



Advice to the Department of
Conservation to assist in development
of the Himalayan Tahr Control
Operational Plan July 2021 to June 2022

GAME ANIMAL COUNCIL
January 2021



Game Animal Council
NEW ZEALAND

Game Animal Council advice to the Department of Conservation to assist in development of the Himalayan Tahr Control Operational Plan July 2021 to June 2022 (HTCOP)

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Consultation

The Christmas/New Year break has limited the opportunity for full consultation to support this submission. Consequently, the Council believes it would be beneficial to discuss the full range of submissions at the next Tahr Plan Implementation Liaison Group (TPILG) meeting.

This submission has three main sections:

1. Introduction
2. Strategic Development Opportunities
3. 2021/22 Tahr Control Prioritisation

Introduction

Decisions about how much tahr control effort should be applied in the 2021/22 HTCOP, and where that effort should be focussed, can be informed by multiple complementary sources of information. These include numbers of tahr observed in the field, evidence of significant ongoing tahr damage, tahr populations that form potential sources for range expansion or consolidation outside the management units, and population projections. The Game Animal Council (GAC) has used all these sources to develop priorities. We are grateful for the information provided by experienced hunters and helicopter operators, whose extensive field observations we have drawn upon.

The GAC recommends that a review of certain provisions within the HTCP takes place as it believes aspects of the Plan are no longer accurate or fit for purpose. Recognising John Parkes' work, the review should include revising intervention densities based on information about the impacts of tahr both across and within management units, and, taking into consideration stock-unit limits within the HTCP rather than tahr-specific density limits.

The GAC is of the view that there is a strong need to work past the annual development of operational plans (with the current process) and develop a longer-term plan that complies with a revised HTCP, provides for protection of the habitat, and also provides certainty for the hunting sector by ensuring the ongoing viability of the tahr herd. The GAC confirms its desire to assist in and support the development of a long-term plan that is widely supported and will achieve the outcomes desired.

The GAC considers there to be three phases in working toward meeting the objectives of the HTCP:

1. The initial knockdown in the 2018-20 calendar years.

2. Where we are now, which is fine tuning the details to ensure smarter tahr management provides for protection of areas with significant conservation values and ensures a viable tahr herd.
3. Future ongoing management required for sustainable outcomes.

As outlined in the population models, due to the effectiveness of tahr population control some of the management units are estimated to be at or below intervention density levels. Additionally, there is now dramatically reduced herd fecundity which means there is time to take stock of what has been achieved, and to focus future control activity on areas most in need of protection.

Due to the significantly reduced population level and population dynamics (male dominant), an opportunity (with very low risk) is provided to pause and take stock, i.e., rest some MUs and undertake intensive monitoring as recognised in the Himalayan Tahr Control Plan 1993 (HTCP).

These recommendations provide the opportunity for the Department to undertake constructive actions related to tahr management, rebuild relationships with the hunting sector and thereby meet the management parameters and provisions outlined by the HTCP. The recommended actions are detailed throughout this submission.

Tahr population post control work and population projections

There have been significant tahr population reductions since the last field counts in early 2019 (which were combined with data from 2016-2018 to develop proxy population estimates in early 2019). Hunting sector and helicopter operator observations confirm significant decreases in tahr populations in most areas, and a significant shift in herd structure, with males now forming a much higher proportion of the population. Tahr populations remain high in some areas, but distribution is patchy. In particular, tahr remain numerous in steep scrub and forested areas on the West Coast, where recreational hunters have little effect, and where tahr are having significant adverse environmental effects. Informants suggest that tahr are becoming more averse to helicopters, whether through learned behaviours or because of selective pressure. These changes make the tahr more difficult to shoot, and also change the location and nature of their vegetative impacts. Consideration of these matters is required for efficient tahr management going forward.

Noting the uncertainty about starting populations, projecting populations based on a single measure of central tendency [such as the mean tahr population estimates for individual management units from Ramsey & Forsyth (2019)] for the initial population is unreliable. The GAC has used Monte Carlo analysis to predict the likely ranges of the contemporary tahr population in each management unit, and has made projections of how those populations would change in the next two years without any further culling by the Department. Because we do not have information on the age or sex of animals killed in MU4, and because the target density is zero, we have not made any population projections for MU4. We do not report on MU7, because it is clearly well below intervention density. Results are reported in Table 1. Graphical depictions of the projected distributions for each management unit are available on request. We include two images for MU1 to illustrate the nature of results.

Table 1: Monte Carlo tahr population projections

MU	N _{Intervention}	2019 proxy Ramsey & Forsyth (2019)		2021 projection		2023 projection	
		Mean	SD	Mean	SD	Mean	SD
1	2,347	6,182	1,601	2,624 (-58%)	1,723	2,586	1,964
2	1,626	4,357	1,694	3,086 (-29%)	1,888	3,350	2,225
3	2,844	8,663	2,306	6,415 (-26%)	2,674	6,763	3,187
5	1,604	4,950	2,617	3,242 (-35%)	2,650	3,488	3,080
6	1,011	3,096	1,091	627 (-80%)	711	595	825

For the five management units analysed, the projected Monte Carlo population distributions for 2021 and 2023, absent further culling, are very similar. This result, in addition to the significant overall population reductions in the management units, signals the effectiveness of culling to date in dramatically reducing herd fecundity. It means there is time to take stock of what has been achieved and to focus future control activity on areas most in need of protection. We indicate where, in the GAC's opinion, those areas are later in this submission.

MU6 appears to be an anomaly. Large numbers of tahr have been killed and significant numbers remain. That does not mean the initial population estimate was incorrect, this outcome is possible within the credible limits estimated by Ramsey & Forsyth (2019). In similar fashion, mean initial tahr population estimates in other management units could have been over-estimates. Without further, more intense population modelling, it will not be possible to know whether tahr populations currently exceed intervention densities. The very large standard deviation relative to the mean for the initial population estimate in MU5 carries through to a very high level of uncertainty about the current and 2023 populations.

MU1 has a relatively “peaky” distribution centred close to the intervention population – it is the management unit where there is most certainty (Figures 1 and 2). Results are not sensitive to the distribution fitted – in addition to the normal distribution illustrated here, we explored log-normal, logistic, log-logistic and Weibull distributions.

Figure 1: Monte Carlo projected MU1 PCL tahr population in early 2019 and early 2021. Normal distribution. Intervention density permits 2,347 tahr (the green bars).

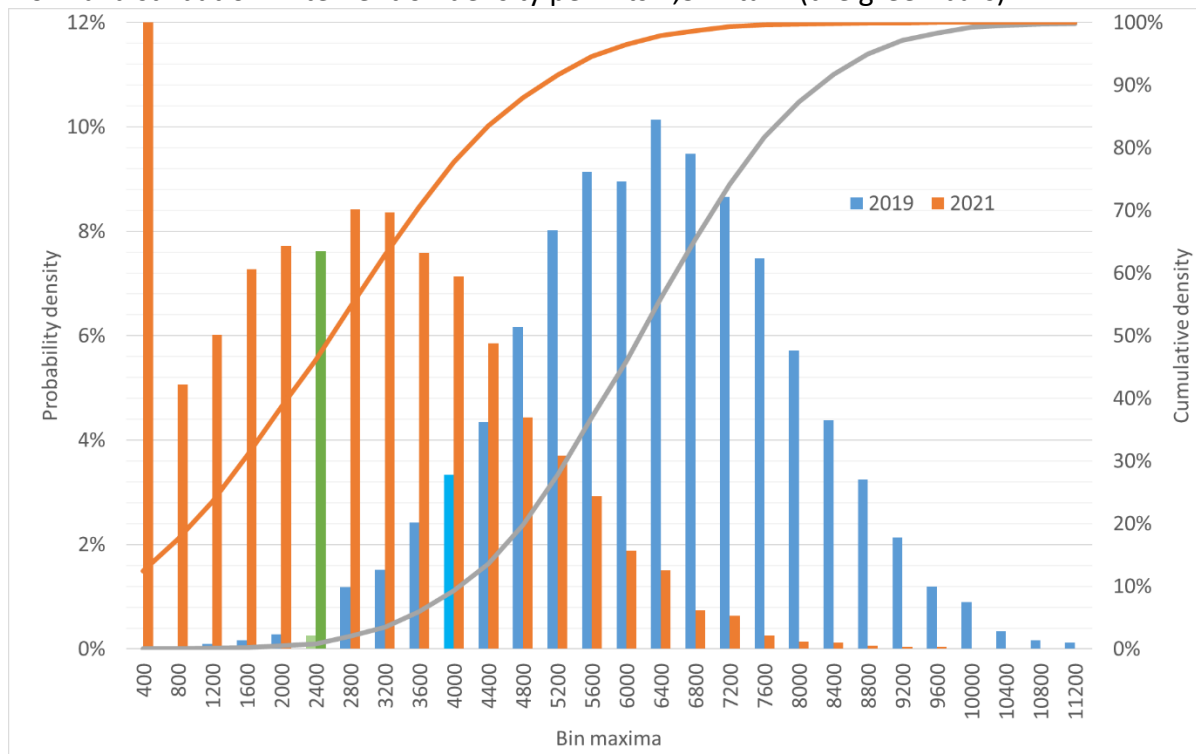
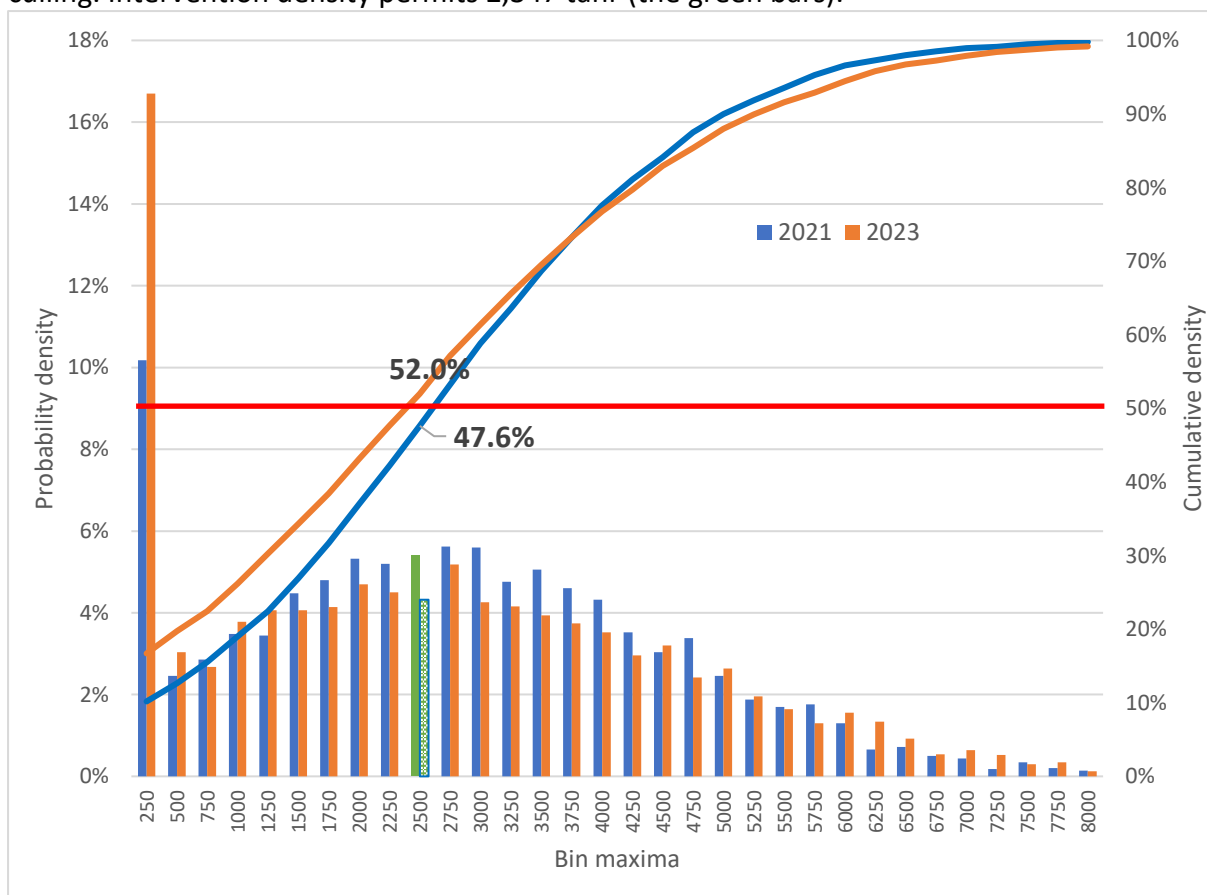


Figure 2: Projected MU1 PCL tahr population in early 2021 and early 2023 without further culling. Intervention density permits 2,347 tahr (the green bars).



The blue bars in Figure 1 show the probability of the population in each population “bin” on the x-axis occurring in 2019. For example, there was a 10% chance the population was between 6,000 and 6,400 tahr. The orange bars do the same for early 2021. The green bars are at the intervention density. The solid lines are the cumulative density functions (CDF). The 2019 CDF shows there was approximately a 50% chance the population in early 2019 was less than 6,400 tahr. The orange bars and CDF are well to the left of the blue ones, illustrating the significance of the population reduction in MU1. Figure 2 does the same for the years 2021 and 2023.

Both figures highlight (i) the high initial (2019) and remaining (2021) uncertainty about the tahr population, and (ii) the inability of the population to rebound in the short term (2023) in the absence of culling. The latter effect arises because of recent selective culling of females and juveniles. The numbers labelling the CDFs are the probabilities that the population is less than intervention density (e.g., there is a 52% chance that the 2023 MU1 PCL tahr population will be less than 2,500 tahr). The red horizontal line is at 50% for easy reference.

Strategic Development Opportunities

As tahr densities approach intervention densities, the uncertainty about population estimates/densities in each management unit becomes more critical. Figures 1 and 2 and the standard deviations in Table 1 indicate there is very high uncertainty about both initial and current populations at the management unit level. The Council is of the opinion that these estimates are inadequate to measure compliance with the HTCP.

Increasing accuracy of population estimates

The need for more accurate population estimates within management units suggests potential benefits from a shift to a more spatially-intense phase of tahr population and vegetation effects monitoring, over an extended cycle. The GAC suggests the Department gives consideration to intensive monitoring of tahr numbers and impacts in one or two management units each year. If required, control operations in those units would occur the following year. The better information obtained will focus effort on places most in need of control, and avoid the need for culling in areas below intervention densities and without significant ongoing adverse vegetative effects. This strategy would make planning easier for the Department and would provide some certainty to hunters about where and when culls are (or, more importantly, are not) occurring.

Recommendation: *The Department gives consideration to intensive monitoring of tahr numbers and impacts in one or two management units each year. If required, control operations in those units would occur the following year.*

Strategic control

Learned helicopter aversion and possible natural preferences for some tahr to live in heavily vegetated areas, coupled with selection for that trait because of culling, suggests the need for consideration of alternative hunting strategies to control tahr. While the aerial control

used to date has been very effective for an overall herd reduction, it will lose effectiveness as tahr populations decrease and become more wary.

Recommendation: *During 2021 the TPILG should give consideration, informed by expert opinion, of alternative strategies to enhance control efficiency and, more importantly, reduce tahr numbers in areas where they are little affected by aerial control, but are causing significant environmental harm.*

Development of a stratification strategy

The HTCP specifies intervention densities across whole management units, irrespective of tenure, land/vegetation type, or historic uses. The HTCP has provisions for revising intervention densities based on information about the effects of tahr, both across and within management units. The Council proposes establishment of a work stream during 2021/22 to consider options for refinement of intervention densities. For example, there is a case for considering stratification of intervention densities in MUs 1, 3 and 5. Research to date suggest that tussock grasslands can accommodate more tahr than the current intervention densities without adverse consequences. Within Public Conservation Land the eastern parts of these MUs are typically tussock grasslands and can carry more animals without adverse effect than the typically steeper, higher, and more pristine western areas. Much of the eastern fringe is retired pastoral lease that has been exposed to, and significantly altered by, long term pastoral grazing. The effects of tahr on natural values in these modified environments are likely to be relatively low. A stratification strategy has the potential to redistribute tahr populations to where they have the least adverse effects and, coincidentally, to areas which are more easily accessible to ground hunters.

Recommendation: *Establishment of a work stream during 2021/22 to consider options for refinement of intervention densities through the development of a stratification strategy.*

Setting appropriate density levels on historically farmed non-PCL

The Council believes that review during the current period of appropriate densities of tahr, in the context of total stock numbers, on non-PCL is merited. This work would be able to draw on the information the Department is currently collecting on tahr numbers on Crown Pastoral Leases. While unit-wide management intervention densities specified in the HTCP apply to these lands, it is likely they are exceeded in some places. However, consideration should be given to whether addressing such exceedances would result in environmental improvement. If tahr, which are de facto farmed for commercial hunting, are replaced by a much larger number of sheep, which are permitted by lease conditions, there is the prospect of a significant increase in effective stock units and subsequent environmental degradation. Consideration of stock-unit limits within the HTCP, rather than tahr-specific density limits, merits consideration. Pastoral leases typically are permitted to graze in the order of 40 sheep/km², but in some cases over 100 sheep/km² are allowed. A maximum permitted tahr density of 2.5 tahr/km² irrespective of sheep density indicates potential gains, both financial and environmental, of stocking at lower than permitted sheep densities to accommodate higher permitted tahr densities on pastoral lease and other non-PCL tenures (not necessarily one for one).

Recommendation: Review the intervention densities on non-PCL land that has historically been farmed to deliver equitable stocking densities between farming and hunting land uses whilst managing ecological impacts.

Increasing mapping detail

While mapping of management unit and feral range boundaries exists, these boundaries are not readily available for the hunting community, or others interested in tahr management. It would be useful if these areas could be readily delineated in web-accessible format (e.g. WAMS) or on maps commonly used by hunters (e.g. New Zealand Maps, Backcountry Navigator, Freshmap, etc.).

Recommendation: Make widely available on common mapping platforms the boundaries of the management units and tahr feral range.

Hunter-led management and Herds of Special Interest (HOSI)

The current burden of tahr management falls on the Department. However, the HTCP includes options for hunter-led management of all or part of tahr management units, and a Herd of Special Interest under the Game Animal Council Act (2013) is an additional option. The Game Animal Council Act 2013 provides an opportunity to change hunting sector responsibility through establishment of herds of special interest. The New Zealand Tahr Foundation was established with that express purpose.

The Council is strongly supportive of hunters taking responsibility for managing tahr, and their effects on the environment, in part of the range. The Council is willing to take a lead in establishment of such a regime, and the science to support it. We would like to work with the Department over the 2021/22 operational plan period to develop a proposal along these lines, to give effect to provisions in the HTCP. The first stage envisaged is identification, establishment, and initial monitoring of plots/transects and areas within MU1 to establish a baseline for localised vegetation status and tahr population demographics.

Recommendation: The Department works with the GAC over the 2021/22 operational plan period in the development of hunter-led management regime or HOSI of all or part of tahr management units.

2021/22 Tahr Control Prioritisation

Management Principles

The Council strongly recommends the following principles are continued in the 2021/22 TCOP. All control within management units (excluding MU4) should:

- Avoid killing recognisable males
- Control groups to a maximum of 10 tahr
- Prioritise areas unsuitable for foot access
- Prioritise areas with obvious tahr damage
- Avoid hunting in the vicinity of huts, camps, road ends, carparks, etc. where recreational hunters are likely to hunt.

Tahr outside the feral range

The Council's top priority, as for previous operational plans, is to protect environmental assets outside the tahr feral range by eliminating known tahr populations, detecting and eliminating new populations, and preventing establishment of new tahr populations outside the feral range, including the exclusion zones. The Council recognises control in these areas has a low kill rate per unit of effort but is of the opinion that investment in prevention and early intervention are much more efficient strategies than allowing these populations to grow, which runs the risk of both more significant environmental harm and higher subsequent control costs.

We are concerned about migration of tahr east across the Lindis Pass highway, and suggest there is merit in establishing a buffer zone in that region to halt further migration. This would need to be complemented by control activity within the Oteake/Hawkdun/Kakanui region to eliminate established populations there. While there has historically been significant migration across Burke's Pass into the Hunter Hills, we understand this population has received significant recent attention, and is at a relatively low level.

Tahr populations remain in the Mavora/Greenstone region. We are aware of tahr abutting the Fiordland National Park boundary, and there may already be tahr in the Park. Detection and removal of tahr in Fiordland would be extremely difficult and expensive. The Council recommends a significant investment of control effort to prevent tahr entering Fiordland National Park.

The Mount Hutt region tahr population is well known to the Department. Indications are that further control is required to eliminate this population, or to reduce it to a level requiring minimal ongoing intervention.

We continue to receive reports of tahr inhabiting and breeding north of the Northern Exclusion Zone, including The Browning Pass/Wilberforce/Upper Waimakariri/Rolleston/Craigieburn Range region. There are occasional sightings in the Taramakau catchment and further north.

Tahr inside management units

As shown in Table 1, it is not possible to verify that tahr populations are at or below intervention density with existing information, except for MU7, which is likely to be well below intervention density, confirmed by very low kill rates during 2020 control operations.

A large number of observations by very experienced informants suggest there are still relatively high numbers of tahr on the West Coast in MUs 2, 4 and 6. These tahr are inhabiting vegetated areas, often living there permanently, where they are hard to detect and shoot from the air, where recreational hunter access is limited, and in some cases are causing extremely significant vegetative damage. For that reason, the Council proposes concentration of DOC control effort in those areas, but notes that continuation of current aerial hunting practices may be inefficient.

Some tahr prefer more heavily vegetated habitats, and that preference may have been selected for by recent aerial control operations, which are more likely to take tahr in open habitats. There may also be an element of learned behaviour. Where tahr have learned helicopter aversion, alternative hunting methods may assist; including spelling areas from helicopter activity to overcome aversion. Use of professional ground hunters (typically positioned by helicopter) may be the only option for control of tahr that naturally prefer more-heavily vegetated habitats.

Areas of particular concern on the West Coast include parts of the Adams Wilderness Area and north from there, as well as the Jacobs, Mahitahi, Copland, Karangarua and Landsborough catchments.

Recommendation: *The GAC encourages the Department to draw on the expertise of the New Zealand Tahr Foundation, which has more detailed information on specific locations of concern.*

Management Unit 1

MUs 1, 3 and 5 east of the Main Divide are typically much more open habitats, where aerial control has had more success. They are also the areas that are most accessible to and used by recreational hunters.

The Council is of the opinion that MU1 is at or close to intervention density (Table 1, Figure 1), so MU1 does not require control effort in 2021/22. This is a low-risk strategy because the tahr population will not increase for at least the next two years in the absence of culling (Figure 2). The Council supports intensive monitoring of tahr population demographics in MU1 to confirm numbers and to permit projections of population effects of alternative potential management strategies.

Recommendation: *Do not undertake any official control in MU1 for 2021/22. Undertake intensive monitoring of tahr population demographics.*

Management Unit 3

Population projections for MU3 suggest it is still above intervention density. However, reports from the field suggest this distribution is patchy, and there is a strong chance the initial population estimate was too high in this management unit. Reports of the highest numbers of tahr in this management unit are in the south-eastern margins between Lakes Pukaki and Tekapo, and in the higher elevations of the Sibbald and western Two Thumb ranges. The Council supports the proposal for intensive monitoring of tahr population demographics in MU3. This information will be useful for identifying the need for, and spatially focussing of, control effort in 2022/23. Control efficiency in 2022/23 may be enhanced by spelling this MU from aerial control in 2021/22. Spelling would also be of benefit to recreational hunters, who could plan their hunts in the knowledge that their hunting area would not be subject to aerial control.

Recommendation: *Undertake intensive monitoring of tahr population and spell areas for enhanced control efficiency and certainty for recreational hunters.*

Management Unit 5

Recommendation: *In MU5, effort should focus on the parts of the Ben Ohau range where tahr numbers remain relatively high and where recreational hunters have limited effect due to difficult access.*

Tahr within the feral range, but outside management units

The Council notes that recent DOC control has not targeted areas within the feral range but outside the management units (such as the country to the west of Lindis Pass and outside MU7, the Ben Ohau Range facing Lake Pukaki, and the central area to the south of MU3 between Lakes Pukaki and Tekapo and eastern areas outside MU3, but within the feral range), which may contribute to source populations for outside the feral range. We recommend commencement of control in those areas, where tahr are known to exist with the following provisions taken into account.

For this operational year we recommend the management principles previously outlined apply in these areas, as some of these areas are ex-pastoral lease with lower conservation values, have high accessibility and high recreational hunting value. This will allow time for assessment of the practicality and dependability of the MU boundaries in these areas and identify important recreational hunting areas where there is limited risk of tahr spreading.

Iterative management

In 2020 the Department and the GAC had an extremely productive meeting midway through the control period to take stock of progress and redirect control effort to places it would provide maximum environmental benefit. The GAC is strongly supportive of continuation of that practice in all operational planning periods going forward, including 2021/22.