A Conservation Decision Support Tool for Freshwater Ecosystems of New Zealand (FENZ)

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The scope…

• New Zealand and it’s freshwaters
• The policy background
• Building a prioritisation tool
• End-user delivery
For those not familiar with New Zealand…
The policy background…

• Part of a whole of government initiative
  – Different departments looked at various aspects
  – To identify nationally important water bodies

• DOC asked to identify nationally important rivers, lakes and wetlands
  – Assembled national freshwater datasets
  – Developed prioritisation tools for rivers, etc.
Building the rivers component

• GIS river network
  – 567,000 individual segments
  – Range of environmental/biological attributes

• A river environmental classification
  – Spatial surrogate for biodiversity patterns

• Estimation of human impacts on biodiversity
  – To allow consideration of current condition

• Methods for identifying efficient sets of sites
  – Complementarity-based selection
The river classification…

- Built using biological sample data for
  - Native fish – 13,363 sites
  - Macro-invertebrates – 2,677 sites
- Environmentally based then tuned to maximise its biological discrimination
- Used Generalised Dissimilarity Modelling to identify the main environmental correlates of species turnover
  - Hierarchical classification – 20, 100, 200 and 300 groups
Typical data …

- Twenty groups
- One hundred groups
- Three hundred groups
Estimation of human impacts...

- Complicated by having multiple pressures
  - Most occur together
  - Strong lowland bias in their effects
  - Lack both quantitative data & reference sites

- Estimated impacts using expert opinion
  - A curve for each pressure describing
    - Threshold or buffering effects
    - The maximum impact and when it occurs

- Estimates combined to give overall condition
Example pressure/integrity relationship...

a) native vegetation loss

integrity

native vegetation loss
Cumulative river pressures...
Site prioritisation…

- Spatial prioritization software – Zonation

- Input data
  - One grid layer per river ecosystem type
    - 200 classification groups
    - 100 m spatial resolution
  - Grids modified to indicate inter-group similarities

- Zonation uses a backwards removal routine
  - 3rd order sub-catchment planning units
  - Stepwise removal of planning units contributing the least to conservation outcomes
Three ranking analyses…

- ‘National rankings’
  - Used estimates of current condition
  - Applied connectivity constraints
    - Planning unit values decline as upstream or downstream planning units are removed

- ‘Gap analysis rankings’
  - Planning units with >80% formal protection retained until all other units removed
  - Separate rankings outside and within reserves

- ‘Regional rankings’
  - Within 29 regional biogeographic units
Planning units and reach classification
Reach condition
Catchment rankings…
Catchment gap rankings...
End-user delivery

- Layers for rivers, lakes & wetlands
  - Environmental attributes
  - Biological values
  - Estimated human impacts
  - Classifications
  - Rankings
  - Background features

- Documentation
  - As metadata, user manual, and associated publications
Progressive release...

- Starting with development partners
  - Training sessions for end-users
  - A paradigm shift for non-GIS users!

- Subsequent release to other central and regional government agencies

- Now beginning to work more widely
  - Forestry companies, agricultural, hydro generation, conservation groups etc.
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Any questions?