

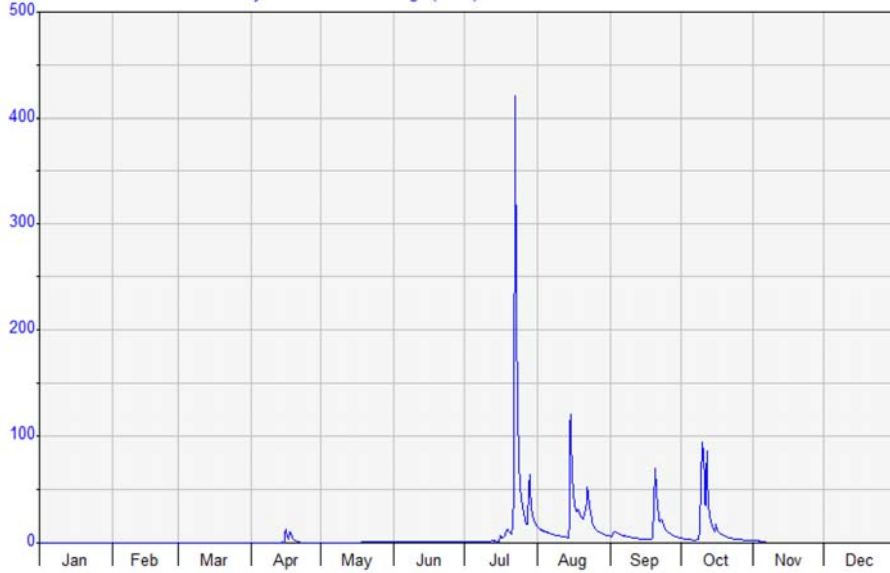


Key messages

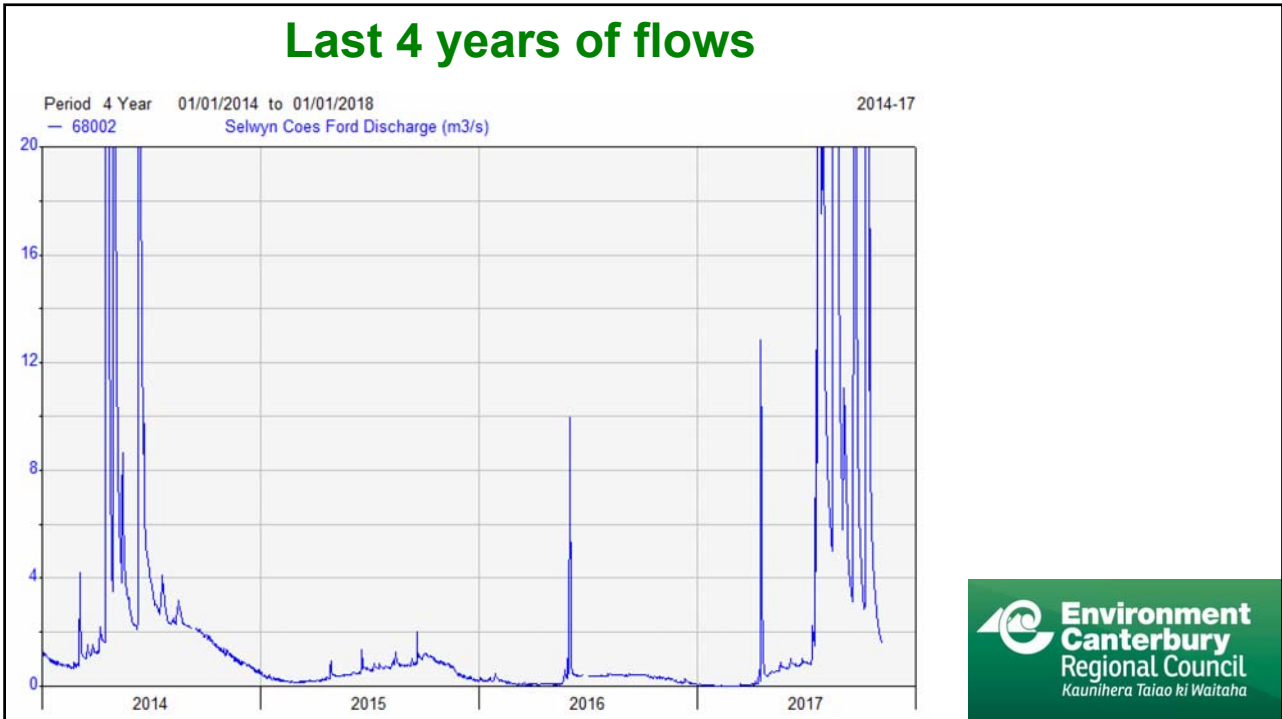
- February 2017 lowest recorded flow (0 m³/s)
- July 2017 highest gauged flow (400 m³/s)
 - Previous highest gauging was 169 m³/s
- This mimics predicted climate change
- Summer low flows were driven by low rainfall (particularly winter) and exacerbated by groundwater extraction
- Selwyn-Waihora plan (PC1) has multiple measures to address problems

2017 flows

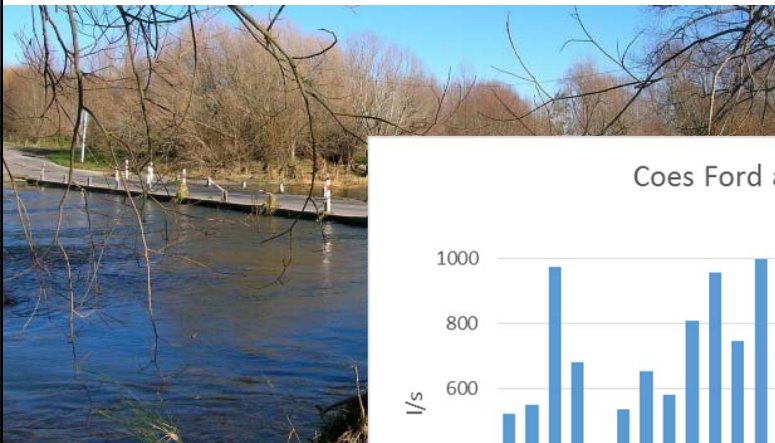
Period 1 Year 01/01/2017 to 01/01/2018
— 68002 Selwyn Coes Ford Discharge (m3/s) 2017



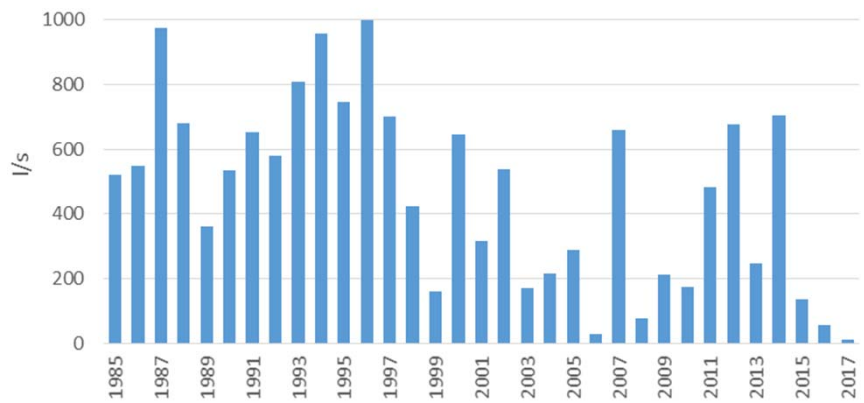
Last 4 years of flows



Coes Ford – summer flows



Coes Ford annual low flow



What has happened to lower Selwyn flows?

- Evidence of growing gap between Whitecliffs and Coes Ford

McKerchar & Schmidt (2007)

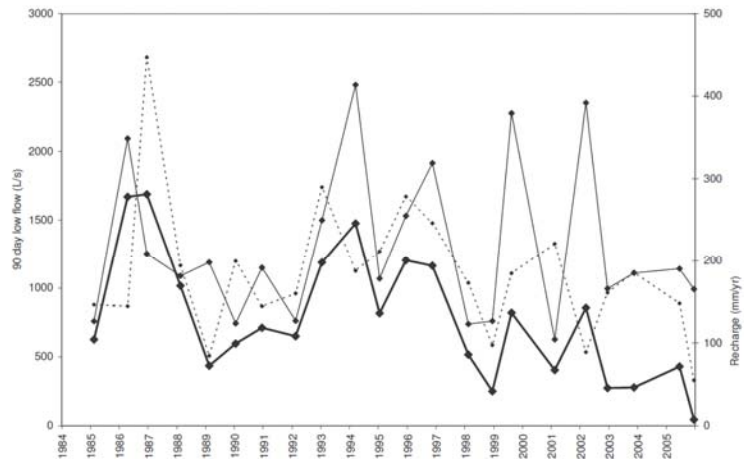


Figure 4 – Observed 90-day annual minimum flows for Whitecliffs (light line) and Coes Ford (heavy line), and average of annual Hororata and Lincoln recharge (dashed line, scale on right).

What has happened to lower Selwyn flows?

- Continued evidence of growing gap between Whitecliffs and Coes Ford (*courtesy of NIWA*)

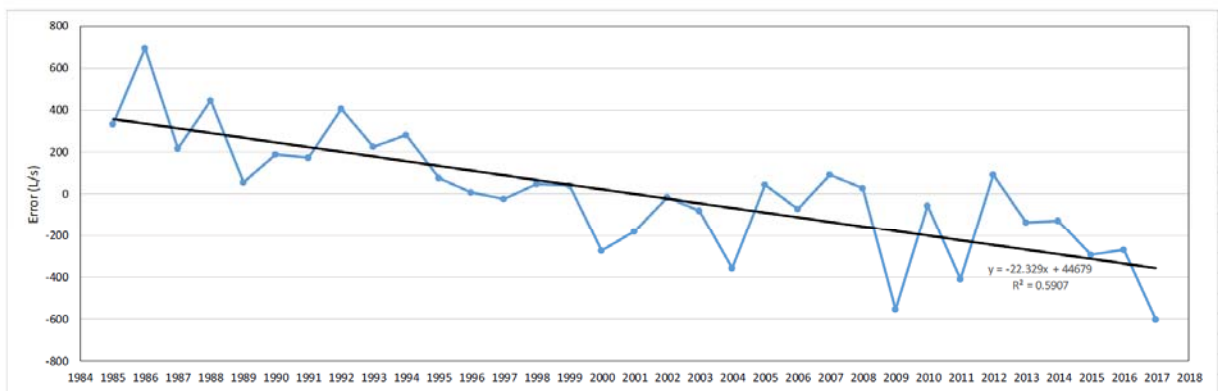


Figure 2. Differences between observed and predicted values for 90-day minima at Coes Ford (1985-2017)

And other spring-fed systems?

- Gap growing between modelled natural and “with GW abstraction” for Harts Creek

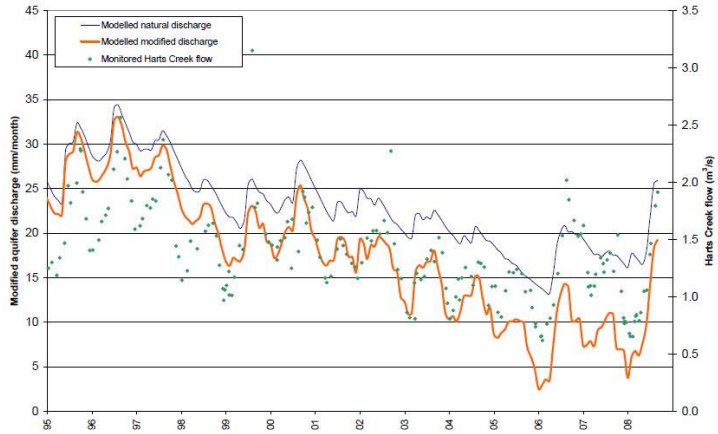
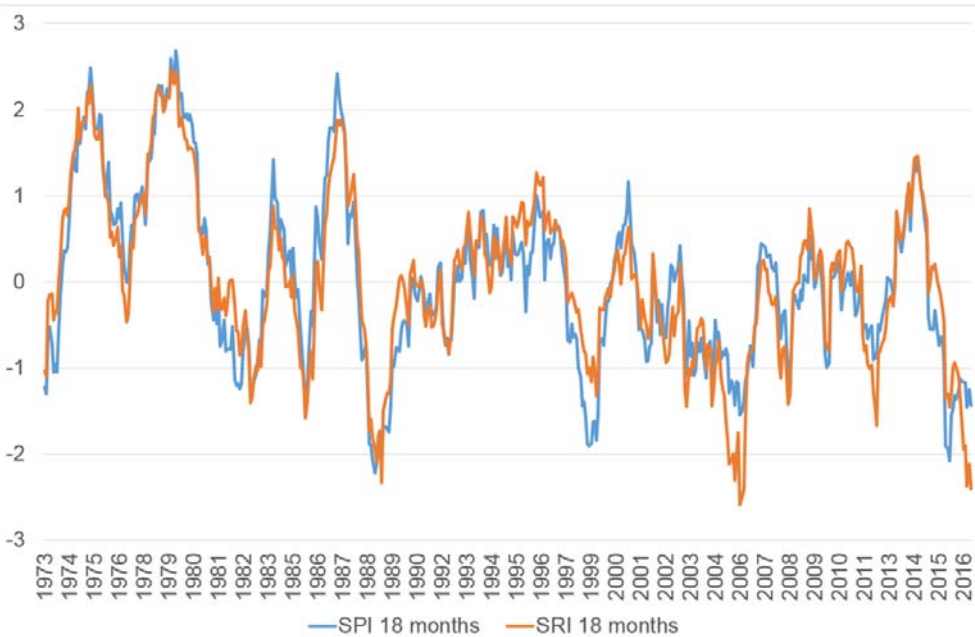
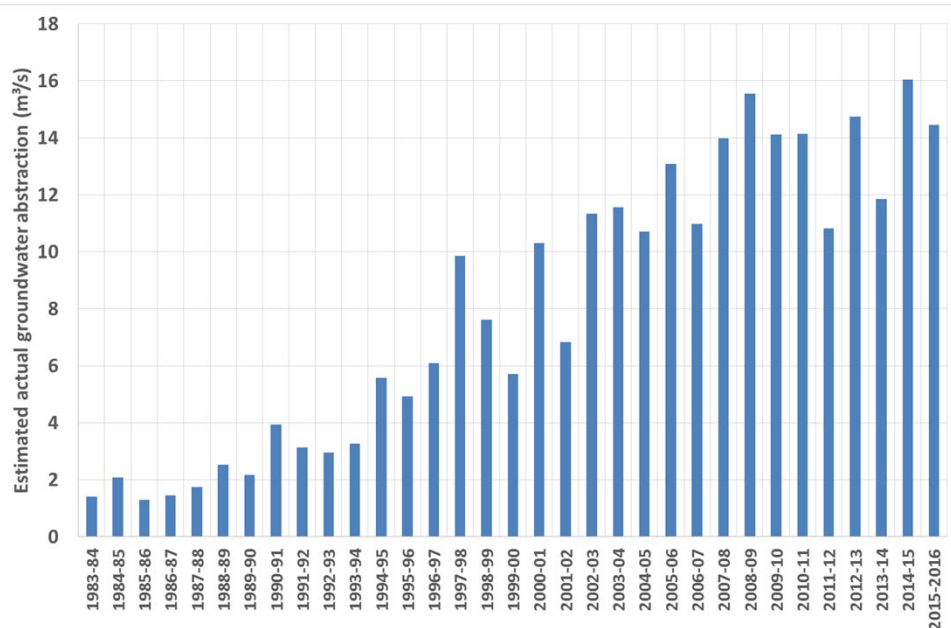


Figure 5-7: Time series plot of Eigen modelled total natural discharge modified to account for estimated abstraction (modelled modified discharge) and monitored Harts Creek flow

Land surface recharge (GW input)



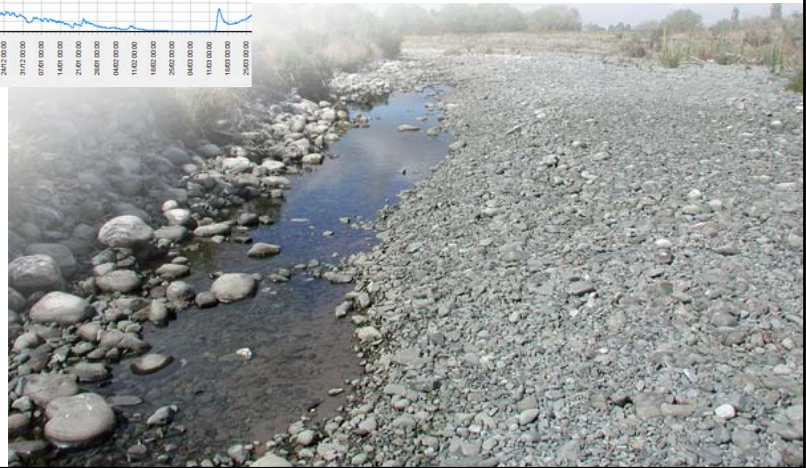
Groundwater abstraction (GW output)



Water budget summary

- Land surface recharge largest component
- Groundwater abstraction \approx half land surface recharge
- Groundwater abstraction \approx equal river recharge
- BUT
 - Land surface recharge varies year on year
 - Groundwater abstraction also varies year on year and has increased markedly

What happened this past summer?



What happened this past summer?

- 3 years of low land surface recharge
 - Very low groundwater
- Irrigation abstractions further depleting groundwater
 - Coes Ford stopped flowing

What is being done about it?

- Over allocation of GW abstraction
 - Absolute limit set ($\approx 30\%$ reduction on current allocation)
 - Transfer of permits requires 50% reduction
 - Central Plains Water (CPW) shareholders can't transfer
 - CPW surface water replacing upper plains abstractions
- More water in lower plains streams
 - Unused GW from CPW reaching streams
 - Selwyn main effect after stage 2 (summer of 2018-19)
 - Raising of minimum flows
 - Possible augmentation through near river recharge (short term)



What is being done about it?

- Immediate during summer
 - Restrictions on surface water takes and GW abstractors close to river (hydraulically linked – stream depletors)

Coes Ford
flows last
12 months



Environment
Herbyury
nal Council
Taiao ki Waitaha