Characterisation and screening of NZ stopbank networks

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Overview

1) Context

2) Research objectives

3) Intended methodology

4) Intended outcomes

NZ stopbank networks

Rangataiki River, 2017 (stuff.co.nz)

NZ stopbank networks

Whirikino, 2004 (teara.govt.nz)

NZ stopbank networks

$7 million

Manawatu River, 2004 (teara.govt.nz)

An ongoing need for understanding and prioritisation

Invercargill, 1984
(Otago Daily Times)

Blenheim, 1923
(Alexander Turnbull Library)

Earth structures in New Zealand

- Complex geologies
- Extreme seismic environment
- Multi-hazard environment
- Informal 'knowledge' -> quantification?

NZ stopbank networks

- Many non-engineered
- Ad-hoc/extempore construction
- Ownership?
- Revised flood estimation (changing 'AEP')
- Public perception/communication

Problem statement and project objectives

1) Stopbank information is presently 'piecemeal':

   - Various formats

   - Completeness varies by region

   ➢ **Assemble National Inventory of Stopbanks (NZIS) (geospatial)**

2) Basic geological/geotechnical characterisation of assets is lacking at national scale

   ➢ **Geospatial analysis of geological units/overlay of "problematic" conditions**

3) Lack of stewardship of empirical performance data

   ➢ **Incorporate and analyse failure/incident data**

Further aim: (agile) geospatial analyses

- Hazard and multi-hazard analyses

- Breach consequence/network interactions (PAR, proximal infrastructure, environment…)

- Proximal land use planning/zoning

- Asset management prioritisation

- Etc…

Data compilation and standardisation

Example: NZ dams

NZID Preliminary Dataset

Potential Impact Classification
- High
- Medium
- Low
- Unknown

NZS 1170
Z_Factor
0.13
0.14 - 0.15
0.16 - 0.20
0.21 - 0.25
0.26 - 0.30
0.31 - 0.35
0.36 - 0.40
0.41 - 0.45
0.45 - 0.50
0.51 - 0.55
0.56 - 0.60
0.61 - 0.65
— Faultlines

0   75   150   300 Kilometers

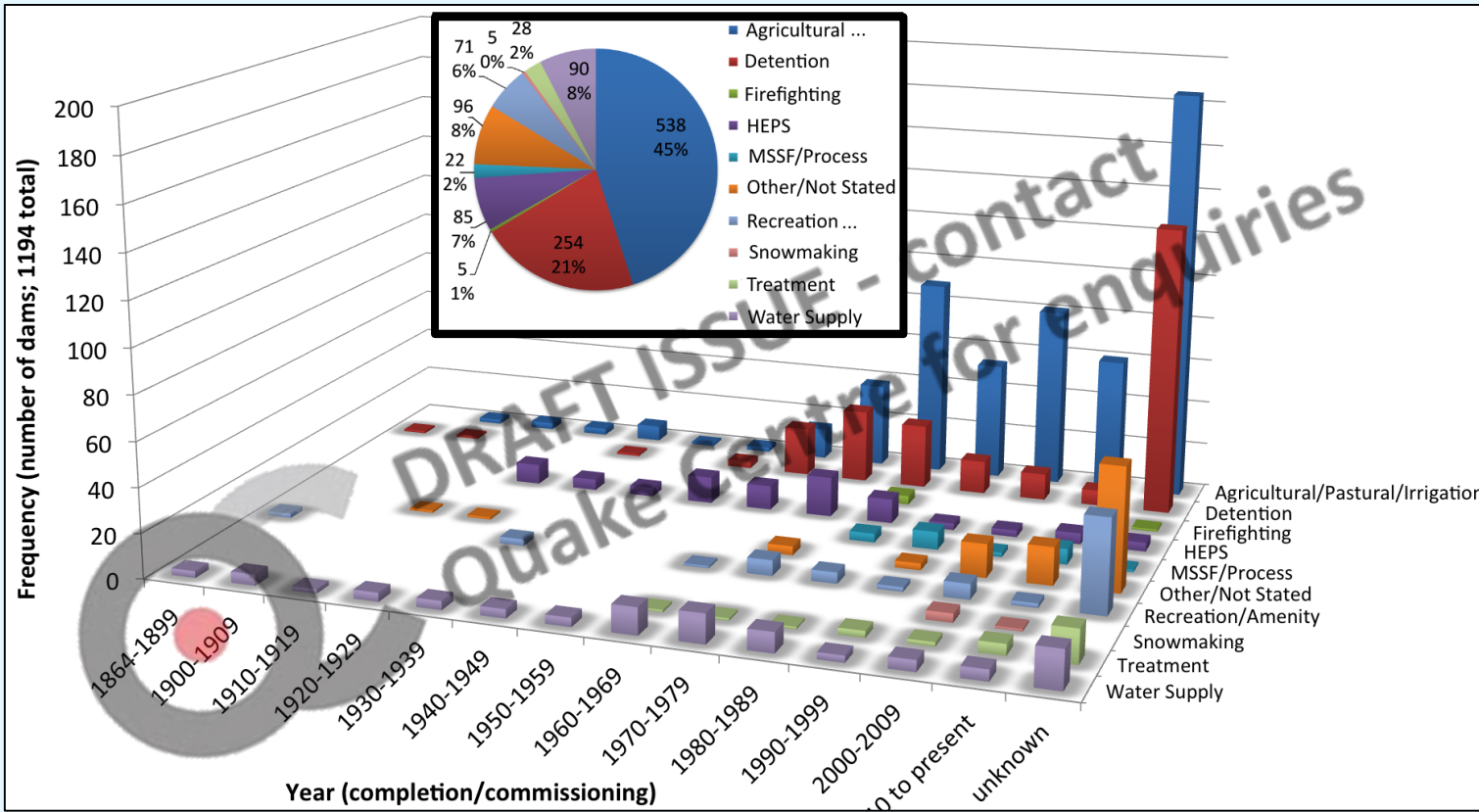Visualisation courtesy of Marcus Rodger
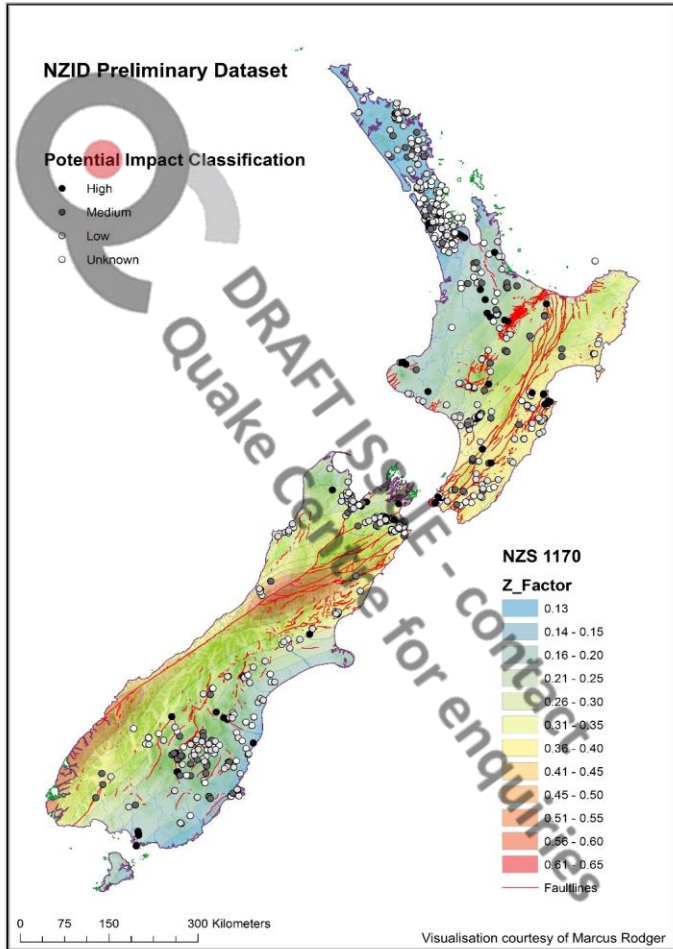
- Height/Volume
- Type
- Purpose
- Age
- PIC (consequence)
- + GIS layers (seismic, geology, roads, buildings…)

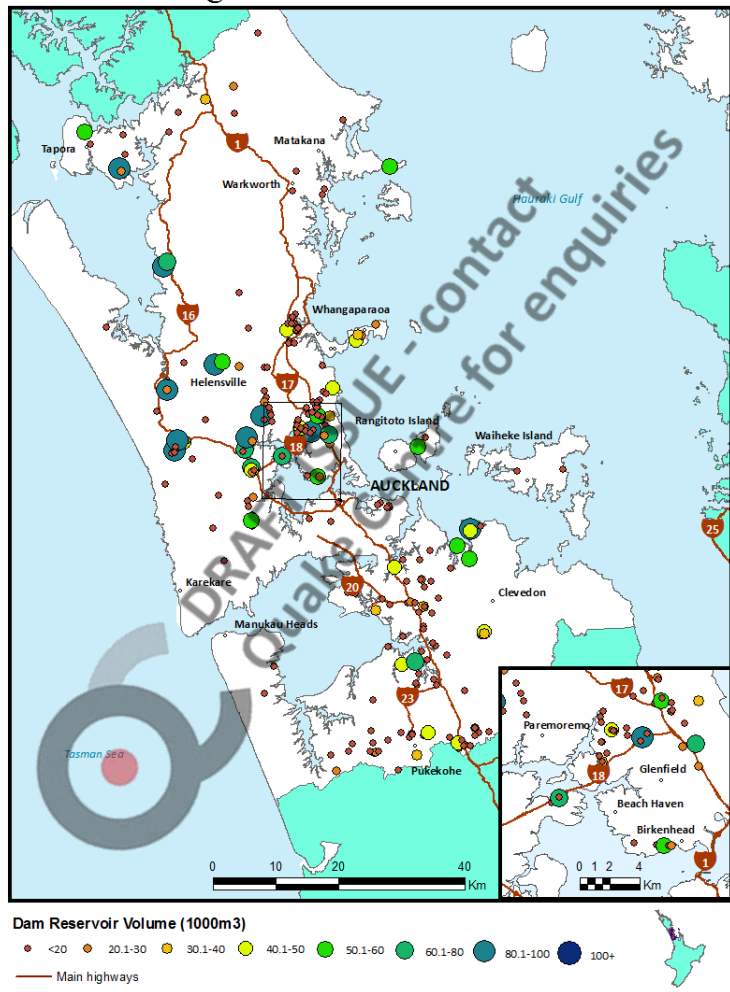- Height
- PIC (consequence)
- Purpose
- Type
- Volume
- Year

- Name
- Identifier
- Owner
- Location
- Co-ords
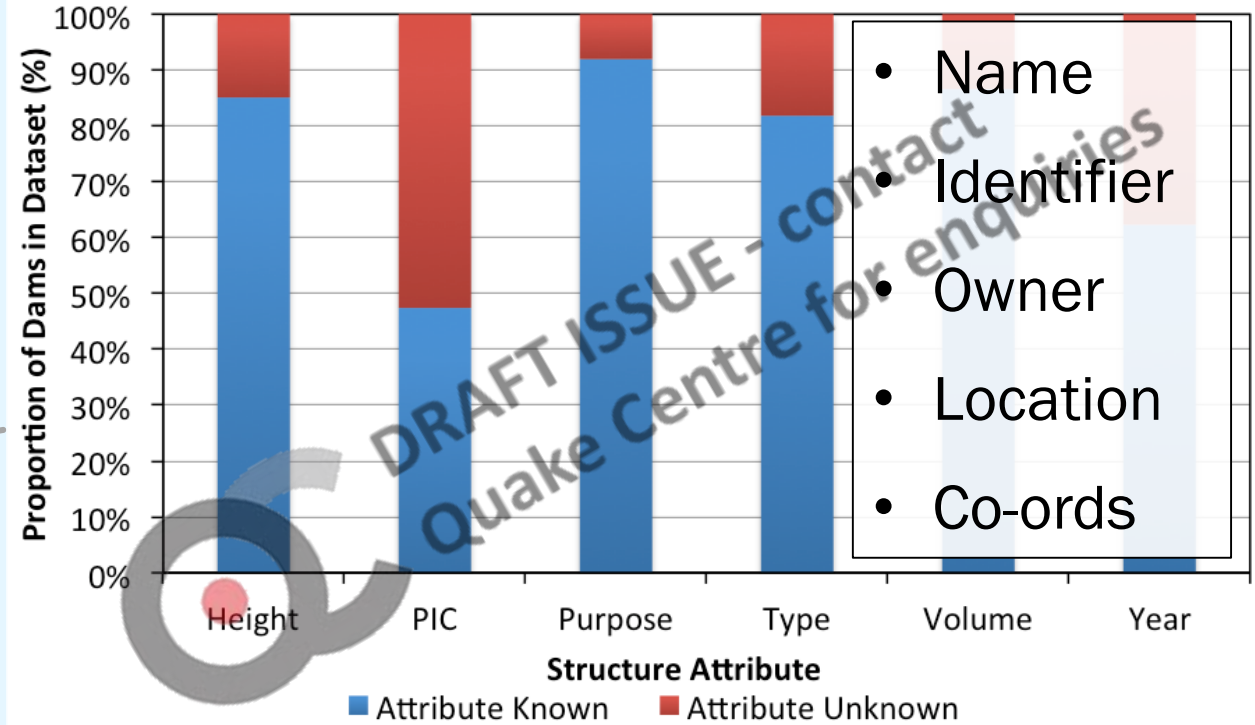
Example: ID key information gaps   (1194 structures)

Example meta-analysis: NZ dam purpose and age

Example: NZ dam attributes

Auckland Region

Dam Reservoir Volume (1000m3)
- <20
- 20.1-30
- 30.1-40
- 40.1-50
- 50.1-60
- 60.1-80
- 80.1-100
- 100+
- Main highways

Waimak stopbanks

Legend
- LiNZ stopbank Centerlines
- **Primary NZLRI Soil class**
  - 14e
  - 19e
  - 20a
  - 21b
  - 40b
  - 41b
  - 42
  - 44
  - 45
  - 47a
  - estu
  - rive
  - town

Intended outcomes

- A **single, standardized geospatial inventory** of NZ stopbank networks (NZSI)

- An initial **spatial analysis framework** (multilayer)

- Key **characteristics** of NZ stopbank **portfolio** (age, location, geology, proximal characteristics)

- Identify key **information gaps**

- Identify **critical network segments** and assist with **risk prioritization** in the future