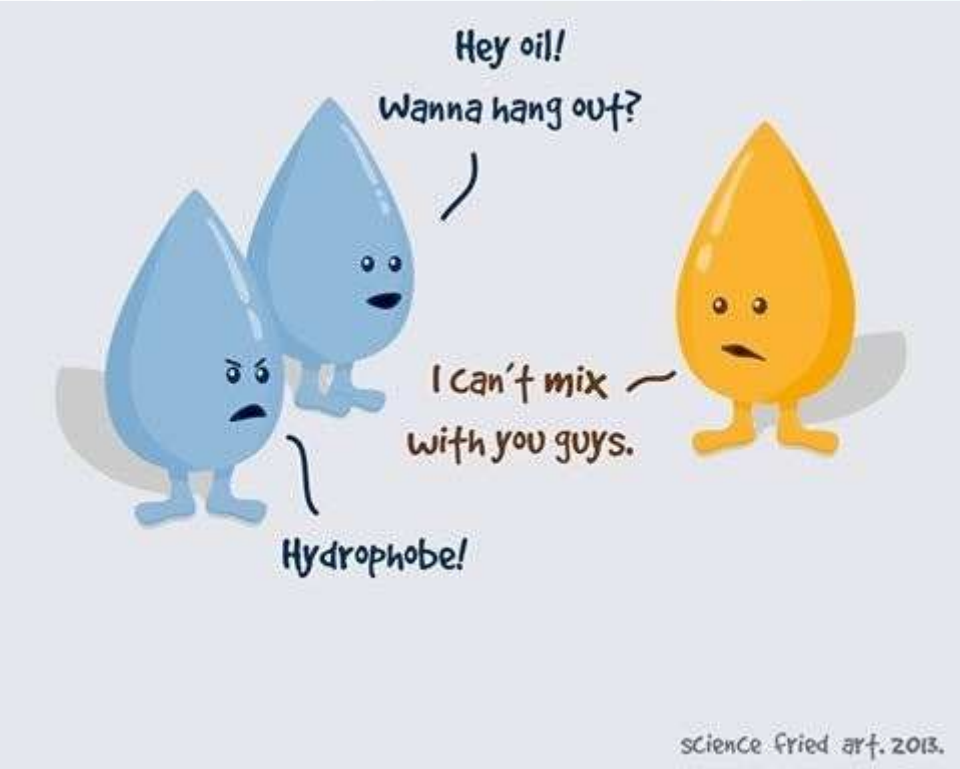
Te Whanganui-a-Tara Biophysical Science Programme



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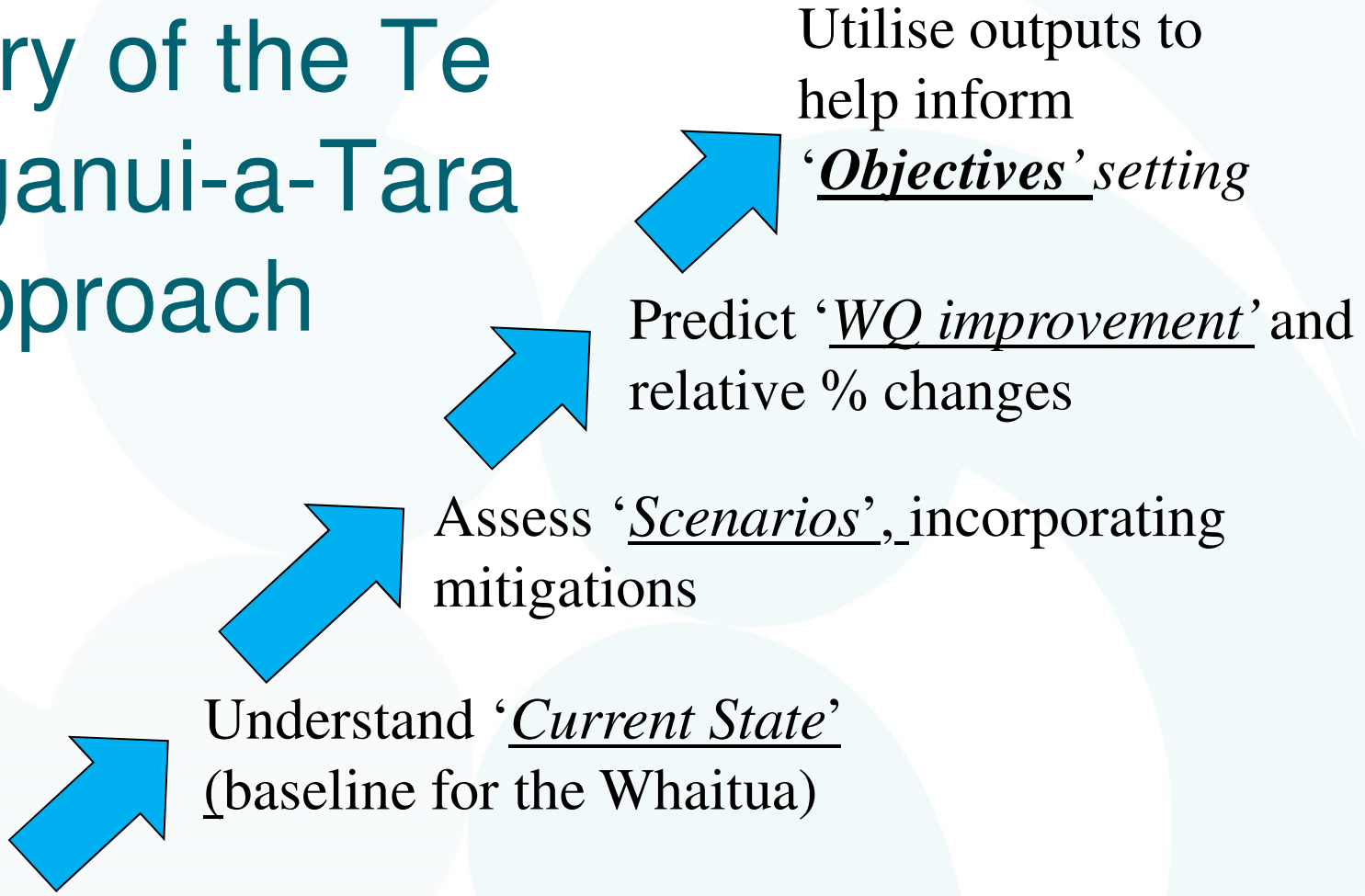
Summary of the Te Whanganui-a-Tara approach



- Use existing monitoring, investigations and models as *foundations* (including Porirua and Ruamahanga scenario modelling)
- Compile/develop local information to apply within this Whaitua

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5 important packages of work

- Bio-physical catchment characterisation
- Contaminant Load Model (CLM)
- Sediment Model
- Water Allocation ‘spreadsheet model’
- Expert Panels

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Biophysical catchment characterisation

- Aim to ‘optimize’ the number of catchments to:
  - Cover appropriate landuses, stream types and climate/geology
  - Manage and make sense of complex information
  - Objective setting becomes a more straight forward process
- Informs the definition of FMUs required under the NPSFM

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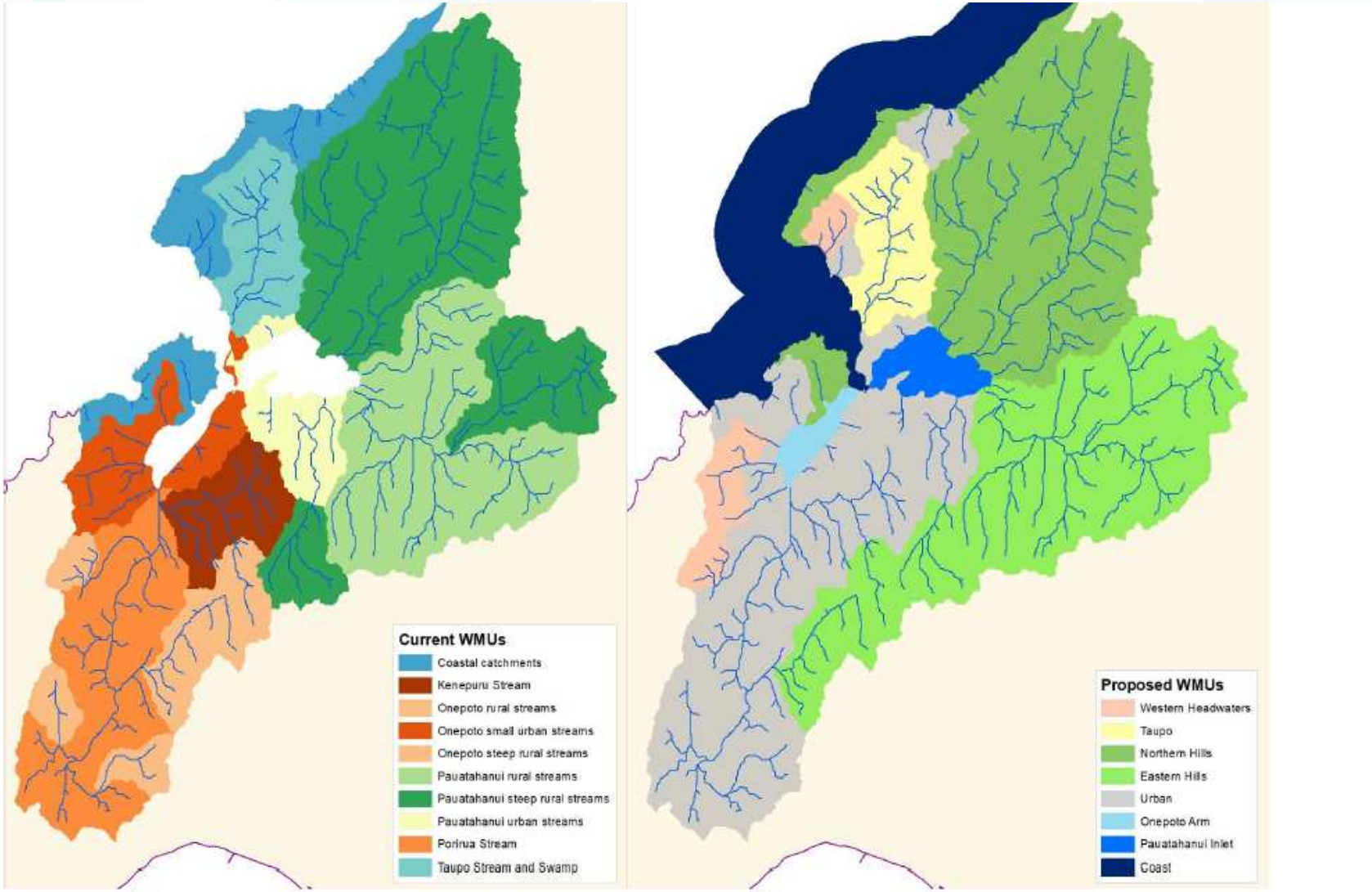

Te Awarua-o-Porirua Whaitua
- Spatial scale for objective setting (Nov 2018)

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Urban Contaminant Load Model (CLM) and Story Maps

- Spreadsheet model linked to GIS (i.e. landuse types, activities and areas)
- Outputs
  - annual average loads for various contaminants (metals, nitrogen etc)
  - GIS maps for '*hot spot*' identification
- Scaleable to catchments or FMU's (i.e. statistics)

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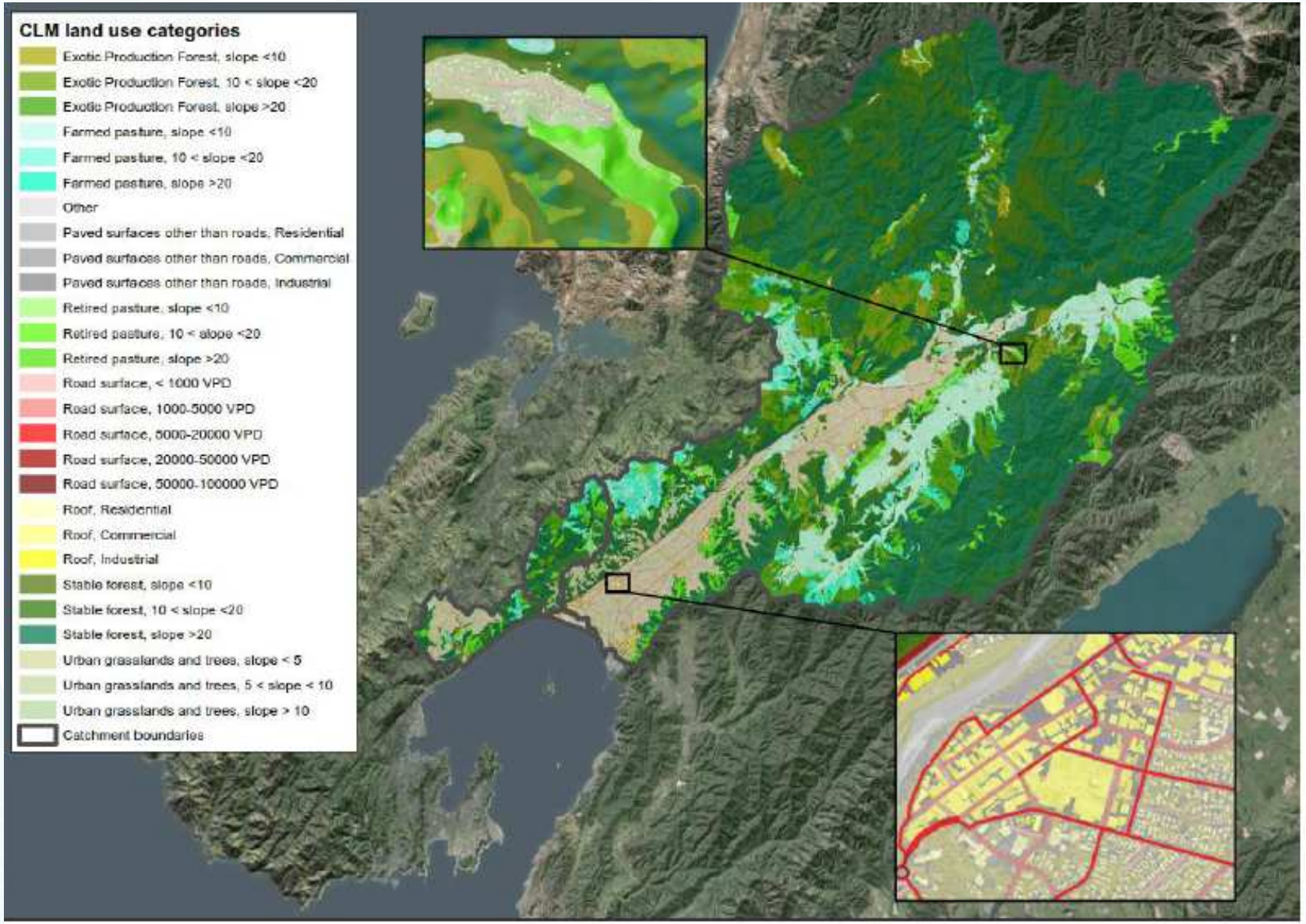

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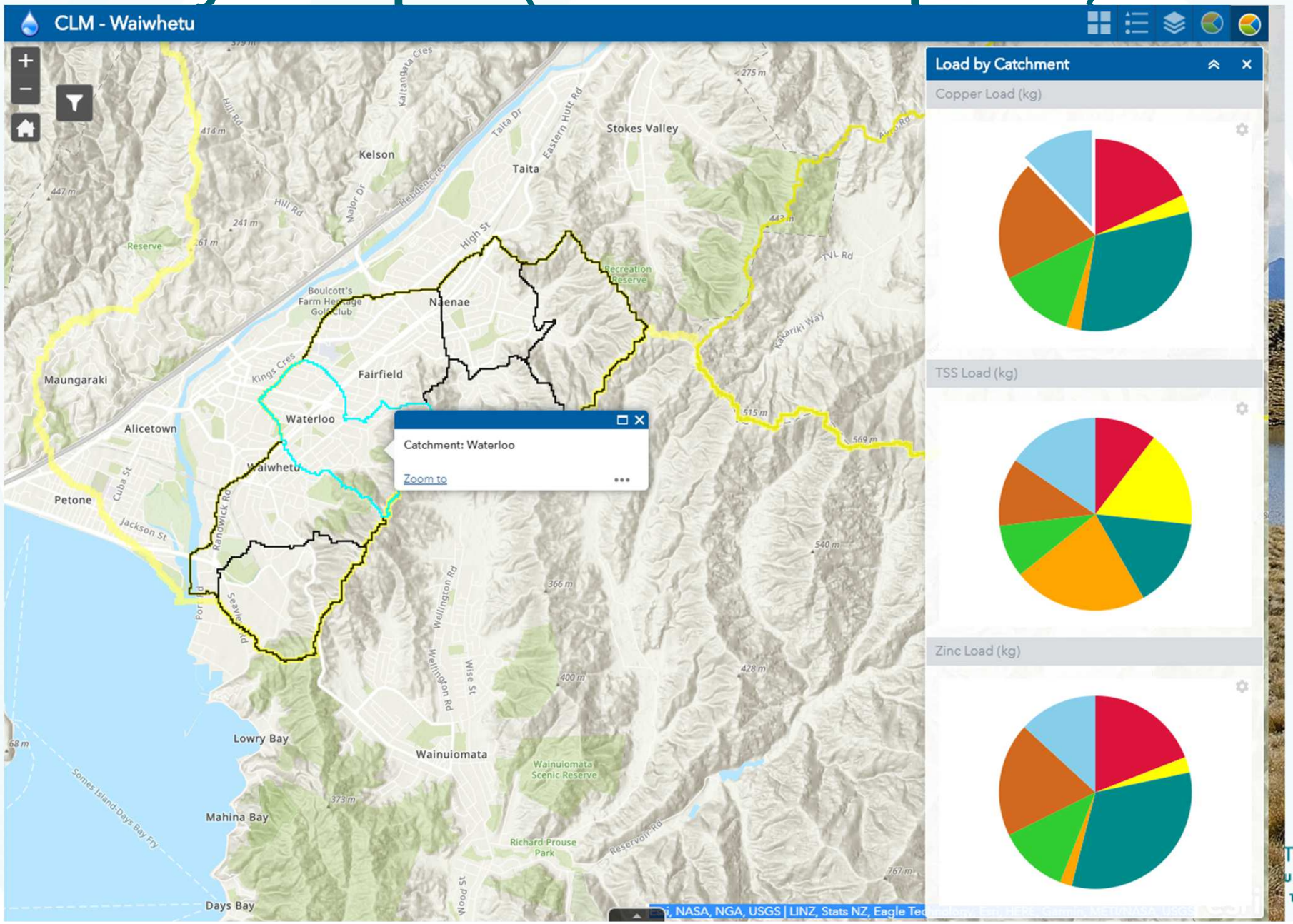
Story Maps (CLM Outputs)



Sediment Model

- Will use Porirua's existing flow model
- Applied to landuse within this Whaitua
- Flows will be validated (checked) against observed data in this Whaitua
- If acceptable, sediment layers in GIS will be developed and integrated into the model

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Sediment Model (cont'd)

- Why 'adapt' a model?
  - Limited sediment monitoring data
  - Provide *current* state estimates of sediment sources (hot spots) and loads into estuaries and Wellington Harbour
  - Draft NPSFM sets sediment related NOF attributes

Sediment source	Porirua at Town Centre	Horokiri at Snodgrass	Pauatahanui at Gorge
Surficial proportion	58 %	25 %	58 %
Landslide proportion	32 %	58 %	19 %
Streambank proportion	9 %	17 %	23 %

Porirua Baseline Model Technical Report

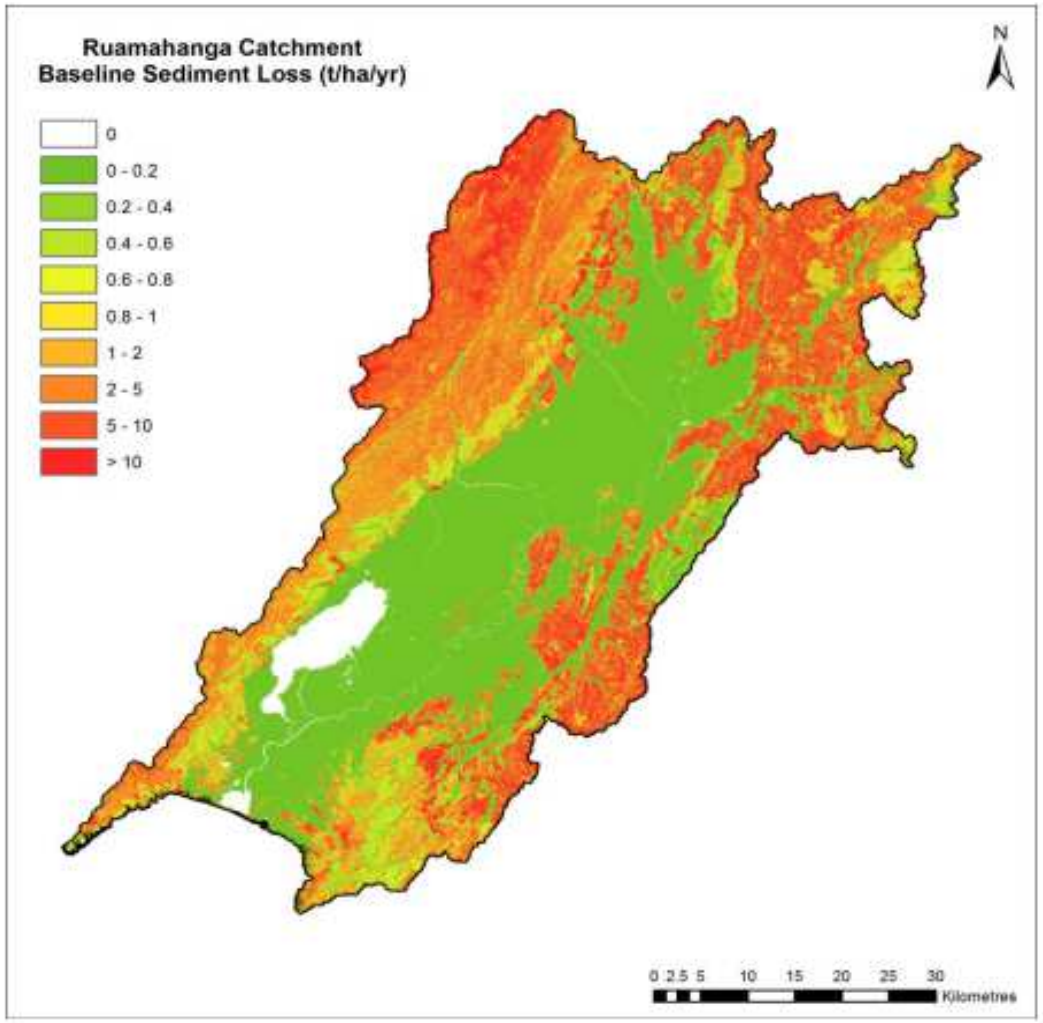

Figure 5.4 : Baseline model sediment loss from SedNetNZ

Ruamahanga Baseline Model Technical Report

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Water Allocation

- A daily flow spreadsheet model is being created for Hutt, Wainuiomata and Orongorongo Rivers
- Uses water abstraction records from 2011
- For the Hutt River - Uses outputs from ‘HAM3’ groundwater model (i.e. GW recharge/losses)
- Primarily low flow focused

Water Allocation (cont'd)

- Why?
  - To test scenarios, such as:
    1. Flow Naturalisation (turning off all abstractions)
    2. Climate Change
    3. Change in minimum flow rules (greater restrictions on users)
    4. Impacts of greater abstraction (population growth)

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Expert Panels

- 3x Expert Panels
  - Coastal
  - Water Allocation
  - Freshwater Quality and Ecology
- Mixture of GWRC staff and independent scientists
- Purpose is to summarise technical information, which will provide guidance to the Committee

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Expert Panels (cont'd)

- Scope of the Panel:
  - Consider technical information from this Whaitua and *proxy* sites (i.e. Porirua)
  - Estimate magnitude of changes and confidence under various '*Scenarios*' for a range of freshwater indicators (in different catchments)
  - Scenarios likely to be adapted from Porirua (i.e. BAU, Improved, Water Sensitive).

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Expert Panels (cont'd)

Table1. EXAMPLE indicators

Indicator	Interpreted in relation to…	Water body types
E. coli	Infection risk while swimming Safety for drinking water	Rivers Groundwater
DIN (dissolved inorganic nitrogen)	Ecosystem health	Rivers
NH4 (ammonia toxicity)	Ecosystem health	Rivers
Zn (zinc toxicity)	Ecosystem health	Rivers
Cu (copper toxicity)	Ecosystem health	Rivers
Native freshwater fish	Ecosystem health	Rivers Lakes
Periphyton	Ecosystem health	Rivers

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Expert Panels cntd.

Outputs:

Summaries on potential *changes* of *indicator states* under different scenarios

Table 2. EXAMPLE Scenario Output

Metric: *E. coli*			Sub-catchment unit: Mississippi Basin
Change	**Effect**	**Confidence**	**Justification**
-2 (Large -)	-2 (Strong -)	0 (Not	Change: In an area with low run off and no border dyke irrigation or tile drainage, direct access by stock will be the major source. Complete exclusion of intensively farmed stock should reduce levels. However, sheep farming is widespread in the area and will remain so with little added irrigation and land-use change predicted in the catchment. As these animals will not be excluded, a large improvement is not expected. This change is no different to that expected under the Current Pathways scenario. Effect: Although reductions across the area should be moderate, levels in key bathing sites are already controlled through upstream fencing and are well below guideline levels. Therefore, it is unlikely that the recreational value of actual bathing sites will improve. Confidence: Levels are already low, land use is not expected to increase, and riparian management practices will improve. There is no potential for further degradation but any improvements are unlikely to have an effect.
-1 (Moderate -)	-1 (Moderate -)	1 (Low)	
0 (No/negligible)	**0 (No/negligible)**	2 (Moderate)	
+1 (Moderate +)	+1 (Moderate +)	**3 (High)**	
+2 (Large +)	+2 (Strong +)		

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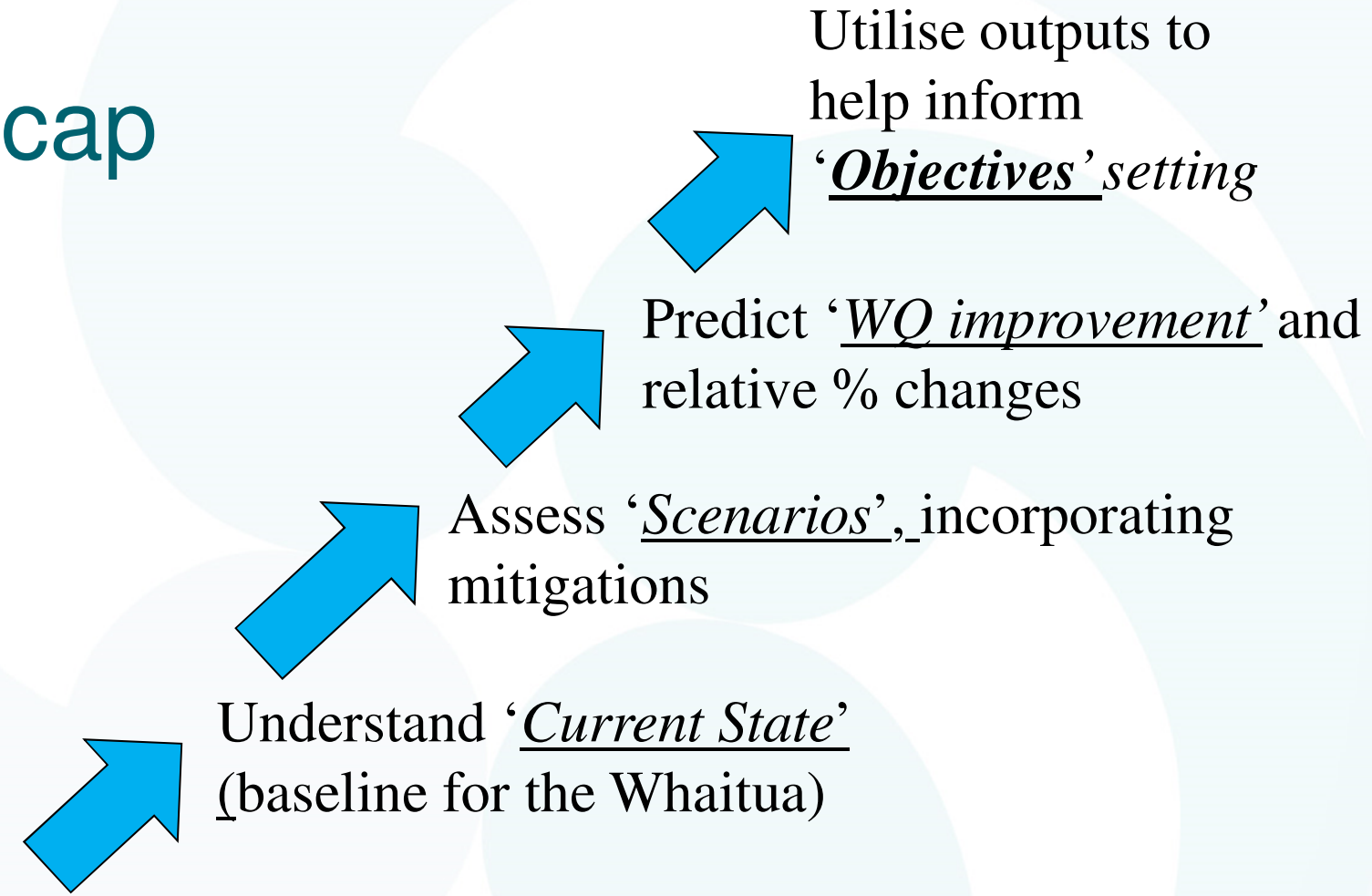
Re-cap



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