Otago Regional Council

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MEMORANDUM

To: **Policy**

From: **Science**

Date: **August 2023**

Re: **Summary outlining the current SoE trends and general environmental impacts in areas of vegetable growing**

Name	Role	Date Completed
Markus Dengg & Erik Button	Authors	18th April 2023
Mark Crawford	Internal Reviewer	18th August 2023

Purpose

To summarise the current state of the environment trends and impacts in areas of vegetable growing in Otago.

Context/Background

There are currently 2 primary vegetable growing areas in the Otago region. The first one is on the Melanic soils south of Oamaru and the other one is located on the Recent soils of the Taieri Plains near Outram. The closest water quality SOE (State of Environment) site for the vegetable growth area near Oamaru is Kakanui at McCones and closest SOE site to the Outram vegetable growth area is Contour Channel at No. 4 Bridge. Both sites show low MCI (Macroinvertebrate Community Index) scores and high *E. Coli* and Chlorophyll *a* concentration but are too far removed from the sites of vegetable growing to give any indication if this land use activity is responsible for the scores and concentrations observed. In both cases the high concentrations cannot be directly linked to vegetable growing and are more likely a result of other land use practices that are more prevailing in the respective area. In addition to surface water SOE sites, ORC monitors several groundwater bores near land use parcels defined as vegetable growing. Most of these bores show high levels of nitrate (ORC, 2021) and some show elevated concentrations of pesticides (ESR, 2019).

Conclusion

Brief summary of key contaminants/environmental pressures typically associated with vegetable growing.

The main pressure from vegetable growing on the environment, in no particular order, is the use of pesticides, fertilizers, water for irrigation and soil disturbance and loss. Pesticides are applied to agricultural land to eliminate undesired plants and animals. However, pesticides will disperse into the environment and can negatively affect plant and animal communities (especially natives). Accumulation in the environment over time can lead to enriched and potentially toxic levels of pesticides in groundwater and surface water. To maximise production, vegetables require large amounts of nutrients, usually requiring external input. Fertilisers, especially those rich in nitrogen (N), are commonly used to attain higher crop yields. N fertilisers commonly applied to soil are water soluble and are easily leached into waterways. Therefore, non-optimal fertilizer use can lead to elevated N levels in groundwater and freshwater (MfE, 2022). In addition to chemical pollution (pesticides and nutrients), vegetable growing has physical impacts on the environment. These are mainly high-water consumption, and soil disturbance by intensive land management. Water takes from natural sources can lead to low flows in rivers and negatively affect ecosystem health. It is likely that most of the water for vegetable growing in North Otago is sourced from the North Otago Irrigation Scheme (NOIC). Heavy machinery and soil disturbance (e.g., tillage) can cause the degradation of soil structure and loss of soil organic matter. This can lead to increased sediment loads in rivers via soil erosion. Additionally, deposited sediments in waterbodies can smother macroinvertebrate habitats and reduce ecosystem health.

References

Otago Regional Council groundwater SoE report (2021). https://www.orc.govt.nz/media/9785/otago-groundwater-soe-report-march-2021.pdf

ESR, (2019). National survey of pesticides and Emerging Organic Contaminants in groundwater 2018. Prepared by Murray Close and Bronwyn Humphries.

Ministry for the Environment (MfE), 2022. Environment Aotearoa 2022. https://environment.govt.nz/publications/environment-aotearoa-2022/