Cadia Annual Review 2022-2023

Surface Water Assessment

Cadia Holdings Pty Limited

13 September 2023

→ **The Power of Commitment**

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Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	0	T. Hopwood	M. Kay	[signature]	S. Gray	[signature]	13/09/2023

Executive summary

GHD Pty Ltd were engaged by Cadia Holdings Pty Limited (CHPL) to undertake an assessment of surface water quality to meet internal and annual reporting requirements for the 2022-2023 reporting period.

Surface water quality for the reporting period as well as historical data have been assessed based on key zones at the Cadia Valley Operations (CVO) site. The findings of these assessments are summarised below.

Upper Cadiangullong Creek

The water quality results for Upper Cadiangullong Creek indicates a potential impact of historical mining in the catchment. The influence of the historical mine adit seepage at CAWS3 is evident in the results from the 2022-2023 reporting period, with this site exhibiting higher salinity and water hardness than other monitoring sites and a distinct ionic composition. Water at CAWS3 also contained elevated concentrations of cadmium, cobalt, copper, manganese, molybdenum, nickel and zinc, with the majority of these metals observed in concentrations in excess of the relevant ANZG (2018) DGVs.

The monitoring data indicate that, with the exception of copper, and to a lesser extent, zinc, these elevated metal concentrations are spatially confined to site CAWS3, with no impact observed downstream in Cadiangullong Creek. Copper concentrations remained slightly elevated above the ANZG (2018) DGV downstream at CAWS79 during the reporting period, though concentrations of both metals are many times lower at CAWS79 than CAWS3. This suggests there has been no clear impact of the historical mine adit evident on the concentration of these parameters at the nearest downstream Cadiangullong Creek monitoring site.

Only copper and cobalt were elevated at CAWS2, located adjacent to the mine adit in Cadiangullong Creek, but were low at background creek sites 412168, CAWS0 and 412144.

Cadia Hill Pit

Water quality at CAWS65 is reflective of tailings decant water monitoring in 2022-2023, showing stable water quality over the reporting period, with the exception of an increasing trend observed in molybdenum concentrations. Molybdenum concentrations, however, remained low at CAWS79, the next site downstream in Cadiangullong Creek. As such, there was no observable impact from tailings deposition on surface water quality downstream in Cadiangullong.

Ore Processing Area

During the 2022-2023 reporting period, CAWS73 (the Site Runoff Pond (SROP)) showed elevated EC and concentrations of nutrients, most major ions, and molybdenum, compared to other Ore Processing Area sites. The SROP is a zero-discharge stormwater runoff dam that captures water from ore processing and other disturbed areas, where poor water quality is expected.

Concentrations of all water quality parameters were similar between the sites upstream (CAWS79) and downstream (CAWS78) of the Ore Processing Area, indicating no discernible impact to downstream water quality from the Ore Processing Area.

Waste Rock Dumps

The water quality within the Waste Rock Dump leachate dams (CAWS34 and CAWS35) demonstrates elevated concentrations of many parameters, compared to both ANZG (2018) DGVs and all other Waste Rock Dump area sites. These include nitrate, major ions calcium, magnesium and sulfate, and metals cadmium, manganese, nickel, selenium and zinc.

In times of high rainfall, increased pumping of TSF decant water to Rodds Creek Dam (operating as a zero-discharge water storage dam) occurs, which has potentially contributed to the elevated molybdenum concentrations observed at Rodds Creek Dam (CAWS52) during the reporting period and historically.

Downstream monitoring results at 412161 show little influence of waste rock leachate on Cadiangullong Creek water quality. Although copper concentrations were consistently elevated above the DGV at 412161 during the reporting period, this may not indicate influence from the Waste Rock Dump leachate dams, as copper concentrations at 412161 were similar to or lower than those observed at upstream Cadiangullong Creek site CAWS78 during each sampling event of the reporting period.

TSF Eastern Zone

Comparison of the major ion compositions of the Tailings Storage Facility (TSF) Eastern Zone sites indicated that there is no clear influence of the decant ponds on surface water in the dyke pond (CAWS60), although it is possible that increasing concentrations of copper and molybdenum observed during the reporting period may be attributable to seepage and/or increases in groundwater levels. However, the dyke pond is part of the mine's internal water system and cannot discharge off site due to its location, and as such, there is no water quality impact from these water sources on the downstream environment in Cadiangullong Creek.

TSF Western Zone

Surface water quality at sites CAWS67, CAWS68, CAWS69, CAWS72 and CAWS76 is characterised by an elevated and distinct ionic composition, dominated by the sulfate ion. These sites, excepting CAWS72, also showed elevated concentrations of molybdenum compared to other sites within the TSF Western Zone, suggesting potential influence of the TSF and waste rock embankments on the surface water storages. However, there is no indication of elevated molybdenum concentrations at CAWS61 on Cadiangullong Creek which is the nearest downstream receptor for any potential water quality impact from the Western Zone of the TSFs.

Overall, while it appears that there is an influence of waste rock runoff/drainage from TSF embankments at a seepage monitoring location and two dams to the west of the TSFs, this influence appears to be limited spatially, and to be fully contained in surface water bodies from which water is recovered for re-use. Therefore, the TSFs do not appear to be having an adverse impact on the water quality of the receiving watercourse in the Western Zone.

TSF Southern Zone

The surface water monitoring sites CAWS31 and CAWS41, which represent a mix of background groundwater and seepage from the STSF, showed elevated molybdenum concentrations over the reporting period, although these concentrations were within historical levels. Most molybdenum concentrations recorded during the 2022-2023 reporting period were below the ANZG (2018) DGV of 0.034 mg/L. Water at these sites is fully contained and returned to the processing plant for reuse, so therefore does not currently pose a further risk to downstream receiving waters. There are no other concerning results at other surface water monitoring locations within the TSF Southern Zone.

No impact of seepage from the STSF on water quality was evident in the receiving environment at site 412702, based on the monitoring records for key parameters associated with the TSF decant water, including nitrogen oxides, molybdenum and major ion composition.

Blayney Dewatering Facility

Water quality at the Blayney Dewatering Facility (BDF) monitoring locations has been generally stable, with few temporal trends observed. While there were some historical spatial trends apparent, these are no longer evident, with similar variability in water quality parameters generally observed at both monitoring locations.

Cadia Dewatering Facility

The potential influence of the Cadia Dewatering Facility (CDF) on water quality had previously been observed at the now decommissioned on-site monitoring location closest to the CDF (CDW02), based on elevated concentrations of copper and molybdenum in excess of the ANZG (2018) default toxicant guidelines for freshwaters. However, water quality at CDF discharge point site CDW05 has been generally much improved compared to that at historical sites CDW01 and CDW02, with low concentrations of most metals. Similarly, water quality at downstream Belubula River site CDW04 is generally improved compared to that at upstream site CDW03, indicating no observable impact on the receiving environment from the CDF.

Site Specific Guideline Value (SSGV) Assessment

The Cadia Water Management Plan specifies SSGVs for five surface water monitoring sites (412702, CAWS63, CAWS10, 412166, 412167). Results for the reporting period for these sites have been compared against the relevant SSGVs, and exceedances have been detailed in this report. The details of the level one investigations undertaken by CHPL, and the outcomes and recommendations from the investigations have been included in this report.

– SSGV exceedances occurred at 412702 during the reporting period, although none were attributed to CVO. Exceedances of aluminium, copper, iron and nutrients were also observed upstream of the mine area and are likely to be the result of agricultural land uses and/or the lithology of the catchment.
– SSGV exceedances occurred at CAWS63 during the reporting period, although these appear to have been isolated incidents and are not likely to be attributable to influences from mining.
– SSGV exceedances occurred at CAWS10, although there are no clear pathways for mine derived pollutants to impact on this creek system. Aluminium and nitrogen concentrations are also elevated upstream in the catchment.
– SSGV exceedances occurred at 412166 and 412167, although are considered to be outside of the area of impact of the mine. The observed exceedances are attributed to either runoff from agricultural lands or increased sedimentation from above average rainfall.

Overall, SSGV exceedances did not pose a risk to downstream water users with respect to aquatic ecosystems, livestock, and short-term irrigation beneficial uses.

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1. Introduction

1.1 Background

Cadia Valley Operations (CVO) is a gold and copper mining and processing operation. CVO is located approximately 25 km south west of Orange, in the central tablelands of NSW. Cadia Holdings Pty Limited (CHPL) is the owner and operator of CVO and is a wholly owned subsidiary of Newcrest Mining Limited (Newcrest). CHPL operates under six Mining Leases (ML): ML1405, ML1449, ML1472, ML1481, ML1689 and ML1690.

The site comprises the Cadia Hill open cut (commenced in 1998 and completed in 2013), the Ridgeway underground mine (commenced in 2002) and the Cadia East underground mine (commenced in 2012). The site also maintains two waste rock emplacements (the rehabilitated North Waste Rock Dump (NWRD) and the active South Waste Rock Dump (SWRD)), as well as the Northern Tailings Storage Facility (NTSF) and Southern Tailings Storage Facility (STSF) which commenced in 1998 and 2002, respectively. Newcrest also operates the Cadia Dewatering Facility located approximately 23.5 km to the east of CVO in the town of Blayney.

The NTSF is currently offline following failure of a section of the NTSF on 9 March 2018, with tailings placed in the Cadia Hill Pit since this time. The Ridgeway operations were placed into care and maintenance in March 2016. Cadia East is a panel cave mining operation to extract approximately 450 million tonnes (Mt) of ore over a period of 21 years, with current approvals taking the project through to June 2031. The ore body contains gold, copper and other trace metals.

Land use in the vicinity of CVO is dominated by sheep and cattle grazing in the more gently undulating areas, and private and state forestry operations to the north and east.

GHD Pty Ltd (GHD) were engaged by CHPL to undertake an assessment of surface water quality to meet internal and annual reporting requirements for the 2022-2023 reporting period. The 2022-2023 reporting period extends from 1 July 2022 to 30 June 2023.

This report presents a review of surface water monitoring data and an assessment of potential impacts from CVO on receptors. The report compares the results for the 2022-2023 reporting period to those from previous years and identifies any long-term trends.

For reporting, CVO have separated the surface water monitoring locations into discrete zones that incorporate potential sources of pollution and receptors such as local creeks. All surface water monitoring sites are shown in Figure 1.1. The zones and their respective figures showing surface monitoring sites are listed in Table 1.1.

Table 1.1 Water management zone figures

Zone	Figure
Upper Cadiangullong Creek and Cadia Hill Pit	Figure 3.1
Ore Processing Area	Figure 3.8
Waste Rock Dumps	Figure 3.12
Tailings Storage Facilities	Figure 3.18
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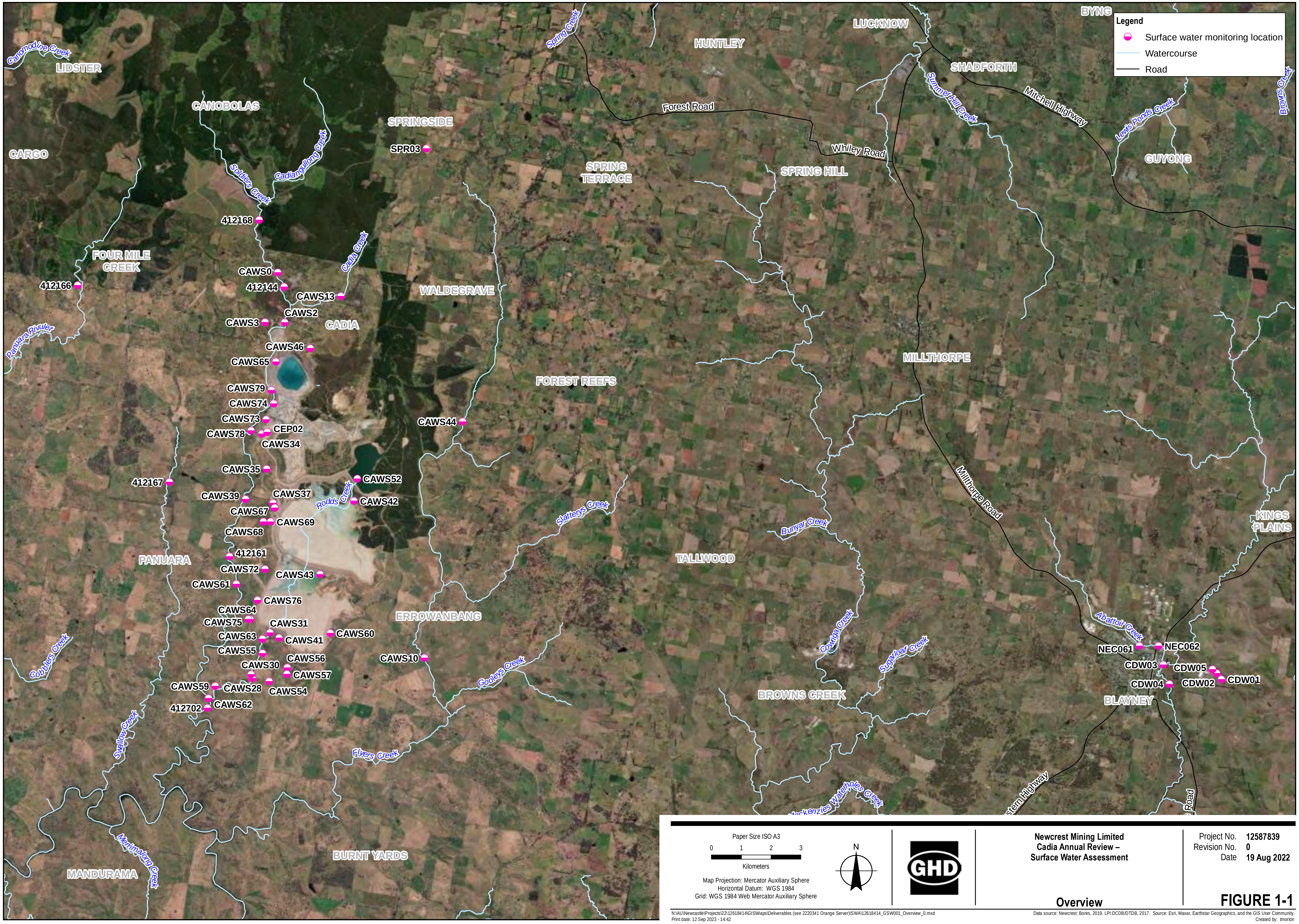
Legend
Surface water monitoring location
Watercourse
Road
LIDSTER
Canomodine Creek
CANOBOLAS
CARGO
SPRINGSIDE
SPR03
Spring Creek
HUNTLEY
LUCKNOW
BYNG
SHADFORTH
Forest Road
Whiley Road
Summer Hill Creek
Mitchell Highway
Lewis Ponds Creek
Browns Creek
GUYONG
SPRING TERRACE
SPRING HILL
Soldiers Creek
Cadiangullong Creek
412168
FOUR MILE CREEK
412166
Cadia Creek
CAWS0
412144
CAWS13
CAWS2
CAWS3
CADIA
WALDEGRAVE
Panuara Rivulet
CAWS46
CAWS65
CAWS79
CAWS74
CAWS73
CEP02
CAWS78
CAWS34
CAWS44
FOREST REEFS
MILLTHORPE
CAWS35
CAWS52
412167
CAWS39
CAWS37
Rodds Creek
CAWS42
CAWS67
CAWS69
CAWS68
Millthorpe Road
Slatterys Creek
Bunyar Creek
KINGS PLAINS
412161
PANUARA
TALLWOOD
CAWS72
CAWS43
CAWS61
CAWS76
CAWS64
CAWS75
ERROWANBANG
CAWS31
CAWS63
CAWS41
CAWS60
CAWS55
CAWS56
CAWS10
CAWS30
CAWS57
CAWS59
CAWS28
CAWS54
CAWS62
412702
Cobblers Creek
Gooleys Creek
Coombing Creek
Sugarloaf Creek
Abattoir Creek
NEC061
NEC062
CDW03
CDW05
CDW01
CDW04
CDW02
BLAYNEY
BROWNS CREEK
Swallow Creek
Flyers Creek
Mackenzies Waterholes Creek
Mandurama
BURNT YARDS
Merrimalong Creek
MANDURAMA
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Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere
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Cadia Annual Review –
Surface Water Assessment
Overview
Project No. 12587839
Revision No. 0
Date 19 Aug 2022
FIGURE 1-1
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Created by: tmorton

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The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

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The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

2. Environmental conditions

2.1 Topography

CVO is situated within and around the Cadiangullong Creek Valley. The Cadiangullong Creek Valley is generally orientated from north to south with elevations within the mining lease boundaries ranging from approximately 1,000 m AHD in the northeast down to 450 m AHD in the southwest.

2.2 Climate

Cadiangullong Creek Valley has a temperate climate characterised by hot, dry summers and cold winters. The rainfall is influenced by topography and generally increases with elevation and decreases with lower land elevation.

Historical rainfall and evaporation data have been used to investigate any potential influences on monitoring results over the period.

2.2.1 Rainfall

For this assessment, historical rainfall data have been obtained from the Bureau of Meteorology (BOM 2023). Monthly data is the total of all available daily rainfall data for each calendar month (and includes all forms of precipitation such as rain, snow and hail) and has undergone quality assurance processes through the BOM.

Historical data have been obtained from BOM station 63113 Orange (Angullong) which is located approximately 12.7 km south-west from CVO. This station was selected based on its proximity to the site and length and quality of data.

The historical data period extends from July 1965 to June 2023. The statistics for this dataset are:

- Minimum annual rainfall of 288.6 mm in 1982
- Average annual rainfall of 756.2 mm
- Median annual rainfall of 764.9 mm
- Maximum annual rainfall of 1,159.0 mm in 2010

Rainfall during the 2020 to 2022 period was above average, after a three-year period (2017-2019) of below average rainfall.

Rainfall data over the 2022-2023 reporting period was provided by Newcrest from the Southern Lease Boundary weather station.

Total rainfall over the 2022-2023 reporting period was 1,010.2 mm, which is just below the 90th percentile of rainfall in the area. The minimum monthly rainfall total occurred in May 2023, where 18.6 mm of rainfall was received. The monthly maximum received during the reporting period occurred in October 2022, where 145.4 mm was recorded.

A graphical comparison of site monthly rainfall data between the 2022-2023 reporting period and long-term monthly average historical data from BOM station 63113 Orange (Angullong) is presented in Figure 2.1. Precipitation during the reporting period was above the historical average in August to November 2022, as well as in February to April 2023. In all other months, rainfall was below the long-term monthly average historical data.

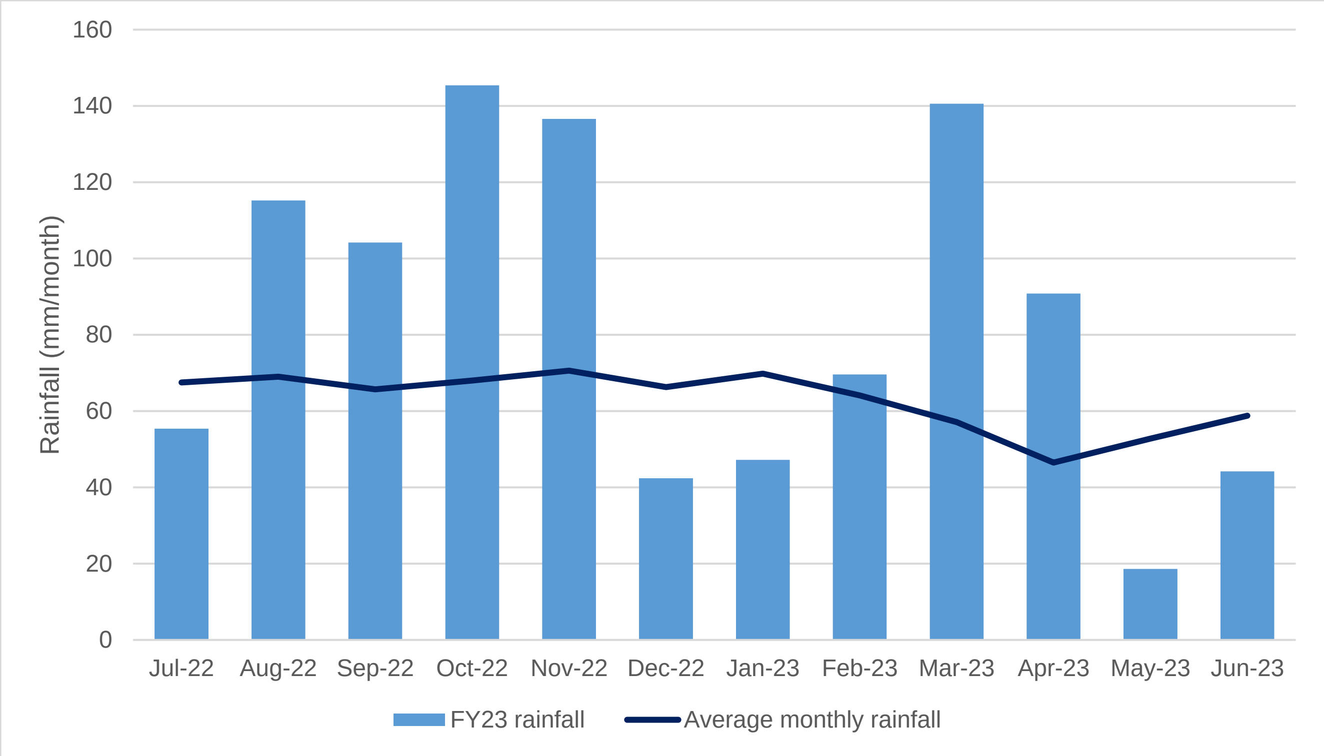


Figure 2.1 ***Comparison of long term monthly average historical (BOM) and 2022-2023 reporting period (site) rainfall data***

2.2.2 Evaporation

Grid point data have been obtained from the Scientific Information for Land Owners (SILO) database operated by the Queensland Department of Science, Information Technology and Innovation. SILO grid point data is based on historical data from nearby BOM stations with data consisting entirely of interpolated estimates from the station's observations. Evaporation data has been sourced from SILO grid point data at a location nearest to CVO at SILO grid reference point -33.45 N, 149.00 E.

Historical monthly evaporation data for January 1960 to June 2023 have been obtained. Statistics for this data set include:

– Minimum annual evaporation of 1,030.7 mm in 2022
– 10^{th} percentile annual evaporation of 1,186.9 mm
– Average annual evaporation of 1,390.6 mm
– Median annual evaporation of 1,390.7 mm
– Maximum annual evaporation of 1,714.1 mm in 1982

Total annual evaporation during the 2022-2023 reporting period was 1,131.4 mm, which was less than the 10^{th} percentile of historical results average at this site. The minimum evaporation during this period occurred in June 2023, with a total of 30.3 mm, while the maximum occurred in January 2022, with a total of 172.5 mm.

A graphical comparison of site monthly total rainfall, and SILO evaporation data over the reporting period is shown in Figure 2.2. Evaporation at CVO exceeded the monthly rainfall totals in months of December 2022, and January February, March and May 2023. During these months, evaporation from surface water catchments is greater than rainfall into the catchments. In other months, rainfall replenished surface water catchments. Overall, total evaporation (1,131.4 mm) exceeded total rainfall (1,010.2 mm) over the 2022-2023 reporting period.

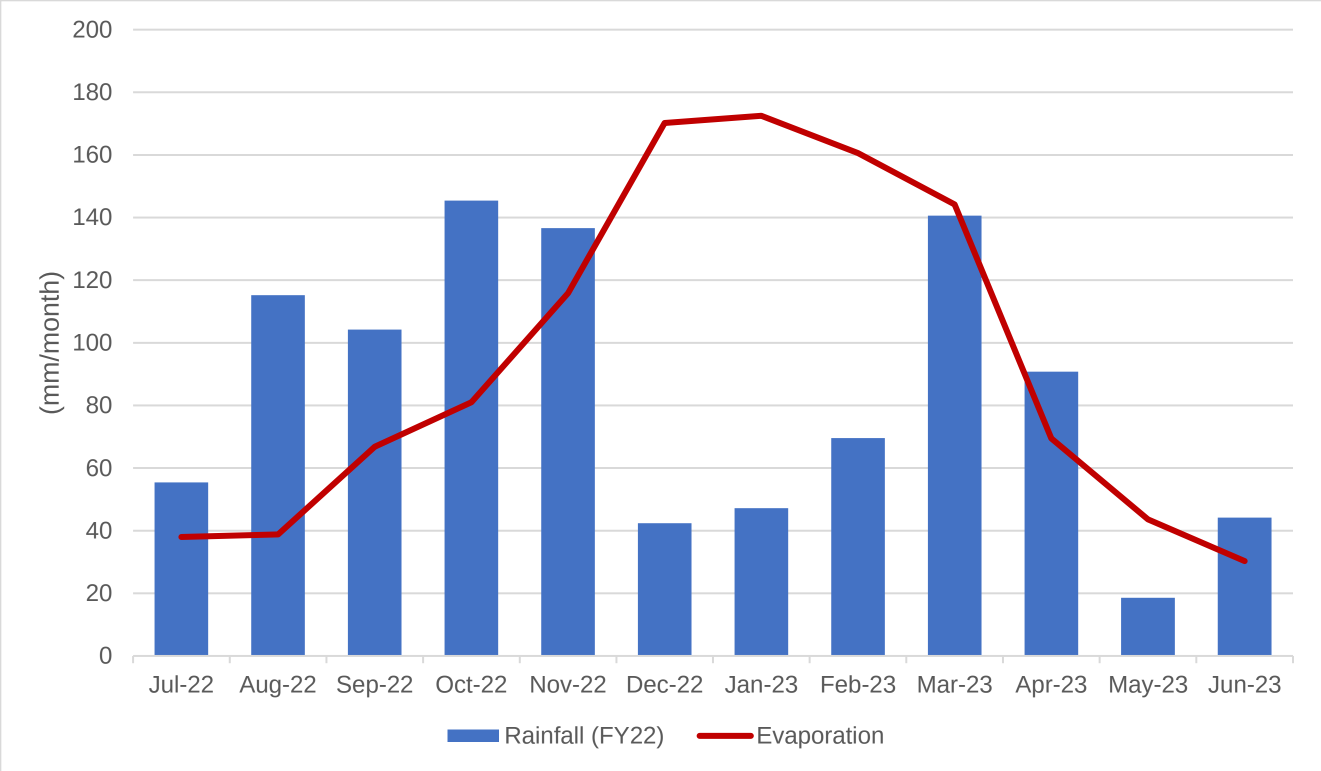


Figure 2.2 Comparison of rainfall and evaporation during 2022-2023 reporting period

2.3 Surface water catchments

There are potential interactions between CVO and the surface water catchments of Flyers, Cadiangullong, Swallow and Diggers Creeks, within which the dominant land use is agriculture.

At the northern end of the Cadiangullong Creek Valley are Mt Canobolas and Mt Towac, which are situated within the confines of Canobolas State Forest. From here, the headwaters of the Cadiangullong Creek begin. Cadiangullong Creek flows north to south through the CVO mining lease area, passing to the west of the Tailings Storage Facilities (TSFs), before discharging into the Belubula River which is located approximately 14 km downstream of the CVO southern lease boundary. The Belubula River forms part of the Lachlan River catchment.

The TSFs are located along Rodds Creek, a tributary of Cadiangullong Creek. Rodds Creek flows into Cadiangullong Creek about 2.5 km downstream of the STSF embankment.

Swallow Creek and Diggers Creek lie to the west of CVO. Flyers Creek flows along the eastern extent of CVO. These creek systems are also tributaries of the Belubula River. These catchments are not directly impacted by CVO's operations, with the only potential influences of the site being changes to groundwater baseflows, and reduced surface flows in Flyers Creek due to licensed extractions. Land use within the catchments is dominated by agriculture.

2.4 Geology

The geology of CVO's mining areas contains copper-gold mineralisation. These rocks are mainly of Ordovician and Silurian age. CVO is situated within the eastern Lachlan Fold Belt of NSW. The Lachlan Fold Belt is divided into northerly trending metamorphic, volcanic and sedimentary belts intruded by numerous igneous rocks.

Near the Rodds Creek catchment, in which the TSFs are located, the basement rocks are overlain by Quaternary alluvial soils. The basement rocks comprise shale, siltstone and mudstone (of Silurian age) in the north and Ordovician volcanics, dominated by volcanoclastic rocks of andesitic composition in the south. Tertiary basalt outcropping is evident in the northern part of the CVO boundary.

3. Surface water assessment

3.1 Monitoring locations

Surface water quality monitoring and assessment of data is undertaken in accordance with the Newcrest Mining Limited, Cadia Water Management Plan (WMP) (CHPL 2019). Monitoring at CVO commenced in 1994 and the program has been continually expanded since then. Surface water quality sampling points include locations along Cadiangullong Creek, Flyers Creek, Diggers Creek and Swallow Creek, and at multiple locations across the mine site. Water quality monitoring is routinely conducted at these locations at either monthly or quarterly intervals as per the WMP requirements. Water quality parameters were selected based on the potential mining operation contaminants as identified in the Cadia East Geochemistry Assessment (Mesh Environmental 2009).

Surface water monitoring locations are grouped by zones, which are defined by physical location, potential source of contamination and surrounding watercourse impact. Table 3.1 shows the site identification and purpose and/or description of each surface water quality monitoring site and the mine area zone. Time series surface water quality graphs are presented in Appendix A and have been analysed to assess whether mine operations or external environmental and/or neighbouring operations have influenced the surface water monitoring results.

Notable increasing and decreasing trends in analyte results are identified and discussed for each area in the following sections. Watercourse monitoring sites are compared against the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) default guideline values (DGVs) for 95% species protection in freshwaters to assess the potential for offsite environmental impact. These DGVs are shown in Table 3.2. Surface water storages or sites impacted by historical seepages are assessed based on trends given that their purpose is to contain potentially contaminated water from operational seepages or runoff.

Water quality results that show no change in trend or results that are less the ANZG (2018) guidelines have generally not been discussed in this report.

Table 3.1 Surface water monitoring sites

<table>
<tr><th>Zone</th><th>Site ID</th><th>Purpose / Description</th></tr>
<tr><td rowspan="5">Upper Cadiangullong Creek</td><td>412168</td><td>Background water quality reference location located upstream from Cadiangullong Dam</td></tr>
<tr><td>CAWS0</td><td>Water quality for process raw water. Furthest upstream surface water monitoring location on Cadiangullong Creek</td></tr>
<tr><td>CAWS2</td><td rowspan="2">Potential for impact from historical mining activities located along Cadiangullong Creek</td></tr>
<tr><td>CAWS3</td></tr>
<tr><td>412144</td><td>Water quality discharging or spilling from Cadiangullong Dam and upstream of active mine operations areas</td></tr>
<tr><td>Cadia Hill Pit</td><td>CAWS65</td><td>Cadia Hill Pit. TSF decant water quality</td></tr>
<tr><td rowspan="3">Ore Processing Area</td><td>CAWS73</td><td>Site Runoff Pond</td></tr>
<tr><td>CAWS78</td><td>Potential for impact from open pit and Ore Processing Area</td></tr>
<tr><td>CAWS79</td><td>Potential for impact from open pit. Background reference location for Ore Processing Area impact</td></tr>
<tr><td rowspan="5">Waste Rock Dumps</td><td>412161</td><td>Potential for impact from mining, processing & Southern Waste Rock Dumps (SWRDs)</td></tr>
<tr><td>CAWS34</td><td rowspan="2">Monitor development of leachate water quality from Waste Rock Dumps</td></tr>
<tr><td>CAWS35</td></tr>
<tr><td>CAWS37</td><td>Monitor for potential seepage impacts from SWRD and NTSF</td></tr>
<tr><td>CAWS52</td><td>Water quality in the mixed water storage dam (Rodds Creek Dam)</td></tr>
</table>

Zone	Site ID	Purpose / Description
TSF Eastern Zone	CAWS42	Monitor development of TSF decant water quality. Used to determine potential impacts of the TSF on surface and/or groundwater quality
	CAWS43	
	CAWS60	Assess potential for seepage contributions on eastern side of southern TSF
TSF Western Zone	CAWS61	Potential impact from mining, processing and TSF
	CAWS62	
	CAWS64	Assess any influence of TSF on surrounding groundwater quality
	CAWS67	Monitor for potential for seepage impacts on the western side of the NTSF and STSF
	CAWS68	
	CAWS69	
	CAWS72	
	CAWS75	
	CAWS76	
TSF Southern Zone	CAWS28	Assess the impact of TSF on surface water quality in Rodds Creek (tributary of Cadiangullong Creek)
	CAWS54	Assess the impact of TSF on surface water quality in Rodds Creek (tributary of Cadiangullong Creek)
	CAWS55	
	CAWS56	
	CAWS57	
	CAWS59	
	CAWS30	
	CAWS63	
	CAWS31	Assess the influence of STSF water on groundwater contributing to base flow in creek
	CAWS41	
	412702	Assess potential impacts from entire site (most downstream monitoring location in Cadiangullong Creek)
Cadia Dewatering Facility	CDW01	Assess potential impact from the new Dewatering Facility – Newbridge Rd
	CDW02	
	CDW03	
	CDW04	
	CDW05	
Blayney Dewatering Facility	NEC061	Upstream water quality
	NEC062	Assess potential residual impact from the decommissioned and remediated Blayney Dewatering Facility

Table 3.2 ANZG (2018) DGVs used in this assessment

Toxicants	ANZG (2018) DGV (mg/L)
Aluminium	0.055
Arsenic	0.013
Cadmium	0.0002
Chromium	0.001
Copper	0.0014
Lead	0.0034
Manganese	1.9
Nickel	0.011
Selenium	0.011
Silver	0.00005
Zinc	0.008

3.2 Upper Cadiangullong Creek

Upper Cadiangullong Creek runs from the Cadiangullong Dam to the Cadia Hill Pit. This reach of the creek adjoins ore processing facilities, office areas, the Cadia Extended Pit and the Cadia Hill Pit, as well as historical mining areas to the west of the creek line which all present potential sources of pollution. Cadia Creek meets Cadiangullong Creek within this reach.

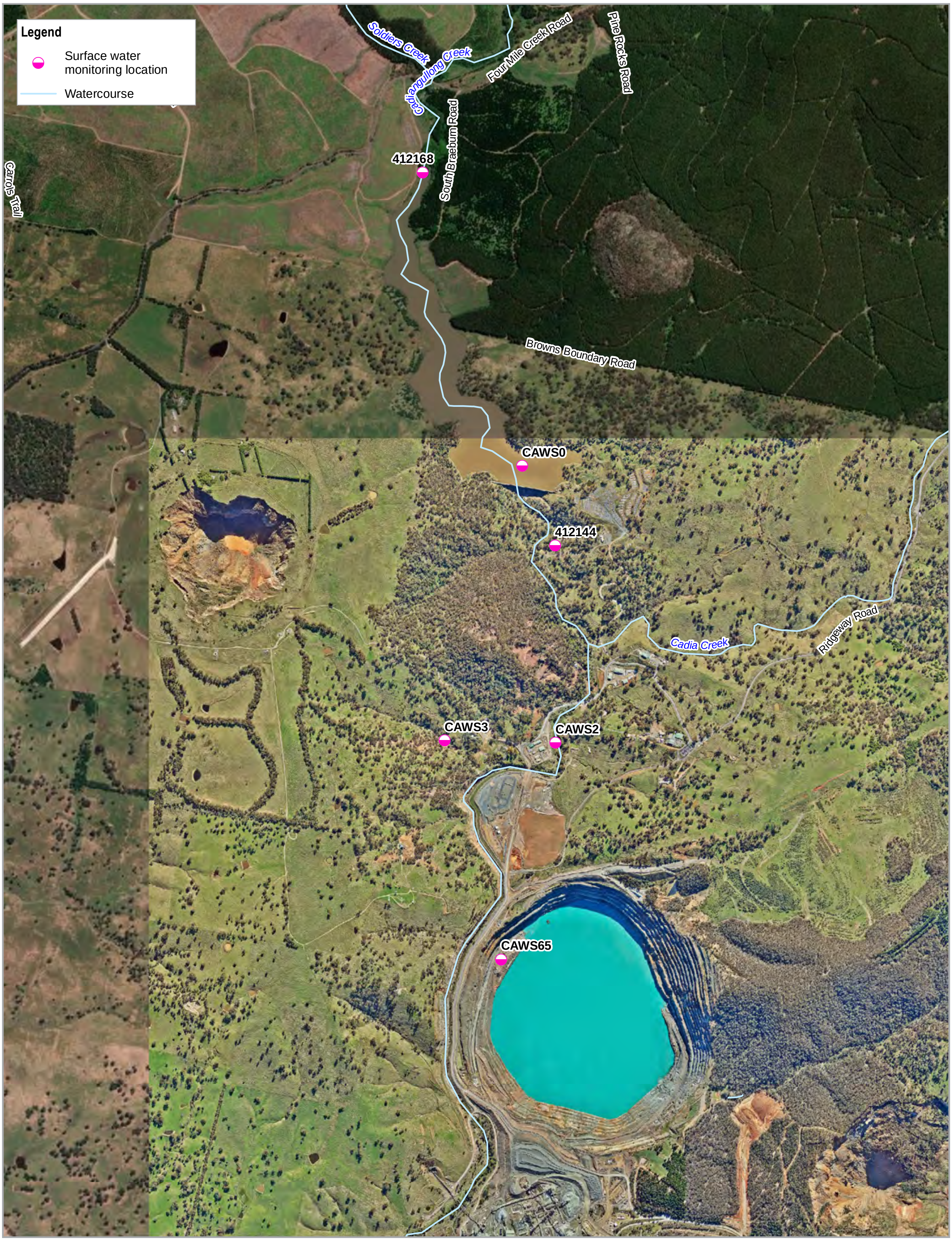
The focus of assessment is identifying potential impacts from mine derived pollutants on the creek as a receptor.

The following surface water sites are within the Upper Cadiangullong Creek area:

- 412168, which is upstream of Cadiangullong Dam
- CAWS0, which is a site on Cadiangullong Dam
- 412144, which is on Cadiangullong Creek downstream of the dam
- CAWS2, which is on Cadiangullong Creek downstream of the dam and the confluence of Cadia Creek, and upstream of the Cadia Extended Pit
- CAWS3, an historical mine adit

The locations of these sites are shown in Figure 3.1.

CAWS3 results have been excluded from the historical analysis for the period from July 2019 to June 2020, as the samples were inadvertently collected from an incorrect location. The correct surface water monitoring location was sampled from July 2020.



Paper Size ISO A4

0 250 500 750

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Newcrest Mining Limited
Cadia Annual Review –
Surface Water Assessment

Project No. **12618414**
Revision No. **0**
Date **02 Aug 2023**

Cadia Hill Pit and Upper Cadiangullong Creek

FIGURE 3-1

Data source: Newcrest: Bores, 2019. LPI: DCDB/DTDB, 2017. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: pkiem, fmackay, tmorton

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3.2.1 Physicochemical parameters

Field pH recorded in Upper Cadiangullong Creek was variable during the reporting period at CAWS3. After the lowest pH was recorded at the site to date in November 2022 (pH 5.7), pH increased consistently to a high of 7.9 in June 2023. The pH at all other sites was more consistent over time and compared to historical results.

Field electrical conductivity (EC) was consistently elevated at CAWS3 compared to other sites, with most values between 1,000 and 1,500 µS/cm during the reporting period (Figure 3.2). The elevated EC results were within the historical range of values and indicate seepage from the historical mine adit. An increasing trend in EC at CAWS3 was evident between August 2021 and January 2022. Values stabilised from March 2022 at around 1,250 µS/cm and have remained close to this since this time. EC results at other Upper Cadiangullong Creek sites were much lower, ranging from 41 µS/cm to 153 µS/cm during the reporting period. EC at these sites generally increased slightly with direction downstream in Cadiangullong Creek.

Total suspended solids (TSS) concentrations were frequently highest at CAWS3 during the reporting period, and lower at the stream sites, where most results were at or below the laboratory limit of reporting (LOR).

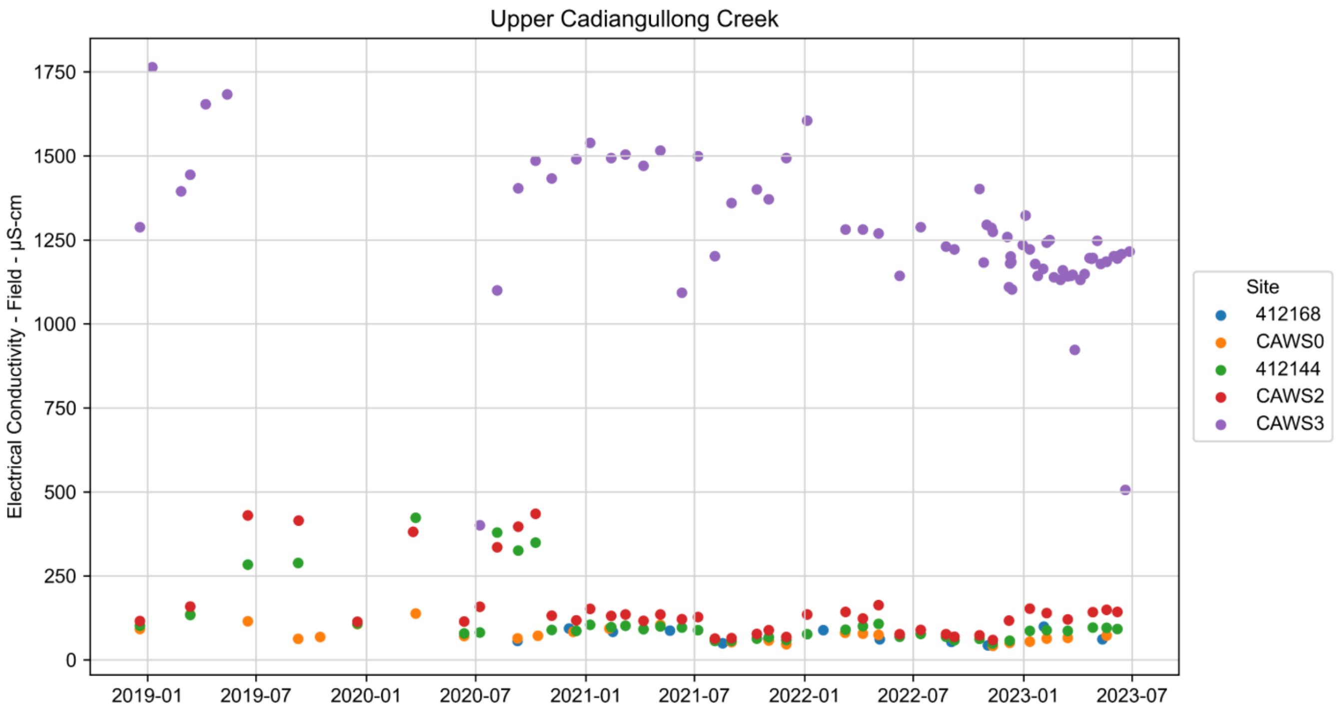

Figure 3.2 EC concentrations in the Upper Cadiangullong Creek Area

3.2.2 Nutrients

Nutrient concentrations were consistent with historical values at all monitoring sites in Upper Cadiangullong Creek during the 2022-2023 reporting period. There have been no temporal trends in nutrient concentrations observed in the Upper Cadiangullong Creek area in recent years. Concentrations of all nutrients were generally the lowest at CAWS3.

3.2.3 Major ion composition

Concentrations of most major ions were notably higher at CAWS3 than at other Upper Cadiangullong Creek sites during the 2022-2023 reporting period. Concentrations of bicarbonate alkalinity and chloride demonstrated an increasing trend at CAWS3 throughout the reporting period, while sulfate demonstrated a decreasing trend. The elevated major ion concentrations at CAWS3 are likely attributable to seepage from the historical mine adit.

Concentrations of all major ions were low at the remaining sites during the 2022-2023 reporting period, as has been the case across the historical monitoring period.

The piper plot in Figure 3.3 shows the ionic composition of Upper Cadiangullong Creek sites during the historical monitoring period, based on calculations of the median concentrations of each major ion for each time period. The ionic composition of water at 412168, CAWS0, 412144 and CAWS2 are similar, demonstrating a mixed cation composition and a dominance of the bicarbonate anion. The ionic composition at CAWS3 is notably different, with less dominance of the sodium ion than at all other sites, as well as sulfate dominance, indicating a distinct source of water at this site.

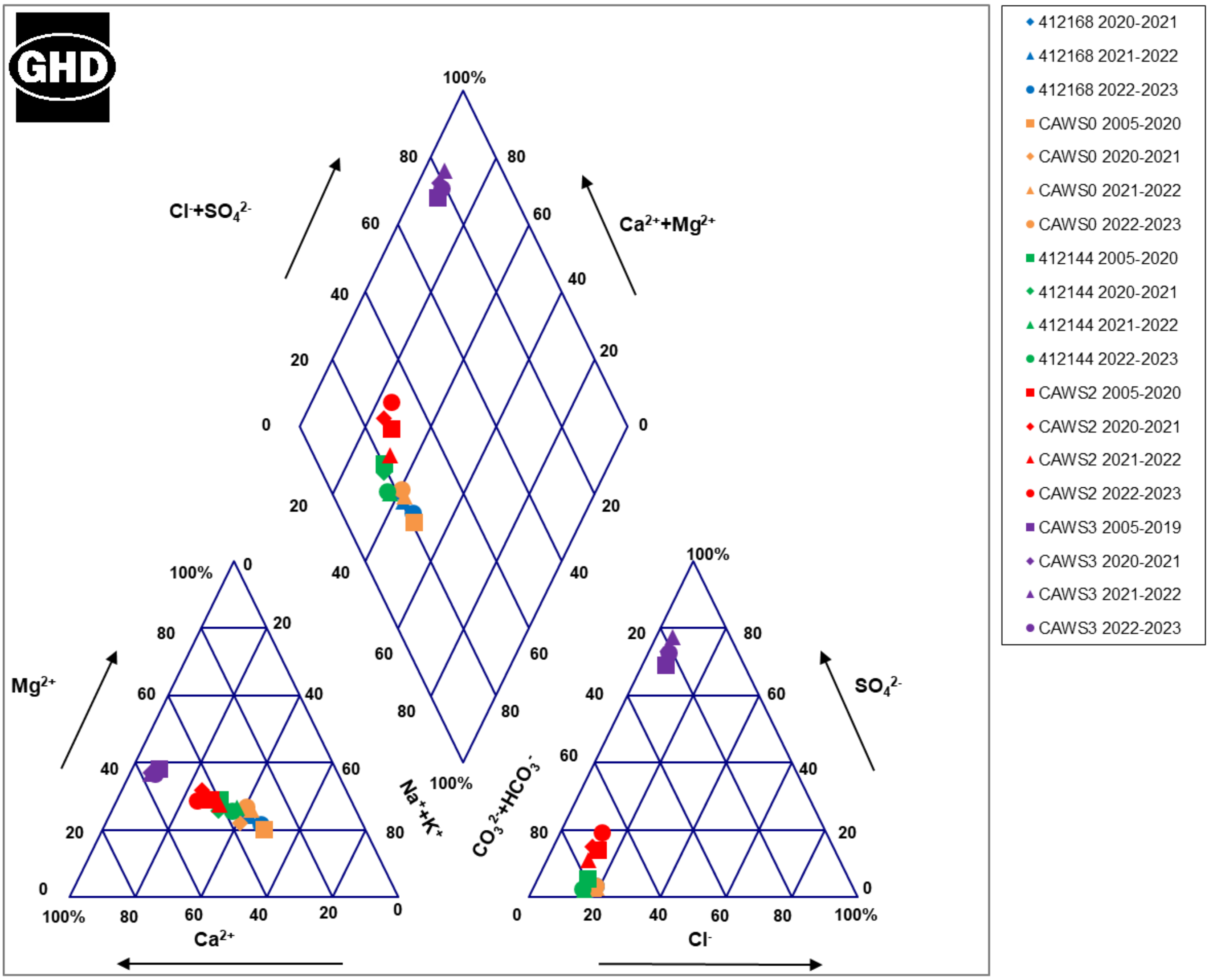

Figure 3.3 Piper chart showing differences in major ion composition at Upper Cadiangullong Creek sites

3.2.4 Dissolved metals

Cadmium, nickel and zinc concentrations at CAWS3 were elevated and consistently higher than the relevant ANZG (2018) DGV during the 2022-2023 reporting period. These elevated metals concentrations are likely to reflect the influence of seepage from the historical mine adit. Concentrations of these metals peaked at CAWS3 in November 2022, before steadily decreasing during the remainder of the reporting period. No elevated dissolved metal concentrations were observed at the other Upper Cadiangullong Creek sites. The majority of dissolved cadmium, nickel and zinc concentrations at these locations were at or below the LOR, suggesting no influence from the mine adit.

Copper concentrations were elevated at CAWS3 and CAWS2 compared to the other sites during the reporting period (refer Figure 3.4). A historically high copper concentration of 26 mg/L was recorded at CAWS3 in November 2022, which was notably higher than the ANZG (2018) DGV of 0.0014 mg/L. Copper concentrations at CAWS3 decreased steadily for the remainder of the reporting period and were below 1 mg/L in June 2023. Copper concentrations at CAWS2 were also elevated above background levels (observed at 412168, CAWS0 and 412144) during the monitoring period. Although all copper concentrations at CAWS2 were within the historical range (0.01 to 0.29 mg/L), all results were above the ANZG (2018) DGV, suggesting the possibility of adverse impacts to aquatic organisms in Cadiangullong Creek.

Concentrations of manganese were the highest at CAWS3 during the reporting period, although all results were below the ANZG (2018) DGV of 1.9 mg/L. Manganese concentrations at CAWS3 also demonstrated a minor decreasing trend from the highest results observed in November 2022. Molybdenum was also higher at CAWS3 than at all other Upper Cadiangullong Creek sites, where most results were at or below the LOR.

Historically high concentrations of cobalt were recorded intermittently at CAWS2 between 2017 and 2020, however, concentrations observed during the two most recent reporting periods were generally lower than those at CAWS3. As with the previously mentioned metals, cobalt was also highest at CAWS3 in November 2022, before demonstrating a consistent decreasing trend across the remainder of the reporting period.

In contrast to most other metals, concentrations of aluminium and iron were lowest at CAWS3 during the 2022-2023 reporting period, which is consistent with historical results. All aluminium concentrations recorded during the reporting period at all sites except CAWS3 exceeded the ANZG (2018) DGV of 0.055 mg/L, suggesting naturally elevated aluminium concentrations in the local lithology or other influences within the catchment unrelated to CVO.

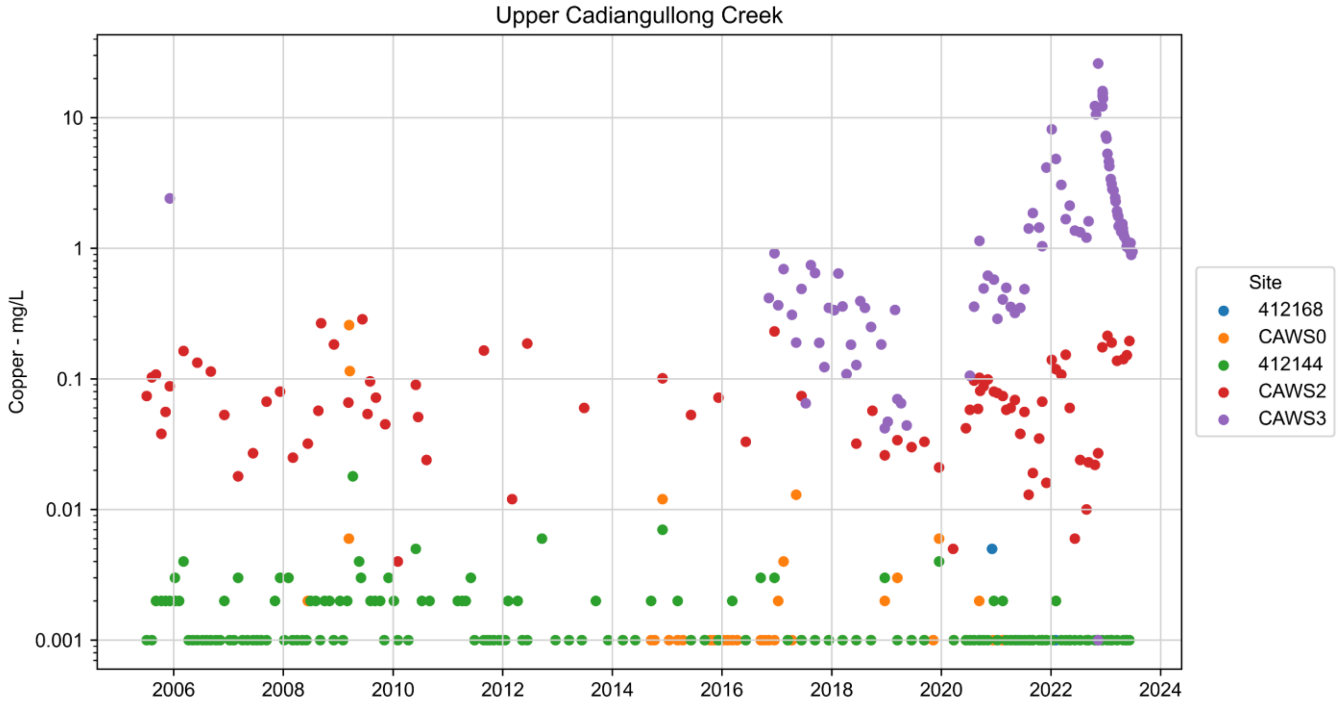

Figure 3.4 Copper concentrations in the Upper Cadiangullong Creek Area

3.2.5 Summary

The water quality results for Upper Cadiangullong Creek indicate a potential impact of historical mining in the catchment. The influence of the historical mine adit seepage at CAWS3 is evident in the results from the 2022-2023 reporting period, with this site exhibiting higher EC and water hardness than other monitoring sites and a distinct ionic composition. Water at CAWS3 also contained elevated concentrations of cadmium, cobalt, copper, manganese, molybdenum, nickel and zinc, with the majority of these metals observed in concentrations in excess of the relevant ANZG (2018) DGVs.

The monitoring data indicate that, with the exception of copper, and to a lesser extent, zinc, these elevated metal concentrations are spatially confined to site CAWS3, with no impact observed at the nearest downstream Cadiangullong Creek monitoring site (CAWS79) (see Section 3.4 and Figure 1.1). Copper concentrations remained elevated above the ANZG (2018) DGV downstream at CAWS79 during the reporting period, indicating a potential impact from CAWS3 upstream. Despite this, concentrations of both copper and zinc were notably lower at CAWS79 than CAWS3. At CAWS79, the maximum copper concentration observed during the reporting period was 0.057 mg/L (June 2023), compared to 26 mg/L at CAWS3 (November 2022), while the majority of zinc concentrations at CAWS79 were below the LOR, and the highest observed concentration was 0.032 mg/L (February 2023), compared to a high of 2.58 mg/L observed at CAWS3 (November 2022).

The very high concentrations of many parameters observed at CAWS3 in November 2022 did not persist, with all decreasing consistently from this time to within the usual range of results.

Only copper and cobalt were elevated at CAWS2, located adjacent to the mine adit in Cadiangullong Creek, but were low at background creek sites 412168, CAWS0 and 412144.

3.3 Cadia Hill Pit

Operations at the Cadia Hill Pit ceased in 2012 and the pit is currently being used for tailings disposal from which water is reclaimed.

In March 2018, a failure of a section of the Northern Tailings Storage Facility (NTSF) led to a modification of the Cadia East Project Approval to allow the deposition of tailings in the Cadia Hill Pit up to 713 m AHD. Baseline pit pond chemistry and background groundwater samples were analysed to enable assessment of any potential impacts from placing tailings in the Cadia Hill Pit.

Since the start of deposition (4 May 2018) the pit decant pond level has risen by approximately 337 metres, of which there are approximately 38 metres of water, with the balance being tailing deposition.

Surface water is monitored in the Cadia Hill Pit area at site CAWS65 (shown in Figure 3.1), which monitors the TSF decant pond water. This represents process water within the mine’s closed process water system.

3.3.1 Physicochemical parameters

Field pH has typically remained pH circumneutral to slightly alkaline, with the majority of observations recorded between 7.6 and 8.6. The highest pH result at CAWS65 was observed in July 2022, however, all pH results for the remainder of the 2022-2023 reporting period were within the historical range.

EC in the pit steadily increased from approximately 2,000 µS/cm to 4,000 µS/cm between March and December 2019. In March 2020, EC began to decline. EC has remained relatively stable since August 2020, ranging between 2,200 µS/cm and 2,800 µS/cm, including all observations in the 2022-2023 reporting period. These results are likely due to the dry conditions experienced in the area up to early-2020, followed by above average rainfall.

Elevated TSS concentrations (representing suspended tailings) were observed in the pit at site CAWS65 following the initial deposition of tailings, with concentrations regularly exceeding 100 g/L up until June 2019. TSS concentrations since this time have generally reduced to concentrations less than 600 mg/L. All TSS results from 2021 to 2023 have remained were below 100 mg/L, reflecting low suspended tailings in the decant water pond (Figure 3.5).

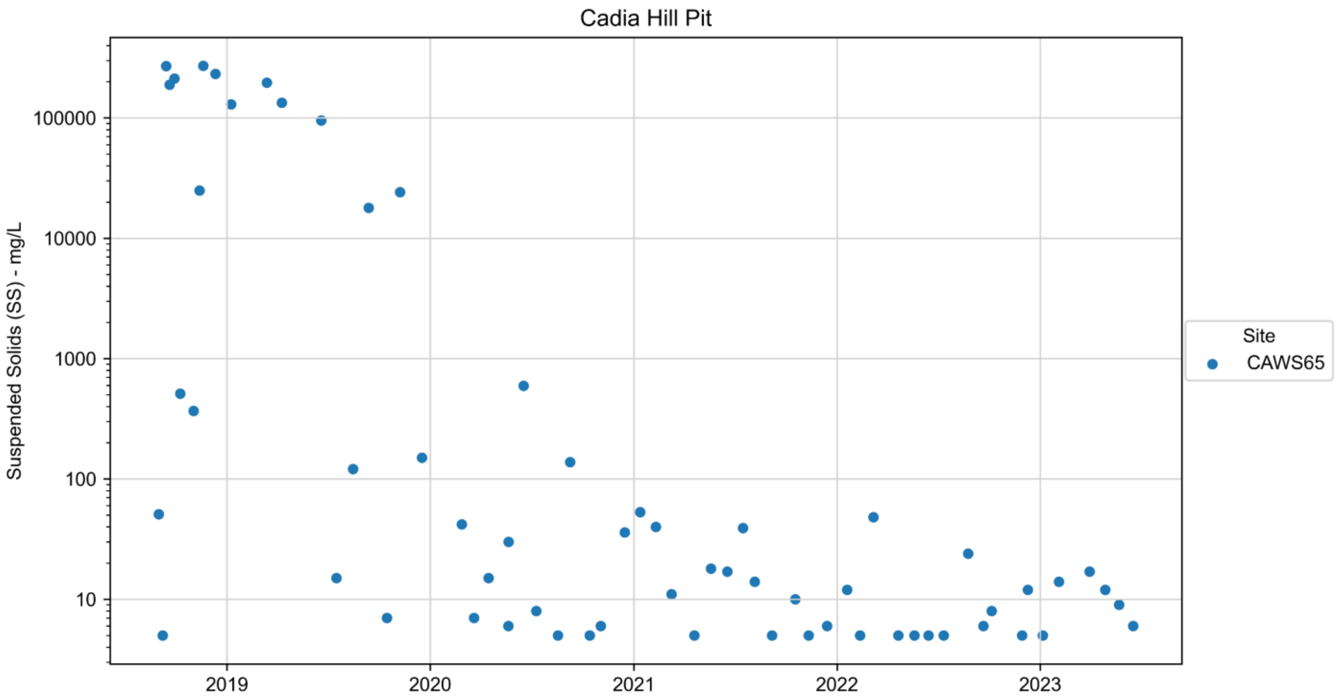

Figure 3.5 TSS concentrations in the Cadia Hill Pit decant water pond

3.3.2 Nutrients

Nitrogen data for CAWS65 indicates that water in the tailings decant water contains a mix of inorganic and organic nitrogen species. Nitrate concentrations showed a decreasing trend between early-2022 and early-2023, while total Kjeldahl nitrogen (TKN) and nitrite concentrations were steady.

Total phosphorous concentrations were elevated at CAWS65 following the initial deposition of tailings in the pit in 2018, with several total phosphorus values recorded over 100 mg/L during 2018 and 2019. However, as with TSS concentrations, phosphorus results have since reduced, with all results for the current reporting period remaining low, at or below 0.06 mg/L.

3.3.3 Major ion composition

Concentrations of most major ions have followed a similar pattern over time at CAWS65, with concentrations of calcium, chloride, potassium, sodium and sulfate peaking in early 2020, before reducing and remaining relatively consistent between 2021 and 2023 in response to increased rainfall during this time.

The piper plot in Figure 3.6 shows the ionic composition of the CHP during the historical monitoring periods and current reporting period, based on calculations of the median concentrations of each major ion. The ionic composition of water in the pit has remained consistent over time, with a mixed sodium/calcium cation dominance and sulfate the dominant anion. Sodium sulfate dominance is consistent with historical tailings water quality at CVO.

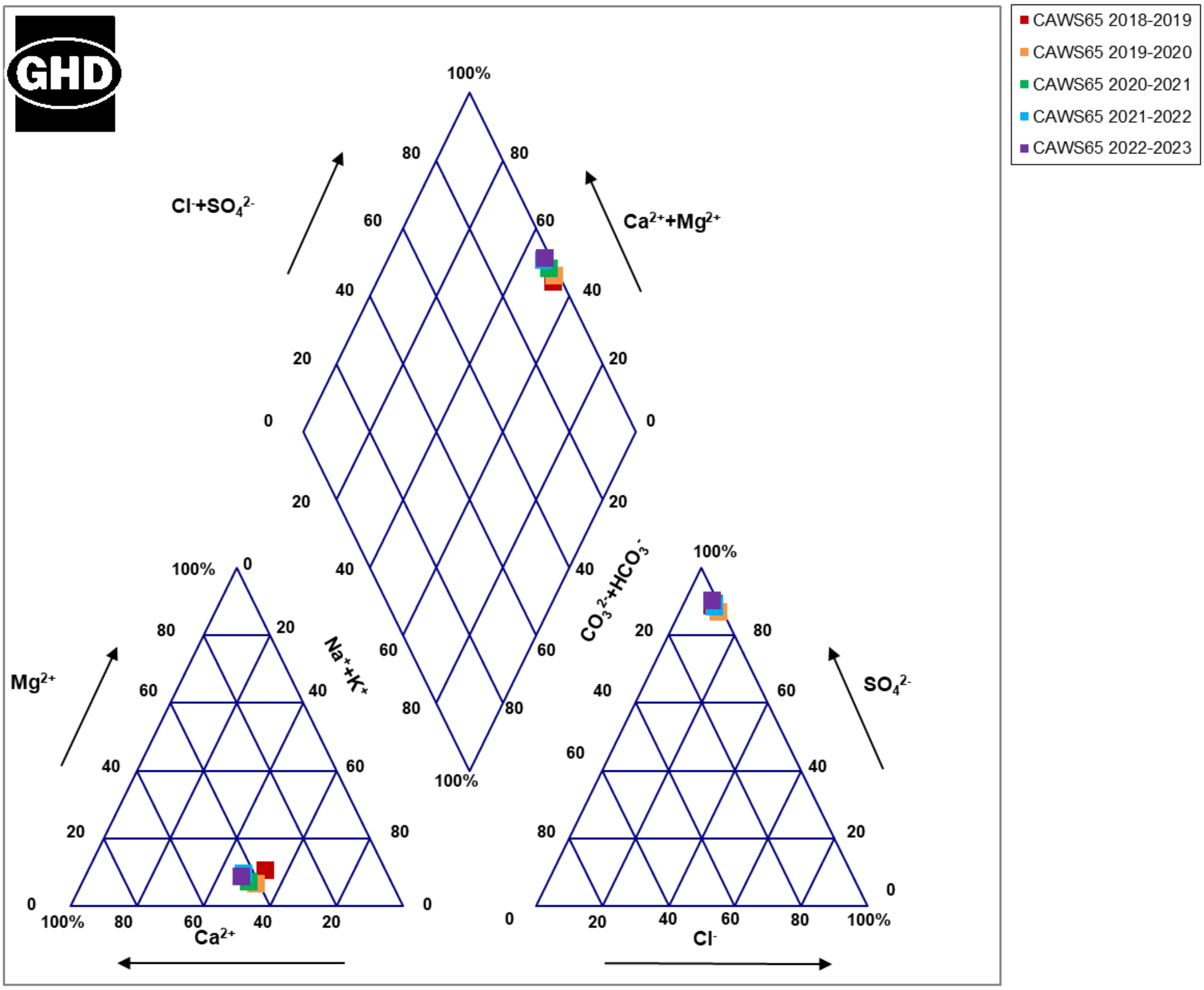

Figure 3.6 Piper chart showing differences in major ion compositions following tailings deposition

3.3.4 Dissolved metals

Concentrations of most metals remained low during the 2022-2023 reporting period, although exceedances of the ANZG (2018) DGVs for aluminium, cadmium, copper and selenium were observed. All concentrations were similar to historical results and no notable increasing or decreasing trends were observed.

The exception to this is molybdenum, which has demonstrated a general increasing trend since 2021 (Figure 3.7). The three highest molybdenum concentrations recorded to date were observed in February (0.919 mg/L), March (0.779 mg/L) and June (0.820 mg/L) 2023, all well above the ANZG (2018) unknown species protection level DGV of 0.034 mg/L.

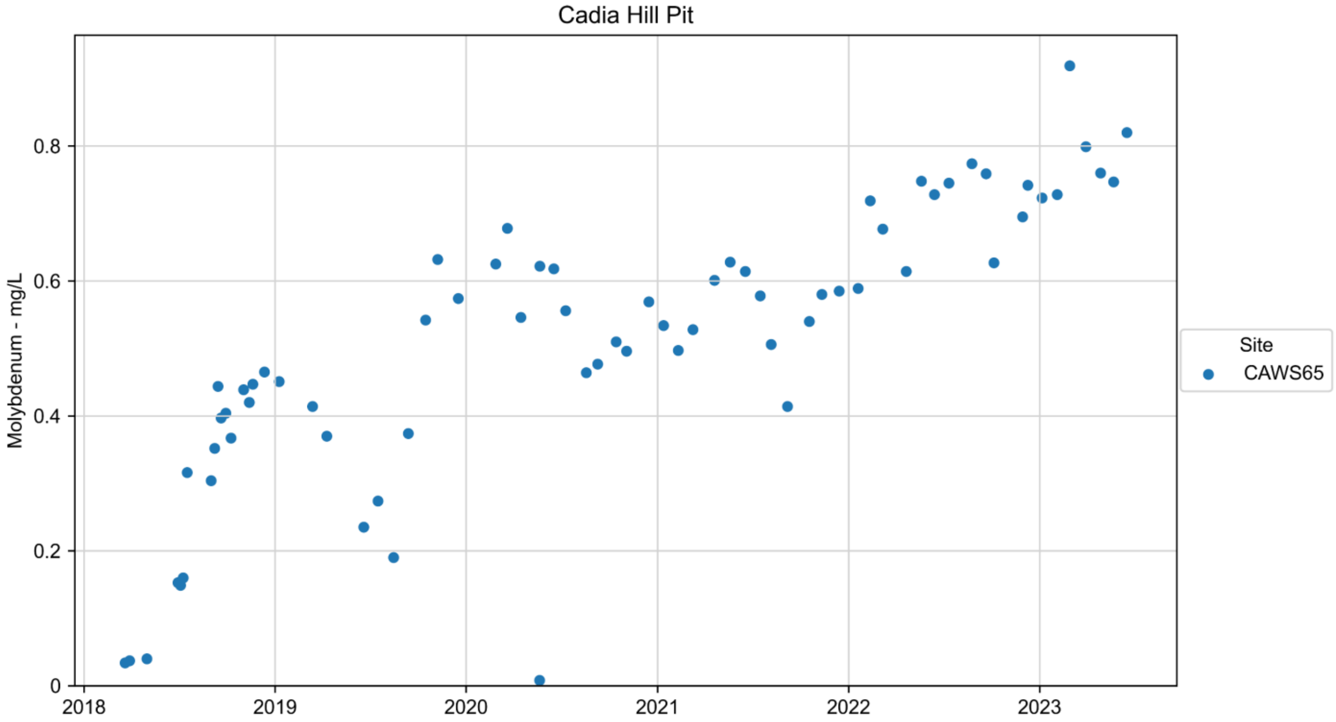

Figure 3.7 Molybdenum concentrations at CAWS65

3.3.5 Summary

Water quality at CAWS65 in 2022-2023 is reflective of tailings decant water. Water quality was relatively stable over the reporting period, with the exception of an increasing trend observed in molybdenum concentrations. Molybdenum concentrations, however, remained low at CAWS79, the site immediately downstream in Cadiangullong Creek (see Section 3.4.4). Therefore, there was no observable impact from tailings deposition in Cadia Hill pit on surface water quality downstream in Cadiangullong Creek.

3.4 Ore Processing Area

The Ore Processing Area consists of the ore crushing and treatment facilities, office areas, laydown yard, workshops, process water ponds, sediment dams and ROM pads. All runoff from this area is captured within the Site Runoff Pond (SROP).

Surface water is monitored at the following sites, as shown in Figure 3.8:

- Watercourses: CAWS79, CAWS78
- Surface water storages: CAWS73

The SROP (CAWS73) is a zero-discharge stormwater runoff dam. The SROP is clay lined and captures site runoff and leakage from the processing plant. CAWS79 (background monitoring location) and CAWS78 (impact monitoring location) are sampled to assess the quality of water in Cadiangullong Creek prior to the zone of influence, and immediately downstream of the zone of influence, respectively.

Paper Size ISO A4

0 50 100 150 200 250

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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GHD

Newcrest Mining Limited
Cadia Annual Review –
Surface Water Assessment

Ore Processing Area

Project No. **12618414**
Revision No. **0**
Date **10 Aug 2023**

FIGURE 3-8

Data source: Newcrest: Bores, 2019. LPI: DCDB/DTDB, 2017. . Created by: pkiem, fmackay, tmorton

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3.4.1 Physicochemical parameters

Field pH results for all sites have remained mostly consistent across the historical monitoring period, including during the 2022-2023 reporting period. Results trended in the pH circumneutral range at the stream sites CAWS79 and CAWS78, and slightly alkaline at dam site CAWS73.

EC results have been consistently lowest at background site CAWS79 during the 2021-2022 and 2022-2023 reporting periods (less than 400 µS/cm) and were only slightly higher (less than 500 µS/cm) at impact site CAWS78 during each sampling event for this period (Figure 3.9). This indicates a slight impact on EC due to activities in the Ore Processing Area. EC results were much higher at CAWS73, generally in the range of 1,000 to 2,000 µS/cm. EC is likely higher at CAWS73 as it a sediment dam that experiences greater evaporation and is influenced by runoff from the Ore Processing Area. All results at CAWS79, CAWS78 and CAWS73 were within the historical range of results for each site.

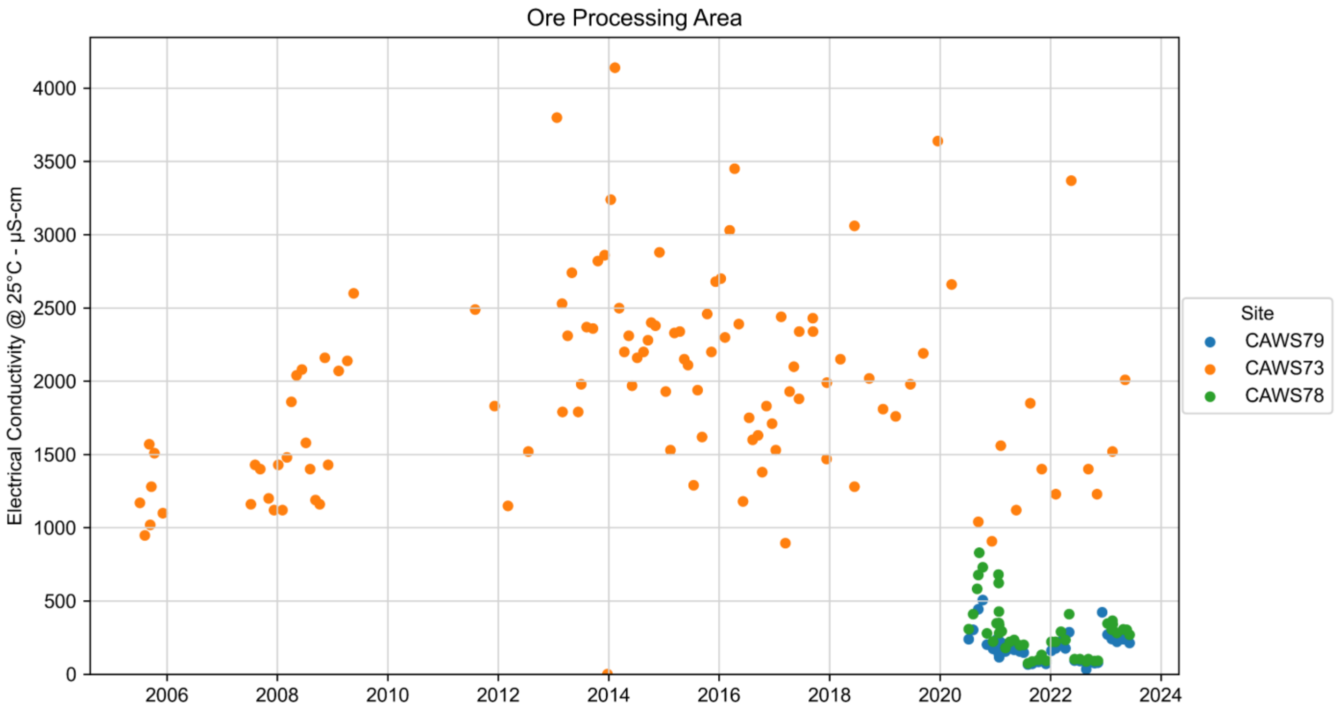

Figure 3.9 ***Laboratory EC at Ore Processing Area sites***

TSS concentrations at CAWS78 and CAWS79 remained mostly low throughout the reporting period, which is consistent with historical results. TSS concentrations at CAWS73 are consistently higher and more variable, though results during the reporting period demonstrated less variability than has been historically observed at the site. All concentrations at CAWS73 during the reporting period were between 17 and 34 mg/L, a notable reduction from the last sample collected during the 2021-2022 reporting period (7,110 mg/L). Variable TSS results are expected at CAWS73 as this site is located within a runoff dam, where all runoff from the Ore Processing Area is captured.

3.4.2 Nutrients

Elevated nutrient concentrations, including nitrate, nitrite, TKN and total phosphorus have been regularly observed at CAWS73 throughout the historical monitoring period. All results were within the historical range during the 2022-2023 reporting period, and the very high total phosphorus concentration observed in early-2022 did not persist at this monitoring site. Nutrient concentrations are likely elevated at CAWS73 because the site collects additional nutrient inputs through runoff during periods of rainfall, which are then concentrated in the pond during dry periods.

Concentrations of total phosphorus and all nitrogen species were lower at CAWS79 and CAWS78 than CAWS73 and were very similar between the two sites. This indicates that the Ore Processing Area has not had an impact on nutrient concentrations in Cadiangullong Creek.

3.4.3 Major ion composition

Concentrations of bicarbonate alkalinity were similar at all Ore Processing Area sites during the 2022-2023 reporting period and were within the historical range of results. Magnesium concentrations at CAWS73 have shown a notable decrease since 2018 with concentrations continuing to remain low during the reporting period. Recent magnesium concentrations at CAWS73 are only slightly higher than those at CAWS78 and CAWS79.

Concentrations of calcium, chloride, potassium, sodium and sulfate were all higher at CAWS73 than at CAWS79 or CAWS78, although all concentrations were within the historical range of results, and no clear temporal trends were evident.

The piper plot in Figure 3.10 shows the ionic composition of Ore Processing Area sites during the historical monitoring periods and current reporting period, based on calculations of the median concentrations of each major ion. The ionic composition of water at CAWS73 shows a strong dominance of the sulfate anion. While the historical cation composition of CAWS73 was previously of mixed type, similar to that at all other Ore Processing Area sites, samples from the three most recent reporting periods have shown a decrease in the dominance of the magnesium cation, as discussed above. The ionic compositions of water at CAWS79 and CAWS78 were most similar in the 2022-2023 reporting period, compared to previous reporting periods where water at CAWS78 had a stronger dominance of the sulfate ion than CAWS79.

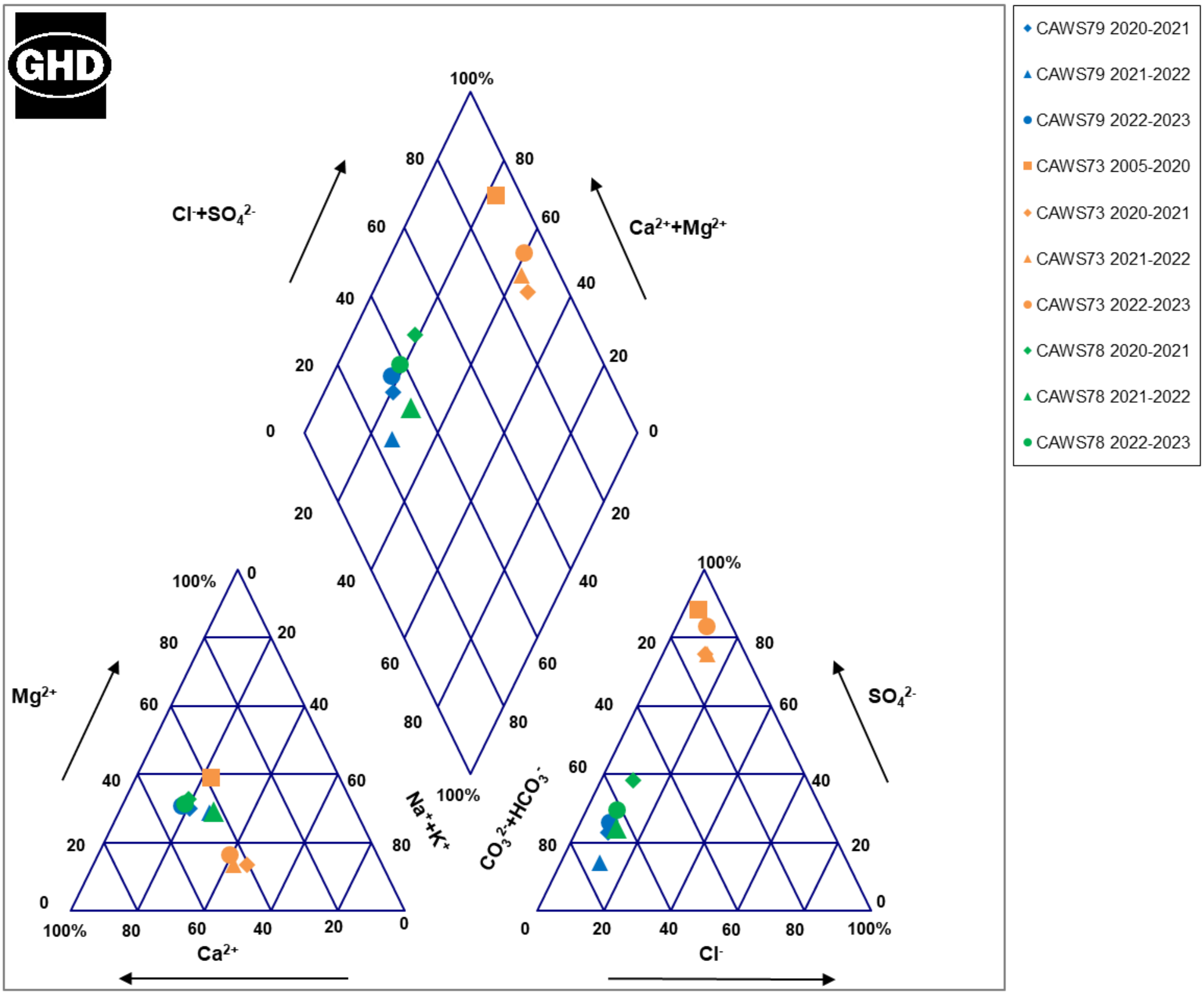

Figure 3.10 Piper chart showing major ion composition at Ore Processing Area sites

3.4.4 Dissolved metals

Concentrations of most dissolved metals were low at all Ore Processing Area sites during the reporting period, with few differences observed between locations. One notable exception to this was molybdenum, which was consistently much higher at CAWS73 than at all other Ore Processing Area sites during the reporting period (see Figure 3.11). Molybdenum concentrations at all other sites were similar and were within the range of 0.001 mg/L and 0.020 mg/L. Molybdenum concentrations at CAWS73 during the reporting period were lower than the peak concentration observed in May 2022, reversing the consistent increasing trend observed to this time, though remain within the range of 0.100 to 0.400 mg/L, significantly higher than those observed at all other sites.

Arsenic concentrations have also generally been higher at CAWS73 than at all other sites. Results from all sites during the 2022-2023 reporting period were equal to the LOR. Similar to arsenic, chromium concentrations were also elevated at CAWS73 throughout the historical monitoring period, however all concentrations were at the LOR during the reporting period for all sites.

Copper concentrations were frequently elevated at all Ore Processing Area sites during the historical monitoring period, with the majority of results exceeding the ANZG (2018) DGV of 0.0014 mg/L. This includes all results recorded during the 2022-2023 reporting period, indicating the potential for ecological harm within Cadiangullong Creek. Copper concentrations are generally highest at upstream site CAWS79 and are also elevated at CAWS2, located upstream in Cadiangullong Creek sites (refer Section 3.2.4). This suggests there has been no impact from the Ore Processing Area on copper concentrations in Cadiangullong Creek, and instead, elevated copper concentrations are likely to be the result of upstream influences, including the mine adit at CAWS3.

Zinc concentrations had commonly been elevated at CAWS73 during the historical monitoring period, however concentrations in recent years (2020 to 2023) have been much lower, with the majority of results at the LOR, including all results from the 2022-2023 reporting period. Zinc concentrations were elevated at upstream site CAWS79 between February and March 2023, exceeding the ANZG (2018) DGV. All results at downstream site CAWS78 were below the LOR, suggesting that there has been no impact from the Ore Processing Area on zinc concentrations in Cadiangullong Creek.

Aluminium and iron concentrations have been commonly elevated at CAWS79 and CAWS78, compared to results at CAWS73. This is likely indicative of the influence of local soils and lithology, as similar aluminium concentrations have been observed at upstream Cadiangullong Creek monitoring sites CAWS2 and 412144.

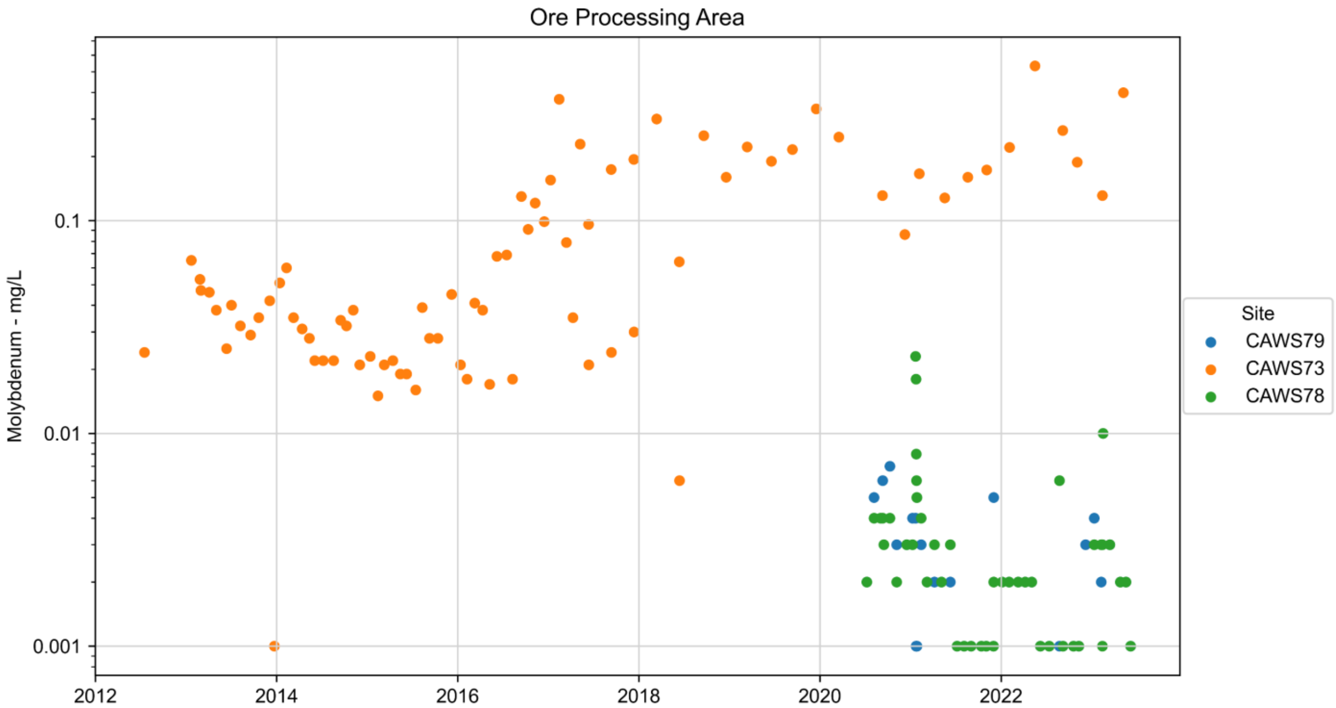

Figure 3.11 Molybdenum concentrations at Ore Processing Area sites

3.4.5 Summary

Concentrations of all water quality parameters were similar between the sites upstream (CAWS79) and downstream (CAWS78) of the Ore Processing Area, except for a slight increase in EC at the downstream site and higher concentrations of copper and zinc at the upstream site. This indicates a minimal impact to downstream water quality from the Ore Processing Area.

During the 2022-2023 reporting period, CAWS73 (the SROP) showed elevated EC and concentrations of nutrients, most major ions and molybdenum, compared to other Ore Processing Area sites. These results are expected given the impounded nature of this site, compared to stream sites CAWS78 and CAWS79.

3.5 Waste Rock Dumps

Surface water is monitored at the following Waste Rock Dump sites, as shown in Figure 3.12:

- Watercourses: 412161
- Surface water storages: CAWS34, CAWS35, CAWS37, CAWS52

The Southern Waste Rock Dumps (SWRDs) are drained by the Northern Leachate Dam (CAWS34), Southern Leachate Dam (CAWS35), H19 Sediment Dam (CAWS37) and Rodds Creek Dam (CAWS52). The WRDs have been partially rehabilitated. Waste Rock Dump leachate dams are operated as zero-discharge water storages and Rodds Creek dam is a mixed water storage that receives river water extracted under licence and rainfall runoff from mine areas.

The nearest downstream Cadiangullong Creek site is 412161, which is the potential receptor for any impact of the SWRDs on surface water quality.

The Northern Waste Rock Dumps have been rehabilitated and are not monitored for surface water.

Paper Size ISO A4

0 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Newcrest Mining Limited
Cadia Annual Review –
Surface Water Assessment

Project No. **12618414**
Revision No. **0**
Date **10 Aug 2023**

Waste Rock Dumps

FIGURE 3-12

Data source: Newcrest: Bores, 2019. LPI: DCDB/DTDB, 2017. . Created by: pkiem, fmackay, tmorton

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3.5.1 Physicochemical parameters

The field pH of all monitoring sites is generally in the circumneutral range, although CAWS37 and CAWS52 have generally been slightly more alkaline. The pH during a sequence of daily observations recorded between 9 and 20 November 2022 at CAWS37 were more acidic than the usual pH results for this site. The pH results recorded at CAWS34 and CAWS35 in November 2022 were also below the historical range of results. However, pH during the remainder of the reporting period at these sites returned to within the historical range.

The EC of the Waste Rock Dump leachate at CAWS34 and CAWS35 is in the brackish to slightly saline range, with all EC values exceeding 2,500 µS/cm (Figure 3.13). EC was lower at CAWS37 and CAWS52, where it was mostly in the 1,000 µS/cm to 2,000 µS/cm range, while EC results at 412161 were consistently the lowest, with all results from the past two years below 600 µS/cm. EC demonstrated a general decreasing trend at all sites from a peak in late-2019 to early 2022, attributable to above average rainfall following drought conditions.

TSS concentrations were generally low during the 2022-2023 reporting period, with the majority of results at all sites except CAWS37 at or below the LOR. Results at sediment dam CAWS37 were higher than at the stream site 412161 or leachate dam sites CAWS34 and CAWS35, which is as expected. Leachate is not likely to carry suspended solids into the surface water in the leachate dams. All TSS results during the 2023-2023 reporting period were within the historical range.

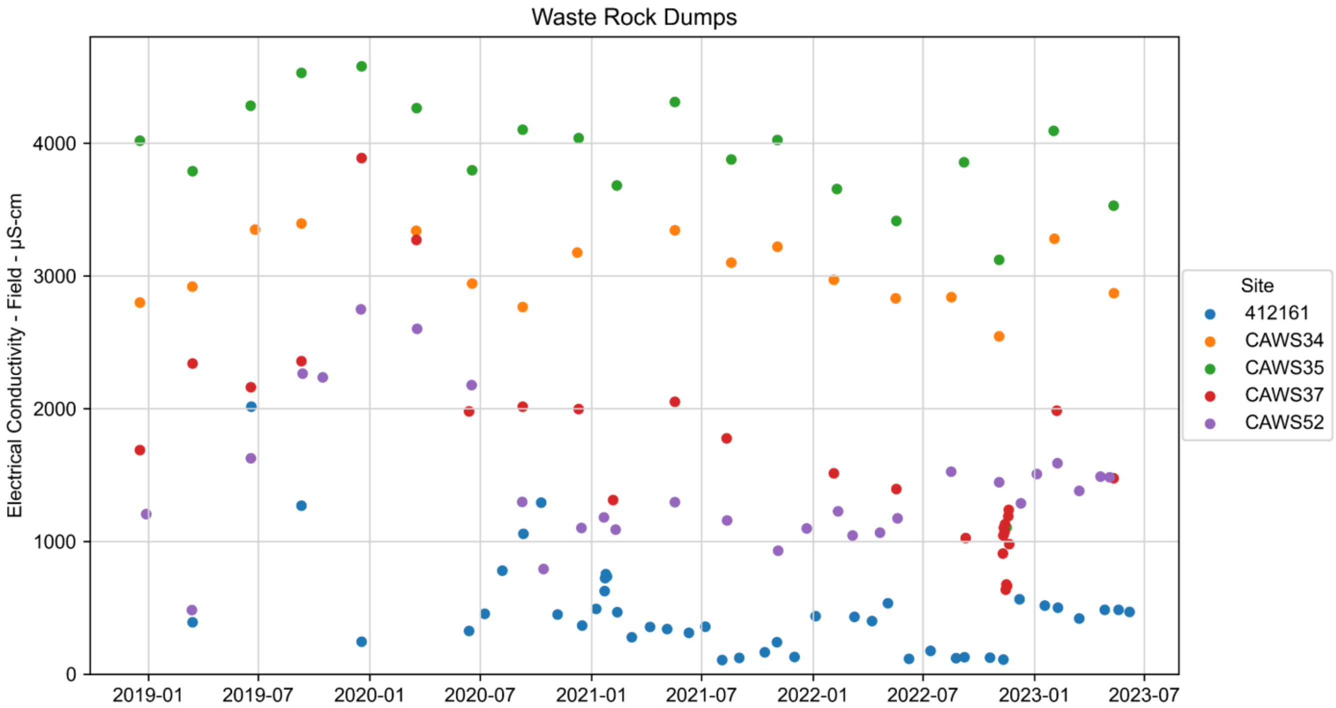


Figure 3.13 ***Electrical conductivity in the Waste Rock Dumps area***

3.5.2 Nutrients

The Waste Rock Dump leachate contains very high concentrations of nitrate, as shown in Figure 3.14. These concentrations are associated with the WRDs and had generally been higher at CAWS35 than at CAWS34. Concentrations, however, have been decreasing gradually over time at CAWS35, while concentrations at CAWS34 increased slightly during the 2022-2023 reporting period, leading to similar concentrations of nitrate observed at these two sites. Although TKN was also higher at the leachate dam sites than at CAWS37, CAWS52 or 412161 during the 2022-2023 reporting period, nitrate remains the dominant nitrogen species in the leachate.

A decreasing long-term trend in nitrate concentrations was observed at Rodds Creek Dam (CAWS52) between 2011 and 2019. Results obtained during 2019 to 2023 have remained low but have shown more variability than historical results. At the downstream Cadiangullong Creek monitoring site 412161, nitrogen oxide concentrations are much lower, in similar concentrations to results at CAWS37 and recent results from CAWS52. Comparison between TKN and nitrogen oxides at 412161 shows more influence of organic nitrogen species than is evident at WRD runoff storages CAWS35 and CAWS34. This suggests that agricultural runoff nutrient inputs to Cadiangullong Creek are influencing the variable elevated nitrogen levels at 412161.

Total phosphorous concentrations do not appear to be impacted by the leachate. Concentrations at CAWS34 and CAWS35 are similar to those observed at upstream and downstream sites on Cadiangullong Creek, and no temporal trend has been observed.

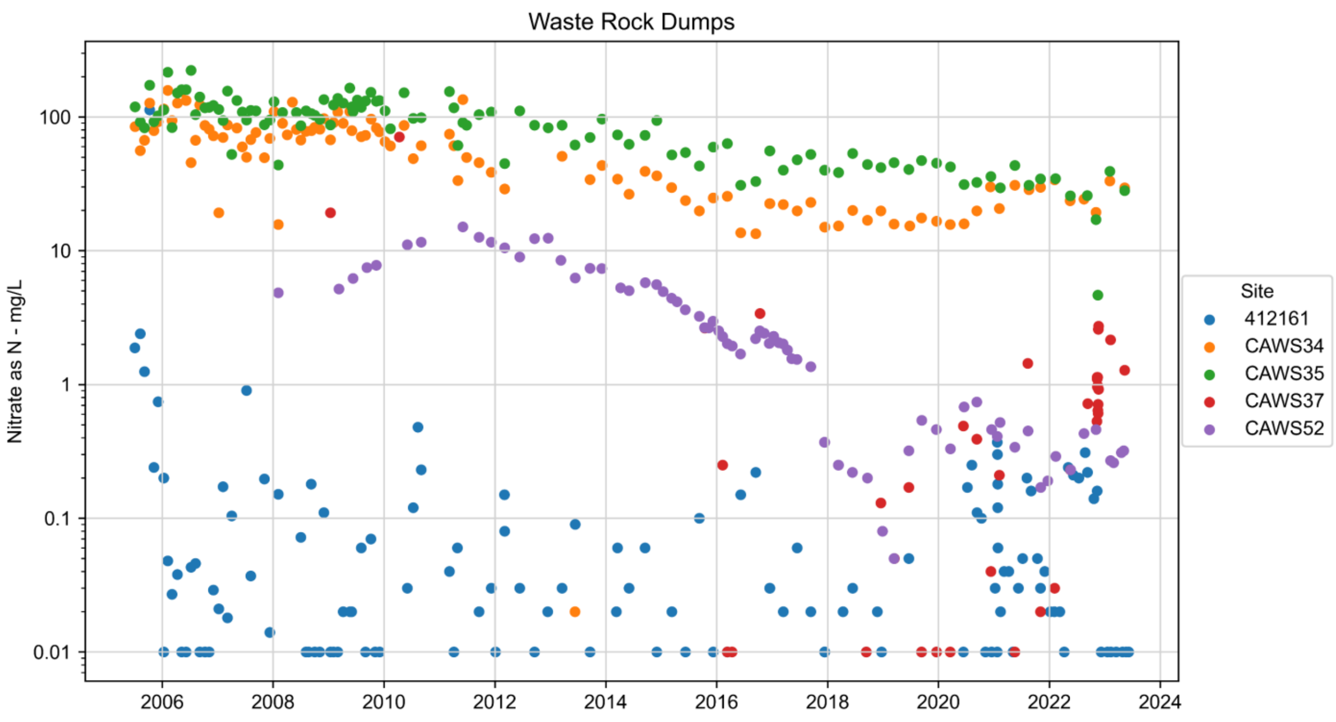


Figure 3.14 Nitrate concentrations in the Waste Rock Dumps area

3.5.3 Major ion composition

Waste Rock Dump leachate sites CAWS35 and CAWS34 contain elevated concentrations of calcium, magnesium and sulfate compared to all other nearby sites. Conversely, bicarbonate and total alkalinity concentrations were generally lowest at CAWS34 and highest at CAWS35 throughout much of the historical monitoring period, but recent spatial patterns are less clear, particularly during the 2021-2023 reporting periods. Bicarbonate alkalinity demonstrated an increasing trend at CAWS37 from 2016 to February 2022, but was lower in subsequent sampling events in 2022 and 2023. Concentrations of all major ions except bicarbonate and chloride are notably lower at 412161 than at any other Waste Rock Dump site.

The piper plot in Figure 3.15 shows the ionic composition of Waste Rock Dump sites during historical monitoring periods and the current reporting period, based on calculations of the median concentrations of each major ion. The piper chart shows that the water of the Waste Rock Dump leachate dams (CAWS34 and CAWS35) is ionically similar to that of the H19 Sediment Dam (CAWS37), with water of magnesium / sulfate type. Sulfate is also the dominant anion at Rodds Creek Dam (CAWS52), though the sodium cation is more dominant. The strong sulfate dominance at the leachate dams and Rodds Creek Dam, which is not observed at 412161, indicates that there has been no significant influence of the leachate on the creek between 2005 and 2023. There has also been no notable change in ionic composition at any site.

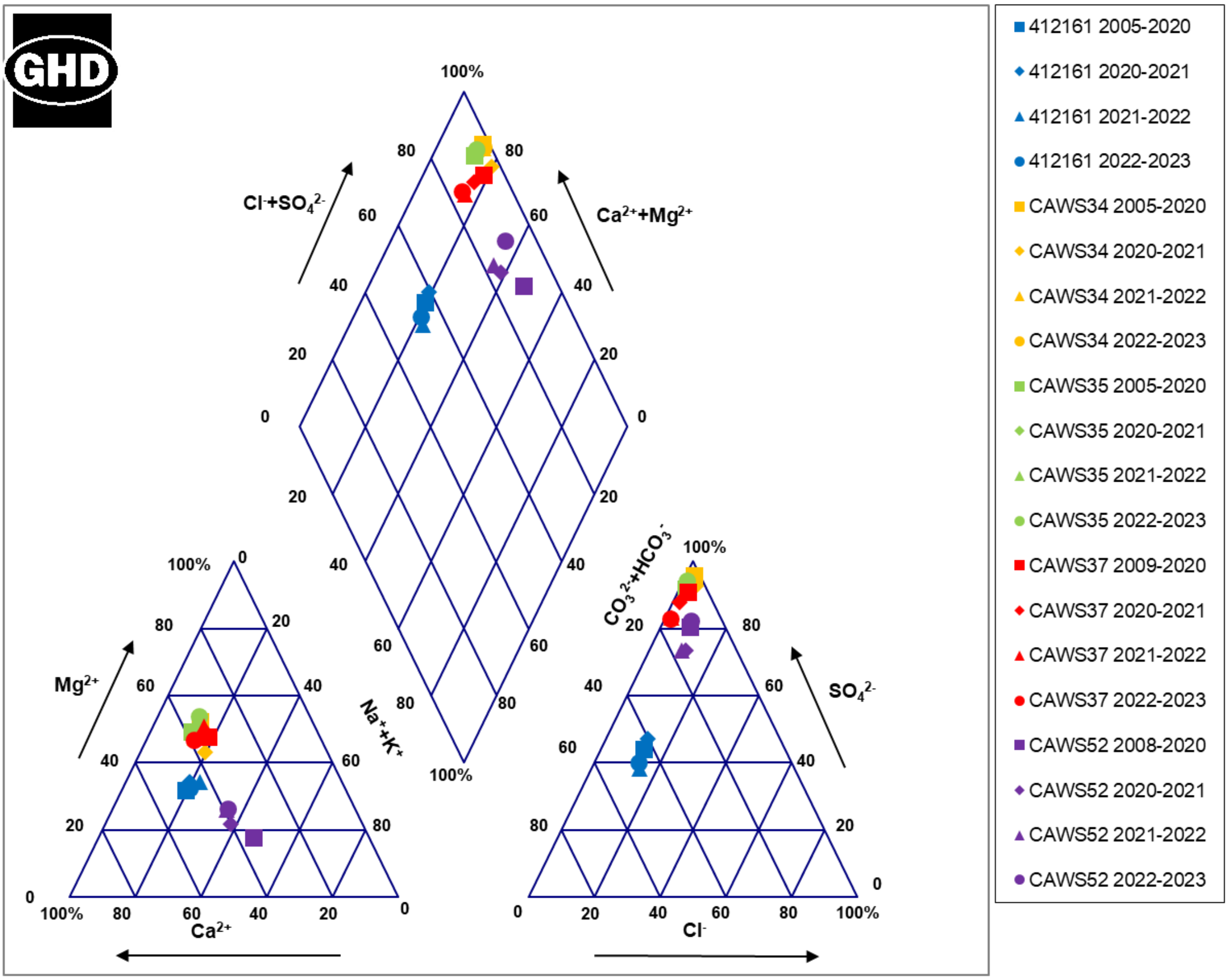


Figure 3.15 Piper chart showing differences in major ion compositions at Waste Rock Dump sites

3.5.4 Dissolved metals

Elevated concentrations of several metals have been observed at CAWS34 and CAWS35, which are likely to be attributable to the water having leached through waste rock. These include cadmium, copper, manganese, nickel, selenium and zinc, with the highest concentration of each metal generally observed at CAWS34. Concentrations of cadmium, copper, nickel, selenium and zinc are consistently above the ANZG (2018) DGVs at these sites, representing a risk to downstream ecosystems if connectivity with Cadiangullong Creek were to occur.

Cadmium, nickel, selenium and zinc have been demonstrating a generally decreasing trend at these two sites across the history of the monitoring period. Similarly, concentrations of cobalt were also historically elevated at CAWS34 and CAWS35, however, cobalt concentrations at CAWS35 have been at or below the LOR since 2019. Concentrations of all these metals have consistently remained much lower at dam sites CAWS37 and CAWS52, and Cadiangullong creek site 412161, with most results at or below the LOR, particularly during the two most recent reporting periods. This suggests no impact from the WRDs on metals concentrations in the downstream environment of Cadiangullong Creek.

The concentrations of aluminium and iron have frequently been highest at Cadiangullong Creek site 412161 across the historical monitoring period, which has also been observed at upstream Cadiangullong Creek sites (refer Section 3.2.4 and Section 3.4.4). Increasing trends in aluminium and iron concentrations were observed at 412161 between 2020 and 2022. Concentrations of aluminium and iron have remained low at CAWS34 and CAWS35 throughout this period and therefore the WRDs are not considered to be the source of these metals.

Elevated copper concentrations were observed at all Waste Rock Dump sites during the reporting period, as shown in Figure 3.16. Although concentrations exceeded the ANZG (2018) DGV of 0.0014 mg/L at all sites, concentrations were again notably higher at CAWS34. A general decreasing trend in copper concentrations was observed at CAWS35 and CAWS34 between 2006 and 2017, while concentrations have remained steady since this time. Elevated copper concentrations have also been observed at the Cadiangullong Creek downstream monitoring site 412161. Copper concentrations at 412161 between August 2021 and November 2022 were the highest observed at the site since 2016. Concentrations of copper at the nearest upstream site in Cadiangullong Creek (CAWS78) were similar to or slightly higher than those observed at 412161, indicating that it is unlikely that WRDs are contributing significant concentrations of copper to Cadiangullong Creek.

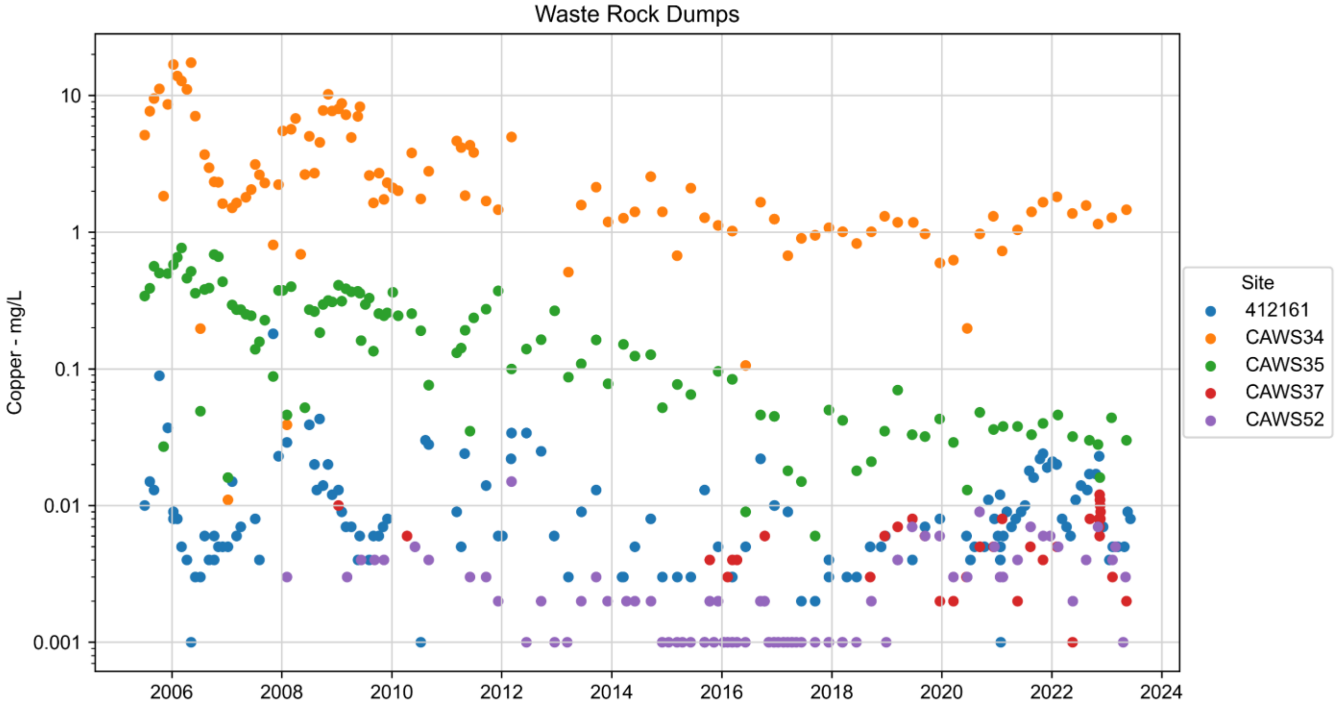


Figure 3.16 Copper concentrations in the Waste Rock Dumps area

Molybdenum concentrations have remained steady at CAWS35 and CAWS37 over the history of the monitoring period (Figure 3.17). Molybdenum concentrations at CAWS34 were historically lower than those at CAWS35 and CAWS37 and were frequently observed in concentrations similar to those at 412161. However, from 2020 to 2023, molybdenum concentrations at CAWS34 have increased and are similar to observed concentrations at CAWS35 and CAWS37. Molybdenum concentrations have been higher at CAWS52 than at the leachate dams, which, considering that molybdenum is associated with the ore mined at CVO, indicates the influence of tailings decant water pumped to Rodds Creek Dam from the NTSF in times of increased rainfall. The CAWS52 molybdenum results showed an increasing trend between 2013 and 2020, before decreasing from 2020 to 2022, and again increasing during 2022 and 2023.

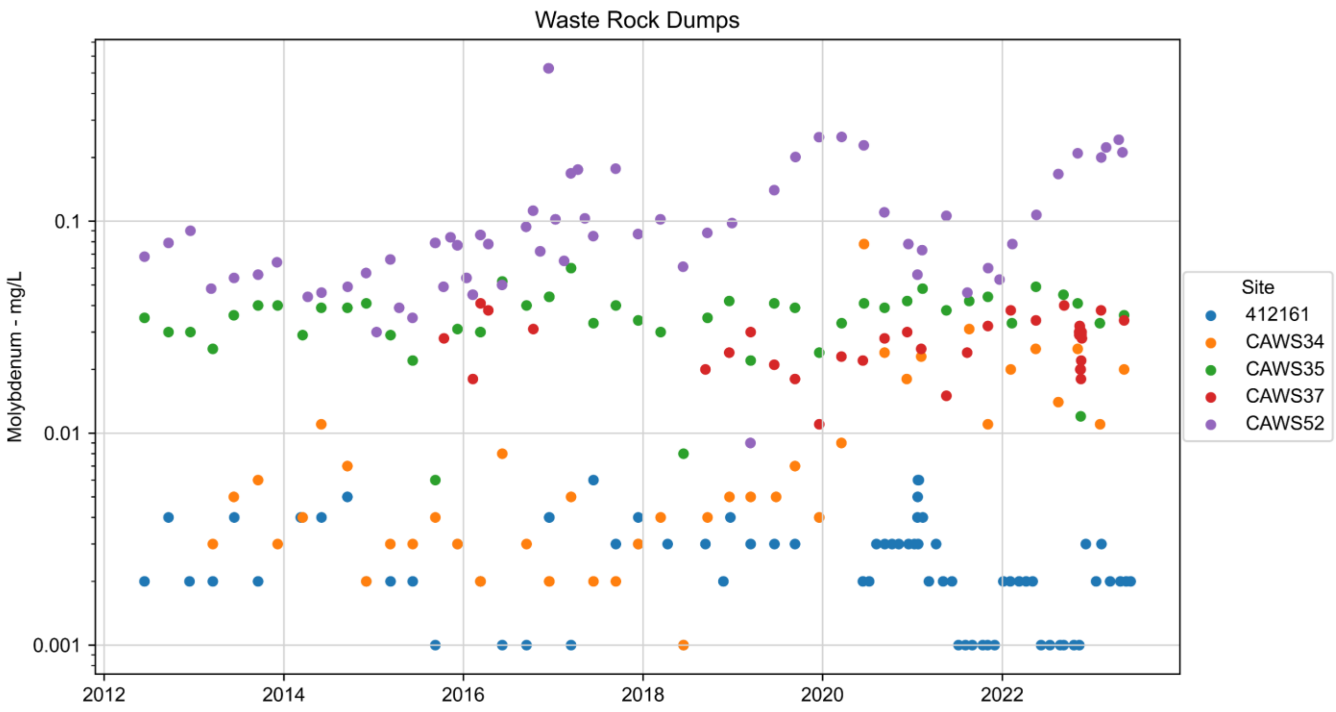


Figure 3.17 ***Molybdenum concentrations in the Waste Rock Dumps area***

3.5.5 Summary

The water quality within the Waste Rock Dump leachate dams (CAWS34 and CAWS35) demonstrates elevated concentrations of multiple parameters, compared to both ANZG (2018) DGVs and all other Waste Rock Dump area sites. These parameters include nitrate, major ions calcium, magnesium and sulfate, and metals cadmium, copper, manganese, nickel, selenium and zinc.

In times of high rainfall, increased pumping of TSF decant water to Rodds Creek Dam (operating as a zero-discharge water storage dam) occurs, which has potentially contributed to the elevated molybdenum concentrations observed at Rodds Creek Dam (CAWS52) during the reporting period and historically.

Downstream monitoring results at 412161 show little influence of waste rock leachate on Cadiangullong Creek water quality. Although copper concentrations were consistently elevated above the DGV at 412161 during the reporting period, this may not indicate influence from the Waste Rock Dump leachate dams. Copper concentrations at 412161 were similar to or lower than those observed at upstream Cadiangullong Creek site CAWS78 during each sampling event of the reporting period.

3.6 Tailings storage facilities

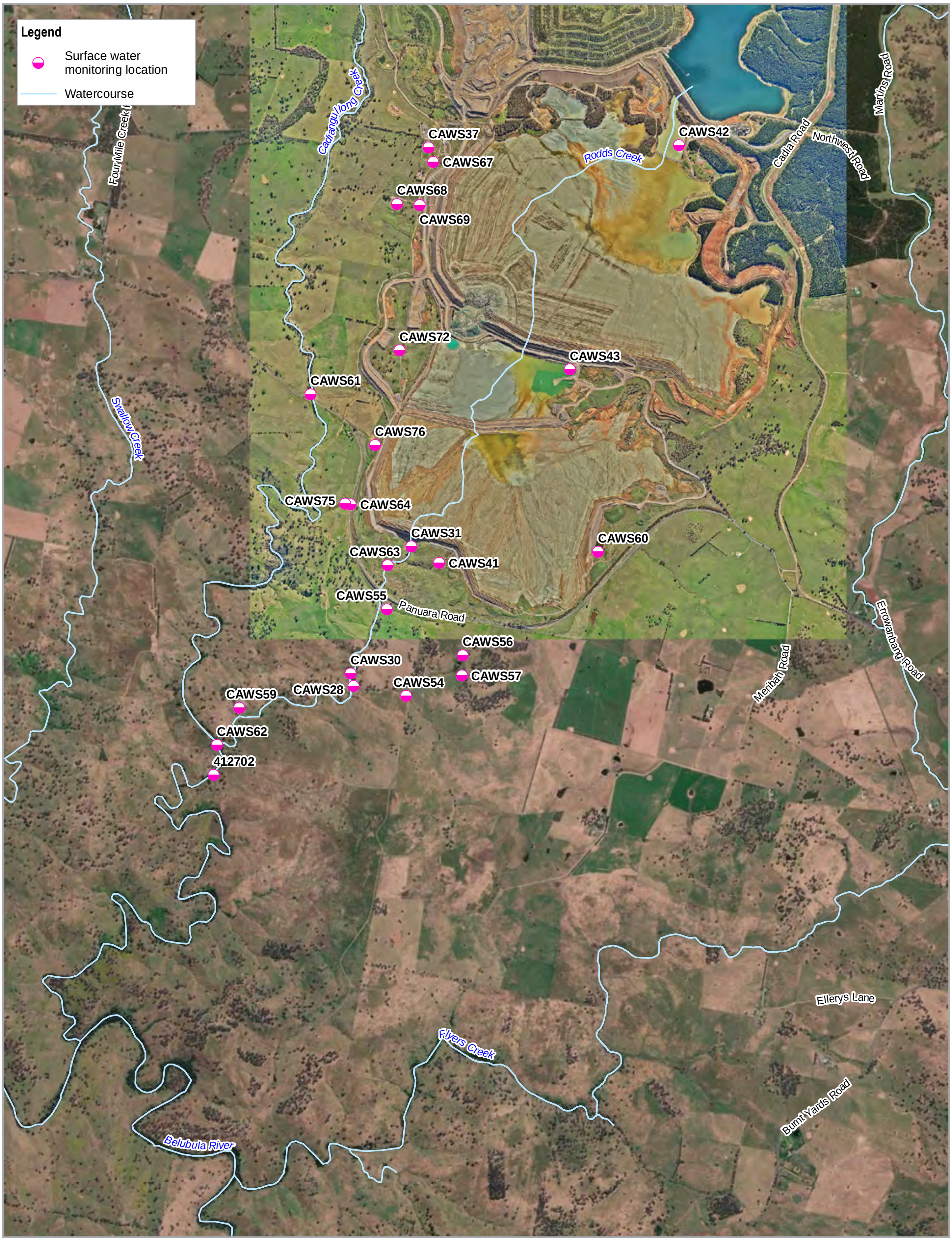
CVO monitors surface water around the STSF and NTSF to assess potential impacts from tailings deposition.

The NTSF commenced in 1998 and the STSF in 2002. Tailings deposition in the NTSF and STSF has since ceased, with tailings placed in the Cadia Hill Pit since this time. Tailings storage facilities and surface monitoring locations are showed in Figure 3.18.

3.6.1 TSF Eastern Zone

Surface water is monitored at the following sites within the TSF Eastern Zone:

- CAWS60 – Dyke Pond east of the Southern TSF to assess potential for seepage contributions
- CAWS42 – Monitor development of Northern TSF decant water quality
- CAWS43 – Monitor development of Southern TSF decant water quality



Paper Size ISO A4

0 500 1,000 1,500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Newcrest Mining Limited
Cadia Annual Review –
Surface Water Assessment

Project No. **12618414**
Revision No. **0**
Date **10 Aug 2023**

Tailings Storage Facilities

FIGURE 3-18

N:\AU\Orange\Projects\22\20341\GIS\Maps\Deliverables\12618414\SWA\12618414_GSW006_TSF_0.mxd
Print date: 10 Aug 2023 - 09:35

Data source: Newcrest: Bores, 2019. LPI: DCDB/DTDB, 2017. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: pkiem, fmackay, tmorton

Physicochemical parameters

Field pH results have generally been consistent over time and similar between the tailings decant pond water (CAWS42 and CAWS43) and the dyke pond (CAWS60). Most results have been circumneutral to slightly alkaline, within the 7.0 to 8.5 range. The pH at CAWS42 was more acidic than all other historical results during the November 2022 to February 2023 period, though results from April 2023 have returned to within the usual range.

EC has been demonstrating a minor decreasing trend over time at CAWS60, with most results from 2019 to 2021 close to 2,000 µS/cm, while results from 2021 to 2023 were closer to 1,500 µS/cm (Figure 3.19). This decreasing trend is likely the result of the large volumes of rainfall received during this period. There were several very low EC results observed at CAWS60 during the 2022-2023 reporting period, in November and December 2022, and April 2023. EC during these sampling events was below 400 µS/cm, below the usual range. However, EC in all other samples collected both between and following these events were within the 1,000 to 2,000 µS/cm range.

EC at CAWS42 and CAWS43 has generally been more variable between sampling events than at CAWS60, although most results have been higher than those at CAWS60. EC at CAWS42 was particularly high during the 2022-2023 reporting period, where most results were in the 2,000 to 3,000 µS/cm range. The reverse was true for CAWS43, where EC was lower than historical results and lower than all results from CAWS42.

TSS concentrations were generally lower at CAWS60 than at other sites in the current reporting period.

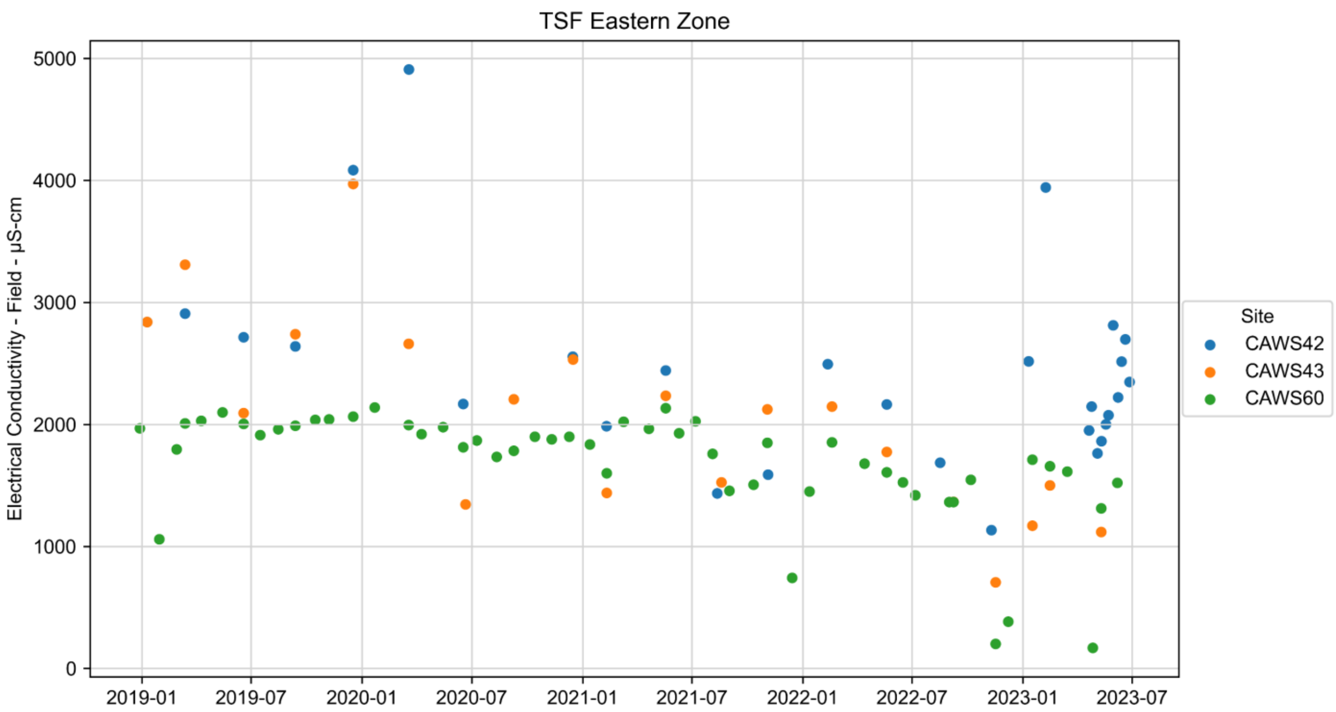


Figure 3.19 EC in the TSF Eastern Zone

Nutrients

Nitrogen oxide concentrations (composed primarily of nitrate) in the decant pond water have generally decreased during the historical period of monitoring and have remained below 5 mg/L since March 2015, with most samples since 2018 below 1 mg/L, including all results in the current reporting period. During the reporting period, nitrogen oxide concentrations in the decant ponds were similar to the concentrations observed at CAWS60 (see Figure 3.20), with more variability typically observed between sampling events than between sites. Nitrite results indicate more differences between sites, with most results at CAWS60 below the LOR, while results at CAWS42 and CAWS43 are higher.

TKN and total phosphorus concentrations were generally similar to those of nitrate, with no clear distinction observable between sites, but variability observed between sampling events.

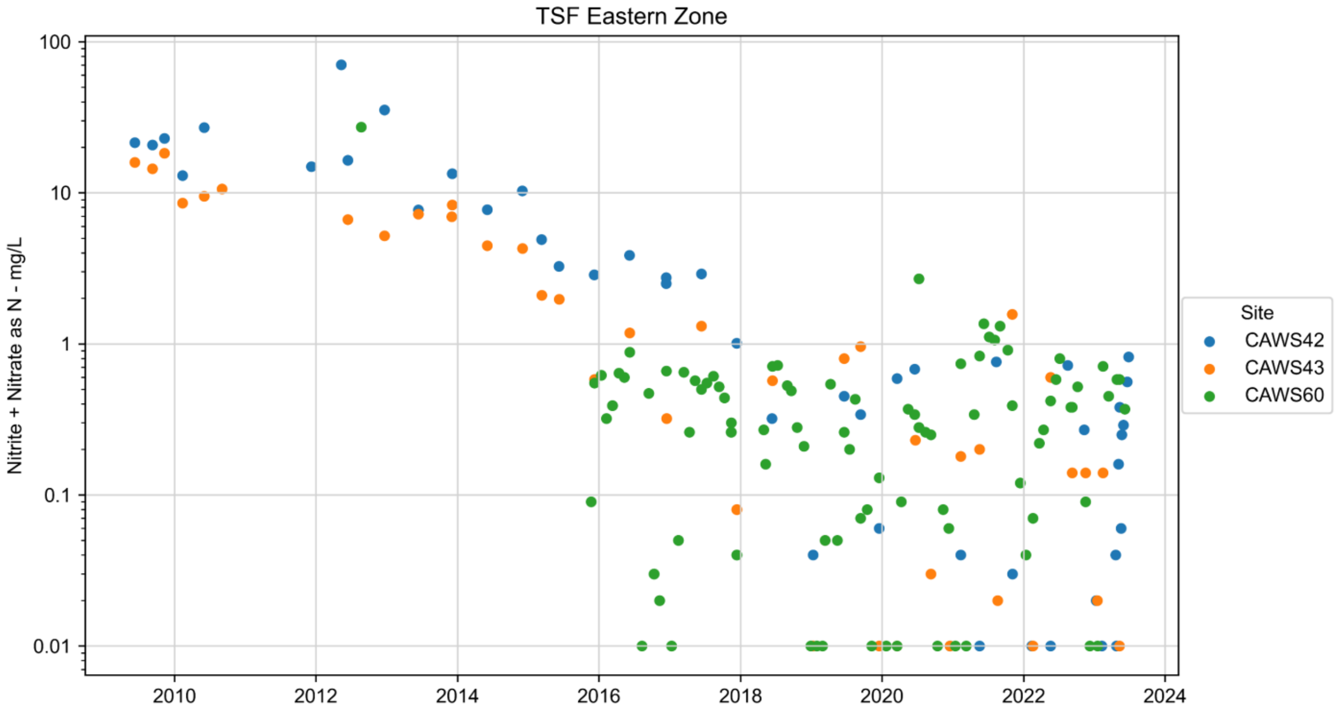


Figure 3.20 ***Nitrogen oxides concentrations in the TSF Eastern Zone***

Major ion composition

Concentrations of bicarbonate alkalinity and magnesium were notably higher at CAWS60 than either of the decant pond sites, while potassium, sodium and sulfate were much lower.

The piper plot in Figure 3.21 shows the ionic composition of TSF Eastern sites during the historical monitoring periods and current reporting period, based on calculations of the median concentrations of each major ion. The piper chart shows that the tailings decant pond water (CAWS42 and CAWS43) is ionically dissimilar to the dyke pond (CAWS60). The TSF decant water was sodium sulfate dominant, though with a stronger dominance of the magnesium ion during more recent sampling events, while the dyke pond shows a mixed ionic composition.

There was a stronger dominance of the sulfate anion at CAWS42 than at CAWS43, while cation composition of the water at these two sites is more similar between sampling events than within sites.

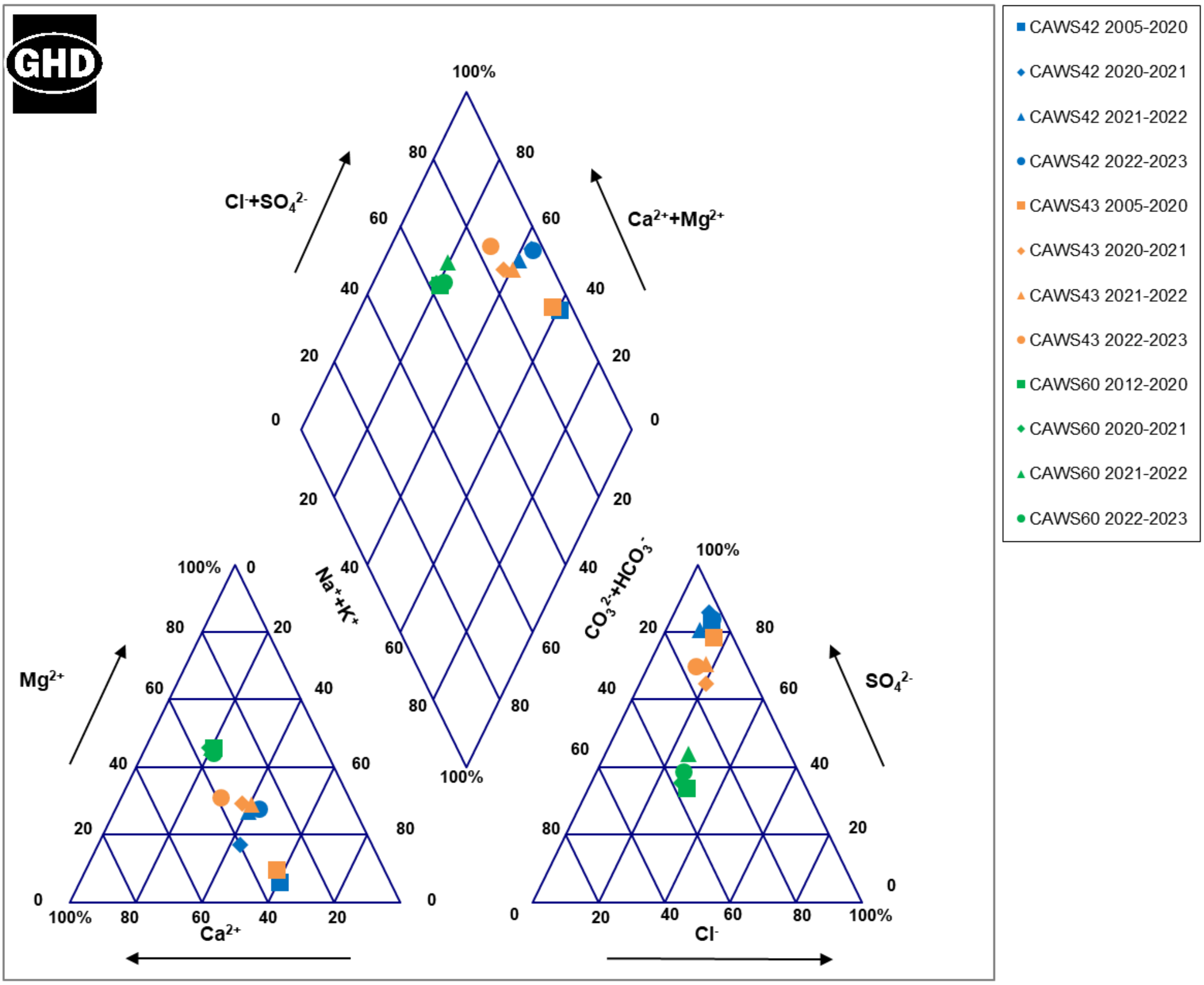


Figure 3.21 Piper chart showing differences in major ion composition at TSF Eastern Zone sites

Dissolved metals

During the 2022-2023 reporting period, concentrations of several metals, including aluminium, antimony, arsenic, cadmium, copper and iron were elevated at CAWS42, compared to both historical results and results from other nearby sites. The highest concentrations of all of these metals were observed in January or February 2023, however, most concentrations remained above historical levels throughout the reporting period. These elevated metals concentrations were not reflected at CAWS43 or CAWS60, where results remained within the historical range. These increasing metals concentrations at CAWS42 are possibly attributable to evapoconcentration within the pond without the addition of process water.

Similarly, molybdenum concentrations were also higher at CAWS42 than at other sites during the reporting period and were higher than the historical range for much of the reporting period (see Figure 3.22). Molybdenum concentrations were historically very similar between CAWS42 and CAWS43 between 2012 and 2020, demonstrating only a slight increasing trend over time. However, since 2020, molybdenum concentrations at CAWS43 have shown a decreasing trend, while concentrations at CAWS42 continue to increase. Molybdenum concentrations have also increased slightly since 2021 at CAWS60, but concentrations have remained below those at CAWS42 and CAWS43.

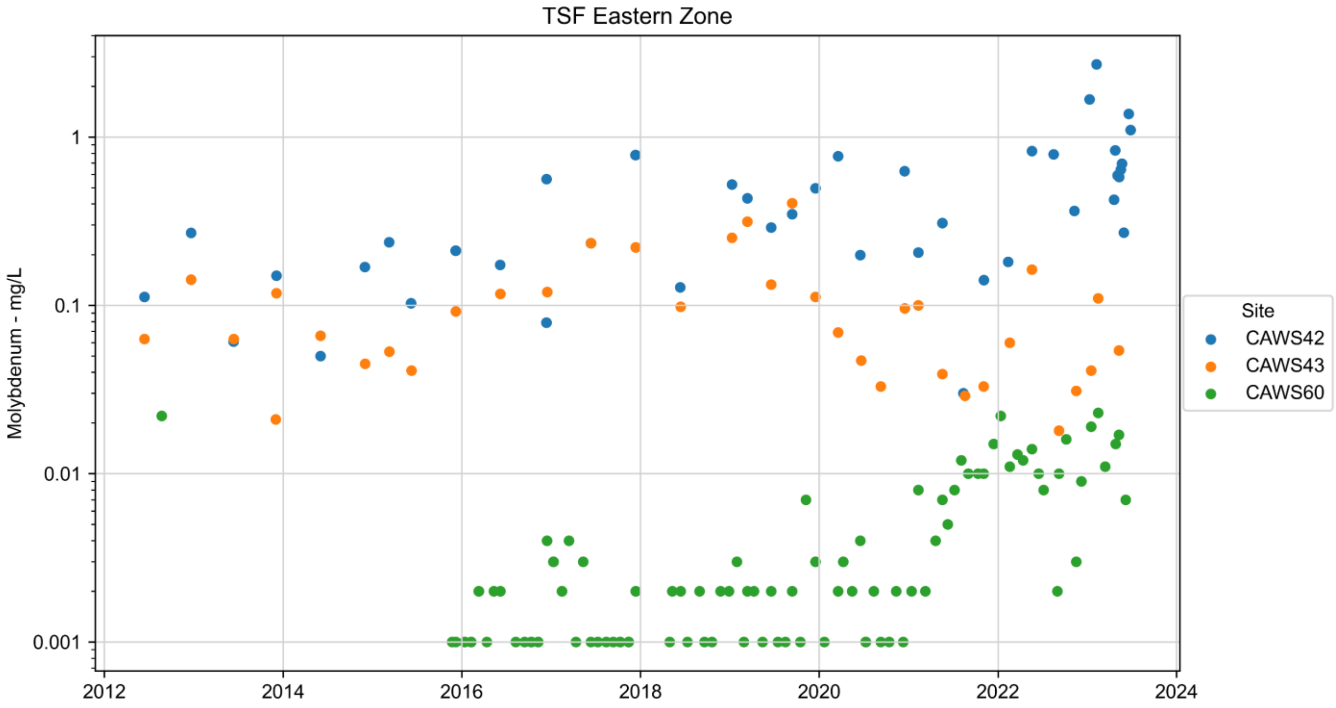


Figure 3.22 ***Molybdenum concentrations in the TSF Eastern Zone***

Zinc concentrations were historically elevated at CAWS42 and CAWS43, in concentrations well above the ANZG (2018) DGV of 0.008 mg/L in most samples from 2005 to 2016 (see Figure 3.23). However, in contrast to most other metals at these sites, from late-2016 (CAWS42) or late-2017 (CAWS43) zinc concentrations have declined, with most concentrations being below the LOR since this time. Similarly, zinc concentrations were also generally low at CAWS60 from 2018 to 2023, with the majority of results below the LOR.

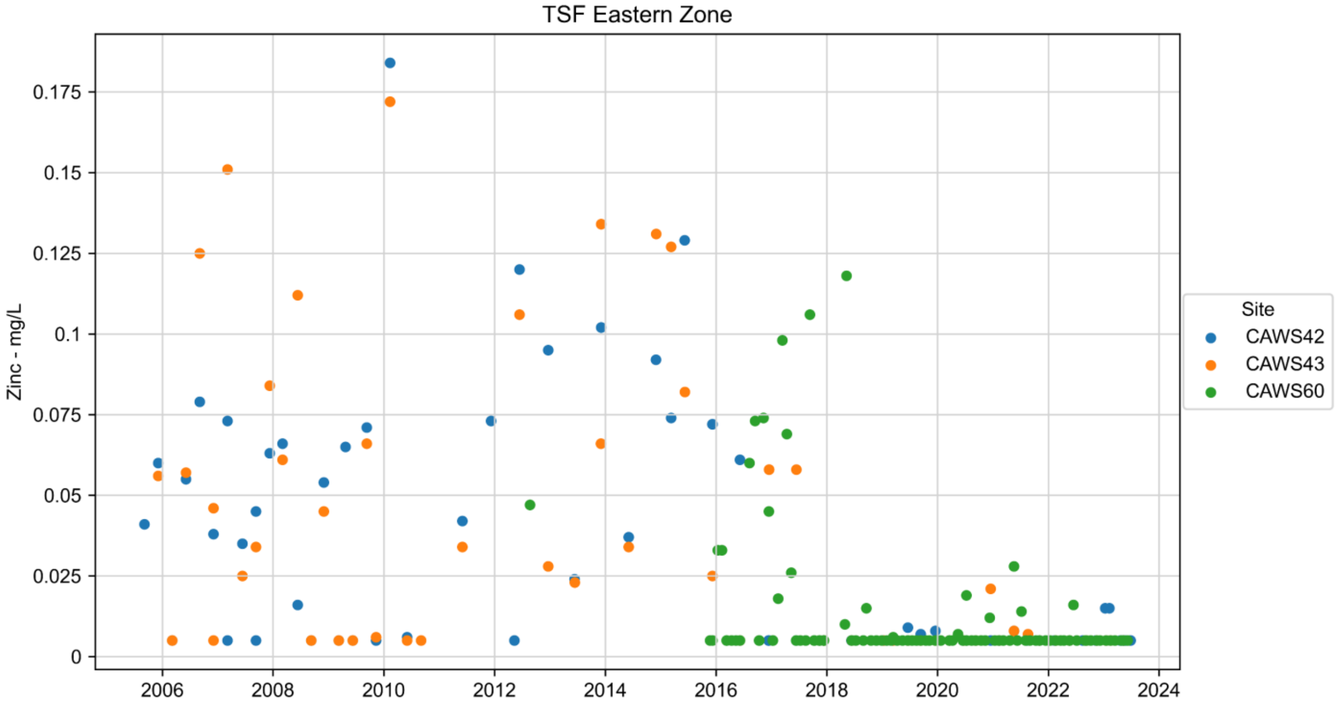


Figure 3.23 ***Zinc concentrations in the TSF Eastern Zone***

Summary

Comparison of the major ion compositions of the TSF Eastern Zone sites indicated that there is no clear influence of the decant ponds on surface water in the dyke pond (CAWS60), although it is possible that increasing concentrations of molybdenum observed during the reporting period at CAWS60 may be attributable to seepage from the TSF and/or increases in groundwater levels. However, the dyke pond is part of the mine's internal water system and cannot discharge off site due to its location, and as such, there is no impact from these water sources on the downstream environment in Cadiangullong Creek.

3.6.2 TSF Western Zone

Surface water is monitored at the following sites in TSF Western Zone:

– Watercourses: CAWS61, CAWS62

– Surface water storages: CAWS64, CAWS67, CAWS68, CAWS69, CAWS72, CAWS75, CAWS76

Physicochemical parameters

Field pH at the TSF Western Zone sites has generally been pH circumneutral to slightly alkaline, with no clear temporal patterns observed.

EC results showed a decreasing trend between 2019 and 2022 at all TSF Western Zone sites, likely due to the above average rainfall recorded during this period, resulting in dilution (Figure 3.24). EC was generally lowest at watercourse sites CAWS61 and CAWS62, and storage sites CAWS75 and CAWS64, where results are typically below 700 µS/cm. EC was highest at CAWS69, CAWS72 and CAWS67, where results were most commonly between 2,000 and 3,000 µS/cm in 2019, and between 2,000 and 3,000 µS/cm from 2019 to 2023.

TSS concentrations in the TSF Western Zone have been variable, with no clear spatial or temporal patterns observed.

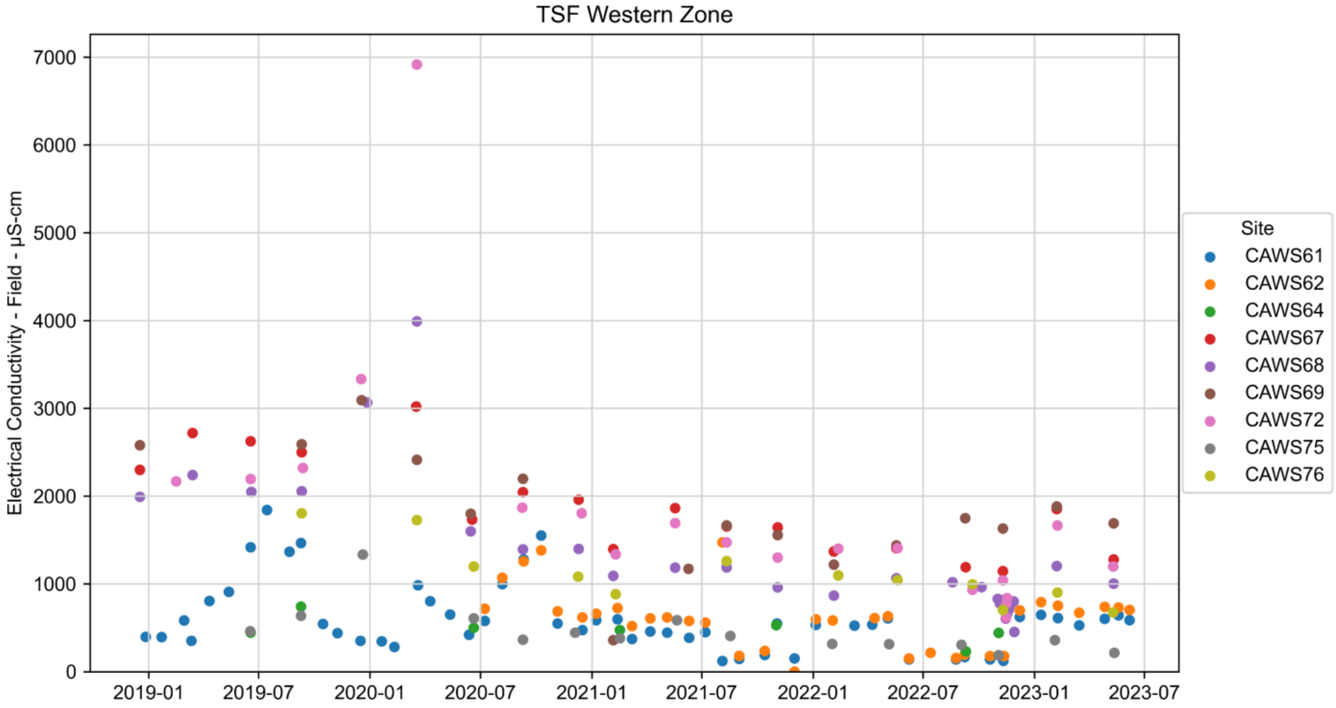


Figure 3.24 EC at TSF Western Zone sites

Nutrients

Elevated total nitrogen concentrations at CAWS64, CAWS68, CAWS72, CAWS75 and CAWS76 have been recorded historically (Figure 3.25). All elevated total nitrogen concentrations (greater than 15 mg/L) observed prior to 2016 comprised primarily of nitrate, while more recent (2018 to 2020) elevated total nitrogen concentrations (typically lower, in the range of 3 to 15 mg/L) are mainly comprised of organic nitrogen, indicating a likely increase in influences from agricultural runoff. A minor decreasing trend in total nitrogen concentrations has been observed at some sites, while nitrogen concentrations at most site have remained similar over time. It appears these elevated nitrogen concentrations are localised to storages in the TSF Western Zone, as no downstream impact of elevated TKN is observed at the Cadiangullong Creek monitoring sites, CAWS61 and CAWS62.

A similar trend in total phosphorus was observed at CAWS64, CAWS68, CAWS72, CAWS75 and CAWS76 as was seen for total nitrogen.

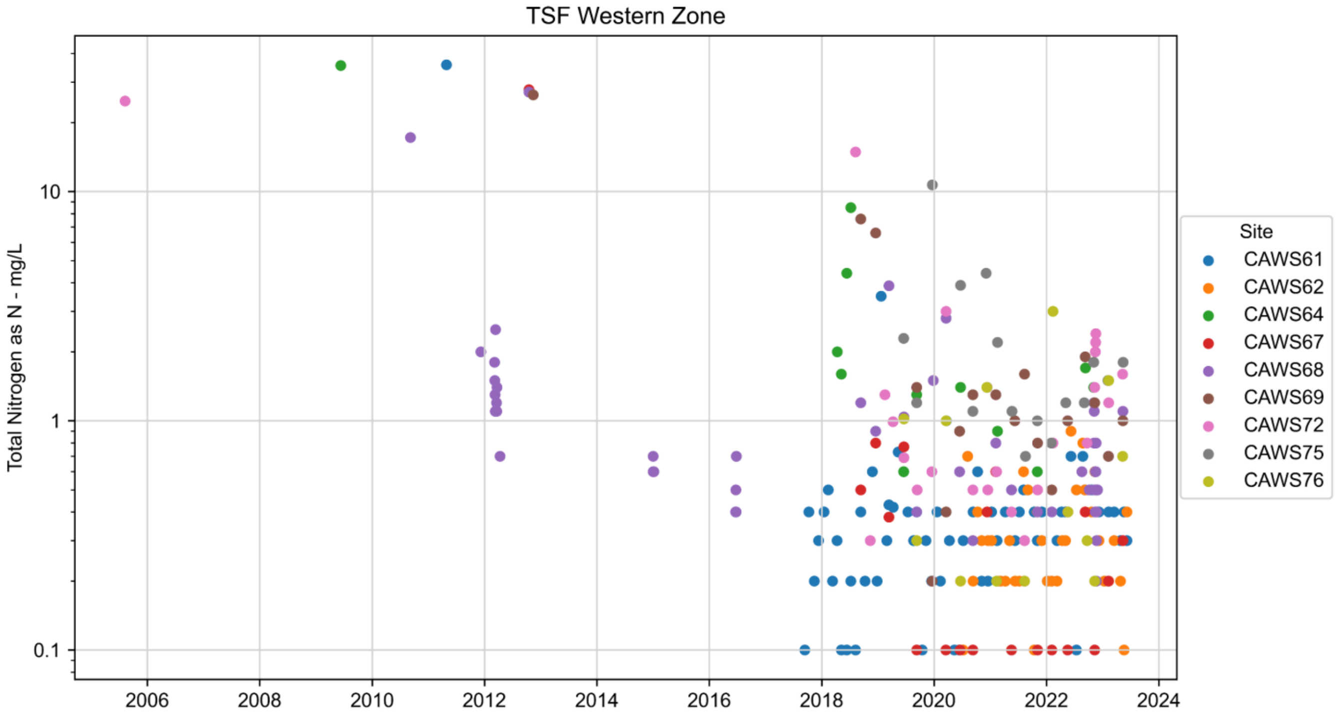


Figure 3.25 Total Nitrogen as N concentrations at TSF Western Zone Area

Major ion composition

There has been a decreasing trend in the concentration of all major ions except bicarbonate alkalinity at most sites between 2018 and 2023. Bicarbonate alkalinity concentrations have fluctuated at all sites and indicate more difference within sites than between sites. With the exception of bicarbonate alkalinity and chloride, which were observed in similar concentrations at all sites, concentrations of all major ions were lowest at CAWS61, CAWS62 and CAWS64. Most major ions were also found in similarly low concentrations at CAWS75, although the potassium concentrations at this site were higher than those observed elsewhere. Concentrations of calcium, magnesium and sulfate have remained consistently highest at CAWS67, CAWS72, CAWS69.

The piper plot in Figure 3.26 displays the ionic composition of TSF western sites during the historical monitoring periods and the current reporting period based on median concentrations of major ions. The piper chart shows that the cation compositions of all sites are very similar and have remained so across the historical monitoring period. The anion composition, however, shows two distinct groupings of sites. Water at CAWS67, CAWS68, CAWS69, CAWS72 and CAWS76 shows a strong sulfate dominance, potentially indicating some influence from the waste rock embankments on these sediment dams. It is noted in previous annual reviews that the groundwater in the area is naturally elevated in sulfate, and there is dissimilarity between the major cation chemistry of the surface water storages and TSF decant water. It is therefore unlikely that there is influence of TSF seepage on these storages.

The dominant anion at CAWS64 was historically bicarbonate, however, the dominance of the bicarbonate ion has become less in recent sampling events. The watercourse sites and CAWS75 contain water of a mixed anion dominance, indicating there is unlikely to be an impact from the TSFs on the composition of water in Cadiangullong Creek. There has been little change in the ionic composition of water at most sites, though the composition of water at CAWS64 has become more similar to that at the Cadiangullong Creek sites over time.

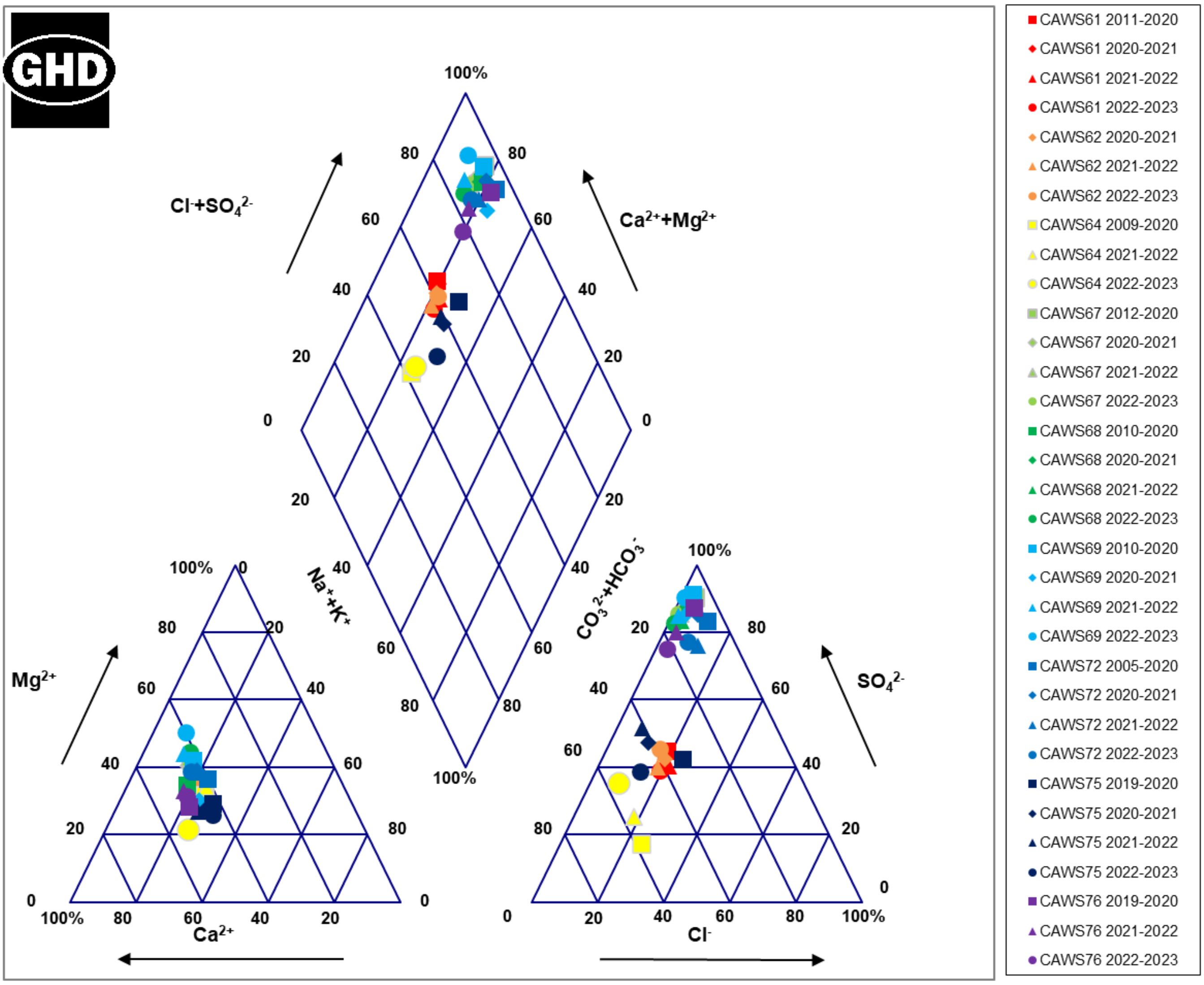


Figure 3.26 Piper chart showing differences in major ion composition in the TSF Western Zone

Dissolved metals

Aluminium concentrations were elevated at CAWS61, CAWS62, CAWS64 and CAWS75 between July and November 2022, in concentrations well above the ANZG (2018) DGV of 0.055 mg/L, and higher than the previously elevated concentrations observed during the 2021-2022 reporting period. These concentrations are similar to those observed at upstream Cadiangullong Creek sites and reflect the naturally elevated aluminium concentrations in the catchment. However, these elevated aluminium concentrations did not persist for the remainder of the reporting period (December 2022 to June 2023), and had reduced substantially at CAWS61 and CAWS62, with most aluminium concentrations during this time below the LOR. CAWS64 was reported as dry for the remainder of the reporting period and was not sampled. Aluminium concentrations at all other sites were low throughout the reporting period and consistent with historical results.

Similarly, iron concentrations were also elevated at CAWS61, CAWS62 and CAWS75 during the reporting period, although a decreasing trend was evident. Most iron concentrations at other TSF Western Zone sites were very low.

The majority of cobalt concentrations at TSF Western Zone sites have been below the LOR for the history of the monitoring program, with the exception of cobalt concentrations at CAWS67, which have been frequently elevated since sampling at the site began in late-2018. The highest cobalt concentration to date of 0.032 mg/L was recorded in February 2023, well above all other cobalt concentrations observed, but this did not persist, with the cobalt concentration recorded in May 2023 returning to usual levels.

During the 2022-2023 reporting period, the majority of copper concentrations at TSF western sites were elevated above the ANZG (2018) DGV of 0.0014 mg/L. Copper concentrations were highest at Cadiangullong Creek sites CAWS61 and CAWS62, which also occurred in the 2021-2023 reporting period. The result at CAWS62 in November 2022 was the highest recorded at the site to date, though subsequent results were much lower. These results were similar to the concentrations observed at upstream Cadiangullong Creek site 412161, which suggests that upstream sources, as opposed to the TSF, are likely to be responsible for the increased copper observed at CAWS61 and CAWS62 during the reporting period.

Copper concentrations were generally lower at the surface water storage sites, particularly CAWS67, where only one of the four samples collected during the reporting period contained a copper concentration higher than the LOR. Copper concentrations at CAWS72, although lower than those at CAWS61 and CAWS62, were also above the usual range of results for this site in samples collected in September and November 2022. Copper concentrations at CAWS72 had returned to historical levels by February 2023

Manganese concentrations during the 2022-2023 reporting period were generally highest at CAWS67 and CAWS72. A notable increasing trend has been observed at CAWS72 between 2019 and 2023. With the exception of one very high manganese concentration at CAWS67 (11 mg/L in February 2023 – the only exceedance of the ANZG (2018) DGV observed in the reporting period) manganese concentrations at CAWS67 have remained steady over time.

Molybdenum concentrations at sites CAWS67, CAWS68, CAWS69 and CAWS76 have been elevated both historically and over the 2022-2023 reporting period compared to other sites within the TSF Western Zone (Figure 3.27), although recent results are within the historical range. Considering the consistently elevated molybdenum concentrations in TSF decant water and WRD leachate, these elevated levels indicate possible surface water drainage/runoff from the TSF embankments, which are made from non-acid forming (NAF) waste rock, and/or seepage from TSF. No trend in molybdenum concentrations during the reporting period was evident however, indicating that the degree of the NAF waste rock runoff influence has not increased during the reporting period. Molybdenum concentrations remain low at CAWS61 (the downstream Cadiangullong Creek indicator for any seepages in the western TSF area) with all results less than or equal to 0.003 mg/L, well below the ANZG (2018) (unknown reliability) guideline 0.034 mg/L. Therefore, there is no inferred surface water contamination impact from the TSF Western Zone on the receiving watercourse.

Zinc concentrations were generally low during the reporting period, with only two elevated concentrations observed, both of which were the only two samples collected during the reporting period from CAWS64. Zinc has also been elevated at CAWS64 previously, and the recent results were on the lower range of concentrations observed at the site. Zinc had also periodically been elevated at other sites, including CAWS68 in the 2012 to 2016 period, and CAWS61 in the 2017 to 2021 period, however, all results at these sites in the current reporting period were low.

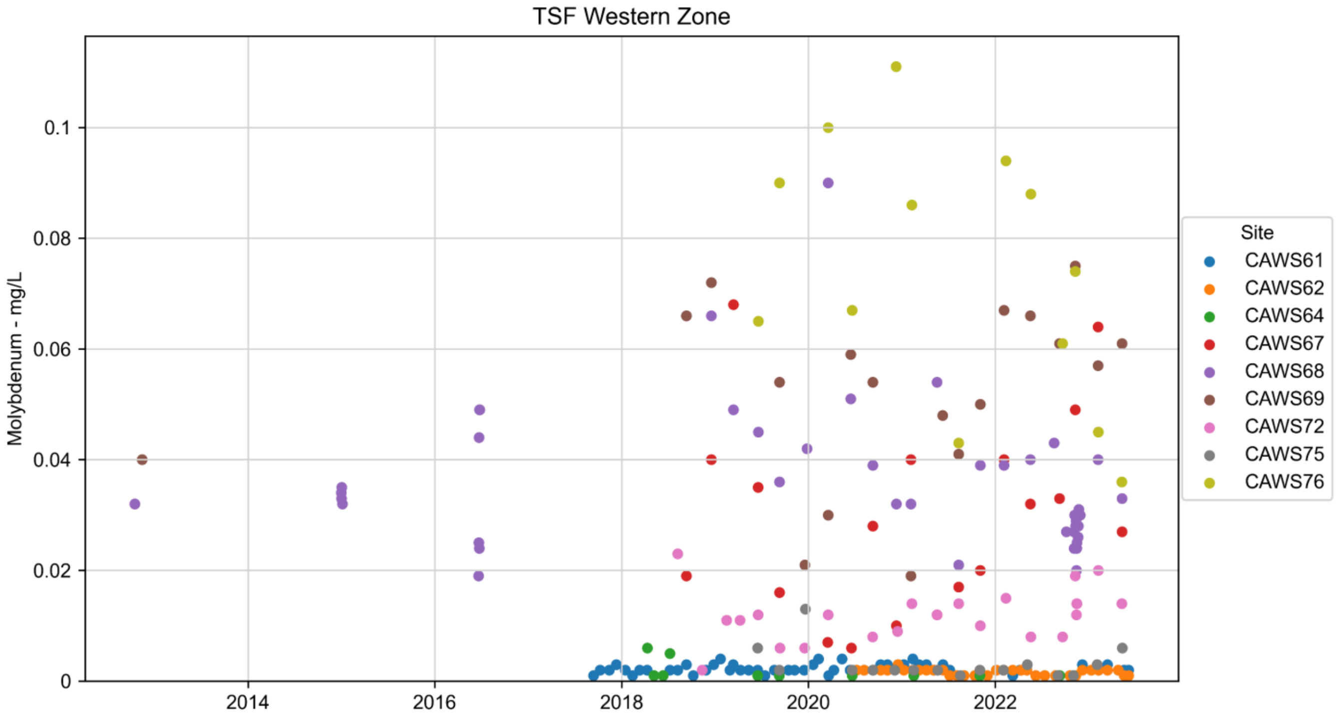


Figure 3.27 Dissolved molybdenum concentrations at TSF Western Zone sites

Summary

Surface water quality at sites CAWS67, CAWS68, CAWS69, CAWS72 and CAWS76 is characterised by an elevated and distinct ionic composition, dominated by the sulfate ion. These sites, excluding CAWS72, also showed elevated concentrations of molybdenum compared to other sites within the TSF Western Zone, suggesting potential influence of the TSF and waste rock embankments on the surface water storages. However, there is no indication of elevated molybdenum concentrations at CAWS61 on Cadiangullong Creek which is the nearest downstream receptor for any potential water quality impact from the Western Zone of the TSFs.

Overall, while it appears that there is an influence of waste rock runoff/drainage from TSF embankments at a seepage monitoring location and two dams to the west of the TSFs, this influence appears to be limited spatially, and to be fully contained in surface water bodies from which water is recovered for re-use. Therefore, the TSFs do not appear to be having an adverse impact on the water quality of the receiving watercourse in the Western TSF Zone.

3.6.3 TSF Southern Zone

Surface water is monitored at the following sites within the TSF Southern Zone:

– Watercourses: CAWS28, CAWS30, CAWS55, CAWS59, CAWS63, 412702
– Surface water storages: CAWS31, CAWS41, CAWS54, CAWS56, CAWS57

Physicochemical parameters

Field pH has generally been stable in the TSF Southern Zone, with most observations for the historical monitoring period indicating circumneutral to slightly alkaline water. pH was generally most acidic at CAWS63, CAWS56, CAWS31 and CAWS57.

EC showed a general increasing trend at most sites between 2016 and 2020, before decreasing between 2020 and 2023 (Figure 3.28). This is likely due to the drought period prior to 2020, followed by a period of above average rainfall from 2020 to 2023, contributing to dilution. EC results are generally lowest at 412702, the most downstream monitoring location in Cadiangullong Creek, although EC results tend to fluctuate more at this site than at any other site.

There were no temporal trends in TSS observed for the TSF Southern Zone. The highest TSS concentrations were reported in tributaries of Rodds Creek at CAWS57 and CAWS56, which is likely associated with livestock accessing these ponds.

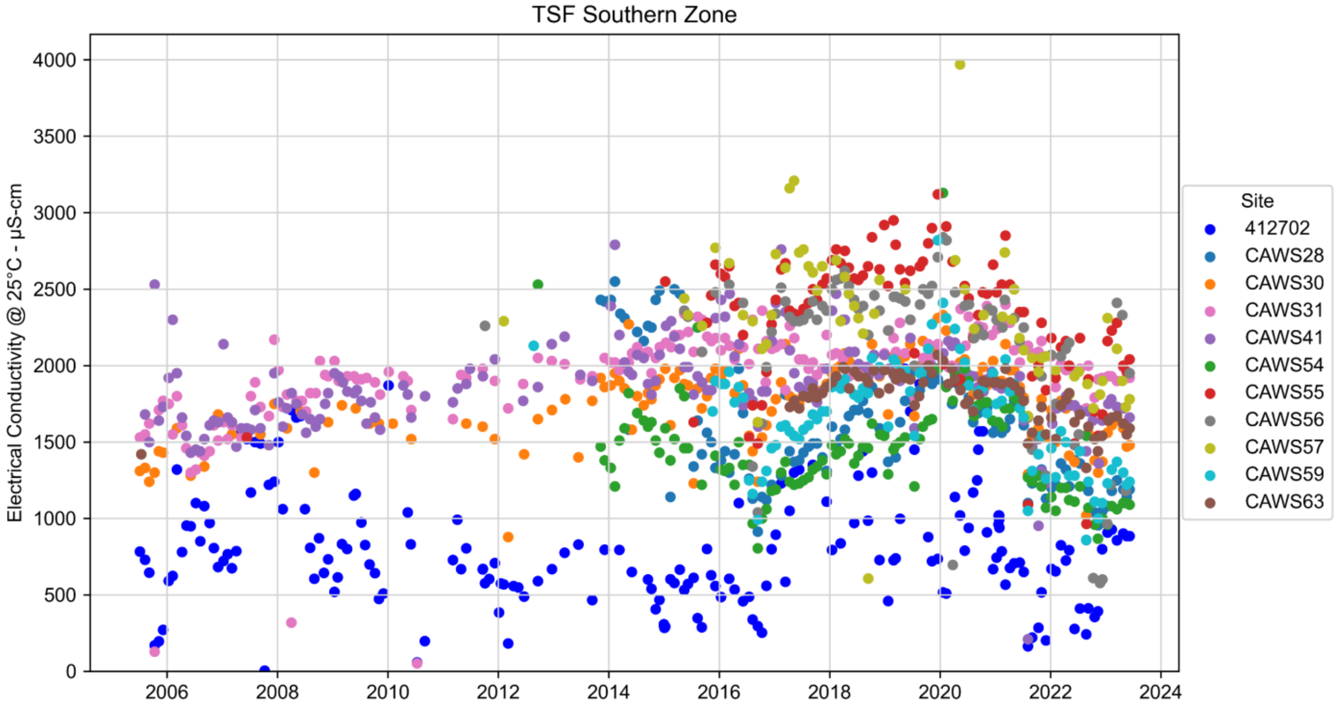


Figure 3.28 Laboratory electrical conductivity in the TSF Southern Zone

Nutrients

The highest concentrations of nitrogen oxides (consisting primarily of nitrate (Figure 3.29)) in the TSF Southern Zone have been observed at CAWS31 and CAWS54. Nitrogen oxide concentrations in the seepage collection dam on Rodds Creek (CAWS31) are elevated as expected, with the tailings decant pond water upstream at CAWS42 and CAWS43 showing similar concentrations of nitrogen oxides. Nitrate concentrations at CAWS31 have demonstrated a decreasing trend from 2014 to present. Elevated nitrogen oxide concentrations at CAWS54 are likely occurring as the site is often sampled as a stagnant tributary in farm paddocks.

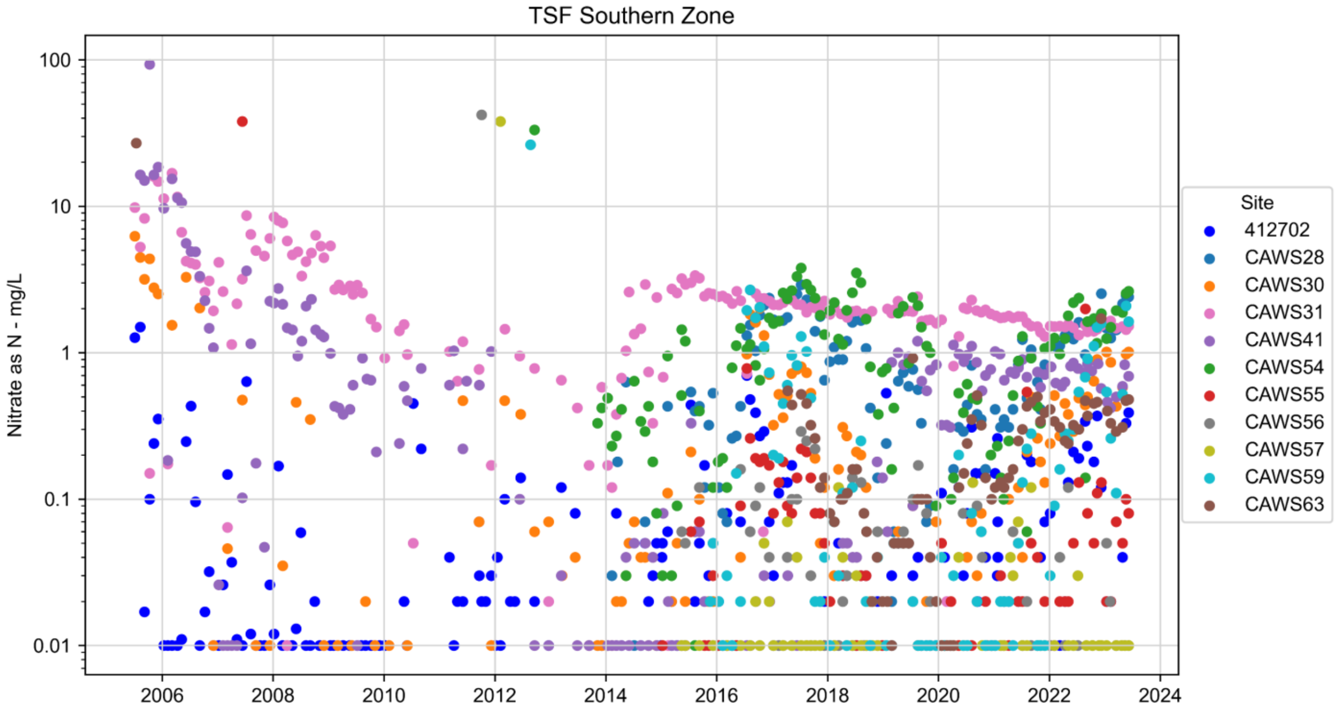


Figure 3.29 ***Nitrate concentrations in the TSF Southern Zone***

TKN concentrations were generally highest at CAWS57, where nitrate concentrations were lower (Figure 3.30). TKN was also elevated at CAWS56 and CAWS54. The influence of organic nitrogen is most likely due to the impact of surrounding agricultural land with increased nutrient runoff into and through surface water monitoring sites. TKN concentrations were historically elevated at CAWS31 between 2005 and 2010, though in contrast to nitrate results, more recent TKN concentrations have been much lower.

Importantly, the lowest total nitrogen concentrations in the TSF Southern Zone are observed at Rodds Creek locations CAWS63 and CAWS55. These locations are the nearest downstream from the seepage collection dam, CAWS31, and confirm that elevated total nitrogen concentrations are not likely influenced by STSF seepage.

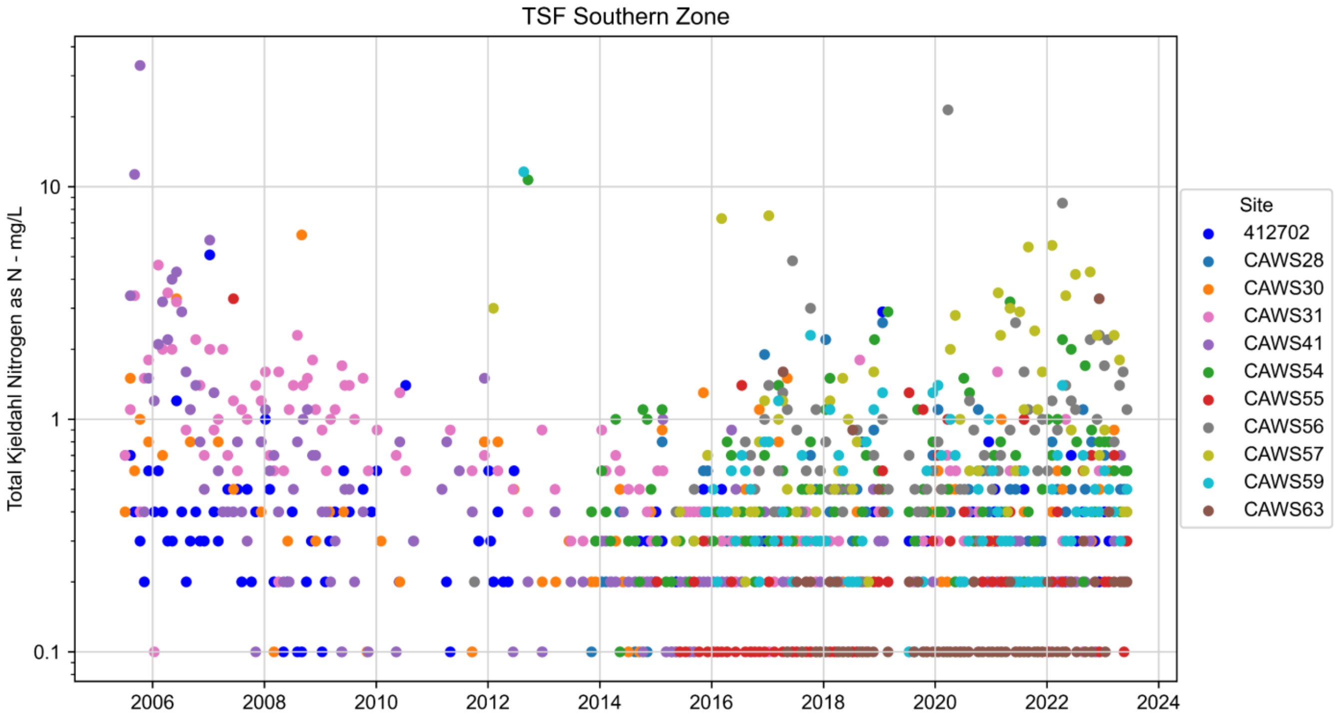


Figure 3.30 TKN concentrations in the TSF Southern Zone

Total phosphorous concentrations followed similar trends to those observed for TKN, with elevated concentrations recorded most recently at CAWS54, CAWS57 and CAWS56. These sites are all located on the eastern tributary of Rodds Creek, where the elevated total phosphorous concentrations are most likely indicative of the influence of grazing within the catchment.

Major ion composition

Concentrations of most major ions, including bicarbonate alkalinity, calcium, chloride, magnesium and sodium were lowest at downstream Cadiangullong Creek site 412702, while sulfate was lowest at CAWS54. Potassium and sulfate concentrations were highest at CAWS31, while bicarbonate alkalinity, chloride, magnesium and sodium were highest at CAWS56 and CAWS57. Magnesium, sulfate and chloride concentrations were also high at CAWS55. Calcium, chloride, magnesium and sulfate concentrations demonstrated an increasing trend at all sites between 2016 and 2020, and a decreasing trend from 2020 to 2023, likely in response to changes in rainfall conditions in the area.

The piper plot in Figure 3.31 displays the ionic composition of TSF Western Zone sites during the historical monitoring periods and the current reporting period based on median concentrations of major ions. The piper chart indicates some possible influence from the STSF on CAWS31, which acts as a seepage collection pond for the STSF, due to the similar ionic composition and dominance of the sulfate ion between CAWS31 and CAWS43 (refer Figure 3.21). Based on major ion composition, there is no indication of any STSF seepage influence on either CAWS63 (Rodds Creek downstream) or 412702 (Cadiangullong Creek downstream from Rodds Creek), as CAWS43 shows a much greater sulfate dominance in comparison to CAWS63 and 412702. There has been little change in the ionic composition of most TSF Southern Zone sites shown in Figure 3.31 between the last three reporting periods, although water at CAWS56 in the 2022-2023 period displayed a stronger dominance of the sodium and bicarbonate ions than had been observed previously.

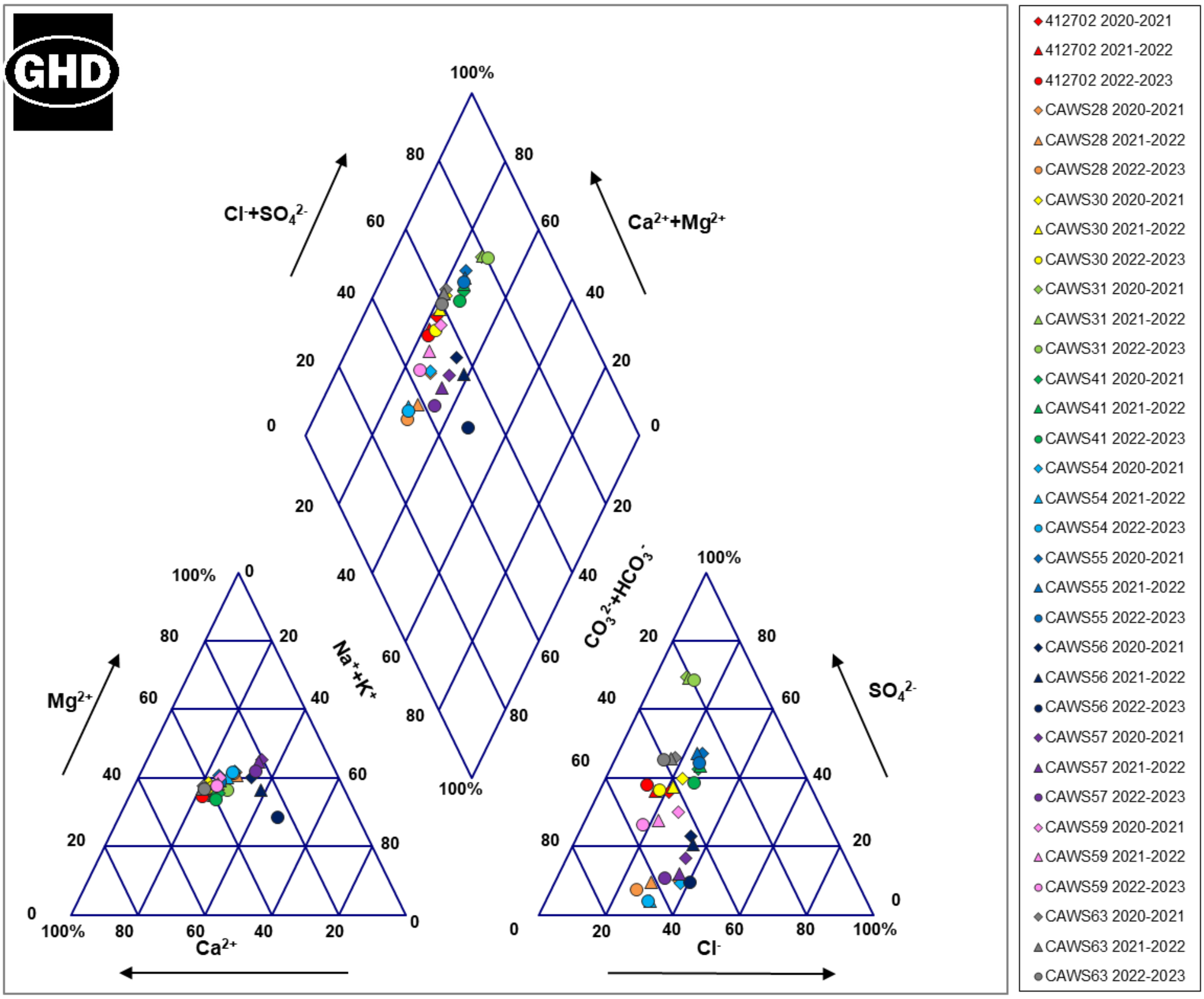


Figure 3.31 ***Piper chart showing differences in major ion composition in the TSF Southern Zone in the past three reporting periods***

Dissolved metals

Copper concentrations are consistently elevated at 412702 and CAWS31, with the majority of concentrations exceeding the ANZG (2018) DGV of 0.0014 mg/L and remaining steady over time. Copper concentrations at these sites are similar to or slightly lower than those observed at upstream Cadiangullong Creek sites CAWS61 and CAWS62.

Manganese concentrations have been variable across the historical monitoring period but are generally lowest at CAWS31 and highest at CAWS56 and CAWS57. The manganese concentrations observed at CAWS57 in October and December 2022 and January 2023, and at CAWS56 in January 2023 exceeded the ANZG (2018) DGV of 1.9 mg/L, though concentrations in all later collected samples had decreased to below the DGV.

Elevated zinc concentrations were common at the TSF Southern Zone sites between 2005 and 2018, however, between 2018 and 2023, most zinc concentrations were below the LOR at all sites. There were only three instances of zinc concentrations exceeding the ANZG (2018) DGV of 0.008 mg/L during the 2022-2023 reporting period. This included one sample at each of 412702 and CAWS57, where the exceedance was below the historically elevated results for these sites, and one very high result of 0.157 mg/L at CAWS31, which was the highest zinc concentration observed at that site to date. Subsequent samples collected at these three sites all contained zinc concentrations below the LOR, indicating that elevated zinc is not a persistent issue in the TSF Southern Zone.

Molybdenum concentrations were highest in the tailings decant water at CAWS42 and CAWS43 in the TSF Eastern Zone (refer to Figure 3.22). As has been observed in previous reporting periods, influence of seepage from the tailings is evident in the elevated molybdenum concentrations observed in contained systems CAWS31 and CAWS41. Based on molybdenum concentrations, there is no influence on sites further downstream (Figure 3.32). Most molybdenum concentrations in the TSF southern area are below the ANZG (2018) guideline of 0.034 mg/L (unknown species protection level)., including all results from the current reporting period except one at CAWS41 in November 2022.

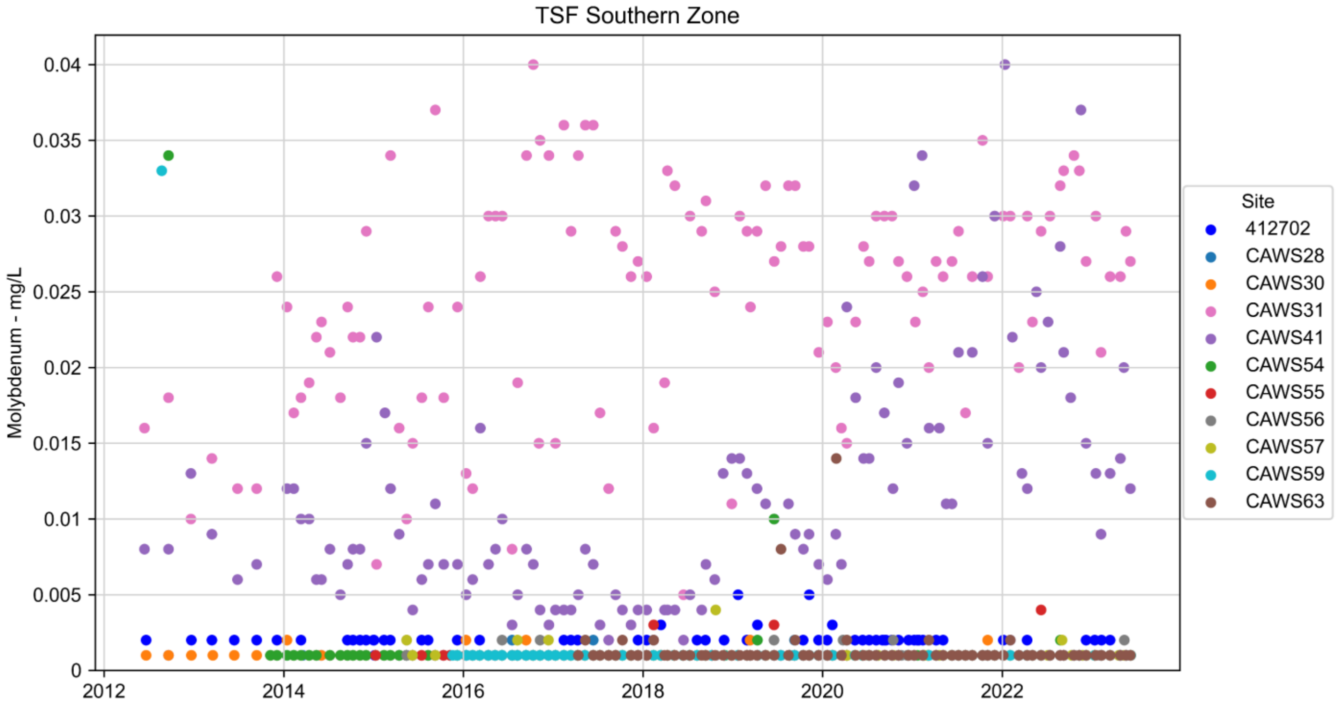


Figure 3.32 ***Molybdenum concentrations in the TSF Southern Zone.***

Summary

The surface water monitoring sites CAWS31 and CAWS41, which represent a mix of background groundwater and seepage from the STSF, showed elevated molybdenum concentrations over the reporting period, although these concentrations were within historical levels. As mentioned above, all but one molybdenum concentration recorded during the 2022-2023 reporting period at TSF Southern sites was below the ANZG (2018) DGV of 0.034 mg/L. Water at these sites is fully contained and returned to the processing plant for reuse, therefore does not currently pose a risk to downstream receiving waters. There are no other concerning results at other surface water monitoring locations within the TSF Southern Zone.

No impact of seepage from the STSF on water quality was evident in the receiving environment at site 412702, based on the monitoring records for key parameters associated with the TSF decant water, including nitrogen oxides, molybdenum and major ion composition.

3.7 Dewatering facilities

The Blayney and Cadia Dewatering Facilities are located approximately 21 km and 23.5 km, respectively, to the east of the CVO in the town of Blayney. The Cadia Dewatering Facility was commissioned in June 2016. Mineral concentrate containing gold and copper is pumped from CVO to the Cadia Dewatering Facility, where it is dewatered and then loaded onto trains for transport to Port Kembla on the eastern seaboard.

The Blayney Dewatering Facility was demolished between March and April 2020. Remediation works followed the site's decommissioning, and the site has now been relinquished to its owner. Monitoring sites at the dewatering facilities are shown in Figure 3.33.

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Blayney Dewatering Facility and Cadia Dewatering Facility

Project No. **12618414**
Revision No. **0**
Date **10 Aug 2023**

FIGURE 3-33

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Data source: Newcrest: Bores, 2019. LPI: DCDB/DTDB, 2017. . Created by: pkiem, fmackay, tmorton

3.7.1 Blayney Dewatering Facility

Surface water is monitored at NEC061 and NEC062 in the Blayney Dewatering Facility (BDF) area. The location of these sites is shown in Figure 3.33.

Physicochemical parameters

Field pH at the BDF sites is generally slightly higher at NEC062 than NEC061 but has followed a similar trend across the history of monitoring. Most pH results are near neutral, within the range of 7.0 to 7.7, though pH was more acidic than this range on several occasions during the reporting period.

EC at these monitoring locations has shown variability between sampling events, but results are generally similar between the two sites during each event. EC measurements during the 2022-2023 reporting period were within the historical range of results. EC demonstrated an increasing trend between 2019 and 2021 but has been more stable since this time.

No temporal trends in TSS concentrations were observed, with the majority of concentrations generally below 20 mg/L.

Nutrients

Concentrations of nitrate are usually higher at NEC061 than NEC062, with results following a similar trend at the two sites. The highest nitrate concentrations during the reporting period were recorded in June 2023 at both sites, with the result at NEC061 being the highest recorded at the site to date. TKN and total phosphorus concentrations were more consistent with historical results an indicated no temporal trends. A similar level of variability was observed for these parameters at both monitoring locations which suggests influence from upstream sources, such as industrial and agricultural runoff, is causing some sporadic elevated nutrient concentrations.

Major ions

Concentrations of all major ions were observed in similar concentrations at both sites and were consistent with historical results, with no temporal patterns observed.

Dissolved metals

The upstream monitoring location (NEC061) had historically shown elevated arsenic concentrations which suggested there was an arsenic source impacting Abattoir Creek upstream of the BDF. Arsenic concentrations at NEC061 have reduced and have been observed in similar concentrations to those at NEC062 since 2019.

Copper concentrations during the 2022-2023 reporting period continued the decreasing trend observed during the 2021-2022 reporting period (Figure 3.34). In the 2022-2023 reporting period, copper concentrations in 10 of 12 samples at NEC061 and eight of 12 samples at NEC062, were now below the DGV of 0.0014 mg/L. There was one more elevated copper concentration observed at NEC061 in November 2022 (0.08 mg/L), however, the copper concentration in all samples collected after this time were below LOR and DGV.

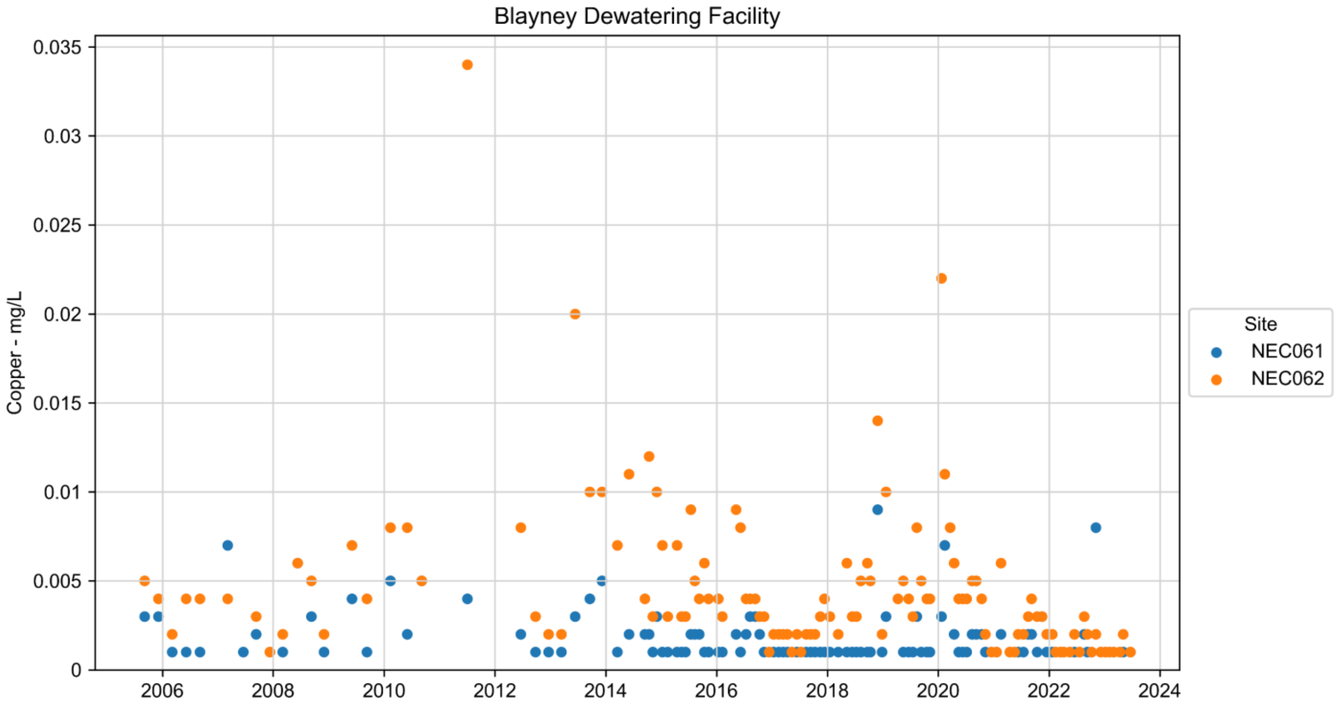


Figure 3.34 ***Dissolved copper concentrations in the Blayney Dewatering Facility Area***

Iron concentrations were previously elevated at NEC061 during the 2020-2021 reporting period, with a source upstream of the BDF suspected. However, iron concentrations observed during the 2021-2022 and 2022-2023 reporting periods were much lower, with all results below 0.5 mg/L, and results similar between the two sites.

Manganese concentrations have been occasionally elevated at both sites, although concentrations during the majority of sampling events were higher at upstream site NEC061 (Figure 3.35). Only one manganese result at NEC061 was above 0.25 mg/L during the 2022-2023 reporting period, with all other results low and similar between the two sites. Despite some elevated concentrations, all manganese concentrations since 2008 have been below the ANZG (2018) DGV of 1.9 mg/L.

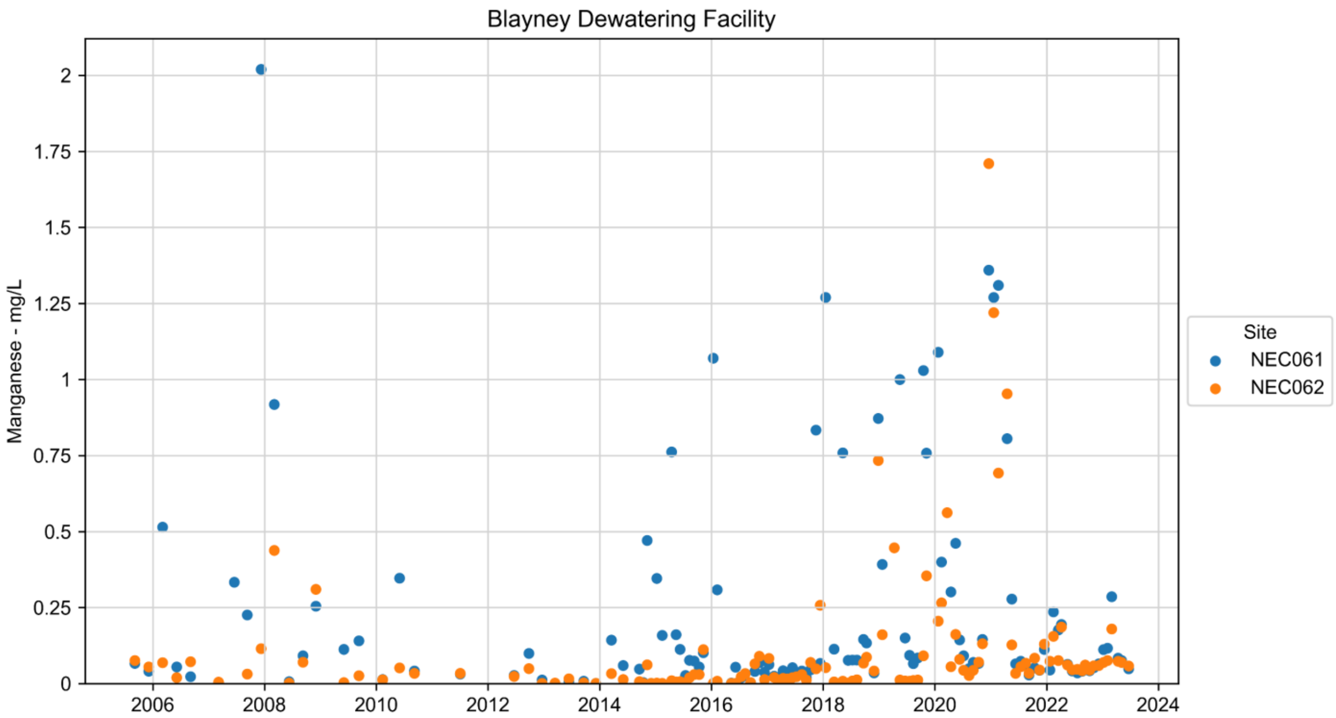


Figure 3.35 ***Dissolved manganese concentrations in the Blayney Dewatering Facility Area***

Elevated zinc concentrations were observed at both monitoring locations prior to the 2017-2018 reporting period (Figure 3.36). Since 2018, zinc concentrations have lowered significantly and remained below 0.03 mg/L. All zinc concentrations at both the upstream and downstream sites during the 2022-2023 reporting period were below the ANZG (2018) DGV of 0.008 mg/L.

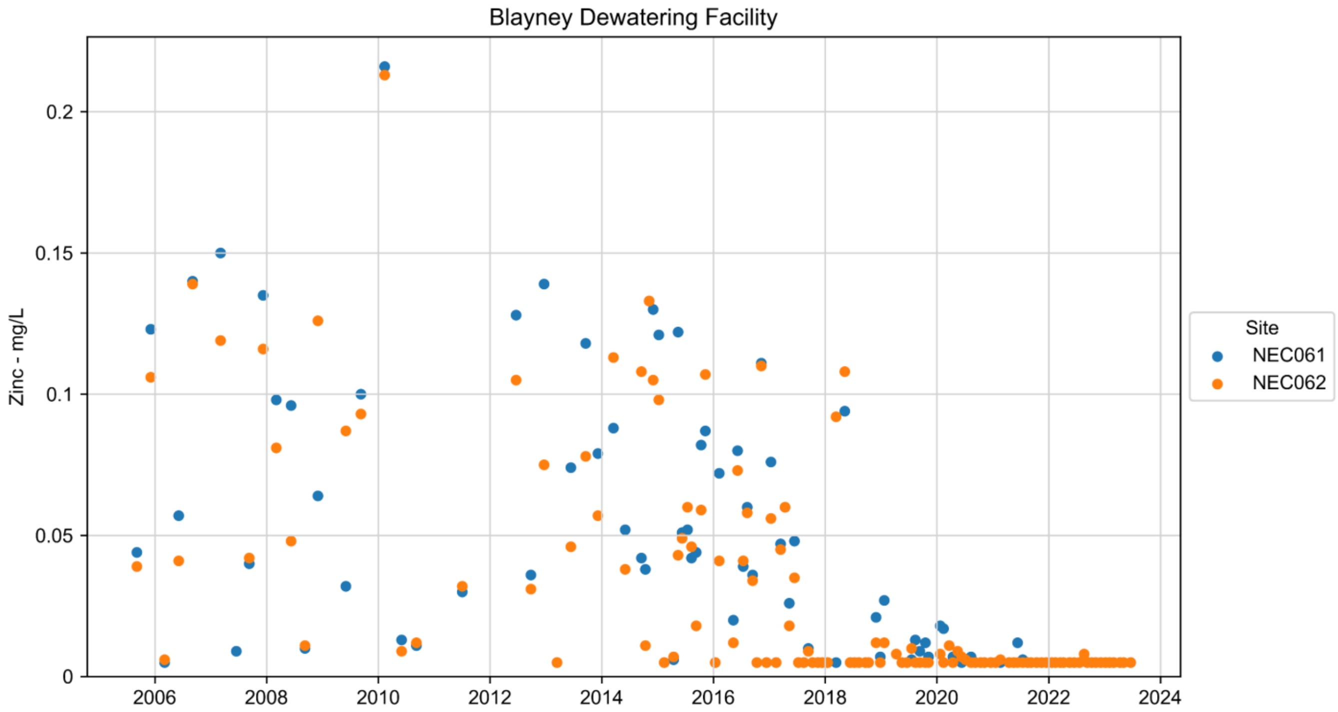


Figure 3.36 Zinc concentrations in the Blayney Dewatering Facility area

Summary

Water quality at the BDF monitoring locations has been generally stable, with few temporal trends observed. While there were some historical spatial trends apparent, these are no longer evident, with similar variability in water quality parameters generally observed at both monitoring locations.

3.7.2 Cadia Dewatering Facility

Surface water is monitored at CDW01, CDW02, CDW03, CDW04 and CDW05 in the Cadia Dewatering Facility (CDF) area. These sites are all potential impact sites as they can be influenced by site operations. CDF monitoring sites are shown in Figure 3.33.

No upstream background sites have been monitored as there is no continuous watercourse upgradient of the site. From farthest upstream to downstream along the onsite drainage channel is CDW01, CDW02, and CDW05. CDW03 is located upstream of the Belubula River and Abattoir Creek confluence, on the Belubula River. CDW04 is located downstream of the drainage channel’s assumed discharge point to the Belubula River, on the Belubula River.

CDW01 and CDW02 were removed from the monitoring program in March 2020 and November 2020 respectively, due to physical removal of the dams which they represented as part of on-site stormwater upgrades to contain runoff. CDW05 represents the offsite discharge point from the CDF and is retained as a monitoring location. CDW01 and CDW02 are included in the dataset for historical context and will be removed upon approval of the revised Cadia WMP.

Physicochemical parameters

Field pH in the CDF area ranges from slightly acidic at CDW03 to slightly alkaline at CDW01 and CDW02. pH results during the 2022-2023 reporting period were within the historical range of results except for one result at CDW04 that was more alkaline that the usual results at this site.

EC was generally lowest at the impact monitoring location closest to the CDF (CDW02) suggesting that any runoff or discharge from the facility is of low EC. In the most recent reporting period, an increasing trend in EC was observed at CDW03 and CDW04, while EC remained consistent at CDW05.

The highest TSS concentrations have been observed at CDW05, although no temporal trend is evident which suggests that spikes in TSS are associated with rainfall events. TSS was also elevated at CDW04 in March 2023, though all other TSS concentrations at CDW04 were low.

Nutrients

The concentrations of nitrogen oxides have been consistently highest at CDW05, which was again the case during the 2022-2023 reporting period (Figure 3.37). Elevated nitrogen oxide concentrations are considered to be indicative of inputs from widespread industrial, agricultural and urban pollution (GHD 2020a). Nitrogen oxides concentrations at CDW03 and CDW04 tend to be higher in winter, and lower in summer, which is likely indicative of uptake of nitrite and nitrate by algae and macrophytes, which occurs at a greater rate with higher temperatures and more daylight. A similar trend was observed for total nitrogen but not total Kjeldahl nitrogen, which supports the theory that the nitrogen is being incorporated into biomass rather than transformed to ammonia or organic nitrogen.

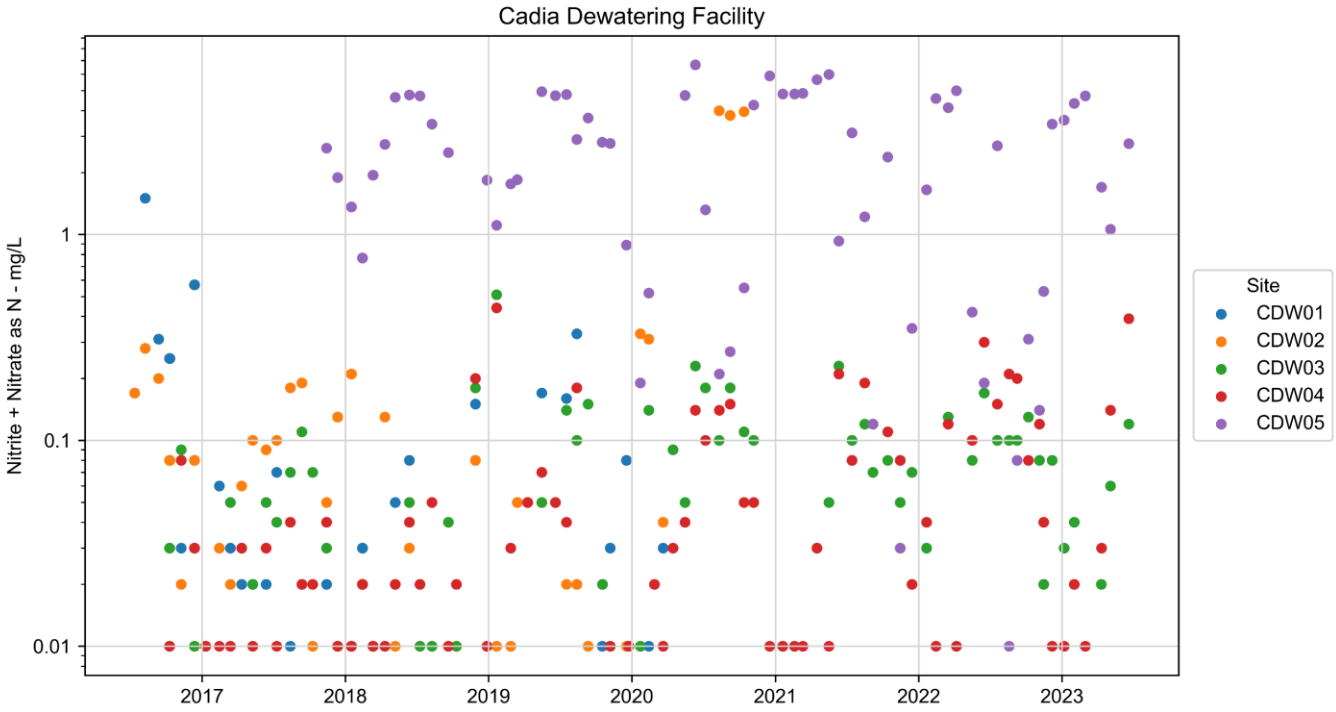


Figure 3.37 ***Nitrogen oxide concentrations in the Cadia Dewatering Facility Area***

Total phosphorus concentrations were similar during the 2022-2023 reporting period to results from previous monitoring events, with all results within the usual range and little difference observed between the sites (Figure 3.38). Elevated total phosphorus concentrations exist at all monitoring points, including the upstream monitoring point on the Belubula River (CDW03). This suggests that background levels of phosphorus in watercourses are naturally elevated in the catchment.

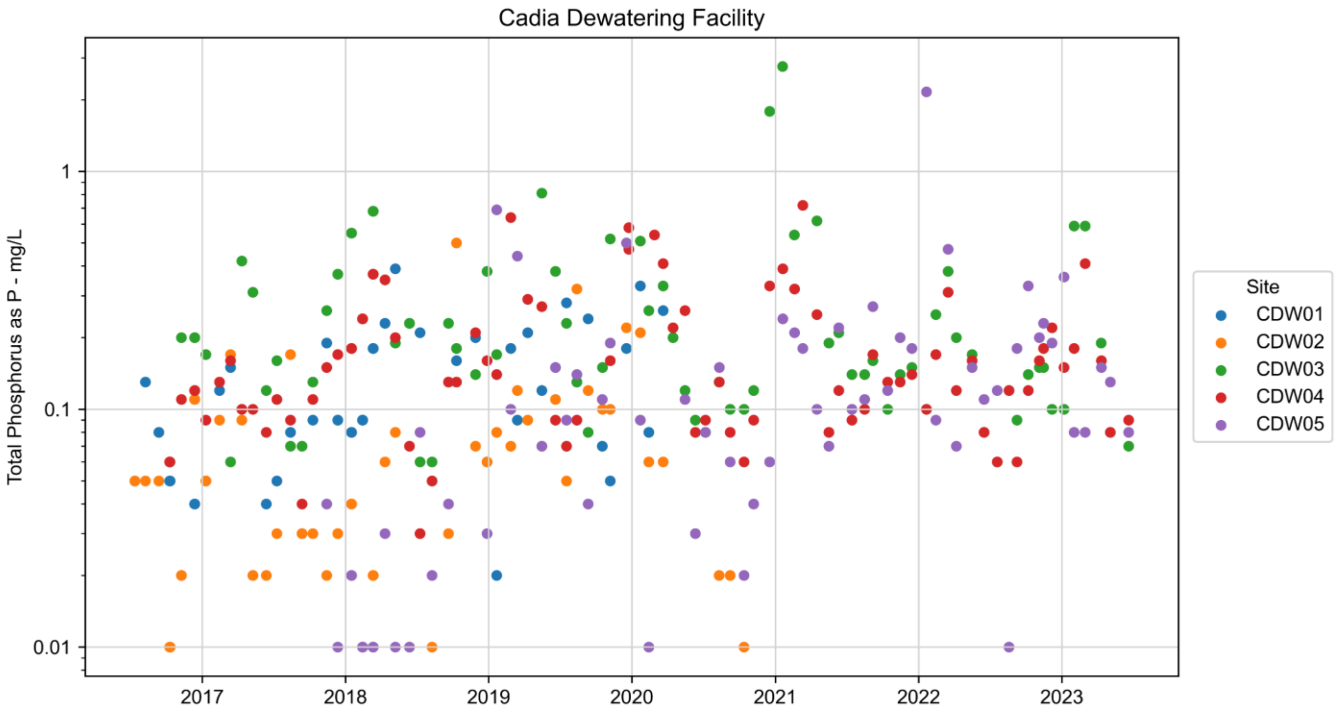


Figure 3.38 ***Total phosphorus concentrations at Cadia Dewatering Facility***

Major ions

In general, concentrations of most major ions follow a similar pattern at all sites, thought bicarbonate alkalinity and magnesium are generally highest at CDW05, while chloride, sodium and sulfate are highest at CDW03. Historically, concentrations of most major ions were lowest at CDW02.

Dissolved metals

The highest aluminium, iron and manganese concentrations have typically been observed in the Belubula River at upstream site CDW03, which is likely indicative of the influence of surrounding land use. Concentrations at downstream site CDW04 are slightly lower but follow a similar trend to that at CDW03, while concentrations at CDW05 were much lower, indicating no impact from the CDF on concentrations of these metals. Concentrations were within historical ranges at all sites during the 2022-2023 reporting period.

All copper concentrations recorded during the 2022-2023 reporting period were less than or equal to 0.006 mg/L, except for one elevated concentration of 0.012 mg/L observed at upstream site CDW03 in November 2022 (Figure 3.39). The copper concentration of all subsequent samples collected from this site, however, were much lower. The copper concentration of the majority of samples in the 2022-2023 period at CDW03 and CDW04 were below the ANZG (2018) DGV of 0.0014 mg/L, and the LOR, while concentrations at CDW05 were more frequently elevated. However, copper concentrations at CDW05 are much lower than those previously observed at CDW01 and CDW02. Copper concentrations have historically been the highest at CDW02, although a general decreasing trend was observed prior to the cessation of sampling at this monitoring location in October 2020. The lower copper concentrations observed at CDW05 compared to CDW02 demonstrates the improvement in copper concentrations in the CDF area.

Copper concentrations were similar in the Belubula River, upstream (CDW03) and downstream (CDW04) of the Abattoir Creek confluence, which indicates that the low-level exceedances of the ANZG (2018) DGV (0.0014 mg/L) observed in the river were unlikely to be associated with the CDF.

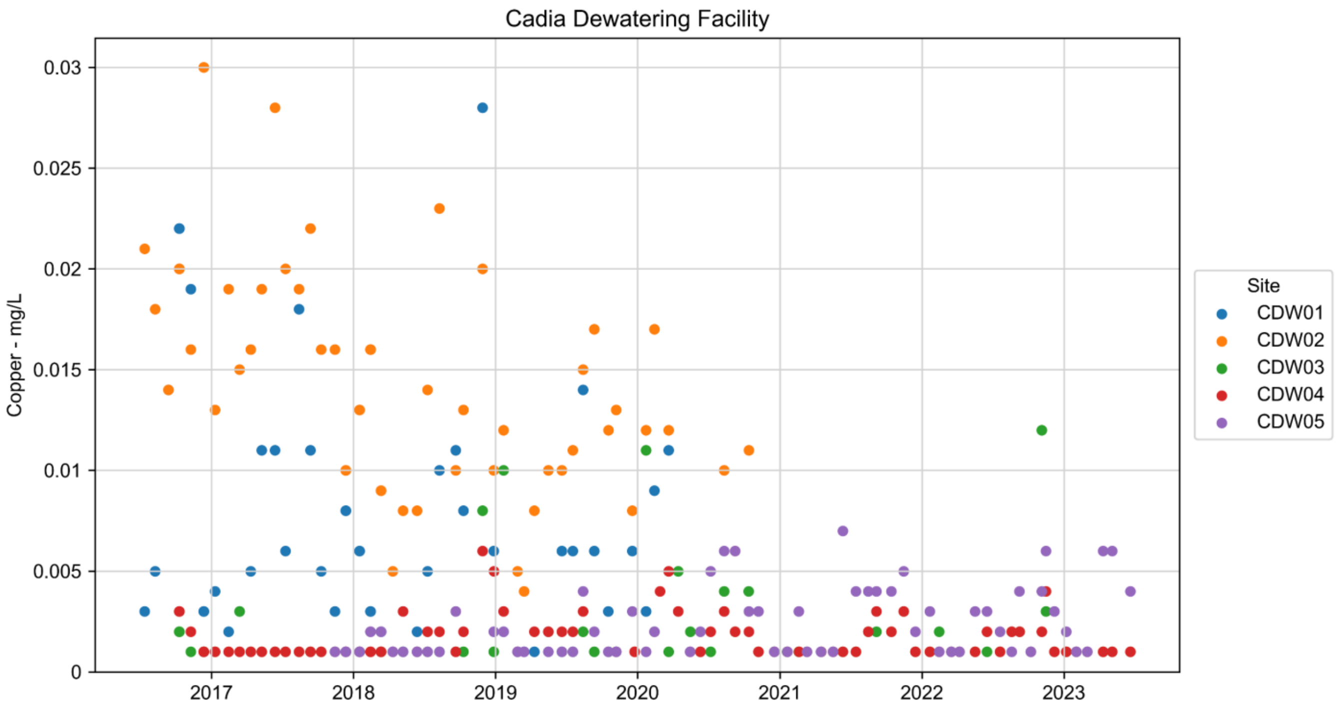


Figure 3.39 ***Dissolved copper concentrations in the Cadia Dewatering Facility Area***

Molybdenum concentrations have historically been highest at CDW02, although were higher at CDW01 on several occasions in 2019 (Figure 3.40). Considering the presence of molybdenum in the ore at CVO, these observations may reflect the influence of the dewatering facility's operation at CDW02, although no such influence has been observed at CDW05 or in the receiving environment of Belubula River at site CDW04. Molybdenum was elevated at upstream site CDW03 in May 2023, and was slightly elevated at downstream site CDW04 in the corresponding sample. This molybdenum did not originate from the CDF, nor was molybdenum observed in any concentration above the LOR at either upstream BDF site in 2023. Molybdenum, however, increased to above the LOR at CDW05 in May 2023, and was elevated in the highest concentration observed at the site to date (0.005 mg/L) in June 2023, though was below the historically elevated concentrations previously observed at CDW02. As such, molybdenum concentrations should be closely assessed in the 2023-2024 reporting period to determine whether this presence of molybdenum is an increasing trend or an isolated occurrence.

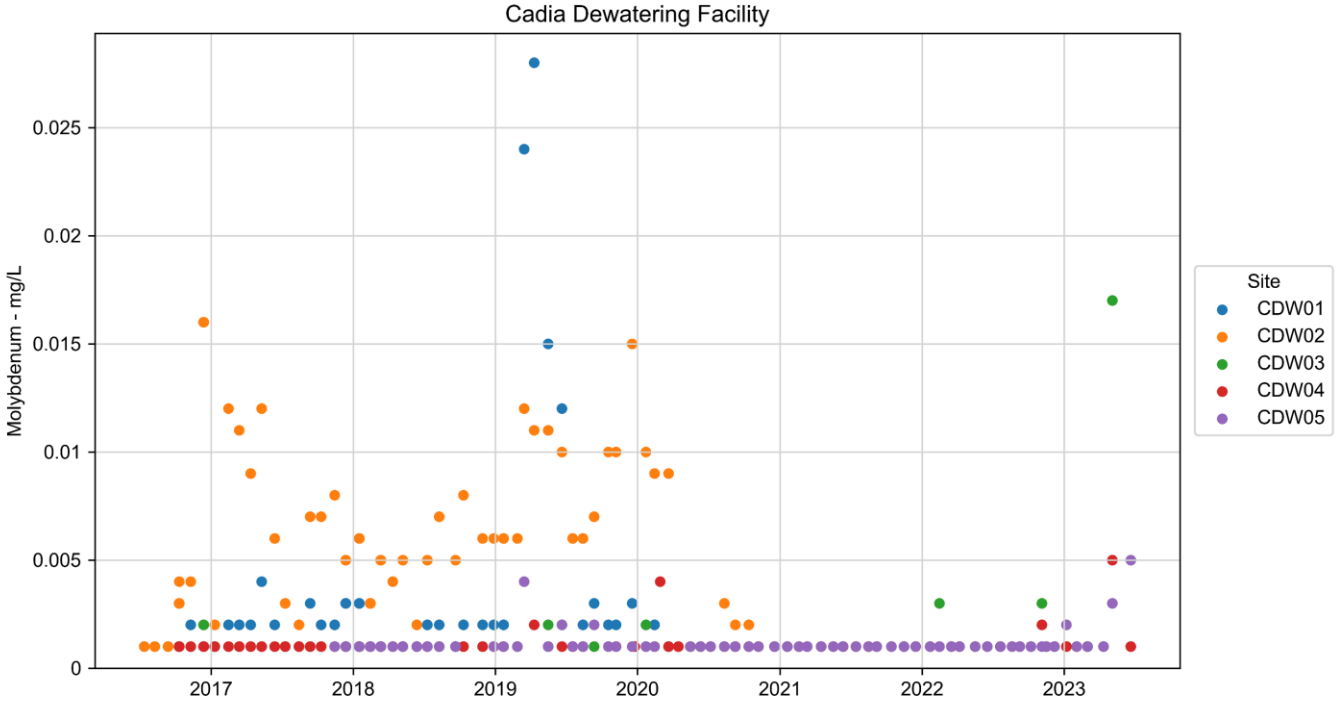


Figure 3.40 Dissolved molybdenum concentrations in the Cadia Dewatering Facility Area

Zinc concentrations were historically elevated at all sites between 2016 and 2020. However, all zinc concentrations during the reporting period were below the ANZG (2018) DGV of 0.008 mg/L, and all but one were equal to or below the LOR.

Summary

The potential influence of the CDF on water quality had previously been observed at CDW02, based on elevated concentrations of copper and molybdenum. However, the water quality at CDW05 generally shows an improvement compared to that at historical sites CDW01 and CDW02, with low concentrations of most metals. Similarly, water quality at downstream Belubula River site (CDW04) has generally improved compared to that at upstream site CDW03, indicating no observable impact on the water quality of the receiving environment from the CDF.

4. SSGV assessment

4.1 Site specific guideline values

Site specific guideline values (SSGVs) have been determined from the baseline data in accordance with ANZG 2018. A review of SSGVs for the downstream Oaky Creek site was conducted in 2018 (GHD 2018). This review was as part of a 10-year review of the aquatic ecosystem monitoring program and the findings indicated that there was no degradation of the downstream aquatic environment despite the exceedances of some SSGVs at this location.

The approved SSGVs, as presented in the WMP (CHPL 2019), are shown in Table 4.1 for each monitoring site. The locations of the SSGV monitoring sites are shown in Figure 4.1. The SSGV monitoring sites provide an indicator of changes in downstream water quality and an initial investigation is triggered where exceedances of the SSGVs are identified.

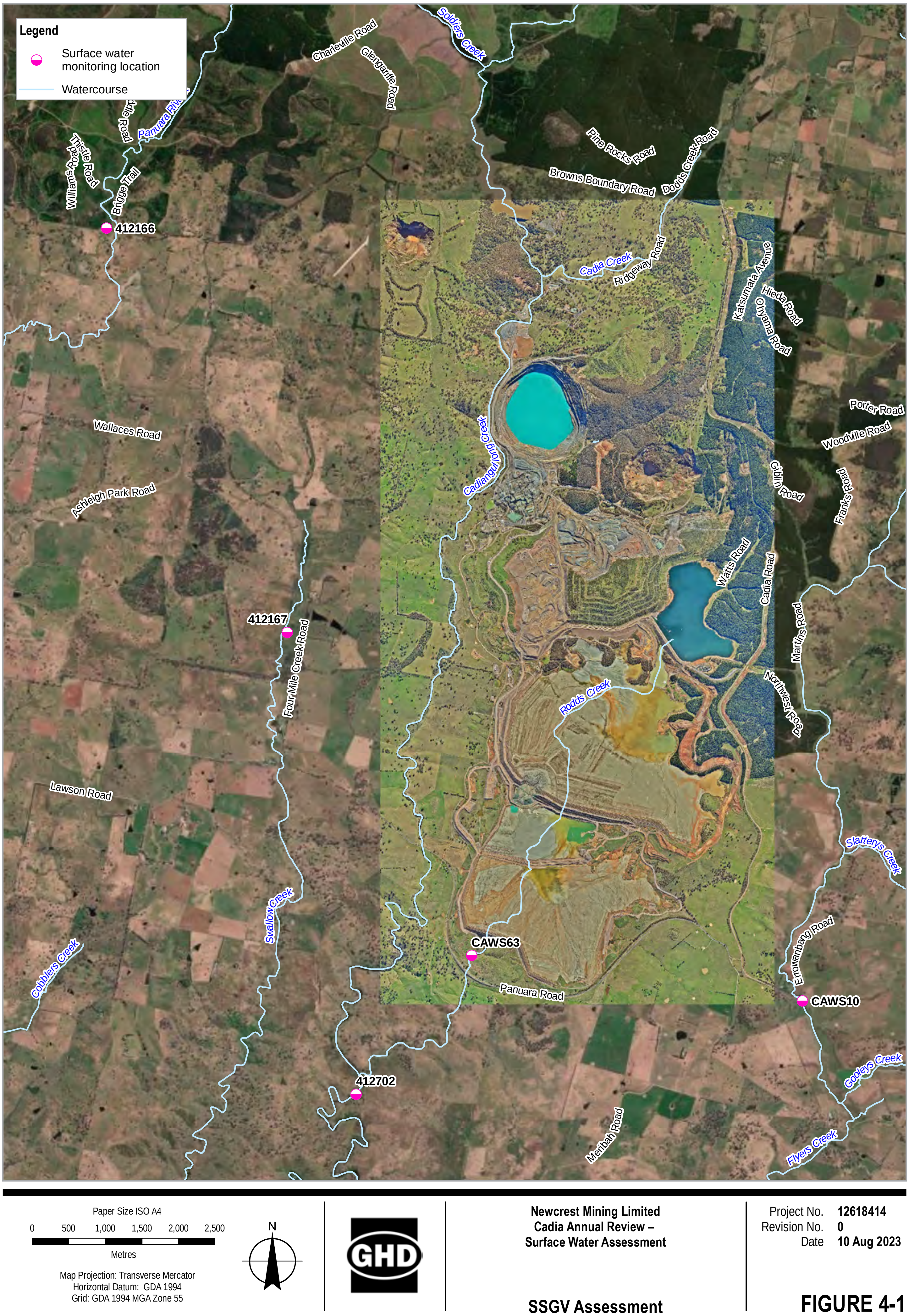
The environmental health of the rivers around CVO is primarily assessed via aquatic ecology and river health surveys conducted by specialised ecologists (GHD 2023). Surveys were conducted in spring 2022 and autumn 2023. These surveys showed that there was no evidence to suggest mining activities have impacted the water quality or the macroinvertebrate communities of Cadiangullong Creek or Rodds Creek.

The following sections report exceedances of the SSGVs. SSGV graphs are shown in Appendix A, and compare data from the reporting period data with the applicable SSGV.

Summaries of the level one investigations that occurred in response to the exceedances, and the outcomes and recommendations from the investigations are provided in the sections below. This information has been supplied by CVO. None of the level one investigations triggered a level two response according to the WMP.

Table 4.1 Surface water quality SSGVs

Parameter	Unit	412702 (Oaky Creek Gauging Station)	412166 (Diggers Creek)	CAWS63 (Rodds Creek)	CAWS10 (Flyers Creek)	412167 (Swallow Creek)
Physicochemical						
pH	pH	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
EC	µS/cm	875	1,960	2,950	965	1,960
TSS	mg/L	50	50	80	50	50
Nutrients						
Nitrogen oxides	mg/L as N	0.25	0.25	-	0.25	0.25
Total nitrogen	mg/L as N	0.6	0.6	9.0	0.6	0.6
Total phosphorous	mg/L as P	0.06	0.09	0.40	0.09	0.09
Dissolved metals						
Aluminium	mg/L	0.055	0.055	0.150	0.055	0.055
Arsenic	mg/L	0.013	0.013	0.005	0.013	0.013
Cadmium	mg/L	0.0002	0.0002	-	0.0002	0.0002
Copper	mg/L	0.0090	0.0014	0.1000	0.0014	0.0014
Iron	mg/L	0.12	1.65	0.73	1.65	1.65
Lead	mg/L	0.0034	0.0034	0.0020	0.0034	0.0034
Manganese	mg/L	1.9	1.9	0.37	1.9	1.9
Molybdenum	mg/L	0.034	0.034	-	0.034	0.034
Zinc	mg/L	0.057	0.077	0.200	0.077	0.077



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SSGV Assessment

FIGURE 4-1

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Data source: Newcrest: Bores, 2019. LPI: DCDB/DTDB, 2017. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community. Created by: pkiem, fmackay, tmorton

4.2 Cadiangullong Creek

Cadiangullong Creek flows north to south through CVO. Potential mine derived sources of pollution are discussed throughout Sections 3.2 to 3.6.

At Oaky Creek Gauging Station (412702), exceedances of the SSGVs observed during the reporting period and investigation conclusions are shown in Table 4.2.

Table 4.2 412702 (Oaky Creek Gauging Station) SSGV exceedances

CVO Reference No.	Analyte	SSGV (mg/L)	Sample date	Result (mg/L)	Investigation
189	Aluminium	0.055	13/07/2022	0.20	Results are within the range of historical values. Aluminium concentrations are consistently lower at 412702 than at all other upstream Cadiangullong Creek sites, including 412168, located upstream of all mining influence. This suggests that the source of the elevated dissolved aluminium originated upstream of mine influenced reaches of Cadiangullong Creek. CAWS59, downstream from the STSF, showed dissolved aluminium less than the SSGV during the entire reporting period, suggesting there was no influence from the STSF on the SSGV exceedance.
192			24/08/2022	0.26	
210			7/09/2022	0.14	
211			19/10/2022	0.16	
212			10/11/2022	0.21	
193	Copper	0.009	24/08/2022	0.011	Dissolved copper was also elevated above the SSGV upstream of potential mine impacted areas on Cadiangullong Creek as represented by CAWS2. Most other monitoring points on Cadiangullong Creek downstream of CAWS2 showed elevated dissolved copper greater than the SSGV. This suggests that the source of the elevated dissolved copper originated upstream of mine influenced reaches of Cadiangullong Creek. Results were within the range of historical values with no indication of a change in trend. Concentrations appear to increase during periods of high rainfall / elevated groundwater levels.
219			7/09/2022	0.010	
220			19/10/2022	0.011	
221			10/11/2022	0.012	
#	EC	875	11/01/2023	922.8	EC was marginally over the SSGV in January and February 2023. EC shows an increasing trend with direction downstream in Cadiangullong Creek between 412168 and 412702. EC was notably higher at all sites on Cadiangullong Creek from CAWS2 downstream to 412702 in the December 2022 to June 2023 period, compared to results from July to November 2022. Historical results have been shown to fluctuate widely, likely in response to rainfall and changes in groundwater levels, suggesting that exceedances may not be related to mining activities.
#			8/02/2023	919.4	
190	Iron	0.12	13/07/2022	0.45	Iron was also elevated above the SSGV upstream of potential mine impacted areas on Cadiangullong Creek as represented by 412168 and CAWS2. Most other monitoring points on Cadiangullong Creek downstream of CAWS2 also showed elevated dissolved iron greater than the SSGV. This suggests that the source of the elevated dissolved iron originated upstream of mine influenced reaches of Cadiangullong Creek.
#			24/08/2022	0.41	
223			7/09/2022	0.26	
224			19/10/2022	0.25	
225			10/11/2022	0.29	

CVO Reference No.	Analyte	SSGV (mg/L)	Sample date	Result (mg/L)	Investigation
194	Nitrite + nitrate as N	0.25	24/08/2022	0.34	All nitrite + nitrate concentrations recorded between July and November 2022 were very similar at 412702 to all sites on Cadiangullong Creek, including 412168 and CAWS0, located upstream of any mining influence. Results suggest influences within the catchment other than mining, including runoff from surrounding agricultural areas.
199			10/11/2022	0.40	
#			19/05/2023	0.33	
#			6/06/2023	0.39	
195	Total nitrogen	0.6	24/08/2022	0.7	Total nitrogen results greater than the SSGV were recorded upstream of 412702 on Cadiangullong Creek at CAWS0 and 412168, upstream of mine impacted areas. It is likely that elevated total nitrogen is resultant from runoff during periods of high rainfall from the surrounding agricultural areas in the catchment. All results were within range of historical values with no indication of a change in trend.
204			10/11/2022	0.7	
#			6/06/2023	0.8	
191	Total phosphorus	0.06	13/07/2022	0.07	Elevated total phosphorus results greater than the SSGV were recorded upstream of 412702 on Cadiangullong Creek at 412168 and CAWS0, upstream of potential mine impacted areas. It is likely that elevated total phosphorus is resultant from runoff during periods of high rainfall from the surrounding agricultural areas in the catchment. All results were within range of historical values with no indication of a change in trend.
196			24/08/2022	0.1	
230			10/11/2022	0.07	

Exceedance not numbered in CVO investigations

4.3 Rodds Creek

At Rodds Creek monitoring location CAWS63, SSGVs are based on EPL 5590 water quality concentration limits at EPA ID Point 19 for discharge to waters. Exceedances of the SSGVs are shown in Table 4.3

Table 4.3 CAWS63 (Rodds Creek) SSGV exceedances

CVO Reference No.	Analyte	SSGV (mg/L)	Sample date	Result (mg/L)	Investigation
226	Manganese	0.37	7/12/2022	0.422	Manganese was notably lower in the upstream storage at CAWS31 and was therefore unlikely to have been related to mining influences. This elevated manganese concentration appears to have been an isolated event and no increasing trend was evident, as all other manganese concentrations recorded at CAWS63 were low.
229	Total phosphorus	0.4	7/12/2022	0.6	Elevated total phosphorus results greater than the SSGV were also recorded throughout the catchment during the reporting period. It is likely that elevated total phosphorus is resultant from runoff from the surrounding agricultural areas. All other total phosphorus concentrations recorded at CAWS63 were low, and do not indicate an increasing trend.

4.4 Flyers Creek

Flyers Creek is located to the east of CVO. There are no clear pathways for mine derived pollutants to impact on this creek system at the CAWS10 downstream monitoring location.

SSGV exceedances for CAWS10 are provided in Table 4.4, including investigation findings on potential non-mine related causes for the SSGV exceedance. Reference throughout Table 4.4 is made to CAWS44 (see Figure 1.1) which is the monitoring location on Flyers Creek located upstream of any potential water quality influence from CVO mine impacted areas. CAWS44 is defined as a 'Regional' monitoring location as per the WMP and is not linked to a 'mining area' as per the methodology in Section 3.1. Therefore, graphical representation and assessment of CAWS44 water quality is not provided in Section 3 and is only used in this section as a refence point for CAWS10.

Table 4.4 CAWS10 (Flyers Creek) SSGV exceedances

CVO Reference No.	Analyte	SSGV (mg/L)	Sample date	Result (mg/L)	Investigation
213	Aluminium	0.055	2/09/2022	0.10	Aluminium was also elevated above the SSGV upstream of potential mine impacted areas on Flyers Creek as represented by CAWS44, and upstream in Cadiangullong Creek at 412168. This suggests the aluminium is likely to be naturally elevated within the lithology of the catchment and is not due to mining influences. The highest value of 0.41 mg/L recorded in November 2022 was immediately following 68 mm of rainfall (as recorded at the Southern Lease Boundary weather station).
214			1/11/2022	0.41	
222	Copper	0.0014	1/11/2022	0.003	Isolated event following high rainfall. All other results were below LOR. No indication of an increasing trend. Copper is also elevated at 412166, 412167 and CAWS2, located outside of the area of impact of the mine, suggesting other catchment influences are responsible for the elevated copper concentrations observed.
200	Nitrite + nitrate as N	0.25	2/09/2022	0.58	Concentrations were consistent with those recorded at CAWS44, located upstream of mining influences. This suggests that the source of the elevated total oxidised nitrogen originated upstream of mine influenced reaches of Flyers Creek. It is likely that there was an agricultural nutrient influence in Flyers Creek causing the SSGV exceedance. Concentrations are consistent with historical results with no indication of a change in trend.
#			4/05/2023	0.41	
205	Total nitrogen	0.6	2/09/2022	1.1	Total nitrogen was also elevated above the SSGV upstream of potential mine impacted areas on Flyers Creek as represented by CAWS44. This suggests that the source of the elevated total nitrogen originated upstream of mine influenced reaches of Flyers Creek. The highest total nitrogen concentration was recorded immediately following 68 mm of rainfall (as recorded at the Southern Lease Boundary weather station).
206			1/11/2022	1.8	
#			4/05/2023	0.8	
231	Total phosphorus	0.09	1/11/2022	0.28	Recorded immediately following 68 mm of rainfall (as recorded at the Southern Lease Boundary weather station). All other results were well below the SSGV. No indication of a change in trend
232	TSS	50	1/11/2022	108	Recorded immediately following 68 mm of rainfall (as recorded at the Southern Lease Boundary weather station). All other results were well below the SSGV.

Exceedance not numbered in CVO investigations

4.5 Diggers Creek and Swallow Creek

Diggers Creek and Swallow Creek are located to the west of CVO. These monitoring locations are considered to be outside of the area of impact of the mine and are included in the monitoring program as reference sites for offsite impacts on water quality. GHD (2019) has recommended that SSGVs for these locations be removed in the next version of the WMP. Exceedances are provided in Table 4.5. All investigation findings on potential non-mine related causes for SSGV exceedances were attributed to either runoff from agricultural lands or increased sedimentation from above average rainfall. As such, no further investigations were required.

Table 4.5 412166 (Diggers Creek) and 412167 (Swallows Creek) SSGV exceedances

CVO Reference No.	Analyte	SSGV (mg/L)	Sample date	Result (mg/L)
412166 (Diggers Creek)				
207	Aluminium	0.055	9/09/2022	0.26
208			2/11/2022	0.19
215	Copper	0.0014	9/09/2022	0.002
216			2/11/2022	0.002
198	Nitrogen oxides	0.25	2/11/2022	0.36
#			12/05/2023	0.28
201	Total nitrogen	0.6	2/11/2022	1.3
227	Total phosphorus	0.09	2/11/2022	0.26
412167 (Swallow Creek)				
207	Aluminium	0.055	2/11/2022	0.55
217	Copper	0.0014	2/09/2022	0.002
218			2/11/2022	0.005
202	Total nitrogen	0.6	2/09/2022	0.7
203			2/11/2022	1.2
228	Total phosphorus	0.09	2/11/2022	0.14

Exceedance not numbered in CVO investigations

5. Conclusions

The review of surface water monitoring results for the 2022-2023 reporting period identified the following key performance/management issues:

– The WRDs and the TSFs appear to have localised influences of mine related chemistry on surface water quality. However, based on results from the 2022-2023 reporting period there is no evidence of water quality impact to receiving environments in these zones.
– Elevated copper concentrations previously observed downstream of the BDF continued to decrease during the 2022-2023 reporting period.
– No exceedances identified during the SSGV assessment were attributed to CVO.

6. References

ANZG (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia.

Bureau of Meteorology (BOM) (2023) *Monthly Rainfall – Orange (Angullong)*, http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_startYear=&p_c=&p_stn_num=063113

Cadia Holdings Pty Limited (CHPL) 2019, *Water Management Plan, 710-005-EN-PLA-0004,* version 7.0.

GHD (2023) *Cadia Valley Operations – AEMP. Annual Report 2022-2023* (August 2023).

GHD (2020a) *Former Blayney Dewatering Facility, Gerty Street, Blayney, NSW. Ecological Risk Assessment for Abattoir Creek* (July 2020).

GHD (2020b) *Newcrest Former Dewatering Facility, Blayney NSW. Validation of Leased Area* (September 2020).

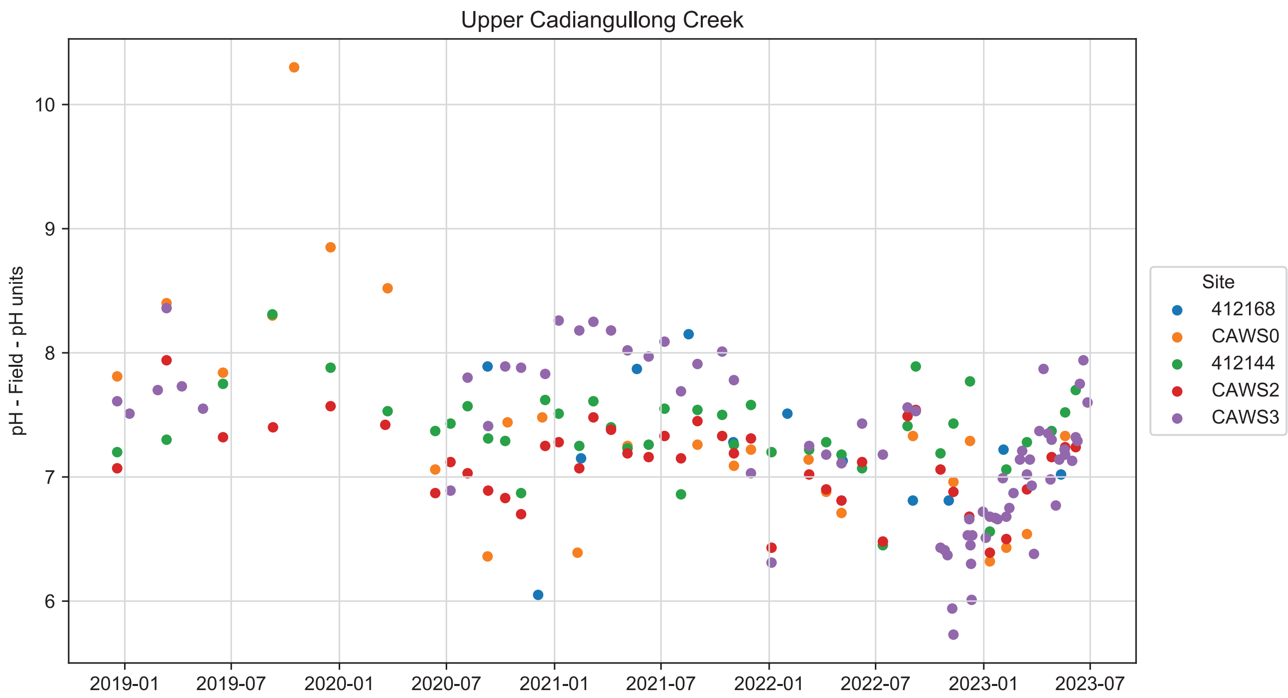
GHD (2019). *CVO AEMR - Surface and Groundwater Assessment. Review of SSGVs for Diggers Creek, Swallow Creek and Flyers Creek* (November 2019).

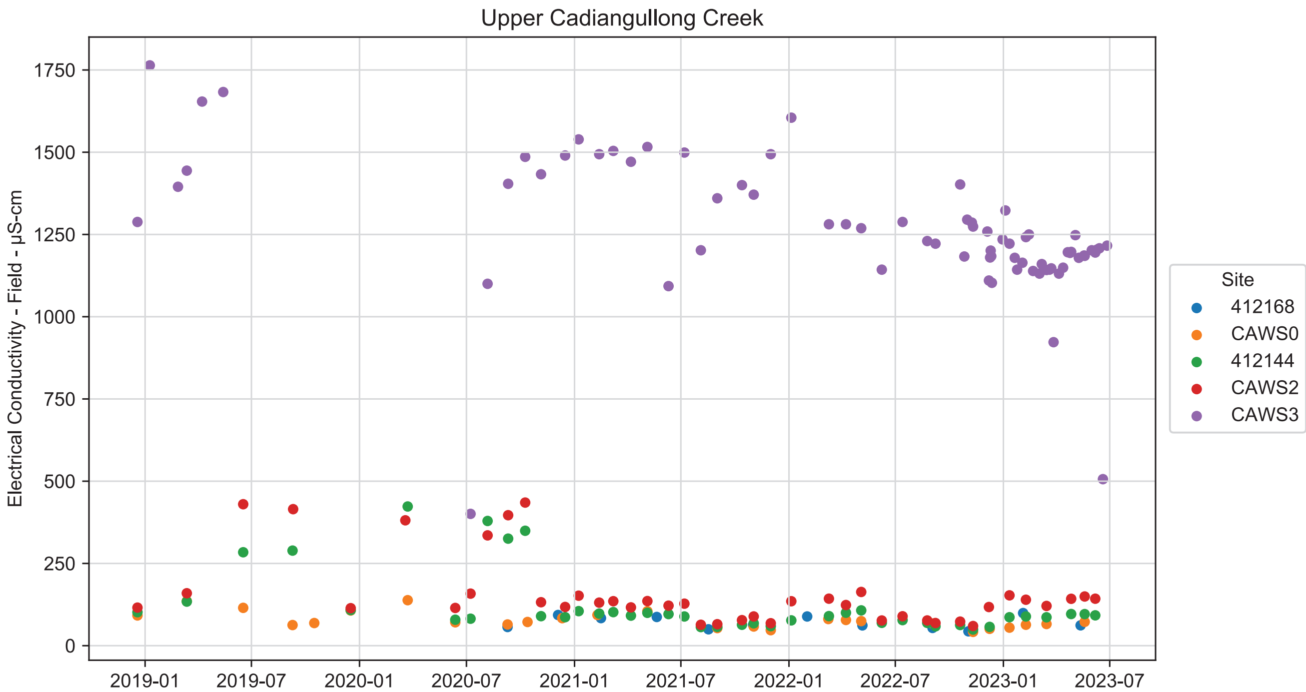
GHD (2018) *Cadia Valley Operations Aquatic Ecosystem Monitoring Project (AEMP): Water quality trigger value review of Oaky Station (412702)*, GHD report to Newcrest Mining Pty Ltd.

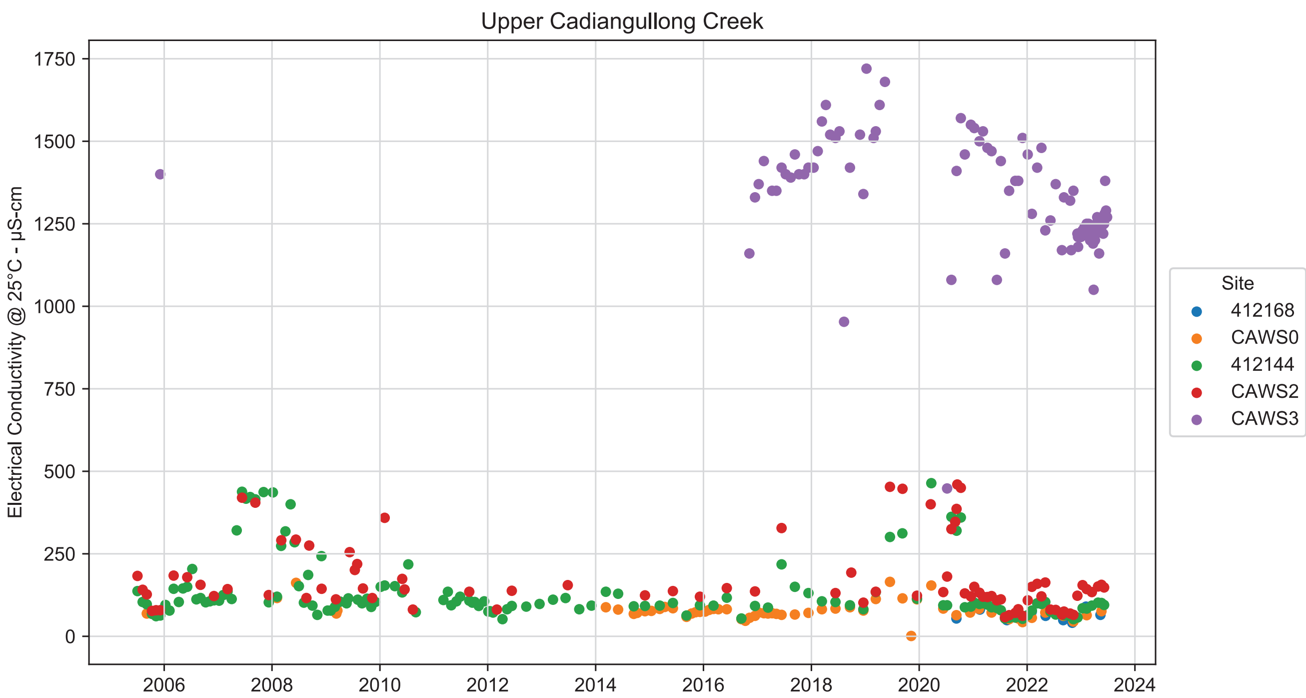
Mesh Environmental (2009) *Cadia East Geochemistry Assessment.*

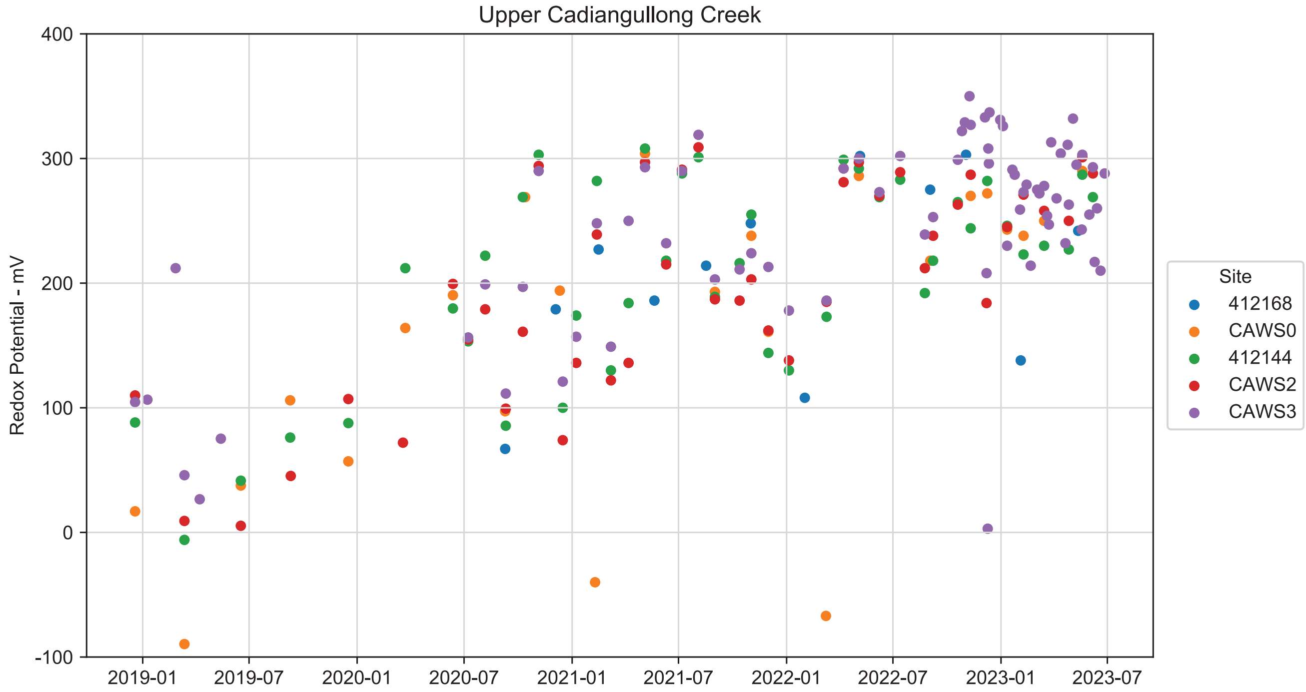
Appendix A

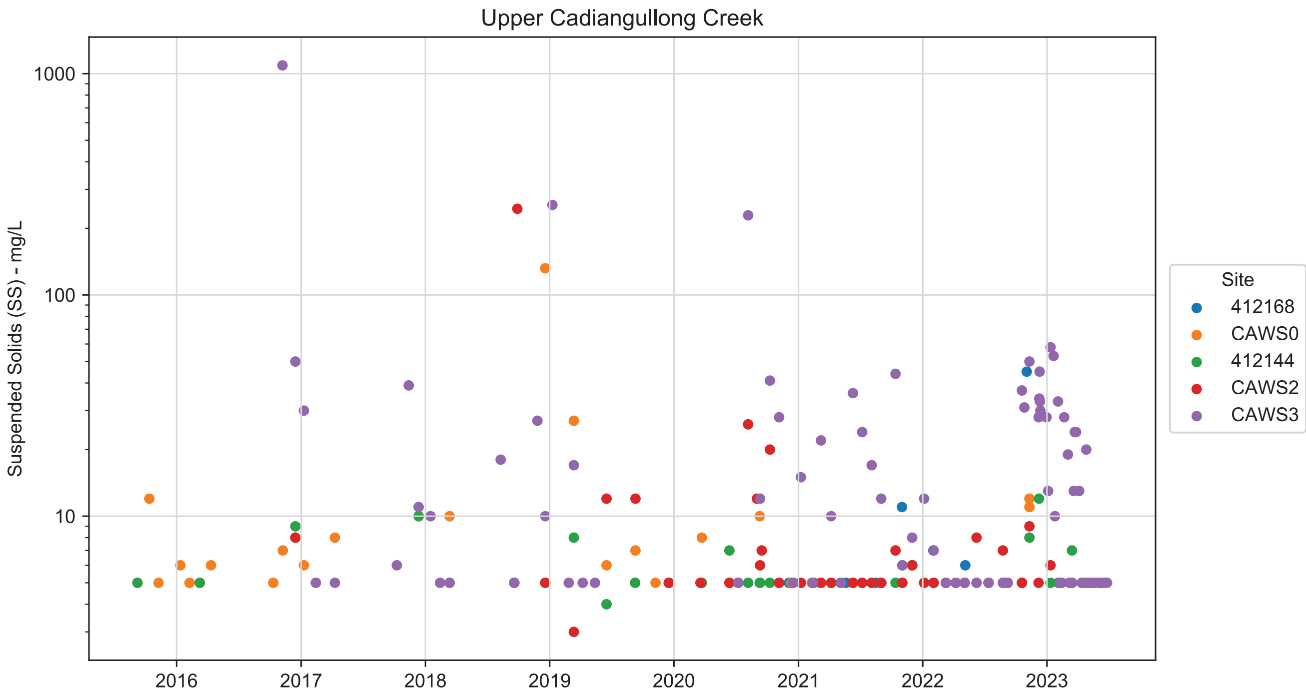
Surface water quality graphs

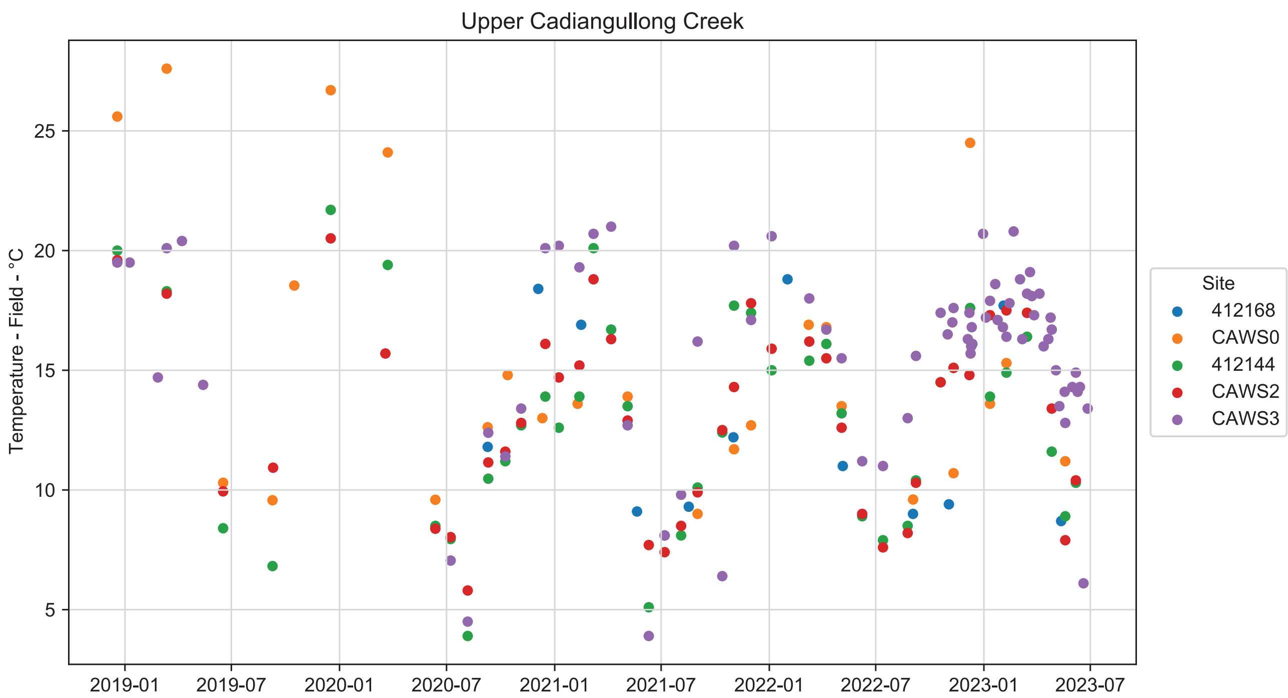

Upper Cadiangullong Creek
pH - Field - pH units
6
7
8
9
10
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
412168
CAWS0
412144
CAWS2
CAWS3


Upper Cadiangullong Creek
Electrical Conductivity - Field - µS-cm
0
250
500
750
1000
1250
1500
1750
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
412168
CAWS0
412144
CAWS2
CAWS3


Upper Cadiangullong Creek
Electrical Conductivity @ 25°C - µS-cm
0
250
500
750
1000
1250
1500
1750
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3


Upper Cadiangullong Creek
Redox Potential - mV
400
300
200
100
0
-100
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
412168
CAWS0
412144
CAWS2
CAWS3


Upper Cadiangullong Creek
Suspended Solids (SS) - mg/L
1000
100
10
2016
2017
2018
2019
2020
2021
2022
2023
Site
412168
CAWS0
412144
CAWS2
CAWS3


Upper Cadiangullong Creek
Temperature - Field - °C
25
20
15
10
5
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
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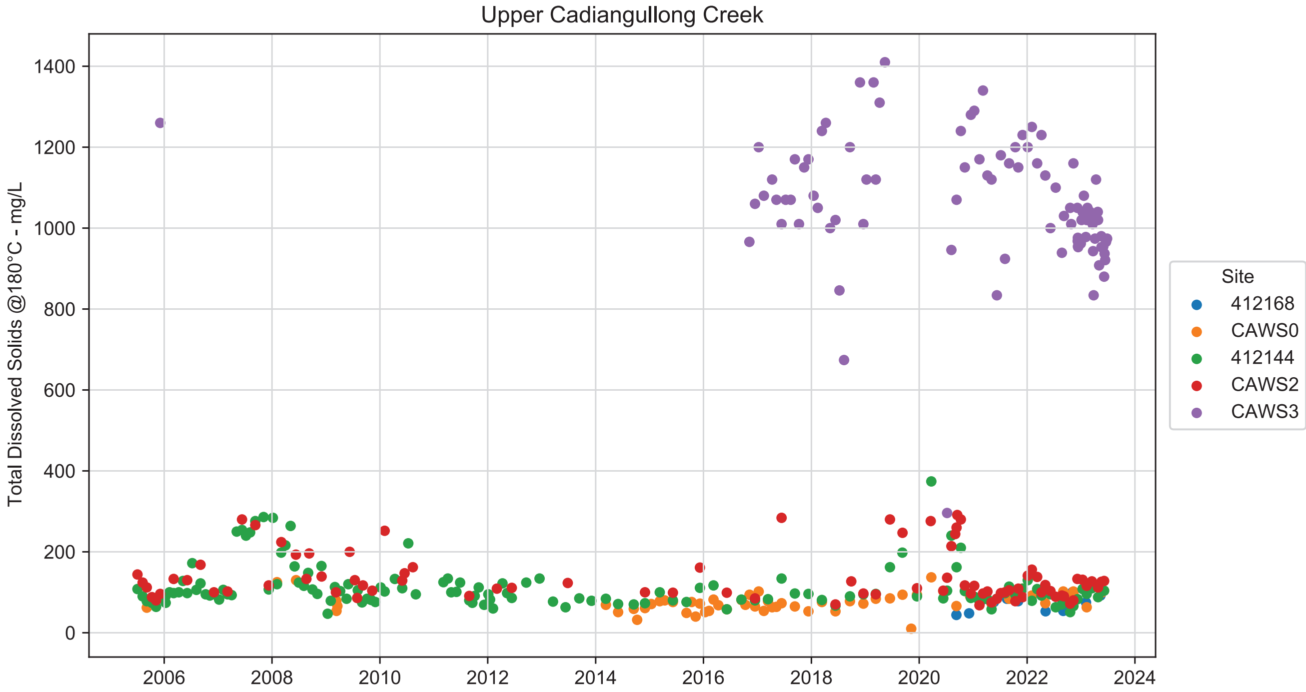
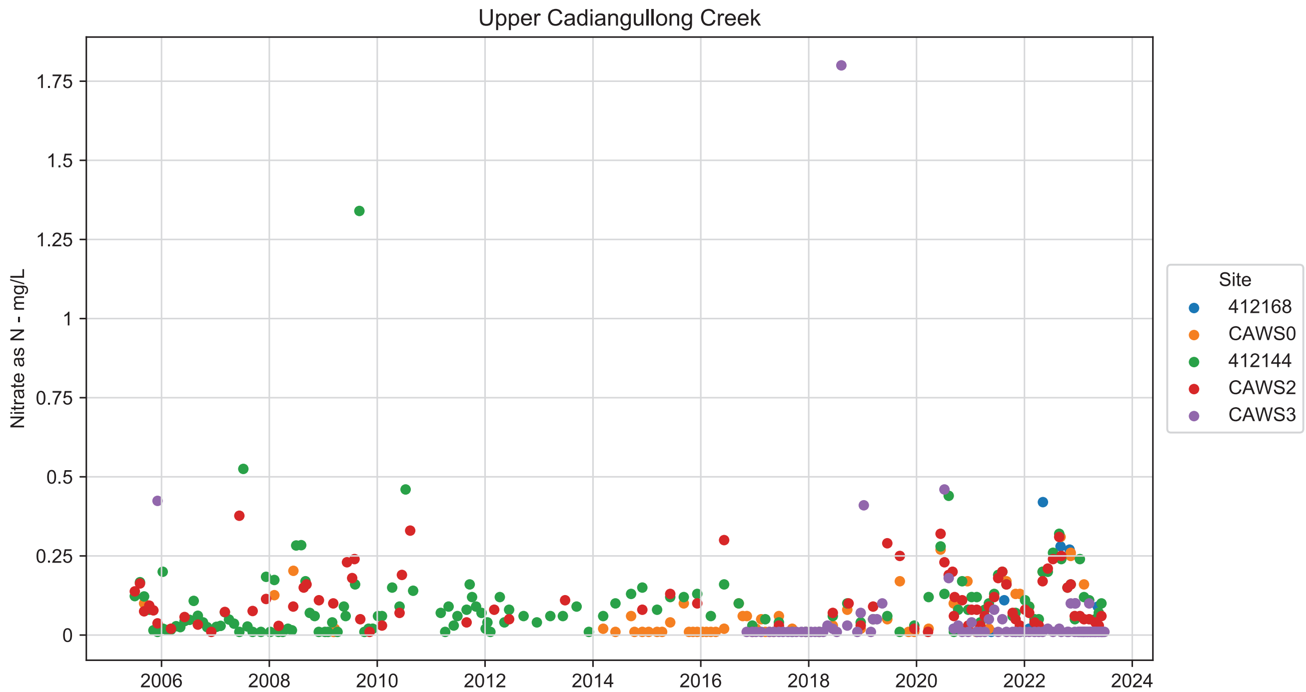
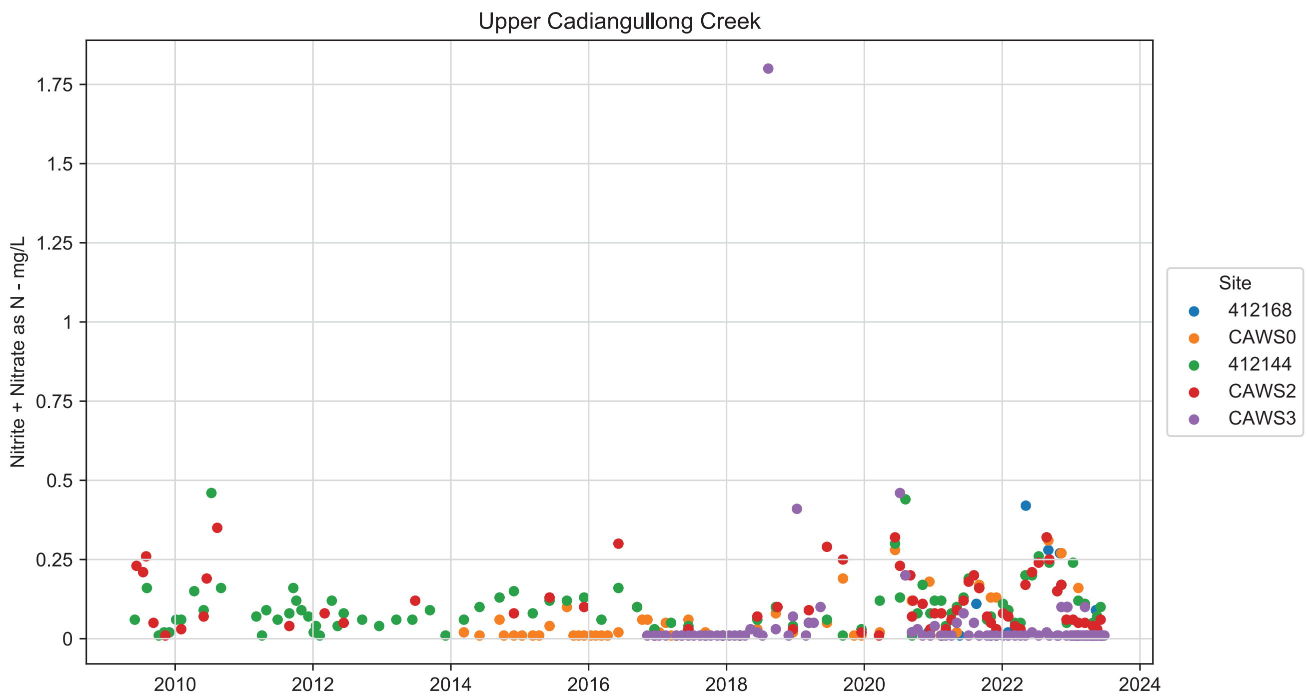
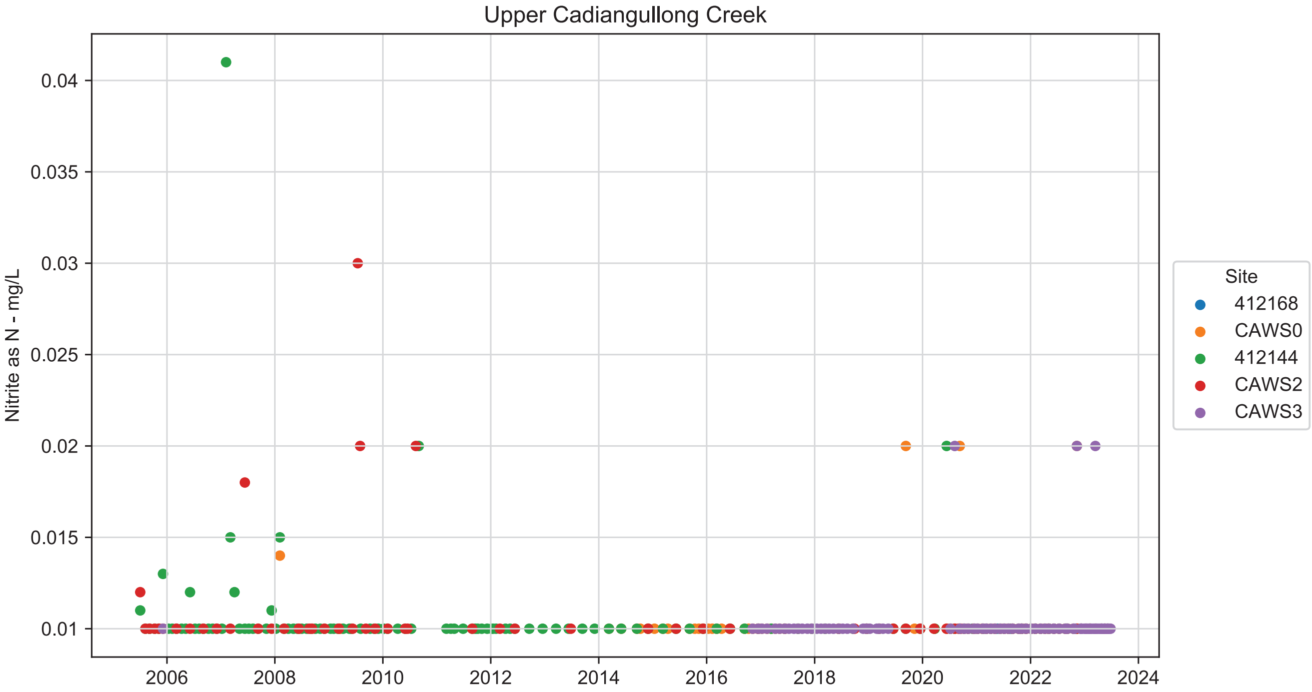
412144
CAWS2
CAWS3

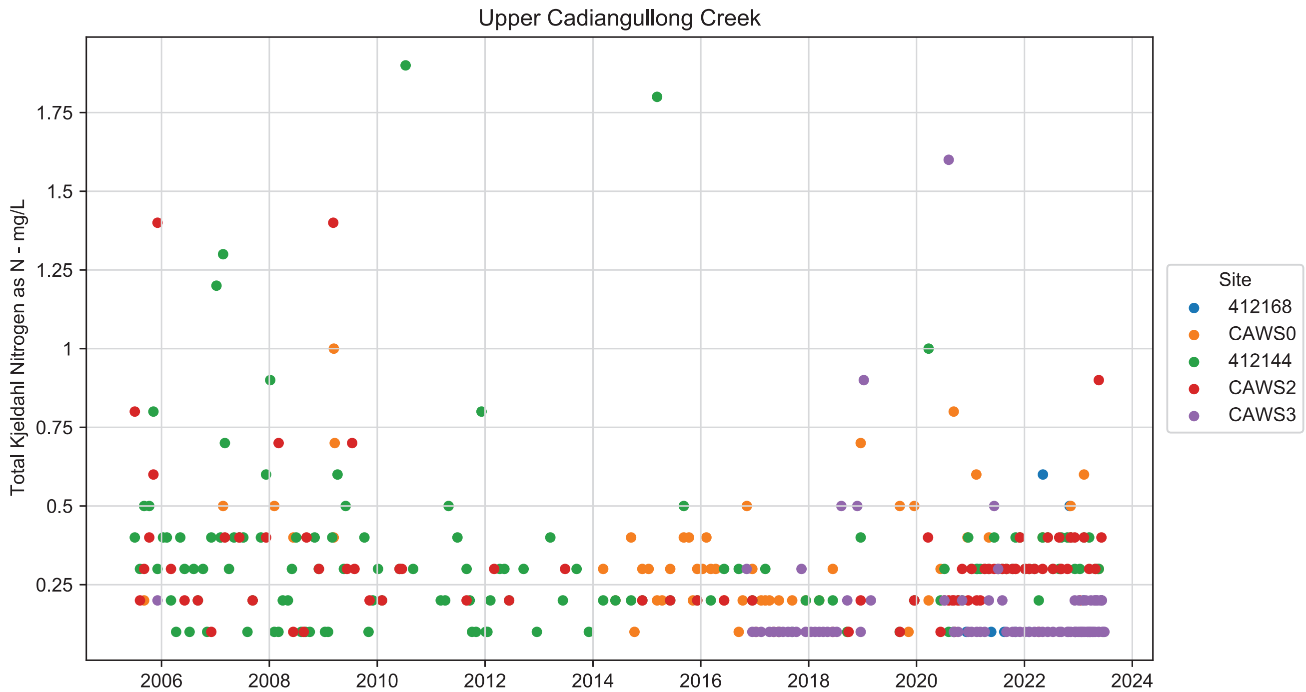

Upper Cadiangullong Creek
Total Dissolved Solids @180°C - mg/L
0
200
400
600
800
1000
1200
1400
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3


Upper Cadiangullong Creek
Nitrate as N - mg/L
0
0.25
0.5
0.75
1
1.25
1.5
1.75
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

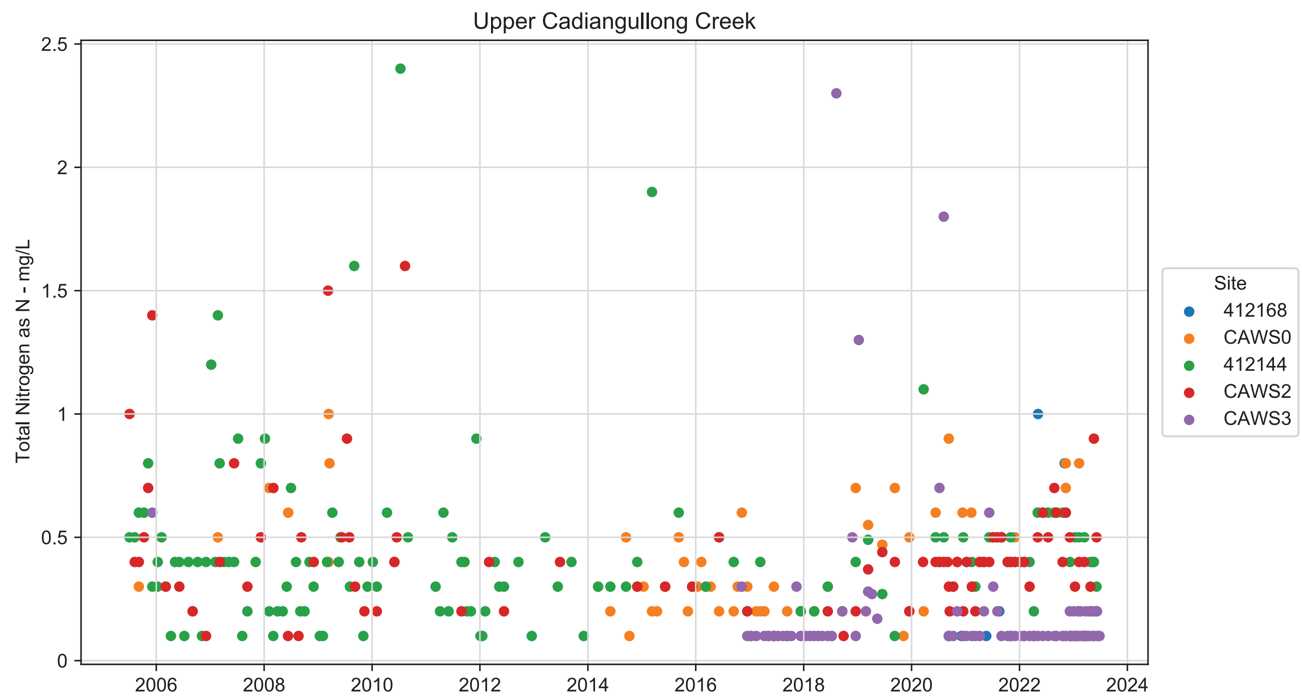

Upper Cadiangullong Creek
Nitrite + Nitrate as N - mg/L
0
0.25
0.5
0.75
1
1.25
1.5
1.75
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3



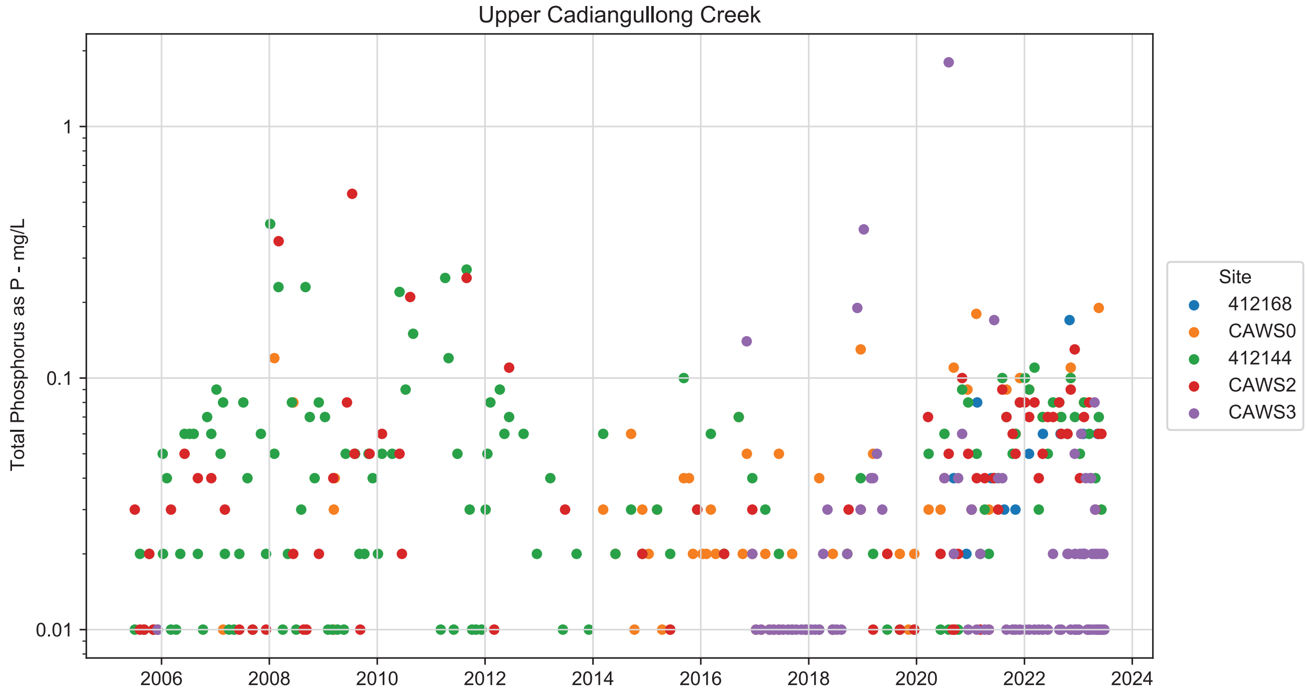
Upper Cadiangullong Creek
Nitrite as N - mg/L
0.04
0.035
0.03
0.025
0.02
0.015
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

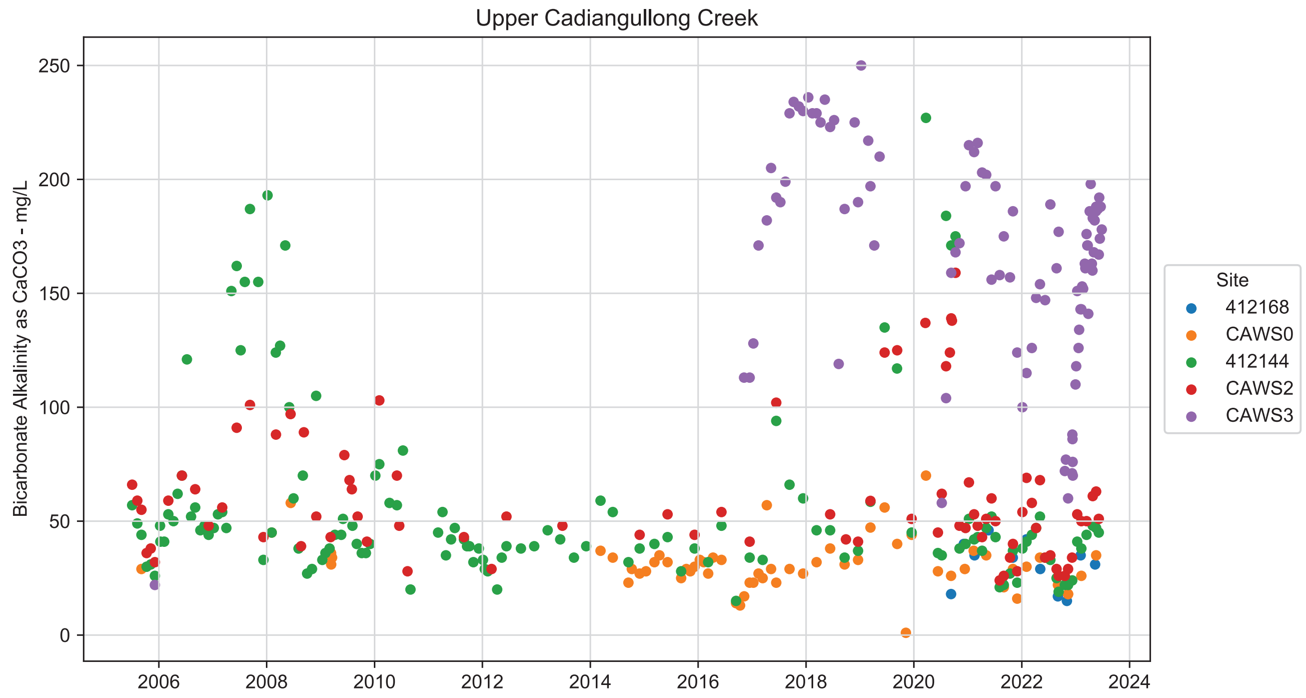


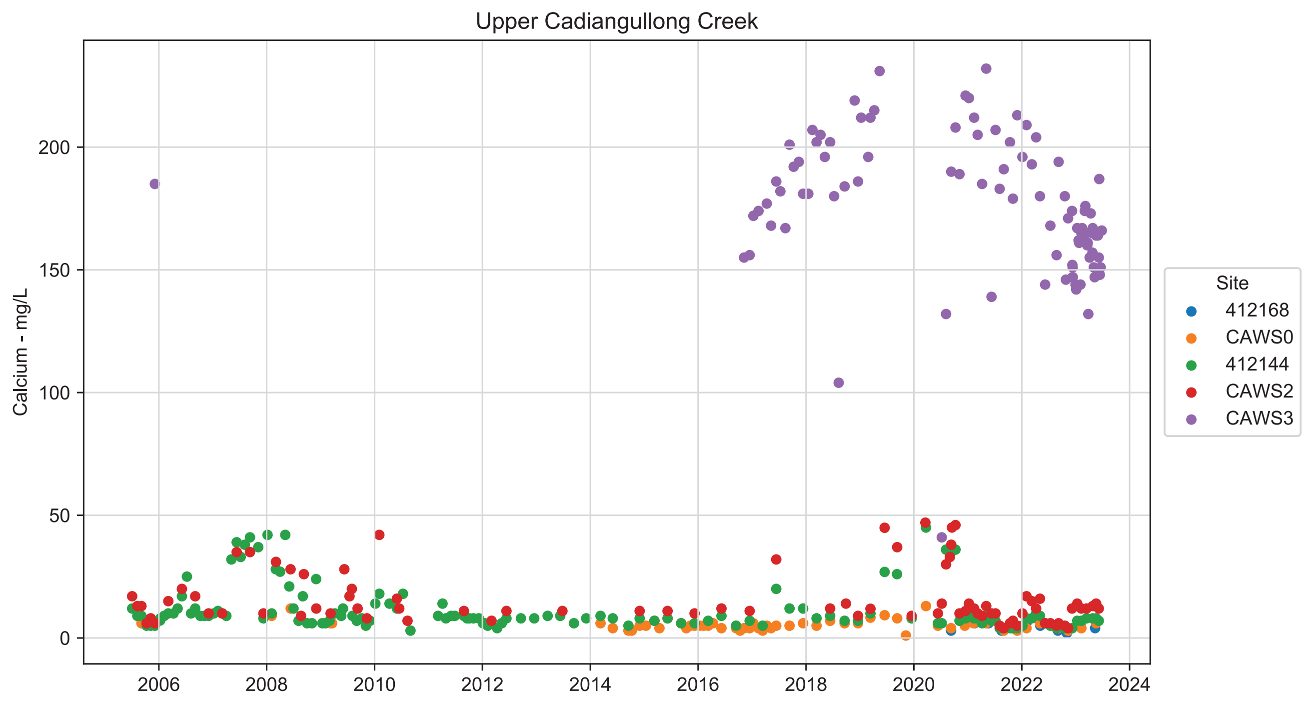
Upper Cadiangullong Creek
Total Kjeldahl Nitrogen as N - mg/L
1.75
1.5
1.25
1
0.75
0.5
0.25
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

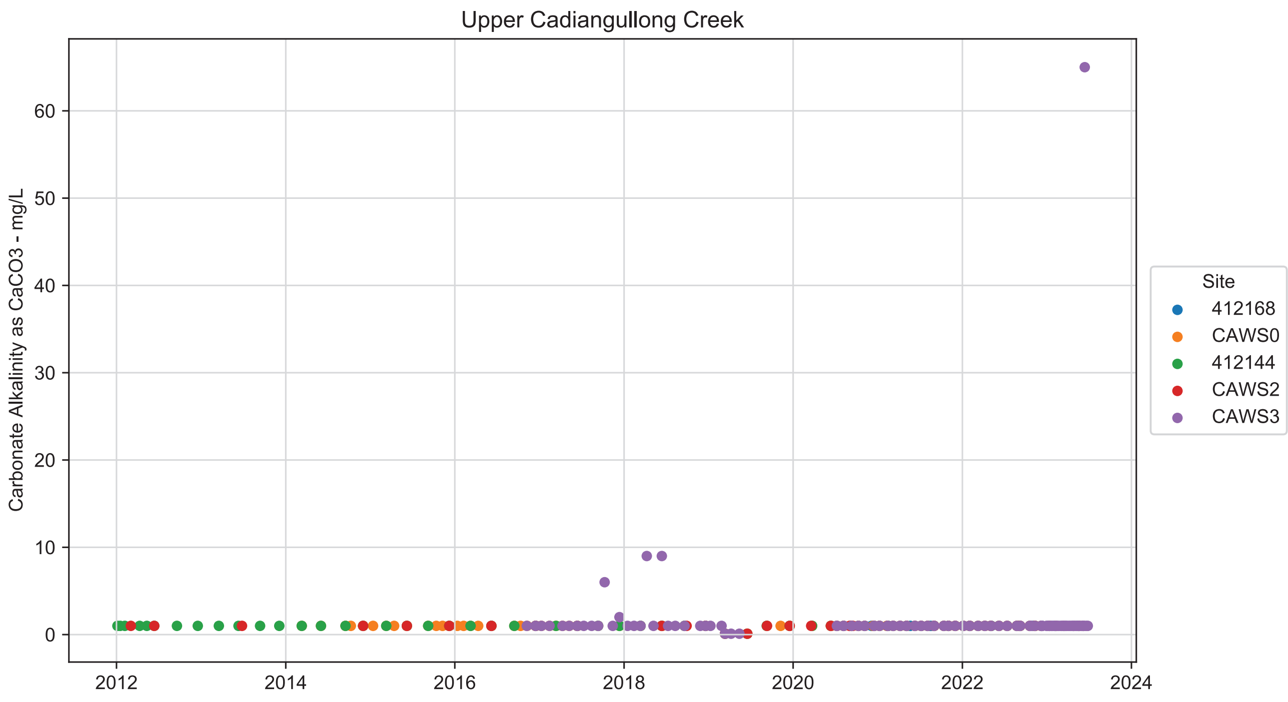


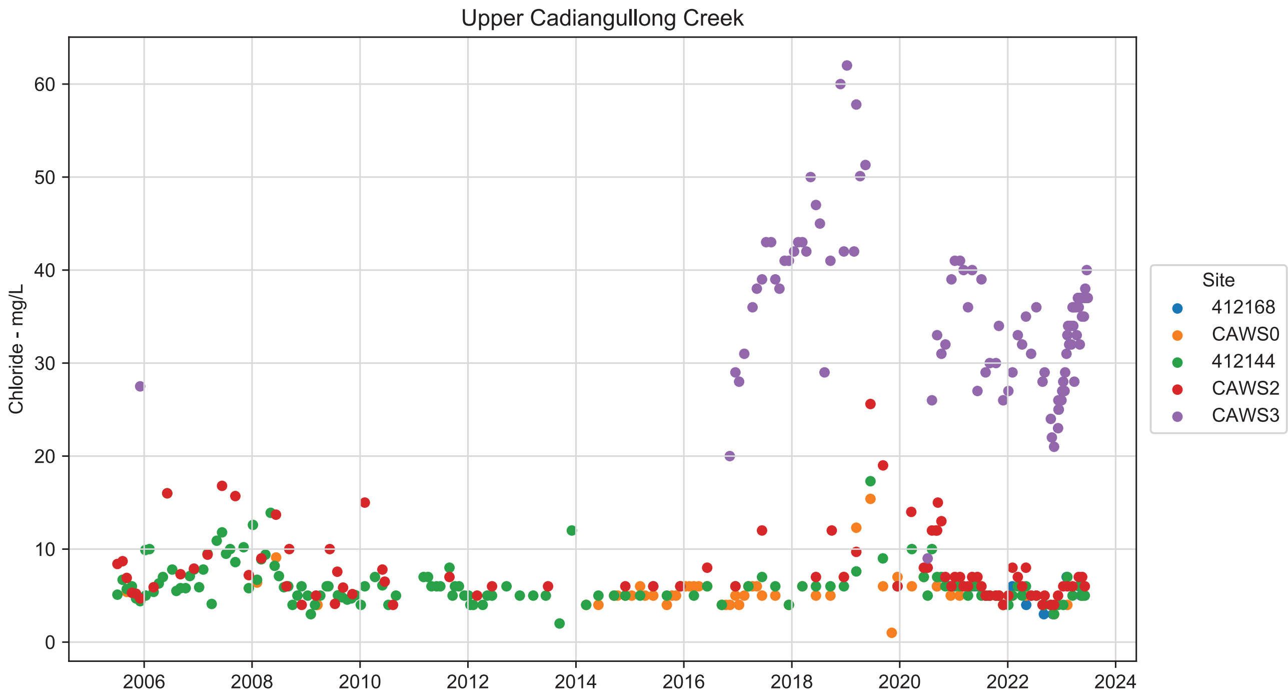
Upper Cadiangullong Creek
Total Nitrogen as N - mg/L
2.5
2
1.5
1
0.5
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

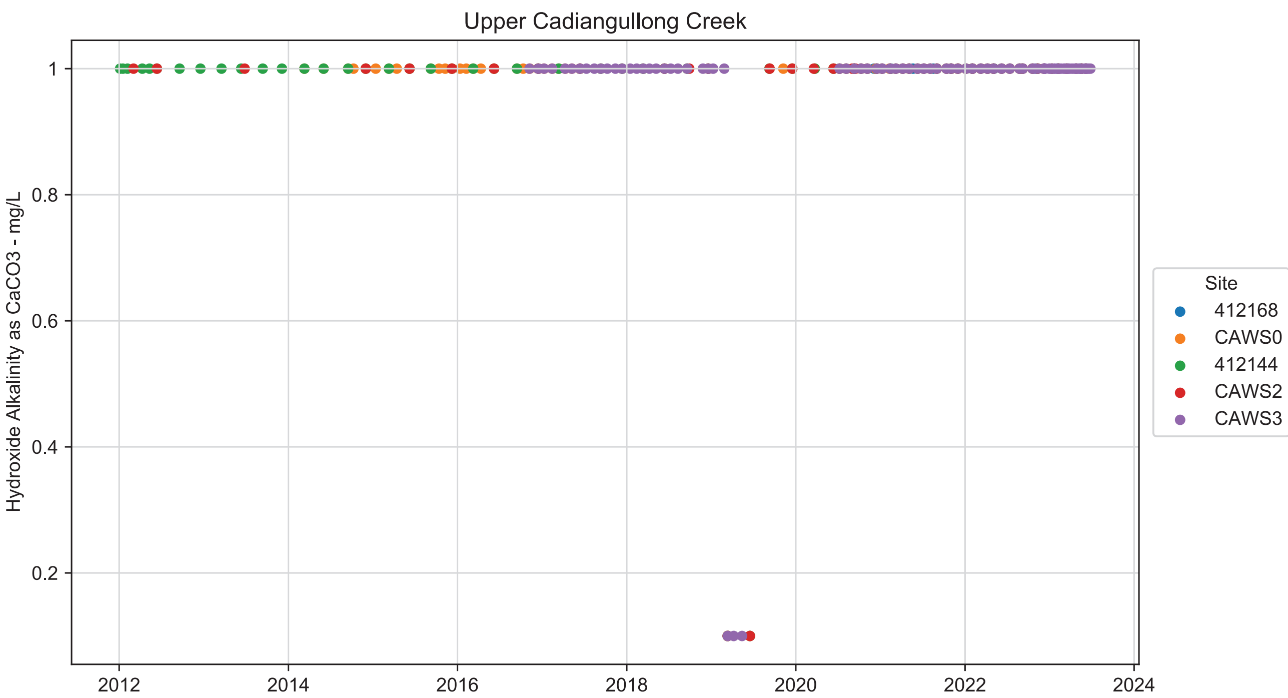

Upper Cadiangullong Creek
Total Phosphorus as P - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

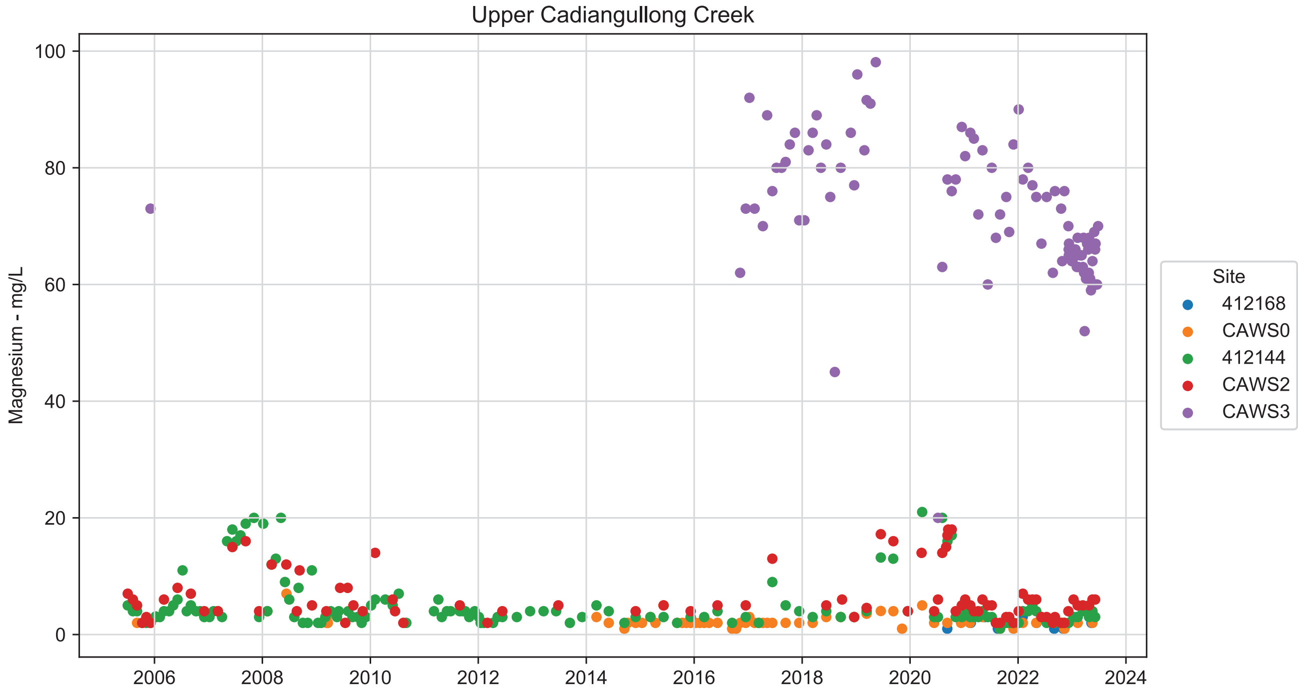

Upper Cadiangullong Creek
Bicarbonate Alkalinity as CaCO3 - mg/L
250
200
150
100
50
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

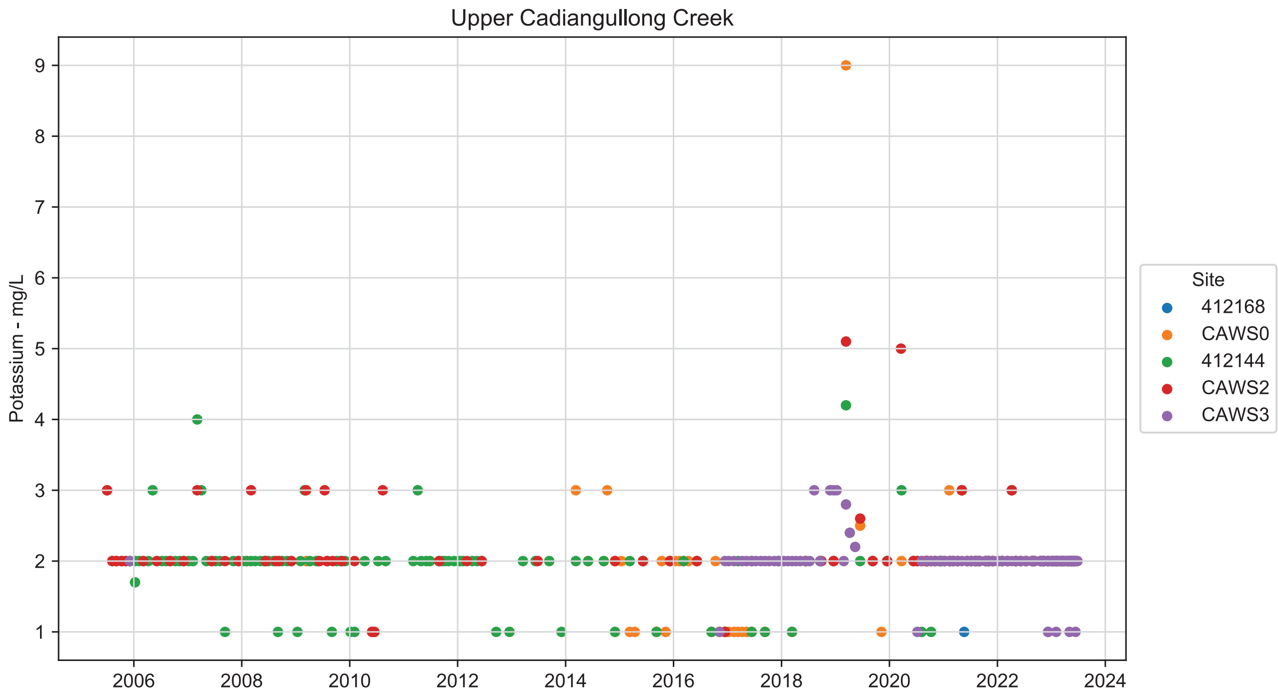

Upper Cadiangullong Creek
Calcium - mg/L
200
150
100
50
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

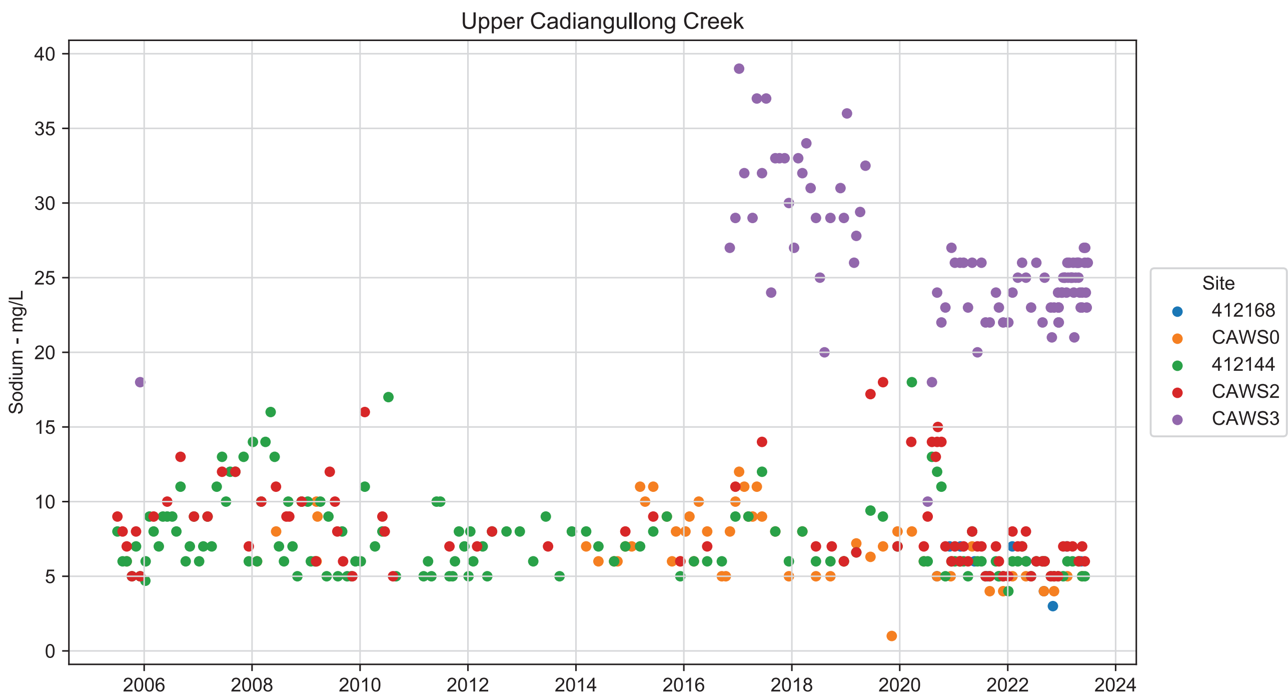

Upper Cadiangullong Creek
Carbonate Alkalinity as CaCO3 - mg/L
Site
412168
CAWS0
412144
CAWS2
CAWS3

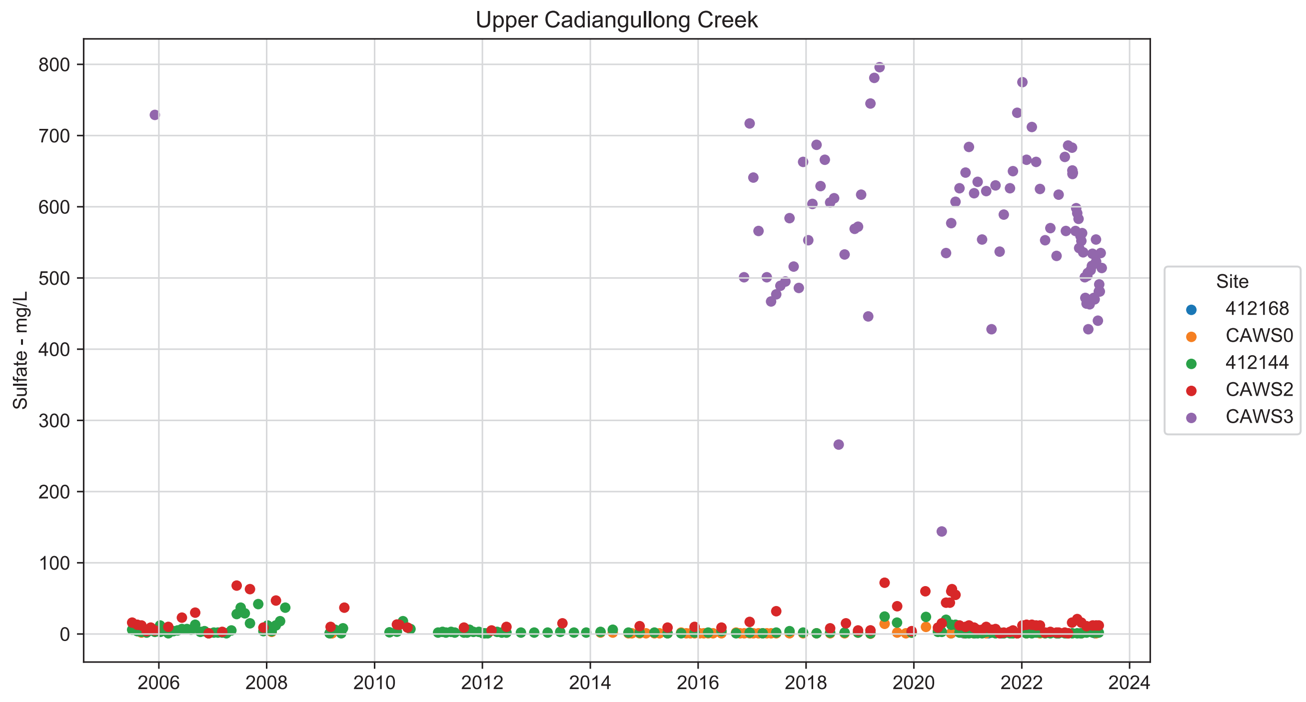

Upper Cadiangullong Creek
Chloride - mg/L
Site
412168
CAWS0
412144
CAWS2
CAWS3


Upper Cadiangullong Creek
Hydroxide Alkalinity as CaCO3 - mg/L
Site
412168
CAWS0
412144
CAWS2
CAWS3

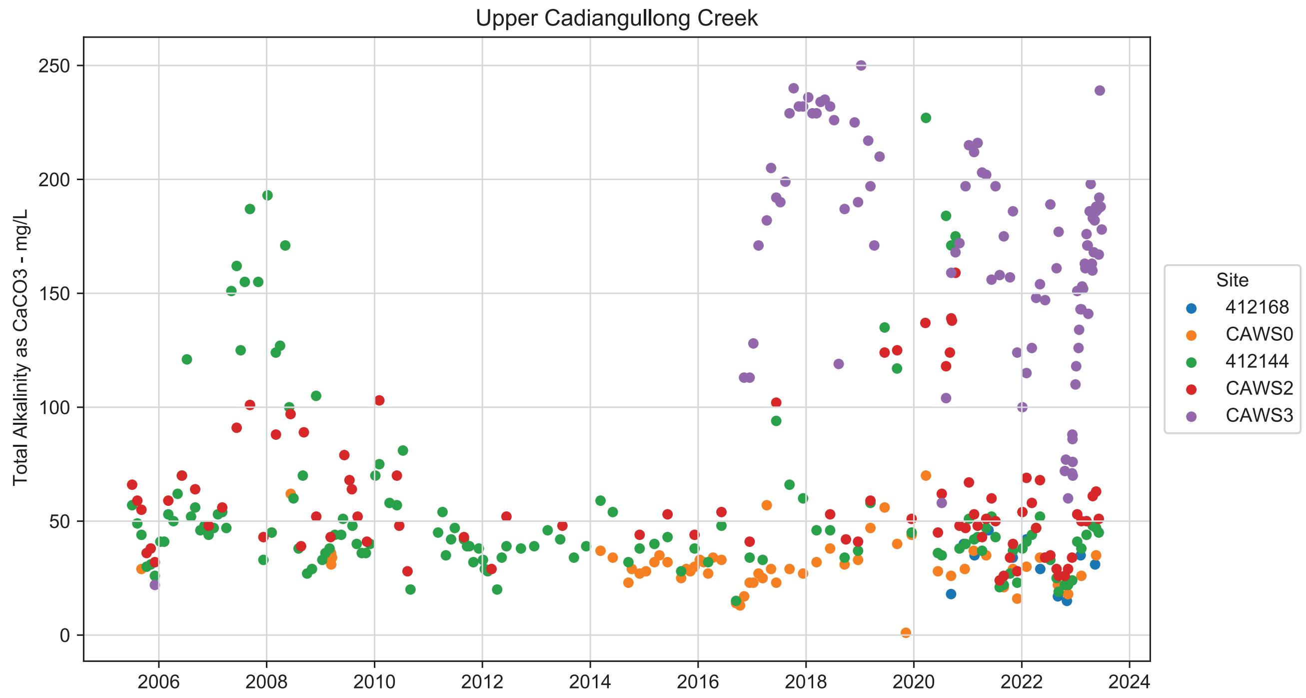

Upper Cadiangullong Creek
Magnesium - mg/L
Site
412168
CAWS0
412144
CAWS2
CAWS3


Upper Cadiangullong Creek
Potassium - mg/L
Site
412168
CAWS0
412144
CAWS2
CAWS3

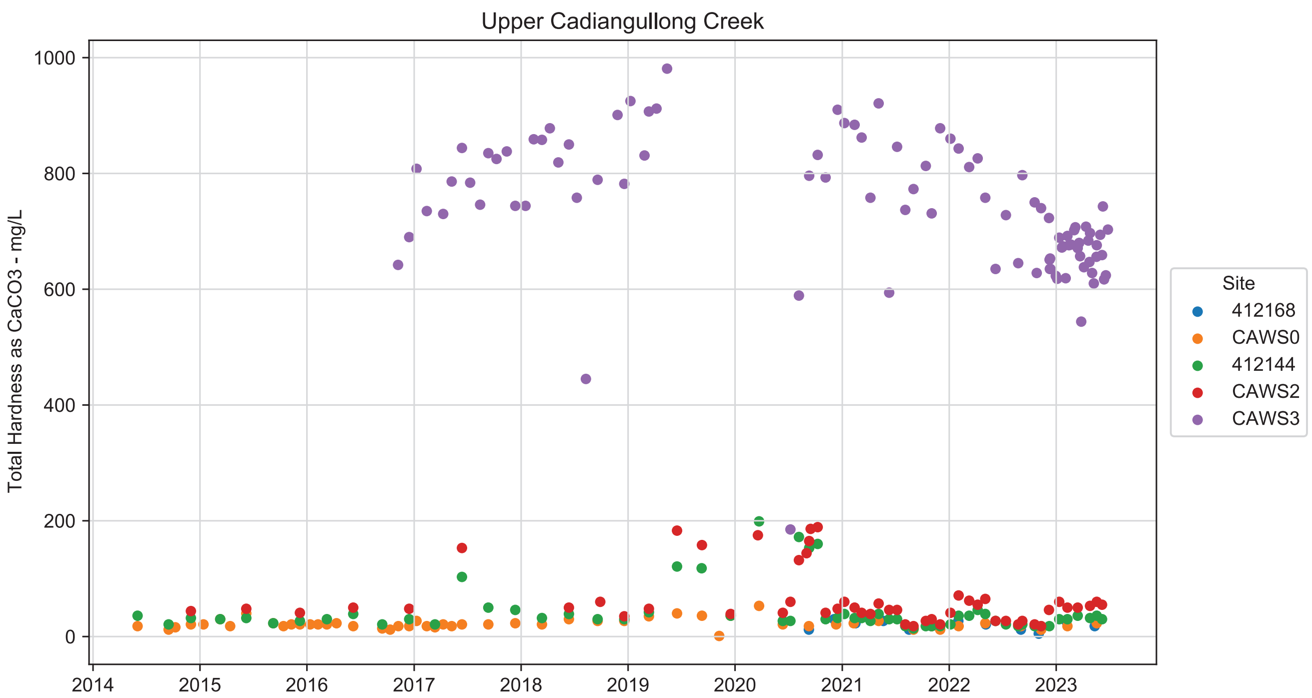

Upper Cadiangullong Creek
Sodium - mg/L
Site
412168
CAWS0
412144
CAWS2
CAWS3



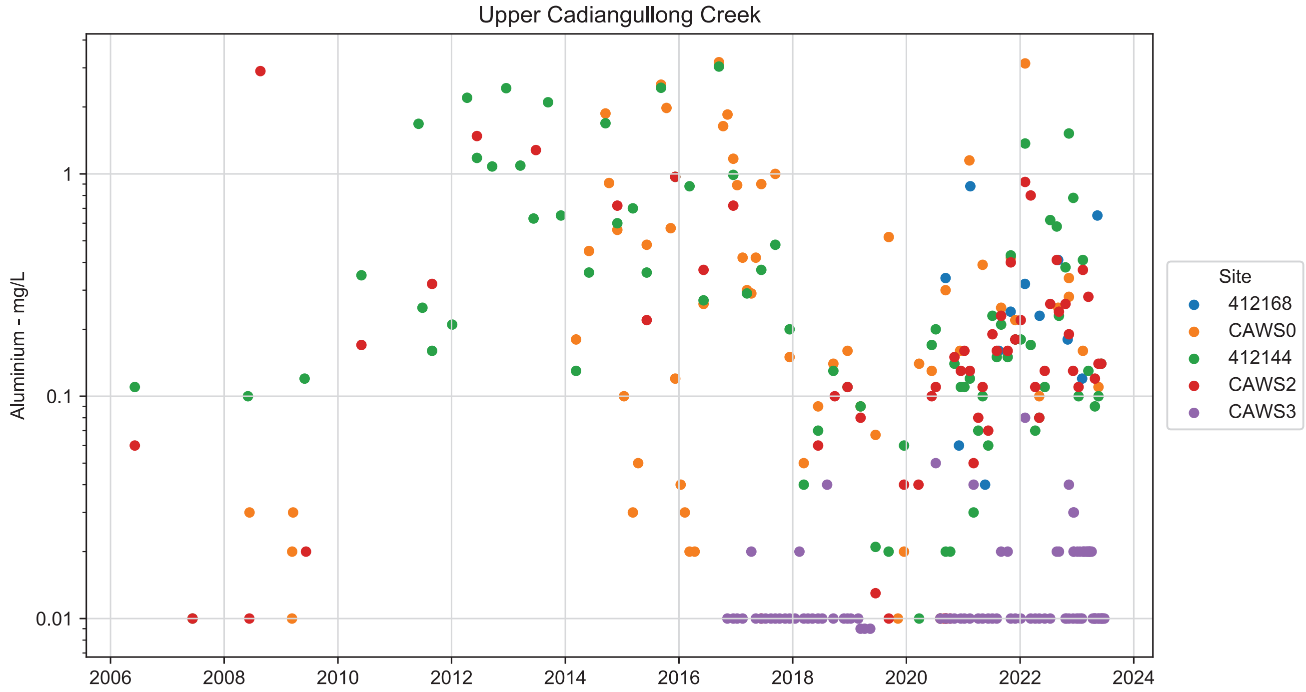
Upper Cadiangullong Creek
Sulfate - mg/L
Site
412168
CAWS0
412144
CAWS2
CAWS3

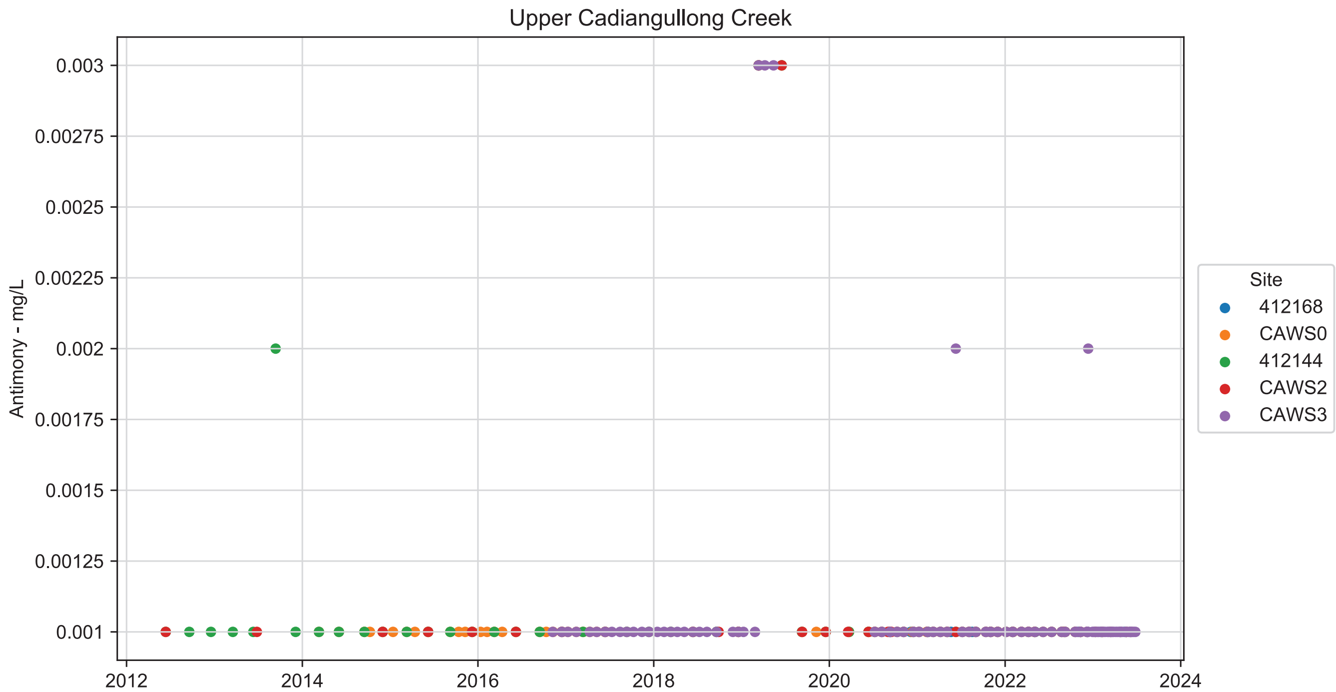


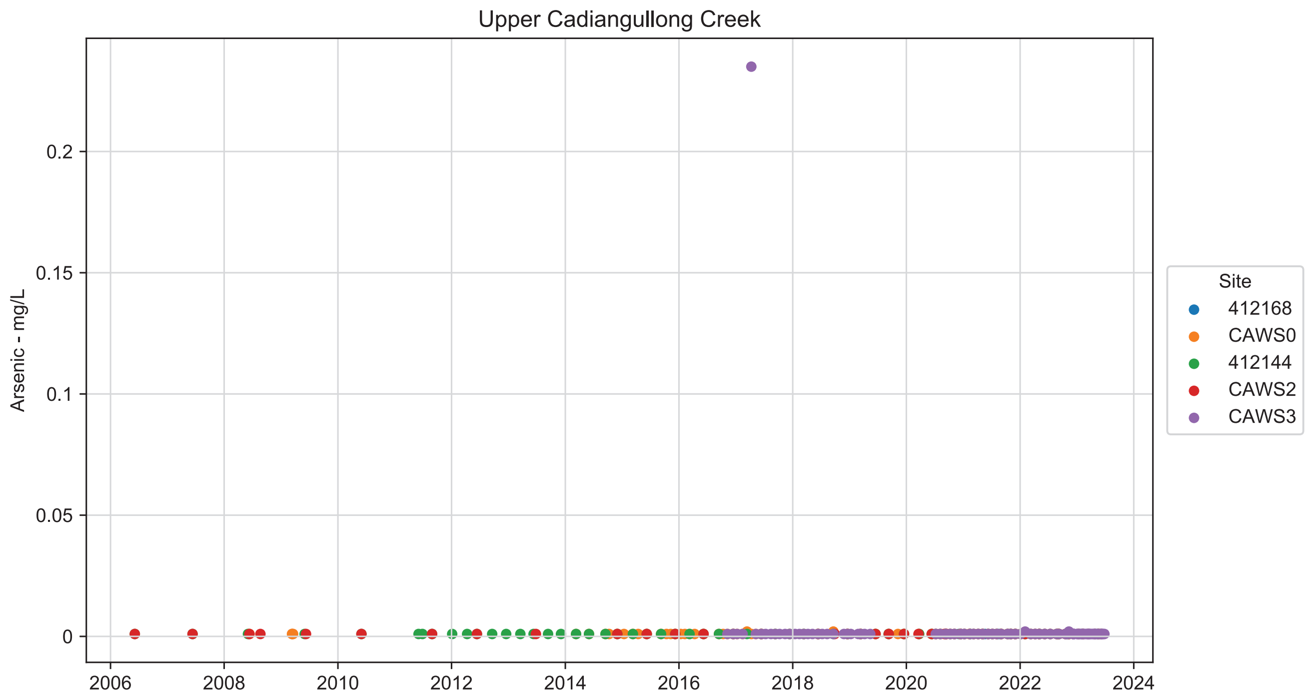
Upper Cadiangullong Creek
Total Alkalinity as CaCO3 - mg/L
Site
412168
CAWS0
412144
CAWS2
CAWS3

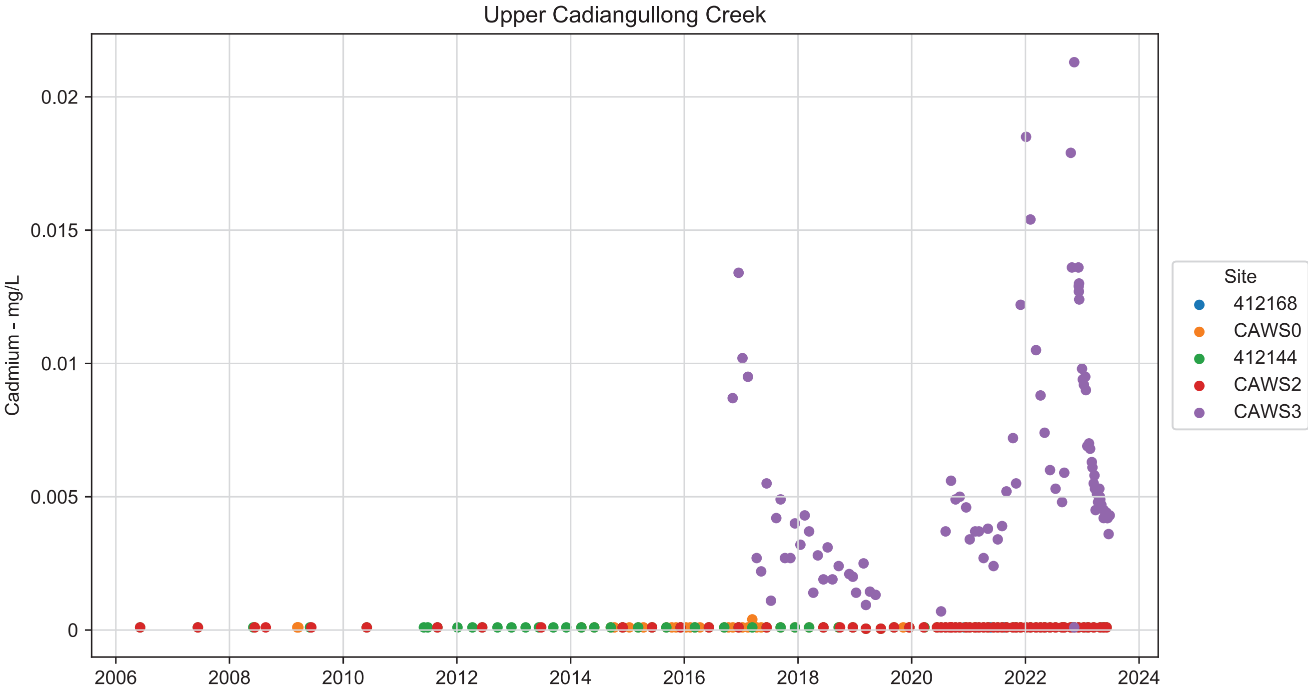


Upper Cadiangullong Creek
Total Hardness as CaCO3 - mg/L
Site
412168
CAWS0
412144
CAWS2
CAWS3

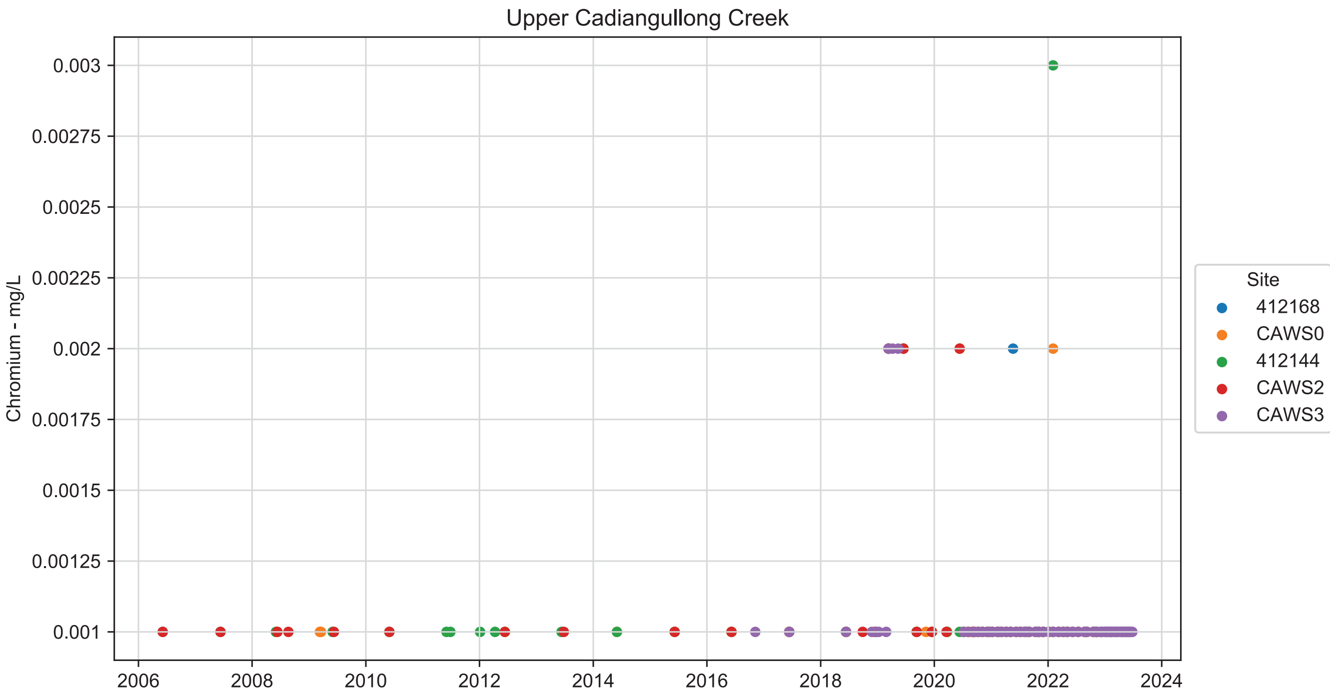

Upper Cadiangullong Creek
Aluminium - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3


Upper Cadiangullong Creek
Antimony - mg/L
0.003
0.00275
0.0025
0.00225
0.002
0.00175
0.0015
0.00125
0.001
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

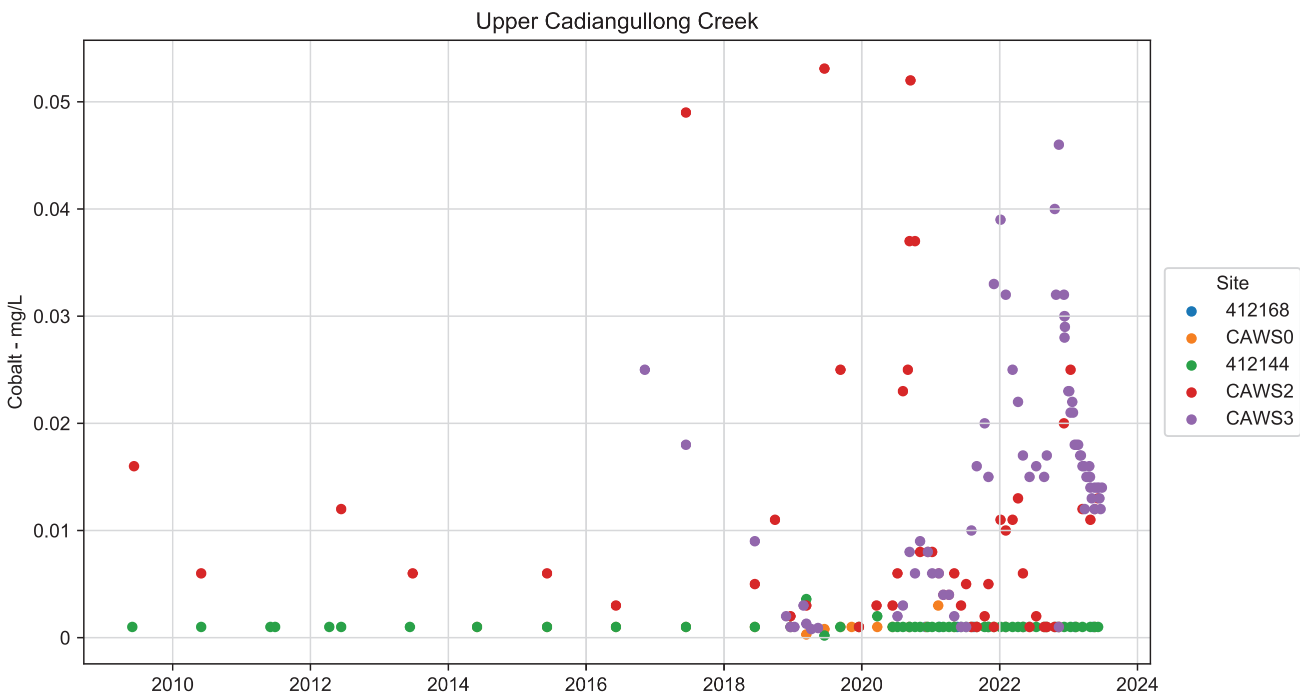

Upper Cadiangullong Creek
Arsenic - mg/L
0.2
0.15
0.1
0.05
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3



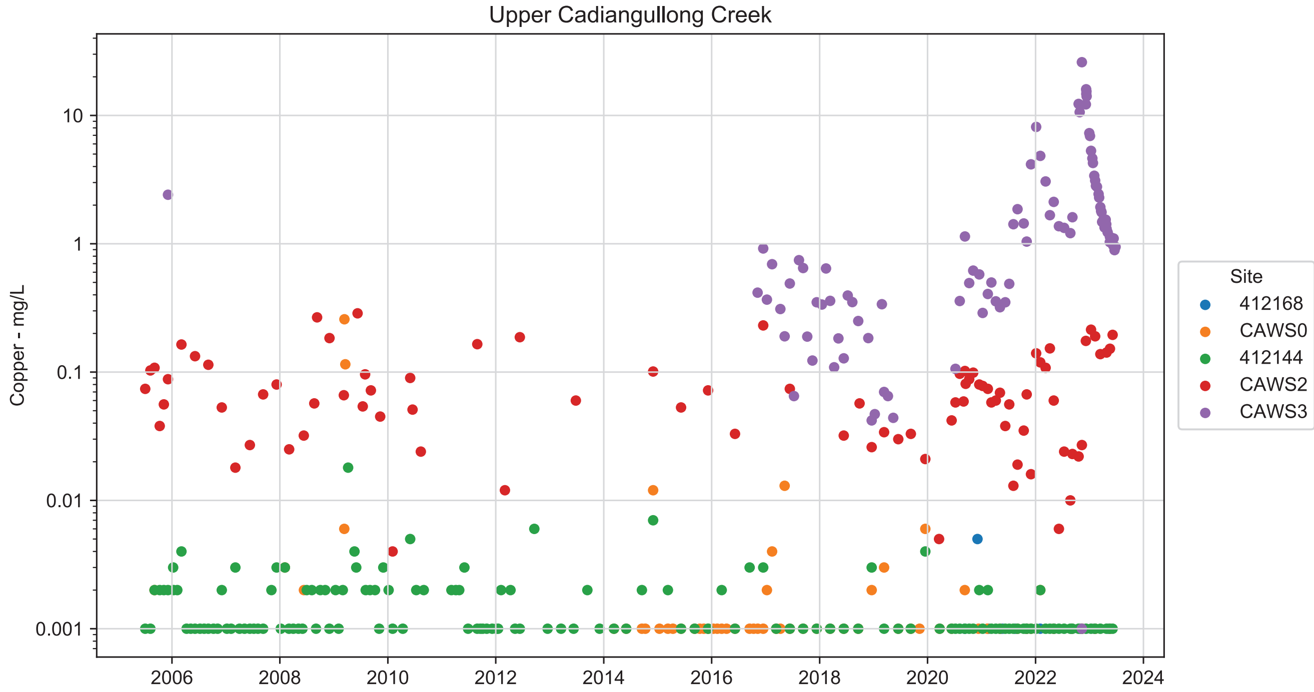
Upper Cadiangullong Creek
Cadmium - mg/L
0.02
0.015
0.01
0.005
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

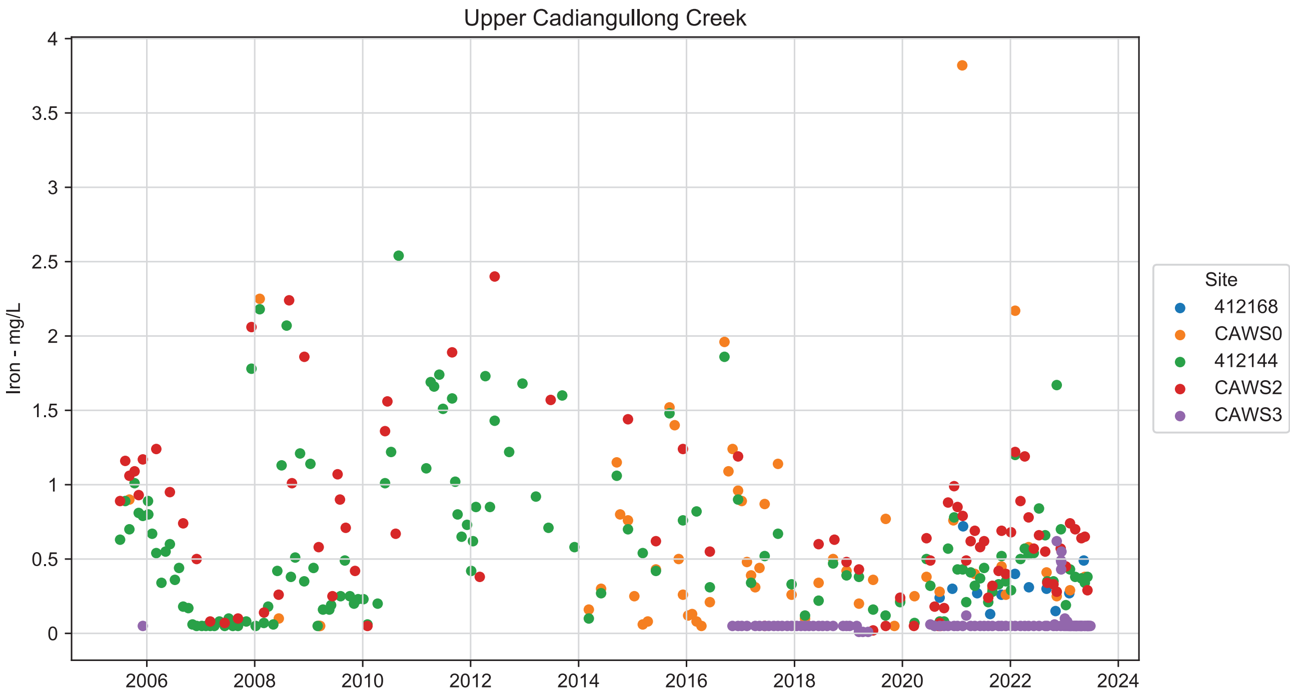


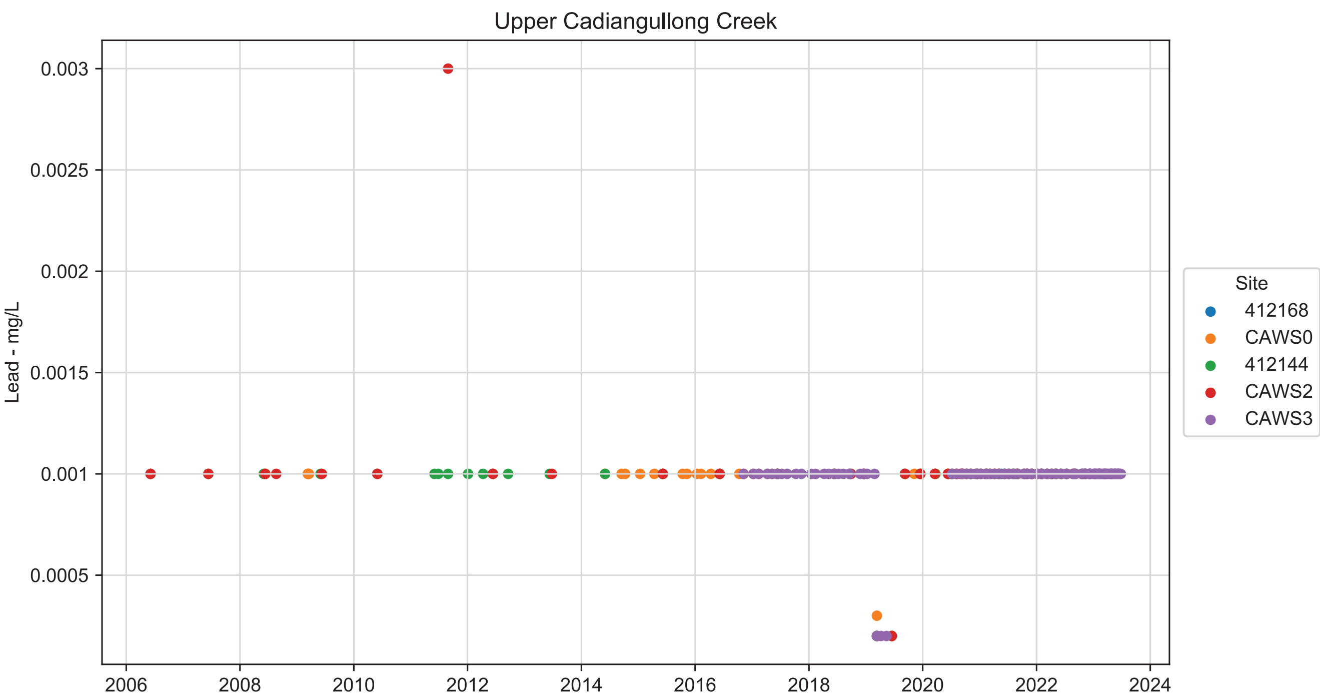
Upper Cadiangullong Creek
Chromium - mg/L
0.003
0.00275
0.0025
0.00225
0.002
0.00175
0.0015
0.00125
0.001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

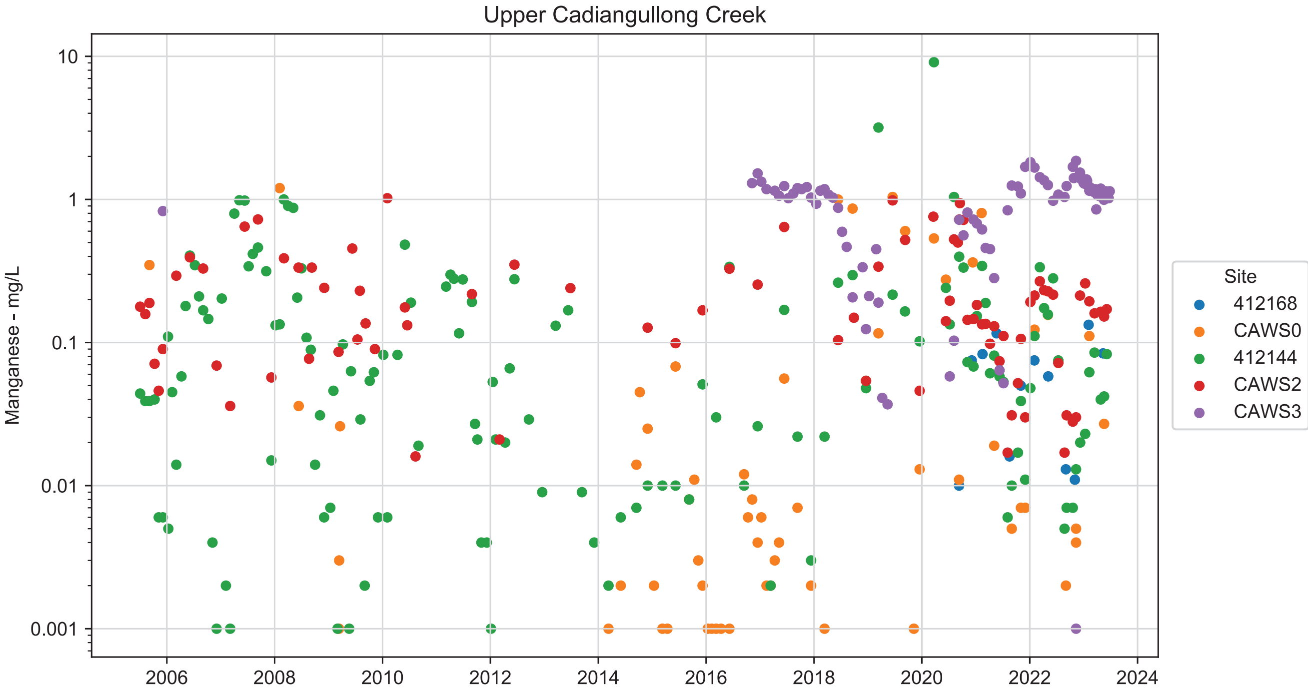


Upper Cadiangullong Creek
Cobalt - mg/L
0.05
0.04
0.03
0.02
0.01
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

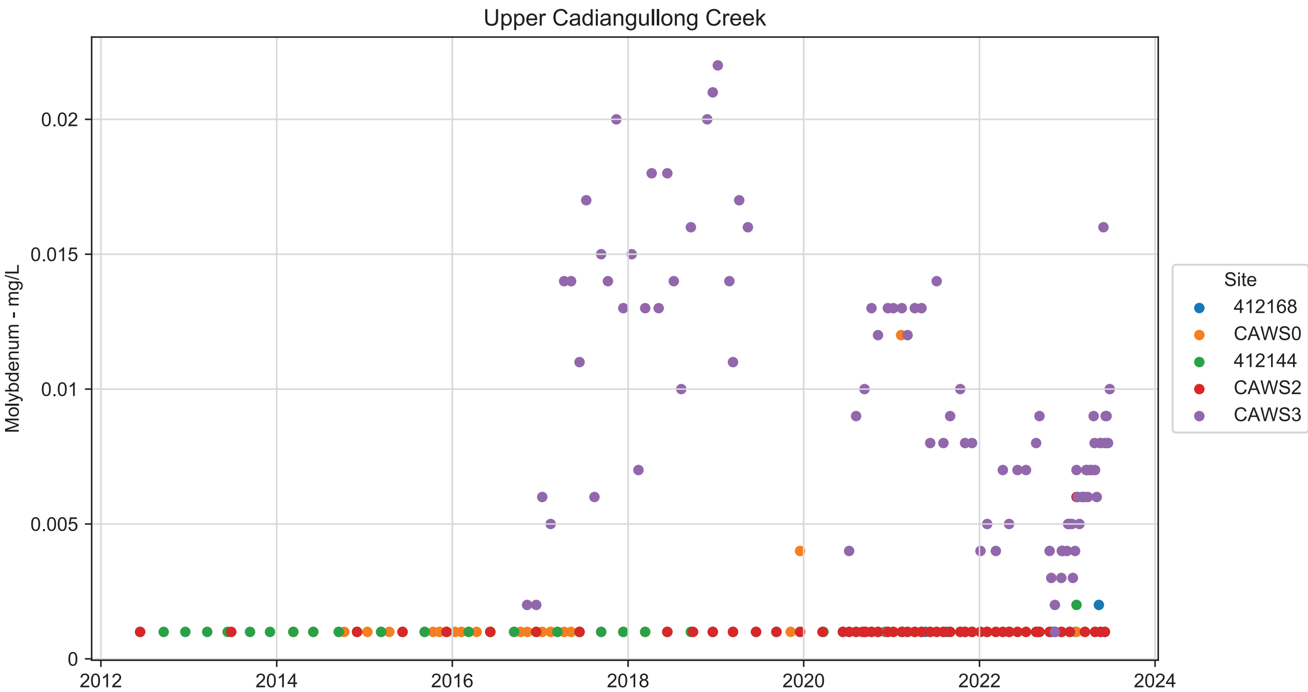

Upper Cadiangullong Creek
Copper - mg/L
10
1
0.1
0.01
0.001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3


Upper Cadiangullong Creek
Iron - mg/L
4
3.5
3
2.5
2
1.5
1
0.5
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

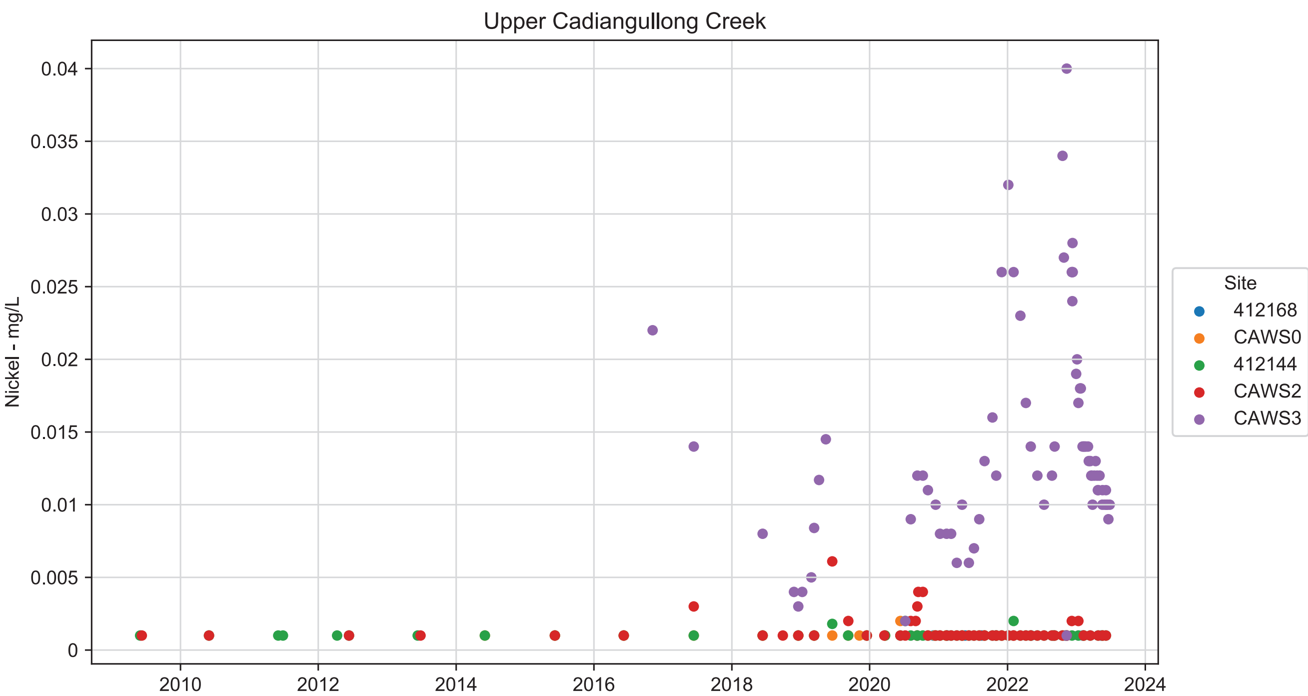

Upper Cadiangullong Creek
Lead - mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3



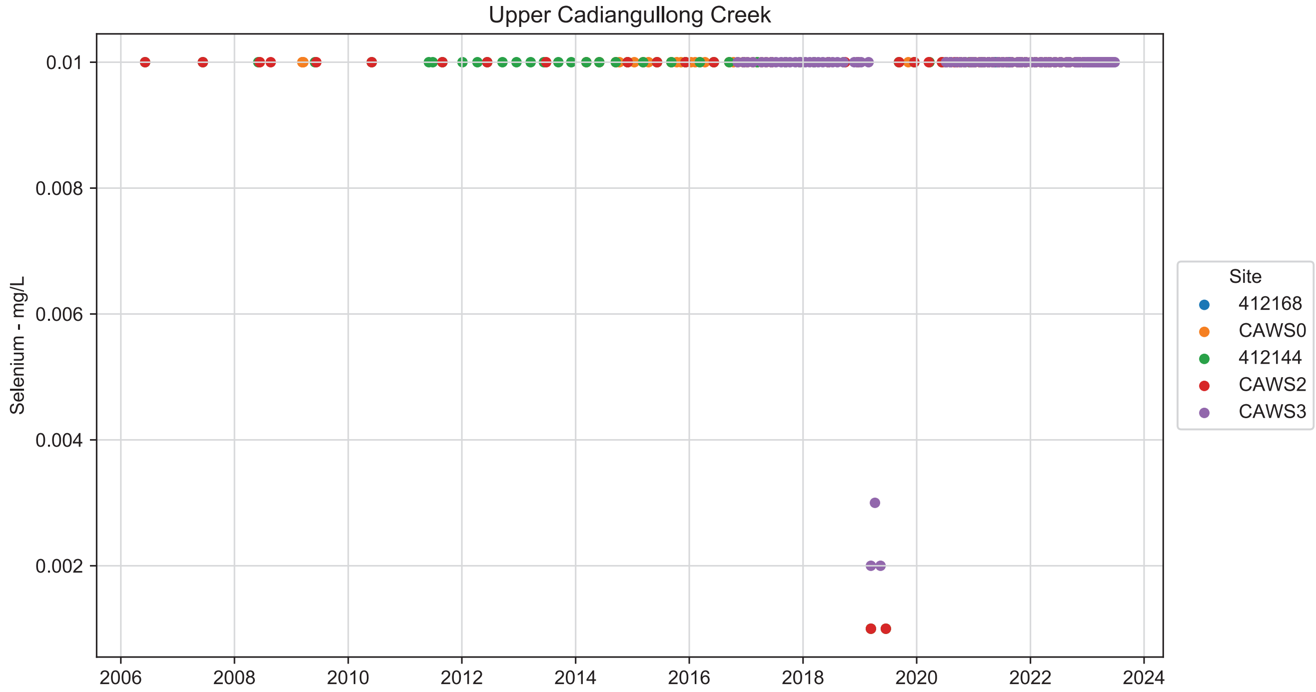
Upper Cadiangullong Creek
Manganese - mg/L
10
1
0.1
0.01
0.001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

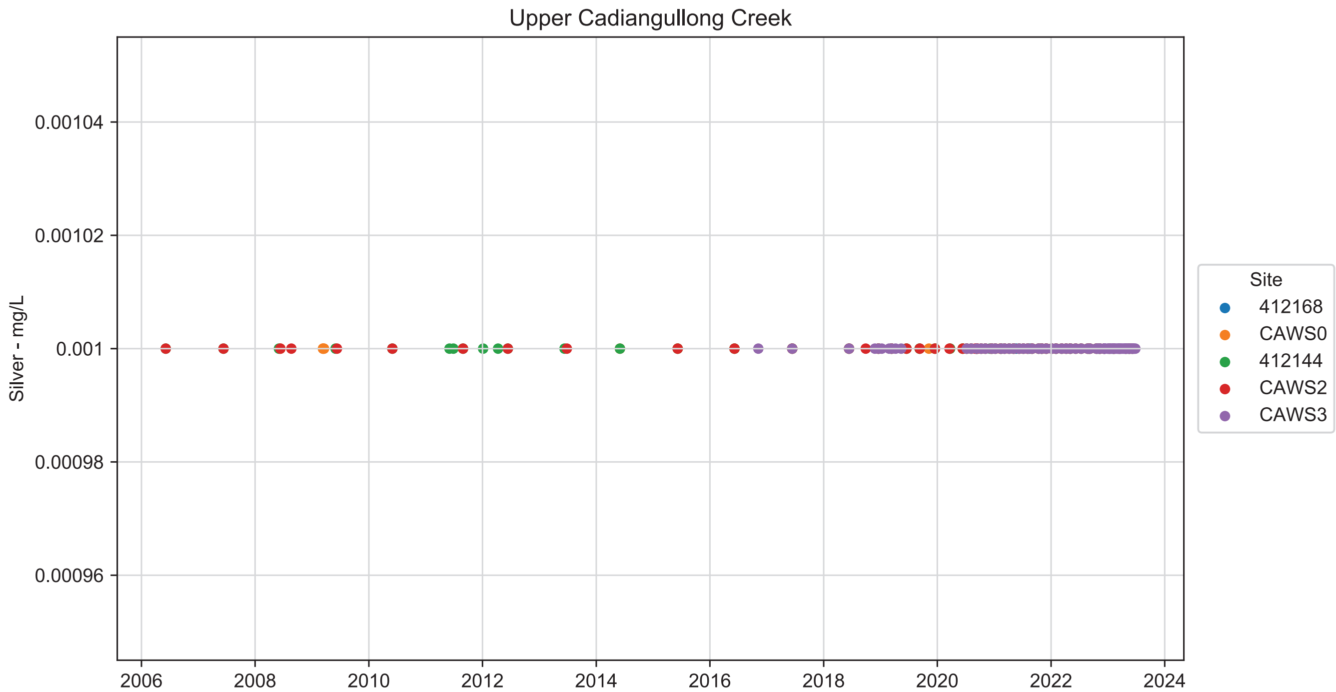


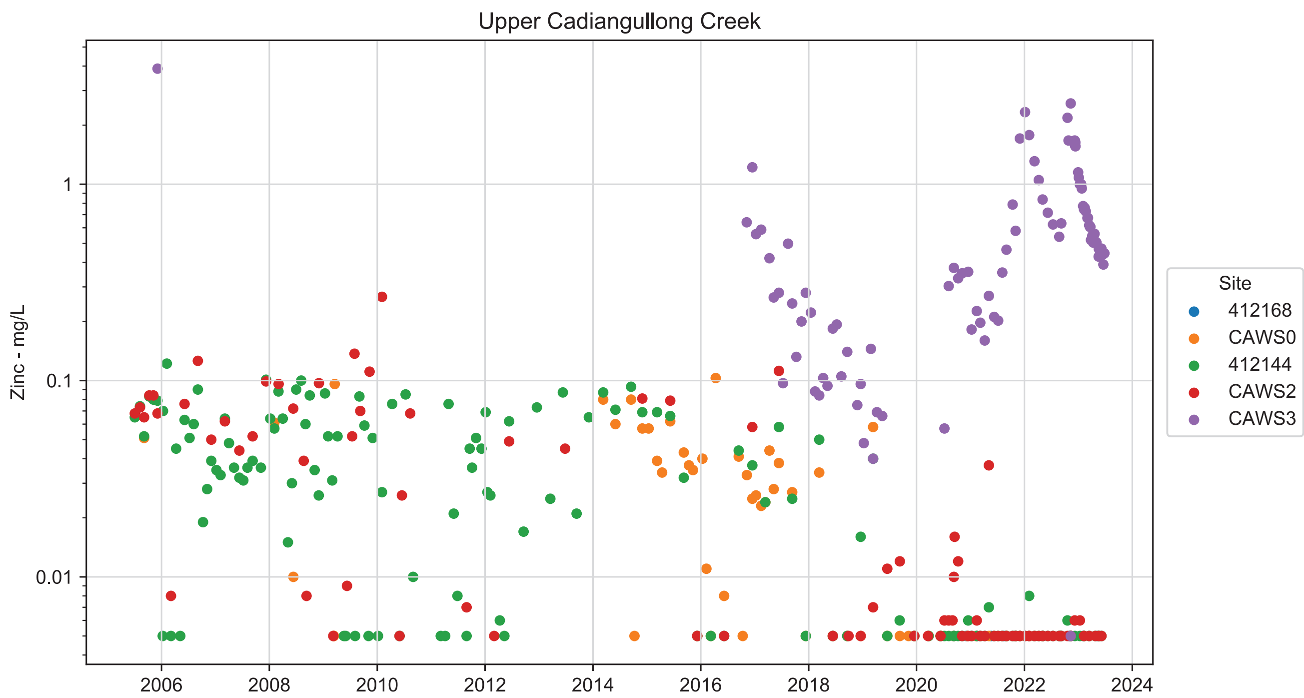
Upper Cadiangullong Creek
Molybdenum - mg/L
0.02
0.015
0.01
0.005
0
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

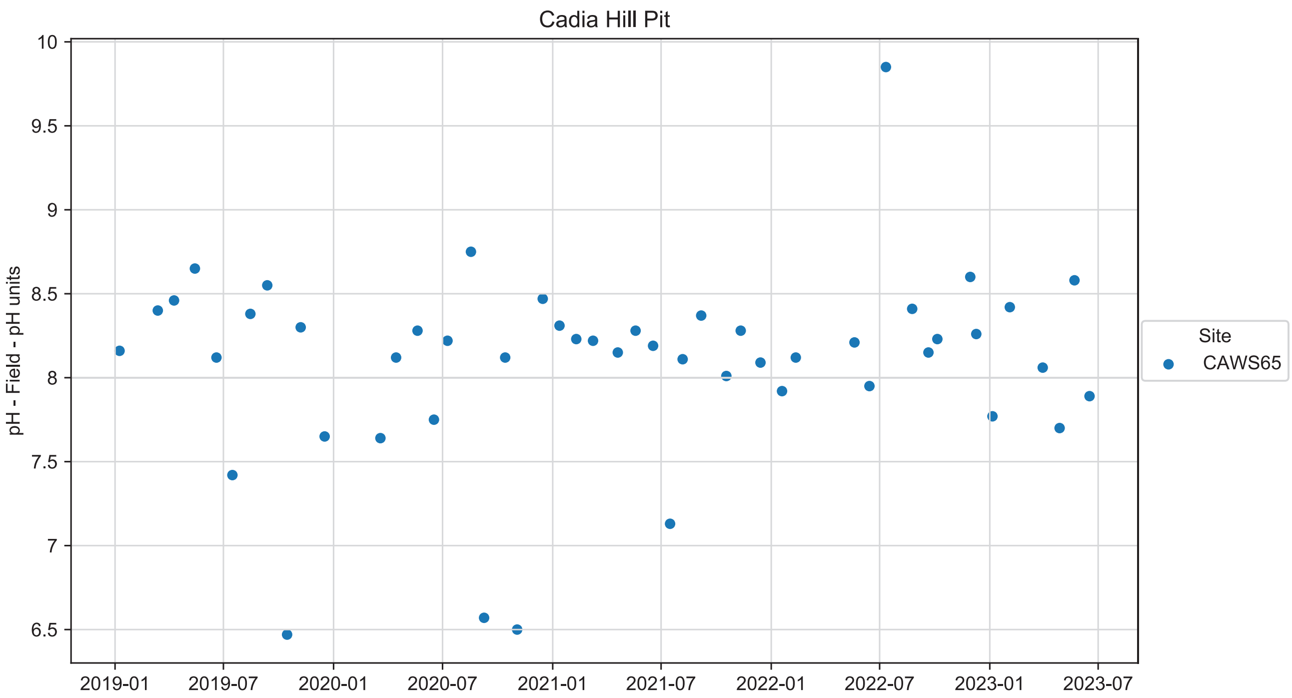


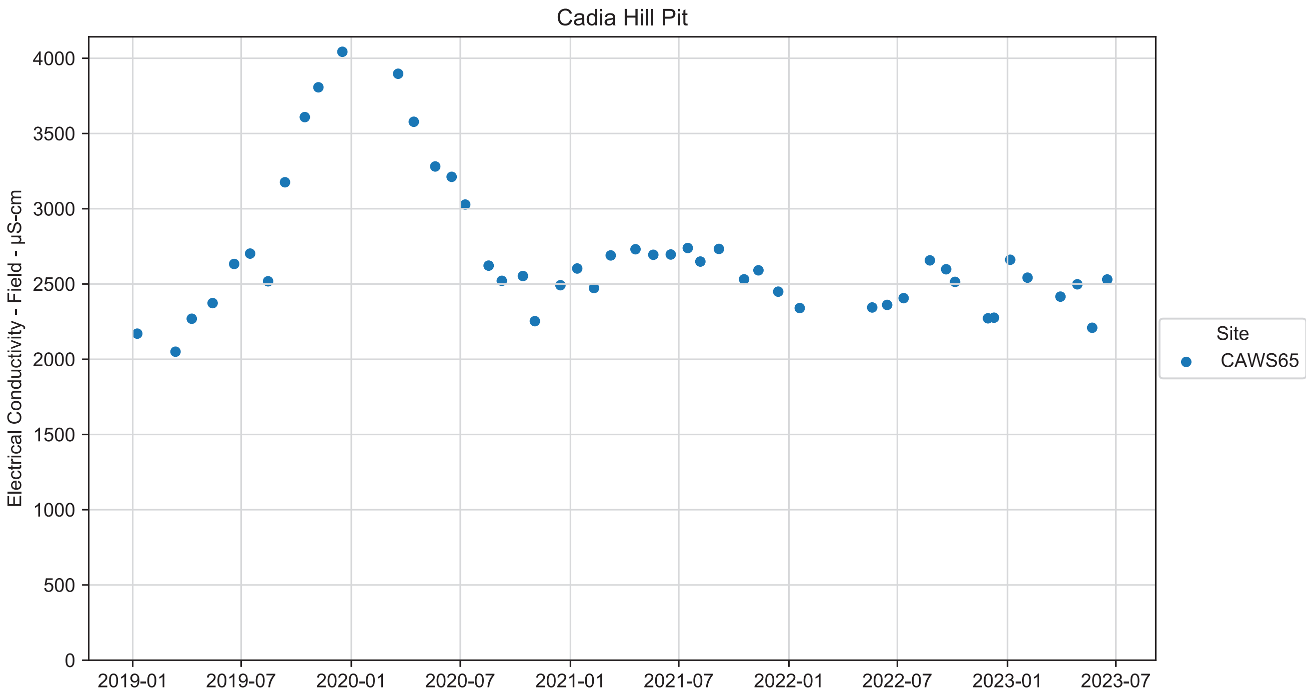
Upper Cadiangullong Creek
Nickel - mg/L
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

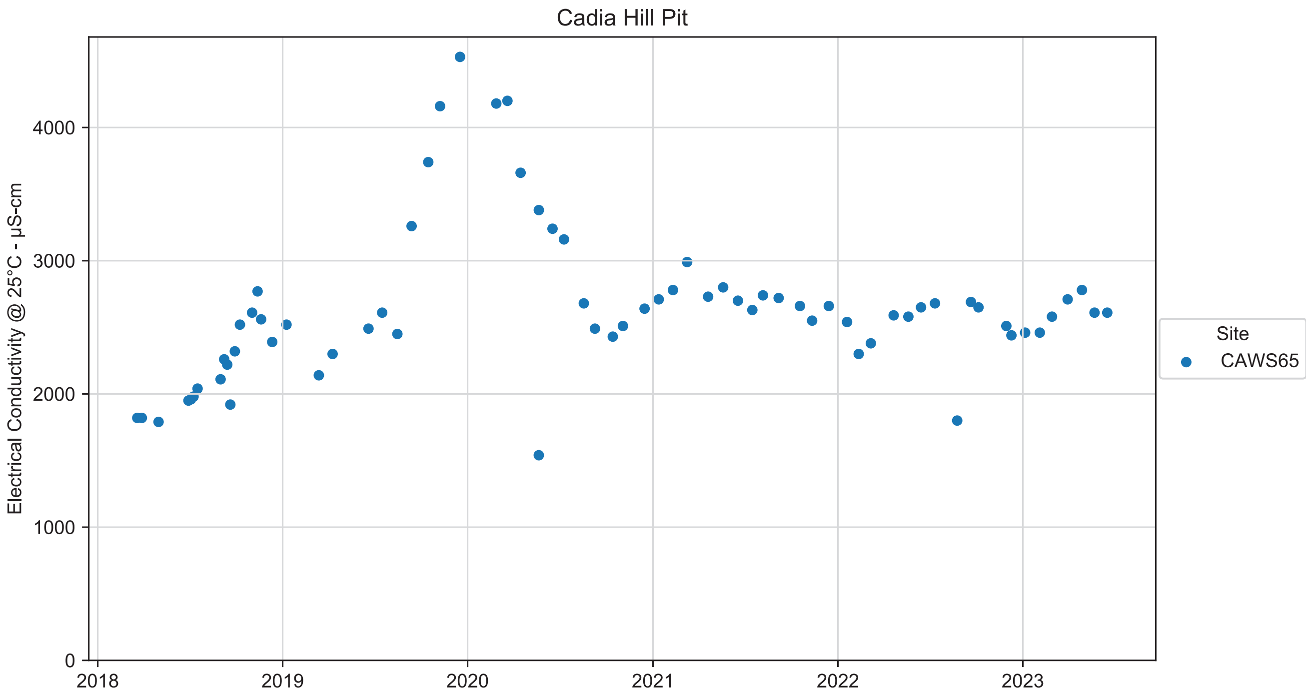

Upper Cadiangullong Creek
Selenium - mg/L
0.01
0.008
0.006
0.004
0.002
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

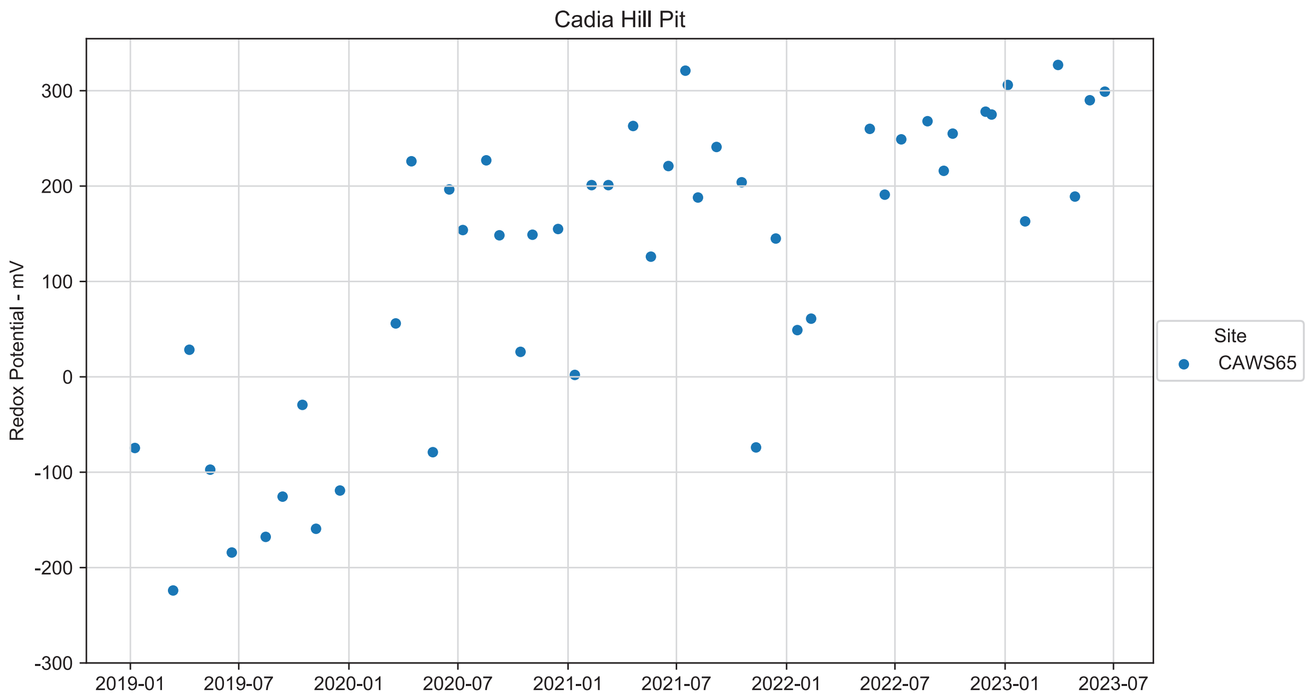

Upper Cadiangullong Creek
Silver - mg/L
0.00104
0.00102
0.001
0.00098
0.00096
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3


Upper Cadiangullong Creek
Zinc - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412168
CAWS0
412144
CAWS2
CAWS3

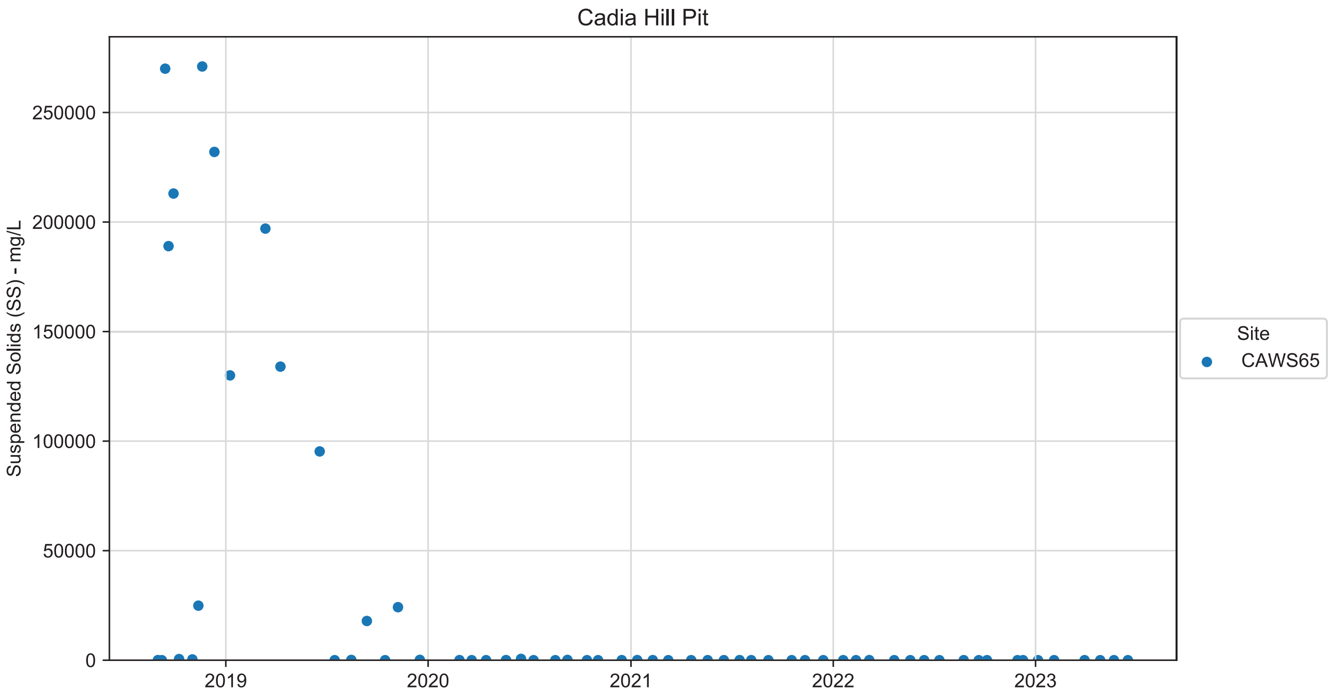

Cadia Hill Pit
pH - Field - pH units
10
9.5
9
8.5
8
7.5
7
6.5
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS65


Cadia Hill Pit
Electrical Conductivity - Field - µS-cm
4000
3500
3000
2500
2000
1500
1000
500
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS65

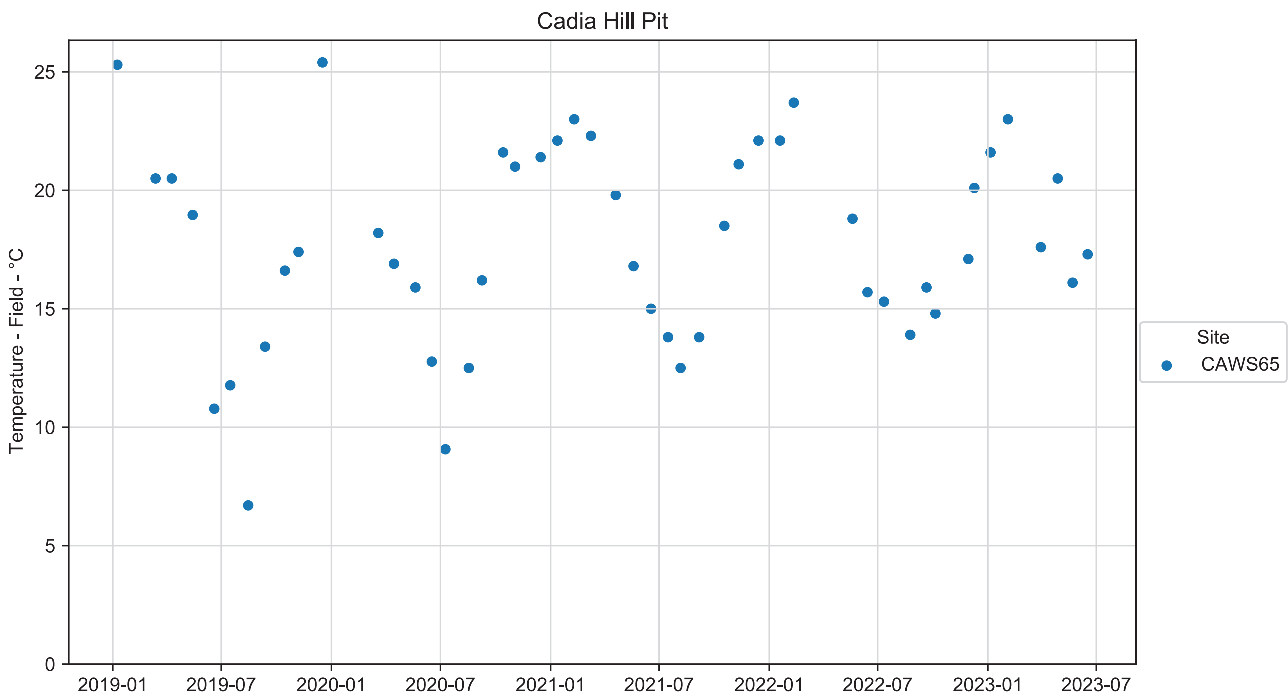

Cadia Hill Pit
Electrical Conductivity @ 25°C - µS-cm
4000
3000
2000
1000
0
2018
2019
2020
2021
2022
2023
Site
CAWS65



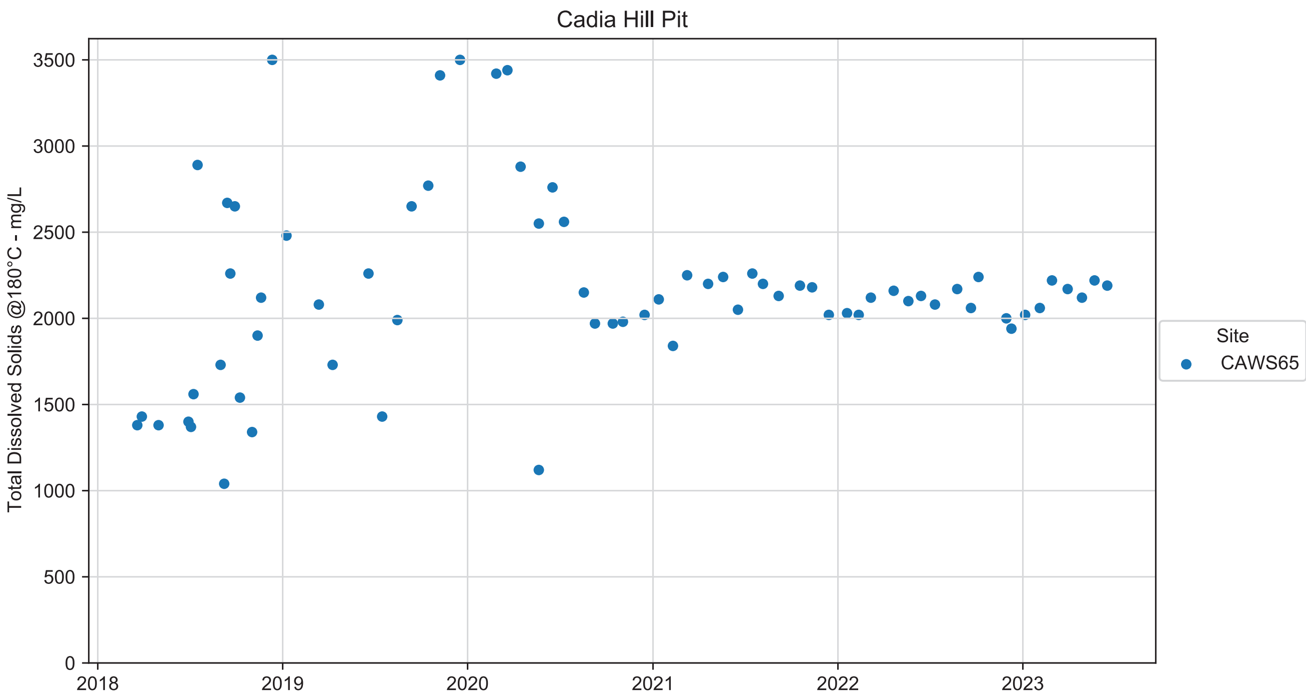
Cadia Hill Pit
Redox Potential - mV
300
200
100
0
-100
-200
-300
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS65



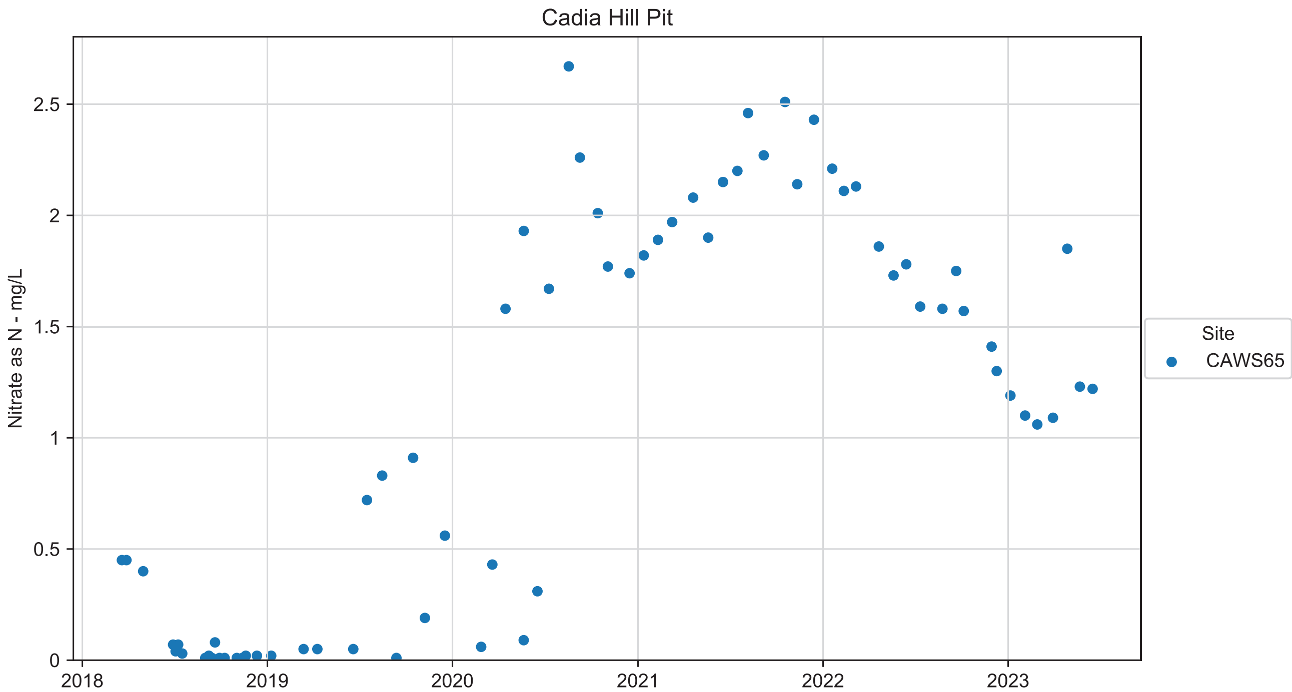
Cadia Hill Pit
Suspended Solids (SS) - mg/L
250000
200000
150000
100000
50000
0
2019
2020
2021
2022
2023
Site
CAWS65



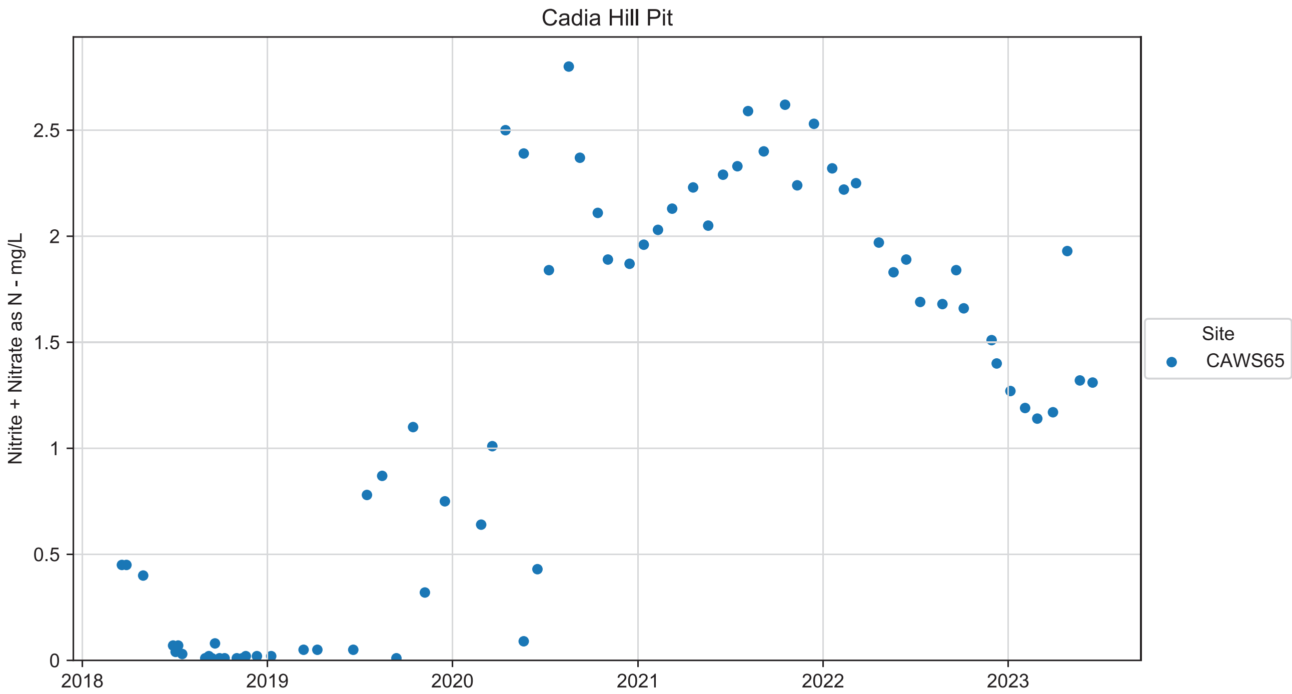
Cadia Hill Pit
Temperature - Field - °C
25
20
15
10
5
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS65



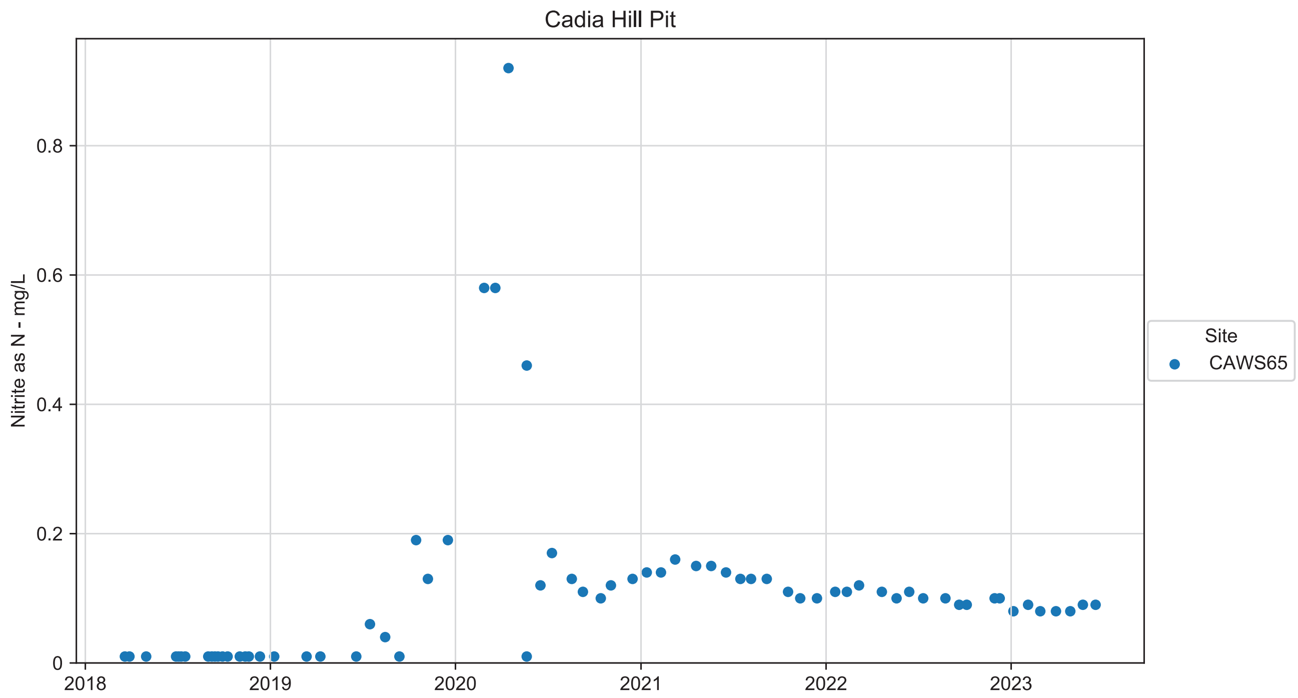
Cadia Hill Pit
Total Dissolved Solids @180°C - mg/L
0
500
1000
1500
2000
2500
3000
3500
2018
2019
2020
2021
2022
2023
Site
CAWS65

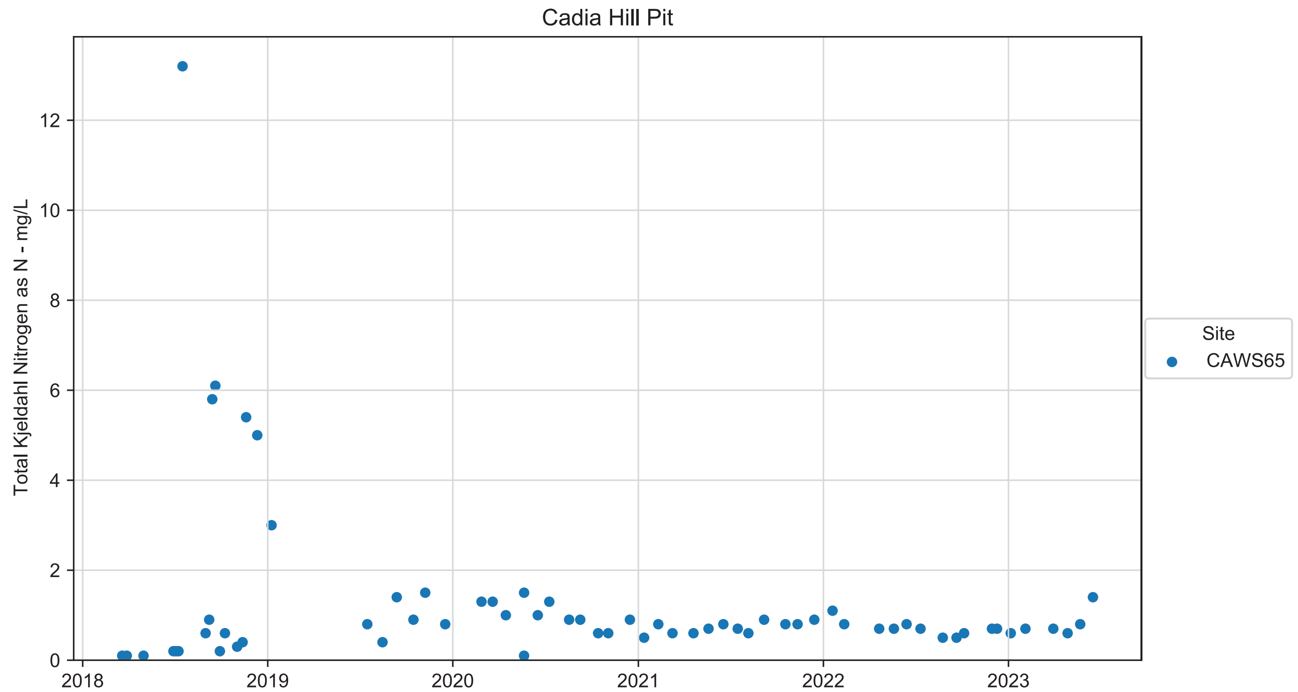


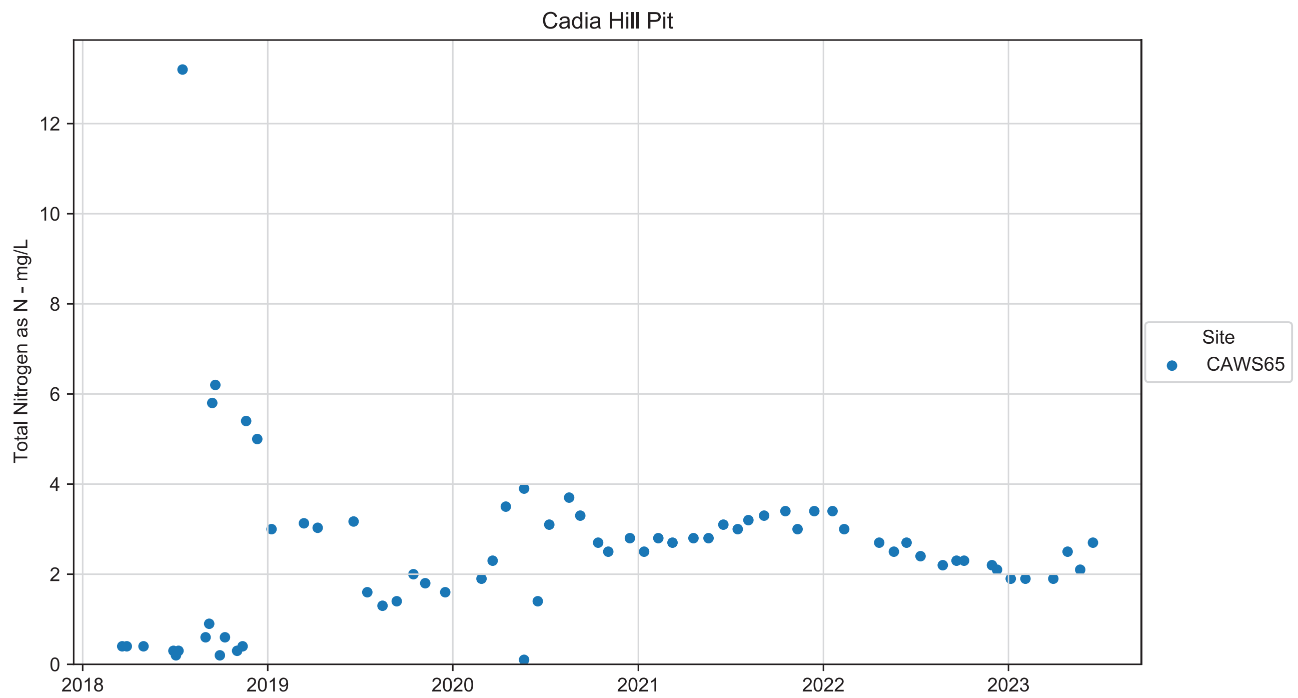
Cadia Hill Pit
Nitrate as N - mg/L
0
0.5
1
1.5
2
2.5
2018
2019
2020
2021
2022
2023
Site
CAWS65

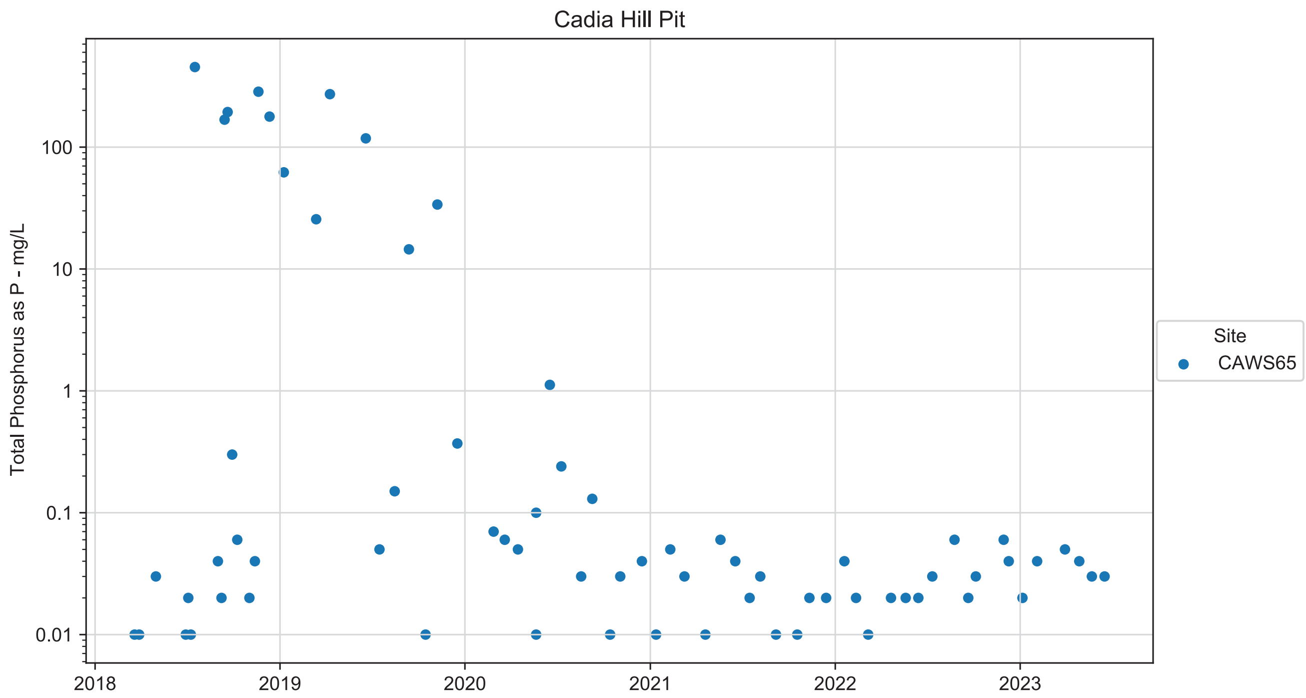


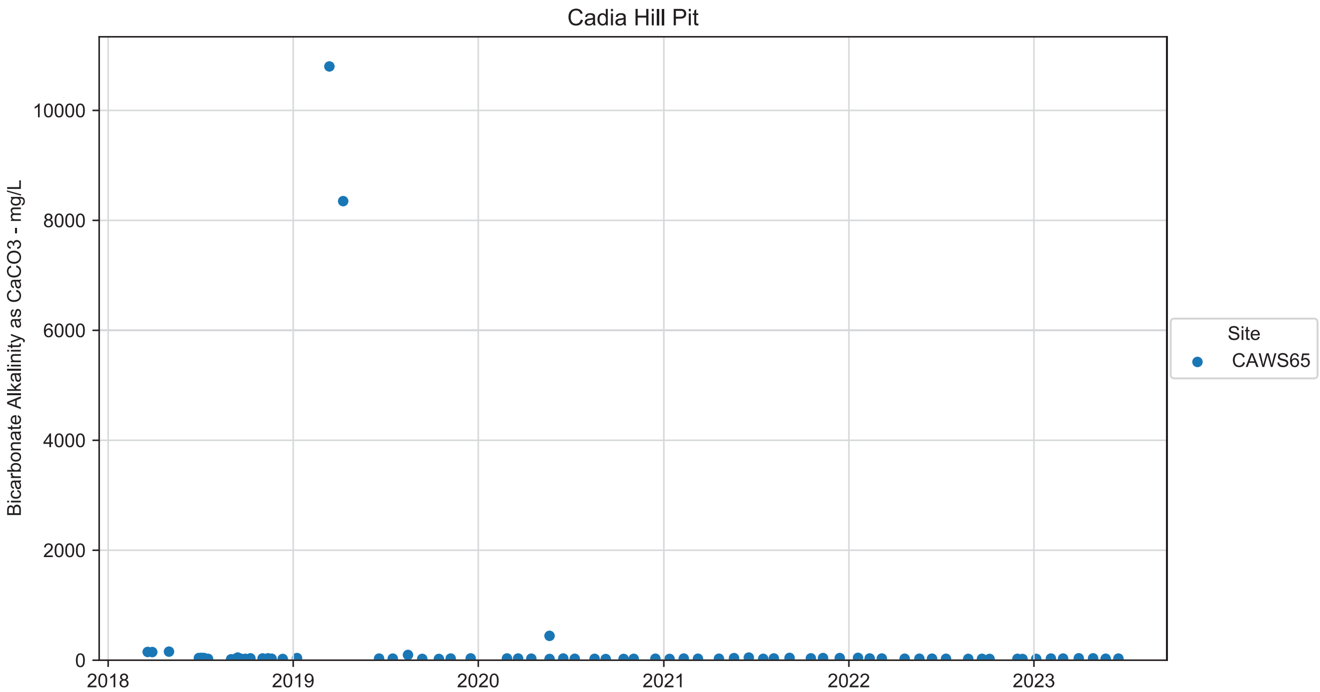
Cadia Hill Pit
Nitrite + Nitrate as N - mg/L
0
0.5
1
1.5
2
2.5
2018
2019
2020
2021
2022
2023
Site
CAWS65

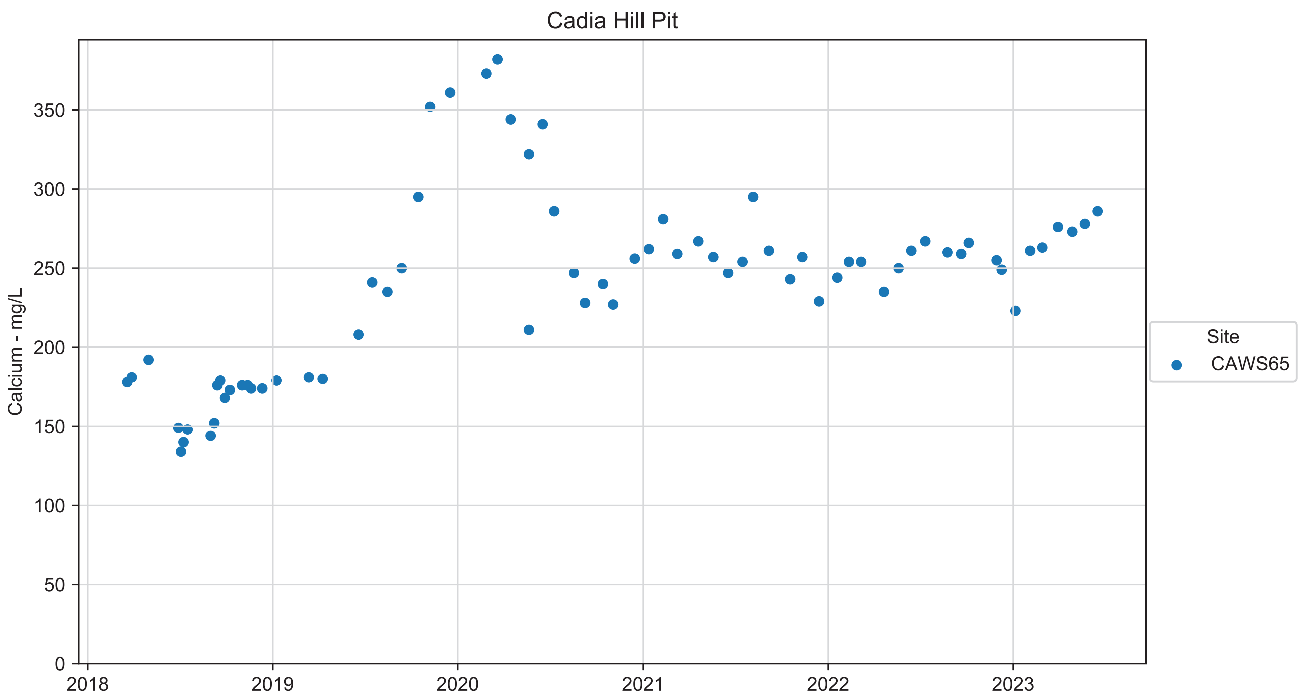

Cadia Hill Pit
Nitrite as N - mg/L
0
0.2
0.4
0.6
0.8
2018
2019
2020
2021
2022
2023
Site
CAWS65

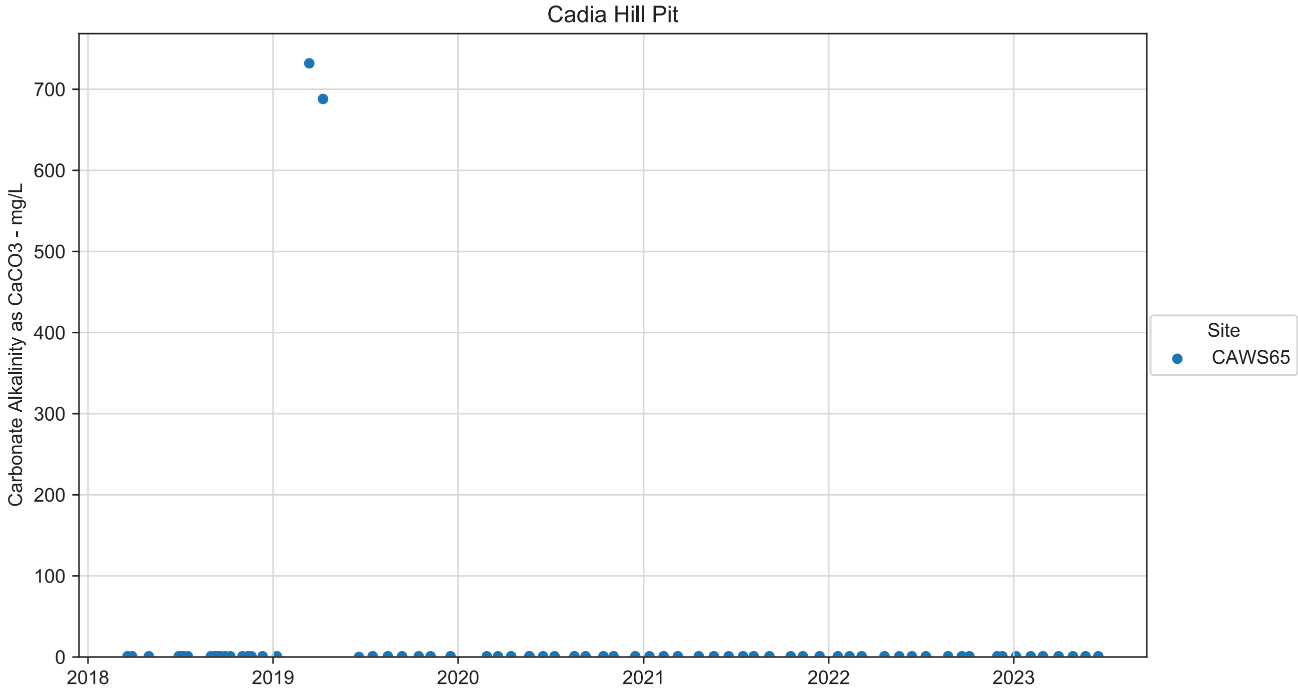

Cadia Hill Pit
Total Kjeldahl Nitrogen as N - mg/L
0
2
4
6
8
10
12
2018
2019
2020
2021
2022
2023
Site
CAWS65

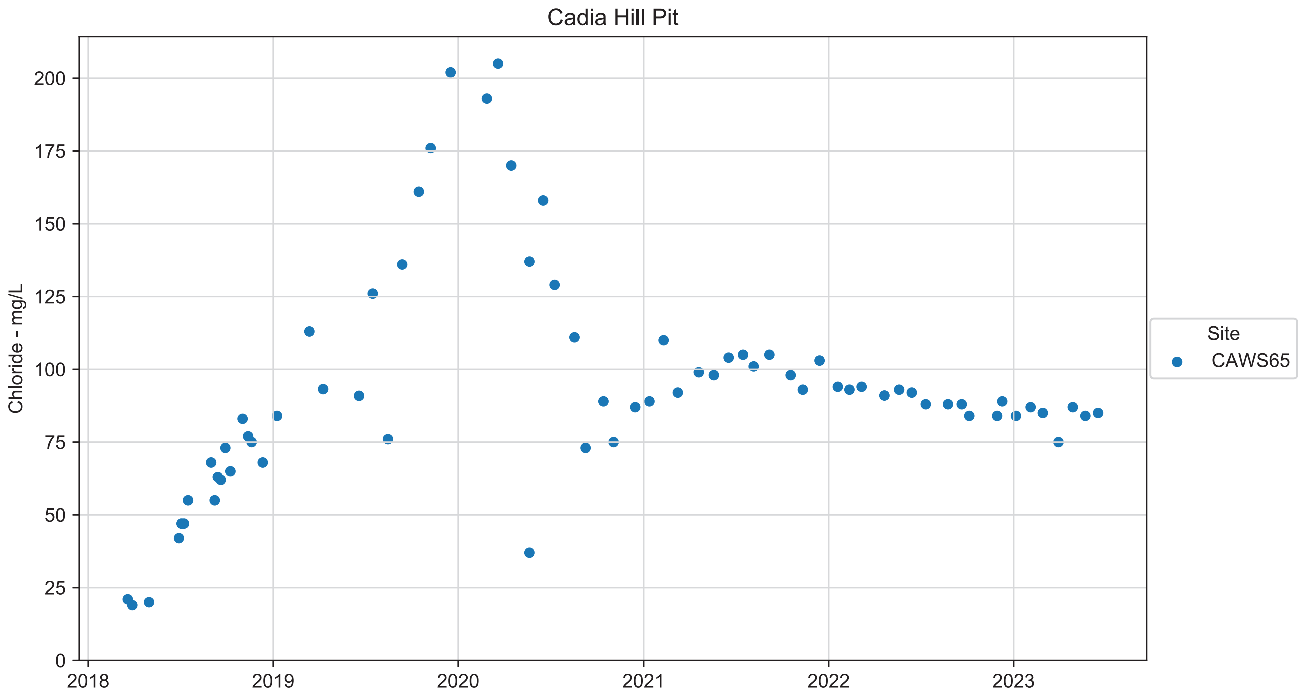

Cadia Hill Pit
Total Nitrogen as N - mg/L
0
2
4
6
8
10
12
2018
2019
2020
2021
2022
2023
Site
CAWS65

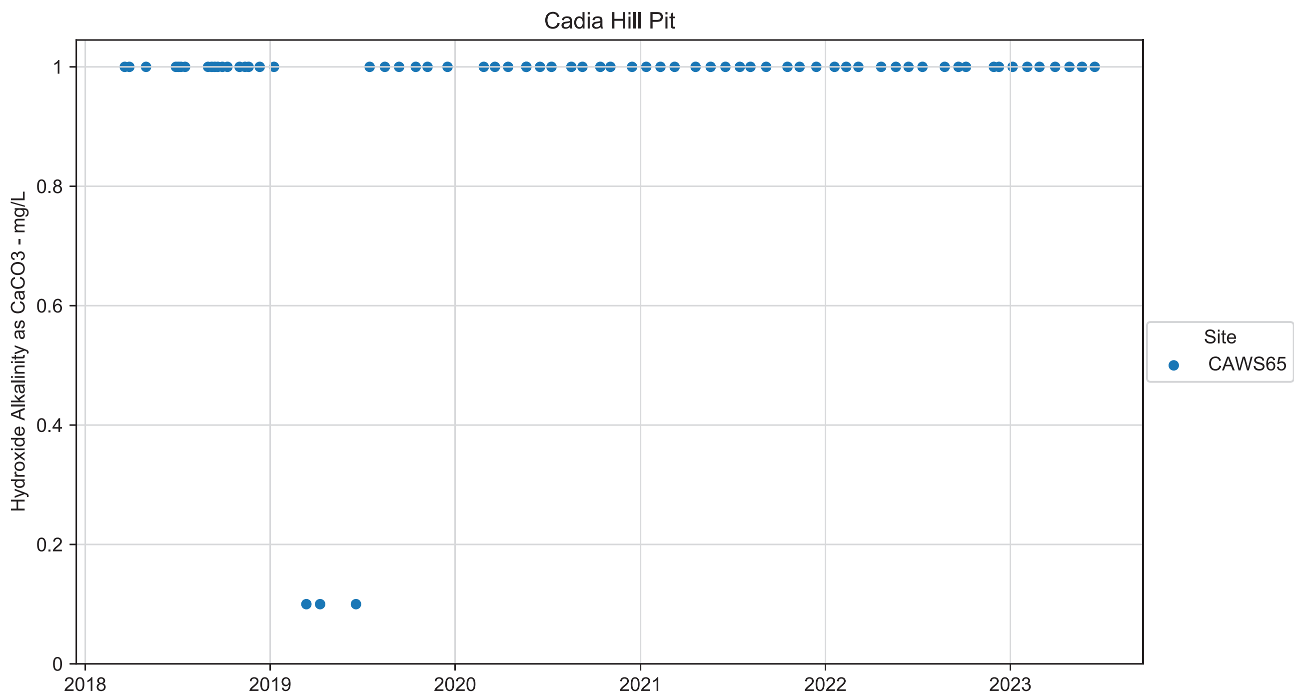

Cadia Hill Pit
Total Phosphorus as P - mg/L
0.01
0.1
1
10
100
2018
2019
2020
2021
2022
2023
Site
CAWS65

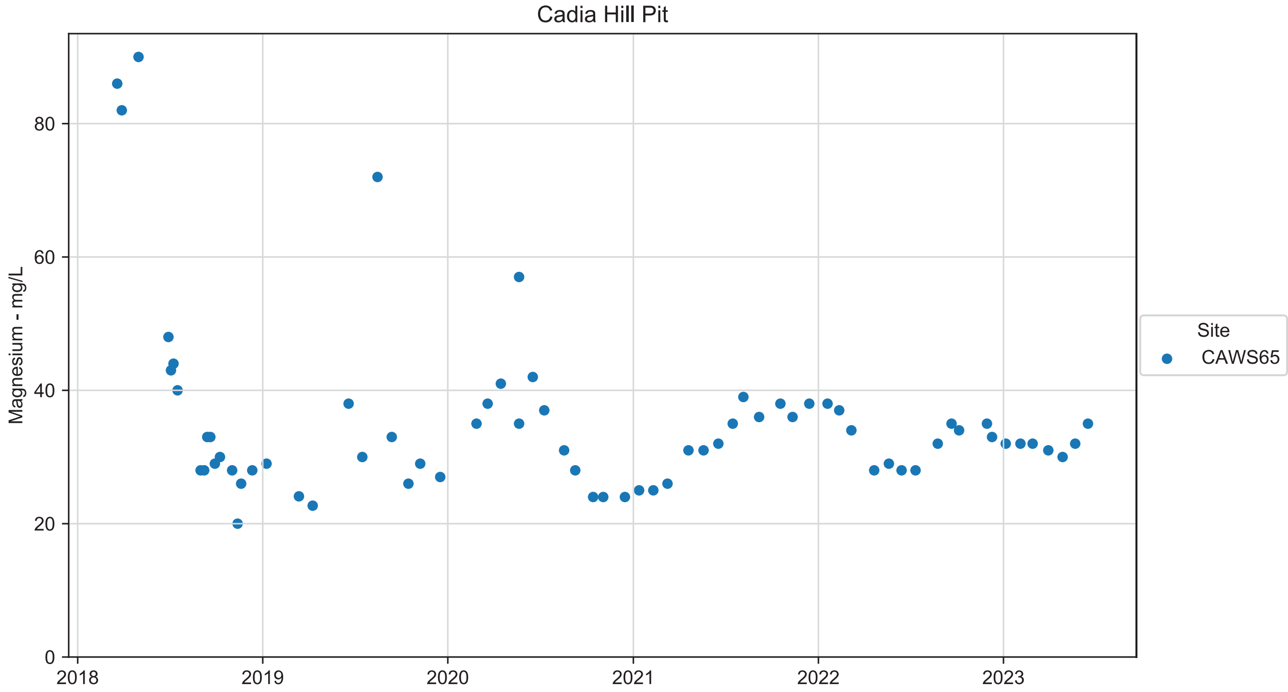

Cadia Hill Pit
Bicarbonate Alkalinity as CaCO3 - mg/L
0
2000
4000
6000
8000
10000
2018
2019
2020
2021
2022
2023
Site
CAWS65

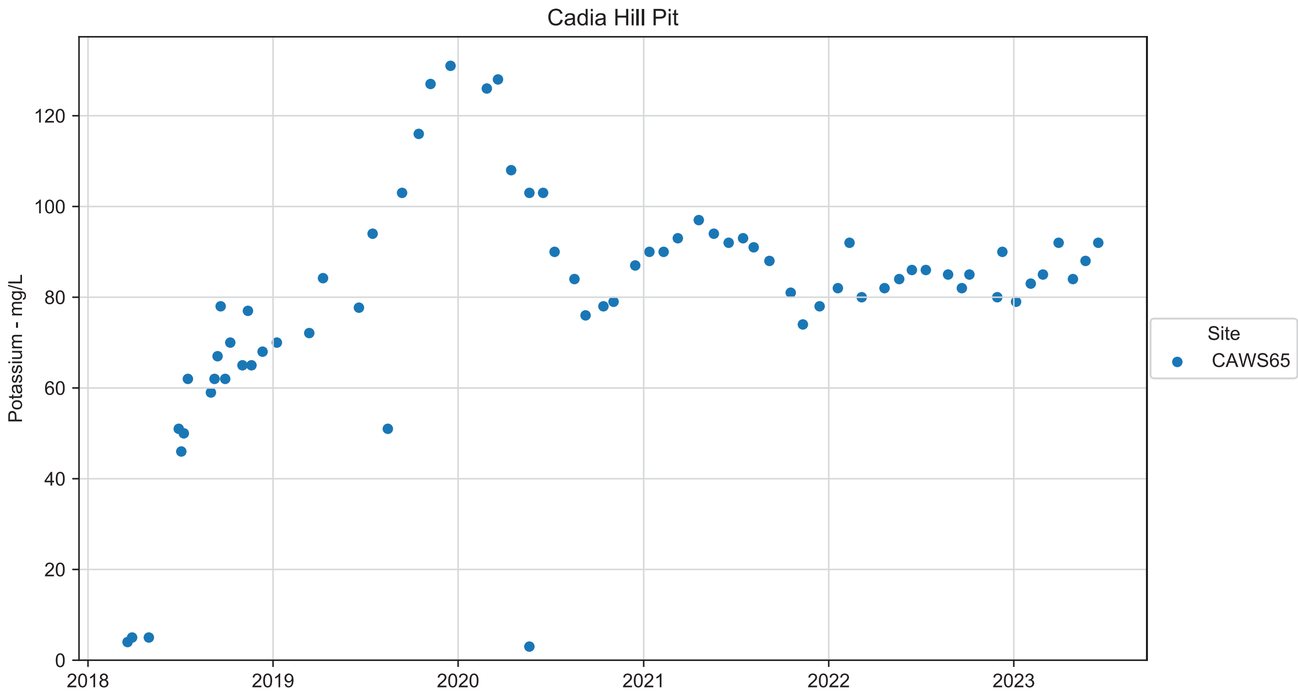

Cadia Hill Pit
Calcium - mg/L
0
50
100
150
200
250
300
350
2018
2019
2020
2021
2022
2023
Site
CAWS65

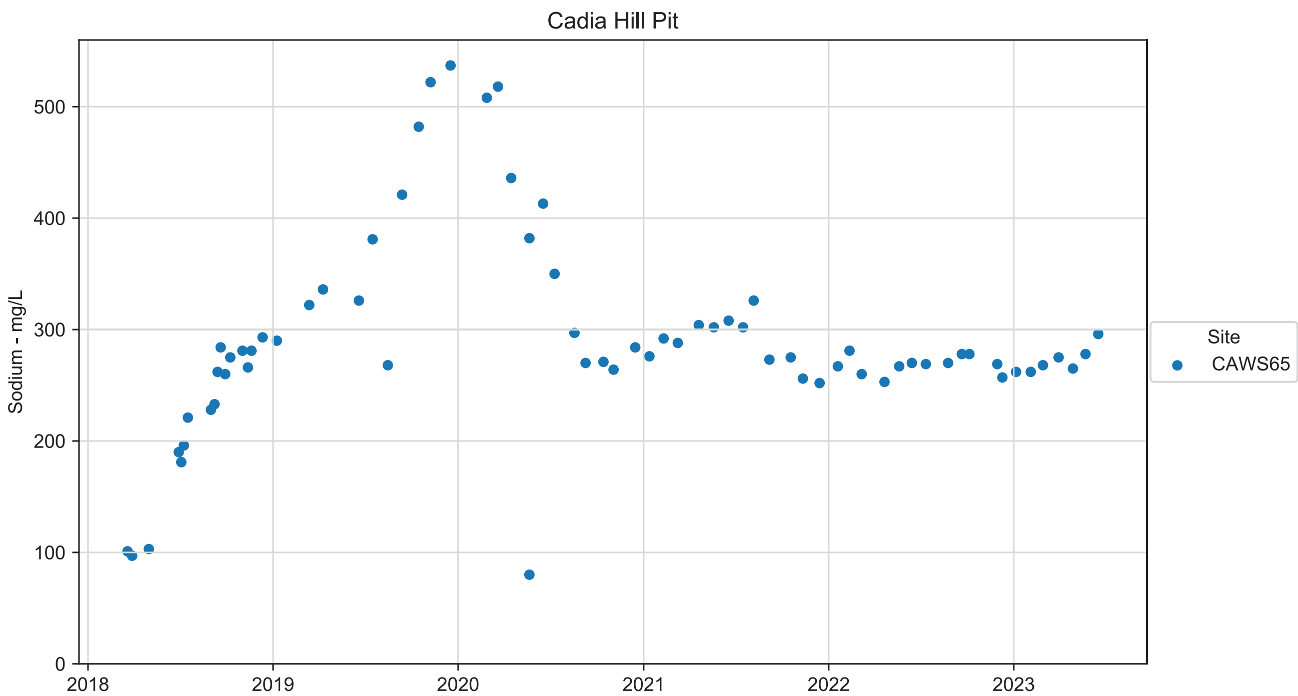

Cadia Hill Pit
Carbonate Alkalinity as CaCO3 - mg/L
0
100
200
300
400
500
600
700
2018
2019
2020
2021
2022
2023
Site
CAWS65

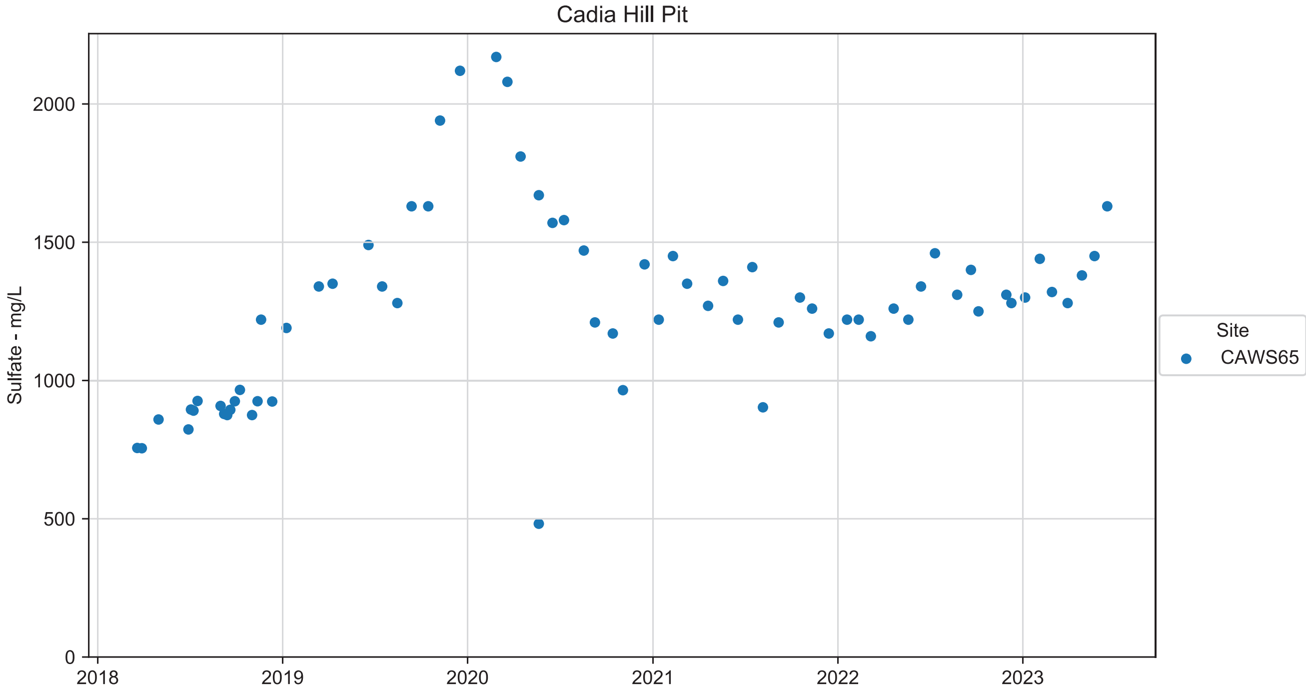

Cadia Hill Pit
Chloride - mg/L
0
25
50
75
100
125
150
175
200
2018
2019
2020
2021
2022
2023
Site
CAWS65

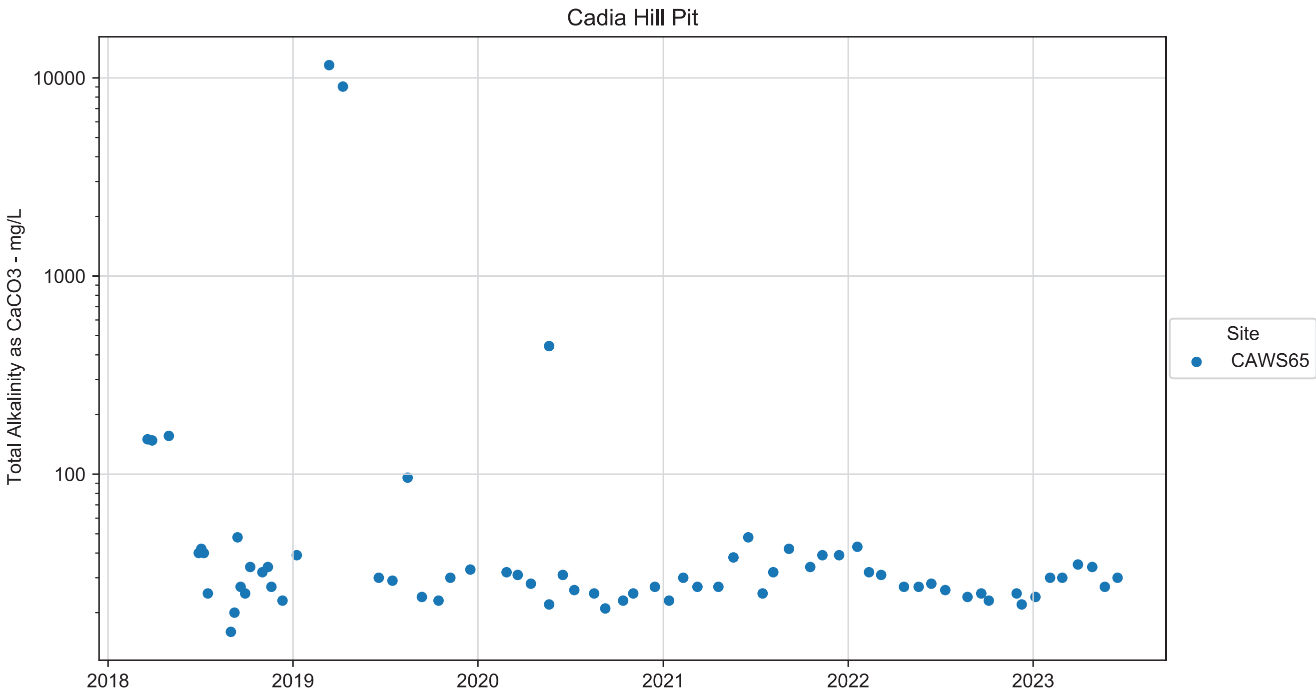

Cadia Hill Pit
Hydroxide Alkalinity as CaCO3 - mg/L
0
0.2
0.4
0.6
0.8
1
2018
2019
2020
2021
2022
2023
Site
CAWS65

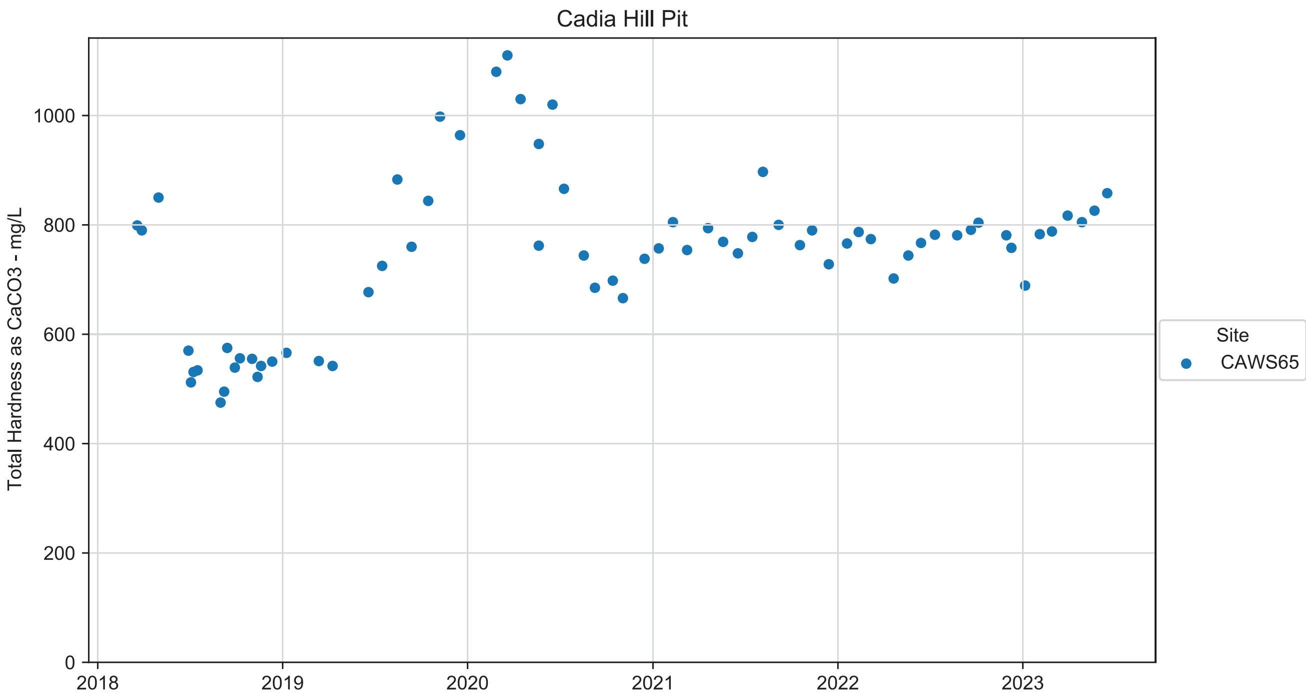

Cadia Hill Pit
Magnesium - mg/L
0
20
40
60
80
2018
2019
2020
2021
2022
2023
Site
CAWS65

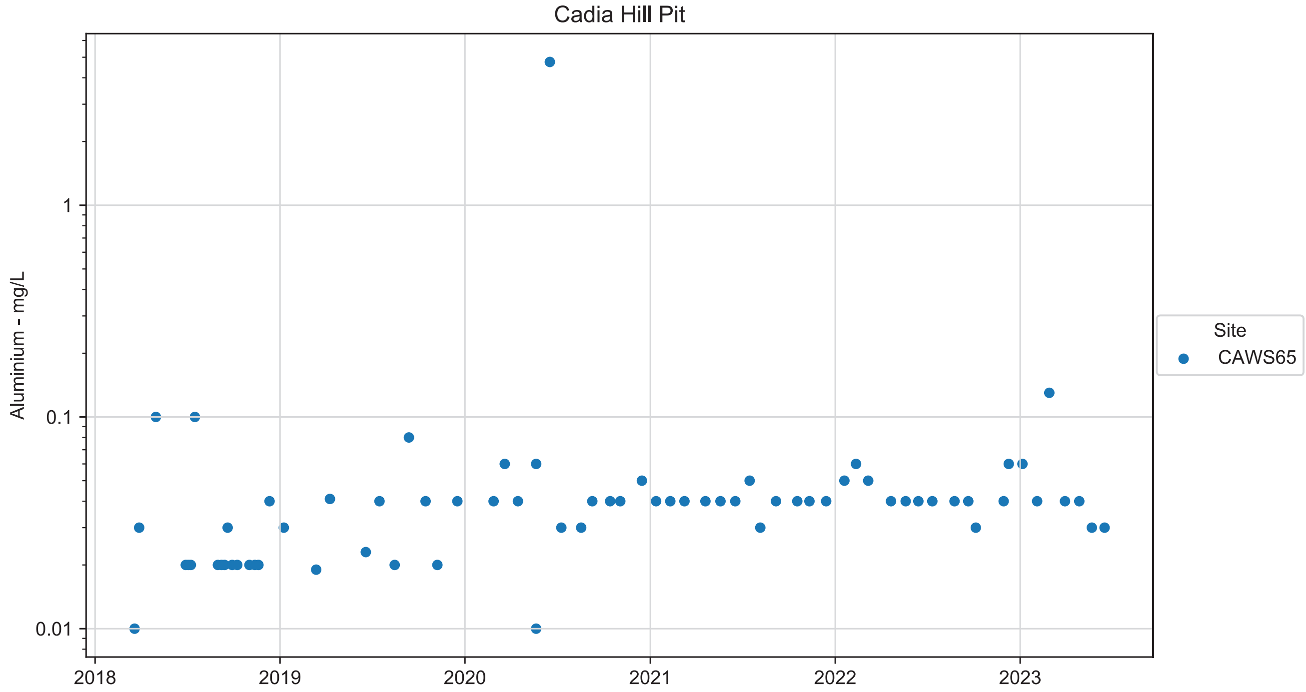

Cadia Hill Pit
Potassium - mg/L
0
20
40
60
80
100
120
2018
2019
2020
2021
2022
2023
Site
CAWS65

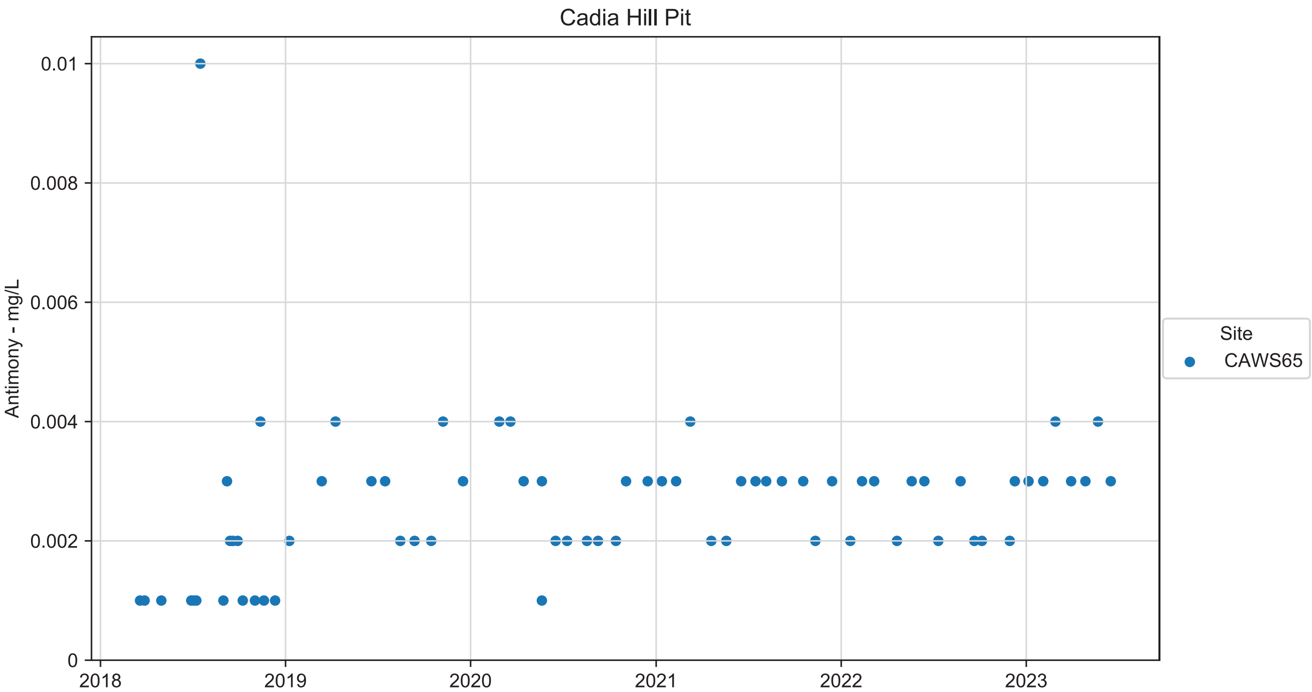

Cadia Hill Pit
Sodium - mg/L
0
100
200
300
400
500
2018
2019
2020
2021
2022
2023
Site
CAWS65

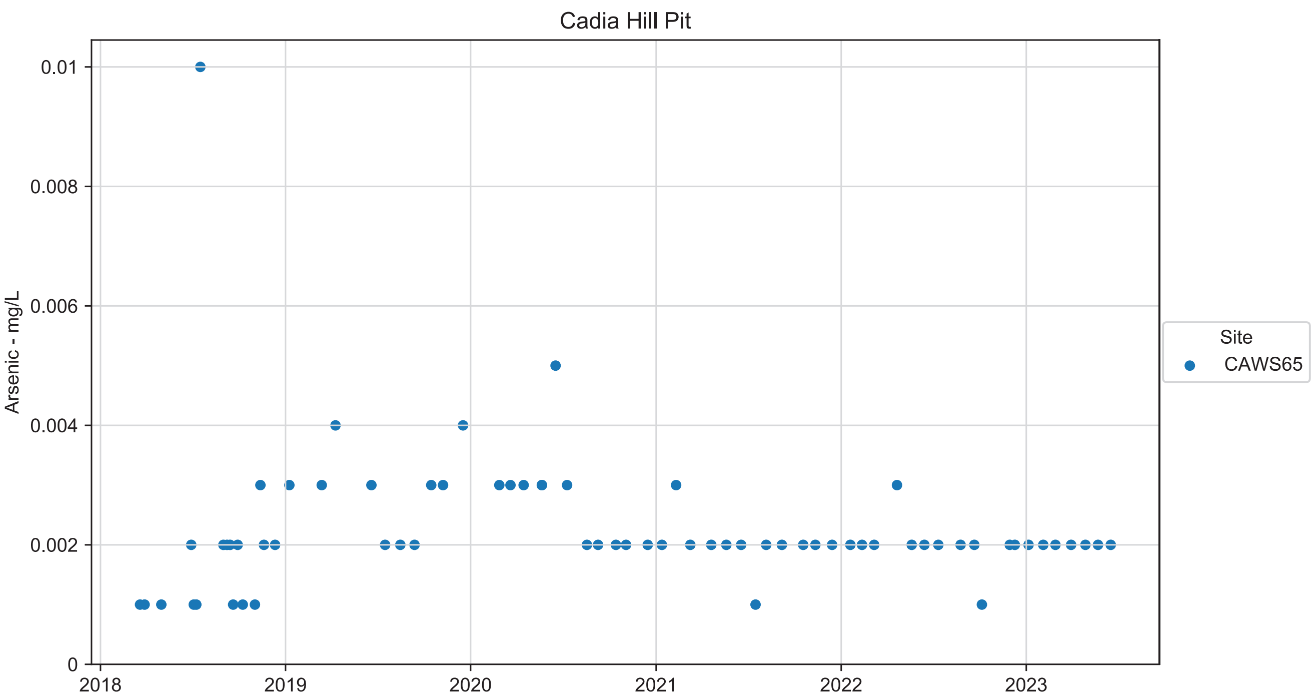

Cadia Hill Pit
Sulfate - mg/L
0
500
1000
1500
2000
2018
2019
2020
2021
2022
2023
Site
CAWS65

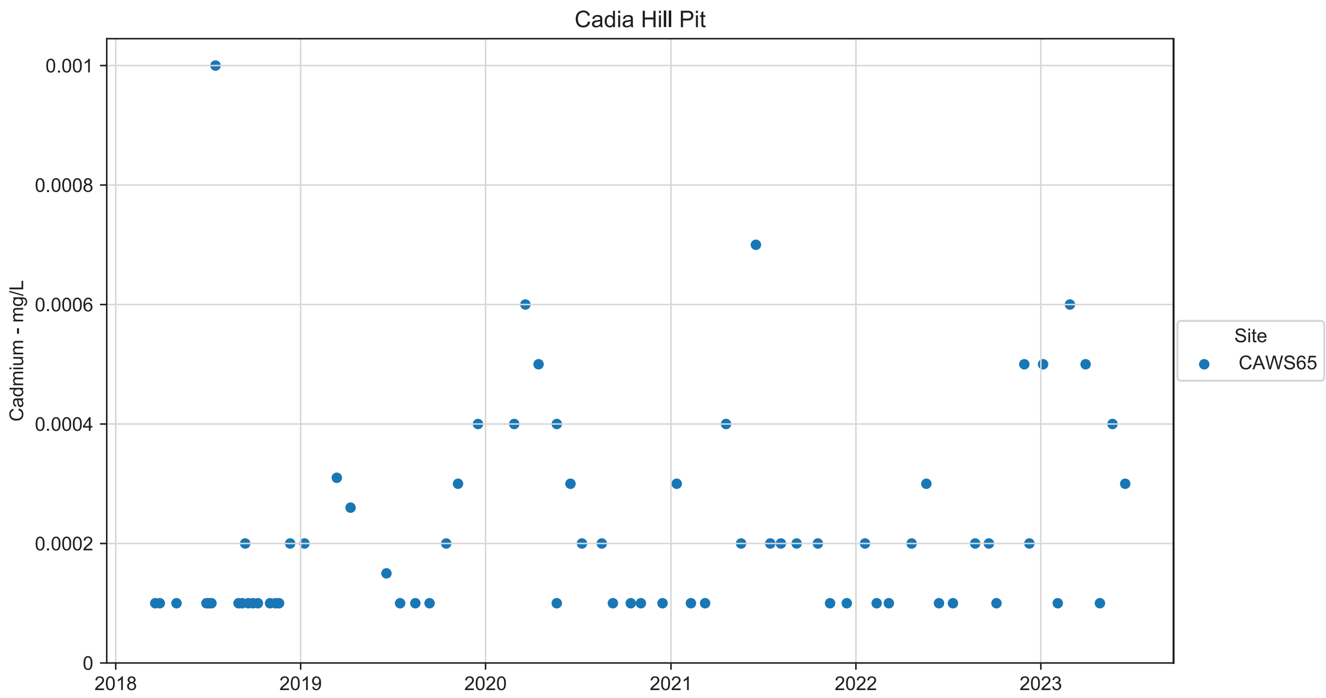

Cadia Hill Pit
Total Alkalinity as CaCO3 - mg/L
100
1000
10000
2018
2019
2020
2021
2022
2023
Site
CAWS65

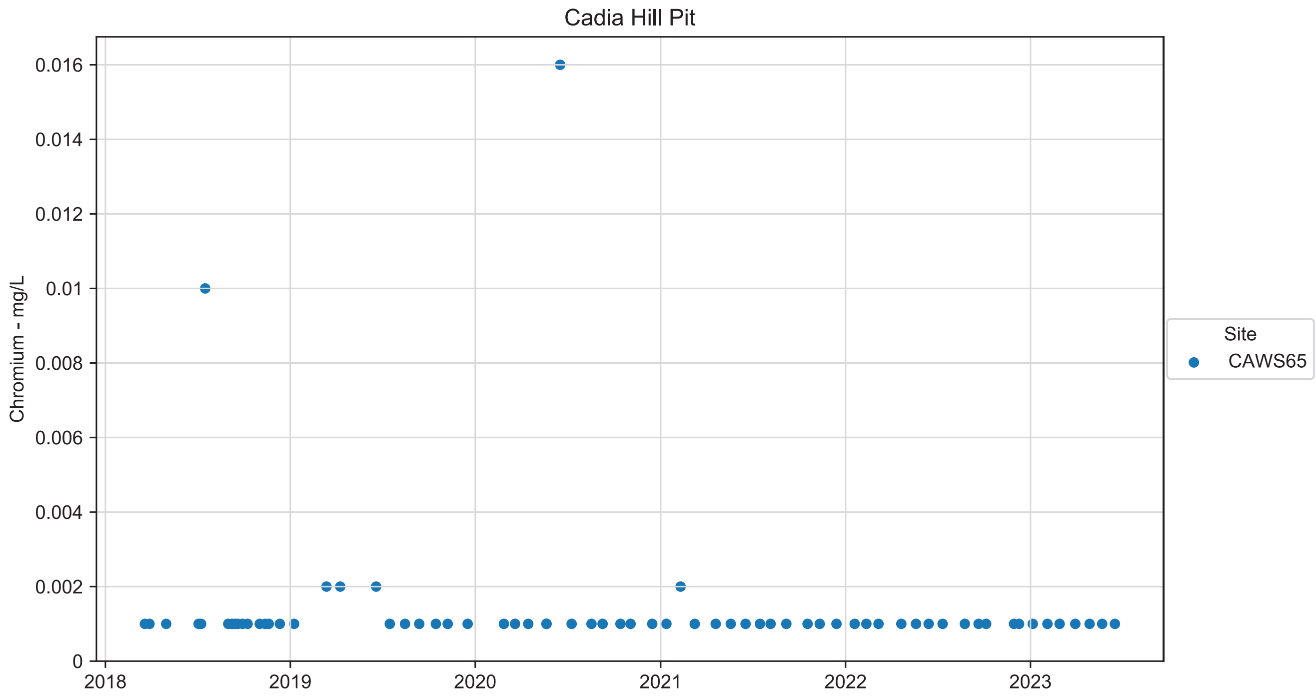

Cadia Hill Pit
Total Hardness as CaCO3 - mg/L
0
200
400
600
800
1000
2018
2019
2020
2021
2022
2023
Site
CAWS65

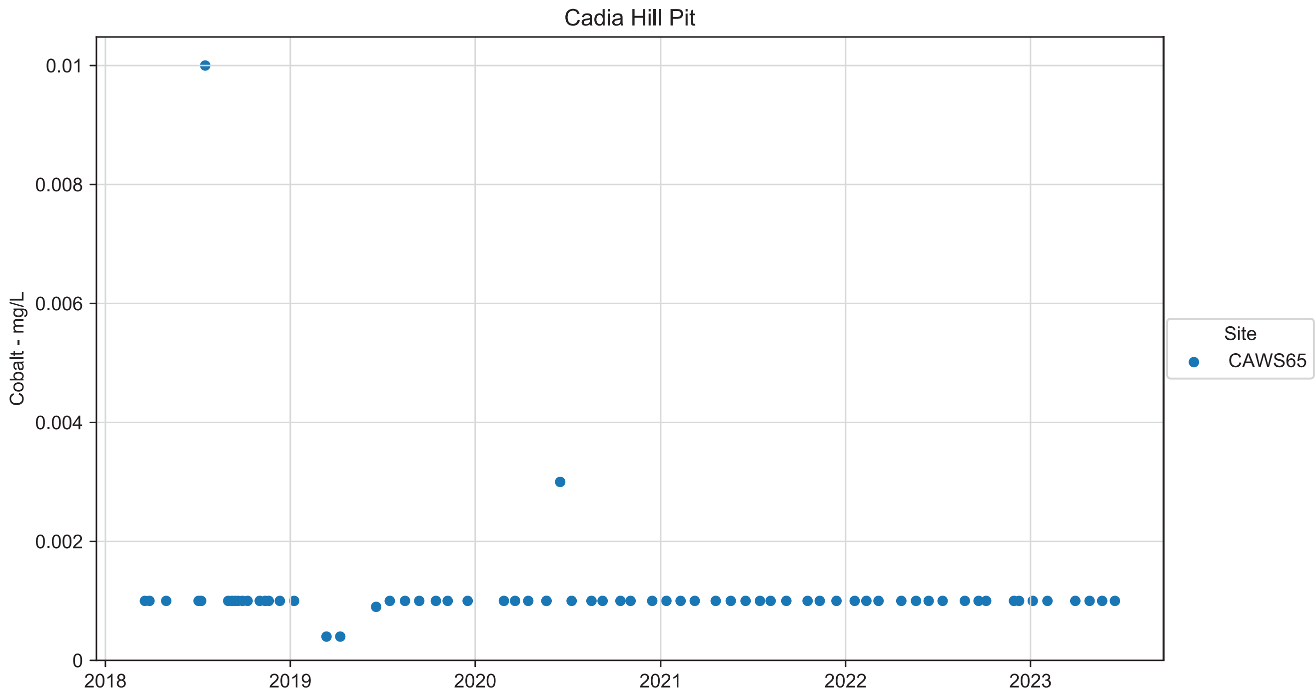

Cadia Hill Pit
Aluminium - mg/L
1
0.1
0.01
2018
2019
2020
2021
2022
2023
Site
CAWS65

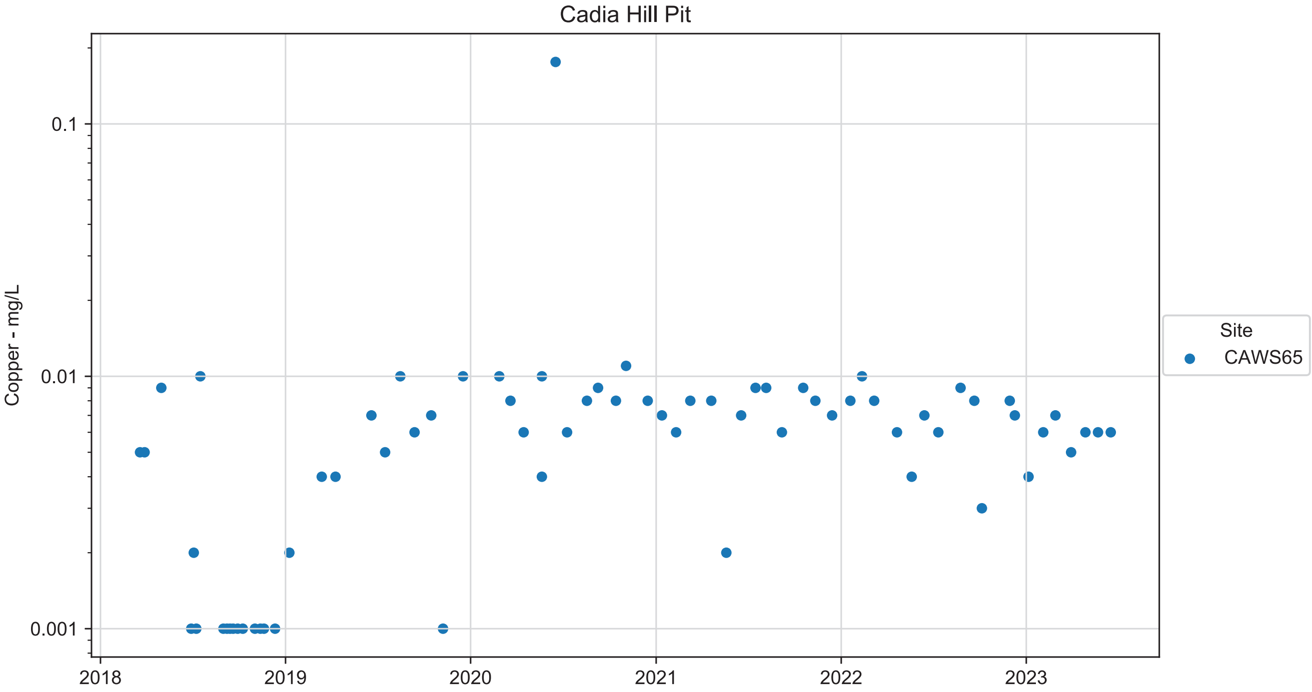

Cadia Hill Pit
Antimony - mg/L
0.01
0.008
0.006
0.004
0.002
0
2018
2019
2020
2021
2022
2023
Site
CAWS65

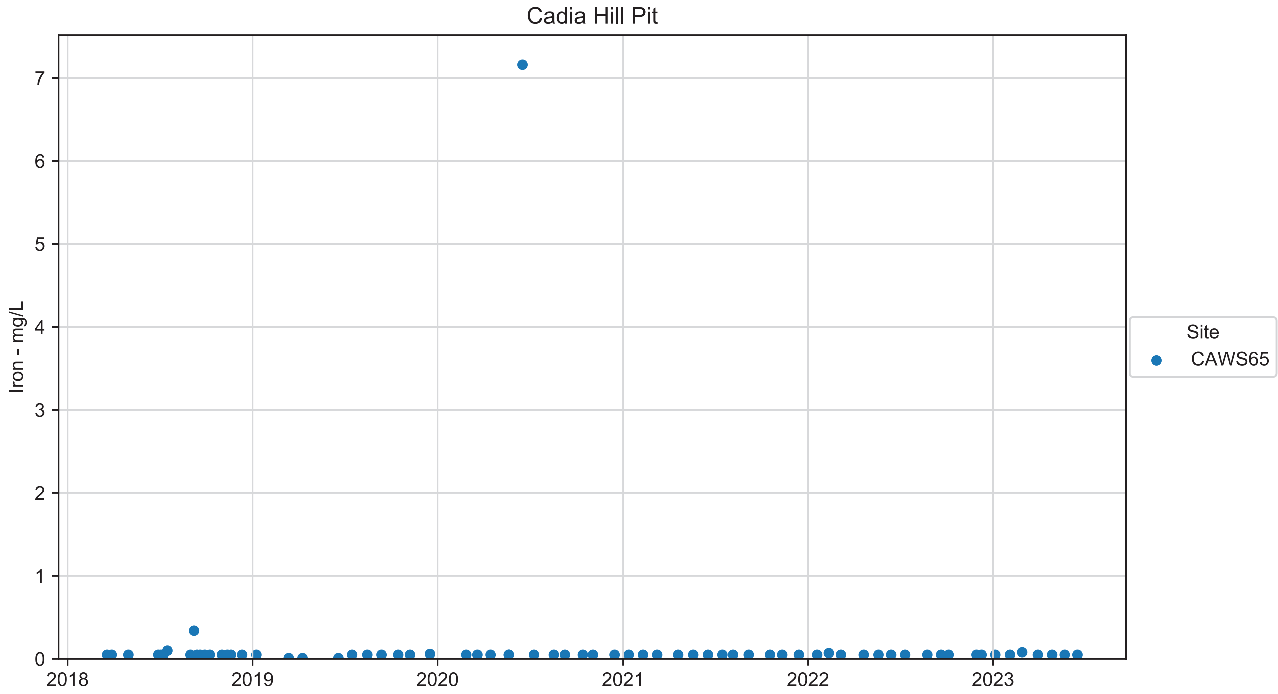

Cadia Hill Pit
Arsenic - mg/L
0.01
0.008
0.006
0.004
0.002
0
2018
2019
2020
2021
2022
2023
Site
CAWS65

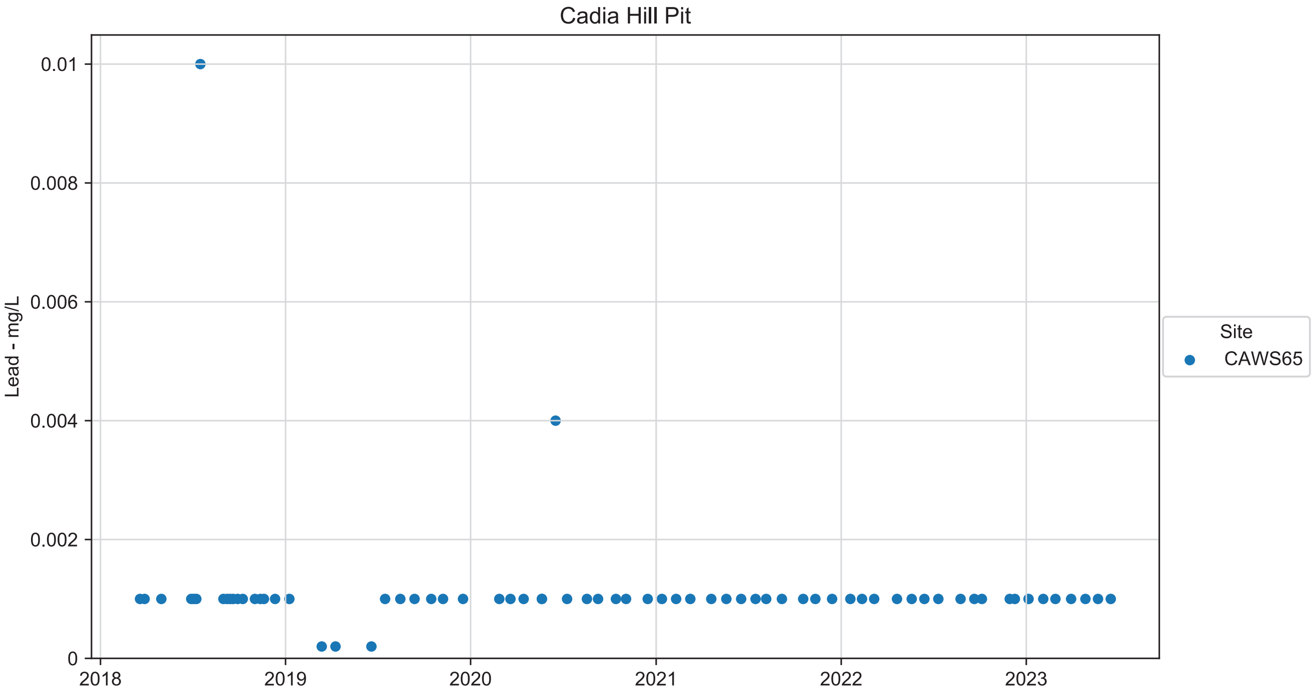

Cadia Hill Pit
Cadmium - mg/L
0.001
0.0008
0.0006
0.0004
0.0002
0
2018
2019
2020
2021
2022
2023
Site
CAWS65

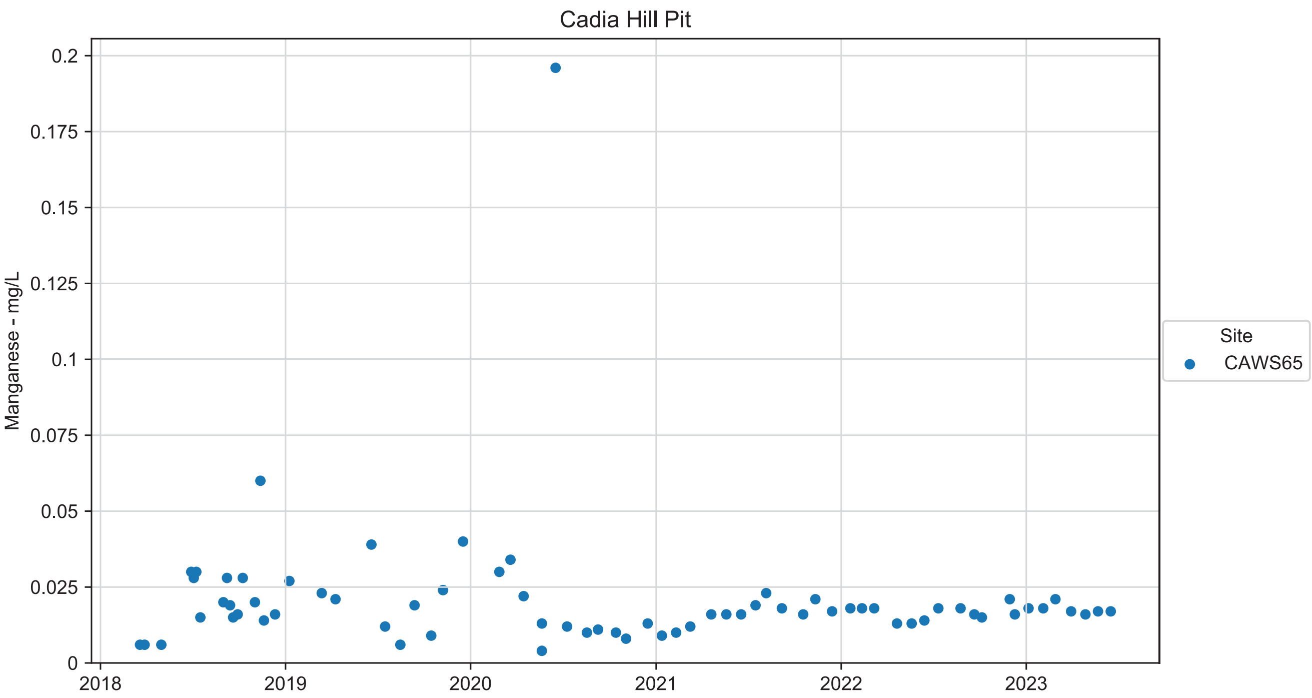

Cadia Hill Pit
Chromium - mg/L
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
2018
2019
2020
2021
2022
2023
Site
CAWS65

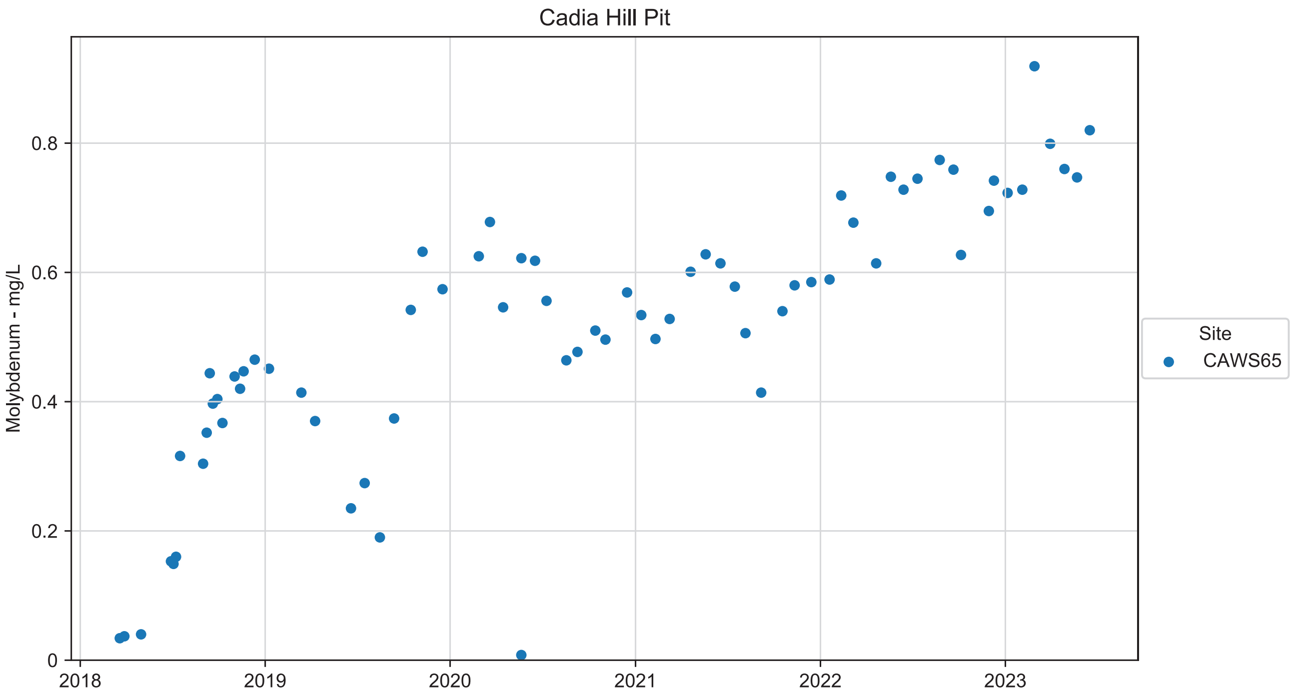

Cadia Hill Pit
Cobalt - mg/L
0.01
0.008
0.006
0.004
0.002
0
2018
2019
2020
2021
2022
2023
Site
CAWS65

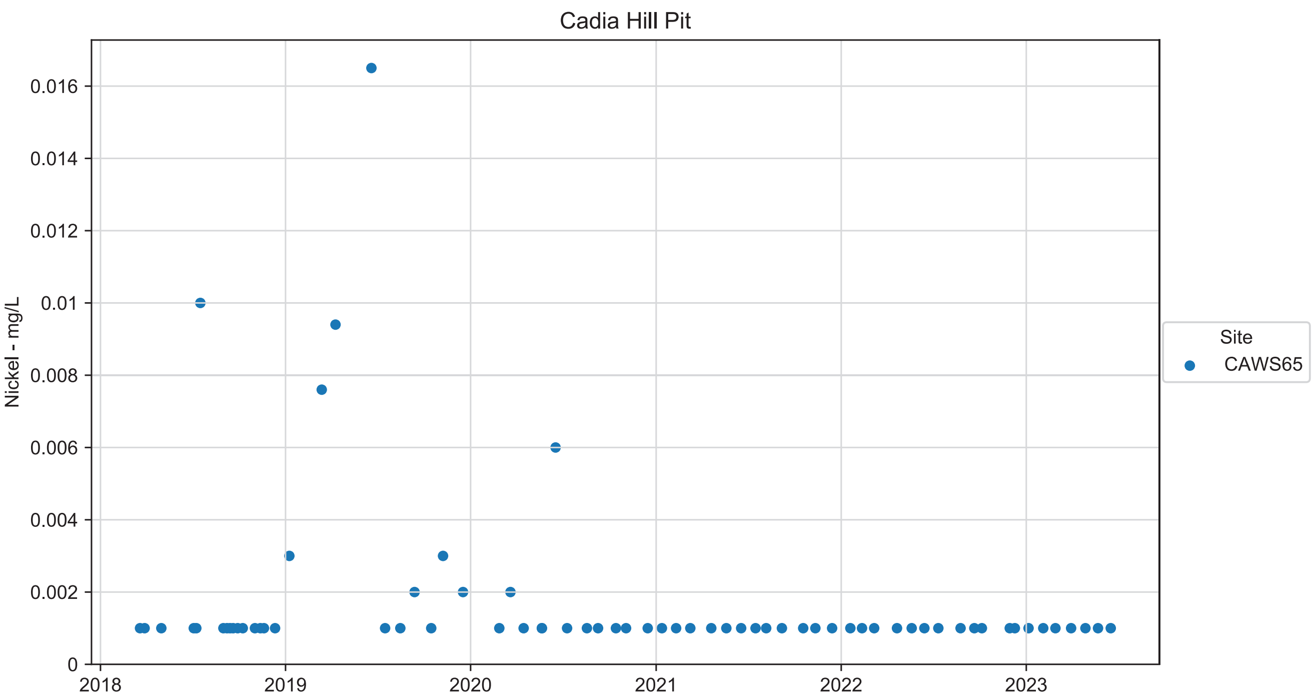

Cadia Hill Pit
Copper - mg/L
0.1
0.01
0.001
2018
2019
2020
2021
2022
2023
Site
CAWS65

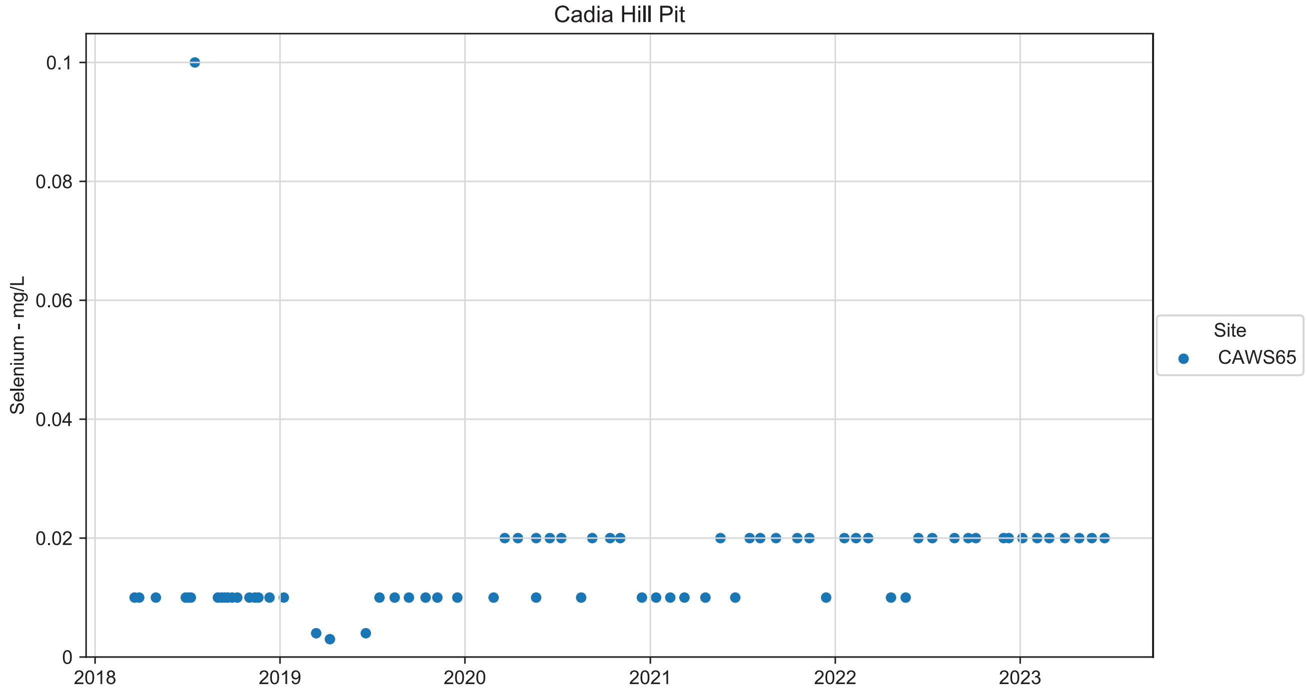

Cadia Hill Pit
Iron - mg/L
7
6
5
4
3
2
1
0
2018
2019
2020
2021
2022
2023
Site
CAWS65

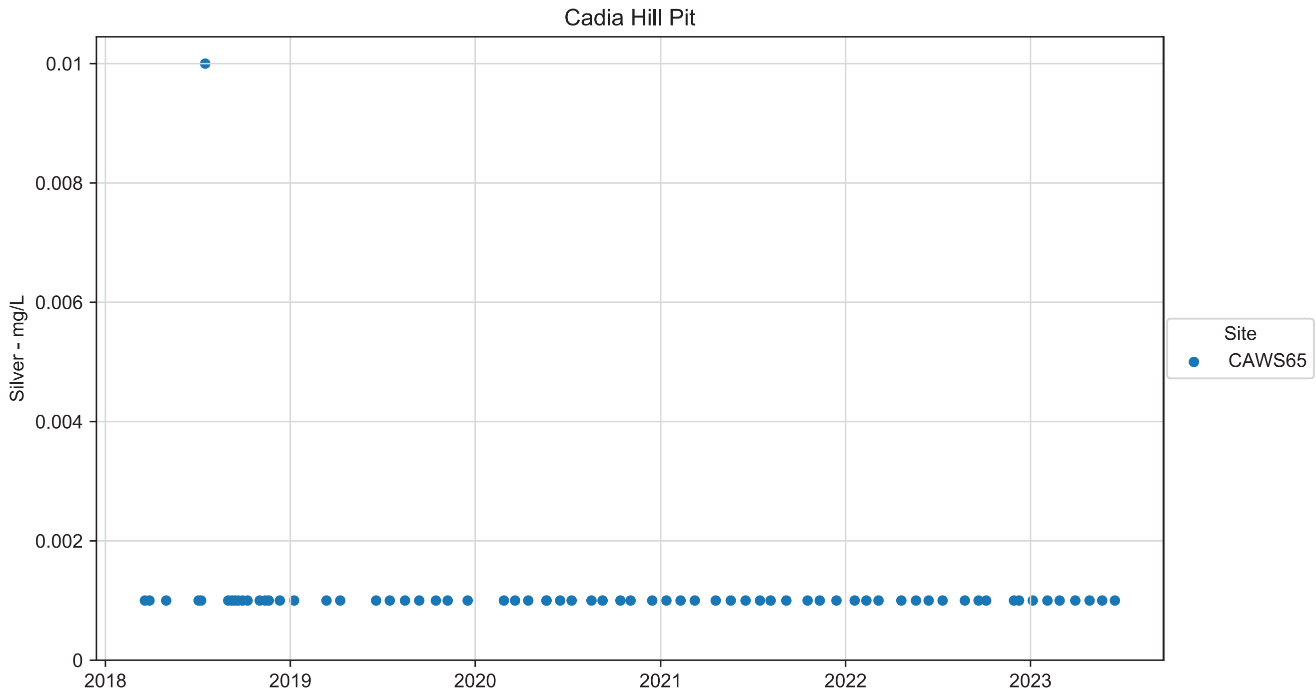

Cadia Hill Pit
Lead - mg/L
0.01
0.008
0.006
0.004
0.002
0
2018
2019
2020
2021
2022
2023
Site
CAWS65

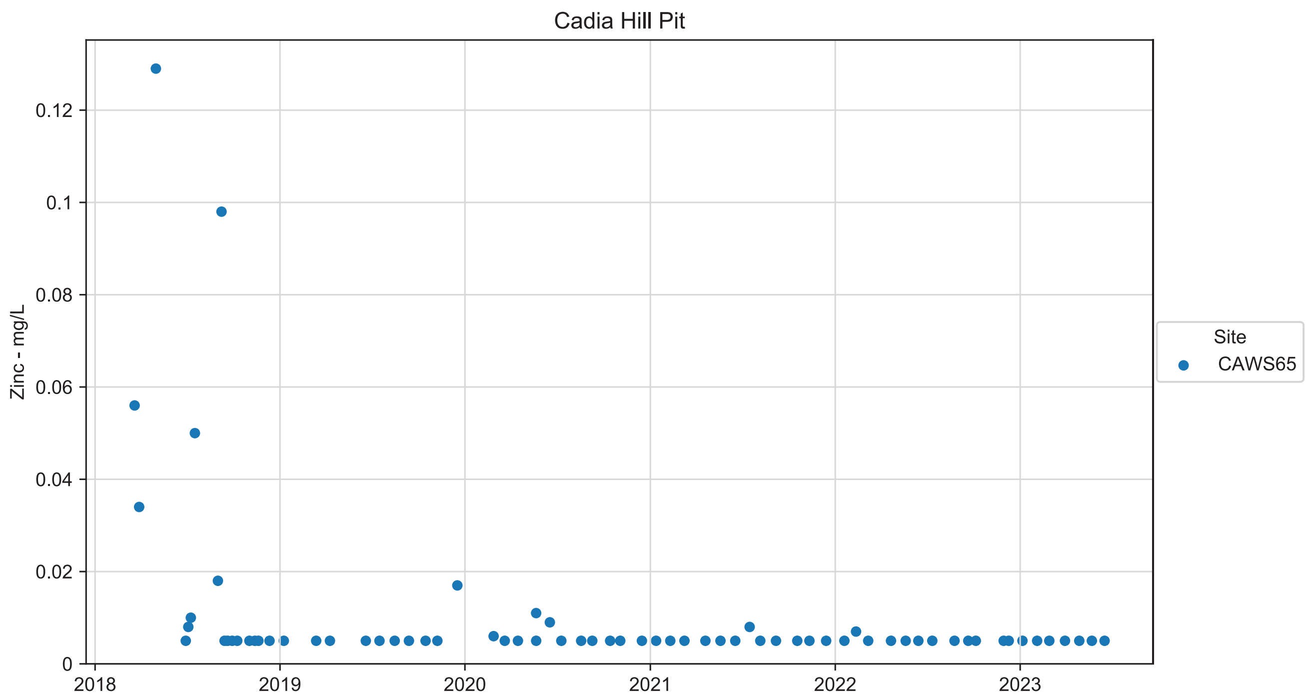

Cadia Hill Pit
Manganese - mg/L
0
0.025
0.05
0.075
0.1
0.125
0.15
0.175
0.2
2018
2019
2020
2021
2022
2023
Site
CAWS65

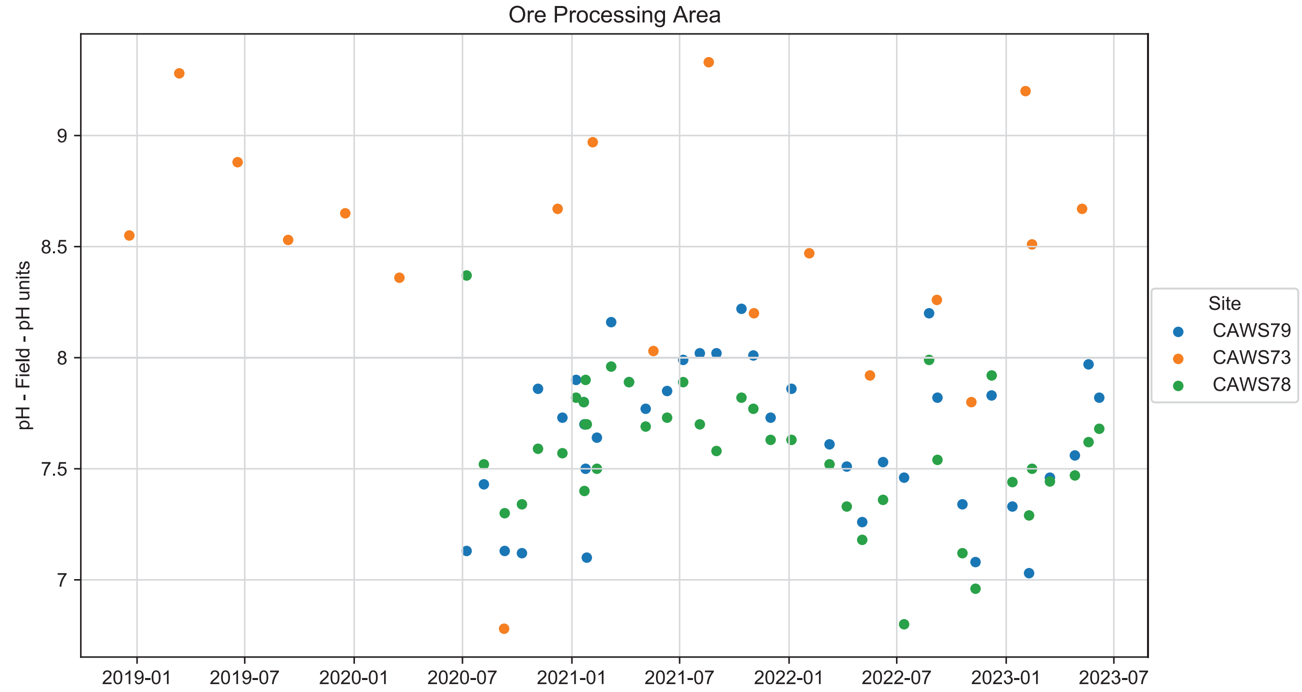

Cadia Hill Pit
Molybdenum - mg/L
0
0.2
0.4
0.6
0.8
2018
2019
2020
2021
2022
2023
Site
CAWS65


Cadia Hill Pit
Nickel - mg/L
0
0.002
0.004
0.006
0.008
0.01
0.012
0.014
0.016
2018
2019
2020
2021
2022
2023
Site
CAWS65

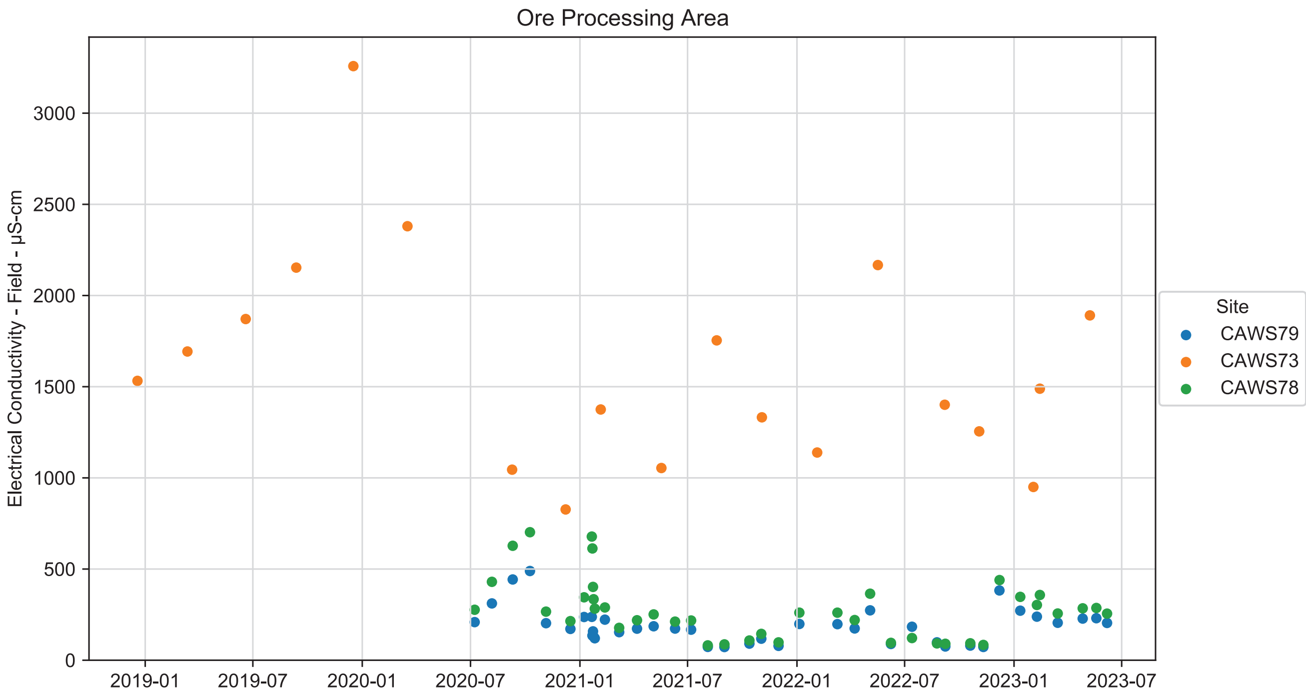

Cadia Hill Pit
Selenium - mg/L
0.1
0.08
0.06
0.04
0.02
0
2018
2019
2020
2021
2022
2023
Site
CAWS65


Cadia Hill Pit
Silver - mg/L
0.01
0.008
0.006
0.004
0.002
0
2018
2019
2020
2021
2022
2023
Site
CAWS65

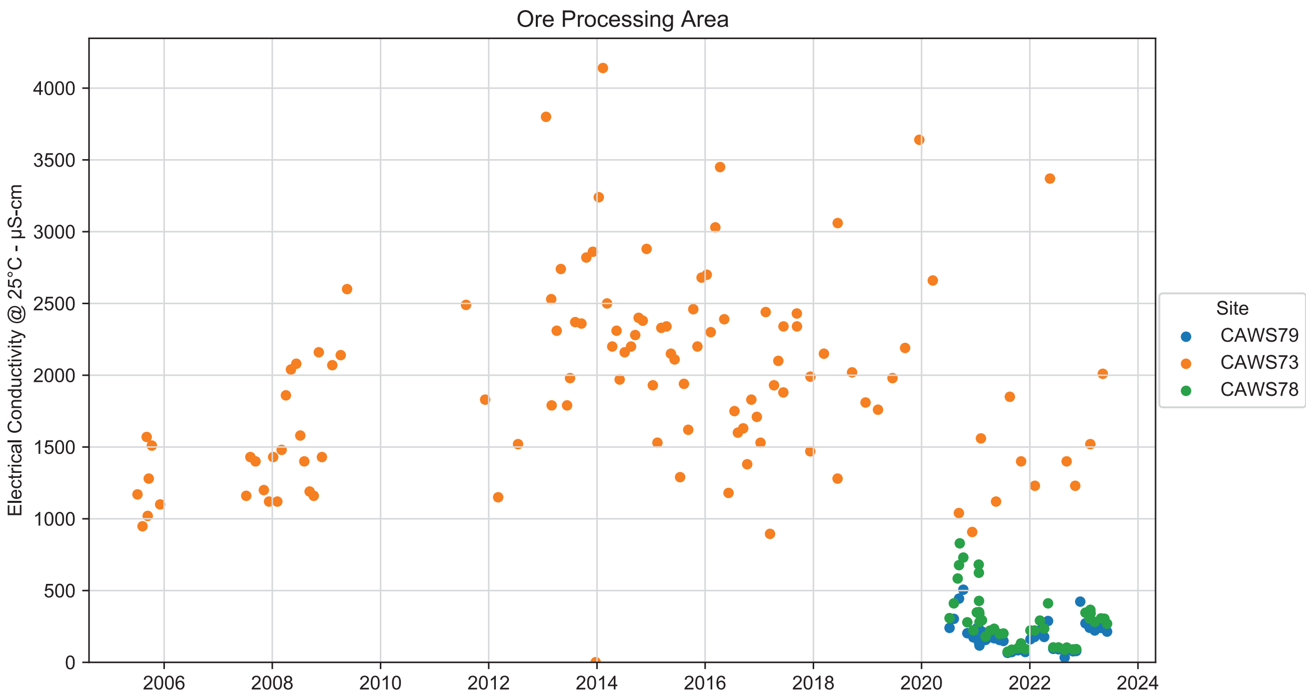

Cadia Hill Pit
Zinc - mg/L
0.12
0.1
0.08
0.06
0.04
0.02
0
2018
2019
2020
2021
2022
2023
Site
CAWS65



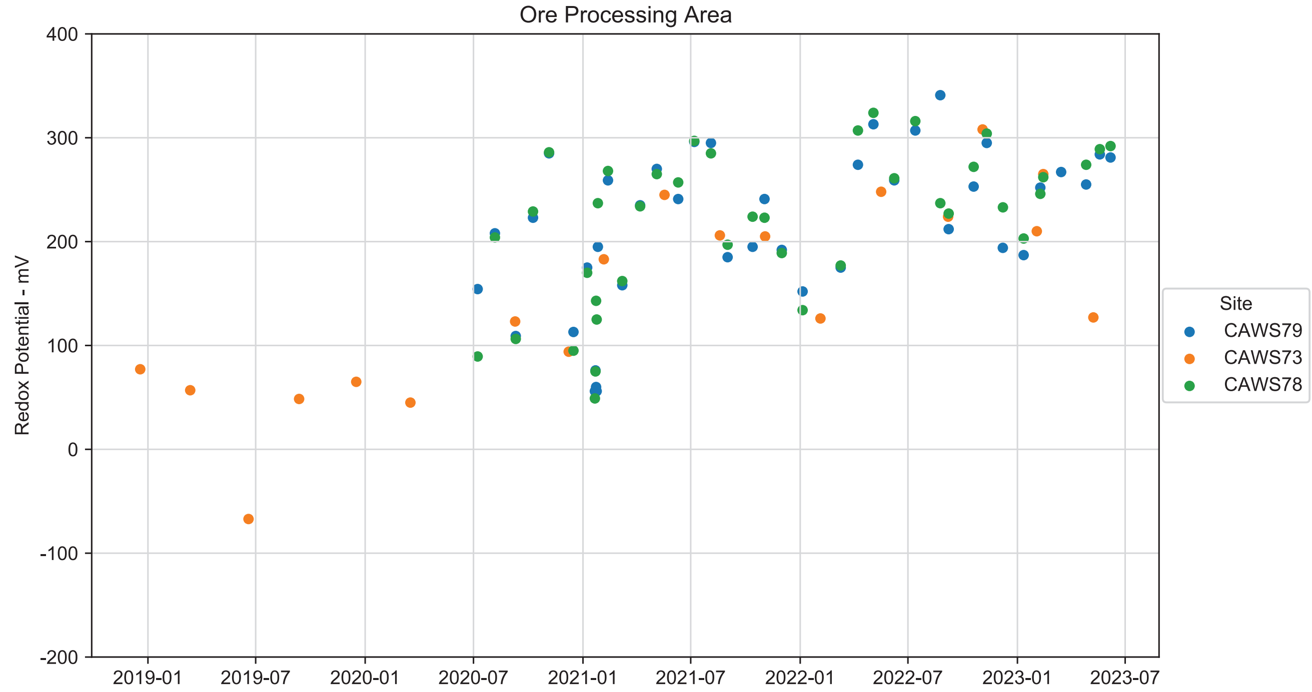
Ore Processing Area
pH - Field - pH units
9
8.5
8
7.5
7
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS79
CAWS73
CAWS78

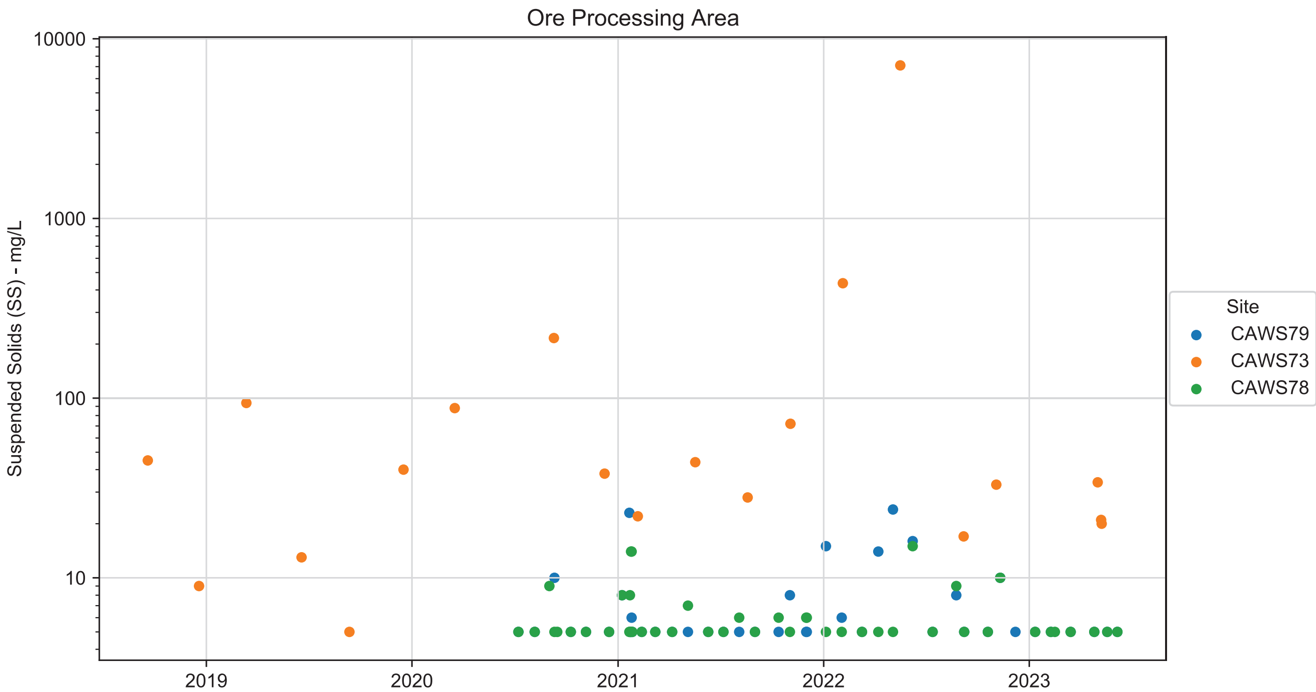


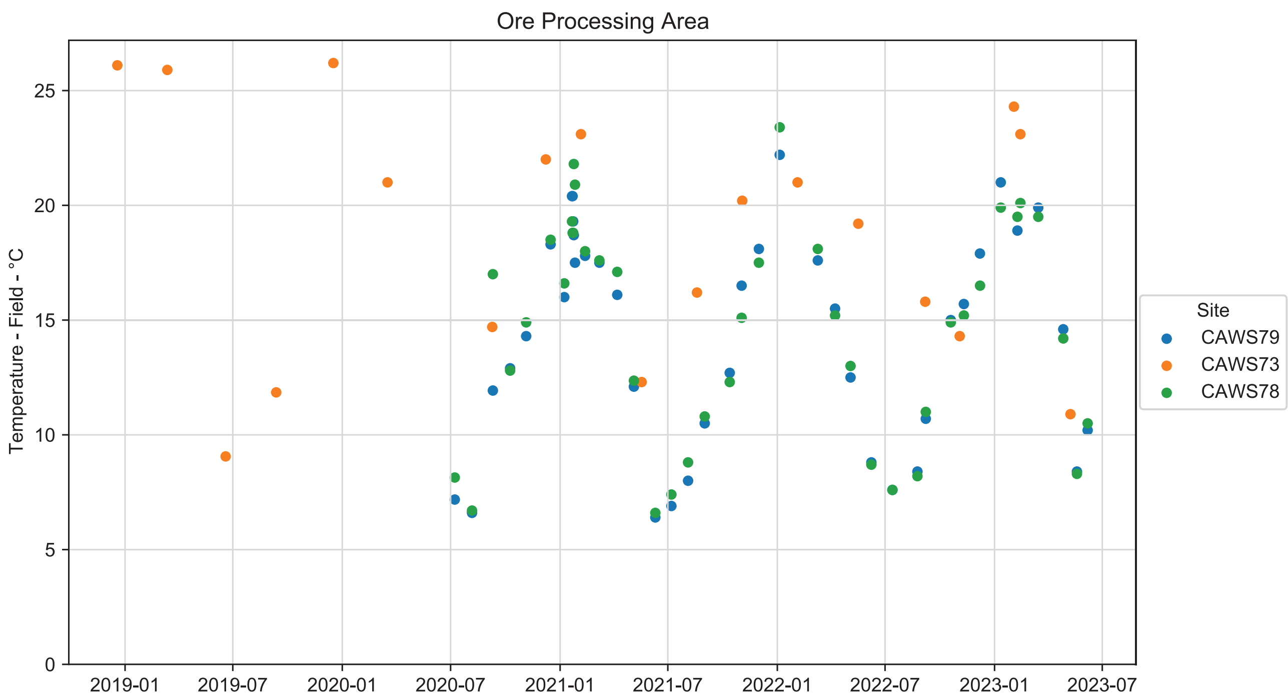
Ore Processing Area
Electrical Conductivity - Field - µS-cm
3000
2500
2000
1500
1000
500
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS79
CAWS73
CAWS78

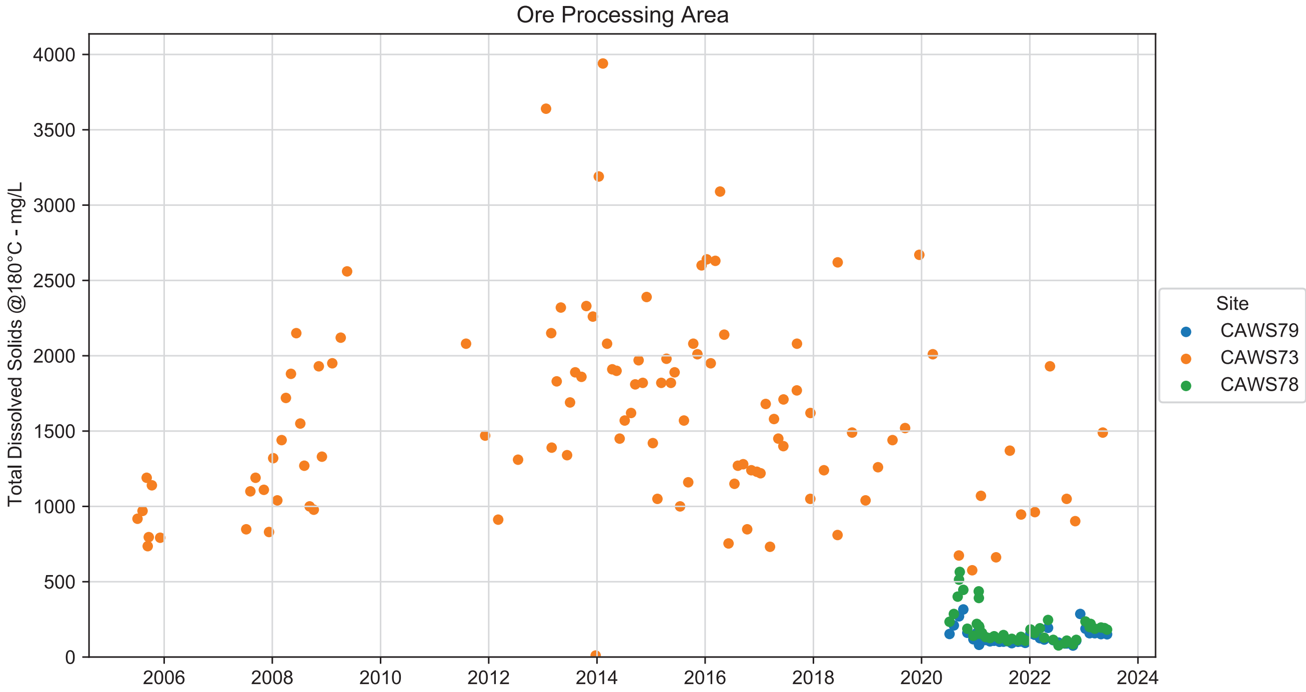


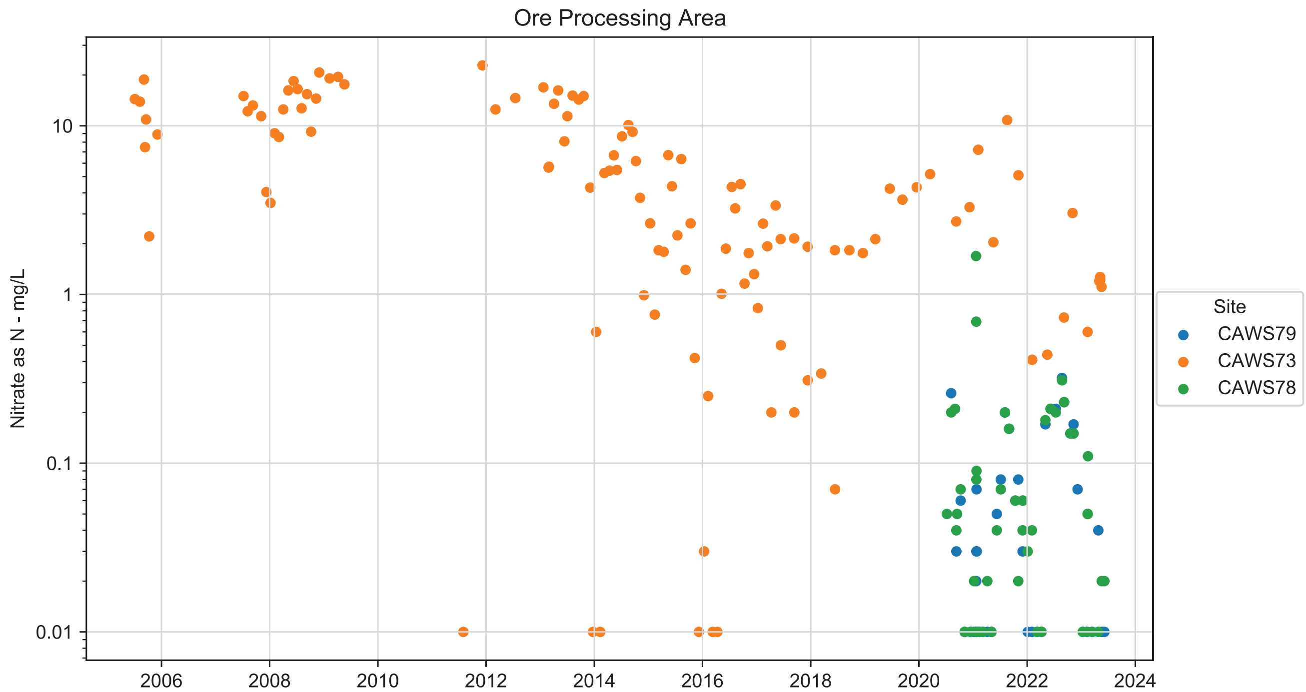
Ore Processing Area
Electrical Conductivity @ 25°C - µS-cm
4000
3500
3000
2500
2000
1500
1000
500
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

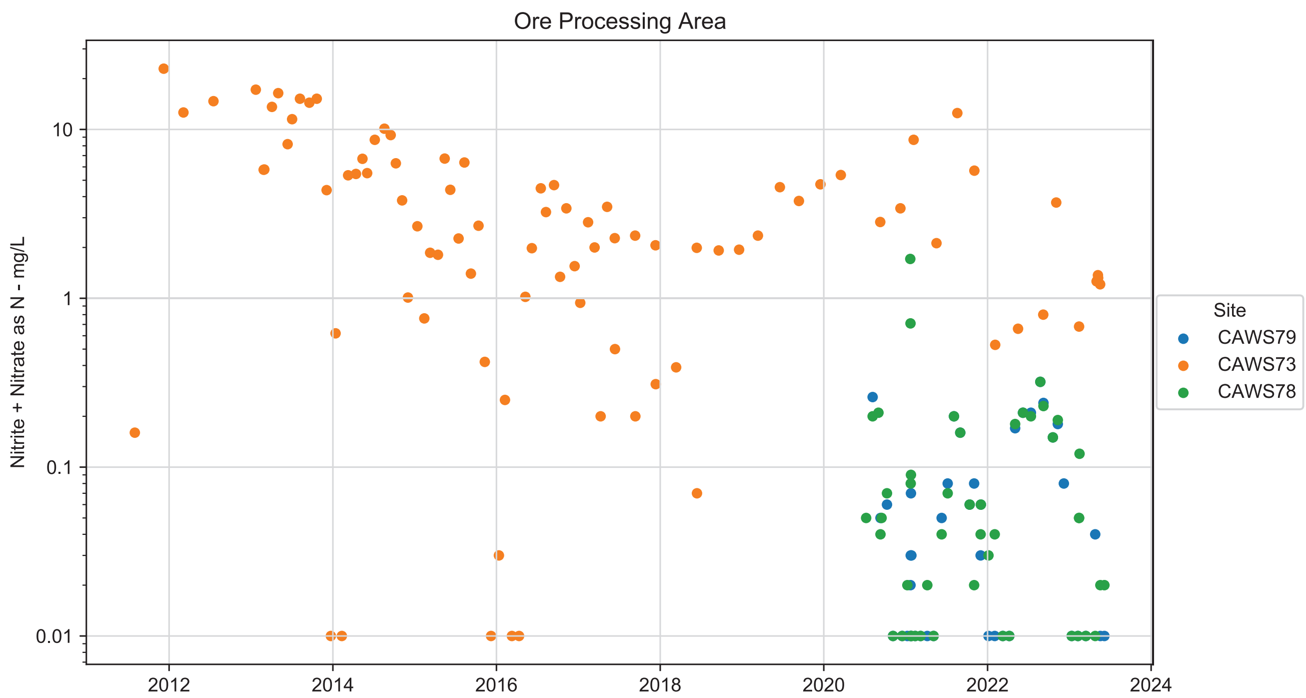

Ore Processing Area
Redox Potential - mV
400
300
200
100
0
-100
-200
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS79
CAWS73
CAWS78

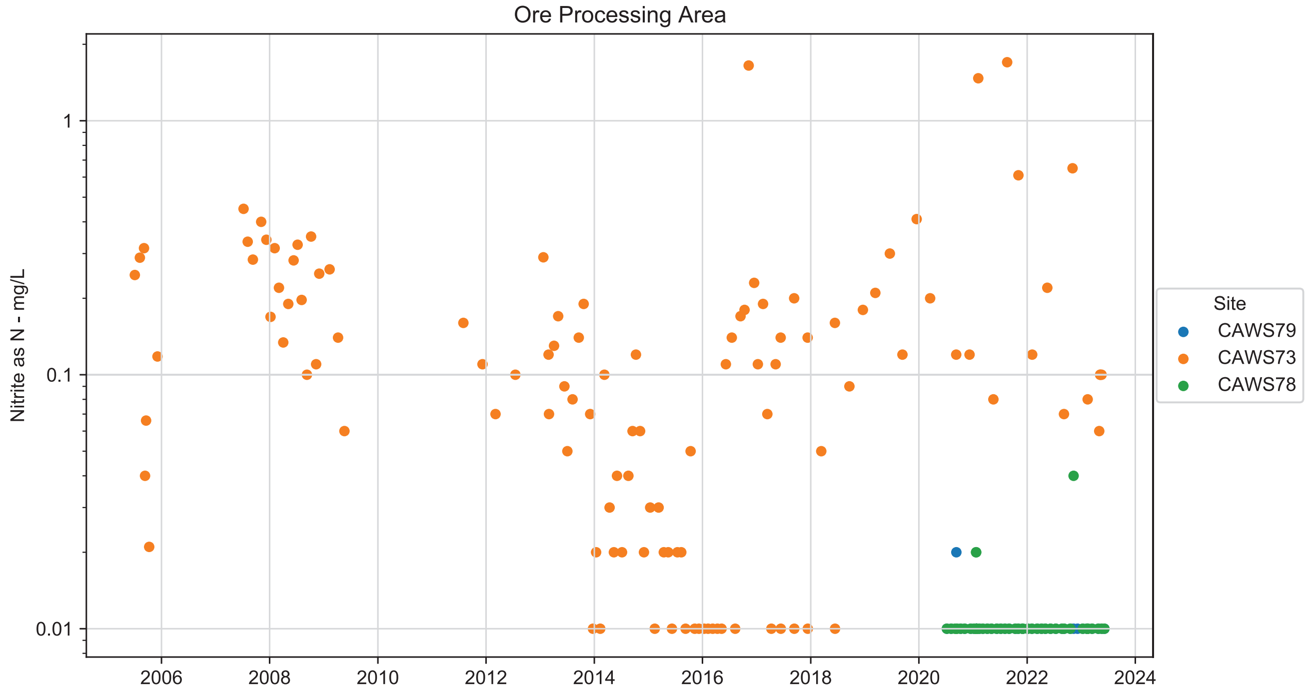

Ore Processing Area
Suspended Solids (SS) - mg/L
10000
1000
100
10
2019
2020
2021
2022
2023
Site
CAWS79
CAWS73
CAWS78

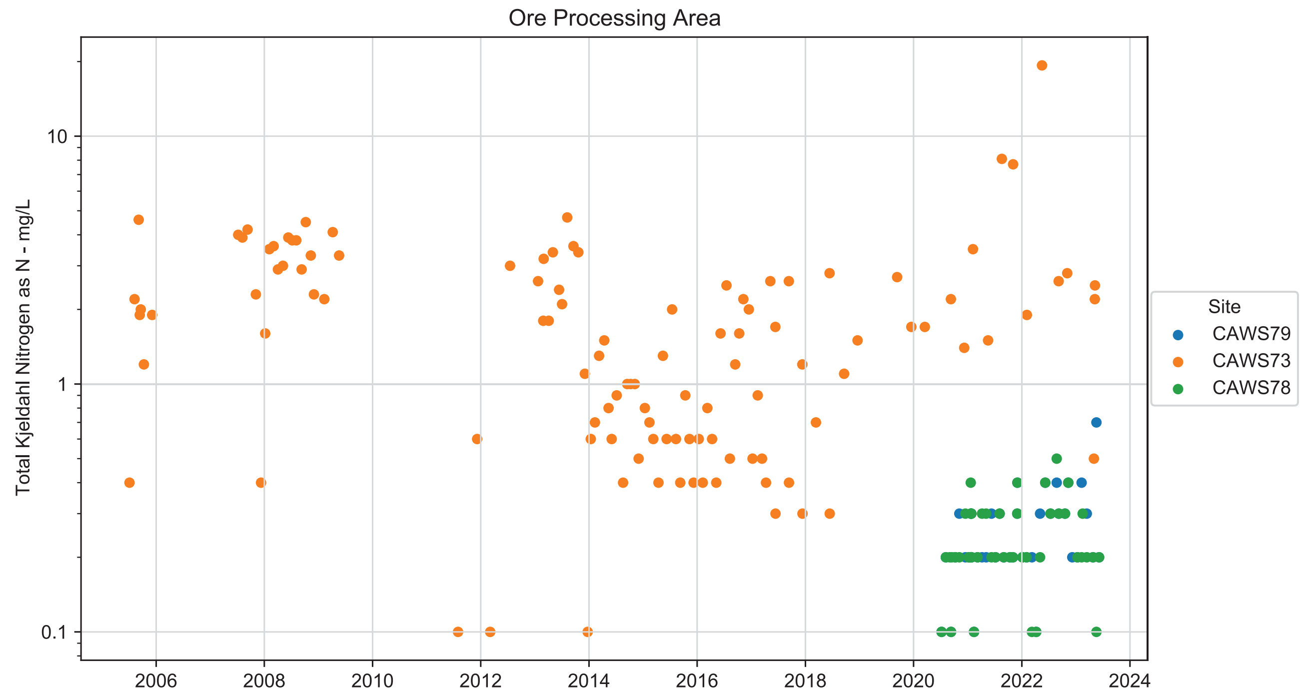

Ore Processing Area
Temperature - Field - °C
25
20
15
10
5
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS79
CAWS73
CAWS78

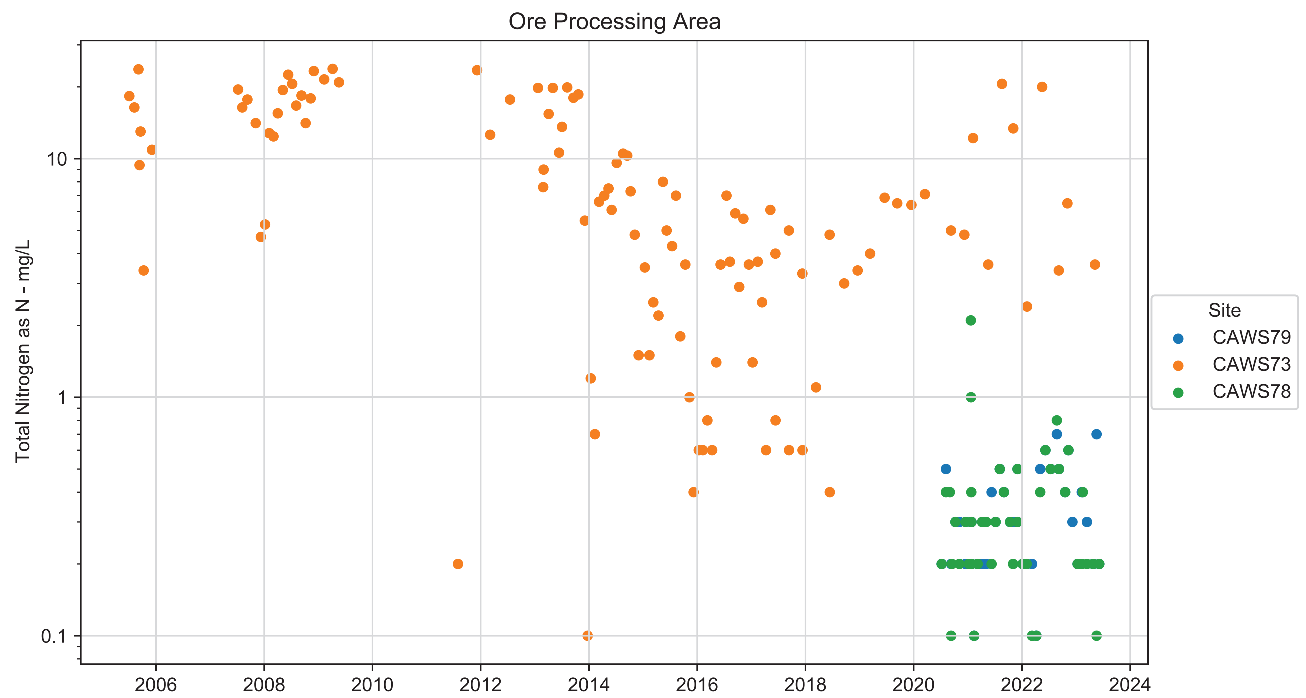

Ore Processing Area
Total Dissolved Solids @180°C - mg/L
0
500
1000
1500
2000
2500
3000
3500
4000
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

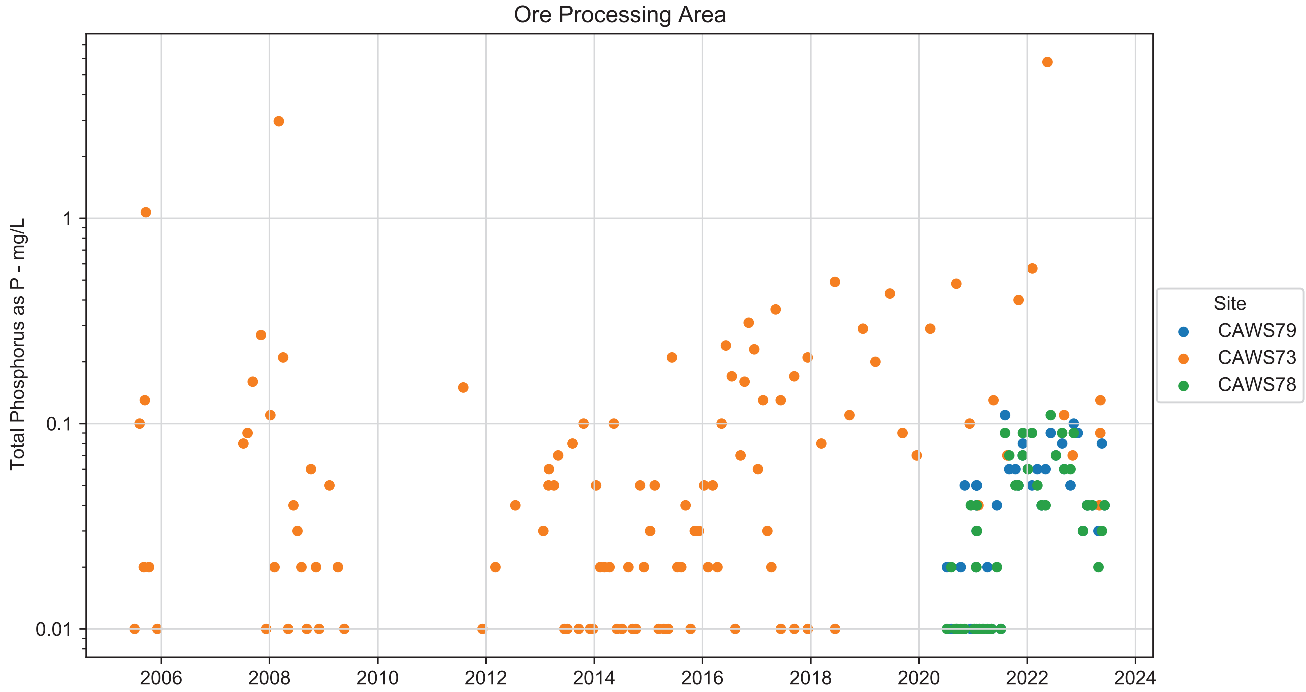

Ore Processing Area
Nitrate as N - mg/L
0.01
0.1
1
10
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78


Ore Processing Area
Nitrite + Nitrate as N - mg/L
0.01
0.1
1
10
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

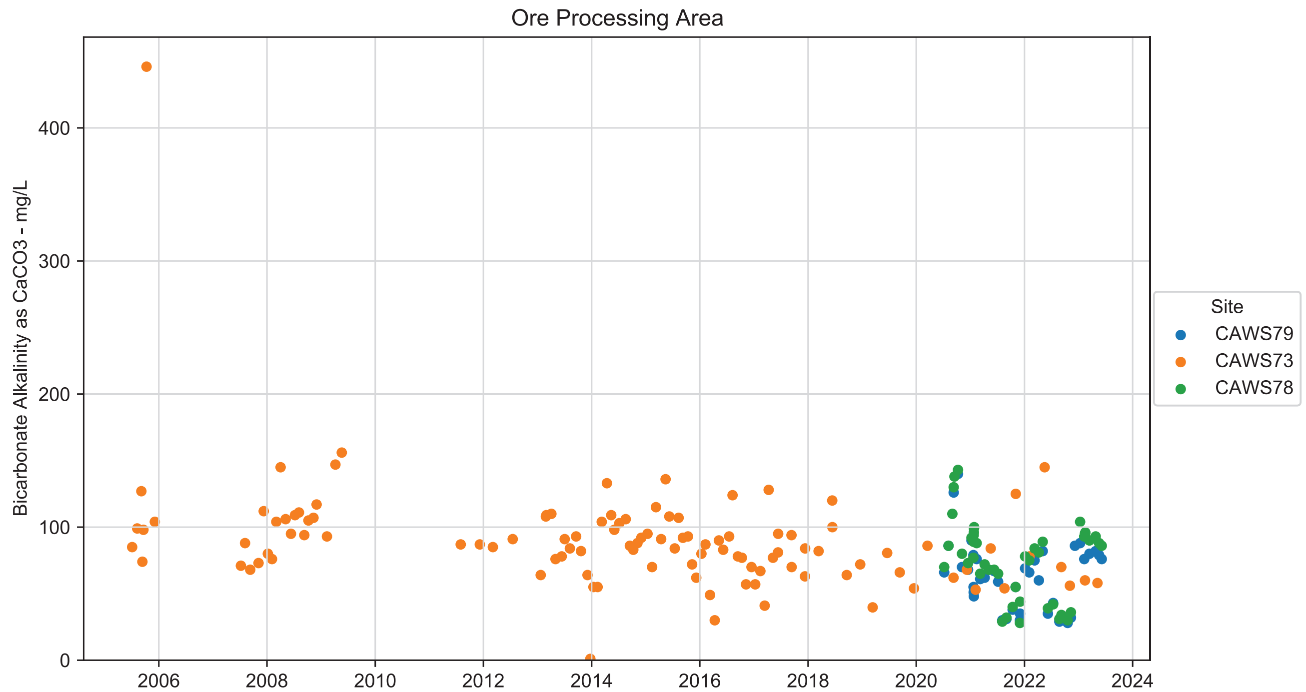

Ore Processing Area
Nitrite as N - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78


Ore Processing Area
Total Kjeldahl Nitrogen as N - mg/L
10
1
0.1
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

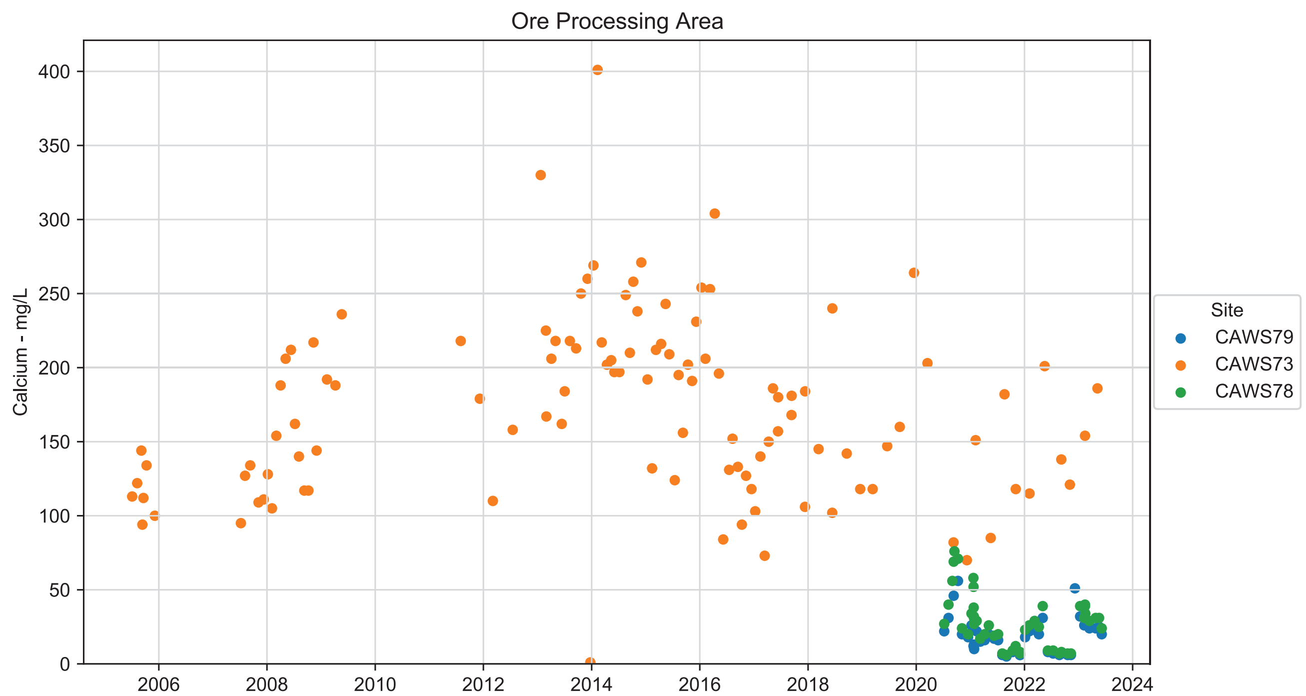

Ore Processing Area
Total Nitrogen as N - mg/L
10
1
0.1
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78



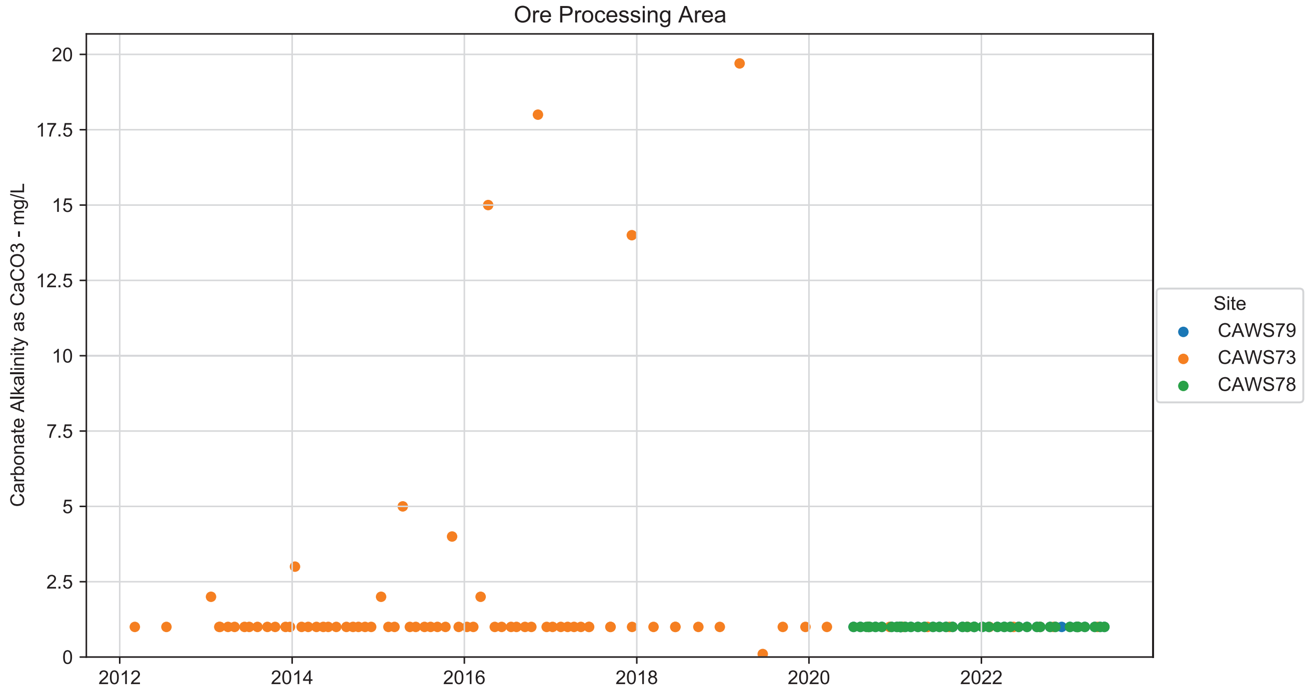
Ore Processing Area
Total Phosphorus as P - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78



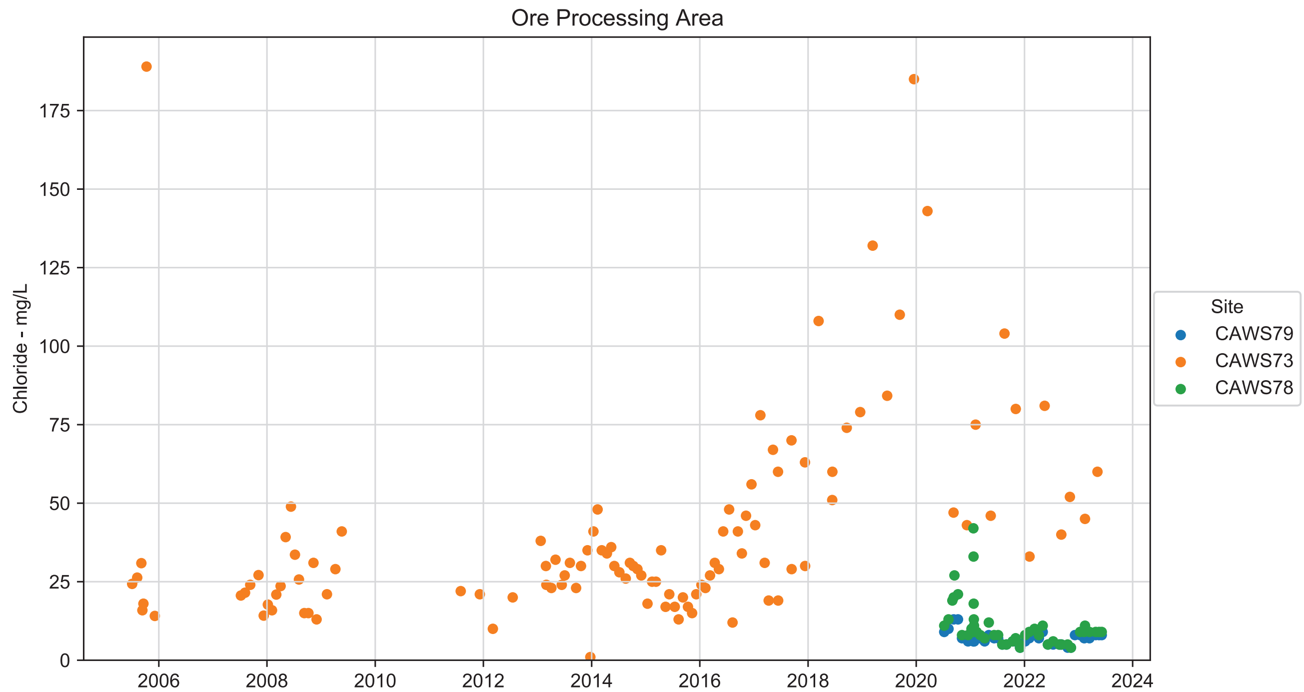
Ore Processing Area
Bicarbonate Alkalinity as CaCO3 - mg/L
0
100
200
300
400
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78



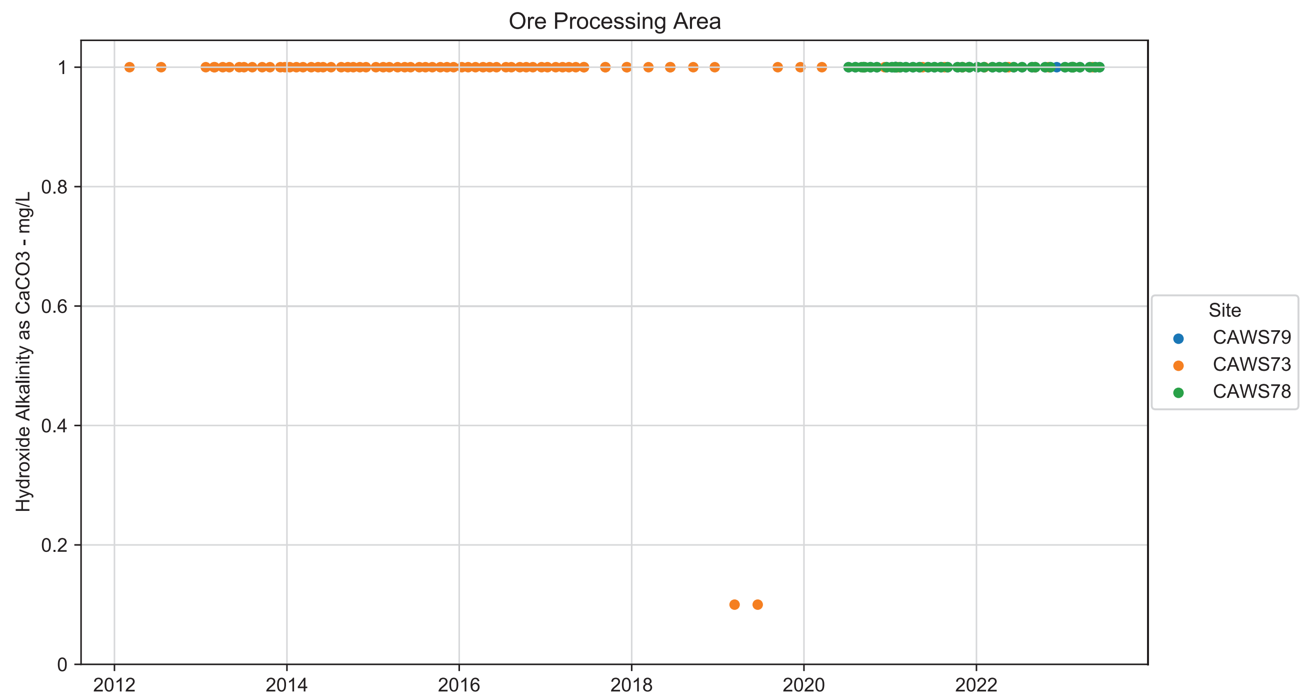
Ore Processing Area
Calcium - mg/L
0
50
100
150
200
250
300
350
400
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78



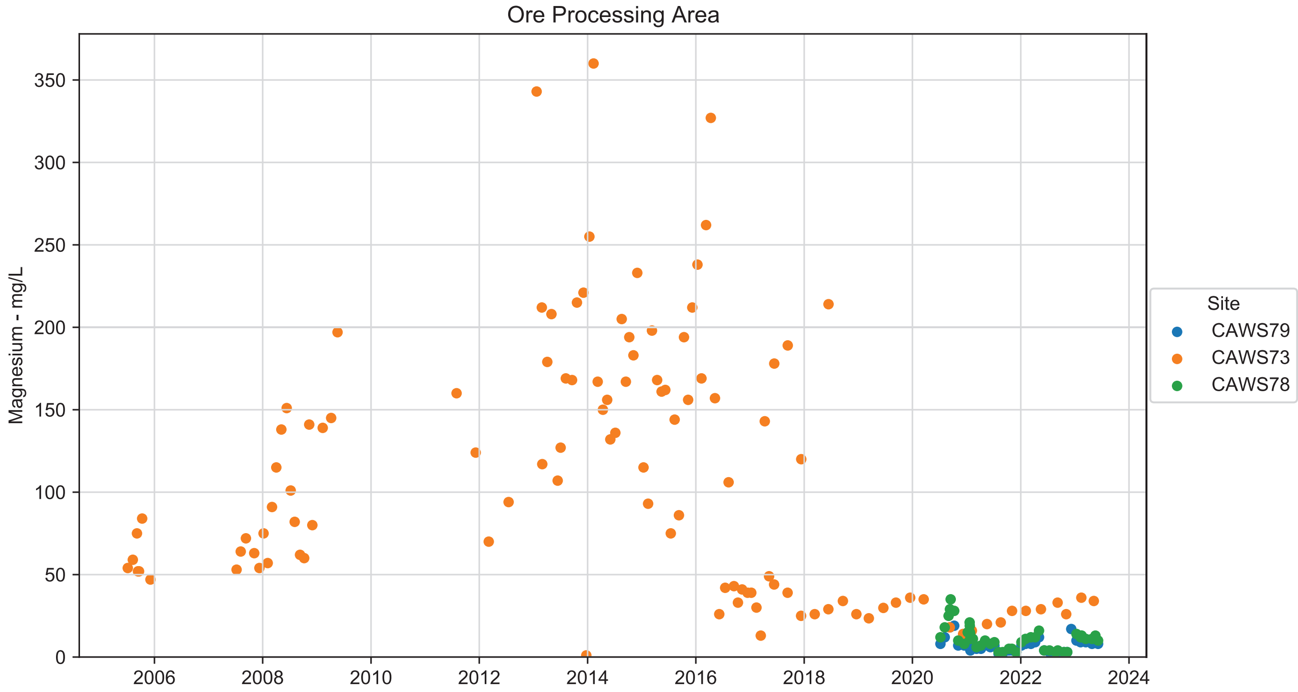
Ore Processing Area
Carbonate Alkalinity as CaCO3 - mg/L
0
2.5
5
7.5
10
12.5
15
17.5
20
2012
2014
2016
2018
2020
2022
Site
CAWS79
CAWS73
CAWS78

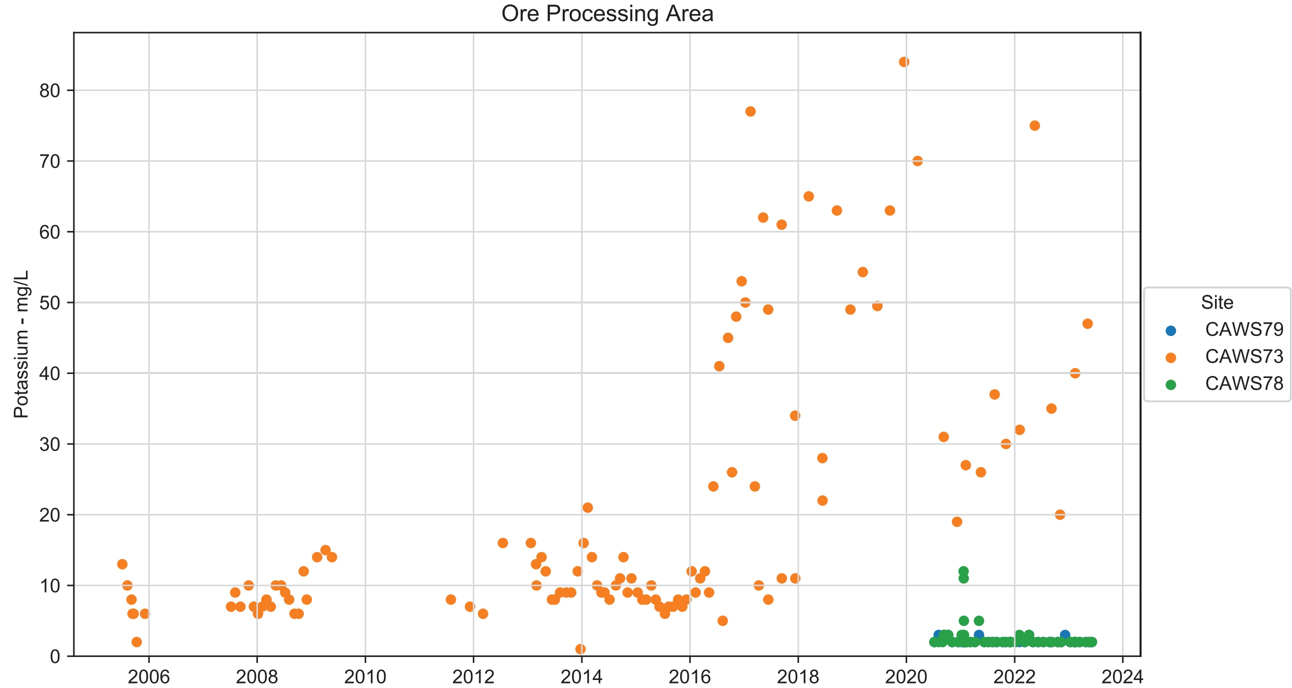


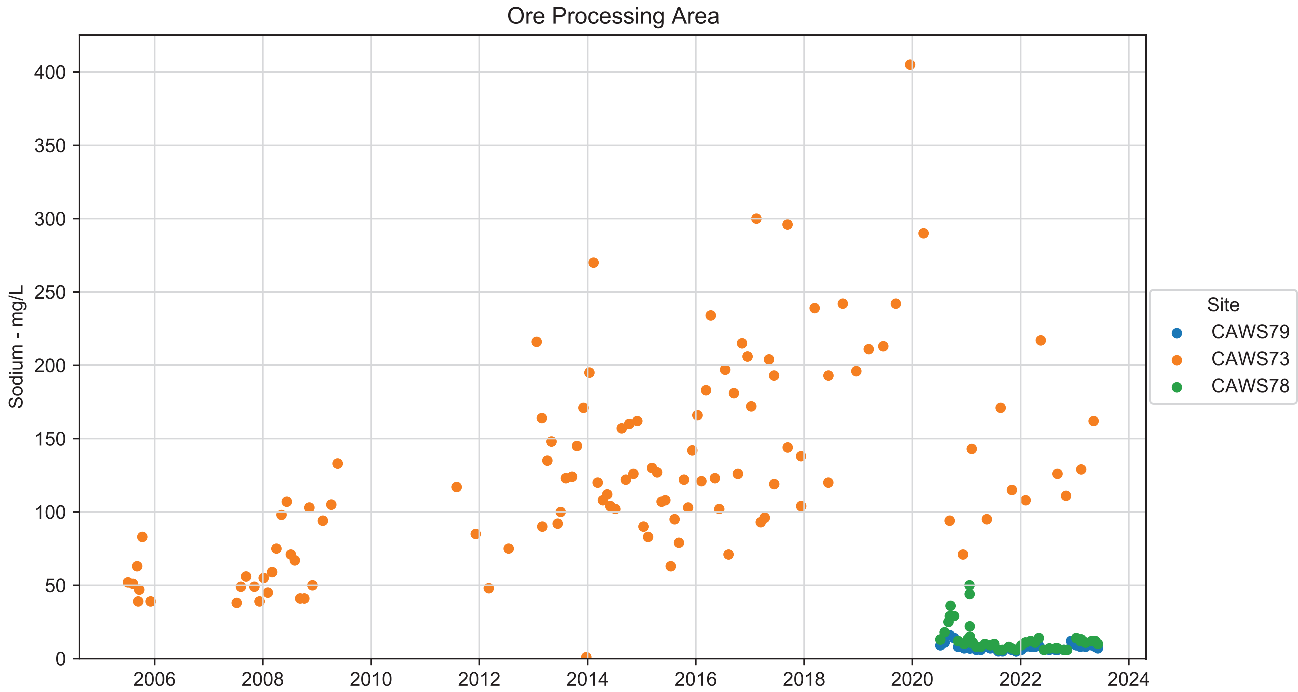
Ore Processing Area
Chloride - mg/L
0
25
50
75
100
125
150
175
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

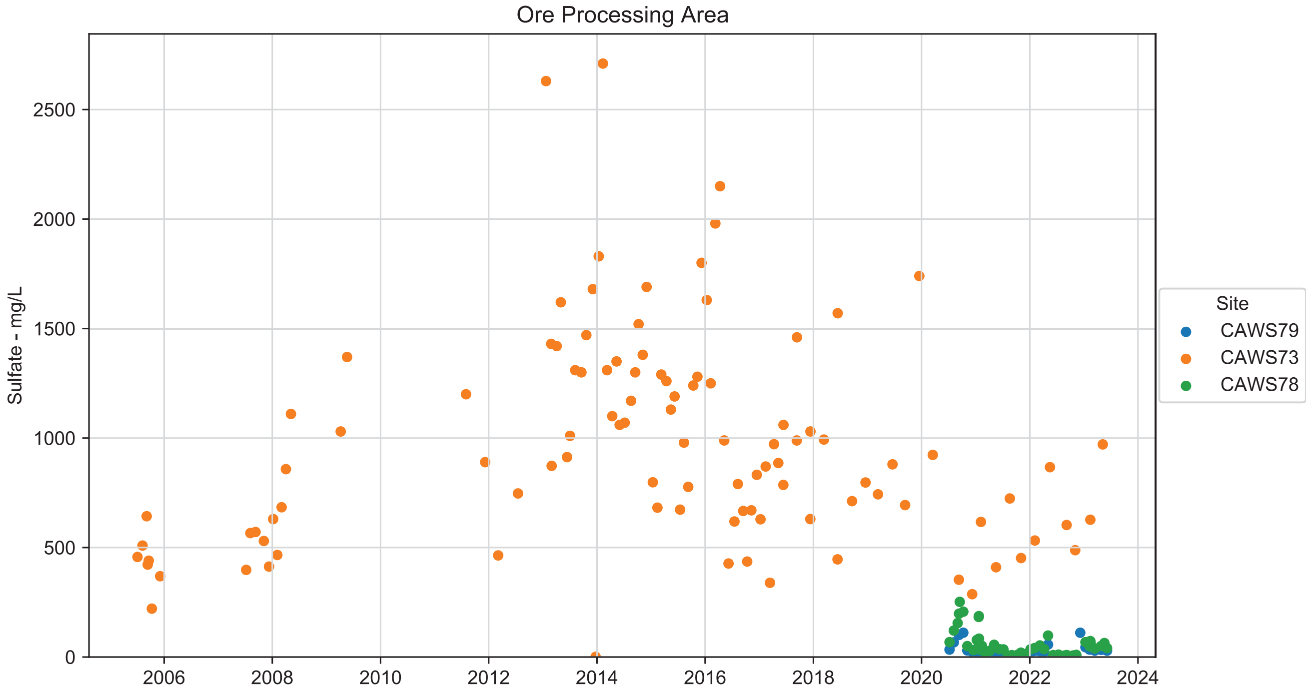


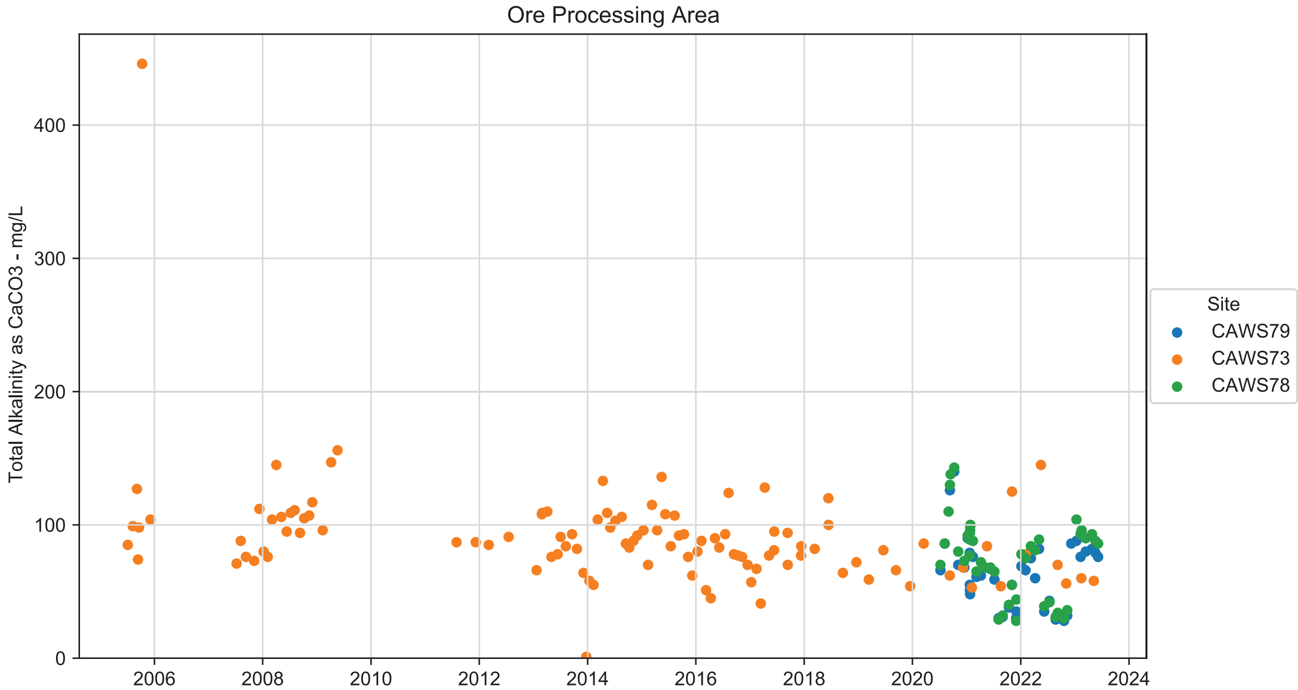
Ore Processing Area
Hydroxide Alkalinity as CaCO3 - mg/L
0
0.2
0.4
0.6
0.8
1
2012
2014
2016
2018
2020
2022
Site
CAWS79
CAWS73
CAWS78

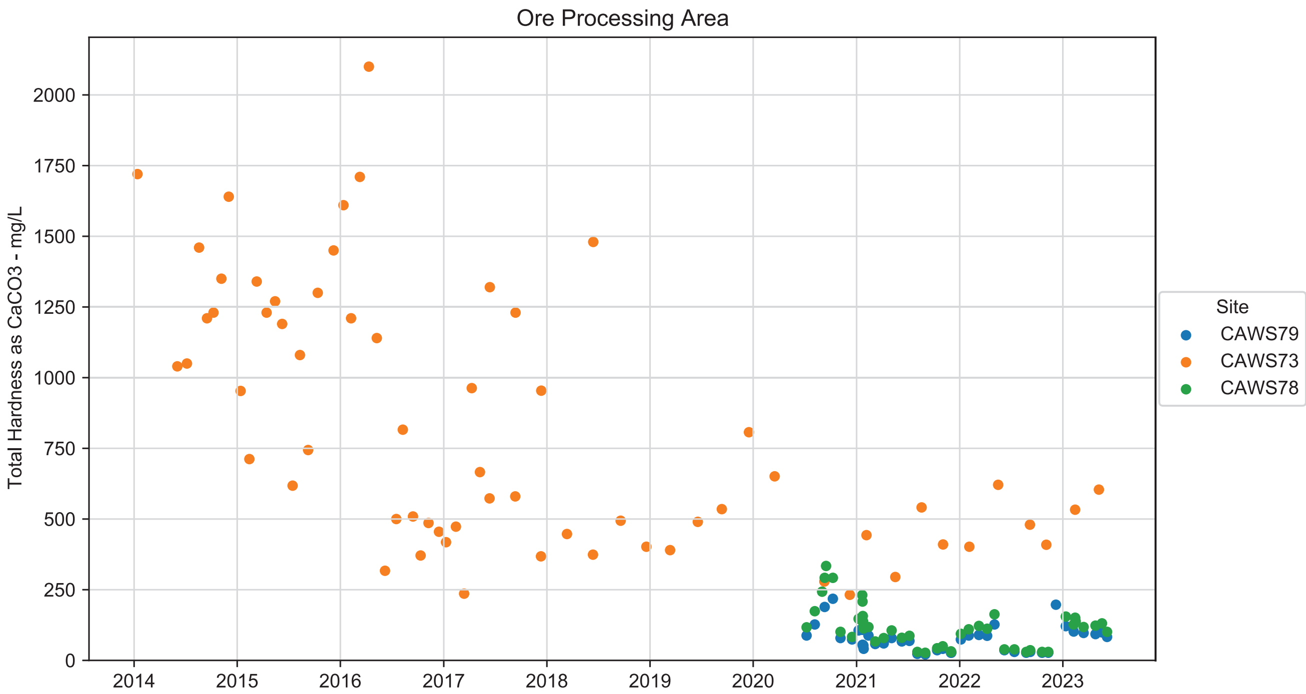

Ore Processing Area
Magnesium - mg/L
Site
CAWS79
CAWS73
CAWS78

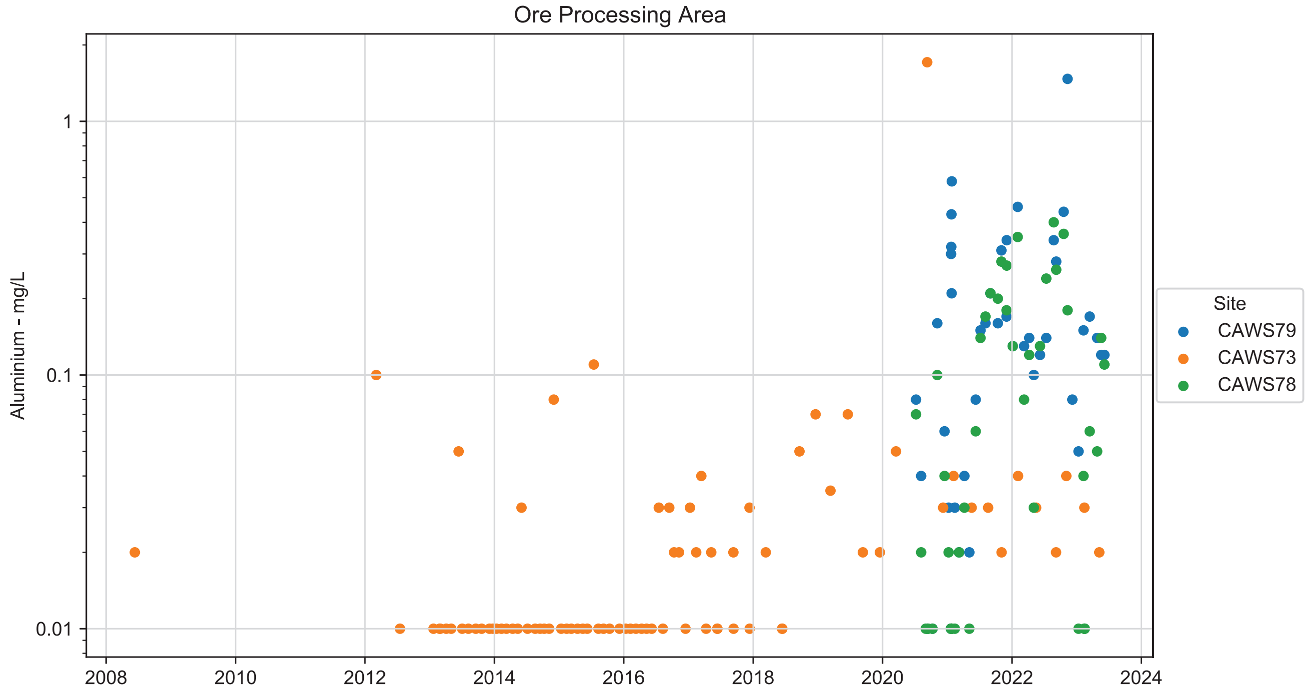

Ore Processing Area
Potassium - mg/L
Site
CAWS79
CAWS73
CAWS78

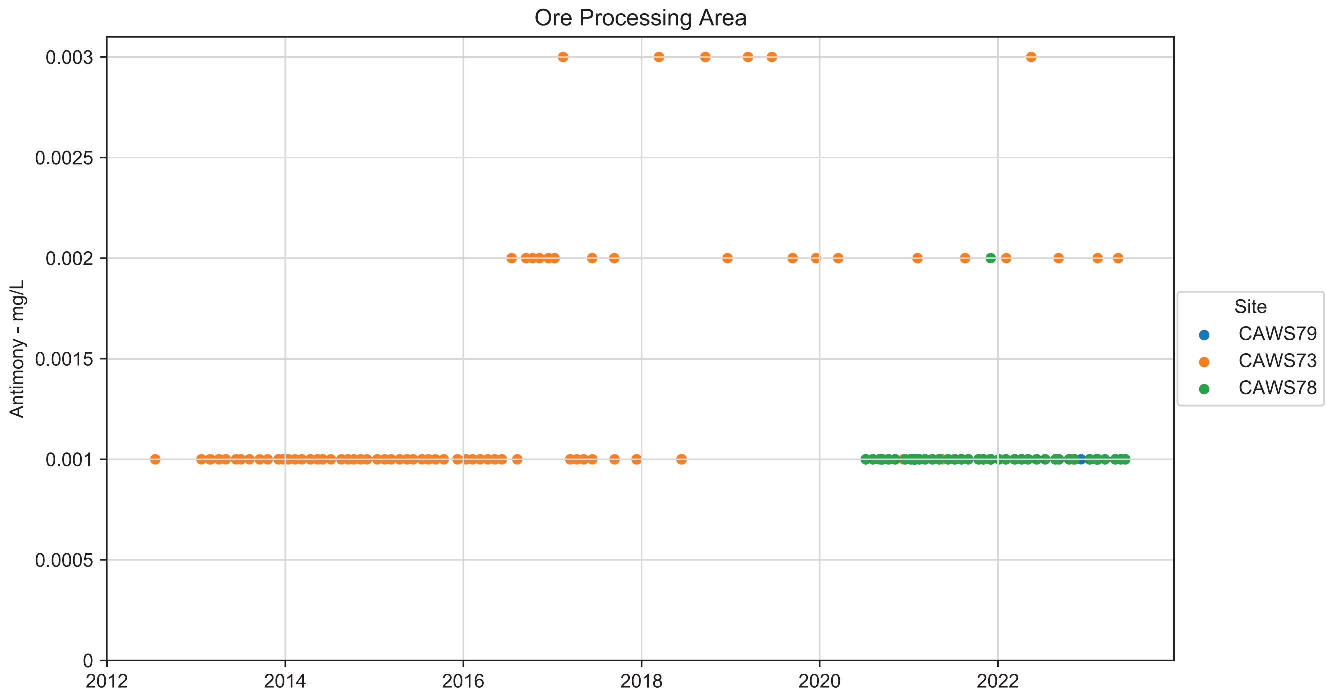

Ore Processing Area
Sodium - mg/L
Site
CAWS79
CAWS73
CAWS78

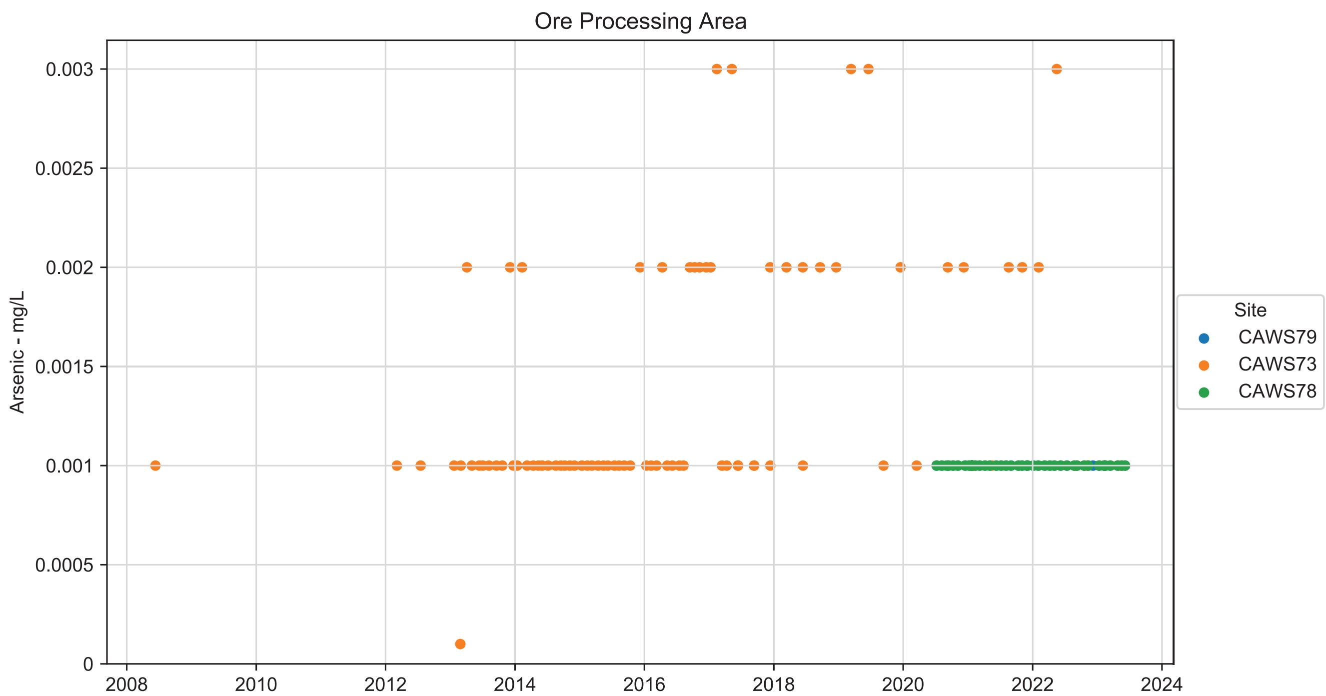

Ore Processing Area
Sulfate - mg/L
0
500
1000
1500
2000
2500
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

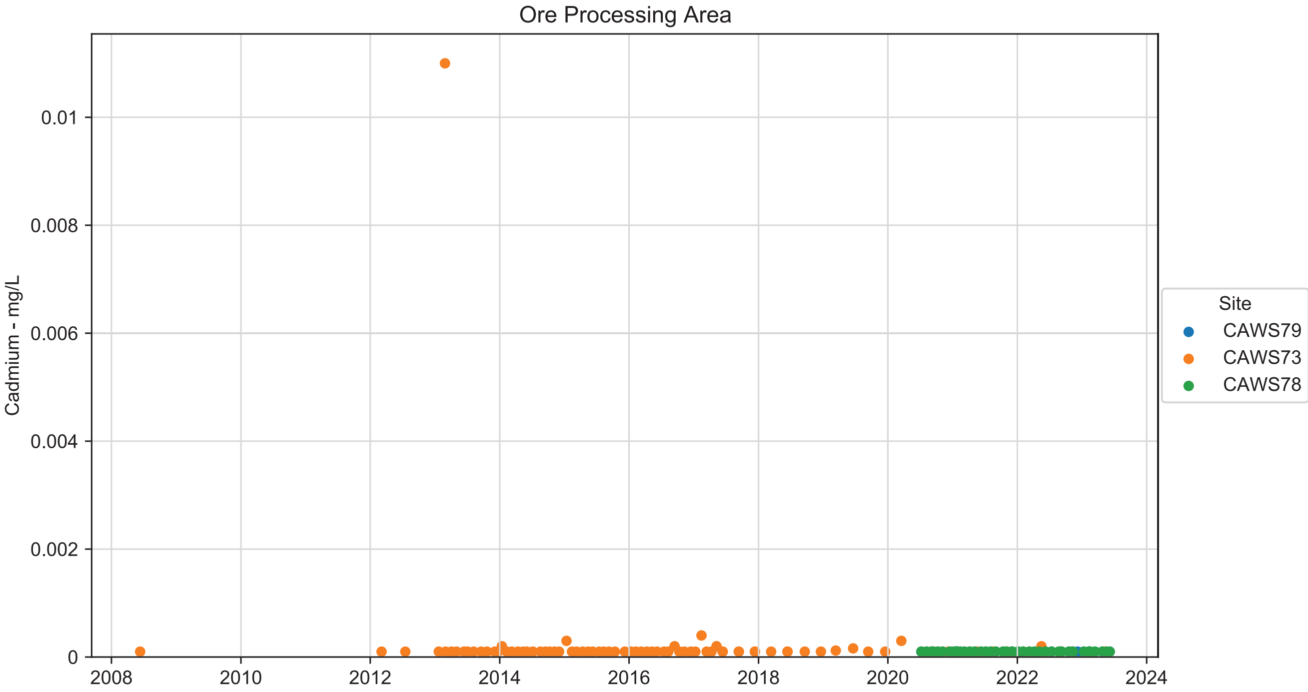

Ore Processing Area
Total Alkalinity as CaCO3 - mg/L
0
100
200
300
400
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

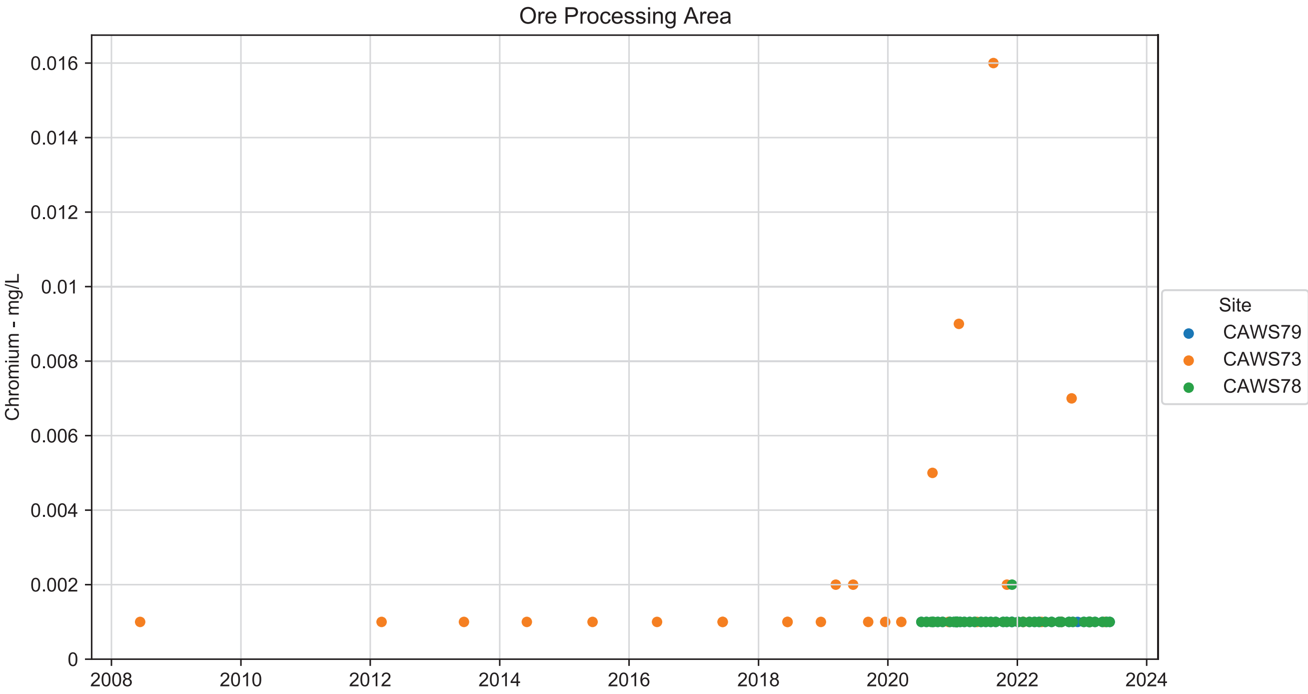

Ore Processing Area
Total Hardness as CaCO3 - mg/L
0
250
500
750
1000
1250
1500
1750
2000
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Site
CAWS79
CAWS73
CAWS78

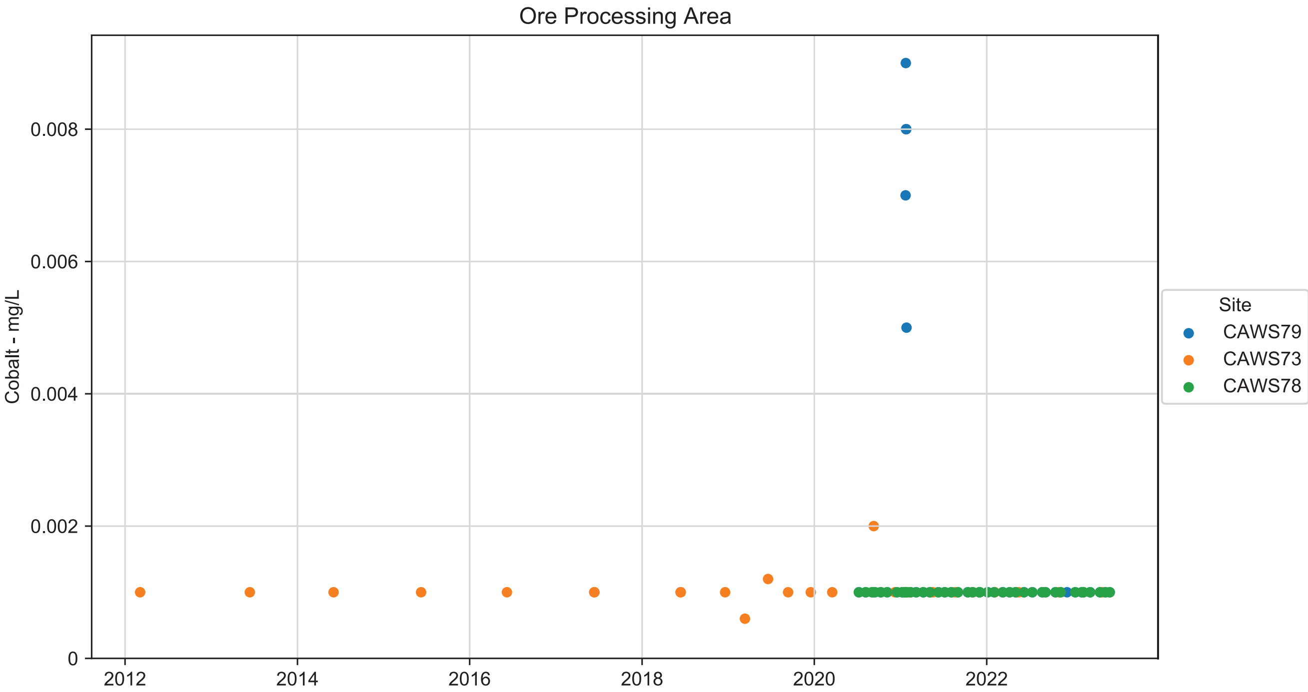

Ore Processing Area
Aluminium - mg/L
1
0.1
0.01
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

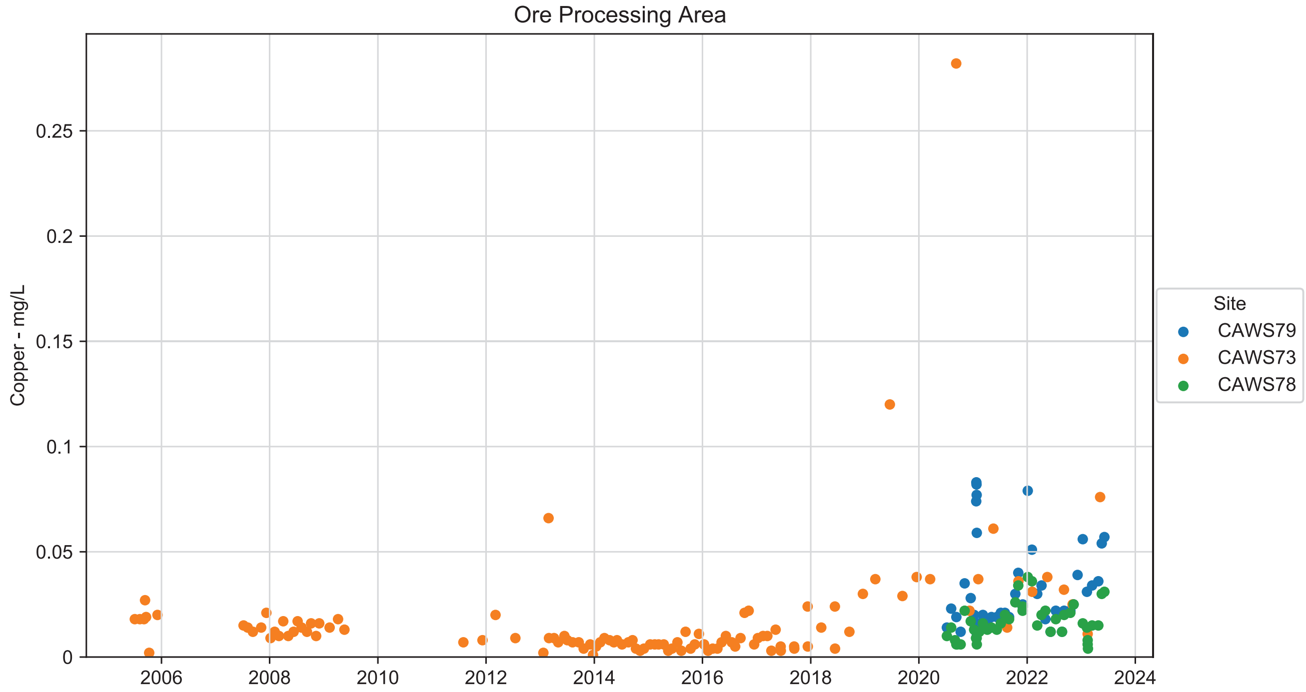

Ore Processing Area
Antimony - mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2012
2014
2016
2018
2020
2022
Site
CAWS79
CAWS73
CAWS78

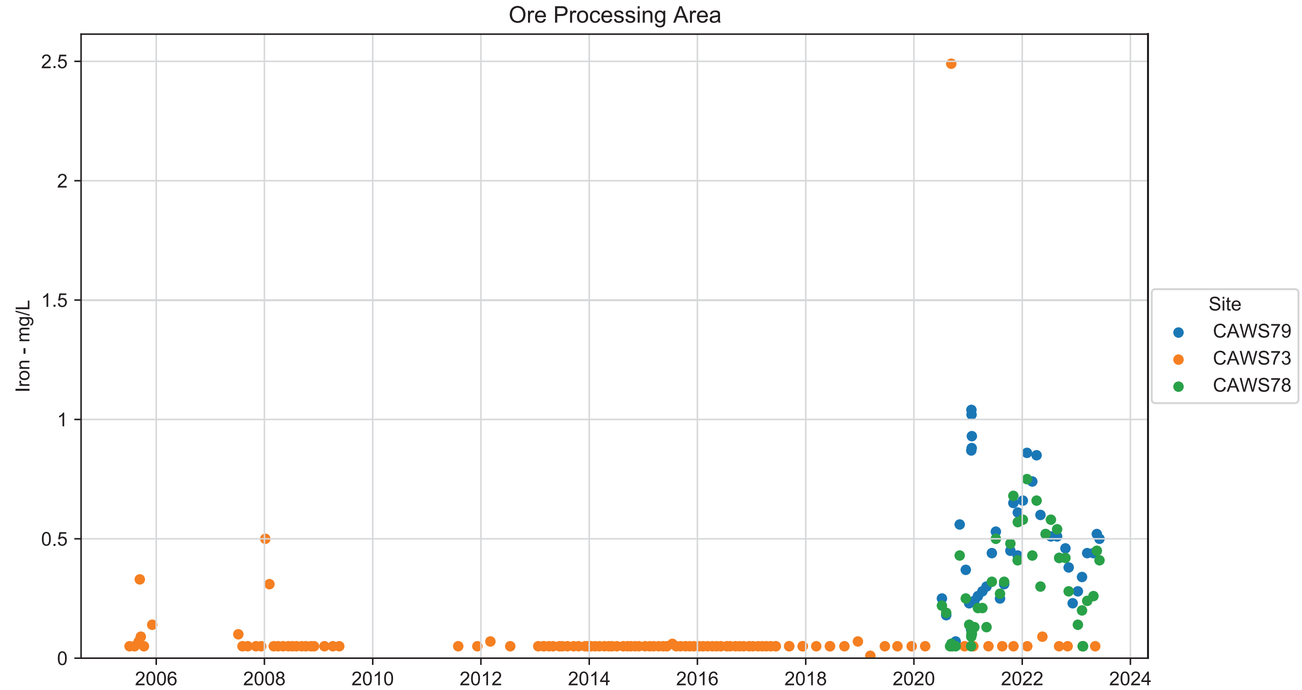

Ore Processing Area
Arsenic - mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

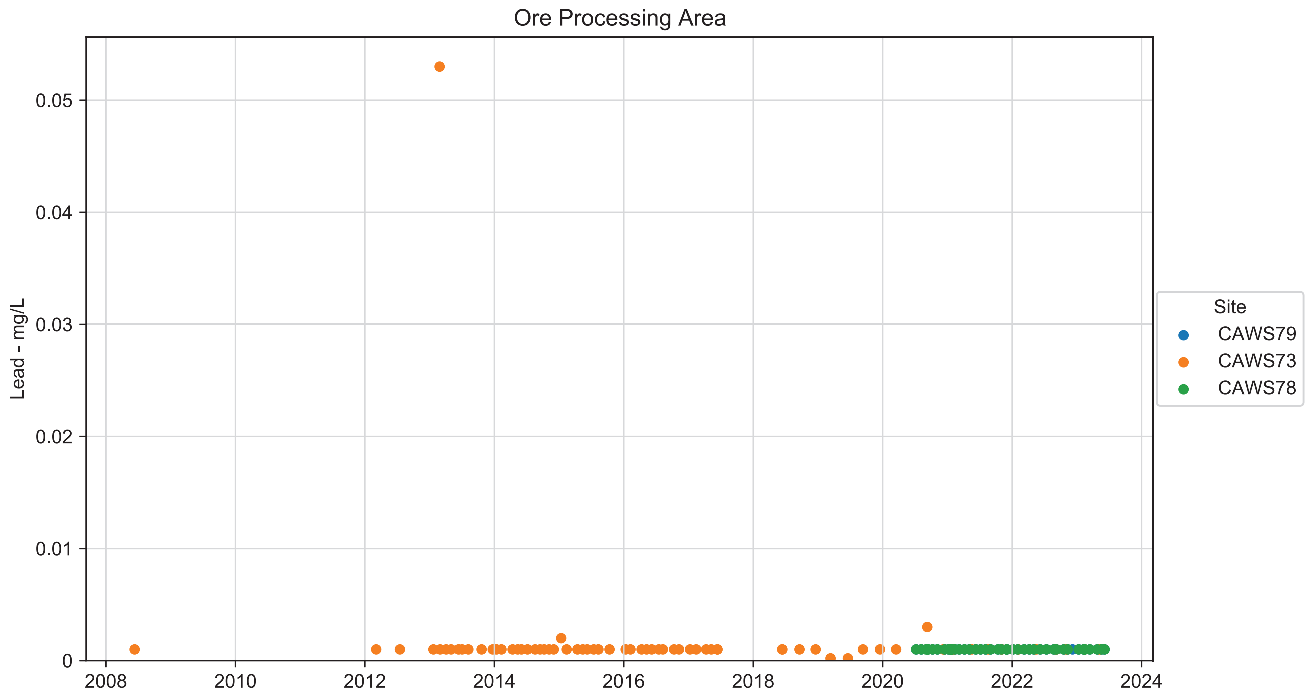

Ore Processing Area
Cadmium - mg/L
0.01
0.008
0.006
0.004
0.002
0
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

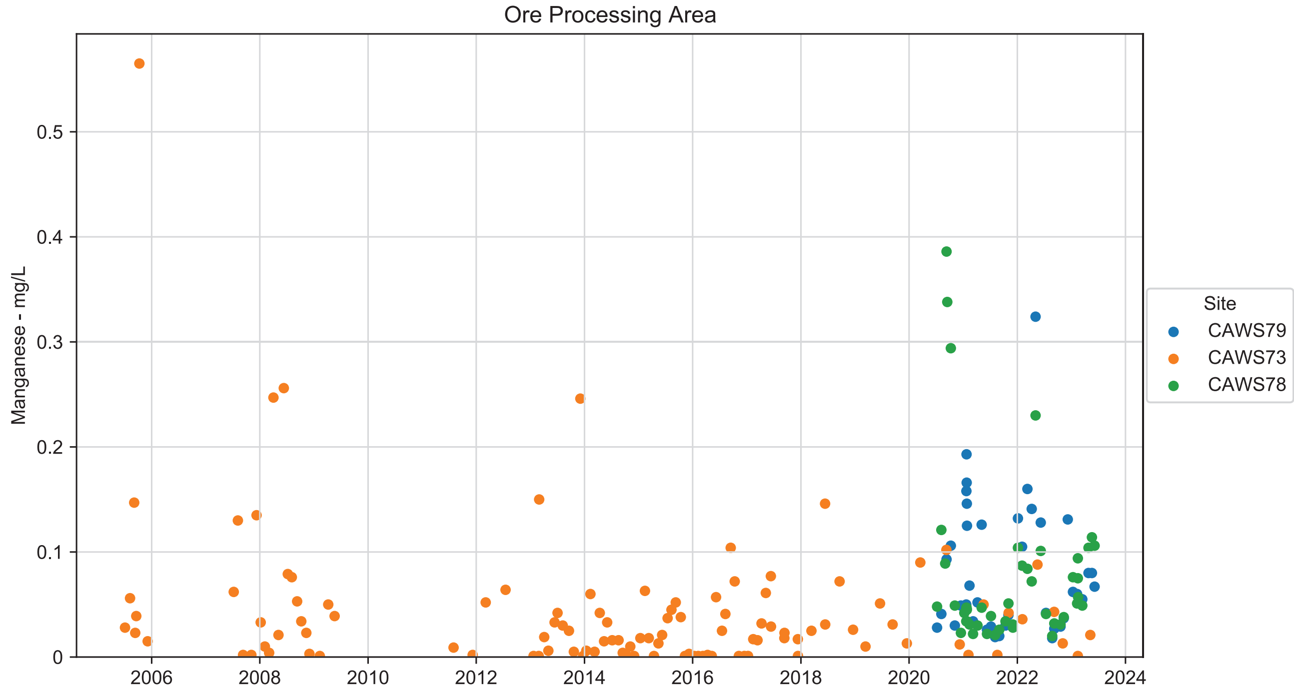

Ore Processing Area
Chromium - mg/L
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

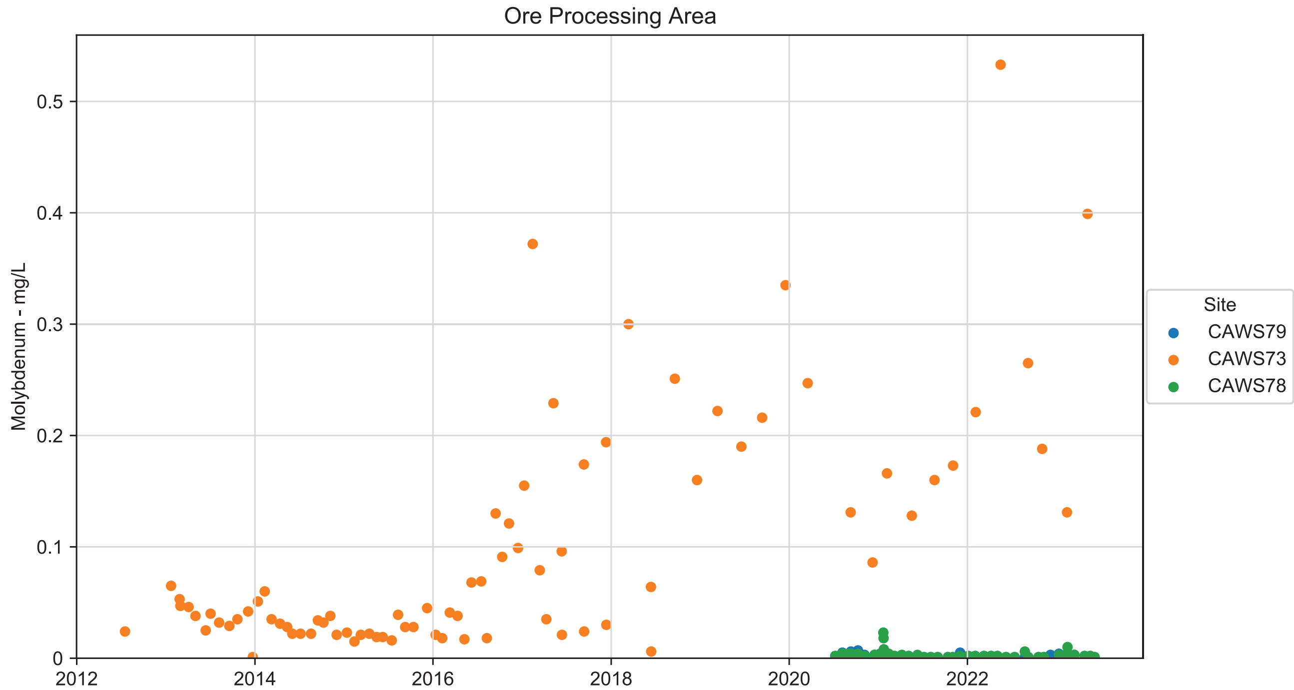

Ore Processing Area
Cobalt - mg/L
0.008
0.006
0.004
0.002
0
2012
2014
2016
2018
2020
2022
Site
CAWS79
CAWS73
CAWS78

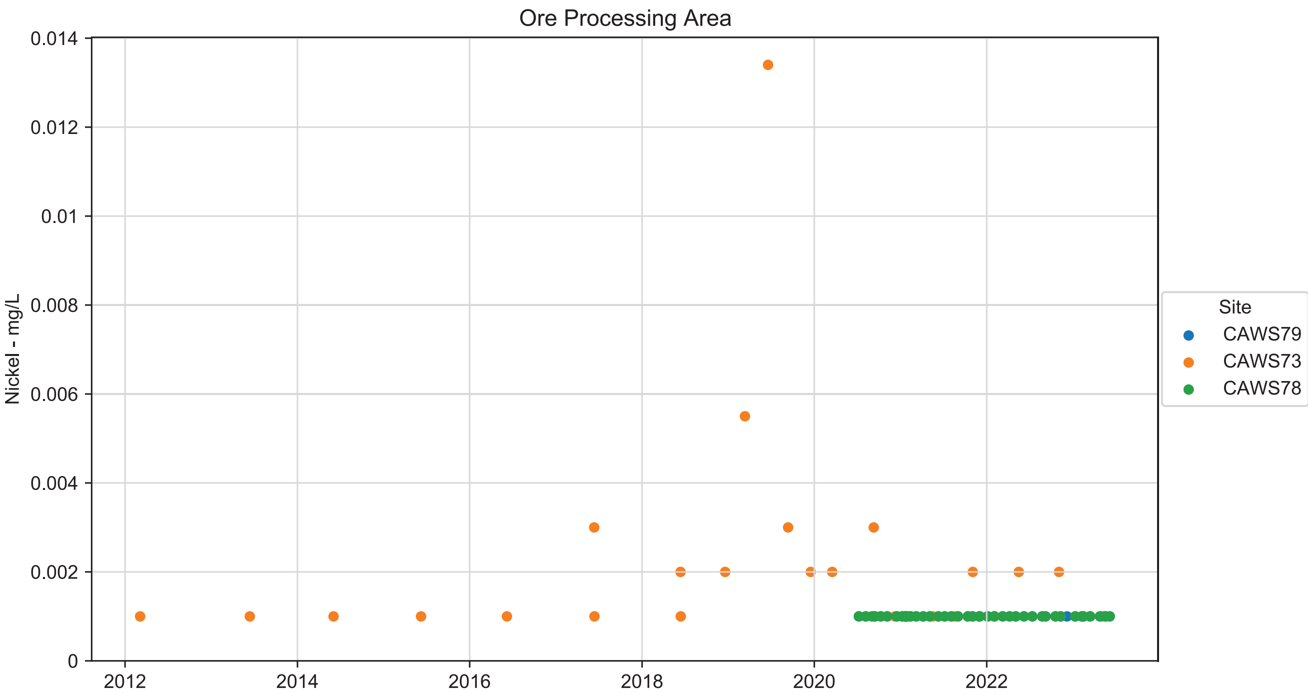

Ore Processing Area
Copper - mg/L
0.25
0.2
0.15
0.1
0.05
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

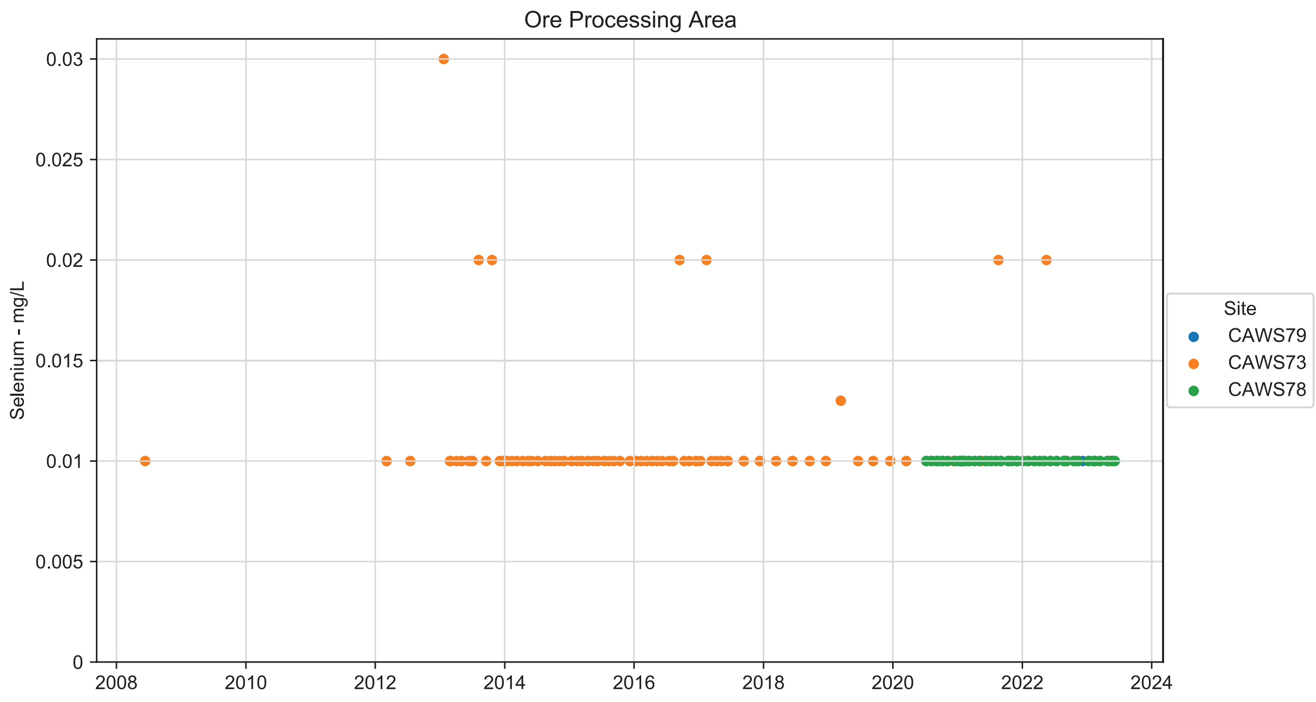

Ore Processing Area
Iron - mg/L
2.5
2
1.5
1
0.5
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

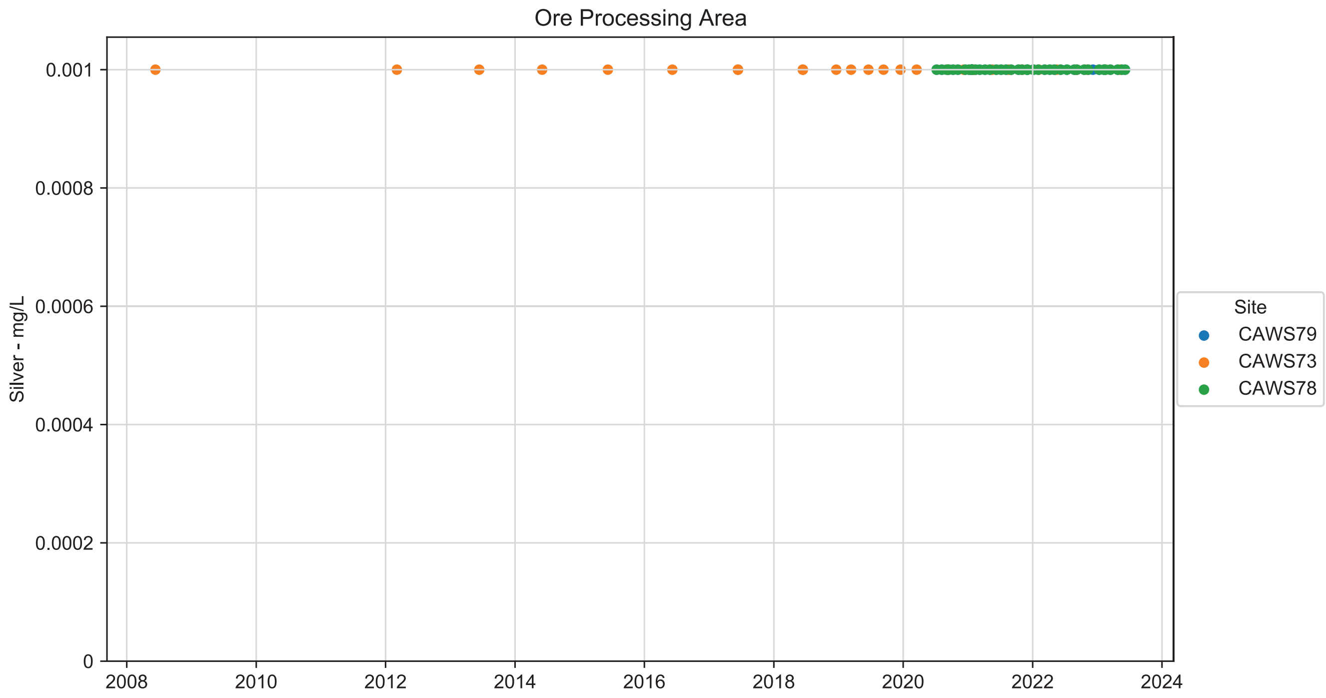

Ore Processing Area
Lead - mg/L
0.05
0.04
0.03
0.02
0.01
0
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

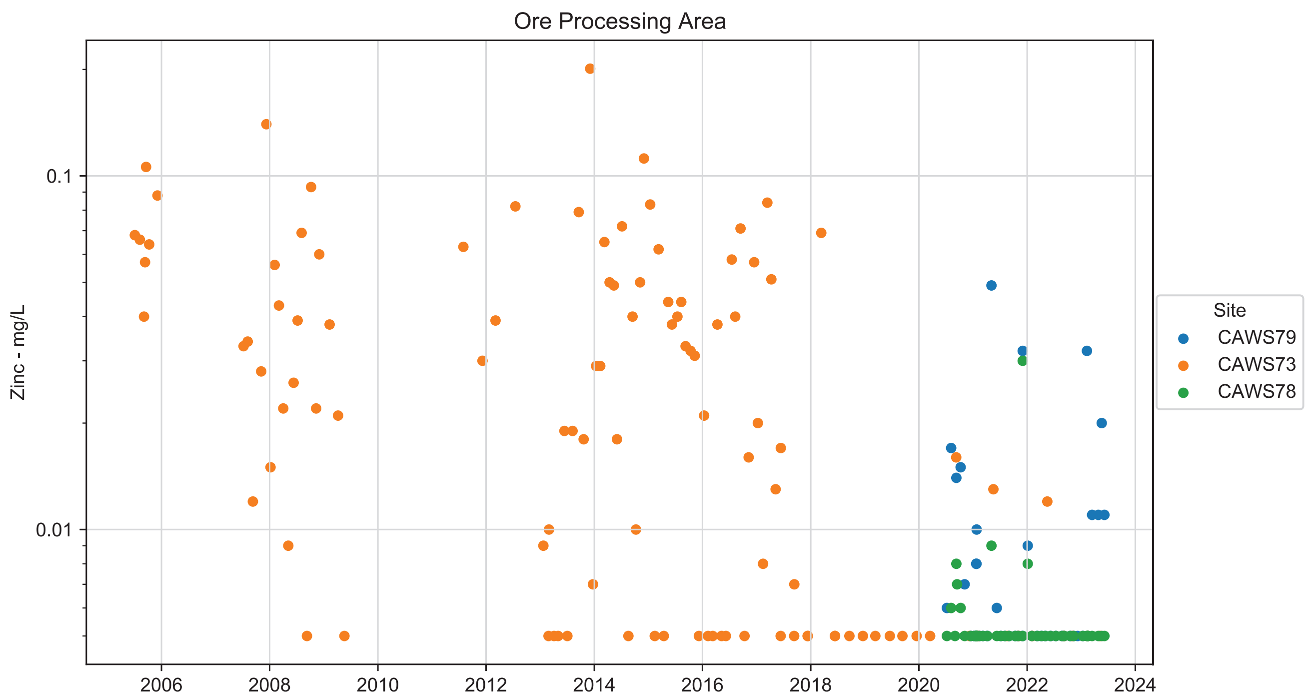

Ore Processing Area
Manganese - mg/L
0
0.1
0.2
0.3
0.4
0.5
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

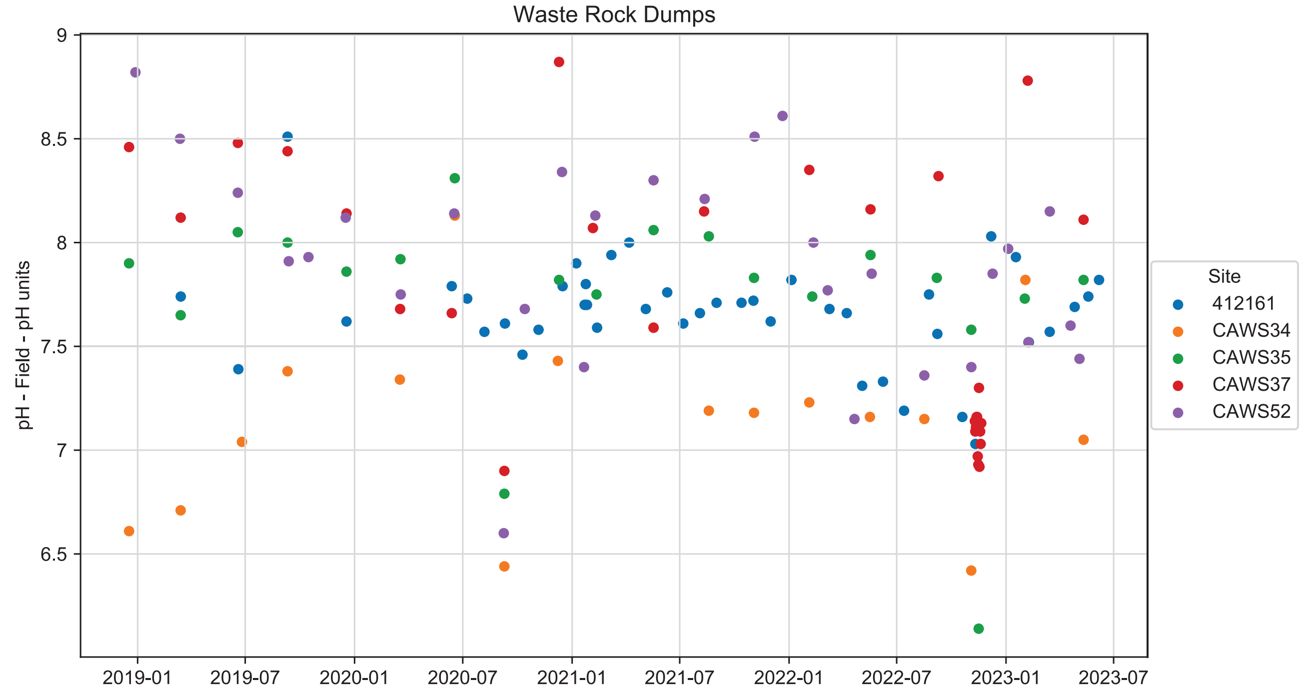

Ore Processing Area
Molybdenum - mg/L
0
0.1
0.2
0.3
0.4
0.5
2012
2014
2016
2018
2020
2022
Site
CAWS79
CAWS73
CAWS78


Ore Processing Area
Nickel - mg/L
0
0.002
0.004
0.006
0.008
0.01
0.012
0.014
2012
2014
2016
2018
2020
2022
Site
CAWS79
CAWS73
CAWS78

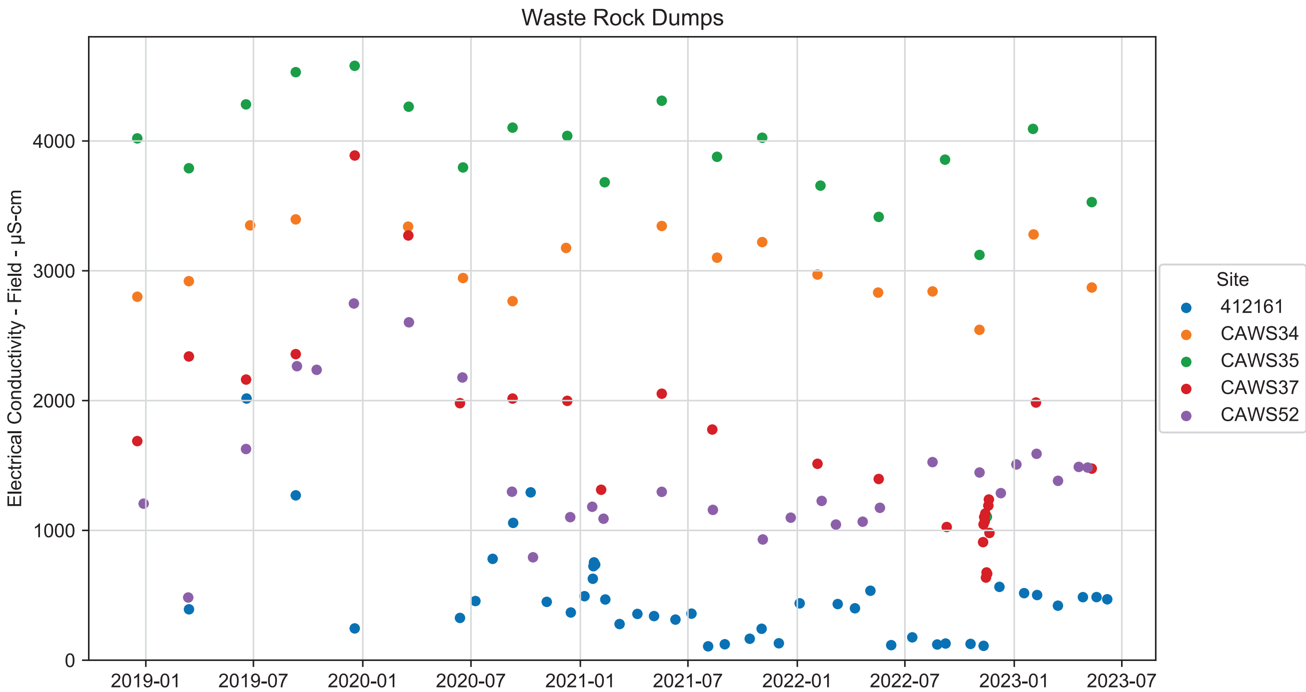

Ore Processing Area
Selenium - mg/L
0.03
0.025
0.02
0.015
0.01
0.005
0
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78


Ore Processing Area
Silver - mg/L
0.001
0.0008
0.0006
0.0004
0.0002
0
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78

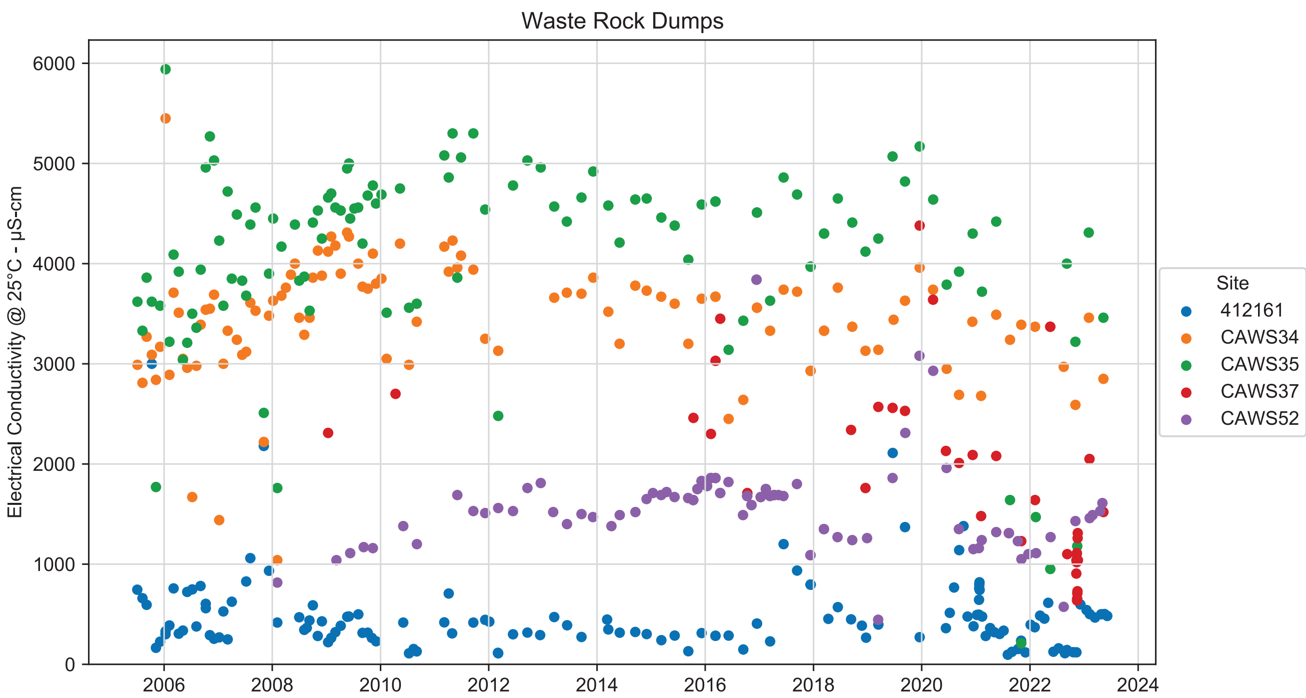

Ore Processing Area
Zinc - mg/L
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS79
CAWS73
CAWS78



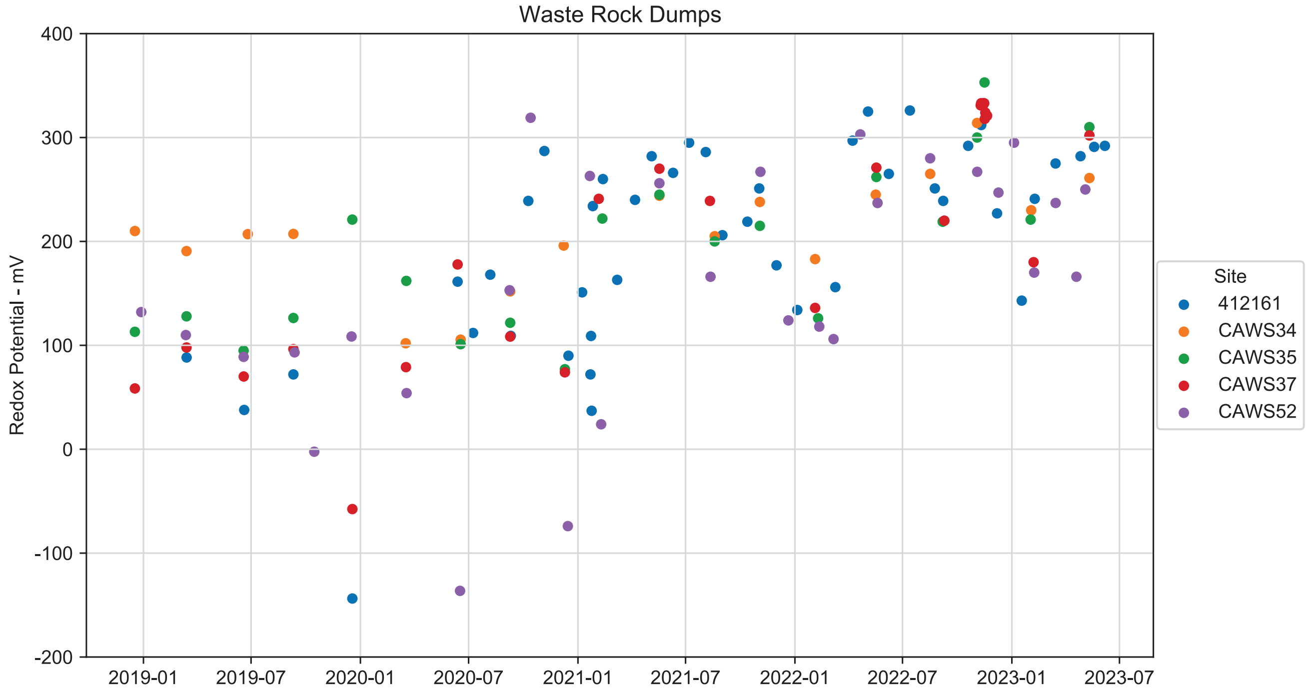
Waste Rock Dumps
pH - Field - pH units
9
8.5
8
7.5
7
6.5
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
412161
CAWS34
CAWS35
CAWS37
CAWS52

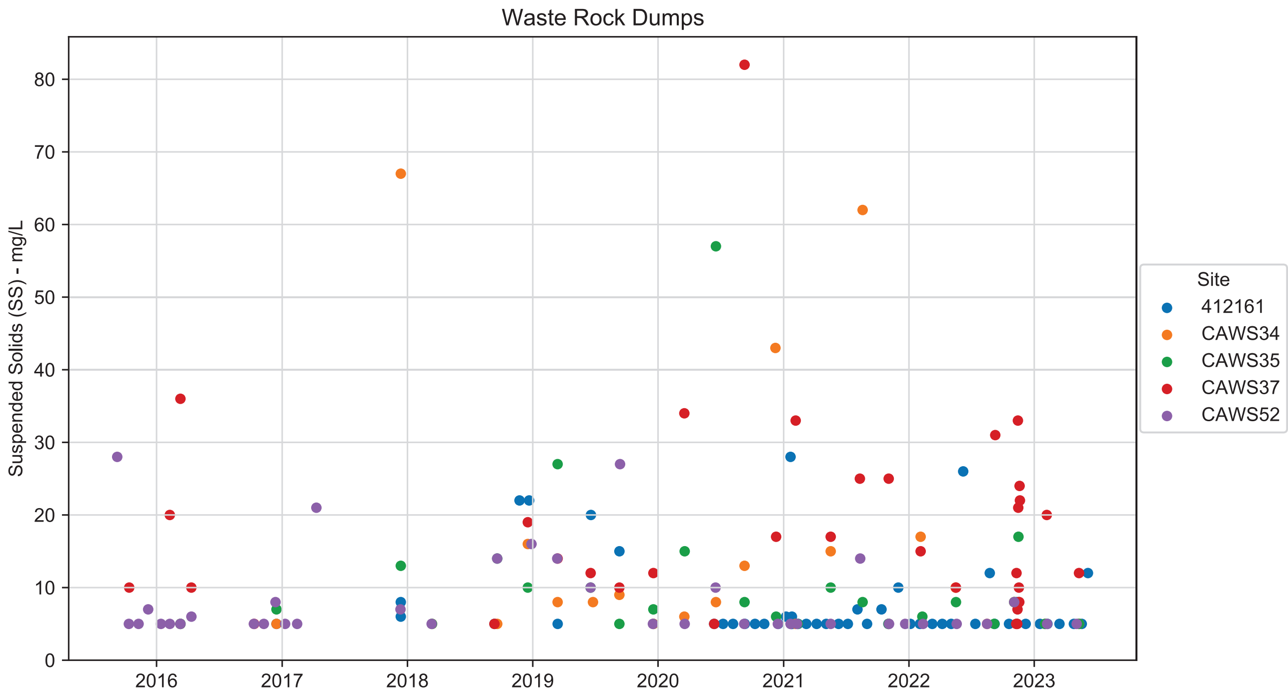


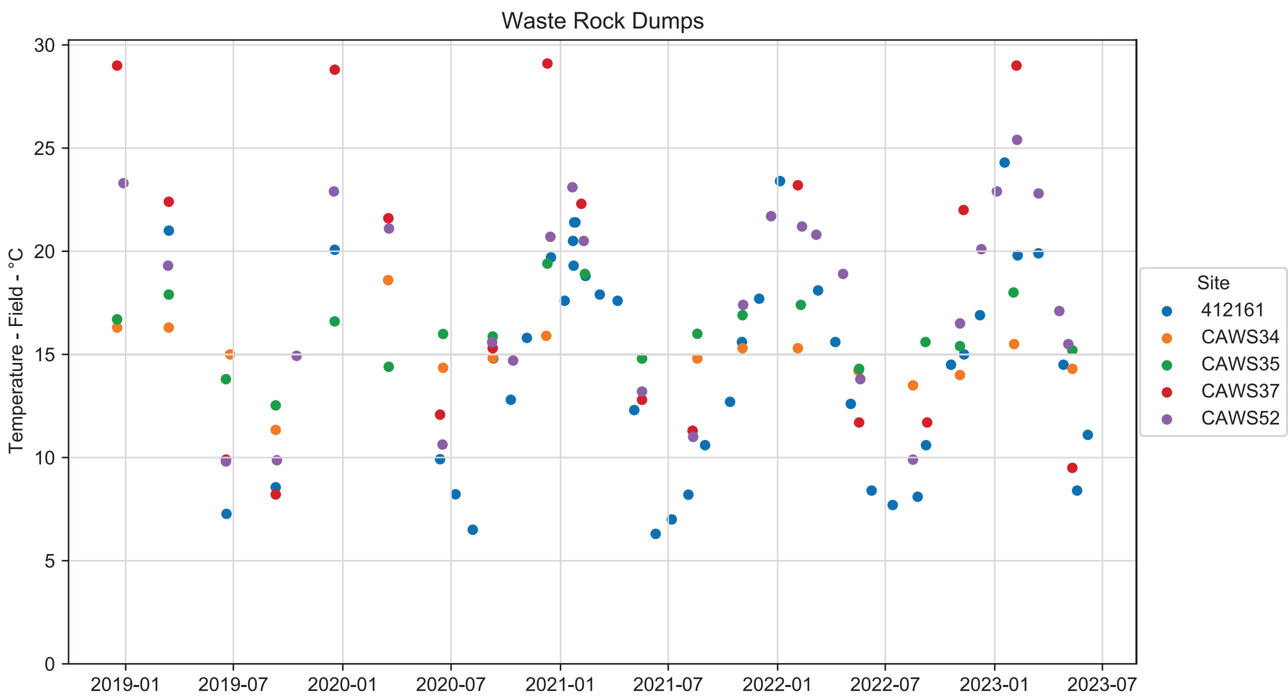
Waste Rock Dumps
Electrical Conductivity - Field - µS-cm
4000
3000
2000
1000
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
412161
CAWS34
CAWS35
CAWS37
CAWS52

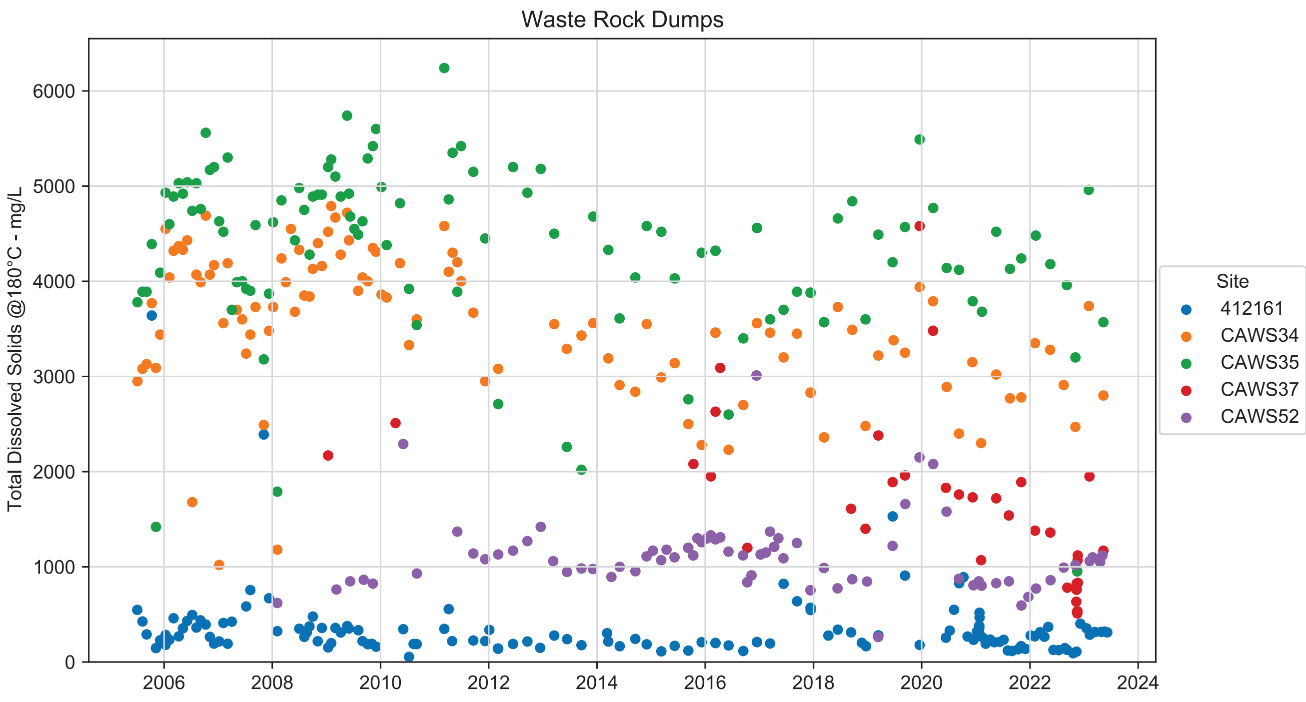


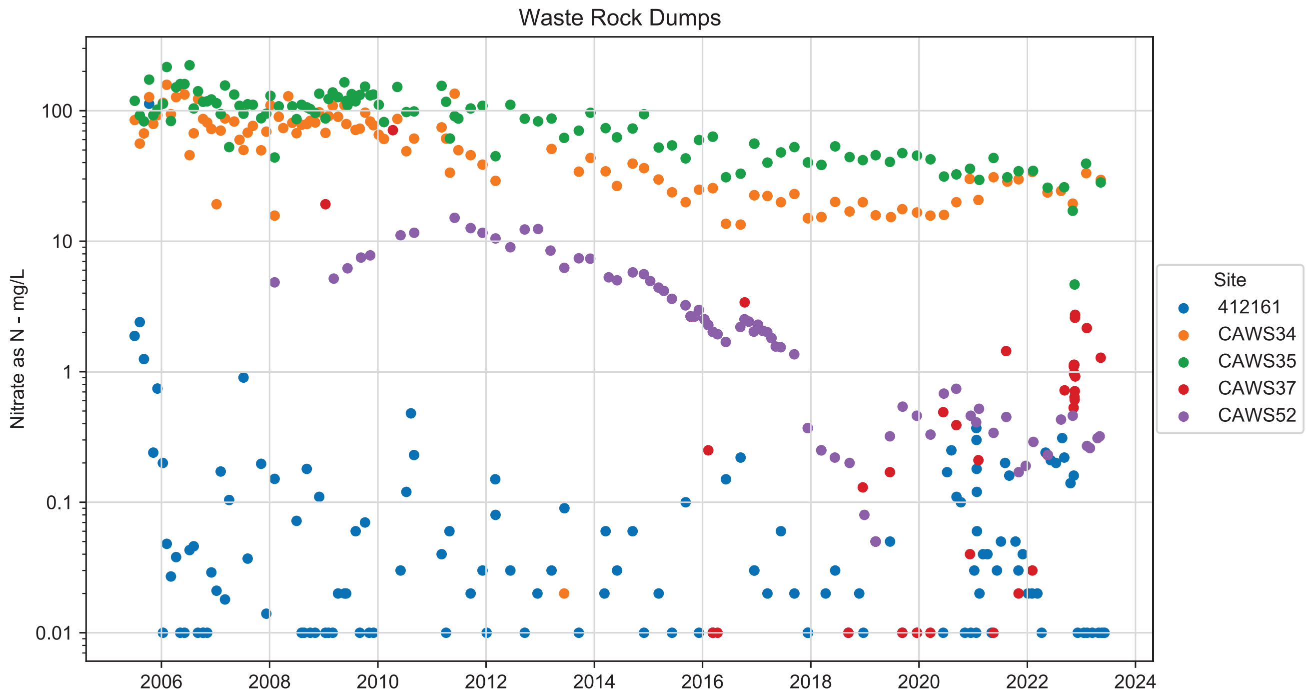
Waste Rock Dumps
Electrical Conductivity @ 25°C - µS-cm
6000
5000
4000
3000
2000
1000
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
CAWS34
CAWS35
CAWS37
CAWS52


Waste Rock Dumps
Redox Potential - mV
400
300
200
100
0
-100
-200
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
412161
CAWS34
CAWS35
CAWS37
CAWS52


Waste Rock Dumps
Suspended Solids (SS) - mg/L
80
70
60
50
40
30
20
10
0
2016
2017
2018
2019
2020
2021
2022
2023
Site
412161
CAWS34
CAWS35
CAWS37
CAWS52


Waste Rock Dumps
Temperature - Field - °C
30
25
20
15
10
5
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
412161
CAWS34
CAWS35
CAWS37
CAWS52


Waste Rock Dumps
Total Dissolved Solids @180°C - mg/L
0
1000
2000
3000
4000
5000
6000
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
CAWS34
CAWS35
CAWS37
CAWS52


Waste Rock Dumps
Nitrate as N - mg/L
0.01
0.1
1
10
100
2006
2008
2010
2012
2014
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2020
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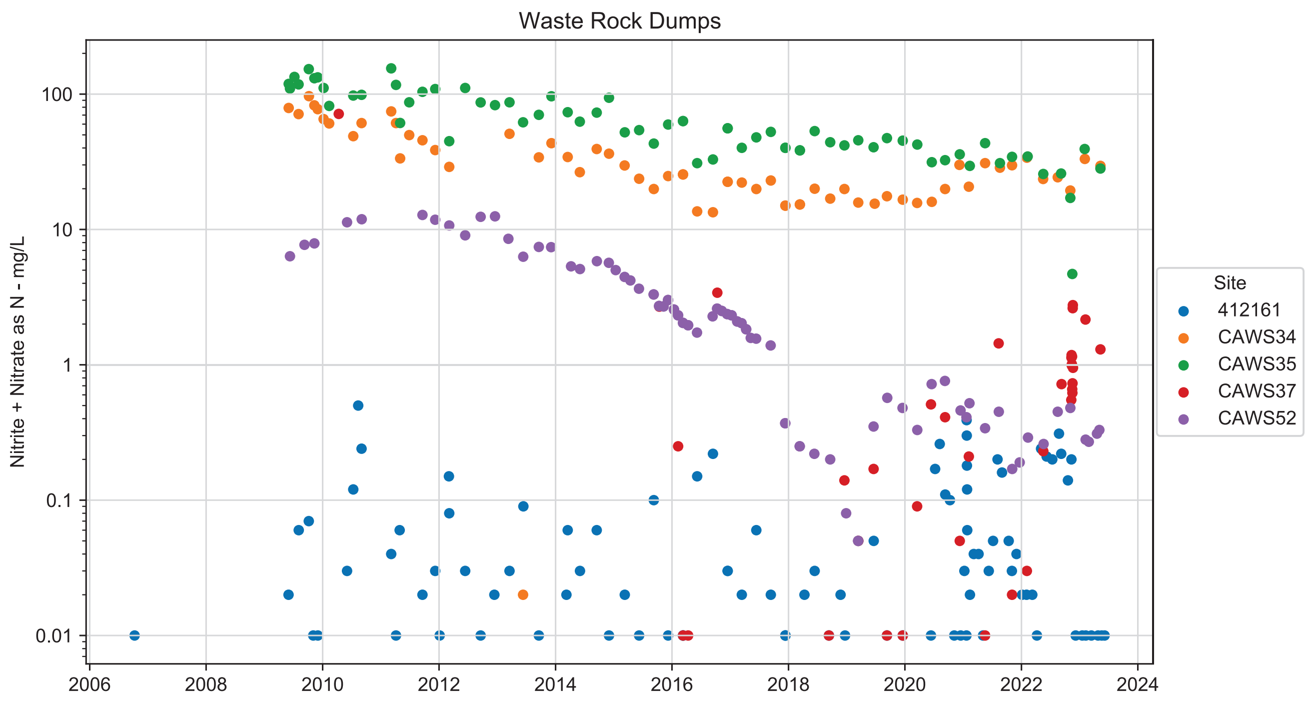
Waste Rock Dumps
Nitrite + Nitrate as N - mg/L
0.01
0.1
1
10
100
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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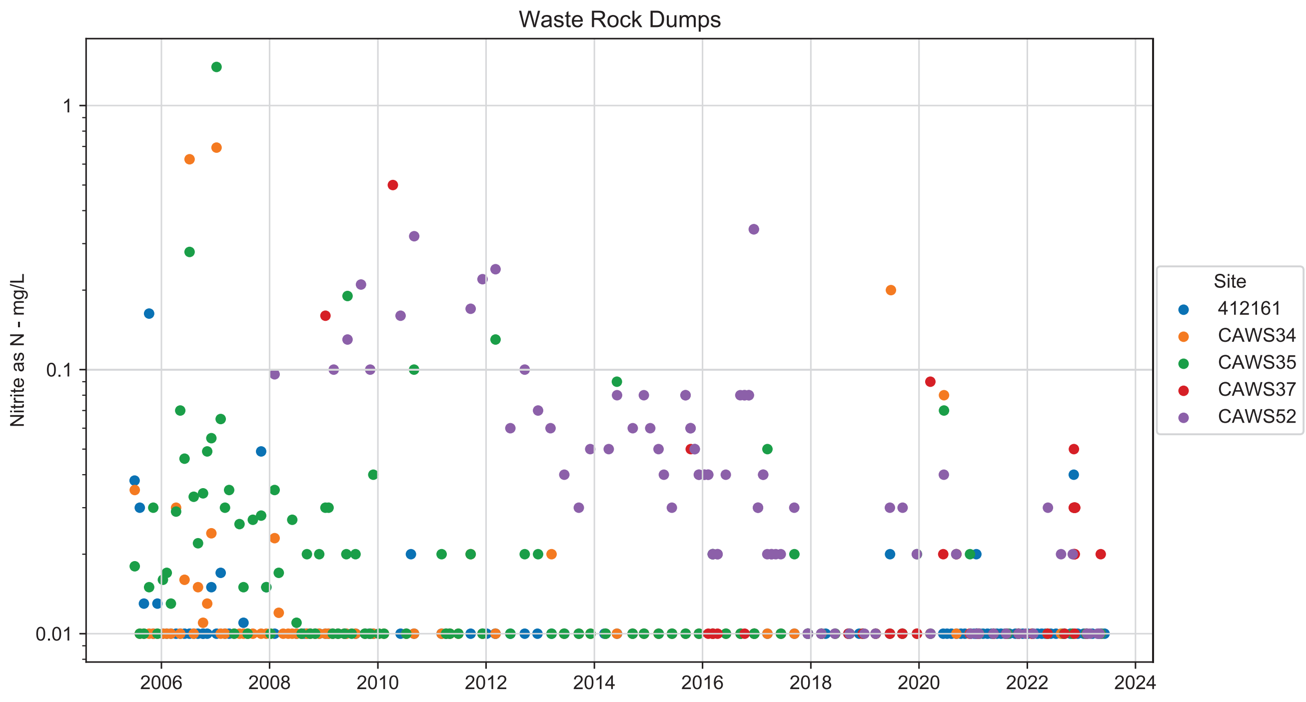
Waste Rock Dumps
Nitrite as N - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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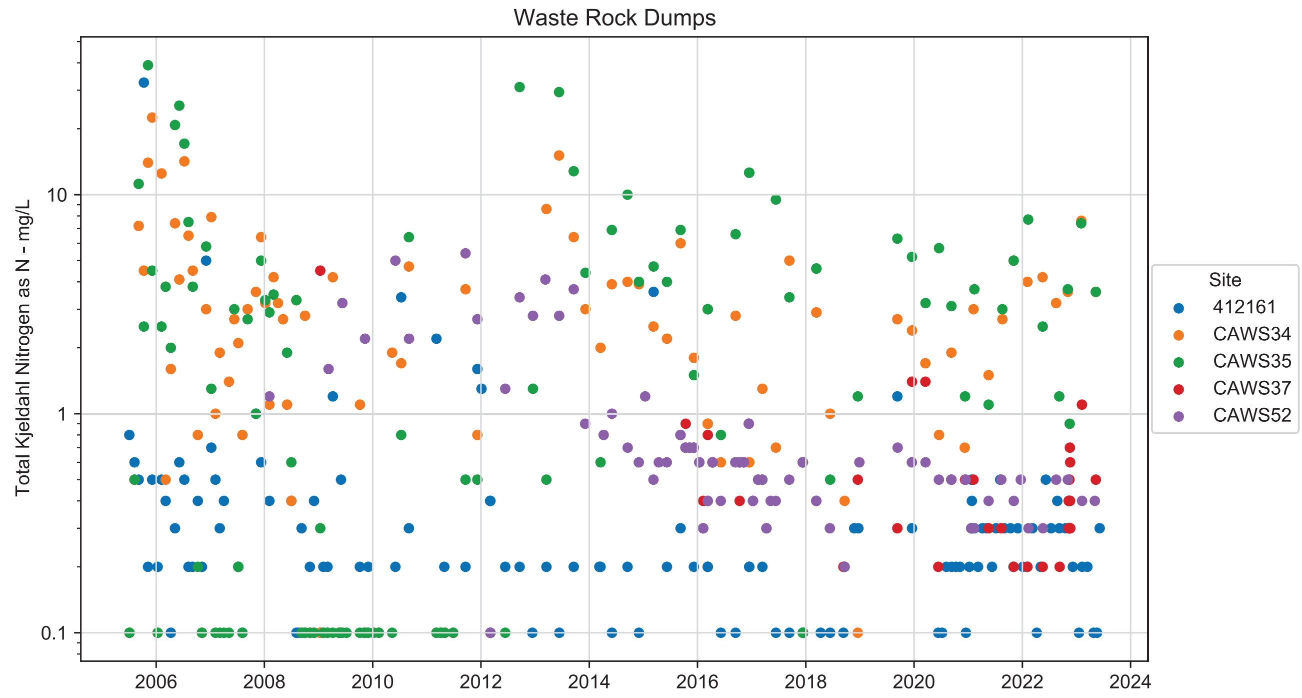
Waste Rock Dumps
Total Kjeldahl Nitrogen as N - mg/L
10
1
0.1
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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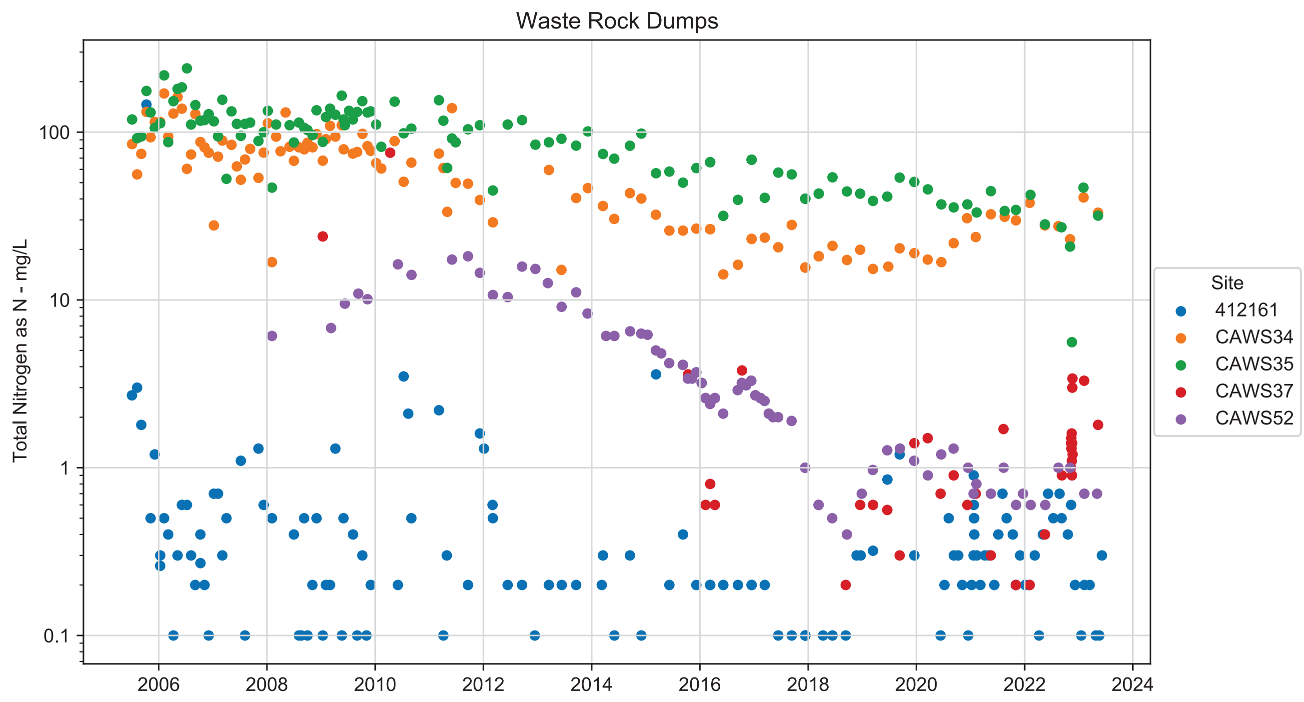
Waste Rock Dumps
Total Nitrogen as N - mg/L
100
10
1
0.1
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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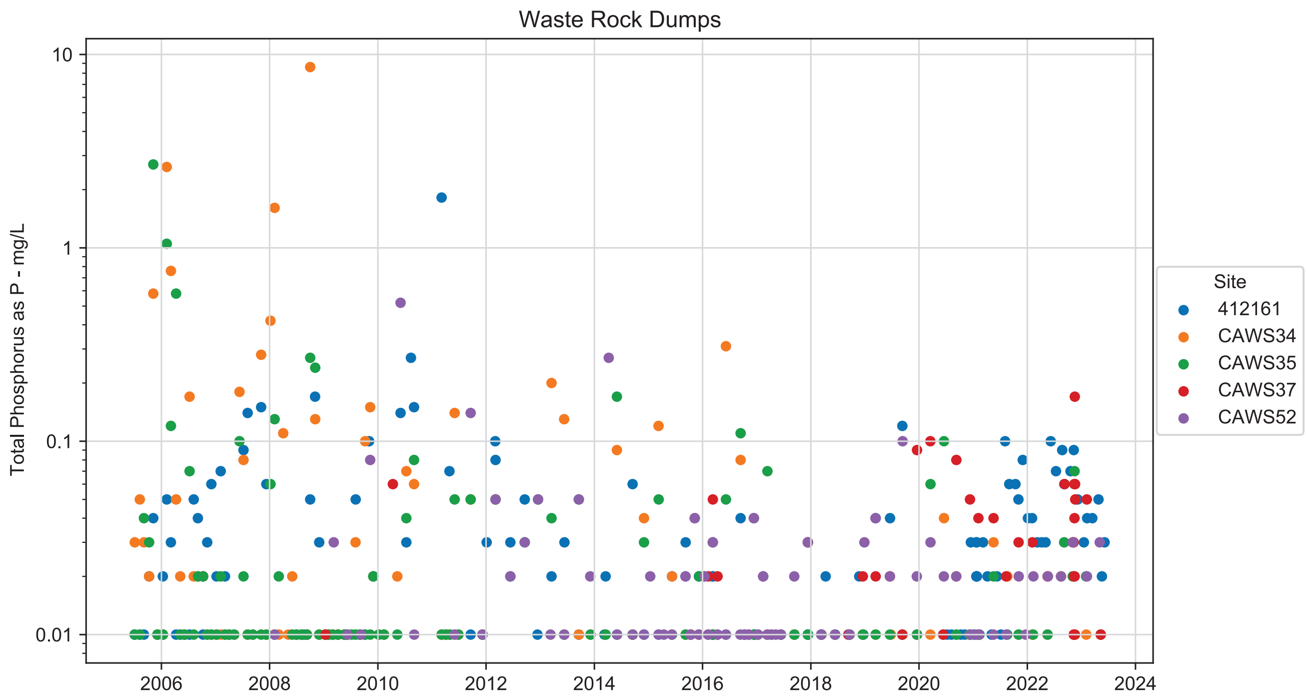
Waste Rock Dumps
Total Phosphorus as P - mg/L
10
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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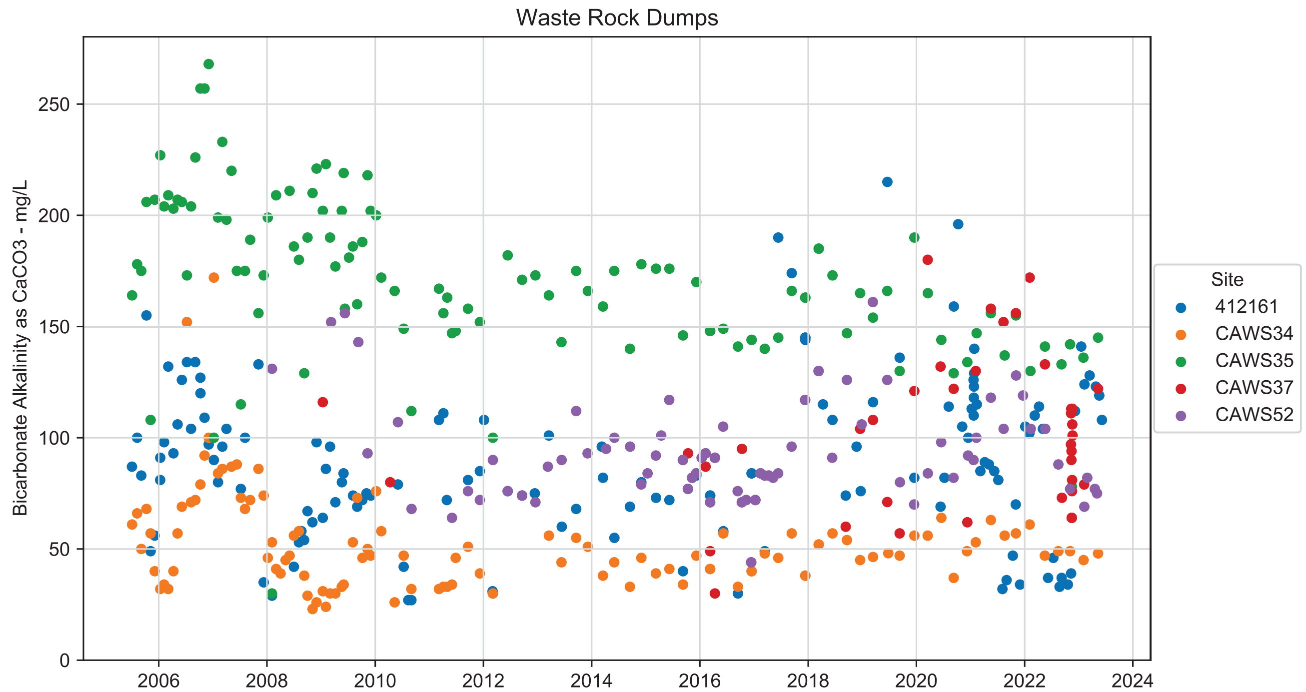
Waste Rock Dumps
Bicarbonate Alkalinity as CaCO3 - mg/L
250
200
150
100
50
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
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412161
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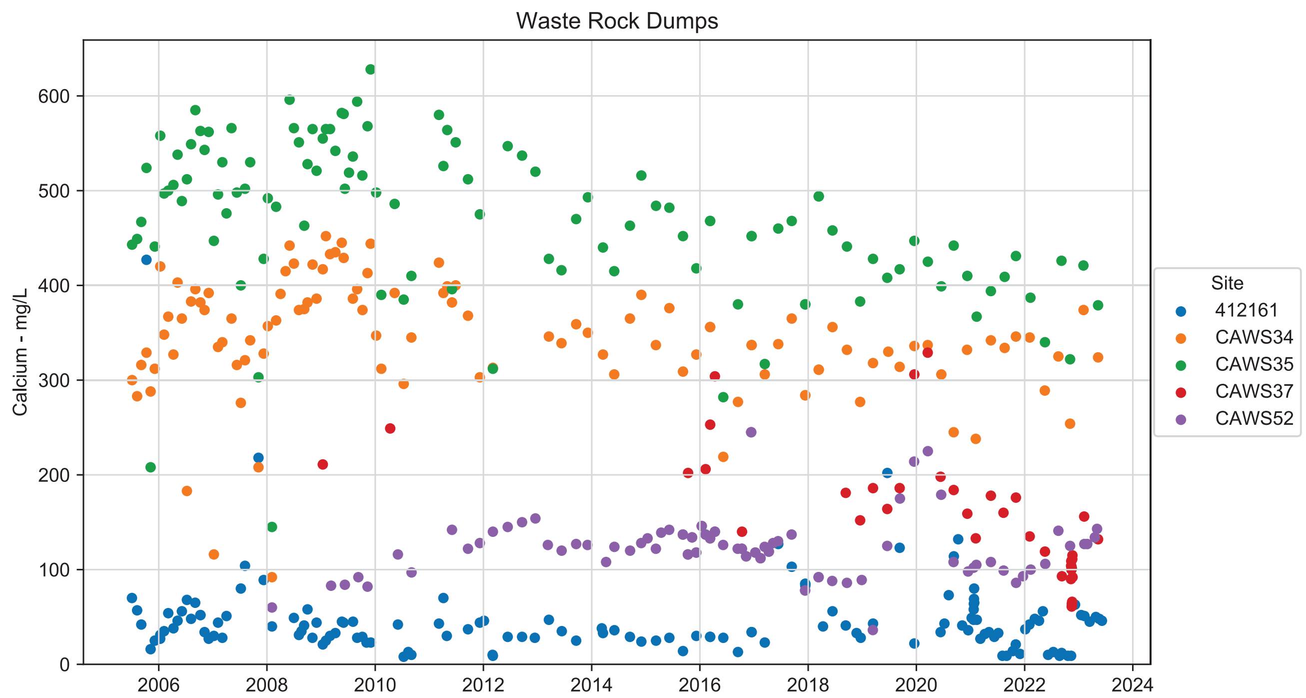
Waste Rock Dumps
Calcium - mg/L
600
500
400
300
200
100
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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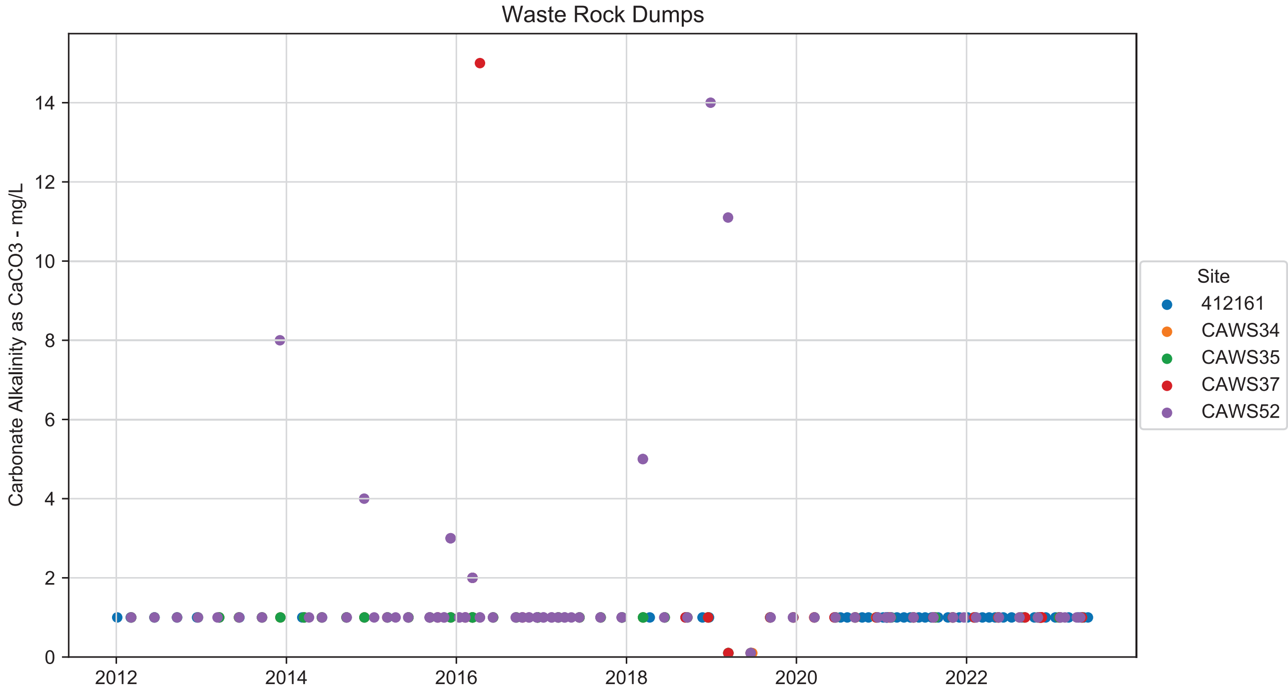
Waste Rock Dumps
Carbonate Alkalinity as CaCO3 - mg/L
0
2
4
6
8
10
12
14
2012
2014
2016
2018
2020
2022
Site
412161
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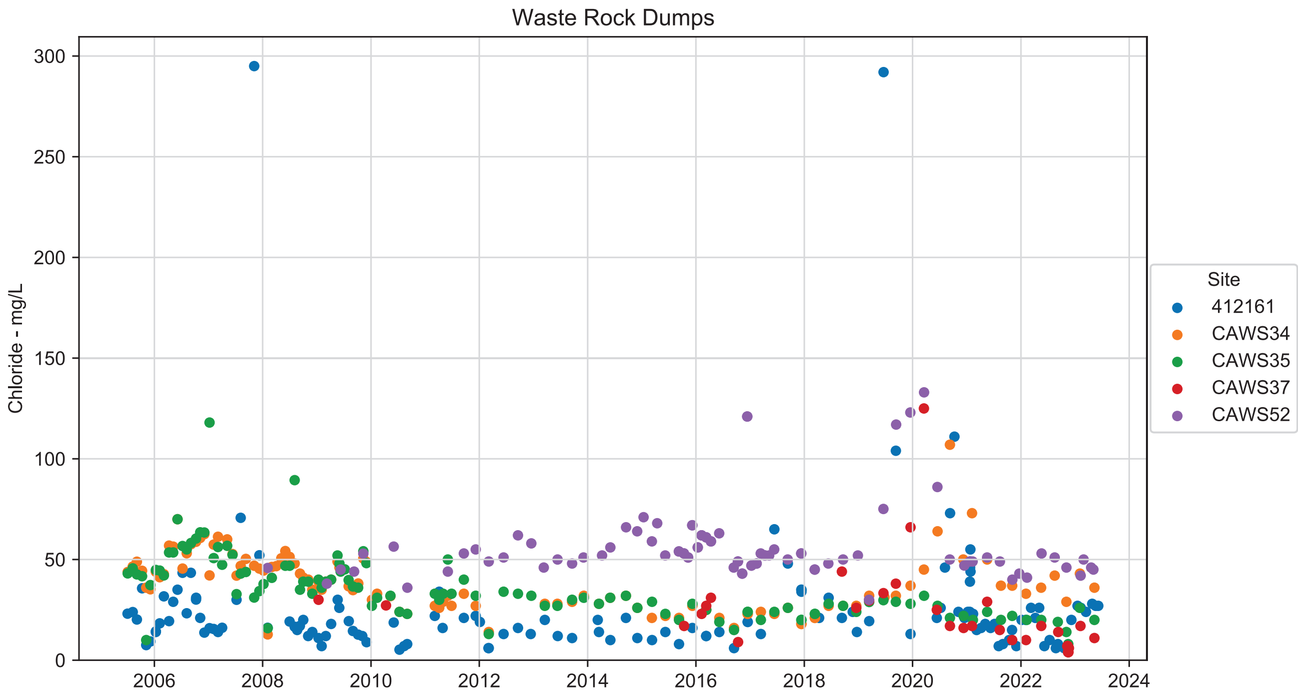
Waste Rock Dumps
Chloride - mg/L
0
50
100
150
200
250
300
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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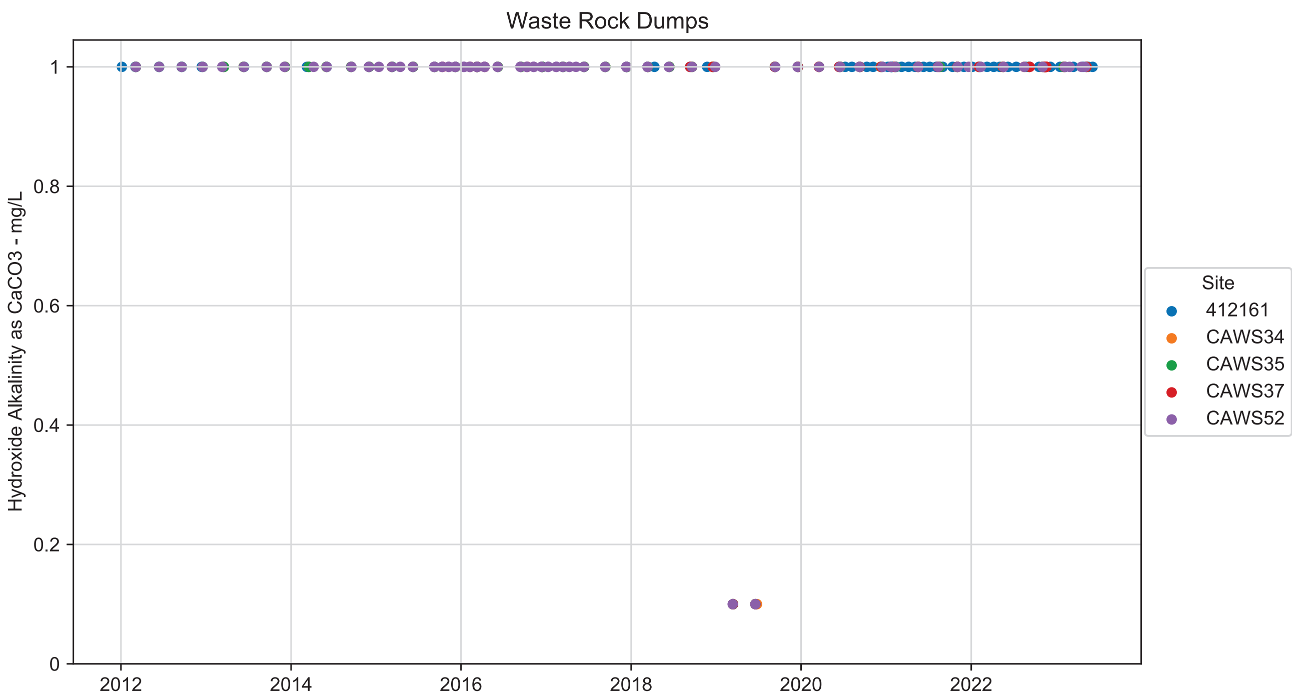
Waste Rock Dumps
Hydroxide Alkalinity as CaCO3 - mg/L
0
0.2
0.4
0.6
0.8
1
2012
2014
2016
2018
2020
2022
Site
412161
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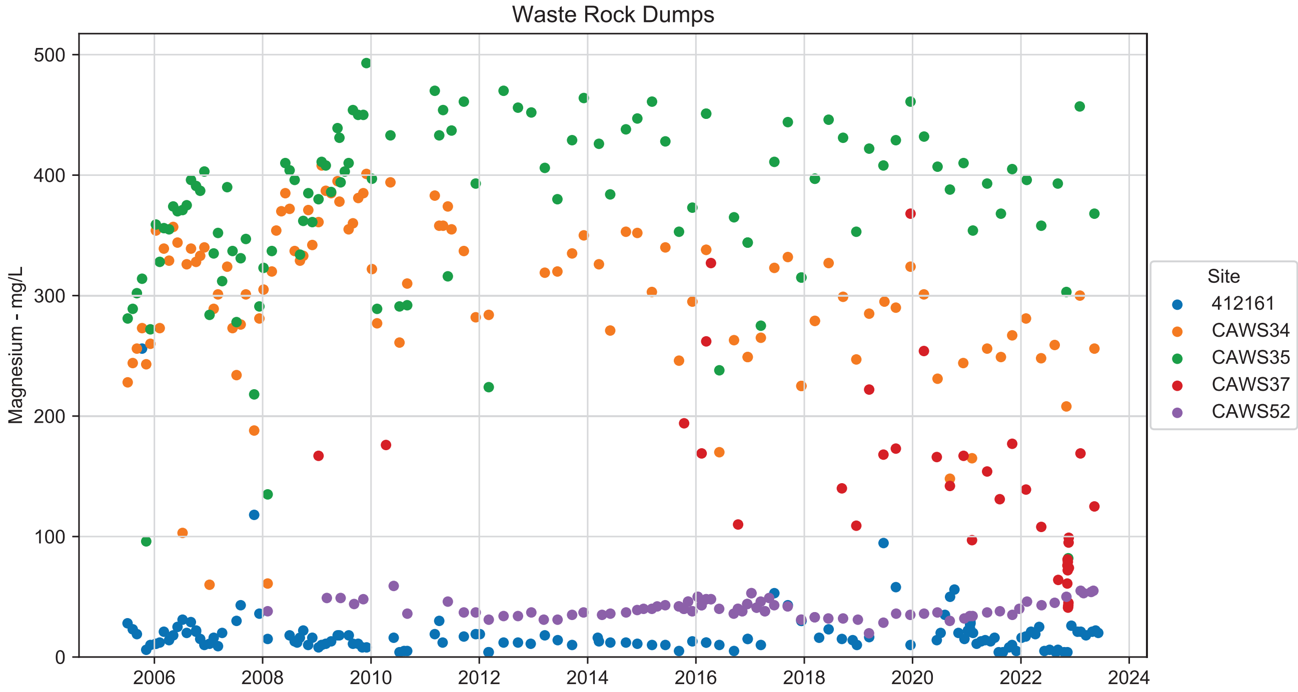
Waste Rock Dumps
Magnesium - mg/L
0
100
200
300
400
500
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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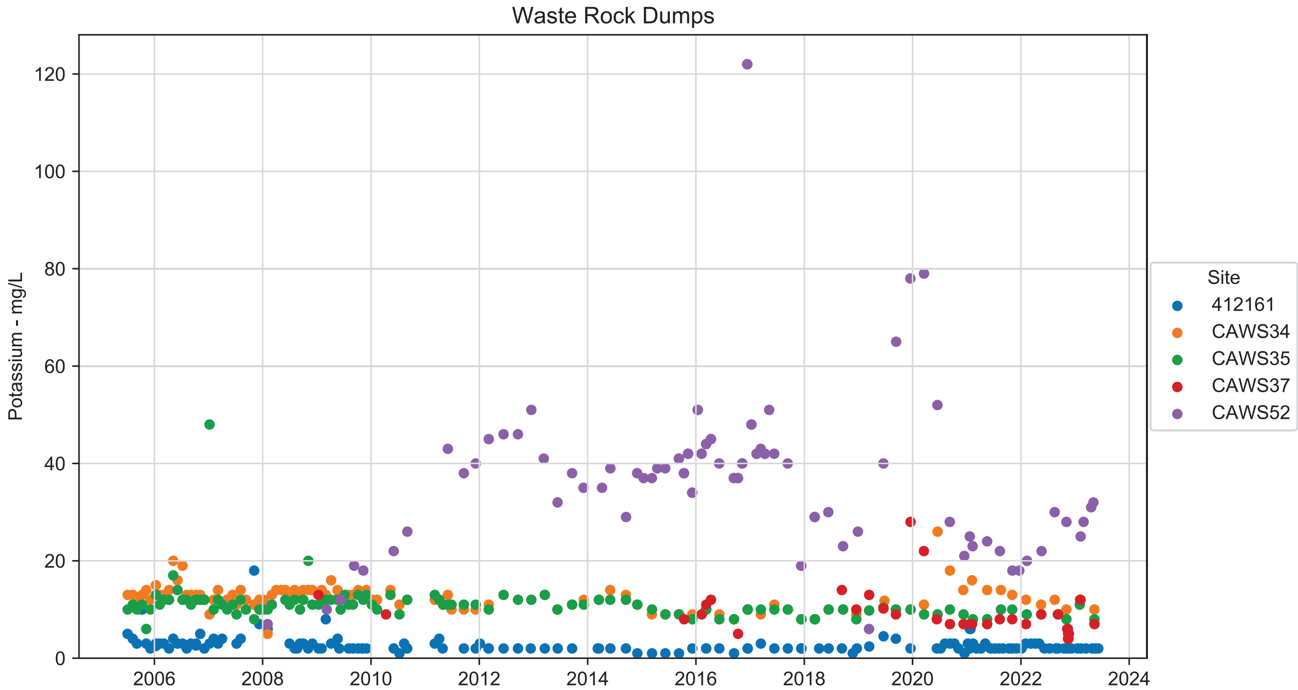
Waste Rock Dumps
Potassium - mg/L
0
20
40
60
80
100
120
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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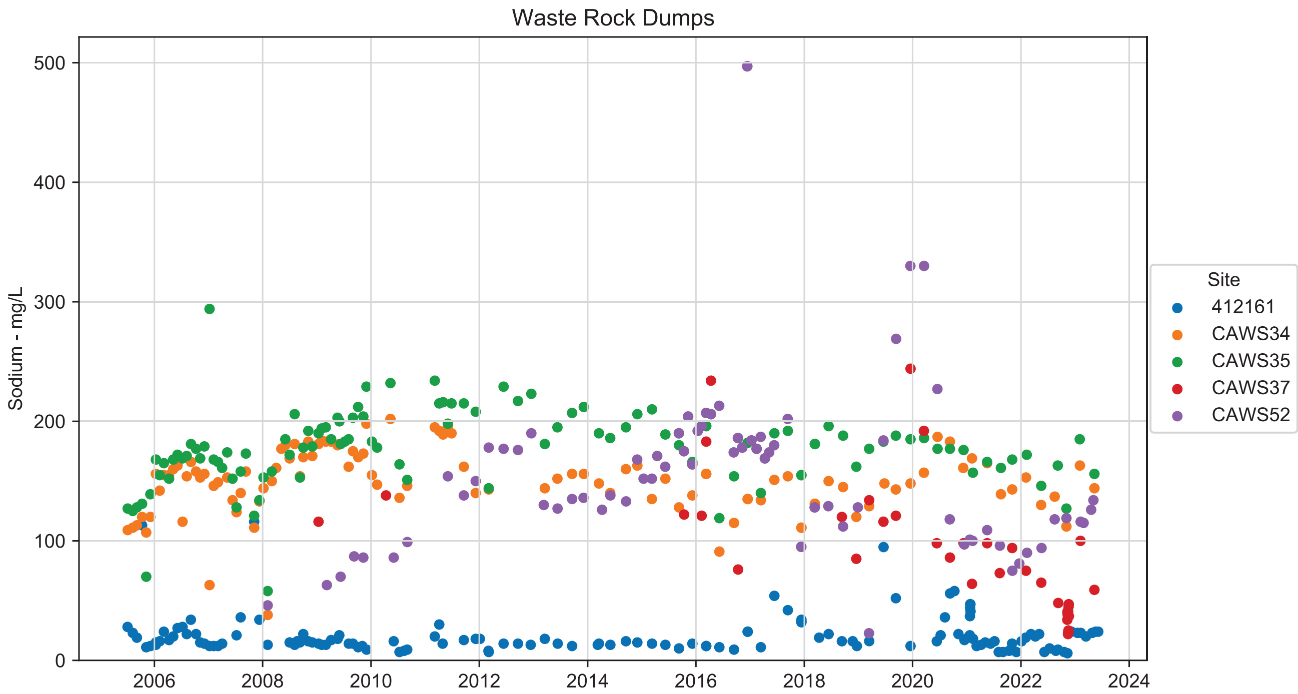
Waste Rock Dumps
Sodium - mg/L
0
100
200
300
400
500
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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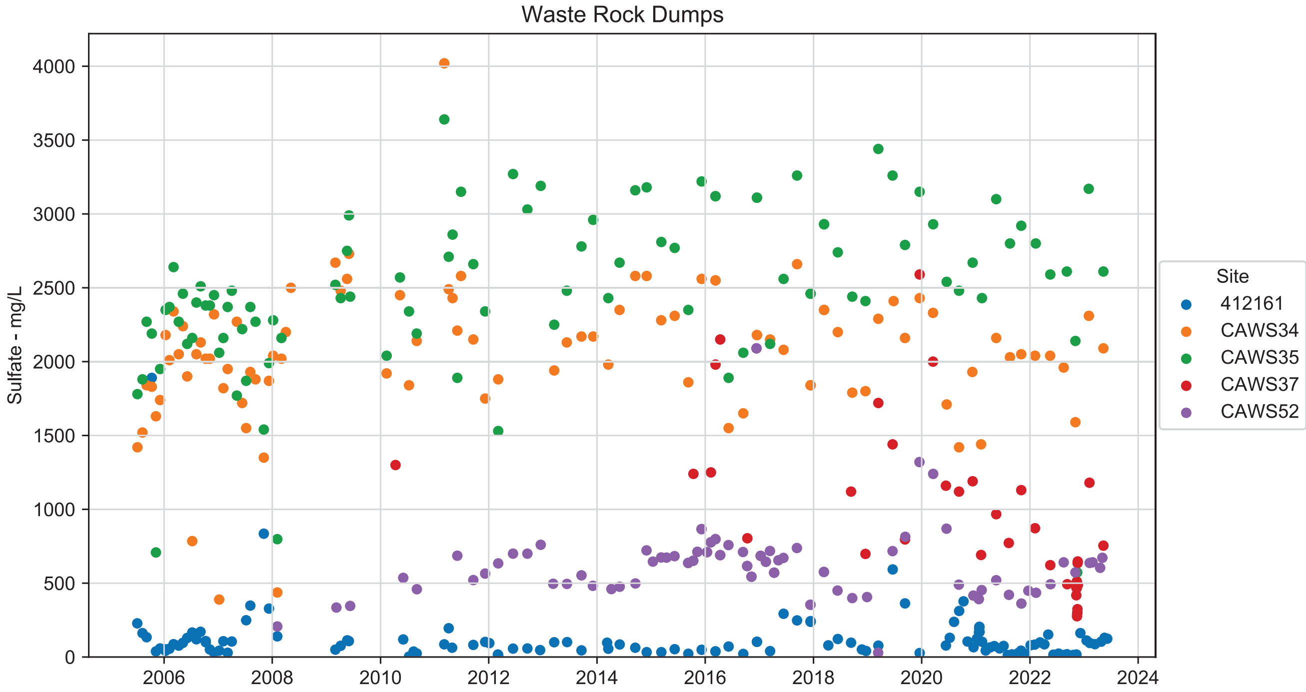
Waste Rock Dumps
Sulfate - mg/L
0
500
1000
1500
2000
2500
3000
3500
4000
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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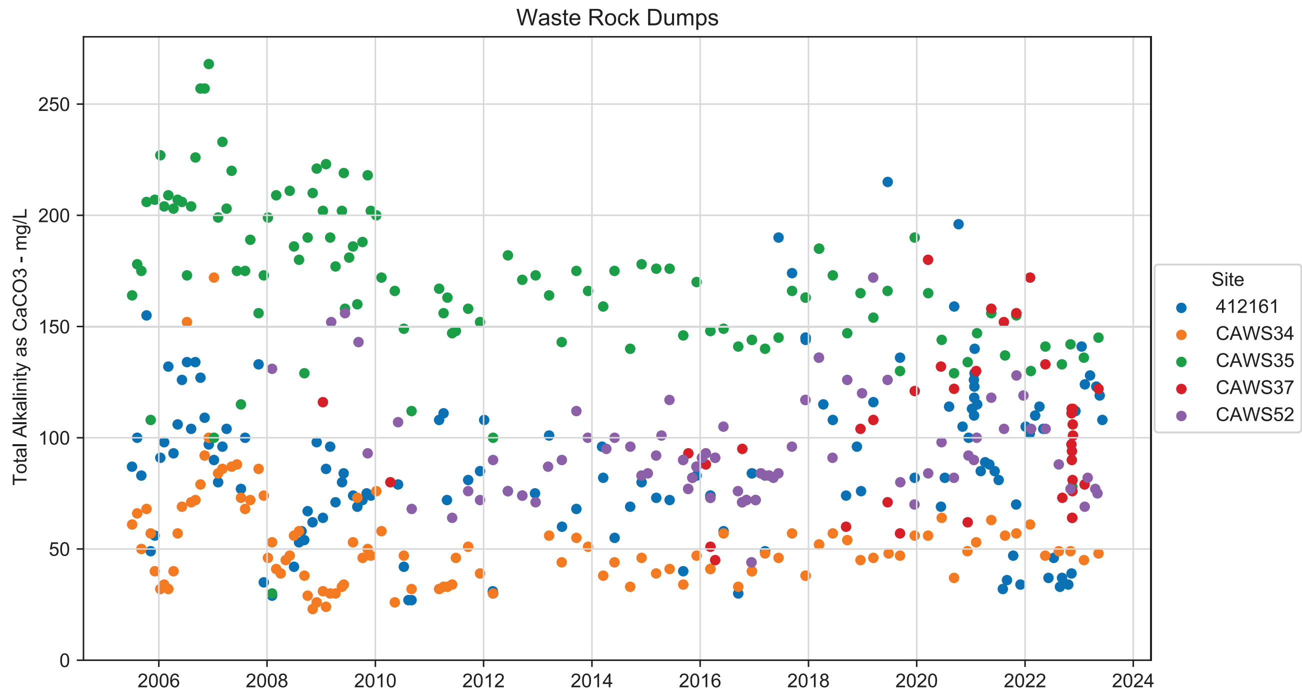
Waste Rock Dumps
Total Alkalinity as CaCO3 - mg/L
0
50
100
150
200
250
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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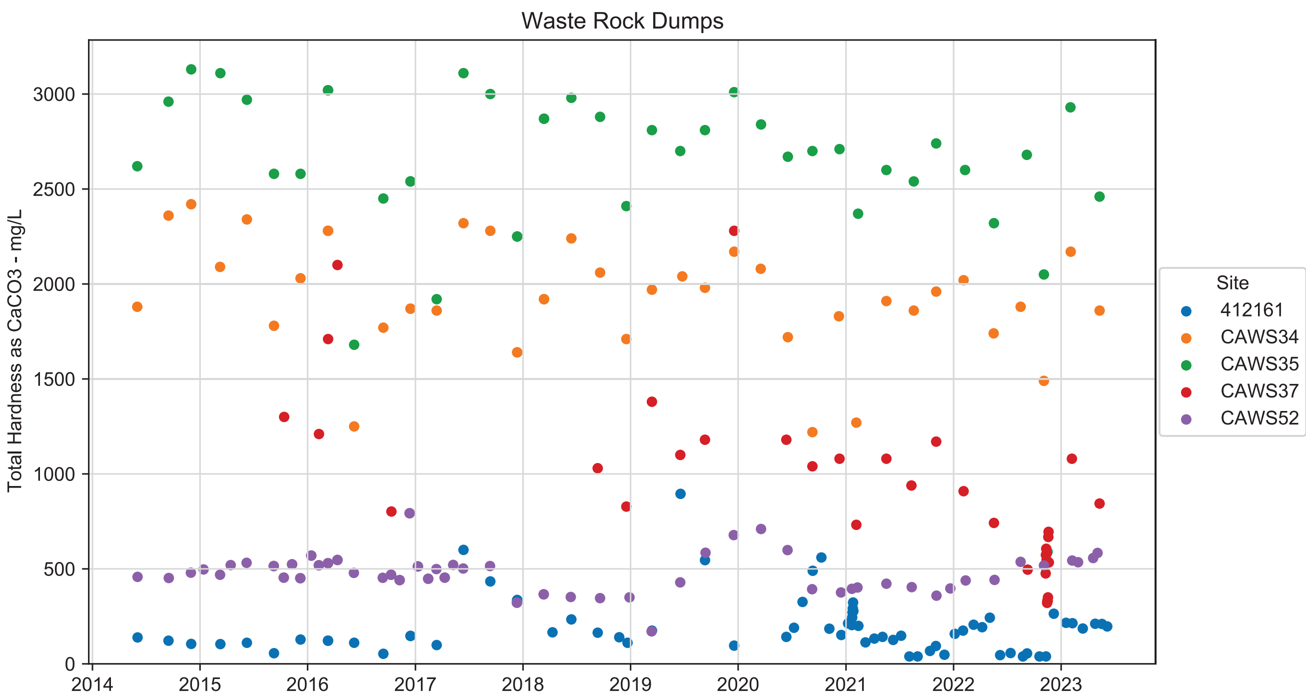
Waste Rock Dumps
Total Hardness as CaCO3 - mg/L
0
500
1000
1500
2000
2500
3000
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Site
412161
CAWS34
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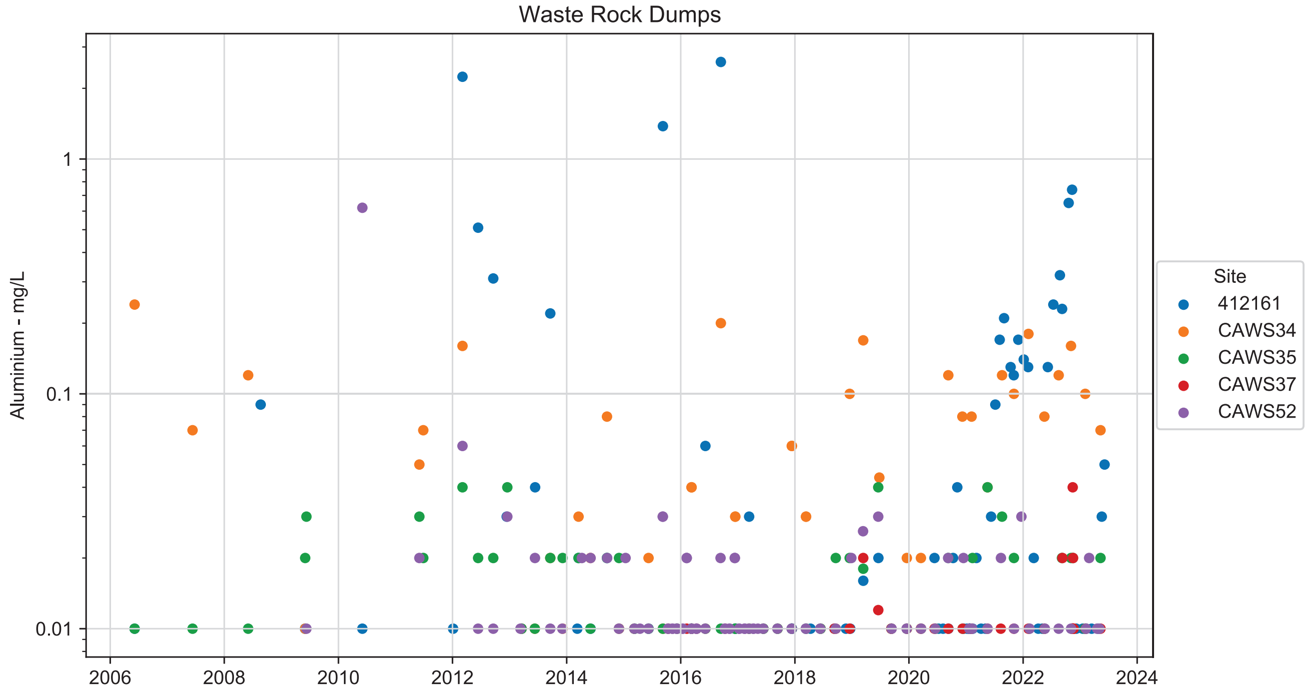

Waste Rock Dumps
Aluminium - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
CAWS34
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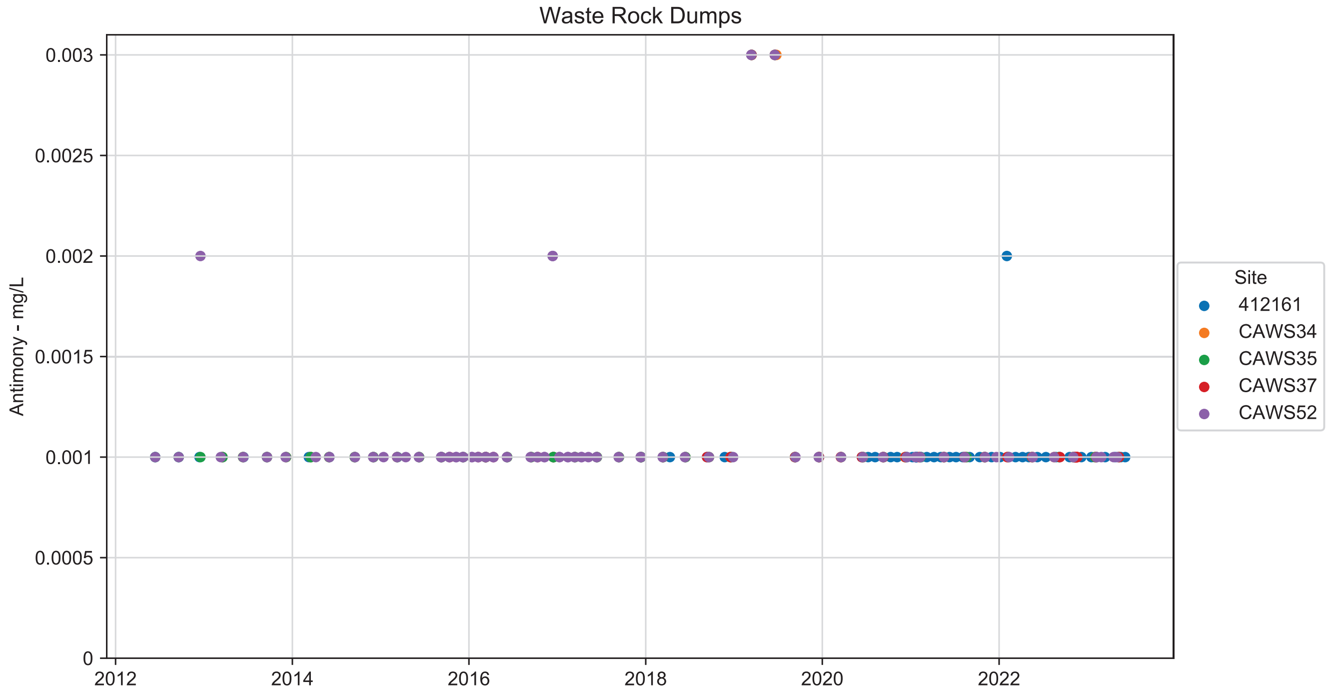

Waste Rock Dumps
Antimony - mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2012
2014
2016
2018
2020
2022
Site
412161
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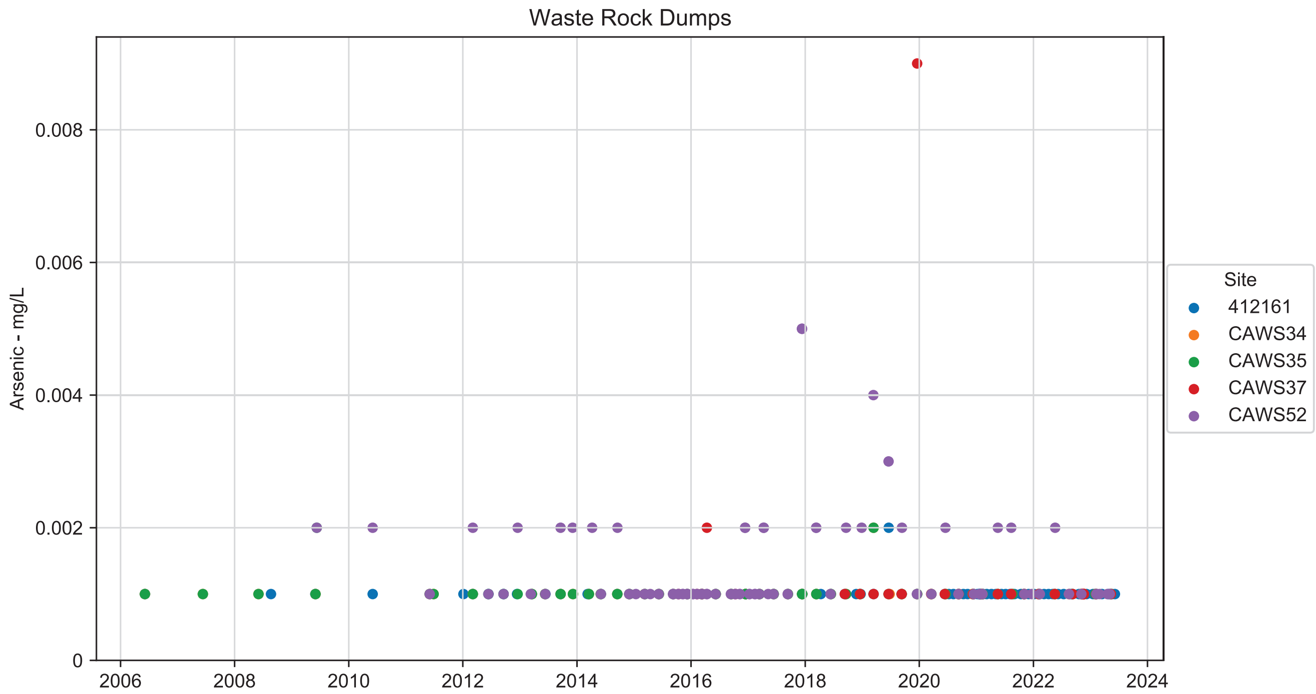

Waste Rock Dumps
Arsenic - mg/L
0.008
0.006
0.004
0.002
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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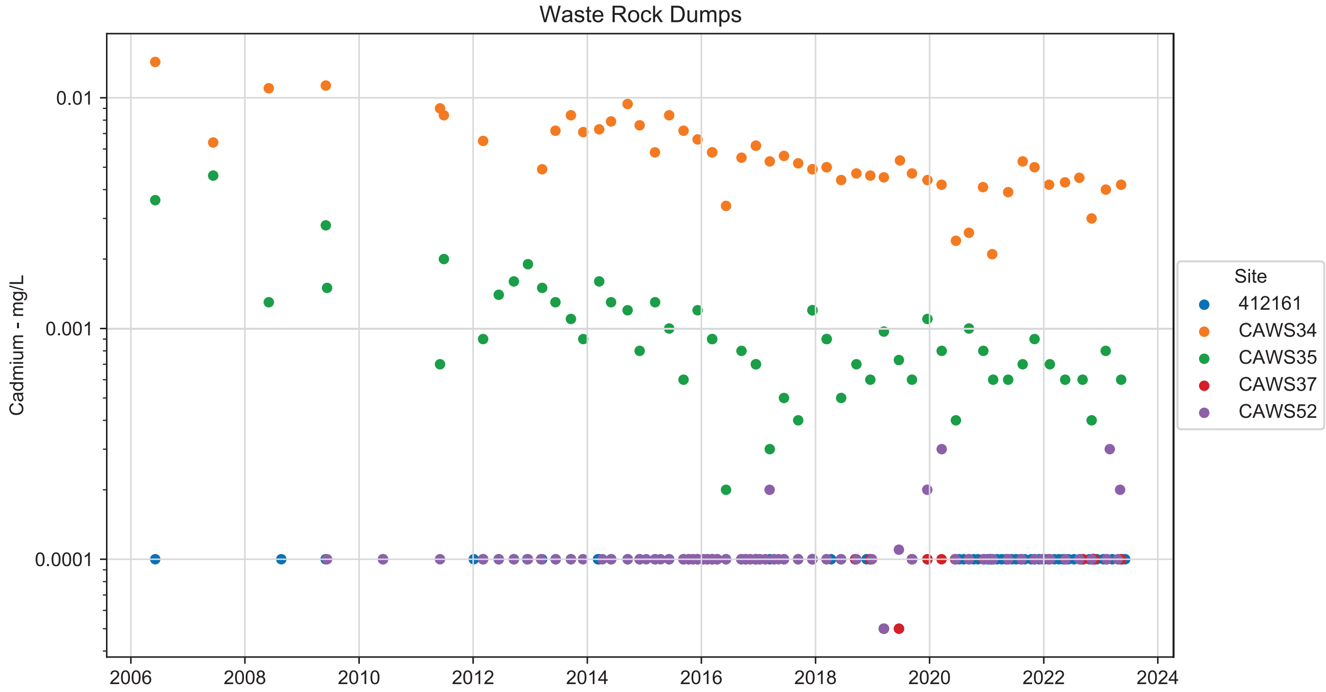
Waste Rock Dumps
Cadmium - mg/L
0.01
0.001
0.0001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
CAWS34
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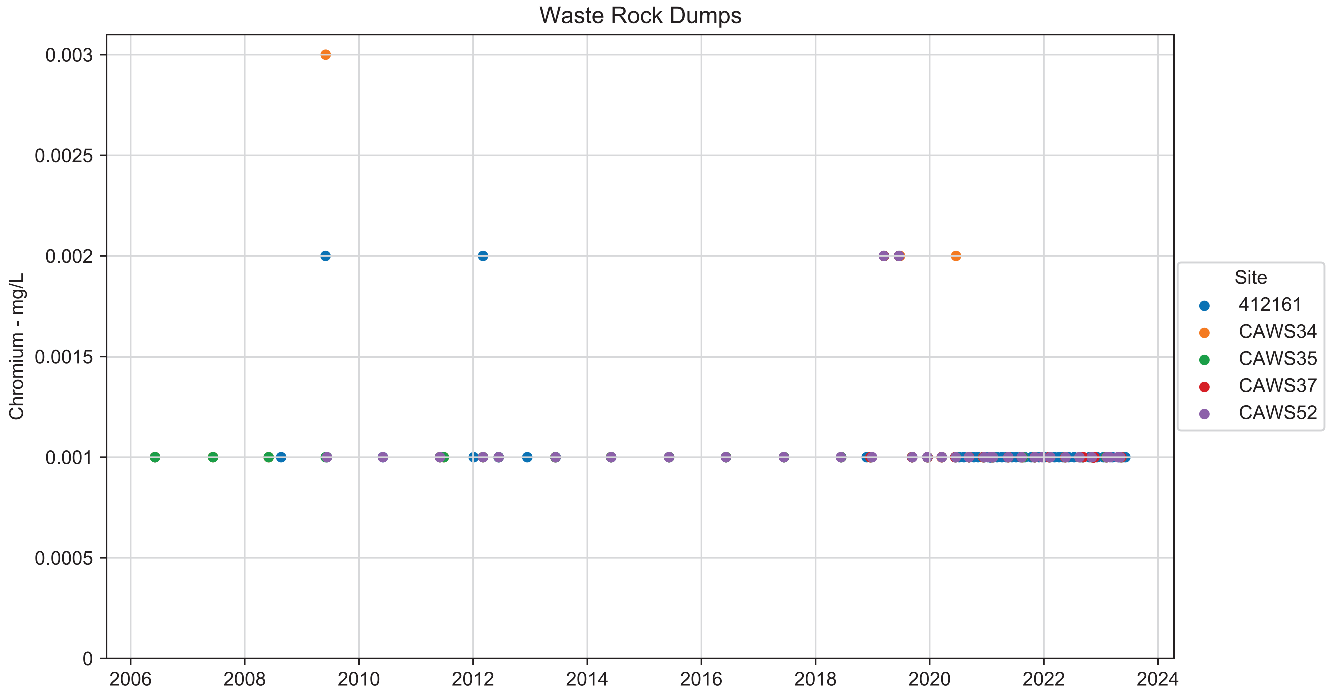
Waste Rock Dumps
Chromium - mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
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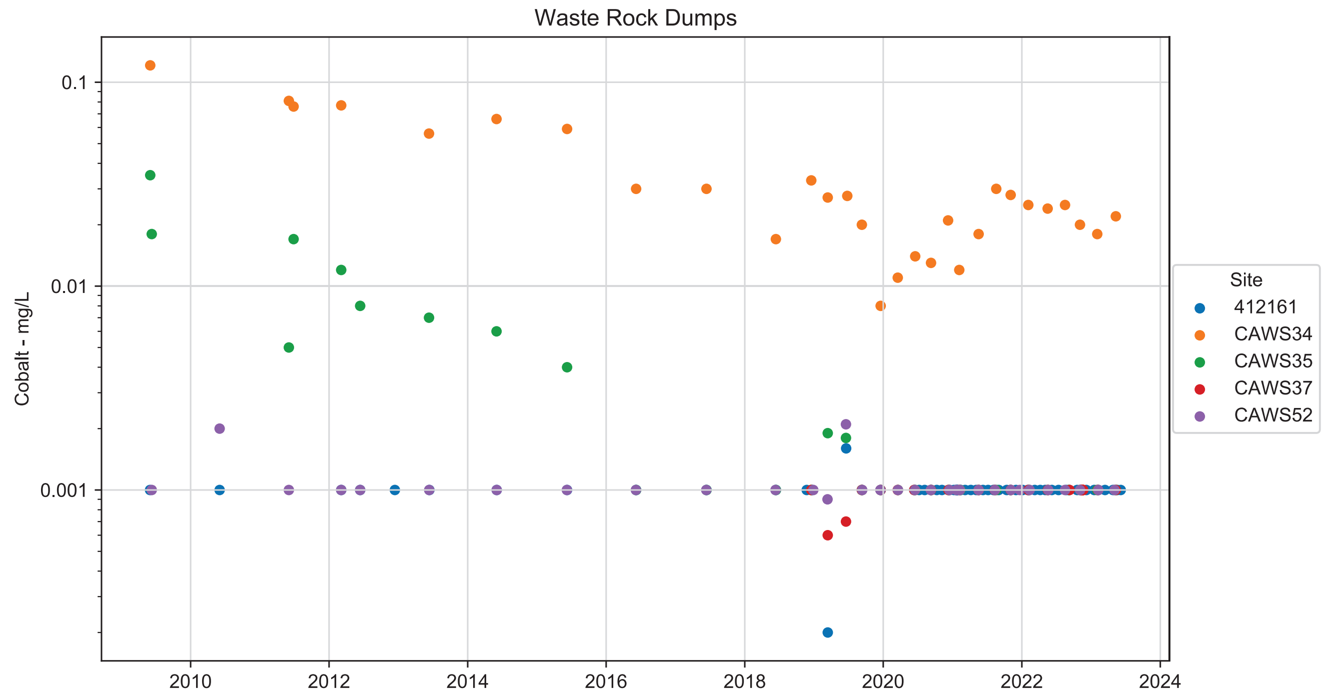
Waste Rock Dumps
Cobalt - mg/L
0.1
0.01
0.001
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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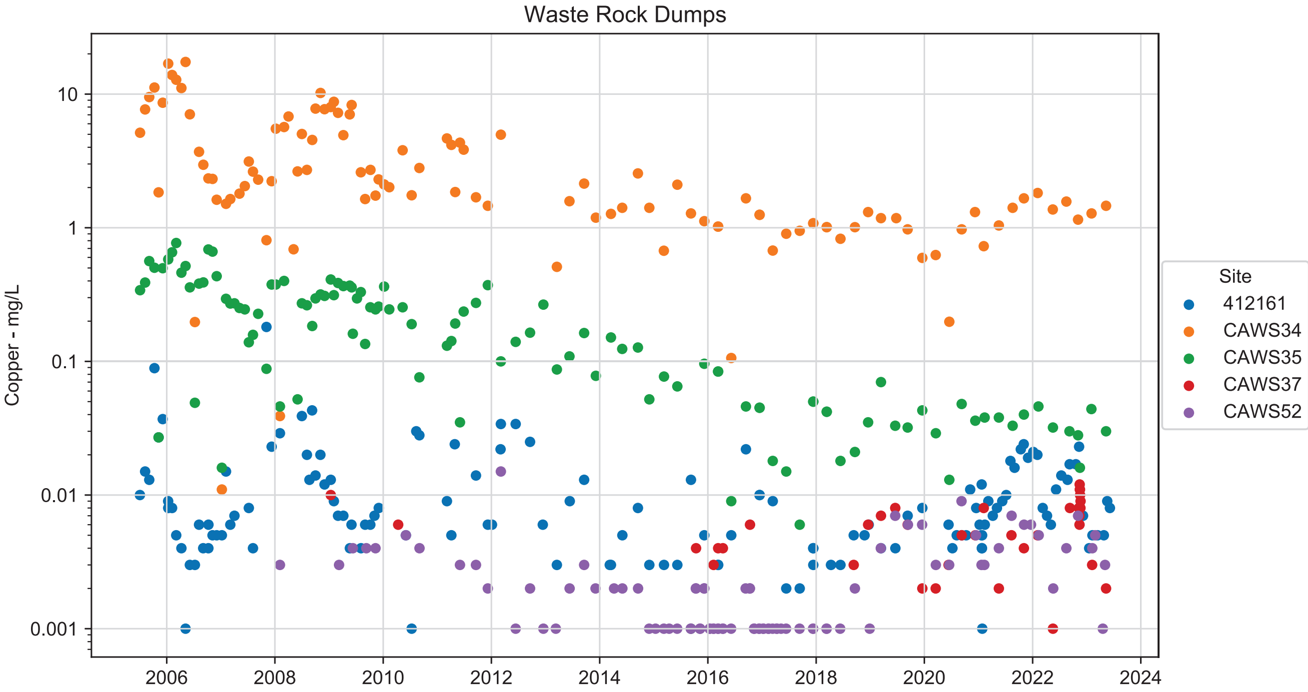

Waste Rock Dumps
Copper - mg/L
10
1
0.1
0.01
0.001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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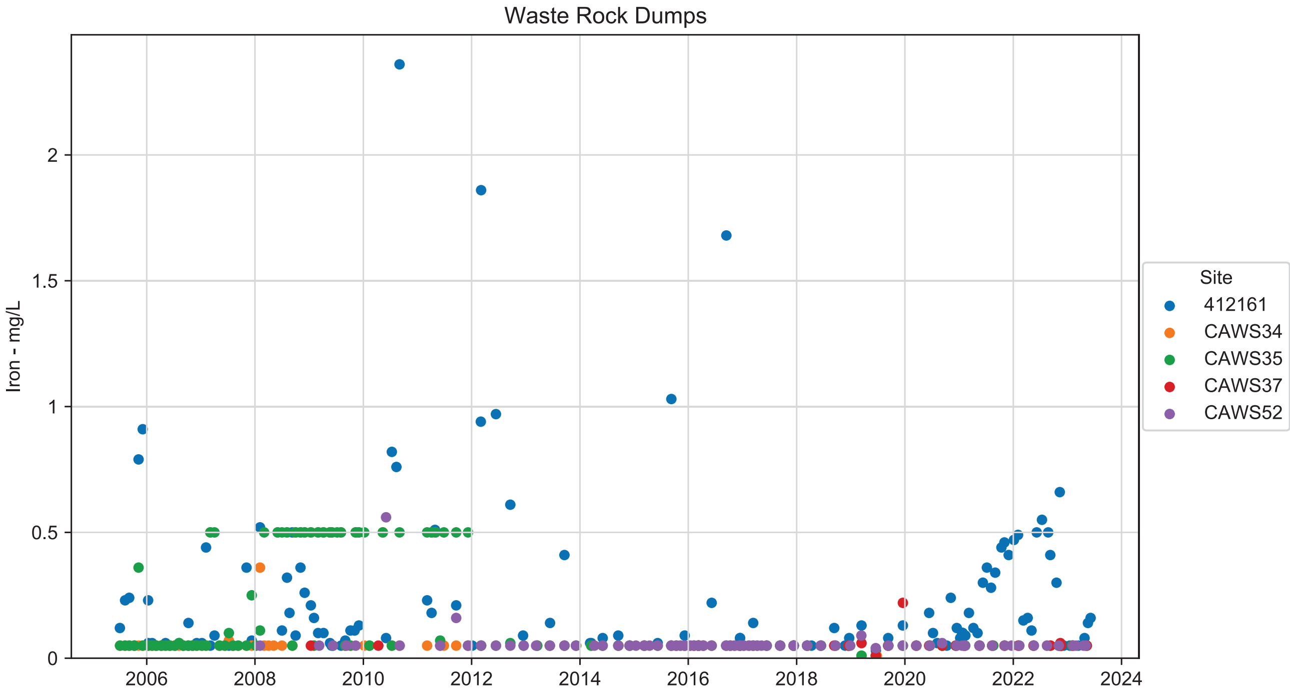

Waste Rock Dumps
Iron - mg/L
2
1.5
1
0.5
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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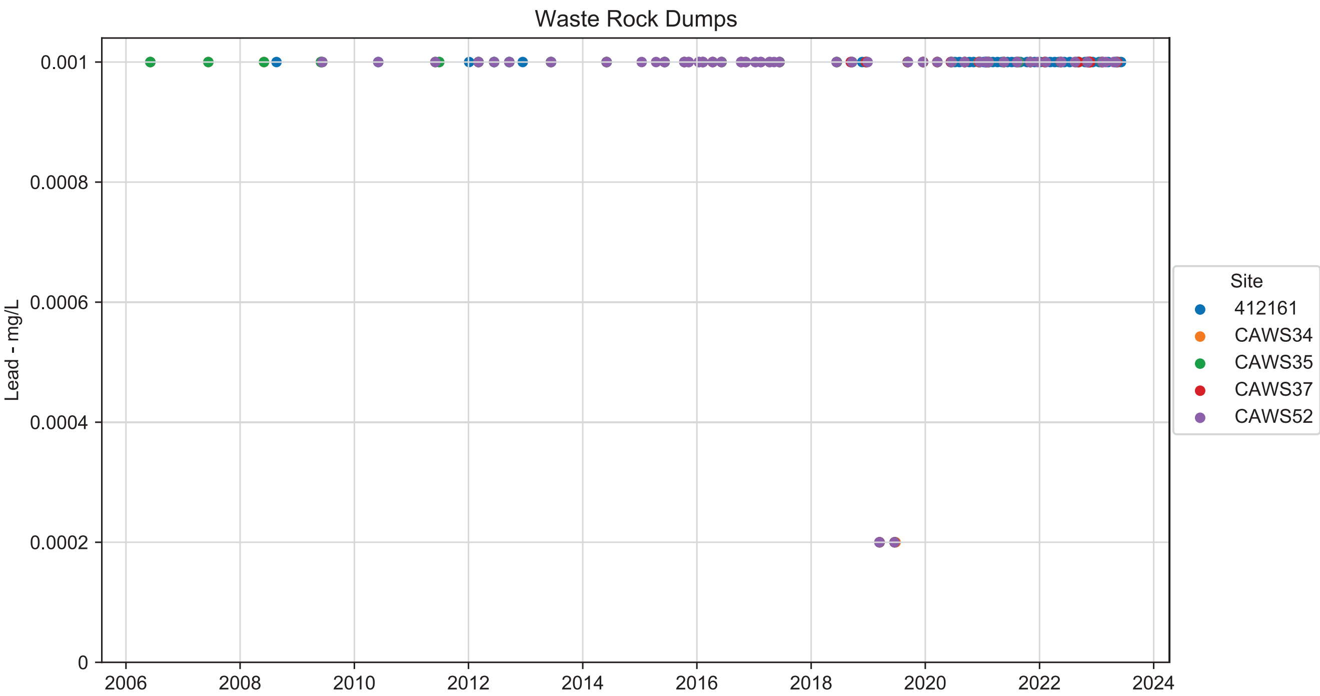

Waste Rock Dumps
Lead - mg/L
0.001
0.0008
0.0006
0.0004
0.0002
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
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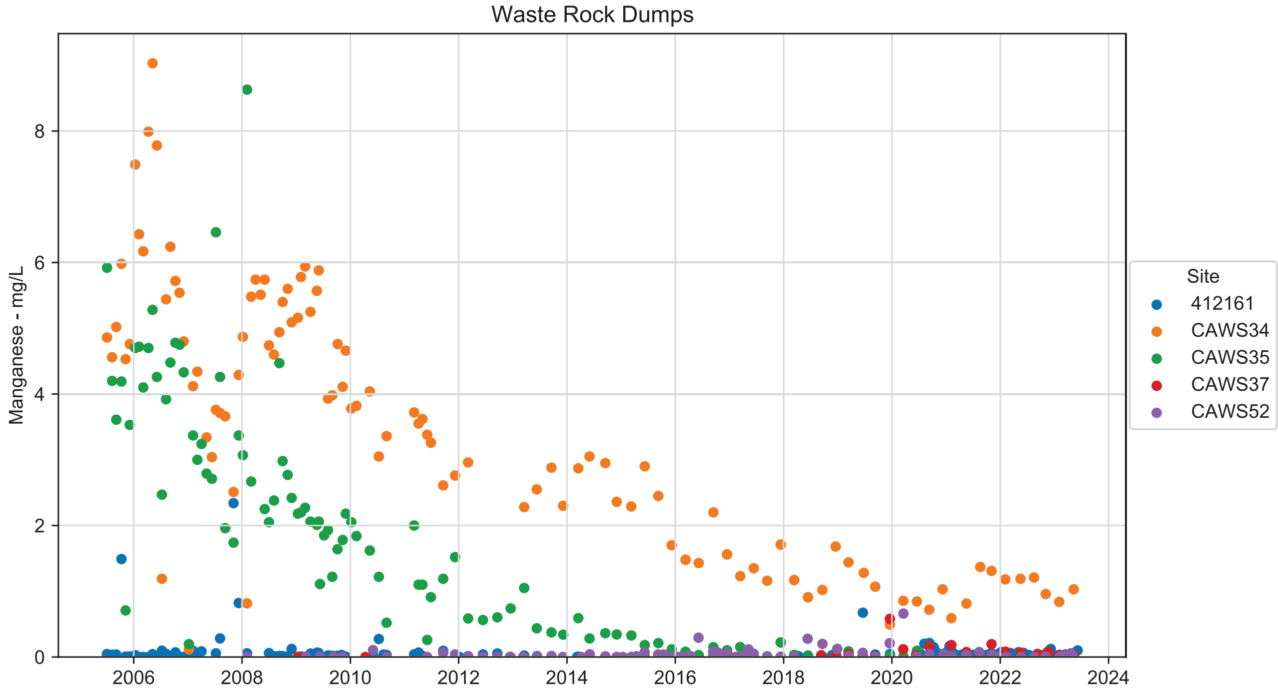

Waste Rock Dumps
Manganese - mg/L
0
2
4
6
8
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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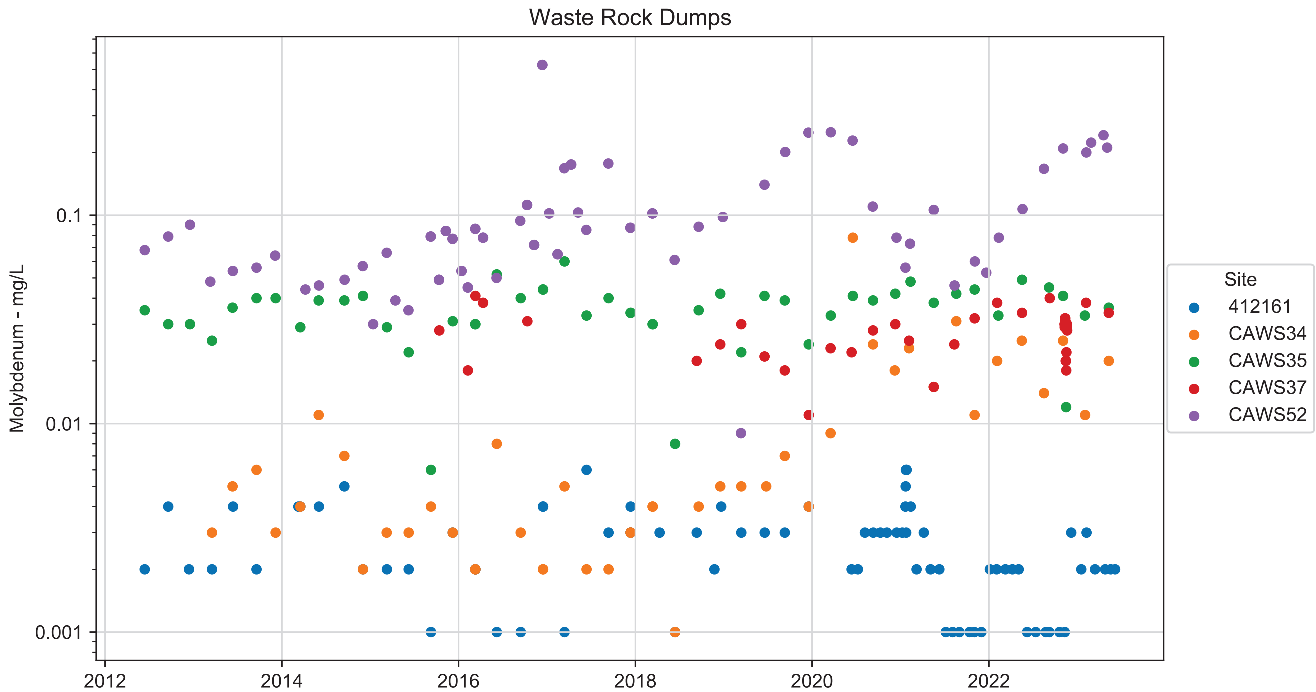

Waste Rock Dumps
Molybdenum - mg/L
0.001
0.01
0.1
2012
2014
2016
2018
2020
2022
Site
412161
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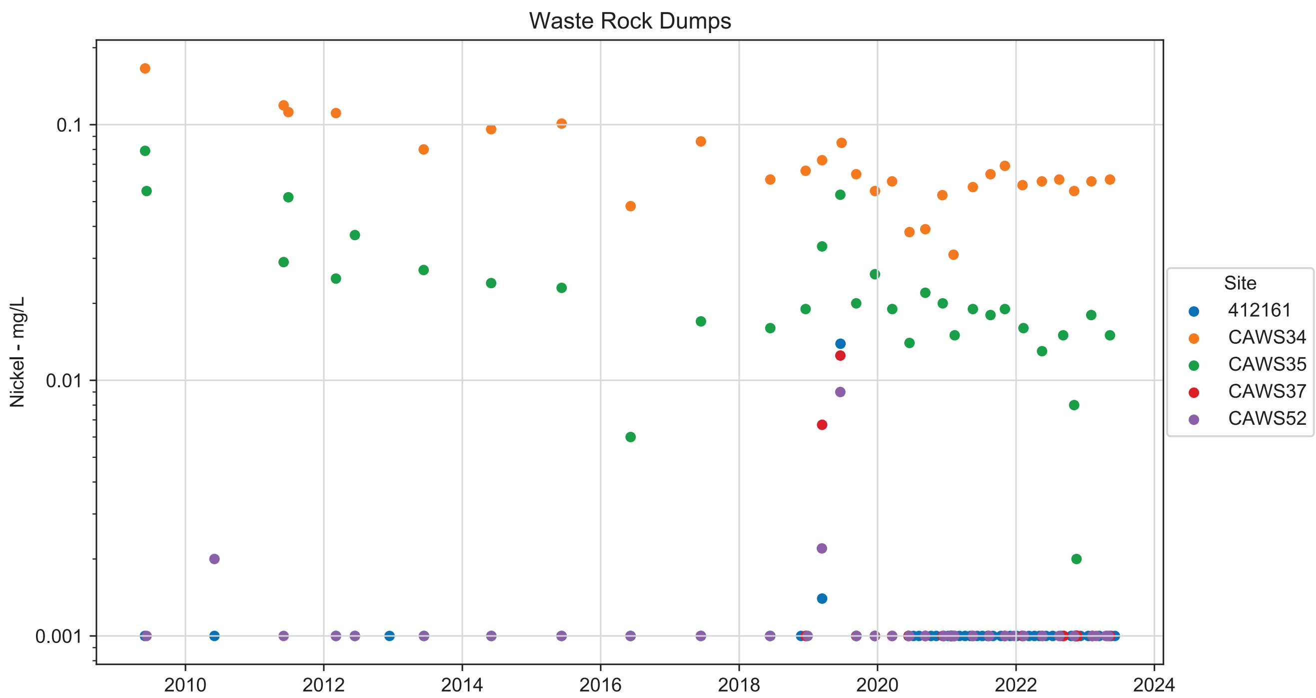

Waste Rock Dumps
Nickel - mg/L
0.001
0.01
0.1
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
CAWS34
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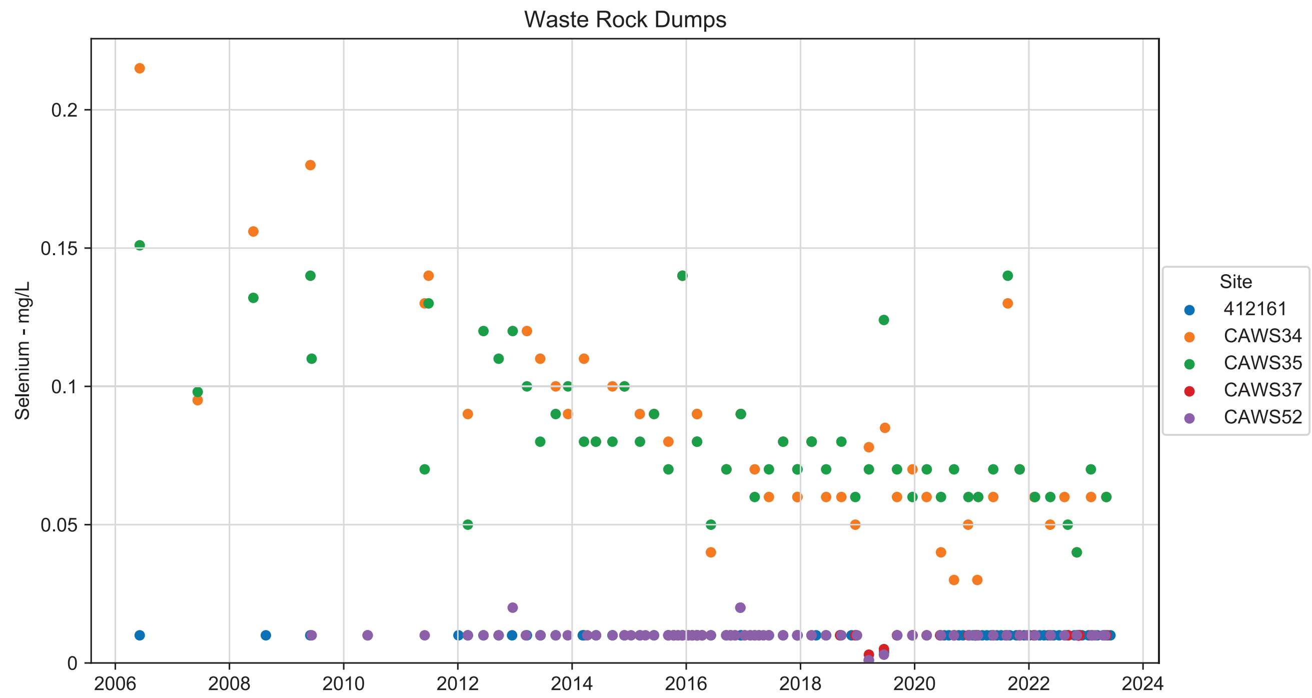

Waste Rock Dumps
Selenium - mg/L
0
0.05
0.1
0.15
0.2
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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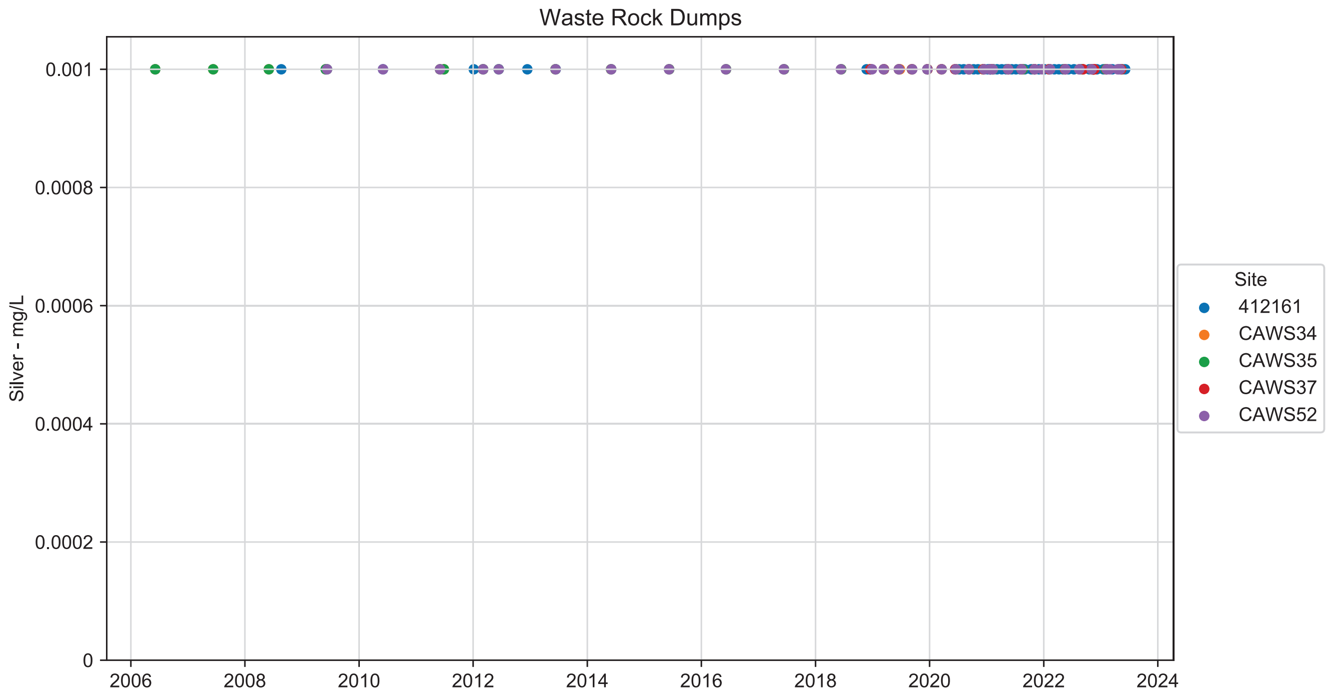

Waste Rock Dumps
Silver - mg/L
0
0.0002
0.0004
0.0006
0.0008
0.001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
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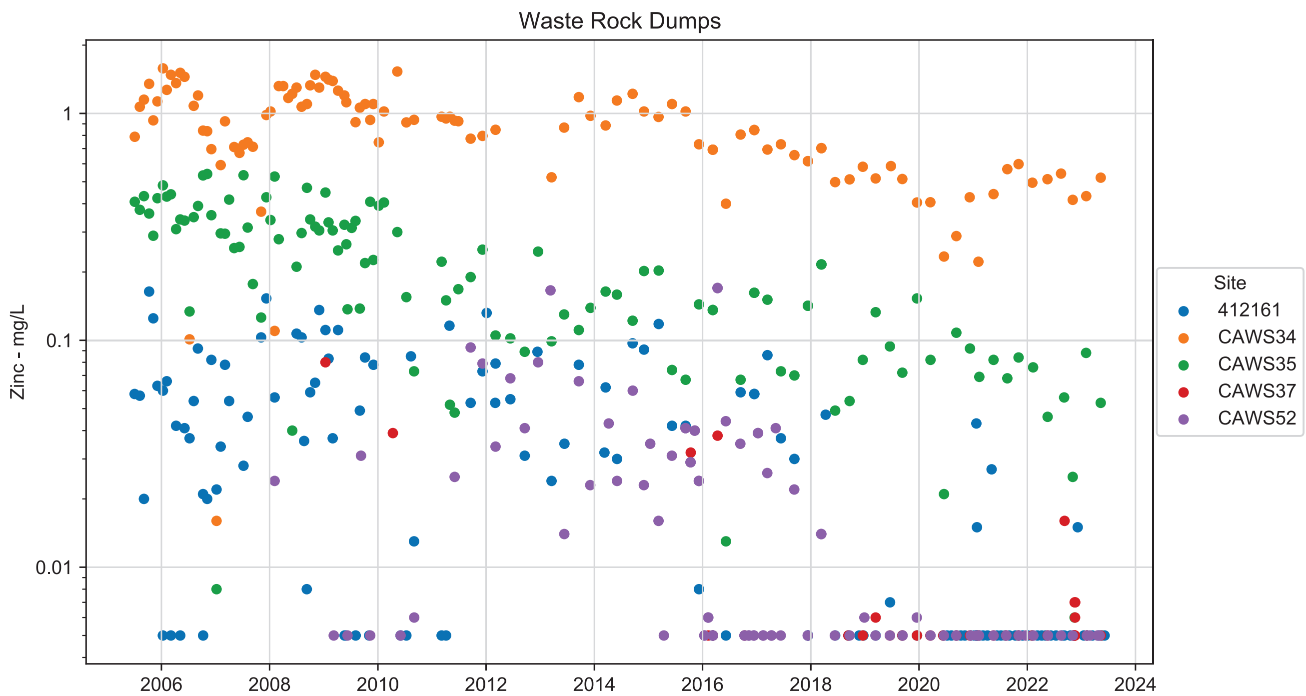

Waste Rock Dumps
Zinc - mg/L
0.01
0.1
1
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412161
CAWS34
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CAWS37
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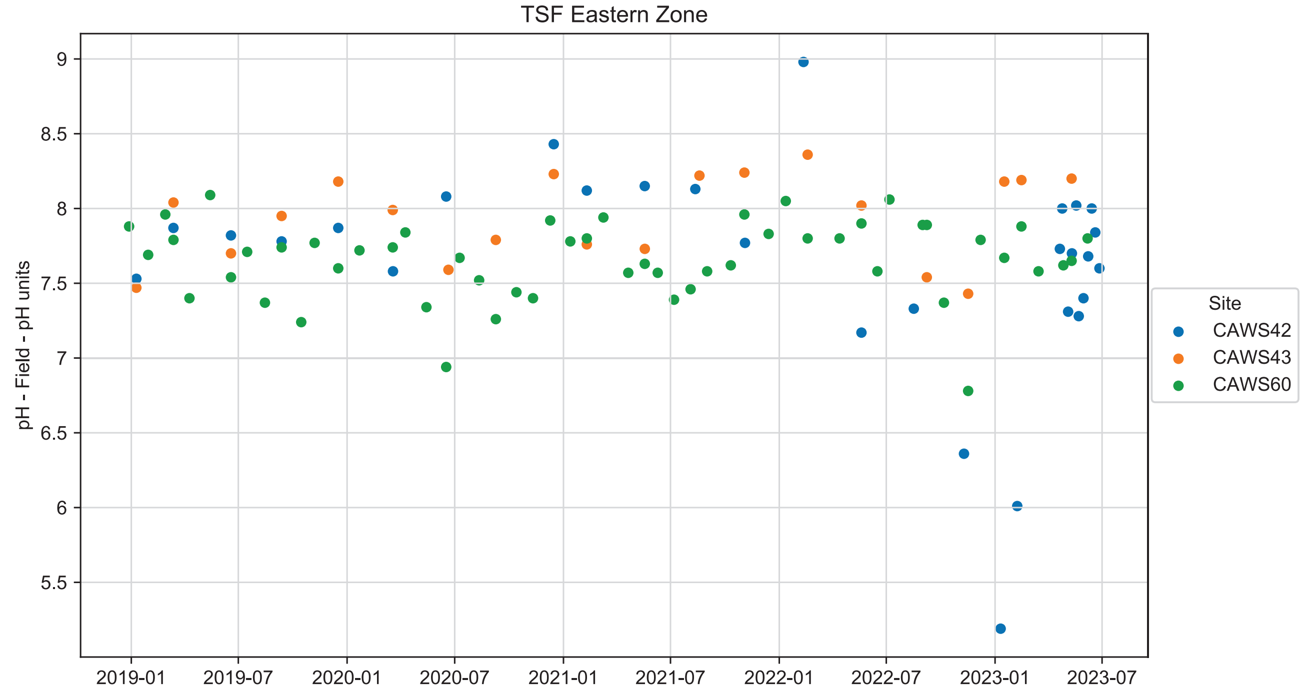
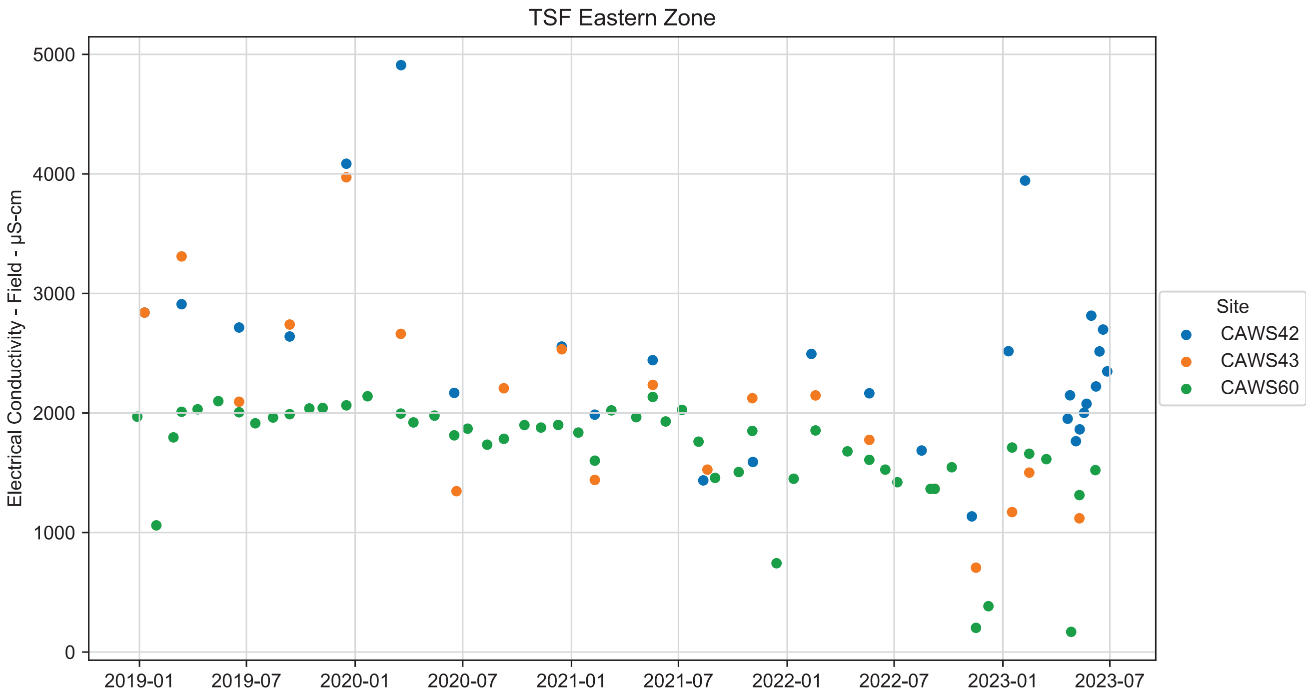
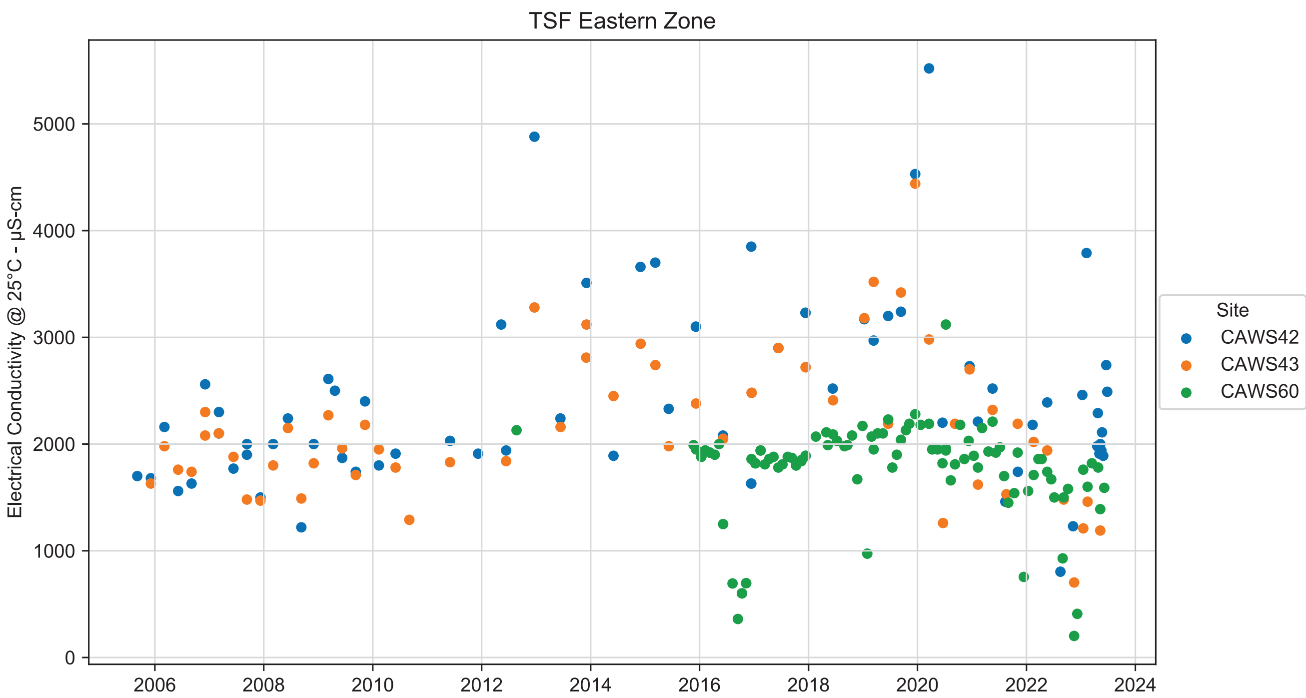
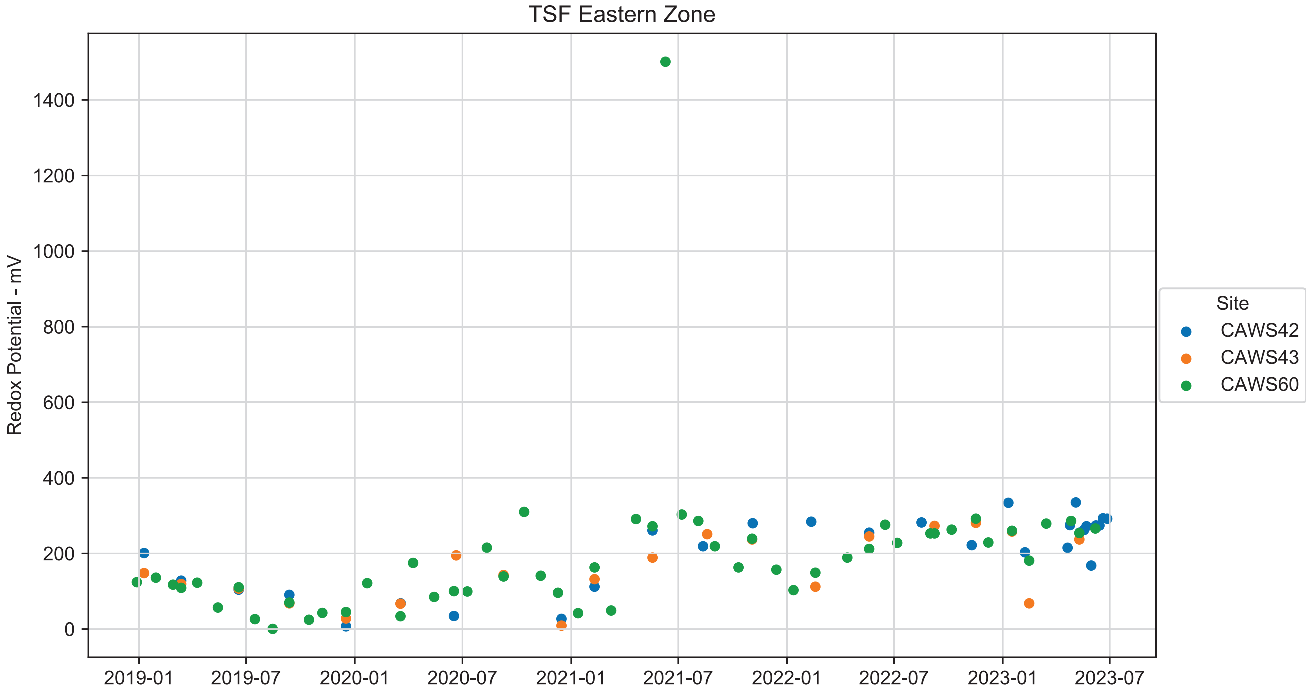

TSF Eastern Zone
pH - Field - pH units
9
8.5
8
7.5
7
6.5
6
5.5
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Electrical Conductivity - Field - µS-cm
5000
4000
3000
2000
1000
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Electrical Conductivity @ 25°C - µS-cm
5000
4000
3000
2000
1000
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Redox Potential - mV
0
200
400
600
800
1000
1200
1400
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
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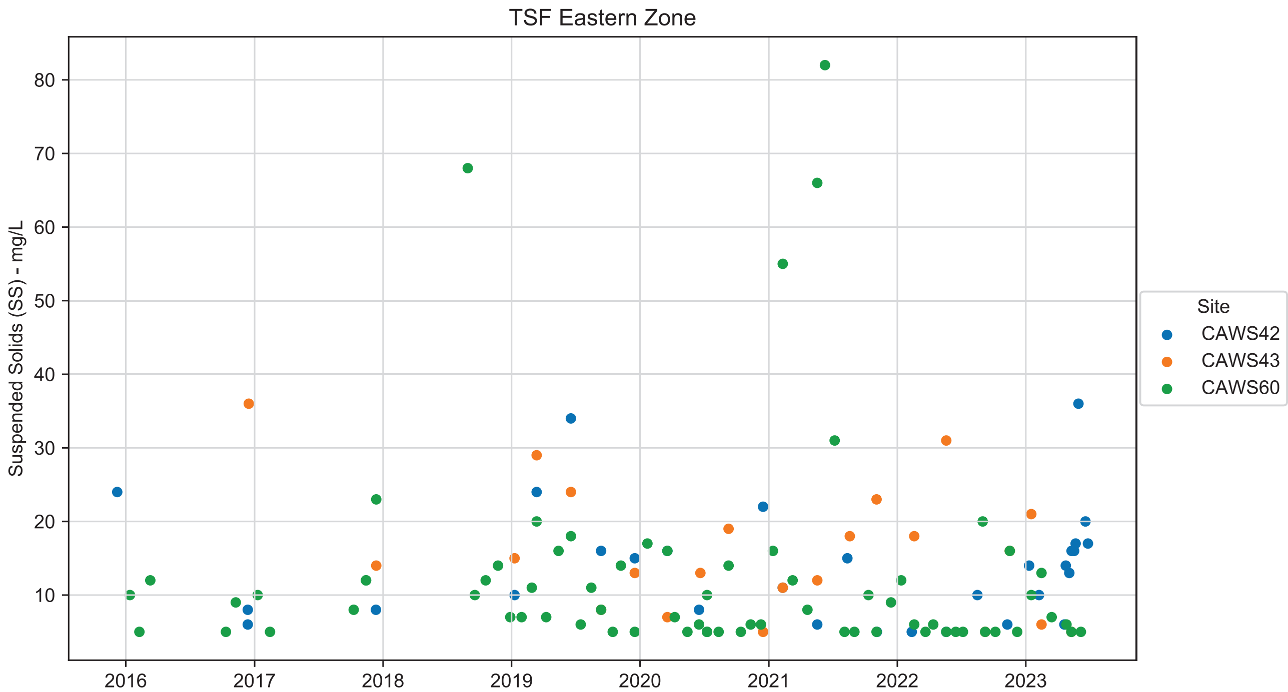
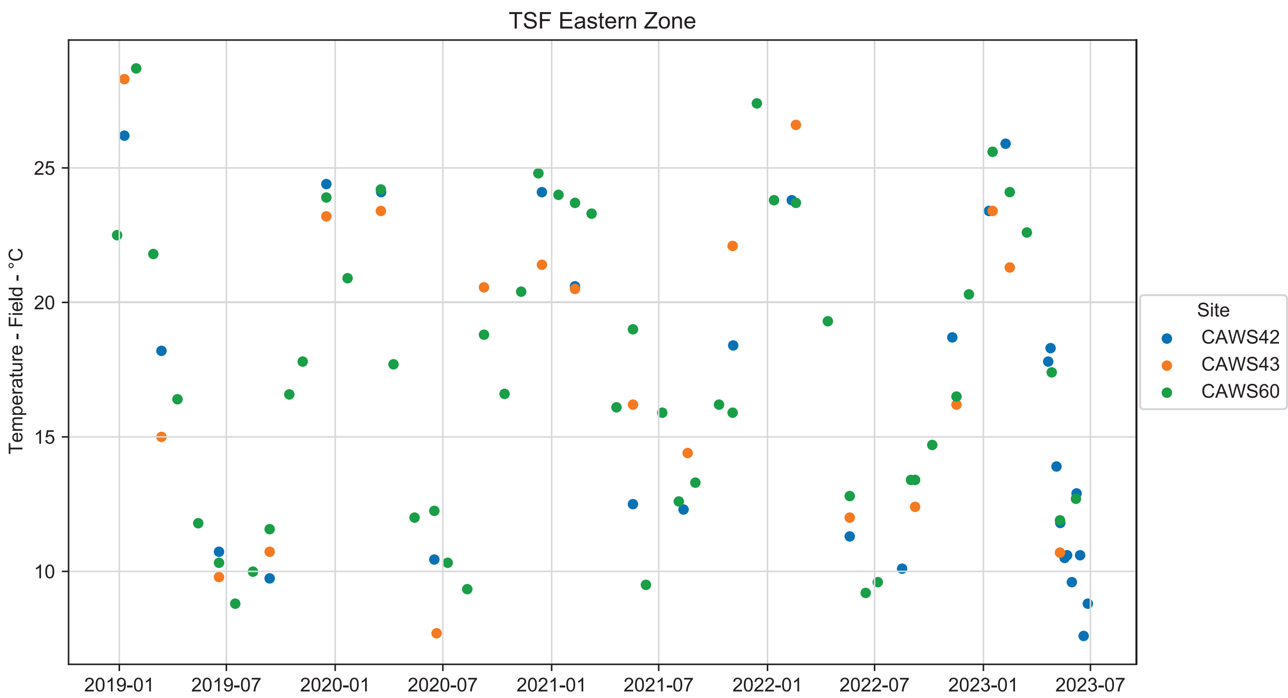
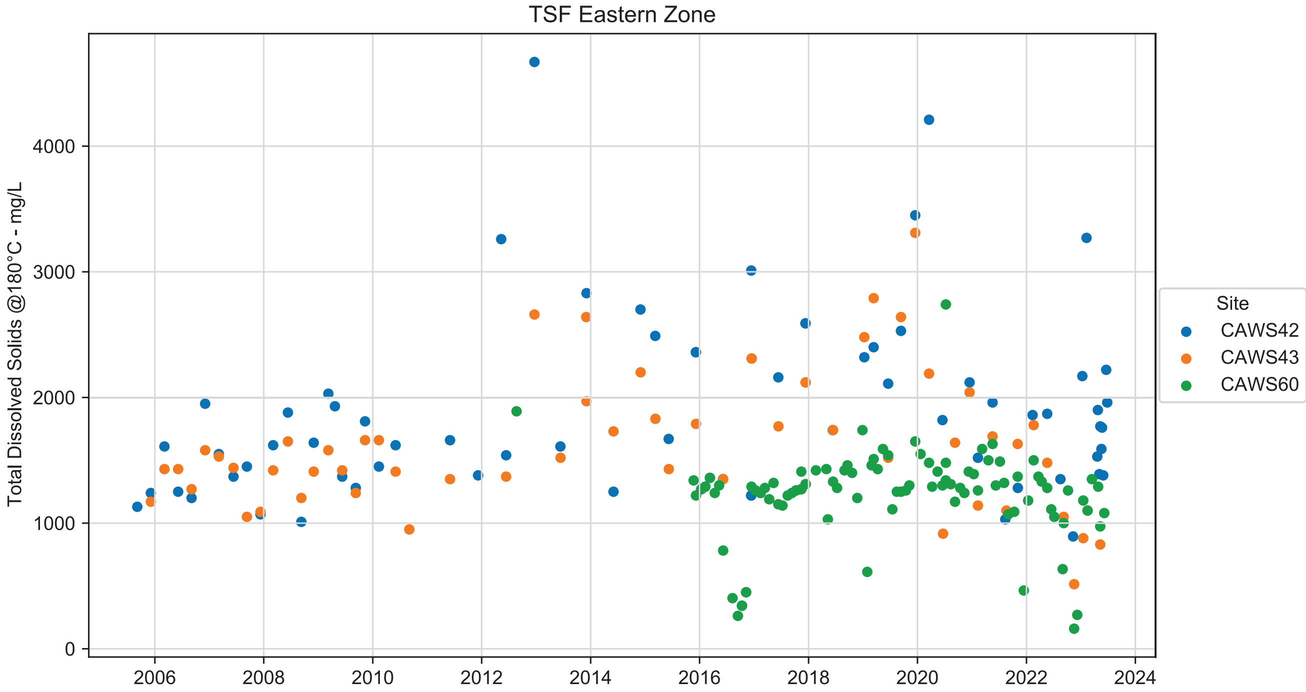
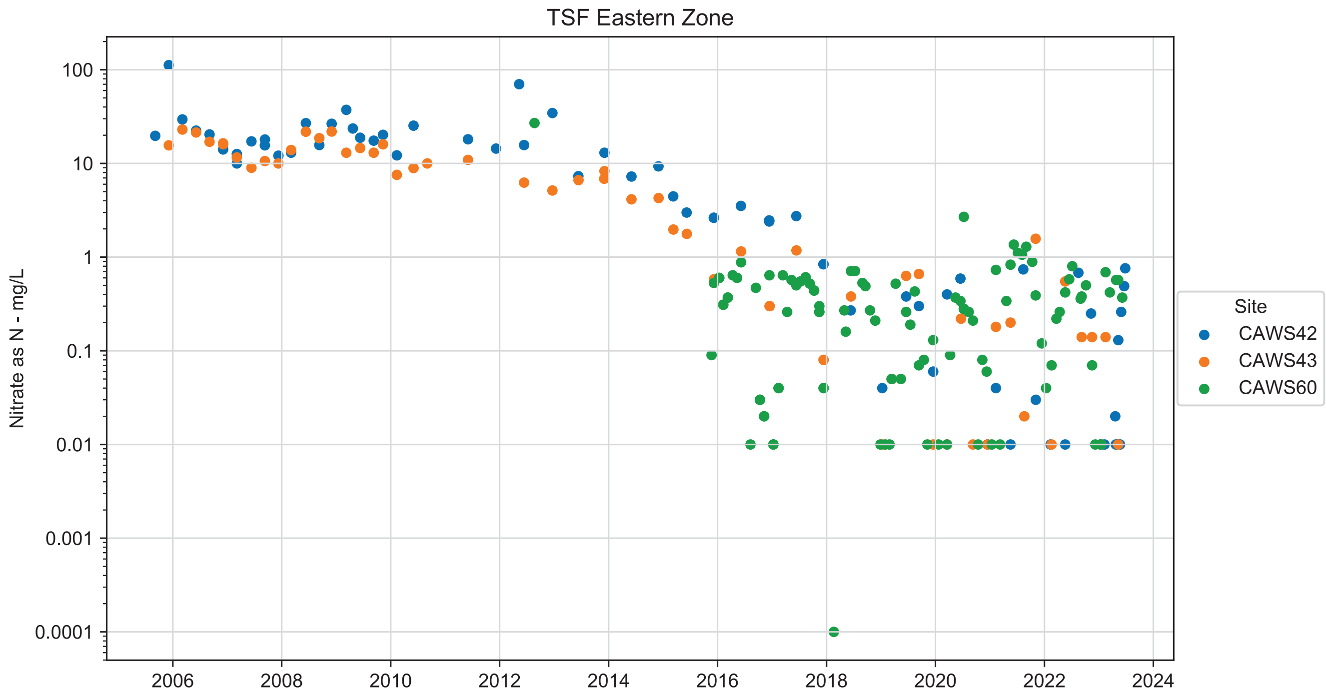
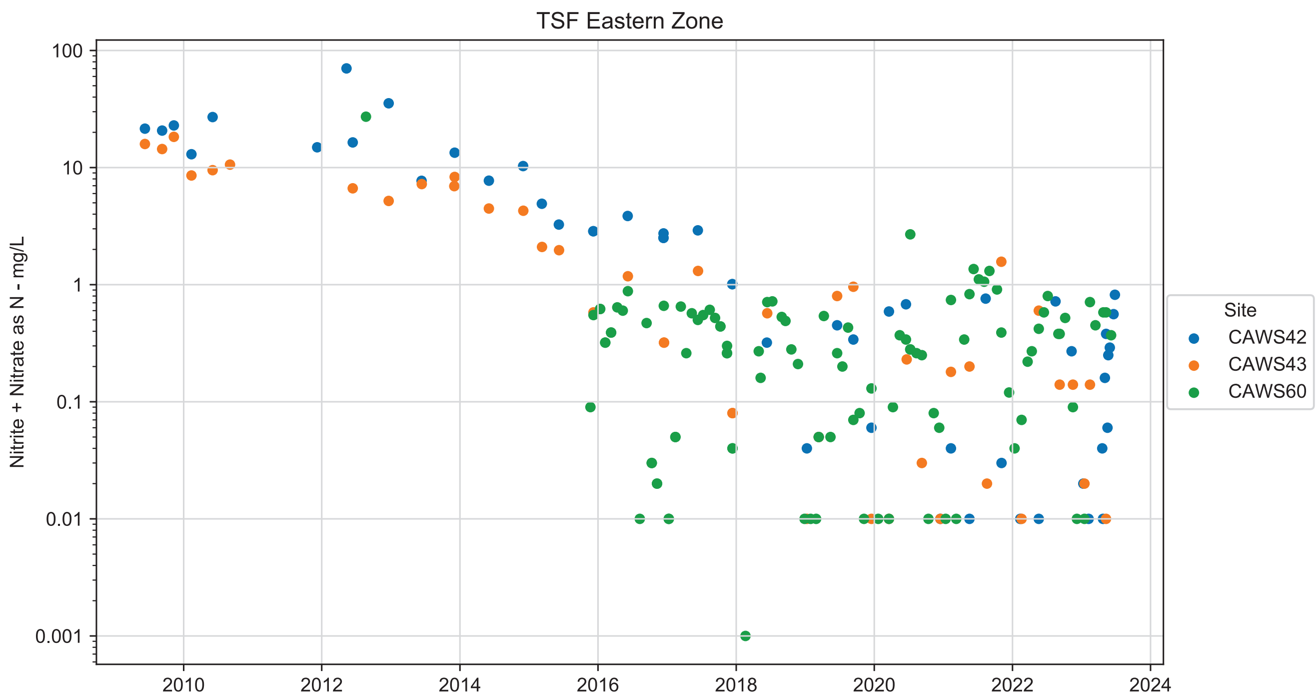
CAWS60

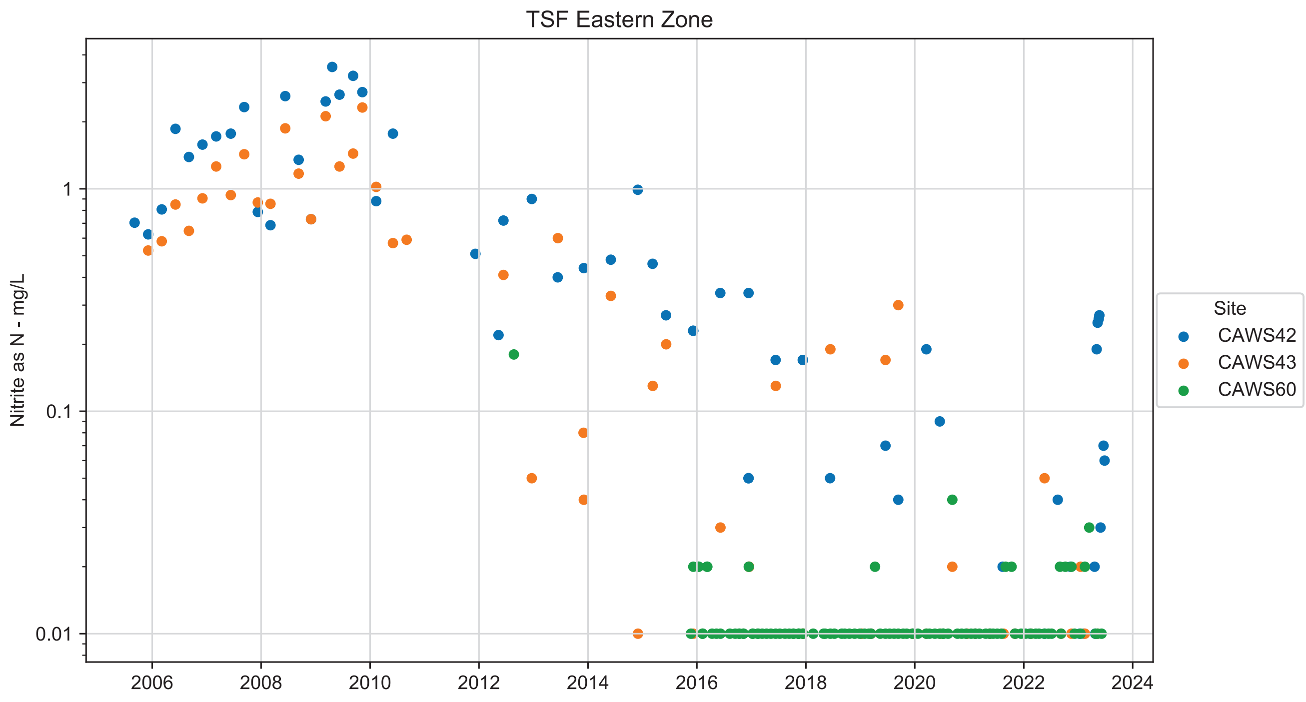

TSF Eastern Zone
Suspended Solids (SS) - mg/L
10
20
30
40
50
60
70
80
2016
2017
2018
2019
2020
2021
2022
2023
Site
CAWS42
CAWS43
CAWS60

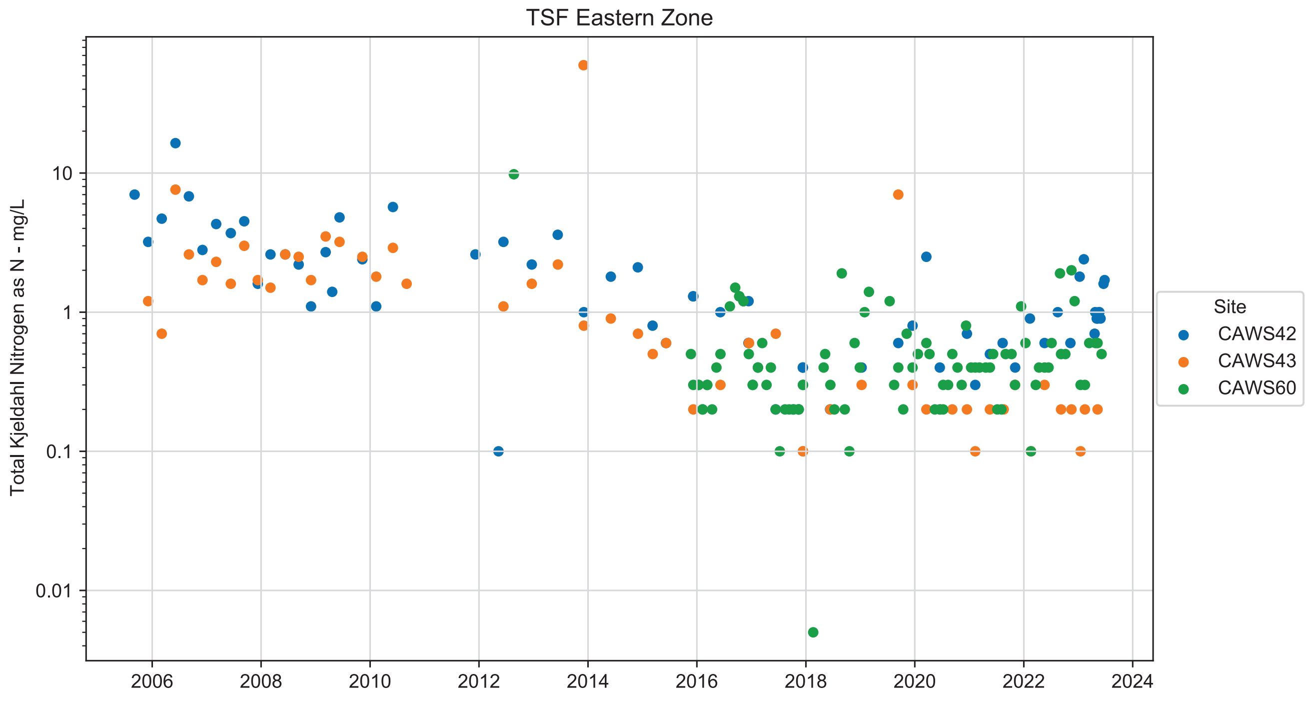

TSF Eastern Zone
Temperature - Field - °C
10
15
20
25
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS42
CAWS43
CAWS60

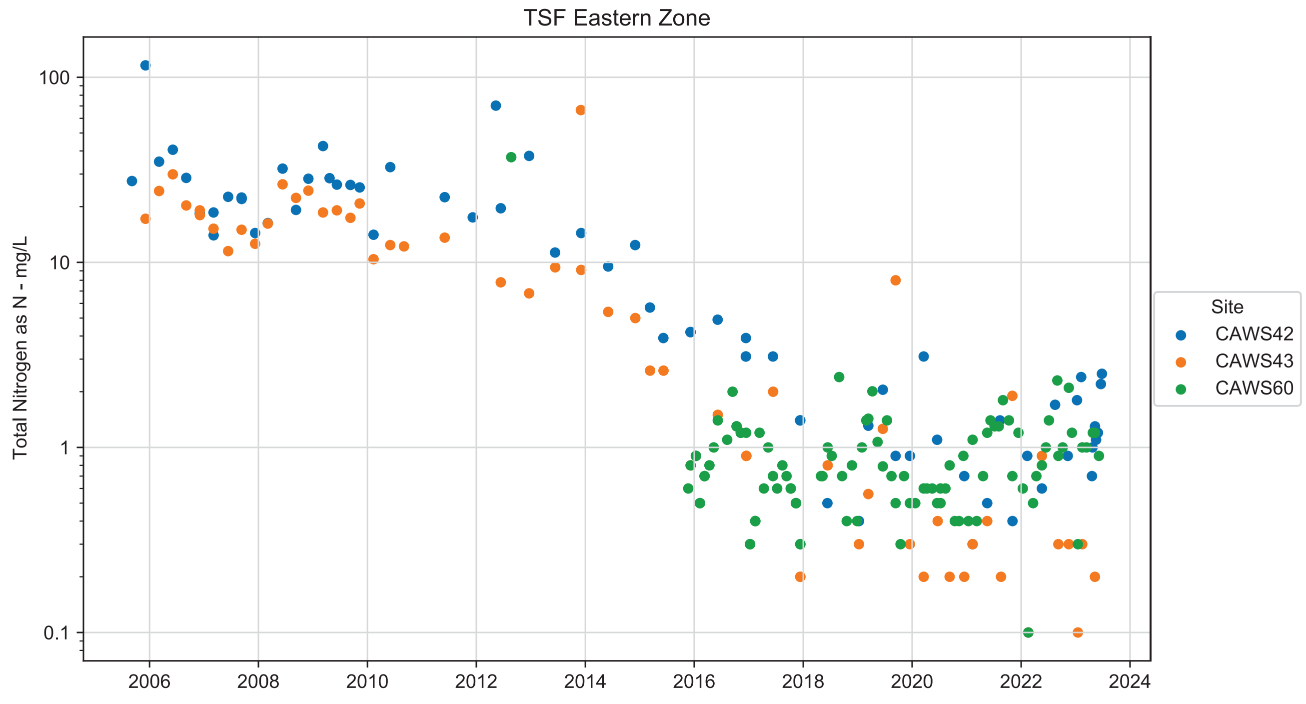

TSF Eastern Zone
Total Dissolved Solids @180°C - mg/L
0
1000
2000
3000
4000
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60

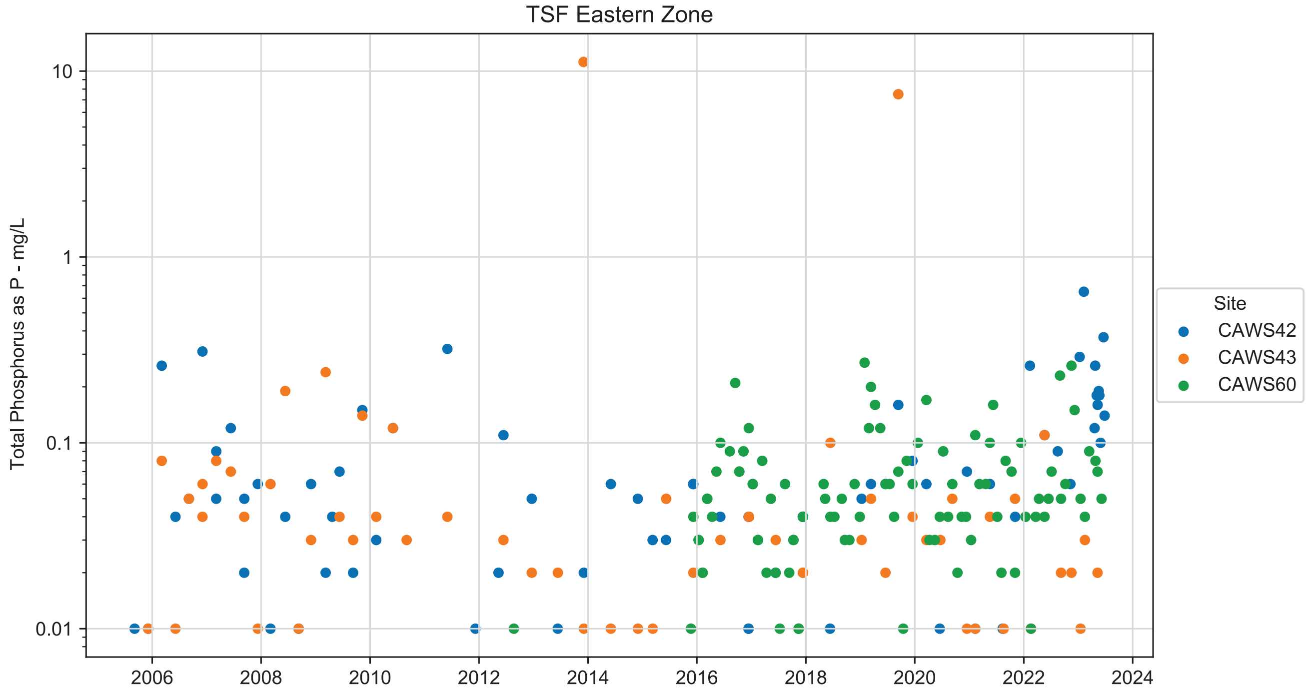

TSF Eastern Zone
Nitrate as N - mg/L
100
10
1
0.1
0.01
0.001
0.0001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60

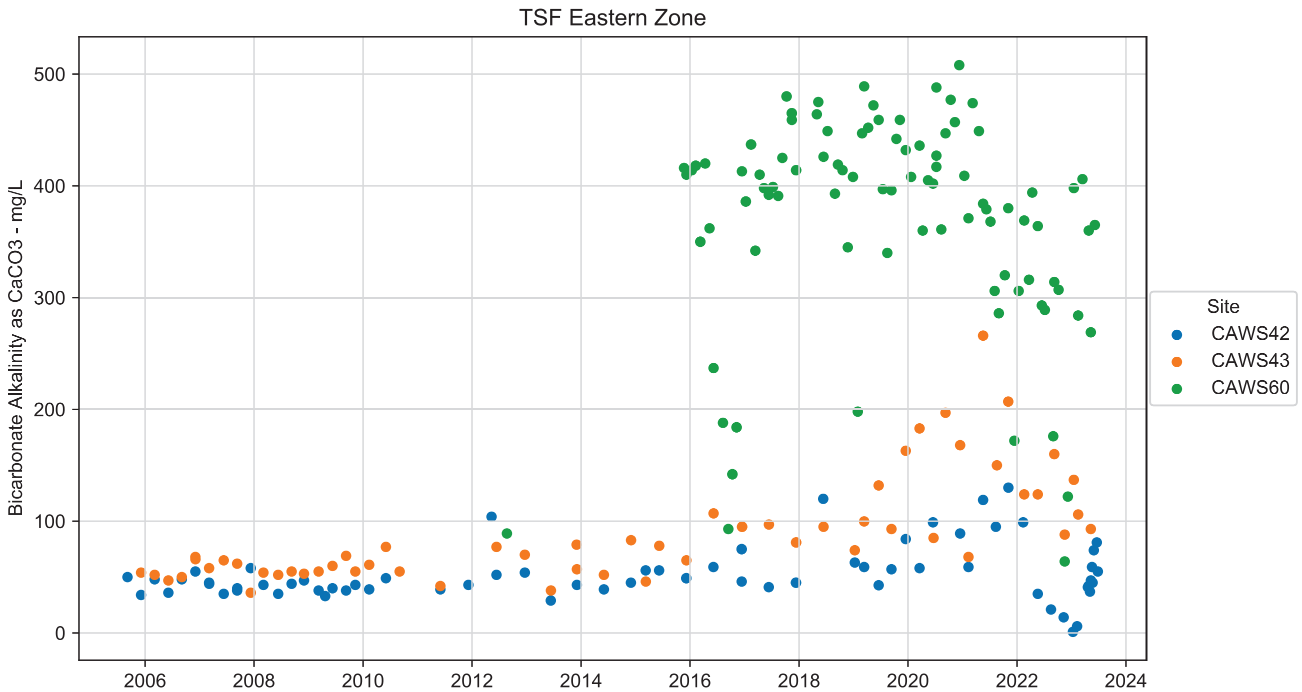

TSF Eastern Zone
Nitrite + Nitrate as N - mg/L
100
10
1
0.1
0.01
0.001
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60

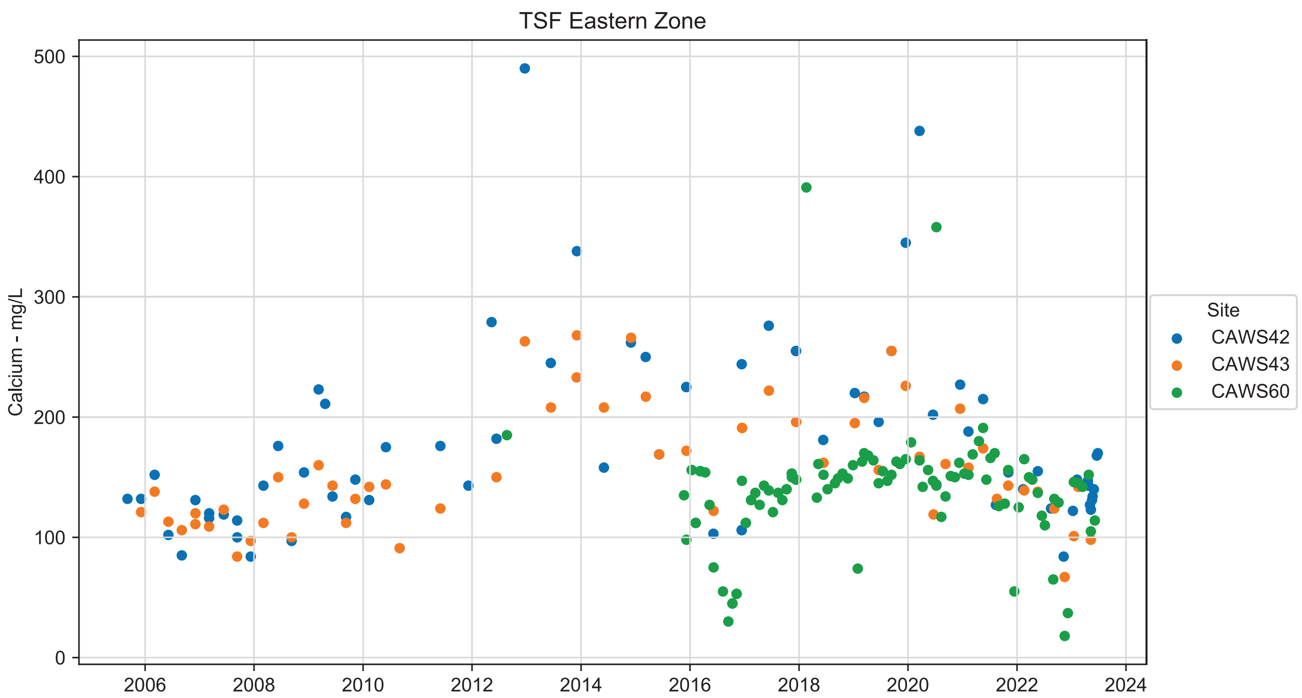

TSF Eastern Zone
Nitrite as N - mg/L
0.01
0.1
1
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60

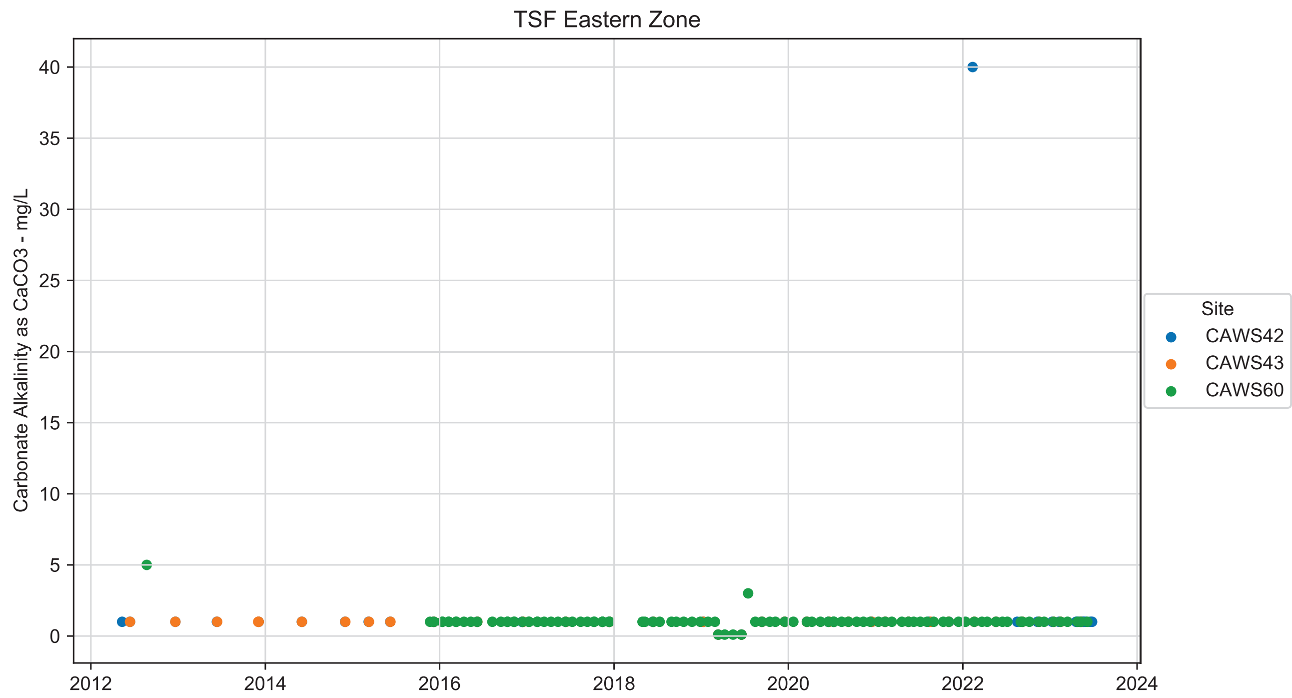

TSF Eastern Zone
Total Kjeldahl Nitrogen as N - mg/L
0.01
0.1
1
10
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60

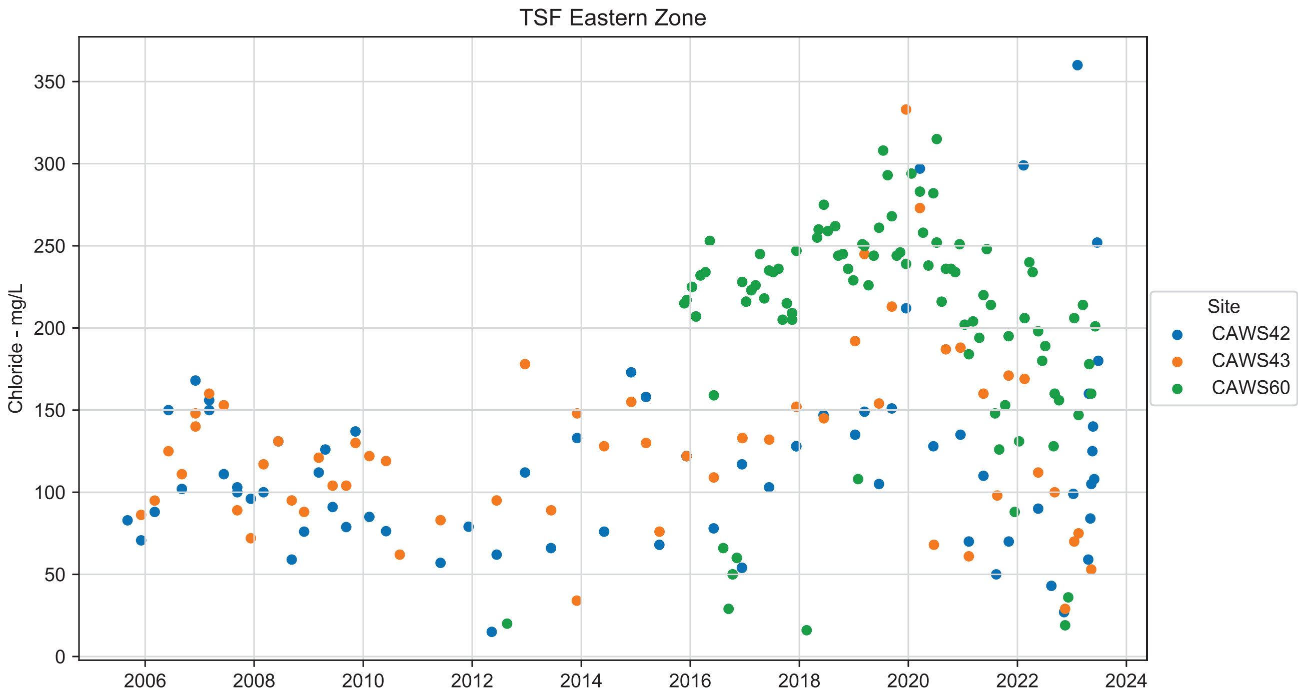

TSF Eastern Zone
Total Nitrogen as N - mg/L
0.1
1
10
100
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60

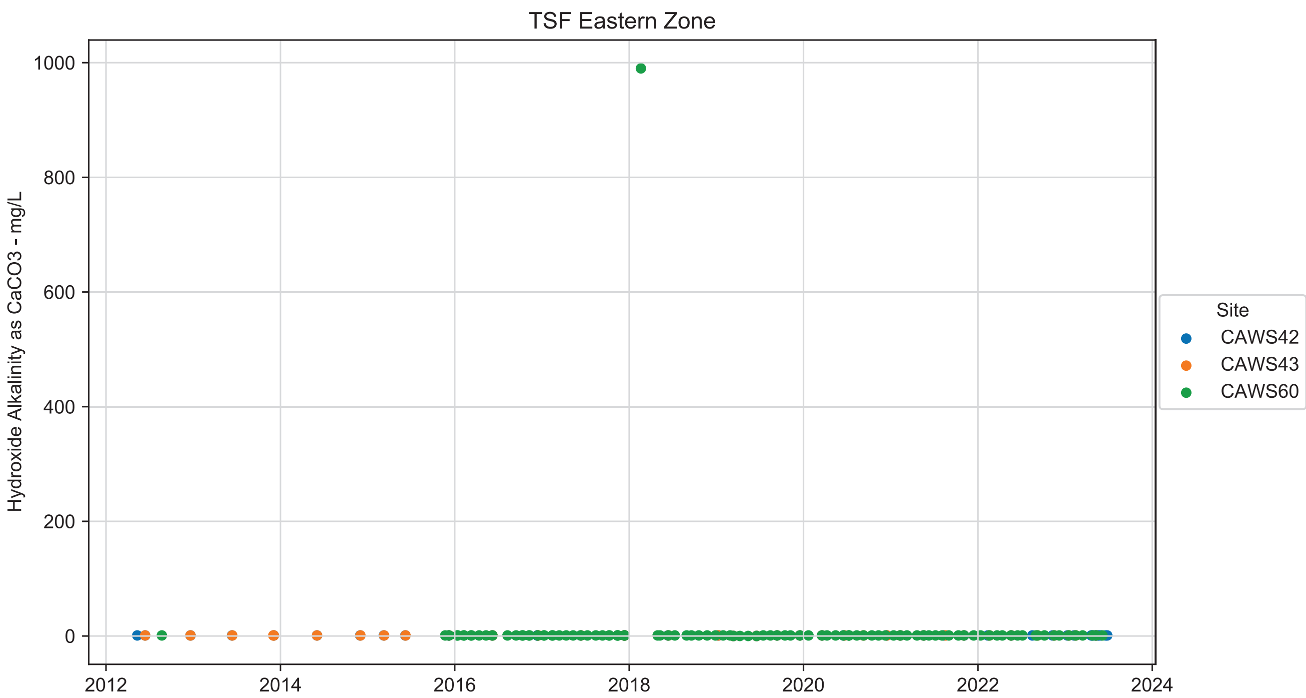

TSF Eastern Zone
Total Phosphorus as P - mg/L
10
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60

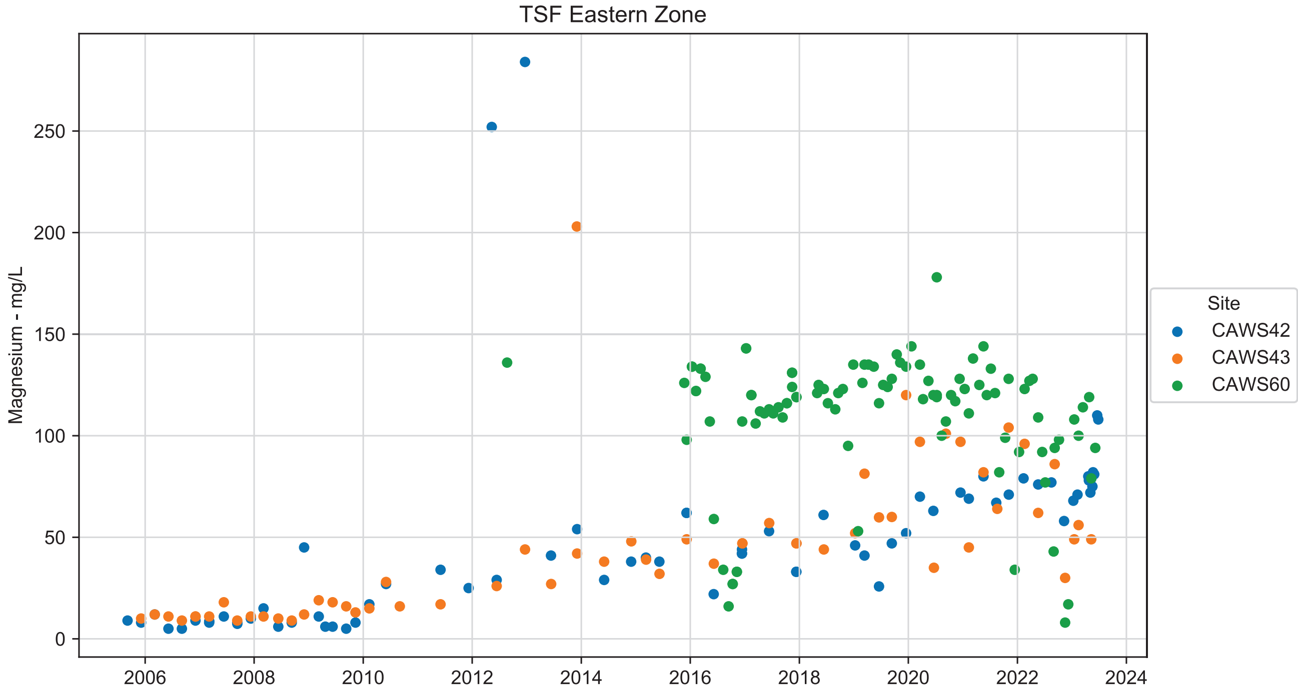

TSF Eastern Zone
Bicarbonate Alkalinity as CaCO3 - mg/L
500
400
300
200
100
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60

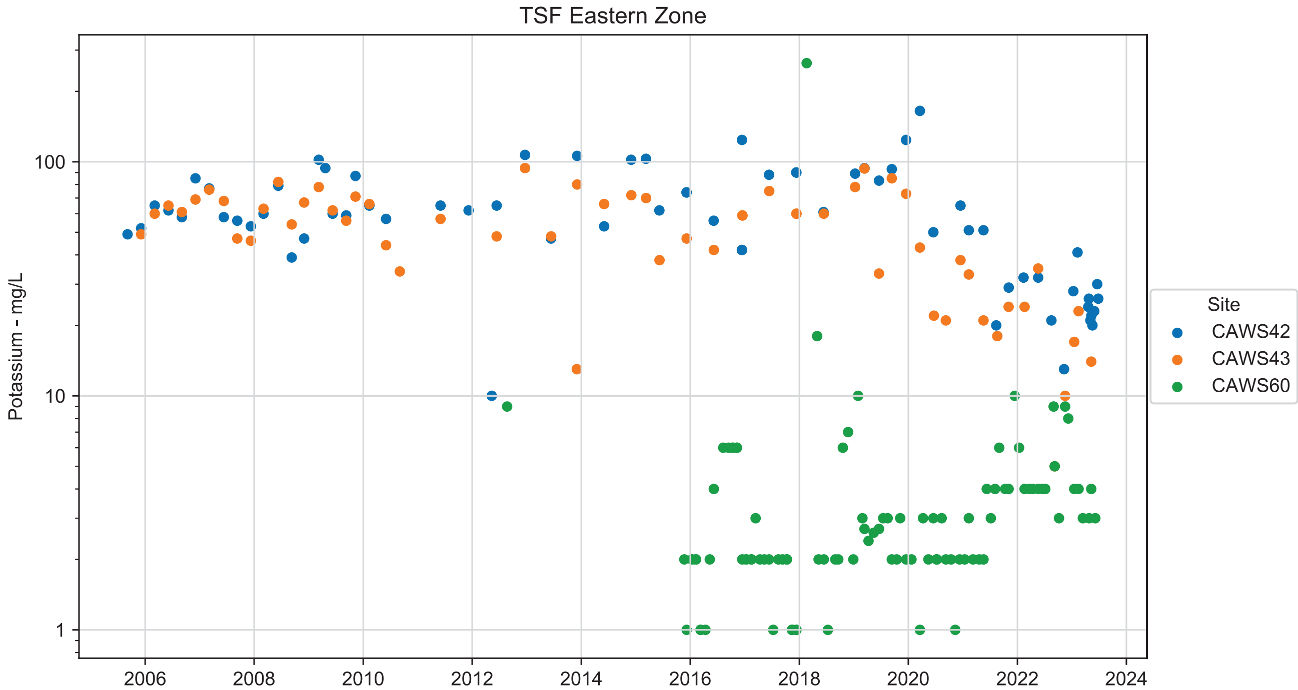

TSF Eastern Zone
Calcium - mg/L
500
400
300
200
100
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60

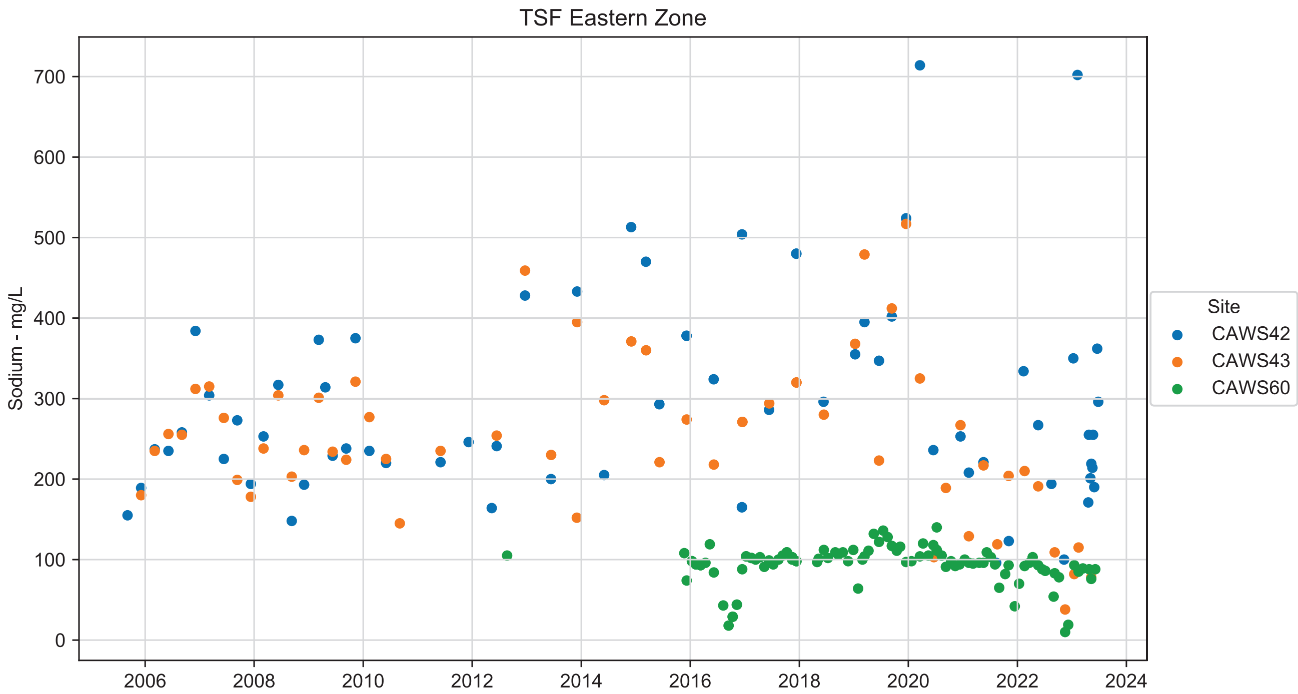

TSF Eastern Zone
Carbonate Alkalinity as CaCO3 - mg/L
Site
CAWS42
CAWS43
CAWS60

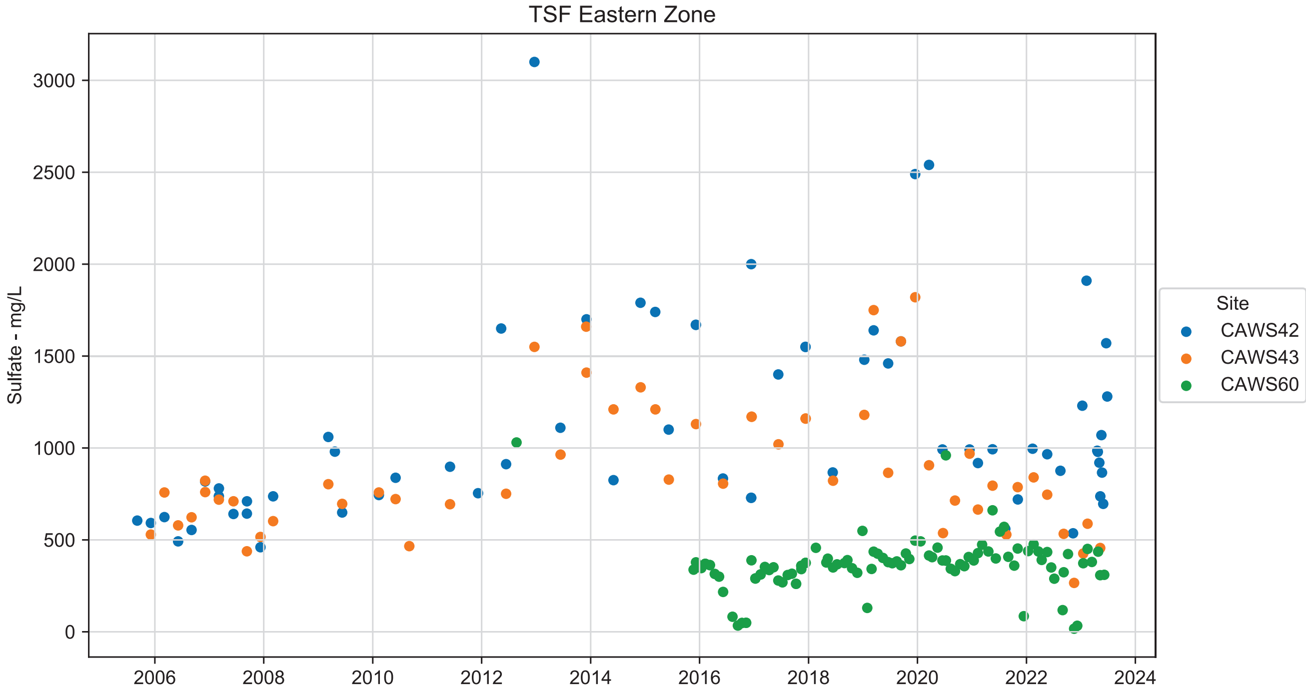

TSF Eastern Zone
Chloride - mg/L
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Hydroxide Alkalinity as CaCO3 - mg/L
Site
CAWS42
CAWS43
CAWS60

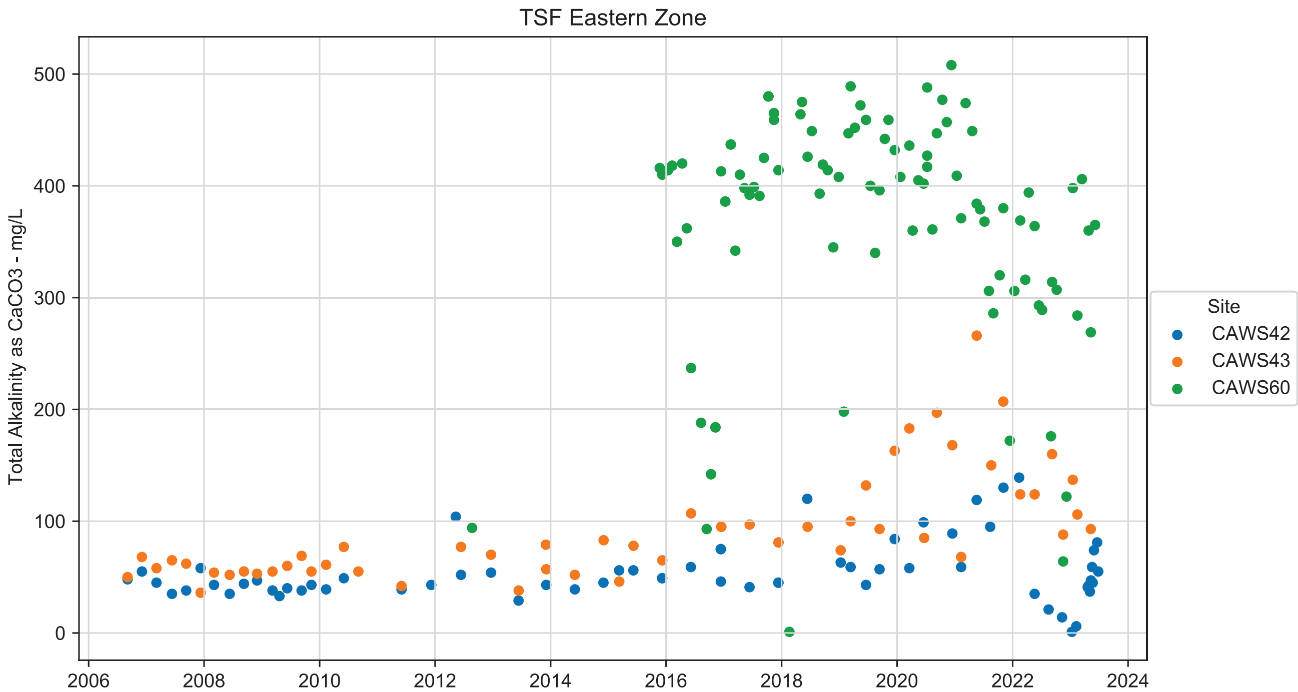

TSF Eastern Zone
Magnesium - mg/L
0
50
100
150
200
250
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Potassium - mg/L
1
10
100
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60

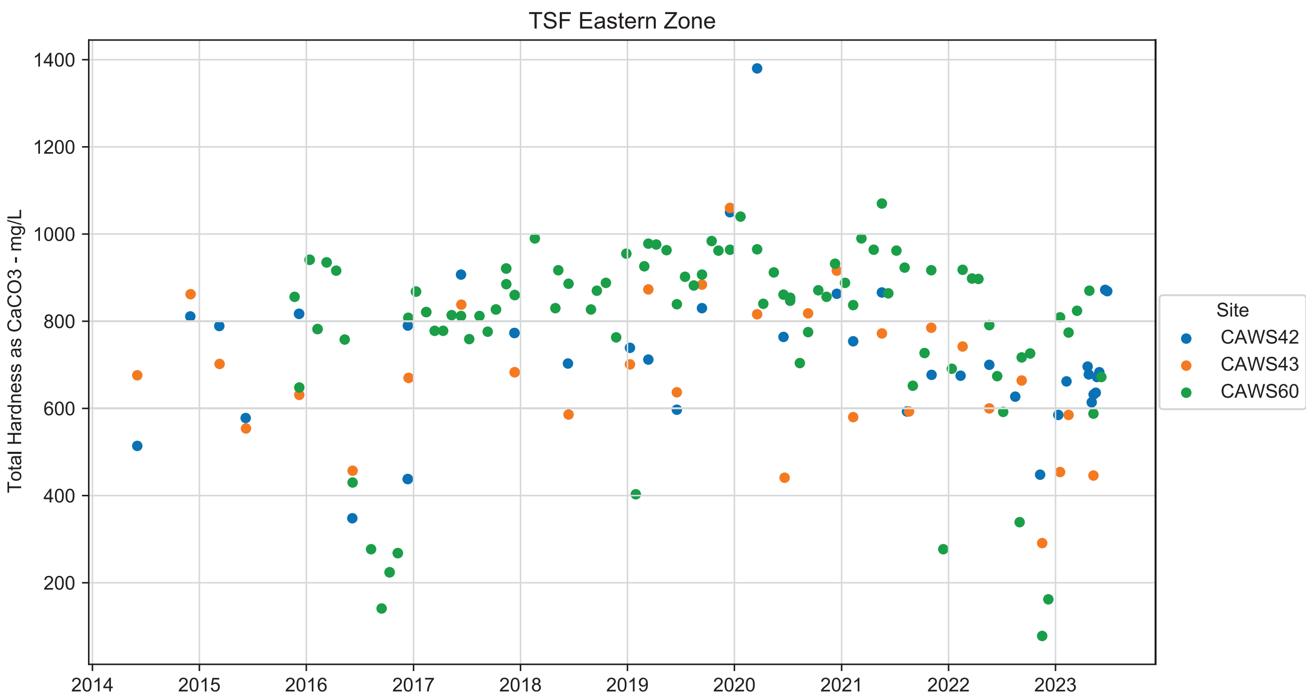

TSF Eastern Zone
Sodium - mg/L
0
100
200
300
400
500
600
700
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60



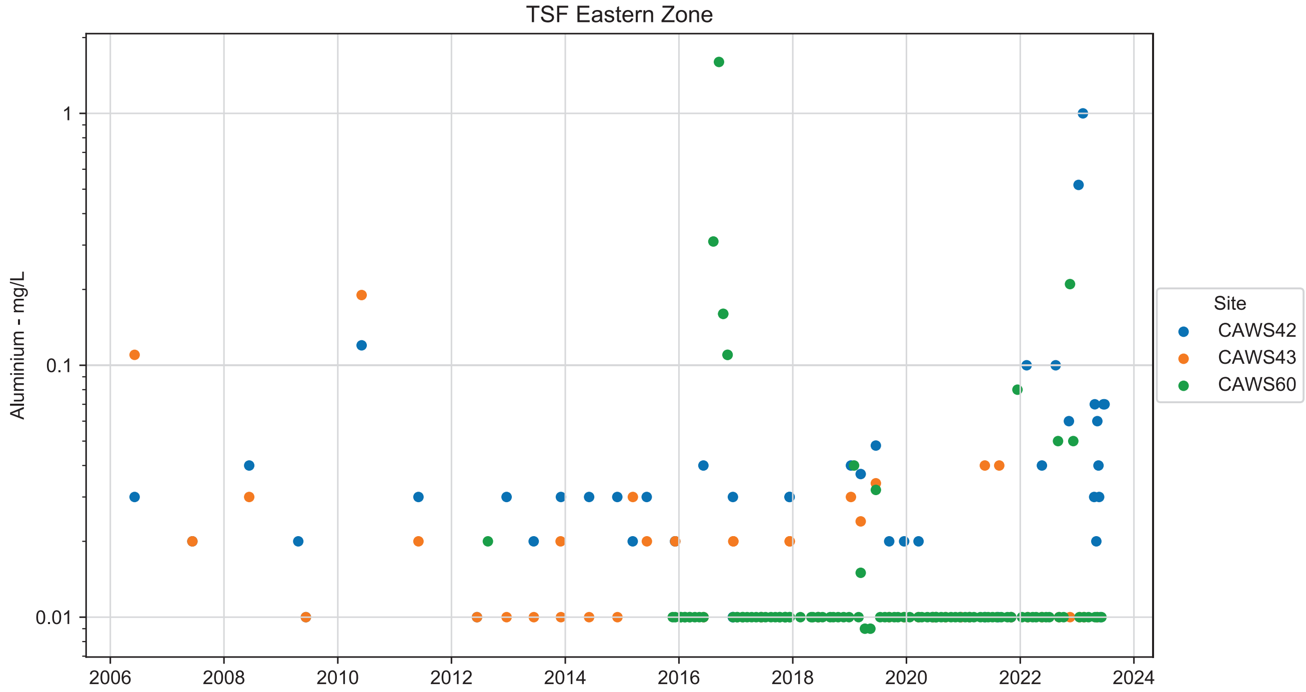
TSF Eastern Zone
Sulfate - mg/L
Site
CAWS42
CAWS43
CAWS60

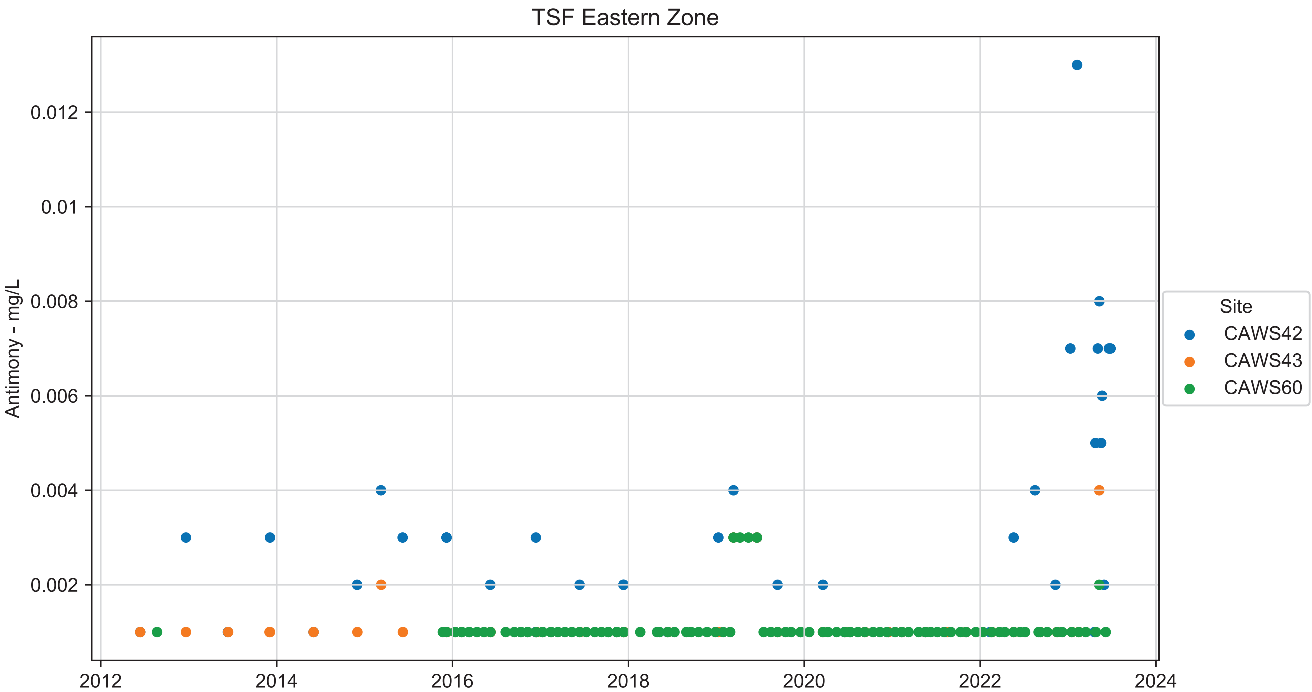


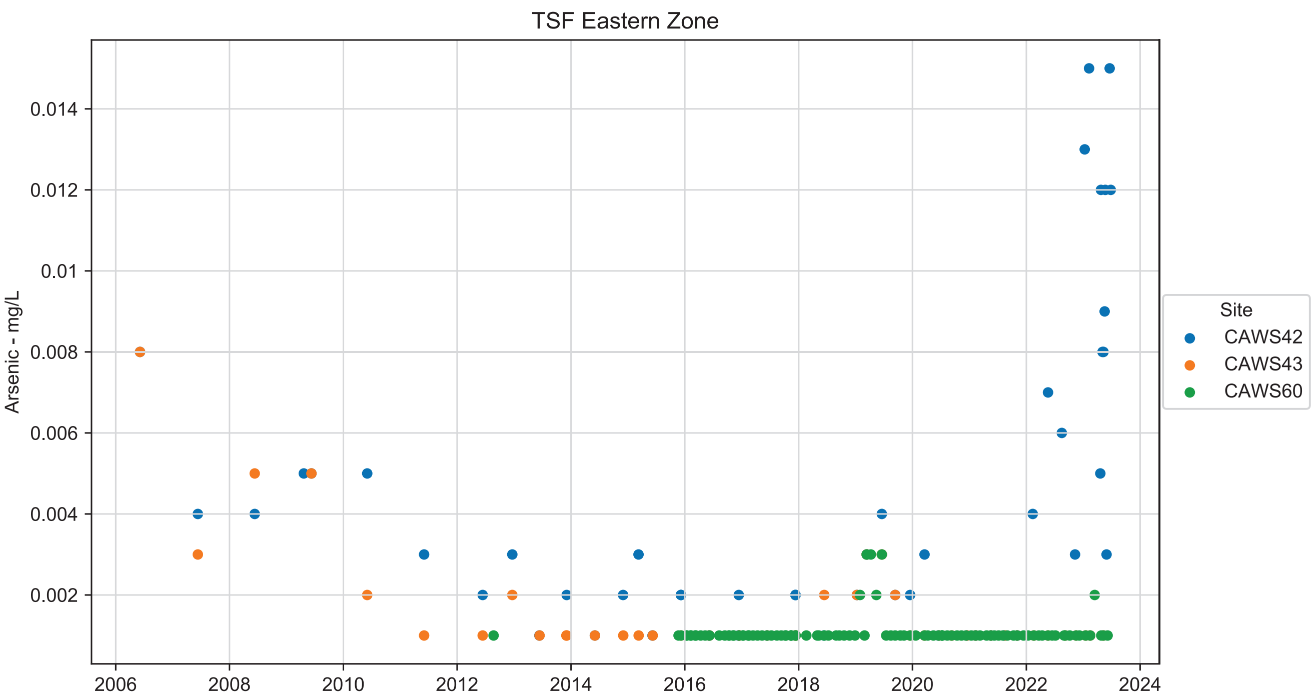
TSF Eastern Zone
Total Alkalinity as CaCO3 - mg/L
Site
CAWS42
CAWS43
CAWS60

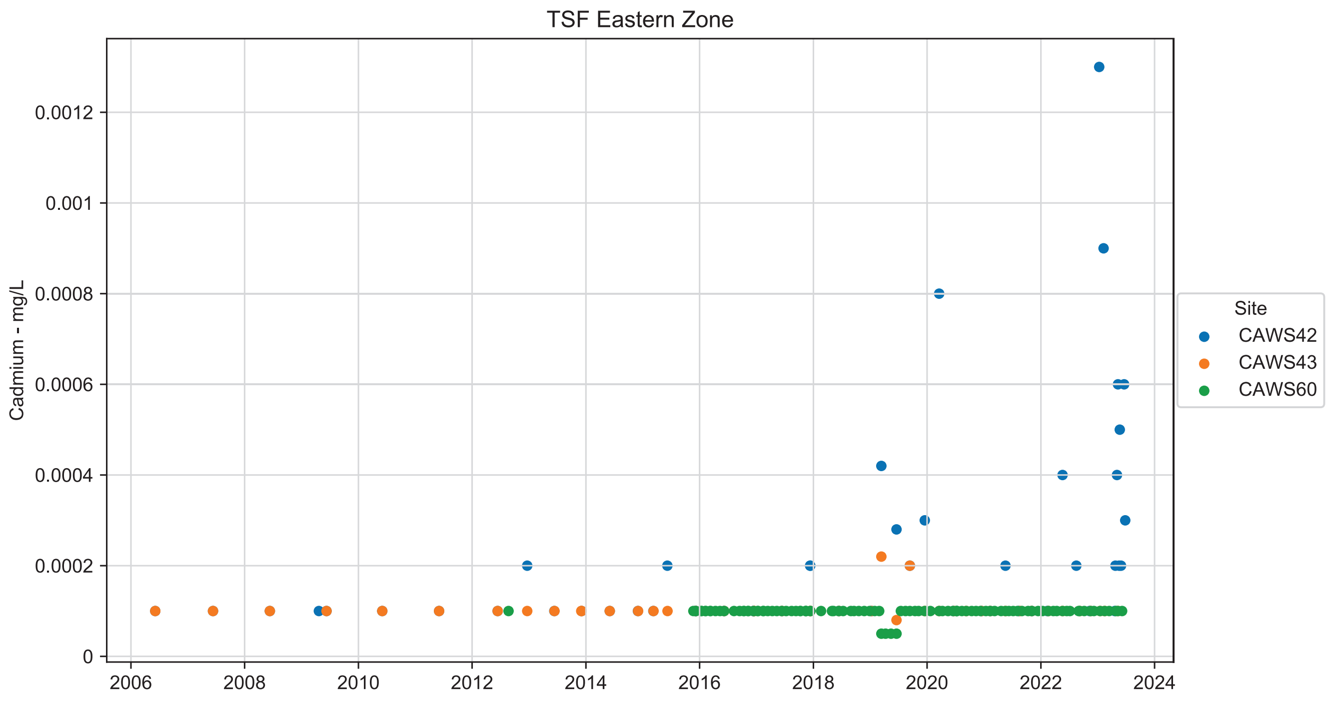


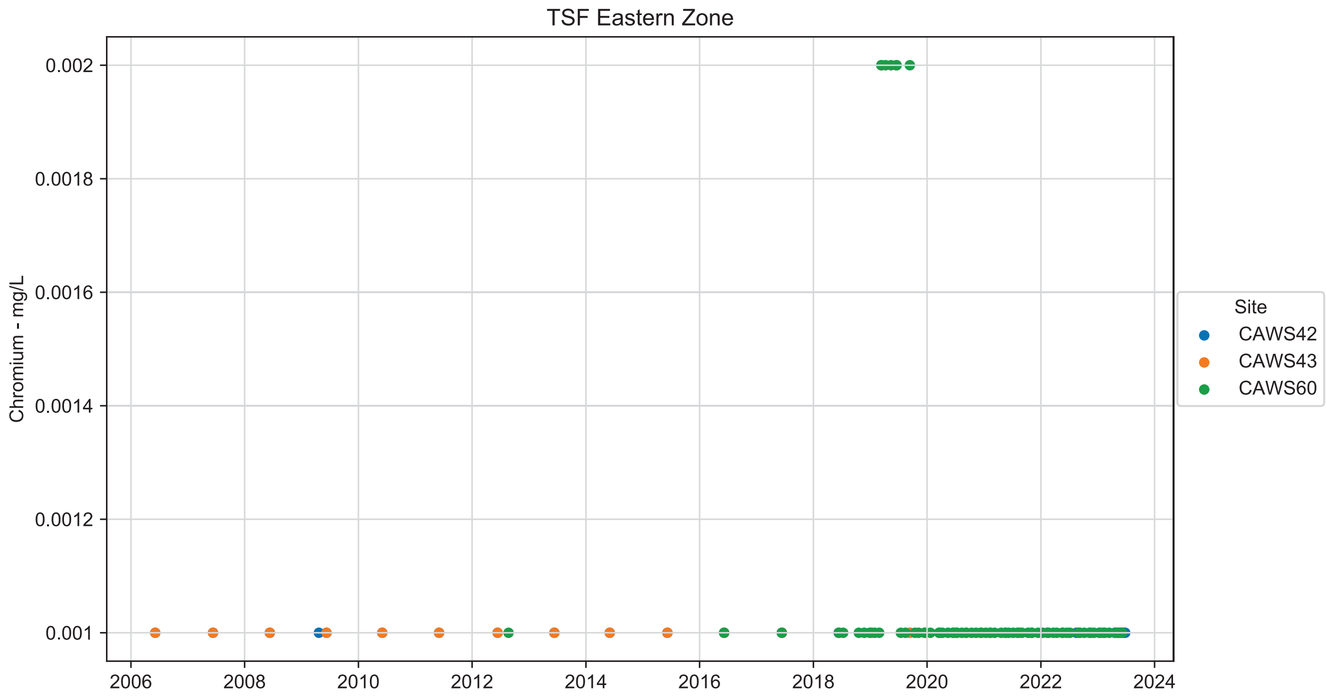
TSF Eastern Zone
Total Hardness as CaCO3 - mg/L
Site
CAWS42
CAWS43
CAWS60

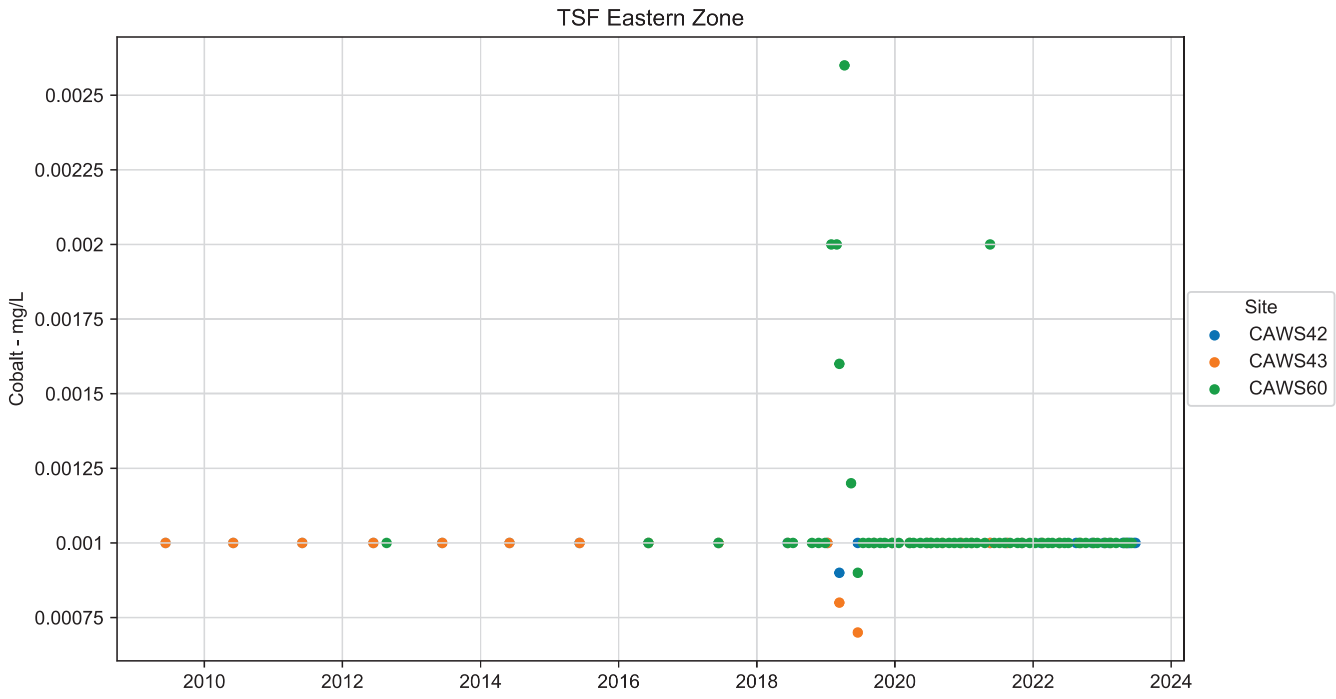

TSF Eastern Zone
Aluminium - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60

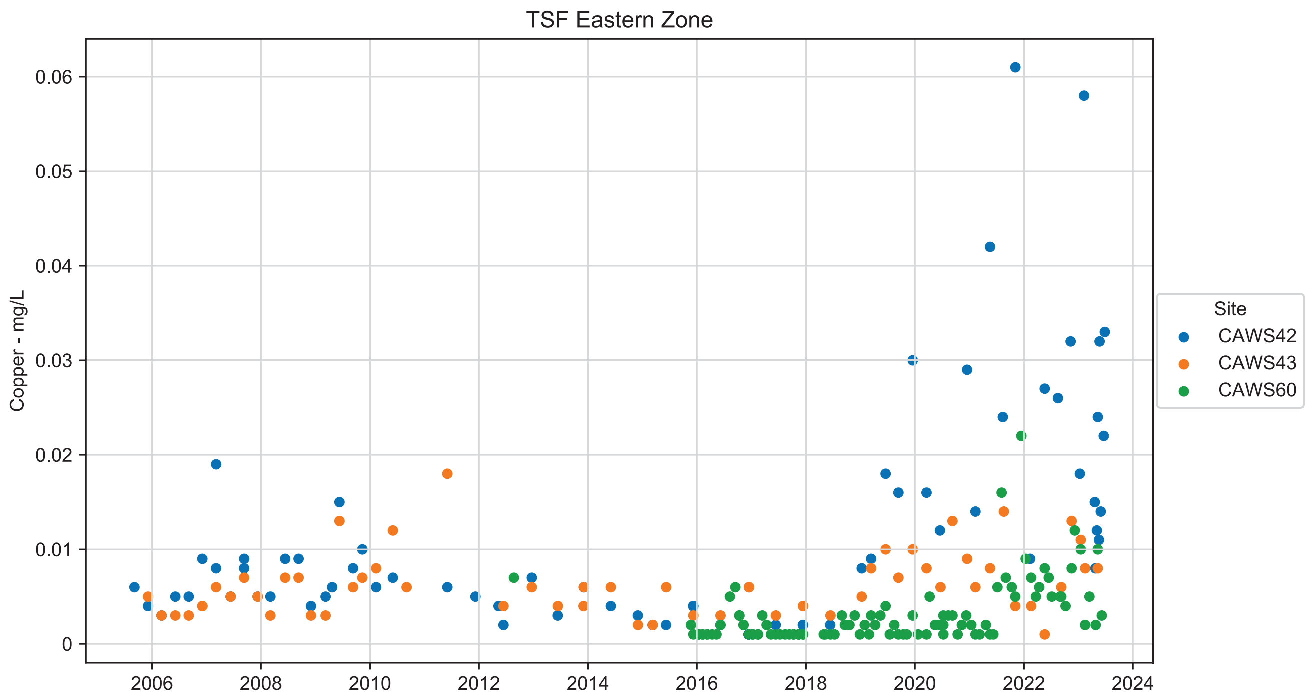

TSF Eastern Zone
Antimony - mg/L
0.012
0.01
0.008
0.006
0.004
0.002
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Arsenic - mg/L
0.014
0.012
0.01
0.008
0.006
0.004
0.002
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Cadmium - mg/L
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Chromium - mg/L
0.002
0.0018
0.0016
0.0014
0.0012
0.001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Cobalt - mg/L
0.0025
0.00225
0.002
0.00175
0.0015
0.00125
0.001
0.00075
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Copper - mg/L
0.06
0.05
0.04
0.03
0.02
0.01
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
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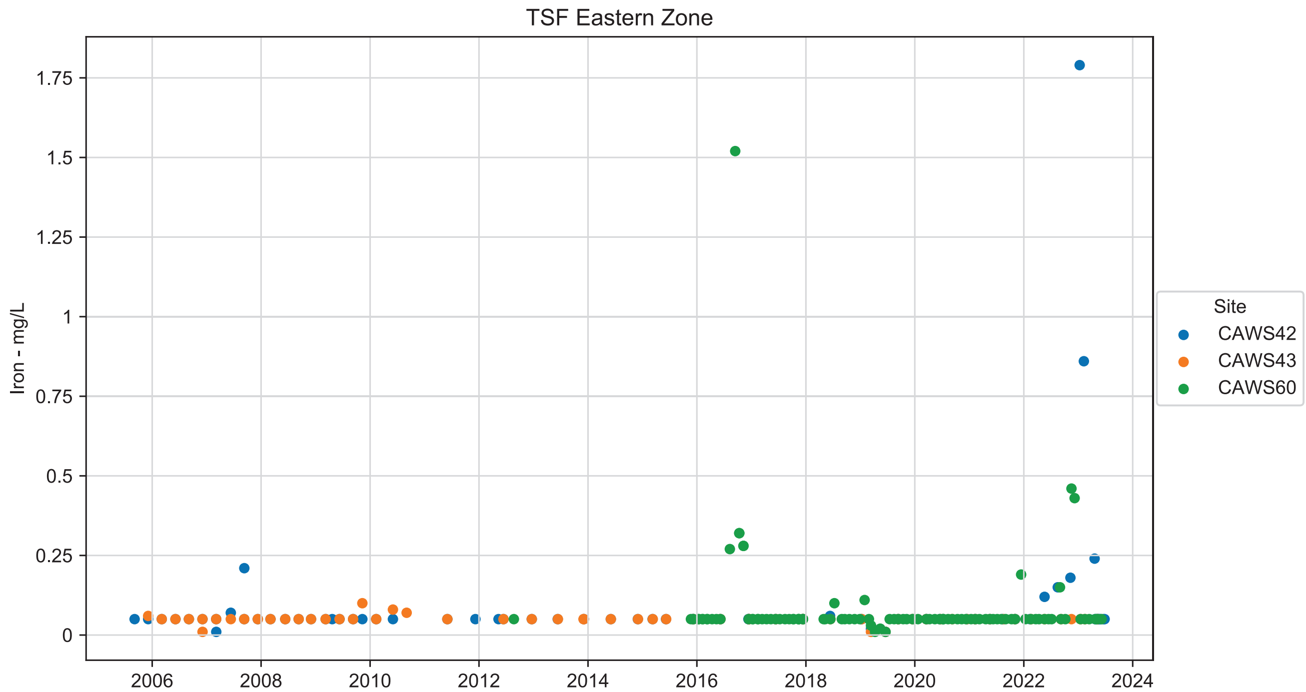
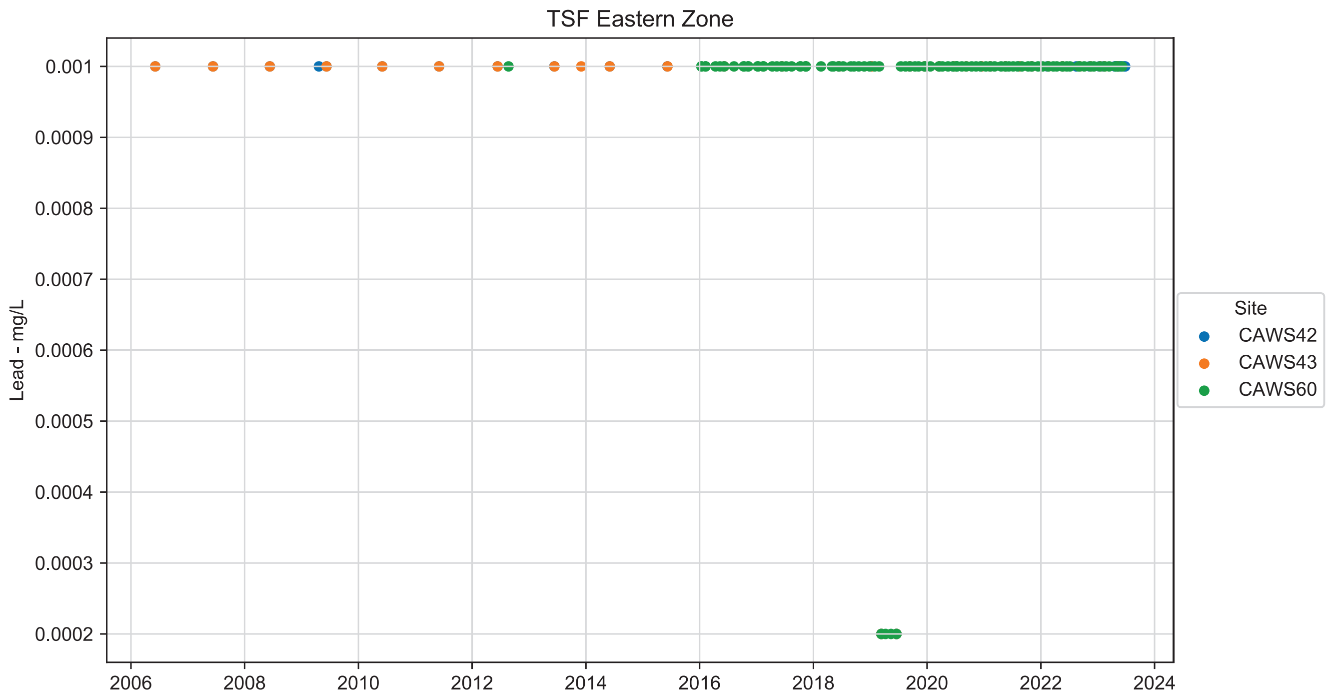
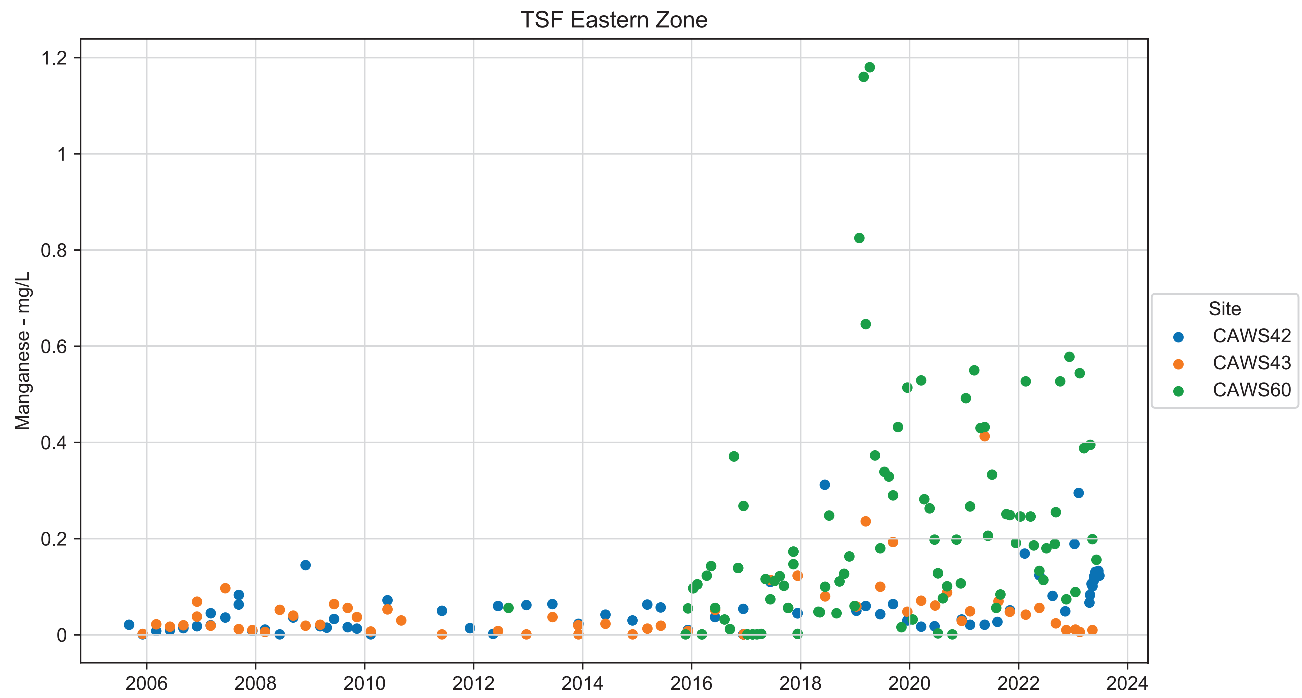
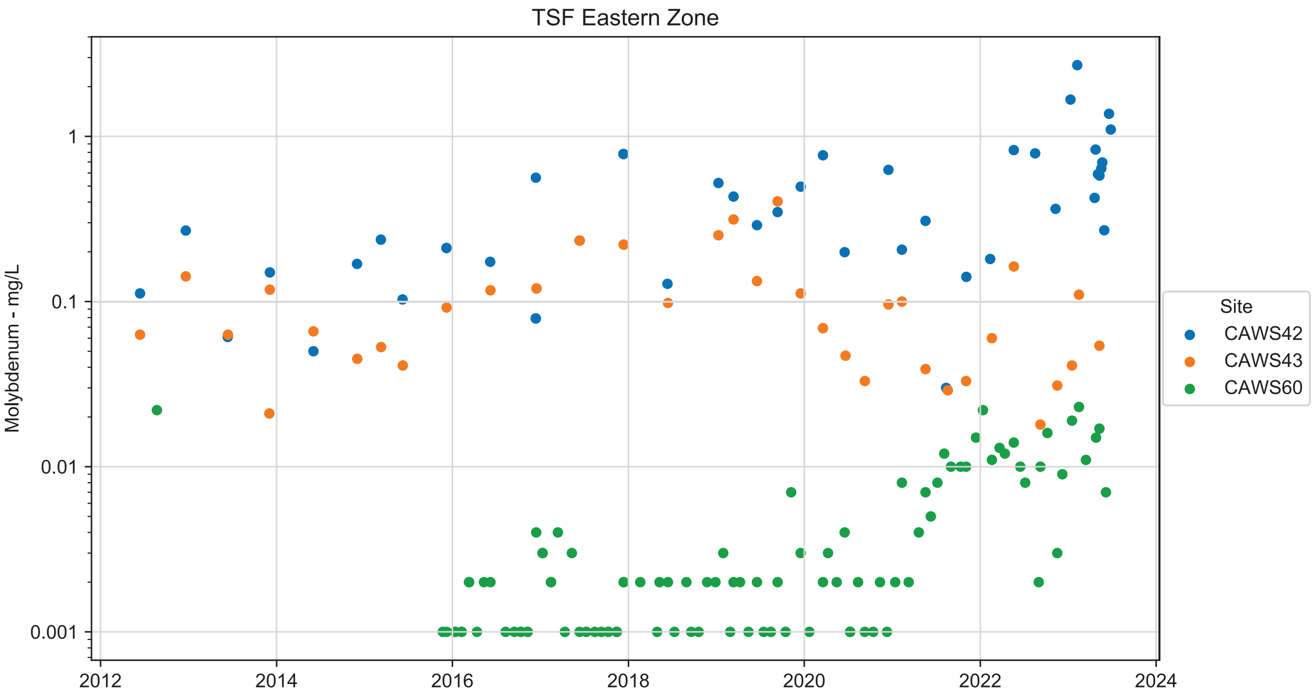
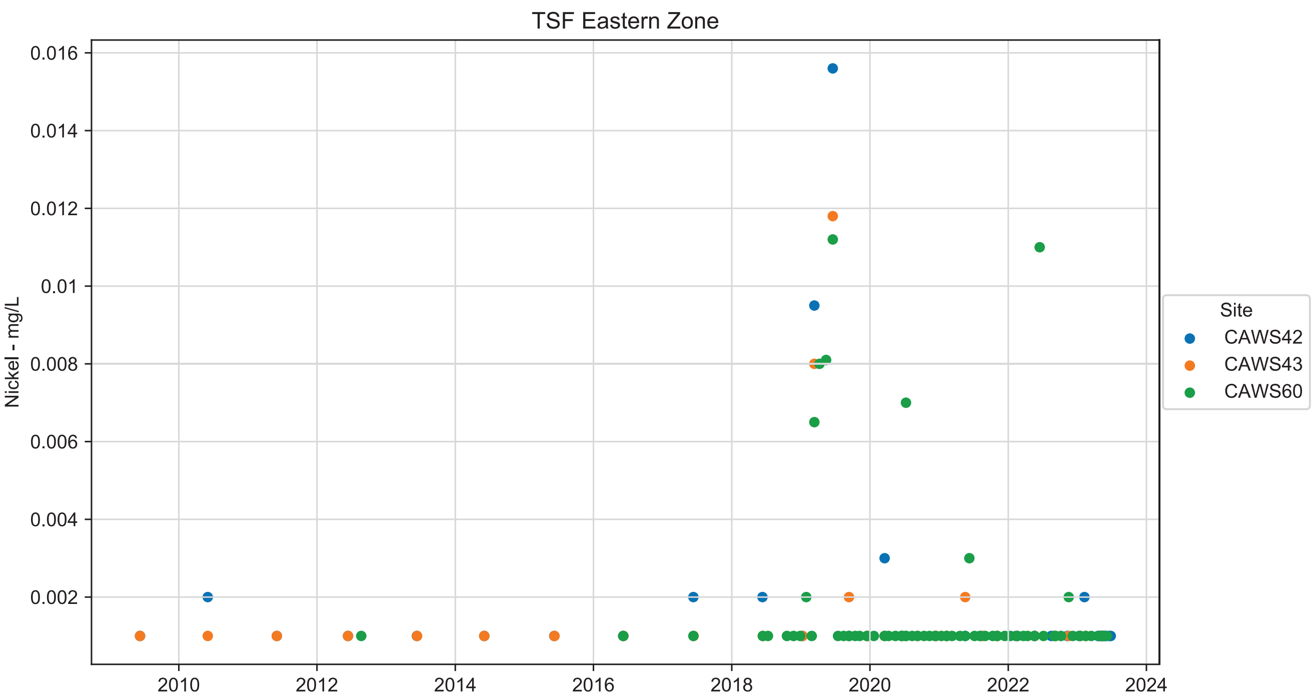
CAWS60


TSF Eastern Zone
Iron - mg/L
1.75
1.5
1.25
1
0.75
0.5
0.25
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Lead - mg/L
0.001
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Manganese - mg/L
0
0.2
0.4
0.6
0.8
1
1.2
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Molybdenum - mg/L
0.001
0.01
0.1
1
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Nickel - mg/L
0.002
0.004
0.006
0.008
0.01
0.012
0.014
0.016
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
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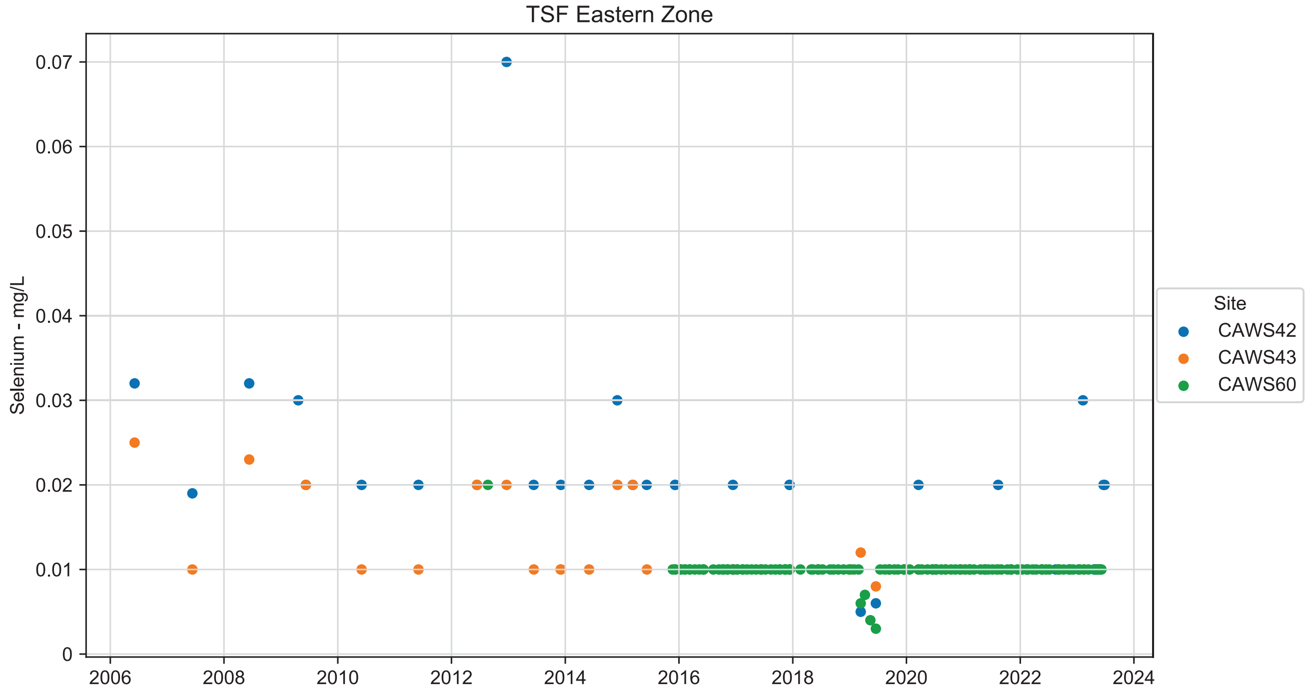
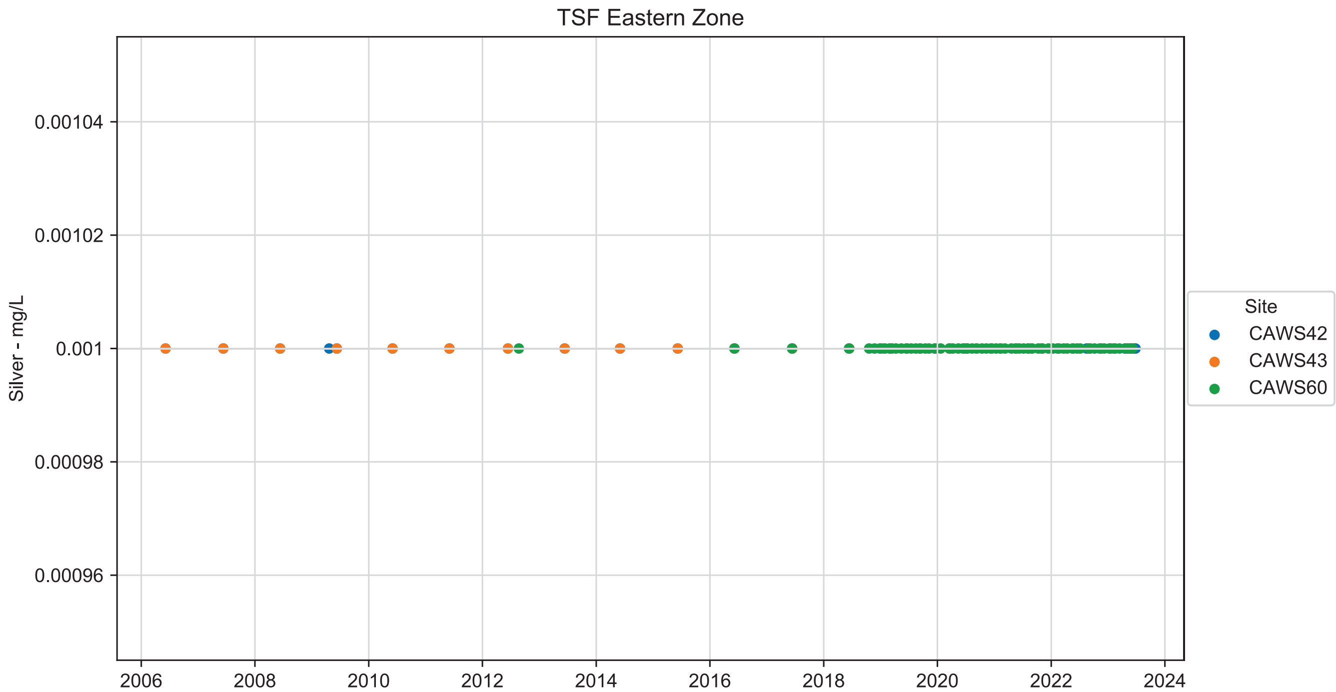
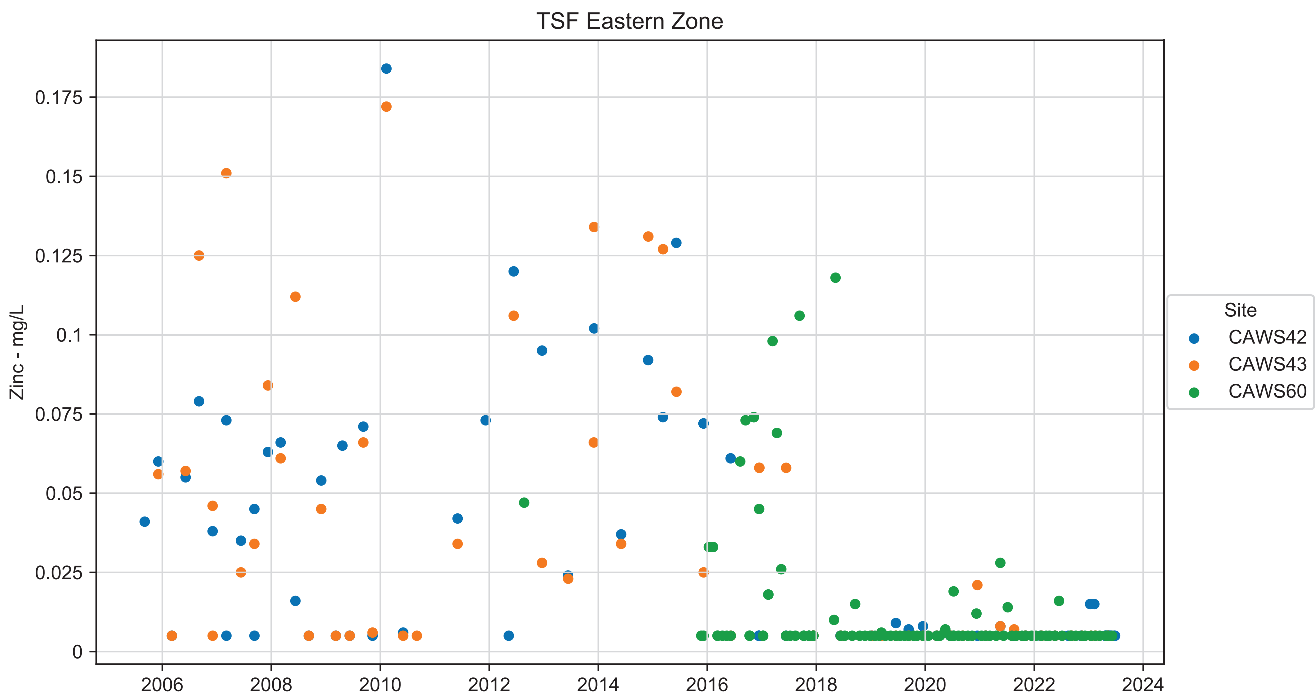
CAWS60


TSF Eastern Zone
Selenium - mg/L
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Silver - mg/L
0.00104
0.00102
0.001
0.00098
0.00096
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS42
CAWS43
CAWS60


TSF Eastern Zone
Zinc - mg/L
0.175
0.15
0.125
0.1
0.075
0.05
0.025
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
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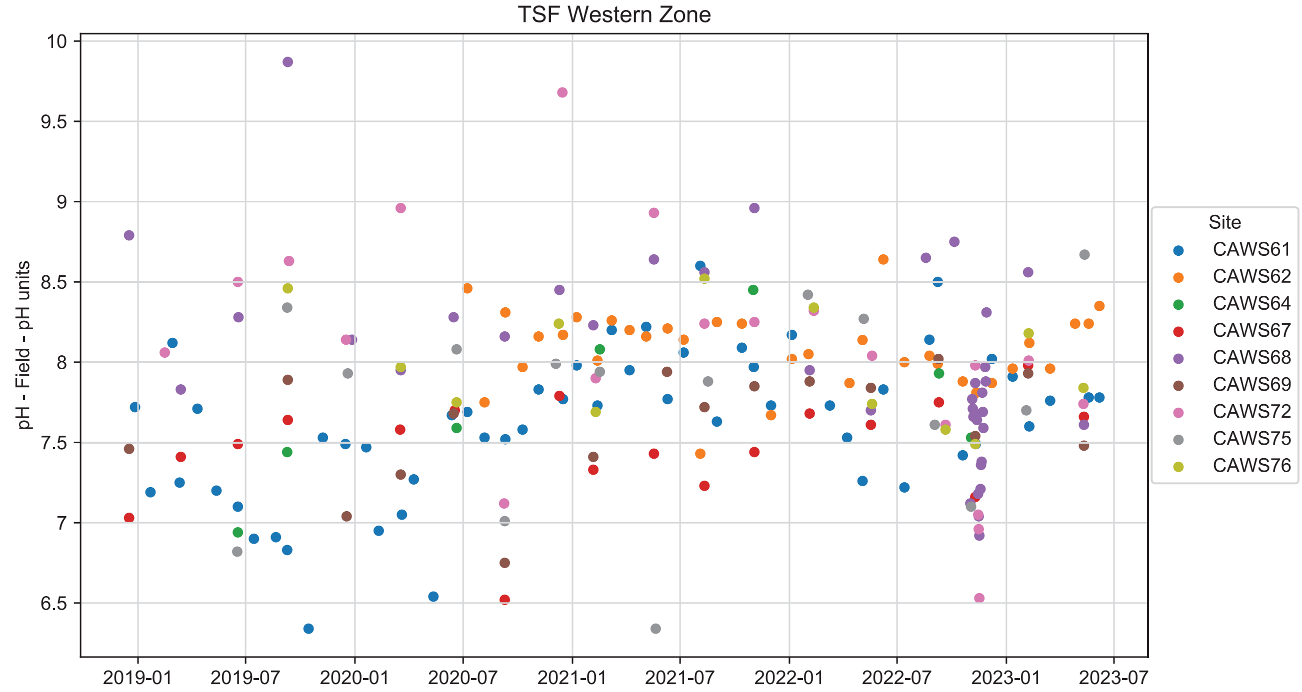
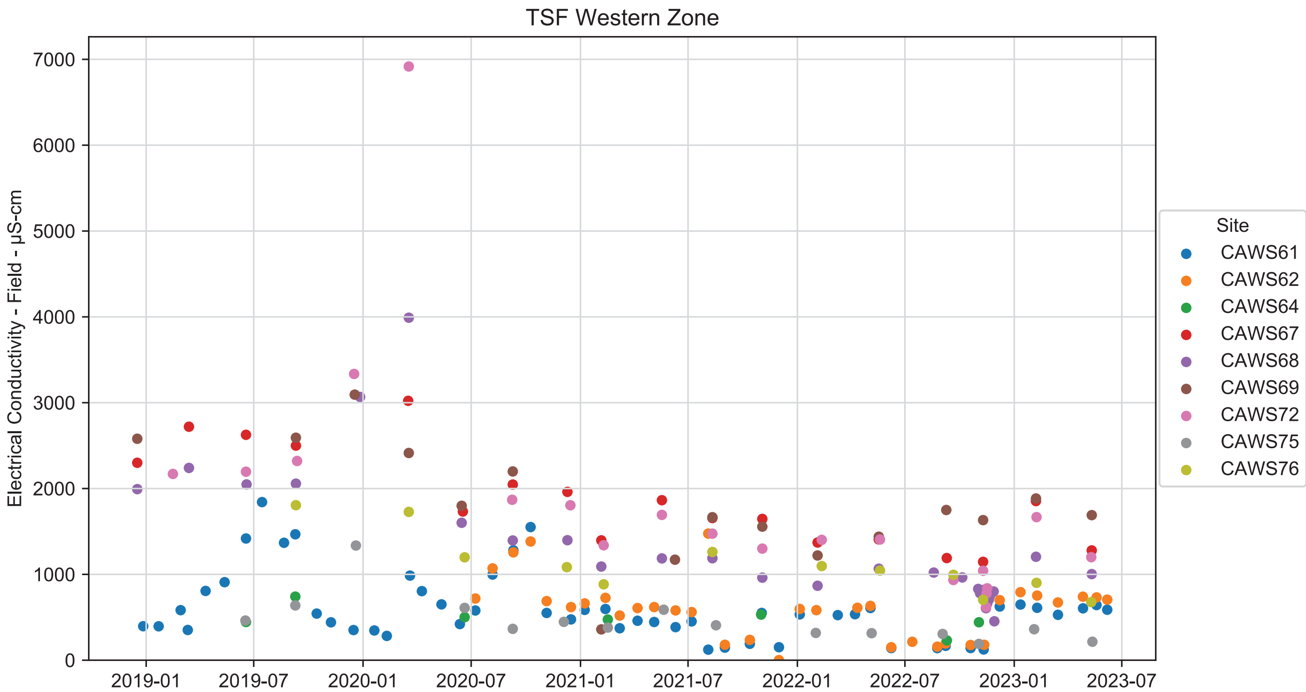
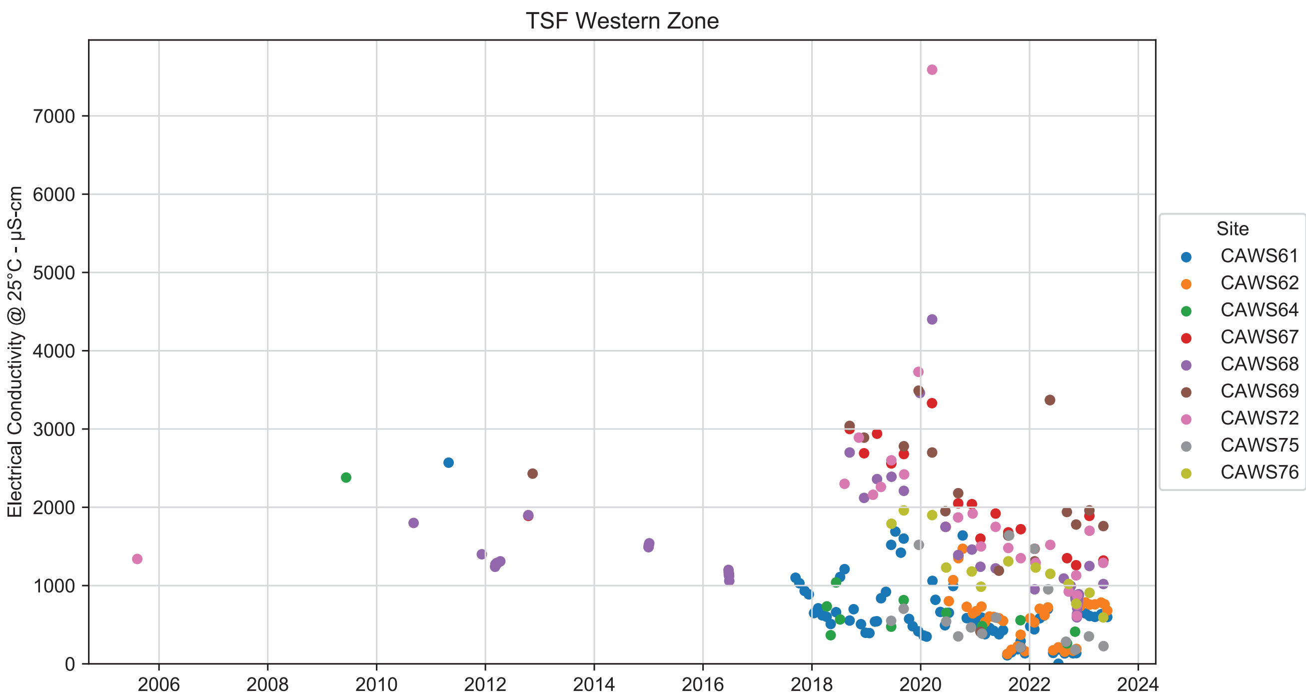
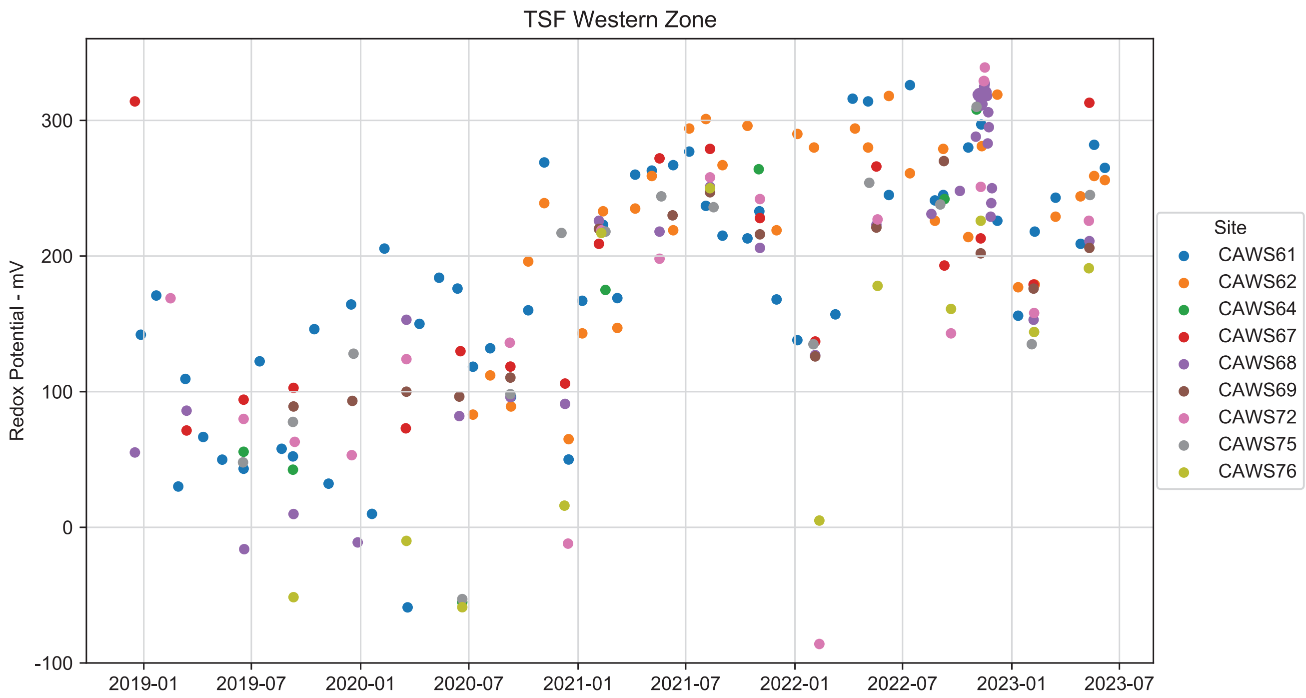
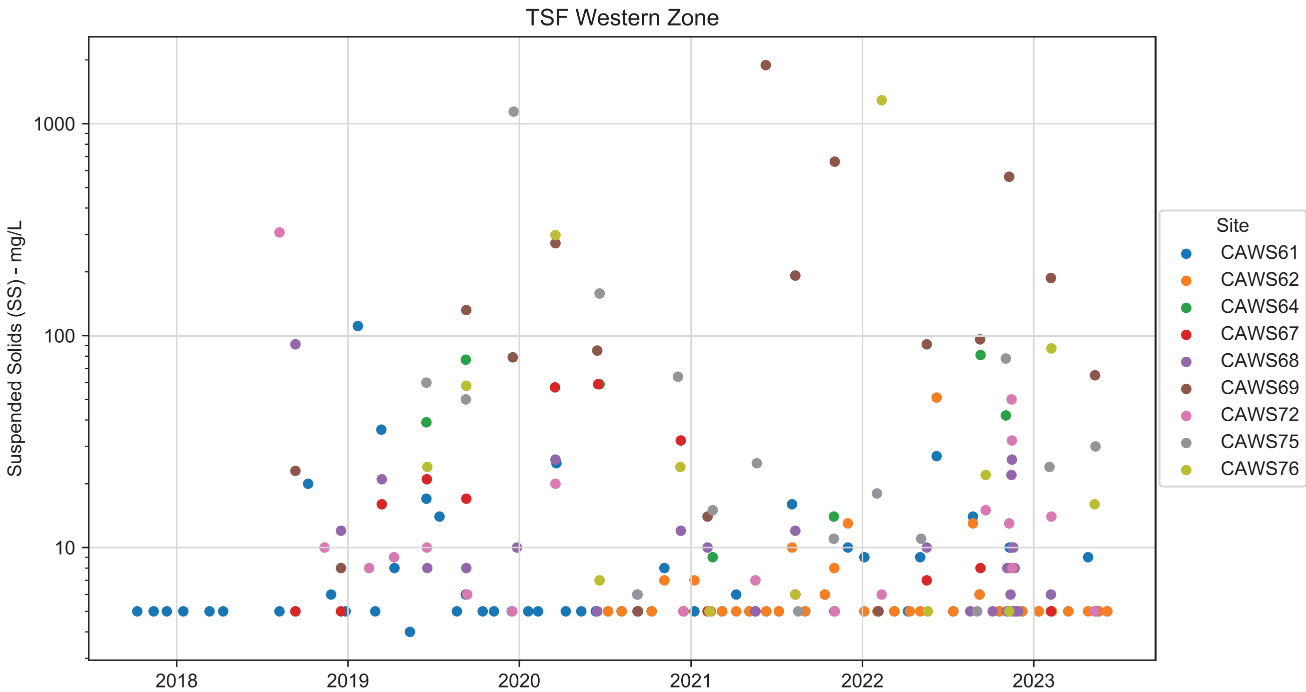
CAWS60

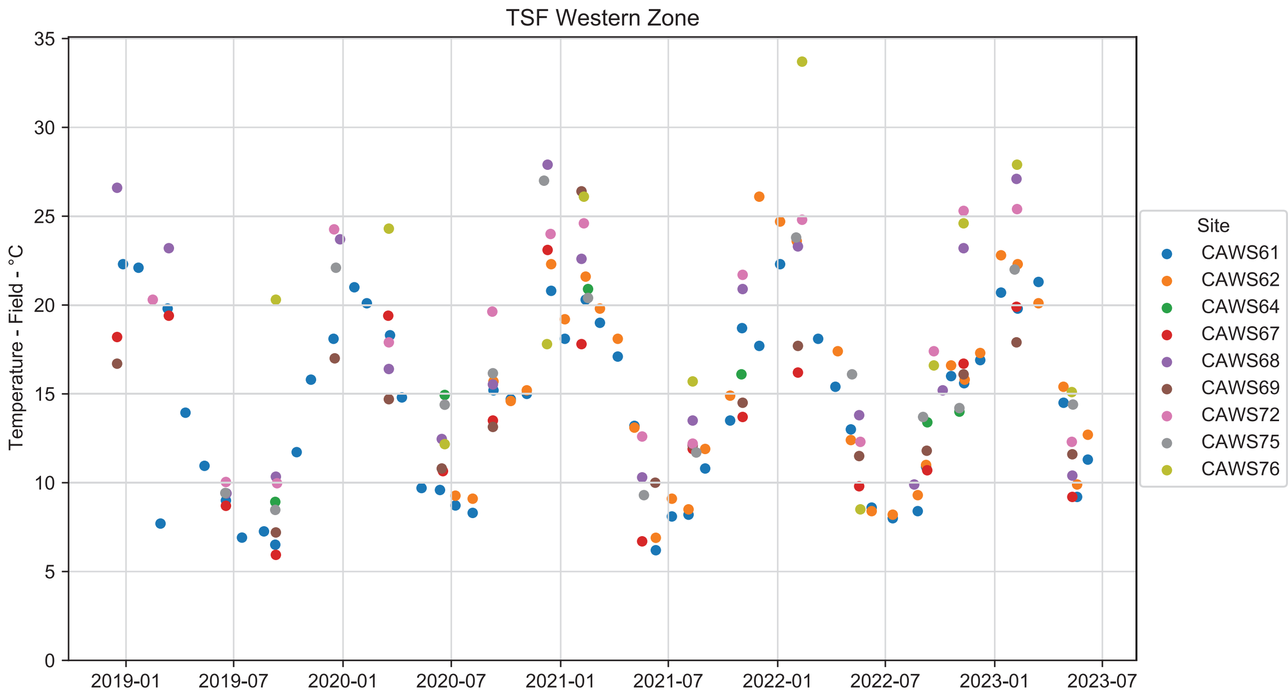

TSF Western Zone
pH - Field - pH units
10
9.5
9
8.5
8
7.5
7
6.5
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

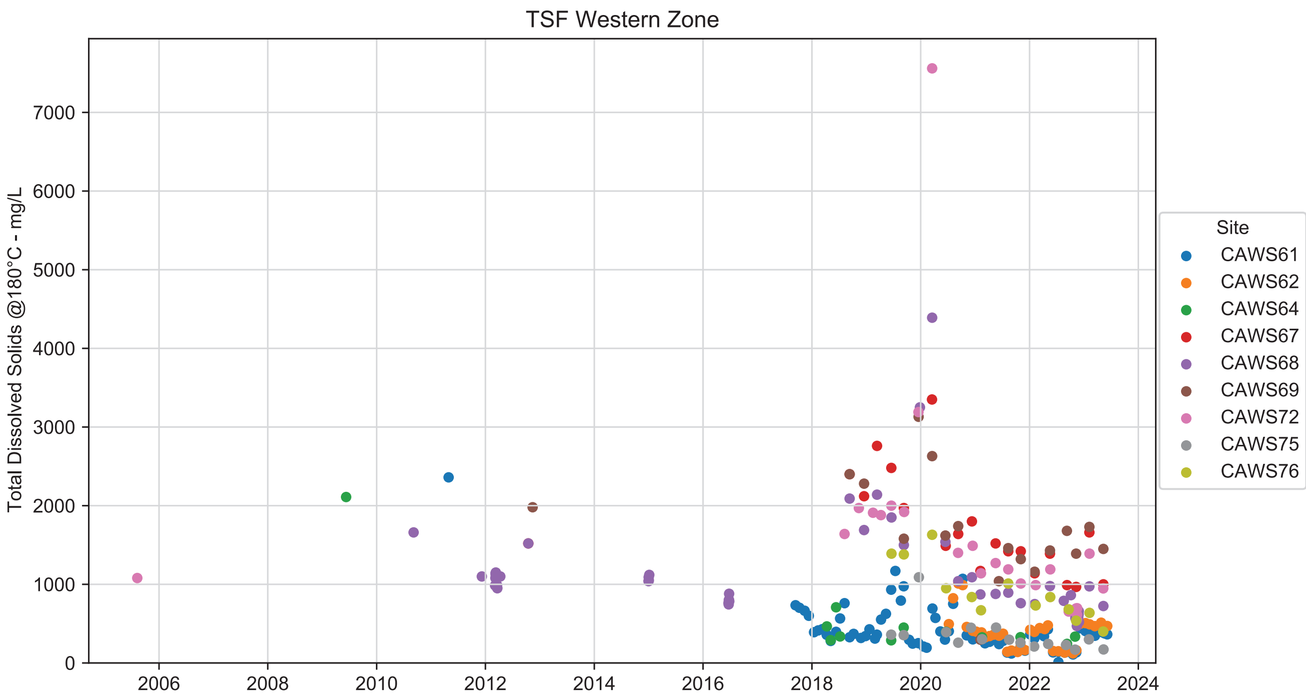

TSF Western Zone
Electrical Conductivity - Field - µS-cm
7000
6000
5000
4000
3000
2000
1000
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

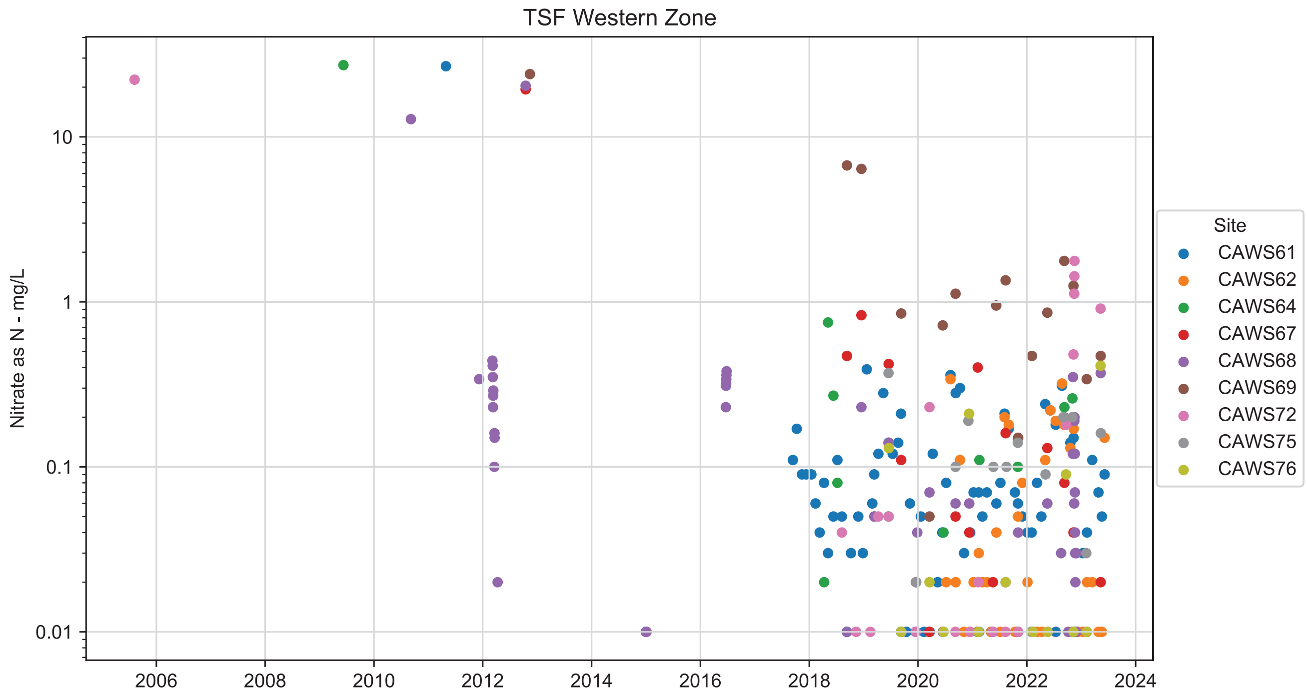

TSF Western Zone
Electrical Conductivity @ 25°C - µS-cm
7000
6000
5000
4000
3000
2000
1000
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

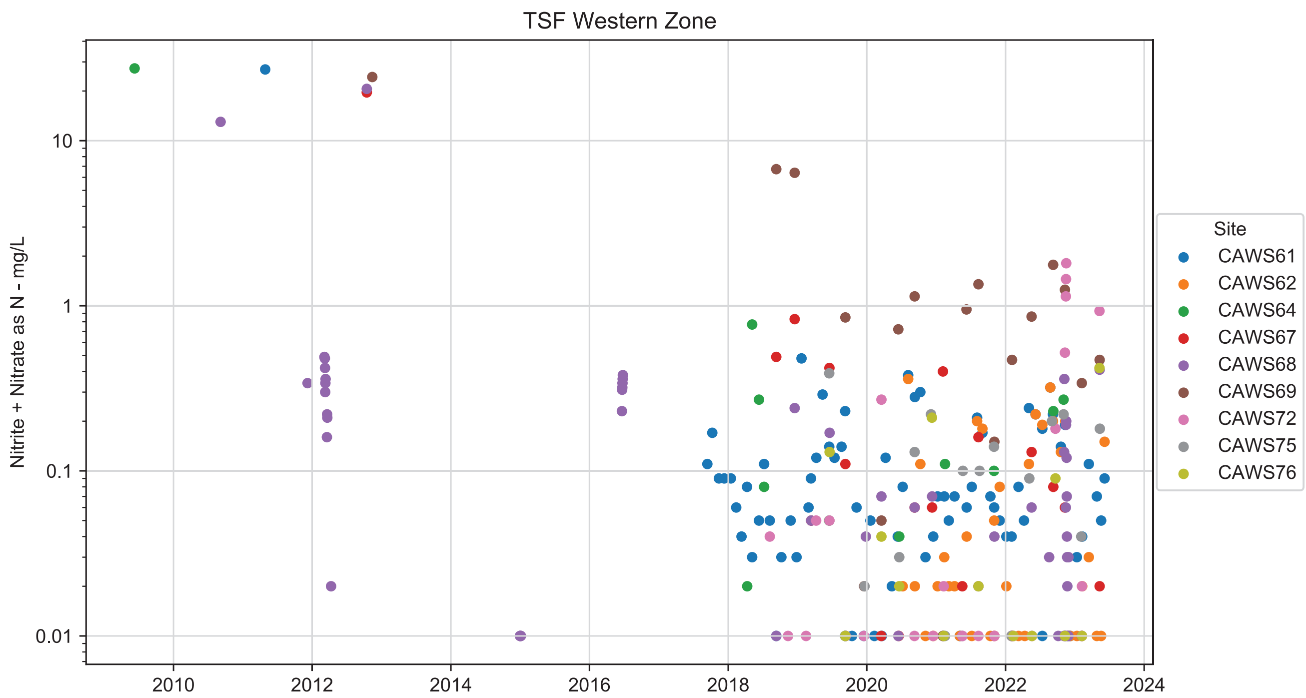

TSF Western Zone
Redox Potential - mV
300
200
100
0
-100
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

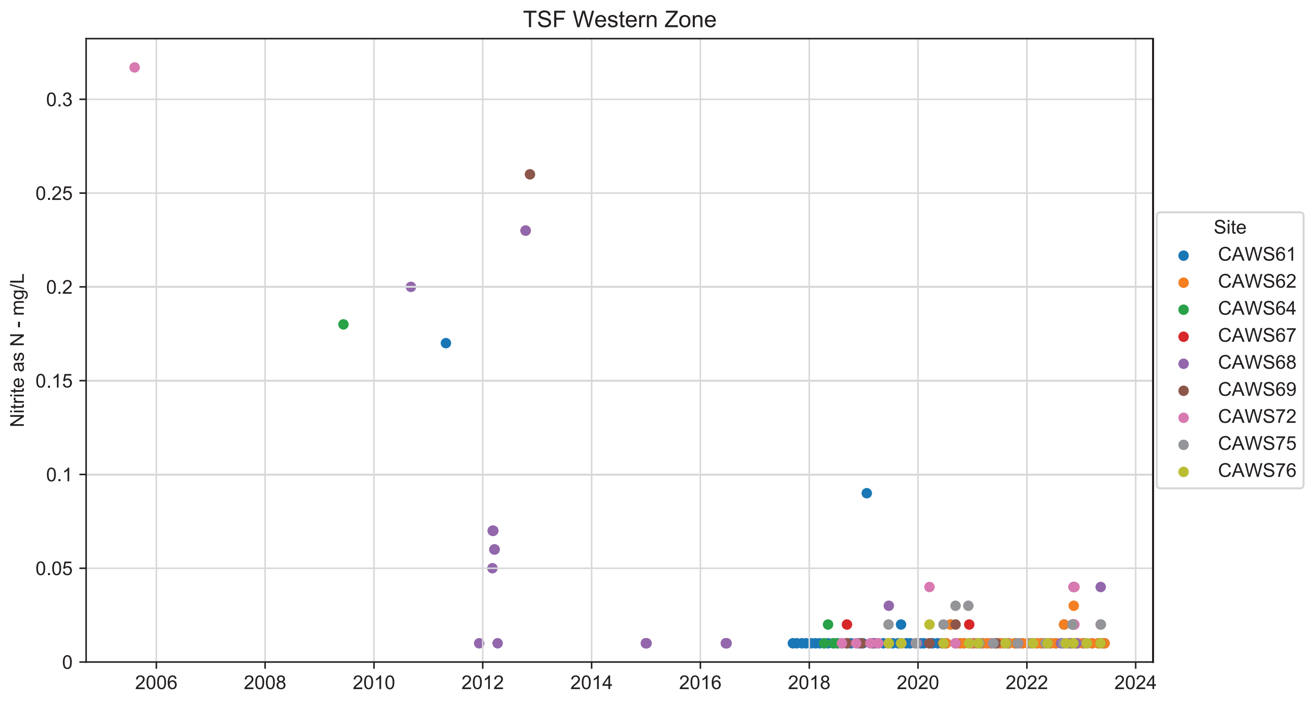

TSF Western Zone
Suspended Solids (SS) - mg/L
1000
100
10
2018
2019
2020
2021
2022
2023
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

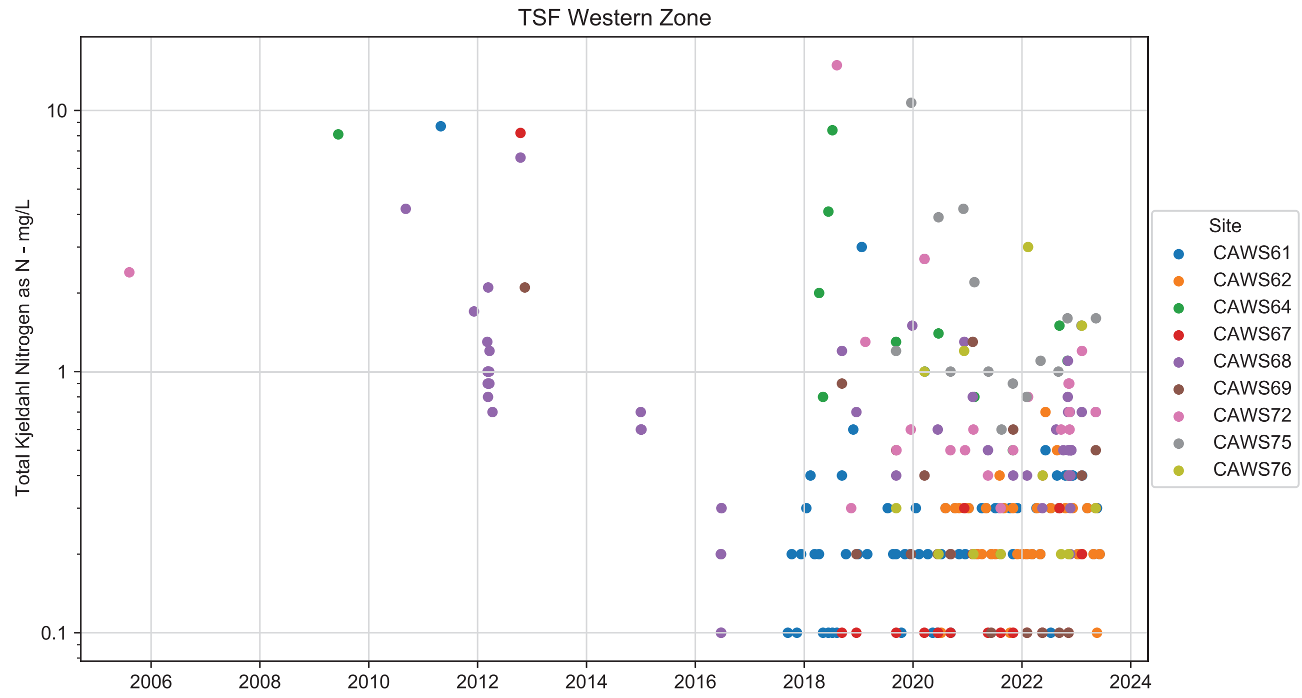

TSF Western Zone
Temperature - Field - °C
35
30
25
20
15
10
5
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

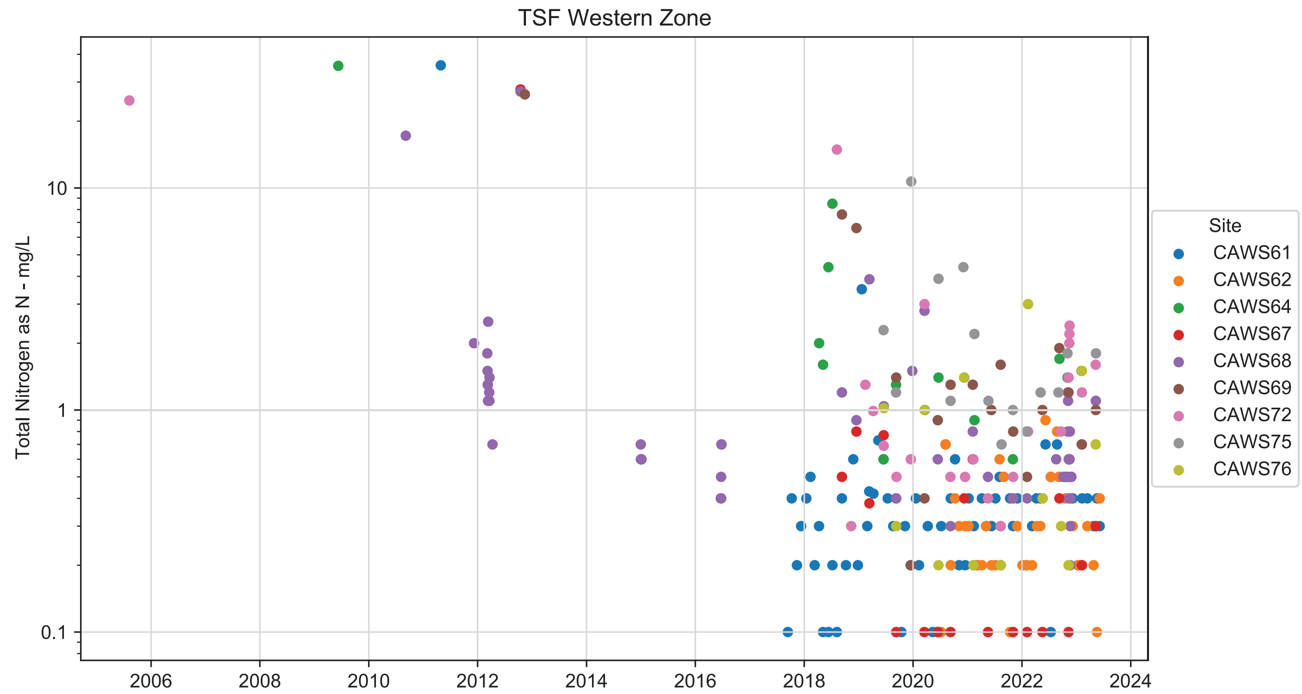

TSF Western Zone
Total Dissolved Solids @180°C - mg/L
7000
6000
5000
4000
3000
2000
1000
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

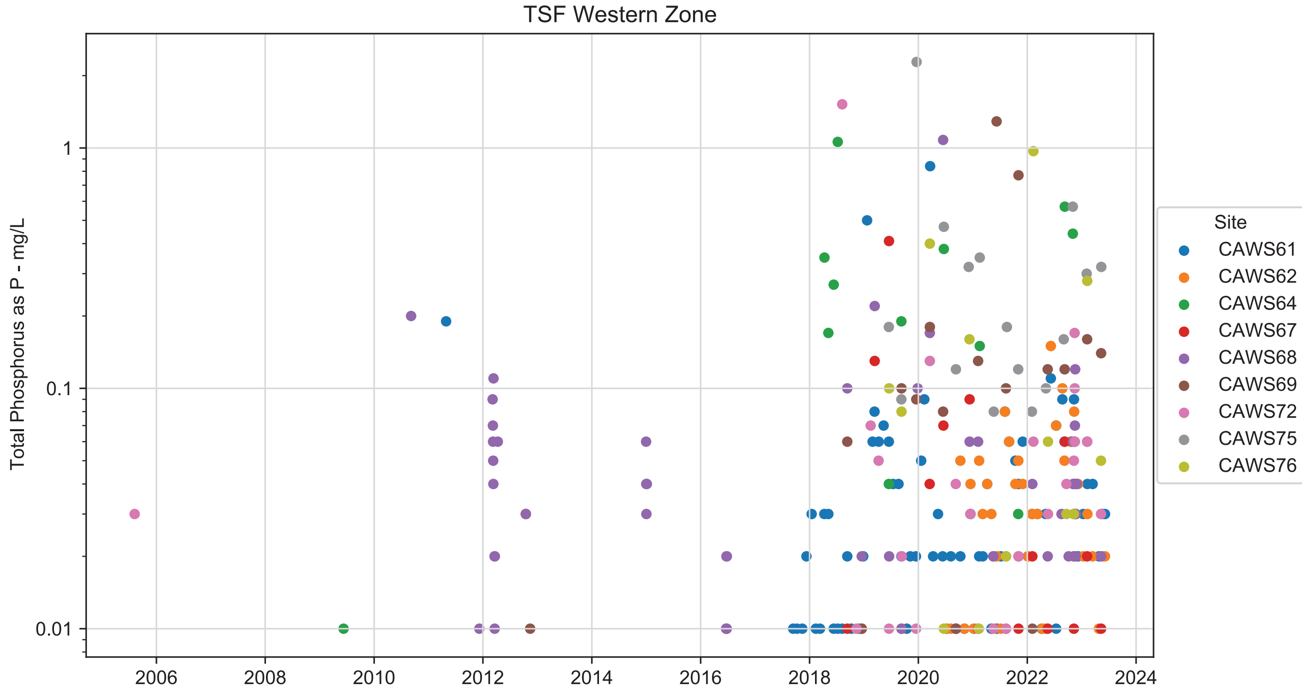

TSF Western Zone
Nitrate as N - mg/L
10
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76


TSF Western Zone
Nitrite + Nitrate as N - mg/L
10
1
0.1
0.01
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

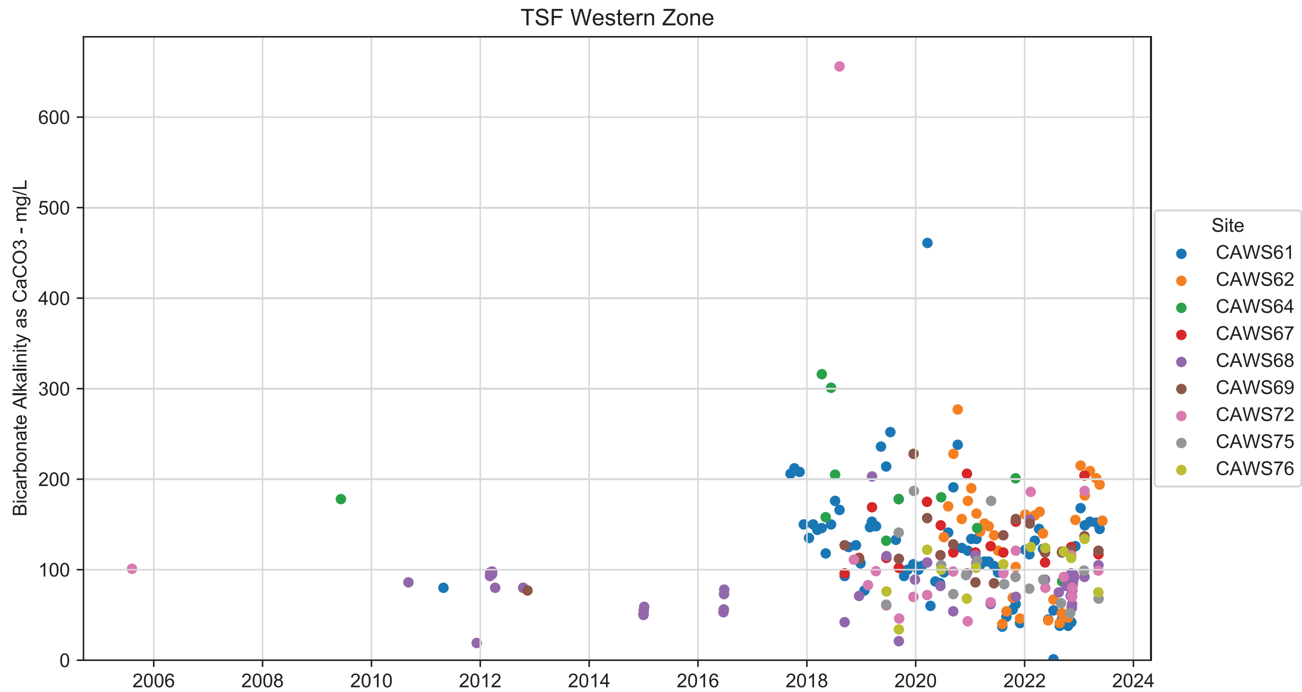

TSF Western Zone
Nitrite as N - mg/L
0.3
0.25
0.2
0.15
0.1
0.05
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76


TSF Western Zone
Total Kjeldahl Nitrogen as N - mg/L
10
1
0.1
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

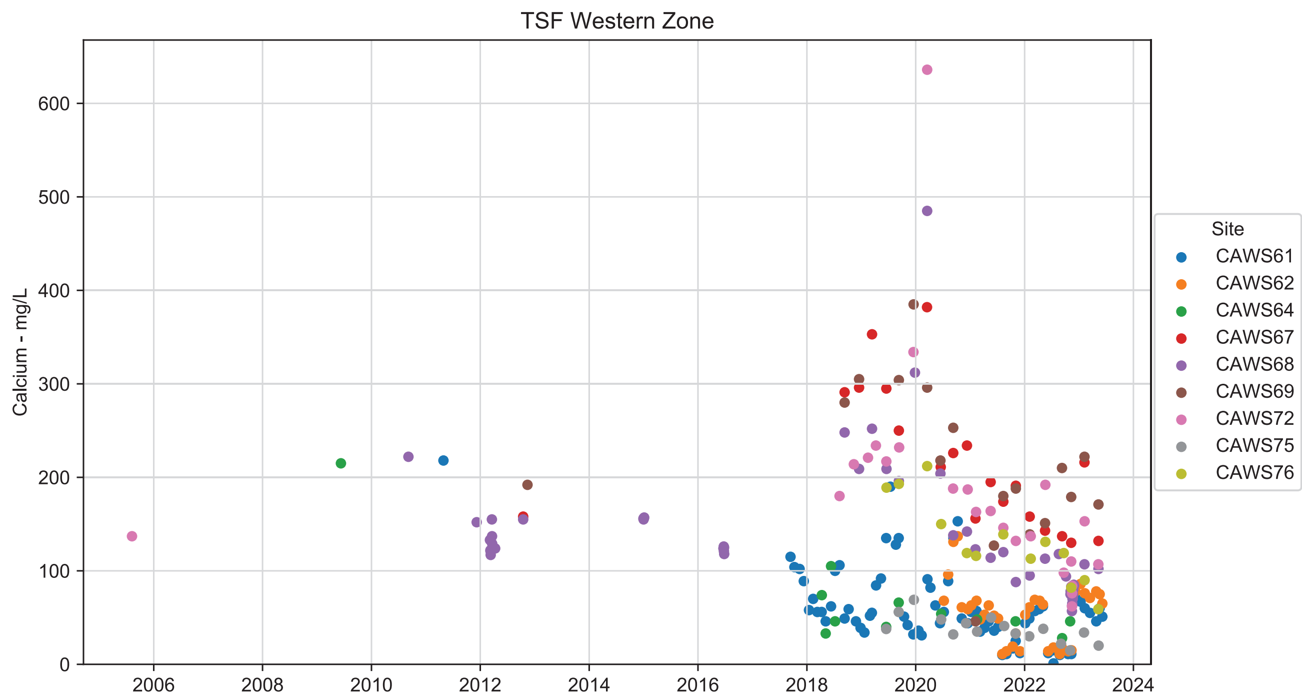

TSF Western Zone
Total Nitrogen as N - mg/L
10
1
0.1
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76



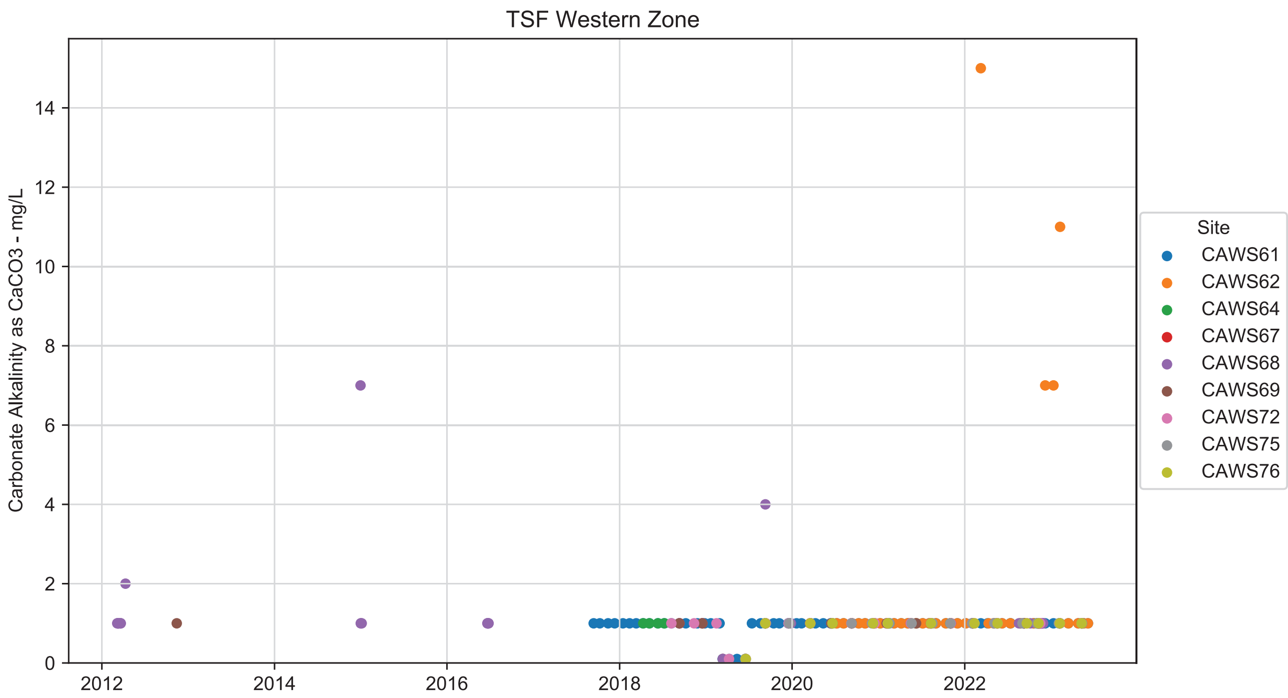
TSF Western Zone
Total Phosphorus as P - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

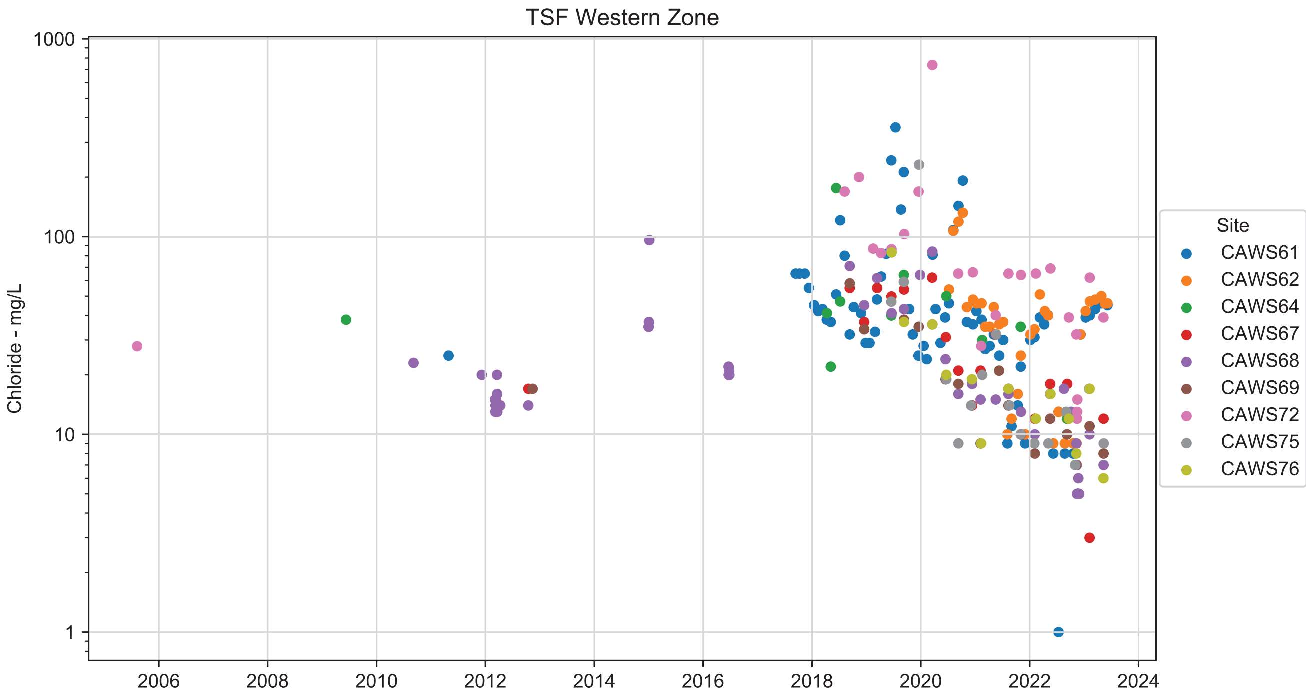


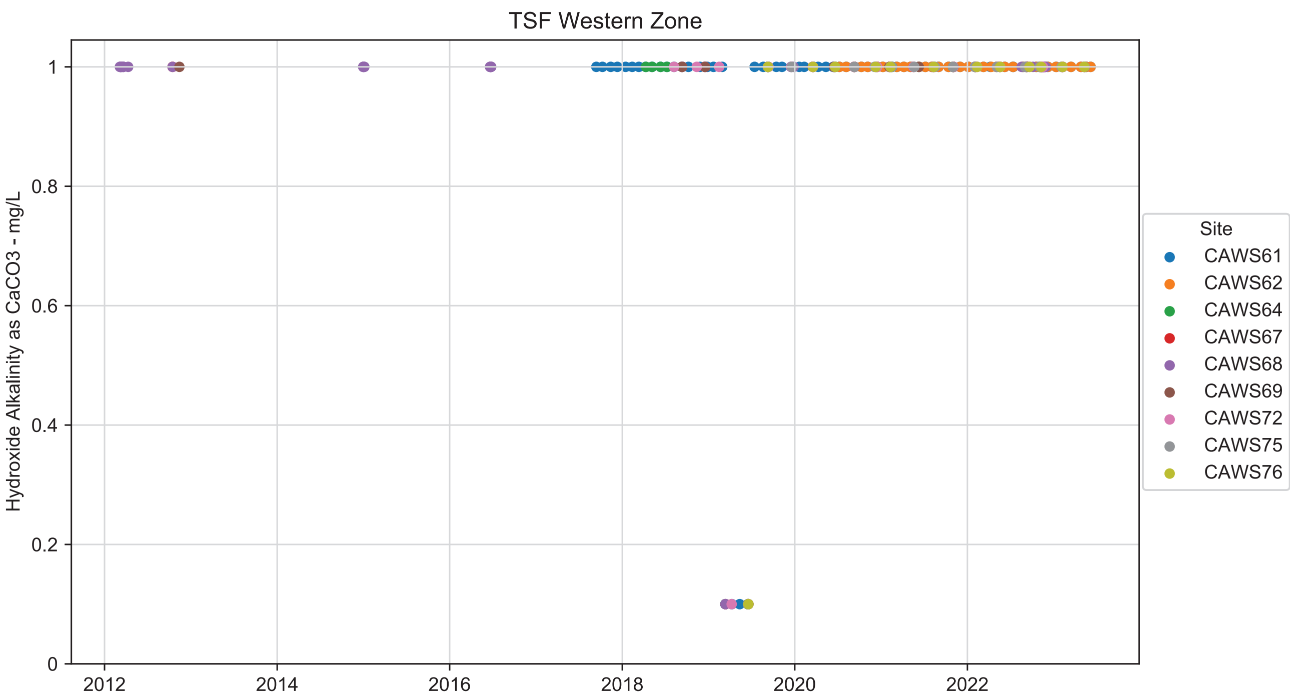
TSF Western Zone
Bicarbonate Alkalinity as CaCO3 - mg/L
600
500
400
300
200
100
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

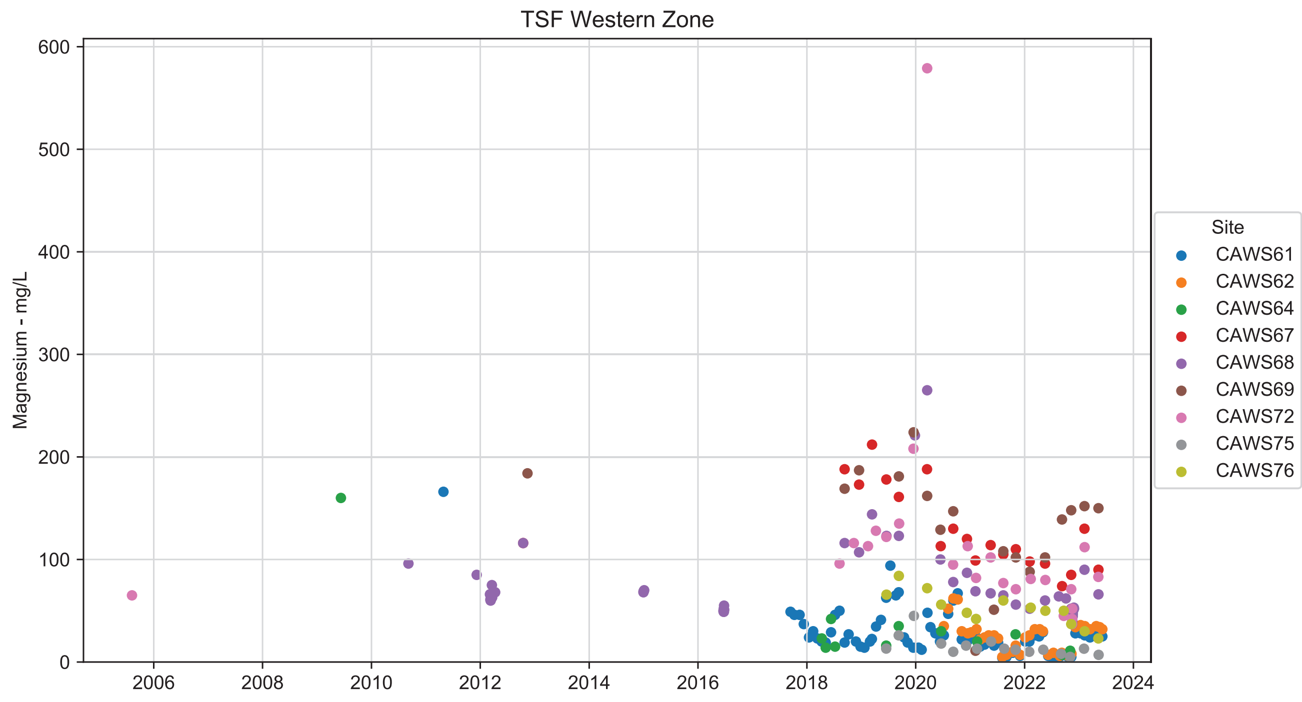


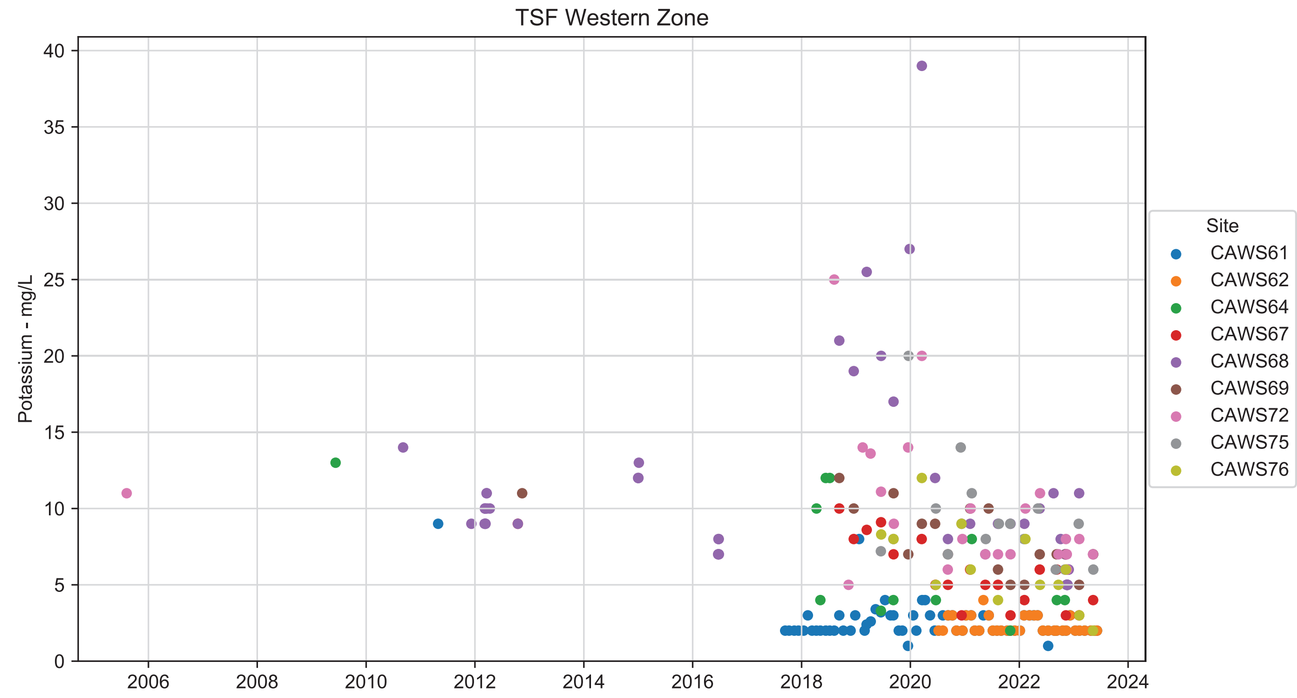
TSF Western Zone
Calcium - mg/L
600
500
400
300
200
100
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

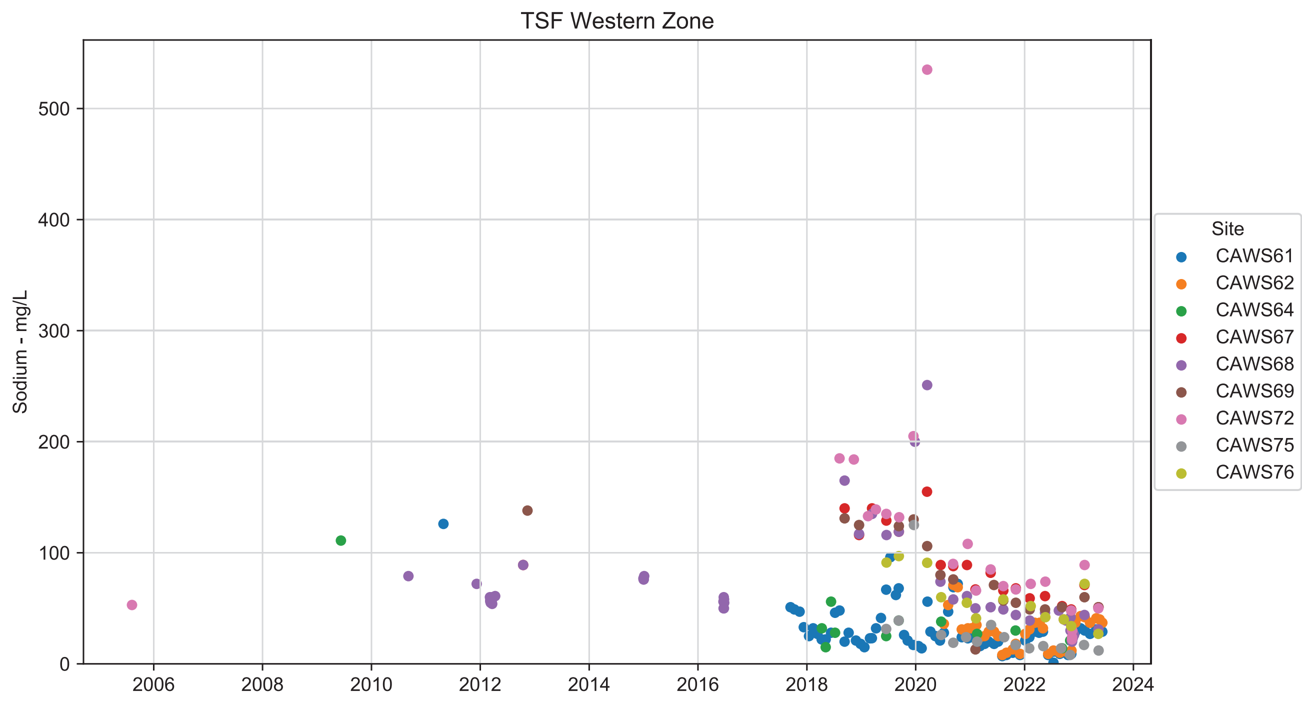

TSF Western Zone
Carbonate Alkalinity as CaCO3 - mg/L
0
2
4
6
8
10
12
14
2012
2014
2016
2018
2020
2022
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

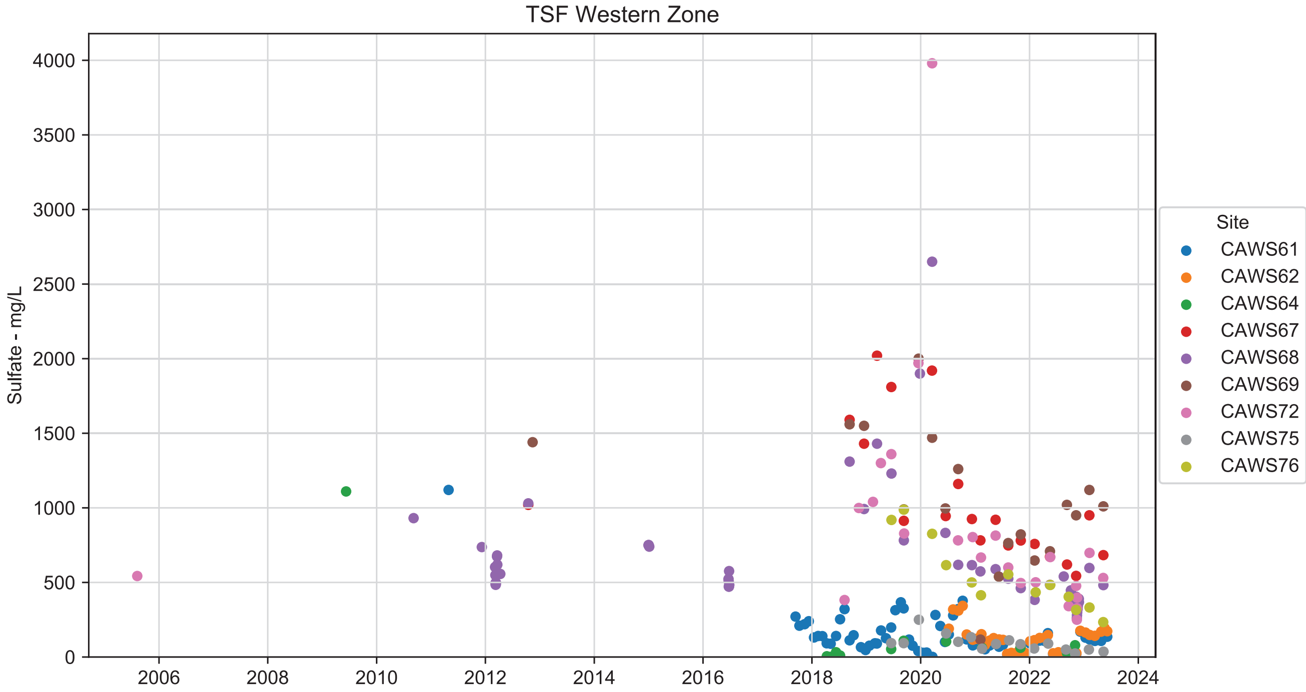

TSF Western Zone
Chloride - mg/L
1
10
100
1000
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

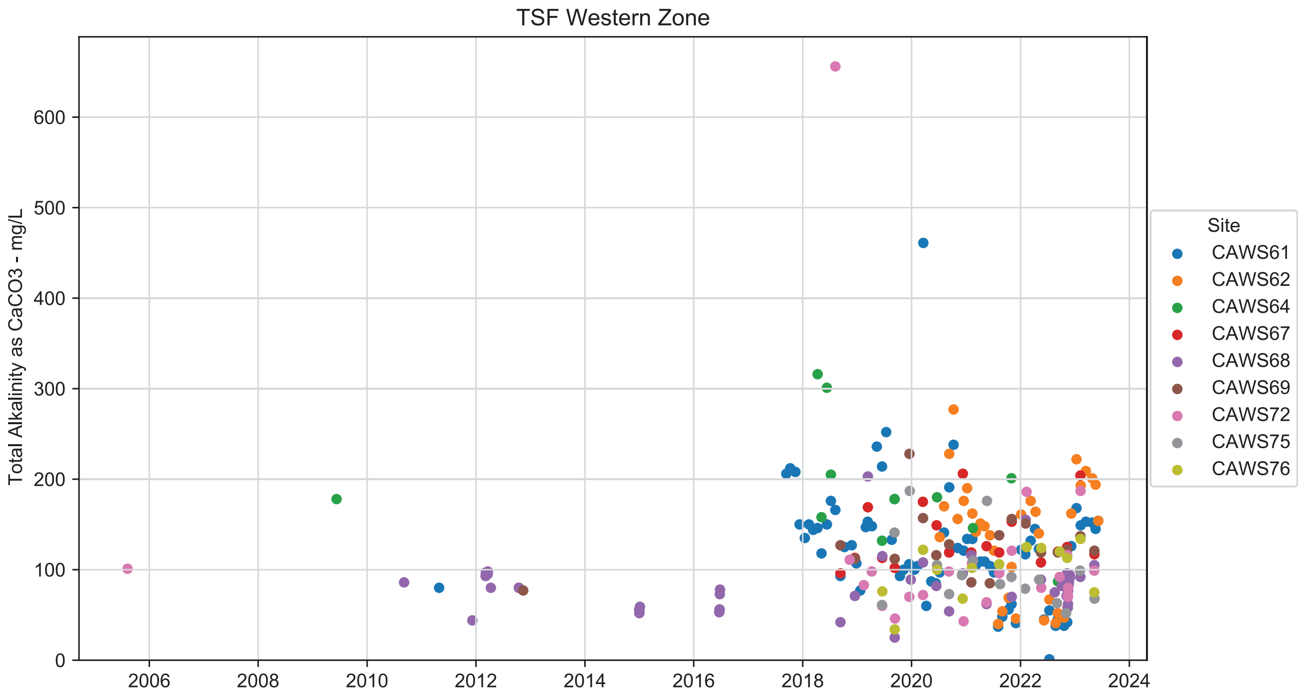

TSF Western Zone
Hydroxide Alkalinity as CaCO3 - mg/L
0
0.2
0.4
0.6
0.8
1
2012
2014
2016
2018
2020
2022
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

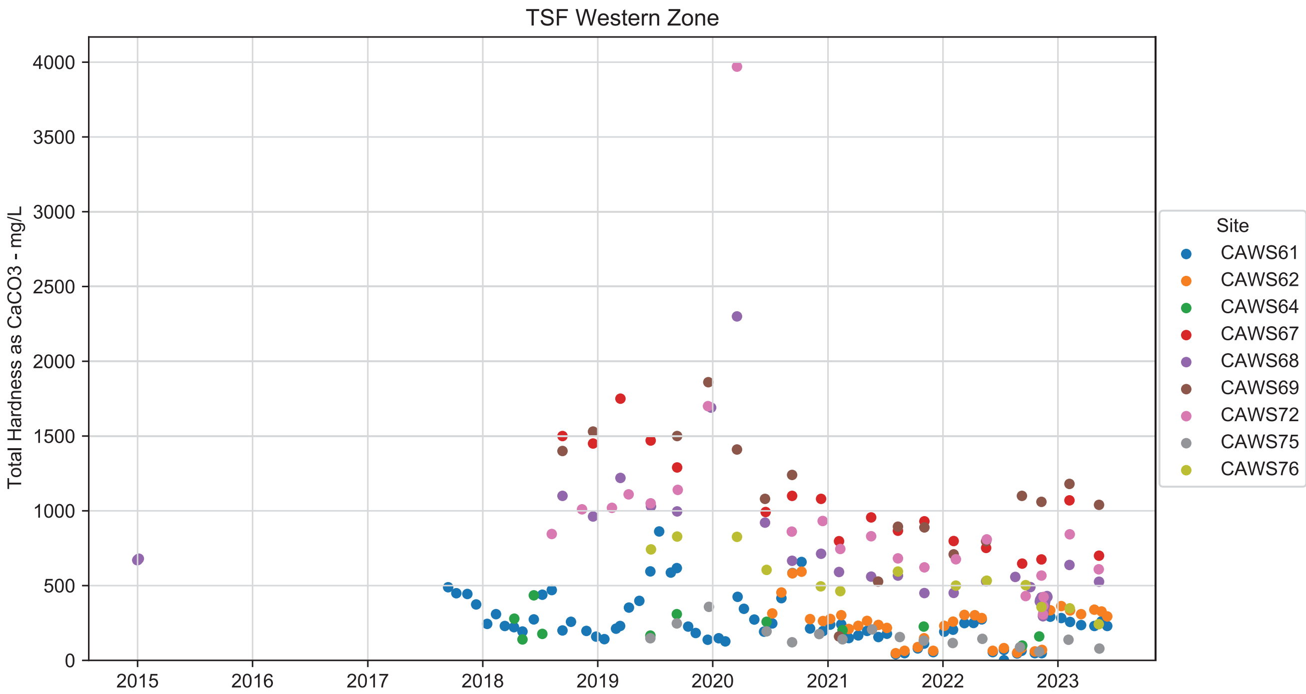

TSF Western Zone
Magnesium - mg/L
0
100
200
300
400
500
600
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

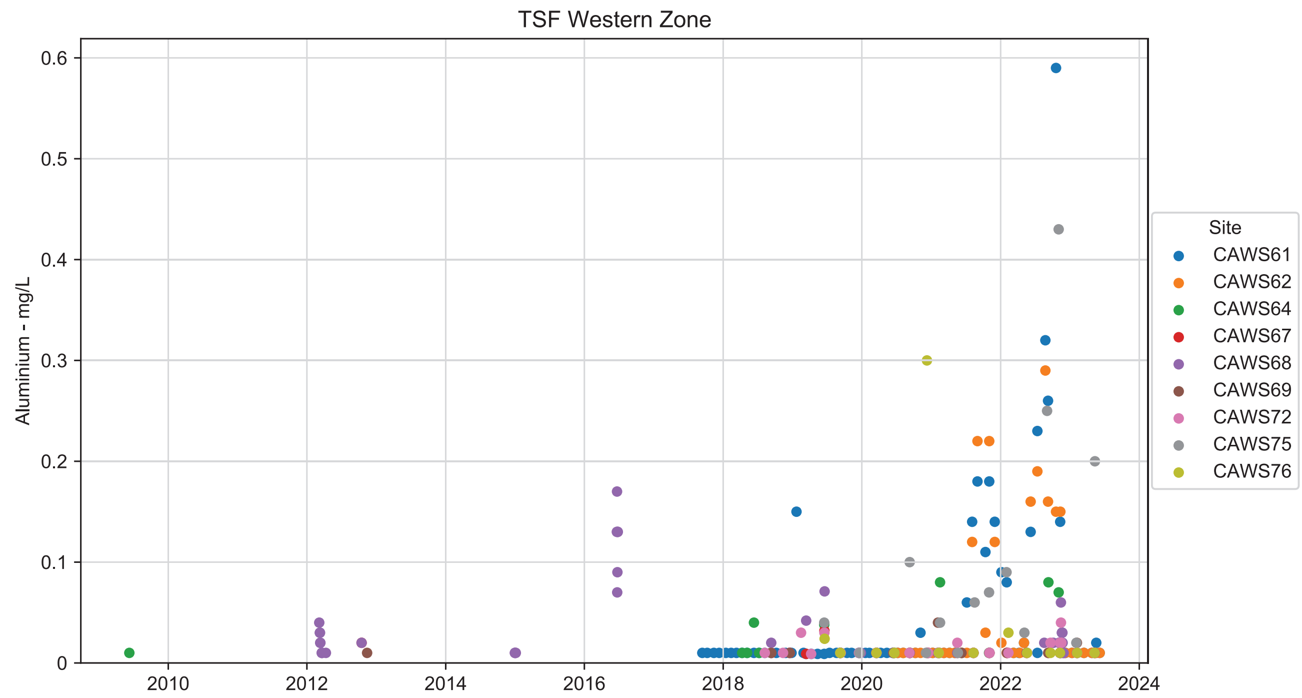

TSF Western Zone
Potassium - mg/L
0
5
10
15
20
25
30
35
40
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

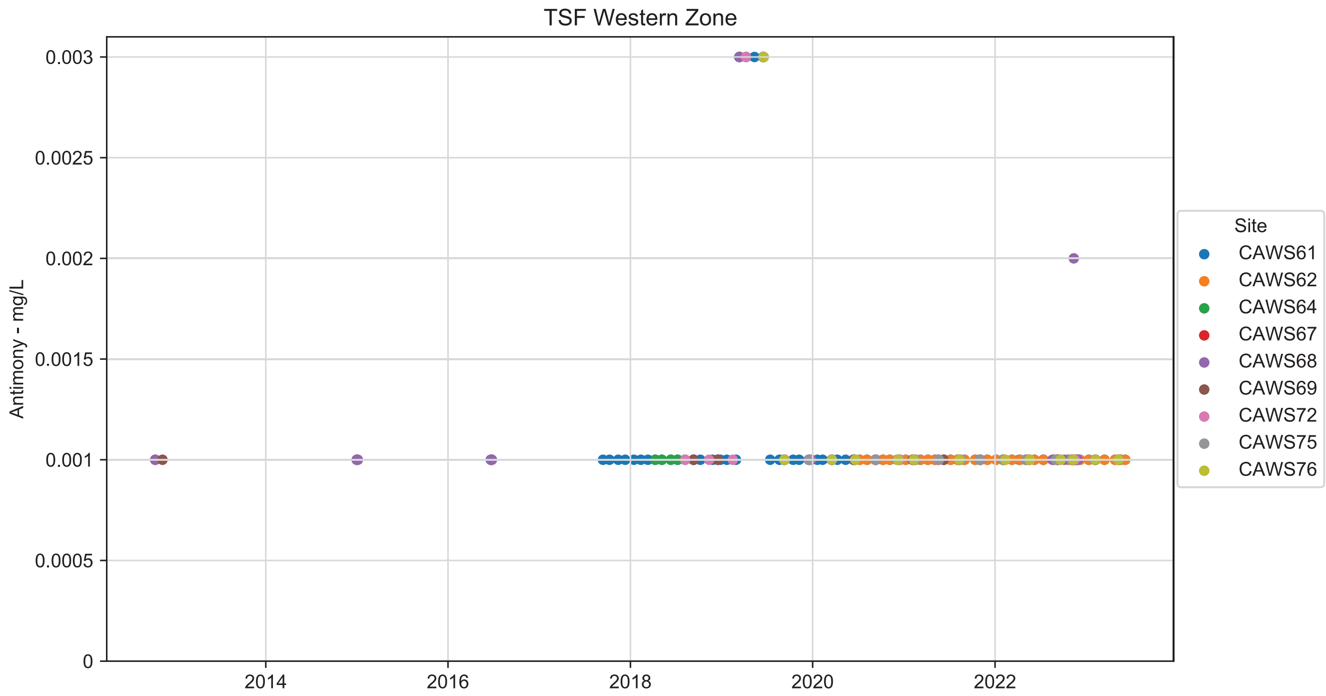

TSF Western Zone
Sodium - mg/L
0
100
200
300
400
500
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

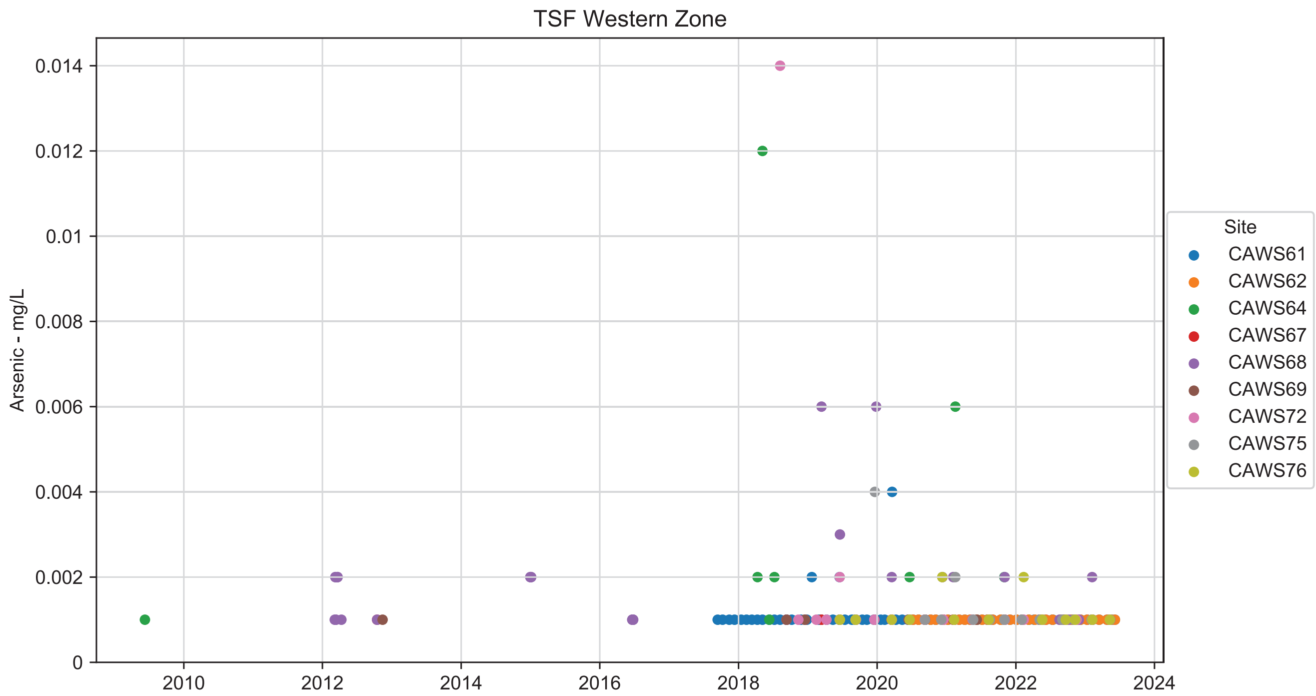

TSF Western Zone
Sulfate - mg/L
0
500
1000
1500
2000
2500
3000
3500
4000
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

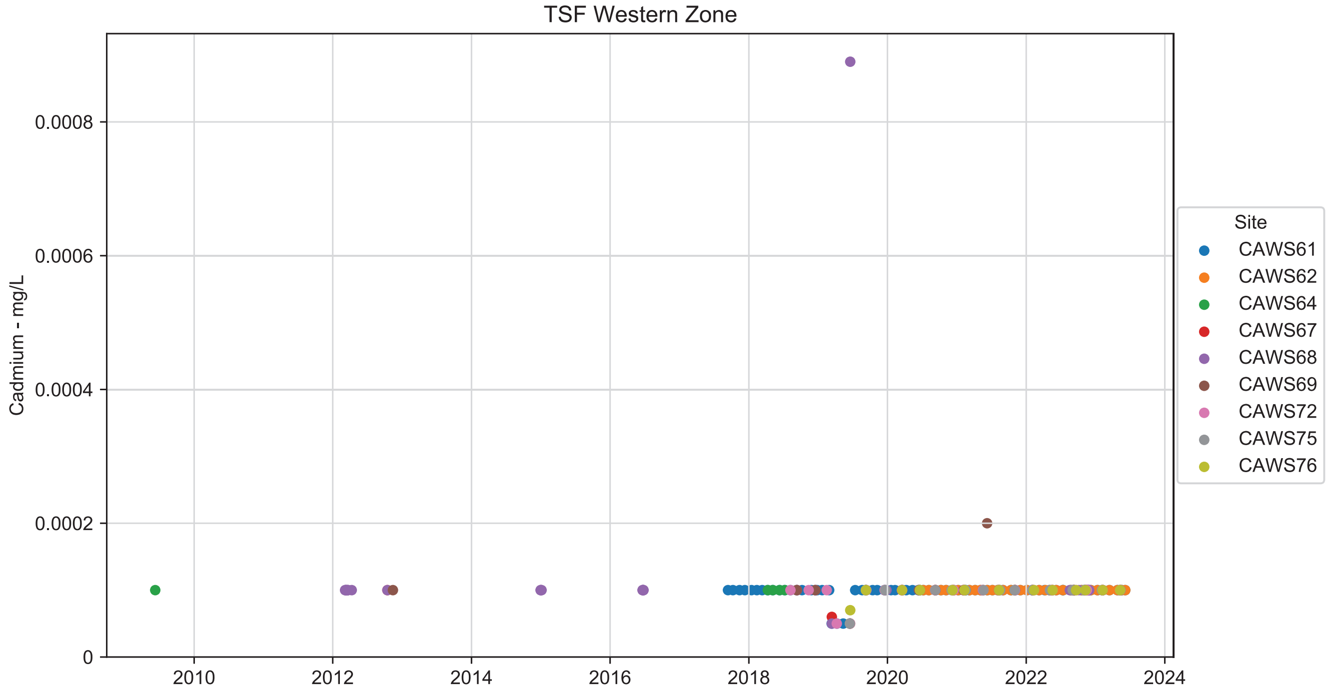

TSF Western Zone
Total Alkalinity as CaCO3 - mg/L
0
100
200
300
400
500
600
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

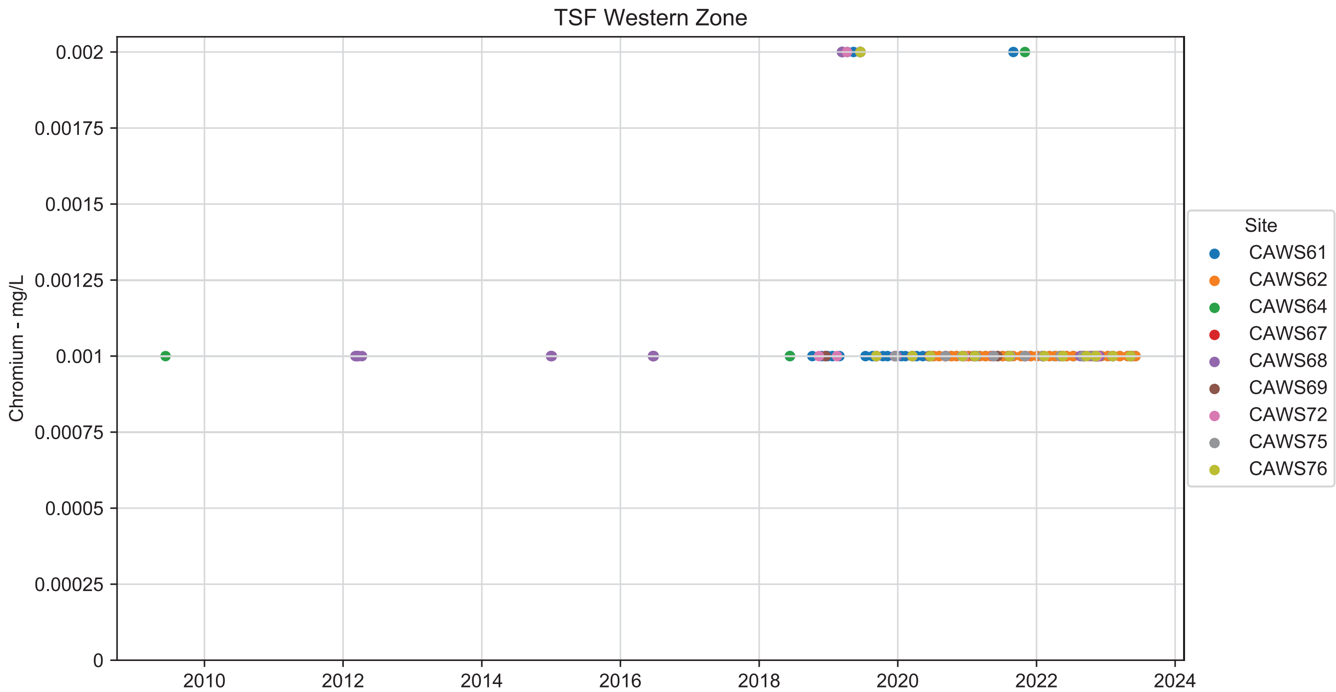

TSF Western Zone
Total Hardness as CaCO3 - mg/L
0
500
1000
1500
2000
2500
3000
3500
4000
2015
2016
2017
2018
2019
2020
2021
2022
2023
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76


TSF Western Zone
Aluminium - mg/L
0.6
0.5
0.4
0.3
0.2
0.1
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76


TSF Western Zone
Antimony - mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2014
2016
2018
2020
2022
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76


TSF Western Zone
Arsenic - mg/L
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76


TSF Western Zone
Cadmium - mg/L
0.0008
0.0006
0.0004
0.0002
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76


TSF Western Zone
Chromium - mg/L
0.002
0.00175
0.0015
0.00125
0.001
0.00075
0.0005
0.00025
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
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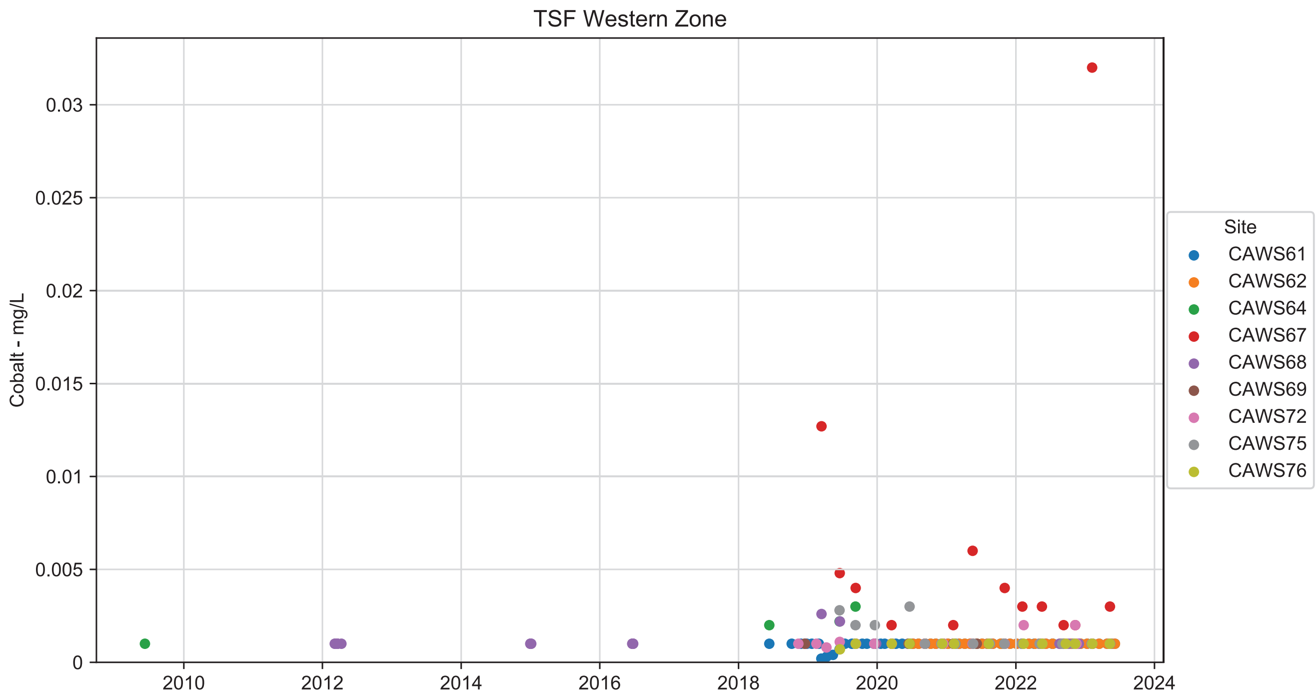
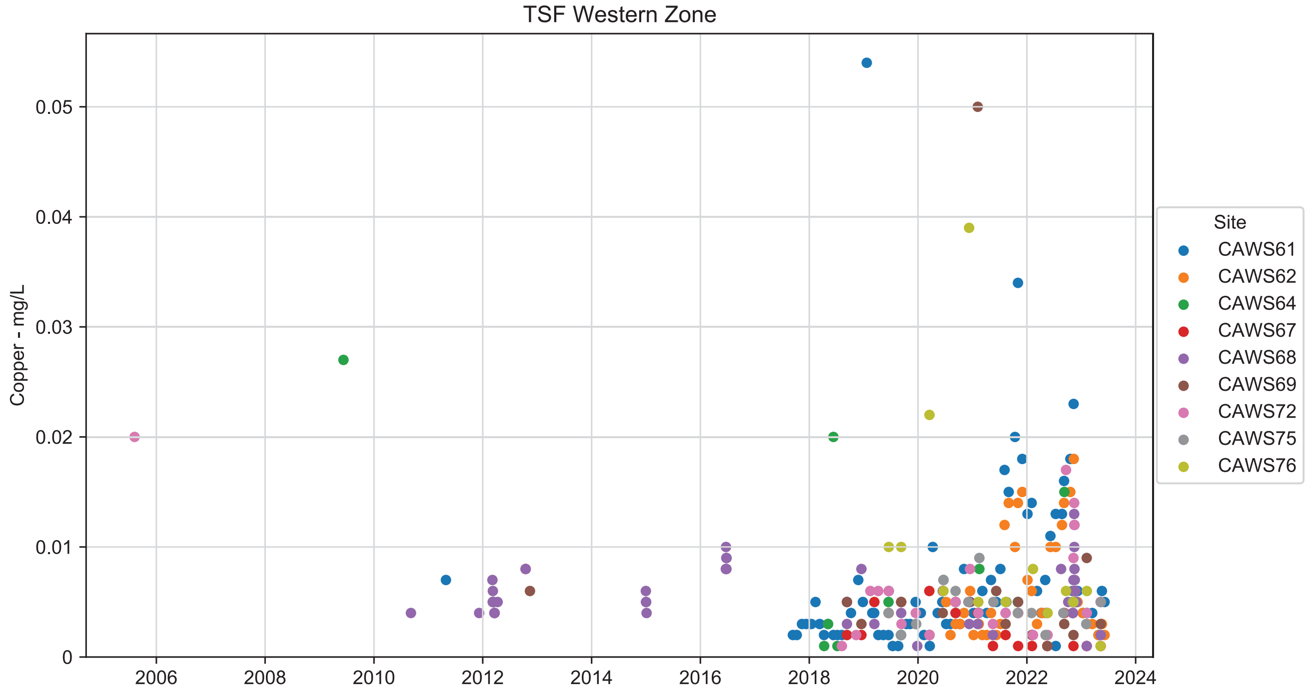
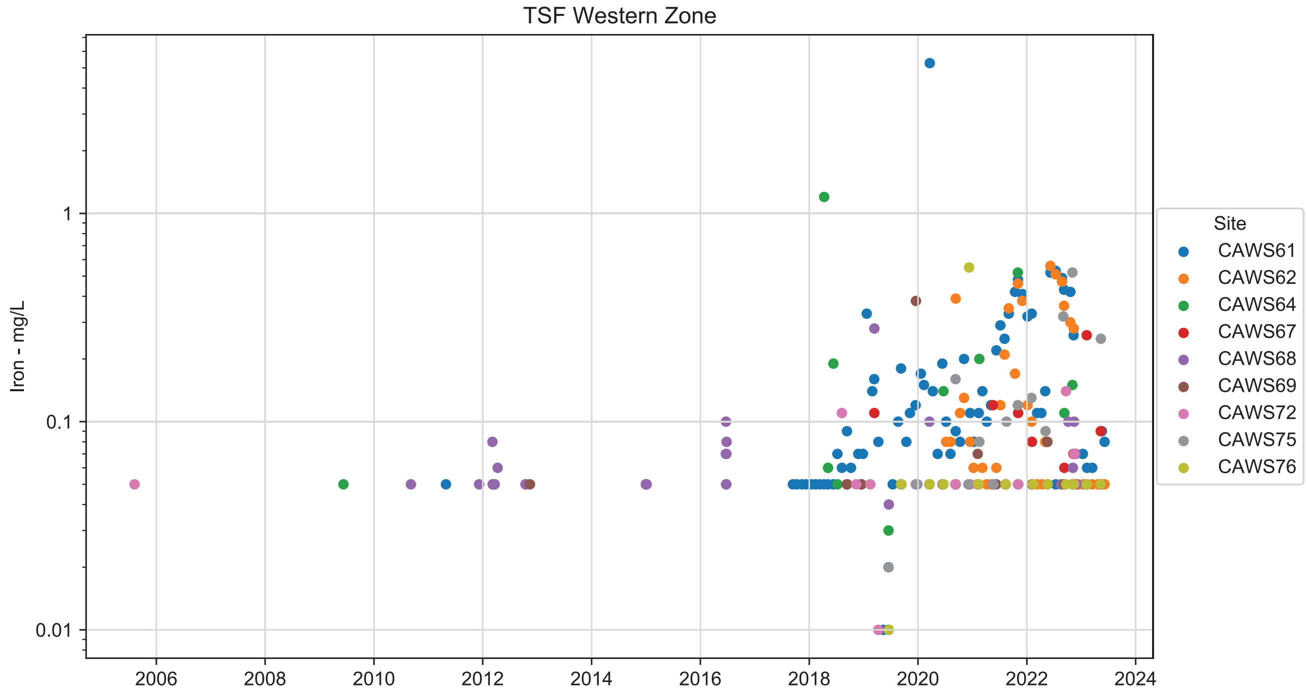
CAWS69
CAWS72
CAWS75
CAWS76

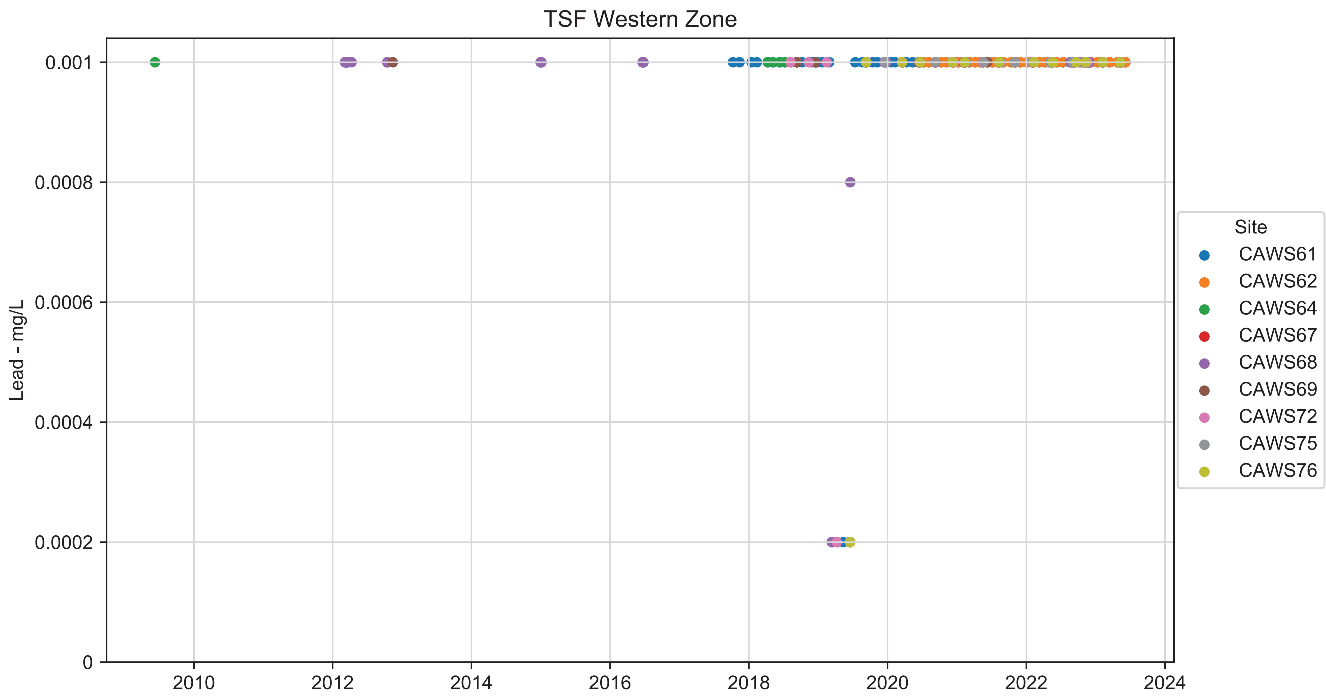

TSF Western Zone
Cobalt - mg/L
0.03
0.025
0.02
0.015
0.01
0.005
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76



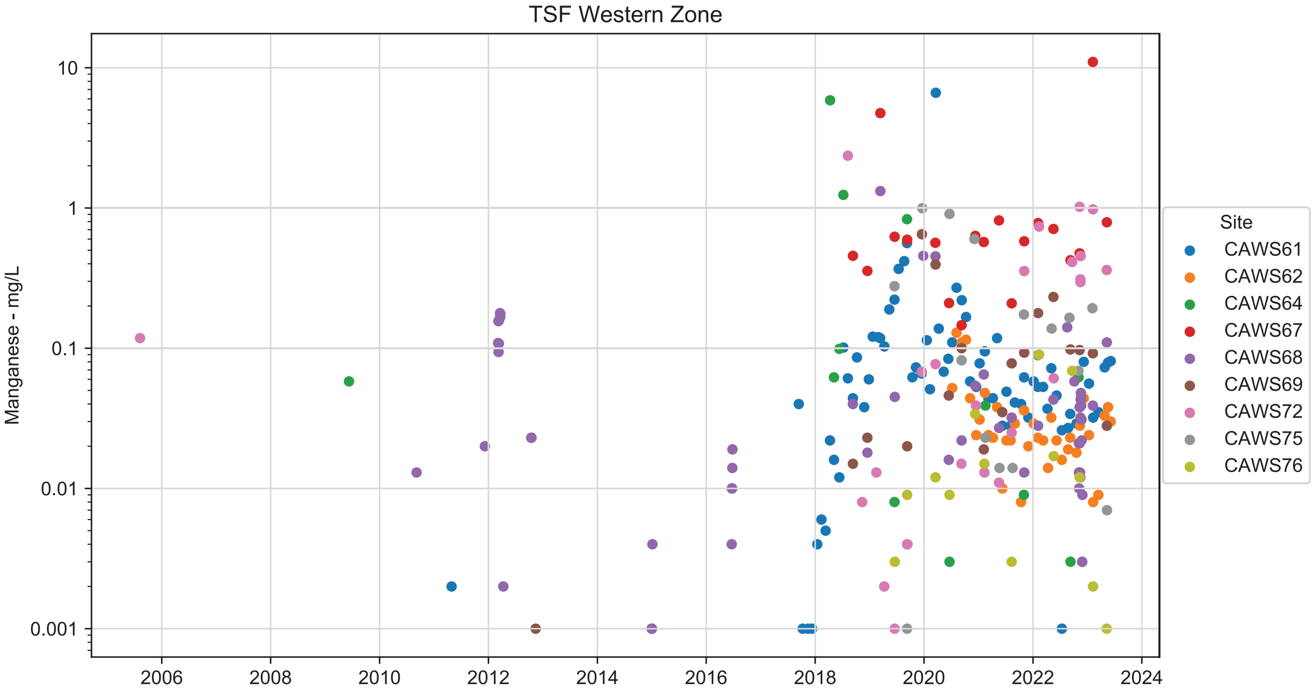
TSF Western Zone
Copper - mg/L
0.05
0.04
0.03
0.02
0.01
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

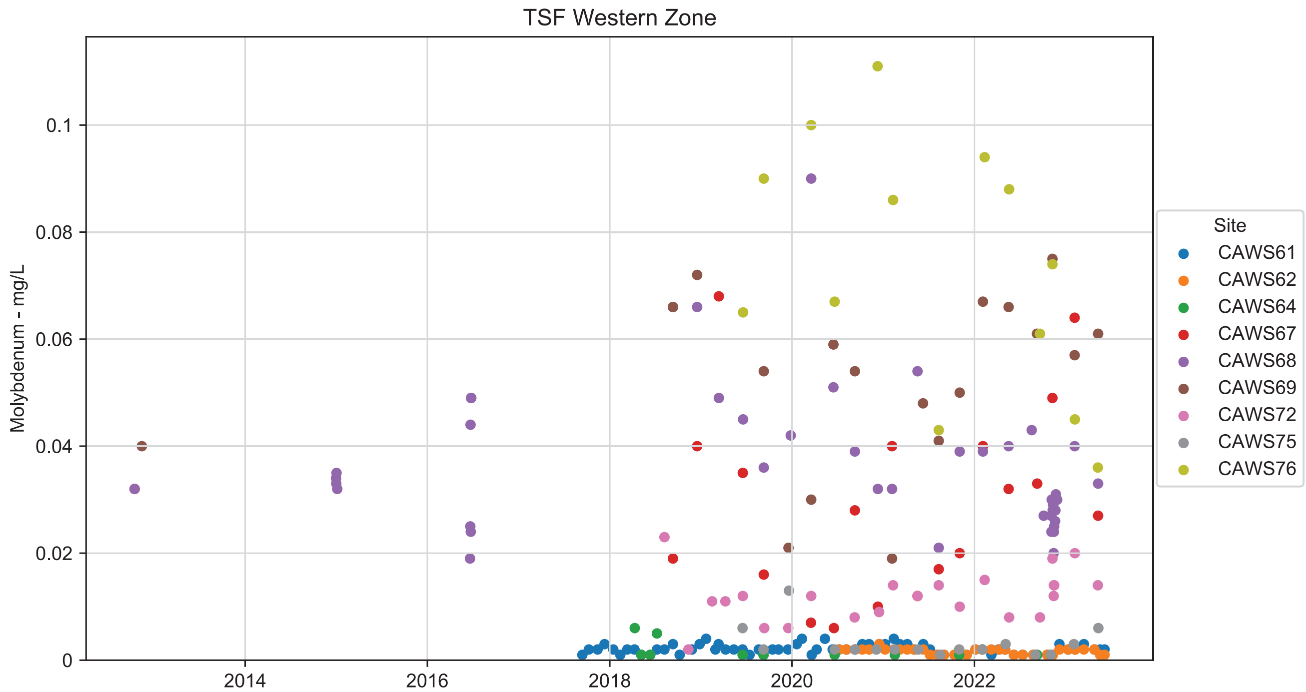


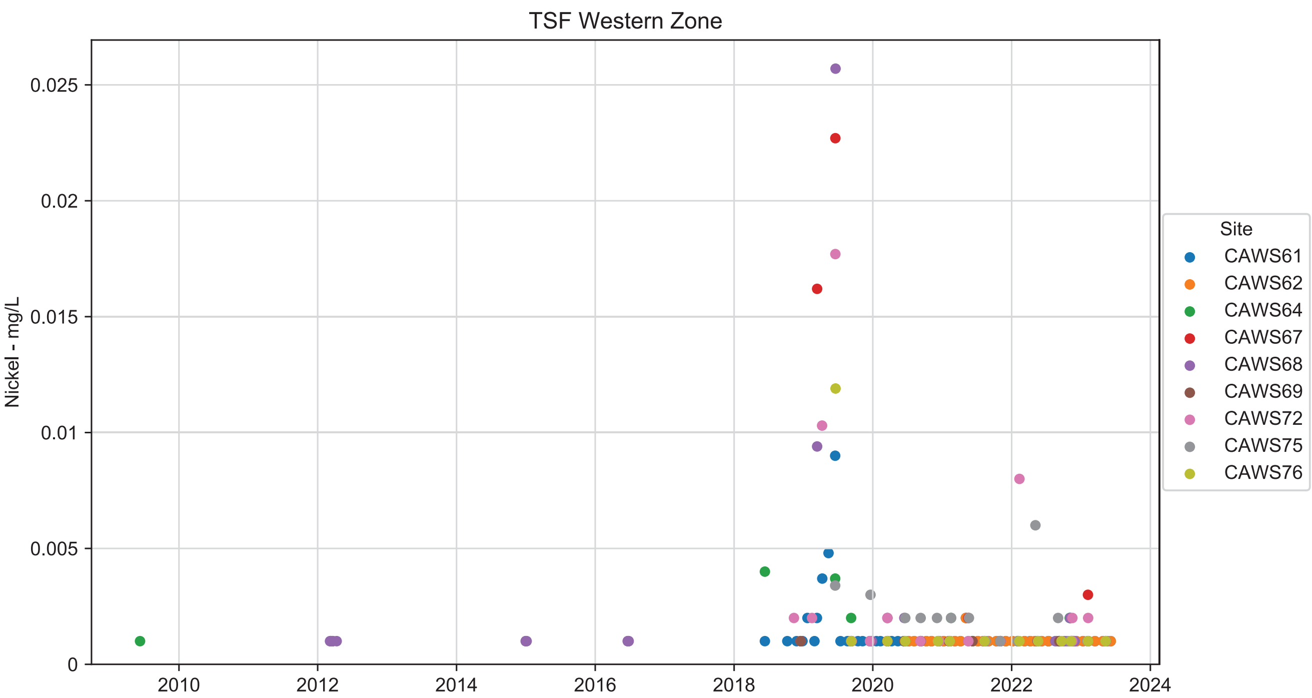
TSF Western Zone
Iron - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

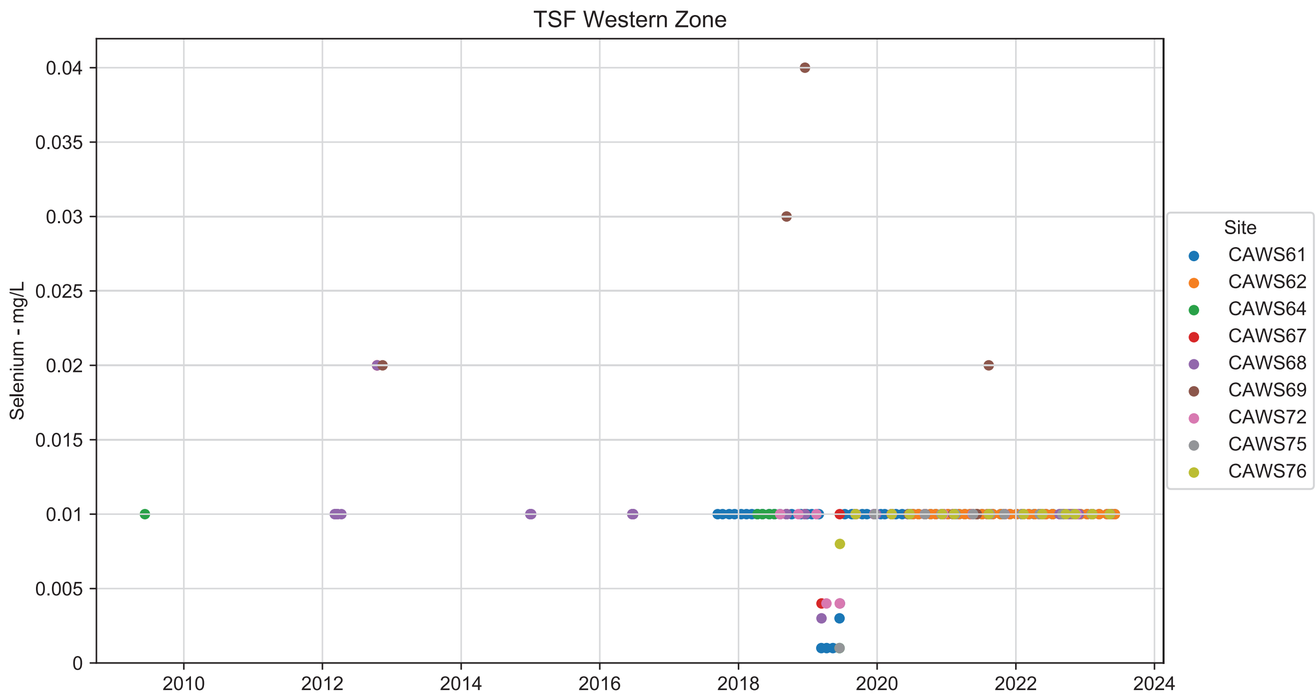


TSF Western Zone
Lead - mg/L
0.001
0.0008
0.0006
0.0004
0.0002
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76


TSF Western Zone
Manganese - mg/L
10
1
0.1
0.01
0.001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76


TSF Western Zone
Molybdenum - mg/L
0.1
0.08
0.06
0.04
0.02
0
2014
2016
2018
2020
2022
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76


TSF Western Zone
Nickel - mg/L
0.025
0.02
0.015
0.01
0.005
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76


TSF Western Zone
Selenium - mg/L
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
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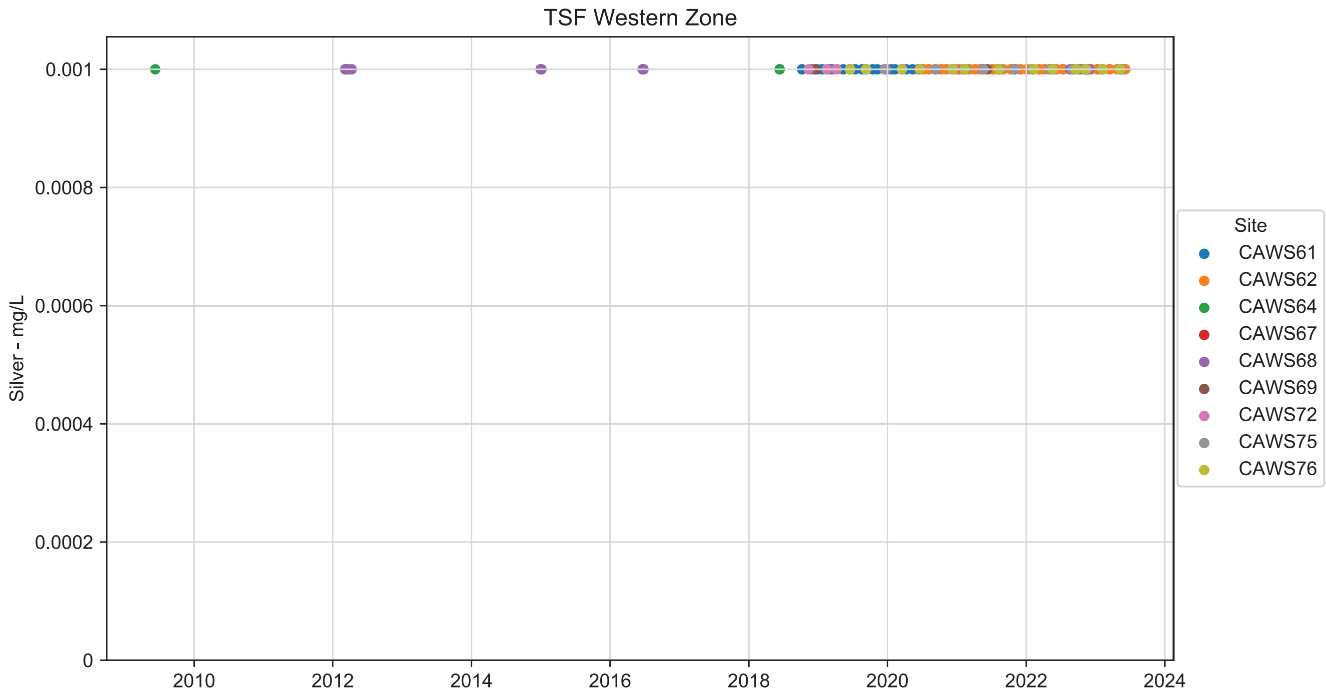
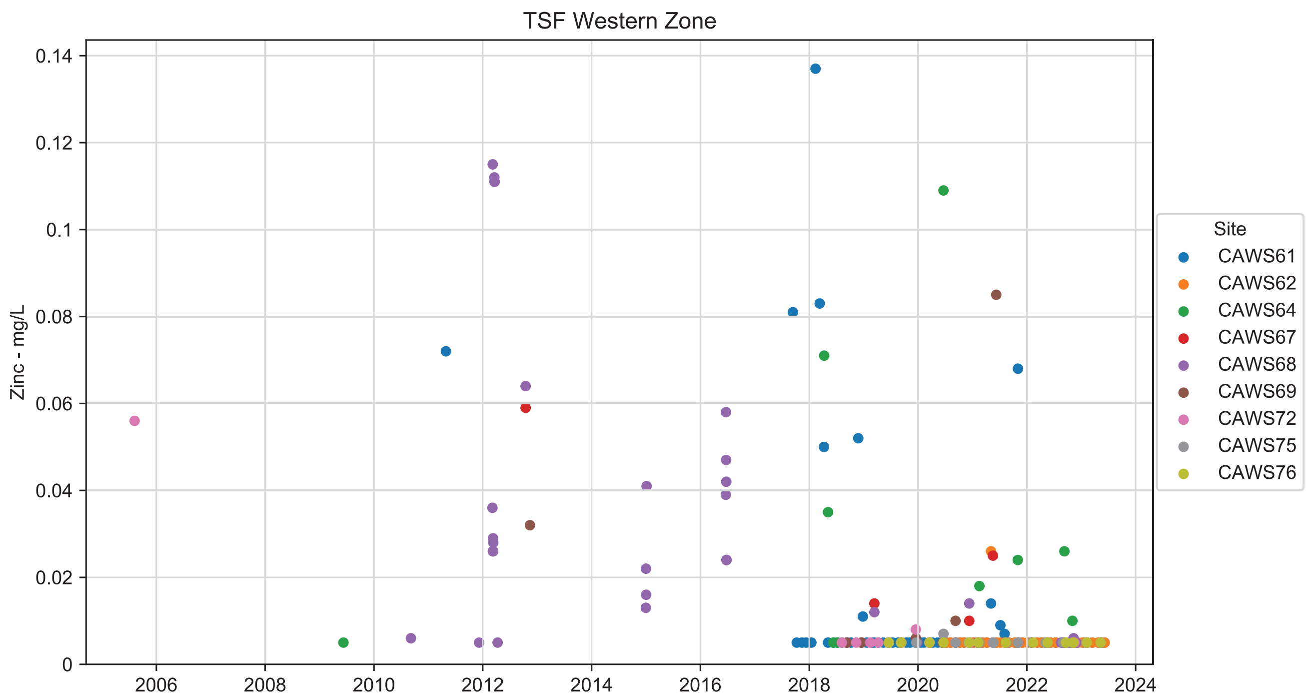
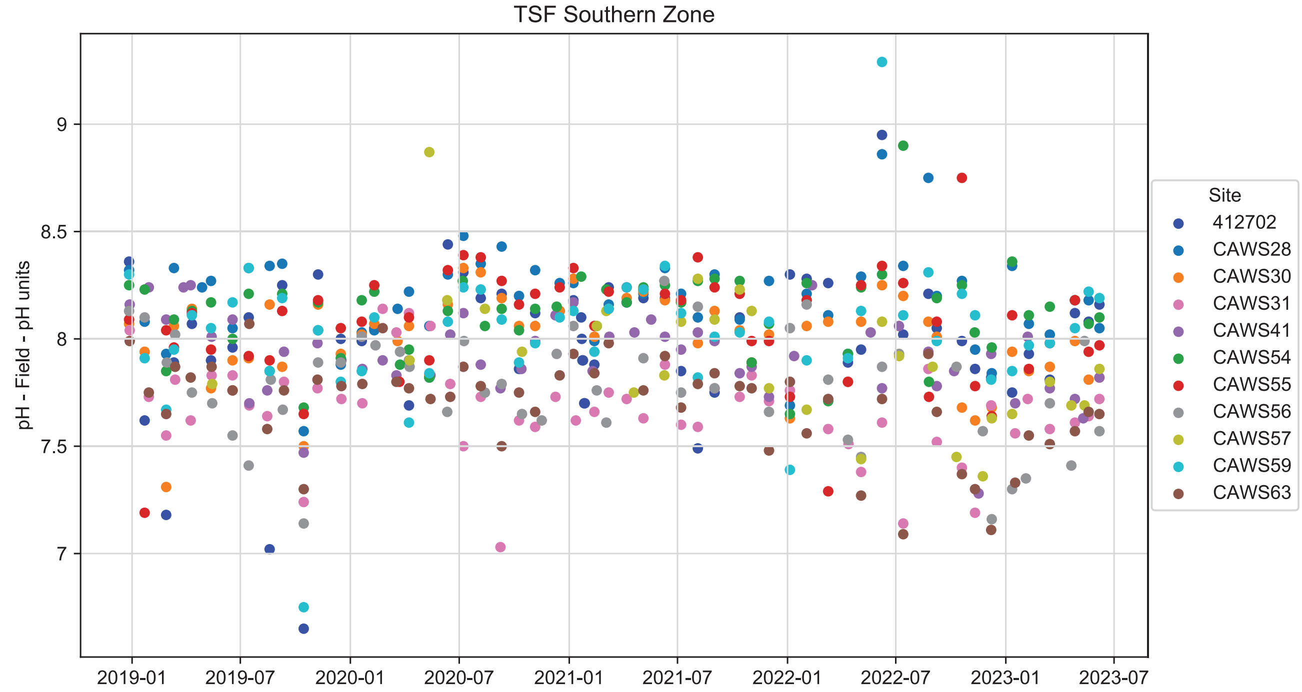
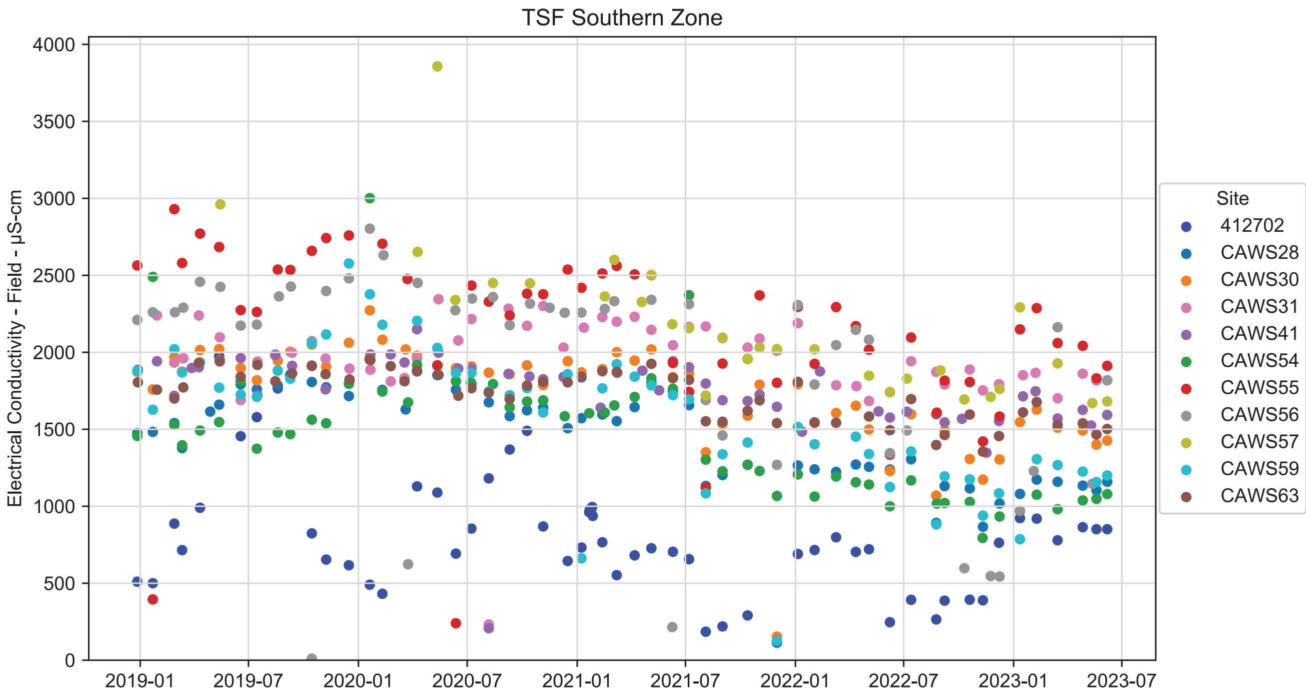
CAWS72
CAWS75
CAWS76


TSF Western Zone
Silver - mg/L
0.001
0.0008
0.0006
0.0004
0.0002
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76

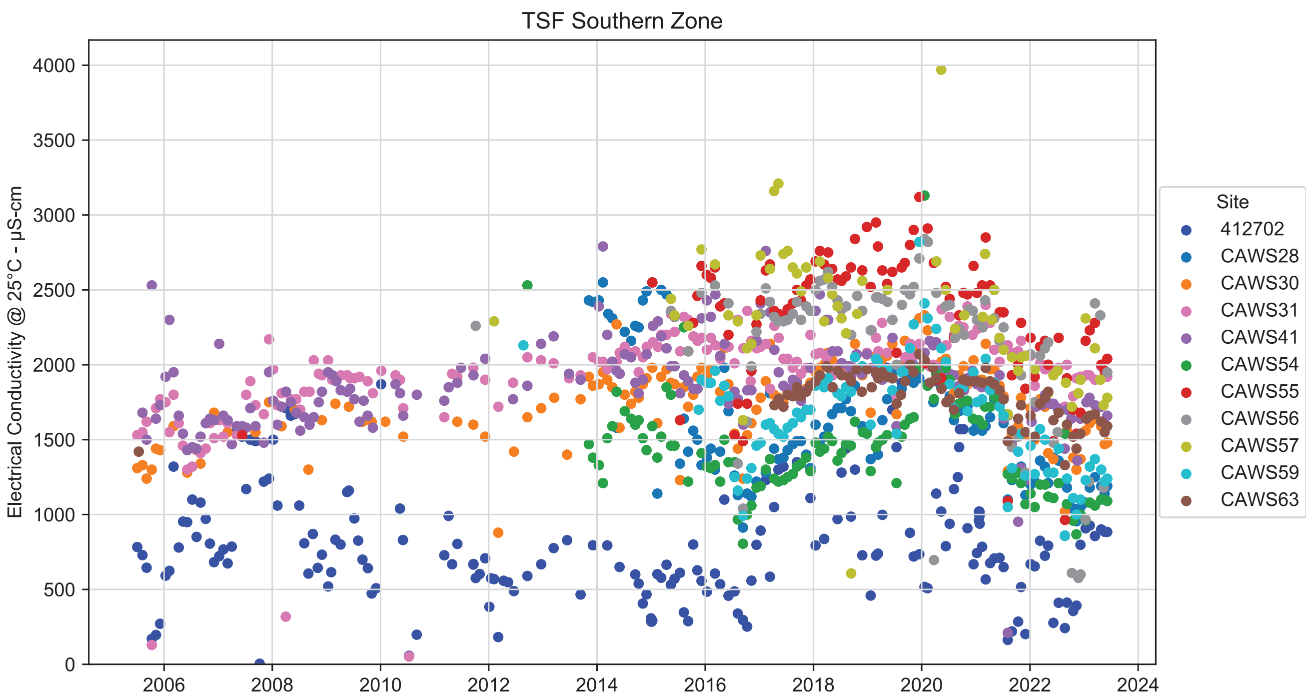

TSF Western Zone
Zinc - mg/L
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
CAWS61
CAWS62
CAWS64
CAWS67
CAWS68
CAWS69
CAWS72
CAWS75
CAWS76



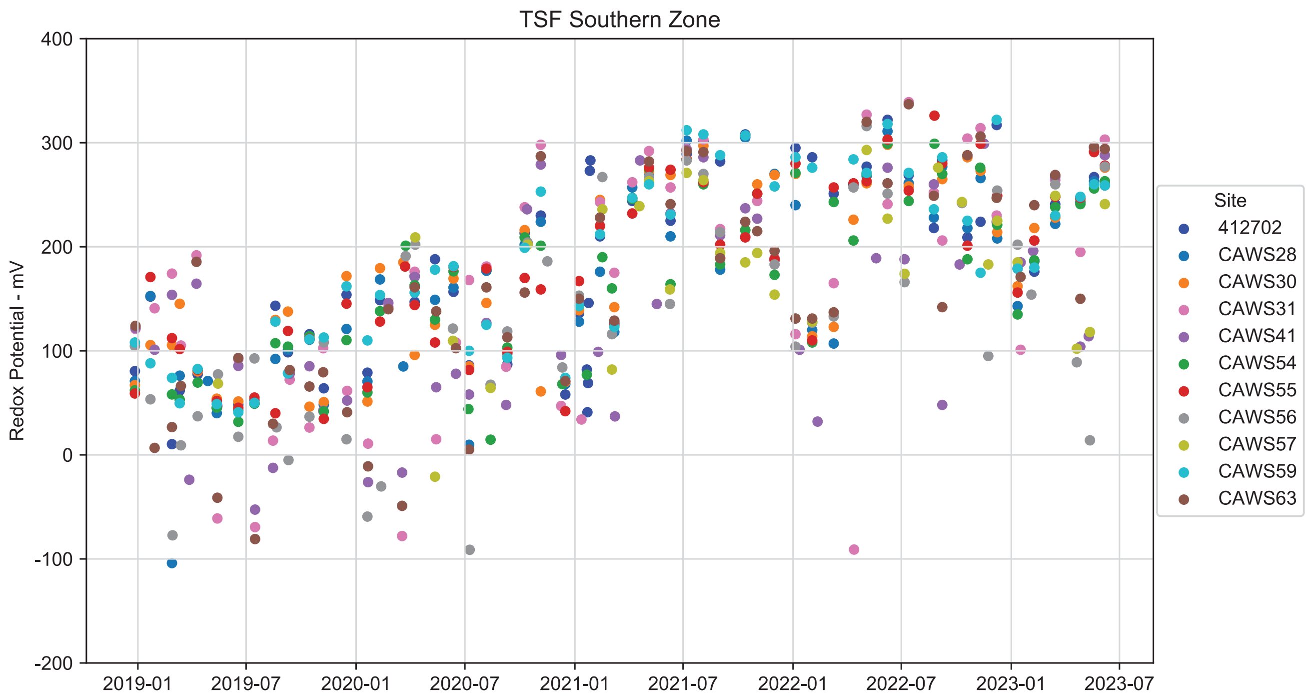
TSF Southern Zone
pH - Field - pH units
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63

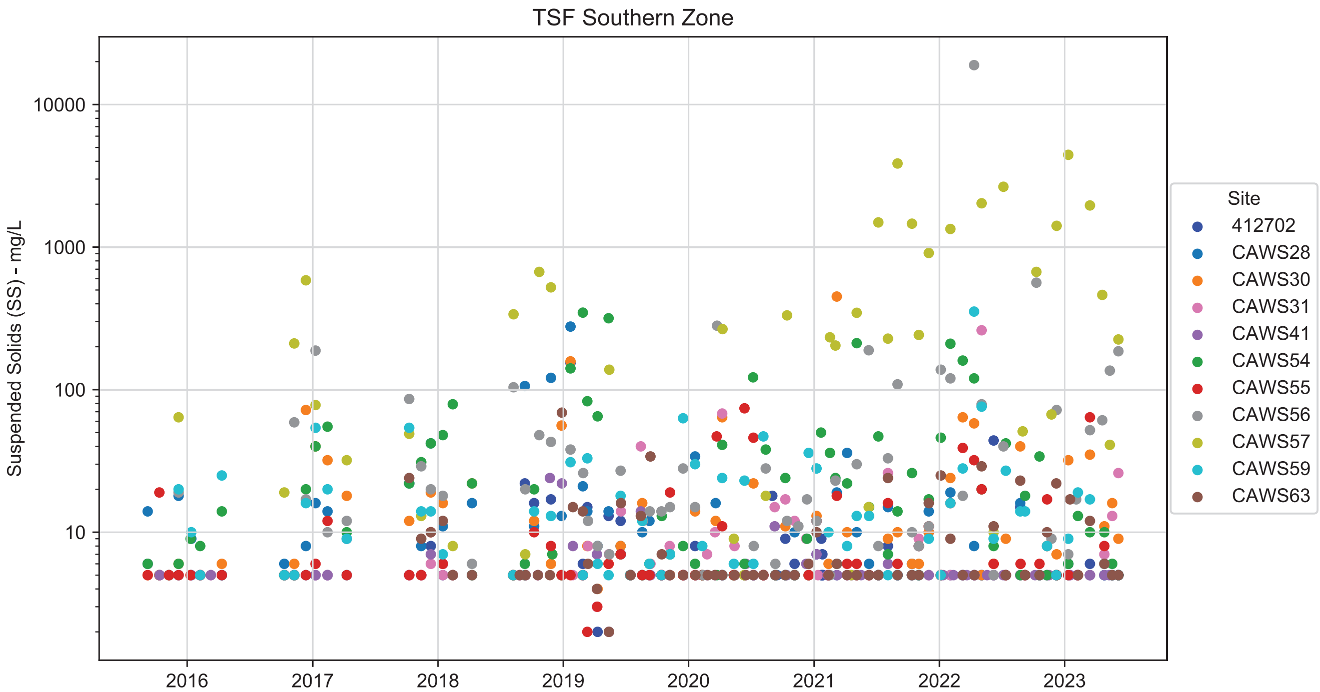


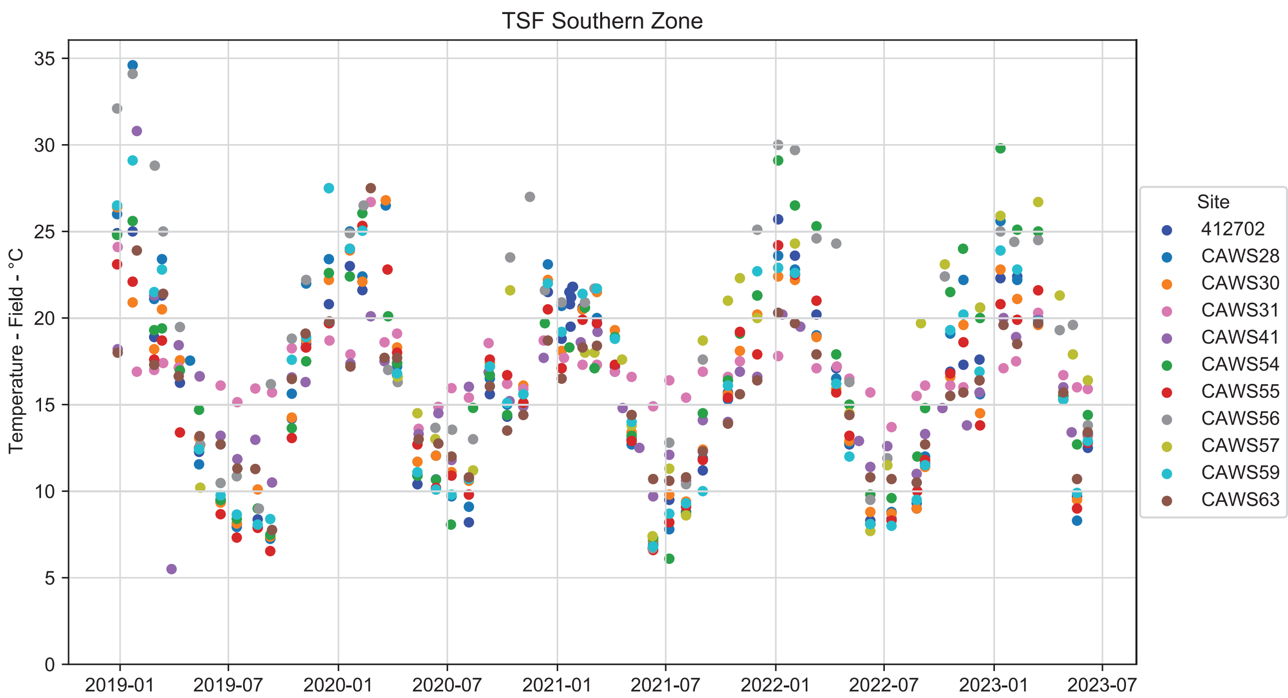
TSF Southern Zone
Electrical Conductivity - Field - µS-cm
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63

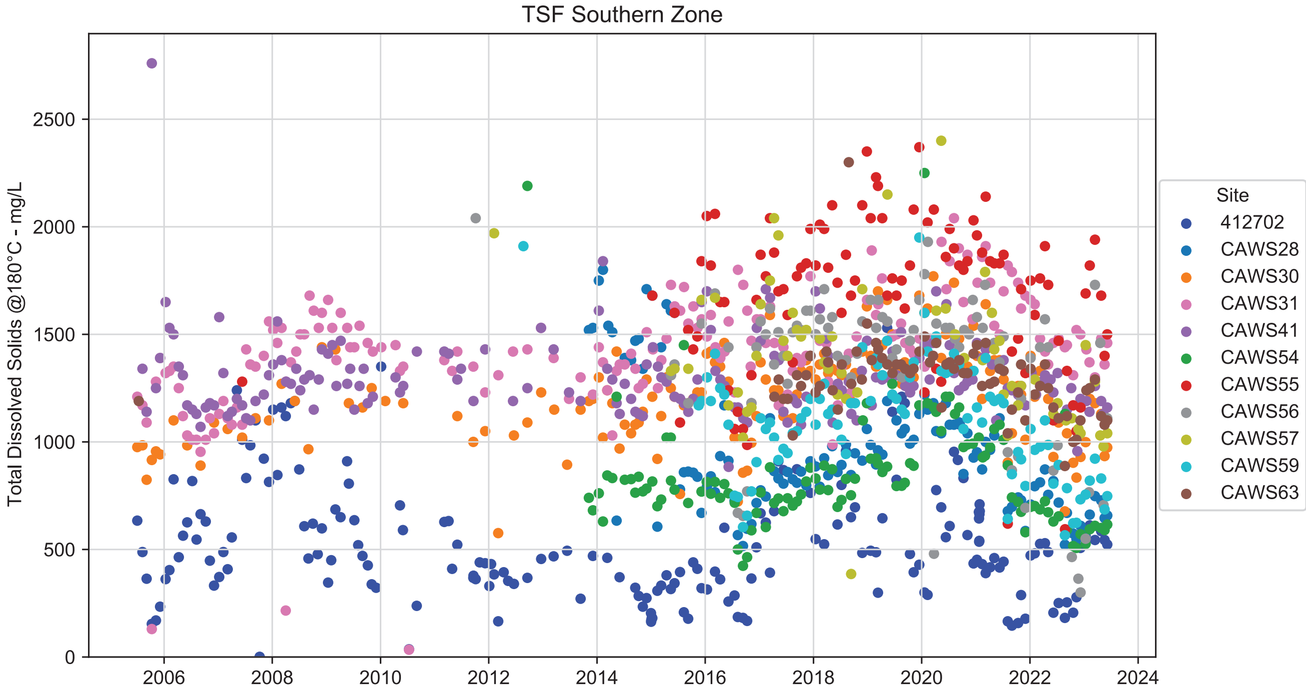


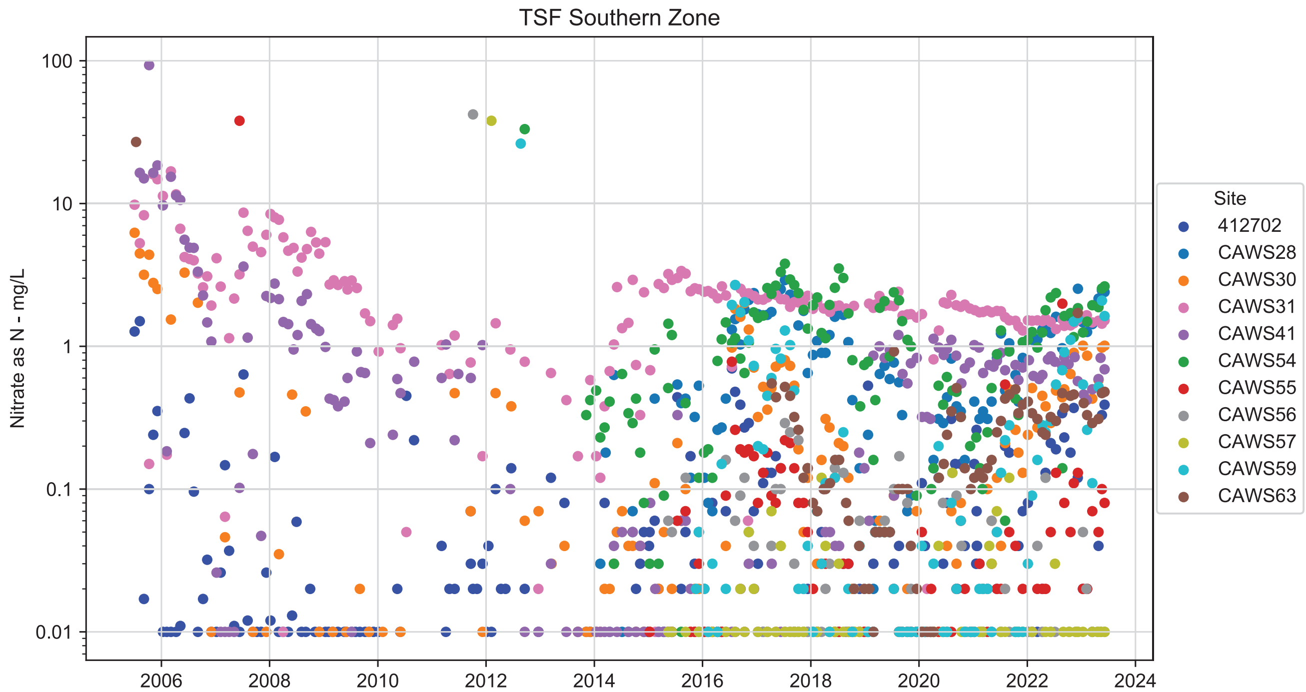
TSF Southern Zone
Electrical Conductivity @ 25°C - µS-cm
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63

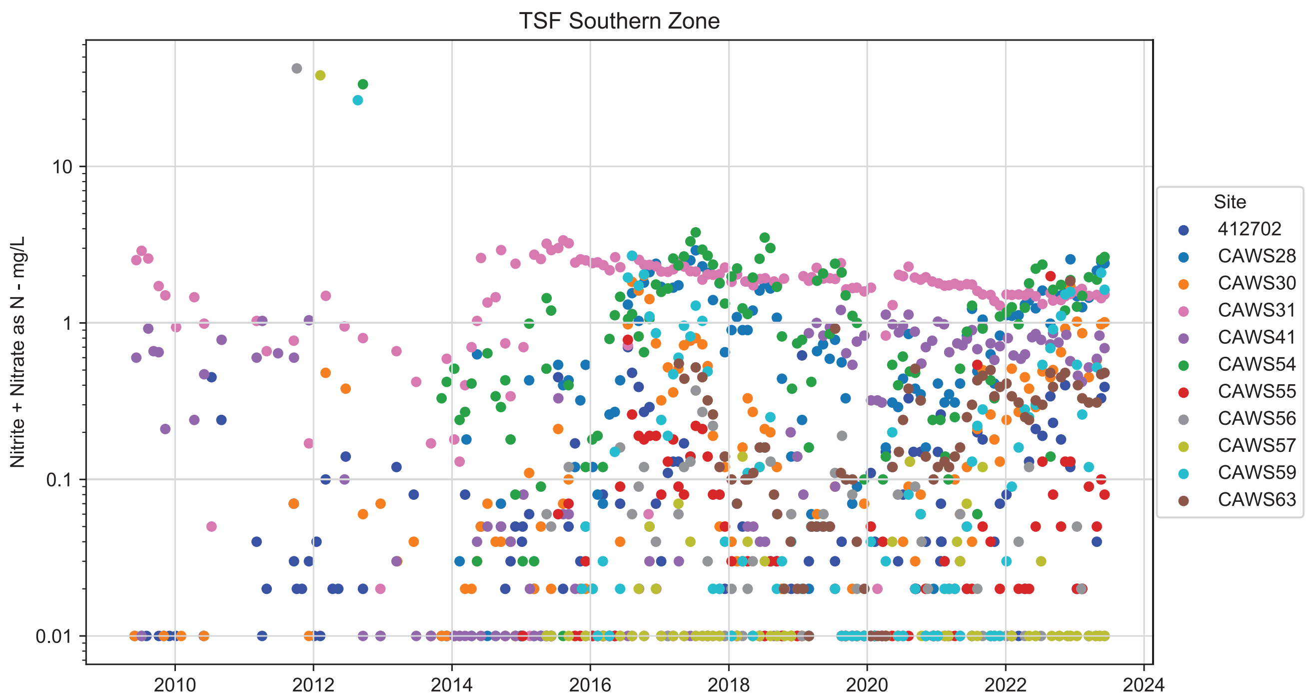

TSF Southern Zone
Redox Potential - mV
400
300
200
100
0
-100
-200
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63

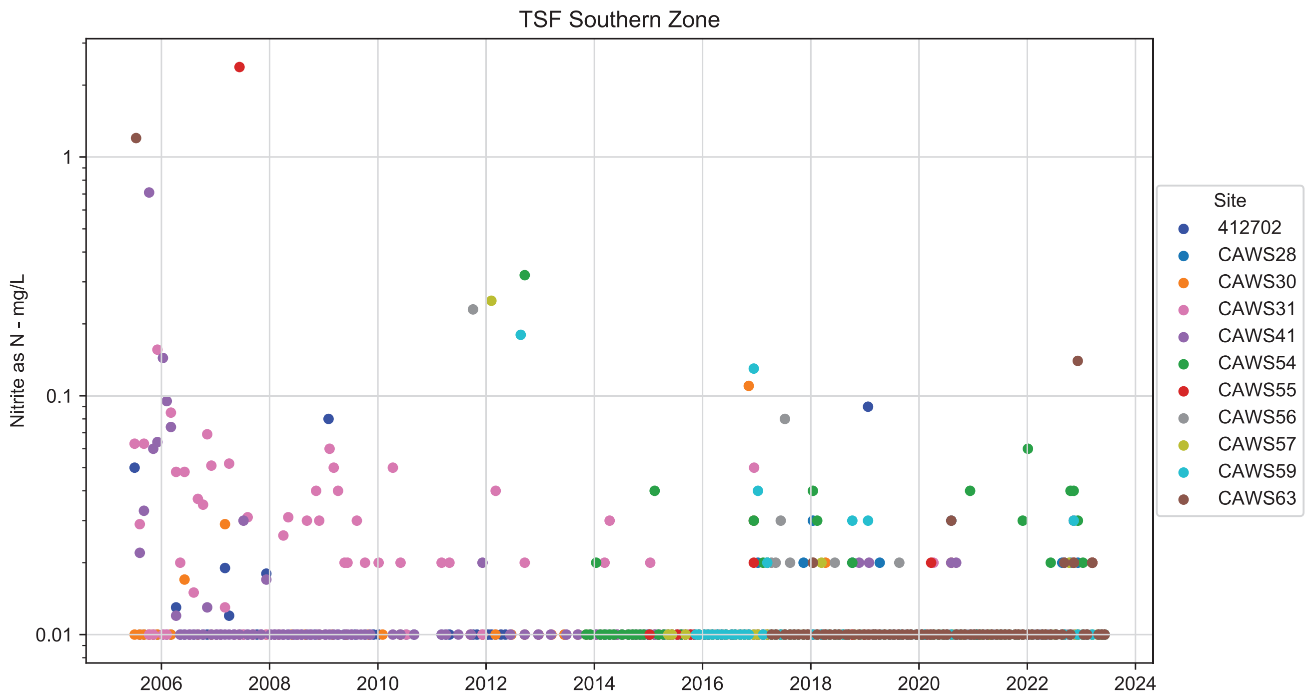

TSF Southern Zone
Suspended Solids (SS) - mg/L
10000
1000
100
10
2016
2017
2018
2019
2020
2021
2022
2023
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63


TSF Southern Zone
Temperature - Field - °C
35
30
25
20
15
10
5
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63

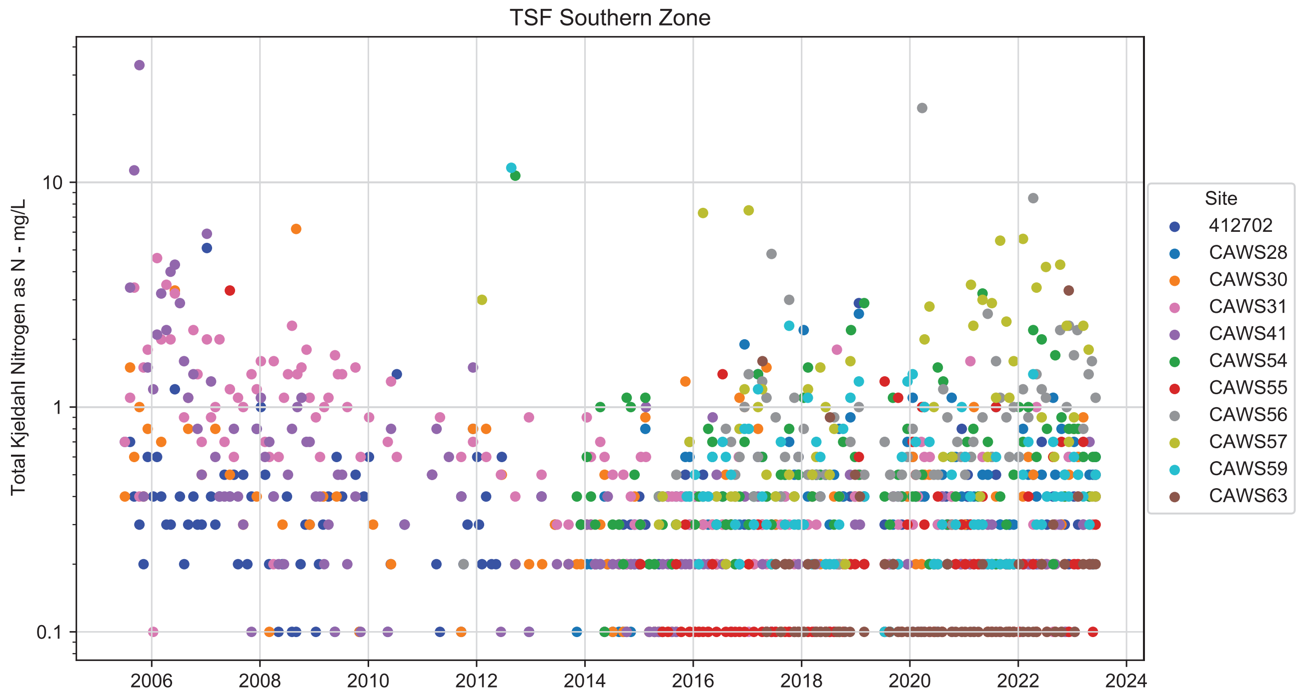

TSF Southern Zone
Total Dissolved Solids @180°C - mg/L
0
500
1000
1500
2000
2500
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63


TSF Southern Zone
Nitrate as N - mg/L
0.01
0.1
1
10
100
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63


TSF Southern Zone
Nitrite + Nitrate as N - mg/L
0.01
0.1
1
10
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63



TSF Southern Zone
Nitrite as N - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63



TSF Southern Zone
Total Kjeldahl Nitrogen as N - mg/L
10
1
0.1
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
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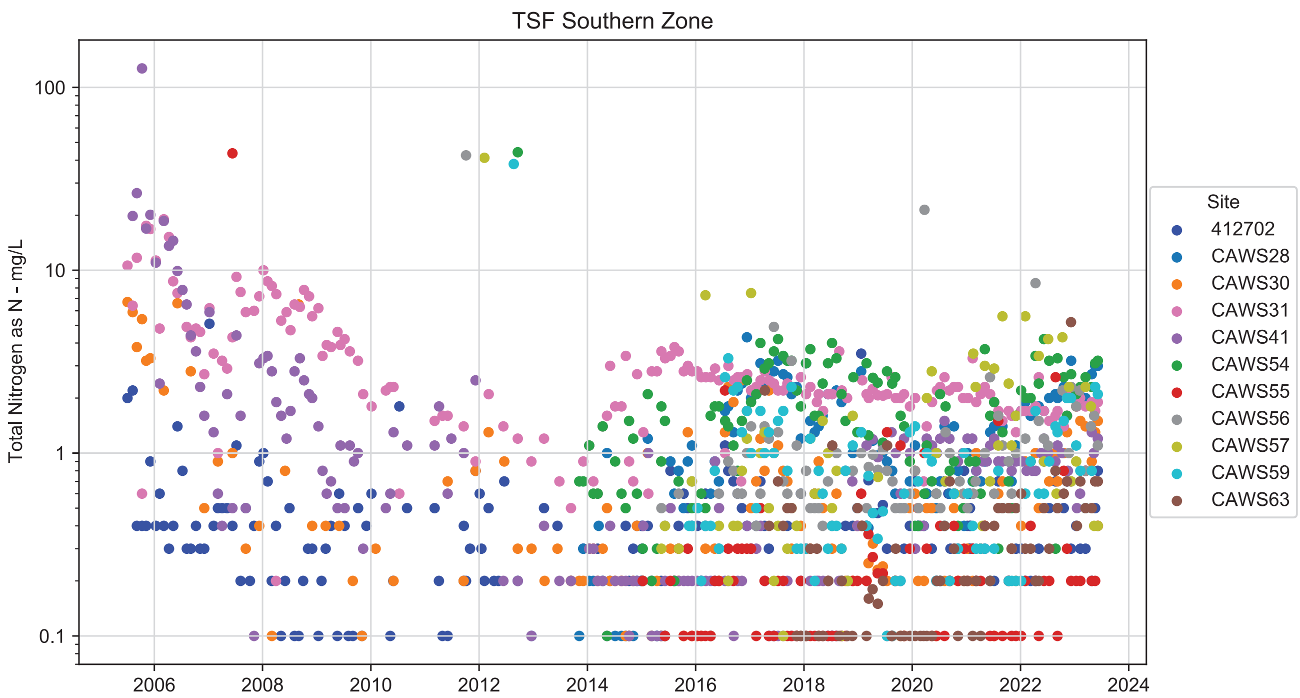

TSF Southern Zone
Total Nitrogen as N - mg/L
100
10
1
0.1
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
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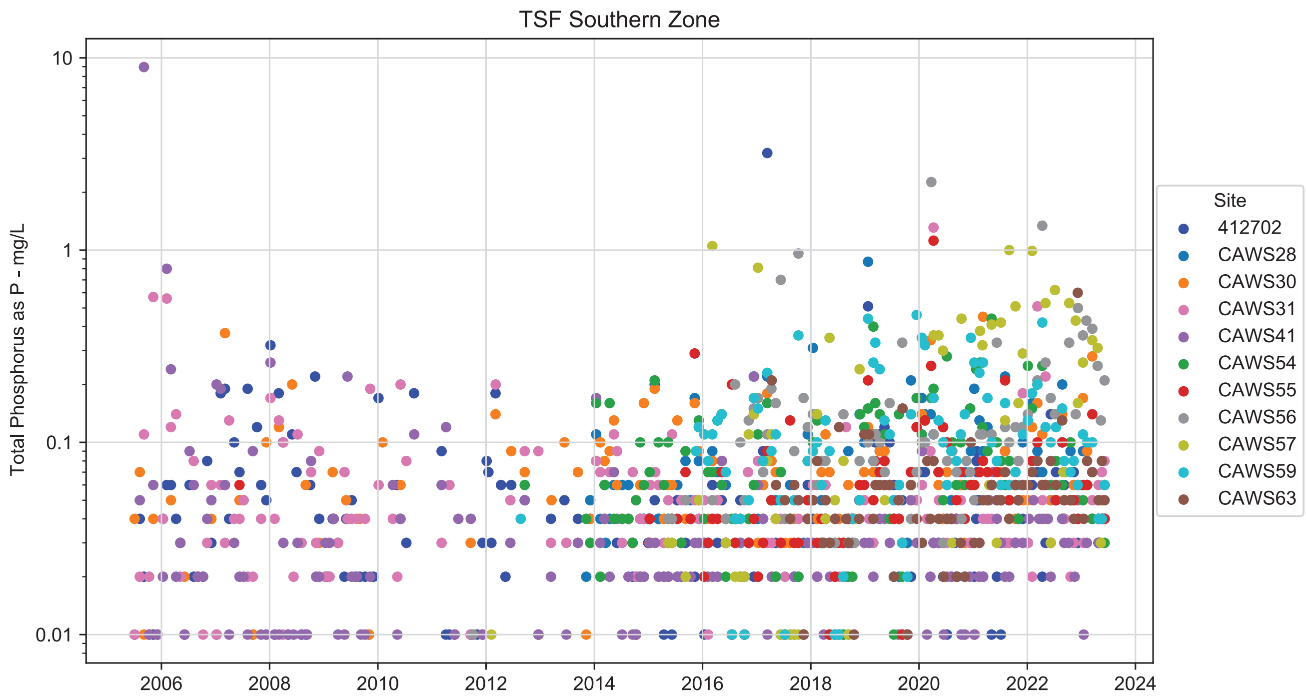
TSF Southern Zone
Total Phosphorus as P - mg/L
10
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
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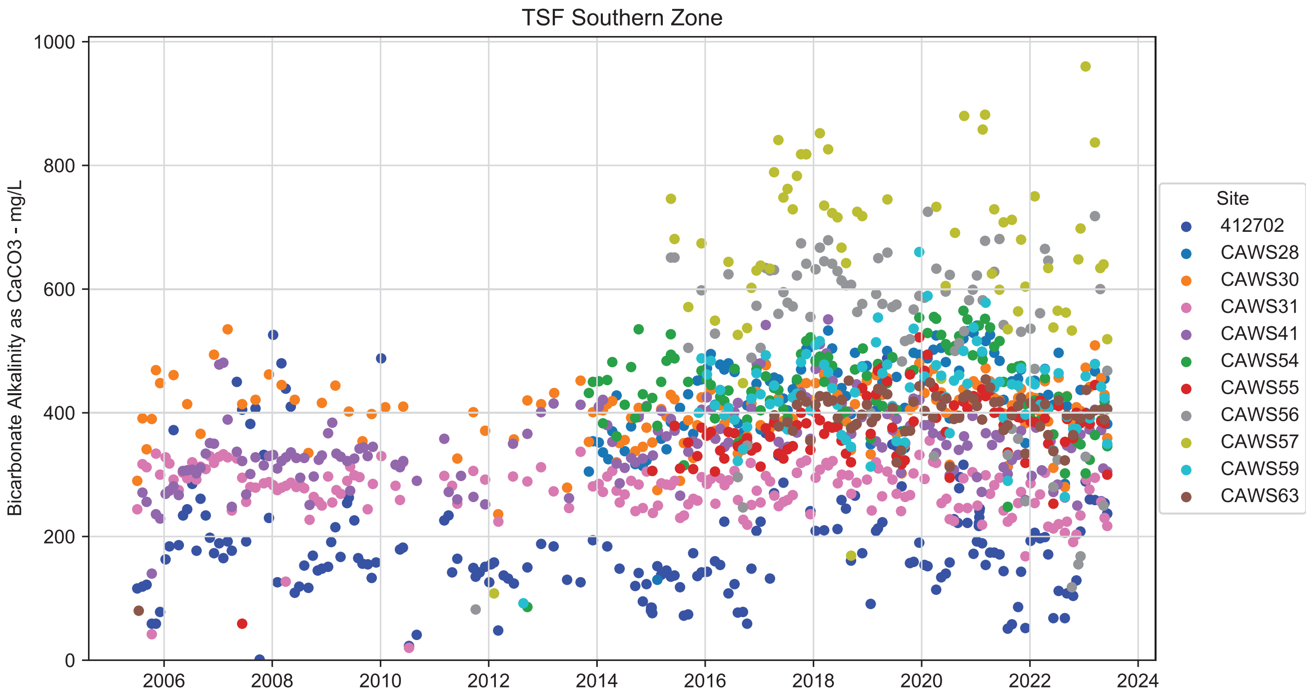
TSF Southern Zone
Bicarbonate Alkalinity as CaCO3 - mg/L
1000
800
600
400
200
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
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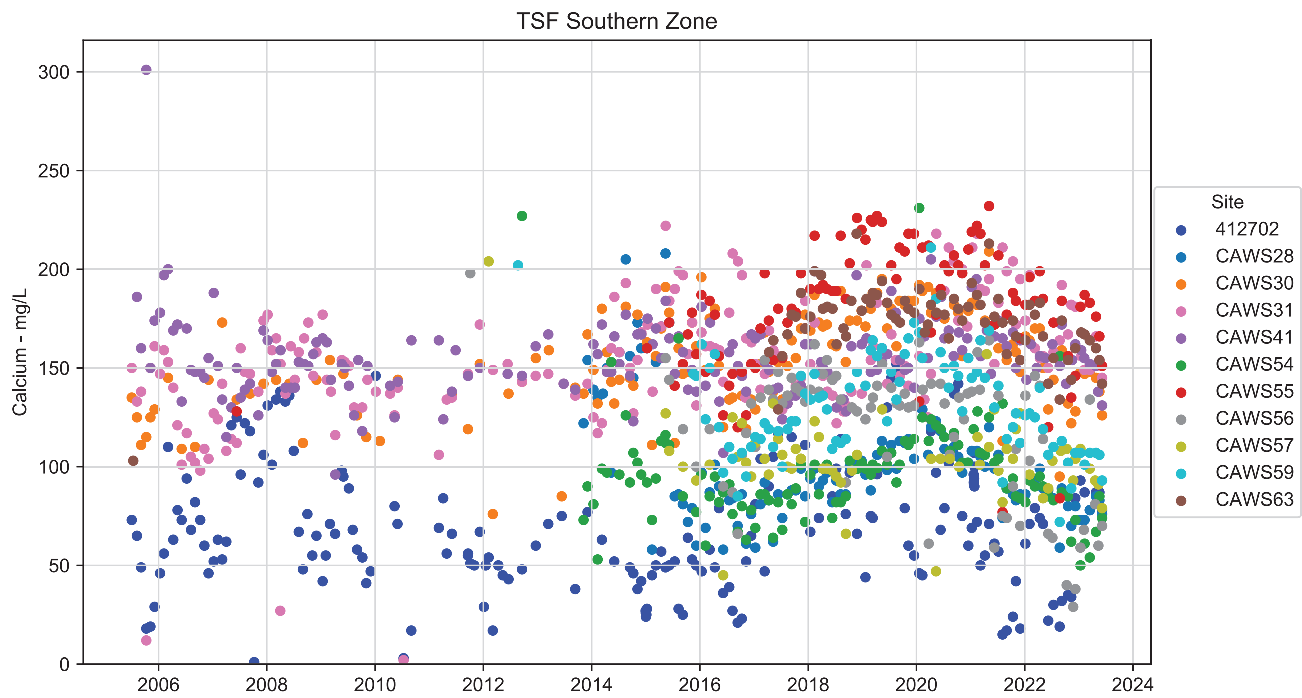
TSF Southern Zone
Calcium - mg/L
300
250
200
150
100
50
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
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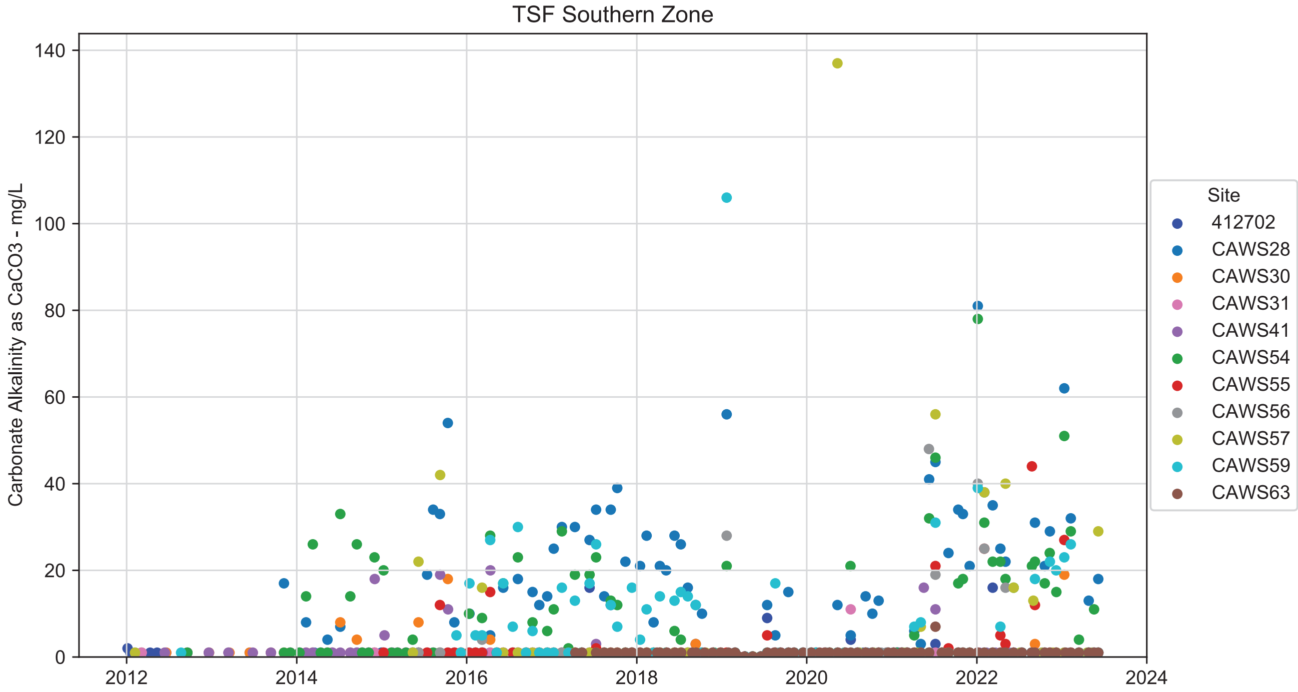
CAWS63


TSF Southern Zone
Carbonate Alkalinity as CaCO3 - mg/L
0
20
40
60
80
100
120
140
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
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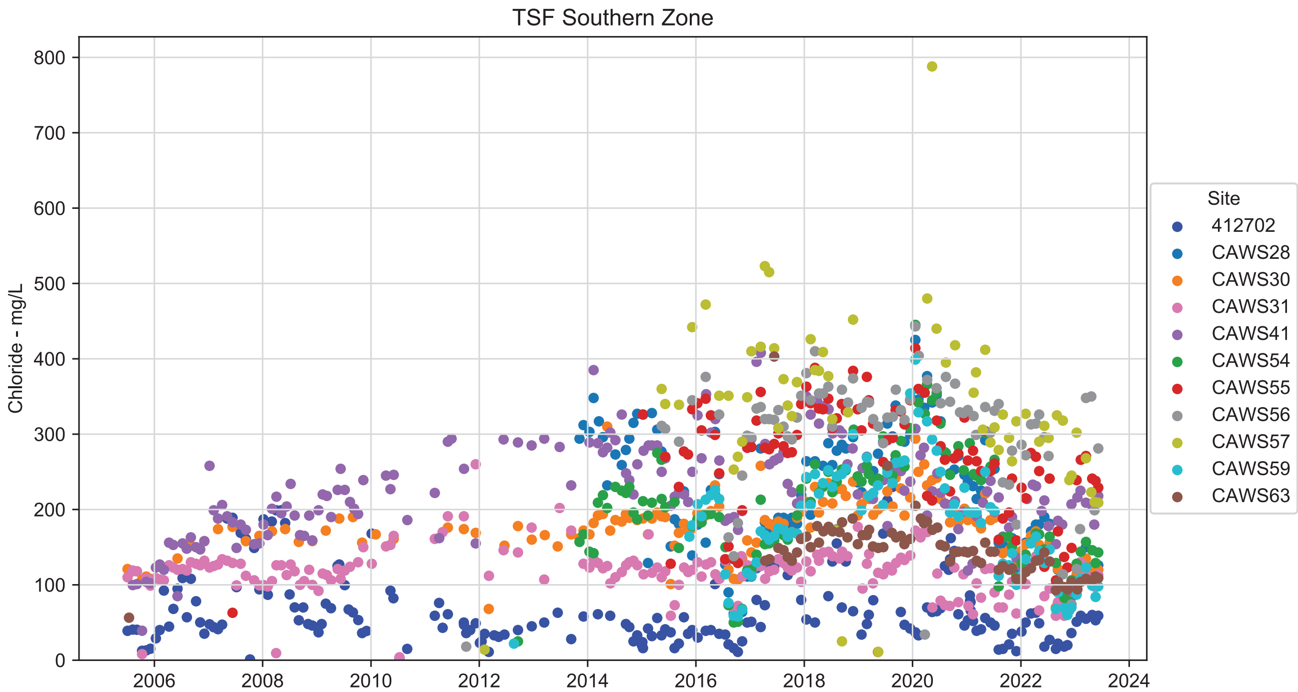
TSF Southern Zone
Chloride - mg/L
0
100
200
300
400
500
600
700
800
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
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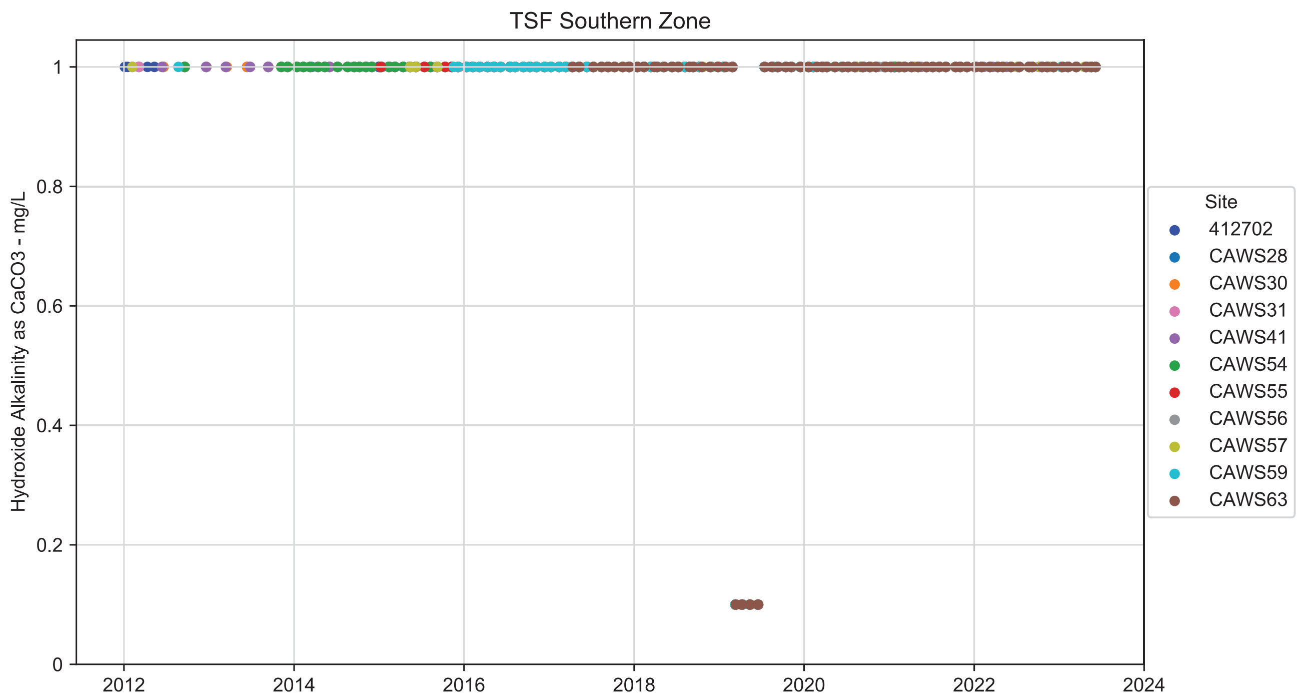
TSF Southern Zone
Hydroxide Alkalinity as CaCO3 - mg/L
0
0.2
0.4
0.6
0.8
1
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
CAWS30
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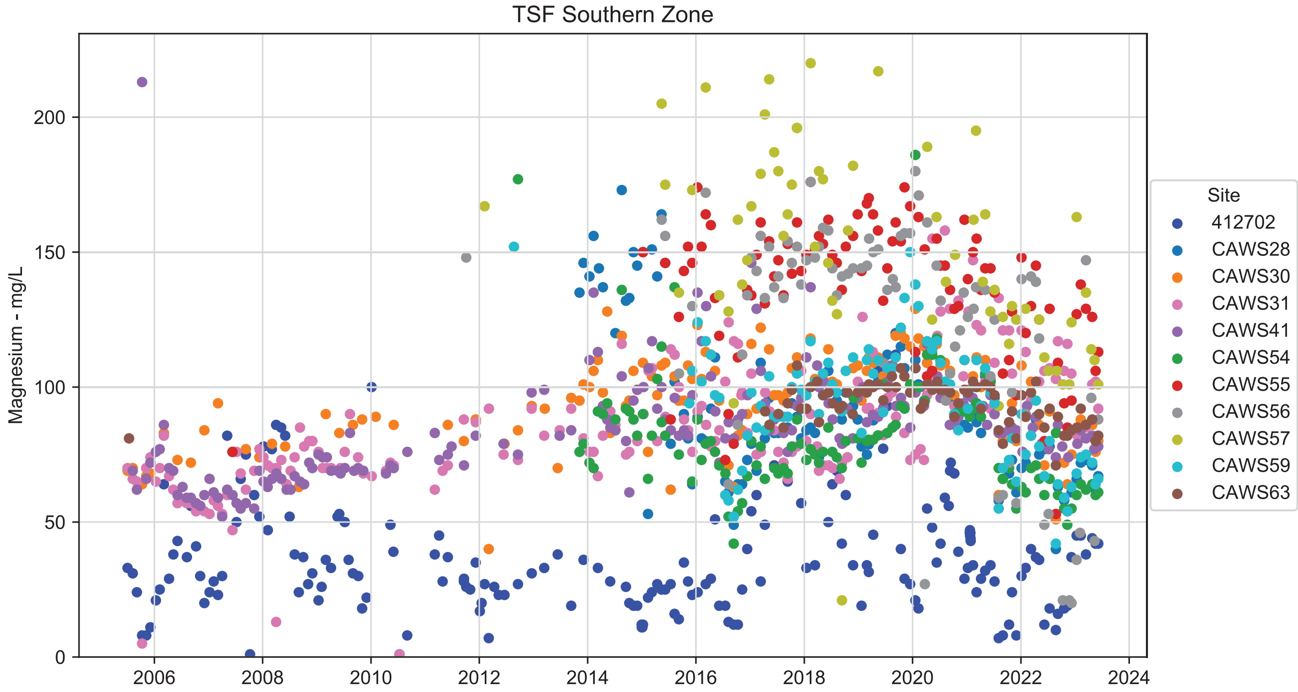
CAWS59
CAWS63


TSF Southern Zone
Magnesium - mg/L
0
50
100
150
200
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
CAWS30
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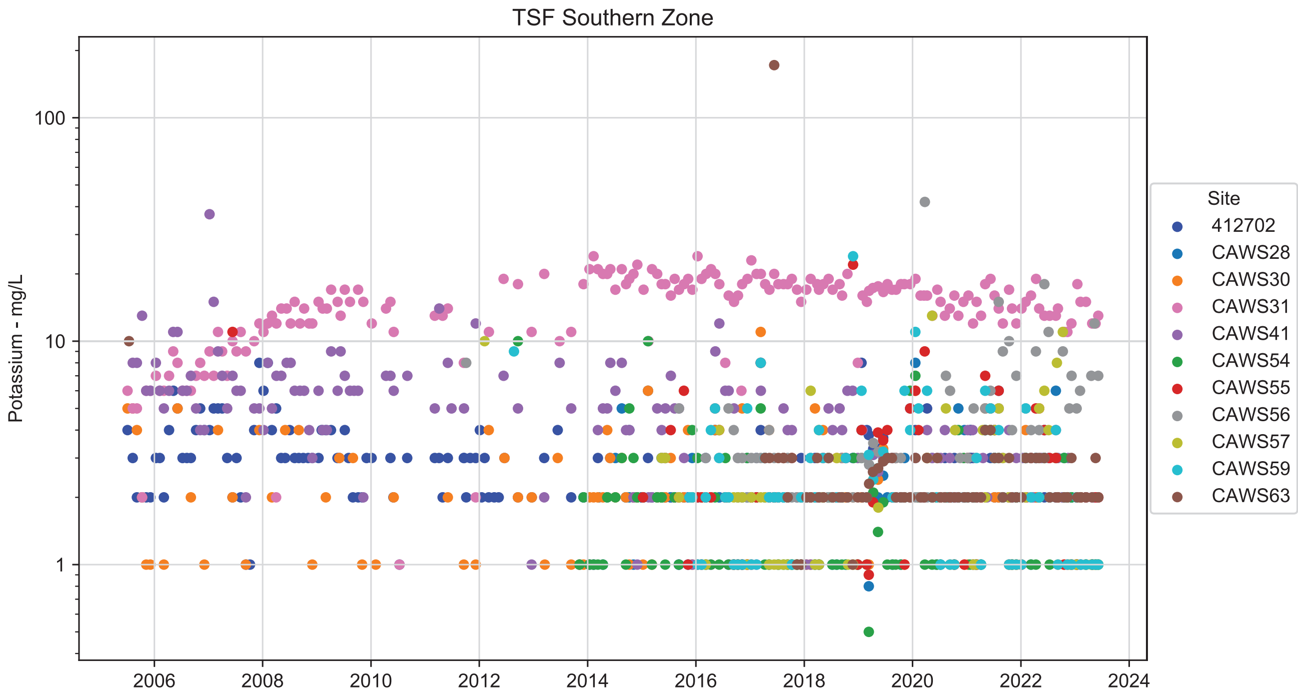
TSF Southern Zone
Potassium - mg/L
1
10
100
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
CAWS30
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CAWS41
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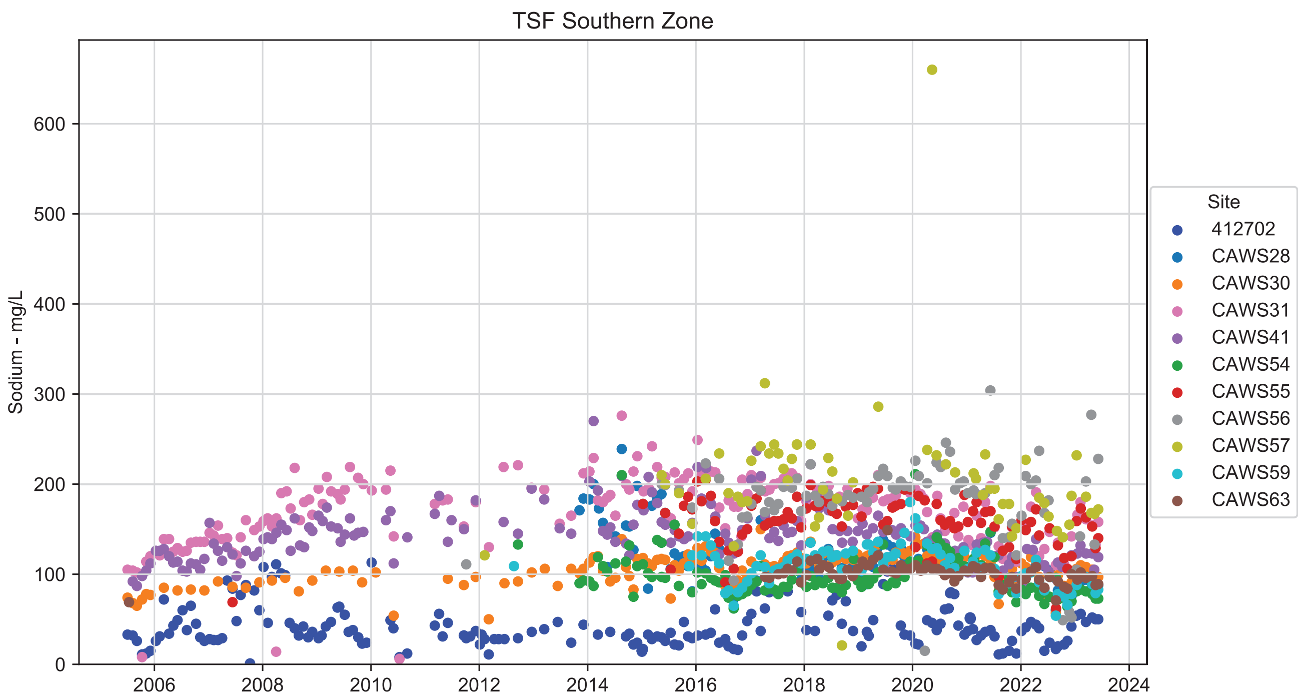
TSF Southern Zone
Sodium - mg/L
0
100
200
300
400
500
600
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
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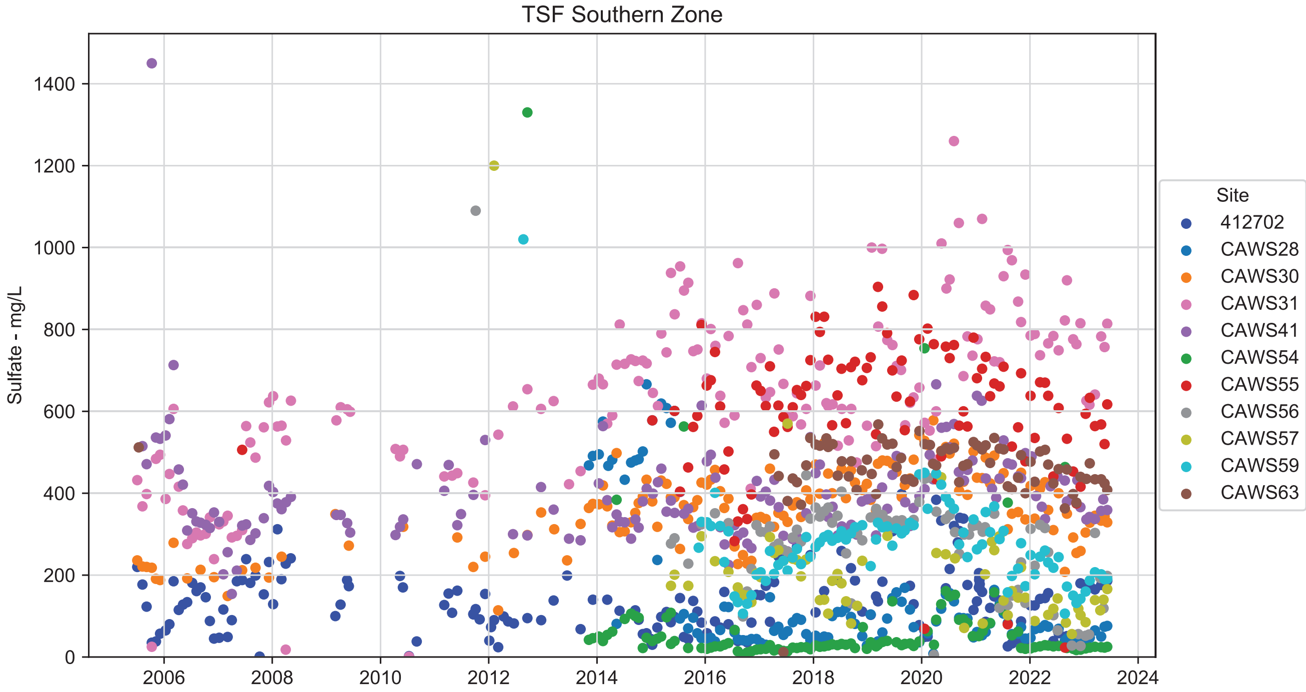
TSF Southern Zone
Sulfate - mg/L
Site
412702
CAWS28
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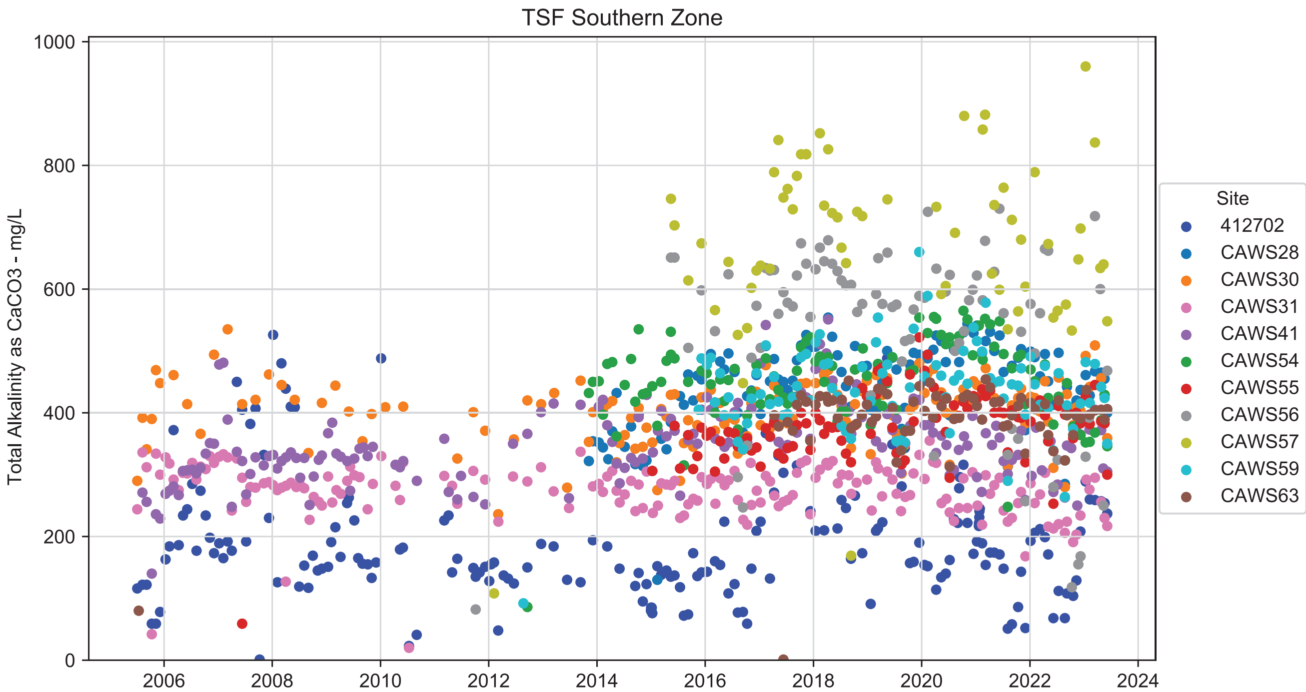
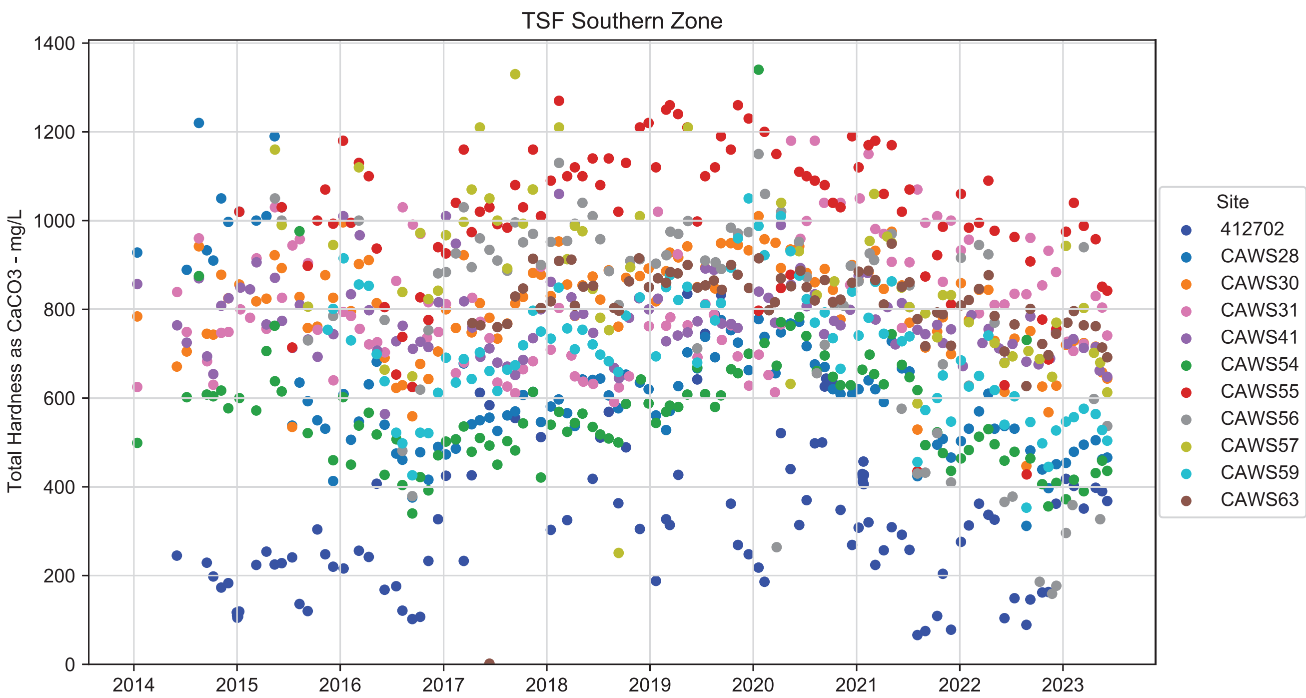
CAWS59
CAWS63


TSF Southern Zone
Total Alkalinity as CaCO3 - mg/L
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63


TSF Southern Zone
Total Hardness as CaCO3 - mg/L
Site
412702
CAWS28
CAWS30
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CAWS56
CAWS57
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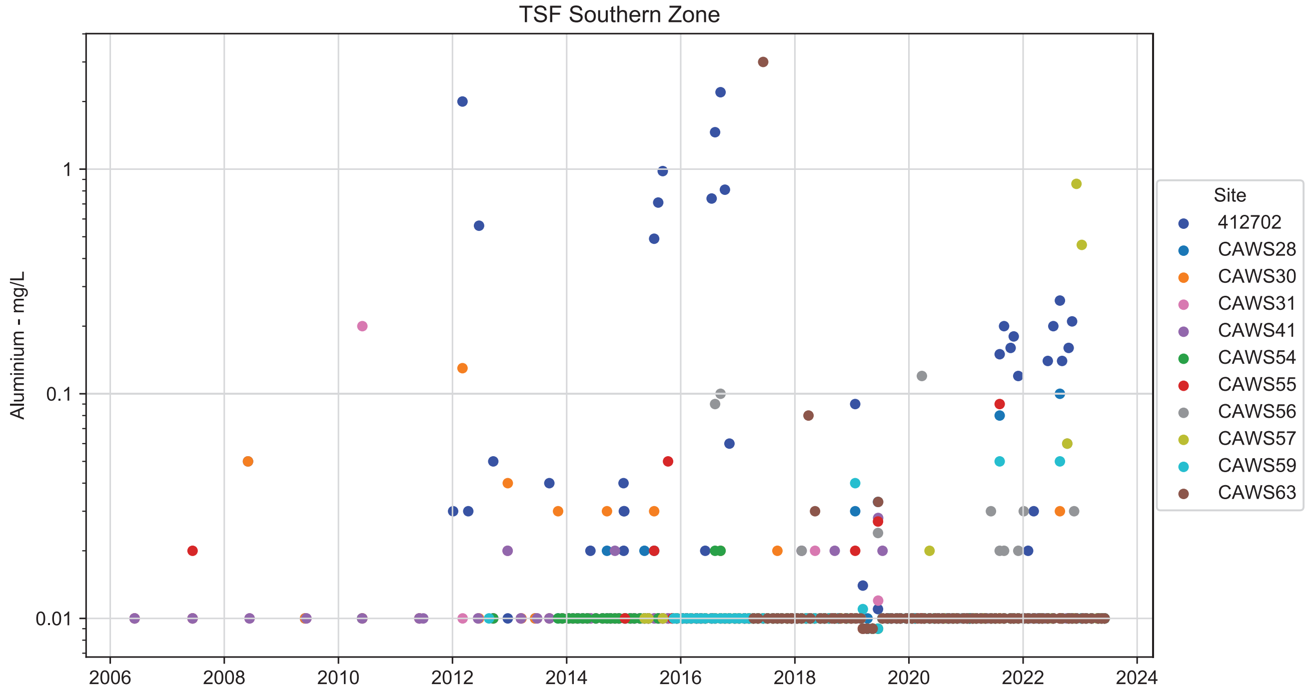
TSF Southern Zone
Aluminium - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
CAWS30
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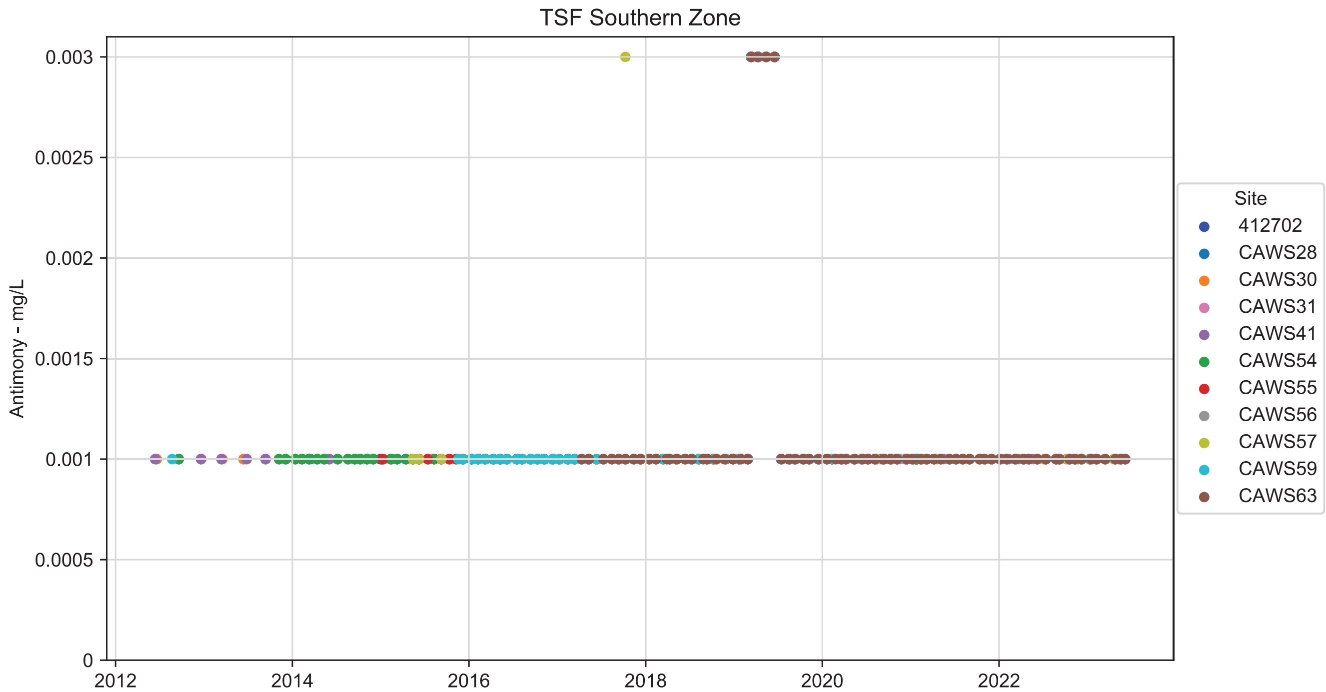
TSF Southern Zone
Antimony - mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2012
2014
2016
2018
2020
2022
Site
412702
CAWS28
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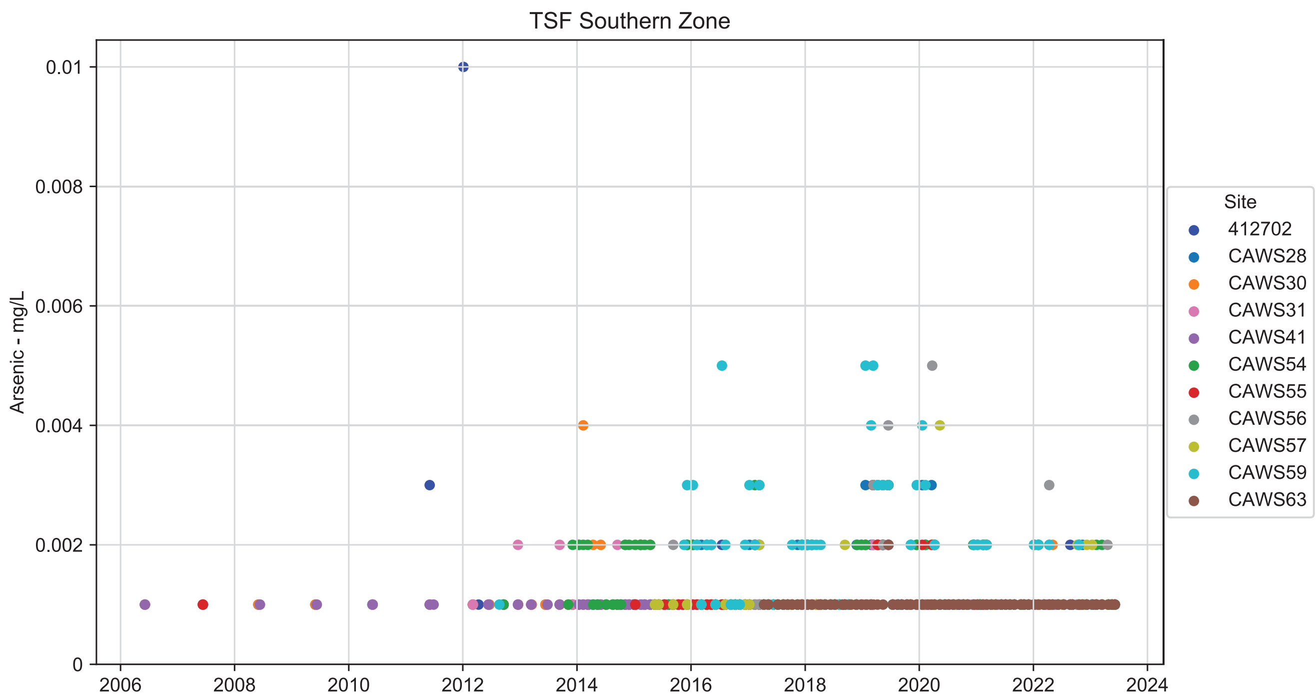
TSF Southern Zone
Arsenic - mg/L
0.01
0.008
0.006
0.004
0.002
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
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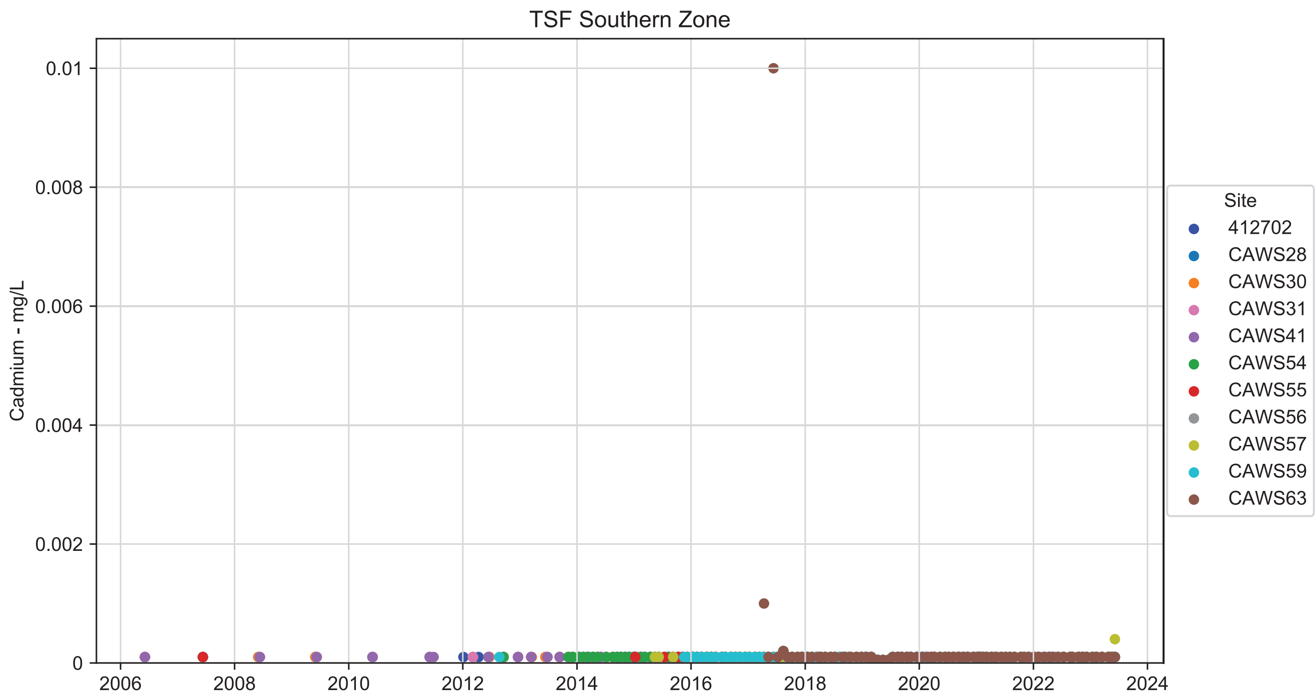
TSF Southern Zone
Cadmium - mg/L
0.01
0.008
0.006
0.004
0.002
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
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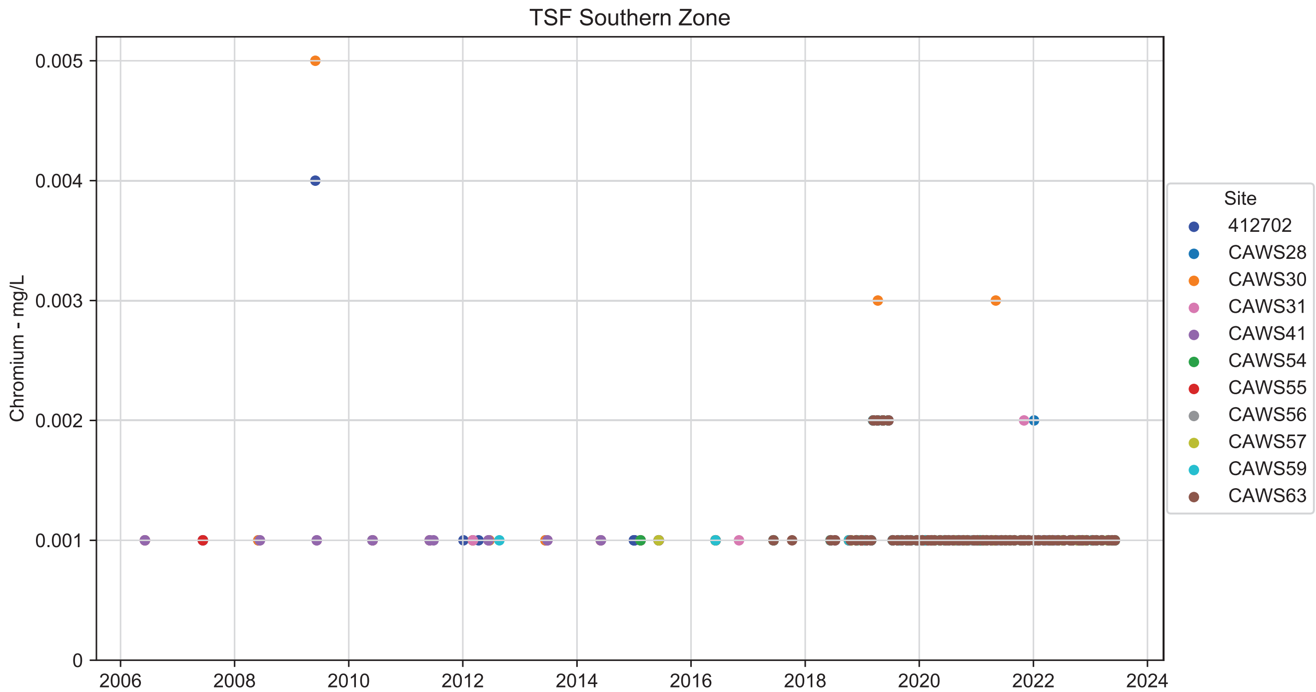
TSF Southern Zone
Chromium - mg/L
0.005
0.004
0.003
0.002
0.001
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
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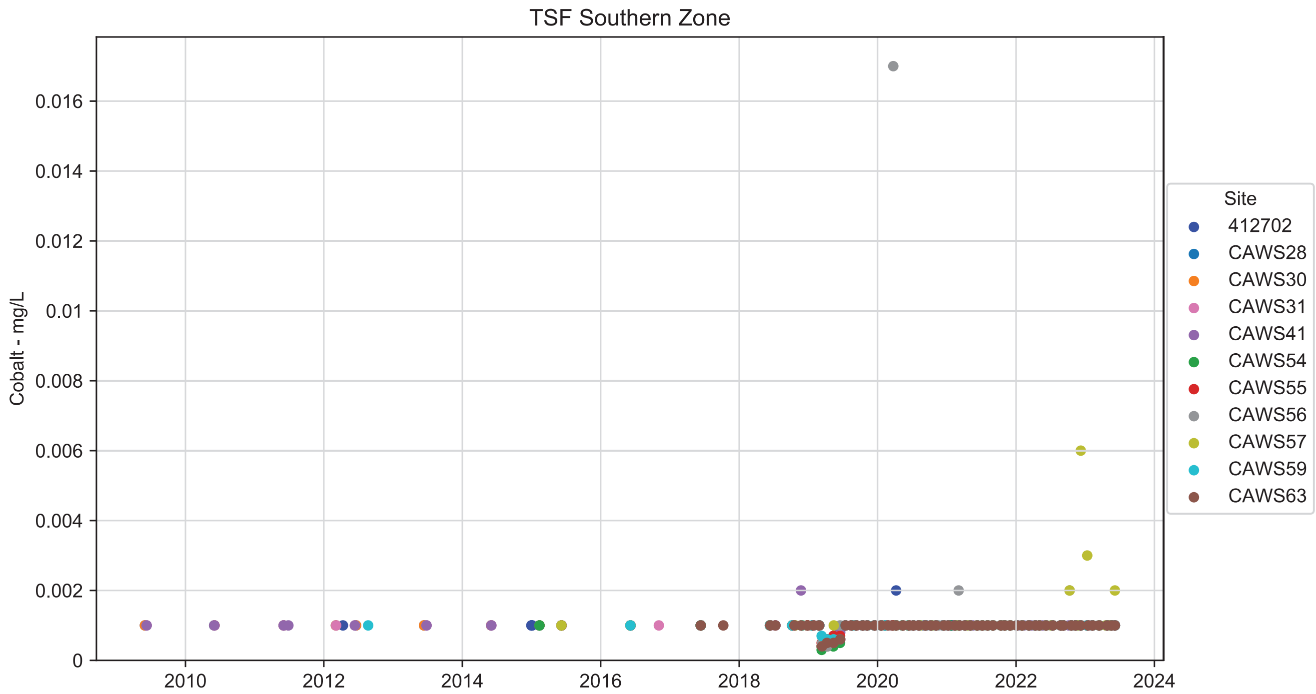
TSF Southern Zone
Cobalt - mg/L
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
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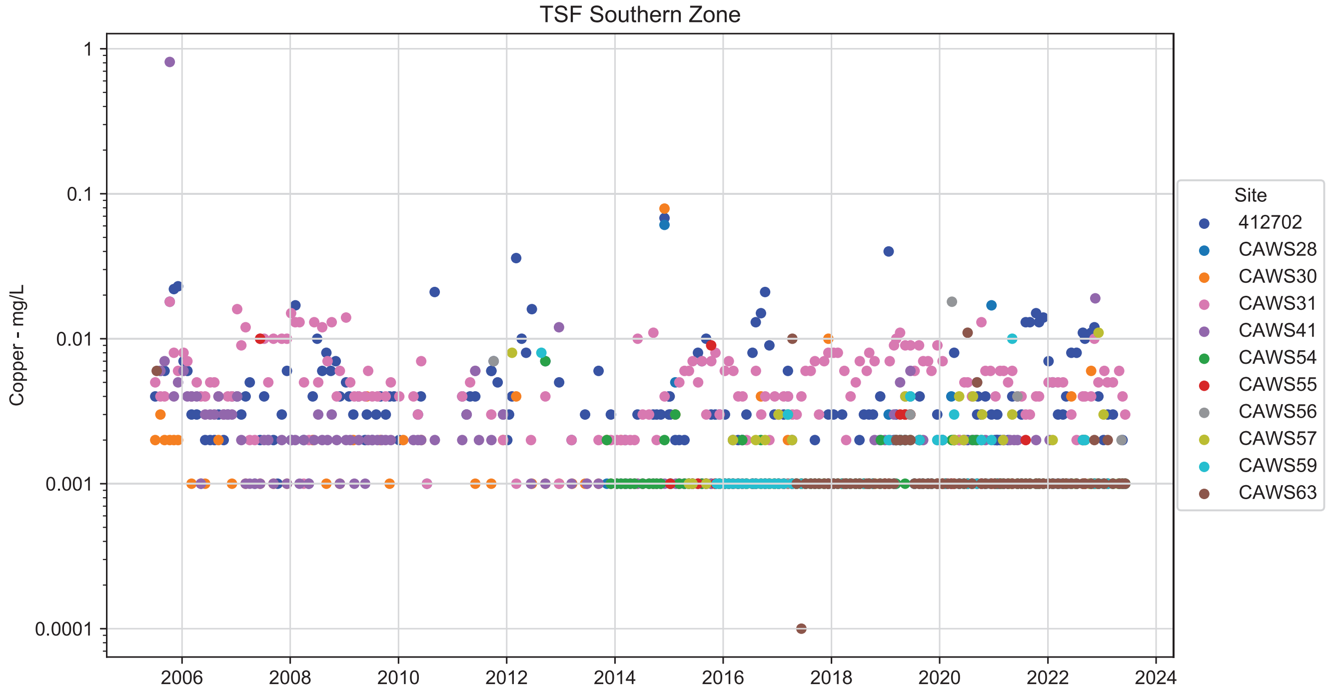

TSF Southern Zone
Copper - mg/L
1
0.1
0.01
0.001
0.0001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
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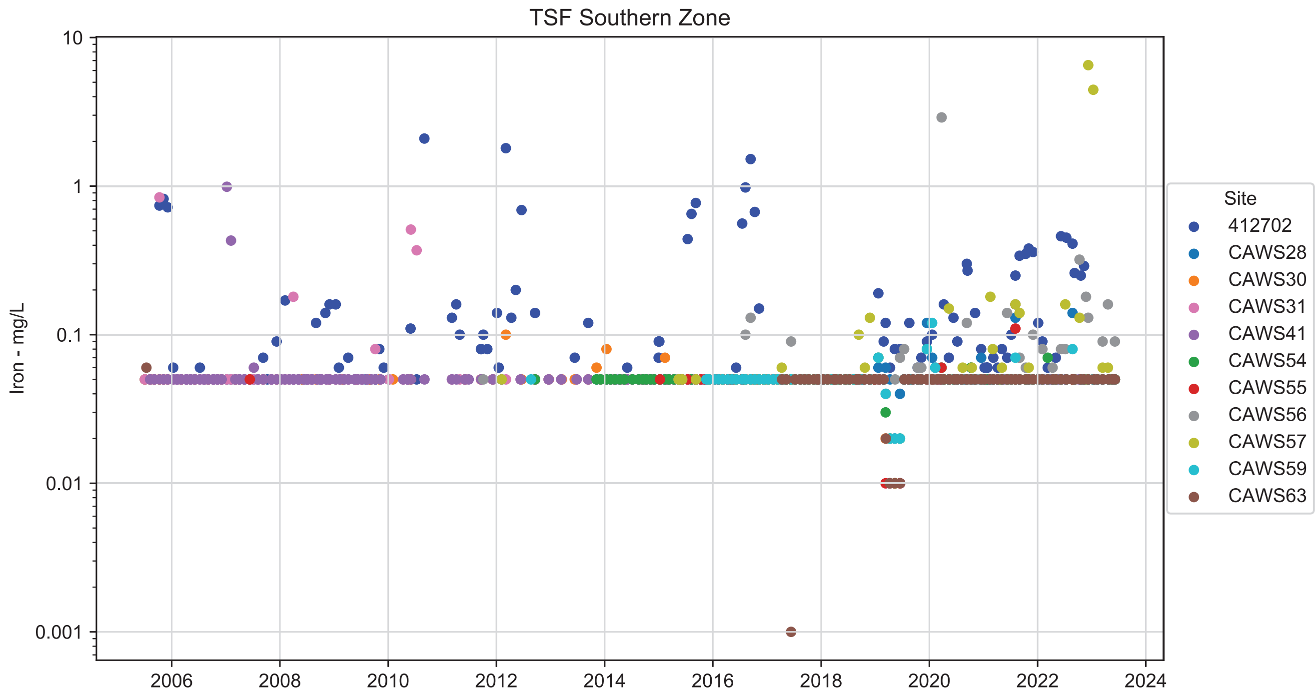

TSF Southern Zone
Iron - mg/L
10
1
0.1
0.01
0.001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
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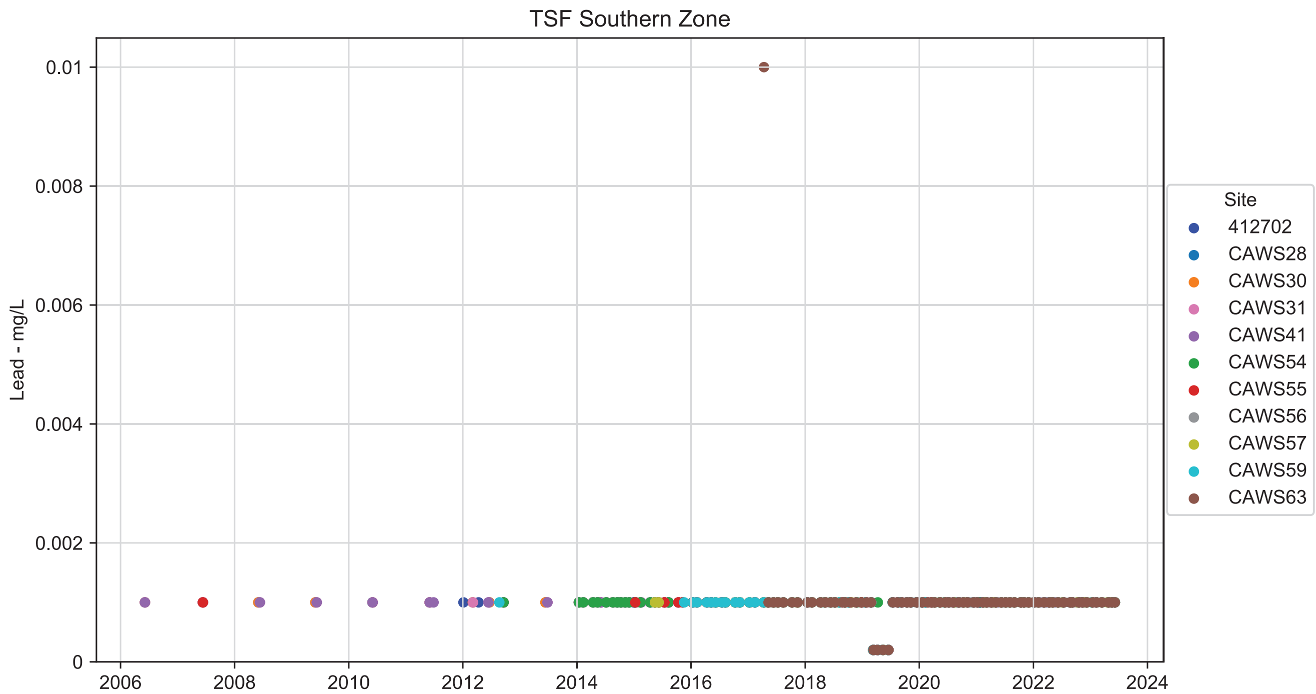

TSF Southern Zone
Lead - mg/L
0.01
0.008
0.006
0.004
0.002
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
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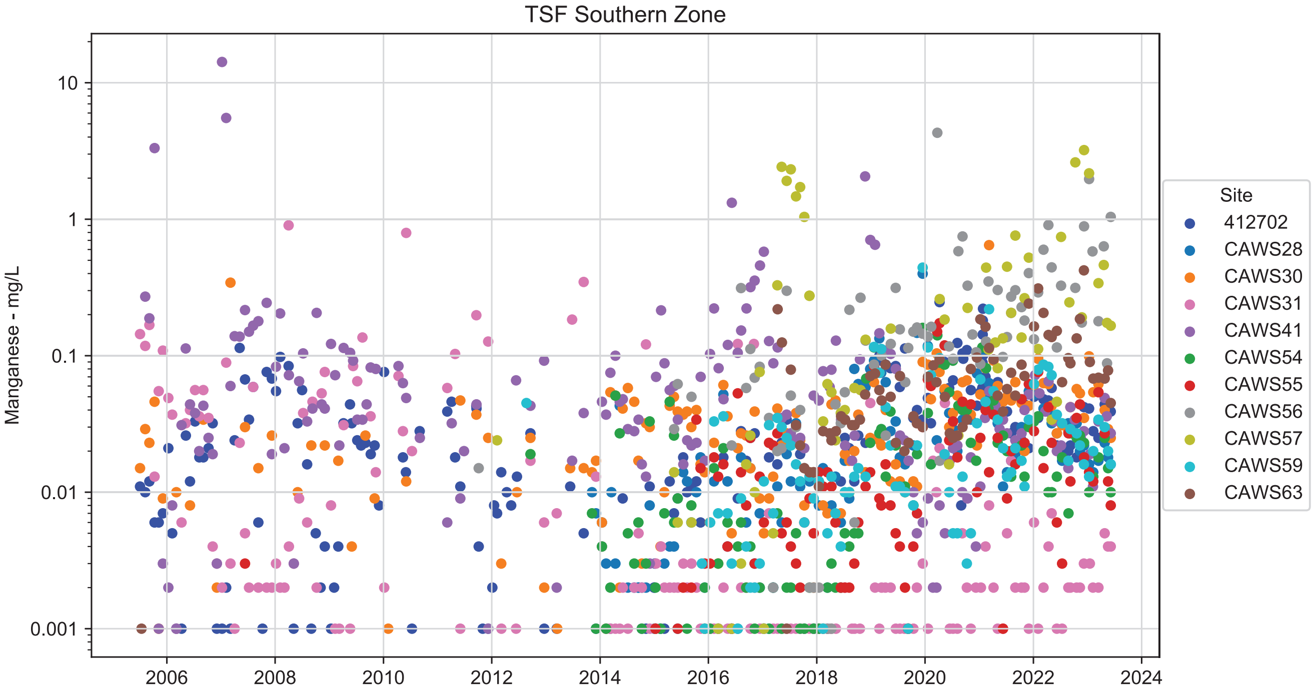
TSF Southern Zone
Manganese - mg/L
10
1
0.1
0.01
0.001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
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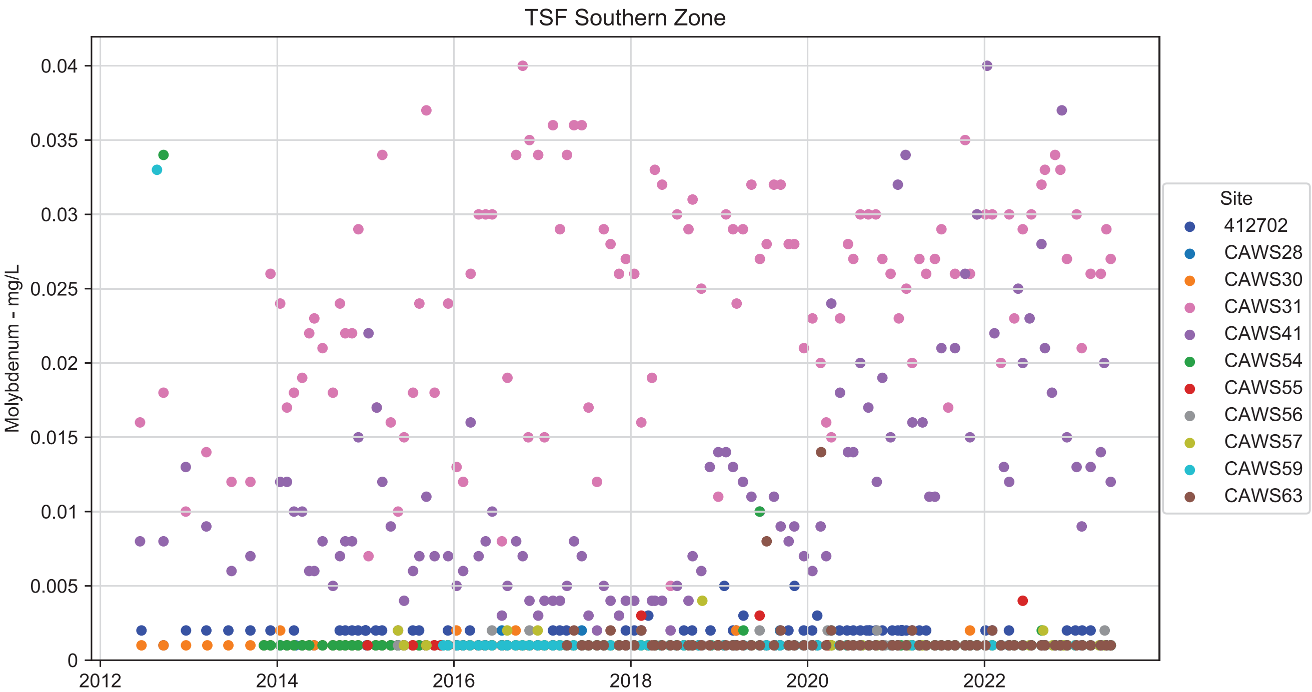
TSF Southern Zone
Molybdenum - mg/L
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
2012
2014
2016
2018
2020
2022
Site
412702
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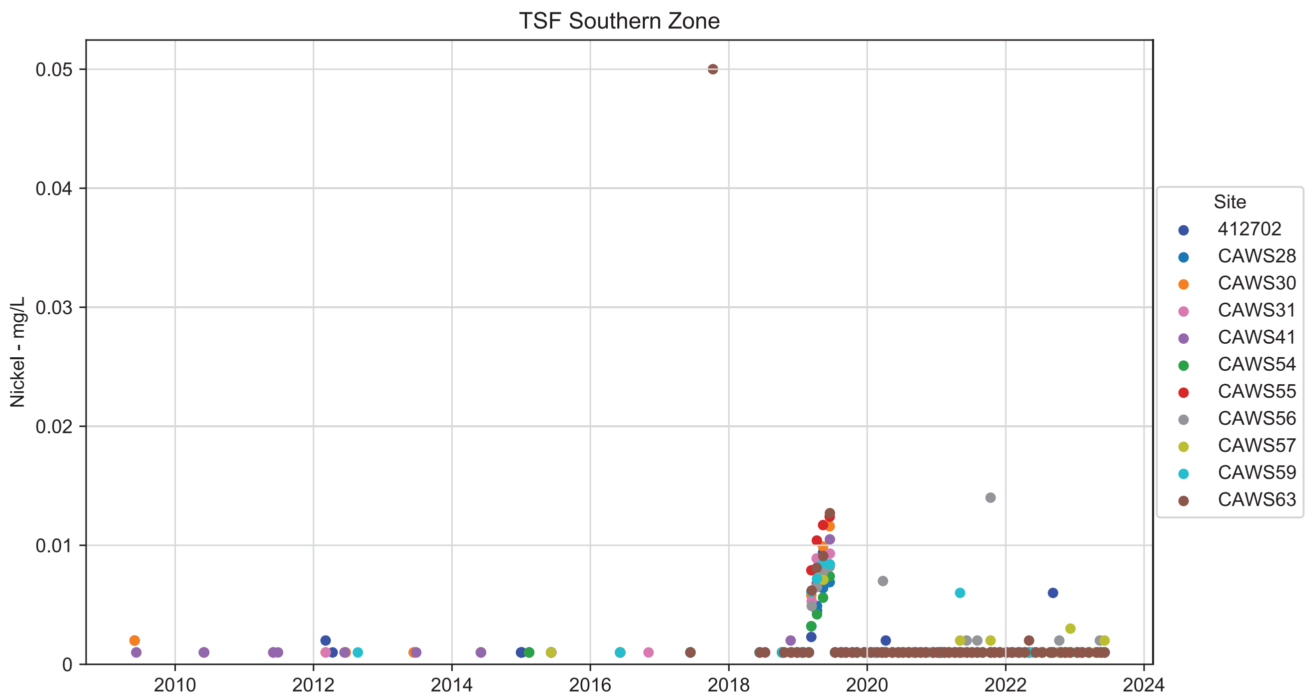
TSF Southern Zone
Nickel - mg/L
0.05
0.04
0.03
0.02
0.01
0
2010
2012
2014
2016
2018
2020
2022
2024
Site
412702
CAWS28
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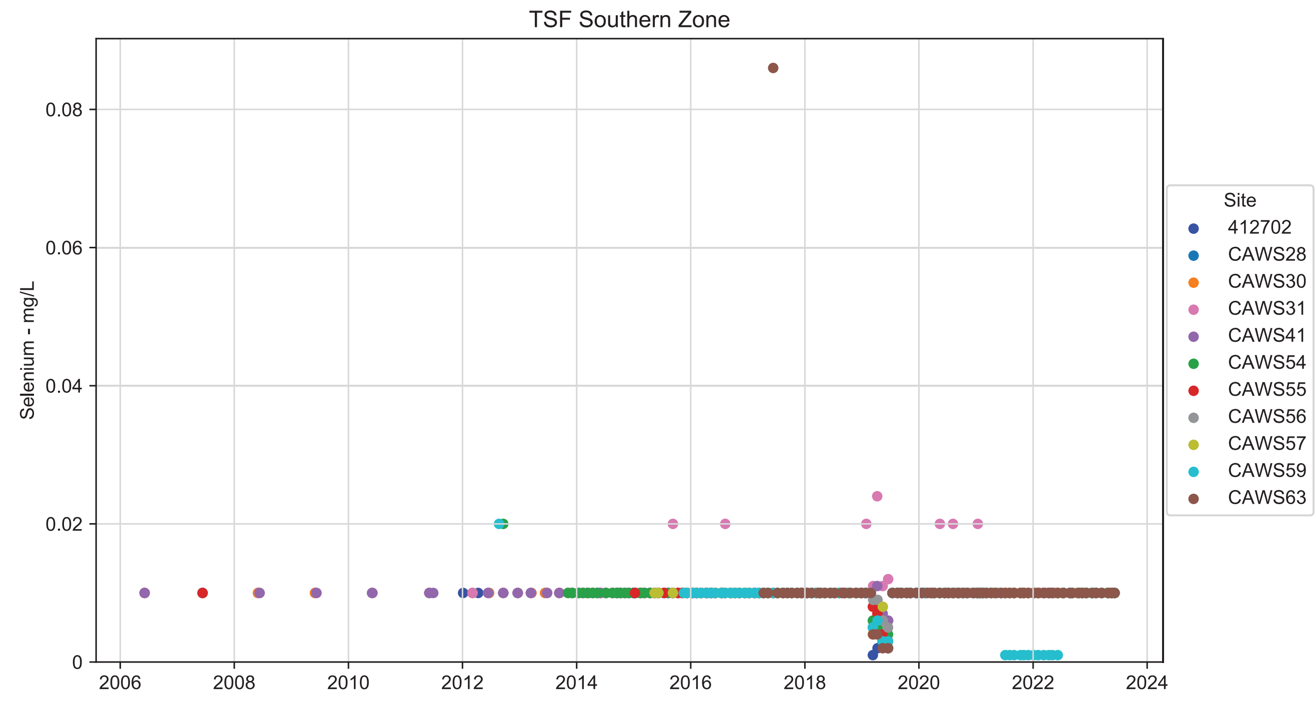
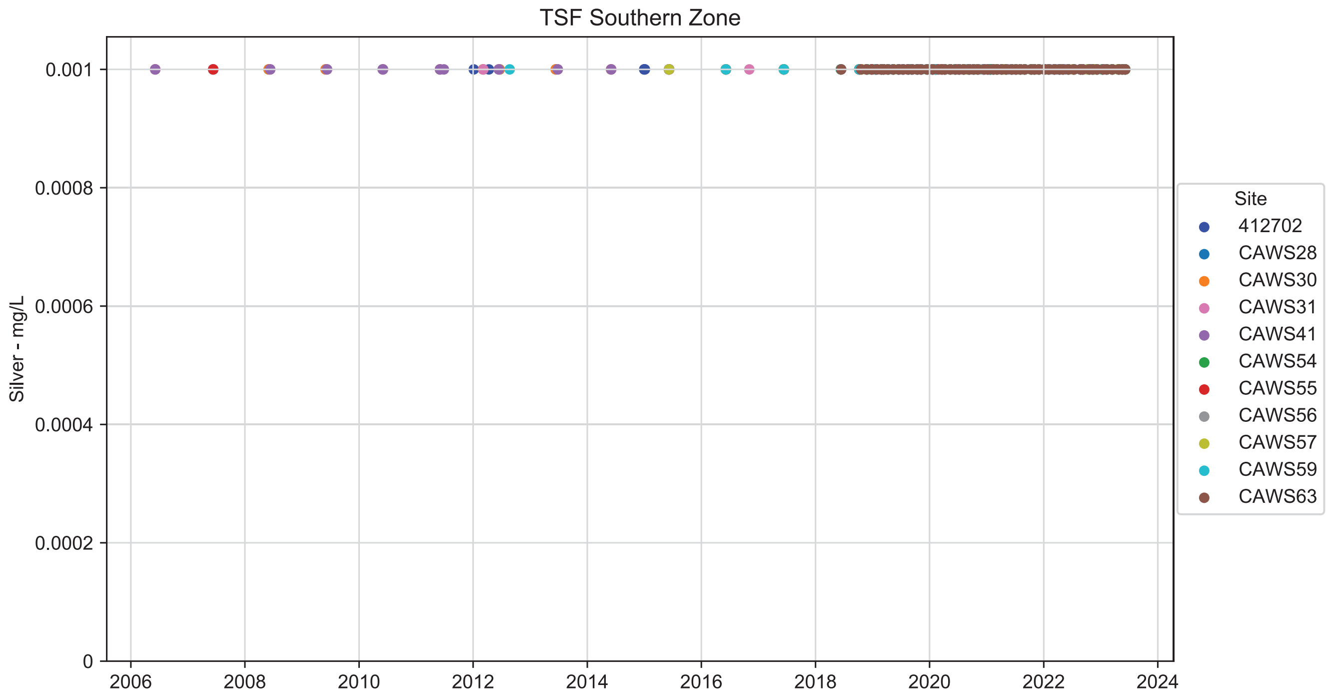
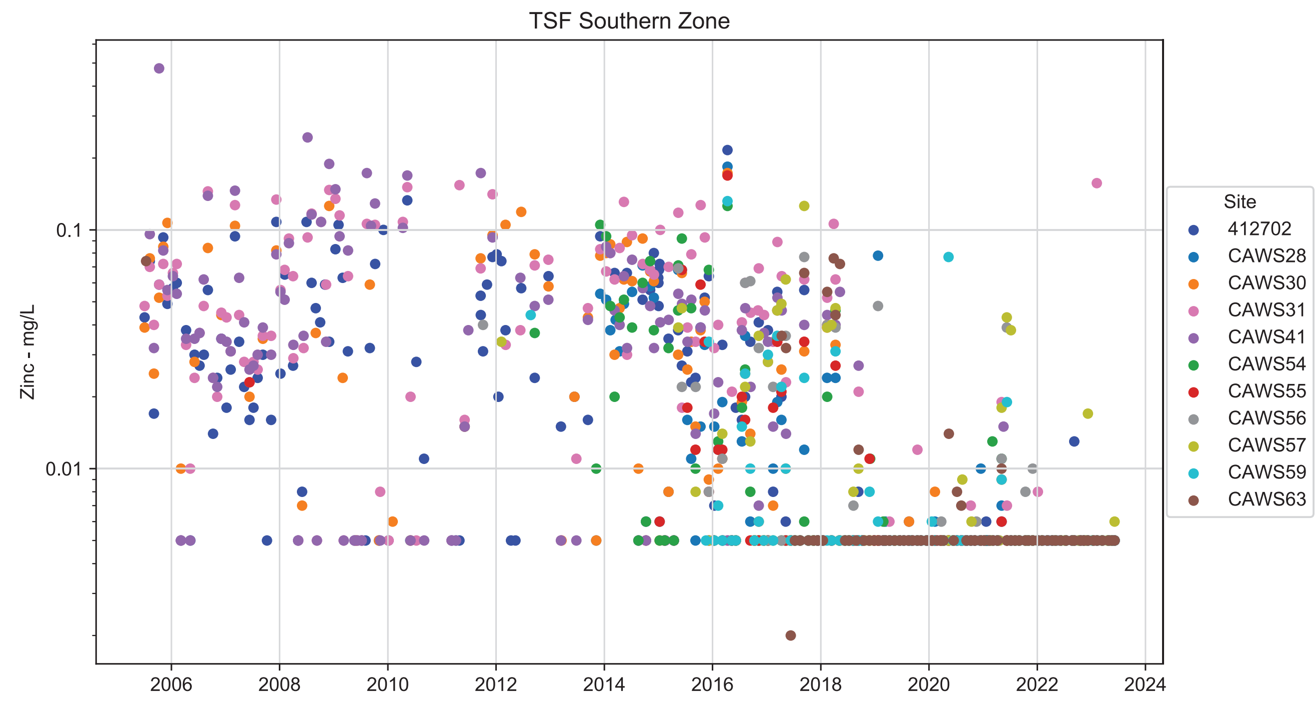
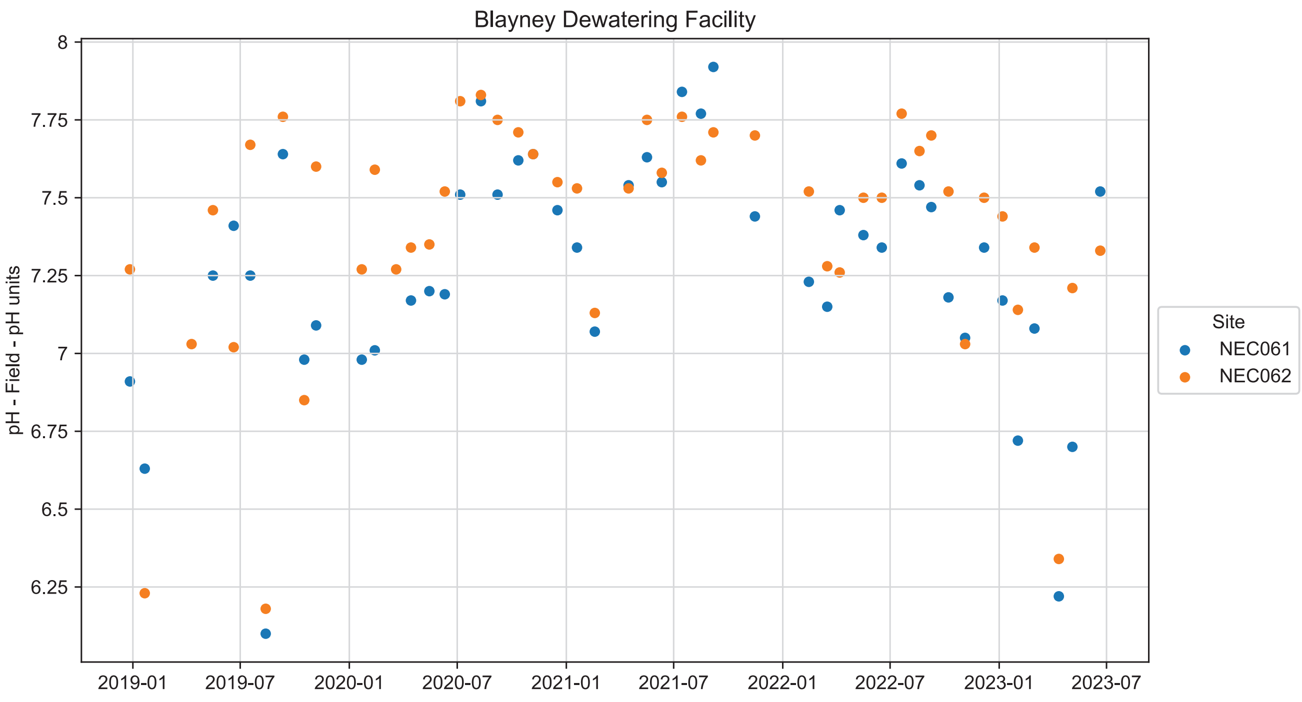
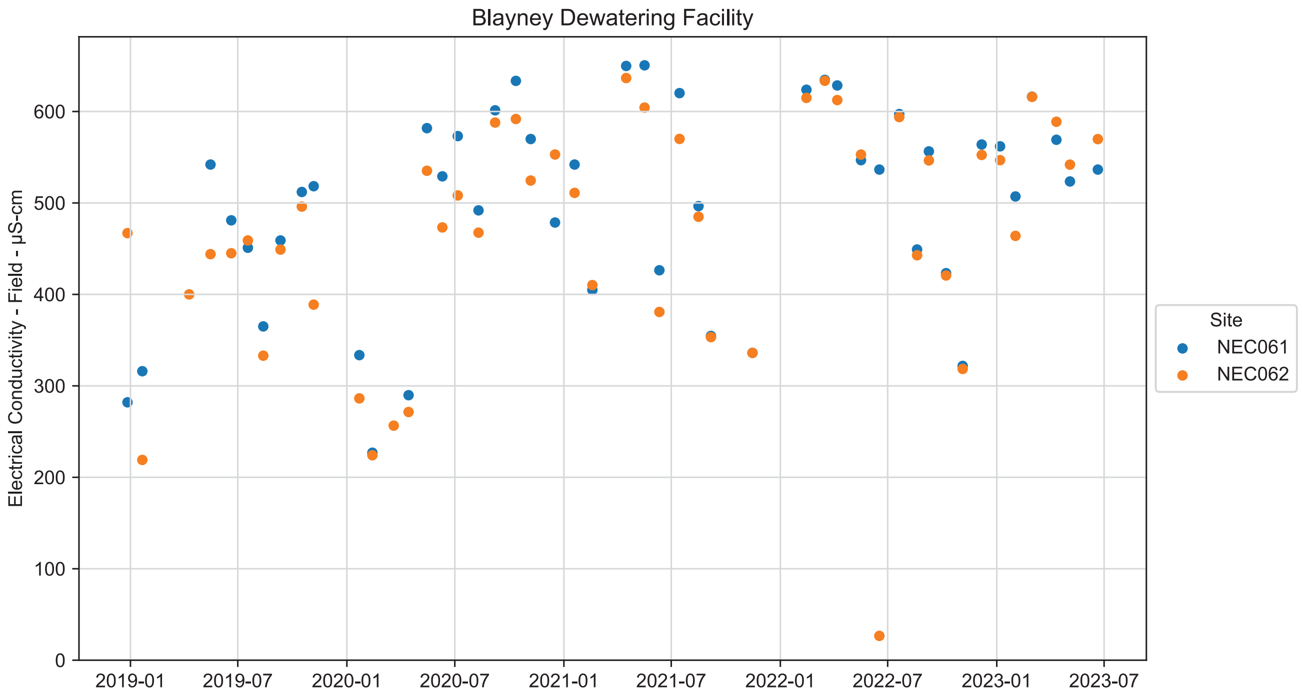
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63

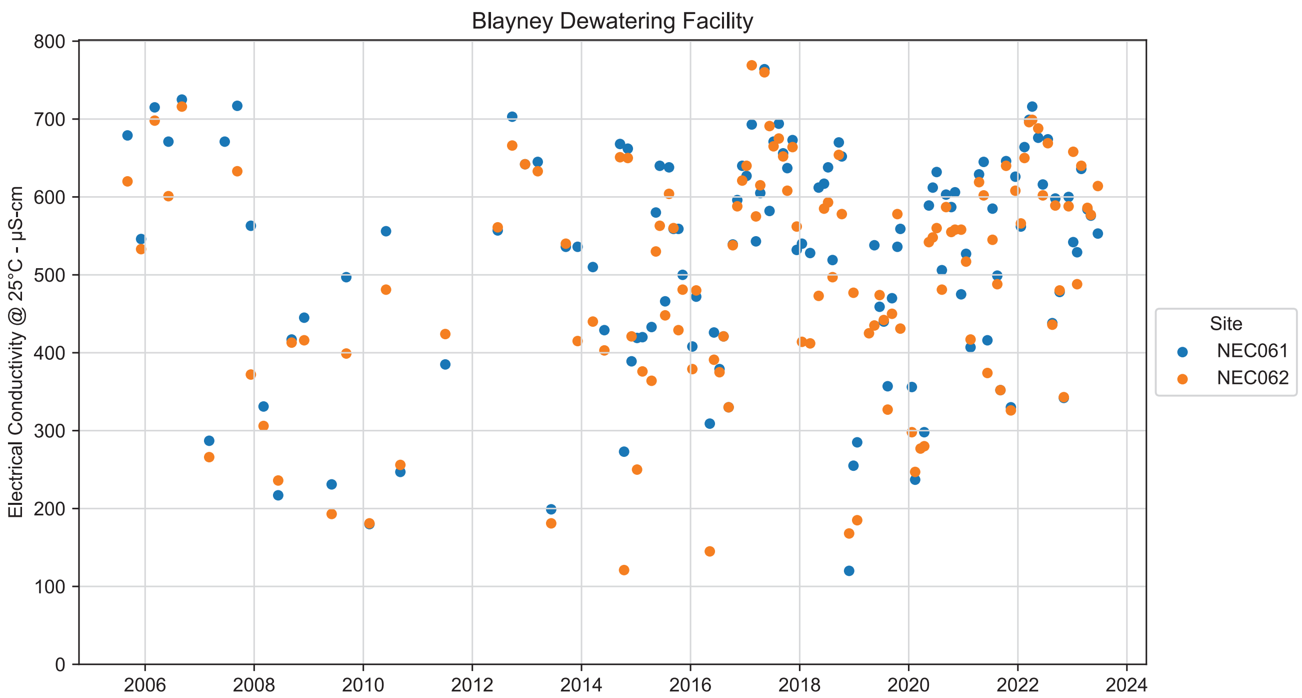

TSF Southern Zone
Selenium - mg/L
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63

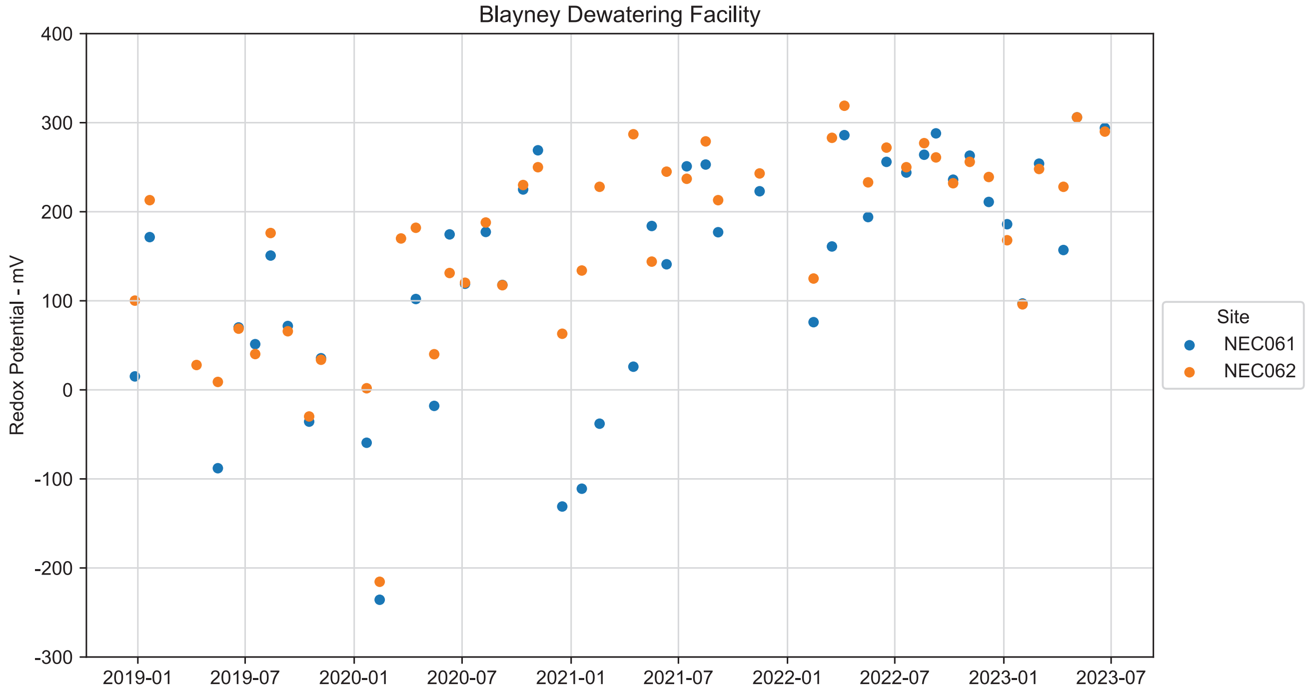

TSF Southern Zone
Silver - mg/L
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63

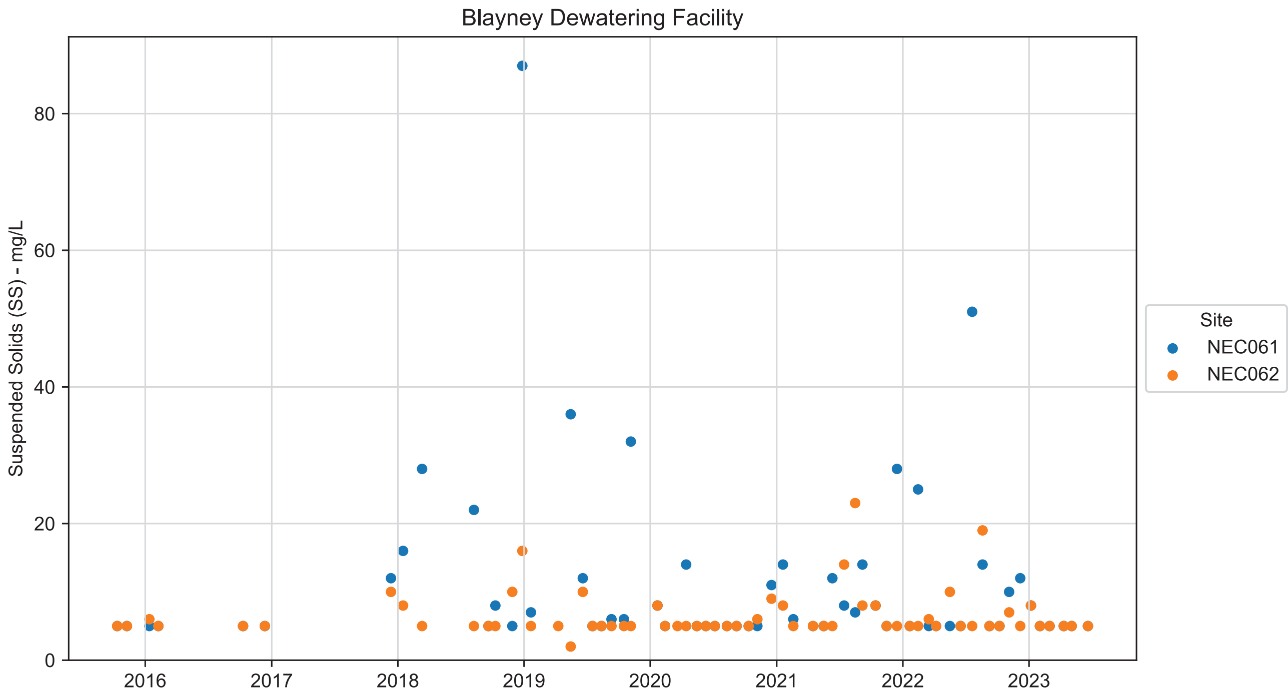

TSF Southern Zone
Zinc - mg/L
Site
412702
CAWS28
CAWS30
CAWS31
CAWS41
CAWS54
CAWS55
CAWS56
CAWS57
CAWS59
CAWS63

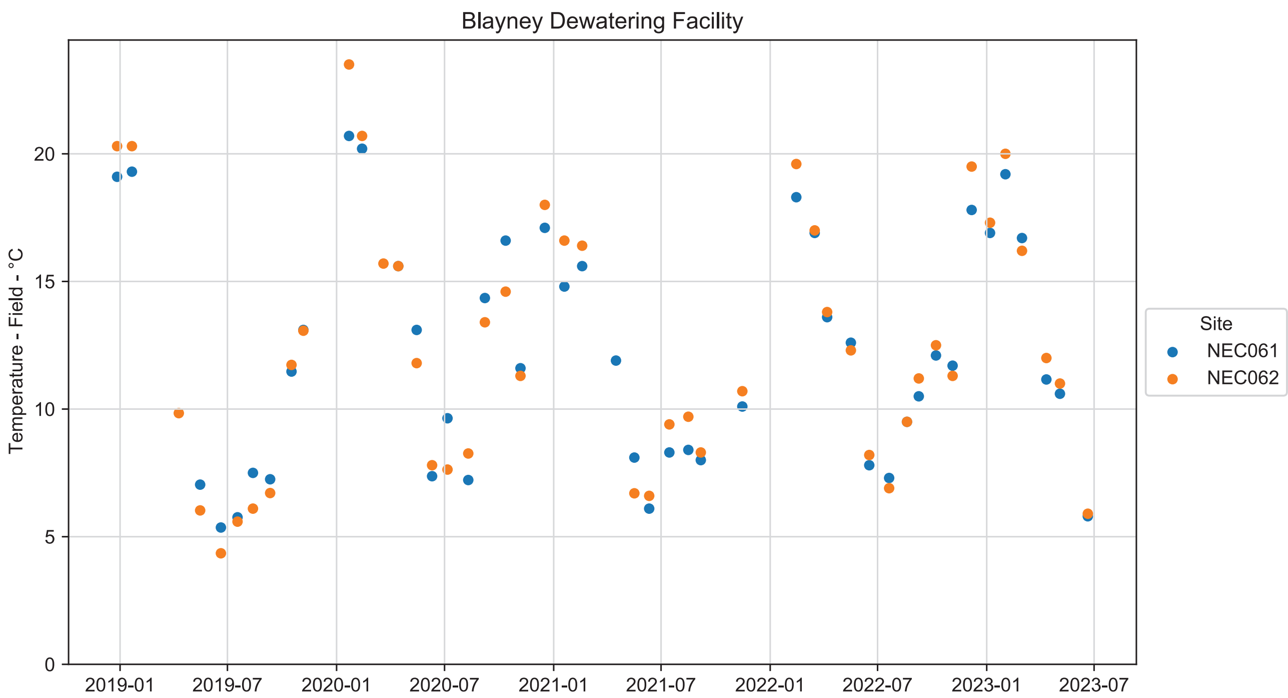

Blayney Dewatering Facility
pH - Field - pH units
Site
NEC061
NEC062

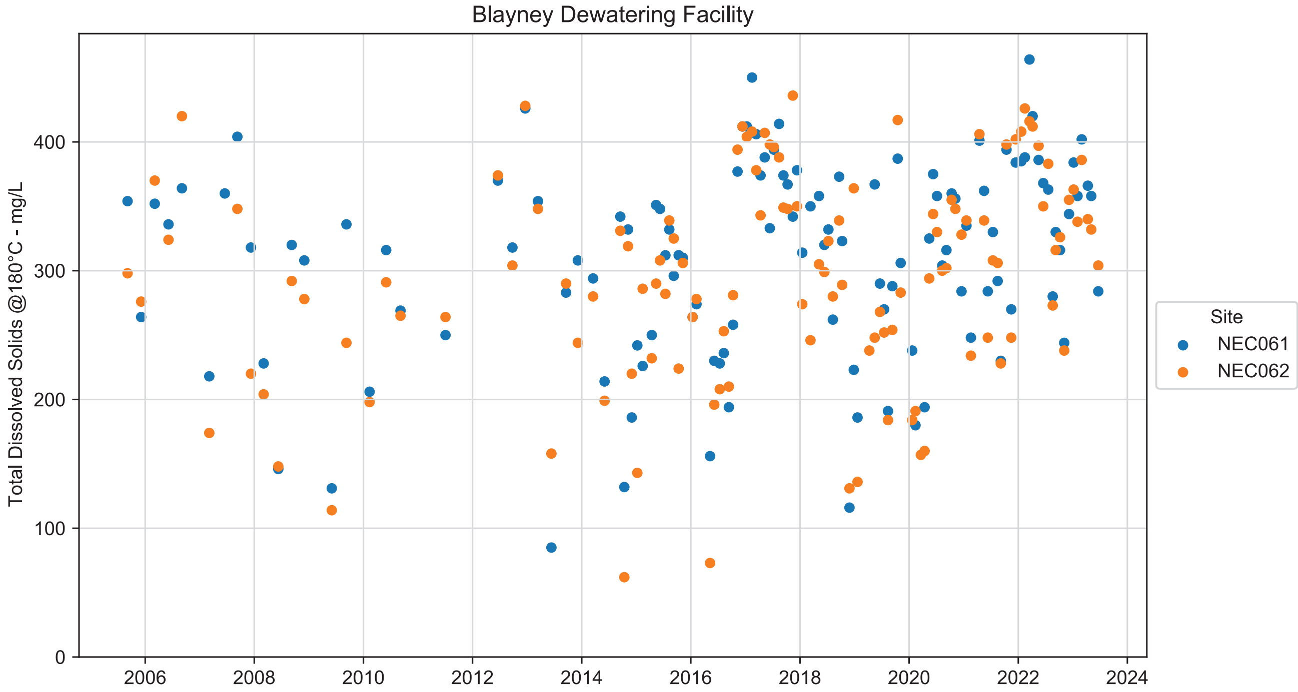

Blayney Dewatering Facility
Electrical Conductivity - Field - µS-cm
Site
NEC061
NEC062

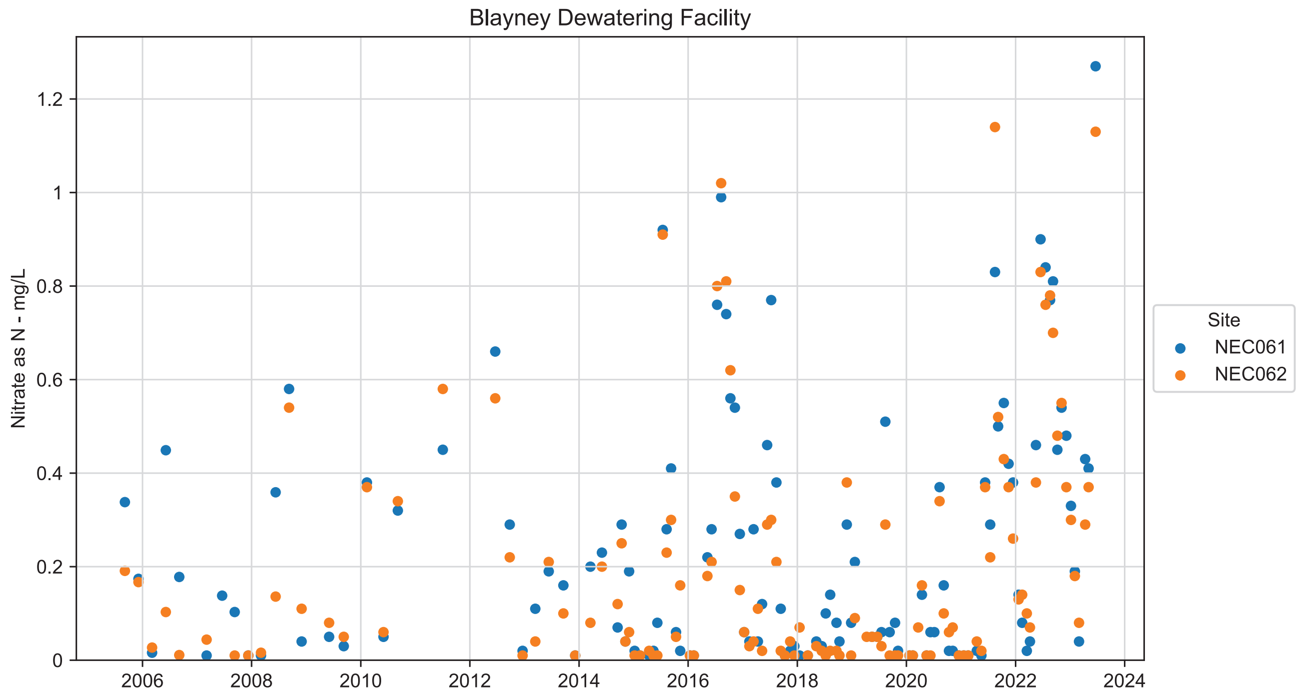

Blayney Dewatering Facility
Electrical Conductivity @ 25°C - µS-cm
Site
NEC061
NEC062

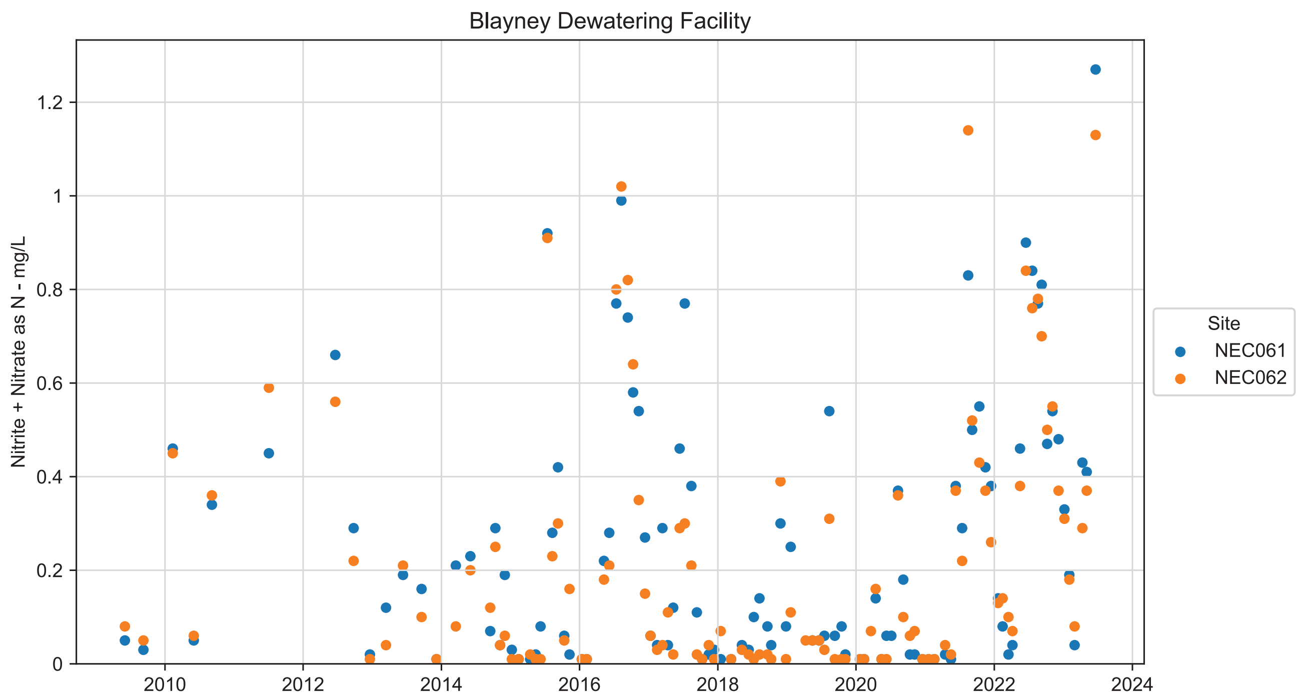

Blayney Dewatering Facility
Redox Potential - mV
400
300
200
100
0
-100
-200
-300
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
NEC061
NEC062

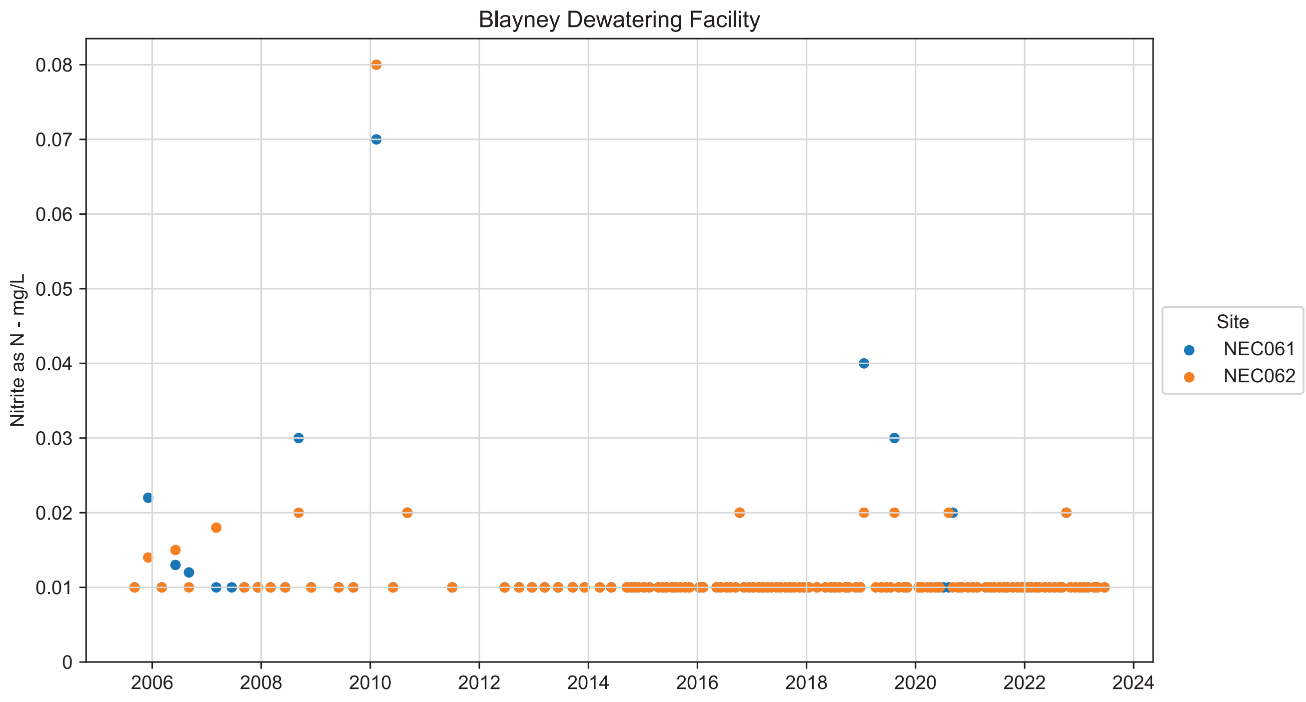

Blayney Dewatering Facility
Suspended Solids (SS) - mg/L
80
60
40
20
0
2016
2017
2018
2019
2020
2021
2022
2023
Site
NEC061
NEC062

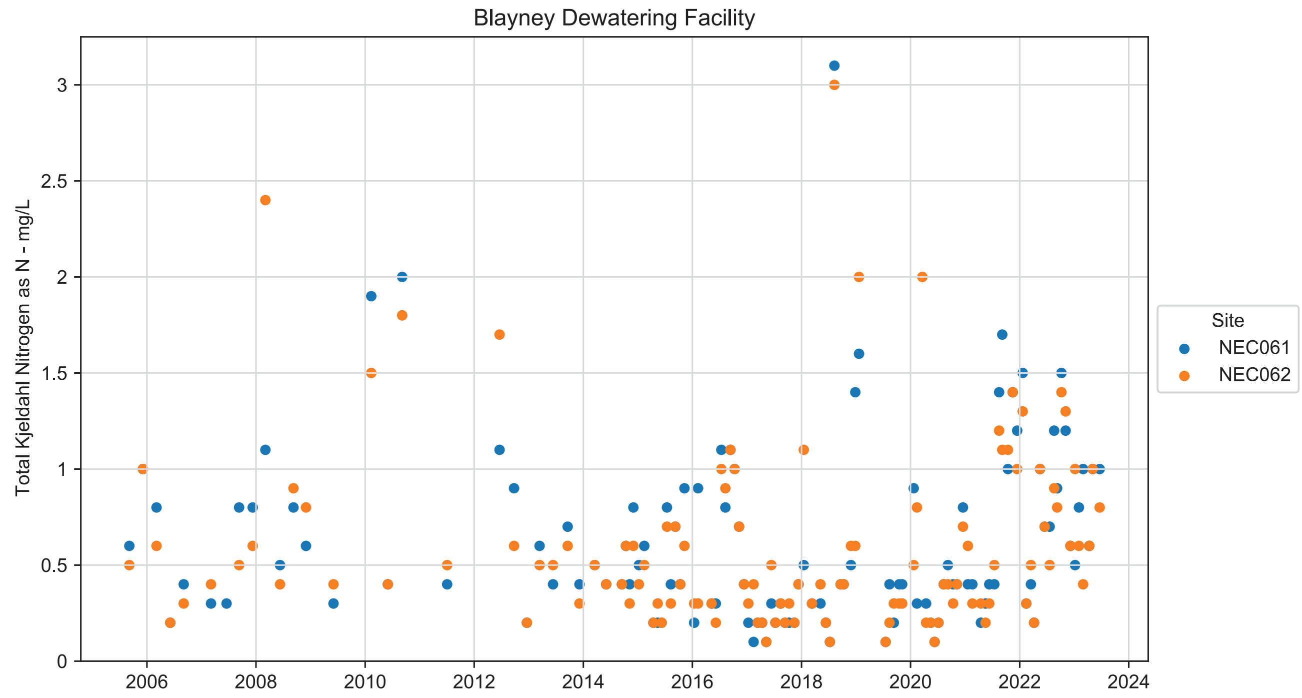

Blayney Dewatering Facility
Temperature - Field - °C
20
15
10
5
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
NEC061
NEC062

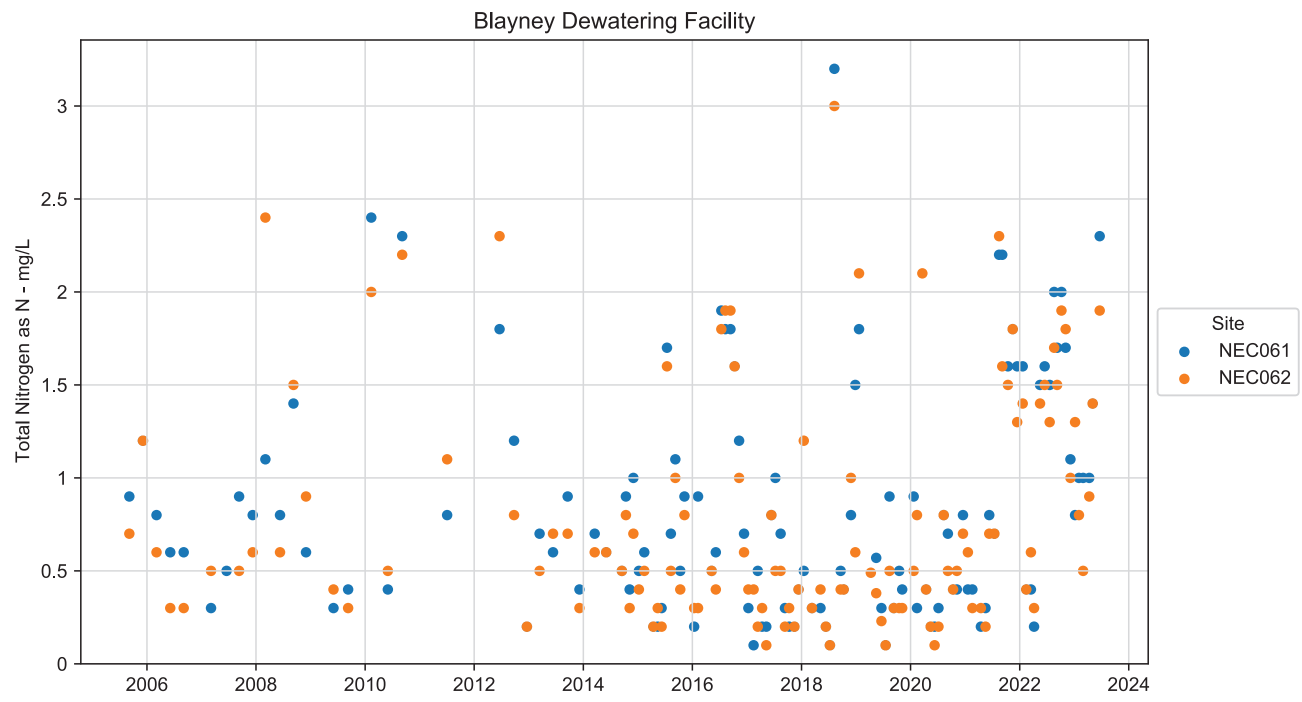

Blayney Dewatering Facility
Total Dissolved Solids @180°C - mg/L
0
100
200
300
400
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

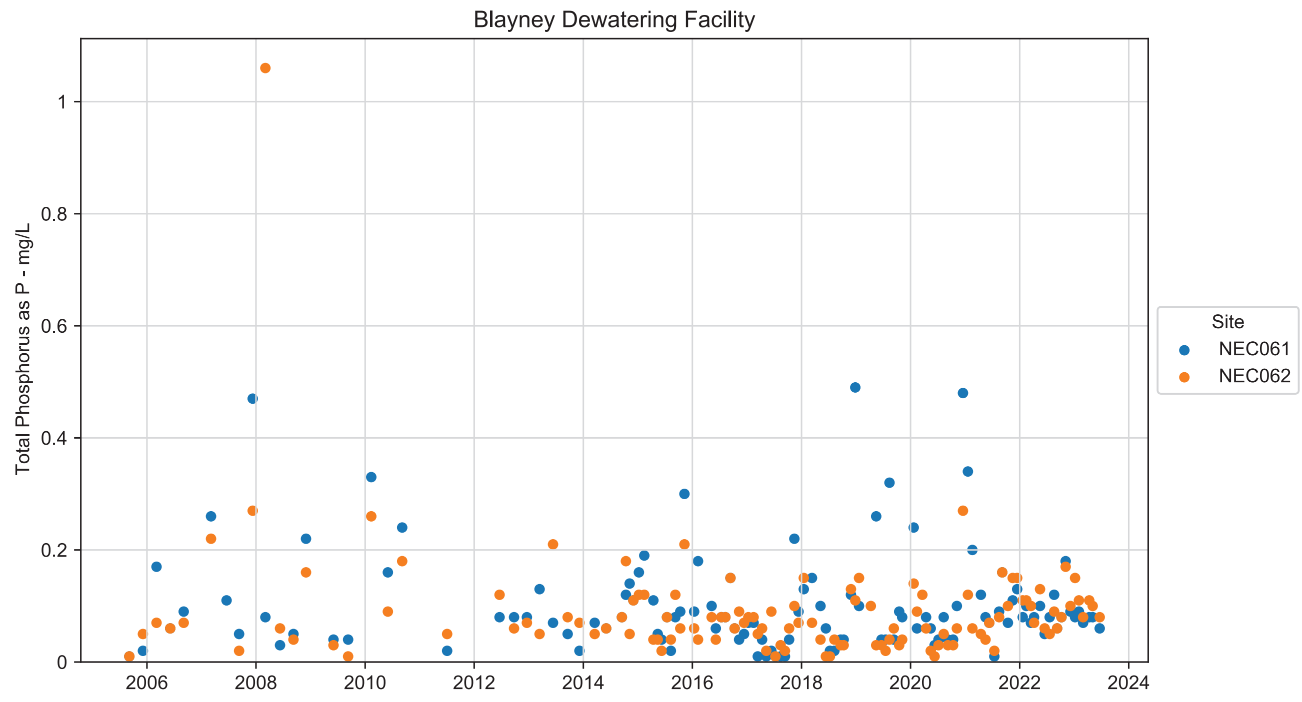

Blayney Dewatering Facility
Nitrate as N - mg/L
0
0.2
0.4
0.6
0.8
1
1.2
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

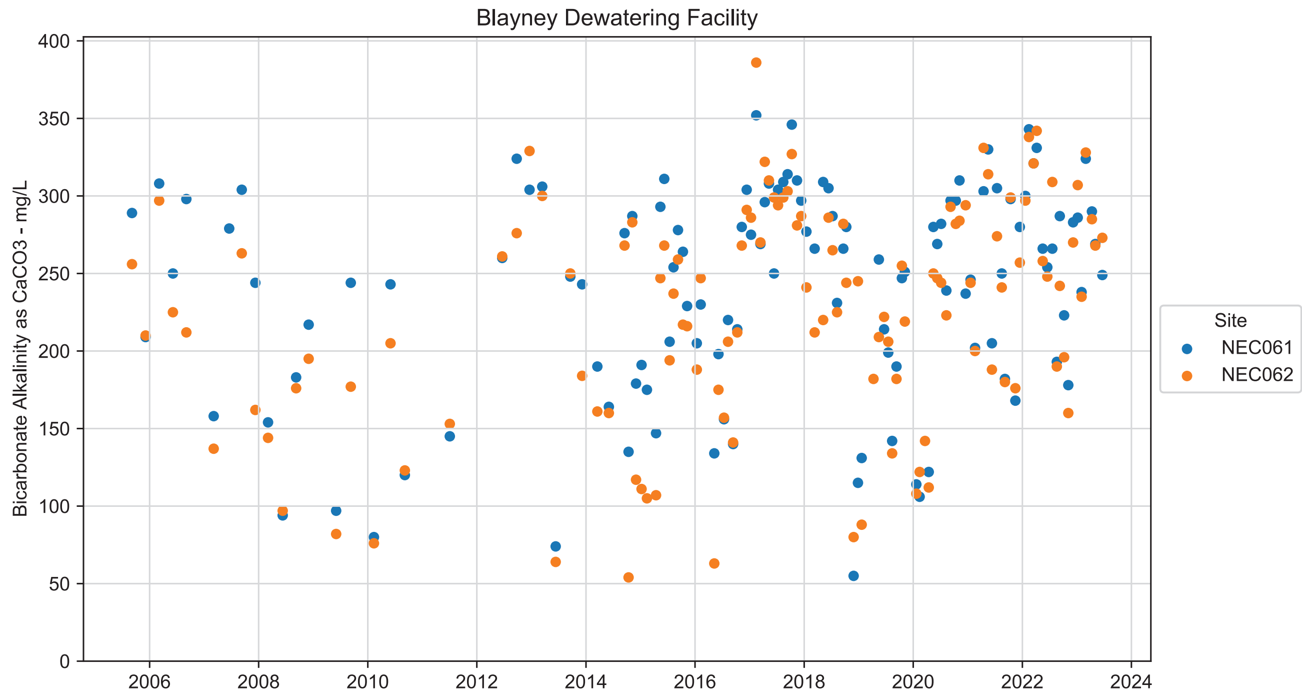

Blayney Dewatering Facility
Nitrite + Nitrate as N - mg/L
0
0.2
0.4
0.6
0.8
1
1.2
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

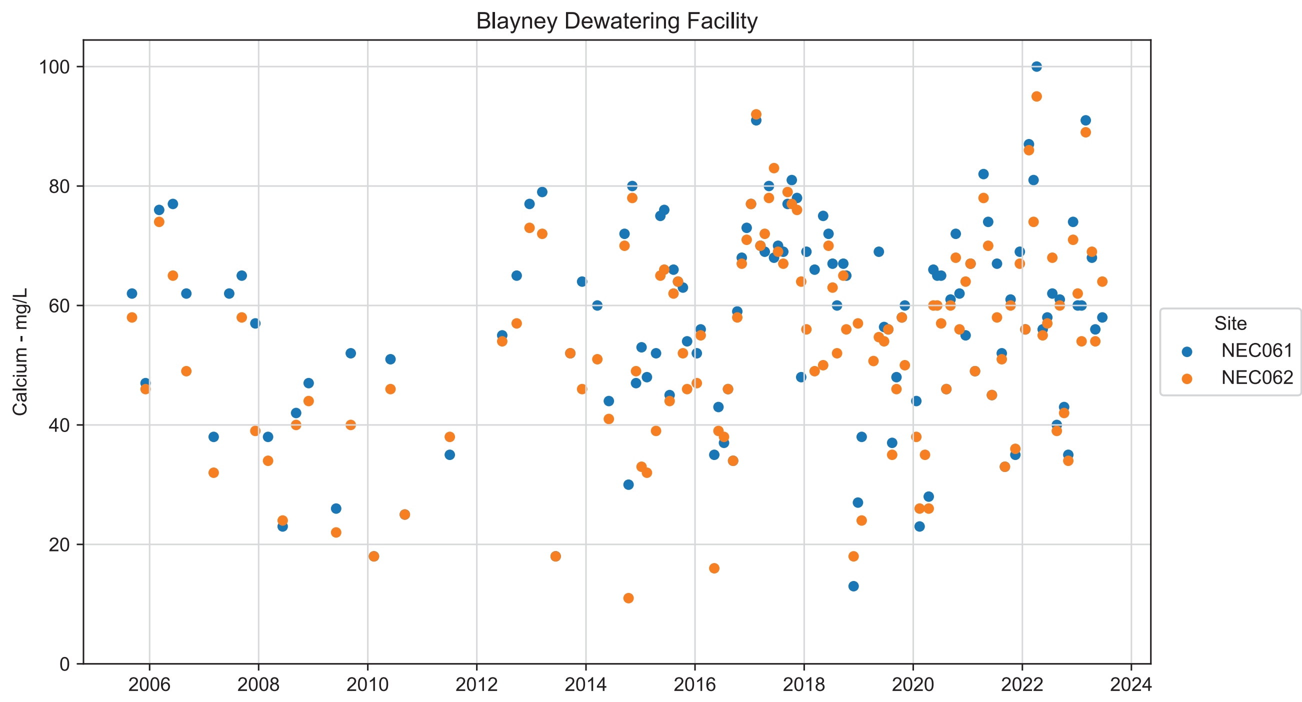

Blayney Dewatering Facility
Nitrite as N - mg/L
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

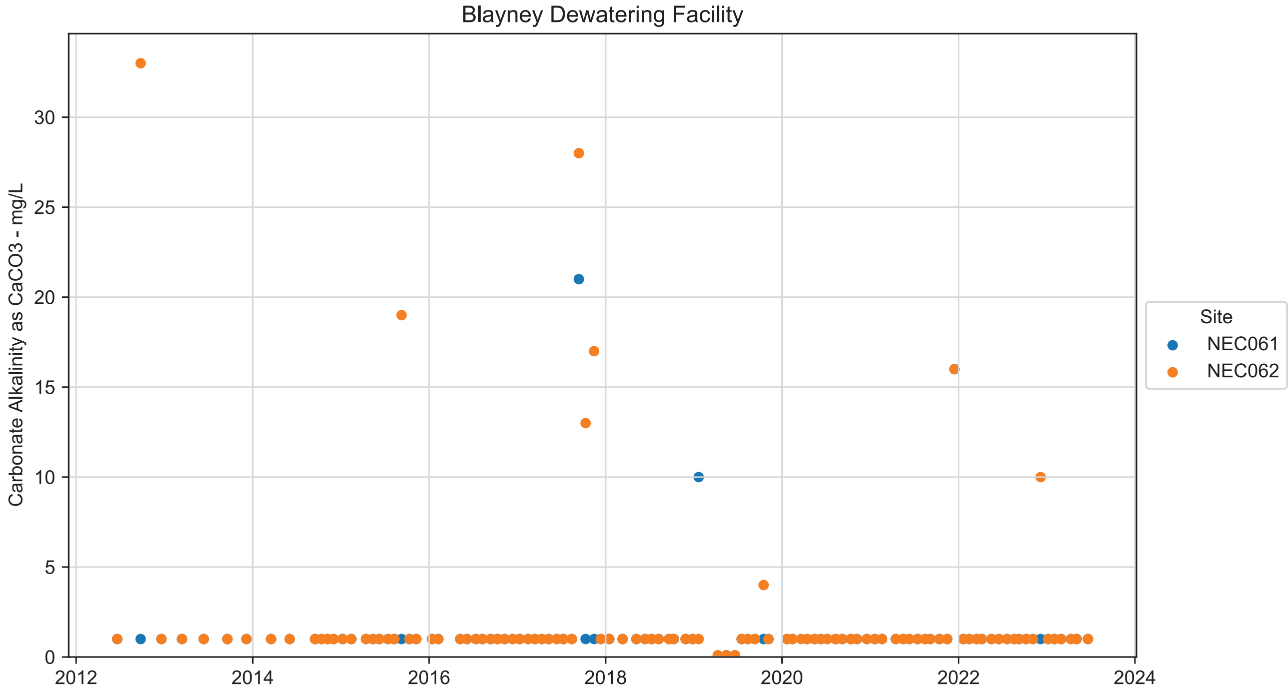

Blayney Dewatering Facility
Total Kjeldahl Nitrogen as N - mg/L
3
2.5
2
1.5
1
0.5
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

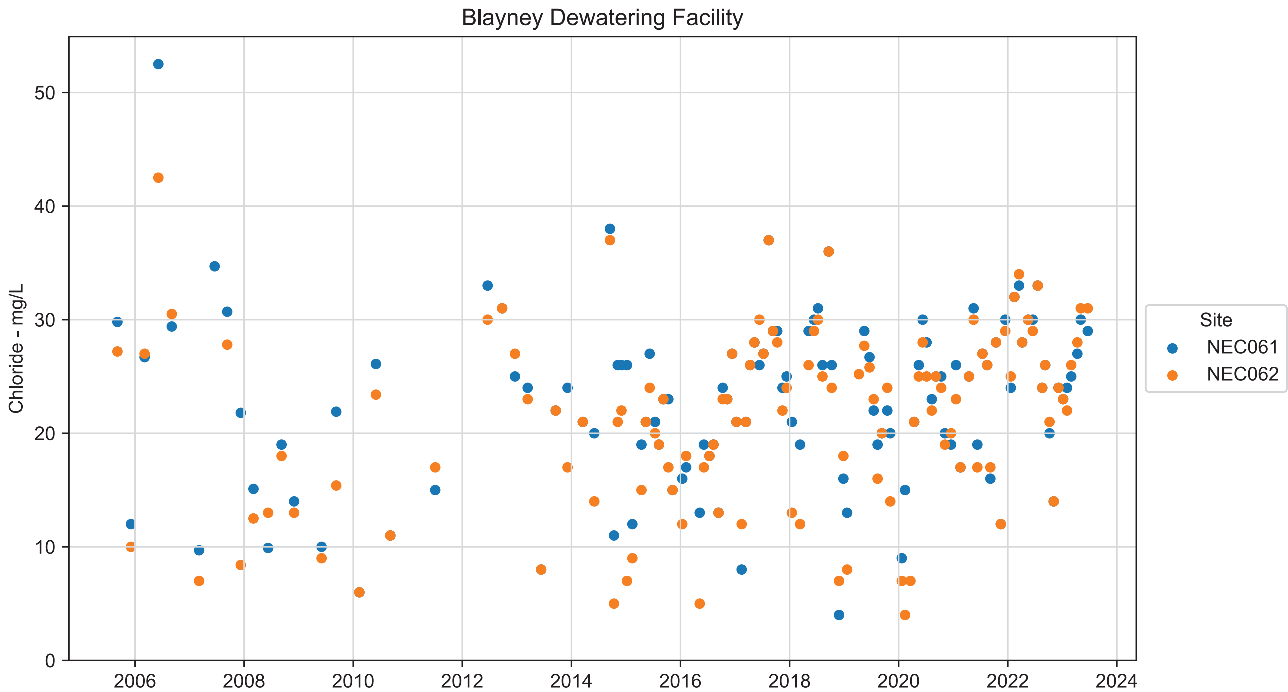

Blayney Dewatering Facility
Total Nitrogen as N - mg/L
3
2.5
2
1.5
1
0.5
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

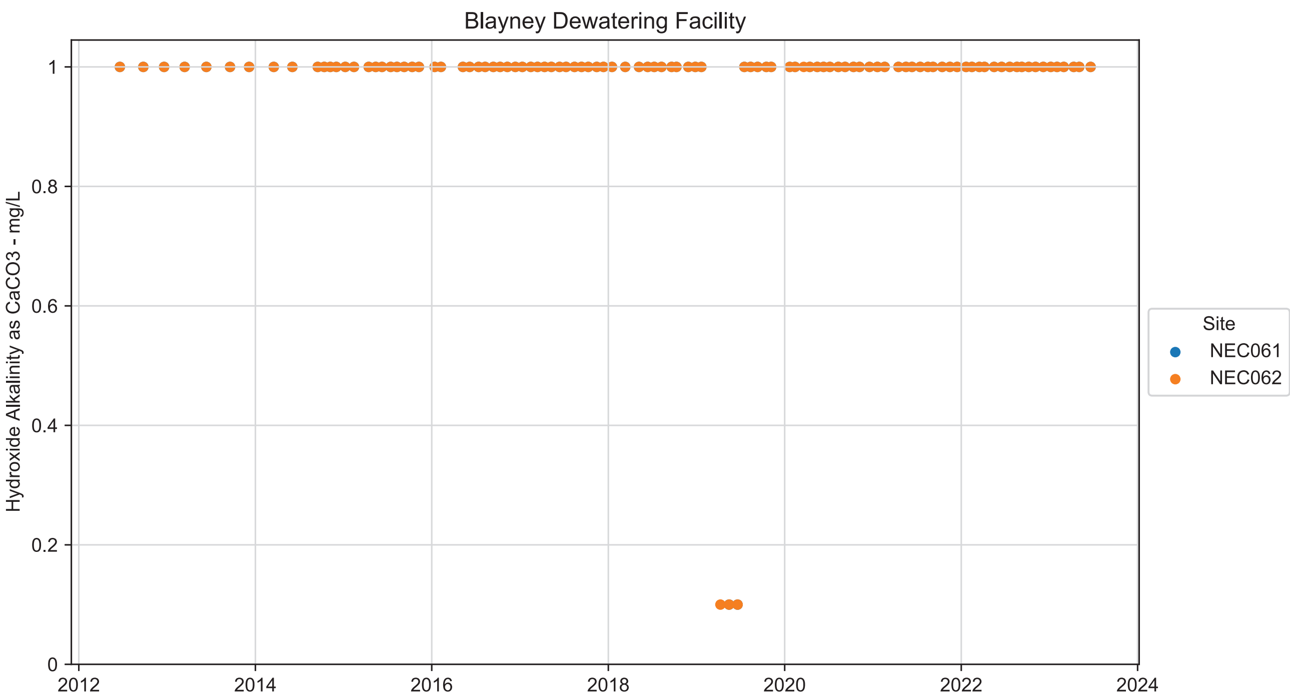

Blayney Dewatering Facility
Total Phosphorus as P - mg/L
0
0.2
0.4
0.6
0.8
1
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

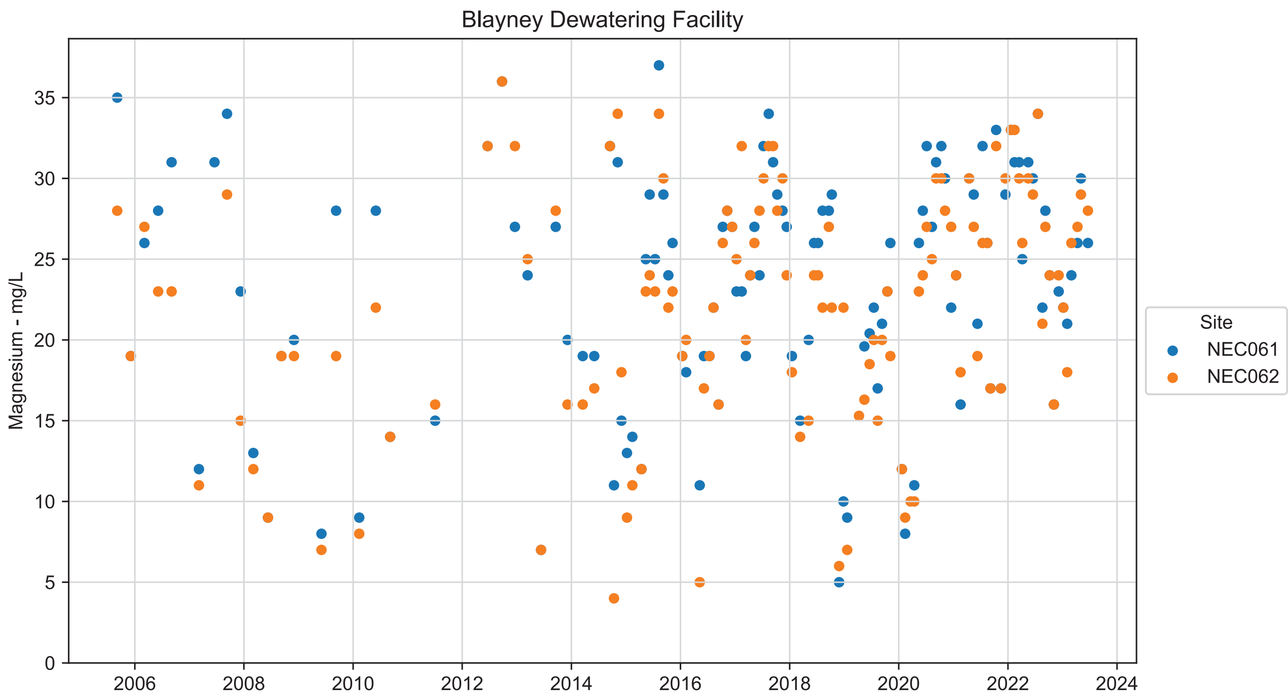

Blayney Dewatering Facility
Bicarbonate Alkalinity as CaCO3 - mg/L
0
50
100
150
200
250
300
350
400
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

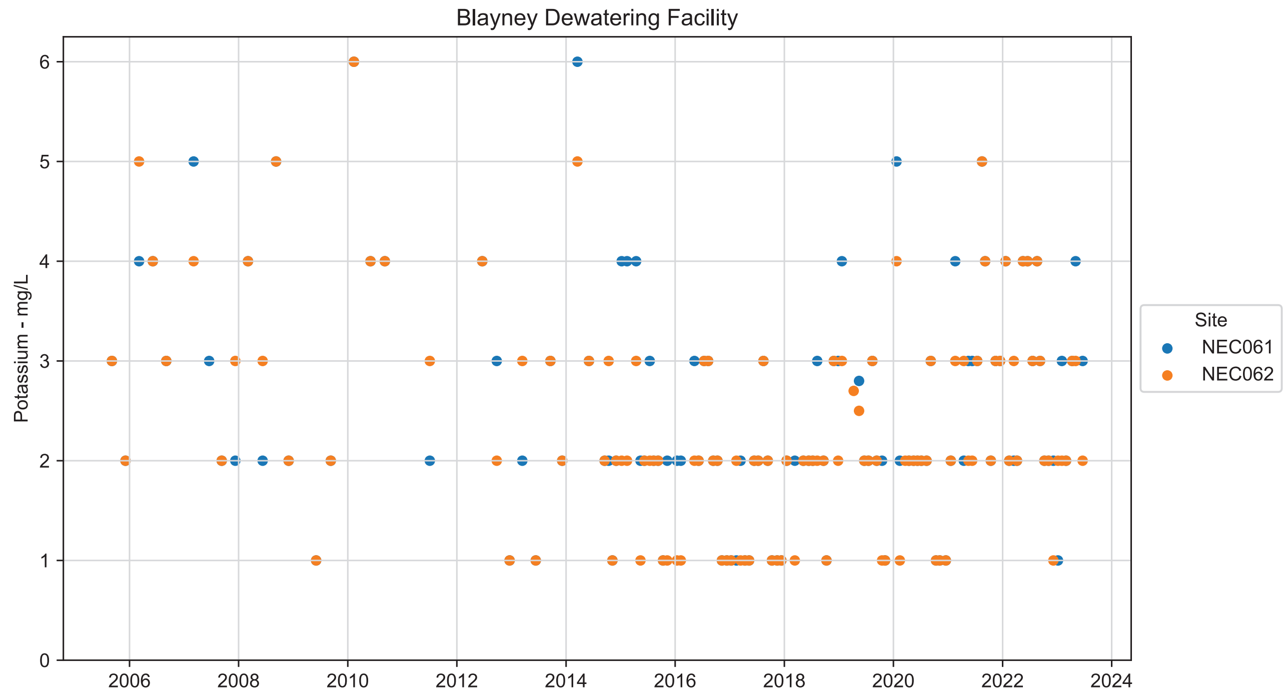

Blayney Dewatering Facility
Calcium - mg/L
0
20
40
60
80
100
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

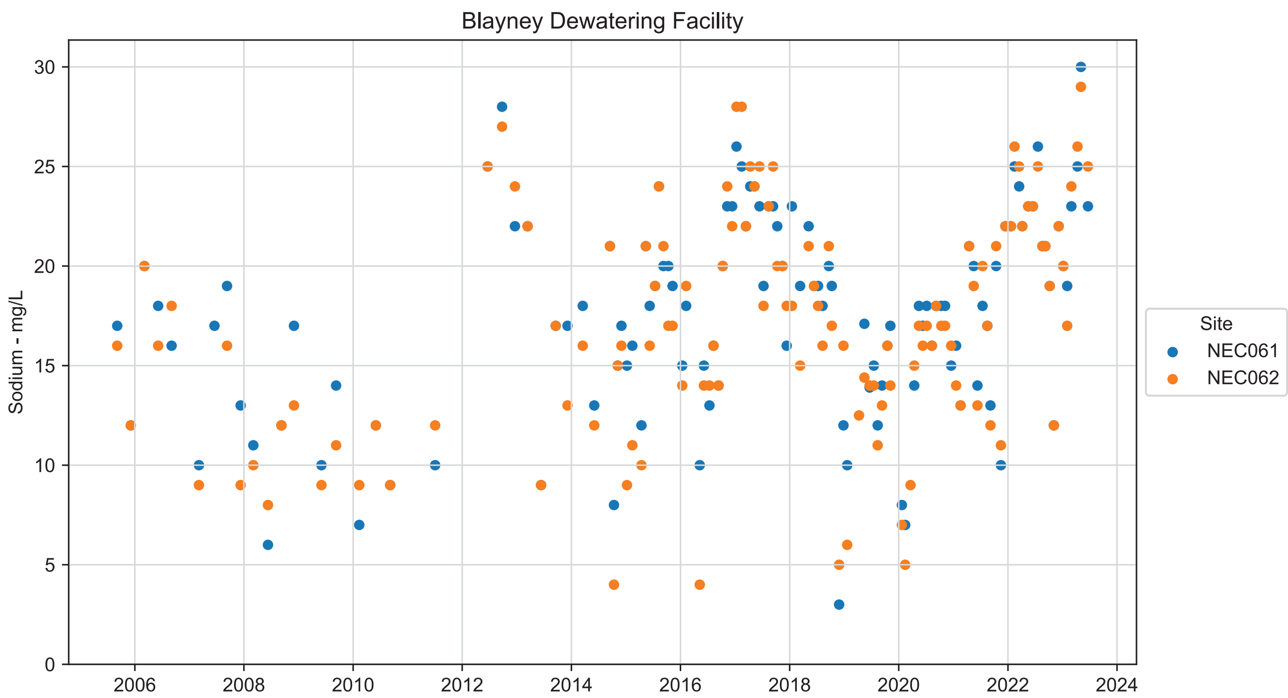

Blayney Dewatering Facility
Carbonate Alkalinity as CaCO3 - mg/L
Site
NEC061
NEC062

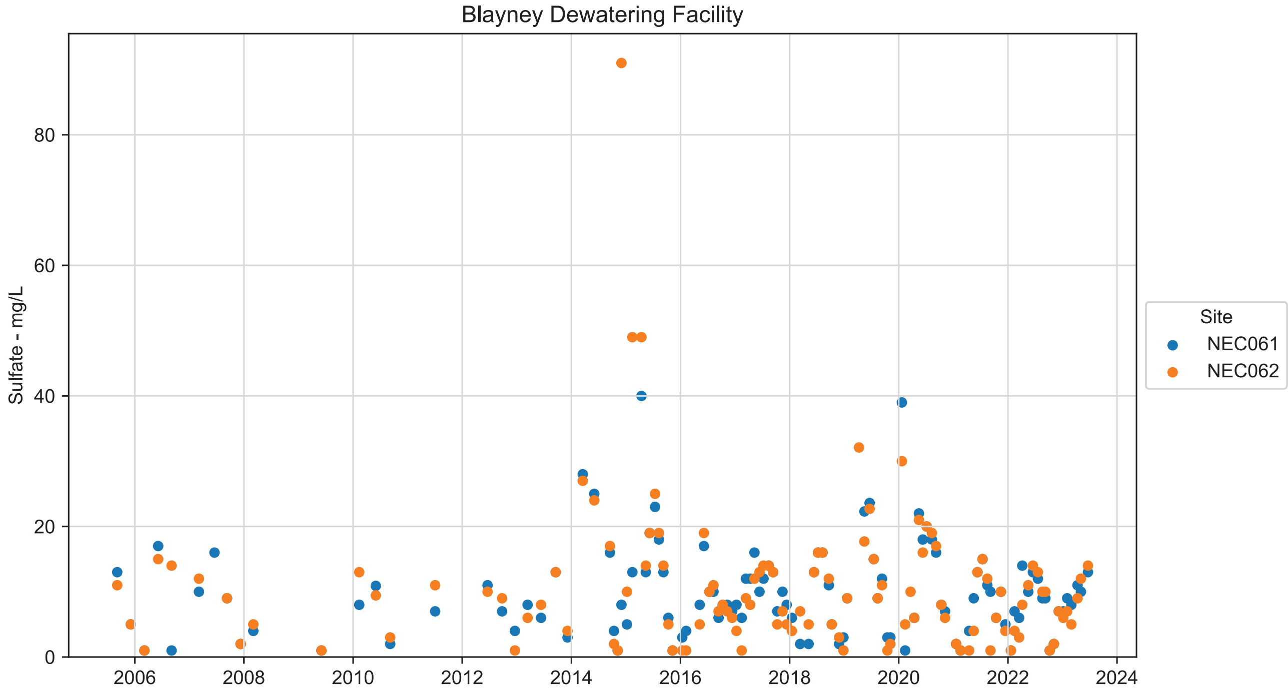

Blayney Dewatering Facility
Chloride - mg/L
Site
NEC061
NEC062

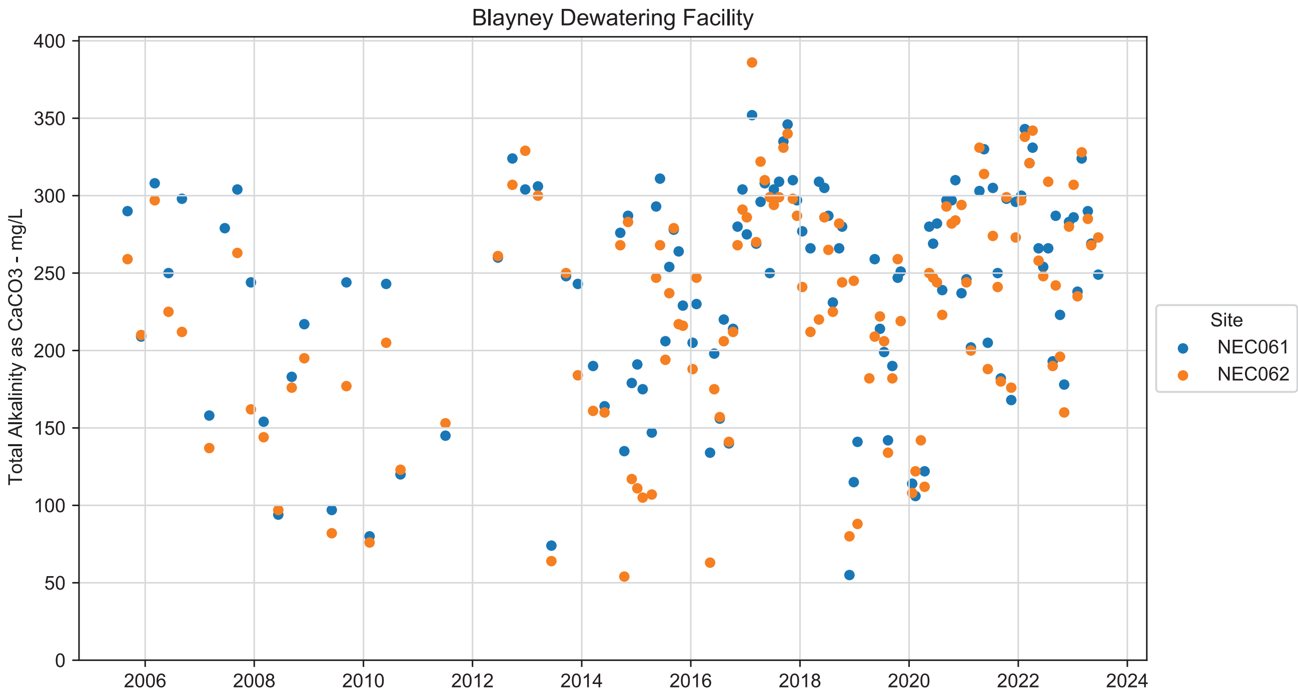

Blayney Dewatering Facility
Hydroxide Alkalinity as CaCO3 - mg/L
Site
NEC061
NEC062

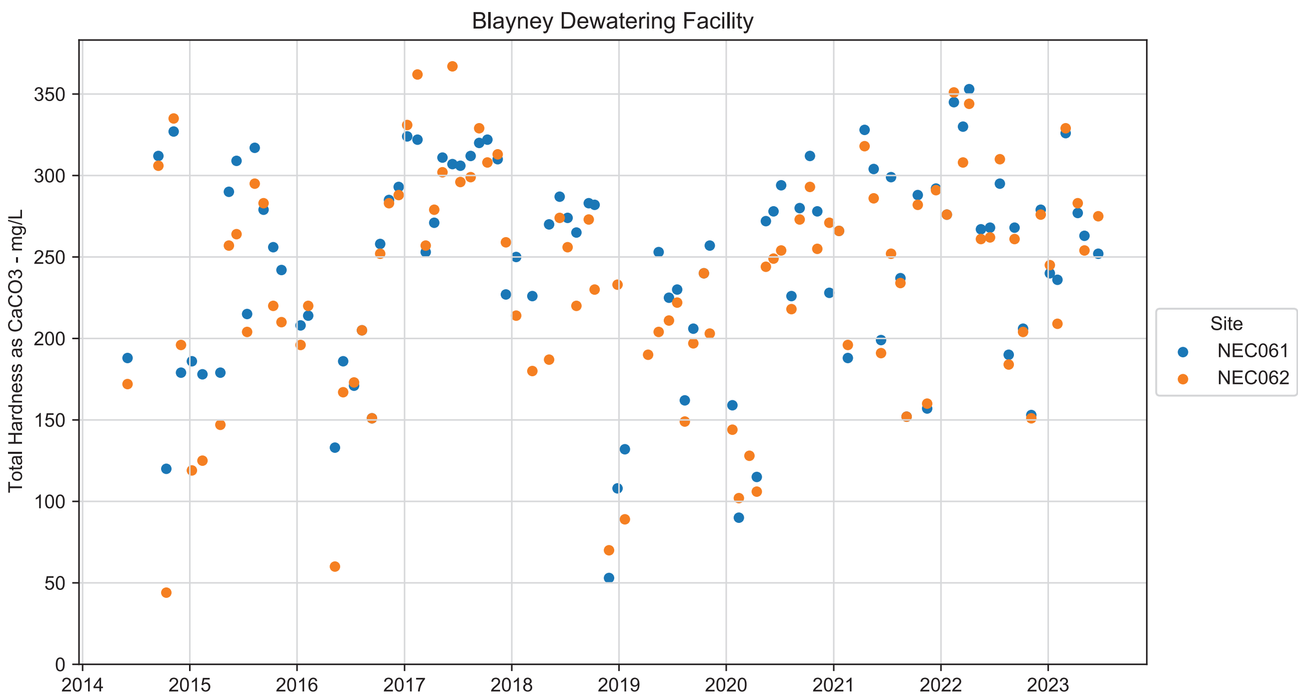

Blayney Dewatering Facility
Magnesium - mg/L
Site
NEC061
NEC062
0
5
10
15
20
25
30
35
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024

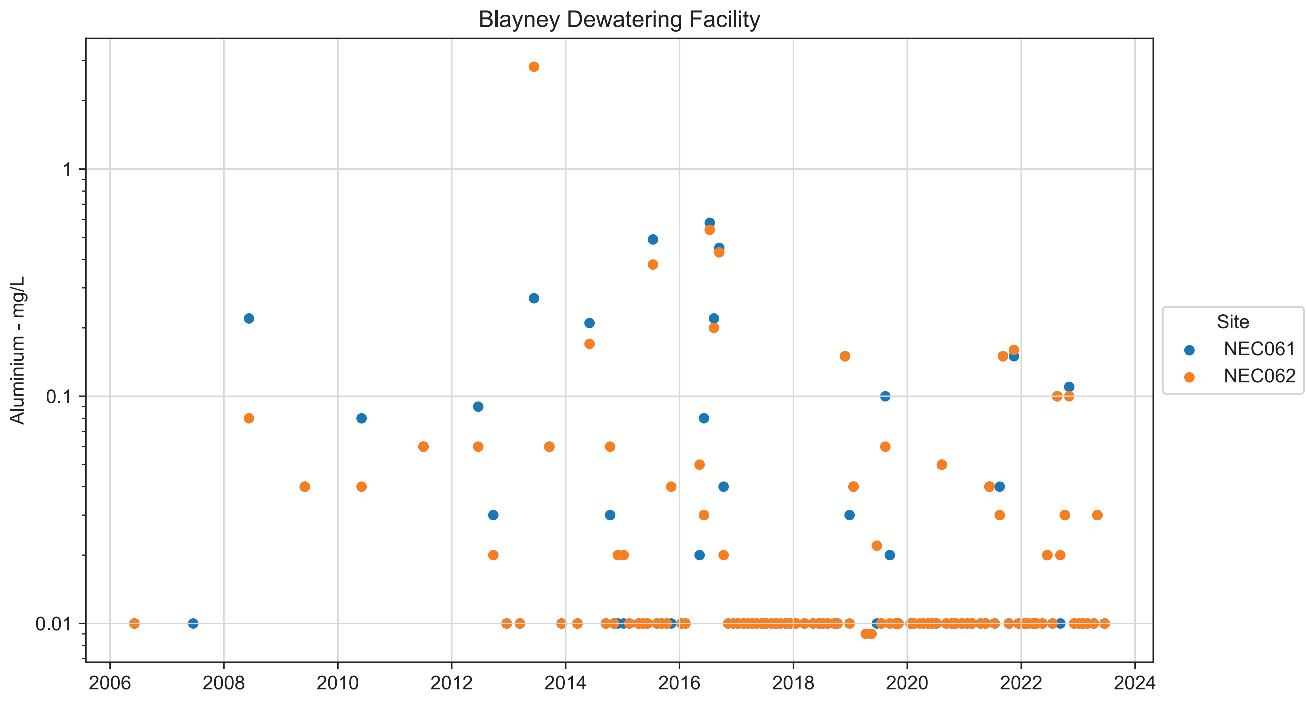

Blayney Dewatering Facility
Potassium - mg/L
Site
NEC061
NEC062
0
1
2
3
4
5
6
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024

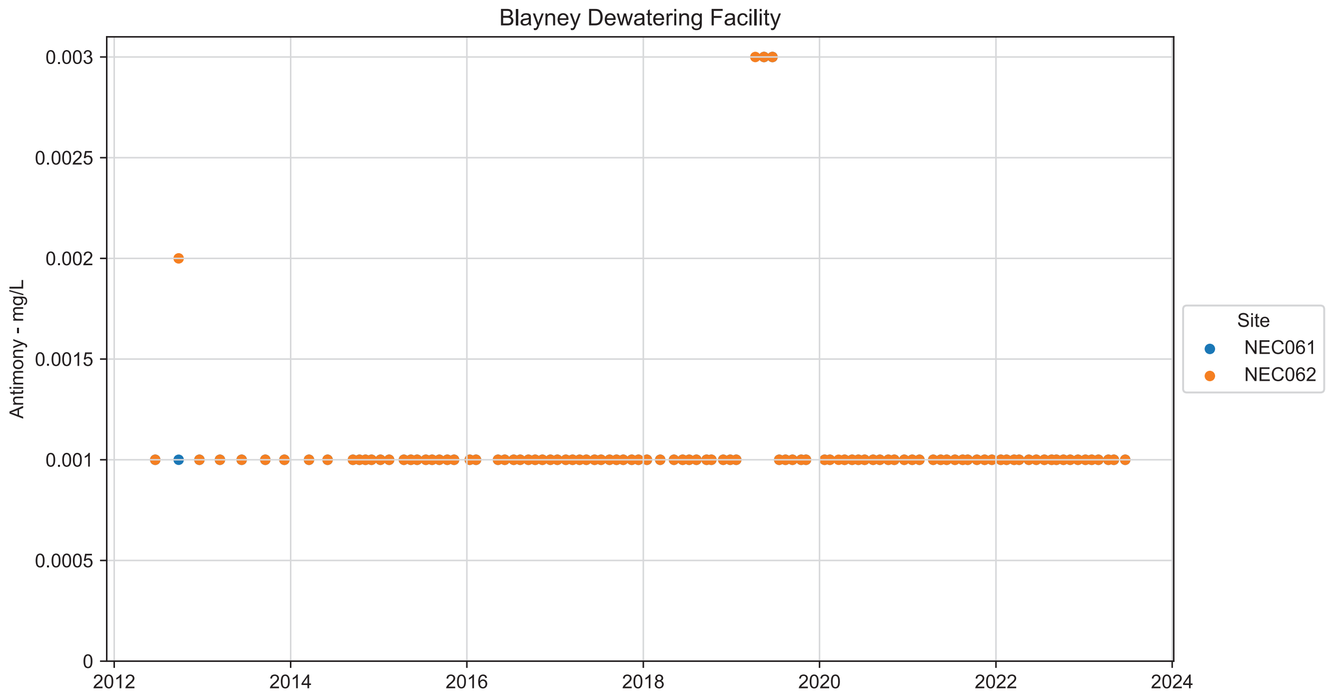

Blayney Dewatering Facility
Sodium - mg/L
Site
NEC061
NEC062
0
5
10
15
20
25
30
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024

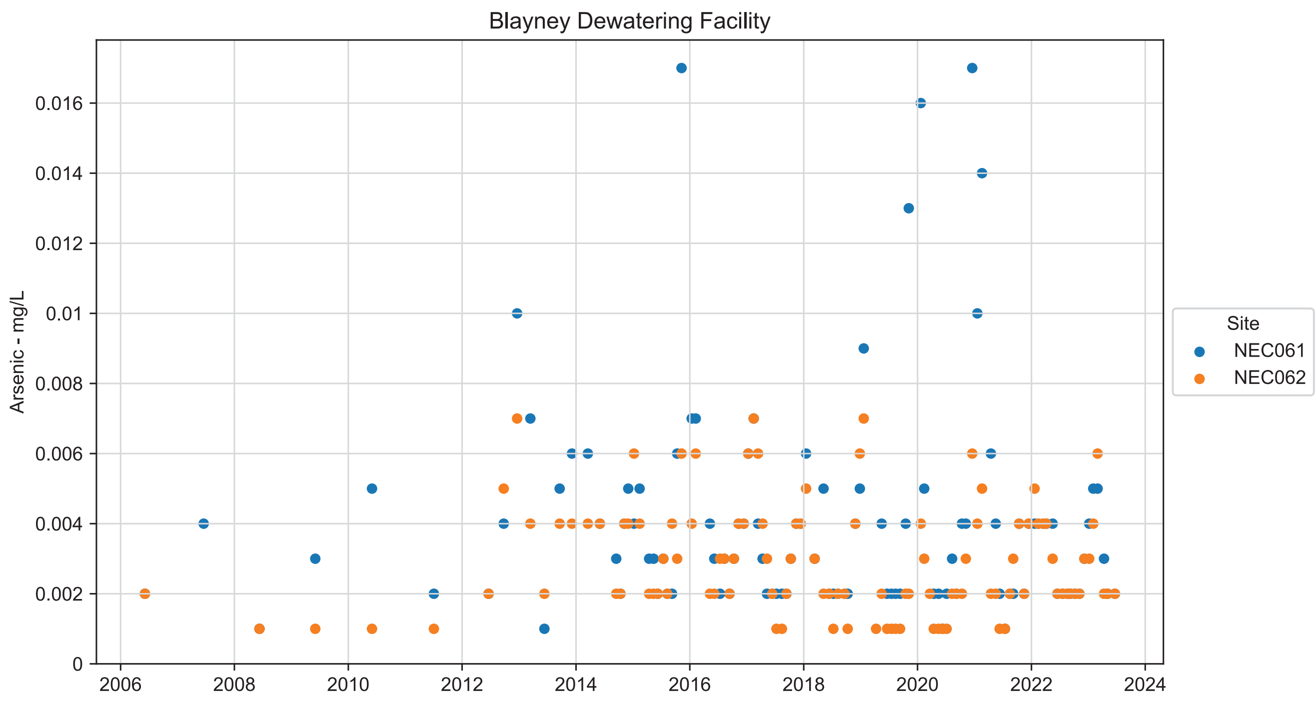

Blayney Dewatering Facility
Sulfate - mg/L
0
20
40
60
80
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

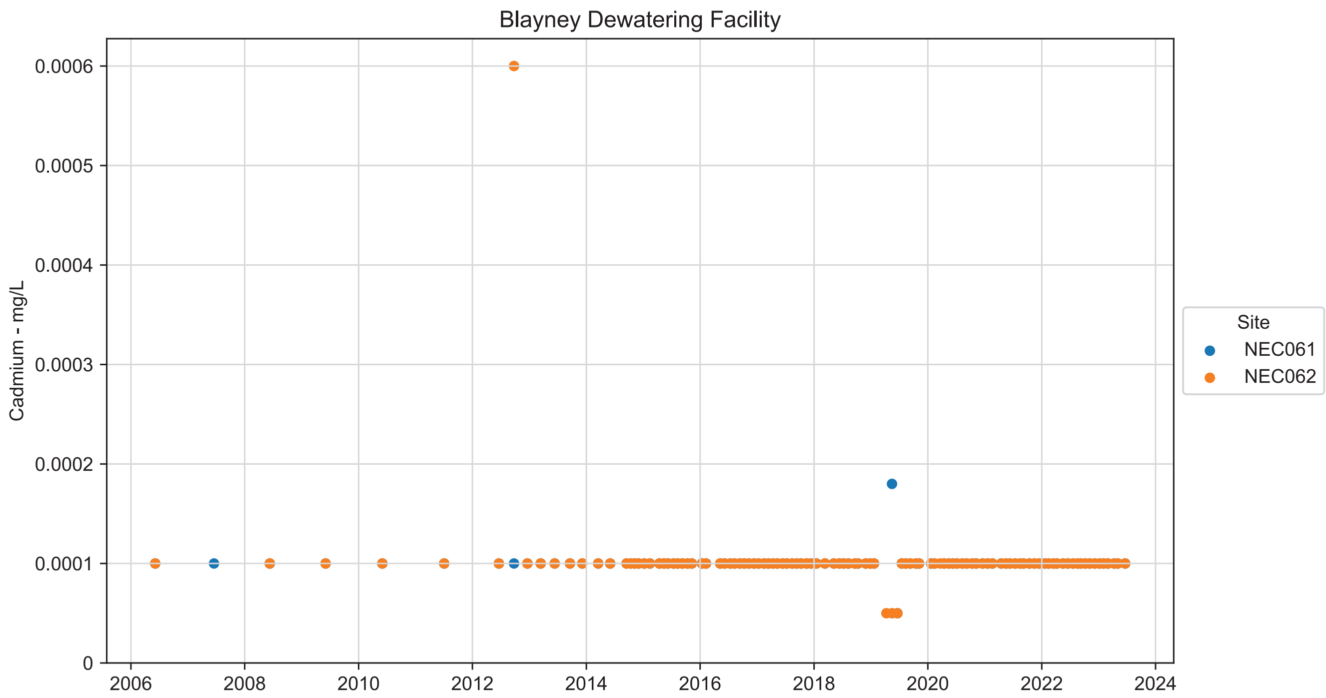

Blayney Dewatering Facility
Total Alkalinity as CaCO3 - mg/L
0
50
100
150
200
250
300
350
400
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

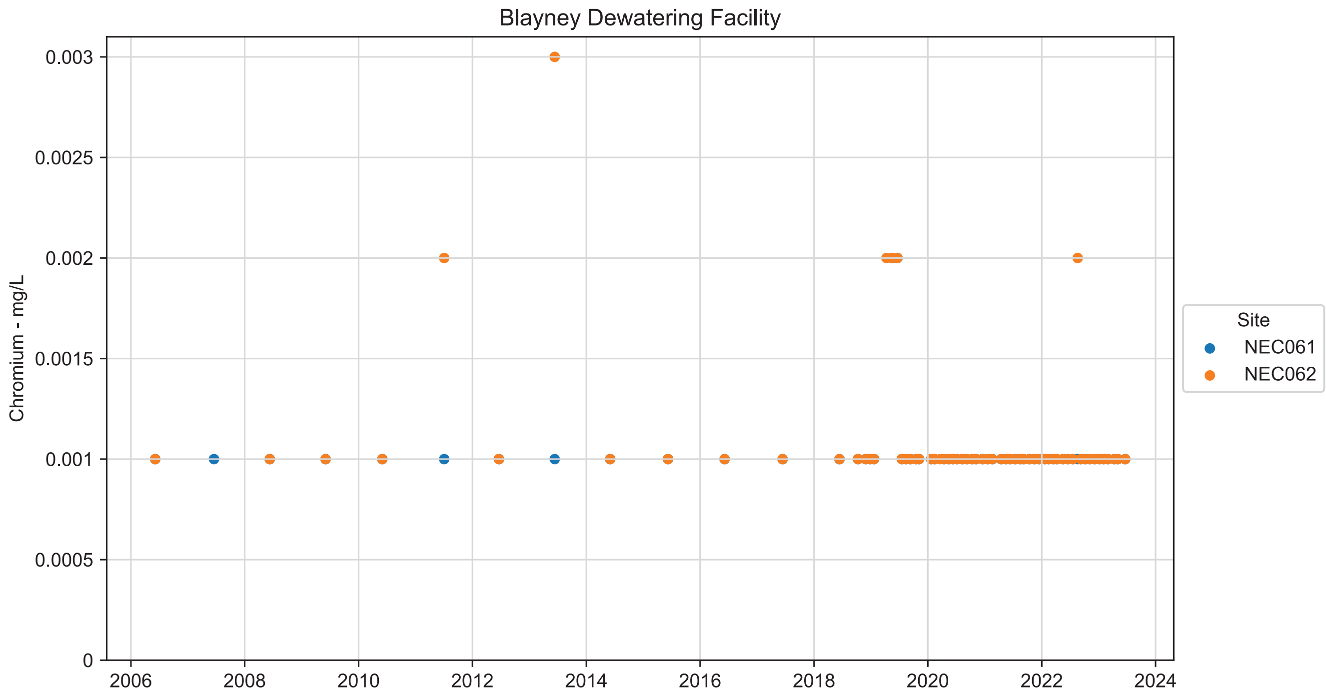

Blayney Dewatering Facility
Total Hardness as CaCO3 - mg/L
0
50
100
150
200
250
300
350
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Site
NEC061
NEC062

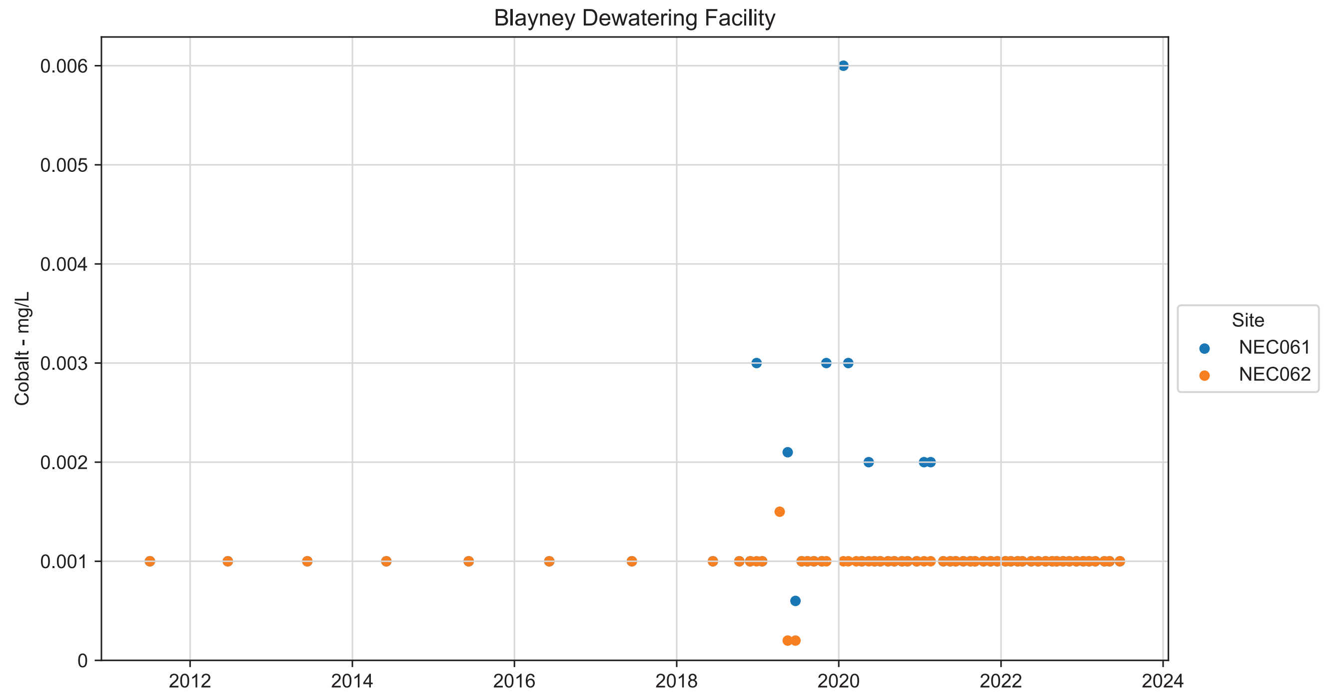

Blayney Dewatering Facility
Aluminium - mg/L
1
0.1
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

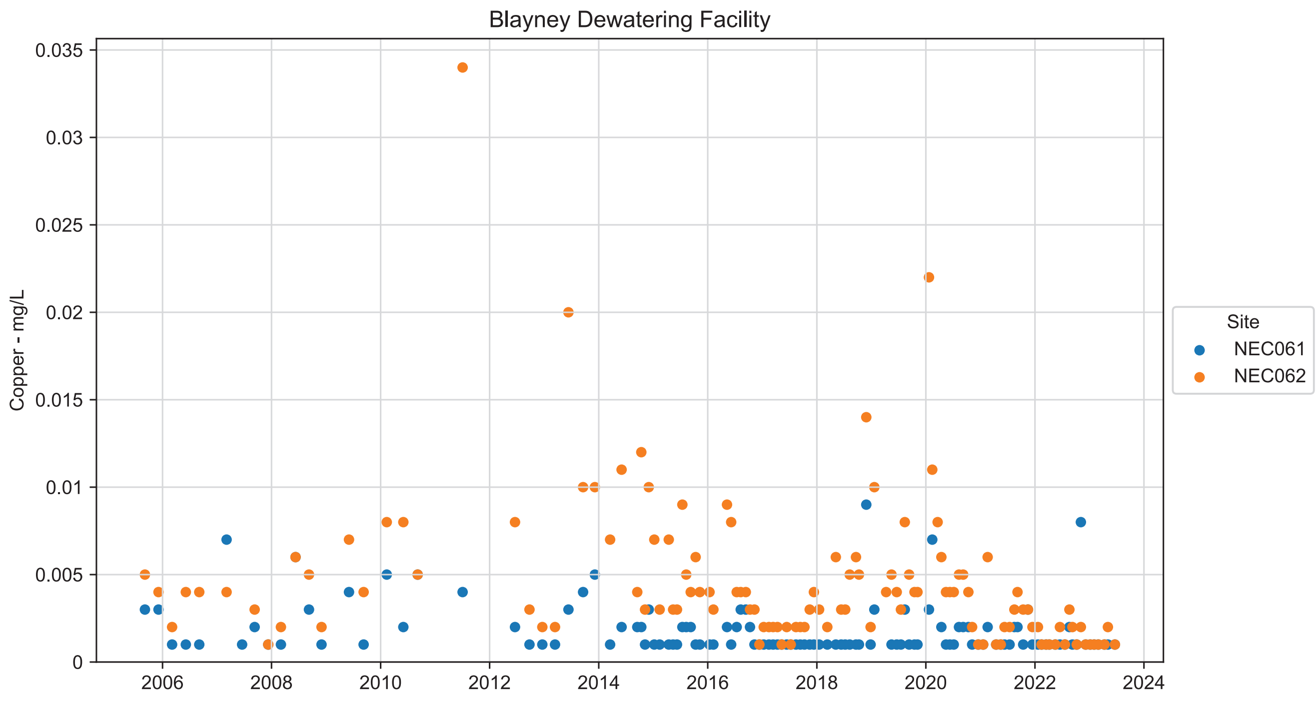

Blayney Dewatering Facility
Antimony - mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

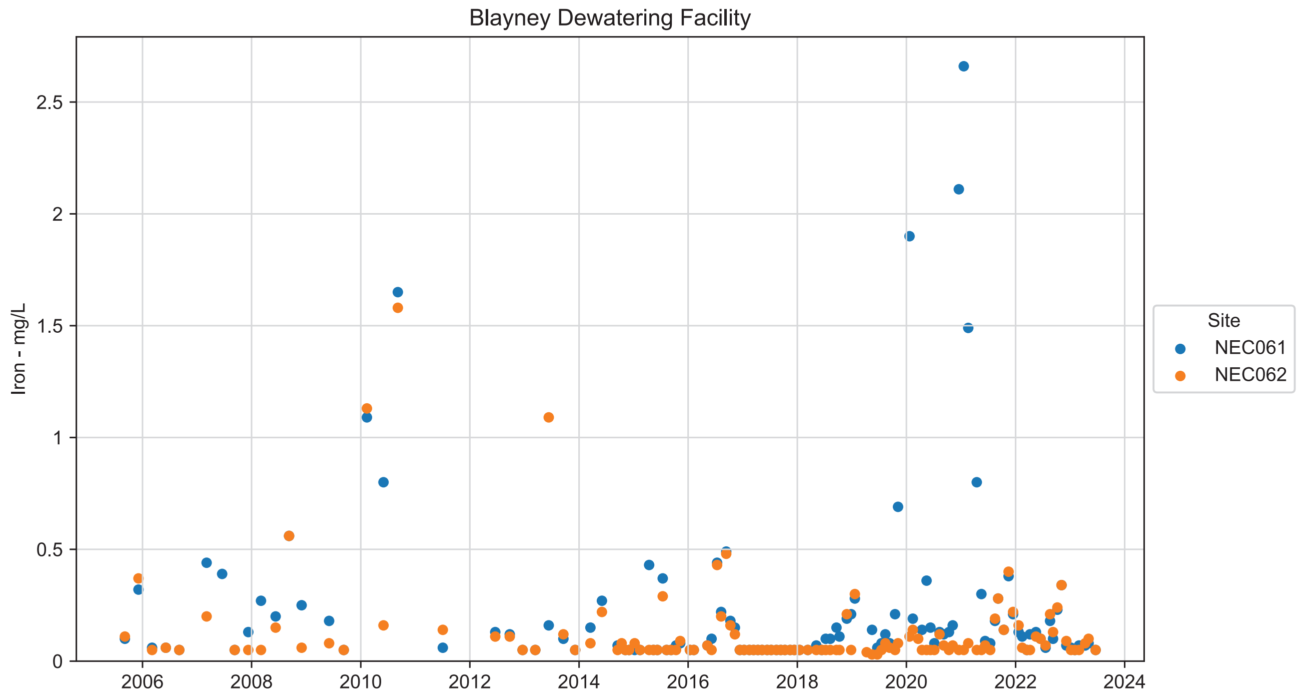

Blayney Dewatering Facility
Arsenic - mg/L
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

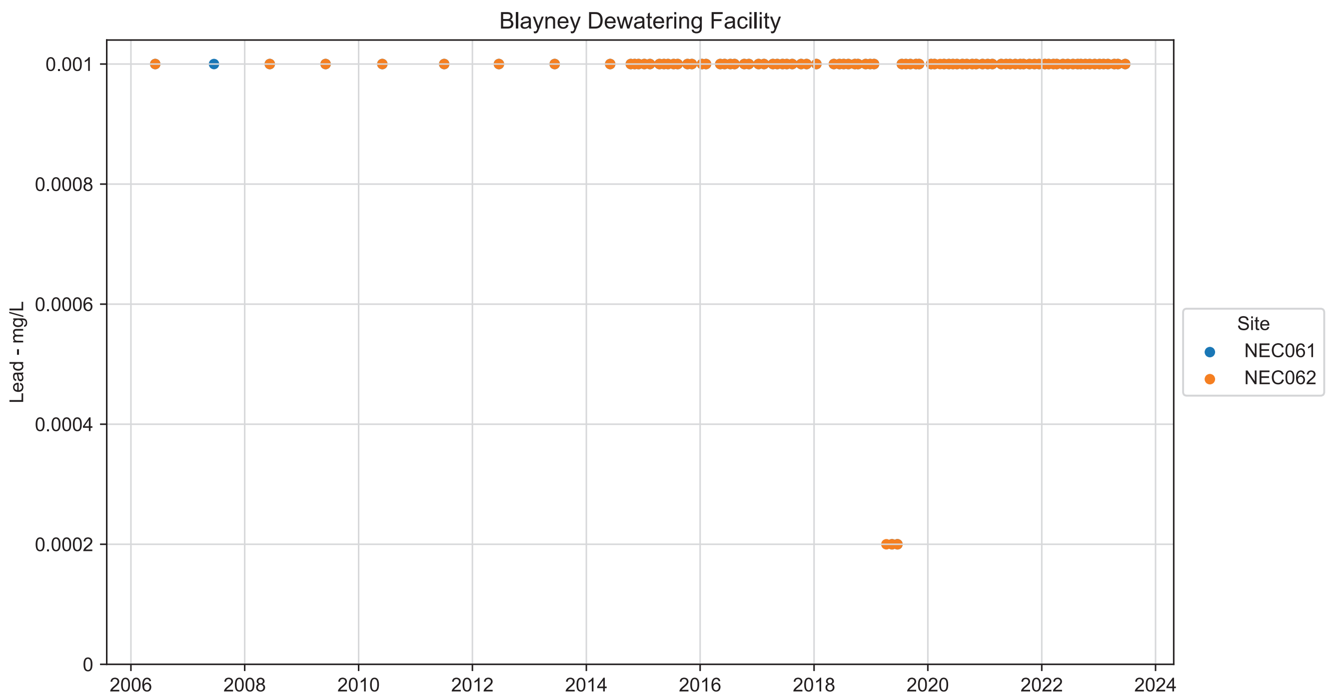

Blayney Dewatering Facility
Cadmium - mg/L
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

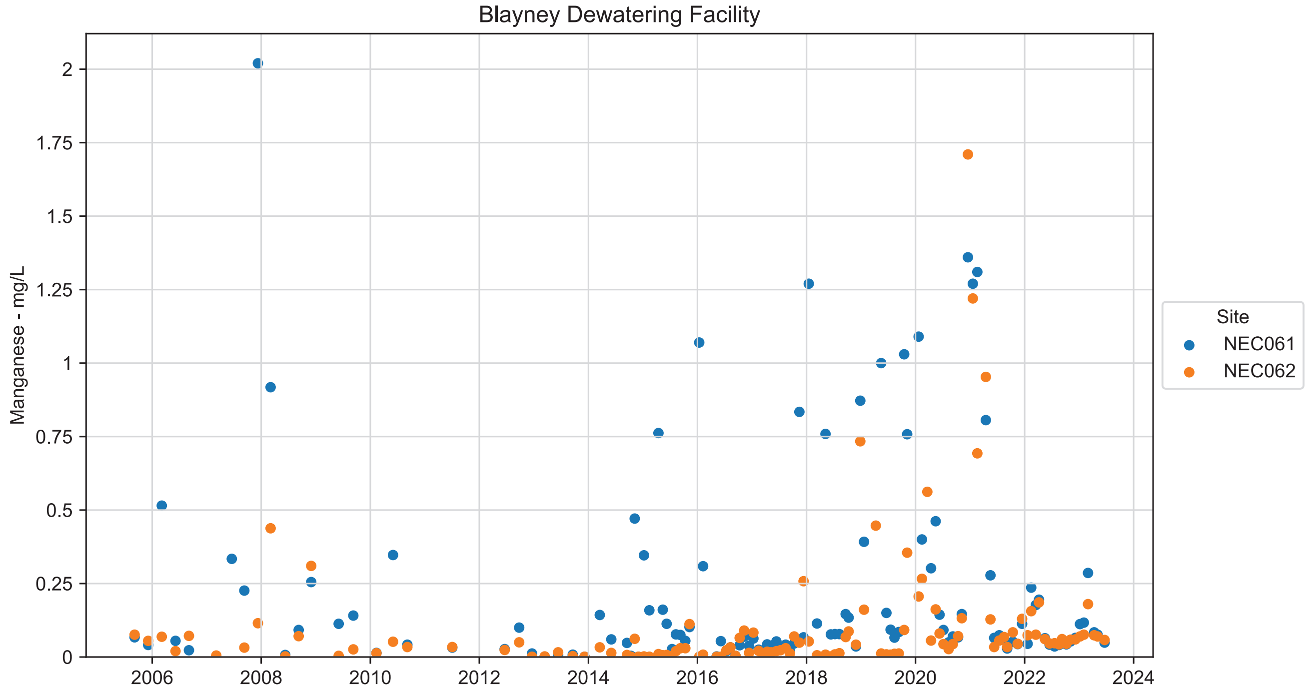

Blayney Dewatering Facility
Chromium - mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

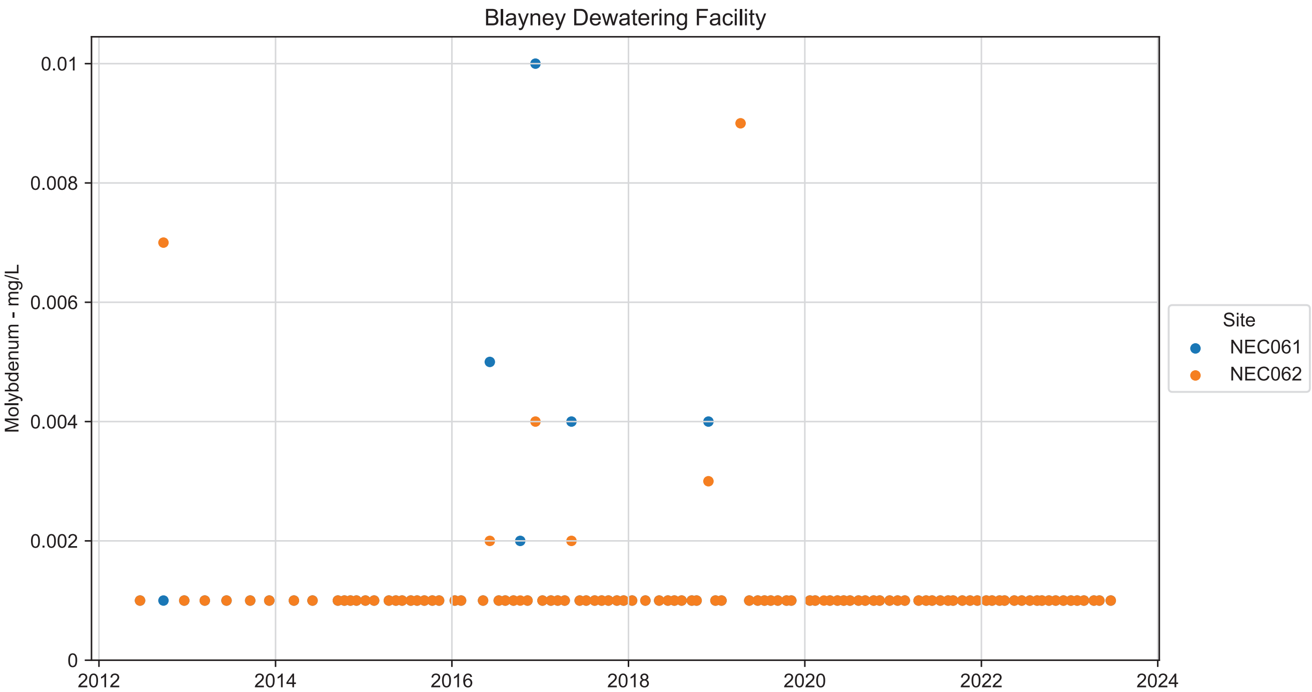

Blayney Dewatering Facility
Cobalt - mg/L
0.006
0.005
0.004
0.003
0.002
0.001
0
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

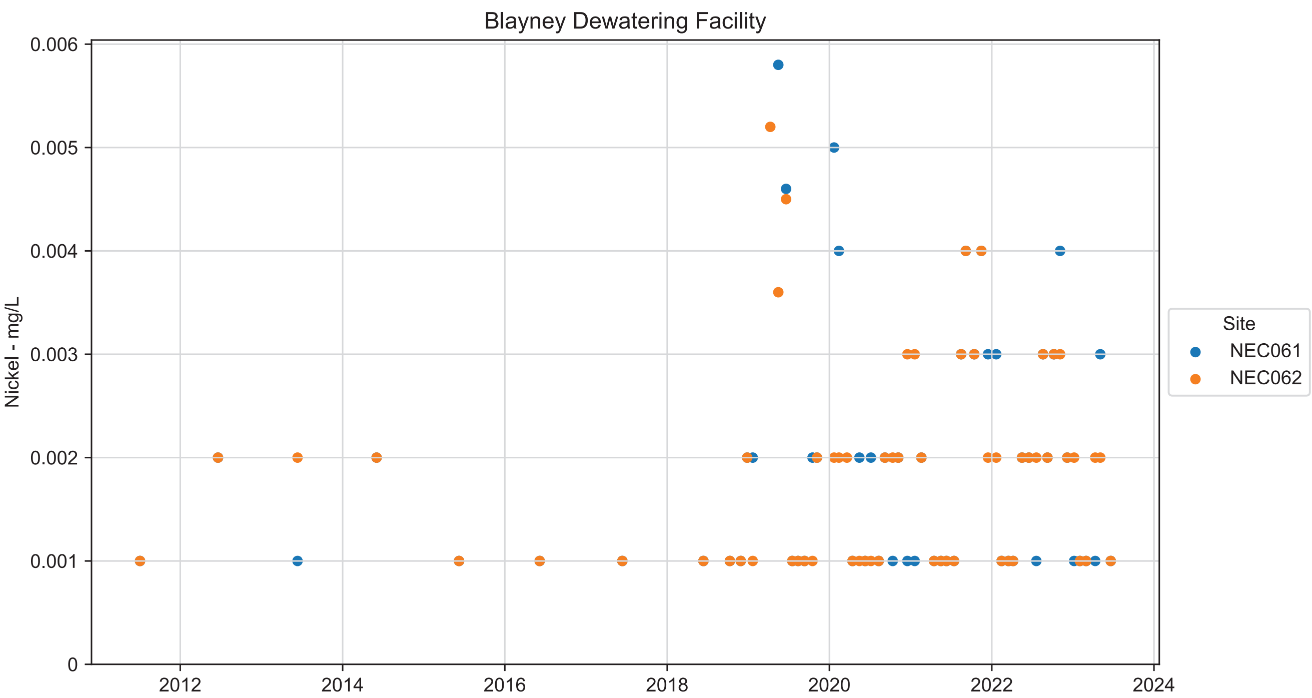

Blayney Dewatering Facility
Copper - mg/L
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

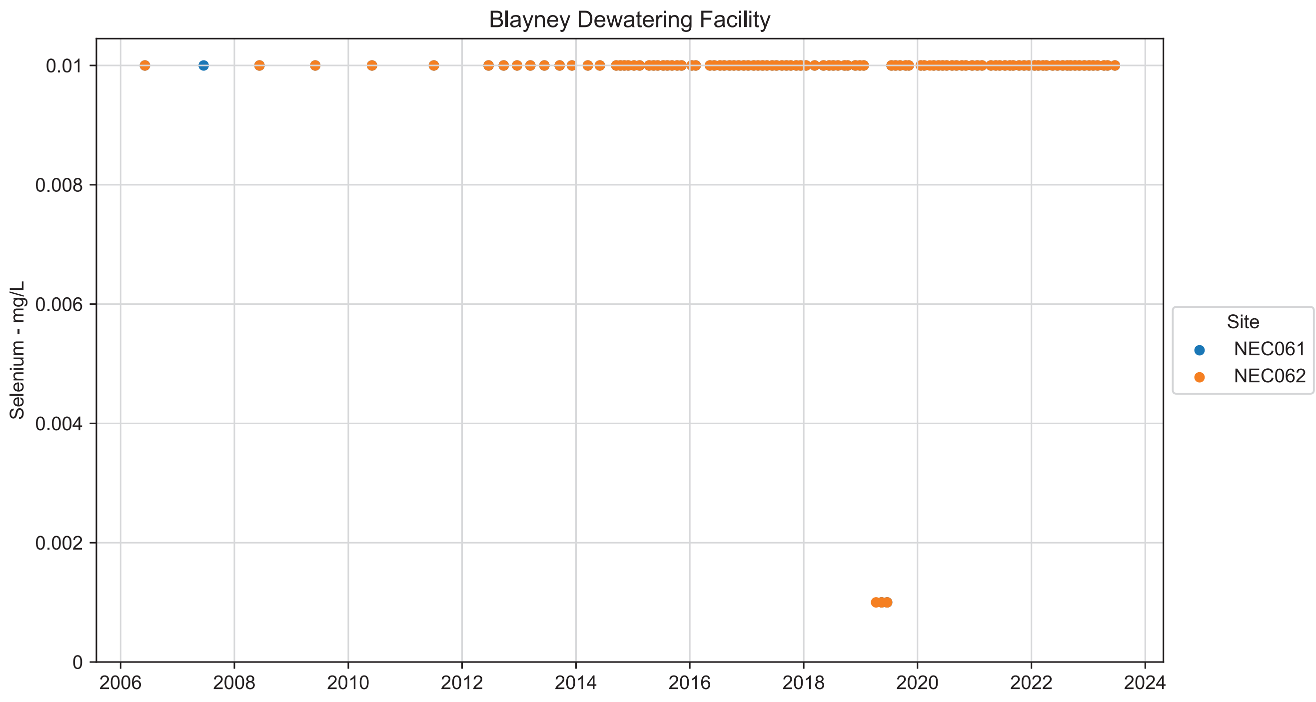

Blayney Dewatering Facility
Iron - mg/L
2.5
2
1.5
1
0.5
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

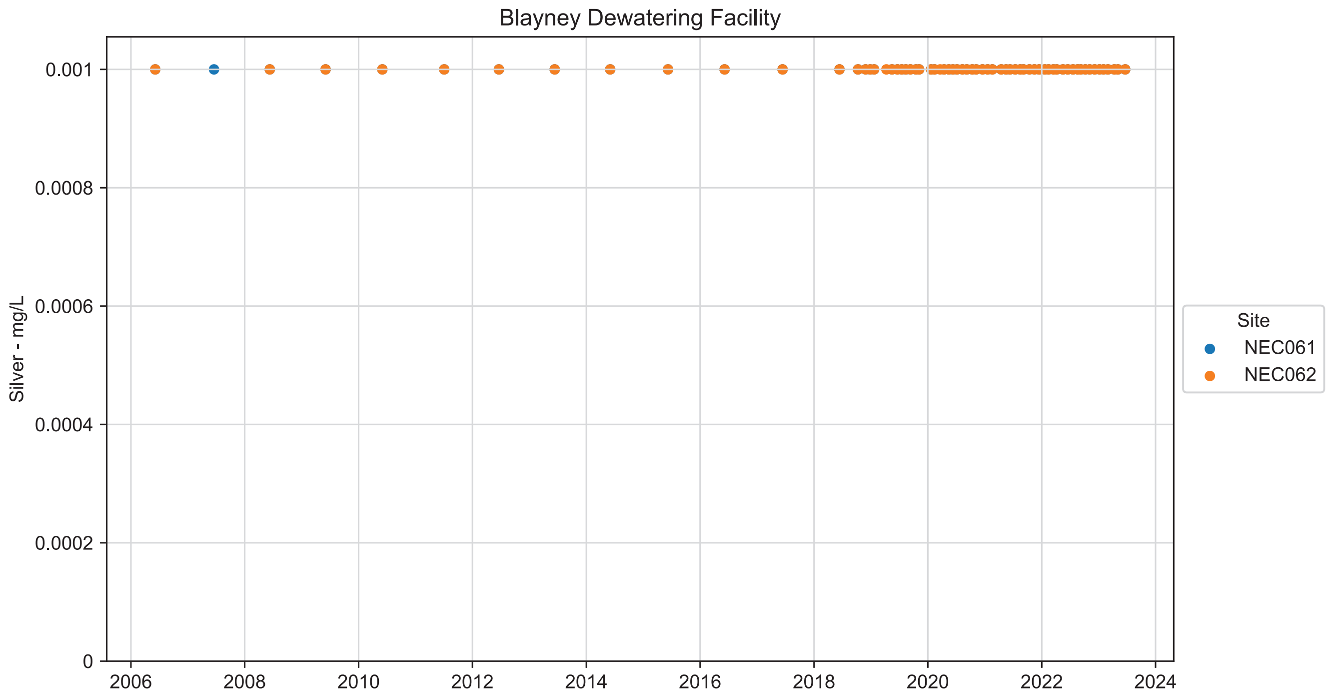

Blayney Dewatering Facility
Lead - mg/L
0.001
0.0008
0.0006
0.0004
0.0002
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

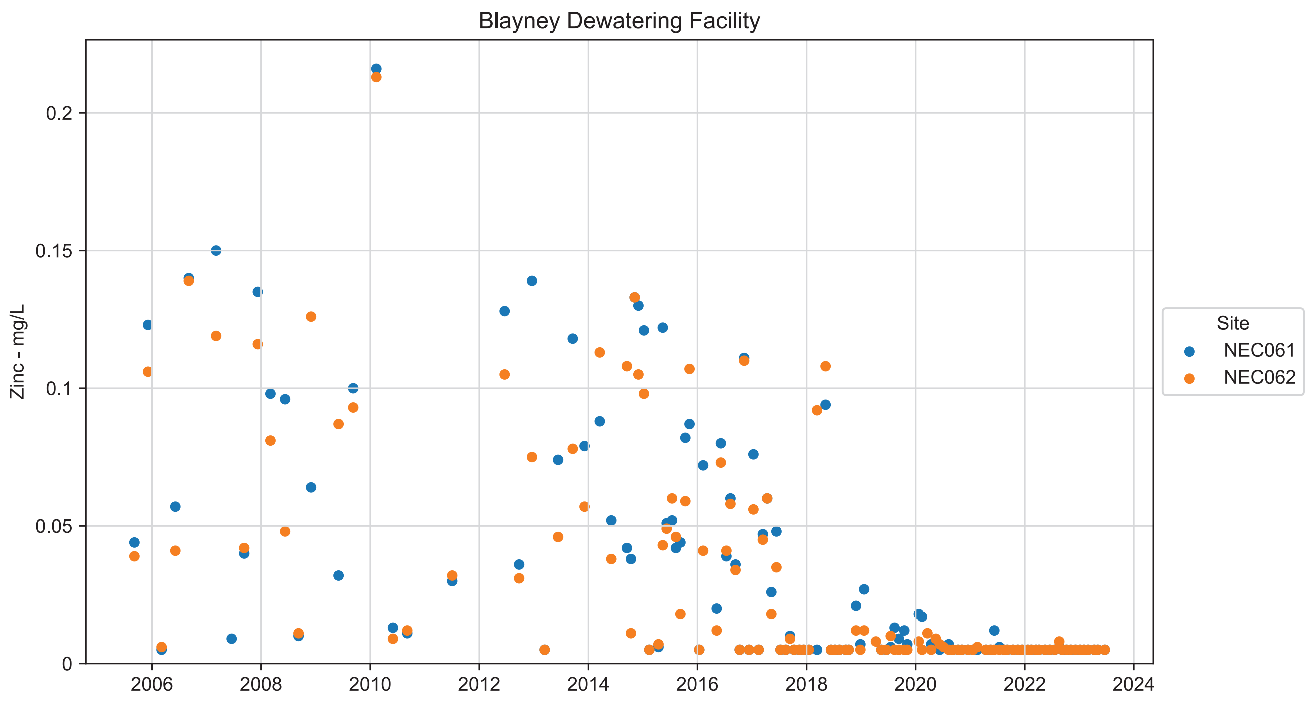

Blayney Dewatering Facility
Manganese - mg/L
0
0.25
0.5
0.75
1
1.25
1.5
1.75
2
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

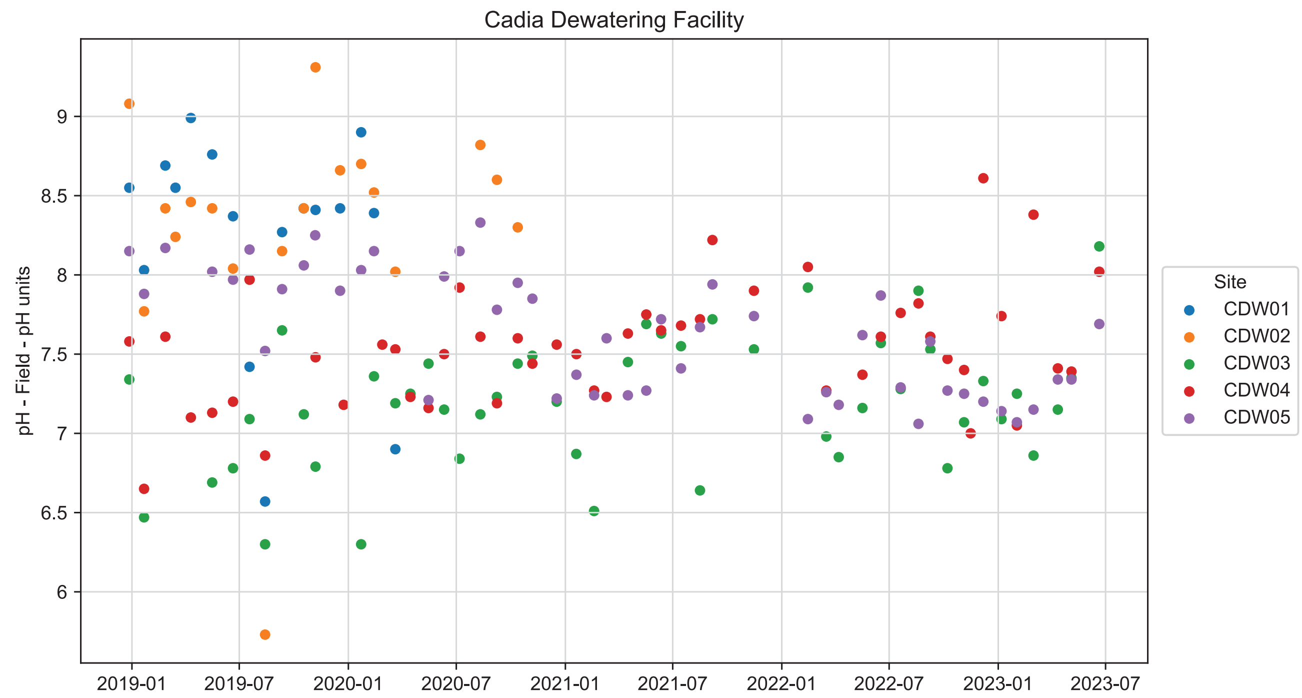

Blayney Dewatering Facility
Molybdenum - mg/L
0
0.002
0.004
0.006
0.008
0.01
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

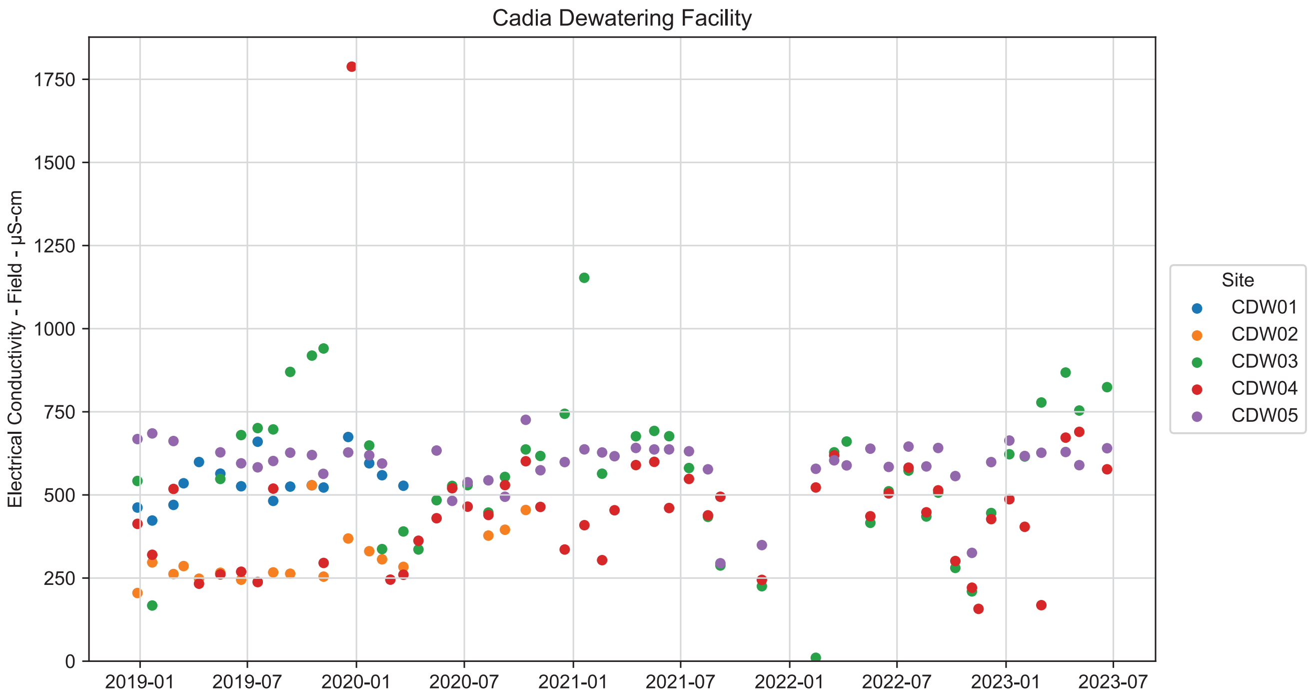

Blayney Dewatering Facility
Nickel - mg/L
0
0.001
0.002
0.003
0.004
0.005
0.006
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

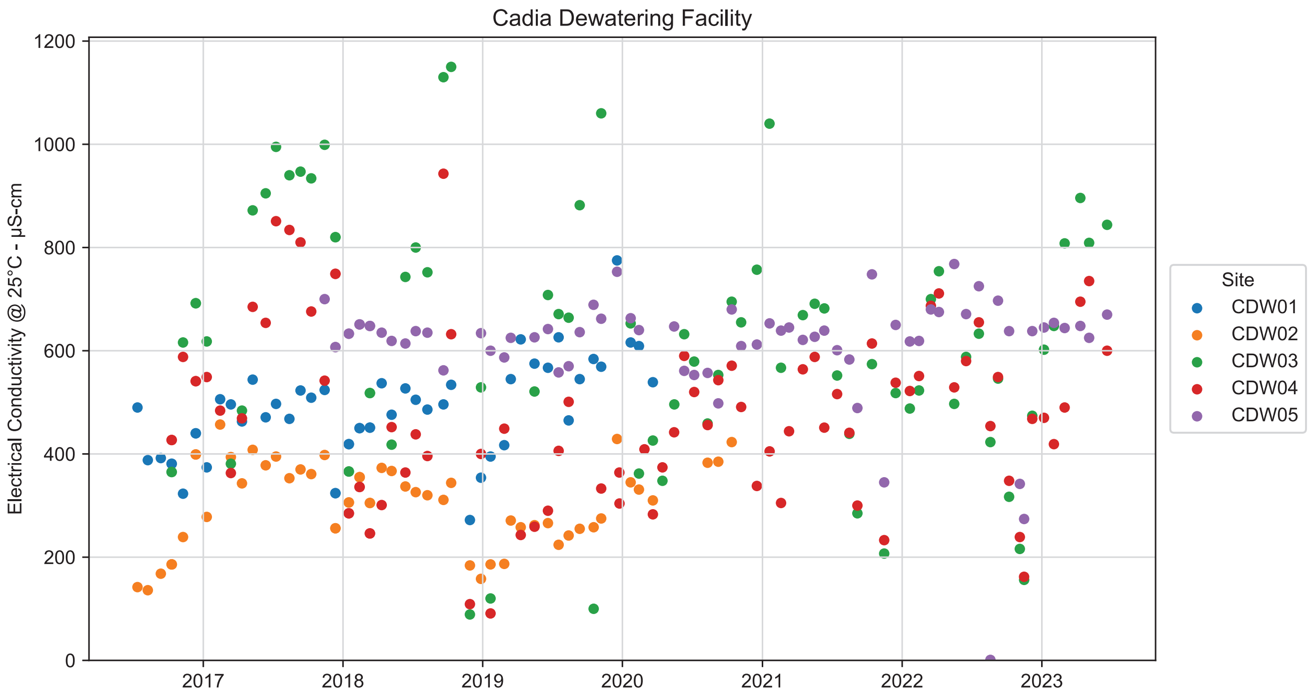

Blayney Dewatering Facility
Selenium - mg/L
0
0.002
0.004
0.006
0.008
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

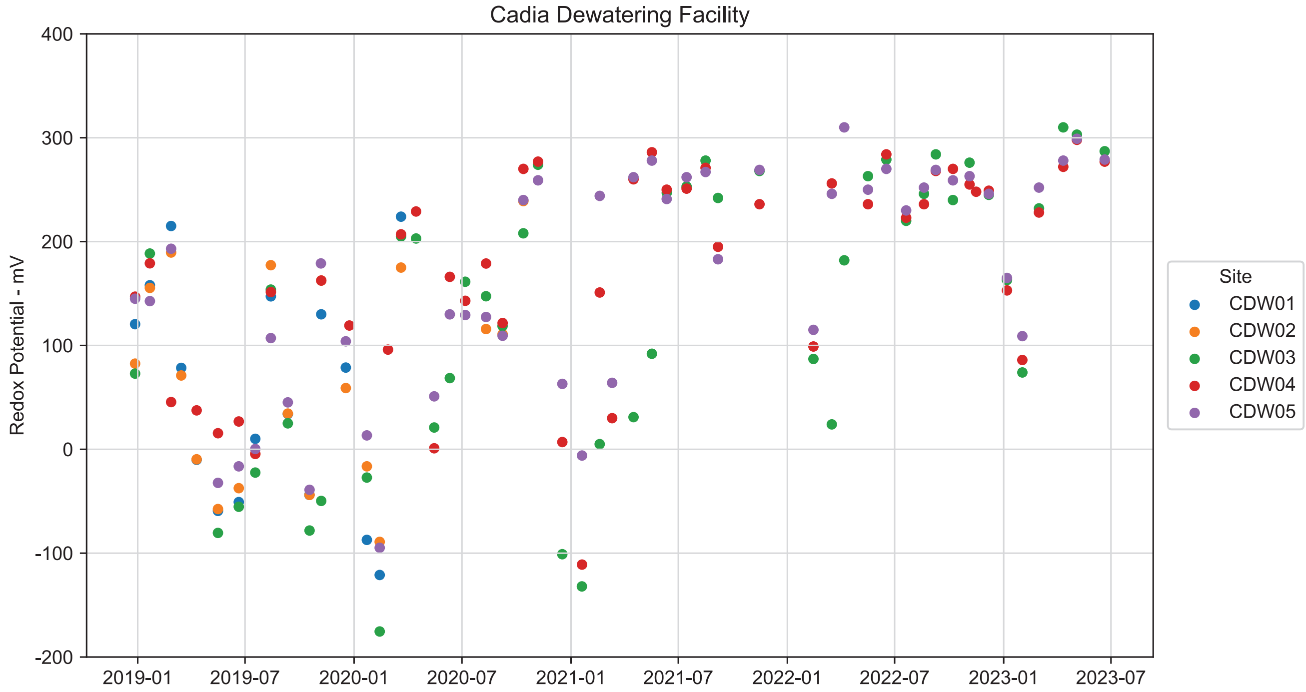

Blayney Dewatering Facility
Silver - mg/L
0
0.0002
0.0004
0.0006
0.0008
0.001
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

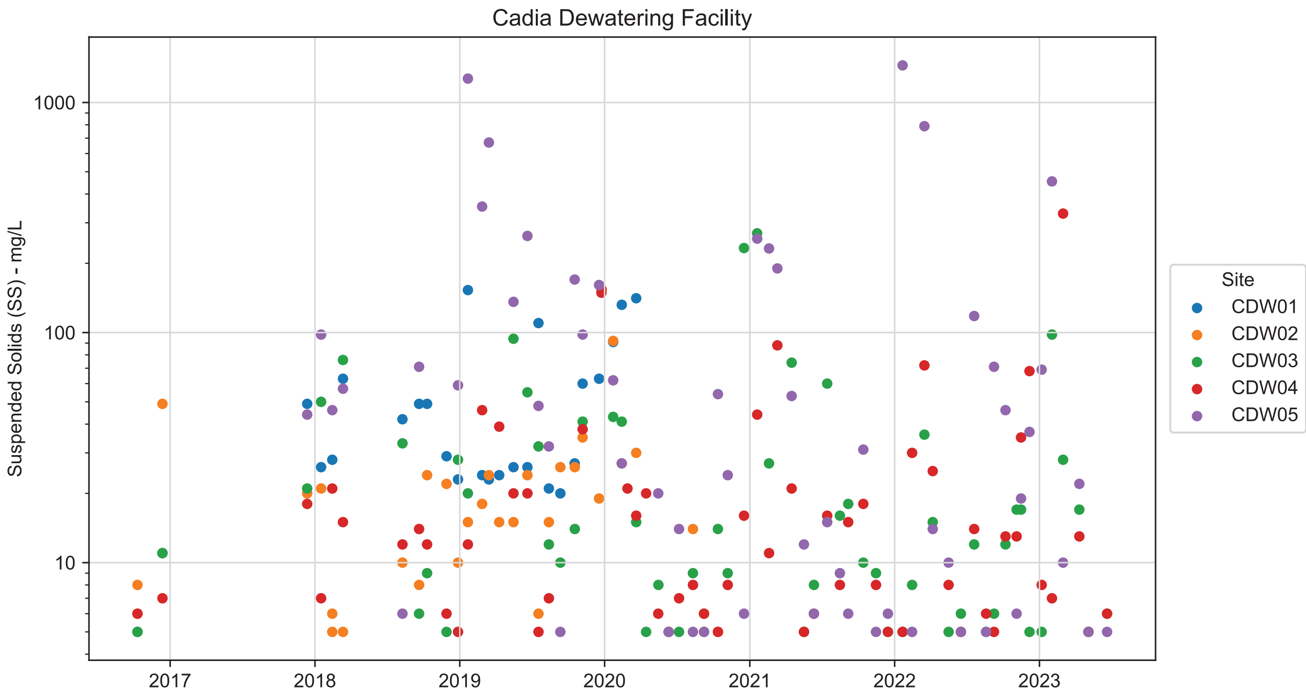

Blayney Dewatering Facility
Zinc - mg/L
0
0.05
0.1
0.15
0.2
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Site
NEC061
NEC062

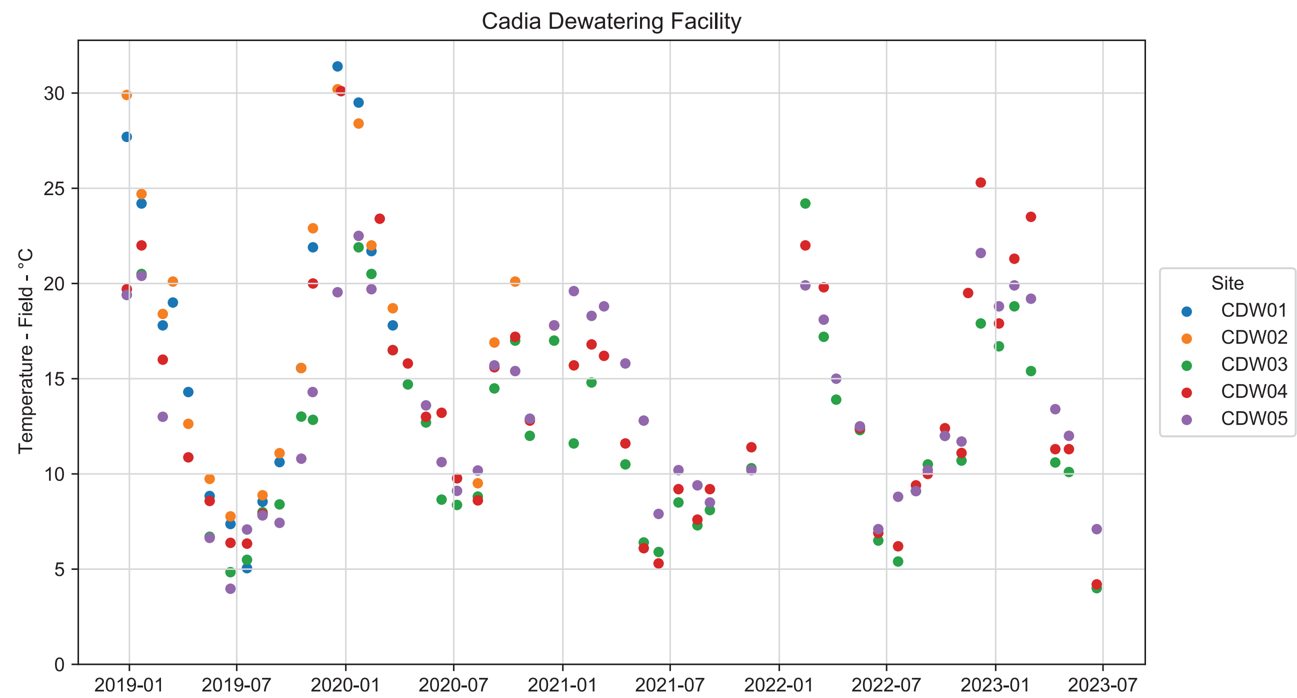

Cadia Dewatering Facility
pH - Field - pH units
Site
CDW01
CDW02
CDW03
CDW04
CDW05

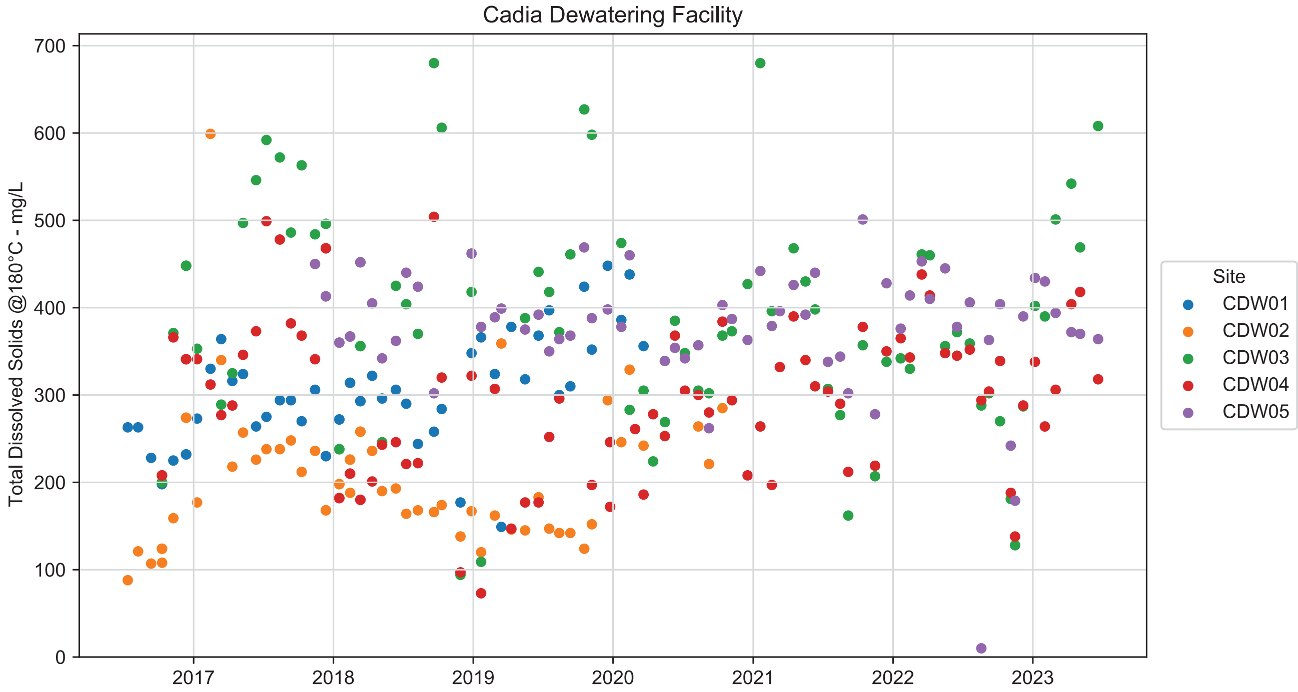

Cadia Dewatering Facility
Electrical Conductivity - Field - µS-cm
Site
CDW01
CDW02
CDW03
CDW04
CDW05


Cadia Dewatering Facility
Electrical Conductivity @ 25°C - µS-cm
Site
CDW01
CDW02
CDW03
CDW04
CDW05

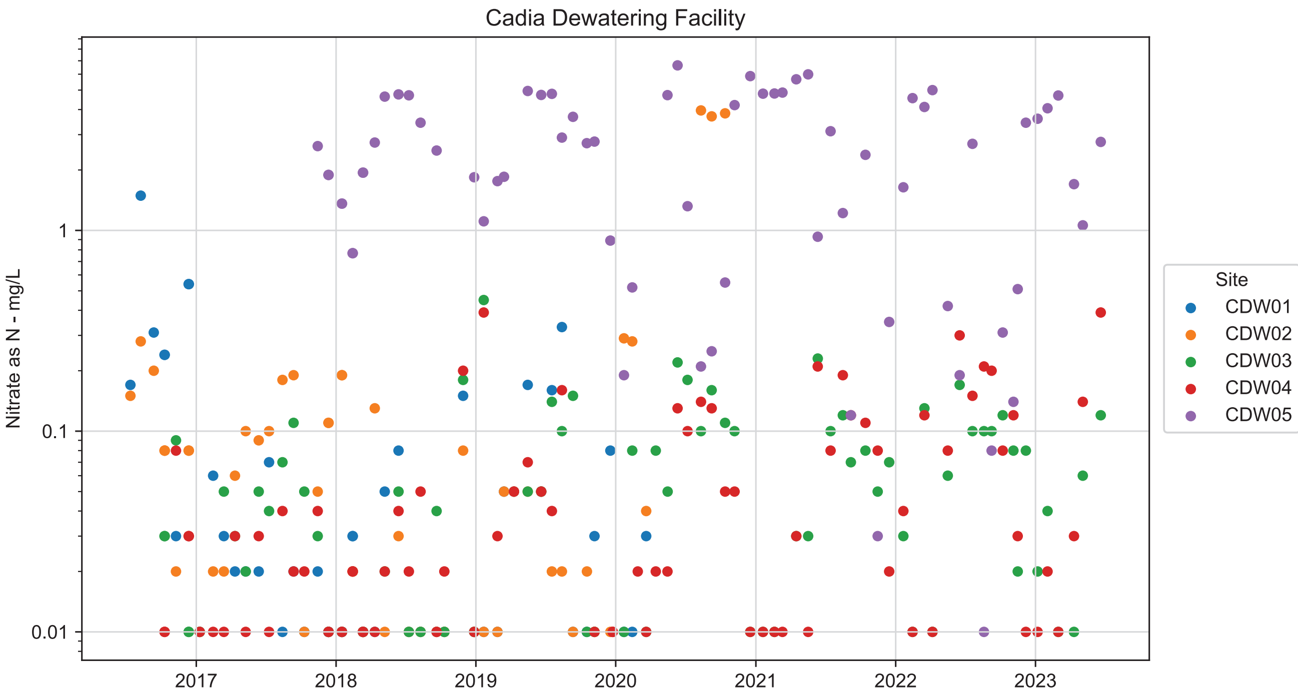

Cadia Dewatering Facility
Redox Potential - mV
400
300
200
100
0
-100
-200
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CDW01
CDW02
CDW03
CDW04
CDW05


Cadia Dewatering Facility
Suspended Solids (SS) - mg/L
1000
100
10
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

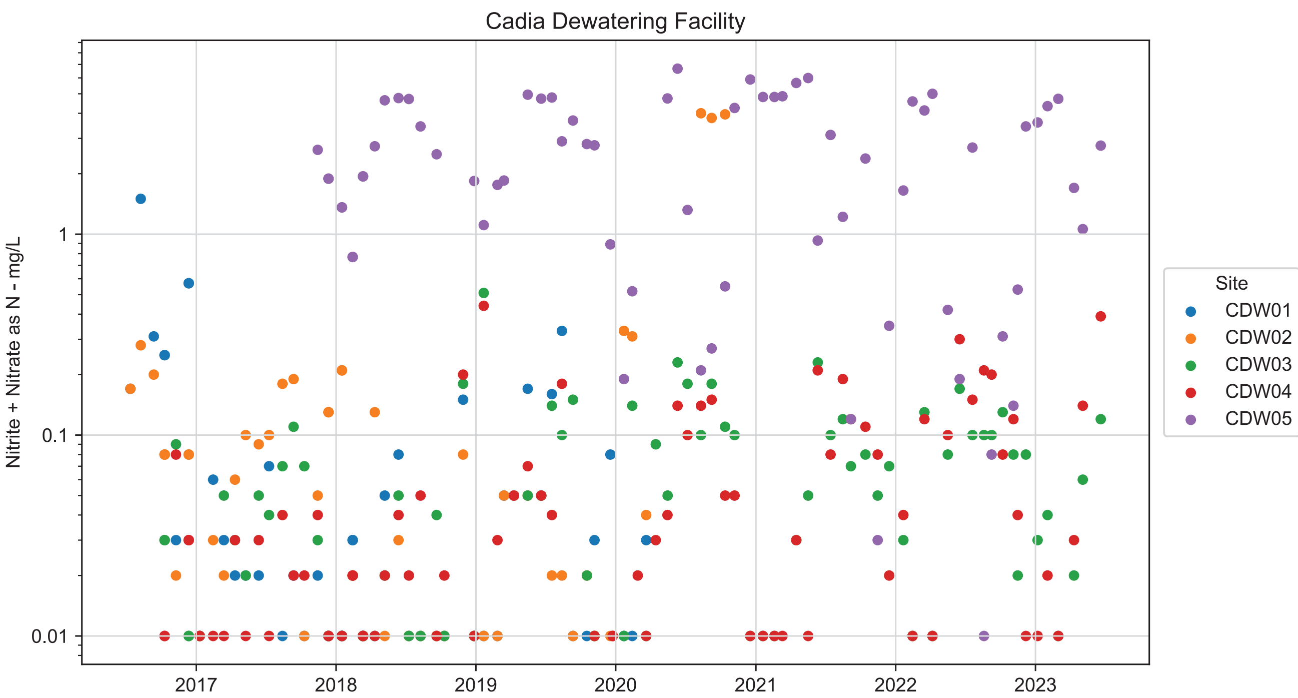

Cadia Dewatering Facility
Temperature - Field - °C
30
25
20
15
10
5
0
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
Site
CDW01
CDW02
CDW03
CDW04
CDW05



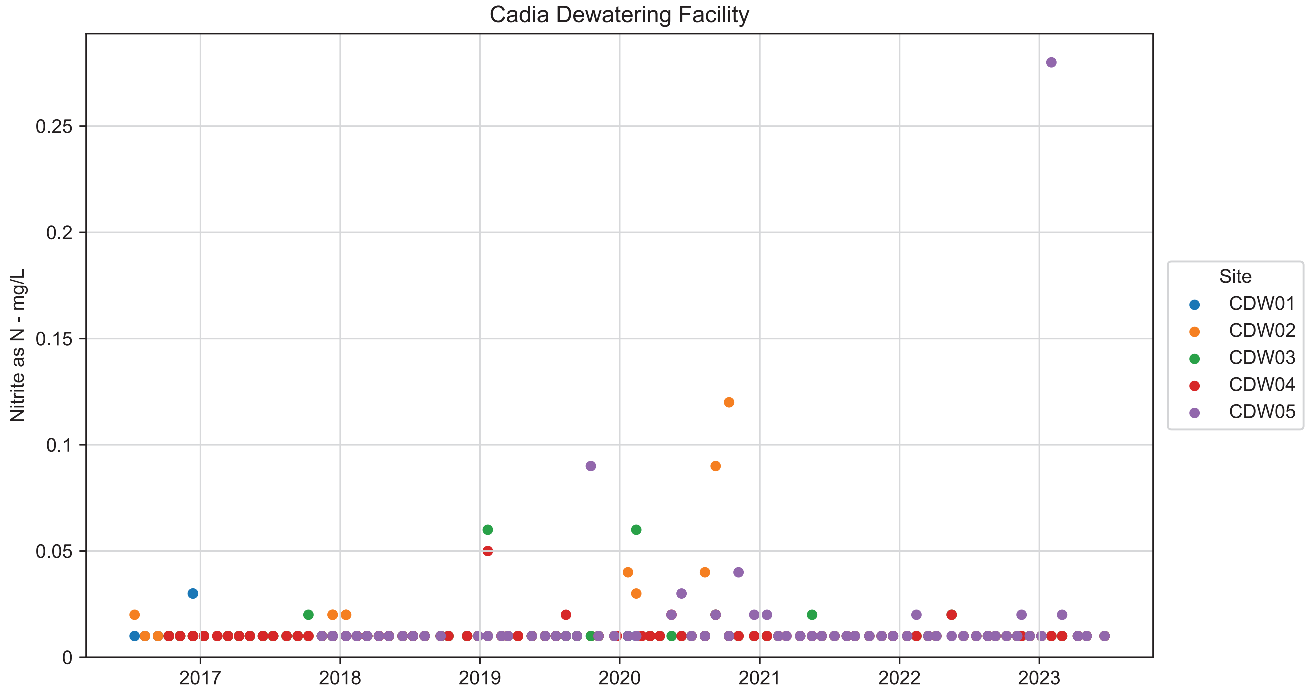
Cadia Dewatering Facility
Total Dissolved Solids @180°C - mg/L
0
100
200
300
400
500
600
700
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05



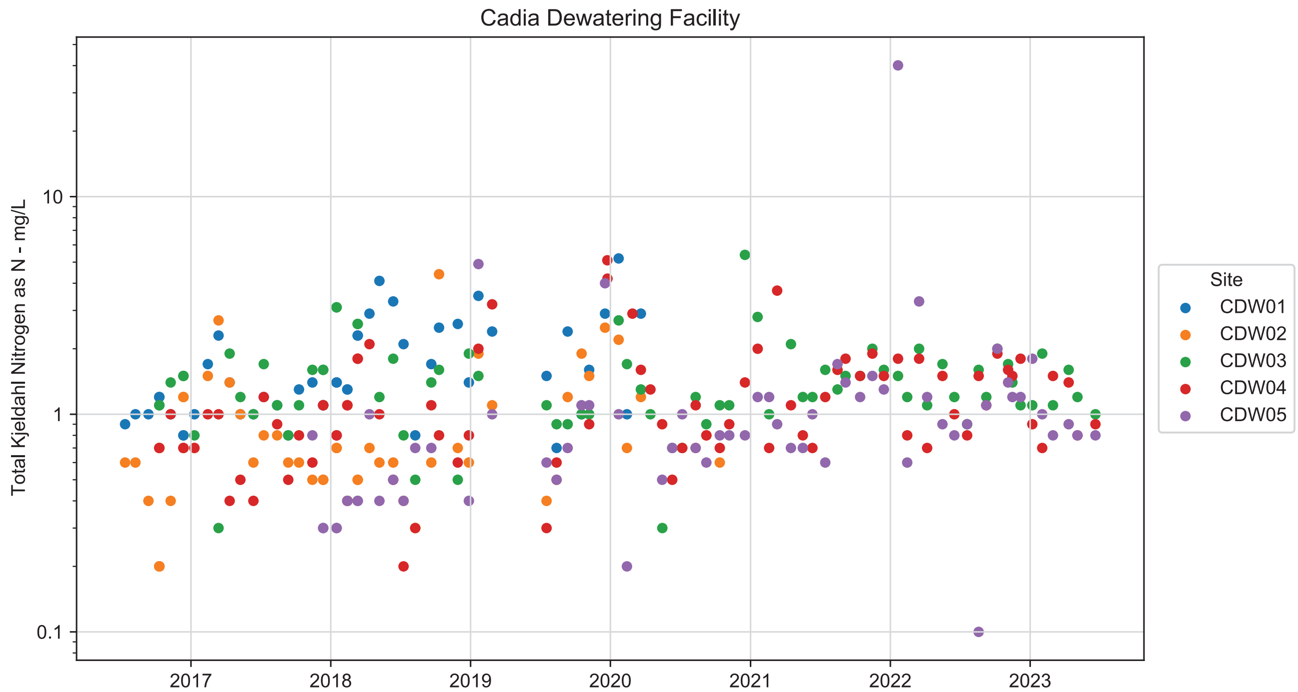
Cadia Dewatering Facility
Nitrate as N - mg/L
0.01
0.1
1
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05



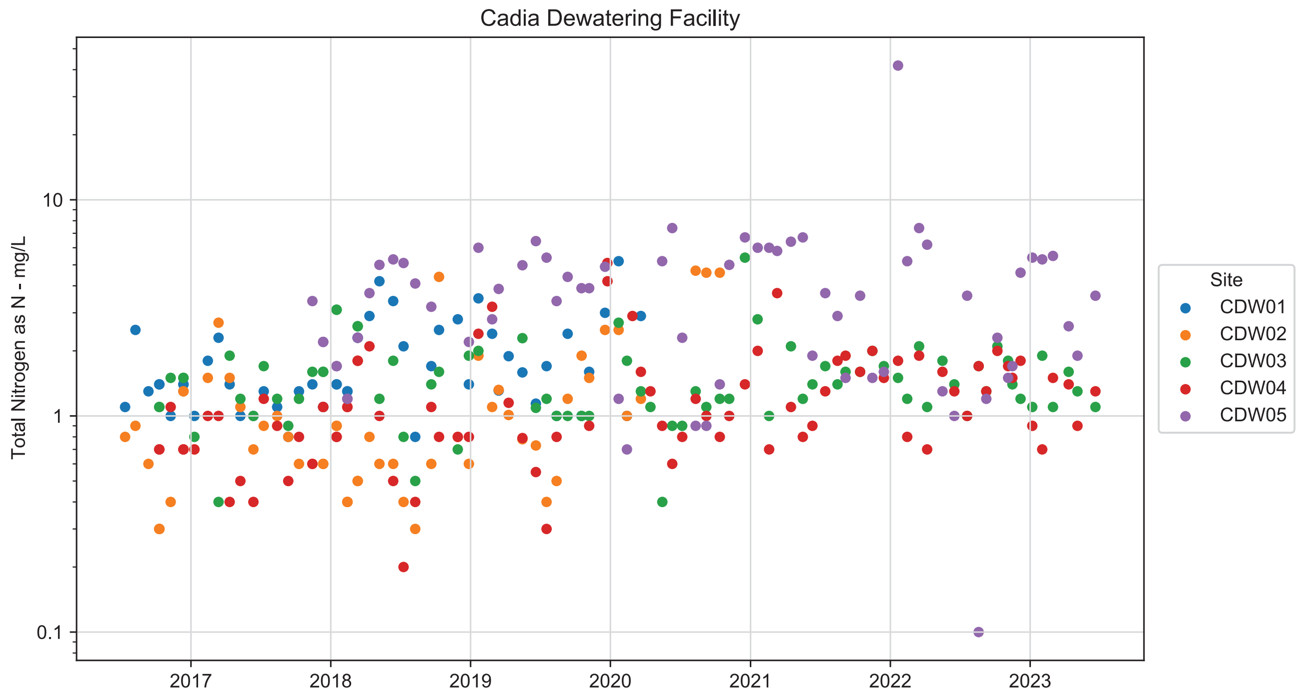
Cadia Dewatering Facility
Nitrite + Nitrate as N - mg/L
0.01
0.1
1
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05



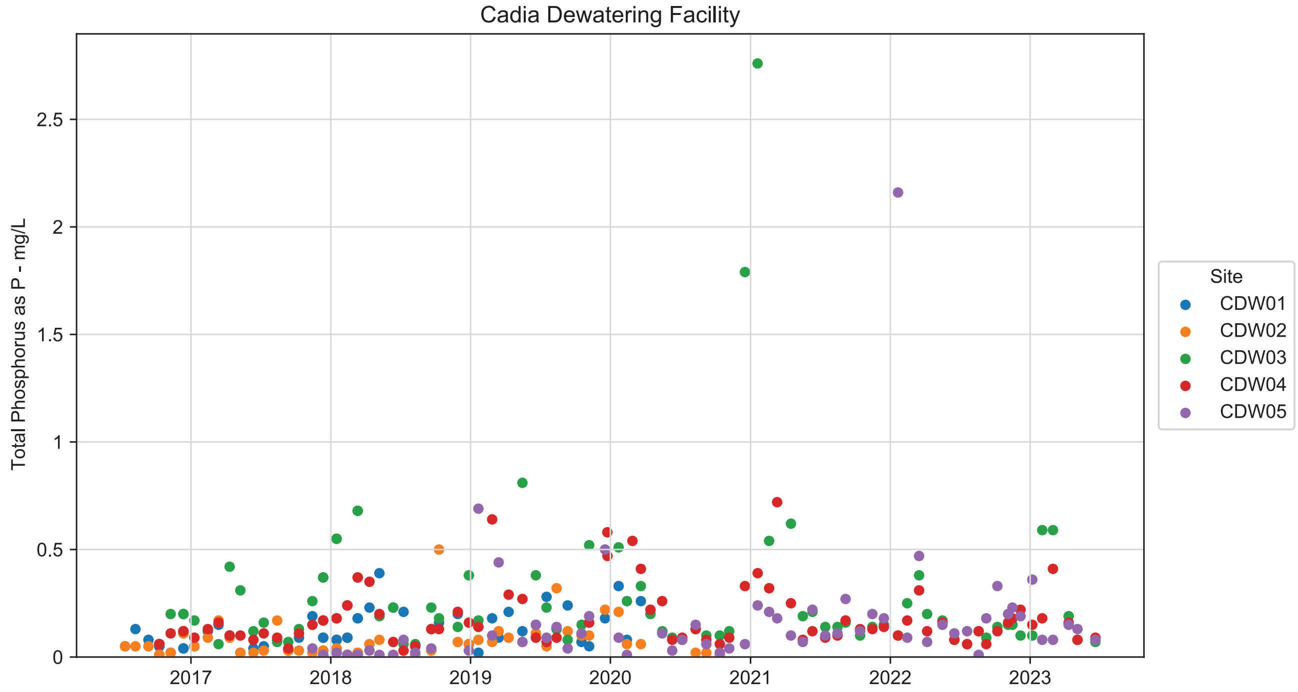
Cadia Dewatering Facility
Nitrite as N - mg/L
0
0.05
0.1
0.15
0.2
0.25
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

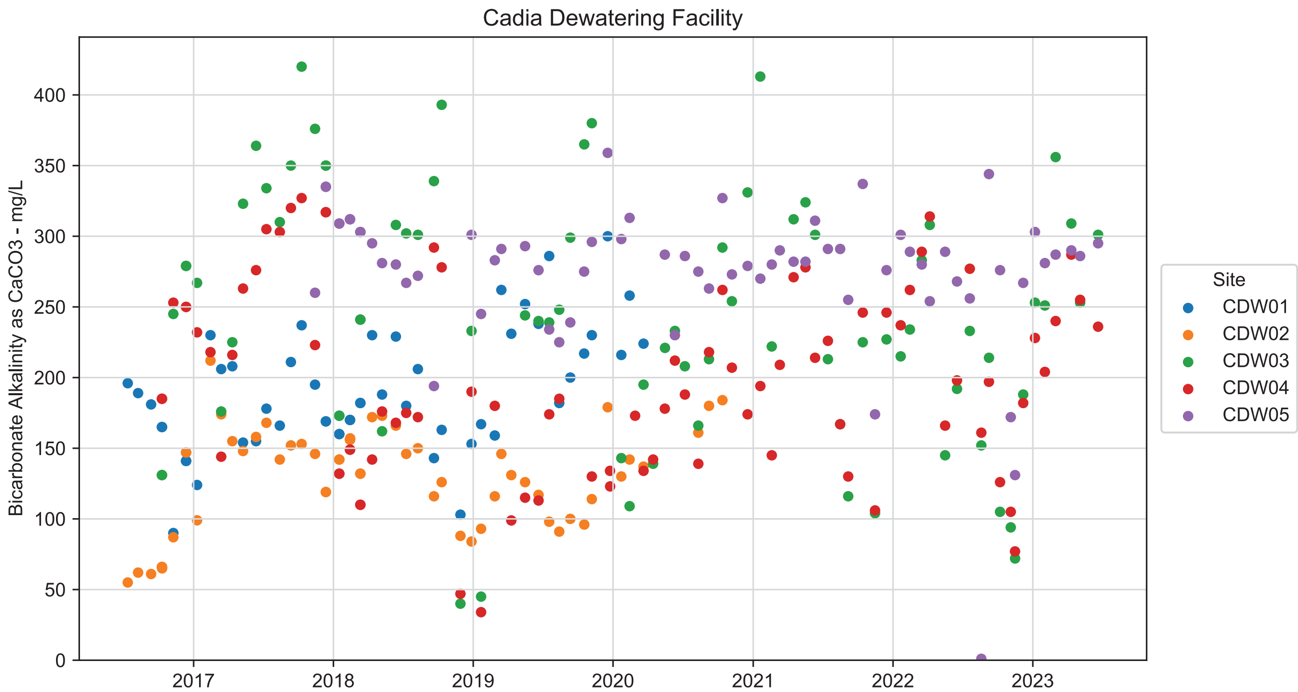


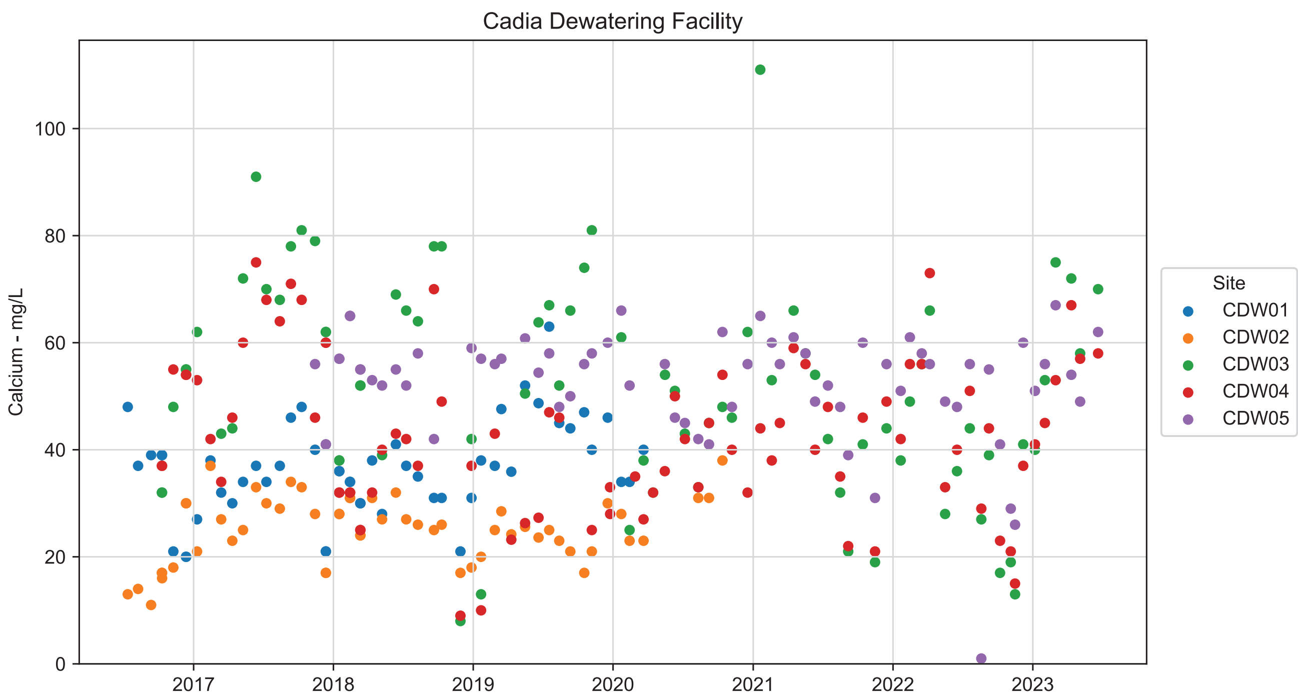
Cadia Dewatering Facility
Total Kjeldahl Nitrogen as N - mg/L
0.1
1
10
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

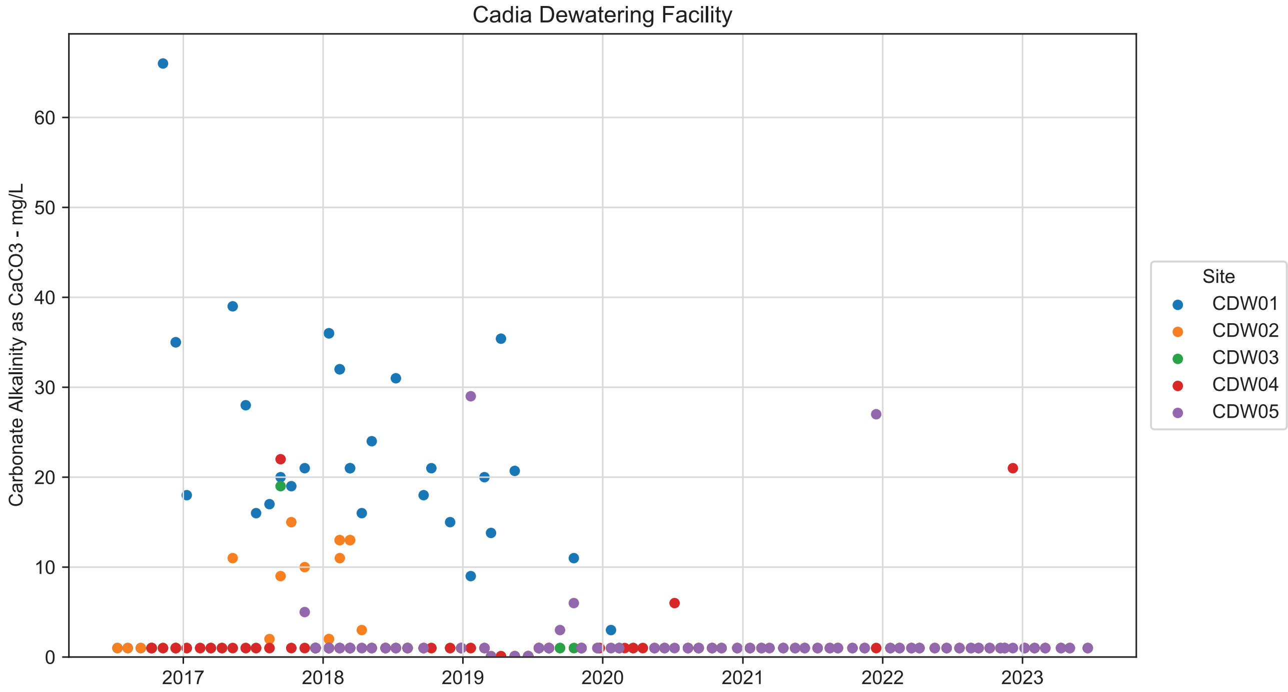


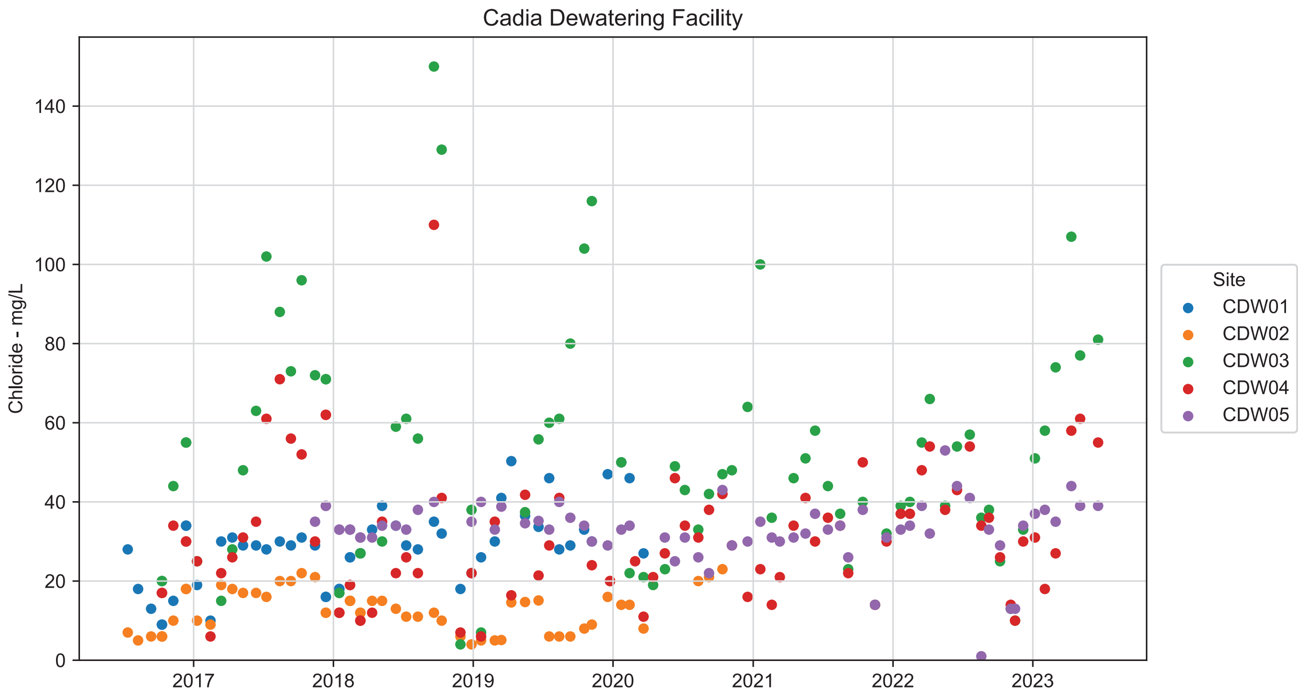
Cadia Dewatering Facility
Total Nitrogen as N - mg/L
0.1
1
10
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

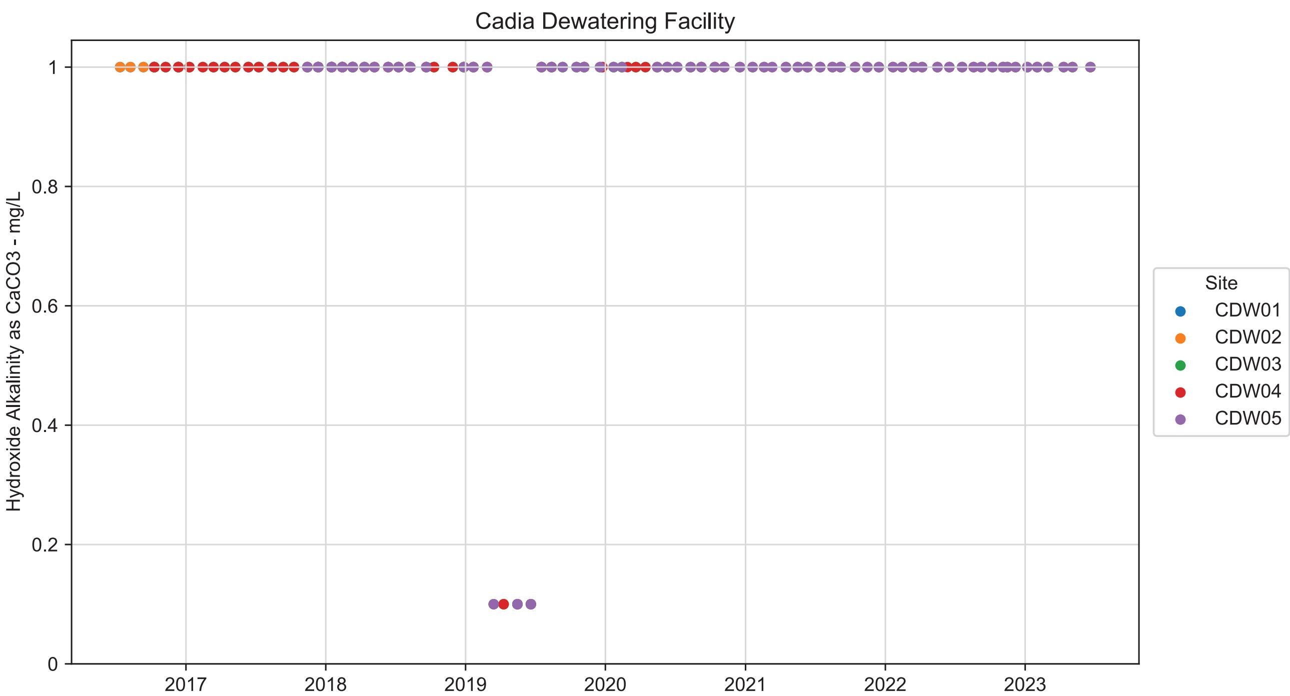

Cadia Dewatering Facility
Total Phosphorus as P - mg/L
0
0.5
1
1.5
2
2.5
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

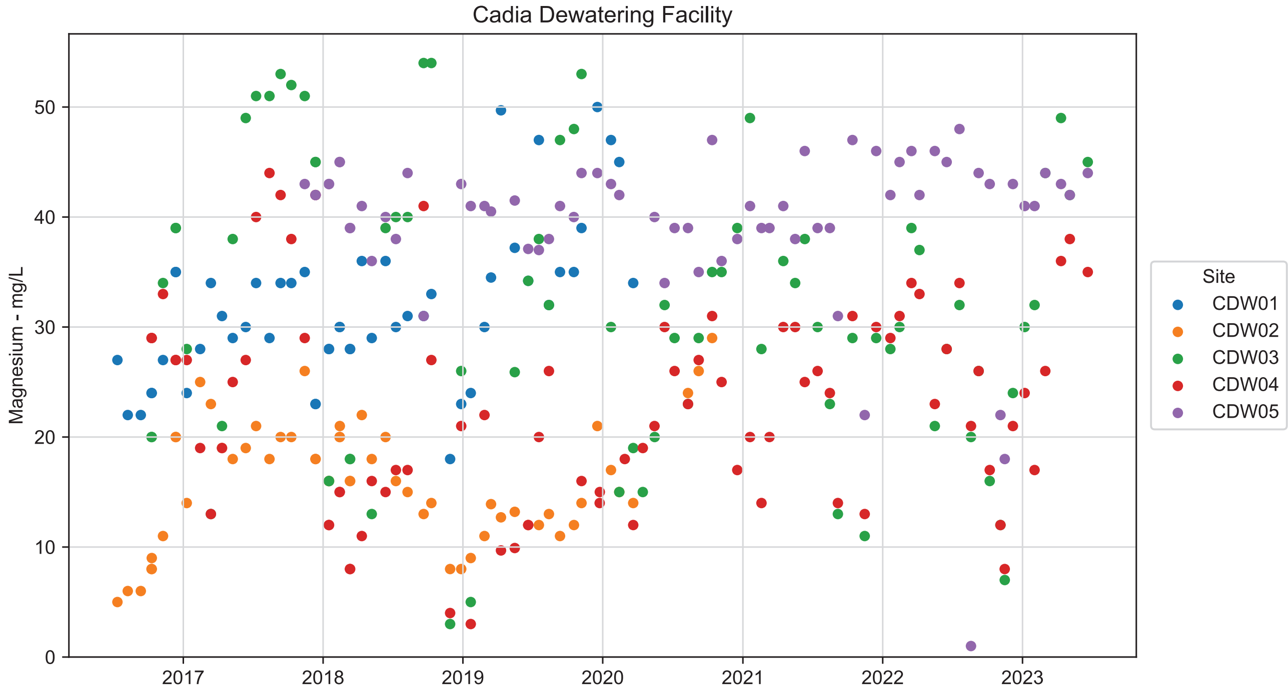

Cadia Dewatering Facility
Bicarbonate Alkalinity as CaCO3 - mg/L
0
50
100
150
200
250
300
350
400
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

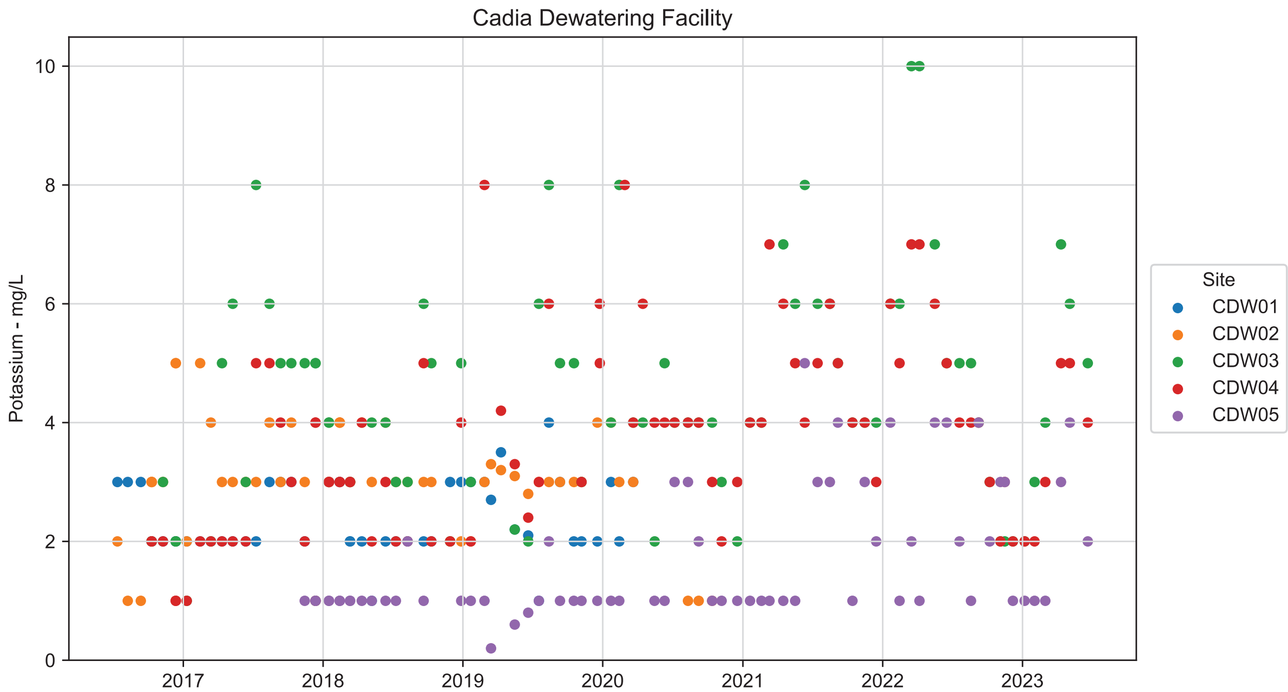

Cadia Dewatering Facility
Calcium - mg/L
0
20
40
60
80
100
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

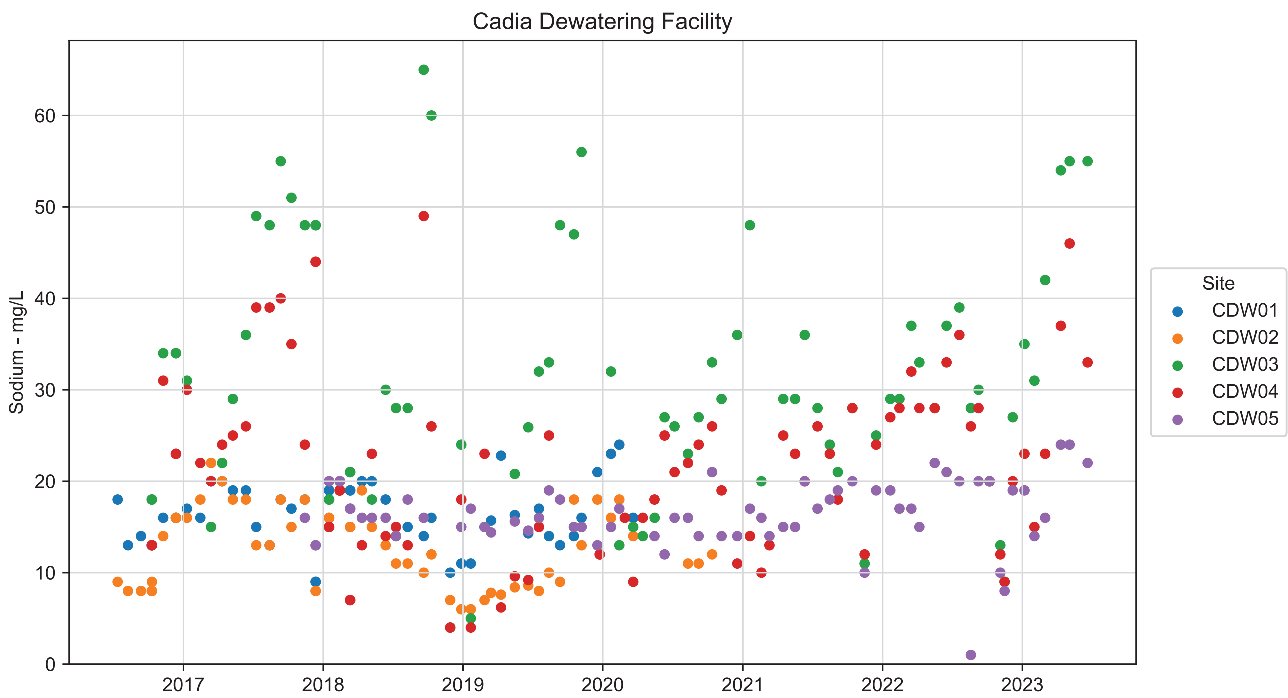

Cadia Dewatering Facility
Carbonate Alkalinity as CaCO3 - mg/L
0
10
20
30
40
50
60
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

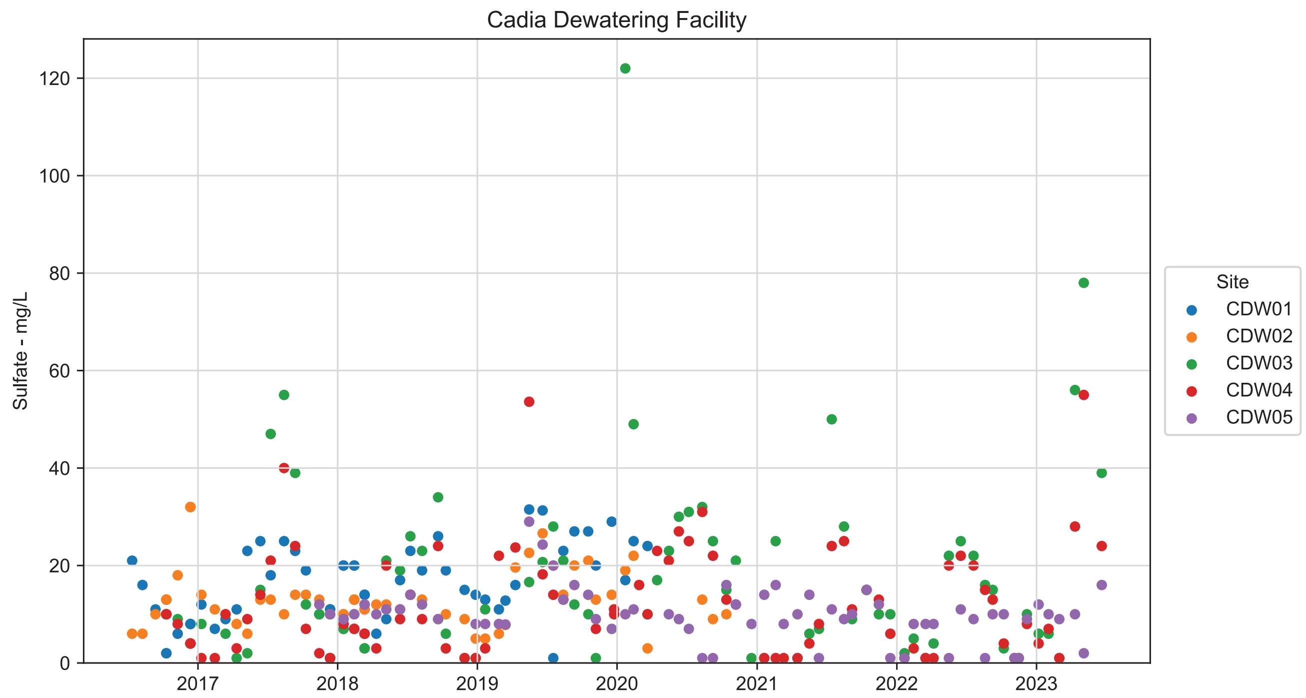

Cadia Dewatering Facility
Chloride - mg/L
0
20
40
60
80
100
120
140
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

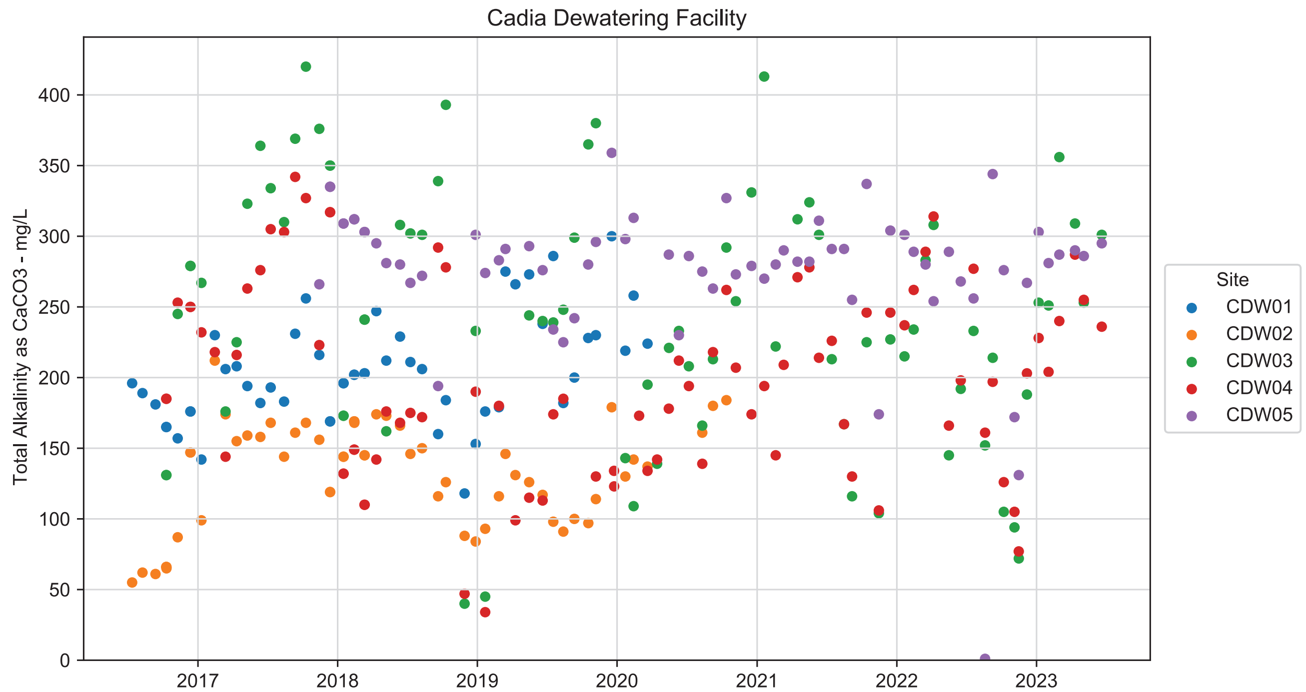

Cadia Dewatering Facility
Hydroxide Alkalinity as CaCO3 - mg/L
0
0.2
0.4
0.6
0.8
1
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

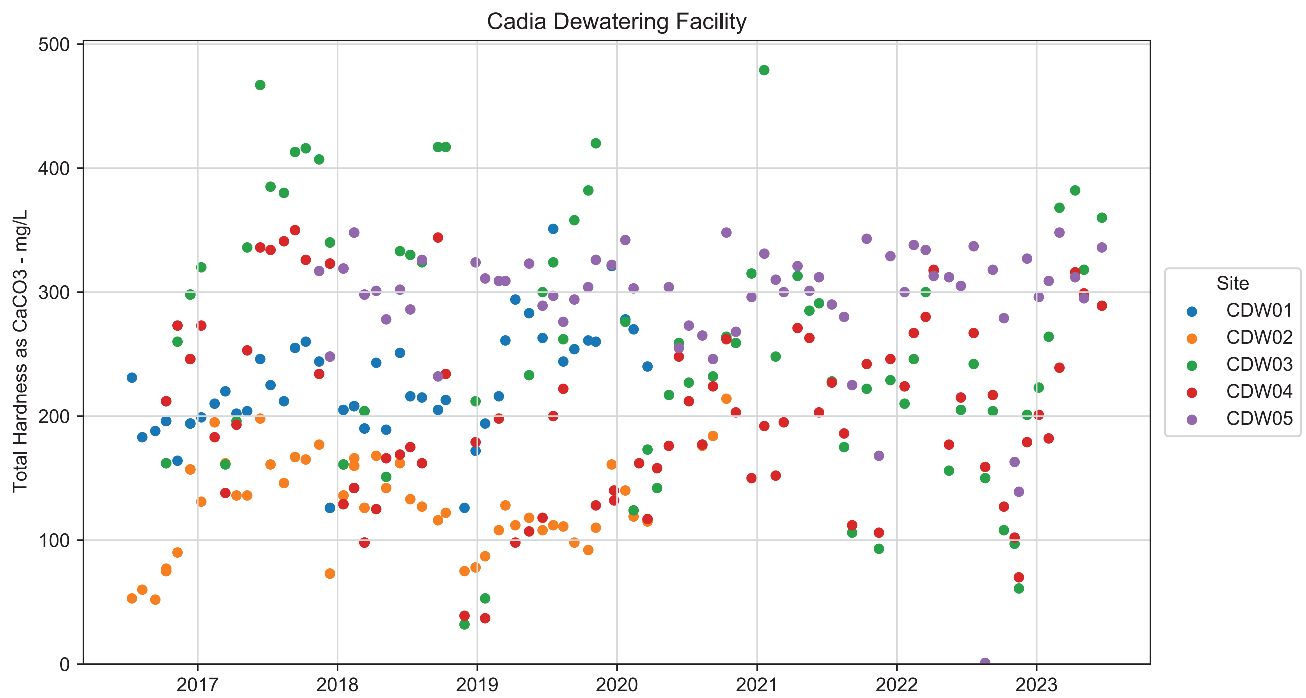

Cadia Dewatering Facility
Magnesium - mg/L
0
10
20
30
40
50
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

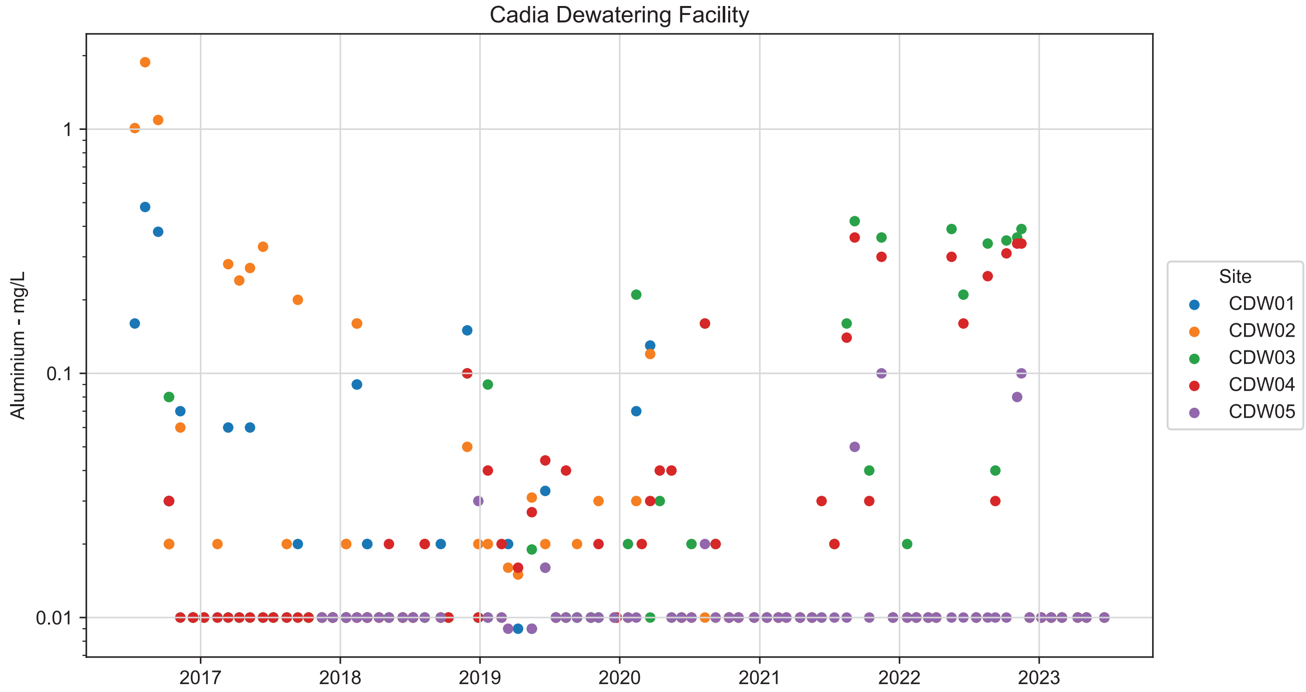

Cadia Dewatering Facility
Potassium - mg/L
0
2
4
6
8
10
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

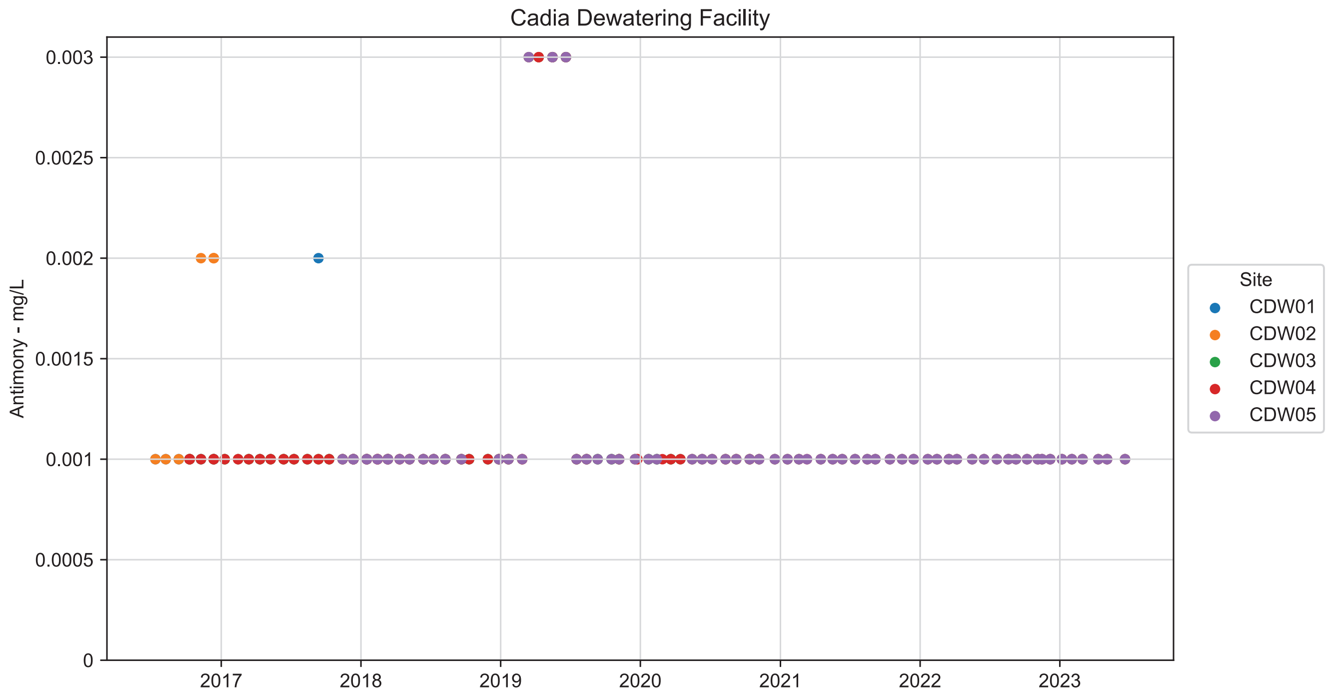

Cadia Dewatering Facility
Sodium - mg/L
0
10
20
30
40
50
60
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

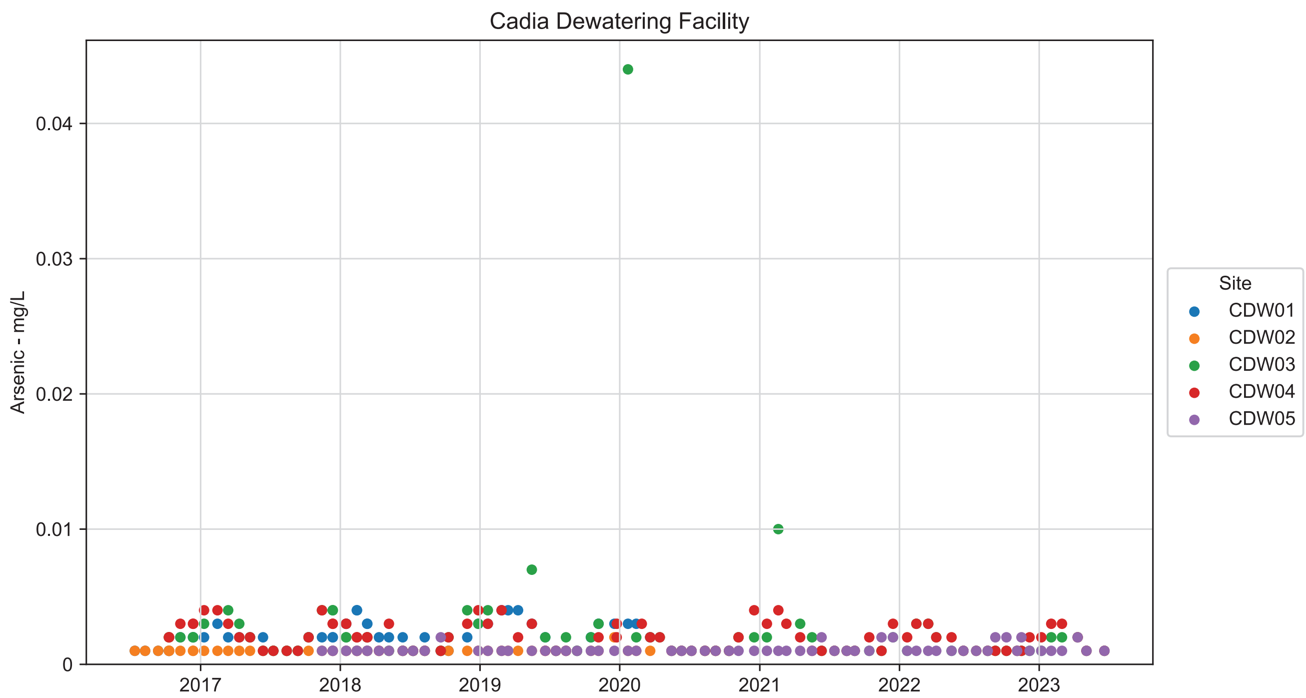

Cadia Dewatering Facility
Sulfate - mg/L
0
20
40
60
80
100
120
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

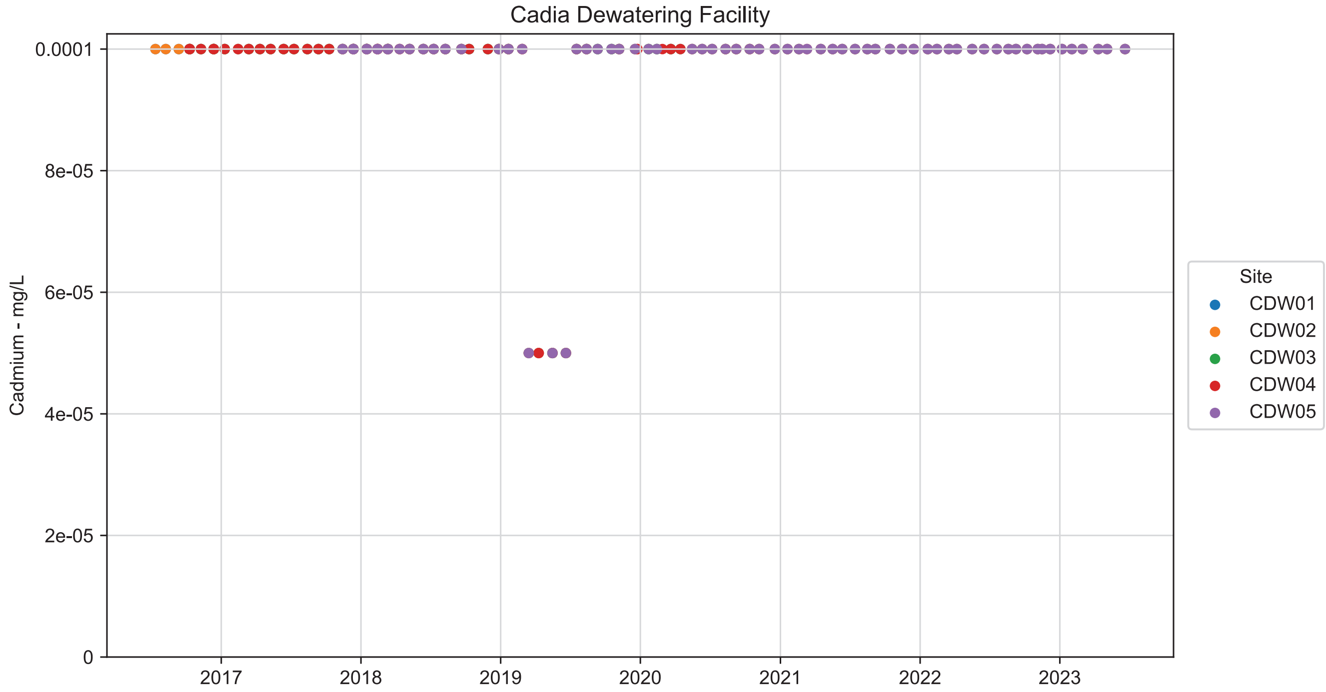

Cadia Dewatering Facility
Total Alkalinity as CaCO3 - mg/L
0
50
100
150
200
250
300
350
400
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

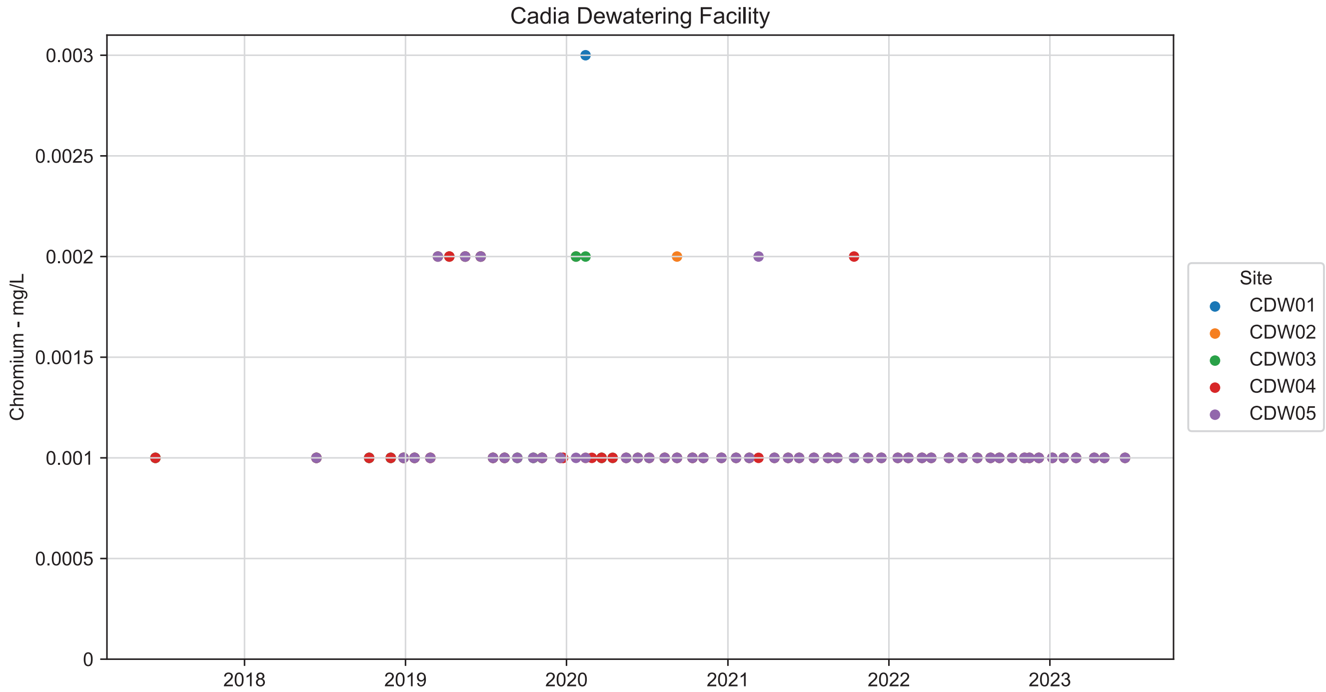

Cadia Dewatering Facility
Total Hardness as CaCO3 - mg/L
0
100
200
300
400
500
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

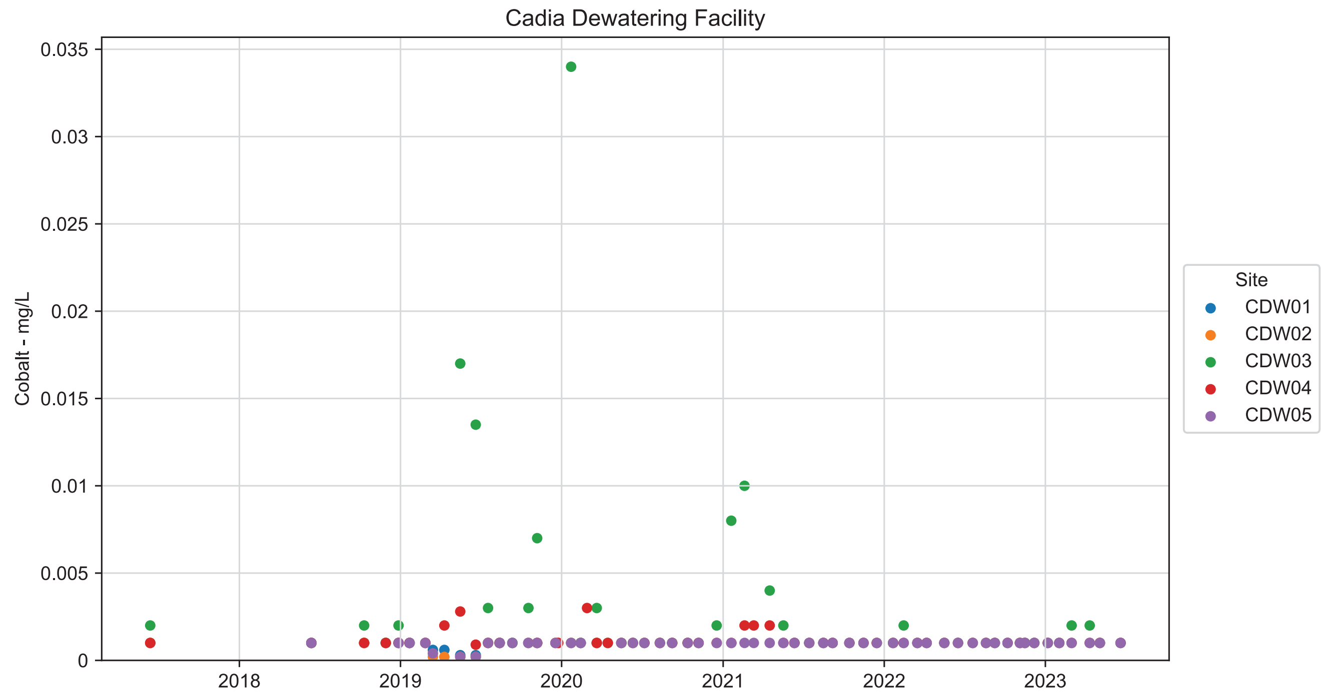

Cadia Dewatering Facility
Aluminium - mg/L
1
0.1
0.01
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

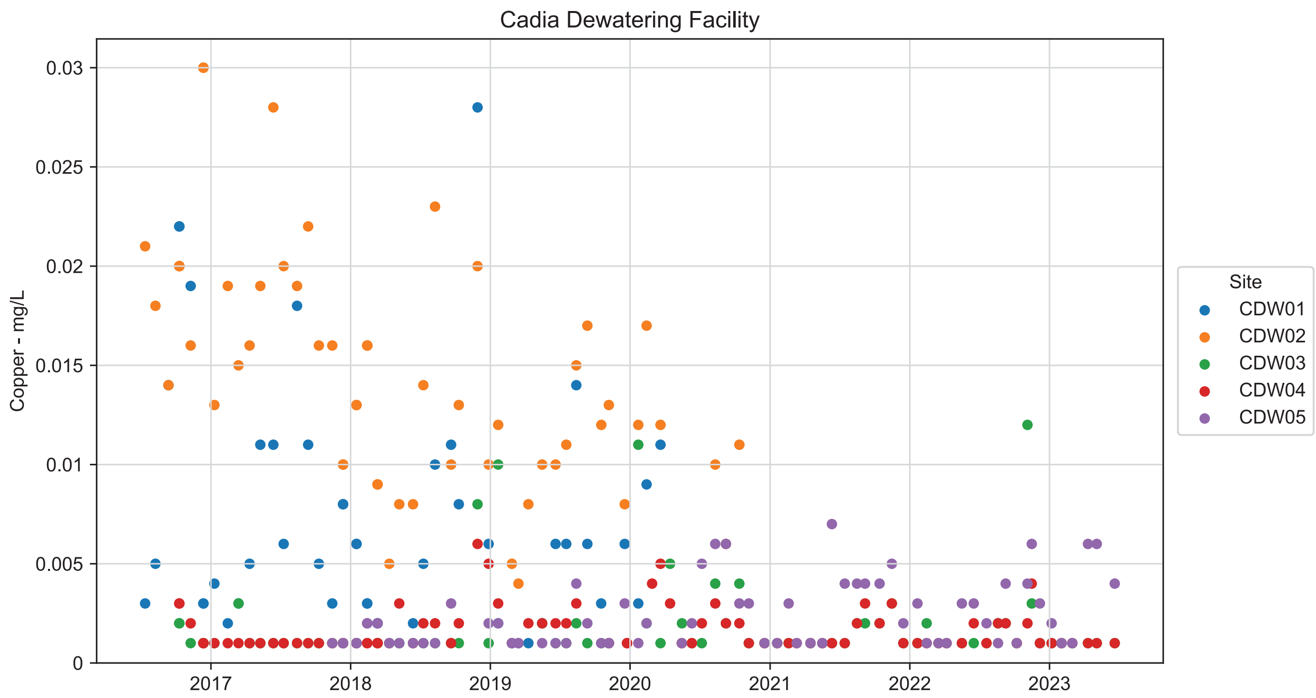

Cadia Dewatering Facility
Antimony - mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

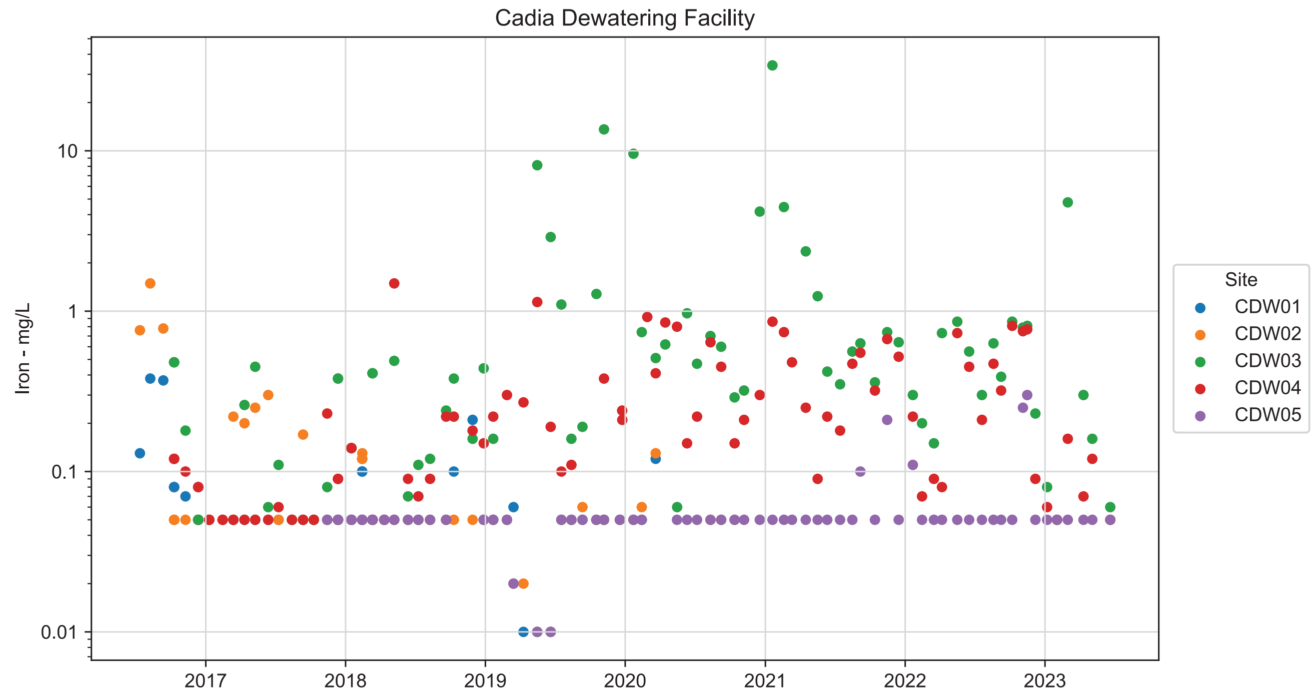

Cadia Dewatering Facility
Arsenic - mg/L
0.04
0.03
0.02
0.01
0
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

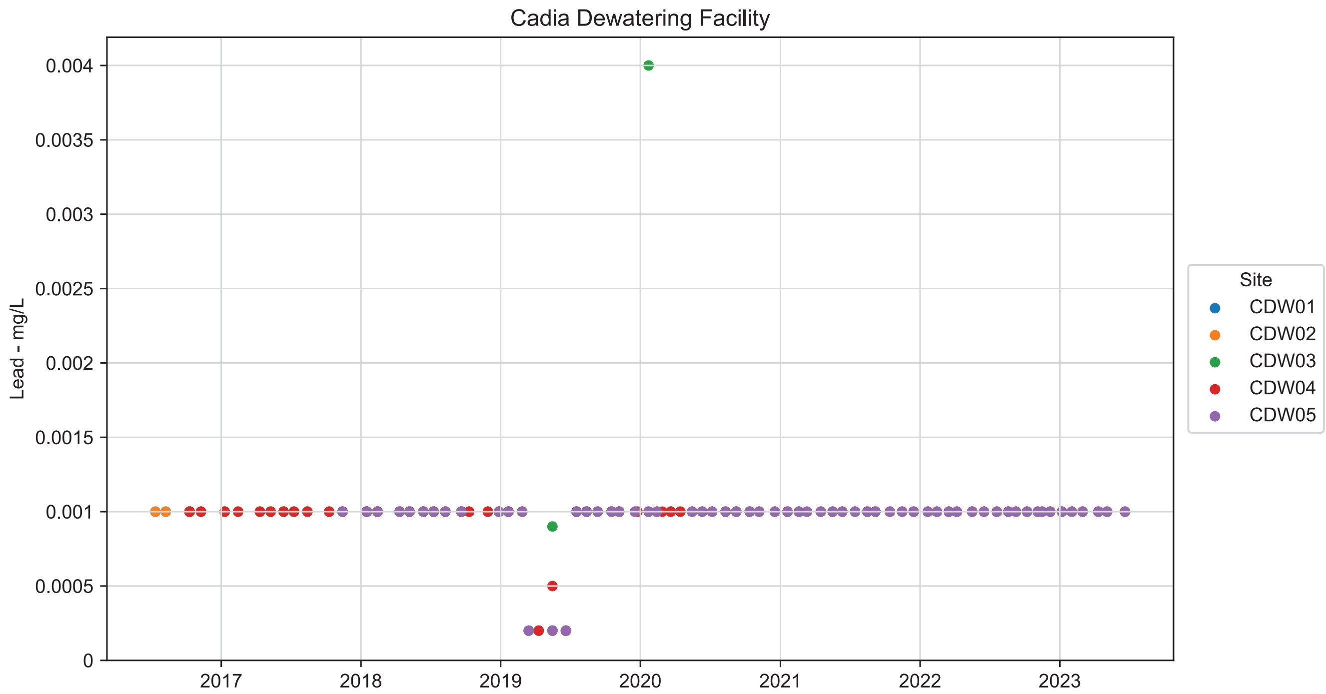

Cadia Dewatering Facility
Cadmium - mg/L
0.0001
8e-05
6e-05
4e-05
2e-05
0
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

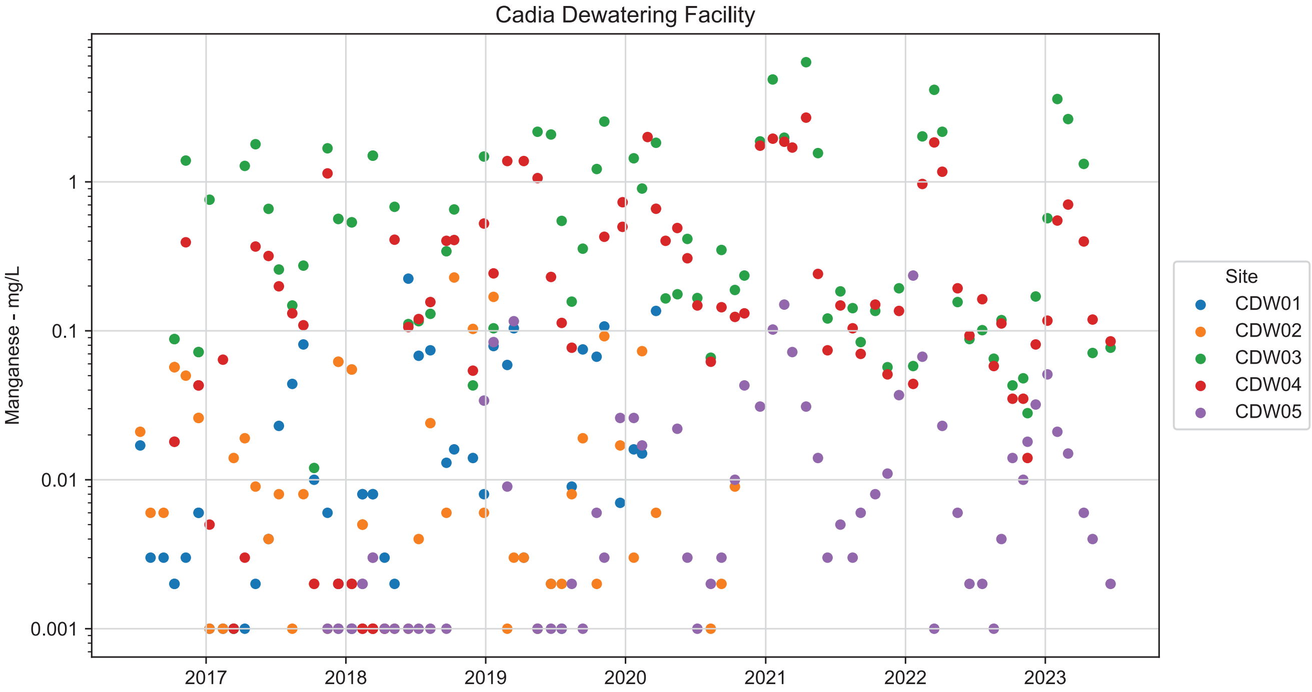

Cadia Dewatering Facility
Chromium - mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

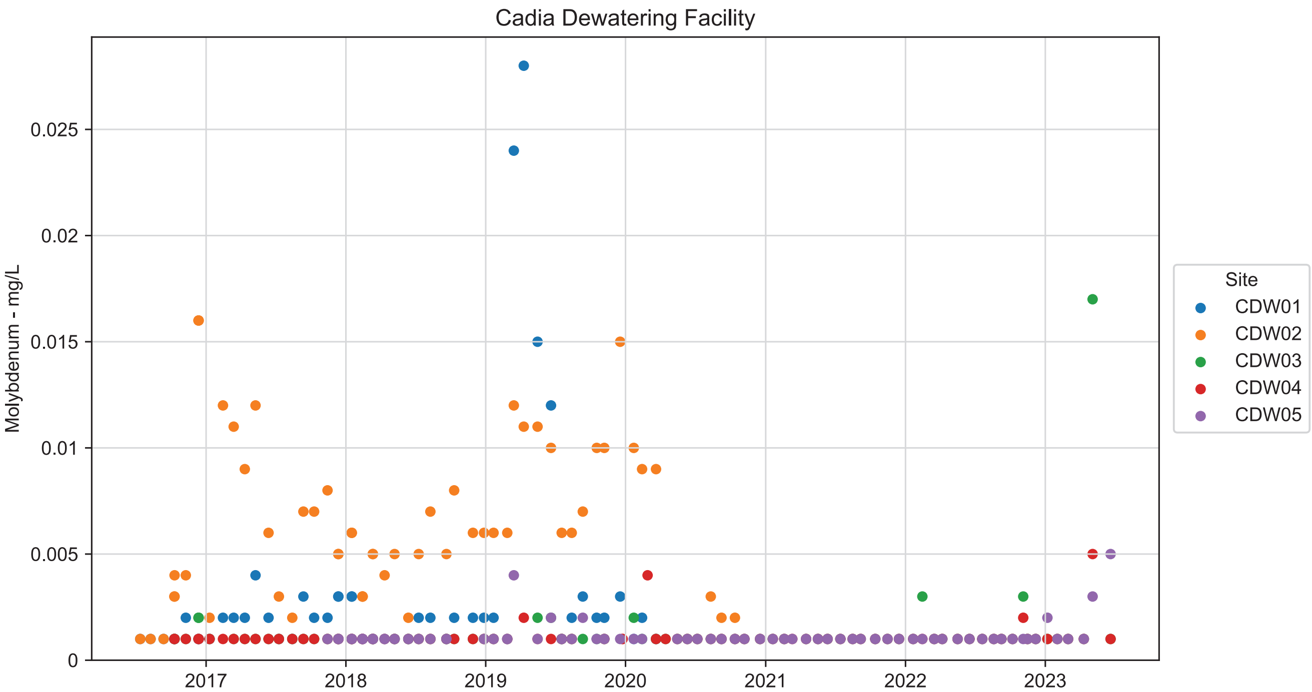

Cadia Dewatering Facility
Cobalt - mg/L
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

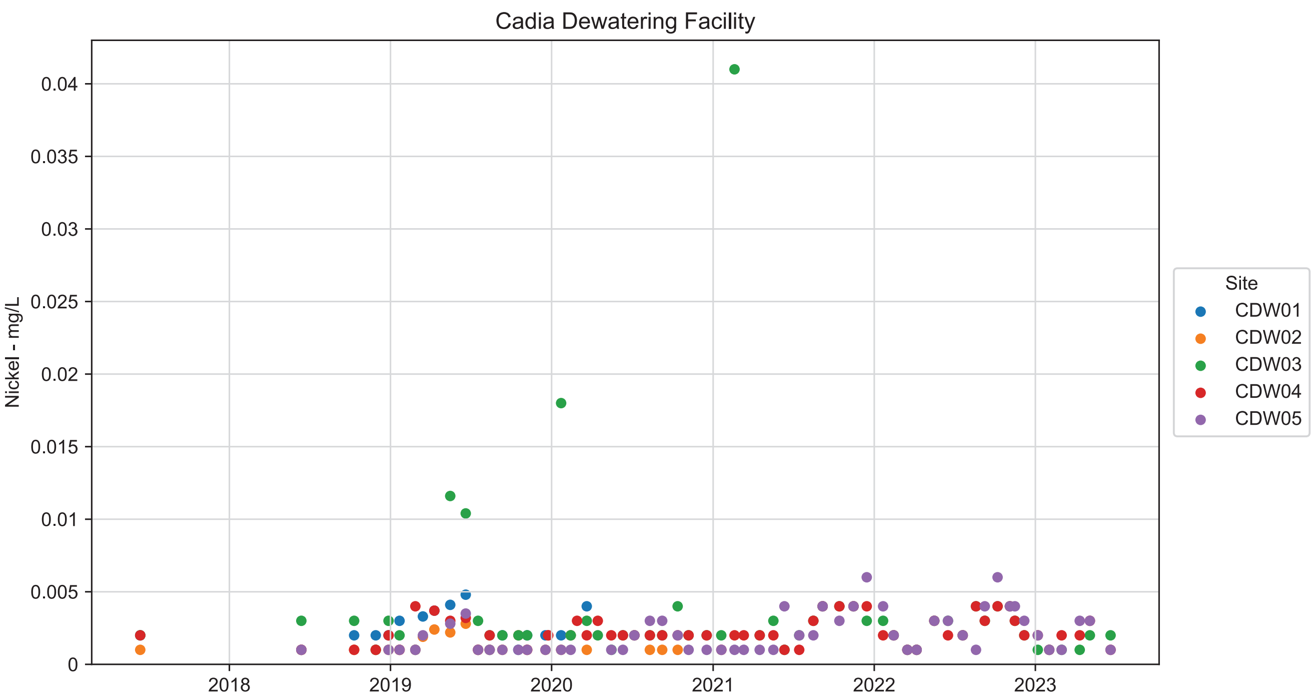

Cadia Dewatering Facility
Copper - mg/L
0.03
0.025
0.02
0.015
0.01
0.005
0
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

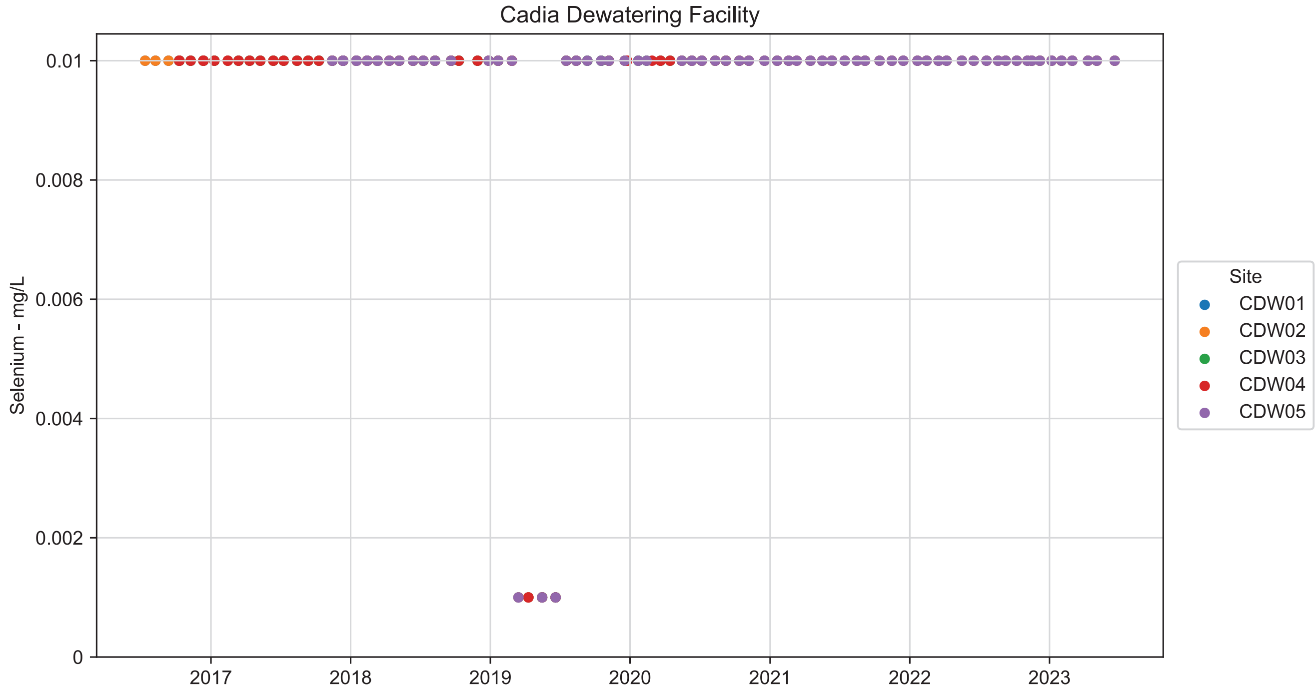

Cadia Dewatering Facility
Iron - mg/L
10
1
0.1
0.01
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

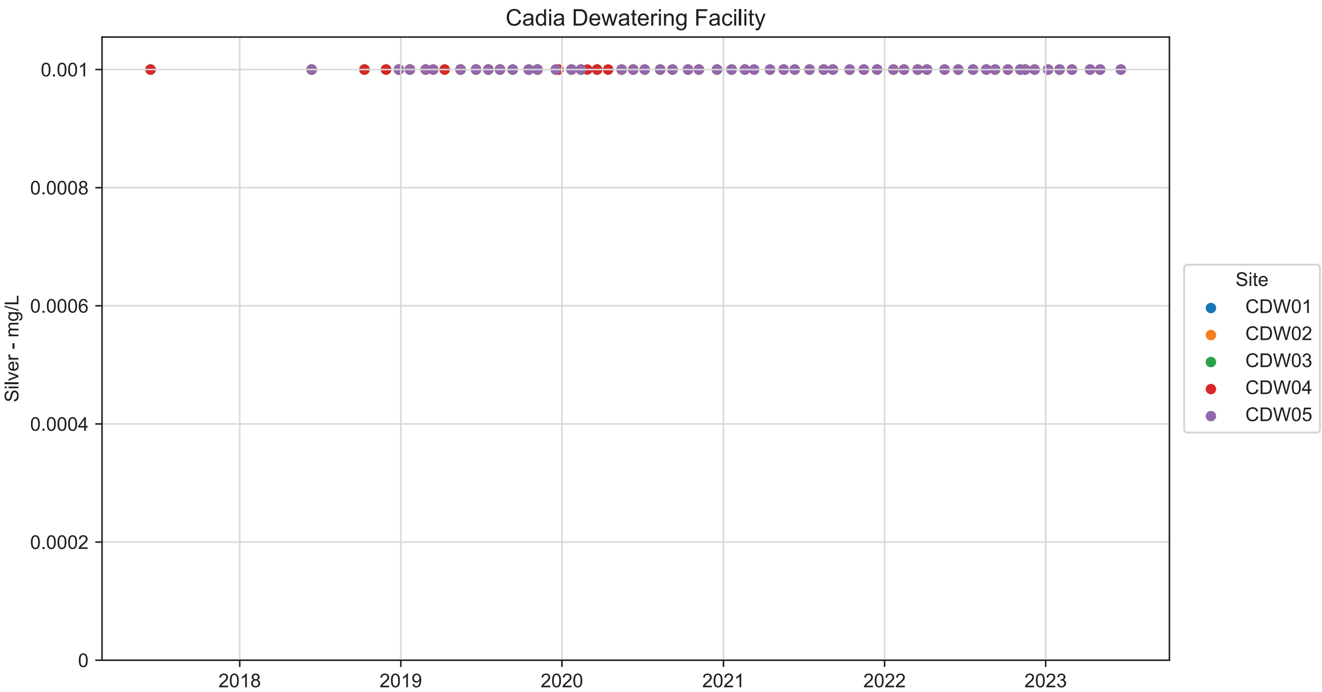

Cadia Dewatering Facility
Lead - mg/L
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

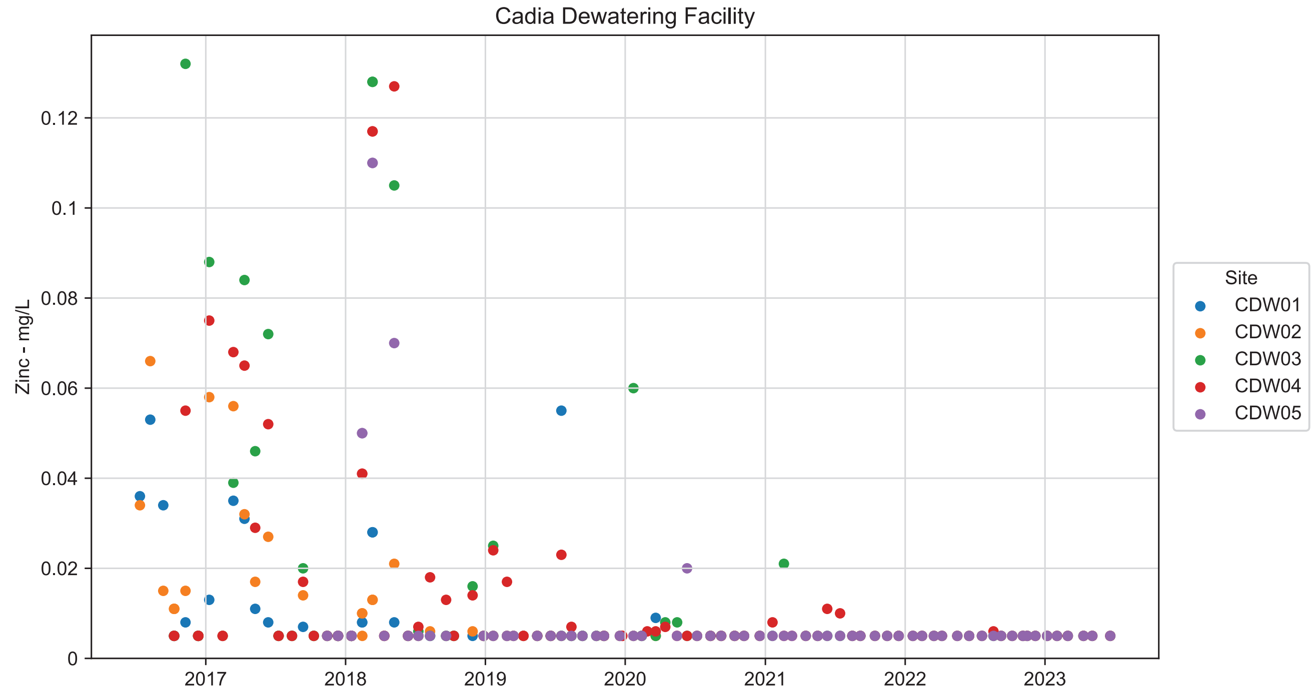

Cadia Dewatering Facility
Manganese - mg/L
1
0.1
0.01
0.001
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

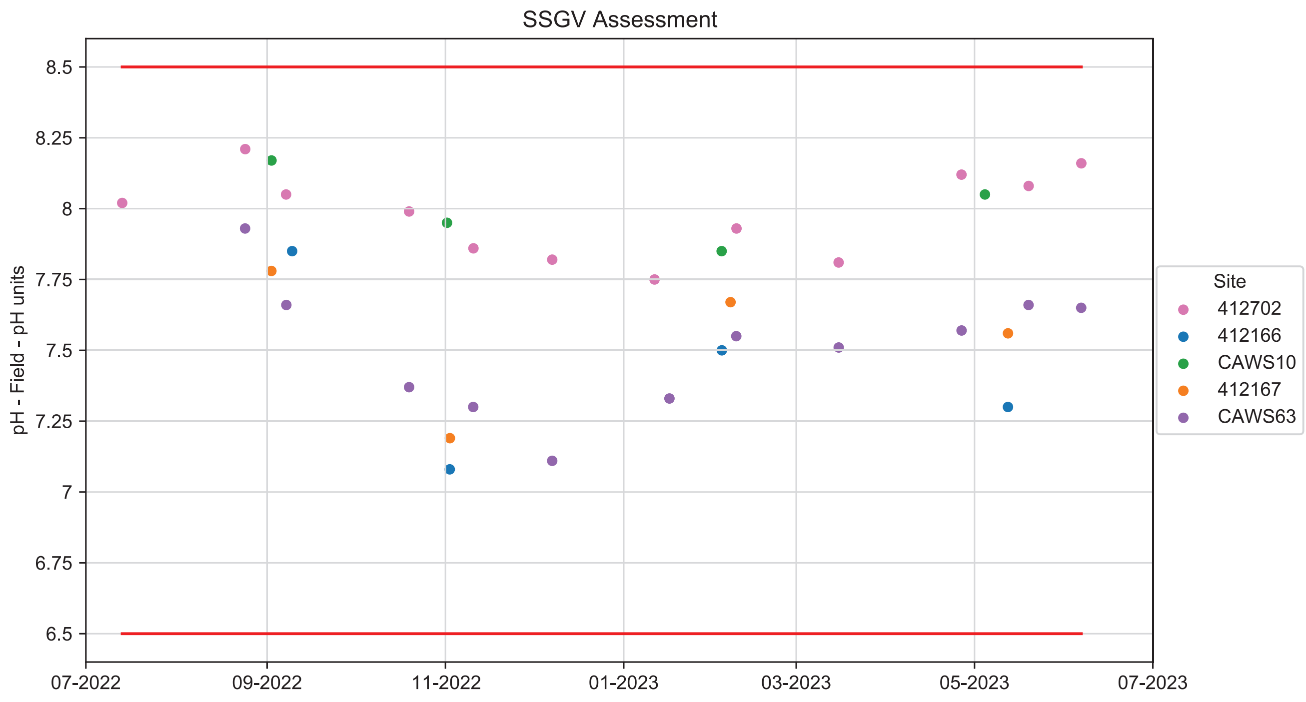

Cadia Dewatering Facility
Molybdenum - mg/L
0.025
0.02
0.015
0.01
0.005
0
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

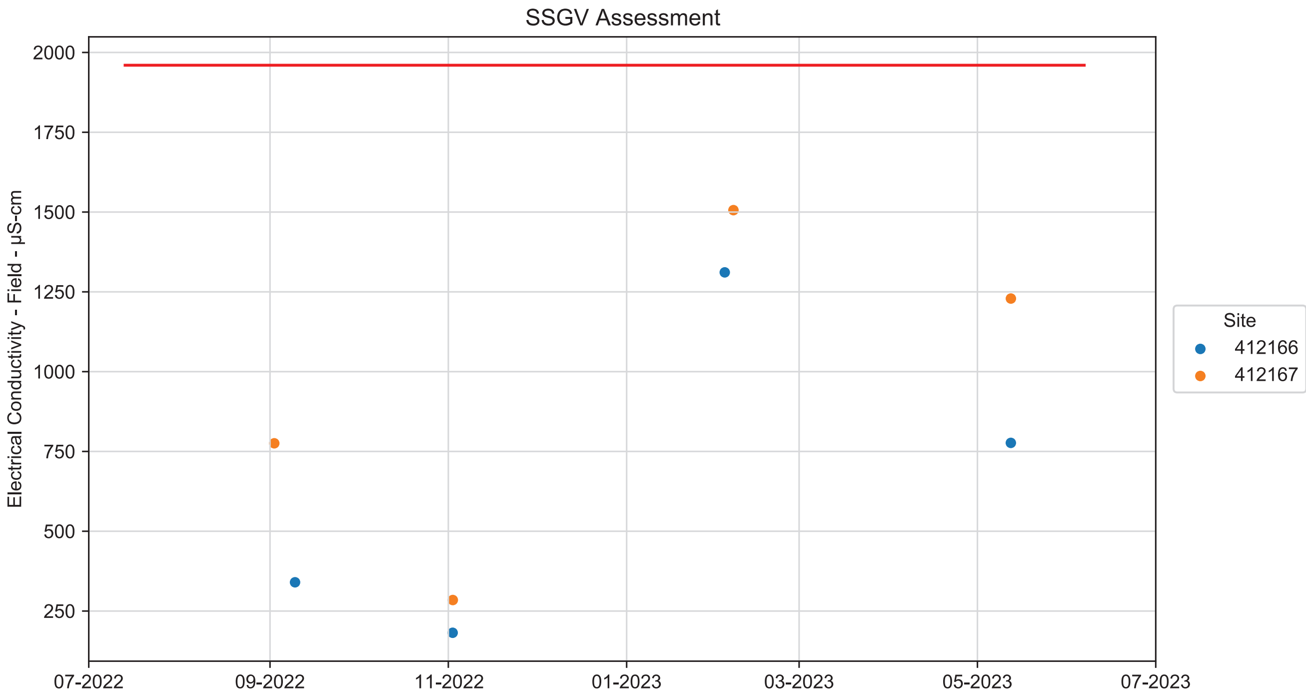

Cadia Dewatering Facility
Nickel - mg/L
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05

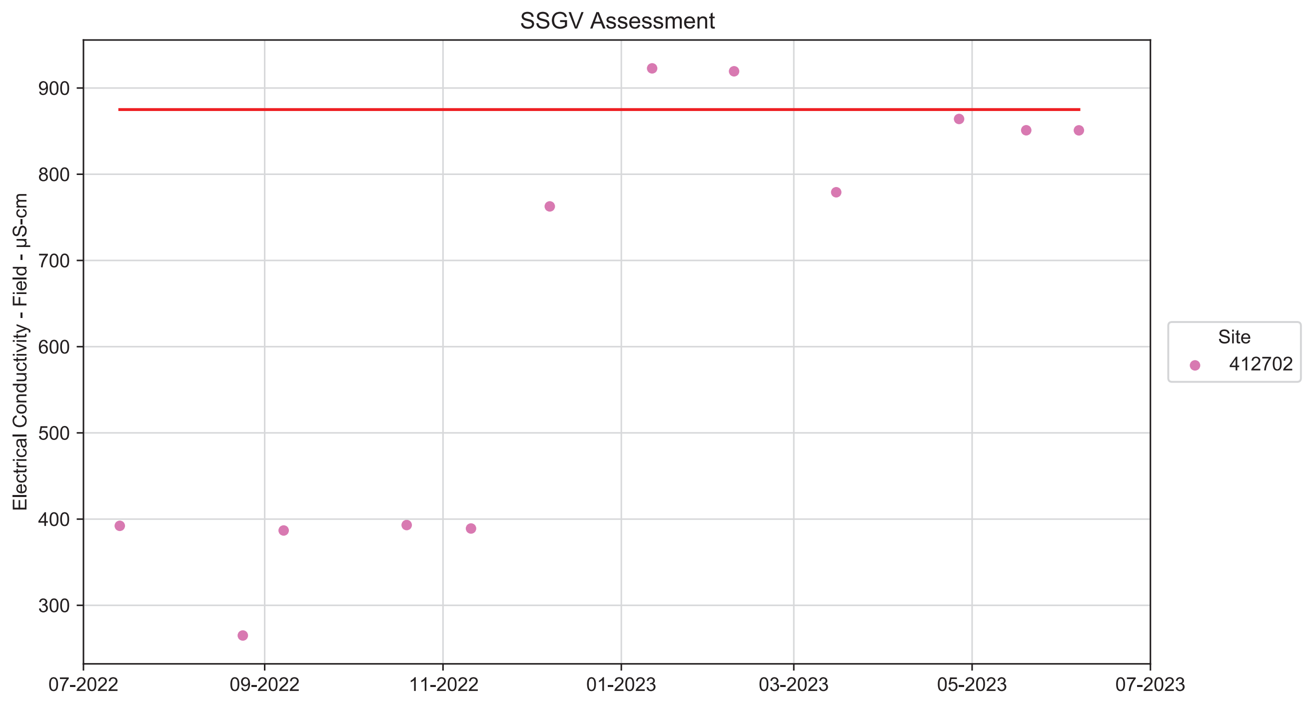

Cadia Dewatering Facility
Selenium - mg/L
0.01
0.008
0.006
0.004
0.002
0
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05


Cadia Dewatering Facility
Silver - mg/L
0.001
0.0008
0.0006
0.0004
0.0002
0
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05


Cadia Dewatering Facility
Zinc - mg/L
0.12
0.1
0.08
0.06
0.04
0.02
0
2017
2018
2019
2020
2021
2022
2023
Site
CDW01
CDW02
CDW03
CDW04
CDW05


SSGV Assessment
pH - Field - pH units
8.5
8.25
8
7.75
7.5
7.25
7
6.75
6.5
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
412702
412166
CAWS10
412167
CAWS63


SSGV Assessment
Electrical Conductivity - Field - µS-cm
2000
1750
1500
1250
1000
750
500
250
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
412166
412167


SSGV Assessment
Electrical Conductivity - Field - µS-cm
900
800
700
600
500
400
300
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
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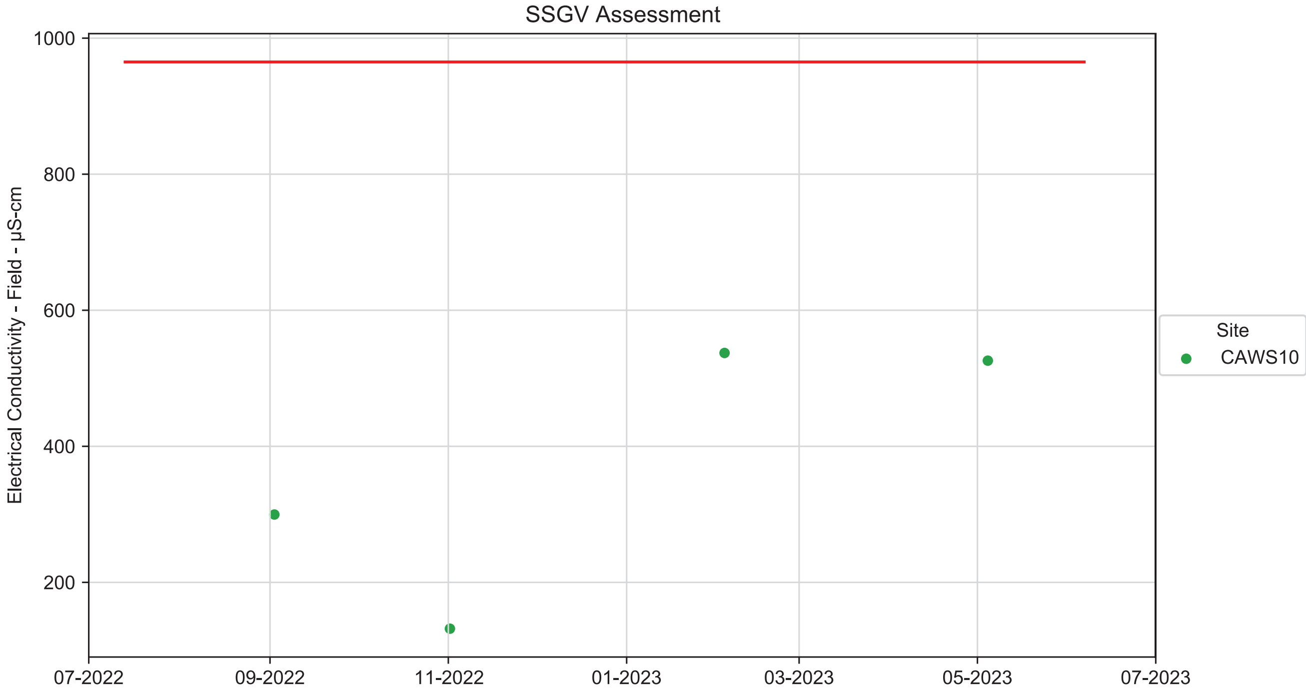
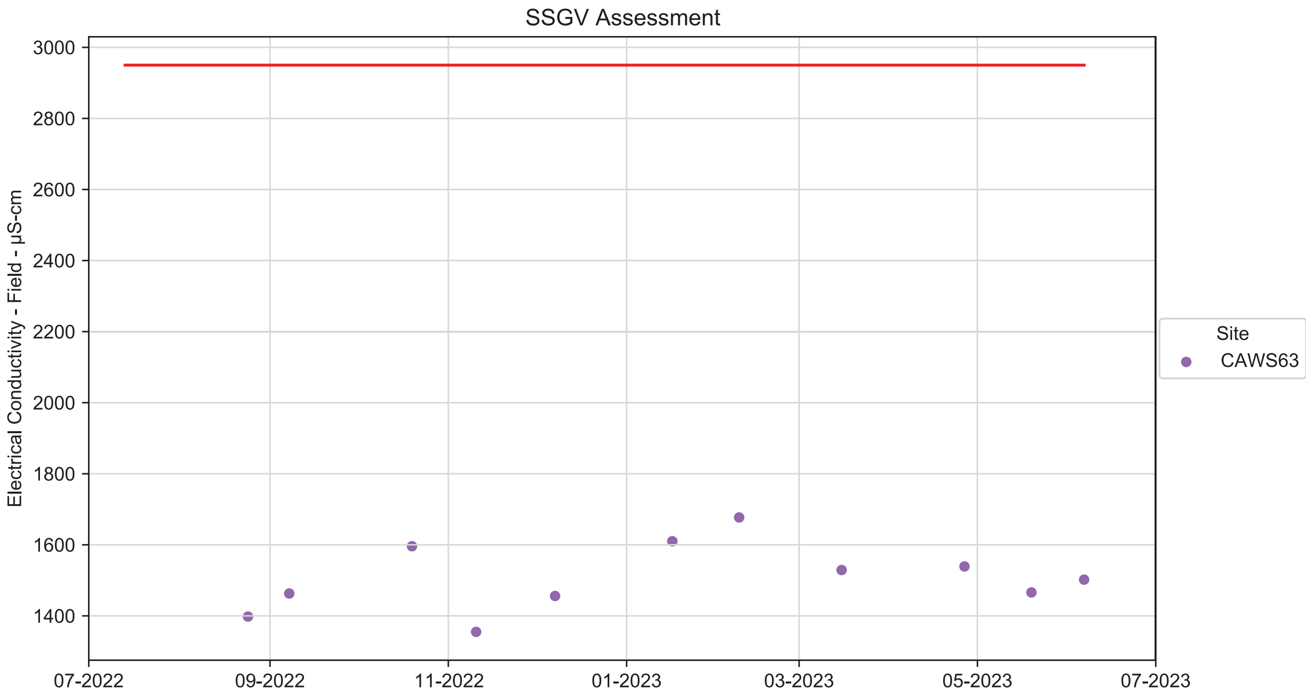
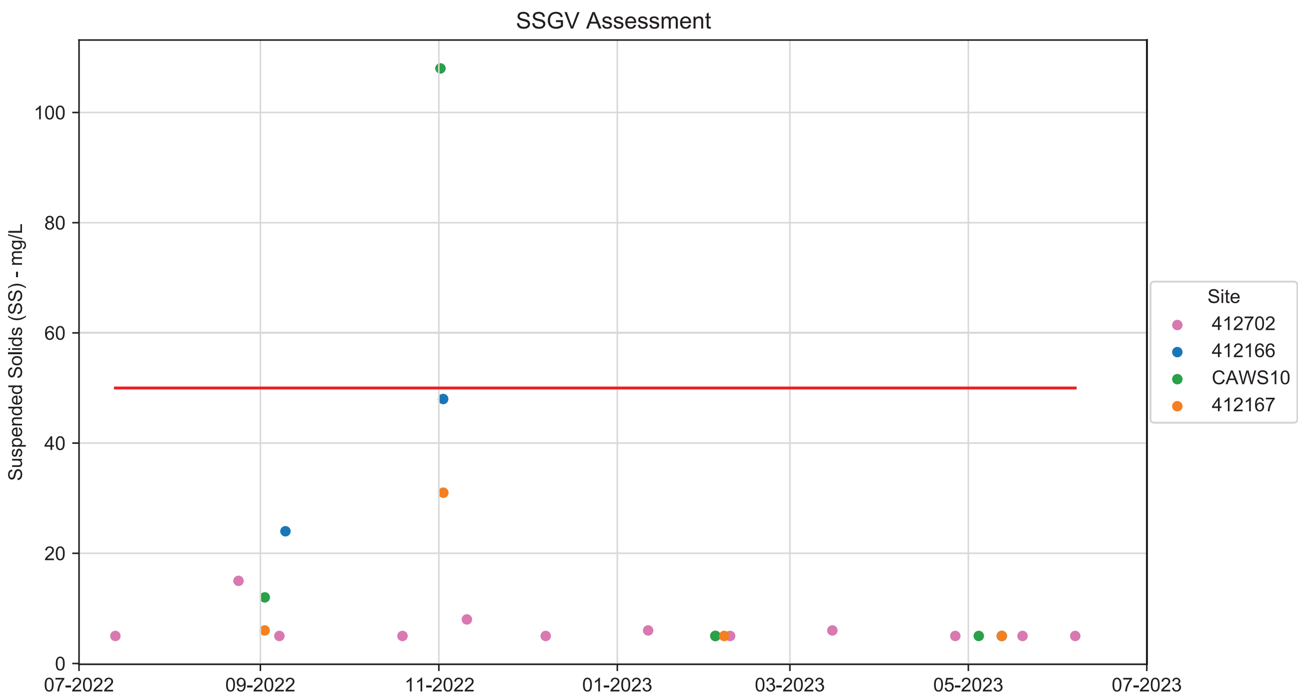
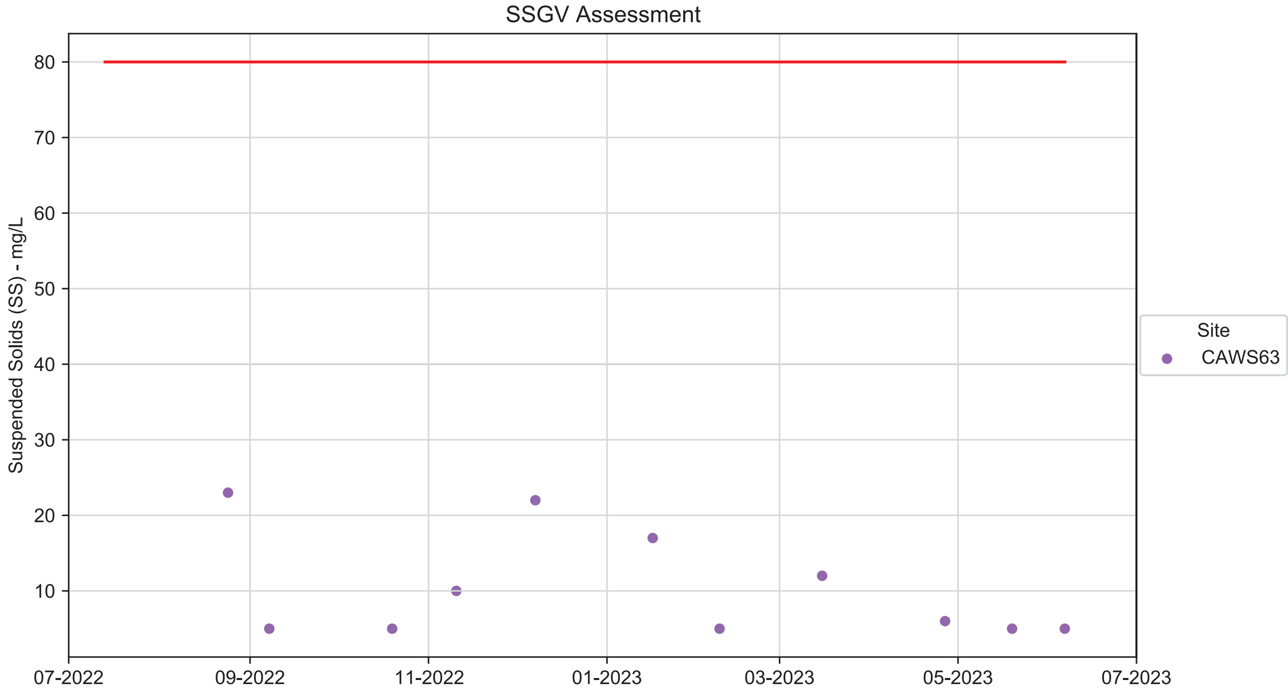
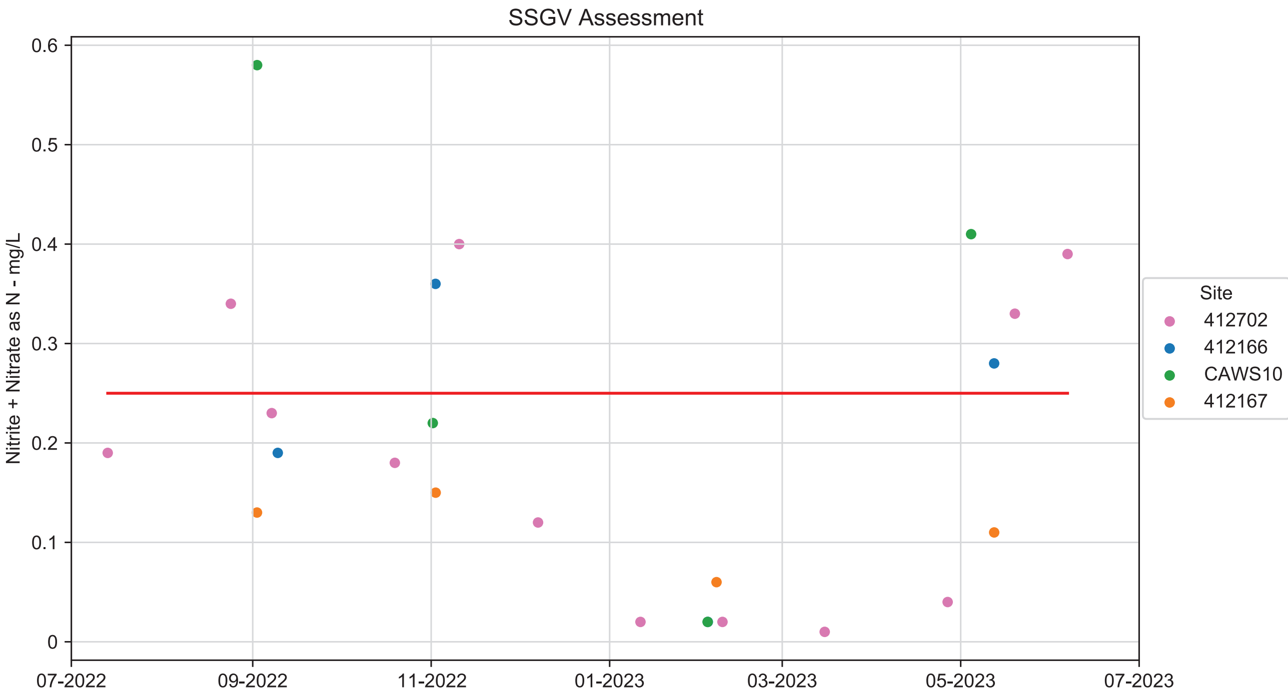
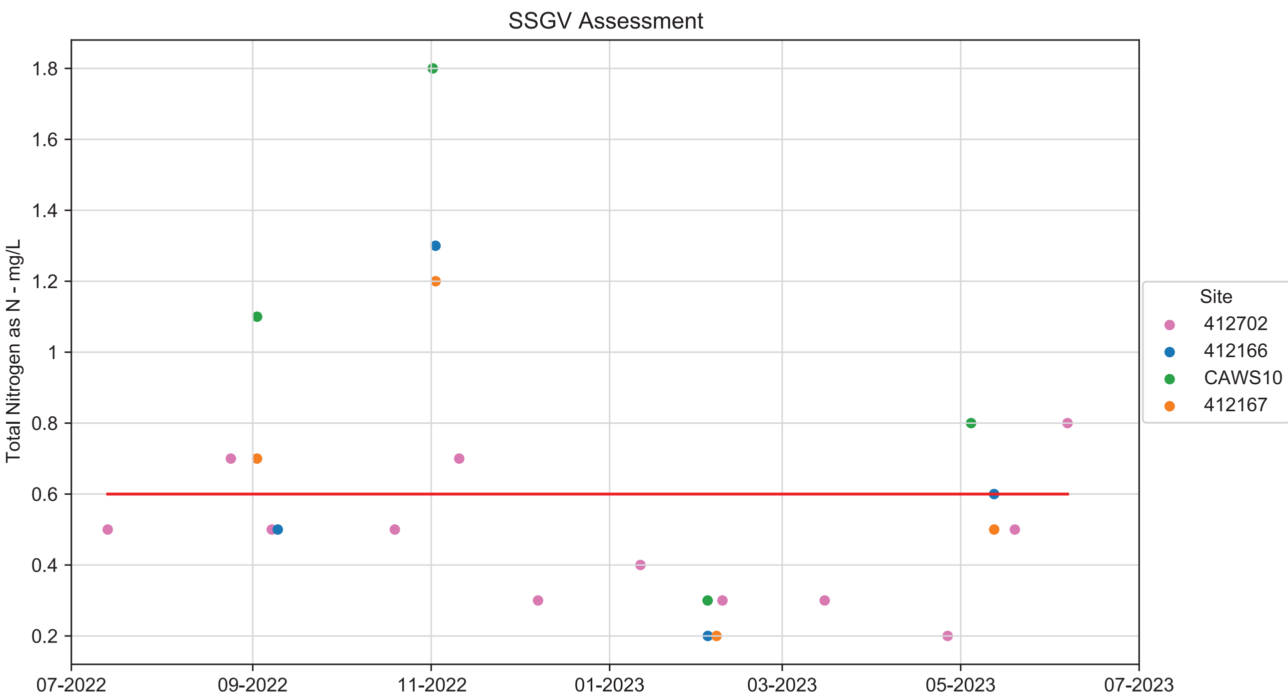

SSGV Assessment
Electrical Conductivity - Field - µS-cm
1000
800
600
400
200
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
CAWS10


SSGV Assessment
Electrical Conductivity - Field - µS-cm
3000
2800
2600
2400
2200
2000
1800
1600
1400
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
CAWS63

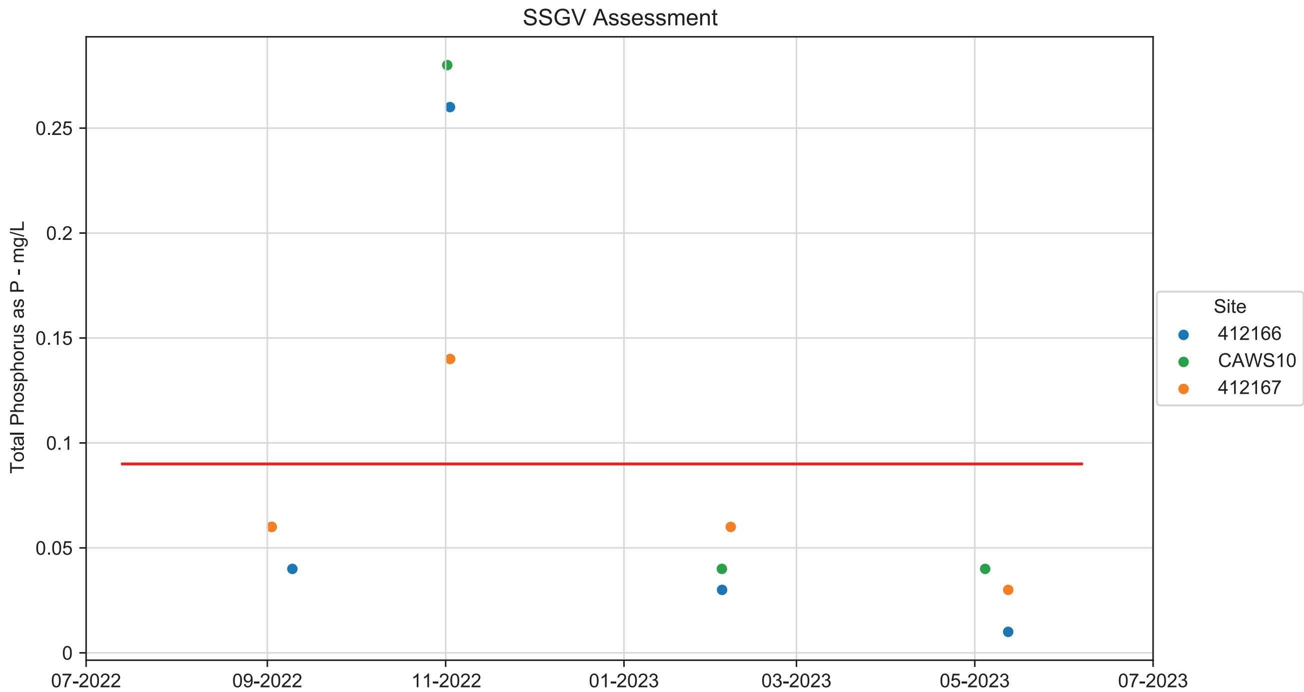

SSGV Assessment
Suspended Solids (SS) - mg/L
100
80
60
40
20
0
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
412702
412166
CAWS10
412167

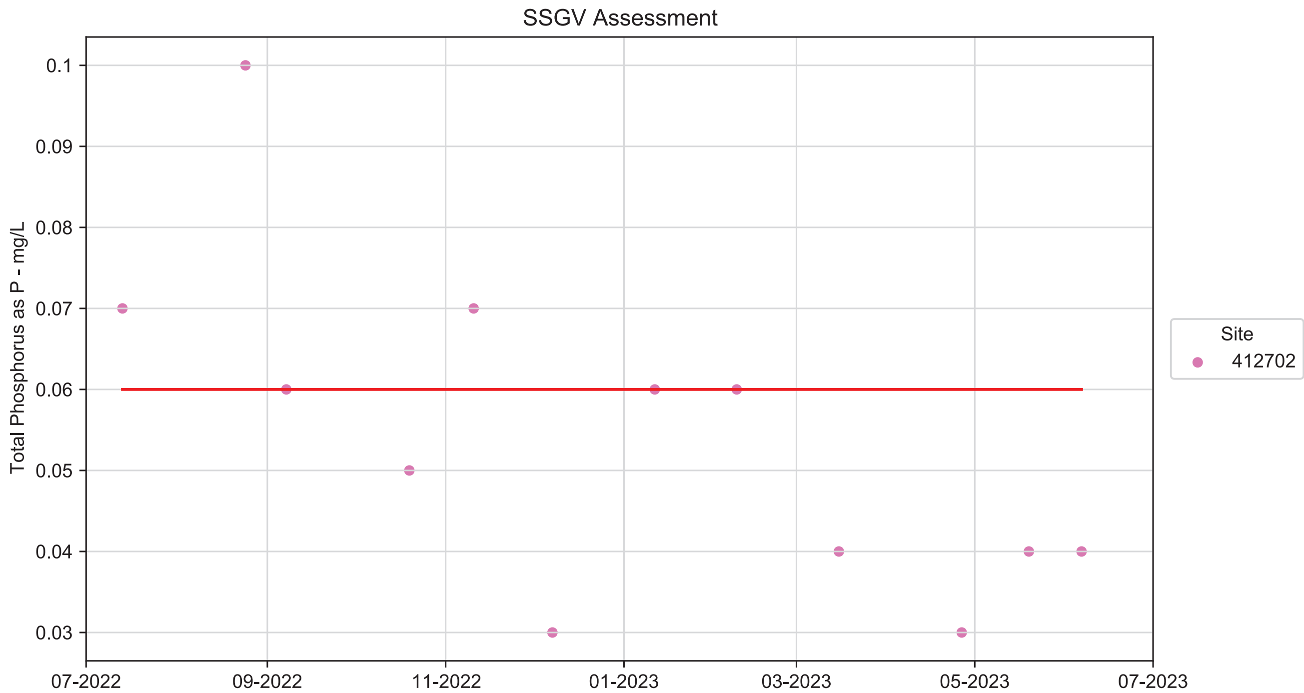

SSGV Assessment
Suspended Solids (SS) - mg/L
Site
CAWS63
80
70
60
50
40
30
20
10
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023

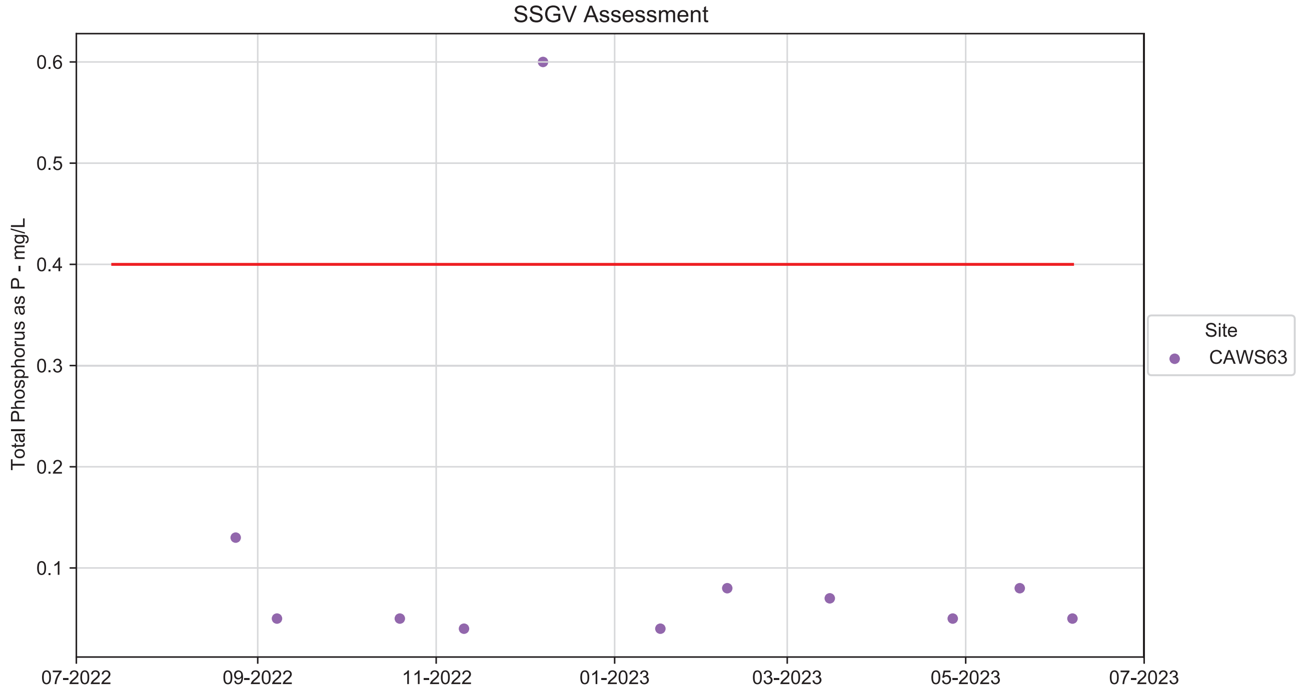

SSGV Assessment
Nitrite + Nitrate as N - mg/L
Site
412702
412166
CAWS10
412167
0.6
0.5
0.4
0.3
0.2
0.1
0
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023

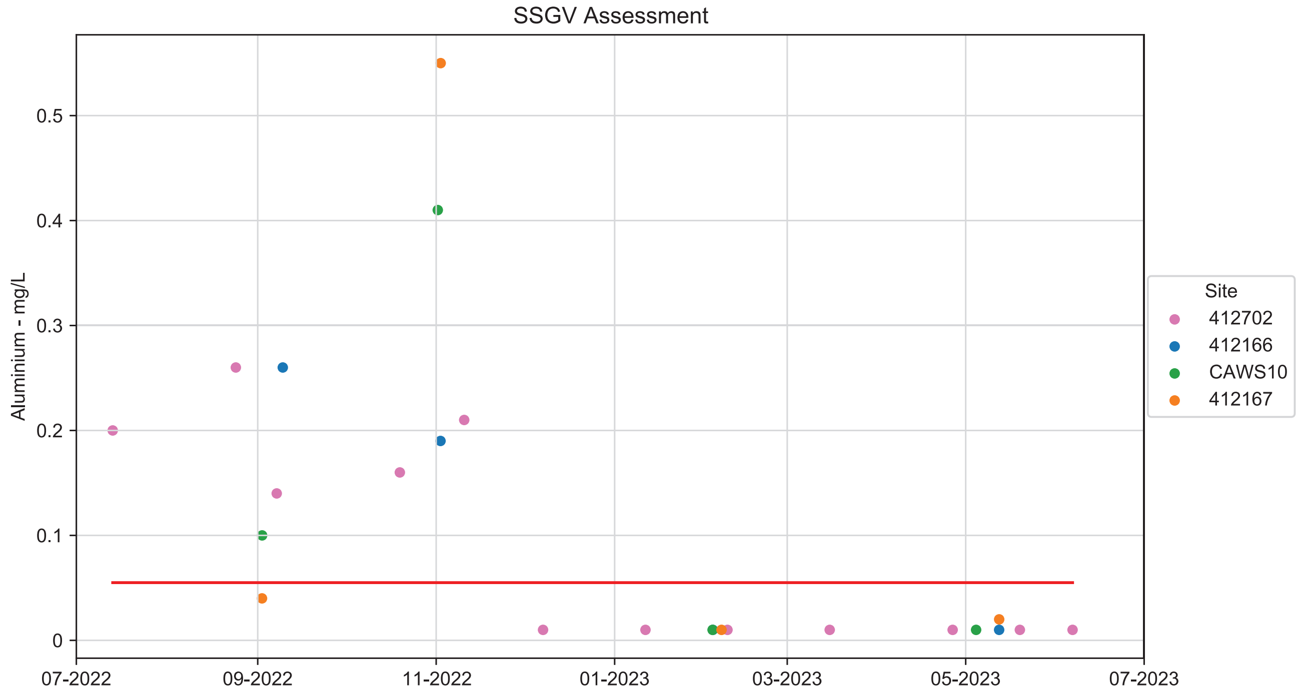

SSGV Assessment
Total Nitrogen as N - mg/L
Site
412702
412166
CAWS10
412167
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023


SSGV Assessment
Total Nitrogen as N - mg/L
0
2
4
6
8
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
CAWS63


SSGV Assessment
Total Phosphorus as P - mg/L
0
0.05
0.1
0.15
0.2
0.25
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
412166
CAWS10
412167


SSGV Assessment
Total Phosphorus as P - mg/L
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
412702


SSGV Assessment
Total Phosphorus as P - mg/L
0.6
0.5
0.4
0.3
0.2
0.1
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
CAWS63


SSGV Assessment
Aluminium - mg/L
0.5
0.4
0.3
0.2
0.1
0
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
412702
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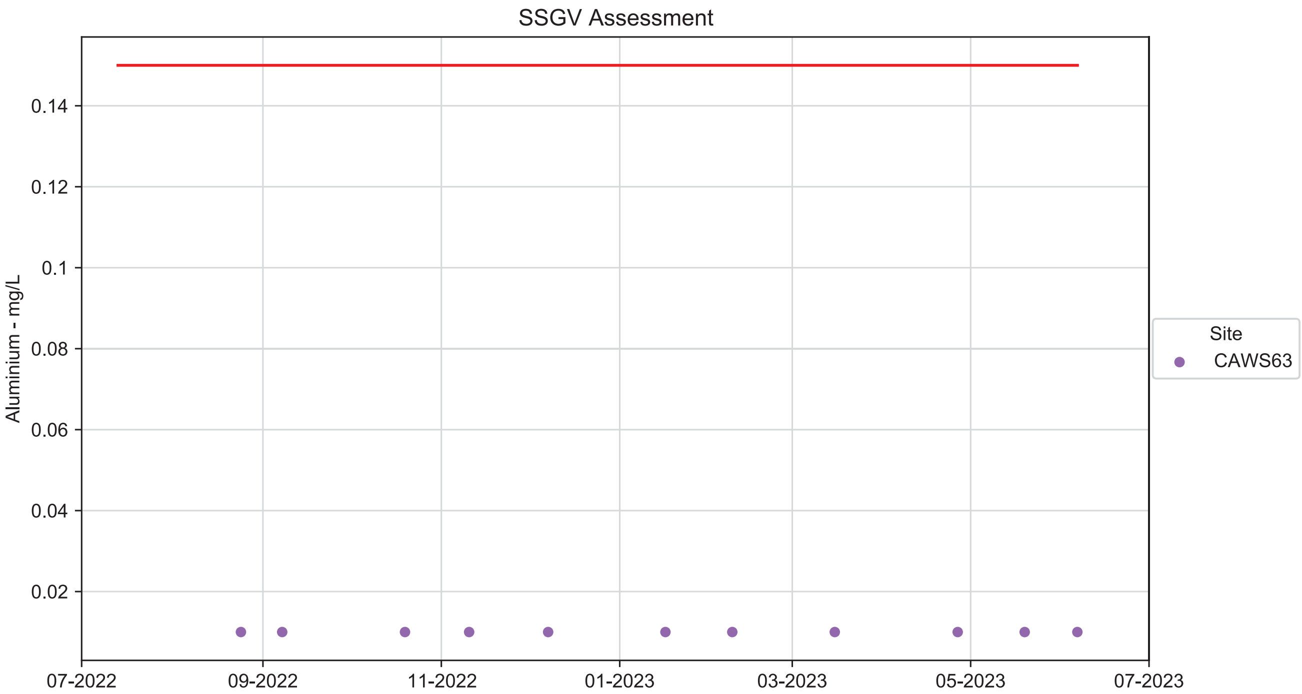
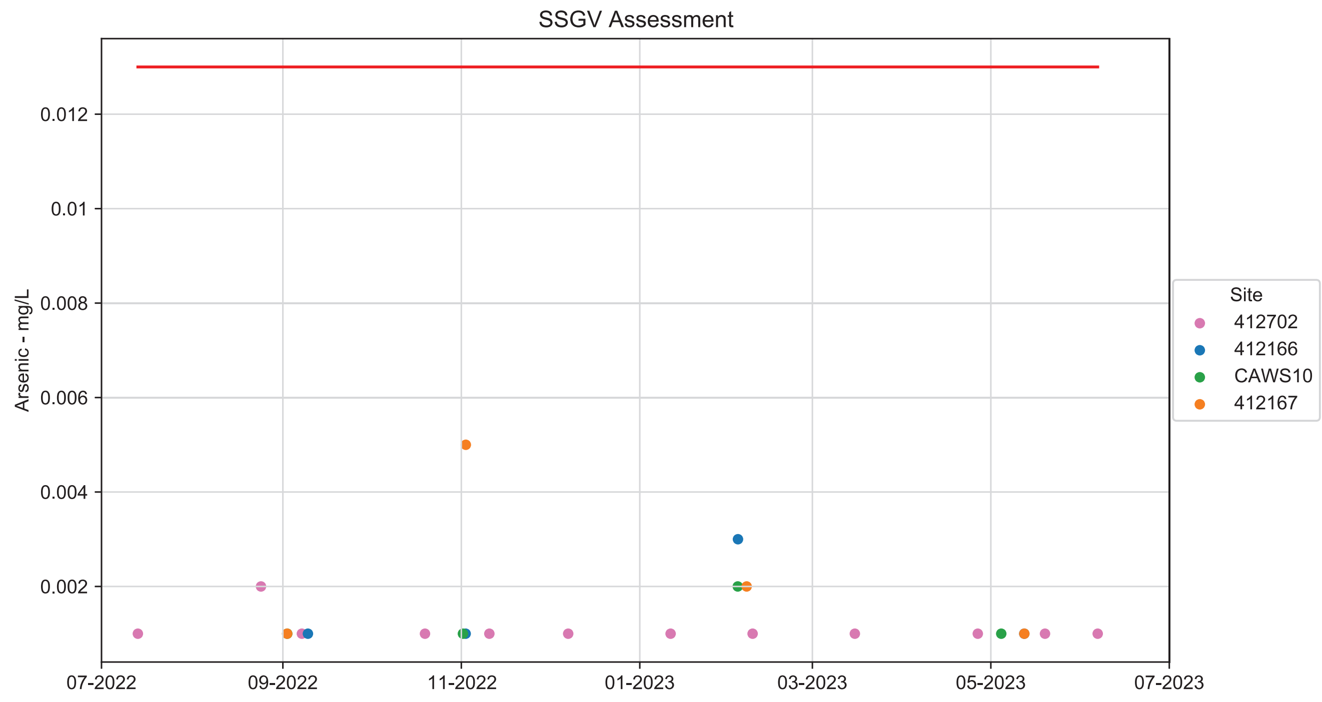
CAWS10
412167


SSGV Assessment
Aluminium - mg/L
0.14
0.12
0.1
0.08
0.06
0.04
0.02
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
CAWS63


SSGV Assessment
Arsenic - mg/L
0.012
0.01
0.008
0.006
0.004
0.002
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
Site
412702
412166
CAWS10
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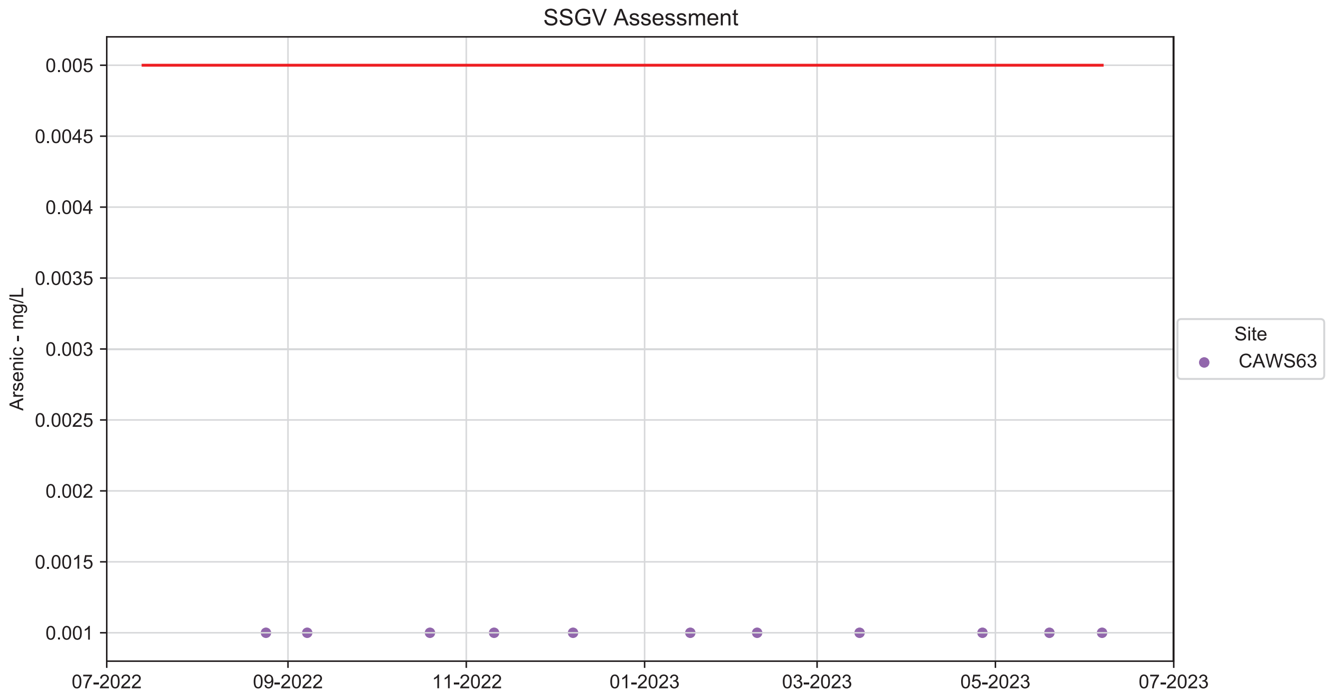
SSGV Assessment
Arsenic - mg/L
0.005
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
07-2022
09-2022
11-2022
01-2023
03-2023
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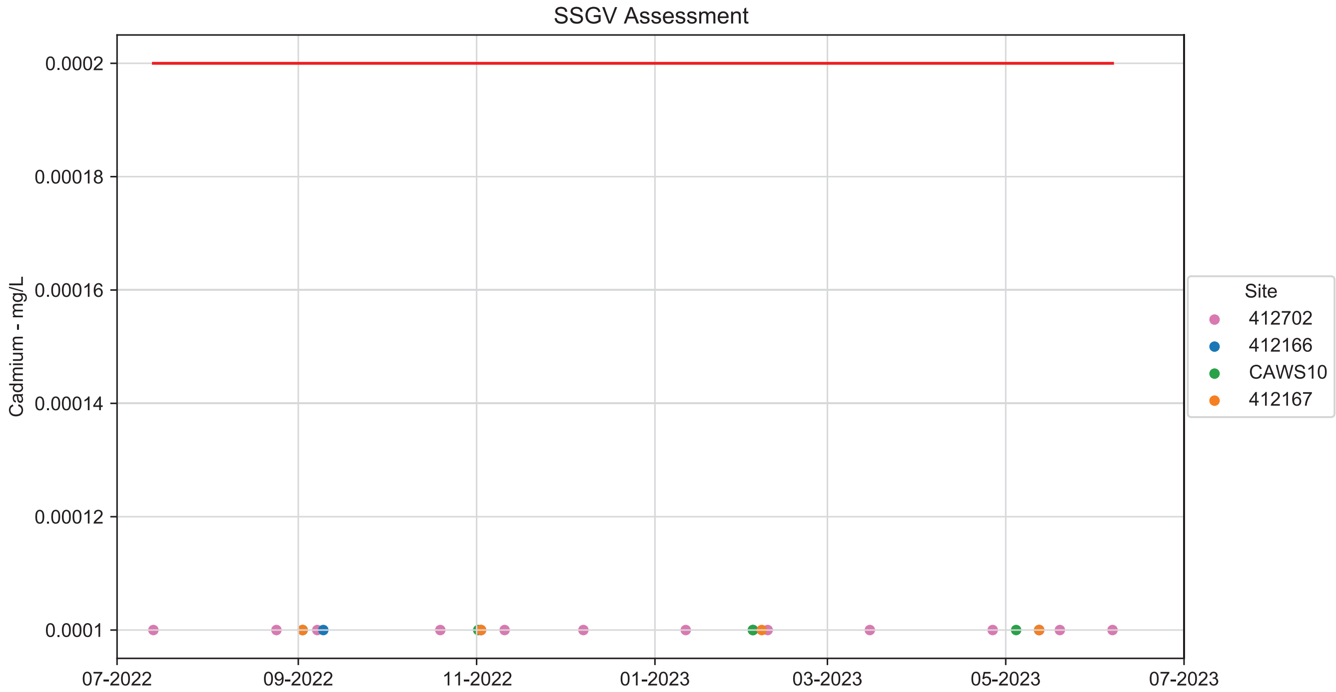
SSGV Assessment
Cadmium - mg/L
0.0002
0.00018
0.00016
0.00014
0.00012
0.0001
07-2022
09-2022
11-2022
01-2023
03-2023
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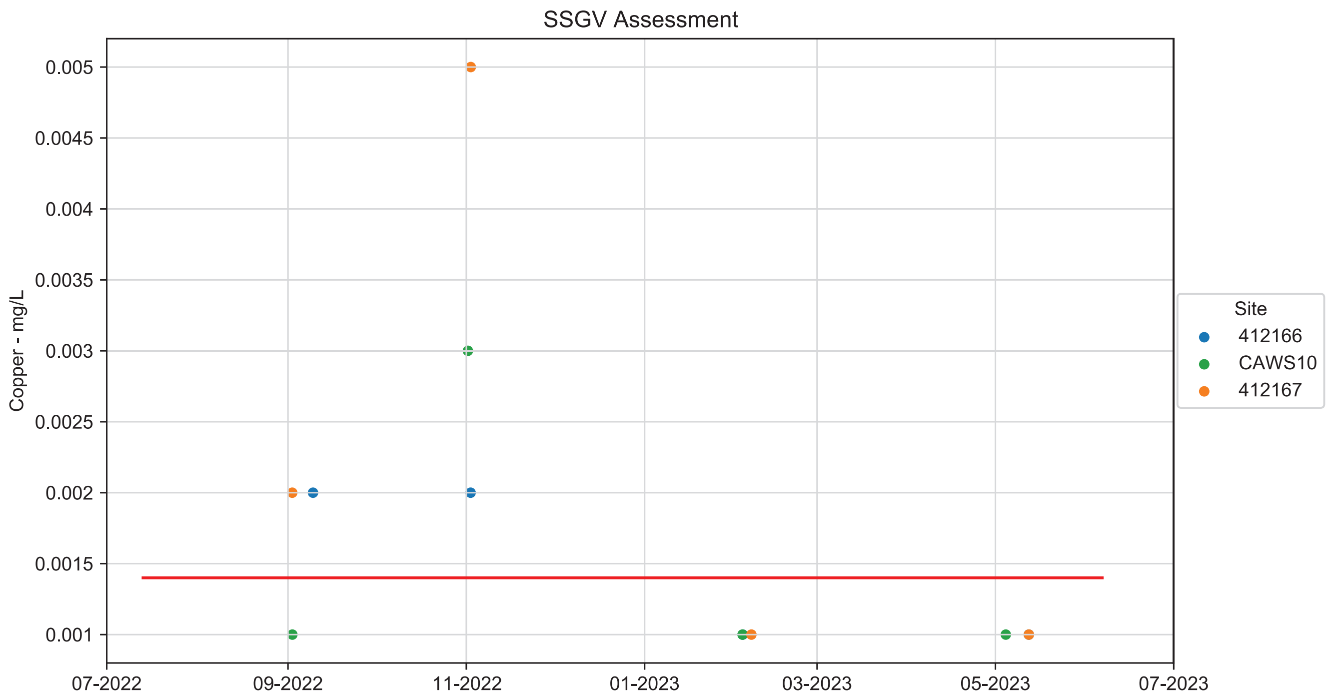
SSGV Assessment
Copper - mg/L
0.005
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
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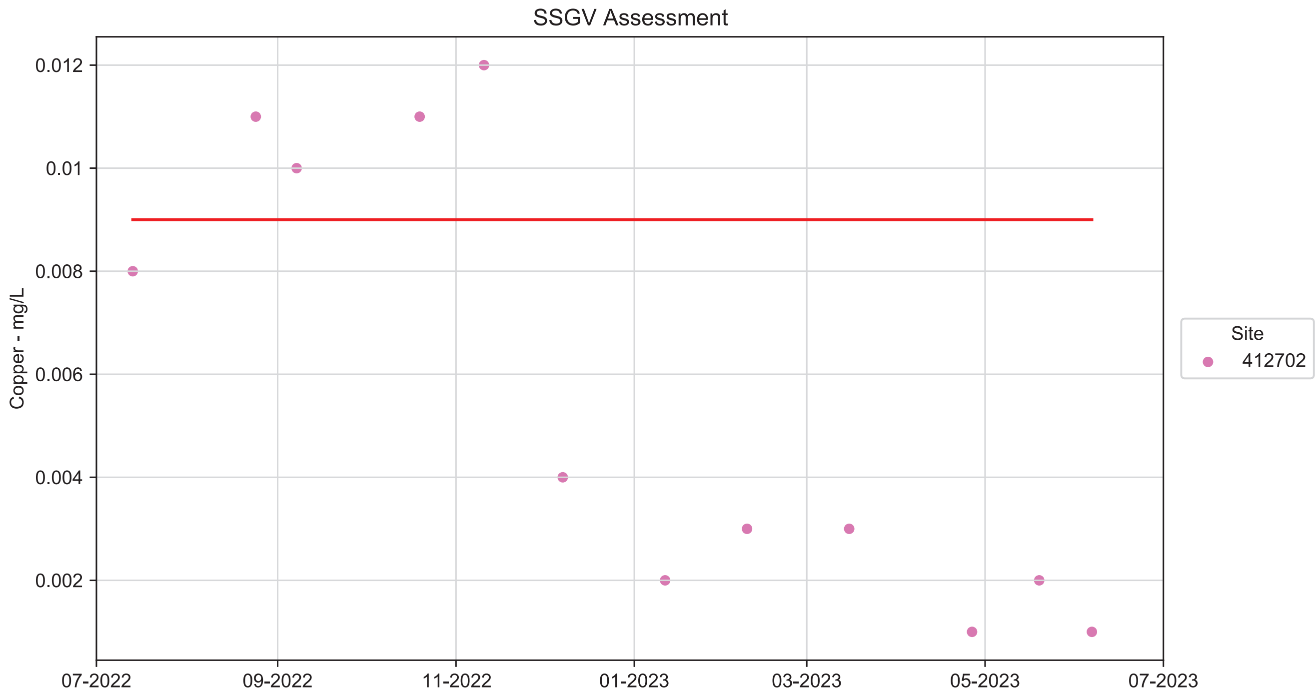
SSGV Assessment
Copper - mg/L
0.012
0.01
0.008
0.006
0.004
0.002
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
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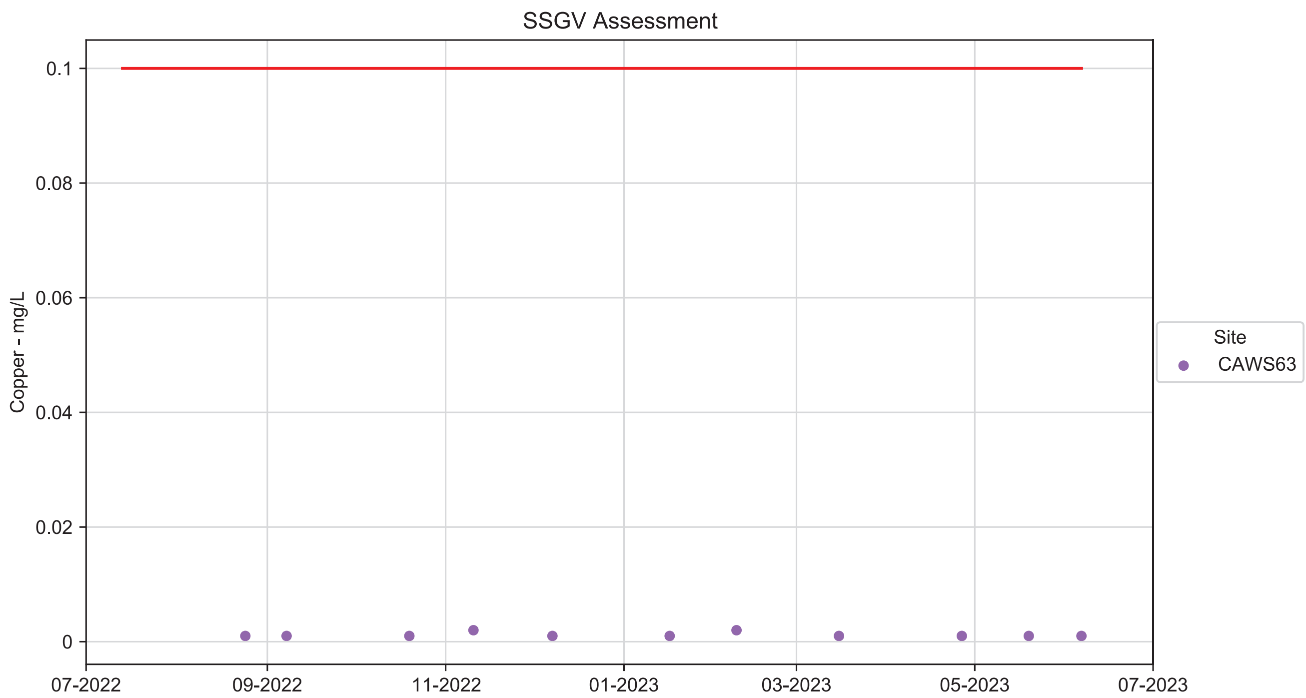
SSGV Assessment
Copper - mg/L
0.1
0.08
0.06
0.04
0.02
0
07-2022
09-2022
11-2022
01-2023
03-2023
05-2023
07-2023
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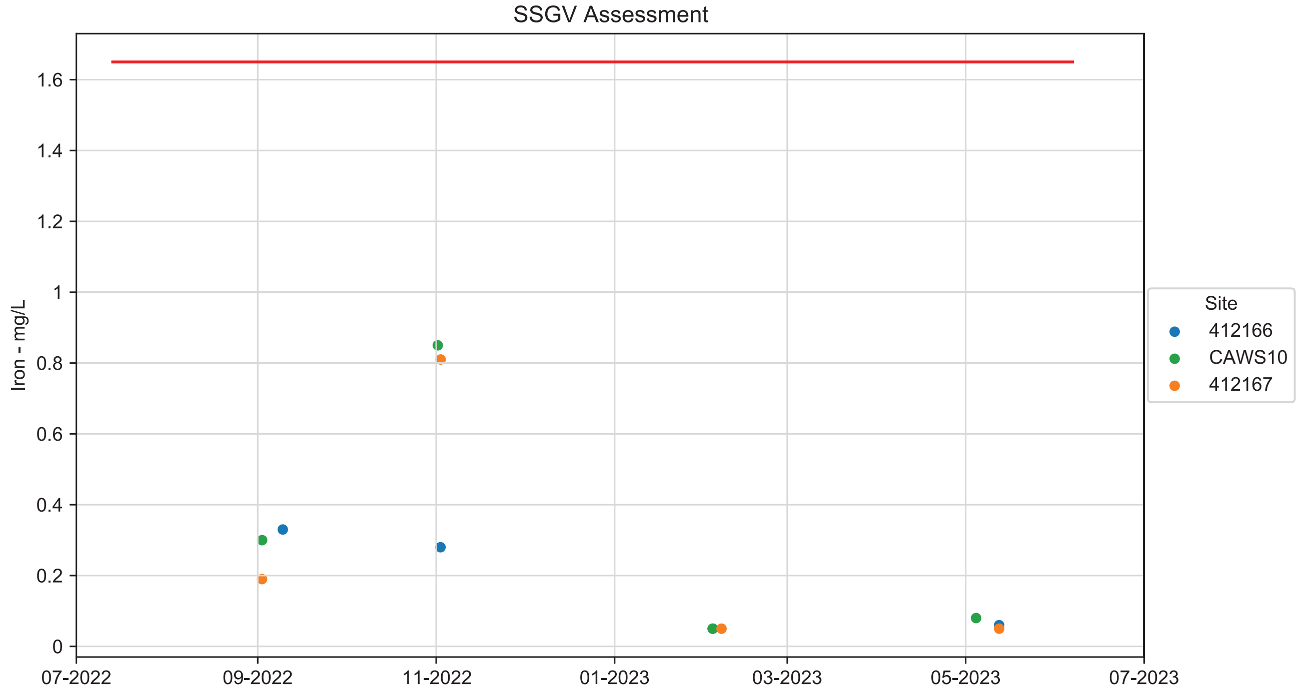
SSGV Assessment
Iron - mg/L
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
07-2022
09-2022
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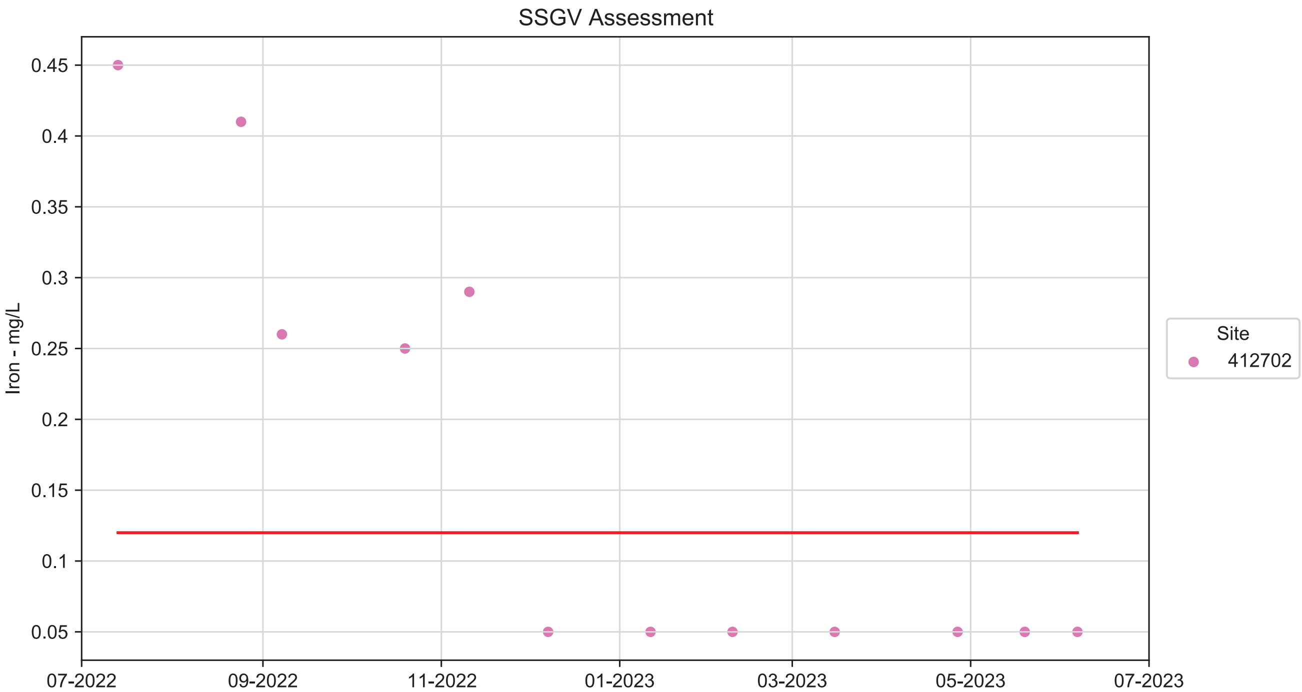
SSGV Assessment
Iron - mg/L
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
07-2022
09-2022
11-2022
01-2023
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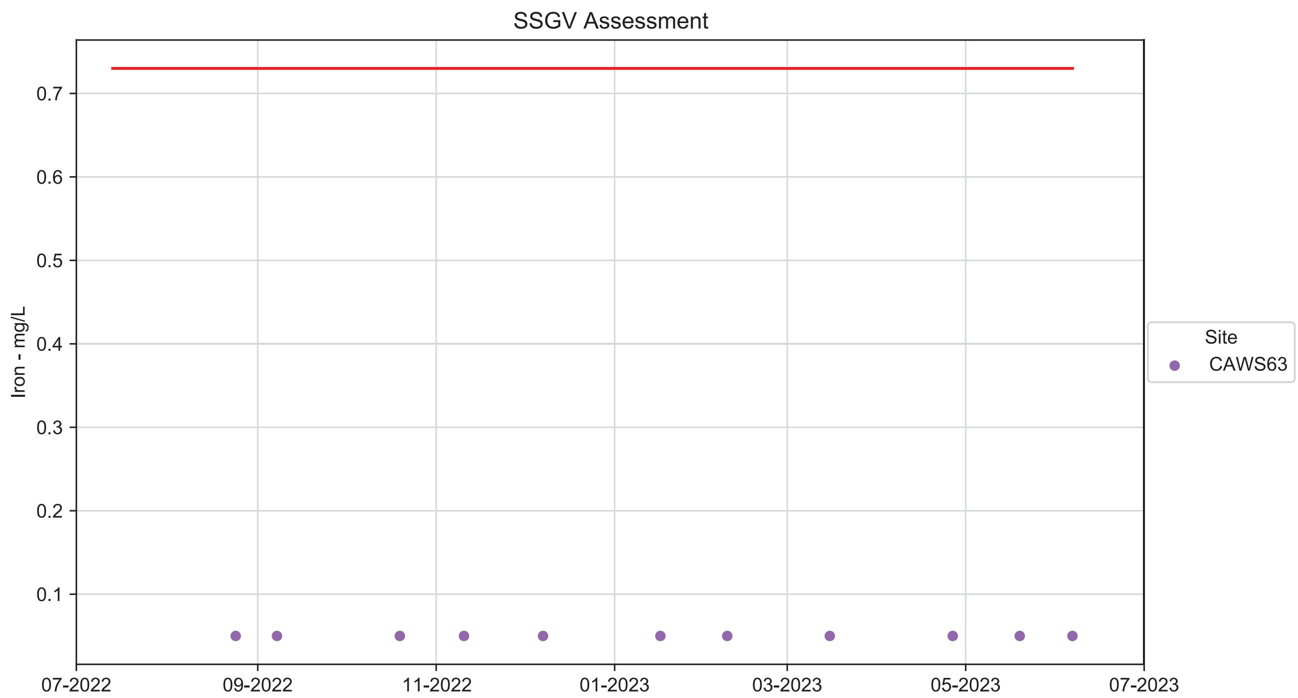
SSGV Assessment
Iron - mg/L
0.7
0.6
0.5
0.4
0.3
0.2
0.1
07-2022
09-2022
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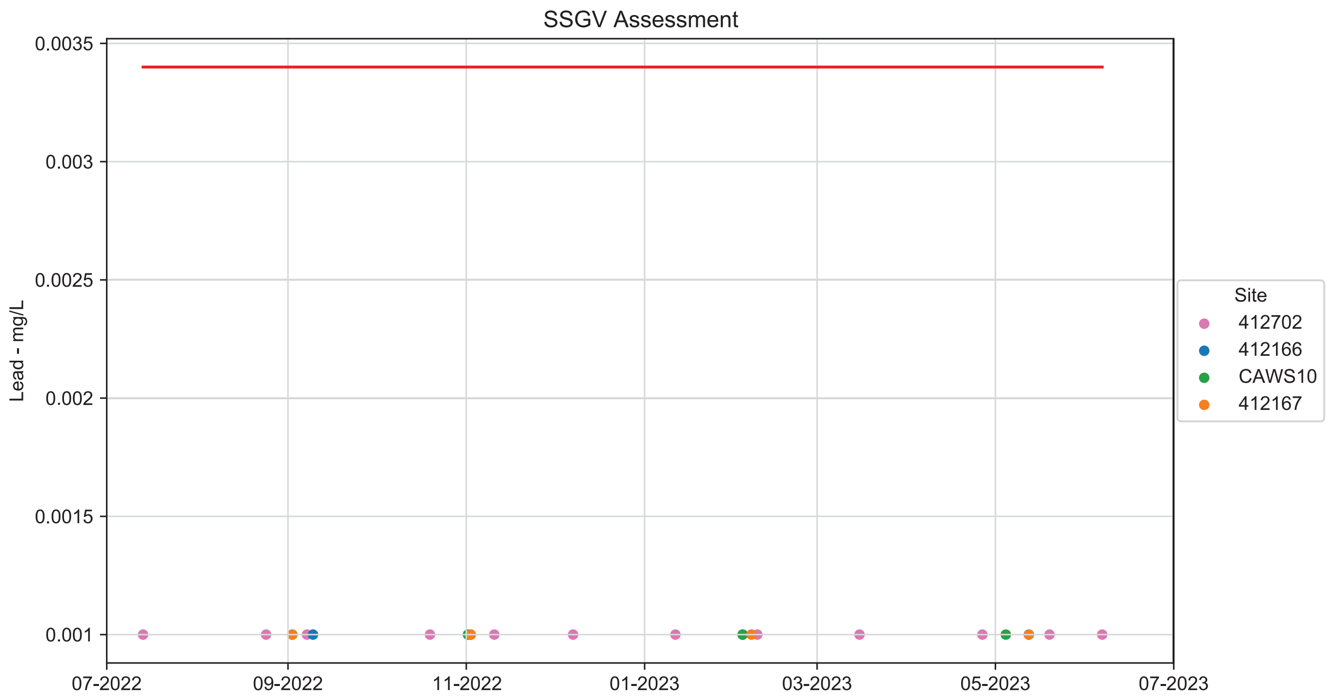
SSGV Assessment
Lead - mg/L
0.0035
0.003
0.0025
0.002
0.0015
0.001
07-2022
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11-2022
01-2023
03-2023
05-2023
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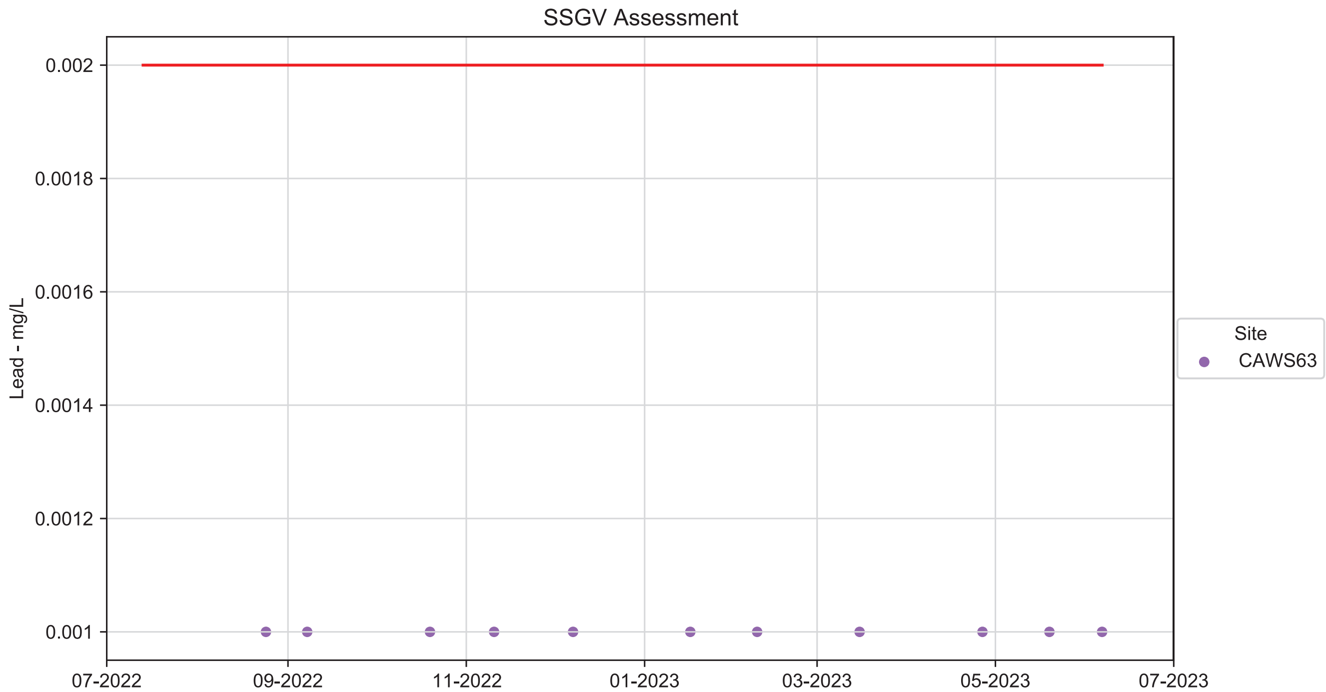
SSGV Assessment
Lead - mg/L
0.002
0.0018
0.0016
0.0014
0.0012
0.001
07-2022
09-2022
11-2022
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03-2023
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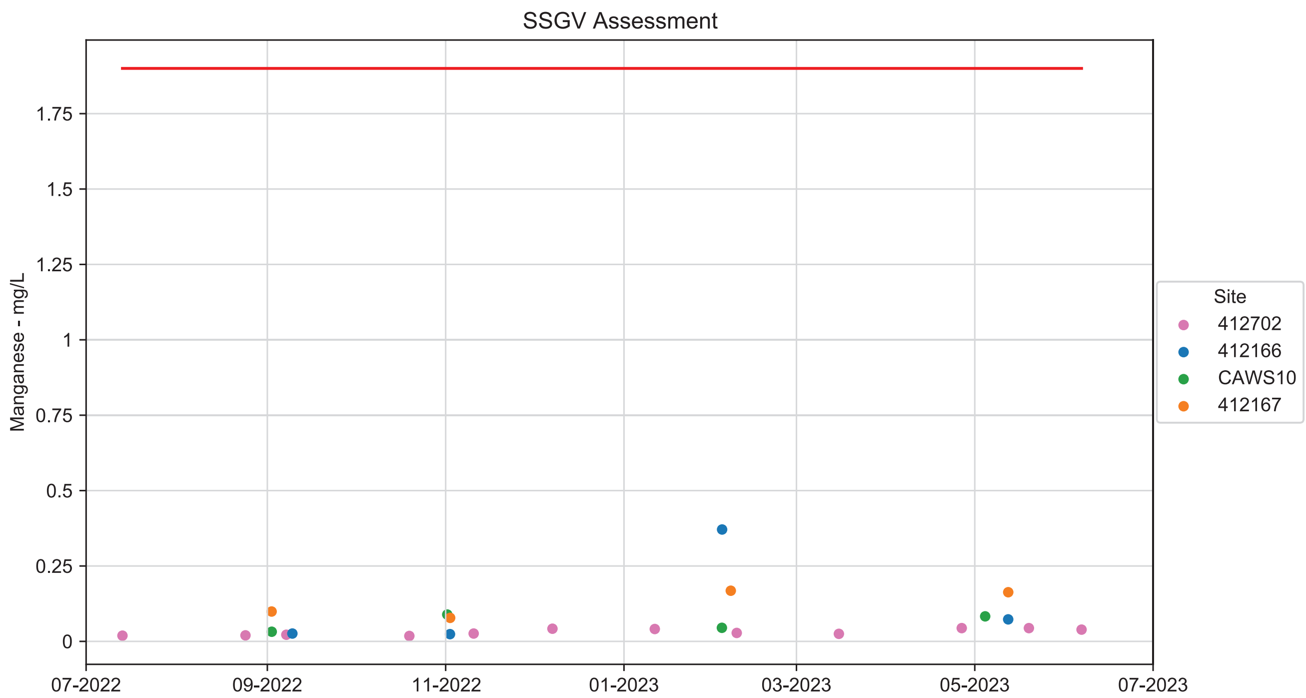
SSGV Assessment
Manganese - mg/L
1.75
1.5
1.25
1
0.75
0.5
0.25
0
07-2022
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11-2022
01-2023
03-2023
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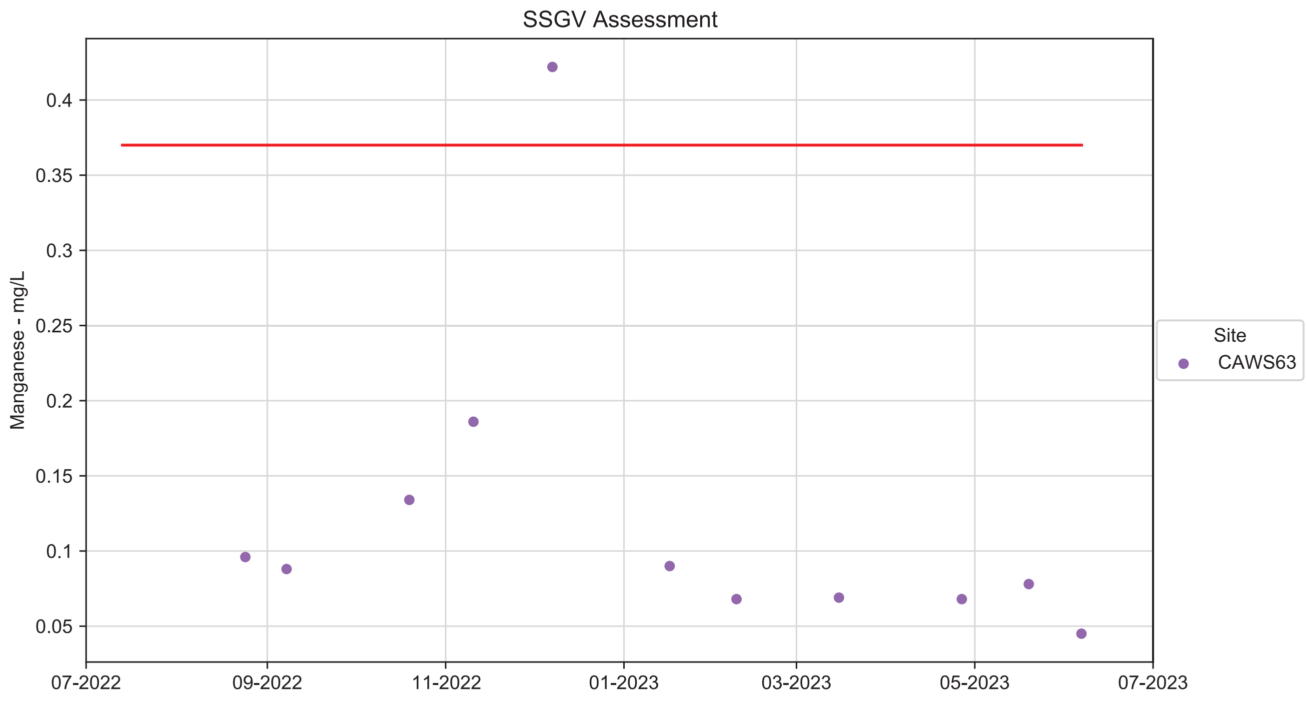
SSGV Assessment
Manganese - mg/L
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
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09-2022
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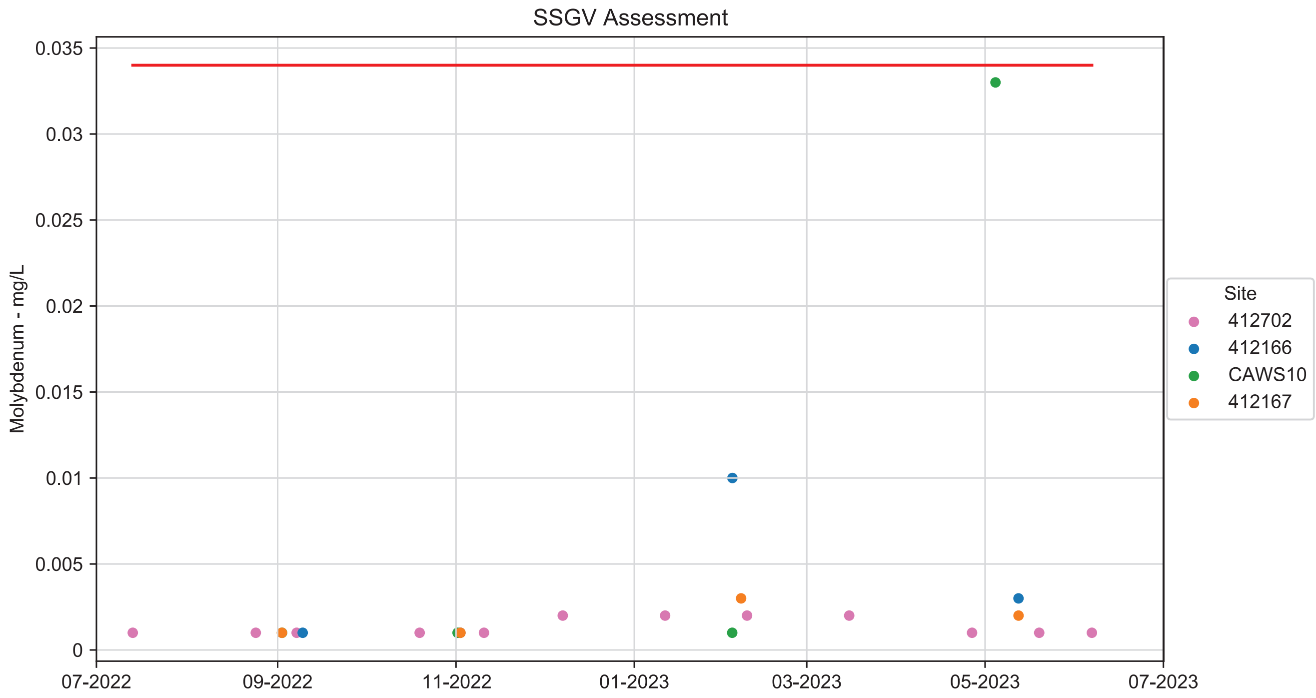
SSGV Assessment
Molybdenum - mg/L
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
07-2022
09-2022
11-2022
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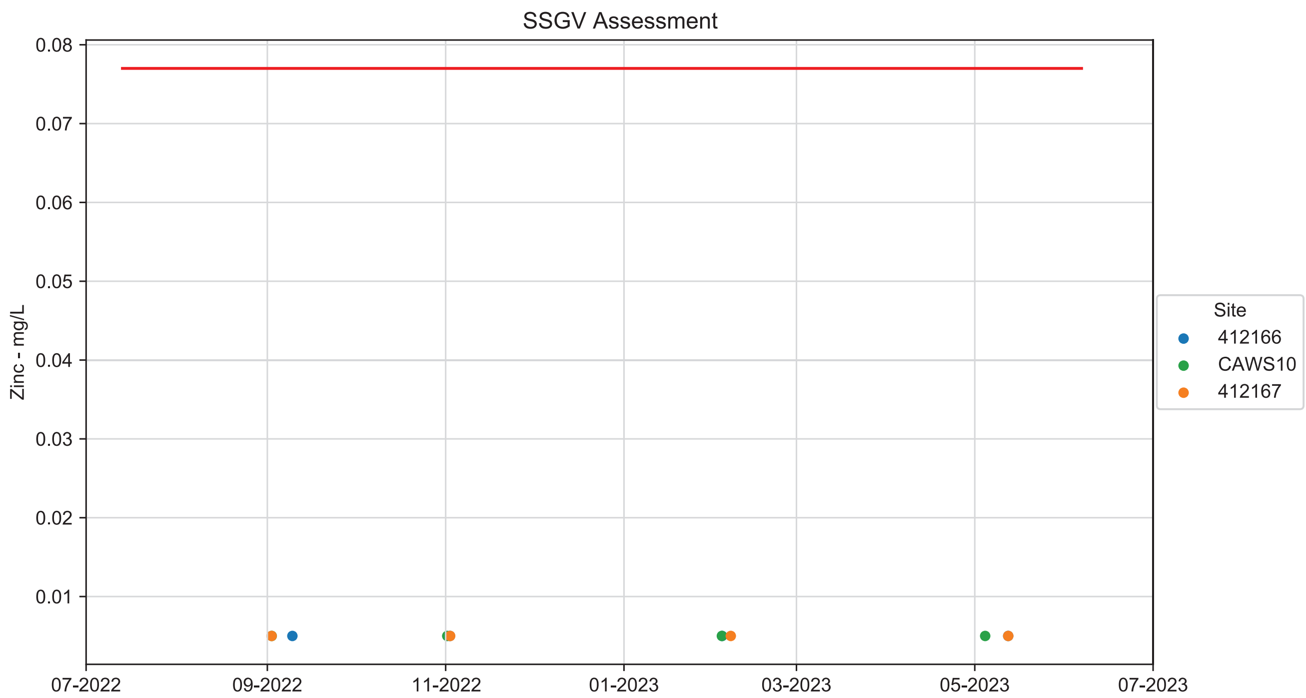
SSGV Assessment
Zinc - mg/L
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
07-2022
09-2022
11-2022
01-2023
03-2023
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07-2023
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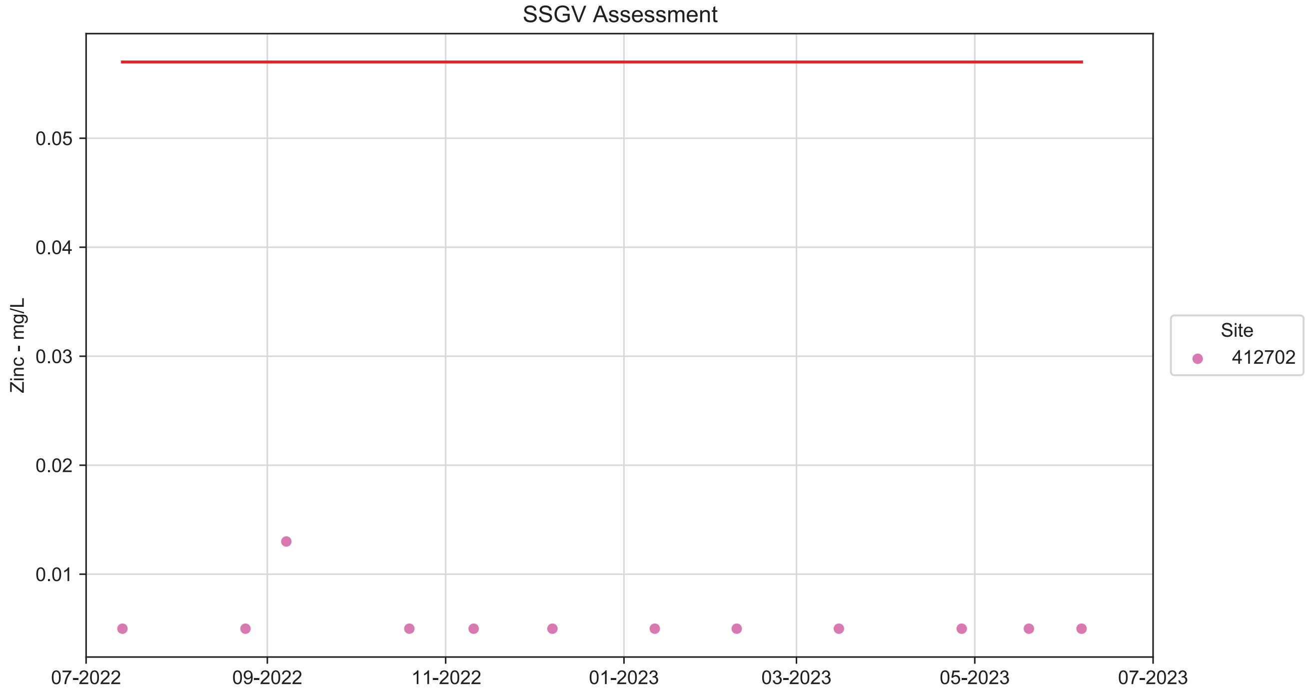
SSGV Assessment
Zinc - mg/L
0.05
0.04
0.03
0.02
0.01
07-2022
09-2022
11-2022
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07-2023
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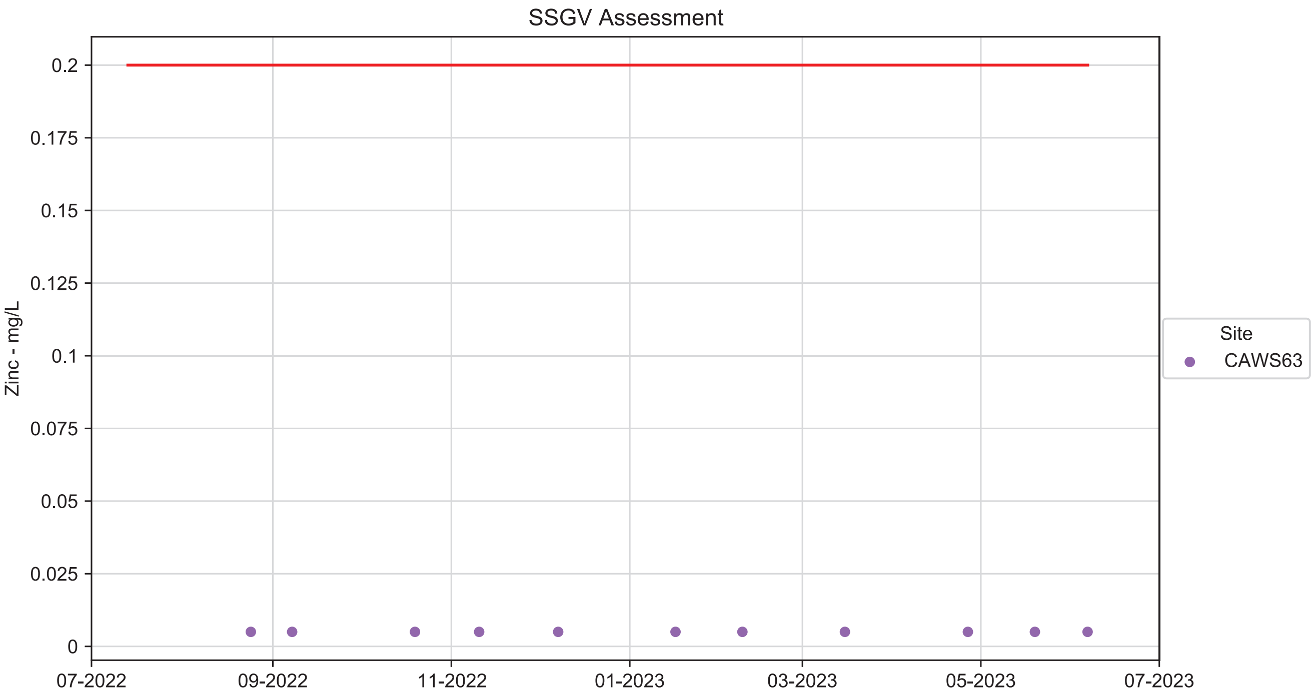
SSGV Assessment
Zinc - mg/L
0.2
0.175
0.15
0.125
0.1
0.075
0.05
0.025
0
07-2022
09-2022
11-2022
01-2023
03-2023
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