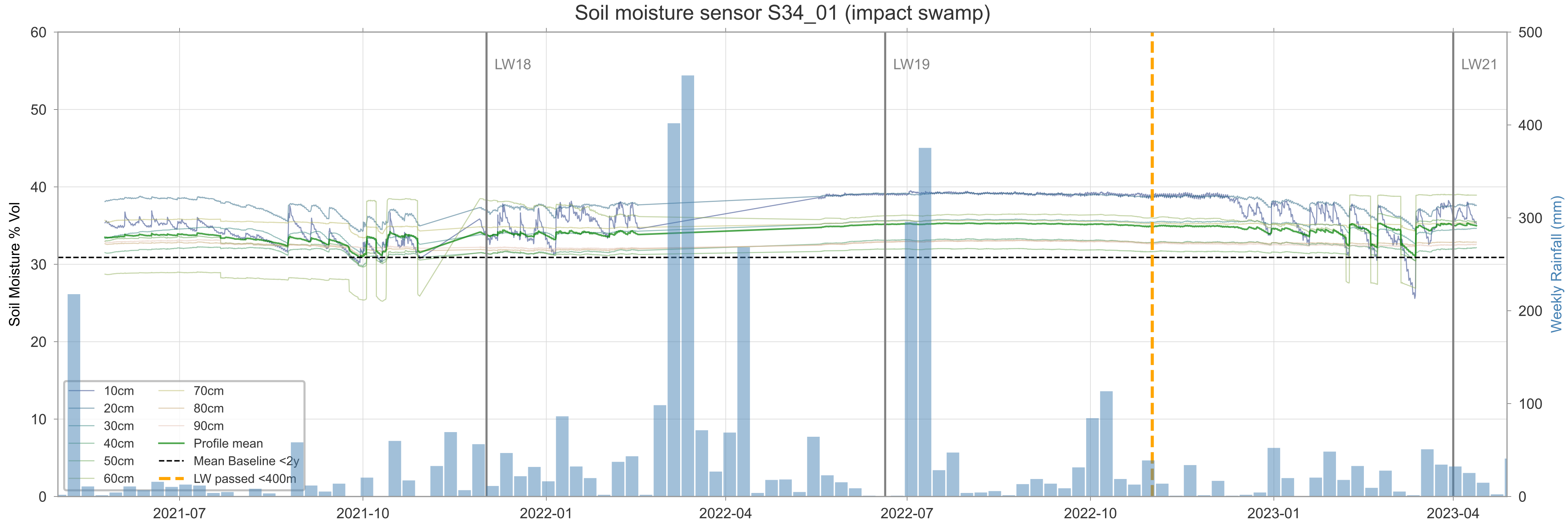
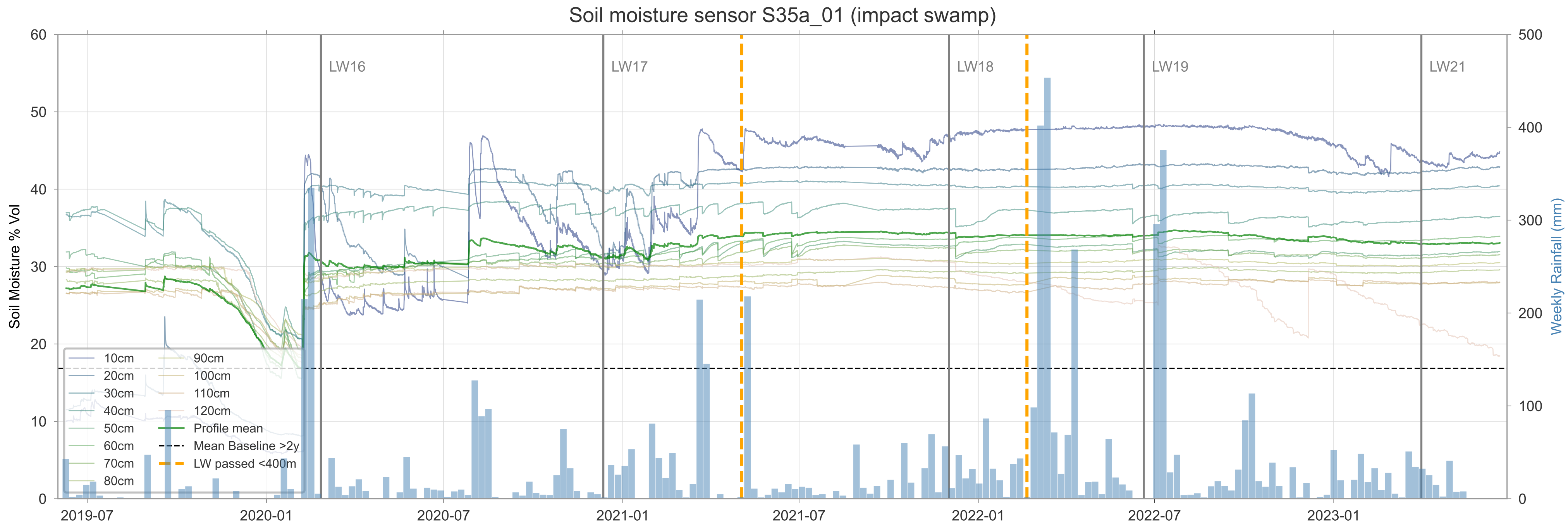
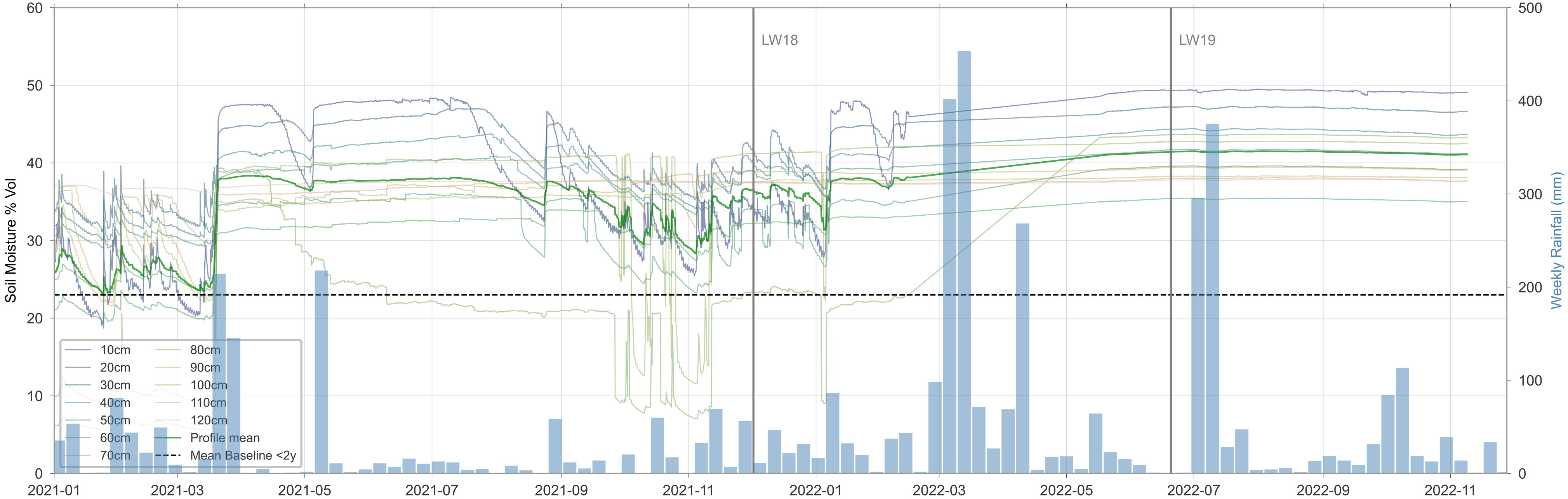


Soil moisture sensor S34_01 (impact swamp)
LW18
LW19
LW21
Soil Moisture % Vol
Weekly Rainfall (mm)
10cm
20cm
30cm
40cm
50cm
60cm
70cm
80cm
90cm
Profile mean
Mean Baseline <2y
LW passed <400m
2021-07
2021-10
2022-01
2022-04
2022-07
2022-10
2023-01
2023-04

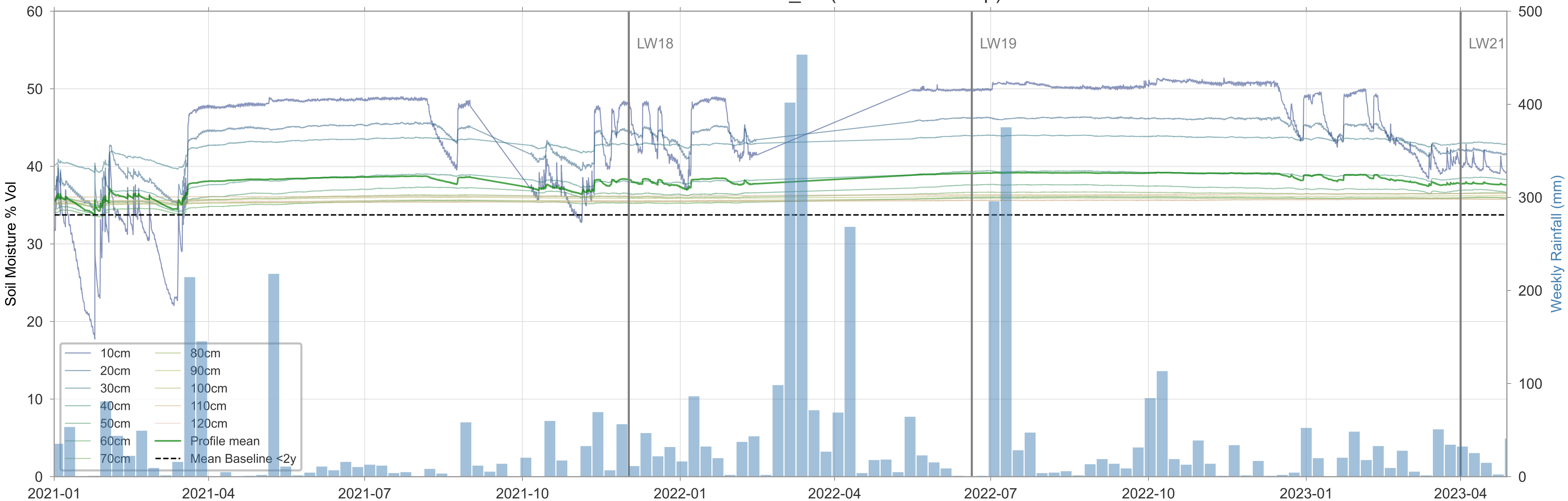


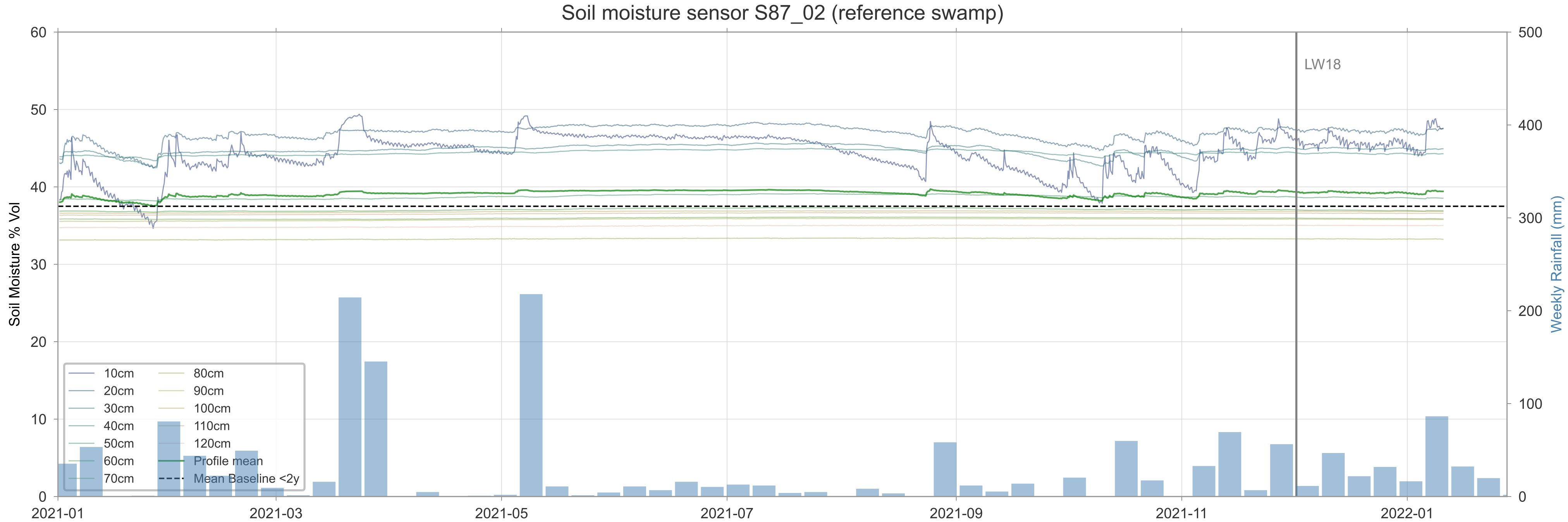
Soil moisture sensor S35a_01 (impact swamp)
LW16
LW17
LW18
LW19
LW21
Soil Moisture % Vol
Weekly Rainfall (mm)
10cm
20cm
30cm
40cm
50cm
60cm
70cm
80cm
90cm
100cm
110cm
120cm
Profile mean
Mean Baseline >2y
LW passed <400m
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01

Soil moisture sensor S85_03 (reference swamp)

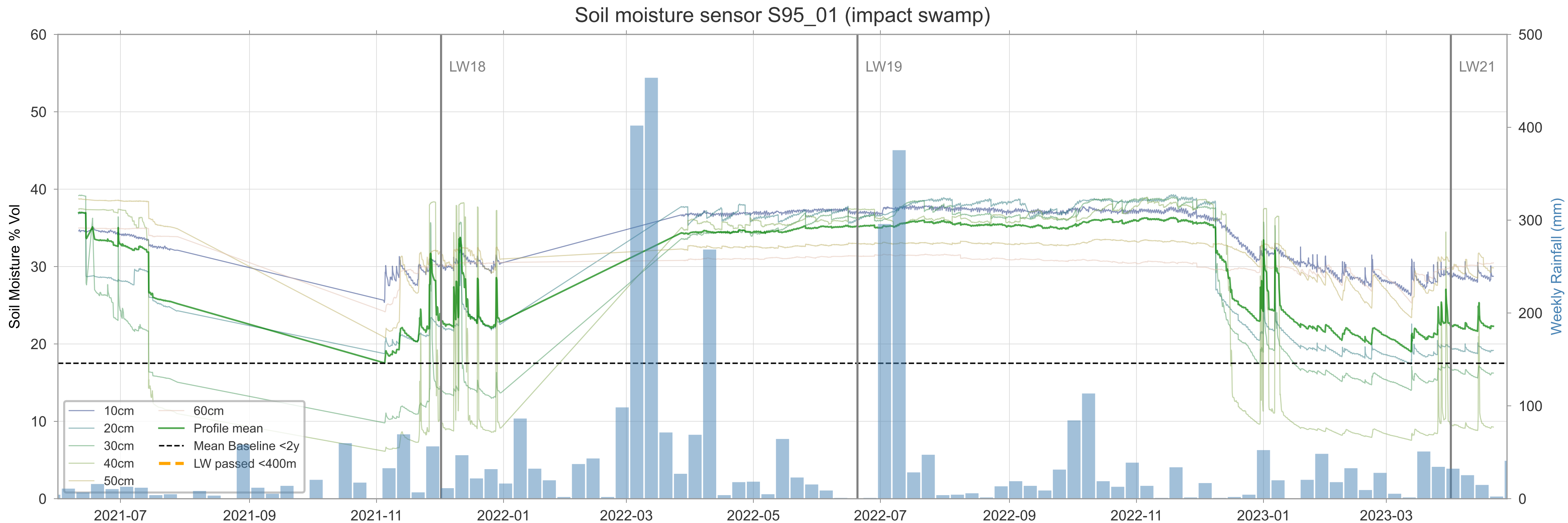


Soil moisture sensor S86_03 (reference swamp)

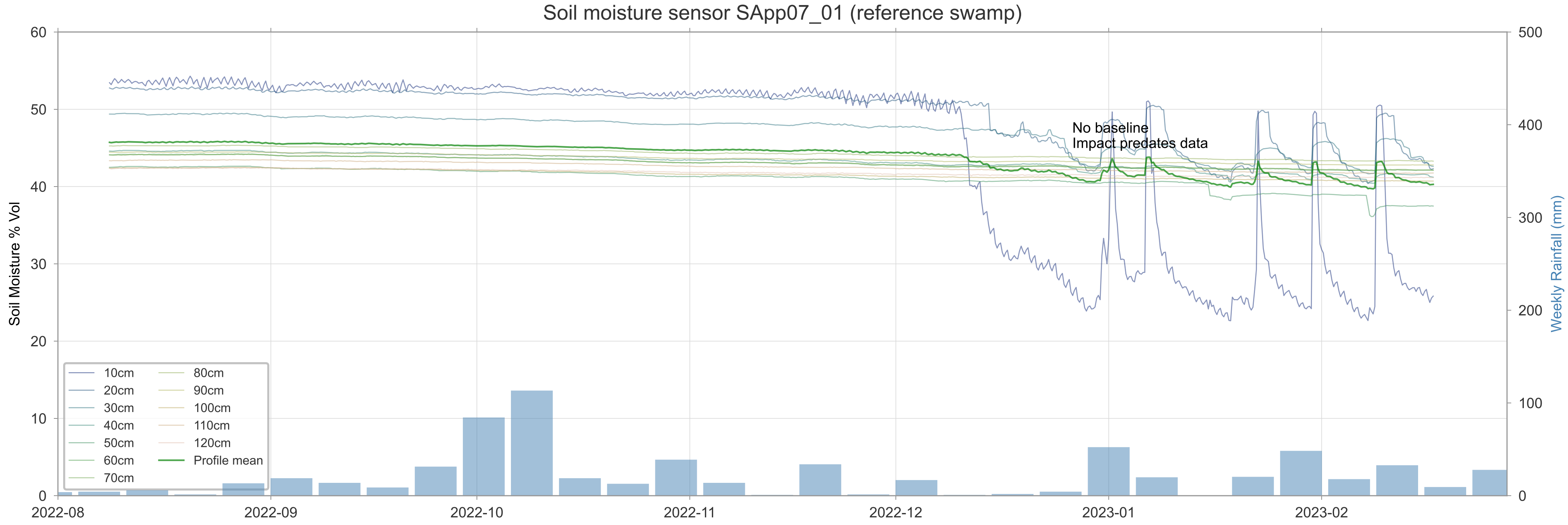




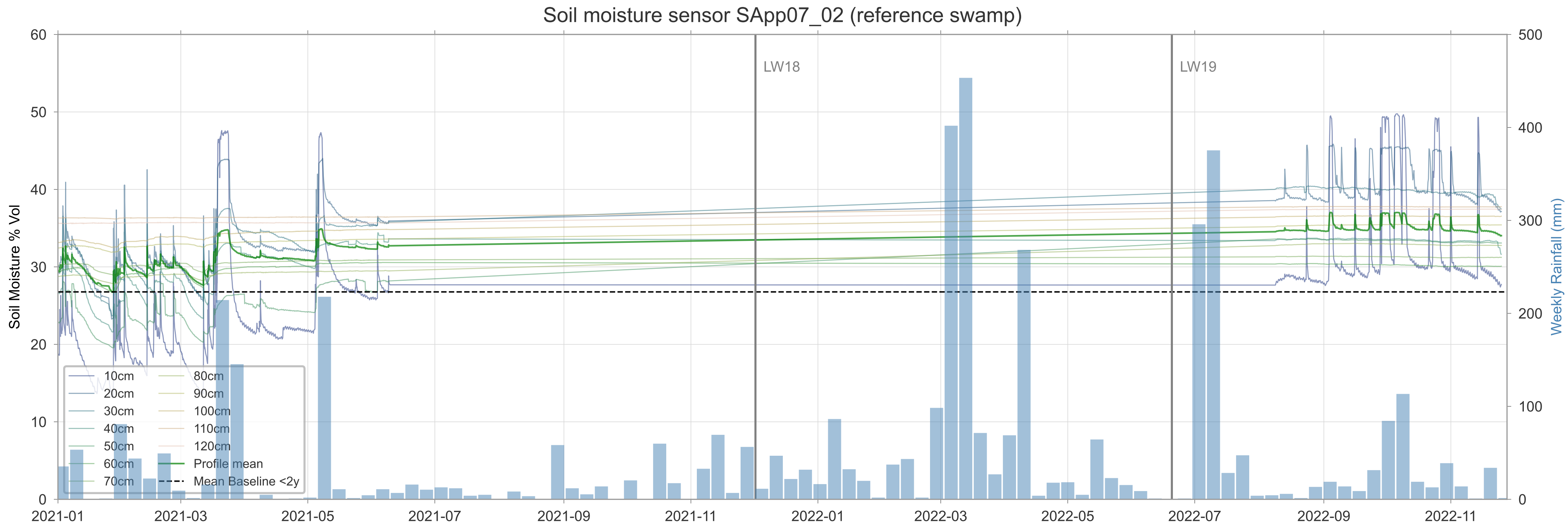
Soil moisture sensor S87_02 (reference swamp)
Soil Moisture % Vol
Weekly Rainfall (mm)
LW18
10cm
20cm
30cm
40cm
50cm
60cm
70cm
80cm
90cm
100cm
110cm
120cm
Profile mean
Mean Baseline <2y
2021-01
2021-03
2021-05
2021-07
2021-09
2021-11
2022-01



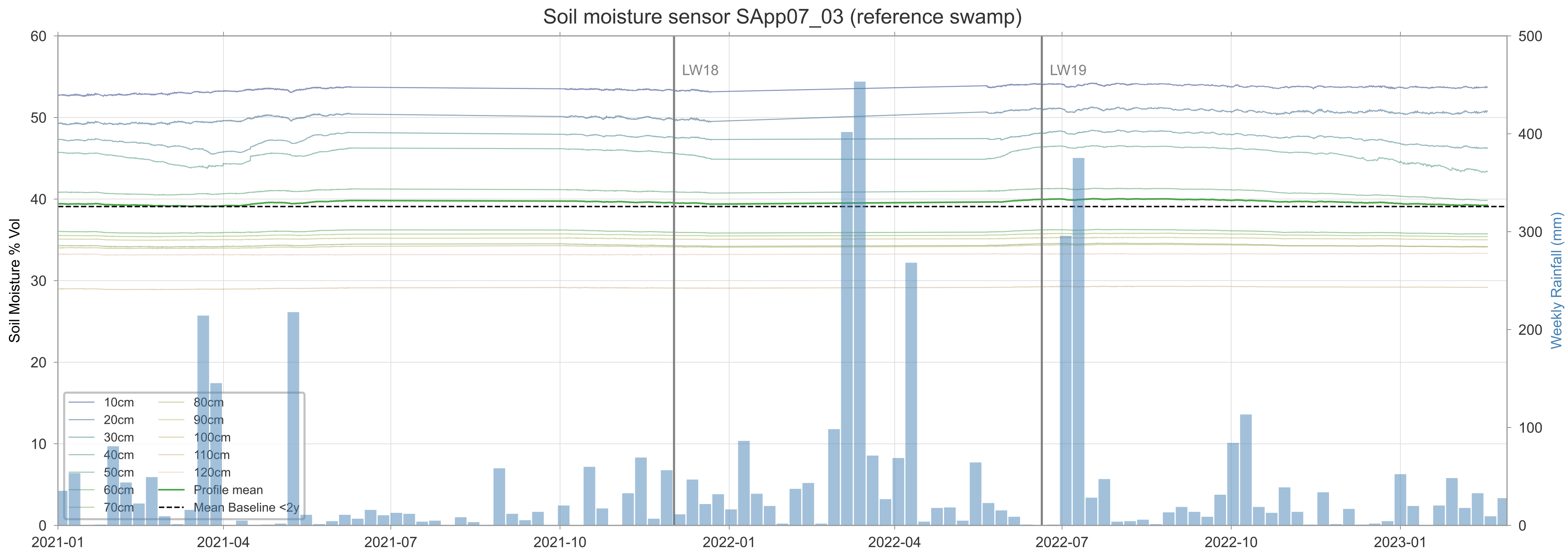
Soil moisture sensor S95_01 (impact swamp)
Soil Moisture % Vol
Weekly Rainfall (mm)
LW18
LW19
LW21
10cm
20cm
30cm
40cm
50cm
60cm
Profile mean
Mean Baseline <2y
LW passed <400m
2021-07
2021-09
2021-11
2022-01
2022-03
2022-05
2022-07
2022-09
2022-11
2023-01
2023-03



Soil moisture sensor SApp07_01 (reference swamp)
Soil Moisture % Vol
Weekly Rainfall (mm)
No baseline
Impact predates data
10cm
20cm
30cm
40cm
50cm
60cm
70cm
80cm
90cm
100cm
110cm
120cm
Profile mean
2022-08
2022-09
2022-10
2022-11
2022-12
2023-01
2023-02

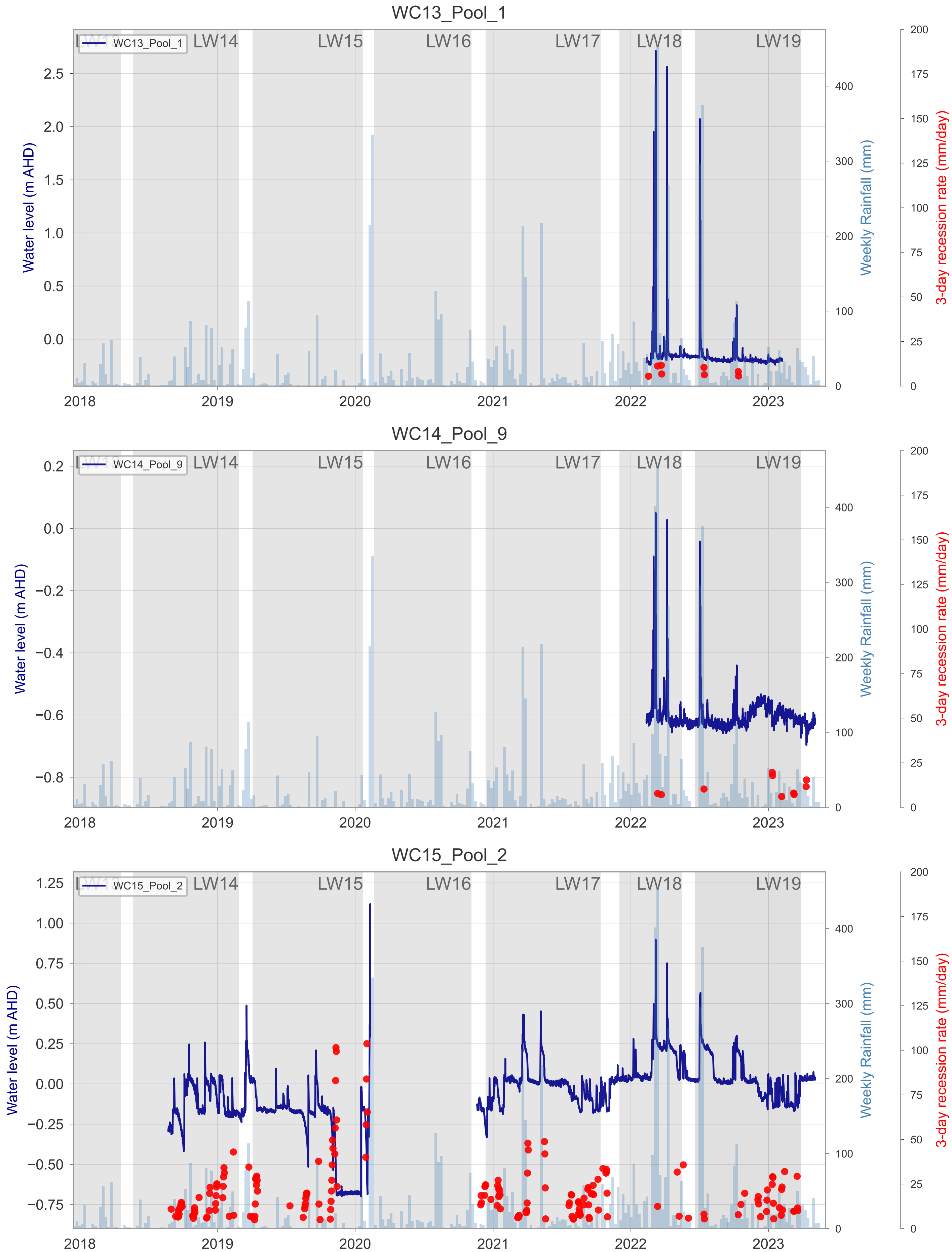


Soil moisture sensor SApp07_02 (reference swamp)
Soil Moisture % Vol
Weekly Rainfall (mm)
LW18
LW19
10cm
20cm
30cm
40cm
50cm
60cm
70cm
80cm
90cm
100cm
110cm
120cm
Profile mean
Mean Baseline <2y
2021-01
2021-03
2021-05
2021-07
2021-09
2021-11
2022-01
2022-03
2022-05
2022-07
2022-09
2022-11

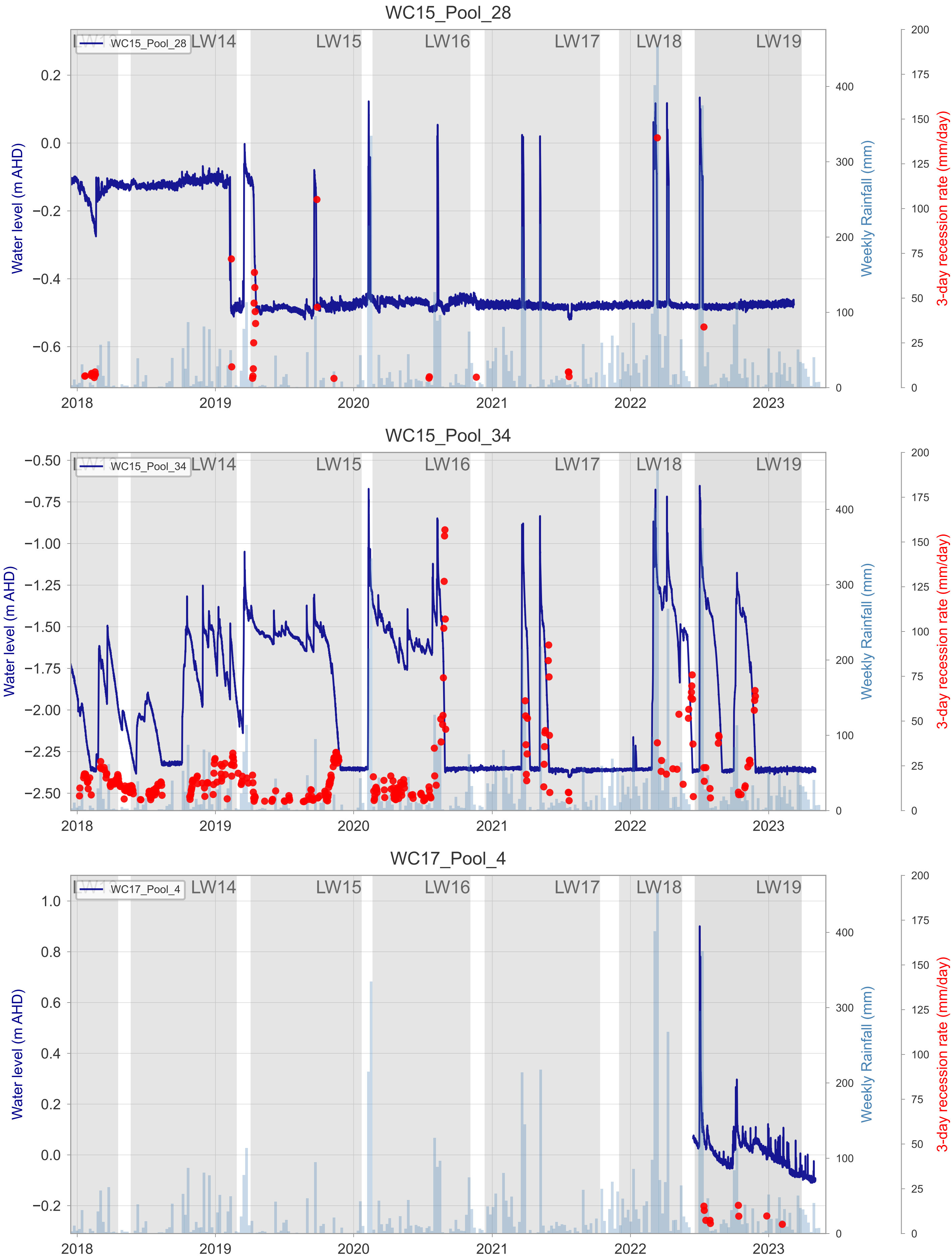


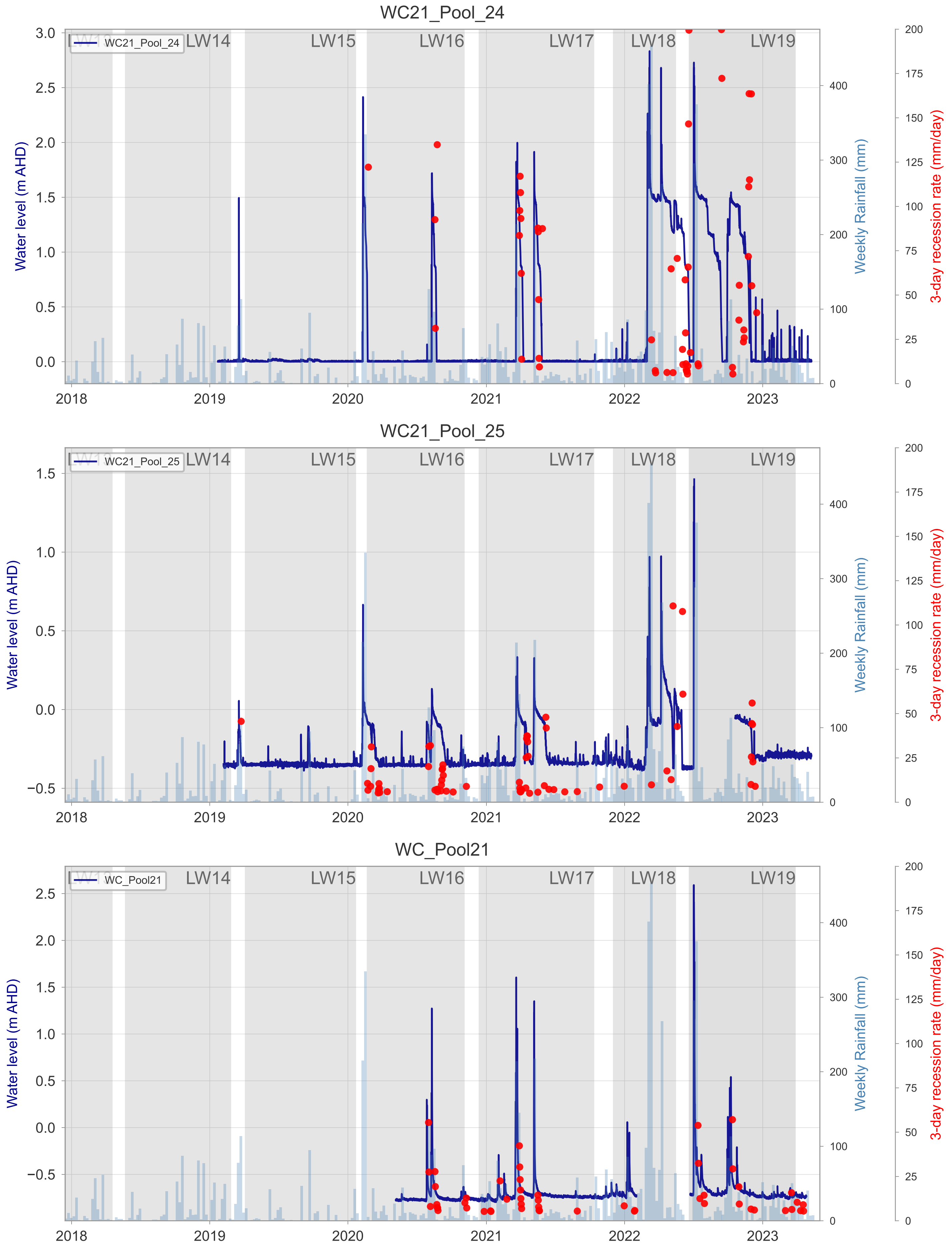
Soil moisture sensor SApp07_03 (reference swamp)
Soil Moisture % Vol
Weekly Rainfall (mm)
LW18
LW19
10cm
20cm
30cm
40cm
50cm
60cm
70cm
80cm
90cm
100cm
110cm
120cm
Profile mean
Mean Baseline <2y
0
10
20
30
40
50
60
100
200
300
400
500
2021-01
2021-04
2021-07
2021-10
2022-01
2022-04
2022-07
2022-10
2023-01

Appendix F: Stream pool level hydrographs

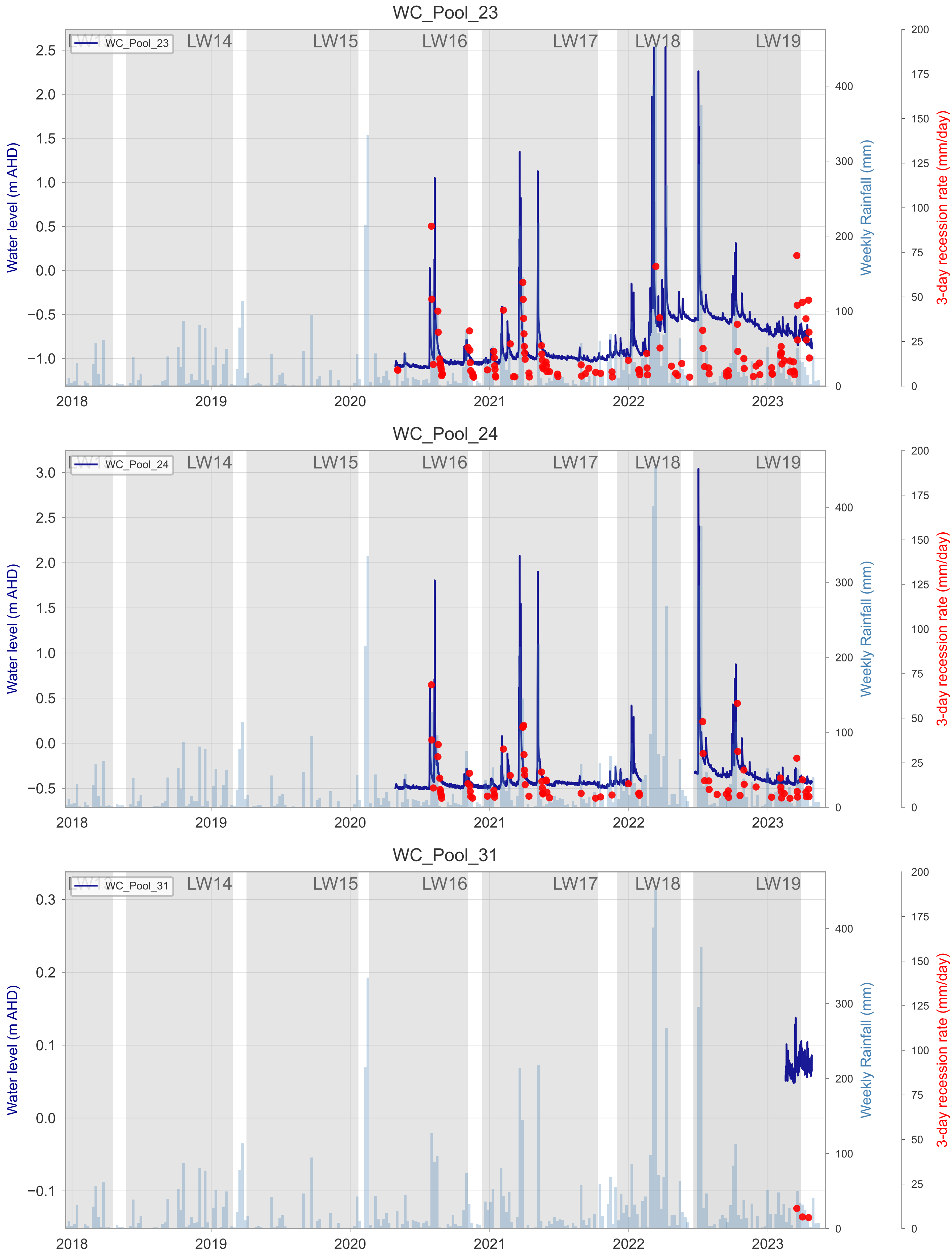


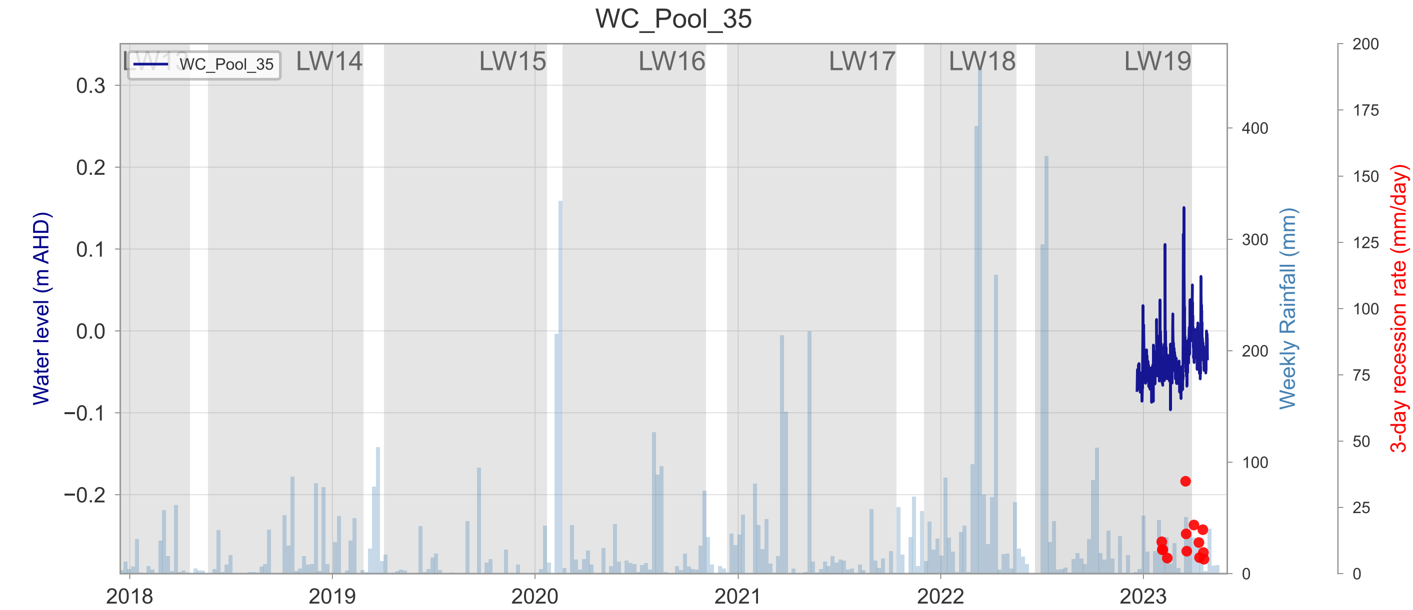
WC13_Pool_1
WC13_Pool_1
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
2018
2019
2020
2021
2022
2023
WC14_Pool_9
WC14_Pool_9
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
2018
2019
2020
2021
2022
2023
WC15_Pool_2
WC15_Pool_2
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
2018
2019
2020
2021
2022
2023

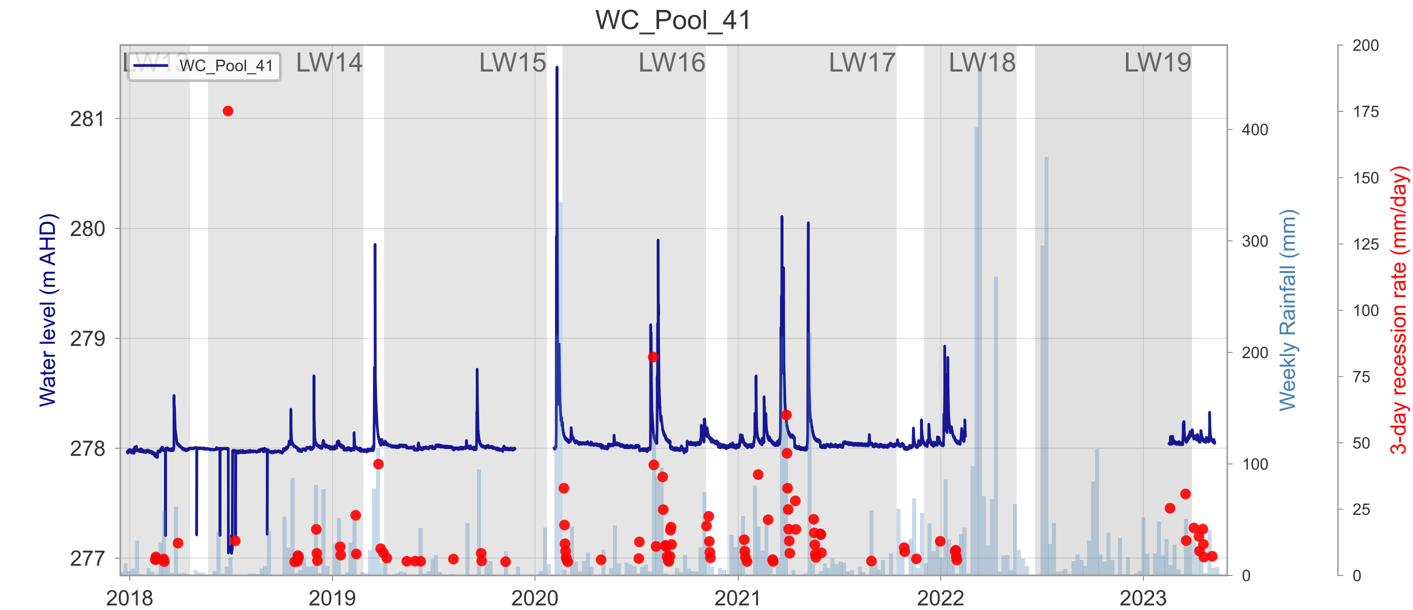

WC15_Pool_28
WC15_Pool_28
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
0.2
0.0
−0.2
−0.4
−0.6
400
300
200
100
0
200
175
150
125
100
75
50
25
0
2018
2019
2020
2021
2022
2023
WC15_Pool_34
WC15_Pool_34
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
−0.50
−0.75
−1.00
−1.25
−1.50
−1.75
−2.00
−2.25
−2.50
2018
2019
2020
2021
2022
2023
WC17_Pool_4
WC17_Pool_4
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
2018
2019
2020
2021
2022
2023

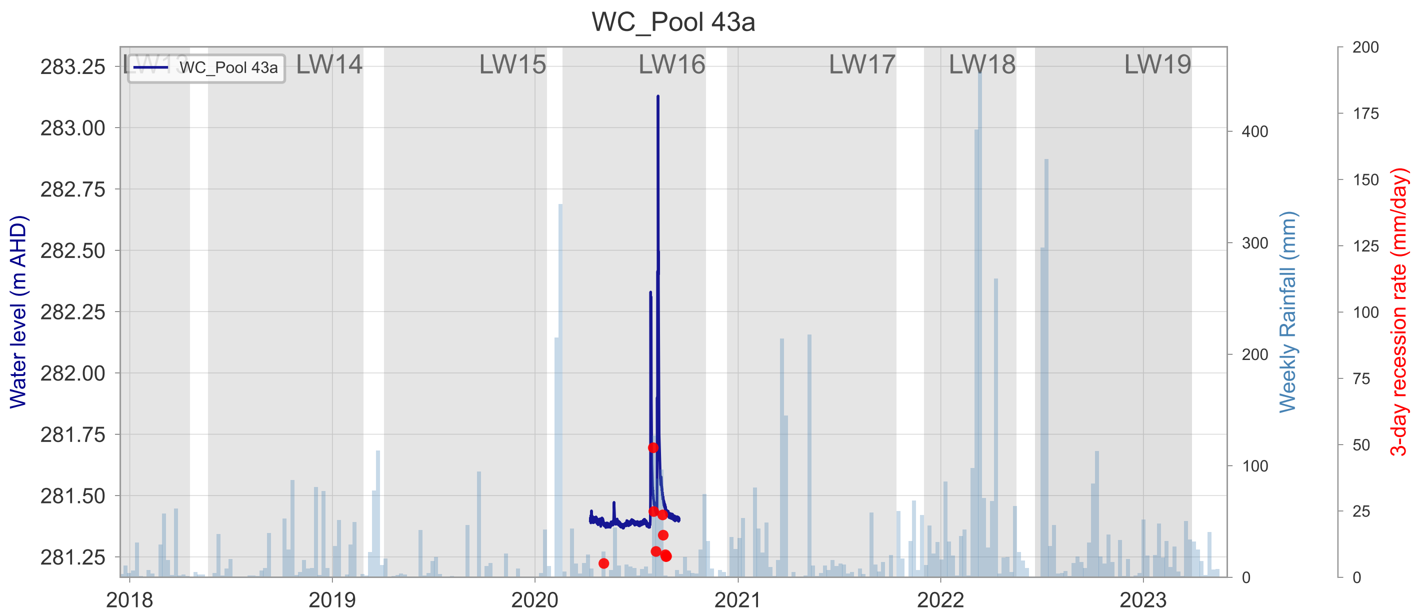


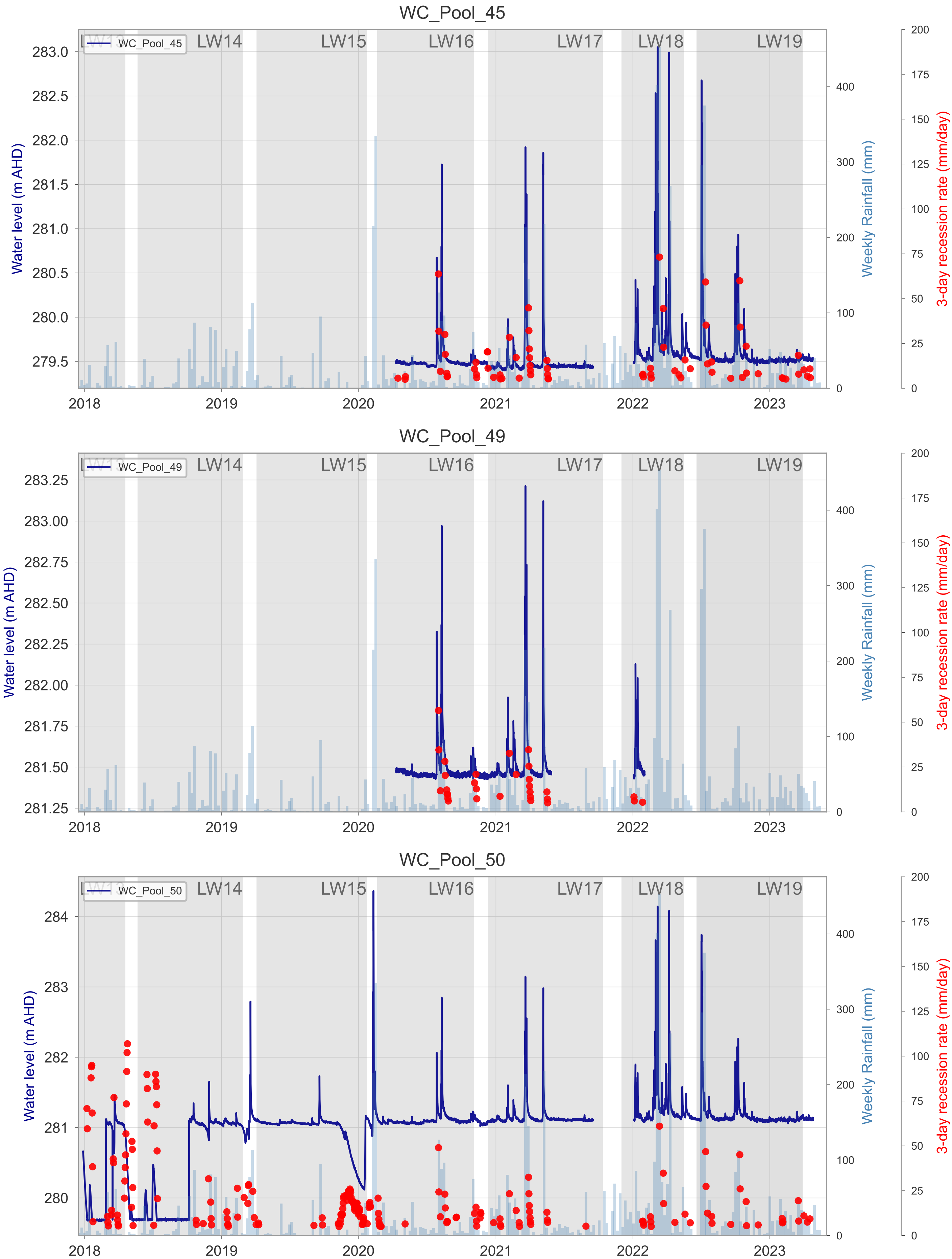
WC21_Pool_24
WC21_Pool_24
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
WC21_Pool_25
WC21_Pool_25
WC_Pool21
WC_Pool21
2018
2019
2020
2021
2022
2023


WC_Pool_23
WC_Pool_23
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
2018
2019
2020
2021
2022
2023
WC_Pool_24
WC_Pool_24
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
2018
2019
2020
2021
2022
2023
WC_Pool_31
WC_Pool_31
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
2018
2019
2020
2021
2022
2023

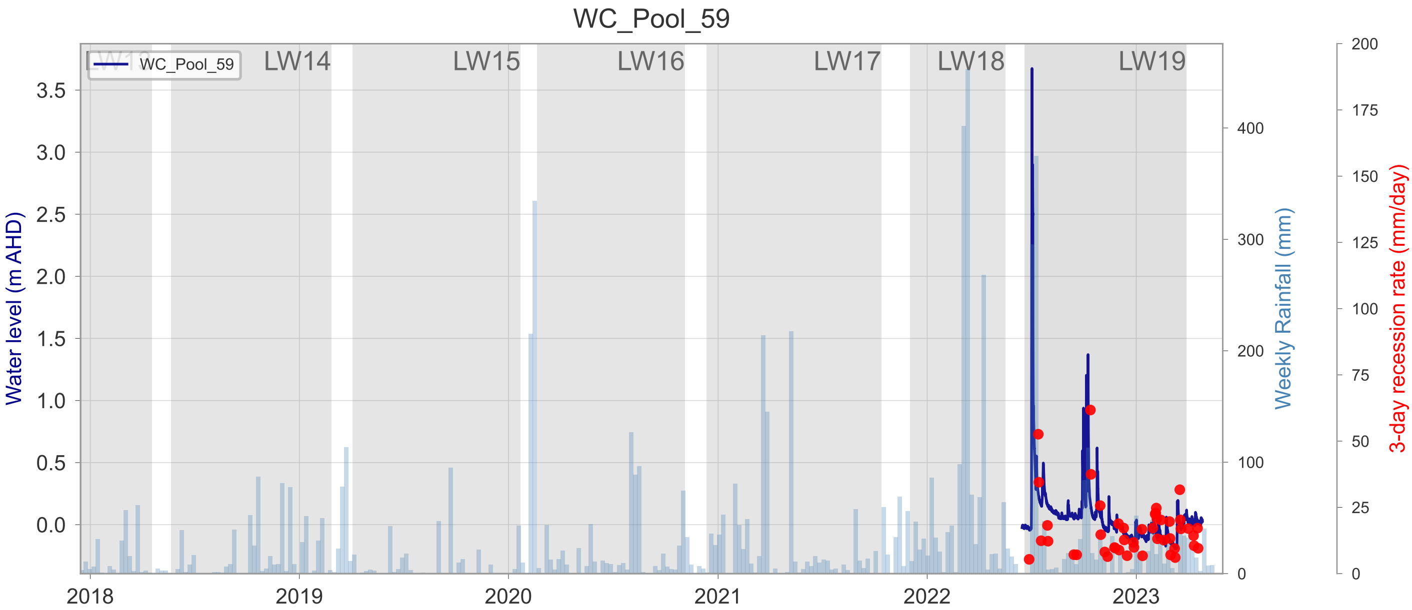

WC_Pool_35
WC_Pool_35
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
0.3
0.2
0.1
0.0
−0.1
−0.2
2018
2019
2020
2021
2022
2023

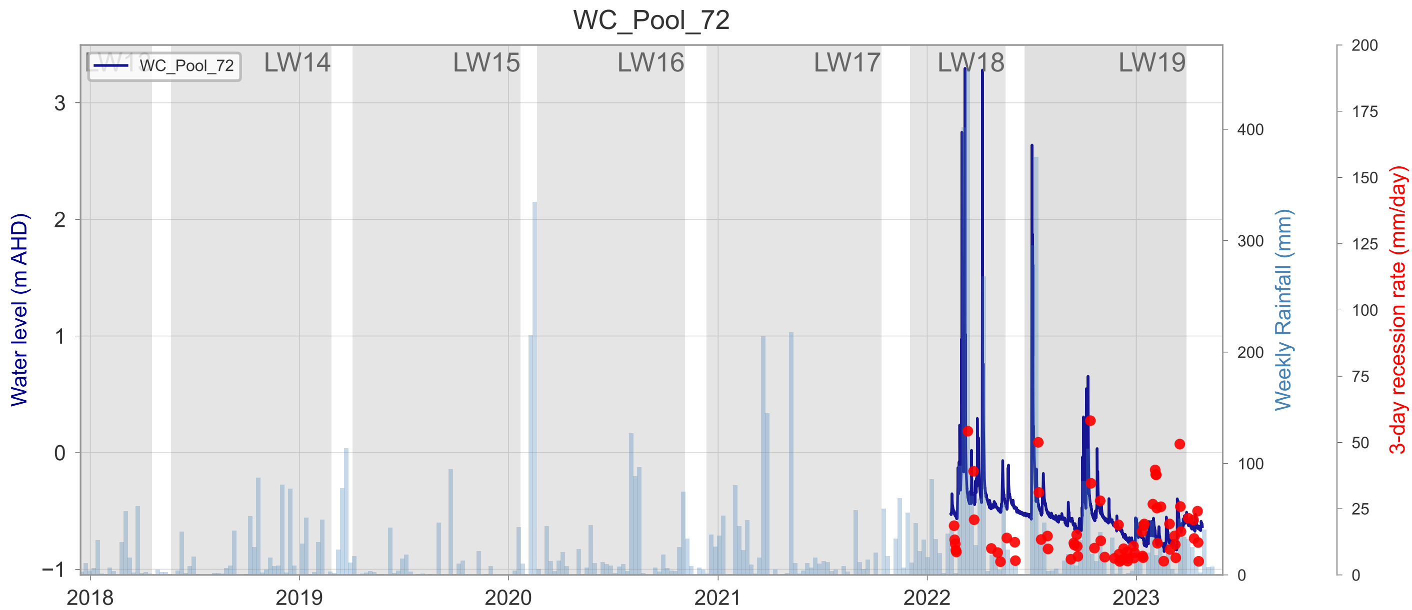

WC_Pool_41
WC_Pool_41
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
281
280
279
278
277
2018
2019
2020
2021
2022
2023

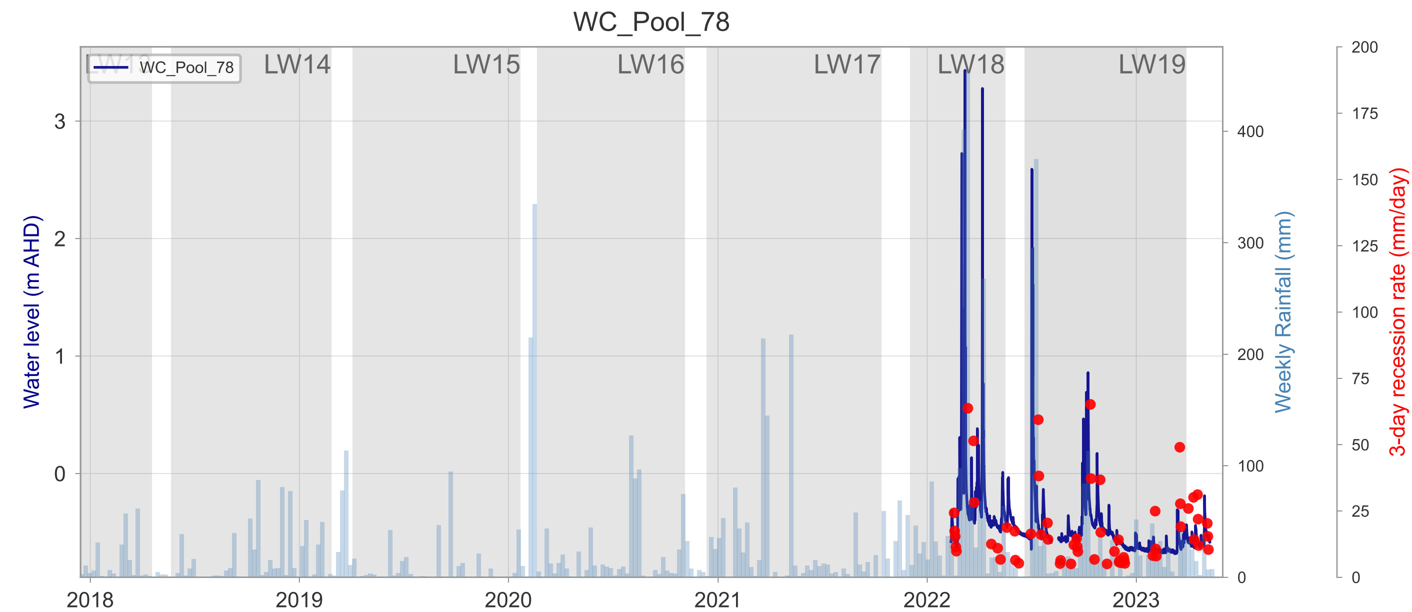

WC_Pool 43a
WC_Pool 43a
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
283.25
283.00
282.75
282.50
282.25
282.00
281.75
281.50
281.25
2018
2019
2020
2021
2022
2023

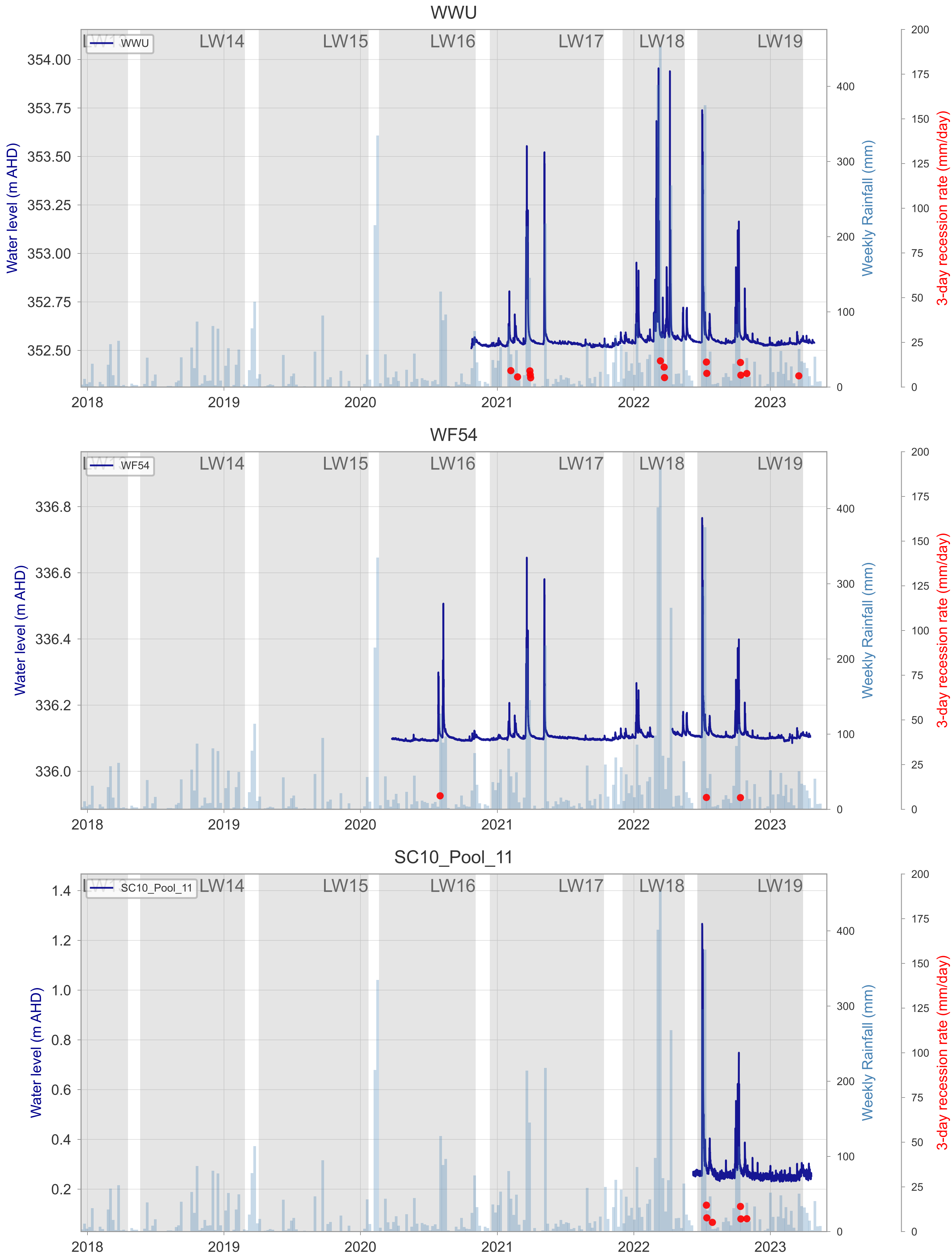


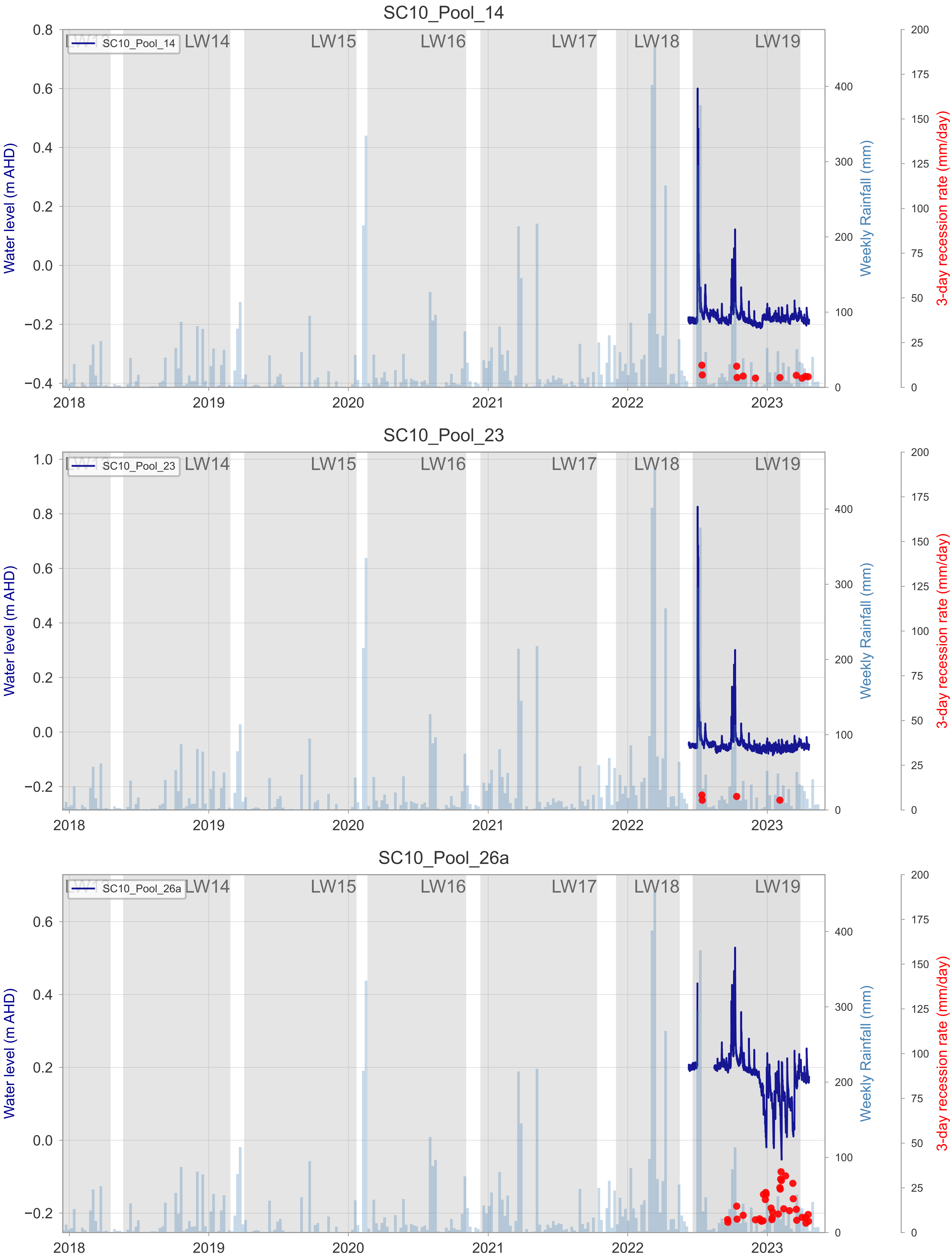
WC_Pool_45
WC_Pool_45
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
WC_Pool_49
WC_Pool_49
WC_Pool_50
WC_Pool_50


WC_Pool_59
WC_Pool_59
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
400
300
200
100
0
200
175
150
125
100
75
50
25
0
2018
2019
2020
2021
2022
2023

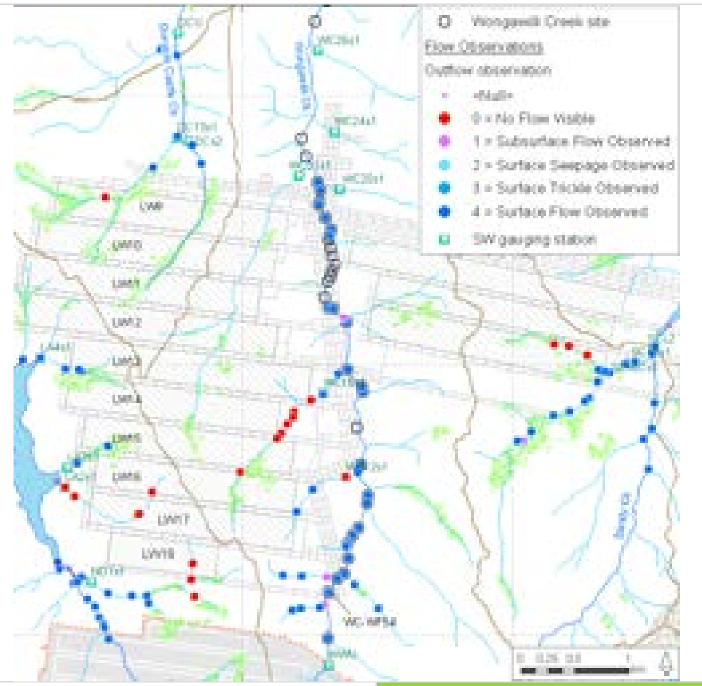

WC_Pool_72
WC_Pool_72
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
3
2
1
0
−1
400
300
200
100
0
200
175
150
125
100
75
50
25
0
2018
2019
2020
2021
2022
2023


WC_Pool_78
WC_Pool_78
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
3
2
1
0
400
300
200
100
0
200
175
150
125
100
75
50
25
0
2018
2019
2020
2021
2022
2023

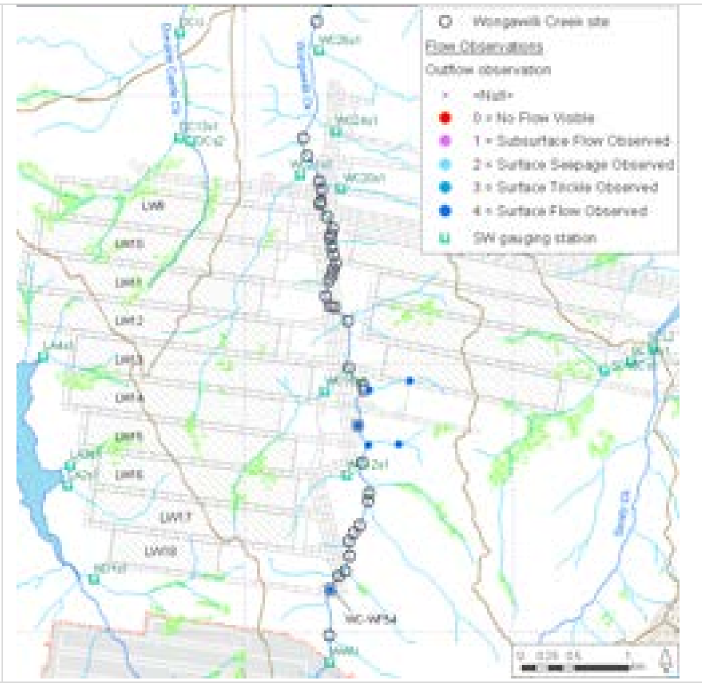

WWU
WWU
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
354.00
353.75
353.50
353.25
353.00
352.75
352.50
2018
2019
2020
2021
2022
2023
WF54
WF54
336.8
336.6
336.4
336.2
336.0
SC10_Pool_11
SC10_Pool_11
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
100
200
300
400
25
50
75
125
150
175


SC10_Pool_14
SC10_Pool_14
LW13
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
400
300
200
100
0
200
175
150
125
100
75
50
25
0
2018
2019
2020
2021
2022
2023
SC10_Pool_23
SC10_Pool_23
LW13
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
400
300
200
100
0
200
175
150
125
100
75
50
25
0
2018
2019
2020
2021
2022
2023
SC10_Pool_26a
SC10_Pool_26a
LW13
LW14
LW15
LW16
LW17
LW18
LW19
Water level (m AHD)
Weekly Rainfall (mm)
3-day recession rate (mm/day)
0.6
0.4
0.2
0.0
−0.2
400
300
200
100
0
200
175
150
125
100
75
50
25
0
2018
2019
2020
2021
2022
2023

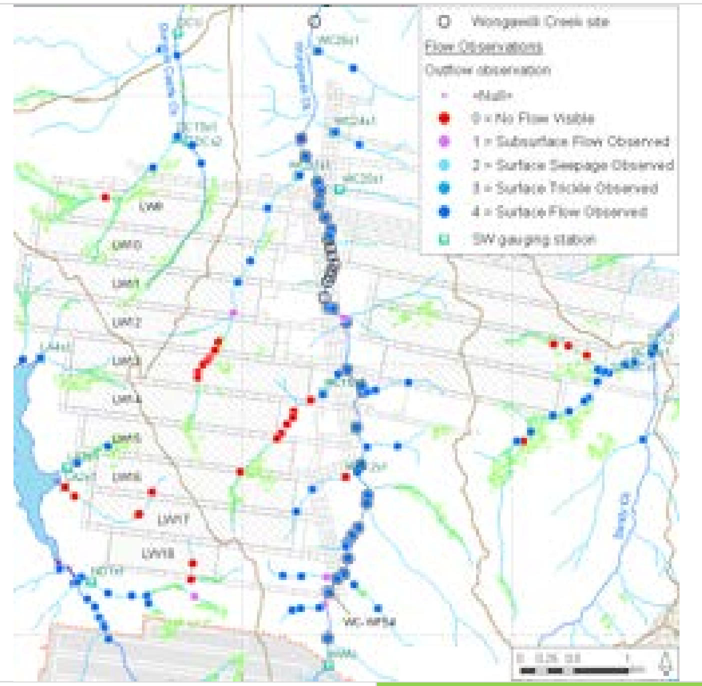
Appendix G: Watercourse flow observations



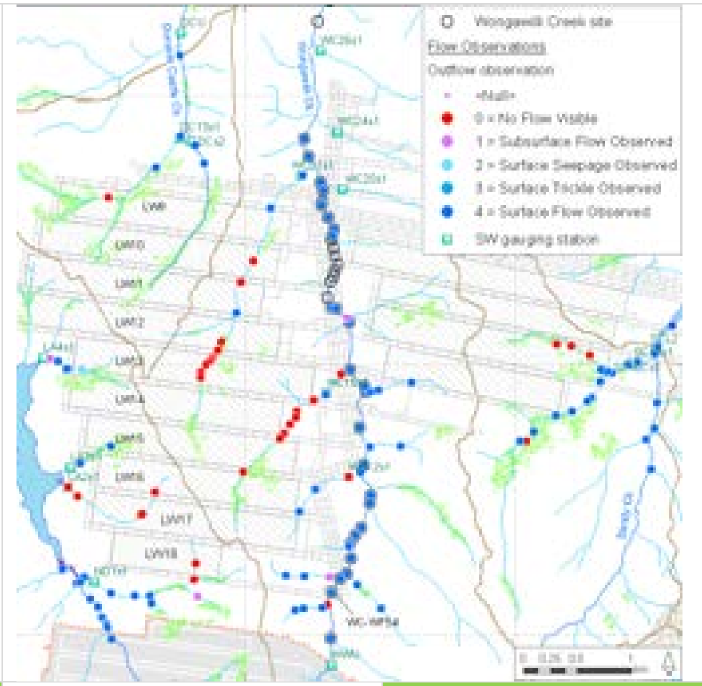
Flow observations: Jun-2022 | Assessment D not triggered



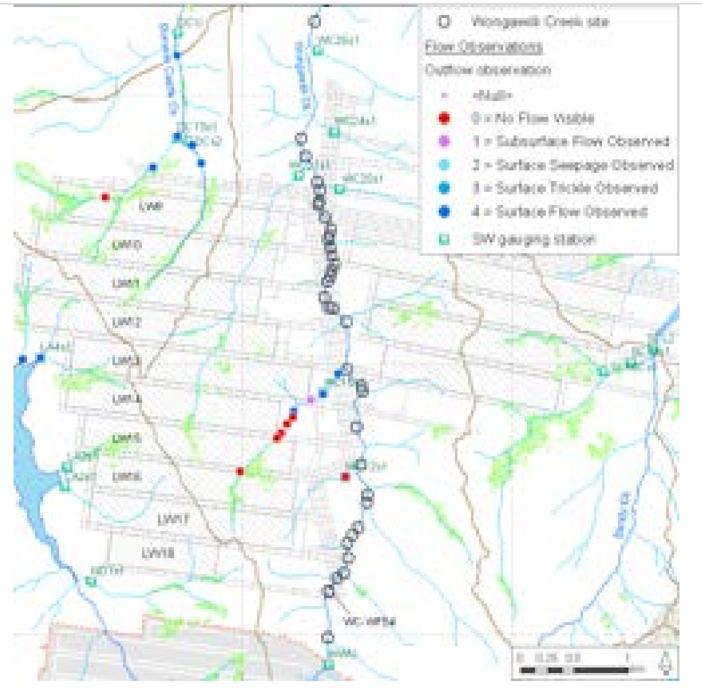
Flow observations: Jul-2022 | Catchment closed *



Flow observations: Aug-2022 | Assessment D not triggered



Flow observations: Sep-2022 | Assessment D not triggered



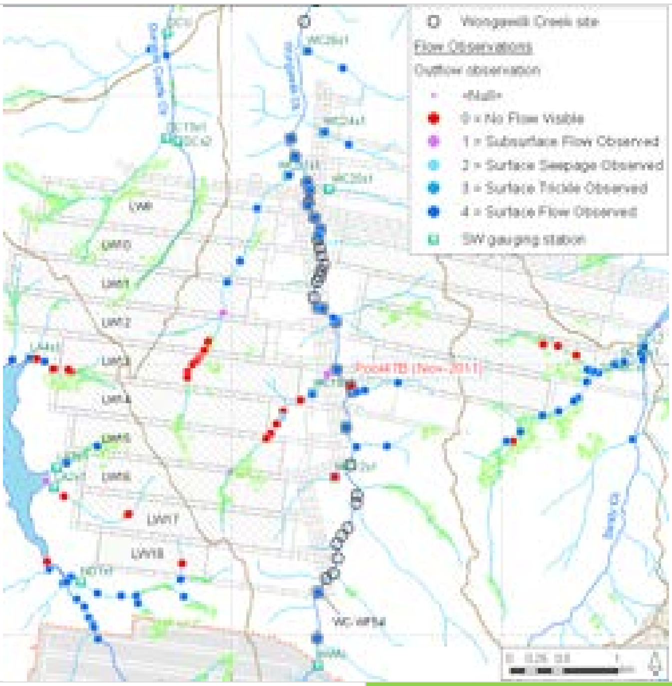
Flow observations: Oct-2022 | Catchment closed *

Outflow observation
- <Null>
- 0 = No Flow Visible
- 1 = Subsurface Flow Observed
- 2 = Surface Seepage Observed
- 3 = Surface Trickle Observed
- 4 = Surface Flow Observed
- Wongawilli Creek site

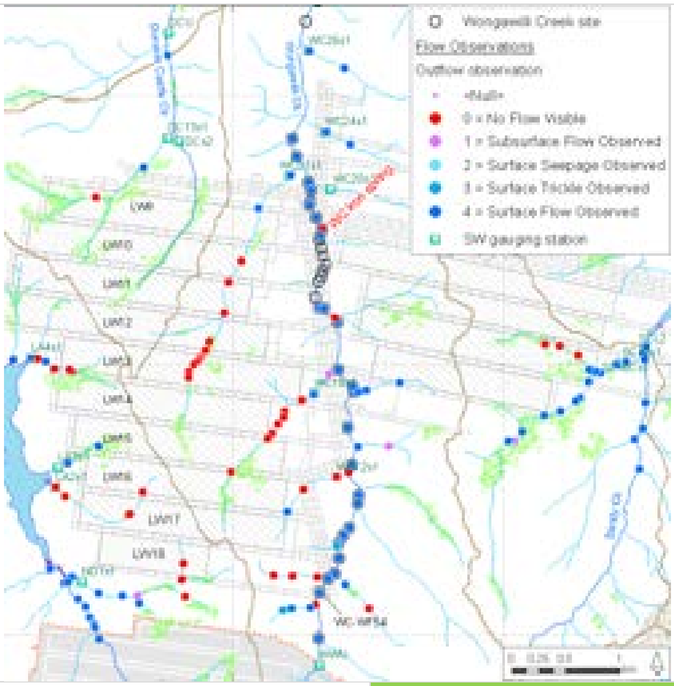
* No or limited observations along Wongawilli Ck because of catchment closure due to high rainfall.

E:\DENDROBIUM\Reports\HGE015\TARP_D\SW Flow observations during LW19.docx
E:\DENDROBIUM\GIS\Maps\Deliverable\EoP19\SWobservations_EOP19.mxd

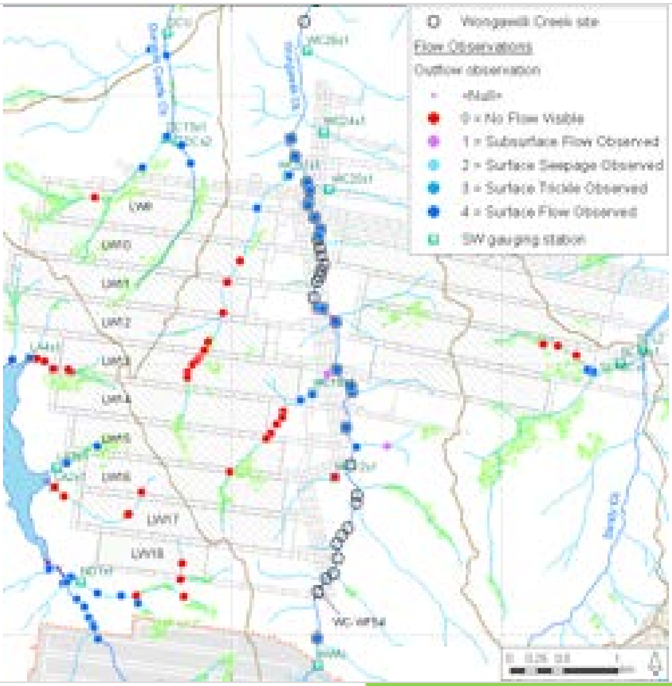
WATERSHED HYDROGEO



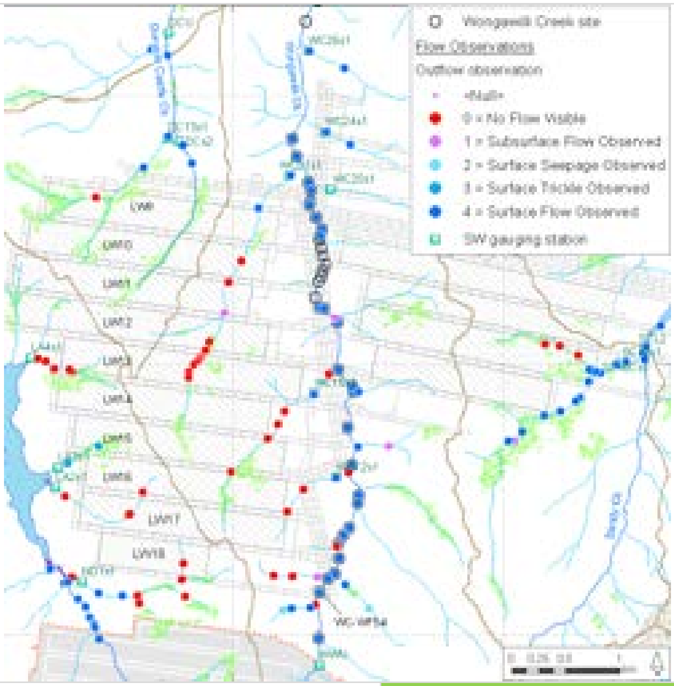
Flow observations: Nov-2022 | Assessment D not triggered



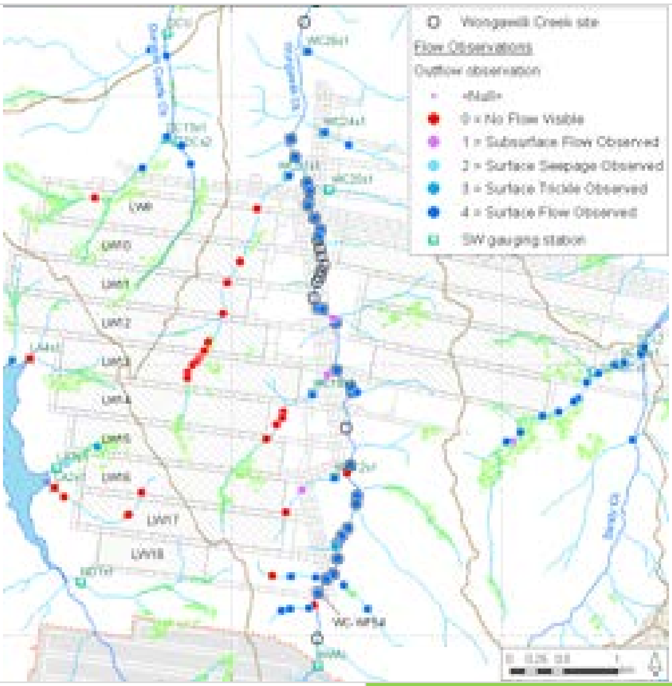
Flow observations: Dec-2022 | Assessment D not triggered



Flow observations: Jan-2023 | Assessment D not triggered



Flow observations: Feb-2023 | Assessment D not triggered



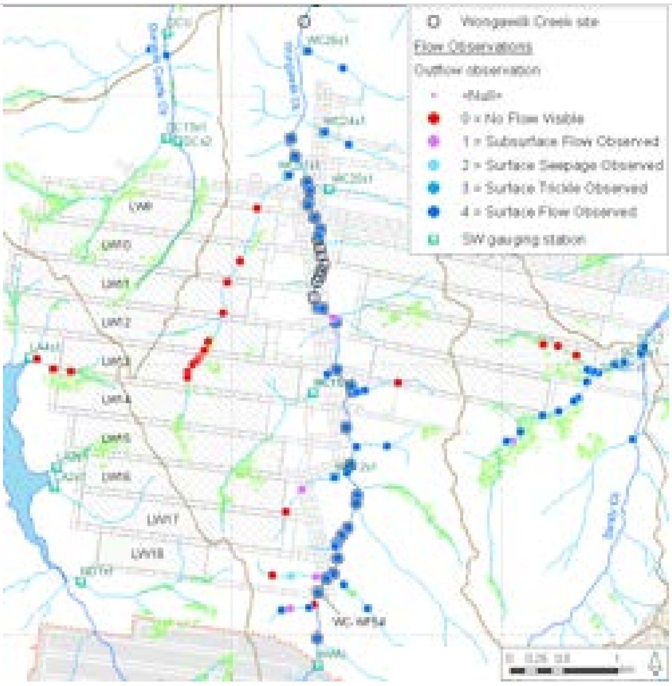
Flow observations: Mar-2023 | Assessment D not triggered

Outflow observation

- <Null>
- 0 = No Flow Visible
- 1 = Subsurface Flow Observed
- 2 = Surface Seepage Observed
- 3 = Surface Trickle Observed
- 4 = Surface Flow Observed
- Wongawilli Creek site

* No or limited observations along Wongawilli Ck because of catchment closure due to high rainfall.

E:\DENDROBIUM\Reports\HGE015\TARP_D\SW Flow observations during LW19.docx
E:\DENDROBIUM\GIS\Maps\Deliverable\EoP19\SWobservations_EOP19.mxd



Flow observations: Apr-2023	Assessment D not triggered

Outflow observation

- × <Null>
- 0 = No Flow Visible
- 1 = Subsurface Flow Observed
- 2 = Surface Seepage Observed
- 3 = Surface Trickle Observed
- 4 = Surface Flow Observed
- O Wongawilli Creek site

* No or limited observations along Wongawilli Ck because of catchment closure due to high rainfall.

Appendix H: Rainfall-runoff modelling

H1. AWBM comparison: DCU – Donalds Castle Creek

This catchment incorporates the headwater sub-catchments DC13 and DCS2, and was mined under at the commencement of Longwall 9, and again by Longwalls 10-12, and marginally by Longwall 13. Longwalls 14-19 are beyond it (to the south). About 60% of the DCU catchment is not mined under.

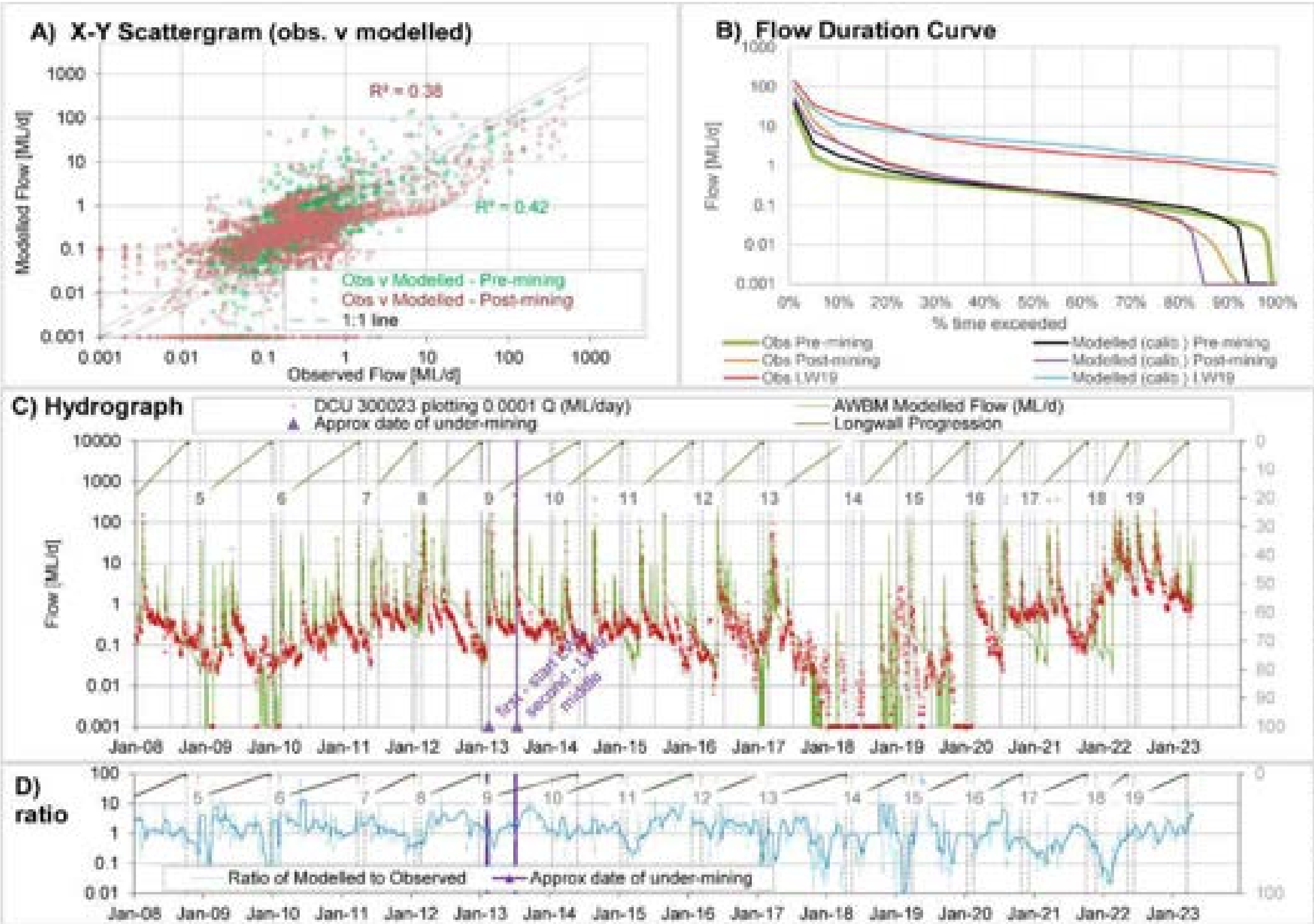


Figure H1 Comparison of observed flow against AWBM simulated flow: DCU

A	This shows that during the pre-mining period the model is a moderate fit to observed data (this site continues to be difficult to calibrate a rainfall-runoff model for). This fit is essentially the same in the post-mining period. Simulation of the very lowest flows remains the main weakness.
B	Confirms the reasonable match between modelled and observed flows for the pre-mining period (black vs green) and illustrates that the model predicts the range of flows reasonably well for the subsequent post-mining period (purple vs orange). The model overestimates lower flows during Longwall 19 (blue vs red).
C	The hydrograph shows a reasonable match between observed flows up until early 2013 (the start of Longwall 9), including periods of zero flow, and the match is the same after that time. The model is considered to capture the 2017-19 drought and flow in the subsequent wetter 2020-23 period quite well. Generally, the flow recessions are matched to a reasonable degree, but there is scope for more improvement in this catchment (it remains the most difficult hydrograph to match. There is no discernible systematic change in behaviour.
D	The pre-mining ratio of modelled to observed flows shows the ratio hovers at about 1 (i.e. a good match between observed and modelled). The post-mining ratio, including during Longwall 19, oscillates around 1, and is similar to the pre-mining behaviour (e.g. see 2009).

Catchment discharge after Longwall 19:	For the complete post-mining period, the water balance [Q*sim* + ET*sim*] is >= -6% of average P*obs* (+12%) (and +4% for Longwall 19 period)	**former TARP – Not triggered**
Assessment:	The flow duration curves suggest that there is no systematic reduction in flow, especially at low flows, during Longwall 19. This is in agreement with the agreed TARP assessment using Reference Sites.	

H2. AWBM comparison: WC12 – Wongawilli Creek tributary

The end of Longwall 15 skirted the north-western edge of this sub-catchment and to within 250 m of the watercourse itself. Longwall 16 mined within 40 m of WC12, and Longwall 17 mined under this watercourse. Longwalls 18-19 did not mine under this sub-catchment (Longwall 19 is 1 km away).

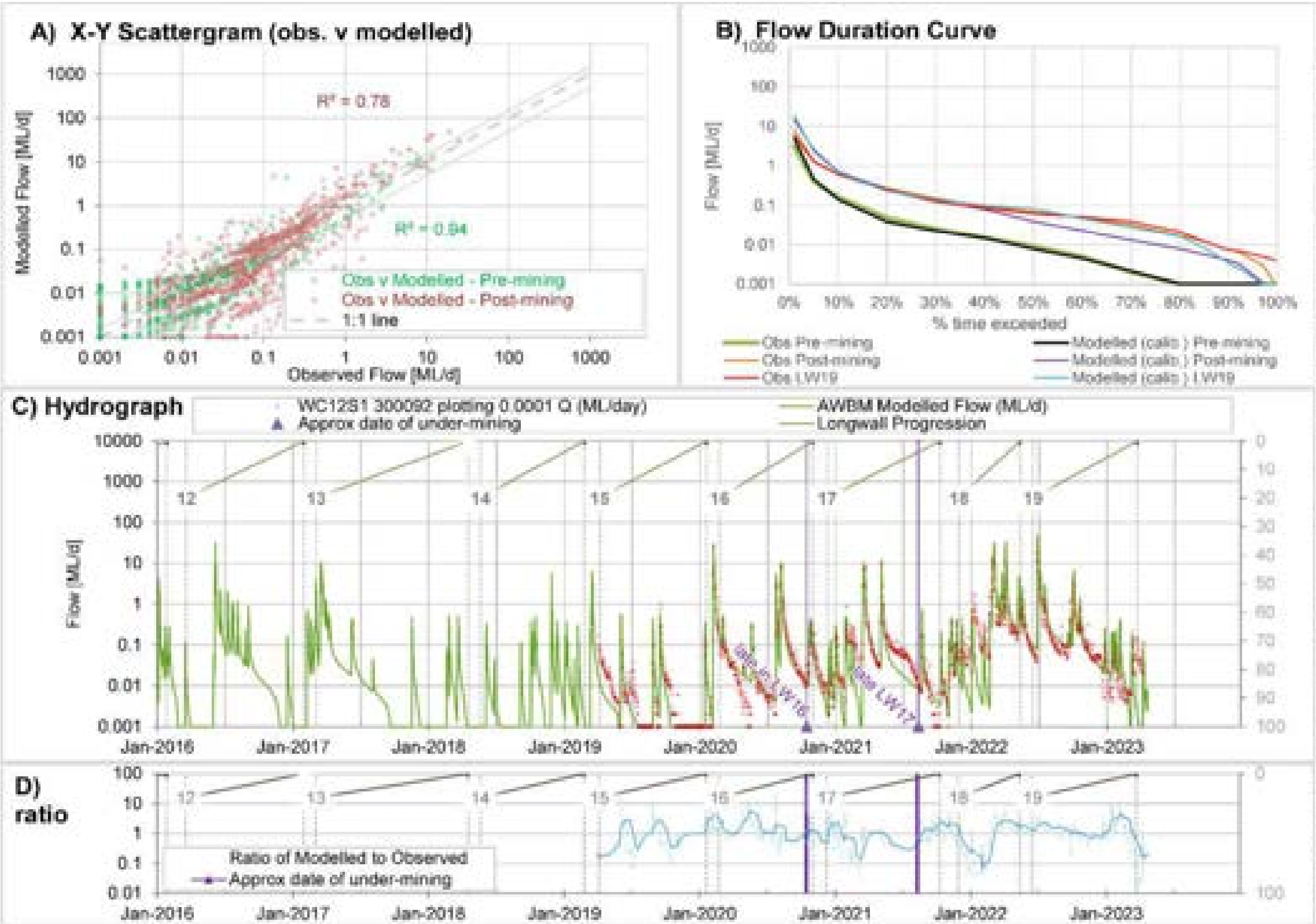


Figure H2 Comparison of observed flow against AWBM simulated flow: WC12

A	This shows that during the short (560 day) pre-mining period the model is a very good fit to observed data (R^2 = 0.84), with the fit weaker in the shorter (605-day) post-mining period, but still good (R^2 = 0.67).
B	Confirms the moderate match between modelled and observed flows for the pre-mining period (black vs green) and illustrates that the model underestimates flow for the subsequent post-mining period (purple vs orange) and also slightly under for the Longwall 19 period (red vs blue).
C	The hydrograph shows a reasonable match between observed flows up until Oct-2020 (as Longwall 16 approaches WC12), including two periods of zero flow during the 2019 drought, and the match is the similar after that time. The model is considered to capture flow in the subsequent wetter 2020-23 period moderately well. Generally, the flow recessions are well matched, but some are over-estimated and some under-estimated in both the pre-mining and post-mining periods. There is no discernible systematic change in behaviour.
D	The pre-mining ratio of modelled to observed flows shows the ratio oscillates at approximately 1 (i.e. a good match between observed and modelled). The post-mining ratio during Longwall 19 has oscillated around 1, and has behaved similarly to the pre-mining ratio.

Catchment discharge after Longwall 19:	For the complete post-mining period, the.water balance [Q*sim* + ET*sim*] is < -6% of average P*obs* (-8.5%)	**former TARP – Level 1**
Assessment:	This assessment suggests that mining effects on surface water flows are likely to occur in this sub-catchment, yet are relatively minor (Level 1). This is the same result as for the Longwall 18 period.	

H3. AWBM comparison: WWL – Wongawilli Creek (lower)

Wongawilli Creek lies between Areas 3A and 3B. The watercourse is not directly mined under by longwalls, but some tributaries (e.g. WC21, WC15, among others) have been mined under by Area 3A and 3B longwalls, including Longwall 19. Longwall 18 is outside the Wongawilli Creek catchment.

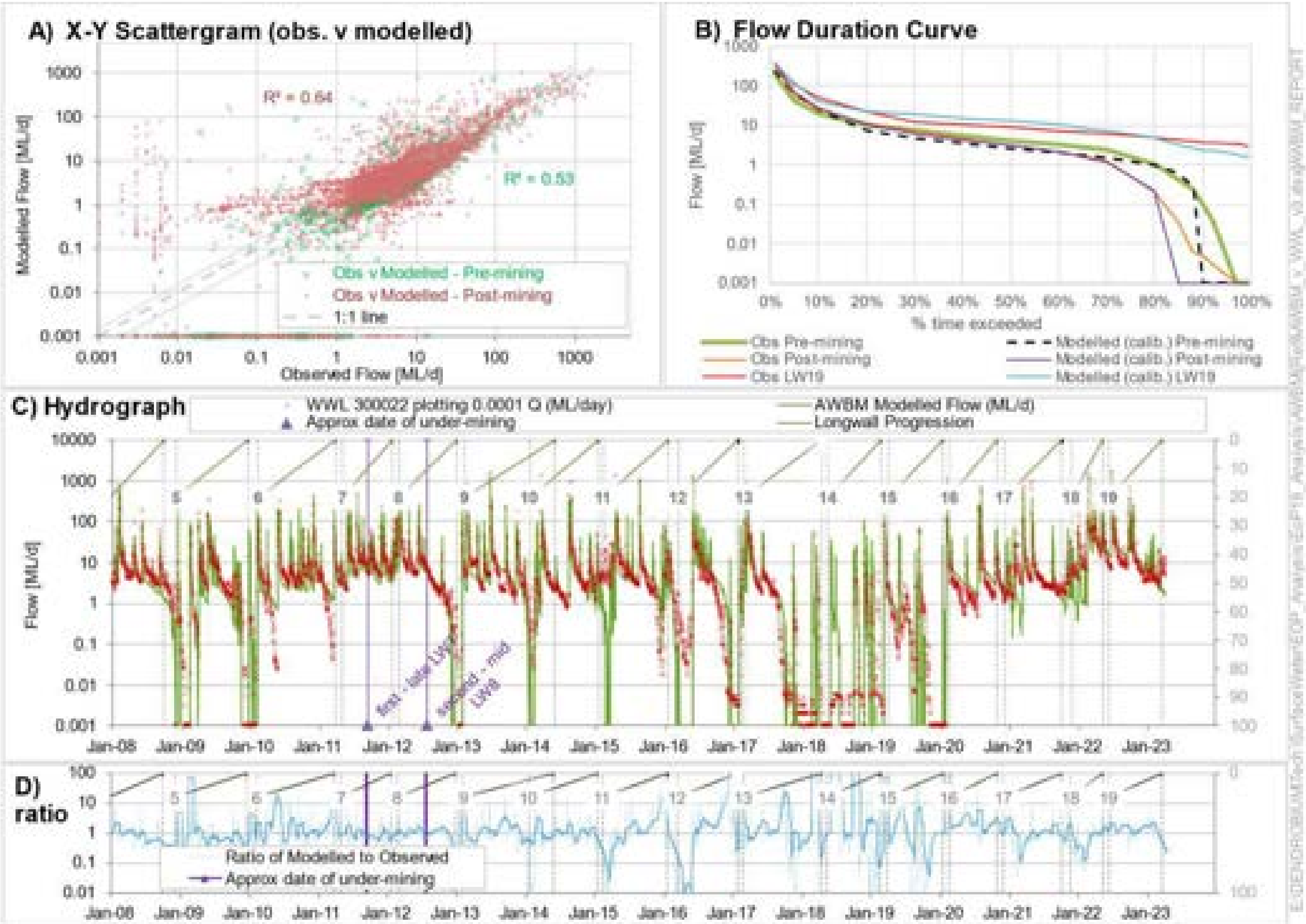


Figure H3 Comparison of observed flow against AWBM simulated flow: WWL

A	This shows that during the pre-mining period the model is a moderate to good fit to observed data (R^2 = 0.53). This fit is slightly better (R^2 = 0.64) in the post-mining period.
B	Confirms the reasonable match between modelled and observed flows for the pre-mining period (black vs green) and illustrates that the model still predicts the range of flows reasonably well for the subsequent post-mining period (purple vs orange) as well as reasonably well during the extremely wet Longwall 19 period – including a good match to low flows during this period.
C	The hydrograph shows a reasonable match between observed flows up until Feb-2010 (the start of Longwall 6), including two periods of zero flow, and the match is the same after that time. The model is considered to capture the 2017-19 drought and flow in the subsequent wetter 2020-23 period quite well. Generally, the flow recessions are well matched, but some are over-estimated and some under-estimated in both the pre-mining and post-mining periods. There is no discernible systematic change in behaviour.
D	The pre-mining ratio of modelled to observed flows shows the ratio hovers at about 1 (i.e. a good match between observed and modelled). The post-mining ratio, including during Longwall 19, oscillates around 1, and is similar to the pre-mining behaviour, although during droughts (when flows were frequently close to 0), the ratio is more variable.

Catchment discharge after Longwall 19:	For the complete post-mining period, the .water balance [Q*sim* + ET*sim*] is >= -6% of average P*obs* (-0.1%)	**former TARP – Not triggered**
Assessment:	The above analysis does not suggest any reduced sub-catchment flow / yield that can be discerned beyond natural variability or model/method accuracy. This is consistent with the agreed TARP assessment using Reference Sites.	

H4. AWBM comparison: ND1S1 on Native Dog tributary ND1

ND1 is a tributary to Native Dog Creek, which flows into Lake Avon. Elouera Colliery longwalls are within or close to this sub-catchment, but were not directly beneath this watercourse or its tributaries. Dendrobium Longwall 18 mined under the upstream parts of the ND1 catchment.

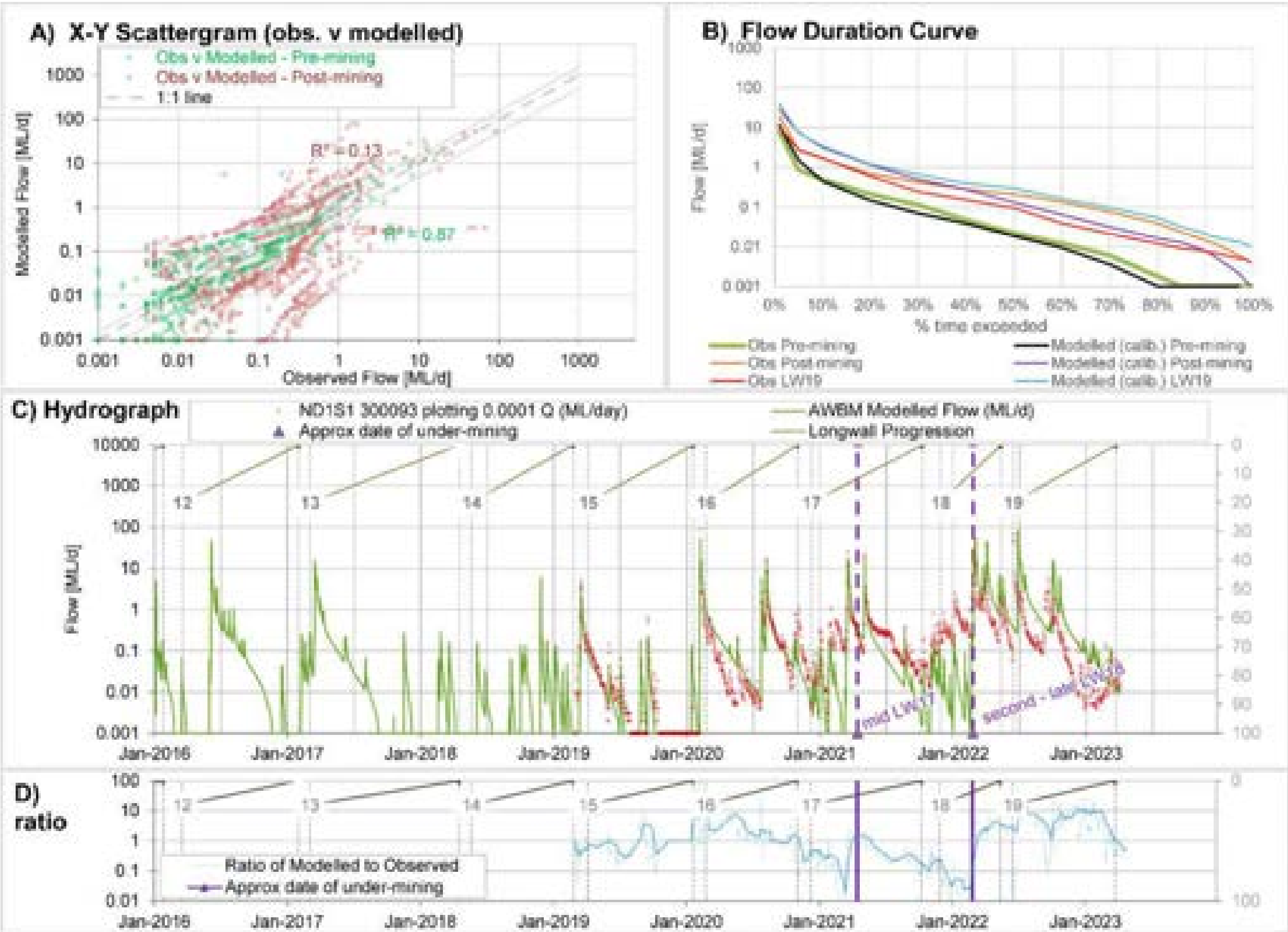


Figure H4 Comparison of observed flow against AWBM simulated flow: ND1

A	This shows that during the pre-mining period the model is a good fit to observed data (R2 = 0.87), while the fit in the post-mining period is much poorer. In part, this is related to the choice of rainfall input. None of the available rainfall series, or combinations, is an appropriate match for the pattern of flow during 2021-23, sometimes causing over-estimated flow and under-estimated flow.
B	Confirms the reasonable match between modelled and observed flows for the pre-mining period (black vs green) and illustrates that the model still tends to under-estimate low flows for the summer of 2021-22 period (purple vs orange) [see comment re: rainfall, above].
C	The hydrograph shows a reasonable match between observed flows up until Jan-2022 (late in Longwall 17), including two periods of zero flow early in Longwall 17. The model then underestimates flows in the summer of 2021-22 (as at some other sites). From Mar-2022, observed flows are consistently below modelled, and the timing of this suggests that Longwall 18 has affected (reduced) the baseflow input to ND1 .
D	The pre-mining ratio of modelled to observed flows shows the ratio hovers at about 1 (i.e. a good match between observed and modelled), but tends to >1 during 2020. Halfway through Longwall 18, the ratio has increased significantly, suggesting a mining effect.

Catchment discharge after Longwall 19:	For the complete post-mining period, the.water balance [Q*sim* + ET*sim*] is < -12% of average P*obs* (-16%)	**former TARP – Level 2**
Assessment:	The above analysis suggests that halfway through Longwall 18, this site has been affected by mining, which is unsurprising given that Longwall 18 passed under the headwaters of this sub-catchment, including tributary ND1C. This is different to the agreed TARP assessment using Reference Sites. During the Longwall 19 period, the flow effects are milder, however continue to be lower than modelled.	

H5. AWBM comparison: SC10S1 on Sandy Creek tributary SC10

SC10 is a tributary to Sandy Creek, which flows into Lake Cordeaux. Earlier Area 3A longwalls are within or close to this sub-catchment, but were not directly beneath this watercourse Dendrobium Longwall 19 mined under the parts of the SC10 catchment. An initial comment is that this site has proven difficult to simulate with AWBM. The flow in this subcatchment (in mm/d per unit area) is high compared to other catchments, which causes problems with selecting a rainfall sequence.

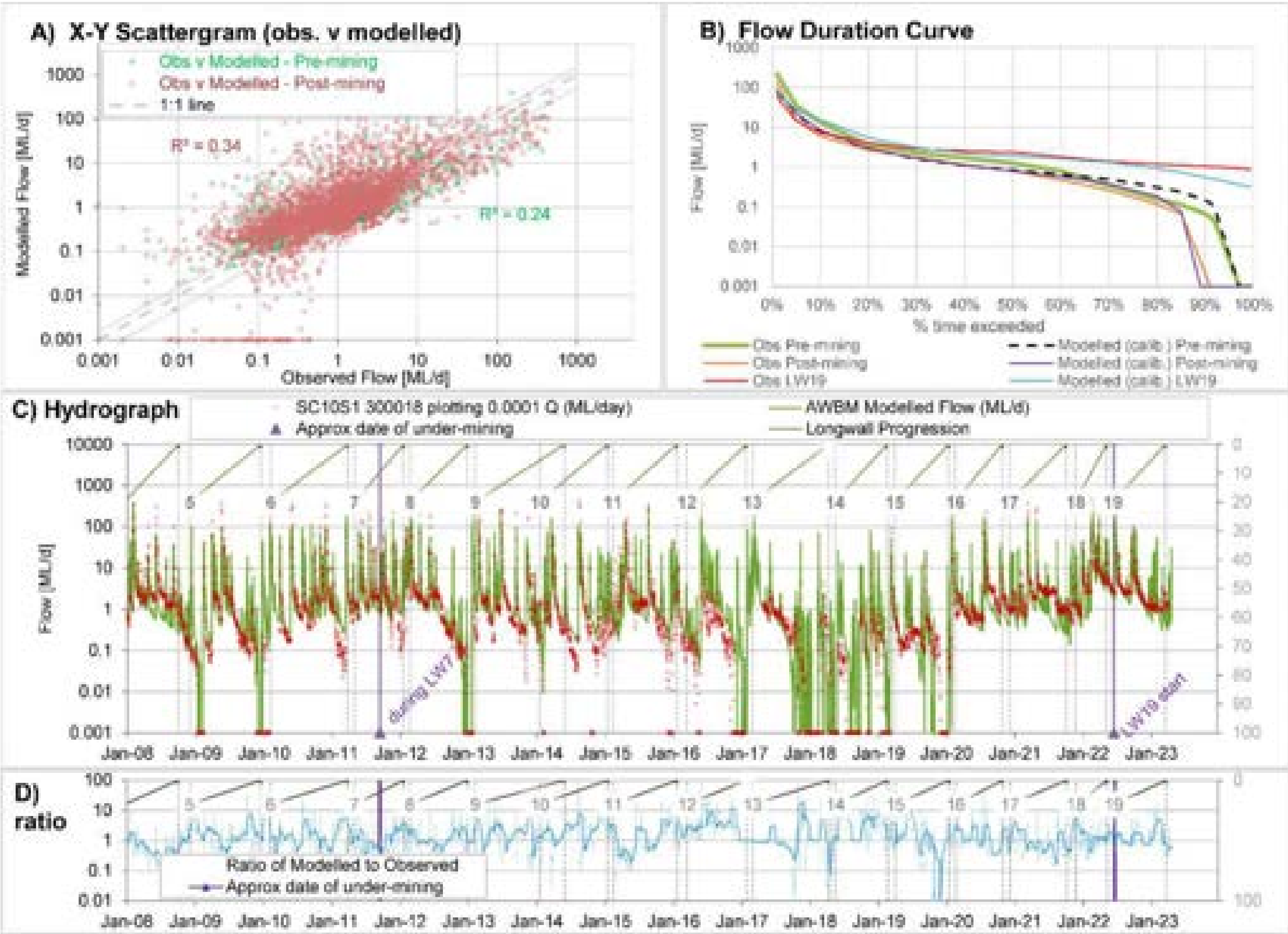


Figure H5 Comparison of observed flow against AWBM simulated flow: SC10

A	This shows that during the pre-mining period the model is a poor fit to observed data (R2 = 0.24), while the fit in the post-mining period similar (0.34).
B	This shows a reasonable match between modelled and observed flows for the pre-mining period (black vs green), albeit that observed flows above Q60 are much higher than modelled flows. This also illustrates that the model tends to match flows for the post-mining period (purple vs orange) and Longwall 19 period (red vs blue).
C	The hydrograph shows a passable match between observed and modelled in the pre- and post-mining periods. The hydrograph does not indicate any significant change in behaviour.
D	The pre-mining ratio of modelled to observed flows shows the ratio hovers at about 1 (i.e. a good match between observed and modelled), is quite noisy, which reflects on the issue of trying to calibrate a rainfall runoff model to flows in this sub-catchment.

Catchment discharge after Longwall 19:	For the complete post-mining period, the water balance [Q*sim* + ET*sim*] is > -6% of average P*obs* (+9%)	**former TARP not triggered**
Assessment:	The above analysis suggests that an effect is not detectable in this catchment (consistent with the TARP assessment using Reference Sites). **However, we should stress that this finding has a low reliability given the difficulty in matching flows in this catchment using a rainfall-runoff model.**	

H6. AWBM comparison: GS2122205 on Sandy Creek

Sandy Creek flows into Lake Cordeaux near Area 3A. Area 2 Longwall 5 mined along the eastern edge of this catchment, while Area 3A Longwalls 7-8 mined beneath this catchment, as did Longwall 19. All these longwalls were at least 400 m from the watercourse (but closer to tributaries, e.g. SC10).

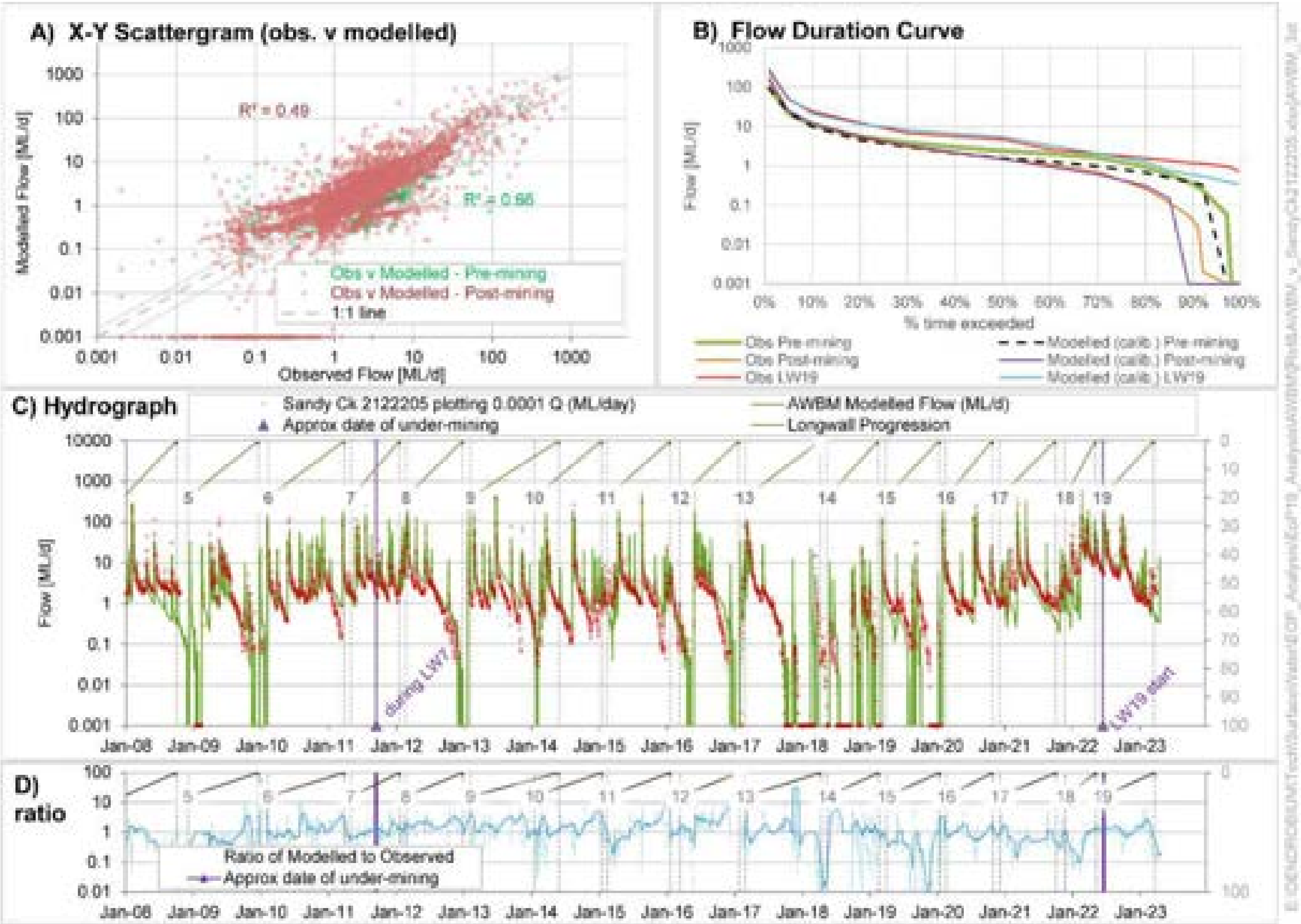


Figure H6 Comparison of observed flow against AWBM simulated flow: Sandy Creek

A	This shows that during the pre-mining period the model is a moderate to good fit to observed data (R2 = 0.66), while the fit in the post-mining period is similar (0.49).
B	Confirms the reasonable match between modelled and observed flows for the pre-mining period (black vs green) and illustrates that the model tends to slightly under-estimate low flows in the post-mining period (purple vs orange/ blue vs red) but is still a good match.
C	The hydrograph shows a reasonable match between observed flows through the historical period, including dry spells in 2013 and 2017-19. Some other periods of low flow are under-estimated by the model, while some are over-estimated. There is no clear difference in the degree to which the model matches the pre-mining period compared to the post-mining period, except perhaps during the 2012-2016.
D	The pre-mining ratio of modelled to observed flows shows the ratio hovers at about 1 (i.e. a good match between observed and modelled), but tends to >1 during 2013-16, before settling down again from 2017 (and continuing around 1 through to 2023).

Catchment discharge after Longwall 19:	For the complete post-mining period, the.water balance [Q*sim* + ET*sim*] is < -6% of average P*obs* (-0.4%)	**former TARP – No triggered** (but close to Level 1 during Longwall 19 alone)
Assessment:	The above analysis suggests this site has not been clearly affected by mining by Longwall 19, but mild effects from earlier mining (Longwalls 7 and 8 in Area 3A) may have occurred – which would match observations made about tributary catchment SC10C. This is consistent with the agreed TARP assessment using Reference Sites.	

H5. Parameters used for AWBM by modelled sub-catchment

AWBM was first developed by W. Boughton in the early 1990s (Boughton, 2004; Boughton and Chiew, 2003). The model takes average rainfall and potential evaporation across a catchment as inputs on a daily timestep. The user provides parameters to describe the relative area and soil moisture storage capacity of three stores covering the catchment (**Figure H5**).

Based on these inputs and parameters, surface runoff and baseflow are calculated and then released from the relevant storage using a linear decay (*Ksurf* or *Kbase*). These decayed flows are summed to estimate total catchment outflow on a daily basis.

Most of the parameters relate in part to the simulated connected groundwater system in the catchment. For this project, AWBM has been populated and run via a spreadsheet version of the AWBM model.

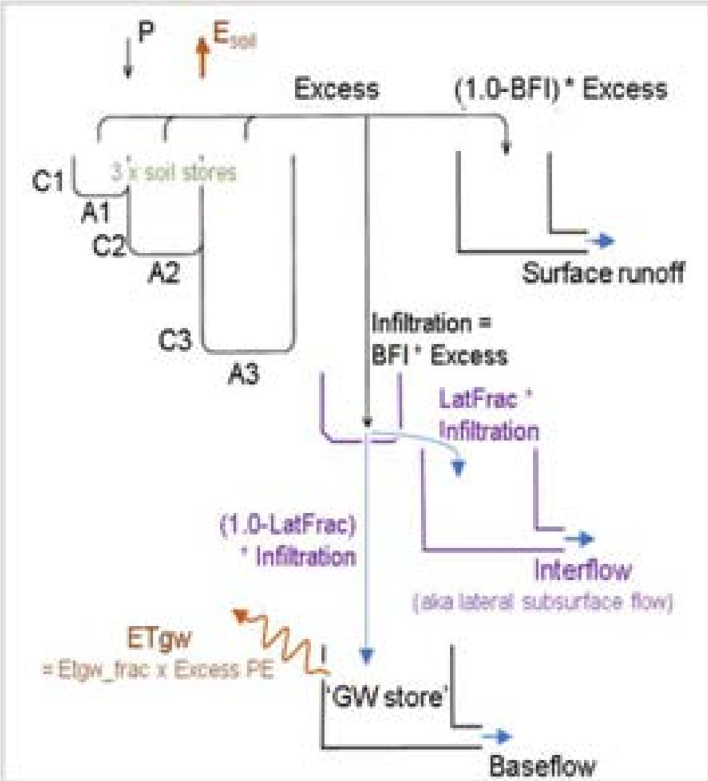


Figure H5. AWBM Rainfall-runoff model flow diagram

(modified from Boughton, 2004)

Table H1. AWBM parameters and inputs for selected Dendrobium catchment models

SITE	A1 area - fraction	A2 area - fraction	A3 area - fraction	Kbase fraction	Klat fraction	Ksurf fraction	BFI fraction	LatFrac fraction	C1 mm	C2 mm	C3 mm	ETgw fraction
Donalds Castle Creek catchments												
DCU	0.08	0.20	0.72	0.99	0.7	0.30	0.60	0.7	0.04	0.25	0.40	0.006
Wongawilli Creek catchments												
WC12	0.1	0.55	0.35	0.982	0.85	0.35	0.32	0.7	0.015	0.175	0.35	0.01
WWL	0.3	0.35	0.35	0.992	0.8	0.20	0.60	0.7	0.015	0.15	0.25	0.04
Lake Avon catchments												
ND1	0.02	0.40	0.58	0.975	0.85	0.5	0.5	0.5	0.06	0.15	0.40	0.06
Sandy Creek catchments												
x												
x												

SITE	DAILY RAINFALL INPUT	EVAPORATION INPUTS
Donalds Castle Creek catchments		
DCU	Daily SILO Data Drill “DEN-South” to Oct-2007. Average of Dendrobium Centroid and A3B rainfall records used for Oct-2007-2021.	Daily SILO “DEN-South” Pan Evaporation (‘Evap’). Pan factor of 1. ET_{Gw} simulated from 0.6% of this sub-catchment.
Wongawilli Creek catchments		
WC12	Average of SILO Data Drill “DEN-South” and WaterNSW Browns Road rainfall used.	Daily SILO “DEN-South” Pan Evaporation (‘Evap’). Pan factor of 1. ET_{Gw} simulated from 1% of this sub-catchment.
WWL	Daily SILO Data Drill “DEN-South” to Oct-2007. Average of Dendrobium Centroid, A3B and SILO “DEN-South” rainfall records used for Oct-2007-2021.	Daily SILO “DEN-South” Pan Evaporation (‘Evap’). Pan factor of 1. ET_{Gw} simulated from 1% of this sub-catchment.
Native Dog Creek catchments		
ND1	Average of Daily SILO Data Drill “DEN-South” and WaterNSW Browns Road to Oct-2007. Average of Dendrobium Centroid, A3B, Browns Rd and SILO “DEN-South” rainfall records used for Oct-2007-2021.	Daily SILO “DEN-South” Pan Evaporation (‘Evap’). Pan factor of 1. ET_{Gw} simulated from 6% of this sub-catchment.
Sandy Creek catchments		
WC12	Average of SILO Data Drill “DEN-South” and WaterNSW Browns Road rainfall used.	Daily SILO “DEN-South” Pan Evaporation (‘Evap’). Pan factor of 1. ET_{Gw} simulated from 1% of this sub-catchment.
WWL	Daily SILO Data Drill “DEN-South” to Oct-2007. Average of Dendrobium Centroid, A3B and SILO “DEN-South” rainfall records used for Oct-2007-2021.	Daily SILO “DEN-South” Pan Evaporation (‘Evap’). Pan factor of 1. ET_{Gw} simulated from 1% of this sub-catchment.