

A scenic mountain landscape. In the background, a large glacier flows down a steep, rocky mountain slope. The foreground shows a river valley with a river winding through it, surrounded by green vegetation and rocky terrain. A thin green horizontal line is visible near the top of the image.

Prioritising ecosystem and species management

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Scope...

- Some background
- Recent work with ecosystems
- Integrating ecosystem and species



Why prioritise?

- Recognition that we're falling behind on protecting biodiversity
 - High level goals in NZ's Biodiversity Strategy have eluded us
 - Relentless pressure from introduced species & human activity
- Decreased resources
 - Ongoing reductions in government expenditure
 - \$54m loss in DOC funding over 4 years
 - Increased demands for accountability
 - Demonstrate outcomes or else...



Systematic conservation planning...

- A subset of conservation science
 - Margules & Pressey – Nature 2001
- Aims to maximise conservation returns
 - Given some budget and management constraints
- How do we most effectively ‘halt the decline’
 - Across terrestrial, freshwater & marine realms
 - Ecosystems and species
 - Approximately one-third of NZ’s land area
 - Biodiversity budget of around \$150m



Representativeness...

- The degree to which a set of reserves represent the ecosystems and species of a landscape
- Can be likened to a sports team
 - Need a range of skills
 - Both generalist and specialist
- Selection needs to cover all required positions
 - Some have higher 'value' because of scarcity



Past work...

- Natural Heritage Management System (NHMS)
 - Identify optimal sets of management projects
 - Initially focussed on threatened species
 - Extended to include ecosystems (2009)
 - Substantial progress over last two years
- Moving from development to implementation
 - Still being refined...
 - Challenging both technically and socially
 - Central part in newly restructured department



Species work...

- Built initially around prioritisation of individual species projects
 - Designed to identify most cost-effective set
- Identified management requirements for each individual species
 - Aimed to raise probability of persistence to >95%
- Approximately 50 species currently under management
 - Strongly cost driven

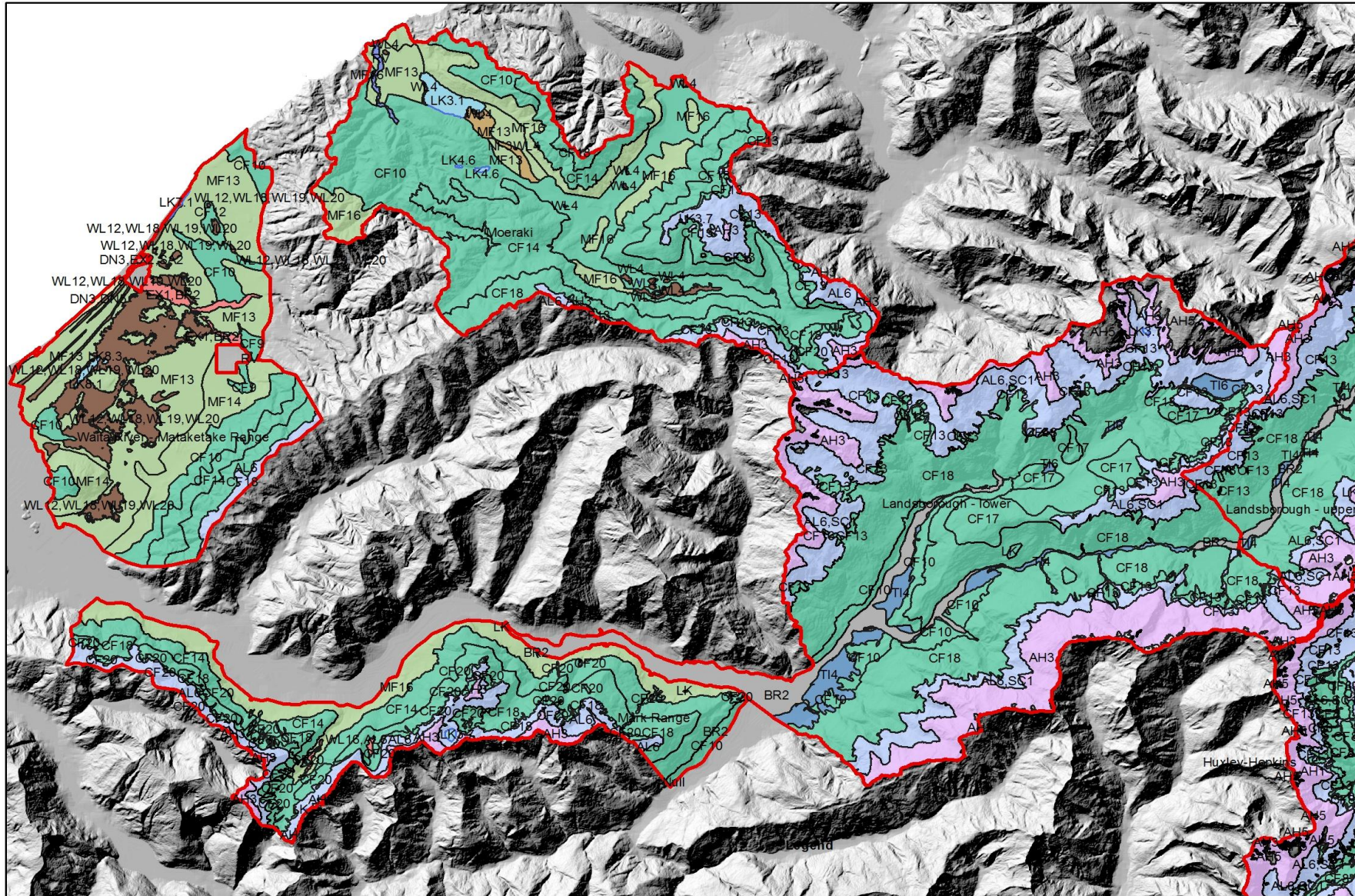


Ecosystems work...

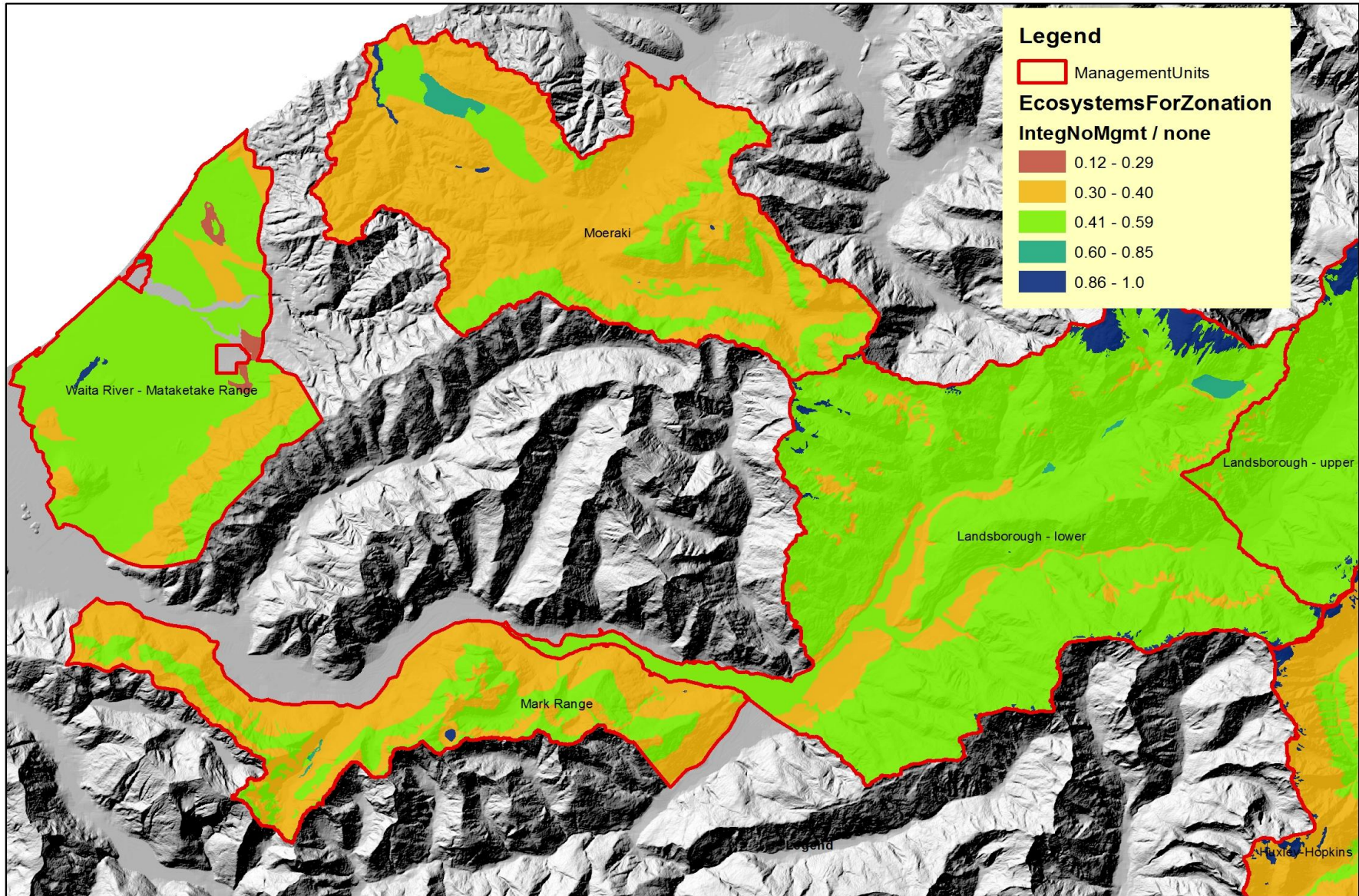
- Initially followed species approach
 - Gradually broadened and expanded from 2010
- Identified around 1000 ecosystem management units nationally
 - Contain a full range of ecosystems
 - Sequences of related ecosystems wherever possible
 - Includes river ecosystems
- Operations staff built management prescriptions
 - Estimated costs and difference made



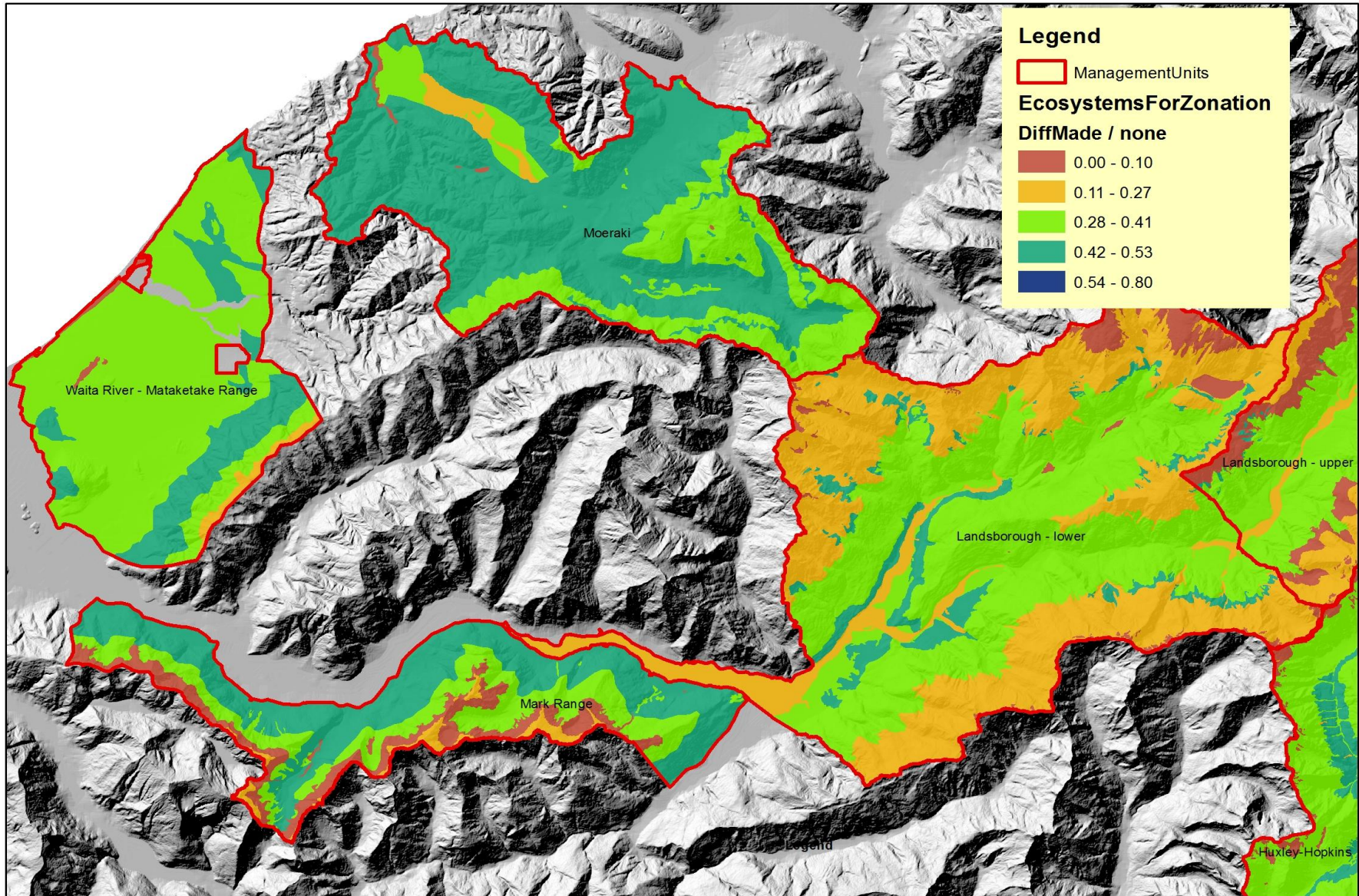
Example layers



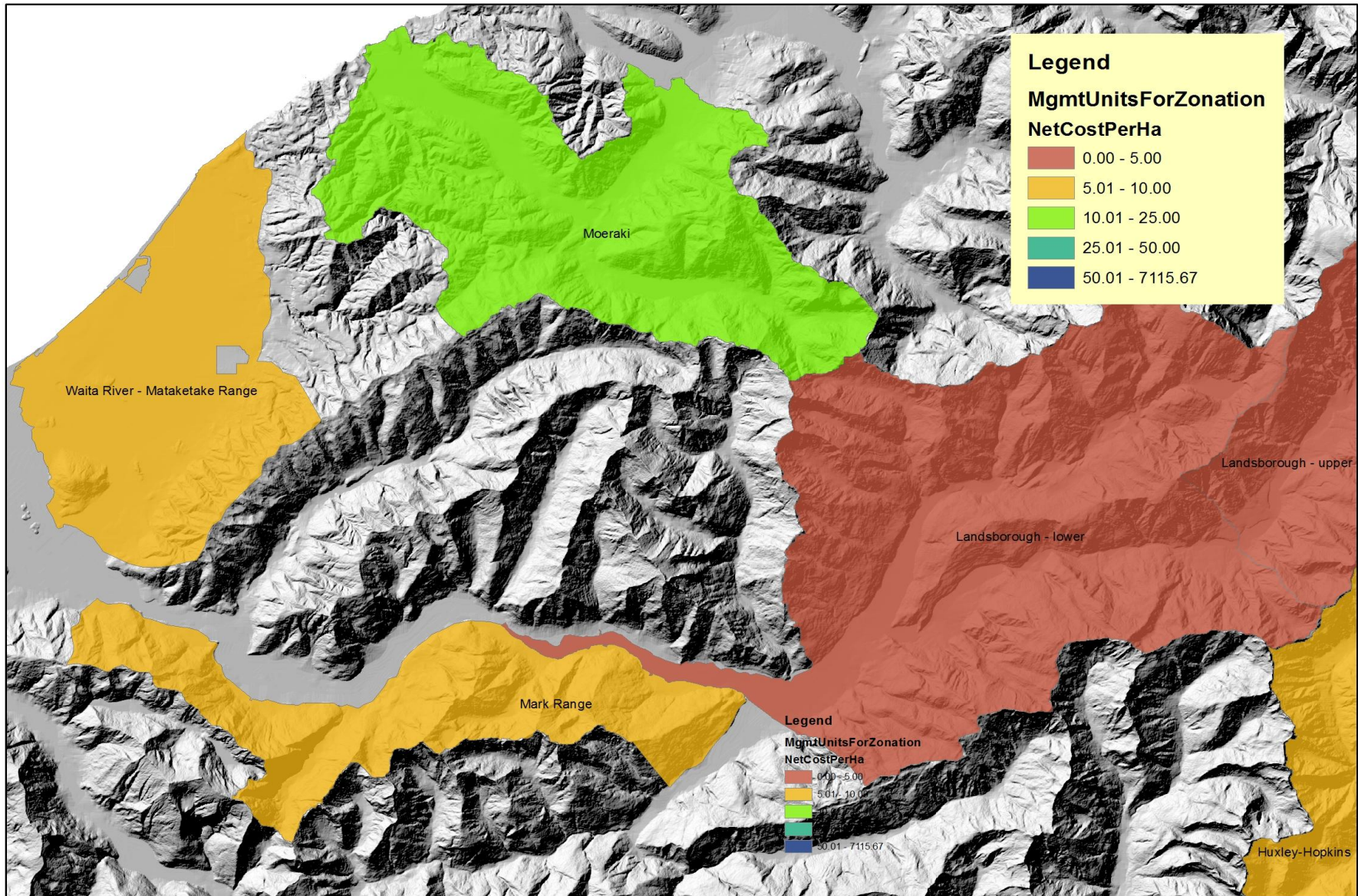
Example layers



Example layers



Example layers



Prioritisation...

- Using software tool called Zonation
 - Analyses spatial data describing distribution of ecosystems
 - Identifies mix of management units that maximises representation of ecosystems
 - Given any level of implementation
- Additional data layers...
 - Current condition or ecological integrity
 - Viable populations of threatened species
 - Difference made by management
 - Cost of management

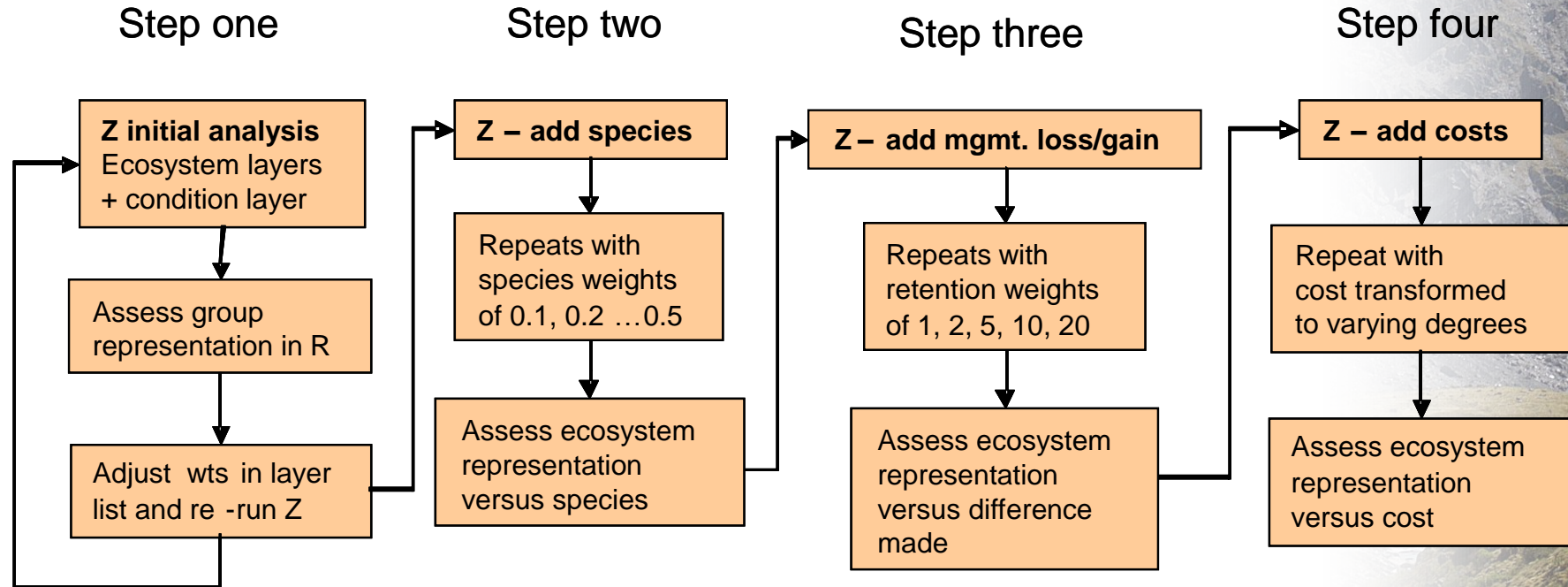


The analysis process...

- Works backwards
 - Starts by assuming management applied to all units
 - Identifies the unit making the lowest contribution to protecting a full range & removes it
 - Repeats until all units removed
- Gives a continuous ranking
 - Identifies those units that maximise representation given any level of implementation
 - Can track level of achievement and cost for any level of implementation



In latest analysis...



Top 400 sites...

- Contain 30% of management units by area
 - Include examples of a full range of ecosystems
 - Would cost \$19m to manage
- Stagewise analysis process delivers
 - 13% increase in threatened species coverage
 - Higher priority for existing good condition sites
 - e.g., Moehau, Te Urewera
 - 19% reduction in costs for top 30% of sites



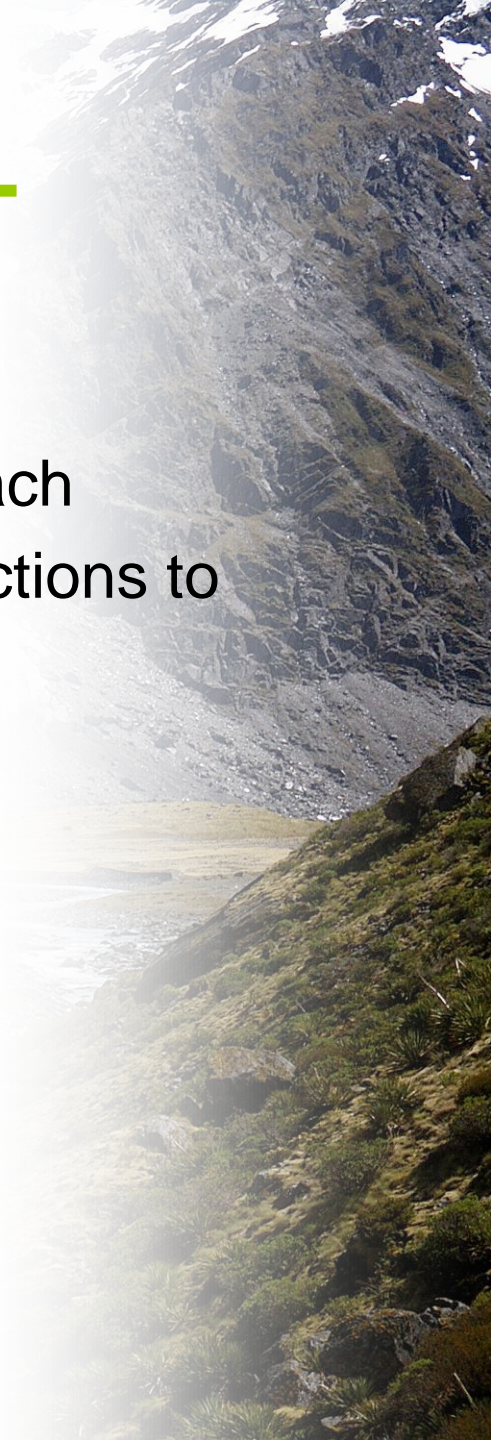
An unforeseen outcome...

- Ecosystem and species prioritisation run separately up until this point
 - Many threatened species occur in ecosystem management units
 - Many will benefit substantially from ecosystem management actions
- Operational arm of DOC called strongly for integration
 - Began a process of exploration
 - How to achieve?

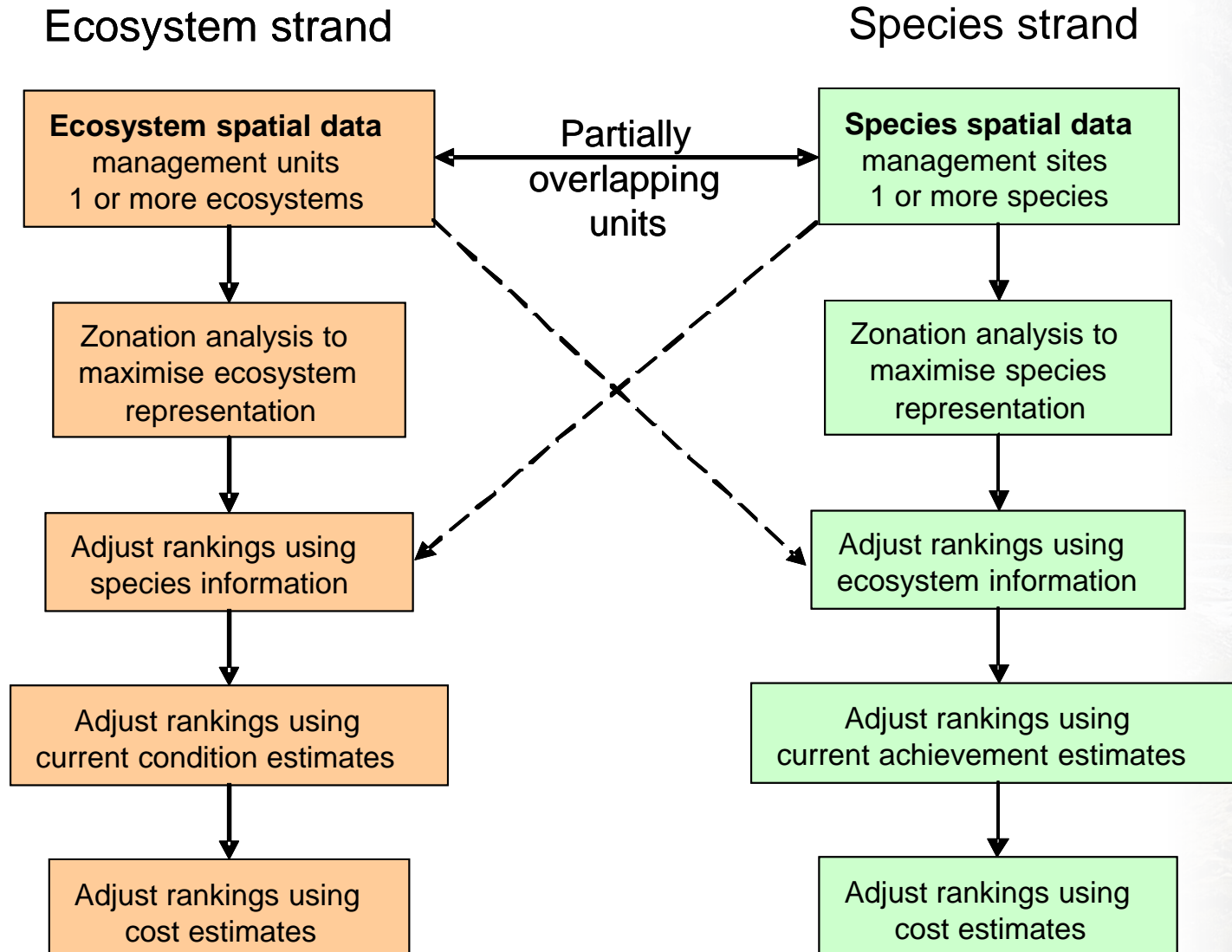


Integrating species and ecosystems

- In an ideal world...
 - Assemble ecosystem and species layers
 - Identify management actions and costs for each
 - Prioritise to identify optimal set of sites and actions to implement...
- The reality...
 - Computationally beyond our reach at present
 - Difficult to assign cost and benefit
 - Species vary widely in their overlaps with ecosystems and each other

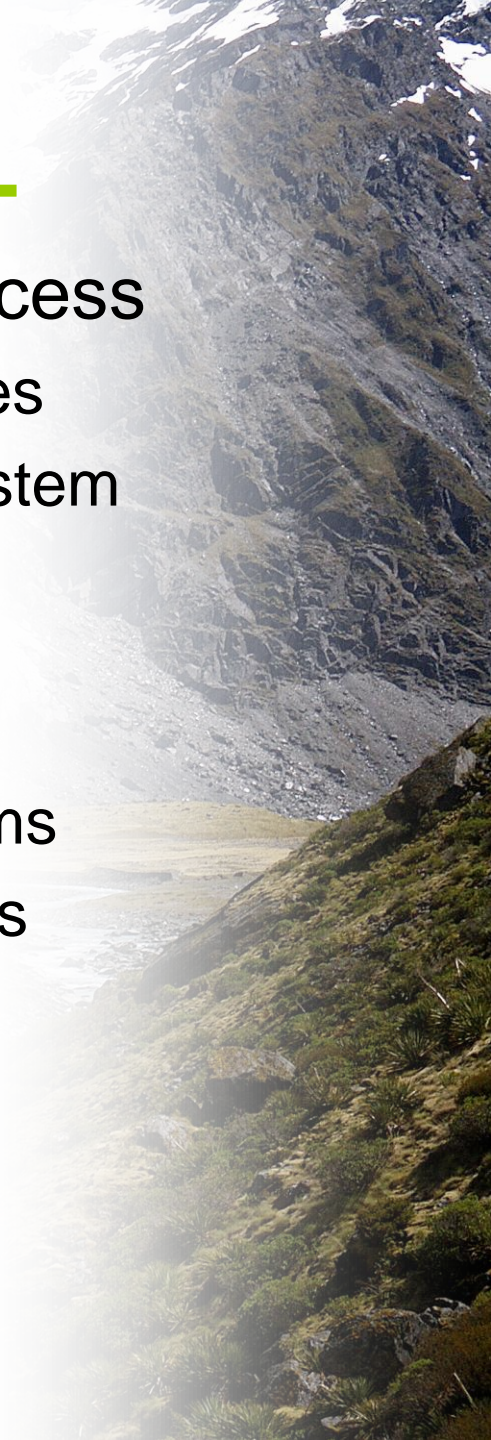


Staged ranking analysis (diagrammatic)



Key changes in thinking...

- Ecosystems come first in a 'both and' process
 - The most efficient way to protect many species
 - Many species will benefit from generic ecosystem management actions
- Maximise species gains by considering
 - Species distributions when ranking ecosystems
 - Ecosystem ranks when selecting species sites
 - Prioritising sites based on their species mix
 - Rather than individual species projects



Beginning a review of sites...

- Analyse data describing both ecosystem and threatened species distributions
 - Some ecosystem sites might be relocated to equivalent sites containing species
 - Some current species sites might be relocated into managed ecosystem units
 - Consistent with maintaining genetic variability



Management prescriptions...

- For ecosystems
 - Maintain broad structure, composition, function
 - Reduce the impacts of significant pressures
 - Browsers, predators, weeds, 'other'
- For species
 - Within ecosystem management units
 - Some species will require nothing extra
 - Actions additional to ecosystem actions
 - Higher intensity sites nested within EM unit?
 - Outside ecosystem management units
 - The full range of pressures



Managing uncertainty...

- Significant knowledge gaps for many species
 - Current and historic distribution
 - Threats to survival
 - Management feasibility
- Developing species 'triage'
 - Adequacy of distributional/ecological knowledge
 - Likelihood of benefit from ecosystem level management
 - Phylogenetic distinctiveness
 - Prioritise which of c. 900 to include in process



Balancing ecosystem and species goals

- In last set of rankings we biased the process towards ecosystems
 - Increased species weights until ecosystem representation began to degrade
 - Ecosystem management the fence at the top
 - Species management the ambulance at the bottom?
- No right answer *at this stage*
 - Requires exploration



Measuring outcomes...

- Ongoing tension within DOC about monitoring
 - Why waste all of that money!!!?
- Monitoring design built around three tiers
 - 1. Systematic grid sample to measure background condition and trend
 - 2. Monitoring of selected management sites to measure change
 - 3. Small number of research-driven sites
- Essential to drive adaptive management



Reporting gains...

- Previously reported numbers of threatened species & ecosystems under management
- Integrating ecosystems & species will deliver broader range of benefits, including
 - At risk species whose declines reversed
 - Formerly widespread species restored in range
 - Endemic species with high levels intervention
- More consistent reporting required
 - Challenging accounting problem remains...
 - Phylogenetic measures?



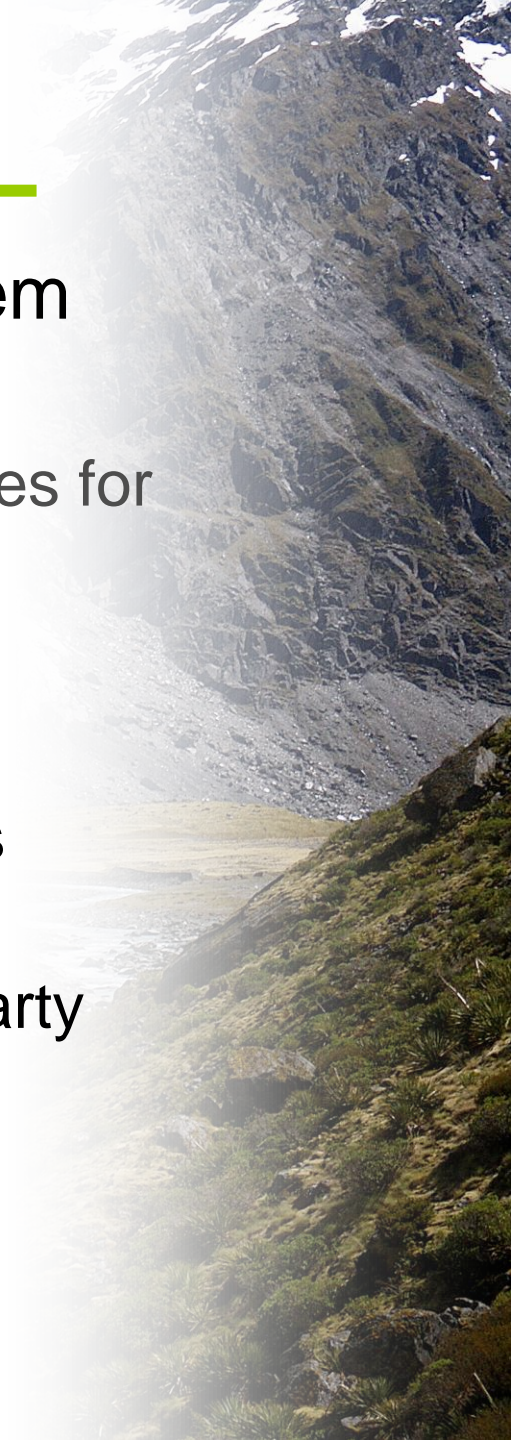
Implementation

- Potentially major biodiversity gains
 - Focussing management on sets of sites with
 - Representative range of ecosystems
 - Maximum overlap with threatened species
 - Recreational and historic values?
 - Plus additional sites for ‘stand-alone’ species
- Major implementation challenges
 - Requires whole of process institutional alignment
 - Prioritisation captures operational realities
 - Operations buys into prioritisation outcomes



Overall...

- A pragmatic approach to a difficult problem
 - Requiring a large number of tradeoffs
 - On-the-run with minimal time and resources for comparative testing
- Increasing institutional buy-in
 - A collective learning process with sometimes challenging dynamics
 - Requires acknowledgement that no single party holds all the cards
 - Together we have enough cards to play!



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- Any questions...



Goals

1.1 A full range of New Zealand's ecosystems is conserved to a healthy functioning state

1.2 Nationally threatened species are conserved to ensure persistence

1.3 Nationally iconic natural features are maintained or restored

1.4 Nationally iconic species are managed to ensure their populations are maintained or restored

1.5 Locally treasured natural heritage is maintained or restored as partnerships

1.6 Public conservation lands, waters and species are held for now and for future generations

Intermediate Outcome 1

The diversity of our natural heritage is maintained and restored



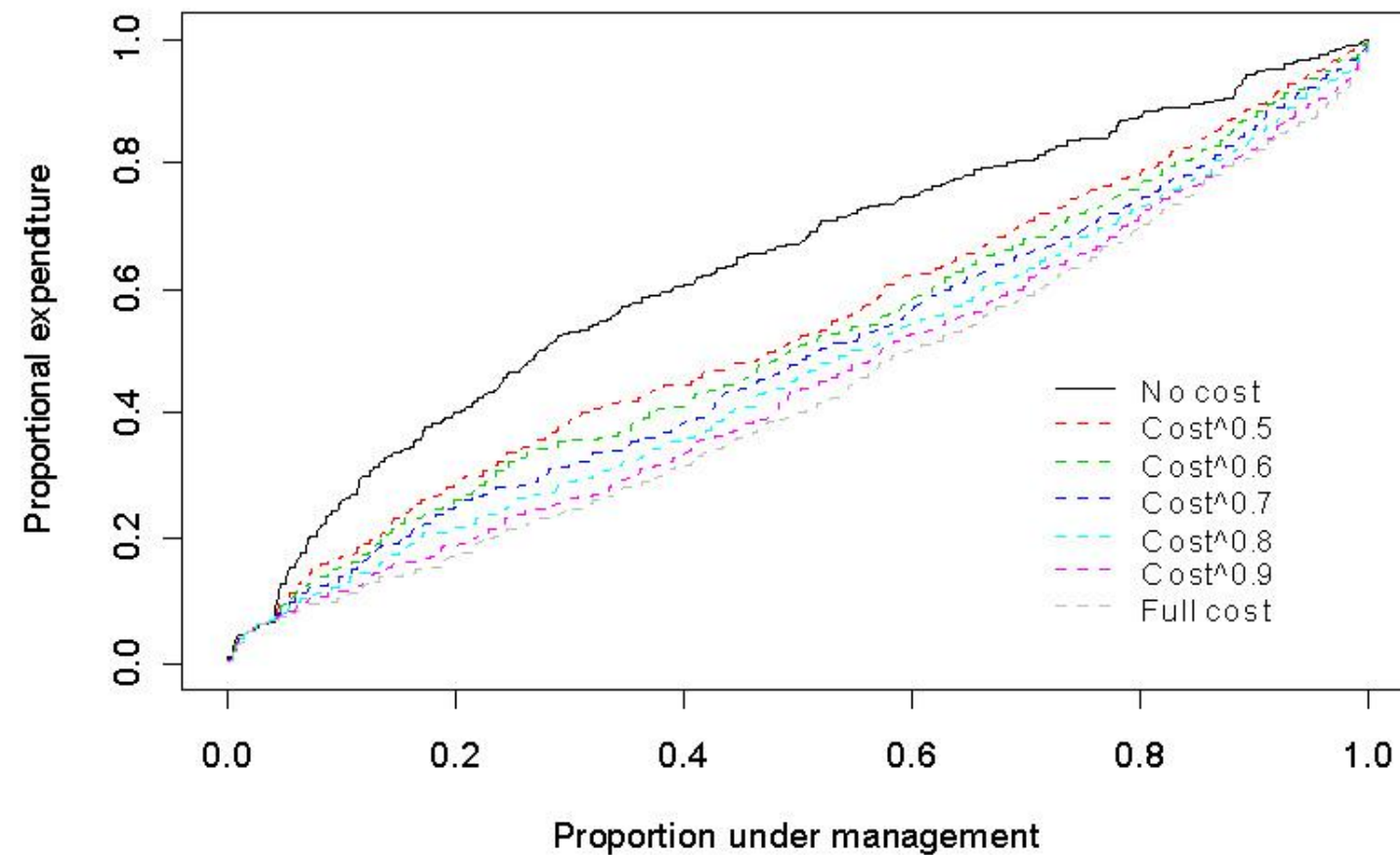
Balancing representation and cost

- Problematic where marked cost differences between taxonomic groups
- Cannot simultaneously prioritise for representation and cost
 - Representation-driven will be expensive
 - Cost-driven will be non-representative
- Requires exploration of the trade-off
 - Management decision on where to strike the balance



E.g., adding cost...

A. Implementation costs



E.g., adding cost...

B. Ecosystem representation

