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Sent: Wednesday, February 20, 2019 2:32 PM

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Subject: Potential to Increase Coastal Fisheries Production now please

Hi Pim, Courtney, Nicki and BOPRC Councillors

Further to our conversation 13 February re the area of land between the Tauranga Eastern Link, the Kaituna River, the Kaituna Wetland and Kaituna Road I make the following recommendations which could best I believe be applied to any area of land within a river catchment without affecting neighbouring land usage. I believe that it could be the most efficient utilisation of any land to be converted into wetland with the greatest potential to lower nutrient loading by exposing water to plants, while providing the greatest possible ideal habitat for galaxius (whitebait) and tuna (eel). Quote R.M. McDowall: 'From the high fecundity (number of eggs) and the large size of fish living in them, lowland bush swamps with brown water appear to be the ideal habitat for Galaxius maculatus.'

I believe that ideally all farm drains could be converted into planted v-drains and they could then lower nutrient loading of the environment. Other obvious highly visible places to start setting an example of coastal fisheries rebuild could be Whakapoukorero Wetland, AFFCO Rangiuuru lowlands, Lawrence Oliver Park, as well as land surrounding Te Puke Borough Sewerage Treatment Plant and extending down the Waiari Stream and Kaituna River stop-banks, as well as the regularly flooding lowlands at the end of Bell Road.

I recommend that you now:

1. Transplant the existing Kahikatea trees into rows running north-south and with the rows 20 meters apart starting from where the Tauranga Eastern Link crosses the Kaituna River.
2. Excavate deep v-drains with 60-degree sides between the rows, building a mound of soil also with 60-degree sides around the kahikatea and with sills at the ends of the v-drains connecting water flow in succession through the v-drains.
3. Introduce flood water to the most western v-drain either from the Kaituna River when in flood, or from the drain when in flood that is adjacent to Kaituna Road and that goes under the motorway. Water could also be syphoned or pumped into the v-drain.
4. Plant the mounds with:

Kahikatea

Kaikomako

Matai

Miro

Tawa

Pigeonwood

Kowhai

Titoki

Kotukutuku

Hinau

Puriri
Cabbage Tree
Flax
Fuchsia
Five-finger
Pate
Taraire
Wineberry
Tree Lucerne to feed native birds.

5. Plant flax along the v-drain water edges and raupo in the shallows to provide shaded nutrient stripping wetland habitat until the kahikatea and other fruit-bearing native trees had grown tall enough to shade the v-drains and so reduce raupo and other aquatic plants. If the v-drains were connected to the sea at their outlet they could quickly fill with galaxius (whitebait) and tuna (eel). Galaxius would in turn spawn on the banks of the lower Kaituna River as well as I expect in the upper Maketu Estuary when maritime marsh galaxius spawning habitat had been created there. Tuna (eel) juveniles would return from Tonga and would also contribute to building coastal fishery food chains.

In support of my recommendations, I quote the following list of interesting facts that I had taken from 'The New Zealand Whitebait Book' authored by R.M. McDowall over 30 years ago:

10. Every lowland water that is still or gentle flowing will have shoals of maturing Inanga by the beginning of summer.
12. Captain L. Hayes (1932): '**Within tidal limits are mudflats bristling with salt rushes. Inanga spawn amongst rushes.** Fairly long, thick growing grasses and rushes or similar vegetation is usually chosen. In March, **I noticed Inanga evidently spawning everywhere amongst the rushes.**'
13. D.H. McKenzie (1904): 'During the months of March and April may be seen at high water spring tides, countless myriads of small fish from 4 to 6 inches in length, making the water literally boil, **wherever any rushes exist.**'
28. A.H. Hefford (1927): 'The amount of whitebait devoured by fish is a very small item indeed as against the huge number that whitebait netters take from the stream.'
33. McDowall: 'Manawatu river productivity in the early days was undoubtedly due to vast areas of lowland swamp. These provided extensive habitat for inanga, giant kokopu and banded kokopu. Swamps have been drained, streams channelised, the forests felled and the whitebait have largely gone. **Low lying estuarine vegetated flats at the river mouth for spawning have also disappeared.** It is no wonder that the fishery isn't what it was.'
35. McDowall: 'Captain Hayes emphasised the desirability of providing sanctuaries or feeding grounds for the adult fishes. Such feeding grounds have of course been greatly diminished in the course of civilised settlement by the drainage of swamps and lagoons and their conversion to agricultural lands. It would appear, however, that there are many places, areas of swamps, which are of little or no value to agriculture and in which permanent lagoons, which would accommodate considerable numbers of inanga, might be formed as a result of comparatively simple and inexpensive work.'

38. McDowall: 'Wetlands are possibly one of the most endangered habitats in New Zealand, with thousands of hectares drained and converted to pasture each year. 84% of the wetlands in the Waikato valley have disappeared in the last 140 years. Wetlands are undoubtedly a crucial habitat for inanga. The populations of the various species have all declined because there is nowhere for them to live. It seems almost too simple to be true. And that's not all. **Whitebait spawn in estuaries**, and out of all the aquatic habitats, estuaries seem most fragile and prone to damage. Towns release effluent into estuaries often with minimal treatment. Further change is brought about by **channelling river mouths, constructing groynes**, etc.

The following is a list of interesting facts about whitebait that I had taken from a Marine Department, Fisheries Research Division, Fisheries Research Bulletin entitled 'Galaxius maculatus, the New Zealand Whitebait,' authored by R.M. McDowall.

3. For breeding purposes, galaxius maculatus migrates downstream into tidal estuaries and downstream migration occurs before spring tides.
7. **Galaxius maculatus spawns in tidal estuaries and either in salty or fresh water but usually in areas affected by an upstream tidal push.**
8. **Spawning takes place in tidal estuaries** and typically on flat grassy banks which are exposed at all times of the tidal cycle, except at high spring tides.
9. **Spawning beds are most often found where the ground is covered by spring tides but not by normal high tides**, although sometimes they are found below this level.
16. Eggs will hatch in fresh or salt water.
20. Whitebait do migrate from the sea at all times of the year.
32. **The downstream limit for galaxius maculatus habitat is the upper estuary.** (Graham noted the presence of adult Inanga in Otago Harbour while not in spawning condition).
33. There is a higher density of adults in the lower river and they are found in predominance in brackish backwaters.
35. From the high fecundity (number of eggs) and the large size of fish living in them, lowland bush swamps with brown water appear to be the ideal habitat for galaxius maculatus.
47. Hayes (1932): 'There are dangers from the trampling of stock and annihilation of possible spawning grounds through grazing. Deciduous trees make the ground beneath them unsuitable for the herbage necessary to give cover to the spawn, the effect of willows on the banks of streams, swamp drainage and **use of chemical weed killers.**'
51. Stockell (1955): 'A major influence has been the drainage of swamps and lowland streams. **The protection of its habitat in certain localities would be in the interests of the fishing industry.**'

The deliberate destruction of any area of potential maritime marsh galaxius spawning habitat in the upper Maketu Estuary on formerly Brain owned land is I believe foolhardy and the reasons given by you are I believe weak and unsubstantiated, because that

area had used to be totally covered by marsh galaxius spawning habitat as is pictured on my website. I believe that was the reason for the fishery's original productivity in conjunction with an undrained catchment and the significant size of the Rotorua Lakes providing adult habitat.

The fact that there is a higher density of galaxius adults in the lower river and that they are found in predominance in brackish backwaters could indicate that they are there in brackish water to spawn within tidal limits "wherever any rushes exist."

Recent studies have looked at an empty glass by comparison and have made conclusions based on lack of habitat and lack of experience.

The deliberate destruction of existing wetland proposed by Steve Everitt comes as no surprise to me and is in total contradiction to the millions of public dollars being spent there by EBOP on enhancing the environment. I believe that this could have been done at considerably less cost and to greater advantage because Kaituna River floods would exit down onto the ocean through two exits under my proposal long before they had climbed up against gravity onto low-lying houses or over a raised Maketu Road. A comparatively inexpensive overtopping structure over Ford Road that I had proposed would have allowed fresh and brackish water and spawning galaxius to enter Maketu Estuary on any high tide and occasional flood flow before again exiting at Te Tumu on a falling tide.

Deflecting screens now placed further up the river from the new diversion intake and inside the bend could stop any logs heading for the new and very expensive diversion without stopping the water and without destroying any more habitat. With 6,500 hectares in the Kaituna River catchment already destroyed by Council engineers isn't it now time to say enough.

A.H. Hefford (1927): 'The amount of whitebait devoured by fish is a very small item indeed as against the huge number that whitebait netters take from the stream.'

What sacrifice is made to our coastal fishery by the removal of a single returning juvenile whitebait so stopping many thousands of its progeny from following it in ensuing years? Whitebaiting in New Zealand is now comparatively non-existent and so is our coastal fishery. I believe that both can now be rebuilt and that Kaituna River re-diversion work could best set an example of this for others to follow. The galaxius is smooth and devoid of scales. I believe that the Bible records that we should not to eat fish without scales for good reason.

John Dryden is quoted by Graham: "For Art may err, but Nature cannot miss." I have attached some original background research re galaxius in attempt to enlighten you and BOPRC about commercial fisheries production rebuild potential that I believe does exist in the Kaituna River/Maketu Estuary ecosystem. I believe that Maketu Estuary restoration has a potential to prove national fisheries production rebuild potential if it is done as I have recommended after my having studied the subject over 50 years.

I request that you ask the contractor who it was that had invited him to recently heavily spray the bund deep into Whakapoukorero Wetland and if he was not a land owner then please prosecute that individual for doing so and please ban him from further association with the project because of his ignorance, arrogance, stupidity

and lack of understanding about ecosystem balance and preservation of life. If it had been a firearm presenting less consequence for future public health, then the police would become involved and would prosecute to protect public health. A glyphosate spray gun is a firearm with potential to kill and injure and it has now been banned by numerous countries around the world for that reason. I see it advertised in Te Puke Times 14 February that WBOPDC are to spray glyphosate on roadsides again which will eventually enter the human food chain and so it goes on under your management killing our children's future.

Kindest regards

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