

E/S/R

Science for Communities



ESR – keeping people and communities **safe**, **healthy** and **prosperous** through smart and sustainable science



ESR supports the **health of people** through monitoring and testing

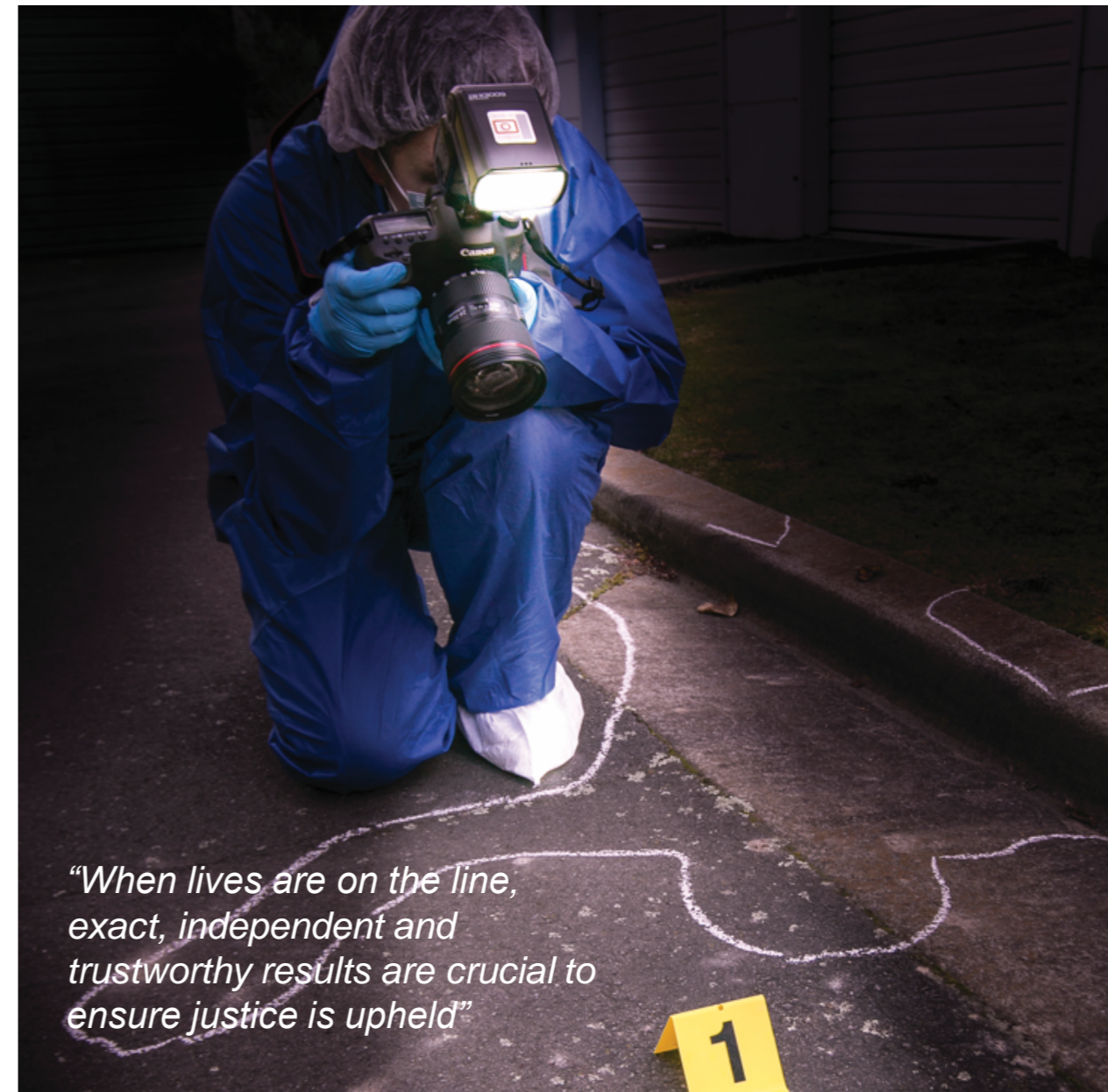
- Reduce the burden of illness and communicable diseases
- Reduce human biosecurity risks
- Reduce risks to human health from radiation
- Timely and proactive response to pandemics
- Safer medicines through pharmaceutical testing
- Proactive informed decisions on complex public and environmental health issues



"Protecting ourselves and our families from disease requires a standing army of highly qualified scientists and medical specialists"

ESR supports justice systems through analysis of **evidence** and **DNA**

- More crime prevented and solved
- Criminal investigations supported by independent, reliable evidence
- Early elimination of the innocent and inclusion of suspects
- Better forensically informed court decisions
- Findings by Coroners are supported by reliable toxicology
- Reduced drug and alcohol dependency of offenders



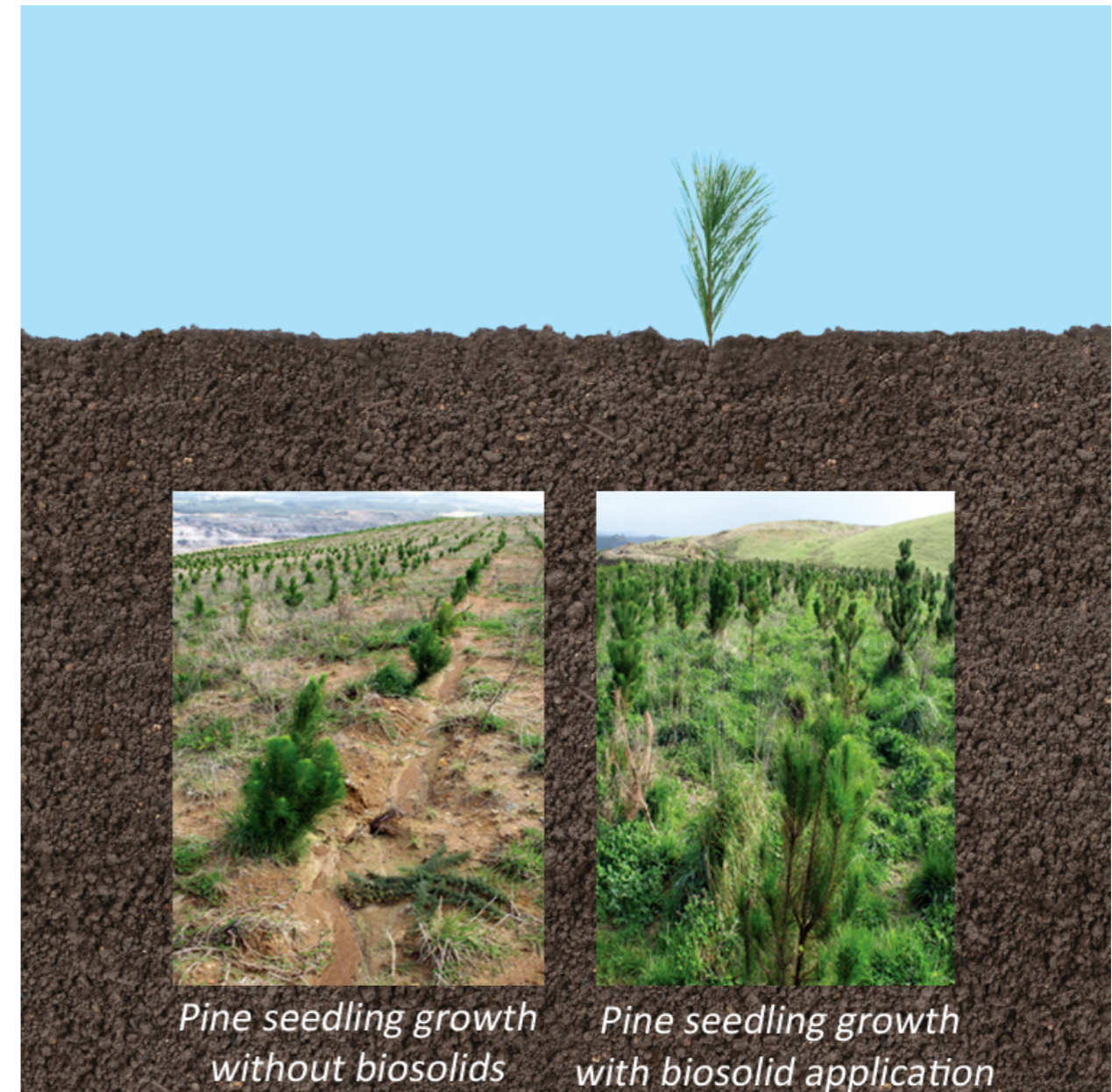
ESR provides research, analysis and advice on water quality and the environment

- New Zealanders have assurance that drinking water is safe
- Improved water quality in rivers, streams and groundwater
- Safer use of biowastes and reduced waste to landfill
- Reduced threats to human health from chemicals, microbes, radiation and physical contaminants



ESR provides solutions for the **treatment** and **use** of sewage and wastewater

“Combining expertise in soil science, microbiology and ecotoxicology, ESR is the lead agency for investigating the sustainable management and re-use of biowastes”



Drugs in wastewater analysis around the World

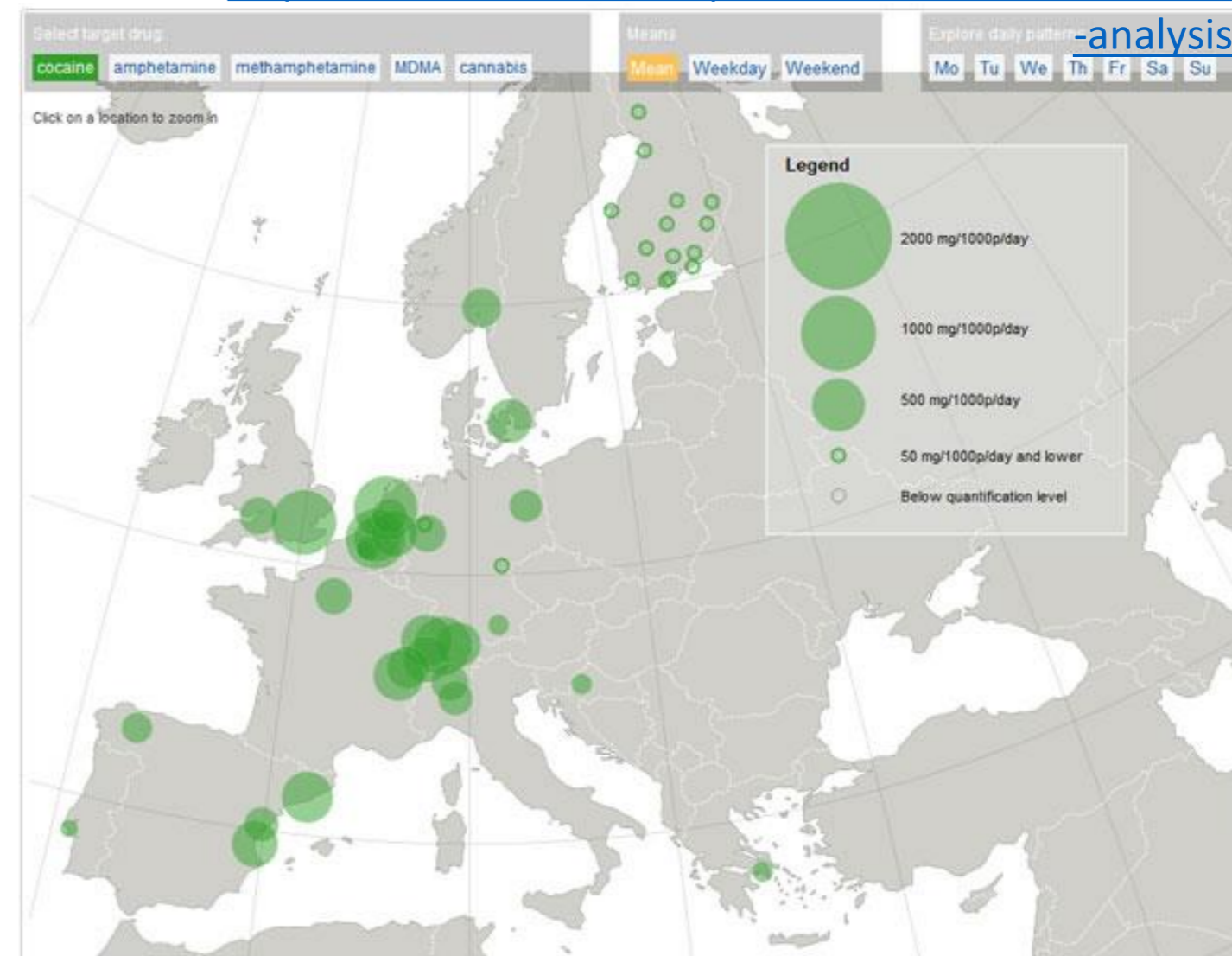
Drugs in wastewater as a estimation of drug use in the community has been studied all over the World, from Europe to Australia and now New Zealand. The concept started in Europe over 10 years ago and since then comprehensive testing of wastewater all over Europe continues to create important drug use data.

The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) are leaders in the field of drugs in wastewater research.



European Monitoring Centre
for Drugs and Drug Addiction

Screenshot of EMCDDA interactive map
<http://www.emcdda.europa.eu/activities/wastewater-analysis>



Introduction to Drugs in Wastewater

Collaboration:

- Local Authorities/WWTP operators
 - Police
 - ESR
-
- Wastewater is tested for Biomarkers of drug consumption
 - Back calculations to work out consumption in a community
 - No targeting / Impossible to identify individuals
 - Results inform effectiveness of drug intervention strategies

Technical details

Sampling

- One week every month or bimonthly
- 7 samples from each site (24 hour composite samples)
- Sample bottles are provided and prepared by ESR
- Bottles contain 0.8 mL HCl so the drugs and metabolites are preserved until analysis at ESR



Technical details

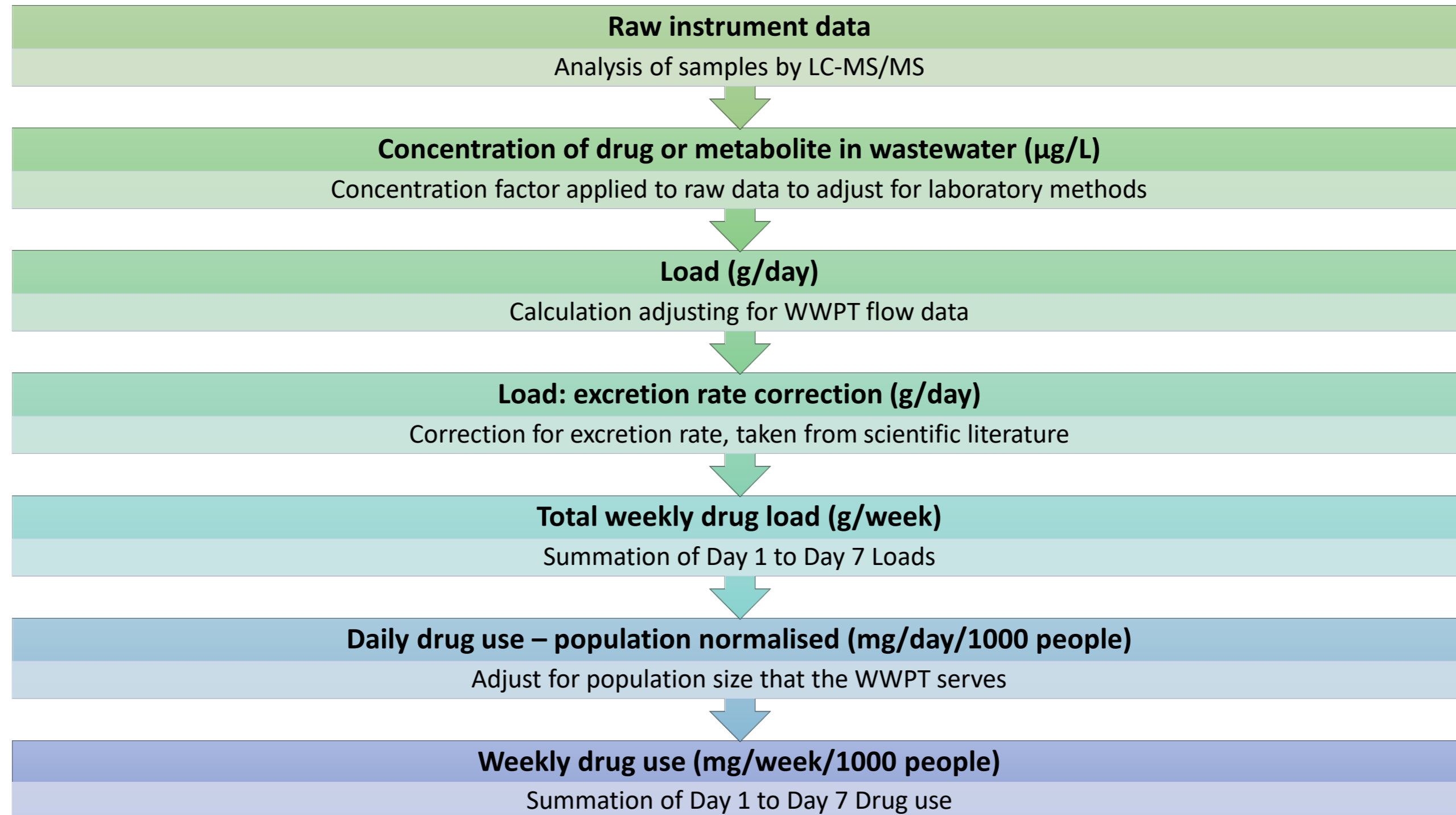
Analysis

- Samples filtered
- Chemically cleaned and concentrated
- Separated and analysed based on atomic mass

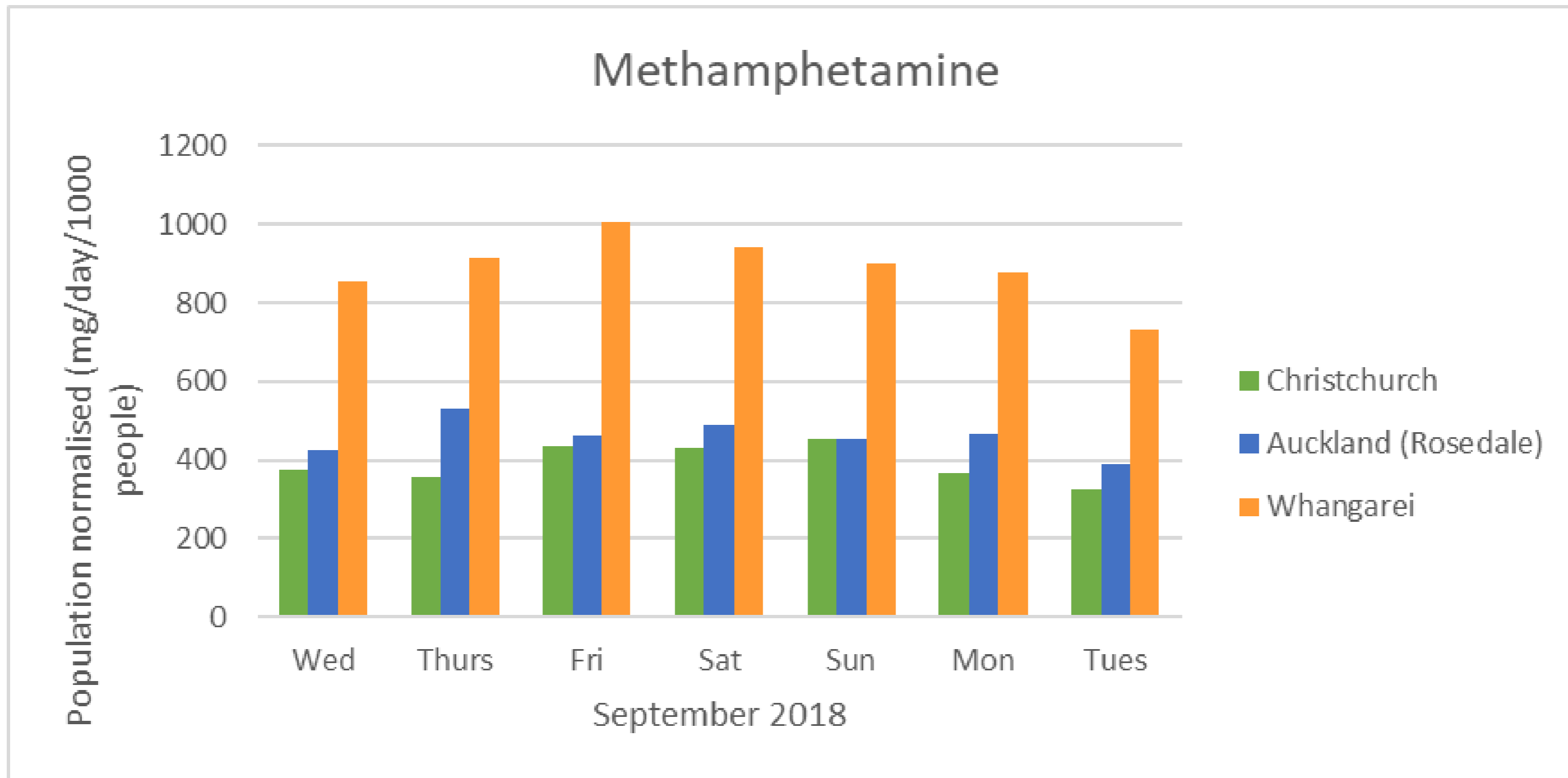


Technical details

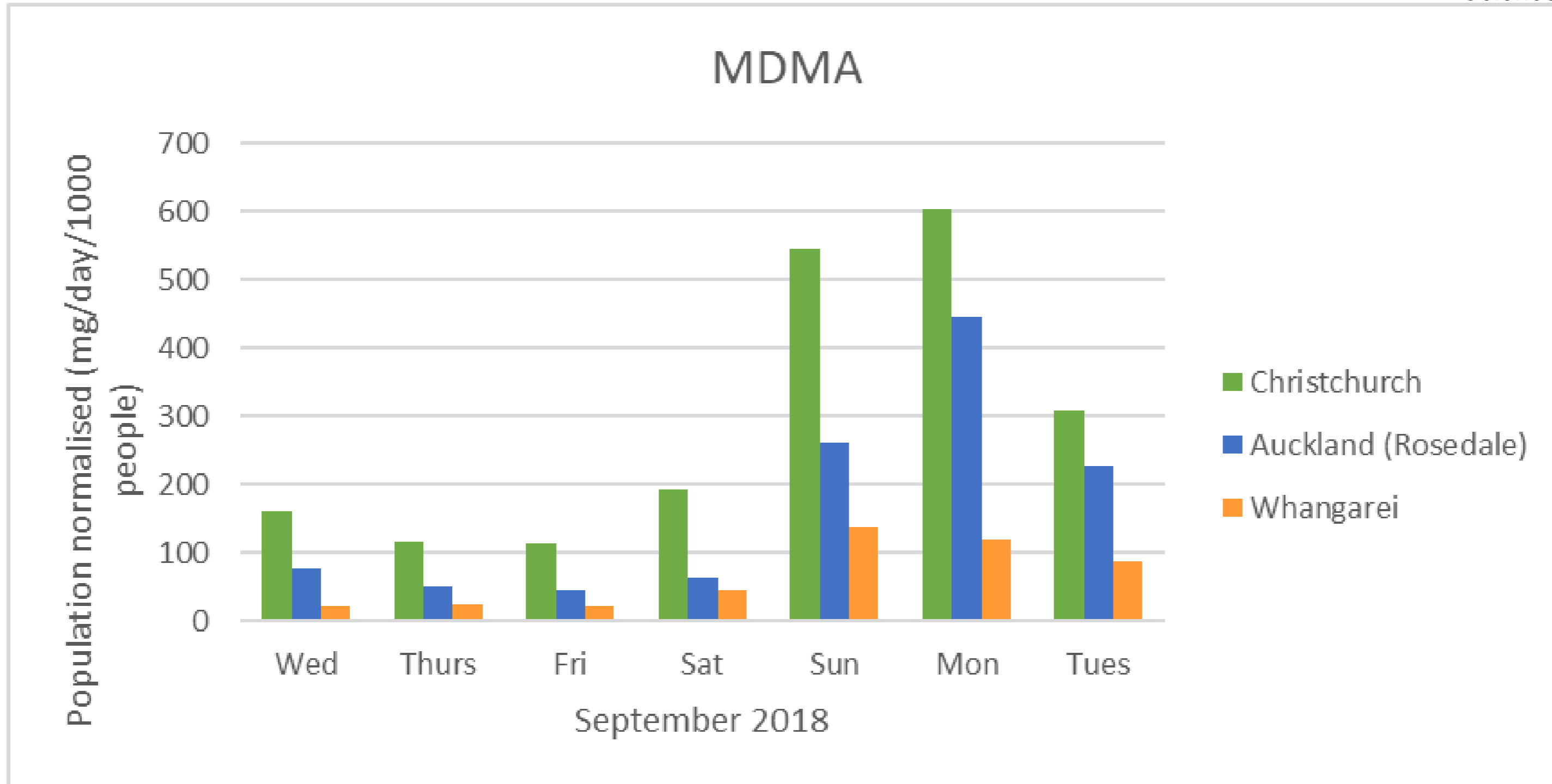
Back calculations



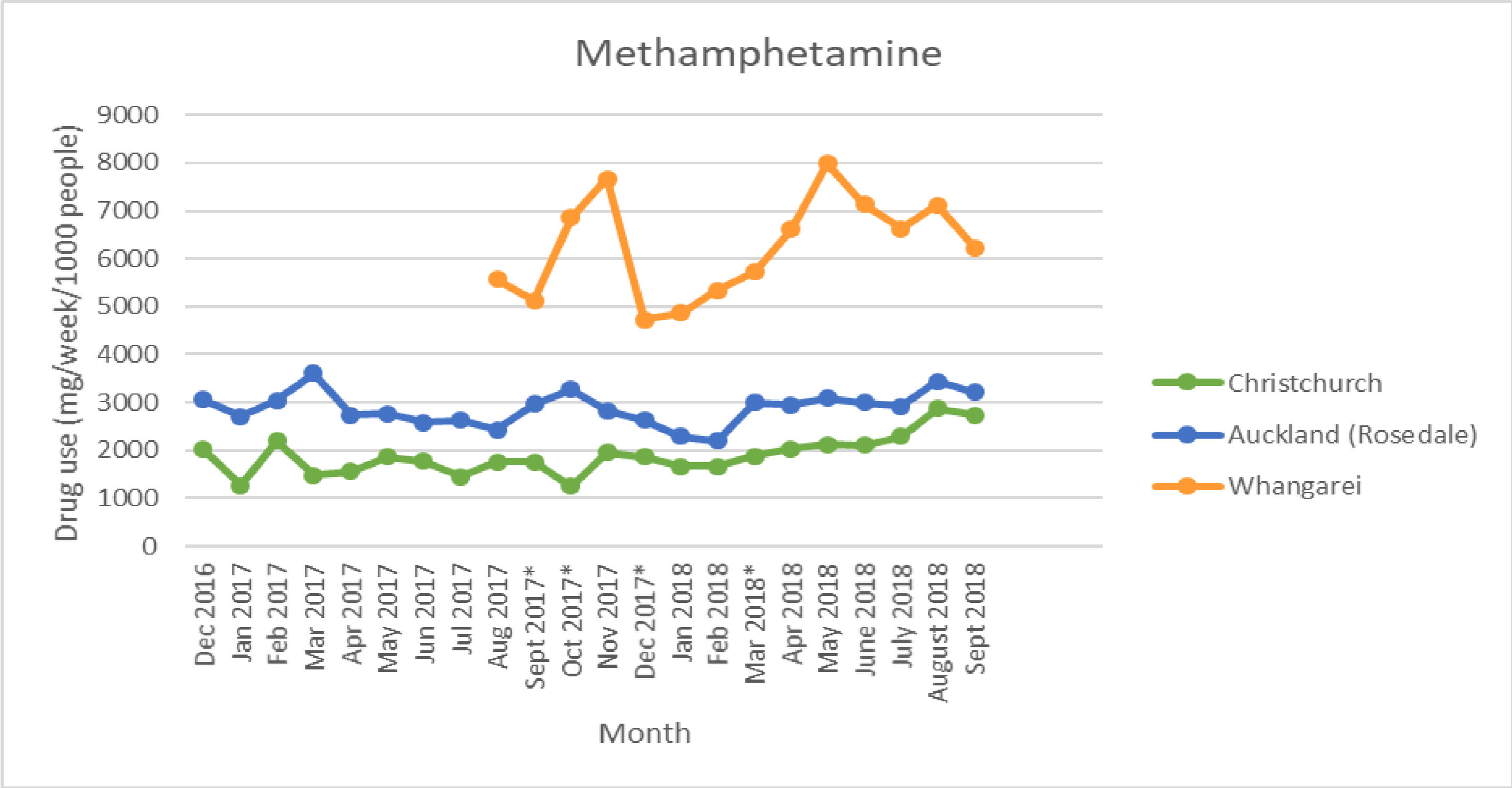
Results



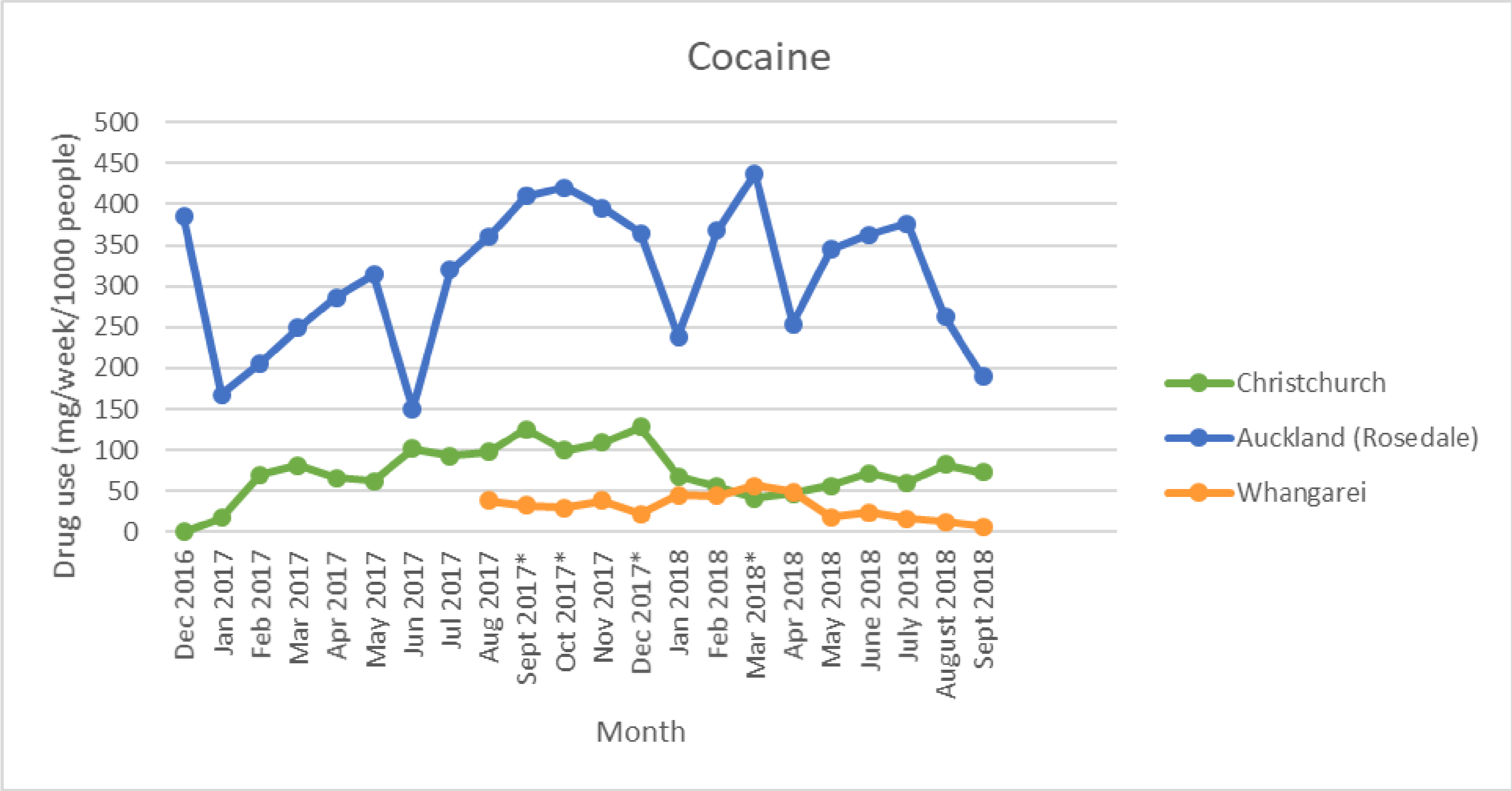
Results



Results



Results



Why is this useful?

- The purpose of the testing is to enrich the picture about drug use in New Zealand. It is one of many key tools to identify drug use, changes in use and to monitor consumption levels, understand risks and inform drug harm reduction programmes to keep people safe.



Comments from Police

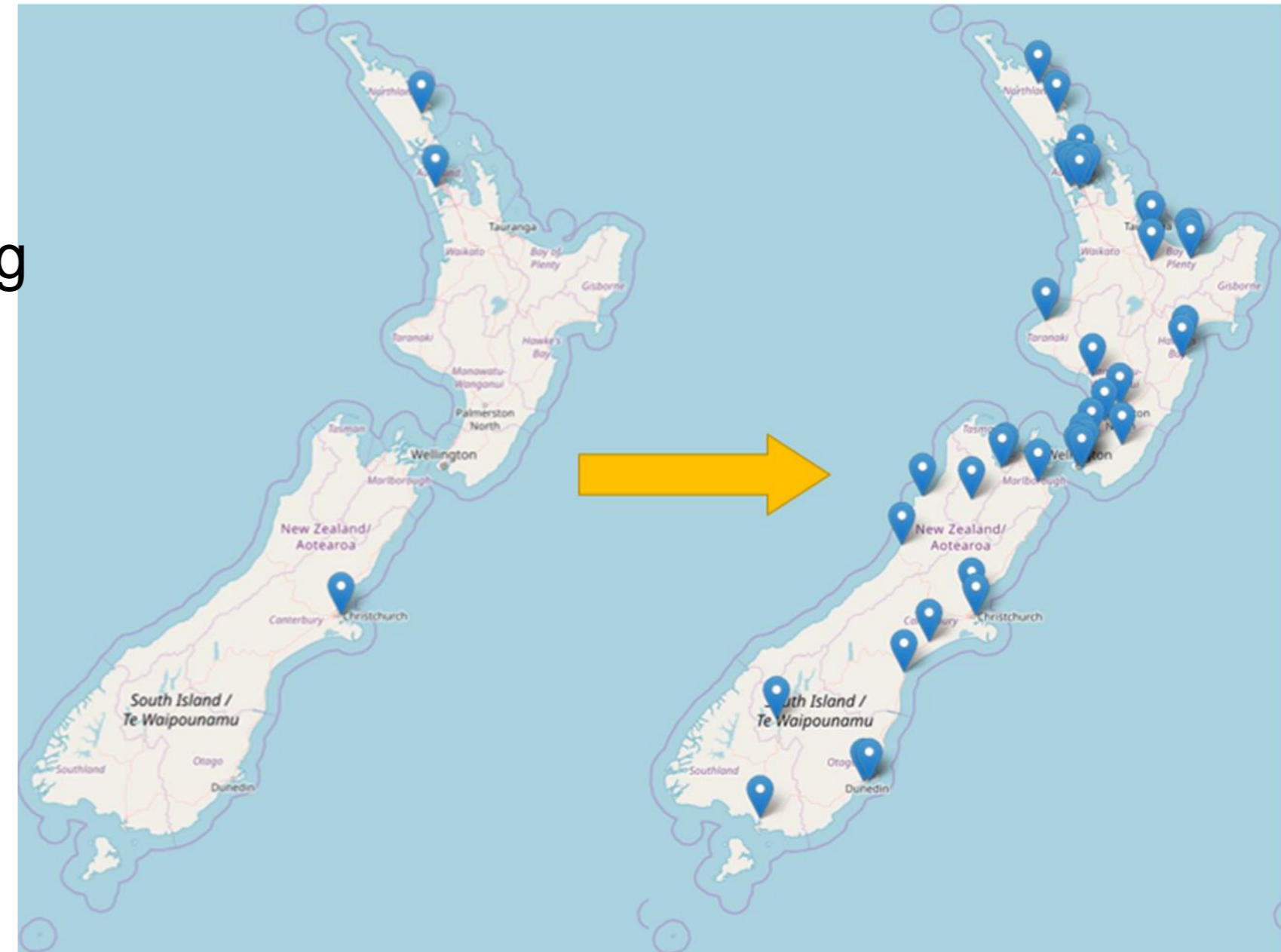
- Government provided funding to Police in 2018 to expand a previous pilot to test wastewater for various drug types nationally. 38 sites were selected covering approximately 80% of NZ's population. Recently three more sites have been added.
- Nationwide testing began in late 2018 with a staggered approach as sites went live by providing samples for analysis.
- ESR collects the samples and provides technical data analysis to the National Drug Intelligence Bureau, an embedded agency within Police that includes Customs and the Ministry of Health. The data is analysed further and converted into information and intelligence products, disseminated to a range of stakeholders including local government and publicly. A quarterly results sheet will be released shortly.

Comments from Police

- During 2019 Police will be reviewing progress with the national roll out with a view to embedding nationwide testing and analysis long-term. There are a number of other countries with well-established testing programmes and Police aim to use NZ data for international comparison as well.
- Police are grateful for the involvement of local government allowing testing to be undertaken. We are confident that local government will benefit from increased knowledge on drug consumption at community level by testing waste water.

Nationwide monitoring programme

- Started November 2018
- 38 sites
- Autosamplers supplied to smaller sampling sites
- Monthly or bimonthly sampling
- Sites selected for population and geographical spread
- 12 month trial
- Development of cannabis extraction methodology
- Monitor ephedrine/pseudoephedrine



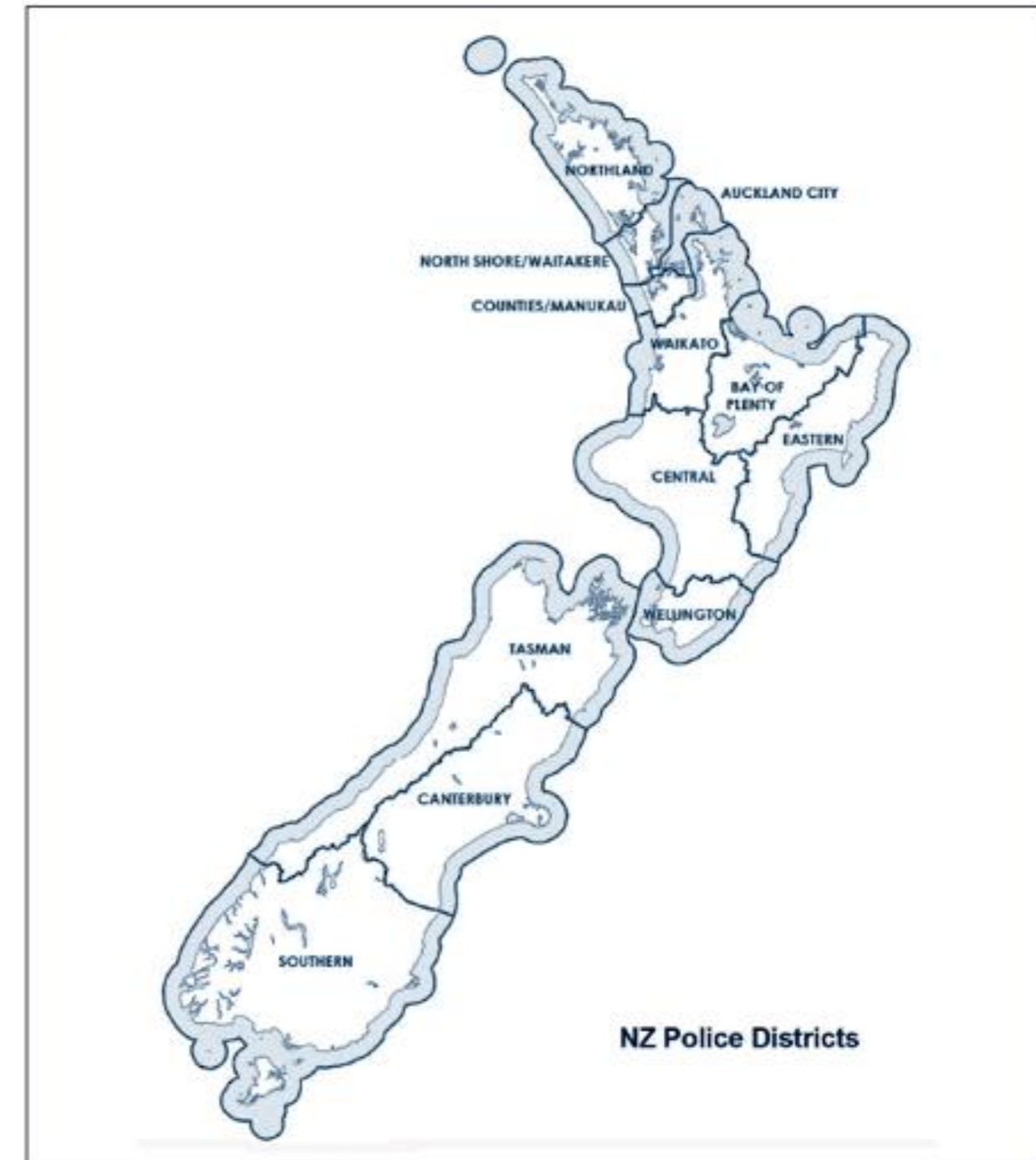
Health and Safety

- Concentrations of drugs in WW are very low (max 2ug/L)
- Drink 1500 L of WW to get the equivalent of one dose



Confidentiality

- All public reporting will be grouped by Police district
- Public results released quarterly
- Police to provide individual reports to each council/organisation supplying samples



Environmental concerns

- Not studied with this work
- International literature suggests that treatment does degrade drugs and metabolites
- Drugs at very low levels compared to other contaminants



What else?

- Pharmaceuticals
- Biomarkers of disease
- Consumption of pesticides
- Food toxins
- Alcohol
- Tobacco

Andrew Chappell

T: 03 351 6019 E: Andrew.chappell@esr.cri.nz