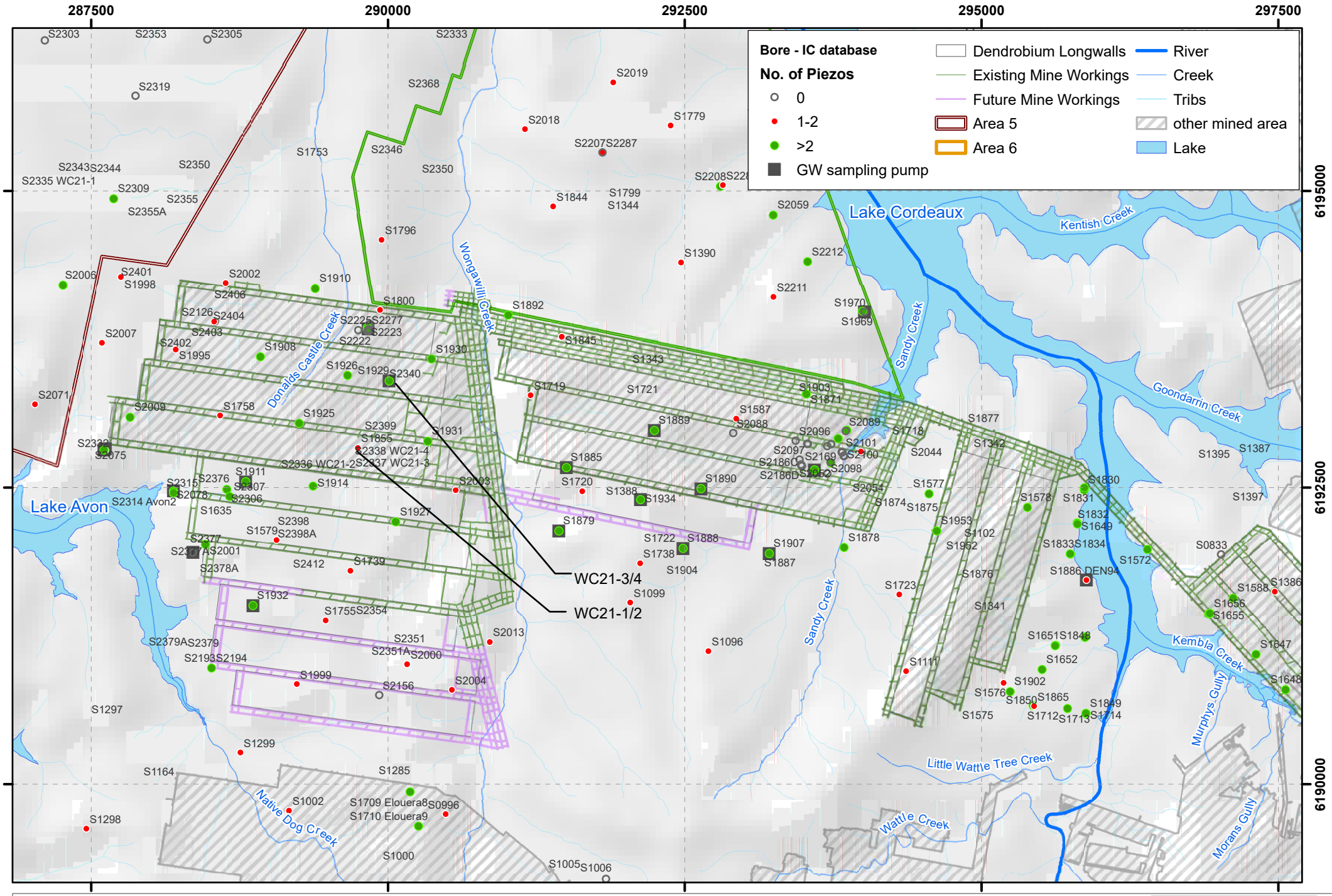
APPENDIX A GROUNDWATER MONITORING NETWORK AT DENDROBIUM [2018]



0 0.3 0.6 0.9 1.2 km

Scale: 40,000 @A4
GDA 1994 MGA Zone

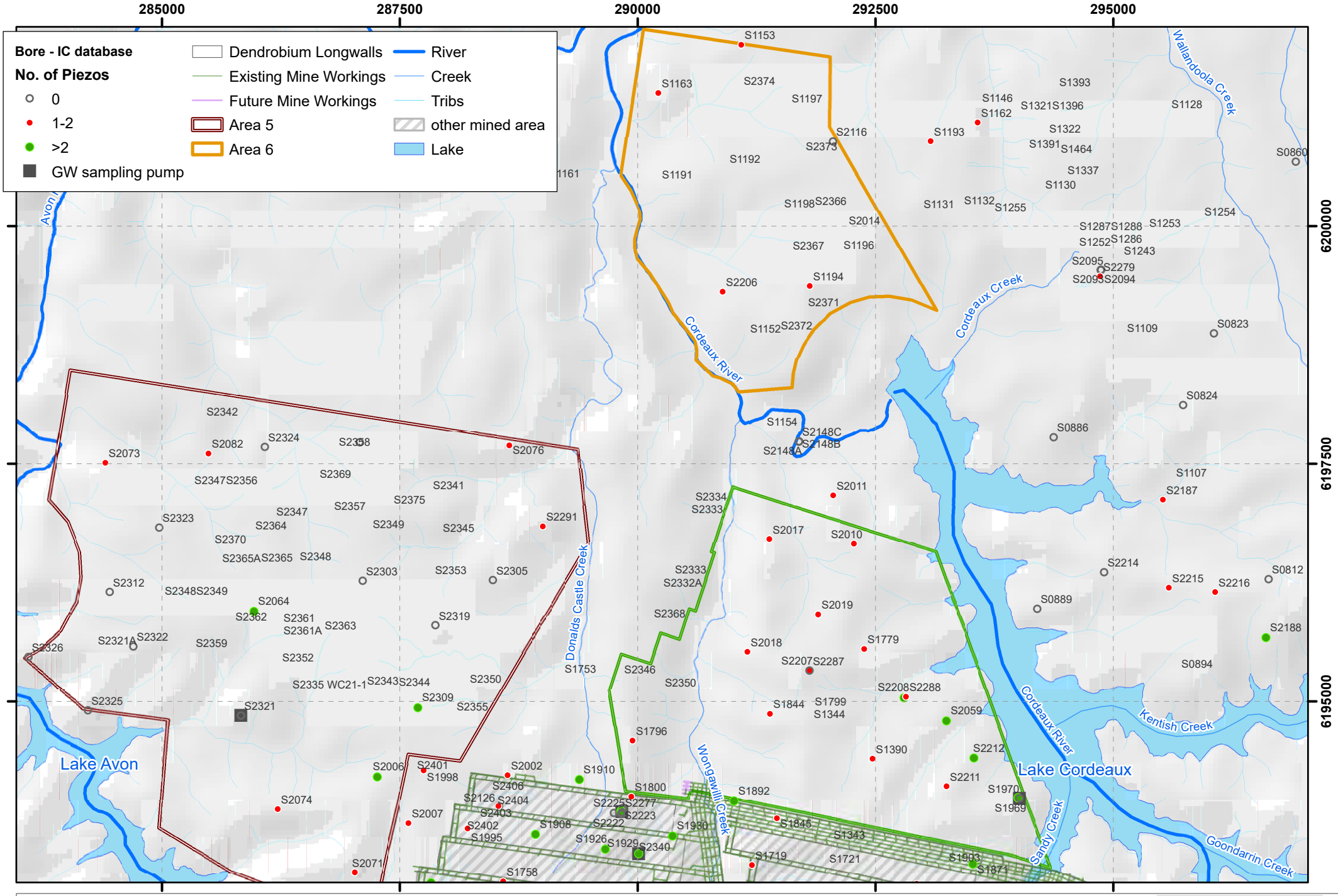
Rev: B. Date: 07/02/2017. Created by: WMinchin

E:\DENDROBIUM\GIS\Maps\Deliverable\DNDPGW\GWmonitoring_Areas23A3B.mxd

Dendrobium Mine - Coal for Steelmaking | Groundwater Assessment

Groundwater Monitoring at Dendrobium - Areas 2, 3A, 3B

Figure A1



0 0.4 0.8 1.2 1.6 km

Scale: 50,000 @A4
GDA 1994 MGA Zone

Rev: B. Date: 07/02/2017. Created by: WMinchin

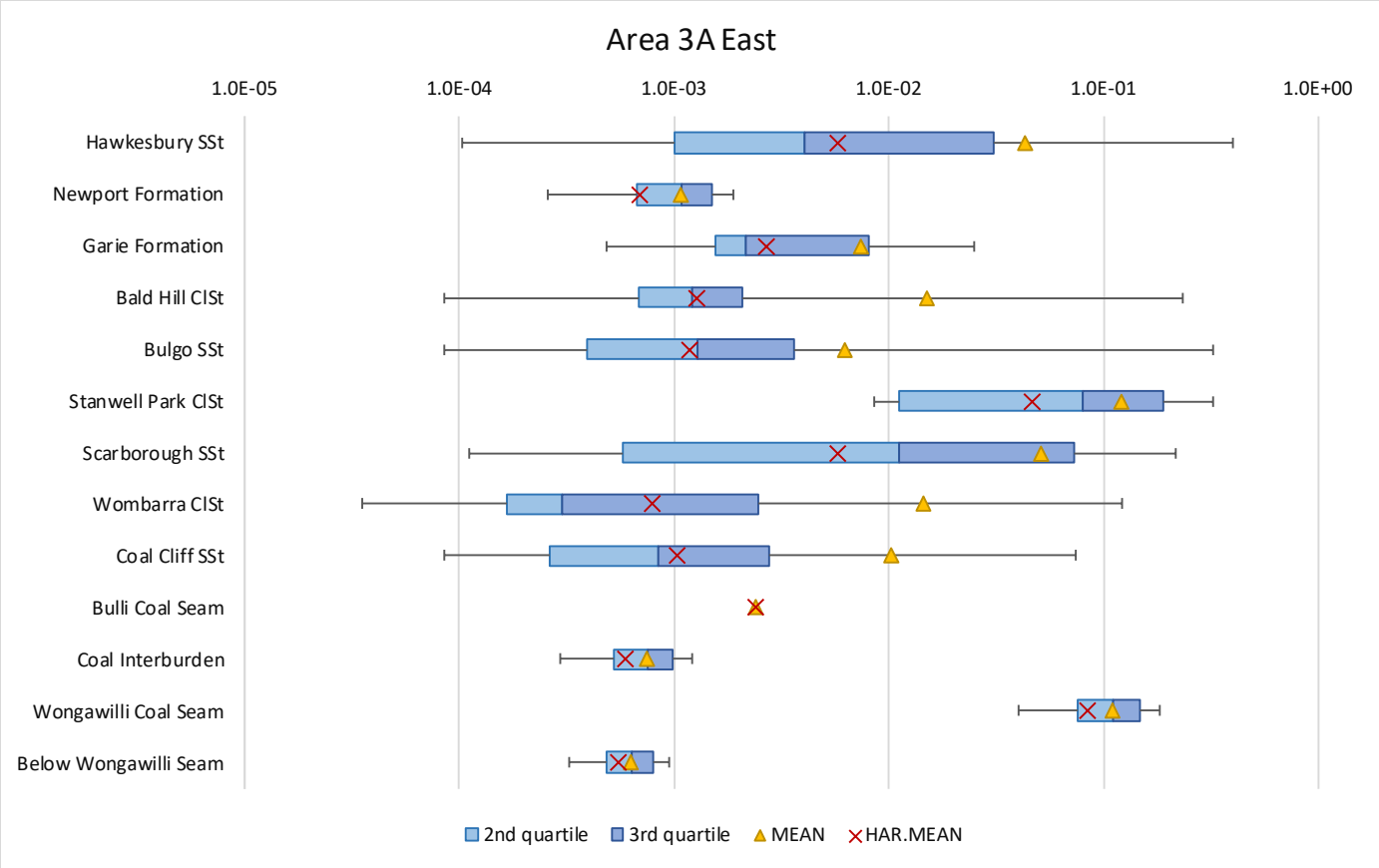
E:\DENDROBIUM\GIS\Maps\Deliverable\DNDPGW\GWmonitoring_Areas3C56.mxd

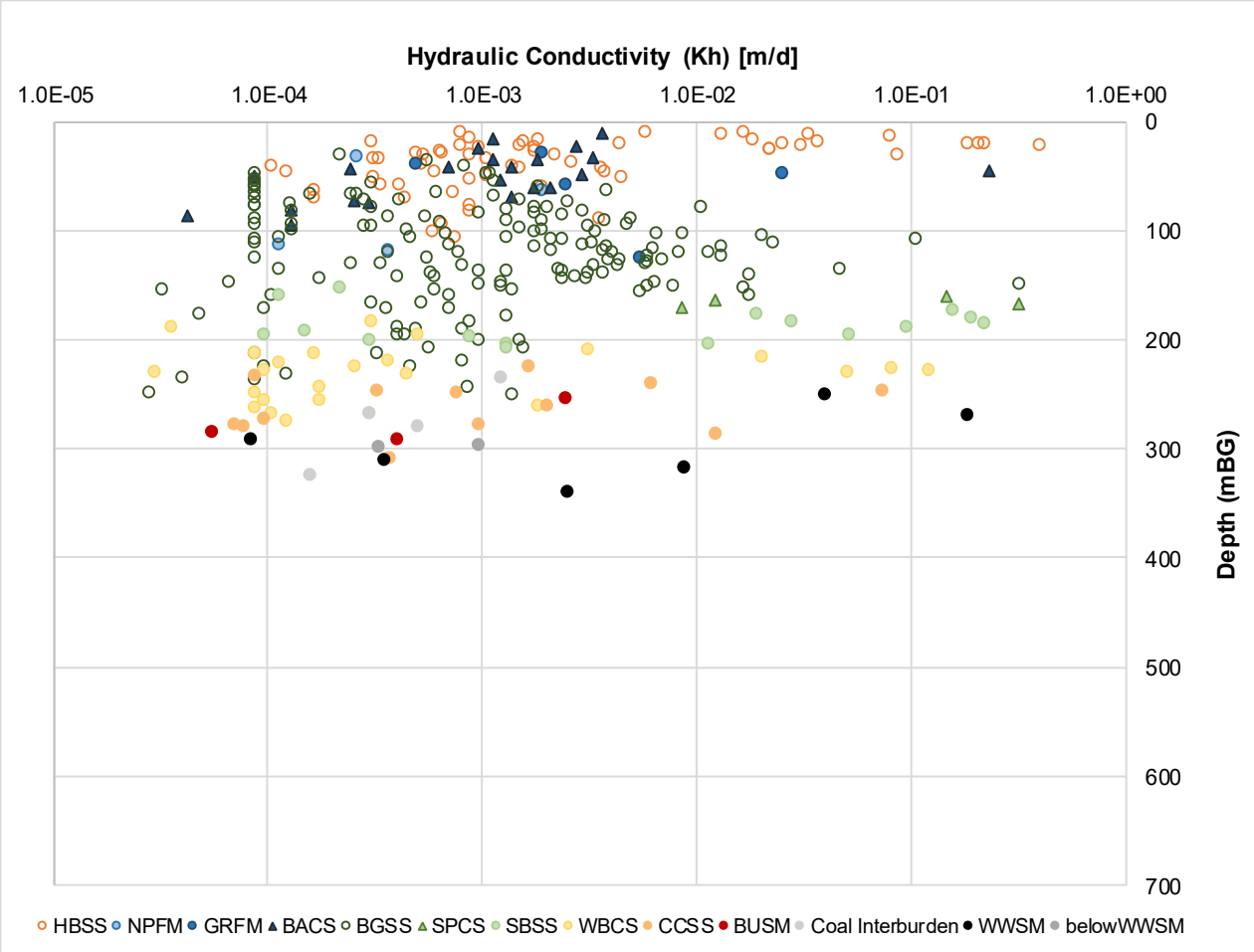
Dendrobium Mine - Coal for Steelmaking | Groundwater Assessment

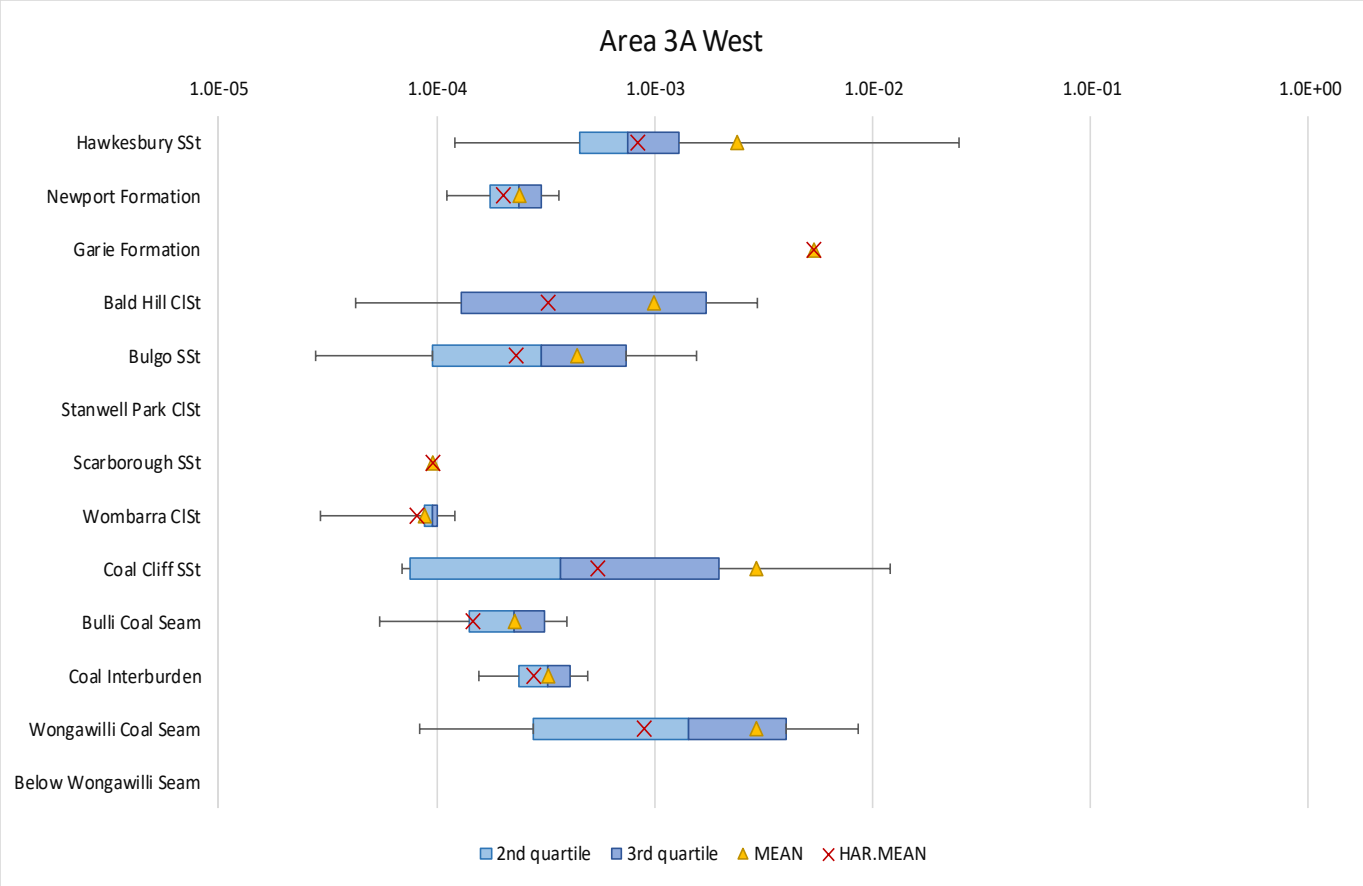
Groundwater Monitoring at Dendrobium - Areas 3C, 5 and 6

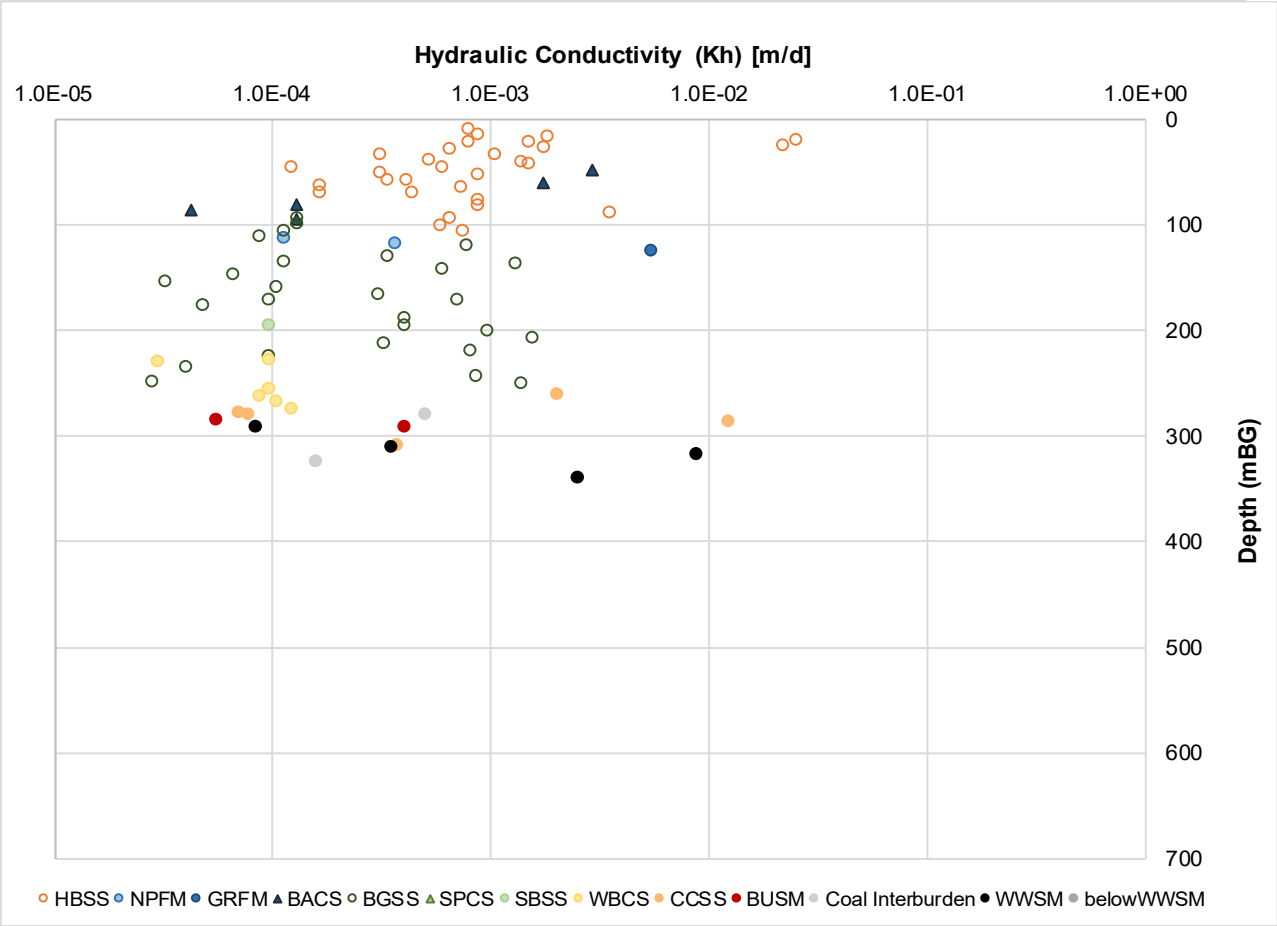
Figure A2

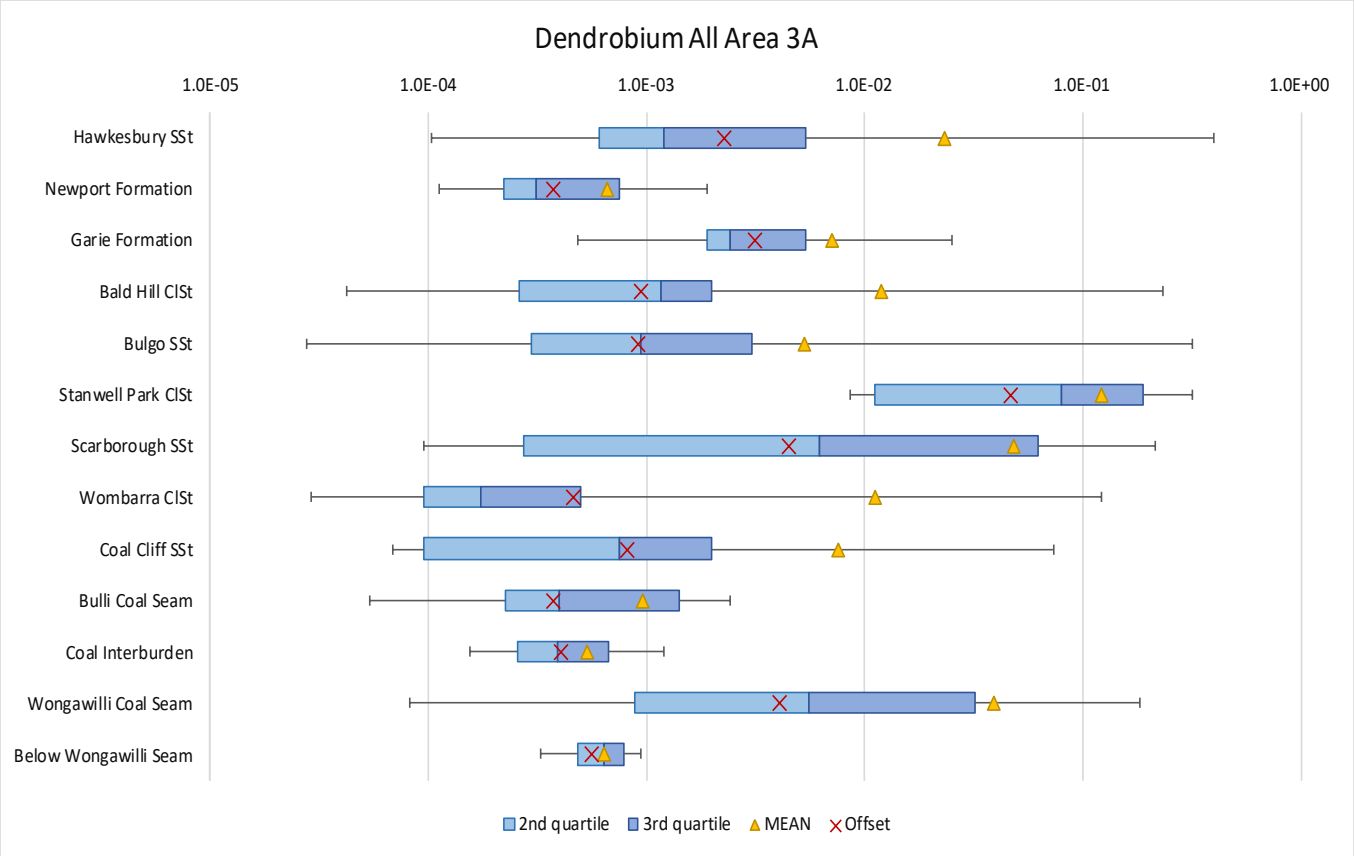
APPENDIX B SPATIAL VARIATION IN HORIZONTAL PERMEABILITY FROM PACKER DATA

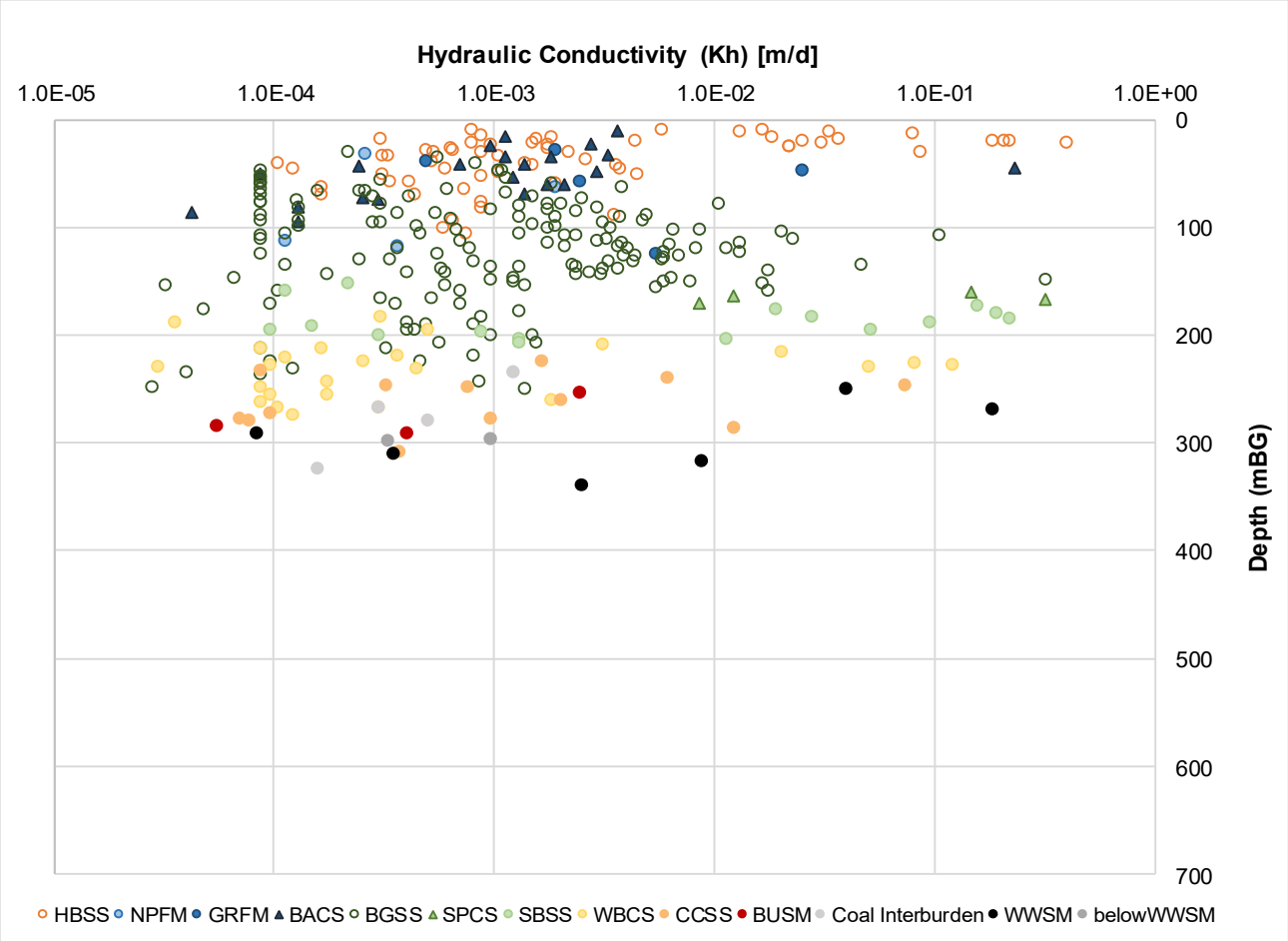

Area 3A East
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
Hawkesbury SSt
Newport Formation
Garie Formation
Bald Hill ClSt
Bulgo SSt
Stanwell Park ClSt
Scarborough SSt
Wombarra ClSt
Coal Cliff SSt
Bulli Coal Seam
Coal Interburden
Wongawilli Coal Seam
Below Wongawilli Seam
2nd quartile
3rd quartile
MEAN
HAR.MEAN

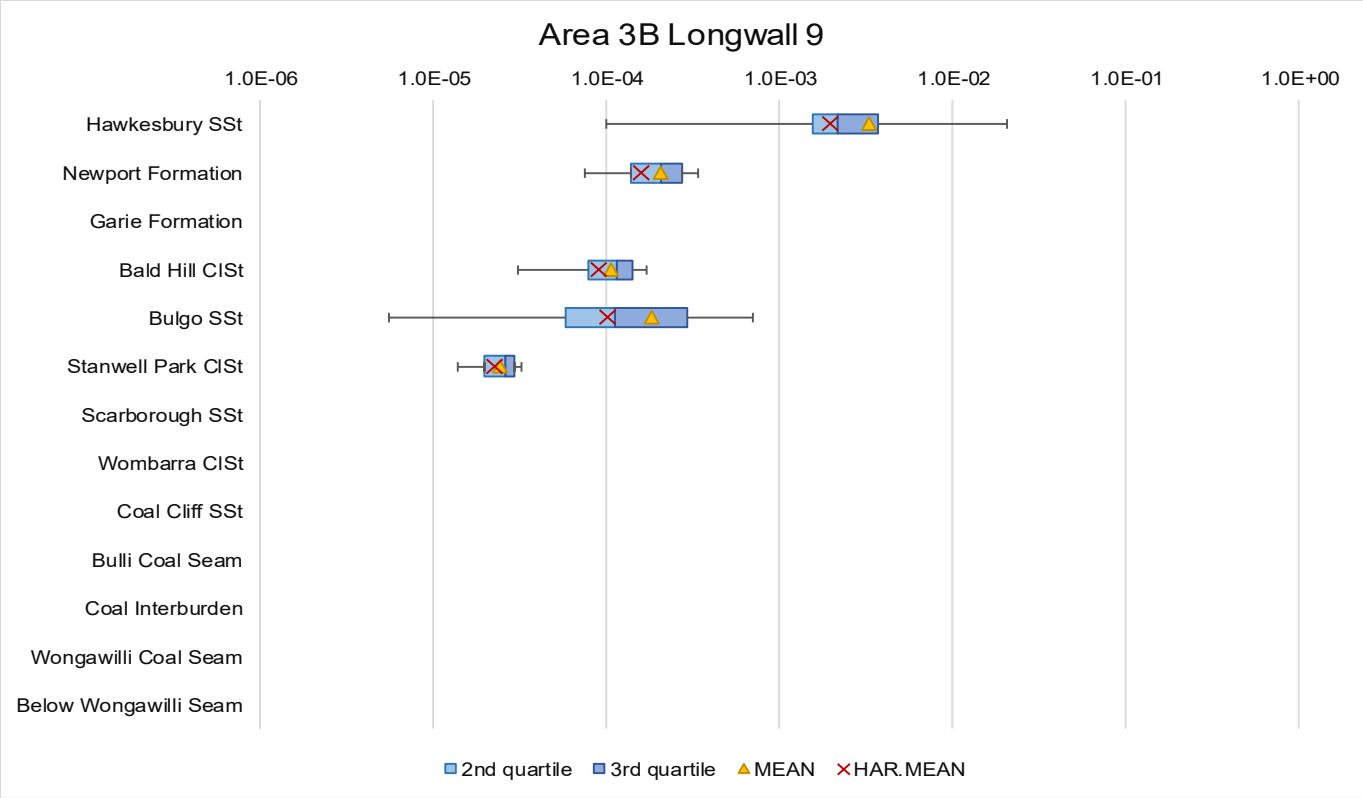

Hydraulic Conductivity (Kh) [m/d]
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
0
100
200
300
400
500
600
700
Depth (mBG)
HBSS
NPFM
GRFM
BACS
BGSS
SPCS
SBSS
WBCS
CCSS
BUSM
Coal Interburden
WWSM
belowWWSM

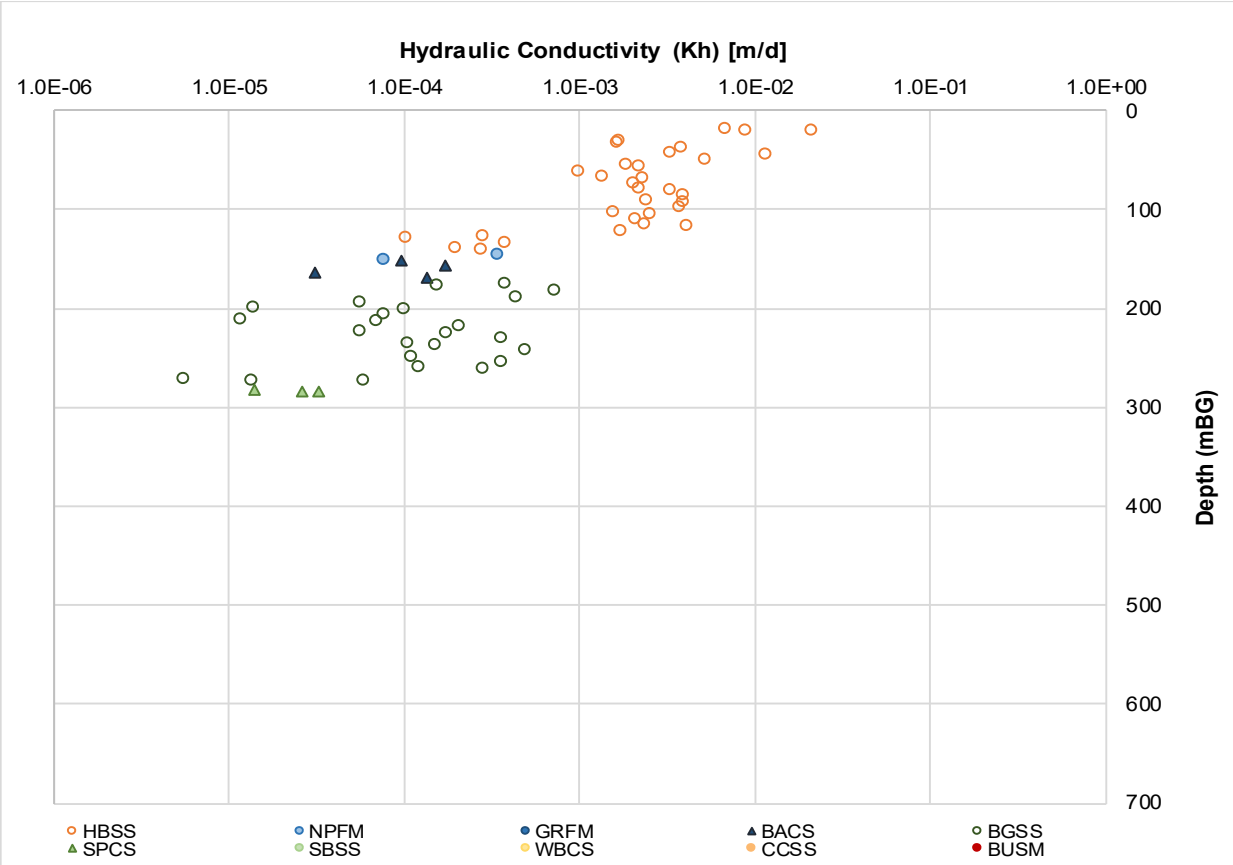

Area 3A West
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
Hawkesbury SSt
Newport Formation
Garie Formation
Bald Hill ClSt
Bulgo SSt
Stanwell Park ClSt
Scarborough SSt
Wombarra ClSt
Coal Cliff SSt
Bulli Coal Seam
Coal Interburden
Wongawilli Coal Seam
Below Wongawilli Seam
2nd quartile
3rd quartile
MEAN
HAR.MEAN

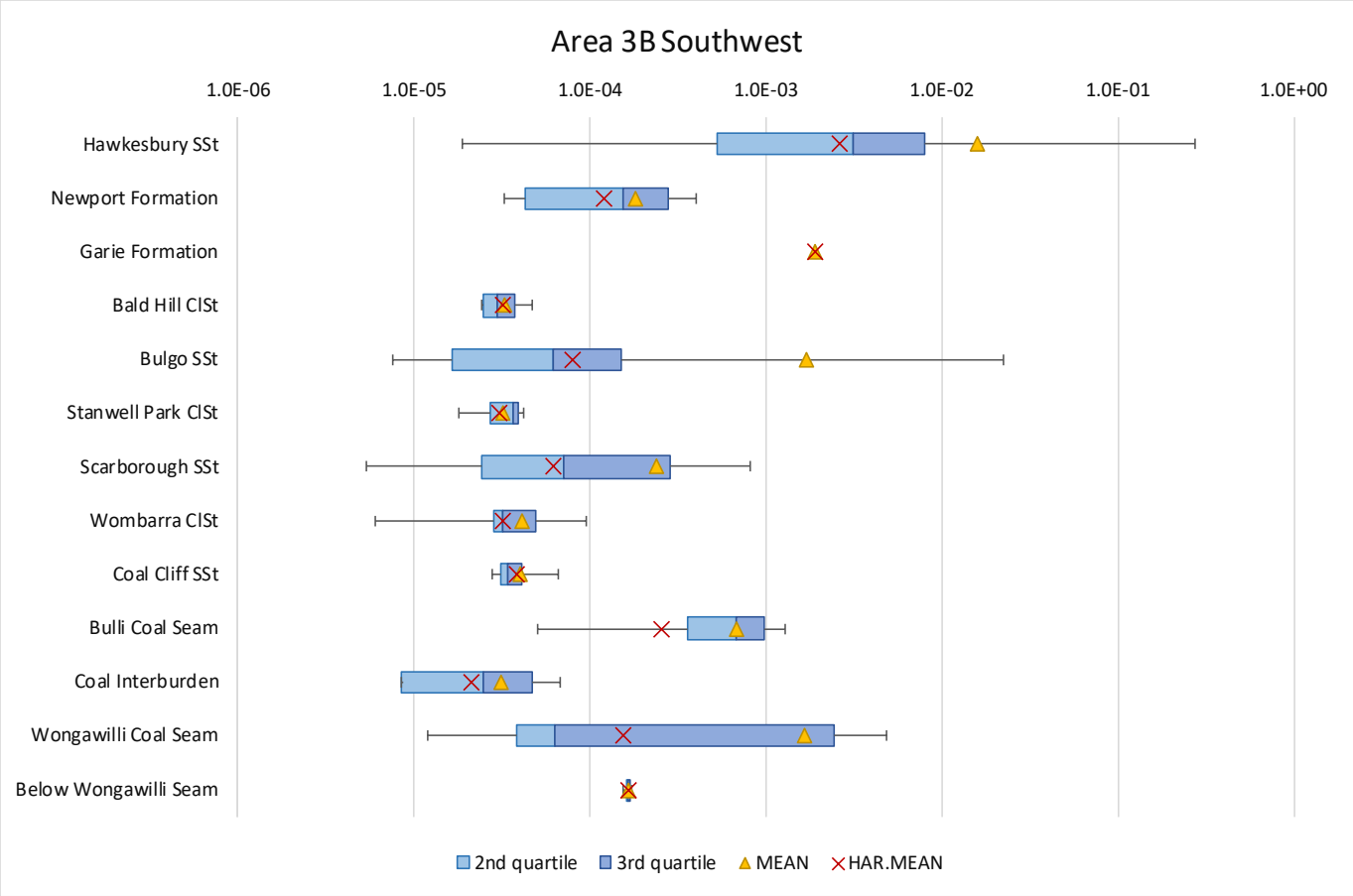

Hydraulic Conductivity (Kh) [m/d]
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
0
100
200
300
400
500
600
700
Depth (mBG)
HBSS
NPFM
GRFM
BACS
BGSS
SPCS
SBSS
WBCS
CCSS
BUSM
Coal Interburden
WWSM
belowWWSM

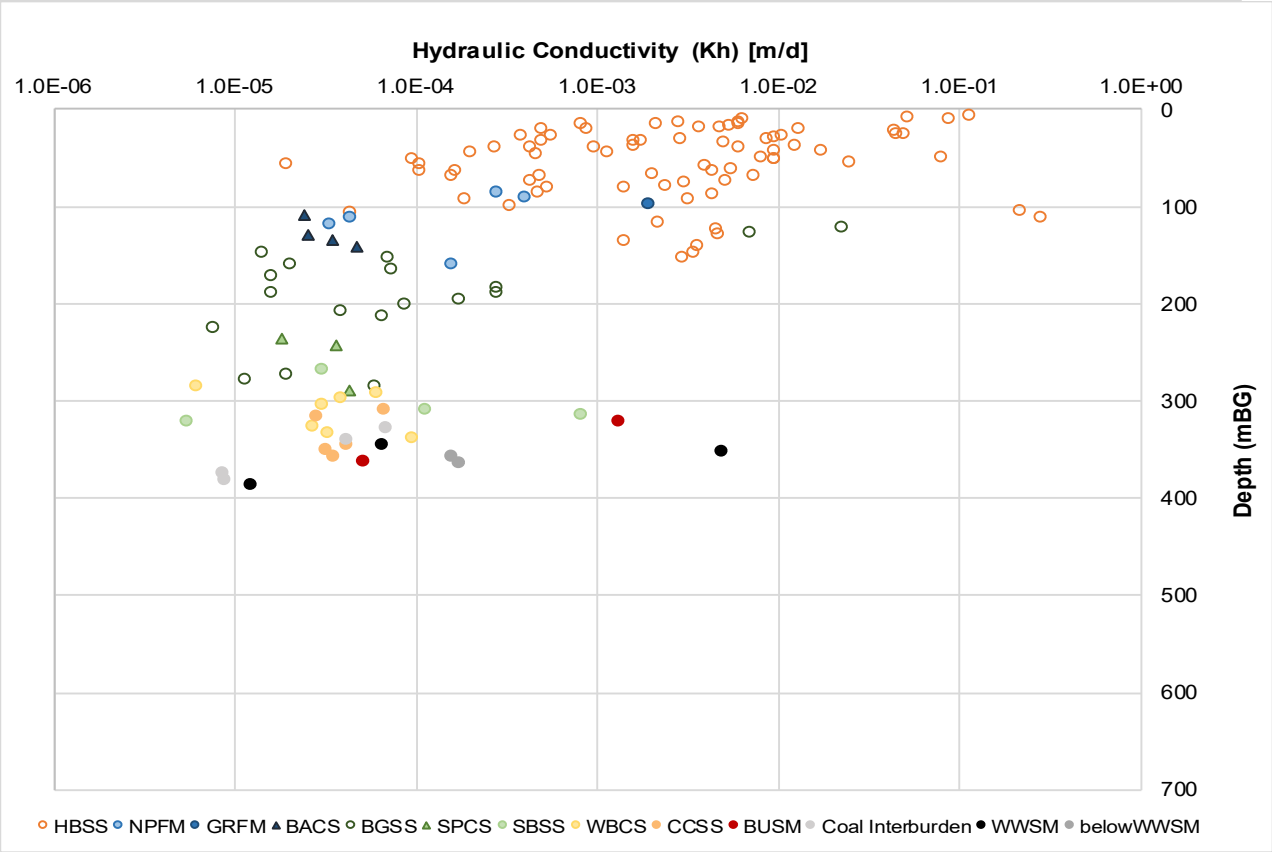

Dendrobium All Area 3A
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
Hawkesbury SSt
Newport Formation
Garie Formation
Bald Hill ClSt
Bulgo SSt
Stanwell Park ClSt
Scarborough SSt
Wombarra ClSt
Coal Cliff SSt
Bulli Coal Seam
Coal Interburden
Wongawilli Coal Seam
Below Wongawilli Seam
2nd quartile
3rd quartile
MEAN
Offset

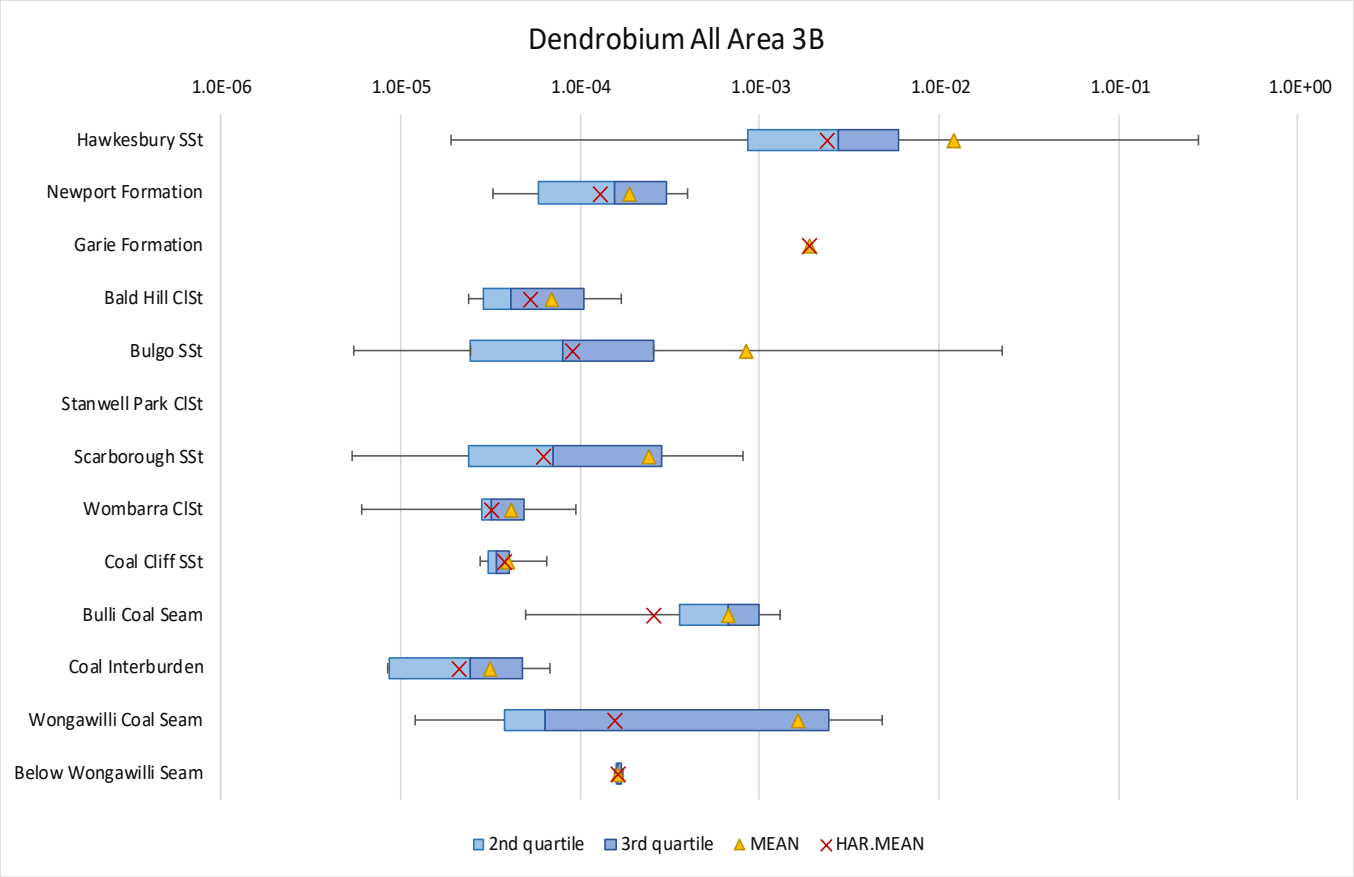

Hydraulic Conductivity (Kh) [m/d]
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
0
100
200
300
400
500
600
700
Depth (mBG)
HBSS
NPFM
GRFM
BACS
BGSS
SPCS
SBSS
WBCS
CCSS
BUSM
Coal Interburden
WWSM
belowWWSM

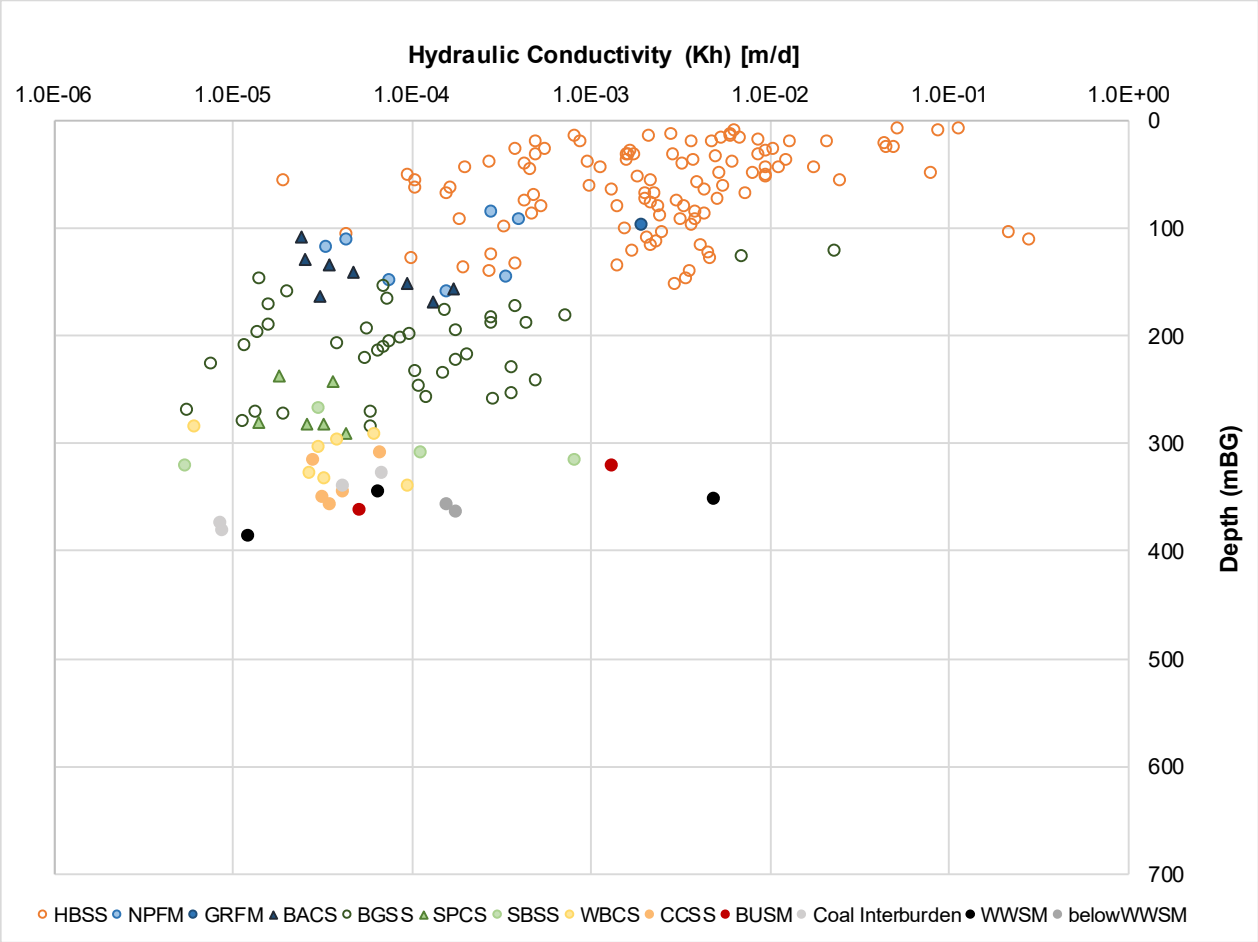

Area 3B Longwall 9
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
Hawkesbury SSt
Newport Formation
Garie Formation
Bald Hill CISt
Bulgo SSt
Stanwell Park CISt
Scarborough SSt
Wombarra CISt
Coal Cliff SSt
Bulli Coal Seam
Coal Interburden
Wongawilli Coal Seam
Below Wongawilli Seam
2nd quartile
3rd quartile
MEAN
HAR.MEAN

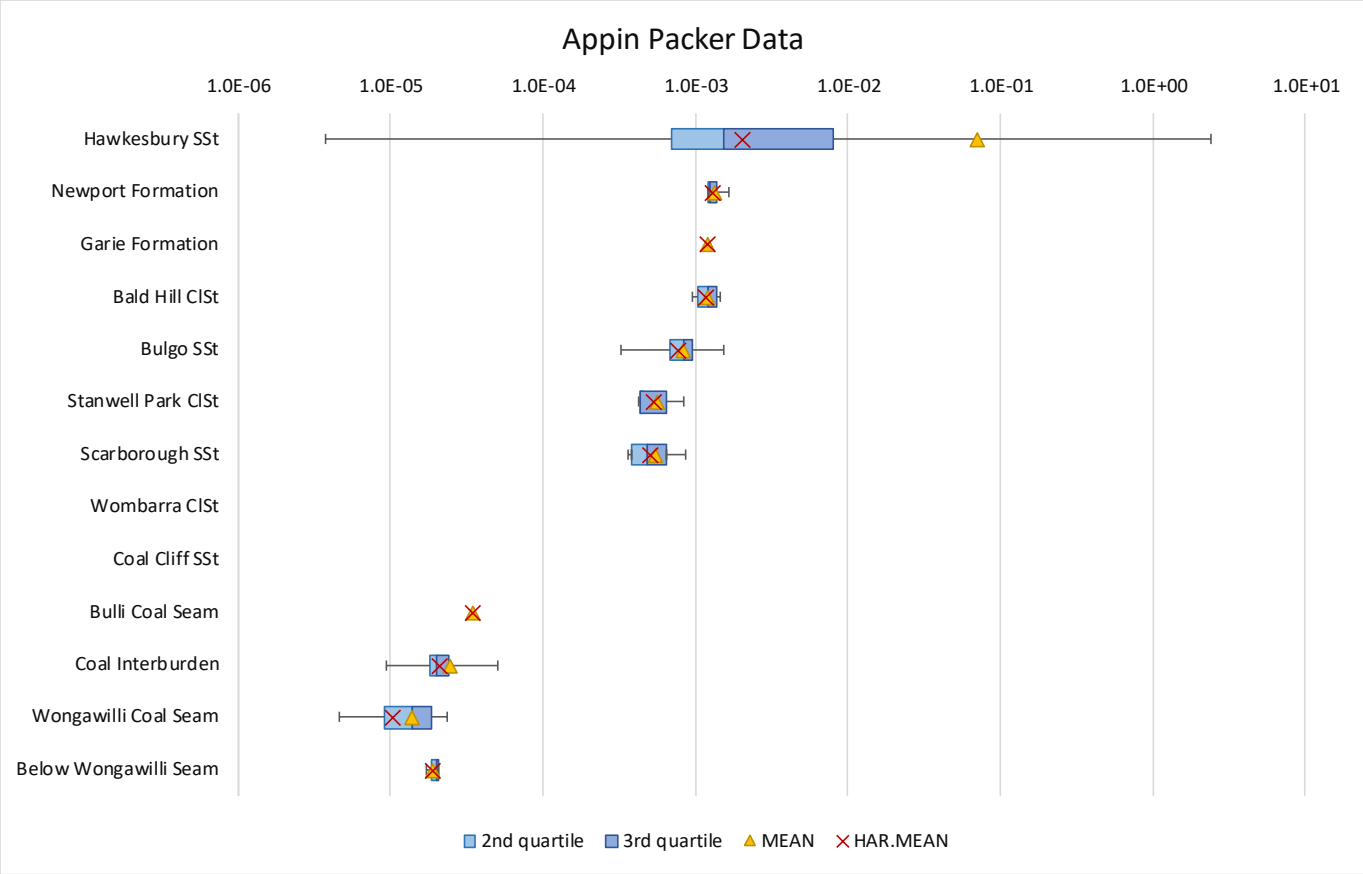

Hydraulic Conductivity (Kh) [m/d]
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
0
100
200
300
400
500
600
700
Depth (mBG)
HBSS
SPCS
NPFM
SBSS
GRFM
WBCS
BACS
CCSS
BGSS
BUSM

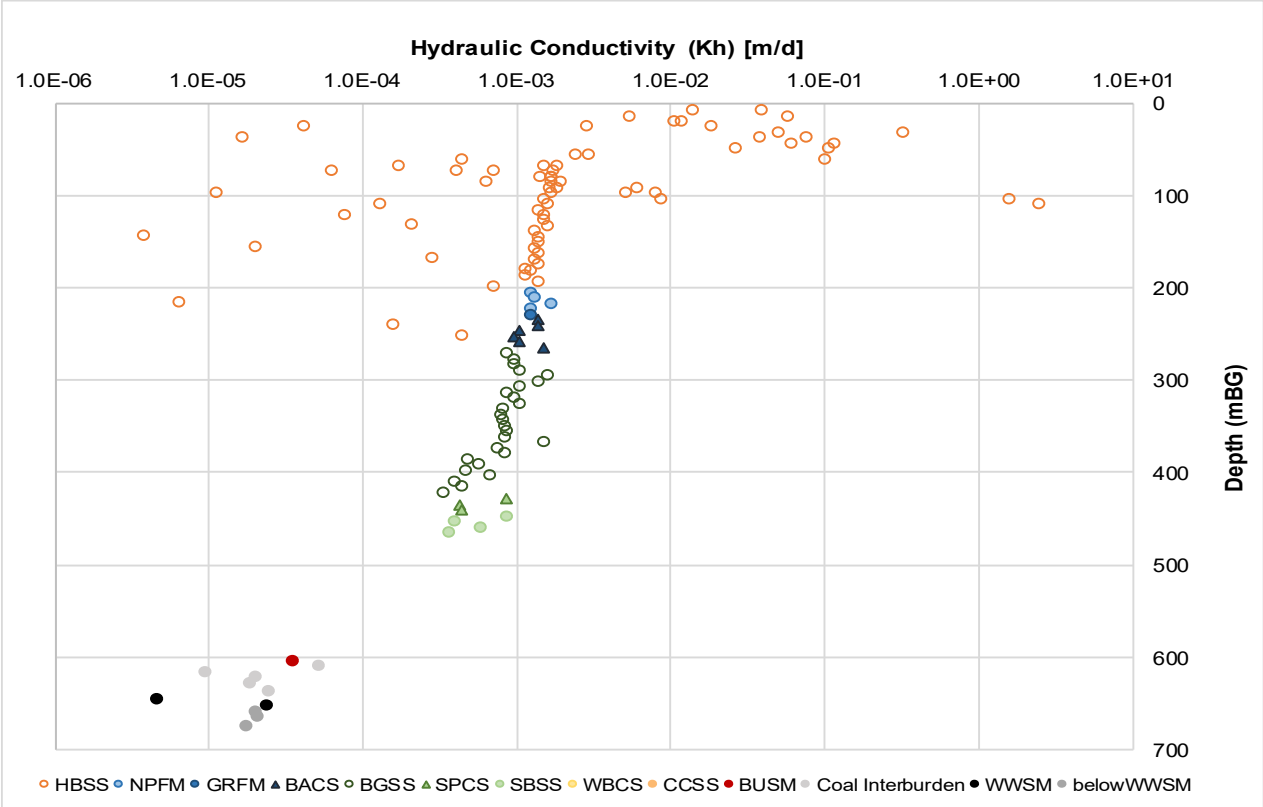

Area 3B Southwest
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
Hawkesbury SSt
Newport Formation
Garie Formation
Bald Hill ClSt
Bulgo SSt
Stanwell Park ClSt
Scarborough SSt
Wombarra ClSt
Coal Cliff SSt
Bulli Coal Seam
Coal Interburden
Wongawilli Coal Seam
Below Wongawilli Seam
2nd quartile
3rd quartile
MEAN
HAR.MEAN


Hydraulic Conductivity (Kh) [m/d]
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
0
100
200
300
400
500
600
700
Depth (mBG)
HBSS
NPFM
GRFM
BACS
BGSS
SPCS
SBSS
WBCS
CCSS
BUSM
Coal Interburden
WWSM
belowWWSM


Dendrobium All Area 3B
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
Hawkesbury SSt
Newport Formation
Garie Formation
Bald Hill ClSt
Bulgo SSt
Stanwell Park ClSt
Scarborough SSt
Wombarra ClSt
Coal Cliff SSt
Bulli Coal Seam
Coal Interburden
Wongawilli Coal Seam
Below Wongawilli Seam
2nd quartile
3rd quartile
MEAN
HAR.MEAN


Hydraulic Conductivity (Kh) [m/d]
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
0
100
200
300
400
500
600
700
Depth (mBG)
HBSS
NPFM
GRFM
BACS
BGSS
SPCS
SBSS
WBCS
CCSS
BUSM
Coal Interburden
WWSM
belowWWSM

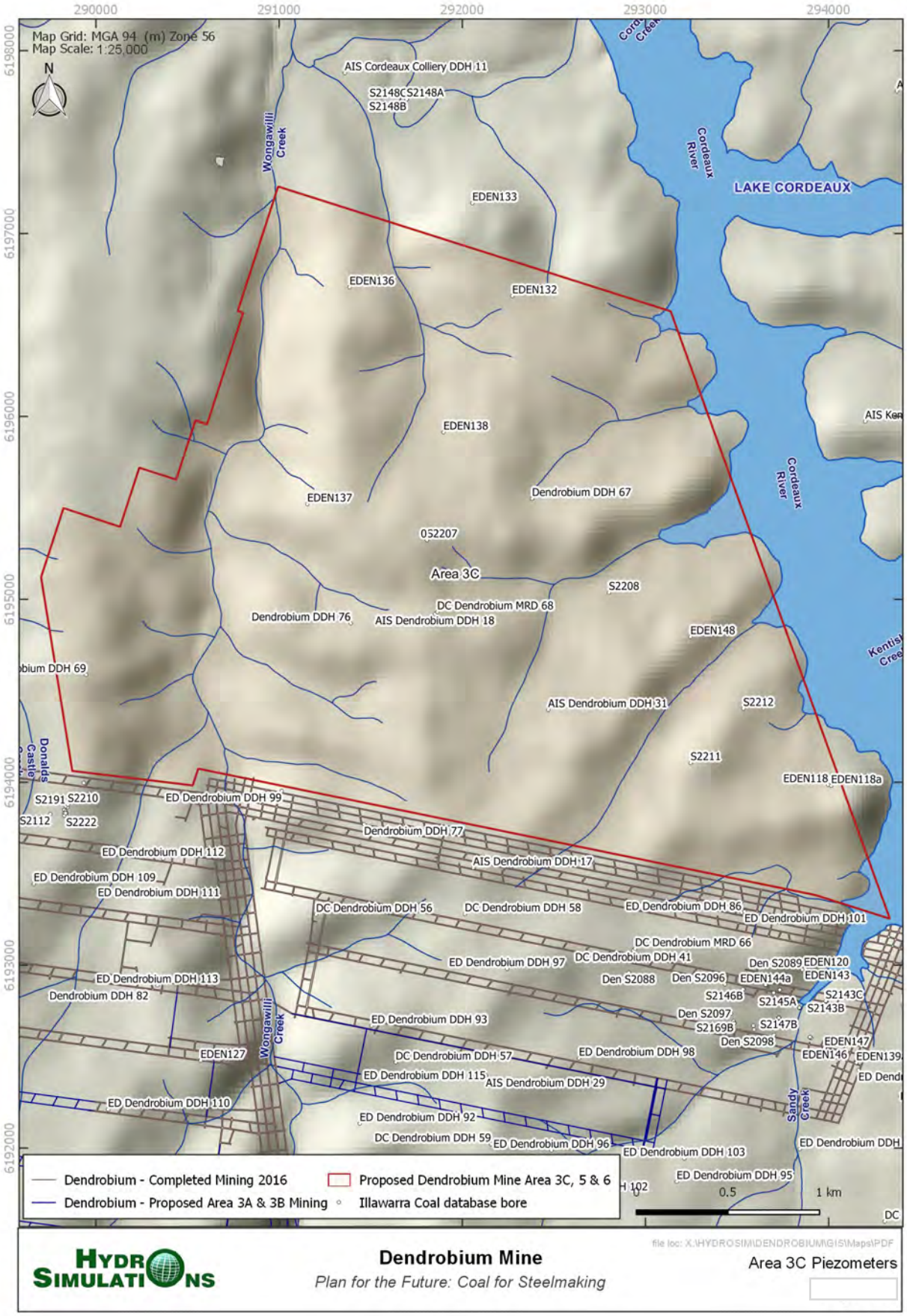

Appin Packer Data
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
1.0E+01
Hawkesbury SSt
Newport Formation
Garie Formation
Bald Hill ClSt
Bulgo SSt
Stanwell Park ClSt
Scarborough SSt
Wombarra ClSt
Coal Cliff SSt
Bulli Coal Seam
Coal Interburden
Wongawilli Coal Seam
Below Wongawilli Seam
2nd quartile
3rd quartile
MEAN
HAR.MEAN


Hydraulic Conductivity (Kh) [m/d]
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
1.0E-01
1.0E+00
1.0E+01
0
100
200
300
400
500
600
700
Depth (mBG)
HBSS
NPFM
GRFM
BACS
BGSS
SPCS
SBSS
WBCS
CCSS
BUSM
Coal Interburden
WWSM
belowWWSM

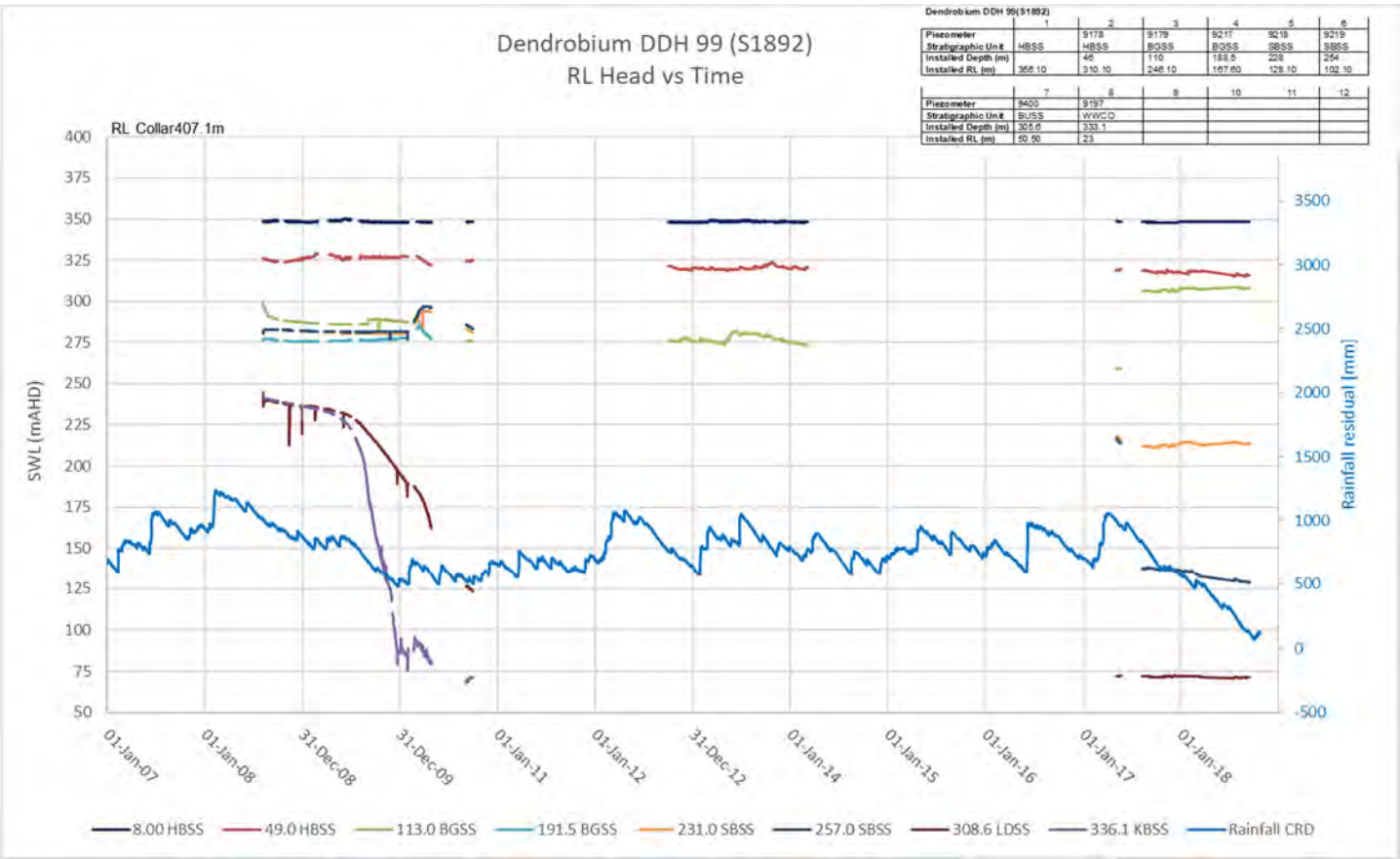
APPENDIX C GROUNDWATER LEVEL HYDROGRAPHS

- Hydrographs from Areas 5, 6 and 3C.
- Sample of hydrographs showing response to rainfall.
- Sample of hydrographs showing response to mining.

AREA 3C


Map Grid: MGA 94 (m) Zone 56
Map Scale: 1:25,000
N
290000
291000
292000
293000
294000
6198000
6197000
6196000
6195000
6194000
6193000
6192000
AIS Cordeaux Colliery DDH 11
S2148C S2148A
S2148B
Wongawilli Creek
Cordeaux River
LAKE CORDEAUX
EDEN133
EDEN136
EDEN132
EDEN138
EDEN137
Dendrobium DDH 67
052207
Area 3C
S2208
DC Dendrobium MRD 68
Dendrobium DDH 76
AIS Dendrobium DDH 18
EDEN148
AIS Dendrobium DDH 31
S2212
S2211
EDEN118 EDEN118a
Donalds Castle
S2191 S2210
S2112
S2222
ED Dendrobium DDH 99
Dendrobium DDH 77
ED Dendrobium DDH 112
AIS Dendrobium DDH 17
ED Dendrobium DDH 109
ED Dendrobium DDH 111
DC Dendrobium DDH 56
DC Dendrobium DDH 58
ED Dendrobium DDH 86
ED Dendrobium DDH 101
DC Dendrobium MRD 66
ED Dendrobium DDH 97
DC Dendrobium DDH 41
Den S2089 EDEN120
EDEN143
ED Dendrobium DDH 113
Den S2088
Den S2096
EDEN144a
Dendrobium DDH 82
S2146B
S2145A
S2143C
S2143B
Den S2097
S2169B
S2147B
ED Dendrobium DDH 93
Den S2098
EDEN147
EDEN127
DC Dendrobium DDH 57
ED Dendrobium DDH 98
EDEN146
ED Dendrobium DDH 115
AIS Dendrobium DDH 29
ED Dendrobium DDH 110
Sandy Creek
ED Dendrobium DDH 92
DC Dendrobium DDH 59
ED Dendrobium DDH 96
ED Dendrobium DDH 103
ED Dendrobium DDH 95
Dendrobium - Completed Mining 2016
Dendrobium - Proposed Area 3A & 3B Mining
Proposed Dendrobium Mine Area 3C, 5 & 6
Illawarra Coal database bore
0.5
1 km
HYDRO SIMULATIONS
Dendrobium Mine
Plan for the Future: Coal for Steelmaking
Area 3C Piezometers

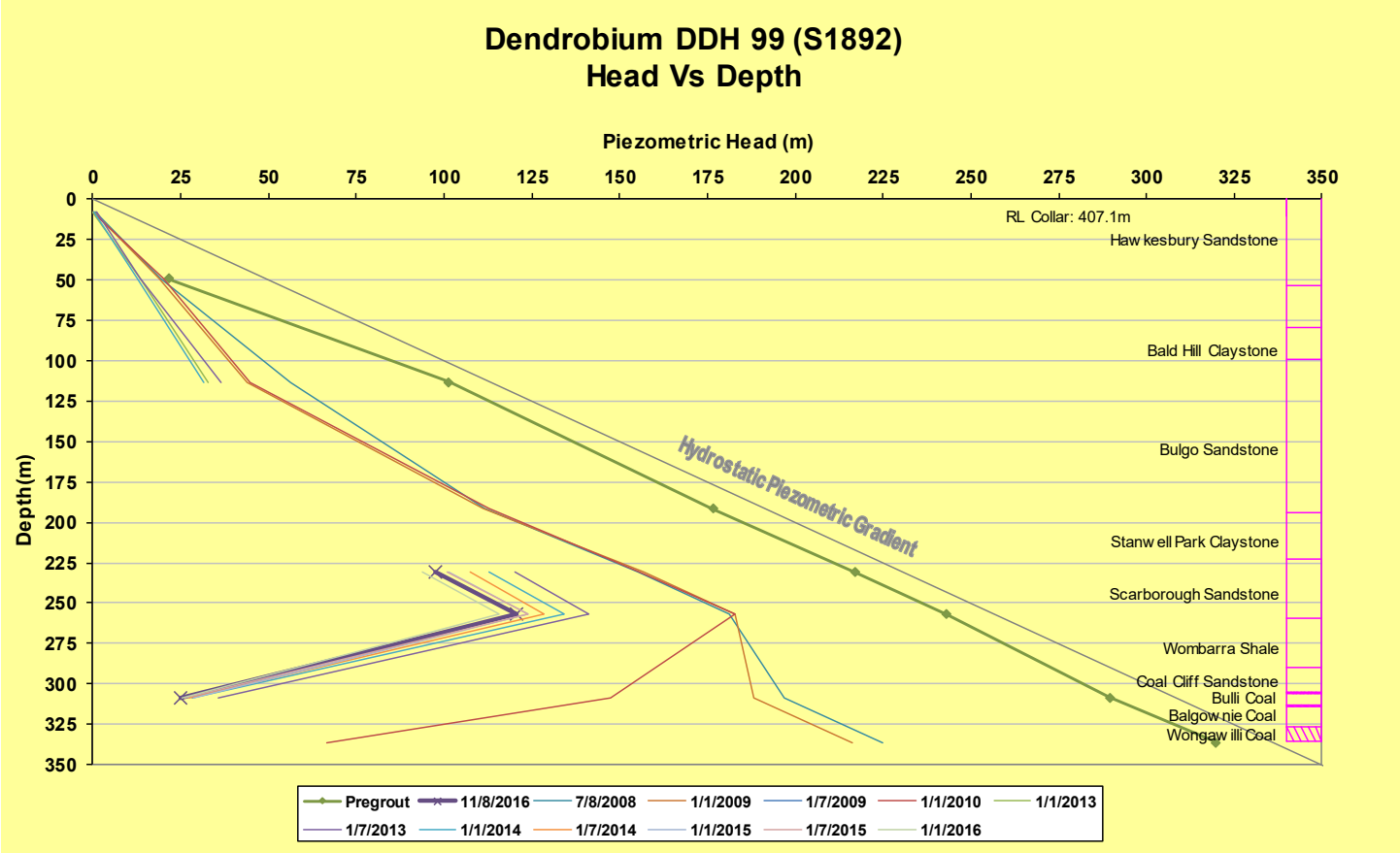
Area 3A / Area 3C



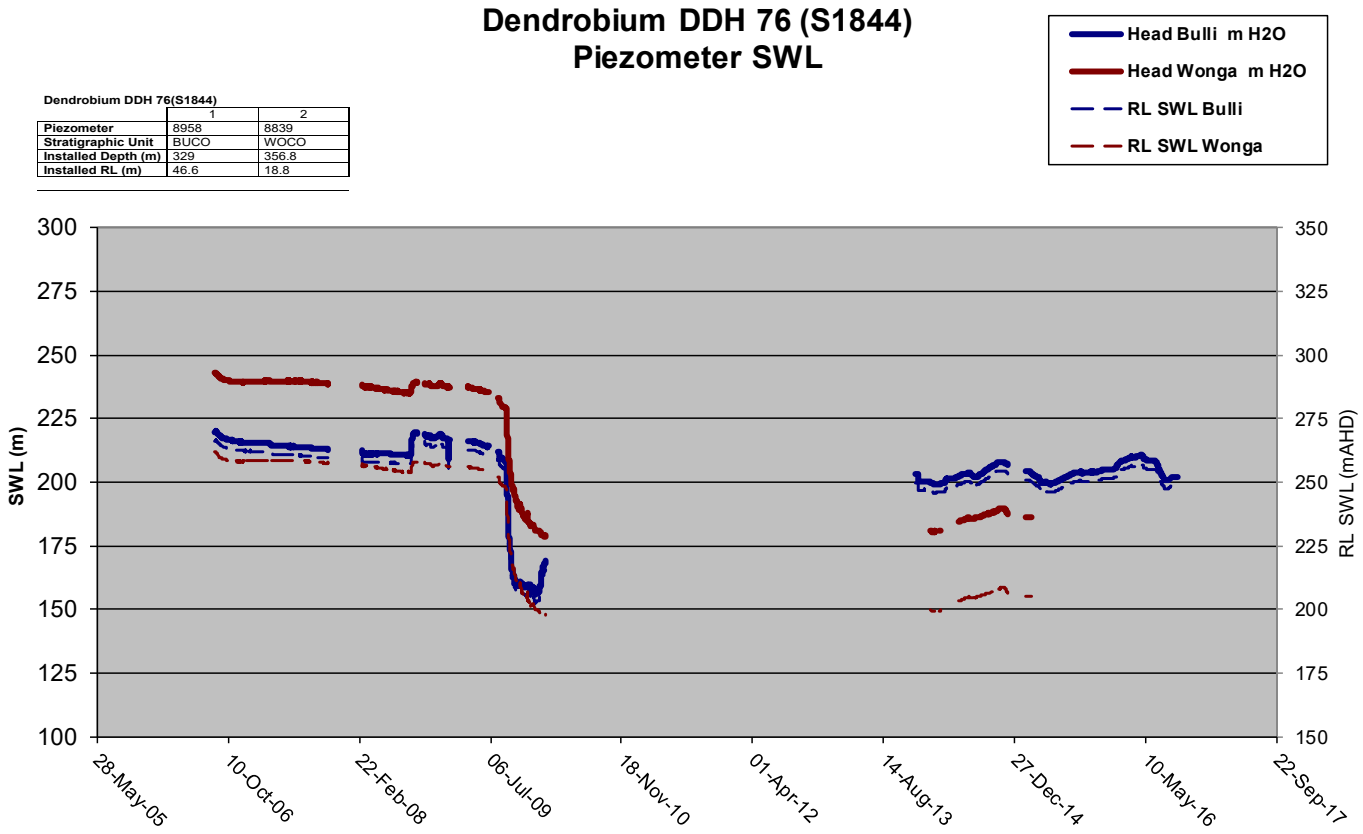
Dendrobium DDH 99(S1892)

	1	2	3	4	5	6
Piezometer		9178	9179	9217	9218	9219
Stratigraphic Unit	HBSS	HBSS	BGSS	BGSS	SBSS	SBSS
Installed Depth (m)		46	110	188.5	228	254
Installed RL (m)	356.10	310.10	246.10	167.60	128.10	102.10

	7	8	9	10	11	12
Piezometer	9400	9197				
Stratigraphic Unit	BLSS	WWCO				
Installed Depth (m)	305.6	333.1				
Installed RL (m)	50.50	23				



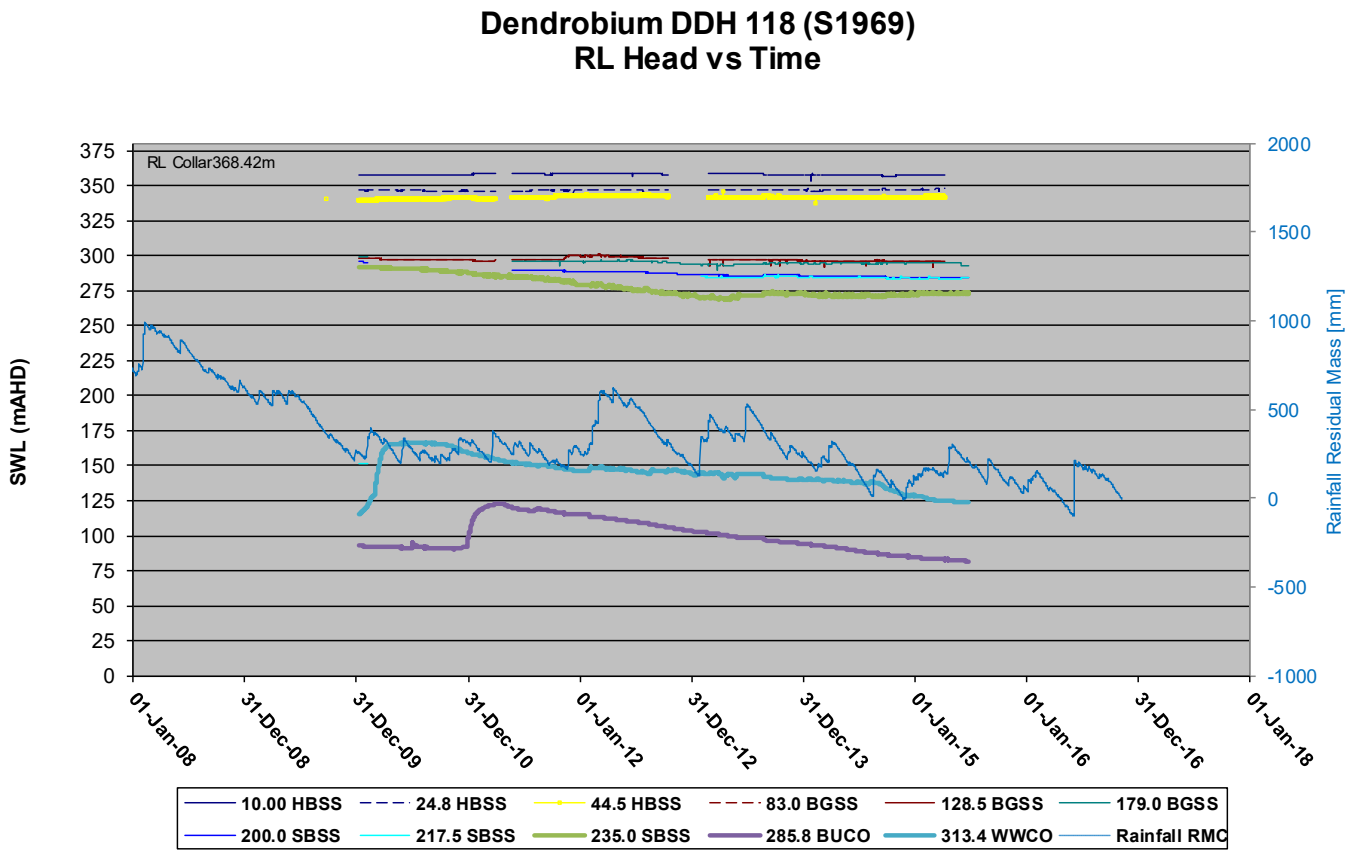
Area 3C

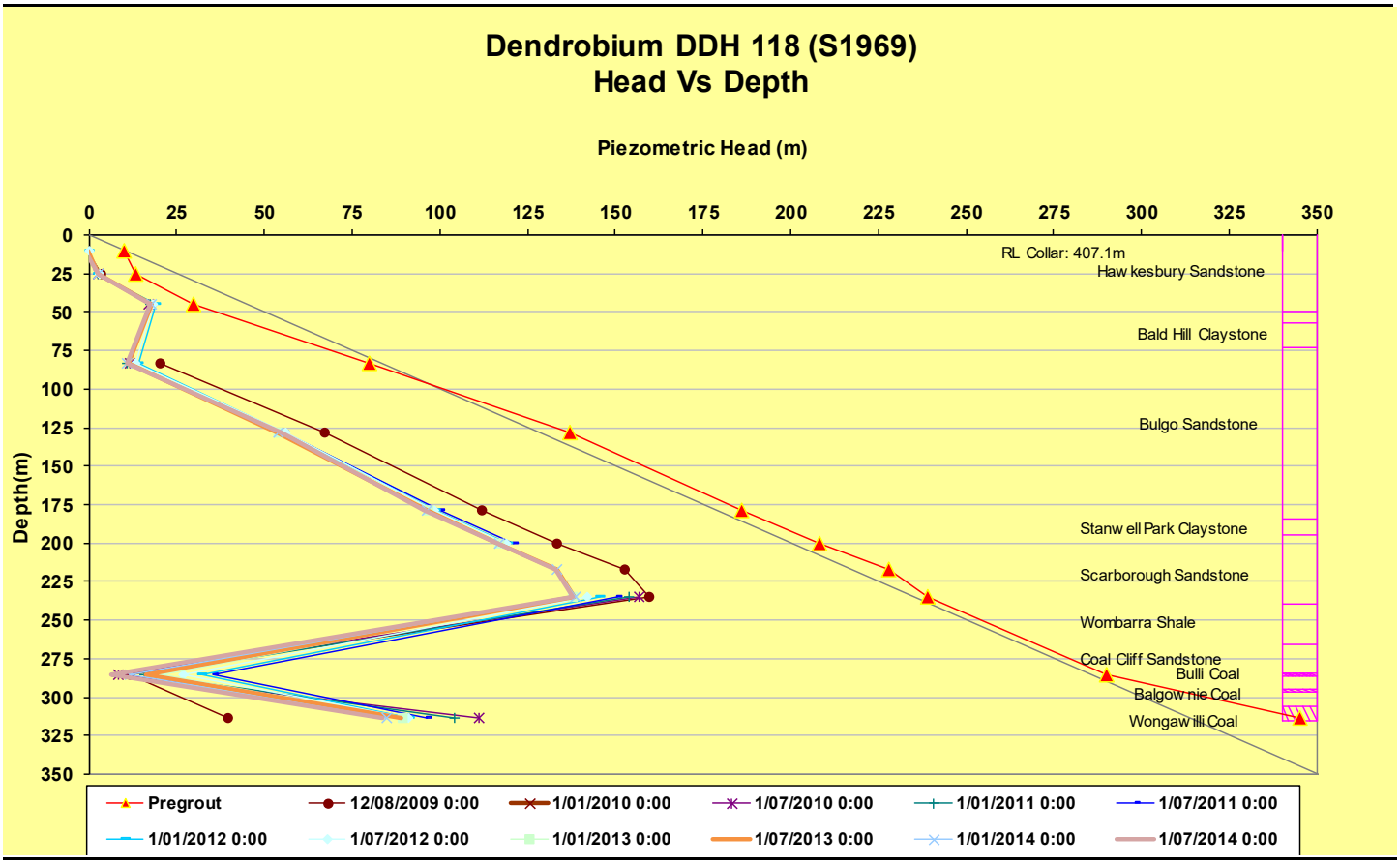


Dendrobium DDH 76(S1844)

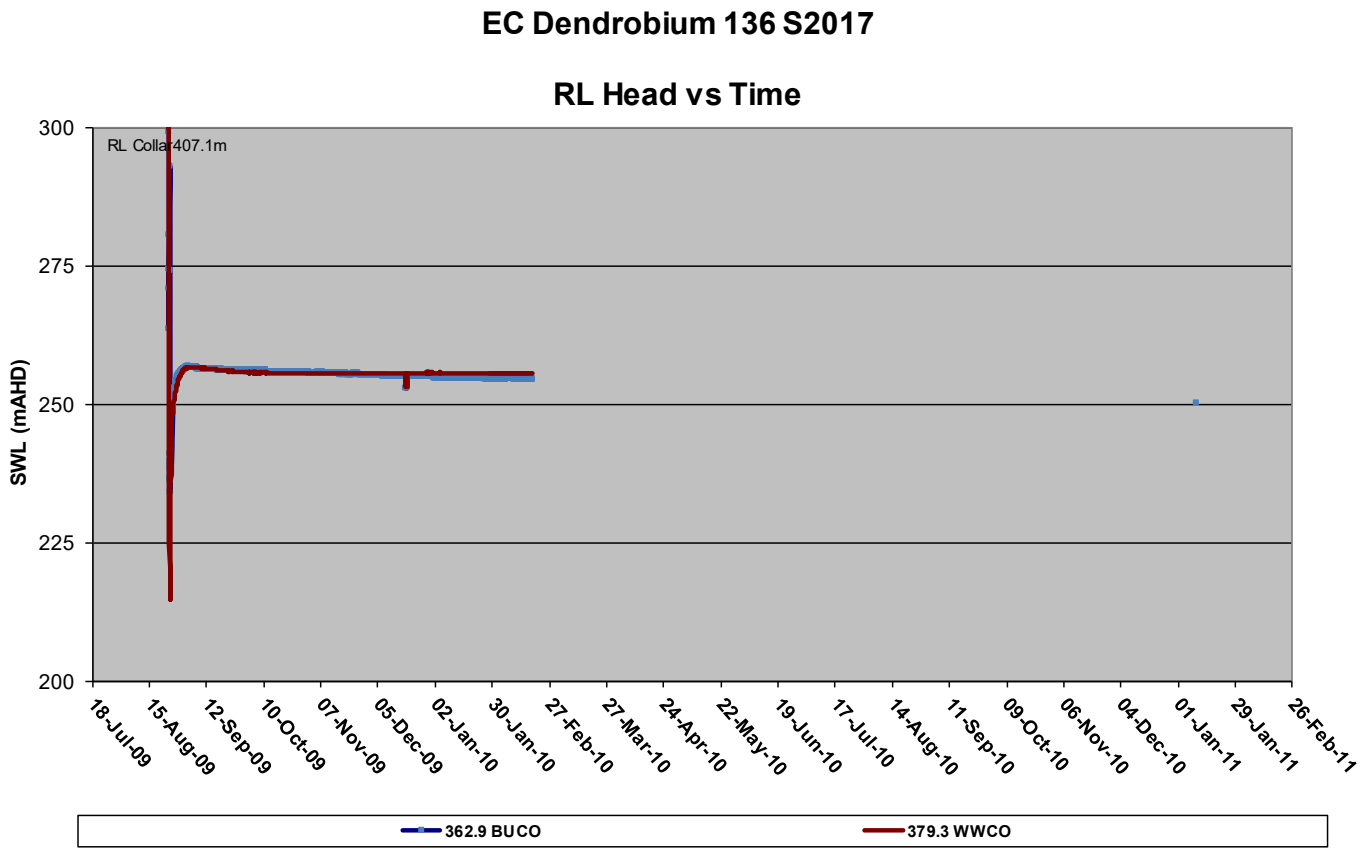
	1	2
Piezometer	8958	8839
Stratigraphic Unit	BUCO	WOCO
Installed Depth (m)	329	356.8
Installed RL (m)	46.6	18.8

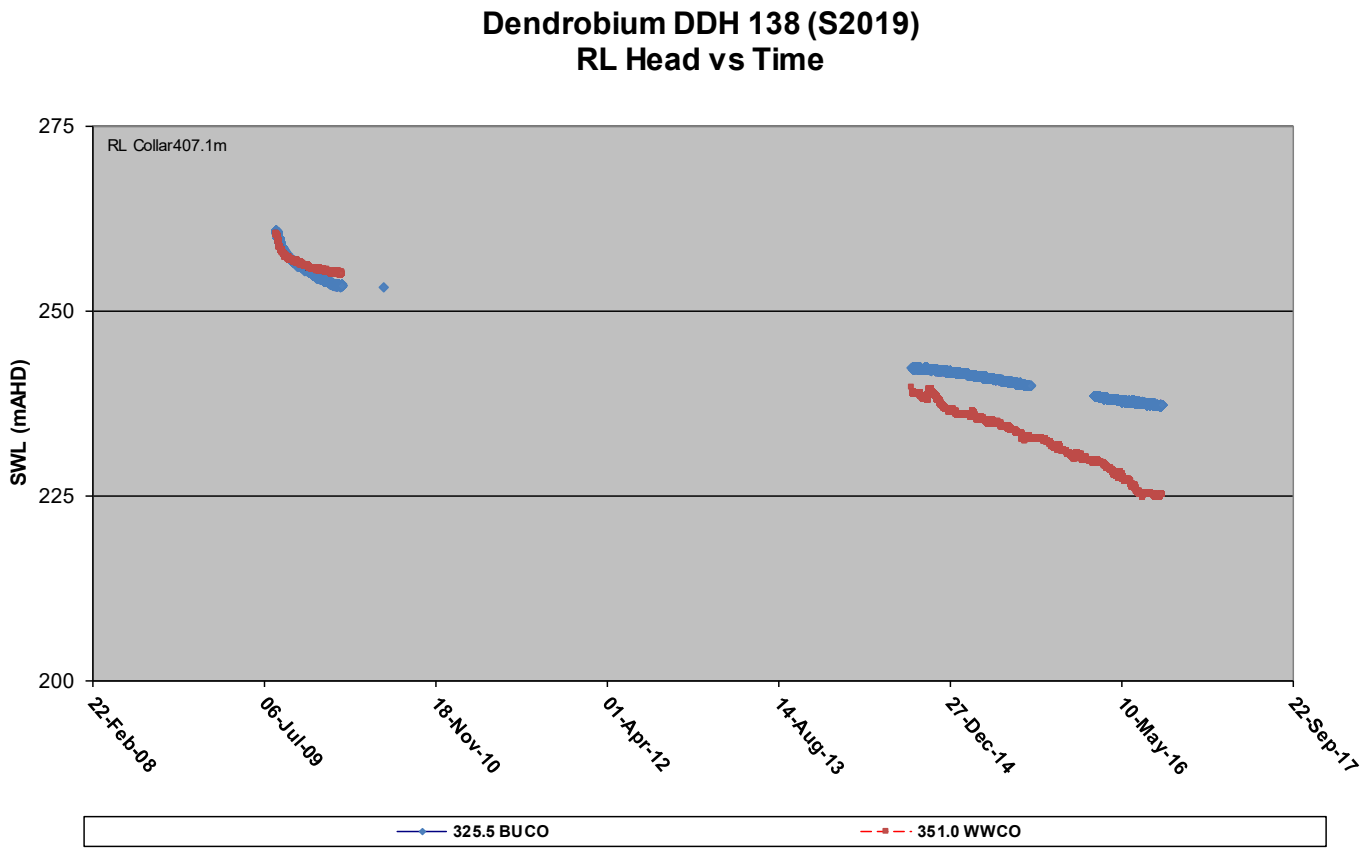
Area 3C


Dendrobium DDH 118 (S1969)
RL Head vs Time
RL Collar368.42m
SWL (mAHD)
Rainfall Residual Mass [mm]
375
350
325
300
275
250
225
200
175
150
125
100
75
50
25
0
2000
1500
1000
500
0
-500
-1000
01-Jan-08
31-Dec-08
31-Dec-09
31-Dec-10
01-Jan-12
31-Dec-12
31-Dec-13
01-Jan-15
01-Jan-16
31-Dec-16
01-Jan-18
10.00 HBSS
24.8 HBSS
44.5 HBSS
83.0 BGSS
128.5 BGSS
179.0 BGSS
200.0 SBSS
217.5 SBSS
235.0 SBSS
285.8 BUCO
313.4 WWCO
Rainfall RMC

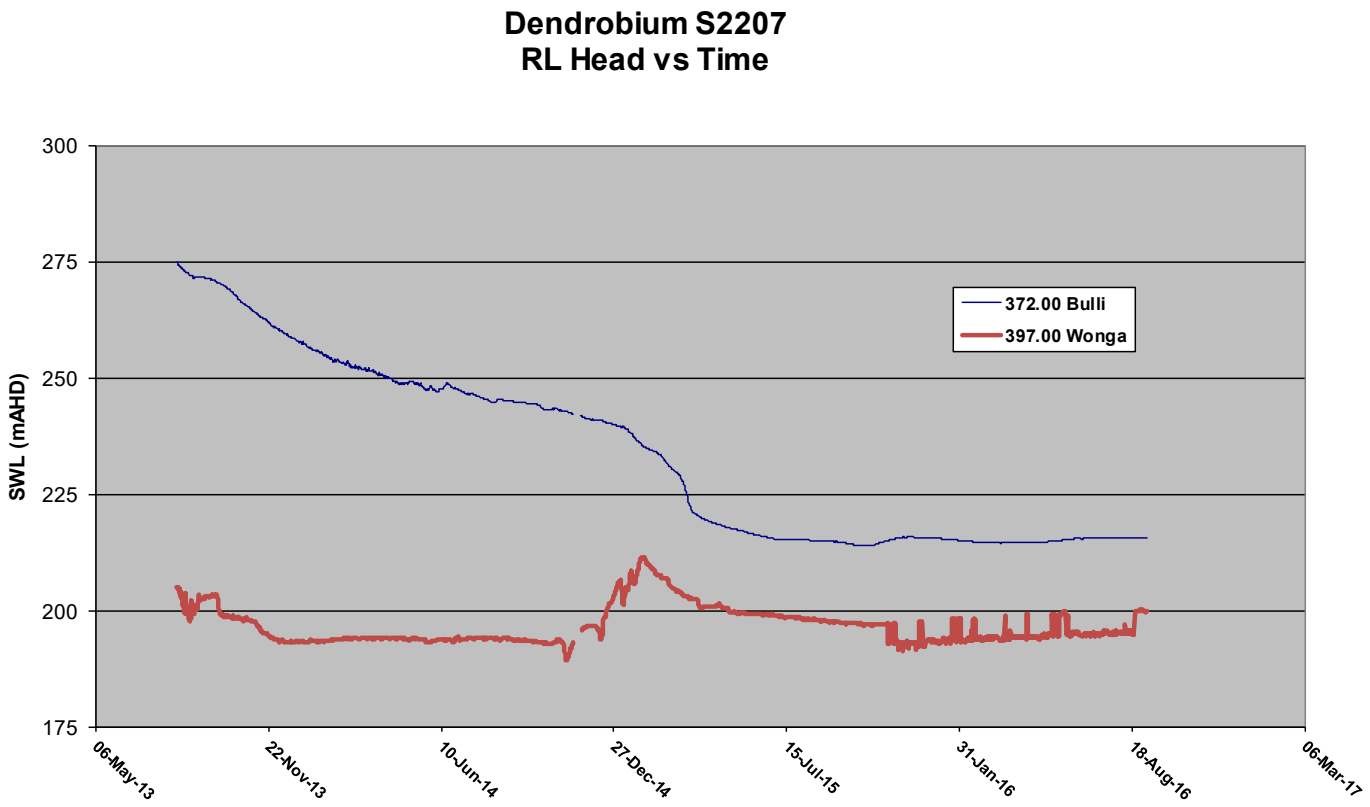

Dendrobium DDH 118 (S1969)
Head Vs Depth
Piezometric Head (m)
Depth(m)
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
RL Collar: 407.1m
Haw kesbury Sandstone
Bald Hill Claystone
Bulgo Sandstone
Stanw ell Park Claystone
Scarborough Sandstone
Wombarra Shale
Coal Cliff Sandstone
Bulli Coal
Balgow nie Coal
Wongaw illi Coal
Pregrout
12/08/2009 0:00
1/01/2010 0:00
1/07/2010 0:00
1/01/2011 0:00
1/07/2011 0:00
1/01/2012 0:00
1/07/2012 0:00
1/01/2013 0:00
1/07/2013 0:00
1/01/2014 0:00
1/07/2014 0:00

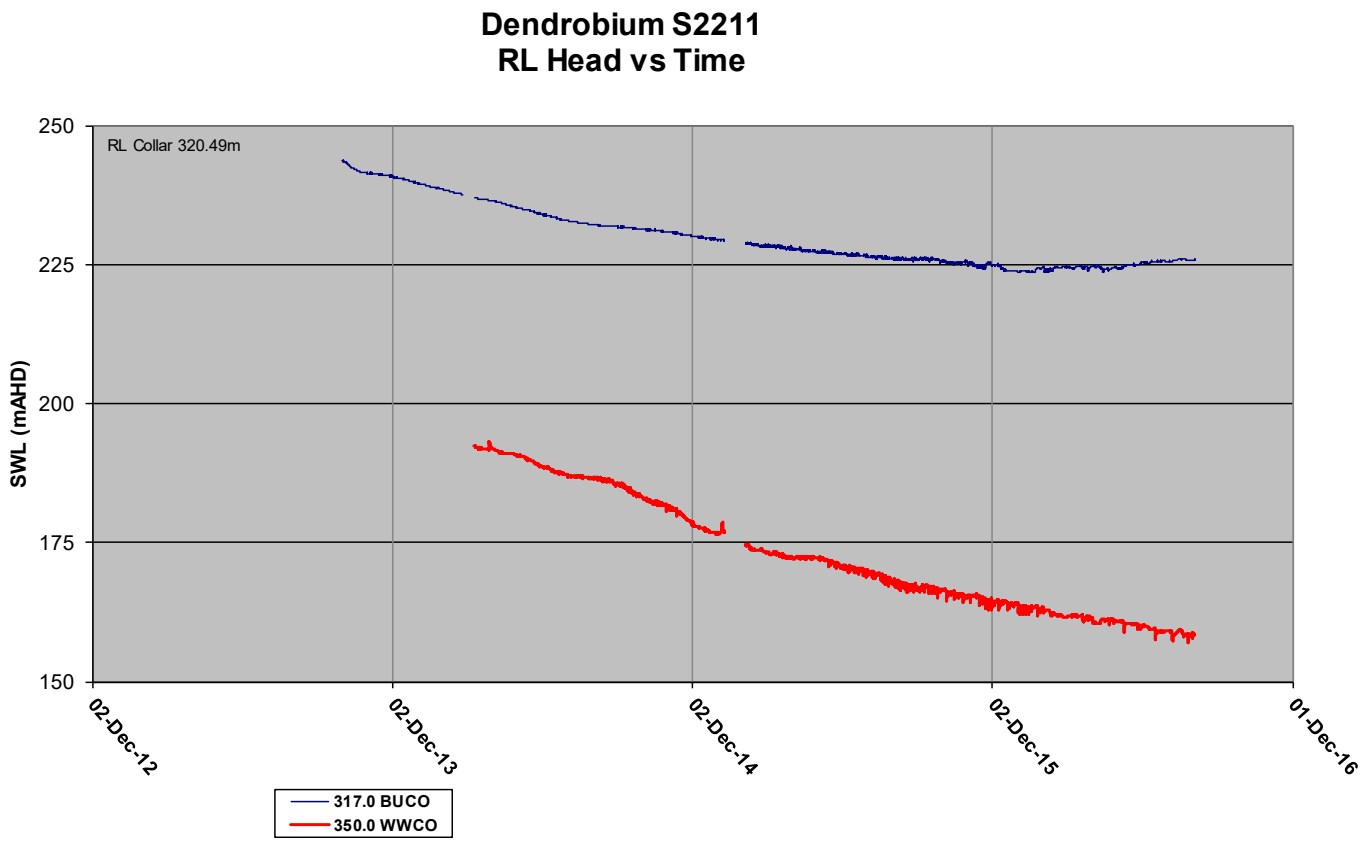
Area 3C


EC Dendrobium 136 S2017
RL Head vs Time
RL Collar407.1m
SWL (mAHD)
300
275
250
225
200
18-Jul-09
15-Aug-09
12-Sep-09
10-Oct-09
07-Nov-09
05-Dec-09
02-Jan-10
30-Jan-10
27-Feb-10
27-Mar-10
24-Apr-10
22-May-10
19-Jun-10
17-Jul-10
14-Aug-10
11-Sep-10
09-Oct-10
06-Nov-10
04-Dec-10
01-Jan-11
29-Jan-11
26-Feb-11
362.9 BUCO
379.3 WWCO

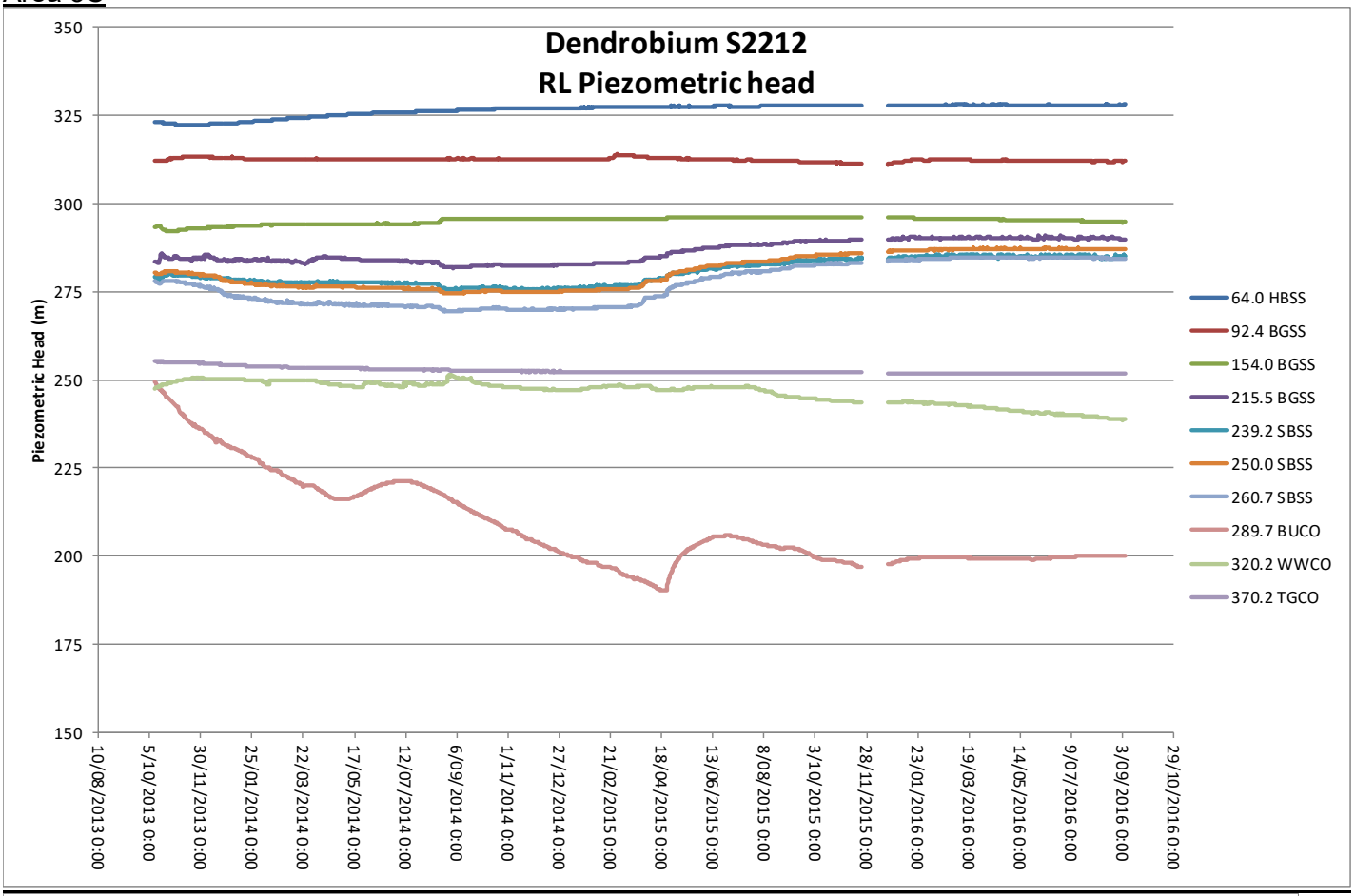

Dendrobium DDH 138 (S2019)
RL Head vs Time
RL Collar407.1m
SWL (mAHD)
275
250
225
200
22-Feb-08
06-Jul-09
18-Nov-10
01-Apr-12
14-Aug-13
27-Dec-14
10-May-16
22-Sep-17
325.5 BUCO
351.0 WWCO

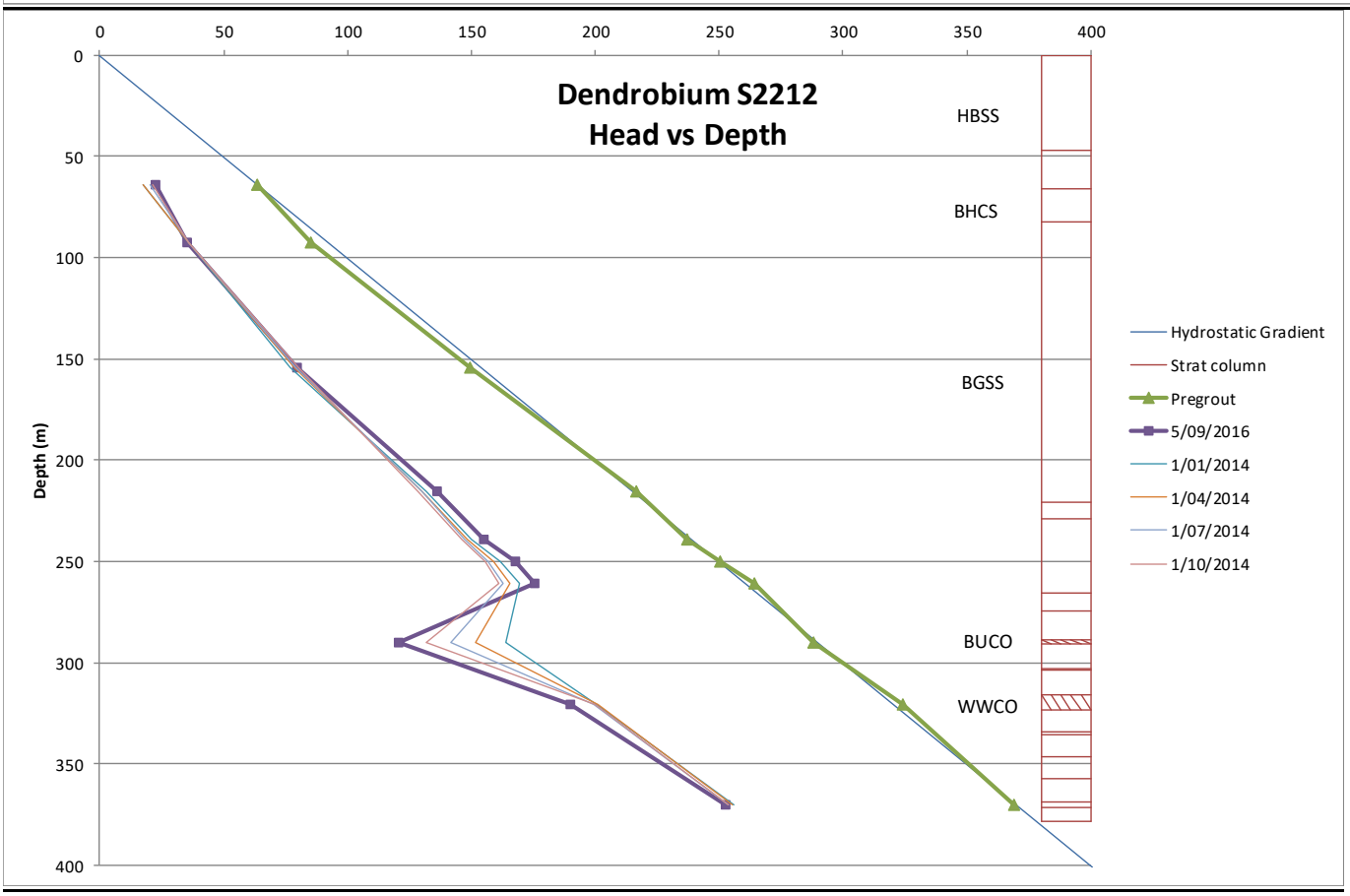
Area 3C


Dendrobium S2207
RL Head vs Time
SWL (mAHD)
300
275
250
225
200
175
06-May-13
22-Nov-13
10-Jun-14
27-Dec-14
15-Jul-15
31-Jan-16
18-Aug-16
06-Mar-17
372.00 Bulli
397.00 Wonga


Dendrobium S2211
RL Head vs Time
RL Collar 320.49m
SWL (mAHD)
250
225
200
175
150
02-Dec-12
02-Dec-13
02-Dec-14
02-Dec-15
01-Dec-16
317.0 BUCO
350.0 WWCO

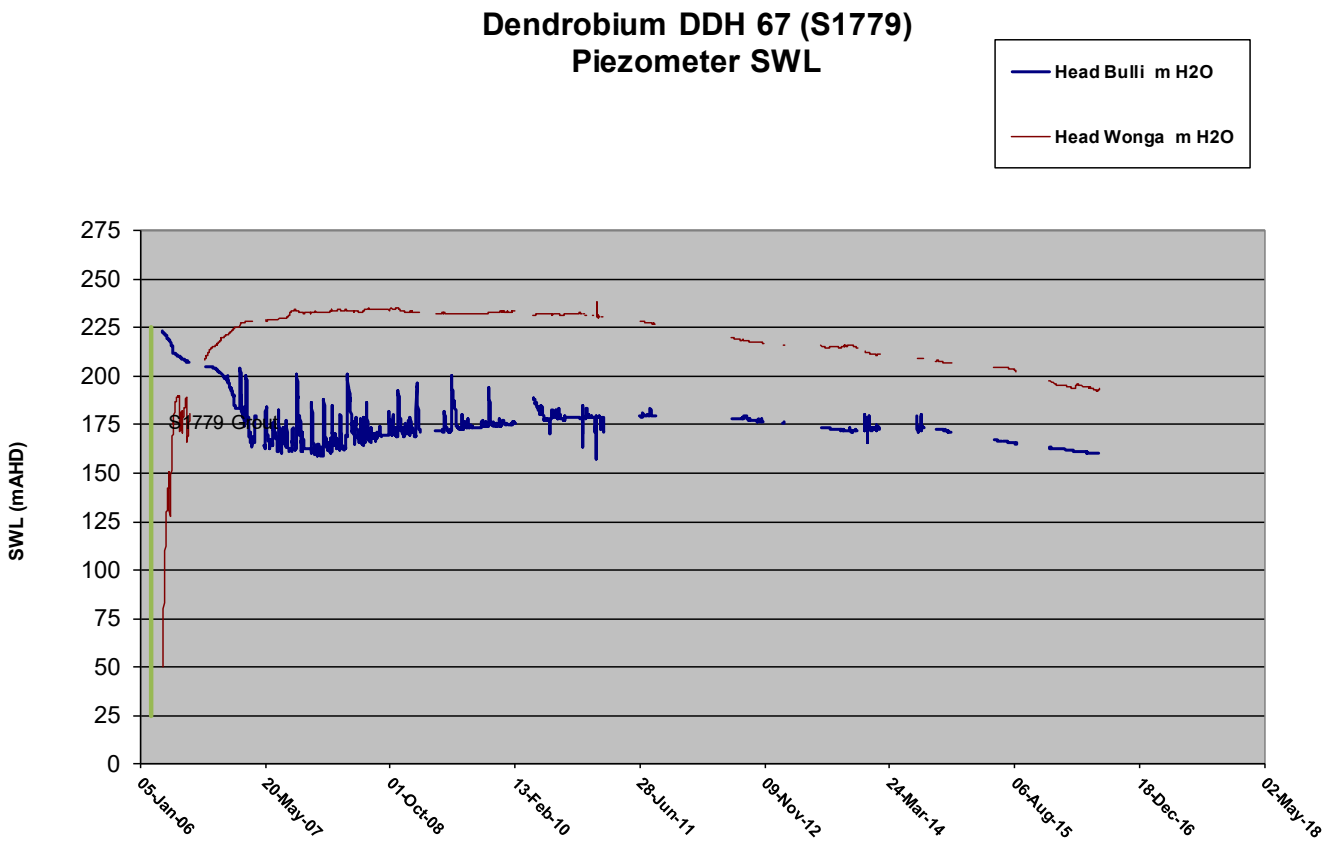
Area 3C


Dendrobium S2212
RL Piezometric head
Piezometric Head (m)
350
325
300
275
250
225
200
175
150
10/08/2013 0:00
5/10/2013 0:00
30/11/2013 0:00
25/01/2014 0:00
22/03/2014 0:00
17/05/2014 0:00
12/07/2014 0:00
6/09/2014 0:00
1/11/2014 0:00
27/12/2014 0:00
21/02/2015 0:00
18/04/2015 0:00
13/06/2015 0:00
8/08/2015 0:00
3/10/2015 0:00
28/11/2015 0:00
23/01/2016 0:00
19/03/2016 0:00
14/05/2016 0:00
9/07/2016 0:00
3/09/2016 0:00
29/10/2016 0:00
64.0 HBSS
92.4 BGSS
154.0 BGSS
215.5 BGSS
239.2 SBSS
250.0 SBSS
260.7 SBSS
289.7 BUCO
320.2 WWCO
370.2 TGCO

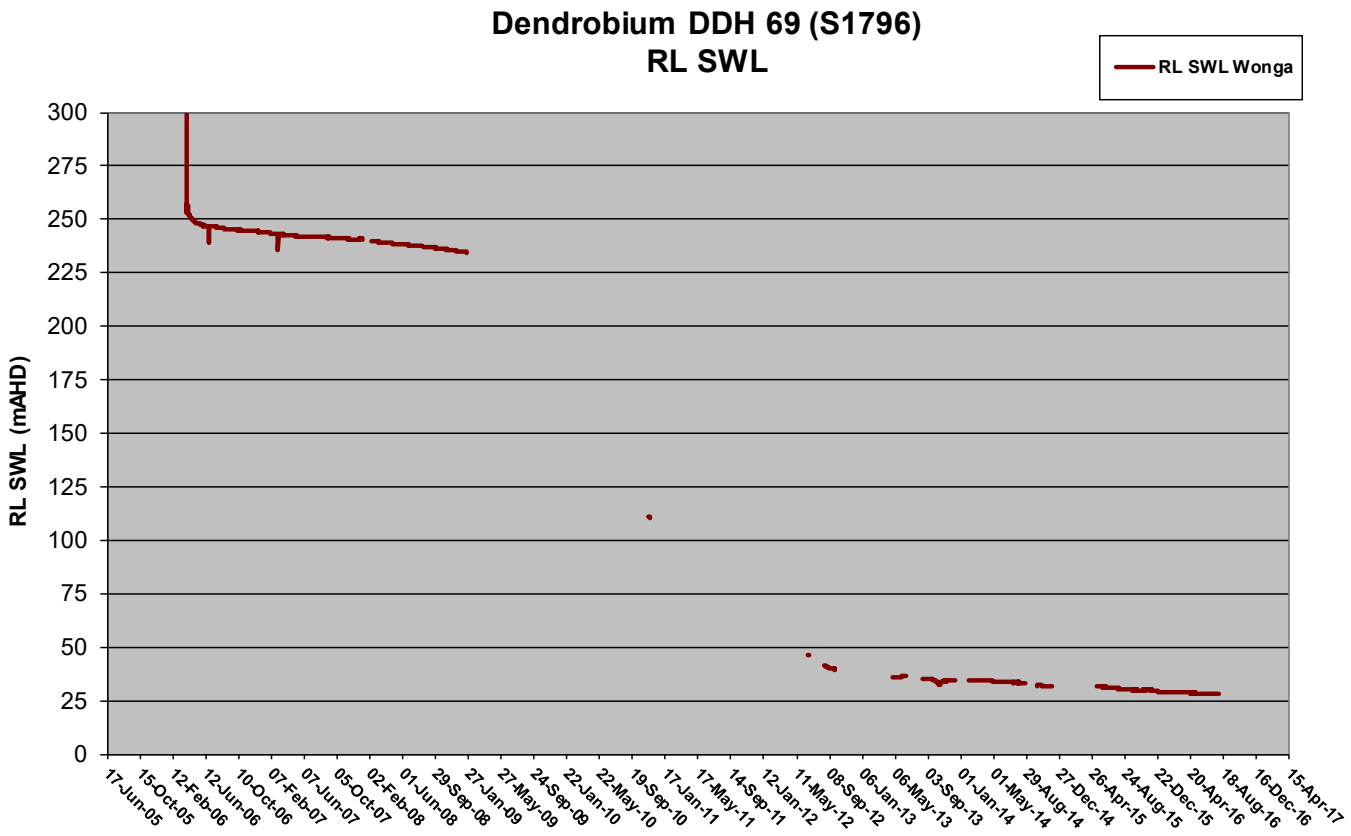

Dendrobium S2212
Head vs Depth
Depth (m)
0
50
100
150
200
250
300
350
400
HBSS
BHCS
BGSS
BUCO
WWCO
Hydrostatic Gradient
Strat column
Pregrout
5/09/2016
1/01/2014
1/04/2014
1/07/2014
1/10/2014

Area 3C

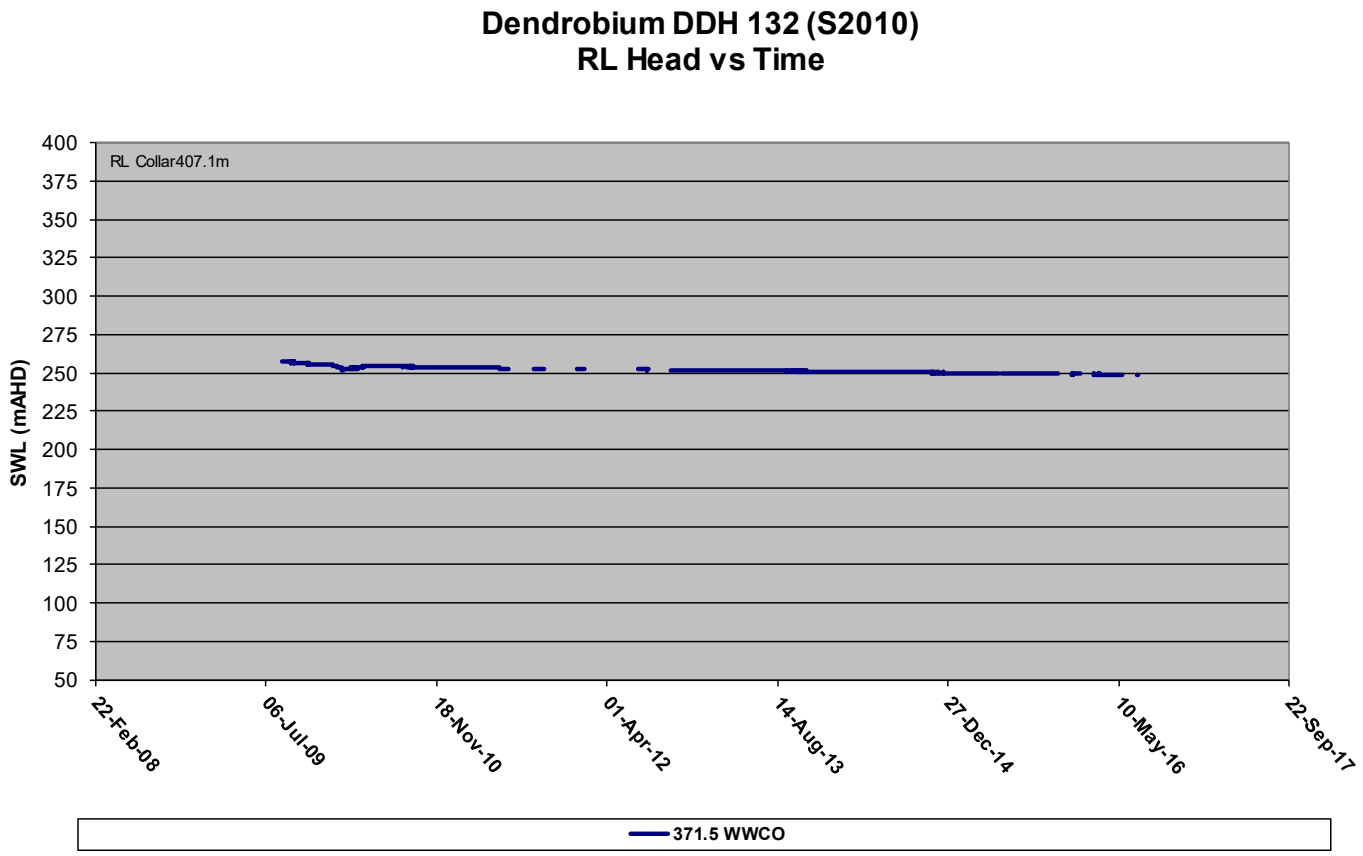
Pressure Head

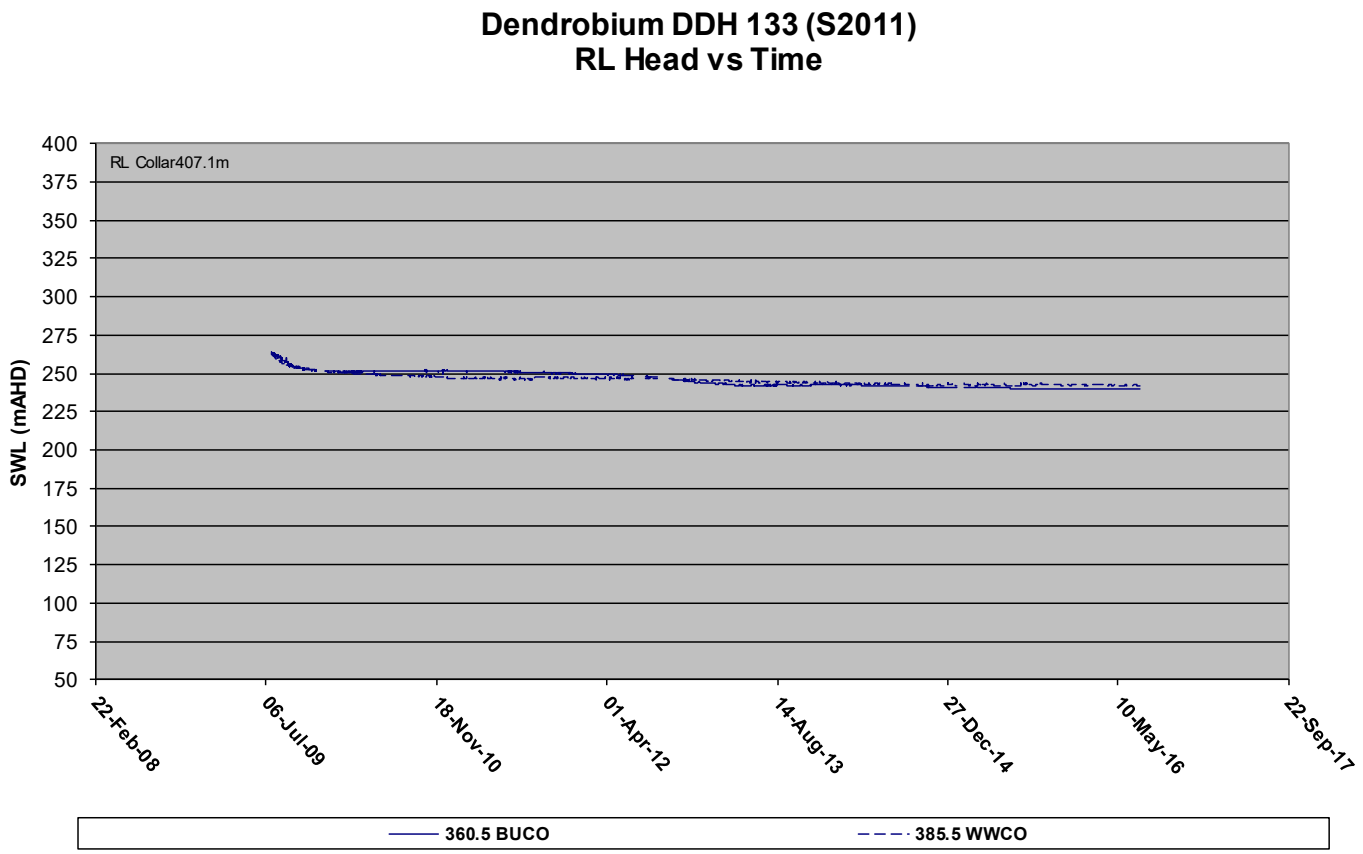


RL Head

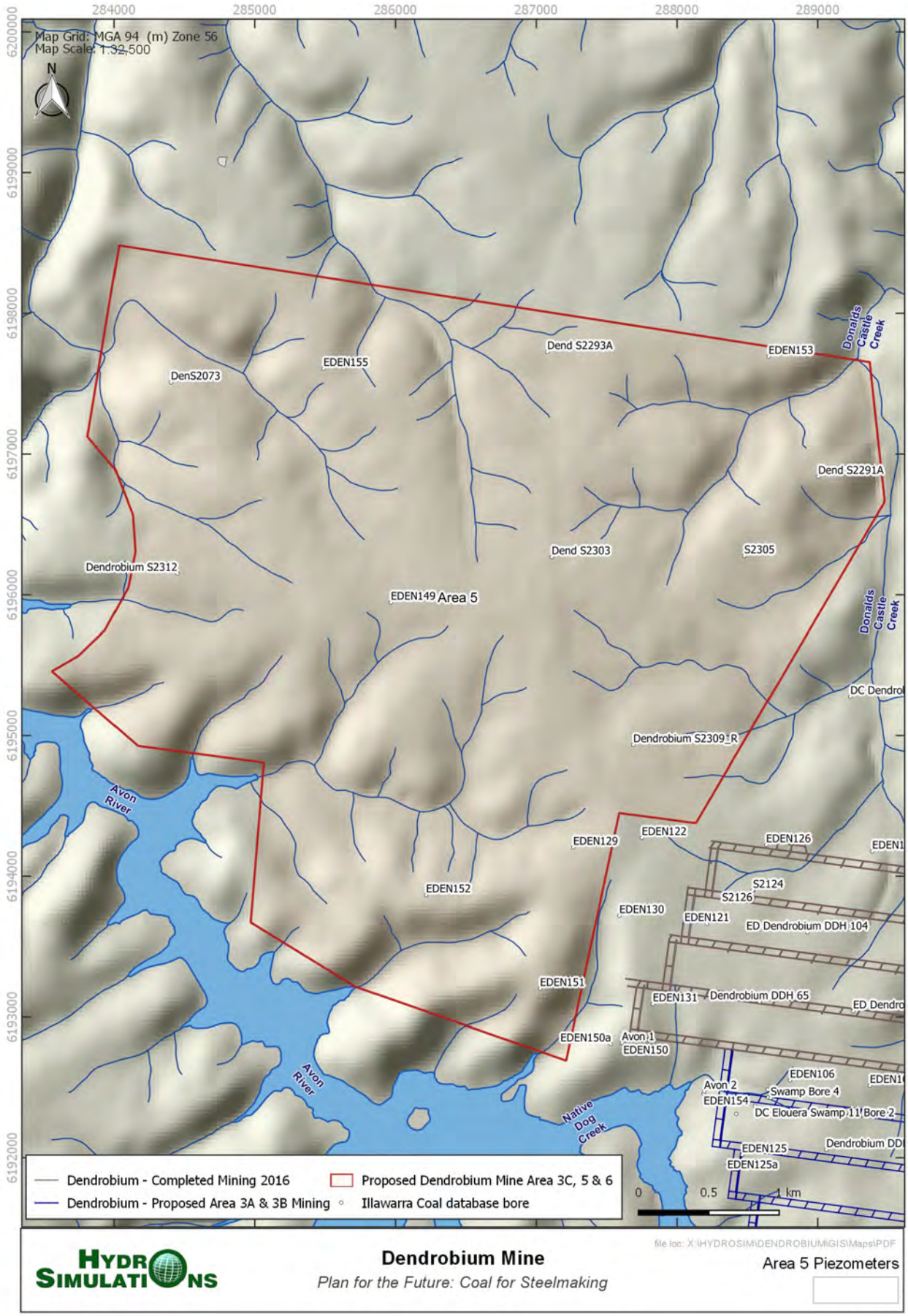


Area 3C


Dendrobium DDH 132 (S2010)
RL Head vs Time
RL Collar407.1m
SWL (mAHD)
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
22-Feb-08
06-Jul-09
18-Nov-10
01-Apr-12
14-Aug-13
27-Dec-14
10-May-16
22-Sep-17
371.5 WWCO

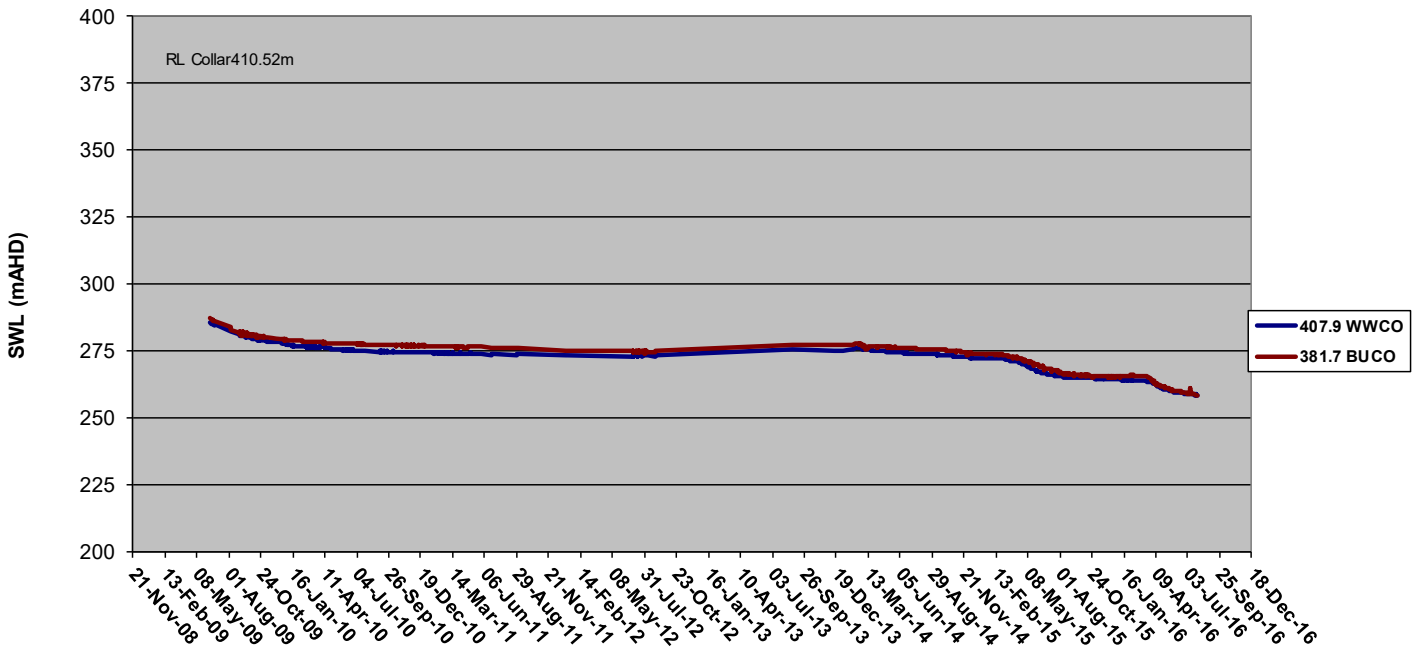

Dendrobium DDH 133 (S2011)
RL Head vs Time
RL Collar407.1m
SWL (mAHD)
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
22-Feb-08
06-Jul-09
18-Nov-10
01-Apr-12
14-Aug-13
27-Dec-14
10-May-16
22-Sep-17
360.5 BUCO
385.5 WWCO

AREA 5

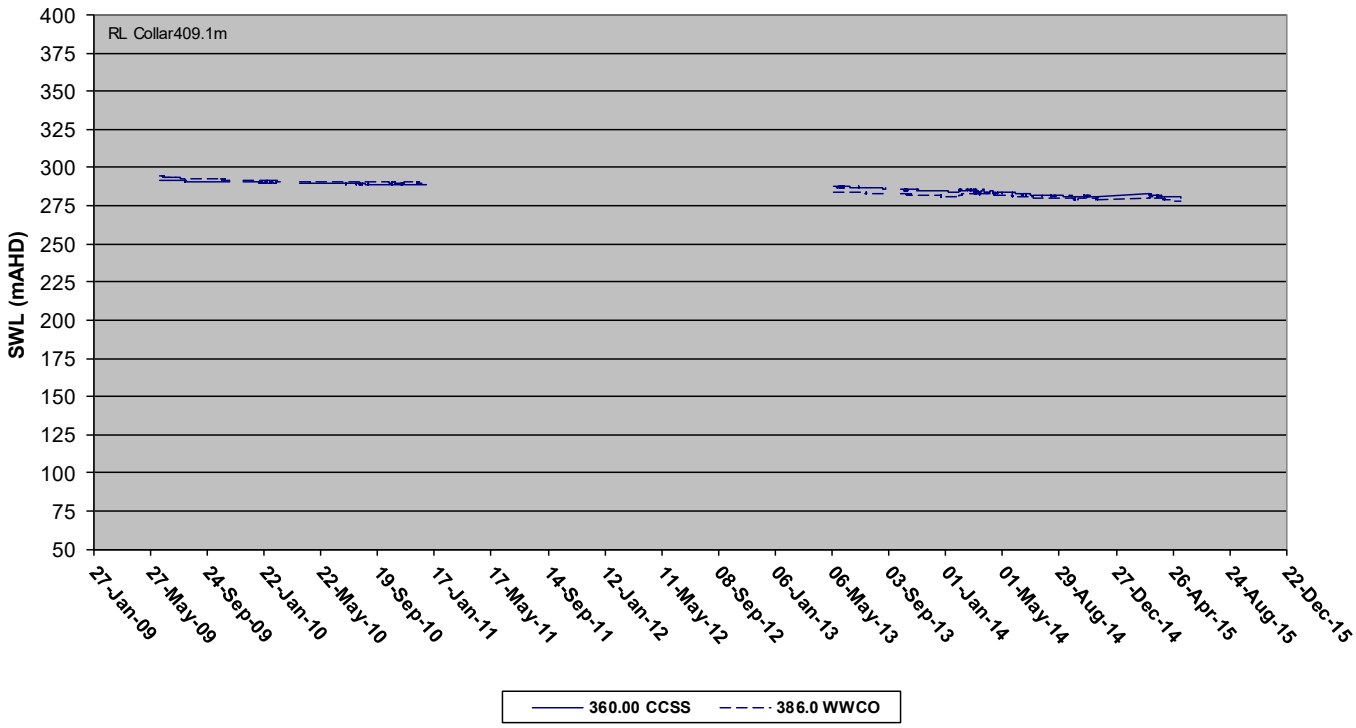

Map Grid: MGA 94 (m) Zone 56
Map Scale: 1:32,500
N
284000
285000
286000
287000
288000
289000
6200000
6199000
6198000
6197000
6196000
6195000
6194000
6193000
6192000
Dend S2293A
EDEN153
Donalds Castle Creek
EDEN155
DenS2073
Dend S2291A
Dend S2303
S2305
Dendrobium S2312
EDEN149 Area 5
Donalds Castle Creek
DC Dendrol
Dendrobium S2309_R
Avon River
EDEN129
EDEN122
EDEN126
S2124
S2126
EDEN152
EDEN130
EDEN121
ED Dendrobium DDH 104
EDEN151
EDEN131
Dendrobium DDH 65
ED Dendro
EDEN150a
Avon 1
EDEN150
Avon River
EDEN106
Avon 2
Swamp Bore 4
EDEN154
DC Elouera Swamp 11 Bore 2
Native Dog Creek
EDEN125
Dendrobium DD
EDEN125a
Dendrobium - Completed Mining 2016
Dendrobium - Proposed Area 3A & 3B Mining
Proposed Dendrobium Mine Area 3C, 5 & 6
Illawarra Coal database bore
0
0.5
1 km
file loc: X:\HYDROSIM\DENDROBIUM\GIS\Maps\PDF
HYDRO SIMULATIONS
Dendrobium Mine
Plan for the Future: Coal for Steelmaking
Area 5 Piezometers

Area 5

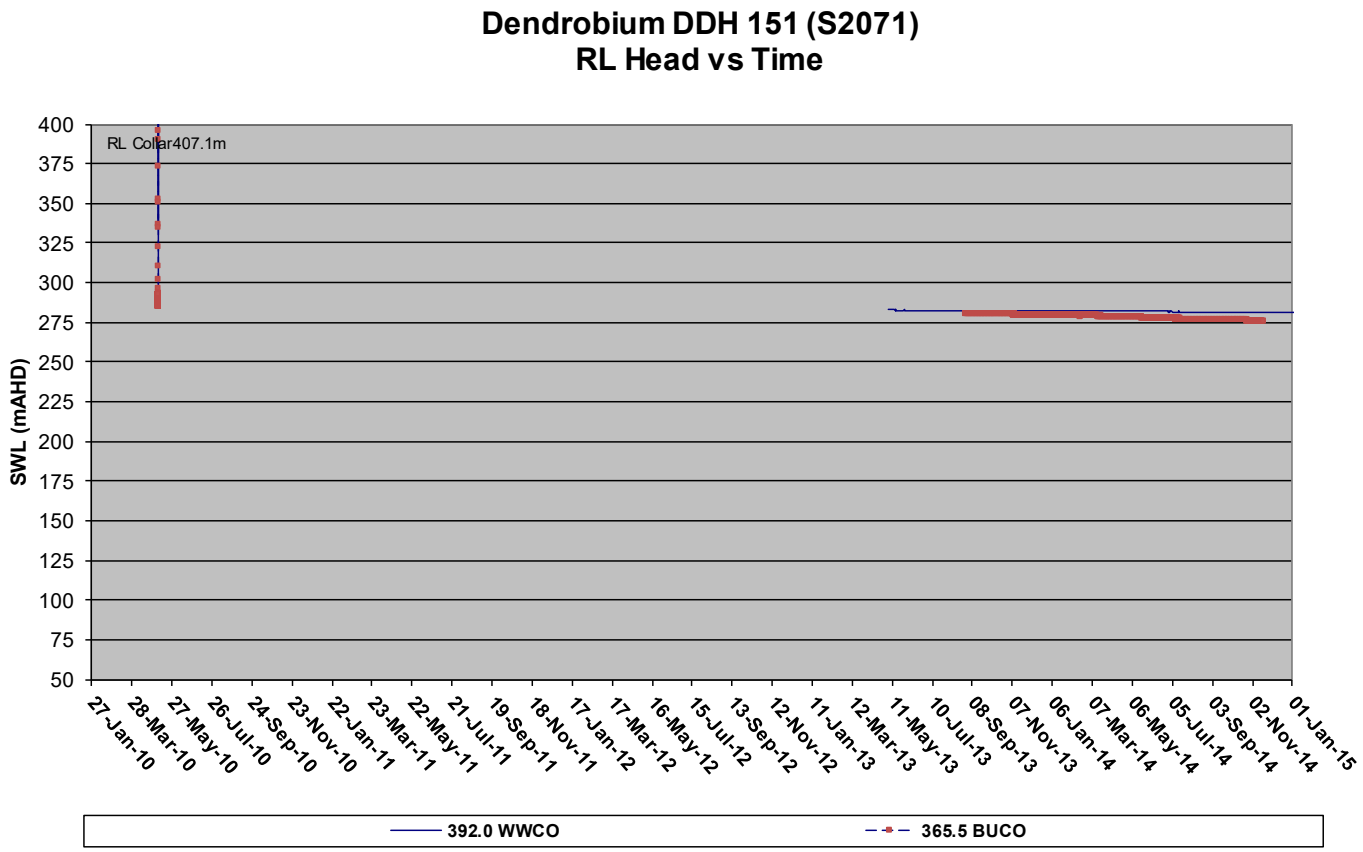
EC Dendrobium 122 S1998
RL Head vs Time

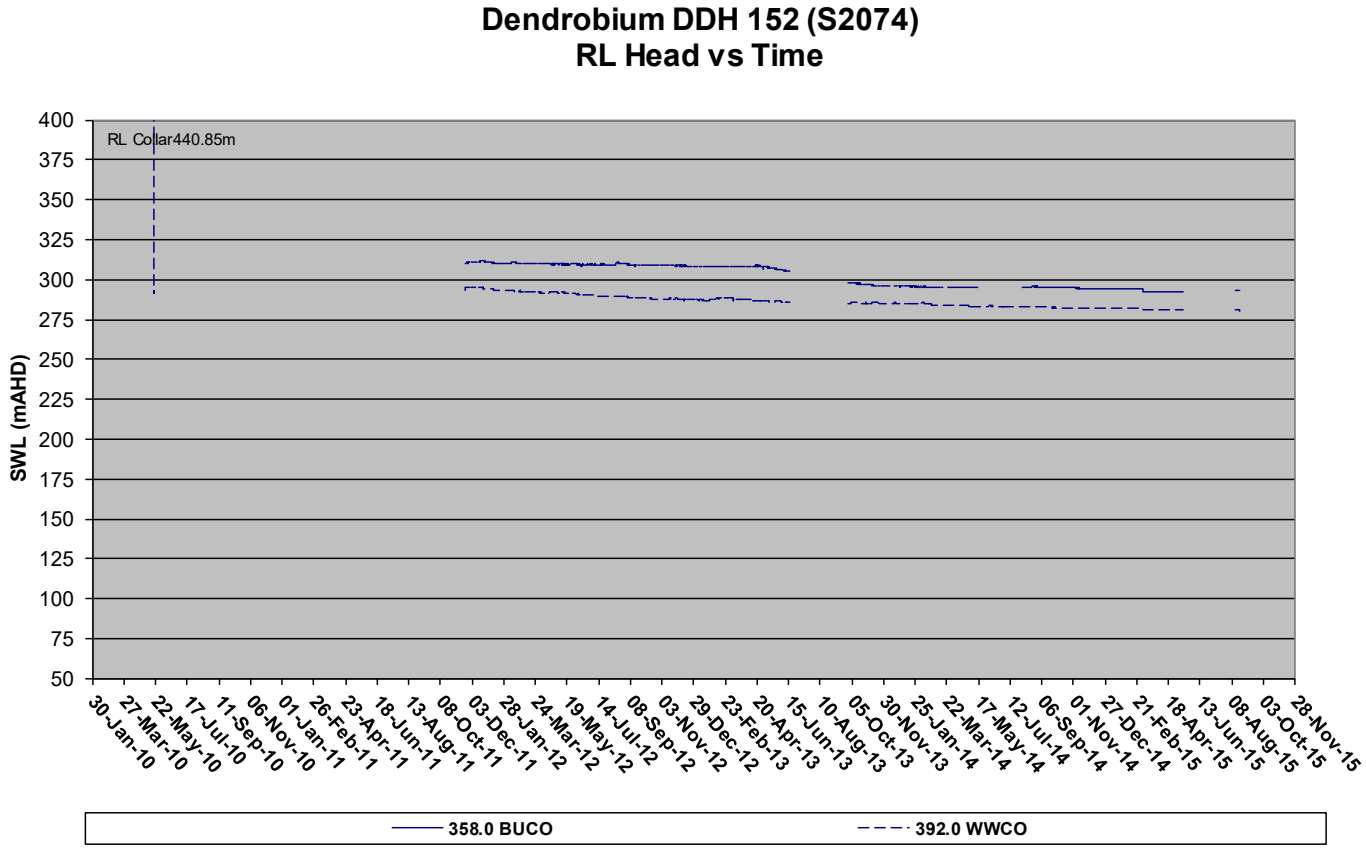


Dendrobium DDH 130 (S2007)
RL Head vs Time

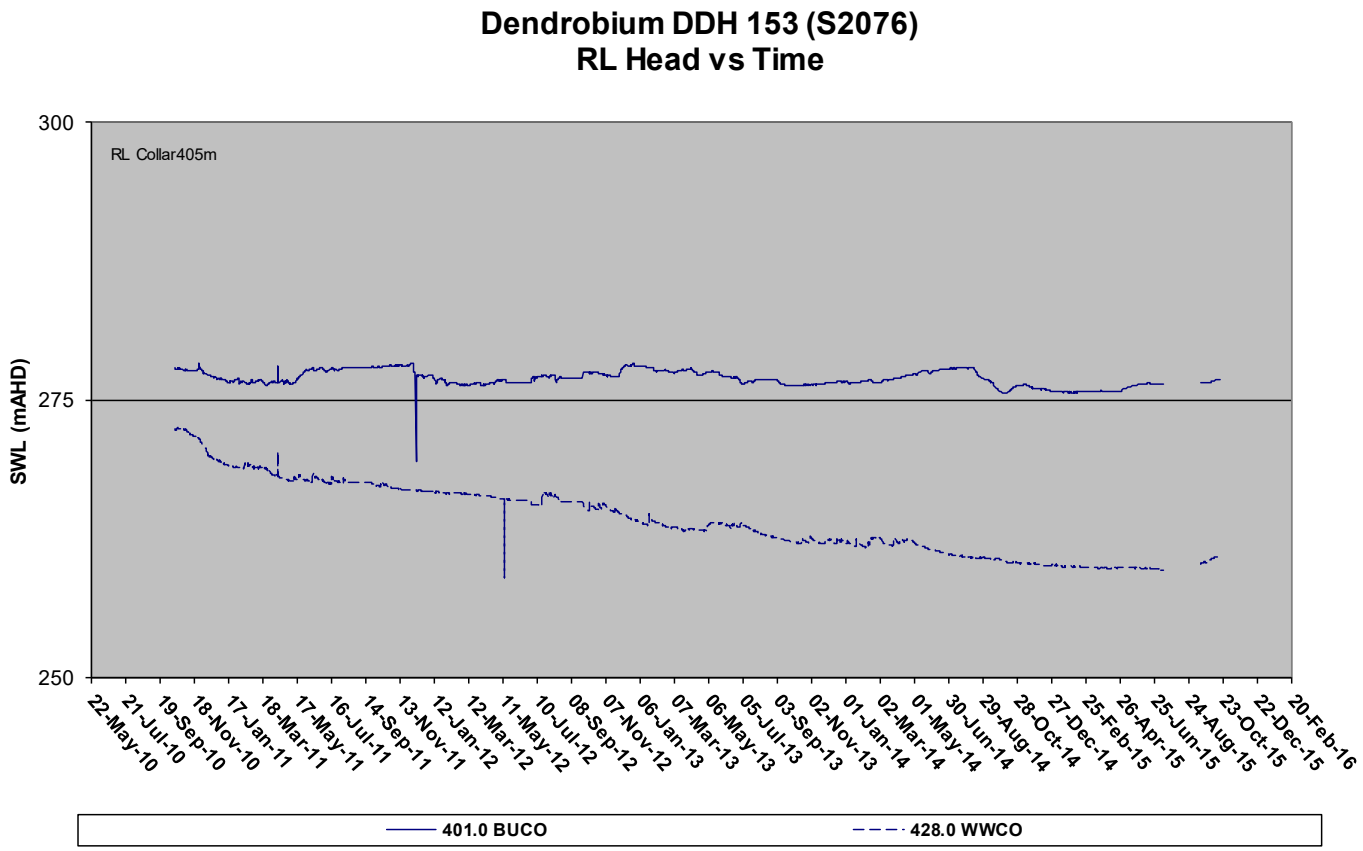


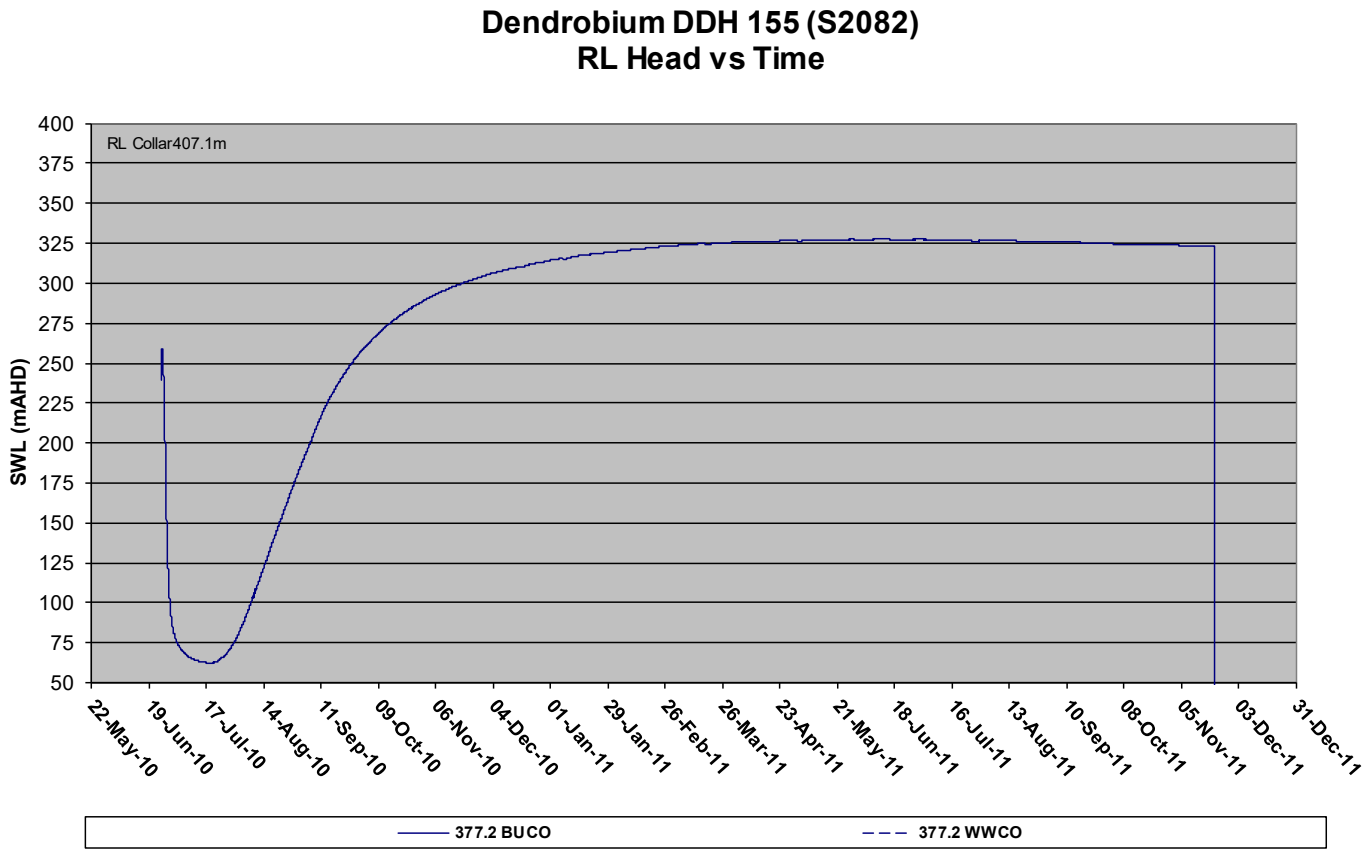
Area 5


Dendrobium DDH 151 (S2071)
RL Head vs Time
RL Collar407.1m
SWL (mAHD)
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
27-Jan-10
28-Mar-10
27-May-10
26-Jul-10
24-Sep-10
23-Nov-10
22-Jan-11
23-Mar-11
22-May-11
21-Jul-11
19-Sep-11
18-Nov-11
17-Jan-12
17-Mar-12
16-May-12
15-Jul-12
13-Sep-12
12-Nov-12
11-Jan-13
12-Mar-13
11-May-13
10-Jul-13
08-Sep-13
07-Nov-13
06-Jan-14
07-Mar-14
06-May-14
05-Jul-14
03-Sep-14
02-Nov-14
01-Jan-15
392.0 WWCO
365.5 BUCO

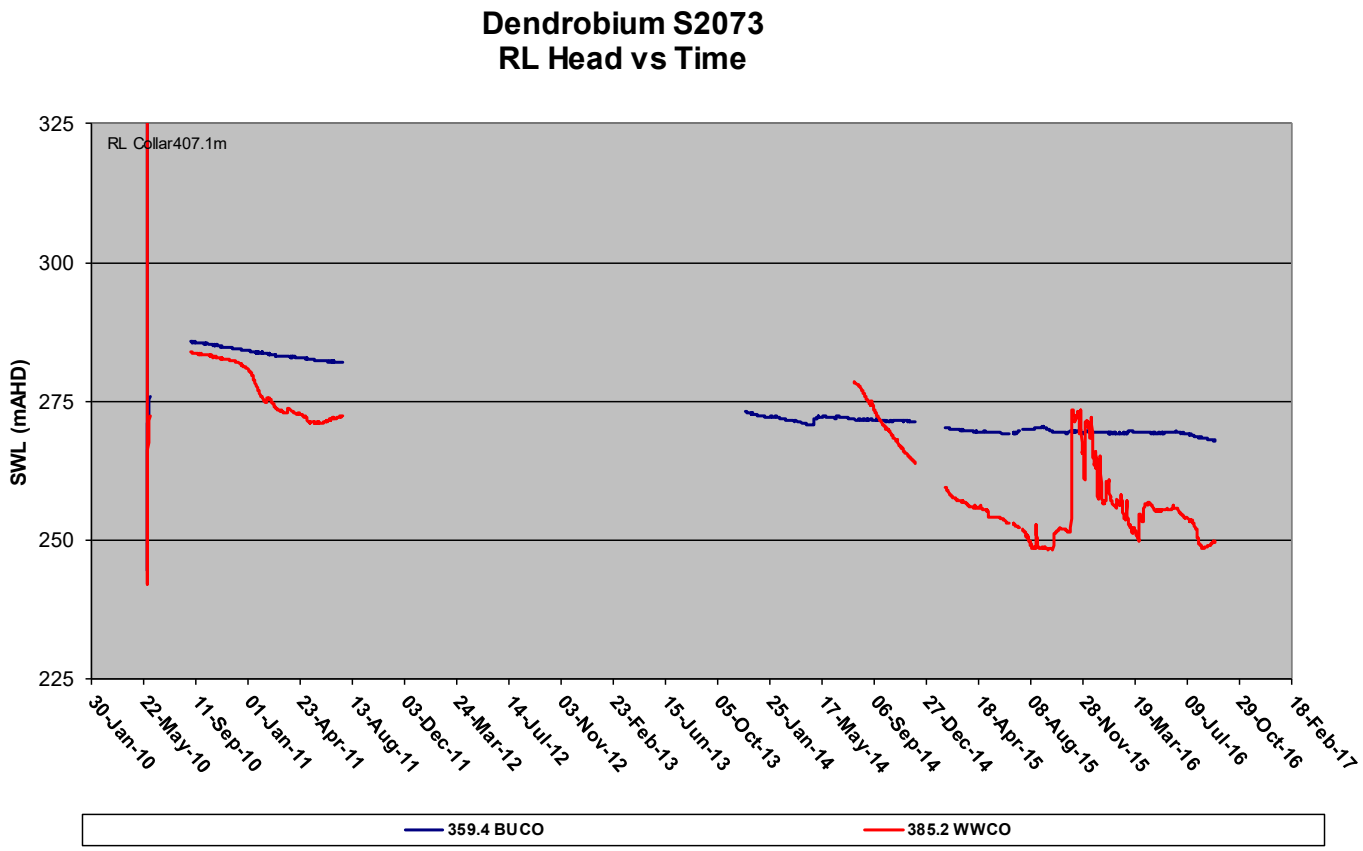

Dendrobium DDH 152 (S2074)
RL Head vs Time
RL Collar440.85m
SWL (mAHD)
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
30-Jan-10
27-Mar-10
22-May-10
17-Jul-10
11-Sep-10
06-Nov-10
01-Jan-11
26-Feb-11
23-Apr-11
18-Jun-11
13-Aug-11
08-Oct-11
03-Dec-11
28-Jan-12
24-Mar-12
19-May-12
14-Jul-12
08-Sep-12
03-Nov-12
29-Dec-12
23-Feb-13
20-Apr-13
15-Jun-13
10-Aug-13
05-Oct-13
30-Nov-13
25-Jan-14
22-Mar-14
17-May-14
12-Jul-14
06-Sep-14
01-Nov-14
27-Dec-14
21-Feb-15
18-Apr-15
13-Jun-15
08-Aug-15
03-Oct-15
28-Nov-15
358.0 BUCO
392.0 WWCO

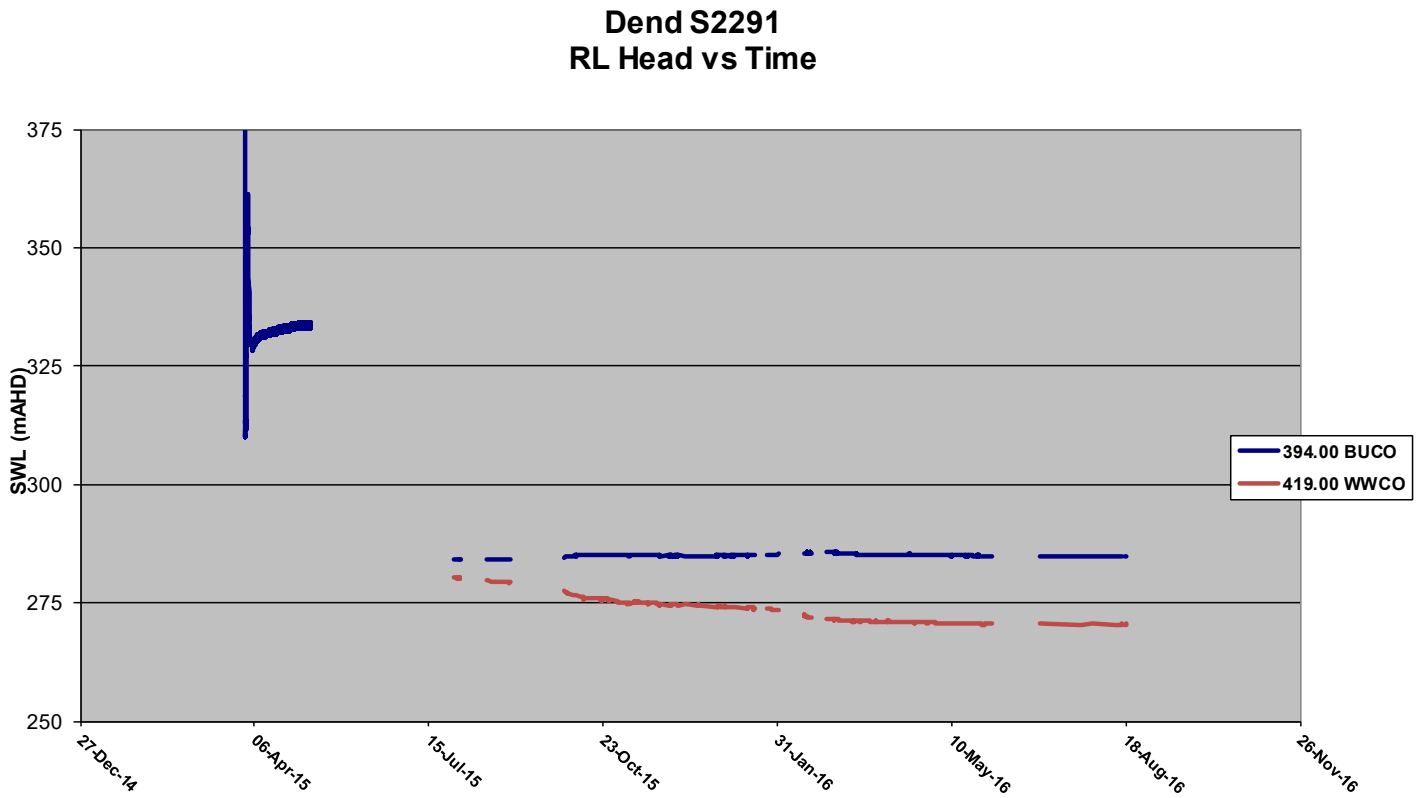
Area 5


Dendrobium DDH 153 (S2076)
RL Head vs Time
RL Collar405m
SWL (mAHD)
300
275
250
22-May-10
21-Jul-10
19-Sep-10
18-Nov-10
17-Jan-11
18-Mar-11
17-May-11
16-Jul-11
14-Sep-11
13-Nov-11
12-Jan-12
12-Mar-12
11-May-12
10-Jul-12
08-Sep-12
07-Nov-12
06-Jan-13
07-Mar-13
06-May-13
05-Jul-13
03-Sep-13
02-Nov-13
01-Jan-14
02-Mar-14
01-May-14
30-Jun-14
29-Aug-14
28-Oct-14
27-Dec-14
25-Feb-15
26-Apr-15
25-Jun-15
24-Aug-15
23-Oct-15
22-Dec-15
20-Feb-16
401.0 BUCO
428.0 WWCO

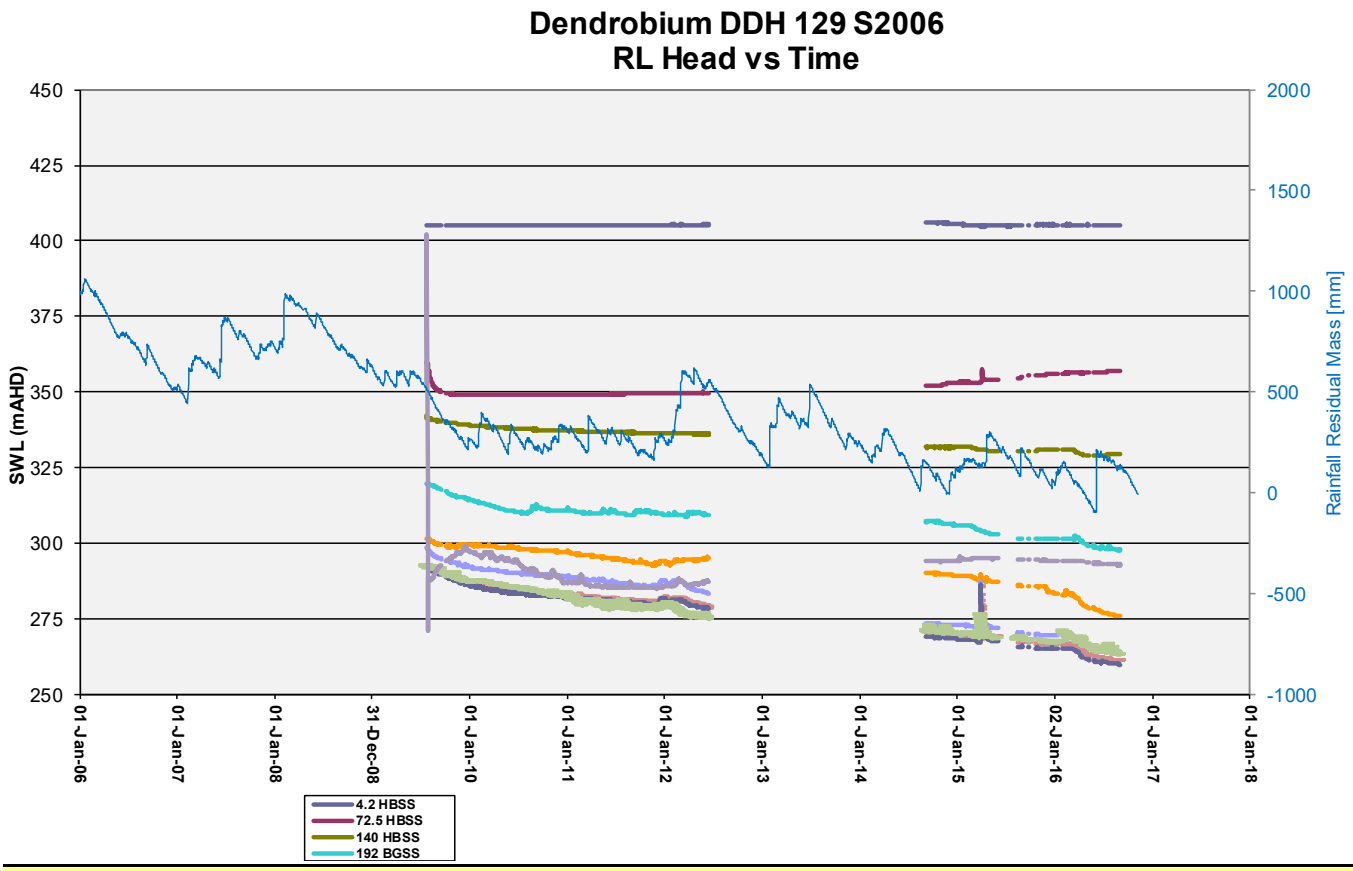

Dendrobium DDH 155 (S2082)
RL Head vs Time
RL Collar407.1m
SWL (mAHD)
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
22-May-10
19-Jun-10
17-Jul-10
14-Aug-10
11-Sep-10
09-Oct-10
06-Nov-10
04-Dec-10
01-Jan-11
29-Jan-11
26-Feb-11
26-Mar-11
23-Apr-11
21-May-11
18-Jun-11
16-Jul-11
13-Aug-11
10-Sep-11
08-Oct-11
05-Nov-11
03-Dec-11
31-Dec-11
377.2 BUCO
377.2 WWCO

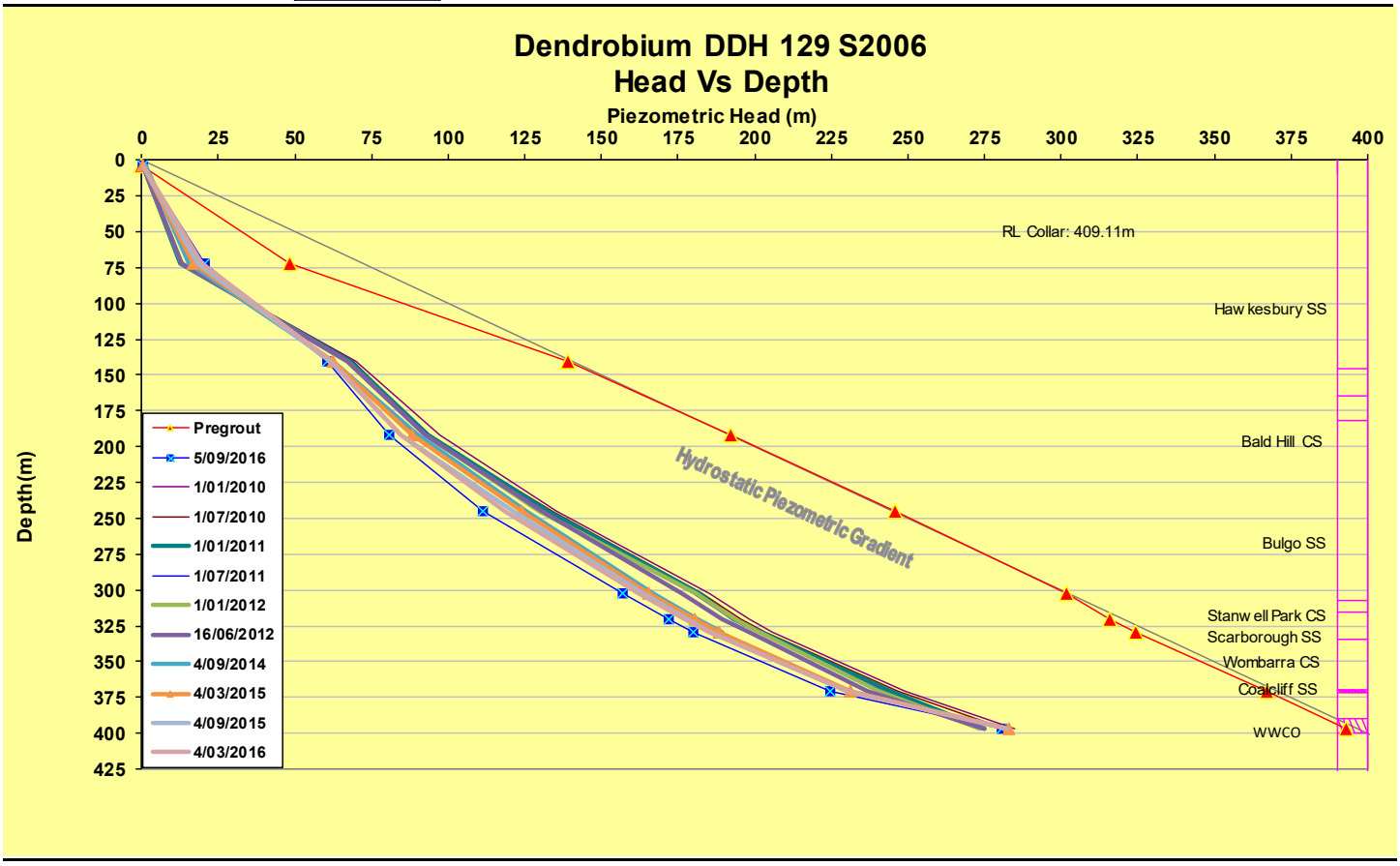
Area 5


Dendrobium S2073
RL Head vs Time
RL Collar407.1m
SWL (mAHD)
325
300
275
250
225
30-Jan-10
22-May-10
11-Sep-10
01-Jan-11
23-Apr-11
13-Aug-11
03-Dec-11
24-Mar-12
14-Jul-12
03-Nov-12
23-Feb-13
15-Jun-13
05-Oct-13
25-Jan-14
17-May-14
06-Sep-14
27-Dec-14
18-Apr-15
08-Aug-15
28-Nov-15
19-Mar-16
09-Jul-16
29-Oct-16
18-Feb-17
359.4 BUCO
385.2 WWCO

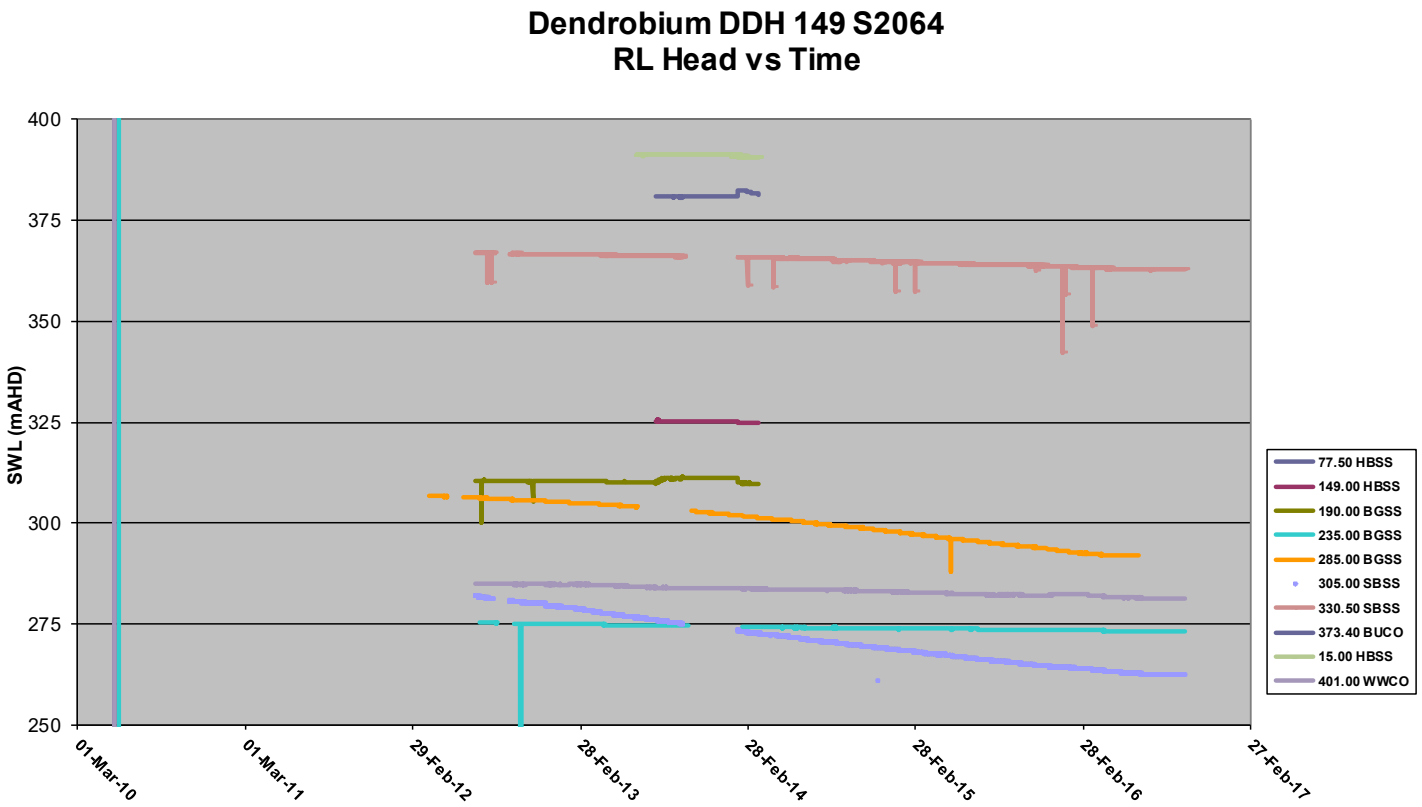

Dend S2291
RL Head vs Time
SWL (mAHD)
375
350
325
300
275
250
27-Dec-14
06-Apr-15
15-Jul-15
23-Oct-15
31-Jan-16
10-May-16
18-Aug-16
26-Nov-16
394.00 BUCO
419.00 WWCO

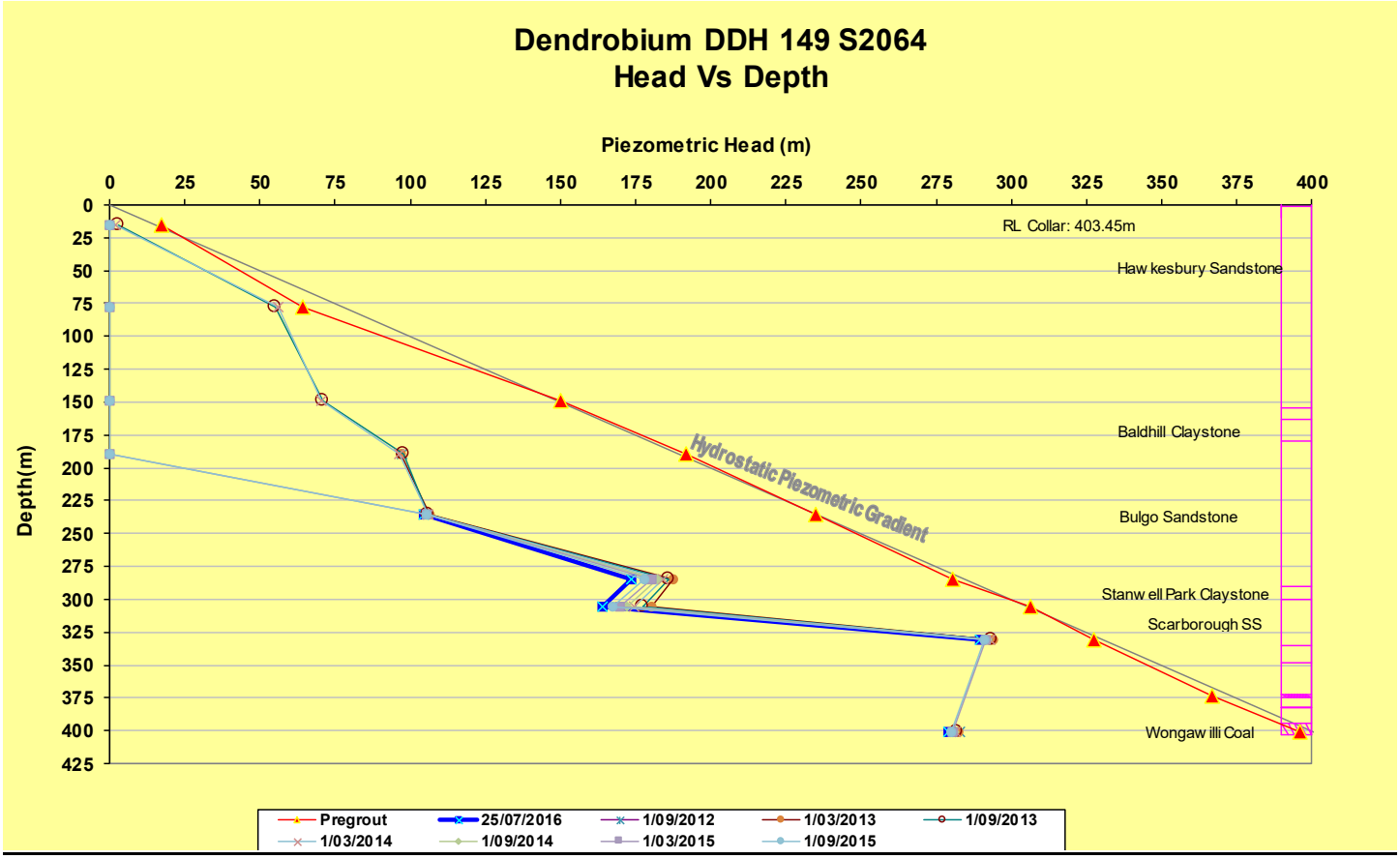
Area 5


Dendrobium DDH 129 S2006
RL Head vs Time
SWL (mAHD)
Rainfall Residual Mass [mm]
450
425
400
375
350
325
300
275
250
2000
1500
1000
500
0
-500
-1000
01-Jan-06
01-Jan-07
01-Jan-08
31-Dec-08
01-Jan-10
01-Jan-11
01-Jan-12
01-Jan-13
01-Jan-14
01-Jan-15
02-Jan-16
01-Jan-17
01-Jan-18
4.2 HBSS
72.5 HBSS
140 HBSS
192 BGSS

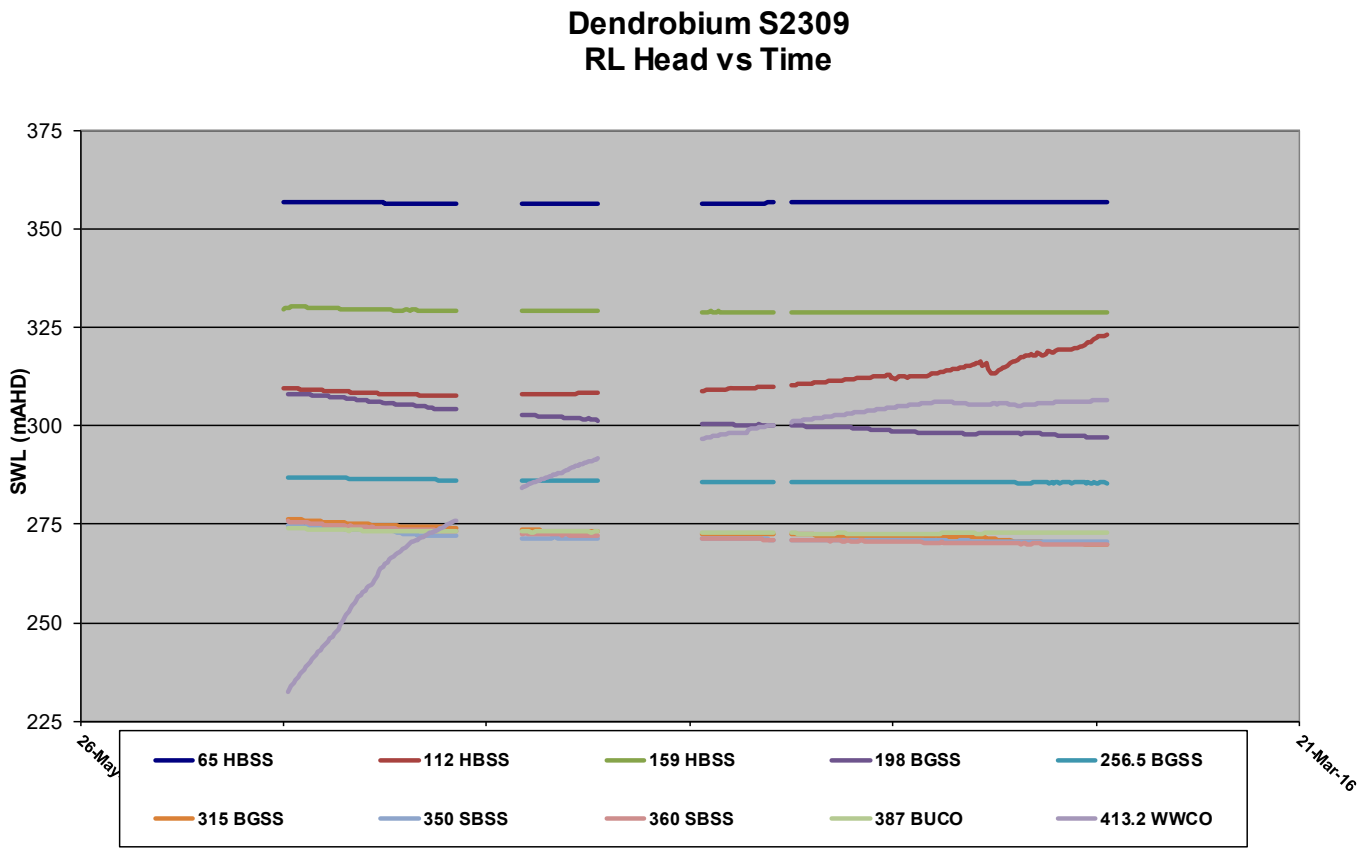

Dendrobium DDH 129 S2006
Head Vs Depth
Piezometric Head (m)
Depth (m)
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
400
425
RL Collar: 409.11m
Hydrostatic Piezometric Gradient
Haw kesbury SS
Bald Hill CS
Bulgo SS
Stanw ell Park CS
Scarborough SS
Wombarra CS
Coalcliff SS
WWCO
Pregrout
5/09/2016
1/01/2010
1/07/2010
1/01/2011
1/07/2011
1/01/2012
16/06/2012
4/09/2014
4/03/2015
4/09/2015
4/03/2016

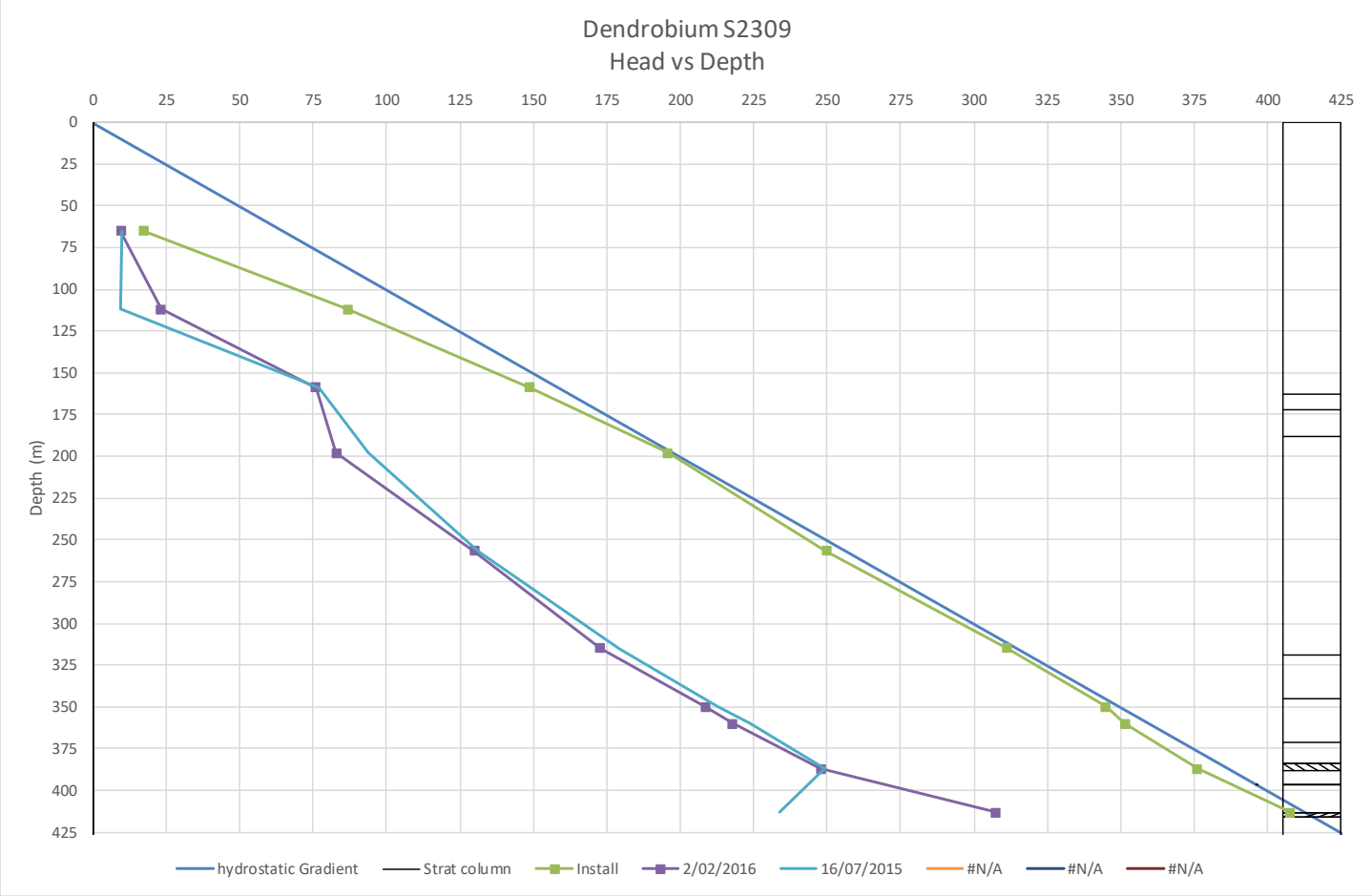
Area 5


Dendrobium DDH 149 S2064
RL Head vs Time
SWL (mAHD)
400
375
350
325
300
275
250
01-Mar-10
01-Mar-11
29-Feb-12
28-Feb-13
28-Feb-14
28-Feb-15
28-Feb-16
27-Feb-17
77.50 HBSS
149.00 HBSS
190.00 BGSS
235.00 BGSS
285.00 BGSS
305.00 SBSS
330.50 SBSS
373.40 BUCO
15.00 HBSS
401.00 WWCO

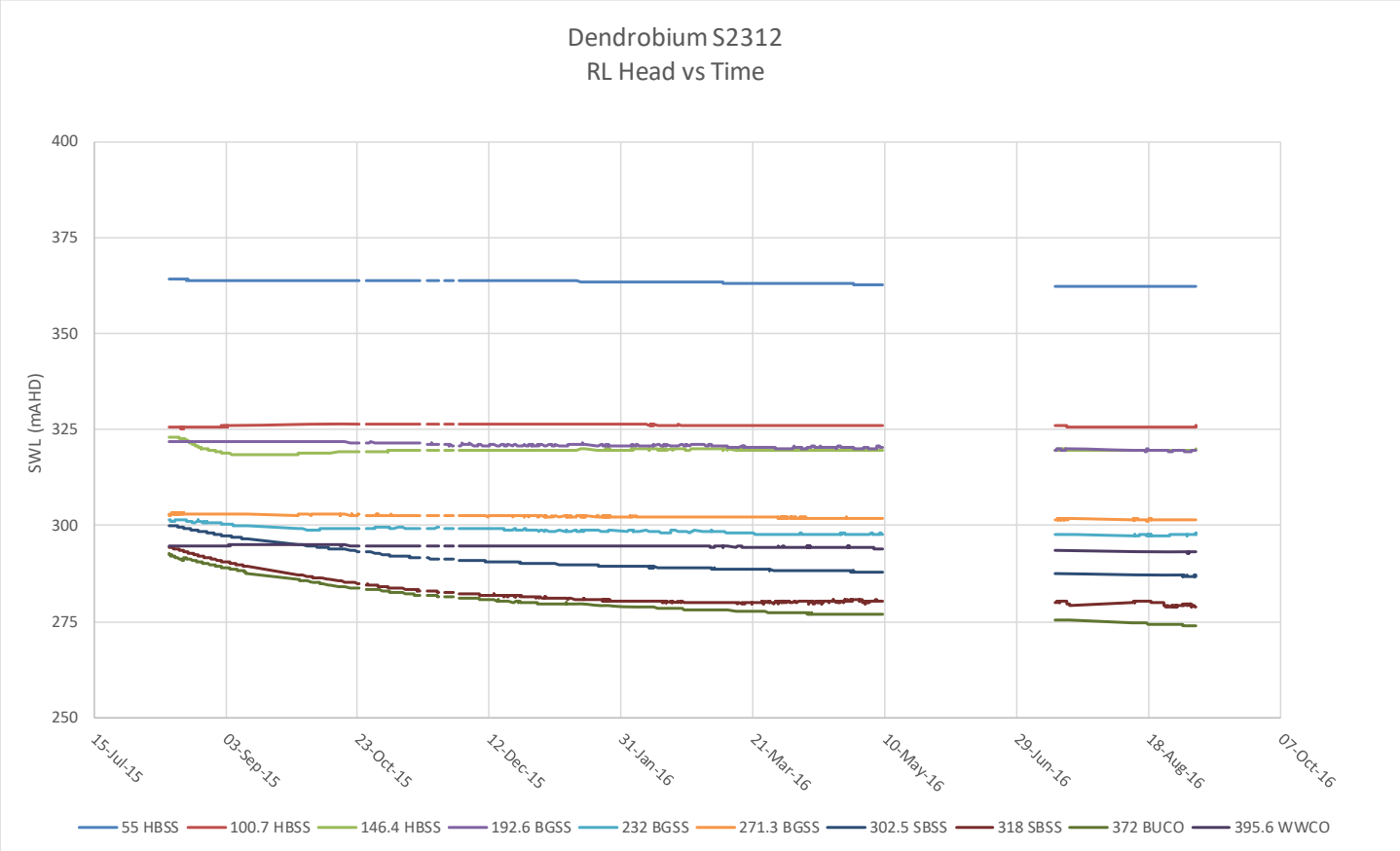

Dendrobium DDH 149 S2064
Head Vs Depth
Piezometric Head (m)
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
400
Depth(m)
425
RL Collar: 403.45m
Haw kesbury Sandstone
Baldhill Claystone
Bulgo Sandstone
Stanw ell Park Claystone
Scarborough SS
Wongaw illi Coal
Hydrostatic Piezometric Gradient
Pregrout
25/07/2016
1/09/2012
1/03/2013
1/09/2013
1/03/2014
1/09/2014
1/03/2015
1/09/2015

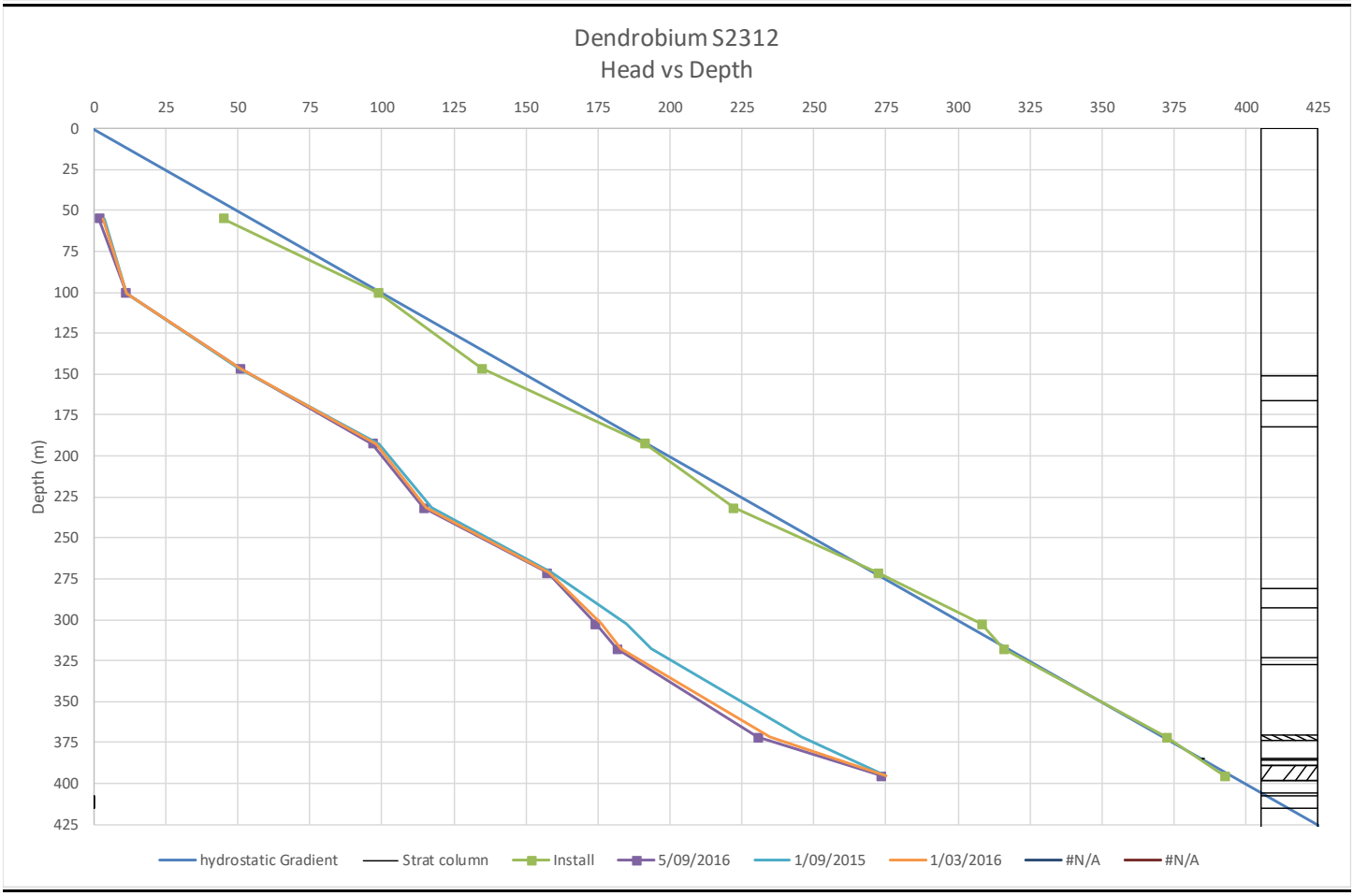
Area 5


Dendrobium S2309
RL Head vs Time
SWL (mAHD)
375
350
325
300
275
250
225
26-May
21-Mar-16
65 HBSS
112 HBSS
159 HBSS
198 BGSS
256.5 BGSS
315 BGSS
350 SBSS
360 SBSS
387 BUCO
413.2 WWCO

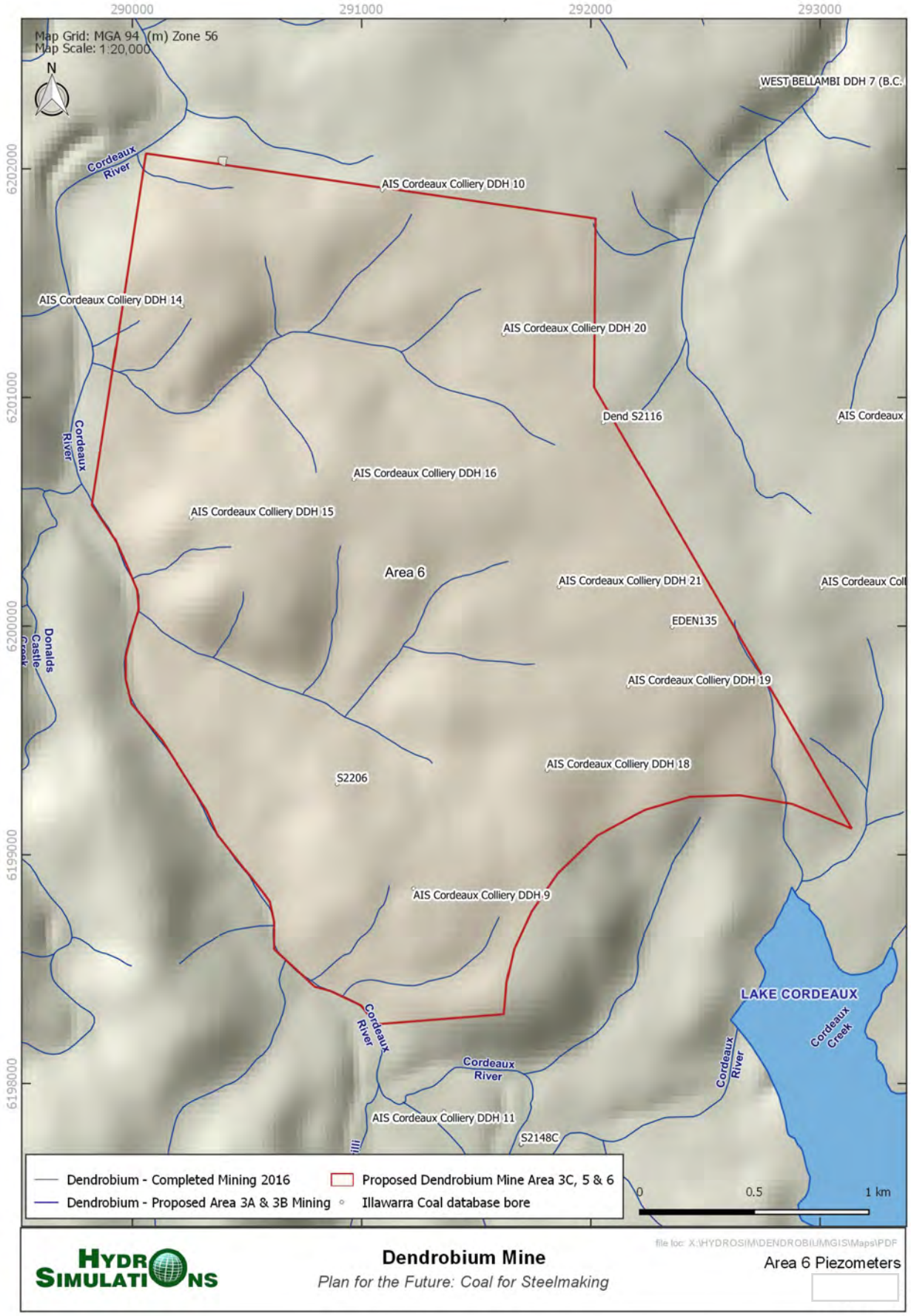

Dendrobium S2309
Head vs Depth
Depth (m)
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
400
425
hydrostatic Gradient
Strat column
Install
2/02/2016
16/07/2015
#N/A
#N/A
#N/A

Area 5

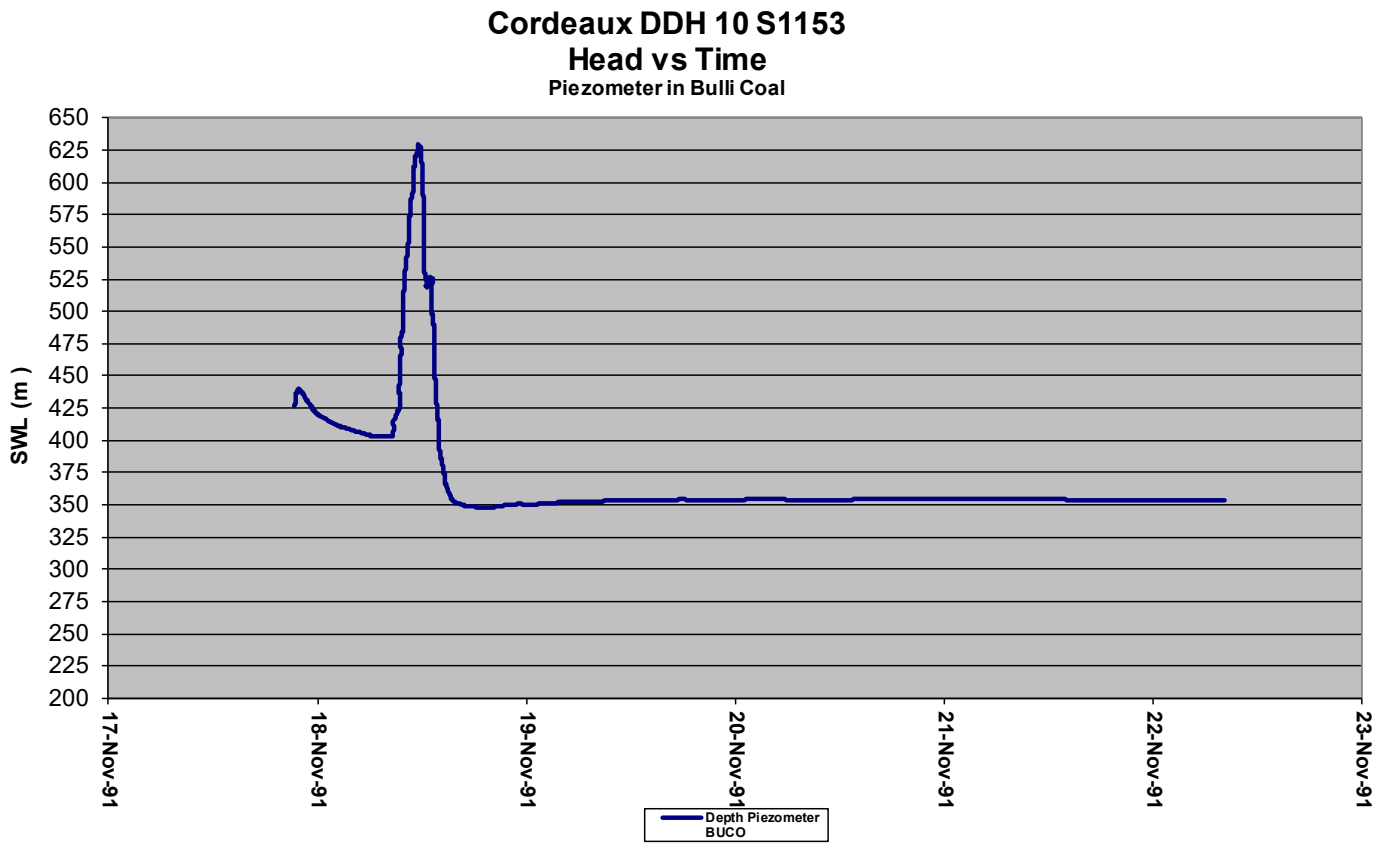

Dendrobium S2312
RL Head vs Time
SWL (mAHD)
400
375
350
325
300
275
250
15-Jul-15
03-Sep-15
23-Oct-15
12-Dec-15
31-Jan-16
21-Mar-16
10-May-16
29-Jun-16
18-Aug-16
07-Oct-16
55 HBSS
100.7 HBSS
146.4 HBSS
192.6 BGSS
232 BGSS
271.3 BGSS
302.5 SBSS
318 SBSS
372 BUCO
395.6 WWCO

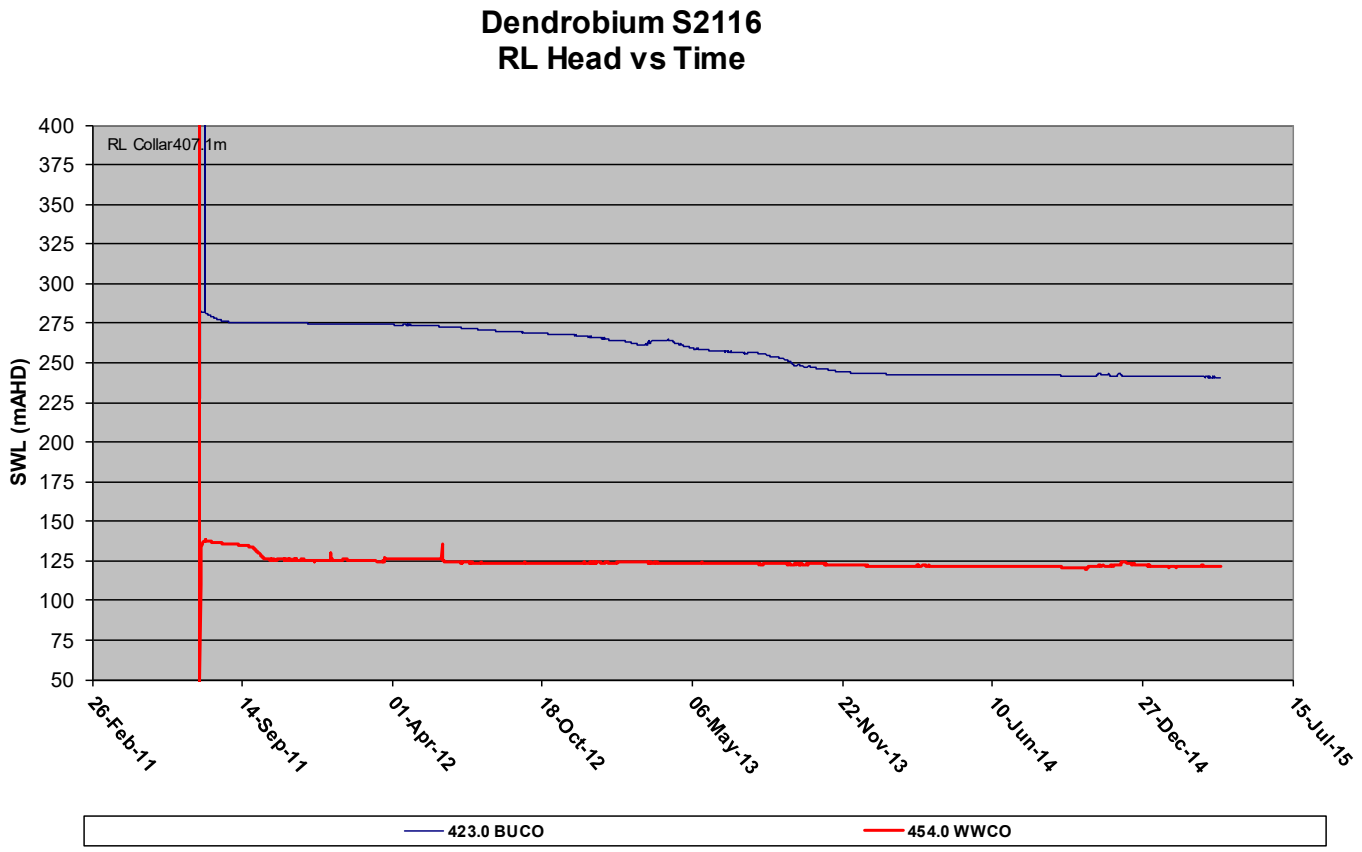

Dendrobium S2312
Head vs Depth
Depth (m)
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
400
425
hydrostatic Gradient
Strat column
Install
5/09/2016
1/09/2015
1/03/2016
#N/A
#N/A

AREA 6

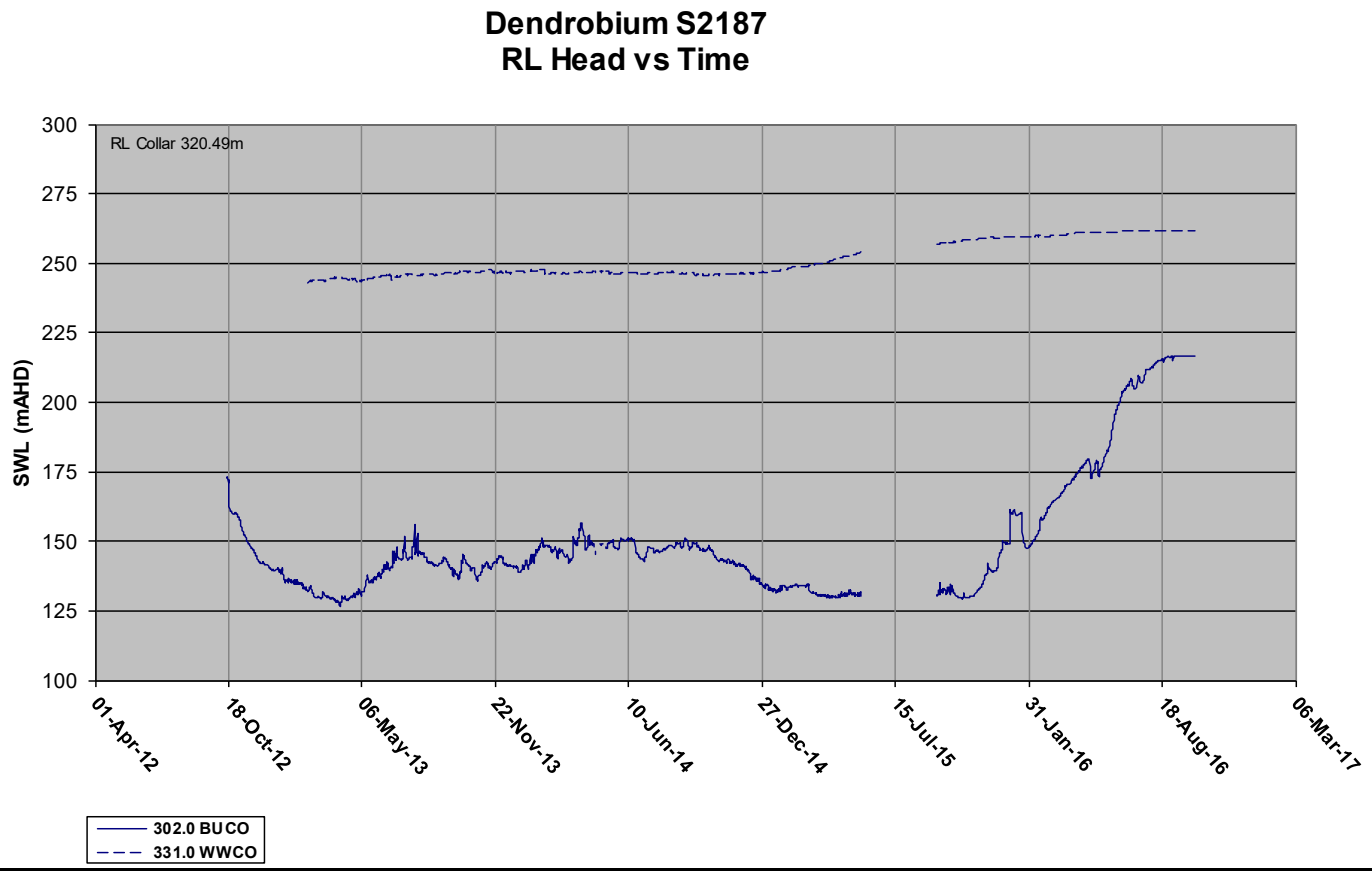

290000
291000
292000
293000
Map Grid: MGA 94 (m) Zone 56
Map Scale: 1:20,000
N
6202000
6201000
6200000
6199000
6198000
WEST BELLAMBI DDH 7 (B.C.
Cordeaux River
AIS Cordeaux Colliery DDH 10
AIS Cordeaux Colliery DDH 14
AIS Cordeaux Colliery DDH 20
Dend S2116
AIS Cordeaux
Cordeaux River
AIS Cordeaux Colliery DDH 16
AIS Cordeaux Colliery DDH 15
Area 6
AIS Cordeaux Colliery DDH 21
AIS Cordeaux Coll
EDEN135
Donalds Castle Creek
AIS Cordeaux Colliery DDH 19
AIS Cordeaux Colliery DDH 18
S2206
AIS Cordeaux Colliery DDH 9
LAKE CORDEAUX
Cordeaux Creek
Cordeaux River
Cordeaux River
Cordeaux River
AIS Cordeaux Colliery DDH 11
S2148C
Dendrobium - Completed Mining 2016
Dendrobium - Proposed Area 3A & 3B Mining
Proposed Dendrobium Mine Area 3C, 5 & 6
Illawarra Coal database bore
0
0.5
1 km
HYDRO SIMULATIONS
Dendrobium Mine
Plan for the Future: Coal for Steelmaking
file loc: X:\HYDROSIM\DENDROBIU\MGIS\Maps\PDF
Area 6 Piezometers

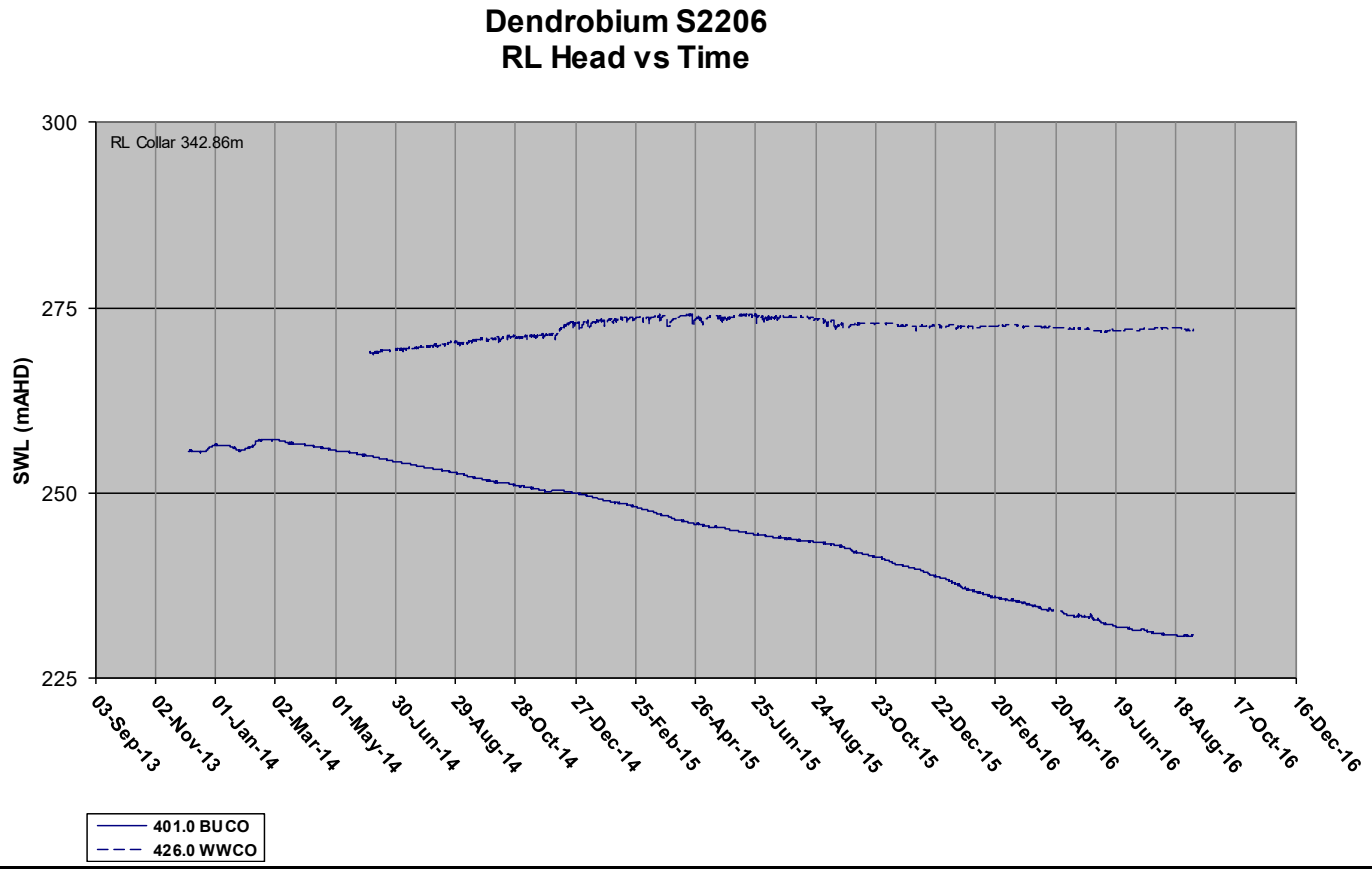
Area 6


Cordeaux DDH 10 S1153
Head vs Time
Piezometer in Bulli Coal
SWL (m)
650
625
600
575
550
525
500
475
450
425
400
375
350
325
300
275
250
225
200
17-Nov-91
18-Nov-91
19-Nov-91
20-Nov-91
21-Nov-91
22-Nov-91
23-Nov-91
Depth Piezometer BUCO

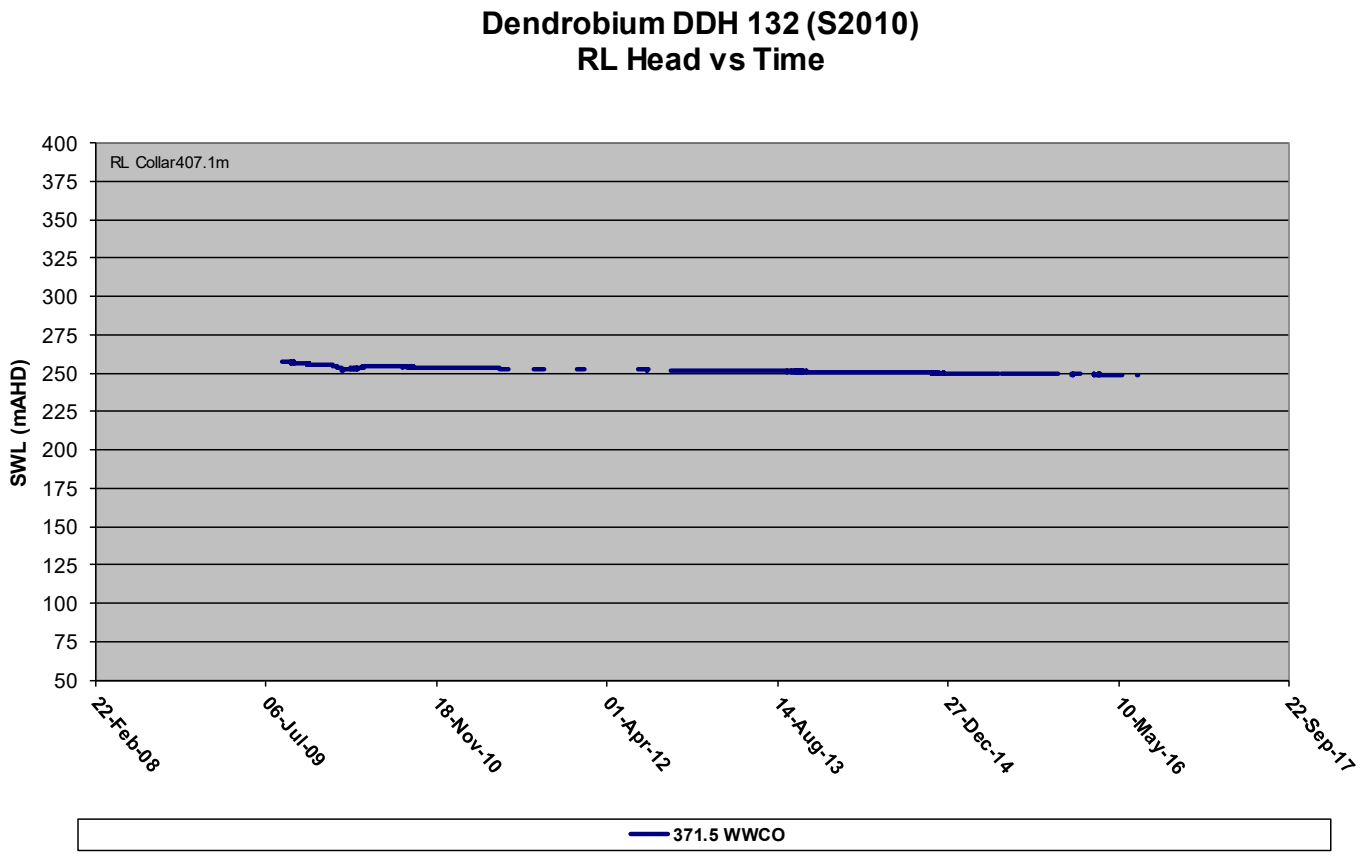

Dendrobium S2116
RL Head vs Time
RL Collar407.1m
SWL (mAHD)
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
26-Feb-11
14-Sep-11
01-Apr-12
18-Oct-12
06-May-13
22-Nov-13
10-Jun-14
27-Dec-14
15-Jul-15
423.0 BUCO
454.0 WWCO

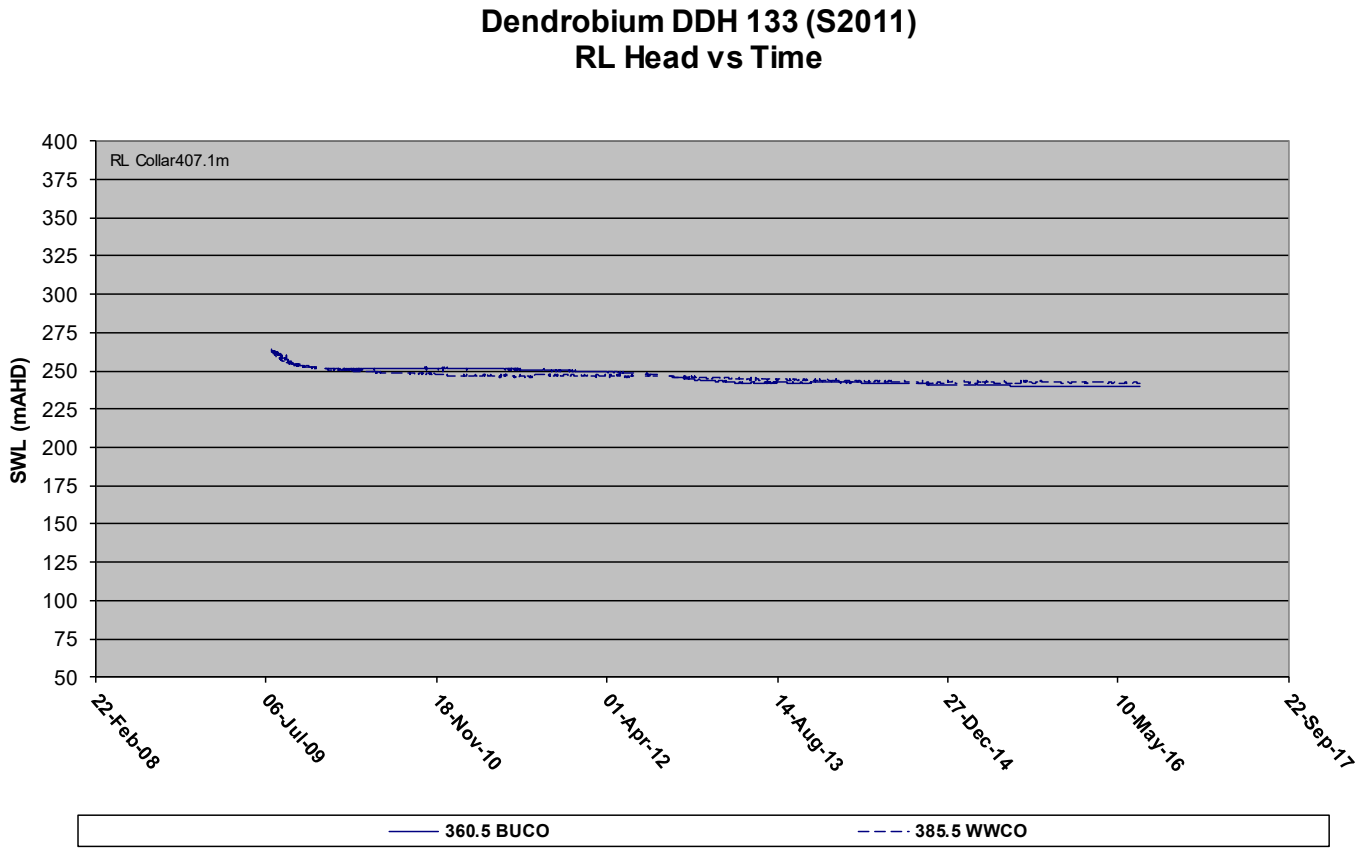
Area 6


Dendrobium S2187
RL Head vs Time
RL Collar 320.49m
SWL (mAHD)
300
275
250
225
200
175
150
125
100
01-Apr-12
18-Oct-12
06-May-13
22-Nov-13
10-Jun-14
27-Dec-14
15-Jul-15
31-Jan-16
18-Aug-16
06-Mar-17
302.0 BUCO
331.0 WWCO


Dendrobium S2206
RL Head vs Time
RL Collar 342.86m
SWL (mAHD)
300
275
250
225
03-Sep-13
02-Nov-13
01-Jan-14
02-Mar-14
01-May-14
30-Jun-14
29-Aug-14
28-Oct-14
27-Dec-14
25-Feb-15
26-Apr-15
25-Jun-15
24-Aug-15
23-Oct-15
22-Dec-15
20-Feb-16
20-Apr-16
19-Jun-16
18-Aug-16
17-Oct-16
16-Dec-16
401.0 BUCO
426.0 WWCO

Area 6


Dendrobium DDH 132 (S2010)
RL Head vs Time
RL Collar407.1m
SWL (mAHD)
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
22-Feb-08
06-Jul-09
18-Nov-10
01-Apr-12
14-Aug-13
27-Dec-14
10-May-16
22-Sep-17
371.5 WWCO


Dendrobium DDH 133 (S2011)
RL Head vs Time
RL Collar407.1m
SWL (mAHD)
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
22-Feb-08
06-Jul-09
18-Nov-10
01-Apr-12
14-Aug-13
27-Dec-14
10-May-16
22-Sep-17
360.5 BUCO
385.5 WWCO

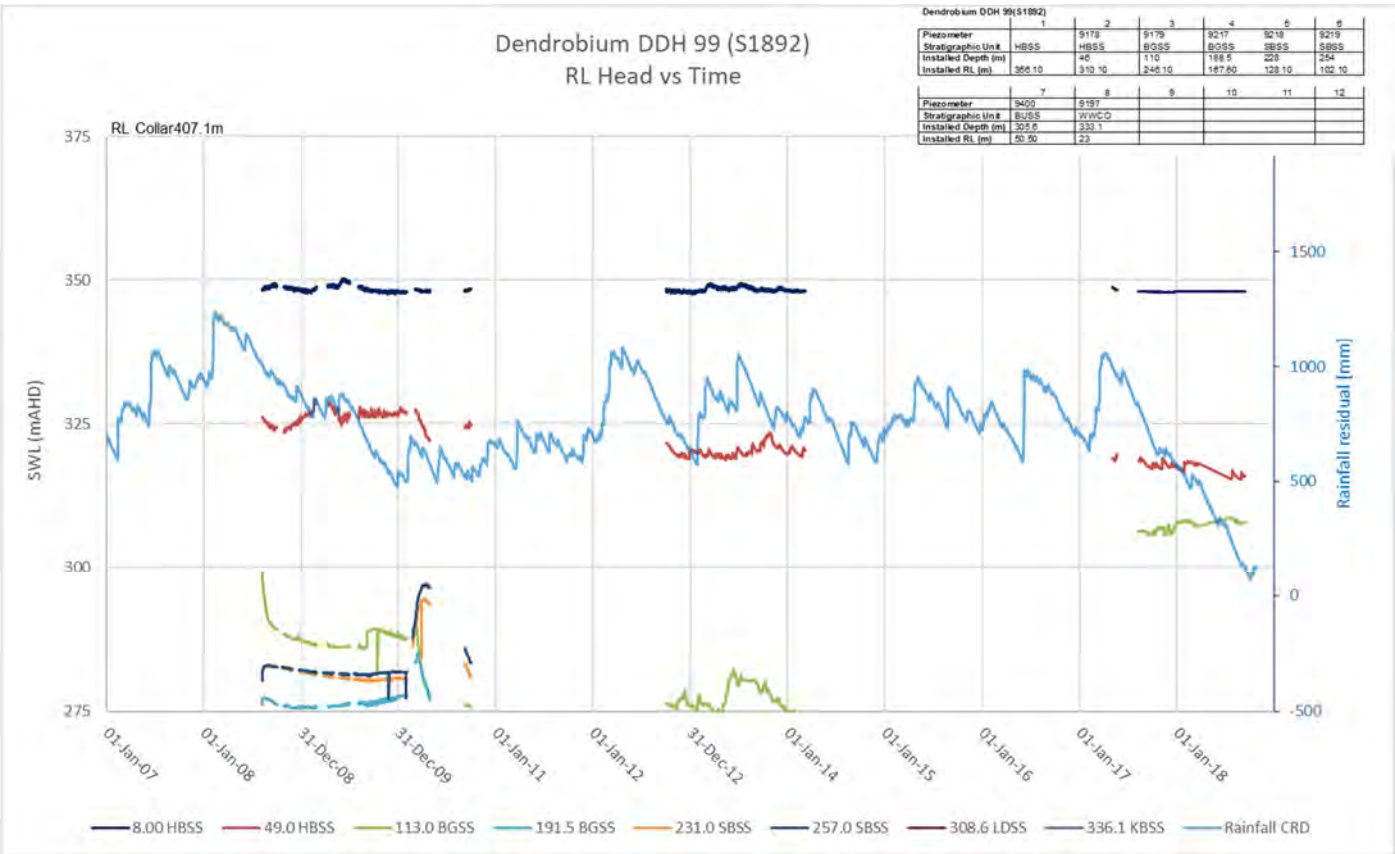
RESPONSE TO RAINFALL

Dendrobium DDH 92(S1879)

	1	2	3	4	5	6
Piezometer	8225	8226	8227	8275	8276	8277
Stratigraphic Unit	HBSS	HBSS	HBSS	BGSS	BGSS	BGSS
Installed Depth (m)	10	29.2	48.3	97.4	153.7	210
Installed RL (m)	369.74	350.54	331.44	282.34	226.04	169.74

Piezometer	8241	8242	8243	8244	7984	8245
Stratigraphic Unit	SBSS	SBSS	SBSS	WBCS	BUCO	WWCO
Installed Depth (m)	227	236	245	263.3	292.4	319.4
Installed RL (m)	152.74	143.74	134.74	116.44	87.34	60.34

S1879 (DEN92) is in Area 3B. Correlation to rainfall is shown in 10m-HBSS and even 48.3m-HBSS piezometers, but not in 29.20m-HBSS piezometer.



Dendrobium DDH 99(S1892)

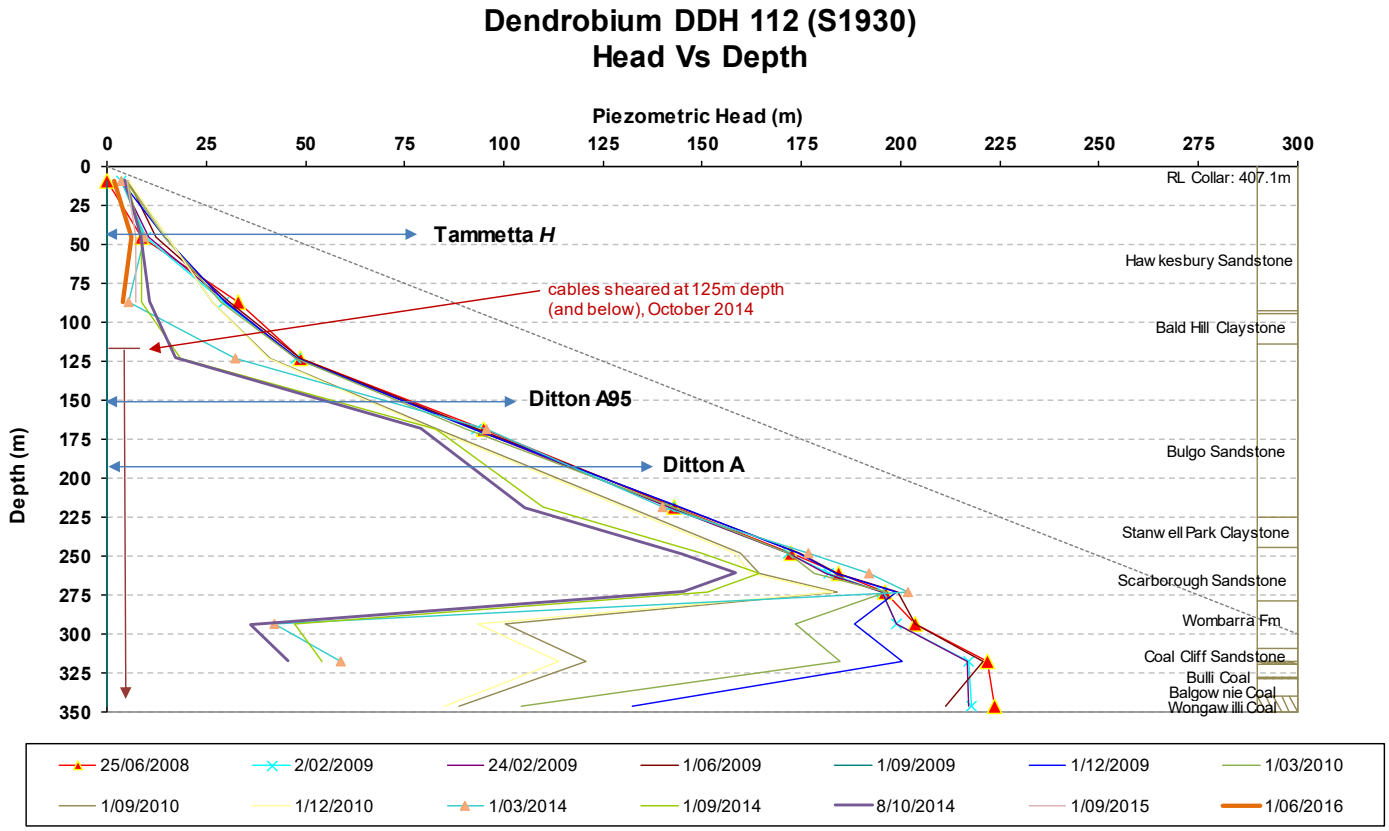
	1	2	3	4	5	6
Piezometer		9178	9179	9217	9218	9219
Stratigraphic Unit	HBSS	HBSS	BGSS	BGSS	SBSS	SBSS
Installed Depth (m)		46	110	188.5	228	254
Installed RL (m)	356.10	310.10	246.10	167.60	128.10	102.10

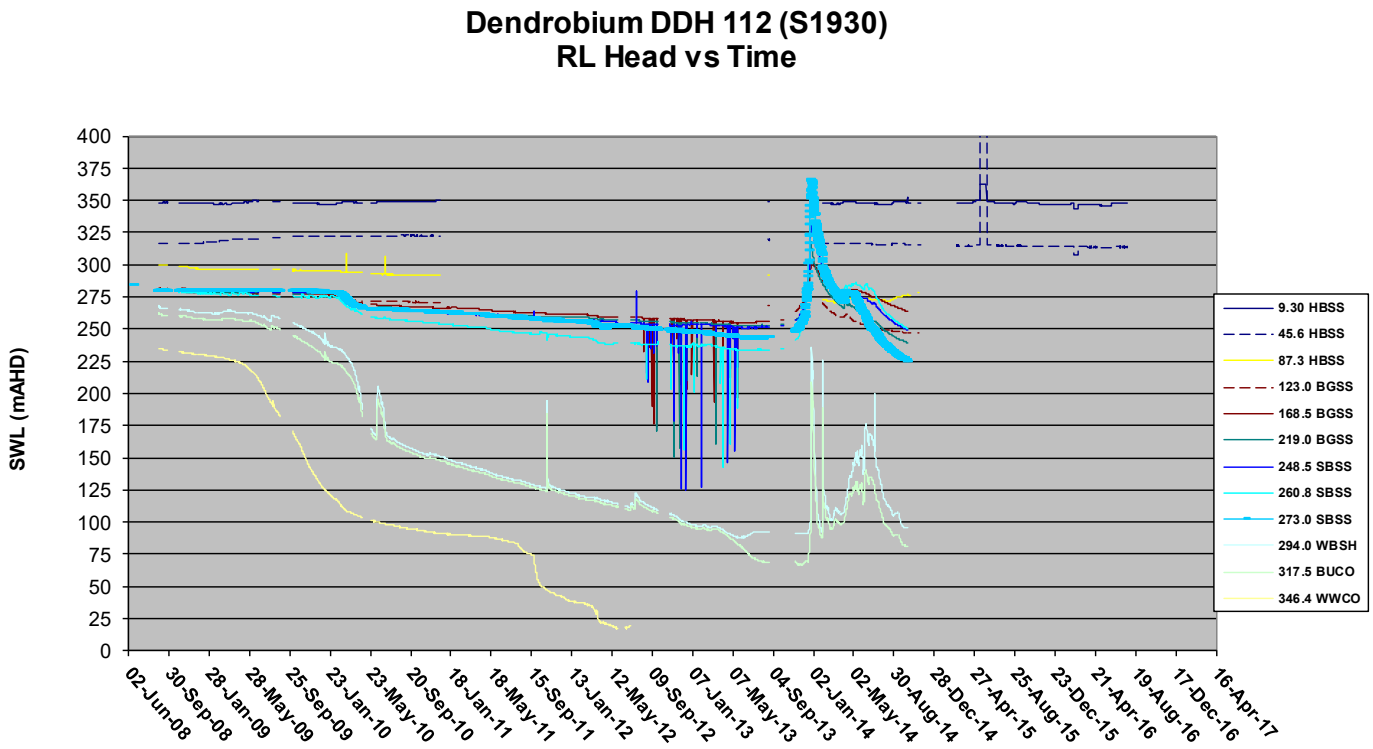
	7	8	9	10	11	12
Piezometer	9400	9197				
Stratigraphic Unit	BUSS	WWCO				
Installed Depth (m)	305.6	333.1				
Installed RL (m)	50.50	23				

S1892 (DEN99) is between Area 3A and 3C. Correlation to rainfall is shown in 8m-HBSS, is more muted in 49m-HBSS and in 113m-HBSS.

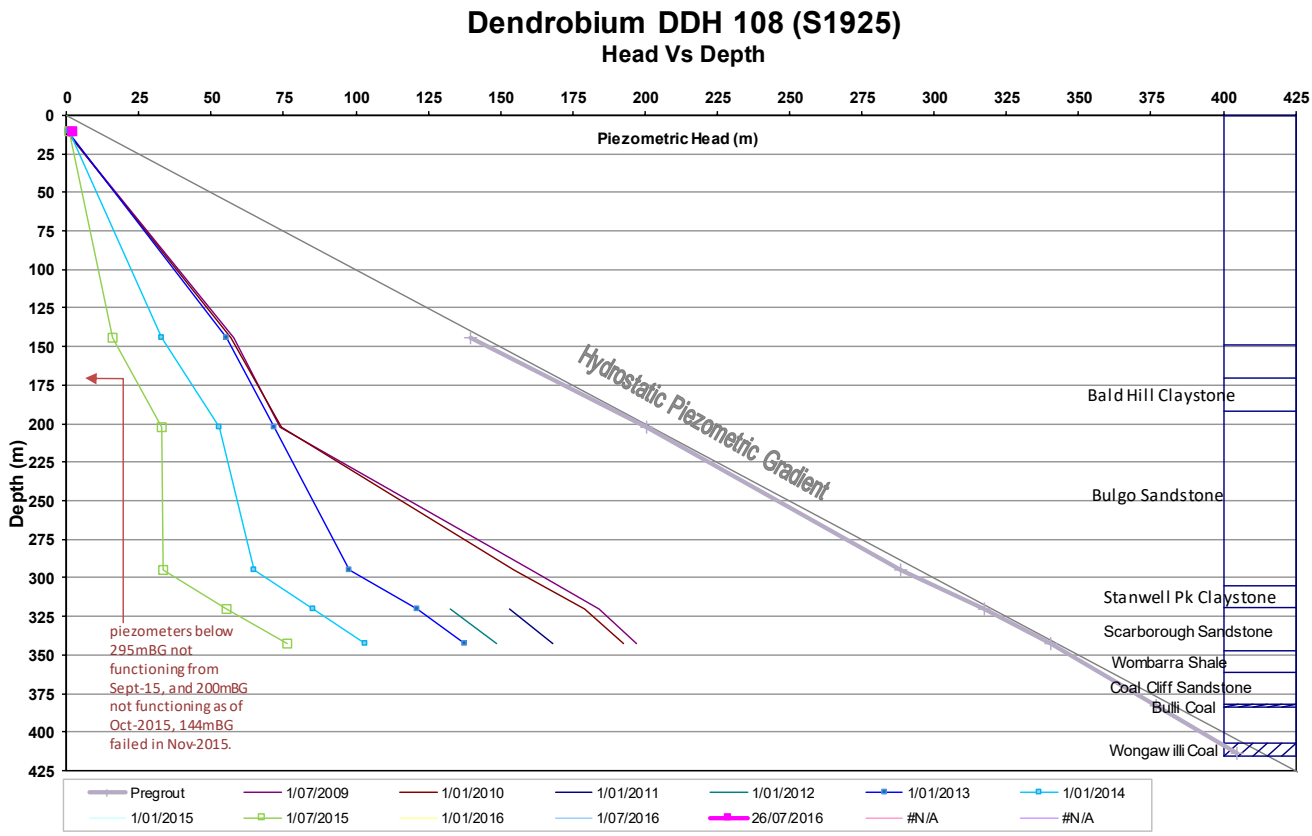
RESPONSE TO MINING

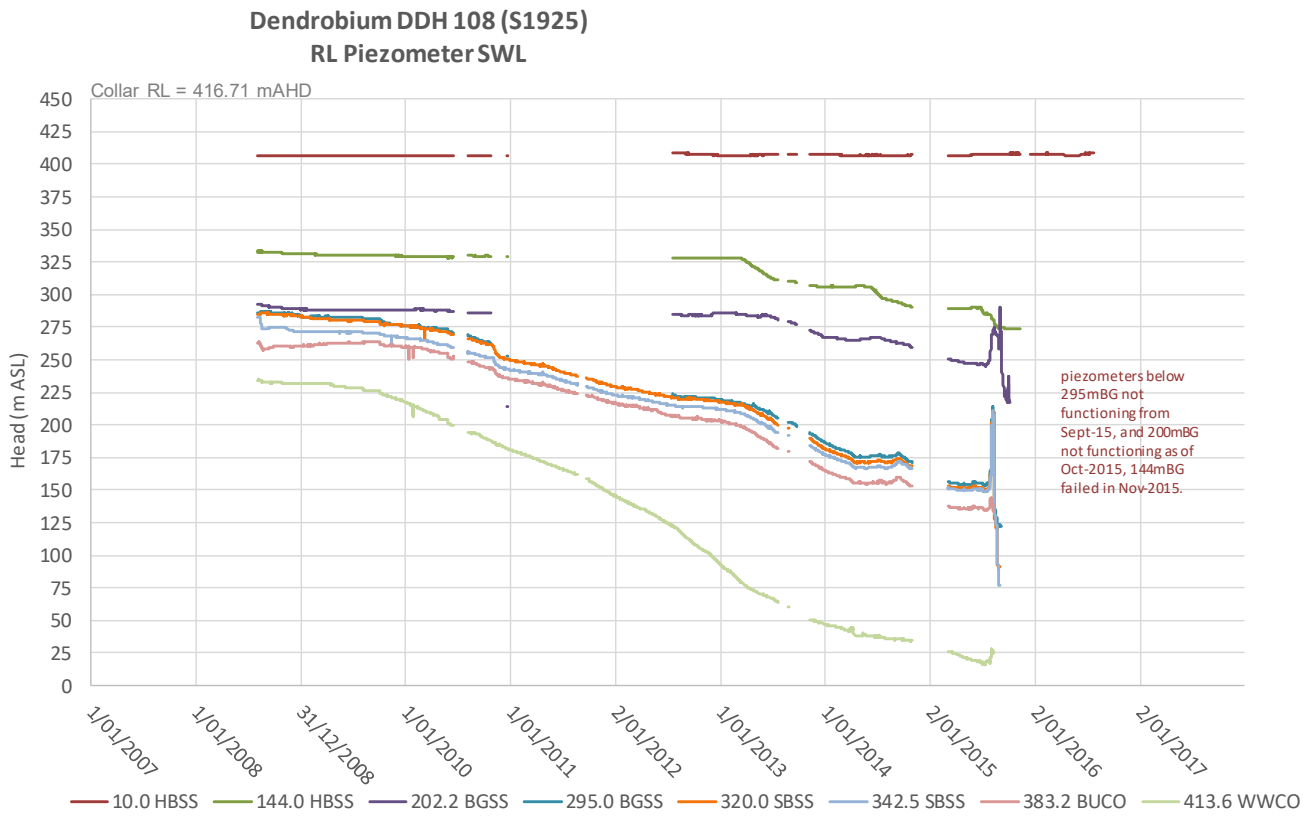
Area 3B





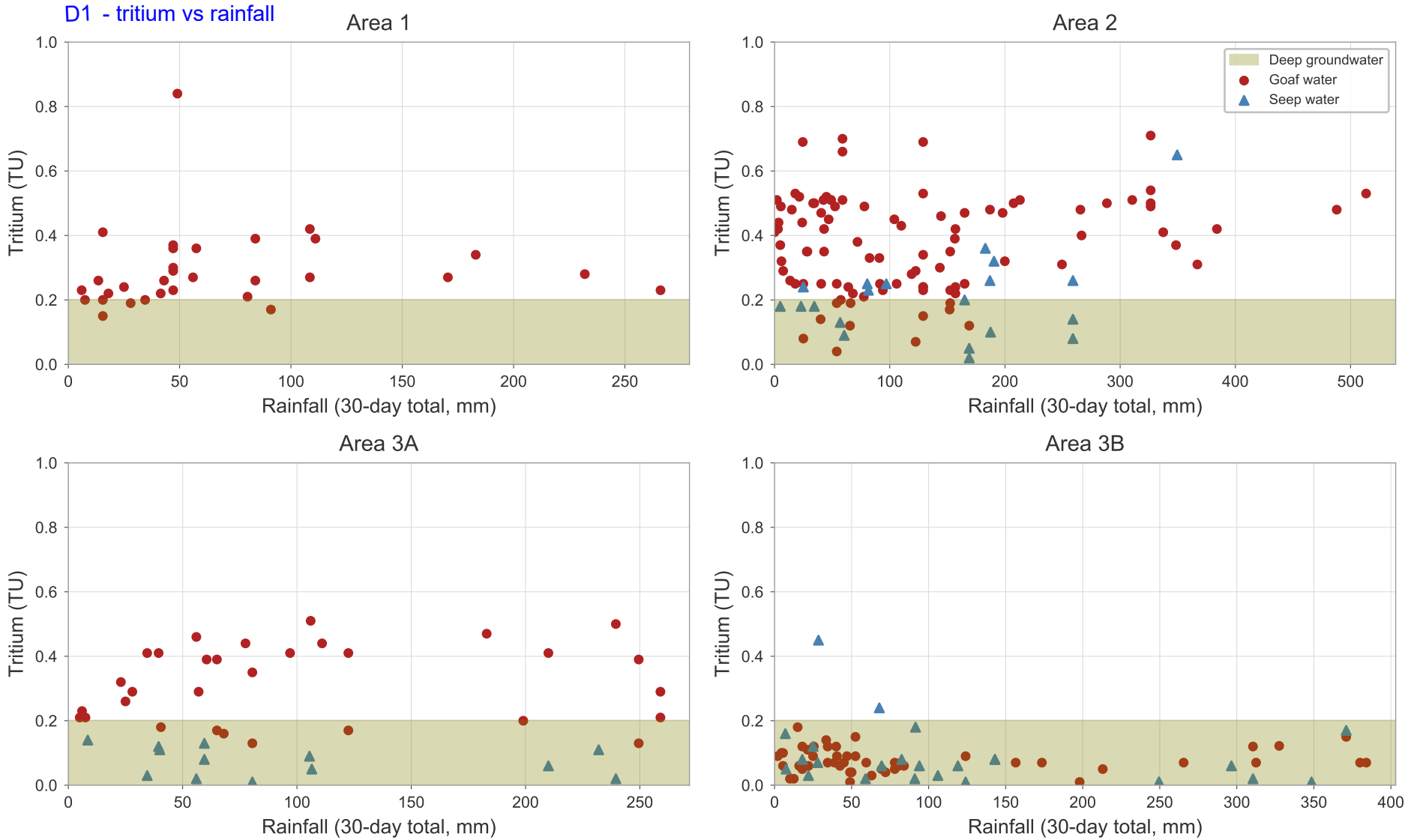
Mining (Longwall 9) passed in December 2013, and Longwall 10 passed in Nov-Dec 2014.



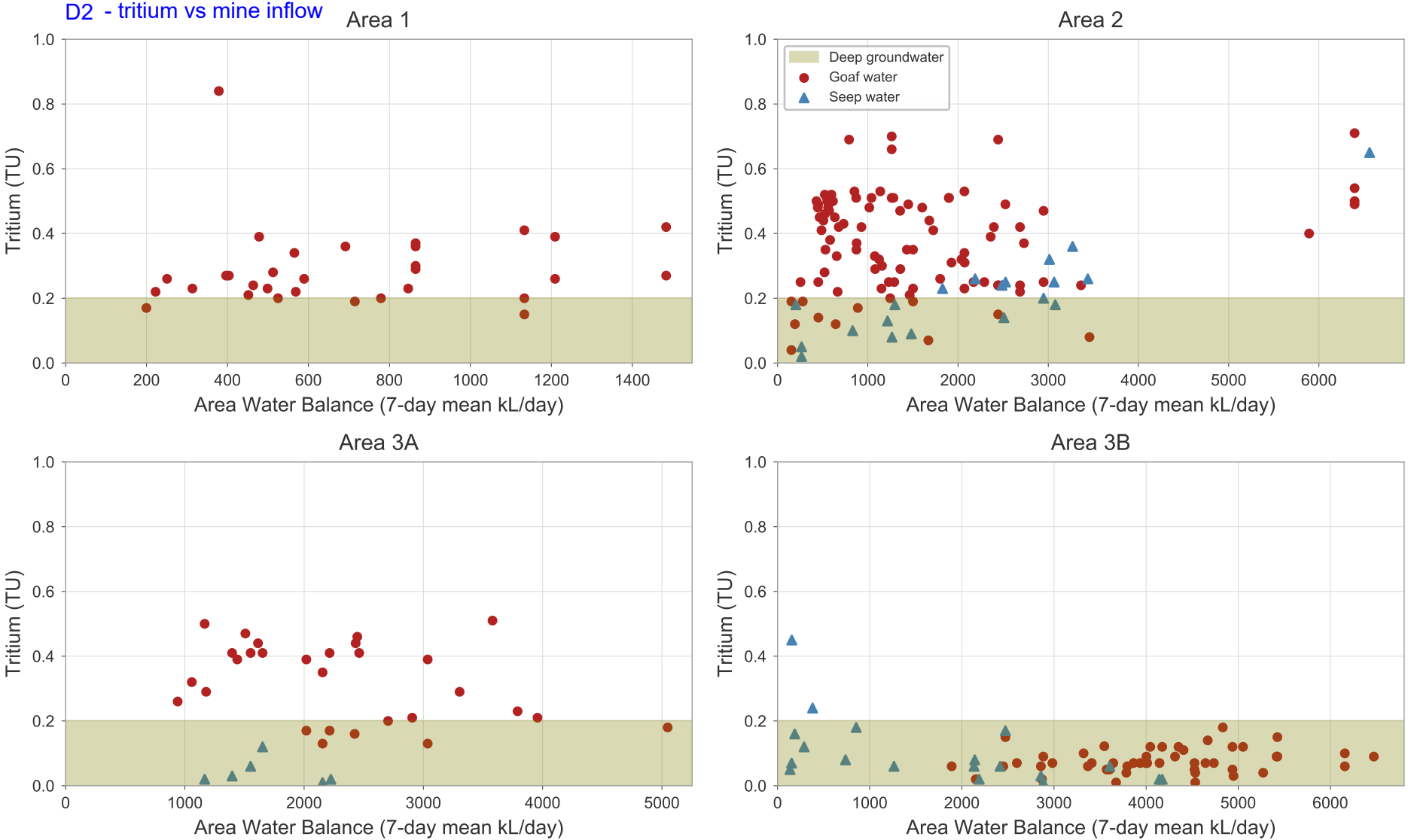


<u>Mining (Longwall 11) passed in July 2015, and Longwall 12 passed in mid 2016.</u>

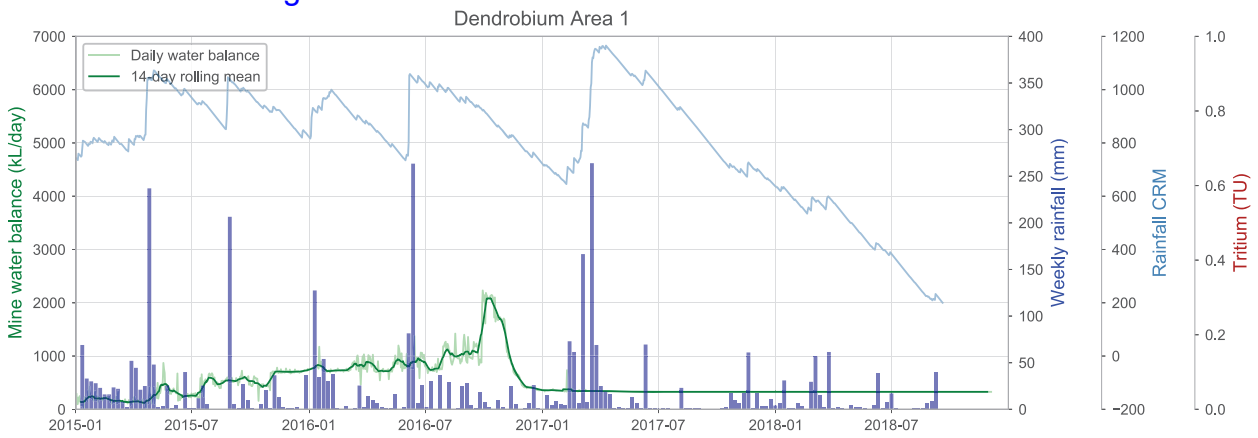
APPENDIX D RELATIONSHIP BETWEEN TRITIUM AND RAINFALL, TRITIUM AND MINE INFLOW

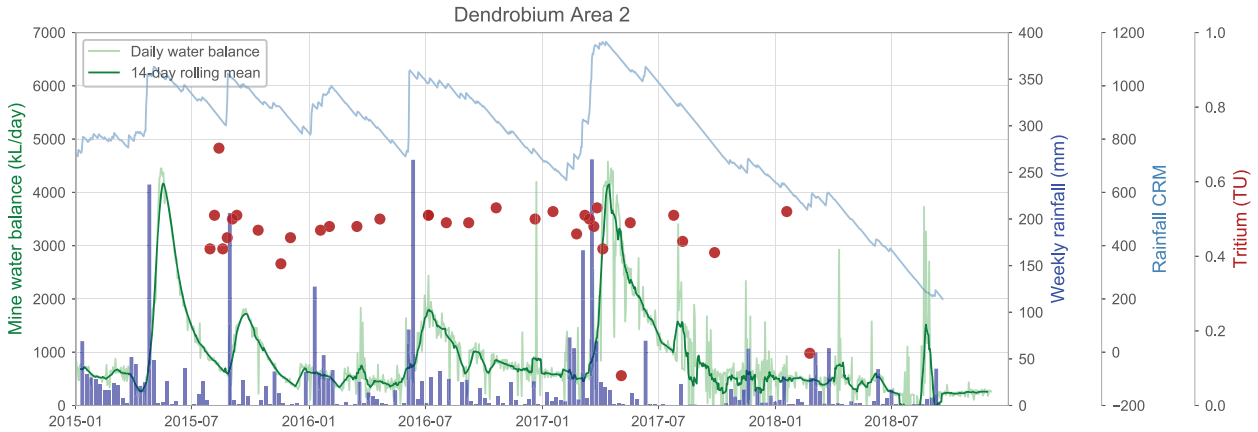

D1 - tritium vs rainfall
Area 1
Area 2
Area 3A
Area 3B
Tritium (TU)
Rainfall (30-day total, mm)
Deep groundwater
Goaf water
Seep water

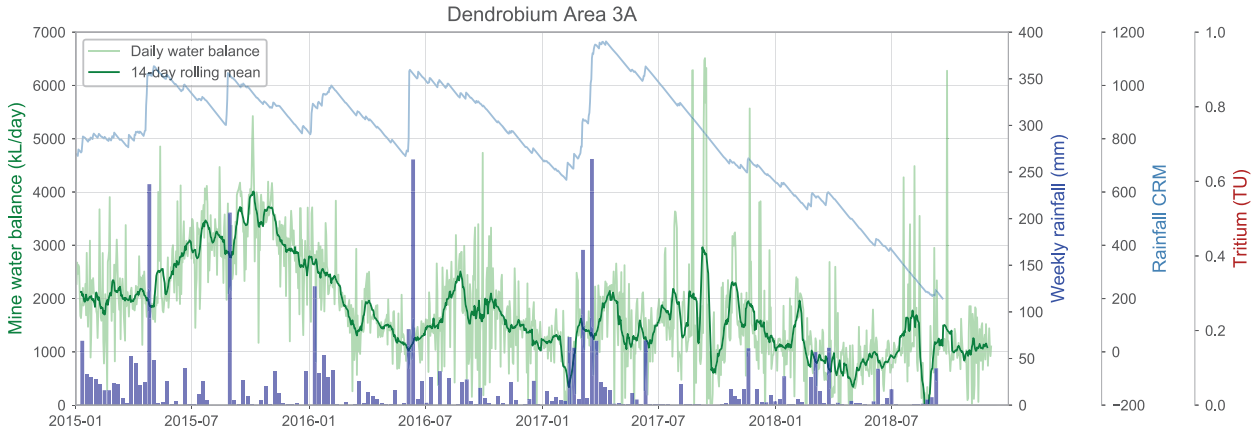
D2 - tritium vs mine inflow

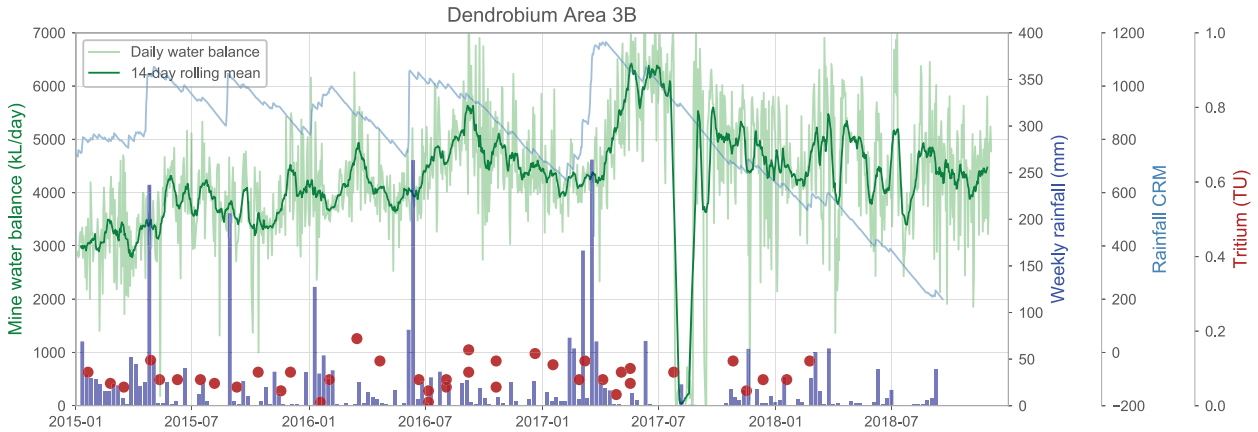


D3 - inflow and tritium through time

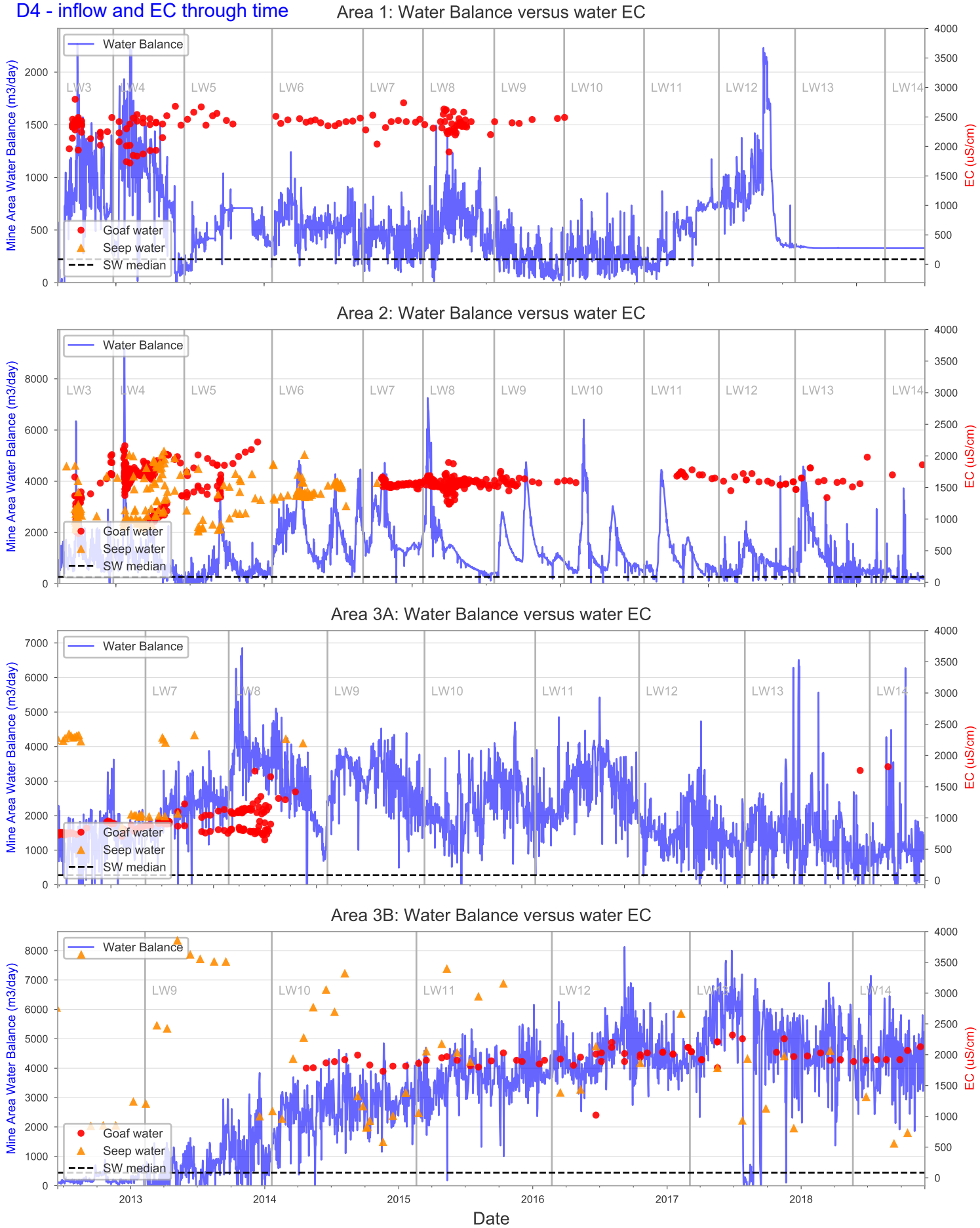




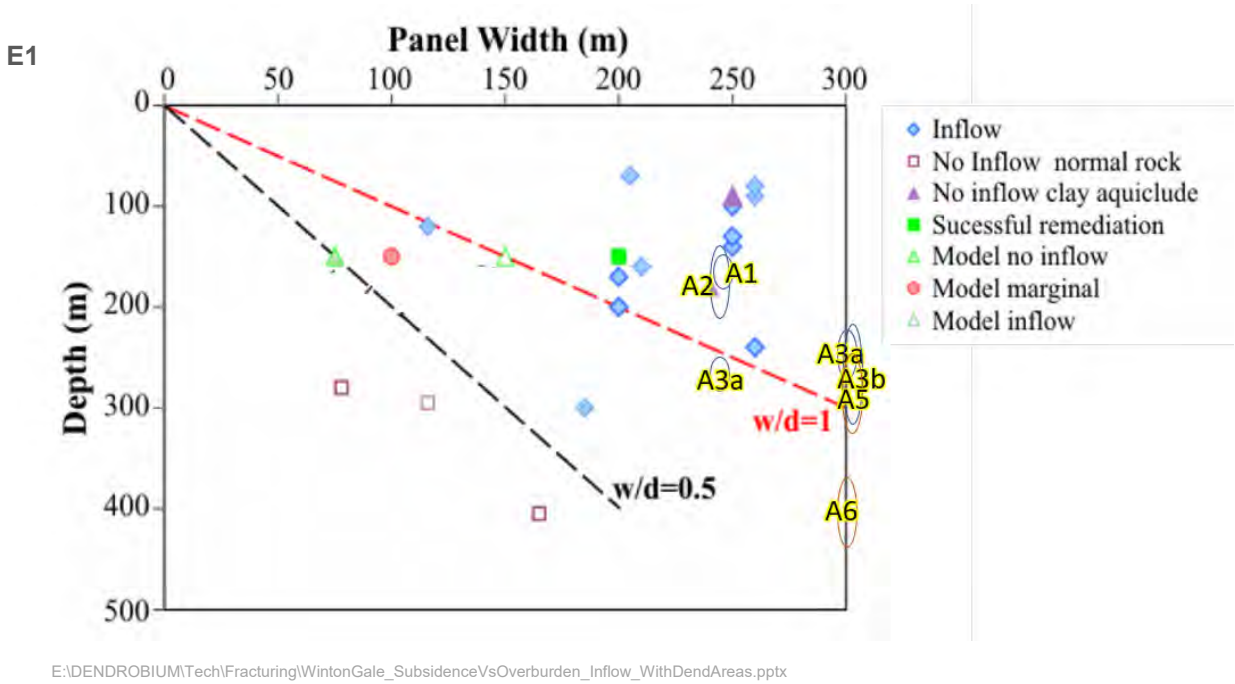




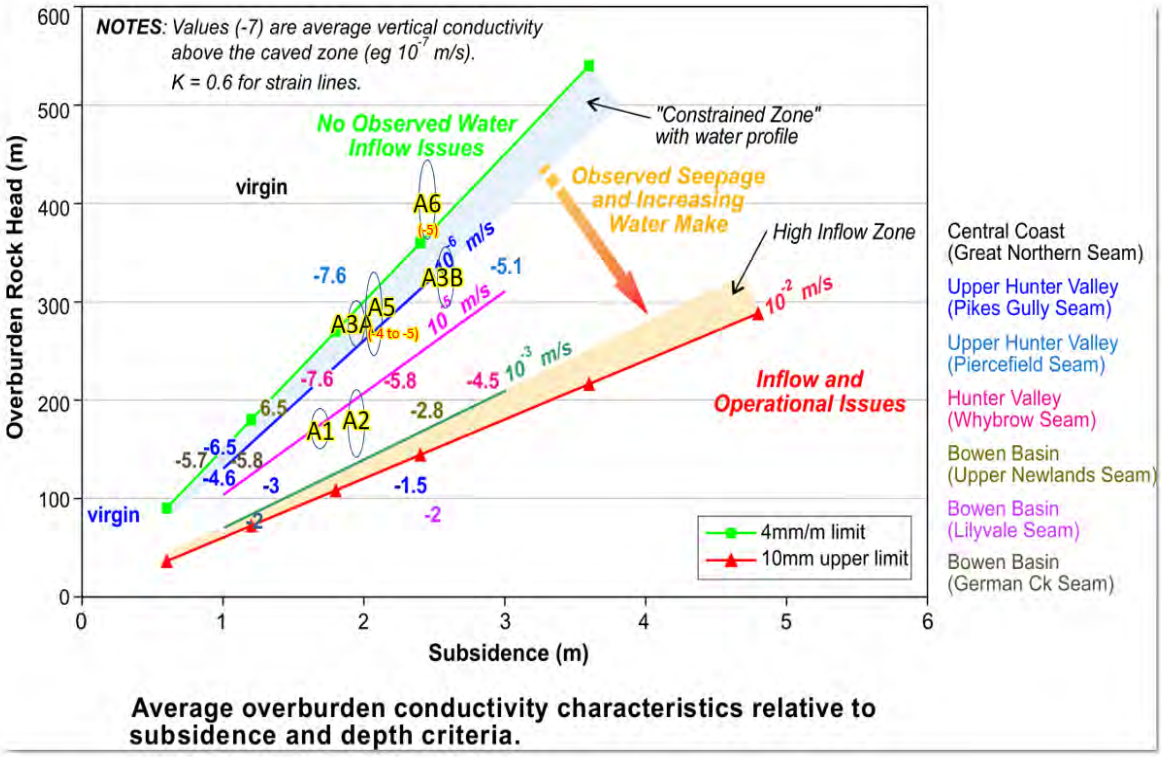
D4 - inflow and EC through time



APPENDIX E COMPARISON OF SEAM-TO-SURFACE CONNECTIVITY AND MINE GEOMETRY

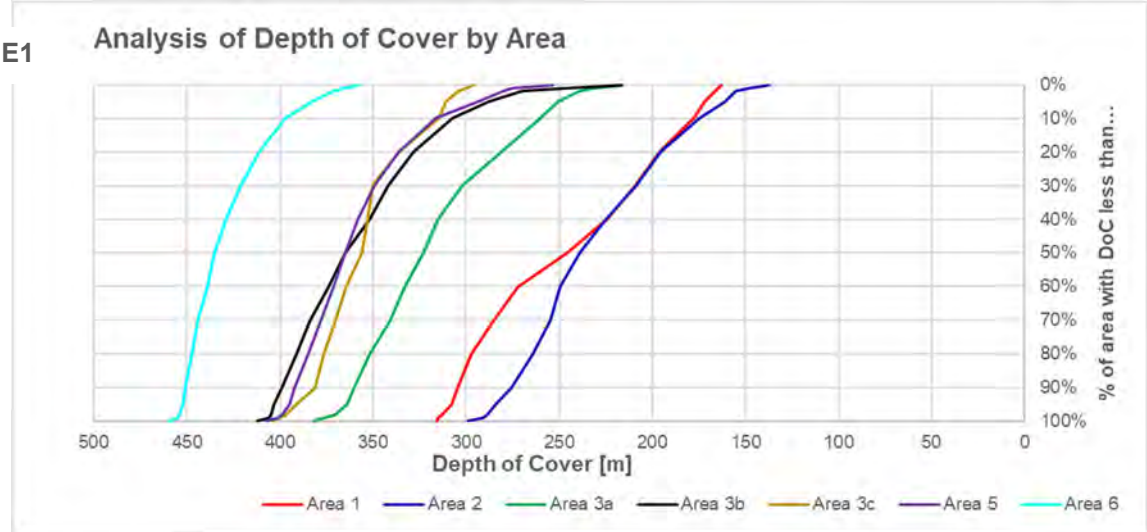


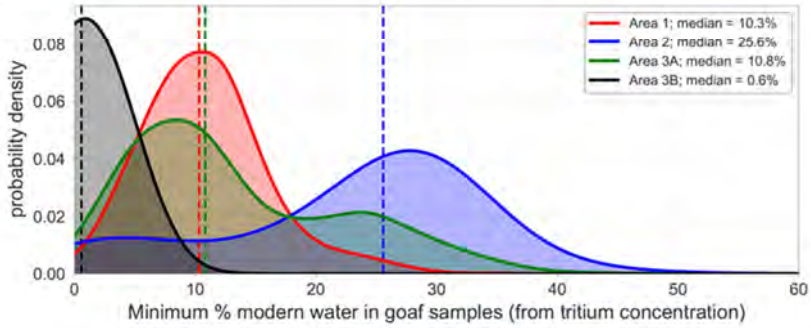
Comparison of Dendrobium W/D ratios against empirical relationship of Gale 2006.



Comparison of Dendrobium subsidence (observed and predicted) against empirical relationship of Gale 2008.

E1

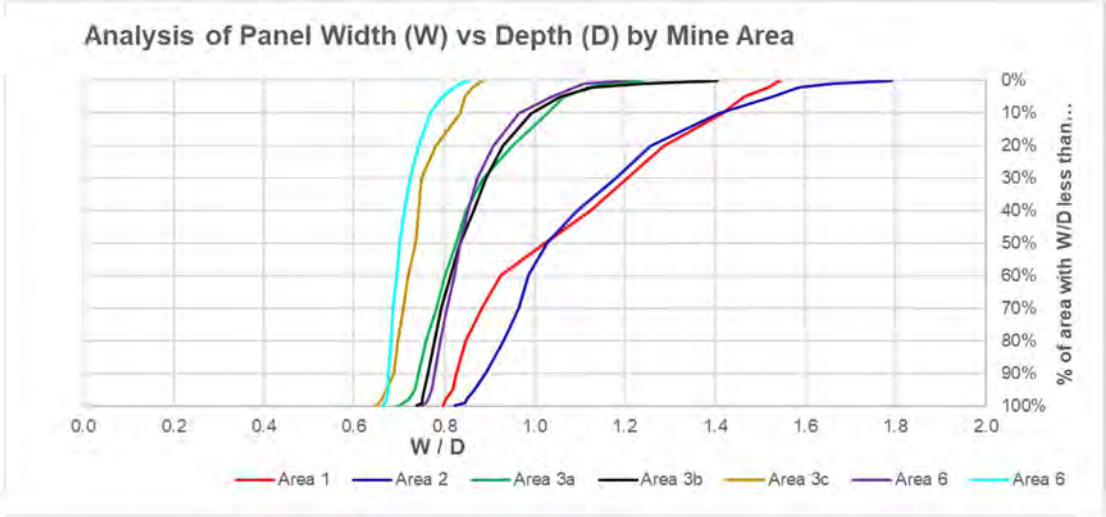


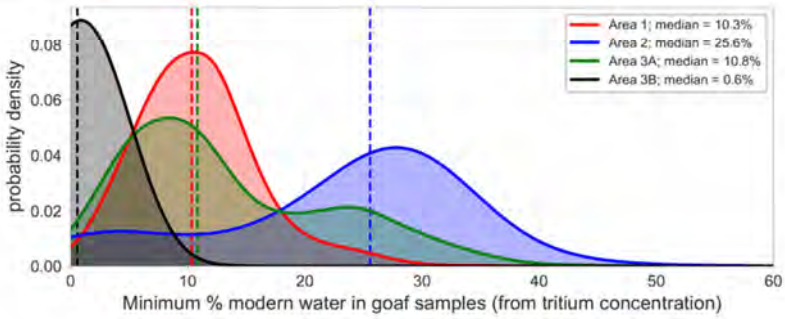


E:\HYDROSIM\DENDROBIUM\Tech\Conceptual\ Dend_ConnectivityAssessment_v4_DND.xlsx

Comment on correlation of Depth of Cover (DoC) to % modern water: DoC suggests that Areas 1, 2 similar, and Area 3A contrasting to Area 2. Poor correlation suggests that DoC not the only consideration.

E2





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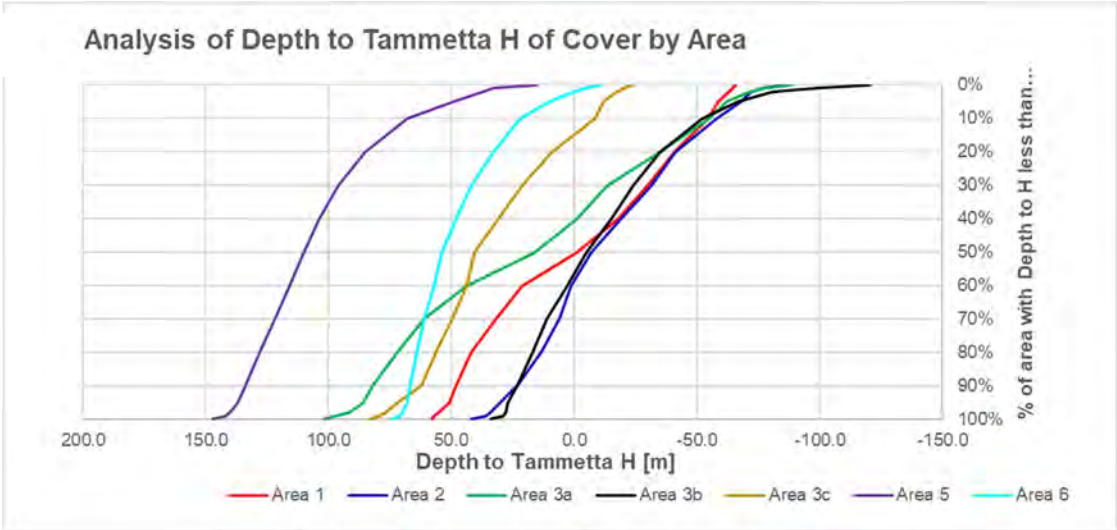
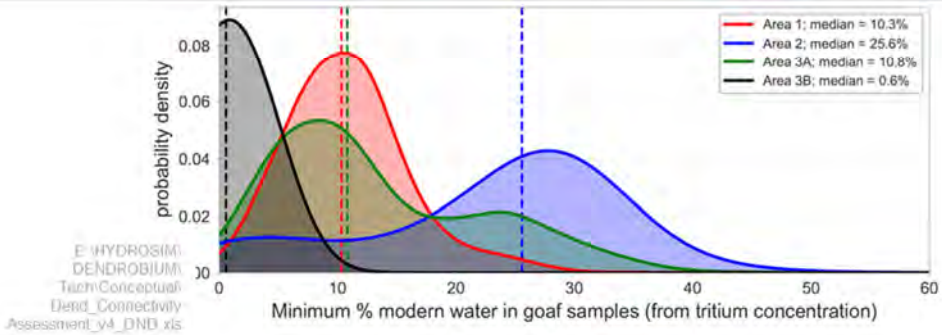
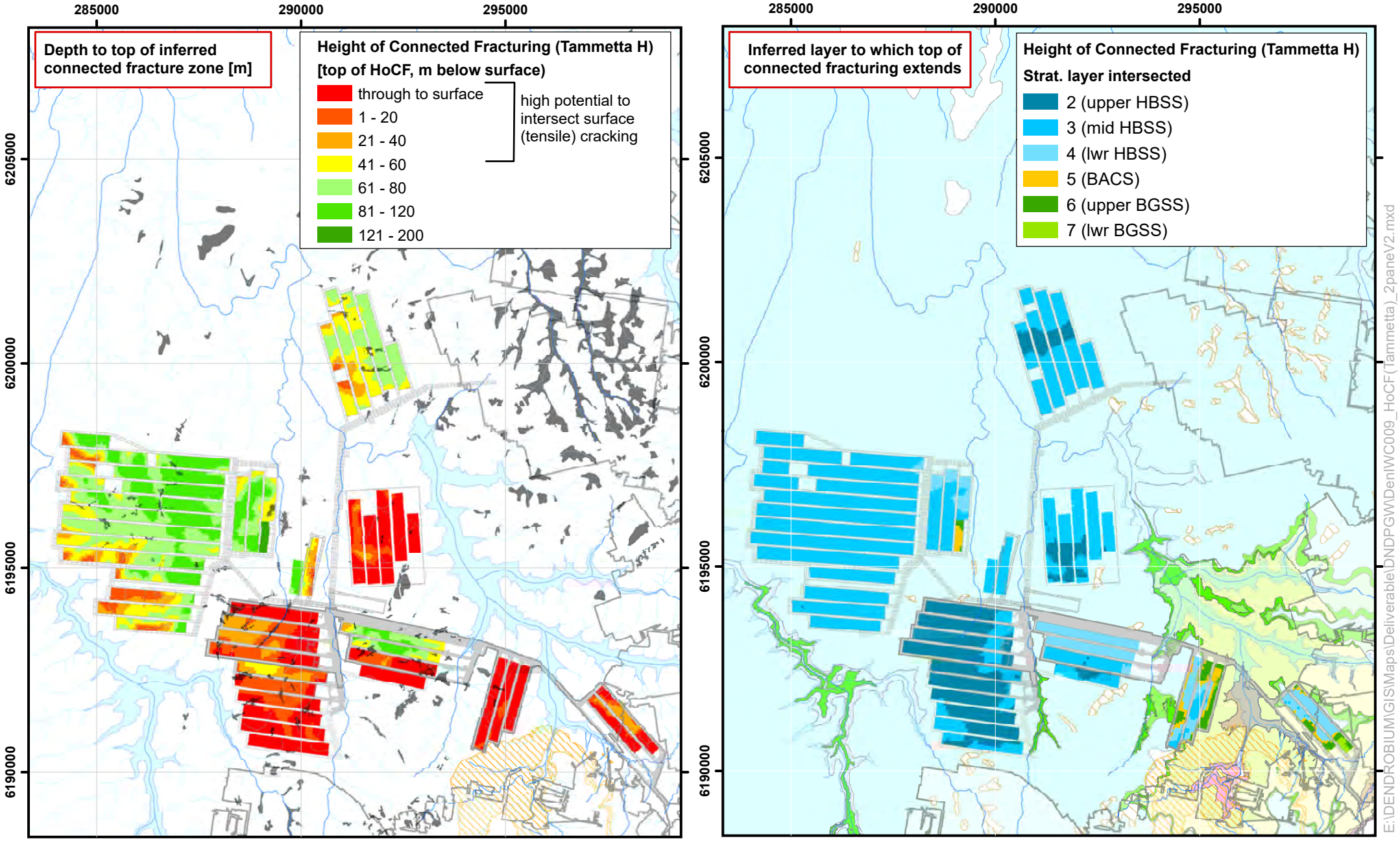
Comment on correlation of W/D to % modern water: D/W suggests that Areas 1, 2 similar, Areas 3A, 3C also similar, and Areas 2, 3A are contrasting. Lack of correlation suggests W/D not the only consideration.

E3





Comment on correlation to % modern water: Distribution of *H* suggests that Area 3B should have more modern water than Area 3A, and 3B should have similar % to Area 2. Also suggets that Area 5 would be less well connected to surface than Area 6. Distribution of H by area has a weak correlation to the distribution of % modern water.



Lake
Watercourse
Upland Swamp
Cordeaux Crinanite
Mine workings
Mine workings (future/proposed)

Outcrop Geology

Geology (Sthn Coalfield 1:100k)

Qa	alluvium	Qt	talus
Qs	swamp sediments	TRh	HBSS
		TRnz	BHCS (BACS)
		TRnbu	BUSS / CVSS

N

Rev: A | WMinchin | 22/02/2019

0 1 2 4 km

Scale: 120,000 at A4
GDA 1994 MGA Zone 56

Spatial variation in inferred height of connected fracturing

Figure E4

APPENDIX F MODEL STRESS PERIOD SCHEDULE

Stage	SP	Days	DateFrom	DateTo	Scheduled Mining	Rainfall / Inflow signal	Total days
	1		***Steady State***				1
CALIBRATION	**2**	18993	1/01/1940	31/12/1991			18994
	3	3608	1/01/1992	16/11/2001			22602
	4	20	17/11/2001	6/12/2001			22622
	5	20	7/12/2001	26/12/2001			22642
	6	20	27/12/2001	15/01/2002			22662
	7	40	16/01/2002	24/02/2002			22702
	8	100	25/02/2002	4/06/2002			22802
	9	100	5/06/2002	12/09/2002			22902
	10	100	13/09/2002	21/12/2002			23002
	11	200	22/12/2002	9/07/2003			23202
	12	200	10/07/2003	25/01/2004			23402
	13	200	26/01/2004	12/08/2004			23602
	14	232	13/08/2004	1/04/2005			23834
	15	90	2/04/2005	30/06/2005	Start LW1		23924
	16	90	1/07/2005	28/09/2005			24014
	17	74	29/09/2005	11/12/2005	End LW1		24088
	18	60	12/12/2005	9/02/2006			24148
	19	60	10/02/2006	10/04/2006	Start LW2		24208
	20	95	11/04/2006	14/07/2006			24303
	21	95	15/07/2006	17/10/2006			24398
	22	96	18/10/2006	21/01/2007	End LW2		24494
	23	99	22/01/2007	30/04/2007	Start LW3		24593
	24	44	1/05/2007	13/06/2007			24637
	25	4	14/06/2007	17/06/2007		A2rain1	24641
	26	8	18/06/2007	25/06/2007		A2week1	24649
	27	43	26/06/2007	7/08/2007		A2inflow1	24692
	28	100	8/08/2007	15/11/2007	End LW3		24792
	29	33	16/11/2007	18/12/2007			24825
	30	47	19/12/2007	3/02/2008	Start LW4		24872
	31	6	4/02/2008	9/02/2008		A2 Rain2	24878
	32	8	10/02/2008	17/02/2008		A2 week2	24886
	33	36	18/02/2008	24/03/2008		A2 inflow2	24922
	34	50	25/03/2008	13/05/2008			24972
	35	32	14/05/2008	14/06/2008			25004
	36	110	15/06/2008	2/10/2008	End LW4		25114
	37	31	3/10/2008	2/11/2008			25145
	38	30	3/11/2008	2/12/2008			25175
	39	31	3/12/2008	2/01/2009	Start LW5		25206
	40	60	3/01/2009	3/03/2009			25266
	41	60	4/03/2009	2/05/2009			25326
	42	17	3/05/2009	19/05/2009			25343
	43	5	20/05/2009	24/05/2009		A2rain3	25348
	44	8	25/05/2009	1/06/2009		A2week3	25356
	45	22	2/06/2009	23/06/2009		A2inflow3	25378
	46	88	24/06/2009	19/09/2009			25466
	47	90	20/09/2009	18/12/2009	End LW5		25556
	48	53	19/12/2009	9/02/2010			25609
	49	105	10/02/2010	25/05/2010	Start LW6		25714
	50	10	26/05/2010	4/06/2010		A2rain4	25724
	51	8	5/06/2010	12/06/2010		A2week4	25732
	52	22	13/06/2010	4/07/2010		A2inflow4	25754
	53	75	5/07/2010	17/09/2010			25829
	54	72	18/09/2010	28/11/2010			25901
	55	9	29/11/2010	7/12/2010		A2rain5	25910
	56	8	8/12/2010	15/12/2010		A2week5	25918
	57	22	16/12/2010	6/01/2011		A2inflow5	25940
	58	71	7/01/2011	18/03/2011			26011
	59	4	19/03/2011	22/03/2011		A2rain6	26015
	60	8	23/03/2011	30/03/2011	End LW6	A2week6	26023
	61	60	31/03/2011	29/05/2011	StartLW7	A2inflow6	26083
	62	4	30/05/2011	2/06/2011		A2rain7	26087
	63	8	3/06/2011	10/06/2011		A2week7	26095
	64	38	11/06/2011	18/07/2011		A2inflow7	26133
	65	5	19/07/2011	23/07/2011		A2rain8	26138
	66	8	24/07/2011	31/07/2011		A2inflow8	26146
	67	22	1/08/2011	22/08/2011		A2inflow8	26168
	68	69	23/08/2011	30/10/2011			26237

Stage	SP	Days	DateFrom	DateTo	Scheduled Mining	Rainfall / Inflow signal	Total days
	69	85	31/10/2011	23/01/2012	End LW7		26322
	70	35	24/01/2012	27/02/2012	Start LW8		26357
	71	11	28/02/2012	9/03/2012		A2rain9	26368
	72	8	10/03/2012	17/03/2012		A2week9	26376
	73	31	18/03/2012	17/04/2012		A2inflow9	26407
	74	85	18/04/2012	11/07/2012			26492
	75	85	12/07/2012	4/10/2012			26577
	76	86	5/10/2012	29/12/2012	End LW8		26663
	77	41	30/12/2012	8/02/2013			26704
	78	11	9/02/2013	19/02/2013	Start LW9		26715
	79	12	20/02/2013	3/03/2013		A2rain10	26727
	80	8	4/03/2013	11/03/2013		A2week10	26735
	81	22	12/03/2013	2/04/2013		A2inflow10	26757
	82	80	3/04/2013	21/06/2013			26837
	83	9	22/06/2013	30/06/2013		A2rain11	26846
	84	8	1/07/2013	8/07/2013		A2week11	26854
	85	22	9/07/2013	30/07/2013		A2inflow11	26876
	86	48	31/07/2013	16/09/2013			26924
	87	106	17/09/2013	31/12/2013	End LW9		27030
	88	77	1/01/2014	18/03/2014	Start LW10		27107
	89	13	19/03/2014	31/03/2014		A2rain12	27120
	90	8	1/04/2014	8/04/2014		A2week12	27128
	91	22	9/04/2014	30/04/2014		A2inflow12	27150
	92	107	1/05/2014	15/08/2014			27257
	93	12	16/08/2014	27/08/2014		A2rain13	27269
	94	8	28/08/2014	4/09/2014		A2week13	27277
	95	22	5/09/2014	26/09/2014		A2inflow13	27299
	96	106	27/09/2014	10/01/2015	End LW10		27405
	97	96	11/01/2015	16/04/2015	Start LW11		27501
	98	16	17/04/2015	2/05/2015		A2rain14	27517
	99	8	3/05/2015	10/05/2015		A2week14	27525
	100	45	11/05/2015	24/06/2015		A2inflow14	27570
	101	196	25/06/2015	6/01/2016	End LW11		27766
	102	149	7/01/2016	3/06/2016	Start LW 12		27915
	103	7	4/06/2016	10/06/2016		rain15	27922
	104	20	11/06/2016	30/06/2016			27942
	105	233	1/07/2016	18/02/2017	End LW 12		28175
	106	71	19/02/2017	30/04/2017	Start LW 13		28246
	107	92	1/05/2017	31/07/2017			28338
	108	92	1/08/2017	31/10/2017			28430
	109	120	1/11/2017	28/02/2018	End LW 13		28550
	110	61	1/03/2018	30/04/2018	Start LW 14		28611

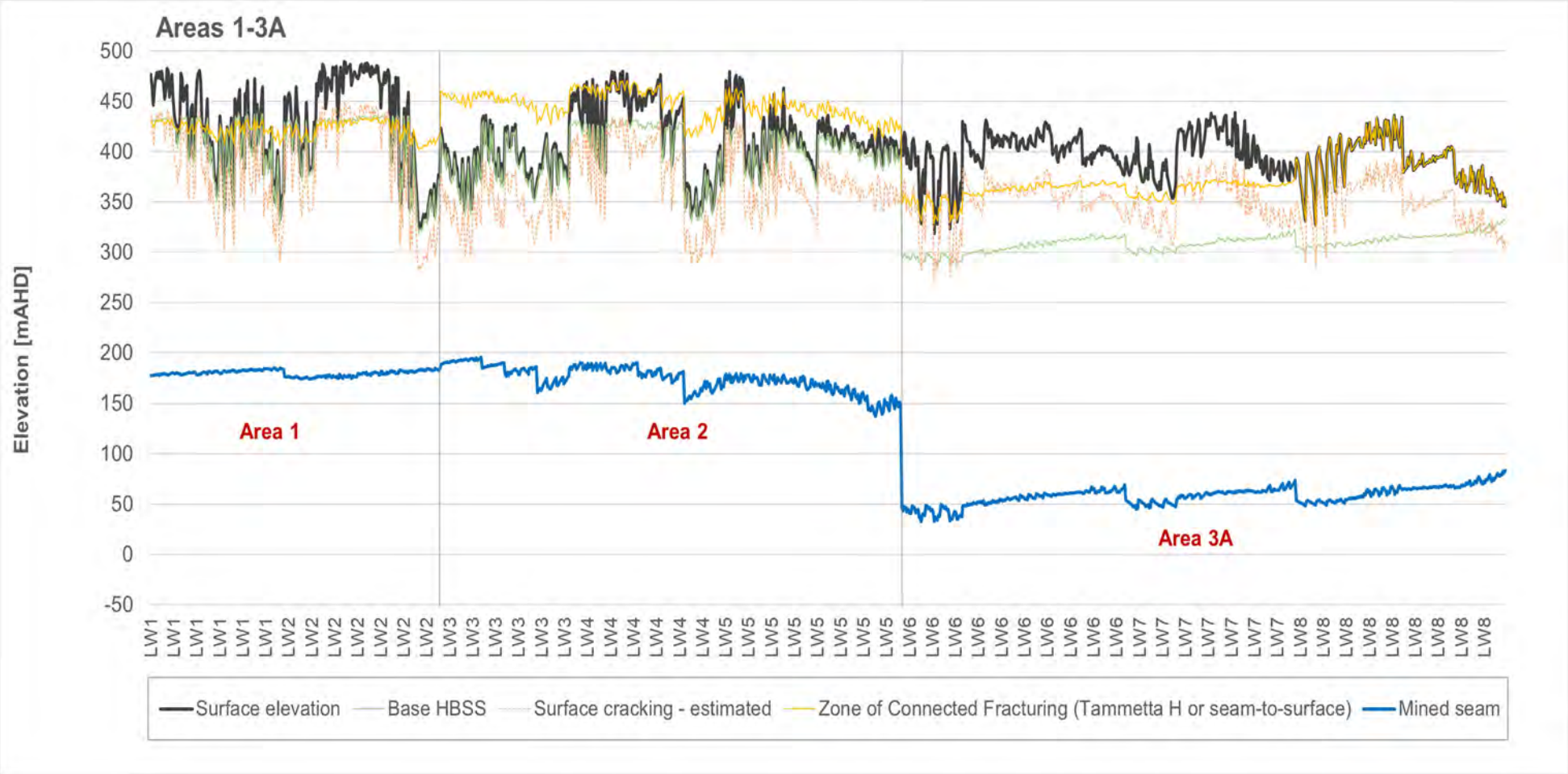
(continued)

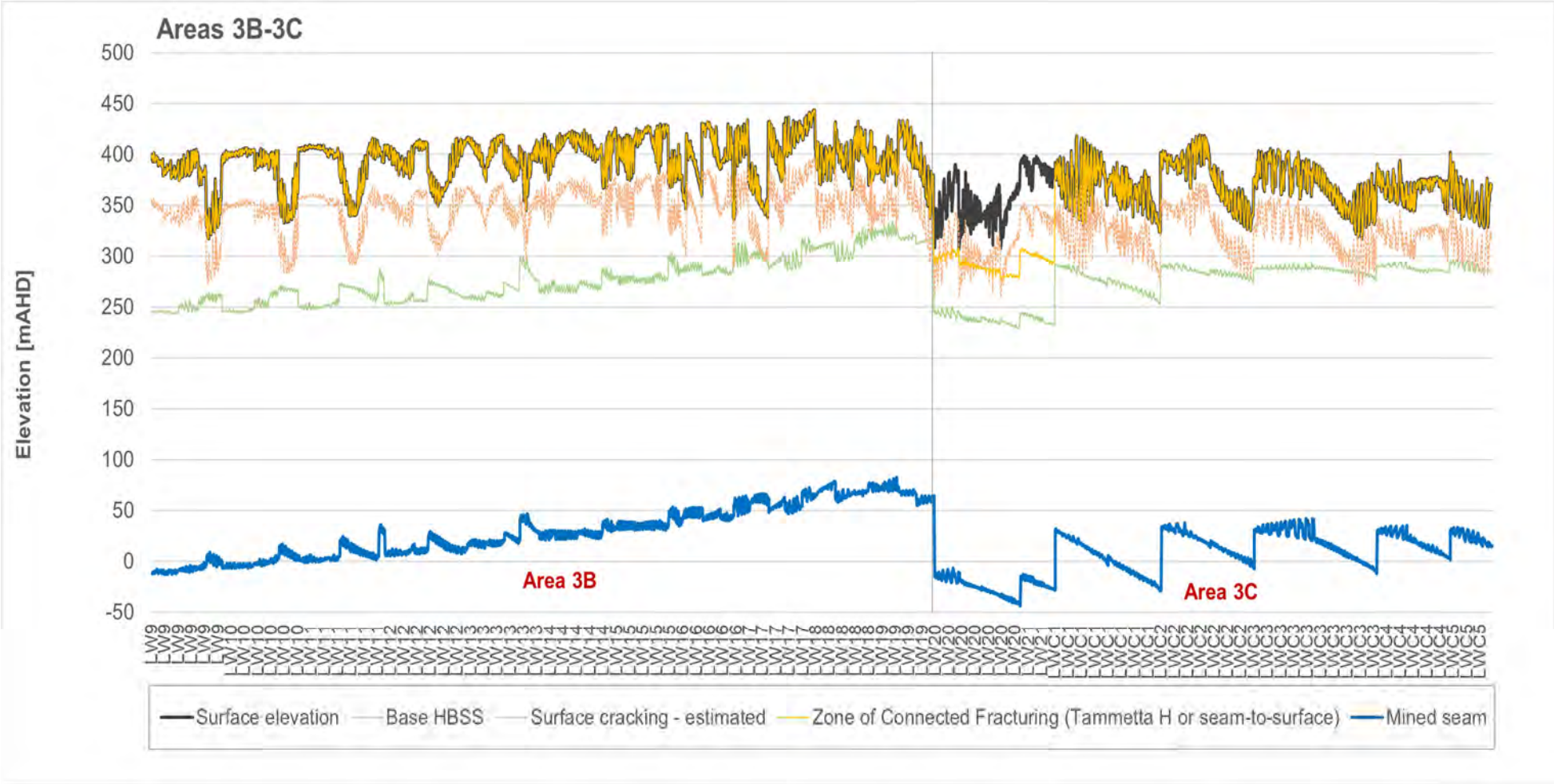
Stage	SP	Days	DateFrom	DateTo	Scheduled Mining	Rainfall / Inflow signal	Total days
PREDICTION	**111**	92	1/05/2018	31/07/2018			28703
	112	92	1/08/2018	31/10/2018			28795
	113	61	1/11/2018	31/12/2018	End LW 14		28856
	114	90	1/01/2019	31/03/2019	Start LW 15		28946
	115	61	1/04/2019	31/05/2019			29007
	116	61	1/06/2019	31/07/2019			29068
	117	61	1/08/2019	30/09/2019	End LW 15		29129
	118	92	1/10/2019	31/12/2019	Start LW 16		29221
	119	59	1/01/2020	28/02/2020	A3C, A5 Development		29280
	120	62	29/02/2020	30/04/2020			29342
	121	61	1/05/2020	30/06/2020	End LW 16		29403
	122	92	1/07/2020	30/09/2020	Start LW 17		29495
	123	61	1/10/2020	30/11/2020			29556
	124	62	1/12/2020	31/01/2021			29618
	125	59	1/02/2021	31/03/2021	End LW 17		29677
	126	61	1/04/2021	31/05/2021	Start LW 18		29738
	127	61	1/06/2021	31/07/2021			29799
	128	61	1/08/2021	30/09/2021			29860
	129	61	1/10/2021	30/11/2021	End LW 18		29921
	130	31	1/12/2021	31/12/2021			29952
	131	59	1/01/2022	28/02/2022	Start LW 19		30011
	132	61	1/03/2022	30/04/2022	LW20-21 roads		30072
	133	61	1/05/2022	30/06/2022	End LW 19		30133
	134	31	1/07/2022	31/07/2022			30164
	135	61	1/08/2022	30/09/2022	Start LW20		30225
	136	61	1/10/2022	30/11/2022			30286
	137	62	1/12/2022	31/01/2023			30348
	138	59	1/02/2023	31/03/2023	End LW20		30407
	139	50	1/04/2023	20/05/2023	Start LW21		30457
	140	51	21/05/2023	10/07/2023			30508
	141	52	11/07/2023	31/08/2023	End LW21		30560
	142	122	1/09/2023	31/12/2023			30682
	143	182	1/01/2024	30/06/2024	**A5 LW501 start**		30864
	144	184	1/07/2024	31/12/2024	501		31048
	145	181	1/01/2025	30/06/2025	502		31229
	146	184	1/07/2025	31/12/2025	502		31413
	147	181	1/01/2026	30/06/2026	503		31594
	148	184	1/07/2026	31/12/2026	503		31778
	149	181	1/01/2027	30/06/2027	504		31959
	150	184	1/07/2027	31/12/2027	504		32143
	151	182	1/01/2028	30/06/2028	505		32325
	152	184	1/07/2028	31/12/2028	505		32509
	153	181	1/01/2029	30/06/2029	LW 506A | **A6 Development**		32690
	154	184	1/07/2029	31/12/2029	506B		32874
	155	181	1/01/2030	30/06/2030	507A		33055
	156	184	1/07/2030	31/12/2030	507B		33239
	157	181	1/01/2031	30/06/2031	508A		33420
	158	184	1/07/2031	31/12/2031	509		33604
	159	182	1/01/2032	30/06/2032	508B		33786
	160	184	1/07/2032	31/12/2032	512		33970
	161	181	1/01/2033	30/06/2033	511		34151
	162	184	1/07/2033	31/12/2033	511		34335
	163	181	1/01/2034	30/06/2034	510		34516
	164	184	1/07/2034	31/12/2034	510		34700
	165	181	1/01/2035	30/06/2035	513		34881
	166	184	1/07/2035	31/12/2035	513		35065
	167	182	1/01/2036	30/06/2036	514		35247
	168	184	1/07/2036	31/12/2036	514		35431
	169	181	1/01/2037	30/06/2037	515		35612
	170	184	1/07/2037	31/12/2037	515		35796
	171	181	1/01/2038	30/06/2038	516		35977
	172	184	1/07/2038	31/12/2038	**A5 LW516 end**		36161
	173	181	1/01/2039	30/06/2039	**A3C LWC1**		36342
	174	184	1/07/2039	31/12/2039	LWC1		36526
	175	182	1/01/2040	30/06/2040	LWC2		36708
	176	184	1/07/2040	31/12/2040	LWC2		36892
	177	181	1/01/2041	30/06/2041	LWC3		37073
	178	184	1/07/2041	31/12/2041	LWC3		37257

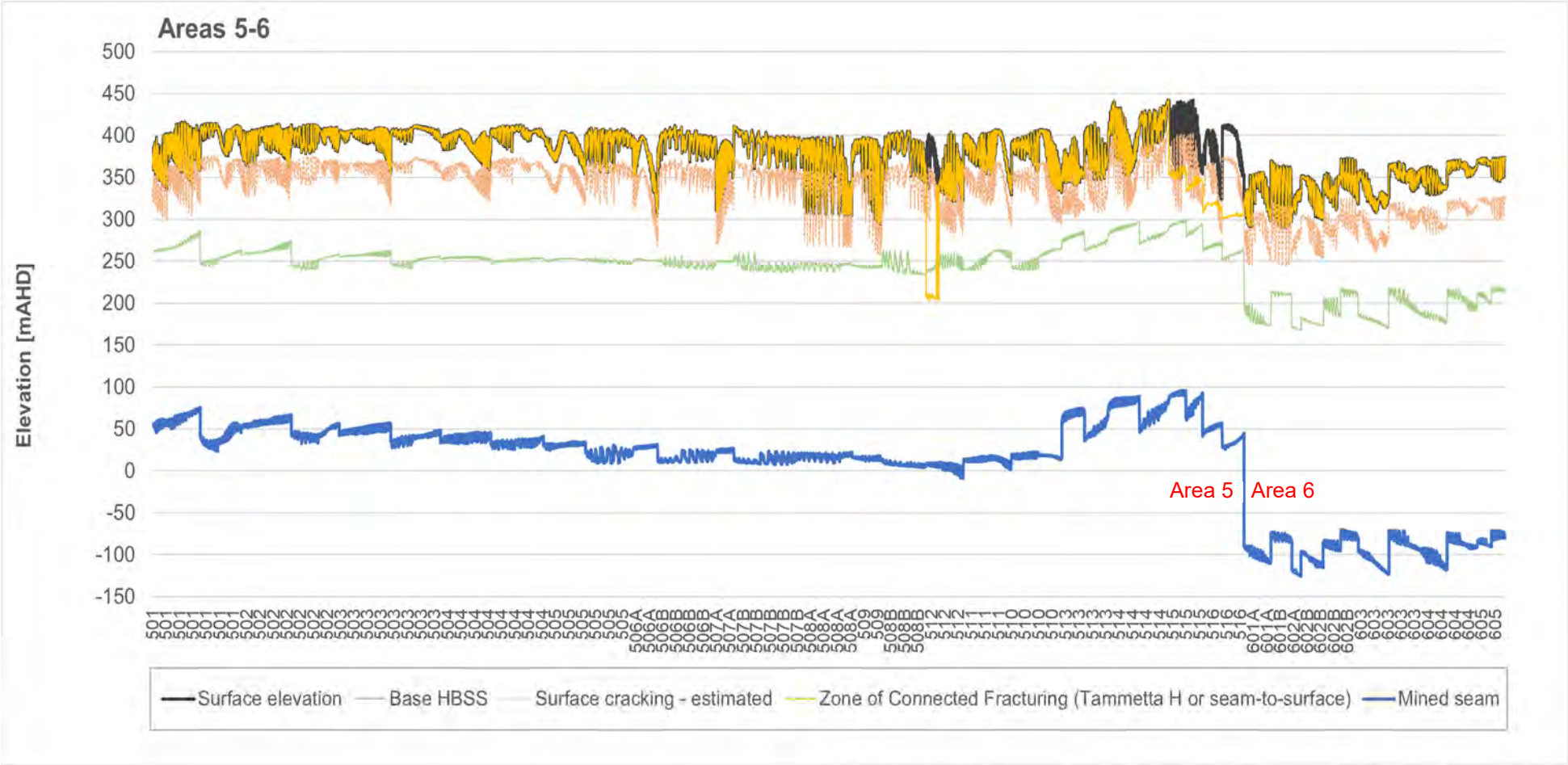
Stage	SP	Days	DateFrom	DateTo	Scheduled Mining	Rainfall / Inflow signal	Total days
	179	181	1/01/2042	30/06/2042	LWC4		37438
	180	184	1/07/2042	31/12/2042	LWC4		37622
	181	181	1/01/2043	30/06/2043	LWC5 | **A6 LW601A**		37803
	182	184	1/07/2043	31/12/2043	601B		37987
	183	182	1/01/2044	30/06/2044	602A		38169
	184	184	1/07/2044	31/12/2044	602B		38353
	185	181	1/01/2045	30/06/2045	602B		38534
	186	184	1/07/2045	31/12/2045	602B		38718
	187	181	1/01/2046	30/06/2046	603		38899
	188	184	1/07/2046	31/12/2046	603		39083
	189	181	1/01/2047	30/06/2047	604		39264
	190	184	1/07/2047	31/12/2047	604		39448
	191	182	1/01/2048	30/06/2048	605		39630
	192	184	1/07/2048	31/12/2048	**A6 LW605 end**		38902
Post-Mining	**193**	181	1/01/2049	30/06/2049			39080
	194	184	1/07/2049	31/12/2049			39267
	195	181	1/01/2050	30/06/2050			39445
	196	184	1/07/2050	31/12/2050			39632
	197	181	1/01/2051	30/06/2051			39811
	198	184	1/07/2051	31/12/2051			39086
	199	182	1/01/2052	30/06/2052			39262
	200	184	1/07/2052	31/12/2052			39446
	201	365	1/01/2053	31/12/2053			39811
	202	1826	1/01/2054	31/12/2058			41637
	203	1826	1/01/2059	31/12/2063			43463
	204	1827	1/01/2064	31/12/2068			45290
	205	1826	1/01/2069	31/12/2073			47116
	206	1826	1/01/2074	31/12/2078			48942
	207	1826	1/01/2079	31/12/2083			50768
	208	1827	1/01/2084	31/12/2088	30 year post **A6** mining		52595
	209	4382	1/01/2089	31/12/2100			56977
	210	18262	1/01/2101	31/12/2150			75239
	211	18262	1/01/2151	31/12/2200	approx 150 year post-mining		93501

E:\DENDROBIUM\Model\GWModel\Construction\Time\[StressPeriods_DND4v31.xlsx]timing_DND

APPENDIX G SIMULATED EXTENT OF CONNECTED FRACTURING AND SURFACE CRACKING

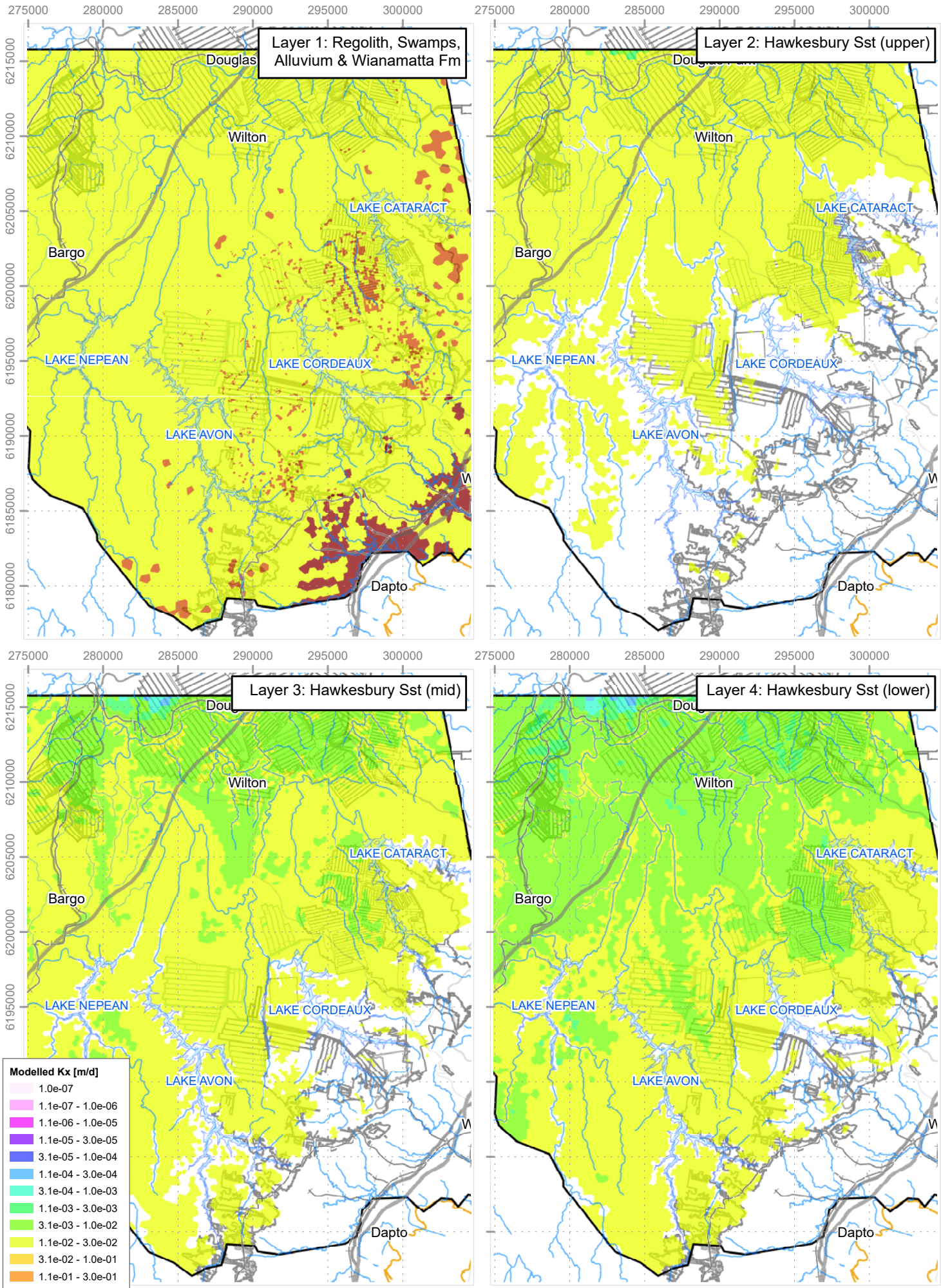

Areas 1-3A
Elevation [mAHD]
500
450
400
350
300
250
200
150
100
50
0
-50
Area 1
Area 2
Area 3A
LW1 LW1 LW1 LW1 LW1 LW1 LW2 LW2 LW2 LW2 LW2 LW2 LW2 LW3 LW3 LW3 LW3 LW3 LW3 LW4 LW4 LW4 LW4 LW4 LW4 LW5 LW5 LW5 LW5 LW5 LW5 LW5 LW6 LW6 LW6 LW6 LW6 LW6 LW6 LW6 LW6 LW7 LW7 LW7 LW7 LW7 LW7 LW7 LW8 LW8 LW8 LW8 LW8 LW8 LW8
Surface elevation
Base HBSS
Surface cracking - estimated
Zone of Connected Fracturing (Tammetta H or seam-to-surface)
Mined seam


Areas 3B-3C
Elevation [mAHD]
500
450
400
350
300
250
200
150
100
50
0
-50
Area 3B
Area 3C
Surface elevation
Base HBSS
Surface cracking - estimated
Zone of Connected Fracturing (Tammetta H or seam-to-surface)
Mined seam



E:\DENDROBIUM\Model\GWModel\Construction\FracZone\Comparison of HoF heights_v4_(DND).xlsx]Data

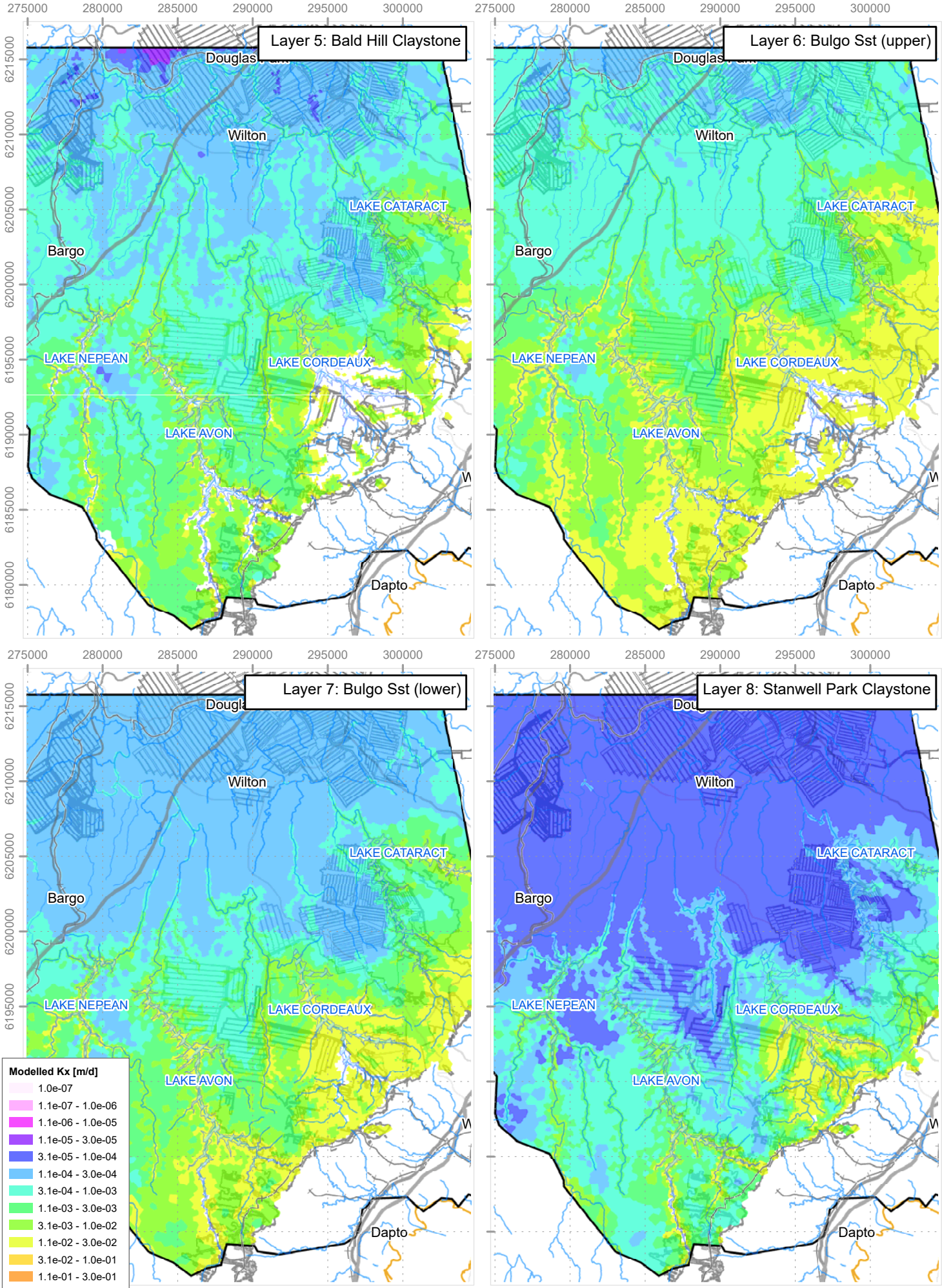
APPENDIX H MODELLED HYDRAULIC CONDUCTIVITY DISTRIBUTIONS



Dendrobium Mine

Groundwater model
Kh distribution (Layers 1-4) **Figure H1**

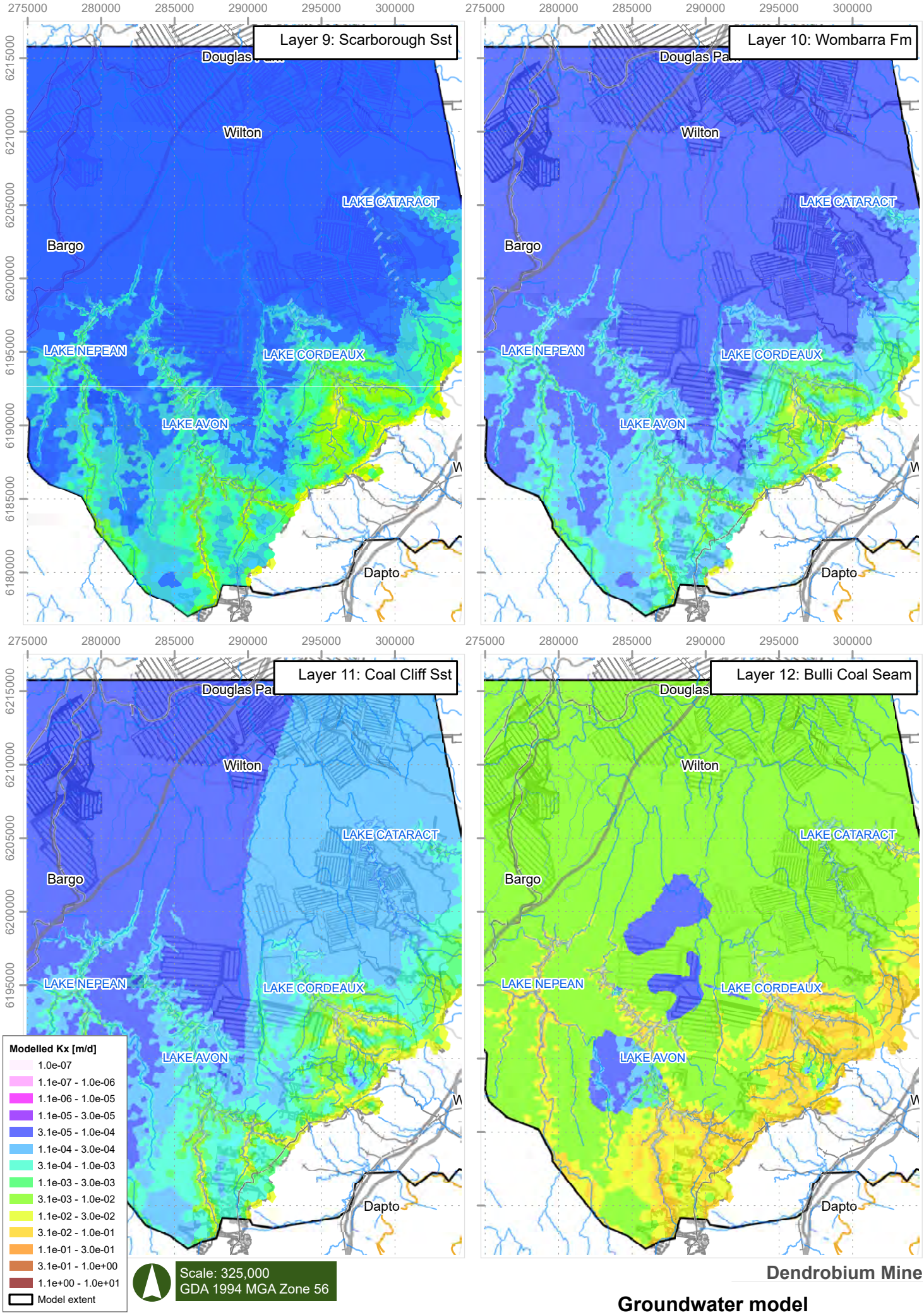
E:\DENDROBIUM\GIS\Maps\Deliverable\DNDPGW\GWModel_HydCond_L1-4_A4L.mxd
DrawingNo: IWC-009 | Rev: A | Created by: W.Minchin | Date: 9/06/2018



Dendrobium Mine

Groundwater model
Kh distribution (Layers 5-8) **Figure H2**

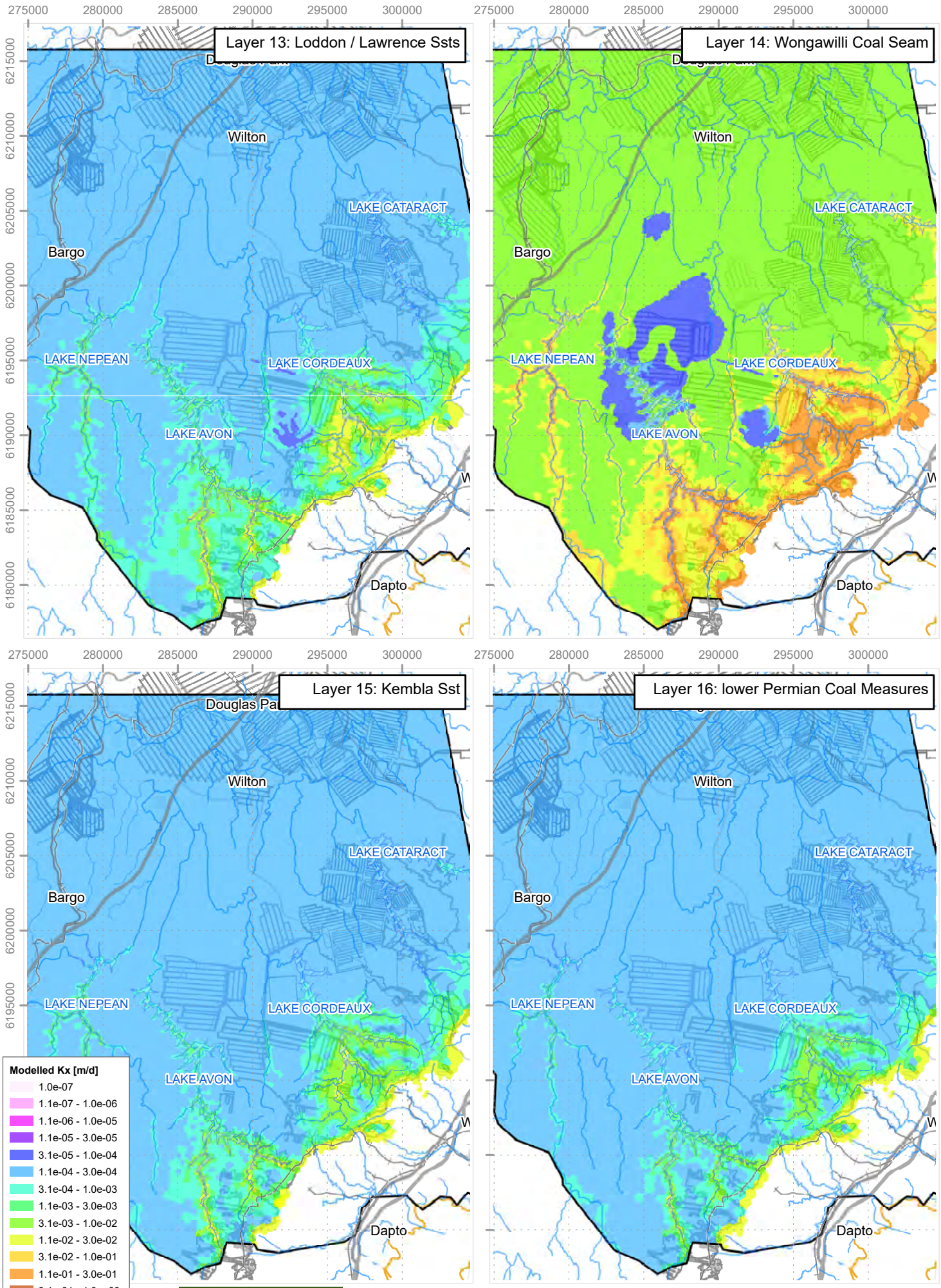
E:\DENDROBIUM\GIS\Maps\Deliverable\DNDPGW\GWModel_HydCond_L5-8_A4L.mxd
DrawingNo: IWC-009 | Rev: A | Created by: W.Minchin | Date: 9/06/2018



Dendrobium Mine

Groundwater model
Kh distribution (Layers 9-12) **Figure H3**

E:\DENDROBIUM\GIS\Maps\Deliverable\DNDPGW\GWModel_HydCond_L9-12_A4L.mxd
DrawingNo: IWC-009 | Rev: B | Created by: W.Minchin | Date: 06/02/2018

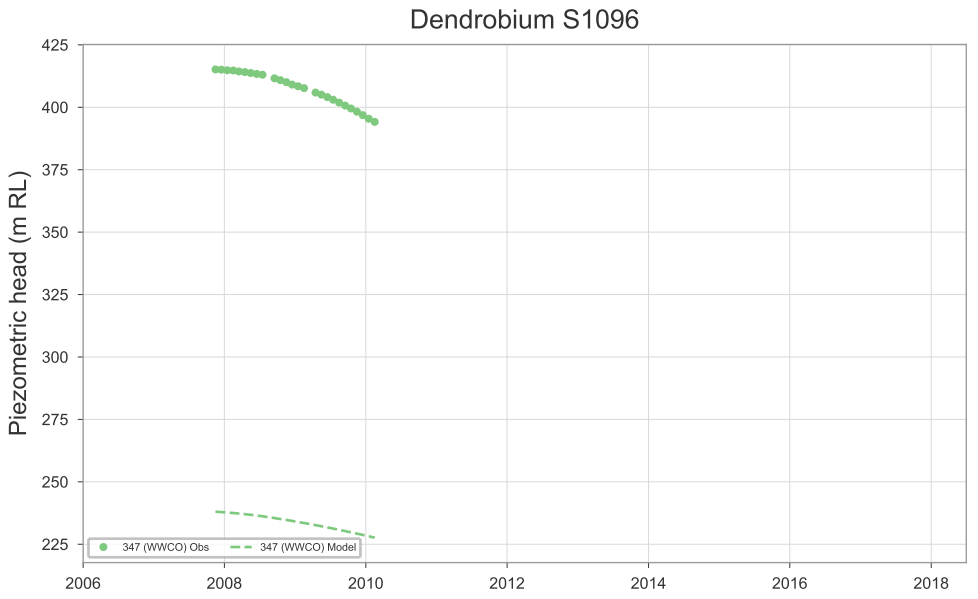


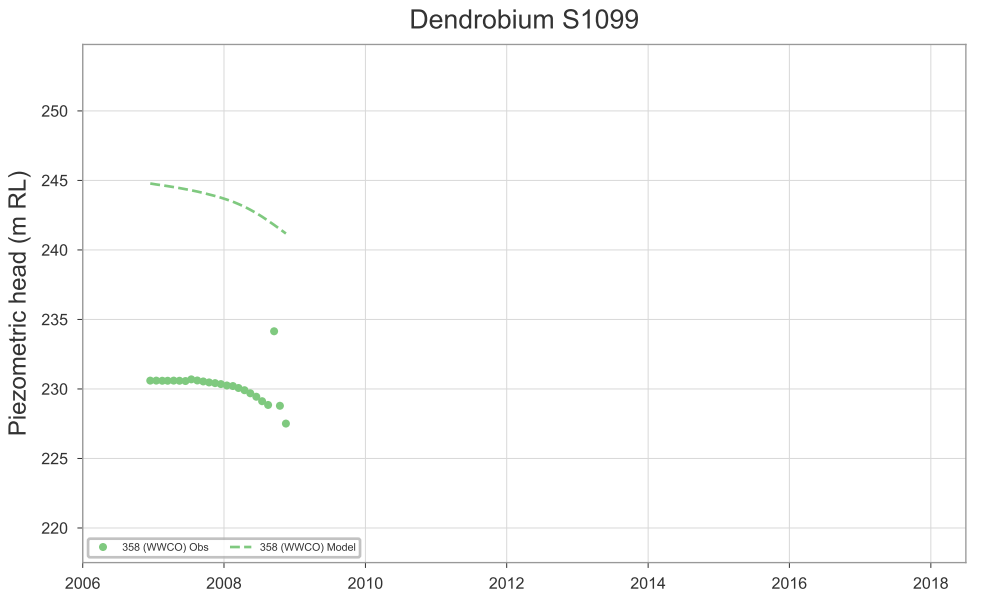
Dendrobium Mine

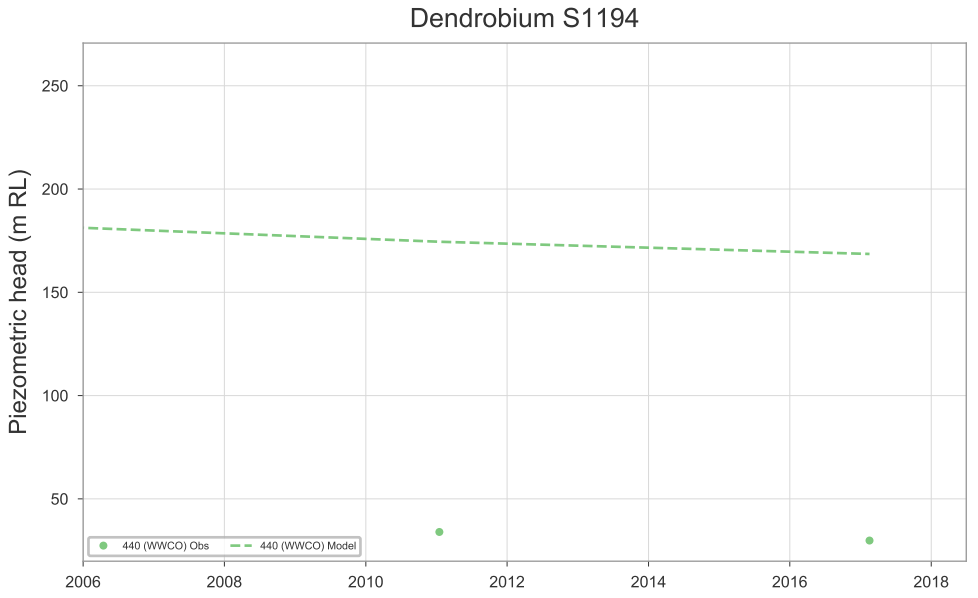
Groundwater model
Kh distribution (Layers 13-16) **Figure H4**

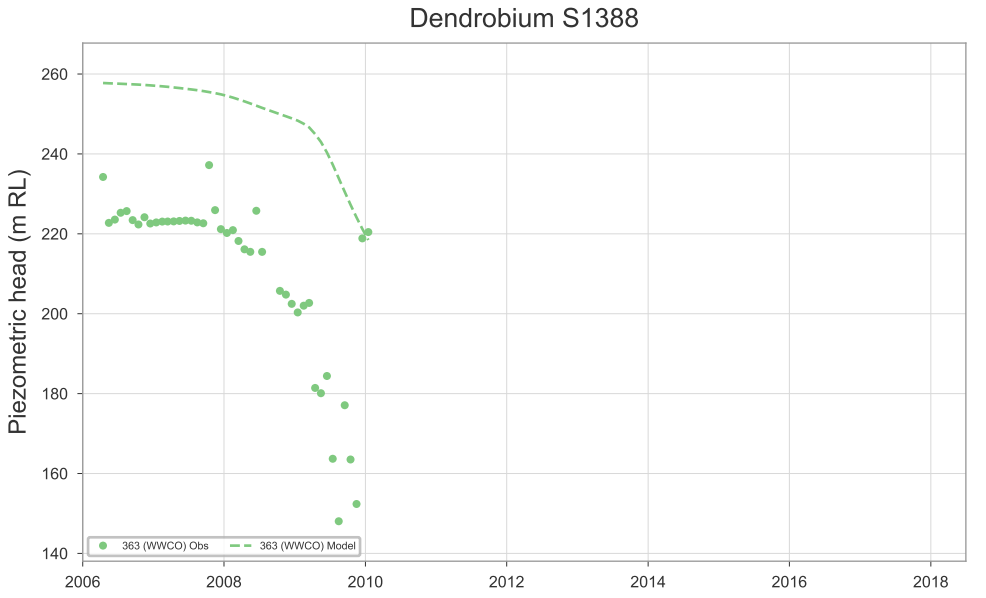
E:\DENDROBIUM\GIS\Maps\Deliverable\DNDPGW\GWModel_HydCond_L13-16_A4L.mxd
DrawingNo: IWC-009 | Rev: B | Created by: W.Minchin | Date: 06/02/2018

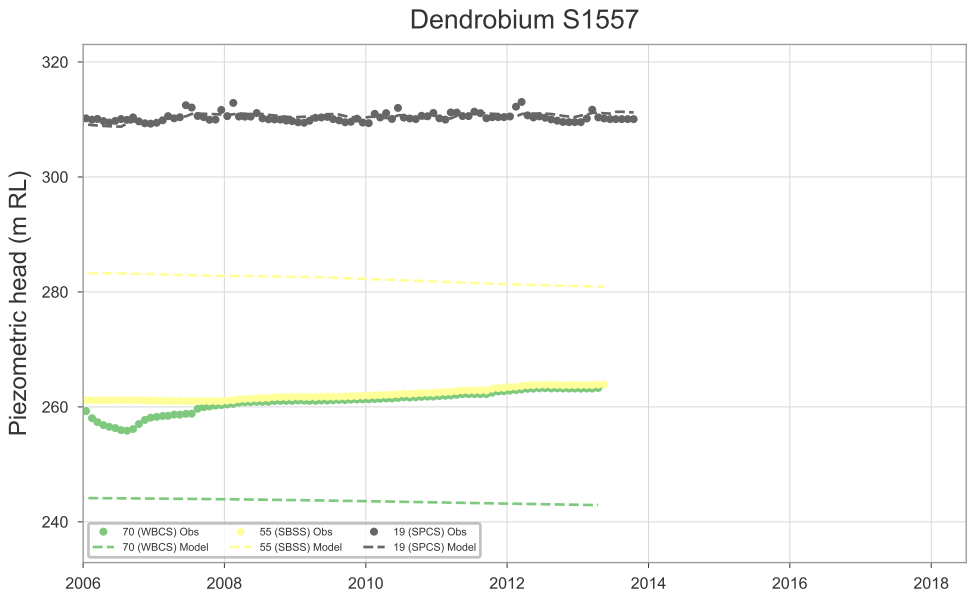
APPENDIX I GROUNDWATER MODEL CALIBRATION HYDROGRAPHS

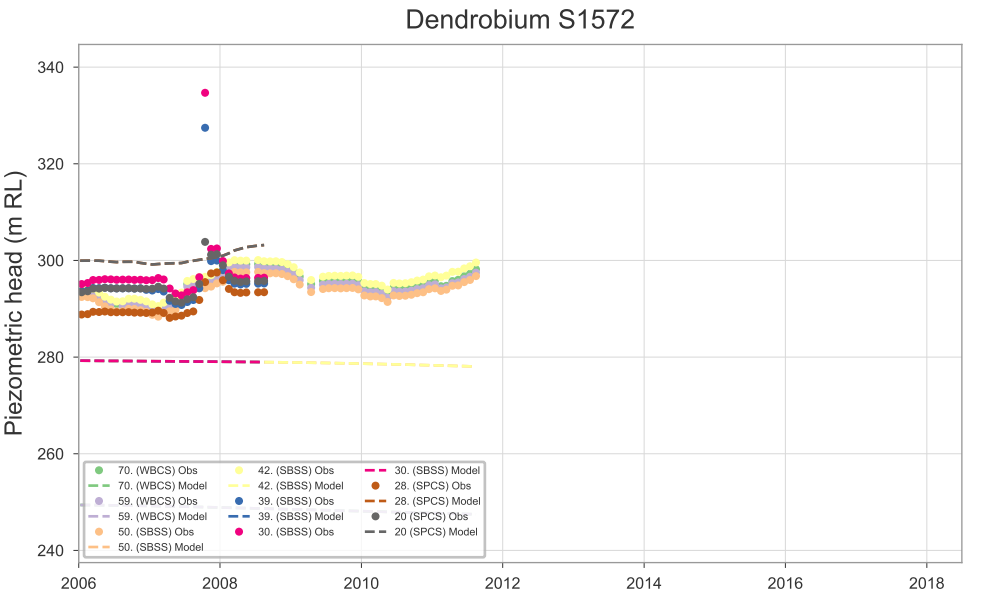

Dendrobium S1096
Piezometric head (m RL)
425
400
375
350
325
300
275
250
225
2006
2008
2010
2012
2014
2016
2018
347 (WWCO) Obs
347 (WWCO) Model

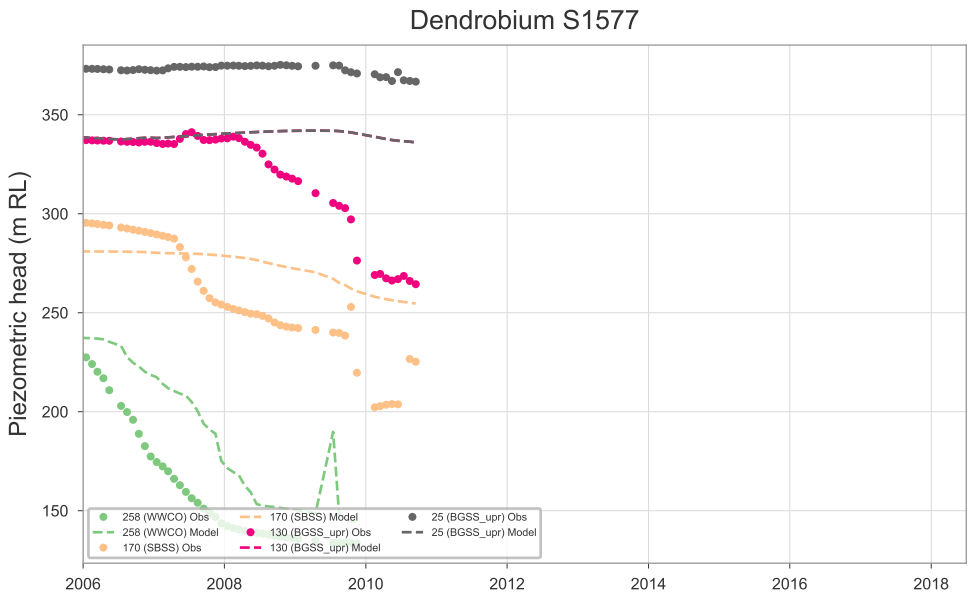

Dendrobium S1099
Piezometric head (m RL)
250
245
240
235
230
225
220
2006
2008
2010
2012
2014
2016
2018
358 (WWCO) Obs
358 (WWCO) Model

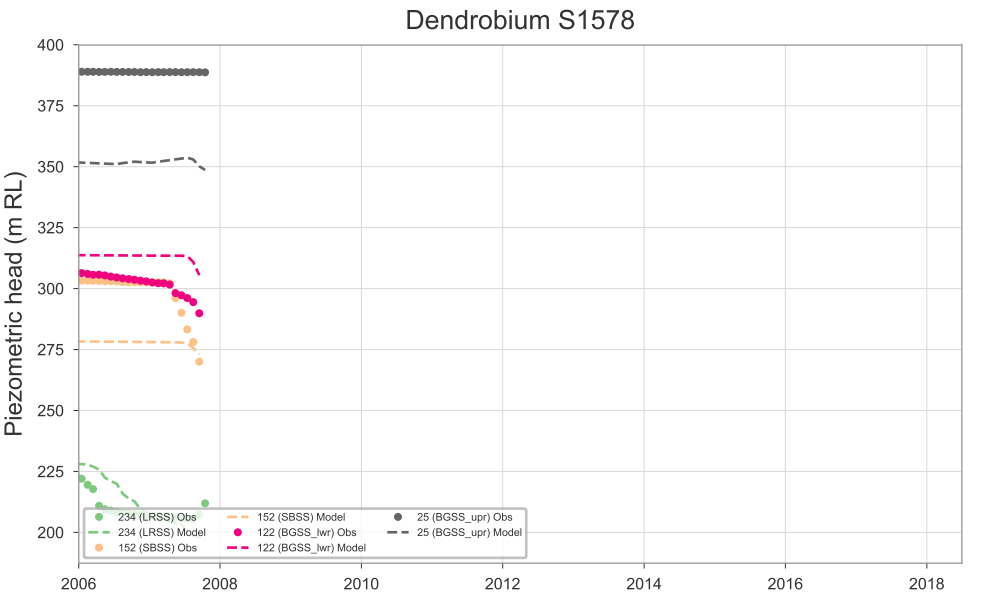

Dendrobium S1194
Piezometric head (m RL)
250
200
150
100
50
2006
2008
2010
2012
2014
2016
2018
440 (WWCO) Obs
440 (WWCO) Model

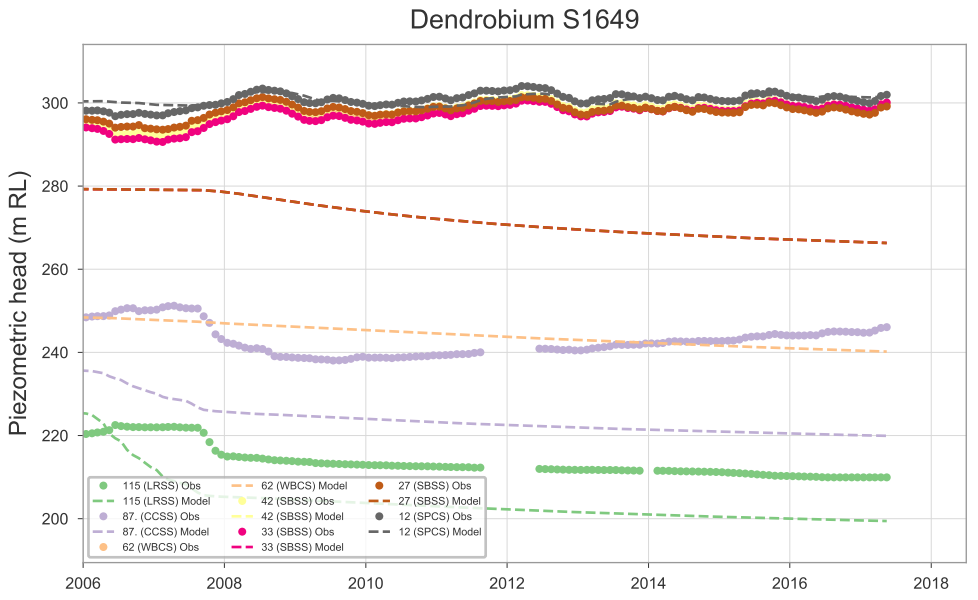

Dendrobium S1388
Piezometric head (m RL)
260
240
220
200
180
160
140
2006
2008
2010
2012
2014
2016
2018
363 (WWCO) Obs
363 (WWCO) Model

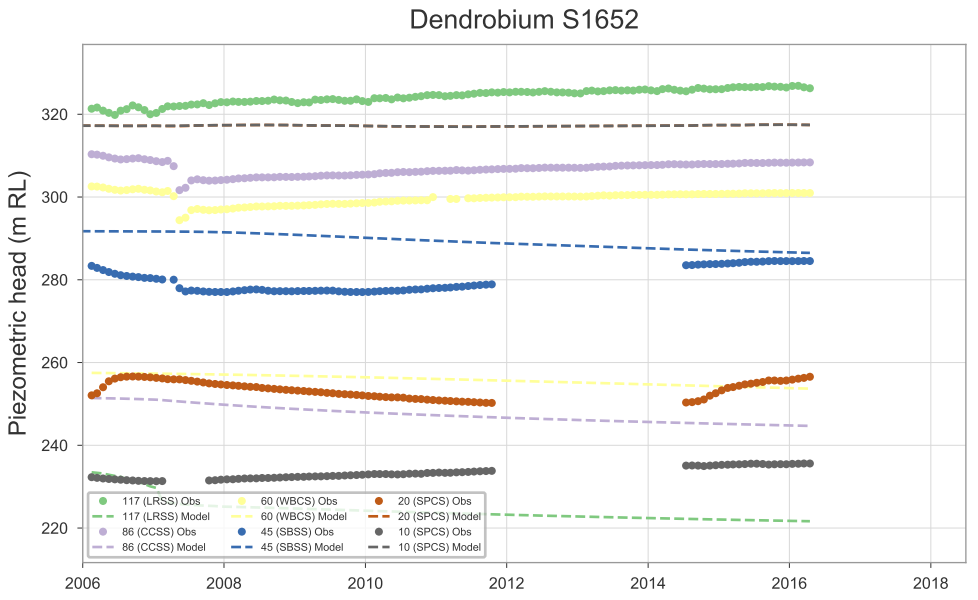

Dendrobium S1557
Piezometric head (m RL)
320
300
280
260
240
2006
2008
2010
2012
2014
2016
2018
70 (WBCS) Obs
70 (WBCS) Model
55 (SBSS) Obs
55 (SBSS) Model
19 (SPCS) Obs
19 (SPCS) Model

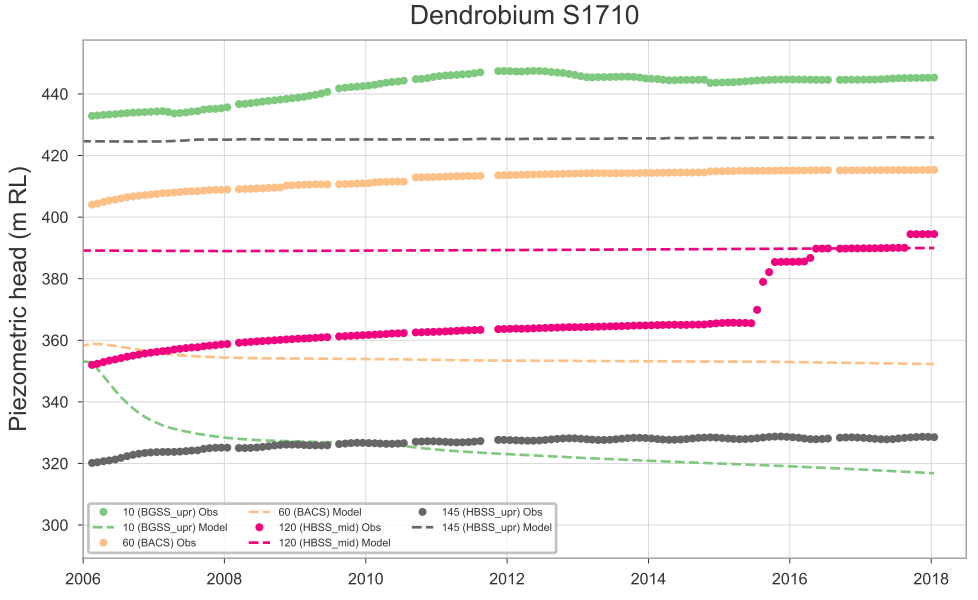

Dendrobium S1572
Piezometric head (m RL)
340
320
300
280
260
240
2006
2008
2010
2012
2014
2016
2018
70. (WBCS) Obs
70. (WBCS) Model
59. (WBCS) Obs
59. (WBCS) Model
50. (SBSS) Obs
50. (SBSS) Model
42. (SBSS) Obs
42. (SBSS) Model
39. (SBSS) Obs
39. (SBSS) Model
30. (SBSS) Obs
30. (SBSS) Model
28. (SPCS) Obs
28. (SPCS) Model
20 (SPCS) Obs
20 (SPCS) Model

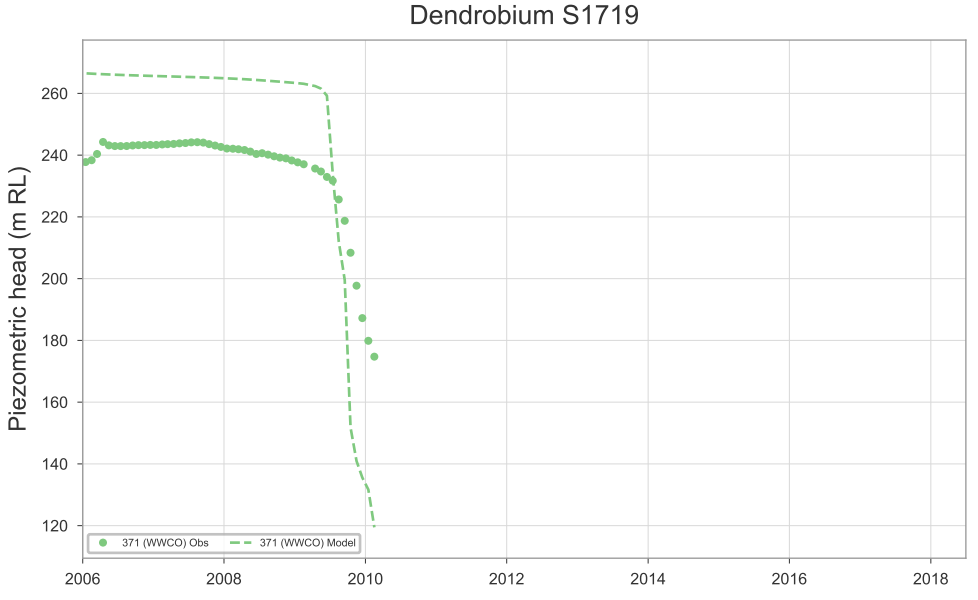

Dendrobium S1577
Piezometric head (m RL)
350
300
250
200
150
2006
2008
2010
2012
2014
2016
2018
258 (WWCO) Obs
258 (WWCO) Model
170 (SBSS) Obs
170 (SBSS) Model
130 (BGSS_upr) Obs
130 (BGSS_upr) Model
25 (BGSS_upr) Obs
25 (BGSS_upr) Model

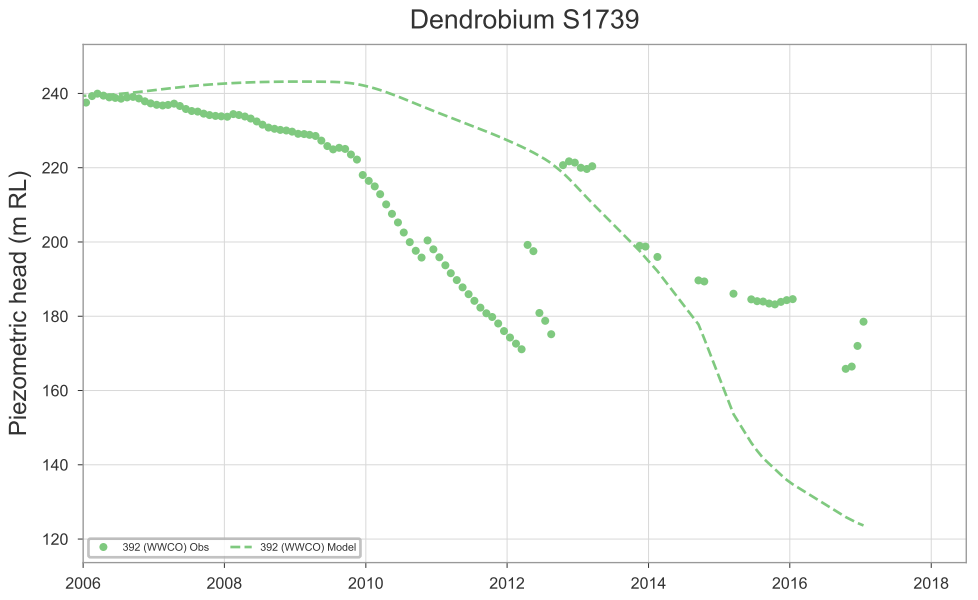

Dendrobium S1578
Piezometric head (m RL)
400
375
350
325
300
275
250
225
200
2006
2008
2010
2012
2014
2016
2018
234 (LRSS) Obs
234 (LRSS) Model
152 (SBSS) Obs
152 (SBSS) Model
122 (BGSS_lwr) Obs
122 (BGSS_lwr) Model
25 (BGSS_upr) Obs
25 (BGSS_upr) Model

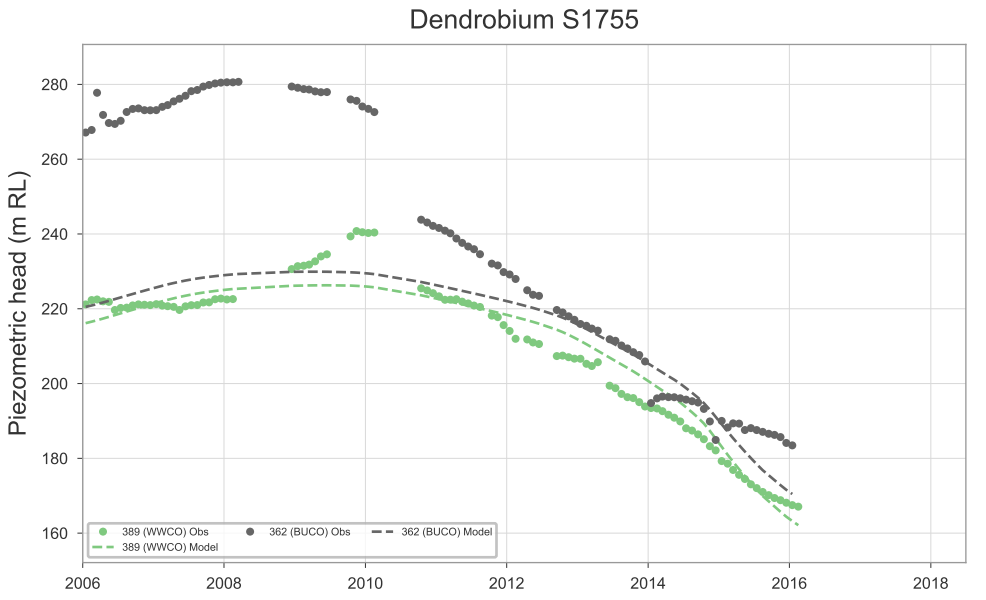

Dendrobium S1649
Piezometric head (m RL)
115 (LRSS) Obs
115 (LRSS) Model
87. (CCSS) Obs
87. (CCSS) Model
62 (WBCS) Obs
62 (WBCS) Model
42 (SBSS) Obs
42 (SBSS) Model
33 (SBSS) Obs
33 (SBSS) Model
27 (SBSS) Obs
27 (SBSS) Model
12 (SPCS) Obs
12 (SPCS) Model

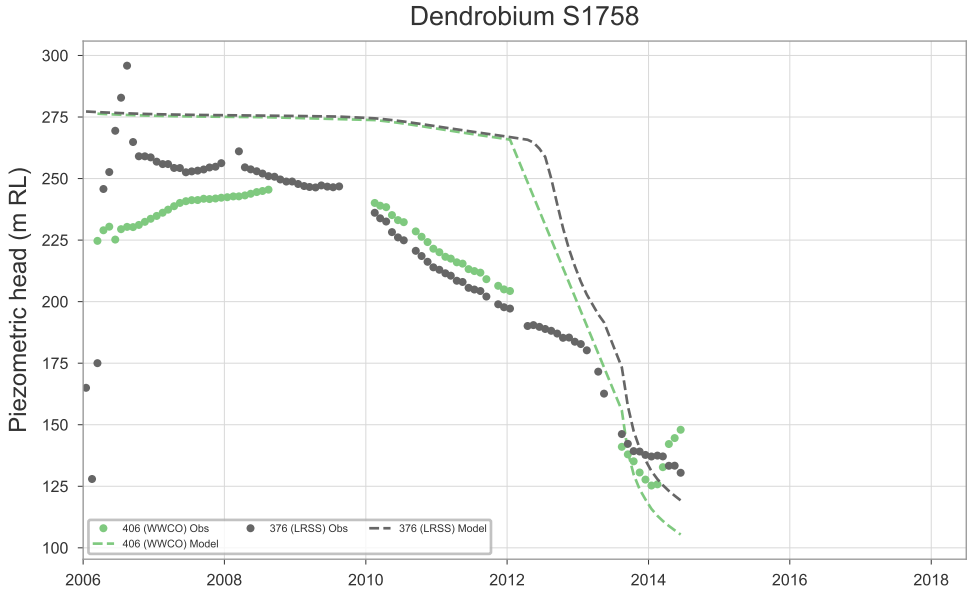

Dendrobium S1652
Piezometric head (m RL)
117 (LRSS) Obs
117 (LRSS) Model
86 (CCSS) Obs
86 (CCSS) Model
60 (WBCS) Obs
60 (WBCS) Model
45 (SBSS) Obs
45 (SBSS) Model
20 (SPCS) Obs
20 (SPCS) Model
10 (SPCS) Obs
10 (SPCS) Model

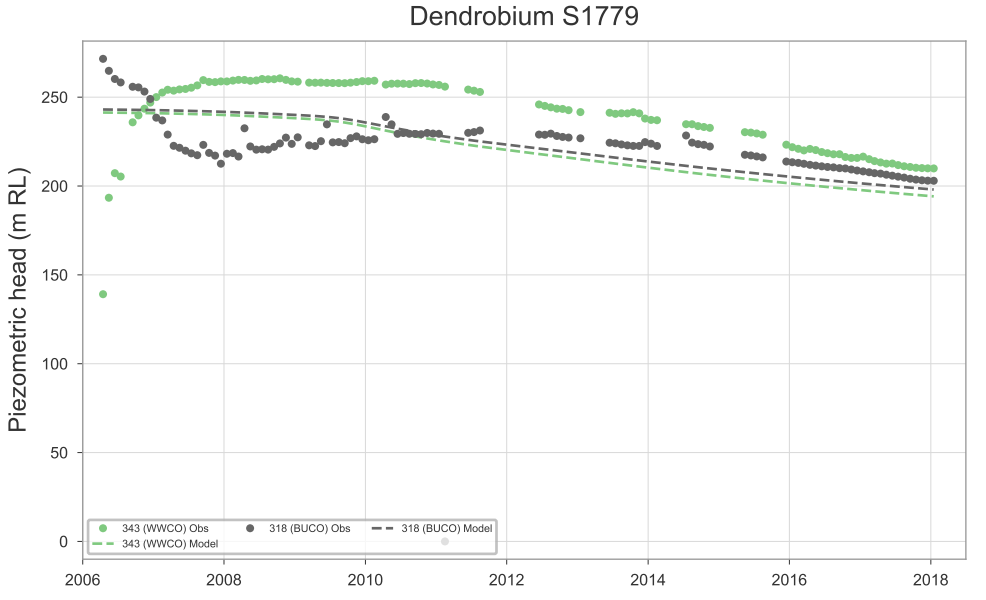

Dendrobium S1710
Piezometric head (m RL)
10 (BGSS_upr) Obs
10 (BGSS_upr) Model
60 (BACS) Obs
60 (BACS) Model
120 (HBSS_mid) Obs
120 (HBSS_mid) Model
145 (HBSS_upr) Obs
145 (HBSS_upr) Model

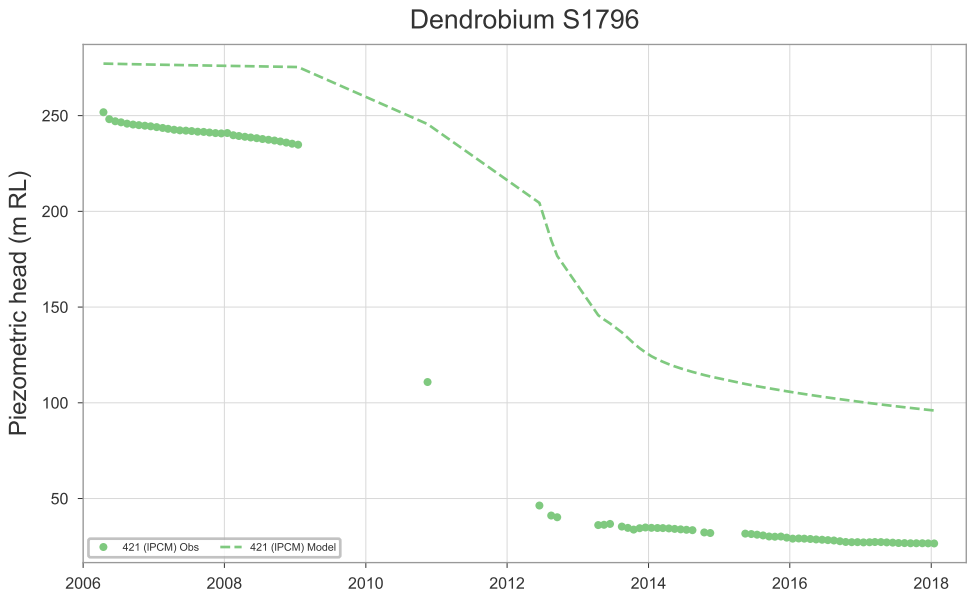

Dendrobium S1719
Piezometric head (m RL)
371 (WWCO) Obs
371 (WWCO) Model

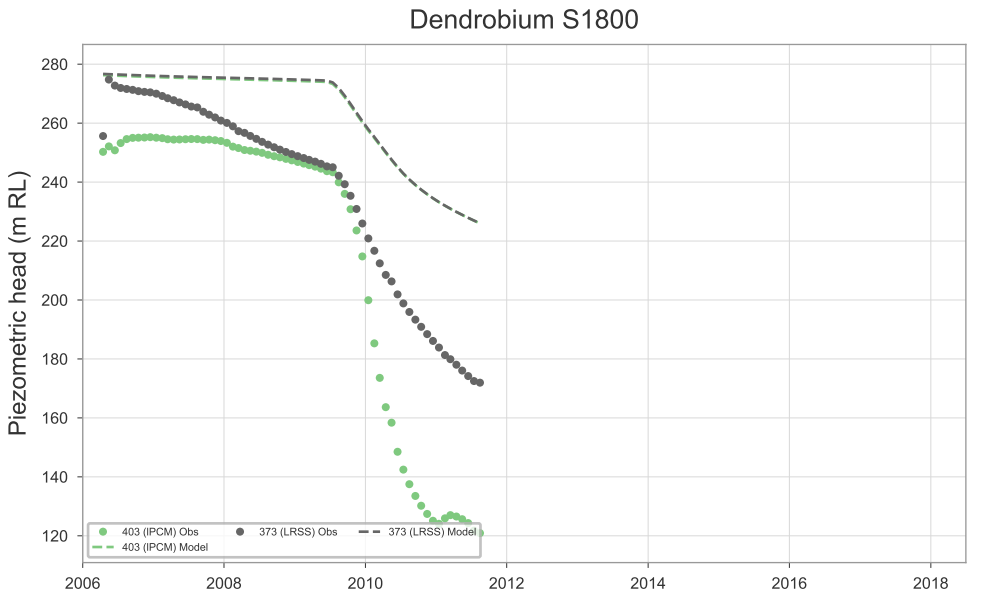

Dendrobium S1739
Piezometric head (m RL)
392 (WWCO) Obs
392 (WWCO) Model

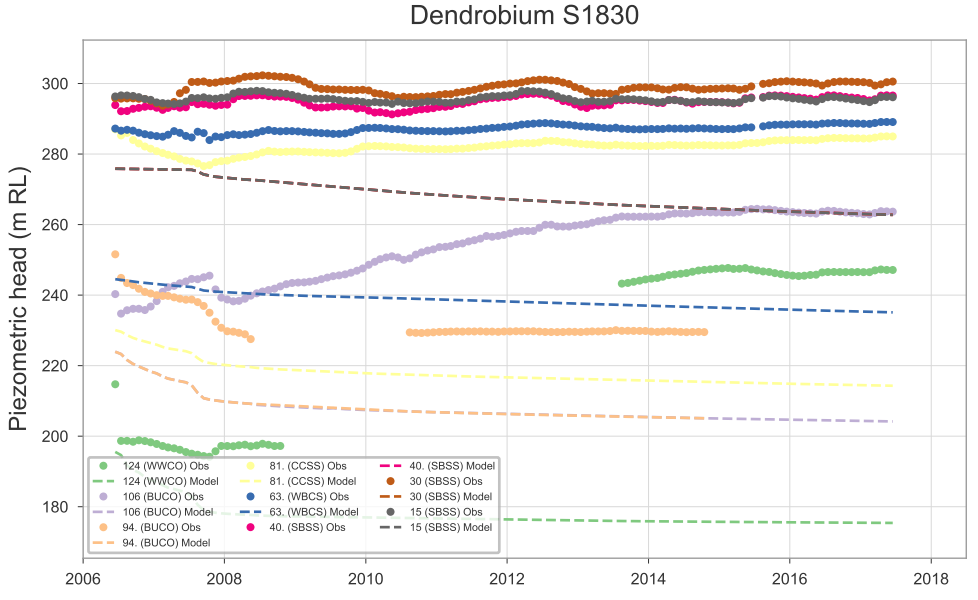

Dendrobium S1755
Piezometric head (m RL)
389 (WWCO) Obs
389 (WWCO) Model
362 (BUCO) Obs
362 (BUCO) Model

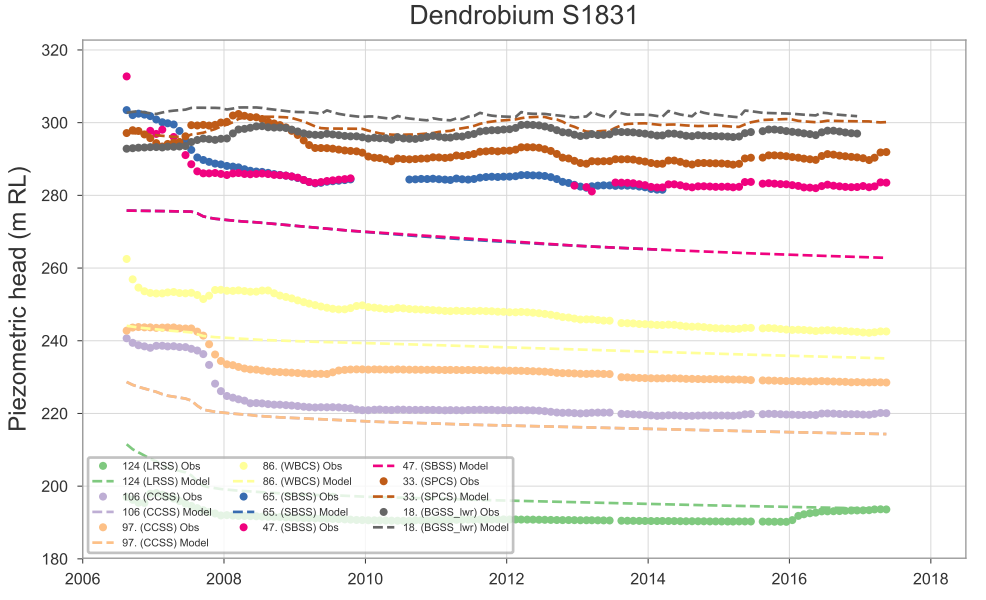

Dendrobium S1758
Piezometric head (m RL)
406 (WWCO) Obs
406 (WWCO) Model
376 (LRSS) Obs
376 (LRSS) Model

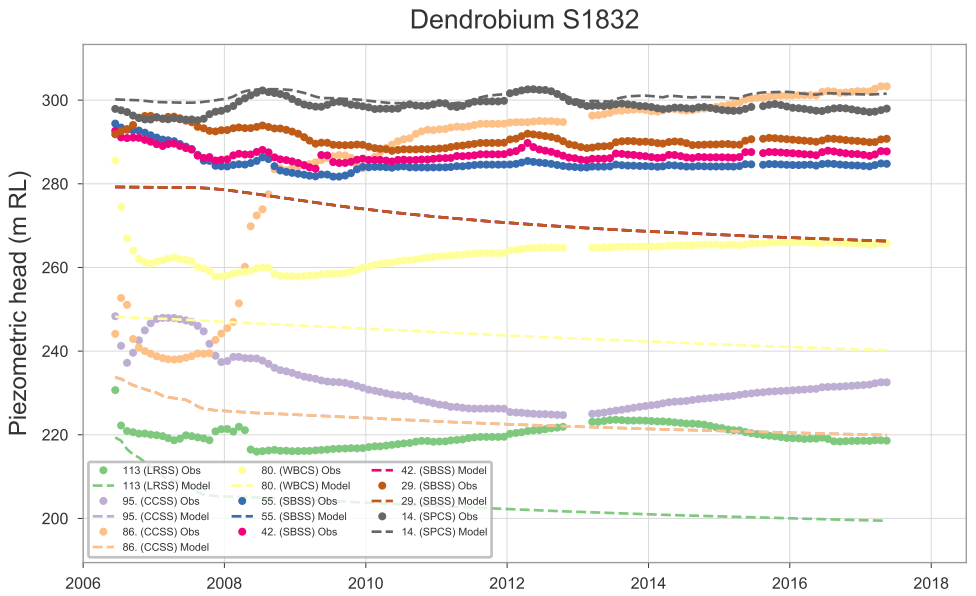

Dendrobium S1779
Piezometric head (m RL)
343 (WWCO) Obs
343 (WWCO) Model
318 (BUCO) Obs
318 (BUCO) Model

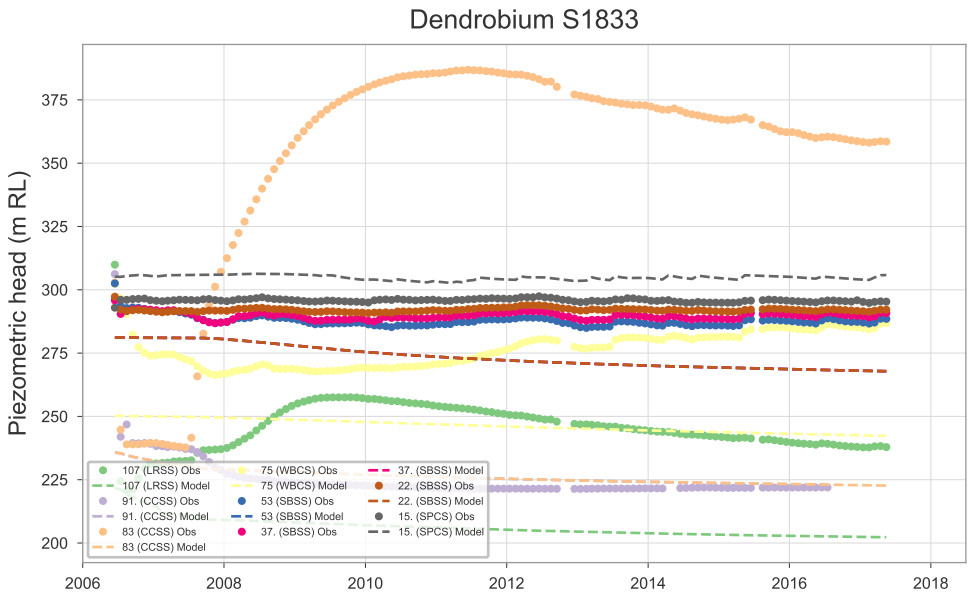

Dendrobium S1796
Piezometric head (m RL)
421 (IPCM) Obs
421 (IPCM) Model

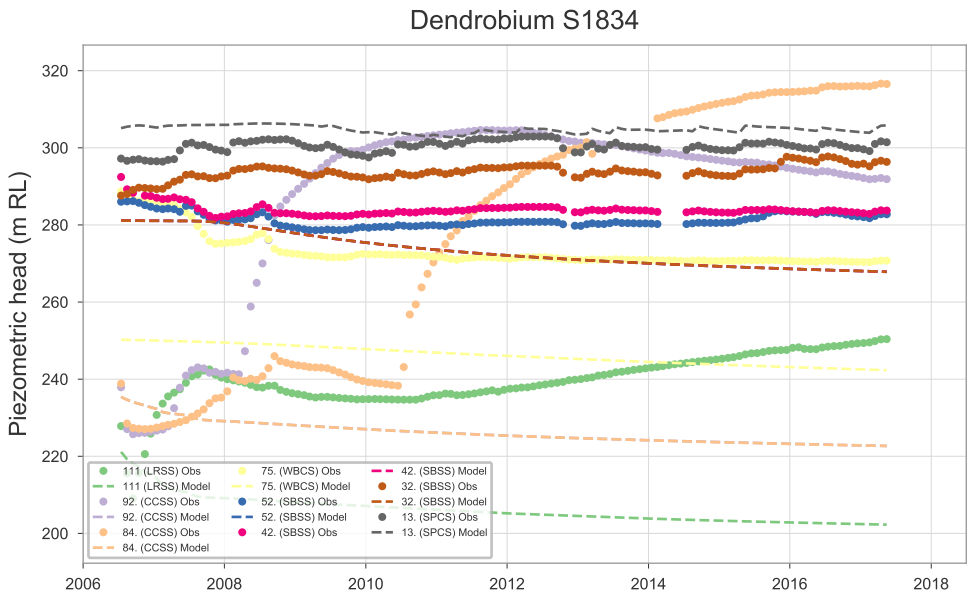

Dendrobium S1800
Piezometric head (m RL)
403 (IPCM) Obs
373 (LRSS) Obs
373 (LRSS) Model
403 (IPCM) Model

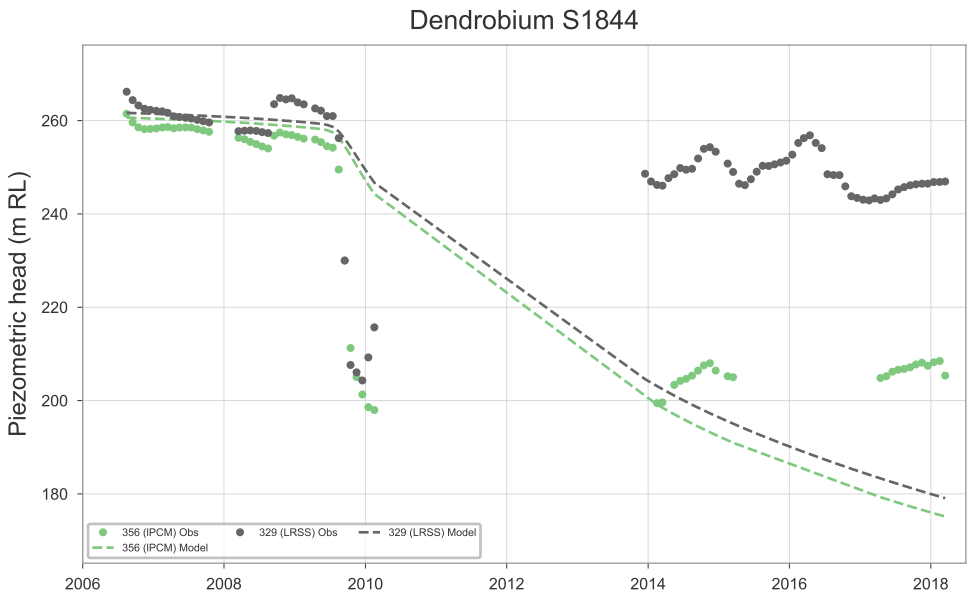

Dendrobium S1830
Piezometric head (m RL)
124 (WWCO) Obs
124 (WWCO) Model
106 (BUCO) Obs
106 (BUCO) Model
94. (BUCO) Obs
94. (BUCO) Model
81. (CCSS) Obs
81. (CCSS) Model
63. (WBCS) Obs
63. (WBCS) Model
40. (SBSS) Obs
40. (SBSS) Model
30 (SBSS) Obs
30 (SBSS) Model
15 (SBSS) Obs
15 (SBSS) Model

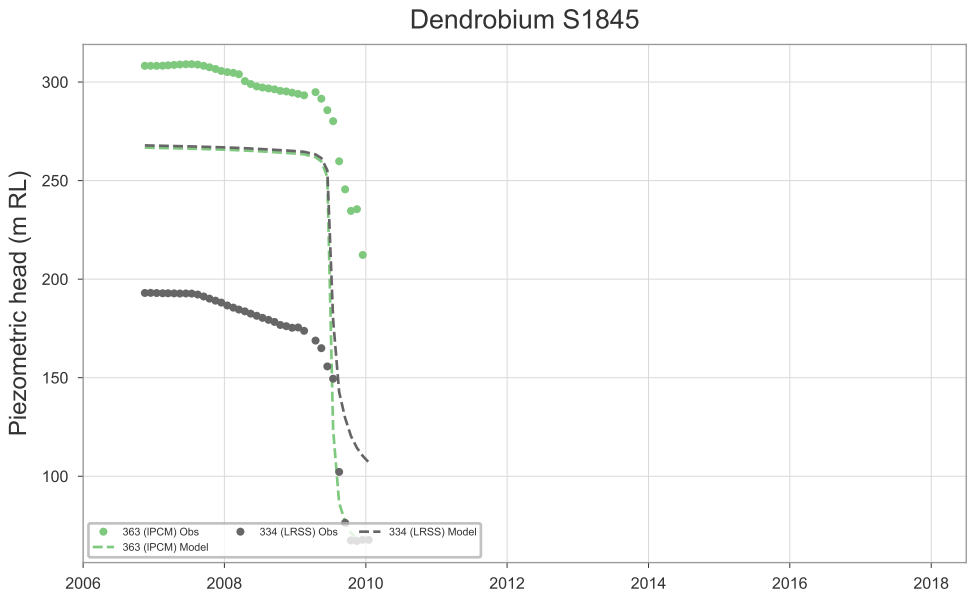

Dendrobium S1831
Piezometric head (m RL)
124 (LRSS) Obs
124 (LRSS) Model
106 (CCSS) Obs
106 (CCSS) Model
97. (CCSS) Obs
97. (CCSS) Model
86. (WBCS) Obs
86. (WBCS) Model
65. (SBSS) Obs
65. (SBSS) Model
47. (SBSS) Obs
47. (SBSS) Model
33. (SPCS) Obs
33. (SPCS) Model
18. (BGSS_lwr) Obs
18. (BGSS_lwr) Model

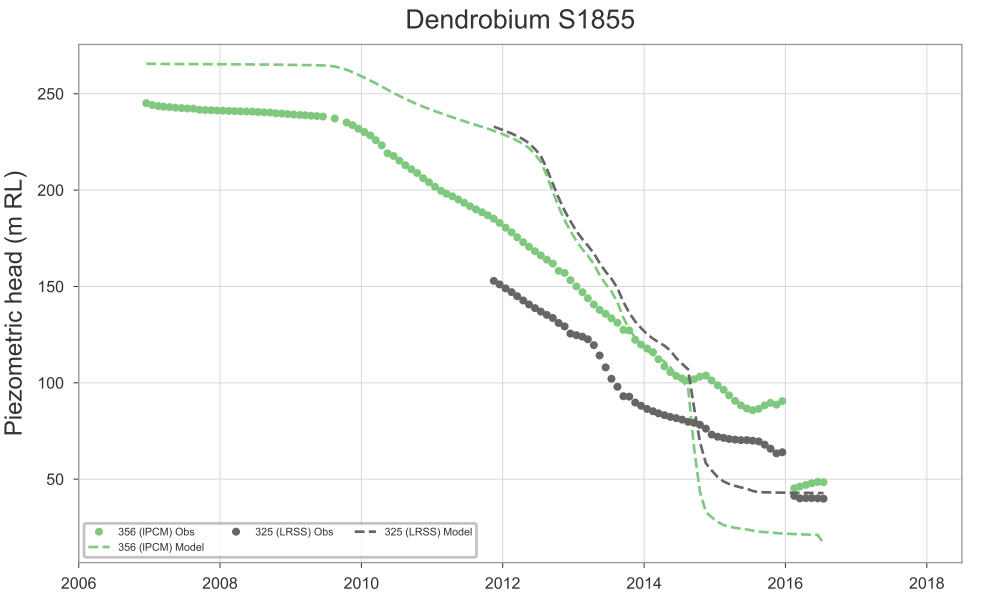

Dendrobium S1832
Piezometric head (m RL)
113 (LRSS) Obs
113 (LRSS) Model
95. (CCSS) Obs
95. (CCSS) Model
86. (CCSS) Obs
86. (CCSS) Model
80. (WBCS) Obs
80. (WBCS) Model
55. (SBSS) Obs
55. (SBSS) Model
42. (SBSS) Obs
42. (SBSS) Model
29. (SBSS) Obs
29. (SBSS) Model
14. (SPCS) Obs
14. (SPCS) Model

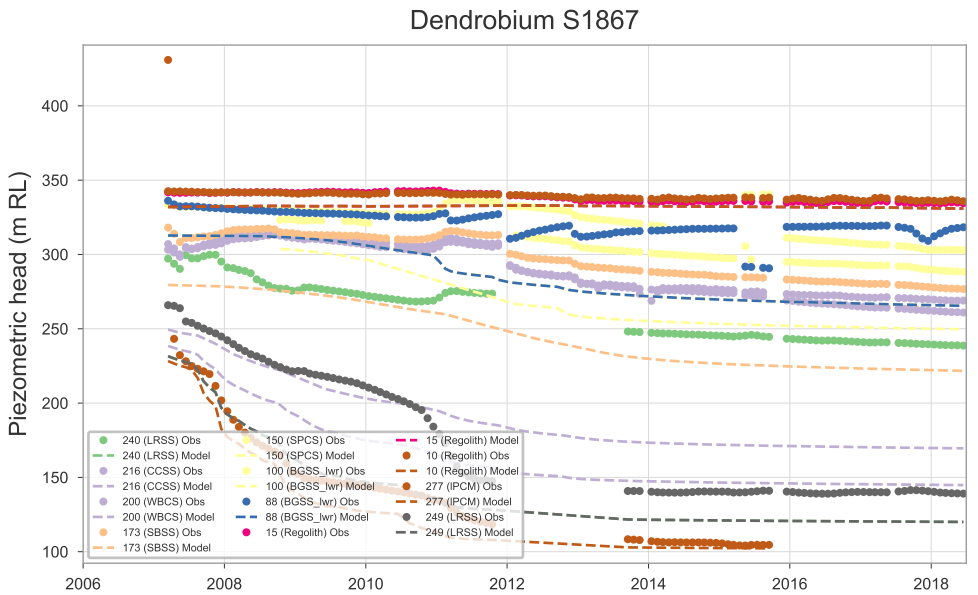

Dendrobium S1833
Piezometric head (m RL)
107 (LRSS) Obs
107 (LRSS) Model
91. (CCSS) Obs
91. (CCSS) Model
83 (CCSS) Obs
83 (CCSS) Model
75 (WBCS) Obs
75 (WBCS) Model
53 (SBSS) Obs
53 (SBSS) Model
37. (SBSS) Obs
37. (SBSS) Model
22. (SBSS) Obs
22. (SBSS) Model
15. (SPCS) Obs
15. (SPCS) Model

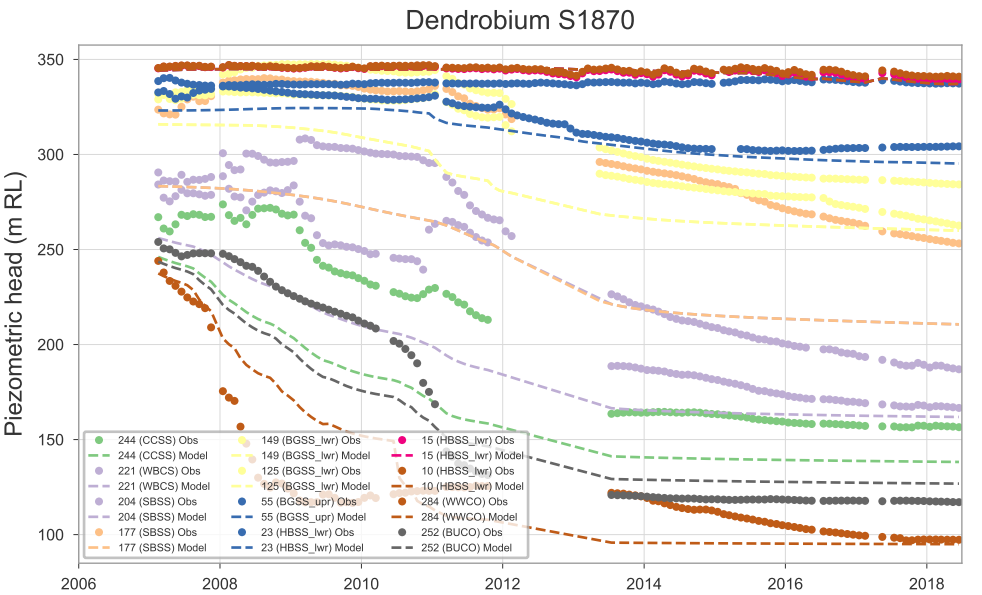

Dendrobium S1834
Piezometric head (m RL)
111 (LRSS) Obs
111 (LRSS) Model
92. (CCSS) Obs
92. (CCSS) Model
84. (CCSS) Obs
84. (CCSS) Model
75. (WBCS) Obs
75. (WBCS) Model
52. (SBSS) Obs
52. (SBSS) Model
42. (SBSS) Obs
42. (SBSS) Model
32. (SBSS) Obs
32. (SBSS) Model
13. (SPCS) Obs
13. (SPCS) Model

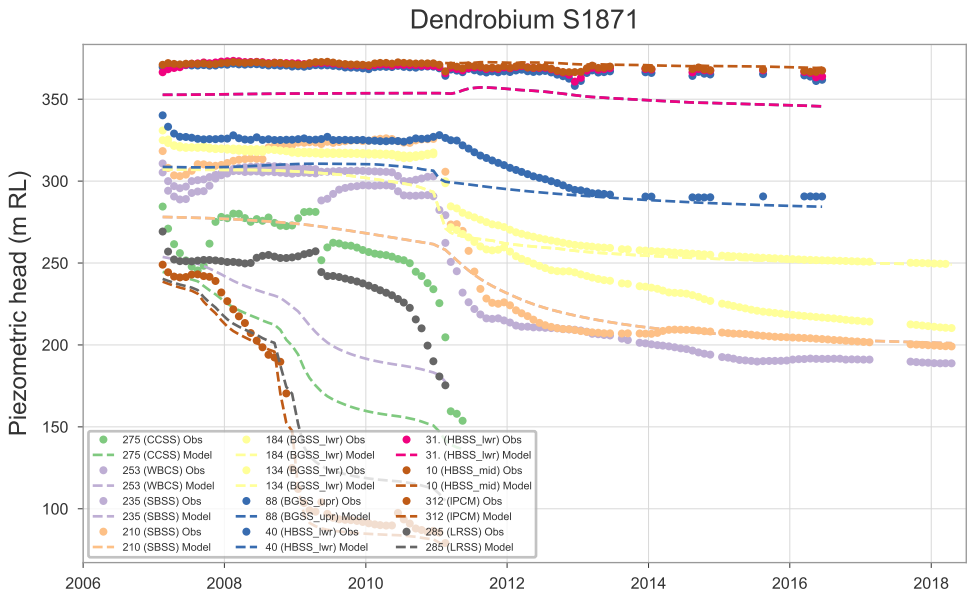

Dendrobium S1844
Piezometric head (m RL)
356 (IPCM) Obs
356 (IPCM) Model
329 (LRSS) Obs
329 (LRSS) Model

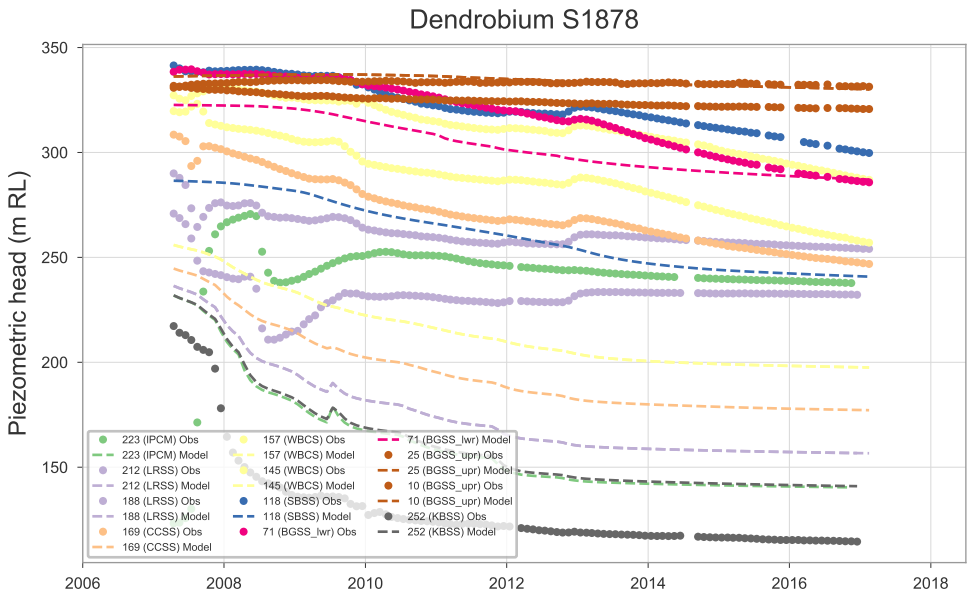

Dendrobium S1845
Piezometric head (m RL)
363 (IPCM) Obs
363 (IPCM) Model
334 (LRSS) Obs
334 (LRSS) Model

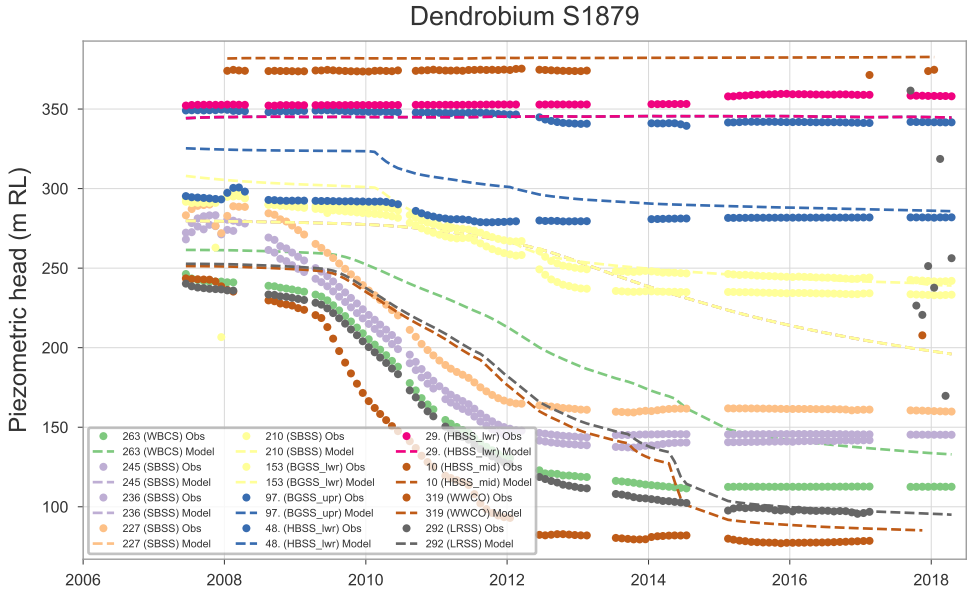

Dendrobium S1855
Piezometric head (m RL)
356 (IPCM) Obs
356 (IPCM) Model
325 (LRSS) Obs
325 (LRSS) Model

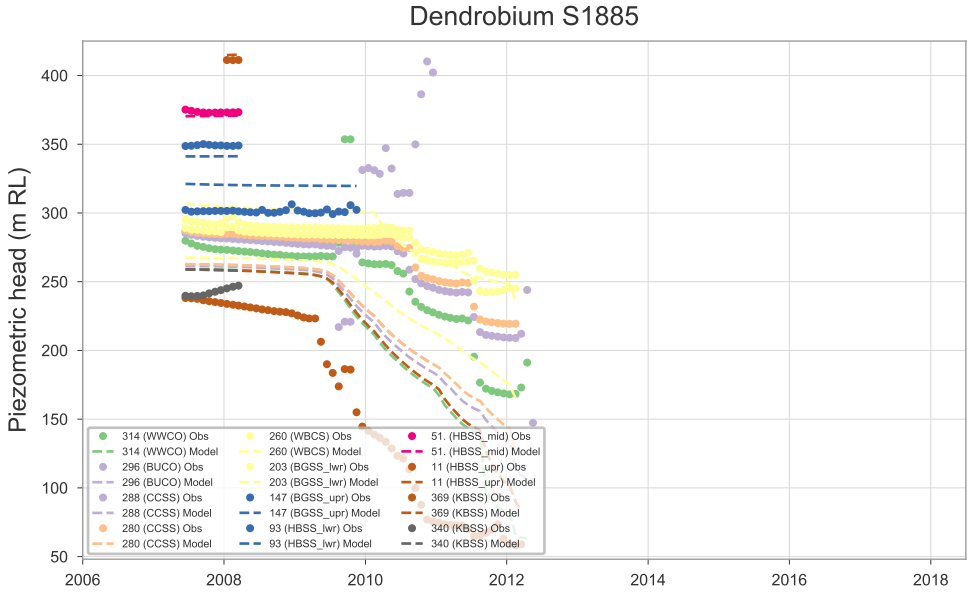

Dendrobium S1867
Piezometric head (m RL)
240 (LRSS) Obs
240 (LRSS) Model
216 (CCSS) Obs
216 (CCSS) Model
200 (WBCS) Obs
200 (WBCS) Model
173 (SBSS) Obs
173 (SBSS) Model
150 (SPCS) Obs
150 (SPCS) Model
100 (BGSS_lwr) Obs
100 (BGSS_lwr) Model
88 (BGSS_lwr) Obs
88 (BGSS_lwr) Model
15 (Regolith) Obs
15 (Regolith) Model
10 (Regolith) Obs
10 (Regolith) Model
277 (IPCM) Obs
277 (IPCM) Model
249 (LRSS) Obs
249 (LRSS) Model

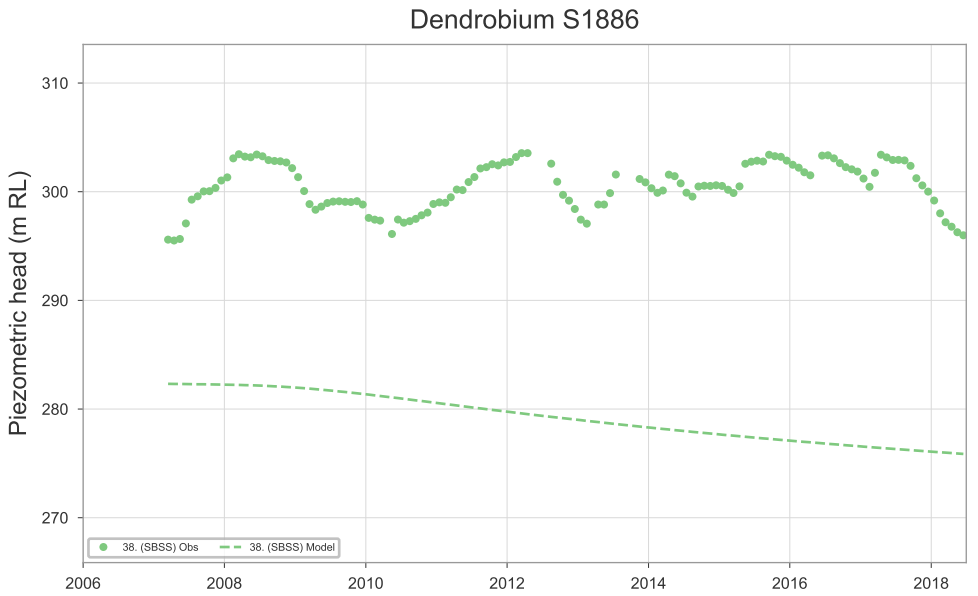

Dendrobium S1870
Piezometric head (m RL)
244 (CCSS) Obs
244 (CCSS) Model
221 (WBCS) Obs
221 (WBCS) Model
204 (SBSS) Obs
204 (SBSS) Model
177 (SBSS) Obs
177 (SBSS) Model
149 (BGSS_lwr) Obs
149 (BGSS_lwr) Model
125 (BGSS_lwr) Obs
125 (BGSS_lwr) Model
55 (BGSS_upr) Obs
55 (BGSS_upr) Model
23 (HBSS_lwr) Obs
23 (HBSS_lwr) Model
15 (HBSS_lwr) Obs
15 (HBSS_lwr) Model
10 (HBSS_lwr) Obs
10 (HBSS_lwr) Model
284 (WWCO) Obs
284 (WWCO) Model
252 (BUCO) Obs
252 (BUCO) Model

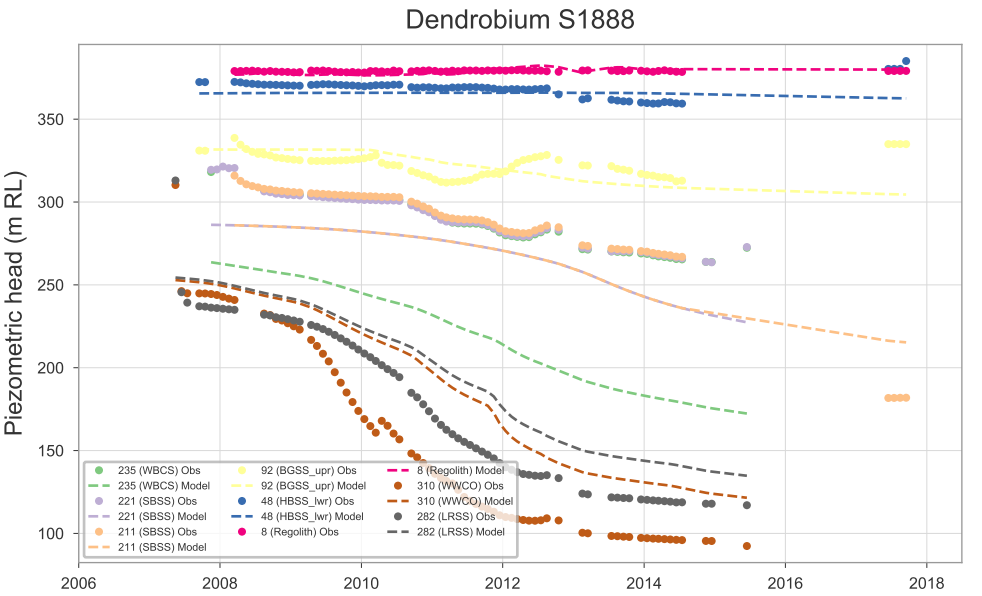

Dendrobium S1871
Piezometric head (m RL)
275 (CCSS) Obs
275 (CCSS) Model
253 (WBCS) Obs
253 (WBCS) Model
235 (SBSS) Obs
235 (SBSS) Model
210 (SBSS) Obs
210 (SBSS) Model
184 (BGSS_lwr) Obs
184 (BGSS_lwr) Model
134 (BGSS_lwr) Obs
134 (BGSS_lwr) Model
88 (BGSS_upr) Obs
88 (BGSS_upr) Model
40 (HBSS_lwr) Obs
40 (HBSS_lwr) Model
31. (HBSS_lwr) Obs
31. (HBSS_lwr) Model
10 (HBSS_mid) Obs
10 (HBSS_mid) Model
312 (IPCM) Obs
312 (IPCM) Model
285 (LRSS) Obs
285 (LRSS) Model

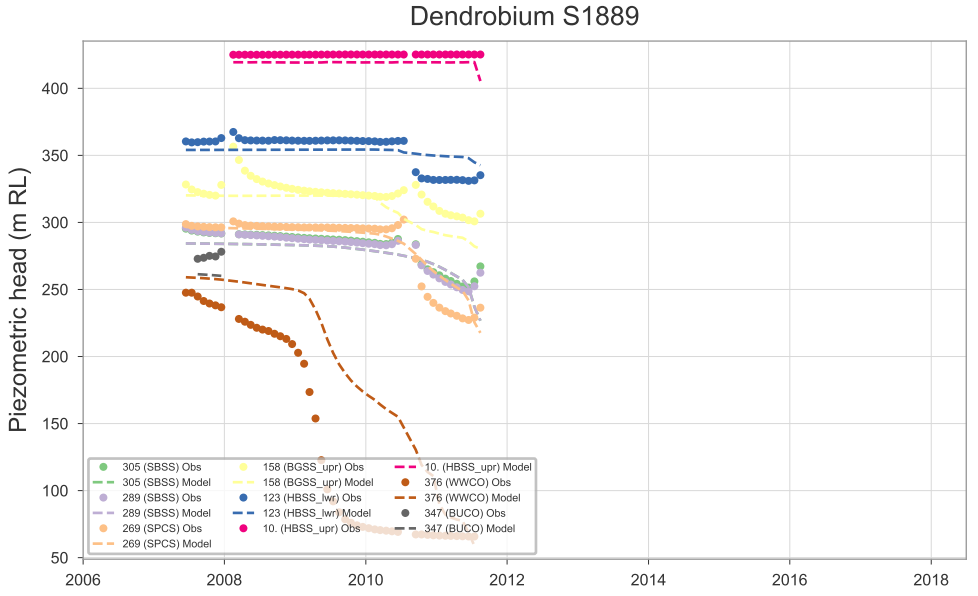

Dendrobium S1878
Piezometric head (m RL)
223 (IPCM) Obs
223 (IPCM) Model
212 (LRSS) Obs
212 (LRSS) Model
188 (LRSS) Obs
188 (LRSS) Model
169 (CCSS) Obs
169 (CCSS) Model
157 (WBCS) Obs
157 (WBCS) Model
145 (WBCS) Obs
145 (WBCS) Model
118 (SBSS) Obs
118 (SBSS) Model
71 (BGSS_lwr) Obs
71 (BGSS_lwr) Model
25 (BGSS_upr) Obs
25 (BGSS_upr) Model
10 (BGSS_upr) Obs
10 (BGSS_upr) Model
252 (KBSS) Obs
252 (KBSS) Model

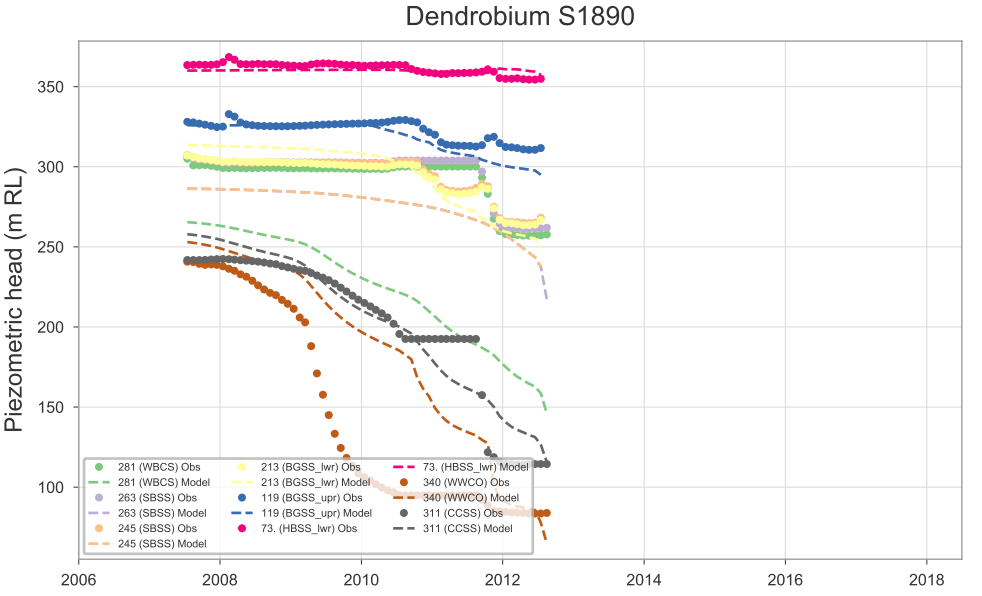

Dendrobium S1879
Piezometric head (m RL)
263 (WBCS) Obs
263 (WBCS) Model
245 (SBSS) Obs
245 (SBSS) Model
236 (SBSS) Obs
236 (SBSS) Model
227 (SBSS) Obs
227 (SBSS) Model
210 (SBSS) Obs
210 (SBSS) Model
153 (BGSS_lwr) Obs
153 (BGSS_lwr) Model
97. (BGSS_upr) Obs
97. (BGSS_upr) Model
48. (HBSS_lwr) Obs
48. (HBSS_lwr) Model
29. (HBSS_lwr) Obs
29. (HBSS_lwr) Model
10 (HBSS_mid) Obs
10 (HBSS_mid) Model
319 (WWCO) Obs
319 (WWCO) Model
292 (LRSS) Obs
292 (LRSS) Model

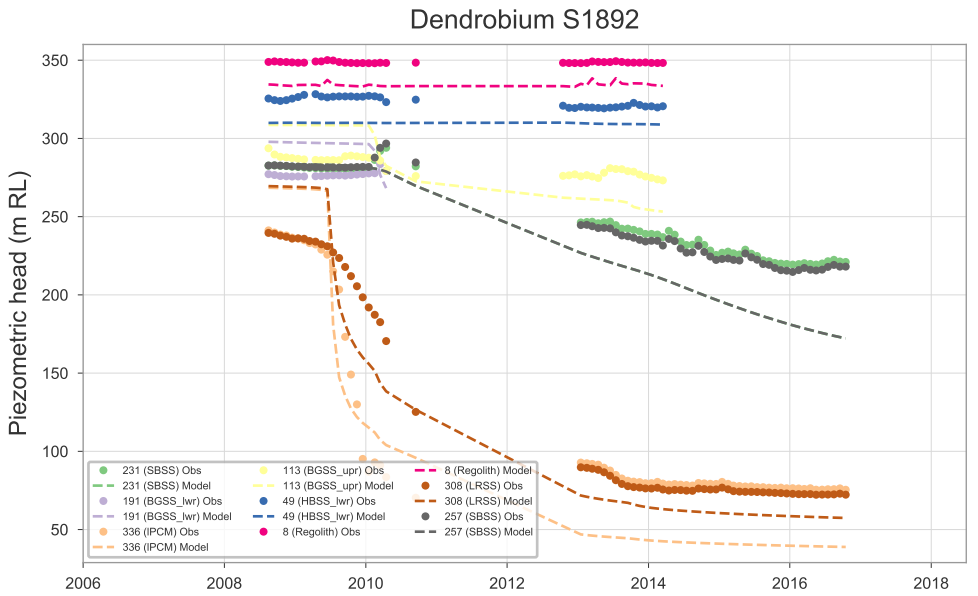

Dendrobium S1885
Piezometric head (m RL)
314 (WWCO) Obs
314 (WWCO) Model
296 (BUCO) Obs
296 (BUCO) Model
288 (CCSS) Obs
288 (CCSS) Model
280 (CCSS) Obs
280 (CCSS) Model
260 (WBCS) Obs
260 (WBCS) Model
203 (BGSS_lwr) Obs
203 (BGSS_lwr) Model
147 (BGSS_upr) Obs
147 (BGSS_upr) Model
93 (HBSS_lwr) Obs
93 (HBSS_lwr) Model
51. (HBSS_mid) Obs
51. (HBSS_mid) Model
11 (HBSS_upr) Obs
11 (HBSS_upr) Model
369 (KBSS) Obs
369 (KBSS) Model
340 (KBSS) Obs
340 (KBSS) Model

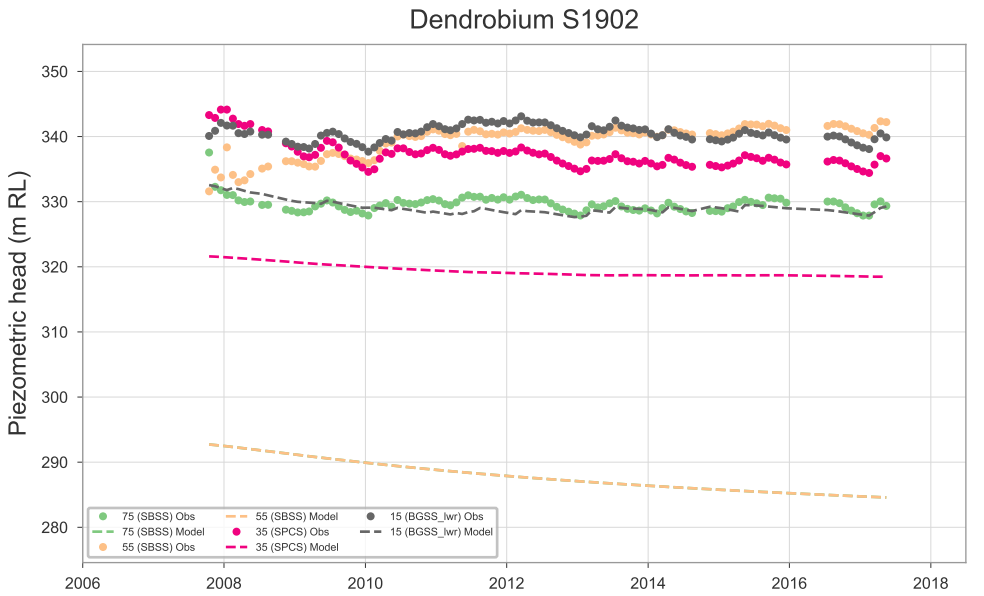

Dendrobium S1886
Piezometric head (m RL)
38. (SBSS) Obs
38. (SBSS) Model

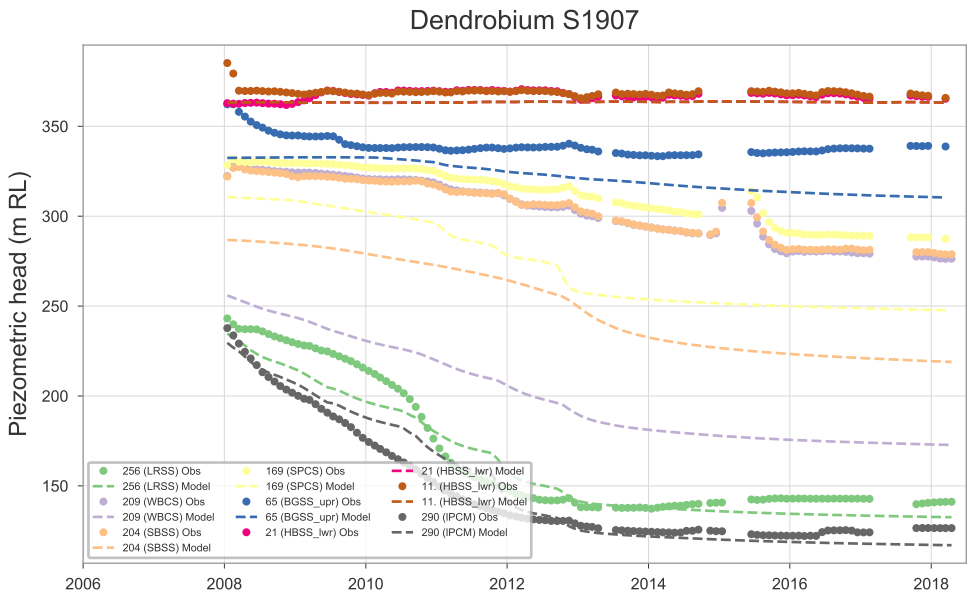

Dendrobium S1888
Piezometric head (m RL)
235 (WBCS) Obs
235 (WBCS) Model
221 (SBSS) Obs
221 (SBSS) Model
211 (SBSS) Obs
211 (SBSS) Model
92 (BGSS_upr) Obs
92 (BGSS_upr) Model
48 (HBSS_lwr) Obs
48 (HBSS_lwr) Model
8 (Regolith) Obs
8 (Regolith) Model
310 (WWCO) Obs
310 (WWCO) Model
282 (LRSS) Obs
282 (LRSS) Model

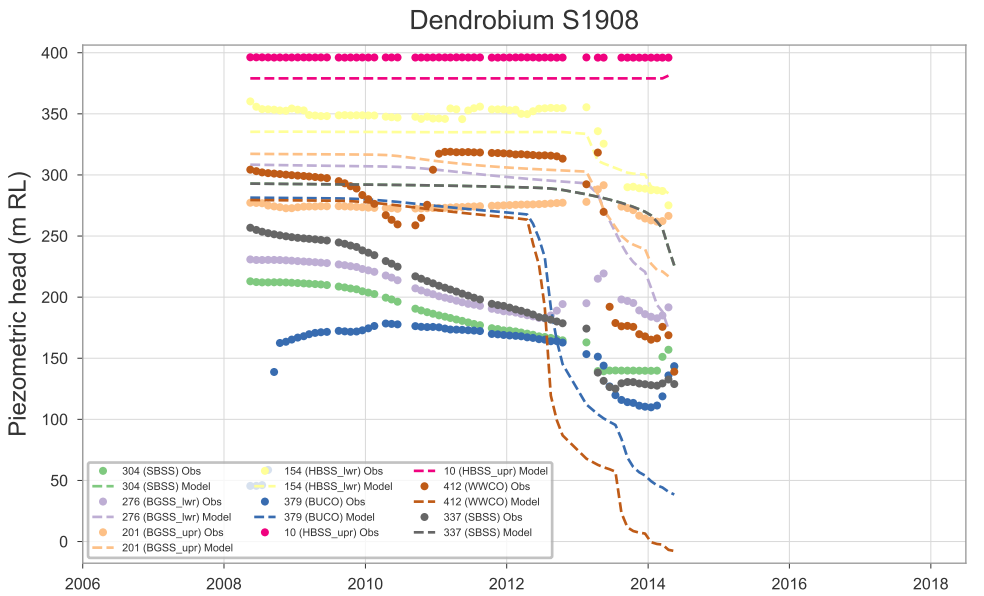

Dendrobium S1889
Piezometric head (m RL)
305 (SBSS) Obs
305 (SBSS) Model
289 (SBSS) Obs
289 (SBSS) Model
269 (SPCS) Obs
269 (SPCS) Model
158 (BGSS_upr) Obs
158 (BGSS_upr) Model
123 (HBSS_lwr) Obs
123 (HBSS_lwr) Model
10. (HBSS_upr) Obs
10. (HBSS_upr) Model
376 (WWCO) Obs
376 (WWCO) Model
347 (BUCO) Obs
347 (BUCO) Model

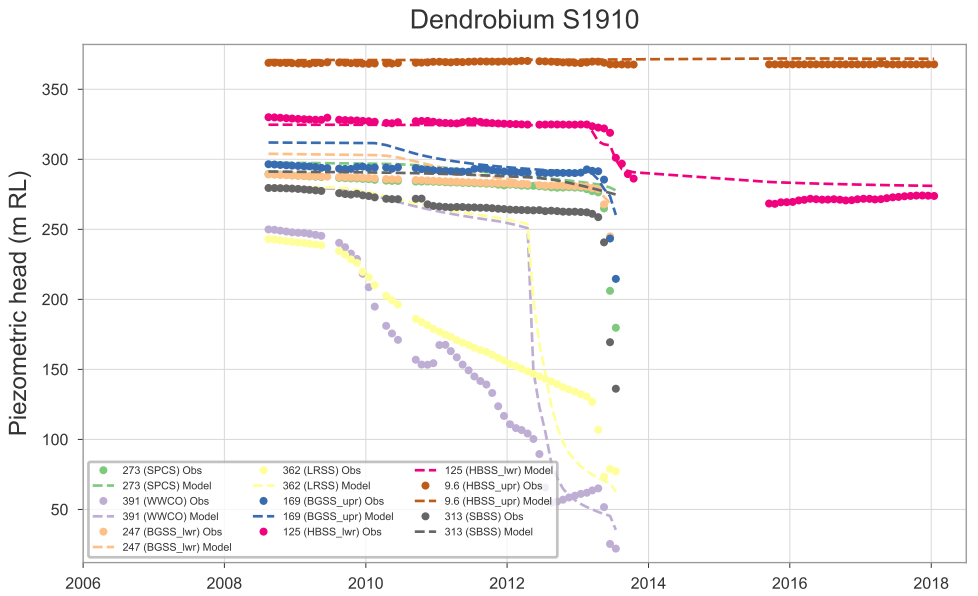

Dendrobium S1890
Piezometric head (m RL)
281 (WBCS) Obs
281 (WBCS) Model
263 (SBSS) Obs
263 (SBSS) Model
245 (SBSS) Obs
245 (SBSS) Model
213 (BGSS_lwr) Obs
213 (BGSS_lwr) Model
119 (BGSS_upr) Obs
119 (BGSS_upr) Model
73. (HBSS_lwr) Obs
73. (HBSS_lwr) Model
340 (WWCO) Obs
340 (WWCO) Model
311 (CCSS) Obs
311 (CCSS) Model

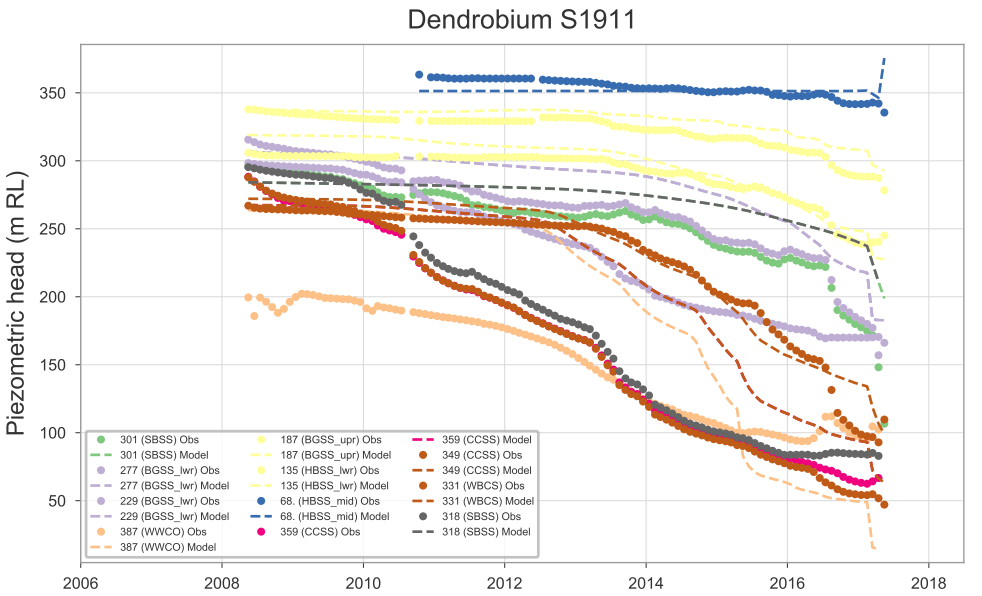

Dendrobium S1892
Piezometric head (m RL)
231 (SBSS) Obs
231 (SBSS) Model
191 (BGSS_lwr) Obs
191 (BGSS_lwr) Model
336 (IPCM) Obs
336 (IPCM) Model
113 (BGSS_upr) Obs
113 (BGSS_upr) Model
49 (HBSS_lwr) Obs
49 (HBSS_lwr) Model
8 (Regolith) Obs
8 (Regolith) Model
308 (LRSS) Obs
308 (LRSS) Model
257 (SBSS) Obs
257 (SBSS) Model

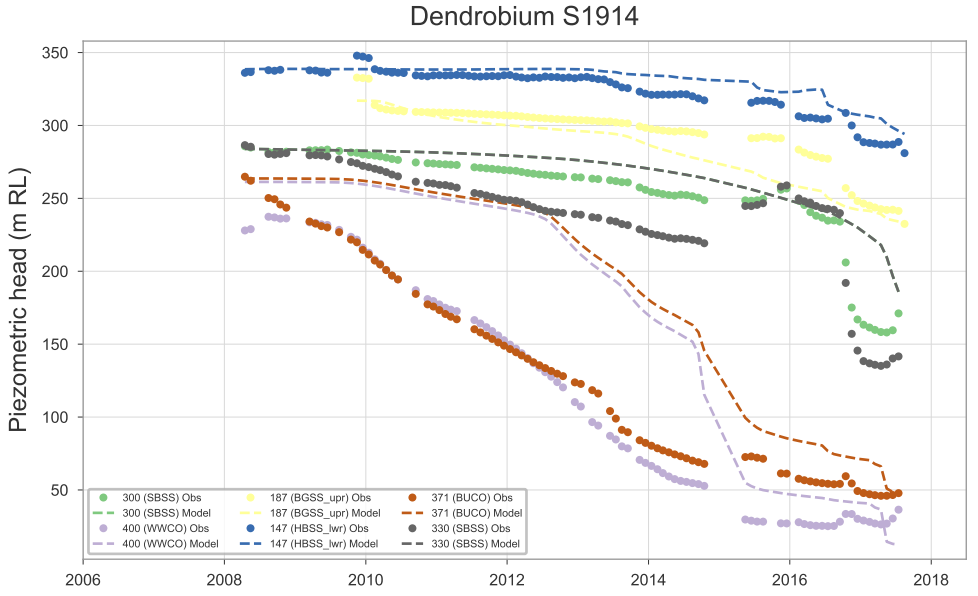

Dendrobium S1902
Piezometric head (m RL)
75 (SBSS) Obs
75 (SBSS) Model
55 (SBSS) Obs
55 (SBSS) Model
35 (SPCS) Obs
35 (SPCS) Model
15 (BGSS_lwr) Obs
15 (BGSS_lwr) Model

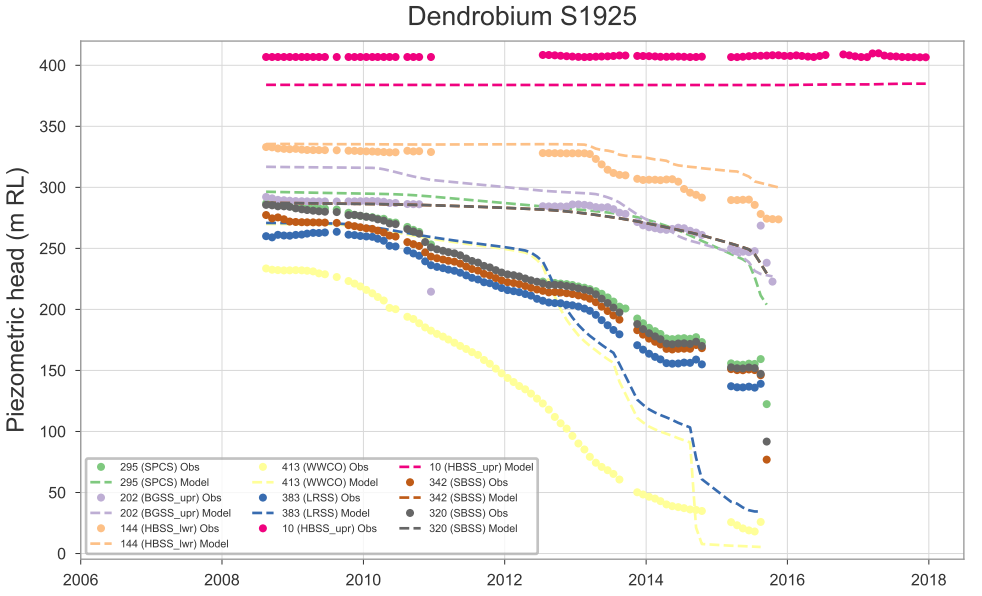

Dendrobium S1907
Piezometric head (m RL)
256 (LRSS) Obs
256 (LRSS) Model
209 (WBCS) Obs
209 (WBCS) Model
204 (SBSS) Obs
204 (SBSS) Model
169 (SPCS) Obs
169 (SPCS) Model
65 (BGSS_upr) Obs
65 (BGSS_upr) Model
21 (HBSS_lwr) Obs
21 (HBSS_lwr) Model
11. (HBSS_lwr) Obs
11. (HBSS_lwr) Model
290 (IPCM) Obs
290 (IPCM) Model

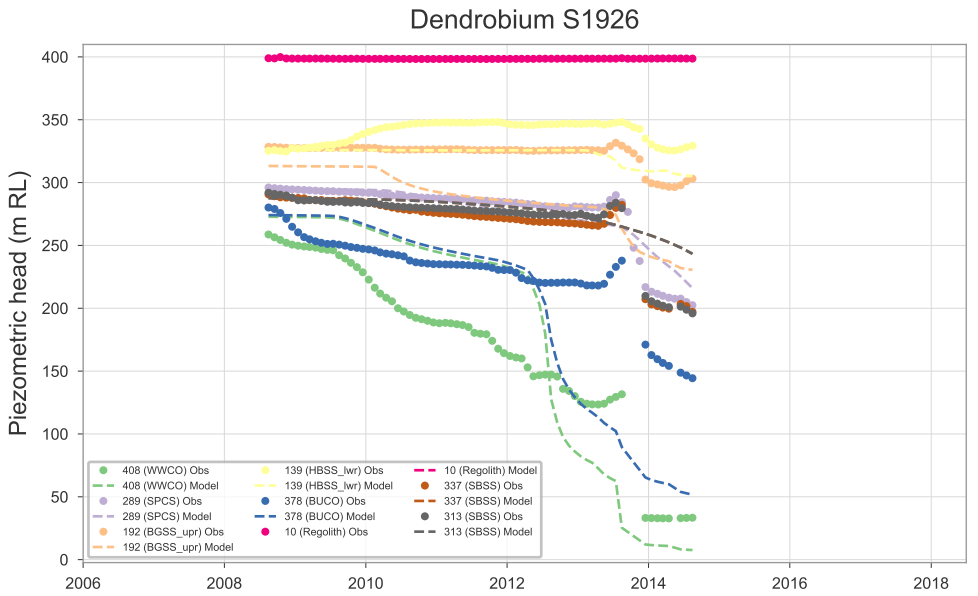

Dendrobium S1908
Piezometric head (m RL)
304 (SBSS) Obs
304 (SBSS) Model
276 (BGSS_lwr) Obs
276 (BGSS_lwr) Model
201 (BGSS_upr) Obs
201 (BGSS_upr) Model
154 (HBSS_lwr) Obs
154 (HBSS_lwr) Model
379 (BUCO) Obs
379 (BUCO) Model
10 (HBSS_upr) Obs
10 (HBSS_upr) Model
412 (WWCO) Obs
412 (WWCO) Model
337 (SBSS) Obs
337 (SBSS) Model

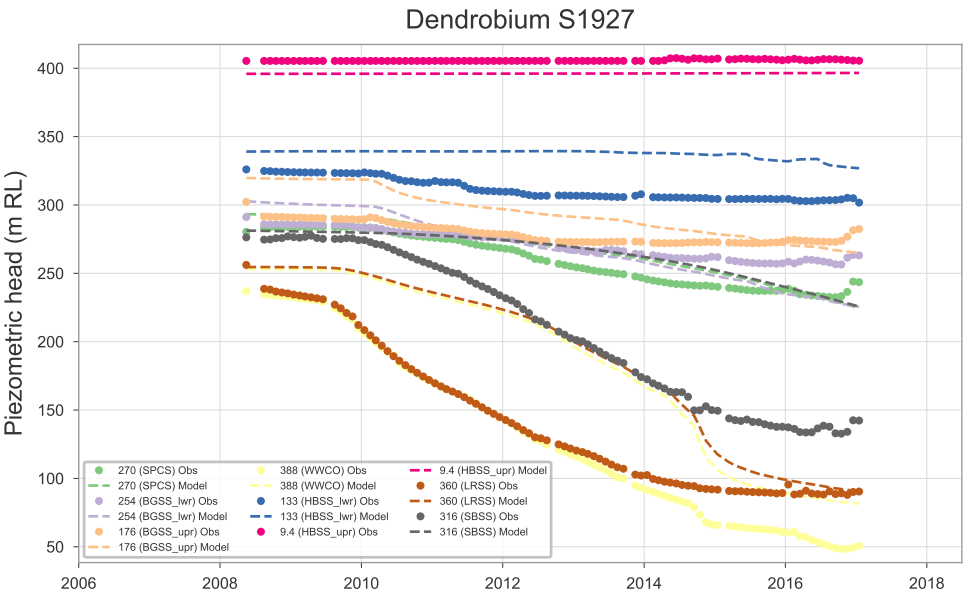

Dendrobium S1910
Piezometric head (m RL)
273 (SPCS) Obs
273 (SPCS) Model
391 (WWCO) Obs
391 (WWCO) Model
247 (BGSS_lwr) Obs
247 (BGSS_lwr) Model
362 (LRSS) Obs
362 (LRSS) Model
169 (BGSS_upr) Obs
169 (BGSS_upr) Model
125 (HBSS_lwr) Obs
125 (HBSS_lwr) Model
9.6 (HBSS_upr) Obs
9.6 (HBSS_upr) Model
313 (SBSS) Obs
313 (SBSS) Model

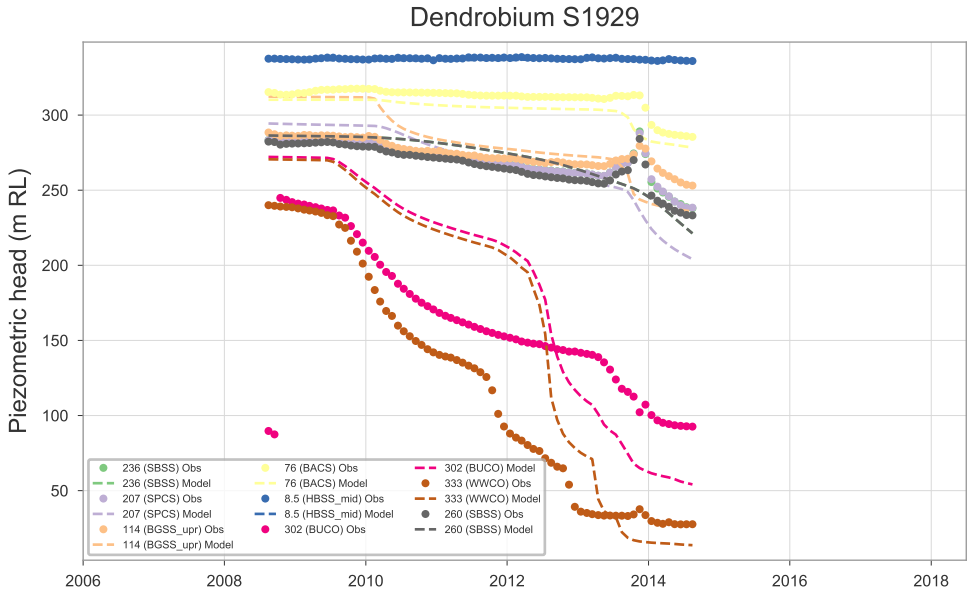

Dendrobium S1911
Piezometric head (m RL)
301 (SBSS) Obs
301 (SBSS) Model
277 (BGSS_lwr) Obs
277 (BGSS_lwr) Model
229 (BGSS_lwr) Obs
229 (BGSS_lwr) Model
387 (WWCO) Obs
387 (WWCO) Model
187 (BGSS_upr) Obs
187 (BGSS_upr) Model
135 (HBSS_lwr) Obs
135 (HBSS_lwr) Model
68. (HBSS_mid) Obs
68. (HBSS_mid) Model
359 (CCSS) Obs
359 (CCSS) Model
349 (CCSS) Obs
349 (CCSS) Model
331 (WBCS) Obs
331 (WBCS) Model
318 (SBSS) Obs
318 (SBSS) Model

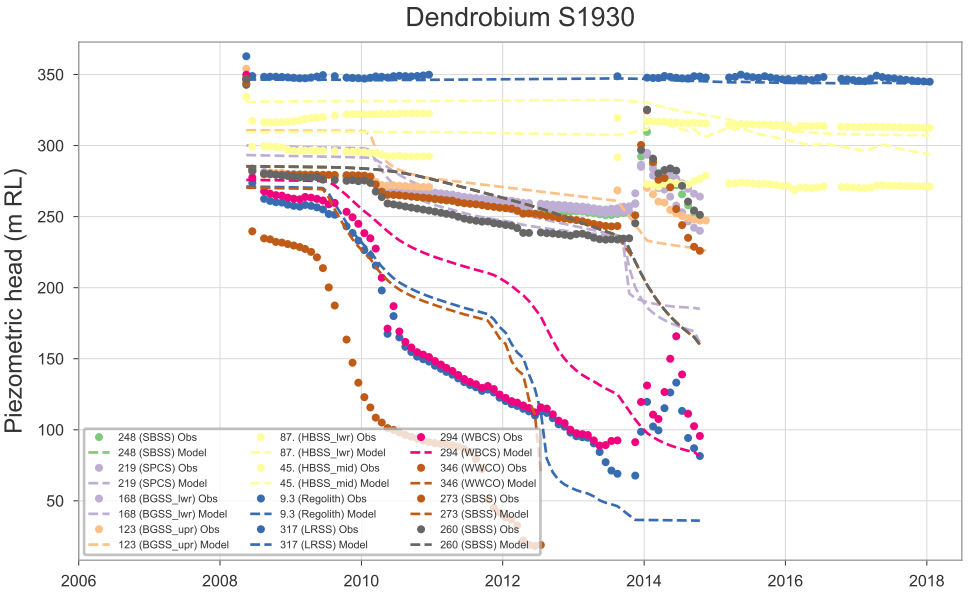

Dendrobium S1914
Piezometric head (m RL)
300 (SBSS) Obs
300 (SBSS) Model
400 (WWCO) Obs
400 (WWCO) Model
187 (BGSS_upr) Obs
187 (BGSS_upr) Model
147 (HBSS_lwr) Obs
147 (HBSS_lwr) Model
371 (BUCO) Obs
371 (BUCO) Model
330 (SBSS) Obs
330 (SBSS) Model

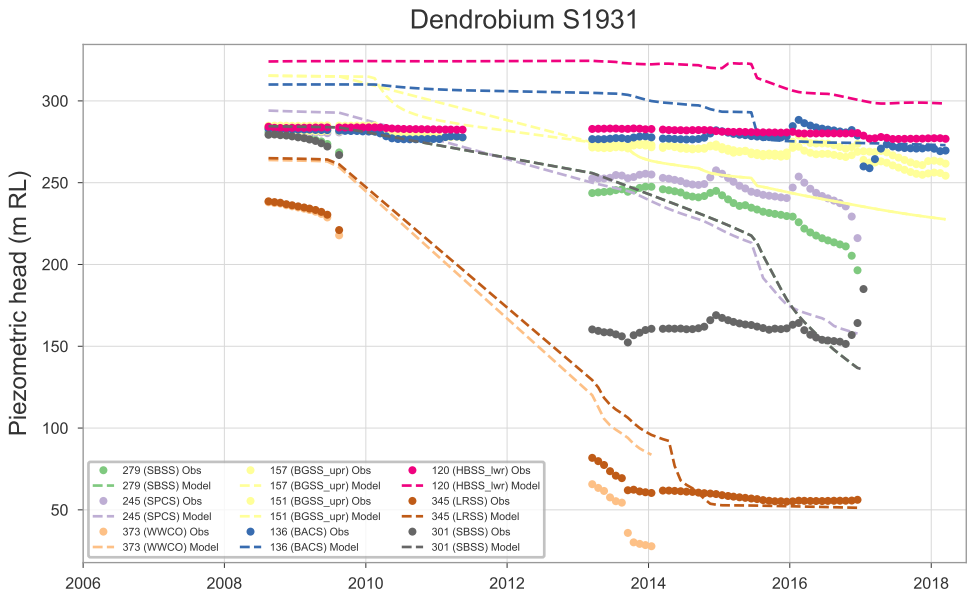

Dendrobium S1925
Piezometric head (m RL)
295 (SPCS) Obs
295 (SPCS) Model
202 (BGSS_upr) Obs
202 (BGSS_upr) Model
144 (HBSS_lwr) Obs
144 (HBSS_lwr) Model
413 (WWCO) Obs
413 (WWCO) Model
383 (LRSS) Obs
383 (LRSS) Model
10 (HBSS_upr) Obs
10 (HBSS_upr) Model
342 (SBSS) Obs
342 (SBSS) Model
320 (SBSS) Obs
320 (SBSS) Model

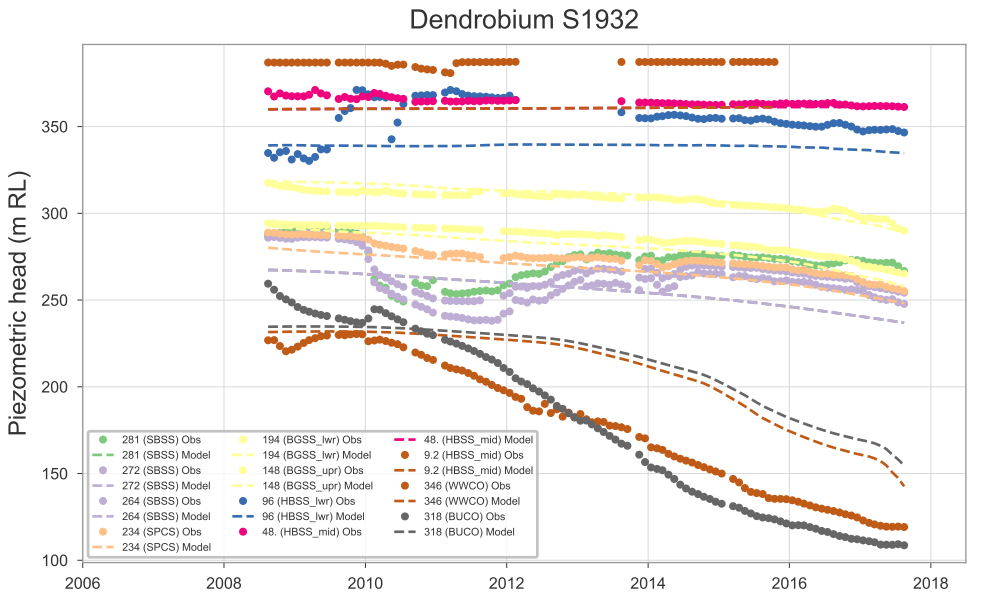

Dendrobium S1926
Piezometric head (m RL)
408 (WWCO) Obs
408 (WWCO) Model
289 (SPCS) Obs
289 (SPCS) Model
192 (BGSS_upr) Obs
192 (BGSS_upr) Model
139 (HBSS_lwr) Obs
139 (HBSS_lwr) Model
378 (BUCO) Obs
378 (BUCO) Model
10 (Regolith) Obs
10 (Regolith) Model
337 (SBSS) Obs
337 (SBSS) Model
313 (SBSS) Obs
313 (SBSS) Model

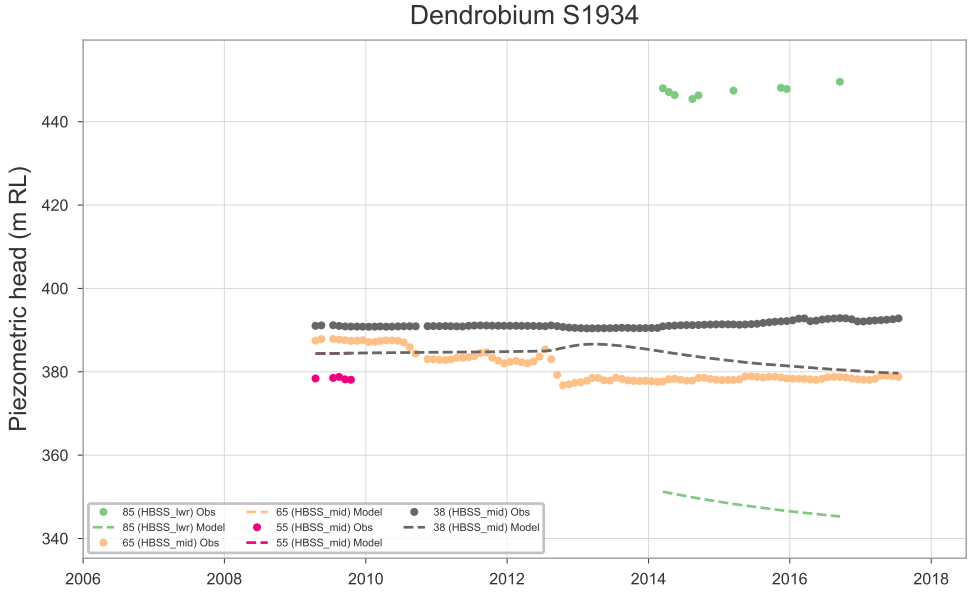

Dendrobium S1927
Piezometric head (m RL)
270 (SPCS) Obs
270 (SPCS) Model
254 (BGSS_lwr) Obs
254 (BGSS_lwr) Model
176 (BGSS_upr) Obs
176 (BGSS_upr) Model
388 (WWCO) Obs
388 (WWCO) Model
133 (HBSS_lwr) Obs
133 (HBSS_lwr) Model
9.4 (HBSS_upr) Obs
9.4 (HBSS_upr) Model
360 (LRSS) Obs
360 (LRSS) Model
316 (SBSS) Obs
316 (SBSS) Model

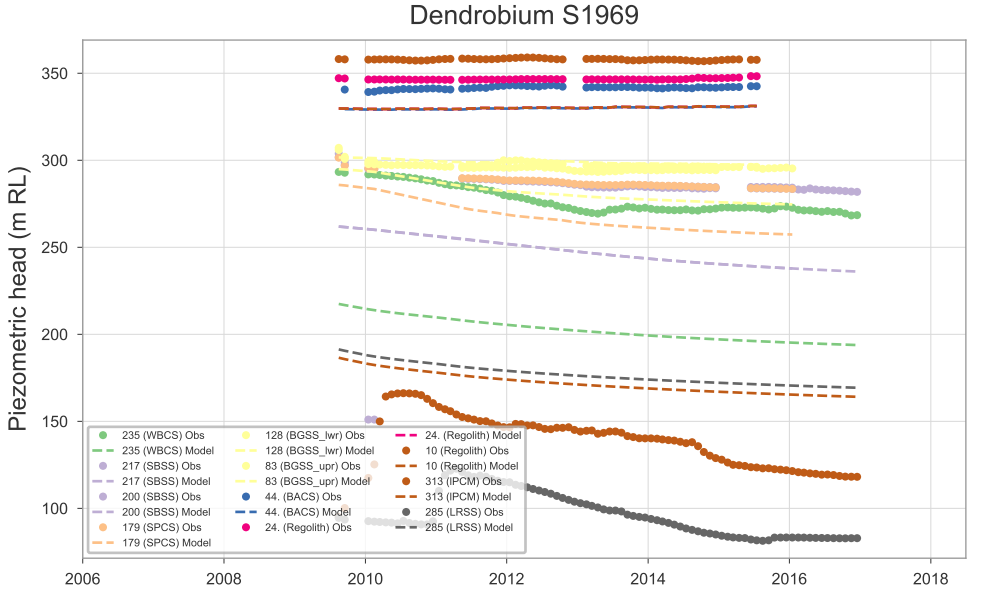

Dendrobium S1929
Piezometric head (m RL)
236 (SBSS) Obs
236 (SBSS) Model
207 (SPCS) Obs
207 (SPCS) Model
114 (BGSS_upr) Obs
114 (BGSS_upr) Model
76 (BACS) Obs
76 (BACS) Model
8.5 (HBSS_mid) Obs
8.5 (HBSS_mid) Model
302 (BUCO) Obs
302 (BUCO) Model
333 (WWCO) Obs
333 (WWCO) Model
260 (SBSS) Obs
260 (SBSS) Model

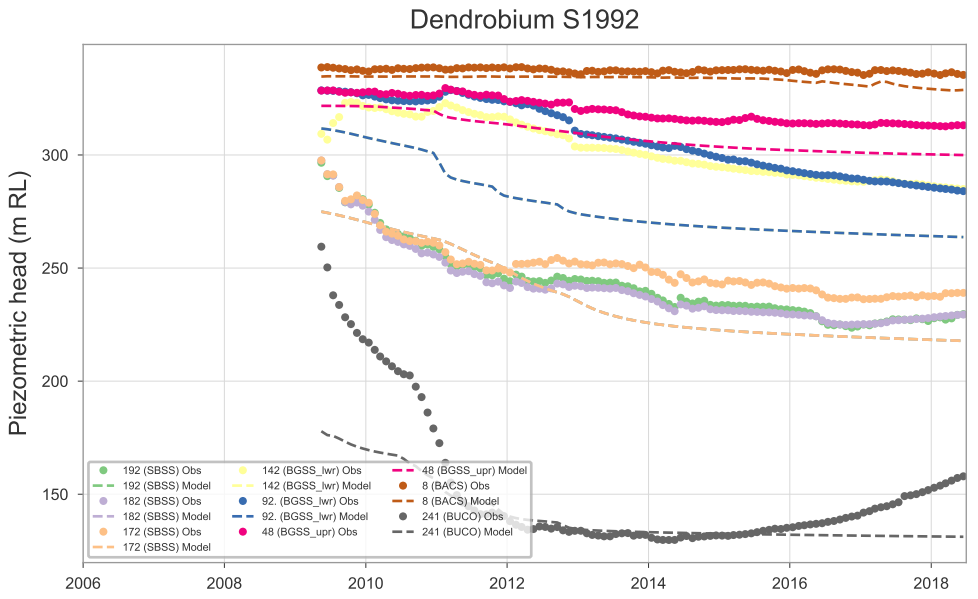

Dendrobium S1930
Piezometric head (m RL)
248 (SBSS) Obs
248 (SBSS) Model
219 (SPCS) Obs
219 (SPCS) Model
168 (BGSS_lwr) Obs
168 (BGSS_lwr) Model
123 (BGSS_upr) Obs
123 (BGSS_upr) Model
87. (HBSS_lwr) Obs
87. (HBSS_lwr) Model
45. (HBSS_mid) Obs
45. (HBSS_mid) Model
9.3 (Regolith) Obs
9.3 (Regolith) Model
317 (LRSS) Obs
317 (LRSS) Model
294 (WBCS) Obs
294 (WBCS) Model
346 (WWCO) Obs
346 (WWCO) Model
273 (SBSS) Obs
273 (SBSS) Model
260 (SBSS) Obs
260 (SBSS) Model

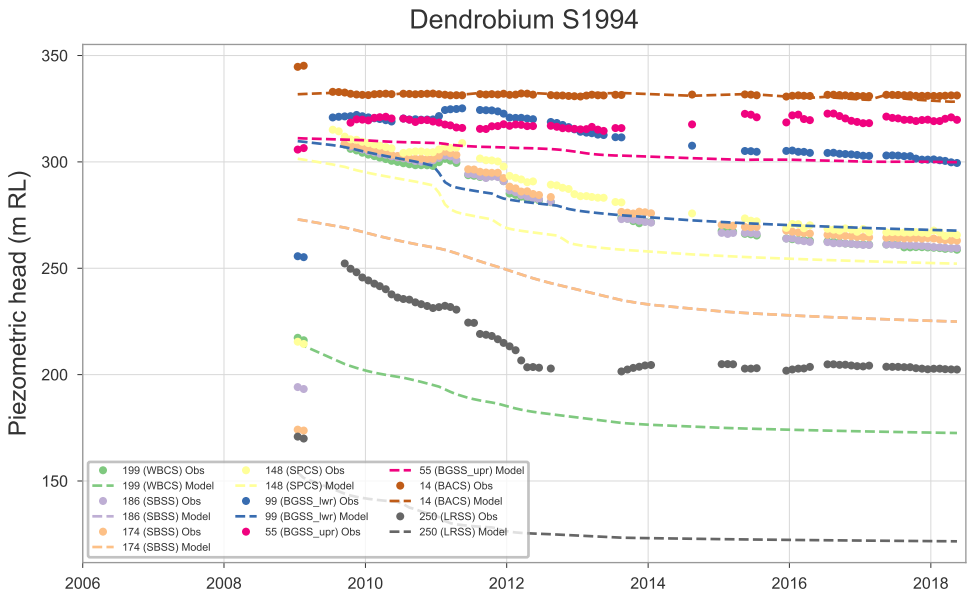

Dendrobium S1931
Piezometric head (m RL)
279 (SBSS) Obs
279 (SBSS) Model
245 (SPCS) Obs
245 (SPCS) Model
373 (WWCO) Obs
373 (WWCO) Model
157 (BGSS_upr) Obs
157 (BGSS_upr) Model
151 (BGSS_upr) Obs
151 (BGSS_upr) Model
136 (BACS) Obs
136 (BACS) Model
120 (HBSS_lwr) Obs
120 (HBSS_lwr) Model
345 (LRSS) Obs
345 (LRSS) Model
301 (SBSS) Obs
301 (SBSS) Model

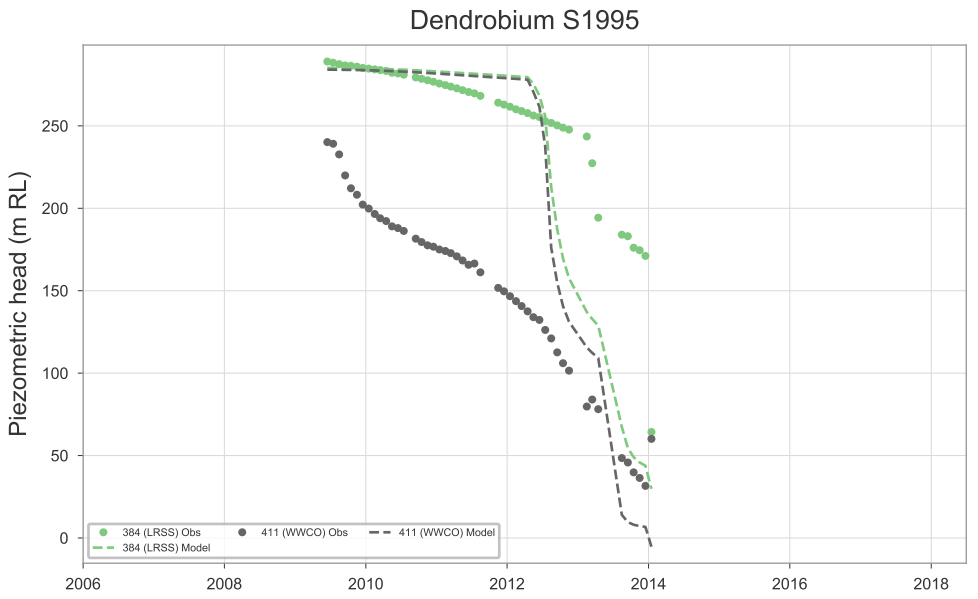

Dendrobium S1932
Piezometric head (m RL)
281 (SBSS) Obs
281 (SBSS) Model
272 (SBSS) Obs
272 (SBSS) Model
264 (SBSS) Obs
264 (SBSS) Model
234 (SPCS) Obs
234 (SPCS) Model
194 (BGSS_lwr) Obs
194 (BGSS_lwr) Model
148 (BGSS_upr) Obs
148 (BGSS_upr) Model
96 (HBSS_lwr) Obs
96 (HBSS_lwr) Model
48. (HBSS_mid) Obs
48. (HBSS_mid) Model
9.2 (HBSS_mid) Obs
9.2 (HBSS_mid) Model
346 (WWCO) Obs
346 (WWCO) Model
318 (BUCO) Obs
318 (BUCO) Model

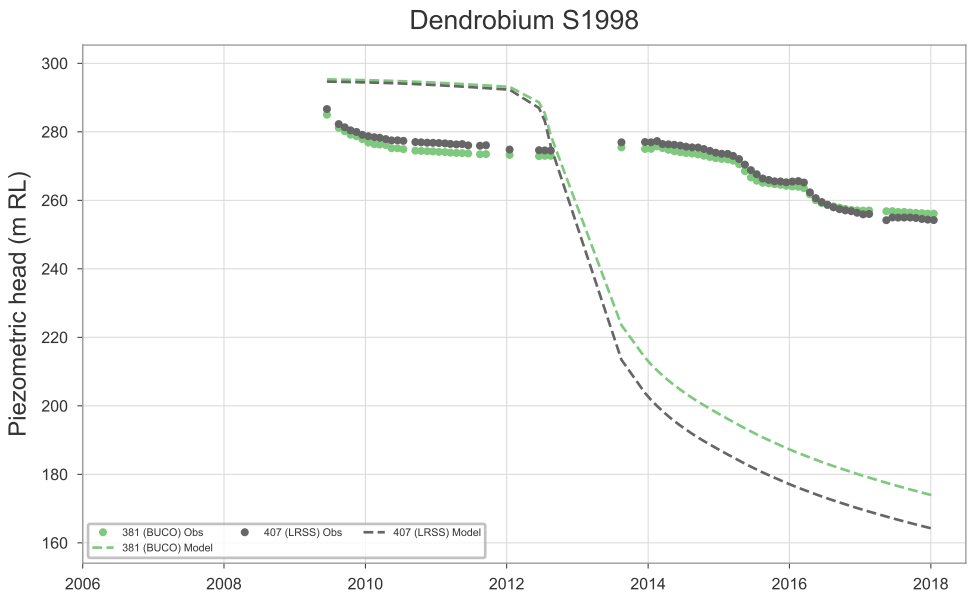

Dendrobium S1934
Piezometric head (m RL)
85 (HBSS_lwr) Obs
85 (HBSS_lwr) Model
65 (HBSS_mid) Obs
65 (HBSS_mid) Model
55 (HBSS_mid) Obs
55 (HBSS_mid) Model
38 (HBSS_mid) Obs
38 (HBSS_mid) Model

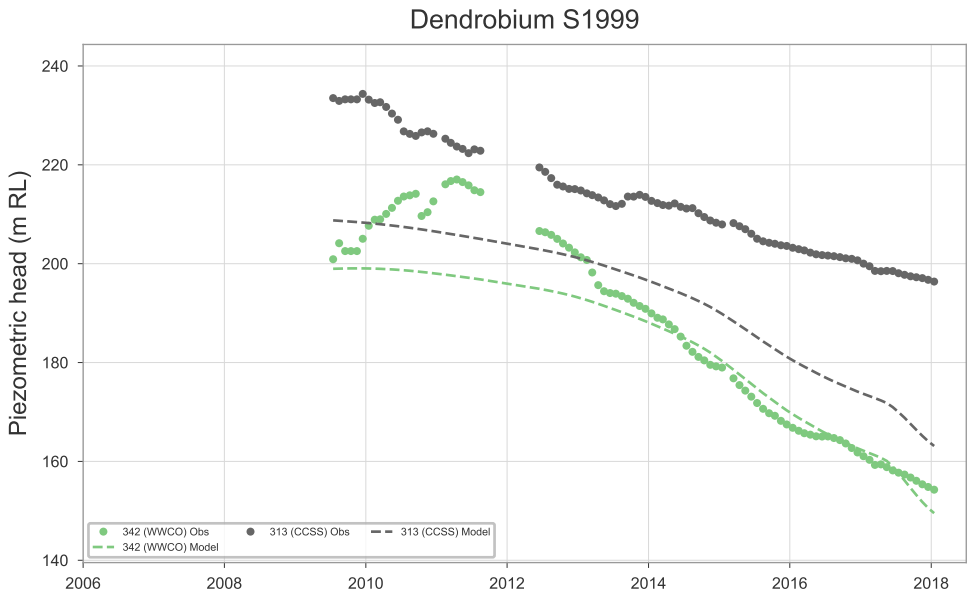

Dendrobium S1969
Piezometric head (m RL)
235 (WBCS) Obs
235 (WBCS) Model
217 (SBSS) Obs
217 (SBSS) Model
200 (SBSS) Obs
200 (SBSS) Model
179 (SPCS) Obs
179 (SPCS) Model
128 (BGSS_lwr) Obs
128 (BGSS_lwr) Model
83 (BGSS_upr) Obs
83 (BGSS_upr) Model
44. (BACS) Obs
44. (BACS) Model
24. (Regolith) Obs
24. (Regolith) Model
10 (Regolith) Obs
10 (Regolith) Model
313 (IPCM) Obs
313 (IPCM) Model
285 (LRSS) Obs
285 (LRSS) Model

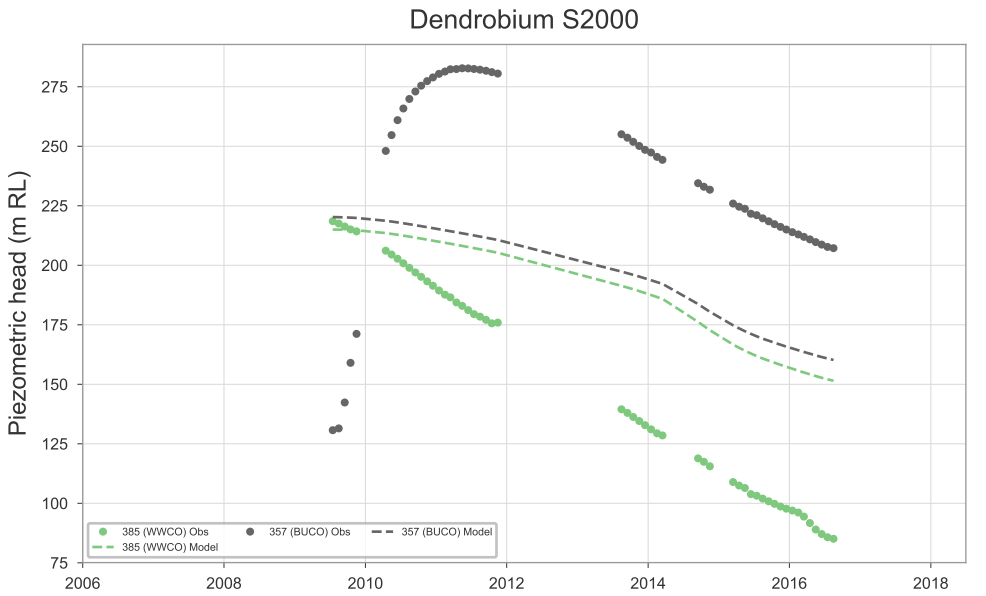

Dendrobium S1992
Piezometric head (m RL)
192 (SBSS) Obs
192 (SBSS) Model
182 (SBSS) Obs
182 (SBSS) Model
172 (SBSS) Obs
172 (SBSS) Model
142 (BGSS_lwr) Obs
142 (BGSS_lwr) Model
92. (BGSS_lwr) Obs
92. (BGSS_lwr) Model
48 (BGSS_upr) Obs
48 (BGSS_upr) Model
8 (BACS) Obs
8 (BACS) Model
241 (BUCO) Obs
241 (BUCO) Model

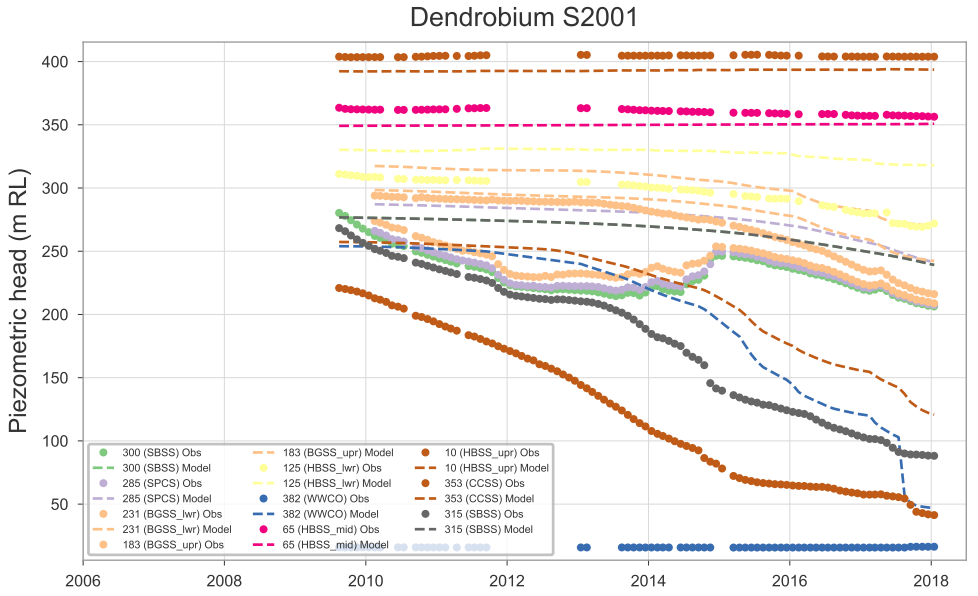

Dendrobium S1994
Piezometric head (m RL)
199 (WBCS) Obs
199 (WBCS) Model
186 (SBSS) Obs
186 (SBSS) Model
174 (SBSS) Obs
174 (SBSS) Model
148 (SPCS) Obs
148 (SPCS) Model
99 (BGSS_lwr) Obs
99 (BGSS_lwr) Model
55 (BGSS_upr) Obs
55 (BGSS_upr) Model
14 (BACS) Obs
14 (BACS) Model
250 (LRSS) Obs
250 (LRSS) Model

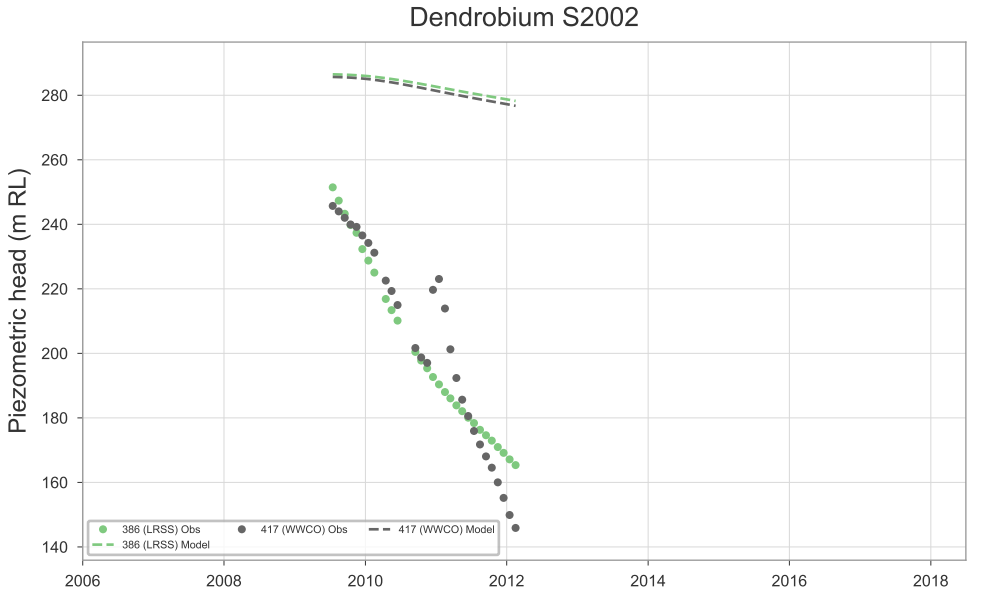

Dendrobium S1995
Piezometric head (m RL)
384 (LRSS) Obs
384 (LRSS) Model
411 (WWCO) Obs
411 (WWCO) Model

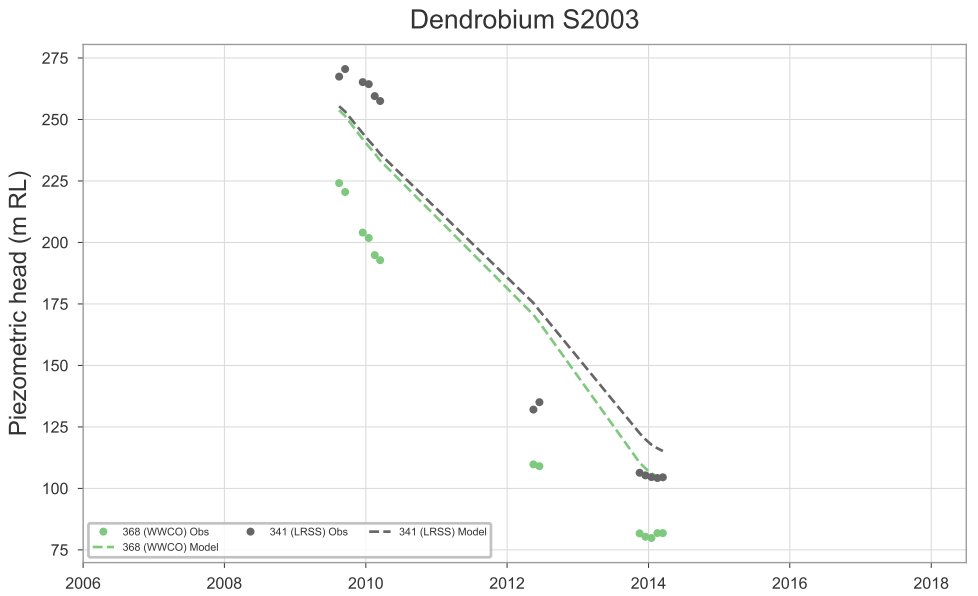

Dendrobium S1998
Piezometric head (m RL)
381 (BUCO) Obs
381 (BUCO) Model
407 (LRSS) Obs
407 (LRSS) Model

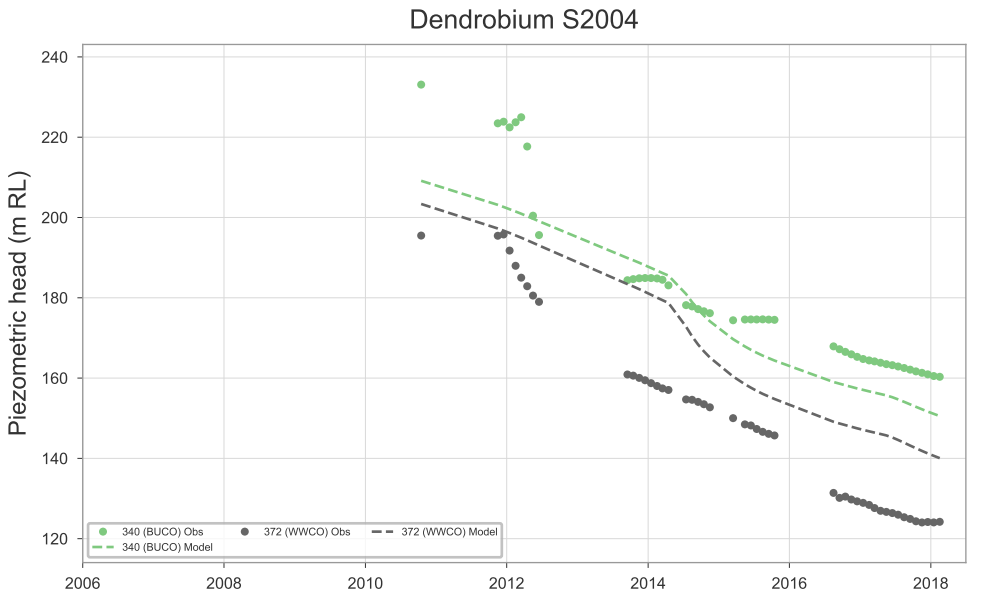

Dendrobium S1999
Piezometric head (m RL)
342 (WWCO) Obs
342 (WWCO) Model
313 (CCSS) Obs
313 (CCSS) Model

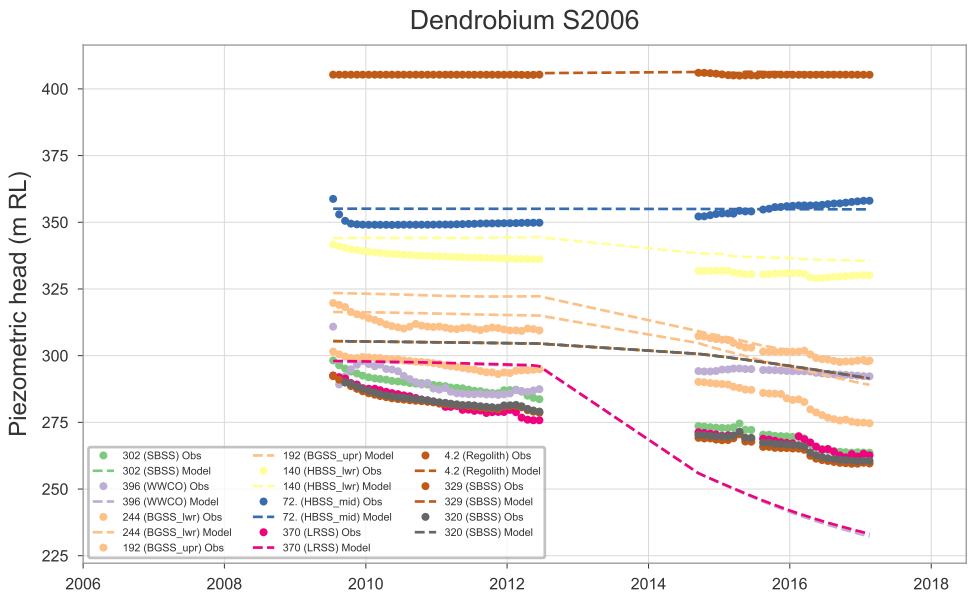

Dendrobium S2000
Piezometric head (m RL)
385 (WWCO) Obs
385 (WWCO) Model
357 (BUCO) Obs
357 (BUCO) Model

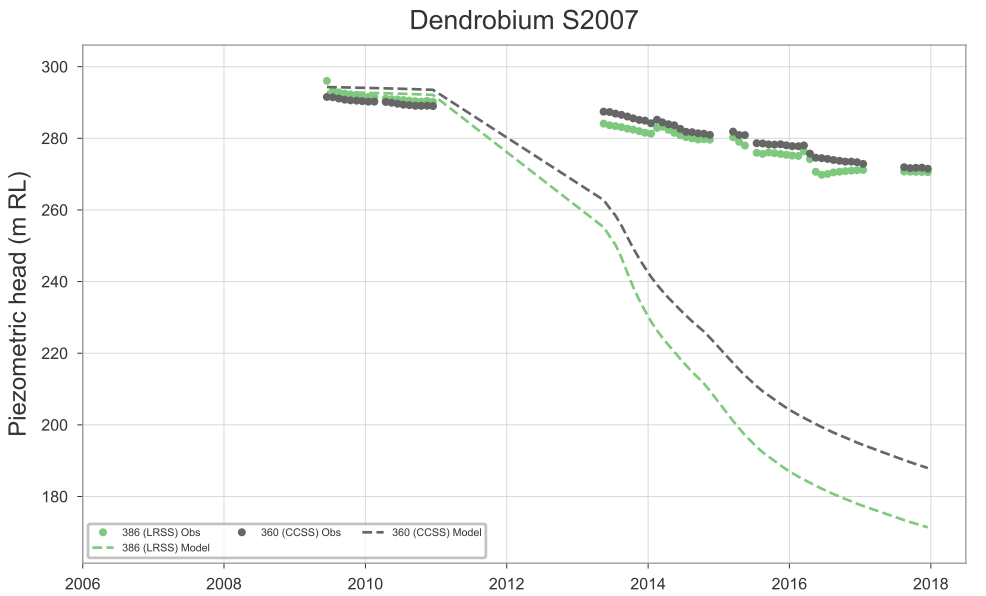

Dendrobium S2001
Piezometric head (m RL)
300 (SBSS) Obs
300 (SBSS) Model
285 (SPCS) Obs
285 (SPCS) Model
231 (BGSS_lwr) Obs
231 (BGSS_lwr) Model
183 (BGSS_upr) Obs
183 (BGSS_upr) Model
125 (HBSS_lwr) Obs
125 (HBSS_lwr) Model
382 (WWCO) Obs
382 (WWCO) Model
65 (HBSS_mid) Obs
65 (HBSS_mid) Model
10 (HBSS_upr) Obs
10 (HBSS_upr) Model
353 (CCSS) Obs
353 (CCSS) Model
315 (SBSS) Obs
315 (SBSS) Model

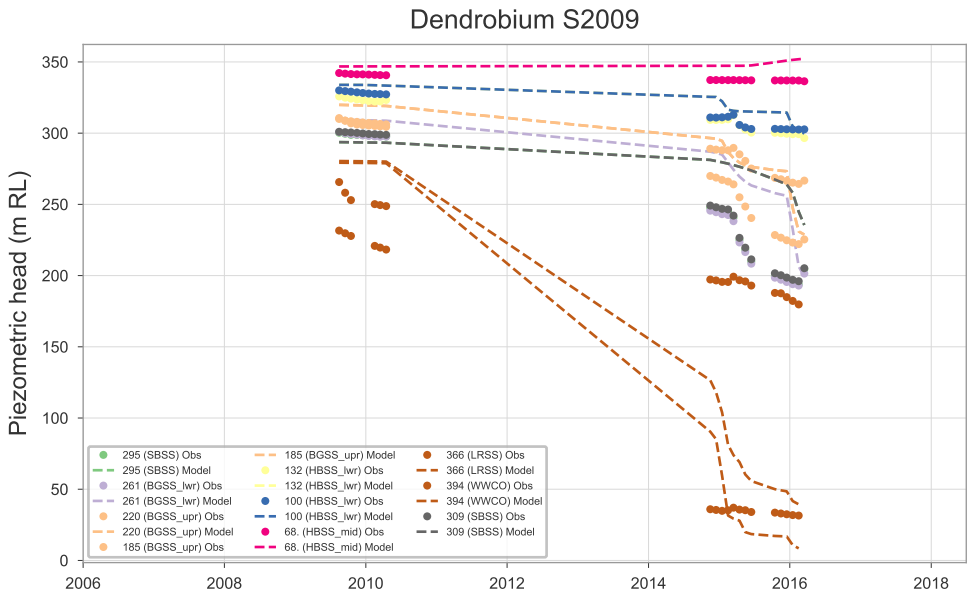

Dendrobium S2002
Piezometric head (m RL)
386 (LRSS) Obs
386 (LRSS) Model
417 (WWCO) Obs
417 (WWCO) Model

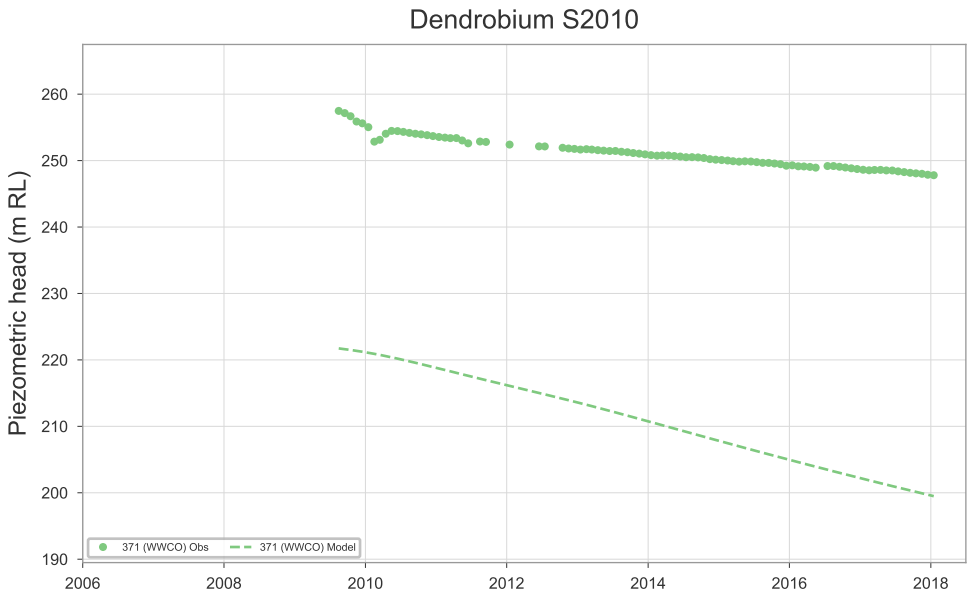

Dendrobium S2003
Piezometric head (m RL)
368 (WWCO) Obs
368 (WWCO) Model
341 (LRSS) Obs
341 (LRSS) Model

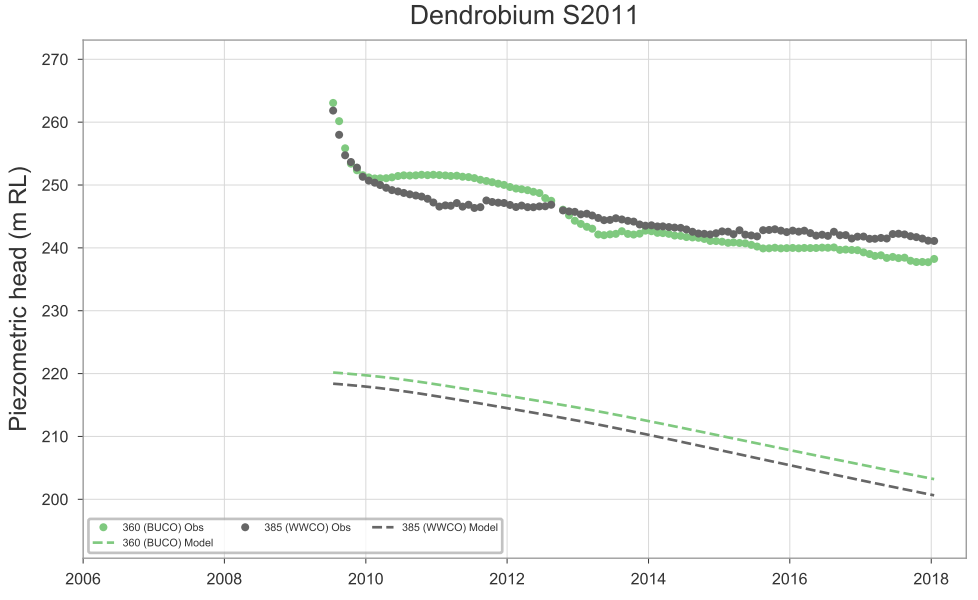

Dendrobium S2004
Piezometric head (m RL)
340 (BUCO) Obs
340 (BUCO) Model
372 (WWCO) Obs
372 (WWCO) Model

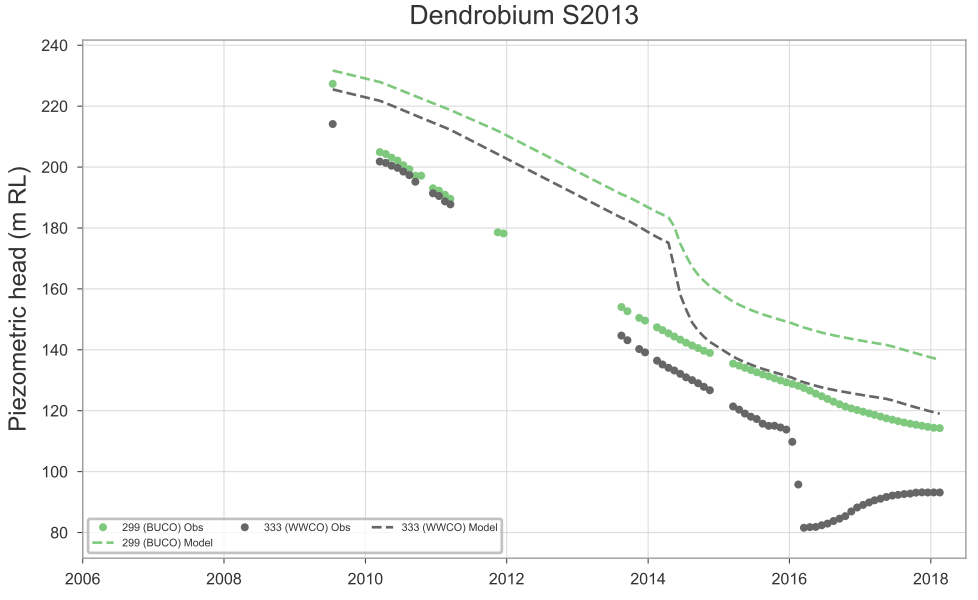

Dendrobium S2006
Piezometric head (m RL)
302 (SBSS) Obs
302 (SBSS) Model
396 (WWCO) Obs
396 (WWCO) Model
244 (BGSS_lwr) Obs
244 (BGSS_lwr) Model
192 (BGSS_upr) Obs
192 (BGSS_upr) Model
140 (HBSS_lwr) Obs
140 (HBSS_lwr) Model
72. (HBSS_mid) Obs
72. (HBSS_mid) Model
370 (LRSS) Obs
370 (LRSS) Model
4.2 (Regolith) Obs
4.2 (Regolith) Model
329 (SBSS) Obs
329 (SBSS) Model
320 (SBSS) Obs
320 (SBSS) Model

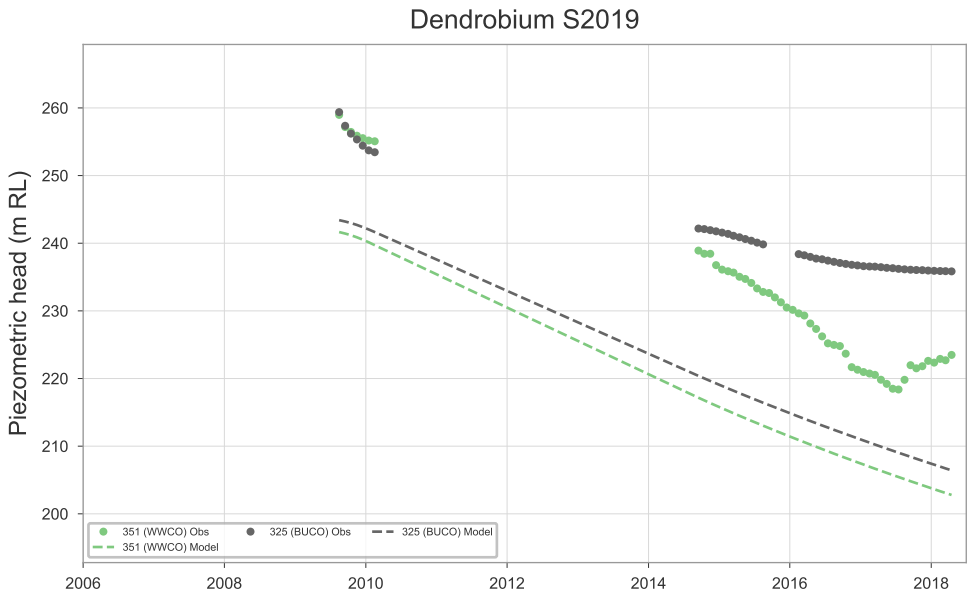

Dendrobium S2007
Piezometric head (m RL)
386 (LRSS) Obs
386 (LRSS) Model
360 (CCSS) Obs
360 (CCSS) Model

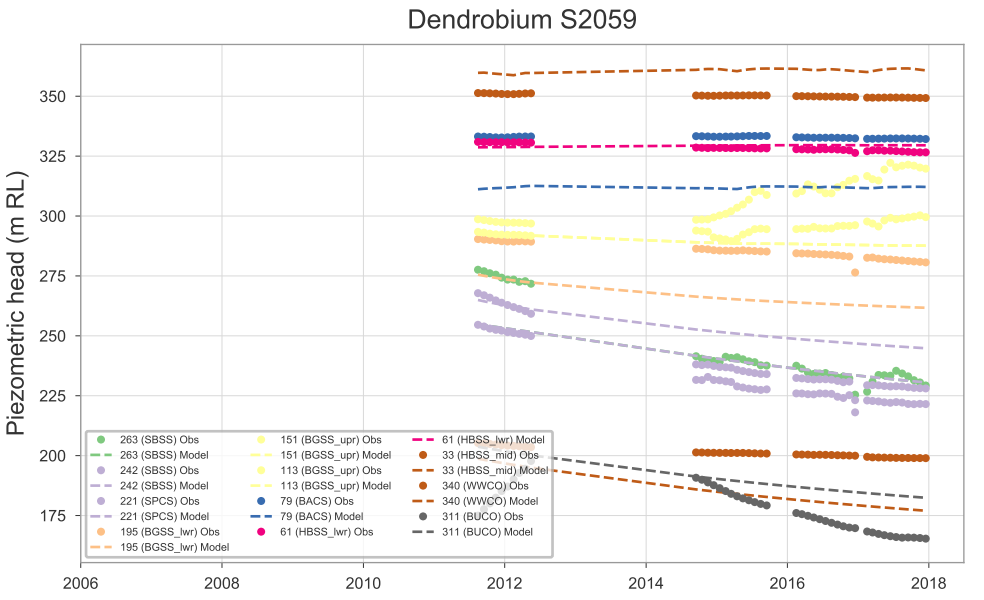

Dendrobium S2009
Piezometric head (m RL)
295 (SBSS) Obs
295 (SBSS) Model
261 (BGSS_lwr) Obs
261 (BGSS_lwr) Model
220 (BGSS_upr) Obs
220 (BGSS_upr) Model
185 (BGSS_upr) Obs
185 (BGSS_upr) Model
132 (HBSS_lwr) Obs
132 (HBSS_lwr) Model
100 (HBSS_lwr) Obs
100 (HBSS_lwr) Model
68. (HBSS_mid) Obs
68. (HBSS_mid) Model
366 (LRSS) Obs
366 (LRSS) Model
394 (WWCO) Obs
394 (WWCO) Model
309 (SBSS) Obs
309 (SBSS) Model

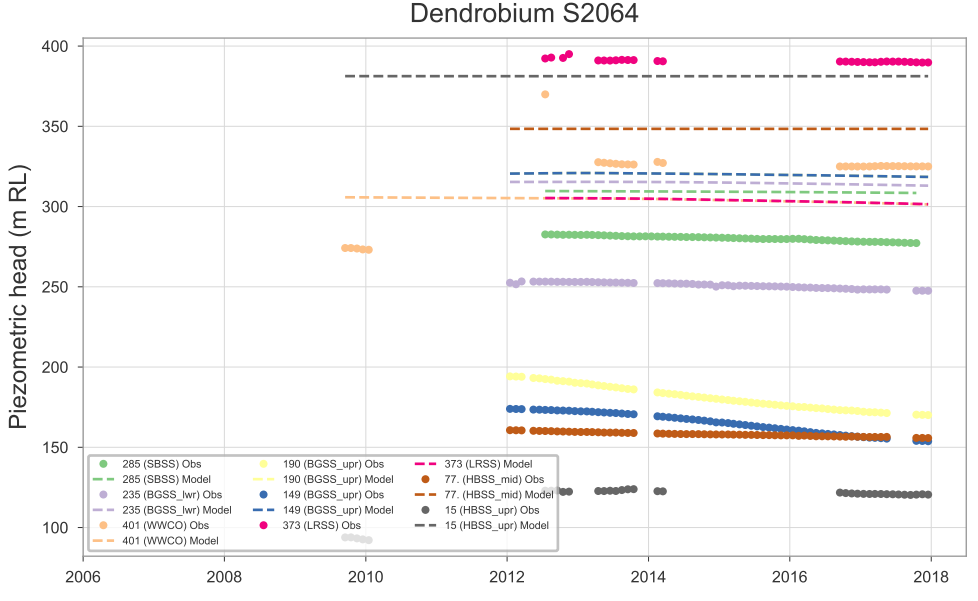

Dendrobium S2010
Piezometric head (m RL)
371 (WWCO) Obs
371 (WWCO) Model

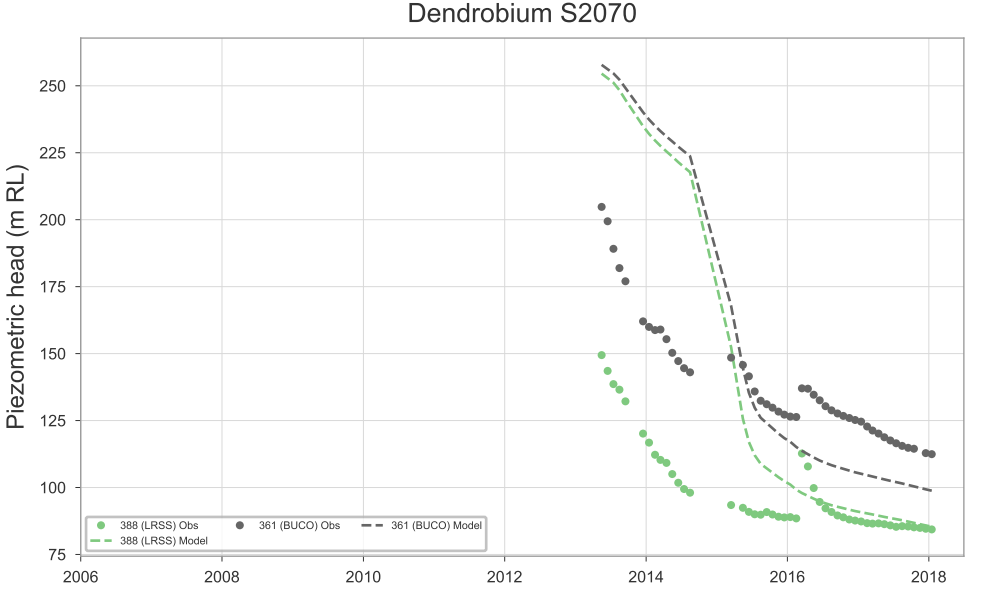

Dendrobium S2011
Piezometric head (m RL)
360 (BUCO) Obs
360 (BUCO) Model
385 (WWCO) Obs
385 (WWCO) Model

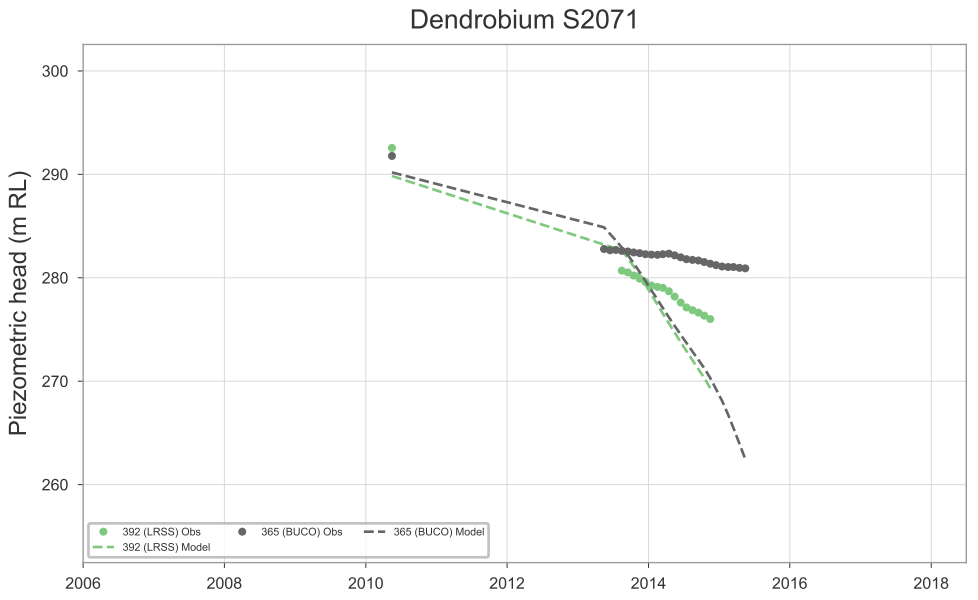

Dendrobium S2013
Piezometric head (m RL)
299 (BUCO) Obs
299 (BUCO) Model
333 (WWCO) Obs
333 (WWCO) Model

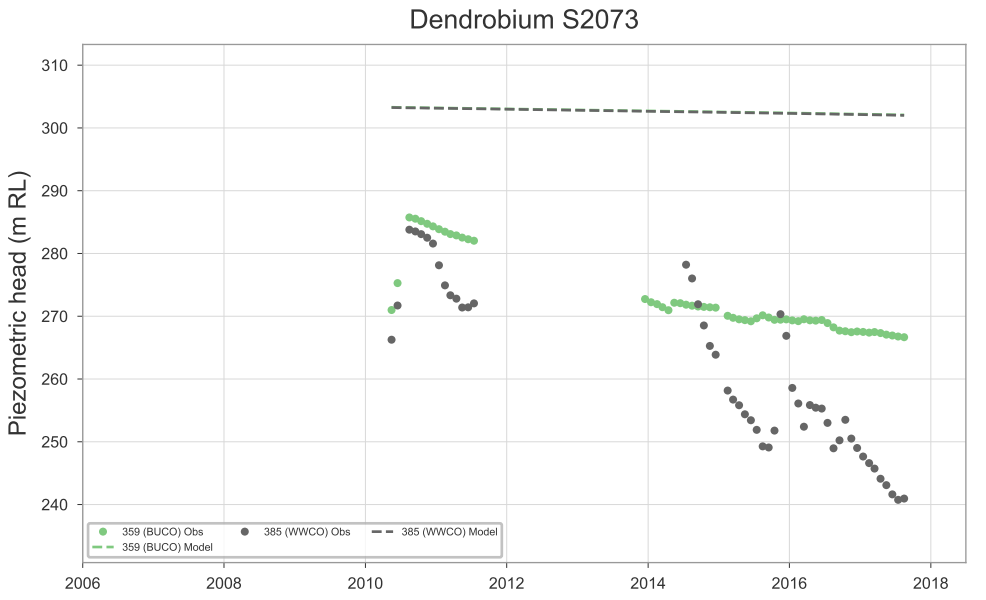

Dendrobium S2019
Piezometric head (m RL)
351 (WWCO) Obs
351 (WWCO) Model
325 (BUCO) Obs
325 (BUCO) Model

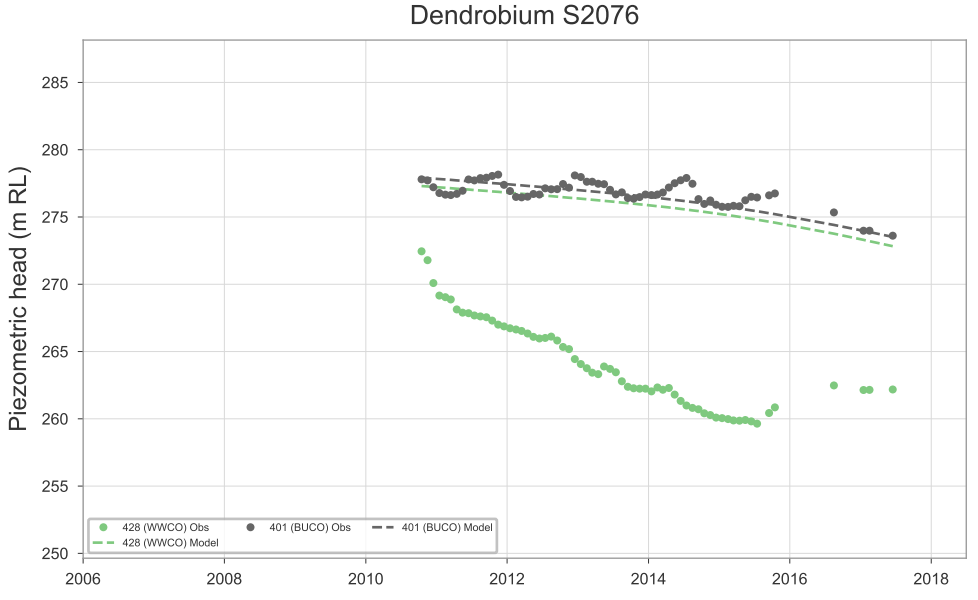

Dendrobium S2059
Piezometric head (m RL)
263 (SBSS) Obs
263 (SBSS) Model
242 (SBSS) Obs
242 (SBSS) Model
221 (SPCS) Obs
221 (SPCS) Model
195 (BGSS_lwr) Obs
195 (BGSS_lwr) Model
151 (BGSS_upr) Obs
151 (BGSS_upr) Model
113 (BGSS_upr) Obs
113 (BGSS_upr) Model
79 (BACS) Obs
79 (BACS) Model
61 (HBSS_lwr) Obs
61 (HBSS_lwr) Model
33 (HBSS_mid) Obs
33 (HBSS_mid) Model
340 (WWCO) Obs
340 (WWCO) Model
311 (BUCO) Obs
311 (BUCO) Model

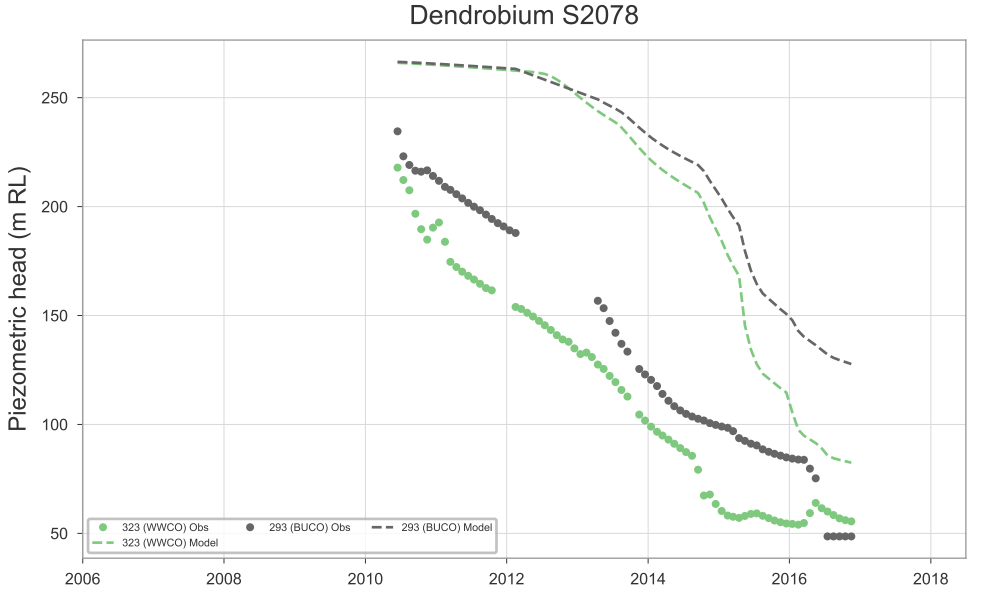

Dendrobium S2064
Piezometric head (m RL)
285 (SBSS) Obs
285 (SBSS) Model
235 (BGSS_lwr) Obs
235 (BGSS_lwr) Model
401 (WWCO) Obs
401 (WWCO) Model
190 (BGSS_upr) Obs
190 (BGSS_upr) Model
149 (BGSS_upr) Obs
149 (BGSS_upr) Model
373 (LRSS) Obs
373 (LRSS) Model
77. (HBSS_mid) Obs
77. (HBSS_mid) Model
15 (HBSS_upr) Obs
15 (HBSS_upr) Model

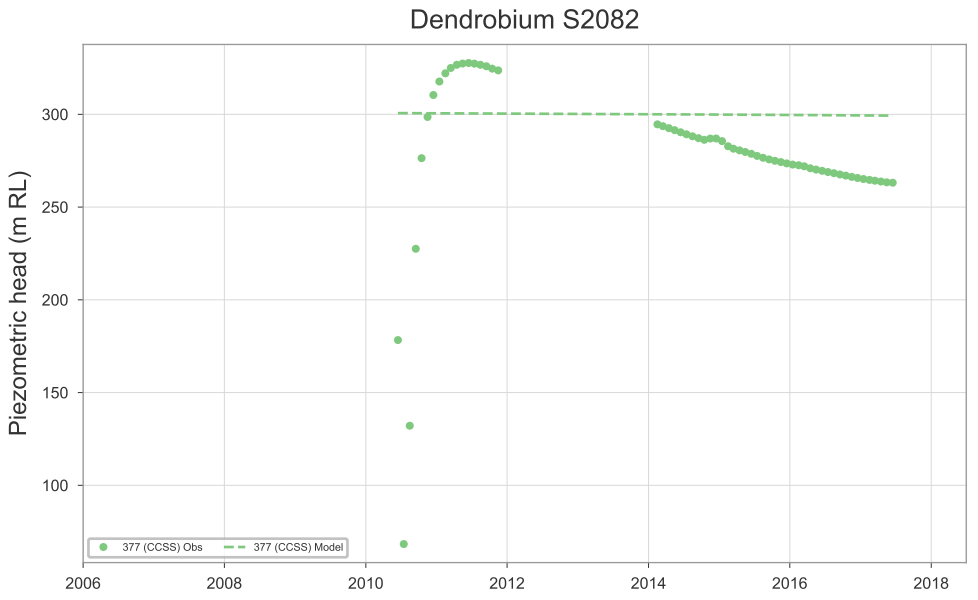

Dendrobium S2070
Piezometric head (m RL)
388 (LRSS) Obs
388 (LRSS) Model
361 (BUCO) Obs
361 (BUCO) Model

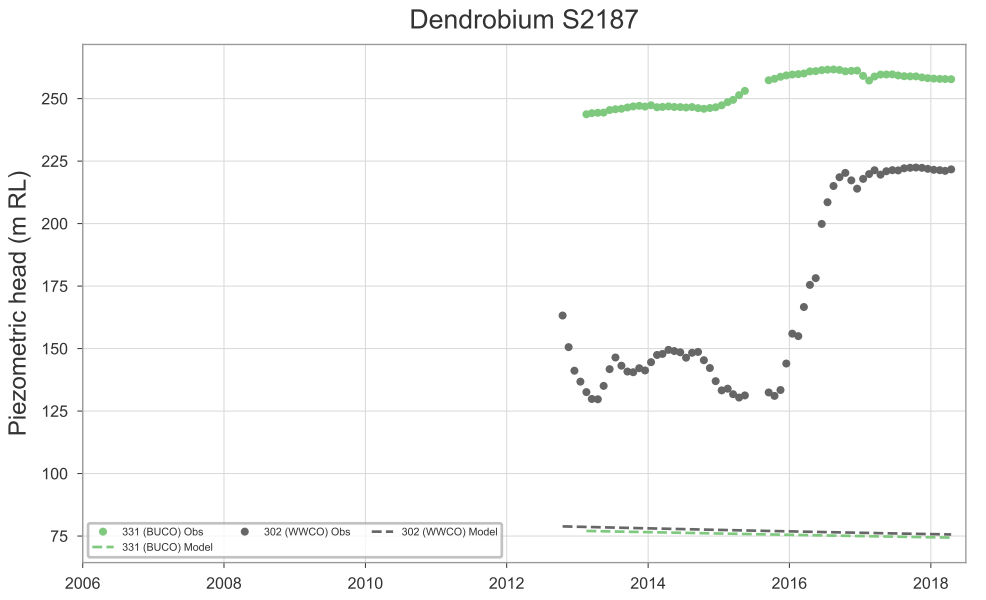

Dendrobium S2071
Piezometric head (m RL)
300
290
280
270
260
2006
2008
2010
2012
2014
2016
2018
392 (LRSS) Obs
392 (LRSS) Model
365 (BUCO) Obs
365 (BUCO) Model

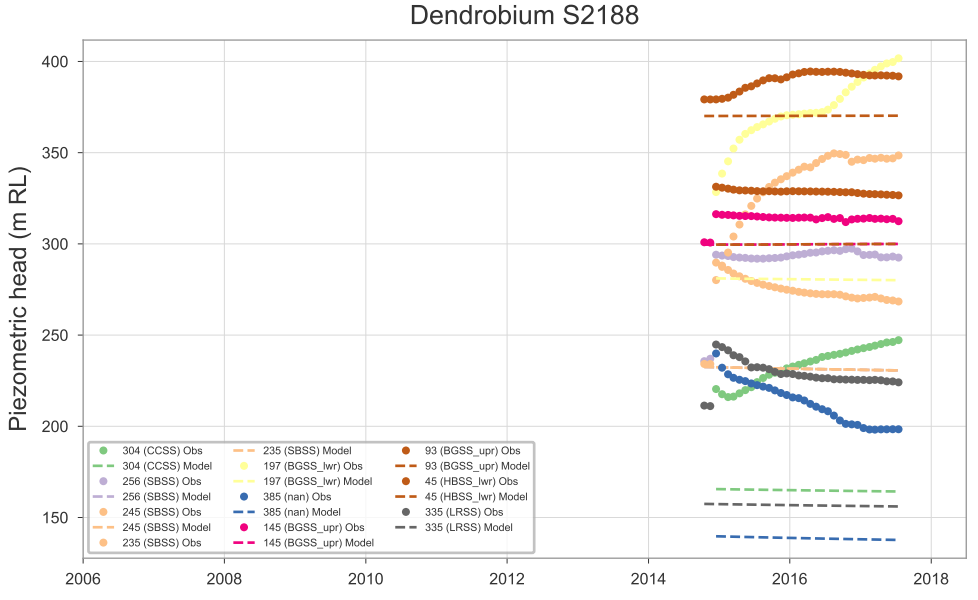

Dendrobium S2073
Piezometric head (m RL)
310
300
290
280
270
260
250
240
2006
2008
2010
2012
2014
2016
2018
359 (BUCO) Obs
359 (BUCO) Model
385 (WWCO) Obs
385 (WWCO) Model

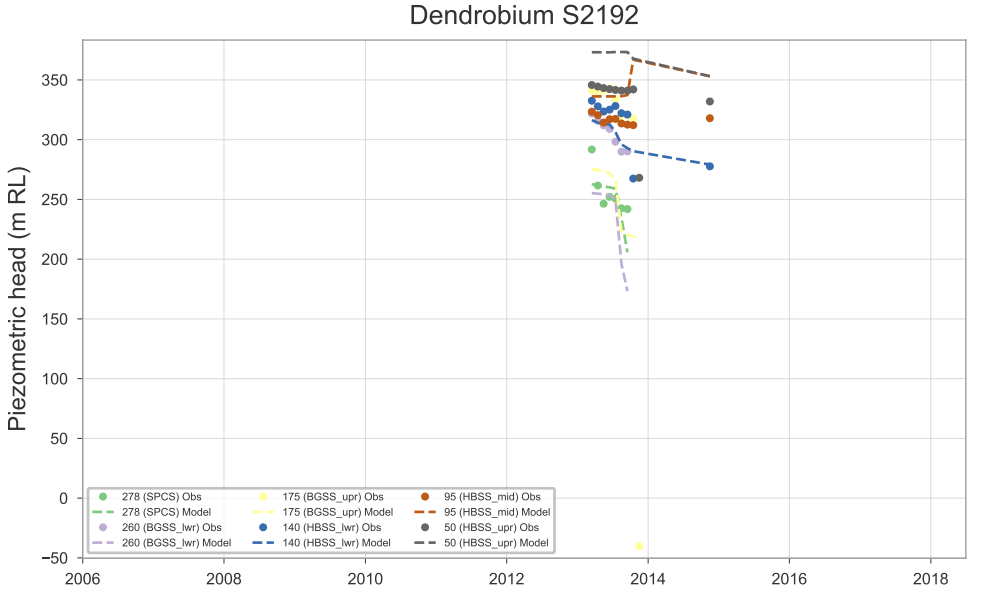

Dendrobium S2076
Piezometric head (m RL)
285
280
275
270
265
260
255
250
2006
2008
2010
2012
2014
2016
2018
428 (WWCO) Obs
428 (WWCO) Model
401 (BUCO) Obs
401 (BUCO) Model

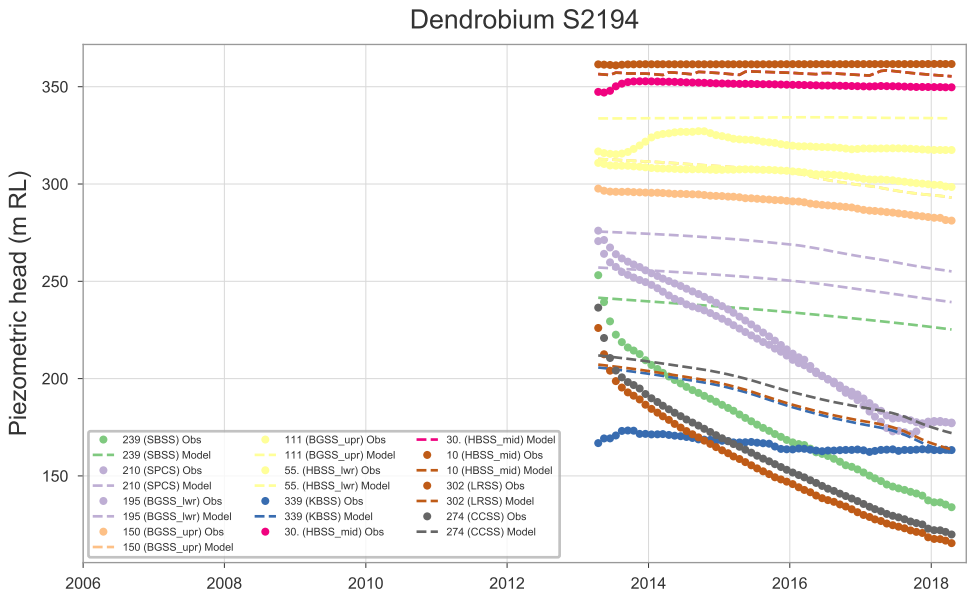

Dendrobium S2078
Piezometric head (m RL)
250
200
150
100
50
2006
2008
2010
2012
2014
2016
2018
323 (WWCO) Obs
323 (WWCO) Model
293 (BUCO) Obs
293 (BUCO) Model

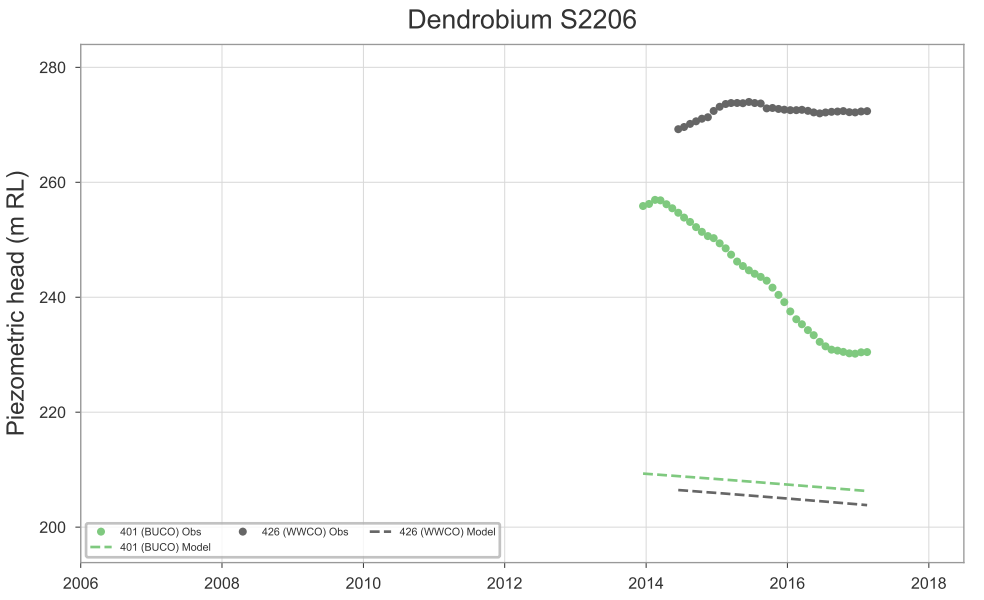

Dendrobium S2082
Piezometric head (m RL)
377 (CCSS) Obs
377 (CCSS) Model

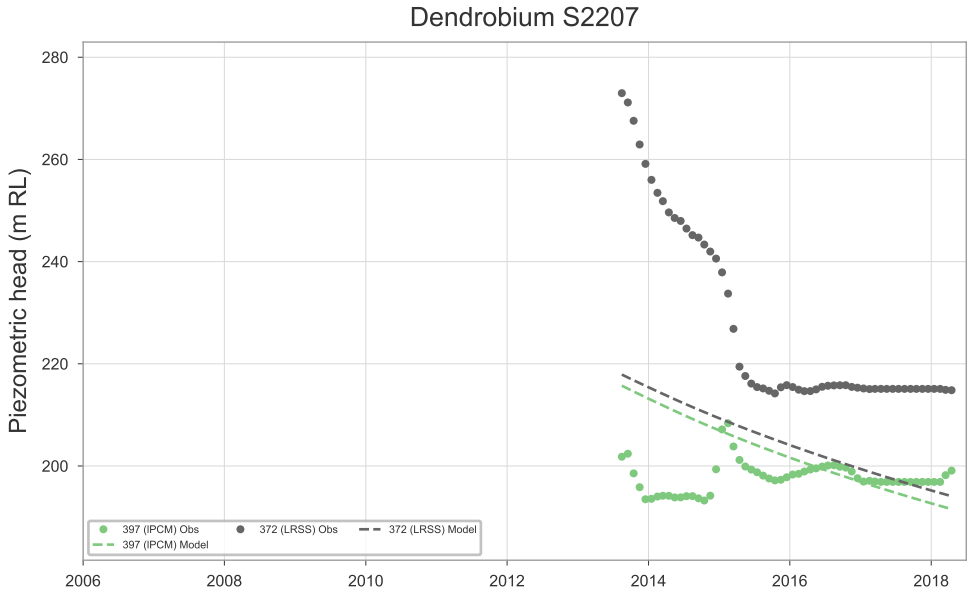

Dendrobium S2187
Piezometric head (m RL)
331 (BUCO) Obs
331 (BUCO) Model
302 (WWCO) Obs
302 (WWCO) Model

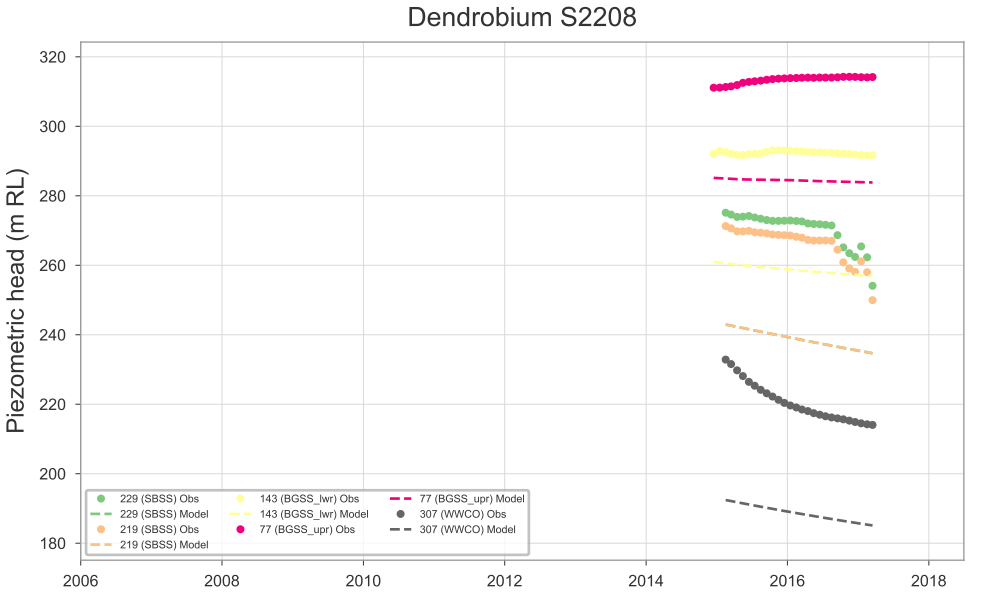

Dendrobium S2188
Piezometric head (m RL)
304 (CCSS) Obs
304 (CCSS) Model
256 (SBSS) Obs
256 (SBSS) Model
245 (SBSS) Obs
245 (SBSS) Model
235 (SBSS) Obs
235 (SBSS) Model
197 (BGSS_lwr) Obs
197 (BGSS_lwr) Model
385 (nan) Obs
385 (nan) Model
145 (BGSS_upr) Obs
145 (BGSS_upr) Model
93 (BGSS_upr) Obs
93 (BGSS_upr) Model
45 (HBSS_lwr) Obs
45 (HBSS_lwr) Model
335 (LRSS) Obs
335 (LRSS) Model

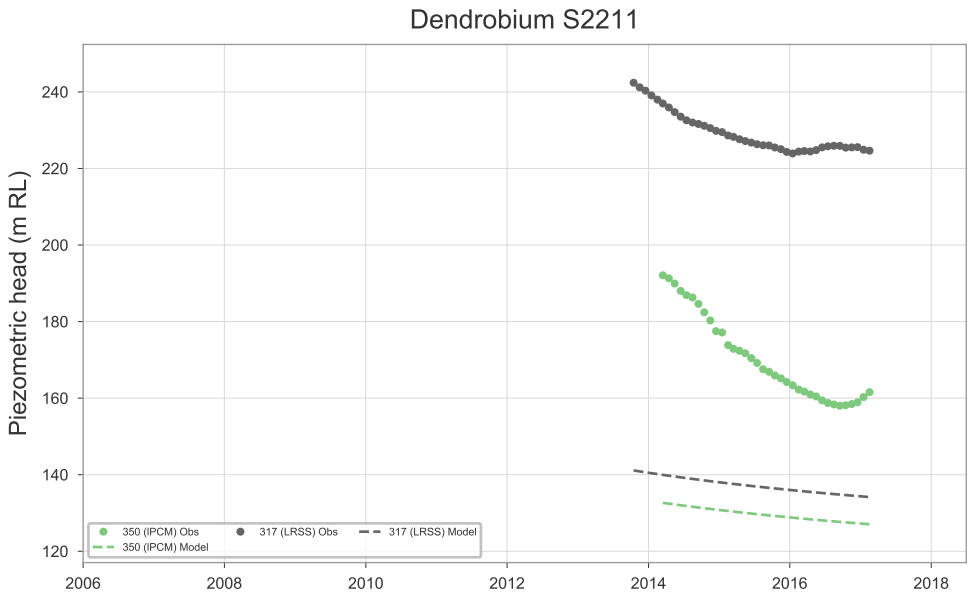

Dendrobium S2192
Piezometric head (m RL)
278 (SPCS) Obs
278 (SPCS) Model
260 (BGSS_lwr) Obs
260 (BGSS_lwr) Model
175 (BGSS_upr) Obs
175 (BGSS_upr) Model
140 (HBSS_lwr) Obs
140 (HBSS_lwr) Model
95 (HBSS_mid) Obs
95 (HBSS_mid) Model
50 (HBSS_upr) Obs
50 (HBSS_upr) Model

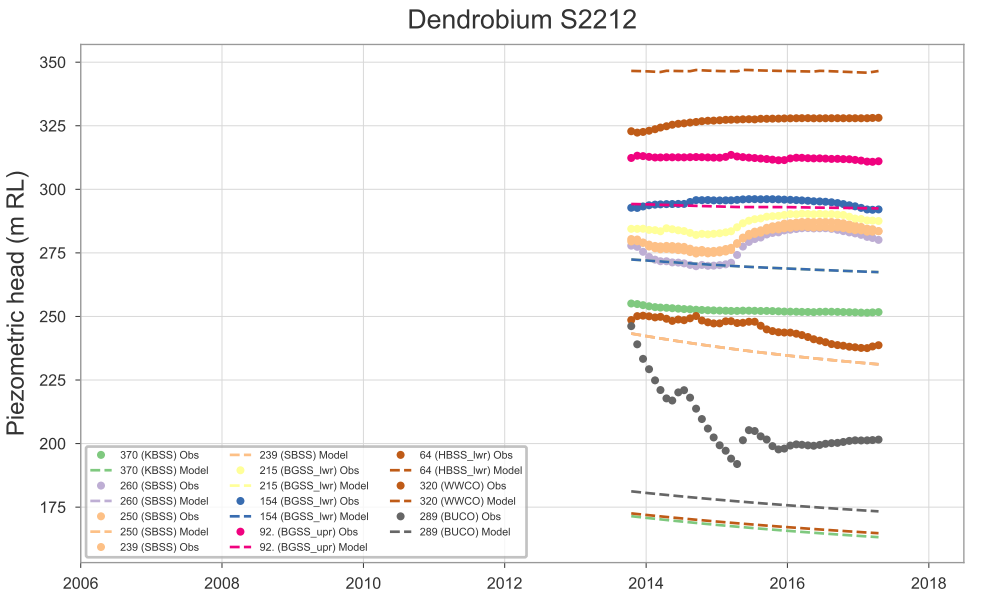

Dendrobium S2194
Piezometric head (m RL)
350
300
250
200
150
2006
2008
2010
2012
2014
2016
2018
239 (SBSS) Obs
239 (SBSS) Model
210 (SPCS) Obs
210 (SPCS) Model
195 (BGSS_lwr) Obs
195 (BGSS_lwr) Model
150 (BGSS_upr) Obs
150 (BGSS_upr) Model
111 (BGSS_upr) Obs
111 (BGSS_upr) Model
55. (HBSS_lwr) Obs
55. (HBSS_lwr) Model
339 (KBSS) Obs
339 (KBSS) Model
30. (HBSS_mid) Obs
30. (HBSS_mid) Model
10 (HBSS_mid) Obs
10 (HBSS_mid) Model
302 (LRSS) Obs
302 (LRSS) Model
274 (CCSS) Obs
274 (CCSS) Model

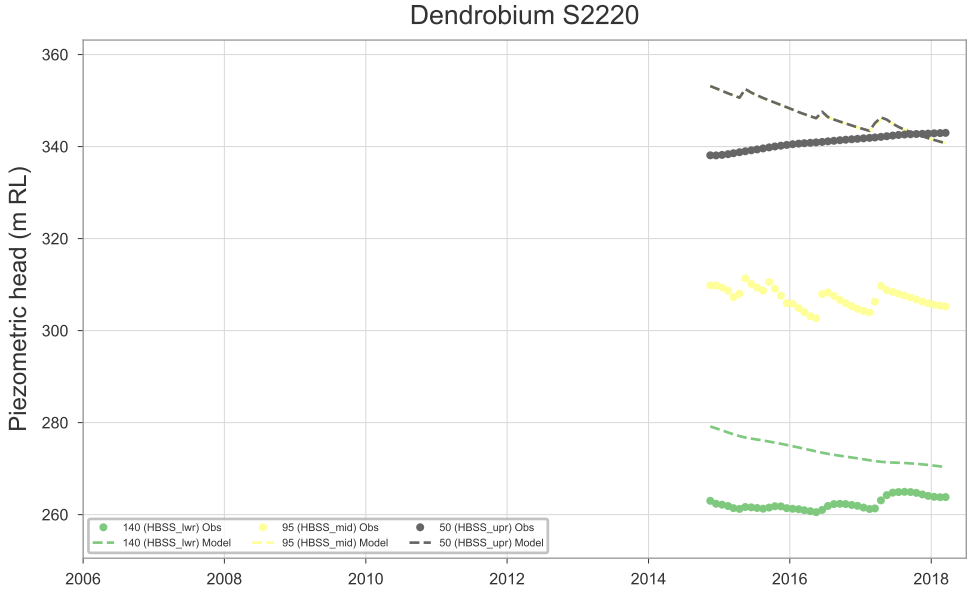

Dendrobium S2206
Piezometric head (m RL)
280
260
240
220
200
2006
2008
2010
2012
2014
2016
2018
401 (BUCO) Obs
401 (BUCO) Model
426 (WWCO) Obs
426 (WWCO) Model

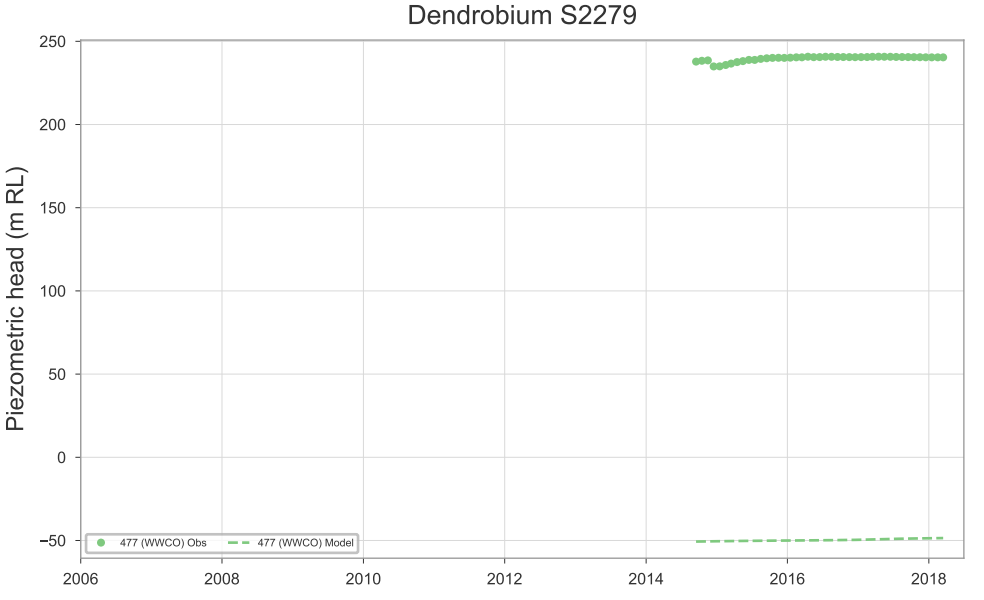

Dendrobium S2207
Piezometric head (m RL)
280
260
240
220
200
2006
2008
2010
2012
2014
2016
2018
397 (IPCM) Obs
397 (IPCM) Model
372 (LRSS) Obs
372 (LRSS) Model

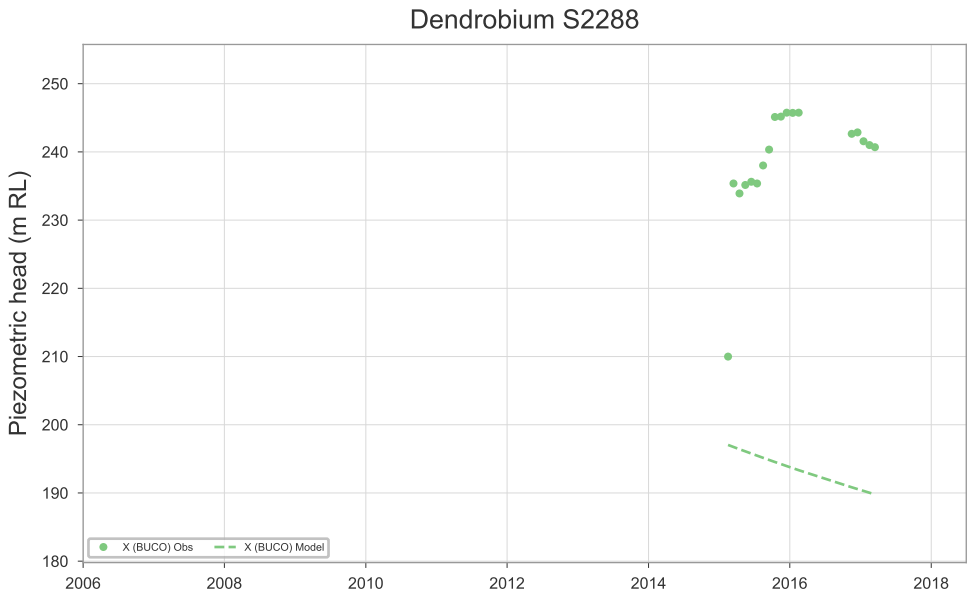

Dendrobium S2208
Piezometric head (m RL)
320
300
280
260
240
220
200
180
2006
2008
2010
2012
2014
2016
2018
229 (SBSS) Obs
229 (SBSS) Model
219 (SBSS) Obs
219 (SBSS) Model
143 (BGSS_lwr) Obs
143 (BGSS_lwr) Model
77 (BGSS_upr) Obs
77 (BGSS_upr) Model
307 (WWCO) Obs
307 (WWCO) Model

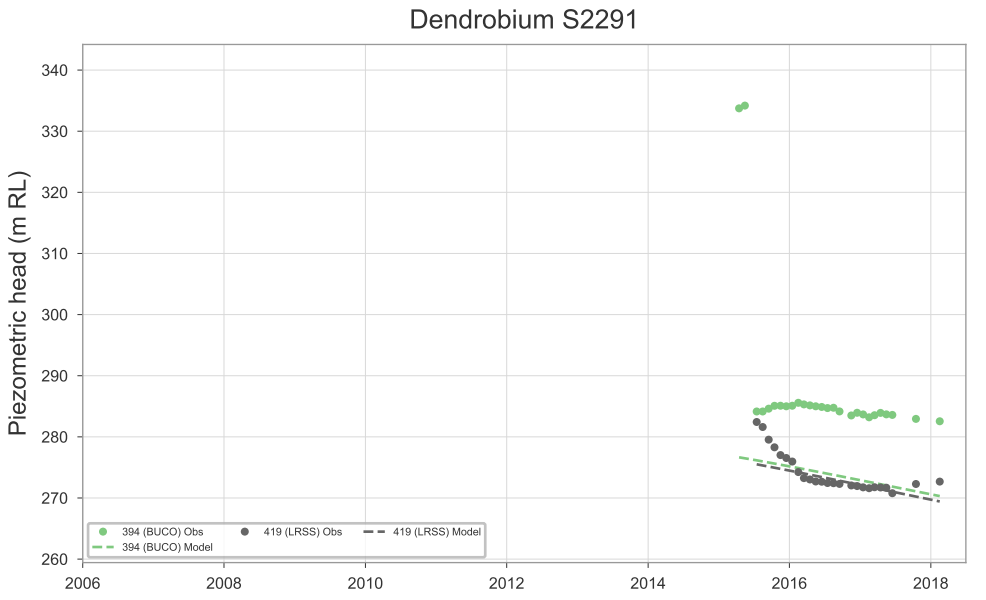

Dendrobium S2211
Piezometric head (m RL)
350 (IPCM) Obs
350 (IPCM) Model
317 (LRSS) Obs
317 (LRSS) Model

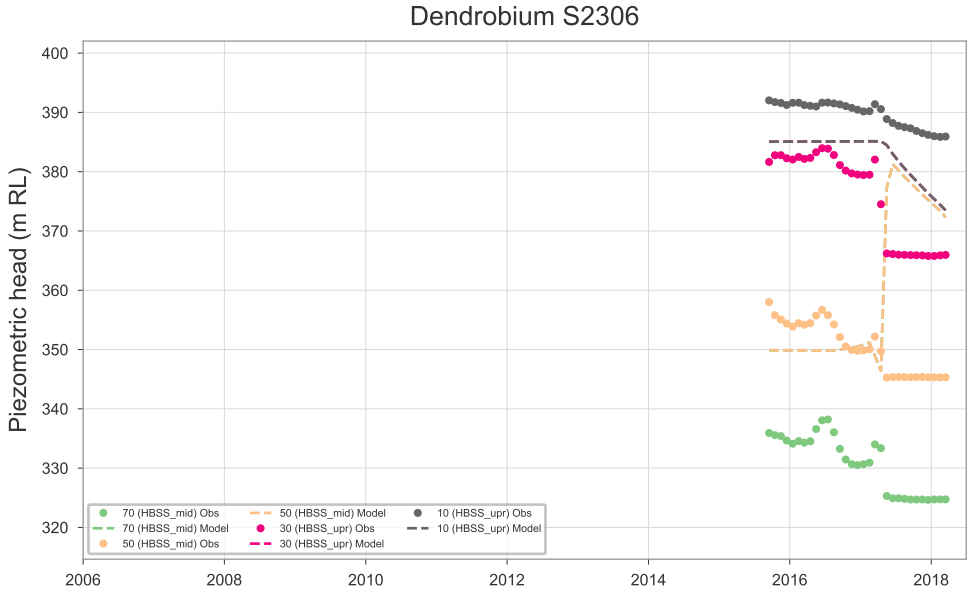

Dendrobium S2212
Piezometric head (m RL)
370 (KBSS) Obs
370 (KBSS) Model
260 (SBSS) Obs
260 (SBSS) Model
250 (SBSS) Obs
250 (SBSS) Model
239 (SBSS) Obs
239 (SBSS) Model
215 (BGSS_lwr) Obs
215 (BGSS_lwr) Model
154 (BGSS_lwr) Obs
154 (BGSS_lwr) Model
92. (BGSS_upr) Obs
92. (BGSS_upr) Model
64 (HBSS_lwr) Obs
64 (HBSS_lwr) Model
320 (WWCO) Obs
320 (WWCO) Model
289 (BUCO) Obs
289 (BUCO) Model

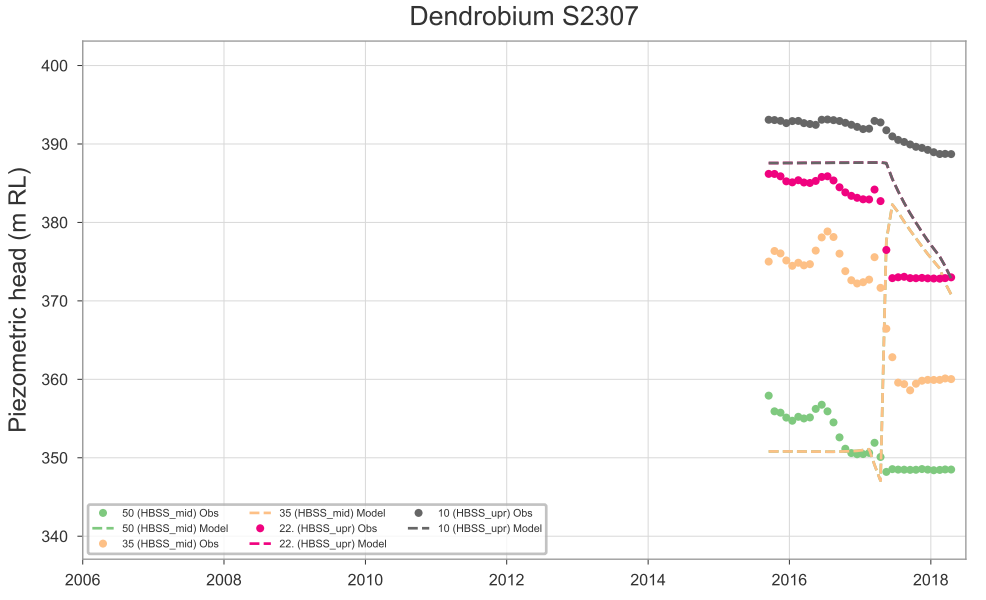

Dendrobium S2220
Piezometric head (m RL)
140 (HBSS_lwr) Obs
140 (HBSS_lwr) Model
95 (HBSS_mid) Obs
95 (HBSS_mid) Model
50 (HBSS_upr) Obs
50 (HBSS_upr) Model

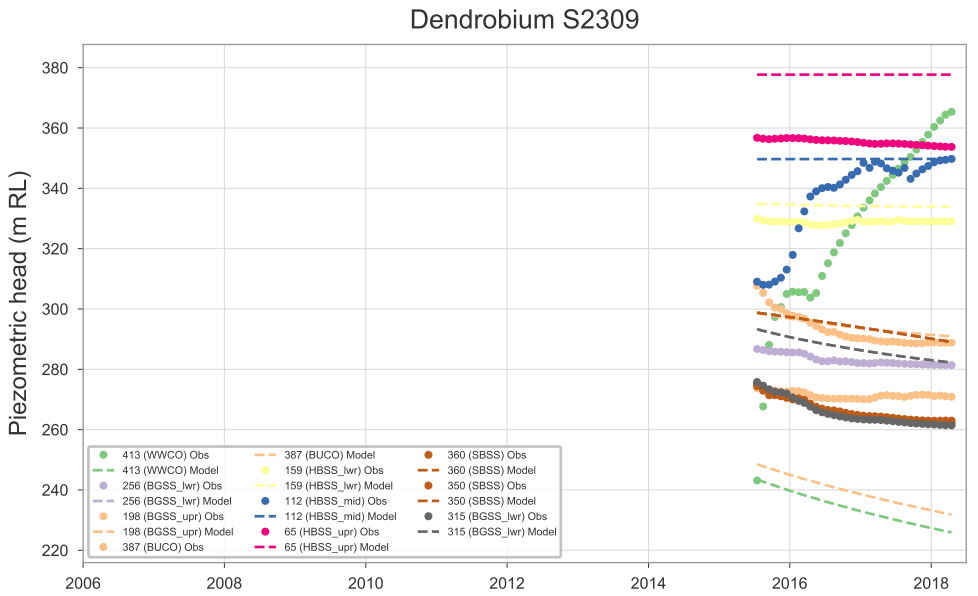

Dendrobium S2279
Piezometric head (m RL)
477 (WWCO) Obs
477 (WWCO) Model

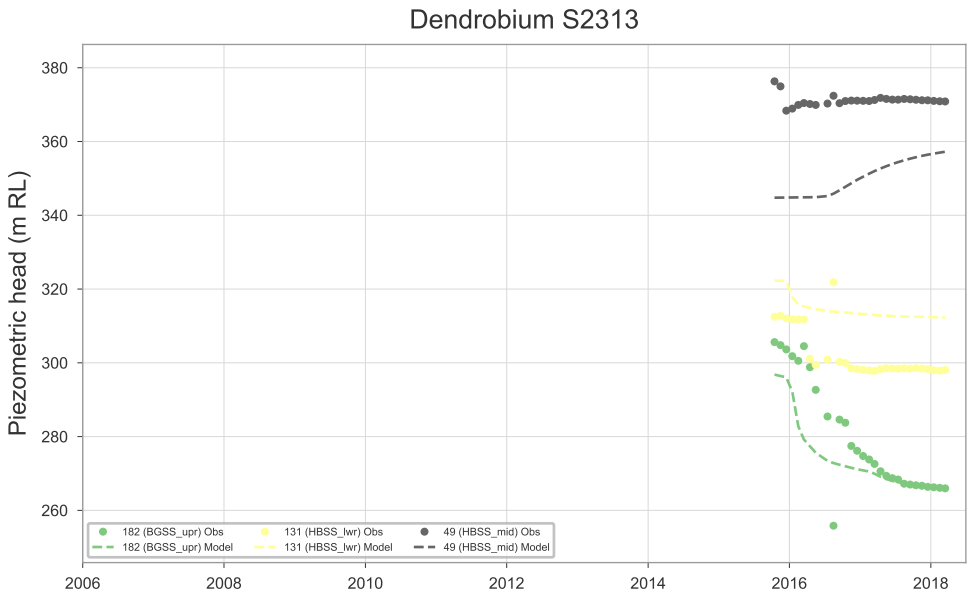

Dendrobium S2288
Piezometric head (m RL)
X (BUCO) Obs
X (BUCO) Model

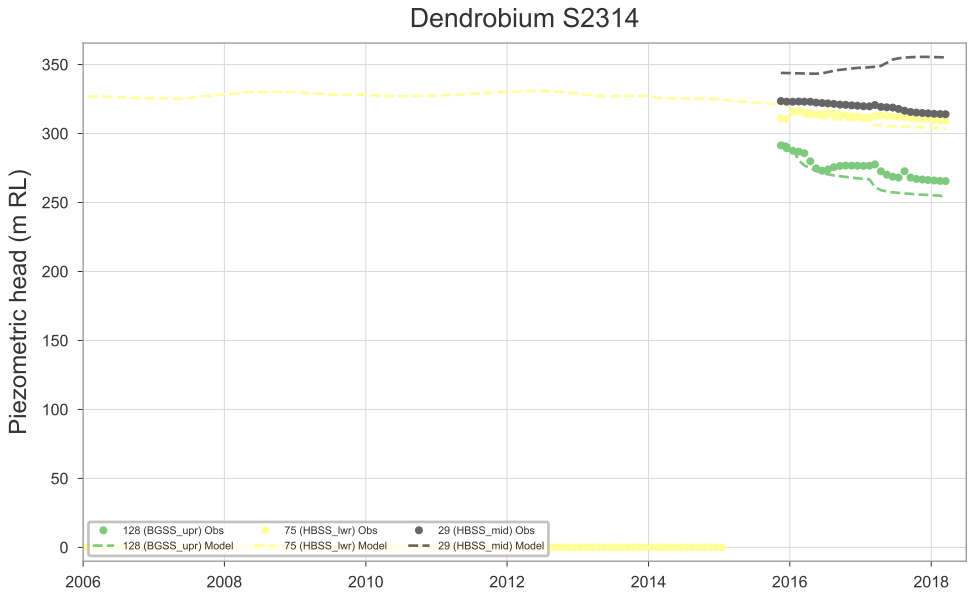

Dendrobium S2291
Piezometric head (m RL)
394 (BUCO) Obs
394 (BUCO) Model
419 (LRSS) Obs
419 (LRSS) Model

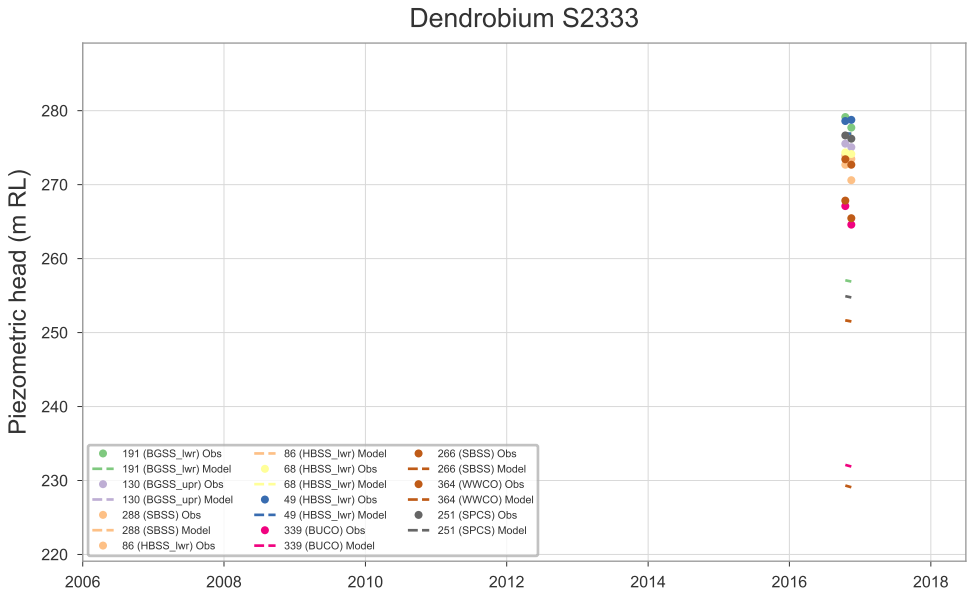

Dendrobium S2306
Piezometric head (m RL)
70 (HBSS_mid) Obs
70 (HBSS_mid) Model
50 (HBSS_mid) Obs
50 (HBSS_mid) Model
30 (HBSS_upr) Obs
30 (HBSS_upr) Model
10 (HBSS_upr) Obs
10 (HBSS_upr) Model

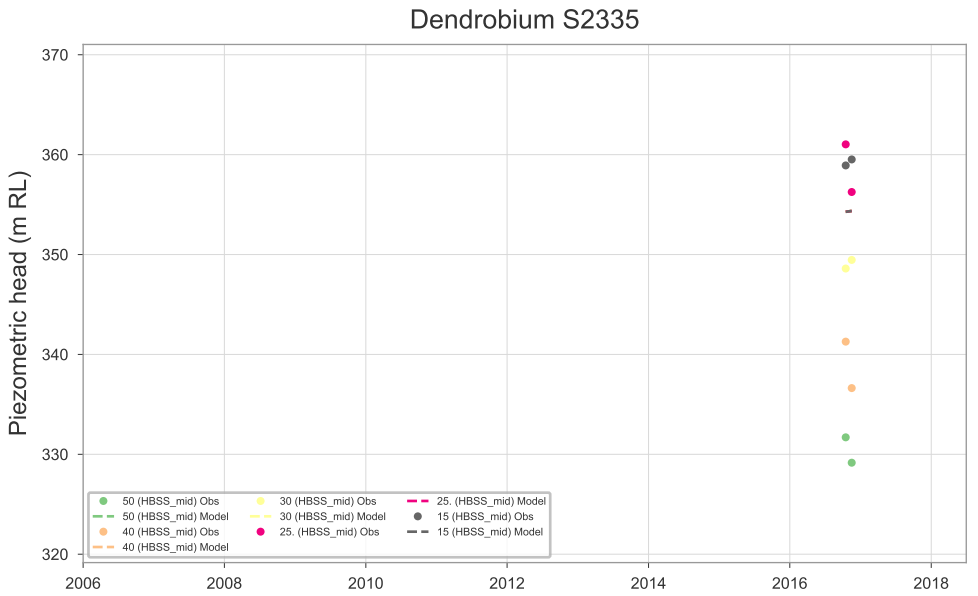

Dendrobium S2307
Piezometric head (m RL)
50 (HBSS_mid) Obs
50 (HBSS_mid) Model
35 (HBSS_mid) Obs
35 (HBSS_mid) Model
22. (HBSS_upr) Obs
22. (HBSS_upr) Model
10 (HBSS_upr) Obs
10 (HBSS_upr) Model

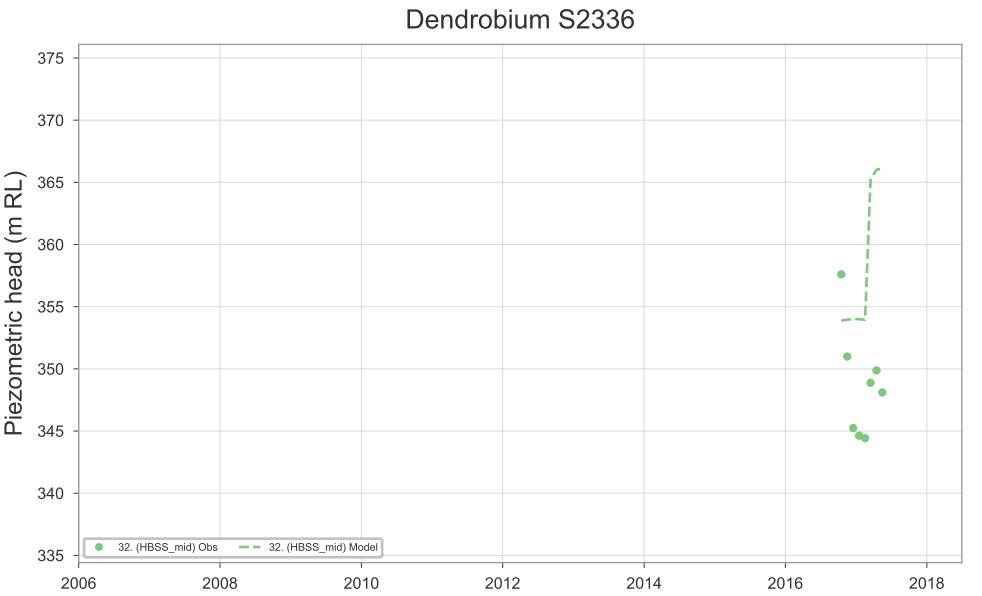

Dendrobium S2309
Piezometric head (m RL)
413 (WWCO) Obs
413 (WWCO) Model
256 (BGSS_lwr) Obs
256 (BGSS_lwr) Model
198 (BGSS_upr) Obs
198 (BGSS_upr) Model
387 (BUCO) Obs
387 (BUCO) Model
159 (HBSS_lwr) Obs
159 (HBSS_lwr) Model
112 (HBSS_mid) Obs
112 (HBSS_mid) Model
65 (HBSS_upr) Obs
65 (HBSS_upr) Model
360 (SBSS) Obs
360 (SBSS) Model
350 (SBSS) Obs
350 (SBSS) Model
315 (BGSS_lwr) Obs
315 (BGSS_lwr) Model

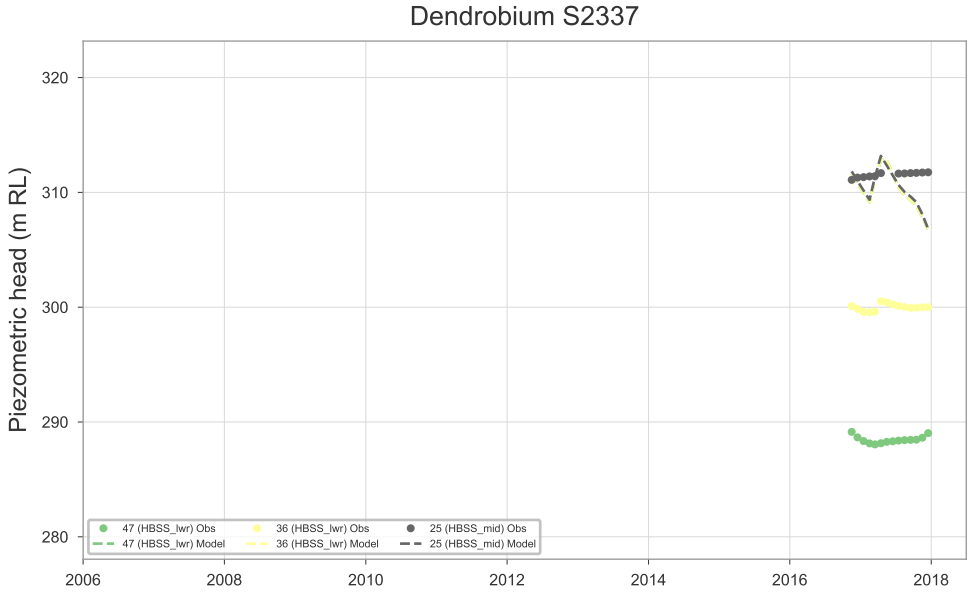

Dendrobium S2313
Piezometric head (m RL)
182 (BGSS_upr) Obs
182 (BGSS_upr) Model
131 (HBSS_lwr) Obs
131 (HBSS_lwr) Model
49 (HBSS_mid) Obs
49 (HBSS_mid) Model

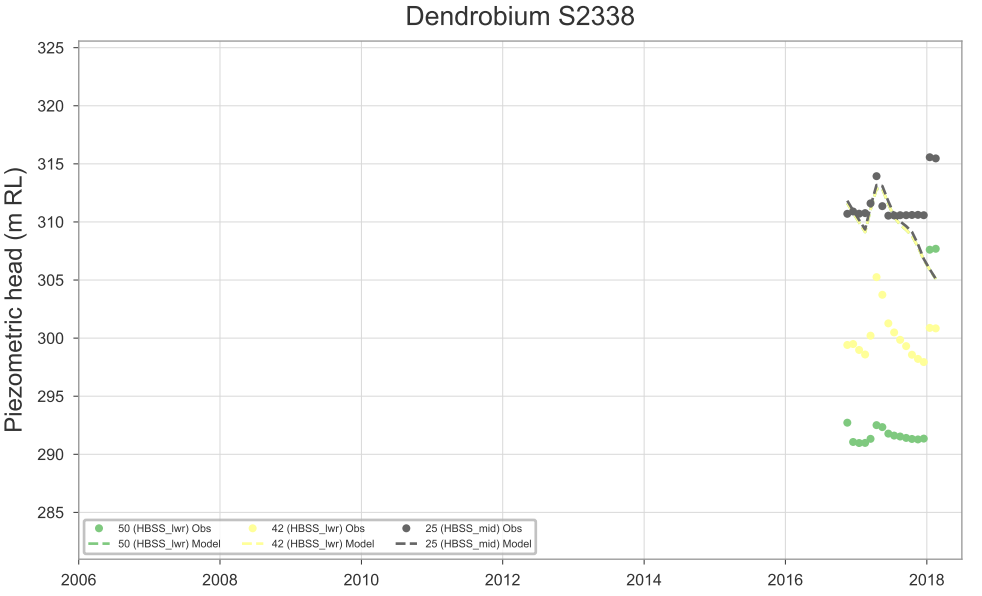

Dendrobium S2314
Piezometric head (m RL)
128 (BGSS_upr) Obs
128 (BGSS_upr) Model
75 (HBSS_lwr) Obs
75 (HBSS_lwr) Model
29 (HBSS_mid) Obs
29 (HBSS_mid) Model

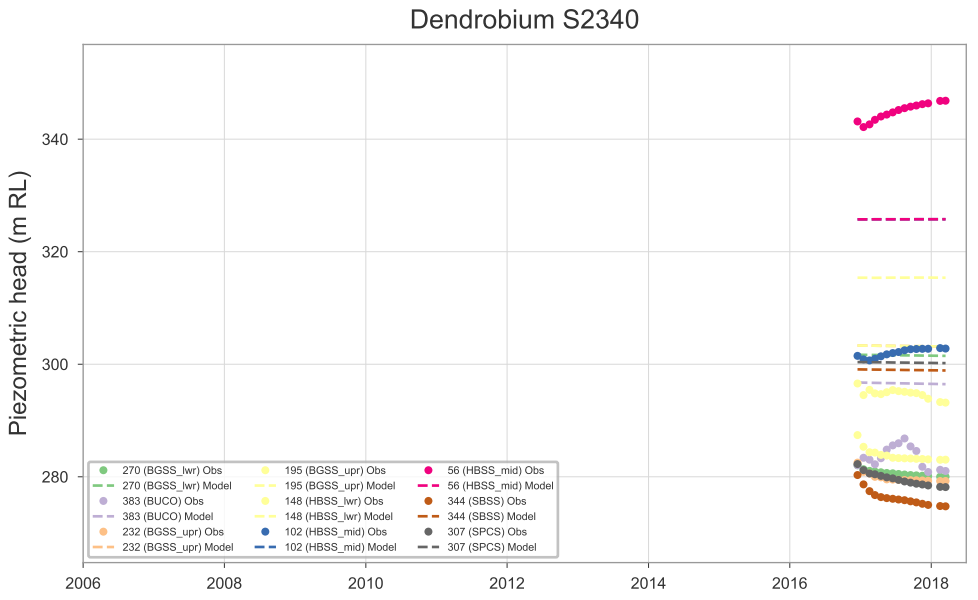

Dendrobium S2333
Piezometric head (m RL)
191 (BGSS_lwr) Obs
191 (BGSS_lwr) Model
130 (BGSS_upr) Obs
130 (BGSS_upr) Model
288 (SBSS) Obs
288 (SBSS) Model
86 (HBSS_lwr) Obs
86 (HBSS_lwr) Model
68 (HBSS_lwr) Obs
68 (HBSS_lwr) Model
49 (HBSS_lwr) Obs
49 (HBSS_lwr) Model
339 (BUCO) Obs
339 (BUCO) Model
266 (SBSS) Obs
266 (SBSS) Model
364 (WWCO) Obs
364 (WWCO) Model
251 (SPCS) Obs
251 (SPCS) Model

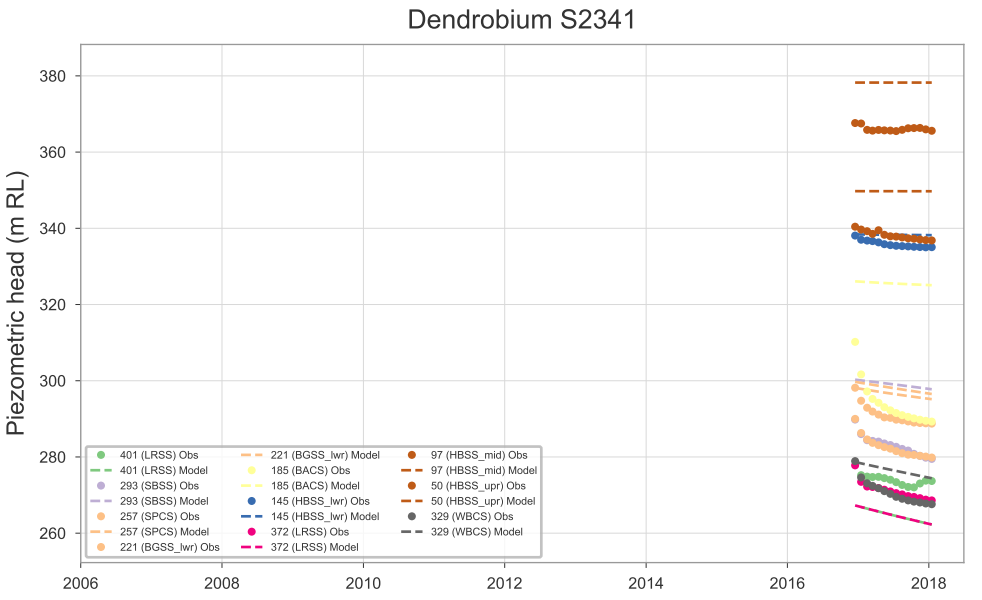

Dendrobium S2335
Piezometric head (m RL)
370
360
350
340
330
320
2006
2008
2010
2012
2014
2016
2018
50 (HBSS_mid) Obs
50 (HBSS_mid) Model
40 (HBSS_mid) Obs
40 (HBSS_mid) Model
30 (HBSS_mid) Obs
30 (HBSS_mid) Model
25. (HBSS_mid) Obs
25. (HBSS_mid) Model
15 (HBSS_mid) Obs
15 (HBSS_mid) Model

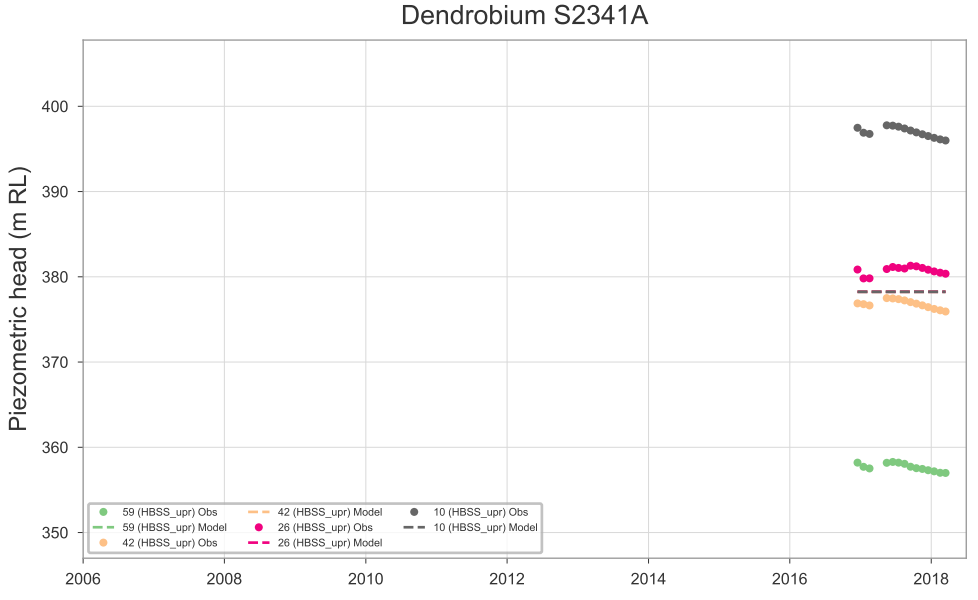

Dendrobium S2336
Piezometric head (m RL)
375
370
365
360
355
350
345
340
335
2006
2008
2010
2012
2014
2016
2018
32. (HBSS_mid) Obs
32. (HBSS_mid) Model

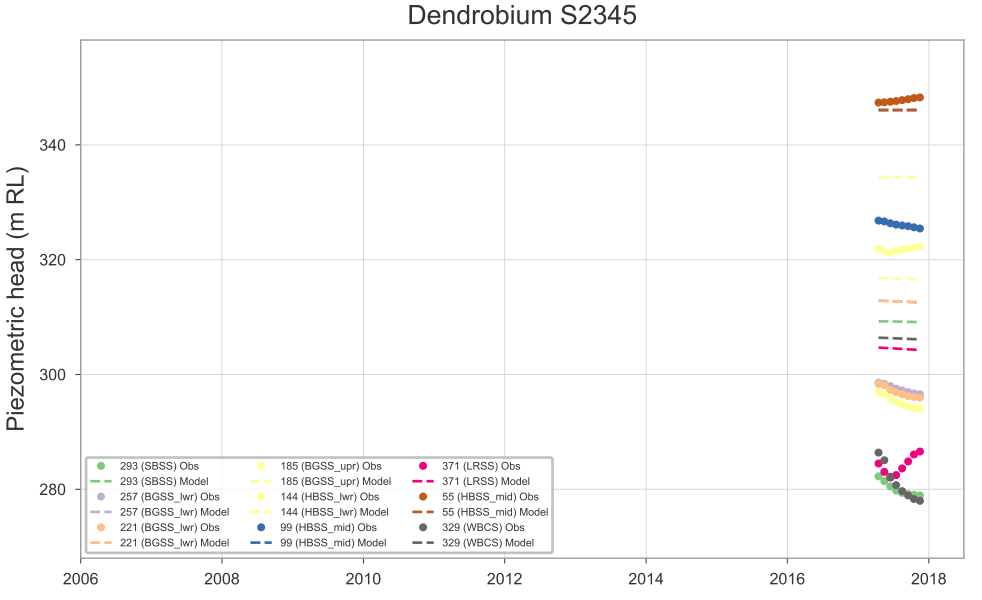

Dendrobium S2337
Piezometric head (m RL)
320
310
300
290
280
2006
2008
2010
2012
2014
2016
2018
47 (HBSS_lwr) Obs
47 (HBSS_lwr) Model
36 (HBSS_lwr) Obs
36 (HBSS_lwr) Model
25 (HBSS_mid) Obs
25 (HBSS_mid) Model

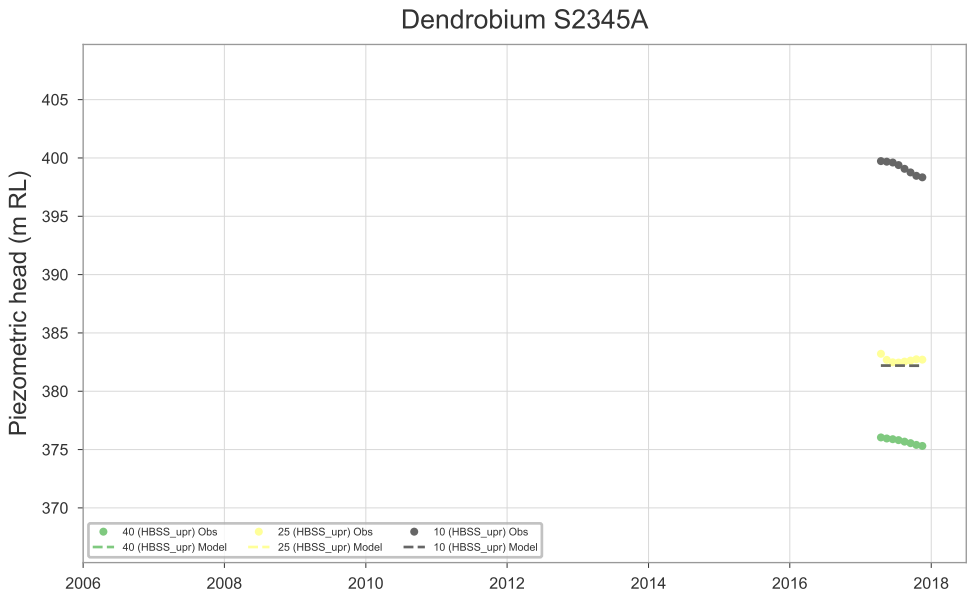

Dendrobium S2338
Piezometric head (m RL)
325
320
315
310
305
300
295
290
285
2006
2008
2010
2012
2014
2016
2018
50 (HBSS_lwr) Obs
50 (HBSS_lwr) Model
42 (HBSS_lwr) Obs
42 (HBSS_lwr) Model
25 (HBSS_mid) Obs
25 (HBSS_mid) Model

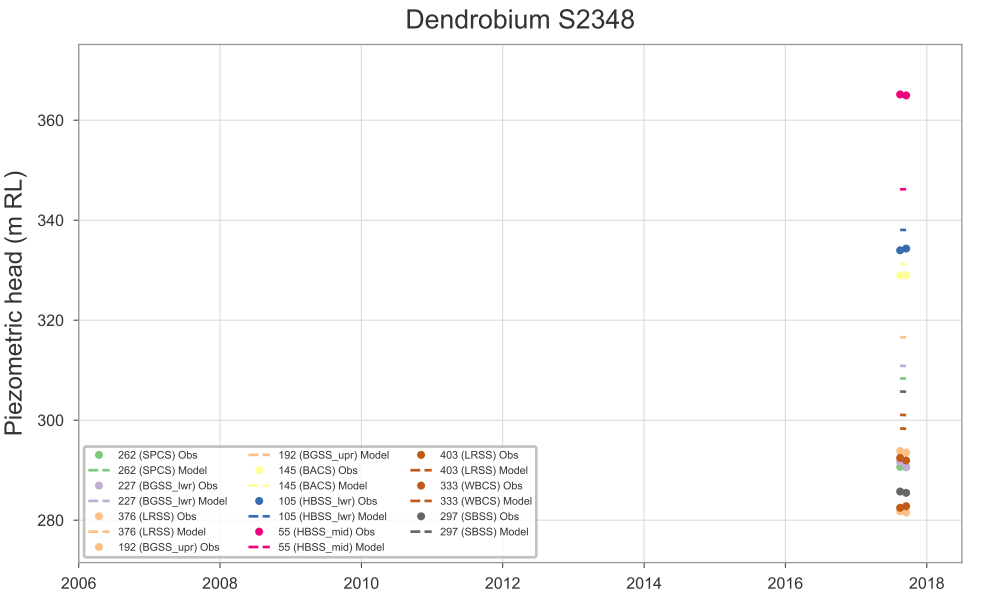

Dendrobium S2340
Piezometric head (m RL)
340
320
300
280
2006
2008
2010
2012
2014
2016
2018
270 (BGSS_lwr) Obs
270 (BGSS_lwr) Model
383 (BUCO) Obs
383 (BUCO) Model
232 (BGSS_upr) Obs
232 (BGSS_upr) Model
195 (BGSS_upr) Obs
195 (BGSS_upr) Model
148 (HBSS_lwr) Obs
148 (HBSS_lwr) Model
102 (HBSS_mid) Obs
102 (HBSS_mid) Model
56 (HBSS_mid) Obs
56 (HBSS_mid) Model
344 (SBSS) Obs
344 (SBSS) Model
307 (SPCS) Obs
307 (SPCS) Model

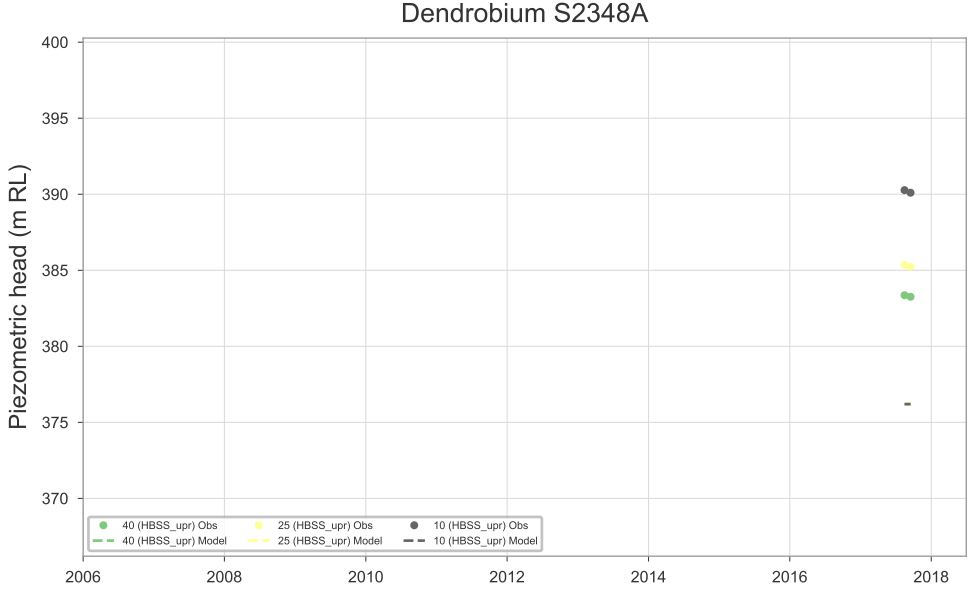

Dendrobium S2341
Piezometric head (m RL)
380
360
340
320
300
280
260
2006
2008
2010
2012
2014
2016
2018
401 (LRSS) Obs
401 (LRSS) Model
293 (SBSS) Obs
293 (SBSS) Model
257 (SPCS) Obs
257 (SPCS) Model
221 (BGSS_lwr) Obs
221 (BGSS_lwr) Model
185 (BACS) Obs
185 (BACS) Model
145 (HBSS_lwr) Obs
145 (HBSS_lwr) Model
372 (LRSS) Obs
372 (LRSS) Model
97 (HBSS_mid) Obs
97 (HBSS_mid) Model
50 (HBSS_upr) Obs
50 (HBSS_upr) Model
329 (WBCS) Obs
329 (WBCS) Model

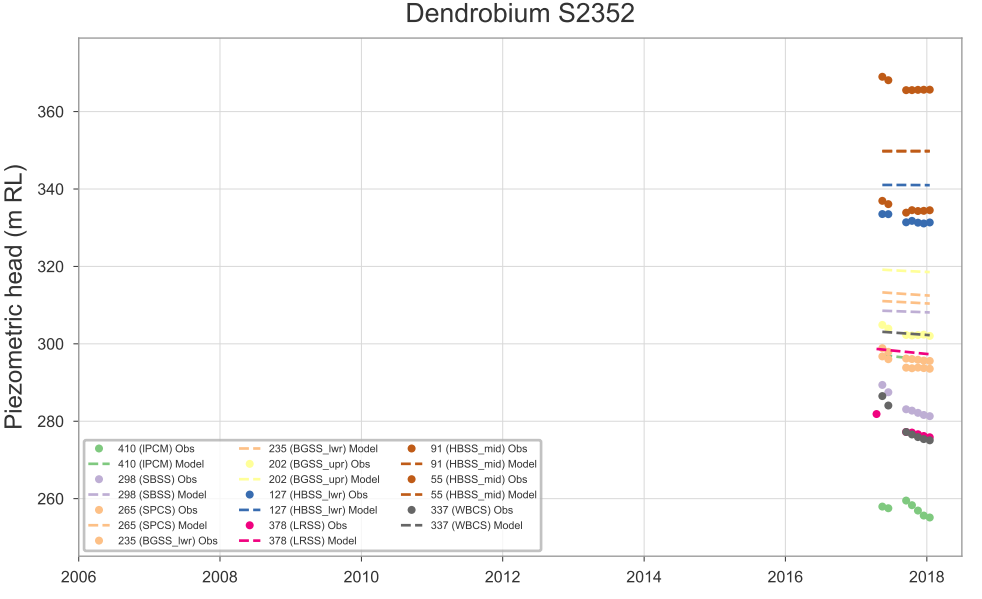

Dendrobium S2341A
Piezometric head (m RL)
400
390
380
370
360
350
2006
2008
2010
2012
2014
2016
2018
59 (HBSS_upr) Obs
59 (HBSS_upr) Model
42 (HBSS_upr) Obs
42 (HBSS_upr) Model
26 (HBSS_upr) Obs
26 (HBSS_upr) Model
10 (HBSS_upr) Obs
10 (HBSS_upr) Model

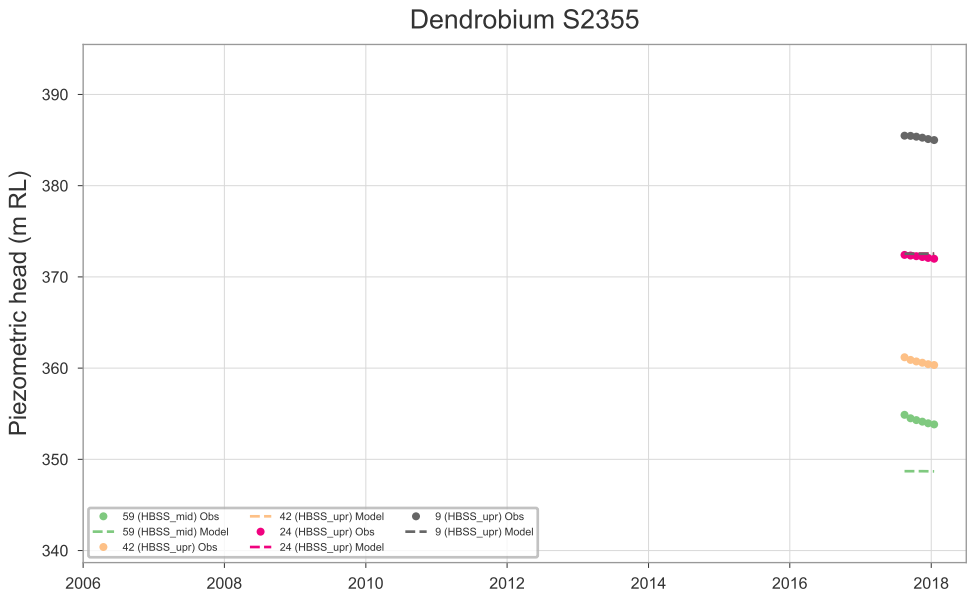

Dendrobium S2345
Piezometric head (m RL)
340
320
300
280
2006
2008
2010
2012
2014
2016
2018
293 (SBSS) Obs
293 (SBSS) Model
257 (BGSS_lwr) Obs
257 (BGSS_lwr) Model
221 (BGSS_lwr) Obs
221 (BGSS_lwr) Model
185 (BGSS_upr) Obs
185 (BGSS_upr) Model
144 (HBSS_lwr) Obs
144 (HBSS_lwr) Model
99 (HBSS_mid) Obs
99 (HBSS_mid) Model
371 (LRSS) Obs
371 (LRSS) Model
55 (HBSS_mid) Obs
55 (HBSS_mid) Model
329 (WBCS) Obs
329 (WBCS) Model

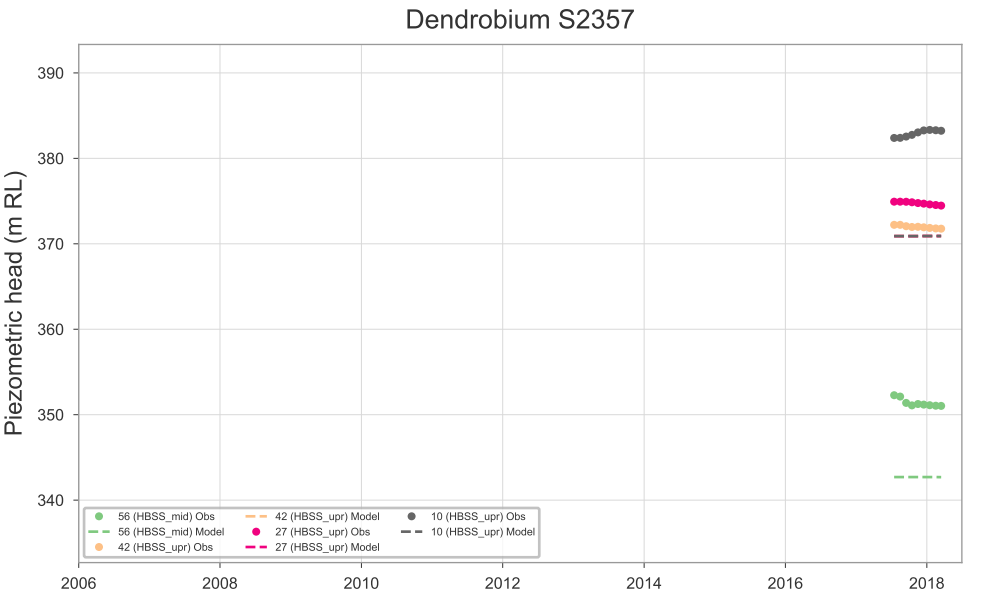

Dendrobium S2345A
Piezometric head (m RL)
405
400
395
390
385
380
375
370
2006
2008
2010
2012
2014
2016
2018
40 (HBSS_upr) Obs
40 (HBSS_upr) Model
25 (HBSS_upr) Obs
25 (HBSS_upr) Model
10 (HBSS_upr) Obs
10 (HBSS_upr) Model

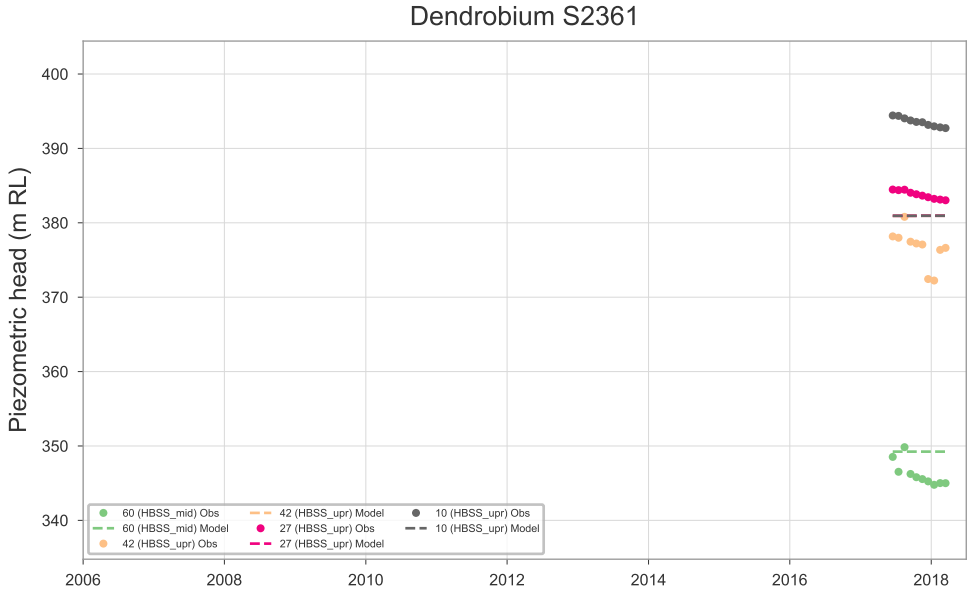

Dendrobium S2348
Piezometric head (m RL)
360
340
320
300
280
2006
2008
2010
2012
2014
2016
2018
262 (SPCS) Obs
262 (SPCS) Model
227 (BGSS_lwr) Obs
227 (BGSS_lwr) Model
376 (LRSS) Obs
376 (LRSS) Model
192 (BGSS_upr) Obs
192 (BGSS_upr) Model
145 (BACS) Obs
145 (BACS) Model
105 (HBSS_lwr) Obs
105 (HBSS_lwr) Model
55 (HBSS_mid) Obs
55 (HBSS_mid) Model
403 (LRSS) Obs
403 (LRSS) Model
333 (WBCS) Obs
333 (WBCS) Model
297 (SBSS) Obs
297 (SBSS) Model

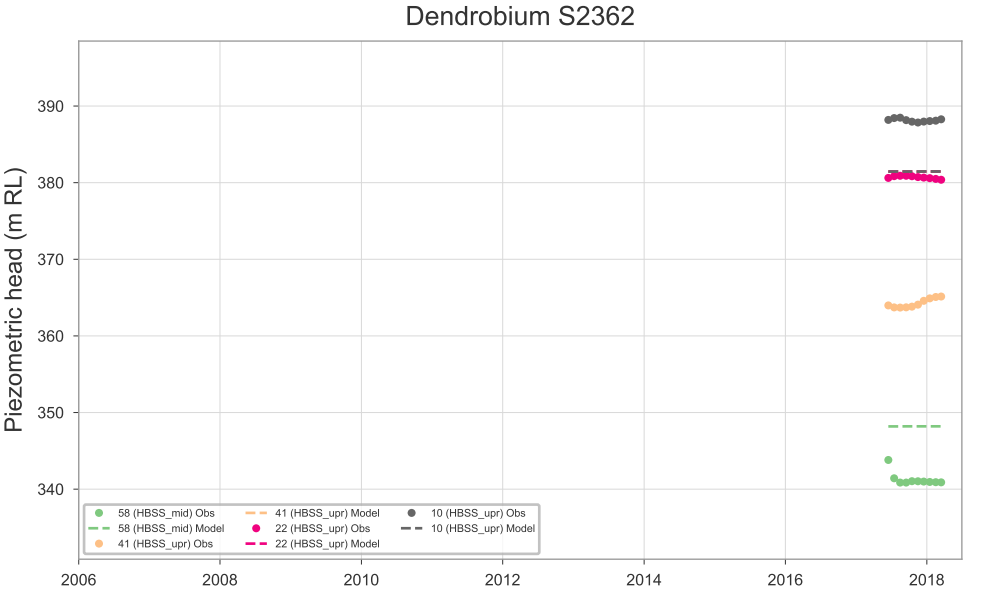

Dendrobium S2348A
Piezometric head (m RL)
400
395
390
385
380
375
370
2006
2008
2010
2012
2014
2016
2018
40 (HBSS_upr) Obs
40 (HBSS_upr) Model
25 (HBSS_upr) Obs
25 (HBSS_upr) Model
10 (HBSS_upr) Obs
10 (HBSS_upr) Model

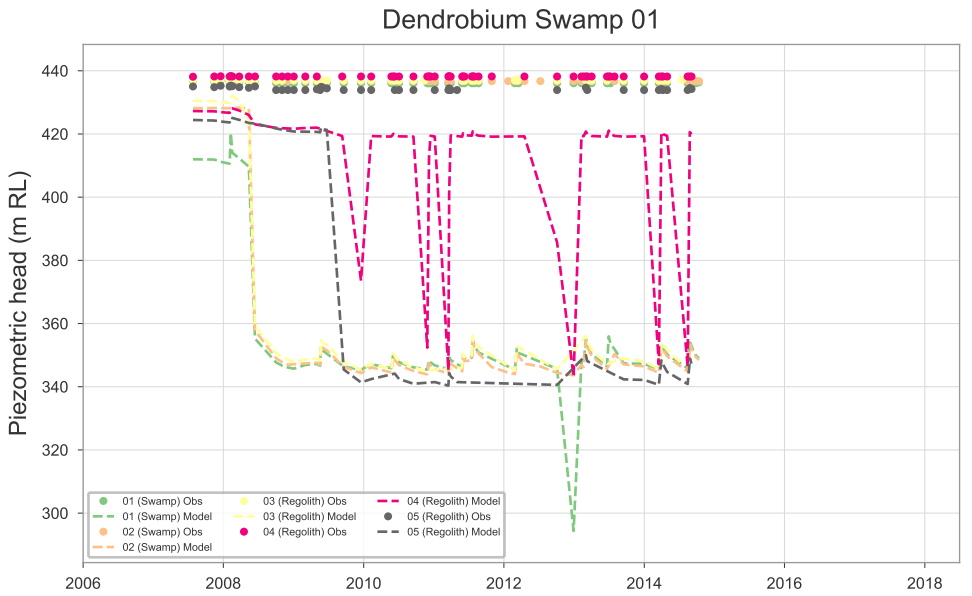

Dendrobium S2352
Piezometric head (m RL)
360
340
320
300
280
260
2006
2008
2010
2012
2014
2016
2018
410 (IPCM) Obs
410 (IPCM) Model
298 (SBSS) Obs
298 (SBSS) Model
265 (SPCS) Obs
265 (SPCS) Model
235 (BGSS_lwr) Obs
235 (BGSS_lwr) Model
202 (BGSS_upr) Obs
202 (BGSS_upr) Model
127 (HBSS_lwr) Obs
127 (HBSS_lwr) Model
378 (LRSS) Obs
378 (LRSS) Model
91 (HBSS_mid) Obs
91 (HBSS_mid) Model
55 (HBSS_mid) Obs
55 (HBSS_mid) Model
337 (WBCS) Obs
337 (WBCS) Model

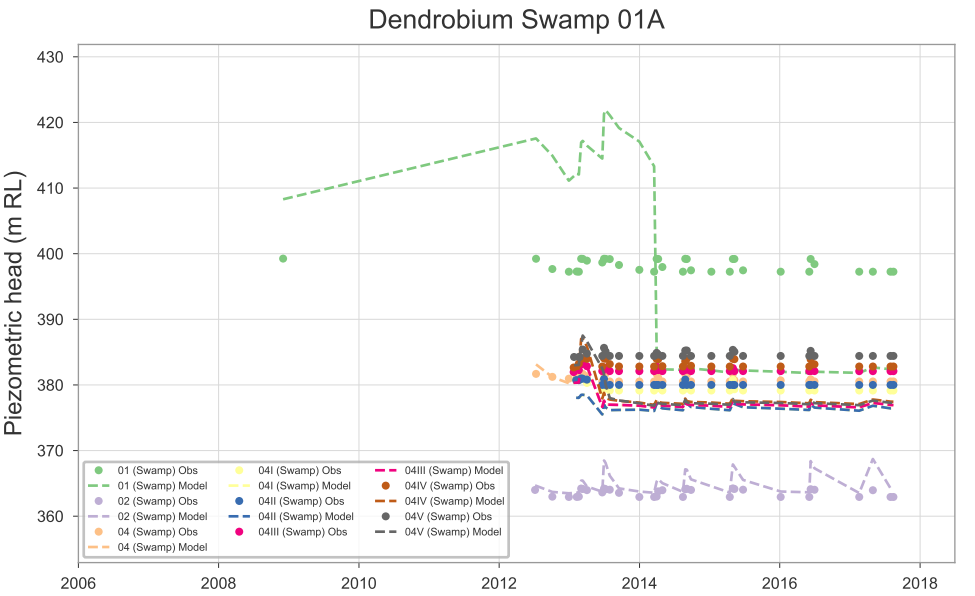

Dendrobium S2355
Piezometric head (m RL)
390
380
370
360
350
340
2006
2008
2010
2012
2014
2016
2018
59 (HBSS_mid) Obs
59 (HBSS_mid) Model
42 (HBSS_upr) Obs
42 (HBSS_upr) Model
24 (HBSS_upr) Obs
24 (HBSS_upr) Model
9 (HBSS_upr) Obs
9 (HBSS_upr) Model

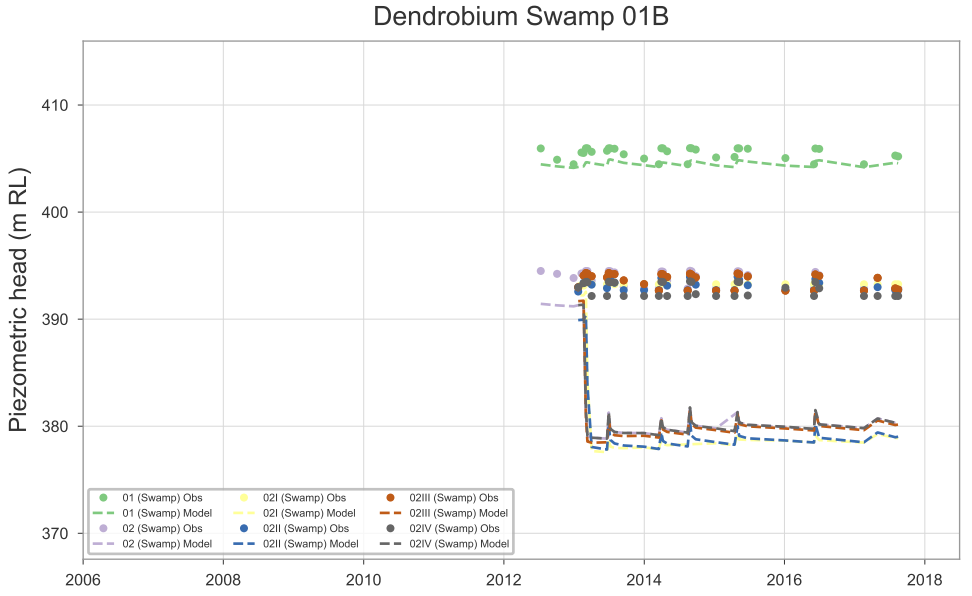

Dendrobium S2357
Piezometric head (m RL)
390
380
370
360
350
340
2006
2008
2010
2012
2014
2016
2018
56 (HBSS_mid) Obs
56 (HBSS_mid) Model
42 (HBSS_upr) Obs
42 (HBSS_upr) Model
27 (HBSS_upr) Obs
27 (HBSS_upr) Model
10 (HBSS_upr) Obs
10 (HBSS_upr) Model

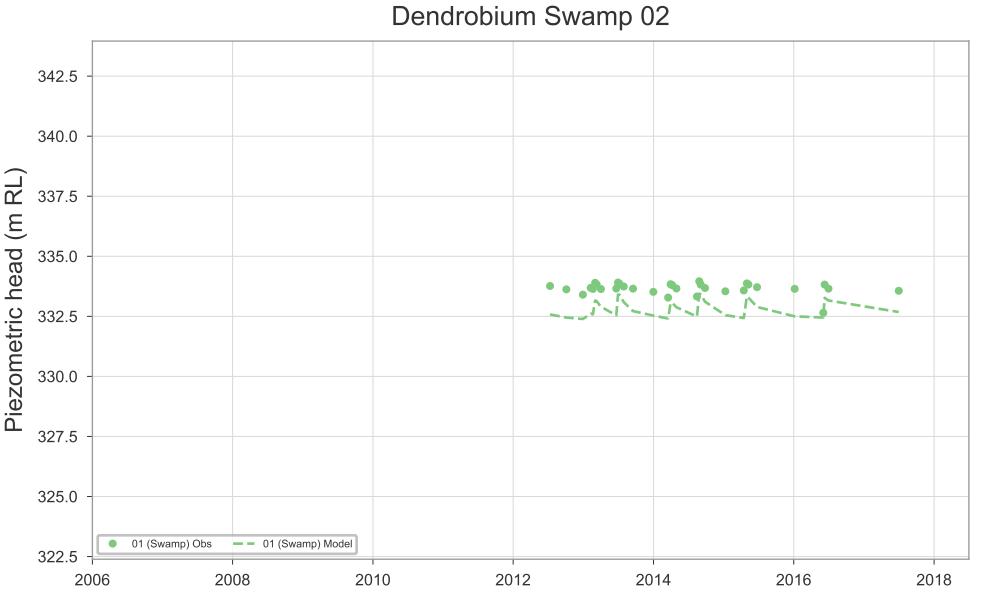

Dendrobium S2361
Piezometric head (m RL)
400
390
380
370
360
350
340
2006
2008
2010
2012
2014
2016
2018
60 (HBSS_mid) Obs
60 (HBSS_mid) Model
42 (HBSS_upr) Obs
42 (HBSS_upr) Model
27 (HBSS_upr) Obs
27 (HBSS_upr) Model
10 (HBSS_upr) Obs
10 (HBSS_upr) Model

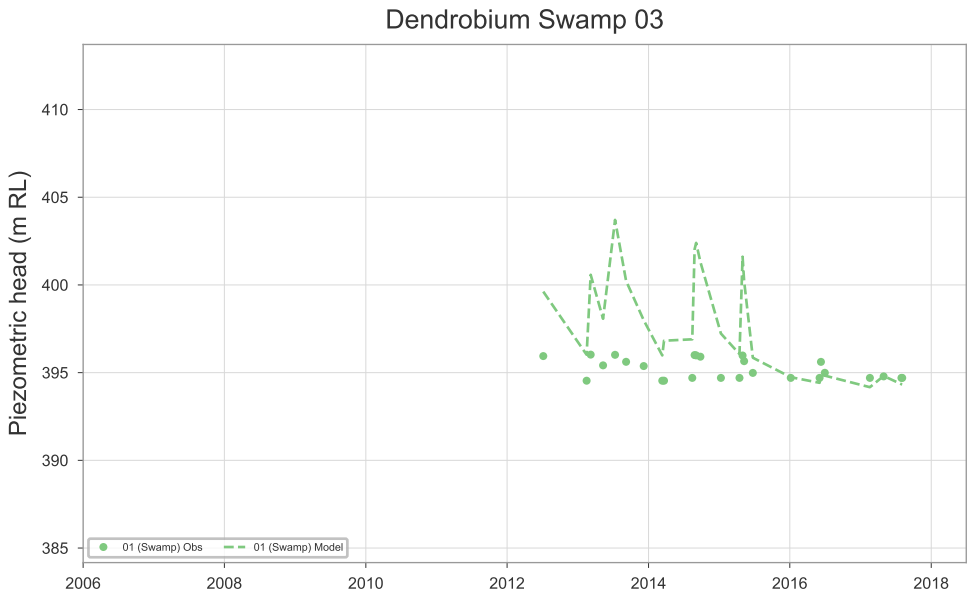

Dendrobium S2362
Piezometric head (m RL)
390
380
370
360
350
340
2006
2008
2010
2012
2014
2016
2018
58 (HBSS_mid) Obs
58 (HBSS_mid) Model
41 (HBSS_upr) Obs
41 (HBSS_upr) Model
22 (HBSS_upr) Obs
22 (HBSS_upr) Model
10 (HBSS_upr) Obs
10 (HBSS_upr) Model

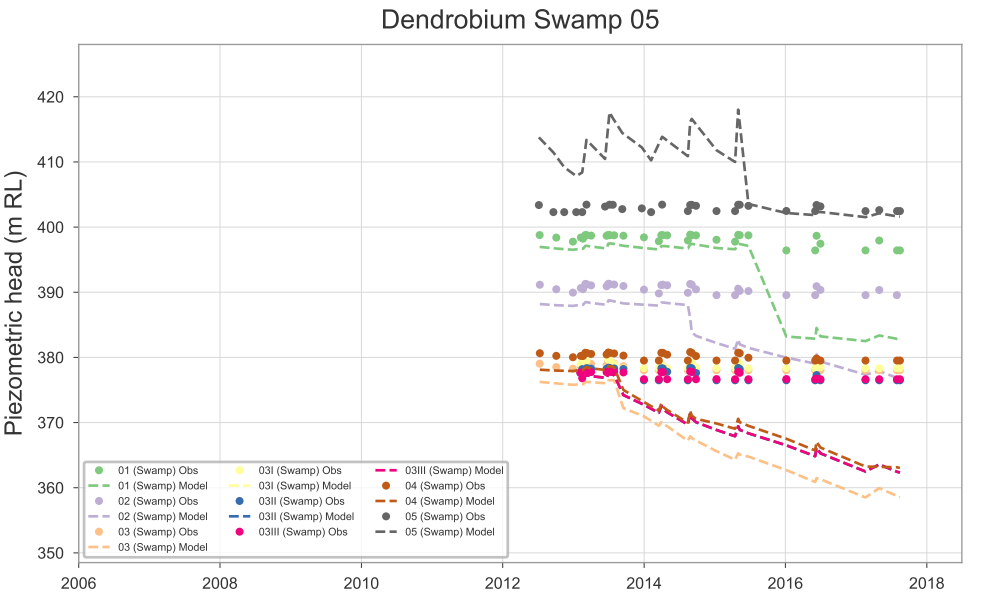

Dendrobium Swamp 01
Piezometric head (m RL)
01 (Swamp) Obs
01 (Swamp) Model
02 (Swamp) Obs
02 (Swamp) Model
03 (Regolith) Obs
03 (Regolith) Model
04 (Regolith) Obs
04 (Regolith) Model
05 (Regolith) Obs
05 (Regolith) Model

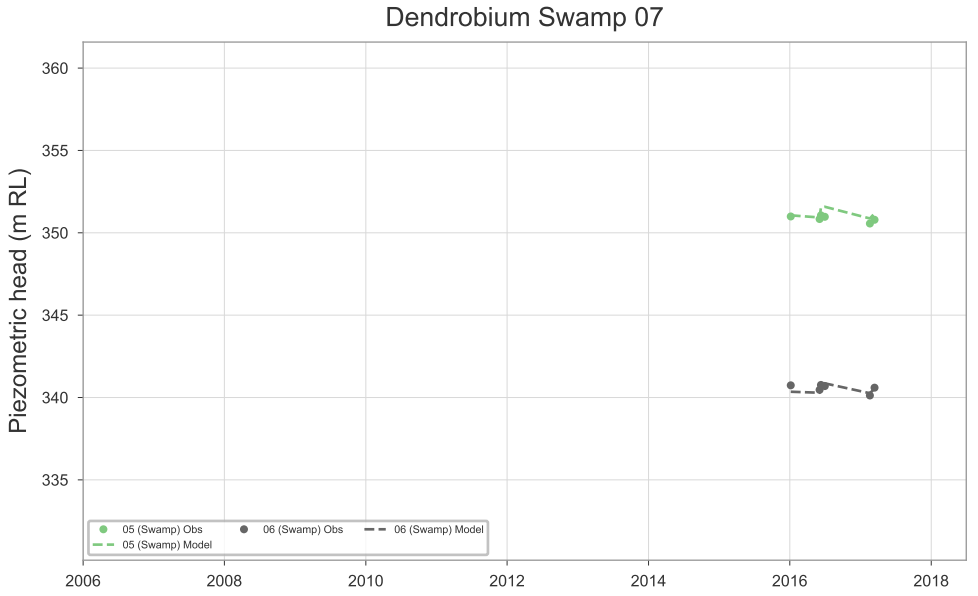

Dendrobium Swamp 01A
Piezometric head (m RL)
01 (Swamp) Obs
01 (Swamp) Model
02 (Swamp) Obs
02 (Swamp) Model
04 (Swamp) Obs
04 (Swamp) Model
04I (Swamp) Obs
04I (Swamp) Model
04II (Swamp) Obs
04II (Swamp) Model
04III (Swamp) Obs
04III (Swamp) Model
04IV (Swamp) Obs
04IV (Swamp) Model
04V (Swamp) Obs
04V (Swamp) Model

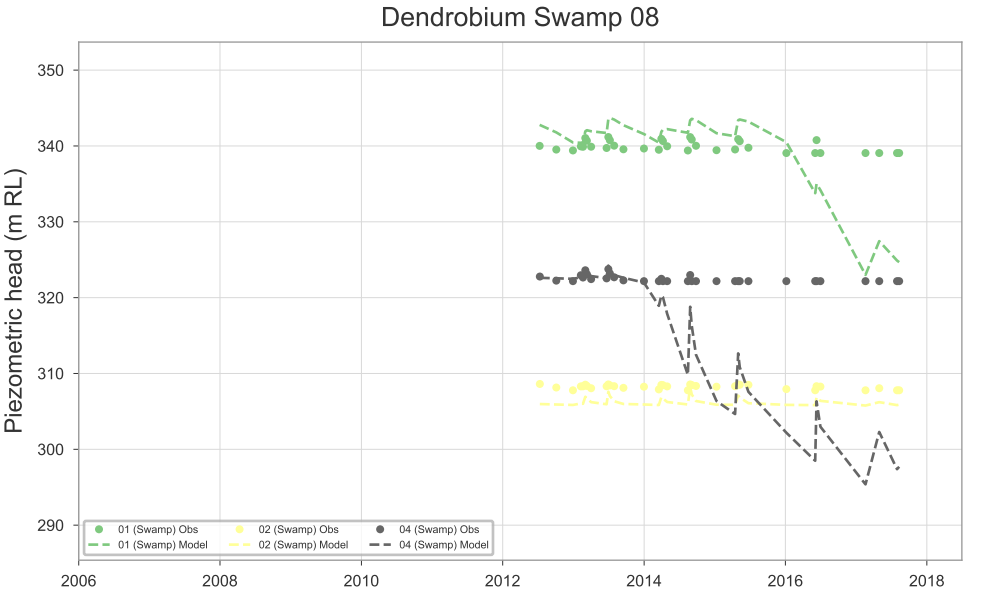

Dendrobium Swamp 01B
Piezometric head (m RL)
01 (Swamp) Obs
01 (Swamp) Model
02 (Swamp) Obs
02 (Swamp) Model
02I (Swamp) Obs
02I (Swamp) Model
02II (Swamp) Obs
02II (Swamp) Model
02III (Swamp) Obs
02III (Swamp) Model
02IV (Swamp) Obs
02IV (Swamp) Model

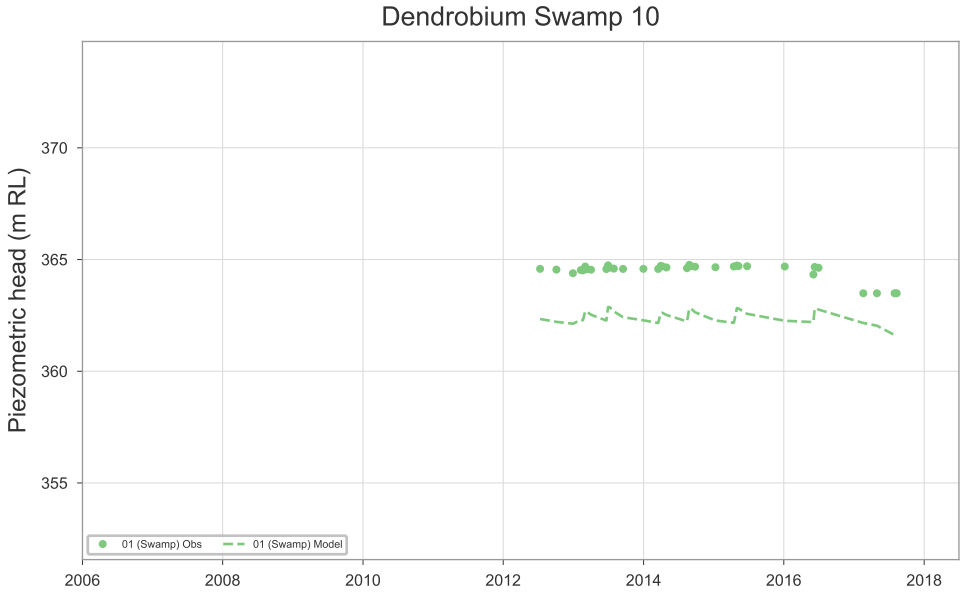

Dendrobium Swamp 02
Piezometric head (m RL)
01 (Swamp) Obs
01 (Swamp) Model

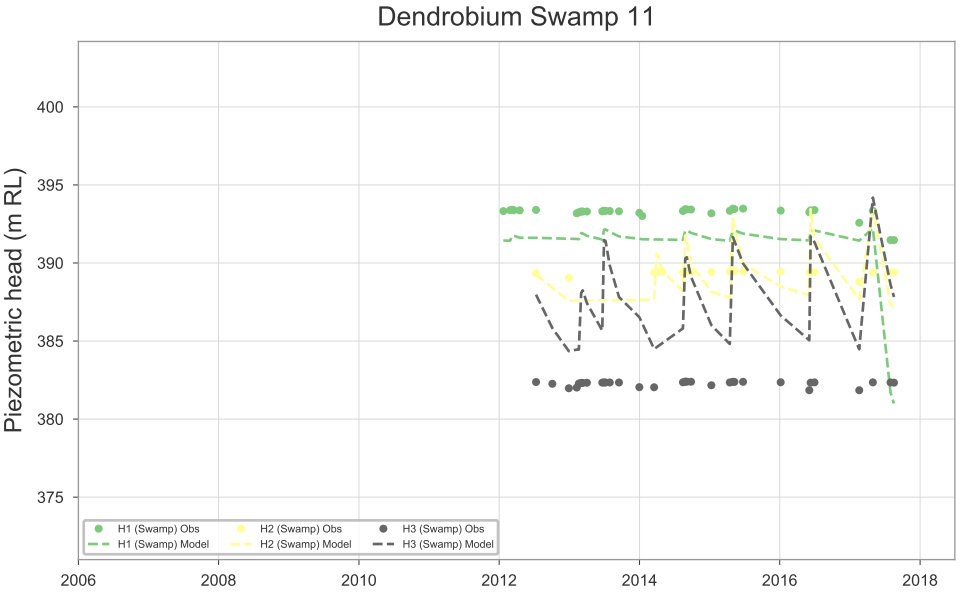

Dendrobium Swamp 03
Piezometric head (m RL)
410
405
400
395
390
385
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model

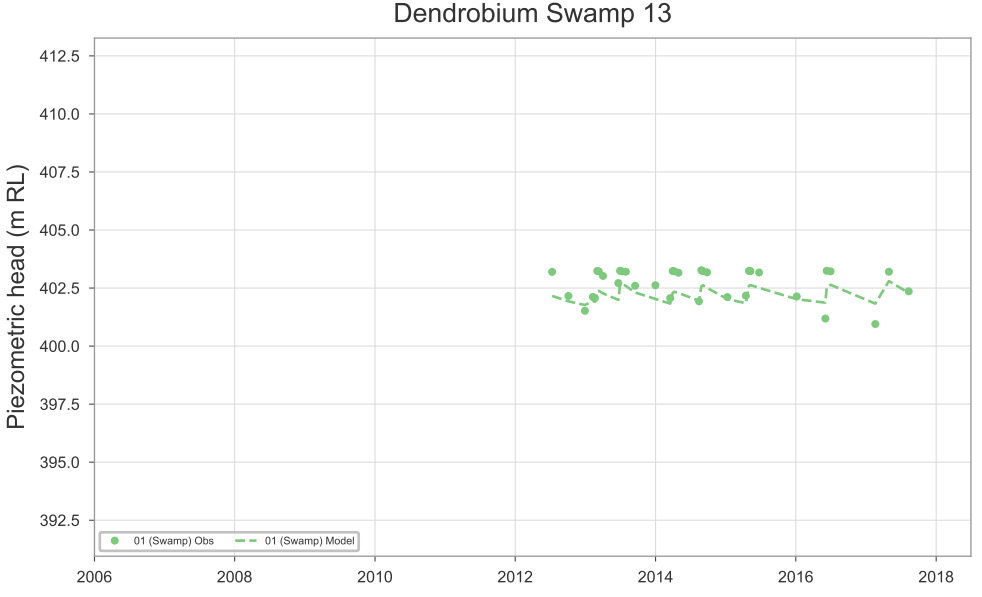

Dendrobium Swamp 05
Piezometric head (m RL)
420
410
400
390
380
370
360
350
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model
02 (Swamp) Obs
02 (Swamp) Model
03 (Swamp) Obs
03 (Swamp) Model
03I (Swamp) Obs
03I (Swamp) Model
03II (Swamp) Obs
03II (Swamp) Model
03III (Swamp) Obs
03III (Swamp) Model
04 (Swamp) Obs
04 (Swamp) Model
05 (Swamp) Obs
05 (Swamp) Model

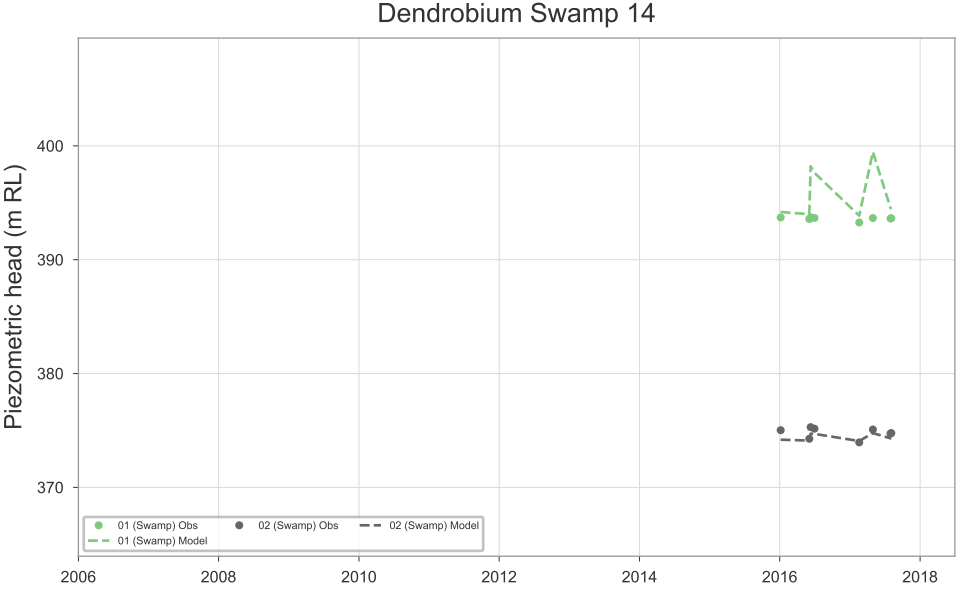

Dendrobium Swamp 07
Piezometric head (m RL)
360
355
350
345
340
335
2006
2008
2010
2012
2014
2016
2018
05 (Swamp) Obs
05 (Swamp) Model
06 (Swamp) Obs
06 (Swamp) Model

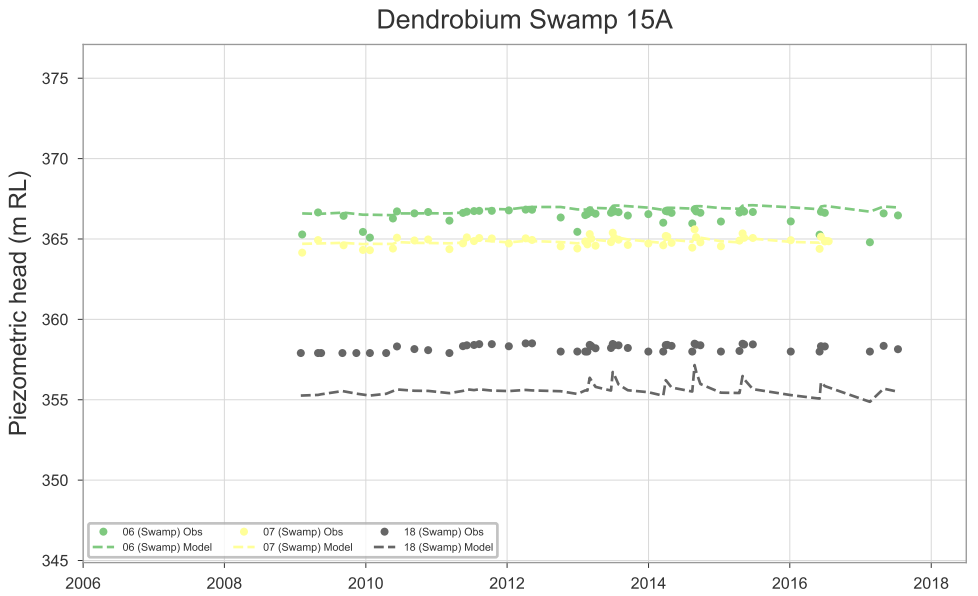

Dendrobium Swamp 08
Piezometric head (m RL)
350
340
330
320
310
300
290
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model
02 (Swamp) Obs
02 (Swamp) Model
04 (Swamp) Obs
04 (Swamp) Model

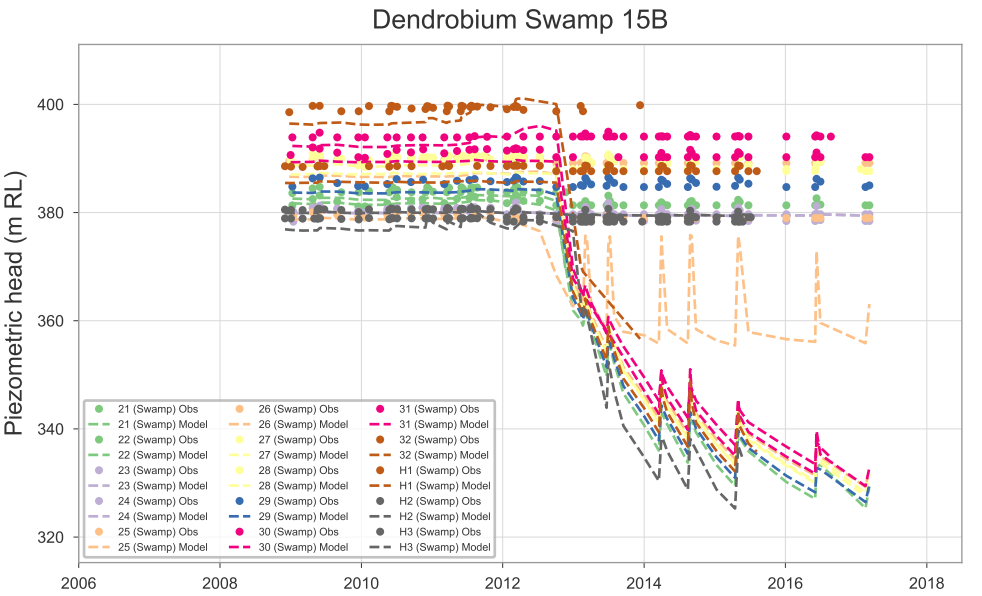

Dendrobium Swamp 10
Piezometric head (m RL)
370
365
360
355
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model

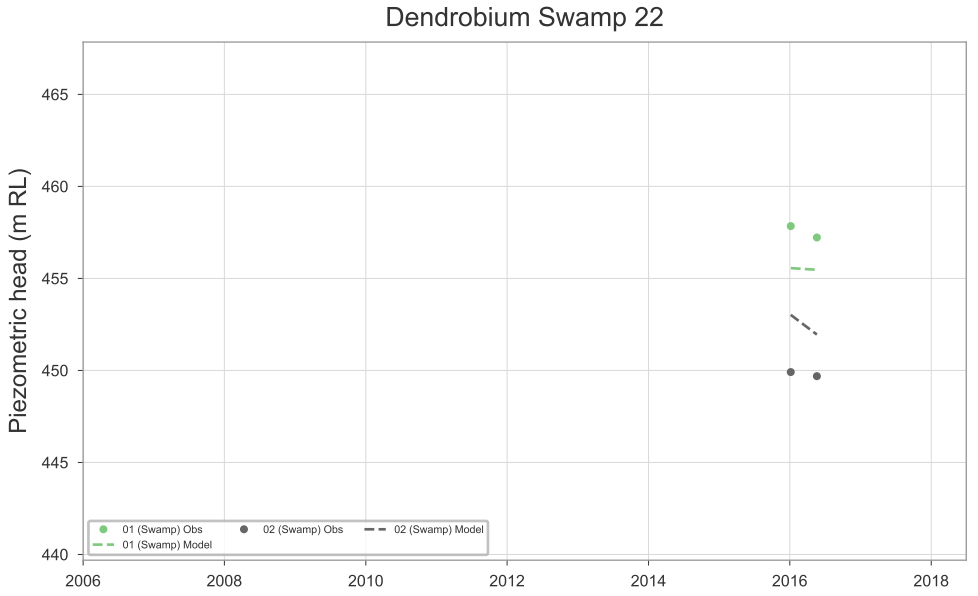

Dendrobium Swamp 11
Piezometric head (m RL)
400
395
390
385
380
375
2006
2008
2010
2012
2014
2016
2018
H1 (Swamp) Obs
H1 (Swamp) Model
H2 (Swamp) Obs
H2 (Swamp) Model
H3 (Swamp) Obs
H3 (Swamp) Model

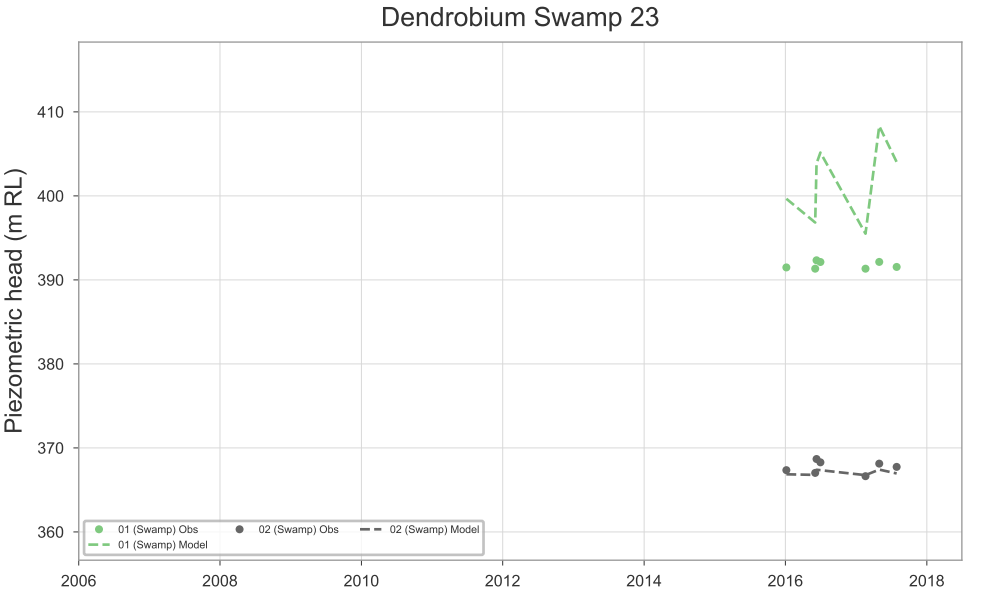

Dendrobium Swamp 13
Piezometric head (m RL)
412.5
410.0
407.5
405.0
402.5
400.0
397.5
395.0
392.5
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model

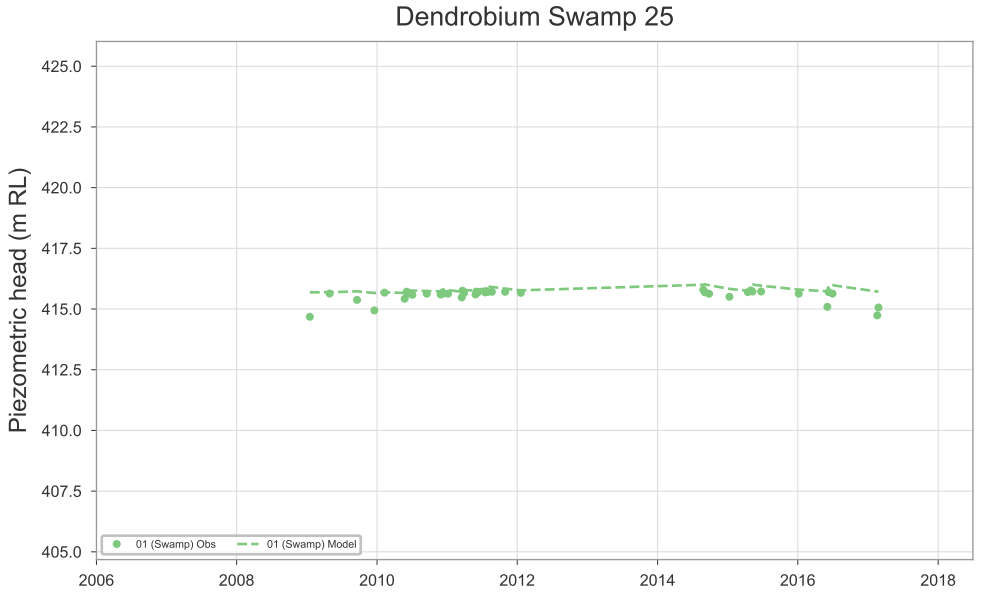

Dendrobium Swamp 14
Piezometric head (m RL)
400
390
380
370
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model
02 (Swamp) Obs
02 (Swamp) Model

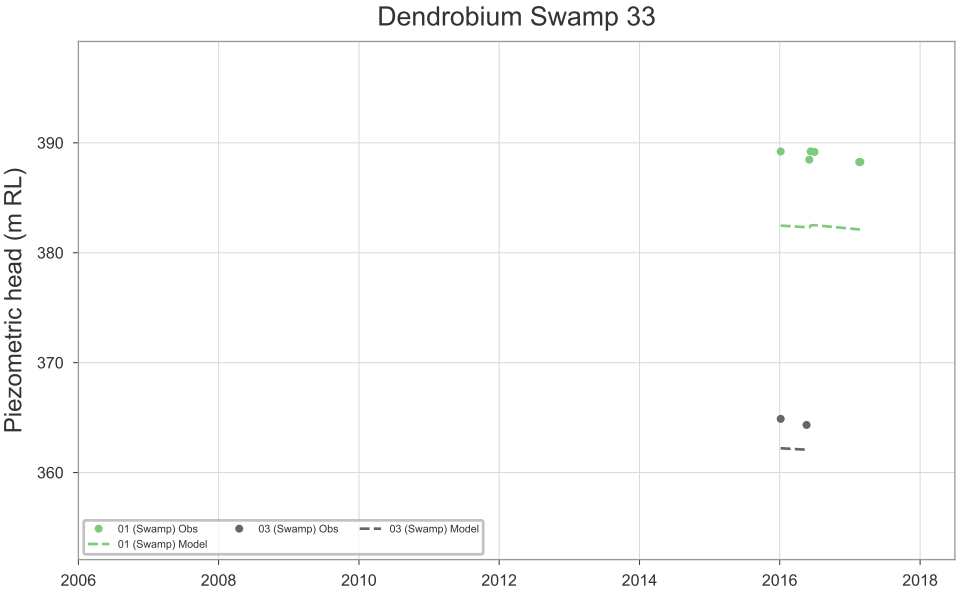

Dendrobium Swamp 15A
Piezometric head (m RL)
375
370
365
360
355
350
345
2006
2008
2010
2012
2014
2016
2018
06 (Swamp) Obs
06 (Swamp) Model
07 (Swamp) Obs
07 (Swamp) Model
18 (Swamp) Obs
18 (Swamp) Model

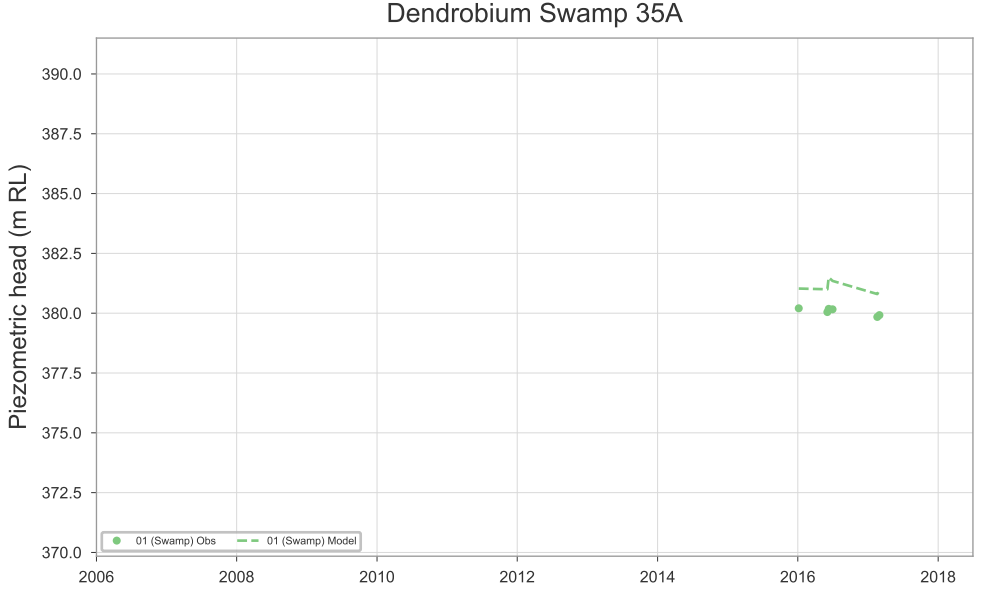

Dendrobium Swamp 15B
Piezometric head (m RL)
400
380
360
340
320
2006
2008
2010
2012
2014
2016
2018
21 (Swamp) Obs
21 (Swamp) Model
22 (Swamp) Obs
22 (Swamp) Model
23 (Swamp) Obs
23 (Swamp) Model
24 (Swamp) Obs
24 (Swamp) Model
25 (Swamp) Obs
25 (Swamp) Model
26 (Swamp) Obs
26 (Swamp) Model
27 (Swamp) Obs
27 (Swamp) Model
28 (Swamp) Obs
28 (Swamp) Model
29 (Swamp) Obs
29 (Swamp) Model
30 (Swamp) Obs
30 (Swamp) Model
31 (Swamp) Obs
31 (Swamp) Model
32 (Swamp) Obs
32 (Swamp) Model
H1 (Swamp) Obs
H1 (Swamp) Model
H2 (Swamp) Obs
H2 (Swamp) Model
H3 (Swamp) Obs
H3 (Swamp) Model

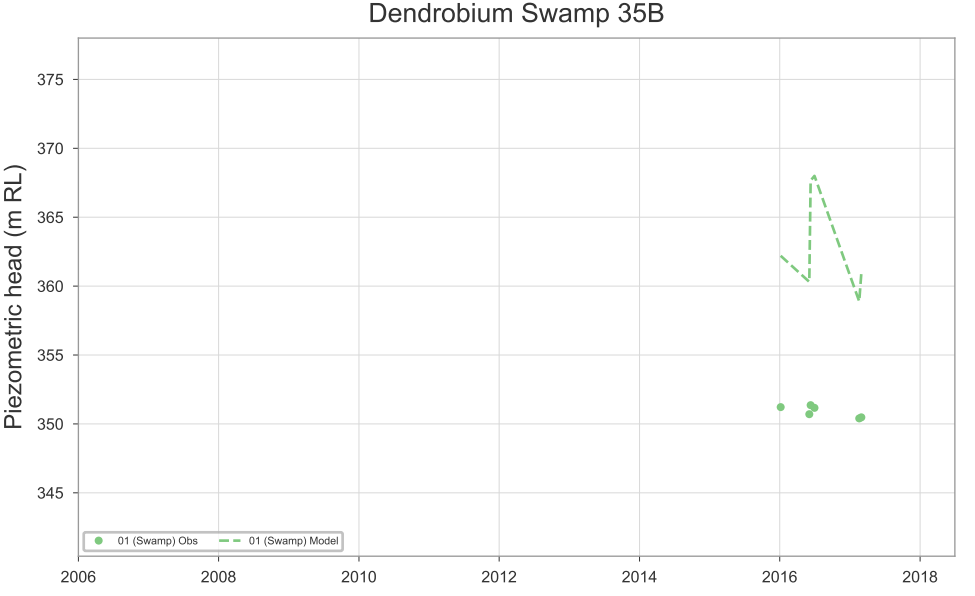

Dendrobium Swamp 22
Piezometric head (m RL)
465
460
455
450
445
440
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model
02 (Swamp) Obs
02 (Swamp) Model

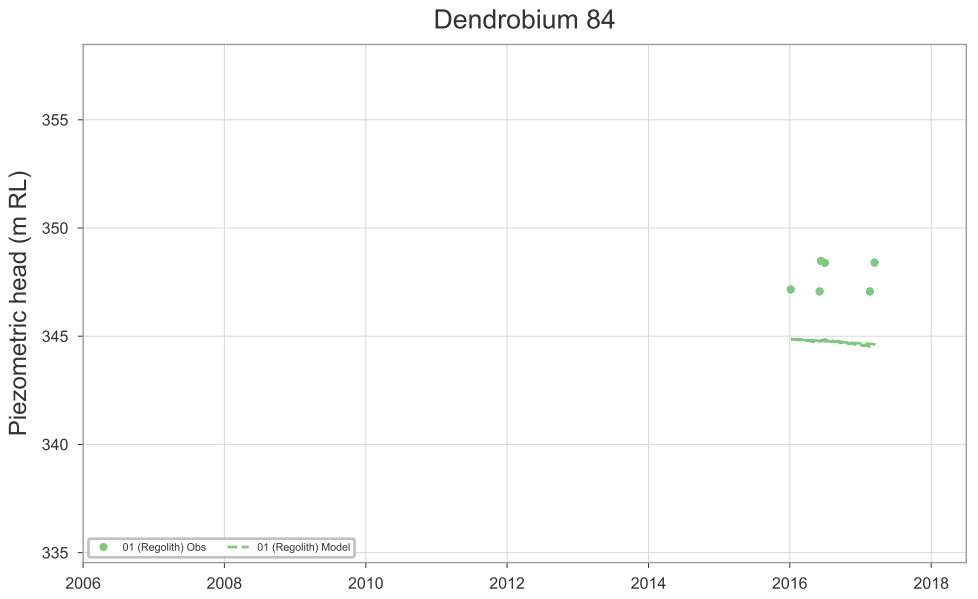

Dendrobium Swamp 23
Piezometric head (m RL)
410
400
390
380
370
360
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model
02 (Swamp) Obs
02 (Swamp) Model

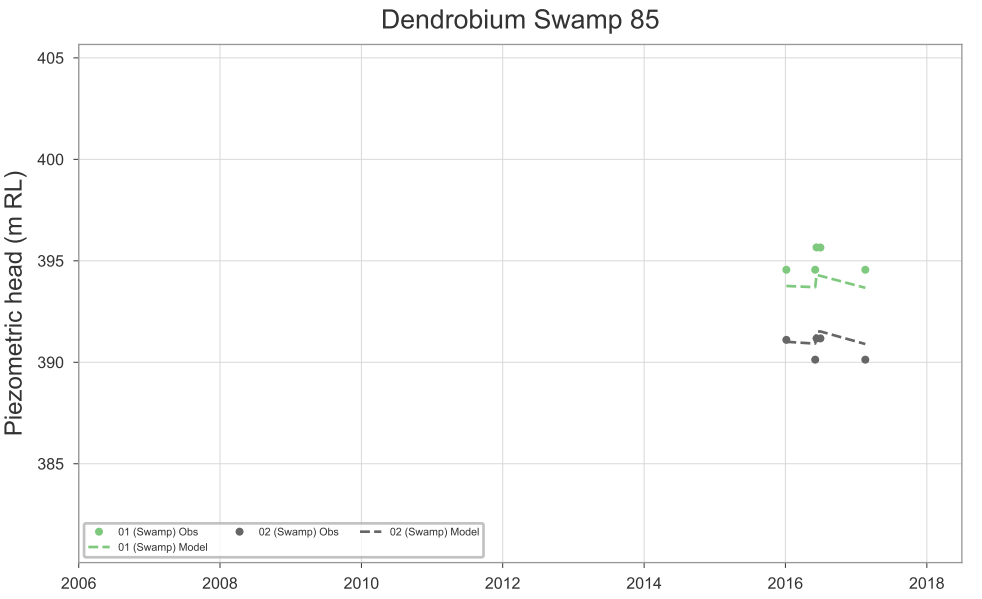

Dendrobium Swamp 25
Piezometric head (m RL)
425.0
422.5
420.0
417.5
415.0
412.5
410.0
407.5
405.0
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model

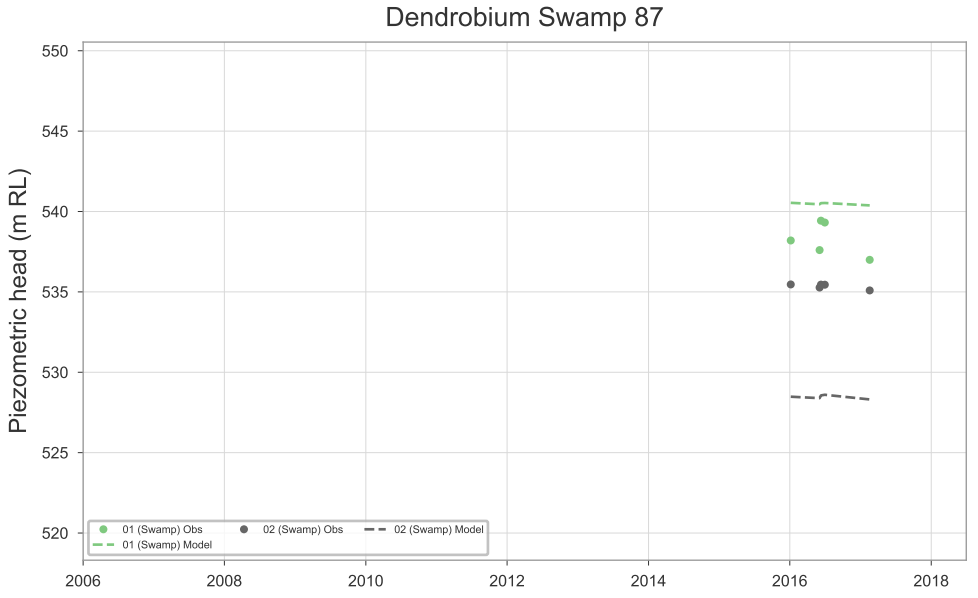

Dendrobium Swamp 33
Piezometric head (m RL)
390
380
370
360
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
03 (Swamp) Obs
03 (Swamp) Model
01 (Swamp) Model

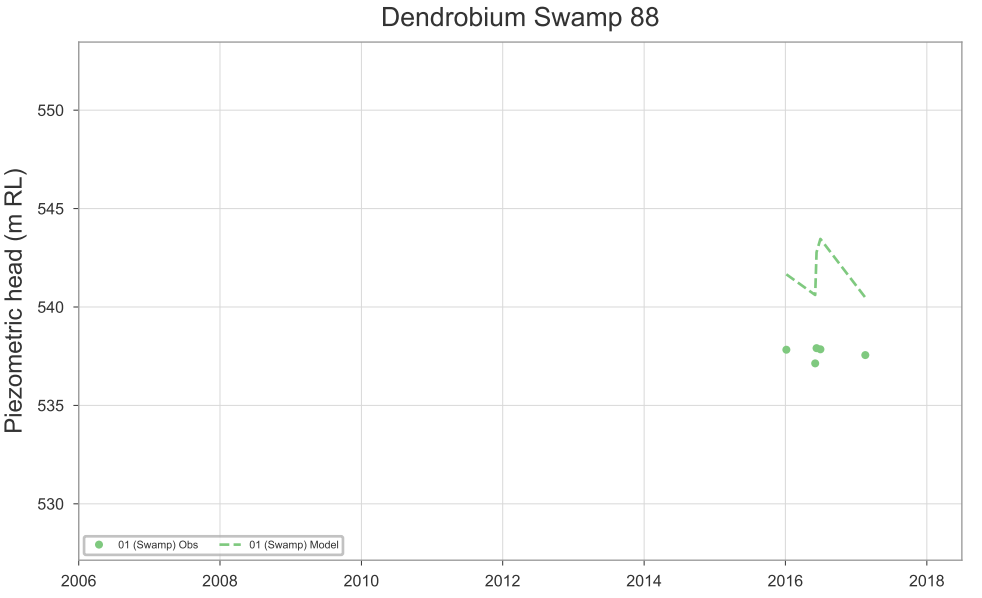

Dendrobium Swamp 35A
Piezometric head (m RL)
390.0
387.5
385.0
382.5
380.0
377.5
375.0
372.5
370.0
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model

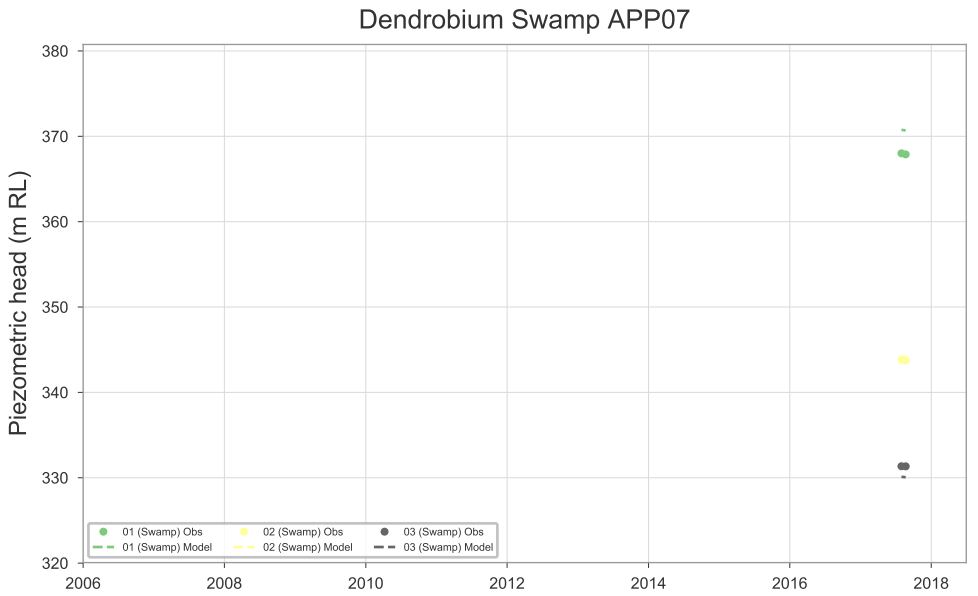

Dendrobium Swamp 35B
Piezometric head (m RL)
375
370
365
360
355
350
345
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model

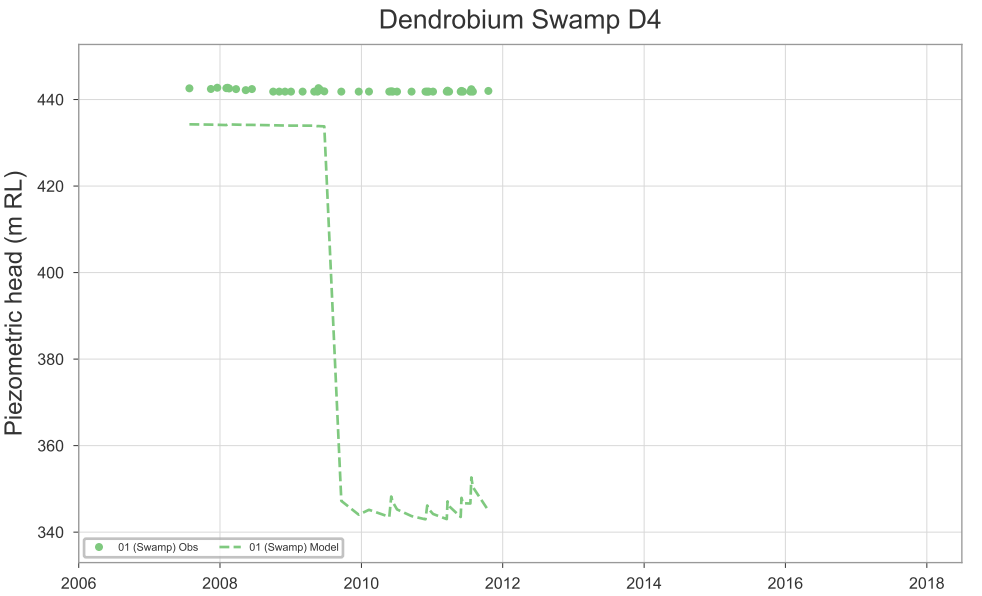

Dendrobium 84
Piezometric head (m RL)
355
350
345
340
335
2006
2008
2010
2012
2014
2016
2018
01 (Regolith) Obs
01 (Regolith) Model


Dendrobium Swamp 85
Piezometric head (m RL)
405
400
395
390
385
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
02 (Swamp) Obs
02 (Swamp) Model
01 (Swamp) Model


Dendrobium Swamp 87
Piezometric head (m RL)
550
545
540
535
530
525
520
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
02 (Swamp) Obs
02 (Swamp) Model
01 (Swamp) Model


Dendrobium Swamp 88
Piezometric head (m RL)
550
545
540
535
530
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model


Dendrobium Swamp APP07
Piezometric head (m RL)
380
370
360
350
340
330
320
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model
02 (Swamp) Obs
02 (Swamp) Model
03 (Swamp) Obs
03 (Swamp) Model


Dendrobium Swamp D4
Piezometric head (m RL)
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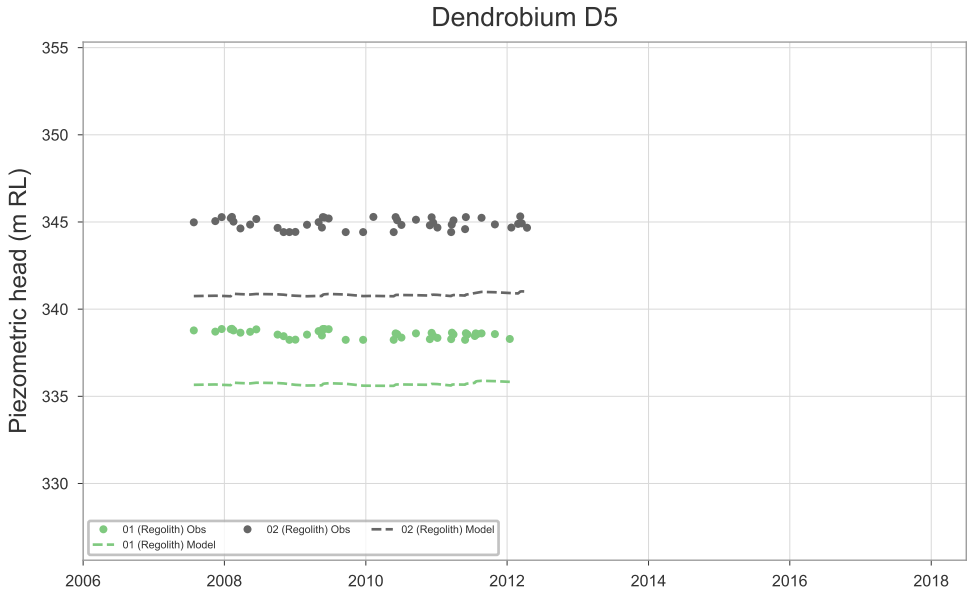
400
380
360
340
2006
2008
2010
2012
2014
2016
2018
01 (Swamp) Obs
01 (Swamp) Model


Dendrobium D5
Piezometric head (m RL)
355
350
345
340
335
330
2006
2008
2010
2012
2014
2016
2018
01 (Regolith) Obs
01 (Regolith) Model
02 (Regolith) Obs
02 (Regolith) Model

APPENDIX J MODEL CONFIDENCE CLASSIFICATION (BARNETT *ET AL*, 2012)

Model Confidence Classification:
Dendrobium Next Domain Groundwater Model.
(Nov, 2018)

Table 2-1: Model confidence level classification—characteristics and indicators

Confidence level classification	*Data*	*Calibration*	*Prediction*	*Key indicator*	*Examples of specific uses*
Class 3	• Spatial and temporal distribution of groundwater head observations adequately define groundwater behaviour, especially in areas of greatest interest and where outcomes are to be reported. • Spatial distribution of bore logs and associated stratigraphic interpretations clearly define aquifer geometry. • Reliable metered groundwater extraction and injection data is available. • Rainfall and evaporation data is available. • Aquifer-testing data to define key parameters. • Streamflow and stage measurements are available with reliable baseflow estimates at a number of points. • Reliable land-use and soil-mapping data available. • Reliable irrigation application data (where relevant) is available. • Good quality and adequate spatial coverage of digital elevation model to define ground surface elevation.	• Adequate validation* is demonstrated. • Scaled RMS error (refer Chapter 5) or other calibration statistics are acceptable. • Long-term trends are adequately replicated where these are important. • Seasonal fluctuations are adequately replicated where these are important. • Transient calibration is current, i.e. uses recent data. • Model is calibrated to heads and fluxes. • Observations of the key modelling outcomes dataset is used in calibration.	• Length of predictive model is not excessive compared to length of calibration period. • Temporal discretisation used in the predictive model is consistent with the transient calibration. • Level and type of stresses included in the predictive model are within the range of those used in the transient calibration. • Model validation* suggests calibration is appropriate for locations and/or times outside the calibration model. • Steady-state predictions used when the model is calibrated in steady-state only.	• Key calibration statistics are acceptable and meet agreed targets. • Model predictive time frame is less than 3 times the duration of transient calibration. • Stresses are not more than 2 times greater than those included in calibration. • Temporal discretisation in predictive model is the same as that used in calibration. • Mass balance closure error is less than 0.5% of total. • Model parameters consistent with conceptualisation. • Appropriate computational methods used with appropriate spatial discretisation to model the problem. • The model has been reviewed and deemed fit for purpose by an experienced, independent hydrogeologist with modelling experience.	• Suitable for predicting groundwater responses to arbitrary changes in applied stress or hydrological conditions anywhere within the model domain. • Provide information for sustainable yield assessments for high-value regional aquifer systems. • Evaluation and management of potentially high-risk impacts. • Can be used to design complex mine-dewatering schemes, salt-interception schemes or water-allocation plans. • Simulating the interaction between groundwater and surface water bodies to a level of reliability required for dynamic linkage to surface water models. • Assessment of complex, large-scale solute transport processes.
Class 2 *Cont'd overleaf*	• Groundwater head observations and bore logs are available but may not provide adequate coverage throughout the model domain.	• Validation* is either not undertaken or is not demonstrated for the full model domain. • Calibration statistics are generally reasonable but may suggest significant errors in parts of the	• Transient calibration over a short time frame compared to that of prediction. • Temporal discretisation used in the predictive model is different from that used in transient	• Key calibration statistics suggest poor calibration in parts of the model domain. • Model predictive time frame is between 3 and 10 times the duration of transient calibration. • Stresses are between 2 and 5 times greater than those	• Prediction of impacts of proposed developments in medium value aquifers. • Evaluation and management of medium risk impacts.

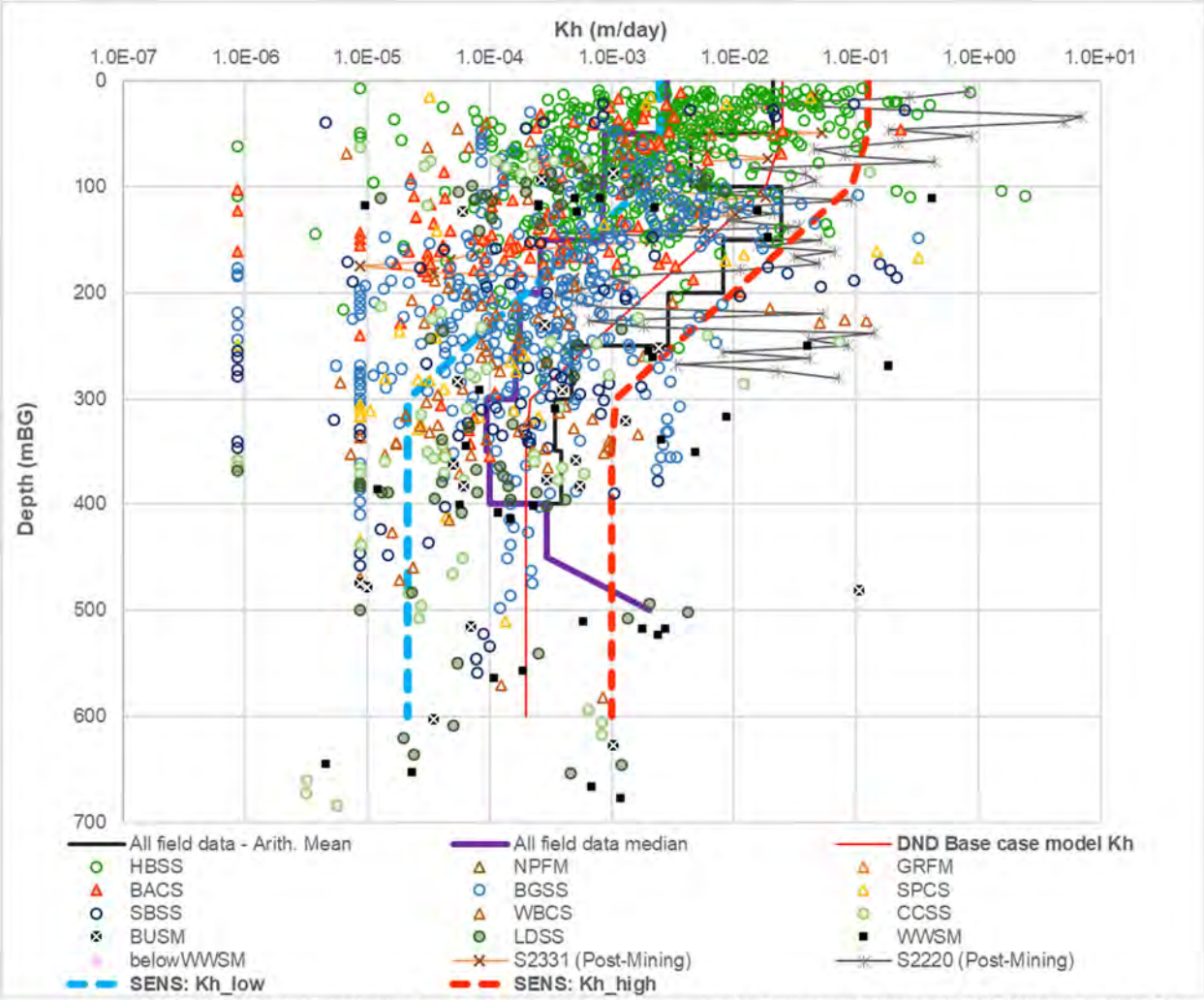
Model Confidence Classification:
Dendrobium Next Domain Groundwater Model.
(Nov, 2018)

Confidence level classification	*Data*	*Calibration*	*Prediction*	*Key indicator*	*Examples of specific uses*
Class 2 *Cont'd*	• Metered groundwater-extraction data may be available but spatial and temporal coverage may not be extensive. • Streamflow data and baseflow estimates available at a few points. • Reliable irrigation-application data available in part of the area or for part of the model duration.	model domain(s). • Long-term trends not replicated in all parts of the model domain. • Transient calibration to historic data but not extending to the present day. • Seasonal fluctuations not adequately replicated in all parts of the model domain. • Observations of the key modelling outcome data set are not used in calibration. e.g. (cannot observe reservoir losses)	calibration. • Level and type of stresses included in the predictive model are outside the range of those used in the transient calibration. • Validation* suggests relatively poor match to observations when calibration data is extended in time and/or space.	included in calibration. • Temporal discretisation in predictive model is not the same as that used in calibration. • Mass balance closure error is less than 1% of total. • Not all model parameters consistent with conceptualisation. • Spatial refinement too coarse in key parts of the model domain. • The model has been reviewed and deemed fit for purpose by an independent hydrogeologist.	• Providing estimates of dewatering requirements for mines and excavations and the associated impacts. • Designing groundwater management schemes such as managed aquifer recharge, salinity management schemes and infiltration basins. • Estimating distance of travel of contamination through particle-tracking methods. Defining water source protection zones.
Class 1	• Few or poorly distributed existing wells from which to obtain reliable groundwater and geological information. • Observations and measurements unavailable or sparsely distributed in areas of greatest interest. • No available records of metered groundwater extraction or injection. • Climate data only available from relatively remote locations. • Little or no useful data on land-use, soils or river flows and stage elevations.	• No calibration is possible. • Calibration illustrates unacceptable levels of error especially in key areas. • Calibration is based on an inadequate distribution of data. • Calibration only to datasets other than that required for prediction.	• Predictive model time frame far exceeds that of calibration. • Temporal discretisation is different to that of calibration. • Transient predictions are made when calibration is in steady state only. • Model validation* suggests unacceptable errors when calibration dataset is extended in time and/or space.	• Model is uncalibrated or key calibration statistics do not meet agreed targets. • Model predictive time frame is more than 10 times longer than transient calibration period. • Stresses in predictions are more than 5 times higher than those in calibration. • Stress period or calculation interval is different from that used in calibration. • Transient predictions made but calibration in steady state only. • Cumulative mass-balance closure error exceeds 1% or exceeds 5% at any given calculation time. • Model parameters outside the range expected by the conceptualisation with no further justification. • Unsuitable spatial or temporal discretisation. • The model has not been reviewed.	• Design observation bore array for pumping tests. • Predicting long-term impacts of proposed developments in low-value aquifers. • Estimating impacts of low-risk developments. • Understanding groundwater flow processes under various hypothetical conditions. • Provide first-pass estimates of extraction volumes and rates required for mine dewatering. • Developing coarse relationships between groundwater extraction locations and rates and associated impacts. • As a starting point on which to develop higher class models as more data is collected and used.

(*Refer Chapter 5 for discussion around validation as part of the calibration process.)

APPENDIX K MODEL PARAMETERS FOR DETERMINISTIC SCENARIO ANALYSIS

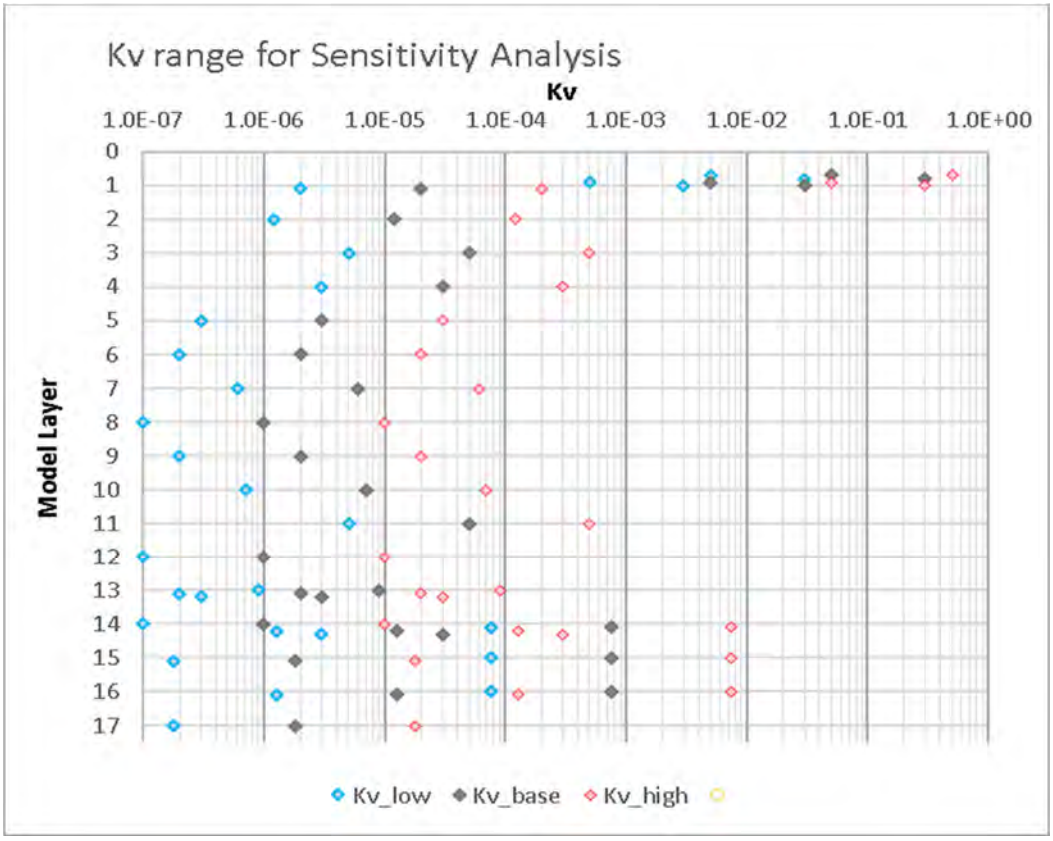
Simulated changes to horizontal hydraulic conductivity Kh.



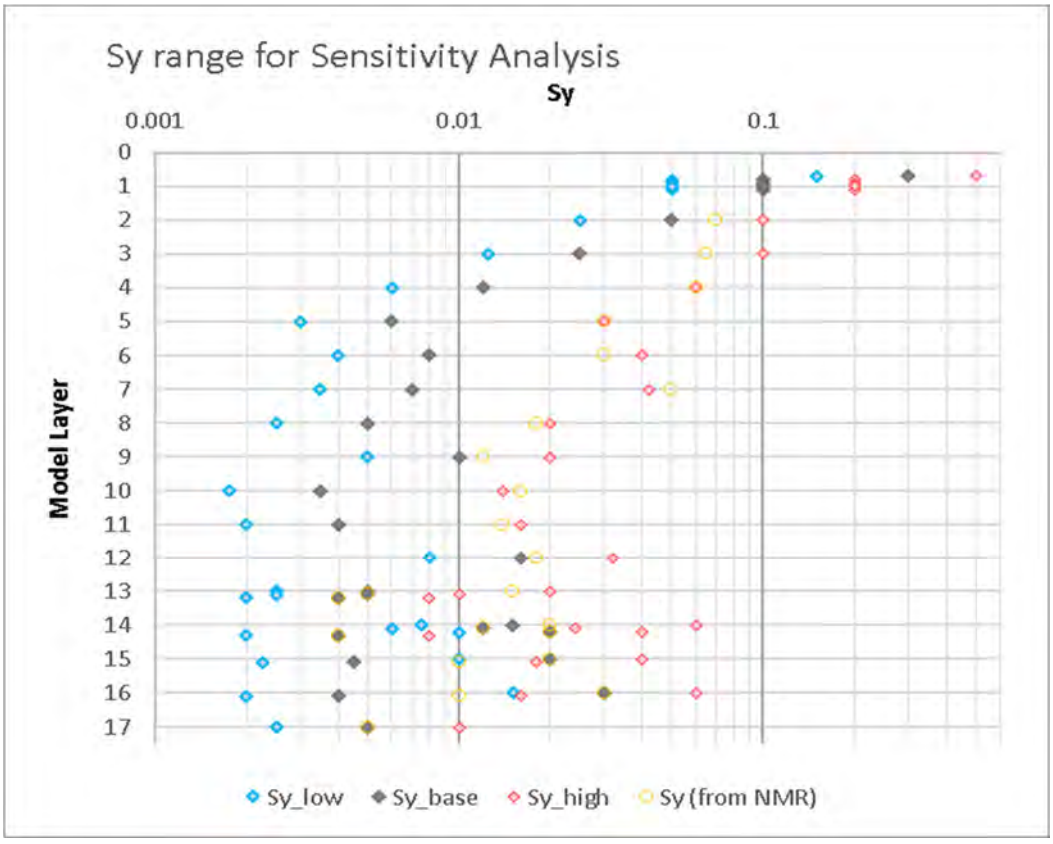
E:\DENDROBIUM\Tech\AquiferProperties\Packer\[Dendrobium_AquiferPropertiesDatabase_20180702.xlsx]Dend_AllData

E:\DENDROBIUM\Model\GWModel\Construction\Properties\DND_Hydraulic properties 4v71.xlsx

Simulated changes to vertical hydraulic conductivity Kv.



Simulated changes to specific yield Sy.



Appendix L WATER SUPPLY WORKS PREDICTED TO BE AFFECTED >2 M DRAWDOWN

Water supply works predicted to be affected >2 m drawdown

			Modelled Maximum Drawdown (at any time); [m] based on the simulation of the following mine development scenarios								
								Sensitivity runs			
GW_Work	Purpose	Aquifer unit	Historical mining (pre-2019)	Future mining (post-2018)	A5, A6	Dendrobium - base case	Cumulative (all mines)	Dendrobium - sens MIN	Dendrobium – sens Median.	Dendrobium - sens MEAN.	Dendrobium - sens MAX
GW007445	Irrigation	HBSS	5.5	76.8	0.1	0.1	82.3	0	0.1	0.1	0.3
GW010459	Irrigation	HBSS (WMFM)	0.2	0	0	0	0.1	0	0	0	0
GW010460	Irrigation	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW010496	Irrigation	HBSS (WMFM)	0.4	0	0	0	0.4	0	0	0	0
GW010584	Unknown	HBSS (WMFM)	0.4	0	0	0	0.3	0	0	0	0
GW010604	Stock & Domestic	HBSS	10.2	0.5	0	0	10.7	0	0	0	0.1
GW010654	Irrigation	HBSS (WMFM)	0.4	0	0	0	0.3	0	0	0	0
GW010779	Water Supply	Shoalhaven	4.8	0.4	0	0.1	5.2	0	0.1	0.1	0.5
GW010968	Water Supply	HBSS (WMFM)	0.2	0	0	0	0.2	0	0	0	0
GW011042	Stock & Domestic	HBSS (WMFM)	0.2	0	0	0	0.2	0	0	0	0
GW011200	Irrigation	HBSS (WMFM)	0.4	0	0	0	0.4	0	0	0	0
GW011738	Water Supply	Shoalhaven	1.3	0.1	0	0	1.4	0	0	0	0.1
GW011918	Water Supply	Shoalhaven	4.7	0.4	0	0	5.1	0	0.1	0.1	0.5
GW012581	Stock & Domestic	Shoalhaven	4.6	0.4	0	0.1	5	0	0.1	0.1	0.5
GW012611	Water Supply	HBSS (WMFM)	0.4	0	0	0	0.4	0	0	0	0
GW012612	Water Supply	HBSS (WMFM)	0.4	0	0	0	0.4	0	0	0	0
GW013023	Water Supply	Shoalhaven	3.4	0.3	0	0.1	3.7	0	0.1	0.1	0.5
GW013282	Irrigation	HBSS (WMFM)	0.4	0	0	0	0.4	0	0	0	0
GW013401	Stock & Domestic	Shoalhaven	5.4	0.4	0	0	5.8	0	0.1	0.1	0.6
GW013626	Water Supply	Shoalhaven	4.8	0.4	0	0	5.2	0	0.1	0.1	0.5
GW013668	Water Supply	Shoalhaven	4.8	0.4	0	0	5.2	0	0.1	0.1	0.5
GW013965	Water Supply	Shoalhaven	4.2	0.3	0	0	4.5	0	0.1	0.2	0.5
GW014262	Stock & Domestic	HBSS (WMFM)	0.2	0.4	0	0	0.6	0	0	0	0
GW015069	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW015090	Stock & Domestic	HBSS (WMFM)	0.2	0.2	0	0	0.4	0	0	0	0
GW015266	Water Supply	Shoalhaven	5	0.3	0	0	5.3	0	0.1	0.1	0.5
GW015549	Water Supply	HBSS	0	0	0	0	0.1	0	0	0	0
GW015789	Water Supply	HBSS	0	0	0	0	0.1	0	0	0	0
GW016480	Stock & Domestic	Shoalhaven	4	0.4	0	0.1	4.4	0	0.1	0.1	0.5
GW016553	Water Supply	HBSS	0.1	0.1	0	0	0.2	0	0	0	0
GW017381	Irrigation	Shoalhaven	4	0.3	0	0.1	4.3	0	0.1	0.1	0.5
GW017768	Water Supply	Shoalhaven	4.7	0.4	0	0.1	5.1	0	0.1	0.1	0.5
GW018568	Irrigation	HBSS	8.6	0.6	0	0	9.2	0	0	0	0.1
GW018800	Water Supply	HBSS	0.6	0	0	0	0.6	0	0	0	0
GW019590	Water Supply	HBSS	2.7	2.8	0	0	5.5	0	0	0.1	0.3
GW024238	Commercial / Indust	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0.1
GW024417	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW024565	Stock & Domestic	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW024623	Stock & Domestic	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW024644	Irrigation	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW025598	Water Supply	HBSS	0.3	0.2	0	0	0.5	0	0	0.1	0.2
GW028270	Stock & Domestic	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW028786	Stock & Domestic	Shoalhaven	4.8	0.4	0	0.1	5.2	0	0.1	0.1	0.5
GW028859	Water Supply	HBSS (WMFM)	0.3	0	0	0	0.3	0	0	0	0
GW029143	Water Supply	HBSS	8.2	0.4	0	0	8.6	0	0	0	0.1
GW031294	Irrigation	HBSS	4.8	19.5	0.1	0.1	24.3	0	0.1	0.1	0.3
GW033916	Water Supply	HBSS (WMFM)	0.2	0	0	0	0.2	0	0	0	0
GW034425	Water Supply	HBSS (WMFM)	0	0	0	0	0	0	0	0	0
GW034518	Irrigation	HBSS	8.4	1.3	0	0	9.7	0	0	0	0.1
GW034687	Unknown	HBSS (WMFM)	0.3	0.1	0	0	0.4	0	0	0	0
GW035033	Stock & Domestic	HBSS	1.8	0.2	0	0	2	0	0	0	0
GW035753	Irrigation	HBSS	19.5	2.9	0	0	22.4	0	0	0	0.1
GW035844	Irrigation	HBSS (WMFM)	0.2	0	0	0	0.2	0	0	0	0
GW037283	Water Supply	Shoalhaven	4.7	0.4	0	0	5.1	0	0.1	0.1	0.5
GW037289	Irrigation	HBSS	15.1	1.3	0	0	16.4	0	0	0	0.1
GW037294	Commercial / Indust	HBSS	1.8	0	0	0	1.8	0	0	0	0
GW037742	Irrigation	HBSS	7.1	0.5	0	0	7.6	0	0	0	0
GW037747	Irrigation	HBSS	0.6	3.3	0.1	0.1	3.9	0	0.1	0.1	0.1
GW037860	Irrigation	HBSS	15	0.7	0	0	15.7	0	0	0	0.1
GW037932	Irrigation	HBSS	2.6	0	0	0	2.6	0	0	0	0
GW038060	Irrigation	HBSS	11.5	0.3	0	0	11.8	0	0	0	0.1
GW038074	Irrigation	HBSS (WMFM)	0.4	0	0	0	0.4	0	0	0	0
GW038451	Water Supply	HBSS	0.2	0.2	0	0	0.4	0	0	0	0.1
GW042537	Irrigation	HBSS	6.1	0.6	0	0	6.7	0	0	0	0
GW042788	Irrigation	HBSS	5	0.6	0	0	5.6	0	0	0	0.1
GW042825	Irrigation	HBSS	3.4	1.3	0	0	4.7	0	0	0	0
GW043690	Water Supply	HBSS	5.7	0.5	0	0	6.2	0	0	0.1	0.2
GW043728	Water Supply	HBSS	0	0	0	0	0.1	0	0	0	0
GW043863	Water Supply	HBSS	8.6	0.6	0	0	9.2	0	0	0.1	0.1
GW045404	Water Supply	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW047037	Irrigation	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW047217	Irrigation	HBSS	0.8	0.2	0	0	1	0	0	0	0
GW047416	Water Supply	HBSS (WMFM)	0.3	0	0	0	0.3	0	0	0	0
GW047817	Irrigation	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW047903	Water Supply	HBSS	9.3	0.3	0	0	9.6	0	0	0	0
GW048563	Unknown	Shoalhaven	3.2	0.4	0	0.1	3.6	0	0.1	0.2	0.5
GW048564	Unknown	Shoalhaven	3.2	0.4	0	0.1	3.6	0	0.1	0.2	0.5
GW049292	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW049516	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW049796	Water Supply	HBSS (WMFM)	0.4	0	0	0	0.4	0	0	0	0
GW050408	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW051877	Stock & Domestic	HBSS	3.1	6	0.1	0.1	9.1	0	0.1	0.1	0.3
GW052016	Stock & Domestic	HBSS	2.5	18	0.1	0.2	20.5	0	0.1	0.1	0.3
GW052540	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW052628	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW053288	Irrigation	HBSS	3.7	0.5	0.3	0.3	4.2	0	0.3	0.3	0.7
GW053294	Irrigation	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW053306	Irrigation	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW053449	Irrigation	HBSS	4.6	14.6	0.1	0.1	19.2	0	0.1	0.1	0.3
GW053450	Irrigation	HBSS	2.3	4.1	0.1	0.1	6.4	0	0.1	0.1	0.4

Water supply works predicted to be affected >2 m drawdown

			Modelled Maximum Drawdown (at any time); [m] based on the simulation of the following mine development scenarios								
								Sensitivity runs			
GW_Work	Purpose	Aquifer unit	Historical mining (pre-2019)	Future mining (post-2018)	A5, A6	Dendrobium - base case	Cumulative (all mines)	Dendrobium - sens MIN	Dendrobium – sens Median.	Dendrobium - sens MEAN.	Dendrobium - sens MAX
GW054146	Water Supply	HBSS	4	26.7	0.1	0.1	30.7	0	0.1	0.1	0.3
GW055146	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW055147	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW055149	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW055154	Water Supply	HBSS (WMFM)	0	0	0	0	0.1	0	0	0	0
GW055918	Water Supply	HBSS (WMFM)	0	0	0	0	0.1	0	0	0	0
GW056095	Water Supply	Shoalhaven	3.4	0.4	0	0.1	3.8	0	0.1	0.2	0.5
GW056632	Water Supply	HBSS (WMFM)	0.1	0.2	0	0	0.3	0	0	0	0
GW056750	Stock & Domestic	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW057274	Stock & Domestic	HBSS	1	0	0	0	1	0	0	0	0
GW057797	Irrigation	HBSS	2	0.3	0	0	2.3	0	0	0	0.1
GW057829	Irrigation	HBSS (WMFM)	0.2	0	0	0	0.2	0	0	0	0
GW057969	Irrigation	HBSS	3.4	6.8	0.1	0.1	10.2	0	0.1	0.1	0.3
GW058634	Water Supply	HBSS	2.9	38.4	0.1	0.1	41.3	0	0.1	0.1	0.3
GW058644	Water Supply	HBSS	0.3	0.3	0	0.1	0.6	0	0.1	0.1	0.2
GW058832	Stock & Domestic	HBSS	4.7	0.8	0.5	0.5	5.5	0	0.5	0.8	2.3
GW059106	Irrigation	HBSS	2.4	1.7	0	0	4.1	0	0	0.1	0.2
GW059311	Irrigation	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW059446	Commercial / Indust	HBSS (WMFM)	0.2	0.2	0	0	0.4	0	0	0	0
GW059618	Water Supply	HBSS	2.1	7.9	0.1	0.1	10	0	0.1	0.1	0.4
GW060205	Irrigation	HBSS (WMFM)	0.3	0	0	0	0.3	0	0	0	0
GW060238	Water Supply	HBSS (WMFM)	0.3	0	0	0	0.3	0	0	0	0
GW062068	Water Supply	HBSS	19	3	0	0	22	0	0	0	0.1
GW062251	Irrigation	Shoalhaven	3.4	0.4	0	0.1	3.8	0	0.1	0.2	0.5
GW062661	Water Supply	HBSS	2.3	1.7	0	0	4	0	0	0.1	0.2
GW063525	Irrigation	HBSS (WMFM)	0.2	0	0	0	0.2	0	0	0	0
GW063732	Water Supply	HBSS	2.7	1	0	0	3.7	0	0	0	0.1
GW064080	Water Supply	HBSS (WMFM)	0.1	0.2	0	0	0.3	0	0	0	0
GW064081	Water Supply	HBSS (WMFM)	0.1	0.2	0	0	0.3	0	0	0	0
GW064083	Water Supply	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW064084	Water Supply	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW064469	Water Supply	HBSS	8.3	0.6	0	0	8.9	0	0	0	0.1
GW064932	Water Supply	HBSS (WMFM)	0.2	0	0	0	0.2	0	0	0	0
GW067570	Water Supply	HBSS (WMFM)	0.3	0	0	0	0.3	0	0	0	0
GW067606	Irrigation	HBSS	2.4	0.2	0	0	2.6	0	0	0	0.1
GW068118	Water Supply	Shoalhaven	3	0.3	0	0.1	3.3	0	0.1	0.2	0.5
GW068119	Irrigation	Shoalhaven	4.6	0.4	0	0.1	5	0	0.1	0.2	0.6
GW070245	Water Supply	HBSS	4.8	19.5	0.1	0.1	24.3	0	0.1	0.1	0.3
GW070979	Unknown	HBSS (WMFM)	0.3	0	0	0	0.3	0	0	0	0
GW072168	Water Supply	HBSS (WMFM)	0	0	0	0	0.1	0	0	0	0
GW072226	Water Supply	HBSS (WMFM)	0.2	0.1	0	0	0.3	0	0	0	0
GW072249	Water Supply	HBSS (WMFM)	0	0	0	0	0	0	0	0	0
GW072298	Water Supply	Shoalhaven	3.6	0.4	0	0.2	4	0	0.2	0.2	0.5
GW072391	Water Supply	HBSS	1.5	0.9	0	0	2.4	0	0	0	0.1
GW072410	Water Supply	Shoalhaven	5	0.4	0	0	5.4	0	0.1	0.1	0.5
GW072432	Water Supply	HBSS	3.1	0	0	0	3.1	0	0	0	0
GW072482	Water Supply	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW072623	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW072887	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW073018	Water Supply	HBSS (WMFM)	0.2	0.2	0	0	0.4	0	0	0	0
GW073406	Water Supply	HBSS (WMFM)	0.3	0	0	0	0.3	0	0	0	0
GW100018	Other	Shoalhaven	3.1	0.4	0	0.1	3.5	0	0.1	0.2	0.5
GW100089	Irrigation	BACS	0.9	0.7	0.1	0.2	1.6	0	0.2	0.3	0.8
GW100198	Water Supply	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0
GW100433	Water Supply	HBSS	3.2	68.8	0.2	0.2	72	0	0.2	0.2	0.5
GW100455	Stock & Domestic	HBSS	3	3.5	0	0	6.5	0	0	0.1	0.3
GW100480	Water Supply	HBSS	4.5	0.7	0	0	5.2	0	0	0.2	0.4
GW100519	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW100562	Irrigation	HBSS	1.7	25.3	0.1	0.1	27	0	0.1	0.1	0.2
GW100721	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW100802	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW101026	Water Supply	HBSS (WMFM)	0.2	0.1	0	0	0.3	0	0	0	0
GW101133	Water Supply	HBSS	3.4	0.3	0	0	3.7	0	0	0	0.1
GW101174	Unknown	HBSS	0	0	0	0	0	0	0	0	0
GW101247	Water Supply	HBSS	1.8	0	0	0	1.8	0	0	0	0
GW101401	Unknown	Shoalhaven	4.6	0.4	0	0.1	5	0	0.1	0.2	0.6
GW101520	Water Supply	HBSS	0.1	0.2	0	0	0.3	0	0	0	0.1
GW101554	Unknown	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW101936	Water Supply	HBSS	2.5	17.9	0.3	0.3	20.4	0	0.3	0.3	0.8
GW102043	Water Supply	BACS	16.6	0.9	0	0.2	17.5	0	0.1	0.1	0.1
GW102045	Water Supply	HBSS	2.9	12.1	0.2	0.3	15	0	0.2	0.3	0.8
GW102084	Water Supply	HBSS	0.2	0.1	0	0	0.3	0	0	0	0.1
GW102179	Irrigation	HBSS	3	15.3	0.2	0.2	18.3	0	0.2	0.3	0.8
GW102289	Commercial / Indust	Shoalhaven	3.4	0.3	0	0.1	3.7	0	0.1	0.2	0.5
GW102344	Irrigation	HBSS	5.2	11.5	0	0	16.7	0	0	0.1	0.2
GW102355	Unknown	HBSS	0.1	0.1	0	0	0.2	0	0	0	0
GW102390	Water Supply	HBSS	5.1	0.1	0	0	5.2	0	0	0	0
GW102418	Water Supply	HBSS (WMFM)	0.1	0.2	0	0	0.3	0	0	0	0
GW102439	Water Supply	HBSS	6.8	0.6	0	0	7.4	0	0	0	0
GW102452	Stock & Domestic	HBSS	1.2	11.8	0.1	0.1	13	0	0.1	0.1	0.2
GW102468	Commercial / Indust	HBSS	0.4	0.6	0	0.1	1	0	0.1	0.1	0.2
GW102478	Water Supply	HBSS	0.9	6.4	0.1	0.1	7.3	0	0.1	0.1	0.2
GW102523	Water Supply	Shoalhaven	4.7	0.4	0	0.1	5.1	0	0.1	0.2	0.5
GW102528	Water Supply	HBSS	3	1.7	1.5	1.6	4.7	0	1.5	2.3	6.3
GW102630	Water Supply	HBSS (WMFM)	0.2	0	0	0	0.2	0	0	0	0
GW102704	Irrigation	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW102706	Commercial / Indust	HBSS	1.3	0	0	0	1.3	0	0	0	0
GW102794	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW102796	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW102798	Irrigation	HBSS	4.9	0.3	0	0	5.2	0	0	0	0.1

Water supply works predicted to be affected >2 m drawdown

			Modelled Maximum Drawdown (at any time); [m] based on the simulation of the following mine development scenarios								
								Sensitivity runs			
GW_Work	Purpose	Aquifer unit	Historical mining (pre-2019)	Future mining (post-2018)	A5, A6	Dendrobium - base case	Cumulative (all mines)	Dendrobium - sens MIN	Dendrobium – sens Median.	Dendrobium - sens MEAN.	Dendrobium - sens MAX
GW103023	Stock & Domestic	HBSS	1.8	14.3	0.1	0.1	16.1	0	0.1	0.2	0.4
GW103036	Water Supply	HBSS	1.2	11.8	0.1	0.1	13	0	0.1	0.1	0.2
GW103235	Water Supply	HBSS	4.1	1.6	0	0	5.7	0	0	0.1	0.2
GW103320	Water Supply	BACS	8	0.9	0	0.1	8.9	0	0.1	0.2	0.6
GW103457	Water Supply	HBSS	0.9	5.5	0.1	0.1	6.4	0	0.1	0.1	0.1
GW103535	Water Supply	HBSS	1.4	1	0	0	2.4	0	0	0	0.1
GW103559	Irrigation	HBSS (WMFM)	0.1	0.2	0	0	0.3	0	0	0	0
GW103615	Water Supply	HBSS	3.4	33.7	0.1	0.1	37.1	0	0.1	0.1	0.3
GW103624	Water Supply	Shoalhaven	4.7	0.4	0	0.1	5.1	0	0.1	0.1	0.5
GW104008	Water Supply	HBSS	5.8	14.3	0.1	0.1	20.1	0	0.1	0.2	0.5
GW104024	Water Supply	HBSS (WMFM)	0	0	0	0	0	0	0	0	0
GW104068	Water Supply	HBSS	4.8	0.3	0	0	5.1	0	0	0	1.2
GW104077	Water Supply	HBSS (WMFM)	0.3	0	0	0	0.3	0	0	0	0
GW104183	Commercial / Indust	HBSS	0.4	0.5	0	0	0.9	0	0	0.1	0.2
GW104323	Water Supply	HBSS	2.9	43.3	0.1	0.1	46.2	0	0.1	0.1	0.3
GW104326	Water Supply	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW104454	Water Supply	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW104499	Water Supply	HBSS	3.7	0.6	0.3	0.4	4.3	0	0.4	0.3	0.8
GW104531	Water Supply	HBSS (WMFM)	0	0	0	0	0.1	0	0	0	0
GW104546	Water Supply	HBSS	2.8	0.2	0	0	3	0	0	0	0.9
GW104558	Water Supply	HBSS	3.6	0.3	0	0	3.9	0	0	0	0.1
GW104565	Water Supply	HBSS	1.7	0.9	0	0	2.6	0	0	0	0.1
GW104577	Water Supply	HBSS	5.1	0.3	0	0	5.4	0	0	0	0
GW104590	Irrigation	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW104633	Water Supply	HBSS	6.1	0.2	0	0	6.3	0	0	0	0
GW104659	Irrigation	HBSS	13	22.9	0	0	35.9	0	0	0.1	0.2
GW104689	Water Supply	HBSS	1.5	11.9	0	0	13.4	0	0.1	0.1	0.1
GW104690	Irrigation	HBSS	6.7	0.4	0	0	7.1	0	0	0	0
GW104720	Water Supply	HBSS	5.7	0.1	0	0	5.8	0	0	0	0
GW104776	Water Supply	Shoalhaven	6.7	0.1	0	0.1	6.8	0	0.1	0.2	0.7
GW104860	Commercial / Indust	HBSS	2.8	3	0.1	0.1	5.8	0	0.1	0.3	0.7
GW105145	Water Supply	HBSS (WMFM)	0.4	0	0	0	0.4	0	0	0	0
GW105148	Water Supply	HBSS	14.8	3.2	0	0	18	0	0	0	0.1
GW105236	Water Supply	HBSS	10.5	0.5	0	0	11	0	0	0	0.1
GW105246	Water Supply	HBSS	12.2	0.2	0	0	12.4	0	0	0	0.1
GW105254	Water Supply	HBSS	22.3	0.9	0	0	23.2	0	0	0	0.1
GW105262	Water Supply	HBSS	1.1	15	0.2	0.2	16.1	0	0.1	0.1	0.2
GW105351	Water Supply	Shoalhaven	5.1	0.4	0	0	5.5	0	0.1	0.1	0.5
GW105356	Water Supply	HBSS	1.2	11.8	0.1	0.1	13	0	0.1	0.1	0.2
GW105395	Water Supply	HBSS	2.7	46.6	0.1	0.1	49.3	0	0.1	0.1	0.3
GW105467	Water Supply	HBSS	8.5	0.5	0	0	9	0	0	0	0.1
GW105494	Water Supply	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0
GW105546	Irrigation	HBSS	10.2	0.7	0	0	10.9	0	0	0	0.1
GW105563	Water Supply	HBSS	0	0	0	0	0	0	0	0	0
GW105577	Irrigation	HBSS	6.7	8.3	0	0	15	0	0.1	0.1	0.4
GW105679	Water Supply	HBSS	2.4	0.1	0	0	2.5	0	0	0	0
GW105699	Water Supply	Shoalhaven	4.8	0.4	0	0.1	5.2	0	0.1	0.2	0.5
GW105735	Water Supply	HBSS	0.7	4.5	0.1	0.1	5.2	0	0.1	0.1	0.1
GW105787	Water Supply	HBSS	1.1	0.3	0	0	1.4	0	0	0	0.1
GW105802	Water Supply	HBSS (WMFM)	0.2	0	0	0	0.2	0	0	0	0
GW105803	Water Supply	HBSS	2.7	5.7	0.2	0.2	8.4	0	0.2	0.3	0.9
GW105813	Water Supply	HBSS	14.9	0.7	0	0	15.6	0	0	0	0.1
GW105821	Water Supply	HBSS	9.4	0.3	0	0	9.7	0	0	0	0.1
GW105827	Irrigation	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0.2
GW105847	Unknown	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0.1
GW105860	Unknown	Shallow (rego., alluv)	0	0	0	0	0	0	0	0.1	0.2
GW105863	Unknown	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0.1
GW105876	Unknown	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0.1
GW105883	Unknown	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0.1
GW105884	Unknown	Shallow (rego., alluv)	0	0	0	0	0	0	0	0.1	0.4
GW105944	Unknown	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0
GW106250	Water Supply	HBSS	3.6	0.6	0	0	4.2	0	0	0.1	0.3
GW106292	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW106546	Water Supply	HBSS	2	2	0	0.1	4	0	0	0.1	0.3
GW106566	Water Supply	HBSS	1	6.8	0.1	0.1	7.8	0	0.1	0.1	0.1
GW106590	Water Supply	HBSS	6.8	12.2	0.1	0.1	19	0	0.1	0.1	0.4
GW106613	Irrigation	HBSS	1.9	13.8	0.1	0.1	15.7	0	0.1	0.1	0.4
GW106628	Water Supply	WBCS	0.3	0	0	0	0.3	0	0	0.1	0.2
GW107011	Water Supply	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW107116	Unknown	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0
GW107117	Unknown	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0
GW107191	Water Supply	Shoalhaven	3.4	0.4	0	0.1	3.8	0	0.1	0.2	0.5
GW107470	Water Supply	HBSS	3.8	2.1	0	0	5.9	0	0	0.1	0.3
GW107525	Water Supply	HBSS	12.2	0.2	0	0	12.4	0	0	0	0.1
GW107654	Other	Shoalhaven	4.7	0.3	0	0	5	0	0.1	0.1	0.5
GW107675	Water Supply	Shoalhaven	5.4	0.5	0	0.1	5.9	0	0.1	0.1	0.6
GW107692	Unknown	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0
GW107727	Water Supply	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0
GW107786	Water Supply	HBSS	0.4	0	0	0	0.4	0	0	0	0
GW107886	Water Supply	HBSS	3.7	4.4	0	0	8.1	0	0	0.1	0.2
GW107918	Water Supply	HBSS (WMFM)	0.2	0	0	0	0.2	0	0	0	0
GW107925	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW108033	Water Supply	Shoalhaven	3.5	0.4	0	0.1	3.9	0	0.1	0.2	0.5
GW108065	Water Supply	WBCS	3.8	0.1	0.3	0	3.9	0	0	0.2	1.1
GW108186	Commercial / Indust	HBSS	0.4	0.5	0	0	0.9	0	0	0.1	0.2
GW108333	Water Supply	Shoalhaven	6.7	0.1	0	0.1	6.8	0	0.1	0.2	0.7
GW108391	Unknown	Shoalhaven	3.1	0.4	0	0.1	3.5	0	0.1	0.2	0.5
GW108392	Unknown	Shoalhaven	3.1	0.4	0	0.1	3.5	0	0.1	0.2	0.5
GW108524	Water Supply	HBSS	0.1	0.1	0	0	0.2	0	0	0	0.1
GW108538	Water Supply	HBSS (WMFM)	0.2	0	0	0	0.2	0	0	0	0

Water supply works predicted to be affected >2 m drawdown

			Modelled Maximum Drawdown (at any time); [m]								
			based on the simulation of the following mine development scenarios								
								Sensitivity runs			
GW_Work	Purpose	Aquifer unit	Historical mining (pre-2019)	Future mining (post-2018)	A5, A6	Dendrobium - base case	Cumulative (all mines)	Dendrobium - sens MIN	Dendrobium – sens Median.	Dendrobium - sens MEAN.	Dendrobium - sens MAX
GW108629	Water Supply	HBSS	2.4	0.1	0	0	2.5	0	0	0	0
GW108842	Irrigation	HBSS	2.6	4.9	0.2	0.2	7.5	0	0.2	0.4	0.9
GW108854	Other	Shoalhaven	3.7	0.3	0	0.1	4	0	0.1	0.1	0.5
GW108922	Commercial / Indust	Shoalhaven	3	0.3	0	0.1	3.3	0	0.1	0.2	0.5
GW108981	Other	HBSS	24	0.8	0	0	24.8	0	0	0.1	0.1
GW109010	Water Supply	HBSS	34.1	1.1	0	0	35.2	0	0.1	0.1	0.2
GW109032	Water Supply	HBSS	2.8	0.5	0	0	3.3	0	0	0	0.1
GW109038	Water Supply	Shoalhaven	4.4	0.3	0	0	4.7	0	0.1	0.2	0.5
GW109153	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW109159	Water Supply	HBSS	5.7	0.4	0	0	6.1	0	0	0	0.1
GW109203	Water Supply	HBSS	8.3	0.3	0	0	8.6	0	0	0	0
GW109224	Water Supply	HBSS	15.6	0.8	0	0	16.4	0	0	0	0.1
GW109257	Water Supply	HBSS	4.4	38.6	0	0	43	0	0	0	0.1
GW109630	Irrigation	HBSS	13.1	1.4	0	0	14.5	0	0	0	0.1
GW109950	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW110215	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW110523	Water Supply	HBSS	7.1	0.2	0	0	7.3	0	0	0	0
GW110613	Water Supply	HBSS	0	0	0	0	0	0	0	0	0
GW110669	Water Supply	HBSS	11.5	3.5	0	0	15	0	0	0	0.1
GW111047	Water Supply	HBSS	5.1	16.4	0.1	0.1	21.5	0	0.1	0.1	0.3
GW111306	Water Supply	HBSS (WMFM)	0	0	0	0	0.1	0	0	0	0
GW111357	Other	HBSS	1.8	14.3	0.1	0.1	16.1	0	0.1	0.2	0.4
GW111415	Irrigation	HBSS	0.3	0.2	0	0	0.5	0	0	0.1	0.2
GW111416	Irrigation	BGSS	2.2	1.8	0.4	0.5	4	0	0.5	0.9	2.8
GW111494	Water Supply	HBSS	0.3	0.3	0	0.1	0.6	0	0.1	0.1	0.2
GW111518	Water Supply	HBSS	1.8	14.3	0.1	0.1	16.1	0	0.1	0.2	0.4
GW111519	Water Supply	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW111520	Water Supply	HBSS (WMFM)	0.1	0	0	0	0.1	0	0	0	0
GW111521	Water Supply	HBSS (WMFM)	0.1	0.1	0	0	0.2	0	0	0	0
GW111669	Water Supply	HBSS	9.5	44.3	0	0	53.8	0	0	0.1	0.2
GW111810	Water Supply	HBSS	5.7	70.8	0	0	76.5	0	0.1	0.1	0.3
GW111828	Irrigation	HBSS	9.2	6.3	0.3	0.4	15.5	0	0.3	0.9	2.4
GW111841	Irrigation	HBSS	7.2	0.3	0	0	7.5	0	0	0	0
GW111842	Irrigation	BGSS	29.9	12.1	1.3	1.4	42	0	1.4	4.3	12.5
GW111955	Water Supply	Shallow (rego., alluv)	0	0	0	0	0	0	0	0	0
GW112415	Water Supply	HBSS	1.7	15	0.2	0.2	16.7	0	0.2	0.2	0.4
GW112437	Water Supply	HBSS (WMFM)	0	0	0	0	0	0	0	0	0
GW112473	Irrigation	HBSS	2.5	21.2	0.1	0.1	23.7	0	0.1	0.1	0.3
GW114441	Water Supply	HBSS	1.3	0	0	0	1.3	0	0	0	0