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| Report No.                                     | 19-171 |
| <b>Information Only - No Decision Required</b> |        |

## NATIONAL PESTICIDE SURVEY

### 1. PURPOSE

- 1.1. This report presents the results of the National Pesticides Survey, a four-yearly groundwater monitoring programme co-ordinated by the **Institute of Environmental Science and Research** (ESR) that has been running since 1990. Sampling was carried out by regional councils and unitary authorities in late 2018 and for the first time included glyphosate (a herbicide used in Roundup and other products) and a suite of **emerging organic contaminants** (EOCs). A copy of the full report is available on the ESR website: <https://www.esr.cri.nz/assets/National-Survey-of-Pesticides-and-EOCs-in-GW-Report-for-RC-v2.pdf>.

### 2. EXECUTIVE SUMMARY

- 2.1. The most recent results from the National Pesticides Survey, co-ordinated by ESR and delivered in partnership with regional councils and unitary authorities, were recently published in October 2019. This national-scale groundwater survey is carried out every four years by participating councils (including Horizons) and has been running since 1990. This is the eighth survey, and the first to include glyphosate, glufosinate (a broad spectrum herbicide) and their metabolites, and a suite of EOCs. Fourteen of the Regional and Unitary Authorities participated in the 2018 survey.
- 2.2. Pesticides, which include insecticides, fungicides, herbicides and plant growth regulators, are commonly used in New Zealand to control insects, diseases and weeds in primary industries such as agricultural farming, forestry and horticulture. Nationally, 279 wells were tested for pesticides (including acidic herbicides and a suite of organochlorine, organophosphorus and organonitrogen pesticides). There were 68 wells (24.4%) with pesticides detected, with 28 of these wells having two or more pesticides detected. None of the pesticides found exceeded national health guidelines for drinking water, and most pesticide detections were less than 0.5% of the **maximum acceptable value** (MAV) set out in the New Zealand Drinking Water Guidelines.
- 2.3. Glyphosate is widely used in New Zealand and other countries as a general purpose herbicide. It binds to soil and is readily degraded and therefore is not expected to leach to groundwater however, a recent study in the USA identified low levels of glyphosate in some groundwater samples. Glyphosate was found in just one of the 135 wells tested (Otago Region) at low concentration, well below **World Health Organisation** (WHO) guideline values. In this case, contamination is likely to be the result of poor well head protection.
- 2.4. Emerging organic contaminants can arise from a range of sources including sewage treatment plants, industrial effluents, stormwater, agricultural run-off and domestic wastewater discharges. Most EOCs are used extensively by people and do not have significant human toxicity when used under normal conditions however, some of these compounds have shown some endocrine disrupting effects in surface waters and environmental or ecological impacts are largely unknown. The survey identified extremely low levels (parts per trillion) of organic contaminants in 85 of 121 (70%) wells tested. Around 25 of the 29 compounds analysed were detected in at least one well however, none of these were detected at levels that would pose a health risk to people. Further research is required to understand what issues low levels of EOCs present to New Zealand's ecosystems.

- 2.5. In the Horizons Region, a total of 20 bores were tested for pesticides and glyphosate, and eight bores for EOCs. Two of the 20 bores (10%) tested for pesticides and herbicides returned positive detections for three variables: bentazone – a selective post-emergent herbicide (detected in one bore), alachlor – a pre-emergent herbicide and metalaxyl – a fungicide (both detected in one bore). None of the 20 bores (0%) tested for glyphosate or its metabolites returned a positive result. Six out of eight bores (75%) tested for emerging organic contaminants returned low concentration positive results, which included preservatives, caffeine, ibuprofen, estrone (hormone found in dairy/swine effluent), sucralose (artificial sweetener), plasticiser (BPA) and UV filters/stabilisers.
- 2.6. Bore owners in the Horizons Region who participated in the survey were contacted by phone initially, and via a follow up email, to notify them of any positive survey results and provide a link to the summary report. The remaining bore owners have also subsequently been contacted via email and provided with a link to the report.

### 3. RECOMMENDATION

That the Committee recommends that Council:

- a. receives the information contained in Report No. 19-171.
- b. endorses the proposed approach.

### 4. FINANCIAL IMPACT

- 4.1. Costs associated with the National Pesticides Survey were previously budgeted at \$25,000 for lab costs as well as associated staff time, and the survey was delivered inside this budget.
- 4.2. Future surveys could potentially include a greater number of bores and/or a wider range of variables if desired – for example, EOCs could be included in all bores. However, this would likely require further investment or redirection of existing budget (assuming there is no significant reduction in sampling/analysis/reporting costs in future).

### 5. COMMUNITY ENGAGEMENT

- 5.1. Community engagement has not been undertaken in preparation of this report.
- 5.2. Information about the National Pesticides Survey, including a copy of the report, is available on ESR's website <https://www.esr.cri.nz/home/about-esr/media-releases/groundwater-pesticide-survey-finds-organic-contaminantsnew-news-page/>.

### 6. SIGNIFICANT BUSINESS RISK IMPACT

- 6.1. There is no immediate significant risk associated with this report.

### 7. BACKGROUND

- 7.1. The National Pesticides Survey has been completed every four years since 1990, with Horizons participating in every survey since 1994. The survey is co-ordinated by ESR, with sampling carried out by regional councils and unitary authorities. The latest survey was conducted from September to December 2018 and for the first time included testing for glyphosate and a suite of EOCs.
- 7.2. Previous surveys in New Zealand have detected low levels of pesticides in some groundwater bores, particularly those intercepting shallow, unconfined groundwater. While the concentrations of detected pesticides have generally been less than 1% of the

respective MAV, there have been occasional exceedances. Triazine pesticides, which are commonly used to kill weeds, are the group of pesticides most commonly detected.

- 7.3. Survey results are reported by ESR in the 'National Survey of Pesticides and Emerging Organic Contaminants (EOCs) in Groundwater 2018', and are available on the ESR website.

## 8. DISCUSSION

### Programme design and site selection

- 8.1. Wells for the 2018 survey were selected based on the importance of an aquifer to a region, known application and storage of pesticides or likely use of organic contaminants in the area, and the vulnerability of the aquifer to contamination. Monitoring wells were selected to represent both natural aquifer conditions and sites that were vulnerable to contamination, the latter of which was based on the following criteria:
- shallow, unconfined and vulnerable aquifers
  - significant and important aquifers
  - past and present land use
  - known or suspected pesticide storage and use
- 8.2. Where possible, wells from previous surveys that had positive detections of pesticides and/or herbicides were included in the 2018 survey. Well owners are contacted prior to the survey to seek permission to access sites for sampling. Sampling is carried out by Horizons, with analysis and reporting completed by ESR.
- 8.3. Horizons sites were selected based on the criteria set out above. As such, there is likely a bias toward locations where detections of these contaminants are expected to occur, and the survey should not be considered spatially representative of the approximately 8,700 groundwater bores in the region. Locations of bores sampled are shown in Figures 1 and 2.

### Pesticides

- 8.4. Pesticides, which include insecticides, fungicides, herbicides and plant growth regulators, are commonly used in New Zealand to control insects, diseases and weeds in primary industries such as agricultural farming, forestry and horticulture. Nationally, 279 wells were tested for pesticides (including acidic herbicides and a suite of organochlorine, organophosphorus and organonitrogen pesticides).
- 8.5. Nationally, a total of 279 wells were sampled and analysed for a suite of pesticides, including 20 wells from the Horizons Region. A total of 68 wells returned positive detections, including two wells located within our region. The maximum number of pesticides detected in a single well was six (two in the Horizons Region). Most detections were less than 0.5% of the MAV identified in the New Zealand Drinking Water Standards, with the highest detection being dieldrin – detected at a concentration of 0.025 µg/L.
- 8.6. In the Horizons Region, three different types of pesticide or herbicide were detected in two out of 20 groundwater wells tested throughout the region. Bentazone was detected at 0.14 µg/L in Well 315027, while alachlor (0.59 µg/L, or 3% of MAV) and matalaxyl (0.024 µg/L, or 0.024% of MAV) were detected in Well 372034. There is no MAV for bentazone. The locations of these detections are shown in Figure 1.

### Glyphosate

- 8.7. Glyphosate is widely used in New Zealand and other countries as a general purpose herbicide. Because it binds to soil and is readily degraded, it is generally not expected to leach to groundwater, and is more commonly detected in surface waters. However, a

recent study in the USA found low levels of glyphosate in groundwater samples, raising concerns about the potential presence of glyphosate in drinking water supplies.

- 8.8. No MAV has been set for glyphosate in drinking water. New Zealand follows the World Health Organisation guidelines when setting its MAVs. While there is currently no WHO guideline for glyphosate, WHO does have a Health Based Value for glyphosate of 900 ppb (the equivalent of 900 µg/L).
- 8.9. Most regional councils had wells tested for glyphosate, with the exception of Hawke's Bay Regional Council, West Coast Regional Council, Nelson City Council, and Waikato Regional Council. Nationally, a total of 135 wells were analysed for glyphosate, glufosinate and their principal metabolites, including 20 wells from the Horizons region.
- 8.10. Glyphosate was only detected in one well from the 135 wells that were tested and none of the 20 wells tested in the Horizons Region. This well, located in the Otago Region, showed evidence of poor well-head protection and the contamination likely came from containers that were stored near the well. The detected level of 2.1 ppb is far below the WHO Health Based value of 900 ppb for glyphosate.

### **Emerging Organic Contaminants (EOCs)**

- 8.11. EOCs include chemicals found in personal care products such as shampoos, insect repellants, sun-screen, antibiotics and other pharmaceuticals, caffeine and nicotine, and industrial compounds. Sources include sewage treatment plants, industrial effluents, stormwater, agricultural run-off and domestic wastewater discharges.
- 8.12. Most EOCs are used extensively by people and do not have significant human toxicity when used under normal conditions however, some of these compounds have shown some endocrine disrupting effects in surface waters and environmental or ecological impacts are largely unknown. There are no MAVs set for EOCs in New Zealand. There are no or very few guideline values for EOCs regarding ecological impacts as the relevant studies are sparse. As such, very little is known of their occurrence or transport characteristics in New Zealand.
- 8.13. The survey identified extremely low levels (parts per trillion) of organic contaminants in 85 of 121 (70%) wells tested. Around 25 of the 29 compounds analysed were detected in at least one well however, none of these were detected at levels that would pose a health risk to people. Further research is required to understand what issues low levels of EOCs present to New Zealand's ecosystems.
- 8.14. Due to the high cost of analysis, just eight of the 20 bores sampled for pesticides and glyphosate were selected for analysis of emerging organic contaminants. Six of these bores returned 22 low-level detections of EOCs that included preservatives, caffeine, ibuprofen, estrone (hormone found in dairy/swine effluent), sucralose (artificial sweetener), plasticiser (BPA) and UV filters/stabilisers. The locations of these detections are shown in Figure 2.
- 8.15. Per- and polyfluoroalkyl substances (PFAS) – other emerging contaminants – were not included in the survey however, these substances are subject to other investigations underway. An update on PFAS is provided in a separate paper.

## **9. CONSULTATION**

- 9.1. Consultation on the content of this report has not been undertaken.

## **10. TIMELINE / NEXT STEPS**

- 10.1. The ESR National Survey of Pesticides and Emerging Organic Contaminants (EOCs) in Groundwater 2018 report recommends that monitoring is extended and that further

research is carried out to quantify the potential risks to ecosystems for the EOCs most frequently detected in the survey.

10.2. The regional sector has a special interest group (SIG) for groundwater (Groundwater Forum) which engages with research institutes and other government agencies around groundwater monitoring and research. The Forum provides a useful contact point for discussion around the next steps and Horizons will continue to engage with the Forum around future monitoring and research around these potential contaminants.

10.3. The next survey is scheduled for late 2022.

## 11. SIGNIFICANCE

11.1. This is not a significant decision according to the Council's Policy on Significance and Engagement.

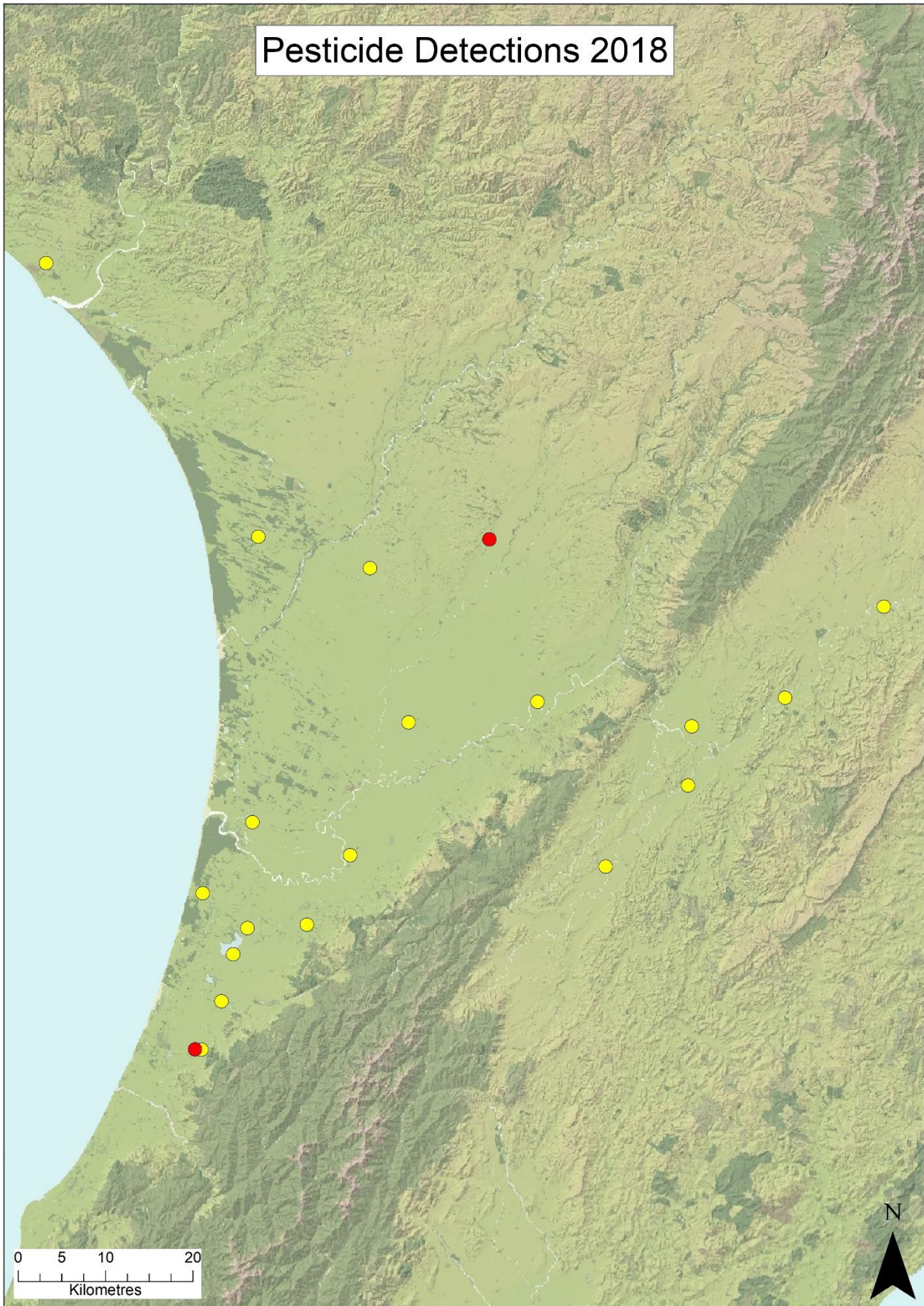


Figure 1: Horizons wells sampled for pesticides – no detection is shown in yellow, wells with positive detections are shown in red.

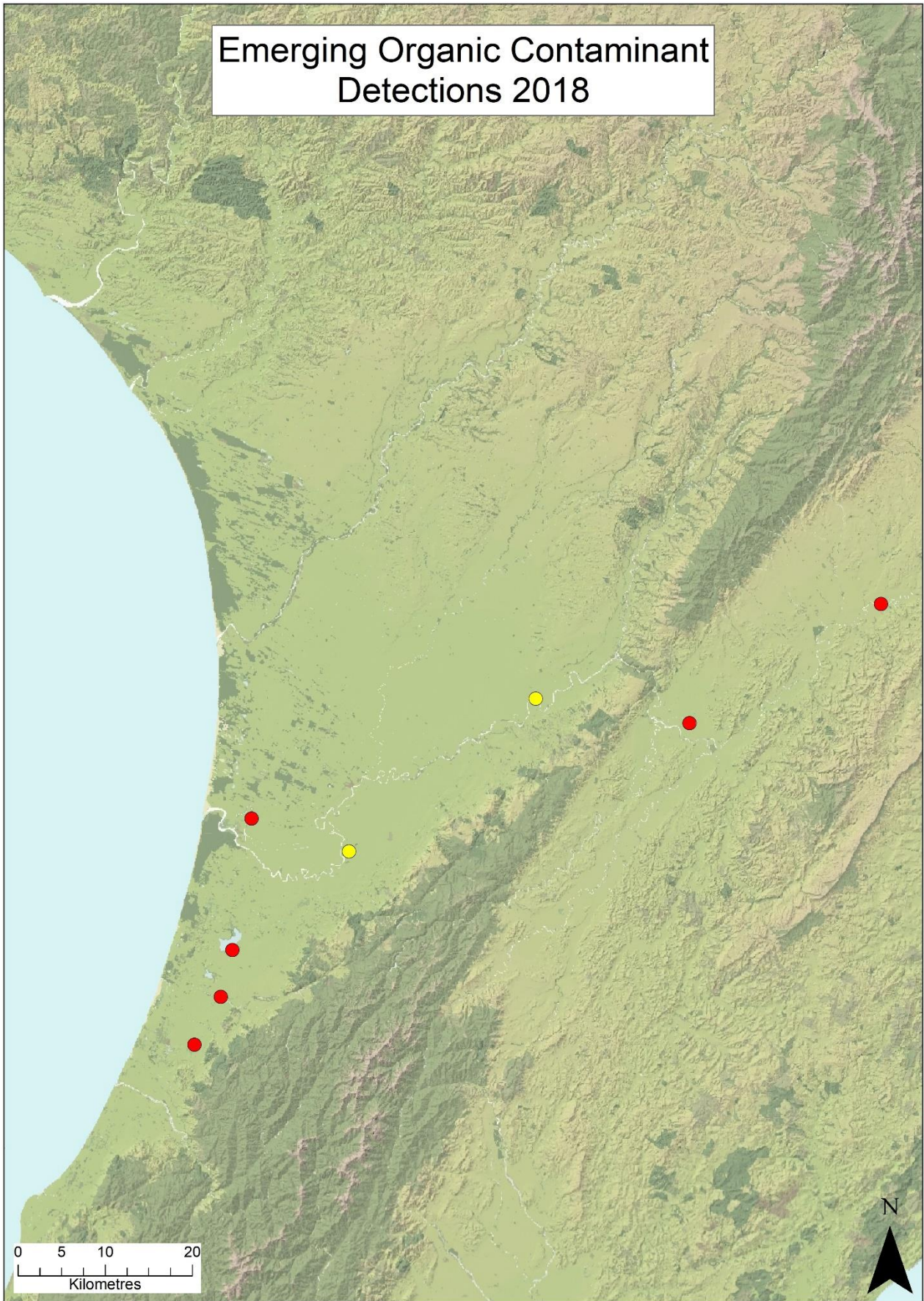


Figure 2: Horizons wells sampled for emerging organic contaminants – no detection is shown in yellow, positive detections are shown in red.

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**ANNEXES**

There are no attachments for this report.