AGENDA ITEM NO: 8(a)	SUBJECT: **Technical progress update: 1) Dryland farming related information, including estimating potential for forage cropping; 2) Outstanding questions on deferral of water takes issue**
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Action required

- Zone committee members note progress to date and the process to deliver dryland farming related information by next meeting on 11 December 2017.

1) Dryland farming related information - progress update

(i) Work by the Hurunui District Landcare Group (Josh Brown)

This work is progressing and is due to be presented to the Zone Committee meeting on 11 December 2017. It is anticipated this work will inform on what is "normal dryland development" and the typical nutrient (N and P) increases that could be expected from that.

(ii) Estimating the potential for dryland forage cropping

Forage cropping is the key concern with deciding on how to permit "normal dryland development" in catchments where nutrient limits are being managed. A permitted activity description is likely to need some form of constraint on how much forage cropping is enabled as a permitted activity - in order to manage within the catchment nutrient limits. The results from the HDLG work mentioned above will be relevant to inform this question. In the mean-time the ECan team has been working with a technical subgroup of the Science Stakeholders Group (SSG) to estimate how much area of forage cropping could occur under the example of the PC5 permitted activity rule (i.e., 10% of a farm; up to a maximum of 100ha).

The team has used a desk-top GIS method to estimate the area of land potentially available for forage cropping under the PC5 example permitted activity description, but the group recognises that several factors may constrain how much of that area could/would be likely to be used for forage cropping in practice. The team presented this information to the SSG on 8 November[1] and asked for assistance to identify and quantify these constraining factors. Several offers were made to help inform on this. Julia Beijeman (Beef and Lamb) and Robb MacBeth (Cheviot Irrigators) both offered to help by providing information via the HDLG work above (i.e., via Josh Brown). Scott Pearson (Fish and Game) suggested testing the physical constraints used by Environment Southland (e.g., maximum slope and proximity to waterway constraints) which the ECan team is following up. When all this information comes available and an agreed estimate of potential winter cropping area in the Hurunui and Waiau catchments is available, the technical team will be able to estimate the nitrogen load increase associated with that area, and consequently also the environmental effects (e.g.

[1] All the papers and presentations made at the 8 November SSG meeting have been sent to committee members.

nuisance algae) when combined with other quantified nitrogen increases from consented and proposed irrigated development[2].

This will inform Hurunui catchment discussions by quantifying the increase in N load (from permitting "normal dryland development") that need to be offset elsewhere to stay within the HWRRP nitrogen load limit.

This will inform Waiau water quality limit discussions by allowing consideration of the environmental effects of allowing for increases in nitrogen load in the Waiau catchment.

(iii) Sources of "manageable" phosphorus losses

This topic is relevant to the issue of "fixing the 10% rule" for dryland farming because, in addition to assessing the effects on nitrogen increases as described above, there is a need to assess whether there is a risk that catchment phosphorus limits (i.e., no increase on 2005-2011 levels) will be breached. Identifying the most manageable sources of phosphorus loss is a useful way to identify and manage this risk. The technical team presented material on this to the SSG workshop on 8 November and this was also circulated to committee members. Key messages from that presentation and discussion at the workshop are:

i) Phosphorus loss can come from multiple sources including natural erosion, diffuse (non-point) sources such as from both irrigated and dryland agriculture and forestry harvesting, and point sources such as community wastewater discharges, salmon farms and farm effluent disposal systems.

ii) The point sources described above are clearly identifiable and potentially manageable.

iii) Evidence from both ECan[3] and AIC data[4] shows that significant gains have been made in reducing phosphorus loads entering the Hurunui and Waiau Rivers from Amuri Plains tributaries. The primary driver for this is thought to be the shift from border to spray irrigation practices on the Amuri Plains, although other good farm management practices also contribute.

iv) Previous and current evidence still all point to further phosphorus gains being possible in Amuri Plains streams (e.g., Pahau River, St Leonards Drain, Rotherham Stream). The gains from converting border to spray irrigation are now largely complete although the latest conversions may not yet be reflected in the monitoring data and trend analysis.

v) Numerous mitigation strategies exist to minimise phosphorus losses from both irrigated and non-irrigated agriculture and forestry operations. Information is available on how, and the cost effectiveness of various strategies; and there are still gains to be made[2].

In summary, the available information, although uncertain, provides a level of comfort that gains from the most manageable sources of phosphorus loss (i.e., point sources, and diffuse sources from

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[2] Note that these latter nitrogen increases have been estimated – see Brian Ellwood and Peter Brown memos and presentations to SSG November 2017.

[3] See Adrian Meredith's presentation to SSG 8 November 2017.

[4] See Peter Brown's memo and presentation to SSG November 2017.

irrigated agriculture) could help to achieve catchment phosphorus limits (i.e., no net increase on the 2005-2011 average annual average instream loads in the Hurunui River) while permitting normal dryland development. This is particularly so if a level of comfort can be achieved around constraint on the total amount of dryland forage cropping in the catchment, which is a key dryland activity for the risk of both nitrogen and phosphorus loss.

2) Outstanding questions on deferral of water takes issue - progress update

The technical team committed to respond on two outstanding matters:

i) How might climate change influence the predictions of environmental effects of deferring water take consent review?

ii) Provide an update on the matter of the recent research by Cawthron Institute on modelling approaches to assist flow-setting processes.

On climate change - a response is provided in the attached agenda paper 8(b). The key conclusion is *"We would expect our assessed environmental effects of delaying implementation of HWRRP minimum flows (already presented) to be similar or slightly worse in the next 15 years all other factors remaining equal"*.

On the Cawthron Institute research - we understand from Joe Hay and John Hayes (both at Cawthron) that the revised draft report of the outcomes from the national workshop on this topic (13 June 2017 in Wellington) has gone back to the peer reviewers for comment. We will circulate this report to the committee, along with at least one other written peer review of the research we are aware of, as soon as the Cawthron report is released. In the mean-time it is the ECan technical lead's opinion that the key Hurunui process-relevant messages likely to come from these reports are:

i) The newly described modelling approach adds usefully to the existing basket of technical tools for informing flow-setting processes in New Zealand; and,

ii) If the HWRRP plan flow setting process was being renewed today and the newly described modelling approach was added to existing assessment tools, it would most likely result in a biophysical assessment that higher minimum flows than those in the HWRRP would increase carrying capacity for (i.e., benefit) drift-feeding trout populations. This information would then be subject to the usual consideration of implications across all values as part of normal flow setting decision-making process.