Periphyton, Macroinvertebrates and Fish

Predictions of the Bayesian Network

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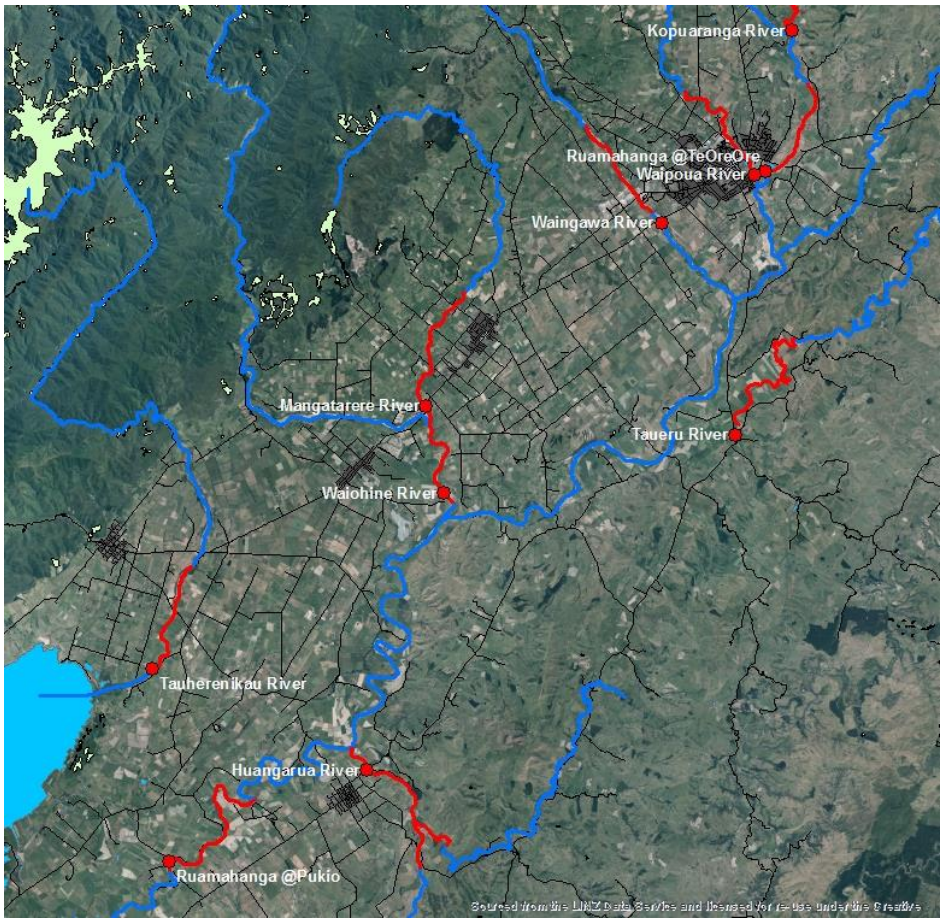
Reporting reaches



- 10 reaches
- Each 6-9 km long
- Large (4th order or larger)
- No small tribs

Periphyton

Determined by:

- Dissolved nutrients
- Light at the riverbed
- Summer water temperature
- Frequency of flooding
- Grazing invertebrates

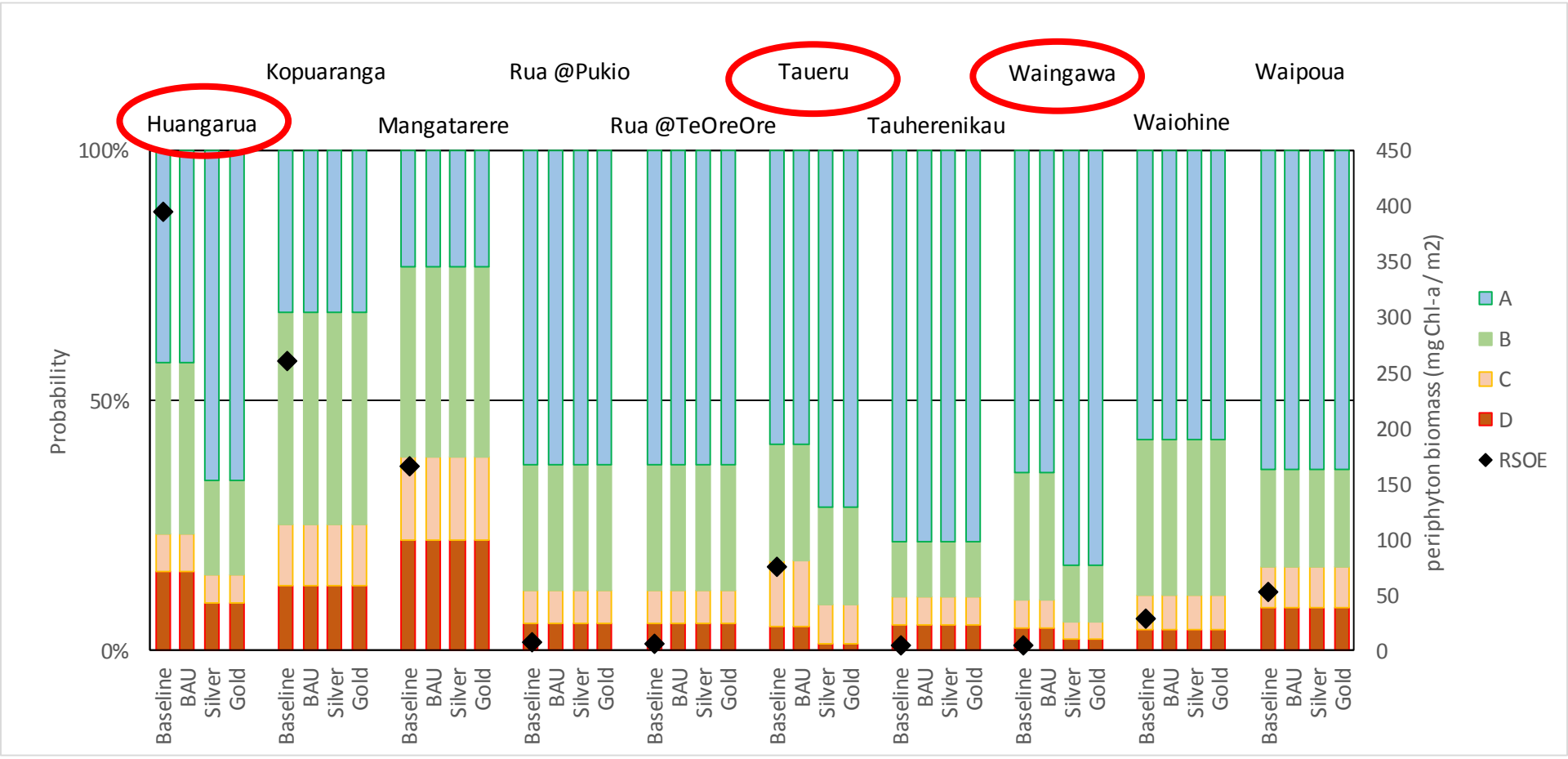
- Based on a national dataset.
- Assume periphyton in Ruamahanga rivers responds to these drivers as it does in other places
- Emphasis on relative results and changes, not absolute values

Periphyton: what the results mean

- Probabilities of being in NOF bands A-D
- NOF band means periphyton biomass doesn't exceed this amount >1x/year in monthly samples.

NOF band	Periphyton biomass (mg Chlorophyll a per m^2)
A	50
B	50-120
C	120-200
D	>200

Periphyton


Huangarua
Kopuaranga
Mangatarere
Rua @Pukio
Rua @TeOreOre
Taueru
Tauherenikau
Waingawa
Waiohine
Waipoua
Probability
100%
50%
0%
periphyton biomass (mg Chl-a / m2)
450
400
350
300
250
200
150
100
50
0
A
B
C
D
RSOE
Baseline
BAU
Silver
Gold

Periphyton

Changes due to

- Reductions in dissolved nutrients
- Decrease in water temperature & light (Taueru only)

Further reductions

- >50% reduction possible in Kopuaranga and Mangatarere
- smaller reductions possible in Ruamahanga, Waiohine and Taueru
- By further decreasing dissolved nutrients
- *Hard to increase flood frequency, stream shade, hard to predict change in invertebrate grazers*

Macroinvertebrate Community Index (MCI)

Determined by:

- Periphyton
- Deposited silt
- Water temperature
- Low flow (MALF)

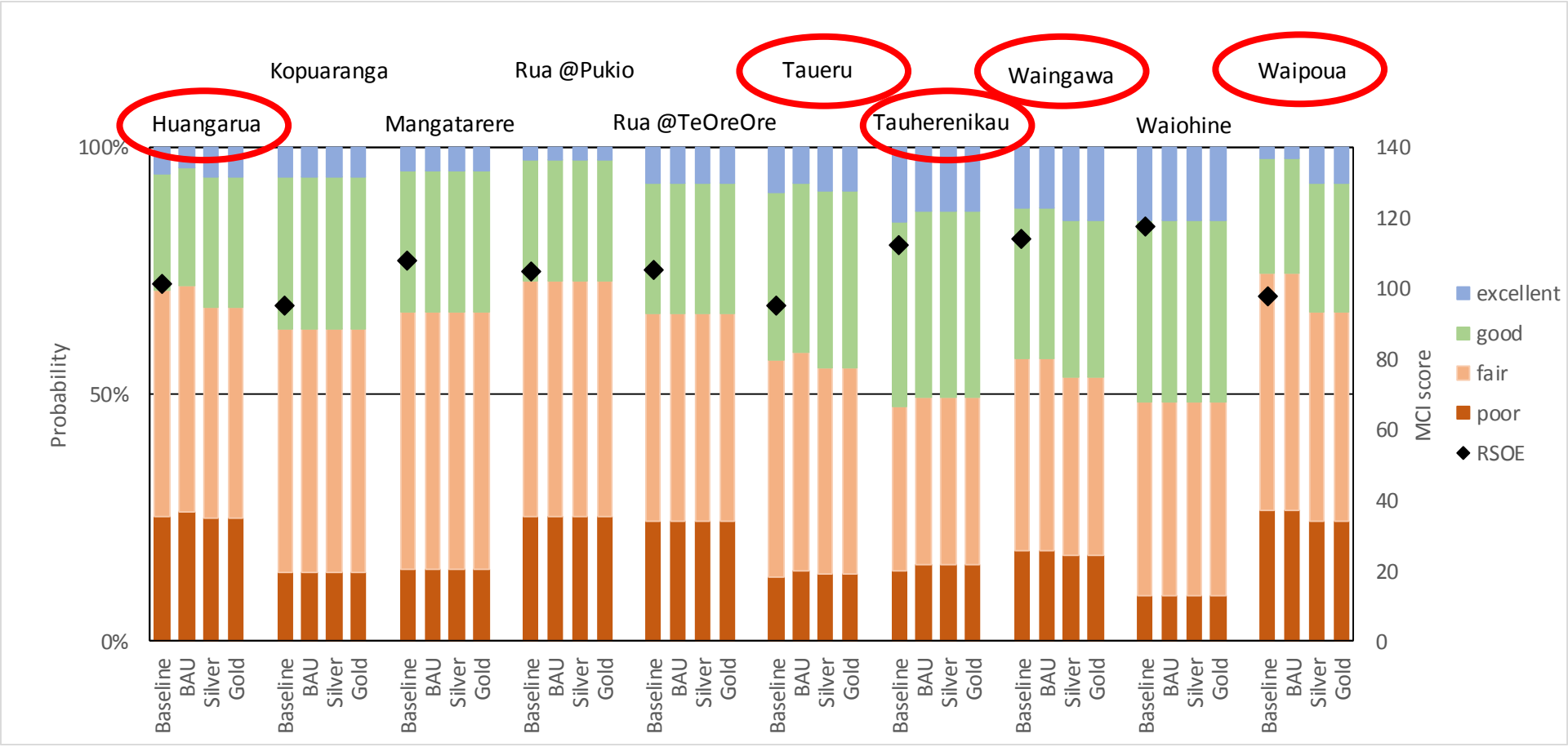
- Based on a national dataset.
- Assume MCI in the Ruamahanga catchment responds to these drivers as it does in other places
- Emphasis on relative values and changes, not absolute values

MCI: what the results mean

- Probabilities of being in condition bands excellent, good, fair, poor
- Based on one sample per year.

Condition band	MCI score
Excellent	>120
Good	100-120
Fair	80-100
Poor	<80

MCI


Huangarua
Kopuaranga
Mangatarere
Rua @Pukio
Rua @TeOreOre
Taueru
Tauherenikau
Waingawa
Waiohine
Waipoua
100%
50%
0%
Probability
140
120
100
80
60
40
20
0
MCI score
excellent
good
fair
poor
RSOE
Baseline
BAU
Silver
Gold

MCI

Changes are minimal because:

- Deposited silt depends only on flood frequency (doesn't change)
- Summer water temp changes little except at Waipoua (up to 2 °C)
- Periphyton changes at only 3 sites
- Weak relationship with low flow (MALF)

Trout size and abundance

Max size determined by

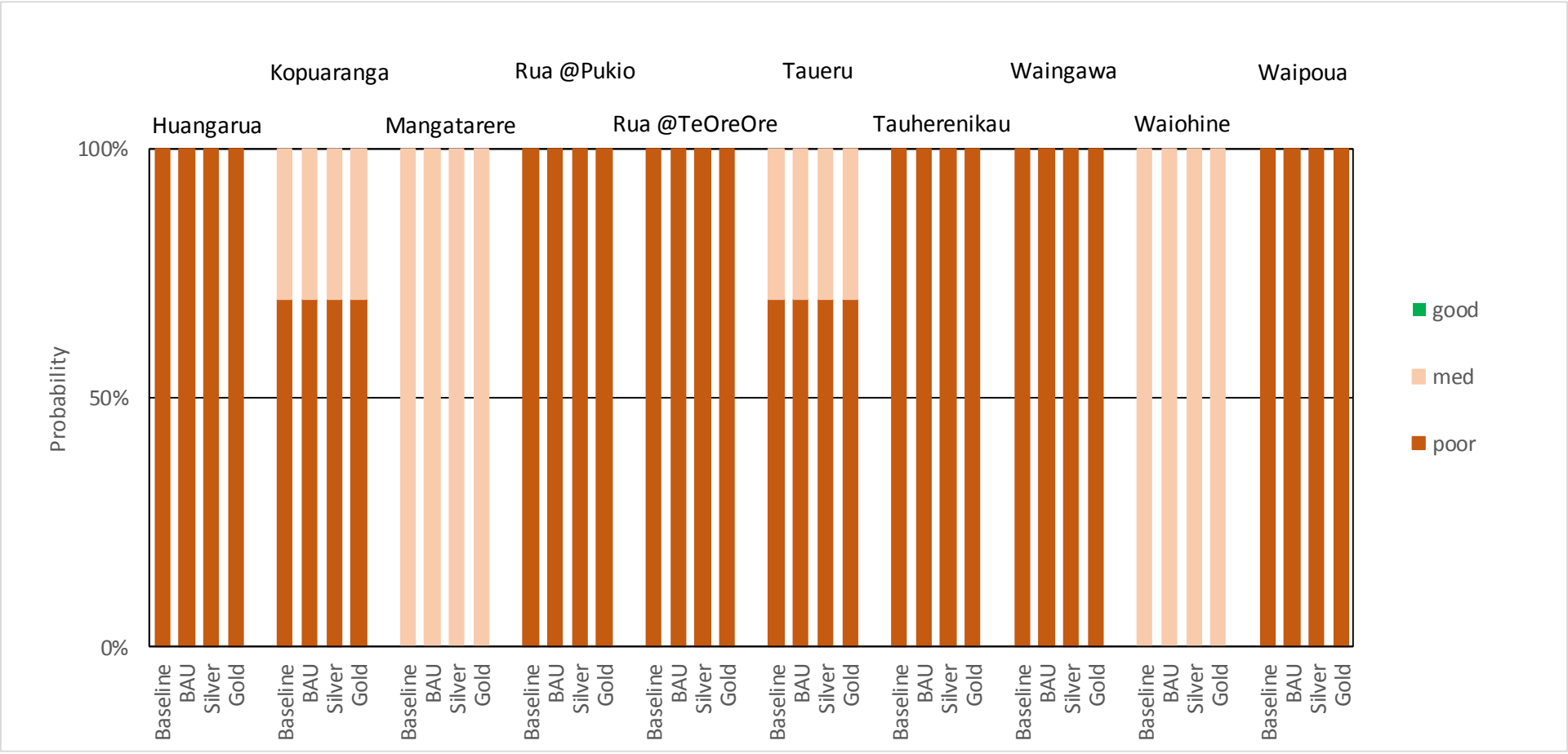
- Invertebrate prey density
- Water temperature
- Water clarity

Abundance determined by

- Habitat area at low flow
- Spawning habitat condition
- Dissolved oxygen

- Based on bioenergetic models and national surveys
- Maybe key habitat characteristics not included
- No local data available
- Emphasis on changes at sites, not absolute values

Trout size and abundance



Trout size and abundance

Results low and changes minimal because:

- Water temperature high (>16 °C) and little change at many sites
- Visual clarity: low (<1.4 m) and little change at all sites
- Trout prey : low (e.g. <10%) and little change (bc little change in deposited silt, water temp, flood freq)
- Habitat area: high and little change (except Huangarua)

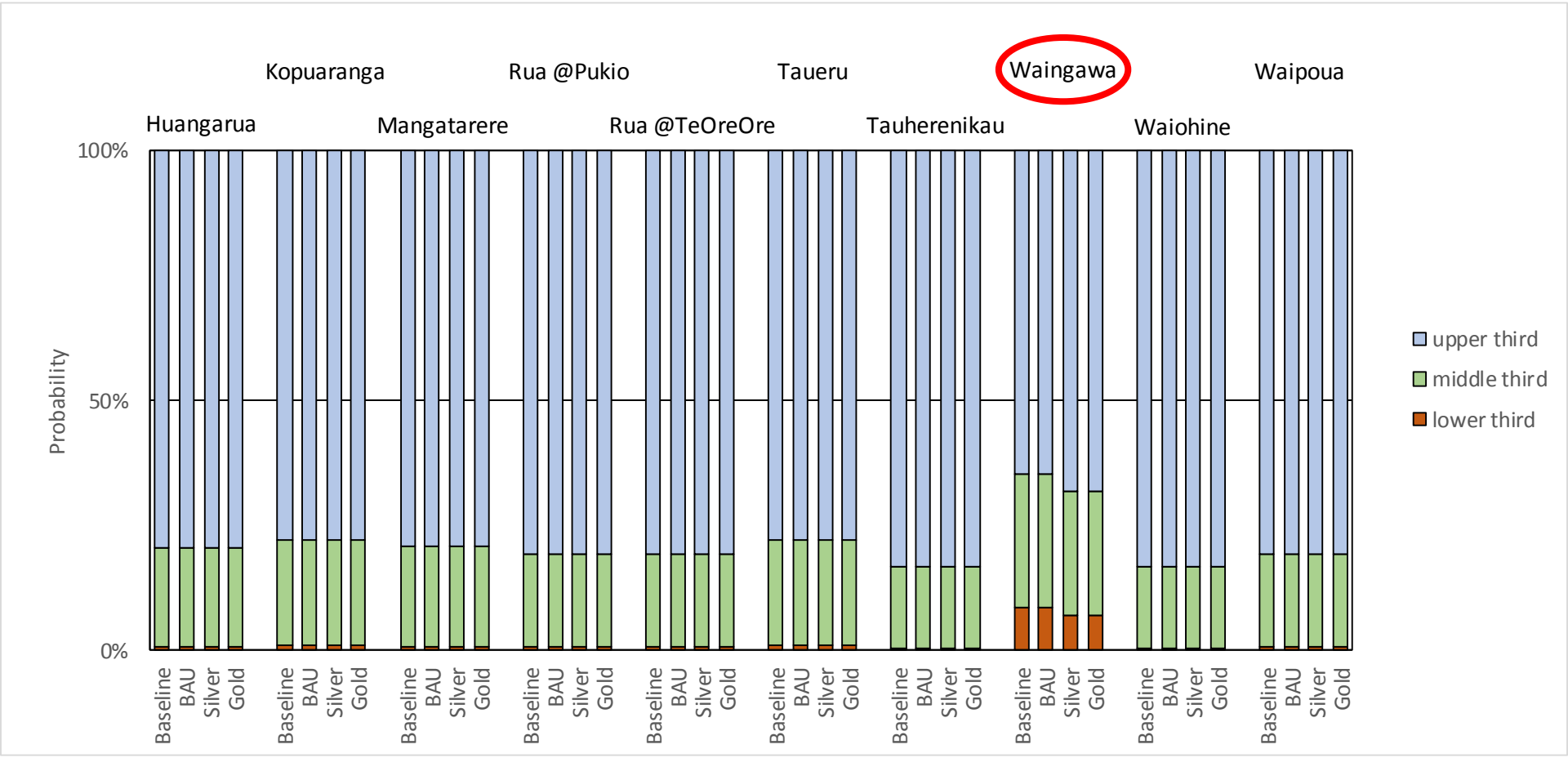
Native fish: IBI

Determined by

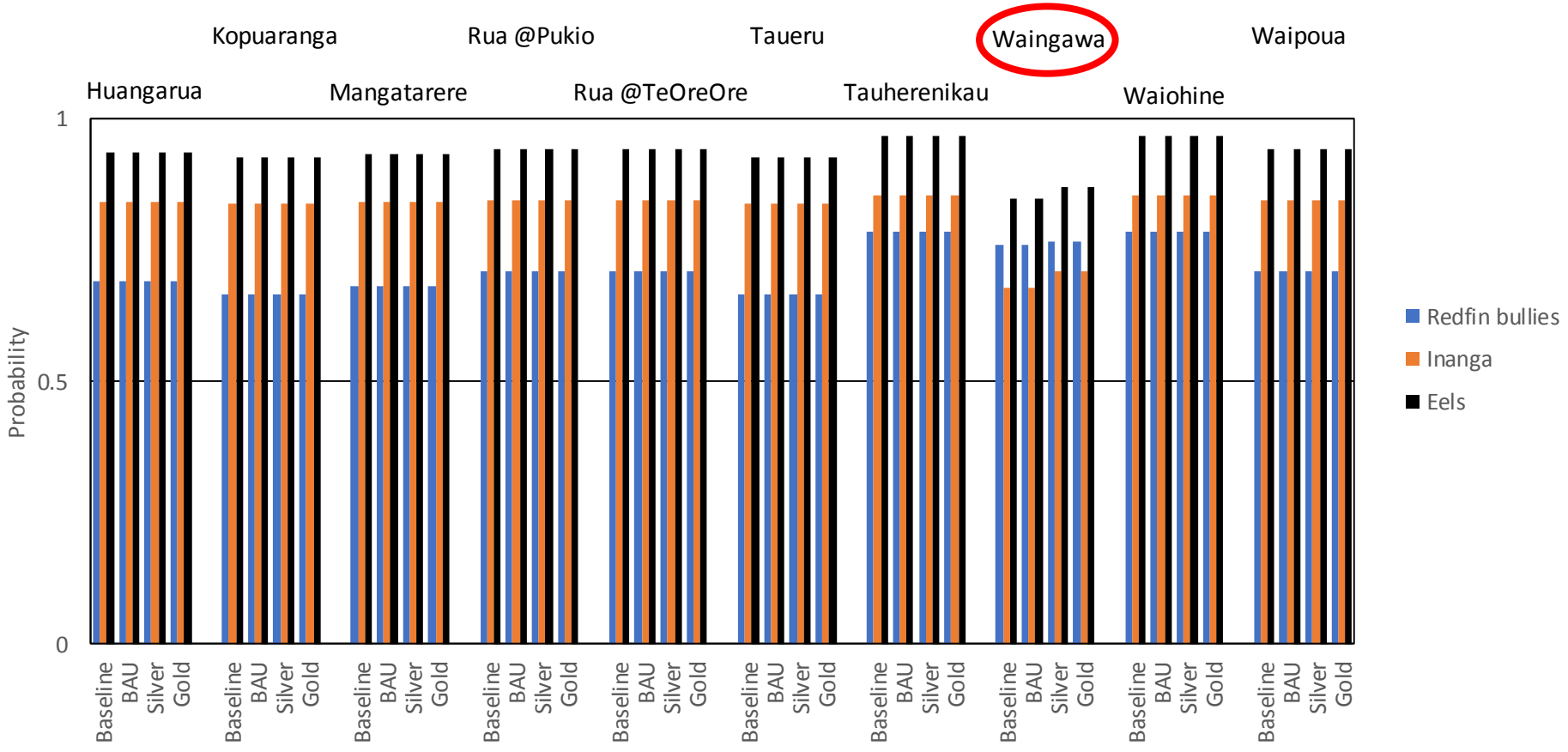
- Migration barriers
- Cover (veg, bank overhangs) on edge of channel
- Amount of deep pools and runs
- Deposited silt

- BN developed for Ruamahanga rivers
- IBI based on presence-absence, not abundance
- IBI depends on native and exotic (pest) species
- Classes (good, med, poor) are equal thirds from range of actual values in Wellington region.

Native fish: IBI



Native fish: 3 species



Native fish: IBI, eels, inanga, RF bullies

Minimal changes because:

- Changes to flood protection works outside scope
- Bank edge cover sufficient at baseline in all sites except Waingawa
- Deposited silt depends only on flood frequency (doesn't change)
- No migration barriers

Note:

- large rivers only
- presence-absence, not abundance

Summary

- Periphyton: small improvements at 3 sites
- MCI: all sites “fair”; no signif. change
- Trout: 2 sites med, rest poor; no change
- Native fish:
  - IBI high; change at 1 site
  - Eels, inanga, RF bullies probably present; change at 1 site