Tranche 2 - Ecology
Response to PDP Memo(4 Nov 2022)

Ecological Questions outstanding

- Effects of augmenting ephemeral or intermittent reaches?
- The use of the “typical” summer period to represent the expected drawdown, and what about extreme years?
- The level of effect to small streams?
- How adverse effects might be monitored in small streams?
- Whether adverse effects in small streams can be reversed?

I respond to these questions below.

Augmentation into ephemeral/intermittent reaches

- I agree that care must be taken with augmentation water so as not to disrupt the natural intermittent ecology patterns.
- The augmentation supports the shallow groundwater and perennial streams affected by the draw down depending on where and when the augmentation does occur.
- Augmentation method/location can be managed so it does not change the natural intermittent pattern.
- But if augmentation water resulted in a permanent perennial flow, then this would be a benefit to aquatic life albeit a change.
- Augmentation cannot cause loss of connectivity or fish passage issues.

Representativeness of Assessment

- My assessment reflects a wet summer season - small streams that are normally dry had some water in them at measure and that the draw down estimates therefore appear to have greater effect on them than if it had been a normal or dry summer. Had the summer been normal or dry, the beds would have been dry and the drawdown would have only affected the hyporheic zone not the instream (dry) aquatic biota.
- Although only a single measure, the assessment represents a conservative case that can be relied on to reflect the conditions of most risk in the small streams.
- Given the agreed quality and robustness of the streams affected remain the same, i.e. poor and robust, the conclusion that effects are unlikely stand.

Uncertainty and Extent of Drawdown

- PDP's report focuses on the % change caused by drawdown, but % change is not the relevant diagnostic. The important factor is the depth that persists; e.g, a 50% drawdown of a depth of 1 cm makes little to no ecological difference as does a 50% change to a 1m deep run.
- Depths that exhibit sensitivity tend to be where the stream is between 100mm for riffles and 200-300mm for runs, but pools are rarely sensitive being substantially deeper.
- I maintain that the communities affected are robust and already cope with this low flow / intermittency, as well as other land use factors, and this makes them resilient to the likely changes. PDP consider that, while degraded, the small streams have potential to have higher values and that restoration is required to improve their condition.
- My assessment is an assessment of their current values and sensitivity and the likely impact of the predicted change caused by the drawdown, not an assessment of the possible values the streams might have if restored.

Effects on Fish and Fish Passage

- PDP accept that the simple macroinvertebrate communities may be more resilient to change, but fish communities (though mobile) could be impacted. I conclude that there is a scarcity of fish surveys in the intermittent sections of affected small streams because they are generally dry and of poor quality and so typically do not contain resident permanent fish populations. That is, there are no fish communities to further disrupt in the most affected streams.
- PDP suggest that these small streams act as migratory pathways and habitat for juvenile fish. There are no reports of fish in the most affected small streams, but in the north (Mangamauku, Mangamate and Mangaoho) those species present (Dwarf galaxiid and long fin eel and koaro and torrent fish) already manage the annual long periods of intermittent bed flow. The extension of drying is an extension of the extent of a dry stream bed, predicted to be around 3 days at the start and 3 days longer (at the end) of the usual summer dry period. This cannot, or is highly unlikely to, impact on passage or habitat of juveniles because it is a small-scale change.
- PDP reference 7 species in the Kahahakuri system, but that is down in the perennial system, there are no records of fish above Ruataniwha.

Inglis Bush wetland

Southern wetland

- A constructed wetland related to the development of a duck shooting pond historically and so not a natural wetland because of exclusion (a) in the NPS FW (2020)
- Predicted draw down 0.2m which will see the wetland vegetation area migrate down slope and the extent of open water diminish slightly, but the area of wetland vegetation will persist and the change will be hard to measure
- no expected value, function or quality change

Degree of Effect on Small Streams

- The key to the question of potential impact to small streams, as I see it, is the extent to which the draw down makes those intermittent systems drier. The streams affected are those generally west of SH 50 and between the Waipawa and Tukituki Rivers and these are already dry for substantive parts of the year and the fauna in those systems are limited and adapted to that regime.
- While the modelling predicts a draw down that in summer would leave them surface dry based on my wet summer measure, under a normal summer those streams would be already dry (or nearly so) and the draw down will only exacerbate the normal condition by perhaps 1 week every year.
- One additional week on what local knowledge says is several months of surface dry will make no difference at all for the fauna and flora present.

Can that Effect be Monitored

- Because of the current degraded simple assemblages present and the variety of current different impacts to that habitat, including natural drying seasonally, the effect of the additional period of drying will not be able to be monitored by following the biota itself.
- The JWS agreed that stream level monitoring is however, one way to monitor the level of effect to depth and check that it is as that predicted by the modelling
- Such a system will also cause a measure of the depth regime in the absence of takes where it is installed prior to a take. I understand that such a monitoring system could be in place and run prior to the deep bore takes and this would then afford an understanding of the range of depths through seasons without the take and then with the take so the impact of the deep bore abstraction could be monitored on small stream depths.
- If the depth change is larger than that predicted by the model then, irrespective of the inability to measure instream faunal responses, the take could be altered (reduced) until monitoring shows it is as predicted.

Reversibility of any Effect Caused

- Reducing the take to the point where surface flows are as pre-abstraction will allow the reach or reaches affected to be recolonised and to be restored to the pre-take condition (poor though that is).
- This is because the streams are a continuous linear habitat and species will still seek to migrate and move up and down stream depending on the water regime. If the water regime changes (reduces) but is then returned to its current state species will recolonised from up and down stream and the community will reinstate itself in a similar form.
- This happens frequently in other intermittent systems (e.g. Selwyn River) every year.