Title: Concepts for managing water allocation

Purpose: To provide the Committee with information on managing water allocation

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1. Background

This report discusses some key concepts for water allocation frameworks for the Ruamāhanga Whaitua Committee (the Committee) to consider as the starting point for developing an allocation framework in the Ruamāhanga catchment for the Whaitua Implementation Programme (WIP).

At its workshop on 17 December 2015 the Committee identified water allocation issues to address in the whaitua. The water allocation framework the Committee develops for the WIP will ultimately replace the current interim water allocation framework in the Proposed Natural Resources Plan (proposed Plan).

At this stage the key concepts are identified without much detail. It should be noted that the approaches to limit setting will be informed by the results of upcoming scenario testing. In particular, minimum flows, allocation limits, reliability of supply, multiple allocation bands, and the effects of climate change will be informed by modelling scenarios.

2. Key concepts in water allocation

The main elements of the water allocation system are shown in figure 1.

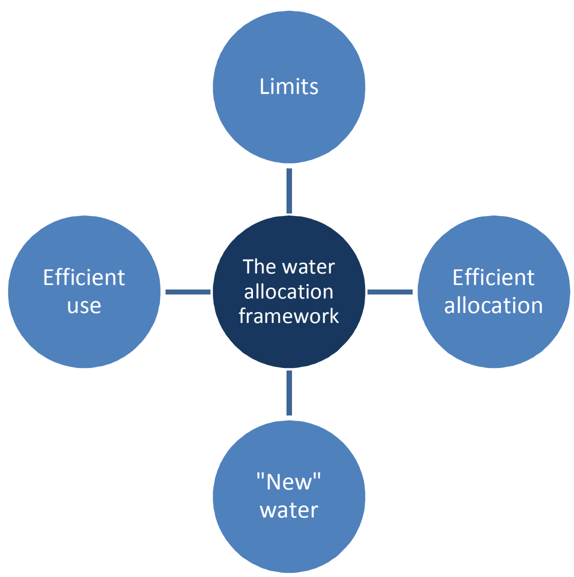


Figure 1: The framework for managing water allocation

2.1. Limits

The National Policy Statement for Freshwater Management (NPS-FM) directs the establishment of minimum flows, minimum water levels and allocation limits, together with freshwater management units within which limits operate. Allocation limits are the maximum amount of water available to be taken from water bodies within management units. Minimum flows and water levels are limits at which taking and using water is restricted or ceases. Minimum flows and minimum water levels do not necessarily determine what minimum occurs in a water body because flows or levels can continue to recede after water takes have ceased.

Identifying minimum flows: Regional councils identify minimum flows by a range of methods at specific locations, and where these are not used by applying a default flow statistic. A flow restriction is then placed in the regional plan. Minimum flows are discrete flows and do not change from year to year. In the Ruamahanga, the majority of minimum flows have been identified by site specific methods. Commonly these restrictions are applied to provide for ecological values. The Committee may wish to test other minimum flows through the modelling process.

Operation of water takes at minimum flows: The Committee will need to consider approaches to what happens when rivers reach minimum flows. Minimum flows are included in regional plans to protect the instream ecological health of rivers and safeguard life supporting capacity. They may also be needed to protect other identified values. Further discussion is provided in Attachment 2. The proposed Plan requires users to cease takes at minimum flows with exceptions of: taking water permitted under the RMA (individual's domestic and stock use and firefighting); taking water permitted under the proposed Plan; water for the health needs of people as part of community water supplies; water for rootstock protection, and groundwater.

To date, community water supplies have been able to take water below minimum flows that may be resulting in adverse effects on aquatic ecosystem health. Under the proposed Plan at minimum flows community water supplies must reduce their water takes to what is required for the health needs of people. Groundwater takes have also been allowed to continue at minimum flows in the past. The proposed Plan now requires category A directly connected groundwater takes to reduce by 50% at minimum flows. The proposed Plan also provides guidance on 'stepdown allocations' that is identified in Attachment 1. 'Stepdown allocations' can be included in resource consents so that total consented amounts of water are reduced as rivers recede towards minimum flows. Community water supplies, groundwater takes and the use and application of stepdown allocations are all matters that the Committee will need to consider in relation to the operation of minimum flows.

Identifying allocation limits: Regional councils have set allocation limits for surface water around existing uses and/or a flow statistic of some kind. Allocation limits for groundwater are usually set around existing uses, surface water depletion over time, aquifer recharge and/or rates of water flowing through the aquifer.

In the proposed Plan the interim core allocation amounts available from surface water and directly connected groundwater shall not exceed whichever is the greater of the total amounts allocated by resource consents (at the time an application is made for resource consent) or the default allocation amounts identified as 50% or 30% of mean annual low flow (depending on river size). This means existing users are able to continue getting water held under existing resource consents when they expire even if the total amounts of water taken are greater than the identified default allocations.

When the Council decided on these interim core allocations it expected whaitua committees to review them, including the provision for existing consents to exceed the default allocation amounts identified. The Committee will need to identify criteria and methods it will use for setting allocation limits. Doing so can be done in the context of developing scenarios for modelling that will help justify the allocation limits selected. This will also identify reductions or improvements in water users' reliability.

Groundwater not directly connected to surface water is treated in a similar way in the proposed Plan. Existing uses can continue while an allocation amount is also identified. The core allocation available shall not exceed whichever is the greater of the total amounts allocated by resource consents or the allocation amounts identified.

Multiple allocation bands/blocks: The proposed Plan places all surface water takes within one core allocation amount that ceases or reduces at minimum flows. Surface water includes rivers, lakes and wetlands, and ground water directly connected to these water bodies. Other regional councils allocate water at different amounts according to several bands. The purpose of multiple bands is to allocate more water (at differing reliabilities for users) while maintaining the in-stream values of the water body. In such cases the amounts of water allocated within different bands have different minimum flows associated with each band. As for the approaches associated with identifying minimum flows and allocation limits, identifying appropriate water allocation bands and justifying them can be done through the scenario testing process.

Minimum levels for Lake Wairarapa: Minimum levels for Lake Wairarapa in the proposed Plan rely to a large extent on what is in the operative Regional Freshwater Plan. The way Lake Wairarapa will be managed in the future is now subject to considerable debate that involves far more than just allocating water. Developing minimum levels and allocation limits for the lake could be considered as part of this wider debate.

Identify reliability of supply numeric(s): Minimum flows, water levels and allocation limits will all have implications for the reliability of water available to users. The interim limits identified in the proposed Plan result in different reliabilities of supply in different sub-catchments of the Ruamāhanga. A reliability of supply numeric or range could be identified that is taken into account when limits are considered. Again, identifying an appropriate reliability of supply metric can be identified and tested through the scenario testing process.

Climate Change: The committee will need to consider the impacts of climate change. One approach could be to allocate an amount of water that takes account of climate change. Considering climate change scenarios within modelling will help inform the implications of climate change.

Attachment 2 provides more explanation of some of the terms above and, in particular, how the interactions between minimum flows, allocation limits and reliability of supply will need to be considered when revising limits.

2.2. Efficient allocation

Efficient allocation refers to how the total amount of water available in a freshwater management unit (the allocation limit) is divided up amongst water users and how allocations move between water users. The National Policy Statement for Freshwater Management (NPS-FM) directs the regional plan to <u>improve and maximise</u> the efficient allocation of water. Allocating water to date in the Wellington Region has relied on a system of first-in-first-serve, which is the starting point for allocating water under the RMA. This system continues until the resource is fully allocated. The issue then becomes what happens when consents expire.

Surface water and groundwater directly connected to surface water in the Ruamāhanga catchment are fully allocated under the proposed Plan. Common expiry dates in sub-catchments is now the practice for water take consenting. The existing convention is that existing users have first call on water when their consents expire. It means no or little water is available to new users in fully allocated areas. Water given up by existing users (such as through efficiency gains) is also not available until the total amount of water taken falls below identified maximum allocation amounts.

For future situations should the Committee decide that existing users do not have first call on water when their consents expire, the Committee is able to consider who gets the water. While the approach of existing users having first call when their consents expire recognises the value of investment already made, it may not be equitable because new users do not have the opportunity to get any water. It should be noted that in this context new or potential users includes iwi. The Committee has the opportunity to put in place a more efficient system if it is warranted.

A range of possible approaches to allocating water are described below.

Grandparenting: Water taken by existing users is protected (subject to an efficiency test). In a fully allocated catchment existing users can retain the water they already take when existing resource consents are renewed. Under this regime new users do not have the opportunity to get water in fully or over allocated catchments unless it is freed up by existing users.

Administrative systems: Administrative systems can be developed through the regional plan that re-allocates water when it becomes available. Such systems make choices on where the water will go and what the water use priorities are. The existing plan does take such an approach to some extent by prioritising water use for community water supply, fire-fighting and stockwater.

A market: Trading of water is an approach that the regional plan can provide for and endorse, although the market itself would operate outside the regional plan. As with some administrative systems such approaches are rare in New Zealand. Using the market to allocate water could include approaches such as auctions or tendering. There may be some legal barriers to these allocation approaches.

Water user groups: Water user groups are another administrative approach currently used in New Zealand. They can work informally by individual consent holders reaching agreement about how their consents will be implemented such as during times of water restriction. For example, consent holders taking water on alternate days. There are now examples in New Zealand where user groups formally hold resource consents and are responsible for managing use of water allocated by the consent, including who gets what and when.

Clawback: In the event the Committee identifies freshwater management units as being over-allocated, ways that water is clawed back over time to meet an identified allocation target will need to be included in the WIP. Water can be clawed back when resource consents expire and in some cases by review of consent conditions.

Water transfer: Transferring water is already an available option that enables water to be transferred from one user to another without adding to the total amount of water taken and used in a management unit. Water transfers are not currently used much in the Ruamāhanga catchment. Resource consents are required and uptake could be increased by making it easier to get resource consent, for example by making water transfers a permitted or controlled activity (resource consent is required but must be granted subject to reasonable controls).

2.3. Efficient use of water

The NPS-FM directs the regional plan to maximise the efficient use of water. Efficient use of water refers to the use of water that is taken by individuals or communities (in the case of public water supply) at different locations in a catchment. These individuals or communities are responsible for ensuring water is used efficiently.

Approaches to efficient use are now described.

Good practice: The proposed Plan promotes good practice in both regulatory and non-regulatory contexts. An efficiency test of 80% efficiency for irrigation water using an appropriate model is included as a consideration when applications are made for resource consents. Criteria are also included in the proposed Plan for group or community water supplies and other uses as identified Attachment 3. The Whaitua Committee is now able to add approaches it comes up with in relation to good practice.

Education: Dissemination of information to assist efficiency gains is a critical component of the system.

Water races: Water taken by water races is recognised as being inefficient. Most of the water taken from rivers is required to 'drive' and maintain flow or is lost by evapotranspiration although rigorous data do not exist to verify these assumptions. Approaches to promote more efficient water use by water races can be considered by the Committee.

Use it or lose it: The proposed Plan includes a 'use it or lose it' policy that is given in Attachment 4 together with a definition of 'unused water'. The policy has been supported by all 49 submitters on it from the Ruamāhanga catchment. The committee should consider this policy and whether and how it can be improved.

2.4. New water

'New water' refers to moving or storing water that was previously not available. It involves changing the hydrology in order to make more water available or to improve reliability of use. Examples of 'new water' include water storage (at a range of scales), artificial recharge of aquifers, and transport of water by pipe or canal between catchments or sub-catchments. The proposed Plan promotes the taking of water for water storage and potentially for aquifer recharge, from rivers above median flow by making it easier to get resource consent than before.

____________________	20 May 2016	____________________	20 May 2016
Report prepared by		**Report approved by**	
Murray McLea	**Date**	***Alastair Smaill***	**Date**

Attachment 1

Schedule S: Guideline for stepdown allocations

When river flows are low, stepdown allocations may be included as conditions of resource consent to help prevent rivers falling below **minimum flows**.

Stepdown allocations may require a take to cease or be reduced. Taking water that is not for the health needs of people may be required to cease or be reduced as flows approach minimum river flows. Typically, a reduction in water take that may be required will be half the consented amount.

Stepdown allocations for specific rivers are identified in Table S1 unless otherwise agreed by a water user group. In other rivers, stepdown allocations may be agreed by a water user group, or in the absence of agreement or such a group, may be implemented by the Wellington Regional Council.

Table S1: Stepdown allocations for rivers in the Ruamahanga River catchment

River	Minimum flow	Flow at which takes shall cease other than for the health needs of people or stock drinking water (water races)	Flow at which takes shall reduce	Management polint
Waipoua River	250		300	Mikimiki Bridge
Waingawa River	1100	1700	1900	Kaituna
Parkvale Stream	100		120	Renalls Weir Recorder
Mangatarere Stream	[upper reach] 240		[upper reach] 330	Gorge Recorder
	[lower reach] 200		[lower reach] 240	Gorge Recorder
Waiohine River	2300	3040		Gorge Recorder
Upper Ruamahanga River	2400		2700	Wardells
Tauherenikau River	1100	1300		Gorge Recorder
Lower Ruamahanga River	8500		9200	Waihenga Recorder

Attachment 2

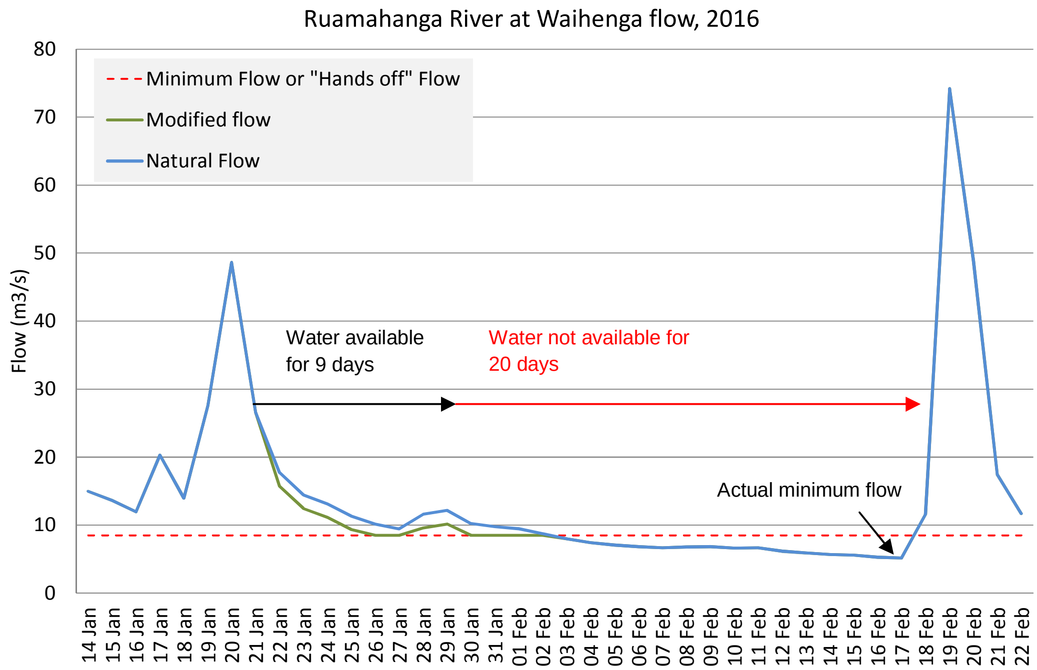
Minimum flows, allocations limits and reliability of supply for surface water and directly connected groundwater

When it comes to setting numerical limits to manage abstraction from rivers and connected groundwater there are three 'controls' that are of particular importance. These are described below with reference to the graph for the Ruamahanga River flow at the bottom of the page.

Minimum flow describes the flow at which it is deemed (via Regional Plan policies) that abstraction should be restricted or cease. It is normally set at a level below which river values may significantly deteriorate. In the graph below the minimum flow is depicted by the red dashed line. However, the term minimum flow in this management context should not be confused with the *actual* (observed) flow that a river may continue to recede to, even after restrictions have come in to force. The minimum flow could be considered a 'hands off flow'.

Allocation limit is the quantum of water that is allocated to users. It is often set as a proportion of a flow statistic such as mean annual low flow but there is no single 'correct' way to define the allocation limit. In the graph below the size of the gap between the natural flow (blue line) and the modified flow (green line) is controlled by the size of the allocation limit. An important point is that the larger the allocation limit, the faster the minimum flow is reached and the lower the reliability of supply for everyone.

Reliability of supply describes the amount of time that water users can actually take all (or some) of the water allocated to them. The more often the minimum flow is reached, the lower the reliability of supply will be. In the graph below reliability of supply is depicted by the number of days water is available before the minimum flow is reached and the number of days it is unavailable after that until a new fresh arrives.



Thresholds for minimum flows and allocation limits cannot be set independently from one another and without parallel consideration of reliability of supply. Trade-offs are common where there are directly competing values and/or water is scarce.

While determining the interplay between these management controls cannot be done at all scales or with certainty, models can be used to broadly test alternative scenarios and help understand trade-offs and the ranges of limit options that are likely to be appropriate. A hypothetical example of how this scenario testing might be applied within the Ruamāhanga catchment is provided below and will be explored in more detail at the 23 May committee meeting.

Example scenario

The following management objectives have been defined for a catchment (for three attributes):

- To maintain a median reliability of **full water supply (R1)** of at least 90%
- To maintain a median reliability of **partial water supply (R2)**of at least 95%, and
- To ensure **loss of longfin eel habitat (H)** of no more than 15% of that available at MALF

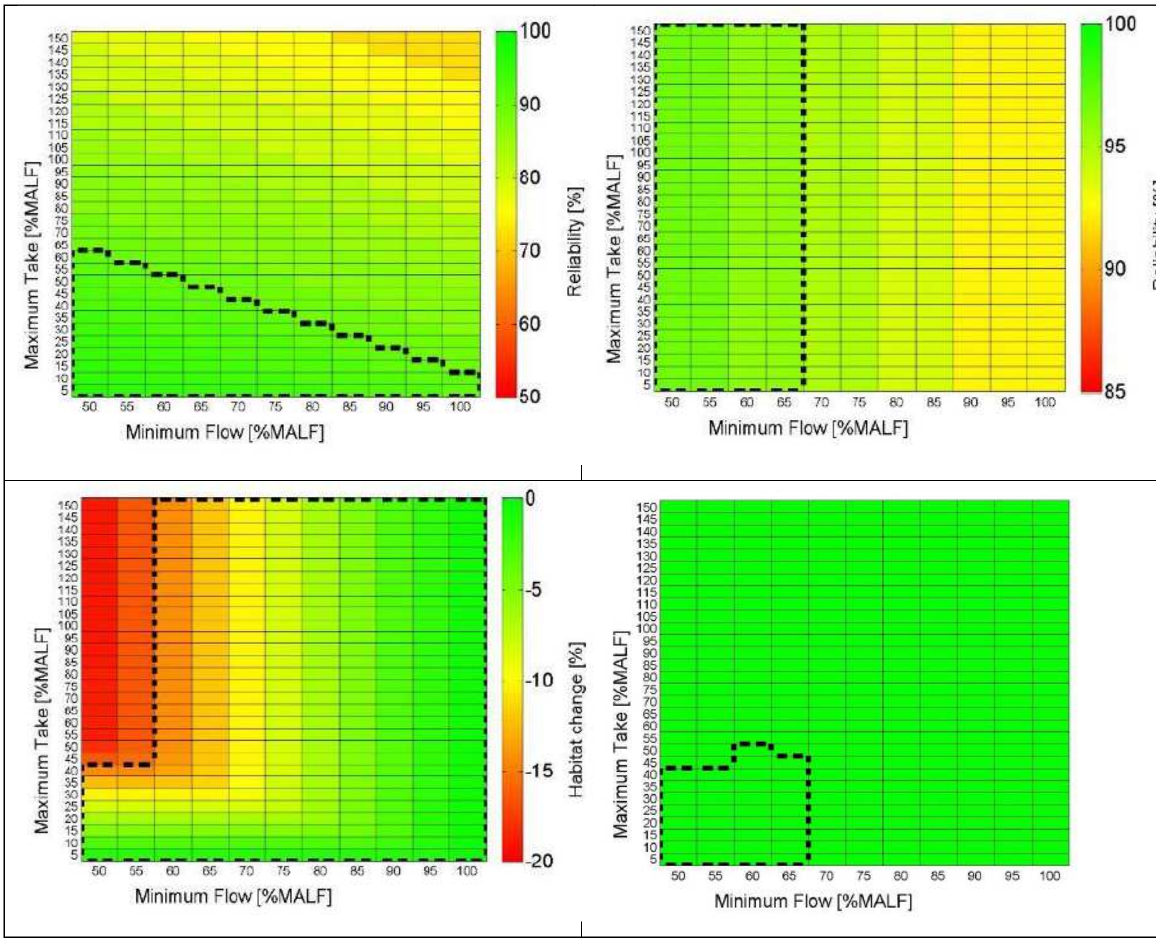
Having defined these objectives, the combinations of minimum flow (hands off flow) and allocation (maximum take) which satisfy the objective for each attribute (R1, R2 and H) can be determined from the decision space diagrams shown on the next page.

There is one decision space diagram for each of the attributes and the areas enclosed by thick black dashed lines represent the combinations of minimum flow and allocation limit that satisfy the objectives. The fourth decision space diagram (bottom right) shows the 'aggregate' result. The area enclosed by the black dashed line represents the overlap of the marked area in the three other diagrams and therefore *the combinations of minimum flow and total allocation that satisfy all three objectives*.

The top left diagram (reliability of full water supply) demonstrates a particularly important trade-off. You cannot have a high (ie relatively conservative) minimum flow combined with a high abstraction rate and expect good reliability for users. In the example given, if you have a minimum flow of 90% of MALF *and want to achieve your reliability objective* then the maximum allocation rate you can have is 20% of MALF. To meet the same reliability objective but allocate more water you must reduce the minimum flow and this may have detrimental consequences for instream values.

The aggregate decision space diagram shows that to meet all three hypothetical objectives, maximum abstraction could range between 5 and 55% of MALF, minimum flow could range from 50 to 70% of MALF, with many combinations within these ranges available. However, bear in mind that there will normally be many more species than just longfin eel to consider as well as many more instream attributes beyond habitat availability.

Decision space diagrams for three objectives: reliability of full water supply, R1 (top left), reliability of partial water supply, R2 (top right) and loss of longfin eel habitat, H (bottom left). The black dashed line encloses the combinations of maximum abstraction and minimum flow that will satisfy each objective. The bottom right diagram is the aggregate result (where the enclosed areas of the three objective diagrams overlap).



Attachment 3

Schedule R: Reasonable and efficient use criteria

Irrigation

Use of a field validated model that considers land use, crop water use requirements, on site physical factors such as soil water holding capacity, and climatic factors such as rainfall variability and potential evapo-transpiration. The model must reliably predict annual irrigation volume within an accuracy of 15%. The annual volume calculated using the model shall meet with the following criteria:

(a) an irrigation application efficiency of 80%, and

(b) demand conditions that occur in nine out of ten years.

Group or community water supplies

A water management plan shall be submitted with a resource consent application to take and use water for group or community water that addresses:

(a) the reasonable demand for water, taking into account the size of the group or community, the number of properties that are to be supplied, the potential growth in demand for water, the sectors in the group or community that will use the water and the relative amounts that will be provided to each sector. Sectors in the community using water include:

- domestic use
- commercial use
- industrial use
- hospitals, other facilities providing medical treatment, marae, schools or other education facilities, New Zealand Defence Force facilities or correction facilities
- public amenity and recreational facilities such as gardens, parks, sports fields and swimming pools
- reasonable needs of animals or agricultural uses that are supplied by the *public water supply* system

(b) the amount of water required for the health needs of people and how the water supplier will manage water used by all sector at times of water shortage when restrictions are being placed on all consented uses of water, and

(c) the effectiveness and efficiency of the distribution network.

Water races

A strategy shall be submitted with resource consent applications to take and use water that identifies water race sections, and/or properties where water use efficiency within the water race network could be improved. The strategy shall set out a timetabled programme to be implemented during the term of a resource consent which investigates opportunities to proactively work with landowners in any identified water race sections, and/or properties. This shall include (but is not limited to) investigating closing section of water races where alternative sources of supply exist or are practical.

Other uses

The amount calculated in accordance with good management practices for efficient use of water in relation to that use or by demonstrating that water is not being wasted, such as by means of a water use audit by an independent party to identify any wastage and any opportunities for re-use or conservation.

Attachment 4

Policy P119: Unused water

Unused water allocated to an **existing resource consent** may be re-allocated to the same user when the **existing resource consent** is replaced, or the abstraction rate is changed, only if the consent holder can demonstrate how the **unused water** will be used within four years, including by means of:

(a) a capital expenditure programme linked to the purpose water is used for, and

(b) satisfying the reasonable and efficient use criteria identified in Schedule Q (efficient use).

Definition

Unused water: Where more than 25% of the maximum daily amount of water allocated to a person for use on a property they own or have an interest in, but not including water that is transferred for use at another location by means of a transfer permit, is demonstrated to not be used over a period of two consecutive years.