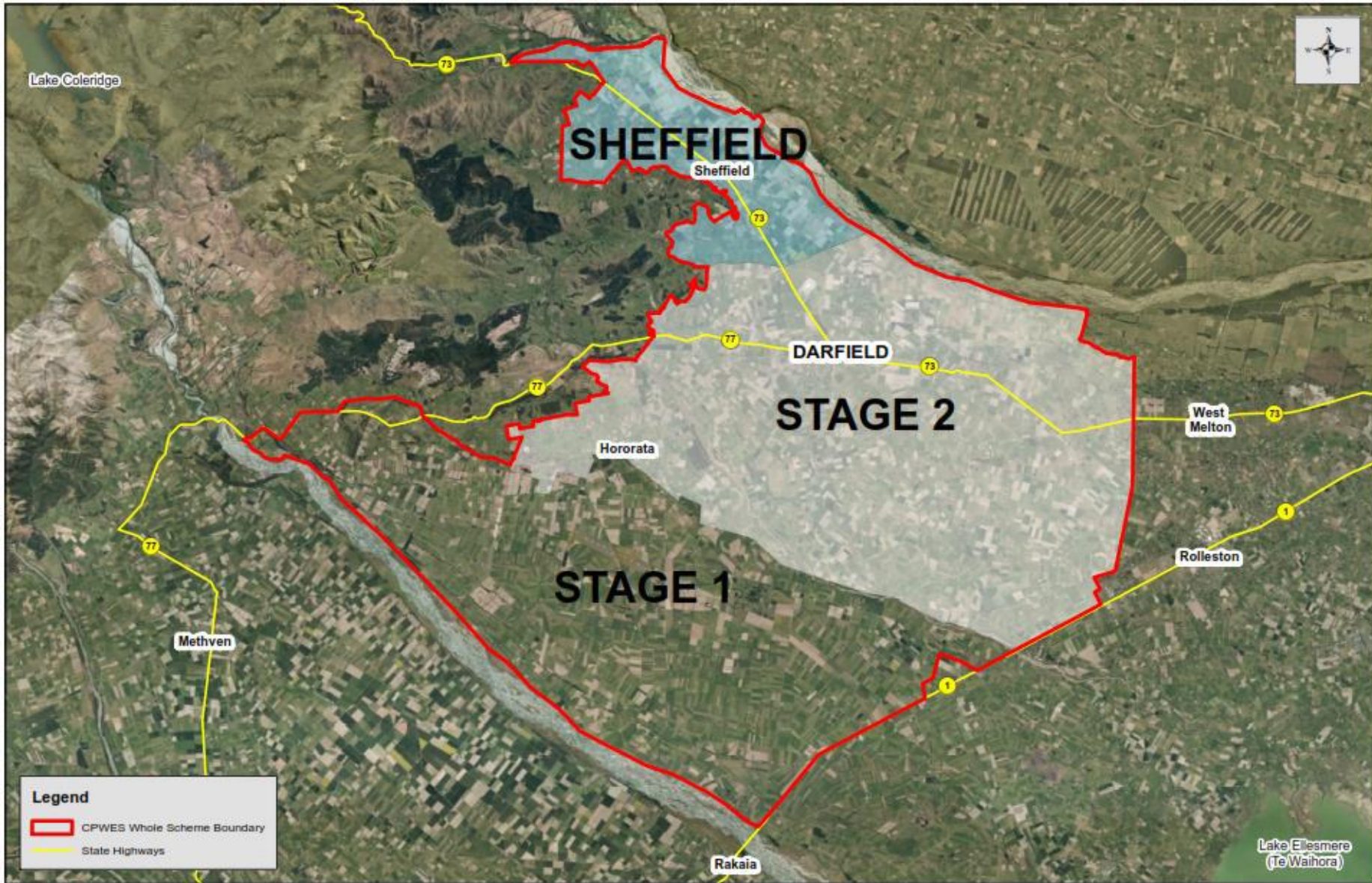


CPWT Annual Sustainability Report 2020-21



Outline

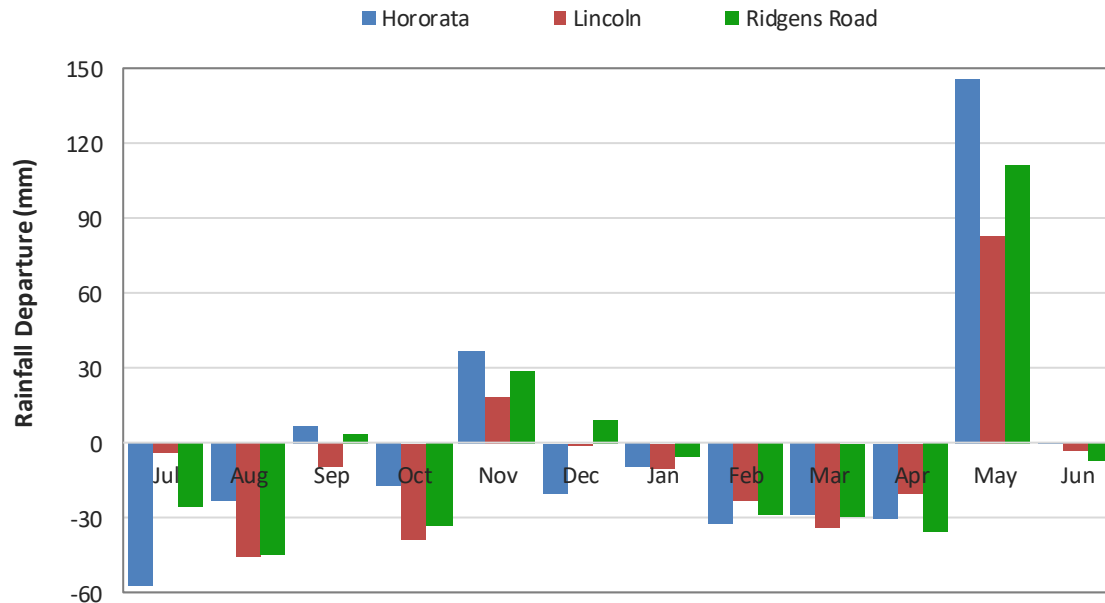
- Background
- 2020-21 Climate
- Summary of 2020-21 operations
- On-farm monitoring
- Environmental monitoring



2019-20 Rainfall

Annual rainfall close to average but unevenly distributed through the year

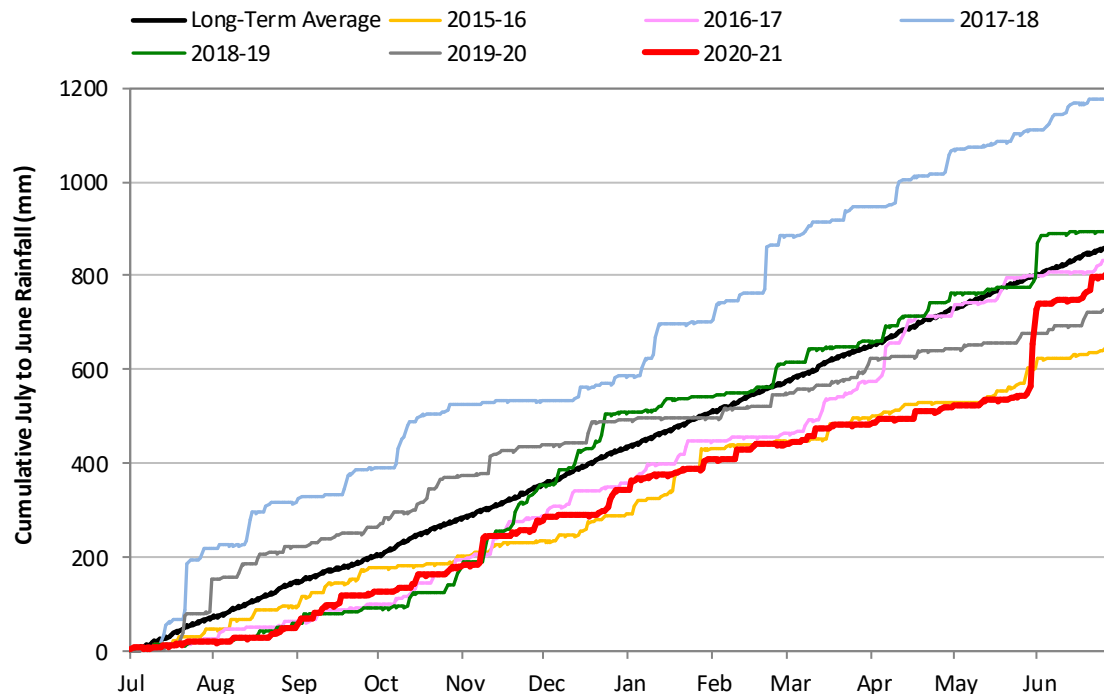
- Monthly rainfall consistently below average July 2020 to April 2021 (aside from November 2020)
- Large rainfall event in late-May 2021 (monthly rainfall >95th percentile*)



* Only May 1923 wetter (274mm) since 1890

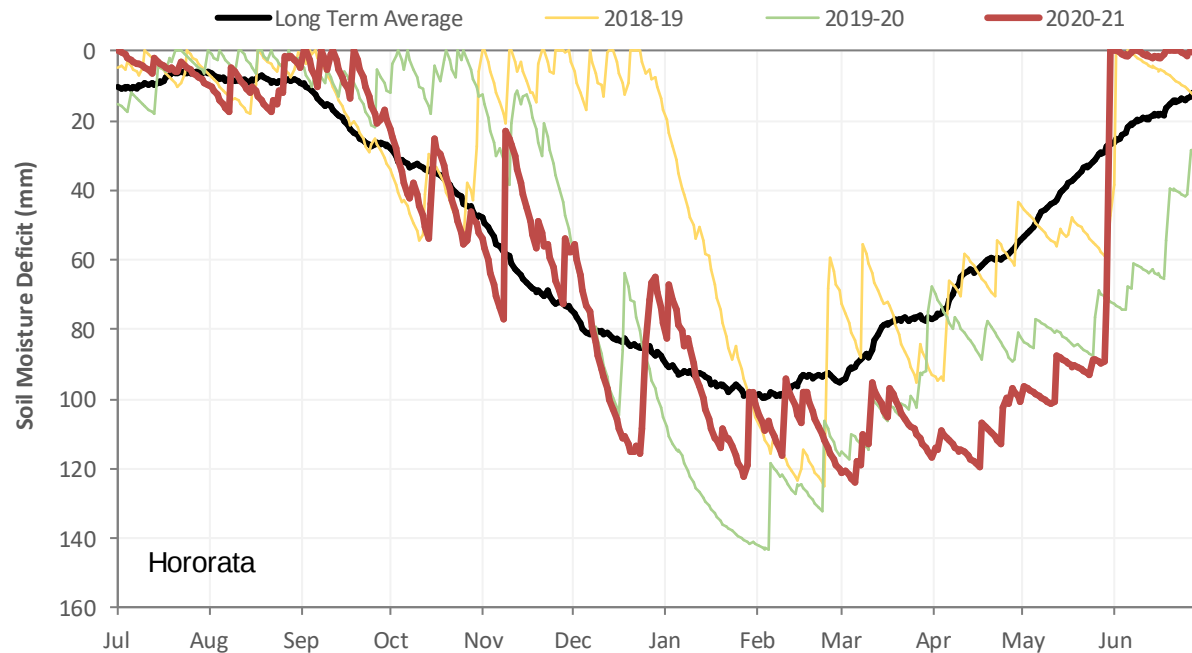
2020-21 Rainfall

- Cumulative rainfall low throughout the year (similar to 2015-16)
- Annual rainfall close to average following the late May 2021 rainfall event



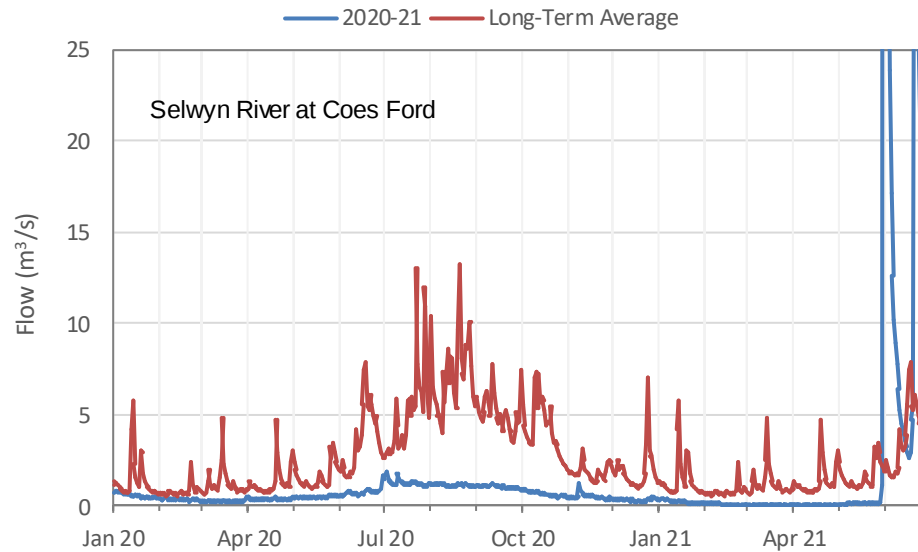
2020-21 Soil Moisture

- Average to above average July to Nov 2019
- Below average remainder of the 2019-20 season
- Similar temporal pattern to 2018-19, but dry 2 months earlier



Hydrology

- 2020-21 river flows remained well below average until the May 2021 rainfall event



- Groundwater levels declined throughout 2020-21 before recovering late in the year

CPW 2020-21 Summary

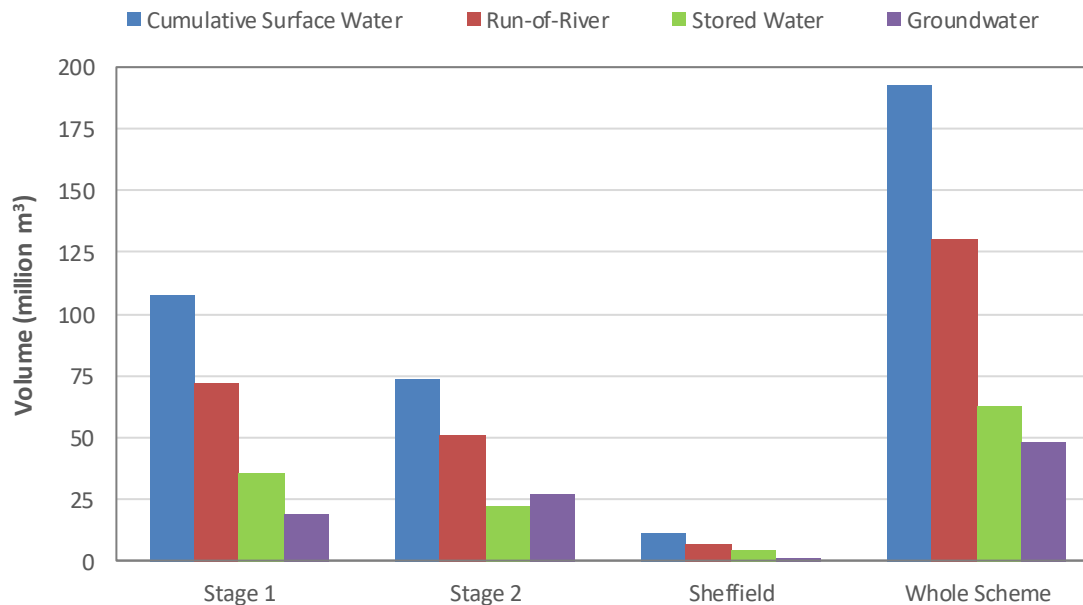
Key Statistics for the CPW 2020-21 Irrigation Season

	Stage 1	Stage 2	Sheffield
Number of Properties Supplied	98	130	31
Number of Turnouts Supplied	133	135	37
Farm Enterprise Property Area	30,300 Ha	32,000 Ha	7,000 Ha
Irrigated area	22,500 Ha	18,200 Ha	4,200 Ha
Total Volume of Water Delivered	107.8 million m ³	73.6 million m ³	11.2 million m ³
Total Volume of Run-of River Take	72.1 million m ³	51.3 million m ³	6.7 million m ³
Total Volume of Water from Storage	35.7 million m ³	22.3 million m ³	4.5 million m ³
Total Volume of Groundwater Used	19.3 million m ³	27.3 million m ³	1.5 million m ³
Length of 2017-18 Irrigation Season	273 days	273 days	273 days
Available Surface Water Allocation Taken	38%	38%	11%
Days with Partial or Full Restriction on Abstraction	126 days	126 days	0 days

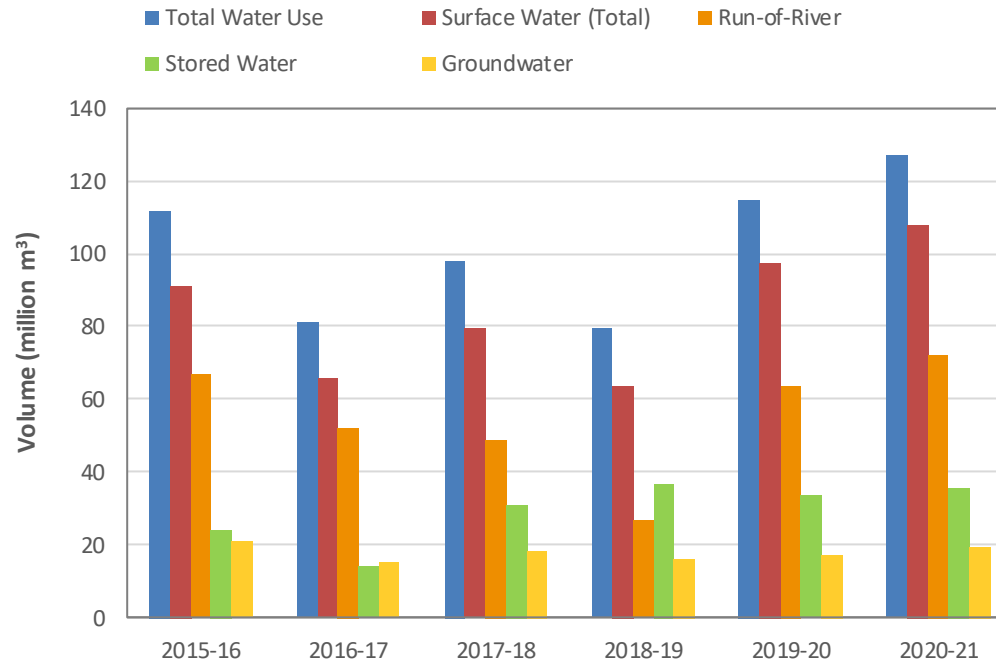
2020-21 Water Use

Total Water Use 2018-19 – **244.8 million m³**

- Run-of River: 134.0 million m³ (55%)
- Stored Water: 62.7 million m³ (25%)
- Total CPW Scheme 192.7 million m³
- Groundwater: 48.1 million m³ (20%)



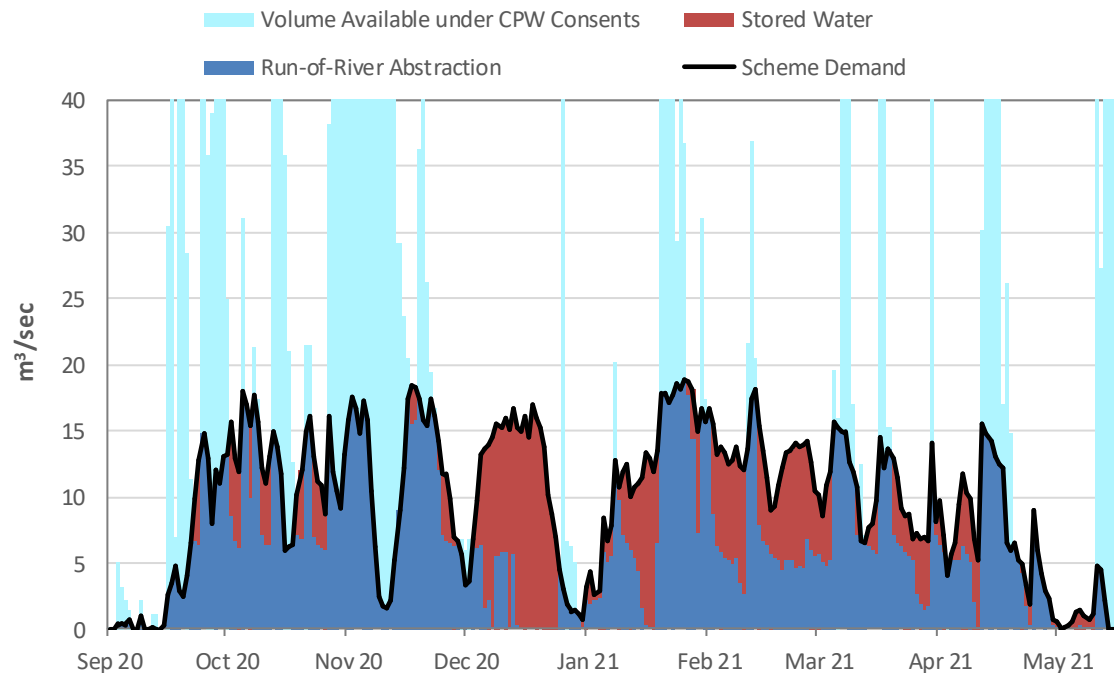
Stage 1 Water Use



2020-21 highest water use to date

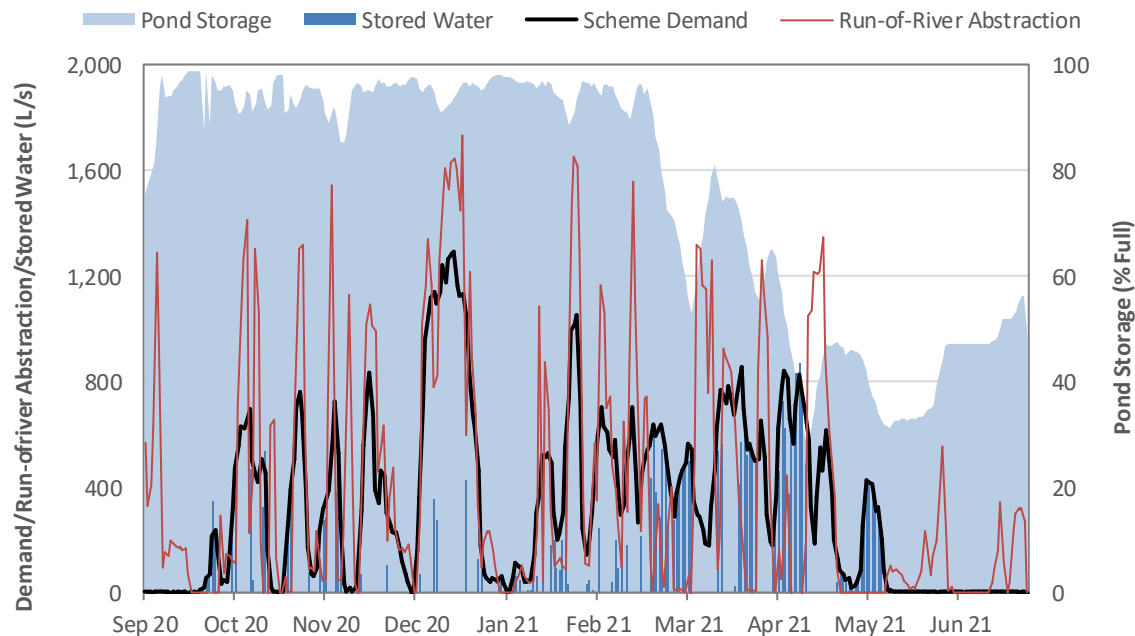
Stage 1 & 2 2020-21

- Irrigation demand climbed steadily in late-September 2020
- Demand fluctuated in response to rainfall Nov-Dec 2020, peaked in late-January 2021 then gradually tapered off until mid-May
- Extensive use of stored water in December 2020 and through late summer/autumn 2021



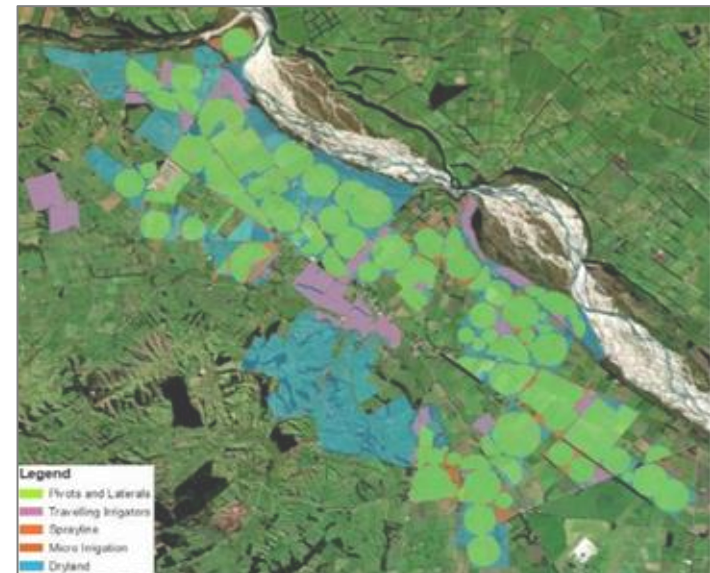
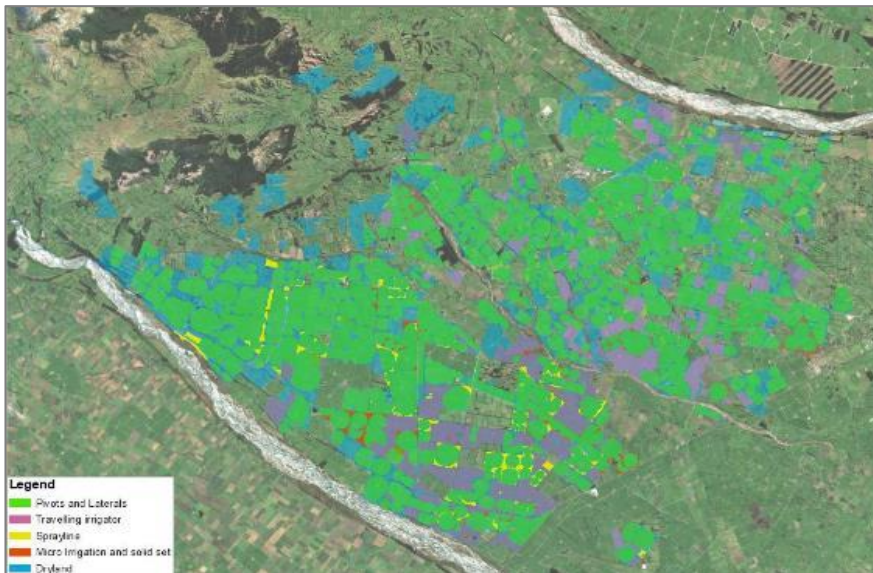
Sheffield Scheme 2020-21

- Variable demand in spring 2019
- Demand increased from late-October 2019 and remained high until tapering-off from early February 2020
- Limited restriction on run-of-river abstraction
- Pond storage used in early summer and autumn



Irrigation Types and Area

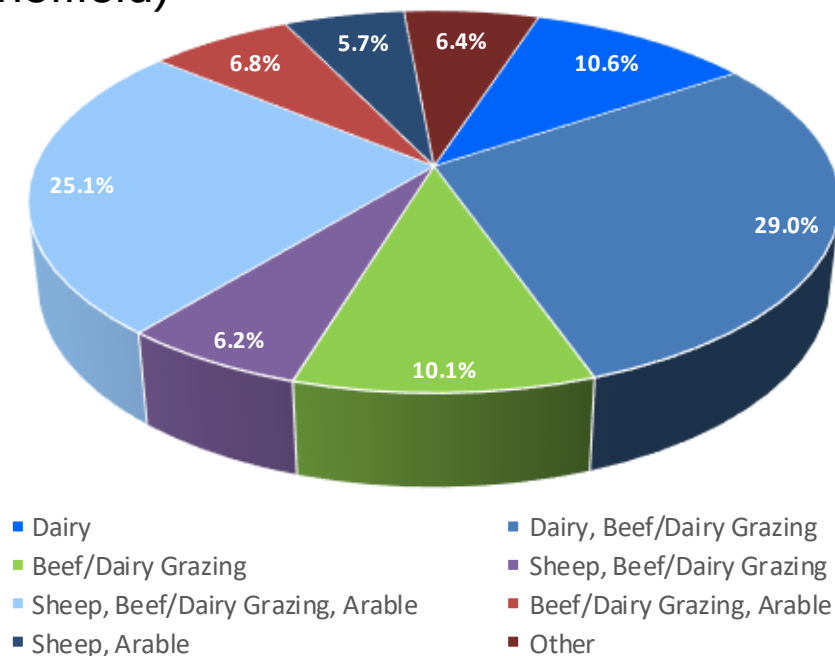
	Farm Enterprise Area (ha)	CPW Irrigated Area (ha)		
Stage 1	30,300	22,500		
Stage 2	32,000	18,200		
Sheffield	7,000	4,200		
Total	69,300	44,900		
			<i>Centre Pivot</i>	80%
			<i>Travelling Irrigator</i>	15%
			<i>Sprayline and Solid Set</i>	5%



On-Farm Monitoring

Land Use Type – Whole Scheme

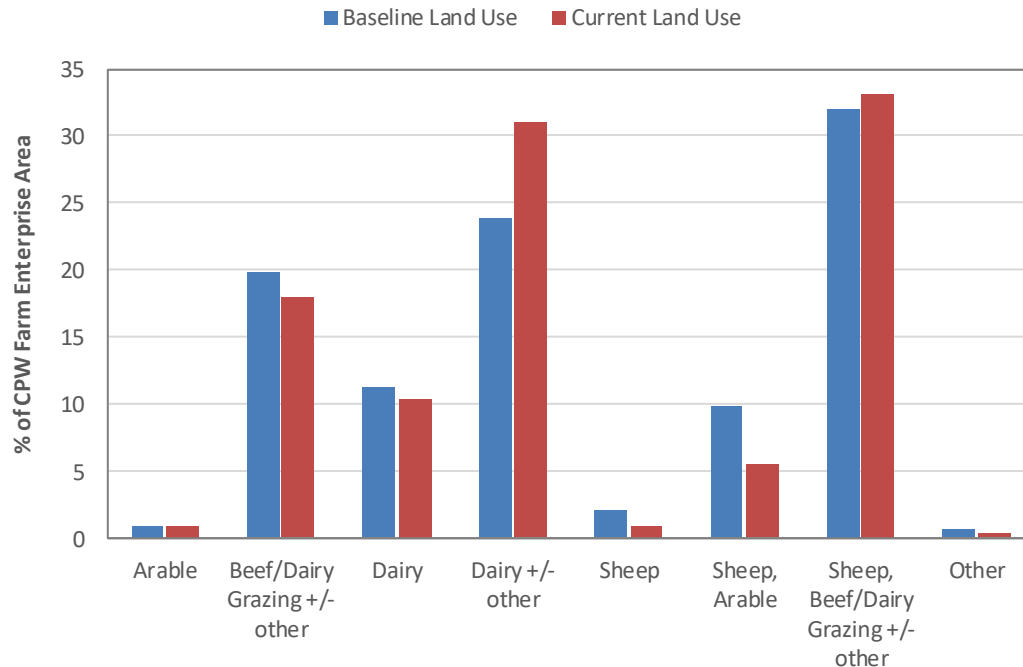
- Mix of land use types (land use categories from Overseer nutrient budgets)
- Two main farming systems = dairy (~40%) and mixed (sheep, beef, dairy grazing)
- Approximately 40% of properties have an interest in arable farming (60% in Stage 2/Sheffield)



Land Use

Changes in Land Use

- Land use has remained relatively static since operations commenced
- Major changes: 7% increase in Dairy + Other enterprises balanced by a decline in Sheep + Arable and Beef/Dairy grazing + Other
- Approximately 40% of properties have an interest in arable farming (60% in Stage 2/Sheffield)



16 Additional Dairy platforms
(8 Stage 1, 6 Stage 2, 2 in
Sheffield)

2 properties converted from
dairy to alternative land uses

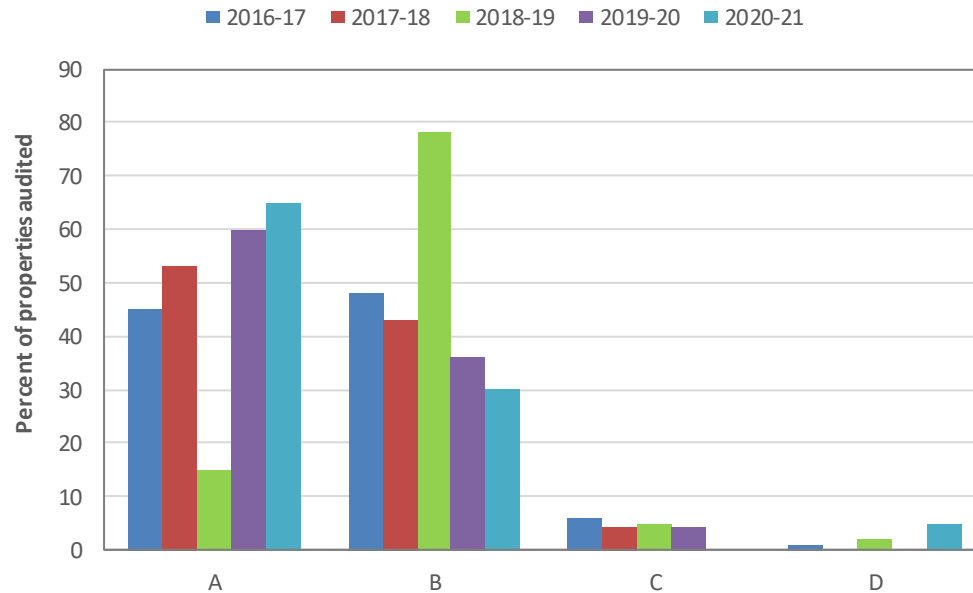
On-Farm Monitoring

2020-21 Farm Environmental Plan (FEP) Audits

37 properties audited (determined by schedule for re-auditing)

Audit Grades

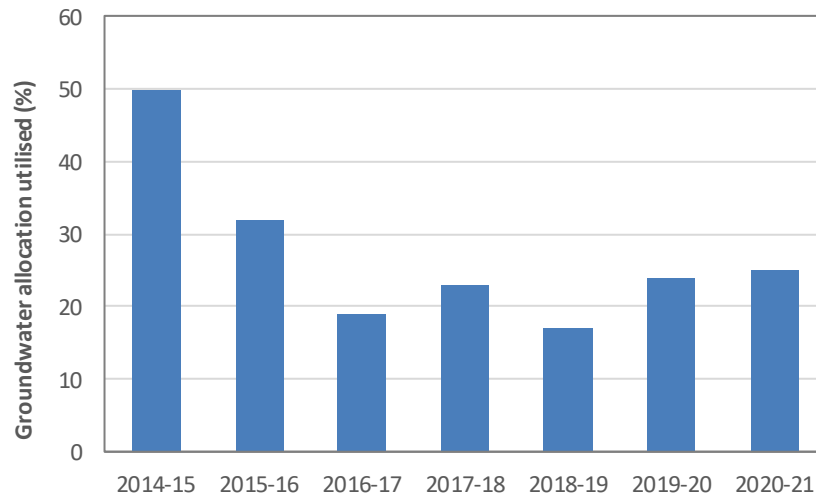
- A-grade – 65%
- B-grade - 30%
- C-grade - 0%
- D-grade - 5%



D-grades reflect properties where 2020-21 nutrient budget exceeded their baseline nitrogen discharge allowance (NDA)

Groundwater Abstraction

- Consented volume ~200 million m³ across whole scheme
- 2020-21 groundwater usage approximately 25% of the total volume allocated (slightly higher than the previous two seasons due to prolonged dry conditions)
- Groundwater usage has varied between 17 and 25% of total allocation since the full Scheme commenced operations in 2018-19.



The Selwyn-Waihora Zone ZIP Addendum has a target of a 80% reduction in groundwater use (i.e., for groundwater usage to be <20% of total allocation).

Nutrient Losses

Total N allocation for CPW Scheme of 979 tonnes N/year specified in LWRP

Includes allowance for:

- Existing irrigation
 - Baseline dryland N loss
 - Conversion of dryland to irrigated
 - Farm enterprise areas not irrigated by CPW water
-
- Nutrient budget figures, catchment loads etc have changed significantly with different versions of OverseerFM
 - Policy 11.4.16(1) of the LWRP requires a 14% reduction in N losses across the Scheme area by 1 January 2022

Nutrient Losses

2020-21 Nutrient Budgets

	Stage 1 kgN/year	Stage 2 kgN/year	Sheffield kgN/year	Scheme Total kgN/year
Baseline N Load	1,797,396	1,476,785	306,773	3,580,954
Top Up for New Irrigation	304,553	357,510	104,799	766,862
Total N Discharge Allowance	2,101,949	1,834,295	411,572	4,347,816
Current Load	1,385,023	1,346,522	332,306	3,063,851
Reduction below Total N Discharge Allowance	-34%	-27%	-19%	-30%
Reduction below Baseline Load	-23%	-9%	-8%	-14%

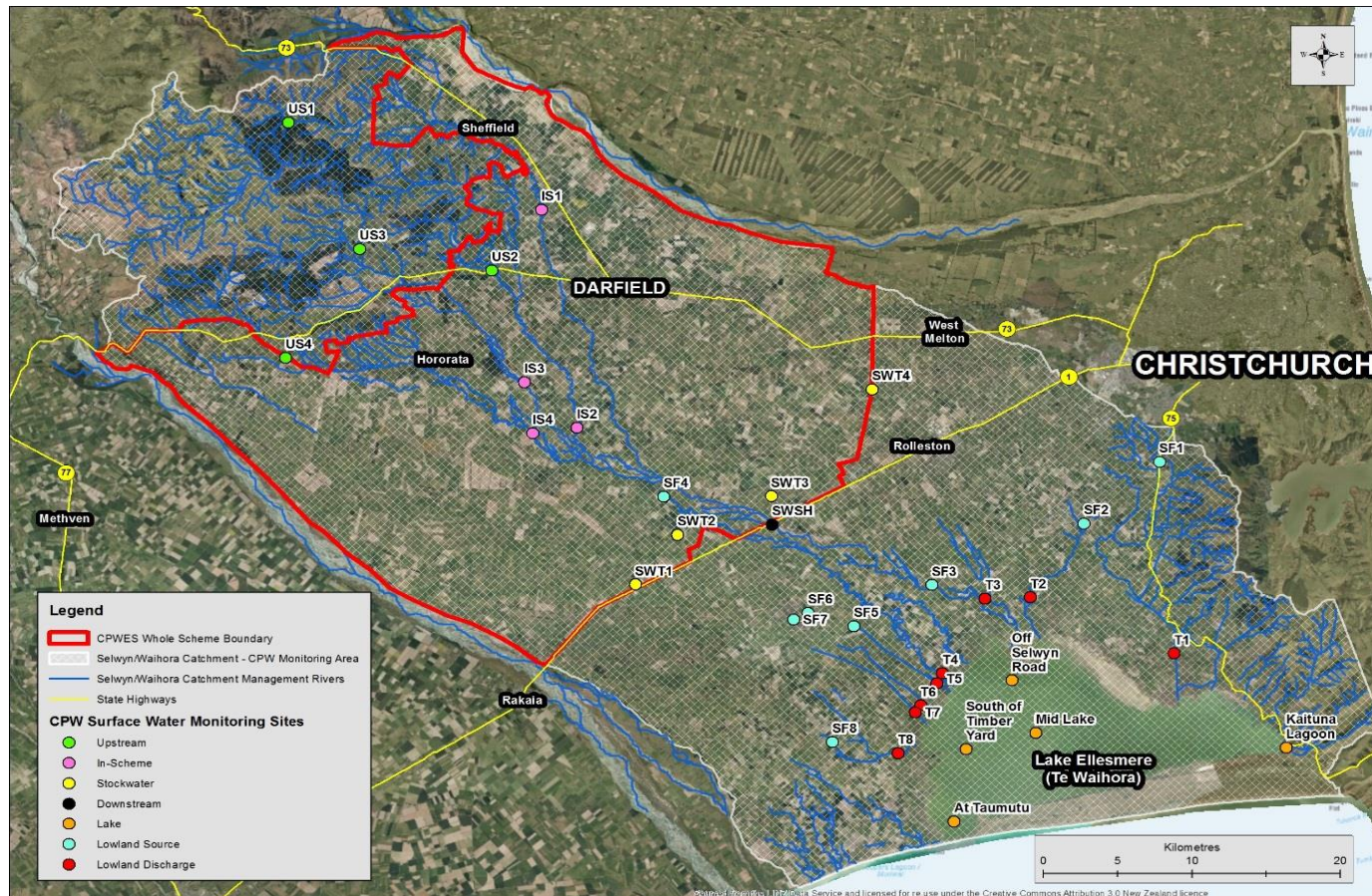
- 2020-21 N losses 30% below the LWPR Scheme Allowance
- Entire Scheme achieving cumulative N loss 14% lower than baseline (i.e., meeting the LWPR 2022 N-loss reduction target)

Environmental Monitoring

- Part 1 of the CPW GSWMP requires extensive monitoring including:
 - 29 surface water quality monitoring sites;
 - 4 lake water quality monitoring sites;
 - 20 groundwater quality monitoring sites; and
 - 12 groundwater level monitoring sites.
- Monitoring undertaken by CPW and Environment Canterbury
- Part 2 of the GSWMP establishes trigger levels for individual parameters and procedures to be followed if trigger levels exceeded

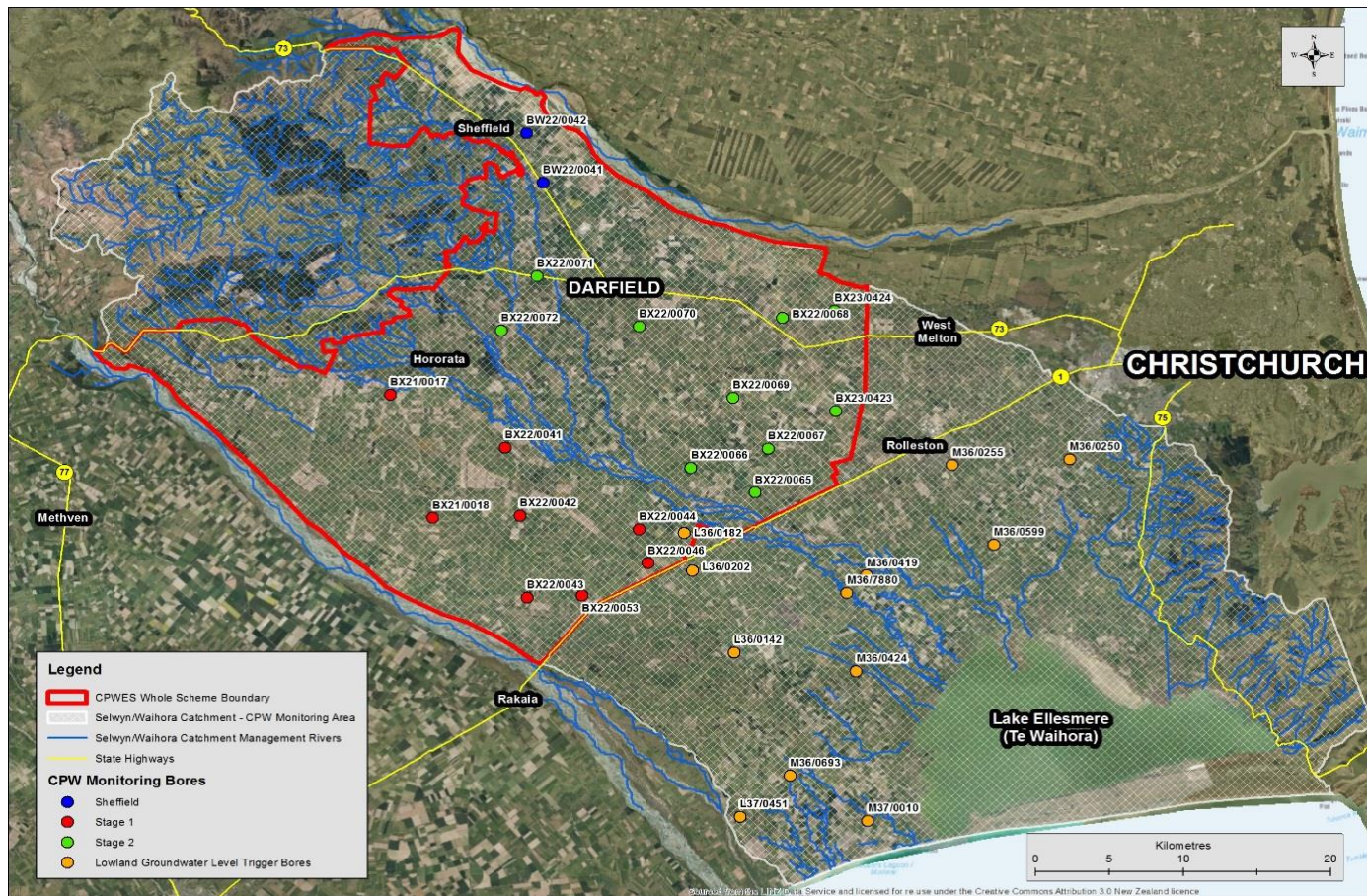
Environmental Monitoring

Surface water and lake water quality monitoring



Environmental Monitoring

Groundwater quality and levels



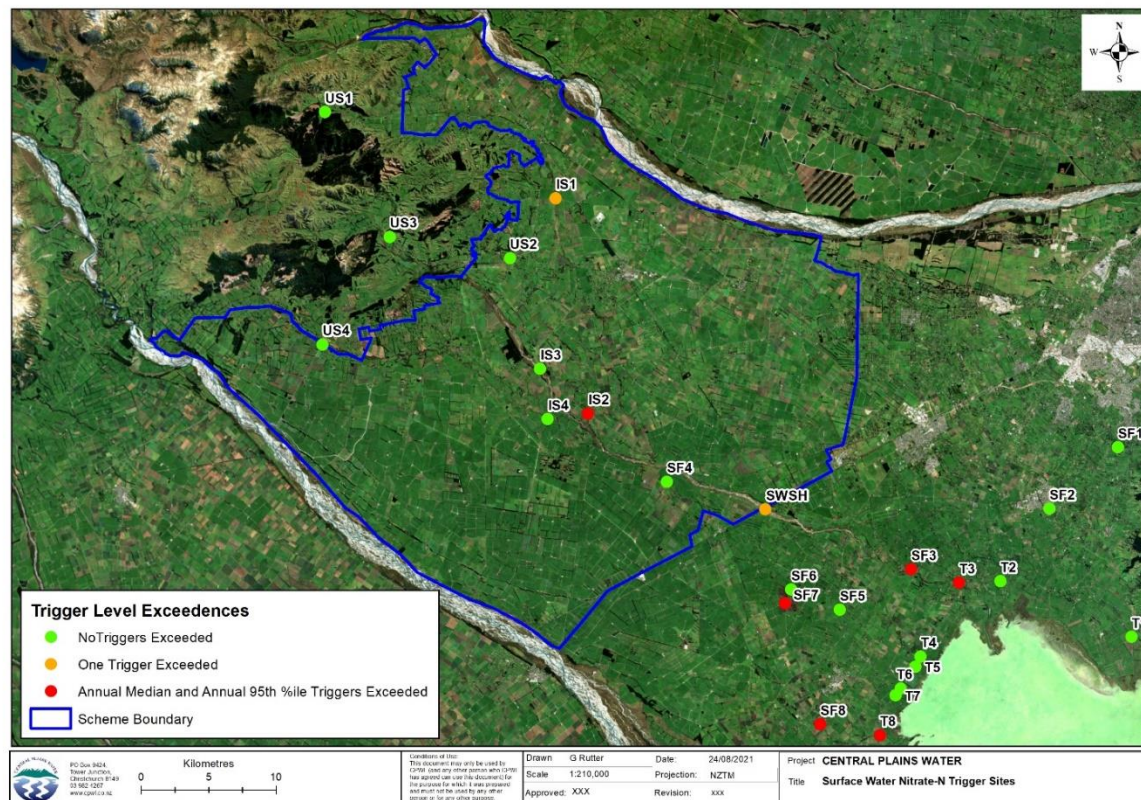
Environmental Monitoring

Environmental Baseline

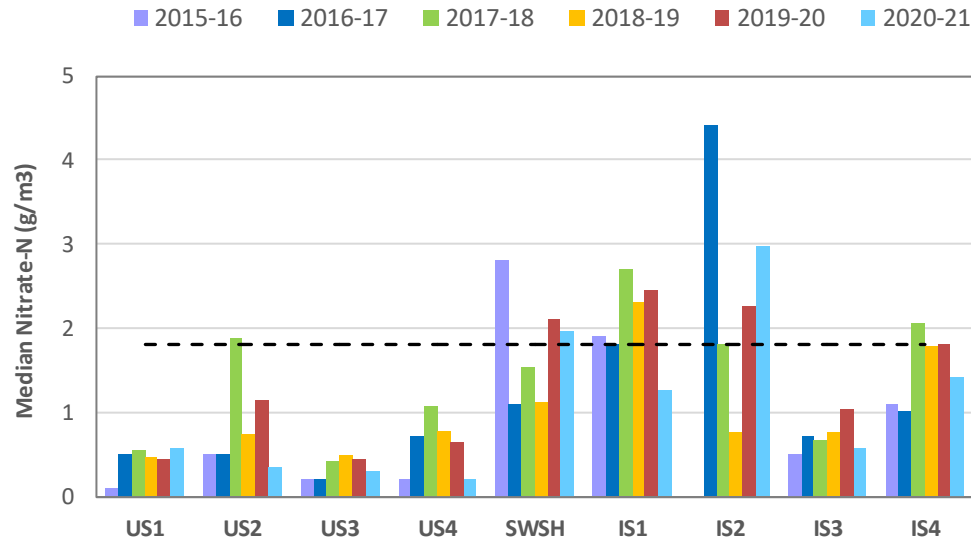
- CPW scheme being developed in area with a long history of agricultural development.
- Significant lag between changes in land use and consequent effects on down-gradient groundwater and surface water resources
- Monitoring prior to Scheme commencement shows water quality does not meet trigger levels in many places and/or shows significant temporal trends

Surface Water Quality

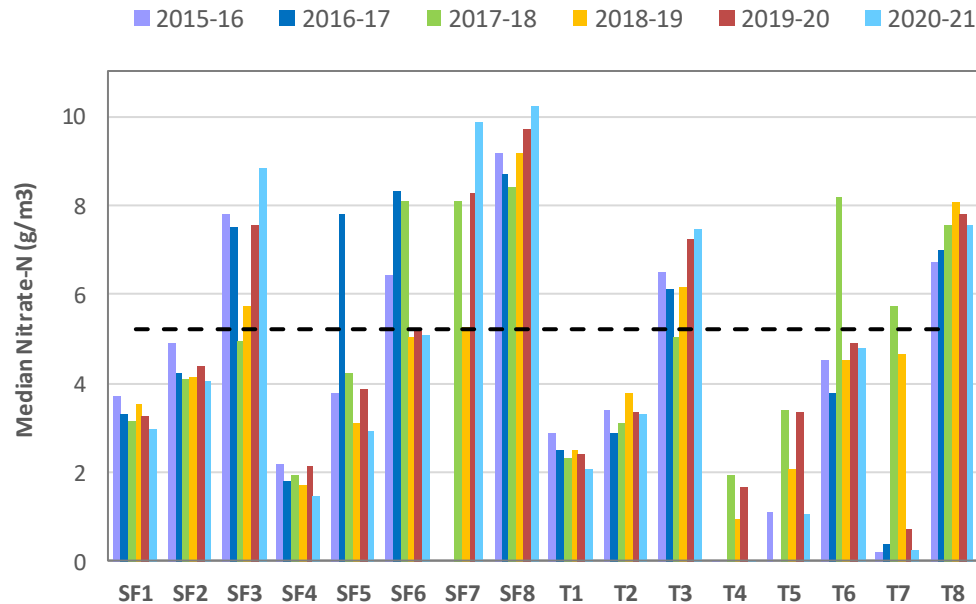
- Surface water nitrate triggers (annual median and 95th percentile) set for Hill-fed and Spring-fed rivers
- Triggers exceeded at 2 Hill-fed sites (2019-20 4 sites, 2018-19 1 site)
- Triggers exceeded at 5 Spring-fed sites (same as last 3 years)



Surface Water Quality

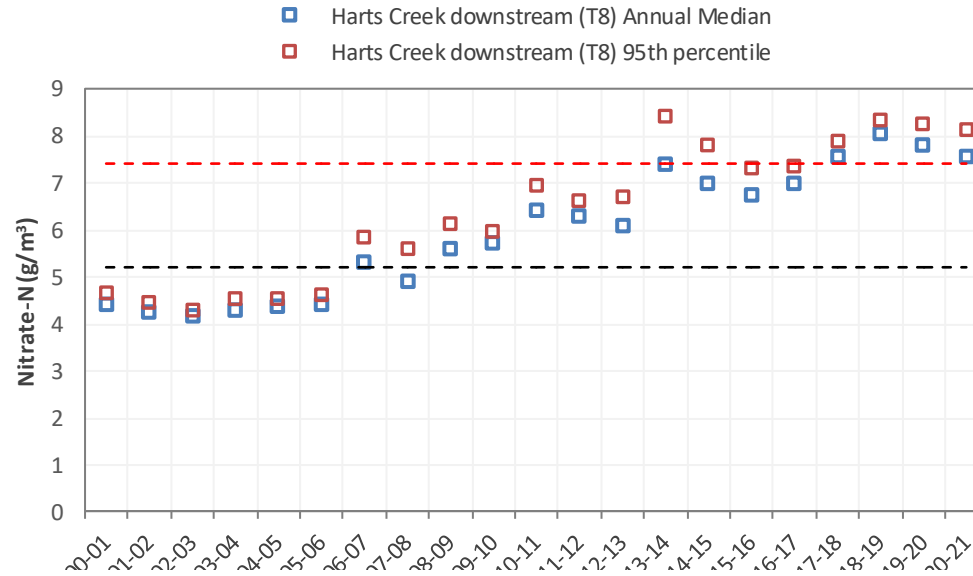


Hill-fed
(annual median)

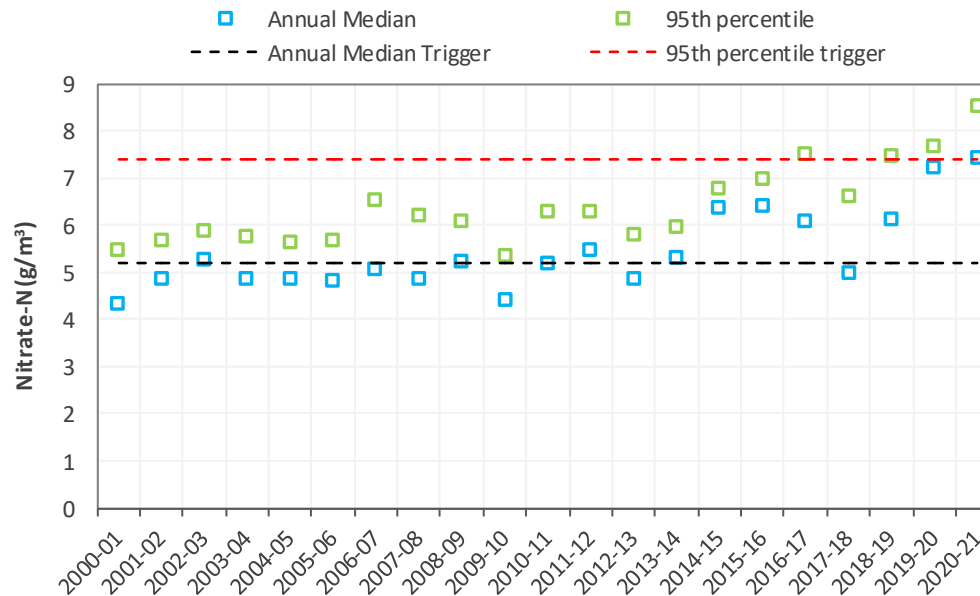


Spring-fed
(annual median)

Surface Water Quality



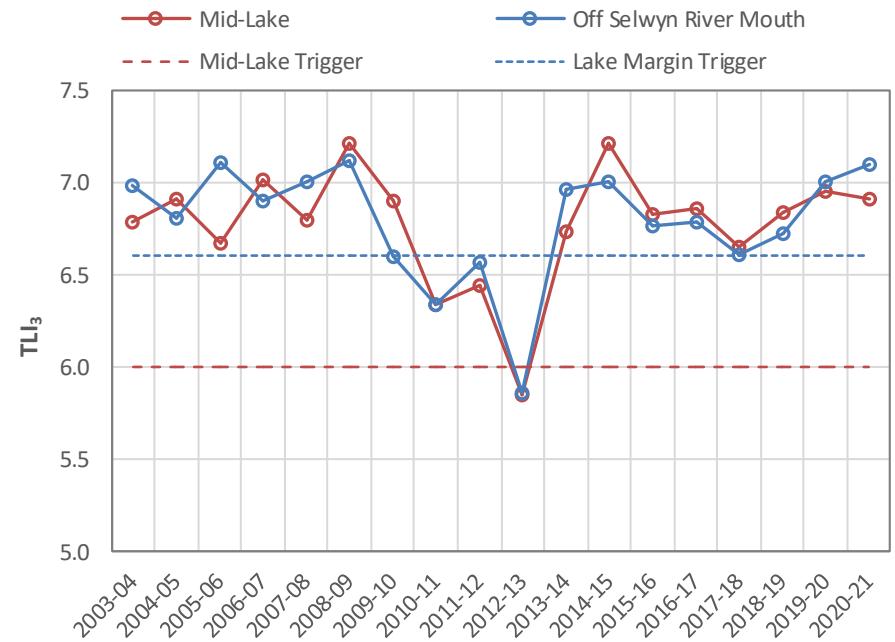
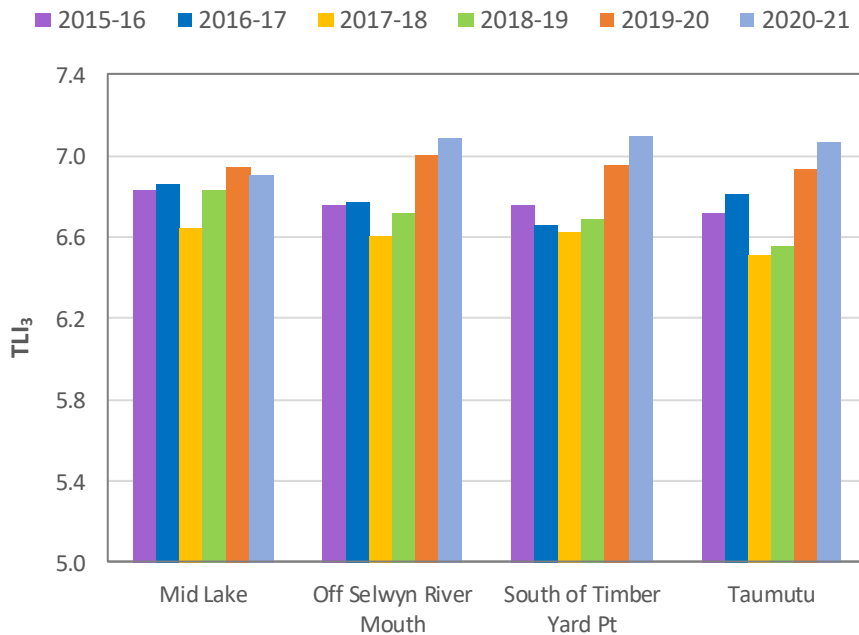
Harts Creek



Coes Ford

Lake Water Quality

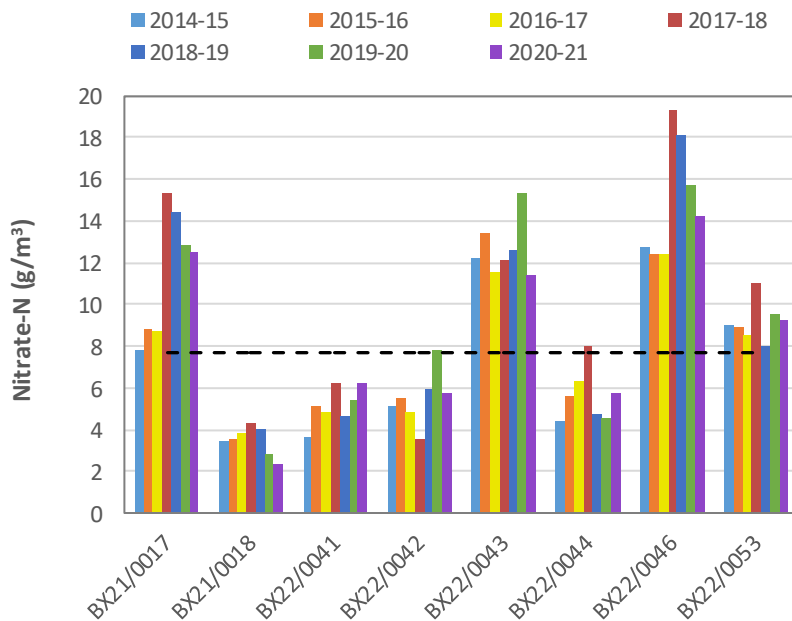
- Triggers set for Chlorophyll-a, Total Nitrogen, Total Phosphorus and TLI₃
- Lake water quality triggers for TLI₃ exceeded at all four monitoring sites in 2020-21. Results above the long-term average but well within historical range



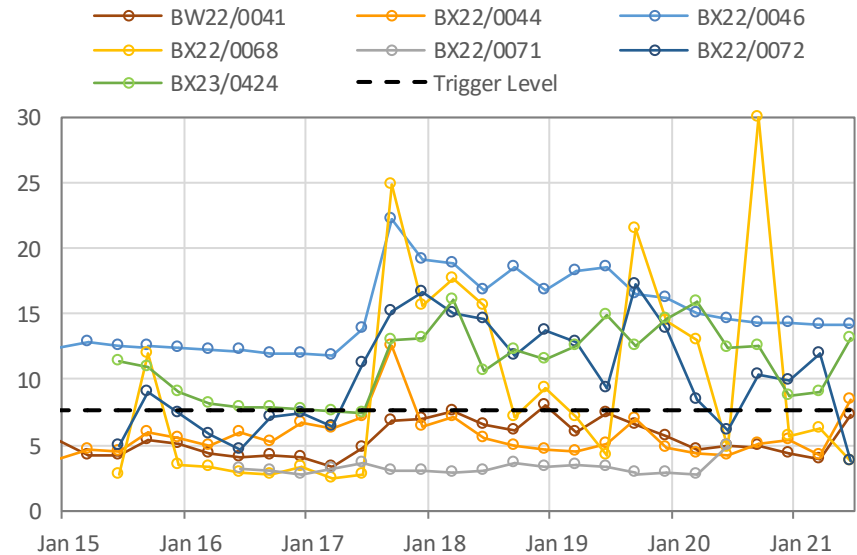
Groundwater Quality

- Triggers set for Nitrate-Nitrogen and E.coli
- Nitrate triggers exceeded in 12 of 20 CPW monitoring bores
- E.coli detected in 22.5% of samples (17 out of 20 monitoring bores), most detections in June 2021

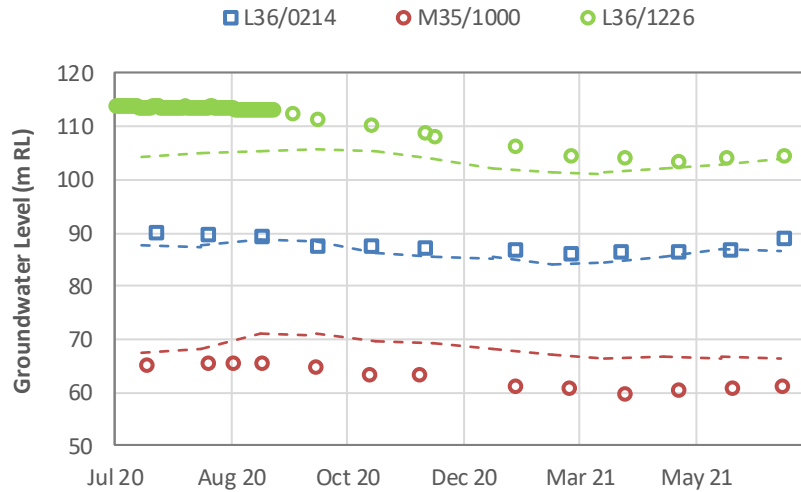
Stage 1



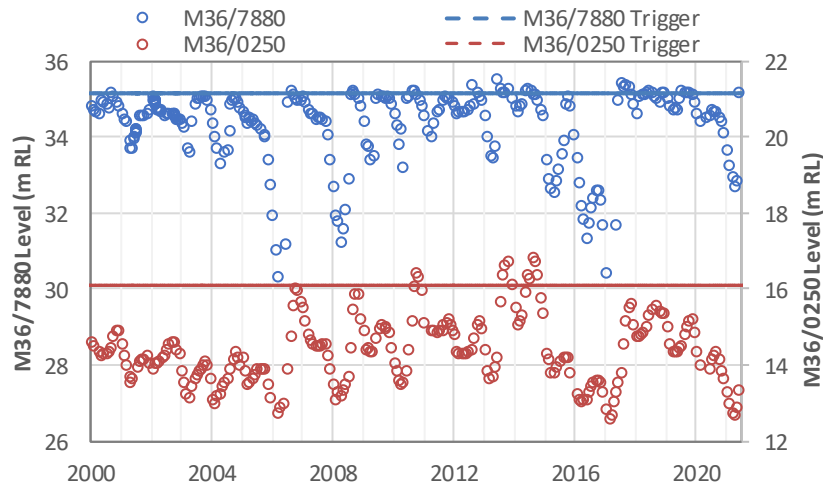
Whole Scheme



Groundwater Levels



- In-Scheme – generally close to or below long-term median



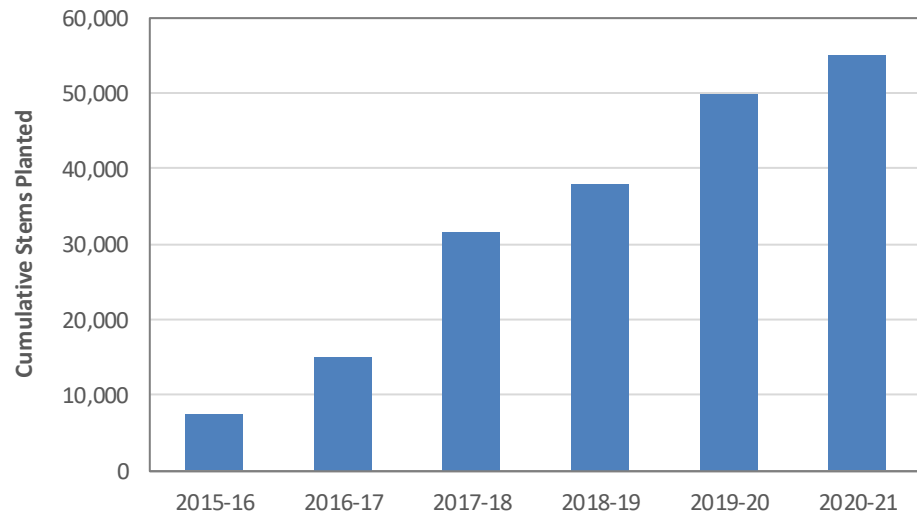
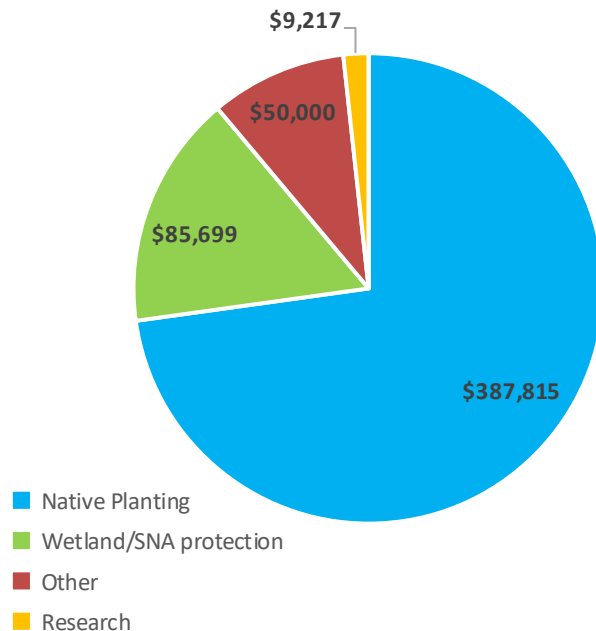
- Lowland – well below triggers but recovered strongly in June 2021

Targeted Stream Augmentation

- Selwyn Near-River Recharge Project commissioned April-May 2021
- Monitored while being run at a range of flow rates
- Operation during a period of low groundwater levels

Environmental Enhancement Funds

- CPW Environmental Management Fund (EMF) generates approximately \$115,000/annum. To date a majority of funding (73%) utilised for native plantings.



- CPW Scheme contributed \$23,797 + GST to opening of Te Waihora/ Lake Ellesmere in 2020-21.

Scheme Benefits

- Growth in rural communities, school roles
- Upwards of 1,000 direct and indirect jobs in the wider Central Plains area
- \$592M pa increase in agricultural output
- Provision of opportunities for alternative, high value crops such as chrysanthemum, hemp, sunflower etc
- Provision of supplementary/backup water supplies to the Springfield and Sheffield communities
- Conversion of groundwater use to Scheme water – Shareholder groundwater usage reduced by >60% compared to pre-Scheme
- Construction of 20 turnouts for fire-fighting as well as infrastructure for targeted stream augmentation
- Long-term environmental funding to ecological projects and programmes

2020-21 Summary

- Third season of full Scheme in operation (sixth year for Stage 1, 4th for Sheffield)
- 192.7 million m³ of water delivered to 259 Shareholder properties
- Irrigation demand moderate during late spring/early summer but increased over the remainder of the year. Stage 1 water use was the highest in 6 years of operation
- A majority of properties achieved A or B grades on farm audits
- Nutrient losses from CPW Farm Enterprise Area meets 2022 LWRP reduction targets
- Environmental monitoring results significantly influenced by baseline water quality.