

Te Awarua-o-Porirua

Biodiversity and ecosystem & human health: Fresh & coastal waters

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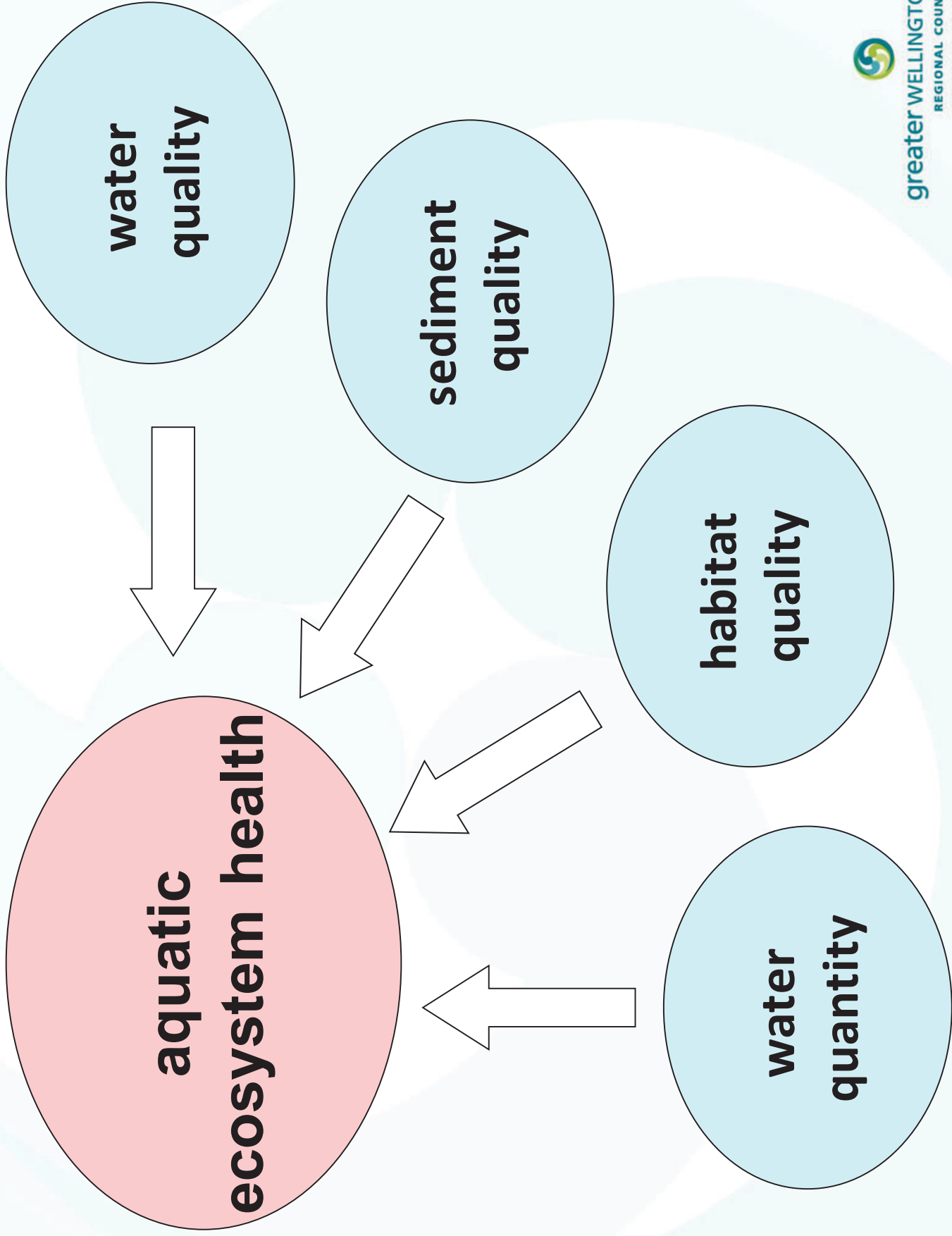
14 September 2015

Reasons for monitoring waterbodies

2 primary purposes in the whaitua:

- Ecosystem health
- Human health (contact recreation)



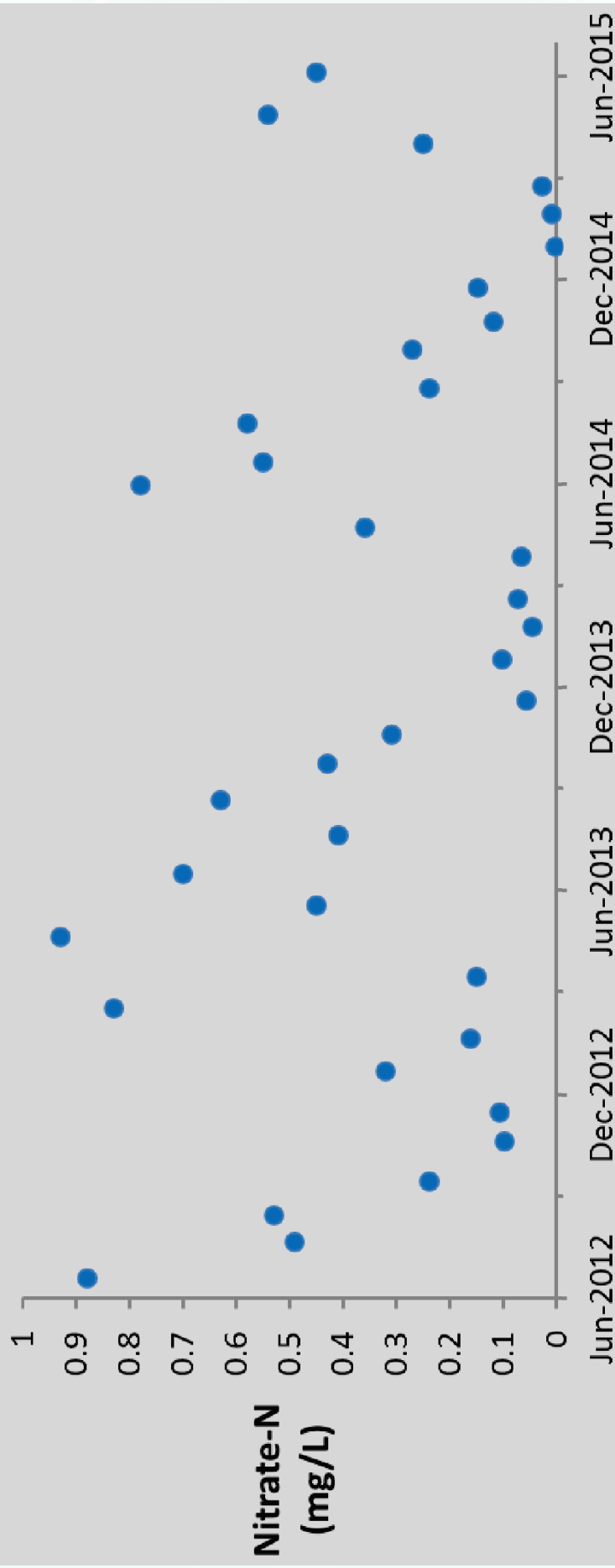


What is water quality?

- Complex!
- Value-dependent
(eg, ecosystems vs human use)
- Multiple characteristics
 - physical, chemical & (micro)biological
- **Highly variable** in both space & time
 - source of flow, geology, climate, land use, weather, tides



Pauatahanui Stream at Elmwood Rd



Units, stats & guidelines

- Concentrations vs loads
- Medians vs 95th percentiles
- Number of data points matters!
- Guidelines vs standards



Kenepuru Stream at Mepham Pt			
Date	E. coli	E. coli	
12/07/2011	1,100	58	Minimum
9/08/2011	360	69	
8/09/2011	320	92	
6/10/2011	800	100	
8/11/2011	400	120	
24/11/2011	4,200	124	
2/12/2011	290	132	
8/12/2011	1,500	204	
22/12/2011	550	208	
5/01/2012	680	240	
16/01/2012	800	250	
19/01/2012	6,100	290	
2/02/2012	2,400	320	
8/02/2012	110,000	340	
17/02/2012	608	346	
8/03/2012	3,200	360	
10/04/2012	400	380	
7/05/2012	2,200	400	
7/06/2012	3,400	400	
17/09/2012	11,000	550	
8/11/2012	92	560	
22/11/2012	100	608	
21/12/2012	120	680	Median
14/01/2013	19,200	780	
15/01/2013	6,000	800	
22/01/2013	208	800	
21/02/2013	124	1,100	
26/03/2013	346	1,300	
23/04/2013	204	1,500	
22/05/2013	1,300	1,700	
13/08/2013	5,000	2,200	
17/09/2013	240	2,400	
9/10/2013	31,000	3,200	
15/10/2013	18,000	3,400	
17/10/2013	250	4,200	
19/11/2013	380	5,000	
17/12/2013	780	6,000	
5/01/2014	6,000	6,000	
14/01/2014	132	6,100	
18/02/2014	69	11,000	
25/03/2014	340	18,000	
15/04/2014	58	19,200	
16/04/2014	22,000	22,000	95th percentile
13/05/2014	1,700	31,000	
18/06/2014	560	110,000	Maximum

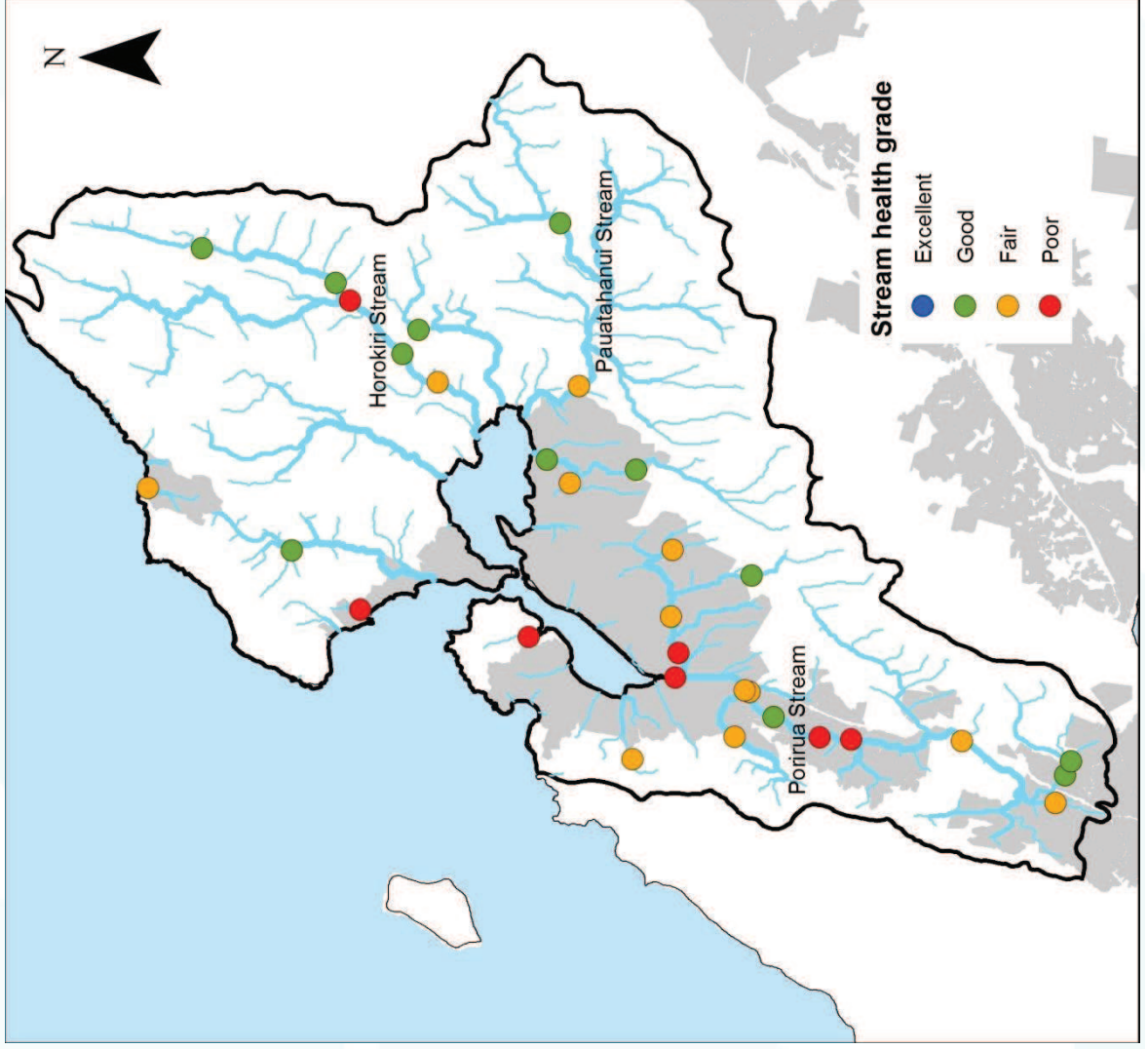
Freshwater biodiversity and ecosystem health

- Biodiversity and biological indicators
- Water quality
- Habitat quality

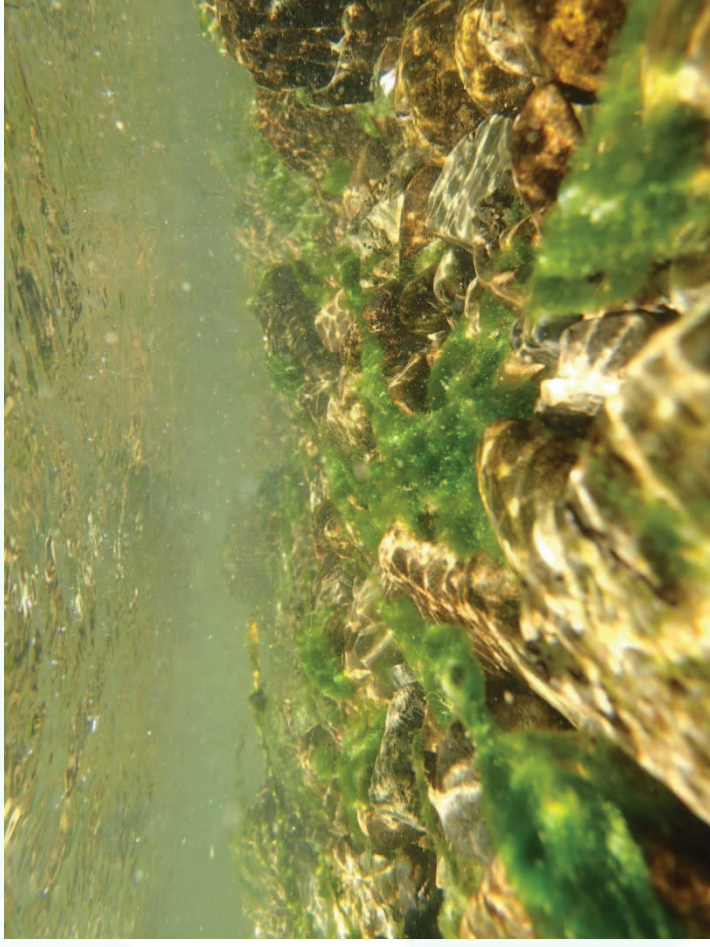




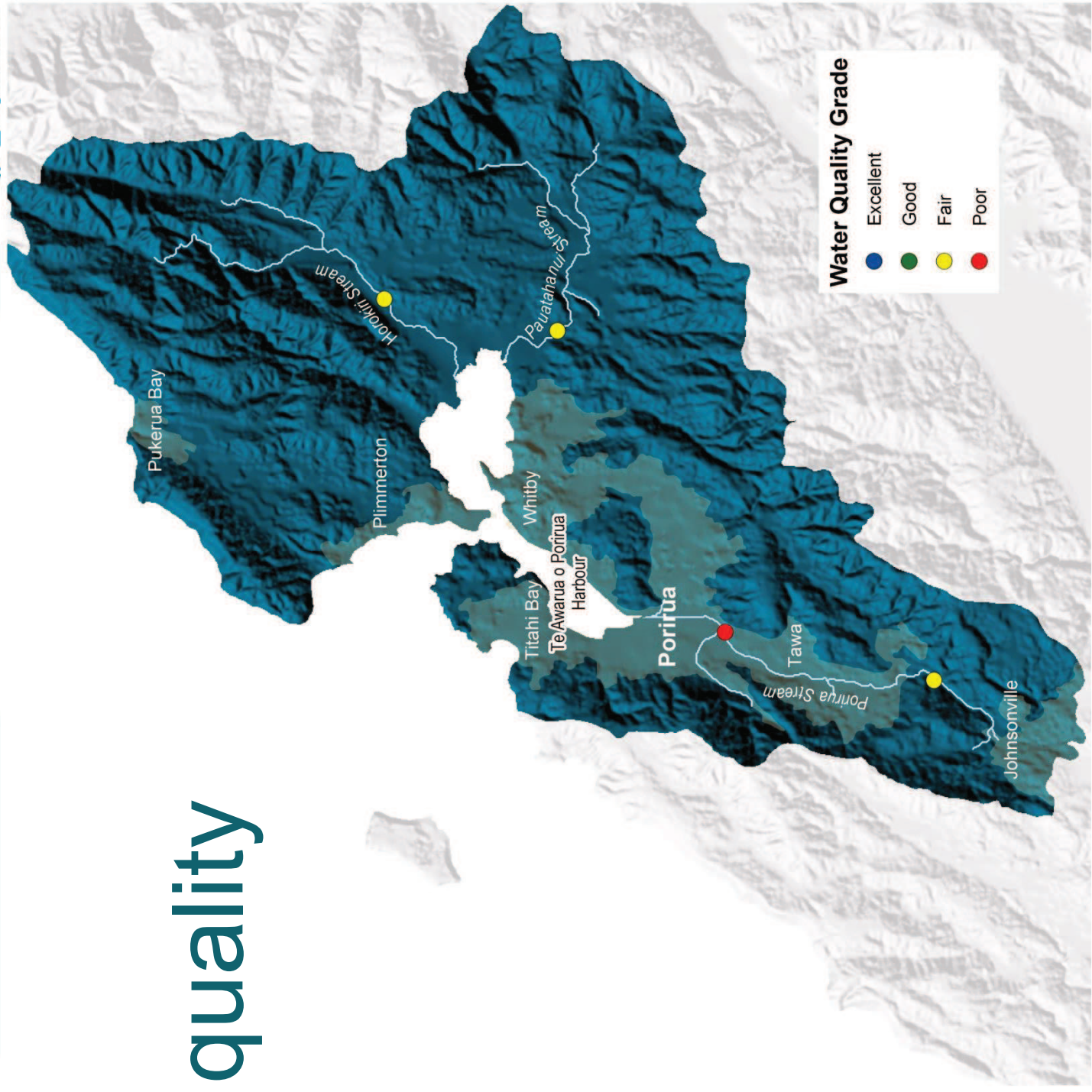
Invertebrates



Plants and algae



Water quality



Water quality – key issues

- Toxic contaminants (eg zinc, copper, PAHs) in water and sediment – urban streams
- Elevated nutrients (nitrogen and phosphorus) – Porirua, Horokiri streams
- Poor water clarity and sedimentation – Porirua, Pauatahanui streams

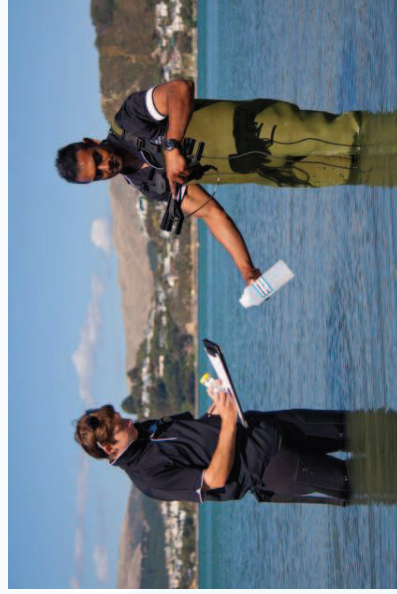


Habitat quality



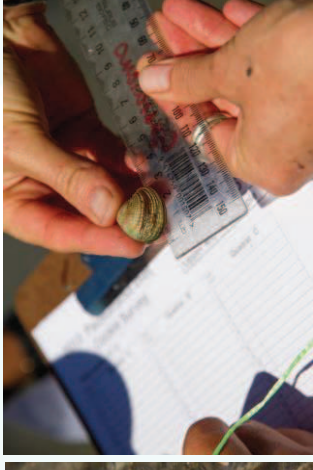
Marine biodiversity & ecosystem health

- Limited water quality data
- Sediment quality and invertebrate community health the focus
- Habitat mapping – type and extent



Invertebrate biodiversity

- Invertebrate communities moderately healthy and diverse throughout the harbour
- Generally healthier communities in Pauatahanui Arm than Onepoto Arm
- Diversity & abundance relatively high compared with other estuaries nationally



Fish biodiversity

- Baseline assessment of fish species 2013
- 43 species identified in the harbour
- More fish species in Pauatahanui Arm than Onepoto



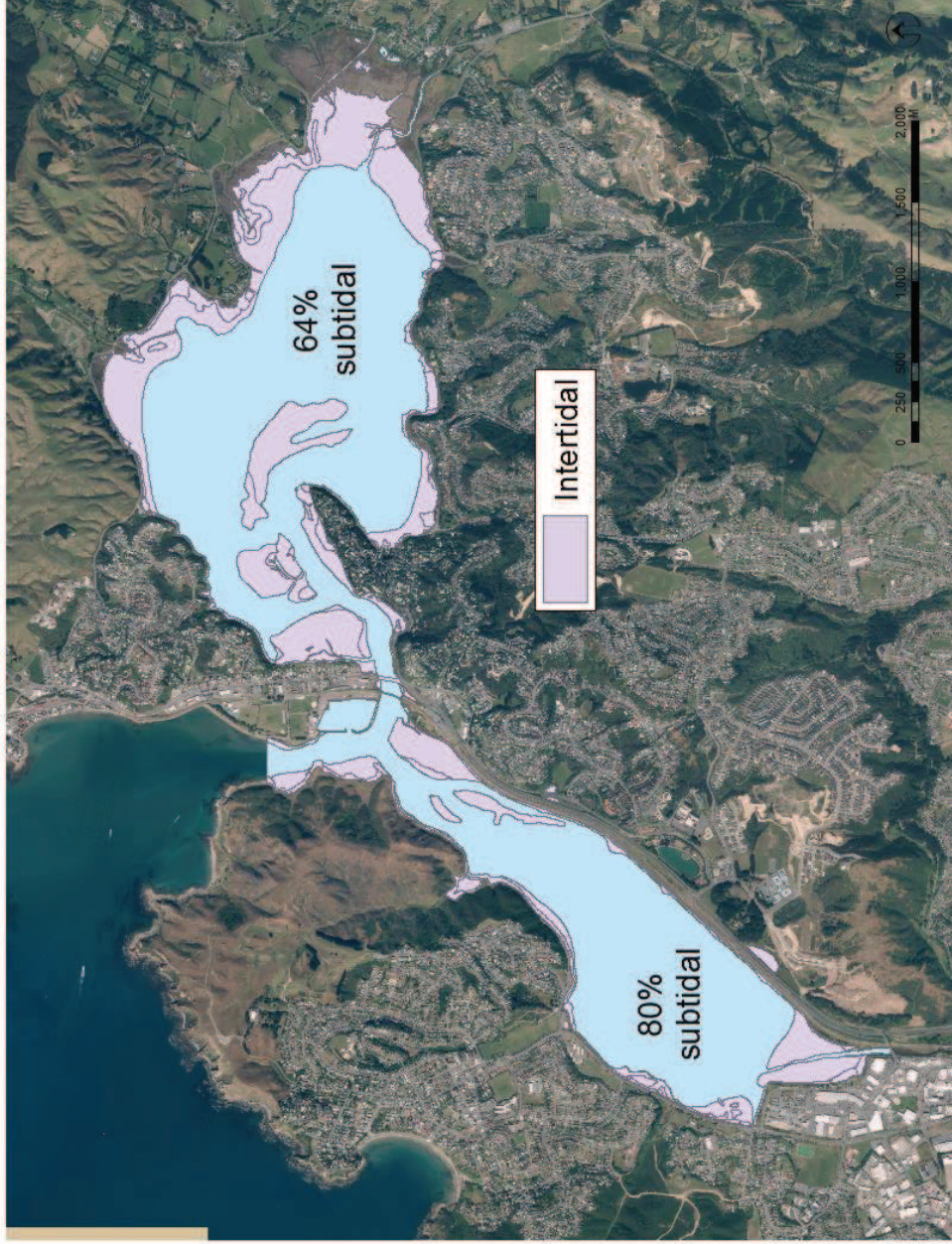
Sediment quality



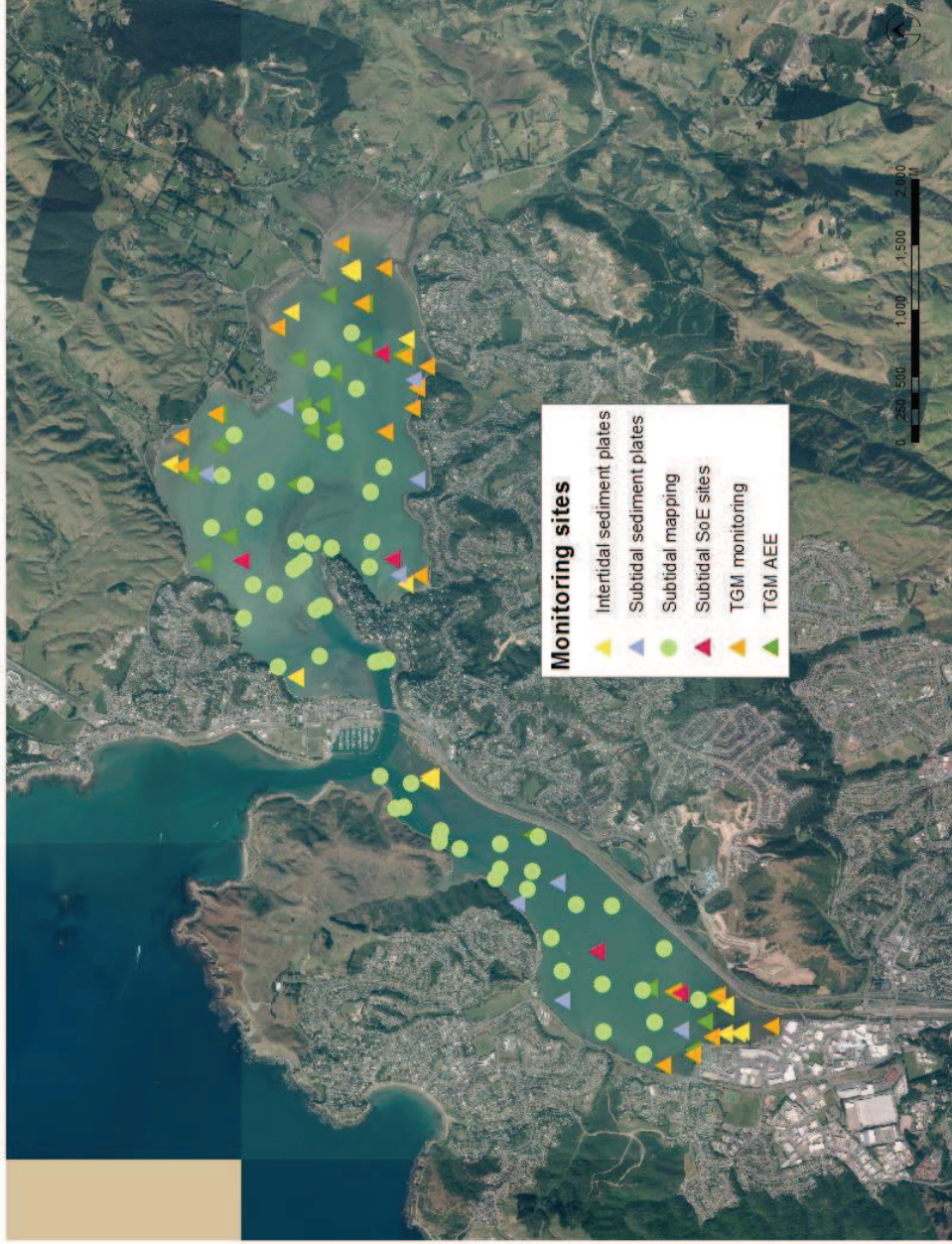
Sediment quality



Sediment quality

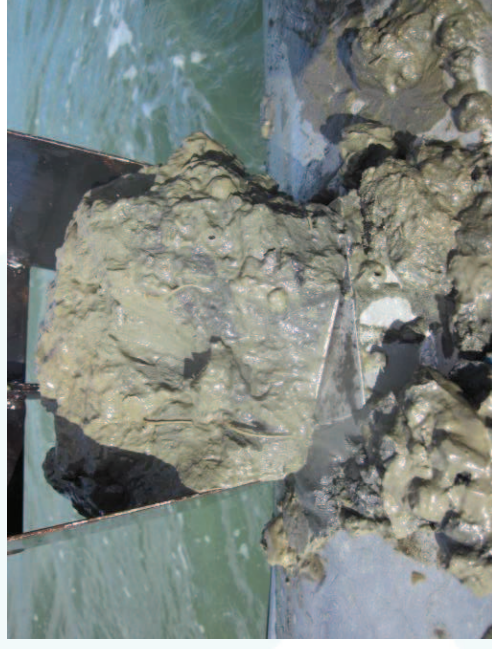


Sediment quality

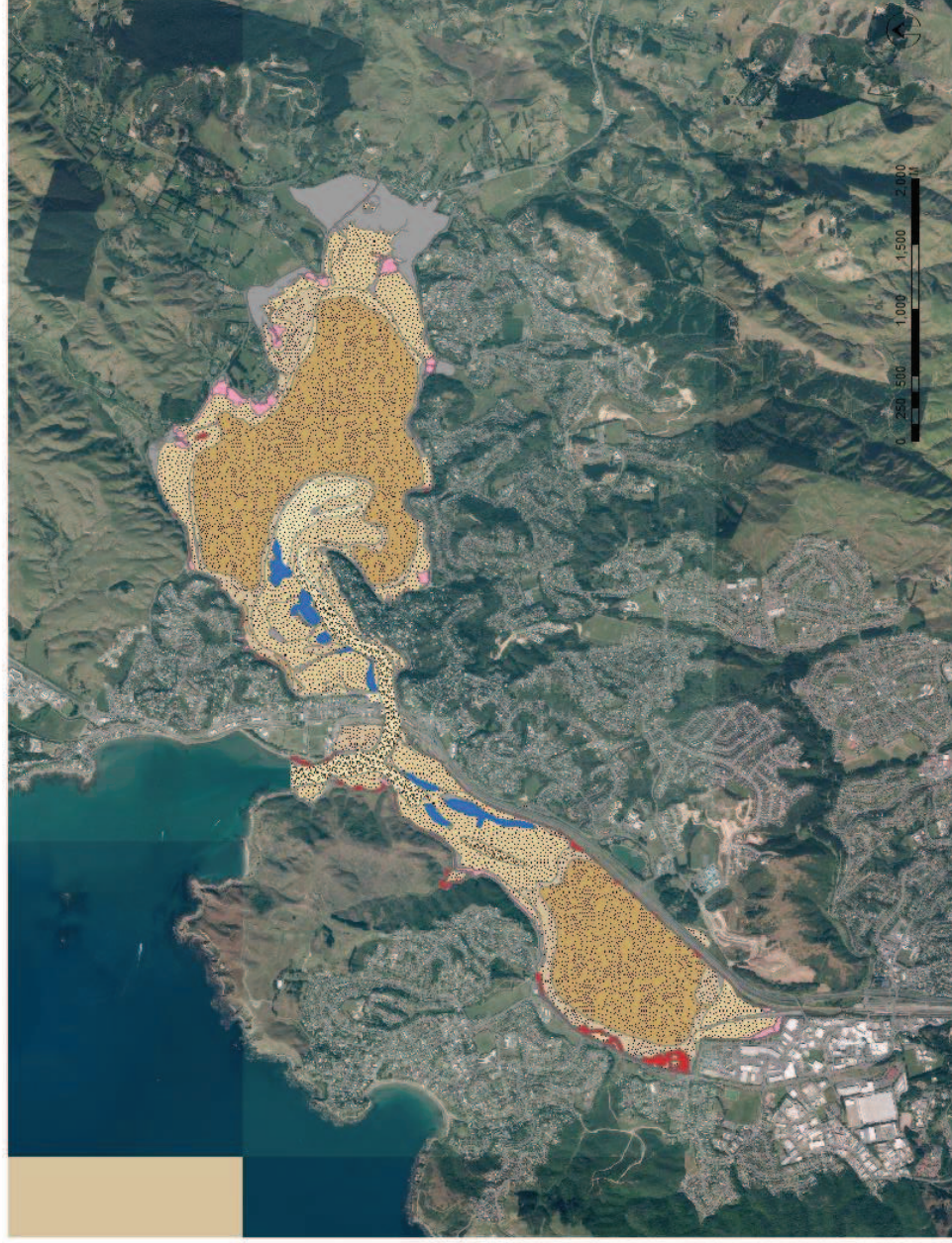


Sediment quality

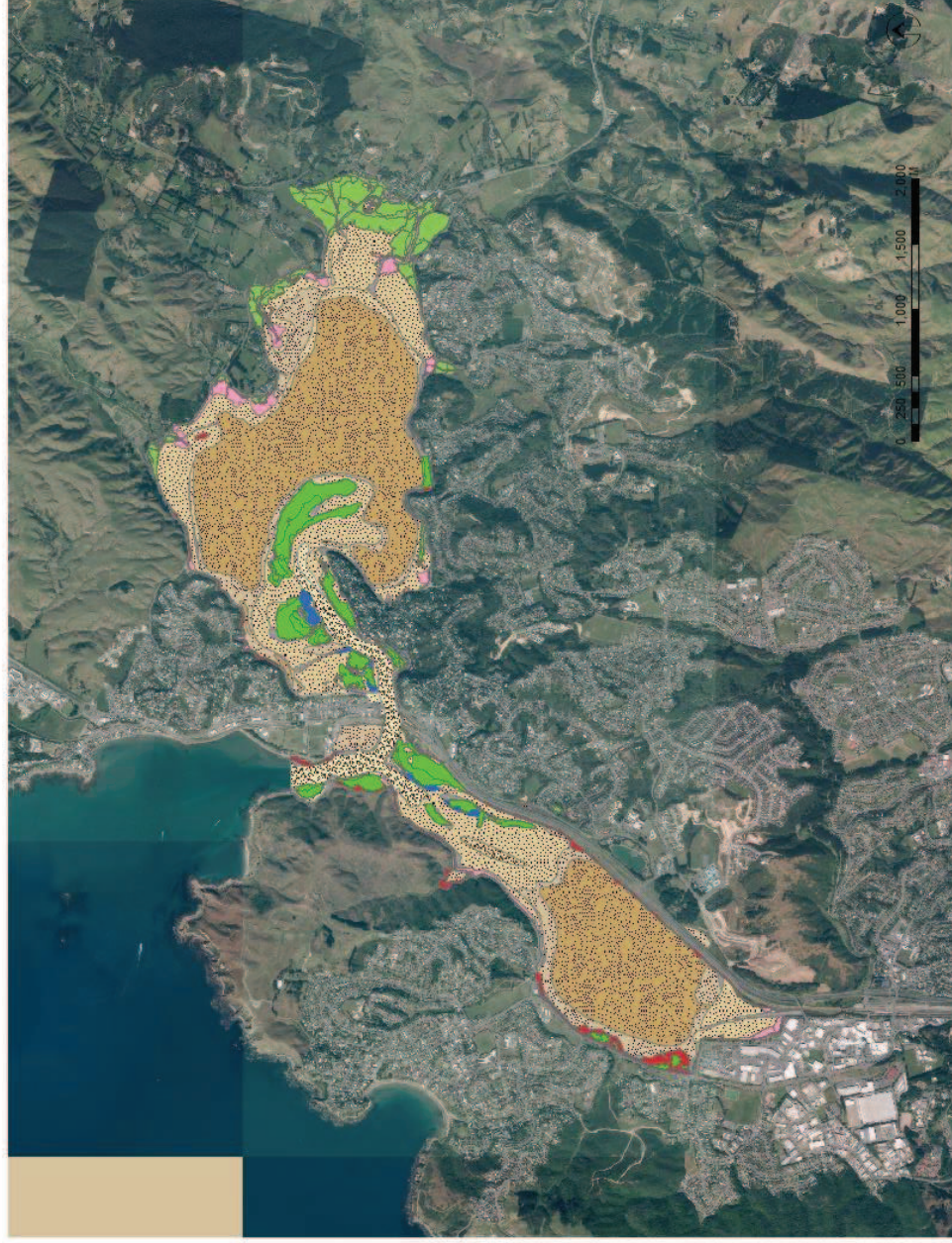
Indicator	Onepoto Arm Intertidal	Onepoto Arm Subtidal	Pauatahanui Arm Intertidal	Pauatahanui Arm Subtidal
Mud content	Low-moderate	Very high	Low-moderate	Very high
Organic content	Low	Moderate-high	Low	Moderate-high
Sediment oxygenation	Moderate	Moderate-high	Moderate	Moderate-high
Nutrients (N&P)	Low-moderate	-	Low-moderate	-
Toxicants	Very low (some hotspots)	Zn, Cu, Pb, DDT	Very low	DDT



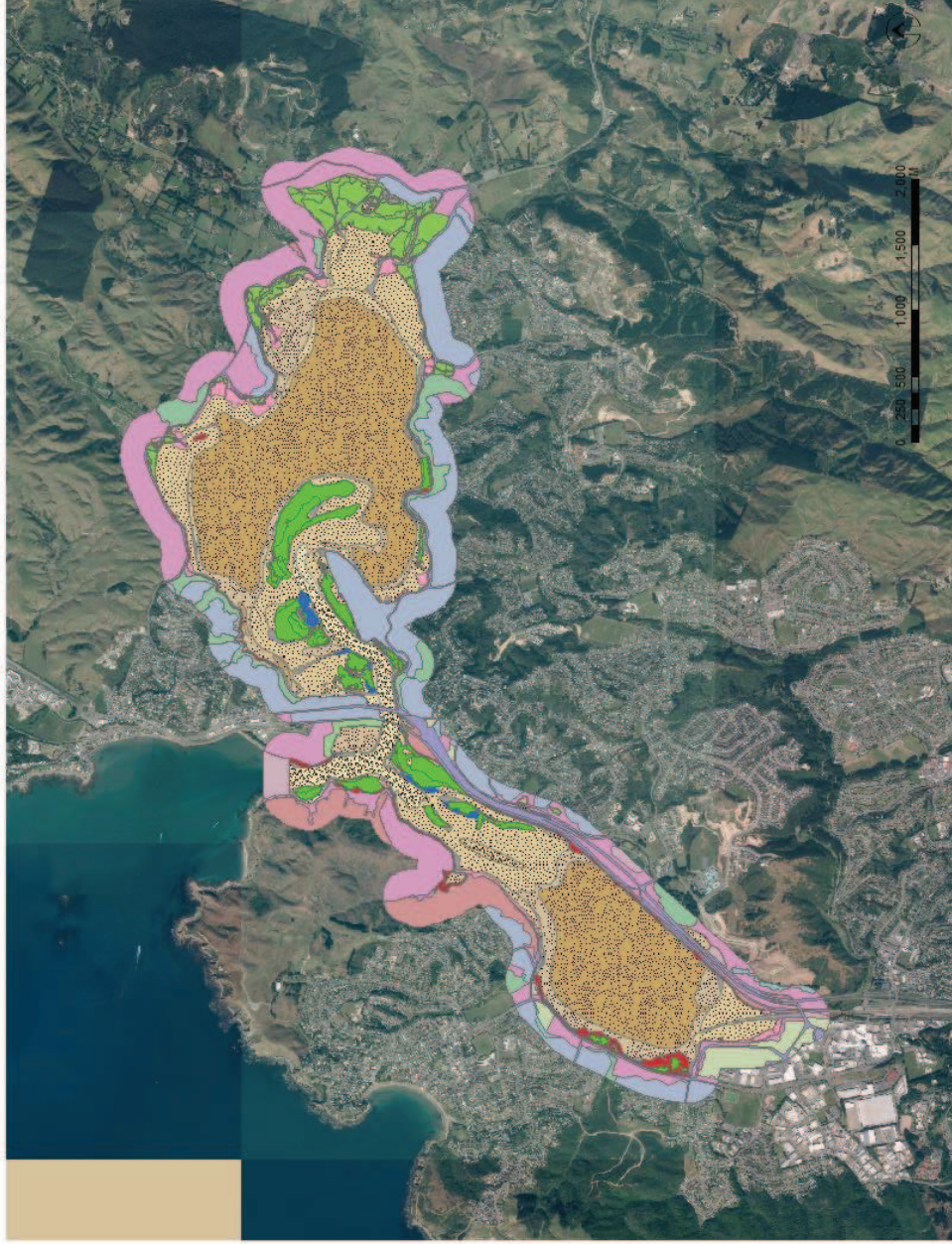
Habitat mapping



Habitat mapping

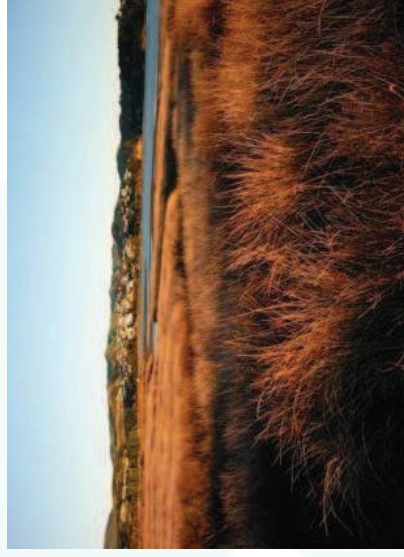


Habitat mapping



Habitat mapping

- Saltmarsh cover has declined long-term but appears stable in last five years
- The area of seagrass continues to decline
- Areas of soft mud increasing in extent
- Areas of dense macroalgal cover near the stream mouths



In summary

- High native fish diversity in many streams but under pressure
- Poor invertebrate health in some urban streams; invertebrate community health poorer in the Onepoto Arm than Pauatahanui
- Stream and coastal water quality poorest in urban areas
- Channelisation of urban streams and lack of riparian vegetation are the key issues
- Seagrass habitat continues to decline and areas of soft mud are increasing



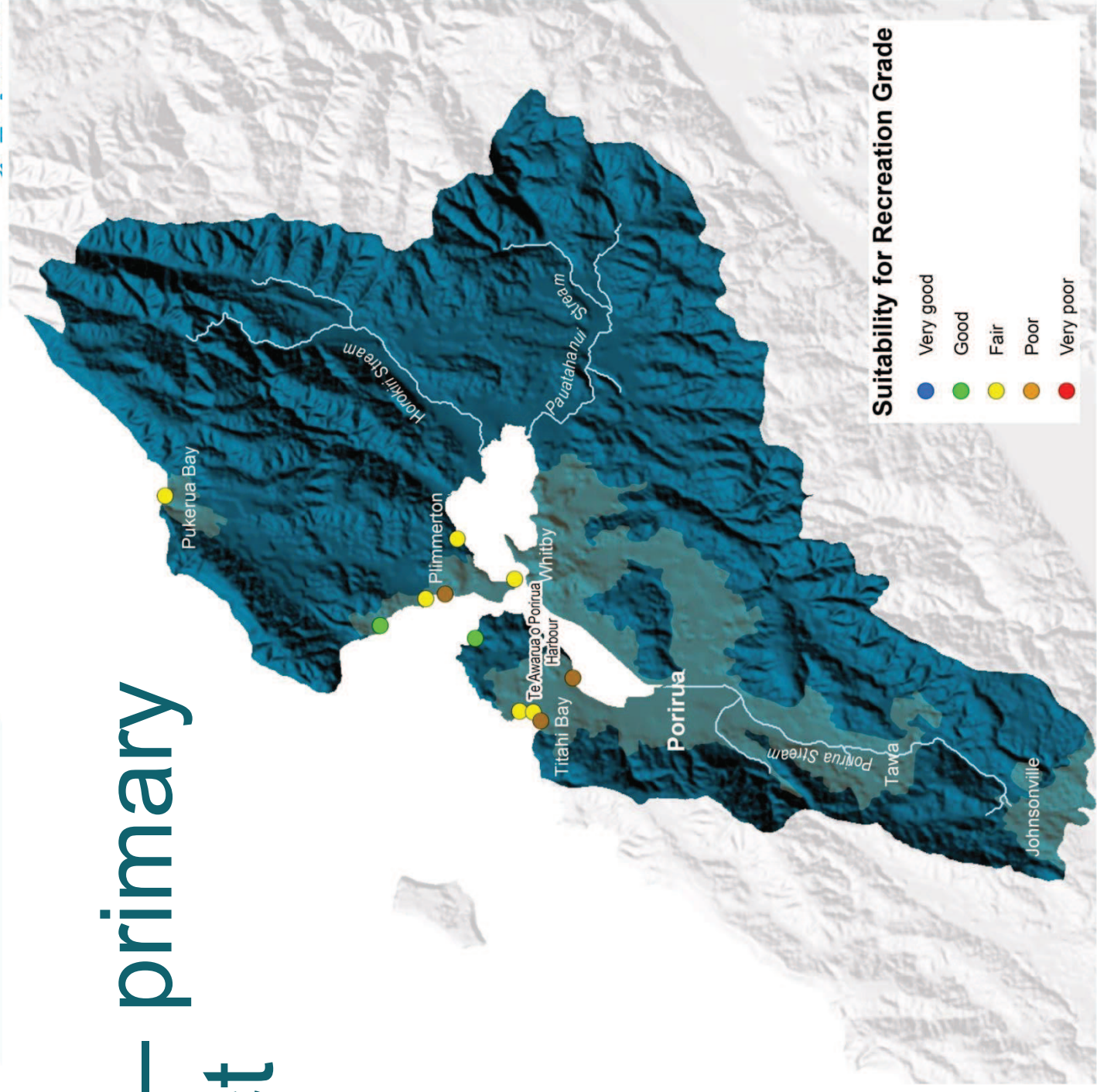
Water quality for human health



Streams – secondary contact

Site Name	<i>E. coli</i> (cfu/100mL) median	NPS-FM secondary contact band	Risk of infection
Horokiri Stream at Snodgrass	385	B	Low (<1%)
Pauatahanui Stream at Elmwood	335	B	Low (<1%)
Porirua Stream at Glenside	430	B	Low (<1%)
Porirua Stream at Wall Park	1,600	D	High (>5%)

Coast – primary contact

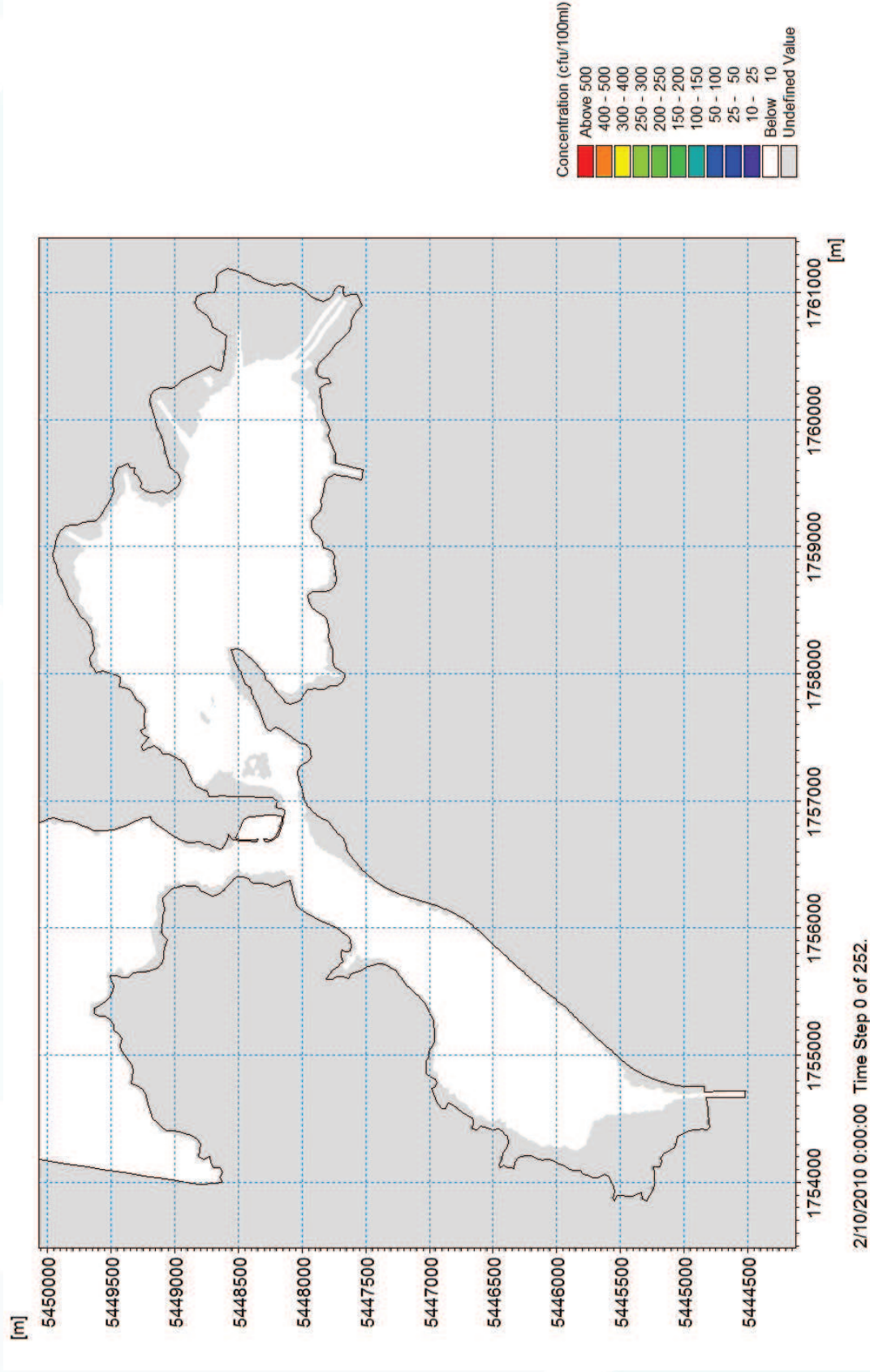


Are shellfish safe to eat?

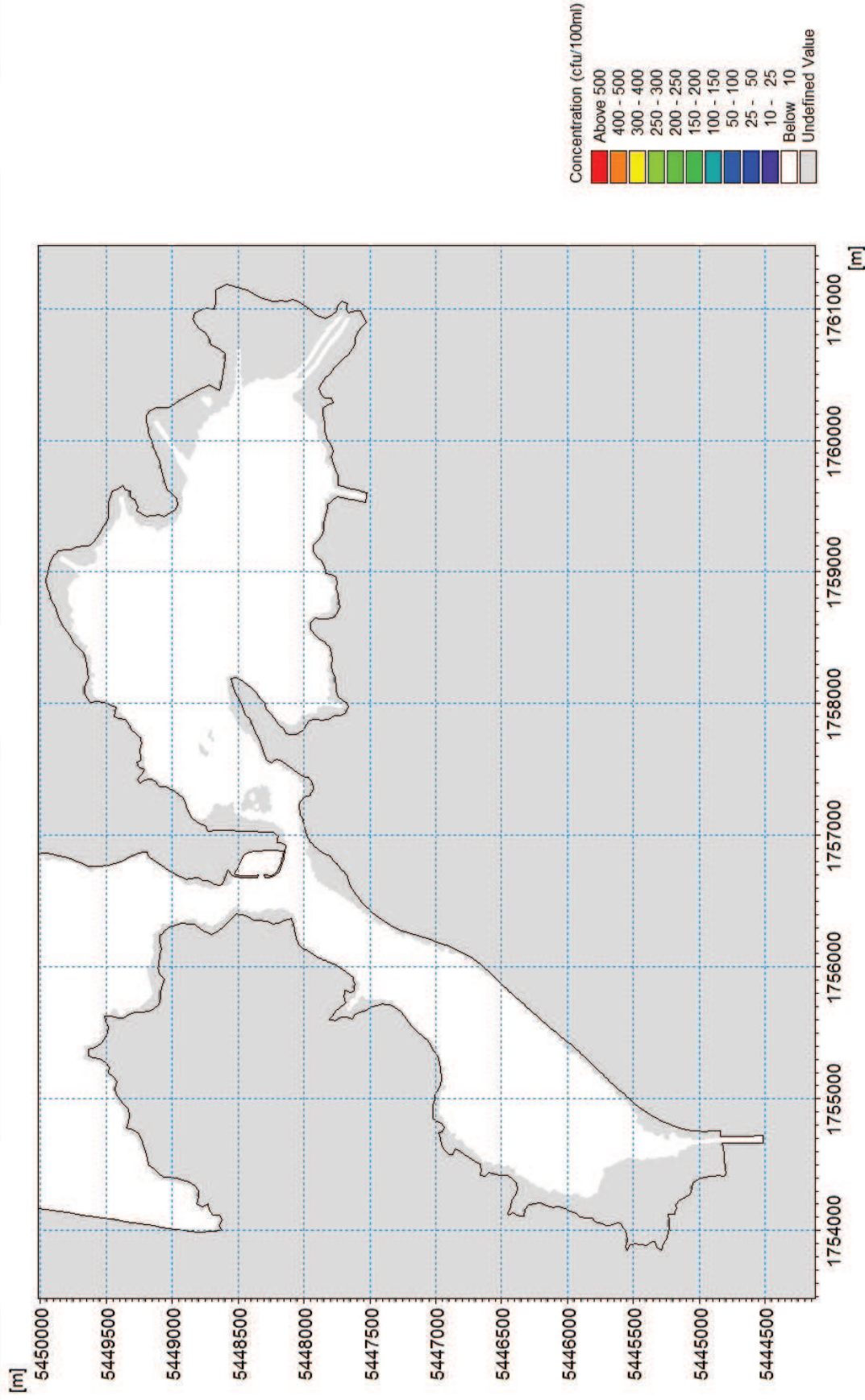
- Uncertainty around guidelines
- Poor relationship between indicator bacteria and pathogens eg viruses
- General advice = shellfish from inner harbour are unsafe to eat



Faecal contaminant modelling



Faecal contaminant modelling (2)



Human health – key points

- Some streams unsuitable for secondary contact
- Some coastal sites graded poor for primary contact
- Poor water quality in streams and coast linked to sewer and stormwater discharges

The challenge

- The freshwater and marine environments inextricably linked, so..
- How do you set limits that will protect both of these environments?

