THINK TANK NEWSLETTER

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Tutaekuri, Ahuriri Estuary, Ngaruroro, Karamū – the TANK project

A number of TANK members joined Jerf van Beek in Twyford before the TANK Group meeting to see the Raupare Irrigation Flow Enhancement Scheme first-hand. Jerf gave the group a summary of land use in the immediate area, the water-sharing scheme and demonstrated a new augmentation installation.

Meeting 38 then began with a focus on enhancing lowland stream flows using groundwater, before moving into rule-setting for high-flow allocation. This meeting also covered AgFirst's economic analysis reporting, and management scenarios that are being assessed to help with setting rules to manage the abstraction/taking of water from the Tutaekuri and Ngaruroro Rivers.

Lowland Streams
– flow enhancement from groundwater

Dr Jeff Smith talked to a discussion paper on targeted stream augmentation. He used the examples of the current Twyford Irrigators Scheme and similar schemes in Canterbury.

There was overall concern that the amount of water in the aquifer is being abstracted at levels resulting in adverse effects on stream and spring flows and groundwater levels in summer. The Group agree flow enhancement is not the silver bullet and that reductions in use also need to occur. The Group then worked through a detailed set of proposals to further help staff to draft policy for the TANK Plan.

TANK members agree that any flow enhancement must be implemented hand-in-hand with riparian planting, wetland development, water use efficiency and over-all reduction in water use.

The Group has already agreed to cap groundwater abstraction to a maximum of 90 million litres[3] and to reduce allocation (over time) to actual use as existing permits are renewed. They debated the possibility of

Impressive when it's in action! This new augmentation structure is one of 2 in place in Twyford, to augment flow to Raupare Stream.

further reductions beyond this, but most TANK members agreed this should be a staged process. It would follow the initial re-allocation and revised management regime so that success in improving environmental outcomes and reducing water use could be assessed.

They acknowledged the benefits provided by a joint approach to solve environmental challenges, as demonstrated by the Twyford Group. Rather than leading to more water use, Jerf was able to report lower water abstraction. Water users have worked together to ensure minimum flows are maintained.

The Group sought further development of an approach to lead to lower water abstraction as well as mitigation measures being proposed.

The 'Unnamed Drain' (bottom right) contributes spring-fed flow to Raupare Stream. Raupare Stream flows at a rate of 300 litres per second through a tile drain created in the 1920s.

Economic Analysis Reporting

Leander Archer of AgFirst presented the first part of an economic analysis report on Modelling Water Restrictions and Nutrient Losses for Horticulture in the TANK Catchment.

The analysis compares a base case of current irrigation restrictions on horticulture to three potential future management scenarios based on different flow regimes and water allocation options.

This work has modelled the impacts on crop production for a number of model or representative farms that reflected most of the land and water use regimes on the Heretaunga Plains.

The economic model used information generated by a plant and water use model (SPASMO) to predict the yield and quality likely under different water availability levels with each of the flow scenarios.

The modelling developed a 'base case' to represent the current management regime and then compared what would happen to farm income if the availability of water changed, which would happen if different trigger flows were used. → *Refer to the 'Habitat Protection' slides (at end) for flow recommendations.

Base Case 60% of irrigators not attached to river-related flow trigger (minimum flow bans) 40% of irrigators currently attached to a flow trigger for 44% (Ngaruroro) and 60% (Tutaekuri) habitat protection* for torrentfish and trout (respectively) as the most flow-sensitive fish species.	**Cumulative Cost of 18 Climate Years at the farm gate** -$113 M (EBIT)
Future Scenario A 80% of irrigators would have 9 in 10 year reliability of annual allocation volume 20% of irrigators would have 80-90% habitat protection* river-related flow trigger (bans) and a 4 in 5 year reliability of annual allocation volume.	-$706 M (EBIT)
Future Scenario B 80% of irrigators on a 9 in 10 year reliability of annual allocation volume 20% of irrigators on 70-75% habitat protection* river-related flow trigger (bans)combined with 4 in 5 year reliability of annual allocation volume	-$659 M (EBIT)
Future Scenario C – Water for 2013 Climate Year 80% of irrigators on a 2013 year reliability of annual allocation volume (similar to 19 in 20 year reliability)	-$163 M (EBIT from 80% of area)
Future Scenario C – Water for 9 in 10 Climate Years 80% of irrigators on a 9 in 10 year reliability of annual allocation volume	-$520 M (EBIT from 80% of area)

AgFirst's information is based on impacts at a farm scale and is the first part of the economic analysis. Work is now underway to assess the impact of water management on the supply and processing components of primary production in TANK's catchments. This work will take farm scale information and develop TANK scale economic models.

The information generated by this analysis will also be used in an assessment of social and cultural impacts of the Plan Change. The TANK Group questioned some aspects of the modelling, including:

- the accuracy of the grape production modelling
- how the use of stored water for some irrigated land was accounted for
- the impact of an allocation regime based on crop water demand for 9 in 10 years
- how changes were shown to the way some groundwater takes were to be classified.

River Flow Management

Additional information about the effect of different 'trigger flows' was provided by Dr Thomas Wilding.

He explained that the term 'minimum flow' was misleading. It implies that a management action like restricting surface water abstraction can ensure the flow is maintained at a minimum level.

Different flow levels are triggers for water management actions, which might include restrictions or bans. In reality, the flow would continue to fall if there is no rain in the ranges. Flows will vary naturally from year to year in response to climate variability, dropping to lower flows in dryer years. Water abstraction will change the frequency at which flows might drop to low flows.

Table 1 The number of water years in which the annual low flow dropped below each flow threshold (7-day mean minimum for the July to June water year). Both measured and naturalised flows are presented for the Ngaruroro at Fernhill (period 1998-2015) and the Tutaekuri at Puketapu (1981-2015). Naturalised flows are the flows estimated to have occurred if there was no water use (based on estimated actual use, rather than allocation). Water year July to June.

	Ngaruroro	/18 years		**Tutaekuri**	/33 years
Flow L/sec	measured	naturalised		measured	naturalised
1000	0	0		0	0
2000	2	0		**0**	**0**
2400	**7**	**2**		2	2
3000	7	4		10	4
3500	10	7		17	14
4000	12	7		23	18
4500	13	9		28	25
5000	16	13		30	28

The duration of low flows increases with water use. The Ngaruroro is estimated to have spent 7 water years below 2,400 L/sec as a result of water use (average days/year for 1998-2015). During most years, flow did not fall below 2,400 L/s (11 out of 18 measured years; 16 out of 18 naturalised years). Dry years saw the biggest increase in the duration of low flows. There were 64 days below 2,400 L/s in 2013, compared to 8 days below from a model of naturalised flow (using daily mean flow).

Neither this data, nor RHYHABSIM (a river monitoring model that shows changes to habitat available to fish) provides the right flow trigger. Nor do they predict what would happen to the instream values of the river. They do however give information to help assess how much a river flow is affected by different types of water abstraction.

Habitat Protection flows - Ngaruroro

Ngaruroro River - downstream of Fernhill nat. MALF 4700 L/s *(was 4500)* exist. MALF 3800 L/s	Flow for 90% habitat	Flow for 80% habitat	Flow for 70% habitat	Habitat protection at 2400 L/s
Fast-water fish i.e. torrentfish	4400 L/s	4000 L/s	3600 L/s	44%
Moderate-water fish i.e. smelt	2700 L/s	2200 L/s	1800 L/s	86%
Slow-water fish i.e. common bully	1200 L/s	<1000 L/s	<1000 L/s	100%
Invertebrates (food producing)	4200 L/s	3700 L/s	3200 L/s	47%

Habitat Protection flows - Tutaekuri

Tutaekuri River - Puketapu nat. MALF 3900 L/s *(was 3800)* exist. MALF 3500 L/s	Flow for 90% habitat	Flow for 80% habitat	Flow for 70% habitat	Habitat protection at 2000 L/s
Fast-water fish i.e. adult trout	3300 L/s (3200)	2800 L/s (2600)	2300 L/s (2100)	65% (68%)
Moderate-water fish i.e. koaro	1600 L/s	1100 L/s	700 L/s	100%
Slow-water fish i.e. common bully	<500 L/s	<500 L/s	<500 L/s	100%
Invertebrates (food producing)	2700 L/s	2100 L/s	1600 L/s	79%

75%

HAWKE'S BAY

The TANK Group selected habitat flows for further economic analysis: 80% and 70% levels for Ngaruroro for torrent fish, and 90% and 75% for Tutaekuri for trout.

TANK members were asked to consider reducing the number of scenarios (to be modelled) for further assessment - to narrow the range of contested possible trigger flow regimes. This would also reflect the similar level of impact between Future A and Future B and allow further refinement of economic modelling once the impact of Future A was provided.

The TANK group agreed to carry on with modelling the impacts of Future A, provided it was understood that Future B is still considered a potential management option.

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TANK
Safe, secure water for Heretaunga Plains