Review of Water Quality & Ecological Monitoring of the Taharua River

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Purpose of report:

• Review HBRC’s draft report
  – ‘Taharua River Water Quality and Instream Ecology November 01 to December 05’

• Recommend how to tailor monitoring to address potential impacts on trout arising from dairy development

• Also reviewed Bioresearches monitoring done for Poronui Stn. – since Dec 1999.
Key results from monitoring

- **Water clarity** declined over time & down Taharua
  - but not often below HBRC’s guideline of 1.6 m (black disc)
  - usually within ANZECC (2000) guidelines for turbidity (4.1 NTU)
  - SS usually within ANZECC (2000) guidelines (6 g/m³)
Key results from monitoring cont’d

• **N** increasing trend to high levels
  – but decreased down river (*dilution?*)

• **DRP** exceeds HBRC’s guideline (0.015 mg/l)
  – HBRC found no trend down river
  – Bioreseraches found P decreased down river

• **Algae** – no proliferation (*Bioreseraches*)
  – despite high N & P
Key results from monitoring cont’d

- DO spot records > 80% saturation – indicate no concern (Bioresearches)
  - but 24h DO monitoring on one occasion found DO dropped to 74% (HBRC & Cawthron)
- Faecal coliforms usually below guideline (<50/100ml)
  - but occasionally high (e.g. following rain or when cattle grazing near river – Bioresearches)
Key results from monitoring cont’d

• **MCI** – indicates good ecosystem health
Recommendations

• Plan monitoring within framework of Limiting Factor Analysis
• Limiting factors:
  – spawning / egg incubation habitat
  – fry / juvenile rearing habitat
  – adult habitat
Spawning / egg incubation habitat

- Key potential impacts:
  - **Sedimentation**
    - Smothering of eggs in redds
  - Nitrate?
    - May be lethal to trout eggs at conc. > 1.1 mg/l
  - DO?
Fry / juvenile rearing habitat

- Key potential impacts:
  - **Sedimentation**
    - embedding of substrate (no gaps to hide under rocks)
    - smothering invertebrate food
  - Riparian vegetation
    - loss of cover (e.g. by stock trampling/grazing)
  - DO?
Adult habitat

• Key potential impacts:
  – **Sedimentation**
    ➢ smothering invertebrate food
  – **Water clarity**
    ➢ reduced drift foraging area (= reduced food intake & growth)
  – Riparian vegetation
    ➢ loss of cover (e.g. by stock trampling/grazing)
  – DO?
Recommendations cont’d

• Revise water clarity guideline
  – 1.6 m BD is inadequate for drift feeding trout
  – ≥ 5 m BD or BD naturally exceeded 90% of time is more appropriate

• Continuous turbidity monitoring
Foraging geometry

\[ MCD = \sqrt{RD^2 - (V \cdot RD/V_{MAX})^2} \]

Conceptual model of drift-feeding trout foraging area
Prey capture probability

Data source: Hughes, N.F., J.W. Hayes, K.A. Shearer and R.G. Young. Testing a model of drift-feeding using 3-D videography of wild brown trout in a New Zealand river. Canadian Journal of Fisheries and Aquatic Sciences. (Accepted pending satisfactory revisions).
0.5 NTU ~ 5m BD
Recommendations cont’d

- **DO** – 24h monitoring
  - regularly
  - & in concert with N interpret in context of river metabolism analysis
Recommendations cont’d

• N, P, Algae
  – extend monitoring into Mohaka River below Taharua confluence
Recommendations cont’d

• Spawning habitat & sedimentation
  – conduct spawning survey
  – check for sedimentation
    ➢ NIWA’s quorer ‘Irish Rubbish Tin’ practical monitoring tool
  – if sedimentation present could study:
    ➢ spawning gravel quality
    ➢ egg survival
Recommendations cont’d

• Riparian habitat condition survey
  – could base on existing protocols
    ➢ Bain et al (1999)
    ➢ MfE (2000)
    ➢ Quinn et al. (2001)
  – or could simply inventory obvious damage from stock & land use change
Recommendations cont’d

- Benthic invertebrates
  - consider including runs in monitoring
    - looking for progressive sedimentation effects which begin in pools → runs → riffles
Recommendations cont’d

• Monitor trout population parameters:
  – abundance & catch rate
  – growth
  – condition

• F&G – drift diving?

• Poronui Stn. – angling records
  – trout size (length & weight)
  – catch rate
  – otoliths & scales for growth analysis?
  – tag & recapture for growth analysis
  – bank counts trout & rising trout by date?