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## **Statistical analysis of river flow data in the Horizons Region**

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**NIWA Client Report: CHC2006-154  
May 2007**

**NIWA Project: ELF07202/HZLC22**



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*Prepared for*

Horizons Manawatu Regional Council

NIWA Client Report: CHC2006-154  
May 2007  
NIWA Project: ELF07202/HZLC22

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Appendix 1: Detailed tables per site – separate document

*Reviewed by:*



Ross Woods

*Approved for release by:*



Charles Pearson

## Executive Summary

Horizons Regional Council is currently researching water quality standards and water allocation options for the various water management zones within the Region. A key parameter within these projects is sound analysis of the available flow data. This project seeks to document the flow statistics for the available continuous flow data records within the Horizons Region.

NIWA's experience in flow analysis and reporting has been applied to the problem of documenting the flow statistics of the Horizons Region. A set of flow statistics has been compiled that allow a succinct description of a flow series from each recording site, and facilitate comparison between sites. The statistics selected cover the areas of magnitude (how much water), variability (flow duration, seasonal behaviour), flow extremes (mean annual flood and low flow), and frequency of eco-system disturbance (FRE3). Effects on river flows of changes in management rules are dealt with by analysing different rule periods separately, and also by using synthetic records that allow rules to be assessed over a complete time period. This is important to avoid confusion between effects of rule changes and effects of climate variability. Flow duration curves and ecological disturbance indices are presented on a seasonal as well as an annual basis.

For each flow record, summary tables showing date range, basic flow statistics, flow variability statistics, and flood and flow statistics. Plots of seasonal variation are also provided, and an appendix (in a separate document) gives complete details of flow duration tables for whole years and seasonal analysis, annual flood and low flow values, and tables of number of days per month below mean annual low flow.



## 1. Introduction

Horizons Regional Council is currently researching water quality standards and water allocation options for the various water management zones within the Region. A key requirement within these projects is sound analysis of the available flow data. This project seeks to document the flow statistics for the available continuous flow data records within the Horizons Region. A likely further step (not included in this project) is the calculation of flow statistics for areas where flow information is not collected on a continuous basis.

NIWA's experience in flow analysis and reporting has been applied to the problem of documenting the flow statistics of the Horizons Region.

In general the data have been taken on an as-is-where-is basis. Only cursory quality checking has been done as data tables and plots were scrutinised. Some inter-site comparisons such as cumulative departure from mean plots would provide firstly a graphical representation of regional wet and dry periods and secondly a qualitative check on overall data integrity, as has been done for long New Zealand records<sup>1</sup>. The summary tables in section 3 of this report contain statistics which are derived in some cases from more detailed tables that are presented in the appendix document.

The flow statistics contained in this document were derived primarily for water allocation/water quality management purposes with an emphasis on low flow parameters. The flood flow information should be used with caution, and if required for any significant design purpose an update of the flood statistics should be requested from the recording authority.

Data for this report were provided from the archives of Horizons Regional Council and the Water Resources Archive (NIWA). Many of the sites from the NIWA archive were funded by Genesis Energy and its predecessors, as was analysis of flows below the TPD scheme, and simulation of natural flows and current consent conditions. We thank Genesis for their permission to use the data and analyses.

## 2. Flow statistics for water allocation planning

Flow records collected at river stations are usually at a short time interval of the order of 15 minutes. A 'good' record length is considered to be at least ten years and

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<sup>1</sup> McKerchar, A. I. and C. P. Pearson (1997). "Quality of Long Flow Records for New Zealand Rivers." *Journal of Hydrology (NZ)* **36**(1): 15-41.

preferably twenty, with more being desirable in some parts of New Zealand where decadal influences on climate and river flow have been observed. Large quantities of data are accumulated. Descriptions of these data are generally tailored to each particular application. There are few ‘generic’ statistics that are universally required or requested. This is because hydrological data vary over a wide range of time scales, may not be stationary because of changes to management upstream and also because applications are often concerned with specific aspects of the hydrology. However it is possible to draw up a ‘short list’ of useful statistics that begin to define a hydrological time series. Such a list seeks to define the flow magnitude and its variability and uncertainty. Flow magnitude is of interest to abstractive users such as irrigation and hydro power generation. Variability is of interest to all water users whether out of river or in-stream. Uncertainty is of interest to scheme designers and economists concerned for their clients’ exposure to risk over the life of a potential scheme. For water allocation planning there is generally an interest in the lower end of the flow range, below the median. Floods are also of significance when designing intake structures, preventing sediment entering distribution systems, and when considering ecological disturbance in river beds.

## **2.1. Flow quantity statistics**

### **2.1.1. Mean flow**

Mean flow is a fundamental statistic of a flow record. It is the area under the hydrograph (the time series plot of varying river flow) divided by the length of the hydrograph. It is usually expressed as flow in L/s or m<sup>3</sup>/s (cumecs), although units of Ml/day are often used in water supply work and cumec-days (CMD) in hydro-power applications. Depth of runoff (mm/time interval, the mean flow divided by the catchment area at the flow recorder) is more easily compared with other catchment wide variables such as rainfall or evapo-transpiration.

### **2.1.2. Median flow**

Median flow is the flow that is equalled or exceeded half the time over the period of analysis. Median differs from mean because flow is not a normally distributed quantity. Rivers in the Horizons Region spend only about 30% of the time above the mean (standard deviation 5%), but these flows can be very large. Conversely the flow is below the mean about 70% of the time, but these lower flows are bounded by zero flow as a lower limit.

## **2.2. Flow variability statistics**

Amount of flow varies with time, over a wide range of time scales. In some parts of New Zealand there is variability on decadal time scales, but this is not evident in previous studies of the flow records from the Horizons Region. There is considerable variability from year to year, and this can be captured by use of annual average flows and their spread measured by a statistic such as standard deviation or coefficient of variation (standard deviation divided by the mean). As with other variability statistics, there is a general gradient from west to east in New Zealand, with variability being lower on the western side of both islands and greater on the east.

### **2.2.1. Seasonal variability**

One measure of seasonal variability is the distribution of monthly mean flows, and this can be presented graphically, to show the average seasonal behaviour. By considering each month in turn, and calculating the quartiles (flow values that are equalled or exceeded one quarter and three quarters of the time) the year to year variability of seasonal behaviour may also be illustrated.

### **2.2.2. Flow distribution**

The spread of flows can be represented by considering the range (maximum – minimum), or alternatively the inter-quartile range, which is less affected by extremes of flood or drought. This measure of spread can also be applied to the seasonal flow variability on a monthly basis. A more detailed presentation of flow distribution is the flow duration curve (FDC). This curve plots each flow against the percentage of time that that flow is equalled or exceeded in the time period being analysed.

The lower end of the flow duration curve (FDC) is a useful descriptor of water availability for abstractive uses. Generally the minimum flow required to remain in the river is the mean annual low flow (MALF) or a fraction of it, or alternatively a high exceedance percentile, such as the flow equalled or exceeded 95% (or similar) of the time. The amount of water between such a flow requirement and the scheme capacity to divert is very sensitive to both the choice of minimum flow and the shape of the FDC.

### **2.3. Flow extremes**

High flows and low flows are characterised in several ways; by the top or bottom 5%-10% of the FDC, by some multiple or fraction of the mean flow or median, or by use of extreme value sampling.

#### **2.3.1. Mean annual flood**

Mean annual flood (MAF) is the average of the highest instantaneous flow measurement from each year. The definition of a water year is generally not as important for New Zealand floods as it is for the mean annual low flow calculation (see below). The ratio of MAF to mean and low flow statistics is one useful indicator of the magnitude of disturbance. These ratios allow comparison between sites, and relate to the gradient of river environment from benign (low ratios of flood/mean or flood/low flow) to harsh (high ratios). Mean annual flood in this report is calculated on a calendar year rather than a water year, and thus for many sites there are one or two fewer annual values than for the MALF analysis.

The major floods of February 2004 have not been registered at every site, as some were damaged by the flood. In addition, no checking has been done of the effect of missing values in the annual flood series. Thus the mean annual flood values and annual series presented in this report should be treated with caution if using them for design purposes.

#### **2.3.2. FRE3 and days of accrual**

The flow which is three times the median flow is a common high flow statistic used in assessment of biological disturbance. The frequency of floods this size or larger (FRE3 expressed as number per year or season for a seasonal analysis) is used as an index of the amount of disturbance experienced by instream organisms. Ecosystem composition (periphyton and invertebrates) in New Zealand rivers and streams varies in a predictable way with this statistic<sup>2</sup>.

Figure 9 in the New Zealand Periphyton Guideline shows an idealised periphyton accrual cycle, where peak biomass at the end of the accrual phase is followed by a loss phase in which various processes lead to a reduction in biomass and an eventual lower carrying capacity value. This 'idealised' function does not commonly happen in rivers,

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<sup>2</sup> Clausen, B. and B. J. F. Biggs (1997). "Relationships between benthic biota and hydrological indices in New Zealand streams." *Freshwater Biology* **38**: 327-342.



because periphyton communities are of mixed species composition, they are spread over a river bed in space and floods often interrupt the process.

The average time between a flood larger than three times the median flow and the next flood of similar magnitude defines the average accrual time that organisms such as periphyton have available to recover and grow (possibly to nuisance levels). This value can be used in the regression equations for peak chlorophyll *a*, as contained in the New Zealand Periphyton Guideline. Calculation of FRE3 uses one additional parameter that is the time between floods required to initiate accrual. This could vary depending on the species of periphyton that are important in a particular river, as they have different growth rates and susceptibility to sloughing with age. For example the invasive alga *Didymosphenia geminata* (Didymo) is quicker to recolonise, faster spreading and more resistant to sloughing than any native species. However since Didymo is not yet a feature of North Island waterways, for the present work we have adopted an inter-flood time of five days, as used in the analyses reported in the papers that informed the New Zealand Periphyton Guideline. This means that after flow recedes below three times the median, a new accrual phase is not begun unless the flow remains below that level for five days.

Periphyton accumulation is a combined result of hydrology, nutrients, temperature and species composition and distribution. Recent research on periphyton ecology suggests that riparian shading is an important factor not yet included in models. Also the work currently being done on chemical control of Didymo could have some relevance in controlling filamentous green algae blooms in other rivers.

Analysis of annual FRE3 values has been included here for the first time. Both the annual and seasonal statistics contain the standard deviation of the annual or seasonal FRE3 statistic. It should be noted that the medians used for the all year and dry season analyses of FRE3 are the medians from the respective periods. Thus the dry season FRE3 is a subset of the all year value, and not a distinct period, so that comparisons between these two statistics should be made with caution. A 'wet season' FRE3 could be a better statistic if comparisons are required.

### 2.3.3. Sensitivity of FRE3

Analysis of the sensitivity of FRE3 to parameters used in the calculation has been done and the results are reported here. Three flow records were nominated by Horizons' staff: Manawatu at Palmerston North; Tamaki at Water Supply Weir; and Mangatainoka at Pahiatua. For each site FRE3 analysis was run for whole years and the summer season (November to April inclusive). Annual FRE3 values and their

coefficients of variation (CV), and the average accrual time and its CV, are presented in Tables 1 to 4, and plots of the relative changes to these four parameters are shown in Figures 1 to 4.

**Table 1:** Effect of varying averaging interval and interflood spacing on FRE3 at three flow sites

Site	FRE3									
	averaging interval	0 s	1 h	3 h	6 h	12 h	24 h	24 h	24 h	24 h
	interflood spacing	5 d	5 d	5 d	5 d	5 d	5 d	7 d	14 d	31 d
Manawatu		15.3	15.2	14.9	14.3	13.2	11.7	10.6	8.1	5.3
Tamaki		12.8	12.6	11.9	11.3	10.2	8.8	8.1	6.6	4.6
Mangatainoka		18.4	18.0	17.6	17.1	16.3	14.5	12.8	9.5	5.9

**Table 2:** Effect of varying averaging interval and interflood spacing on FRE3 annual CV at three flow sites

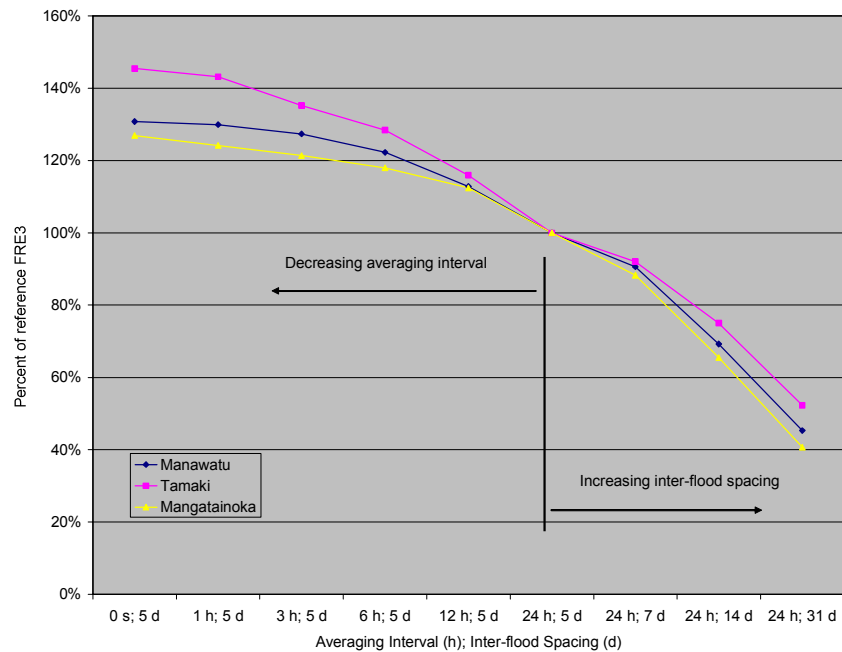
Site	FRE3 CV									
	averaging interval	0 s	1 h	3 h	6 h	12 h	24 h	24 h	24 h	24 h
	interflood spacing	5 d	5 d	5 d	5 d	5 d	5 d	7 d	14 d	31 d
Manawatu		21%	21%	20%	20%	22%	24%	21%	22%	24%
Tamaki		23%	21%	22%	23%	26%	28%	27%	25%	28%
Mangatainoka		15%	16%	16%	18%	18%	20%	21%	20%	19%

**Table 3:** Effect of varying averaging interval and interflood spacing on mean accrual at three flow sites

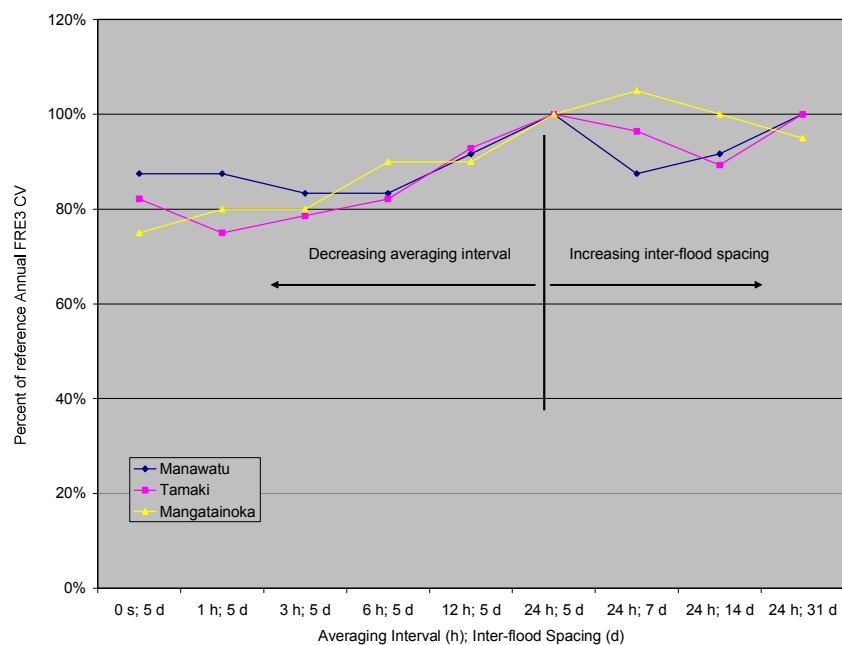
Site	Mean Accrual									
	averaging interval	0 s	1 h	3 h	6 h	12 h	24 h	24 h	24 h	24 h
	Interflood spacing	5 d	5 d	5 d	5 d	5 d	5 d	7 d	14 d	31 d
Manawatu		21.0	21.0	21.4	22.4	24.2	27.1	30.1	39.4	60.6
Tamaki		25.1	25.5	26.6	27.9	30.8	35.3	38.4	47.3	68.8
Mangatainoka		16.7	16.9	17.2	17.7	18.5	20.7	23.4	31.5	50.7

**Table 4:** Effect of varying averaging interval and interflood spacing on mean accrual CV at three flow sites

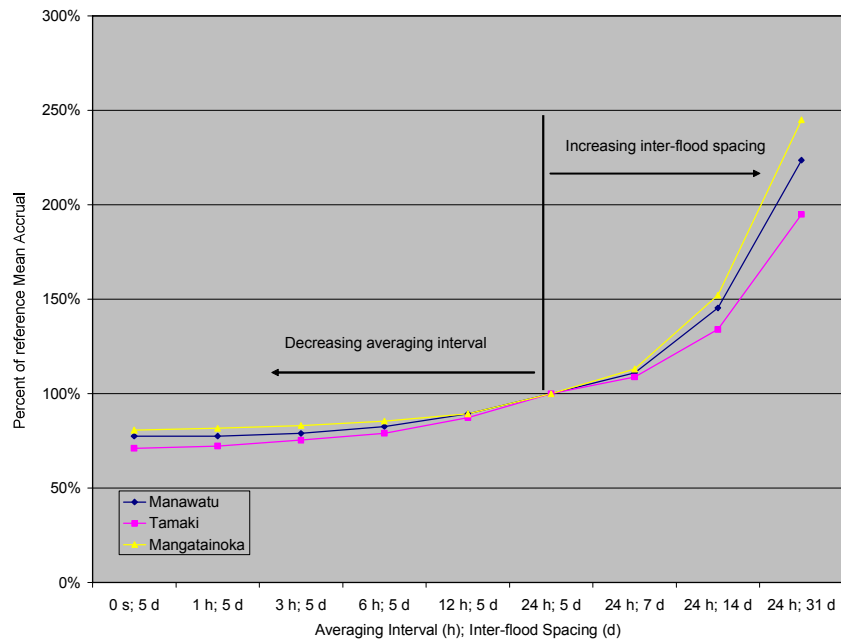
Site	Accrual CV									
	averaging interval	0 s	1 h	3 h	6 h	12 h	24 h	24 h	24 h	24 h
	interflood spacing	5 d	5 d	5 d	5 d	5 d	5 d	7 d	14 d	31 d
Manawatu		102%	103%	104%	105%	111%	120%	110%	90%	63%
Tamaki		96%	95%	95%	98%	103%	110%	103%	85%	63%
Mangatainoka		93%	93%	94%	98%	106%	111%	101%	81%	54%



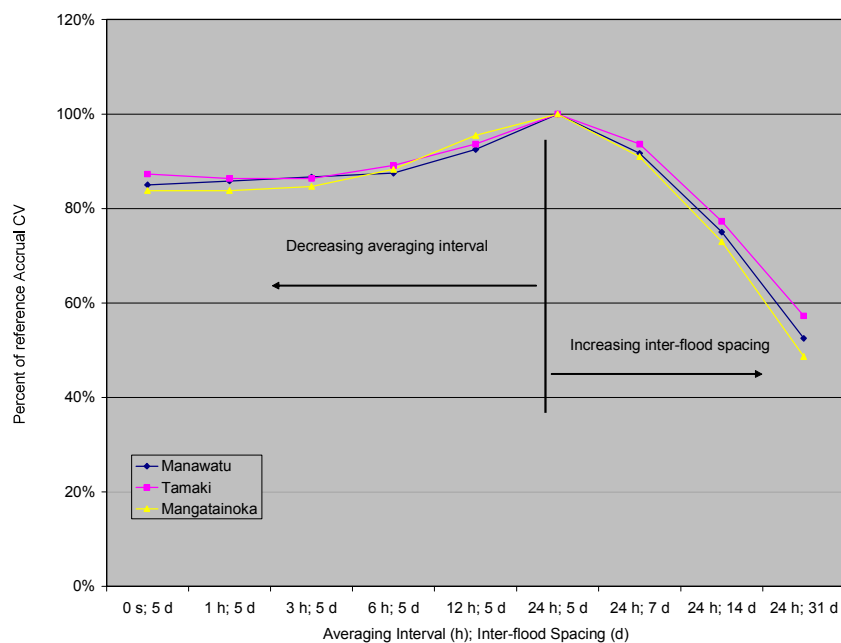
**Figure 1:** Relative change to FRE3 at three sites by varying averaging interval and interflood spacing



**Figure 2:** Relative change to FRE3 annual CV at three sites by varying averaging interval and interflood spacing



**Figure 3:** Relative change to mean accrual at three sites by varying averaging interval and interflood spacing



**Figure 4:** Relative change to accrual CV at three sites by varying averaging interval and interflood spacing

#### 2.3.4. Mean annual low flow

Mean annual low flow (MALF) is the average of the lowest flow measured in each year of record. For the North Island of New Zealand the water year recommended is July to June, because significant droughts often begin in December. If a calendar year is used, then low flows from the same event may appear as the lowest value in two different years, thus biasing the sample.

Low flows can be sampled from the data as instantaneous flows, or as moving means over a range of averaging intervals. Commonly used intervals in New Zealand are one day, seven days and one month. A seven day interval is the most relevant when considering ecological processes because it smoothes out short term flow fluctuations that are less important to biota, and concentrates on longer low flow events that dry out parts of the river bed. In the present study a one day interval has been specified by the client because rivers of the region respond quickly over this time range in flow ranges where water use is important. A one day interval for calculation of mean annual low flow is consistent with the one day maximum daily rate consent limits used in allocating water within the region.

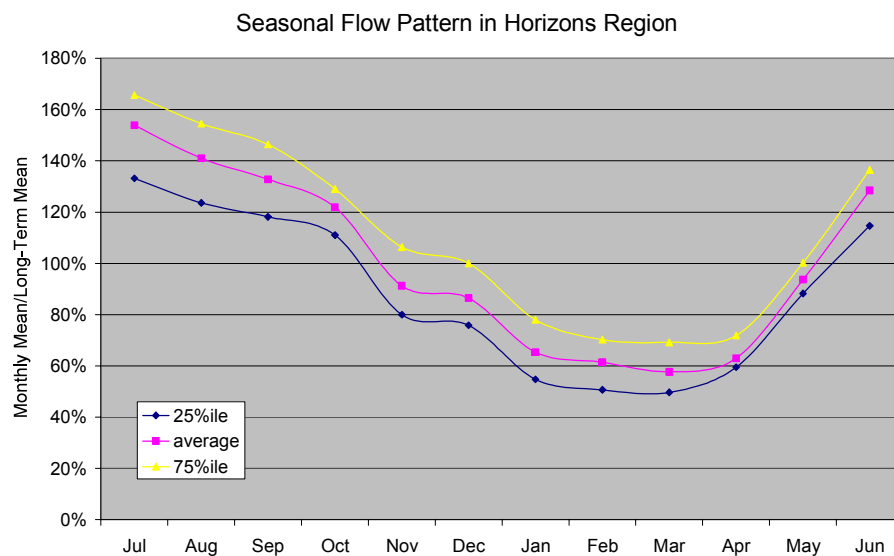
MALF is widely used as an estimate of the flow required in a river or stream to support biological processes and ecosystem function. It provides a general estimate of in-stream flow requirements when first considering the amount of water that might be potentially available for out of stream use. For larger rivers, especially single-thread rivers, MALF can be an over-estimate of the instream requirement for water, depending on the values to be conserved. The Tekapo, Waiau (Southland) and Moawhango Rivers are all rivers where minima smaller than the MALF have been shown to produce healthy ecosystem values when supplemented with managed releases to maintain a flushing regime (in effect use of FRE3 principles). For larger rivers, as significant water resources which may be subject to major investment in water related infrastructure, more detailed analysis involving Instream Flow Incremental Methodology (IFIM) is recommended as a more robust way to determine instream flow requirements than rule-of-thumb methods based on MALF. This view is based on extensive application and testing of the use of IFIM to determine flows to protect instream values<sup>3</sup>. We are also very familiar with rules-of-thumb methods and consider them to be useful first step planning tools, but fairly blunt when assessing specific requirements to maintain values such as salmonid habitat and biodiversity.

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<sup>3</sup> Jowett, I. G. and B. J. F. Biggs (2006). "Flow regime requirements and the biological effectiveness of habitat-based minimum flow assessments for six rivers." *International Journal of River Basin Management* 4(2): 1-11.

## 2.4. Filtering

Because there is a pronounced seasonal cycle of water availability and likely demand for water in the Horizons Region, it makes sense to sample the part of the year that is expected to be drier. Figure 5 below shows the average and quartile spread of normalised seasonal behaviour from sites in the Horizons region. While it is clear that the months of January to April are well below the long-term mean flow, there is some ambiguity about November, December and May. Discussion with Horizons regarding irrigation seasons and consideration of low flow periods led to selection of November to April inclusive as the ‘dry season’. The inclusion of November is more consistent in this case with the overall goal of statistics used for water allocation and water quality (Roygard, pers. comm.).



**Figure 5:** Monthly mean flow as a percentage of the long-term mean flow for all sites in the Horizons region unaffected by diversions (including simulated natural records).

## 2.5. Temporal sampling

Flow statistics as discussed above can be calculated for different time periods from a hydrological record. Often the complete record is used, as this provides the best estimate of each statistic when the flow series is stationary (i.e. its statistics do not vary with time). However where there is significant variability either seasonally or at decadal scales it can be useful to sample within the full record, either by filtering data to select certain seasons, or by defining different time periods. An example of decadal variability is that related in the South Island to the Inter-decadal Pacific Oscillation

(IPO). There flows recorded in major rivers experienced a step change in statistical properties at 1978. The years 1945 to 1977 on the Clutha River for example were 14% drier than the years 1978 to 1999<sup>4</sup>. There is some evidence of opposite effects in the eastern Manawatu catchment and the east coast part of the Horizons Region (Woods, pers. comm.).

Another significant effect on flow statistics is changes in river management due to changes in the consent rules for major abstractions. These can be coincident with climate effects and it can be difficult to separate the two. For example, changes in the consent rules have changed the minimum flows downstream of the Tongariro Power Development (TPD) over time. These affect the flow statistics of the rivers below diversions. A chronology follows.

We are not aware of any other significant temporal influences, either natural or artificial, in the Horizons Region, that would affect the calculation of flow statistics.

#### **2.5.1. Western diversion**

Operation of these structures affects flows in the Whanganui and Whakapapa Rivers and tributaries.

28 November 1972: Western Diversion begins. Small release flows (600 L/s) at Whakapapa for fish, and a temperature based minimum flow rule (7.1 m<sup>3</sup>/s) at Piriaka.

25 December 1983: implementation of minimum flow rule at Te Maire (22 m<sup>3</sup>/s from 1<sup>st</sup> December to 15<sup>th</sup> February, and Easter weekend; 16 m<sup>3</sup>/s otherwise).

1 September 1992: Planning Tribunal rules on Whanganui (a 3 m<sup>3</sup>/s minimum flow at Whakapapa, 29 m<sup>3</sup>/s at Te Maire from 1<sup>st</sup> December to 31 May, otherwise no minimum).

20 April 1993: Otamangakau sluice valve used to provide minimum flows at Te Maire, in preference to Whakapapa releases.

1 December 2004: Additional minimum flows at Mangatepopo Intake (0.5 m<sup>3</sup>/s) and the Whanganui Intake (0.3 m<sup>3</sup>/s) as a result of the resource consent hearings.

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<sup>4</sup> McKerchar, A. I. and R. D. Henderson (2003). "Shifts in flood and low-flow regimes in New Zealand due to interdecadal climate variations." *Hydrological Sciences Journal* **48**(4): 637-654.

### **2.5.2. Eastern diversion**

Operation of these structures affects flows in the Whangaehu, Moawhango and Rangitikei Rivers and tributaries.

April 1979: Moawhango Dam operational. No minimum flow below the dam.

July 1979: Mangaio Tunnel operational.

1 December 2004: flushing flows and an increased minimum flow ( $0.6 \text{ m}^3/\text{s}$ ) down the Moawhango River below the dam as a result of the resource consent hearings.

### **2.5.3. TPD as a whole**

1 December 2004: Current consents become operative.

To analyse the effects of these flow regime changes the affected records have been analysed as shorter series between significant date changes.

As a consequence of these alterations over time in TPD consents and management, a number of different time periods have been assessed at affected sites. These are:

- Pre-diversion: up to June 1972 on the Whanganui, June 1978 on the Moawhango, Rangitikei and Whangaehu;
- 1972 rules: July 1973 to June 1983 on the Whanganui;
- 1983 rules: July 1983 to July 1992 on the Whanganui;
- Post-diversion: July 1979 to present on the Moawhango, Rangitikei and Whangaehu;
- Planning Tribunal 1990: July 1992 to June 2004 on the Whanganui.
- All data: the full record. This is applied to all other sites and to the TPD records for completeness. However only limited use can be gained from the full record analysis of affected sites.



There was insufficient data since the inception of the current consents for a special data period to be used from then. This will become viable in five or ten years.

Because of these varying effects, the most reliable comparisons on sites affected by the TPD is to compare the simulated natural record (all data) with the simulated current consent (all data). Recorded data should only be used with caution over periods of consistent management rules and consent conditions.

## **2.6. Synthetic time series**

### **2.6.1. Temporal changes**

When changes in regime over time significantly affect a river record, temporal sampling can be used to separate effects. However when there are changes in climate regime over the same time periods, this leads to mixed effects that can be difficult to separate. One way to deal with this difficulty is to synthesise flow records over the full time range. This is done by using records of diverted and in-river flows, and recombining them into a natural flow series. This natural flow series can then be used to model different operational regimes using the full date range thus covering a wider range of climate influences. By comparing the natural flow series with the modelled operational regimes, the true impact of the operational regime can be seen, separate from the climatic influences.

Numerous exercises of this type have been done on the rivers downstream of the TPD, and the results of natural flow simulation and a model of the present consents on the Whanganui River have been used here to illustrate the importance of this approach.

Other rivers affected by diversion or significant abstractions are:

- Turitea Stream near Palmerston North: used for water supply with a take of up to 37,000 m<sup>3</sup>/day (average 430 L/s), and a minimum flow downstream of the dam of 25 L/s. This influences the Turitea at Ngahere Park record and the modelled flow at Manawatu at Opiki Bridge;
- Mangahao River in the Tararuas: diverted for hydro power generation into the Mangaore Stream which flows into the lower Manawatu near Shannon. This impacts flows in the Manawatu at sites such as Mangahao at Ballance, Manawatu at Upper Gorge, Manawatu at Teachers College and Opiki Bridge;

- Makotuku and Makara, tributaries of the Whangaehu: these have water diverted by the Raetihi power scheme to the Orautoha power station and thence into the Orautoha, a tributary of the Manganui-o-te-ao, a tributary of the Whanganui. The take is up to 300 L/s based on the current consent, and affects the flow records Mangawhero at Ore Ore, Whangaehu at Kauangaroa, Manganui-o-te-ao at Ashworth, and Whanganui at Paetawa; and
- Turakina River flows are affected by a power scheme.

Flow records affected by these known diversions have not been naturalised, partly because they have minor impacts and partly because there are insufficient data to allow a consistent treatment.

There are other influences on flow data in the region (e.g. the Dannevirke Water Supply take of up to 100 L/s affects the Tamaki at Water Supply Weir). Increasing irrigation abstraction and other demand for water over time will also have an influence. These can only be properly assessed if accurate water use records are kept, so that flow series can be naturalised.

#### **2.6.2. Other synthetic records**

Horizons staff have synthesised long flow records at three sites as follows:

- Kiwitea at Spur Road All: this dataset is a combination of Kiwitea at Spur Rd Extension (1032516) that was lost in the October 1998 flood, its replacement at the Cheltenham Gun Club (1032578) that was lost in the February 2004 flood, and its replacement currently operating at Haynes Line (1132517). Relationships between flows at the various sites were used to establish the merged record.
- Manawatu at Palmerston North: the record is a combination of Manawatu at Fitzherbert (32502) from 1923 to 1971, Manawatu at Ruahine Street (32580) from 1971 to 1987, and Manawatu at Teachers College (1032560) from 1987 onwards. The Fitzherbert and Teachers College sites are within metres of each other, with the Fitzherbert site just downstream but above the bridge. The Ruahine Street site, approximately four kilometres upstream was closed due to extensive disturbance of the control during river control works. The three sites can be regarded as a homogeneous series and have therefore merely been combined into one dataset.

- Mangatainoka at Pahiatua All: the record is a combination of Mangatainoka at Suspension Bridge (32531) and Mangatainoka at Pahiatua Town Bridge (1132513) approximately four kilometres upstream, which replaced the historic Suspension Bridge site in October 2004. The river is occasionally partially dammed during river works and by Tararua District Council when gravel movement in the channel affects their gallery intakes limiting water supplies to Pahiatua. Where these events reduce river flows to the extent that analysis of annual low flows is affected they have been removed from the record. Other instances remain.
- Mangatera at Dannevirke (1 & 2): these flows are synthesised using linear regression relations derived from simultaneous gaugings at Manawatu at Weber Road. The second series has the regression forced through zero.
- Oroua at Kawa Wool All: this record is a combination of the site operated at Kawa Wool (32563) adjacent to Feilding Golf Course and routed flows from upstream sites. Data since July 1992 has been modelled using routed addition of flows from the upstream Kiwitea and Almadale sites. Kiwitea input is from Spur Rd Extension and therefore is also modelled for part of the record, although slightly differently to the model used for Kiwitea Spur Rd All dataset used for flow statistics in this project. An important feature of this record is that the February 2004 flood is a modelled value since the Oroua recorder failed during the event.
- Oroua at Almadale All: the record is combination of historic site (32514), also known as Oroua at Forlongs Road, operated by Manawatu Catchment Board and Oroua at Almadale Slackline (1132508). Oroua at Almadale closed Jan 1979 but was re-opened by HRC in July 1992 following loss of the Kawa Wool site. Site moved slightly downstream in Nov 2002 to the slackline gauging section. Flows affected by water abstraction upstream at Barrows Road for Feilding supply (~100 L/s). Most irrigation abstraction occurs between Almadale and the Kawa Wool station at Feilding.
- Tokomaru All: this record is a combination of the Tokomaru at Quarry (1032517) and Tokomaru at Darcy's Hole (approximately 500 metres downstream). Darcy's Hole installation was washed away in Jan 2005 flood and the cross-section was damaged. The site was re-established a further kilometre downstream at Highway Bridge (32511). Site closed again Jan 2006. The river is affected by Mangahao Power Scheme. The headwaters are dammed by the Arapeti dam which collects water from the upper Tokomaru catchment and the Tararua Range tunnel from the Mangahao dams and diverts

it to the Power House at Shannon, which discharges to the Mangaore Stream. The Arapeti dam has no minimum release flow and there are no records that it has ever spilled.

- Manawatu at Opiki 37 Mile: this is a modelled site, located just above upstream extent of tidal influence and upstream of Oroua confluence and Moutoa Sluice Gates. The flow series to Opiki has been modelled using routed addition of flows from upstream Manawatu at Teachers College, Mangaone at Milson Line, Turitea at Ngahere Park and Kahuterawa at Johnstons Rata sites. The Turitea and Kahuterawa records are short and these have been extended using correlations with the combined Tokomaru record. The Mangaone rating curves required significant review and amendment.
- Hautapu Taihape All. This dataset is a combination of Hautapu at Taihape (32726), now closed, and Hautapu at Alabasters (32767), slightly upstream of the Taihape site. Adjustments to the high flows have been done to create the merged flow series.
- Mangawhero at Ohakune All. The record is combination of a Rangitikei Wanganui Catchment Board site at the western end of Burns Street, Ohakune (33118) and the current site at Hagleys (33143) several hundred metres upstream near the southern edge of the sewage ponds.

### **3. Acknowledgements**

Data for this report were provided from the archives of Horizons Regional Council and the water Resources Archive (NIWA). Many of the sites from the NIWA archive were funded by Genesis Energy and its predecessors, as was analysis of flows below the TPD scheme, and simulation of natural flows and current consent conditions. We thank Genesis for their permission to use the data and analyses.

This project was funded largely by the Foundation for Research Science and Technology under the Envirolink programme.

### **4. Flow summaries**

For each time series supplied by Horizons, and for a number of synthetic flow series, flow statistics are presented in a variety of ways. Flow summaries are sorted in the following order:

- by major catchment<sup>5</sup>,
- alphabetically by flow site name,
- data type – recorded data, simulated natural flows, or simulated flows for the present consent conditions;
- date range – different periods downstream of the TPD diversions during which operational constraints or consent conditions have been consistent.

A flow summary table gives the statistics considered of prime importance, for both the complete record (truncated to the nearest water year boundary, and for the ‘dry season’ as defined above. For each flow site, and for each time period where there are significant changes to the flow regime as described in section 2.5, there is a two page spread. The first page identifies the site and time period, and presents flow magnitude and flow variability statistics as follows:

- Flow Statistics:
  - Mean, the long term average of the flow record;
  - MALF, the mean annual low flow from one day moving average flows;
  - $\frac{1}{2}$  median (all year and dry season), half the median flow for the season;
  - 3x median (all year and dry season), three times the median flow used as an index of ecological disturbance;
  - MAF;
- Flow Variability: for all year and summer only, a selection of flow values at specified percentiles on the flow duration curve:

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<sup>5</sup> “Catchments of New Zealand”, Soil Conservation and Rivers Control Council, December 1956.

- 0 (maximum recorded), 10, 20, 25 (upper quartile), 30, 40, 50 (median), 60, 70, 75 (lower quartile), 80, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 and 100 (minimum recorded);
- Biological disturbance indicators:
  - MAF/MALF ratio;
  - MAF/median ratio;
  - FRE3 (all year and dry season), the number of floods per year or season greater than three times the relevant median flow;
  - STD Annual FRE3, the standard deviation of the annual series of FRE3 values;
  - Mean days of accrual, the average of the periods between the floods that exceed 3x median flow;
  - STD Accrual, the standard deviation of the number of days between the floods that exceed 3x median flow;
  - MIN Accrual, the shortest interflood period;
  - MAX Accrual, the longest interflood period.

Then a graph shows the seasonal flow regime using the maximum and minimum, upper and lower quartiles and mean and median of the monthly mean flows.

Where statistics could not be calculated because of data continuity or quality issues, a symbol 'NaN' meaning 'not a number' is used to indicate this. Subsequent statistics that use the invalid value are also indicated with a 'NaN'.

In an Appendix, more complete tables are presented. These show the complete FDC for both the full record and 'dry season', the series of annual maxima used to define the mean annual flood, the series of annual minima used to define the MALF, and a table showing the number of days per month that the river flow has historically been below the MALF. At present the MALF is used as threshold for all records. Alternative statistics such as the catchment minimum flow under a water plan could readily be substituted.

Location maps have been provided by Horizons to show the locations of flow recorders. These are presented below as Figures 6 to 10 which are presented prior to the flow statistics for each of the major catchments.

#### **4.1. East Coast Catchments**

The list below shows: section number in this report, site name, (site number) and full date range. The analysis date range is from the first July after the start date until the last June before the finish date.

3.1.1. Akitio at Weber (25003), Jul-1980 to Jul-2000 (all data)

3.1.2. Owahanga at Branscombe Br (1425101), Jul-1999 to Jul-2005 (all data)



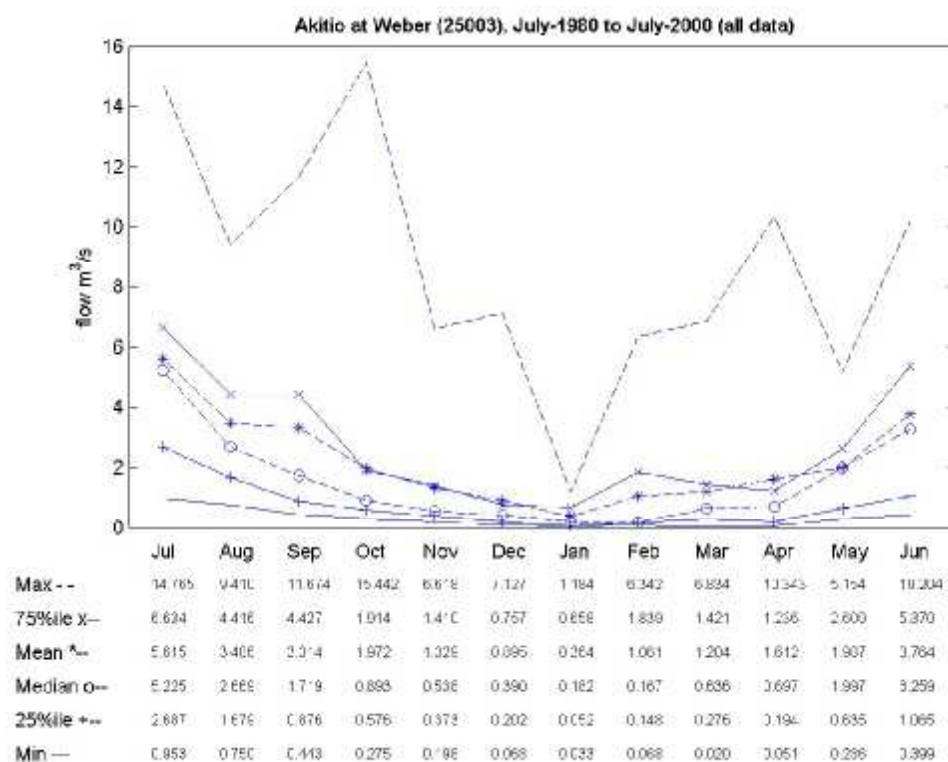


#### 4.1.1. Akitio at Weber (25003), Jul-1980 to Jul-2000 (all data)

Site		Akitio at Weber	
Time series details	Data Start Time	2-Nov-79	
	Data End Time	1-May-01	
	Analysis Start time	1-Jul-80	
	Analysis End time	1-Jul-00	
	Years of record analysed	20	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m³/s)	Flow (m³/s)
	Mean	2.223	
	MALF	0.047	
	½ median	0.313	0.13
	3x median	1.878	0.78
	MAF	194.75	
Flow variability percentiles	0 (maximum recorded flow)	445.248	445.248
	10	4.054	1.579
	20	2.113	0.839
	25 (upper quartile flow)	1.666	0.668
	30	1.358	0.555
	40	0.919	0.393
	50 (median flow)	0.626	0.26
	60	0.435	0.172
	70	0.286	0.112
	75 (lower quartile flow)	0.217	0.089
	80	0.154	0.069
	90	0.068	0.04
	91	0.061	0.038
	92	0.056	0.036
	93	0.051	0.033
	94	0.046	0.03
	95	0.041	0.027
	96	0.036	0.024
	97	0.03	0.021
	98	0.021	0.018
	99	0.011	0.011
	100 (minimum recorded flow)	0.002	0.002

Season		1 July to 30 June	1 Nov to 30 April
Biological	MAF/MALF	4143.617	
disturbance	MAF/median	311.102	
indicators	FRE3 (floods/year or season)	9.7	10.576
	STD Annual FRE3	2.975	4.12
	Mean Days of Accrual (days)	27.689	24.297
	STD Accrual (days)	33.92	29.876
	Min Accrual (days)	5	5
	Max Accrual (days)	235	170

### Seasonal Distribution of Mean Monthly Flows

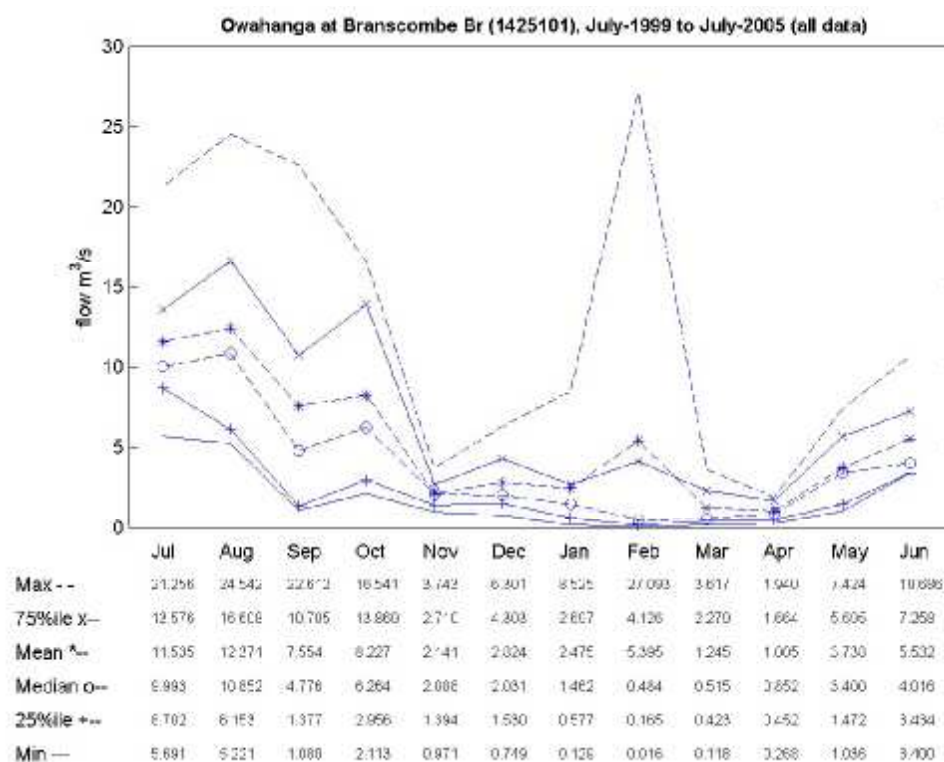


#### 4.1.2. Owahanga at Branscombe Br (1425101), Jul-1999 to Jul-2005 (all data)

Site		Owahanga at Branscombe Br	
Time series details	Data Start Time	22-Jun-99	
	Data End Time	18-Nov-05	
	Analysis Start time	1-Jul-99	
	Analysis End time	1-Jul-05	
	Years of record analysed	6	
	Gaps in the data (% of record).	1.85	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	5.5	
	MALF	0.039	
	½ median	0.746	0.28
	3x median	4.476	1.677
	MAF	300.29	
Flow variability percentiles	0 (maximum recorded flow)	664.541	664.541
	10	9.954	3.728
	20	5.156	1.861
	25 (upper quartile flow)	4.098	1.458
	30	3.291	1.184
	40	2.212	0.827
	50 (median flow)	1.492	0.559
	60	0.964	0.387
	70	0.583	0.245
	75 (lower quartile flow)	0.443	0.185
	80	0.31	0.127
	90	0.125	0.055
	91	0.11	0.05
	92	0.095	0.046
	93	0.08	0.042
	94	0.065	0.038
	95	0.054	0.034
	96	0.043	0.03
	97	0.032	0.025
	98	0.022	0.016
	99	0.011	0.008
	100 (minimum recorded flow)	0	0

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	6673.111	
	MAF/median	201.267	
	FRE3 (floods/year or season)	11.165	11.073
	STD Annual FRE3	1.176	3.03
	Mean Days of Accrual (days)	22.594	21.568
	STD Accrual (days)	25.227	19.204
	Min Accrual (days)	5	5
	Max Accrual (days)	154	76

### Seasonal Distribution of Mean Monthly Flows



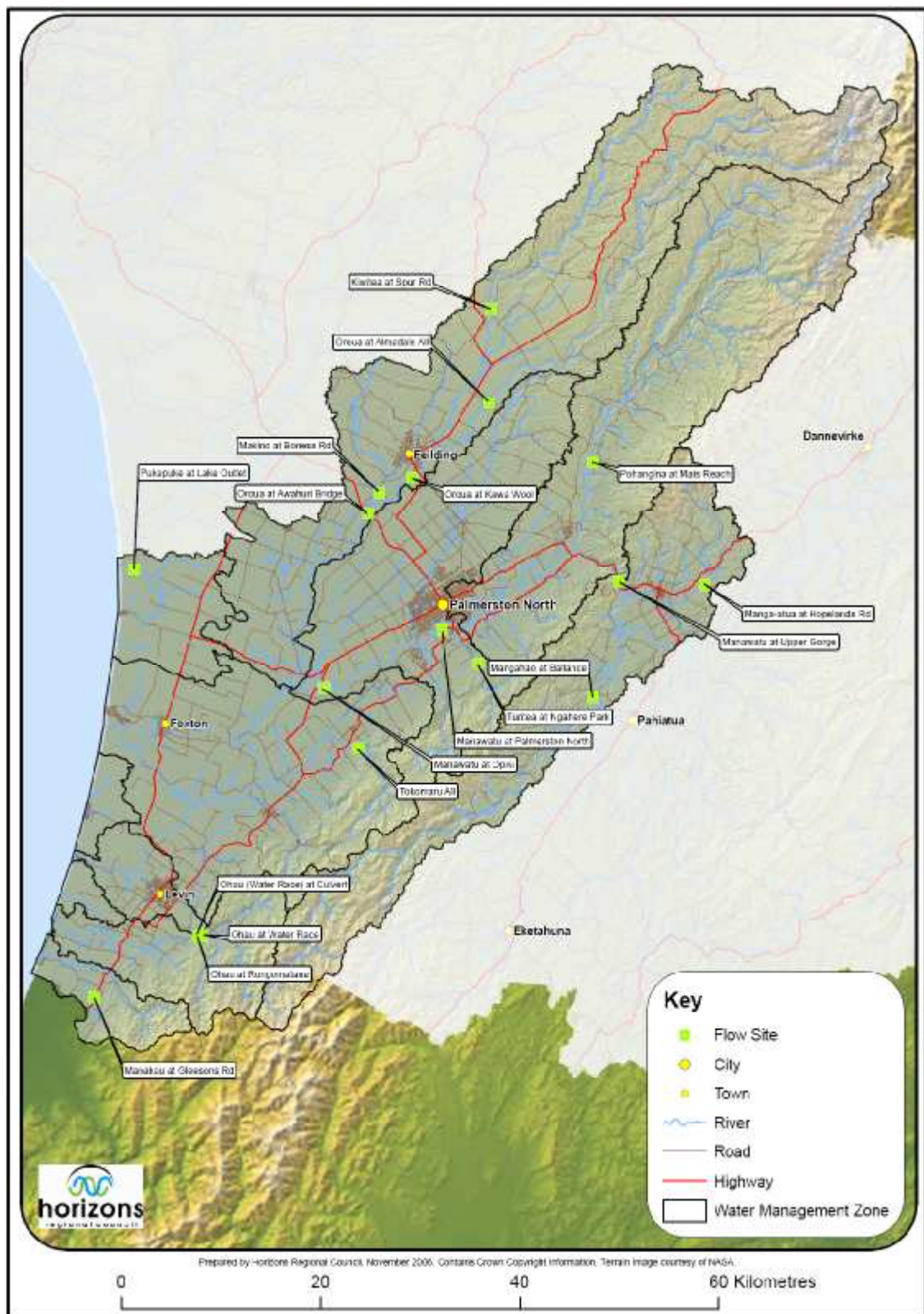
## 4.2. Manawatu and Southern West Coast Catchments

The list below shows: section number in this report, site name, (site number) and full date range. The analysis date range is from the first July after the start date until the last June before the finish date.

- 3.2.1. Manakau at Gleasons Rd (32001), Jul-1979 to Jul-1989 (all data)
- 3.2.2. Ohau (Water Race) at d/s Culvert (32107), Jul-1991 to Jul-1994 (all data)
- 3.2.3. Ohau at Rongomatane (32106), Jul-1978 to Jul-2004 (all data)
- 3.2.4. Ohau at Water Race (32105), Jul-1974 to Jul-1978 (all data)
- 3.2.5. Kiwitea at Spur Rd All (200), Jul-1977 to Jul-2005 (all data)
- 3.2.6. Kumeti at SH2(Napier) (32599), Jul-1975 to Jul-1980 (all data)
- 3.2.7. Kumeti at Te Rehunga (1032501), Jul-1981 to Jul-2004 (all data)
- 3.2.8. Makakahi at Hamua (1032518), Jul-1980 to Jul-2005 (all data)
- 3.2.9. Makino at Boness Rd (1032564), Jul-1992 to Jul-2006 (all data)
- 3.2.10. Makuri at Tuscan Hills (1032591), Jul-2001 to Jul-2006 (all data)
- 3.2.11. Manawatu at Hopelands (32504), Jul-1948 to Jul-2005 (all data)
- 3.2.12. Manawatu at Opiki (synthetic) (1932501), Jul-1980 to Jul-2006 (all data)
- 3.2.13. Manawatu at Palmerston North All (300), Jul-2023 to Jul-2005 (all data)
- 3.2.14. Manawatu at Upper Gorge (1232566), Jul-1979 to Jul-2003 (all data)
- 3.2.15. Manawatu at Weber Rd (32503), Jul-1955 to Jul-2004 (all data)
- 3.2.16. Manga-Atua at Hopelands Rd (1232564), Jul-1980 to Jul-1989 (all data)
- 3.2.17. Mangahao at Ballance (32526), Jul-1962 to Jul-2004 (all data)
- 3.2.18. Mangatainoka at Larsons Br (1032555), Jul-1983 to Jul-2006 (all data)
- 3.2.19. Mangatainoka at Pahiatua All (400), Jul-1954 to Jul-2005 (all data)
- 3.2.20. Mangatera at Dannevirke 1 (synthetic) (32541), Jul-1955 to Jul-2004 (all data)
- 3.2.21. Mangatera at Dannevirke 2 (synthetic) (500), Jul-1955 to Jul-2004 (all data)
- 3.2.22. Oroua at Almadale All (800), Jul-1948 to Jul-2004 (all data)
- 3.2.23. Oroua at Awahuri Br (1932512), Jul-1992 to Jul-2004 (all data)

- 3.2.24. Oroua at Kawa Wool (synthetic) (700), Jul-1967 to Jul-2004 (all data)
- 3.2.25. Pohangina at Mais Reach (32576), Jul-1969 to Jul-2005 (all data)
- 3.2.26. Tamaki at SH2(Napier) (1032503), Jul-1977 to Jul-1983 (all data)
- 3.2.27. Tamaki at Stephensons (1332556), Dec-2003 to Apr-2005 (all data)
- 3.2.28. Tamaki at Water Supply Weir (1032504), Jul-1983 to Jul-2004 (all data)
- 3.2.29. Tiraumea at Ngaturi (32529), Jul-1980 to Jul-2004 (all data)
- 3.2.30. Tokomaru All (900), Jul-1980 to Jul-2005 (all data)
- 3.2.31. Turitea at Ngahere Park Rd (1132501), Jul-2001 to Jul-2006 (all data)
- 3.2.32. Puke Puke at Lake Outlet (32602), Jul-1971 to Jul-1980 (all data)





**Figure 7:** Flow sites in the lower Manawatu and southern West Coast catchments.



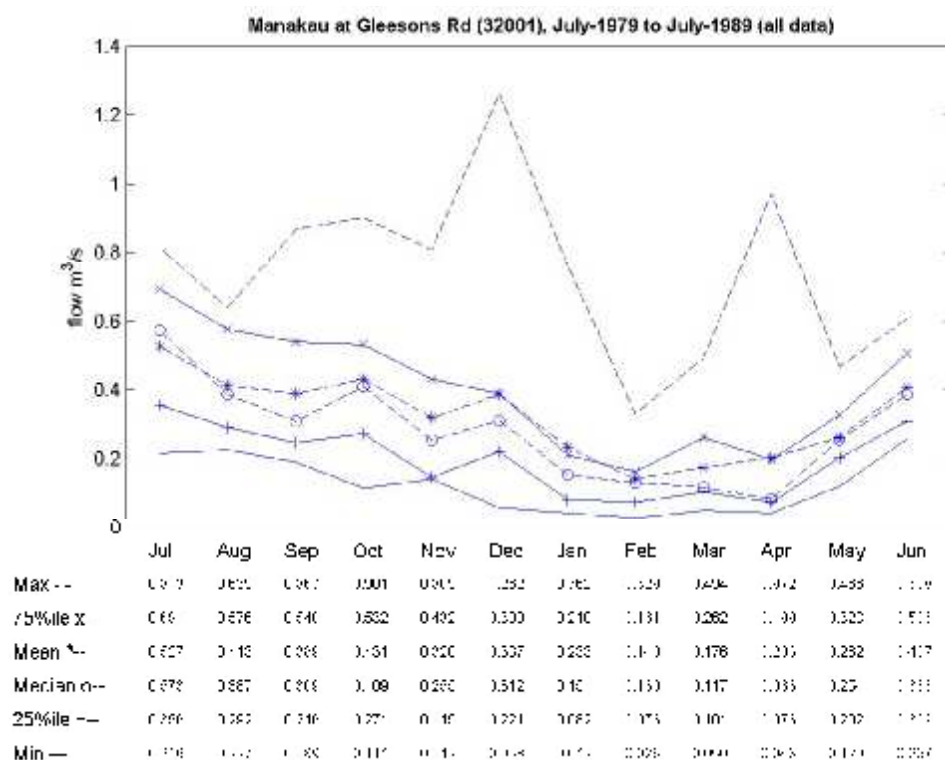


#### 4.2.1. Manakau at Gleesons Rd (32001), Jul-1979 to Jul-1989 (all data)

Site		Manakau at Gleesons Rd	
Time series details	Data Start Time	23-Nov-78	
	Data End Time	21-Mar-90	
	Analysis Start time	1-Jul-79	
	Analysis End time	1-Jul-89	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.325	
	MALF	0.036	
	½ median	0.086	0.054
	3x median	0.513	0.321
	MAF	19.061	
Flow variability percentiles	0 (maximum recorded flow)	32.711	32.711
	10	0.654	0.443
	20	0.385	0.243
	25 (upper quartile flow)	0.321	0.202
	30	0.274	0.173
	40	0.214	0.139
	50 (median flow)	0.171	0.107
	60	0.141	0.084
	70	0.106	0.067
	75 (lower quartile flow)	0.089	0.059
	80	0.076	0.052
	90	0.05	0.038
	91	0.047	0.036
	92	0.044	0.035
	93	0.042	0.033
	94	0.04	0.031
	95	0.037	0.029
	96	0.034	0.028
	97	0.031	0.026
	98	0.027	0.022
	99	0.022	0.017
	100 (minimum recorded flow)	0.010	0.010

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	529.472	
	MAF/median	111.468	
	FRE3 (floods/year or season)	13.298	12.49
	STD Annual FRE3	2.404	4.221
	Mean Days of Accrual (days)	22.278	21.731
	STD Accrual (days)	23.784	23.725
	Min Accrual (days)	5	5
	Max Accrual (days)	137	126

### Seasonal Distribution of Mean Monthly Flows

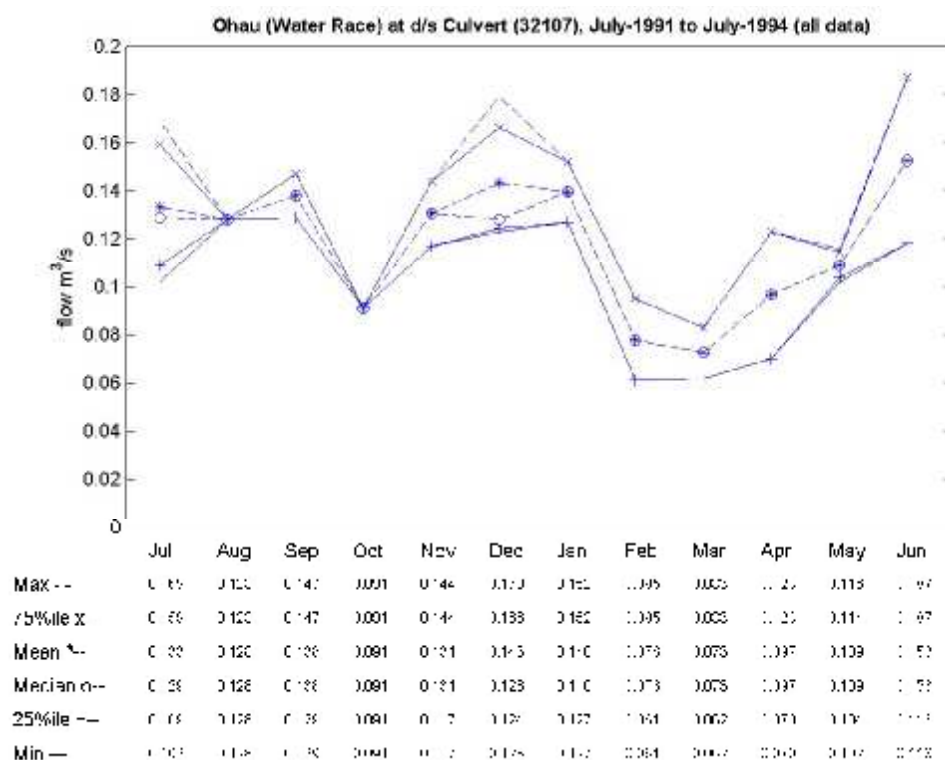


#### 4.2.2. Ohau (Water Race) at d/s Culvert (32107), Jul-1991 to Jul-1994 (all data)

Site		Ohau (Water Race) at d/s Culvert	
Time series details	Data Start Time	6-Mar-91	
	Data End Time	6-Oct-94	
	Analysis Start time	1-Jul-91	
	Analysis End time	1-Jul-94	
	Years of record analysed	3	
	Gaps in the data (% of record).	7.86	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.125	
	MALF	0.039	
	½ median	0.059	0.054
	3x median	0.354	0.324
	MAF		
Flow variability percentiles	0 (maximum recorded flow)	0.442	0.424
	10	0.189	0.181
	20	0.162	0.154
	25 (upper quartile flow)	0.152	0.145
	30	0.146	0.137
	40	0.133	0.12
	50 (median flow)	0.118	0.108
	60	0.106	0.097
	70	0.095	0.085
	75 (lower quartile flow)	0.09	0.08
	80	0.084	0.073
	90	0.068	0.06
	91	0.066	0.058
	92	0.064	0.057
	93	0.062	0.056
	94	0.06	0.056
	95	0.058	0.055
	96	0.056	0.053
	97	0.054	0.052
	98	0.052	0.05
	99	0.049	0.046
	100 (minimum recorded flow)	0.017	0.017

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	NaN	NaN
	MAF/median	NaN	NaN
	FRE3 (floods/year or season)	NaN	NaN
	STD Annual FRE3	NaN	NaN
	Mean Days of Accrual (days)	NaN	NaN
	STD Accrual (days)	NaN	NaN
	Min Accrual (days)	NaN	NaN
	Max Accrual (days)	NaN	NaN

### Seasonal Distribution of Mean Monthly Flows

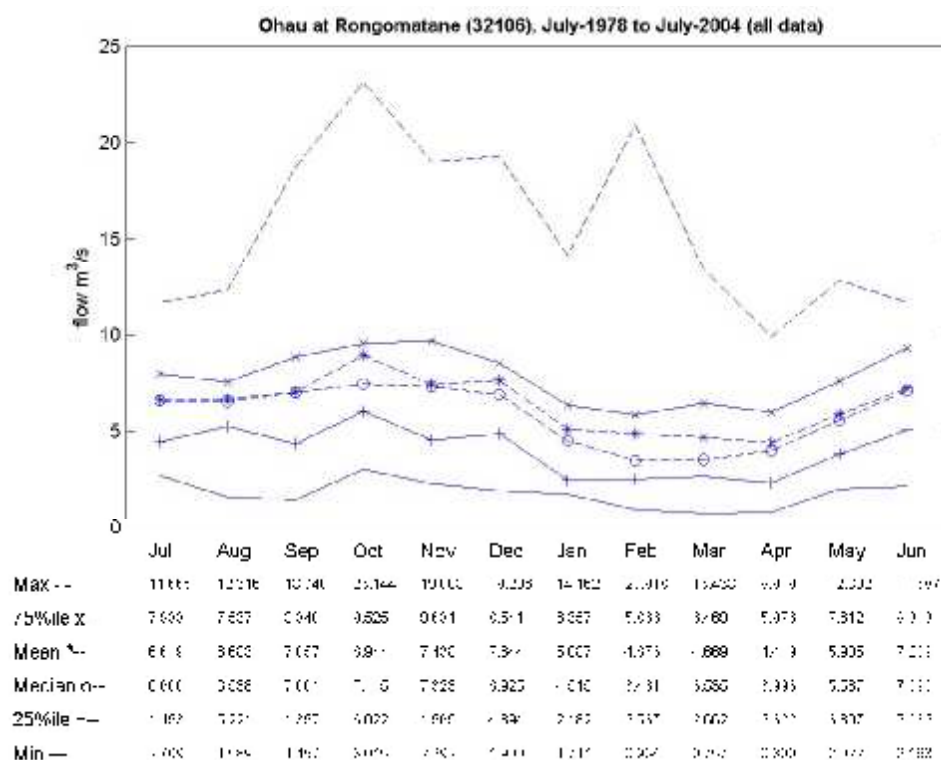


#### 4.2.3. Ohau at Rongomatane (32106), Jul-1978 to Jul-2004 (all data)

Site		Ohau at Rongomatane	
Time series details	Data Start Time	14-Jul-78	
	Data End Time	11-Apr-05	
	Analysis Start time	14-Jul-78	
	Analysis End time	1-Jul-04	
	Years of record analysed	26	
	Gaps in the data (% of record).	0.19	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	6.399	
	MALF	1.042	
	½ median	1.91	1.535
	3x median	11.457	9.207
	MAF	222.75	
Flow variability percentiles	0 (maximum recorded flow)	492.722	410.542
	10	12.176	10.595
	20	7.785	6.492
	25 (upper quartile flow)	6.675	5.517
	30	5.862	4.775
	40	4.66	3.78
	50 (median flow)	3.819	3.069
	60	3.149	2.549
	70	2.588	2.116
	75 (lower quartile flow)	2.327	1.901
	80	2.068	1.696
	90	1.517	1.274
	91	1.457	1.232
	92	1.396	1.19
	93	1.33	1.14
	94	1.258	1.081
	95	1.189	1.027
	96	1.111	0.978
	97	1.025	0.912
	98	0.928	0.815
	99	0.787	0.665
	100 (minimum recorded flow)	0.584	0.584

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	210.738	
	MAF/median	58.327	
	FRE3 (floods/year or season)	14.845	14.955
	STD Annual FRE3	2.086	3.947
	Mean Days of Accrual (days)	20.187	18.846
	STD Accrual (days)	18.261	17.392
	Min Accrual (days)	5	5
	Max Accrual (days)	145	125

### Seasonal Distribution of Mean Monthly Flows



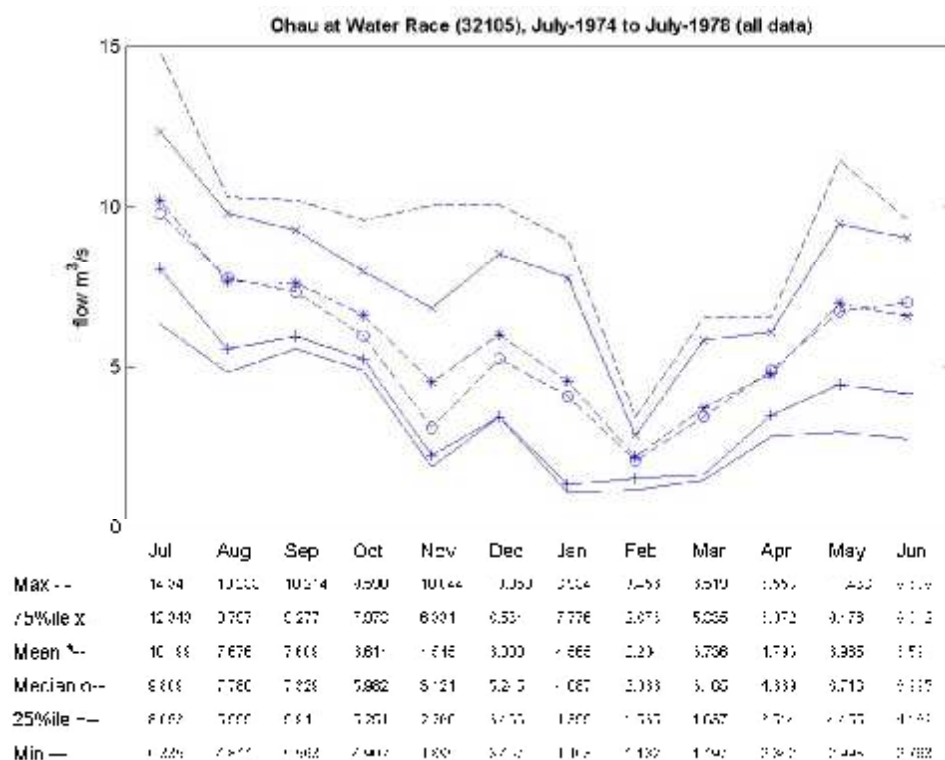
#### 4.2.4. Ohau at Water Race (32105), Jul-1974 to Jul-1978 (all data)

Site		Ohau at Water Race	
Time series details	Data Start Time	18-Jan-74	
	Data End Time	15-Jul-78	
	Analysis Start time	1-Jul-74	
	Analysis End time	1-Jul-78	
	Years of record analysed	4	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	5.988	
	MALF	0.802	
	½ median	1.715	1.116
	3x median	10.287	6.696
	MAF	207.84	
Flow variability percentiles	0 (maximum recorded flow)	333.913	333.913
	10	12.027	7.78
	20	7.287	4.539
	25 (upper quartile flow)	6.067	3.918
	30	5.332	3.513
	40	4.214	2.851
	50 (median flow)	3.429	2.232
	60	2.872	1.783
	70	2.261	1.5
	75 (lower quartile flow)	1.927	1.346
	80	1.692	1.225
	90	1.232	0.898
	91	1.189	0.868
	92	1.12	0.844
	93	1.059	0.814
	94	0.982	0.787
	95	0.901	0.727
	96	0.846	0.678
	97	0.784	0.631
	98	0.666	0.588
	99	0.59	0.554
	100 (minimum recorded flow)	0.504	0.504



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	259.152	
	MAF/median	60.612	
	FRE3 (floods/year or season)	14.498	14.605
	STD Annual FRE3	3.093	2.988
	Mean Days of Accrual (days)	20.877	19.621
	STD Accrual (days)	21.222	15.511
	Min Accrual (days)	5	5
	Max Accrual (days)	120	69

### Seasonal Distribution of Mean Monthly Flows

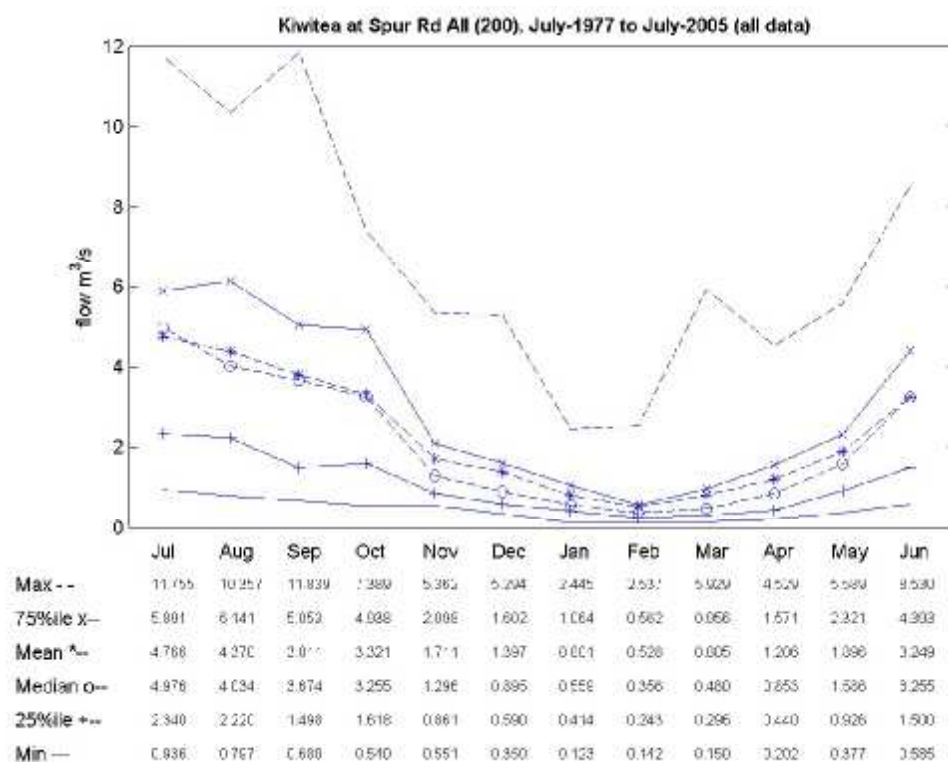


#### 4.2.5. Kiwitea at Spur Rd All (200), Jul-1977 to Jul-2005 (all data)

Site		Kiwitea at Spur Rd All	
Time series details	Data Start Time	5-Nov-76	
	Data End Time	2-Feb-06	
	Analysis Start time	1-Jul-77	
	Analysis End time	1-Jul-05	
	Years of record analysed	28	
	Gaps in the data (% of record).	0.24	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	2.356	
	MALF	0.161	
	½ median	0.52	0.243
	3x median	3.12	1.455
	MAF	75.15	
Flow variability percentiles	0 (maximum recorded flow)	357.744	357.744
	10	5.41	2.13
	20	3.245	1.248
	25 (upper quartile flow)	2.643	1.043
	30	2.133	0.871
	40	1.454	0.63
	50 (median flow)	1.04	0.485
	60	0.739	0.378
	70	0.527	0.298
	75 (lower quartile flow)	0.44	0.262
	80	0.361	0.23
	90	0.229	0.17
	91	0.217	0.164
	92	0.205	0.158
	93	0.193	0.151
	94	0.181	0.144
	95	0.169	0.137
	96	0.157	0.129
	97	0.143	0.12
	98	0.128	0.108
	99	0.105	0.09
	100 (minimum recorded flow)	0.038	0.038

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	478.662	
	MAF/median	72.26	
	FRE3 (floods/year or season)	8.678	9.714
	STD Annual FRE3	2.506	3.547
	Mean Days of Accrual (days)	31.851	26.494
	STD Accrual (days)	38.192	25.607
	Min Accrual (days)	5	5
	Max Accrual (days)	229	123

### Seasonal Distribution of Mean Monthly Flows

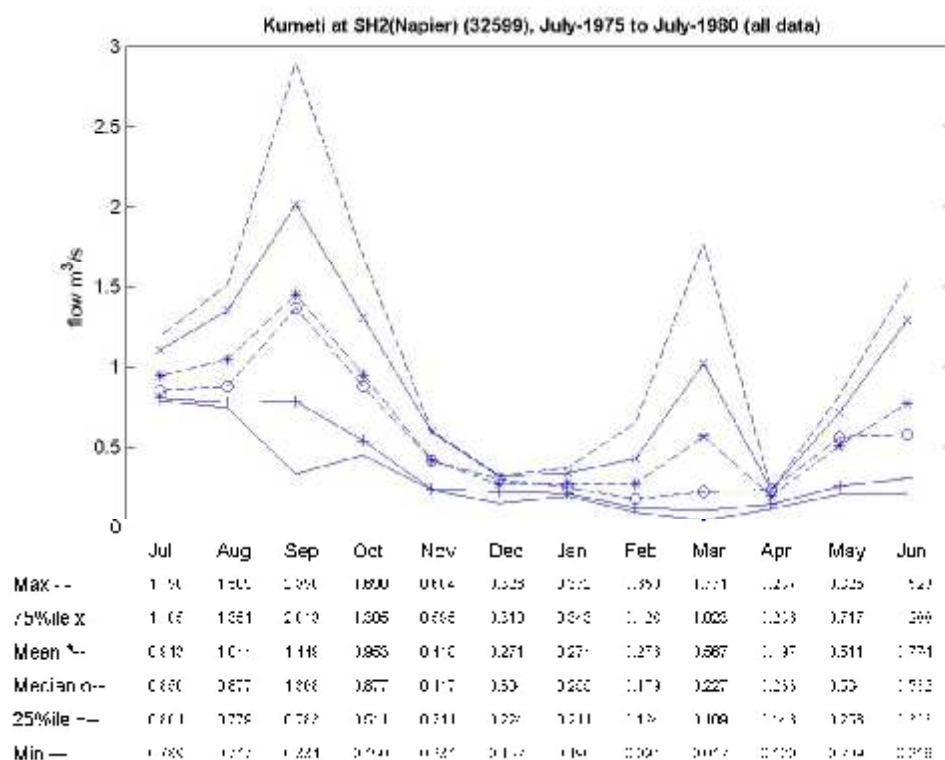


#### 4.2.6. Kumeti at SH2(Napier) (32599), Jul-1975 to Jul-1980 (all data)

Site		Kumeti at SH2(Napier)	
Time series details	Data Start Time	26-Jun-75	
	Data End Time	21-Aug-80	
	Analysis Start time	1-Jul-75	
	Analysis End time	1-Jul-80	
	Years of record analysed	5	
	Gaps in the data (% of record).	4.33	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.719	
	MALF	0.042	
	½ median	0.185	0.114
	3x median	1.11	0.681
	MAF		
Flow variability percentiles	0 (maximum recorded flow)	47.281	45.456
	10	1.27	0.668
	20	0.857	0.443
	25 (upper quartile flow)	0.752	0.382
	30	0.66	0.339
	40	0.493	0.272
	50 (median flow)	0.37	0.227
	60	0.294	0.186
	70	0.234	0.149
	75 (lower quartile flow)	0.206	0.13
	80	0.178	0.111
	90	0.112	0.064
	91	0.104	0.058
	92	0.094	0.053
	93	0.085	0.049
	94	0.076	0.045
	95	0.065	0.041
	96	0.054	0.037
	97	0.045	0.033
	98	0.037	0.029
	99	0.029	0.023
	100 (minimum recorded flow)	0.012	0.012

Season		1 July to 30 June	1 Nov to 30 April
Biological	MAF/MALF	0	
disturbance	MAF/median	0	
indicators	FRE3 (floods/year or season)	11.243	5.524
	STD Annual FRE3	1.902	4.447
	Mean Days of Accrual (days)	33.629	47.769
	STD Accrual (days)	42.988	48.415
	Min Accrual (days)	5	5
	Max Accrual (days)	187	170

### Seasonal Distribution of Mean Monthly Flows

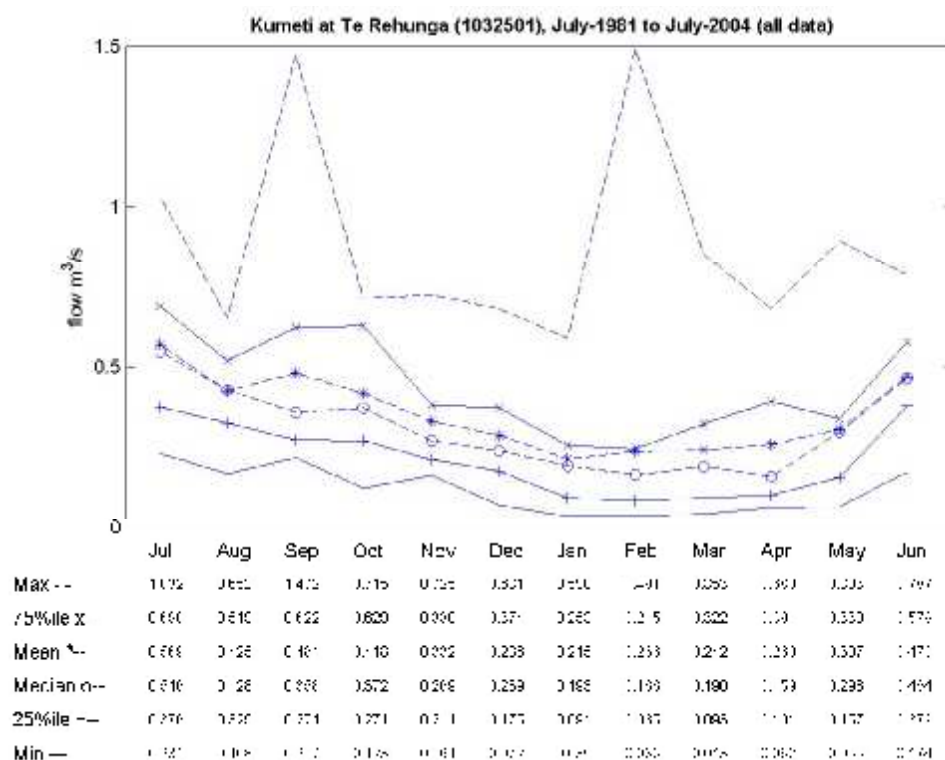


#### 4.2.7. Kumeti at Te Rehunga (1032501), Jul-1981 to Jul-2004 (all data)

Site		Kumeti at Te Rehunga	
Time series details	Data Start Time	20-Aug-80	
	Data End Time	21-Apr-05	
	Analysis Start time	1-Jul-81	
	Analysis End time	1-Jul-04	
	Years of record analysed	23	
	Gaps in the data (% of record).	0.34	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.354	
	MALF	0.061	
	½ median	0.138	0.097
	3x median	0.828	0.579
	MAF	8.283	
Flow variability percentiles	0 (maximum recorded flow)	22.177	22.177
	10	0.595	0.421
	20	0.441	0.328
	25 (upper quartile flow)	0.404	0.301
	30	0.368	0.273
	40	0.319	0.227
	50 (median flow)	0.276	0.193
	60	0.23	0.156
	70	0.186	0.122
	75 (lower quartile flow)	0.159	0.109
	80	0.133	0.095
	90	0.088	0.064
	91	0.084	0.06
	92	0.079	0.056
	93	0.073	0.052
	94	0.067	0.048
	95	0.061	0.043
	96	0.054	0.04
	97	0.046	0.037
	98	0.039	0.033
	99	0.032	0.029
	100 (minimum recorded flow)	0.012	0.012

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	135.787	
	MAF/median	30.011	
	FRE3 (floods/year or season)	5.391	3.854
	STD Annual FRE3	2.676	2.971
	Mean Days of Accrual (days)	58.098	48.4
	STD Accrual (days)	66.212	45.065
	Min Accrual (days)	5	5
	Max Accrual (days)	331	180

### Seasonal Distribution of Mean Monthly Flows



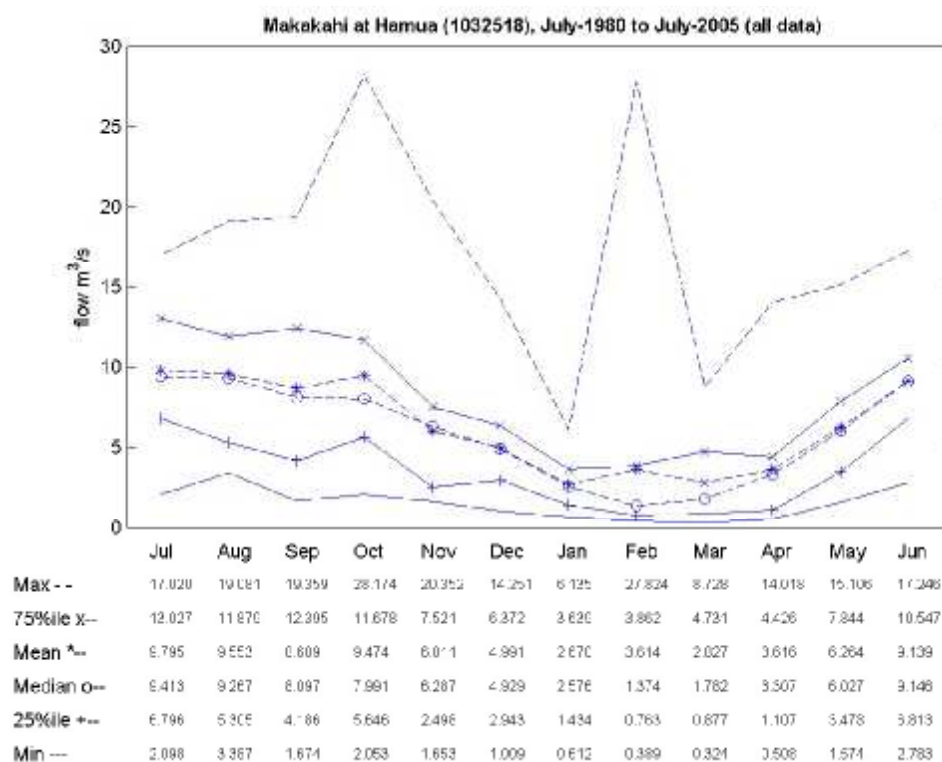
#### 4.2.8. Makakahi at Hamua (1032518), Jul-1980 to Jul-2005 (all data)

Site		Makakahi at Hamua	
Time series details	Data Start Time	19-Dec-79	
	Data End Time	6-Sep-05	
	Analysis Start time	1-Jul-80	
	Analysis End time	1-Jul-05	
	Years of record analysed	25	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	6.406	
	MALF	0.345	
	½ median	1.59	0.827
	3x median	9.54	4.959
	MAF	192.84	
Flow variability percentiles	0 (maximum recorded flow)	483.054	298.839
	10	13.943	8.297
	20	8.293	4.65
	25 (upper quartile flow)	6.86	3.738
	30	5.82	3.096
	40	4.27	2.217
	50 (median flow)	3.18	1.653
	60	2.324	1.238
	70	1.659	0.939
	75 (lower quartile flow)	1.367	0.801
	80	1.113	0.664
	90	0.637	0.4
	91	0.587	0.376
	92	0.54	0.352
	93	0.488	0.33
	94	0.437	0.309
	95	0.389	0.289
	96	0.345	0.266
	97	0.306	0.236
	98	0.264	0.195
	99	0.195	0.16
	100 (minimum recorded flow)	0.091	0.091



Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	558.957	
	MAF/median	60.642	
	FRE3 (floods/year or season)	13.24	12.011
	STD Annual FRE3	2.535	5.445
	Mean Days of Accrual (days)	21.227	20.982
	STD Accrual (days)	23.81	22.175
	Min Accrual (days)	5	5
	Max Accrual (days)	162	124

### Seasonal Distribution of Mean Monthly Flows

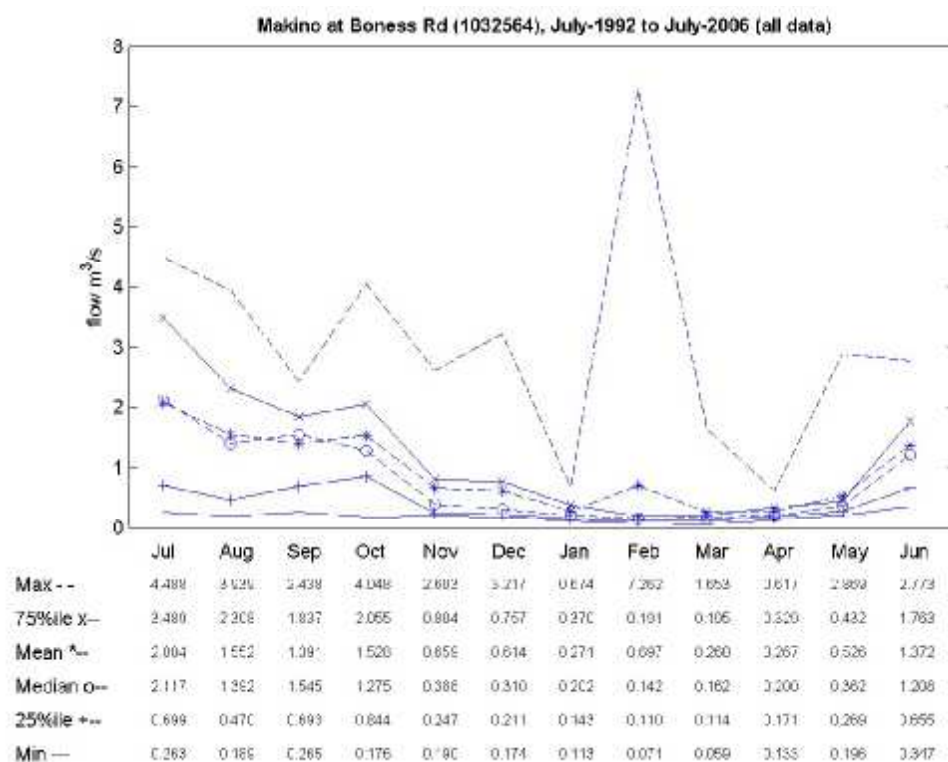


#### 4.2.9. Makino at Boness Rd (1032564), Jul-1992 to Jul-2006 (all data)

Site		Makino at Boness Rd	
Time series details	Data Start Time	19-Dec-91	
	Data End Time	10-Jul-06	
	Analysis Start time	1-Jul-92	
	Analysis End time	1-Jul-06	
	Years of record analysed	14	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.938	
	MALF	0.083	
	½ median	0.122	0.082
	3x median	0.732	0.489
	MAF	38.928	
Flow variability percentiles	0 (maximum recorded flow)	90.788	90.788
	10	2.002	0.594
	20	0.911	0.307
	25 (upper quartile flow)	0.69	0.258
	30	0.534	0.227
	40	0.333	0.191
	50 (median flow)	0.244	0.163
	60	0.197	0.142
	70	0.166	0.123
	75 (lower quartile flow)	0.151	0.114
	80	0.136	0.105
	90	0.104	0.085
	91	0.1	0.083
	92	0.096	0.081
	93	0.093	0.079
	94	0.089	0.077
	95	0.086	0.075
	96	0.082	0.072
	97	0.078	0.069
	98	0.073	0.062
	99	0.061	0.048
	100 (minimum recorded flow)	0.028	0.028

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	469.012	
	MAF/median	159.541	
	FRE3 (floods/year or season)	8.5	10.506
	STD Annual FRE3	1.502	4.036
	Mean Days of Accrual (days)	30.857	26.12
	STD Accrual (days)	32.931	25.006
	Min Accrual (days)	5	5
	Max Accrual (days)	164	142

### Seasonal Distribution of Mean Monthly Flows

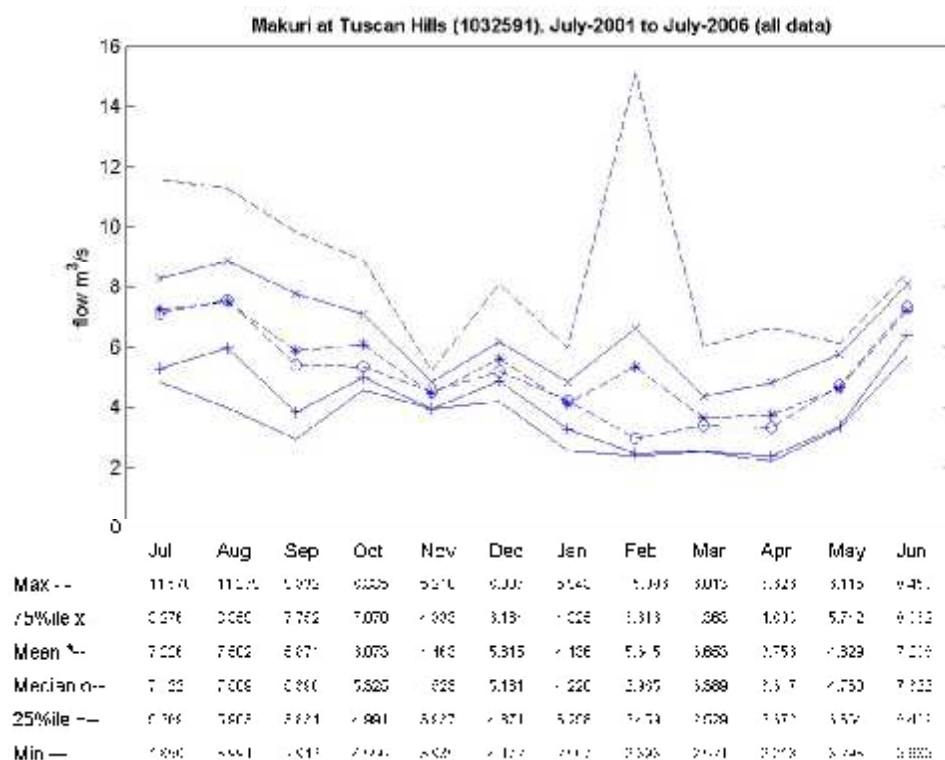


#### 4.2.10. Makuri at Tuscan Hills (1032591), Jul-2001 to Jul-2006 (all data)

Site		Makuri at Tuscan Hills	
Time series details	Data Start Time	7-Oct-00	
	Data End Time	10-Jul-06	
	Analysis Start time	1-Jul-01	
	Analysis End time	1-Jul-06	
	Years of record analysed	5	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	5.464	
	MALF	2.156	
	½ median	1.922	1.6
	3x median	11.529	9.6
	MAF	140.02	
Flow variability percentiles	0 (maximum recorded flow)	278.547	278.547
	10	8.97	6.612
	20	6.146	4.712
	25 (upper quartile flow)	5.48	4.314
	30	5.028	3.983
	40	4.38	3.539
	50 (median flow)	3.843	3.2
	60	3.434	2.928
	70	3.049	2.653
	75 (lower quartile flow)	2.859	2.556
	80	2.665	2.428
	90	2.311	2.207
	91	2.274	2.192
	92	2.241	2.176
	93	2.214	2.159
	94	2.189	2.137
	95	2.158	2.112
	96	2.125	2.088
	97	2.09	2.063
	98	2.054	2.035
	99	2.005	2.003
	100 (minimum recorded flow)	1.908	1.927

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	64.944	
	MAF/median	36.435	
	FRE3 (floods/year or season)	10.801	8.868
	STD Annual FRE3	1.638	2.701
	Mean Days of Accrual (days)	31.038	33.44
	STD Accrual (days)	31.24	30.837
	Min Accrual (days)	6	6
	Max Accrual (days)	169	132

## Seasonal Distribution of Mean Monthly Flows

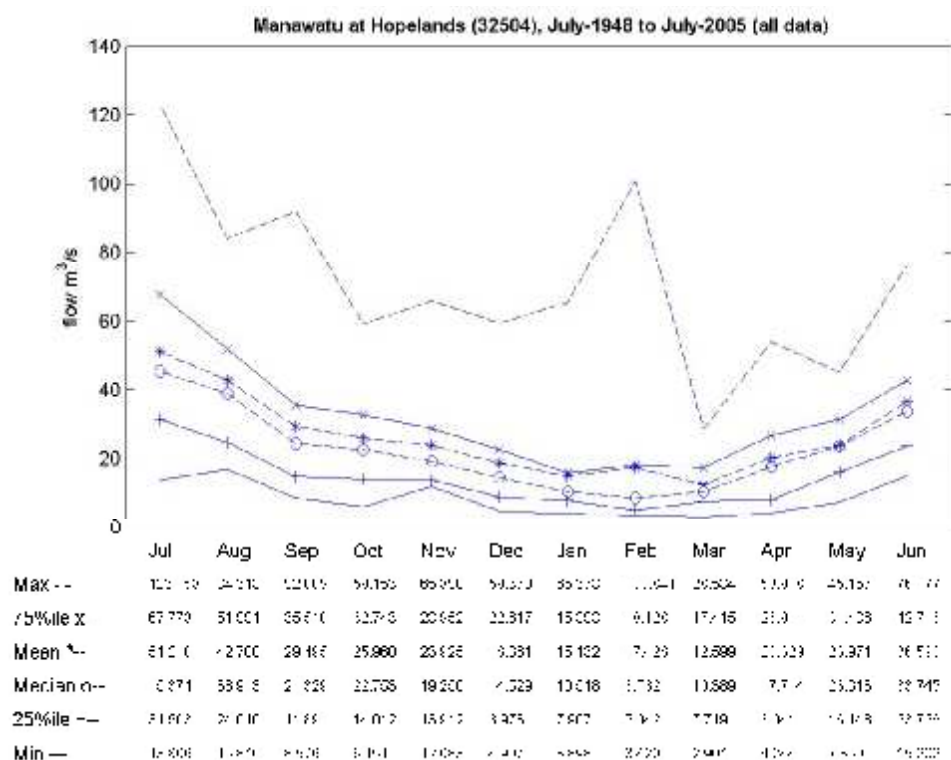


#### 4.2.11. Manawatu at Hopelands (32504), Jul-1948 to Jul-2005 (all data)

Site		Manawatu at Hopelands	
Time series details	Data Start Time	12-Dec-47	
	Data End Time	16-Oct-05	
	Analysis Start time	1-Jul-48	
	Analysis End time	1-Jul-05	
	Years of record analysed	57	
	Gaps in the data (% of record).	58.15	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	26.655	
	MALF (1989 to 2005)	3.734	
	½ median	7.852	5.014
	3x median	47.109	30.084
	MAF	681.28	
Flow variability percentiles	0 (maximum recorded flow)	1669.6	1669.6
	10	53.185	32.7
	20	33.881	20.476
	25 (upper quartile flow)	28.877	17.671
	30	24.592	15.7
	40	19.461	12.711
	50 (median flow)	15.703	10.028
	60	12.809	8.587
	70	9.846	7.135
	75 (lower quartile flow)	8.967	6.234
	80	7.563	5.431
	90	5.278	4.007
	91	5.207	3.818
	92	4.909	3.62
	93	4.583	3.507
	94	4.229	3.456
	95	3.909	3.36
	96	3.531	3.126
	97	3.429	2.822
	98	3.084	2.453
	99	2.389	2.182
	100 (minimum recorded flow)	0.637	0.637

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	182.453	
	MAF/median	43.385	
	FRE3 (floods/year or season)	8.783	8.064
	STD Annual FRE3	2.558	4.98
	Mean Days of Accrual (days)	35.652	34.557
	STD Accrual (days)	41.576	33.615
	Min Accrual (days)	5	5
	Max Accrual (days)	253	184

### Seasonal Distribution of Mean Monthly Flows



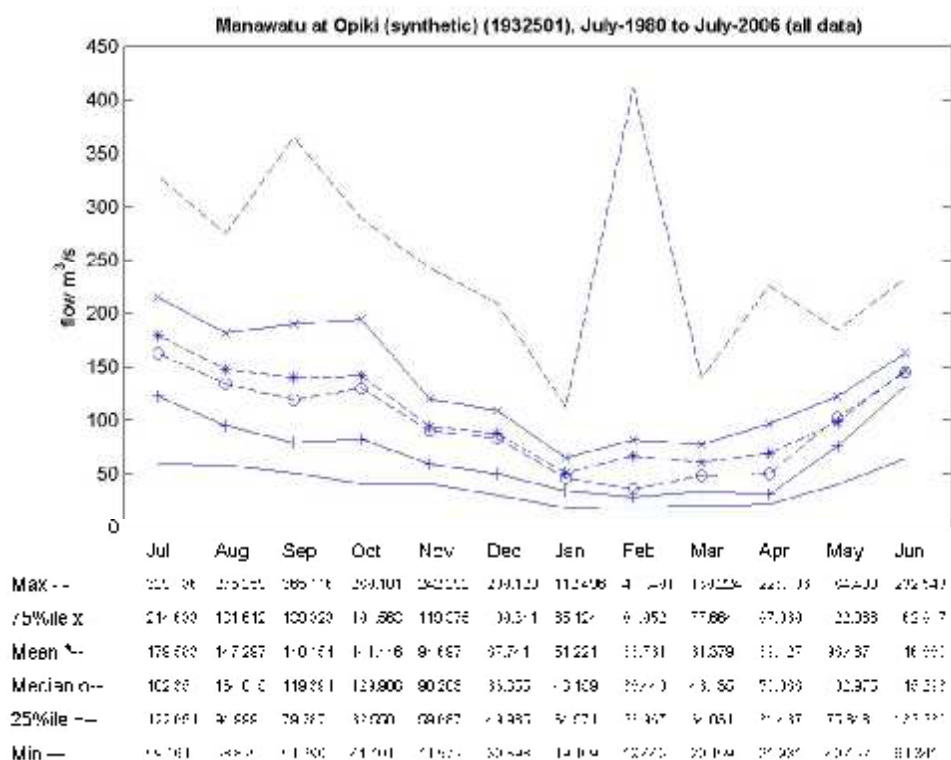
#### 4.2.12. Manawatu at Opiki (synthetic) (1932501), Jul-1980 to Jul-2006 (all data)

Site		Manawatu at Opiki (synthetic)	
Time series details	Data Start Time	13-Dec-79	
	Data End Time	16-Sep-06	
	Analysis Start time	1-Jul-80	
	Analysis End time	1-Jul-06	
	Years of record analysed	26	
	Gaps in the data (% of record).	0.11	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	107.558	
	MALF	15.9	
	½ median	33.569	21.399
	3x median	201.414	128.391
	MAF	1508.4	
Flow variability percentiles	0 (maximum recorded flow)	3656.873	3656.873
	10	223.02	140.584
	20	145.483	88.443
	25 (upper quartile flow)	124.595	75.543
	30	108.774	65.646
	40	85.059	52.364
	50 (median flow)	67.138	42.797
	60	53.628	35.201
	70	42.673	28.855
	75 (lower quartile flow)	37.463	26.394
	80	32.482	23.799
	90	23.152	18.737
	91	22.301	18.264
	92	21.413	17.764
	93	20.466	17.22
	94	19.501	16.663
	95	18.621	16.144
	96	17.658	15.549
	97	16.577	14.868
	98	15.524	14.158
	99	14.182	13.234
	100 (minimum recorded flow)	10.362	10.362



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	95.438	
	MAF/median	22.467	
	FRE3 (floods/year or season)	10.962	10.619
	STD Annual FRE3	2.487	3.762
	Mean Days of Accrual (days)	27.982	25.168
	STD Accrual (days)	33.914	24.369
	Min Accrual (days)	5	5
	Max Accrual (days)	198	143

### Seasonal Distribution of Mean Monthly Flows

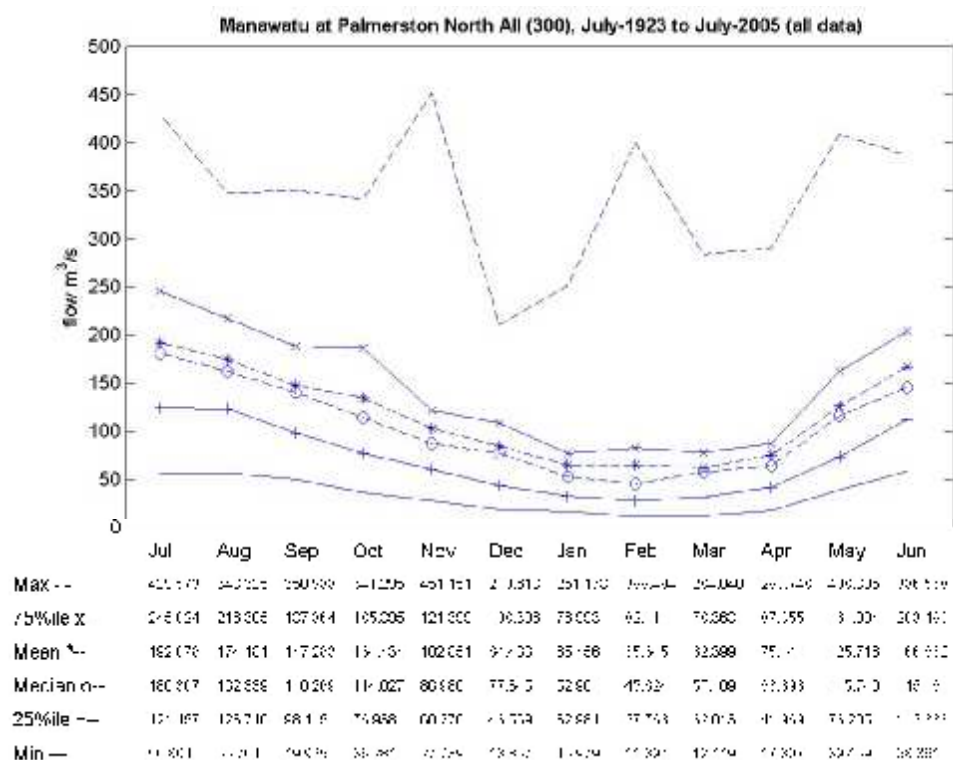


#### 4.2.13. Manawatu at Palmerston North All (300), Jul-1923 to Jul-2005 (all data)

Site		Manawatu at Palmerston North All	
Time series details	Data Start Time	1-Jun-23	
	Data End Time	15-Oct-05	
	Analysis Start time	1-Jul-23	
	Analysis End time	1-Jul-05	
	Years of record analysed	82	
	Gaps in the data (% of record).	0.51	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	116.604	
	MALF	15.735	
	½ median	36.702	21.749
	3x median	220.212	130.491
	MAF	1518.9	
Flow variability percentiles	0 (maximum recorded flow)	3504.7	3504.7
	10	248.017	159.336
	20	164.281	99.343
	25 (upper quartile flow)	140.397	83.042
	30	121.943	71.449
	40	94.266	54.707
	50 (median flow)	73.404	43.497
	60	56.926	35.098
	70	44.051	28.177
	75 (lower quartile flow)	38.156	25.145
	80	32.616	22.358
	90	22.008	17.235
	91	21.028	16.727
	92	20.065	16.194
	93	19.101	15.656
	94	18.145	15.074
	95	17.169	14.476
	96	16.149	13.893
	97	15.067	13.22
	98	13.904	12.36
	99	12.375	11.372
	100 (minimum recorded flow)	8.395	8.395

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	97.798	
	MAF/median	20.692	
	FRE3 (floods/year or season)	10.814	10.102
	STD Annual FRE3	2.406	4.412
	Mean Days of Accrual (days)	28.242	26.959
	STD Accrual (days)	33.159	25.821
	Min Accrual (days)	5	5
	Max Accrual (days)	250	143

### Seasonal Distribution of Mean Monthly Flows

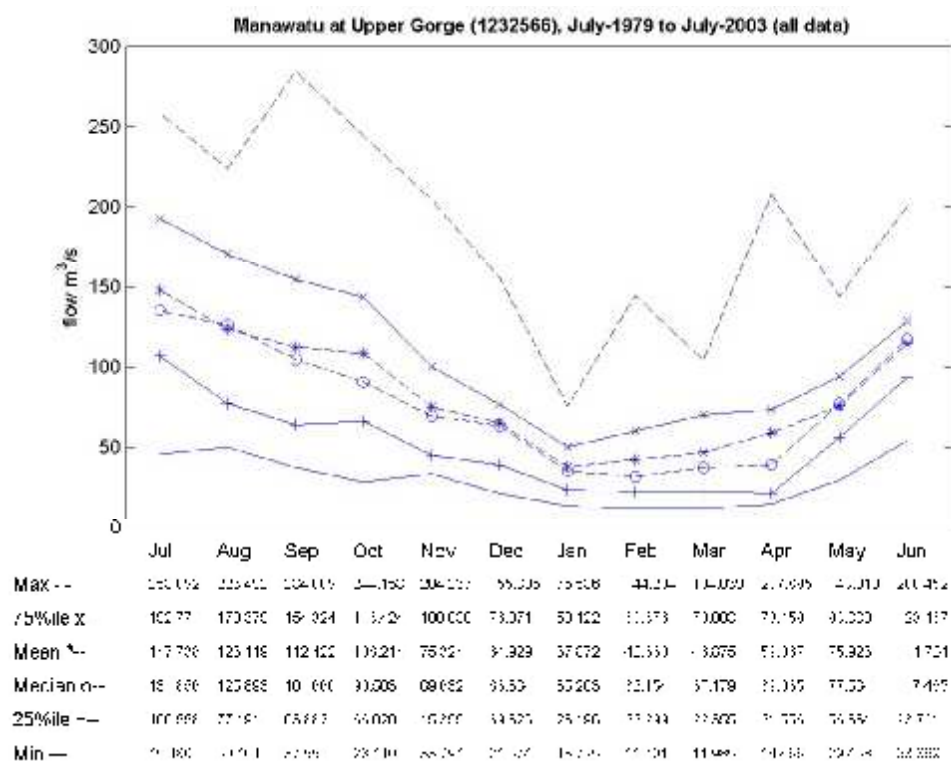


#### 4.2.14. Manawatu at Upper Gorge (1232566), Jul-1979 to Jul-2003 (all data)

Site		Manawatu at Upper Gorge	
Time series details	Data Start Time	16-Jul-79	
	Data End Time	13-Mar-04	
	Analysis Start time	16-Jul-79	
	Analysis End time	1-Jul-03	
	Years of record analysed	24	
	Gaps in the data (% of record).	0.43	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	83.816	
	MALF	11.703	
	½ median	25.185	15.441
	3x median	151.11	92.643
	MAF	1237.2	
Flow variability percentiles	0 (maximum recorded flow)	2469.3	1957
	10	179.818	109.717
	20	115.045	65.515
	25 (upper quartile flow)	97.291	55.437
	30	83.93	48.241
	40	64.565	38.232
	50 (median flow)	50.37	30.881
	60	40.117	25.33
	70	31.368	20.499
	75 (lower quartile flow)	27.36	18.436
	80	23.315	16.448
	90	15.971	12.916
	91	15.271	12.555
	92	14.617	12.171
	93	13.999	11.753
	94	13.397	11.282
	95	12.777	10.867
	96	12.071	10.449
	97	11.2	10.018
	98	10.416	9.654
	99	9.643	9.126
	100 (minimum recorded flow)	7.318	7.318

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	106.462	
	MAF/median	24.562	
	FRE3 (floods/year or season)	11.291	11.923
	STD Annual FRE3	2.707	4.481
	Mean Days of Accrual (days)	26.401	22.306
	STD Accrual (days)	32.906	21.683
	Min Accrual (days)	5	5
	Max Accrual (days)	198	143

### Seasonal Distribution of Mean Monthly Flows

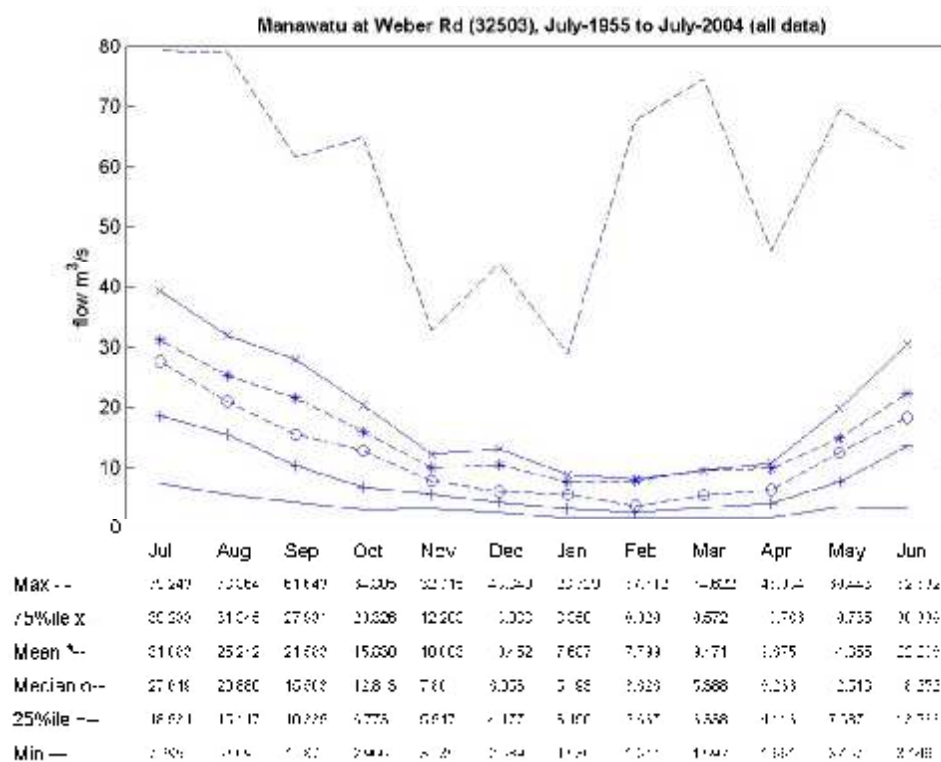


#### 4.2.15. Manawatu at Weber Rd (32503), Jul-1955 to Jul-2004 (all data)

Site		Manawatu at Weber Rd	
Time series details	Data Start Time	3-Jan-55	
	Data End Time	14-Apr-05	
	Analysis Start time	1-Jul-55	
	Analysis End time	1-Jul-04	
	Years of record analysed	49	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	15.563	
	MALF	1.879	
	½ median	3.803	2.115
	3x median	22.815	12.687
	MAF	513.41	
Flow variability percentiles	0 (maximum recorded flow)	1417.1	1417.1
	10	30.52	16.253
	20	19.186	9.823
	25 (upper quartile flow)	15.888	8.213
	30	13.489	6.991
	40	10.101	5.356
	50 (median flow)	7.605	4.229
	60	5.777	3.448
	70	4.354	2.837
	75 (lower quartile flow)	3.778	2.584
	80	3.208	2.338
	90	2.32	1.875
	91	2.231	1.831
	92	2.144	1.785
	93	2.053	1.736
	94	1.963	1.685
	95	1.879	1.634
	96	1.786	1.582
	97	1.687	1.519
	98	1.578	1.446
	99	1.447	1.346
	100 (minimum recorded flow)	1.051	1.051

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	273.236	
	MAF/median	67.51	
	FRE3 (floods/year or season)	8.999	8.881
	STD Annual FRE3	2.524	3.744
	Mean Days of Accrual (days)	32.736	28.972
	STD Accrual (days)	39.324	30.012
	Min Accrual (days)	5	5
	Max Accrual (days)	262	184

### Seasonal Distribution of Mean Monthly Flows



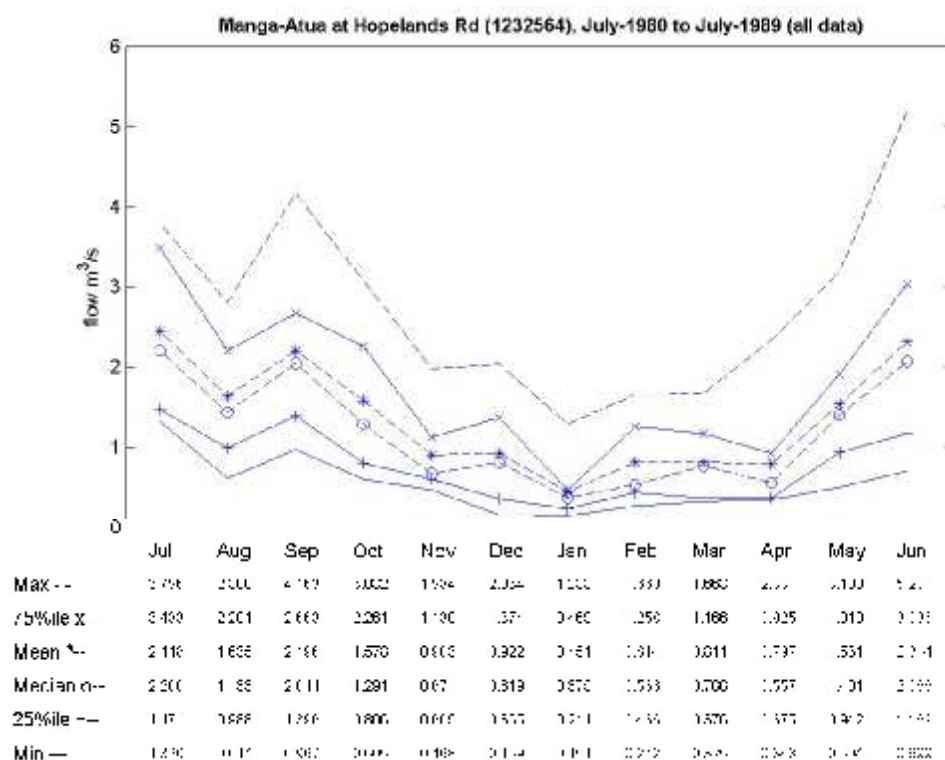
#### 4.2.16. Manga-Atua at Hopelands Rd (1232564), Jul-1980 to Jul-1989 (all data)

Site		Manga-Atua at Hopelands Rd	
Time series details	Data Start Time	28-Feb-80	
	Data End Time	23-Jan-90	
	Analysis Start time	1-Jul-80	
	Analysis End time	1-Jul-89	
	Years of record analysed	9	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	1.369	
	MALF	0.075	
	½ median	0.351	0.195
	3x median	2.106	1.17
	MAF	68.176	
Flow variability percentiles	0 (maximum recorded flow)	131.266	44.537
	10	2.798	1.457
	20	1.623	0.962
	25 (upper quartile flow)	1.345	0.789
	30	1.145	0.668
	40	0.896	0.512
	50 (median flow)	0.702	0.39
	60	0.535	0.311
	70	0.398	0.244
	75 (lower quartile flow)	0.342	0.215
	80	0.287	0.19
	90	0.187	0.14
	91	0.177	0.135
	92	0.166	0.13
	93	0.156	0.125
	94	0.146	0.119
	95	0.137	0.113
	96	0.129	0.104
	97	0.119	0.094
	98	0.102	0.086
	99	0.085	0.074
	100 (minimum recorded flow)	0.042	0.042



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	909.013	
	MAF/median	97.117	
	FRE3 (floods/year or season)	12.446	13.437
	STD Annual FRE3	2.657	2.844
	Mean Days of Accrual (days)	23.973	20.569
	STD Accrual (days)	25.122	18.716
	Min Accrual (days)	5	5
	Max Accrual (days)	166	93

### Seasonal Distribution of Mean Monthly Flows

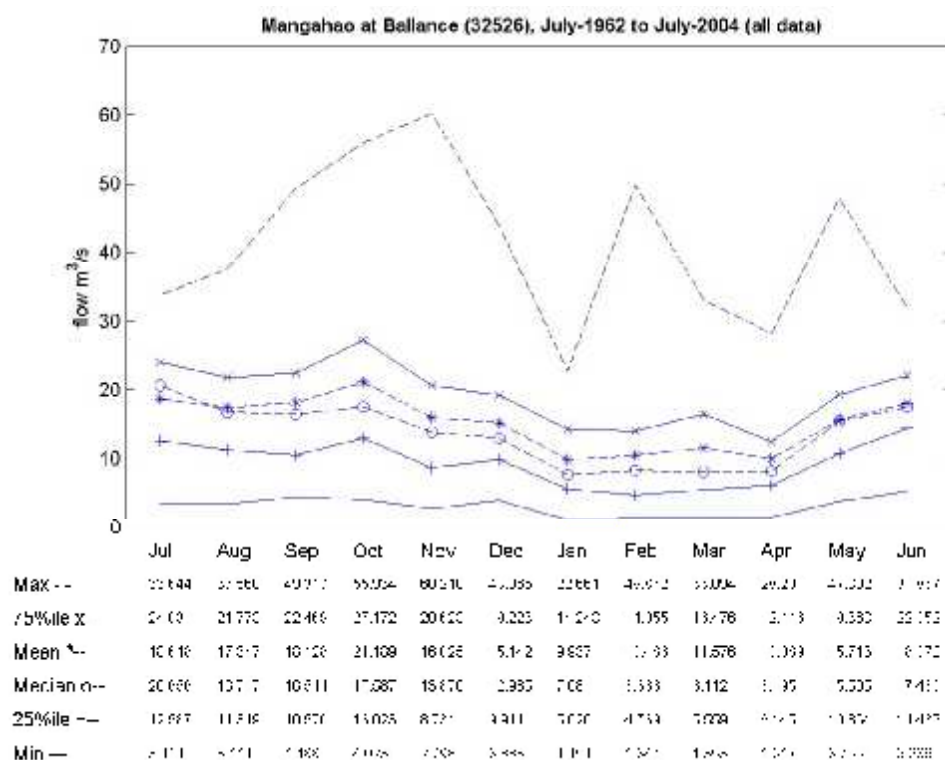


#### 4.2.17. Mangahao at Ballance (32526), Jul-1962 to Jul-2004 (all data)

Site		Mangahao at Ballance	
Time series details	Data Start Time	1-Jan-62	
	Data End Time	14-Jan-05	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-04	
	Years of record analysed	42	
	Gaps in the data (% of record).	2.3	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	15.24	
	MALF	1.649	
	½ median	3.683	2.576
	3x median	22.098	15.453
	MAF	539.04	
Flow variability percentiles	0 (maximum recorded flow)	815.374	815.374
	10	29.574	22.192
	20	16.927	12.052
	25 (upper quartile flow)	14.096	9.954
	30	12.072	8.504
	40	9.3	6.519
	50 (median flow)	7.366	5.151
	60	5.84	4.221
	70	4.581	3.46
	75 (lower quartile flow)	4.06	3.116
	80	3.568	2.777
	90	2.603	2.067
	91	2.501	1.974
	92	2.393	1.88
	93	2.277	1.782
	94	2.155	1.663
	95	2.003	1.522
	96	1.831	1.35
	97	1.619	1.22
	98	1.335	1.113
	99	1.113	0.968
	100 (minimum recorded flow)	0.541	0.541

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	321.623	
	MAF/median	73.179	
	FRE3 (floods/year or season)	15.023	14.546
	STD Annual FRE3	2.741	4.47
	Mean Days of Accrual (days)	18.953	17.947
	STD Accrual (days)	17.217	15.735
	Min Accrual (days)	5	5
	Max Accrual (days)	148	147

### Seasonal Distribution of Mean Monthly Flows

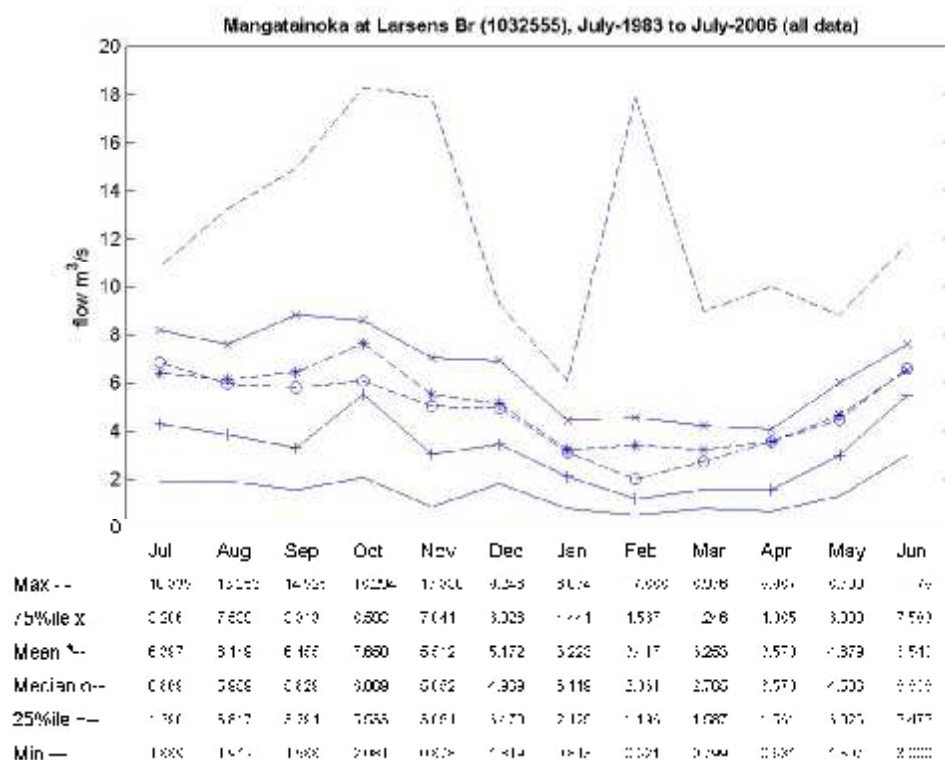


#### 4.2.18. Mangatainoka at Larsons Br (1032555), Jul-1983 to Jul-2006 (all data)

Site		Mangatainoka at Larsons Br	
Time series details	Data Start Time	20-Jul-83	
	Data End Time	10-Jul-06	
	Analysis Start time	20-Jul-83	
	Analysis End time	1-Jul-06	
	Years of record analysed	23	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	5.17	
	MALF	0.395	
	½ median	1.065	0.743
	3x median	6.39	4.458
	MAF	194.48	
Flow variability percentiles	0 (maximum recorded flow)	273.571	273.571
	10	10.524	7.494
	20	5.651	3.931
	25 (upper quartile flow)	4.582	3.166
	30	3.818	2.651
	40	2.807	1.945
	50 (median flow)	2.13	1.486
	60	1.633	1.177
	70	1.264	0.942
	75 (lower quartile flow)	1.109	0.835
	80	0.963	0.737
	90	0.68	0.529
	91	0.649	0.507
	92	0.613	0.484
	93	0.578	0.462
	94	0.541	0.441
	95	0.504	0.419
	96	0.467	0.397
	97	0.43	0.372
	98	0.389	0.339
	99	0.335	0.284
	100 (minimum recorded flow)	0.211	0.211

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	493.604	
	MAF/median	91.305	
	FRE3 (floods/year or season)	17.434	17.523
	STD Annual FRE3	2.348	4.996
	Mean Days of Accrual (days)	14.873	14.453
	STD Accrual (days)	12.536	11.34
	Min Accrual (days)	5	5
	Max Accrual (days)	116	90

### Seasonal Distribution of Mean Monthly Flows

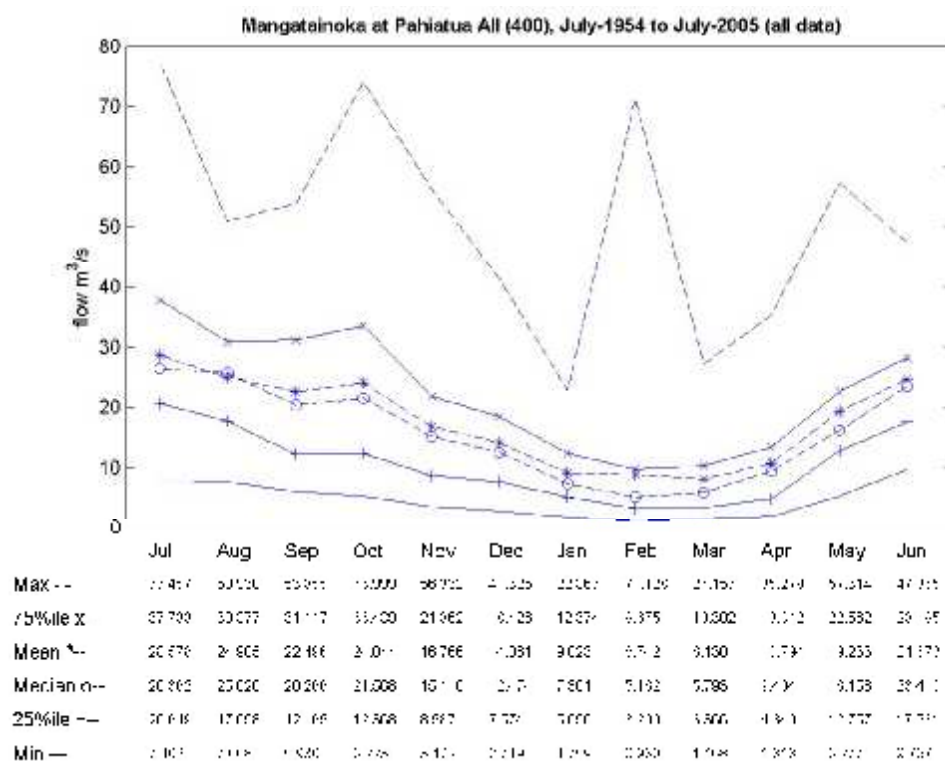


#### 4.2.19. Mangatainoka at Pahiatua All (400), Jul-1954 to Jul-2005 (all data)

Site		Mangatainoka at Pahiatua All	
Time series details	Data Start Time	1-Jan-54	
	Data End Time	25-Jul-05	
	Analysis Start time	1-Jul-54	
	Analysis End time	1-Jul-05	
	Years of record analysed	51	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	17.68	
	MALF	1.578	
	½ median	4.45	2.573
	3x median	26.7	15.435
	MAF	403.71	
Flow variability percentiles	0 (maximum recorded flow)	885.771	601.799
	10	38.67	23.576
	20	23.337	12.968
	25 (upper quartile flow)	19.18	10.471
	30	16.115	8.824
	40	11.735	6.6
	50 (median flow)	8.9	5.145
	60	6.833	4.104
	70	5.158	3.245
	75 (lower quartile flow)	4.43	2.874
	80	3.727	2.479
	90	2.412	1.784
	91	2.287	1.701
	92	2.169	1.617
	93	2.049	1.529
	94	1.919	1.441
	95	1.758	1.331
	96	1.597	1.218
	97	1.422	1.092
	98	1.202	0.961
	99	0.959	0.816
	100 (minimum recorded flow)	0.231	0.231

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	255.837	
	MAF/median	45.361	
	FRE3 (floods/year or season)	13.038	12.169
	STD Annual FRE3	2.686	4.884
	Mean Days of Accrual (days)	21.565	21.773
	STD Accrual (days)	23.804	21.823
	Min Accrual (days)	5	5
	Max Accrual (days)	186	147

### Seasonal Distribution of Mean Monthly Flows



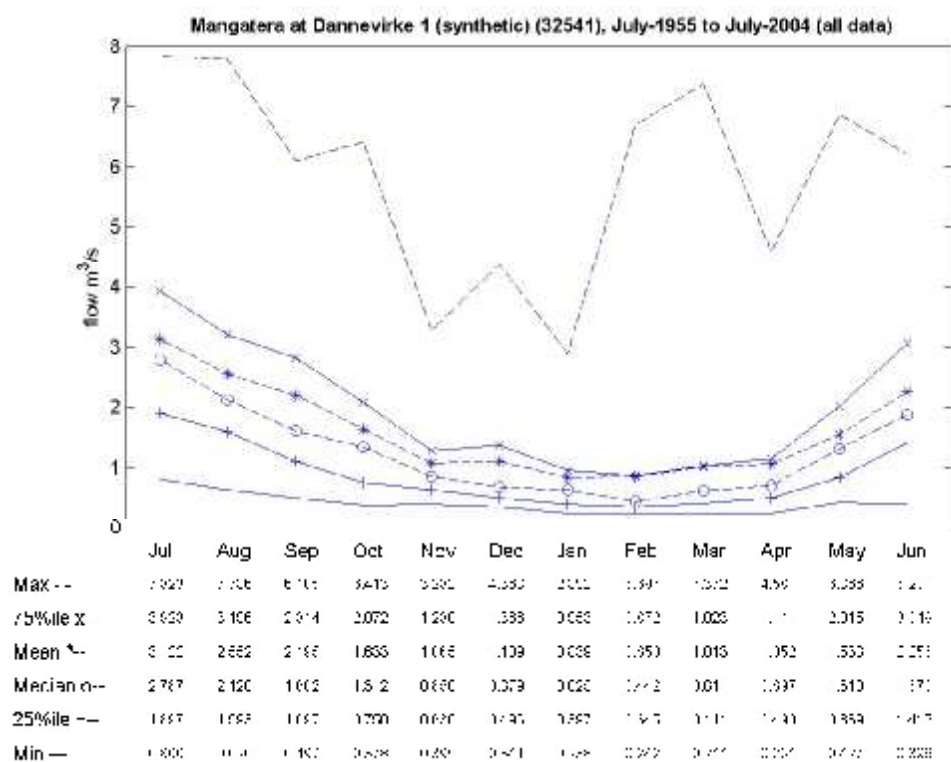
#### 4.2.20. Mangatera at Dannevirke 1 (synthetic) (32541), Jul-1955 to Jul-2004 (all data)

Site		Mangatera at Dannevirke 1 (synthetic)	
Time series details	Data Start Time	3-Jan-55	
	Data End Time	14-Apr-05	
	Analysis Start time	1-Jul-55	
	Analysis End time	1-Jul-04	
	Years of record analysed	49	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	1.607	
	MALF	0.272	
	½ median	0.416	0.251
	3x median	2.493	1.503
	MAF	50.197	
Flow variability percentiles	0 (maximum recorded flow)	138.398	138.398
	10	3.067	1.675
	20	1.961	1.047
	25 (upper quartile flow)	1.639	0.89
	30	1.405	0.771
	40	1.074	0.611
	50 (median flow)	0.831	0.501
	60	0.652	0.425
	70	0.513	0.365
	75 (lower quartile flow)	0.457	0.341
	80	0.402	0.317
	90	0.315	0.272
	91	0.307	0.267
	92	0.298	0.263
	93	0.289	0.258
	94	0.281	0.253
	95	0.272	0.248
	96	0.263	0.243
	97	0.253	0.237
	98	0.243	0.23
	99	0.23	0.219
	100 (minimum recorded flow)	0.191	0.191



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	184.548	
	MAF/median	60.406	
	FRE3 (floods/year or season)	8.877	8.595
	STD Annual FRE3	2.721	3.921
	Mean Days of Accrual (days)	33.993	30.398
	STD Accrual (days)	42.051	31.534
	Min Accrual (days)	5	5
	Max Accrual (days)	269	180

### Seasonal Distribution of Mean Monthly Flows

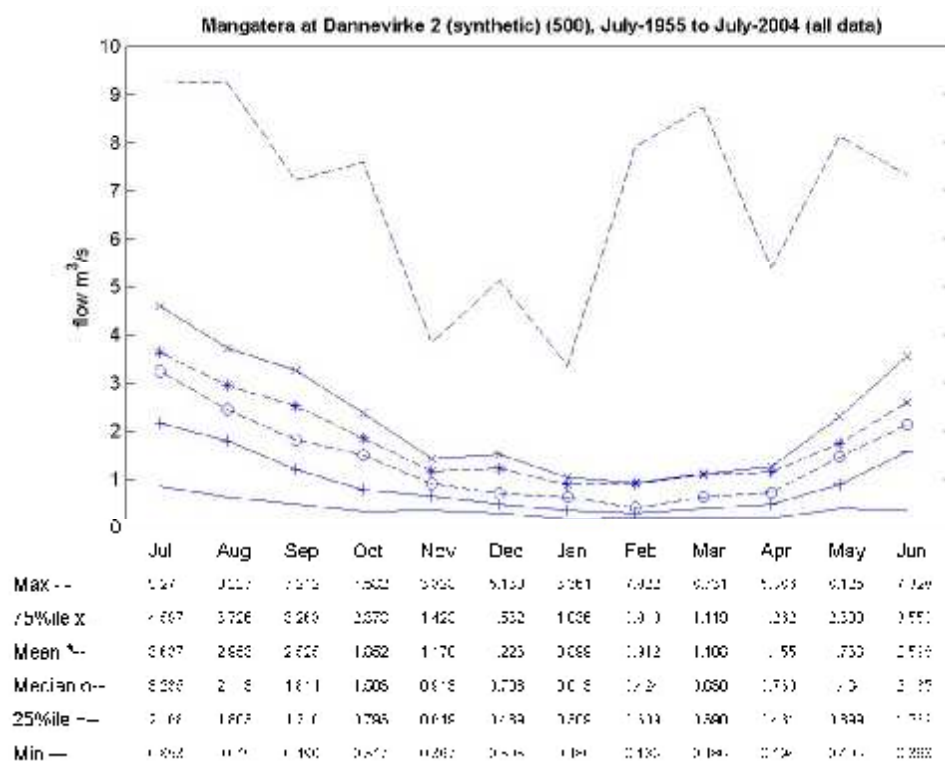


#### 4.2.21. Mangatera at Dannevirke 2 (synthetic) (500), Jul-1955 to Jul-2004 (all data)

Site		Mangatera at Dannevirke 2 (synthetic)	
Time series details	Data Start Time	3-Jan-55	
	Data End Time	14-Apr-05	
	Analysis Start time	1-Jul-55	
	Analysis End time	1-Jul-04	
	Years of record analysed	49	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	1.821	
	MALF	0.22	
	½ median	0.445	0.248
	3x median	2.67	1.485
	MAF	60.069	
Flow variability percentiles	0 (maximum recorded flow)	165.802	165.802
	10	3.571	1.902
	20	2.245	1.149
	25 (upper quartile flow)	1.859	0.961
	30	1.578	0.818
	40	1.182	0.627
	50 (median flow)	0.89	0.495
	60	0.676	0.404
	70	0.51	0.332
	75 (lower quartile flow)	0.442	0.302
	80	0.376	0.273
	90	0.272	0.22
	91	0.262	0.214
	92	0.251	0.209
	93	0.241	0.203
	94	0.23	0.197
	95	0.22	0.191
	96	0.209	0.185
	97	0.197	0.178
	98	0.185	0.169
	99	0.169	0.158
	100 (minimum recorded flow)	0.123	0.123

Season		1 July to 30 June	1 Nov to 30 April
Biological	MAF/MALF	273.041	
disturbance	MAF/median	67.493	
indicators	FRE3 (floods/year or season)	8.999	8.881
	STD Annual FRE3	2.524	3.744
	Mean Days of Accrual (days)	32.738	28.972
	STD Accrual (days)	39.323	30.012
	Min Accrual (days)	5	5
	Max Accrual (days)	262	184

### Seasonal Distribution of Mean Monthly Flows



#### 4.2.22. Oroua at Almadale All (800), Jul-1948 to Jul-2004 (all data)

Site		Oroua at Almadale All	
Time series details	Data Start Time	3-Dec-47	
	Data End Time	3-Apr-05	
	Analysis Start time	1-Jul-48	
	Analysis End time	1-Jul-04	
	Years of record analysed	56	
	Gaps in the data (% of record).	24.1	

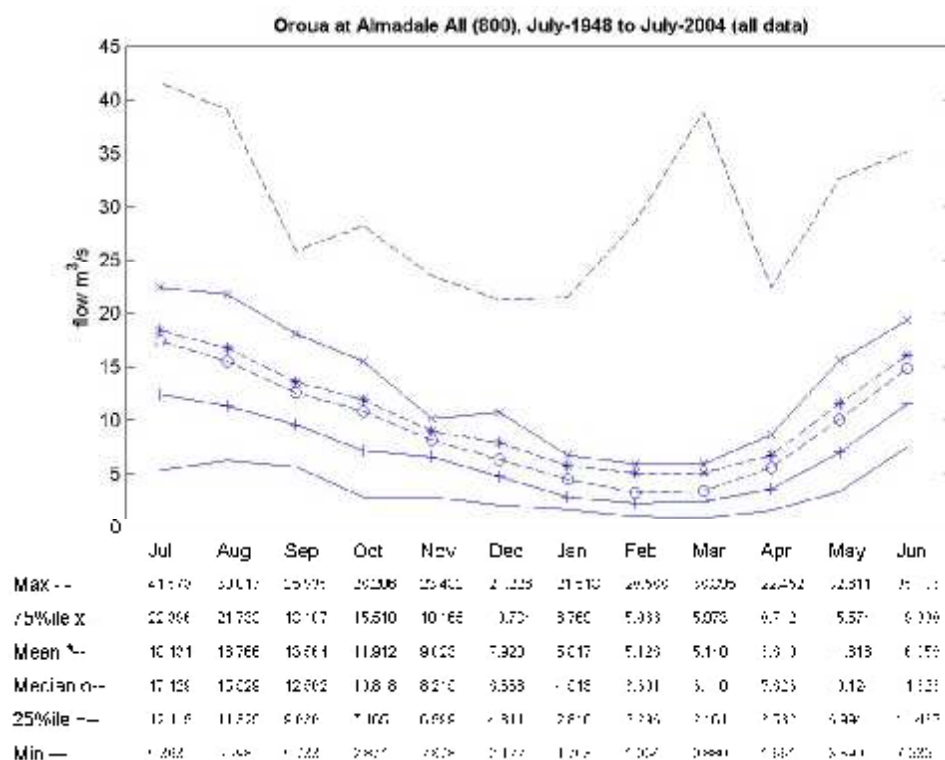
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	10.711	
	MALF	1.211	
	½ median	3.552	1.921
	3x median	21.312	11.523
	MAF	173.85	

Flow variability percentiles	0 (maximum recorded flow)	449.847	449.847
	10	22.392	13.599
	20	15.562	8.581
	25 (upper quartile flow)	13.372	7.193
	30	11.685	6.165
	40	9.086	4.753
	50 (median flow)	7.104	3.841
	60	5.411	3.113
	70	4.095	2.452
	75 (lower quartile flow)	3.499	2.148
	80	2.93	1.876
	90	1.874	1.395
	91	1.782	1.337
	92	1.688	1.285
	93	1.594	1.237
	94	1.499	1.19
	95	1.396	1.13
	96	1.287	1.073
	97	1.191	1.011
	98	1.074	0.926
	99	0.927	0.813
	100 (minimum recorded flow)	0.413	0.413

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	145.117	
	MAF/median	24.472	
	FRE3 (floods/year or season)	9.858	9.789
	STD Annual FRE3	2.612	3.524
	Mean Days of Accrual (days)	31.966	28.219
	STD Accrual (days)	36.366	26.628
	Min Accrual (days)	5	5
	Max Accrual (days)	213	163

### Seasonal Distribution of Mean Monthly Flows

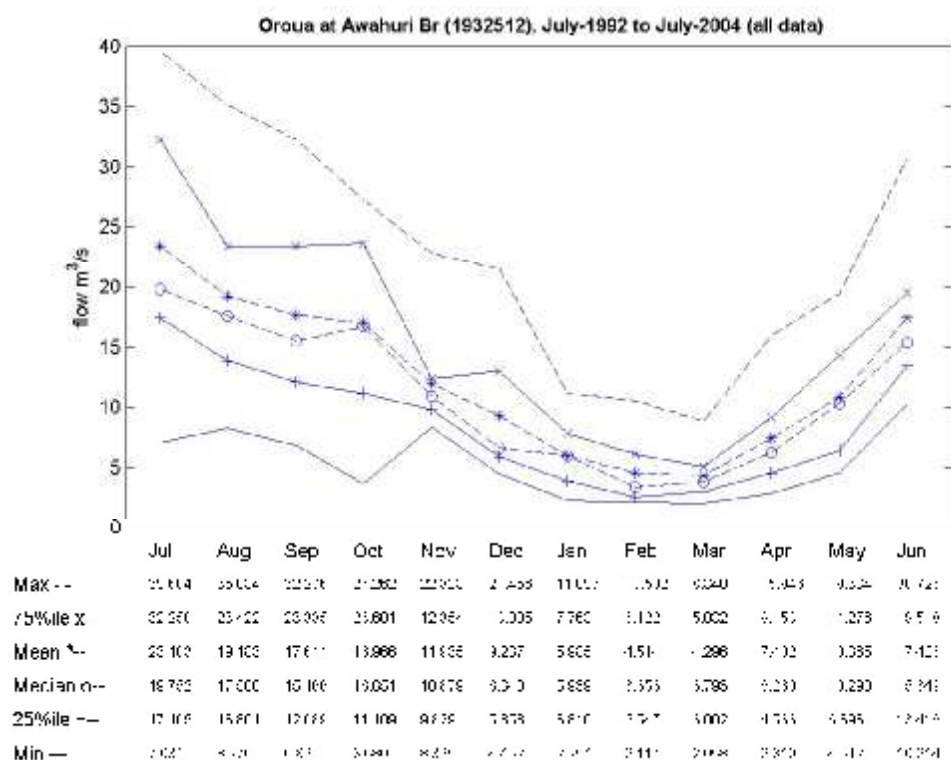


#### 4.2.23. Oroua at Awahuri Br (1932512), Jul-1992 to Jul-2004 (all data)

Site		Oroua at Awahuri Br	
Time series details	Data Start Time	19-Dec-91	
	Data End Time	3-Apr-05	
	Analysis Start time	1-Jul-92	
	Analysis End time	1-Jul-04	
	Years of record analysed	12	
	Gaps in the data (% of record).	0.55	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	12.611	
	MALF	1.62	
	½ median	3.908	2.252
	3x median	23.448	13.509
	MAF	216.07	
Flow variability percentiles	0 (maximum recorded flow)	879.955	879.955
	10	26.923	14.5
	20	17.749	9.564
	25 (upper quartile flow)	15.125	8.257
	30	13.009	7.181
	40	10.018	5.541
	50 (median flow)	7.816	4.503
	60	6.058	3.681
	70	4.655	2.994
	75 (lower quartile flow)	4.057	2.684
	80	3.48	2.401
	90	2.385	1.854
	91	2.27	1.79
	92	2.173	1.719
	93	2.07	1.65
	94	1.973	1.585
	95	1.854	1.531
	96	1.727	1.475
	97	1.593	1.403
	98	1.473	1.307
	99	1.312	1.189
	100 (minimum recorded flow)	0.9	0.9

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	133.377	
	MAF/median	27.645	
	FRE3 (floods/year or season)	10.416	9.738
	STD Annual FRE3	1.925	3.724
	Mean Days of Accrual (days)	28.573	26.318
	STD Accrual (days)	30.609	26.319
	Min Accrual (days)	5	5
	Max Accrual (days)	172	132

### Seasonal Distribution of Mean Monthly Flows



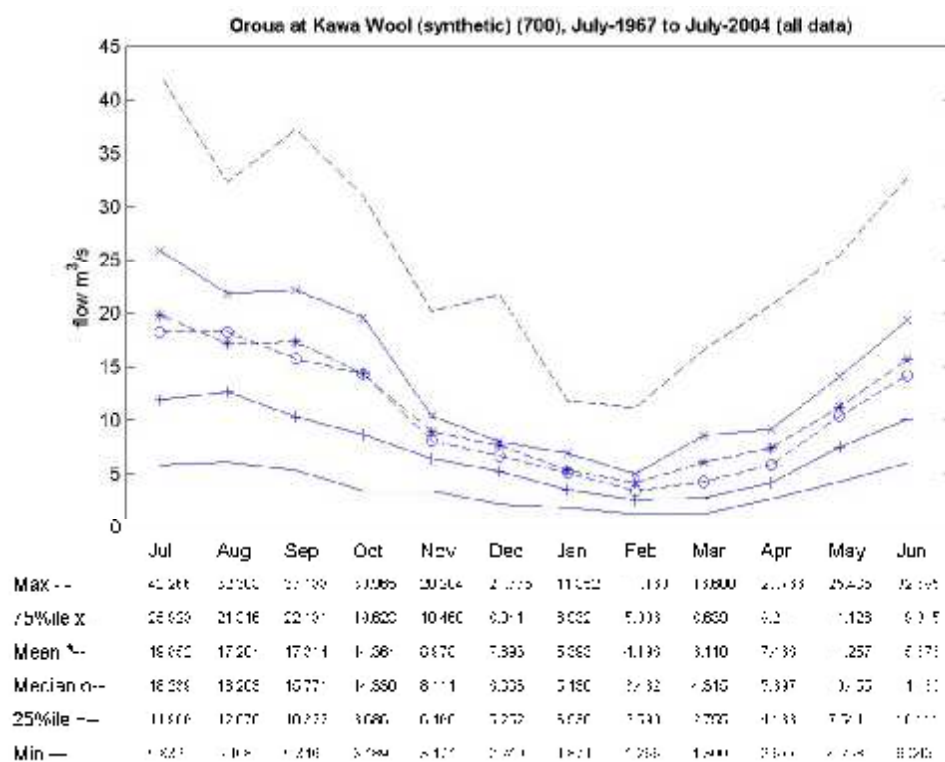
#### 4.2.24. Oroua at Kawa Wool (synthetic) (700), Jul-1967 to Jul-2004 (all data)

Site		Oroua at Kawa Wool (synthetic)	
Time series details	Data Start Time	3-Feb-67	
	Data End Time	3-Apr-05	
	Analysis Start time	1-Jul-67	
	Analysis End time	1-Jul-04	
	Years of record analysed	37	
	Gaps in the data (% of record).	0.18	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	11.376	
	MALF	1.24	
	½ median	3.486	1.98
	3x median	20.913	11.88
	MAF	204.83	
Flow variability percentiles	0 (maximum recorded flow)	790.154	790.154
	10	24.187	13.003
	20	16.078	8.302
	25 (upper quartile flow)	13.701	7.067
	30	11.809	6.133
	40	9.027	4.873
	50 (median flow)	6.971	3.96
	60	5.409	3.232
	70	4.204	2.633
	75 (lower quartile flow)	3.623	2.369
	80	3.094	2.111
	90	2.092	1.594
	91	1.995	1.54
	92	1.901	1.485
	93	1.806	1.43
	94	1.699	1.377
	95	1.593	1.321
	96	1.485	1.253
	97	1.38	1.179
	98	1.253	1.092
	99	1.092	0.969
	100 (minimum recorded flow)	0.638	0.638



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	165.185	
	MAF/median	29.383	
	FRE3 (floods/year or season)	9.864	10.67
	STD Annual FRE3	2.717	3.203
	Mean Days of Accrual (days)	30.391	25.848
	STD Accrual (days)	36.249	22.547
	Min Accrual (days)	5	5
	Max Accrual (days)	226	131

### Seasonal Distribution of Mean Monthly Flows

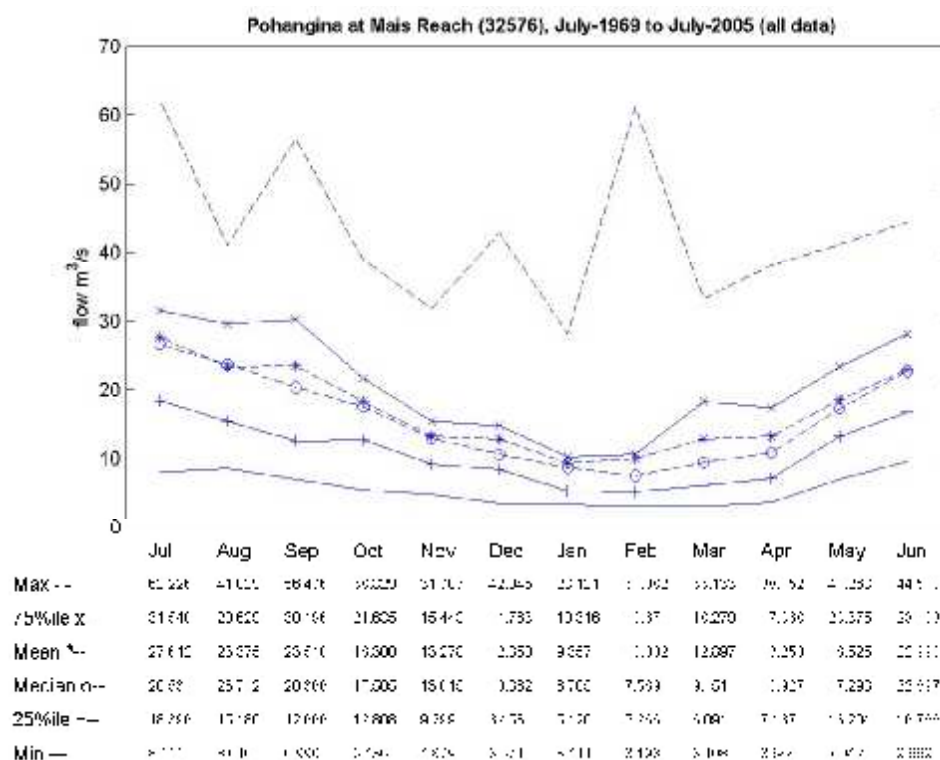


#### 4.2.25. Pohangina at Mais Reach (32576), Jul-1969 to Jul-2005 (all data)

Site		Pohangina at Mais Reach	
Time series details	Data Start Time	10-Jun-69	
	Data End Time	10-Aug-05	
	Analysis Start time	1-Jul-69	
	Analysis End time	1-Jul-05	
	Years of record analysed	36	
	Gaps in the data (% of record).	0.01	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	17.214	
	MALF	2.315	
	½ median	5.006	3.1
	3x median	30.036	18.597
	MAF	489.99	
Flow variability percentiles	0 (maximum recorded flow)	1109.1	1109.1
	10	33.517	21.929
	20	21.819	13.337
	25 (upper quartile flow)	18.643	11.327
	30	16.16	9.802
	40	12.589	7.66
	50 (median flow)	10.012	6.199
	60	7.997	5.154
	70	6.337	4.309
	75 (lower quartile flow)	5.591	3.923
	80	4.919	3.592
	90	3.582	2.927
	91	3.461	2.86
	92	3.329	2.789
	93	3.194	2.718
	94	3.068	2.64
	95	2.931	2.563
	96	2.795	2.456
	97	2.643	2.347
	98	2.465	2.222
	99	2.222	1.971
	100 (minimum recorded flow)	1.35	1.35

Season		1 July to 30 June	1 Nov to 30 April
Biological	MAF/MALF	211.659	
disturbance	MAF/median	48.94	
indicators	FRE3 (floods/year or season)	12.528	12.931
	STD Annual FRE3	2.501	3.175
	Mean Days of Accrual (days)	24.195	20.854
	STD Accrual (days)	24.047	17.274
	Min Accrual (days)	5	5
	Max Accrual (days)	172	93

### Seasonal Distribution of Mean Monthly Flows

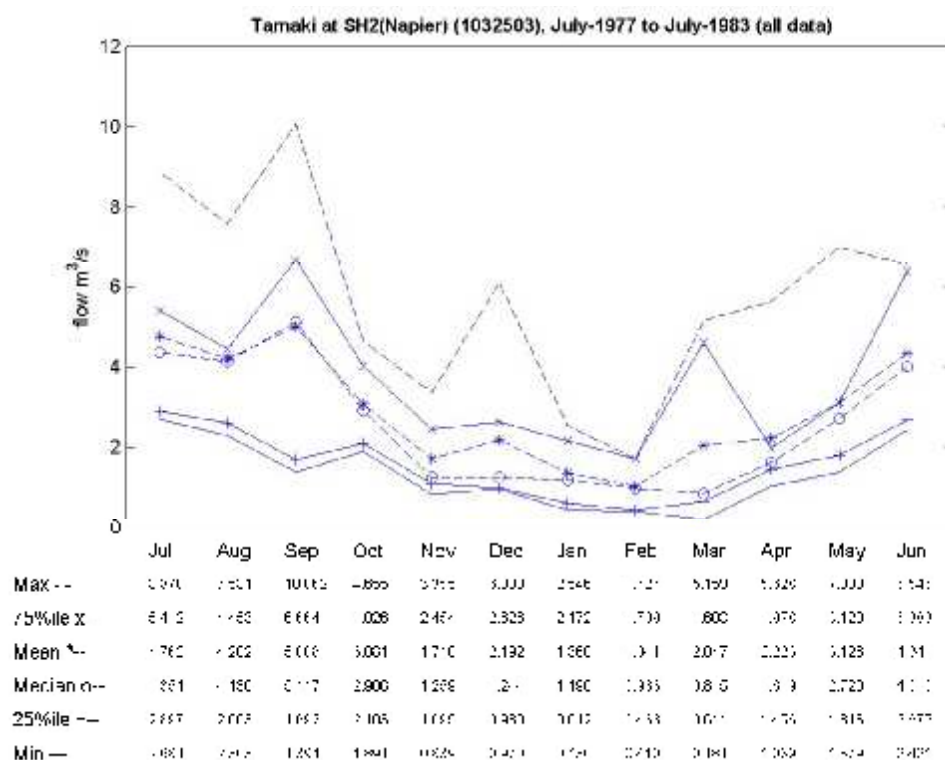


#### 4.2.26. Tamaki at SH2(Napier) (1032503), Jul-1977 to Jul-1983 (all data)

Site		Tamaki at SH2(Napier)	
Time series details	Data Start Time	1-Nov-76	
	Data End Time	1-Jan-84	
	Analysis Start time	1-Jul-77	
	Analysis End time	1-Jul-83	
	Years of record analysed	6	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	2.935	
	MALF	0.207	
	½ median	0.800	0.487
	3x median	4.797	2.922
	MAF	56.343	
Flow variability percentiles	0 (maximum recorded flow)	77.504	56.980
	10	6.554	3.456
	20	3.828	2.061
	25 (upper quartile flow)	3.192	1.720
	30	2.728	1.527
	40	2.055	1.199
	50 (median flow)	1.599	0.974
	60	1.271	0.797
	70	0.996	0.624
	75 (lower quartile flow)	0.863	0.558
	80	0.727	0.491
	90	0.475	0.321
	91	0.444	0.299
	92	0.410	0.282
	93	0.386	0.262
	94	0.356	0.242
	95	0.313	0.220
	96	0.276	0.199
	97	0.241	0.173
	98	0.195	0.154
	99	0.152	0.124
	100 (minimum recorded flow)	0.030	0.030

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	272.188	
	MAF/median	35.258	
	FRE3 (floods/year or season)	8.336	7.726
	STD Annual FRE3	3.39	3.696
	Mean Days of Accrual (days)	35.137	32.519
	STD Accrual (days)	38.755	35.63
	Min Accrual (days)	5	5
	Max Accrual (days)	209	127

### Seasonal Distribution of Mean Monthly Flows

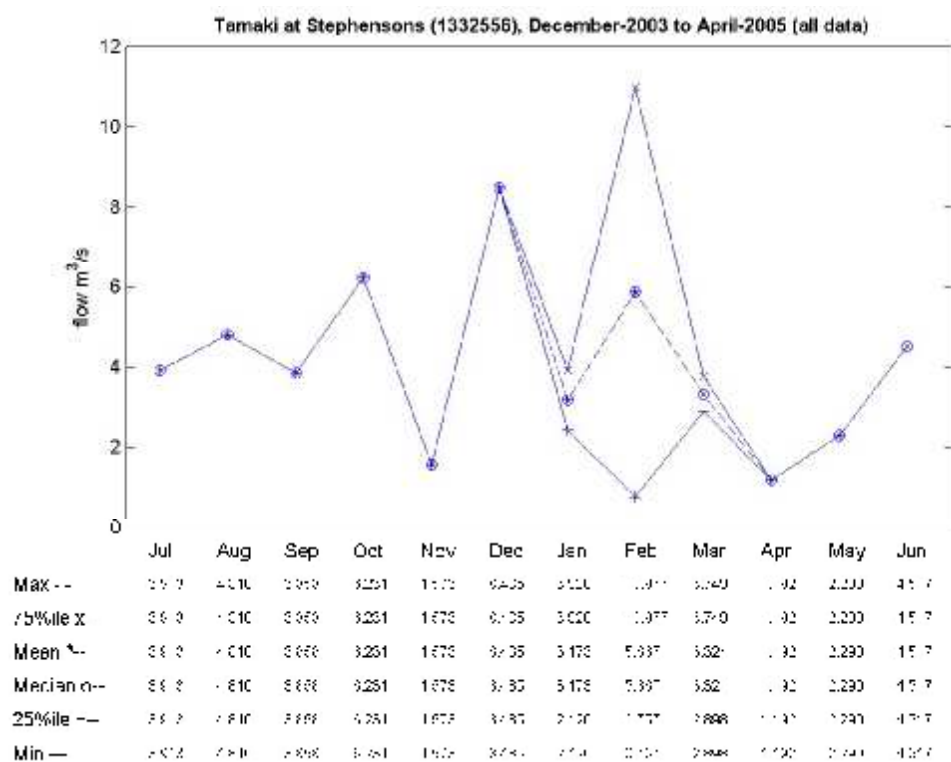


#### 4.2.27. Tamaki at Stephensons (1332556), Dec-2003 to Apr-2005 (all data)

Site		Tamaki at Stephensons	
Time series details	Data Start Time	16-Dec-03	
	Data End Time	30-Apr-05	
	Analysis Start time	16-Dec-03	
	Analysis End time	30-Apr-05	
	Years of record analysed	1	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	4.032	
	MALF	0.395	
	½ median	1.227	0.925
	3x median	7.359	5.547
	MAF	158.47	
Flow variability percentiles	0 (maximum recorded flow)	158.471	158.471
	10	8.609	9.034
	20	5.401	5.189
	25 (upper quartile flow)	4.547	4.254
	30	3.813	3.489
	40	2.954	2.485
	50 (median flow)	2.453	1.849
	60	2.046	1.388
	70	1.559	1.175
	75 (lower quartile flow)	1.357	1.108
	80	1.205	1.036
	90	0.964	0.701
	91	0.918	0.66
	92	0.81	0.638
	93	0.74	0.599
	94	0.678	0.564
	95	0.635	0.522
	96	0.574	0.473
	97	0.509	0.429
	98	0.432	0.379
	99	0.368	0.348
	100 (minimum recorded flow)	0.305	0.305

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	343.753	
	MAF/median	64.603	
	FRE3 (floods/year or season)	6.004	8.072
	STD Annual FRE3	0	0
	Mean Days of Accrual (days)	34.636	25.222
	STD Accrual (days)	27.703	23.557
	Min Accrual (days)	5	5
	Max Accrual (days)	87	70

### Seasonal Distribution of Mean Monthly Flows



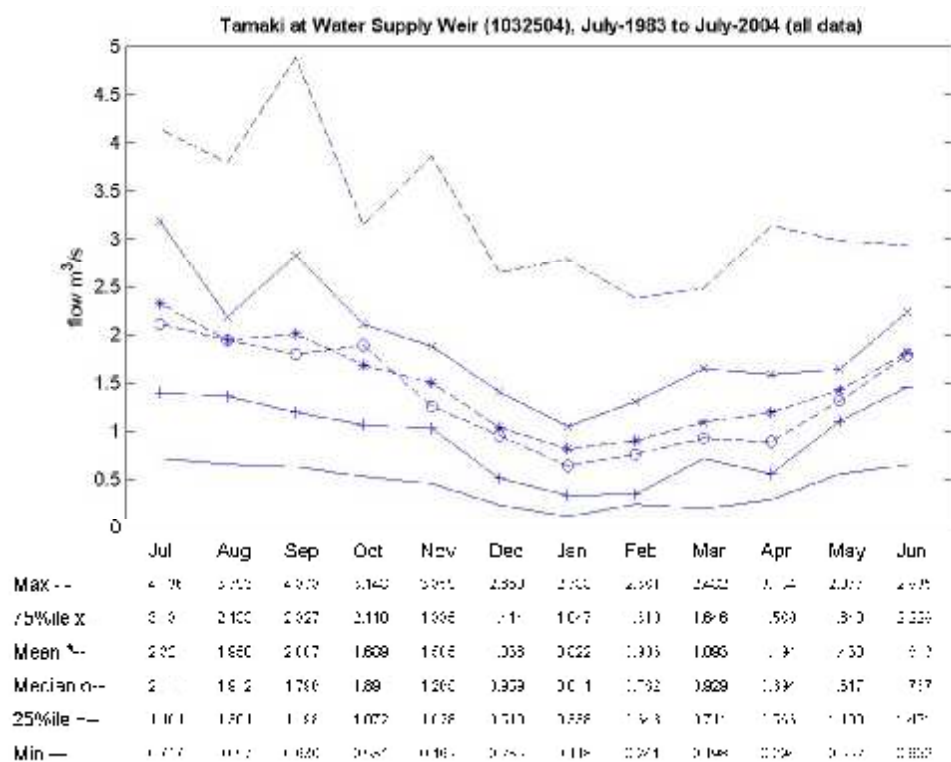
#### 4.2.28. Tamaki at Water Supply Weir (1032504), Jul-1983 to Jul-2004 (all data)

Site		Tamaki at Water Supply Weir	
Time series details	Data Start Time	17-Nov-82	
	Data End Time	21-Apr-05	
	Analysis Start time	1-Jul-83	
	Analysis End time	1-Jul-04	
	Years of record analysed	21	
	Gaps in the data (% of record).	5.38	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	1.484	
	MALF	0.181	
	½ median	0.487	0.339
	3x median	2.919	2.031
	MAF	29.857	
Flow variability percentiles	0 (maximum recorded flow)	91.272	91.272
	10	2.963	1.936
	20	1.934	1.327
	25 (upper quartile flow)	1.686	1.149
	30	1.498	1.012
	40	1.199	0.826
	50 (median flow)	0.973	0.677
	60	0.799	0.554
	70	0.648	0.431
	75 (lower quartile flow)	0.572	0.374
	80	0.493	0.325
	90	0.322	0.224
	91	0.302	0.213
	92	0.281	0.2
	93	0.264	0.189
	94	0.245	0.177
	95	0.224	0.166
	96	0.2	0.155
	97	0.177	0.139
	98	0.155	0.122
	99	0.123	0.096
	100 (minimum recorded flow)	0.023	0.023



Season		1 July to 30 June	1 Nov to 30 April
Biological	MAF/MALF	164.956	
disturbance	MAF/median	30.686	
indicators	FRE3 (floods/year or season)	8.599	8.057
	STD Annual FRE3	2.212	4.081
	Mean Days of Accrual (days)	35.696	30.619
	STD Accrual (days)	36.725	30.335
	Min Accrual (days)	5	5
	Max Accrual (days)	221	148

### Seasonal Distribution of Mean Monthly Flows

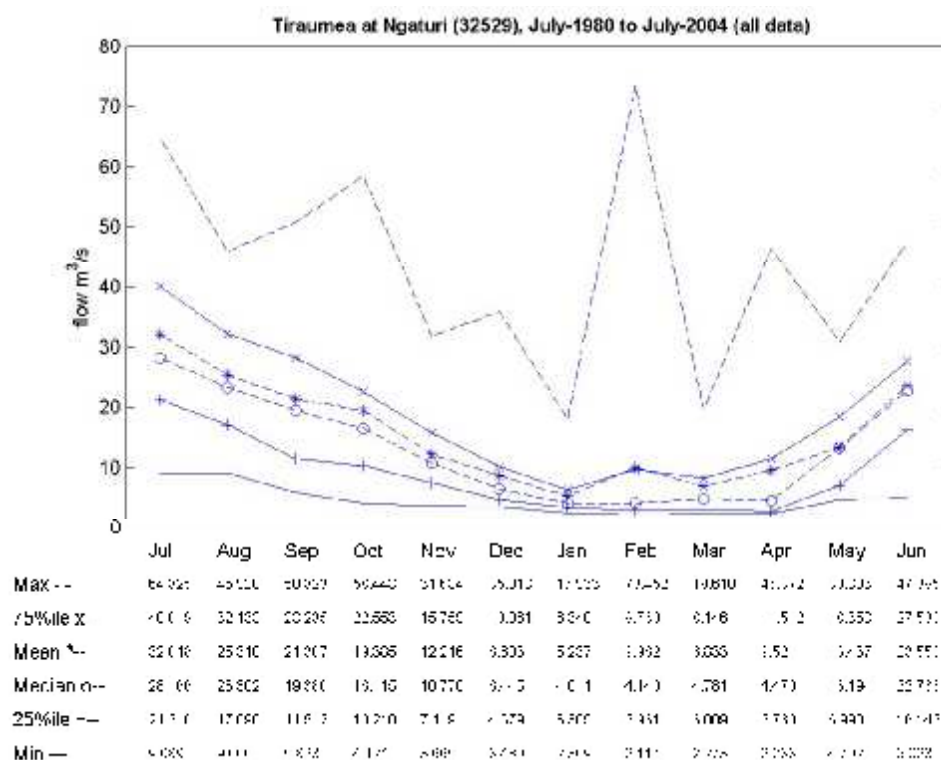


#### 4.2.29. Tiraumea at Ngaturi (32529), Jul-1980 to Jul-2004 (all data)

Site		Tiraumea at Ngaturi	
Time series details	Data Start Time	17-Dec-79	
	Data End Time	18-Oct-04	
	Analysis Start time	1-Jul-80	
	Analysis End time	1-Jul-04	
	Years of record analysed	24	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	15.66	
	MALF	2.383	
	½ median	3.606	2.126
	3x median	21.633	12.756
	MAF	302.15	
Flow variability percentiles	0 (maximum recorded flow)	739.057	739.057
	10	34.02	14.629
	20	19.195	8.36
	25 (upper quartile flow)	15.629	7.03
	30	13.058	6.191
	40	9.566	5.025
	50 (median flow)	7.211	4.252
	60	5.622	3.629
	70	4.414	3.17
	75 (lower quartile flow)	3.895	2.958
	80	3.443	2.749
	90	2.705	2.435
	91	2.643	2.406
	92	2.583	2.376
	93	2.524	2.344
	94	2.467	2.311
	95	2.412	2.27
	96	2.354	2.218
	97	2.29	2.167
	98	2.191	2.089
	99	2.045	1.956
	100 (minimum recorded flow)	1.567	1.612

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	126.794	
	MAF/median	41.901	
	FRE3 (floods/year or season)	10.541	8.645
	STD Annual FRE3	2.389	5.02
	Mean Days of Accrual (days)	27.225	30.86
	STD Accrual (days)	38.045	36.391
	Min Accrual (days)	5	5
	Max Accrual (days)	205	172

### Seasonal Distribution of Mean Monthly Flows

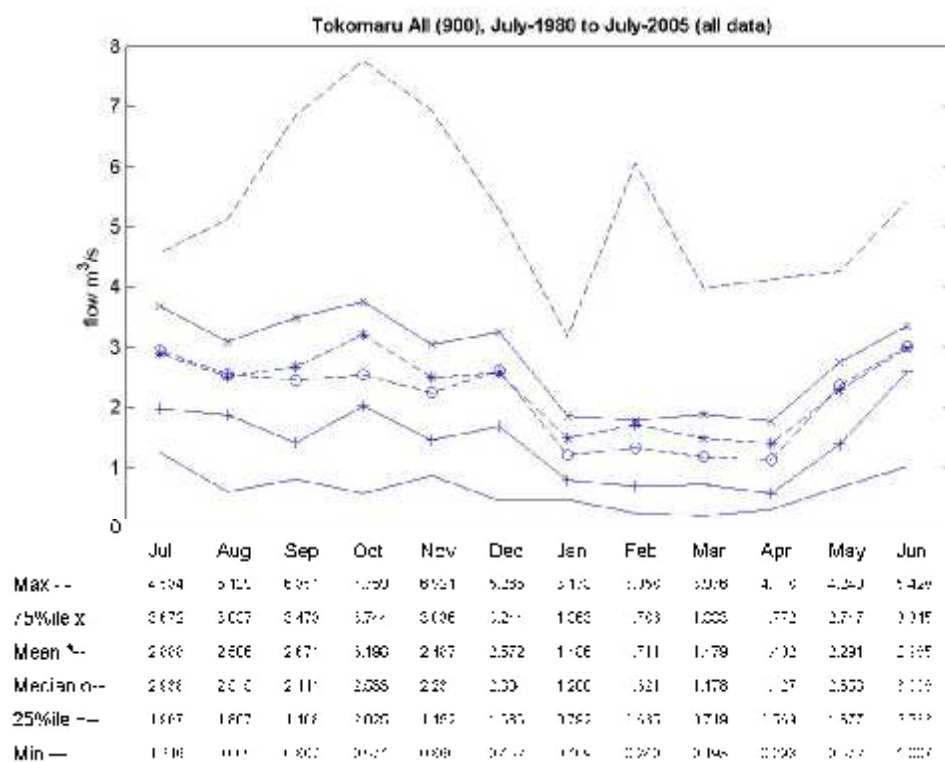


#### 4.2.30. Tokomaru All (900), Jul-1980 to Jul-2005 (all data)

Site		Tokomaru All	
Time series details	Data Start Time	13-Dec-79	
	Data End Time	6-Dec-05	
	Analysis Start time	1-Jul-80	
	Analysis End time	1-Jul-05	
	Years of record analysed	25	
	Gaps in the data (% of record).	0.12	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	2.314	
	MALF	0.247	
	½ median	0.625	0.439
	3x median	3.747	2.631
	MAF	98.882	
Flow variability percentiles	0 (maximum recorded flow)	169.711	169.711
	10	4.509	3.503
	20	2.796	2.049
	25 (upper quartile flow)	2.365	1.709
	30	2.041	1.456
	40	1.588	1.108
	50 (median flow)	1.249	0.877
	60	0.985	0.709
	70	0.77	0.575
	75 (lower quartile flow)	0.677	0.513
	80	0.588	0.451
	90	0.415	0.325
	91	0.395	0.312
	92	0.375	0.298
	93	0.354	0.284
	94	0.332	0.267
	95	0.309	0.247
	96	0.283	0.228
	97	0.25	0.208
	98	0.218	0.185
	99	0.184	0.161
	100 (minimum recorded flow)	0.108	0.108

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	403.6	
	MAF/median	79.169	
	FRE3 (floods/year or season)	15.201	14.671
	STD Annual FRE3	2.633	4.012
	Mean Days of Accrual (days)	18.867	17.648
	STD Accrual (days)	17.603	16.833
	Min Accrual (days)	5	5
	Max Accrual (days)	145	125

### Seasonal Distribution of Mean Monthly Flows

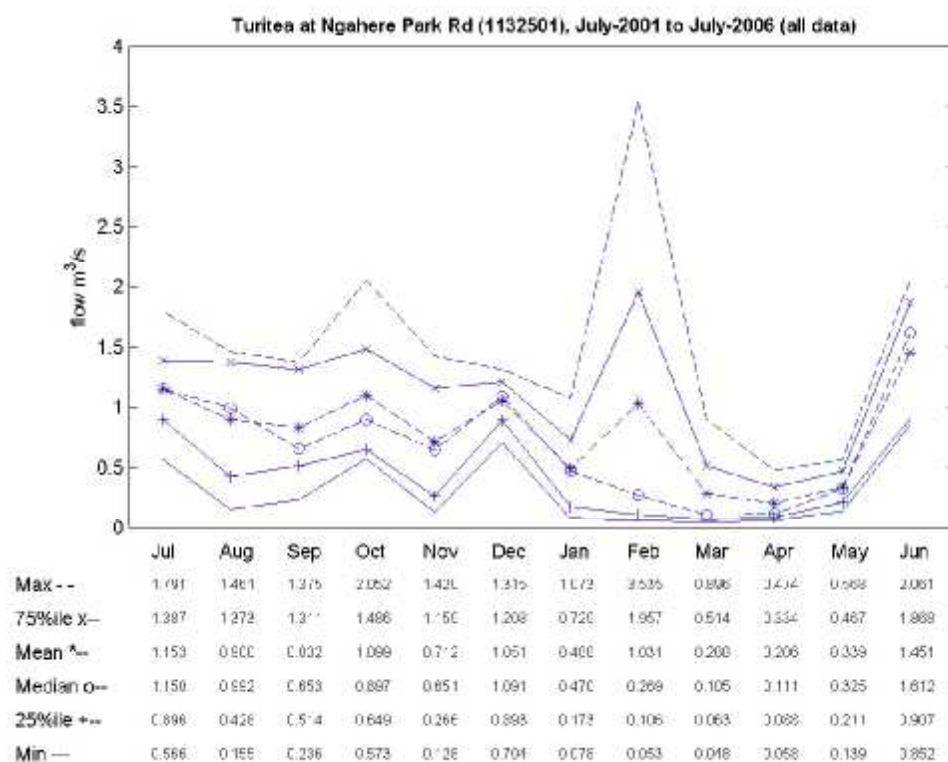


#### 4.2.31. Turitea at Ngahere Park Rd (1132501), Jul-2001 to Jul-2006 (all data)

Site		Turitea at Ngahere Park Rd	
Time series details	Data Start Time	25-Aug-00	
	Data End Time	14-Aug-06	
	Analysis Start time	1-Jul-01	
	Analysis End time	1-Jul-06	
	Years of record analysed	5	
	Gaps in the data (% of record).	1.44	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.775	
	MALF	0.039	
	½ median	0.193	0.104
	3x median	1.155	0.624
	MAF	22.639	
Flow variability percentiles	0 (maximum recorded flow)	52.729	50.15
	10	1.693	1.185
	20	1.051	0.714
	25 (upper quartile flow)	0.882	0.598
	30	0.753	0.503
	40	0.569	0.313
	50 (median flow)	0.385	0.208
	60	0.263	0.124
	70	0.162	0.088
	75 (lower quartile flow)	0.115	0.078
	80	0.091	0.07
	90	0.066	0.054
	91	0.064	0.052
	92	0.061	0.051
	93	0.058	0.049
	94	0.056	0.048
	95	0.053	0.046
	96	0.051	0.044
	97	0.047	0.042
	98	0.044	0.04
	99	0.04	0.037
	100 (minimum recorded flow)	0.007	0.007

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	539.024	
	MAF/median	58.803	
	FRE3 (floods/year or season)	10	8.059
	STD Annual FRE3	2.226	4.718
	Mean Days of Accrual (days)	26.523	26.95
	STD Accrual (days)	34.328	34.235
	Min Accrual (days)	5	5
	Max Accrual (days)	169	132

### Seasonal Distribution of Mean Monthly Flows



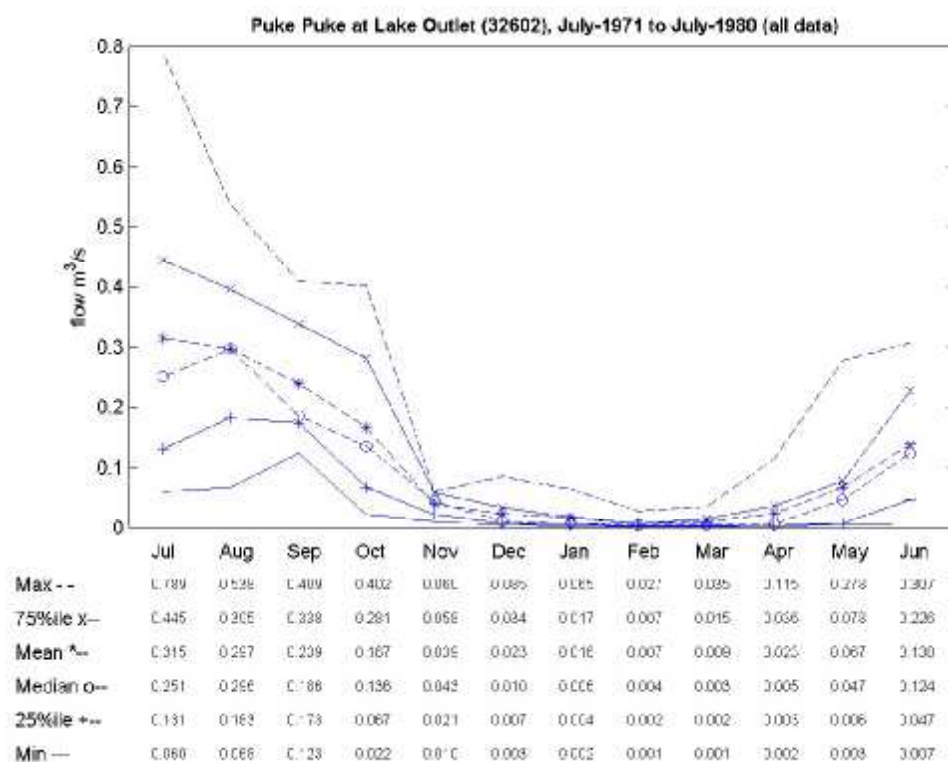
#### 4.2.32. Puke Puke at Lake Outlet (32602), Jul-1971 to Jul-1980 (all data)

Site		Puke Puke at Lake Outlet	
Time series details	Data Start Time	24-Jun-71	
	Data End Time	1-Jul-80	
	Analysis Start time	1-Jul-71	
	Analysis End time	1-Jul-80	
	Years of record analysed	9	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.112	
	MALF	0.003	
	½ median	0.016	0.004
	3x median	0.096	0.024
	MAF	1.312	
Flow variability percentiles	0 (maximum recorded flow)	2.256	0.49
	10	0.331	0.051
	20	0.17	0.029
	25 (upper quartile flow)	0.129	0.021
	30	0.099	0.015
	40	0.06	0.01
	50 (median flow)	0.032	0.008
	60	0.013	0.006
	70	0.008	0.004
	75 (lower quartile flow)	0.007	0.004
	80	0.005	0.003
	90	0.003	0.002
	91	0.003	0.002
	92	0.002	0.002
	93	0.002	0.002
	94	0.002	0.002
	95	0.002	0.001
	96	0.002	0.001
	97	0.002	0.001
	98	0.001	0.001
	99	0.001	0.001
	100 (minimum recorded flow)	0	0



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	437.333	
	MAF/median	41	
	FRE3 (floods/year or season)	3.998	2.459
	STD Annual FRE3	2.342	2.613
	Mean Days of Accrual (days)	62.139	81
	STD Accrual (days)	86.959	69.665
	Min Accrual (days)	5	8
	Max Accrual (days)	277	180

### Seasonal Distribution of Mean Monthly Flows



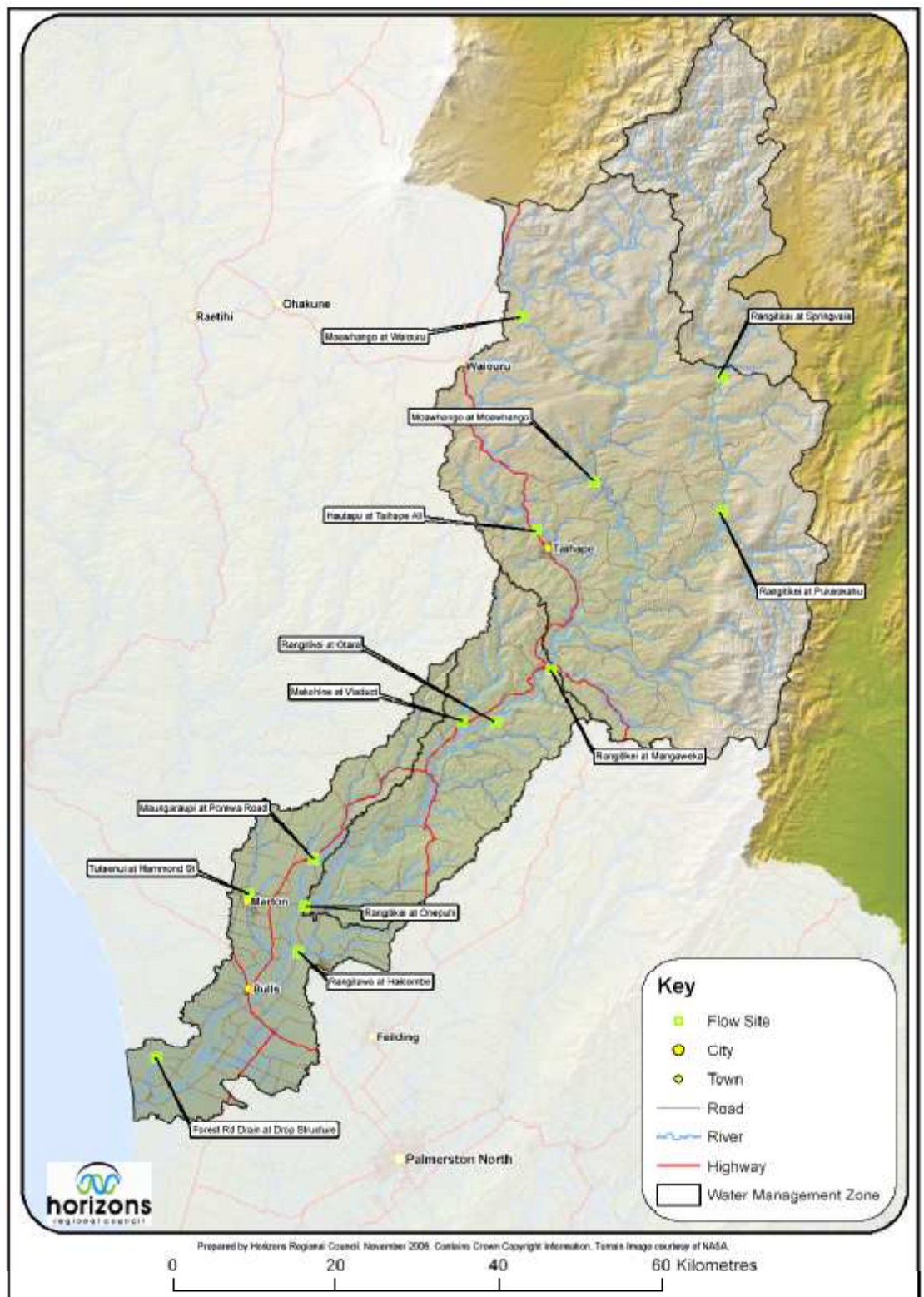


### 4.3. Rangitikei Catchments

The list below shows: section number in this report, site name, (site number) and full date range. The analysis date range is from the first July after the start date until the last June before the finish date.

- 3.3.1. Forest Rd Drain at Drop Structure (32747), Jul-1974 to Jul-2006 (all data)
- 3.3.2. Hautapu Taihape All (100), Jul-1963 to Jul-2004 (all data)
- 3.3.3. Makohine at Viaduct (32754), Jul-1977 to Jul-2004 (all data)
- 3.3.4. Maungaraupi at Maungaraupi (32723), Jul-1970 to Jul-1975 (all data)
- 3.3.5. Moawhango at Moawhango (32733), Jul-1964 to Jul-2005 (all data)
- 3.3.6. Moawhango at Moawhango (32733), Jul-1964 to Jul-1978 (pre-diversion)
- 3.3.7. Moawhango at Moawhango (32733), Jul-1979 to Jul-2004 (post-diversion)
- 3.3.8. Moawhango at Moawhango (sim natural) (327330), Jul-1964 to Jul-2003 (all data)
- 3.3.9. Moawhango at Moawhango (sim natural) (327330), Jul-1964 to Jul-1978 (pre-div.)
- 3.3.10. Moawhango at Moawhango (sim natural) (327330), Jul-1979 to Jul-2003 (post-div.)
- 3.3.11. Moawhango at Waiouru (32732), Jul-1960 to Jul-2005 (all data)
- 3.3.12. Moawhango at Waiouru (32732), Jul-1960 to Jul-1978 (pre-diversion)
- 3.3.13. Moawhango at Waiouru (32732), Jul-1979 to Jul-2004 (post-diversion)
- 3.3.14. Moawhango at Waiouru (sim natural) (46060), Jul-1960 to Jul-2003 (all data)
- 3.3.15. Moawhango at Waiouru (sim natural) (46060), Jul-1960 to Jul-1978 (pre-diversion)
- 3.3.16. Moawhango at Waiouru (sim natural) (46060), Jul-1979 to Jul-2003 (post-diversion)
- 3.3.17. Porewa at Tututotara (32715), Jul-1963 to Jul-1991 (all data)
- 3.3.18. Rangitawa at Halcombe (32735), Jul-1969 to Jul-1980 (all data)
- 3.3.19. Rangitikei at Mangaweka (32702), Jul-1969 to Jul-2004 (all data)
- 3.3.20. Rangitikei at Mangaweka (32702), Jul-1969 to Jul-1978 (pre-diversion)
- 3.3.21. Rangitikei at Mangaweka (32702), Jul-1979 to Jul-2004 (post-diversion)
- 3.3.22. Rangitikei at Mangaweka (sim natural) (327020), Jul-1963 to Jul-2003 (all data)
- 3.3.23. Rangitikei at Mangaweka (sim natural) (327020), Jul-1963 to Jul-1978 (pre-diversion)

- 3.3.24. Rangitikei at Mangaweka (sim natural) (327020), Jul-1979 to Jul-2003 (post-diversion)
- 3.3.25. Rangitikei at Onepuhi (32703), Jul-2002 to Jul-2005 (post-diversion)
- 3.3.26. Rangitikei at Otara (32705), Jul-1963 to Jul-1969 (pre-diversion)
- 3.3.27. Rangitikei at Pukeokahu (32763), Jul-1999 to Jul-2005 (post-diversion)
- 3.3.28. Rangitikei at Springvale (32708), Jul-1964 to Jul-1973 (all data)
- 3.3.29. Tutaenui at Hammond St (32739), Jul-1968 to Jul-1987 (all data)



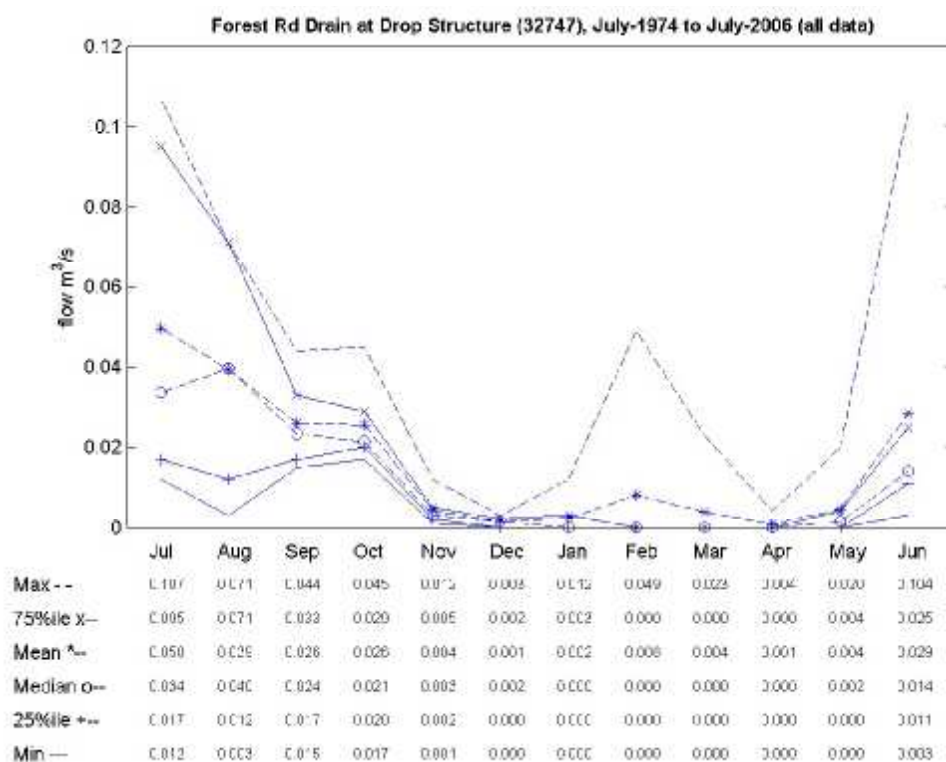
**Figure 8: Flow sites in the Rangitikei catchment.**

#### 4.3.1. Forest Rd Drain at Drop Structure (32747), Jul-1974 to Jul-2006 (all data)

Site		Forest Rd Drain at Drop Structure	
Time series details	Data Start Time	29-May-74	
	Data End Time	14-Aug-06	
	Analysis Start time	1-Jul-74	
	Analysis End time	1-Jul-06	
	Years of record analysed	32	
	Gaps in the data (% of record).	81.35	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.016	
	MALF	0	
	½ median	0.002	0.001
	3x median	0.009	0.003
	MAF	1.082	
Flow variability percentiles	0 (maximum recorded flow)	2.569	0.617
	10	0.039	0.009
	20	0.024	0.004
	25 (upper quartile flow)	0.02	0.001
	30	0.015	0.001
	40	0.009	0.001
	50 (median flow)	0.003	0.001
	60	0.001	0.001
	70	0.001	0
	75 (lower quartile flow)	0.001	0
	80	0	0
	90	0	0
	91	0	0
	92	0	0
	93	0	0
	94	0	0
	95	0	0
	96	0	0
	97	0	0
	98	0	0
	99	0	0
	100 (minimum recorded flow)	0	0

Season		1 July to 30 June	1 Nov to 30 April
Biological	MAF/MALF	#DIV/0!	
disturbance	MAF/median	360.667	
indicators	FRE3 (floods/year or season)	3.998	4.697
	STD Annual FRE3	2.185	2.071
	Mean Days of Accrual (days)	51.545	40.813
	STD Accrual (days)	61.679	40.362
	Min Accrual (days)	5	7
	Max Accrual (days)	185	139

### Seasonal Distribution of Mean Monthly Flows



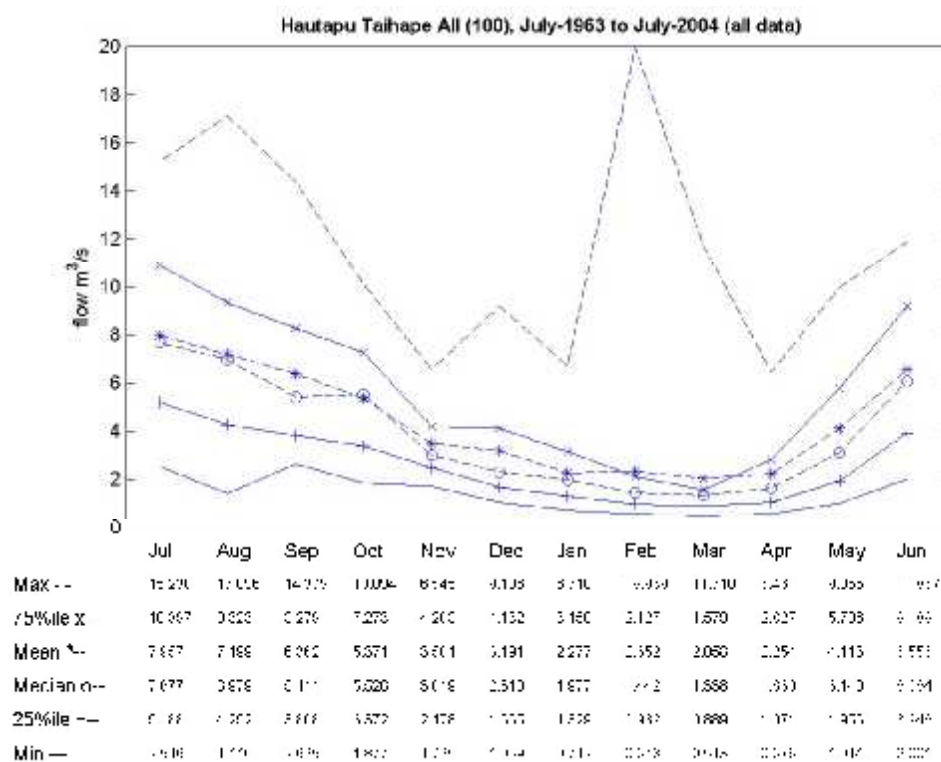
#### 4.3.2. Hautapu Taihape All (100), Jul-1963 to Jul-2004 (all data)

Site		Hautapu Taihape All	
Time series details	Data Start Time	2-May-63	
	Data End Time	1-Apr-05	
	Analysis Start time	1-Jul-63	
	Analysis End time	1-Jul-04	
	Years of record analysed	41	
	Gaps in the data (% of record).	28.82	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	4.46	
	MALF	0.745	
	½ median	1.4	0.831
	3x median	8.4	4.983
	MAF	46.193	
Flow variability percentiles	0 (maximum recorded flow)	206.409	206.409
	10	9.794	4.739
	20	6.472	3.128
	25 (upper quartile flow)	5.466	2.716
	30	4.705	2.403
	40	3.576	1.987
	50 (median flow)	2.8	1.661
	60	2.207	1.392
	70	1.73	1.172
	75 (lower quartile flow)	1.514	1.076
	80	1.303	0.971
	90	0.944	0.749
	91	0.909	0.725
	92	0.873	0.702
	93	0.831	0.679
	94	0.785	0.658
	95	0.737	0.639
	96	0.694	0.612
	97	0.652	0.575
	98	0.606	0.534
	99	0.536	0.456
	100 (minimum recorded flow)	0.272	0.272



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	62.004	
	MAF/median	16.498	
	FRE3 (floods/year or season)	6.792	5.627
	STD Annual FRE3	2.239	3.335
	Mean Days of Accrual (days)	45.695	46.832
	STD Accrual (days)	58.332	49.472
	Min Accrual (days)	5	5
	Max Accrual (days)	279	180

### Seasonal Distribution of Mean Monthly Flows

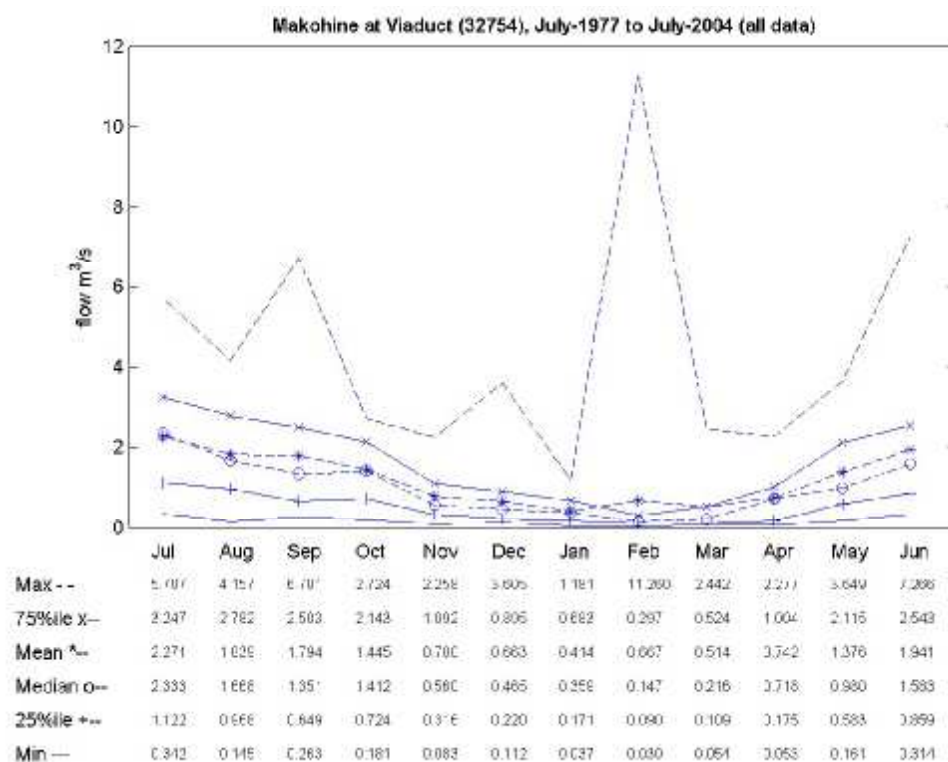


#### 4.3.3. Makohine at Viaduct (32754), Jul-1977 to Jul-2004 (all data)

Site		Makohine at Viaduct	
Time series details	Data Start Time	22-Mar-77	
	Data End Time	12-Apr-05	
	Analysis Start time	1-Jul-77	
	Analysis End time	1-Jul-04	
	Years of record analysed	27	
	Gaps in the data (% of record).	0.14	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	1.208	
	MALF	0.04	
	½ median	0.163	0.069
	3x median	0.975	0.411
	MAF	70.905	
Flow variability percentiles	0 (maximum recorded flow)	198.549	198.549
	10	2.653	1.084
	20	1.295	0.456
	25 (upper quartile flow)	0.98	0.343
	30	0.764	0.268
	40	0.49	0.181
	50 (median flow)	0.325	0.137
	60	0.217	0.103
	70	0.149	0.082
	75 (lower quartile flow)	0.124	0.072
	80	0.099	0.064
	90	0.062	0.05
	91	0.06	0.049
	92	0.057	0.047
	93	0.055	0.046
	94	0.052	0.044
	95	0.049	0.041
	96	0.046	0.039
	97	0.042	0.036
	98	0.038	0.032
	99	0.031	0.027
	100 (minimum recorded flow)	0.012	0.012

Season		1 July to 30 June	1 Nov to 30 April
Biological	MAF/MALF	1772.625	
disturbance	MAF/median	218.169	
indicators	FRE3 (floods/year or season)	12.184	13.51
	STD Annual FRE3	2.6	3.208
	Mean Days of Accrual (days)	20.617	18.318
	STD Accrual (days)	22.135	15.827
	Min Accrual (days)	5	5
	Max Accrual (days)	172	100

### Seasonal Distribution of Mean Monthly Flows

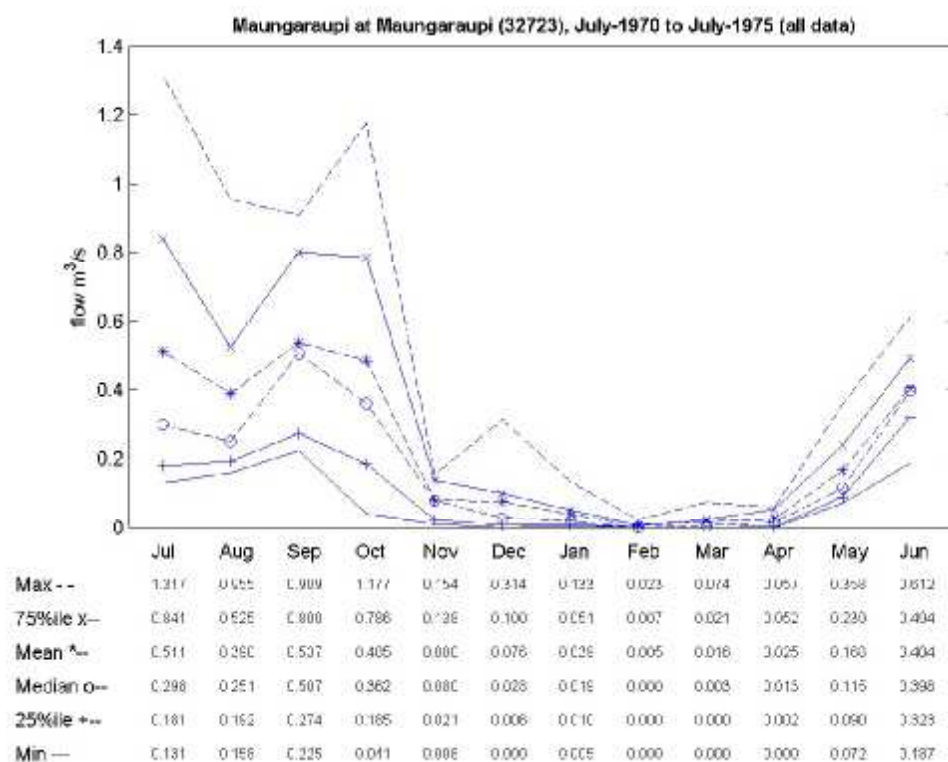


#### 4.3.4. Maungaraupi at Maungaraupi (32723), Jul-1970 to Jul-1975 (all data)

Site		Maungaraupi at Maungaraupi	
Time series details	Data Start Time	19-Mar-70	
	Data End Time	29-Apr-76	
	Analysis Start time	1-Jul-70	
	Analysis End time	1-Jul-75	
	Years of record analysed	5	
	Gaps in the data (% of record).	0.22	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.234	
	MALF	0	
	½ median	0.02	0.001
	3x median	0.117	0.006
	MAF	20.969	
Flow variability percentiles	0 (maximum recorded flow)	28.681	14.574
	10	0.547	0.06
	20	0.271	0.013
	25 (upper quartile flow)	0.214	0.006
	30	0.17	0.003
	40	0.105	0.002
	50 (median flow)	0.039	0.002
	60	0.005	0.001
	70	0.003	0.001
	75 (lower quartile flow)	0.002	0.001
	80	0.001	0
	90	0.001	0
	91	0.001	0
	92	0.001	0
	93	0.001	0
	94	0	0
	95	0	0
	96	0	0
	97	0	0
	98	0	0
	99	0	0
	100 (minimum recorded flow)	0	0

Season		1 July to 30 June	1 Nov to 30 April
Biological	MAF/MALF	20969	
disturbance	MAF/median	537.667	
indicators	FRE3 (floods/year or season)	7.401	7.256
	STD Annual FRE3	1.515	2.297
	Mean Days of Accrual (days)	30.2	34.15
	STD Accrual (days)	38.216	28.914
	Min Accrual (days)	5	5
	Max Accrual (days)	178	99

### Seasonal Distribution of Mean Monthly Flows

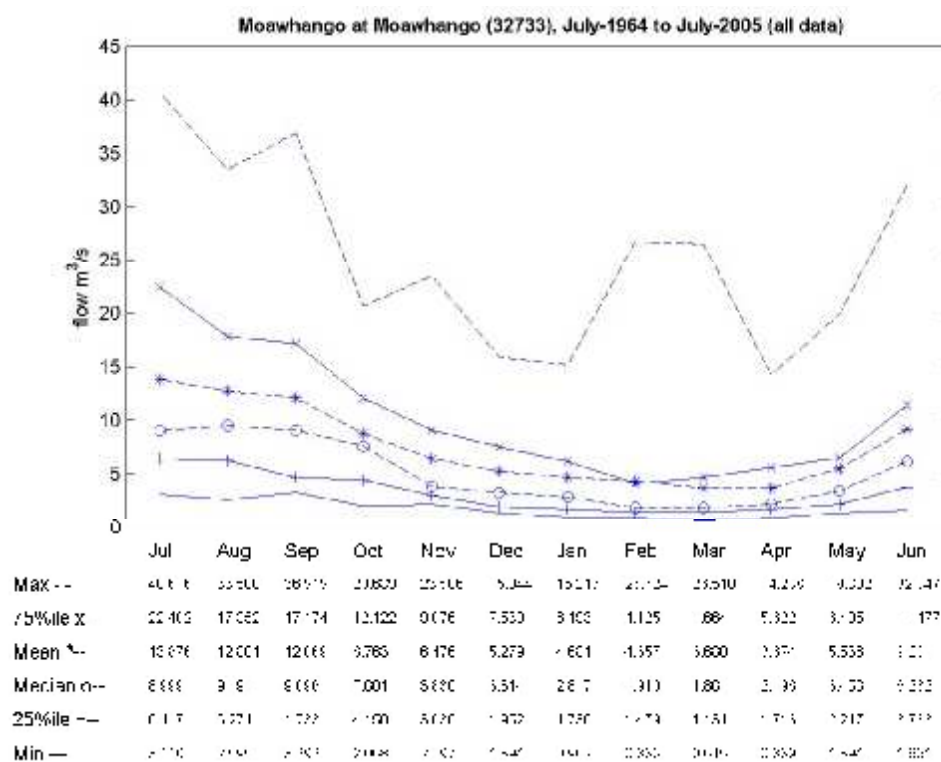


#### 4.3.5. Moawhango at Moawhango (32733), Jul-1964 to Jul-2005 (all data)

Site		Moawhango at Moawhango	
Time series details	Data Start Time	28-Sep-63	
	Data End Time	5-Jan-06	
	Analysis Start time	1-Jul-64	
	Analysis End time	1-Jul-05	
	Years of record analysed	41	
	Gaps in the data (% of record).	13.07	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	7.627	
	MALF	1.542	
	½ median	2.167	1.269
	3x median	13.002	7.611
	MAF	101.61	
Flow variability percentiles	0 (maximum recorded flow)	282.267	282.267
	10	18.036	10.628
	20	11.176	6.604
	25 (upper quartile flow)	9.324	5.371
	30	7.908	4.476
	40	5.744	3.251
	50 (median flow)	4.334	2.537
	60	3.312	2.031
	70	2.514	1.645
	75 (lower quartile flow)	2.173	1.478
	80	1.839	1.309
	90	1.272	1.004
	91	1.213	0.975
	92	1.157	0.947
	93	1.109	0.914
	94	1.05	0.88
	95	0.992	0.837
	96	0.936	0.802
	97	0.868	0.771
	98	0.797	0.732
	99	0.732	0.67
	100 (minimum recorded flow)	0.489	0.489

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	65.218	
	MAF/median	23.445	
	FRE3 (floods/year or season)	4.714	5.526
	STD Annual FRE3	3.175	4.159
	Mean Days of Accrual (days)	61.272	43.025
	STD Accrual (days)	100.835	49.276
	Min Accrual (days)	5	5
	Max Accrual (days)	759	180

### Seasonal Distribution of Mean Monthly Flows



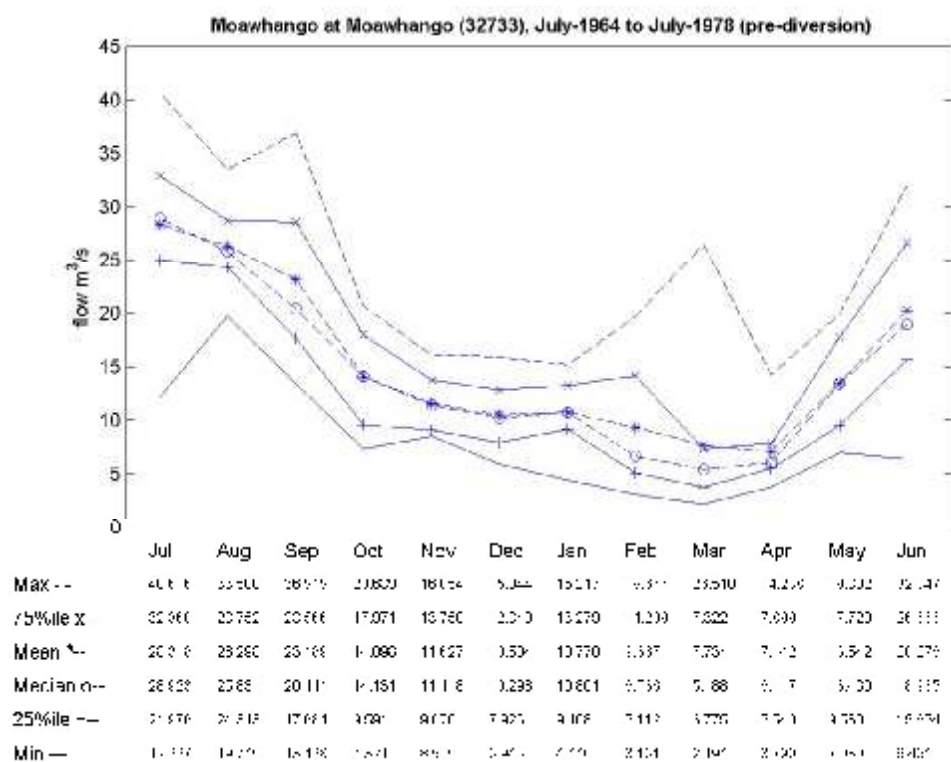
#### 4.3.6. Moawhango at Moawhango (32733), Jul-1964 to Jul-1978 (pre-diversion)

Site		Moawhango at Moawhango	
Time series details	Data Start Time	28-Sep-63	
	Data End Time	1-Apr-79	
	Analysis Start time	1-Jul-64	
	Analysis End time	1-Jul-78	
	Years of record analysed	14	
	Gaps in the data (% of record).	38.11	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	15.568	
	MALF	3.535	
	½ median	6.224	3.902
	3x median	37.344	23.412
	MAF	178.66	
Flow variability percentiles	0 (maximum recorded flow)	282.267	282.267
	10	30.188	16.618
	20	22.375	13.052
	25 (upper quartile flow)	20.191	11.717
	30	18.13	10.828
	40	14.971	9.021
	50 (median flow)	12.448	7.804
	60	10.248	6.646
	70	8.153	5.528
	75 (lower quartile flow)	7.389	5.015
	80	6.434	4.619
	90	4.615	3.617
	91	4.435	3.414
	92	4.251	3.142
	93	4.06	2.953
	94	3.876	2.851
	95	3.621	2.768
	96	3.231	2.522
	97	2.874	2.335
	98	2.611	2.193
	99	2.21	2.026
	100 (minimum recorded flow)	1.885	1.885



Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	50.54	
	MAF/median	14.353	
	FRE3 (floods/year or season)	4.374	4.783
	STD Annual FRE3	2.261	3.216
	Mean Days of Accrual (days)	70.378	49.208
	STD Accrual (days)	66.77	38.692
	Min Accrual (days)	6	5
	Max Accrual (days)	226	142

### Seasonal Distribution of Mean Monthly Flows

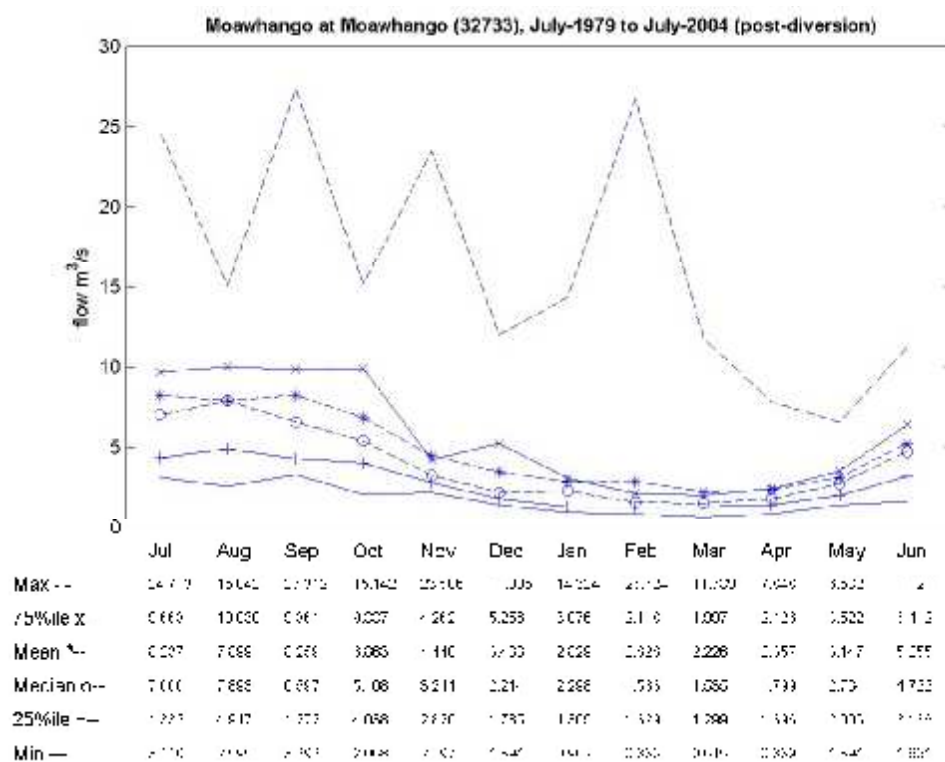


#### 4.3.7. Moawhango at Moawhango (32733), Jul-1979 to Jul-2004 (post-diversion)

Site		Moawhango at Moawhango	
Time series details	Data Start Time	1-Apr-79	
	Data End Time	1-Dec-04	
	Analysis Start time	1-Jul-79	
	Analysis End time	1-Jul-04	
	Years of record analysed	25	
	Gaps in the data (% of record).	0.09	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	4.839	
	MALF	0.923	
	½ median	1.538	0.945
	3x median	9.228	5.667
	MAF	78.768	
Flow variability percentiles	0 (maximum recorded flow)	272.815	272.815
	10	9.727	4.879
	20	6.579	3.374
	25 (upper quartile flow)	5.574	2.987
	30	4.834	2.686
	40	3.841	2.25
	50 (median flow)	3.076	1.889
	60	2.485	1.611
	70	1.963	1.361
	75 (lower quartile flow)	1.734	1.238
	80	1.517	1.132
	90	1.108	0.915
	91	1.069	0.89
	92	1.027	0.863
	93	0.988	0.833
	94	0.949	0.806
	95	0.903	0.786
	96	0.854	0.765
	97	0.801	0.738
	98	0.762	0.7
	99	0.7	0.648
	100 (minimum recorded flow)	0.489	0.489

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	85.711	
	MAF/median	25.607	
	FRE3 (floods/year or season)	4.96	4.752
	STD Annual FRE3	2.072	2.832
	Mean Days of Accrual (days)	65.057	51.218
	STD Accrual (days)	92.037	48.314
	Min Accrual (days)	5	5
	Max Accrual (days)	619	180

### Seasonal Distribution of Mean Monthly Flows

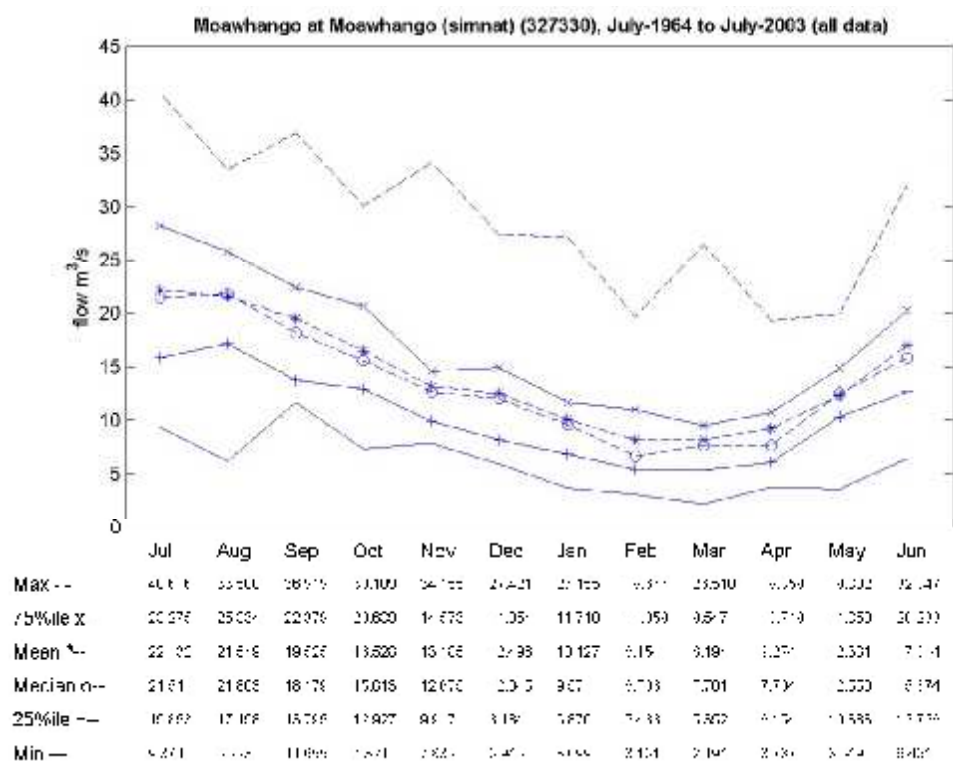


#### 4.3.8. Moawhango at Moawhango (sim natural) (327330), Jul-1964 to Jul-2003 (all data)

Site		Moawhango at Moawhango (sim natural)	
Time series details	Data Start Time	28-Sep-63	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-64	
	Analysis End time	1-Jul-03	
	Years of record analysed	39	
	Gaps in the data (% of record).	13.68	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	14.313	
	MALF	3.424	
	½ median	5.688	3.937
	3x median	34.128	23.619
	MAF	136.96	
Flow variability percentiles	0 (maximum recorded flow)	373.838	279.351
	10	26.976	18.761
	20	20.447	13.726
	25 (upper quartile flow)	18.264	12.29
	30	16.526	11.156
	40	13.609	9.275
	50 (median flow)	11.376	7.873
	60	9.47	6.641
	70	7.662	5.598
	75 (lower quartile flow)	6.849	5.142
	80	6.083	4.756
	90	4.644	3.937
	91	4.493	3.841
	92	4.351	3.73
	93	4.213	3.612
	94	4.05	3.474
	95	3.89	3.295
	96	3.691	3.099
	97	3.447	2.911
	98	3.08	2.731
	99	2.713	2.361
	100 (minimum recorded flow)	1.910	1.910

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	42.72	
	MAF/median	12.039	
	FRE3 (floods/year or season)	6.06	7.692
	STD Annual FRE3	2.41	4.039
	Mean Days of Accrual (days)	55.801	36.276
	STD Accrual (days)	55.871	33.711
	Min Accrual (days)	5	5
	Max Accrual (days)	329	180

### Seasonal Distribution of Mean Monthly Flows

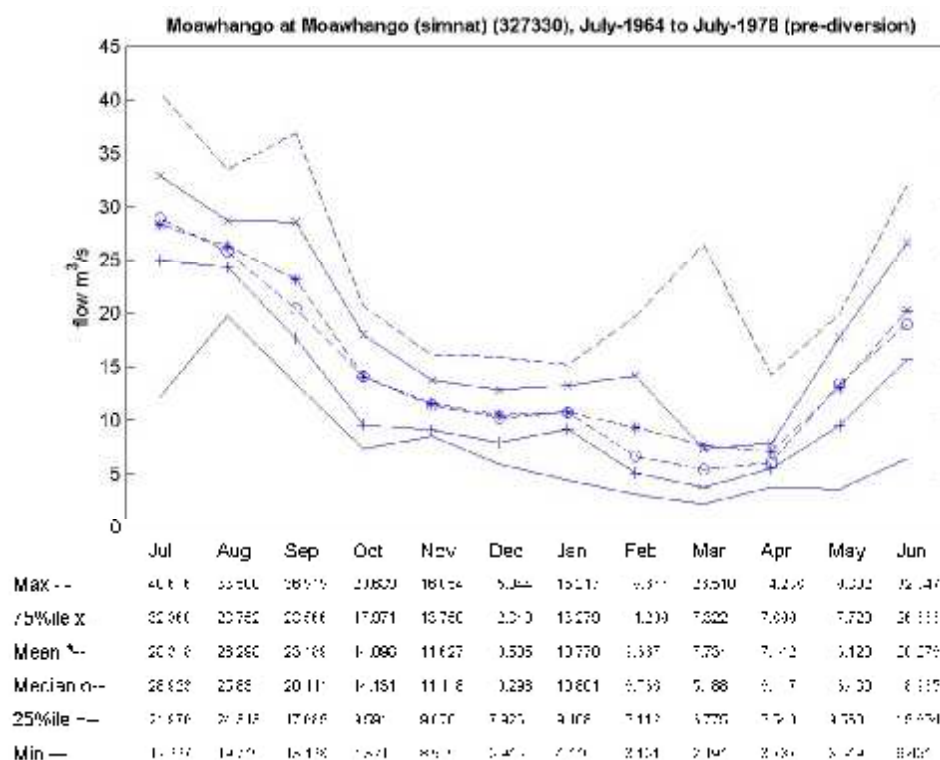


#### 4.3.9. Moawhango at Moawhango (sim natural) (327330), Jul-1964 to Jul-1978 (pre-diversion)

Site		Moawhango at Moawhango (sim natural)	
Time series details	Data Start Time	28-Sep-63	
	Data End Time	1-Apr-79	
	Analysis Start time	1-Jul-64	
	Analysis End time	1-Jul-78	
	Years of record analysed	14	
	Gaps in the data (% of record).	38.12	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	15.535	
	MALF	3.525	
	½ median	6.225	3.909
	3x median	37.35	23.451
	MAF	158.32	
Flow variability percentiles	0 (maximum recorded flow)	245.888	245.888
	10	30.172	16.611
	20	22.41	13.083
	25 (upper quartile flow)	20.22	11.756
	30	18.139	10.848
	40	14.966	9.041
	50 (median flow)	12.45	7.817
	60	10.246	6.663
	70	8.123	5.518
	75 (lower quartile flow)	7.299	5.01
	80	6.316	4.618
	90	4.486	3.607
	91	4.303	3.405
	92	4.157	3.135
	93	3.974	2.951
	94	3.795	2.853
	95	3.473	2.768
	96	3.06	2.525
	97	2.823	2.335
	98	2.539	2.194
	99	2.208	2.029
	100 (minimum recorded flow)	1.894	1.894

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	44.913	
	MAF/median	12.716	
	FRE3 (floods/year or season)	4.374	4.783
	STD Annual FRE3	2.261	3.216
	Mean Days of Accrual (days)	70.378	49.208
	STD Accrual (days)	66.77	38.692
	Min Accrual (days)	6	5
	Max Accrual (days)	226	142

### Seasonal Distribution of Mean Monthly Flows



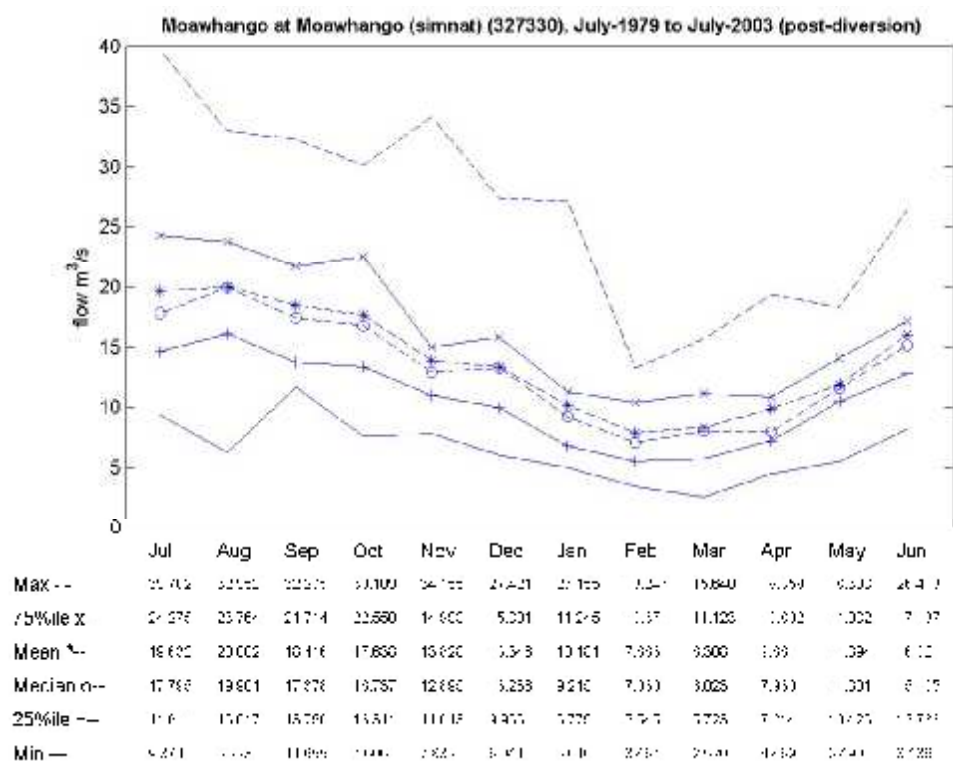
#### 4.3.10. Moawhango at Moawhango (sim natural) (327330), Jul-1979 to Jul-2003 (post-diversion)

Site		Moawhango at Moawhango (sim natural)	
Time series details	Data Start Time	1-Apr-79	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-79	
	Analysis End time	1-Jul-03	
	Years of record analysed	24	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	13.959	
	MALF	3.443	
	½ median	5.566	3.968
	3x median	33.393	23.808
	MAF	133.83	
Flow variability percentiles	0 (maximum recorded flow)	373.838	279.351
	10	25.952	19.75
	20	19.855	14.18
	25 (upper quartile flow)	17.795	12.589
	30	16.066	11.394
	40	13.27	9.443
	50 (median flow)	11.131	7.936
	60	9.267	6.657
	70	7.508	5.645
	75 (lower quartile flow)	6.75	5.204
	80	6.037	4.834
	90	4.718	4.06
	91	4.578	3.974
	92	4.439	3.889
	93	4.31	3.787
	94	4.18	3.678
	95	4.021	3.564
	96	3.86	3.426
	97	3.664	3.255
	98	3.421	3.054
	99	3.059	2.777
	100 (minimum recorded flow)	1.910	1.910



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	42.594	
	MAF/median	12.023	
	FRE3 (floods/year or season)	6.666	8.645
	STD Annual FRE3	2.582	3.998
	Mean Days of Accrual (days)	50.981	32.689
	STD Accrual (days)	48.02	29.775
	Min Accrual (days)	5	5
	Max Accrual (days)	204	159

### Seasonal Distribution of Mean Monthly Flows

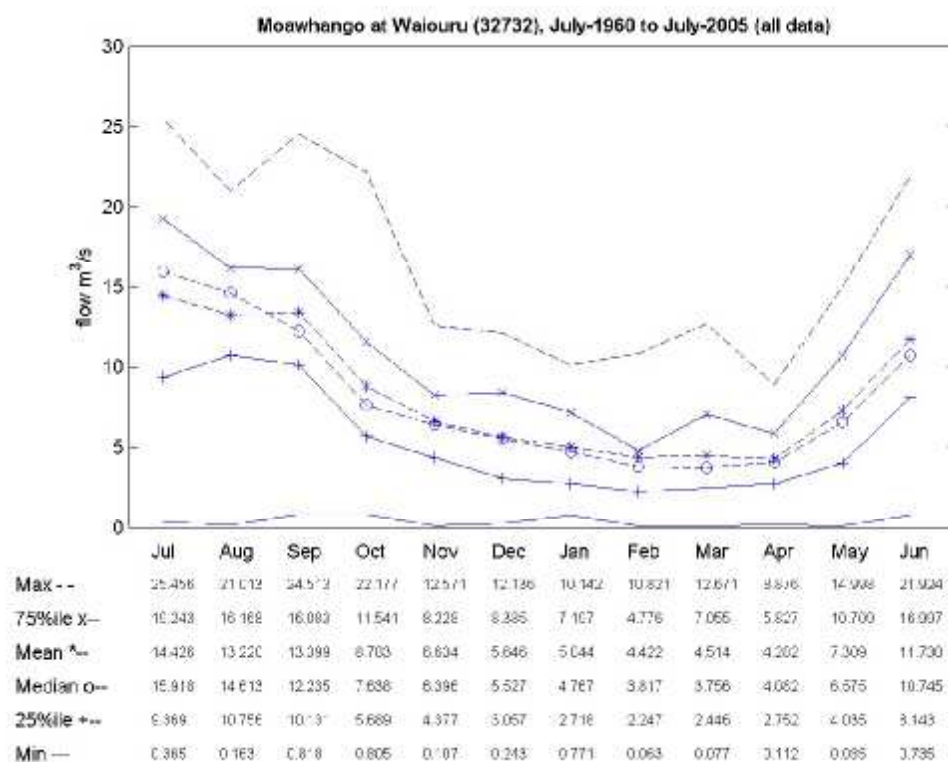


#### 4.3.11. Moawhango at Waiouru (32732), Jul-1960 to Jul-2005 (all data)

Site		Moawhango at Waiouru	
Time series details	Data Start Time	17-Nov-59	
	Data End Time	13-Jan-06	
	Analysis Start time	1-Jul-60	
	Analysis End time	1-Jul-05	
	Years of record analysed	45	
	Gaps in the data (% of record).	52.11	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	8.216	
	MALF	1.902	
	½ median	3.047	1.833
	3x median	18.282	10.998
	MAF	101.47	
Flow variability percentiles	0 (maximum recorded flow)	173.784	173.784
	10	16.992	9.767
	20	12.386	7.007
	25 (upper quartile flow)	10.957	6.126
	30	9.759	5.475
	40	7.826	4.449
	50 (median flow)	6.094	3.666
	60	4.654	3.151
	70	3.497	2.604
	75 (lower quartile flow)	3.043	2.29
	80	2.548	1.994
	90	0.878	0.854
	91	0.852	0.842
	92	0.838	0.831
	93	0.816	0.814
	94	0.785	0.778
	95	0.743	0.513
	96	0.203	0.117
	97	0.11	0.087
	98	0.079	0.065
	99	0.063	0.054
	100 (minimum recorded flow)	0.005	0.005

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	53.349	
	MAF/median	16.651	
	FRE3 (floods/year or season)	6.857	6.908
	STD Annual FRE3	2.969	4.051
	Mean Days of Accrual (days)	43.706	41.216
	STD Accrual (days)	54.396	39.508
	Min Accrual (days)	5	5
	Max Accrual (days)	300	180

### Seasonal Distribution of Mean Monthly Flows

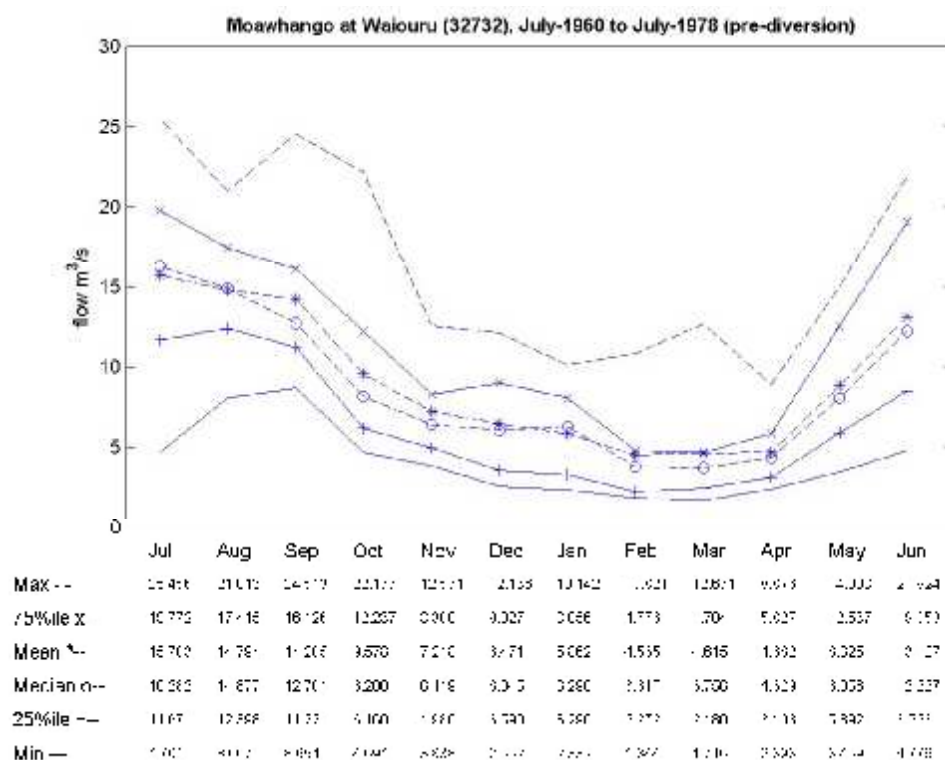


#### 4.3.12. Moawhango at Waouru (32732), Jul-1960 to Jul-1978 (pre-diversion)

Site		Moawhango at Waouru	
Time series details	Data Start Time	17-Nov-59	
	Data End Time	1-Apr-79	
	Analysis Start time	1-Jul-60	
	Analysis End time	1-Jul-78	
	Years of record analysed	18	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	9.162	
	MALF	2.084	
	½ median	3.522	2.018
	3x median	21.129	12.108
	MAF	102.84	
Flow variability percentiles	0 (maximum recorded flow)	173.784	173.784
	10	17.751	10.149
	20	13.186	7.4
	25 (upper quartile flow)	11.699	6.598
	30	10.564	5.873
	40	8.666	4.872
	50 (median flow)	7.043	4.036
	60	5.594	3.488
	70	4.359	3.069
	75 (lower quartile flow)	3.829	2.822
	80	3.391	2.6
	90	2.577	2.092
	91	2.478	2.025
	92	2.378	1.956
	93	2.277	1.89
	94	2.172	1.835
	95	2.09	1.796
	96	1.955	1.75
	97	1.835	1.709
	98	1.752	1.673
	99	1.67	1.604
	100 (minimum recorded flow)	0.366	0.671

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	49.347	
	MAF/median	14.602	
	FRE3 (floods/year or season)	6.389	5.595
	STD Annual FRE3	2.726	3.746
	Mean Days of Accrual (days)	50.789	48.453
	STD Accrual (days)	61.932	43.862
	Min Accrual (days)	5	5
	Max Accrual (days)	301	180

### Seasonal Distribution of Mean Monthly Flows

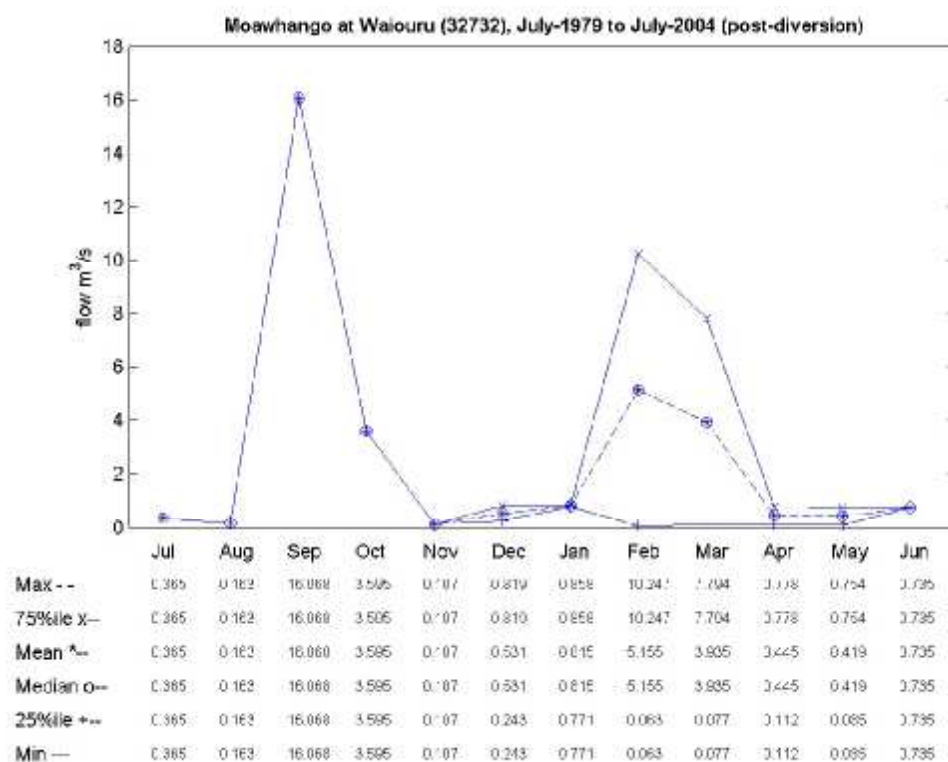


#### 4.3.13. Moawhango at Waioru (32732), Jul-1979 to Jul-2004 (post-diversion)

Site		Moawhango at Waioru	
Time series details	Data Start Time	1-Apr-79	
	Data End Time	1-Dec-04	
	Analysis Start time	1-Jul-79	
	Analysis End time	1-Jul-04	
	Years of record analysed	25	
	Gaps in the data (% of record).	93.79	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	2.333	
	MALF	0.614	
	½ median	0.113	0.087
	3x median	0.675	0.522
	MAF		
Flow variability percentiles	0 (maximum recorded flow)	126.846	126.846
	10	4.632	0.999
	20	0.858	0.859
	25 (upper quartile flow)	0.838	0.843
	30	0.806	0.827
	40	0.759	0.782
	50 (median flow)	0.225	0.174
	60	0.119	0.104
	70	0.09	0.082
	75 (lower quartile flow)	0.078	0.073
	80	0.072	0.064
	90	0.06	0.049
	91	0.059	0.047
	92	0.057	0.046
	93	0.056	0.044
	94	0.055	0.043
	95	0.053	0.041
	96	0.048	0.04
	97	0.043	0.038
	98	0.038	0.037
	99	0.033	0.035
	100 (minimum recorded flow)	0.005	0.005

Season		1 July to 30 June	1 Nov to 30 April
Biological	MAF/MALF	0	
disturbance	MAF/median	0	
indicators	FRE3 (floods/year or season)	3.992	6.021
	STD Annual FRE3	0	0
	Mean Days of Accrual (days)	52.333	39
	STD Accrual (days)	11.719	0
	Min Accrual (days)	39	39
	Max Accrual (days)	61	39

### Seasonal Distribution of Mean Monthly Flows



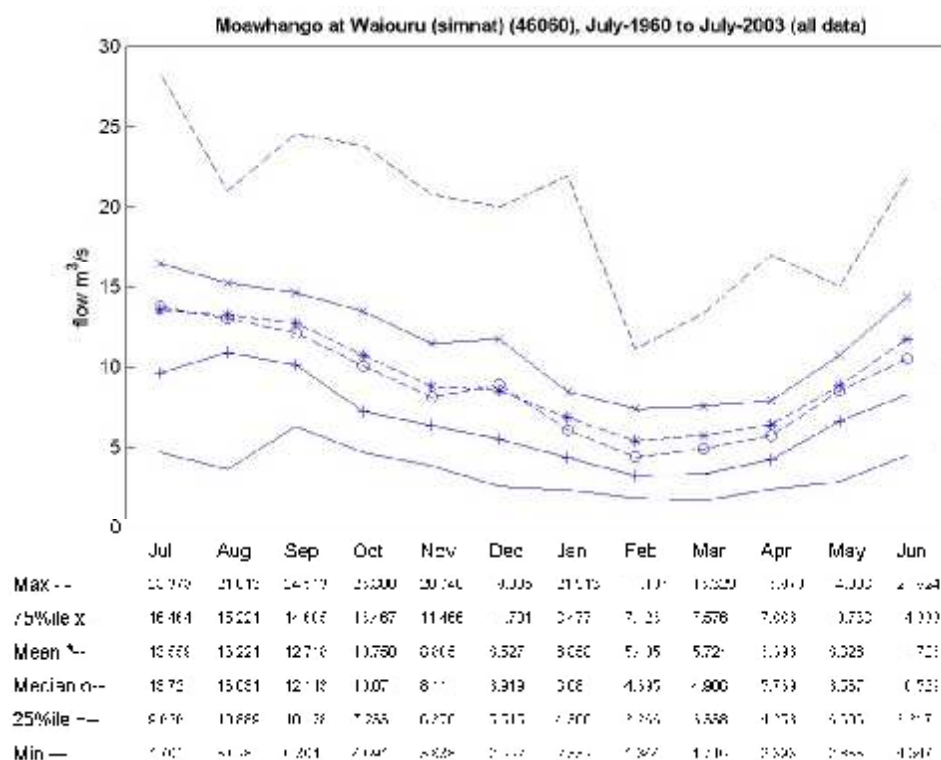
#### 4.3.14. Moawhango at Waouru (sim natural) (46060), Jul-1960 to Jul-2003 (all data)

Site		Moawhango at Waouru (sim natural)	
Time series details	Data Start Time	17-Nov-59	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-60	
	Analysis End time	1-Jul-03	
	Years of record analysed	43	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	9.401	
	MALF	2.26	
	½ median	3.602	2.453
	3x median	21.609	14.718
	MAF	96.065	
Flow variability percentiles	0 (maximum recorded flow)	156.762	152.499
	10	18.052	13.323
	20	13.303	9.342
	25 (upper quartile flow)	11.826	8.151
	30	10.652	7.231
	40	8.772	5.902
	50 (median flow)	7.203	4.906
	60	5.892	4.094
	70	4.699	3.526
	75 (lower quartile flow)	4.182	3.286
	80	3.755	3.043
	90	2.952	2.439
	91	2.847	2.366
	92	2.746	2.293
	93	2.652	2.223
	94	2.539	2.146
	95	2.416	2.075
	96	2.286	1.974
	97	2.142	1.859
	98	1.975	1.773
	99	1.774	1.687
	100 (minimum recorded flow)	0.654	0.654



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	42.507	
	MAF/median	13.337	
	FRE3 (floods/year or season)	7.976	8.902
	STD Annual FRE3	3.187	5.107
	Mean Days of Accrual (days)	42.273	31.856
	STD Accrual (days)	47.562	34.14
	Min Accrual (days)	5	5
	Max Accrual (days)	301	180

### Seasonal Distribution of Mean Monthly Flows

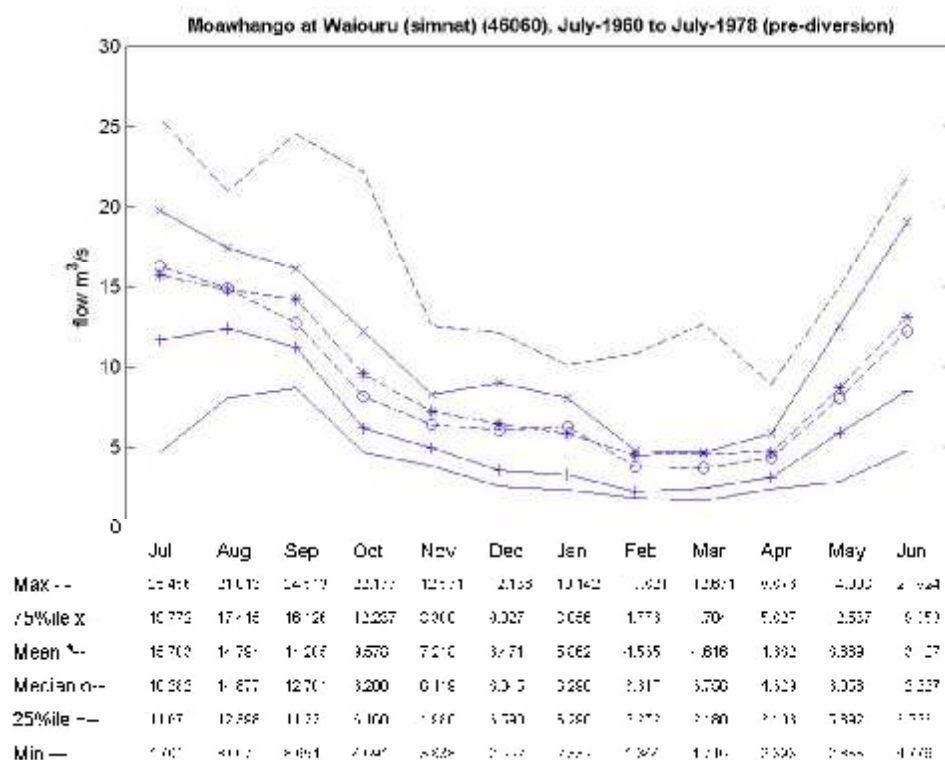


#### 4.3.15. Moawhango at Waiouru (sim natural) (46060), Jul-1960 to Jul-1978 (pre-diversion)

Site		Moawhango at Waiouru (sim natural)	
Time series details	Data Start Time	17-Nov-59	
	Data End Time	1-Apr-79	
	Analysis Start time	1-Jul-60	
	Analysis End time	1-Jul-78	
	Years of record analysed	18	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	9.149	
	MALF	2.081	
	½ median	3.519	2.013
	3x median	21.111	12.075
	MAF	93.696	
Flow variability percentiles	0 (maximum recorded flow)	143.655	143.655
	10	17.771	10.105
	20	13.188	7.386
	25 (upper quartile flow)	11.707	6.573
	30	10.564	5.864
	40	8.67	4.855
	50 (median flow)	7.037	4.025
	60	5.563	3.481
	70	4.314	3.062
	75 (lower quartile flow)	3.796	2.821
	80	3.365	2.597
	90	2.565	2.089
	91	2.464	2.022
	92	2.366	1.954
	93	2.27	1.888
	94	2.169	1.836
	95	2.087	1.796
	96	1.955	1.751
	97	1.836	1.71
	98	1.752	1.673
	99	1.671	1.605
	100 (minimum recorded flow)	1.472	1.472

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	45.025	
	MAF/median	13.315	
	FRE3 (floods/year or season)	6.389	5.595
	STD Annual FRE3	2.726	3.746
	Mean Days of Accrual (days)	50.781	48.453
	STD Accrual (days)	61.916	43.862
	Min Accrual (days)	5	5
	Max Accrual (days)	301	180

### Seasonal Distribution of Mean Monthly Flows

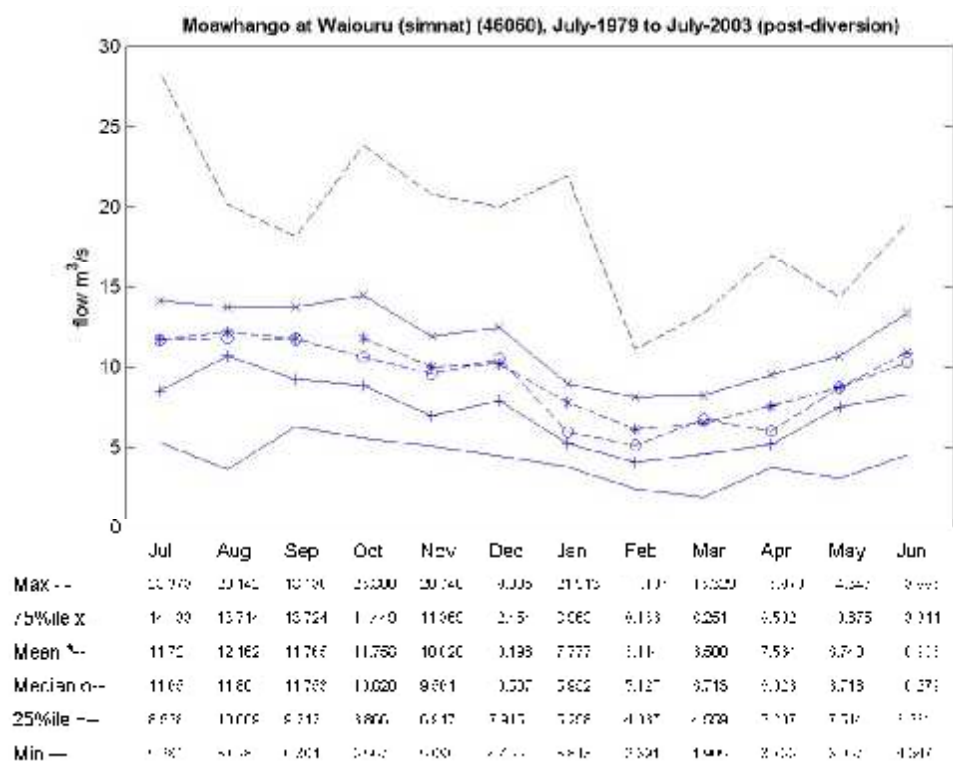


#### 4.3.16. Moawhango at Waouru (sim natural) (46060), Jul-1979 to Jul-2003 (post-diversion)

Site		Moawhango at Waouru (sim natural)	
Time series details	Data Start Time	1-Apr-79	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-79	
	Analysis End time	1-Jul-03	
	Years of record analysed	24	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	9.624	
	MALF	2.423	
	½ median	3.672	2.845
	3x median	22.032	17.067
	MAF	98.764	
Flow variability percentiles	0 (maximum recorded flow)	156.762	152.499
	10	18.336	15.803
	20	13.456	10.986
	25 (upper quartile flow)	11.969	9.653
	30	10.787	8.509
	40	8.904	6.853
	50 (median flow)	7.344	5.689
	60	6.1	4.696
	70	4.964	3.99
	75 (lower quartile flow)	4.445	3.704
	80	4.014	3.434
	90	3.254	2.866
	91	3.17	2.804
	92	3.085	2.736
	93	2.997	2.652
	94	2.89	2.571
	95	2.788	2.482
	96	2.662	2.391
	97	2.521	2.29
	98	2.371	2.178
	99	2.179	2.046
	100 (minimum recorded flow)	1.704	1.704

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	40.761	
	MAF/median	13.448	
	FRE3 (floods/year or season)	9.166	11.417
	STD Annual FRE3	2.971	4.218
	Mean Days of Accrual (days)	36.787	25.697
	STD Accrual (days)	33.458	22.884
	Min Accrual (days)	5	5
	Max Accrual (days)	201	100

### Seasonal Distribution of Mean Monthly Flows

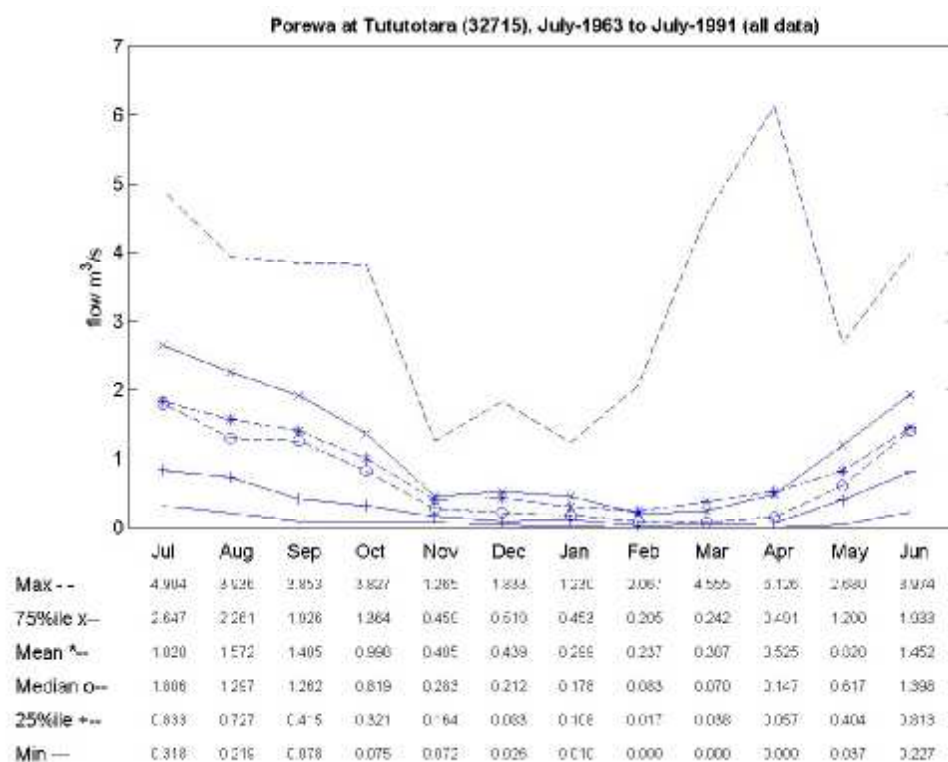


#### 4.3.17. Porewa at Tututotara (32715), Jul-1963 to Jul-1991 (all data)

Site		Porewa at Tututotara	
Time series details	Data Start Time	25-Mar-63	
	Data End Time	30-Jul-91	
	Analysis Start time	1-Jul-63	
	Analysis End time	1-Jul-91	
	Years of record analysed	28	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.868	
	MALF	0.001	
	½ median	0.114	0.029
	3x median	0.684	0.171
	MAF	28.504	
Flow variability percentiles	0 (maximum recorded flow)	105.351	105.351
	10	1.932	0.616
	20	0.958	0.272
	25 (upper quartile flow)	0.732	0.201
	30	0.577	0.156
	40	0.362	0.094
	50 (median flow)	0.228	0.057
	60	0.139	0.032
	70	0.074	0.016
	75 (lower quartile flow)	0.047	0.009
	80	0.028	0.005
	90	0.006	0.003
	91	0.006	0.002
	92	0.005	0.002
	93	0.004	0.002
	94	0.004	0.002
	95	0.003	0.001
	96	0.003	0.001
	97	0.002	0.001
	98	0.001	0.001
	99	0.001	0
	100 (minimum recorded flow)	0	0

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	28504	
	MAF/median	125.018	
	FRE3 (floods/year or season)	10.285	12.235
	STD Annual FRE3	2.914	3.103
	Mean Days of Accrual (days)	24.344	19.311
	STD Accrual (days)	28.21	17.996
	Min Accrual (days)	5	5
	Max Accrual (days)	186	101

### Seasonal Distribution of Mean Monthly Flows



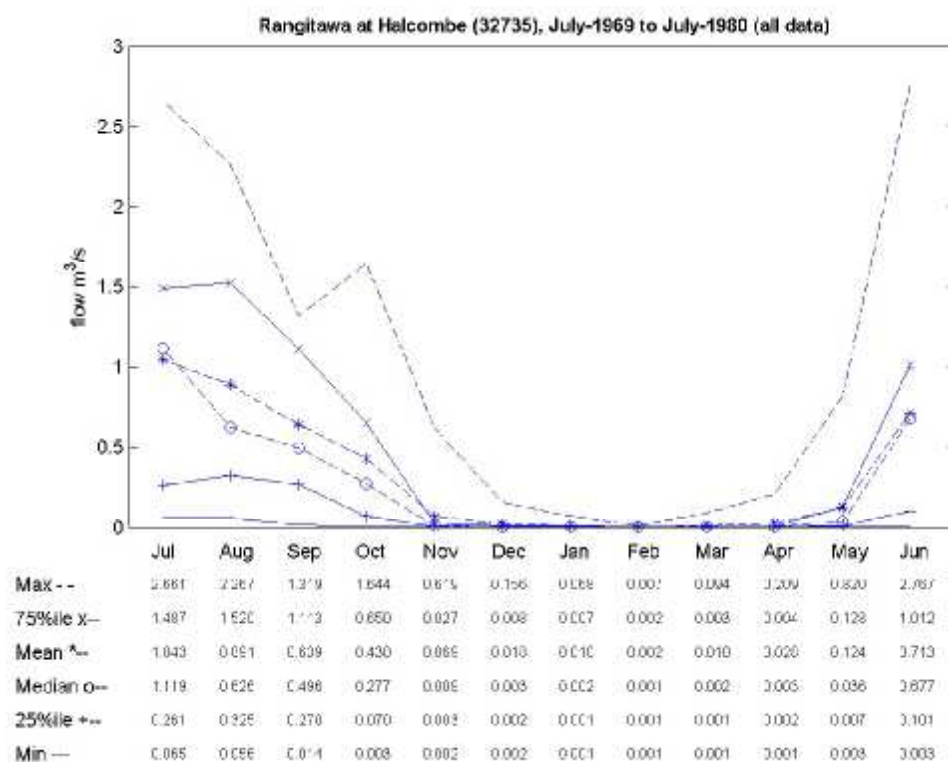
#### 4.3.18. Rangitawa at Halcombe (32735), Jul-1969 to Jul-1980 (all data)

Site		Rangitawa at Halcombe	
Time series details	Data Start Time	25-Mar-69	
	Data End Time	7-Oct-80	
	Analysis Start time	1-Jul-69	
	Analysis End time	1-Jul-80	
	Years of record analysed	11	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.333	
	MALF	0.001	
	½ median	0.003	0.001
	3x median	0.015	0.006
	MAF	36.027	
Flow variability percentiles	0 (maximum recorded flow)	80.793	37.654
	10	0.578	0.008
	20	0.146	0.005
	25 (upper quartile flow)	0.079	0.004
	30	0.04	0.003
	40	0.01	0.003
	50 (median flow)	0.005	0.002
	60	0.004	0.002
	70	0.003	0.002
	75 (lower quartile flow)	0.002	0.002
	80	0.002	0.001
	90	0.001	0.001
	91	0.001	0.001
	92	0.001	0.001
	93	0.001	0.001
	94	0.001	0.001
	95	0	0.001
	96	0	0.001
	97	0	0.001
	98	0	0.001
	99	0	0
	100 (minimum recorded flow)	0	0



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	36027	
	MAF/median	7205.4	
	FRE3 (floods/year or season)	4.453	7.323
	STD Annual FRE3	1.504	3.011
	Mean Days of Accrual (days)	50.612	35.327
	STD Accrual (days)	63.38	32.748
	Min Accrual (days)	5	5
	Max Accrual (days)	273	127

### Seasonal Distribution of Mean Monthly Flows

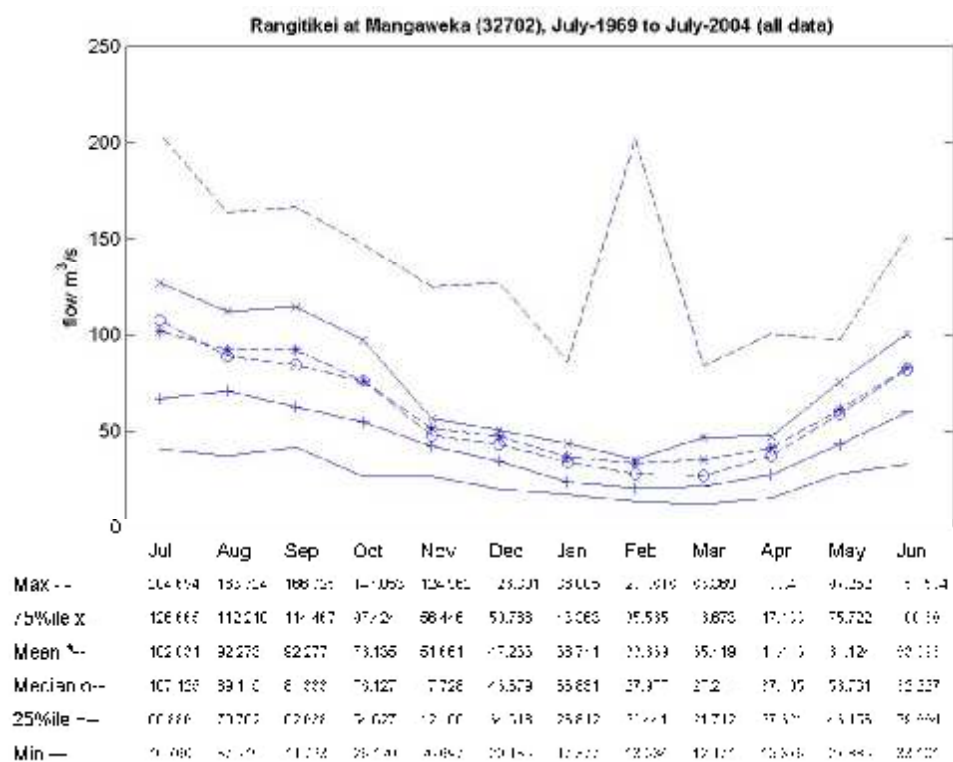


#### 4.3.19. Rangitikei at Mangaweka (32702), Jul-1969 to Jul-2004 (all data)

Site		Rangitikei at Mangaweka	
Time series details	Data Start Time	29-Apr-69	
	Data End Time	12-Apr-05	
	Analysis Start time	1-Jul-69	
	Analysis End time	1-Jul-04	
	Years of record analysed	35	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	62.939	
	MALF	13.725	
	½ median	22.519	14.247
	3x median	135.111	85.482
	MAF	720.01	
Flow variability percentiles	0 (maximum recorded flow)	2493.1	2493.1
	10	122.46	73.35
	20	87.318	51.063
	25 (upper quartile flow)	77.129	44.955
	30	68.839	40.243
	40	55.743	33.379
	50 (median flow)	45.037	28.494
	60	36.741	24.655
	70	29.772	21.461
	75 (lower quartile flow)	26.544	19.926
	80	23.661	18.454
	90	18.308	15.576
	91	17.783	15.25
	92	17.207	14.874
	93	16.63	14.437
	94	16.104	14.058
	95	15.535	13.715
	96	14.812	13.301
	97	14.032	12.754
	98	13.265	12.012
	99	12.013	11.427
	100 (minimum recorded flow)	9.038	9.038

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	52.46	
	MAF/median	15.987	
	FRE3 (floods/year or season)	8.456	8.23
	STD Annual FRE3	2.757	3.095
	Mean Days of Accrual (days)	38.375	33.787
	STD Accrual (days)	45.124	29.801
	Min Accrual (days)	5	5
	Max Accrual (days)	298	159

### Seasonal Distribution of Mean Monthly Flows

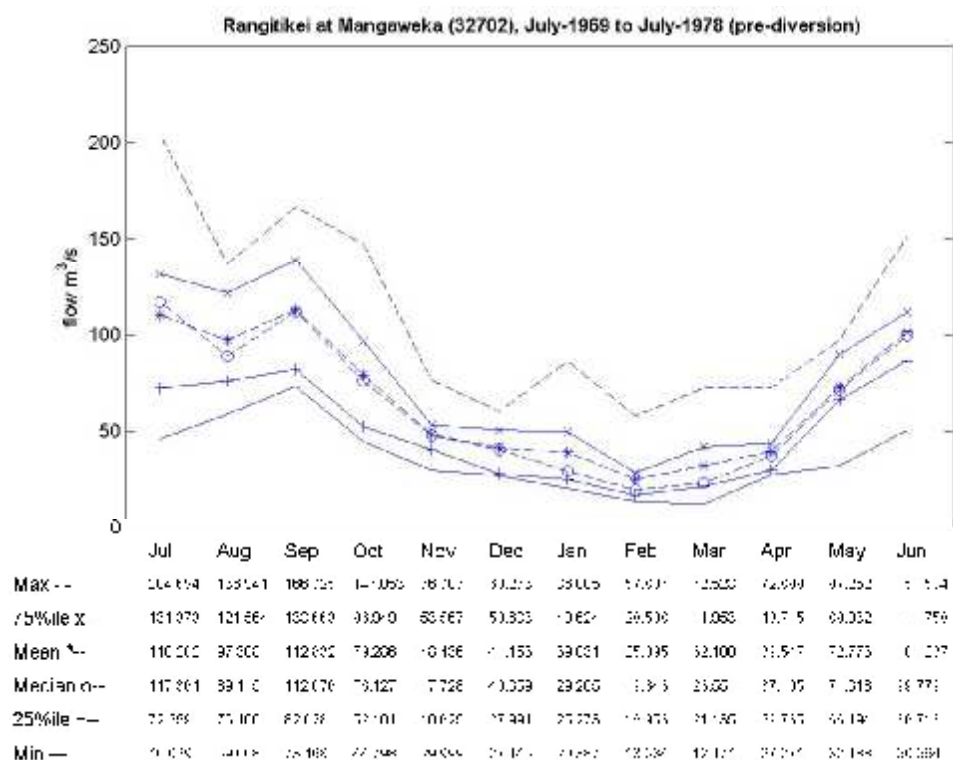


#### 4.3.20. Rangitikei at Mangaweka (32702), Jul-1969 to Jul-1978 (pre-diversion)

Site		Rangitikei at Mangaweka	
Time series details	Data Start Time	29-Apr-69	
	Data End Time	1-Apr-79	
	Analysis Start time	1-Jul-69	
	Analysis End time	1-Jul-78	
	Years of record analysed	9	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	66.809	
	MALF	13.347	
	½ median	25.019	13.633
	3x median	150.114	81.798
	MAF	710.41	
Flow variability percentiles	0 (maximum recorded flow)	906.259	783.943
	10	130.757	67.933
	20	92.971	48.507
	25 (upper quartile flow)	82.944	42.904
	30	74.64	38.411
	40	61.406	31.7
	50 (median flow)	50.038	27.266
	60	40.025	23.584
	70	30.612	20.408
	75 (lower quartile flow)	26.704	19.048
	80	23.342	17.758
	90	17.789	14.944
	91	17.188	14.377
	92	16.659	13.917
	93	16.171	13.612
	94	15.733	13.243
	95	14.989	12.774
	96	13.941	12.262
	97	13.264	11.853
	98	12.277	11.606
	99	11.625	11.111
	100 (minimum recorded flow)	10.496	10.496

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	53.226	
	MAF/median	14.197	
	FRE3 (floods/year or season)	7.776	7.387
	STD Annual FRE3	3.146	1.997
	Mean Days of Accrual (days)	42.414	41.447
	STD Accrual (days)	56.158	31.513
	Min Accrual (days)	5	5
	Max Accrual (days)	299	116

### Seasonal Distribution of Mean Monthly Flows

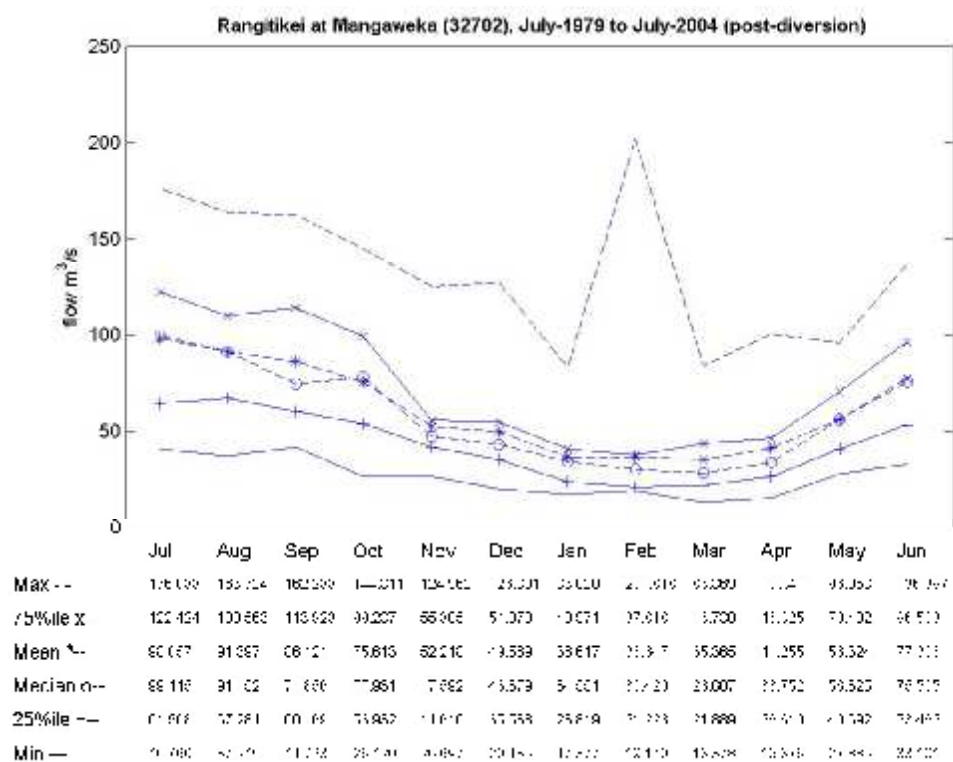


#### 4.3.21. Rangitikei at Mangaweka (32702), Jul-1979 to Jul-2004 (post-diversion)

Site		Rangitikei at Mangaweka	
Time series details	Data Start Time	1-Apr-79	
	Data End Time	12-Apr-05	
	Analysis Start time	1-Jul-79	
	Analysis End time	1-Jul-04	
	Years of record analysed	25	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	61.544	
	MALF	13.859	
	½ median	21.648	14.411
	3x median	129.888	86.463
	MAF	734.29	
Flow variability percentiles	0 (maximum recorded flow)	2493.1	2493.1
	10	119.889	74.917
	20	85.272	51.618
	25 (upper quartile flow)	75.014	45.326
	30	66.563	40.503
	40	53.508	33.718
	50 (median flow)	43.296	28.821
	60	35.655	24.893
	70	29.342	21.707
	75 (lower quartile flow)	26.297	20.222
	80	23.648	18.712
	90	18.448	15.722
	91	17.953	15.43
	92	17.401	15.069
	93	16.801	14.668
	94	16.236	14.298
	95	15.65	13.96
	96	15.004	13.567
	97	14.231	13.129
	98	13.519	12.457
	99	12.363	11.503
	100 (minimum recorded flow)	9.038	9.038

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	52.983	
	MAF/median	16.96	
	FRE3 (floods/year or season)	8.639	8.539
	STD Annual FRE3	2.674	3.443
	Mean Days of Accrual (days)	37.742	32.289
	STD Accrual (days)	43.093	29.377
	Min Accrual (days)	5	5
	Max Accrual (days)	230	159

### Seasonal Distribution of Mean Monthly Flows



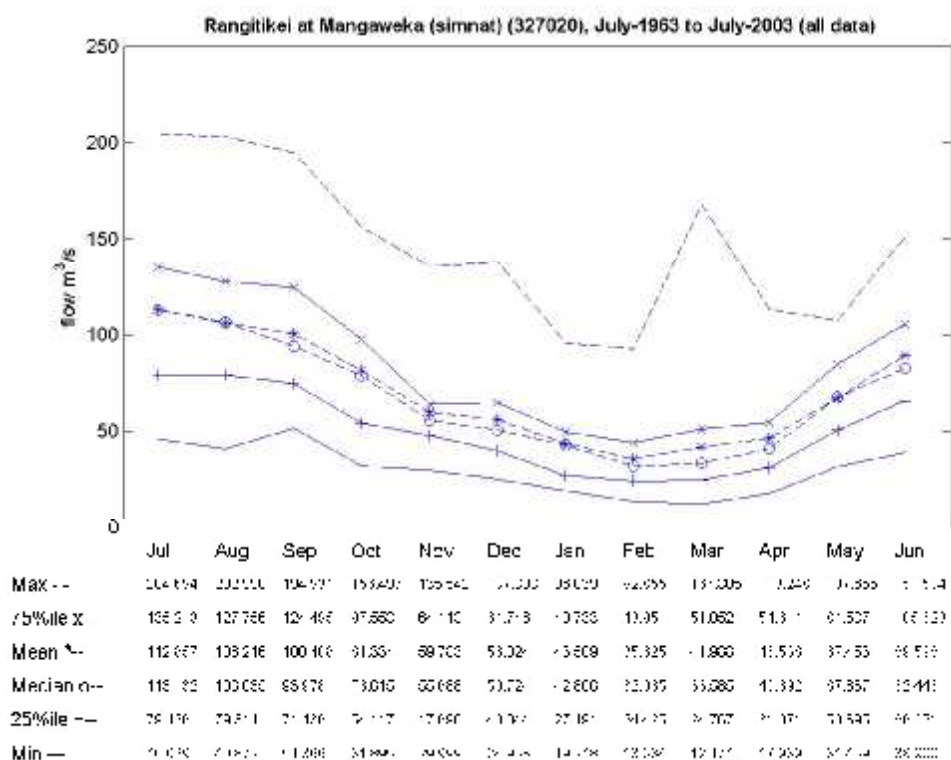
#### 4.3.22. Rangitikei at Mangaweka (sim natural) (327020), Jul-1963 to Jul-2003 (all data)

Site		Rangitikei at Mangaweka (sim natural)	
Time series details	Data Start Time	4-May-63	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-63	
	Analysis End time	1-Jul-03	
	Years of record analysed	40	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	70.328	
	MALF	15.754	
	½ median	26.173	16.956
	3x median	157.035	101.736
	MAF	692.44	
Flow variability percentiles	0 (maximum recorded flow)	1225	1101
	10	136.031	85.633
	20	98.2	60.481
	25 (upper quartile flow)	86.948	53.438
	30	78.083	47.868
	40	63.809	40.072
	50 (median flow)	52.345	33.912
	60	43.061	28.983
	70	35.173	24.839
	75 (lower quartile flow)	31.337	23.045
	80	27.659	21.297
	90	21.108	17.568
	91	20.445	17.119
	92	19.78	16.702
	93	19.059	16.301
	94	18.326	15.902
	95	17.558	15.394
	96	16.692	14.696
	97	15.901	13.947
	98	14.682	13.252
	99	13.263	12.153
	100 (minimum recorded flow)	10.518	10.518



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	43.953	
	MAF/median	13.228	
	FRE3 (floods/year or season)	8.099	8.361
	STD Annual FRE3	2.77	3.427
	Mean Days of Accrual (days)	40.809	34.01
	STD Accrual (days)	48.439	30.992
	Min Accrual (days)	5	5
	Max Accrual (days)	325	159

### Seasonal Distribution of Mean Monthly Flows

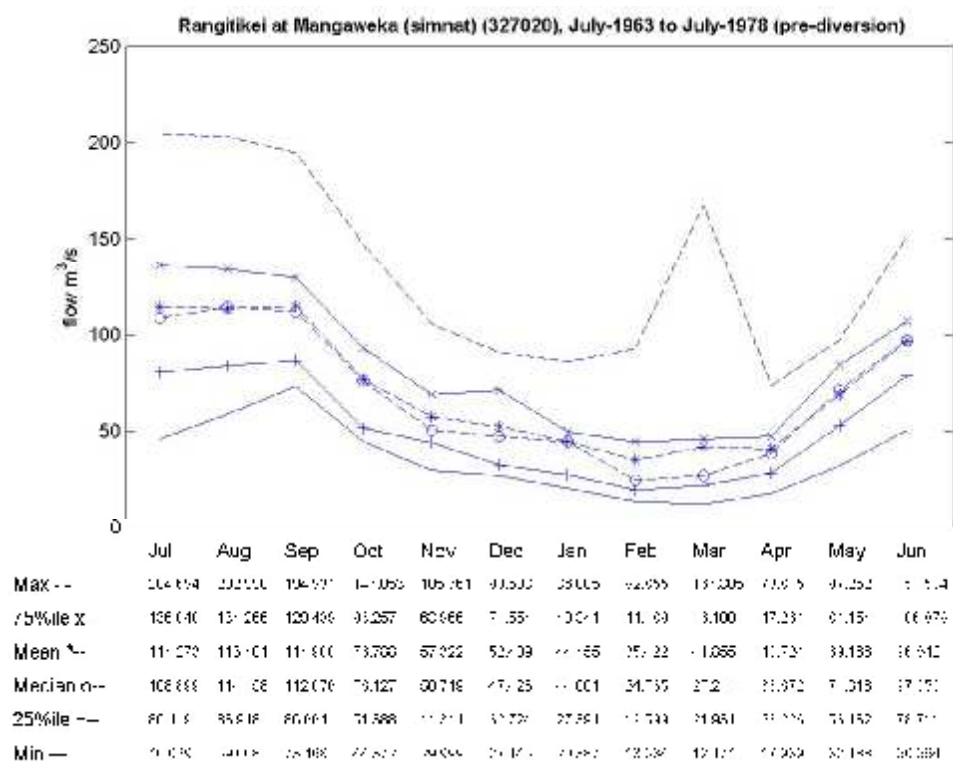


#### 4.3.23. Rangitikei at Mangaweka (sim natural) (327020), Jul-1963 to Jul-1978 (pre-diversion)

Site		Rangitikei at Mangaweka (sim natural)	
Time series details	Data Start Time	4-May-63	
	Data End Time	1-Apr-79	
	Analysis Start time	1-Jul-63	
	Analysis End time	1-Jul-78	
	Years of record analysed	15	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	71.664	
	MALF	14.599	
	½ median	26.937	15.961
	3x median	161.619	95.763
	MAF	721.46	
Flow variability percentiles	0 (maximum recorded flow)	1101	1101
	10	140.475	82.044
	20	99.649	58.796
	25 (upper quartile flow)	88.336	51.704
	30	79.607	46.287
	40	65.764	38.069
	50 (median flow)	53.873	31.921
	60	43.662	26.84
	70	34.441	22.879
	75 (lower quartile flow)	30.197	21.047
	80	26.076	19.355
	90	19.392	15.886
	91	18.661	15.488
	92	17.977	14.971
	93	17.248	14.31
	94	16.503	13.872
	95	15.901	13.475
	96	15.021	13.059
	97	13.906	12.534
	98	13.054	11.902
	99	11.917	11.478
	100 (minimum recorded flow)	10.518	10.518

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	49.418	
	MAF/median	13.392	
	FRE3 (floods/year or season)	7.998	7.923
	STD Annual FRE3	2.824	3.264
	Mean Days of Accrual (days)	41.345	37.426
	STD Accrual (days)	54.487	33.944
	Min Accrual (days)	5	5
	Max Accrual (days)	325	134

### Seasonal Distribution of Mean Monthly Flows

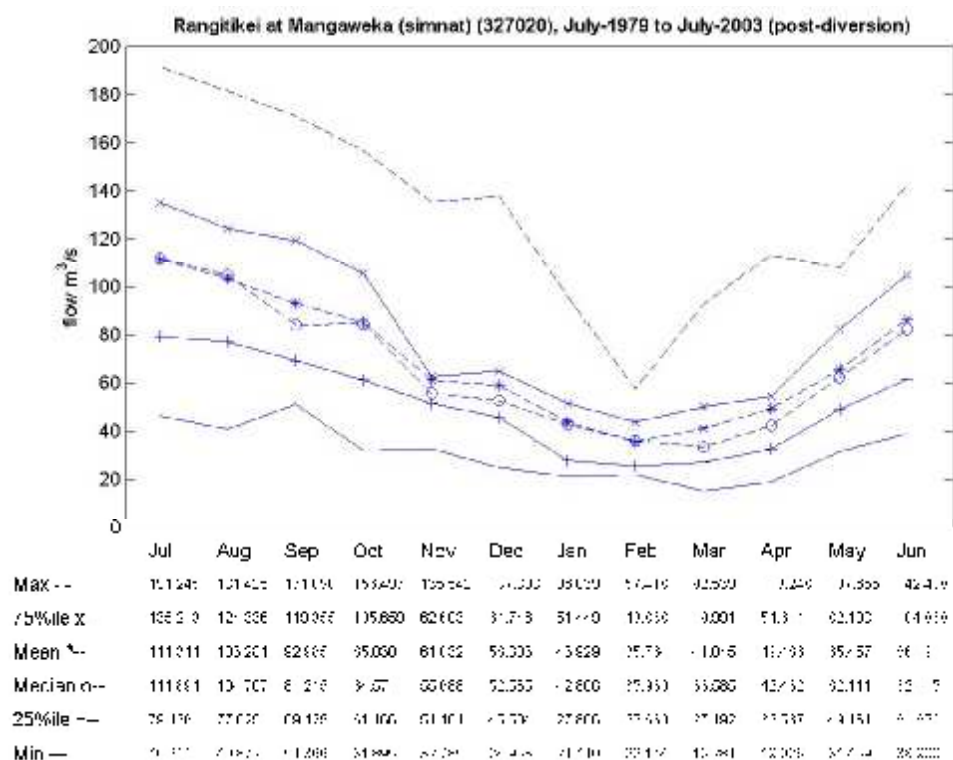


#### 4.3.24. Rangitikei at Mangaweka (sim natural) (327020), Jul-1979 to Jul-2003 (post-diversion)

Site		Rangitikei at Mangaweka (sim natural)	
Time series details	Data Start Time	1-Apr-79	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-79	
	Analysis End time	1-Jul-03	
	Years of record analysed	24	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	69.755	
	MALF	16.557	
	½ median	25.778	17.519
	3x median	154.668	105.111
	MAF	685.92	
Flow variability percentiles	0 (maximum recorded flow)	1225	1004
	10	134.202	87.396
	20	97.74	61.515
	25 (upper quartile flow)	86.585	54.412
	30	77.496	48.706
	40	62.935	41.027
	50 (median flow)	51.556	35.037
	60	42.788	30.208
	70	35.395	26.12
	75 (lower quartile flow)	31.833	24.242
	80	28.423	22.495
	90	22.18	18.933
	91	21.563	18.549
	92	20.914	18.108
	93	20.256	17.647
	94	19.565	17.192
	95	18.843	16.759
	96	18.052	16.293
	97	17.152	15.731
	98	16.245	14.911
	99	14.88	13.843
	100 (minimum recorded flow)	11.123	11.123

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	41.428	
	MAF/median	13.304	
	FRE3 (floods/year or season)	8.249	8.477
	STD Annual FRE3	2.877	3.929
	Mean Days of Accrual (days)	39.779	32.861
	STD Accrual (days)	44.011	29.882
	Min Accrual (days)	5	5
	Max Accrual (days)	230	159

### Seasonal Distribution of Mean Monthly Flows

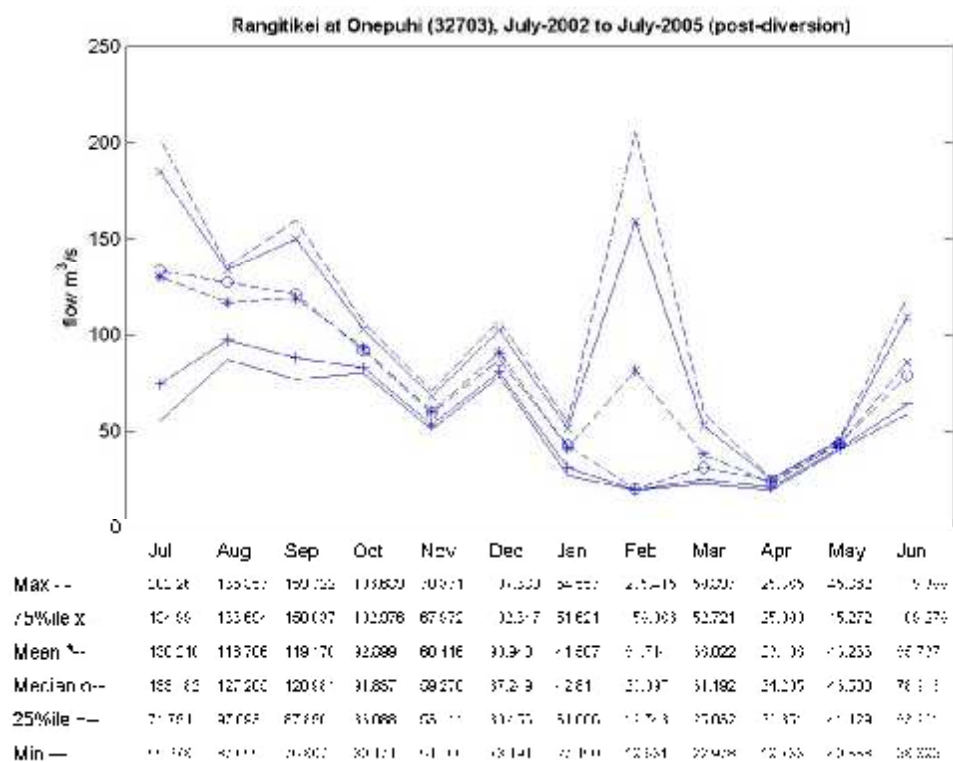


#### 4.3.25. Rangitikei at Onepuhi (32703), Jul-2002 to Jul-2005 (post-diversion)

Site		Rangitikei at Onepuhi	
Time series details	Data Start Time	19-Feb-02	
	Data End Time	11-Jul-05	
	Analysis Start time	1-Jul-02	
	Analysis End time	1-Jul-05	
	Years of record analysed	3	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	77.106	
	MALF	15.375	
	½ median	26.637	16.319
	3x median	159.822	97.914
	MAF	1095.8	
Flow variability percentiles	0 (maximum recorded flow)	1496	1496
	10	158.281	106.687
	20	106.86	69.118
	25 (upper quartile flow)	93.667	59.883
	30	82.846	53.12
	40	65.607	42.506
	50 (median flow)	53.274	32.638
	60	40.998	26.175
	70	30.731	22.657
	75 (lower quartile flow)	27.039	20.755
	80	24.26	19.283
	90	18.651	16.171
	91	18.059	15.976
	92	17.41	15.784
	93	16.902	15.601
	94	16.42	15.399
	95	16.08	15.172
	96	15.709	14.924
	97	15.343	14.643
	98	14.855	14.302
	99	14.305	13.852
	100 (minimum recorded flow)	12.986	12.986

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	71.272	
	MAF/median	20.569	
	FRE3 (floods/year or season)	7.997	9.391
	STD Annual FRE3	0.988	4.157
	Mean Days of Accrual (days)	31.08	26.933
	STD Accrual (days)	37.154	24.013
	Min Accrual (days)	5	5
	Max Accrual (days)	153	73

### Seasonal Distribution of Mean Monthly Flows



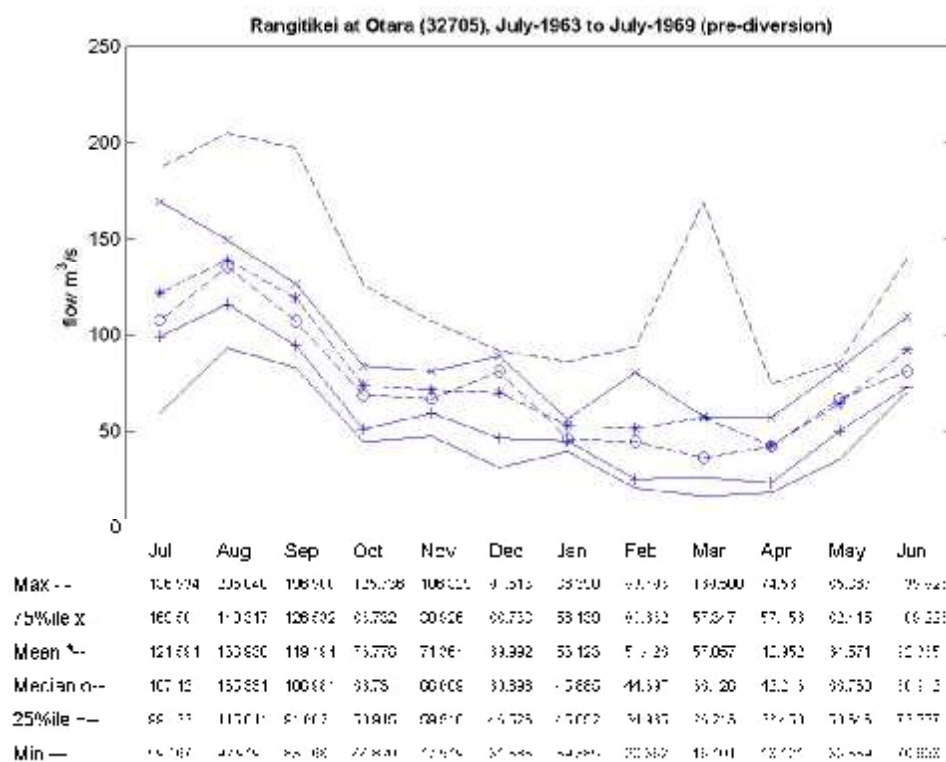
#### 4.3.26. Rangitikei at Otara (32705), Jul-1963 to Jul-1969 (pre-diversion)

Site		Rangitikei at Otara	
Time series details	Data Start Time	4-May-63	
	Data End Time	21-Aug-69	
	Analysis Start time	1-Jul-63	
	Analysis End time	1-Jul-69	
	Years of record analysed	6	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	79.856	
	MALF	16.684	
	½ median	30.12	20.693
	3x median	180.717	124.158
	MAF	929.23	
Flow variability percentiles	0 (maximum recorded flow)	1135.5	1135.5
	10	155.467	104.977
	20	110.907	73.599
	25 (upper quartile flow)	98.145	65.679
	30	87.821	58.774
	40	73.32	48.755
	50 (median flow)	60.239	41.386
	60	49.718	35.295
	70	40.781	29.753
	75 (lower quartile flow)	36.301	26.164
	80	32.182	23.715
	90	23.087	18.987
	91	22.346	18.174
	92	21.685	17.624
	93	20.831	16.68
	94	20.041	15.96
	95	18.977	15.262
	96	17.673	14.387
	97	15.993	14.023
	98	14.424	13.305
	99	13.33	12.858
	100 (minimum recorded flow)	11.263	11.263



Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	55.696	
	MAF/median	15.426	
	FRE3 (floods/year or season)	7.83	8.728
	STD Annual FRE3	1.321	2.754
	Mean Days of Accrual (days)	43.391	36.333
	STD Accrual (days)	44.753	33.733
	Min Accrual (days)	5	6
	Max Accrual (days)	200	134

### Seasonal Distribution of Mean Monthly Flows

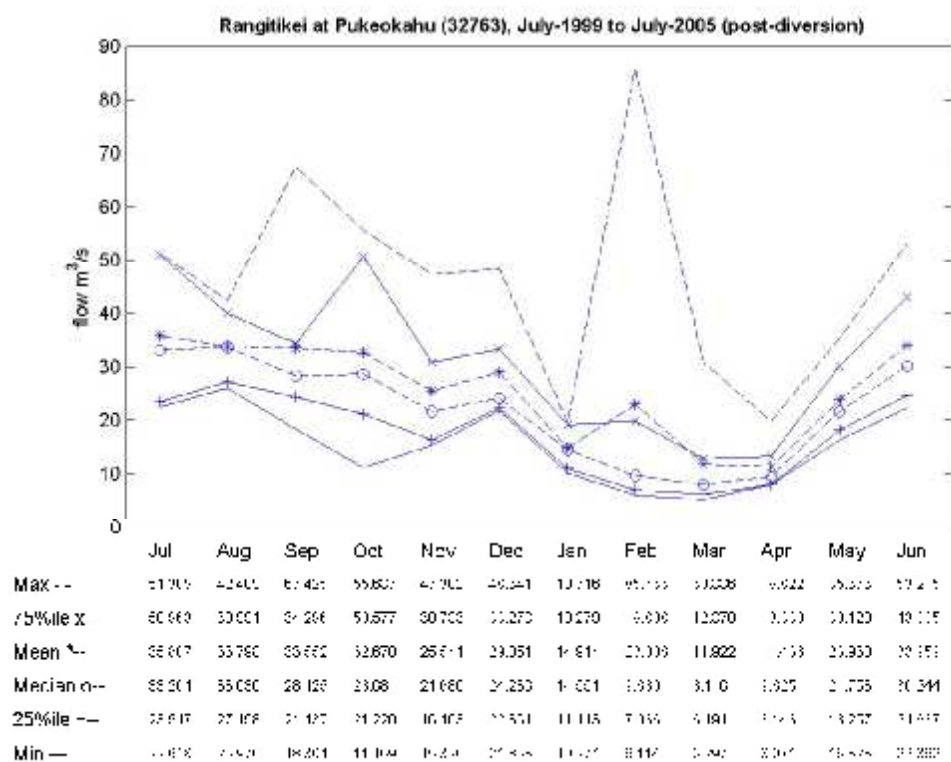


#### 4.3.27. Rangitikei at Pukeokahu (32763), Jul-1999 to Jul-2005 (post-diversion)

Site		Rangitikei at Pukeokahu	
Time series details	Data Start Time	16-Mar-99	
	Data End Time	17-Oct-05	
	Analysis Start time	1-Jul-99	
	Analysis End time	1-Jul-05	
	Years of record analysed	6	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	25.839	
	MALF	5.25	
	½ median	8.689	5.984
	3x median	52.134	35.901
	MAF	727.52	
Flow variability percentiles	0 (maximum recorded flow)	1463.2	1463.2
	10	48.498	33.229
	20	33.812	22.564
	25 (upper quartile flow)	29.431	19.541
	30	25.951	17.274
	40	20.952	14.312
	50 (median flow)	17.378	11.967
	60	14.405	9.819
	70	11.673	8.11
	75 (lower quartile flow)	10.256	7.484
	80	8.908	6.836
	90	6.756	5.81
	91	6.543	5.727
	92	6.336	5.618
	93	6.152	5.525
	94	5.963	5.397
	95	5.783	5.28
	96	5.593	5.205
	97	5.379	5.083
	98	5.18	4.922
	99	4.925	4.797
	100 (minimum recorded flow)	4.535	4.535

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	138.575	
	MAF/median	41.864	
	FRE3 (floods/year or season)	9.331	7.715
	STD Annual FRE3	1.361	4.099
	Mean Days of Accrual (days)	34.909	34.615
	STD Accrual (days)	33.044	32.908
	Min Accrual (days)	5	5
	Max Accrual (days)	147	124

### Seasonal Distribution of Mean Monthly Flows

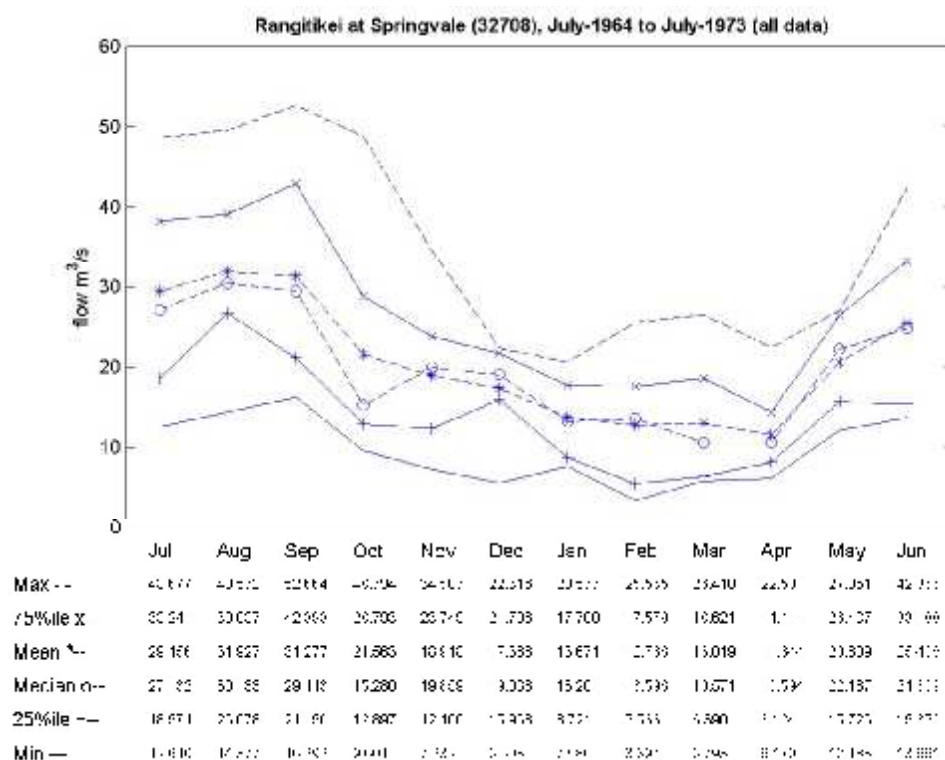


#### 4.3.28. Rangitikei at Springvale (32708), Jul-1964 to Jul-1973 (all data)

Site		Rangitikei at Springvale	
Time series details	Data Start Time	27-Sep-63	
	Data End Time	2-May-74	
	Analysis Start time	1-Jul-64	
	Analysis End time	1-Jul-73	
	Years of record analysed	9	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	20.679	
	MALF	4.806	
	½ median	6.981	5.119
	3x median	41.886	30.711
	MAF	312.41	
Flow variability percentiles	0 (maximum recorded flow)	437.309	382.206
	10	41.669	26.75
	20	27.079	17.582
	25 (upper quartile flow)	23.407	15.215
	30	20.628	13.613
	40	16.688	11.481
	50 (median flow)	13.962	10.237
	60	11.741	8.536
	70	10.1	7.291
	75 (lower quartile flow)	8.975	6.702
	80	8.011	5.951
	90	5.797	4.844
	91	5.645	4.752
	92	5.463	4.675
	93	5.239	4.61
	94	5.039	4.52
	95	4.844	4.34
	96	4.676	4.129
	97	4.518	3.878
	98	4.137	3.515
	99	3.521	3.115
	100 (minimum recorded flow)	1.783	1.783

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	65.004	
	MAF/median	22.376	
	FRE3 (floods/year or season)	10.445	9.181
	STD Annual FRE3	1.94	4.947
	Mean Days of Accrual (days)	30.817	28.745
	STD Accrual (days)	31.934	23.244
	Min Accrual (days)	5	5
	Max Accrual (days)	209	103

### Seasonal Distribution of Mean Monthly Flows

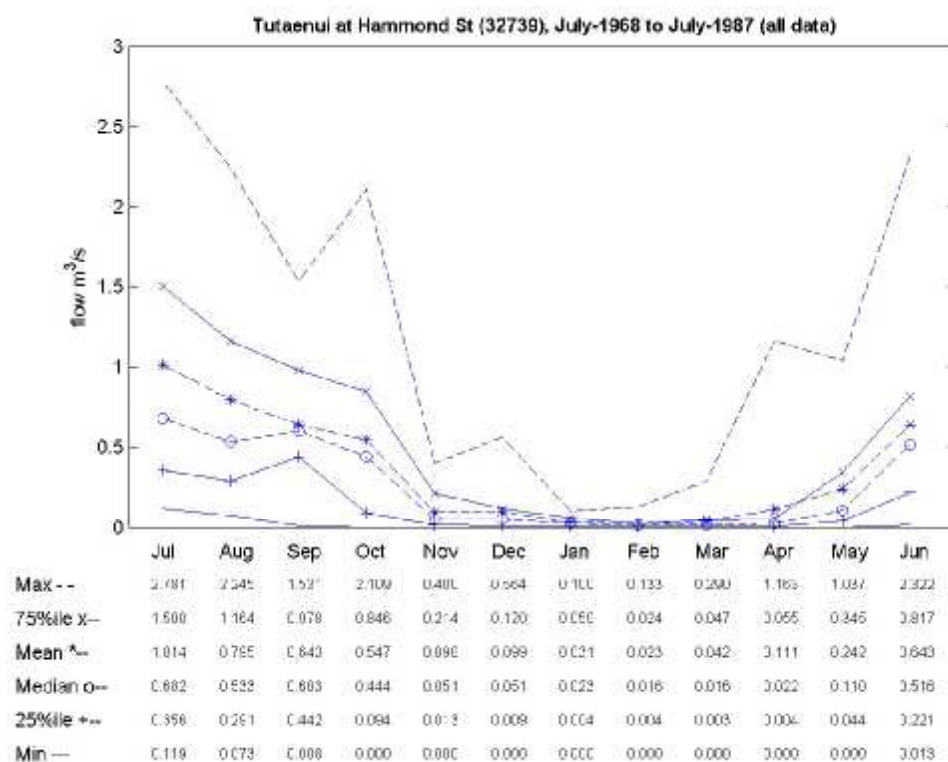


#### 4.3.29. Tutaenui at Hammond St (32739), Jul-1968 to Jul-1987 (all data)

Site		Tutaenui at Hammond St	
Time series details	Data Start Time	30-Mar-68	
	Data End Time	27-Aug-87	
	Analysis Start time	1-Jul-68	
	Analysis End time	1-Jul-87	
	Years of record analysed	19	
	Gaps in the data (% of record).	2.76	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.367	
	MALF	0.004	
	½ median	0.024	0.007
	3x median	0.144	0.042
	MAF	19.843	
Flow variability percentiles	0 (maximum recorded flow)	42.308	13.047
	10	0.911	0.107
	20	0.392	0.051
	25 (upper quartile flow)	0.277	0.042
	30	0.203	0.036
	40	0.096	0.022
	50 (median flow)	0.048	0.014
	60	0.028	0.009
	70	0.013	0.004
	75 (lower quartile flow)	0.009	0.002
	80	0.005	0.001
	90	0.002	0.001
	91	0.002	0
	92	0.001	0
	93	0.001	0
	94	0.001	0
	95	0.001	0
	96	0.001	0
	97	0.001	0
	98	0	0
	99	0	0
	100 (minimum recorded flow)	0	0

Season		1 July to 30 June	1 Nov to 30 April
Biological	MAF/MALF	3968.6	
disturbance	MAF/median	413.396	
indicators	FRE3 (floods/year or season)	5.723	6.72
	STD Annual FRE3	1.963	3.794
	Mean Days of Accrual (days)	36.704	31.731
	STD Accrual (days)	52.181	36.932
	Min Accrual (days)	5	5
	Max Accrual (days)	269	169

### Seasonal Distribution of Mean Monthly Flows



#### 4.4. Turakina and Whangaehu Catchments

The list below shows: section number in this report, site name, (site number) and full date range. The analysis date range is from the first July after the start date until the last June before the finish date.

- 3.4.1. Turakina at Otairi (33004), Jul-1991 to Jul-2004 (all data)
- 3.4.2. Turakina at SH3 Br (33003), Jul-1977 to Jul-1992 (all data)
- 3.4.3. Makotuku at SH 49A Br (33117), Jul-1968 to Jul-2005 (all data)
- 3.4.4. Mangaetoroa at School (33115), Jul-1969 to Jul-2004 (all data)
- 3.4.5. Mangawhero at Ohakune All (600), Jul-1975 to Jul-2005 (all data)
- 3.4.6. Mangawhero at Ore Ore (33111), Jul-1962 to Jul-2004 (all data)
- 3.4.7. Tokiahuru at Whangaehu Junction (33112), Jul-1980 to Jul-1993 (post-diversion)
- 3.4.8. Wahianoa at Karioi (33116), Jul-1968 to Jul-1972 (pre-diversion)
- 3.4.9. Waitangi at Tangiwai (33114), Jul-1968 to Jul-1991 (all data)
- 3.4.10. Whangaehu at Karioi (33107), Jul-1963 to Jul-2003 (all data)
- 3.4.11. Whangaehu at Karioi (33107), Jul-1963 to Jul-1978 (pre-diversion)
- 3.4.12. Whangaehu at Karioi (33107), Jul-1979 to Jul-2003 (post-diversion)
- 3.4.13. Whangaehu at Karioi (sim natural) (331070), Jul-1963 to Jul-2003 (all data)
- 3.4.14. Whangaehu at Karioi (sim natural) (331070), Jul-1963 to Jul-1978 (pre-diversion)
- 3.4.15. Whangaehu at Karioi (sim natural) (331070), Jul-1979 to Jul-2003 (post-diversion)
- 3.4.16. Whangaehu at Kauangaroa (33101), Jul-1971 to Jul-2004 (all data)
- 3.4.17. Whangaehu at Kauangaroa (33101), Jul-1971 to Jul-1978 (pre-diversion)
- 3.4.18. Whangaehu at Kauangaroa (33101), Jul-1979 to Jul-2004 (post-diversion)
- 3.4.19. Whangaehu at Kauangaroa (sim natural) (331010), Jul-1971 to Jul-1994 (all data)
- 3.4.20. Whangaehu at Kauangaroa (sim natural) (331010), Jul-1971 to Jul-1978 (pre-diversion)
- 3.4.21. Whangaehu at Kauangaroa (sim natural) (331010), Jul-1979 to Jul-1994 (post-div.)



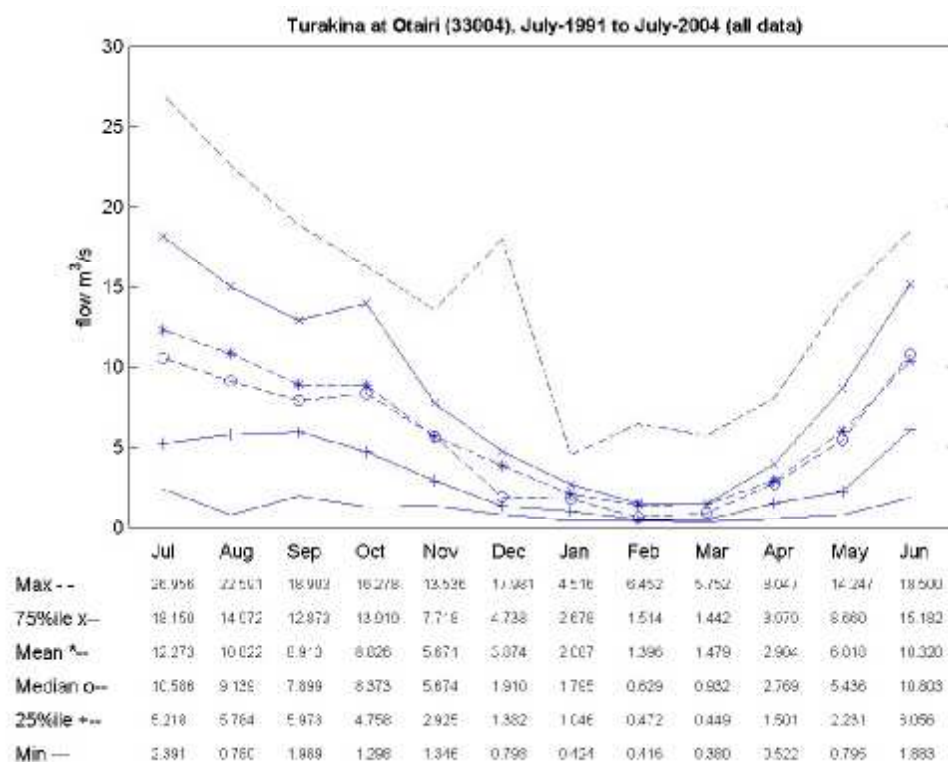


#### 4.4.1. Turakina at Otairi (33004), Jul-1991 to Jul-2004 (all data)

Site		Turakina at Otairi	
Time series details	Data Start Time	9-Apr-91	
	Data End Time	12-Apr-05	
	Analysis Start time	1-Jul-91	
	Analysis End time	1-Jul-04	
	Years of record analysed	13	
	Gaps in the data (% of record).	0.89	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	6.309	
	MALF	0.382	
	½ median	1.068	0.504
	3x median	6.405	3.021
	MAF	208.87	
Flow variability percentiles	0 (maximum recorded flow)	395.13	395.13
	10	15.138	5.645
	20	7.95	2.8
	25 (upper quartile flow)	6.051	2.187
	30	4.796	1.799
	40	3.148	1.315
	50 (median flow)	2.135	1.007
	60	1.5	0.789
	70	1.039	0.614
	75 (lower quartile flow)	0.869	0.538
	80	0.731	0.481
	90	0.477	0.39
	91	0.458	0.383
	92	0.44	0.377
	93	0.423	0.371
	94	0.407	0.365
	95	0.391	0.354
	96	0.375	0.343
	97	0.359	0.329
	98	0.342	0.306
	99	0.305	0.249
	100 (minimum recorded flow)	0.125	0.125

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	546.78	
	MAF/median	97.831	
	FRE3 (floods/year or season)	9.69	10.743
	STD Annual FRE3	1.744	4.393
	Mean Days of Accrual (days)	26.571	23.368
	STD Accrual (days)	28.92	23.731
	Min Accrual (days)	5	5
	Max Accrual (days)	177	124

### Seasonal Distribution of Mean Monthly Flows

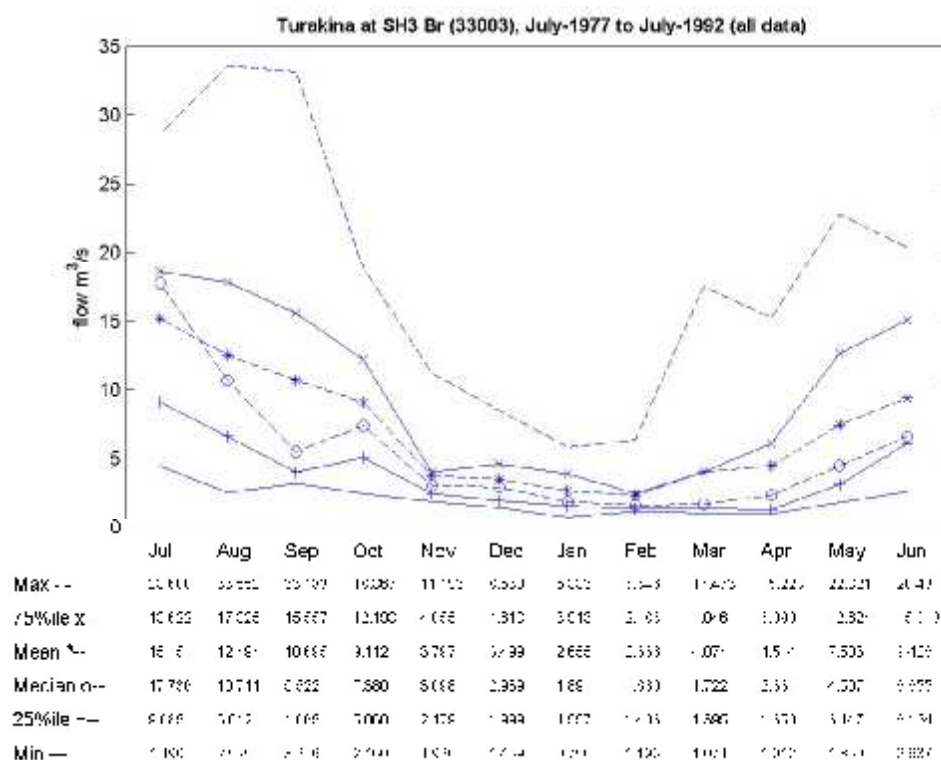


#### 4.4.2. Turakina at SH3 Br (33003), Jul-1977 to Jul-1992 (all data)

Site		Turakina at SH3 Br	
Time series details	Data Start Time	2-Feb-77	
	Data End Time	24-Jun-92	
	Analysis Start time	1-Jul-77	
	Analysis End time	1-Jul-92	
	Years of record analysed	15	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	7.194	
	MALF	0.925	
	½ median	1.467	0.844
	3x median	8.802	5.061
	MAF	233.48	
Flow variability percentiles	0 (maximum recorded flow)	372.704	294.896
	10	15.182	5.554
	20	8.287	3.368
	25 (upper quartile flow)	6.651	2.859
	30	5.446	2.513
	40	3.896	2.012
	50 (median flow)	2.934	1.687
	60	2.302	1.498
	70	1.784	1.352
	75 (lower quartile flow)	1.615	1.267
	80	1.449	1.181
	90	1.16	1.025
	91	1.128	1.009
	92	1.097	0.993
	93	1.069	0.977
	94	1.043	0.96
	95	1.015	0.942
	96	0.985	0.918
	97	0.949	0.875
	98	0.897	0.795
	99	0.797	0.698
	100 (minimum recorded flow)	0.512	0.512

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	252.411	
	MAF/median	79.577	
	FRE3 (floods/year or season)	9.132	9.67
	STD Annual FRE3	2.472	3.33
	Mean Days of Accrual (days)	30.978	28.783
	STD Accrual (days)	35.239	28.504
	Min Accrual (days)	5	5
	Max Accrual (days)	215	133

### Seasonal Distribution of Mean Monthly Flows

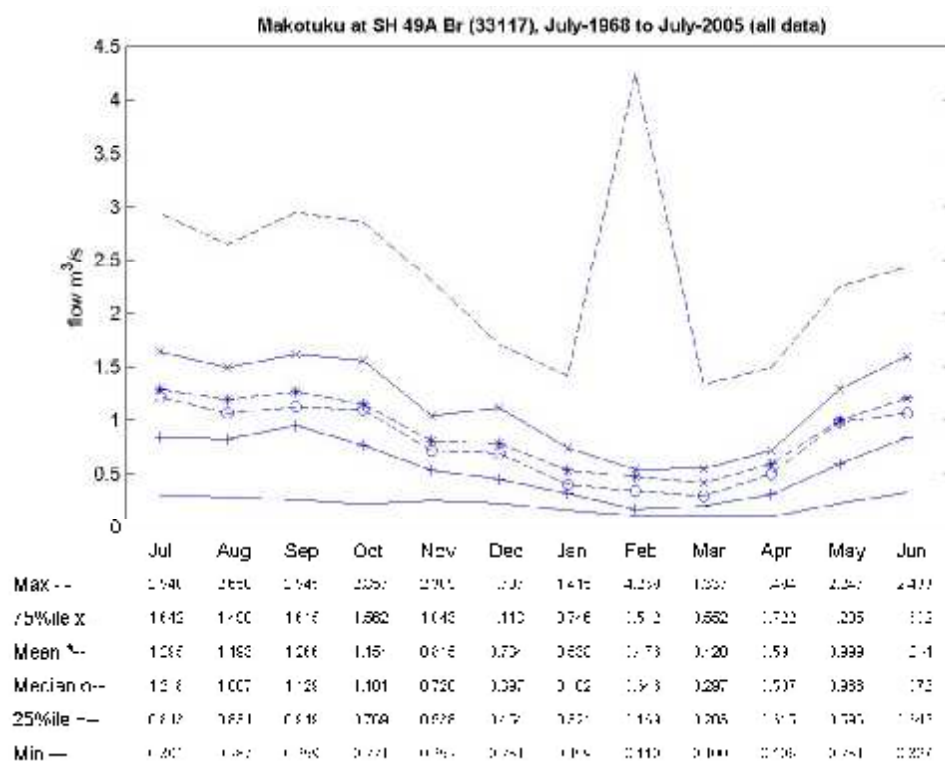


#### 4.4.3. Makotuku at SH 49A Br (33117), Jul-1968 to Jul-2005 (all data)

Site		Makotuku at SH 49A Br	
Time series details	Data Start Time	7-Feb-68	
	Data End Time	12-Jan-06	
	Analysis Start time	1-Jul-68	
	Analysis End time	1-Jul-05	
	Years of record analysed	37	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.898	
	MALF	0.116	
	½ median	0.223	0.14
	3x median	1.338	0.837
	MAF	34.662	
Flow variability percentiles	0 (maximum recorded flow)	83.825	83.825
	10	1.881	1.173
	20	1.118	0.658
	25 (upper quartile flow)	0.926	0.54
	30	0.782	0.457
	40	0.579	0.351
	50 (median flow)	0.446	0.279
	60	0.35	0.229
	70	0.269	0.188
	75 (lower quartile flow)	0.233	0.169
	80	0.206	0.153
	90	0.149	0.123
	91	0.142	0.121
	92	0.138	0.118
	93	0.132	0.115
	94	0.126	0.113
	95	0.123	0.111
	96	0.117	0.108
	97	0.112	0.105
	98	0.107	0.101
	99	0.101	0.098
	100 (minimum recorded flow)	0.067	0.067

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	298.81	
	MAF/median	77.717	
	FRE3 (floods/year or season)	14.676	14.16
	STD Annual FRE3	2.666	3.952
	Mean Days of Accrual (days)	19.048	19.122
	STD Accrual (days)	17.583	17.369
	Min Accrual (days)	5	5
	Max Accrual (days)	122	109

### Seasonal Distribution of Mean Monthly Flows



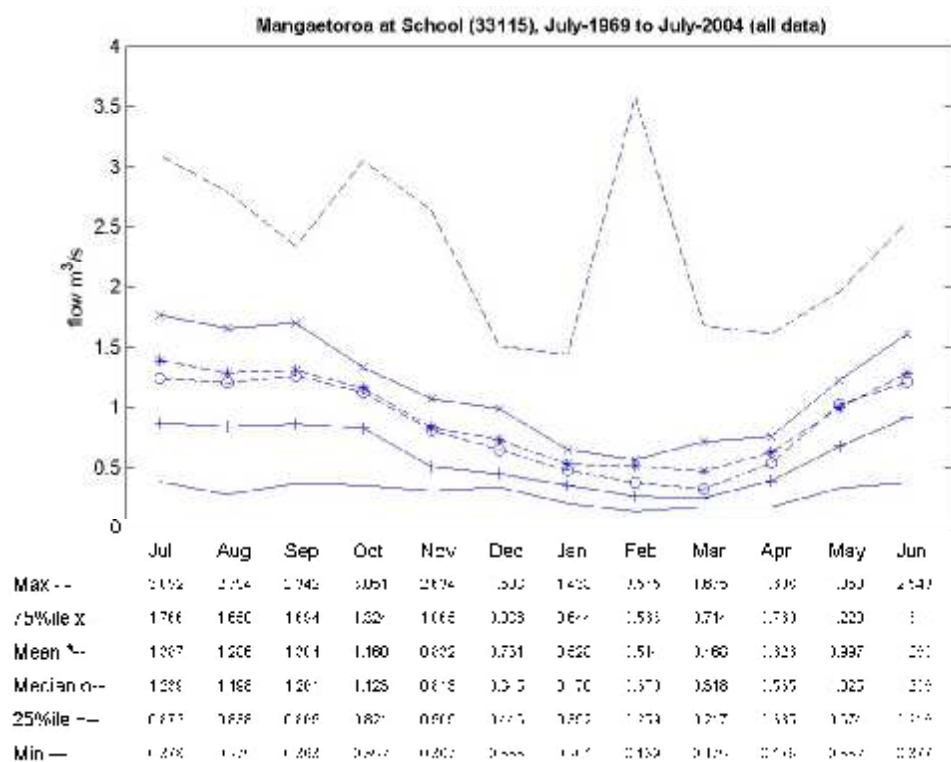
#### 4.4.4. Mangaetoroa at School (33115), Jul-1969 to Jul-2004 (all data)

Site		Mangaetoroa at School	
Time series details	Data Start Time	30-Dec-68	
	Data End Time	8-Apr-05	
	Analysis Start time	1-Jul-69	
	Analysis End time	1-Jul-04	
	Years of record analysed	35	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.928	
	MALF	0.184	
	½ median	0.269	0.173
	3x median	1.611	1.038
	MAF	20.564	
Flow variability percentiles	0 (maximum recorded flow)	48.165	48.165
	10	1.946	1.149
	20	1.188	0.688
	25 (upper quartile flow)	1.007	0.579
	30	0.871	0.506
	40	0.672	0.412
	50 (median flow)	0.537	0.346
	60	0.435	0.3
	70	0.352	0.259
	75 (lower quartile flow)	0.316	0.24
	80	0.282	0.223
	90	0.218	0.187
	91	0.211	0.184
	92	0.205	0.18
	93	0.199	0.177
	94	0.192	0.172
	95	0.185	0.168
	96	0.178	0.162
	97	0.171	0.153
	98	0.161	0.144
	99	0.144	0.134
	100 (minimum recorded flow)	0.117	0.117



Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	111.761	
	MAF/median	38.294	
	FRE3 (floods/year or season)	12.399	11.974
	STD Annual FRE3	2.668	4.312
	Mean Days of Accrual (days)	24.241	23.667
	STD Accrual (days)	24.834	22.254
	Min Accrual (days)	5	5
	Max Accrual (days)	200	148

### Seasonal Distribution of Mean Monthly Flows

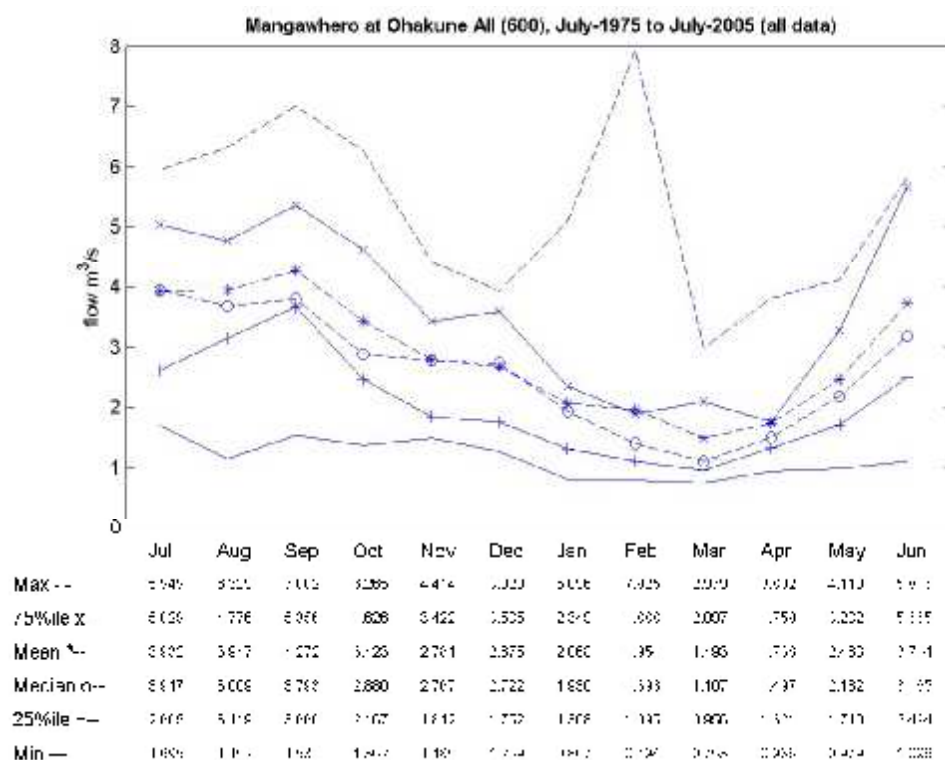


#### 4.4.5. Mangawhero at Ohakune All (600), Jul-1975 to Jul-2005 (all data)

Site		Mangawhero at Ohakune All	
Time series details	Data Start Time	15-Apr-75	
	Data End Time	4-Aug-05	
	Analysis Start time	1-Jul-75	
	Analysis End time	1-Jul-05	
	Years of record analysed	30	
	Gaps in the data (% of record).	57.53	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	2.896	
	MALF	0.748	
	½ median	0.93	0.672
	3x median	5.577	4.029
	MAF	64.601	
Flow variability percentiles	0 (maximum recorded flow)	122.416	87.67
	10	5.534	3.661
	20	3.6	2.373
	25 (upper quartile flow)	3.091	2.078
	30	2.736	1.857
	40	2.241	1.557
	50 (median flow)	1.859	1.343
	60	1.542	1.177
	70	1.27	1.022
	75 (lower quartile flow)	1.164	0.961
	80	1.058	0.902
	90	0.873	0.801
	91	0.858	0.795
	92	0.838	0.783
	93	0.821	0.772
	94	0.799	0.763
	95	0.786	0.753
	96	0.769	0.743
	97	0.751	0.732
	98	0.734	0.721
	99	0.714	0.705
	100 (minimum recorded flow)	0.58	0.58

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	86.365	
	MAF/median	34.75	
	FRE3 (floods/year or season)	12.162	10.573
	STD Annual FRE3	3.204	3.104
	Mean Days of Accrual (days)	25.673	25.917
	STD Accrual (days)	26.605	26.535
	Min Accrual (days)	5	5
	Max Accrual (days)	156	125

### Seasonal Distribution of Mean Monthly Flows

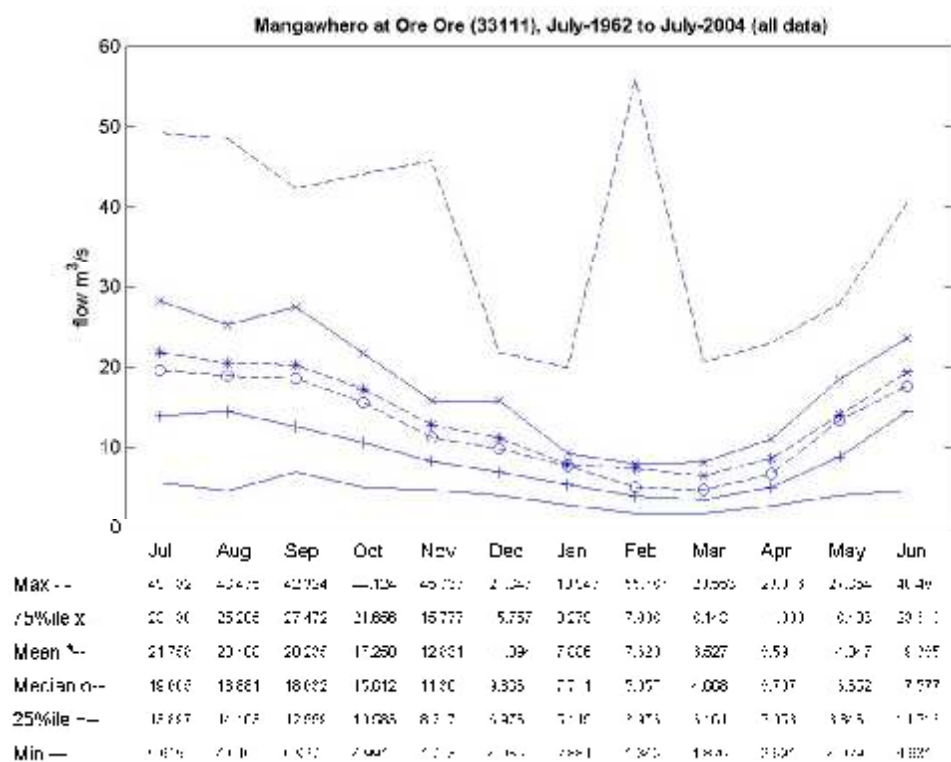


#### 4.4.6. Mangawhero at Ore Ore (33111), Jul-1962 to Jul-2004 (all data)

Site		Mangawhero at Ore Ore	
Time series details	Data Start Time	7-May-62	
	Data End Time	8-Apr-05	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-04	
	Years of record analysed	42	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	13.982	
	MALF	2.803	
	½ median	4.206	2.687
	3x median	25.233	16.119
	MAF	231.7	
Flow variability percentiles	0 (maximum recorded flow)	701.195	701.195
	10	29.357	17.022
	20	18.475	10.631
	25 (upper quartile flow)	15.715	9.072
	30	13.686	7.911
	40	10.587	6.354
	50 (median flow)	8.411	5.373
	60	6.727	4.609
	70	5.426	3.984
	75 (lower quartile flow)	4.877	3.704
	80	4.362	3.425
	90	3.353	2.867
	91	3.252	2.804
	92	3.149	2.744
	93	3.037	2.686
	94	2.933	2.624
	95	2.817	2.556
	96	2.701	2.477
	97	2.585	2.375
	98	2.444	2.204
	99	2.163	1.906
	100 (minimum recorded flow)	1.337	1.337

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	82.661	
	MAF/median	27.547	
	FRE3 (floods/year or season)	11.142	10.505
	STD Annual FRE3	2.44	4.086
	Mean Days of Accrual (days)	27.373	26.932
	STD Accrual (days)	31.646	26.852
	Min Accrual (days)	5	5
	Max Accrual (days)	249	149

### Seasonal Distribution of Mean Monthly Flows

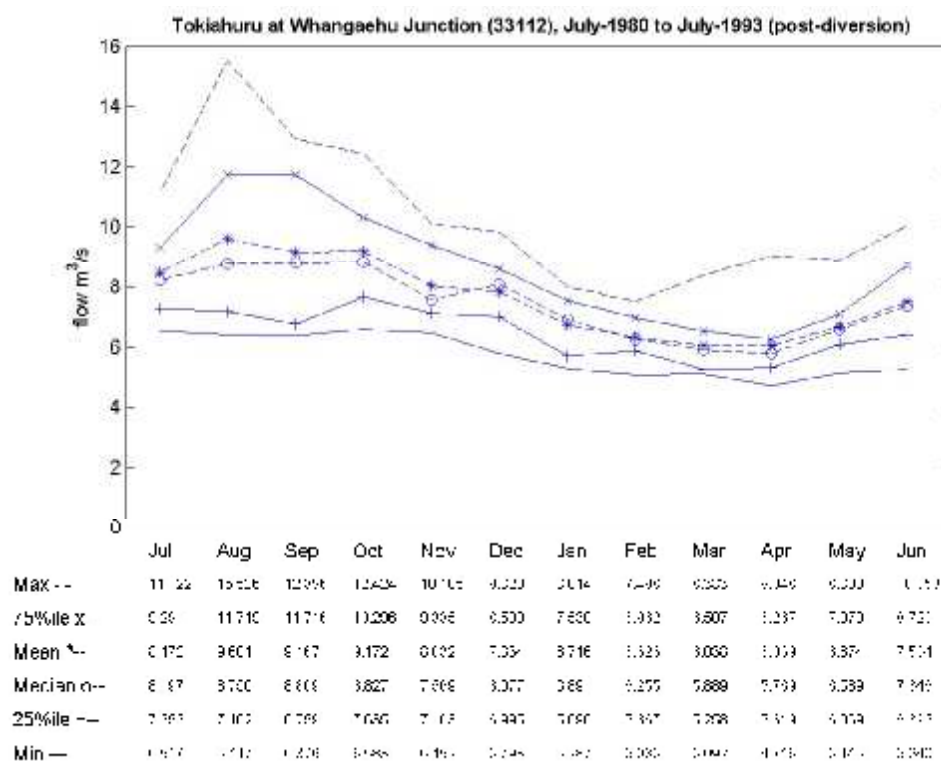


#### 4.4.7. Tokiahuru at Whangaehu Junction (33112), Jul-1980 to Jul-1993 (post-diversion)

Site		Tokiahuru at Whangaehu Junction	
Time series details	Data Start Time	13-Aug-79	
	Data End Time	12-Jan-94	
	Analysis Start time	1-Jul-80	
	Analysis End time	1-Jul-93	
	Years of record analysed	13	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	7.641	
	MALF	4.821	
	½ median	3.37	3.096
	3x median	20.22	18.573
	MAF	41.552	
Flow variability percentiles	0 (maximum recorded flow)	61.922	41.866
	10	10.999	9.25
	20	9.205	7.898
	25 (upper quartile flow)	8.568	7.478
	30	8.043	7.133
	40	7.322	6.588
	50 (median flow)	6.74	6.191
	60	6.275	5.853
	70	5.9	5.565
	75 (lower quartile flow)	5.722	5.44
	80	5.541	5.276
	90	5.119	4.965
	91	5.074	4.935
	92	5.022	4.9
	93	4.971	4.868
	94	4.919	4.829
	95	4.861	4.776
	96	4.799	4.711
	97	4.725	4.65
	98	4.648	4.556
	99	4.475	4.429
	100 (minimum recorded flow)	4.108	4.261

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	8.619	
	MAF/median	6.165	
	FRE3 (floods/year or season)	1.539	1.551
	STD Annual FRE3	1.199	1.209
	Mean Days of Accrual (days)	219.95	101.095
	STD Accrual (days)	213.237	58.096
	Min Accrual (days)	8	19
	Max Accrual (days)	771	181

### Seasonal Distribution of Mean Monthly Flows



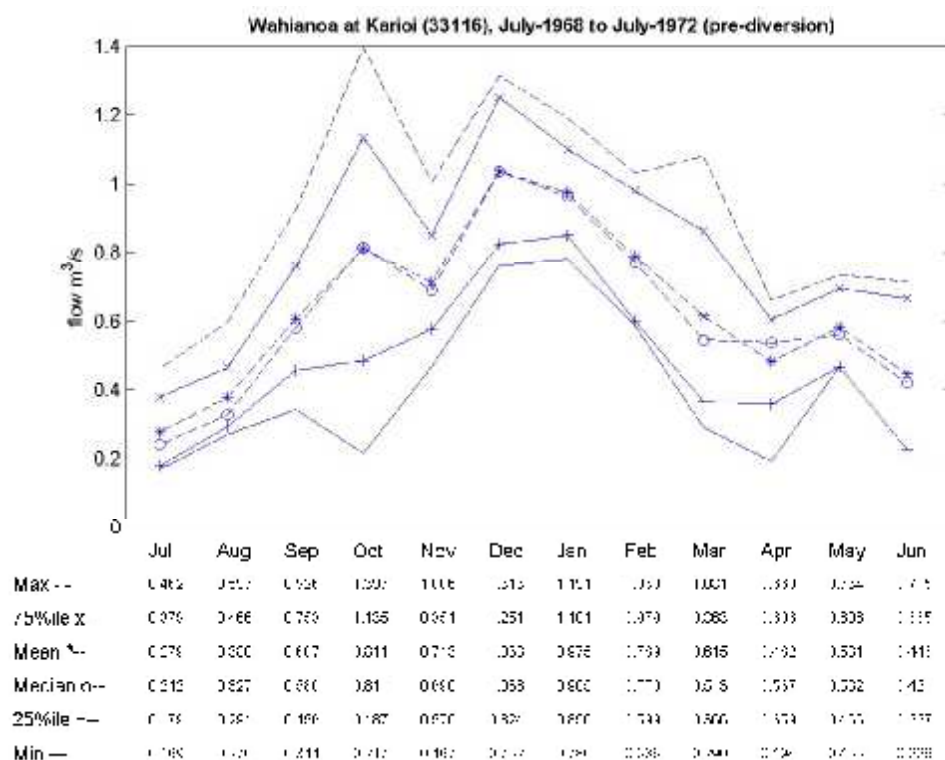
#### 4.4.8. Wahianoa at Karioi (33116), Jul-1968 to Jul-1972 (pre-diversion)

Site		Wahianoa at Karioi	
Time series details	Data Start Time	12-Aug-67	
	Data End Time	13-Sep-72	
	Analysis Start time	1-Jul-68	
	Analysis End time	1-Jul-72	
	Years of record analysed	4	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	0.643	
	MALF	0.093	
	½ median	0.226	0.3
	3x median	1.356	1.8
	MAF	16.51	
Flow variability percentiles	0 (maximum recorded flow)	26.414	26.414
	10	1.211	1.333
	20	0.82	0.932
	25 (upper quartile flow)	0.729	0.84
	30	0.656	0.777
	40	0.539	0.677
	50 (median flow)	0.452	0.6
	60	0.374	0.518
	70	0.296	0.451
	75 (lower quartile flow)	0.265	0.416
	80	0.235	0.383
	90	0.175	0.279
	91	0.167	0.262
	92	0.158	0.246
	93	0.151	0.233
	94	0.145	0.217
	95	0.139	0.198
	96	0.132	0.181
	97	0.123	0.16
	98	0.115	0.146
	99	0.106	0.129
	100 (minimum recorded flow)	0.058	0.086



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	177.527	
	MAF/median	36.527	
	FRE3 (floods/year or season)	11.5	10.572
	STD Annual FRE3	2.516	4.438
	Mean Days of Accrual (days)	27.289	26.826
	STD Accrual (days)	27.251	22.91
	Min Accrual (days)	5	5
	Max Accrual (days)	112	89

### Seasonal Distribution of Mean Monthly Flows

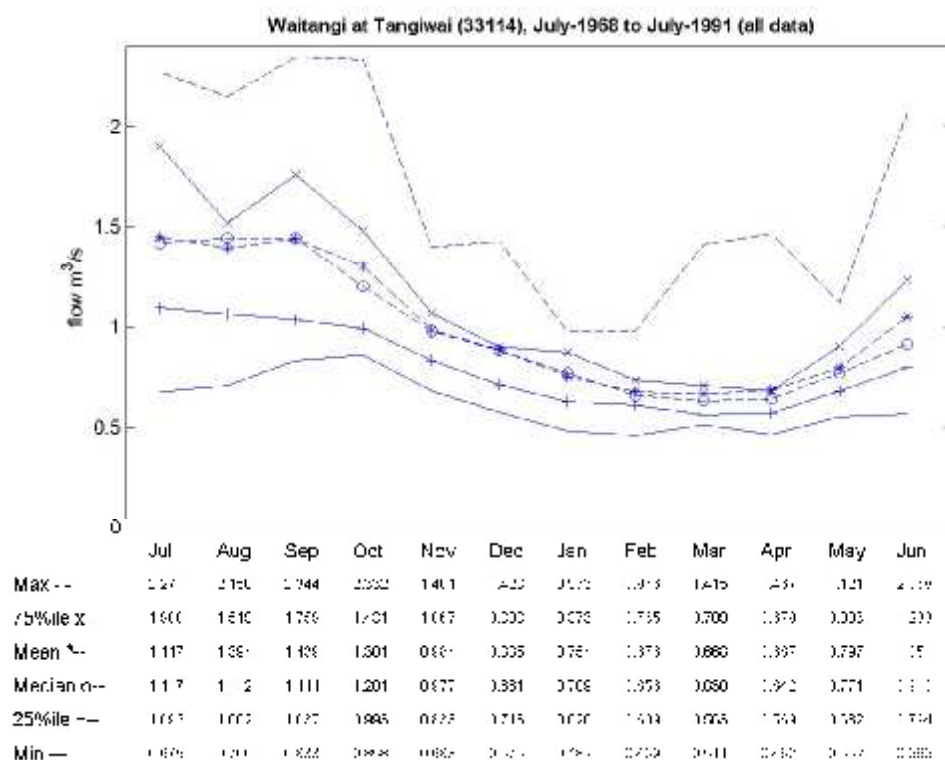


#### 4.4.9. Waitangi at Tangiwai (33114), Jul-1968 to Jul-1991 (all data)

Site		Waitangi at Tangiwai	
Time series details	Data Start Time	22-Nov-67	
	Data End Time	2-Apr-92	
	Analysis Start time	1-Jul-68	
	Analysis End time	1-Jul-91	
	Years of record analysed	23	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	1.009	
	MALF	0.526	
	½ median	0.431	0.353
	3x median	2.586	2.118
	MAF	3.432	
Flow variability percentiles	0 (maximum recorded flow)	5.767	5.767
	10	1.669	1.09
	20	1.313	0.929
	25 (upper quartile flow)	1.201	0.875
	30	1.116	0.831
	40	0.973	0.763
	50 (median flow)	0.862	0.706
	60	0.771	0.663
	70	0.694	0.623
	75 (lower quartile flow)	0.663	0.601
	80	0.634	0.582
	90	0.566	0.531
	91	0.557	0.528
	92	0.549	0.521
	93	0.542	0.519
	94	0.532	0.51
	95	0.527	0.5
	96	0.518	0.483
	97	0.5	0.464
	98	0.47	0.445
	99	0.441	0.426
	100 (minimum recorded flow)	0.33	0.33

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	6.525	
	MAF/median	3.981	
	FRE3 (floods/year or season)	1.435	1.05
	STD Annual FRE3	1.674	1.808
	Mean Days of Accrual (days)	219.849	123.576
	STD Accrual (days)	283.526	63.506
	Min Accrual (days)	5	16
	Max Accrual (days)	1114	181

### Seasonal Distribution of Mean Monthly Flows

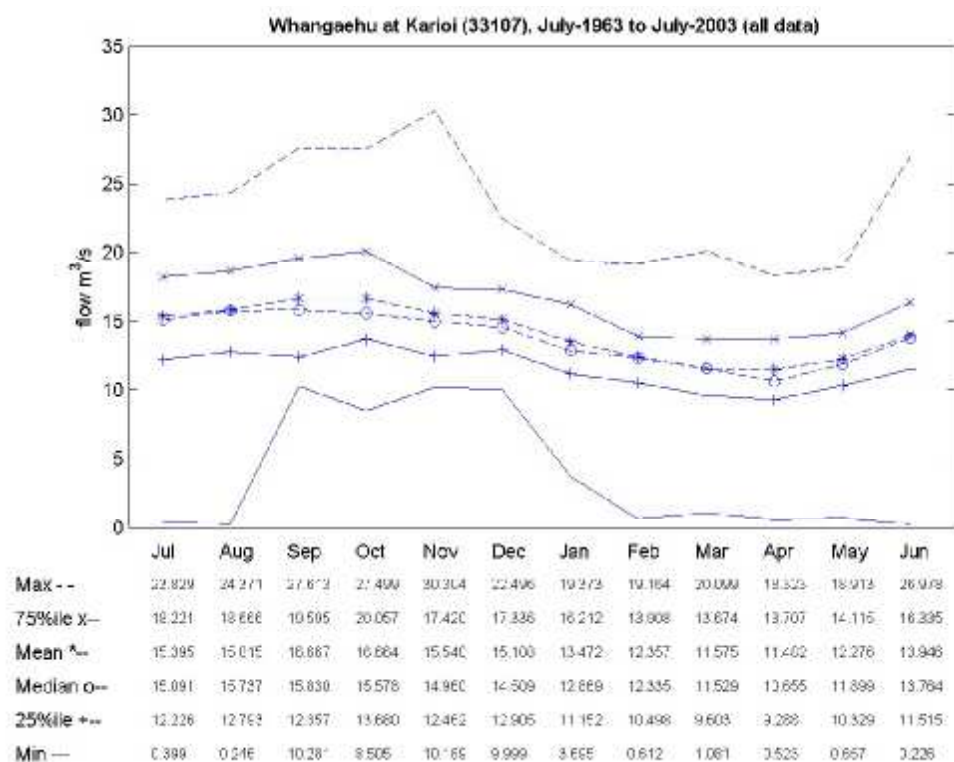


#### 4.4.10. Whangaehu at Karioi (33107), Jul-1963 to Jul-2003 (all data)

Site		Whangaehu at Karioi	
Time series details	Data Start Time	1-Nov-62	
	Data End Time	6-Apr-04	
	Analysis Start time	1-Jul-63	
	Analysis End time	1-Jul-03	
	Years of record analysed	40	
	Gaps in the data (% of record).	8.15	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	14.202	
	MALF	8.975	
	½ median	6.48	6.12
	3x median	38.877	36.72
	MAF	94.286	
Flow variability percentiles	0 (maximum recorded flow)	238.25	132.021
	10	20.811	18.783
	20	17.634	15.984
	25 (upper quartile flow)	16.565	15.036
	30	15.614	14.273
	40	14.115	13.158
	50 (median flow)	12.959	12.24
	60	11.967	11.347
	70	10.949	10.413
	75 (lower quartile flow)	10.429	9.972
	80	9.953	9.527
	90	8.855	8.603
	91	8.716	8.492
	92	8.575	8.389
	93	8.426	8.276
	94	8.267	8.161
	95	8.101	8.044
	96	7.927	7.921
	97	7.701	7.694
	98	7.082	7.199
	99	0.394	0.554
	100 (minimum recorded flow)	0.058	0.174

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	10.446	
	MAF/median	7.276	
	FRE3 (floods/year or season)	1.5	1.847
	STD Annual FRE3	1.109	1.824
	Mean Days of Accrual (days)	213	94.985
	STD Accrual (days)	179.647	60.916
	Min Accrual (days)	6	5
	Max Accrual (days)	786	181

### Seasonal Distribution of Mean Monthly Flows

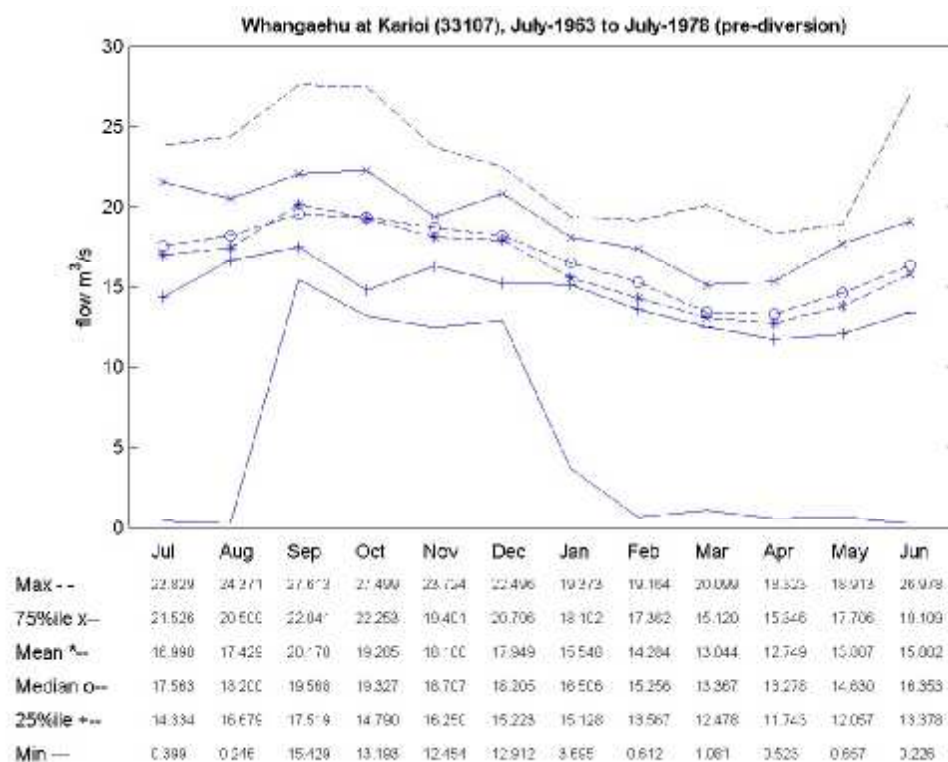


#### 4.4.11. Whangaehu at Karioi (33107), Jul-1963 to Jul-1978 (pre-diversion)

Site		Whangaehu at Karioi	
Time series details	Data Start Time	1-Nov-62	
	Data End Time	1-Apr-79	
	Analysis Start time	1-Jul-63	
	Analysis End time	1-Jul-78	
	Years of record analysed	15	
	Gaps in the data (% of record).	21.44	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	16.139	
	MALF	10.771	
	½ median	7.727	7.241
	3x median	46.362	43.443
	MAF	96.805	
Flow variability percentiles	0 (maximum recorded flow)	118.631	117.766
	10	23.127	20.888
	20	19.972	18.394
	25 (upper quartile flow)	18.959	17.672
	30	18.197	16.937
	40	16.85	15.588
	50 (median flow)	15.454	14.481
	60	14.251	13.578
	70	13.227	12.763
	75 (lower quartile flow)	12.743	12.357
	80	12.269	11.901
	90	10.808	10.825
	91	10.575	10.683
	92	10.345	10.517
	93	9.993	10.359
	94	7.991	10.087
	95	0.82	1.729
	96	0.511	0.755
	97	0.384	0.537
	98	0.296	0.417
	99	0.207	0.332
	100 (minimum recorded flow)	0.058	0.174

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	10.158	
	MAF/median	6.264	
	FRE3 (floods/year or season)	1.182	1.098
	STD Annual FRE3	0.603	1.382
	Mean Days of Accrual (days)	254.077	116.308
	STD Accrual (days)	194.987	61.658
	Min Accrual (days)	38	32
	Max Accrual (days)	656	181

### Seasonal Distribution of Mean Monthly Flows



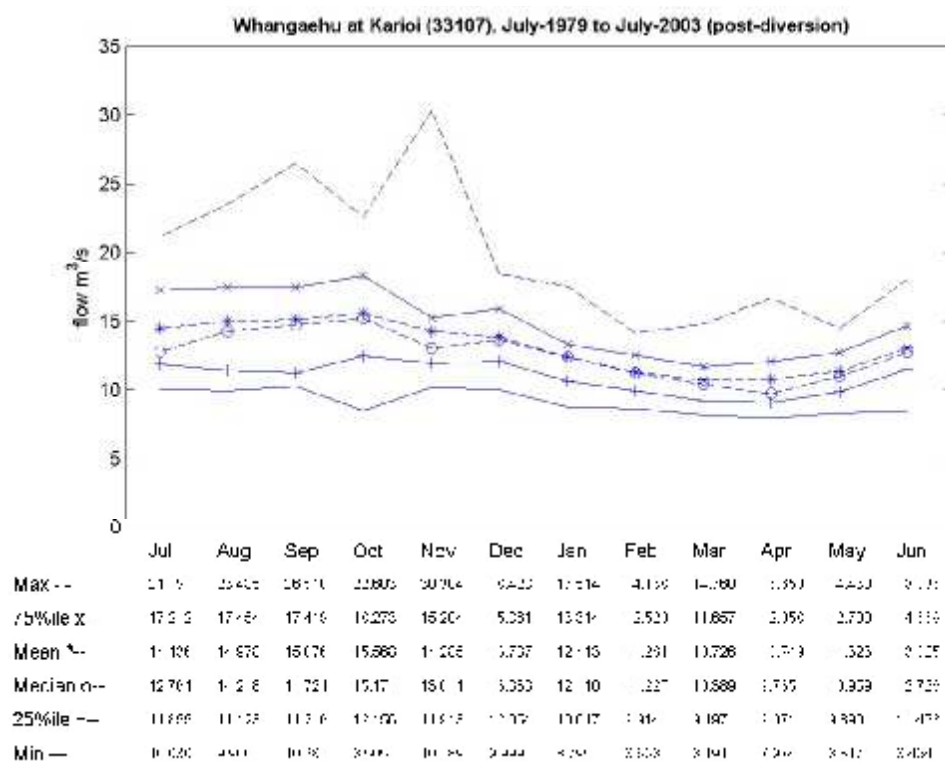
#### 4.4.12. Whangaehu at Karioi (33107), Jul-1979 to Jul-2003 (post-diversion)

Site		Whangaehu at Karioi	
Time series details	Data Start Time	1-Apr-79	
	Data End Time	6-Apr-04	
	Analysis Start time	1-Jul-79	
	Analysis End time	1-Jul-03	
	Years of record analysed	24	
	Gaps in the data (% of record).	0.18	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	13.203	
	MALF	8.244	
	½ median	5.873	5.5
	3x median	35.238	33
	MAF	92.437	
Flow variability percentiles	0 (maximum recorded flow)	238.25	132.021
	10	18.901	16.637
	20	15.809	14.107
	25 (upper quartile flow)	14.829	13.388
	30	14.021	12.812
	40	12.755	11.875
	50 (median flow)	11.746	11
	60	10.888	10.267
	70	10.145	9.636
	75 (lower quartile flow)	9.793	9.368
	80	9.463	9.077
	90	8.658	8.418
	91	8.559	8.347
	92	8.46	8.272
	93	8.357	8.193
	94	8.247	8.117
	95	8.136	8.046
	96	8.022	7.966
	97	7.899	7.87
	98	7.758	7.708
	99	7.508	7.419
	100 (minimum recorded flow)	6.676	6.876



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	11.243	
	MAF/median	7.87	
	FRE3 (floods/year or season)	1.833	1.931
	STD Annual FRE3	1.404	1.512
	Mean Days of Accrual (days)	177.561	90.556
	STD Accrual (days)	158.167	63.873
	Min Accrual (days)	5	5
	Max Accrual (days)	771	181

### Seasonal Distribution of Mean Monthly Flows

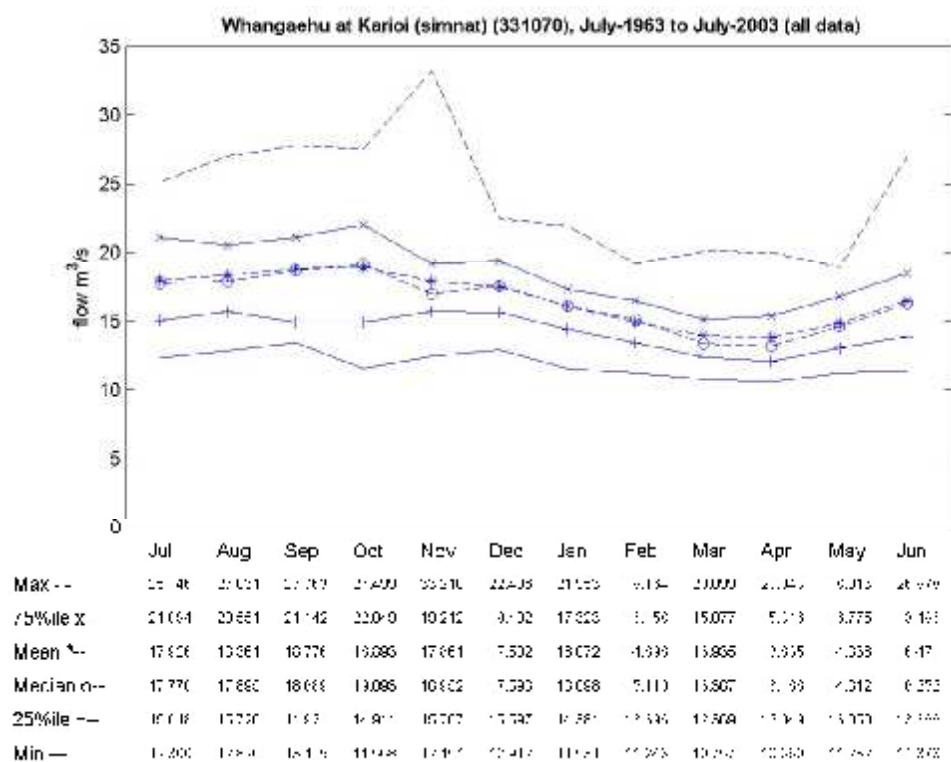


#### 4.4.13. Whangaehu at Karioi (sim natural) (331070), Jul-1963 to Jul-2003 (all data)

Site		Whangaehu at Karioi (sim natural)	
Time series details	Data Start Time	1-Nov-62	
	Data End Time	4-Jul-03	
	Analysis Start time	1-Jul-63	
	Analysis End time	1-Jul-03	
	Years of record analysed	40	
	Gaps in the data (% of record).	9.88	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	16.657	
	MALF	10.879	
	½ median	7.63	7.233
	3x median	45.777	43.398
	MAF	89.663	
Flow variability percentiles	0 (maximum recorded flow)	171.357	128.475
	10	22.739	20.501
	20	19.553	17.987
	25 (upper quartile flow)	18.558	17.235
	30	17.768	16.551
	40	16.413	15.476
	50 (median flow)	15.259	14.466
	60	14.231	13.621
	70	13.362	12.871
	75 (lower quartile flow)	12.953	12.503
	80	12.542	12.15
	90	11.633	11.34
	91	11.522	11.237
	92	11.396	11.136
	93	11.261	11.033
	94	11.12	10.937
	95	10.985	10.829
	96	10.835	10.716
	97	10.675	10.57
	98	10.471	10.381
	99	10.222	10.136
	100 (minimum recorded flow)	8.852	8.852

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	8.267	
	MAF/median	5.876	
	FRE3 (floods/year or season)	1.027	0.952
	STD Annual FRE3	1.081	1.318
	Mean Days of Accrual (days)	325.606	122.531
	STD Accrual (days)	348.055	64.503
	Min Accrual (days)	6	5
	Max Accrual (days)	1322	181

### Seasonal Distribution of Mean Monthly Flows

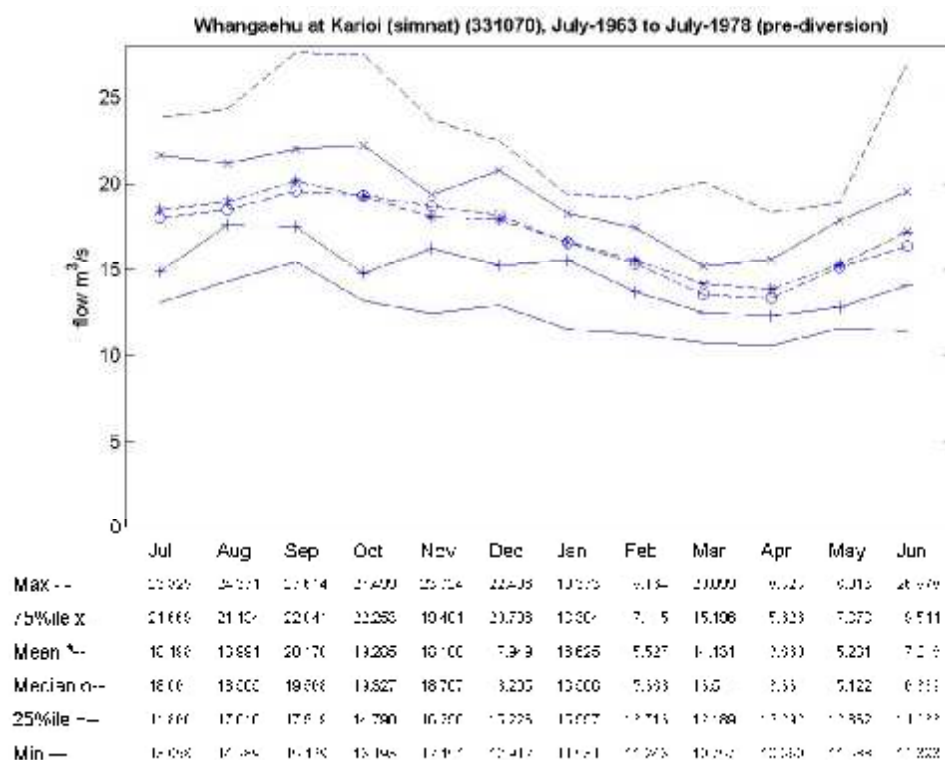


#### 4.4.14. Whangaehu at Karioi (sim natural) (331070), Jul-1963 to Jul-1978 (pre-diversion)

Site		Whangaehu at Karioi (sim natural)	
Time series details	Data Start Time	1-Nov-62	
	Data End Time	1-Apr-79	
	Analysis Start time	1-Jul-63	
	Analysis End time	1-Jul-78	
	Years of record analysed	15	
	Gaps in the data (% of record).	26.05	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	17.131	
	MALF	10.75	
	½ median	7.934	7.372
	3x median	47.604	44.229
	MAF	91.504	
Flow variability percentiles	0 (maximum recorded flow)	112.505	112.505
	10	23.419	21.1
	20	20.285	18.555
	25 (upper quartile flow)	19.237	17.87
	30	18.449	17.181
	40	17.177	15.86
	50 (median flow)	15.868	14.743
	60	14.607	13.83
	70	13.64	13.079
	75 (lower quartile flow)	13.177	12.682
	80	12.724	12.303
	90	11.791	11.427
	91	11.652	11.34
	92	11.514	11.236
	93	11.37	11.119
	94	11.233	11.005
	95	11.067	10.825
	96	10.85	10.696
	97	10.635	10.544
	98	10.41	10.376
	99	10.237	10.202
	100 (minimum recorded flow)	9.536	9.84

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	8.537	
	MAF/median	5.767	
	FRE3 (floods/year or season)	1.272	0.914
	STD Annual FRE3	1.102	1.382
	Mean Days of Accrual (days)	269	126.083
	STD Accrual (days)	196.194	62.355
	Min Accrual (days)	38	32
	Max Accrual (days)	657	181

### Seasonal Distribution of Mean Monthly Flows

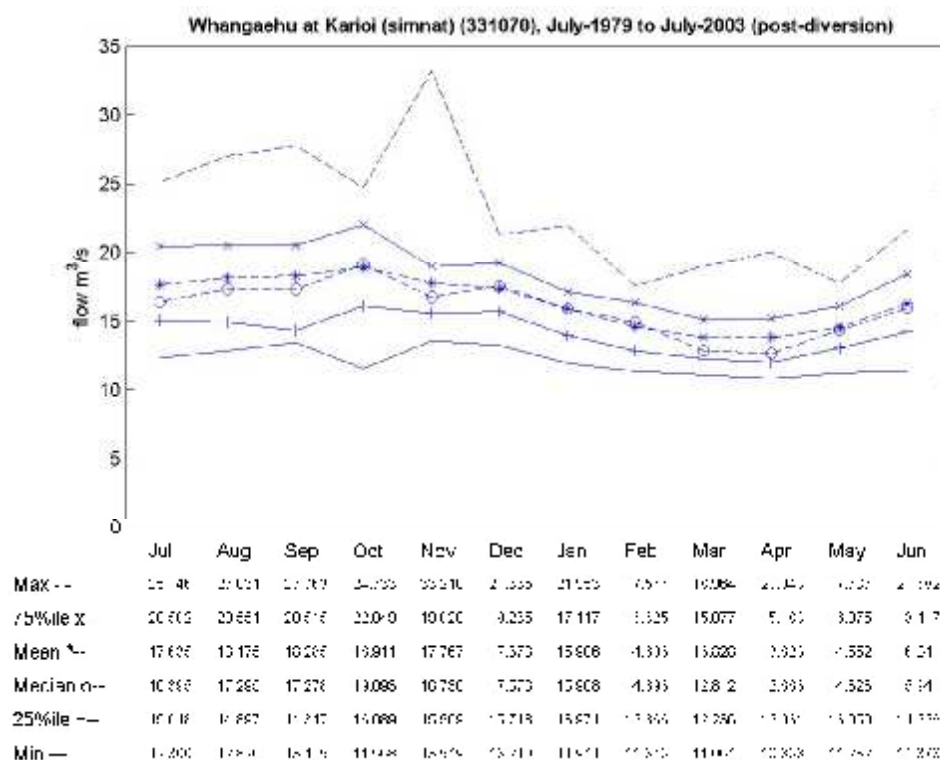


#### 4.4.15. Whangaehu at Karioi (sim natural) (331070), Jul-1979 to Jul-2003 (post-diversion)

Site		Whangaehu at Karioi (sim natural)	
Time series details	Data Start Time	1-Apr-79	
	Data End Time	4-Jul-03	
	Analysis Start time	1-Jul-79	
	Analysis End time	1-Jul-03	
	Years of record analysed	24	
	Gaps in the data (% of record).	0.19	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	16.494	
	MALF	10.96	
	½ median	7.559	7.204
	3x median	45.354	43.224
	MAF	87.696	
Flow variability percentiles	0 (maximum recorded flow)	171.357	128.475
	10	22.473	20.24
	20	19.291	17.711
	25 (upper quartile flow)	18.294	17.003
	30	17.496	16.391
	40	16.209	15.401
	50 (median flow)	15.118	14.408
	60	14.132	13.565
	70	13.294	12.797
	75 (lower quartile flow)	12.889	12.441
	80	12.488	12.094
	90	11.571	11.287
	91	11.457	11.187
	92	11.33	11.092
	93	11.197	11.002
	94	11.065	10.916
	95	10.948	10.827
	96	10.821	10.722
	97	10.679	10.58
	98	10.497	10.377
	99	10.202	10.104
	100 (minimum recorded flow)	8.852	8.852

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	8.029	
	MAF/median	5.801	
	FRE3 (floods/year or season)	1	0.924
	STD Annual FRE3	1.103	1.327
	Mean Days of Accrual (days)	341.714	122.758
	STD Accrual (days)	383.622	64.432
	Min Accrual (days)	6	5
	Max Accrual (days)	1263	181

### Seasonal Distribution of Mean Monthly Flows



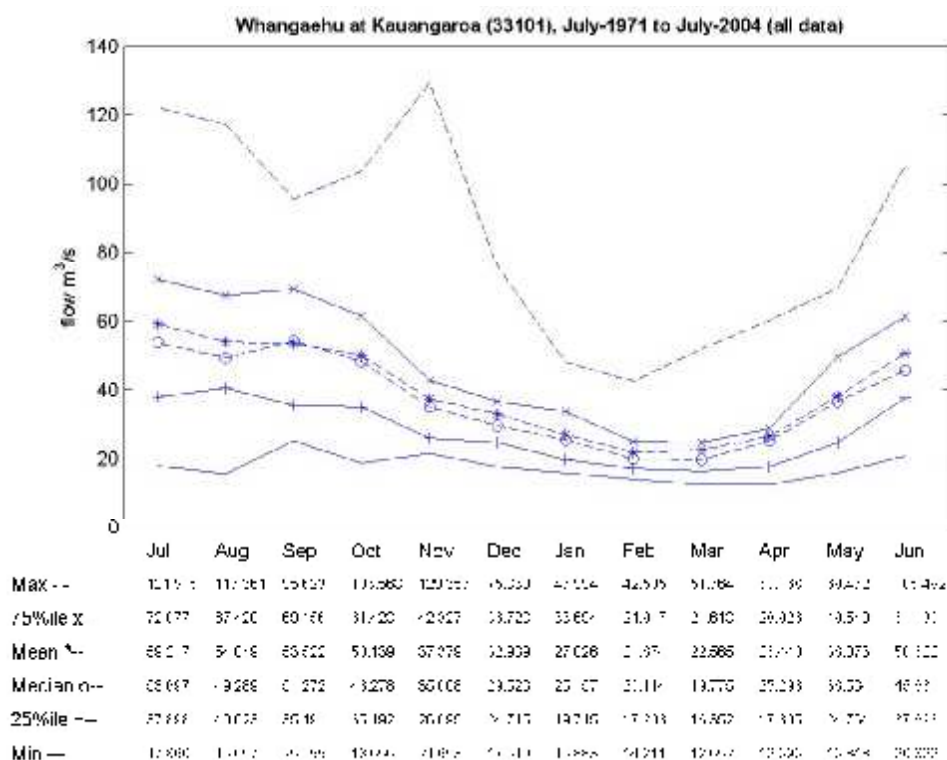
#### 4.4.16. Whangaehu at Kauangaroa (33101), Jul-1971 to Jul-2004 (all data)

Site		Whangaehu at Kauangaroa	
Time series details	Data Start Time	18-Jun-71	
	Data End Time	15-Jun-04	
	Analysis Start time	1-Jul-71	
	Analysis End time	1-Jul-04	
	Years of record analysed	33	
	Gaps in the data (% of record).	0	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	39.896	
	MALF	13.647	
	½ median	13.58	10.413
	3x median	81.48	62.478
	MAF	459.84	
Flow variability percentiles	0 (maximum recorded flow)	1195.9	1195.9
	10	75.382	46.205
	20	50.933	32.388
	25 (upper quartile flow)	44.397	29.215
	30	39.427	26.905
	40	32.216	23.334
	50 (median flow)	27.16	20.826
	60	23.301	18.983
	70	20.285	17.389
	75 (lower quartile flow)	19.015	16.619
	80	17.832	15.79
	90	15.3	13.986
	91	15.004	13.831
	92	14.692	13.671
	93	14.369	13.485
	94	14.055	13.295
	95	13.777	13.075
	96	13.474	12.859
	97	13.09	12.525
	98	12.642	12.113
	99	11.914	11.564
	100 (minimum recorded flow)	10.184	10.184



Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	33.695	
	MAF/median	16.931	
	FRE3 (floods/year or season)	9.15	7.079
	STD Annual FRE3	2.435	3.832
	Mean Days of Accrual (days)	35.348	40.811
	STD Accrual (days)	39.404	40.342
	Min Accrual (days)	5	5
	Max Accrual (days)	237	184

### Seasonal Distribution of Mean Monthly Flows

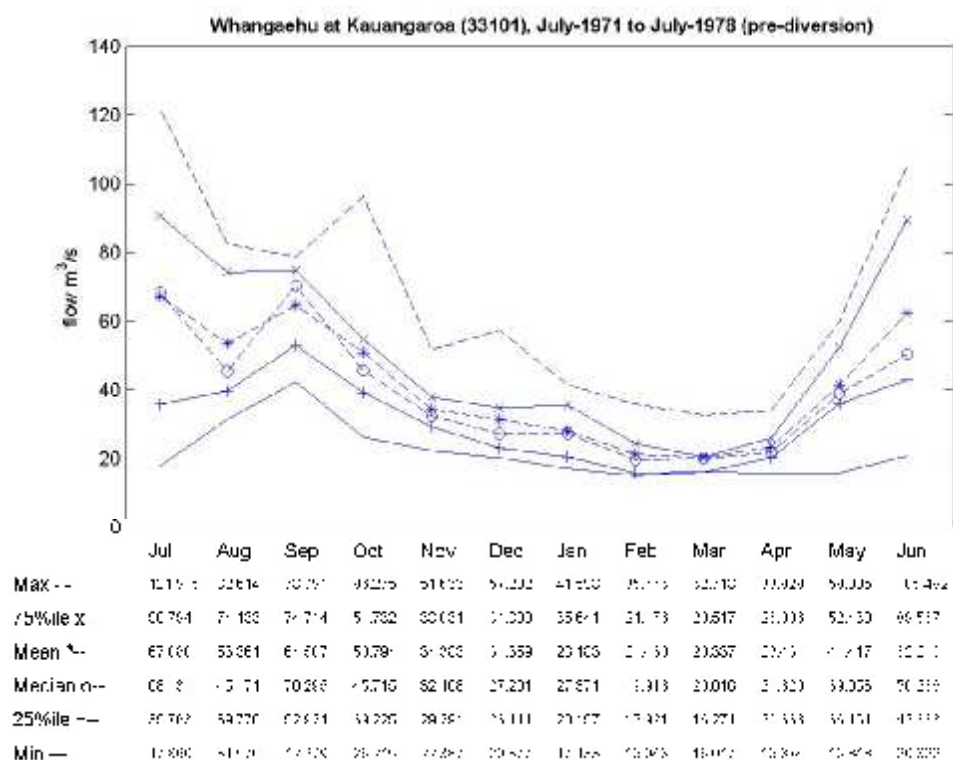


#### 4.4.17. Whangaehu at Kauangaroa (33101), Jul-1971 to Jul-1978 (pre-diversion)

Site		Whangaehu at Kauangaroa	
Time series details	Data Start Time	18-Jun-71	
	Data End Time	1-Apr-79	
	Analysis Start time	1-Jul-71	
	Analysis End time	1-Jul-78	
	Years of record analysed	7	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	41.645	
	MALF	14.174	
	½ median	14.301	10.575
	3x median	85.803	63.447
	MAF	483.34	
Flow variability percentiles	0 (maximum recorded flow)	639.85	481.802
	10	78.547	40.165
	20	52.592	30.363
	25 (upper quartile flow)	45.778	28.373
	30	41.086	26.425
	40	33.906	23.399
	50 (median flow)	28.601	21.149
	60	24.355	19.561
	70	20.872	18.244
	75 (lower quartile flow)	19.577	17.499
	80	18.483	16.826
	90	16.121	14.811
	91	15.775	14.409
	92	15.496	14.122
	93	15.212	13.998
	94	14.738	13.867
	95	14.294	13.764
	96	13.968	13.559
	97	13.722	13.256
	98	13.255	12.953
	99	12.276	12.21
	100 (minimum recorded flow)	11.328	11.73

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	34.1	
	MAF/median	16.899	
	FRE3 (floods/year or season)	8.283	4.888
	STD Annual FRE3	3.493	3.452
	Mean Days of Accrual (days)	38	63.4
	STD Accrual (days)	49.437	51.986
	Min Accrual (days)	5	5
	Max Accrual (days)	237	184

### Seasonal Distribution of Mean Monthly Flows

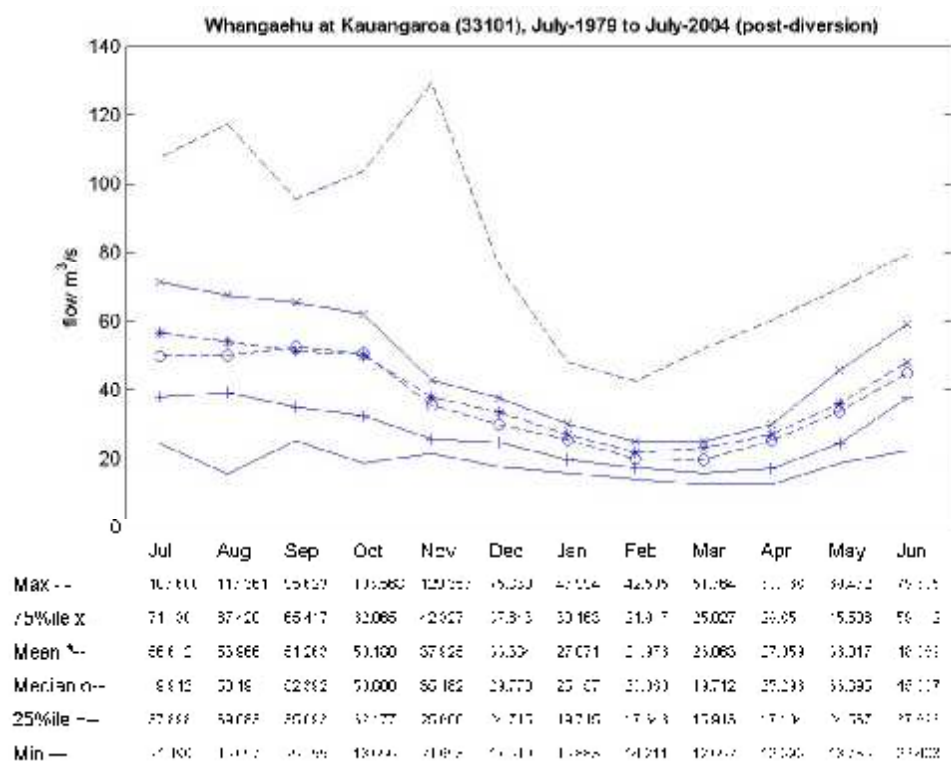


#### 4.4.18. Whangaehu at Kauangaroa (33101), Jul-1979 to Jul-2004 (post-diversion)

Site		Whangaehu at Kauangaroa	
Time series details	Data Start Time	1-Apr-79	
	Data End Time	15-Jun-04	
	Analysis Start time	1-Jul-79	
	Analysis End time	1-Jul-04	
	Years of record analysed	25	
	Gaps in the data (% of record).	0	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	39.387	
	MALF	13.48	
	½ median	13.361	10.369
	3x median	80.166	62.211
	MAF	463.21	
Flow variability percentiles	0 (maximum recorded flow)	1195.9	1195.9
	10	74.425	48.118
	20	50.41	33.066
	25 (upper quartile flow)	43.852	29.569
	30	38.952	27.025
	40	31.734	23.323
	50 (median flow)	26.722	20.737
	60	23.017	18.756
	70	20.088	17.069
	75 (lower quartile flow)	18.791	16.287
	80	17.587	15.456
	90	15.014	13.779
	91	14.734	13.629
	92	14.435	13.458
	93	14.132	13.288
	94	13.866	13.08
	95	13.576	12.896
	96	13.268	12.677
	97	12.916	12.31
	98	12.476	11.87
	99	11.718	11.381
	100 (minimum recorded flow)	10.184	10.184

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	34.363	
	MAF/median	17.334	
	FRE3 (floods/year or season)	9.439	7.572
	STD Annual FRE3	2.198	3.817
	Mean Days of Accrual (days)	34.404	37.722
	STD Accrual (days)	37.227	37.94
	Min Accrual (days)	5	5
	Max Accrual (days)	226	171

### Seasonal Distribution of Mean Monthly Flows

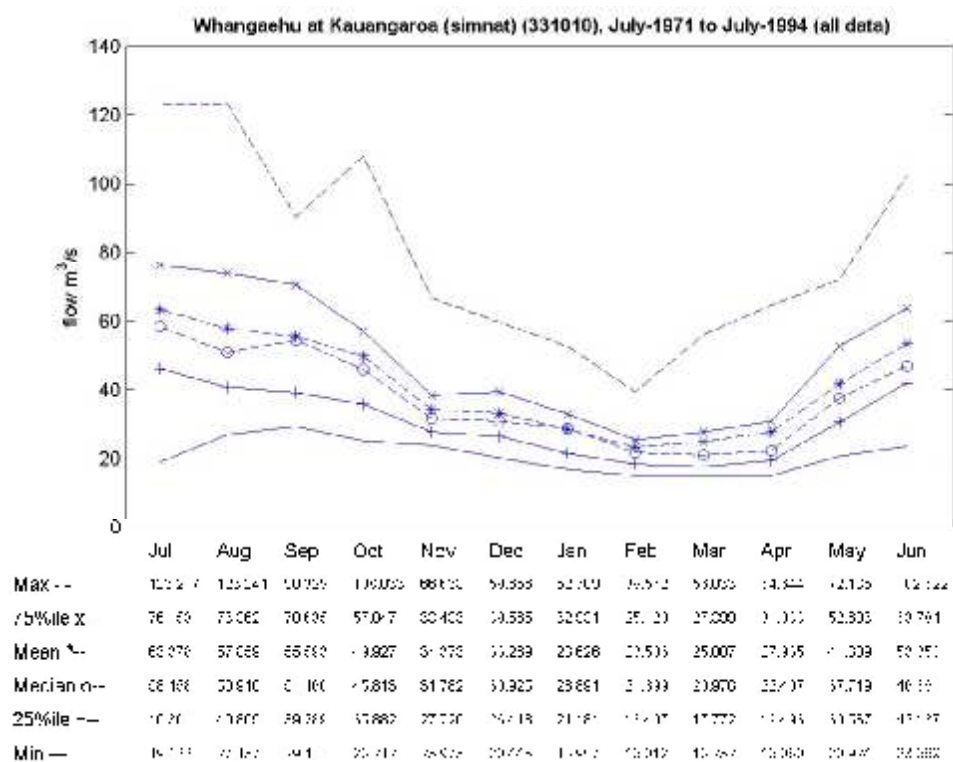


#### 4.4.19. Whangaeahu at Kauangaroa (sim natural) (331010), Jul-1971 to Jul-1994 (all data)

Site		Whangaeahu at Kauangaroa (sim natural)	
Time series details	Data Start Time	19-Jun-71	
	Data End Time	4-Jul-94	
	Analysis Start time	1-Jul-71	
	Analysis End time	1-Jul-94	
	Years of record analysed	23	
	Gaps in the data (% of record).	0.02	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	41.204	
	MALF	14.711	
	½ median	14.602	11.251
	3x median	87.609	67.503
	MAF	435.37	
Flow variability percentiles	0 (maximum recorded flow)	635.112	479.585
	10	76.302	44.877
	20	52.679	33.184
	25 (upper quartile flow)	45.955	30.394
	30	41.119	28.29
	40	34.104	24.969
	50 (median flow)	29.203	22.501
	60	25.436	20.805
	70	22.248	19.234
	75 (lower quartile flow)	21.05	18.466
	80	19.895	17.686
	90	17.309	15.652
	91	16.922	15.432
	92	16.567	15.187
	93	16.24	14.972
	94	15.848	14.73
	95	15.451	14.504
	96	15.027	14.235
	97	14.634	13.923
	98	14.098	13.597
	99	13.435	12.98
	100 (minimum recorded flow)	10.272	10.272

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	29.595	
	MAF/median	14.908	
	FRE3 (floods/year or season)	8.216	6.044
	STD Annual FRE3	2.408	3.097
	Mean Days of Accrual (days)	39.926	47.425
	STD Accrual (days)	45.136	43.647
	Min Accrual (days)	5	5
	Max Accrual (days)	237	184

### Seasonal Distribution of Mean Monthly Flows



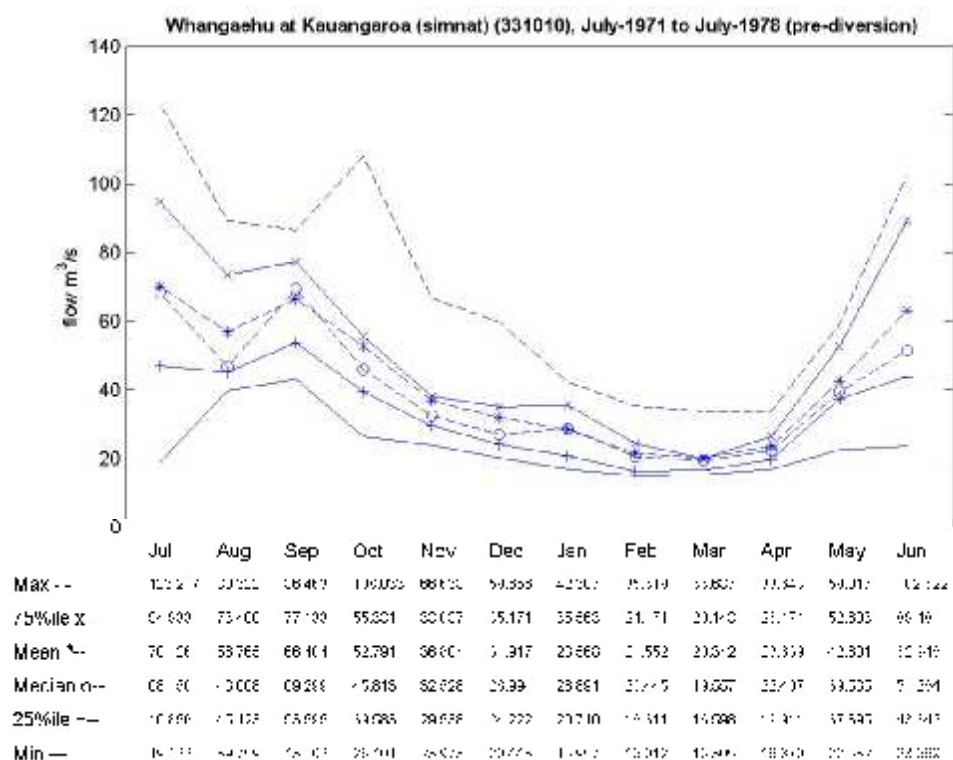
#### 4.4.20. Whangaehu at Kauangaroa (sim natural) (331010), Jul-1971 to Jul-1978 (pre-diversion)

Site		Whangaehu at Kauangaroa (sim natural)	
Time series details	Data Start Time	19-Jun-71	
	Data End Time	1-Apr-79	
	Analysis Start time	1-Jul-71	
	Analysis End time	1-Jul-78	
	Years of record analysed	7	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	42.985	
	MALF	14.39	
	½ median	15.141	10.689
	3x median	90.843	64.134
	MAF	476.35	
Flow variability percentiles	0 (maximum recorded flow)	634.147	479.585
	10	81.081	43.069
	20	55.44	31.281
	25 (upper quartile flow)	48.634	28.92
	30	43.779	27.03
	40	35.726	23.734
	50 (median flow)	30.281	21.378
	60	25.614	19.724
	70	21.588	18.439
	75 (lower quartile flow)	20.251	17.871
	80	19.062	16.987
	90	16.65	14.78
	91	16.37	14.684
	92	15.918	14.531
	93	15.538	14.324
	94	15.115	13.95
	95	14.794	13.651
	96	14.538	13.414
	97	13.97	13.107
	98	13.417	12.577
	99	12.565	11.456
	100 (minimum recorded flow)	10.879	10.879



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	33.103	
	MAF/median	15.731	
	FRE3 (floods/year or season)	7.996	4.601
	STD Annual FRE3	3.909	3.008
	Mean Days of Accrual (days)	36.982	66.474
	STD Accrual (days)	49.284	51.51
	Min Accrual (days)	5	9
	Max Accrual (days)	237	184

### Seasonal Distribution of Mean Monthly Flows

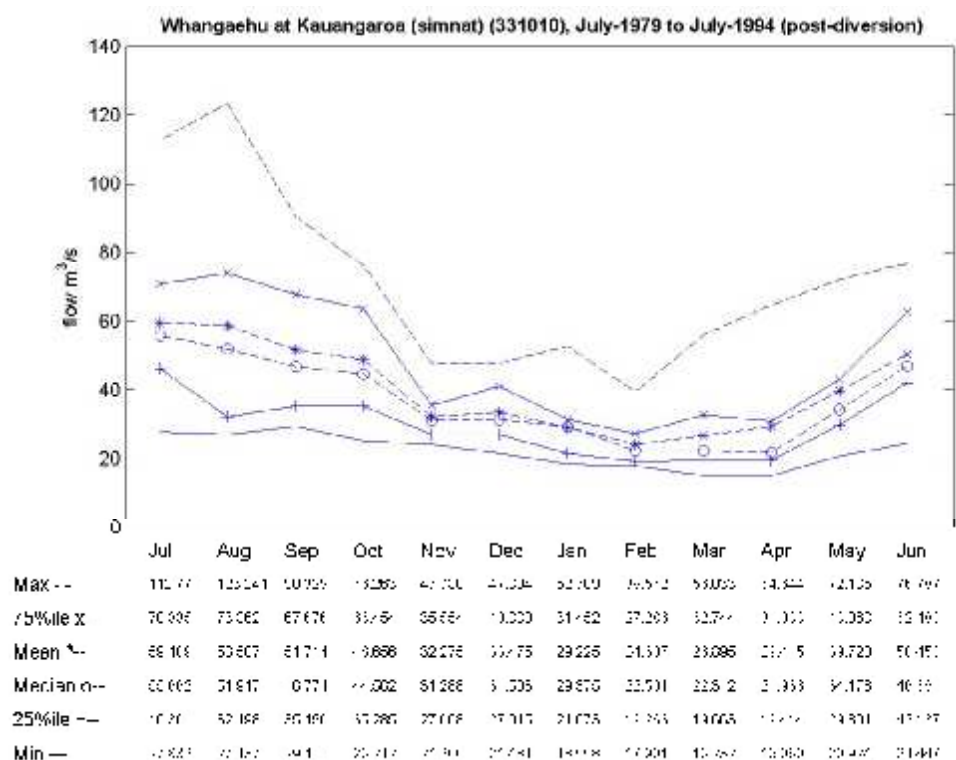


#### 4.4.21. Whangaeahu at Kauangaroa (sim natural) (331010), Jul-1979 to Jul-1994 (post-diversion)

Site		Whangaeahu at Kauangaroa (sim natural)	
Time series details	Data Start Time	1-Apr-79	
	Data End Time	4-Jul-94	
	Analysis Start time	1-Jul-79	
	Analysis End time	1-Jul-94	
	Years of record analysed	15	
	Gaps in the data (% of record).	0.03	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	40.27	
	MALF	14.855	
	½ median	14.332	11.452
	3x median	85.989	68.712
	MAF	423.54	
Flow variability percentiles	0 (maximum recorded flow)	635.112	467.868
	10	73.686	45.139
	20	50.933	33.59
	25 (upper quartile flow)	44.527	30.867
	30	39.772	28.694
	40	33.241	25.37
	50 (median flow)	28.663	22.904
	60	25.31	21.168
	70	22.406	19.655
	75 (lower quartile flow)	21.264	18.822
	80	20.171	17.898
	90	17.433	15.901
	91	17.102	15.693
	92	16.725	15.502
	93	16.382	15.302
	94	16.046	15.07
	95	15.655	14.835
	96	15.272	14.499
	97	14.863	14.237
	98	14.305	13.968
	99	13.797	13.658
	100 (minimum recorded flow)	10.272	10.272

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	28.512	
	MAF/median	14.777	
	FRE3 (floods/year or season)	8.332	6.715
	STD Annual FRE3	2.022	2.915
	Mean Days of Accrual (days)	39.952	43.71
	STD Accrual (days)	43.772	41.369
	Min Accrual (days)	5	5
	Max Accrual (days)	226	171

### Seasonal Distribution of Mean Monthly Flows



#### 4.5. Whanganui Catchments and Kai Iwi

The list below shows: section number in this report, site name, (site number) and full date range. The analysis date range is from the first July after the start date until the last June before the finish date.

- 3.5.1. Manganui-o-te-ao at Ashworth (33309), Jul-1962 to Jul-1980 (all data)
- 3.5.2. Mangaroa at Ohura Town Br (33341), Jul-1965 to Jul-1970 (all data)
- 3.5.3. Ohura at Tokorima (33313), Jul-1962 to Jul-2005 (all data)
- 3.5.4. Ongarue at Taringamotu (33316), Jul-1963 to Jul-2004 (all data)
- 3.5.5. Tangarakau at Tangarakau (33311), Jul-1962 to Jul-1968 (all data)
- 3.5.6. Whakapapa at Footbridge (33320), Jul-1960 to Jul-2000 (all data)
- 3.5.7. Whakapapa at Footbridge (33320), Jul-1960 to Jul-1972 (pre-diversion)
- 3.5.8. Whakapapa at Footbridge (33320), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.9. Whakapapa at Footbridge (33320), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.10. Whakapapa at Footbridge (33320), Jul-1993 to Jul-2000 (Planning Tribunal 1990)
- 3.5.11. Whakapapa at Footbridge (sim natural) (333001), Jul-1960 to Jul-2003 (all data)
- 3.5.12. Whakapapa at Footbridge (sim natural) (333001), Jul-1960 to Jul-1972 (pre-diversion)
- 3.5.13. Whakapapa at Footbridge (sim natural) (333001), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.14. Whakapapa at Footbridge (sim natural) (333001), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.15. Whakapapa at Footbridge (sim nat.) (333001), Jul-1993 to Jul-2003 (Plan. Trib. 1990)
- 3.5.16. Whakapapa at Footbridge (sim consent) (8005), Jul-1962 to Jul-2003 (all data)
- 3.5.17. Whakapapa at Footbridge (sim consent) (8005), Jul-1962 to Jul-1972 (pre-diversion)
- 3.5.18. Whakapapa at Footbridge (sim consent) (8005), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.19. Whakapapa at Footbridge (sim consent) (8005), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.20. Whakapapa at Footbridge (sim consent) (8005), Jul-1993 to Jul-2003 (Plan. Trib. 1990)
- 3.5.21. Whanganui at Matapuna (33338), Jul-1964 to Jul-1972 (pre-diversion)
- 3.5.22. Whanganui at Paetawa (33301), Jul-1957 to Jul-2004 (all data)
- 3.5.23. Whanganui at Paetawa (33301), Jul-1957 to Jul-1972 (pre-diversion)

- 3.5.24. Whanganui at Paetawa (33301), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.25. Whanganui at Paetawa (33301), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.26. Whanganui at Paetawa (33301), Jul-1993 to Jul-2004 (Planning Tribunal 1990)
- 3.5.27. Whanganui at Paetawa (sim natural) (333005), Jul-1951 to Jul-2003 (all data)
- 3.5.28. Whanganui at Paetawa (sim natural) (333005), Jul-1951 to Jul-1972 (pre-diversion)
- 3.5.29. Whanganui at Paetawa (sim natural) (333005), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.30. Whanganui at Paetawa (sim natural) (333005), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.31. Whanganui at Paetawa (sim natural) (333005), Jul-1993 to Jul-2003 (Plan. Trib. 1990)
- 3.5.32. Whanganui at Paetawa (sim consent) (8005), Jul-1962 to Jul-2003 (all data)
- 3.5.33. Whanganui at Paetawa (sim consent) (8005), Jul-1962 to Jul-1972 (pre-diversion)
- 3.5.34. Whanganui at Paetawa (sim consent) (8005), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.35. Whanganui at Paetawa (sim consent) (8005), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.36. Whanganui at Paetawa (sim consent) (8005), Jul-1993 to Jul-2003 (Plan. Trib. 1990)
- 3.5.37. Whanganui at Piriaka (33356), Jul-1971 to Jul-2003 (all data)
- 3.5.38. Whanganui at Piriaka (33356), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.39. Whanganui at Piriaka (33356), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.40. Whanganui at Piriaka (33356), Jul-1993 to Jul-2003 (Planning Tribunal 1990)
- 3.5.41. Whanganui at Piriaka (sim natural) (33300), Jul-1964 to Jul-2003 (all data)
- 3.5.42. Whanganui at Piriaka (sim natural) (33300), Jul-1964 to Jul-1972 (pre-diversion)
- 3.5.43. Whanganui at Piriaka (sim natural) (33300), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.44. Whanganui at Piriaka (sim natural) (33300), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.45. Whanganui at Piriaka (sim natural) (33300), Jul-1993 to Jul-2003 (Plan. Trib. 1990)
- 3.5.46. Whanganui at Piriaka (sim consent) (8005), Jul-1964 to Jul-2003 (all data)
- 3.5.47. Whanganui at Piriaka (sim consent) (8005), Jul-1964 to Jul-1972 (pre-diversion)
- 3.5.48. Whanganui at Piriaka (sim consent) (8005), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.49. Whanganui at Piriaka (sim consent) (8005), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.50. Whanganui at Piriaka (sim consent) (8005), Jul-1993 to Jul-2003 (Plan. Trib. 1990)

- 3.5.51. Whanganui at Te Maire (33302), Jul-1962 to Jul-2004 (all data)
- 3.5.52. Whanganui at Te Maire (33302), Jul-1962 to Jul-1972 (pre-diversion)
- 3.5.53. Whanganui at Te Maire (33302), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.54. Whanganui at Te Maire (33302), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.55. Whanganui at Te Maire (33302), Jul-1993 to Jul-2004 (Planning Tribunal 1990)
- 3.5.56. Whanganui at Te Maire (sim natural) (33300), Jul-1962 to Jul-2003 (all data)
- 3.5.57. Whanganui at Te Maire (sim natural) (33300), Jul-1962 to Jul-1972 (pre-diversion)
- 3.5.58. Whanganui at Te Maire (sim natural) (33300), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.59. Whanganui at Te Maire (sim natural) (33300), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.60. Whanganui at Te Maire (sim natural) (33300), Jul-1993 to Jul-2003 (Plan. Trib. 1990)
- 3.5.61. Whanganui at Te Maire (sim consent) (8005), Jul-1962 to Jul-2003 (all data)
- 3.5.62. Whanganui at Te Maire (sim consent) (8005), Jul-1962 to Jul-1972 (pre-diversion)
- 3.5.63. Whanganui at Te Maire (sim consent) (8005), Jul-1973 to Jul-1983 (1972 rules)
- 3.5.64. Whanganui at Te Maire (sim consent) (8005), Jul-1984 to Jul-1992 (1983 rules)
- 3.5.65. Whanganui at Te Maire (sim consent) (8005), Jul-1993 to Jul-2003 (Plan. Trib. 1990)
- 3.5.66. Whanganui at Te Porere (33347), Jul-1966 to Jul-2001 (all data)
- 3.5.67. Kai Iwi at Handley Rd (33502), Jul-1978 to Jul-2004 (all data)





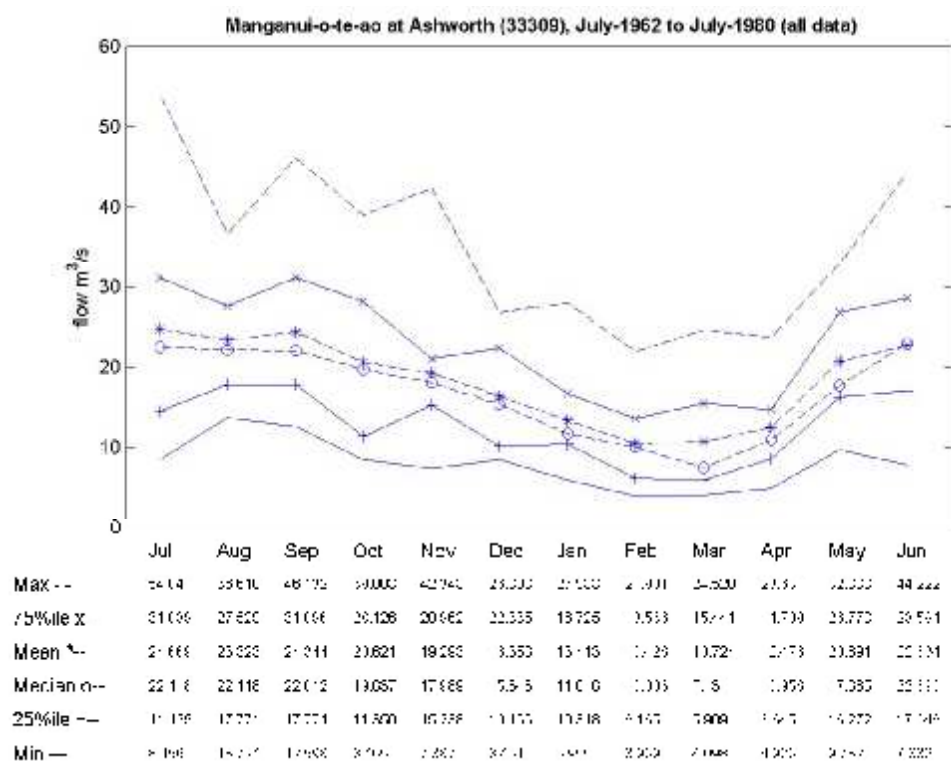
#### 4.5.1. Manganui-o-te-ao at Ashworth (33309), Jul-1962 to Jul-1980 (all data)

Site		Manganui-o-te-ao at Ashworth	
Time series details	Data Start Time	16-Aug-61	
	Data End Time	7-Aug-80	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-80	
	Years of record analysed	18	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	18.29	
	MALF	4.389	
	½ median	5.758	4.184
	3x median	34.545	25.101
	MAF	336.22	
Flow variability percentiles	0 (maximum recorded flow)	478.856	478.856
	10	35.557	25.956
	20	23.132	16.531
	25 (upper quartile flow)	20.014	13.998
	30	17.585	12.196
	40	14.099	9.919
	50 (median flow)	11.515	8.367
	60	9.59	7.162
	70	7.99	6.238
	75 (lower quartile flow)	7.27	5.736
	80	6.625	5.347
	90	5.239	4.481
	91	5.093	4.404
	92	4.943	4.333
	93	4.767	4.258
	94	4.582	4.194
	95	4.425	4.118
	96	4.284	4.032
	97	4.156	3.904
	98	3.998	3.756
	99	3.749	3.492
	100 (minimum recorded flow)	3.096	3.096



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	76.605	
	MAF/median	29.198	
	FRE3 (floods/year or season)	14.219	12.198
	STD Annual FRE3	3.757	5.232
	Mean Days of Accrual (days)	21.863	23.658
	STD Accrual (days)	21.41	24.007
	Min Accrual (days)	5	5
	Max Accrual (days)	146	140

### Seasonal Distribution of Mean Monthly Flows

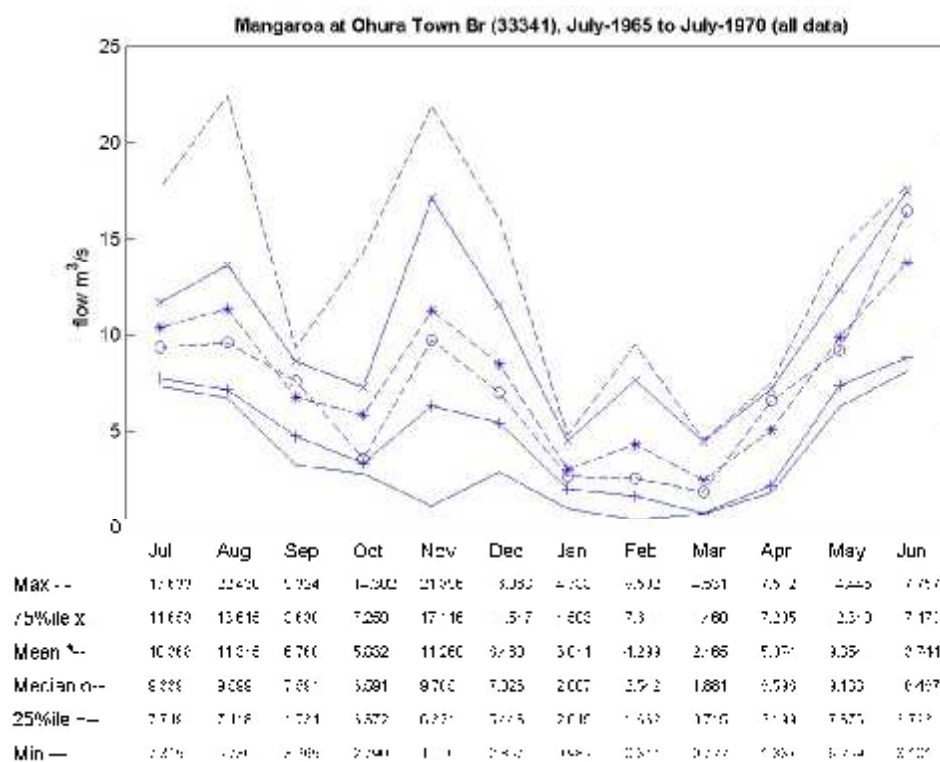


#### 4.5.2. Mangaroa at Ohura Town Br (33341), Jul-1965 to Jul-1970 (all data)

Site		Mangaroa at Ohura Town Br	
Time series details	Data Start Time	9-May-65	
	Data End Time	18-Mar-71	
	Analysis Start time	1-Jul-65	
	Analysis End time	1-Jul-70	
	Years of record analysed	5	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	7.717	
	MALF	0.501	
	½ median	1.569	0.918
	3x median	9.414	5.505
	MAF	126.24	
Flow variability percentiles	0 (maximum recorded flow)	165.026	165.026
	10	18.389	12.755
	20	9.793	5.871
	25 (upper quartile flow)	7.632	4.593
	30	6.066	3.629
	40	4.288	2.439
	50 (median flow)	3.138	1.835
	60	2.398	1.388
	70	1.838	1.074
	75 (lower quartile flow)	1.578	0.945
	80	1.298	0.808
	90	0.8	0.518
	91	0.754	0.476
	92	0.696	0.439
	93	0.642	0.402
	94	0.586	0.355
	95	0.52	0.3
	96	0.442	0.25
	97	0.357	0.224
	98	0.247	0.2
	99	0.199	0.179
	100 (minimum recorded flow)	0.159	0.159

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	251.976	
	MAF/median	40.229	
	FRE3 (floods/year or season)	17.204	14.917
	STD Annual FRE3	3.573	6.786
	Mean Days of Accrual (days)	15.565	17.351
	STD Accrual (days)	14.202	18.636
	Min Accrual (days)	5	5
	Max Accrual (days)	96	95

### Seasonal Distribution of Mean Monthly Flows

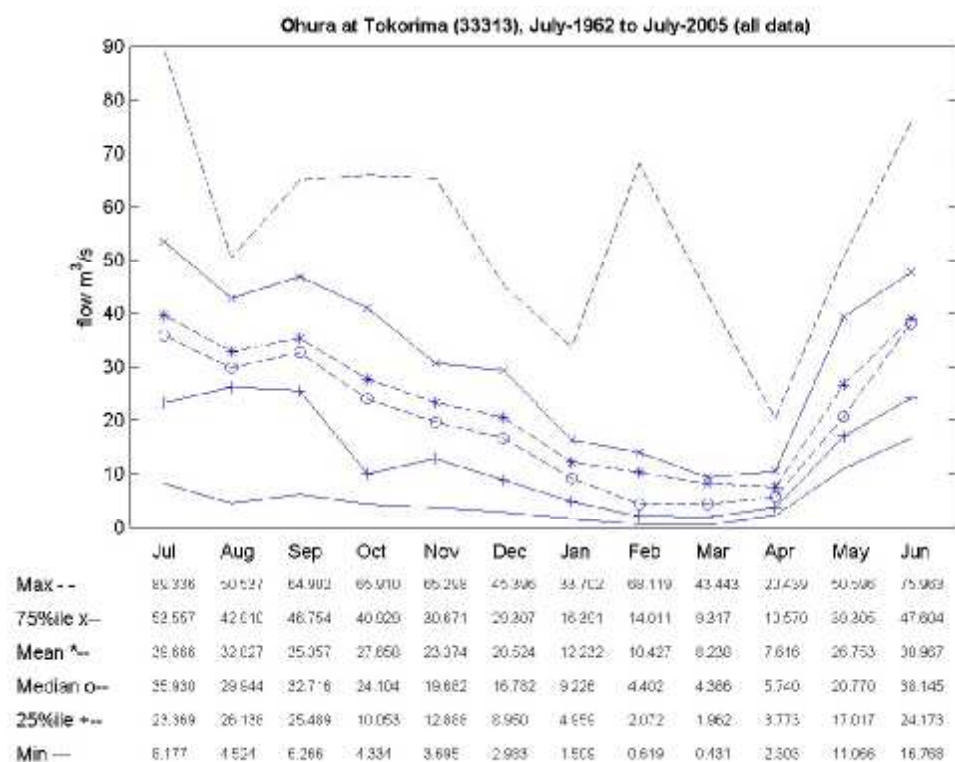


#### 4.5.3. Ohura at Tokorima (33313), Jul-1962 to Jul-2005 (all data)

Site		Ohura at Tokorima	
Time series details	Data Start Time	7-Sep-61	
	Data End Time	17-Oct-05	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-05	
	Years of record analysed	43	
	Gaps in the data (% of record).	52.99	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	23.797	
	MALF	1.064	
	½ median	5.95	2.555
	3x median	35.7	15.33
	MAF	278.61	
Flow variability percentiles	0 (maximum recorded flow)	413.834	413.834
	10	60.285	32.222
	20	34.301	16.683
	25 (upper quartile flow)	27.992	13.214
	30	23.304	10.623
	40	16.505	7.221
	50 (median flow)	11.9	5.11
	60	8.359	3.701
	70	5.486	2.656
	75 (lower quartile flow)	4.338	2.238
	80	3.337	1.807
	90	1.739	0.985
	91	1.57	0.92
	92	1.39	0.845
	93	1.226	0.785
	94	1.105	0.719
	95	0.987	0.641
	96	0.856	0.547
	97	0.725	0.49
	98	0.557	0.424
	99	0.424	0.339
	100 (minimum recorded flow)	0.176	0.176

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	261.852	
	MAF/median	23.413	
	FRE3 (floods/year or season)	11.4	10.478
	STD Annual FRE3	2.723	4.117
	Mean Days of Accrual (days)	24.459	24.8
	STD Accrual (days)	31.235	25.592
	Min Accrual (days)	5	5
	Max Accrual (days)	234	124

### Seasonal Distribution of Mean Monthly Flows

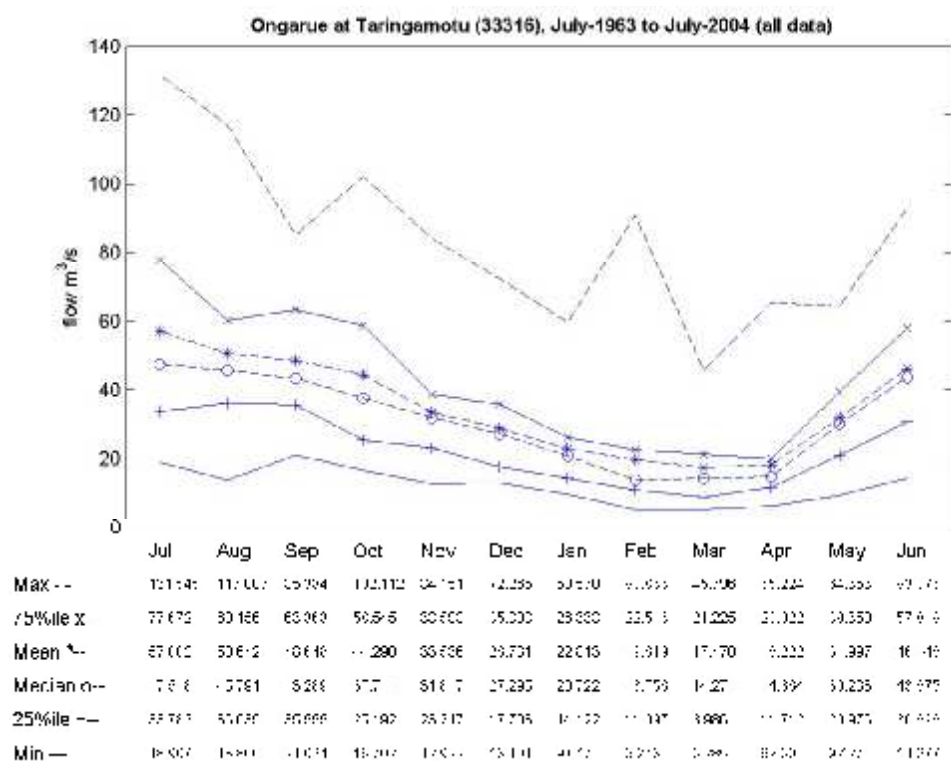


#### 4.5.4. Ongarue at Taringamotu (33316), Jul-1963 to Jul-2004 (all data)

Site		Ongarue at Taringamotu	
Time series details	Data Start Time	5-Aug-62	
	Data End Time	1-Jul-04	
	Analysis Start time	1-Jul-63	
	Analysis End time	1-Jul-04	
	Years of record analysed	41	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	35.046	
	MALF	8.251	
	½ median	12.27	8.503
	3x median	73.62	51.015
	MAF	292.66	
Flow variability percentiles	0 (maximum recorded flow)	554.134	449.049
	10	70.341	43.153
	20	48.508	29.766
	25 (upper quartile flow)	42.157	26.374
	30	37.302	23.73
	40	29.973	19.738
	50 (median flow)	24.54	17.005
	60	20.253	14.499
	70	16.803	12.322
	75 (lower quartile flow)	15.118	11.281
	80	13.413	10.308
	90	9.953	8.354
	91	9.576	8.132
	92	9.26	7.875
	93	8.913	7.572
	94	8.49	7.279
	95	8.079	7.003
	96	7.573	6.629
	97	7.067	6.241
	98	6.433	5.806
	99	5.762	5.367
	100 (minimum recorded flow)	4.416	4.416

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	35.47	
	MAF/median	11.926	
	FRE3 (floods/year or season)	7.145	6.583
	STD Annual FRE3	2.359	4
	Mean Days of Accrual (days)	45.301	40.91
	STD Accrual (days)	50.718	40.89
	Min Accrual (days)	5	5
	Max Accrual (days)	324	180

### Seasonal Distribution of Mean Monthly Flows



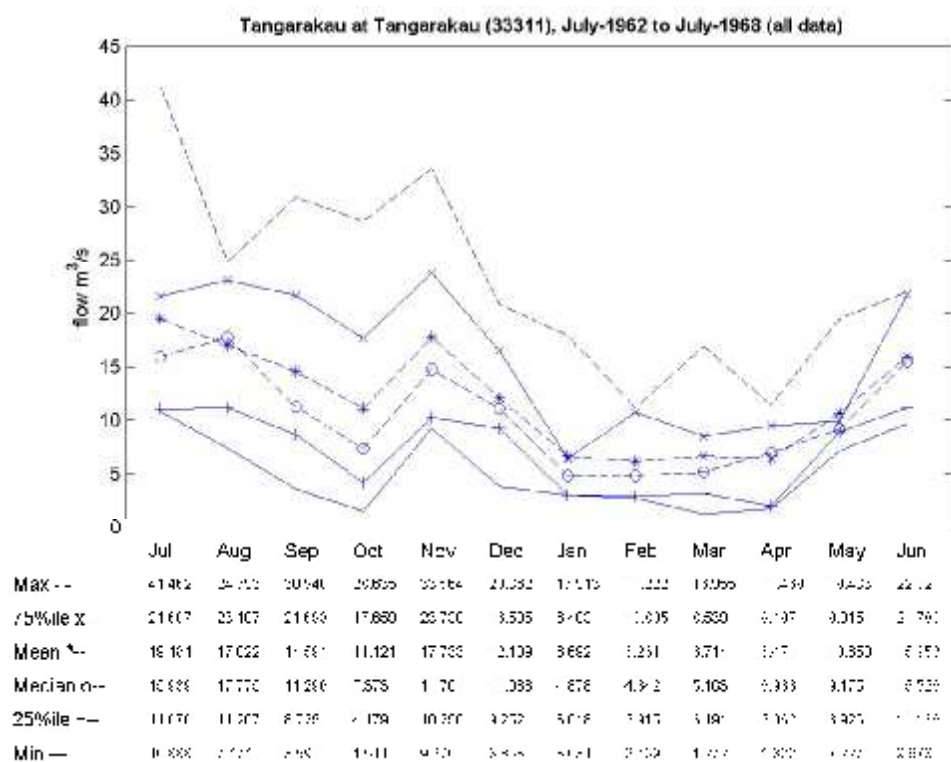
#### 4.5.5. Tangarakau at Tangarakau (33311), Jul-1962 to Jul-1968 (all data)

Site		Tangarakau at Tangarakau	
Time series details	Data Start Time	7-Oct-61	
	Data End Time	9-Jan-69	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-68	
	Years of record analysed	6	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	12.086	
	MALF	0.527	
	½ median	2.614	1.626
	3x median	15.681	9.753
	MAF	255.01	
Flow variability percentiles	0 (maximum recorded flow)	367.108	367.108
	10	29.83	23.461
	20	16.331	11.164
	25 (upper quartile flow)	12.686	8.302
	30	10.138	6.561
	40	7.18	4.5
	50 (median flow)	5.227	3.251
	60	3.925	2.377
	70	2.924	1.778
	75 (lower quartile flow)	2.447	1.518
	80	2.008	1.27
	90	1.174	0.791
	91	1.096	0.742
	92	0.989	0.693
	93	0.908	0.66
	94	0.84	0.628
	95	0.753	0.58
	96	0.687	0.527
	97	0.626	0.474
	98	0.52	0.435
	99	0.429	0.37
	100 (minimum recorded flow)	0.274	0.274



Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	483.89	
	MAF/median	48.787	
	FRE3 (floods/year or season)	15.165	14.778
	STD Annual FRE3	1.954	3.554
	Mean Days of Accrual (days)	18.278	18.022
	STD Accrual (days)	13.394	11.667
	Min Accrual (days)	5	5
	Max Accrual (days)	65	45

### Seasonal Distribution of Mean Monthly Flows

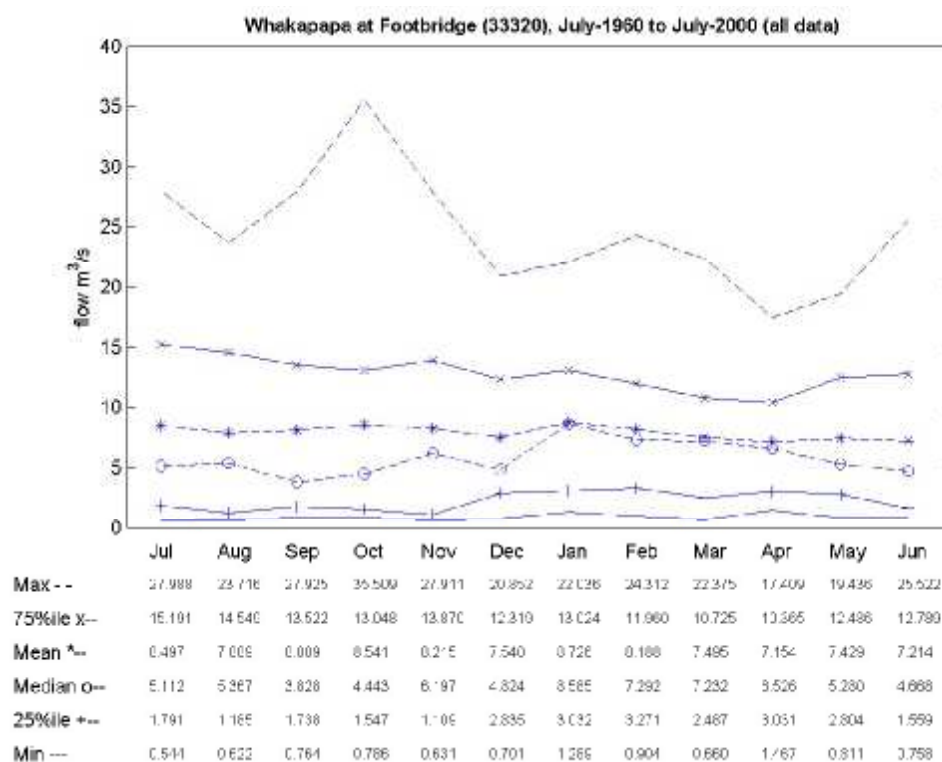


#### 4.5.6. Whakapapa at Footbridge (33320), Jul-1960 to Jul-2000 (all data)

Site		Whakapapa at Footbridge	
Time series details	Data Start Time	12-Nov-59	
	Data End Time	24-Apr-01	
	Analysis Start time	1-Jul-60	
	Analysis End time	1-Jul-00	
	Years of record analysed	40	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	7.915	
	MALF	3.133	
	½ median	1.795	2.15
	3x median	10.77	12.9
	MAF	282.93	
Flow variability percentiles	0 (maximum recorded flow)	477.643	427.494
	10	16.265	14.75
	20	12.022	11.335
	25 (upper quartile flow)	10.727	10.319
	30	9.771	9.556
	40	7.527	8.204
	50 (median flow)	3.59	4.3
	60	2.698	3.262
	70	0.941	1.483
	75 (lower quartile flow)	0.86	0.953
	80	0.8	0.861
	90	0.671	0.695
	91	0.658	0.68
	92	0.64	0.665
	93	0.622	0.645
	94	0.598	0.625
	95	0.571	0.594
	96	0.549	0.555
	97	0.527	0.523
	98	0.499	0.494
	99	0.45	0.467
	100 (minimum recorded flow)	0.005	0.005

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	90.306	
	MAF/median	78.811	
	FRE3 (floods/year or season)	9.699	9.22
	STD Annual FRE3	3.509	4.449
	Mean Days of Accrual (days)	26.689	27.376
	STD Accrual (days)	28.796	26.65
	Min Accrual (days)	5	5
	Max Accrual (days)	204	147

### Seasonal Distribution of Mean Monthly Flows

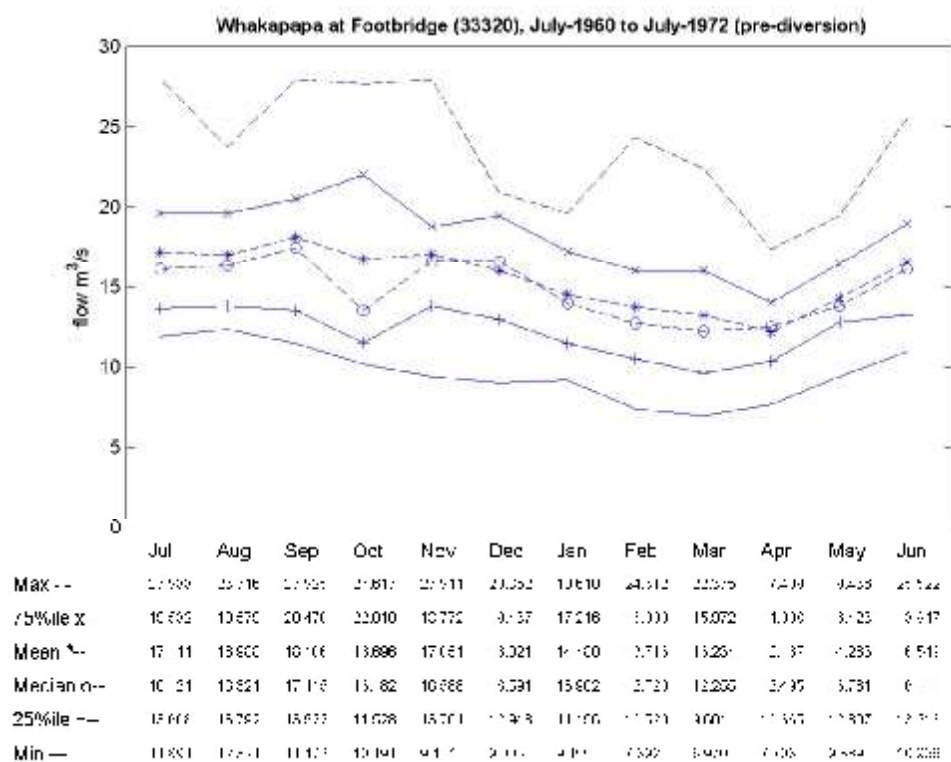


#### 4.5.7. Whakapapa at Footbridge (33320), Jul-1960 to Jul-1972 (pre-diversion)

Site		Whakapapa at Footbridge	
Time series details	Data Start Time	12-Nov-59	
	Data End Time	28-Nov-72	
	Analysis Start time	1-Jul-60	
	Analysis End time	1-Jul-72	
	Years of record analysed	12	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	15.542	
	MALF	8.061	
	½ median	6.008	5.612
	3x median	36.048	33.669
	MAF	311.43	
Flow variability percentiles	0 (maximum recorded flow)	412.345	412.345
	10	23.775	20.593
	20	17.075	15.469
	25 (upper quartile flow)	15.669	14.245
	30	14.56	13.448
	40	13.092	12.335
	50 (median flow)	12.016	11.223
	60	11.077	10.426
	70	10.298	9.708
	75 (lower quartile flow)	9.935	9.355
	80	9.547	9.103
	90	8.839	8.361
	91	8.747	8.305
	92	8.637	8.193
	93	8.507	8.048
	94	8.376	7.828
	95	8.268	7.595
	96	8.052	7.396
	97	7.639	7.218
	98	7.261	6.991
	99	6.792	6.63
	100 (minimum recorded flow)	6.202	6.332

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	38.634	
	MAF/median	25.918	
	FRE3 (floods/year or season)	9.833	8.396
	STD Annual FRE3	3.325	3.199
	Mean Days of Accrual (days)	34.923	33.22
	STD Accrual (days)	34.658	26.921
	Min Accrual (days)	5	5
	Max Accrual (days)	157	136

### Seasonal Distribution of Mean Monthly Flows

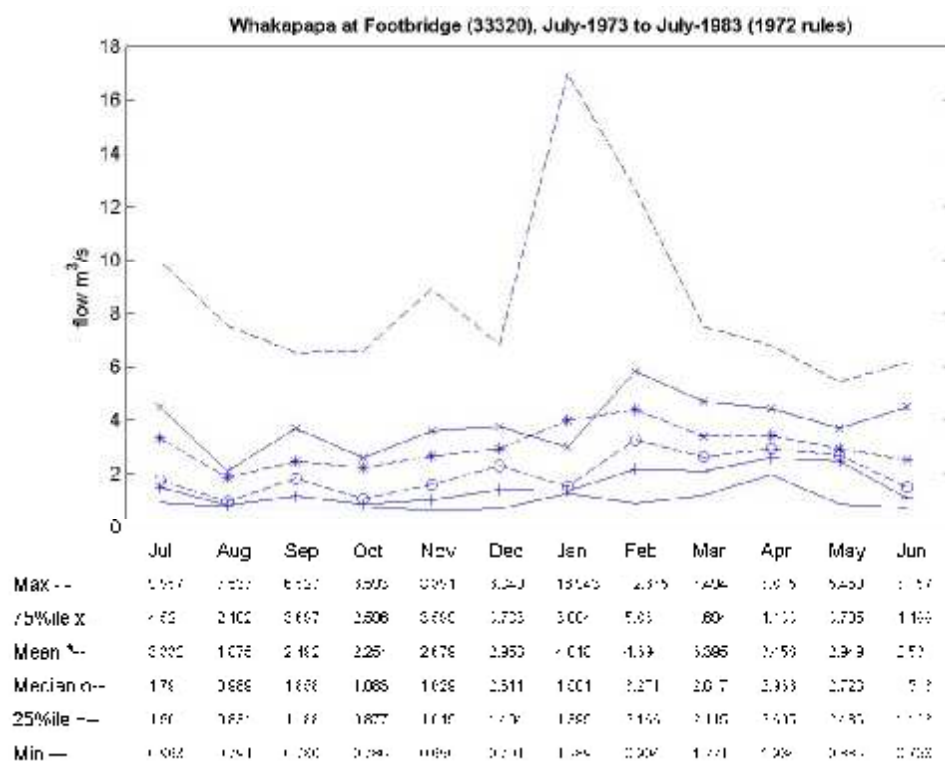


#### 4.5.8. Whakapapa at Footbridge (33320), Jul-1973 to Jul-1983 (1972 rules)

Site		Whakapapa at Footbridge	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	3.021	
	MALF	0.41	
	½ median	0.451	0.496
	3x median	2.706	2.976
	MAF	252.34	
Flow variability percentiles	0 (maximum recorded flow)	402.933	402.933
	10	3.946	7.026
	20	2.269	3.305
	25 (upper quartile flow)	1.611	2.847
	30	1.147	2.295
	40	0.966	1.496
	50 (median flow)	0.902	0.992
	60	0.855	0.918
	70	0.813	0.863
	75 (lower quartile flow)	0.792	0.832
	80	0.767	0.805
	90	0.691	0.711
	91	0.678	0.698
	92	0.658	0.684
	93	0.634	0.666
	94	0.606	0.648
	95	0.576	0.615
	96	0.549	0.569
	97	0.511	0.529
	98	0.465	0.491
	99	0.4	0.462
	100 (minimum recorded flow)	0.094	0.094

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	615.463	
	MAF/median	279.756	
	FRE3 (floods/year or season)	13.099	12.695
	STD Annual FRE3	4.547	3.671
	Mean Days of Accrual (days)	20.738	18.884
	STD Accrual (days)	17.15	14.379
	Min Accrual (days)	5	5
	Max Accrual (days)	89	89

### Seasonal Distribution of Mean Monthly Flows



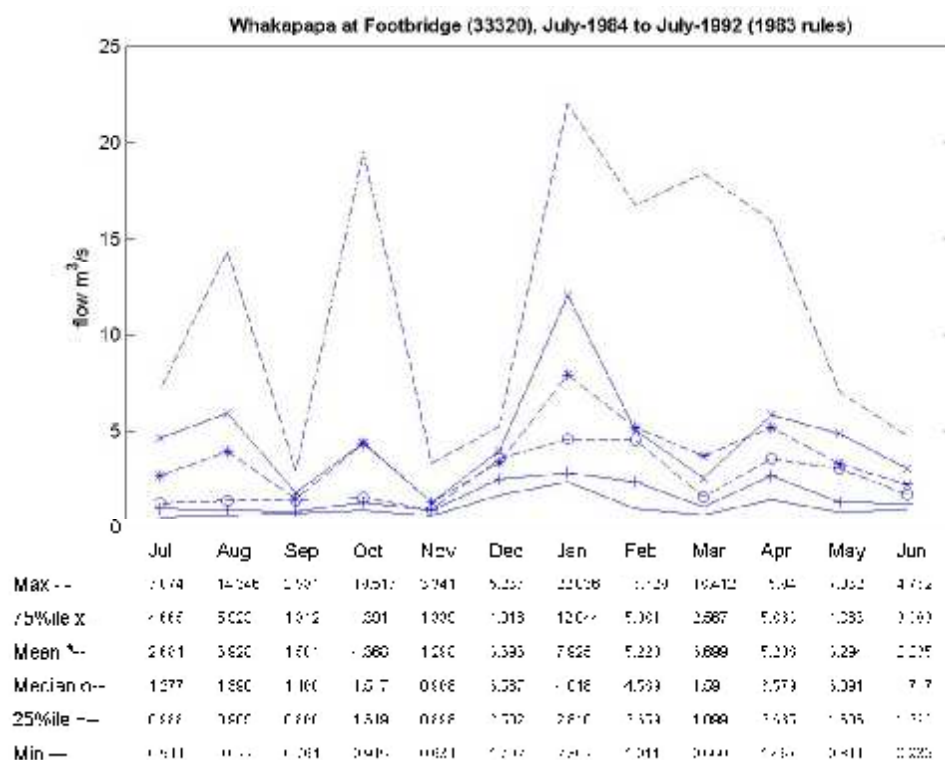
#### 4.5.9. Whakapapa at Footbridge (33320), Jul-1984 to Jul-1992 (1983 rules)

Site		Whakapapa at Footbridge	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	3.731	
	MALF	0.257	
	½ median	0.367	0.4
	3x median	2.199	2.4
	MAF	238.68	
Flow variability percentiles	0 (maximum recorded flow)	427.494	427.494
	10	9.067	10.843
	20	2.449	4.311
	25 (upper quartile flow)	1.545	2.832
	30	1.003	2.037
	40	0.81	0.997
	50 (median flow)	0.733	0.8
	60	0.685	0.724
	70	0.643	0.668
	75 (lower quartile flow)	0.621	0.641
	80	0.581	0.606
	90	0.522	0.528
	91	0.517	0.52
	92	0.512	0.512
	93	0.507	0.504
	94	0.502	0.495
	95	0.496	0.487
	96	0.491	0.479
	97	0.477	0.471
	98	0.447	0.449
	99	0.362	0.386
	100 (minimum recorded flow)	0.025	0.025



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	928.716	
	MAF/median	325.621	
	FRE3 (floods/year or season)	15	15.114
	STD Annual FRE3	1.695	4.033
	Mean Days of Accrual (days)	16.933	14.25
	STD Accrual (days)	11.691	9.292
	Min Accrual (days)	5	5
	Max Accrual (days)	55	50

### Seasonal Distribution of Mean Monthly Flows

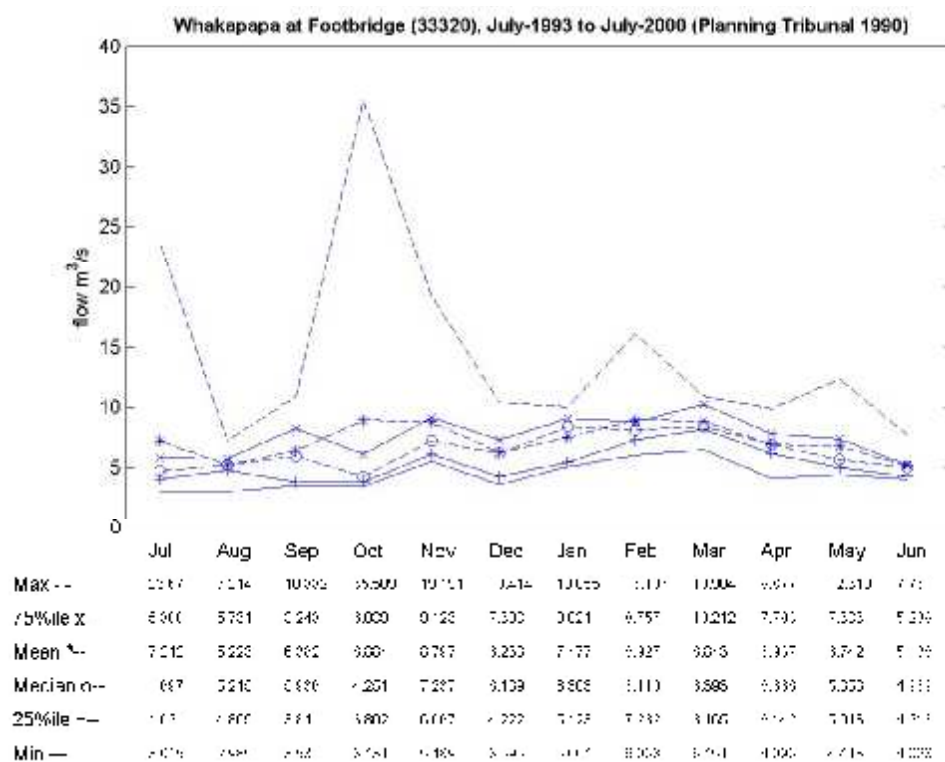


#### 4.5.10. Whakapapa at Footbridge (33320), Jul-1993 to Jul-2000 (Planning Tribunal 1990)

Site		Whakapapa at Footbridge	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	24-Apr-01	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-00	
	Years of record analysed	7	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	7.226	
	MALF	3.023	
	½ median	1.894	2.583
	3x median	11.364	15.495
	MAF	340.63	
Flow variability percentiles	0 (maximum recorded flow)	477.643	420.122
	10	10.002	10.289
	20	8.37	9.089
	25 (upper quartile flow)	7.759	8.654
	30	6.188	8.322
	40	4.059	7.573
	50 (median flow)	3.788	5.165
	60	3.614	3.99
	70	3.489	3.76
	75 (lower quartile flow)	3.433	3.64
	80	3.381	3.544
	90	3.216	3.403
	91	3.2	3.378
	92	3.156	3.353
	93	3.116	3.315
	94	3.076	3.273
	95	3.031	3.249
	96	3.001	3.225
	97	2.972	3.194
	98	2.947	3.159
	99	2.922	3.019
	100 (minimum recorded flow)	0.119	0.119

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	112.679	
	MAF/median	89.923	
	FRE3 (floods/year or season)	11.427	9.497
	STD Annual FRE3	3.2	4.755
	Mean Days of Accrual (days)	27.012	28.316
	STD Accrual (days)	23.613	28.751
	Min Accrual (days)	5	5
	Max Accrual (days)	121	157

### Seasonal Distribution of Mean Monthly Flows

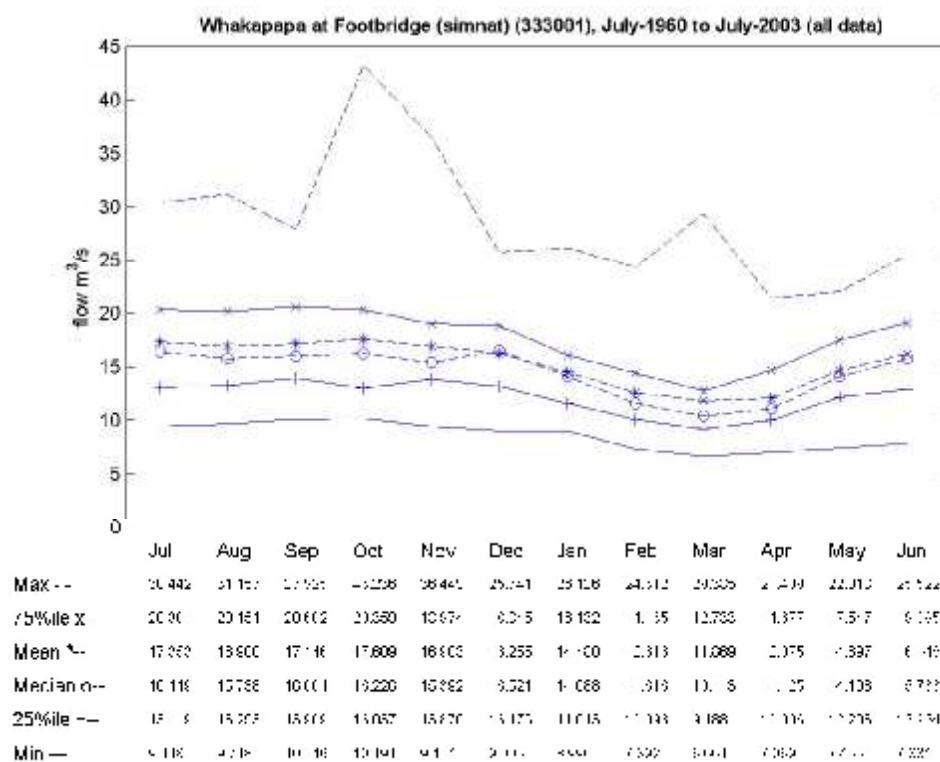


#### 4.5.11. Whakapapa at Footbridge (sim natural) (333001), Jul-1960 to Jul-2003 (all data)

Site		Whakapapa at Footbridge (sim natural)	
Time series details	Data Start Time	12-Nov-59	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-60	
	Analysis End time	1-Jul-03	
	Years of record analysed	43	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	15.356	
	MALF	8.2	
	½ median	6.258	5.817
	3x median	37.545	34.902
	MAF	237.95	
Flow variability percentiles	0 (maximum recorded flow)	407.486	380.927
	10	21.37	18.377
	20	16.61	14.933
	25 (upper quartile flow)	15.528	14.17
	30	14.721	13.539
	40	13.49	12.561
	50 (median flow)	12.515	11.634
	60	11.557	10.746
	70	10.655	10.017
	75 (lower quartile flow)	10.25	9.642
	80	9.866	9.264
	90	8.943	8.387
	91	8.826	8.263
	92	8.678	8.133
	93	8.516	7.958
	94	8.312	7.796
	95	8.092	7.614
	96	7.801	7.416
	97	7.497	7.216
	98	7.195	6.955
	99	6.818	6.69
	100 (minimum recorded flow)	1.001	1.001

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	29.018	
	MAF/median	19.013	
	FRE3 (floods/year or season)	7.488	6.325
	STD Annual FRE3	3.231	3.556
	Mean Days of Accrual (days)	46.394	42.506
	STD Accrual (days)	48.065	39.843
	Min Accrual (days)	5	5
	Max Accrual (days)	288	180

### Seasonal Distribution of Mean Monthly Flows

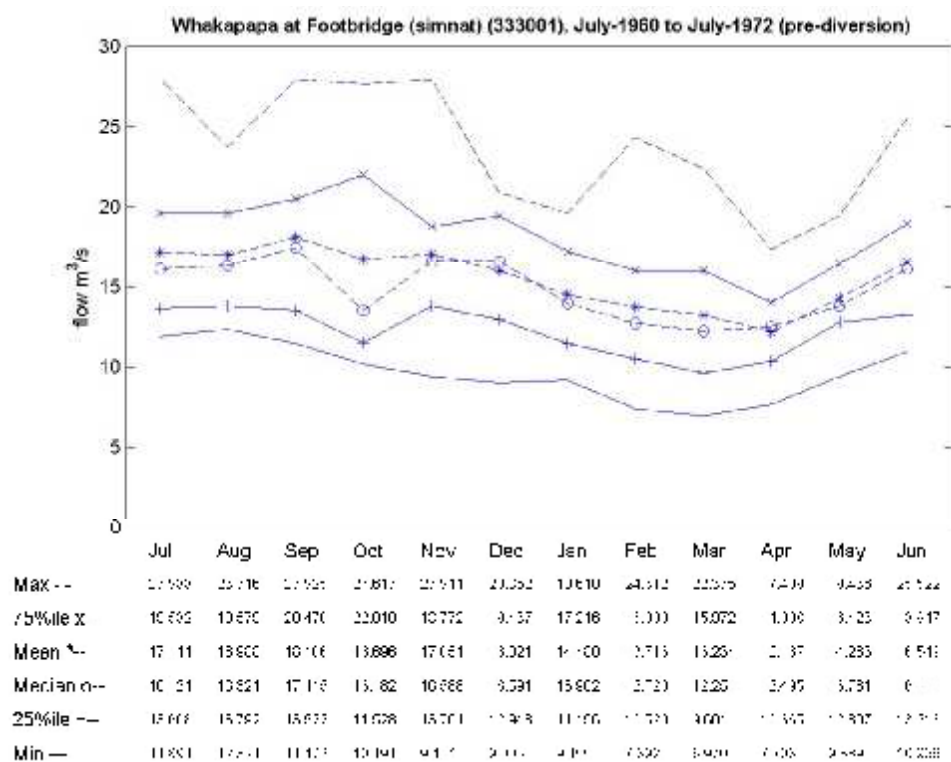


#### 4.5.12. Whakapapa at Footbridge (sim natural) (333001), Jul-1960 to Jul-1972 (pre-diversion)

Site		Whakapapa at Footbridge (sim natural)	
Time series details	Data Start Time	12-Nov-59	
	Data End Time	28-Nov-72	
	Analysis Start time	1-Jul-60	
	Analysis End time	1-Jul-72	
	Years of record analysed	12	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	15.542	
	MALF	8.057	
	½ median	6.011	5.612
	3x median	36.066	33.672
	MAF	244	
Flow variability percentiles	0 (maximum recorded flow)	340.867	340.867
	10	23.89	20.67
	20	17.11	15.478
	25 (upper quartile flow)	15.697	14.25
	30	14.588	13.439
	40	13.099	12.337
	50 (median flow)	12.022	11.224
	60	11.078	10.429
	70	10.298	9.714
	75 (lower quartile flow)	9.939	9.361
	80	9.549	9.104
	90	8.839	8.358
	91	8.75	8.288
	92	8.637	8.192
	93	8.51	8.059
	94	8.376	7.825
	95	8.271	7.592
	96	8.059	7.4
	97	7.643	7.22
	98	7.267	6.989
	99	6.805	6.627
	100 (minimum recorded flow)	6.208	6.332

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	30.284	
	MAF/median	20.296	
	FRE3 (floods/year or season)	9.833	8.396
	STD Annual FRE3	3.325	3.199
	Mean Days of Accrual (days)	34.923	33.22
	STD Accrual (days)	34.658	26.921
	Min Accrual (days)	5	5
	Max Accrual (days)	157	136

### Seasonal Distribution of Mean Monthly Flows



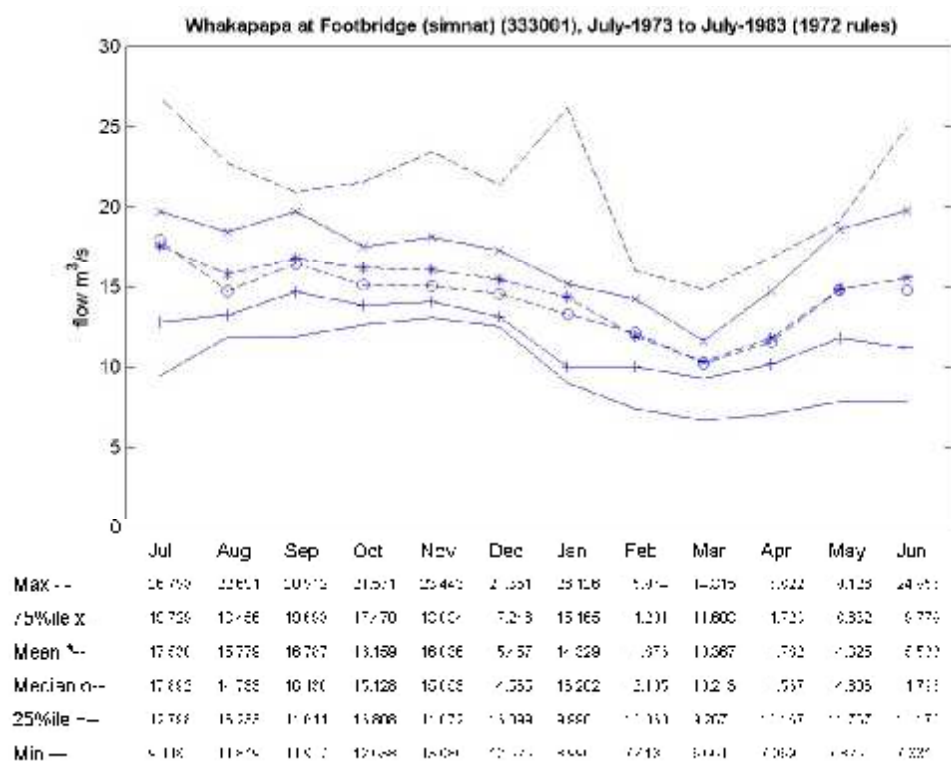
#### 4.5.13. Whakapapa at Footbridge (sim natural) (333001), Jul-1973 to Jul-1983 (1972 rules)

Site		Whakapapa at Footbridge (sim natural)	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	14.724	
	MALF	7.959	
	½ median	6.418	5.929
	3x median	38.508	35.574
	MAF	223.66	
Flow variability percentiles	0 (maximum recorded flow)	340.615	340.615
	10	18.801	16.209
	20	15.72	14.48
	25 (upper quartile flow)	15.081	14.005
	30	14.56	13.539
	40	13.73	12.658
	50 (median flow)	12.836	11.858
	60	12.069	10.954
	70	11.129	10.147
	75 (lower quartile flow)	10.602	9.904
	80	10.083	9.394
	90	8.96	8.454
	91	8.824	8.188
	92	8.589	7.894
	93	8.267	7.645
	94	7.855	7.276
	95	7.373	7.052
	96	7.08	6.959
	97	6.911	6.848
	98	6.786	6.634
	99	6.581	6.186
	100 (minimum recorded flow)	1.001	1.001



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	28.102	
	MAF/median	17.424	
	FRE3 (floods/year or season)	5.9	5.439
	STD Annual FRE3	3.175	3.551
	Mean Days of Accrual (days)	58.793	52.257
	STD Accrual (days)	66.027	50.055
	Min Accrual (days)	5	5
	Max Accrual (days)	288	180

### Seasonal Distribution of Mean Monthly Flows

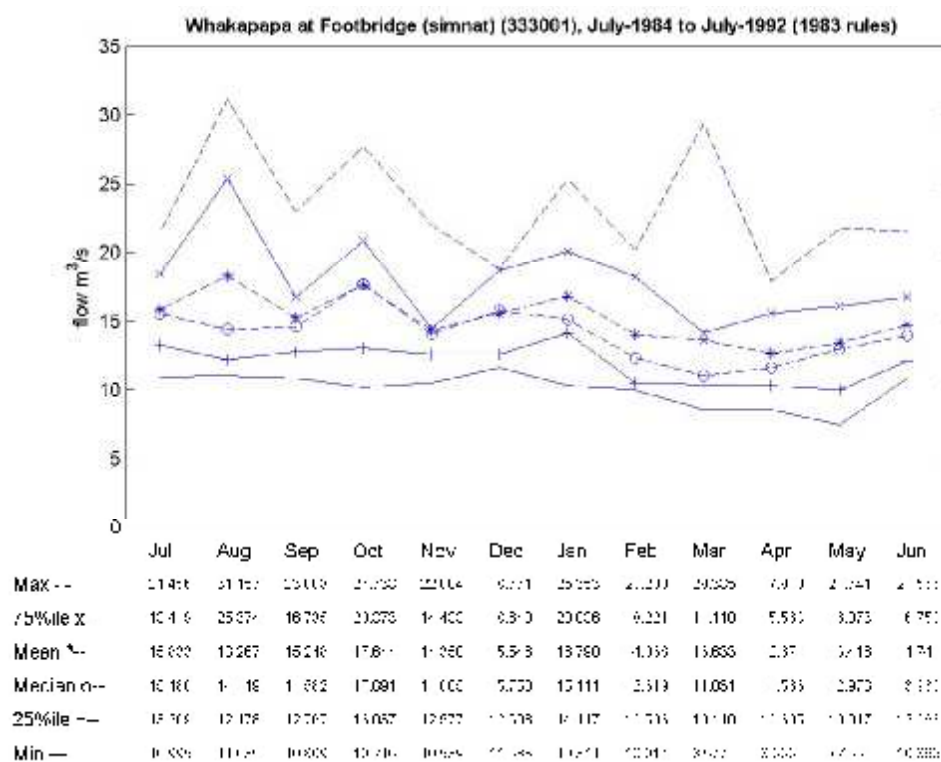


#### 4.5.14. Whakapapa at Footbridge (sim natural) (333001), Jul-1984 to Jul-1992 (1983 rules)

Site		Whakapapa at Footbridge (sim natural)	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	15.2	
	MALF	8.313	
	½ median	6.159	5.895
	3x median	36.954	35.367
	MAF	211.62	
Flow variability percentiles	0 (maximum recorded flow)	279.361	279.361
	10	20.662	18.434
	20	16.125	14.364
	25 (upper quartile flow)	14.941	13.737
	30	14.184	13.237
	40	13.107	12.467
	50 (median flow)	12.318	11.789
	60	11.518	11.099
	70	10.749	10.583
	75 (lower quartile flow)	10.473	10.24
	80	10.13	9.867
	90	9.361	9.261
	91	9.274	9.192
	92	9.192	9.095
	93	9.065	8.974
	94	8.879	8.848
	95	8.765	8.77
	96	8.521	8.595
	97	8.008	8.352
	98	7.632	7.835
	99	7.408	7.49
	100 (minimum recorded flow)	7.009	7.327

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	25.457	
	MAF/median	17.18	
	FRE3 (floods/year or season)	6.874	7.052
	STD Annual FRE3	4.223	2.635
	Mean Days of Accrual (days)	47	39
	STD Accrual (days)	50.444	34.343
	Min Accrual (days)	5	5
	Max Accrual (days)	262	135

### Seasonal Distribution of Mean Monthly Flows

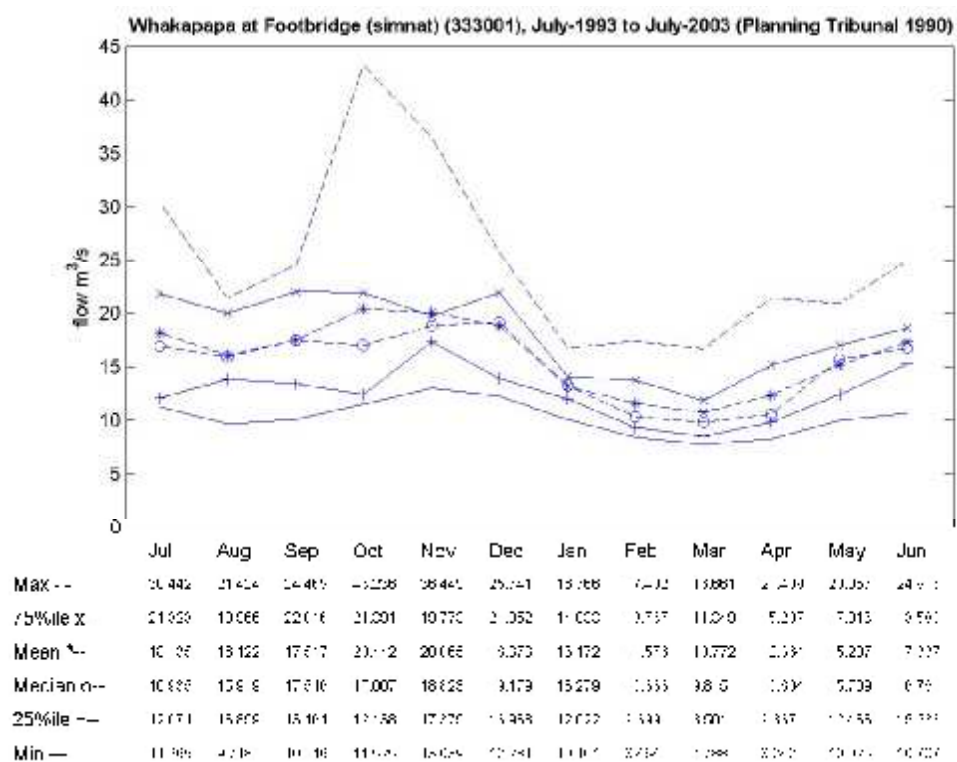


#### 4.5.15. Whakapapa at Footbridge (sim natural) (333001), Jul-1993 to Jul-2003 (Planning Tribunal 1990)

Site		Whakapapa at Footbridge (sim natural)	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-03	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	15.991	
	MALF	8.627	
	½ median	6.451	6.078
	3x median	38.706	36.465
MAF		288.23	
Flow variability percentiles	0 (maximum recorded flow)	407.486	380.927
	10	21.454	18.805
	20	17.35	15.826
	25 (upper quartile flow)	16.308	15.009
	30	15.506	14.348
	40	14.209	13.08
	50 (median flow)	12.902	12.155
	60	11.854	11.018
	70	10.773	9.981
	75 (lower quartile flow)	10.259	9.37
	80	9.787	8.852
	90	8.756	8.141
	91	8.636	8.076
	92	8.518	7.972
	93	8.338	7.897
	94	8.187	7.831
	95	8.061	7.742
	96	7.894	7.642
	97	7.772	7.529
	98	7.602	7.401
	99	7.375	6.995
	100 (minimum recorded flow)	6.684	6.684

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	33.41	
	MAF/median	22.34	
	FRE3 (floods/year or season)	7.5	6.446
	STD Annual FRE3	2.674	3.997
	Mean Days of Accrual (days)	44.507	39.975
	STD Accrual (days)	44.596	40.674
	Min Accrual (days)	5	5
	Max Accrual (days)	181	166

### Seasonal Distribution of Mean Monthly Flows

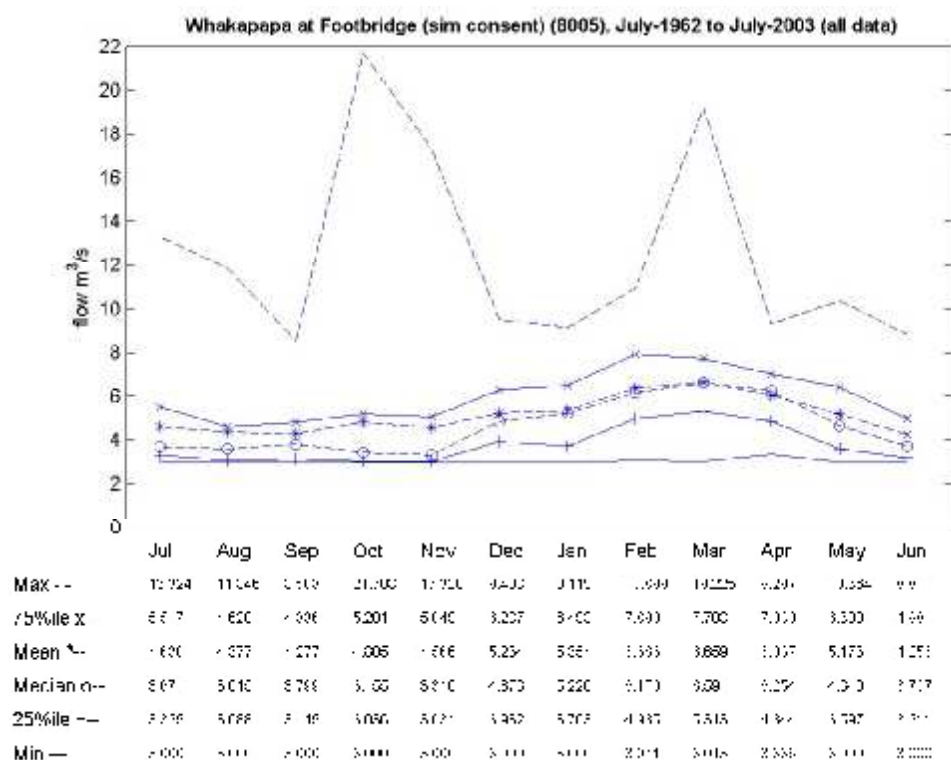


#### 4.5.16. Whakapapa at Footbridge (sim consent) (8005), Jul-1962 to Jul-2003 (all data)

Site		Whakapapa at Footbridge (sim consent)	
Time series details	Data Start Time	1-Jul-62	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-03	
	Years of record analysed	41	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	5.14	
	MALF	3	
	½ median	1.512	1.517
	3x median	9.069	9.102
	MAF	209.2	
Flow variability percentiles	0 (maximum recorded flow)	377.486	350.927
	10	7.817	8.452
	20	5.83	7.433
	25 (upper quartile flow)	3.035	6.97
	30	3.032	6.402
	40	3.028	3.041
	50 (median flow)	3.023	3.034
	60	3.018	3.027
	70	3.014	3.02
	75 (lower quartile flow)	3.012	3.017
	80	3.009	3.014
	90	3.005	3.007
	91	3.004	3.006
	92	3.004	3.005
	93	3.003	3.005
	94	3.003	3.004
	95	3.002	3.003
	96	3.002	3.003
	97	3.001	3.002
	98	3.001	3.001
	99	3	3.001
	100 (minimum recorded flow)	3	3

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	69.733	
	MAF/median	69.203	
	FRE3 (floods/year or season)	10.707	9.879
	STD Annual FRE3	3.478	3.393
	Mean Days of Accrual (days)	30.868	28.913
	STD Accrual (days)	29.107	24.5
	Min Accrual (days)	5	5
	Max Accrual (days)	174	150

### Seasonal Distribution of Mean Monthly Flows



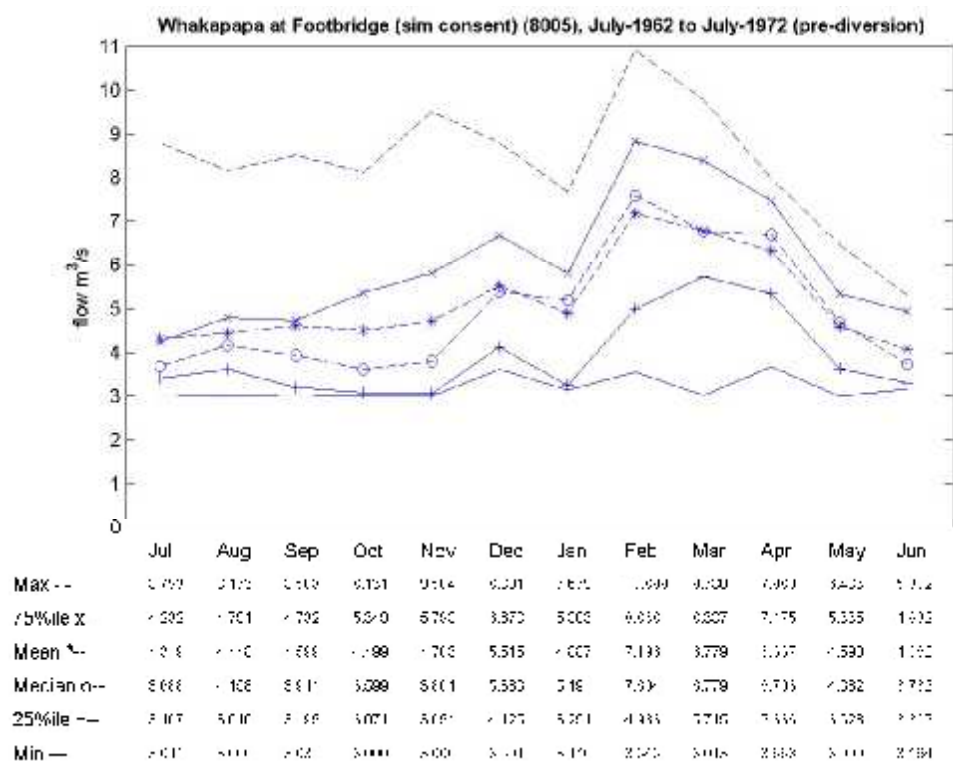
#### 4.5.17. Whakapapa at Footbridge (sim consent) (8005), Jul-1962 to Jul-1972 (pre-diversion)

Site		Whakapapa at Footbridge (sim consent)	
Time series details	Data Start Time	1-Jul-62	
	Data End Time	28-Nov-72	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-72	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	5.151	
	MALF	3	
	½ median	1.511	1.517
	3x median	9.063	9.102
	MAF	220.9	
Flow variability percentiles	0 (maximum recorded flow)	310.867	310.867
	10	7.875	8.634
	20	5.921	7.392
	25 (upper quartile flow)	3.031	6.994
	30	3.029	6.387
	40	3.025	3.041
	50 (median flow)	3.021	3.034
	60	3.016	3.027
	70	3.012	3.02
	75 (lower quartile flow)	3.01	3.017
	80	3.008	3.014
	90	3.004	3.007
	91	3.004	3.006
	92	3.003	3.005
	93	3.003	3.005
	94	3.002	3.004
	95	3.002	3.003
	96	3.002	3.003
	97	3.001	3.002
	98	3.001	3.001
	99	3	3.001
	100 (minimum recorded flow)	3	3



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	73.633	
	MAF/median	73.121	
	FRE3 (floods/year or season)	11.897	11.079
	STD Annual FRE3	3.032	3.037
	Mean Days of Accrual (days)	27.627	26.933
	STD Accrual (days)	24.269	22.326
	Min Accrual (days)	5	5
	Max Accrual (days)	126	121

### Seasonal Distribution of Mean Monthly Flows

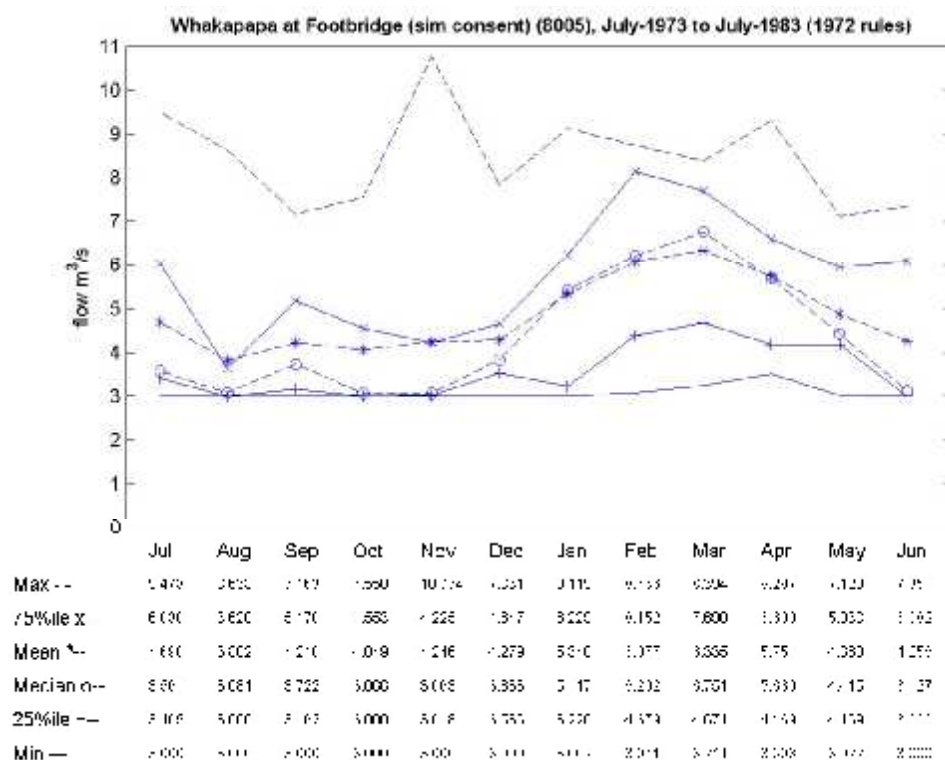


#### 4.5.18. Whakapapa at Footbridge (sim consent) (8005), Jul-1973 to Jul-1983 (1972 rules)

Site		Whakapapa at Footbridge (sim consent)	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	4.816	
	MALF	3	
	½ median	1.51	1.512
	3x median	9.057	9.072
	MAF	193.66	
Flow variability percentiles	0 (maximum recorded flow)	310.615	310.615
	10	7.693	8.362
	20	5.639	7.386
	25 (upper quartile flow)	3.029	6.924
	30	3.027	6.339
	40	3.023	3.029
	50 (median flow)	3.019	3.024
	60	3.016	3.019
	70	3.012	3.014
	75 (lower quartile flow)	3.01	3.012
	80	3.008	3.01
	90	3.004	3.005
	91	3.004	3.004
	92	3.003	3.004
	93	3.003	3.003
	94	3.002	3.003
	95	3.002	3.002
	96	3.002	3.002
	97	3.001	3.001
	98	3.001	3.001
	99	3	3
	100 (minimum recorded flow)	3	3

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	64.553	
	MAF/median	64.147	
	FRE3 (floods/year or season)	9.201	8.464
	STD Annual FRE3	3.85	2.808
	Mean Days of Accrual (days)	35.934	33.694
	STD Accrual (days)	36.186	27.959
	Min Accrual (days)	5	5
	Max Accrual (days)	174	150

### Seasonal Distribution of Mean Monthly Flows

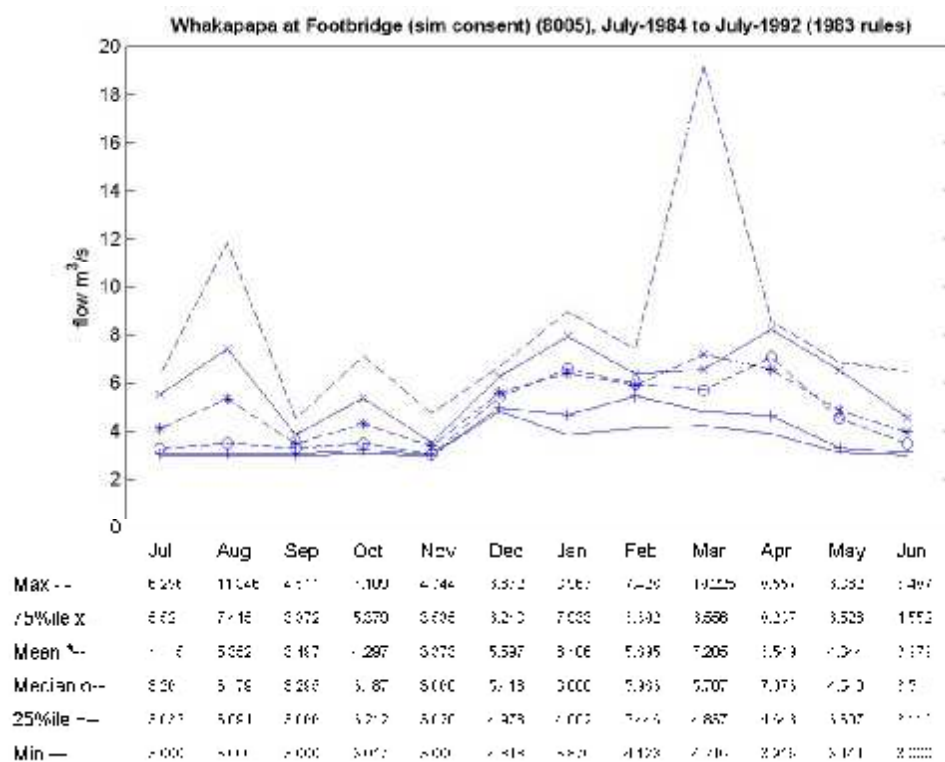


#### 4.5.19. Whakapapa at Footbridge (sim consent) (8005), Jul-1984 to Jul-1992 (1983 rules)

Site		Whakapapa at Footbridge (sim consent)	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	5.095	
	MALF	3	
	½ median	1.512	1.518
	3x median	9.072	9.108
	MAF	181.62	
Flow variability percentiles	0 (maximum recorded flow)	249.361	249.361
	10	7.787	8.58
	20	5.13	7.445
	25 (upper quartile flow)	3.035	6.87
	30	3.033	5.847
	40	3.028	3.043
	50 (median flow)	3.024	3.036
	60	3.019	3.029
	70	3.014	3.022
	75 (lower quartile flow)	3.012	3.018
	80	3.009	3.014
	90	3.005	3.007
	91	3.004	3.006
	92	3.004	3.006
	93	3.003	3.005
	94	3.003	3.004
	95	3.002	3.004
	96	3.002	3.003
	97	3.001	3.002
	98	3.001	3.001
	99	3	3.001
	100 (minimum recorded flow)	3	3

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	60.54	
	MAF/median	60.06	
	FRE3 (floods/year or season)	9.999	10.33
	STD Annual FRE3	3.928	3.319
	Mean Days of Accrual (days)	33.203	26.841
	STD Accrual (days)	31.18	22.965
	Min Accrual (days)	5	5
	Max Accrual (days)	143	104

### Seasonal Distribution of Mean Monthly Flows

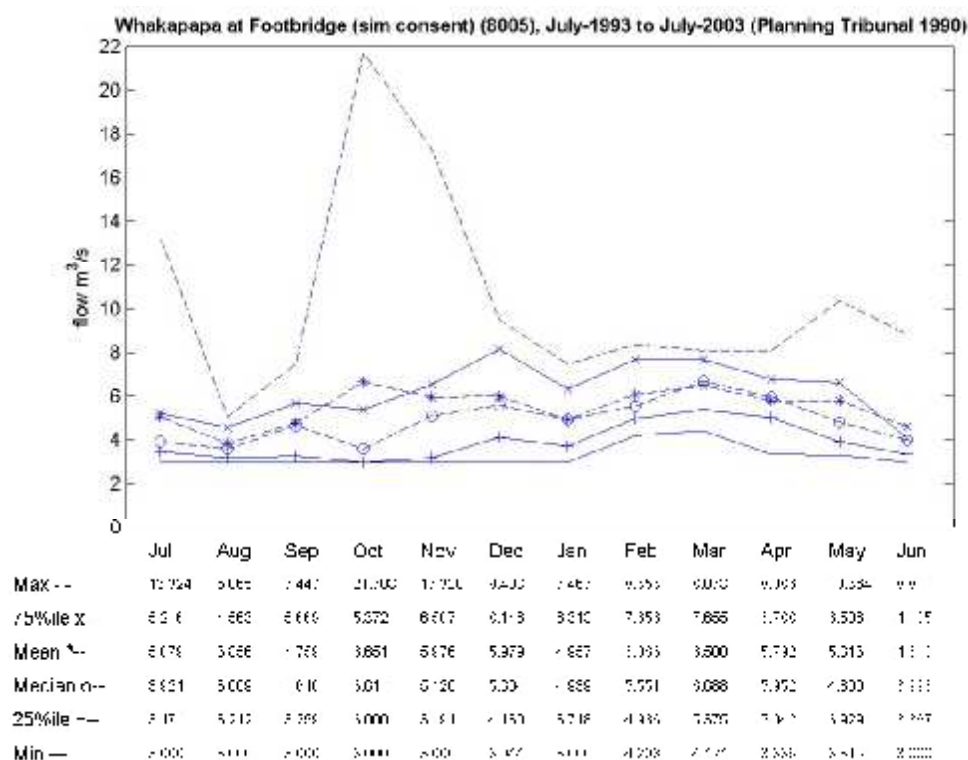


#### 4.5.20. Whakapapa at Footbridge (sim consent) (8005), Jul-1993 to Jul-2003 (Planning Tribunal 1990)

Site		Whakapapa at Footbridge (sim consent)	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-03	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	5.502	
	MALF	3	
	½ median	1.516	1.52
	3x median	9.093	9.117
MAF		258.23	
Flow variability percentiles	0 (maximum recorded flow)	377.486	350.927
	10	7.853	8.227
	20	6.1	7.513
	25 (upper quartile flow)	3.047	7.002
	30	3.044	6.436
	40	3.037	3.047
	50 (median flow)	3.031	3.039
	60	3.025	3.031
	70	3.019	3.023
	75 (lower quartile flow)	3.016	3.019
	80	3.012	3.016
	90	3.006	3.008
	91	3.006	3.007
	92	3.005	3.006
	93	3.004	3.005
	94	3.004	3.005
	95	3.003	3.004
	96	3.002	3.003
	97	3.002	3.002
	98	3.001	3.002
	99	3.001	3.001
100 (minimum recorded flow)		3	3

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	86.077	
	MAF/median	85.196	
	FRE3 (floods/year or season)	11.201	10.279
	STD Annual FRE3	3.486	4.185
	Mean Days of Accrual (days)	28.77	27.576
	STD Accrual (days)	26.515	25.809
	Min Accrual (days)	5	5
	Max Accrual (days)	146	122

### Seasonal Distribution of Mean Monthly Flows



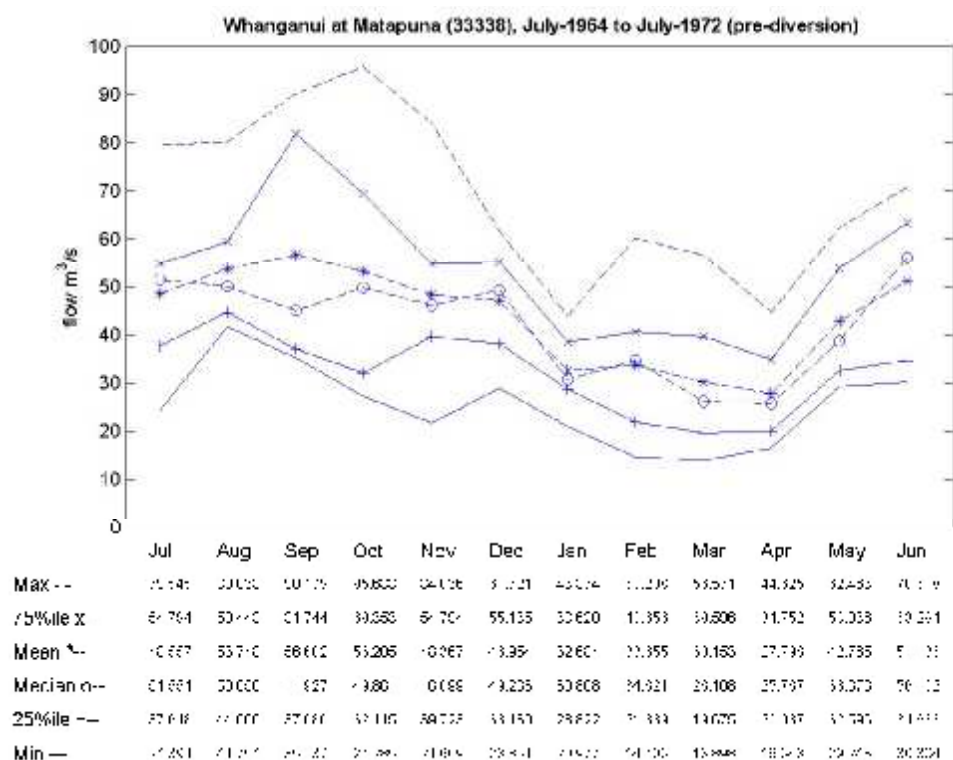
#### 4.5.21. Whanganui at Matapuna (33338), Jul-1964 to Jul-1972 (pre-diversion)

Site		Whanganui at Matapuna	
Time series details	Data Start Time	30-Jun-64	
	Data End Time	28-Nov-72	
	Analysis Start time	3-Jul-64	
	Analysis End time	1-Jul-72	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	44.394	
	MALF	16.842	
	½ median	17.62	14.166
	3x median	105.72	84.993
	MAF	502.51	
Flow variability percentiles	0 (maximum recorded flow)	687.114	687.114
	10	76.696	59.54
	20	56.457	44.93
	25 (upper quartile flow)	50.882	40.683
	30	46.737	37.569
	40	40.272	32.546
	50 (median flow)	35.24	28.331
	60	30.424	25.567
	70	26.537	22.632
	75 (lower quartile flow)	24.82	21.141
	80	23.135	20.085
	90	19.503	17.236
	91	19.109	16.846
	92	18.725	16.635
	93	18.139	16.242
	94	17.48	15.752
	95	16.821	15.21
	96	16.221	14.497
	97	15.268	13.893
	98	14.166	13.428
	99	13.317	13.032
	100 (minimum recorded flow)	10.863	10.863



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	29.837	
	MAF/median	14.26	
	FRE3 (floods/year or season)	6.373	6.296
	STD Annual FRE3	2.32	2.938
	Mean Days of Accrual (days)	53.94	45.483
	STD Accrual (days)	62.274	42.631
	Min Accrual (days)	5	5
	Max Accrual (days)	393	181

### Seasonal Distribution of Mean Monthly Flows

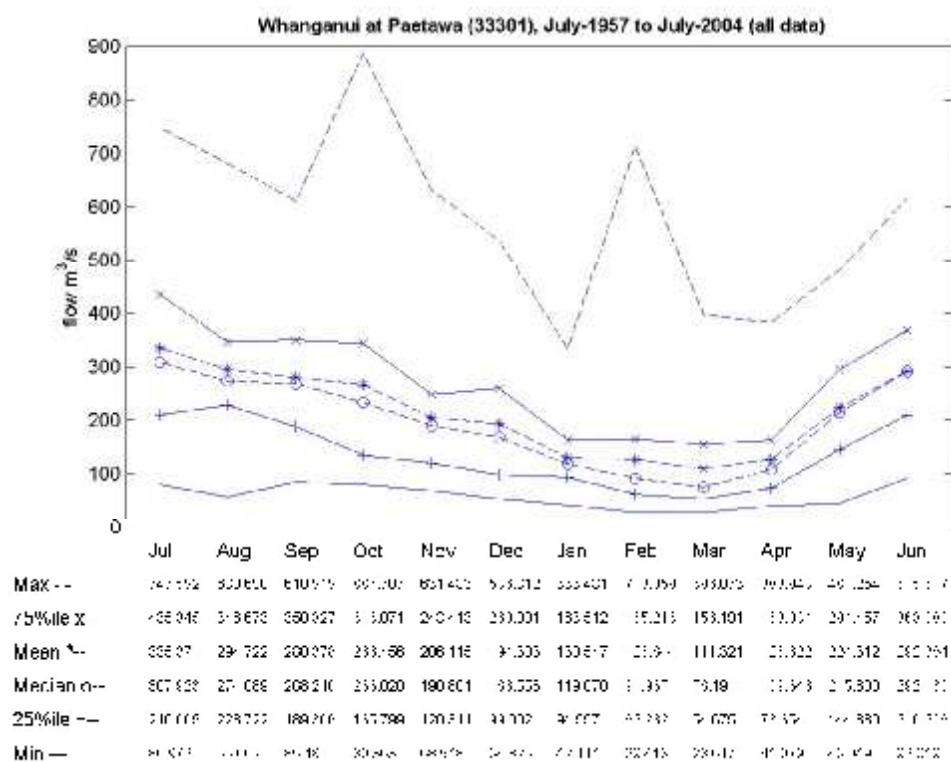


#### 4.5.22. Whanganui at Paetawa (33301), Jul-1957 to Jul-2004 (all data)

Site		Whanganui at Paetawa	
Time series details	Data Start Time	26-Jul-57	
	Data End Time	4-Apr-05	
	Analysis Start time	26-Jul-57	
	Analysis End time	1-Jul-04	
	Years of record analysed	47	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	216.166	
	MALF	39.132	
	½ median	64.346	41.838
	3x median	386.076	251.025
	MAF	2316.1	
Flow variability percentiles	0 (maximum recorded flow)	4105.8	4105.8
	10	473.562	303.044
	20	300.199	182.546
	25 (upper quartile flow)	253.184	153.252
	30	217.133	131.665
	40	164.806	103
	50 (median flow)	128.692	83.675
	60	102.078	70.332
	70	80.618	60.077
	75 (lower quartile flow)	71.962	55.308
	80	63.976	50.949
	90	49.25	41.372
	91	47.745	40.265
	92	46.055	39.217
	93	44.184	38.031
	94	42.24	36.846
	95	40.307	35.349
	96	38.167	33.907
	97	35.785	32.408
	98	33.229	30.636
	99	30.407	27.604
	100 (minimum recorded flow)	22.212	22.212

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	19.397	
	MAF/median	17.997	
	FRE3 (floods/year or season)	11.085	10.375
	STD Annual FRE3	2.651	3.872
	Mean Days of Accrual (days)	27.355	26.285
	STD Accrual (days)	30.574	25.501
	Min Accrual (days)	5	5
	Max Accrual (days)	236	184

### Seasonal Distribution of Mean Monthly Flows

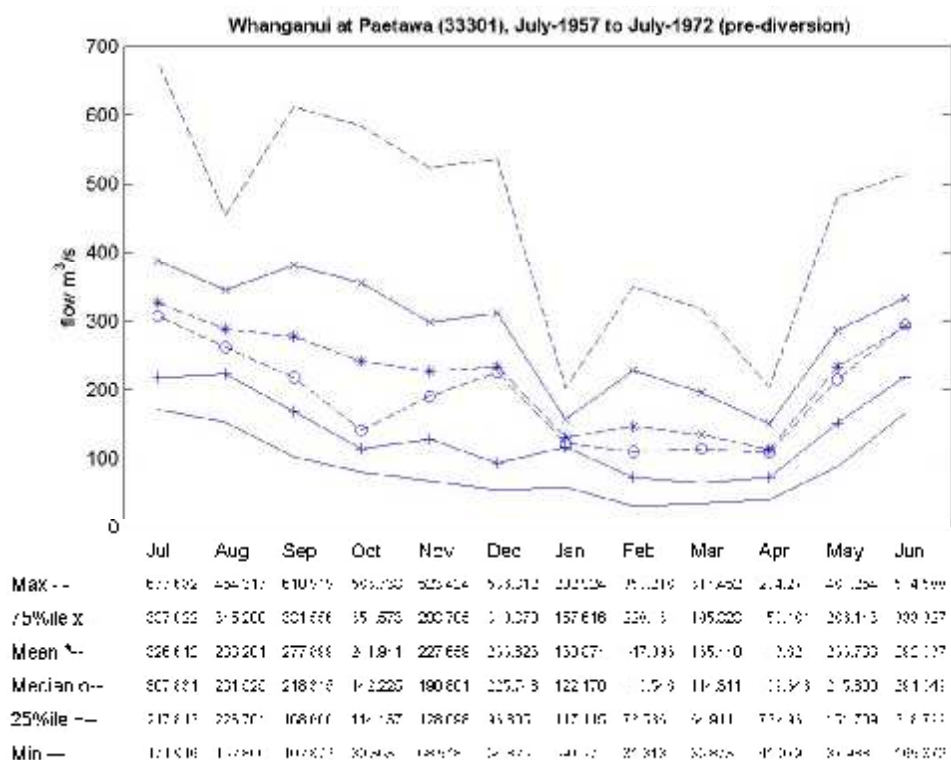


#### 4.5.23. Whanganui at Paetawa (33301), Jul-1957 to Jul-1972 (pre-diversion)

Site		Whanganui at Paetawa	
Time series details	Data Start Time	26-Jul-57	
	Data End Time	28-Nov-72	
	Analysis Start time	26-Jul-57	
	Analysis End time	1-Jul-72	
	Years of record analysed	15	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	220.637	
	MALF	45.356	
	½ median	68.047	46.2
	3x median	408.279	277.2
	MAF	2242.5	
Flow variability percentiles	0 (maximum recorded flow)	3844.6	3844.6
	10	470.918	330.767
	20	302.971	198.274
	25 (upper quartile flow)	258.355	166.764
	30	223.565	143.666
	40	171.521	112.633
	50 (median flow)	136.093	92.4
	60	110.664	78.013
	70	89.802	67.13
	75 (lower quartile flow)	80.77	62.229
	80	72.693	57.796
	90	56.631	48.604
	91	55.173	47.667
	92	53.634	46.487
	93	51.812	45.219
	94	49.844	43.445
	95	48.125	41.646
	96	45.796	39.233
	97	42.693	36.985
	98	38.35	33.859
	99	32.921	30.515
	100 (minimum recorded flow)	26.987	26.987

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	49.712	
	MAF/median	16.478	
	FRE3 (floods/year or season)	10.6	9.941
	STD Annual FRE3	2.798	4.21
	Mean Days of Accrual (days)	28.595	27.565
	STD Accrual (days)	32.24	26.059
	Min Accrual (days)	5	5
	Max Accrual (days)	236	180

### Seasonal Distribution of Mean Monthly Flows

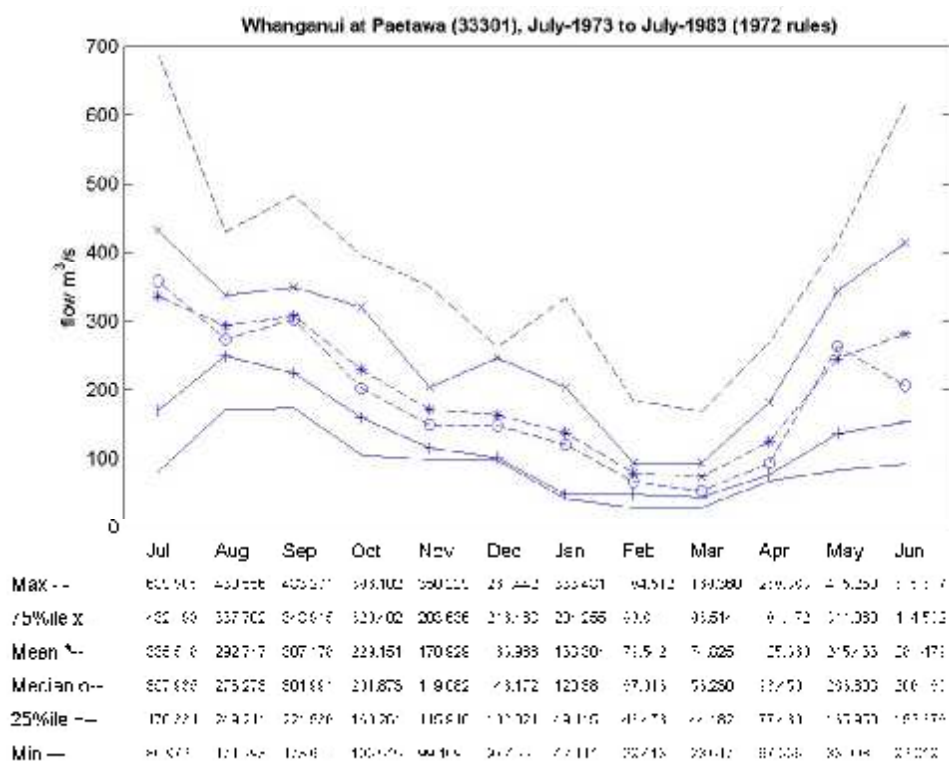


#### 4.5.24. Whanganui at Paetawa (33301), Jul-1973 to Jul-1983 (1972 rules)

Site		Whanganui at Paetawa	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	204.495	
	MALF	32.221	
	½ median	62.465	37.106
	3x median	374.787	222.633
	MAF	2274.6	
Flow variability percentiles	0 (maximum recorded flow)	3133.9	3071.5
	10	452.341	257.446
	20	289.437	162.929
	25 (upper quartile flow)	246.246	137.79
	30	212.127	118.052
	40	162.687	91.32
	50 (median flow)	124.929	74.211
	60	95.543	62.478
	70	73.596	50.79
	75 (lower quartile flow)	64.666	45.941
	80	56.536	41.106
	90	39.023	32.763
	91	37.488	32.087
	92	36.115	31.455
	93	34.744	30.641
	94	33.481	29.807
	95	32.351	28.889
	96	31.135	27.818
	97	29.782	26.719
	98	27.846	25.257
	99	25.281	24.037
	100 (minimum recorded flow)	22.212	22.212

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	70.594	
	MAF/median	18.207	
	FRE3 (floods/year or season)	11.1	11.083
	STD Annual FRE3	2.465	2.712
	Mean Days of Accrual (days)	27.509	25.71
	STD Accrual (days)	33.277	25.084
	Min Accrual (days)	5	5
	Max Accrual (days)	182	140

### Seasonal Distribution of Mean Monthly Flows



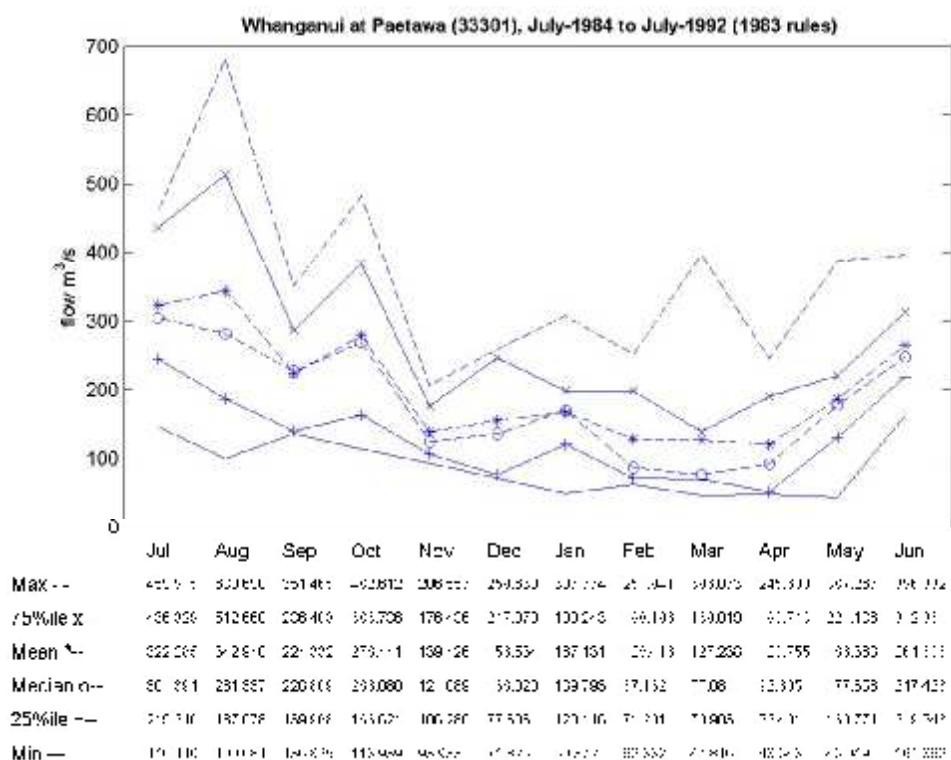
#### 4.5.25. Whanganui at Paetawa (33301), Jul-1984 to Jul-1992 (1983 rules)

Site		Whanganui at Paetawa	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	205.635	
	MALF	33.961	
	½ median	59.958	39.659
	3x median	359.745	237.951
	MAF	2354	
Flow variability percentiles	0 (maximum recorded flow)	4105.8	4105.8
	10	466.528	287.708
	20	292.678	172.234
	25 (upper quartile flow)	244.122	142.99
	30	206.386	123.647
	40	153.472	98.489
	50 (median flow)	119.915	79.317
	60	95.411	66.81
	70	74.872	56.389
	75 (lower quartile flow)	67.026	51.826
	80	59.472	47.605
	90	45.438	40.019
	91	44.046	39.318
	92	42.468	38.282
	93	41.068	37.138
	94	39.834	36.134
	95	38.24	35.152
	96	36.33	34.221
	97	34.64	33.255
	98	33.143	32.34
	99	31.412	30.519
	100 (minimum recorded flow)	26.592	26.592



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	69.315	
	MAF/median	19.631	
	FRE3 (floods/year or season)	11.25	11.84
	STD Annual FRE3	2.122	3.133
	Mean Days of Accrual (days)	26.667	23.327
	STD Accrual (days)	26.075	21.65
	Min Accrual (days)	5	5
	Max Accrual (days)	145	103

### Seasonal Distribution of Mean Monthly Flows

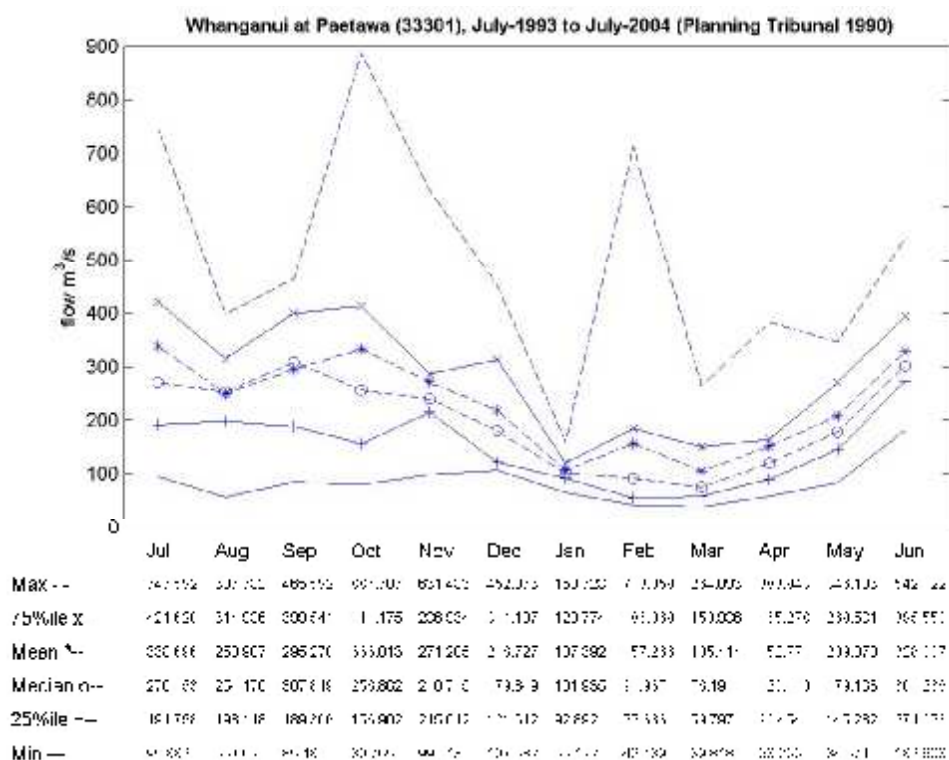


#### 4.5.26. Whanganui at Paetawa (33301), Jul-1993 to Jul-2004 (Planning Tribunal 1990)

Site		Whanganui at Paetawa	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	1-Dec-04	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-04	
	Years of record analysed	11	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	230.99	
	MALF	41.286	
	½ median	65.568	44.349
	3x median	393.408	266.091
	MAF	2683.9	
Flow variability percentiles	0 (maximum recorded flow)	3815.4	3292.9
	10	501.999	351.305
	20	317.263	208.576
	25 (upper quartile flow)	263.123	172.837
	30	222.613	147.178
	40	168.189	113.41
	50 (median flow)	131.136	88.697
	60	103.497	73.494
	70	80.104	62.604
	75 (lower quartile flow)	71.976	57.471
	80	64.3	53.39
	90	51.775	45.576
	91	50.651	44.426
	92	49.357	43.27
	93	48.125	42.305
	94	46.571	41.54
	95	44.939	40.705
	96	42.923	39.778
	97	41.385	38.96
	98	39.683	37.905
	99	37.766	35.989
	100 (minimum recorded flow)	33.401	33.401

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	65.008	
	MAF/median	20.467	
	FRE3 (floods/year or season)	11.817	10.254
	STD Annual FRE3	2.956	4.161
	Mean Days of Accrual (days)	25.015	25.266
	STD Accrual (days)	26.721	26.061
	Min Accrual (days)	5	5
	Max Accrual (days)	145	123

### Seasonal Distribution of Mean Monthly Flows

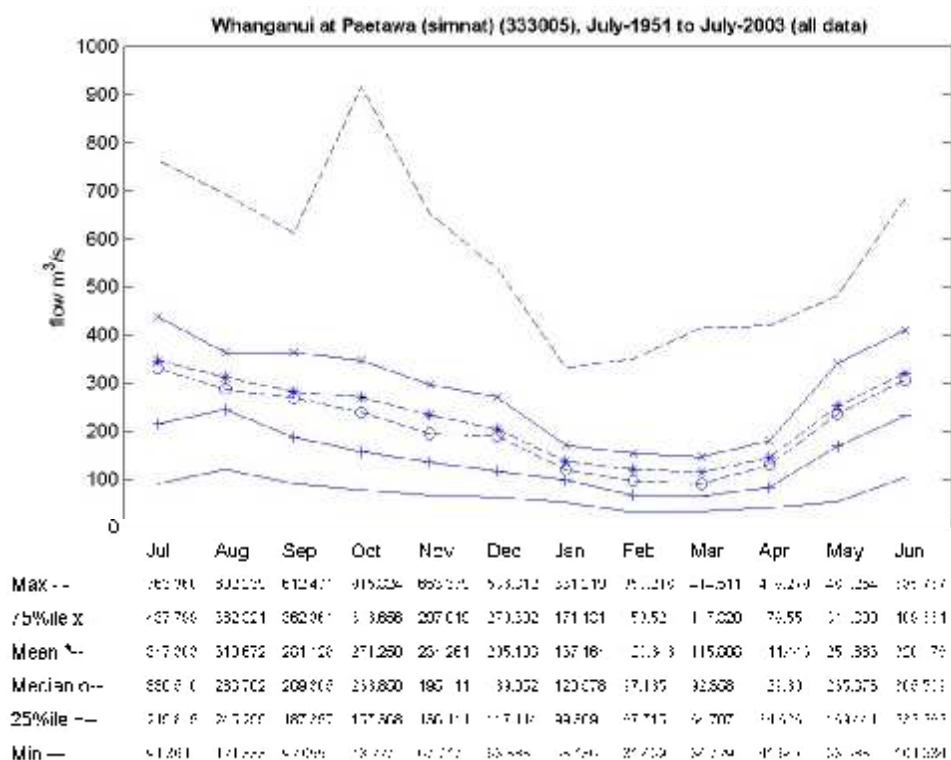


#### 4.5.27. Whanganui at Paetawa (sim natural) (333005), Jul-1951 to Jul-2003 (all data)

Site		Whanganui at Paetawa (sim natural)	
Time series details	Data Start Time	1-Jul-51	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-51	
	Analysis End time	1-Jul-03	
	Years of record analysed	52	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	228.937	
	MALF	43.847	
	½ median	71.746	47.861
	3x median	430.473	287.166
	MAF	2286.8	
Flow variability percentiles	0 (maximum recorded flow)	4084.8	4084.8
	10	489.074	321.385
	20	319.927	199.902
	25 (upper quartile flow)	272.13	168.896
	30	234.487	146.014
	40	181.267	116.598
	50 (median flow)	143.491	95.722
	60	115.492	80.931
	70	93.015	68.461
	75 (lower quartile flow)	83.415	63.048
	80	74.242	58.026
	90	56.539	47.683
	91	54.804	46.617
	92	52.985	45.537
	93	50.964	44.259
	94	48.797	43.027
	95	46.804	41.505
	96	44.61	39.904
	97	42.235	37.961
	98	39.534	35.722
	99	35.563	32.42
	100 (minimum recorded flow)	26.085	26.085

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	52.154	
	MAF/median	15.937	
	FRE3 (floods/year or season)	10.461	9.765
	STD Annual FRE3	2.738	3.706
	Mean Days of Accrual (days)	29.598	28.111
	STD Accrual (days)	33.631	26.321
	Min Accrual (days)	5	5
	Max Accrual (days)	249	180

### Seasonal Distribution of Mean Monthly Flows

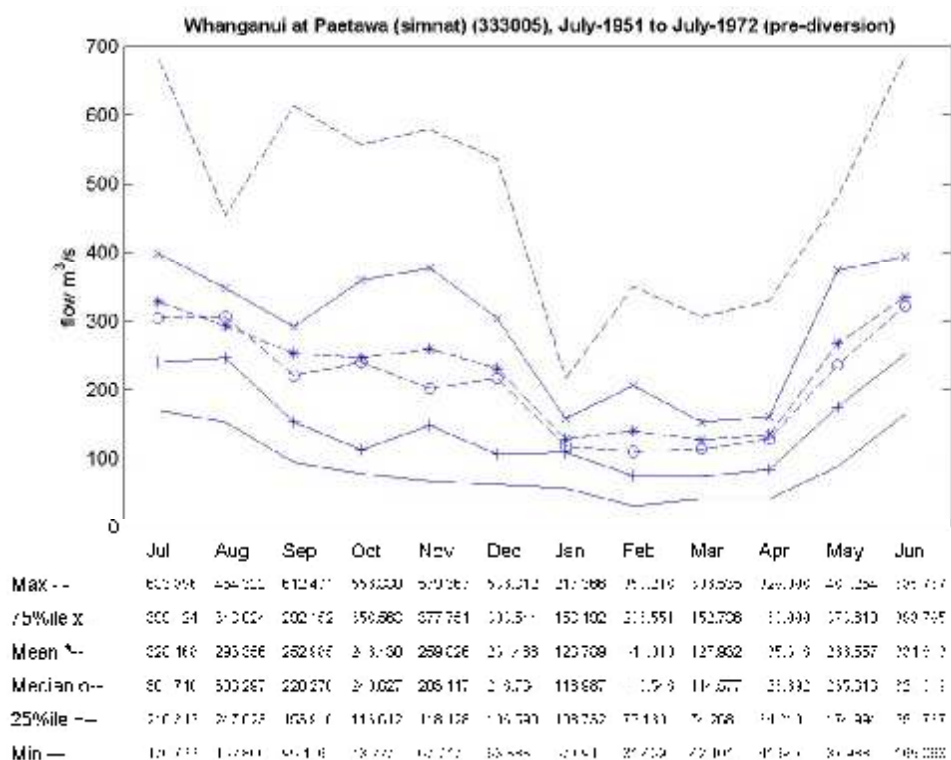


#### 4.5.28. Whanganui at Paetawa (sim natural) (333005), Jul-1951 to Jul-1972 (pre-diversion)

Site		Whanganui at Paetawa (sim natural)	
Time series details	Data Start Time	1-Jul-51	
	Data End Time	28-Nov-72	
	Analysis Start time	1-Jul-51	
	Analysis End time	1-Jul-72	
	Years of record analysed	21	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	229.362	
	MALF	46.14	
	½ median	73.462	50.075
	3x median	440.772	300.45
	MAF	2170.7	
Flow variability percentiles	0 (maximum recorded flow)	3794.2	3794.2
	10	480.958	346.723
	20	321.41	220.106
	25 (upper quartile flow)	275.24	180.459
	30	238.867	154.728
	40	184.537	122.091
	50 (median flow)	146.924	100.15
	60	118.712	84.106
	70	96.062	70.486
	75 (lower quartile flow)	86.628	65.318
	80	76.893	60.078
	90	59.202	50.057
	91	57.404	48.878
	92	55.638	47.863
	93	54.038	46.815
	94	52.049	45.378
	95	49.75	43.701
	96	47.719	41.885
	97	45.098	39.341
	98	41.353	36.587
	99	36.157	31.657
	100 (minimum recorded flow)	26.995	26.995

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	47.046	
	MAF/median	14.774	
	FRE3 (floods/year or season)	9.855	9.307
	STD Annual FRE3	2.932	3.636
	Mean Days of Accrual (days)	31.612	29.373
	STD Accrual (days)	36.66	26.102
	Min Accrual (days)	5	5
	Max Accrual (days)	252	180

### Seasonal Distribution of Mean Monthly Flows



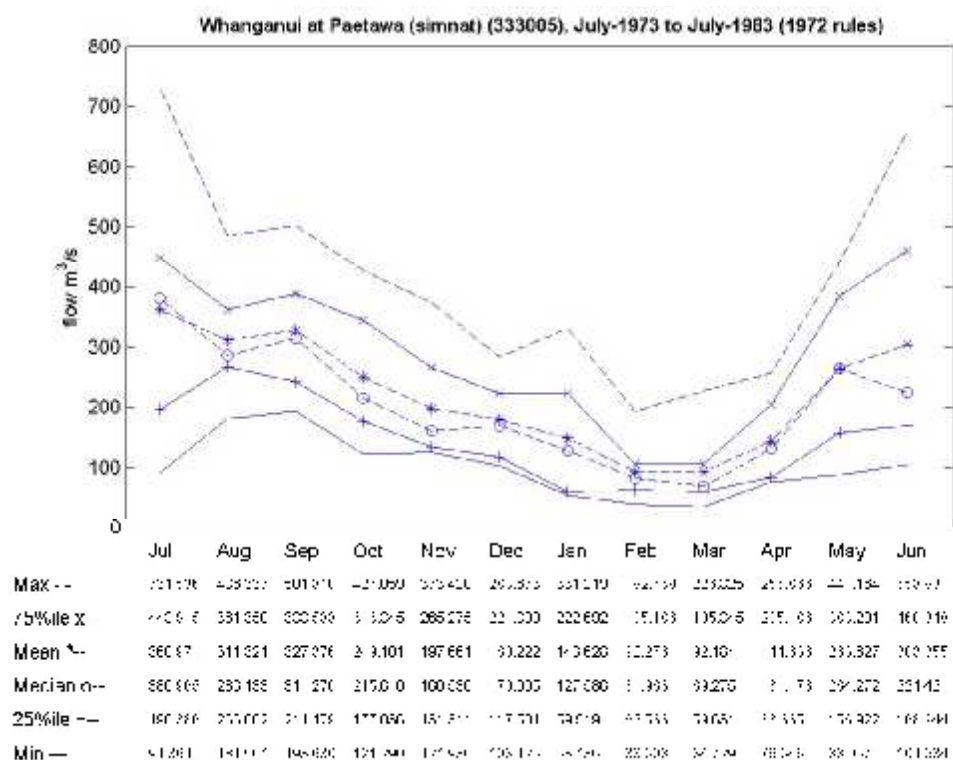
#### 4.5.29. Whanganui at Paetawa (sim natural) (333005), Jul-1973 to Jul-1983 (1972 rules)

Site		Whanganui at Paetawa (sim natural)	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	223.417	
	MALF	41.978	
	½ median	71.937	45.71
	3x median	431.622	274.257
	MAF	2295	
Flow variability percentiles	0 (maximum recorded flow)	3152	3107
	10	477	280.714
	20	311.575	182.335
	25 (upper quartile flow)	268.871	157.461
	30	233.1	137.602
	40	182.65	109.657
	50 (median flow)	143.874	91.419
	60	113.44	77.831
	70	90.354	64.386
	75 (lower quartile flow)	80.467	58.709
	80	70.913	53.668
	90	51.008	44.582
	91	49.298	43.579
	92	47.728	41.728
	93	46.361	40.243
	94	44.764	38.204
	95	42.665	36.896
	96	40.474	35.38
	97	37.888	33.117
	98	35.246	31.63
	99	31.661	30.522
	100 (minimum recorded flow)	26.085	26.085



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	54.671	
	MAF/median	15.951	
	FRE3 (floods/year or season)	9.9	10.681
	STD Annual FRE3	2.02	2.844
	Mean Days of Accrual (days)	31.222	28.633
	STD Accrual (days)	38.213	27.164
	Min Accrual (days)	5	5
	Max Accrual (days)	223	140

### Seasonal Distribution of Mean Monthly Flows

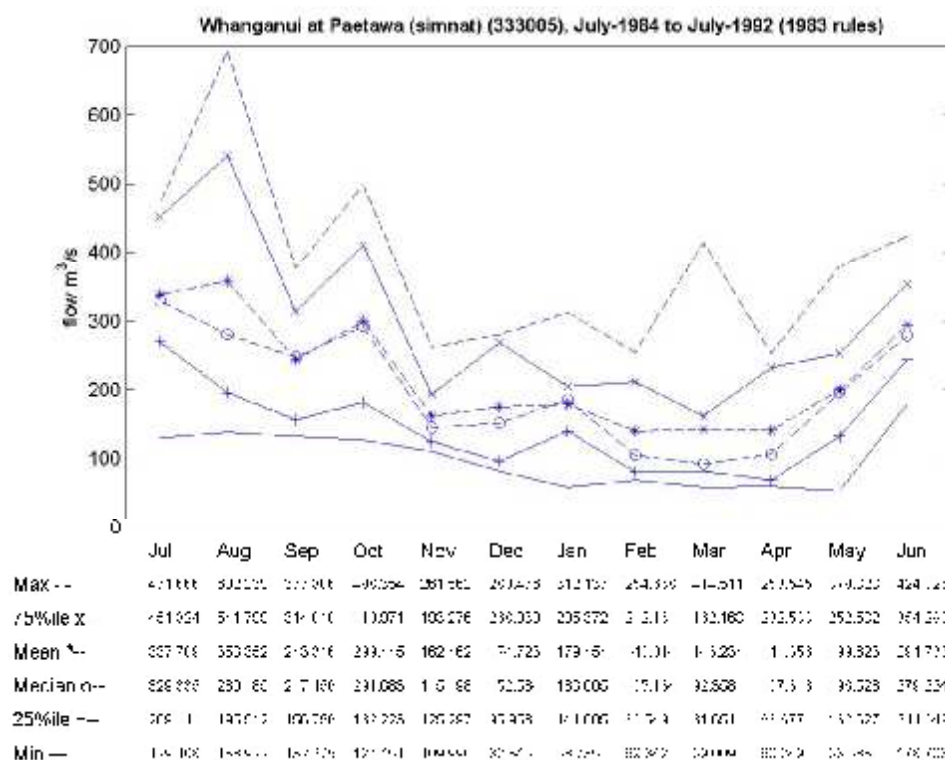


#### 4.5.30. Whanganui at Paetawa (sim natural) (333005), Jul-1984 to Jul-1992 (1983 rules)

Site		Whanganui at Paetawa (sim natural)	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	223.625	
	MALF	42.132	
	½ median	68.41	47.785
	3x median	410.457	286.71
	MAF	2369.9	
Flow variability percentiles	0 (maximum recorded flow)	4084.8	4084.8
	10	489.515	314.803
	20	315.365	190.032
	25 (upper quartile flow)	264.996	159.169
	30	226.76	140.478
	40	171.843	114.894
	50 (median flow)	136.819	95.57
	60	111.576	81.862
	70	90.725	71.09
	75 (lower quartile flow)	81.96	66.138
	80	74.383	61.491
	90	58.252	51.345
	91	56.355	50.299
	92	54.51	49.045
	93	52.856	47.613
	94	51.237	46.482
	95	49.099	45.509
	96	46.707	44.296
	97	44.698	42.779
	98	42.223	40.22
	99	39.777	37.75
	100 (minimum recorded flow)	34.07	34.07

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	56.249	
	MAF/median	17.321	
	FRE3 (floods/year or season)	11.25	10.579
	STD Annual FRE3	2.186	2.995
	Mean Days of Accrual (days)	27.189	25.489
	STD Accrual (days)	26.666	24.154
	Min Accrual (days)	5	6
	Max Accrual (days)	145	104

### Seasonal Distribution of Mean Monthly Flows

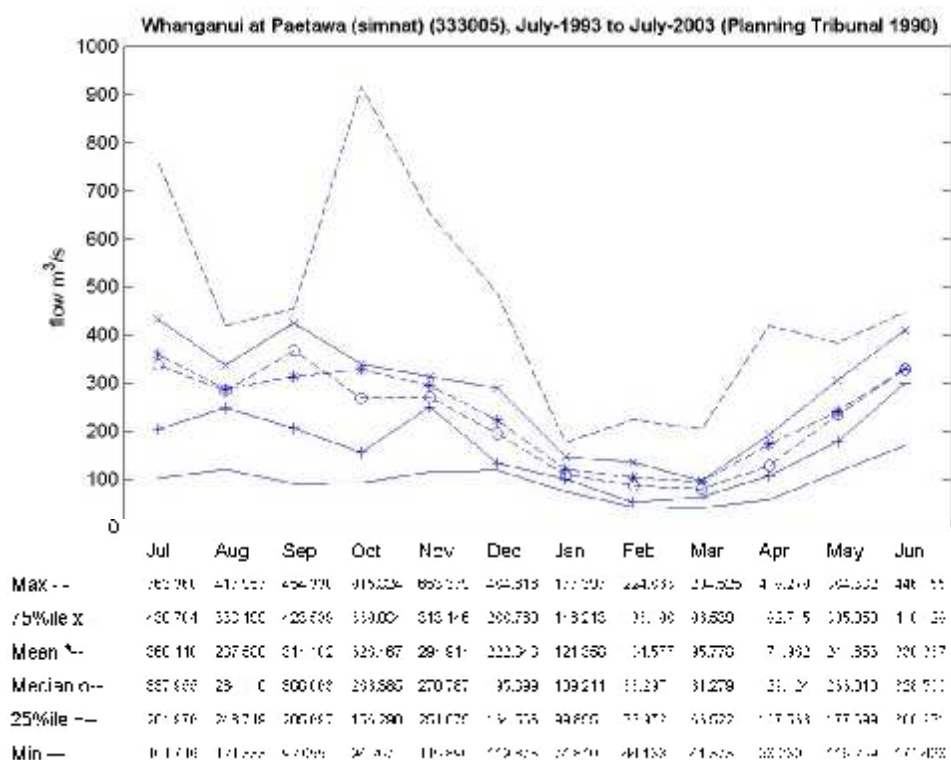


#### 4.5.31. Whanganui at Paetawa (sim natural) (333005), Jul-1993 to Jul-2003 (Planning Tribunal 1990)

Site		Whanganui at Paetawa (sim natural)	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-03	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	240.149	
	MALF	43.672	
	½ median	73.045	49.49
	3x median	438.27	296.937
MAF		2719.2	
Flow variability percentiles	0 (maximum recorded flow)	3816.1	3028.2
	10	513.712	341.355
	20	332.053	212.998
	25 (upper quartile flow)	278.121	180.44
	30	237.845	156.754
	40	183.723	124.511
	50 (median flow)	146.09	98.979
	60	117.498	82.837
	70	92.745	68.787
	75 (lower quartile flow)	83.274	62.599
	80	73.727	57.109
	90	55.965	45.503
	91	53.934	44.344
	92	51.879	43.499
	93	49.772	42.612
	94	47.623	41.798
	95	45.157	40.93
	96	43.382	40.25
	97	41.784	39.173
	98	40.22	37.711
	99	37.716	35.573
	100 (minimum recorded flow)	34.167	34.167

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	62.264	
	MAF/median	18.613	
	FRE3 (floods/year or season)	11.101	9.671
	STD Annual FRE3	3.071	4.9
	Mean Days of Accrual (days)	27.155	25.37
	STD Accrual (days)	30.324	23.902
	Min Accrual (days)	5	5
	Max Accrual (days)	163	107

### Seasonal Distribution of Mean Monthly Flows

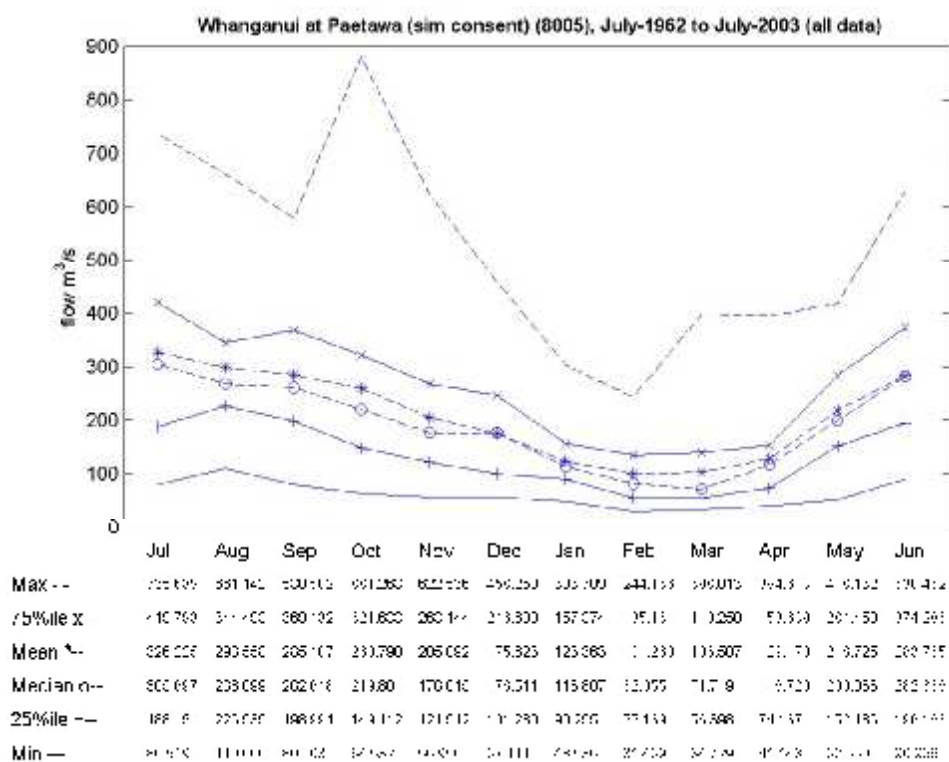


#### 4.5.32. Whanganui at Paetawa (sim consent) (8005), Jul-1962 to Jul-2003 (all data)

Site		Whanganui at Paetawa (sim consent)	
Time series details	Data Start Time	1-Jul-62	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-03	
	Years of record analysed	41	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	209.905	
	MALF	40.533	
	½ median	62.487	38.779
	3x median	374.919	232.674
	MAF	2285.6	
Flow variability percentiles	0 (maximum recorded flow)	4074.2	4074.2
	10	460.146	282.348
	20	292.76	170.582
	25 (upper quartile flow)	247.05	143.3
	30	210.945	123.811
	40	160.633	96.247
	50 (median flow)	124.973	77.558
	60	98.103	65.345
	70	76.62	55.996
	75 (lower quartile flow)	68.001	52.691
	80	60.593	49.921
	90	48.962	43.974
	91	48.008	43.274
	92	47.005	42.521
	93	45.812	41.702
	94	44.594	40.614
	95	43.345	39.545
	96	41.945	38.182
	97	40.208	36.671
	98	37.816	34.79
	99	34.553	31.67
	100 (minimum recorded flow)	26.085	26.085

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	391.169	
	MAF/median	18.289	
	FRE3 (floods/year or season)	11.268	10.763
	STD Annual FRE3	2.539	4.017
	Mean Days of Accrual (days)	26.905	25.8
	STD Accrual (days)	30.317	25.18
	Min Accrual (days)	5	5
	Max Accrual (days)	237	180

### Seasonal Distribution of Mean Monthly Flows



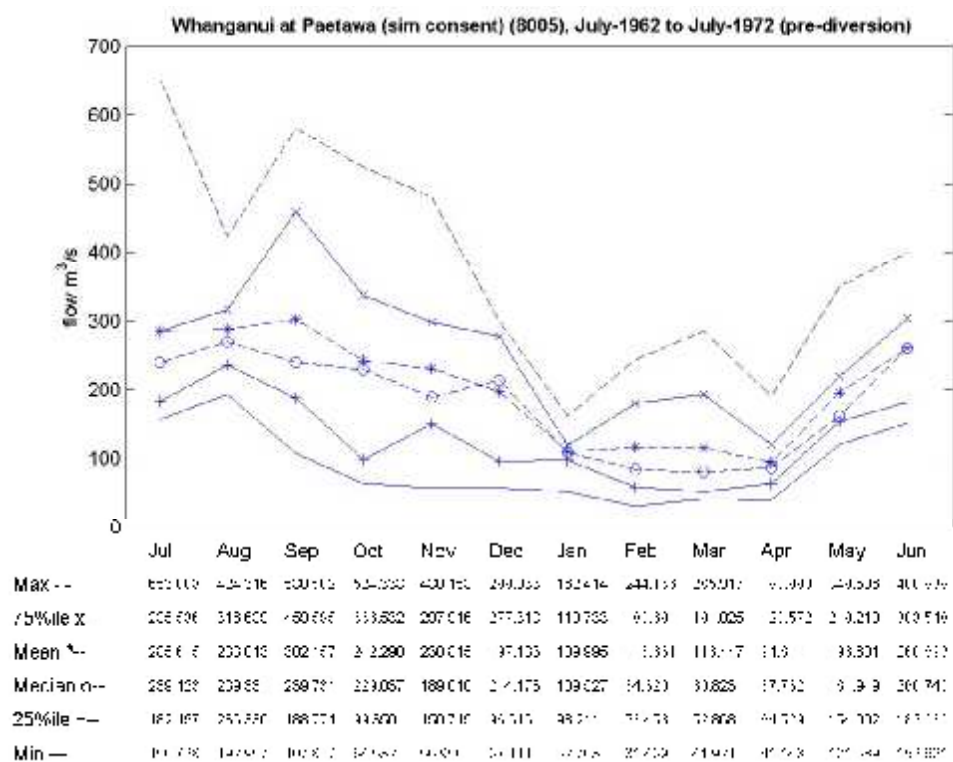
#### 4.5.33. Whanganui at Paetawa (sim consent) (8005), Jul-1962 to Jul-1972 (pre-diversion)

Site		Whanganui at Paetawa (sim consent)	
Time series details	Data Start Time	1-Jul-62	
	Data End Time	28-Nov-72	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-72	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	203.848	
	MALF	40.901	
	½ median	62.697	37.86
	3x median	376.182	227.157
	MAF	2136.6	
Flow variability percentiles	0 (maximum recorded flow)	3206.7	3206.7
	10	440.776	298.426
	20	284.164	175.461
	25 (upper quartile flow)	241.614	146.784
	30	207.544	125.845
	40	159.338	95.753
	50 (median flow)	125.394	75.719
	60	98.642	62.747
	70	76.108	54.009
	75 (lower quartile flow)	67.18	51.005
	80	58.847	48.306
	90	47.668	42.297
	91	46.576	41.164
	92	45.579	40.168
	93	44.757	39.335
	94	43.596	38.42
	95	41.873	37.466
	96	39.907	36.269
	97	38.232	33.445
	98	35.824	31.523
	99	31.454	28.917
	100 (minimum recorded flow)	26.995	26.995



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	52.238	
	MAF/median	17.039	
	FRE3 (floods/year or season)	11.399	11.284
	STD Annual FRE3	2.952	4.685
	Mean Days of Accrual (days)	27	24.587
	STD Accrual (days)	31.19	21.659
	Min Accrual (days)	5	5
	Max Accrual (days)	237	126

### Seasonal Distribution of Mean Monthly Flows

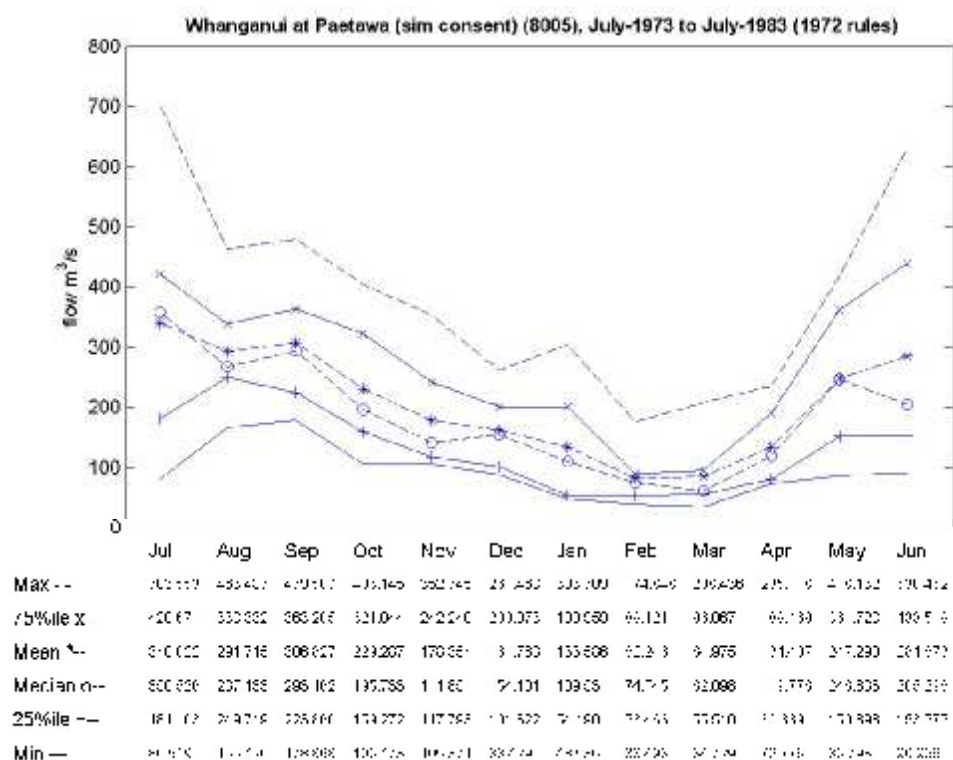


#### 4.5.34. Whanganui at Paetawa (sim consent) (8005), Jul-1973 to Jul-1983 (1972 rules)

Site		Whanganui at Paetawa (sim consent)	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	207.039	
	MALF	39.766	
	½ median	63.58	38.15
	3x median	381.477	228.897
	MAF	2262.8	
Flow variability percentiles	0 (maximum recorded flow)	3104.3	3059.4
	10	451.39	259.554
	20	290.705	163.934
	25 (upper quartile flow)	248.289	139.026
	30	214.165	120.396
	40	164.903	93.513
	50 (median flow)	127.159	76.299
	60	97.756	64.535
	70	75.955	54.639
	75 (lower quartile flow)	67.059	51.196
	80	59.221	48.213
	90	47.197	42.771
	91	46.123	42.153
	92	44.886	41.272
	93	43.941	40.102
	94	43.008	38.222
	95	41.898	36.895
	96	40.228	35.373
	97	37.4	33.113
	98	34.848	31.636
	99	31.603	30.517
	100 (minimum recorded flow)	26.085	26.085

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	56.903	
	MAF/median	17.795	
	FRE3 (floods/year or season)	10.501	11.689
	STD Annual FRE3	1.896	2.462
	Mean Days of Accrual (days)	28.848	25.846
	STD Accrual (days)	33.224	25.827
	Min Accrual (days)	5	5
	Max Accrual (days)	183	140

### Seasonal Distribution of Mean Monthly Flows

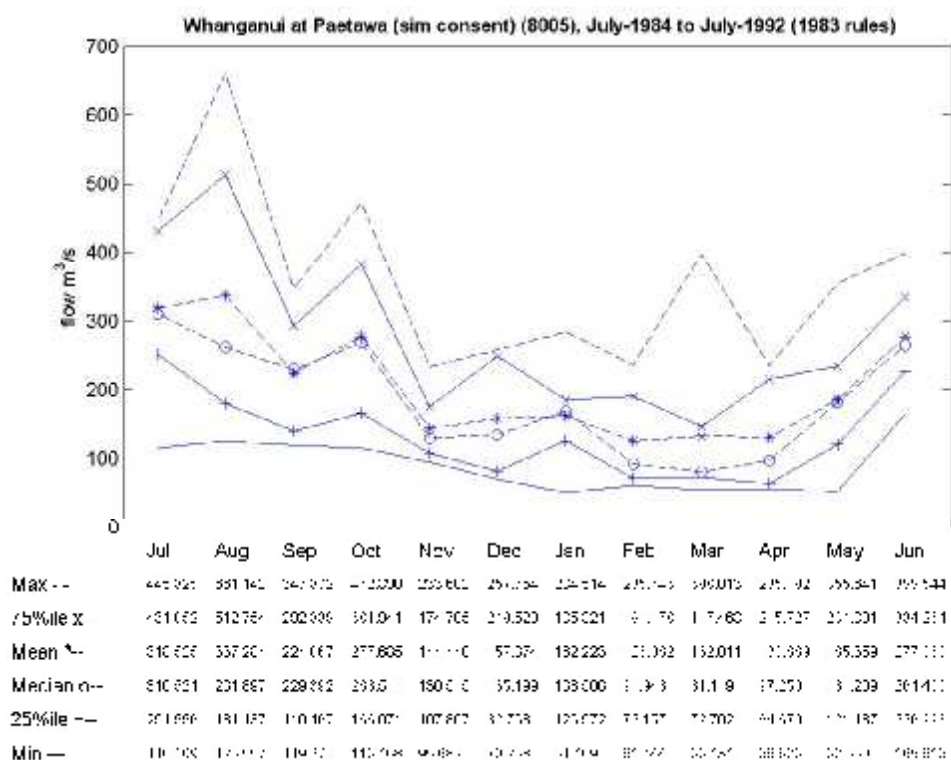


#### 4.5.35. Whanganui at Paetawa (sim consent) (8005), Jul-1984 to Jul-1992 (1983 rules)

Site		Whanganui at Paetawa (sim consent)	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	206.856	
	MALF	40.635	
	½ median	60.704	40.296
	3x median	364.224	241.776
	MAF	2338.5	
Flow variability percentiles	0 (maximum recorded flow)	4074.2	4074.2
	10	463.279	290.154
	20	292.97	169.52
	25 (upper quartile flow)	244.538	140.809
	30	206.824	123.53
	40	154.33	98.716
	50 (median flow)	121.408	80.592
	60	96.876	68.212
	70	76.966	59.331
	75 (lower quartile flow)	69.082	55.77
	80	62.489	52.713
	90	51.275	47.687
	91	50.328	47.165
	92	49.324	46.521
	93	48.415	45.803
	94	47.466	45.001
	95	46.445	44.174
	96	44.984	43.376
	97	43.557	42.267
	98	41.83	40.219
	99	39.499	37.754
	100 (minimum recorded flow)	32.628	34.07

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	57.549	
	MAF/median	19.261	
	FRE3 (floods/year or season)	11.625	11.84
	STD Annual FRE3	2.202	3.313
	Mean Days of Accrual (days)	25.957	23.269
	STD Accrual (days)	26.258	22.555
	Min Accrual (days)	5	6
Max Accrual (days)		145	103

### Seasonal Distribution of Mean Monthly Flows

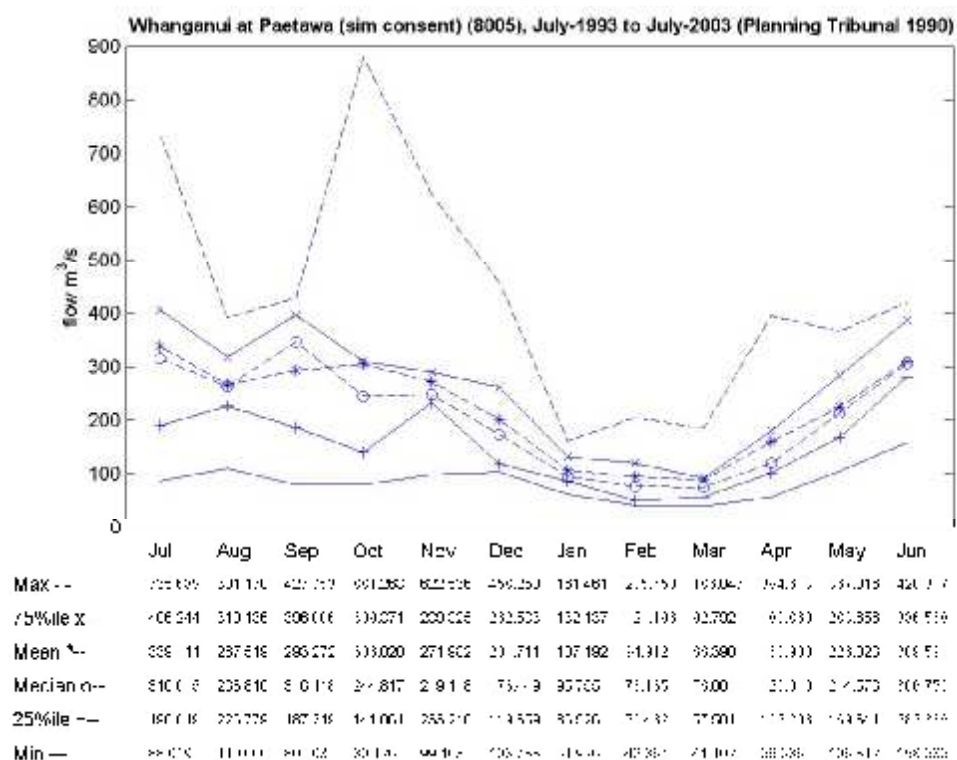


#### 4.5.36. Whanganui at Paetawa (sim consent) (8005), Jul-1993 to Jul-2003 (Planning Tribunal 1990)

Site		Whanganui at Paetawa (sim consent)	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-03	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	222.822	
	MALF	41.253	
	½ median	64.455	41.76
	3x median	386.727	250.557
MAF		2687.4	
Flow variability percentiles	0 (maximum recorded flow)	3771.6	2980.6
	10	485.701	315.697
	20	307.784	192.978
	25 (upper quartile flow)	256.049	160.916
	30	217.315	138.027
	40	164.964	107.646
	50 (median flow)	128.909	83.519
	60	102.194	69.413
	70	78.673	58.825
	75 (lower quartile flow)	70.446	54.159
	80	62.357	51.087
	90	50.383	44.418
	91	49.333	43.559
	92	48.374	42.776
	93	47.337	42.131
	94	45.989	41.468
	95	44.201	40.836
	96	42.714	40.162
	97	41.526	39.131
	98	40.156	37.707
	99	37.708	35.599
	100 (minimum recorded flow)	34.167	34.167

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	65.144	
	MAF/median	20.847	
	FRE3 (floods/year or season)	11.501	10.275
	STD Annual FRE3	2.952	5.391
	Mean Days of Accrual (days)	25.649	23.614
	STD Accrual (days)	27.996	22.682
	Min Accrual (days)	5	5
	Max Accrual (days)	163	107

### Seasonal Distribution of Mean Monthly Flows



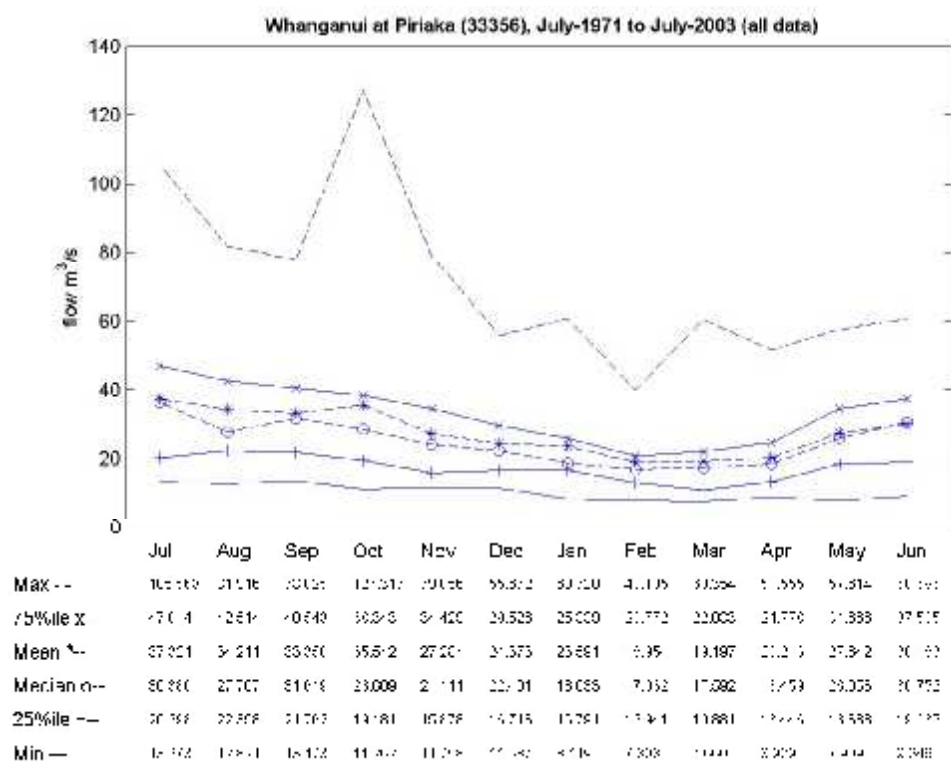
#### 4.5.37. Whanganui at Piriaka (33356), Jul-1971 to Jul-2003 (all data)

Site		Whanganui at Piriaka	
Time series details	Data Start Time	1-Dec-70	
	Data End Time	1-Jan-04	
	Analysis Start time	1-Jul-71	
	Analysis End time	1-Jul-03	
	Years of record analysed	32	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	27.722	
	MALF	9.24	
	½ median	9.276	8.148
	3x median	55.656	48.888
	MAF	600.53	
Flow variability percentiles	0 (maximum recorded flow)	1056.4	934.19
	10	48.792	35.005
	20	32.416	24.44
	25 (upper quartile flow)	28.365	21.783
	30	25.471	20.068
	40	21.248	18.034
	50 (median flow)	18.552	16.296
	60	16.499	14.372
	70	14.357	12.404
	75 (lower quartile flow)	13.313	11.42
	80	12.157	10.536
	90	9.675	8.437
	91	9.35	8.261
	92	8.954	8.092
	93	8.652	7.953
	94	8.36	7.81
	95	8.098	7.669
	96	7.846	7.529
	97	7.619	7.374
	98	7.441	7.207
	99	7.145	6.948
	100 (minimum recorded flow)	3.872	3.872



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	64.992	
	MAF/median	32.37	
	FRE3 (floods/year or season)	9.249	7.803
	STD Annual FRE3	2.814	4.133
	Mean Days of Accrual (days)	34.936	35.04
	STD Accrual (days)	34.986	33.004
	Min Accrual (days)	5	5
	Max Accrual (days)	224	159

### Seasonal Distribution of Mean Monthly Flows

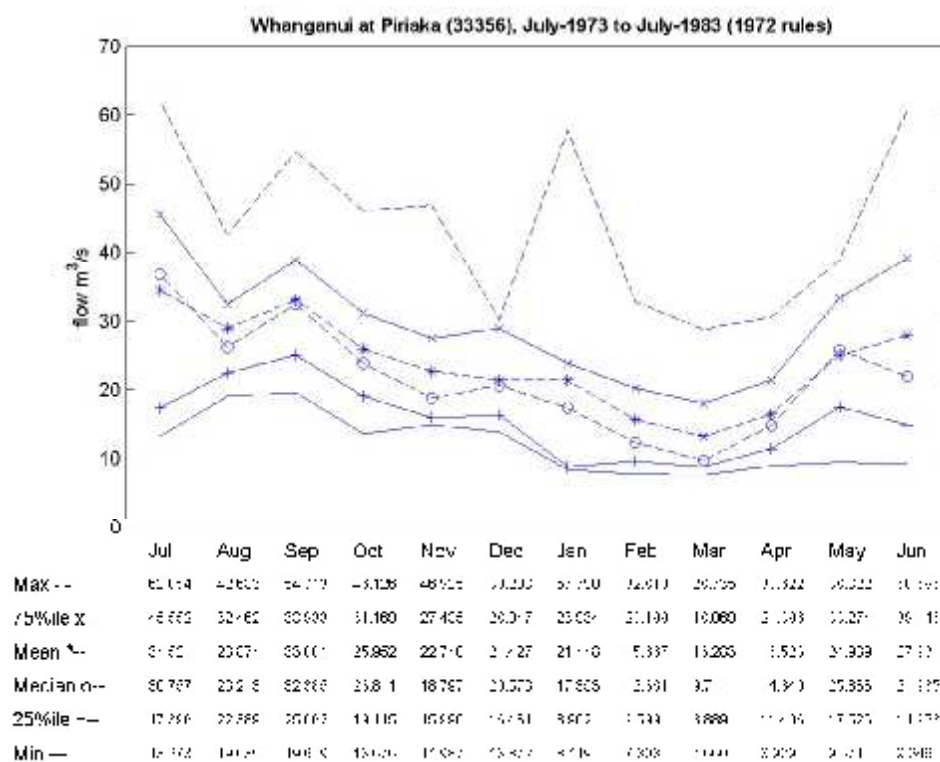


#### 4.5.38. Whanganui at Piriaka (33356), Jul-1973 to Jul-1983 (1972 rules)

Site		Whanganui at Piriaka	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	23.917	
	MALF	7.235	
	½ median	8.202	6.18
	3x median	49.209	37.077
	MAF	521.64	
Flow variability percentiles	0 (maximum recorded flow)	894.382	894.382
	10	42.162	30.435
	20	28.839	20.972
	25 (upper quartile flow)	25.504	18.679
	30	22.978	16.907
	40	19.307	14.175
	50 (median flow)	16.403	12.359
	60	13.904	11.023
	70	11.871	9.896
	75 (lower quartile flow)	10.943	9.139
	80	10.178	8.48
	90	8.197	7.664
	91	8.09	7.596
	92	7.933	7.525
	93	7.815	7.452
	94	7.692	7.381
	95	7.568	7.313
	96	7.44	7.241
	97	7.312	7.085
	98	7.186	6.95
	99	6.936	6.75
	100 (minimum recorded flow)	4.024	4.245

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	72.1	
	MAF/median	31.801	
	FRE3 (floods/year or season)	9.599	9.471
	STD Annual FRE3	3.331	2.321
	Mean Days of Accrual (days)	33.884	32.113
	STD Accrual (days)	35.699	30.226
	Min Accrual (days)	5	5
	Max Accrual (days)	224	149

### Seasonal Distribution of Mean Monthly Flows

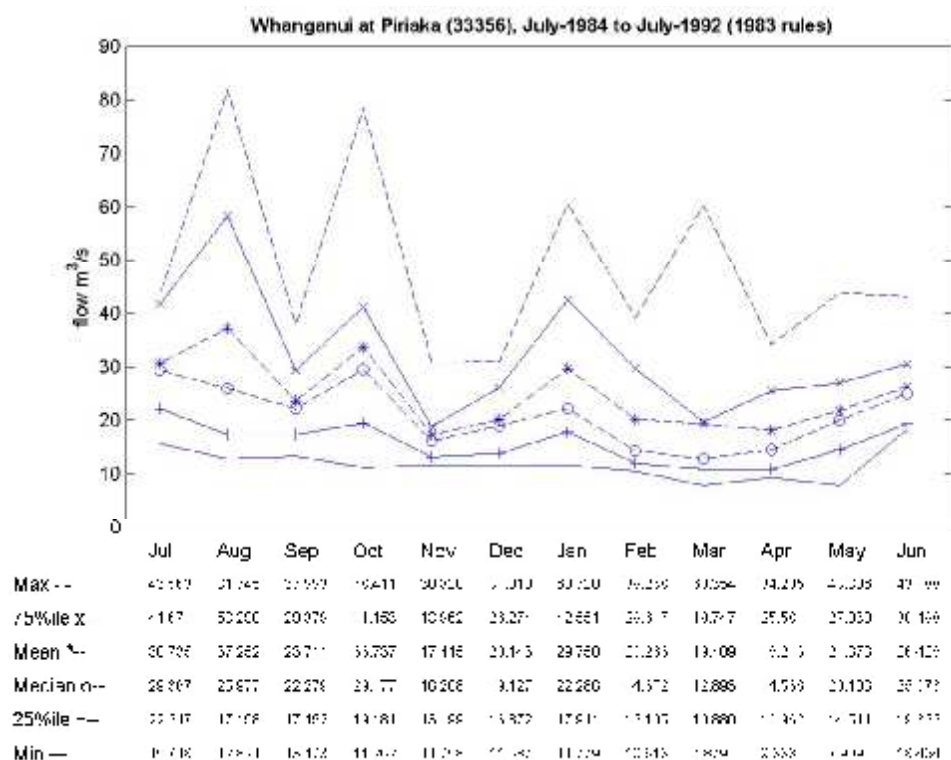


#### 4.5.39. Whanganui at Piriaka (33356), Jul-1984 to Jul-1992 (1983 rules)

Site		Whanganui at Piriaka	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	24.984	
	MALF	7.208	
	½ median	7.668	6.421
	3x median	46.005	38.523
	MAF	537.56	
Flow variability percentiles	0 (maximum recorded flow)	769.051	769.051
	10	45.298	34.236
	20	29.427	22.115
	25 (upper quartile flow)	25.469	19.364
	30	22.514	17.36
	40	18.325	14.432
	50 (median flow)	15.335	12.841
	60	13.399	11.58
	70	11.693	10.425
	75 (lower quartile flow)	10.975	9.886
	80	10.193	9.19
	90	8.449	7.913
	91	8.266	7.807
	92	8.07	7.703
	93	7.906	7.606
	94	7.759	7.53
	95	7.623	7.44
	96	7.496	7.318
	97	7.392	7.174
	98	7.277	7.044
	99	6.984	6.8
	100 (minimum recorded flow)	3.889	3.917

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	74.578	
	MAF/median	35.054	
	FRE3 (floods/year or season)	10.124	10.073
	STD Annual FRE3	2.746	2.625
	Mean Days of Accrual (days)	31.37	28.023
	STD Accrual (days)	28.173	24.301
	Min Accrual (days)	5	5
	Max Accrual (days)	124	89

### Seasonal Distribution of Mean Monthly Flows

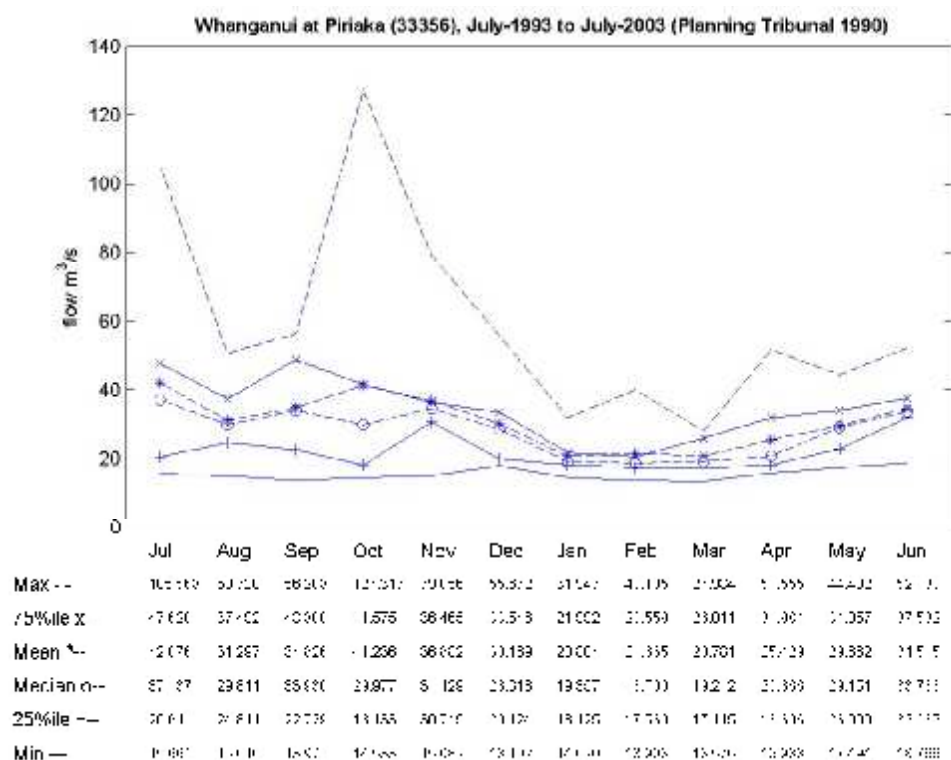


#### 4.5.40. Whanganui at Piriaka (33356), Jul-1993 to Jul-2003 (Planning Tribunal 1990)

Site		Whanganui at Piriaka	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	1-Jan-04	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-03	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	30.825	
	MALF	11.901	
	½ median	10.044	9.336
	3x median	60.264	56.016
	MAF	758.19	
Flow variability percentiles	0 (maximum recorded flow)	1056.4	934.19
	10	50.17	36.285
	20	33.861	26.117
	25 (upper quartile flow)	29.621	23.639
	30	26.724	21.825
	40	22.767	19.779
	50 (median flow)	20.088	18.672
	60	18.527	17.74
	70	17.256	16.829
	75 (lower quartile flow)	16.62	16.335
	80	15.893	15.779
	90	14.12	14.183
	91	13.889	13.984
	92	13.642	13.759
	93	13.429	13.542
	94	13.18	13.351
	95	12.902	13.1
	96	12.583	12.829
	97	12.195	12.531
	98	11.733	12.109
	99	11.069	11.375
	100 (minimum recorded flow)	4.566	4.566

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	63.708	
	MAF/median	37.743	
	FRE3 (floods/year or season)	9.1	7.05
	STD Annual FRE3	2.511	4.466
	Mean Days of Accrual (days)	34.9	35.884
	STD Accrual (days)	35.224	38.298
	Min Accrual (days)	5	5
	Max Accrual (days)	179	161

### Seasonal Distribution of Mean Monthly Flows



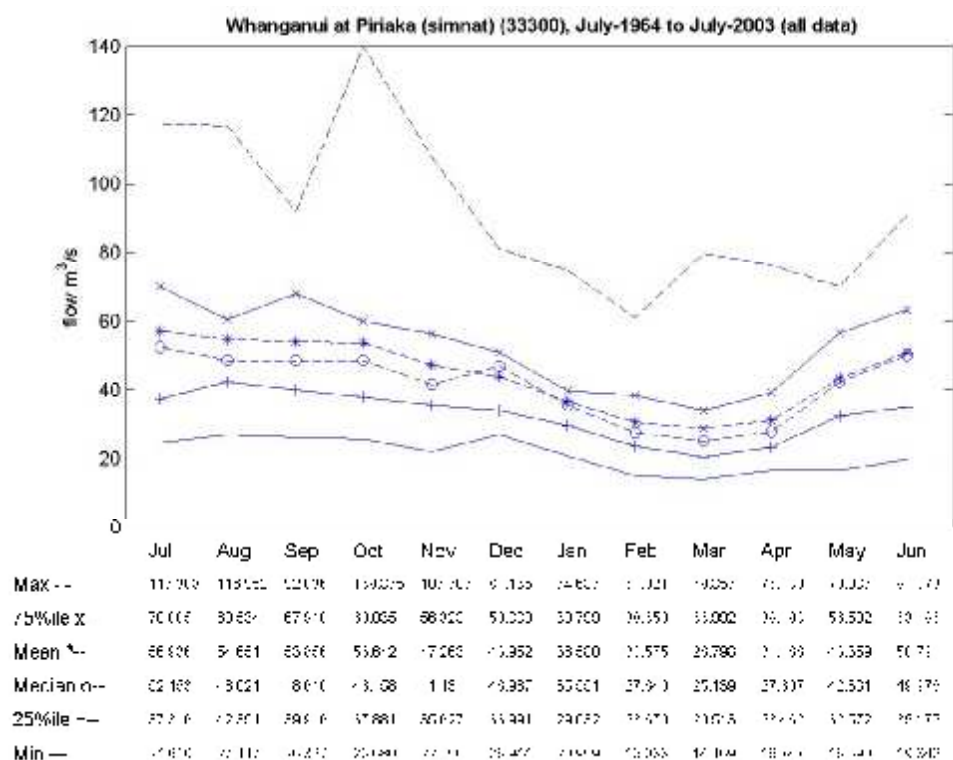
#### 4.5.41. Whanganui at Piriaka (sim natural) (33300), Jul-1964 to Jul-2003 (all data)

Site		Whanganui at Piriaka (sim natural)	
Time series details	Data Start Time	3-Jul-64	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-64	
	Analysis End time	1-Jul-03	
	Years of record analysed	39	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	44.389	
	MALF	18.031	
	½ median	17.235	14.601
	3x median	103.407	87.603
	MAF	557.8	
Flow variability percentiles	0 (maximum recorded flow)	987.965	843.598
	10	73.866	55.01
	20	53.454	41.617
	25 (upper quartile flow)	48.163	38.332
	30	44.367	35.982
	40	38.648	32.305
	50 (median flow)	34.469	29.201
	60	30.89	26.481
	70	27.499	23.865
	75 (lower quartile flow)	25.896	22.628
	80	24.266	21.381
	90	20.639	18.748
	91	20.213	18.38
	92	19.773	17.997
	93	19.236	17.574
	94	18.696	17.079
	95	18.012	16.516
	96	17.213	15.728
	97	16.268	14.989
	98	15.247	14.453
	99	14.351	13.62
	100 (minimum recorded flow)	7.500 (estimate)	10.852



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	19.949	
	MAF/median	16.183	
	FRE3 (floods/year or season)	7.23	5.94
	STD Annual FRE3	2.894	3.542
	Mean Days of Accrual (days)	46.93	44.946
	STD Accrual (days)	49.163	40.603
	Min Accrual (days)	5	5
	Max Accrual (days)	324	180

### Seasonal Distribution of Mean Monthly Flows

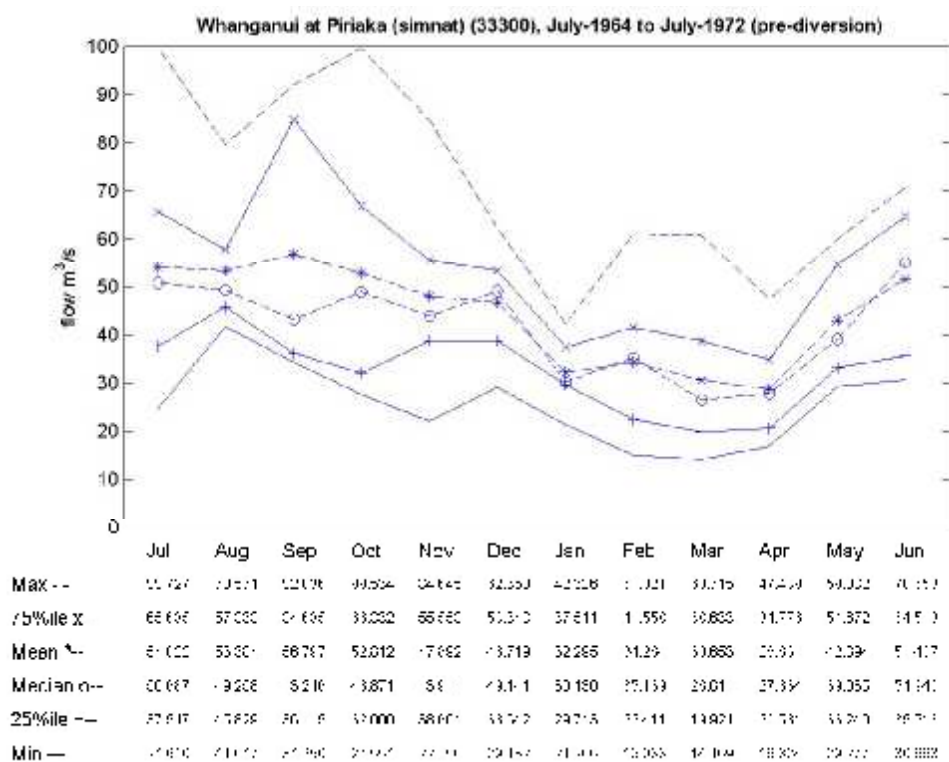


#### 4.5.42. Whanganui at Piriaka (sim natural) (33300), Jul-1964 to Jul-1972 (pre-diversion)

Site		Whanganui at Piriaka (sim natural)	
Time series details	Data Start Time	3-Jul-64	
	Data End Time	28-Nov-72	
	Analysis Start time	1-Jul-64	
	Analysis End time	1-Jul-72	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	44.379	
	MALF	18.294	
	½ median	17.346	14.323
	3x median	104.076	85.938
	MAF	492.6	
Flow variability percentiles	0 (maximum recorded flow)	695.462	695.462
	10	76.519	57.347
	20	53.801	42.746
	25 (upper quartile flow)	48.253	39.176
	30	44.191	36.514
	40	38.647	32.309
	50 (median flow)	34.692	28.646
	60	30.595	26.047
	70	27.155	23.467
	75 (lower quartile flow)	25.572	22.053
	80	24.009	20.741
	90	20.004	17.846
	91	19.611	17.337
	92	19.193	16.979
	93	18.705	16.509
	94	18.024	15.935
	95	17.185	15.344
	96	16.434	14.759
	97	15.394	14.219
	98	14.428	13.733
	99	13.52	13.231
	100 (minimum recorded flow)	7.500 (estimate)	12.42

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	32.774	
	MAF/median	14.199	
	FRE3 (floods/year or season)	6.498	6.296
	STD Annual FRE3	2.385	3.13
	Mean Days of Accrual (days)	51.25	43.833
	STD Accrual (days)	54.079	39.618
	Min Accrual (days)	5	5
	Max Accrual (days)	324	180

### Seasonal Distribution of Mean Monthly Flows

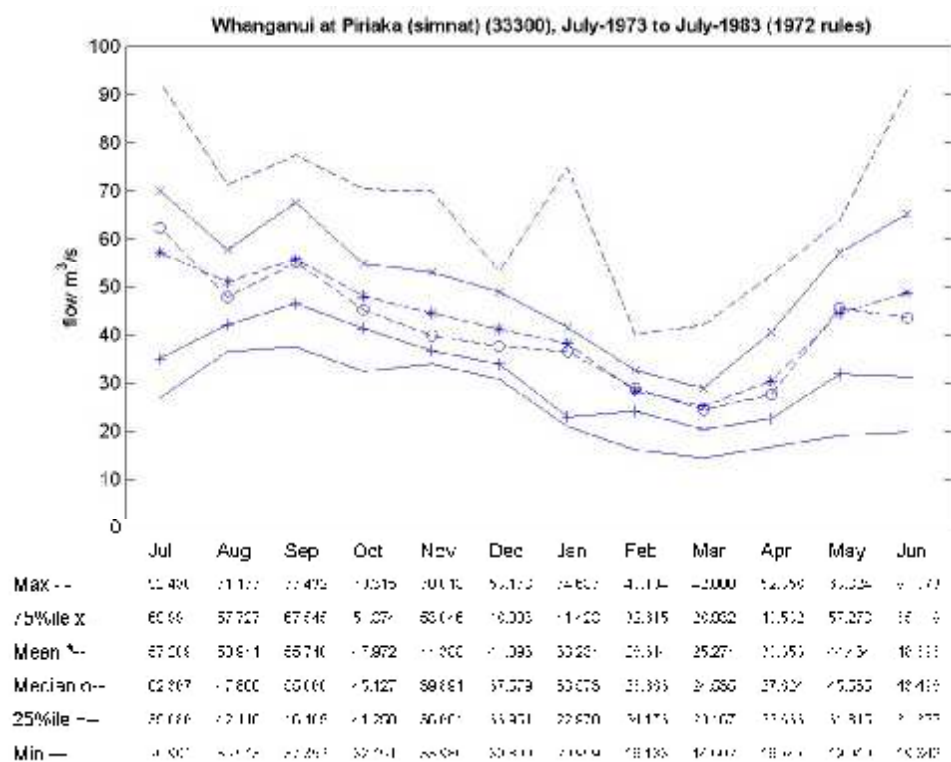


#### 4.5.43. Whanganui at Piriaka (sim natural) (33300), Jul-1973 to Jul-1983 (1972 rules)

Site		Whanganui at Piriaka (sim natural)	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	42.813	
	MALF	17.549	
	½ median	17.569	14.672
	3x median	105.411	88.029
	MAF	509.59	
Flow variability percentiles	0 (maximum recorded flow)	824.323	824.323
	10	68.373	50.91
	20	51.48	39.822
	25 (upper quartile flow)	47.063	37.368
	30	43.82	35.478
	40	38.769	32.331
	50 (median flow)	35.137	29.343
	60	31.801	26.343
	70	28.22	23.386
	75 (lower quartile flow)	26.189	22.166
	80	23.931	21.061
	90	20.162	18.582
	91	19.776	18.137
	92	19.249	17.492
	93	18.68	16.709
	94	17.873	16.083
	95	16.914	15.396
	96	15.98	14.839
	97	15.188	14.565
	98	14.618	14.19
	99	14.104	13.319
	100 (minimum recorded flow)	10.852	10.852

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	29.038	
	MAF/median	14.503	
	FRE3 (floods/year or season)	6.8	4.835
	STD Annual FRE3	3.118	2.878
	Mean Days of Accrual (days)	50.313	56.625
	STD Accrual (days)	59.014	47.968
	Min Accrual (days)	5	8
	Max Accrual (days)	244	180

### Seasonal Distribution of Mean Monthly Flows

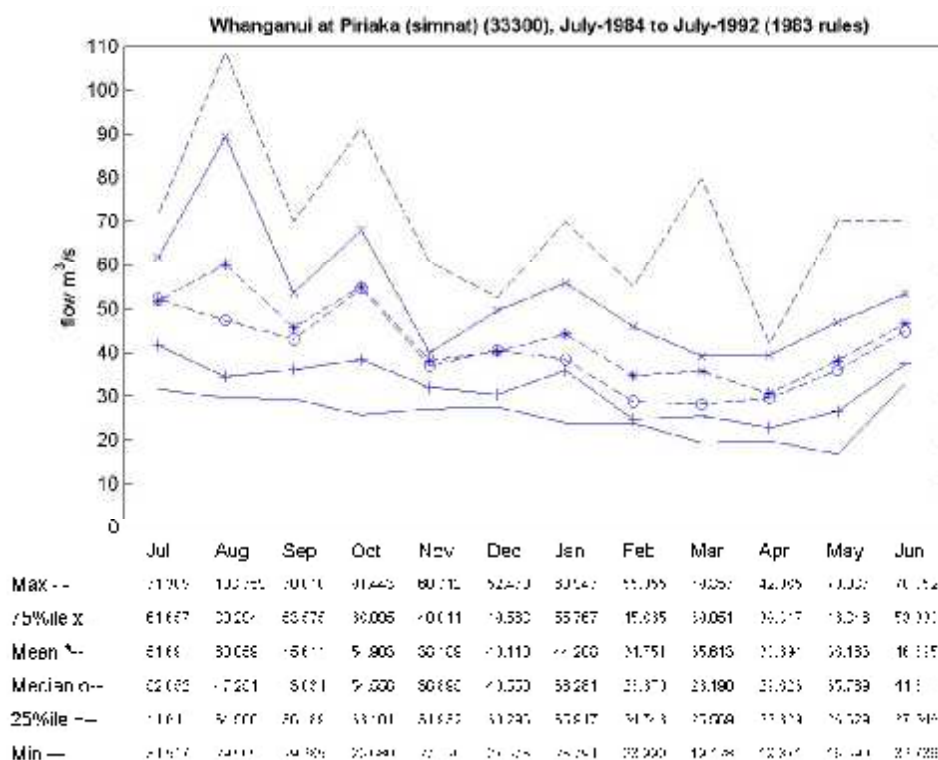


#### 4.5.44. Whanganui at Piriaka (sim natural) (33300), Jul-1984 to Jul-1992 (1983 rules)

Site		Whanganui at Piriaka (sim natural)	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	43.49	
	MALF	18.199	
	½ median	16.457	14.584
	3x median	98.739	87.501
	MAF	525.83	
Flow variability percentiles	0 (maximum recorded flow)	746.654	746.654
	10	71.968	54.295
	20	51.823	40.747
	25 (upper quartile flow)	46.507	37.51
	30	42.489	35.196
	40	36.765	31.689
	50 (median flow)	32.913	29.167
	60	29.874	26.915
	70	27.091	24.878
	75 (lower quartile flow)	25.777	23.761
	80	24.577	22.663
	90	21.526	20.409
	91	21.143	20.209
	92	20.789	19.992
	93	20.459	19.706
	94	20.111	19.375
	95	19.638	19.052
	96	19.09	18.575
	97	18.319	17.94
	98	17.053	17.126
	99	15.875	16.125
	100 (minimum recorded flow)	14.243	14.243

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	28.893	
	MAF/median	15.976	
	FRE3 (floods/year or season)	7.999	7.05
	STD Annual FRE3	3.702	2.843
	Mean Days of Accrual (days)	42.5	39.364
	STD Accrual (days)	41.372	34.384
	Min Accrual (days)	5	5
	Max Accrual (days)	187	134

### Seasonal Distribution of Mean Monthly Flows



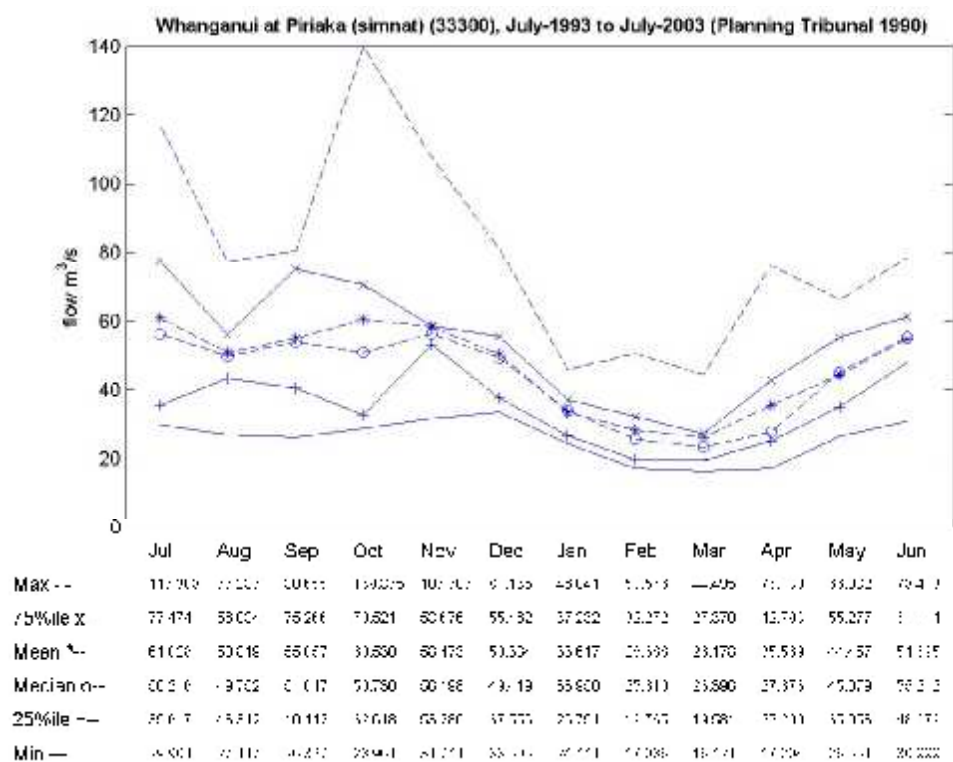
#### 4.5.45. Whanganui at Piriaka (sim natural) (33300), Jul-1993 to Jul-2003 (Planning Tribunal 1990)

Site		Whanganui at Piriaka (sim natural)	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-03	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m³/s)	Flow (m³/s)
	Mean	46.698	
	MALF	18.848	
	½ median	17.712	15.203
	3x median	106.272	91.215
MAF		713.87	
Flow variability percentiles	0 (maximum recorded flow)	987.965	843.598
	10	76.788	59.444
	20	56.391	45.071
	25 (upper quartile flow)	50.641	41.147
	30	46.41	38.354
	40	40.464	34.048
	50 (median flow)	35.424	30.405
	60	31.452	27.205
	70	27.741	24.421
	75 (lower quartile flow)	26.165	22.968
	80	24.529	21.624
	90	21.094	18.622
	91	20.668	18.201
	92	20.133	17.828
	93	19.629	17.391
	94	18.927	16.825
	95	18.278	15.889
	96	17.53	15.205
	97	16.42	14.691
	98	15.182	14.323
	99	14.317	13.418
100 (minimum recorded flow)		12.08	12.08



Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	37.875	
	MAF/median	20.152	
	FRE3 (floods/year or season)	7.6	7.05
	STD Annual FRE3	3.401	4.849
	Mean Days of Accrual (days)	42.868	36.419
	STD Accrual (days)	44.353	40.034
	Min Accrual (days)	5	5
	Max Accrual (days)	180	166

### Seasonal Distribution of Mean Monthly Flows

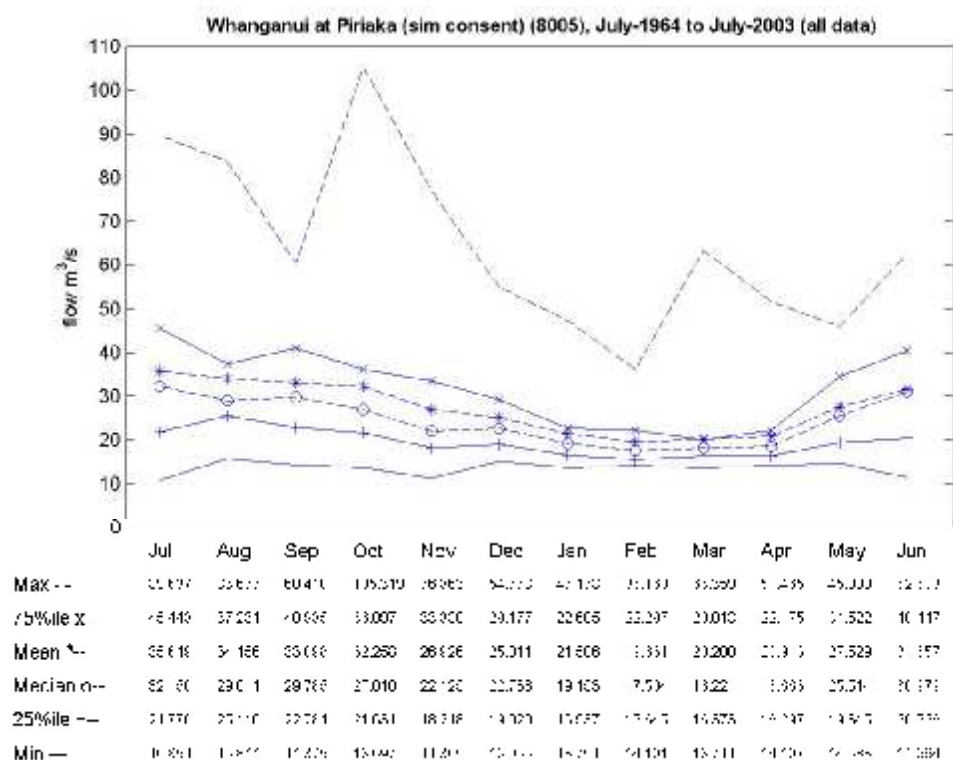


#### 4.5.46. Whanganui at Piriaka (sim consent) (8005), Jul-1964 to Jul-2003 (all data)

Site		Whanganui at Piriaka (sim consent)	
Time series details	Data Start Time	3-Jul-64	
	Data End Time	1-Jul-03	
	Analysis Start time	4-Jul-64	
	Analysis End time	1-Jul-03	
	Years of record analysed	39	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	27.508	
	MALF	9.257	
	½ median	9.467	8.504
	3x median	56.799	51.021
	MAF	517.82	
Flow variability percentiles	0 (maximum recorded flow)	940.346	812.504
	10	44.76	30.312
	20	31.078	22.163
	25 (upper quartile flow)	27.56	20.476
	30	24.954	19.439
	40	21.267	18.121
	50 (median flow)	18.933	17.007
	60	17.399	16.015
	70	16.057	15.053
	75 (lower quartile flow)	15.4	14.605
	80	14.764	14.145
	90	13.39	13.057
	91	13.225	12.917
	92	13.057	12.756
	93	12.852	12.579
	94	12.626	12.371
	95	12.367	12.145
	96	12.063	11.872
	97	11.678	11.502
	98	11.118	10.939
	99	10.189	10.054
	100 (minimum recorded flow)	7.500 (estimate)	7.500 (estimate)

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	20.481	
	MAF/median	27.35	
	FRE3 (floods/year or season)	8.436	6.56
	STD Annual FRE3	3.133	3.655
	Mean Days of Accrual (days)	39.492	40.769
	STD Accrual (days)	41.677	39
	Min Accrual (days)	5	5
	Max Accrual (days)	324	180

### Seasonal Distribution of Mean Monthly Flows

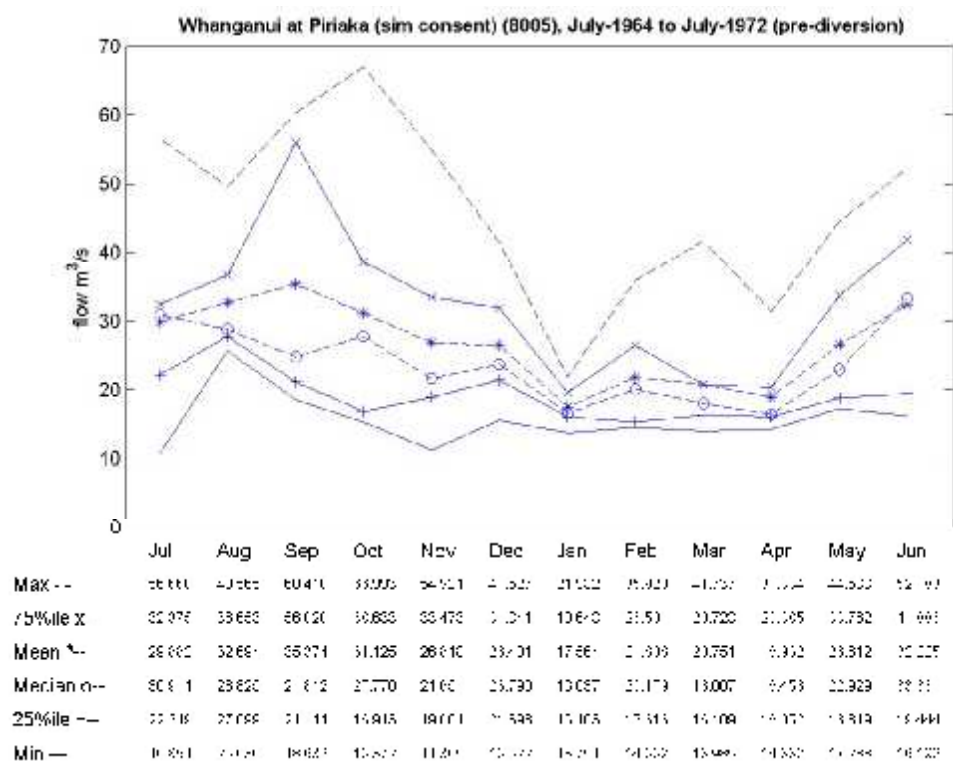


#### 4.5.47. Whanganui at Piriaka (sim consent) (8005), Jul-1964 to Jul-1972 (pre-diversion)

Site		Whanganui at Piriaka (sim consent)	
Time series details	Data Start Time	3-Jul-64	
	Data End Time	28-Nov-72	
	Analysis Start time	4-Jul-64	
	Analysis End time	1-Jul-72	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	27.147	
	MALF	6.282	
	½ median	9.431	8.185
	3x median	56.586	49.11
	MAF	448.42	
Flow variability percentiles	0 (maximum recorded flow)	647.843	647.843
	10	45.492	30.31
	20	31.076	22.27
	25 (upper quartile flow)	27.702	20.571
	30	24.866	19.179
	40	21.477	17.504
	50 (median flow)	18.862	16.37
	60	16.966	15.362
	70	15.595	14.396
	75 (lower quartile flow)	14.913	13.92
	80	14.247	13.481
	90	12.858	12.305
	91	12.662	12.107
	92	12.43	11.906
	93	12.151	11.635
	94	11.822	11.359
	95	11.434	10.978
	96	10.9	10.607
	97	10.378	10.209
	98	9.9	9.871
	99	8.571	8.567
	100 (minimum recorded flow)	7.500 (estimate)	7.500 (estimate)

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	73.887	
	MAF/median	23.774	
	FRE3 (floods/year or season)	7.499	6.549
	STD Annual FRE3	2.329	3.188
	Mean Days of Accrual (days)	44.017	41.161
	STD Accrual (days)	49.221	39.19
	Min Accrual (days)	5	5
	Max Accrual (days)	324	180

### Seasonal Distribution of Mean Monthly Flows

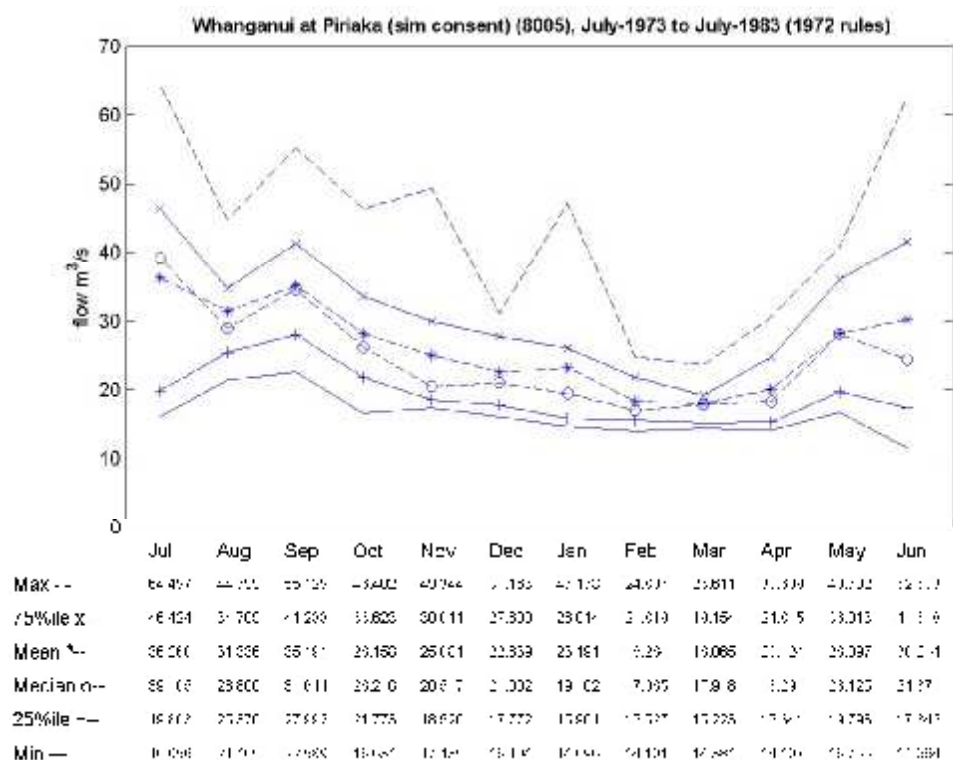


#### 4.5.48. Whanganui at Piriaka (sim consent) (8005), Jul-1973 to Jul-1983 (1972 rules)

Site		Whanganui at Piriaka (sim consent)	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	26.435	
	MALF	9.63	
	½ median	9.532	8.464
	3x median	57.189	50.781
	MAF	465.99	
Flow variability percentiles	0 (maximum recorded flow)	776.704	776.704
	10	41.717	28.324
	20	30.266	21.304
	25 (upper quartile flow)	27.239	20.037
	30	24.883	19.209
	40	21.295	17.997
	50 (median flow)	19.063	16.927
	60	17.556	15.974
	70	16.222	15.017
	75 (lower quartile flow)	15.556	14.612
	80	14.894	14.217
	90	13.519	13.121
	91	13.335	12.98
	92	13.144	12.827
	93	12.935	12.666
	94	12.706	12.468
	95	12.424	12.267
	96	12.156	12.057
	97	11.814	11.801
	98	11.288	11.383
	99	10.572	10.582
	100 (minimum recorded flow)	7.500 (estimate)	7.500 (estimate)

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	48.389	
	MAF/median	24.445	
	FRE3 (floods/year or season)	8.2	5.441
	STD Annual FRE3	2.777	2.693
	Mean Days of Accrual (days)	40.938	51.629
	STD Accrual (days)	44.109	44.83
	Min Accrual (days)	5	6
	Max Accrual (days)	230	180

### Seasonal Distribution of Mean Monthly Flows



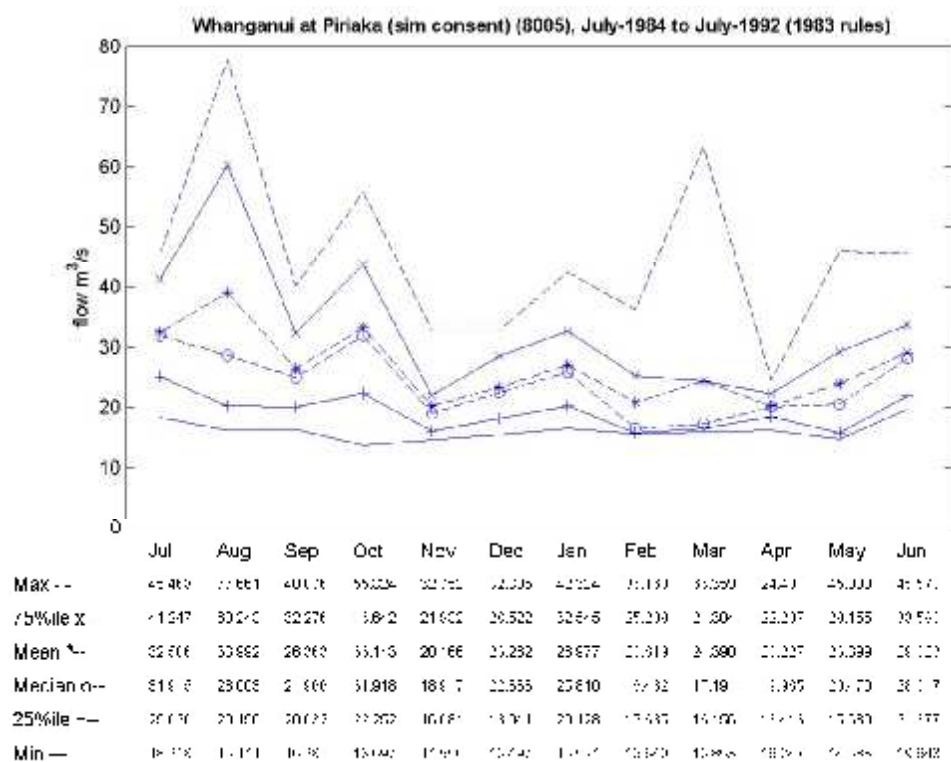
#### 4.5.49. Whanganui at Piriaka (sim consent) (8005), Jul-1984 to Jul-1992 (1983 rules)

Site		Whanganui at Piriaka (sim consent)	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	26.722	
	MALF	9.288	
	½ median	9.144	8.401
	3x median	54.864	50.403
	MAF	488.12	
Flow variability percentiles	0 (maximum recorded flow)	699.035	699.035
	10	43.657	29.896
	20	29.781	21.665
	25 (upper quartile flow)	26.174	20.034
	30	23.777	19.126
	40	20.141	17.885
	50 (median flow)	18.288	16.801
	60	16.852	15.911
	70	15.706	15.063
	75 (lower quartile flow)	15.153	14.624
	80	14.55	14.173
	90	13.265	13.126
	91	13.114	12.995
	92	12.959	12.848
	93	12.777	12.676
	94	12.558	12.468
	95	12.277	12.19
	96	11.948	11.813
	97	11.536	11.425
	98	11.057	10.939
	99	10.21	10.104
	100 (minimum recorded flow)	7.500 (estimate)	7.500 (estimate)



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	52.554	
	MAF/median	26.691	
	FRE3 (floods/year or season)	9.249	7.303
	STD Annual FRE3	4.235	3.03
	Mean Days of Accrual (days)	35.838	37.853
	STD Accrual (days)	36.474	34.18
	Min Accrual (days)	5	5
	Max Accrual (days)	186	134

### Seasonal Distribution of Mean Monthly Flows

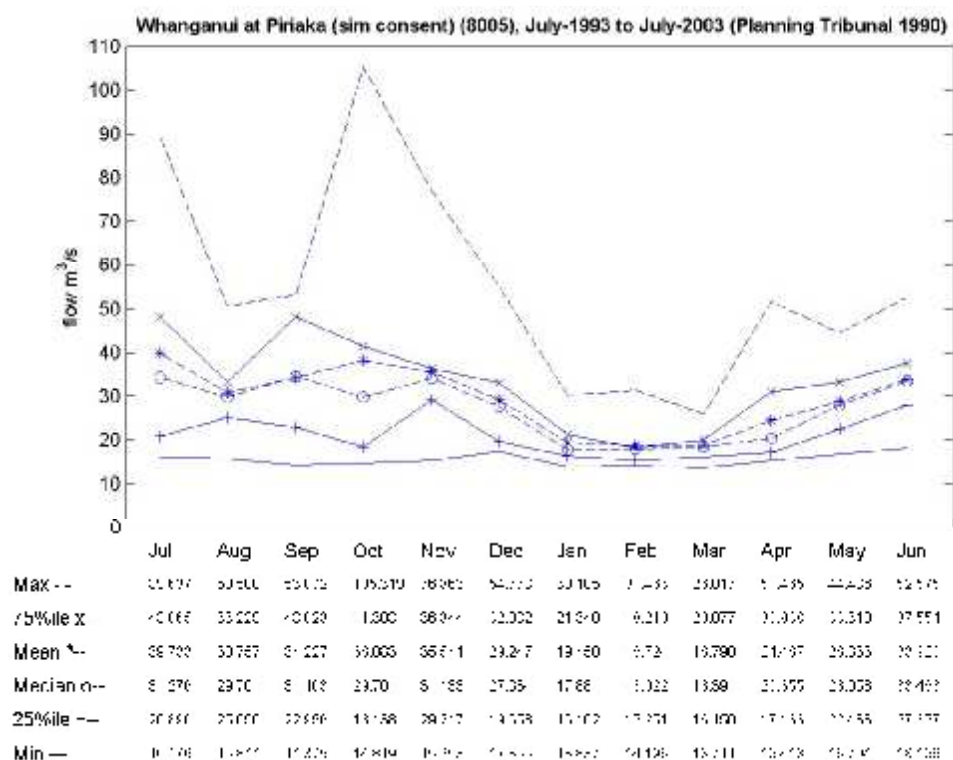


#### 4.5.50. Whanganui at Piriaka (sim consent) (8005), Jul-1993 to Jul-2003 (Planning Tribunal 1990)

Site		Whanganui at Piriaka (sim consent)	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-03	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	29.371	
	MALF	11.082	
	½ median	9.787	8.934
	3x median	58.719	53.601
	MAF	673.71	
Flow variability percentiles	0 (maximum recorded flow)	940.346	812.504
	10	46.615	33.893
	20	32.83	24.331
	25 (upper quartile flow)	28.935	22.006
	30	26.122	20.65
	40	22.075	18.998
	50 (median flow)	19.573	17.867
	60	17.962	16.734
	70	16.491	15.609
	75 (lower quartile flow)	15.791	15.073
	80	15.086	14.576
	90	13.71	13.507
	91	13.545	13.371
	92	13.372	13.228
	93	13.188	13.087
	94	12.989	12.918
	95	12.756	12.711
	96	12.499	12.467
	97	12.216	12.205
	98	11.857	11.877
	99	11.386	11.402
	100 (minimum recorded flow)	7.500 (estimate)	7.500 (estimate)

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	60.793	
	MAF/median	34.42	
	FRE3 (floods/year or season)	8.7	7.654
	STD Annual FRE3	3.33	4.901
	Mean Days of Accrual (days)	37.287	33.804
	STD Accrual (days)	39.963	38.186
	Min Accrual (days)	5	5
	Max Accrual (days)	180	166

### Seasonal Distribution of Mean Monthly Flows

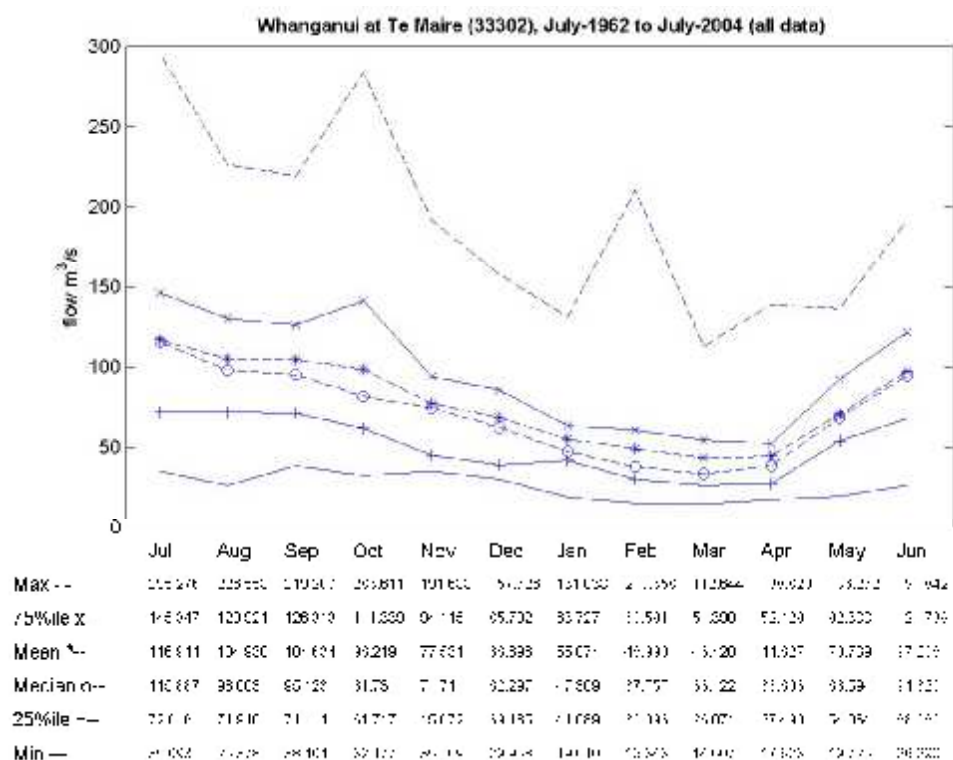


#### 4.5.51. Whanganui at Te Maire (33302), Jul-1962 to Jul-2004 (all data)

Site		Whanganui at Te Maire	
Time series details	Data Start Time	29-Jun-62	
	Data End Time	11-Apr-05	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-04	
	Years of record analysed	42	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	77.791	
	MALF	22.538	
	½ median	26.211	18.945
	3x median	157.263	113.67
	MAF	902.06	
Flow variability percentiles	0 (maximum recorded flow)	1801.4	1393.6
	10	152.392	102.593
	20	103.673	68.409
	25 (upper quartile flow)	90.438	59.371
	30	80.09	52.897
	40	64.092	44.134
	50 (median flow)	52.421	37.89
	60	43.472	33.335
	70	36.303	30.179
	75 (lower quartile flow)	33.23	28.655
	80	30.817	26.571
	90	25.026	21.86
	91	24.293	21.335
	92	23.615	20.724
	93	22.927	20.067
	94	22.047	19.483
	95	21.071	18.785
	96	19.928	18.076
	97	18.784	17.224
	98	17.48	16.051
	99	15.281	14.301
	100 (minimum recorded flow)	11.573	11.573

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	40.024	
	MAF/median	17.208	
	FRE3 (floods/year or season)	8.547	8.298
	STD Annual FRE3	2.941	4.385
	Mean Days of Accrual (days)	37.695	33.468
	STD Accrual (days)	42.117	33.203
	Min Accrual (days)	5	5
	Max Accrual (days)	298	160

### Seasonal Distribution of Mean Monthly Flows

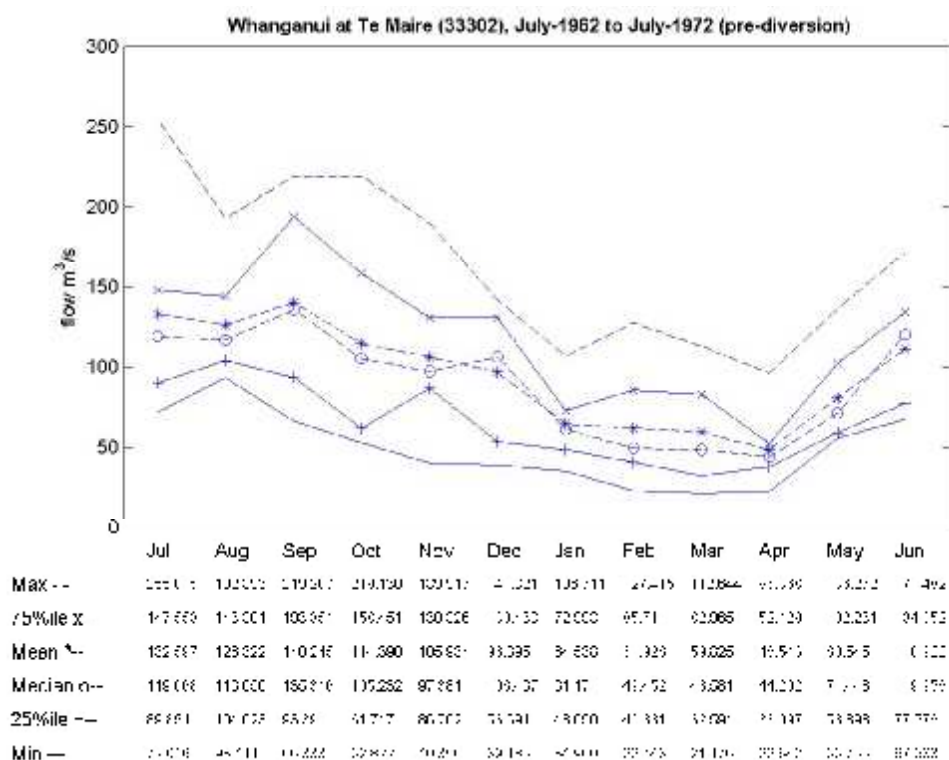


#### 4.5.52. Whanganui at Te Maire (33302), Jul-1962 to Jul-1972 (pre-diversion)

Site		Whanganui at Te Maire	
Time series details	Data Start Time	29-Jun-62	
	Data End Time	28-Nov-72	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-72	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	95.383	
	MALF	28.802	
	½ median	35.3	25.114
	3x median	211.797	150.684
	MAF	824.78	
Flow variability percentiles	0 (maximum recorded flow)	1152.8	1152.8
	10	182.853	134.49
	20	129.693	93.691
	25 (upper quartile flow)	114.104	82.128
	30	102.145	73.571
	40	84.777	60.486
	50 (median flow)	70.599	50.228
	60	58.964	43.564
	70	48.987	38.32
	75 (lower quartile flow)	44.936	36.254
	80	41.048	33.7
	90	32.996	28.965
	91	32.196	28.567
	92	31.267	28.004
	93	30.245	26.791
	94	29.594	24.502
	95	28.632	22.969
	96	27.096	21.898
	97	23.411	21.18
	98	21.548	20.441
	99	20.286	19.761
	100 (minimum recorded flow)	16.906	16.906

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	28.636	
	MAF/median	11.683	
	FRE3 (floods/year or season)	7.099	7.656
	STD Annual FRE3	2.33	4.012
	Mean Days of Accrual (days)	46.155	36.205
	STD Accrual (days)	51.218	33.819
	Min Accrual (days)	5	5
	Max Accrual (days)	324	180

### Seasonal Distribution of Mean Monthly Flows



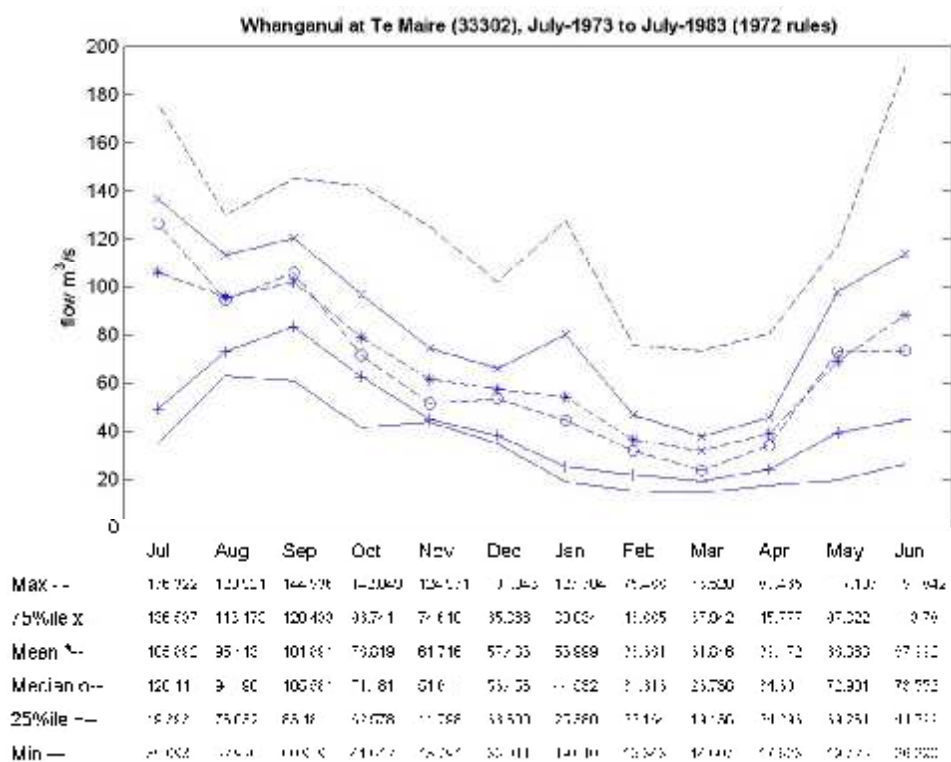
#### 4.5.53. Whanganui at Te Maire (33302), Jul-1973 to Jul-1983 (1972 rules)

Site		Whanganui at Te Maire	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	68.499	
	MALF	17.425	
	½ median	24.181	17.123
	3x median	145.086	102.735
	MAF	803.41	
Flow variability percentiles	0 (maximum recorded flow)	1349.8	1349.8
	10	132.577	83.251
	20	92.713	58.142
	25 (upper quartile flow)	82.399	51.43
	30	73.878	46.576
	40	59.692	39.56
	50 (median flow)	48.362	34.245
	60	40.315	29.23
	70	33.15	24.18
	75 (lower quartile flow)	29.785	22.047
	80	26.193	19.954
	90	19.071	16.778
	91	18.514	16.437
	92	17.928	15.94
	93	17.241	15.448
	94	16.646	15.038
	95	15.856	14.695
	96	15.181	14.23
	97	14.722	13.796
	98	14.122	13.363
	99	13.349	13.019
	100 (minimum recorded flow)	11.573	11.573



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	46.107	
	MAF/median	16.612	
	FRE3 (floods/year or season)	8.4	7.052
	STD Annual FRE3	2.752	3.032
	Mean Days of Accrual (days)	38.88	39.302
	STD Accrual (days)	47.684	36.145
	Min Accrual (days)	5	5
	Max Accrual (days)	292	159

### Seasonal Distribution of Mean Monthly Flows

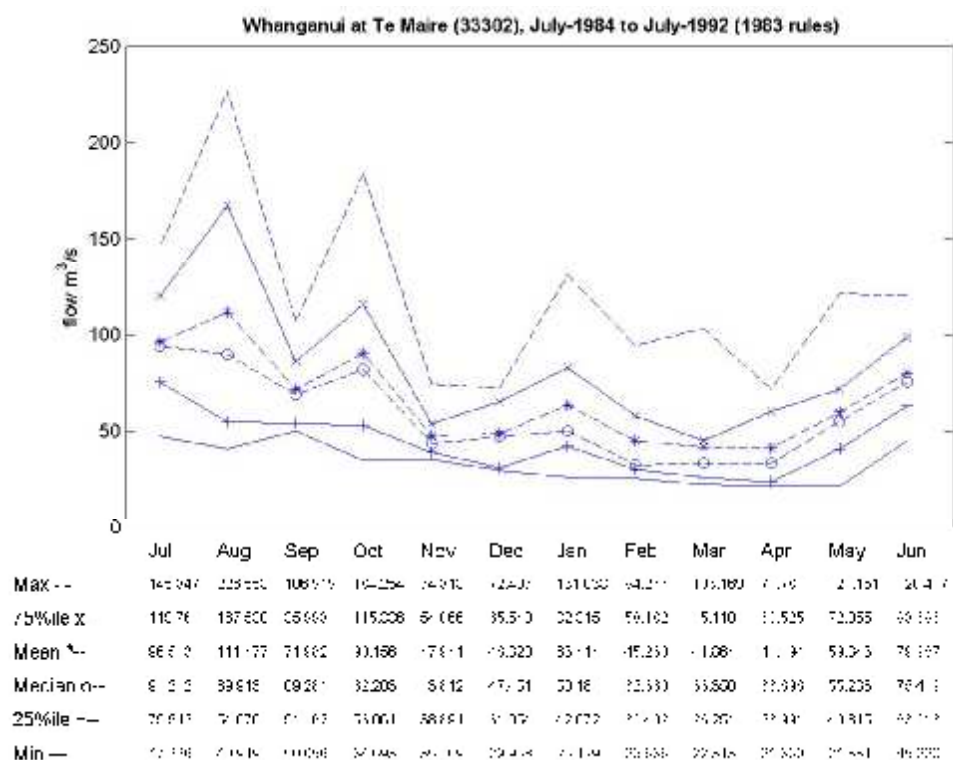


#### 4.5.54. Whanganui at Te Maire (33302), Jul-1984 to Jul-1992 (1983 rules)

Site		Whanganui at Te Maire	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	66.76	
	MALF	17.938	
	½ median	22.364	16.37
	3x median	134.181	98.217
	MAF	862.92	
Flow variability percentiles	0 (maximum recorded flow)	1217	998.551
	10	130.231	84.533
	20	87.91	56.246
	25 (upper quartile flow)	76.343	50.278
	30	67.554	45.281
	40	54.152	37.733
	50 (median flow)	44.727	32.739
	60	37.174	28.806
	70	31.466	25.269
	75 (lower quartile flow)	28.941	24.078
	80	26.224	23.163
	90	22.329	20.342
	91	21.833	19.947
	92	21.32	19.521
	93	20.796	19.128
	94	20.153	18.795
	95	19.482	18.404
	96	18.909	18.091
	97	18.327	17.838
	98	17.884	17.327
	99	17.212	16.633
	100 (minimum recorded flow)	14.255	14.255

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	48.106	
	MAF/median	19.293	
	FRE3 (floods/year or season)	9.374	8.562
	STD Annual FRE3	3.247	1.772
	Mean Days of Accrual (days)	34.533	32.816
	STD Accrual (days)	35.148	28.997
	Min Accrual (days)	5	6
	Max Accrual (days)	186	104

### Seasonal Distribution of Mean Monthly Flows

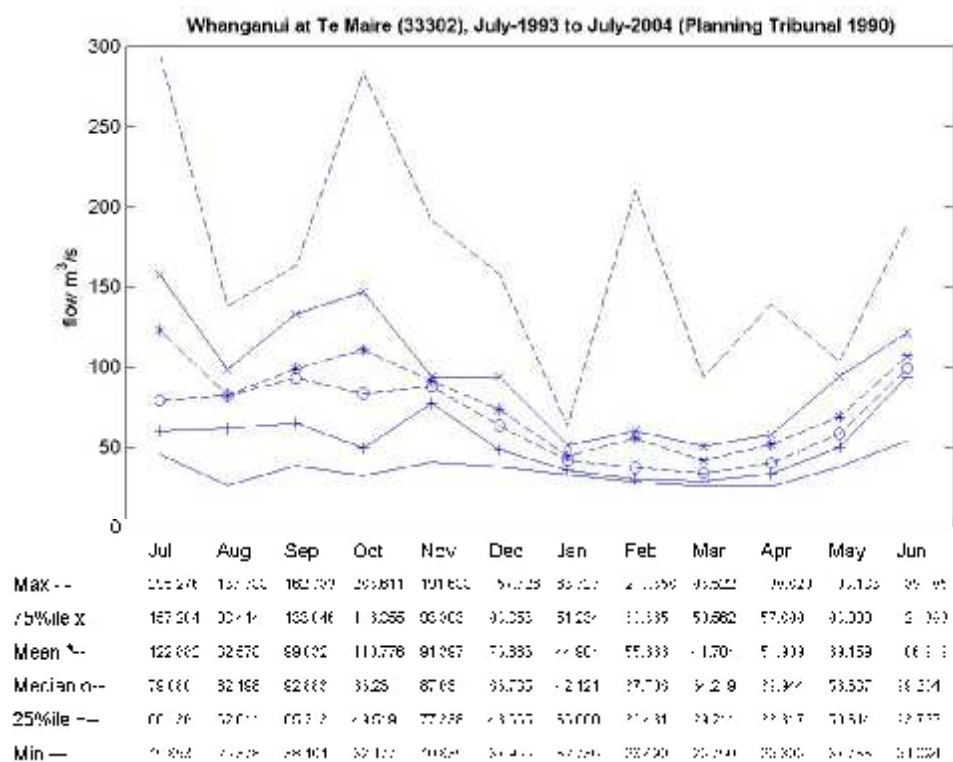


#### 4.5.55. Whanganui at Te Maire (33302), Jul-1993 to Jul-2004 (Planning Tribunal 1990)

Site		Whanganui at Te Maire	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	1-Dec-04	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-04	
	Years of record analysed	11	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	79.34	
	MALF	24.938	
	½ median	24.18	18.58
	3x median	145.077	111.477
	MAF	1180.8	
Flow variability percentiles	0 (maximum recorded flow)	1801.4	1393.6
	10	153.509	103.103
	20	99.199	66.126
	25 (upper quartile flow)	84.514	57.366
	30	73.358	51.375
	40	58.206	43.318
	50 (median flow)	48.359	37.159
	60	40.792	33.526
	70	34.901	31.256
	75 (lower quartile flow)	32.767	30.515
	80	31.227	29.797
	90	28.643	27.426
	91	28.226	27.109
	92	27.786	26.846
	93	27.363	26.511
	94	26.91	26.103
	95	26.39	25.611
	96	25.743	25.163
	97	25.093	24.65
	98	24.31	24.008
	99	23.499	23.446
	100 (minimum recorded flow)	19.814	21.68

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	47.349	
	MAF/median	24.417	
	FRE3 (floods/year or season)	9.362	8.054
	STD Annual FRE3	2.969	4.302
	Mean Days of Accrual (days)	32.476	32.731
	STD Accrual (days)	35.773	37.413
	Min Accrual (days)	5	5
	Max Accrual (days)	177	160

### Seasonal Distribution of Mean Monthly Flows

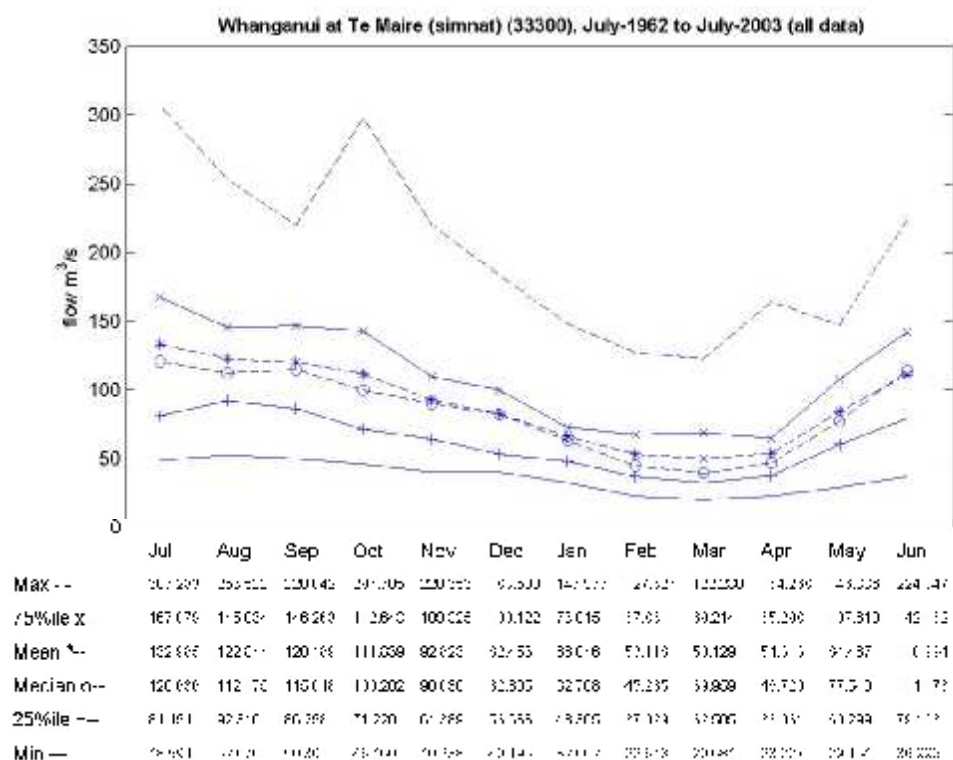


#### 4.5.56. Whanganui at Te Maire (sim natural) (33300), Jul-1962 to Jul-2003 (all data)

Site		Whanganui at Te Maire (sim natural)	
Time series details	Data Start Time	1-Jul-62	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-03	
	Years of record analysed	41	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	90.417	
	MALF	27.949	
	½ median	32.792	24.768
	3x median	196.752	148.608
	MAF	882.34	
Flow variability percentiles	0 (maximum recorded flow)	1769.3	1313.1
	10	169.113	113.776
	20	118.875	80.589
	25 (upper quartile flow)	105.082	72.238
	30	94.267	65.728
	40	77.931	56.251
	50 (median flow)	65.584	49.536
	60	55.935	43.664
	70	47.987	38.525
	75 (lower quartile flow)	44.225	36.026
	80	40.481	33.417
	90	32.462	28.987
	91	31.71	28.498
	92	30.928	27.796
	93	30.084	27.063
	94	29.178	26.122
	95	28.16	25.286
	96	26.822	24.333
	97	25.361	23.132
	98	23.546	21.702
	99	21.424	20.115
	100 (minimum recorded flow)	13.505	13.505

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	20.648	
	MAF/median	13.454	
	FRE3 (floods/year or season)	7.853	6.73
	STD Annual FRE3	2.592	3.857
	Mean Days of Accrual (days)	42.217	39.907
	STD Accrual (days)	46.648	37.012
	Min Accrual (days)	5	5
	Max Accrual (days)	292	180

### Seasonal Distribution of Mean Monthly Flows



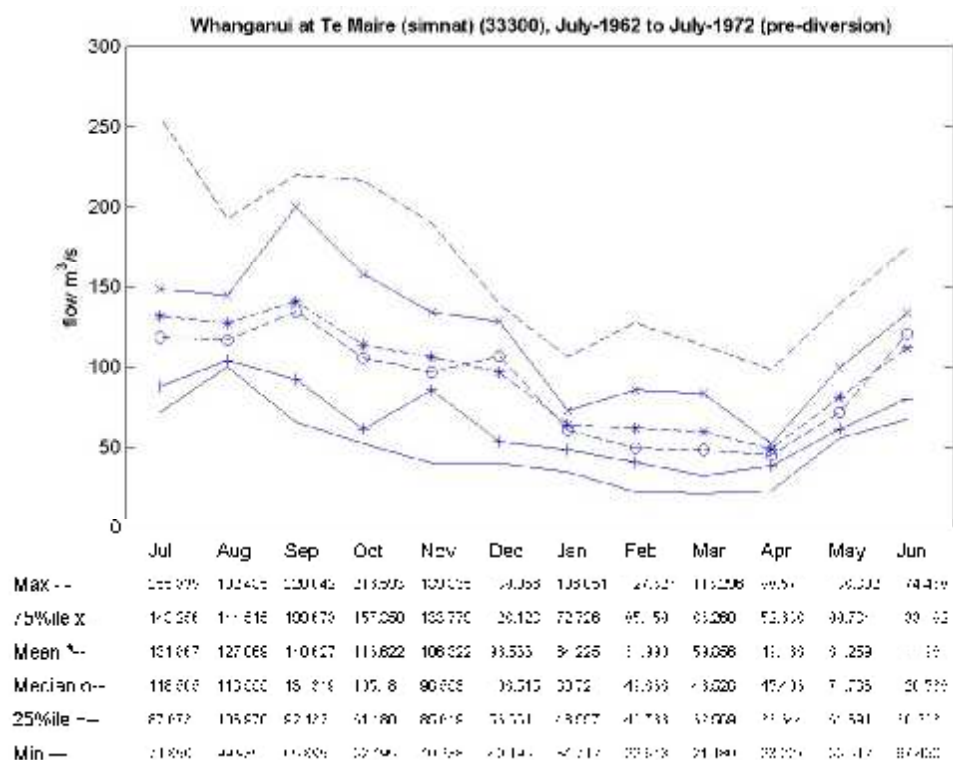
#### 4.5.57. Whanganui at Te Maire (sim natural) (33300), Jul-1962 to Jul-1972 (pre-diversion)

Site		Whanganui at Te Maire (sim natural)	
Time series details	Data Start Time	1-Jul-62	
	Data End Time	28-Nov-72	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-72	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	95.532	
	MALF	28.966	
	½ median	35.391	25.093
	3x median	212.346	150.558
	MAF	783.05	
Flow variability percentiles	0 (maximum recorded flow)	1121.3	1121.3
	10	183.023	133.746
	20	129.807	93.659
	25 (upper quartile flow)	114.291	82.182
	30	102.256	73.65
	40	84.99	60.402
	50 (median flow)	70.782	50.186
	60	59.122	43.501
	70	49.157	38.297
	75 (lower quartile flow)	45.007	36.332
	80	41.149	33.846
	90	33.216	29.008
	91	32.438	28.579
	92	31.53	28.097
	93	30.492	27.076
	94	29.696	24.727
	95	28.674	23.005
	96	27.537	21.966
	97	23.716	21.289
	98	21.686	20.451
	99	20.383	19.775
	100 (minimum recorded flow)	18.24	18.24



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	27.033	
	MAF/median	11.063	
	FRE3 (floods/year or season)	7.499	7.254
	STD Annual FRE3	2.8	3.945
	Mean Days of Accrual (days)	44.122	37.762
	STD Accrual (days)	50.245	37.154
	Min Accrual (days)	5	5
	Max Accrual (days)	324	180

### Seasonal Distribution of Mean Monthly Flows

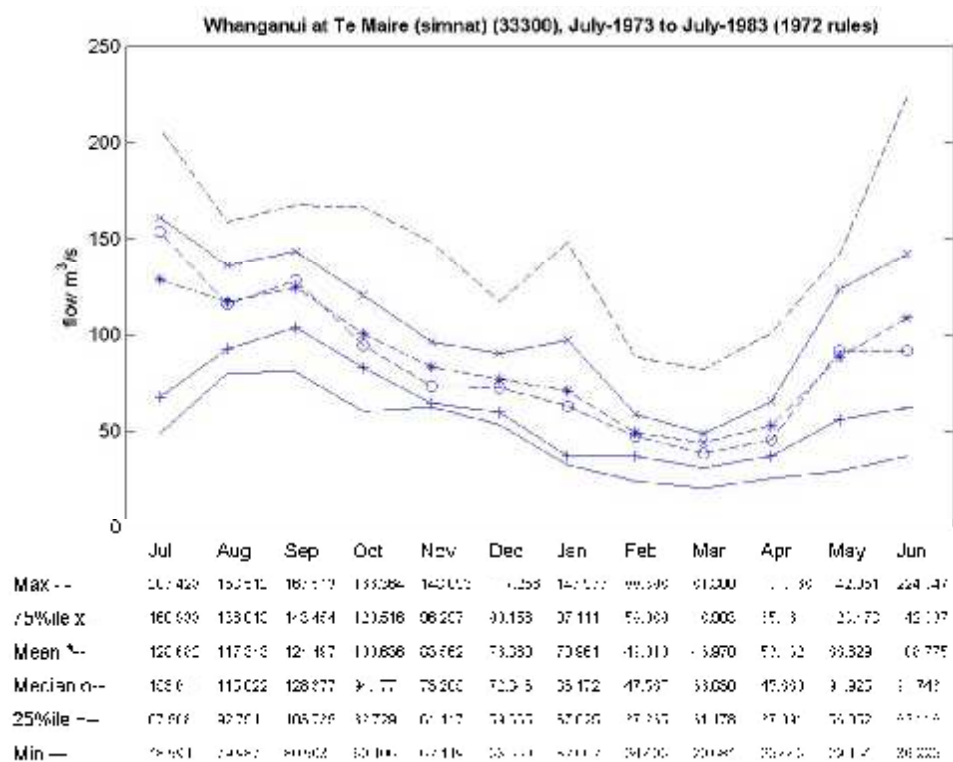


#### 4.5.58. Whanganui at Te Maire (sim natural) (33300), Jul-1973 to Jul-1983 (1972 rules)

Site		Whanganui at Te Maire (sim natural)	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	87.419	
	MALF	27.475	
	½ median	33.692	25.272
	3x median	202.149	151.629
	MAF	806.06	
Flow variability percentiles	0 (maximum recorded flow)	1313.1	1313.1
	10	158.559	103.995
	20	115.222	77.565
	25 (upper quartile flow)	103.826	70.64
	30	94.476	65.226
	40	79.223	56.983
	50 (median flow)	67.383	50.543
	60	57.896	44.337
	70	49.202	37.976
	75 (lower quartile flow)	44.89	35.091
	80	40.615	32.656
	90	31.241	27.279
	91	30.54	26.288
	92	29.912	25.387
	93	28.493	24.317
	94	26.501	23.187
	95	25.007	22.35
	96	23.19	21.303
	97	22.141	20.311
	98	21.1	19.939
	99	19.932	19.259
	100 (minimum recorded flow)	13.505	13.505

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	29.338	
	MAF/median	11.962	
	FRE3 (floods/year or season)	7.1	5.843
	STD Annual FRE3	2.958	2.756
	Mean Days of Accrual (days)	47.857	48.081
	STD Accrual (days)	61.198	39.654
	Min Accrual (days)	5	5
	Max Accrual (days)	292	159

### Seasonal Distribution of Mean Monthly Flows

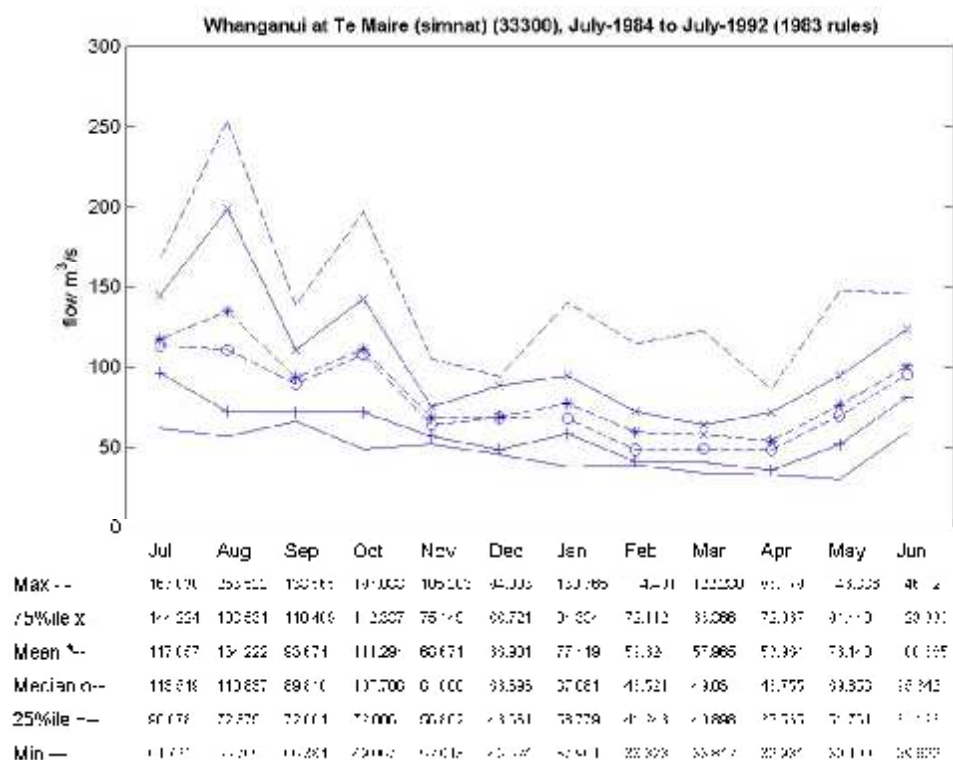


#### 4.5.59. Whanganui at Te Maire (sim natural) (33300), Jul-1984 to Jul-1992 (1983 rules)

Site		Whanganui at Te Maire (sim natural)	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	85.22	
	MALF	27.496	
	½ median	30.979	24.628
	3x median	185.874	147.765
	MAF	872.85	
Flow variability percentiles	0 (maximum recorded flow)	1242.1	995.597
	10	157.428	104.418
	20	110.336	75.751
	25 (upper quartile flow)	97.18	68.497
	30	87.329	62.796
	40	72.621	54.575
	50 (median flow)	61.958	49.255
	60	53.399	44.325
	70	47.142	39.94
	75 (lower quartile flow)	43.972	37.983
	80	40.86	35.685
	90	34.216	31.609
	91	33.452	31.292
	92	32.803	30.921
	93	32.211	30.43
	94	31.449	29.893
	95	30.729	29.375
	96	29.669	28.872
	97	28.824	28.072
	98	27.723	27.182
	99	26.31	25.916
	100 (minimum recorded flow)	18.083	18.083

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	31.745	
	MAF/median	14.088	
	FRE3 (floods/year or season)	8.374	7.049
	STD Annual FRE3	3.815	3.033
	Mean Days of Accrual (days)	39.806	39.324
	STD Accrual (days)	42.382	32.91
	Min Accrual (days)	5	5
	Max Accrual (days)	186	134

### Seasonal Distribution of Mean Monthly Flows

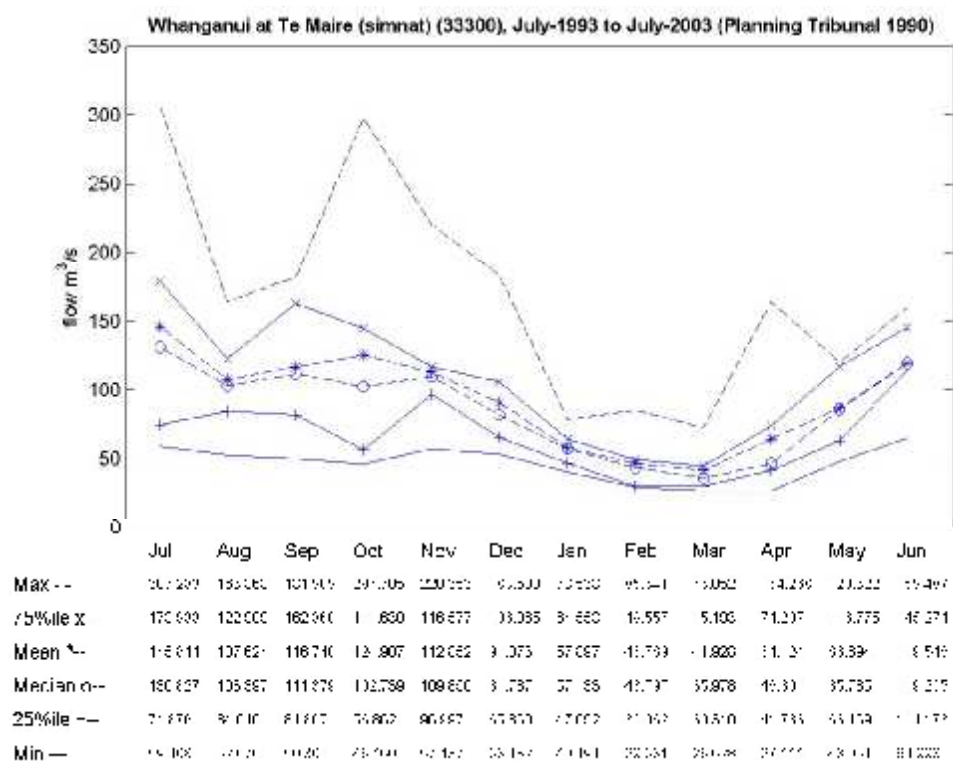


#### 4.5.60. Whanganui at Te Maire (sim natural) (33300), Jul-1993 to Jul-2003 (Planning Tribunal 1990)

Site		Whanganui at Te Maire (sim natural)	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-03	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	93.253	
	MALF	28.797	
	½ median	31.866	25.288
	3x median	191.193	151.725
	MAF	1166.3	
Flow variability percentiles	0 (maximum recorded flow)	1769.3	1225.2
	10	175.615	117.77
	20	118.778	81.761
	25 (upper quartile flow)	103.301	72.948
	30	91.747	66.176
	40	75.459	56.732
	50 (median flow)	63.731	50.575
	60	54.642	44.267
	70	47.377	38.793
	75 (lower quartile flow)	43.597	36.203
	80	40.034	33
	90	32.235	28.397
	91	31.483	27.846
	92	30.658	27.391
	93	29.838	26.83
	94	29.022	26.292
	95	28.012	25.676
	96	27.068	25.14
	97	26.043	24.619
	98	25.07	24.016
	99	23.984	23.354
	100 (minimum recorded flow)	20.947	20.947

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	40.501	
	MAF/median	18.3	
	FRE3 (floods/year or season)	7.6	7.25
	STD Annual FRE3	1.893	4.749
	Mean Days of Accrual (days)	40.895	34.591
	STD Accrual (days)	41.672	37.771
	Min Accrual (days)	5	5
	Max Accrual (days)	178	162

### Seasonal Distribution of Mean Monthly Flows



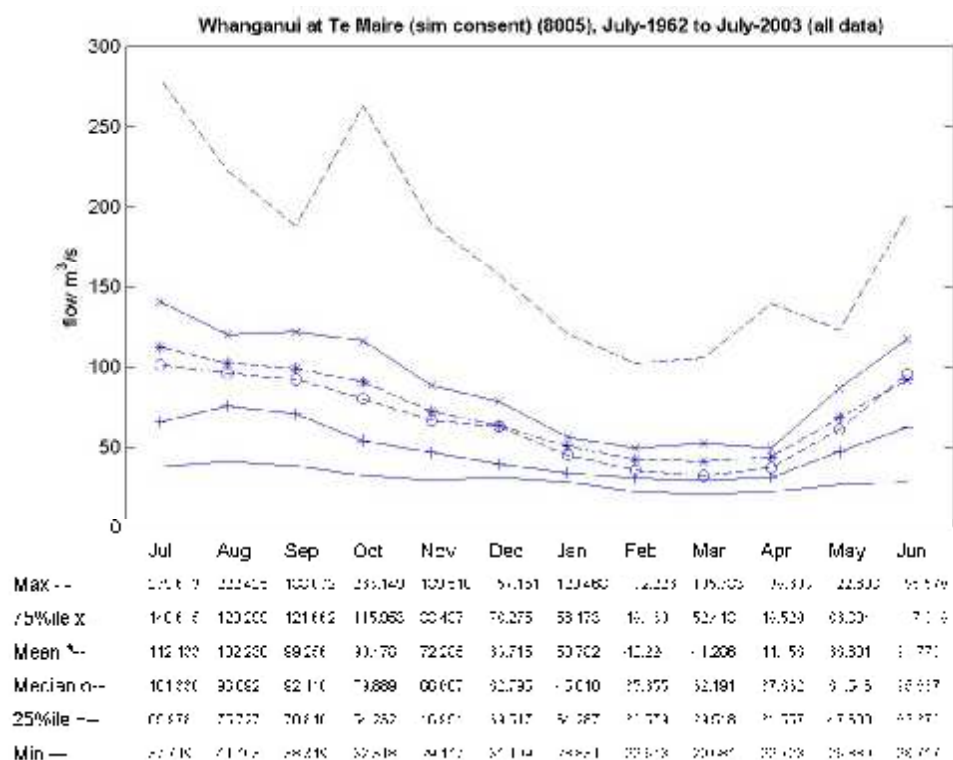
#### 4.5.61. Whanganui at Te Maire (sim consent) (8005), Jul-1962 to Jul-2003 (all data)

Site		Whanganui at Te Maire (sim consent)	
Time series details	Data Start Time	1-Jul-62	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-03	
	Years of record analysed	41	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	73.464	
	MALF	25.153	
	½ median	24.651	17.336
	3x median	147.906	104.016
	MAF	835.05	
Flow variability percentiles	0 (maximum recorded flow)	1721.7	1265.5
	10	140.385	89.402
	20	96.471	60.737
	25 (upper quartile flow)	84.359	53.544
	30	74.821	48.078
	40	60.255	40.088
	50 (median flow)	49.302	34.672
	60	41.006	29.998
	70	34.215	29.129
	75 (lower quartile flow)	31.149	29.088
	80	29.223	29.047
	90	29.045	28.665
	91	29.028	28.098
	92	29.01	27.5
	93	28.887	26.692
	94	28.091	25.879
	95	27.206	25.094
	96	26.079	24.169
	97	24.822	23.028
	98	23.177	21.646
	99	21.153	20.11
	100 (minimum recorded flow)	13.505	13.505



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	278.35	
	MAF/median	16.937	
	FRE3 (floods/year or season)	8.658	7.321
	STD Annual FRE3	2.504	3.941
	Mean Days of Accrual (days)	37.575	36.989
	STD Accrual (days)	41.255	35.749
	Min Accrual (days)	5	5
	Max Accrual (days)	291	180

### Seasonal Distribution of Mean Monthly Flows

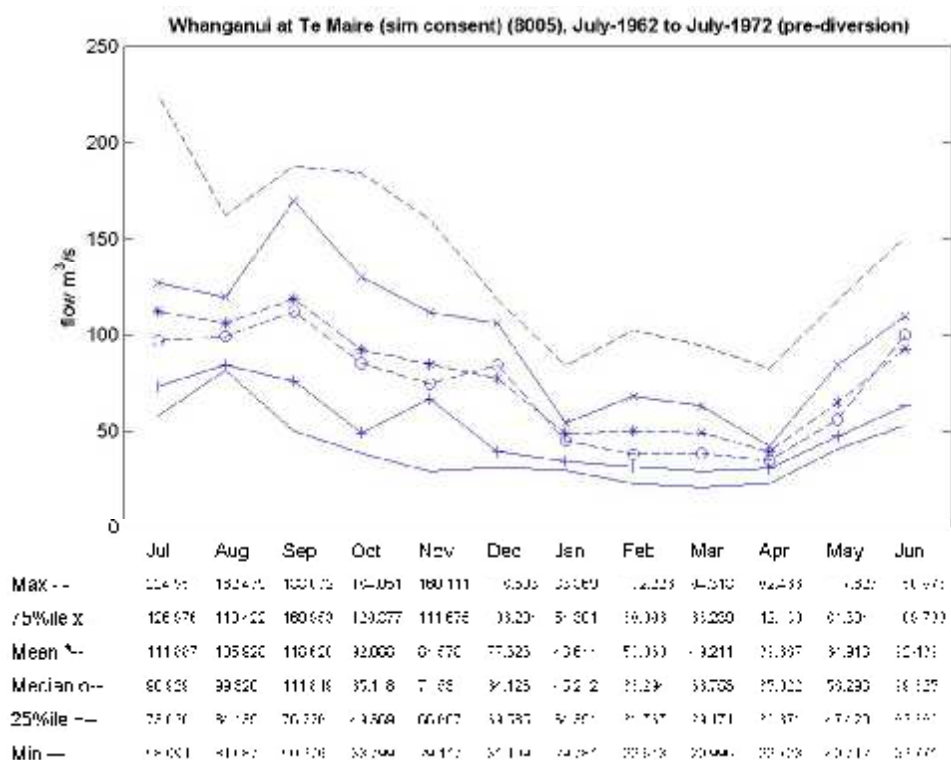


#### 4.5.62. Whanganui at Te Maire (sim consent) (8005), Jul-1962 to Jul-1972 (pre-diversion)

Site		Whanganui at Te Maire (sim consent)	
Time series details	Data Start Time	1-Jul-62	
	Data End Time	28-Nov-72	
	Analysis Start time	1-Jul-62	
	Analysis End time	1-Jul-72	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	78.073	
	MALF	25.776	
	½ median	27.289	18.028
	3x median	163.731	108.165
	MAF	735.43	
Flow variability percentiles	0 (maximum recorded flow)	1073.7	1073.7
	10	151.807	106.123
	20	106.043	71.93
	25 (upper quartile flow)	92.838	62.465
	30	82.212	55.462
	40	67.119	43.959
	50 (median flow)	54.577	36.055
	60	44.597	30.471
	70	35.966	28.961
	75 (lower quartile flow)	32.291	28.911
	80	29.378	28.861
	90	28.919	28.559
	91	28.9	28.111
	92	28.881	27.392
	93	28.862	25.351
	94	28.702	23.99
	95	27.887	22.642
	96	25.594	21.835
	97	23.16	21.191
	98	21.594	20.409
	99	20.34	19.754
	100 (minimum recorded flow)	17.938	18.24

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	28.532	
	MAF/median	13.475	
	FRE3 (floods/year or season)	7.999	7.859
	STD Annual FRE3	2.406	4.197
	Mean Days of Accrual (days)	40.835	34.87
	STD Accrual (days)	42.283	35.553
	Min Accrual (days)	5	5
	Max Accrual (days)	237	180

### Seasonal Distribution of Mean Monthly Flows

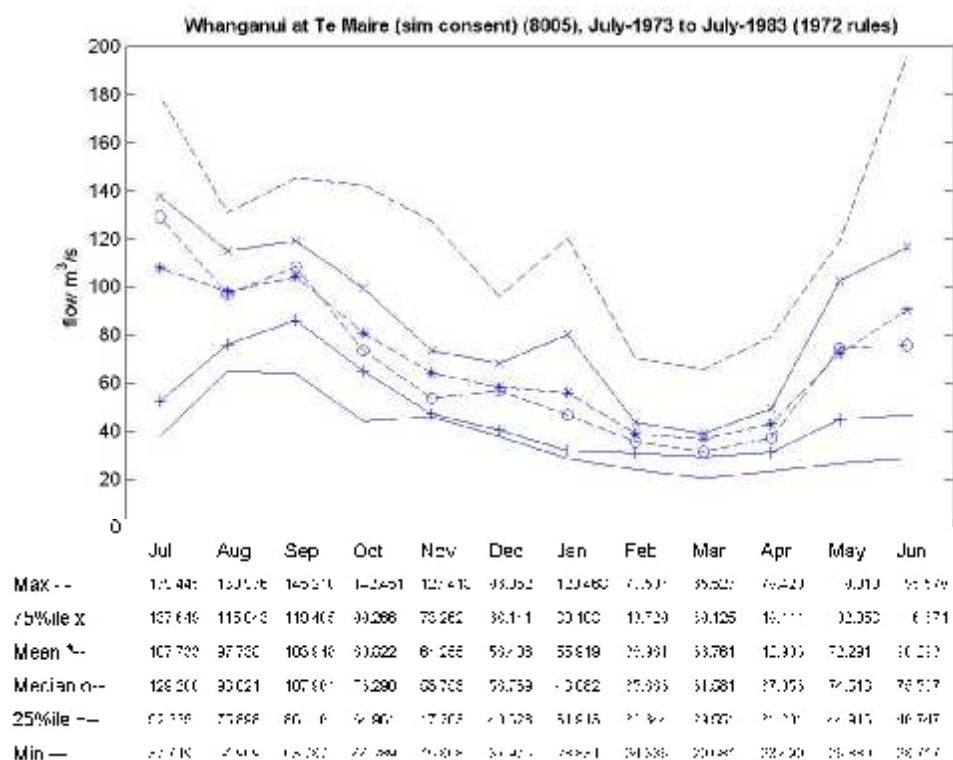


#### 4.5.63. Whanganui at Te Maire (sim consent) (8005), Jul-1973 to Jul-1983 (1972 rules)

Site		Whanganui at Te Maire (sim consent)	
Time series details	Data Start Time	28-Nov-72	
	Data End Time	25-Dec-83	
	Analysis Start time	1-Jul-73	
	Analysis End time	1-Jul-83	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	71.041	
	MALF	24.857	
	½ median	25.227	17.721
	3x median	151.362	106.326
	MAF	759.88	
Flow variability percentiles	0 (maximum recorded flow)	1265.5	1265.5
	10	132.457	81.974
	20	94.223	58.764
	25 (upper quartile flow)	84.231	52.437
	30	75.79	47.733
	40	61.653	40.572
	50 (median flow)	50.454	35.442
	60	42.12	30.452
	70	34.96	29.118
	75 (lower quartile flow)	31.626	29.082
	80	29.005	29.045
	90	28.816	27.267
	91	28.798	26.289
	92	28.639	25.391
	93	27.263	24.318
	94	25.933	23.198
	95	24.458	22.356
	96	22.98	21.308
	97	21.883	20.313
	98	20.611	19.939
	99	19.724	19.254
	100 (minimum recorded flow)	13.505	13.505

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	30.57	
	MAF/median	15.061	
	FRE3 (floods/year or season)	8.5	6.447
	STD Annual FRE3	3.132	2.964
	Mean Days of Accrual (days)	39.119	43.75
	STD Accrual (days)	49.203	38.182
	Min Accrual (days)	5	7
	Max Accrual (days)	291	159

### Seasonal Distribution of Mean Monthly Flows

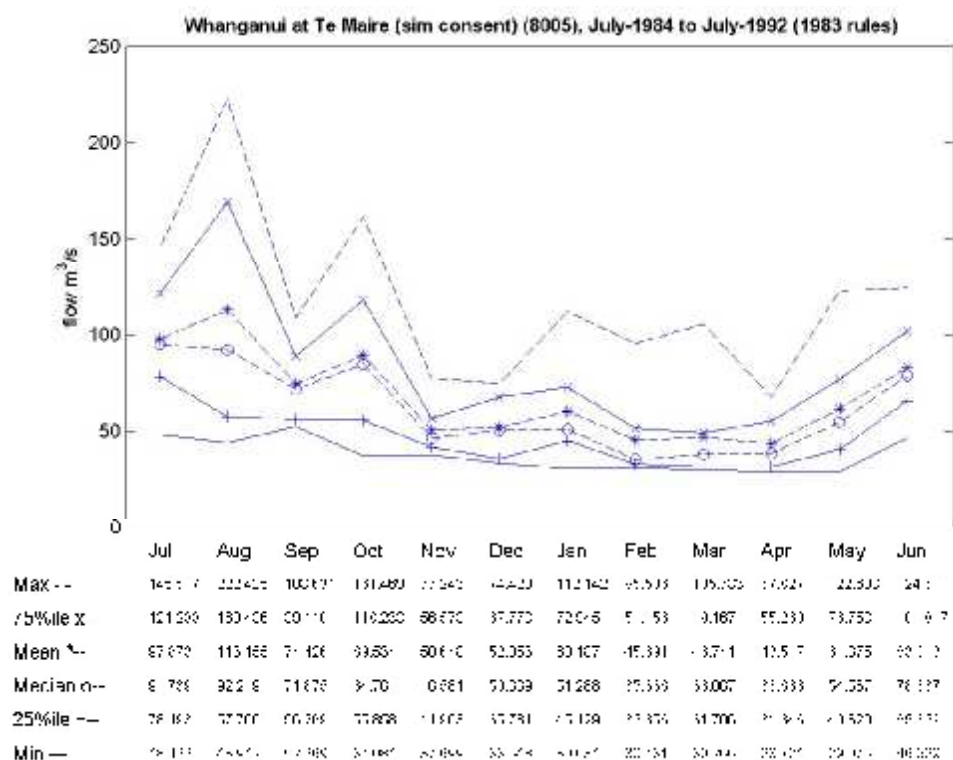


#### 4.5.64. Whanganui at Te Maire (sim consent) (8005), Jul-1984 to Jul-1992 (1983 rules)

Site		Whanganui at Te Maire (sim consent)	
Time series details	Data Start Time	25-Dec-83	
	Data End Time	1-Sep-92	
	Analysis Start time	1-Jul-84	
	Analysis End time	1-Jul-92	
	Years of record analysed	8	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	68.451	
	MALF	24.6	
	½ median	23.095	17.202
	3x median	138.567	103.209
	MAF	825.23	
Flow variability percentiles	0 (maximum recorded flow)	1194.5	947.978
	10	129.306	80.077
	20	88.761	56.127
	25 (upper quartile flow)	76.999	50.338
	30	68.375	45.563
	40	55.386	38.827
	50 (median flow)	46.189	34.403
	60	38.891	30.231
	70	33.607	29.039
	75 (lower quartile flow)	30.957	29.01
	80	29.016	28.982
	90	28.878	28.924
	91	28.864	28.919
	92	28.85	28.913
	93	28.836	28.907
	94	28.822	28.901
	95	28.808	28.677
	96	28.328	28.022
	97	27.567	27.413
	98	26.562	26.45
	99	25.228	25.311
	100 (minimum recorded flow)	18.083	18.083

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	33.546	
	MAF/median	17.866	
	FRE3 (floods/year or season)	8.749	7.806
	STD Annual FRE3	3.282	2.498
	Mean Days of Accrual (days)	37.3	36.229
	STD Accrual (days)	39.108	31.778
	Min Accrual (days)	6	5
	Max Accrual (days)	186	123

### Seasonal Distribution of Mean Monthly Flows



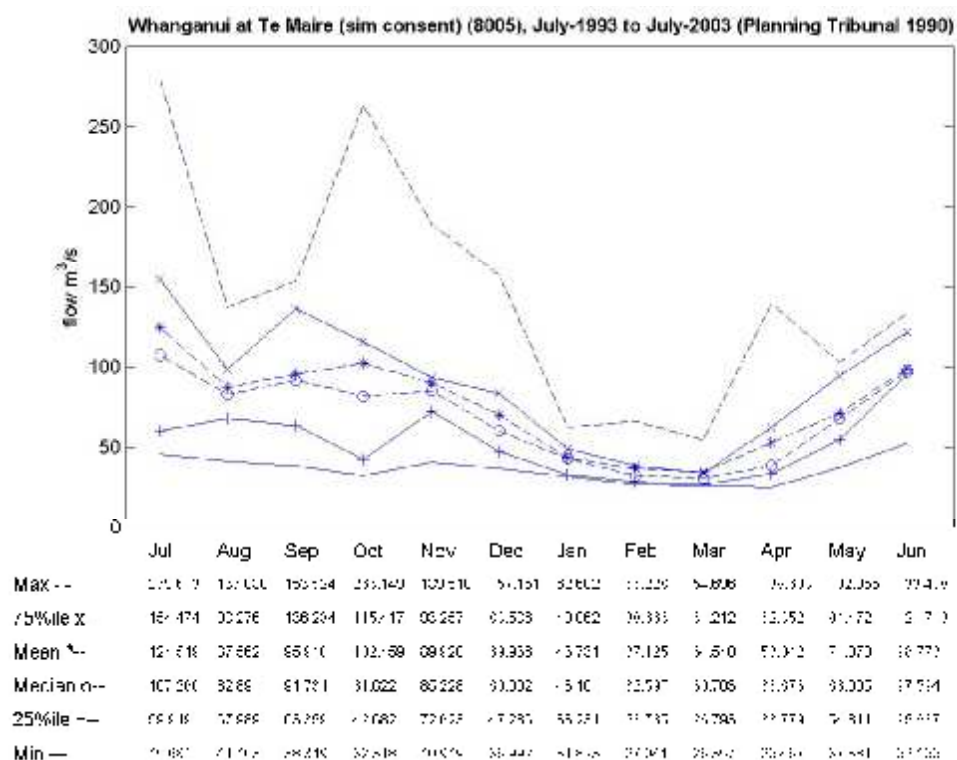
#### 4.5.65. Whanganui at Te Maire (sim consent) (8005), Jul-1993 to Jul-2003 (Planning Tribunal 1990)

Site		Whanganui at Te Maire (sim consent)	
Time series details	Data Start Time	1-Sep-92	
	Data End Time	1-Jul-03	
	Analysis Start time	1-Jul-93	
	Analysis End time	1-Jul-03	
	Years of record analysed	10	
	Gaps in the data (% of record).	None	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m³/s)	Flow (m³/s)
	Mean	75.926	
	MALF	25.461	
	½ median	23.502	17.434
	3x median	141.012	104.601
	MAF	1118.7	
Flow variability percentiles	0 (maximum recorded flow)	1721.7	1177.6
	10	146.424	92.317
	20	95.738	61.113
	25 (upper quartile flow)	81.573	53.428
	30	71.608	47.794
	40	57.004	40.166
	50 (median flow)	47.004	34.867
	60	39.46	30.086
	70	33.404	29.139
	75 (lower quartile flow)	30.344	29.081
	80	29.161	29.024
	90	28.942	28.24
	91	28.921	27.761
	92	28.899	27.313
	93	28.425	26.746
	94	27.717	26.238
	95	27.024	25.669
	96	26.286	25.14
	97	25.526	24.605
	98	24.659	24.031
	99	23.702	23.285
	100 (minimum recorded flow)	20.947	20.947



Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	43.938	
	MAF/median	23.8	
	FRE3 (floods/year or season)	9.1	7.654
	STD Annual FRE3	2.466	4.901
	Mean Days of Accrual (days)	33.622	32.756
	STD Accrual (days)	35.249	37.889
	Min Accrual (days)	5	5
	Max Accrual (days)	163	161

### Seasonal Distribution of Mean Monthly Flows

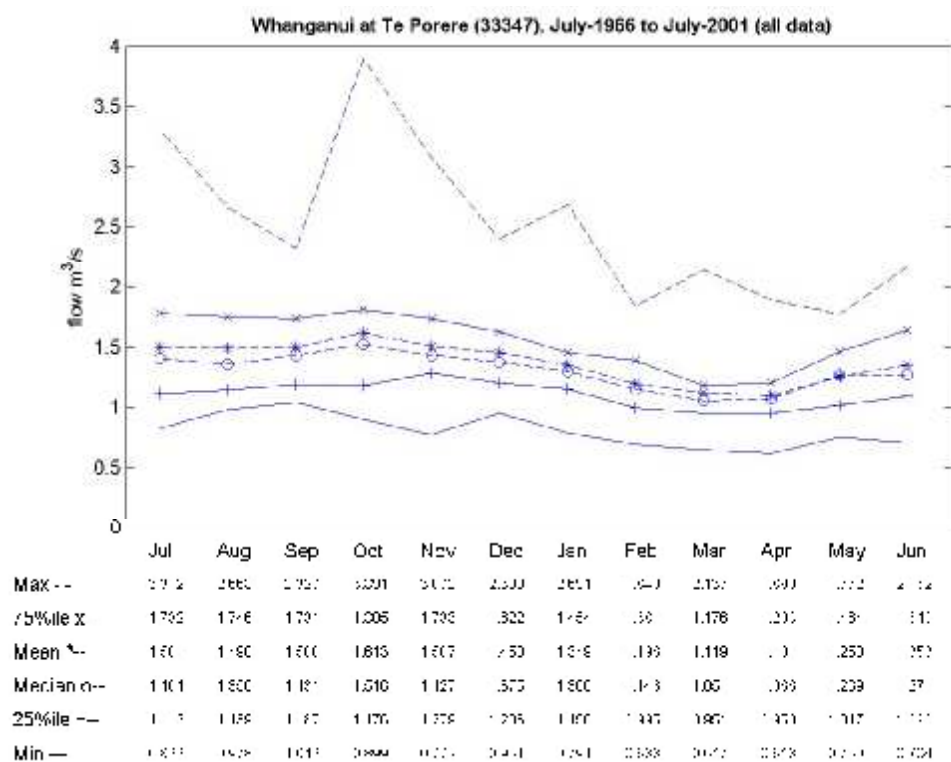


#### 4.5.66. Whanganui at Te Porere (33347), Jul-1966 to Jul-2001 (all data)

Site		Whanganui at Te Porere	
Time series details	Data Start Time	13-Jan-66	
	Data End Time	4-Jul-01	
	Analysis Start time	1-Jul-66	
	Analysis End time	1-Jul-01	
	Years of record analysed	35	
	Gaps in the data (% of record).	0	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	1.37	
	MALF	0.816	
	½ median	0.576	0.559
	3x median	3.453	3.354
	MAF	30.34	
Flow variability percentiles	0 (maximum recorded flow)	51.596	51.596
	10	1.831	1.665
	20	1.521	1.401
	25 (upper quartile flow)	1.43	1.335
	30	1.358	1.279
	40	1.244	1.189
	50 (median flow)	1.151	1.118
	60	1.074	1.056
	70	1.006	0.992
	75 (lower quartile flow)	0.975	0.968
	80	0.946	0.935
	90	0.871	0.855
	91	0.859	0.839
	92	0.848	0.825
	93	0.834	0.809
	94	0.816	0.792
	95	0.795	0.773
	96	0.769	0.757
	97	0.748	0.733
	98	0.707	0.703
	99	0.656	0.672
	100 (minimum recorded flow)	0.509	0.509

Season		1 July to 30 June	1 Nov to 30 April
Biological indicators	MAF/MALF	37.181	
	MAF/median	26.36	
	FRE3 (floods/year or season)	5.971	5.123
	STD Annual FRE3	3.382	3.501
	Mean Days of Accrual (days)	59.264	51.182
	STD Accrual (days)	65.3	46.503
	Min Accrual (days)	5	5
	Max Accrual (days)	419	180

### Seasonal Distribution of Mean Monthly Flows



#### 4.5.67. Kai Iwi at Handley Rd (33502), Jul-1978 to Jul-2004 (all data)

Site		Kai Iwi at Handley Rd	
Time series details	Data Start Time	5-Apr-78	
	Data End Time	4-Apr-05	
	Analysis Start time	1-Jul-78	
	Analysis End time	1-Jul-04	
	Years of record analysed	26	
	Gaps in the data (% of record).	0.1	
Season		1 July to 30 June	1 Nov to 30 April
Flow magnitude	Flow Statistic	Flow (m <sup>3</sup> /s)	Flow (m <sup>3</sup> /s)
	Mean	1.485	
	MALF	0.525	
	½ median	0.499	0.391
	3x median	2.994	2.343
	MAF	27.102	
Flow variability percentiles	0 (maximum recorded flow)	70.326	70.326
	10	2.644	1.598
	20	1.739	1.155
	25 (upper quartile flow)	1.515	1.062
	30	1.358	0.989
	40	1.142	0.868
	50 (median flow)	0.998	0.781
	60	0.884	0.71
	70	0.778	0.654
	75 (lower quartile flow)	0.728	0.628
	80	0.681	0.599
	90	0.591	0.533
	91	0.58	0.525
	92	0.569	0.517
	93	0.556	0.509
	94	0.543	0.501
	95	0.528	0.491
	96	0.514	0.481
	97	0.499	0.468
	98	0.479	0.449
	99	0.45	0.416
	100 (minimum recorded flow)	0.178	0.178

Season		1 July to 30 June	1 Nov to 30 April
Biological disturbance indicators	MAF/MALF	51.33	
	MAF/median	27.156	
	FRE3 (floods/year or season)	9.654	7.439
	STD Annual FRE3	2.116	3.255
	Mean Days of Accrual (days)	33.821	37.059
	STD Accrual (days)	38.029	37.054
	Min Accrual (days)	5	5
	Max Accrual (days)	216	167

### Seasonal Distribution of Mean Monthly Flows

