"from ridge tops to the sea" Integrated Catchment Management

INTEGRATED CATCHMENT MANAGEMENT:

Insights for the Motueka catchment

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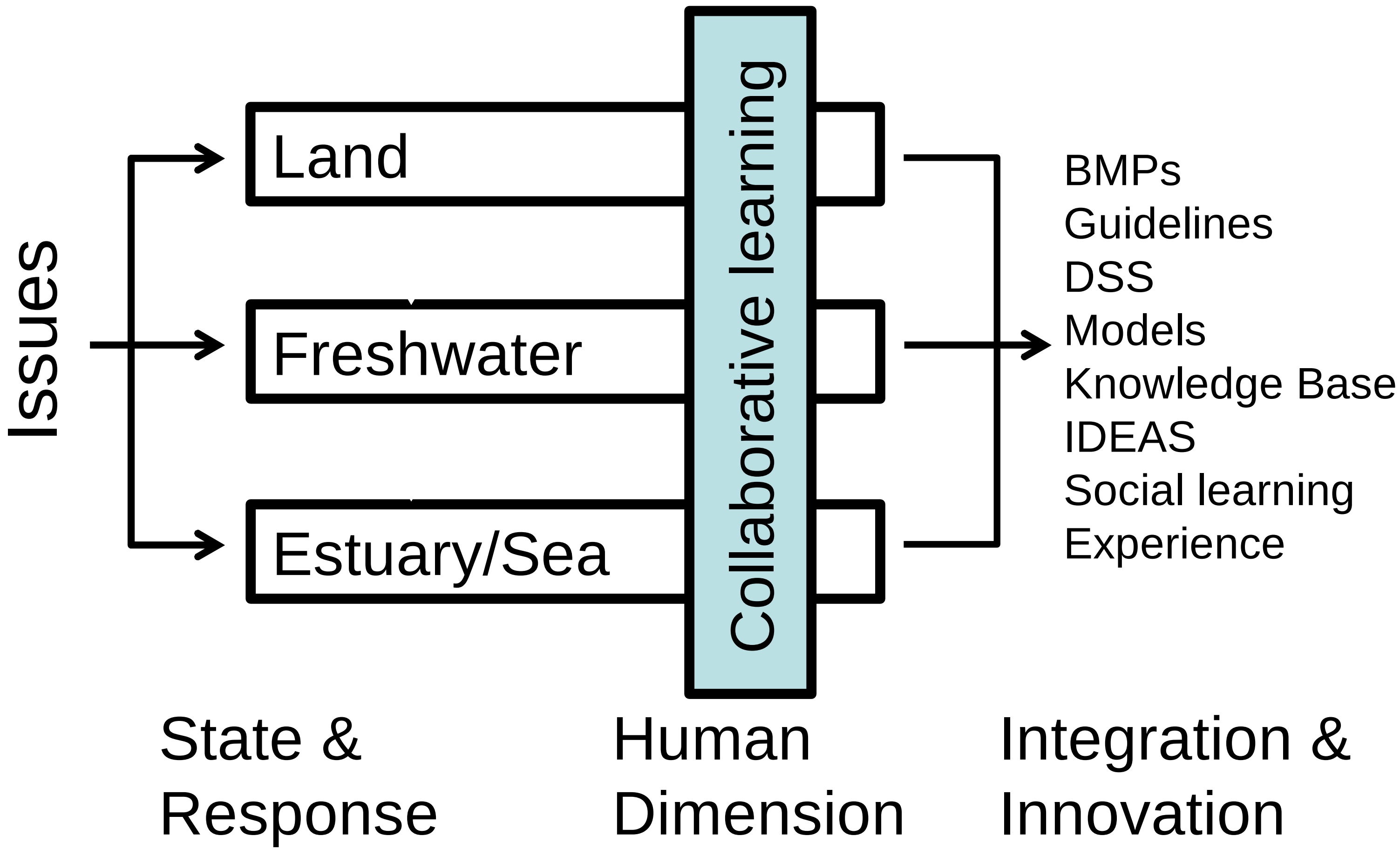
with thanks to the whole ICM research team

Manaaki Whenua Landcare Research
CAWTHRON The power of science®
tasman district council

Common Ground Ltd
Tiakina te Taiao Ltd
Pansophy Ltd
nz landcare trust nga matapopore whenua
Fish & Game NEW ZEALAND
NIWA Taihoro Nukurangi
SCION Next generation biomaterials
Institute of Geological & Nuclear Sciences Limited

ICM connects **land, water, coast and people**



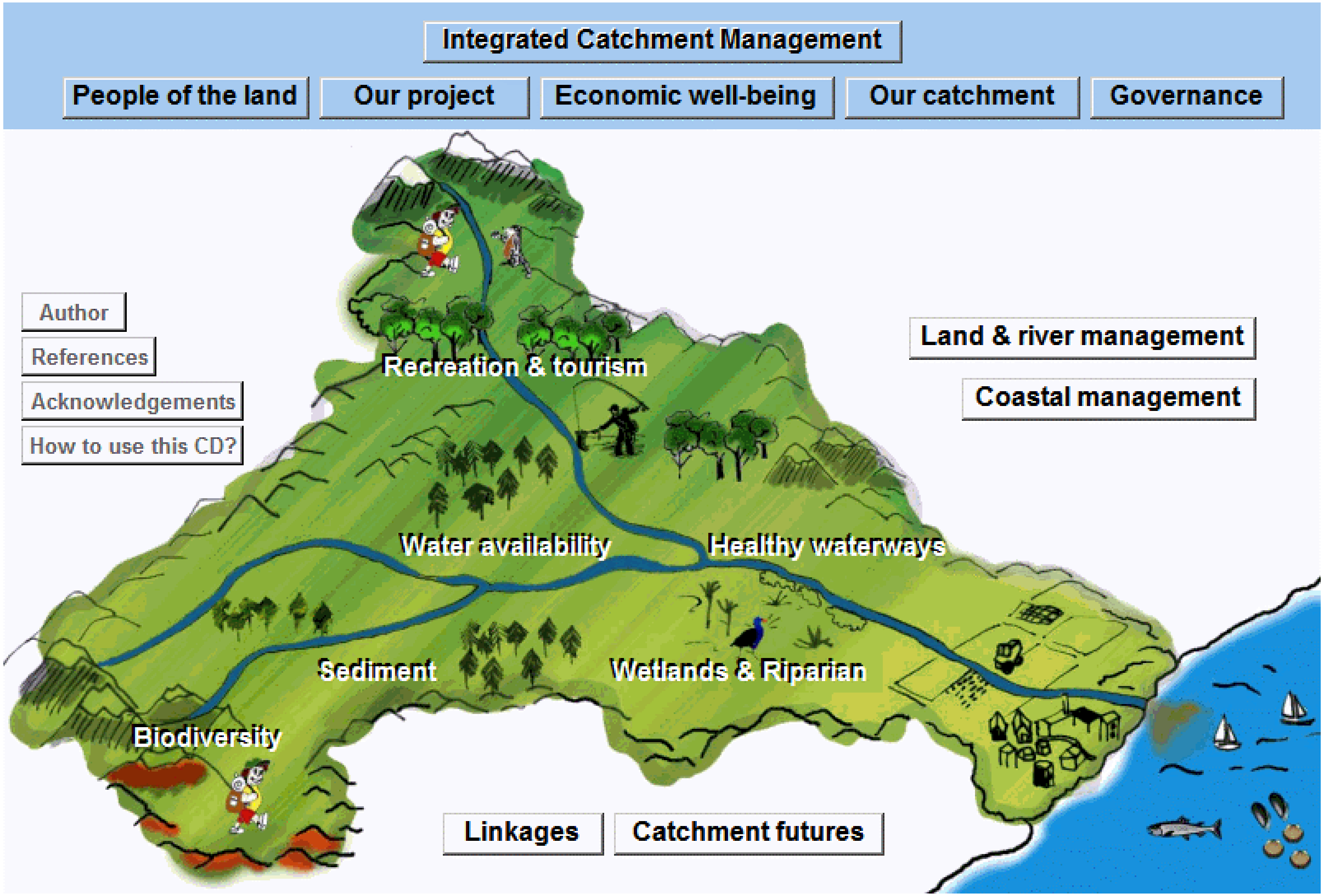
Integrated	…together
Catchment	…scale
Management	…action

ICM – why work this way?

… because land uses have CUMULATIVE IMPACTS down-catchment, so we need to work together to reduce those impacts from RIDGE-TOPS TO SEA

… and COLLECTIVE ACTIONS are more effective than just individual actions

Motueka catchment



Motueka Stakeholder Survey: Top 10 Issues (in 2000)

1. **River *Water* and Groundwater Availability**
2. ***Groundwater* Pumping Effects on Stream and River Flows**
3. **Methods to Resolve Competing Demands on Resources, e.g. *Water***
4. ***River Gravel* Supply and Extraction Effects**
5. **Environmental Effects of Increased *Water* Takes**

Top 10 Issues ctd

6. **Economic Impact on Irrigators of *Water* Restrictions**

7. **Environmental Impacts of Changes in *Land Use***

8. **Off-Site Environmental Impacts of Major Catchment *Land Uses***

9. **Best Methods to Improve Understanding and Acceptance of Research Results and *Resource Management Plans***

10. **Protection and Management of *Riparian* Vegetation**

‘5 Big Picture’ ICM Issues

1. Managing Land Uses in harmony with Freshwater
2. Water Allocation & Governance
3. Catchment – Coastal Interactions
4. Integrative Modelling to Manage Cumulative Effects
5. Build human capital, Facilitate community action

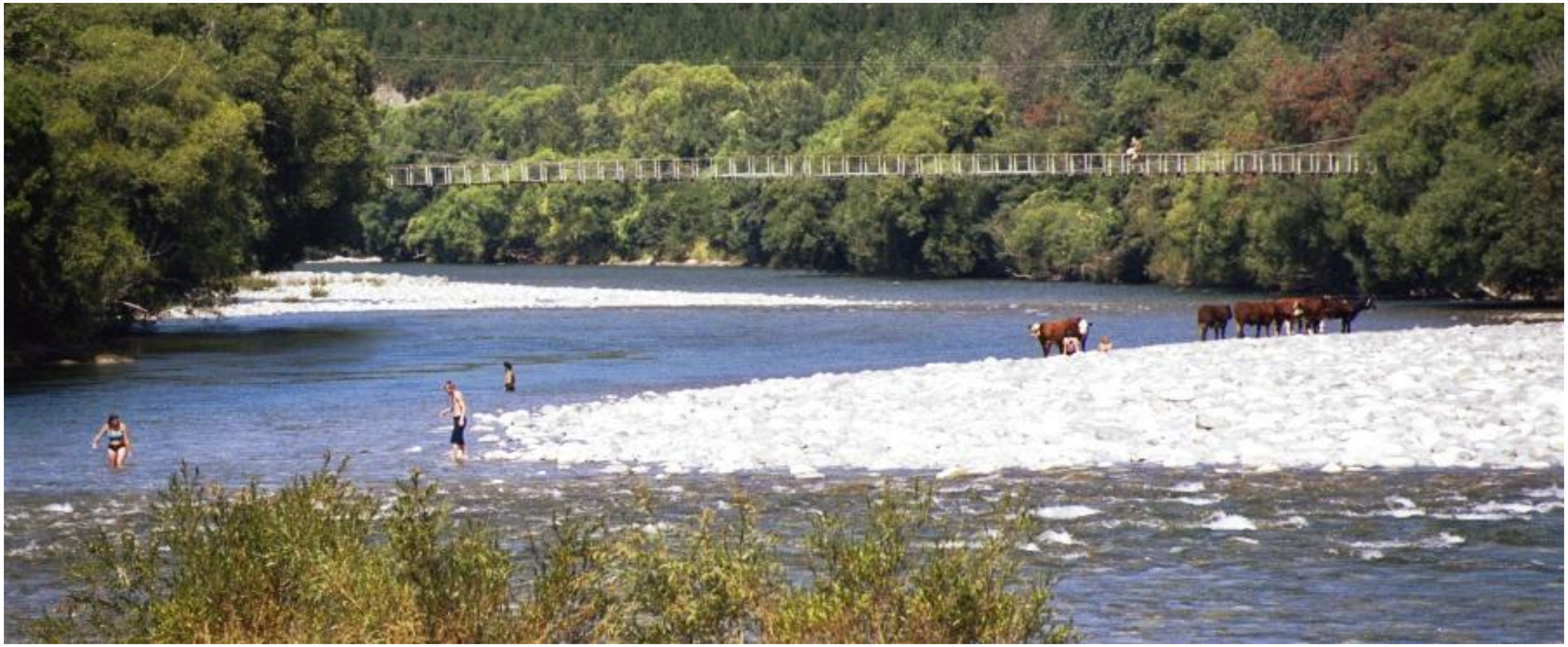




SOME QUESTIONS to discuss later

1. What do you consider the biggest land/water issues in your sub-catchment?
2. What are the main areas where you need better information?
3. How can we collectively act to enhance freshwater health in our area?
4. What actions could I contribute towards a catchment we can all be proud of?

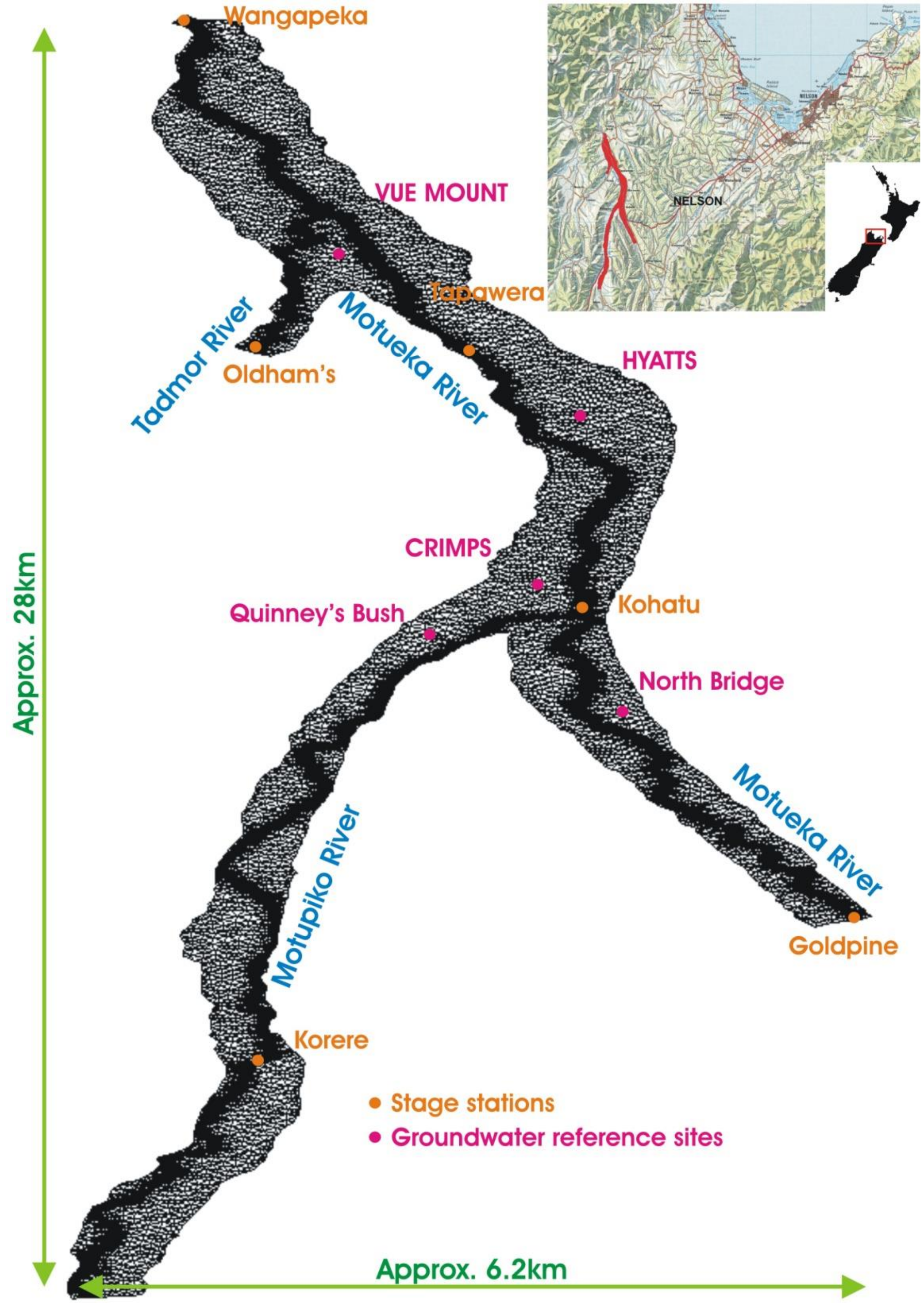
Managing land uses in harmony with freshwater and coastal water



Guiding limits for water allocation – Upper Motueka groundwater model

Computer model used to review groundwater allocation limits in 2013 – one aim, to maintain river flows above Tapawera Bridge

Joseph Thomas (TDC) presented previously on hydrology



Contaminant losses from the Sherry

Floods carried

92% of bacteria (98% in lower Mot)

74% of total phosphorus

63% of ammonia

and this occurred during only 9.5% of 2008-09

But **low** flows carried away

55% of total nitrogen

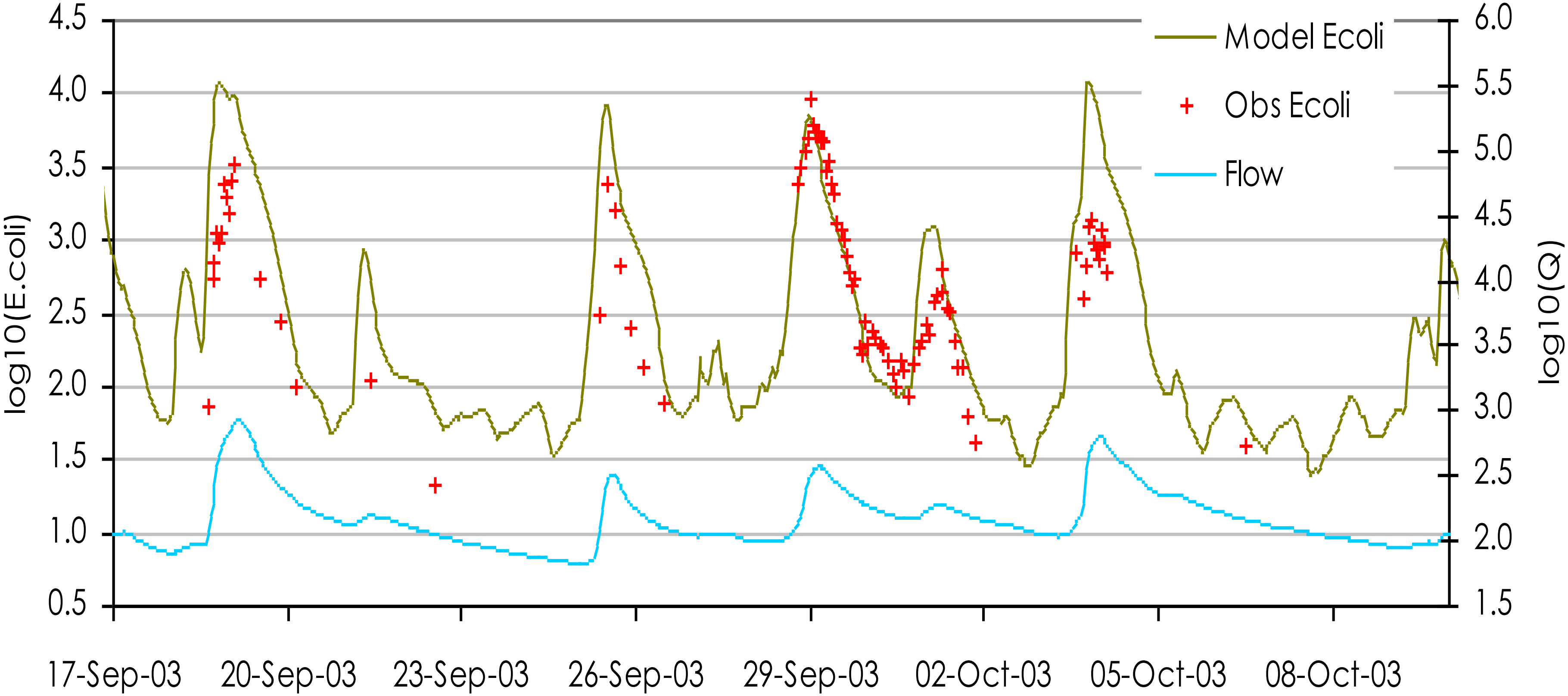
78% of nitrate

during 90.5% of the year 2008-09

Bacteria flushed with first rain (and some are stored in river channel)

From data collected by Rob Merrilees & Bill Booth

E. coli in lower Motueka River



98% of faecal pollution from the Mot Catchment is transported in stormflows

McKergow & Davies-Colley 2010: *Hydrological Processes* 24: 276-289.
Wilkinson et al.: *NZ Journal of Marine & Freshwater Research.*

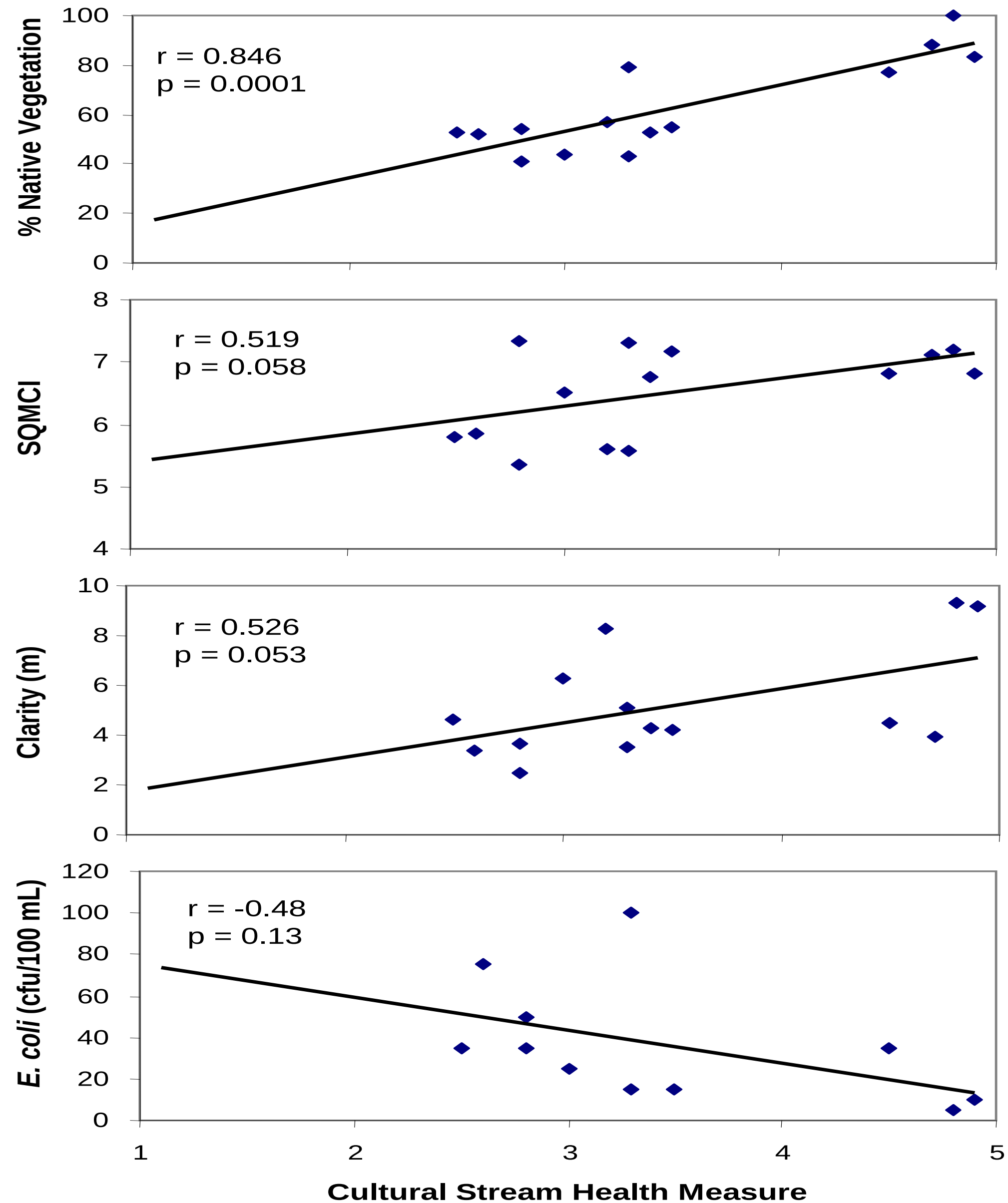
Linking science and cultural river health

Native vegetation

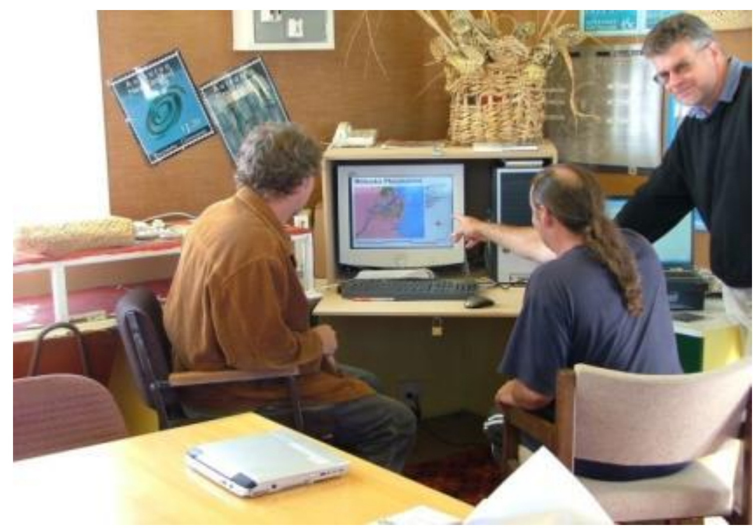
Macro-invertebrates

Water clarity

Bacteria



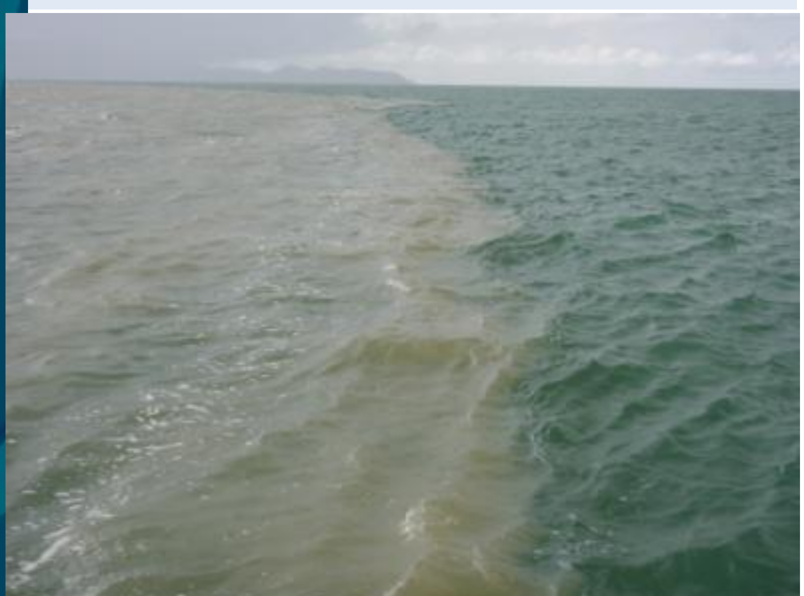
- Importance of local iwi partnership as kaitiaki
- Links between science and cultural indicators
  - Some strong correlations, some weak
  - Strong correlation between cultural health and % of catchment area in natural cover
- Science/cultural monitoring together gives a rich, full picture of river health (and the environment)

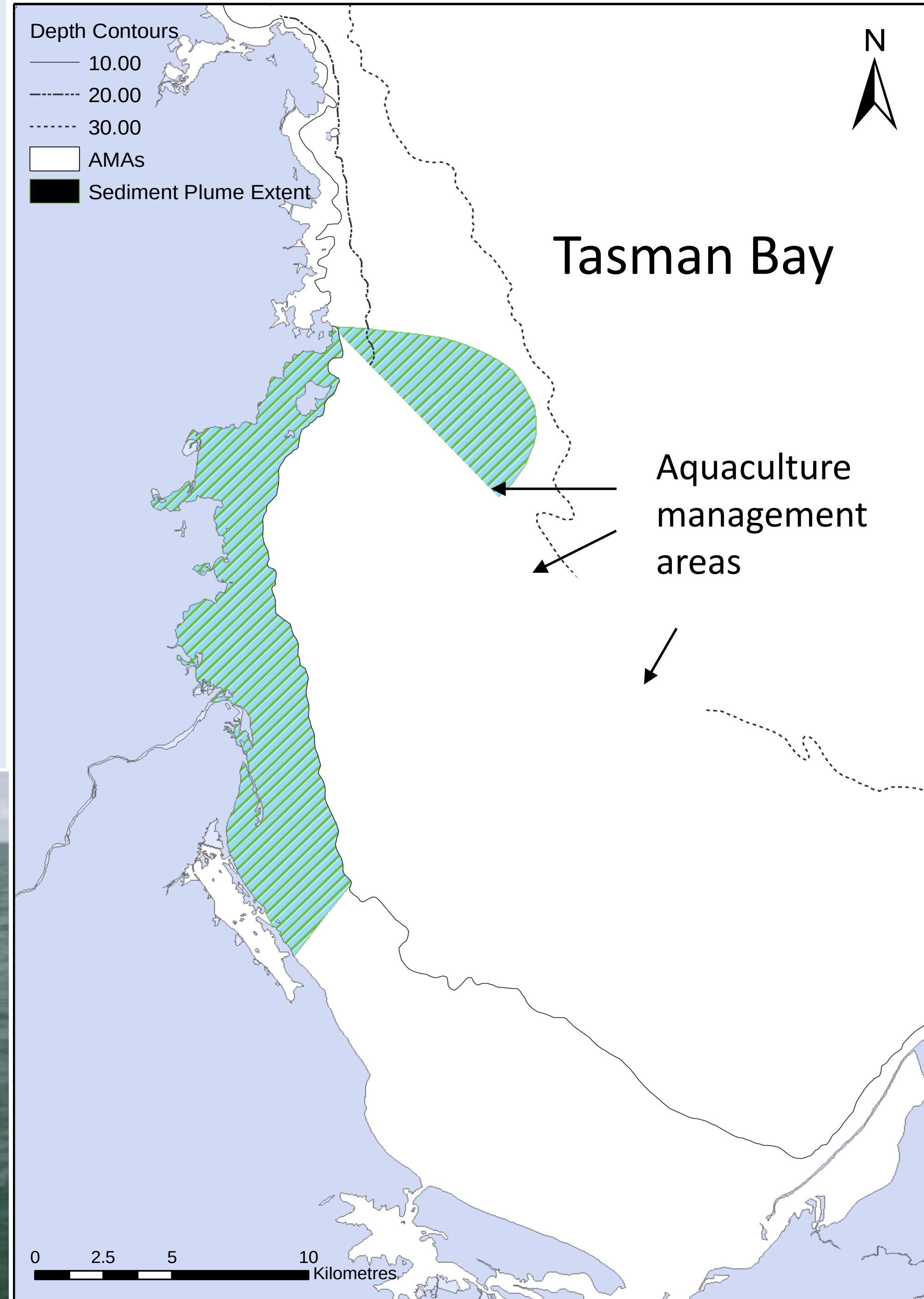


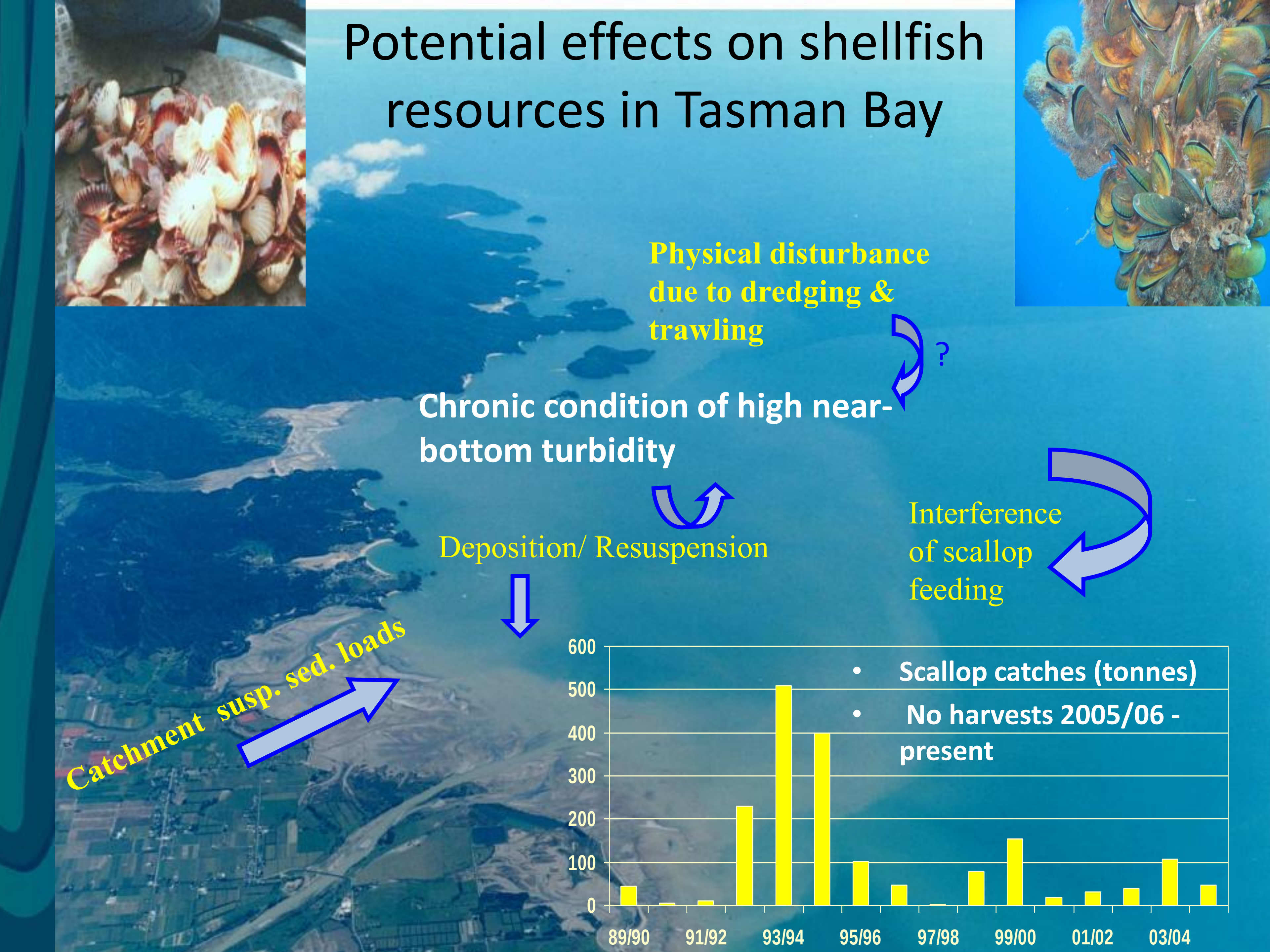
180 km^2 river plume depositional area

based on

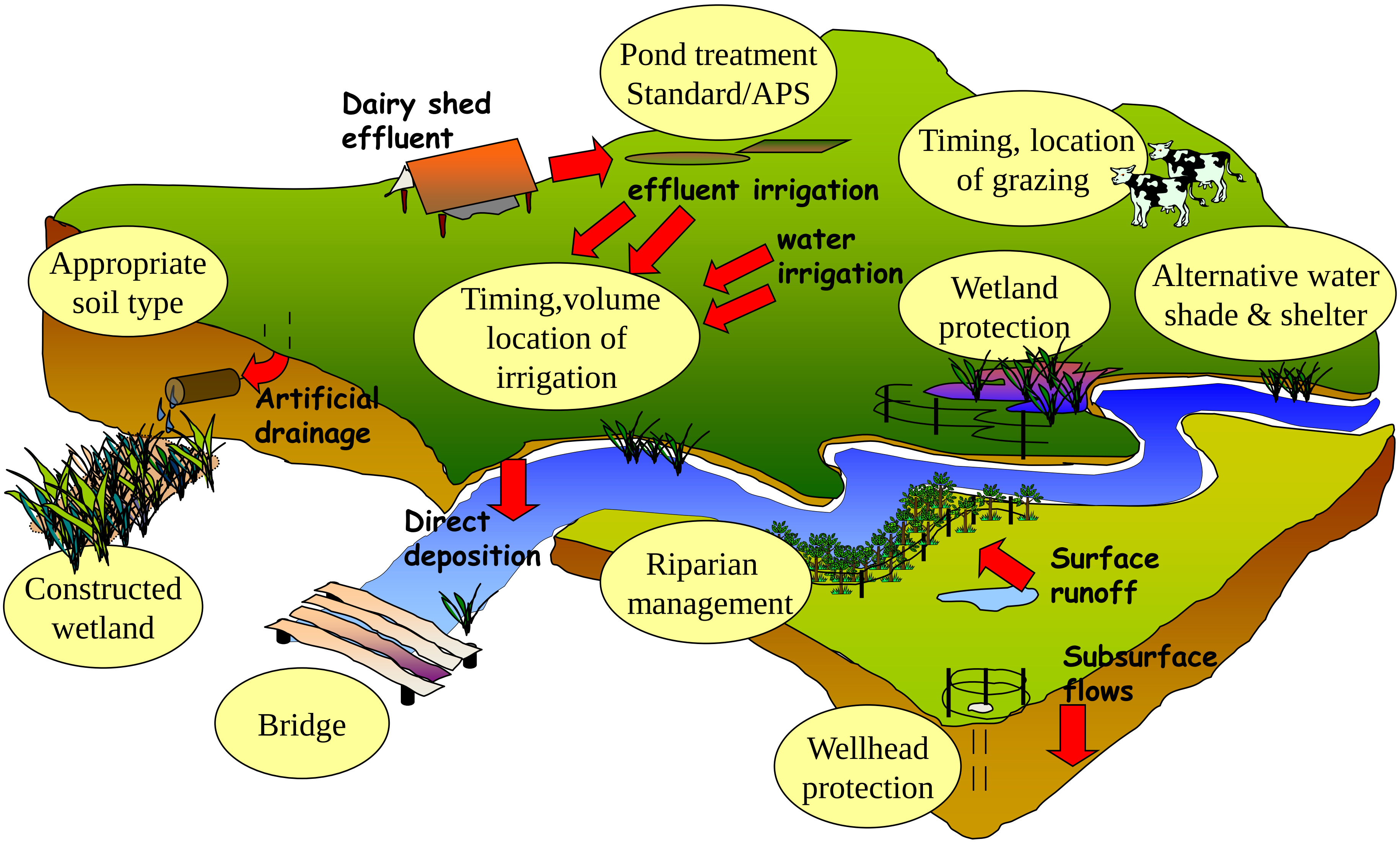
composites of multiple benthic indicators






Potential effects on shellfish resources in Tasman Bay
Physical disturbance due to dredging & trawling
?
Chronic condition of high near-bottom turbidity
Deposition/ Resuspension
Interference of scallop feeding
Catchment susp. sed. loads
Scallop catches (tonnes)
No harvests 2005/06 - present
600
500
400
300
200
100
0
89/90
91/92
93/94
95/96
97/98
99/00
01/02
03/04

Faecal pollution mitigation (BMPs)



Collins et al. 2007: *NZ Journal of Agricultural Research* 50: 267-278.

ICM Riparian project on native plant root reinforcement

Riparian plant trial

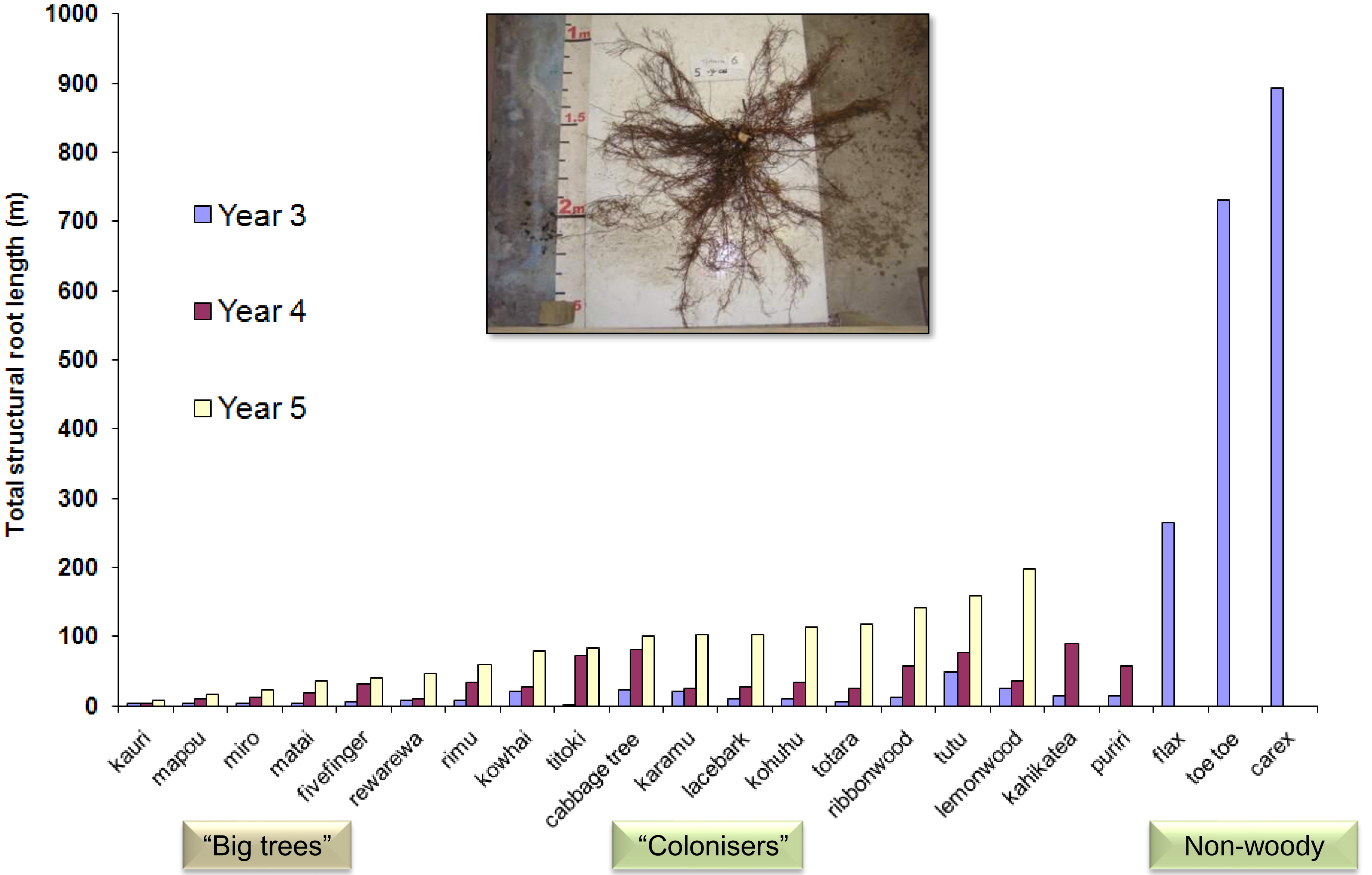
Common name
- Karamu
- Ribbonwood
- Kowhai
- Lemonwood
- Kohuhu
- Lacebark
- Mapou
- Fivefinger
- Cabbage tree
- Rewarewa
- Manuka
- Tutu

Podocarp trial

Common name
- Kauri
- Rimu
- Kahikatea
- Miro
- Totara
- Matai
- Puriri
- Titoki

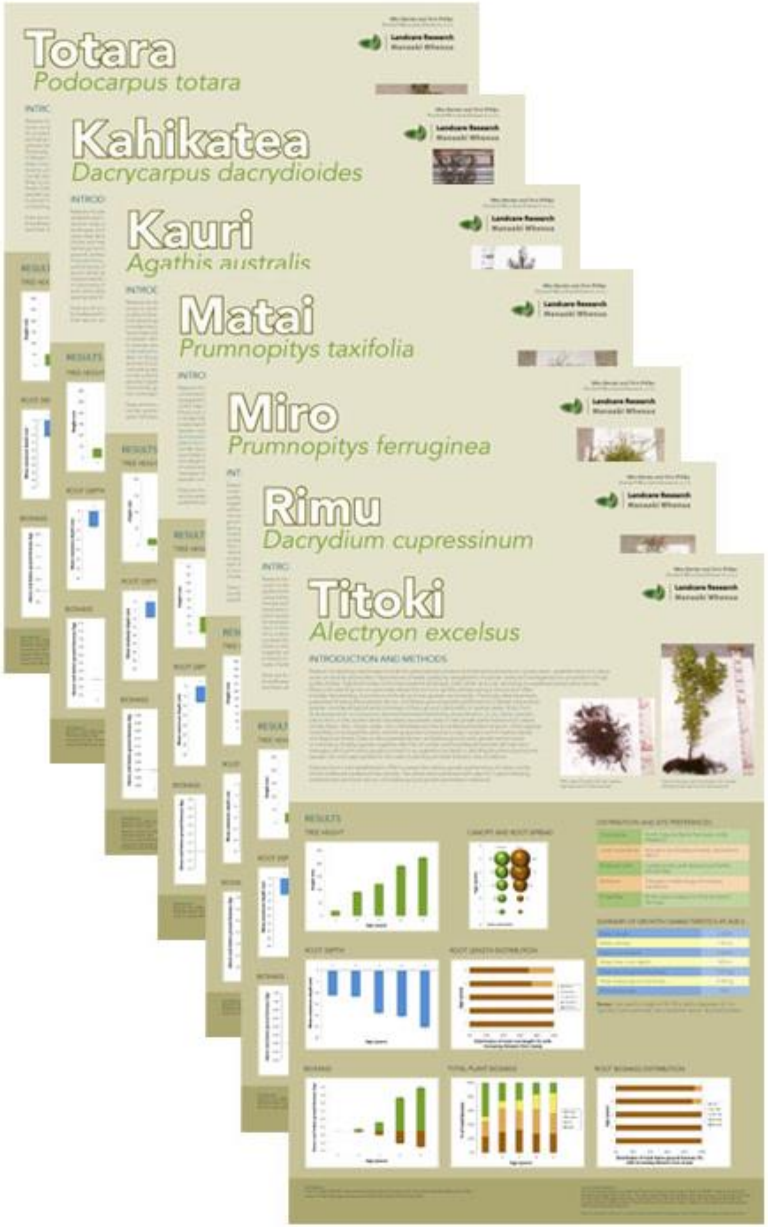
- Sedge grass
- NZ Mountain flax
- Toe toe

Native plants & soil reinforcement



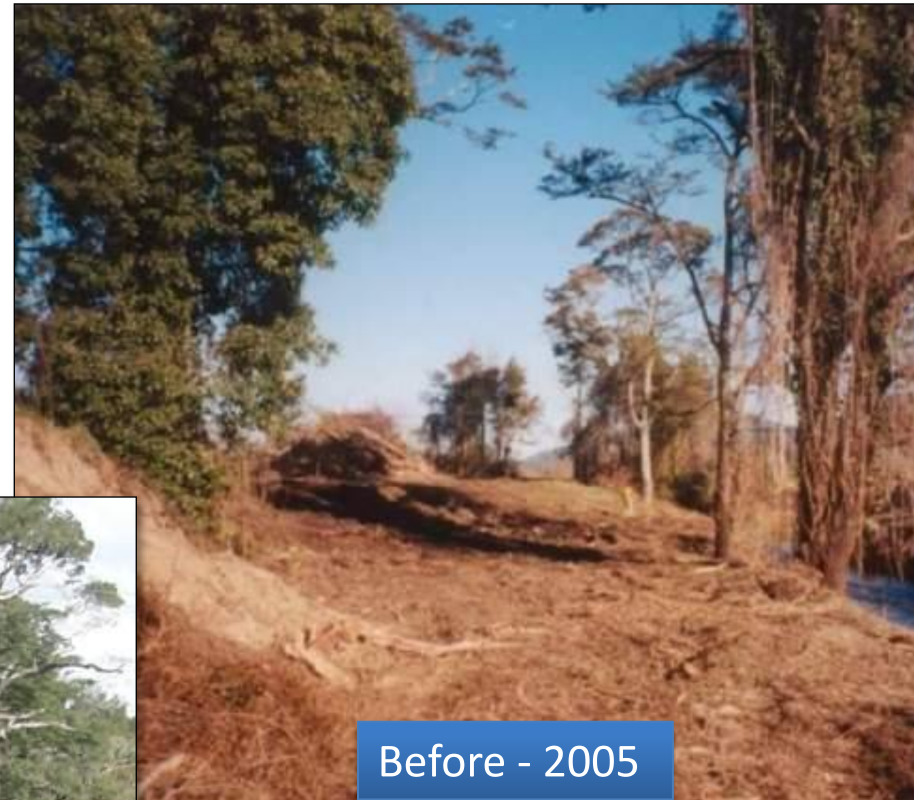
Total structural root length (all roots >1mm diameter) is an 'indicator' of soil root reinforcement

All information summarised on ICM website



http://icm.landcareresearch.co.nz/

Riparian Plant Trial, Sherry River



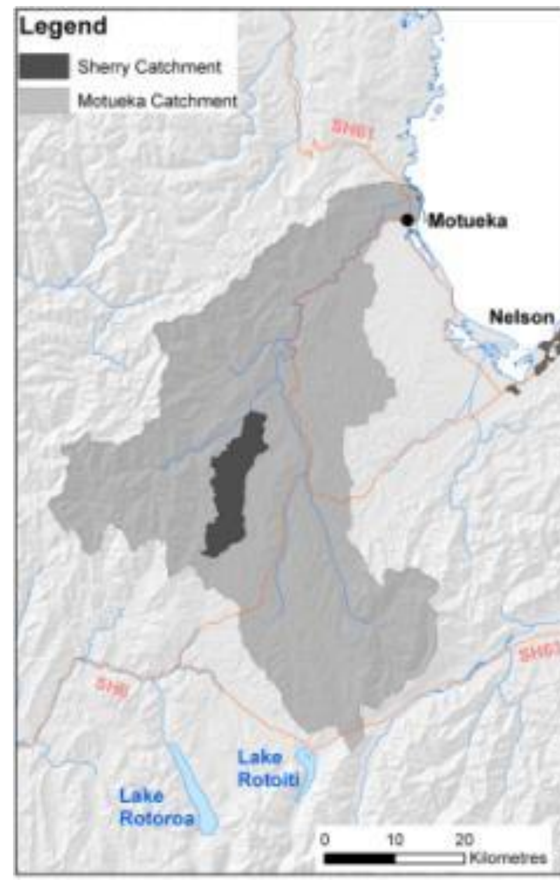
Chemical weed control cheapest and most effective

Ledgard & Henley 2009: Best bet guidelines for riparian planting.
Ledgard et al. 2011: *NZ Journal of Marine & Freshwater Research.*

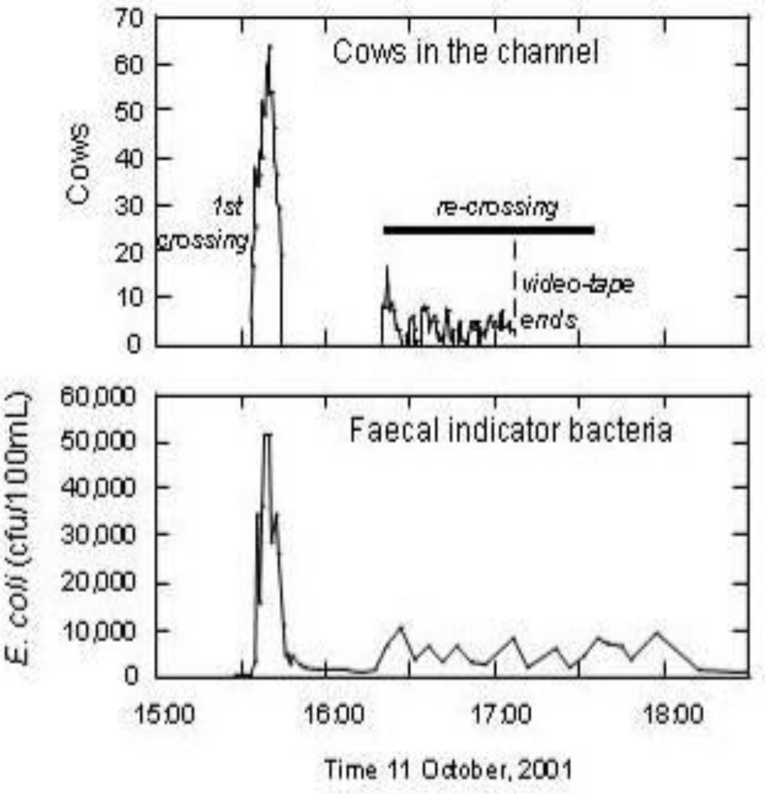
Riparian setback guidelines for six environmental objectives

Riparian functional objective	Minimum setback recommendations	Applicability
Reduce nutrient and other contaminant inputs	10 m 20 m	For land with slope <10º. Aim is to filter out >80% sediment and pesticide, >70% nitrogen and phosphorus in overland flow, and remove c90% groundwater nitrate in fine shallow riparian sediments For steeper land than 10º
Improve light exposure and water body temperature	10 m	Mature trees needed for shading; buffer width should exceed mature tree height and channel width. Even a single line of trees is beneficial.
Freshwater ecosystem health, terrestrial and aquatic habitat diversity	15 m	To sustain macroinvertebrates, fish, terrestrial biodiversity using a range of riparian vegetation. Riparian biodiversity is easier to sustain with a 15 m setback; smaller setbacks and weedy buffers require more management
Improve channel and bank stability	10 m	Equivalent to the root-mass diameter of a mature riparian tree
Pass and attenuate flood flows	None	Base the riparian setback on the flood characteristics of specific catchment and river reach
Recreational, cultural, aesthetic and landscape values	20 m	A balance of ecosystem service benefits achieved in the longer term

Collaboration & Science help everyone to improve water quality

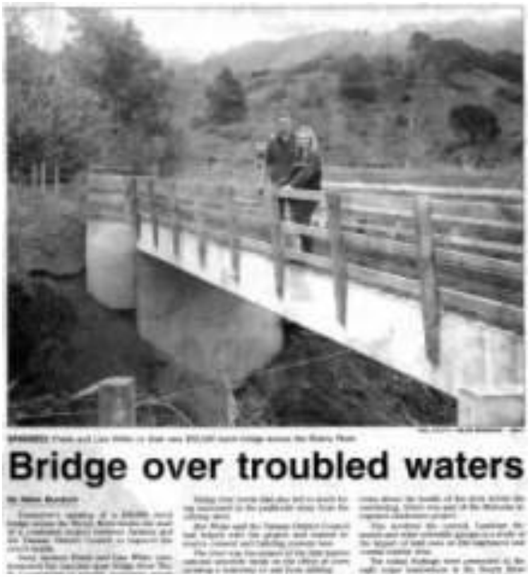


Cows crossing streams



- **400% increase in *E.Coli* during cow crossings**
- **Cows 50x more likely to defecate in water**

Bridges replace cow crossings

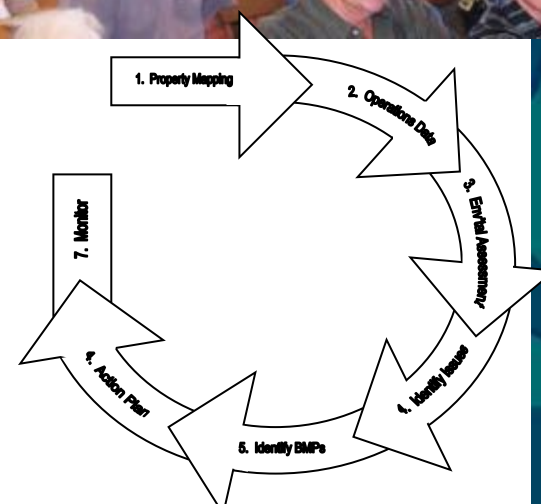

Bridge over troubled waters


news extra

Farmers and scientists join up to sweeten the Sherry River

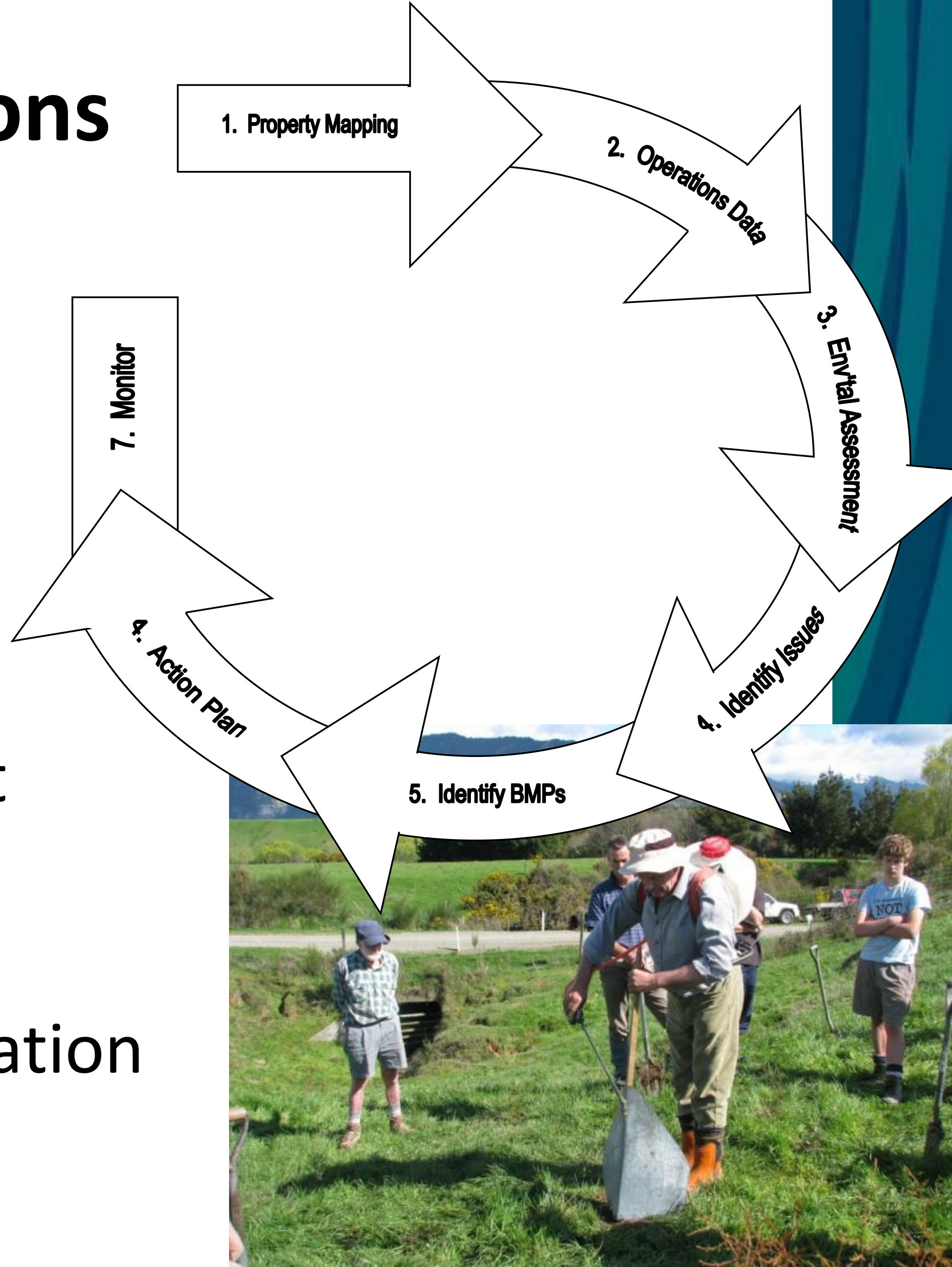
While farmers are frequently criticised for the effects of dairying on the environment, positive developments are often ignored. Simon Towle reports on work along the Sherry River in Tasman District, where farmers have joined forces with scientists and the district council.

.. and Landowner Environmental Plans reduced contamination but not by the goal of 80%



Example LEP actions

Stream fencing
Riparian planting
Stream culverts
Wetland protection
Stock Troughs
Nutrient Management
Erosion plantings
Stormwater control
Deferred effluent irrigation



So why did landowners participate?

7 ingredients for collaborative success

1. Institutional encouragement & support (incl $$)

"We need support from Council and science to reach our goal"

"The independent facilitation by NZ Landcare Trust kept us on track"

7 ingredients for collaborative success

2. **Good relationships between stakeholders**

"Working together shares the load and helps to keep everyone focused."

"The landowners here regard this valley as our place and our home."

"ICM works with landowners; offending farmers doesn't."

7 ingredients for collaborative success

3. Clear roles and goals

“We want our children to be able to swim in the river again.”

“We want to minimise farming’s impact on the environment. I want our farming business, in the dairy industry 50 years from now.”

7 ingredients for collaborative success

4. Quality of leadership

"Leadership emerged from the landowners rather than being dictated by any formal election process."

"Council rules need to be in place to pull up major transgressions."

7 ingredients for collaborative success

5. Good information & communication

"The information on existing water quality and where it was worst, surprised some landowners"

"The objectivity and non-judgemental nature of the advice was appreciated"

"having a field day or meeting meant we discussed a wide range of issues beyond those for which the event was organised."

7 ingredients for collaborative success

6. Opportunities to develop common understanding, and share knowledge and skills

"Field days were opportunities to see what the neighbours are doing, to talk about environmental issues among different land-use types, and to air differences."

"Best Practices can only minimise adverse environmental effects, not remove them entirely."

7 ingredients for collaborative success

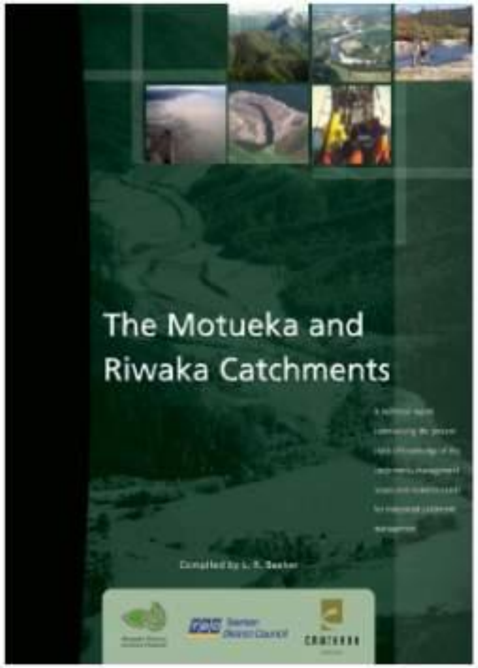
7. Measure and celebrate success

"Our community has seen measurable results from the efforts of the local catchment group and I think that inspires us to keep working at it."

"This project has helped lessen our environmental impact – and many have also been practical business investments."

"Expenditure (without labour) over the past five years totalled $270,000, plus 'thousands of dollars' by forestry landowners. For the next two years, planned expenditure is about $150,000."

ICM – a model for sustainable land & water management



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THOSE QUESTIONS for discussion

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