

Freshwater Management Units for Te Awarua-o-Porirua Whaitua

Ton Snelder, LWP Ltd

Acknowledgement to:

Caroline Fraser, Aqualinc Research Ltd



LWP

Outline

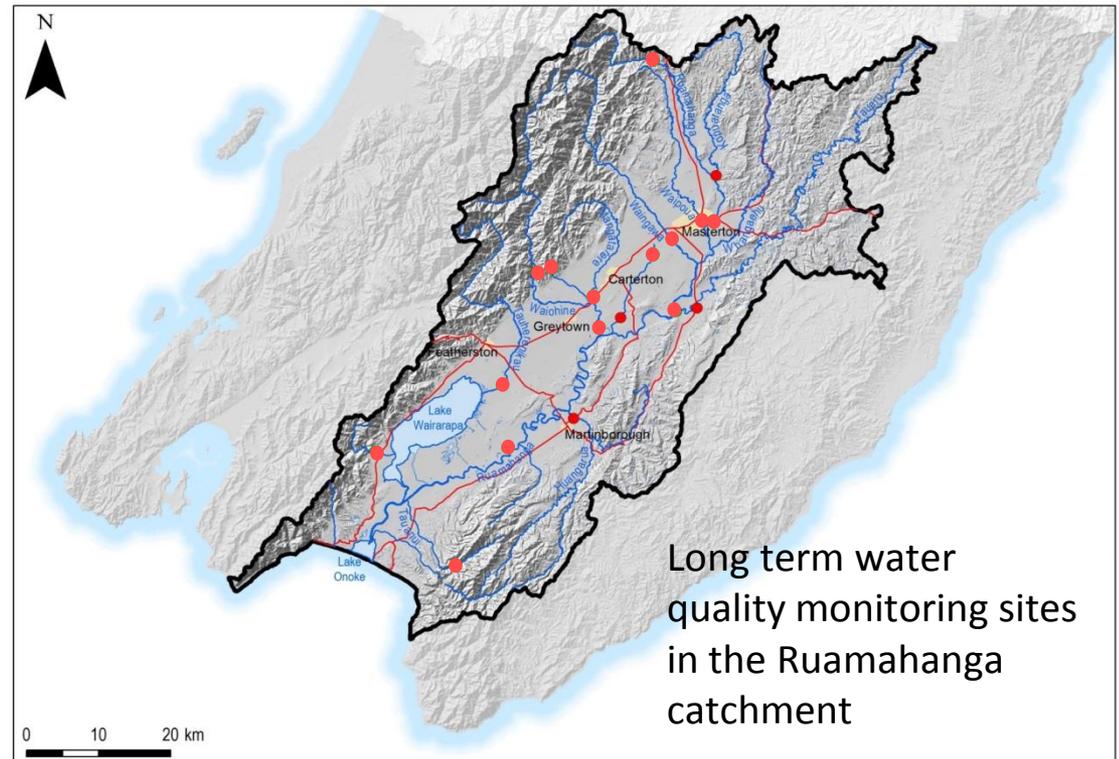
1. Some desirable criteria for defining FMUs
2. Data and using classifications to represent broader areas
3. A “biophysical” classification approach to defining FMUs

1. Criteria for defining FMUs

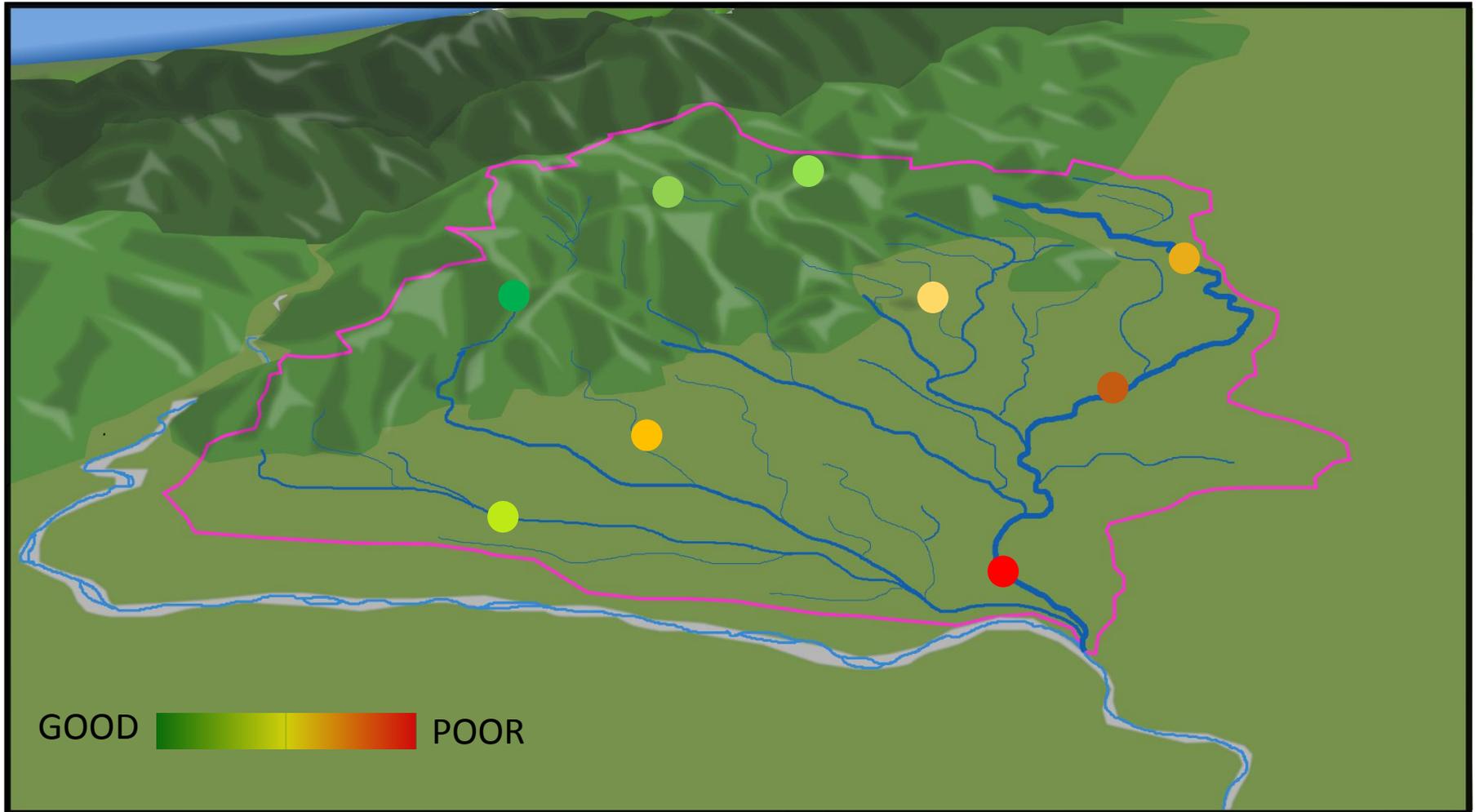
- Incorporate the water body **and** its catchment
- Discriminate differences in values and “capacity for resource use” [**current state** - water quality]
- Basis for defining **justifiable** plan provisions (objectives and policies)
- Practically monitored and administered
- Provide plan clarity and certainty – boundaries
- Easily altered and revised as part of plan development
- Need a “Goldilocks” number, not too many, nor too few

2. Data and classifications

- Data is limited
- Monitoring is expensive
- But monitoring sites represent broader areas!

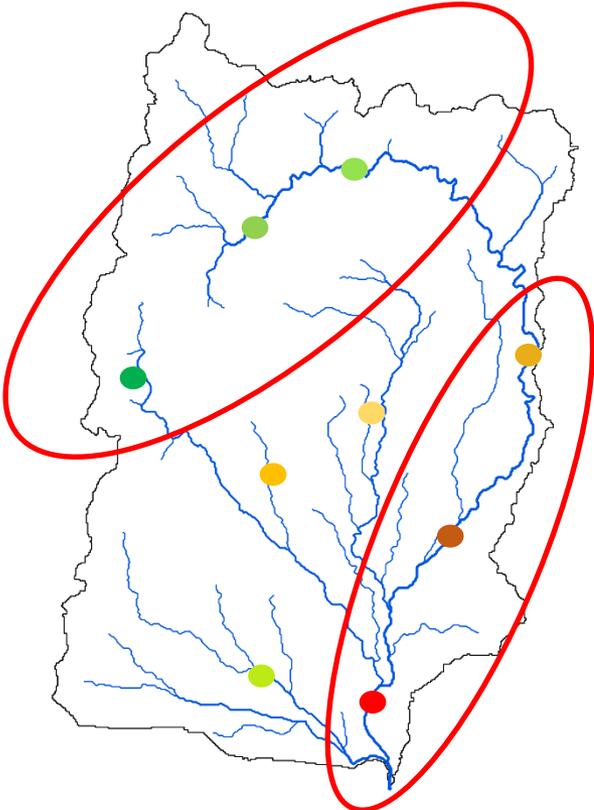


Can you see any patterns in the observed water quality in relation to the catchment characteristics?
An example - catchment

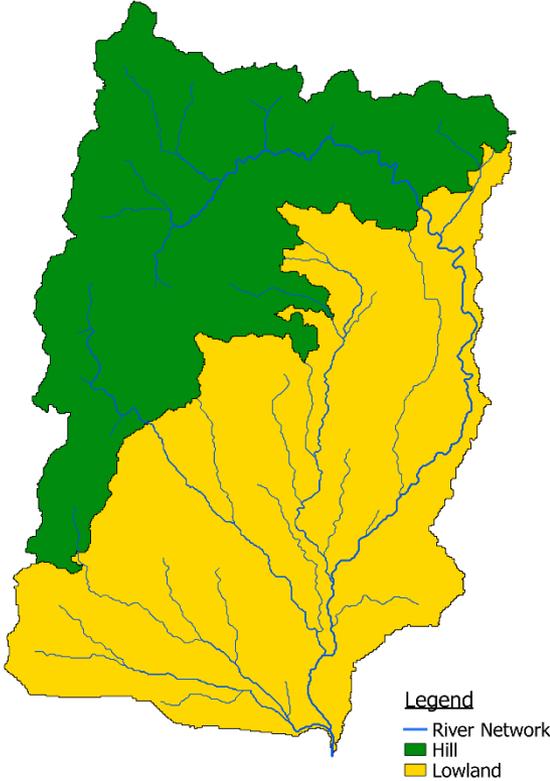


Looking for patterns between water body (river) state and catchment characteristics

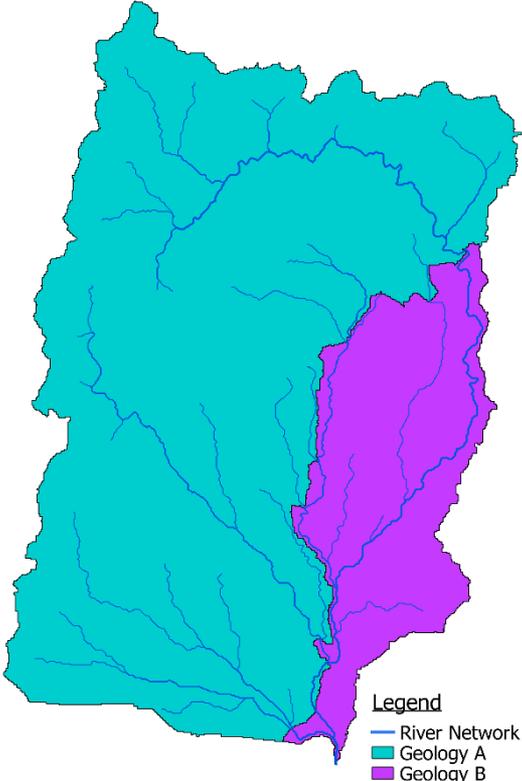
Monitoring of Water Quality



Catchment Steepness

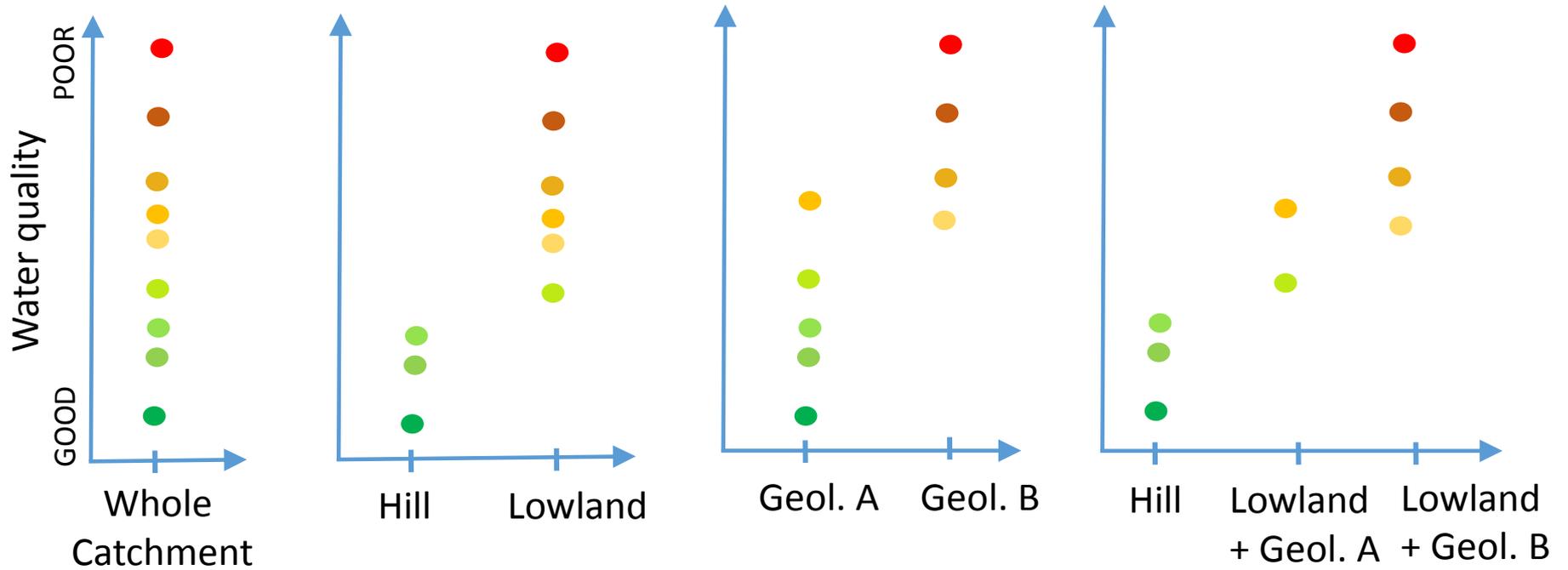


Catchment Geology

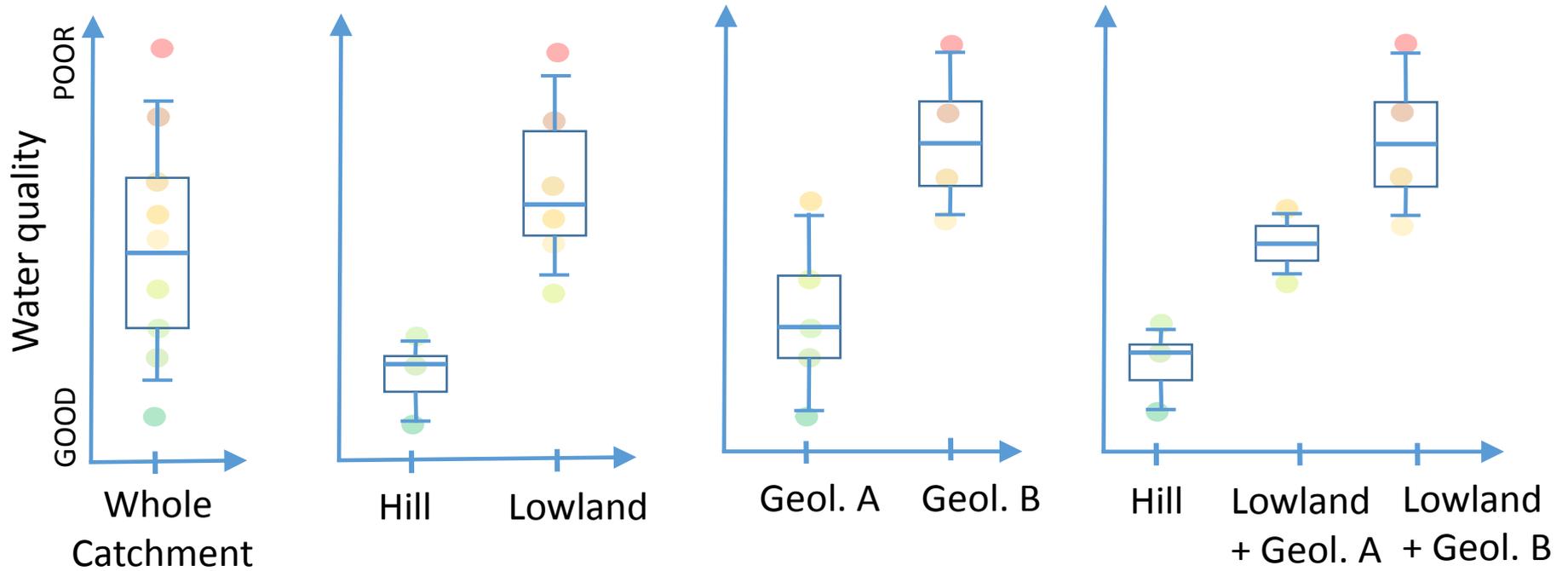


GOOD  POOR

Can catchment characteristics explain differences in biophysical state?

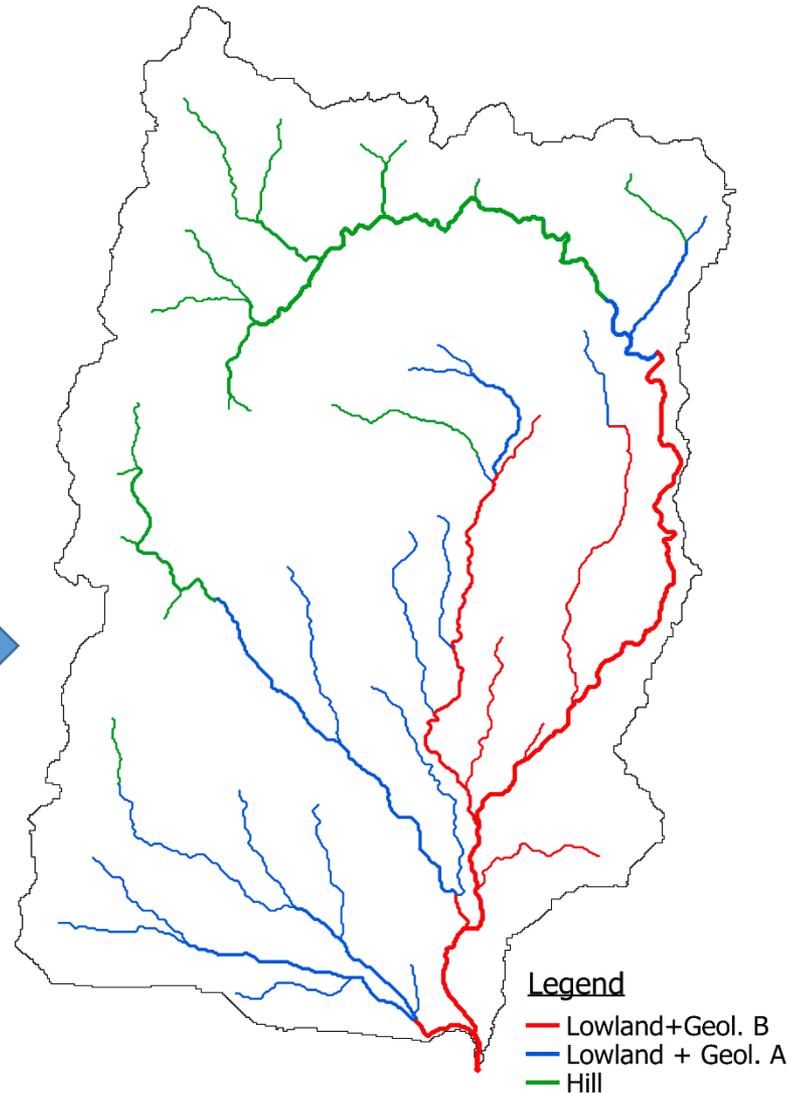
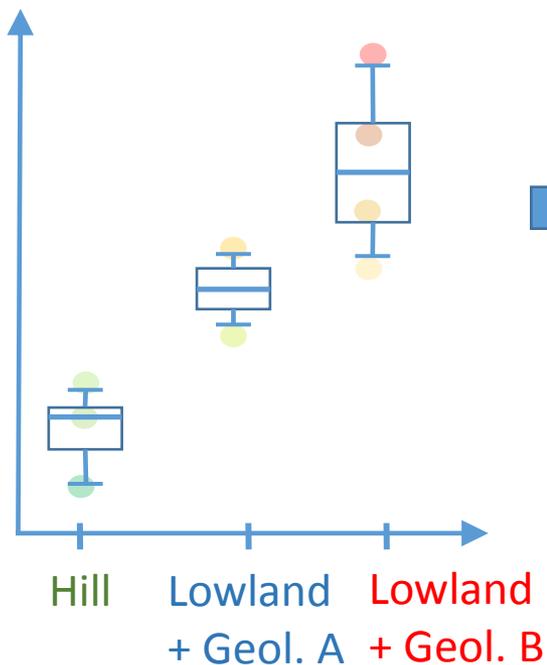


Can catchment characteristics explain differences in biophysical state?



Use of classification

- Combining data and classification
- Infer characteristics at un-sampled locations
- Maximises use of precious data

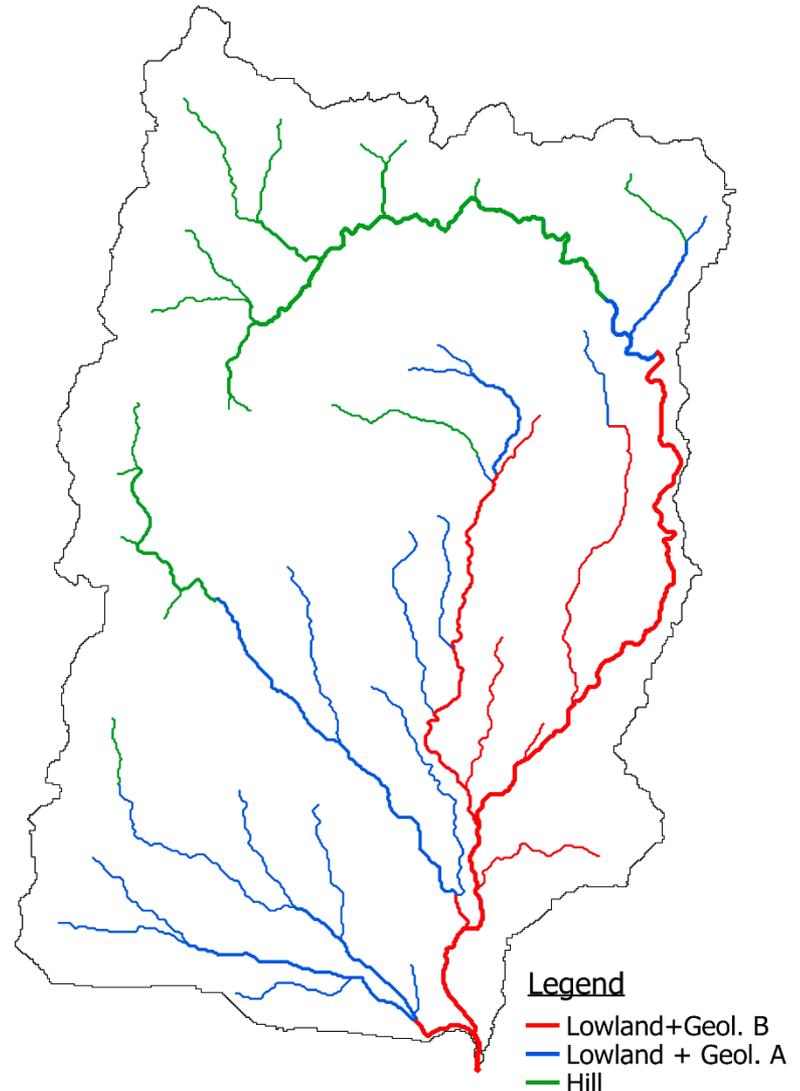


Proposed approach: A Bio-physical classification

- ASSUMES:
 - Water bodies with similar natural catchment characteristics are likely to:
 - Have similar states (e.g. water quality)
 - Have similar values (e.g. fishing, swimming, irrigation) and associated objectives
 - Respond in similar ways to pressures/change/management
- Provides a transparent and justifiable **starting point** for defining FMUs
 - Later on, can incorporate sites of special interest, social, cultural &/or economic considerations

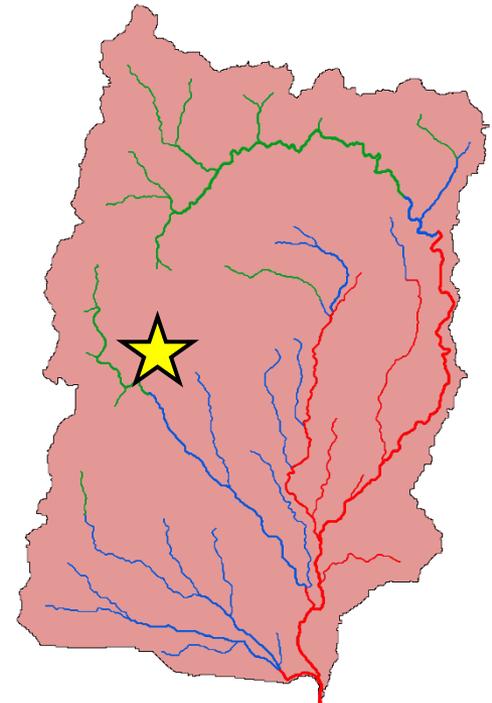
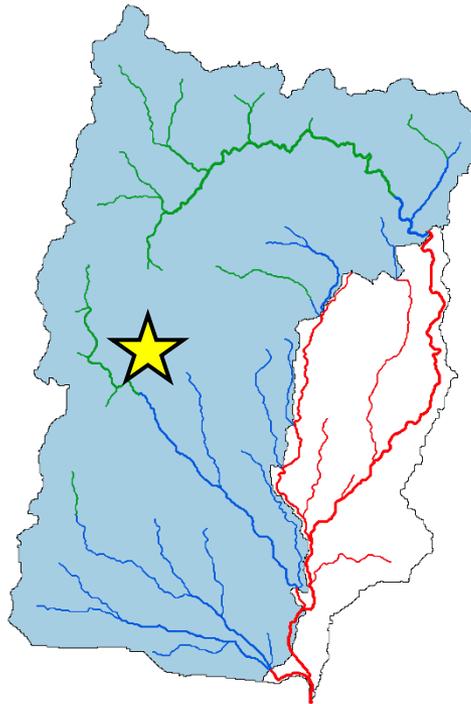
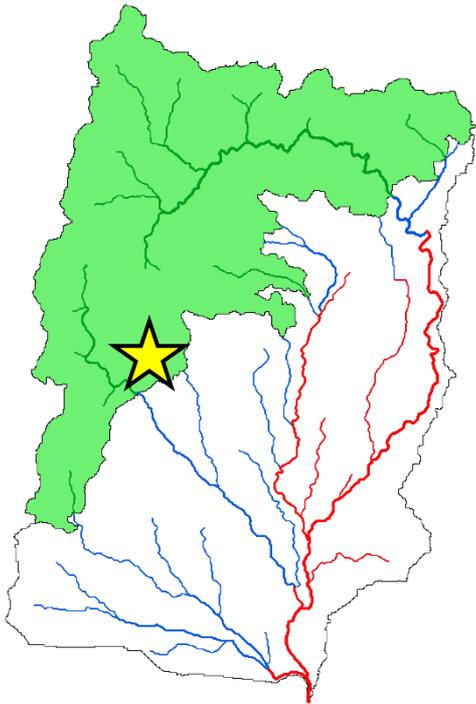
Management Classes

- A management class is a grouping of similar **water bodies** (i.e. river sections)



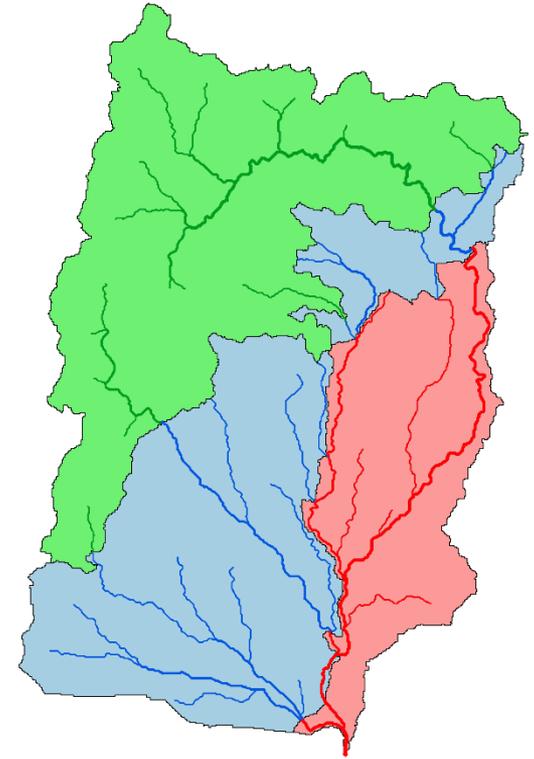
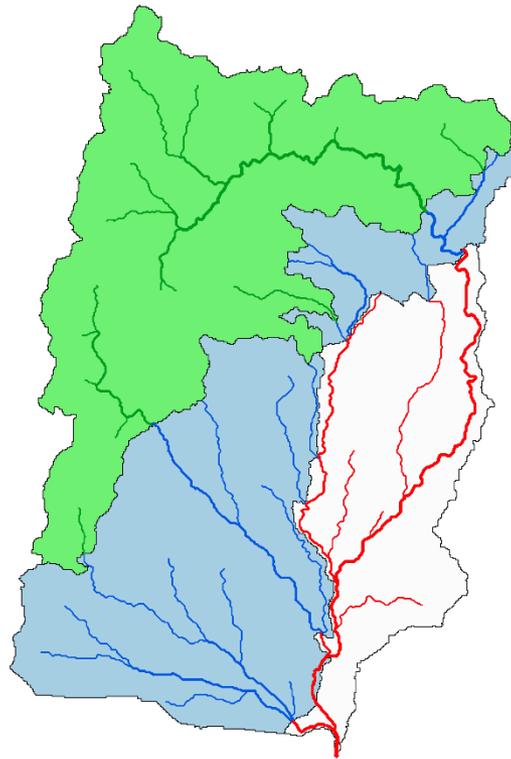
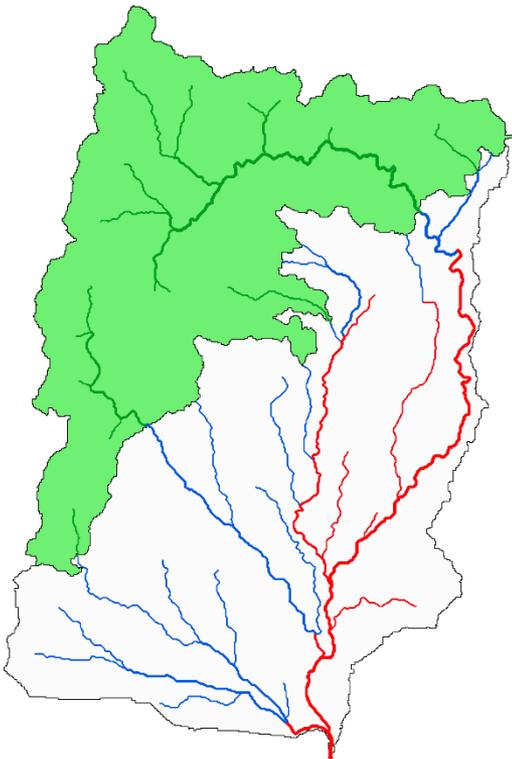
Management Zones

- Land areas that drain to a management class
- One zone for each class.
- A given location may be within many zones.



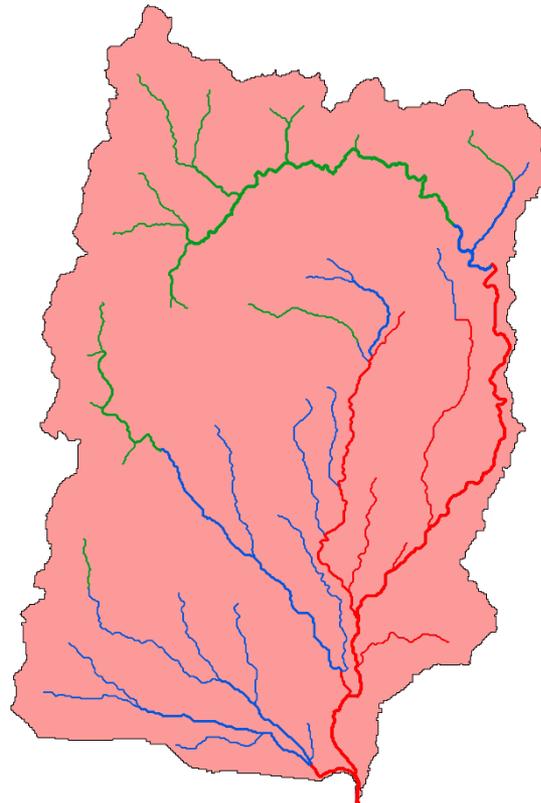
Use zone **building blocks** to define the FMUs (1)

- Assume :
 - Objectives:
 - Green – A band, Blue – B Band, Red – C Band
 - Management regimes to achieve these are most restrictive in;
 - Green > Blue > Red zones



Use zone building blocks to define the FMUs (2)

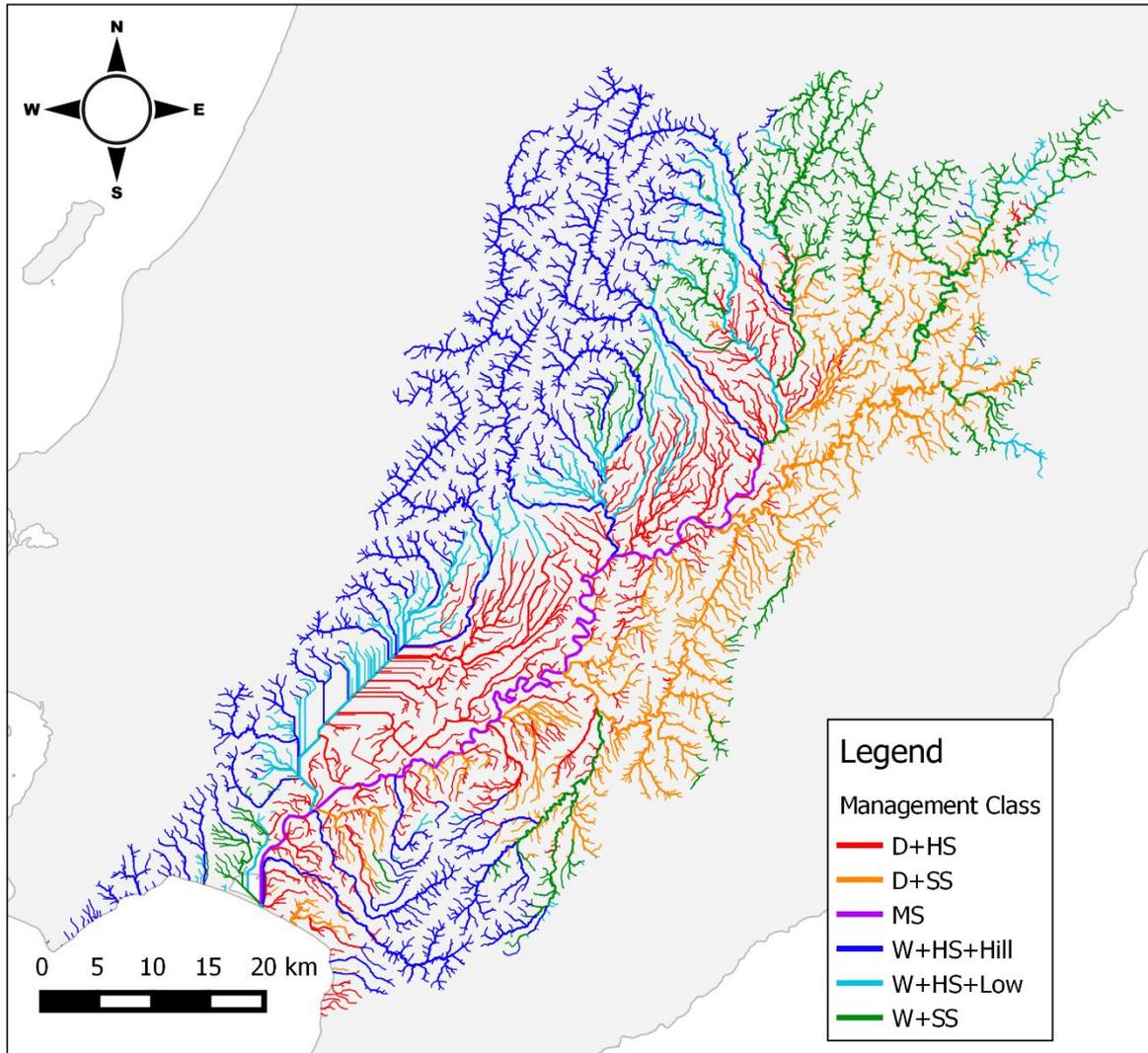
- Assume
 - Objectives;
 - are the same in all classes Green, Blue, Red –
 - Management regimes to achieve these are;
 - the same across all zones



Application to the Ruamahanga

- Collected together information about:
 - Rainfall, topography, geology, flow magnitude
- Compared catchment characteristics to state:
 - Water Quality:
 - Chemical: $\text{NO}_3\text{-N}$, TN, DRP, TP, $\text{NH}_4\text{-N}$
 - Bacterial : E. coli
 - Ecological: Periphyton, MCI, QMCI
 - Water Quantity: (not discussed further today)
 - Take reliability
 - Generalised fish habitat response

Management Classes – water quality



Climate:

W - Wet

D - Dry

Geology:

HS – Hard Sedimentary

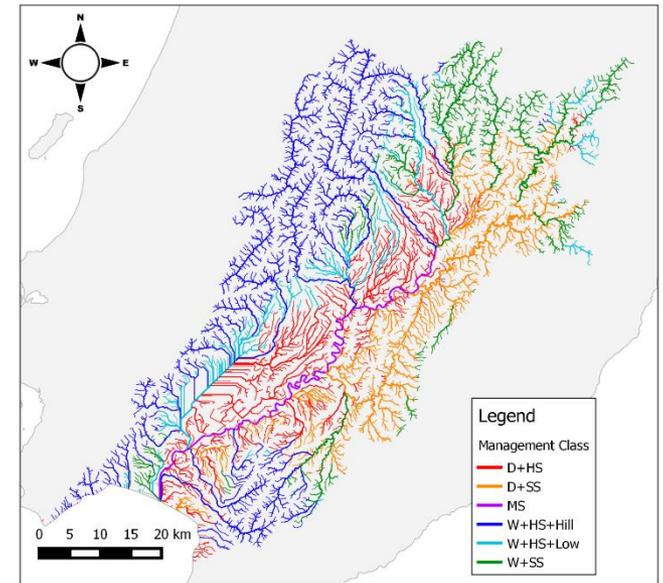
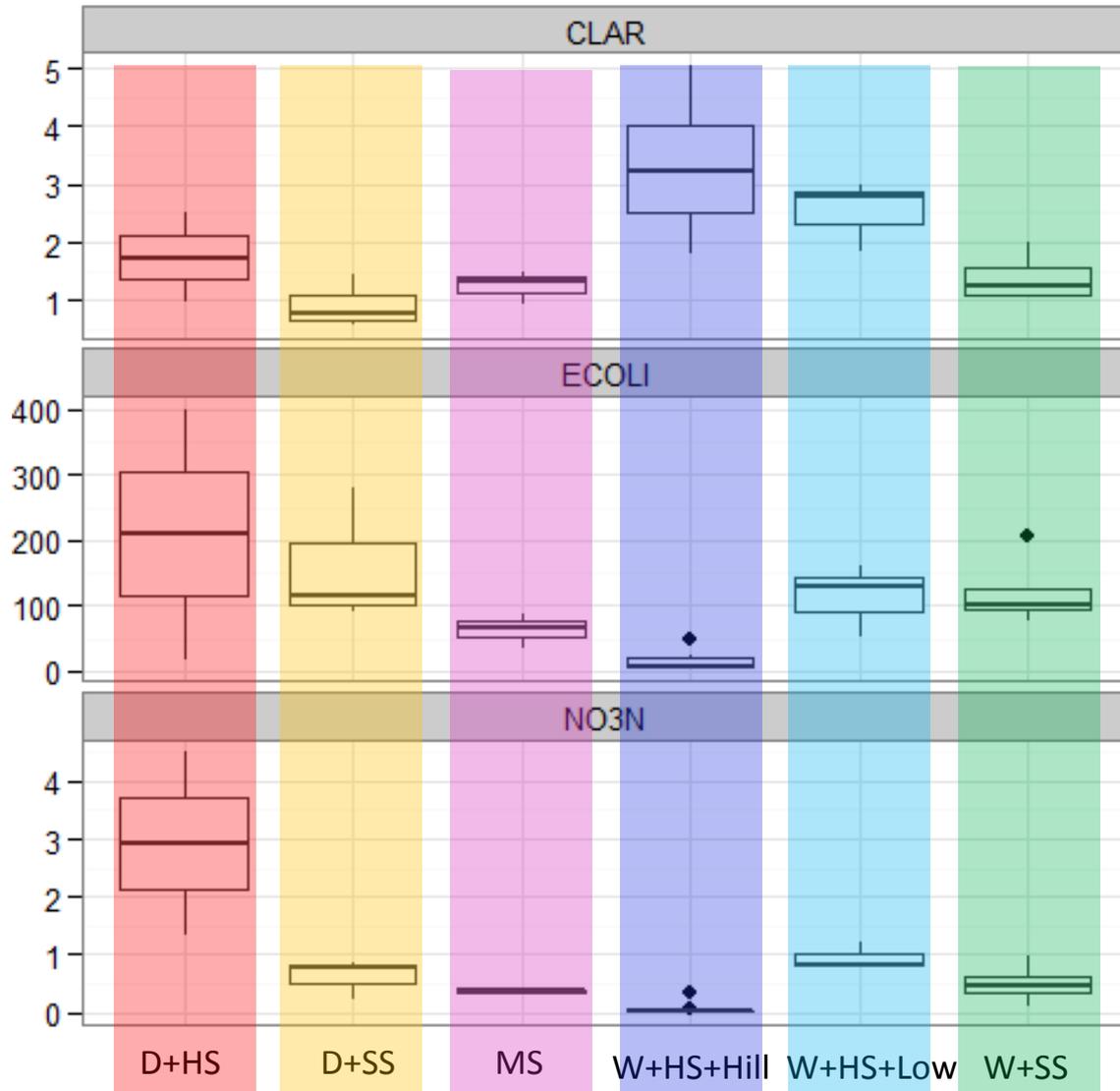
SS – Soft Sedimentary

Slope:

Hill – Upstream $>17^\circ$ slope

Low – Upstream $<17^\circ$ slope

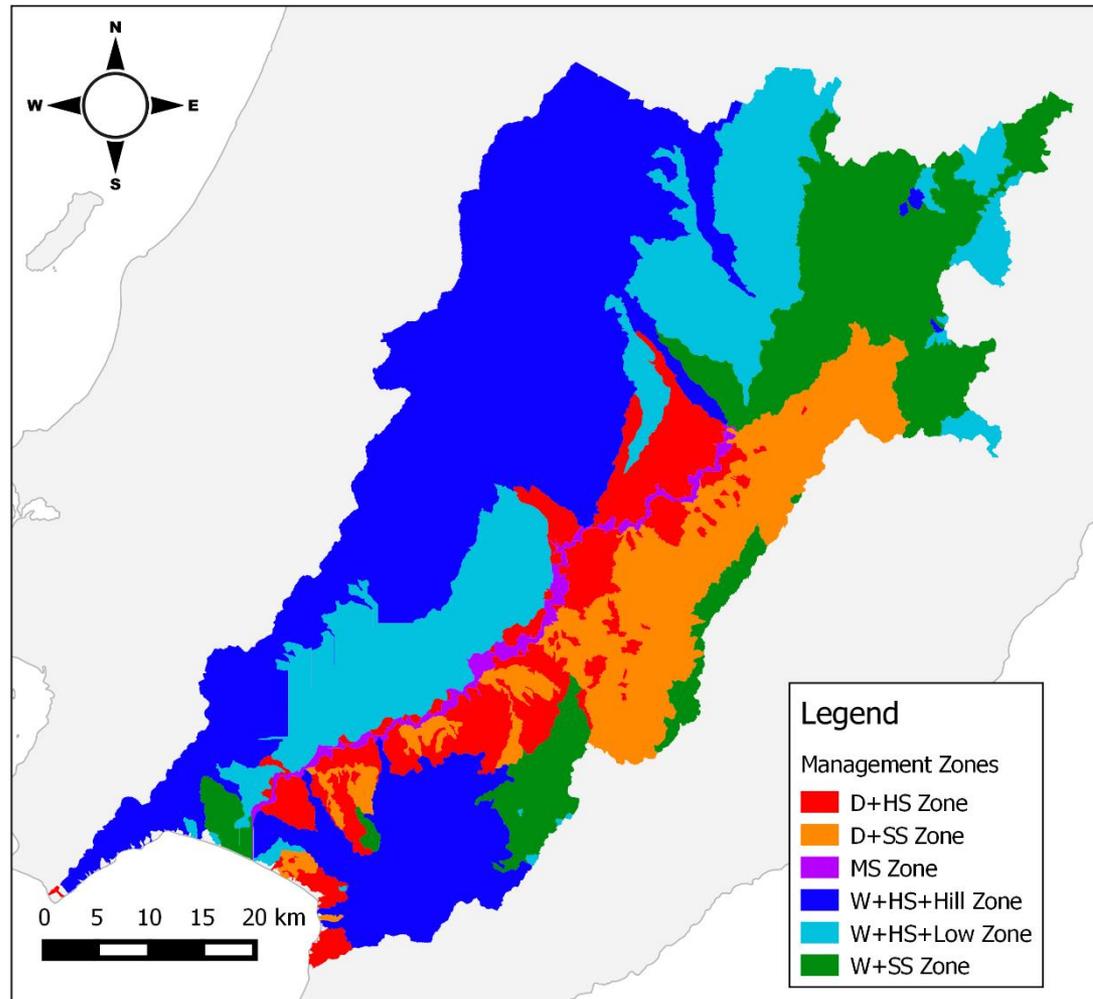
Variation in water quality by management classes



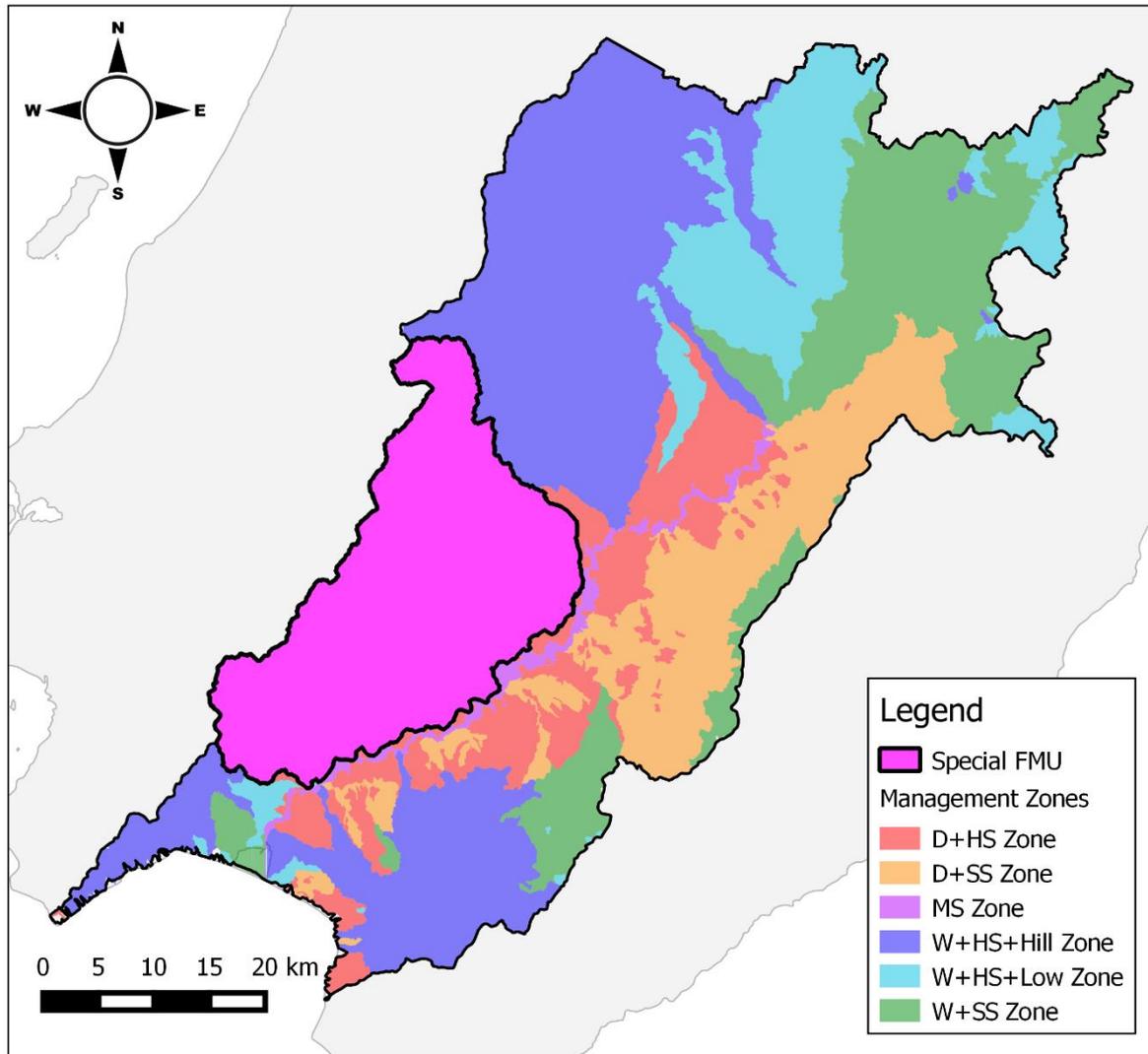
Example objectives

- Assume that the classes with higher water quality would have more stringent objectives
- Assume that the management zones associated with the more stringent objectives need more restrictive management regimes
- Then a RANKING of management zones in terms of restrictivness of management is:
 - $W+HS+HILL > W+HS+LOW > W+SS > D+HS > D+SS$
 - (MS kept separate)

Resulting (example) water quality FMUs



Special FMUs



Benefits of this approach

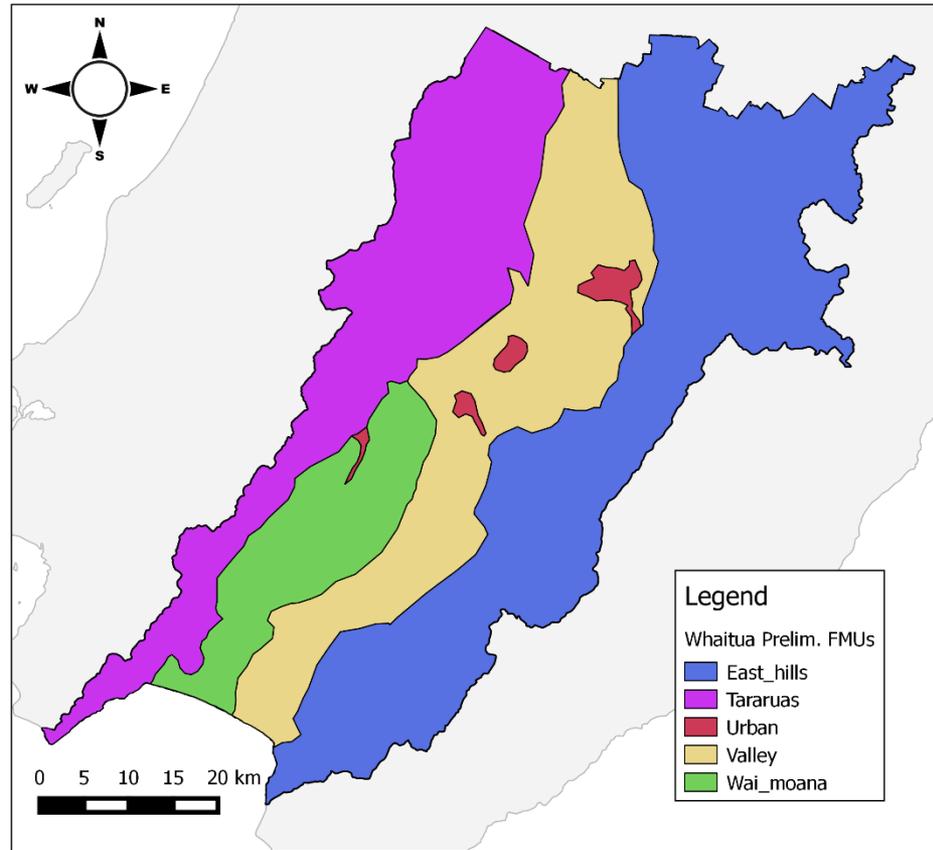
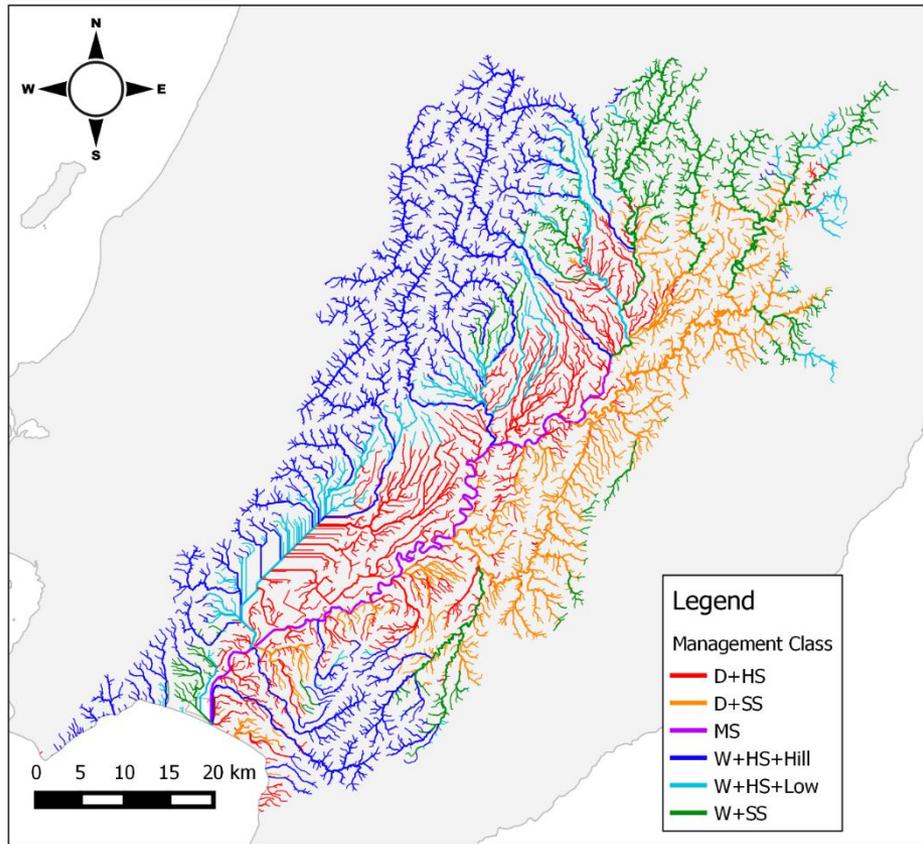
- Classification determines resolution of plan provisions - coarse or fine (simple or complex)
- Easily modified (e.g. to make different or coarser/finer FMUs).
- Transparent and clear - based on specific criteria
- Inherent logic –
 - objectives apply to the water bodies
 - limits and actions apply to the catchments
- Limits and actions set to achieve the most restrictive downstream objective

Benefits (continued)

- Efficient monitoring based on representative monitoring sites in each management class.
- Spatially clear framework showing where:
 - objectives and policies apply
 - limits need to be met
 - where accounting should occur (administrative points)

THANK YOU

Biophysical compared to Whaitua committee's first cut FMUs.



Management Zones (quality)

