A SCIENTIFIC FRAMEWORK FOR SETTING FLOW AND ALLOCATION LIMITS - TAKAKA

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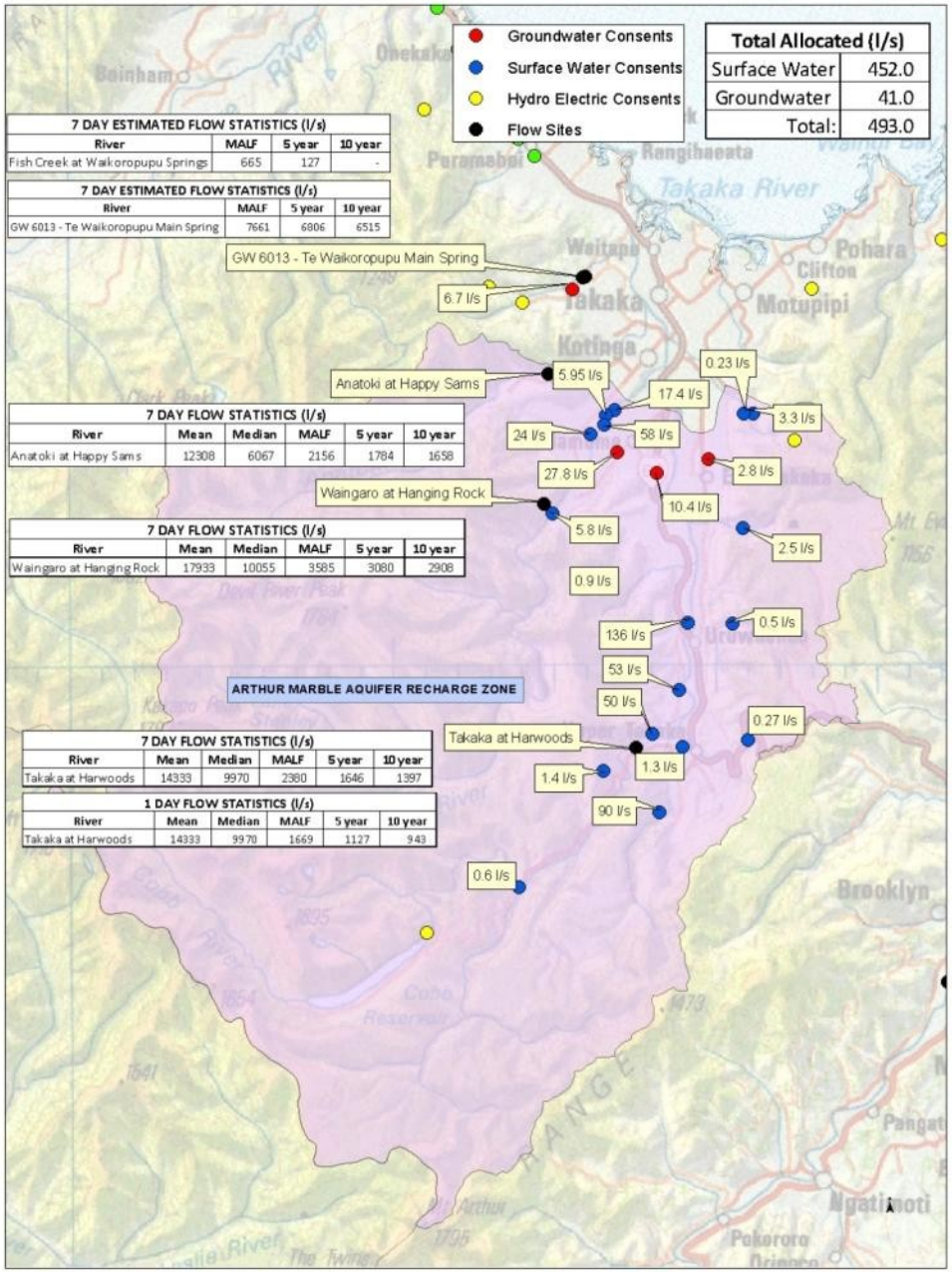
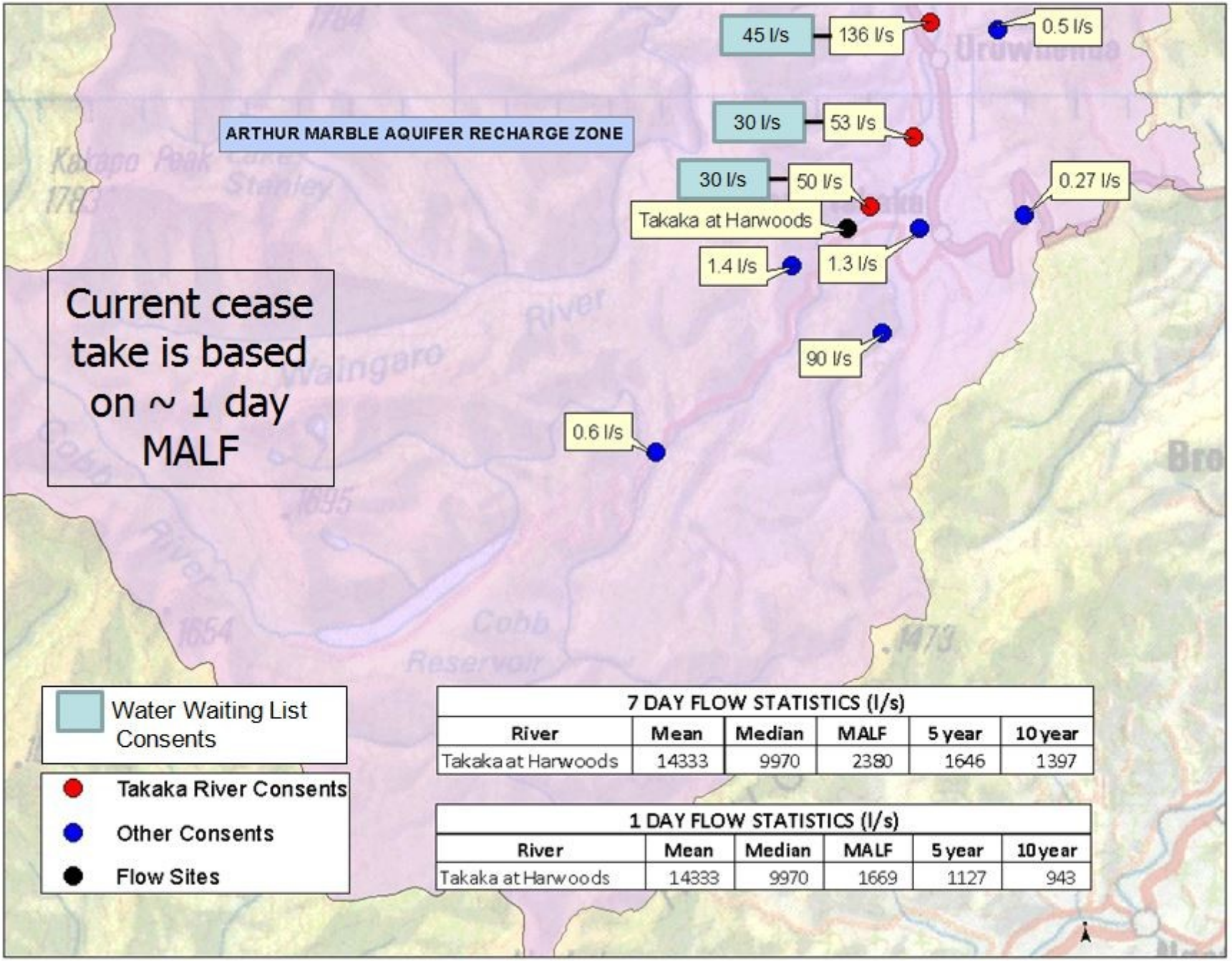
UPPER TAKAKA/
ARTHUR MARBLE AQUIFER

Arthur Marble Aquifer Recharge Zone
Consents & Flow Statistics



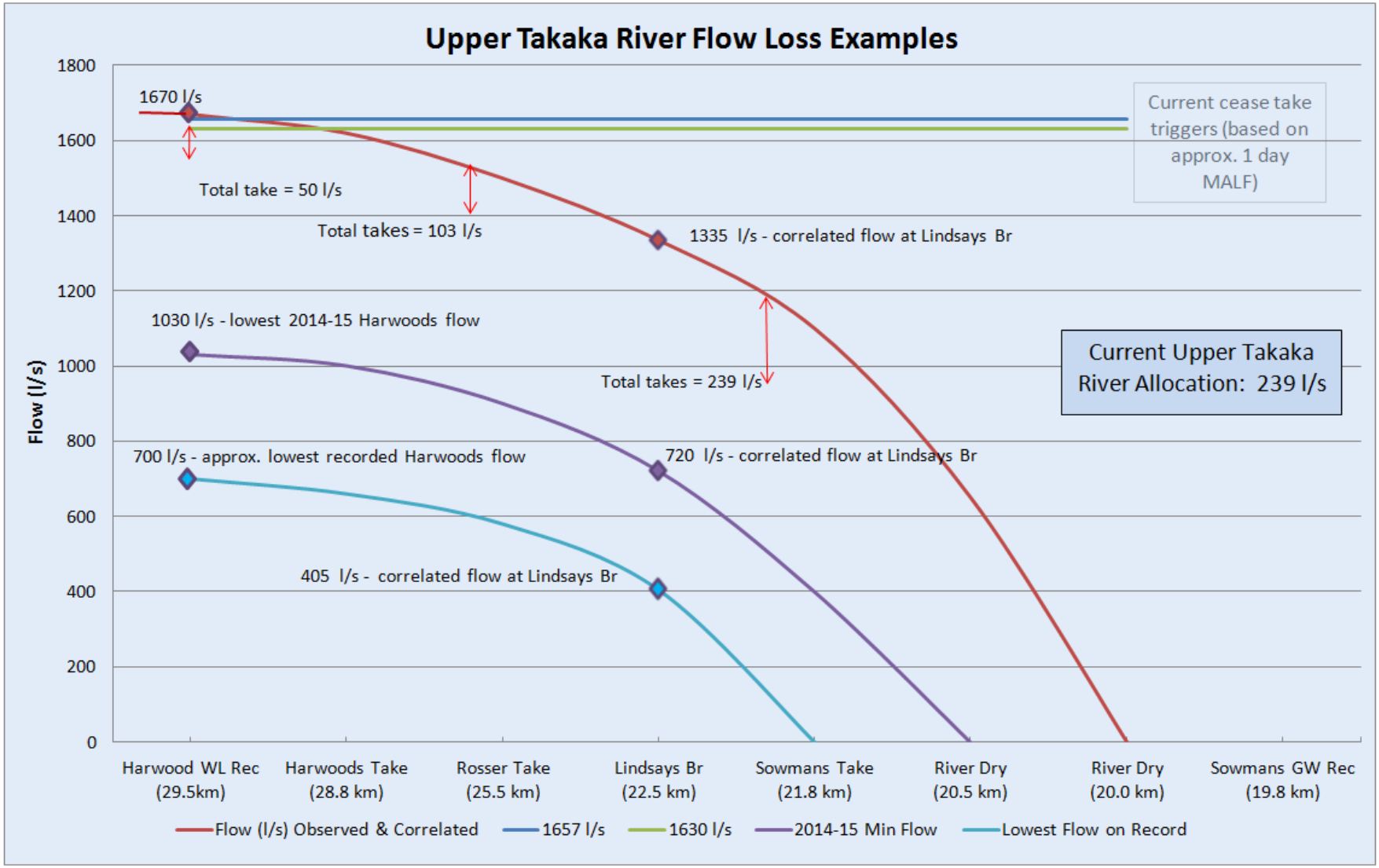
Current Water Take Consents



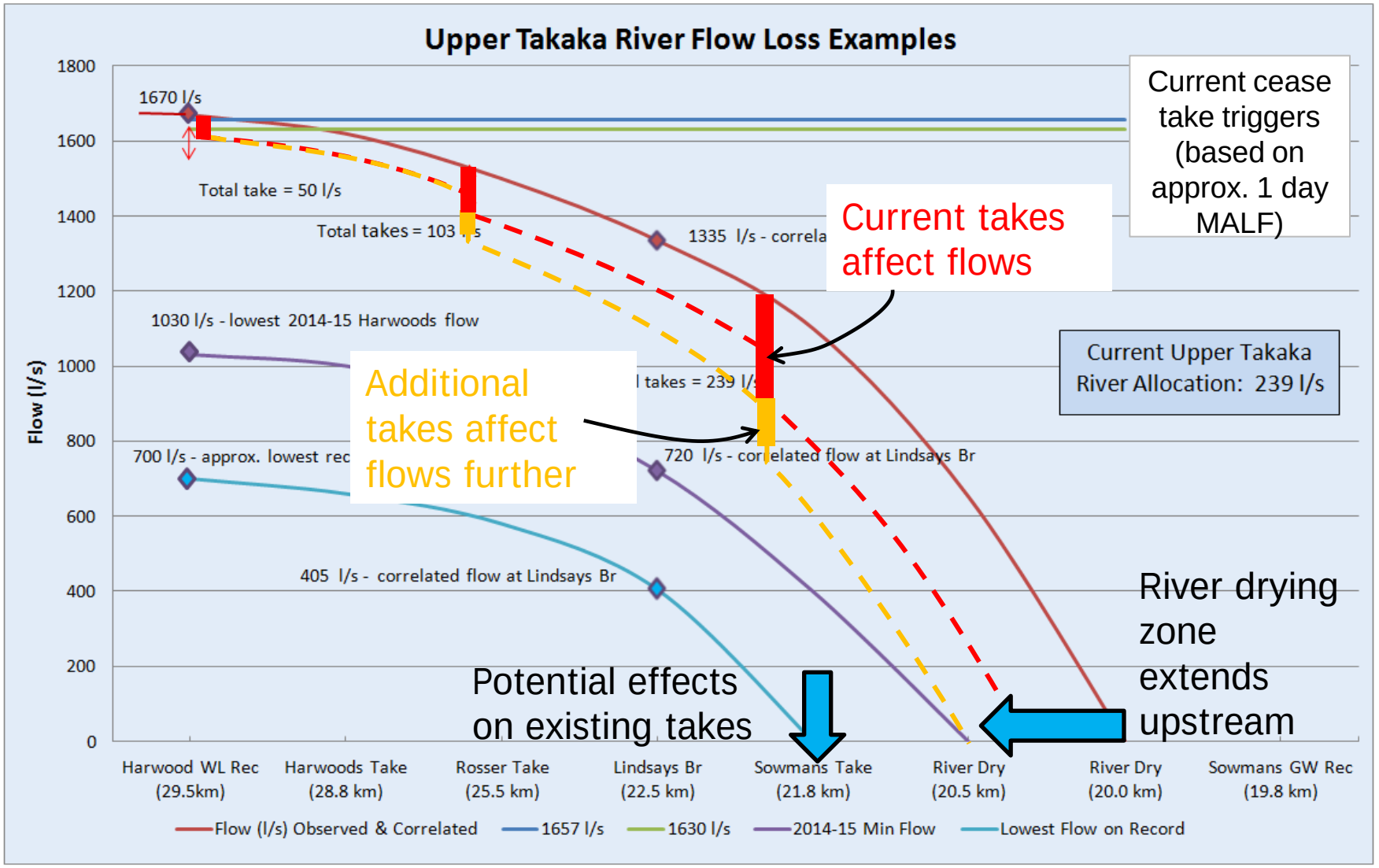
7 DAY FLOW STATISTICS (l/s)					
River	Mean	Median	MALF	5 year	10 year
Takaka at Harwoods	14333	9970	2380	1646	1397

1 DAY FLOW STATISTICS (l/s)					
River	Mean	Median	MALF	5 year	10 year
Takaka at Harwoods	14333	9970	1669	1127	943

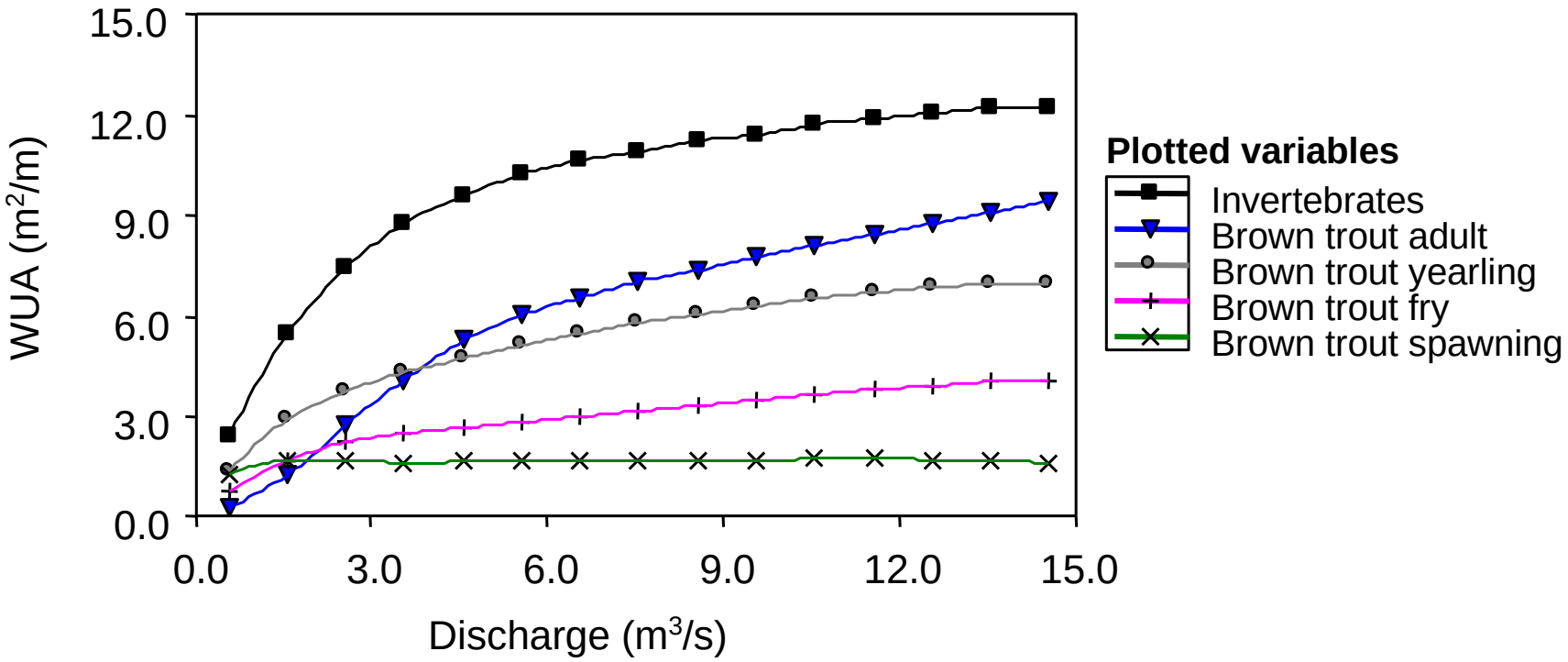
LOSSES TO GROUNDWATER



LOSSES TO GROUNDWATER

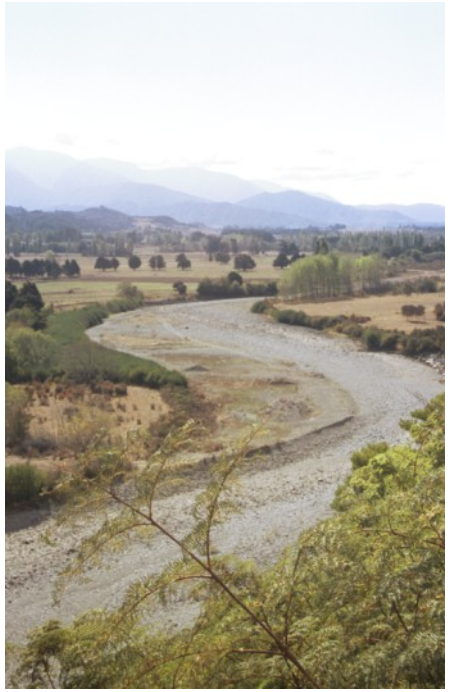


HABITAT VERSUS FLOW MODEL – HARWOODS REACH



CAWTHRON INSTITUTE

UPPER TAKAKA



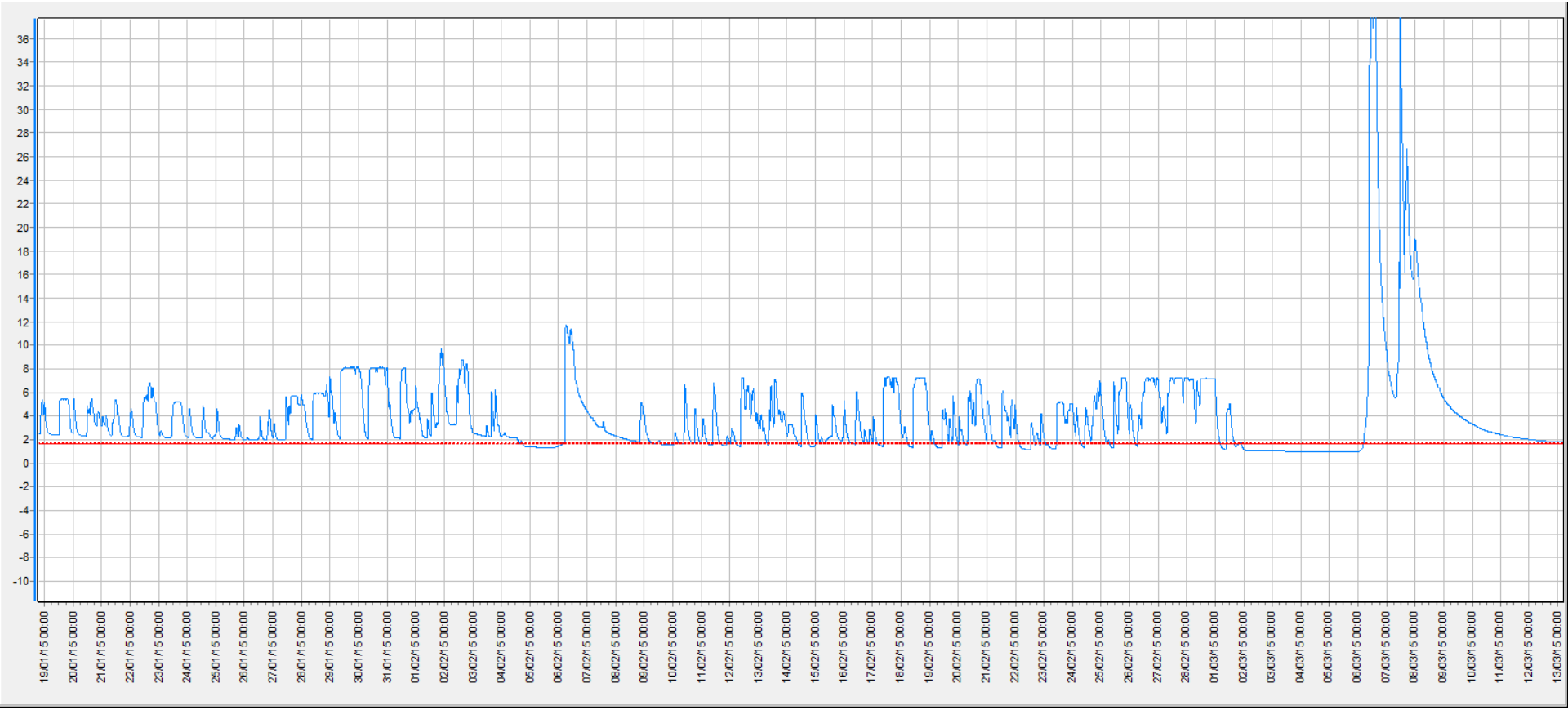
- Upper Takaka class
- Moderate ecological values
- Significant loss to Marble Aquifer (up to 100%)
- Significant contribution to Te Waikoropupu (45%)
- Relatively high mean flow (14 m^3/s)
- 239 l/s of current takes
- Further demand
- Current minimum flow (cease take) = 1657 l/s (70% 7 Day MALF)

- Minimum flow = 70-80% of 7 Day MALF
- Allocation limit = 20-30% of 7 Day MALF
- Minimum flow = cease take
- No rationing trigger

- Minimum flows and abstraction based on flows at Takaka at Harwoods

FLUCTUATING FLOWS – COBB POWER SCHEME

- Frequent fluctuations of 6-7 m^3/s related to power scheme generation



UPPER TAKAKA– SECURITY OF SUPPLY

Flow statistic	Flow (l/s)	Average number of days below this flow per year
7Day MALF	2380	
70% 7Day MALF	1666	8
70% 7Day MALF + 10% allocation	1904	12
70% 7Day MALF + 20% allocation	2142	16

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UPPER TAKAKA - OPTIONS

- Minimum flow = 1666 l/s (70% of 7Day MALF at Harwoods)
- Allocation limit = 476 l/s (20% of 7Day MALF at Harwoods)

- Cease take at 2142 l/s
- Expect cease take for 16 days per year

- But…..increased allocation may affect Marble Aquifer
- ……..large frequent fluctuations from Cobb Power Station

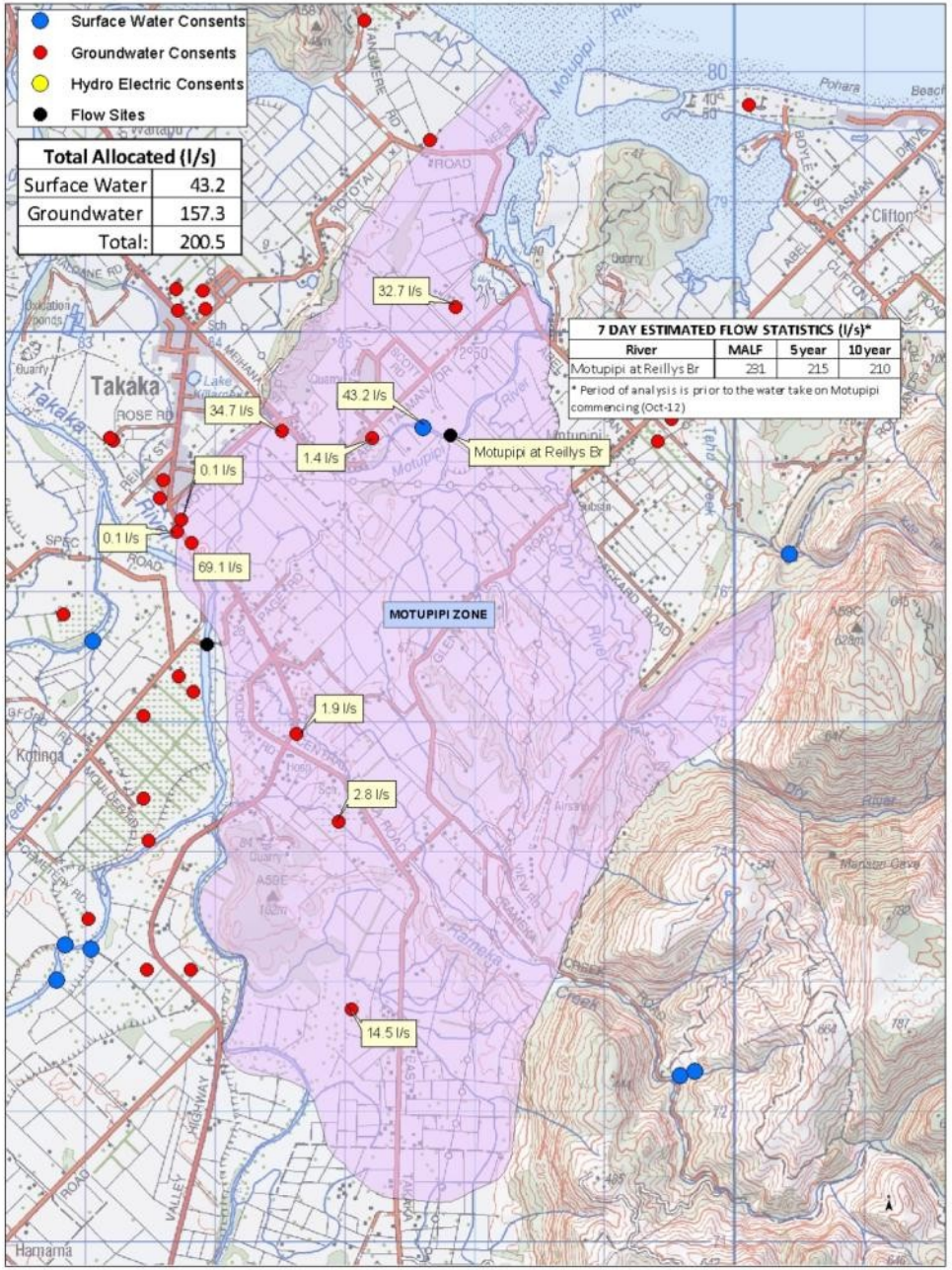
- Cap allocation at current levels or allow increase??
- Allocations need to consider overall Arthur Marble Aquifer allocation

- Current management only restricts takes once minimum flow is hit

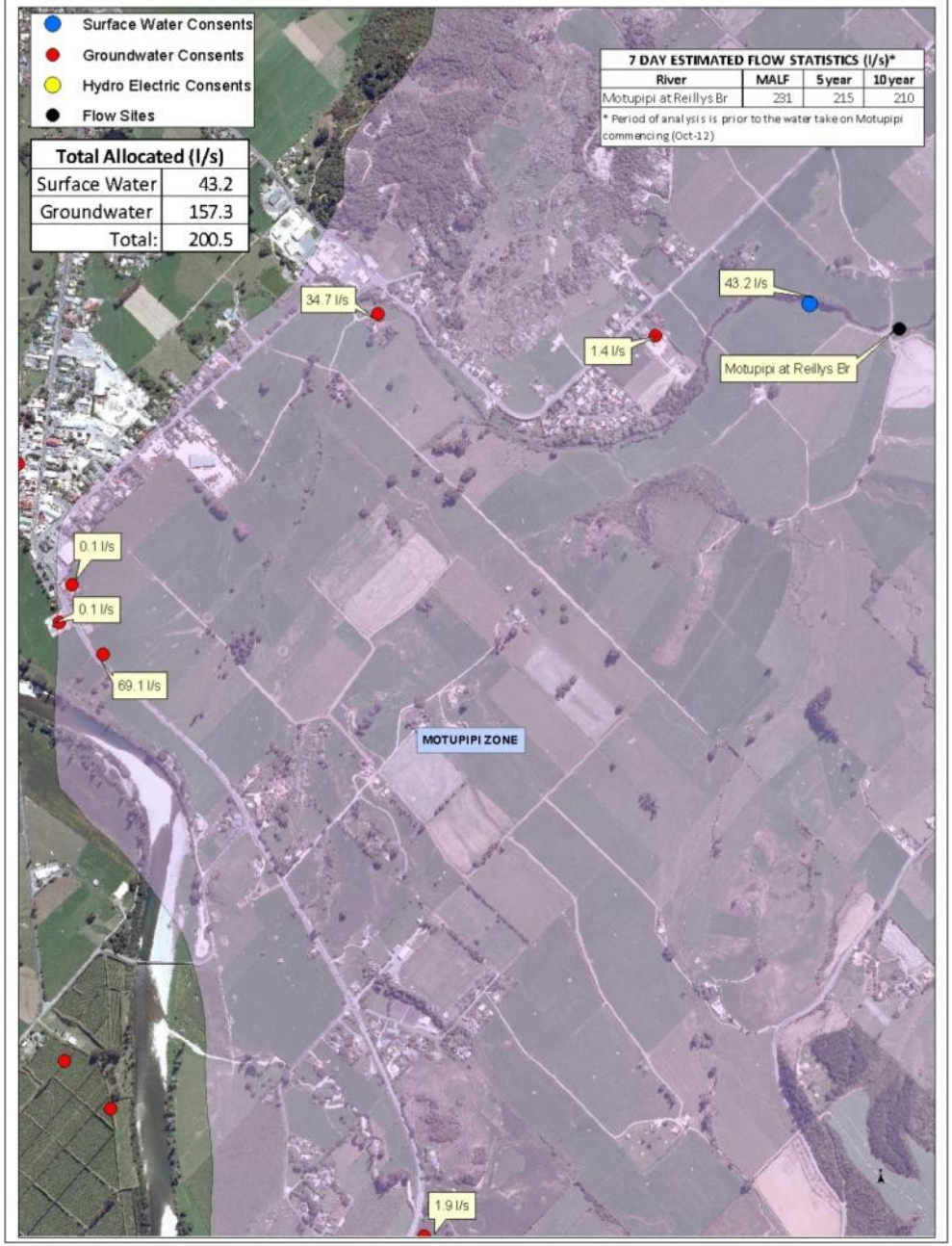
DISCUSSION/QUESTIONS

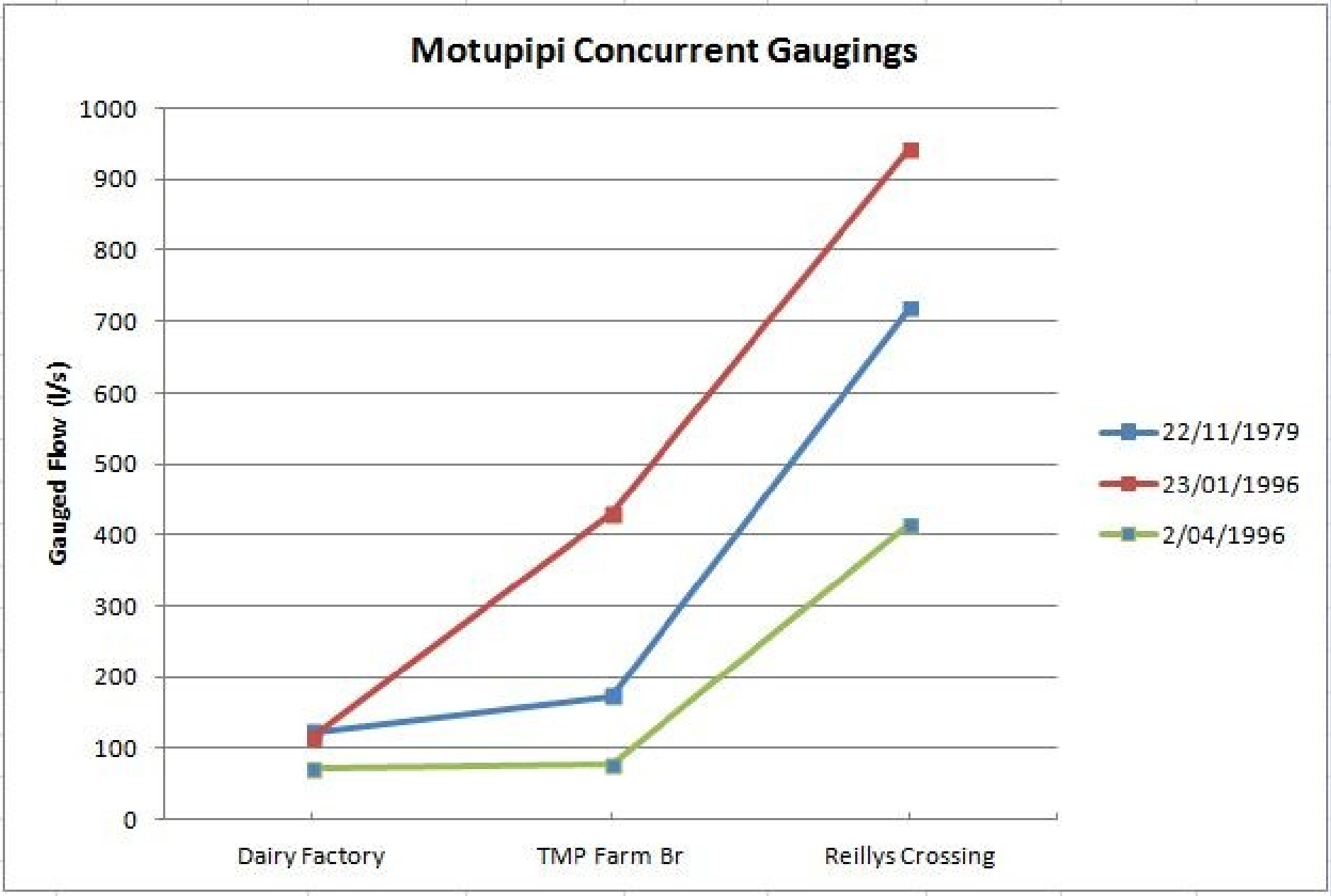
MOTUPIPI

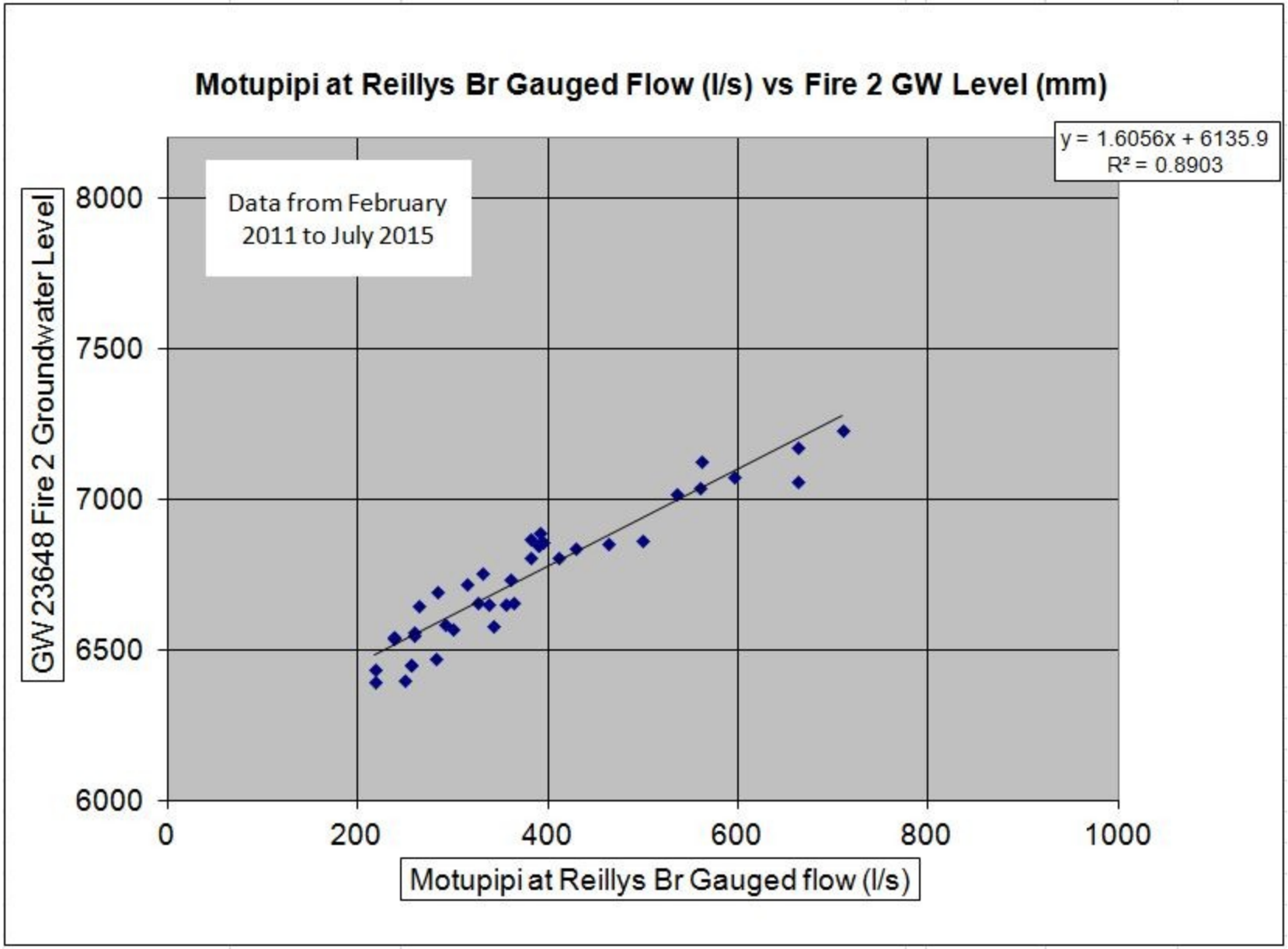
Motupipi Zone
Consents & Flow Statistics



Upper Motupipi Zone
Consents & Flow Statistics




Motupipi Concurrent Gaugings
Gauged Flow (l/s)
1000
900
800
700
600
500
400
300
200
100
0
Dairy Factory
TMP Farm Br
Reillys Crossing
22/11/1979
23/01/1996
2/04/1996


Motupipi at Reillys Br Gauged Flow (l/s) vs Fire 2 GW Level (mm)
y = 1.6056x + 6135.9
R² = 0.8903
Data from February 2011 to July 2015
GW 23648 Fire 2 Groundwater Level
8000
7500
7000
6500
6000
0
200
400
600
800
1000
Motupipi at Reillys Br Gauged flow (l/s)

MOTUPIPI

- Spring-fed streams class
- Moderate-high ecological values
- 201 l/s of current takes (43 l/s surface water)
- Complex groundwater/surface water interactions
- Near river groundwater takes in town included in restrictions?

- Minimum flow = 70-80% of 7 Day MALF
- Allocation limit = 20-30% of 7 Day MALF
- Minimum flow = cease take?
- Stage 1 Rationing trigger??
- Further monitoring of saltwater intrusion required

- Minimum flows and abstraction based on groundwater level at Fire2 well

MOTUPIPI – SECURITY OF SUPPLY

Flow statistic	Flow (l/s)	Average number of days below this flow per year
7Day MALF	231	
80% 7Day MALF	185	
80% 7Day MALF + 10% allocation	208	??
80% 7Day MALF + 20% allocation	231	??

MOTUPIPI - OPTIONS

- Minimum flow = 185 l/s (80% of 7Day MALF at Reillys Br)
  Equivalent to 6433 mm at Fire2 groundwater level

- Allocation limit = 46 l/s (20% of 7Day MALF at Reillys Br)

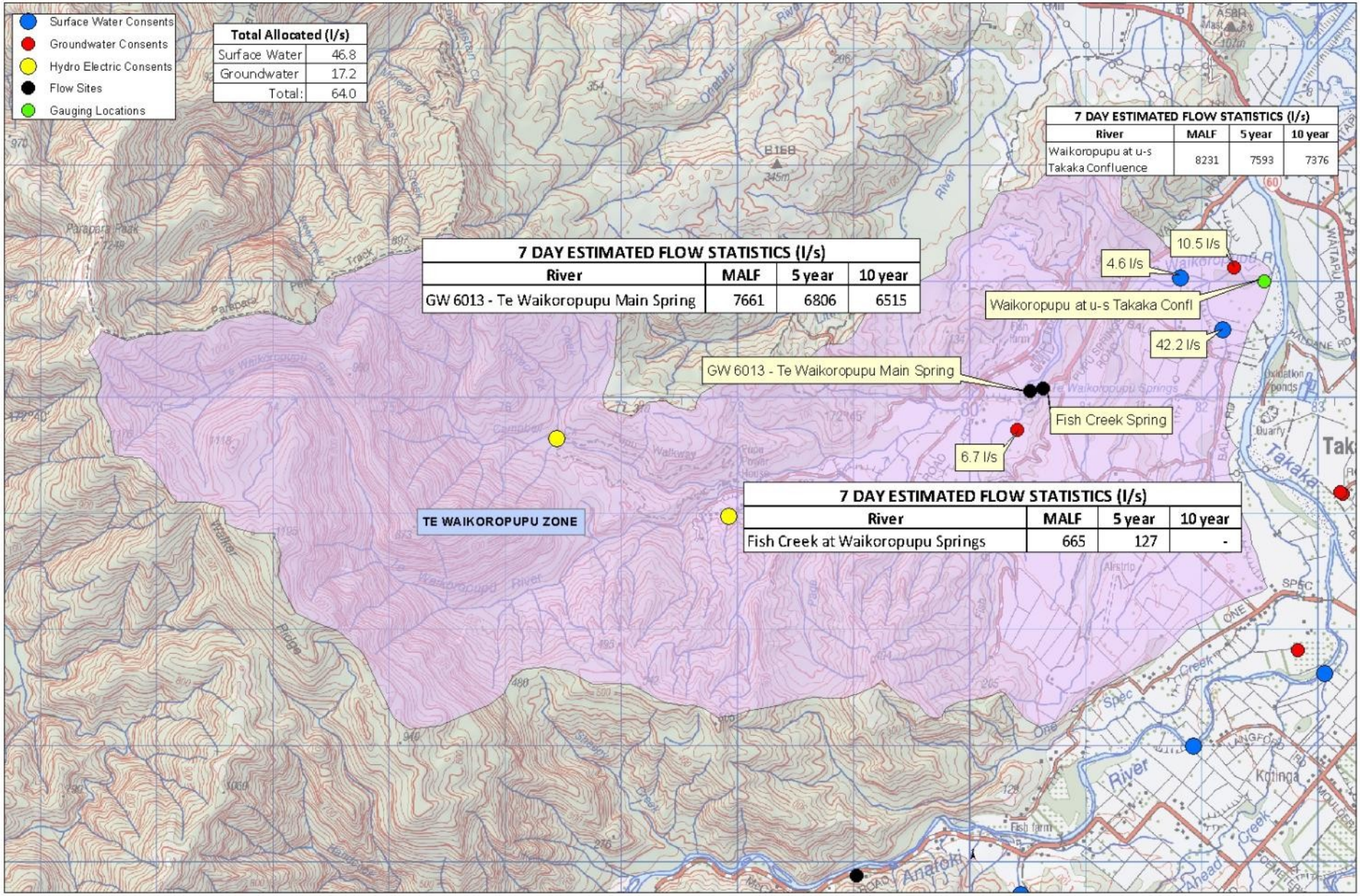
- Current surface water take 43 l/s
- Adding groundwater takes means this zone is over allocated

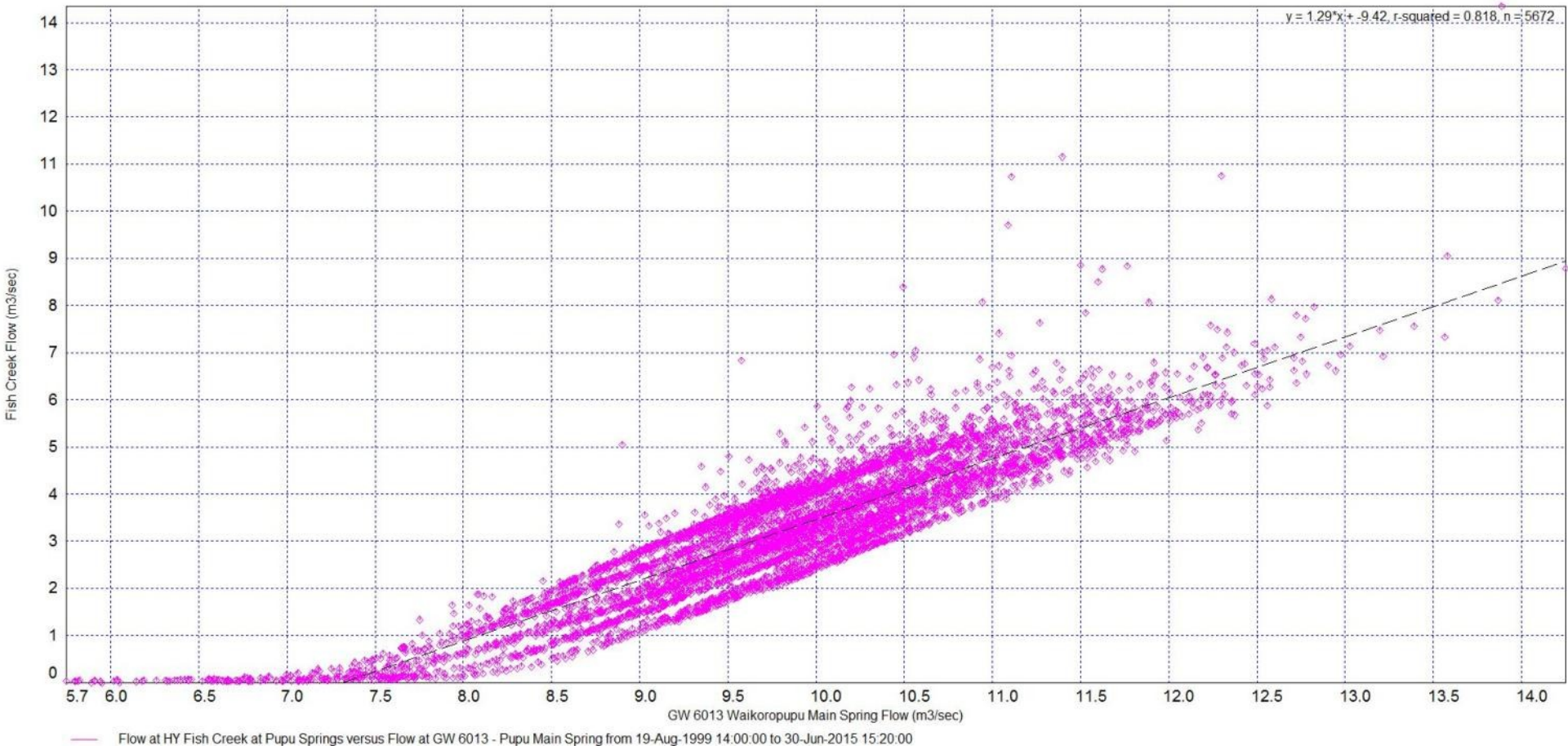
- But does groundwater takes affect river flows?

DISCUSSION/QUESTIONS

TE WAIKOROPUPU

Te Waikoropupu Zone
Consents & Flow Statistics




y = 1.29*x + -9.42, r-squared = 0.818, n = 5672
Fish Creek Flow (m3/sec)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
5.7
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
GW 6013 Waikoropupu Main Spring Flow (m3/sec)
Flow at HY Fish Creek at Pupu Springs versus Flow at GW 6013 - Pupu Main Spring from 19-Aug-1999 14:00:00 to 30-Jun-2015 15:20:00

TE WAIKOROPUPU

- Te Waikoropupu class
- Moderate-High ecological values
- Very high cultural values
- Fed by Marble Aquifer
- 64 l/s of current consumptive takes

- Minimum flow = 90-100% of 7 Day MALF
- Allocation limit = 10-20% of 7 Day MALF
- Minimum flow = cease take

- Takes from surface catchment based on Bell Creek flows

TE WAIKOROPUPU - OPTIONS

Whole Springs area including recharge zone

- Minimum flow = 6895 l/s (90% of 7Day MALF at Main Spring)
- Allocation limit = 766 l/s (10% of 7Day MALF at Main Spring)
- Rationing step (50%) = 7661 l/s
- Cease take at 7278 l/s

- Expect restrictions for 13 days per year
- Expect cease take for 7 days per year

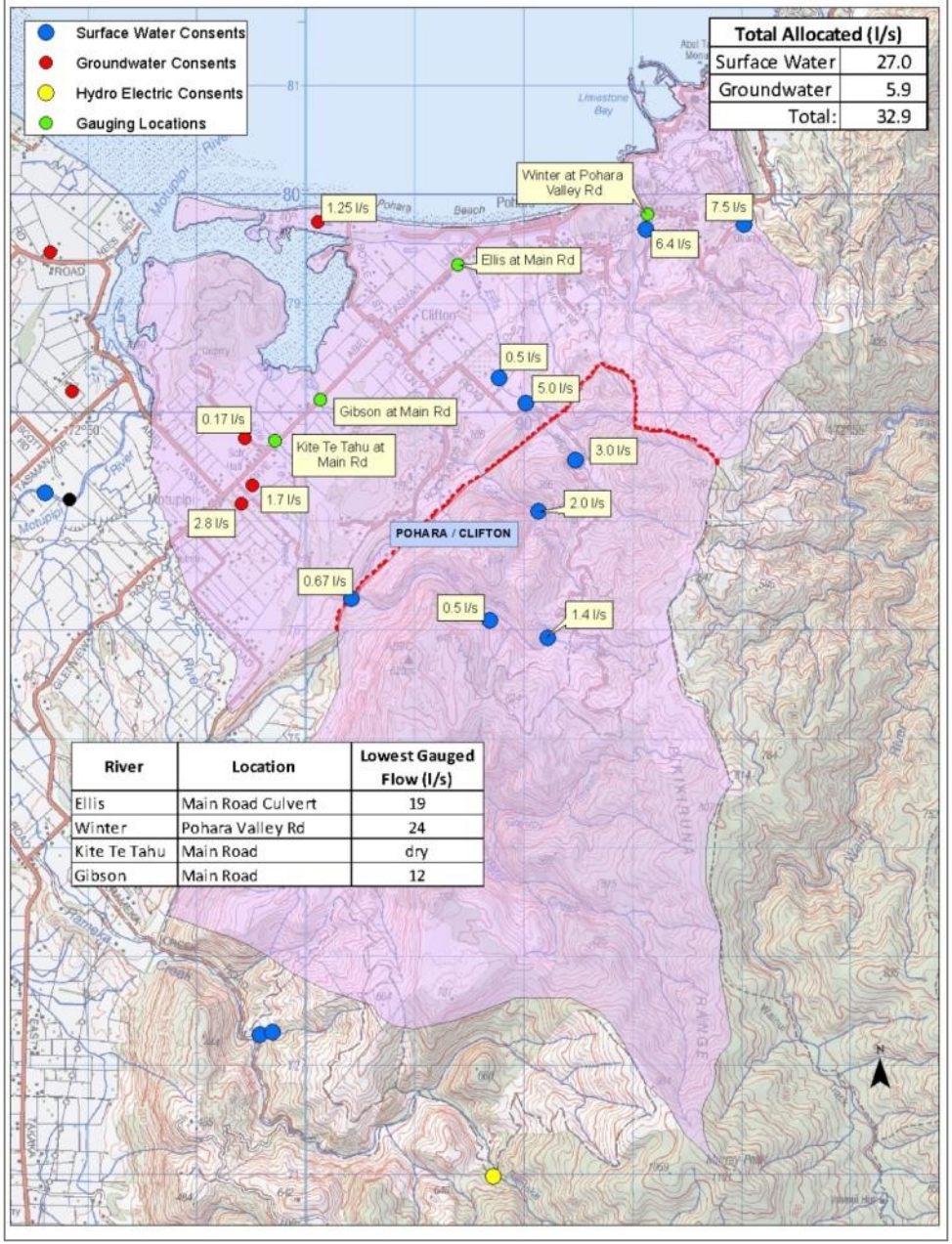
- Total allocation is 64 l/s in surface catchment, but 500 l/s in AMA
- AMA allocation currently 500 l/s
- Future AMA allocation needs to consider new limits for all parts of AMA

Surface area focused on Bell Creek

- Minimum flow 90% MALF
- Allocation limit 10% Bell Creek

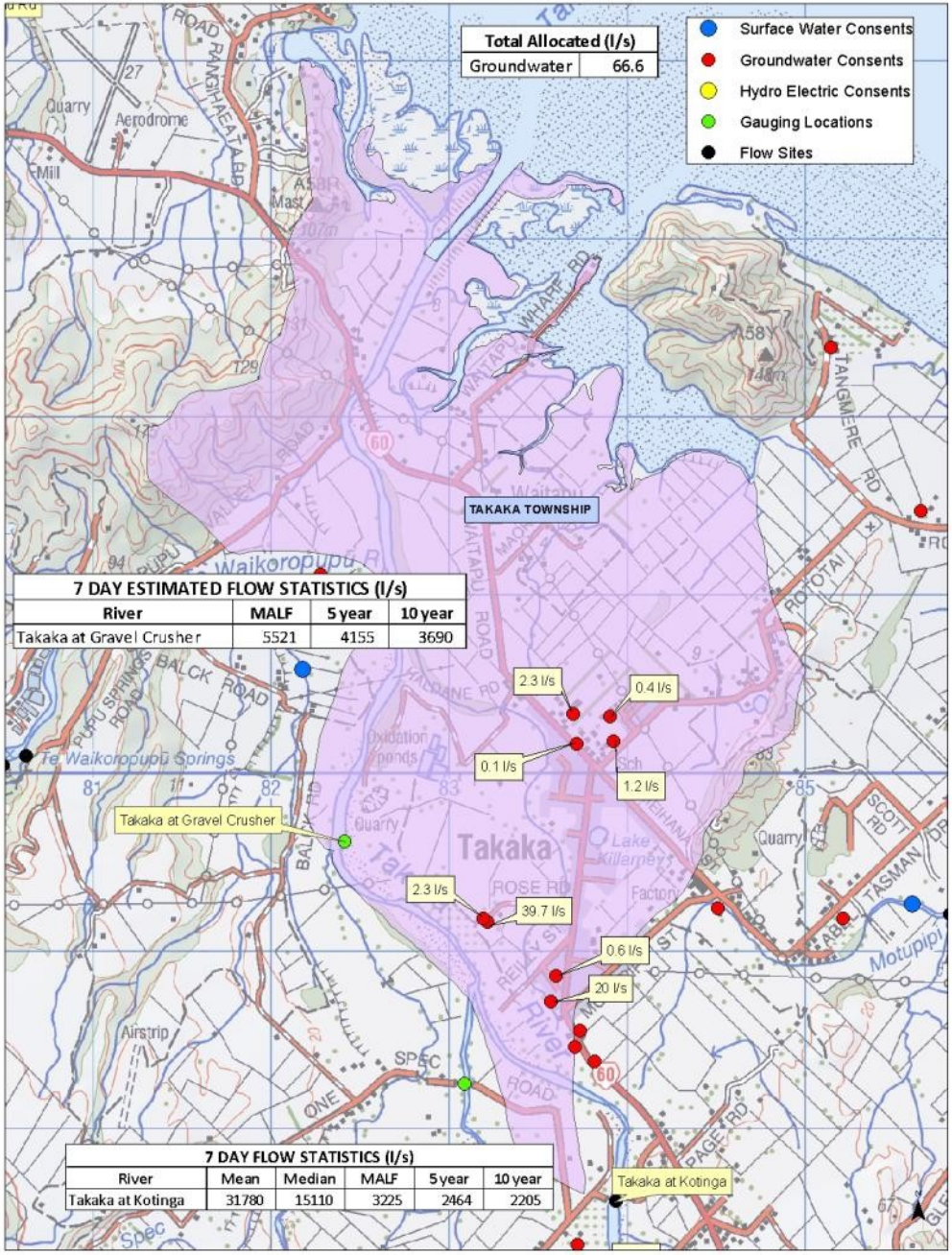
POHARA / CLIFTON

Pohara and Clifton Zone
Consents & Flow Statistics



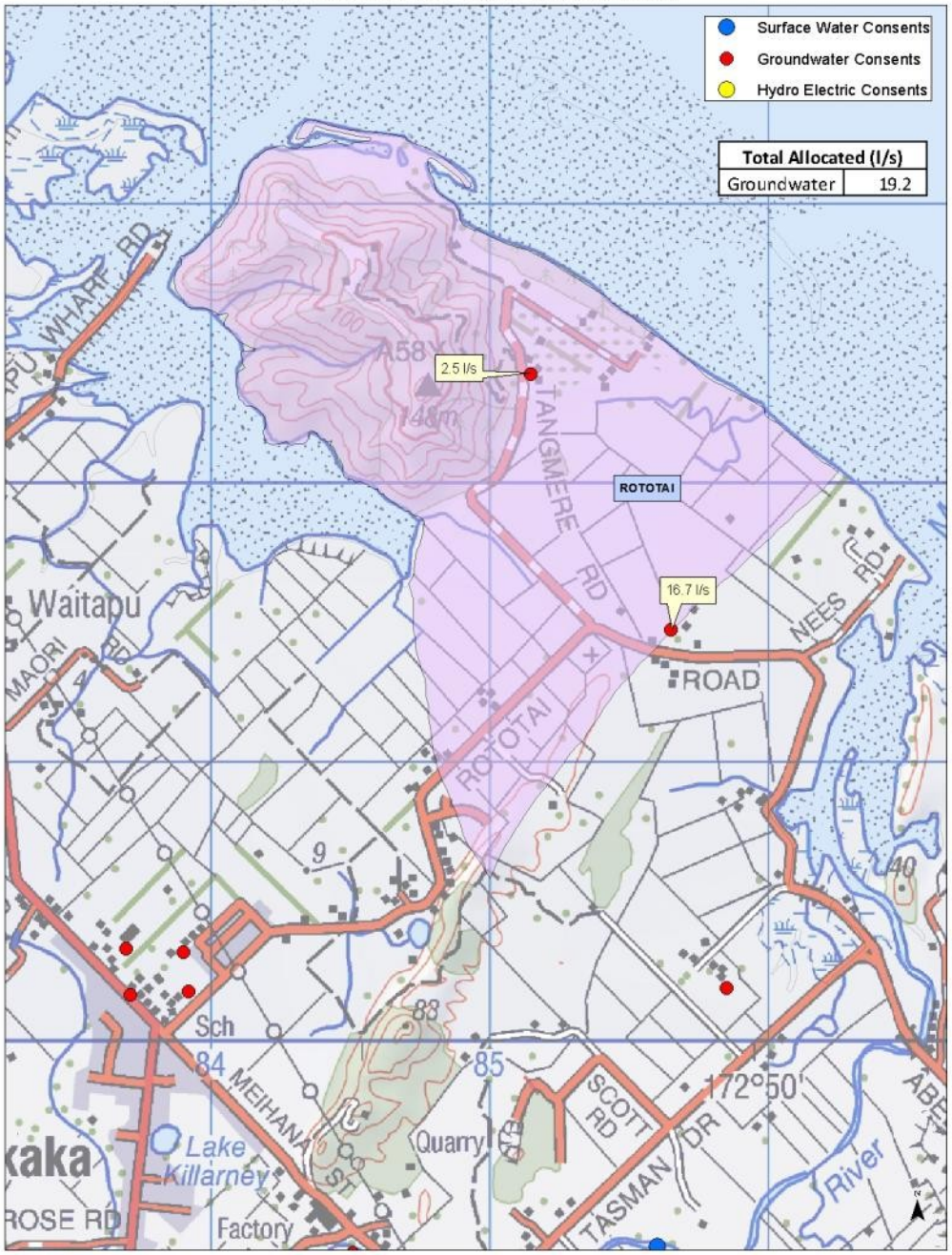
TAKAKA TOWNSHIP

Takaka Township Zone
Consents & Flow Statistics



ROTOTAI

Rototai Zone
Consents & Flow Statistics



LIGAR BAY / TATA BEACH

Ligar Bay / Tata Beach Zone
Consents & Flow Statistics