

Part 4

Community Advisory Group Report

for

Minimum Flows Process

**- Knights Creek, Halswell River, LII River, Kaituna River and
Prices Stream -**

May 2007

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1. Purpose of this Report

As part of its statutory responsibilities, Environment Canterbury (ECan) is engaged in a process of reviewing the minimum flows for a number of streams and rivers in the Lake Ellesmere/Te Waihora area. One component of the process involves canvassing opinions and information from potentially affected parties, including the local community.

ECan facilitated the establishment of three Advisory Groups, based around Lake Ellesmere, to represent the perspectives of local landowners and residents. Each of the three Advisory Groups has a membership comprised predominantly of local farmers. This report summarises the views and local knowledge, relevant to the setting of minimum flows, presented to meetings of the Advisory Group representing the interests of the Halswell, LII and Kaituna Rivers and Prices Stream.

The report outlines the background to the formation of the Advisory Groups, a description of the consultation process and information collated during the process.

2. The Consultation Process

2.1 General

The public consultation process timetable was initially determined by the optimal time for a technical panel field assessment for 29 sites. This would have been in early to mid April 2002, when the stream flows would be sufficiently low for the assessment to proceed. Unfortunately, wet weather forced a reconsideration of this timing and the field assessments were deferred until 26 March 2003. However, a small number of streams west of the Selwyn River were still dry during the 2003 and 2004 autumn periods, delaying the completion of the overall technical field work until late 2005.

An initial round of public meetings took place in early March 2002, followed by the first Advisory Group meeting a week later. A "scientists meeting" was held on the 4 April to allow ECan staff to make presentations on technical aspects of Ellesmere/Te Waihora hydrology and groundwater.

This was followed during the weekend of 6-7 April 2002 by two bus tours around the Ellesmere/Te Waihora lower tributaries catchment area, to view gauging sites and other points of interest. A second Advisory Group meeting took place in mid April 2002, to consolidate collation of local knowledge material relating to individual streams.

2.2 Initial Public Meetings

Public meetings were held around the Ellesmere/Te Waihora catchment area during 5-11 March 2002. ECan advertised these meetings locally, and sent invitation letters to the approximately 250 Ellesmere/Te Waihora permit holders.

Table 1 outlines the times and venues for these public meetings.

Table 1 Ellesmere/ Te Waihora Minimum Flows Public Meetings		
Meeting	Date (2002)/Time	Meeting Venue
Meeting 1	5 th March, 9.00 am	• Sedgemere Hall,
Meeting 2	5 th March, 7.30 pm	• Lincoln Community Hall,
Meeting 3	6 th March, 9.00 am	• Tai Tapu Hall, Old Tai
Meeting 4	6 th March, 7.30 pm	• Leeston Rugby Club
Meeting 5	7 th March, 9.00 am	• Kaituna Hall, Kaituna
Meeting 6	11 th March, 9.00 am	• Memorial Hall, Springston
Meeting 7	11 th March, 7.30 pm	• Dunsandel Sports Centre
Meeting 8	12 th March, 9.00 am	• Sudeley Park Hall, Irwell

The purpose of these public meetings was to explain the ECan minimum flow assessment process, record information and ideas that the Expert Panel should be aware of, and seek nominations for three Advisory Groups to work with the Expert Panel.

Each meeting was chaired by the ECan Chairman Richard Johnson, and this was followed by presentations from John Glennie (ECan Regional Policy Manager) and Carole Donaldson (ECan Lake Ellesmere Project Leader)

Chairperson Richard Johnson introduced himself, and opened the meeting. He welcomed those present, and introduced the ECan staff and consultants who would assist with the Lake Ellesmere / Te Waihora minimum flow setting consultative process.

He noted the purposes of the meetings (listed above) and made brief reference to an earlier expert panel process. This current process would allow full consideration of local input. It would enable people living in the area to "share their knowledge" with the expert panel. Local people would be sought for representation on three Advisory Groups, whose members would communicate ideas and issues to the panel and the Council.

At each meeting John Glennie spoke briefly on the planning background to the proposed consultative process. He referred to the RMA which sets the overriding framework for all resource management planning. The other key document is the RPS, based on the principles and purposes of the RMA.

John Glennie displayed an overhead which listed Chapter 9, Objective 1 of the RPS. This lists the "bottom line" values to be considered by ECan when determining water quantity allocations for the region's water bodies.

He then displayed an overhead which outlined the reasons ECan is using a Technical Panel process to determine minimum flows. Unlike big rivers for which there is considerable data, for many of the small lower catchment tributaries there is a paucity of information relating to some of the values which need to be considered. The Technical Panel process enables assessment by people with acknowledged expertise, in a cost effective way. It is particularly useful for small streams for which not much technical information is available.

John Glennie noted that when ECan completed the Expert Panel process two years ago people with local knowledge were not given the opportunity to talk to the Panel before they visited the rivers. This time, ECan wish to obtain local knowledge about each stream to help both ECan staff and the Panel to undertake the assessment.

John Glennie then outlined what will happen to the minimum flow information when it has been gathered. He referred to the draft chapters of the NRRP which were publicly distributed. Submissions closed for these chapters at the end of March 2002, and all going well the chapters will most likely be notified as part of the Proposed Plan about March 2003. If everything goes smoothly with the Ellesmere process, the recommended minimum flows may be incorporated into the Proposed NRRP.

Carole Donaldson also spoke at all 8 public meetings. At each meeting she explained her role as project manager in the process, and indicated that she wished to "keep ECan at arms length" to preserve objectivity. This is why consultants Tina von Pein and Barry Knox were assisting with the process.

She displayed an overhead which listed the 29 streams to be assessed as part of the process. This indicated the scope and complexity of the project task.

Carole Donaldson acknowledged the assistance of Roger Gilbert, Federated Farmers, who advised on appropriate meeting venues and times. She then outlined the proposed process with reference to another overhead. It was the intention to obtain nominations or volunteers for one or two people from each of the public meetings, to be represented on three Advisory Groups. The Advisory Groups would look at key areas of the catchment during a bus tour, then meet to finalise representations to be made to the Technical Panel.

At each of the public meetings nominations were taken for membership of three smaller representative Advisory Groups. (Refer to section 2.5 of this report.)

Issues and concerns were also expressed by members of the public and these were recorded in notes taken at each meeting. (These notes were subsequently distributed to members of the Advisory Groups. Copies are available from ECan if required.)

2.3 The ECan Technical Information (Scientists) Meeting

At the public meeting and the first round of Advisory Group meetings a number of technical questions pertinent to the setting of minimum flows were raised. To allow ECan scientists to answer these questions, a meeting was arranged for Thursday 4 April 2002 at the Lincoln Community Hall.

The meeting was attended by ECan groundwater and hydrology scientists who provided a good general technical overview on these aspects of the Ellesmere / Te Waihora catchment area.

Subsequently, written responses were provided for some of those questions that were unable to be addressed at the meeting. These responses are attached as Appendix 4.3.

2.4 Ellesmere Field Tours

These bus tours were held on Saturday 6 April and Sunday 7 April 2002, and they were designed primarily to familiarise Advisory Group members with the stream gauging sites where the Technical Panel minimum flow assessments are to be made. The tours also provided an opportunity for Advisory Group members and ECan staff to get to know one another, and for particular sites of interest to be seen at first hand.

On Saturday the bus left from Lincoln and travelled north to sites around the Halswell River. From here the tour followed south to the Kaituna Valley and Prices Stream, before heading north west to visit sites around Coes Ford, LI, LII and Selwyn / Irwell.

The tour on Sunday focused on sites to the west of Lake Ellesmere. The bus left from Leeston and went north east to visit sites around Selwyn 1 Irwell, before travelling south past Boggy Creek, Doyleston Drain and Harts Creek. After lunch the Southbridge / Taumutu area was visited.

2.5 Initial Advisory Group Meetings

2.5.1 General

The Ellesmere/Te Waihora lower tributaries catchment is intensively settled, and as a consequence the issues apparent at different parts of the catchment also vary. With advice from Roger Gilbert, Federated Farmers, it was decided that to adequately represent the variety of local conditions and issues, three Advisory Groups were set up to provide local input on the ECan minimum flow setting project.

The Advisory Groups established cover the Taitapu area, the Irwell/ Selwyn area and the Southbridge area. Meetings were held at Taitapu Hall, Sudeley Park Hall and Sedgemere Hall.

The first meeting of the Taitapu area Advisory Group was held on 25 March 2002. The objectives for the meeting included reviewing the terms of reference, seeking questions for the scientists to consider at the meeting held on 4 April 2002 and beginning the process of collating "local knowledge" for waterways covered by the Advisory Group.

A second meeting was held from 15 April 2002. At that meeting Advisory Group members continued the process of identifying and defining what information about the individual streams. Would be useful for the Technical Panel assessments. At these second meetings preferred representatives ("champions") for each waterway were confirmed.

Notes were taken to record matters raised at all of these meetings. These are available from ECan if required. Table 2 summarises the Advisory Group meetings held to date.

Table 2 Ellesmere/Te Waihora Minimum Flows Advisory Group Meetings		
Advisory Group	Meeting Dates	Agenda Items
1. Tai Tapu Area Tai Tapu Hall		
Meeting 1	25 March, 7.30pm	<ul style="list-style-type: none"> terms of reference, scientists questions, local knowledge
Meeting 2	15 April, 7.30pm	<ul style="list-style-type: none"> stream representatives, local knowledge for each waterway

2.5.2 Terms of Reference

A draft terms of reference was presented to the Advisory Group meeting and it resolved to adopt the following:

- *The primary purpose of the Advisory Group is to collate and develop relevant local knowledge to assist the Expert Panel¹ assessing the minimum flow settings for the streams around Lake Ellesmere.*
- *As part of this process, the Advisory Groups will produce a written report for Environment Canterbury detailing relevant local knowledge. Council resources will be available to assist with the compilation of this report.*
- *The Advisory Group will also identify technical information they consider maybe able to be provided by Environment Canterbury to assist them with these tasks.*

The third bullet point relates to technical information Advisory Group members sought prior to the ECan scientists meeting on 4 April 2002. The questions and subsequent answers are contained in section 5.2.

2.5.3 Advisory Group Membership

Nominations for members for each of the Advisory Groups were called for at the eight public meetings. Those who volunteered or who were nominated by others showed a willingness to put their time and effort into the Advisory Group tasks. Many expressed the view that they saw the setting of minimum flows as a significant issue for the local community.

3 Advisory Group Views and Local Knowledge

3.1 General Comments For Technical Panel Consideration

3.1.1 The minimum flow process

During the eight public meetings and the first round of Advisory Group meetings a number of questions were asked about the ECan approach to minimum flow setting, and several comments were expressed about the process. Table 3 summarises the main points made.

At an early stage it was apparent that most local people felt that there should be a stronger "local expert" representation on the Technical Panel. It was pointed out by ECan that the Technical Panel had to be objective and that "local experts" could be seen to have vested interests in the same way that Fish & Game or DoC were perceived to have by some people during the first Expert Panel assessments. The focus then went on ensuring that "local knowledge" should be communicated clearly to the Technical Panel, and that there would be opportunities for local residents to make comments at key stages throughout the process.

¹ Subsequently referred to as the Technical Panel

Table 3 Summary of General Questions Asked and Comments Made During the Public Consultation Process (Public and AG Meetings)

Category	Questions/Comments Summary*
1. The ECan Minimum Flow Setting Process	<ul style="list-style-type: none"> • Why have a process at all? There is nothing wrong with the status quo – a satisfactory equilibrium exists now. • There should be “local” experts on the Technical Panel • Who decides on the “experts”? • Why do ECan not determine maximum as well as minimum flows? • Why is there not a drinking water expert on the panel? • There should be follow up public meetings • People should be able to debate the levels set by the Technical Panel • The Advisory Groups should be able to see the Technical Panel report when it is completed • The Technical Panel assessments should be deferred until flows in the streams are lower
2. The RPS Assessment Criteria (Chapter 9, Objective 1)	<ul style="list-style-type: none"> • Economic values should be given greater value • Why do landowner and recreation user concerns come after the (a) to (g) matters? • Is there a ranking of the (a) to (g) matters? • Why is drinking water listed at the top of the list? • Why is there a focus on existing values? • What is the importance of the words "significant" and "outstanding"? • What do wahi tapu and wahi taonga mean? • Clarify the meaning of (g) "habitat of trout and salmon"
3. Broader Catchment Wide Issues (Note that some of these points do not have a direct relationship to minimum flows, but are relevant to wider planning aspects of the NRRP)	<ul style="list-style-type: none"> • Water quality issues are as important as minimum flows • Studies should be done on heavy metals in Ellesmere streams • Management plans should be developed for all significant Canterbury streams • What work is being done to look at the effects of silt in the Ellesmere lower catchment rivers? • Are there possible conflicts of purpose between the various parts of ECan? • Does ECan have to follow a section 32 (RMA) process when setting minimum flows for Ellesmere lower tributary rivers?

* Note 1:

The comments, expressed above were recorded during the meetings, but do not necessarily represent the unanimous view of all people present at the meetings.

Note 2:

ECan staff addressed and answered many of the questions listed here, either at the meetings or subsequently. Responses are noted elsewhere in this report, or can be viewed in the individual meeting notes available from ECan.

3.1.2 Comments on minimum flows with general Ellesmere/Te Waihora Catchment implications

Table 4 summaries the main comments made during the consultative process to date which have relevance to minimum flow setting over the whole of the Ellesmere / Te Waihora lower tributaries catchment. These issues include an opinion of how drains should be regarded; the relevance of weed and stream bed materials as a factor in aquatic health; the importance of clarifying the purposes of drainage works and stream maintenance; the need to consider local hydrological variations, and issues associated with hydraulic connection.

Table 4 Summary of General Comments Made During the Public Consultation Process (Public and AG Meetings)	
Category	Questions/Comments Summary
General Comments Relevant to Minimum Flows	<ul style="list-style-type: none"> • <u><i>Drains vs Waterways</i></u> Considerable comment expressing the view that drains should have drainage as a primary purpose, and that in stream values should be secondary to this primary purpose. • <u><i>Consideration of Factors Other Than Flows</i></u> A recurring theme at several meetings was the suggestion that for many Ellesmere waterways, the presence or absence of weed has more impact on in-stream values than flows. Other comments were made about the effects of streambed substrate (ie gravel or mud) on stream aquatic health. • <u><i>The Importance of Stream Maintenance</i></u> In association with the point above, this was mentioned a number of times as being an important factor in determining stream health, depending on how sensitively or competently stream maintenance work is done. • <u><i>The Conflict Between "Drainage Board" Objectives and Setting Minimum Flows</i></u> The objectives of each are fundamentally opposed. - one attempts to remove water, the other to retain it. This conflict of purpose needs to be resolved. • <u><i>The Importance of Considering Local Surface and Groundwater Variations</i></u> A number of Advisory Group members pointed out the complexity of water sources (springs, etc) which can introduce considerable variation in local hydrology over very small distances, giving streams unique characteristics. • <u><i>Hydraulic Connection</i></u> This issue arose reasonably frequently and is of considerable importance to Advisory Group members who may have a different viewpoint from ECan about the extent to which well abstractions affect surface water flows • <u><i>Deep Wells vs Shallow Wells</i></u> Although not directly related to the setting of minimum flows, this issue is related to the degree of hydraulic connection, and featured in several meetings held in the Irwell/Selwyn area.

3.1.3 Subsequent Advisory Group meeting

The staff moderation report was presented to a meeting of the Advisory Group on 28 July 2004. A number of questions arose regarding the rationale put forward by staff to justify the minimum flows proposed. Staff undertook a review and circulated a revised report, along with a number of options for setting the size of the allocation blocks. The only feedback received was from one member advising of his preference to have the size of the A block based on those water permits that commenced prior to 1 January 2002.

3.2 Specific Local Knowledge on Ellesmere / Te Waihora Waterways

As noted in the terms of reference, the primary purpose of the three Lake Ellesmere / Te Waihora Minimum Flow Advisory Groups is to collate and develop relevant local knowledge to assist the Technical Panel assessing the minimum flow settings for the streams around Lake Ellesmere. At an early stage in the process people attending the public meetings identified the need to nominate stream representatives ("champions") to help collate this local knowledge for each stream to be assessed by ECan for minimum flow setting. During the Technical Panel site visits Advisory Group members, usually the nominated stream representatives, presented local knowledge to assist the Panel.

The local knowledge information relating to individual streams is presented in this section of the report. Where a written submission has been received, this is summarised, and the submission is attached in full as an appendix. Stream representatives for each waterway are also noted. (Representatives were finalised at the second round of Advisory Group meetings).

3.2.1 Kaituna Stream

Stream Representative: Peter Lankow

Written Submission: From John A Revill, Kaituna Orchards (Appendix H)

The submission presents a report by Dr Antony Davoren, Hydro-Services Ltd, which provides background information on the irrigation requirements of Kaituna Orchards, and presents a case for the consideration of water harvesting from the Kaituna Stream.

Local Knowledge Recorded:

- The question of whether or not the stream is hydraulically linked to groundwater on the plain is considered important
- Another question relates to the responsibility for stream maintenance. The stream "hasn't been cleaned for years"
- Peter Lankow on the field trip pointed out the difference between the upper and lower reaches of the stream. Near the lake it is very deep, sluggish and quite discoloured, whereas further upstream it has characteristics more typical of the area, with swifter flows, better water quality and a reasonable gradient.

3.2.2 Prices Stream

Stream Representative: Albert Birdling

Local Knowledge Recorded:

- Currently there are no abstractions from the stream. The predominant Advisory Group opinion seems to be that there is therefore no strong reason to impose a minimum flow. (Note that in response to this suggestion, ECan has noted that minimum flows are sometimes imposed in anticipation of future consent applications for abstractions.)
- In response to a question about the data held by ECan on the stream, Graeme Horrell / Suzanne Gabites replied, "26 gaugings have been carried out between 1985 and 2001 (last gauging 8/11/01). Prices Valley shows a very good correlation with neighbouring valley Kaituna".

3.2.3 Knights Creek

Stream Representative: No-one nominated
Local Knowledge Recorded: No information recorded.

3.2.4 Halswell River

Stream Representatives: Ian Minson (Leadley's Road) and Jim Geddes (Tobecks Road)

Local Knowledge Recorded

- Maintenance of the river and "height" of the river should be considered, along with flows. All other measurements - temperature, oxygen availability, fish quantity - don't vary much at all.
- Because of the spring fed nature of the river, there is very little variation in flows - weed growth has more effect
- 2002 is the first time since 1972 (approximately) that flows have been read at the same time as irrigation off-takes have been recorded. Correlation now possible.
- No new large abstractions are likely
- Hydraulic connections in the Halswell, LII area are unlikely. (These are regarded by the group as not hydraulically connected to underlying aquifers, because of the higher strata around Lincoln)
- Consideration of new monitoring points recommended. (ie Move from Ryans to McCartney's, where there is a confined/flat bottom)
- In response to a question about gauging on the river, Graeme Horrell and Suzanne Gabites replied, " Yes, we have one recorder site located at Ryans Road. This data is measured every 15 minutes and telemetered back to the Council twice a day and will appear on the internet shortly. The Halswell is also gauged monthly at McCartney's Bridge. For this investigation a number of other sites were gauged a number of times."
- Run-off from the new suburbs above Halswell is believed to affect water quality.

3.2.1.5 LII River

Stream Representatives: Rex Moir (Moir's property); Murray Lancaster and Murray Tyson (Wolfe's Road)

Local Knowledge Recorded:

- Maintenance extremely significant - the amount of weed present determines change more frequently than flows;
- Fed primarily from 3 large springs and confined to one large property (cf Halswell which has a much larger catchment);

- Springs flowing down from Lincoln - Leeston Road explain why there are differences between Moirs/ Pannetts/Wolfe;
- There are many big springs just across from Moir's Lane gauging point;
- There are springs all the way down. It is difficult to know how much water comes from Yaas Lagoon, which is "like a big sponge";
- The Liffey comes into the LII below the Moir's Lane gauging location (visited on the site tour). This flow is roughly equal to the flows at Moir's Lane.

3.2.6 LI River

Stream Representative: Don Heffer

Local Knowledge Recorded

- Maintenance for weed very important (same as for LII).
- Flows don't vary much.

3.3 Additional written information from individual members of the Advisory Group

3.3.1 Field trip around Ellesmere gauging sites – 6/4/02

Rex Moir:

Rex commented on the lack of correlation of L2 at Moirs and Ryans Road. L2 is fed primarily from three large springs, and a number of smaller ones and the catchment area is confined to mainly one property, compared to Halswell which is fed by drainage and has a much larger catchment.

Alastair Fiecken:

Would like to see Ryans Road data telemetered to ECan and set on the Website so farmers have better idea if nearing restriction.

Murray Tyson:

Commented on wetland situated between Lincoln- Leeston Road and Selwyn Confluence (Armitage property). Probably having effect on Selwyn flows when Selwyn is low – which may explain lack of correlation for Silverstream at Selwyn confluence.

A number of drains and springs flow down from Lincoln-Leeston Road towards the L2 which would most likely explain why there are differences between Moirs/ Pannetts/ Wolfes.

Jim Geddes - Provided for Technical Panel visit of 26 March 2003:

My name is Jim Geddes and I am 63 years of age.

I have lived in the Greenpark/Tai Tapu area all my life near the Halswell River.

In my primary school days prior to 1950, Greenpark School used to have regular visits to the river for swimming. Myself and friends spent most of our spare time swimming, boating, eeling, and on a number of occasions caught whitebait.

Since 1967 I have been a landowner adjacent to the Halswell River and have irrigated from the river from that time.

I was a member of the original committee of river uses and represented the group, and made submissions on their behalf at the hearings in 1974.

Irrigating farmers have always had the highest regard for the river and have a custodian attitude to its wellbeing.

Prior to 1974 the irrigators with the larger pumps had an unofficial roster for water use.

After that time (1974) an official roster was drawn for all irrigating farmers through their organisation to take effect in drought and low flow conditions.

This arrangement has worked successfully since then with no adverse effects due to irrigation abstraction even in low rainfall years.

A unique river that recharges itself.

4. Appendices

4.1 Attendance at Group Meetings

			Public Meeting 05/03/02 Lincoln	Public Meeting 06/03/02 Taitapu	Public Meeting 07/03/02 Kaituna	Advisory Group 25/03/02 Taitapu	Advisory Group 15/04/02 Taitapu	Advisory Group 28/07/04 Taitapu
Mr	Roger	Gilbert	√	√		√	√	√
Cr	Warren	Hardwick	√					
Mr	Rex	Moir	√			√	√	√
Mrs	Meijer	Curry	√					
Mrs	Ruth	Maunsell	√					
Mr	Don	Heffer	√			√	√	√
Mr	Richard	Turner	√					
Mr	Alister	Fieken		√		√	√	√
Mr	Darryl	Havelwick		√				
Mr	Michael	Sellas		√				
Mr	Jim	McCartney		√				
Mr	Murray	Gillet		√				
Mr	Ian	Minson		√		√	√	A
Cr	Debra	Hassan		√				
Mr	Max	Manson		√				
Mr	Chris	Gray			√	√	√	
Mr	Trevor	Young			√			
Mr	Michael	Nutt			√	√	√	A
Cr	Stewart	Miller			√	√	√	
Mr	John	Revill			√			
Mr	Robin	Manson			√			
Mr	Lachlan	Hunter			√			
Mr	Albert	Birdling			√	√	√	A
Mr	Tim	Perry			√			
Mr	Peter	Lankow			√	√	√	
Mr	Jim	Geddes				√	√	A
Mr	Tony	Gilbert						√
Mrs	Pam	Richardson	A	A	√	√	√	√
Environment Canterbury								
Cr	Richard	Johnson	√	√	√			

Mr	John	Glennie	√	√	√			
Ms	Suzanne	Gabites						√
Ms	Carole	Donaldson	√	√	√			
Mr	Ray	Maw						√
Consultants								
Ms	Tina	von Pein	√	√	√			
Mr	Barry	Knox	√	√	√			
Ms	Carole	Donaldson						√

4.2 Summary of Hydrology Discussion, Lincoln Community Hall - 4/4/02 (Graeme Horrell, Water Resource Scientist, Ecan)

- **What is MALF?**

7 day Mean Annual Low Flow (7-day MALF) is a statistic or measure of a streams average low flow. We expect to see this flow once every 2 years on average.

- **How do we calculate MALF for recorder sites and non-recorded sites?**

It is calculated as the lowest flows recorded over seven consecutive days. These values are then averaged over the record period to give the 7-day MALF for that stream/river. However, this only is accurate for long term monitoring sites, so for those sites where we have limited data (secondary sites- a large number of Lake Ellesmere tributaries) we need to correlate these with recorder sites (primary sites). Linear regressions are then carried out to find the best primary site for each secondary site- Example of Kaituna and Prices Valleys was used. These regression equations are then used to create 7-day MALF's for each secondary site.

MALF is the minimum flow for the Waimakariri River and Harts Creek. However, MALF is not necessarily going to become the minimum flow for each stream, but acts as more of a guide to us and to the Technical Panel.

- **Do we notice stream depletion?**

Parkins Drain example used, where unusual recessions occurred in three different periods in last six months. It was pointed out at the meeting that during at least one of these times the Rakaia Water Race II, which feeds into the top of the drain at 0-8 l/s, was not flowing.

4.3 Questions for ECan Specialists (not answered at public meeting 4/4/02)

- **Is gauging of streams done physically on site or just estimated?**

Environment Canterbury measures river flows by:

1. Measuring water levels;
2. Measuring river flows; and
3. Combining the information to produce a flow record.

Automatic water level recorders measure the level of water. By recording this information every 15 minutes we can capture rapid changes in the river flow.

The most common recorders are made of hollow towers. At the top of the tower is a machine which records the data, known as a logger. At the bottom of the tower is an "intake pipe" which allows the tower to fill up until it reaches the same level as the water in the river.

To measure river flow, we first measure the river's width, depth and velocity. This is called "gauging," and there are different ways to do this, depending on the river. When we do a gauging we measure the velocity of the water from at least 20 points across the river cross-section. These points are called "verticals." Current meters are used to measure velocity and they have buckets or propellers that rotate at a speed in proportion to the water velocity.

At each of the verticals we also measure the depth of the water and the distance from the river bank, so we know the area between each vertical. From these measurements we can calculate the "discharge flow" between each vertical and add these up to calculate the discharge of the entire cross-section.

At water level recorder sites we carry out gaugings at least once a month and, at some sites, every fortnight.

- **Can the depth of rivers, as affected by weed growth, affect flows?**
No, weed may affect the depth of the river but flows are not altered. This does have implication for ECan's system of rating sites. Each recorder site has a "rating curve", which shows the relationship between water levels and the flow. As weed affects the water levels it also affects the rating curve. Those streams known to have a weed problem would have rating change more often than those that would be relatively weed free.
- **Is any gauging done on the Halswell River?**
Yes, we have one recorder site located at Ryans Bridge. This data is measured every 15 minutes and telemetered back to the council twice a day and will appear on the Internet shortly.
The Halswell is also gauged monthly at McCartneys Bridge.
For this investigation another six sites were gauged a number of times.
- **How accurate is the ECan monitoring information?**
ECan's archive is very accurate while the data on the internet is only provisional until checked.
- **What data does ECan have on Prices Valley Stream?**
26 gaugings have been carried out between 1985 and 2001 (last gauging 8/11/01).
Prices Valley shows a very good correlation with neighbouring Kaituna valley.
- **Is the ECan data used available to the general public?**
Most recent telemetered data is available on ECan website: www.ecan.govt.nz however this data has not been checked and is only provisional.
Historical flow data and gauging data can be requested through ECan's Customer Services.
- **Does ECan have access to historical low flow data used prior to the initiation of the current minimum flow process?**
A few sites have gauging data back to 1954 while a number of streams have data from the early 1970's when a number investigations were carried out during the severe drought of that time.
- **Can the language used be explained- ie What is "index", "stage" etc?**
If data has been requested from Customer Services or through consents, it comes normally in the form:
Index- which is the gauging card number.
Date- date on which gauging was carried out.
Time- time at which gauging was carried out.
Stage- water level as recorded from staff gauge at site.
Flow- as calculated after gauging completed.
Area- total area of cross section at gauging site.
Mean V m/s- mean velocity calculated using current meter at each vertical.

Acc. %- accuracy of the gauging.

T in C°- Water temperature at time of gauging in degrees celsius.

- **What Hydrological data is available? How far back does this go, especially in relation to Hanmer Drain?**

We have five long term flow recorder sites within the lower Ellesmere tributaries;

Stream	Site		
		Recorded period	Mean Recorded Flow (litres per second)
Kaituna River	Kaituna Valley Road	10/6/86-present	553
Halswell River	Ryans Bridge	17/4/96-present	752
Selwyn River	Coes Ford	1/2/84-present	3235
Doyleston Drain	The Lake Road	13/2/87-present	103
Parkin Drain	Taumutu Road	21/6/01-present	57

We also have a large number of streams which are gauged regularly on monthly runs.

Hanmer Road Drain has 185 gaugings between 1970- 2002.

- **Has shingle build-up been considered in stream dynamics? (Suggestion that shingle forces surface water underground)**
The shingle build up would have to be in large amounts for this to cause significant effects.
- **How accurate is ECan gauging?**
ECan’s gauging program generally calculates ±5-8% accuracy.
- **Why was Hanmer Drain not dry last year?**
According to our records, Hanmer Road Drain was dry on at least three site visits last year, 23/2/01, 28/3/01 and 5/4/01.
- **What is the difference in “depth” between Hanmer Drain, Doyleston Drain and Boggy Creek, as they approach the lake?**
ECan has not carried out longitudinal profiles on any stream flowing into Lake Ellesmere.
- **Drains. Initial purpose? What significant waterways were there before the drains?**
Drains were dug to make the land farmable. Springs and wetlands dominated the lower areas of the Central Plains- now known as the Lake Ellesmere tributaries. What were natural springs and streams were altered to a number of straight drains flowing into larger drains and some natural streams.
- **Explain the dynamics of the Selwyn**
ECan manages three recorder sites on the Selwyn River, at Whitecliff, Ridgens Road, and Coes Ford. Whitecliffs and Coes Ford are water level and flow recorder sites while Ridgens Road is solely a water level recorder primarily used as a flood warning.

Site	Recorded period	Mean Recorded Flow (m ³ /s)	Minimum Flow (m ³ /s)	Maximum Flow (m ³ /s)
Whitecliffs	26/5/64-present	3.32	0.48	342.60
Coes Ford (Total flow)	1/2/84-present	3.30	0.14	674.00
Coes Ford (<i>Baseflow Component</i>)	1/2/84-present	1.30	0.14	7.22
Coes Ford (<i>Quickflow Component</i>)	1/2/84-present	2.00	0	667.00

Note: *Baseflow* is that which is contributed from springs and seepage into the streambed.

Quickflow is that water that is fed from the upper catchment.

The Upper Selwyn is closely associated with regular south-westerly frontal systems, with occasional rainfall to the western margins from north-westerly conditions. Significant loss of surface flow to groundwater storage in the unconsolidated gravel aquifers underlying the plains - from the foothills to just above SH1. Flow in the mid reaches of the Selwyn occurs more or less only during times of fresh or flood. For example, the Ridgens Road recorder site (11.5km upstream of SH1) is dry for almost 70% of the year. Flow in the lower Selwyn is primarily fed through springs and seeps and appears to be closely correlated with groundwater levels in the area.

- **Effect of shallow wells on the Selwyn River**
To be answered by a groundwater specialist.
- **Effect of planting trees in the upper catchment on the rate of surface run-off (water yield)?**
There is a potential for this land use change to have an effect upon the surface and groundwater resource held in the Selwyn. This is being addressed in the Land chapter of the Natural Resource Regional Plan (NRRP).
- **The effects of minimum flows on drainage.**
This question requires elaboration. No investigations carried out by ECan have addressed this type of issue.
- **Effects on county water race overflows on minimum flows (eg. Lee, Harts and Waikekewai)**
This issue is being investigated and addressed as part of this investigation. We realise these flows can be large after heavy rains, by actually carrying runoff. However, we are actually most interested in their contribution during a drought, when they are having maximum use made of them.

- **Effects of drain maintenance on instream values – how this affects expert panel assessment.**

This is a separate issue, but yes it does have an impact. Drain clearance is done to try and minimise damage. However no flow, or an extended period of extremely low flow have a greater impact. We have engaged consultants to advise us on ways to minimise this impact. Research is being done at the Cawthron Institute, funded by Regional Council and District Councils on minimising the environmental impacts of drain clearing.

For example, on the Halswell we use three methods:

Mechanical
Chemical
Hand Clearing

Hand clearing is the most expensive, but done when we wish to have the least impact on the rivers environment.

With mechanical drain clearing we are aware the drain can get bigger with time, and this method can lead to sediment problems downstream. Mechanical clearing is done normally after the summer recreational season, but preferentially before winter.

We trap the weed from the Halswell at Greenpark so it is removed. ECan is also tending to leave weed on the side during the summer for shade and habitat for fish.

- **Do Ecan consider the effects of modern drainage clearing techniques on the streams? Modern ditch diggers lead to deepening and drying**

As per the previous answer, however we do believe many drains are getting deeper and with the use of drainage coil pipes and nova flow pipes the soil is perhaps drier.

This more effective drainage may remove water at periods of low flow, and in contrast higher runoff during wet periods.

- **What is the relationship between lake opening and flows in the lower tributaries?**

Opening the lake is unlikely to affect flows at any of the minimum flow sites as these are situated far enough upstream not to be affected by downstream head. The tributaries are largely fed by spring flow, rainfall and drainage in their upper reaches, which would not be affected by opening the lake.

Lake openings may, however, affect the depth of each tributary at reaches directly adjacent to the lake.