

## **Introduction**

This evidence covers:

- An assessment of the habitat quality at the current compliance point (Northland Regional Council Sample Site 5941). This assessment demonstrates that aquatic habitat at the ammonia compliance point is capable of supporting the aquatic fauna that the ammonia limits imposed by the resource consent are intended to protect.
- An assessment of an alternative compliance point in the receiving catchment.
- A recommendation on whether the existing or alternative compliance point should be selected for future monitoring of ammonia limits.

## **Survey methods**

Aquatic habitats were assessed at four sites by Dr Tim Martin and assistants in winter high flow conditions and summer low flow conditions. Sites were:

- Site 1: the discharge flow path.
- Site 2: the receiving drain immediately upstream of its confluence with the discharge flow path.
- Site 3: the receiving drain immediately downstream of its confluence with the discharge.
- Site 4: the stream into which the receiving drain flows, c.650 m downstream of the compliance point at the Parapara Road bridge.

Fish were sampled in the winter and summer assessments using Gee minnow traps and kick netting. Aquatic macroinvertebrates were sampled at all sites in the summer assessment.

## **Survey results**

Survey results are presented in Appendix 1.

## **Ecological values of receiving environments**

The Taipa WWTP discharge empties into a drain and stream that flow through a highly modified catchment. Run-off of stock effluent into the waterways, grazing along the banks of the watercourses, and a lack of overhead shade also contributes to poor water quality in the receiving environment. Overall, the ecological values of the receiving watercourses, relative to other streams in the Far North District, are low.

Three indigenous fish species were recorded at the sampling sites (inanga, common bully, and longfin eel) and two of these (inanga and longfin eel) are classified as "At Risk - Declining".

Based on the MCI scores for the three sites sampled in February 2015, the water quality, and associated aquatic habitat values, declines from the compliance point in a downstream direction. This is likely to be due to a combination of discharge from the WWTP and other sources of pollution including potential input of effluent from a dairy shed oxidation pond. Mr Ben Tait notes in the Northland Regional Council notified Staff Report that the land is no longer being used as a dairy farm; however, no comment is made in the report about the current state of the dairy shed oxidation pond.

## **Effects of ammonia on the receiving environment**

Experiments testing the acute toxicity of ammonia to seven New Zealand freshwater fish species, including the three species confirmed as present at the compliance point by this study. No lethal or sub-lethal effects occurred for any New Zealand fish species after exposure for one hour to ammonia concentrations of c.2 mg/L. This can be

regarded as the ideal maximum concentration for ammonia, because it would result in no adverse effects on freshwater fish.

Ammonia concentrations for the compliance point for the period April 2009-March 2010, averaged 1.1 mg/L. In dry conditions, the ammonia concentrations at the compliance point can be similar to the discharge from the treatment plant due to little or no mixing of the discharge until it reaches confluences with flowing streams further down the catchment. In February 2015, ammonia concentrations ranged from 17-20 mg/L for the discharge flow path, and 8.8-13 mg/L at the compliance point.

During the winter months, water volumes within the receiving environment are much higher, and consequently there is more mixing of the discharge with the receiving waters. Minor peaks in ammonia can occur at the compliance point, with concentrations frequently between 1-2 mg/L, but these peaks are below the levels at which lethal or sub-lethal effects would be expected.

Background levels of ammonia are also monitored at the settlement of Parapara, upstream of where the WWTP discharge tributary meets the Parapara Stream. Ammonia levels here appear to be closely correlated with concentration at the compliance point. Whilst the WWTP discharge is a significant source of ammonia, the Parapara Stream also receives ammonia from multiple sources other than the wastewater treatment plant such as stock grazing riparian margins, septic tanks, and effluent ponds. Ammonia levels in effluent can frequently exceed 360 mg/L and at the time of assessment there was a dairy shed effluent pond downstream of the WWTP discharge point and the compliance point that may have discharged into the stream. As noted above however, the farm is no longer being used for dairy and this potential pollution source may no longer be a concern.

Based on MCI scores, water quality was at its lowest c.650 metres downstream of the compliance point, where the receiving stream passes under the Parapara Road bridge. Therefore, opportunities for fish to survive adverse conditions at the compliance point by moving elsewhere in the catchment may be limited.

#### **Assessment of the compliance point**

The existing compliance point provides habitat during higher winter flows for several indigenous freshwater fish species, two of which are classified as "At Risk-Declining". Indigenous fish species are also present at the compliance site during low summer flows, albeit in much lower numbers. Therefore, the aquatic habitat at the ammonia compliance point supports fauna that the ammonia limits imposed on the resource consent are intended to protect. Furthermore, the compliance point had the best MCI score (and therefore potentially the best quality fauna habitat) of the three sites sampled.

The existing compliance point should be retained. However, it should be acknowledged that, during low flow conditions, little or no dilution of the discharge occurs upstream of Parapara Road. Any site that allows for dilution of the discharge at all times would receive pollutants from multiple sources other than the wastewater treatment plant.

Appendix 2 in Evidence

Appendix 1 - survey results

| Site   | Season | Description   | Fish species present              | MCI score | MCI interpretation                |
|--------|--------|---|-----------------------------------|-----------|-----------------------------------|
| Site 1 | Winter | Discharge flowpath                                      | Inanga, common bully, longfin eel | n/a       | n/a                               |
| Site 1 | Summer |   | Shortfin eel                      | 74.1      | Poor, probable severe pollution   |
| Site 2 | Winter | Drain upstream of confluence with discharge             | Inanga, common bully              | n/a       | n/a                               |
| Site 2 | Summer |   | none                              | n/a       | n/a                               |
| Site 3 | Winter | Drain downstream of confluence with discharge           | Inanga, common bully              | n/a       | n/a                               |
| Site 3 | Summer |   | Inanga, gambusia                  | 80        | Fair, probably moderate pollution |
| Site 4 | Winter | Stream by Parapara Road Bridge downstream of confluence | Inanga, common bully              | n/a       | n/a                               |
| Site 4 | Summer |   | Inanga, gambusia, koi carp        | 50.5      | Poor, probable severe pollution   |