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## **Report 02.721**

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Report to Environment Committee  
from Summer Warr, Water Quality Scientist, Planning and Resources

### **Rivers State of the Environment Monitoring Review - 2002**

#### **1. Purpose**

To present the recommendations of the review of the Rivers State of the Environment (RSoE) monitoring programme to the Committee.

#### **2. Background**

A review of the Rivers State of the Environment (RSoE) monitoring programme has been carried out as part of an on-going process to improve the information available to the Council for the management of the Region's river and stream ecosystems.

A number of issues underpinned this review. They included:

- concerns about whether the existing network was representative of the different habitats/ecosystems in the Wellington Region;
- the release of updated national water quality guidelines and a number of other guidelines and protocols; and
- inconsistencies between monitoring programmes run out of the Wairarapa and Wellington offices.

#### **3. Review Findings**

The review focussed on four main areas:

- The monitoring network;
- The parameters measured;
- Laboratory analyses; and
- Data management.

### 3.1 **Monitoring Network**

To be effective in providing information on which to assess and review WRC policy, the RSoE programme needs to be representative of both natural and impacted river ecosystems in the Region.

The current Rivers State of the Environment monitoring programme consists of 51 sites on 32 rivers and streams throughout the Region. Thirty-five of these sites are located in the western Region while 16 are located in the Wairarapa.

The existing monitoring network was examined to assess how well it represented the different habitats and ecosystems in the Region. The Region's rivers and streams were divided into 29 classes by their natural physical characteristics using the Rivers Environment Classification (REC) system developed by NIWA.

A number of deficiencies were identified including:

- the lack of reference sites from which to base assessment of land use impacts;
- an over representation of rivers with cool humid, low elevation, hard sedimentary catchments in the south-western Region in and around Wellington City;
- a lack of sites on the cool humid and cool dry, low elevation, soft sedimentary streams of eastern Wairarapa;
- the complete absence of sites on the warm dry, low elevation, alluvial plain streams of the western Wairarapa plains and Kapiti coast, which are likely to be susceptible to dairy farming impacts;
- no sites representing the impacts of exotic forestry on stream ecosystems; and
- a lack of a site near the bottom of the Ruamahanga River from which to assess total catchment loading to this river.

### 3.2 **Parameters Measured**

A number of issues concerning the parameters monitored under the RSoE programme were identified.

- Temperature, dissolved oxygen, pH, and conductivity, which vary considerably throughout the day, are currently only assessed using single monthly measurements. These monthly measurements do not adequately represent these parameters. These parameters should be monitored on a continuous basis. Turbidity is also included as a continuous measurement as the relationship between high flow events and sediment yield can be important in determining management needs for catchments and to assess recovery through riparian rehabilitation.

Permanent continuous monitoring sites have already been established on the Wainuiomata River and Horokiri Stream, while a mobile datasonde has been purchased by the Wairarapa Division. However, continuous monitoring sites are needed on each of the main river types in the Region to adequately assess the pressures placed on the Region's rivers by variation in these parameters.

- Water colour and organic nitrogen levels are not currently assessed. These parameters are important indicators of stream health.
- *E. coli*, which is now considered to be the most accurate indicator of faecal related pathogens in freshwater environments and is the indicator used in the national recreational water quality guidelines, is not currently measured at all RSoE monitoring sites.
- Currently, reliable flow data is available for only a small number of RSoE sites. The values of many water quality parameters are dependent to some extent on river flow and it is important that accurate flow data is available when assessing water quality results.
- Monitoring of biological indicators needs to be more comprehensive. Currently macroinvertebrates are only monitored at sites with hard substrates, no quantitative or taxonomic periphyton assessments are made, no fish monitoring is carried out and current habitat assessment methods are inadequate. Monitoring of stream life gives an indication of impacts affecting river ecosystems and complements water quality data by providing an integrated picture of physical, chemical and habitat related pressures. Biological monitoring also provides important information regarding freshwater biodiversity in the Region.

### 3.3 Laboratory Analyses

The WRC currently uses four laboratories to analyse water quality samples taken as part of the RSoE programme. Samples from the Wairarapa are analysed by Wairarapa Laboratory Services and Hill Laboratories. Samples from the western Region are analysed by the WRC's Mabey Road laboratory and Environmental Laboratory Services.

The use of different laboratories means that for a number of parameters, samples are analysed using different methods and subject to different detection limits. This creates significant issues of data comparability and affects the WRC's ability to detect trends in water quality.

### 3.4 Data Management

The RSoE monitoring programmes in the Wairarapa and western Region have been run as separate programmes since their inception. As a consequence, data has been stored in different locations and managed using different methods. Some of these methods limit the effectiveness of data manipulation and reporting.

No matter how accurate and representative data is, it is of little use unless it can be analysed and the results communicated effectively.

## 4. What Does the Review Propose?

### 4.1 Monitoring Network

The review proposes the following changes to the monitoring network to make it more representative of the range of ecosystems and land use occurring within the Region:

- The removal of 12 sites, many of which represent sheep and beef farming and urban impacts on streams in the south-west of the Region.
- The addition of 17 sites including:
  - Approximately nine reference sites covering all of the main river types.
  - Sites on eastern Wairarapa and central alluvial plain streams.
  - Two sites representative of the impacts of exotic forestry.
  - A site near the mouth of the Ruamahanga River.
- Movement of six sites, many to undisturbed locations enabling data from these sites to be used as reference data.
- The establishment of approximately seven additional permanent sites and the purchase of an additional mobile datasonde to continually monitor temperature, dissolved oxygen, pH, conductivity and turbidity over a range of river types and land use impacts.

The proposed network changes are summarised in Figures 1 and 2.

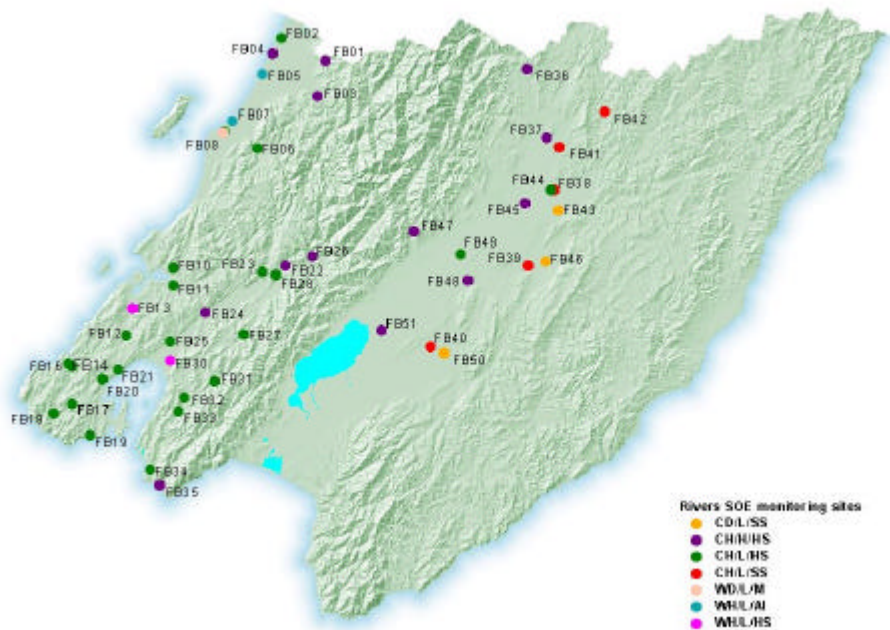


Figure 1. Map showing location and natural REC class of the 51 sites currently monitored under the RSoE programme.

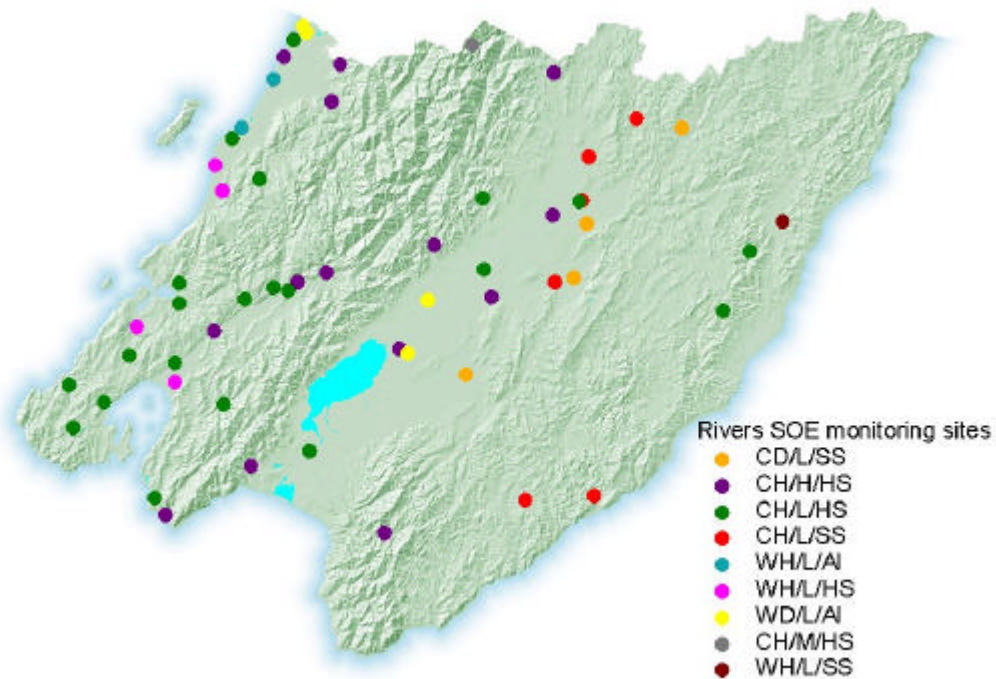


Figure 2. Map showing approximate location and natural REC class of the future RSoE sites as recommended in the review.

#### 4.2 Parameters Measured

The review proposes:

- The establishment of continuous monitoring equipment at a further seven sites. These sites would cover a range of climatic zones and land use types.
- Expanding the range of parameters measured to include measurements of water colour, nitrite nitrogen and organic nitrogen.
- The adoption of *E coli* as an indicator of faecal pollution at all sites.
- Extension of biological monitoring to include:
  - macroinvertebrate monitoring at all sites including those on soft substrate streams;
  - quantitative and taxonomic periphyton analysis; and
  - monitoring of fish populations pending the design of a fish monitoring programme.
- Improvement of habitat assessment methods including quantitative assessment of substrate size.

### 4.3 Laboratory Analyses

The review proposes that all RSoE water quality samples be sent to the same IANZ accredited laboratory which can provide the specified sampling methods and detection limits.

### 4.4 Data Management

The review proposes that:

- physical, chemical and microbiological data from all RSoE sites be stored in one location on a Hilltop Database; and
- a suitable database is found to store biological and habitat data from all sites.

## 5. What Will It Cost?

Cost implications of recommendations for changes to regular monthly monitoring sites are detailed in the table below (figures are approximate).

	Current Cost	Future Cost	% increase
Western Region	\$150,000	\$142,000	-5%
Wairarapa	\$50,000*	\$80,000	60%
Whole Programme	\$200,000	\$222,000	11%

*\*current cost is actual cost of programme, budget provision for this is only \$30,000 making a shortfall of \$20,000. This is currently provided for at the expense of other existing programmes.*

Permanent continuous monitoring sites cost on average \$10,000 to establish. The establishment of three further sites in the western Region will cost approximately \$30,000. The establishment of five permanent continuous monitoring sites in the Wairarapa and the purchase of a further mobile datasonde will cost approximately \$70,000. The two datasondes will then be made available for specific investigation work (including incident response). In the absence of specific investigations they will be used to gather information at other important ecological freshwater systems, additional to the nine identified in the review.

The recommended changes to the RSoE programme will require considerably greater staff time, particularly in the Wairarapa. These costs are not included here.

These costs have been used to prepare a proposal for consideration in developing the Council's LTCCP.

## 6. **What Happens Next?**

The review recommendations will be implemented within the constraints set by LTCCP and budget decisions.

## 7. **Communication**

Outcomes of the changes to the RSoE sites will be documented as part of the annual fresh water quality reporting process.

## 8. **Recommendations**

*It is recommended that the Committee:*

- (1) *receive the report; and*
- (2) *note the contents.*

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