



Habitats of Rangatira Reef

How might a breakwater effect the reef?

Shade Smith

Prepared for Napier City Council

Rangatira Reef

- Patch reef complex of boulders/cobbles
- 5.5ha of intertidal and subtidal reef area
- Highly dynamic, physically dominated environment
- High species diversity
- Widely valued reef system



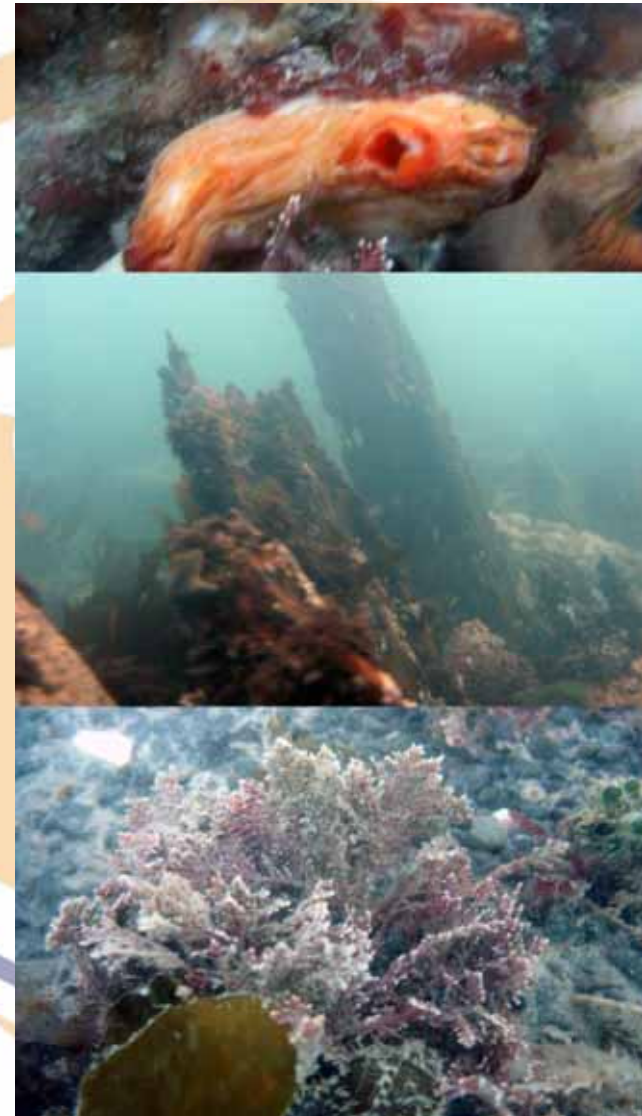
Introduction

- Sth Westshore coastal protection programme
- Ecological implications for Rangatira Reef
- Classification & mapping of habitats
- Assessment of Environmental Effects



Research Aims

- What habitats comprise subtidal Rangatira Reef?
- How can these habitats be characterised?
- Where do these habitats occur?
- What are the likely effects of a breakwater on the reef?

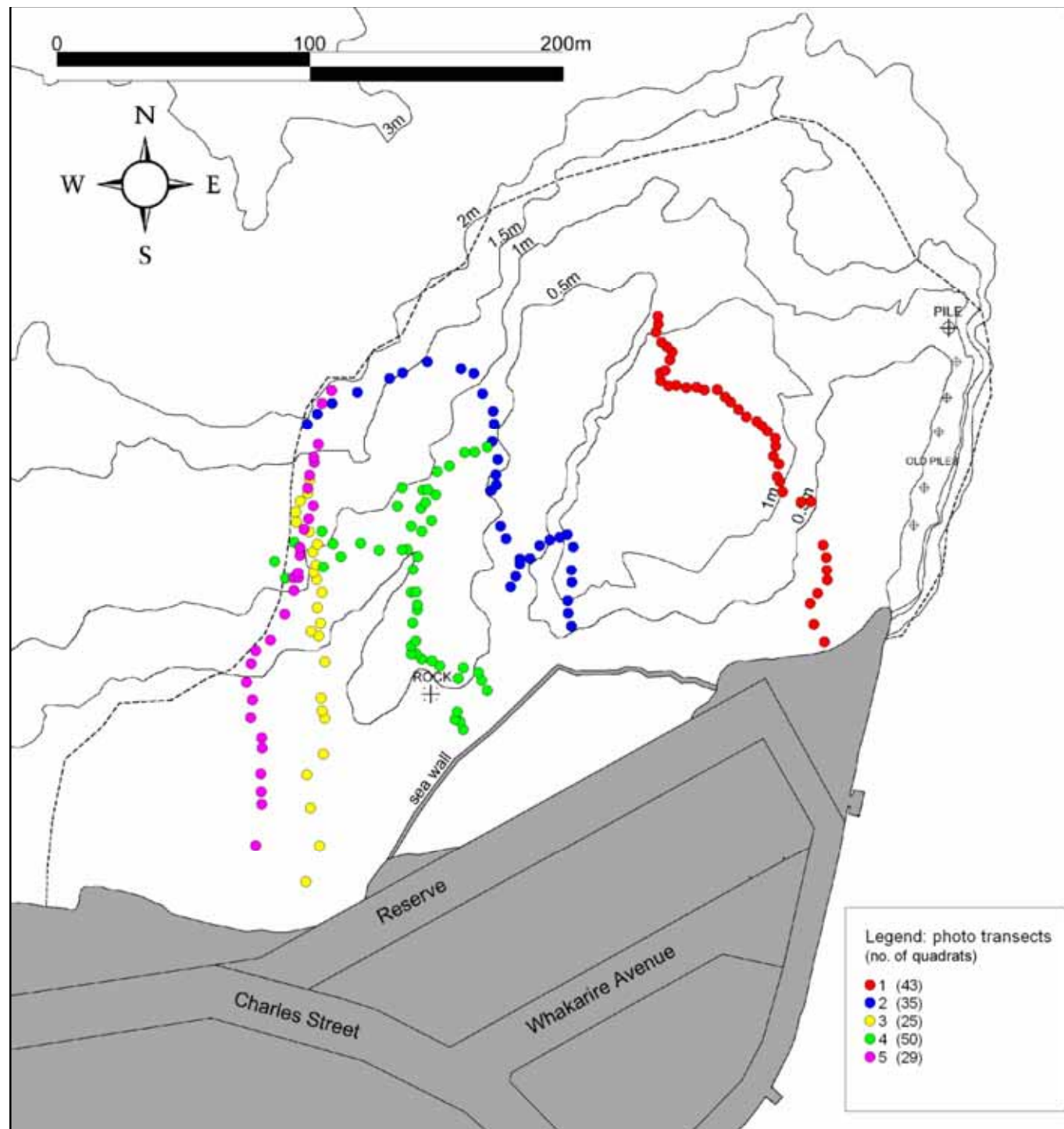


Methodology

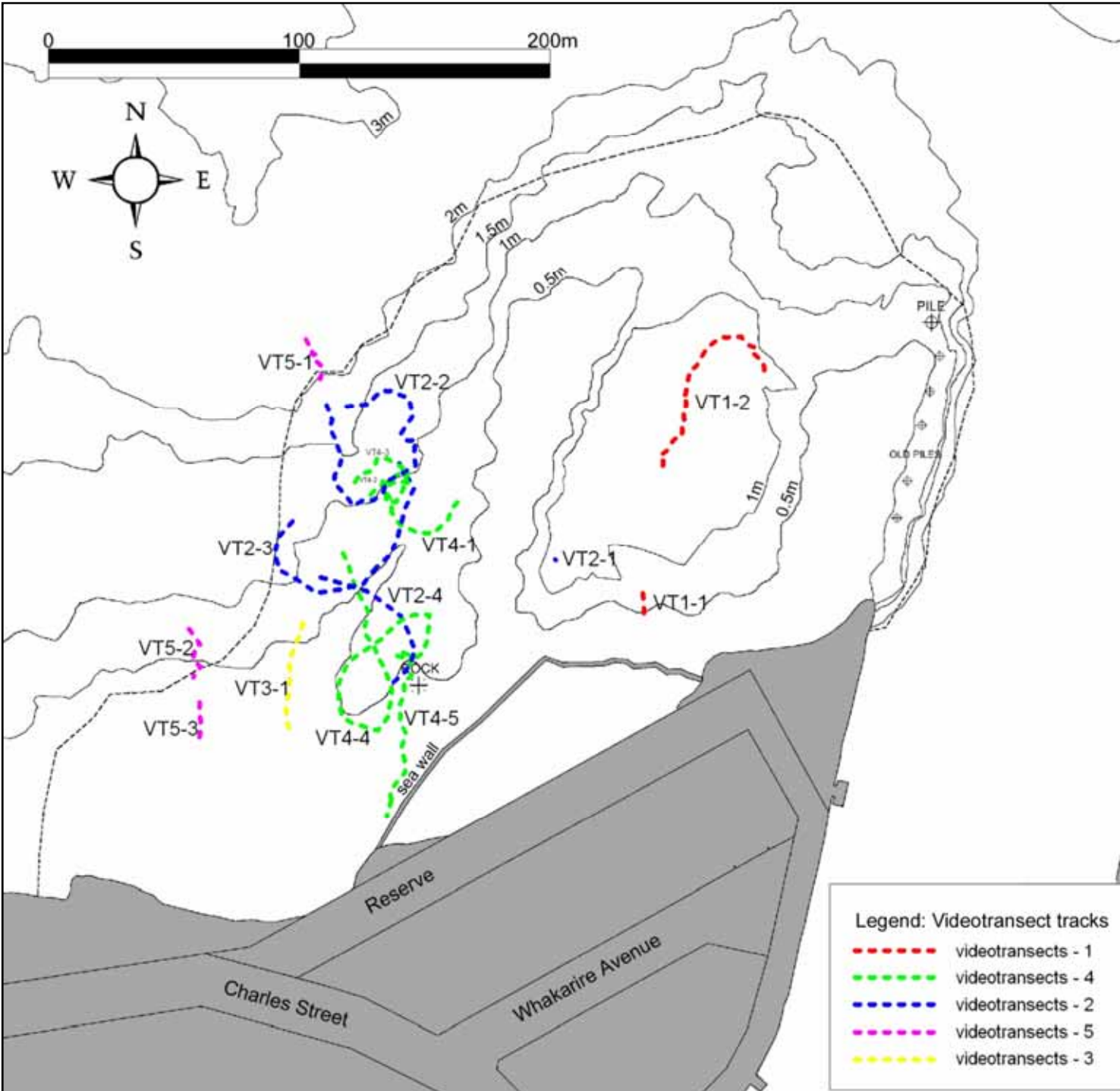
- Underwater survey with integrated GPS location data – GIS approach
- Digital photo and video transects of reef
- 0.25m² quadrats used to assess habitat types (n = 182)
- Habitat map produced using interpolation of photopoints



Photo transects



Video transects



Results

- High species diversity in general
- Reef complex variously comprised of cobbles, pebbles, gravel, sand and mud
- 6 representative habitat types identified
 - Turfing algae
 - Encrusting invertebrate
 - Shallow *Carpophyllum*
 - Cobbles
 - Sand
 - Red foliose algae

Cobble (CO)

- Generally in shallower areas
- Unstable, high levels of agitation
- Crustose coralline algae
- High cover of bare rock and sand
- Large brown algae generally absent
- c. < 0.5m diam. cobbles



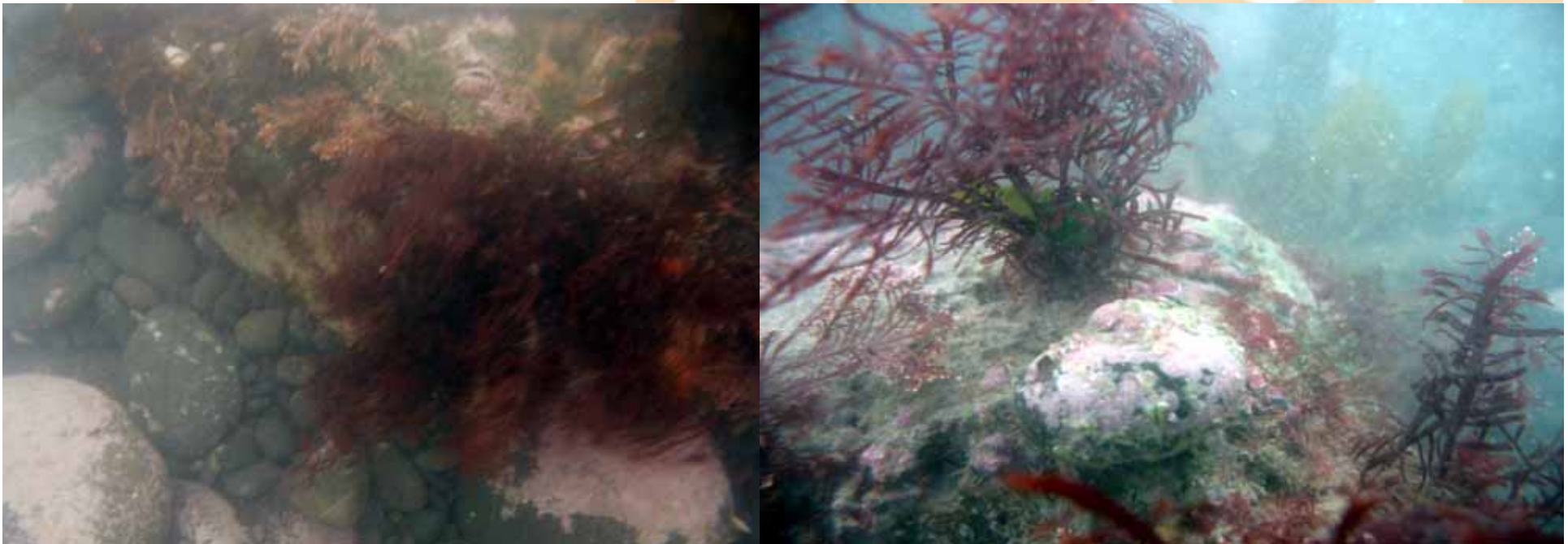
Sand (SA)

- Generally occurs in shallower areas
- Absence of hard reef substrate
- Coarse sand dominant
- Rippled - indicative of high mobility
- Few macrofaunal species



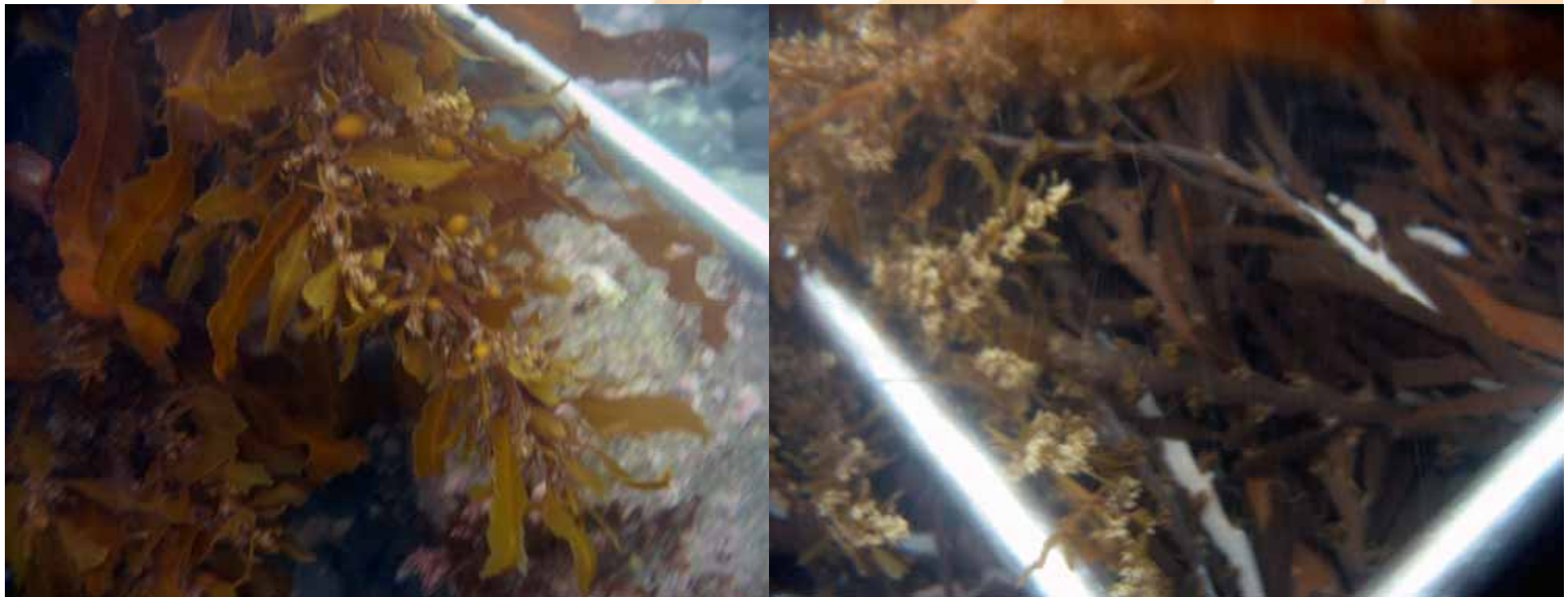
Red Foliose algae (RF)

- Substratum predominantly covered by red foliose algae
- Karengo (*Porphyra* sp.) and *Pterocladia lucida*
- Low numbers of large brown algae
- Reef substratum mainly boulders with some cobbles



Shallow *Carpophyllum* (SC)

- Dominated by *Carpophyllum maschalocarpum*.
- *Cystophora* spp. also common
- Substratum mainly stable aggregations of cobbles and pebbles



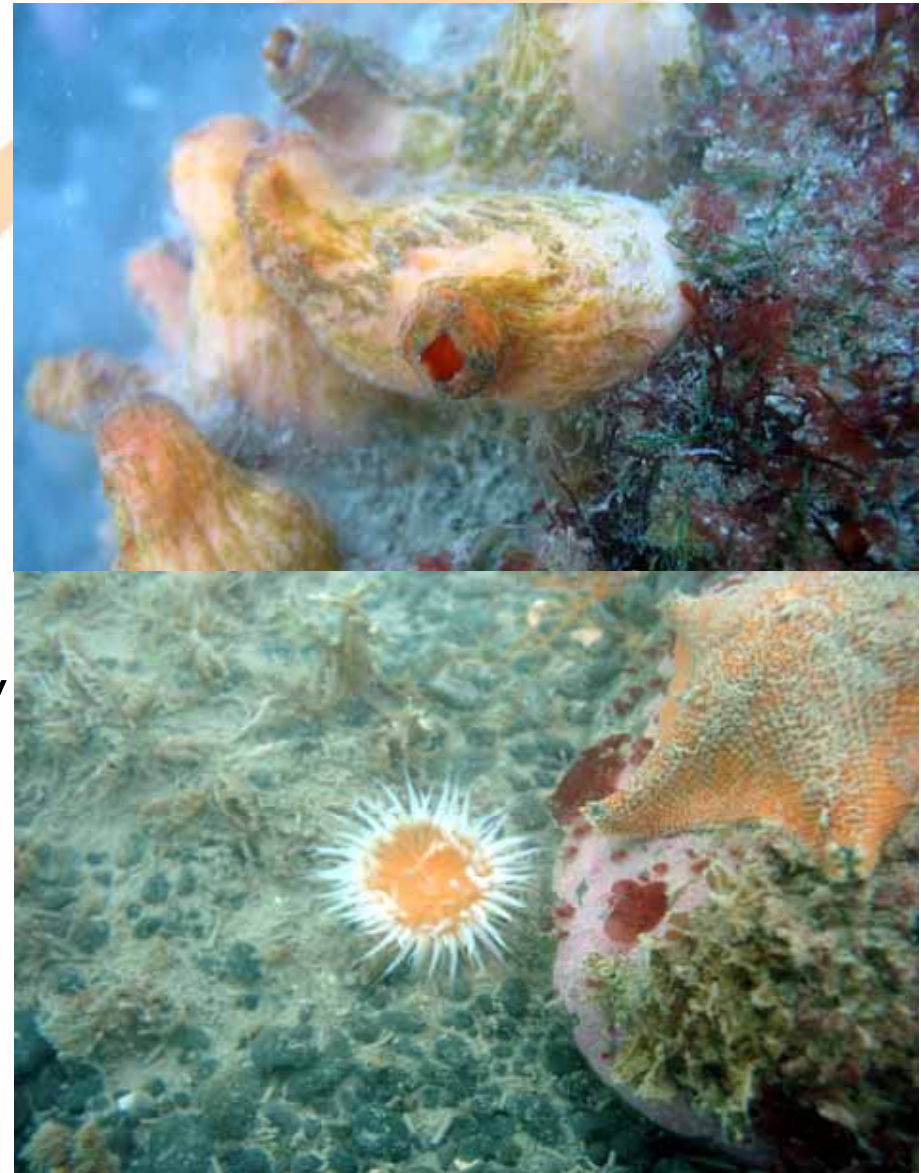
Turfing Algae (TA)

- Turfing algae (e.g. articulated corallines) >30% cover
- Low numbers of large brown algae
- Reef substratum mainly pebbles and gravel with few cobbles

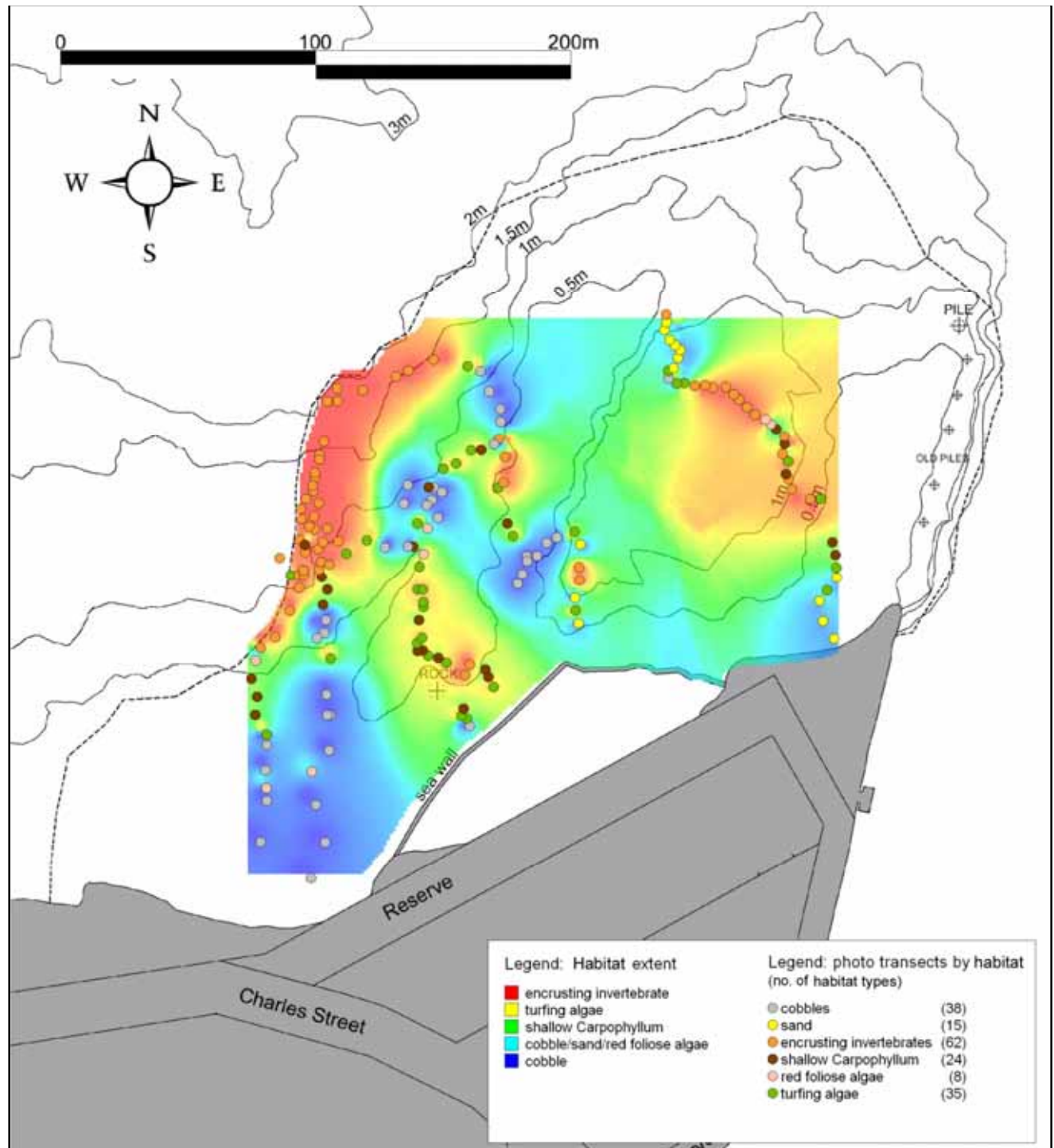


Encrusting invertebrate (EI)

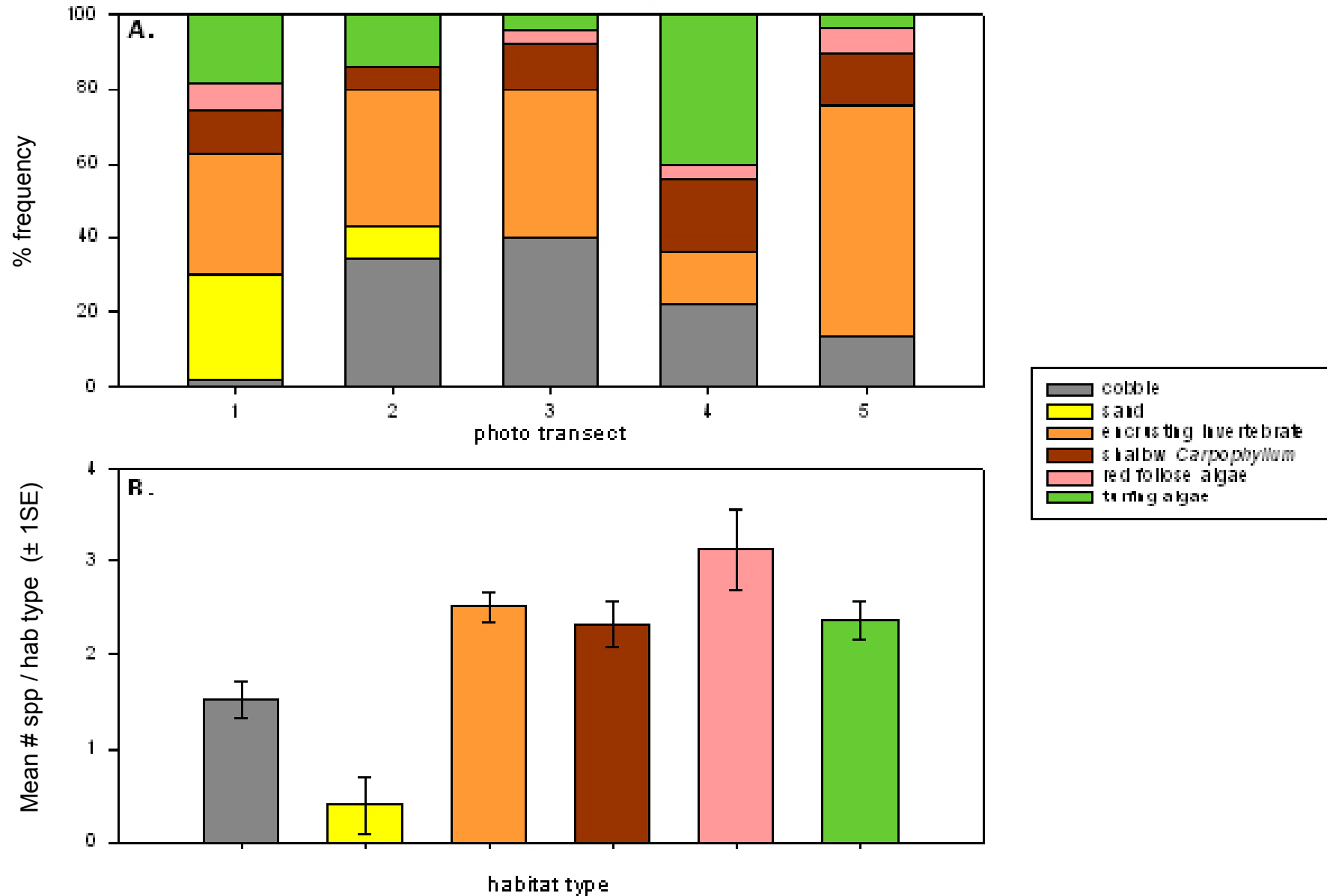
- Substratum mainly covered with ascidians/anemones
- Horse mussels common
- Large brown algae absent
- reef substratum: gravelly mud interspersed with cobbles
- Generally occurs in deeper areas



Habitat locations



Habitat frequency & diversity



Summary

- Physically dominated, frequently disturbed environment
- Elevated species diversity among SC, RF, TA and EI habitats
- General ordering of habitats along gradients of disturbance frequency and intensity

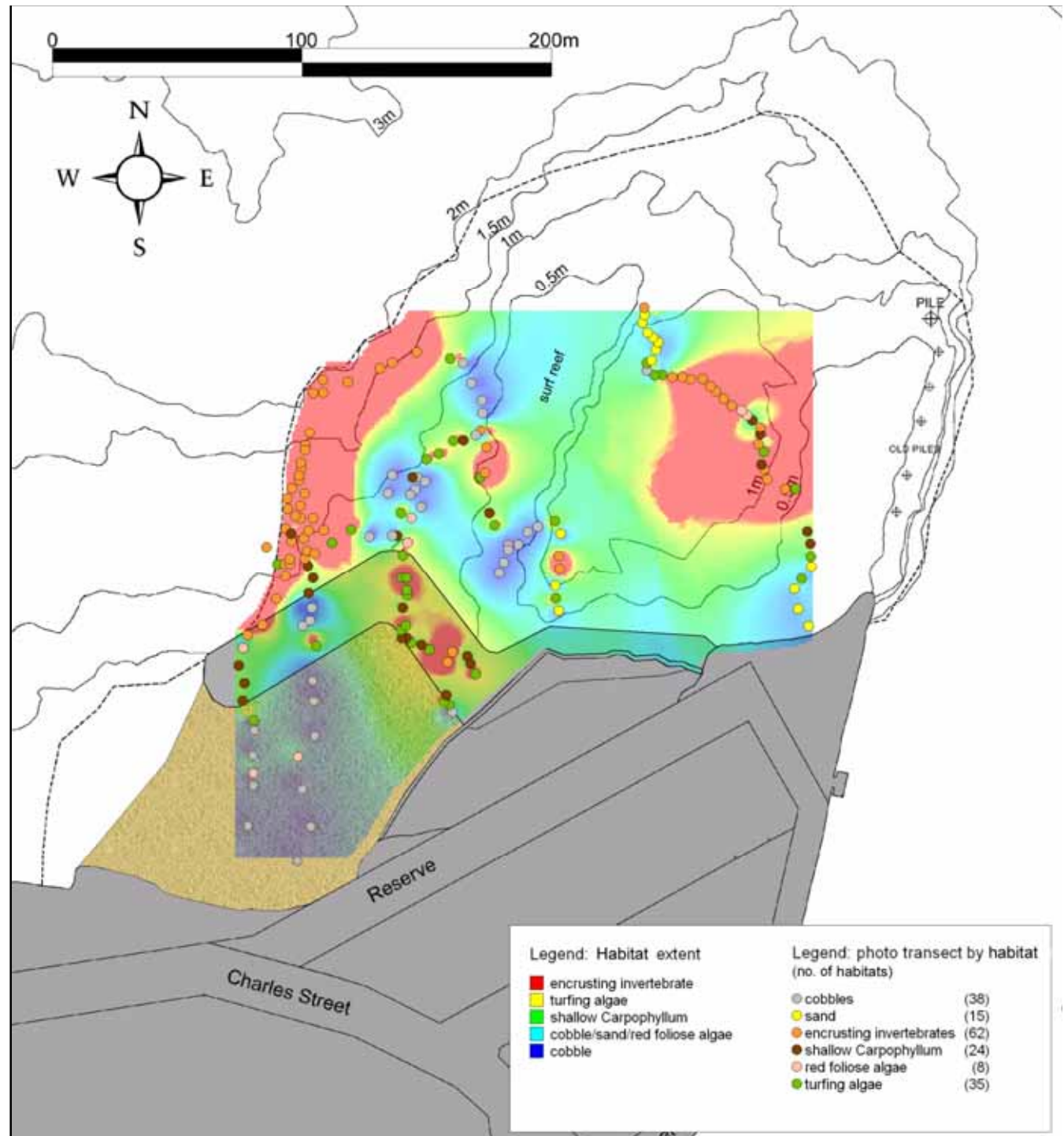
Atrina zelandica (Horse mussel) beds

- Habitat modifier
 - Refugia for juvenile fish
 - Alters boundary flows
 - Source of biodeposits
- Beds may potentially incr. abundance and species richness

Atrina bed.wmv



Breakwater Proposal



Breakwater Effects

- Significant area of reef lost to breakwater and created beach

	Area (m ²)	Relative area of the reef lost (Rangatira Reef = 54,930 m ²)
Proposed Breakwater	4,320	7.9%
Created beach	9,586	17.5%
Total	13,906	25.4%

Breakwater effects

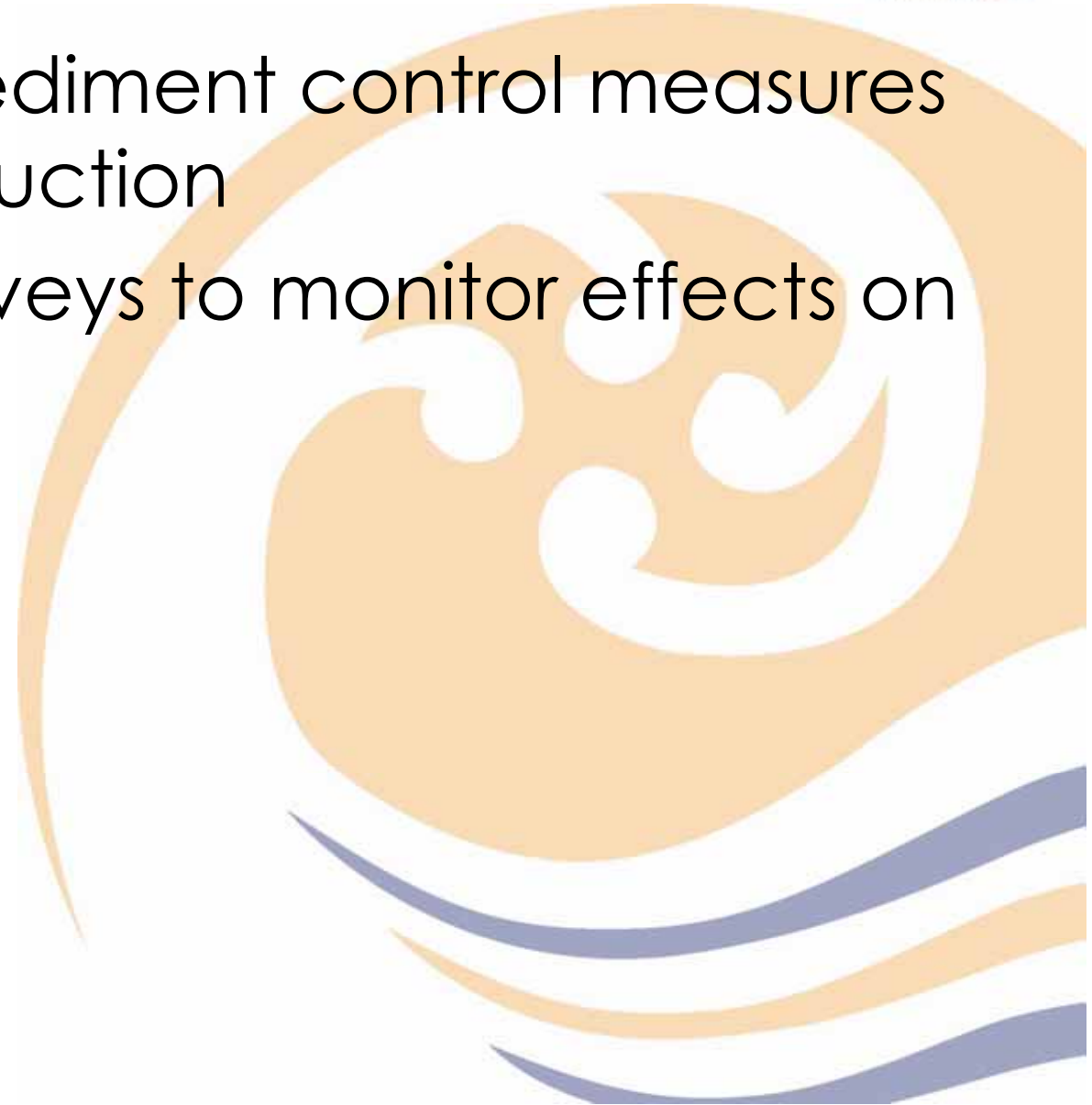
- Cobble habitat loss likely to be largest
- Some direct loss of SC, TA, RF, and EI habitat including an *Atrina* bed
- Re-ordering of habitats along margin of breakwater over time
- Some sediment related effects likely during construction

Effects Assessment

- Significant loss of habitat
- Biodiversity loss considered minor
 - Surveyed species common on neighbouring reefs
- Low risk of sediment related problems during construction
 - Highly dynamic environment results in high sediment mobility

Response measures

- Implement sediment control measures during construction
- Follow up surveys to monitor effects on ecology



Conclusions

- Rangatira Reef is a valued and unique resource
- A significant area of habitats will be lost with the construction of a breakwater
- Effects on benthic ecology are likely to be minor if habitats can re-establish over time