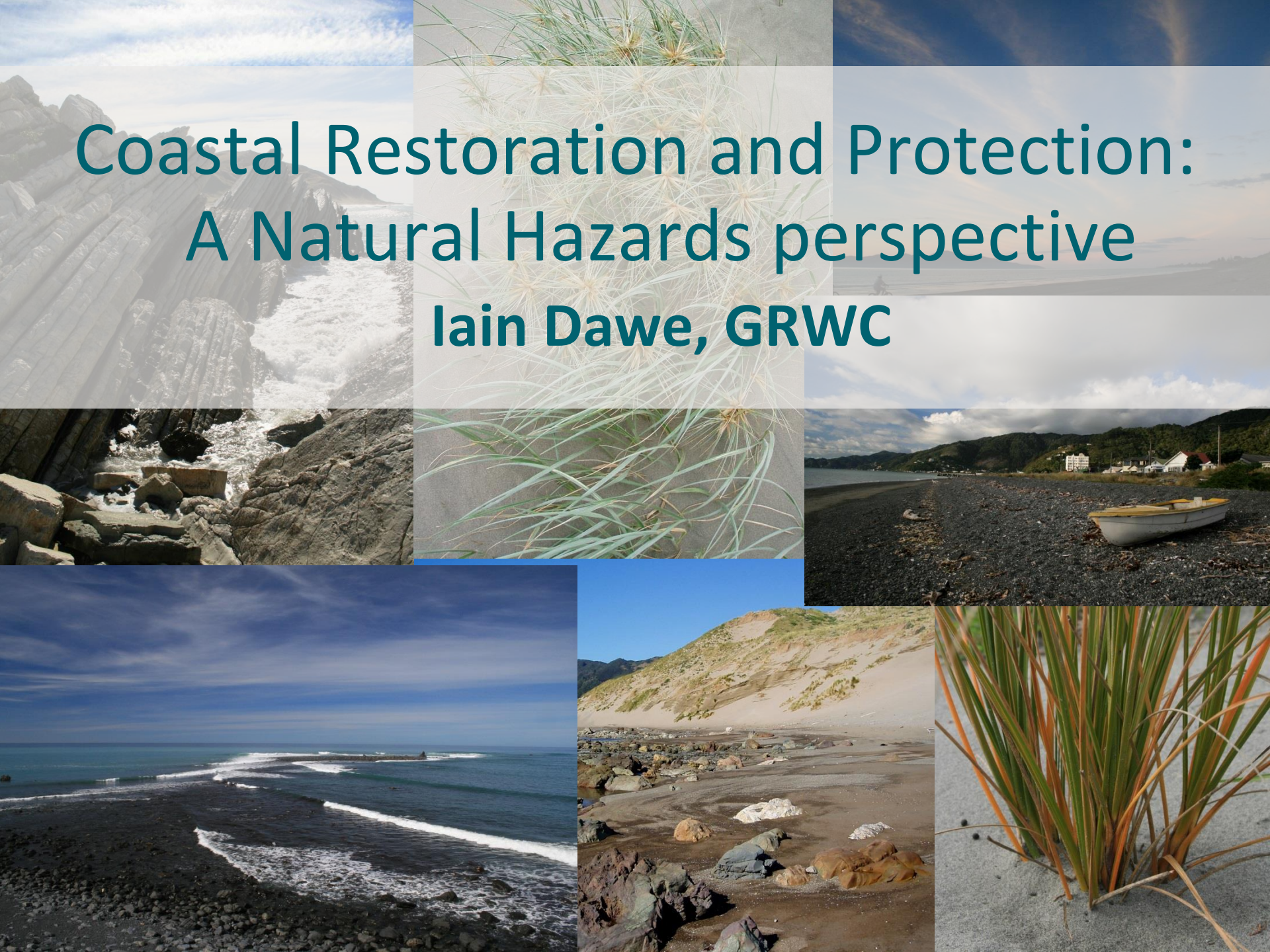


Coastal Restoration and Protection: A Natural Hazards perspective

Iain Dawe, GRWC



Coastal Beauty Losing Battle

Against

Ugly Sprawl

By **SUSAN WOODHOUSE**
Herald Staff Correspondent

Pressure for the development of land on the east coast of the North Island from Tauranga to the Bay of Islands is increasing steadily.

Warm temperatures and ready access to a coastline of interest and beauty are causing more rapid development than on any other ocean-washed part of the country.

Students of the environment have warned us that our beaches are a diminishing resource. A balance should be sought to restrain local greed from gobbling up the coastline. The tranquillity and natural beauty of untouched beaches are irretrievable once the subdivider moves in. Uncontrolled development could leave us with very little land worth

D. A. Thom, deputy chairman of the Environmental Council. "People from a distance use roads to the coast during the summer. The developer comes along with a proposal to subdivide and the local bodies are tempted by the prospect of funds from the extra rates for road maintenance and other services.

"The weakness here is national policy and the availability of money. In order to make objective decisions on land development the local authorities should have guidance in expressed national policies and financial



The New Zealand Herald Report: Shellfish

near the intersection of the oxidation ponds at Orewa

a risk in bay

A SHORELINE FOR SHARING

In one way and another, the shoreline commands a regular place in the news. For an isthmus city, where the variant tides of two oceans wash twin harbours, it is legitimately a matter for vigilance or concern. Perhaps no other city on the map can claim a longer stretch of beach and coast within a score of miles.

To miles add variety . . . the ruggedness of Piha contrasting with the gentleness of the beaches of the Gulf . . . beaches east and beaches west . . . facing north, facing south, whatever the wind and sun may be. Such wealth might lead to carelessness. Today must think of tomorrow

of Western civilisation, is fortunate to see both warning and example take shape in older and much more crowded

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has islar bays the Sub

It would be unwise to eat uncooked shellfish gathered from the beach at Stanmore Bay, says Auckland analyst Dr T. J. Spratt in a report prepared for the Auckland

taken are heavily contaminated by organic matter which could come from septic tank effluent and also from surface run-off.

The samples were taken

Keep sewage off Coast, says critic

Stanmore Bay sewage opponent Mr W. A. Subritzky said today he does not favour piping effluent into Arles Bay or any other Hibiscus Coast beach.

"I am opposed to package

permanent plant on the end of the peninsula to be discharged into the Tiri Channel.

"We have passed resolutions to this effect at meetings attended by residents

oxidation ponds in the Orewa River began to discharge more than 2000ft off Orewa and Red beaches just before Christmas, said a Waitemata County Council spokesman today

ponds are part of a million sewerage scheme Orewa and Red Beach re; which has been approved by the Water Allocation Council, and which was started late last year. Council spokesmen have said 16 ponds will be able to handle sewage for discharge to 30 days. Sewage would only be discharged when the wind was from the offshore. The scheme is designed for a population of 26,000, and the ponds cover 26 of estuary.

The protection of sandhills and trees is important."

In Britain and California new coastal commissions are proving effective in controlling coastal development. There should be such bodies in New Zealand which would have wide planning power and an income with which they could buy, administer and develop reserves for holidaymakers.

"We should examine the ecology of the area and then decide whether development is justified. A serious fault in the system is the lack of skilled planning to assist local authorities."

Mr Thom says: "Ac-

Professor Urges New Look At Coastal Planning

Responsibility for coastline planning should ultimately be removed from the counties to a body which was less dependent on local opinion and ratepayer support, according to Professor J. E. Morton.

He also believes that the onus should be clearly on a developer to show why — taking the widest view of the public interest — any further coastal subdivision should be allowed.

The University of Auckland zoology professor aired these and other views in a letter delivered

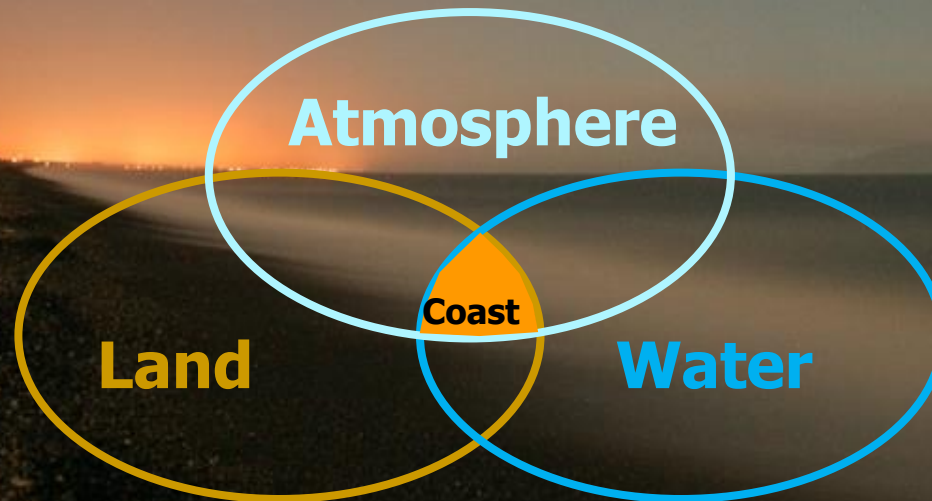
had already reached a point where sufficient coastline was set aside and zoned for residential subdivision.

• The provision for coastal

ment plan by professional consultants then follows its unifying course as the price the public must pay is correspondingly inflated."

Coastlines

- **Dynamic balance between the geology & sediments, climate, wave & current activity**
- **Results in natural changes in shoreline position & volume**
- **Cause of many legacy and current challenges**



Coastal Process vs Hazards

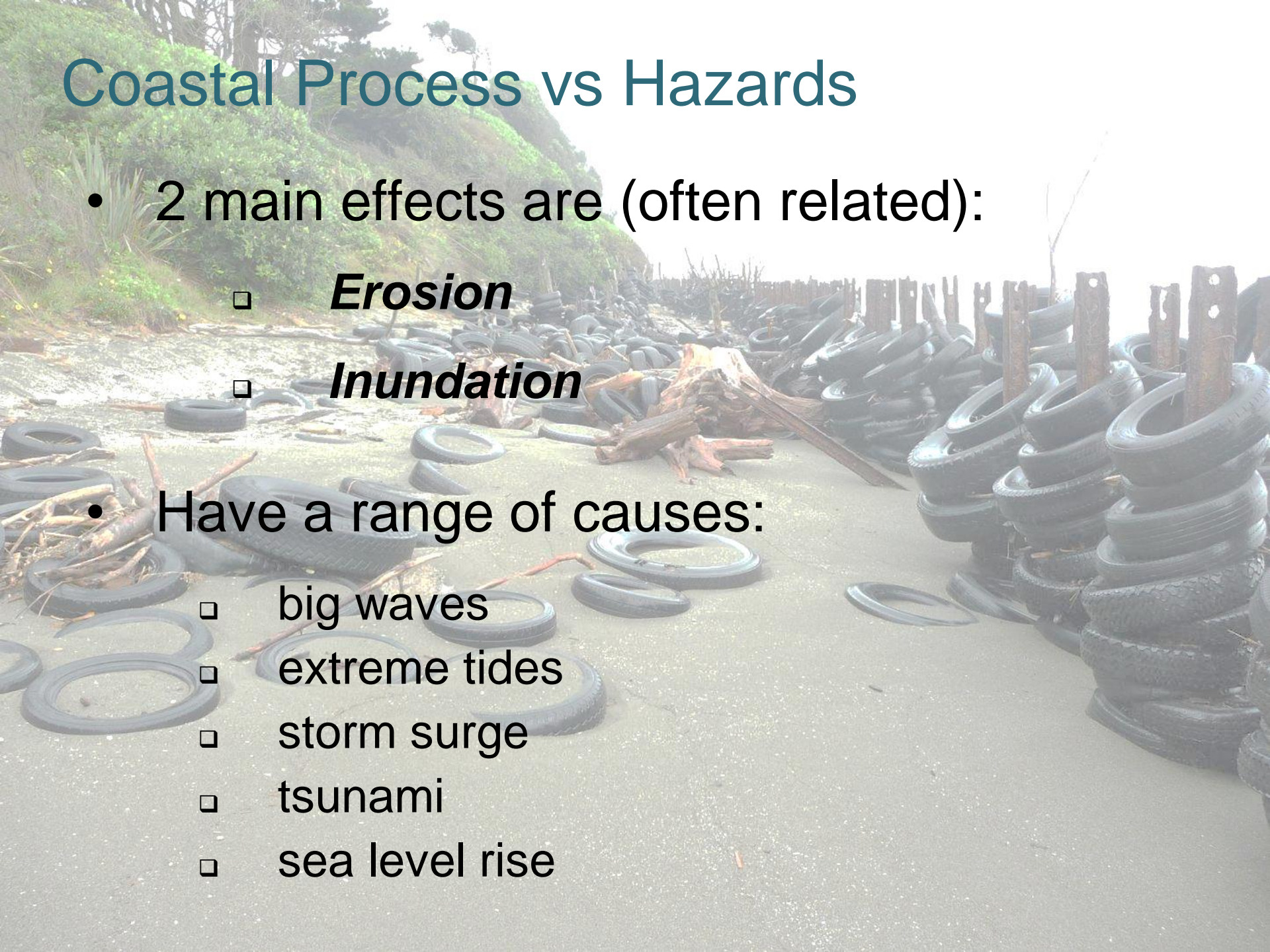
- 2 main effects are (often related):

- ***Erosion***

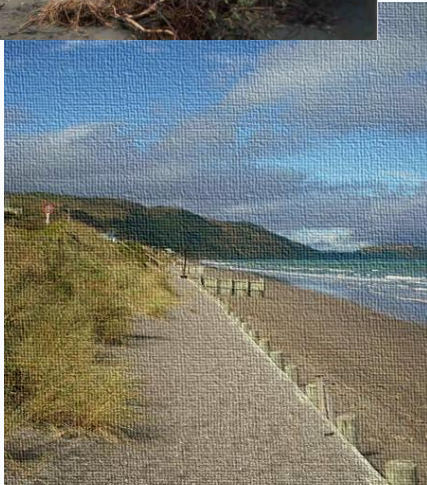
- ***Inundation***

- Have a range of causes:

- big waves
- extreme tides
- storm surge
- tsunami
- sea level rise



Coastal Erosion



- All beaches experience some erosion from time to time (natural fluctuations)
- Need to distinguish between long term erosion & short term events and potential human impacts
- Have different causes, leading to different management options
- Often an issue in cases of beach management
- Important to apply the correct response

Why does it matter?

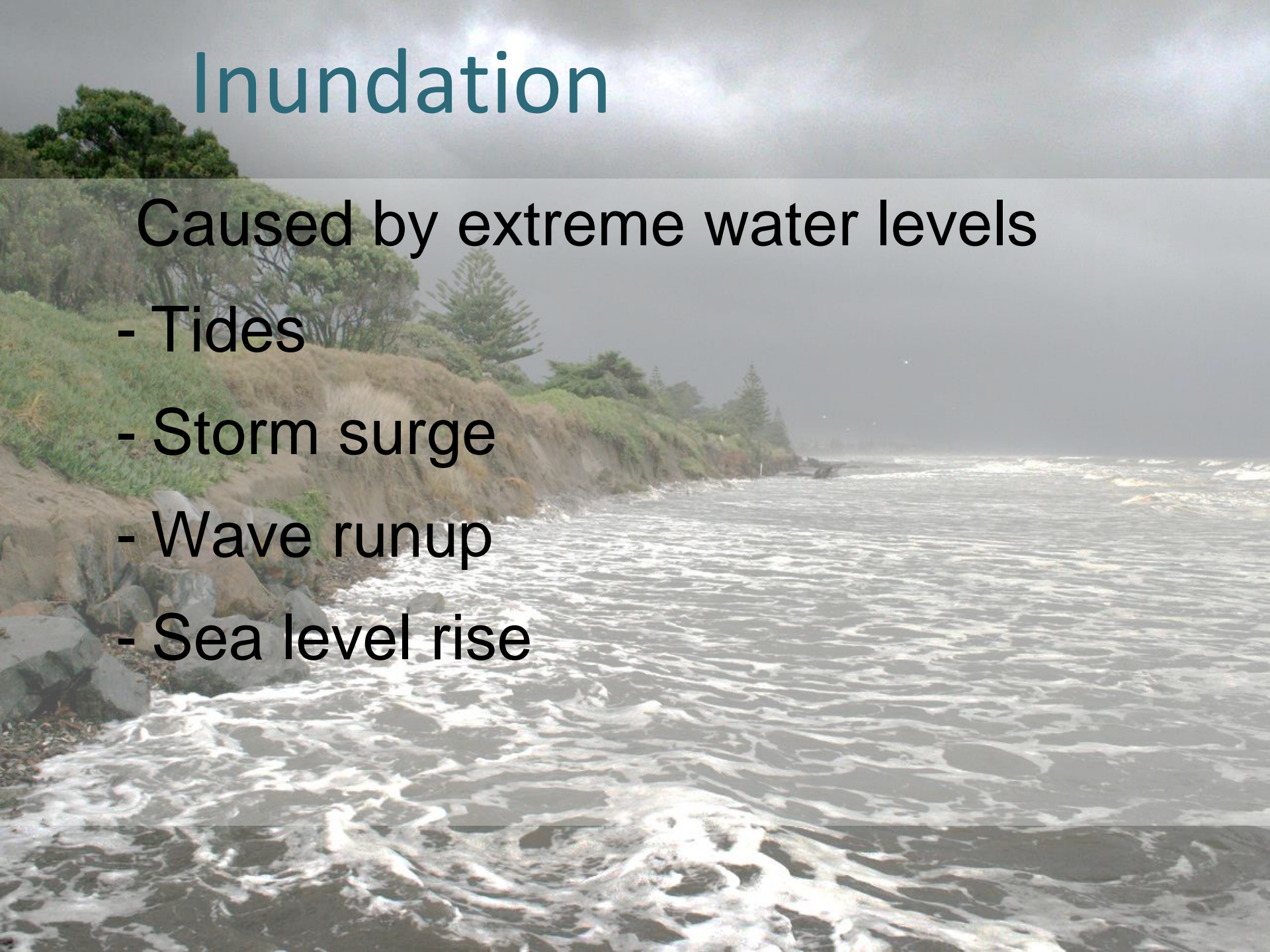
- Different problems require different solutions
- Mild erosion – Restoration planting and management controls
- Moderate erosion – Renourishment or soft engineering
- Severe erosion may require planning intervention and/or engineered structures as a last resort
- Requires community engagement



Inundation

Caused by extreme water levels

- Tides
- Storm surge
- Wave runup
- Sea level rise



Storm Surge

- Storm surge is a temporary elevation in sea level due to weather conditions
- It poses a risk to many low lying coastal areas
- The risk is increasing due to sea level rise



Storm Surge - Kāpiti



Sea surface elevation ~ 0.5 m above mean level due to storm surge effects

Result: Sea wall completely overtopped, heavy scouring in the backshore and damage to property and coastal infrastructure



Wave runup



Climatic sea level fluctuations

Annual seasonal heating and cooling of sea surface

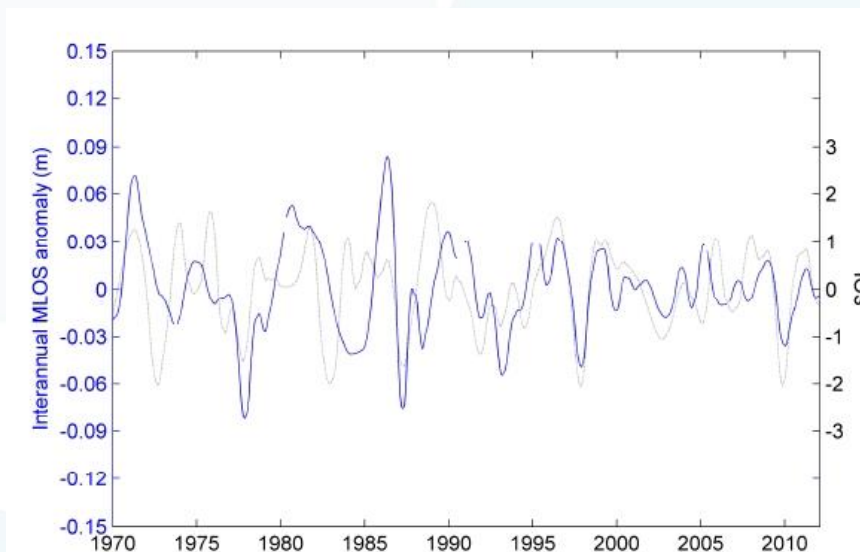
- highest levels in late autumn, lowest in early spring (± 3.5 cm)

Interannual El Nino/La Nina cycles (ENSO) (2-4 yrs)

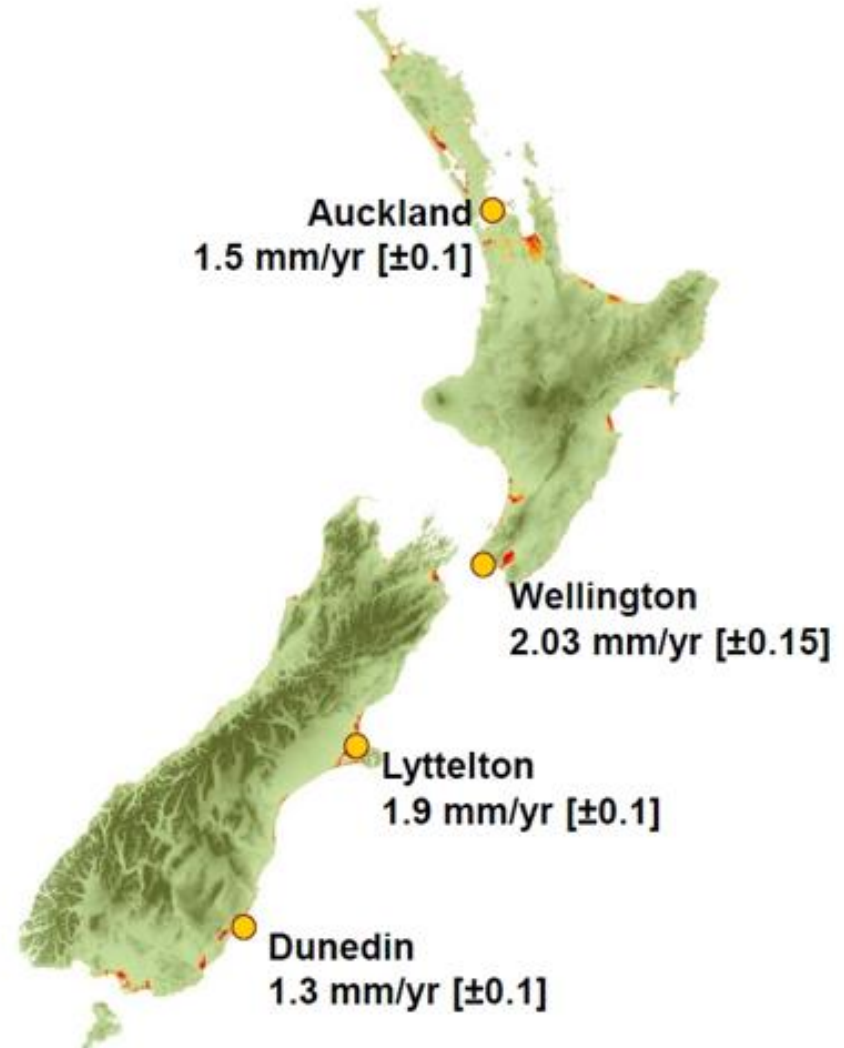
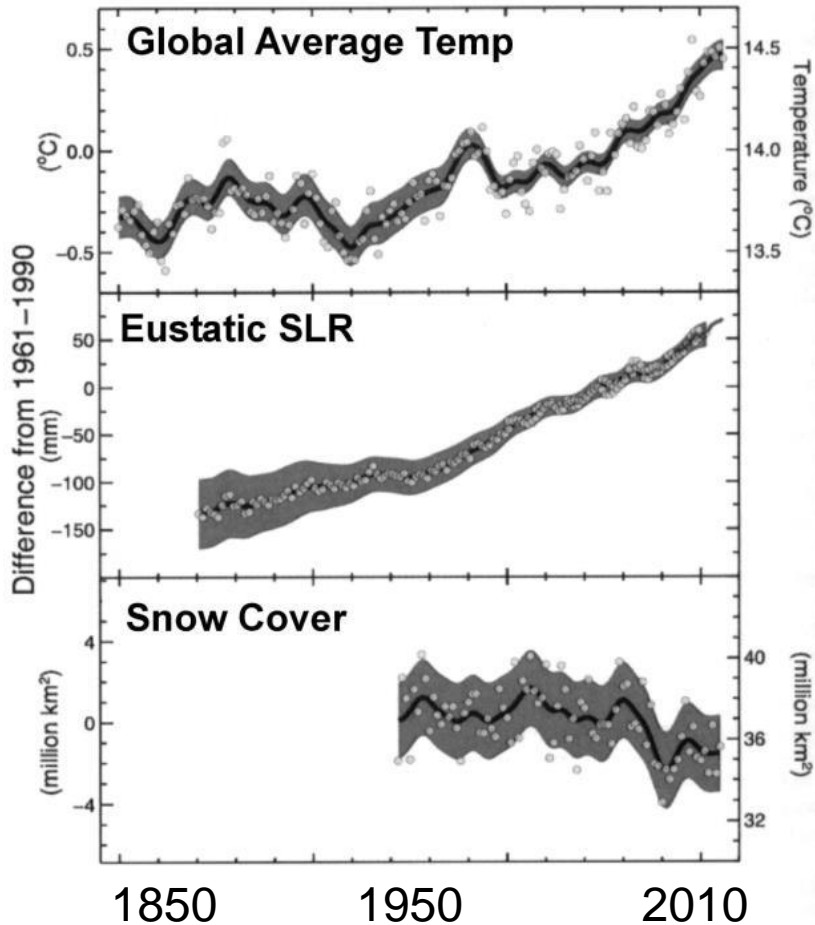
- sea levels lower during El Nino (cooler SSTs), higher during La Nina (warmer SSTs) (± 10 cm)

Interdecadal Pacific Oscillation (20-30 yrs)

- positive and negative phases, influences ENSO (± 5 cm)

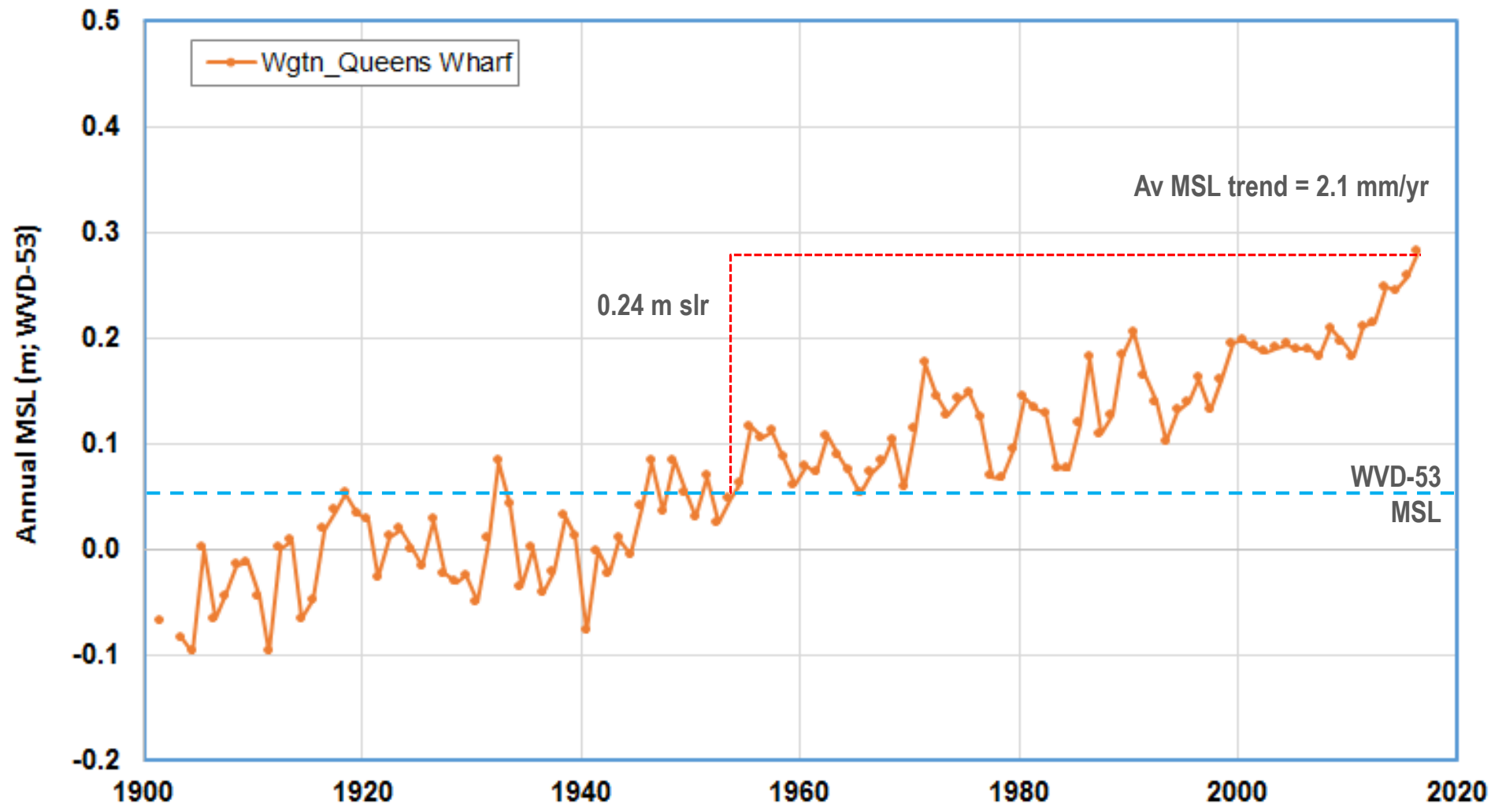


Sea Level Rise



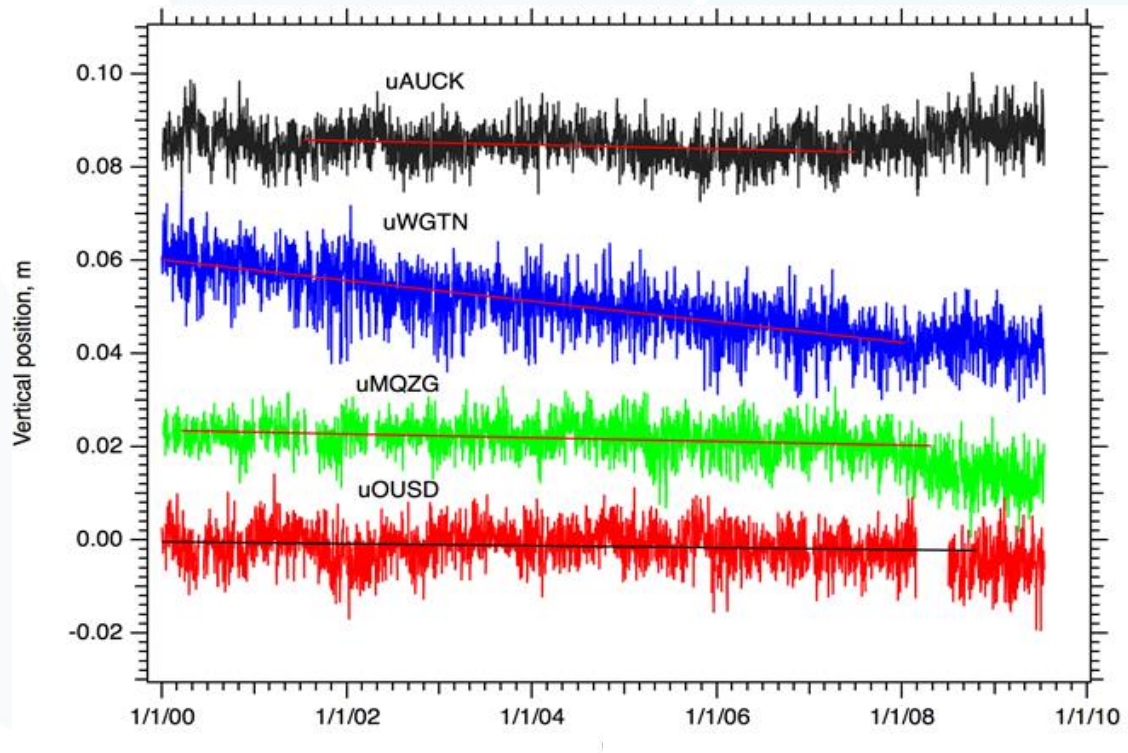
Wellington annual mean sea level trend

Annual MSL at Wellington relative to WVD-53 (1900 - 2016)



Relative sea level changes

Vertical land movement from slow slip earthquake events and tectonic subsidence

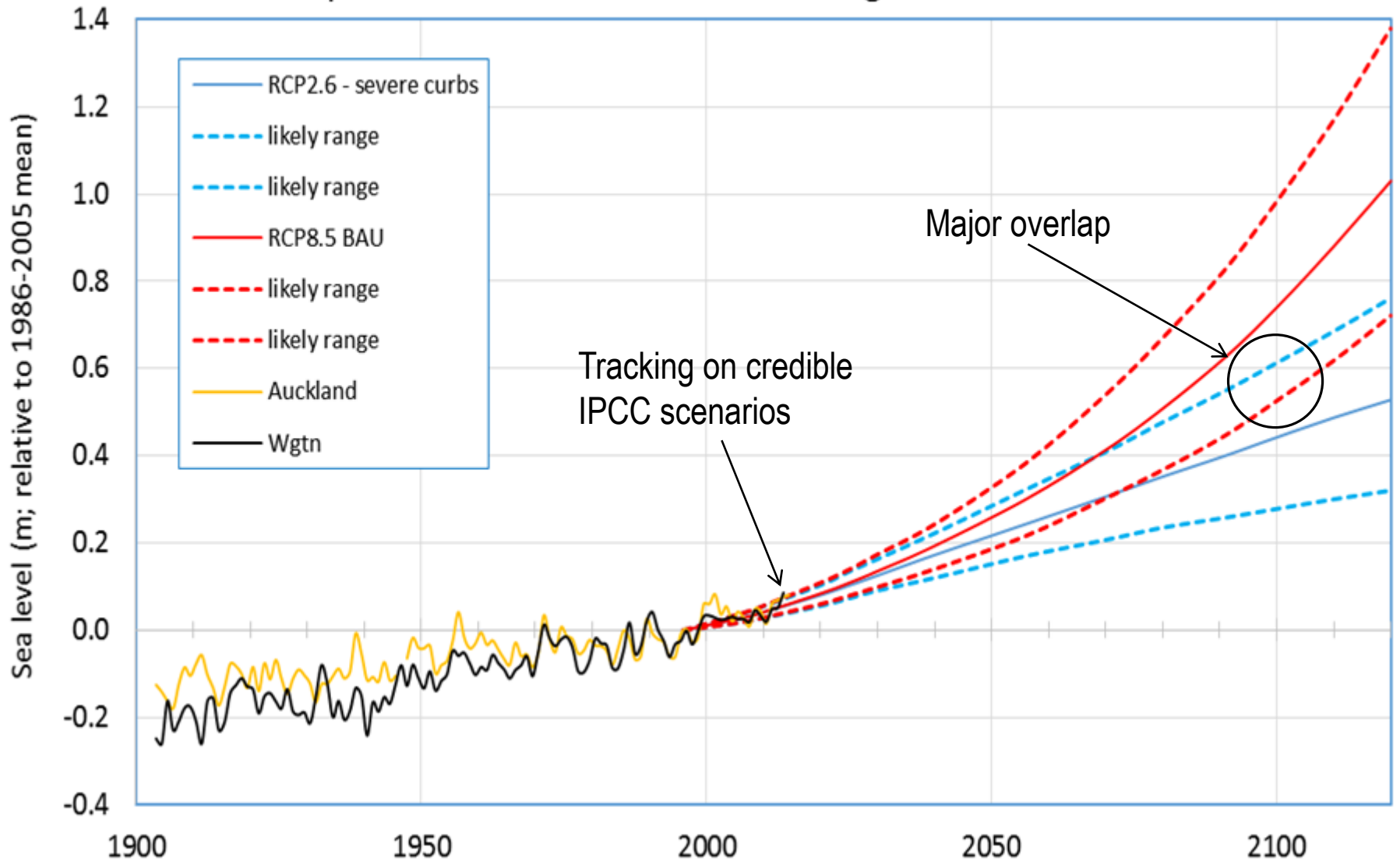


Wellington
-1.7 mm/yr

Ranges from -1 to -3 mm/yr for region since at least 2000
relative sea level rise is temporarily double long term average

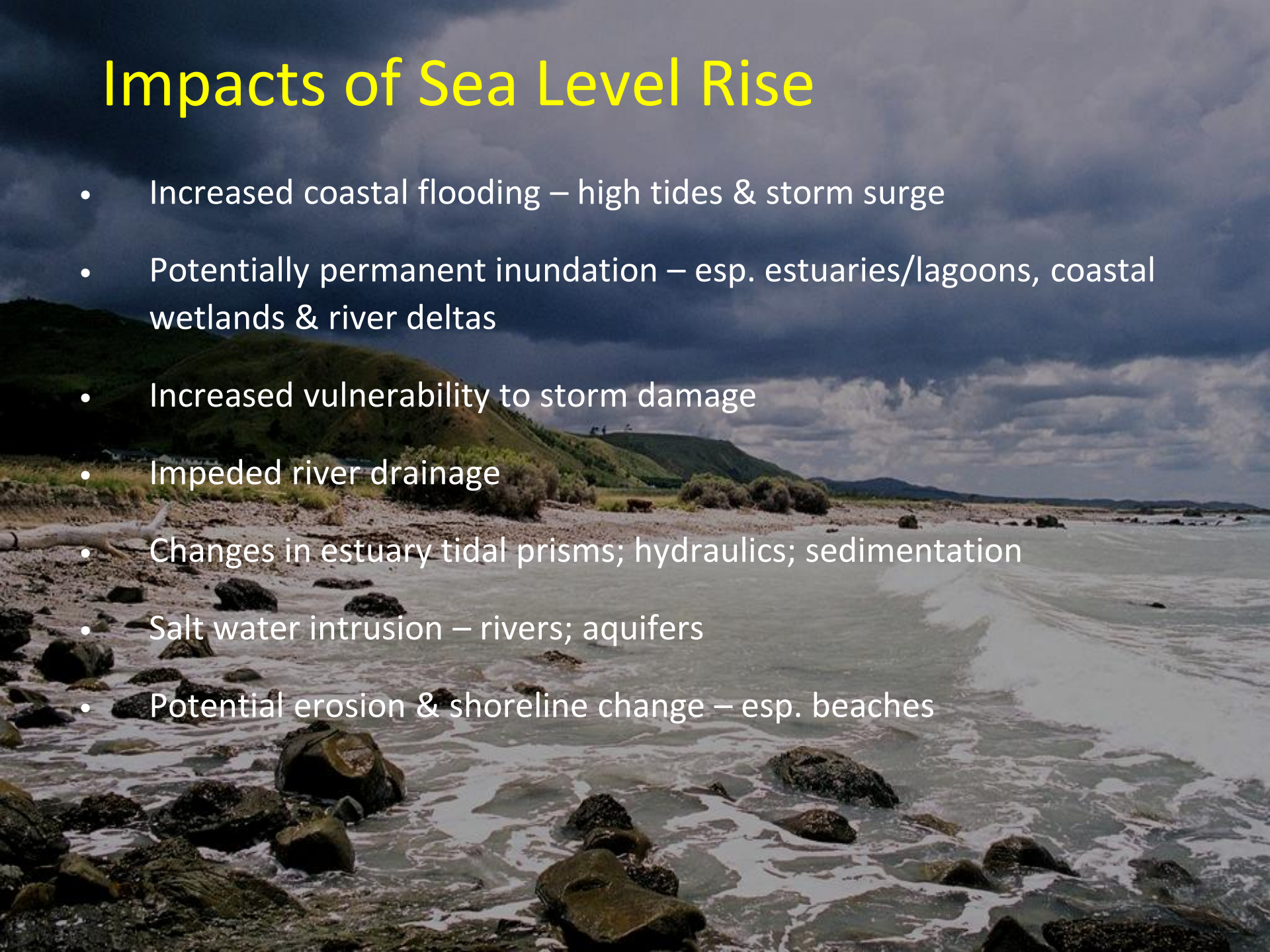
IPCC projections (RCP2.6 and RCP 8.5) in NZ

AR5 global mean sea-level projections extended to 2120 (RCP2.6 & RCP8.5)
spliced with annual MSL from Wellington and Auckland



Impacts of Sea Level Rise

- Increased coastal flooding – high tides & storm surge
- Potentially permanent inundation – esp. estuaries/lagoons, coastal wetlands & river deltas
- Increased vulnerability to storm damage
- Impeded river drainage
- Changes in estuary tidal prisms; hydraulics; sedimentation
- Salt water intrusion – rivers; aquifers
- Potential erosion & shoreline change – esp. beaches



Coastal squeeze



Prograding or stable shorelines



- May continue to grow or remain stable
- Good options for soft management but needs the community
- Require careful management of development pressures

Engineered shorelines



- Uncertain future...
- Continue to protect at what cost?
- Beach nourishment or managed retreat

Eroding shorelines

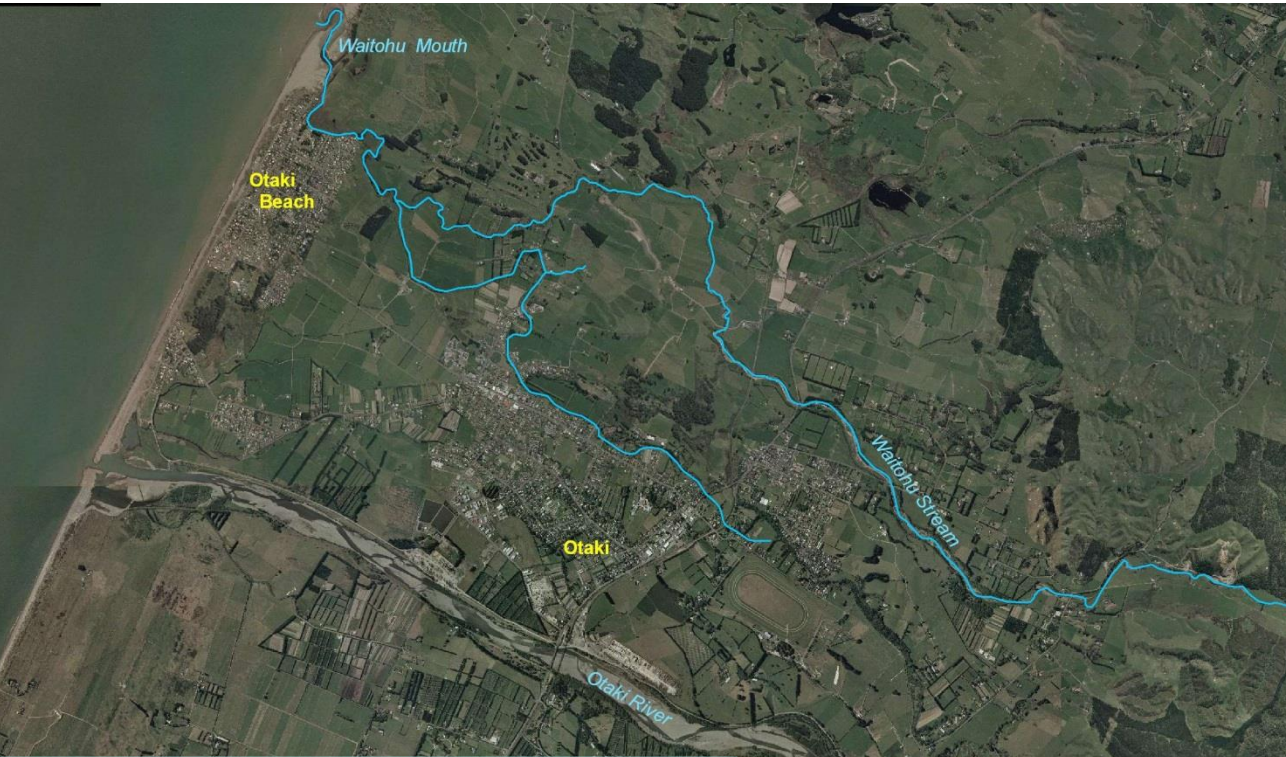


- Options limited especially with pre-existing development
- Unmanaged retreat?

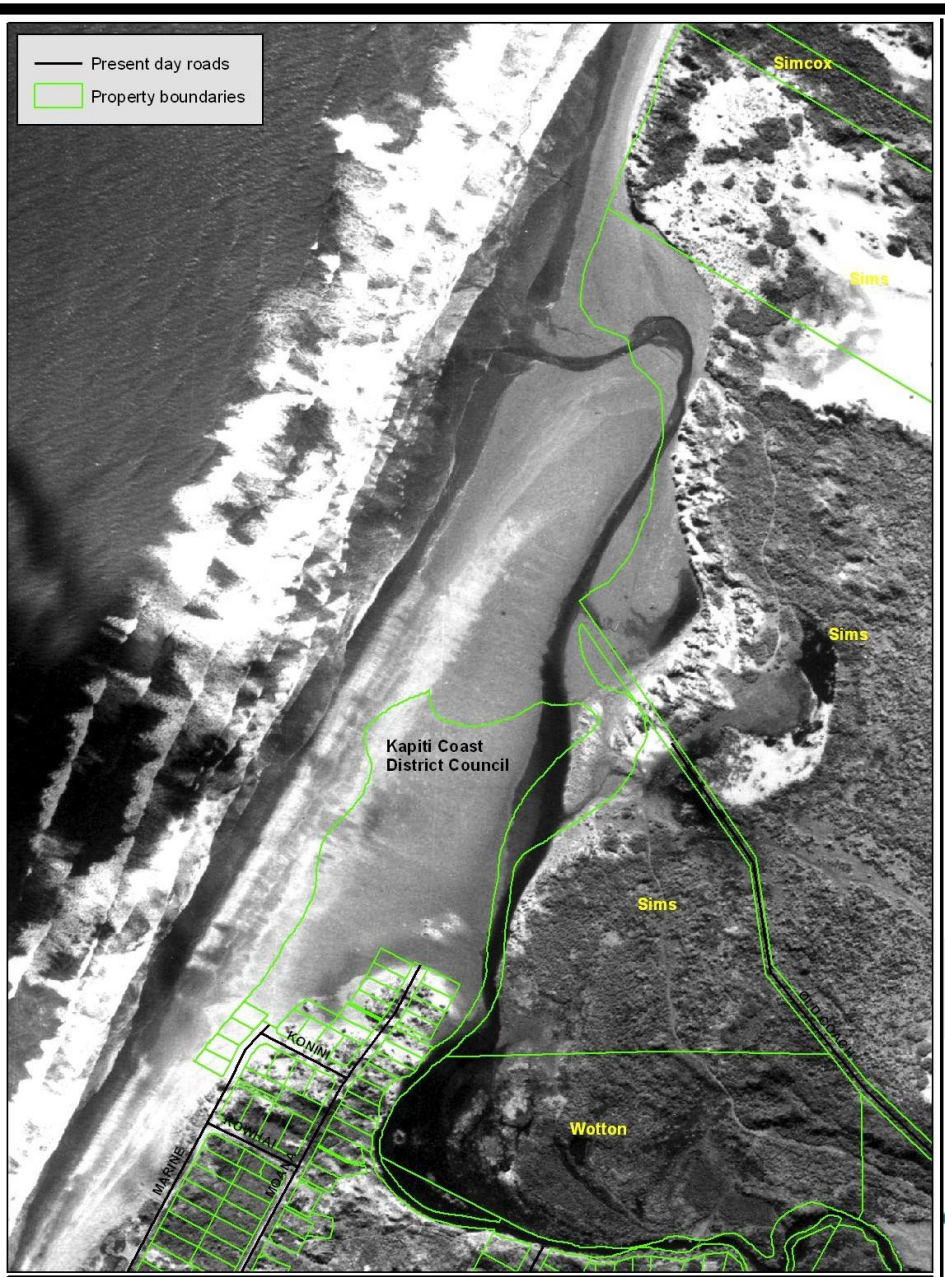
A natural process approach to managing coastline and stream mouth erosion, Waitohu Stream



Waitohu Catchment



A Little History



- Extensive subdivision and farm development since 1950s with associated flooding and erosion hazards
- History of mouth cutting and interventions such as rock groynes and stream bank revetments back to mid 1960s

Waitohu Stream 1948



greater WELLINGTON
REGIONAL COUNCIL

Mouth Cut Triggers



- Permitted activity under operative Regional Coastal Plan - subject to conditions incl. cutting triggers
- Landowner pressure led to a 3 yr trial of different cutting triggers in 2006
- Trial triggers reviewed in 2009 to assess their effectiveness

Historic Shoreline Analysis



Management Plan



- New trigger points restricted to above MHWS
- New landward trigger line to assist dune development
- Implement dune restoration programme
- Retain and plant the wetland as a flood overflow area
- Aim for 1 cut per annum maximum and allow stream to meander naturally within envelope
- Cut channel on northwest alignment

North
side



Dune
Restoration



north side



Dune Restoration

south side



Ephemeral lagoon

Managing for hazards and also biodiversity gains

Wetland overflow area



WELLINGTON REGION NATURAL HAZARDS MANAGEMENT STRATEGY



Resilience



Key Partners

- Kāpiti Coast District Council
- Porirua City Council
- Wellington City Council
- Hutt City Council
- Upper Hutt City Council
- Greater Wellington Regional Council
- WREMO
- Mana Whenua Iwi
- Infrastructure providers

