Irrigation District Water Quality Project

Water quality trends in irrigation water of southern Alberta

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Executive Summary

More than 65% of Canada's irrigation occurs in southern Alberta's 13 irrigation districts. The associated irrigation conveyance network supplies water for crops and livestock production, as well as for rural communities and many rural homes. Irrigation water provides wildlife habitat and recreational activities such as fishing, boating, and camping on irrigation reservoirs. Good quality irrigation water is important for all these uses. The quality of irrigation water in Alberta has been previously monitored by several researchers, but differences in study design and objectives made the data difficult to compare. A 10-year study (2006 to 2007 and 2011 to 2018) was conducted by Alberta Agriculture and Forestry, Agriculture and Agri-Food Canada, and the Alberta Irrigation Projects Association (now Alberta Irrigation Districts Association) to assess the quality of irrigation water within Alberta's irrigation districts using a long-term, consistent approach. This report is one of a series of reports based on data collected from the 10-year Irrigation District Water Quality project. The focus of this report is to examine whether water quality trends are present in irrigation water of southern Alberta.

Outlet of Little Bow Reservoir into Bow River Irrigation District Main Canal

A temporal trend is a consistent upward or downward shift in data with time. With regard to water quality, a downward or negative trend is generally interpreted as an improvement in water quality and an upward or positive trend is interpreted as a degradation of water quality. This is because the degradation of water quality is usually associated with increasing concentrations of contaminants such as excess nutrients, pathogens or pesticide residue. Trend analysis is a useful tool for interpreting large, multi-year datasets. It can be helpful in identifying water quality parameters of concern for the prioritization of management actions, recognizing future water quality concerns, and identifying situations in which water quality has improved. Temporal trend analyses were performed on irrigation water quality data collected during the Irrigation District Water Quality project to identify whether temporal trends in water quality data were present at individual monitoring sites, and in the overall study region. Of the 105 sites sampled for the project, trend analyses were performed on the 80 sites that were sampled for at least seven years, and whose location did not change. Tests in the Mann-Kendall family were chosen for the analysis of trends in water quality data.

Of the 38 parameters included in the regional (all sites combined) trend tests, there were 24 negative trends and one positive trend. Moderate negative trends were observed for pH and concentrations of total nitrogen, total dissolved solids, 2,4-Dichlorophenoxyacetic acid (2,4-D), aluminum, titanium, and zinc. Weak negative trends occurred for temperature and concentrations of dicamba, 2-methyl-4-chlorophenoxyacetic acid (MCPA), antimony, boron, copper, iron, lead, lithium, selenium, uranium, and vanadium. Very weak negative trends were found for concentrations of total phosphorus, dichlorprop, mecoprop, simazine, and thallium. A single positive (very weak) regional trend was observed for total suspended solids. Regional trends were not detected for the remaining 13 parameters tested. These included nitrate, orthophosphate, *Escherichia coli*, atrazine, clopyralid, *S*-ethyl dipropylthiocarbamate (EPTC), arsenic, barium, chromium, cobalt, manganese, mercury, and nickel. Overall, 37 out of 38 paramenters tested (97%) had either a negative trend or no trend in concentration with time.

Water sampling from an irrigation canal during the Irrigation District Water Quality project

Trend analyses were also completed for each water quality parameter at each site (parameter-by-site analysis). In total, 2324 trend tests were conducted in the parameter-by-site analysis. Trends were detected in 321 of these analyses, 306 of which were negative and 15 of which were positive. In over 90% of datasets, trends were either not detected or trend tests were not performed (which can generally be interpreted as lacking a meaningful trend). The parameters with the highest number of trends detected were total nitrogen, total dissolved solids, pH, 2,4-D, aluminum, antimony, boron, titanium, and zinc, These parameters had trends detected at more than 15 sites, with the vast majority being negative. The results of the parameter-by-site analysis were generally in agreement with the regional analysis.

The results of these analyses provide evidence that some temporal trends in water quality occurred from 2006 to 2018 in Alberta's irrigation districts. Although a relatively small percentage (< 15%) of tests identified trends in the parameter-by-site analysis, which could lead to the conclusion that water quality remained relatively constant during the study period, negative regional trends existed in a number of pesticide and metal parameters, as well as total nitrogen, total dissolved solids, pH, and temperature. This indicated an overall improvement in water quality in Alberta's irrigation districts given that lower values generally represent better water quality.

Although these negative trends indicate that water quality improved for several parameters during the study period, it should not be assumed that the results are part of a long-term consistent pattern. For many parameters, it appears that negative regional trends were driven by high values that occurred in 2006 and/or 2007. The absence of monitoring data in 2008 through 2010 make it difficult to assess whether negative trends were gradual, or whether 2006 and 2007 were simply outliers. Another phenomenon that would preclude the observed results representing a long-term improvement in water quality is if monitoring data only captured years representing the downward-trend of a longer-term oscillating cycle.

Further analyses would be necessary to understand the causes and magnitudes of trends, but the results can be used to identify areas of focus. The presence or absence of trends in water quality parameters can be used to help guide water quality management actions at regional and site-specific scales. Regional trends can help inform overarching priorities, while trends at individual sites can be useful for more localized management applications. Based on the trend analysis results, particular consideration could be given to the positive, albeit very weak, regional trend observed for total suspended solids, and to individual sites where positive trends occurred despite the absence of a regional trend (nitrate, *E. coli*, arsenic and manganese) or the absence of overall negative regional trend (total dissolved solids, aluminum, iron, and lead) as this may indicate that local rather than regional water quality concerns could exist.

Alberta Environment and Parks canal outside Calgary carrying water diverted from the Bow River to the Western Irrigation District

Although continued monitoring would be necessary to determine whether the observed trends are consistent with time, it can still be said that overall water quality remained consistent or even improved for several parameters during the specific period of study.

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1 Introduction

1.1 Project Background

More than 65% of Canada's irrigation occurs in Alberta's 13 irrigation districts. These districts encompass approximately 8,000 km of district- and government-owned irrigation infrastructure and more than 55 reservoirs that together serve 555,705 ha of irrigated agricultural land (Alberta Agriculture and Forestry 2019). Irrigation is essential for high agricultural production and crop diversity in southern Alberta. The irrigation conveyance network supplies water to many rural homes and more than 30 communities for household potable water, municipal purposes, parks, and industrial uses including food processing plants and factories. The conveyance network also supplies water for other important uses such as livestock production, wildlife habitat, and recreational activities such as fishing, boating, and camping on irrigation reservoirs. Good quality irrigation water is needed for all of these uses. High yielding and safe food production requires low concentrations of pesticides and pathogens in irrigation water. Low nutrient concentrations in water help prevent the growth of aquatic weeds and algae that would otherwise impede water conveyance. Good quality water is also important to minimize treatment costs for rural communities.

Secondary A canal in the Western Irrigation District

The quality of irrigation water in Alberta has been previously monitored by researchers including Bolseng (1991), Cross (1997), Greenlee et al. (2000), Saffran (2005), Little et al. (2010), and Palliser Environmental Services Ltd. (2011). The design and extent of monitoring varied among these studies, ranging from a one-time sampling of return sites in select irrigation districts (Bolseng 1991) to a comprehensive study throughout the irrigation districts (Little et al. 2010). Palliser Environmental Services Ltd. (2011) focused on only one irrigation district, whereas, irrigation water quality reported by Saffran (2005) was part of a larger study on surface water quality within the Oldman River watershed. Cross (1997) carried out a review of irrigation district water quality based on several data sources from 1977 to 1996. Such variation in design, parameters, and methodology used among these studies made the data difficult to compare.

A 10-year study (2006 to 2007 and 2011 to 2018) was conducted by Alberta Agriculture and Forestry, Agriculture and Agri-Food Canada, and Alberta Irrigation Projects Association (now Alberta Irrigation Districts Association) to assess the quality of irrigation water within Alberta's irrigation districts using a long-term, consistent approach. Although minor adjustments and additions were made during the study to accommodate secondary objectives and auxiliary projects, core sites and parameters remained unchanged. This study was supported by the Canada-Alberta Water Supply Expansion Program, the Irrigation Rehabilitation Program (special funding), and by Alberta’s irrigation districts. This report is one of a series of reports based on the data collected from the10-year Irrigation District Water Quality (IDWQ) project. The focus of this report is to examine whether water quality trends were present in irrigation water of southern Alberta during the project.

Irrigation District Water Quality Project Objectives:

- Assess quality of irrigation water used for irrigation and livestock watering
- Assess quality of irrigation water for the protection of aquatic life
- Assess changes in water quality as water travels through the irrigation infrastructure
- Assess water quality among irrigation districts
- Assess cumulative effect of irrigation returns on river water quality
- Assess effect of land-use on irrigation water quality

1.2 Water Quality Trend Analysis

A temporal trend is a consistent upward or downward shift in data with time. Trend analysis is a useful tool for interpreting large, multi-year datasets. It can be helpful in identifying water quality parameters of concern for the prioritization of management actions, recognizing potential future water quality concerns, and identifying situations in which water quality has improved. Temporal trend analyses were performed on irrigation water quality data collected during the IDWQ project (IDWQ) to identify whether temporal trends in water quality data were present at individual monitoring sites, and in the overall study region. Up to 10 years of data were available for trend analysis (2006 to 2007 and 2011 to 2018). The analysis performed was an initial assessment of whether trends in irrigation water quality exist and whether they are positive or negative. Further analyses would be required to answer more advanced questions such as what factor(s) caused trends, or what the magnitude of the trends were.

2 Methods

2.1 Site Selection

Water sampling sites were defined as primary, secondary, and return site types. Primary sites were where source water entered an irrigation district, such as from a reservoir a river diversion, or a main canal (Figure 2.1). Secondary sites were on lateral canals that branch off a main canal, or were immediately downstream of a mid-district reservoir. Return sites were located at the ends of the irrigation district conveyance network where unused irrigation water is returned to the rivers. Return sites are divided into watershed returns where water returns to rivers via coulees or natural drains, and infrastructure returns where water returns through constructed irrigation canals (Table 2.1). Additionally, three sites owned and operated by Alberta Environment and Parks (AEP) were included in trend analyses. These sites represent water diverted from rivers as it is conveyed towards irrigation districts: one on a canal that diverts water off the Bow River in the southeast part of the City of Calgary (AEP-P2); one on a canal that diverts water off the Bow River at Carseland, (AEP-P3); and one on a canal that diverts water from the Belly River to St. Mary Reservoir (AEP-S2).

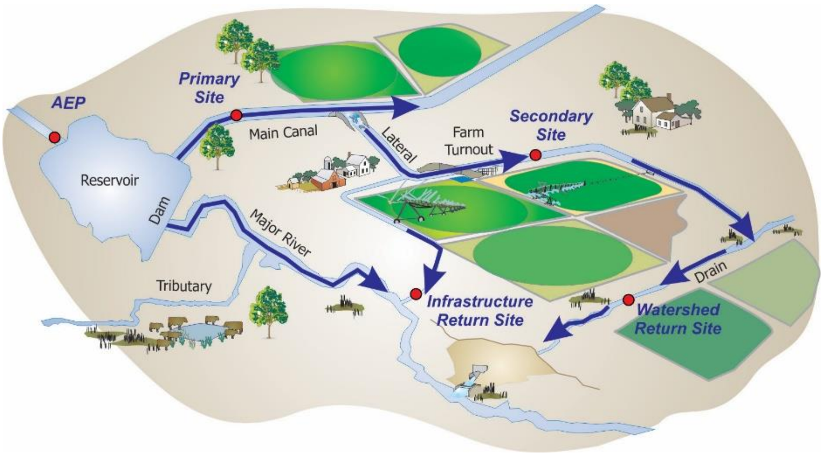

Figure 2.1 Schematic diagram of southern Alberta's irrigation conveyance network with Irrigation District Water Quality project site types.

Irrigation water was sampled at 105 sites in 12 districts from 2006 to 2018 (Figure 2.2) with the number of sites varying per year during the course of monitoring. The irrigation districts sampled were Mountain View (MVID), Aetna (AID), United (UID), Magrath (MID), Raymond (RID), Lethbridge Northern (LNID), Taber (TID), St. Mary River (SMRID), Ross Creek (RCID), Western (WID), Bow River (BRID), and Eastern (EID). There were no sampling sites in the Leavitt Irrigation District (LID) as it is a small district and water quality upstream and downstream of the LID was captured by other sites.Of the 105 sites sampled for the IDWQ project, trend analyses were performed on 80 sites. These sites were sampled for at least seven years, and had locations that did not change. This meant that 10 of the 13 irrigation districts were represented in the trend analyses, although not every site type (i.e., primary, secondary, or return) was represented in each irrigation district (Table 2.1).

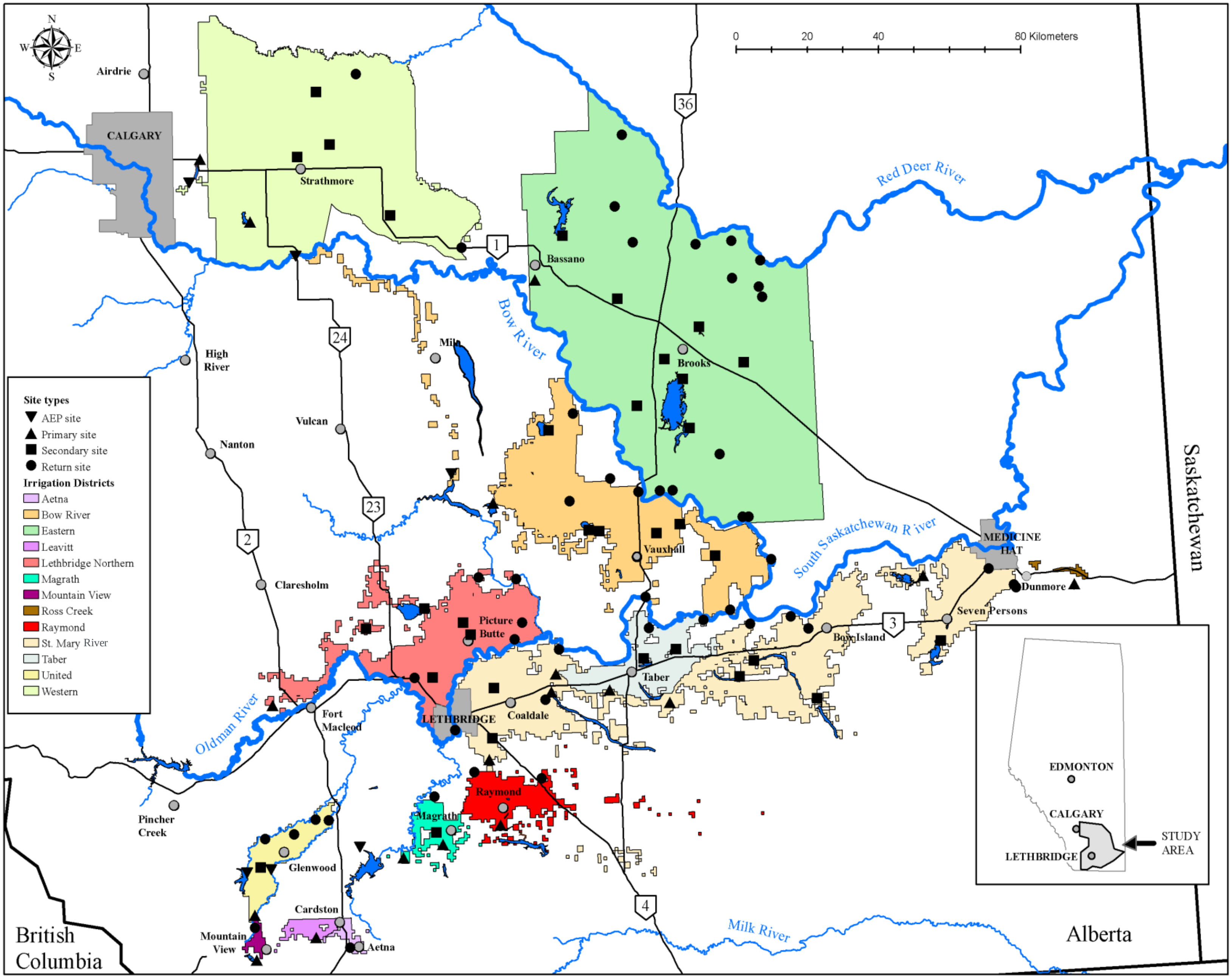

Figure 2.2 Irrigation District Water Quality project sampling site location within Alberta's irrigation districts.

Table 2.1 Sites from which data were used in trend analyses

District	Type	Site
MVID	Primary	MV-P1
	Return	MV-R1[z]
AID	Return	A-R1[y]
UID	Primary	U-P1
	Secondary	U-S1
	Return	U-R2[z]
MID	Primary	M-P1
	Secondary	M-S1
	Return	M-R1[y]
RID	Primary	R-P1
	Return	R-R1[y]
		R-R2[y]
LNID	Primary	LN-P1
	Secondary	LN-S1
		LN-S2
		LN-S3
		LN-S4
		LN-S5
	Return	LN-R1[y]
		LN-R2[y]
		LN-R3[z]
		LN-R4[z]
TID	Primary	T-P1a
	Secondary	T-S1
		T-S2
		T-S3
	Return	T-R1[z]
		T-R2[z]
SMRID	Primary	SMW-P1
	Secondary	SMW-S2
	Return	SMW-R1[y]
		SMW-R2[z]
	Primary	SMC-P1
	Secondary	SMC-S1
		SMC-S2
		SMC-S3
	Return	SMC-R1[z]
		SMC-R3[z]
		SMC-R4[z]
	Primary	SME-P1
	Secondary	SME-S1
	Return	SME-R1a[z]
		SME-R2[y]
WID	Primary	W-P1
		W-P2
	Secondary	W-S1
		W-S2
		W-S3
		W-S4
	Return	W-R1a[z]
		W-R2[y]
BRID	Primary	BR-P1
	Secondary	BR-S1
		BR-S2
		BR-S3
		BR-S4a
		BR-S5
	Return	BR-R1[z]
		BR-R2[y]
		BR-R3[y]
		BR-R4[y]
		BR-R5[z]
EID	Primary	E-P1
	Secondary	E-S1
		E-S2
		E-S3
		E-S4
		E-S5
		E-S6
		E-S8
	Return	E-R1[z]
		E-R2[z]
		E-R2a[y]
		E-R3[z]
		E-R4a[z]
		E-R5[z]
		E-R8a[y]
AEP canal		AEP-P2
		AEP-P3
		AEP-S2

[z] Infrastructure return
[y] Watershed return

2.2 Site Nomenclature

Sampling sites were identified using a prefix according to their location, either in an irrigation district (abbreviated to the first one or two letters of the district acronym), or outside of the districts (AEP = Alberta Environment and Parks canal). The St. Mary River Irrigation District was further divided into three areas as distinguished by a third letter in the prefix, (W = west, C = central, and E = east). The site type and numeric identifier were included in the suffix of the hyphenated name. The site type (P = primary, S = secondary, R = return) preceded a numeral used to differentiate sites of the same type, within the same district. Numeric identifiers do not necessarily represent the sequence of sites from upstream to downstream. Finally, the letter ‘a’ was appended to the end of some site names to indicate the replacement of a former site with a similar, but relocated site. Signs were located at each site to identify the site name and sampling location (Figure 2.3).

Figure 2.3 Sign post at SMW-R2.

2.3 Sampling Deployment and Intervals

Sites were grouped into sampling areas, with entire irrigation districts (except SMRID) being sampled on the same day. A single team was responsible for collecting samples from each sampling area. Larger districts, such as BRID, LNID, EID, and WID, included two or three areas sampled on the same day. Smaller districts, such as AID, MVID, and UID, were grouped in one area and sampled on the same day. This was also done for RID and MID. The three areas in the SMRID were sampled during three consecutive days.

Sampling was conducted from late May to the beginning of September, with two to five weeks separating four sampling events. Collection times were optimized to occur during active irrigation demand. The start of the season or individual sample collections were occasionally postponed as a result of reduced irrigation demand, usually due to rainfall. Three to four days were required to sample all sites during each sampling event.

2.4 Sample Collection

Grab samples were collected using a 1-L polyethylene bottle, attached to a telescopic pole with an extension range of four meters. The bottle was filled by pointing the mouth upstream, as close to the middle of the channel as possible, and mid-depth to avoid sampling the water surface or disturbing the bottom sediment (Figure 2.4a). The bottle was triple rinsed with sample water, and the rinse water was emptied downstream of the sample site. A new sampling bottle was used at each site.

At each site, the sampling bottle was used to fill laboratory bottles for the analysis of different parameters (Figure 2.4b). Latex gloves and appropriate safety equipment were used when collecting the sample and filling the bottles. Samples were placed in coolers with ice while in the field. At the end of the sampling day, bottles were delivered to their respective laboratories for analysis.

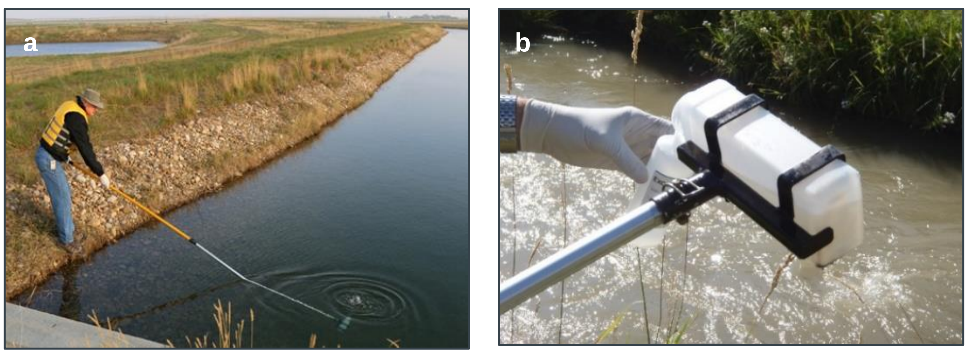

Figure 2.4 Water sampling an irrigation canal with a) a telescopic pole and b) filling a laboratory bottle from sampling bottle.

2.5 Parameter Selection

Of the 240 parameters measured for the IDWQ project, 44 were chosen for trend analysis (Table 2.2). Most parameters selected for trend analysis were measured throughout the study, resulting in datasets comprising 10 years of data (i.e., 2006 to 2007 and 2011 to 2018) with four samples per year. However, some parameters were added to the analytical suite after the start of the project and were monitored for less than 10 years. Trend analyses were not performed for parameters with less than seven years of monitoring data (Table 2.2). Among the parameters related to salinity, total dissolved solids (TDS) was included as a measure of the overall concentration of salts. Of the nutrient parameters, nitrate, total nitrogen (TN), orthophosphate, and total phosphorus (TP) were chosen for trend analysis. Total dissolved phosphorus (TDP) was not included as it was only measured for six years, and was closely correlated to orthophosphate. Additionally, because TN was a calculated parameter in 2006 and 2007, data from these years were excluded from analyses. This was because there was uncertainty in the values of TN that were calculated from nitrogen fractions less than laboratory method detection limits (MDLs). Additionally, temperature, total suspended solids (TSS), and pH were included in the trend analyses. Flow is an important physical parameter that strongly affects concentrations; however, flow data were not available for most sites and thus were not included and/or accounted for in the trend analysis directly or indirectly. Generic *Escherichia coli* (*E. coli*) was included in trend analysis as it was the only bacteriological parameter consistently measured throughout the study. Among the pesticides, only those with more than two detections at any given site were considered, and as a result, a large majority of pesticides were excluded. Trend analyses were performed on concentrations of total metals that met the 7-year requirement, and these datasets had a maximum of seven years of data because analysis of metals was discontinued after 2015.

Eight data points (five *E. coli* values and three TSS values) were right censored (i.e., had concentrations that were greater than a certain value but were otherwise unquantifiable). These values were deleted as they would have created technical issues in trend analyses. Such data censoring is generally unadvisable, however, it was considered to have no effect on the overall findings of trend analysis given that only eight out of more than six thousand *E. coli* and TSS values (<0.1%) were deleted.

Table 2.2 Water quality parameters analyzed for the presence of trends, with the number of years of data available/analyzed for each parameter.

Parameter	Years	Parameter	Years
Nutrients		***Metals (Total)***	
Nitrate nitrogen (NO_3-N)	10[z]	Aluminum (Al)	7[y]
Total nitrogen (TN)	8[x]	Antimony (Sb)	7
Total phosphorus (TP)	10	Arsenic (As)	7
Orthophosphate phosphorus (PO_4-P)	10	Barium (Ba)	7
		Beryllium (Be)	7
Salinity		Boron (B)	7
Total dissolved solids (TDS)	10	Cadmium (Cd)	7
		Chromium (Cr)	7
Physical		Cobalt (Co)	7
pH	10	Copper (Cu)	7
Temperature (Temp)	10	Iron (Fe)	7
Total suspended solids (TSS)	10	Lead (Pb)	7
		Lithium (Li)	7
Bacteriological		Manganese (Mn)	7
Escherichia coli (*E. coli*)	10	Mercury (Hg)	7
		Molybdenum (Mo)	7
Pesticides		Nickel (Ni)	7
2,4-Dichlorophenoxyacetic acid (2,4-D)	10	Selenium (Se)	7
Atrazine (Atra)	10	Silver (Ag)	7
Bromoxynil (Brox)	10	Thallium (Tl)	7
Clopyralid (Clop)	10	Tin (Sn)	7
Dicamba (Dicm)	10	Titanium (Ti)	7
Dichlorprop (Dcpr)	10	Uranium (U)	7
S-ethyl dipropylthiocarbamate (EPTC)	8	Vanadium (V)	7
2-methyl-4-chlorophenoxyacetic acid (MCPA)	10	Zinc (Zn)	7
Mecoprop (MCPP)	10		
Simazine (Sima)	8		

[z]Parameters with 10 years of available data were sampled from 2006-2007, and 2011-2018.
[y]Parameters with seven years of available data were sampled from 2006-2007, and 2011-2015 (i.e., metals).
[x]Parameters with eight years of available data were sampled from 2011-2018.

2.6 Data Analysis

2.6.1 Testing for the Presence of Seasonality

The presence of seasonality, or in this case, differences in concentrations that are related to the timing of sampling (June/early July, July, late July/early August, late August/September), is often a major source of variation in environmental data. Accounting for seasonality can lend greater power to detect temporal tends (Helsel and Hirsch 2002). For this reason, the presence of seasonal patterns in water quality parameters (i.e., for each parameter at each site) was assessed before testing for the presence of trends. Different trend tests were applied depending on whether seasonality was present (Section 2.6.2). Because most parameters were not normally distributed and contained censored observations, a version of the generalized Wilcoxon score test was used to test for seasonality using the 'cendiff' routine in the package NADA (Lee 2013) of the statistical software R (R Development Core Team 2018) rather than a parametric test (Helsel 2012). Assessment of seasonality was performed on data re-censored at the highest detection limit as seasonal data would be assessed for trends using the Seasonal Kendall test (Section 2.6.2), which can only accommodate a single level of censoring.

2.6.2 Assessment of Trends

Tests in the Mann-Kendall family were chosen for the analysis of trends in water quality data given that these are non-parametric, rank-based methods that require fewer assumptions to be made about the data (e.g., normality of residuals) than parametric, regression-based tests. They also more easily accommodate the presence of data that are less than MDLs (i.e., left-censored data), a feature of the majority of water quality parameters (Helsel and Hirsch 2002, Helsel 2012).

Two different tests in the Mann-Kendall family were used for the analysis of temporal trends of each parameter at each site (herein referred to as the 'parameter-by-site trend analysis'). For datasets that displayed seasonality, the Seasonal Kendall test was used (Hirsch et al. 1982). Before performing Seasonal Kendall tests, data were re-censored at the highest MDL, as the Seasonal Kendall test cannot accommodate multiple detection limits. In this process, all censored (less than MDL) values and values less than the maximum MDL for a given paramter were set at the same (arbitrary) value less than the greatest MDL. These analyses were performed in the statistical software R, using the function 'kendallSeasonalTrendTest' with a continuity correction, in the package 'EnvSats' (Millard 2013). For data that were not seasonal, a version of the Mann-Kendall test that can accommodate multiple detection limits, the Censored Mann-Kendall test, was used. Because this test allows the presence of multiple MDLs (unlike the Seasonal Kendall), it did not require data to be re-censored below the highest MDL. Censored data were set at the detection limit, as described in (Helsel 2012). These tests were implemented using the 'cenken' routine in the package 'NADA' (Lee 2013) in R.

In the parameter-by-site trend analysis, trend tests were not performed for datasets with less than seven years of data. For example, although the metals included in the trend analysis were sampled for seven years (Table 2.2), at specific sites (e.g., LN-R3 and LN-R4) they were sampled for less than seven years and not included. Additionally, trend tests were not performed for specific datasets with less than two values that were greater than the MDL, as statistical power would have been too low to detect a trend. Because many individual trend tests were performed in the parameter-by-site analysis, the false discovery rate (FDR) method (Benjamini and Hochberg 1995) for P-value adjustment was used to adjust the P-values of individual trend tests to maintain the expected rate of false positives for the entire analysis (rather than individual tests) at 0.05.

Overall trends, considering all sites, were also tested. This was done using the Regional Kendall test. This test is essentially the same as the Seasonal Kendall test and was performed using the 'kendallSeasonalTrendTest' function in R with sites instead of seasons used to block the data (Helsel and Frans 2006). Like the Seasonal Kendall test, the Regional Kendall test cannot accommodate multiple MDLs, so the data for the test were re-censored at an arbitrary value less than the highest MDL, as described previously. Additionally, the Regional Kendall test can only accommodate one observation per site per year, so for each parameter at each site, the second largest concentration of four values per year, after censoring, was used (i.e., the 75th percentile). It would have been preferred to use median concentrations, but this approach was deemed inappropriate given that there were only four values per site per year of a given parameter. This meant that the median annual concentration would have represented the mean of the second and third largest concentrations. This was problematic when one of those values was below the MDL, making the median concentration the mean of a censored value set at an arbitrary value below the MDL and a non-censored value. This created uncertainty in the ranks of observations. The FDR method of P-value correction was used for the Regional Kendell tests performed to maintain the expected rate of false positives for the regional trend analysis at 0.05.

All three of the tests employed in this trend analysis (i.e., the Seasonal Kendall, Censored Mann-Kendall, and Regional Kendall) have test statistics based on Kendall's tau (τ) correlation coefficient. This coefficient measures the strength of the monotonic (i.e., consistently increasing or decreasing) association between two variables, for example, a given water quality parameter and time. It makes no assumption about the shape of the trend (e.g., linear, exponential, logarithmic), as long as it is monotonic. Kendall's tau varies between 1 and -1, with positive values indicating a positive correlation, negative values indicating a negative correlation, and 0 indicating no association. The absolute value of the magnitude of tau reflects the strength of the correlation (i.e., values close to 1 and -1 represent strong correlations) (Helsel and Hirsch 2002). The shape of trends were not assessed or reported in this study, and because the P-values of the tests used were not affected by transformations that do not change the ranks of the data (Helsel and Hirsch 2002), the data were not transformed before performing trend tests.

3 Results and Discussion

3.1 Seasonality Results

Of the 3,520 parameter-by-site datasets (i.e., 44 parameters by 80 sites), 582 displayed seasonal patterns as indicated by a significant generalized Wilcoxon score test. Certain parameters tended to display seasonality more often than others, but only temperature (66 out of 80 sites), TDS (52 of 80 sites), silver (41 out of 80 sites), and uranium (44 out of 80 sites) displayed seasonality in more than half of the parameter-by-site datasets. Of the remaining parameters, only TSS (32 of 80 sites), *E. coli* (25 of 80 sites), aluminum (21 of 80 sites), barium (22 of 80 sites), copper (22 of 80 sites), iron (31 of 80 sites), manganese (35 of 80 sites), and vanadium (25 of 80 sites) demonstrated seasonality in more than one quarter of the datasets. As it is related to trend analysis, seasonality was assessed only for the purpose of deciding whether to perform Seasonal Kendall tests or Censored Mann-Kendall tests. Datasets that displayed seasonality, as indicated by performance of a Seasonal Kendall (SK) test, are identified in Tables A.4 and A.5.

3.2 Trend Analysis Results

3.2.1 Regional Kendall Trend Analysis

Of the 44 parameters included in trend analyses, 38 were tested for the presence of regional trends. Regional Kendall trend analysis was not performed for bromoxynil, beryllium, cadmium, molybdenum, silver, and tin because the Regional Kendall datasets for these parameters had less than two above-MDL values after re-censoring at their respective highest MDLs and reducing the datasets to one value per site per year. Of the 38 tests, there were 24 negative trends and one positive trend (Table 3.1, Table 3.2). Moderate negative trends (Kendall's tau correlation coefficient = -0.5 to -0.3) were observed for pH and concentrations of TN, TDS, 2,4-Dichlorophenoxyacetic acid (2,4-D), aluminum, titanium, and zinc (Table 3.1, Table 3.2, Figure 3.1, Table A.2 and Table A.3). Weak negative trends (Kendall's tau = -0.3 to -0.1) occurred for temperature and concentrations of dicamba, 2-methyl-4-chlorophenoxyacetic acid (MCPA), antimony, boron, copper, iron, lead, lithium, selenium, uranium, and vanadium. Very weak negative trends (Kendall's tau = -0.10 to 0) were found for concentrations of TP, dichlorprop, mecoprop, simazine, and thallium. The single positive (very weak) regional trend was observed in TSS (tau = 0.09). Regional trends were not detected for 13 parameters: nitrate, orthophosphate, *E. coli*, atrazine, clopyralid, *S*-ethyl dipropylthiocarbamate (EPTC), arsenic, barium, chromium, cobalt, manganese, mercury, and nickel (Table 3.1, Table 3.2, Figure 3.1, Table A.2 and Table A.3). Overall, 37 out of 38 parameters tested (97%) had either a negative trend or no trend in concentration with time.

3.2.2 Parameter-by-Site Analysis

In the parameter-by-site analysis, 2,324 Seasonal Kendall/Censored Mann-Kendall tests were performed out of the 3,520 potential datasets (i.e., 44 parameters at 80 sites). Tests were not run in 1,196 instances because datasets had either less than seven years of data or fewer than two values above the MDL. In total, 321 trends (Padj ≤ 0.05) were detected: 306 of which were negative and 15 of which were positive. This means that trends were detected in 14% of the tests performed. When considering the whole dataset, trends were either not detected or trend tests were not performed (which can generally be interpreted as lacking a meaningful trend) in over 90% of the datasets. The details of each test, including the test performed, the percentage of values that were below the MDL, the strength of the trend (Kendall's tau correlation coefficient), and the P-value of the tests, are reported in Tables A.4 and A.5. The parameters with the highest number of trends were TN, TDS, pH, 2,4-D, aluminum, antimony, boron, titanium, and zinc, which all had trends detected at more than 15 sites, with the vast majority being negative trends. The highest number of trends (36) was observed for 2,4-D. No trends were found in the parameter-by-site analysis of five pesticides (atrazine, bromoxynil, clopyralid, EPTC, and simazine, Table 3.1) and 11 metals (barium, beryllium, cadmium, chromium, cobalt, mercury, molybdenum, nickel, silver, thallium, and tin, Table 3.2).

The results of the parameter-by-site analysis were generally in agreement with the regional analysis. Parameters with regional trends displayed trends of the same direction at a number of individual sites. For instance, the negative regional trends in TN, TP, pH, temperature, 2,4-D, dichlorprop, dicamba, MCPA, mecoprop, antimony, boron, copper, lithium, selenium, titanium, uranium, vanadium, and zinc were consistent with the fact that any trends detected in the parameter-by-site analysis were also negative (Table 3.1, Table 3.2). Parameters that had no trends detected in the parameter-by-site analysis after FDR P-value correction also displayed no regional trends, except for simazine and thallium, for which very weak negative regional trends were detected. The opposite occurred in the case of orthophosphate and manganese, for which positive trends occurred at one or more sites, yet no regional trend was observed (Table 3.1, Table 3.2). For nitrate, *E. coli*, and arsenic, the small number of trends at individual sites were mixed in whether they were positive or negative. This could explain the absence of an overarching regional trend. Additional small inconsistencies existed between the regional and parameter-by-site trend analyses. For TDS, aluminum, iron, and lead, the parameter-by-site analysis revealed one positive trend for each parameter that was contrary to the direction of the overall negative regional trends, and for TSS, one negative trend was observed despite the positive regional trend.

Including all districts, a similar percentage of tests showed negative trends among site types. Primary, secondary, and return sites showed negative trends for 8.2%, 8.8%, and 8.8% of trend tests, respectively (Table 3.3). The same was true for positive trends (i.e., 0.1%, 0.4%, and 0.6% of trend tests for primary, secondary, and return sites, respectively), with no individual district having positive trends detected in more than 2.3% of trend tests for any site type. Infrastructure and watershed return site types had similar percentages of negative and positive trends when compared to each other. Specifically, infrastructure and watershed return site types showed 6.7% and 8.9% for negative trends, and 0.5% and 0.7% for positive trends, respectively (Table 3.4). More variability was observed in the percentage of trend tests found to be negative among irrigation districts (0.0 to 18.2% for primary sites, 0.0 to 15.3% for secondary sites, and 2.6 to 19.3% for return sites, Table 3.3).

3.3 Discussion

The results of these analyses provide evidence that temporal trends occurred in some water quality parameters from 2006 to 2018 in Alberta’s irrigation districts. Negative regional trends existed for a number of pesticide and metal parameters, as well as for TN, TDS, pH, and temperature (25 out of 38 parameters tested), despite a relatively small percentage (< 15%) of sgnificant tests being found in the parameter-by-site analysis. This indicates an overall improvement in water quality in Alberta’s irrigation districts, given that lower values generally represent better water quality for parameters. The high number of regional trends, as compared to parameter-by-site trends, also demonstrates the benefit of the Regional Kendall test; that while the evidence may be inadequate to identify trends at individual sites, an overall trend can be detected when consistent patterns are observed at many sites (Helsel and Frans 2006). For this reason, and the fact that the parameter-by-site analysis was mostly consistent with the regional analysis, the discussion herein is focused largely on the regional trends.

Although the finding that trends were generally negative indicates that water quality improved for several parameters during the study period, caution should be taken in assuming that the results are part of a long-term consistent pattern. For many parameters, it appears that negative regional trends were driven by high values (or simply a higher number of above-MDL values) that occurred in 2006 and/or 2007 (e.g., dichloroprop, antimony, thallium, selenium, and zinc) (Figure 3.1). The absence of monitoring data in 2008 through 2010, and the prevalence of below-MDL values, make it difficult to assess whether negative trends were gradual, or whether 2006 and 2007 were simply outliers. Indeed, it was common for one or two years to have values inconsistent with trends or average conditions (e.g., temperature, MCPA) (Figure 3.1). If higher concentrations in many parameters in 2006 and 2007 occurred because of particular conditions occurring at random in these years, the observed negative trends will not necessarily continue. Furthermore, there was a change in analytical laboratories that occurred between 2007 and 2011 for all parameters except pesticides. Although all efforts were taken to maintain the same analytical methods, this may have contributed to the commonality of negative trends. Even a small methodological bias leading to estimation of slightly higher concentrations in 2006 and 2007 could cause the detection of trends in the rank-based analysis applied here. That being said, if a change in laboratories was the reason for high values in some parameters early in the study, it does not explain why 2006 values were sometimes higher than 2007 values, as was the case for antimony, nor does it explain why the same pattern occurred for many pesticide parameters even though the laboratory for these analyses did not change. Regardless, caution should be exercised when interpreting trends where values in 2006 and/or 2007 were noticeably greater than in the remainder of the study, yet patterns in concentrations and/or proportion of below-MDL values in later years appeared relatively flat (TP, dichloroprop, antimony, selenium, thallium, and zinc). Antimony in particular should be viewed carefully because of the drastic change in the proportion of values below the MDL between 2006 and the rest of the study. These same parameters should be interpreted with caution in the parameter-by-site analysis.

Another phenomenon that would preclude the observed results representing a long-term improvement in water quality is if monitoring data only captured years representing the downward-trend of a longer-term oscillating cycle. For example, for TDS and pH, where the absence of below-MDL values makes patterns easier to see, there is some evidence of multi-year fluctuations that occurred on top of overall negative trends (Figure 3.1). Continued monitoring would be necessary to determine whether the observed trends are consistent with time, the result of some factor causing particularly high concentrations of many parameters in 2006 and 2007, or part of longer-term oscillations. Nonetheless, it can still be said that overall water quality for several parameters improved during the specific period of study.

For those parameters for which no regional trend was found, there were three scenarios in which this result should not be interpreted as definitive proof that regional trends were absent. The first was when there was little power to detect trends because the majority of values were below the maximum MDLs. This was true for atrazine, clopyralid, EPTC, chromium, cobalt, and mercury (Figure 3.1, Tables A.2 and A.3), and for those parameters where regional trends were not assessed because of too few above-MDL values (bromoxynil, beryllium, cadmium, molybdenum, silver, and tin). For these parameters it is possible that trends were present in concentrations below detection limits. That being said, from a management perspective, it is probably safe to interpret these instances as having no meaningful trend. This point also applies to many datasets in the parameter-by-site analyses (Tables A.4 and A.5). The second scenario occurred for nitrate, *E. coli*, and arsenic, for which both positive trends and negative trends occurred at individual sites (Table 3.1). This indicates that, for these parameters, the absence of an overall regional trend may not be the result of a lack of trends in the area, but because of opposing trends occurring at different sites (Helsel and Frans 2006). For these parameters, although trends at individual sites were not common, the parameter-by-site analysis is more important than the regional analysis in determining whether trends were present. Tests for heterogeneity of trend (van Belle and Hughes

1984) were attempted for each Regional Kendall analysis to formally test whether evidence for opposing trends between sites existed. However, the test could not be computed for parameters that had at least one site where all observations were below-MDL. Because this was true for the majority of parameters, these results are not presented. This same concept applies to the parameter-by-site analysis from a seasonal perspective; opposing trends occurring in different seasons could result in the overall absence of a trend. Again, tests for heterogeneity of trend were run for Seasonal Kendall tests performed in the parameter by-site analysis. Because these tests were invalid for datasets in which at least one season had all below-MDL values, and because few Seasonal Kendall tests were performed owing to a lack of seasonality, opposing seasonal trends were not considered to be a prevalent problem. Finally, a lack of overall trend as detected in this analysis could also occur if a trend was present but was non-monotonic (e.g., humped or u-shaped trends). This phenomenon was not assessed in the parameter-by-site analysis, and was not formally tested in the regional analysis, but visual inspection did not show the presence of regional humped or u-shaped trends to be particularly obvious in those parameters for which regional trends were not found. Although, as discussed previously, potential multi-year oscillations may be superimposed upon overall negative trends.

Information on the presence and/or location of trends in water quality parameters in the irrigation districts of Alberta can inform the management of water and watersheds as it can help to identify and prioritize parameters that represent water quality concerns. For example, if a parameter consistently exceeds water quality guidelines (regionally or site-specifically) and exhibits a positive trend through time, it may be considered a higher management priority than a parameter that exceeds guidelines but has a decreasing trend. Similarly, if a parameter is below guidelines but is increasing with time, proactive management actions may be developed to prevent it from becoming problematic. Based on these results, particular consideration could be given to positive trends, including the positive, albeit very weak, regional trend observed for TSS, and to individual sites where positive trends occurred despite the absence of a regional trend (nitrate, *E. coli*, arsenic, and manganese), or an overall negative regional trend (TDS, aluminum, iron, and lead) where local rather than regional water quality concerns could exist.

These results should not be used to conclude that any particular management practices during the period of the study caused observed trends as information on changes in land uses and practices was not available nor included in the temporal trend analysis. Volume 10 of this IDWQ report series (Hillman et al 2021) examines the complexities of relationships between land use and water quality within the Taber Irrigation District, which was used as a case study, but does not include a temporal component. Further research is needed to link changes in water quality to changes in land use. If water quality concerns are identified by trend analyses, it is recommended that further work be done to investigate the causes of these identified trends.

It is also unknown whether trends in water quality at any given site are driven by trends in the source water for that site or by phenomena occurring between sites (e.g., land practices between a return site and its respective secondary or primary source). To truly answer this question at a regional scale, spatio-temporal analysis that considers the network connectivity of sites and the magnitude of concentrations or loads would be necessary. However, clues can be gathered from the patterns of trends on a site-by-site basis. For example, when TDS in the Taber Irrigation District are examined, negative trends occur in all three types of sites (Table 3.1). This could indicate that the trends at the return sites were driven by changes in source water rather than changes in land use, although a consideration of the magnitude of trends, concentrations, and loads would be important in confirming such suggestions. Similarly, if a trend was found in a return site but not its source water, it may be speculated that land use between the sampling sites was driving the change. In cases where there is interest in understanding the causes of trends, such patterns can be used to generate hypotheses and ideas for further investigation.

Lastly, it should be emphasized that the nonparametric trend analysis performed did not provide information on the magnitude or rate of change in parameters with time, only whether values typically increased or decreased with time. If the presence of a trend is considered to be a potential concern, further analysis to estimate the magnitude of rate of change can be performed to better understand the degree of concern and/or to forecast future concentrations given the current observed trend(s).

Table 3.1 Summarized results of regional and parameter-by-site trend analysis of nutrient, salinity, physical, bacteriological, and pesticide parameters. Tests that did not indicate the presence of a statistically significant trend are labelled as “ns”; “nt” indicates that no test was run because there were less than 7 years of collected data, or because there was not more than one value above the MDL. Trends that were statistically significant after FDR P-value correction are represented by - for negative trends and + for positive trends. Trends that were significant before correction for multiple tests but not afterwards are represented by (-) and (+). Details of each statistical test can be found in Tables A.2 to A.5. Parameter abbreviations are defined in Table 2.2.

		NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	*E. coli*	2,4-D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
Regional																				
		ns	-	ns	-	-	-	-	+	ns	-	ns	nt	ns	-	-	ns	-	-	-
Parameter-by-site																				
Total negative trends:		4	19	0	3	29	20	6	1	4	36	0	0	0	10	11	0	7	5	0
Total positive trends:		1	0	2	0	1	0	0	3	2	0	0	0	0	0	0	0	0	0	0
District	**Site**	**NO_3-N**	**TN**	**PO_4-P**	**TP**	**TDS**	**pH**	**Temp**	**TSS**	***E. coli***	**2,4-D**	**Atra**	**Brox**	**Clop**	**Dcpr**	**Dicm**	**EPTC**	**MCPA**	**MCPP**	**Sima**
MVID	MV-P1	ns	-	ns	-	ns	-	ns	ns	(+)	(-)	nt	nt	nt	nt	nt	nt	nt	nt	nt
	MV-R1	ns	ns	(+)	ns	ns	(-)	ns	ns	(+)	ns	nt	nt	nt	nt	nt	nt	ns	nt	nt
AID	A-R1	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	nt	nt	nt	nt	(-)	nt	ns	nt	nt
UID	U-P1	ns	ns	ns	ns	ns	ns	ns	(+)	ns	ns	nt	nt	nt	nt	ns	nt	ns	nt	nt
	U-S1	ns	-	ns	(-)	ns	ns	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	nt	nt
	U-R2	ns	(-)	ns	ns	ns	(-)	ns	ns	(-)	(-)	nt	nt	nt	nt	ns	nt	ns	nt	nt
MID	M-P1	-	(-)	ns	ns	ns	(-)	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	nt	nt
	M-S1	-	-	nt	-	ns	ns	ns	ns	(+)	(-)	nt	nt	ns	nt	ns	nt	ns	nt	nt
	M-R1	(-)	(-)	ns	ns	-	-	-	ns	ns	(-)	nt	nt	ns	nt	ns	nt	ns	nt	nt
RID	R-P1	-	(-)	ns	ns	ns	(-)	ns	ns	(+)	(-)	nt	nt	nt	nt	ns	nt	ns	nt	nt
	R-R1	-	-	ns	ns	ns	ns	ns	(-)	(-)	-	nt	nt	nt	nt	ns	nt	ns	nt	nt
	R-R2	ns	ns	ns	ns	(-)	(-)	-	(-)	ns	(-)	nt	nt	ns	nt	ns	nt	ns	nt	nt
LNID	LN-P1	ns	ns	ns	ns	ns	(-)	(-)	ns	ns	ns	nt	nt	nt	nt	nt	nt	ns	nt	nt
	LN-S1	ns	(-)	ns	ns	ns	(-)	(-)	ns	ns	ns	nt	nt	ns	nt	nt	nt	ns	nt	nt
	LN-S2	nt	ns	ns	ns	(-)	(-)	(-)	ns	ns	-	nt	nt	nt	nt	nt	nt	ns	nt	nt
	LN-S3	ns	-	ns	ns	(-)	(-)	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	nt	nt
	LN-S4	nt	-	ns	ns	(-)	(-)	(-)	ns	ns	-	nt	nt	ns	nt	nt	nt	ns	nt	nt
	LN-S5	ns	ns	ns	ns	-	ns	ns	ns	(-)	-	nt	nt	nt	nt	ns	nt	ns	ns	nt
	LN-R1	ns	ns	ns	ns	-	(-)	ns	ns	ns	-	nt	nt	nt	nt	ns	nt	ns	nt	nt
	LN-R2	+	ns	ns	ns	+	(-)	(-)	+	ns	-	ns	ns	nt	nt	ns	nt	ns	nt	nt
	LN-R3	ns	-	nt	ns	-	(-)	ns	ns	ns	-	nt	nt	ns	nt	ns	nt	ns	nt	nt
	LN-R4	ns	(-)	nt	ns	(-)	(-)	ns	ns	+	-	nt	nt	ns	nt	ns	nt	(-)	ns	nt

Table 3.1 continued.

District	Site	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	*E. coli*	2,4-D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
TID	T-P1a	ns	-	(+)	ns	-	(-)	ns	ns	ns	(-)	nt	nt	ns	nt	nt	nt	ns	nt	nt
	T-P2	ns	-	(+)	ns	-	(-)	ns	ns	ns	ns	ns	ns	ns	nt	ns	nt	ns	nt	nt
	T-S2	ns	(-)	ns	ns	-	ns	ns	ns	-	-	ns	nt	ns	-	ns	ns	(-)	ns	nt
	T-S3	ns	ns	+	ns	-	ns	ns	ns	ns	(-)	ns	nt	nt	-	-	ns	-	ns	nt
	T-R1	ns	ns	ns	ns	-	ns	ns	ns	ns	-	nt	nt	ns	-	(-)	ns	ns	nt	nt
	T-R2	ns	ns	+	ns	-	ns	ns	ns	ns	-	ns	ns	nt	-	-	ns	-	ns	nt
SMRID	SMW-P1	(-)	ns	ns	ns	(-)	-	ns	ns	ns	-	nt	nt	nt	nt	nt	nt	ns	nt	nt
	SMW-S2	ns	ns	nt	ns	ns	-	ns	ns	ns	ns	nt	nt	nt	nt	nt	nt	ns	nt	nt
	SMW-R1	ns	-	ns	(-)	ns	ns	ns	ns	ns	ns	nt	nt	ns	nt	(-)	nt	(-)	ns	nt
	SMW-R2	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	nt	nt	nt	nt	-	ns	-	nt	nt
SMRID	SMC-P1	ns	(-)	ns	ns	-	-	ns	ns	ns	(-)	nt	nt	ns	nt	ns	nt	(-)	nt	nt
	SMC-S1	ns	(-)	ns	ns	-	ns	ns	ns	ns	ns	nt	nt	nt	nt	nt	ns	-	ns	nt
	SMC-S2	ns	(-)	ns	ns	-	ns	ns	(+)	ns	ns	ns	nt	ns	nt	nt	ns	ns	nt	nt
	SMC-S3	ns	-	ns	ns	(-)	(-)	(-)	ns	ns	ns	nt	nt	nt	nt	ns	ns	-	nt	nt
	SMC-R1	ns	-	ns	ns	-	-	(-)	ns	ns	ns	ns	nt	nt	nt	nt	ns	ns	nt	nt
	SMC-R3	ns	ns	ns	ns	-	-	ns	ns	+	ns	nt	nt	nt	nt	ns	ns	ns	ns	nt
	SMC-R4	ns	-	ns	ns	-	-	ns	(+)	ns	ns	ns	nt	nt	nt	ns	nt	ns	nt	nt
SMRID	SME-P1	ns	ns	(+)	ns	(-)	-	(-)	ns	ns	-	ns	nt	nt	-	ns	nt	-	nt	nt
	SME-S1	ns	ns	ns	(+)	(-)	ns	ns	ns	ns	ns	nt	nt	nt	nt	nt	nt	(-)	nt	nt
	SME-R1a	(+)	ns	nt	(+)	-	ns	ns	ns	ns	ns	nt	nt	nt	nt	nt	nt	ns	ns	nt
	SME-R2	ns	ns	nt	ns	-	-	ns	-	ns	ns	nt	nt	nt	nt	nt	nt	ns	nt	nt
WID	W-P1	ns	ns	ns	ns	ns	ns	ns	ns	ns	(-)	nt	nt	nt	nt	-	nt	ns	-	nt
	W-P2	ns	-	ns	(-)	(-)	ns	ns	ns	(-)	(-)	nt	nt	nt	nt	-	nt	ns	-	nt
	W-S1	ns	(-)	ns	ns	ns	(-)	ns	(-)	-	-	nt	nt	nt	-	-	nt	-	-	nt
	W-S2	ns	ns	ns	ns	ns	ns	(-)	ns	-	-	nt	nt	nt	nt	-	nt	ns	(-)	nt
	W-S3	ns	(-)	ns	ns	ns	ns	ns	ns	ns	-	nt	nt	ns	nt	-	nt	ns	-	nt
	W-S4	(-)	ns	ns	ns	ns	ns	ns	ns	ns	-	nt	nt	ns	nt	(-)	nt	ns	-	nt
	W-R1a	ns	ns	nt	ns	ns	ns	ns	ns	ns	(-)	nt	nt	nt	nt	ns	nt	ns	ns	nt
	W-R2	ns	ns	ns	ns	ns	ns	(-)	ns	ns	-	nt	ns	ns	nt	-	nt	ns	(-)	nt
BRID	BR-P1	ns	-	ns	ns	-	-	-	ns	(+)	(-)	nt	nt	ns	nt	nt	nt	ns	nt	nt
	BR-S1	ns	-	ns	ns	-	-	-	ns	ns	-	nt	nt	ns	nt	ns	nt	ns	nt	nt
	BR-S2	ns	nt	(-)	ns	(-)	ns	ns	(+)	ns	-	nt	nt	ns	-	-	nt	ns	nt	nt
	BR-S3	ns	-	ns	ns	-	(-)	-	ns	ns	-	nt	nt	nt	nt	nt	nt	(-)	nt	ns
	BR-S4a	(-)	-	nt	ns	-	(-)	ns	ns	ns	(-)	nt	nt	nt	nt	ns	nt	ns	nt	ns
	BR-S5	ns	ns	ns	(+)	-	(-)	(-)	ns	ns	-	nt	nt	nt	nt	(-)	nt	ns	nt	ns
	BR-R1	ns	-	ns	(-)	-	(-)	ns	ns	ns	-	nt	nt	nt	nt	nt	nt	ns	nt	ns
	BR-R2	ns	(-)	ns	ns	-	(-)	(-)	ns	ns	-	nt	ns	nt	-	(-)	nt	ns	nt	ns
	BR-R3	ns	ns	ns	(+)	ns	ns	ns	(+)	ns	-	nt	nt	nt	-	(-)	ns	ns	nt	ns
	BR-R4	ns	ns	ns	ns	-	ns	(-)	(+)	ns	-	ns	ns	ns	-	(-)	nt	ns	nt	(-)
	BR-R5	ns	ns	ns	ns	-	-	-	+	ns	-	nt	nt	nt	nt	(-)	nt	ns	nt	ns

Table 3.1 continued.

District	Site	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	*E. coli*	2,4-D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
EID	E-P1	ns	ns	ns	ns	ns	(-)	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	ns	nt
	E-S1	ns	ns	ns	ns	ns	(-)	ns	ns	ns	-	nt	nt	nt	nt	-	nt	nt	ns	nt
	E-S2	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	ns	nt
	E-S3	(+)	ns	ns	ns	ns	(-)	ns	ns	ns	-	nt	nt	nt	nt	ns	nt	ns	ns	nt
	E-S4	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	nt	nt	nt	nt	ns	nt	nt	nt	nt
	E-S5	ns	ns	ns	ns	ns	(-)	ns	ns	ns	-	nt	nt	nt	nt	nt	nt	ns	nt	nt
	E-S6	ns	ns	ns	ns	(+)	ns	ns	ns	ns	-	nt	nt	nt	nt	ns	nt	ns	nt	nt
	E-S8	ns	(-)	nt	-	-	-	ns	ns	ns	-	nt	nt	nt	nt	(-)	nt	ns	ns	nt
	E-R1	ns	(-)	nt	ns	ns	ns	ns	ns	-	-	nt	nt	nt	nt	ns	nt	ns	nt	nt
	E-R2	ns	ns	nt	ns	ns	-	ns	ns	ns	-	ns	nt	nt	nt	ns	nt	ns	nt	nt
	E-R2a	ns	ns	nt	ns	ns	-	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	nt	nt
	E-R3	ns	ns	nt	ns	ns	ns	ns	ns	ns	(-)	nt	nt	nt	nt	ns	nt	ns	ns	nt
	E-R4a	ns	ns	nt	ns	ns	(-)	ns	ns	ns	(-)	nt	nt	nt	nt	(-)	nt	ns	nt	nt
	E-R5	ns	ns	nt	ns	ns	-	ns	ns	ns	-	nt	nt	nt	nt	ns	nt	nt	nt	nt
	E-R8a	ns	ns	nt	ns	(-)	-	ns	ns	ns	(-)	nt	nt	ns	nt	ns	nt	ns	nt	nt
AEP canals	AEP-P2	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	nt	nt	ns	nt	ns	ns	nt
	AEP-P3	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	nt	nt	nt	nt	nt	nt	nt	(-)	nt
	AEP-S2	ns	nt	ns	ns	ns	ns	ns	+	(+)	ns	nt	nt	nt	nt	nt	nt	ns	nt	nt

Table 3.2 Summarized results of regional and parameter-by-site trend analysis of total metals parameters. Tests that did not indicate the presence of a statistically significant trend are labelled as “ns”; “nt” indicates that no test was run because there were less than 7 years of collected data, or because there was not more than one value above the MDL. Trends that were statistically significant after FDR P-value correction are represented by - for negative trends and + for positive trends. Trends that were significant before correction for multiple tests but not afterwards are represented by (-) and (+). Details of each statistical test can be found in Tables A.2 to A.5. Parameter abbreviations are defined in Table 2.2.

		Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
Regional																										
		nt	-	ns	-	ns	nt	nt	ns	ns	-	-	ns	-	ns	nt	ns	-	-	-	nt	-	-	-	-	-
Parameter-by-site																										
Total negative trends:		0	15	4	23	0	0	0	0	0	6	1	0	6	0	0	0	4	30	3	0	29	0	4	3	23
Total positive trends:		0	1	2	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0
District	**Site**	**Ag**	**Al**	**As**	**B**	**Ba**	**Be**	**Cd**	**Co**	**Cr**	**Cu**	**Fe**	**Hg**	**Li**	**Mn**	**Mo**	**Ni**	**Pb**	**Sb**	**Se**	**Sn**	**Ti**	**Tl**	**U**	**V**	**Zn**
MVID	MV-P1	ns	-	ns	ns	ns	nt	ns	nt	nt	nt	ns	nt	ns	(-)	nt	ns	ns	-	ns	nt	-	nt	ns	ns	-
	MV-R1	ns	-	ns	(-)	ns	nt	ns	ns	ns	ns	(-)	nt	ns	ns	nt	ns	(-)	-	(-)	nt	-	nt	ns	(-)	-
AID	A-R1	ns	-	ns	(-)	(+)	nt	ns	ns	ns	ns	(-)	nt	ns	ns	nt	ns	(-)	(-)	ns	nt	-	nt	ns	(-)	-
UID	U-P1	ns	ns	(+)	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	(+)	nt	ns	(+)	(-)	ns	nt	(-)	nt	ns	ns	-
	U-S1	ns	-	ns	(-)	ns	nt	ns	ns	nt	nt	ns	nt	ns	ns	nt	nt	nt	-	(-)	nt	-	nt	ns	ns	-
	U-R2	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	+	ns	ns	ns	-	ns	nt	ns	nt	ns	ns	-
MID	M-P1	ns	ns	ns	(-)	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	-	ns	nt	-	nt	ns	ns	-
	M-S1	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	M-R1	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	ns	ns	(+)	nt	ns	ns	-	ns	nt	ns	nt	ns	ns	ns
RID	R-P1	ns	(-)	ns	ns	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	(-)	(-)	nt	-	nt	ns	ns	(-)
	R-R1	ns	ns	ns	-	ns	nt	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	-	ns	nt	-	nt	ns	ns	-
	R-R2	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	nt	ns	(-)	(-)	ns	nt	-	ns	ns	-	(-)
LNID	LN-P1	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns	nt	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns
	LN-S1	ns	ns	ns	(-)	ns	ns	ns	ns	ns	ns	ns	ns	ns	(+)	nt	ns	ns	(-)	ns	nt	ns	nt	ns	ns	(-)
	LN-S2	ns	ns	-	(-)	(+)	nt	ns	ns	nt	ns	ns	nt	(-)	ns	ns	ns	ns	(-)	ns	nt	-	nt	ns	ns	(-)
	LN-S3	ns	(-)	ns	(-)	ns	nt	ns	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	(-)	ns	nt	-	nt	ns	ns	(-)
	LN-S4	ns	ns	-	-	ns	nt	ns	ns	ns	ns	ns	ns	(-)	ns	ns	ns	ns	(-)	ns	nt	(-)	nt	ns	ns	ns
	LN-S5	ns	-	ns	(-)	ns	nt	ns	ns	ns	ns	ns	nt	(-)	ns	ns	ns	ns	(-)	ns	nt	-	nt	ns	ns	(-)
	LN-R1	ns	(-)	(-)	-	ns	ns	ns	ns	(-)	ns	ns	ns	(-)	ns	ns	ns	ns	-	ns	nt	-	ns	(-)	(-)	(-)
	LN-R2	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	ns	ns	(+)	ns	ns	ns	(-)	ns	nt	-	nt	(+)	ns	ns
	LN-R3	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	LN-R4	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
TID	T-P1a	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	T-P2	nt	ns	ns	-	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	nt	ns	ns	-	ns	nt	ns	nt	ns	ns	-
	T-S2	ns	(-)	ns	-	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	(-)	ns	nt	(-)	nt	ns	ns	(-)
	T-S3	nt	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	(-)	ns	nt	ns	nt	ns	ns	(-)
	T-R1	ns	-	ns	-	ns	nt	ns	ns	ns	(-)	(-)	nt	ns	ns	ns	ns	ns	(-)	ns	nt	(-)	nt	ns	ns	-
	T-R2	ns	-	ns	-	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	-	-	(-)	nt	-	nt	ns	ns	-

***Table 3.2** continued.*

District	Site	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
SMRID	SMW-P1	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	-	(-)	ns	nt	(-)	nt	ns	ns	(-)
	SMW-S2	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	SMW-R1	ns	(-)	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	nt	ns	ns	(-)	ns	nt	(-)	nt	ns	ns	-
	SMW-R2	ns	(-)	ns	ns	ns	nt	(-)	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	-	ns	nt	-	nt	ns	(-)	(-)
SMRID	SMC-P1	ns	ns	ns	-	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	nt	ns	ns	-	ns	nt	-	nt	ns	ns	-
	SMC-S1	ns	-	ns	-	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	nt	(-)	ns	nt	(-)	ns	ns	ns	(-)
	SMC-S2	ns	ns	ns	(-)	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	(+)	(-)	ns	nt	ns	nt	ns	ns	-
	SMC-S3	ns	(-)	ns	-	ns	nt	ns	ns	ns	ns	ns	ns	(-)	ns	nt	ns	ns	-	ns	nt	(-)	nt	ns	ns	-
	SMC-R1	ns	(-)	ns	-	ns	nt	ns	ns	ns	ns	ns	nt	(-)	ns	ns	ns	ns	(-)	ns	nt	(-)	nt	ns	ns	(-)
	SMC-R3	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	(+)	nt	-	ns	ns	ns	ns	(-)	ns	nt	ns	nt	ns	ns	(-)
	SMC-R4	ns	ns	ns	-	ns	nt	ns	ns	ns	ns	ns	nt	-	(+)	nt	ns	ns	-	ns	nt	ns	nt	ns	ns	(-)
SMRID	SME-P1	ns	-	ns	(-)	ns	nt	ns	ns	nt	(-)	(-)	ns	ns	ns	ns	ns	ns	-	ns	nt	-	nt	ns	ns	(-)
	SME-S1	ns	(-)	ns	-	ns	nt	ns	ns	ns	(-)	ns	ns	ns	ns	ns	ns	ns	(-)	ns	nt	-	ns	ns	ns	ns
	SME-R1a	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	SME-R2	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
WID	W-P1	ns	(-)	-	-	ns	nt	ns	ns	ns	-	ns	nt	-	ns	ns	ns	(-)	(-)	ns	nt	-	nt	(-)	(-)	ns
	W-P2	ns	(-)	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	(-)	ns	ns	ns	(-)	(-)	nt	-	nt	ns	ns	ns
	W-S1	ns	-	(-)	(-)	ns	nt	ns	ns	ns	-	(-)	nt	ns	ns	ns	ns	-	-	ns	nt	-	nt	ns	(-)	(-)
	W-S2	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	-	nt	ns	(-)	(-)	-	(-)
	W-S3	ns	(-)	ns	(-)	ns	nt	ns	ns	ns	-	(-)	ns	ns	ns	ns	ns	(-)	-	(-)	ns	-	(-)	ns	-	ns
	W-S4	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	-	ns	nt	ns	ns	ns	ns	(-)
	W-R1a	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	W-R2	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	-	(-)	nt	ns	ns	ns	ns	-
BRID	BR-P1	ns	ns	+	-	ns	nt	ns	ns	nt	(-)	ns	nt	(-)	ns	ns	ns	nt	-	ns	nt	-	nt	-	ns	(-)
	BR-S1	ns	ns	+	(-)	ns	nt	ns	ns	nt	(-)	ns	ns	ns	(+)	ns	ns	nt	(-)	ns	nt	(-)	nt	ns	ns	-
	BR-S2	ns	ns	-	-	(-)	nt	ns	ns	ns	(-)	ns	ns	-	ns	ns	ns	ns	ns	(-)	nt	ns	ns	ns	(-)	ns
	BR-S3	ns	-	ns	-	(-)	nt	ns	ns	nt	(-)	ns	nt	(-)	ns	ns	ns	ns	-	ns	nt	-	nt	-	ns	(-)
	BR-S4a	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	BR-S5	ns	ns	ns	-	(-)	nt	ns	ns	nt	(-)	ns	nt	ns	ns	ns	ns	ns	(-)	ns	nt	(-)	nt	(-)	ns	(-)
	BR-R1	ns	(-)	ns	-	ns	nt	ns	ns	ns	(-)	ns	nt	-	ns	ns	ns	ns	-	(-)	nt	(-)	nt	-	ns	-
	BR-R2	ns	-	ns	-	(-)	nt	ns	ns	ns	-	(-)	nt	-	(-)	ns	ns	ns	(-)	(-)	nt	-	nt	(-)	(-)	-
	BR-R3	ns	ns	ns	ns	(-)	nt	ns	ns	ns	-	ns	nt	ns	(+)	ns	ns	ns	(-)	ns	nt	-	ns	ns	ns	-
	BR-R4	ns	ns	ns	-	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	ns	-	-	nt	-	nt	ns	ns	-
	BR-R5	ns	ns	ns	-	ns	nt	ns	ns	nt	-	ns	nt	(-)	ns	ns	ns	ns	-	ns	nt	(-)	nt	-	ns	(-)

***Table 3.2** continued.*

District	Site	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
EID	E-P1	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	(-)	ns	nt	(-)	ns	ns	ns	(-)
	E-S1	ns	ns	ns	ns	ns	nt	ns	ns	nt	(-)	ns	ns	ns	(+)	ns	ns	ns	-	(-)	nt	(-)	ns	ns	ns	(-)
	E-S2	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	(-)	ns	nt	-	ns	ns	ns	ns
	E-S3	ns	+	(-)	ns	(+)	nt	ns	ns	ns	(+)	+	nt	ns	ns	ns	ns	+	(-)	ns	nt	ns	ns	ns	ns	ns
	E-S4	ns	-	(+)	ns	(+)	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	(-)	(-)	nt	-	ns	ns	ns	ns
	E-S5	ns	-	(+)	ns	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	nt	-	(-)	nt	(-)	ns	ns	ns	-
	E-S6	ns	(-)	ns	-	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	-	-	-	nt	(-)	ns	ns	(-)	-
	E-S8	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	E-R1	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	E-R2	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	E-R2a	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	E-R3	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	E-R4a	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	E-R5	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
	E-R8a	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
AEP canals	AEP-P2	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	(-)	nt	ns	nt	ns	ns	(-)
	AEP-P3	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	nt	ns	nt	ns	ns	(-)
	AEP-S2	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	(+)	nt	ns	ns	nt	ns	(+)	(-)	ns	nt	ns	nt	ns	ns	ns

Table 3.3 Results of parameter-by-site trend analysis summarized by irrigation district and site type. Cells containing “na” (not applicable) indicate irrigation districts where a given site-type was not sampled or lacked adequate data to be included in analysis.

	Site type								
	Primary			Secondary			Return		
Irrigation district	Number of tests (parameters × sites)	Number and percentage of tests demonstrating a negative trend[z]	Number and percentage of tests demonstrating a positive trend[z]	Number of tests (parameters × sites)	Number and percentage of tests demonstrating a negative trend[z]	Number and percentage of tests demonstrating a positive trend[z]	Number of tests (parameters × sites)	Number and percentage of tests demonstrating a negative trend[z]	Number and percentage of tests demonstrating a positive trendt[z]
All districts	704 (44×16)	58 (8.2%)	1 (0.1%)	1364 (44×31)	120 (8.8%)	6 (0.4%)	1452 (44×33)	128 (8.8%)	8 (0.6%)
MVID	44 (44×1)	7 (15.9%)	0 (0.0%)	na	na	na	44 (44×1)	4 (9.1%)	0 (0.0%)
AID	na	na	na	na	na	na	44 (44×1)	4 (9.09%)	0 (0.0%)
UID	44 (44×1)	1 (2.3%)	0 (0.0%)	44 (44×1)	5 (11.4%)	0 (0.0%)	44 (44×1)	2 (4.5%)	1 (2.3%)
MID	44 (44×1)	4 (9.1%)	0 (0.0%)	44 (44×1)	3 (6.8%)	0 (0.0%)	44 (44×1)	4 (9.1%)	0 (0.0%)
RID	44 (44×1)	2 (4.5%)	0 (0.0%)	na	na	na	88 (44×2)	12 (13.6%)	0 (0.0%)
LNID	44 (44×1)	0 (0.0%)	0 (0.0%)	440 (44×5)	13 (5.9%)	0 (0.0%)	176 (44×4)	11 (6.3%)	4 (2.3%)
TID	88 (44×2)	7 (8.0%)	0 (0.0%)	88 (44×2)	9 (10.2%)	1 (1.1%)	88 (44×2)	17 (19.3%)	1 (1.1%)
SMRID	132 (44×3)	16 (12.1%)	0 (0.0%)	440 (44×5)	14 (6.4%)	0 (0.0%)	308 (44×7)	24 (7.8%)	1 (0.3%)
WID	88 (44×2)	11 (12.5%)	0 (0.0%)	176 (44×4)	27 (15.3%)	0 (0.0%)	88 (44×2)	4 (4.5%)	0 (0.0%)
BRID	44 (44×1)	8 (18.2%)	1 (2.3%)	440 (44×5)	26 (11.8%)	1 (0.5%)	440 (44×5)	38 (17.3%)	1 (0.5%)
EID	44 (44×1)	0 (0.0%)	0 (0.0%)	308 (44×7)	23 (7.5%)	3 (1.0%)	308 (44×7)	8 (2.6%)	0 (0.0%)
AEP Canals	88 (44×2)	2 (2.3%)	0 (0.0%)	44 (44×1)	0 (0.0%)	1 (2.3%)	na	na	na

[z] P_{adj} value ≤ 0.05.

Table 3.4 Results of parameter-by-site trend analysis summarized for irrigation districts having infrastructure and watershed return site types.

	Infrastructure Return			Watershed Return		
Irrigation district	Number of tests (parameters × sites)	Number and percentage of tests demonstrating a negative trend[z]	Number and percentage of tests demonstrating a positive trend[z]	Number of tests (parameters × sites)	Number and percentage of tests demonstrating a negative trend[z]	Number and percentage of tests demonstrating positive trend[z]
LNID	88 (44×2)	4 (4.5%)	1 (1.1%)	88 (44×2)	7 (7.9%)	3 (3.4%)
SMRID	440 (44×5)	19 (4.3%)	1 (0..2%)	88 (44×2)	5 (5.6%)	0 (0.0%)
WID	44 (44×1)	0 (0.0%)	0 (0.0%)	44 (44×1)	4 (9.1%)	0 (0.0%)
BRID	88 (44×2)	16 (18.2%)	1 (1.1%)	132 (44×3)	21 (15.9%)	0 (0%)
EID	440 (44×5)	6 (1.4%)	0 (0.0%)	88 (44×2)	2 (2.3%)	0 (0%)
Total	664 (44x15)	45 (6.7%)	3 (0.5%)	440(44x10)	39 (8.9%)	3 (0.7%)

[z] Padj value ≤ 0.05.

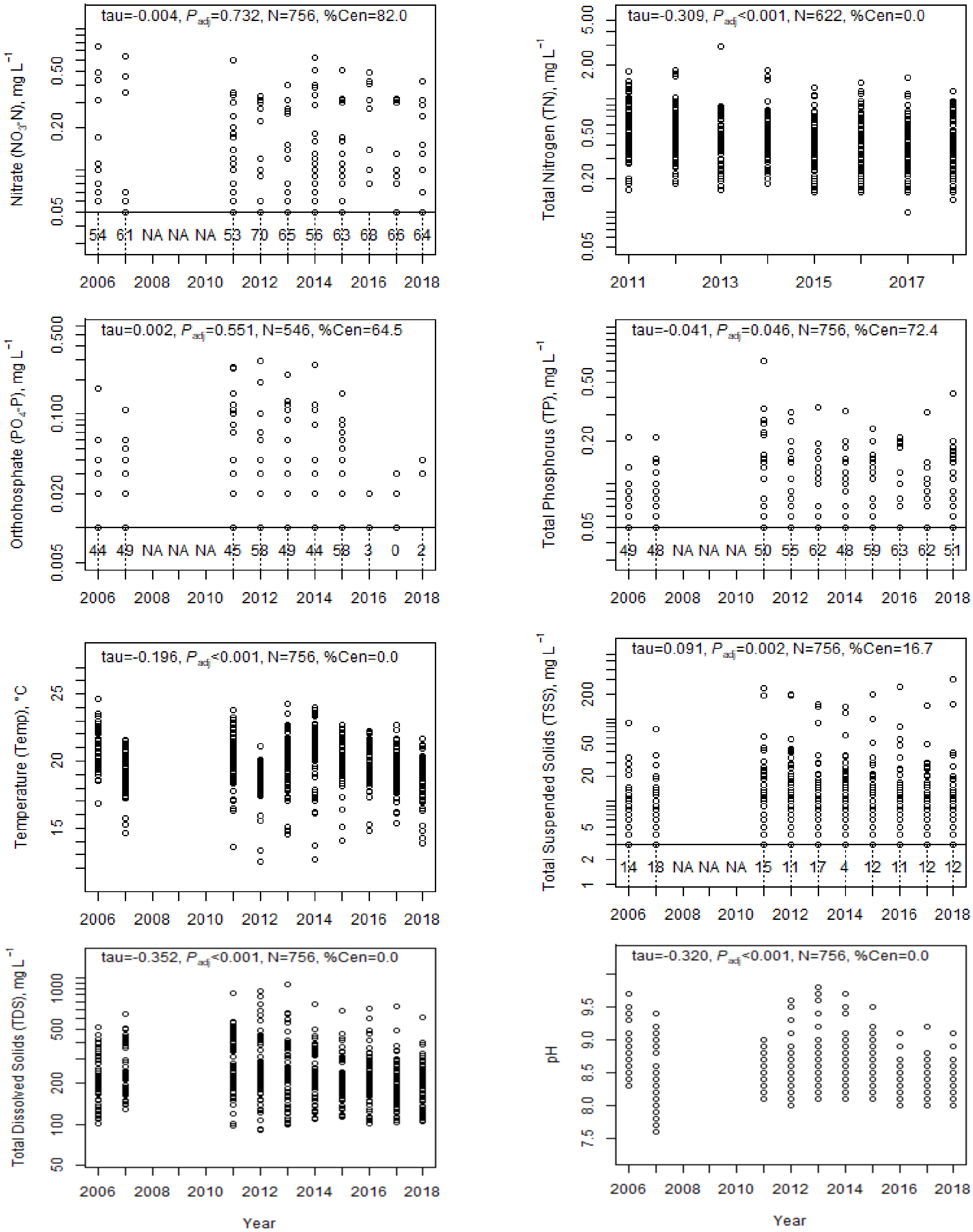

Figure 3.1 Regional trends in water quality data in Alberta's irrigation districts from 2006 to 2018. Results of the Regional Kendall trend tests are displayed at the top of plots, with tau representing Kendall's correlation coefficient, P_{adj} representing the P-value of the test after applying a false discovery rate P-value adjustment given 38 tests, N representing the number of measurements used in the analysis, and %Cen representing the percentage of censored data. If data below MDLs were present, the number of below-MDL values per year are reported below a horizontal line representing the MDL. For graphical clarity, the y-axis is presented in log scale for most parameters.

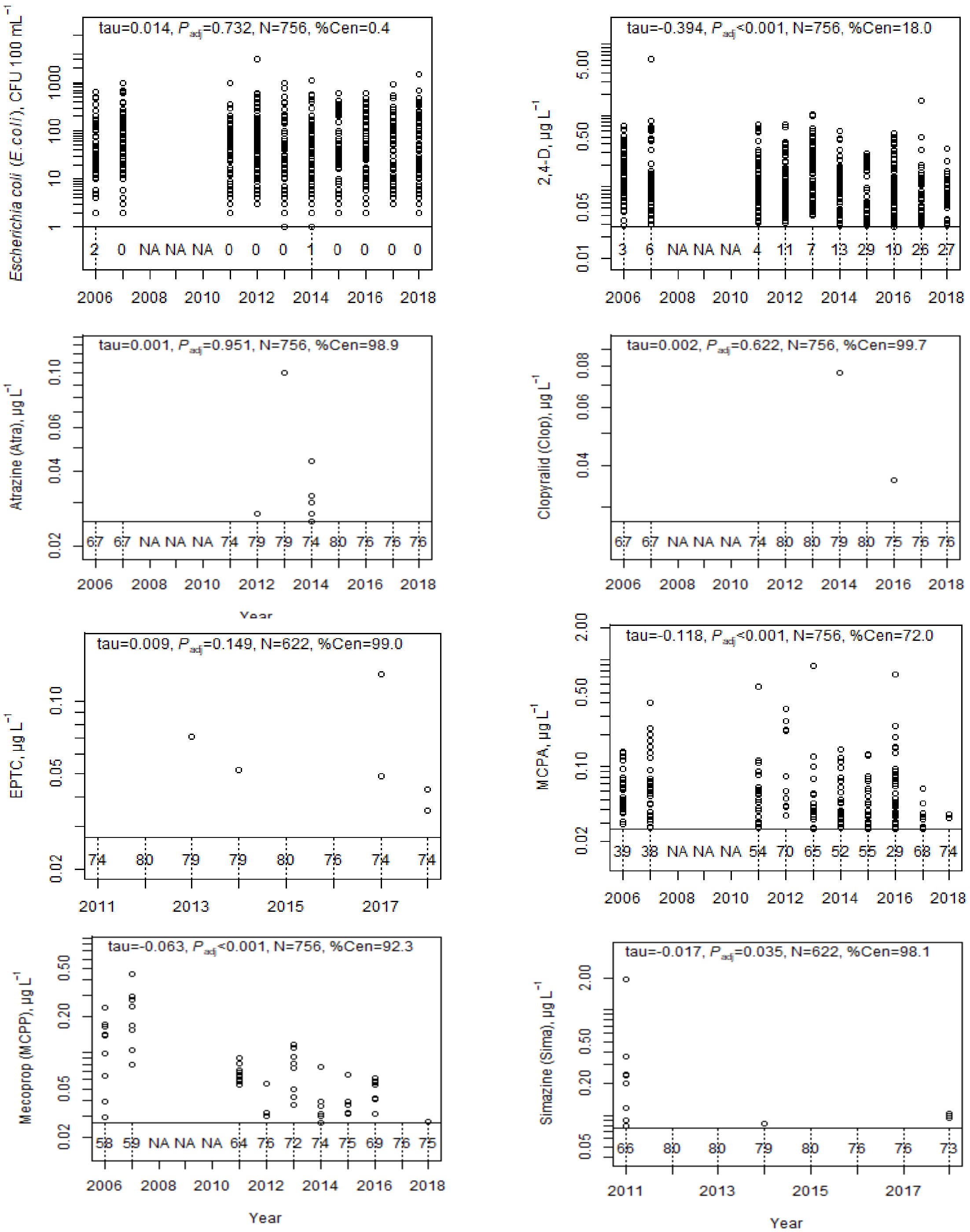

Figure 3.1 *continued.*

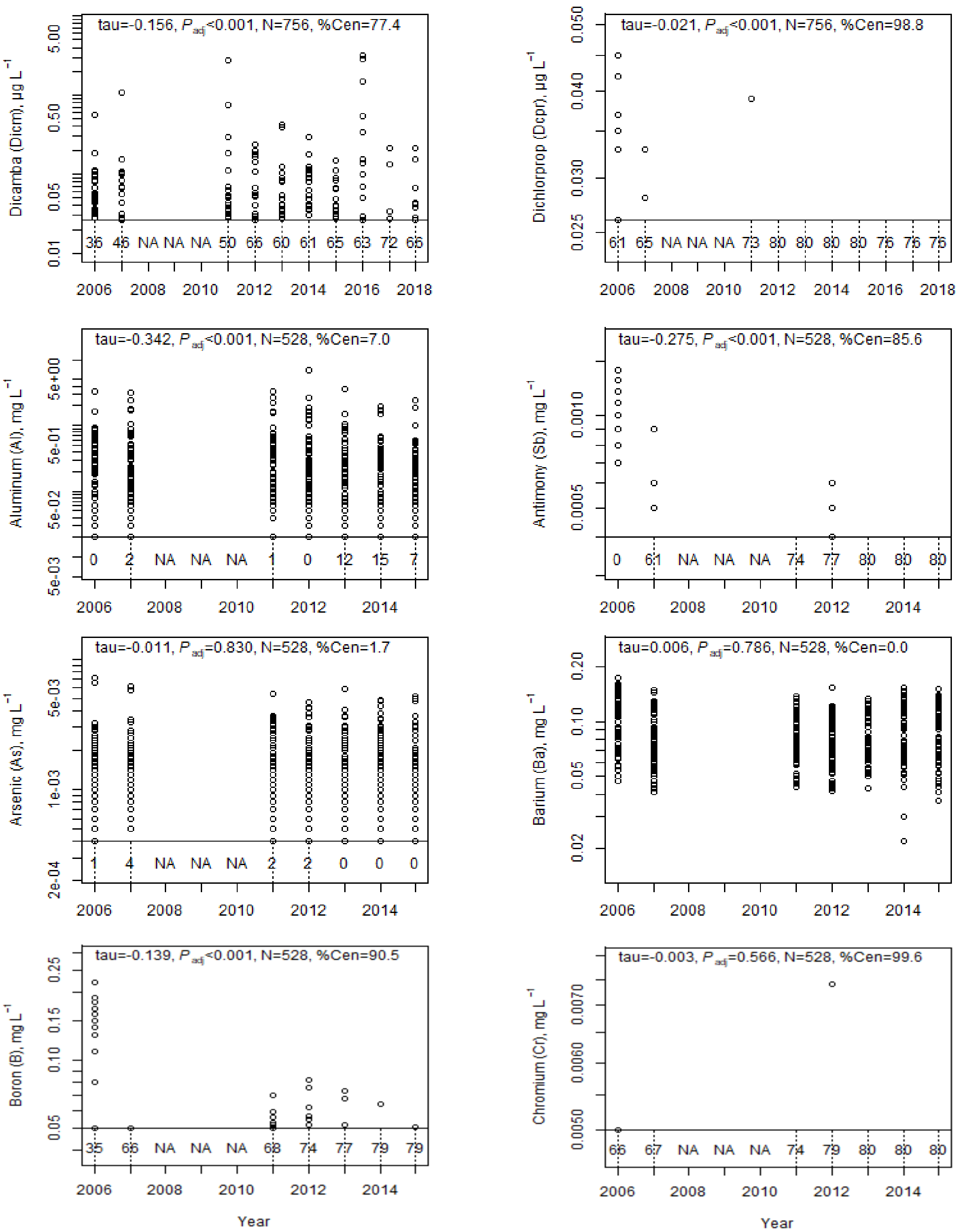

***Figure 3.1** continued.*

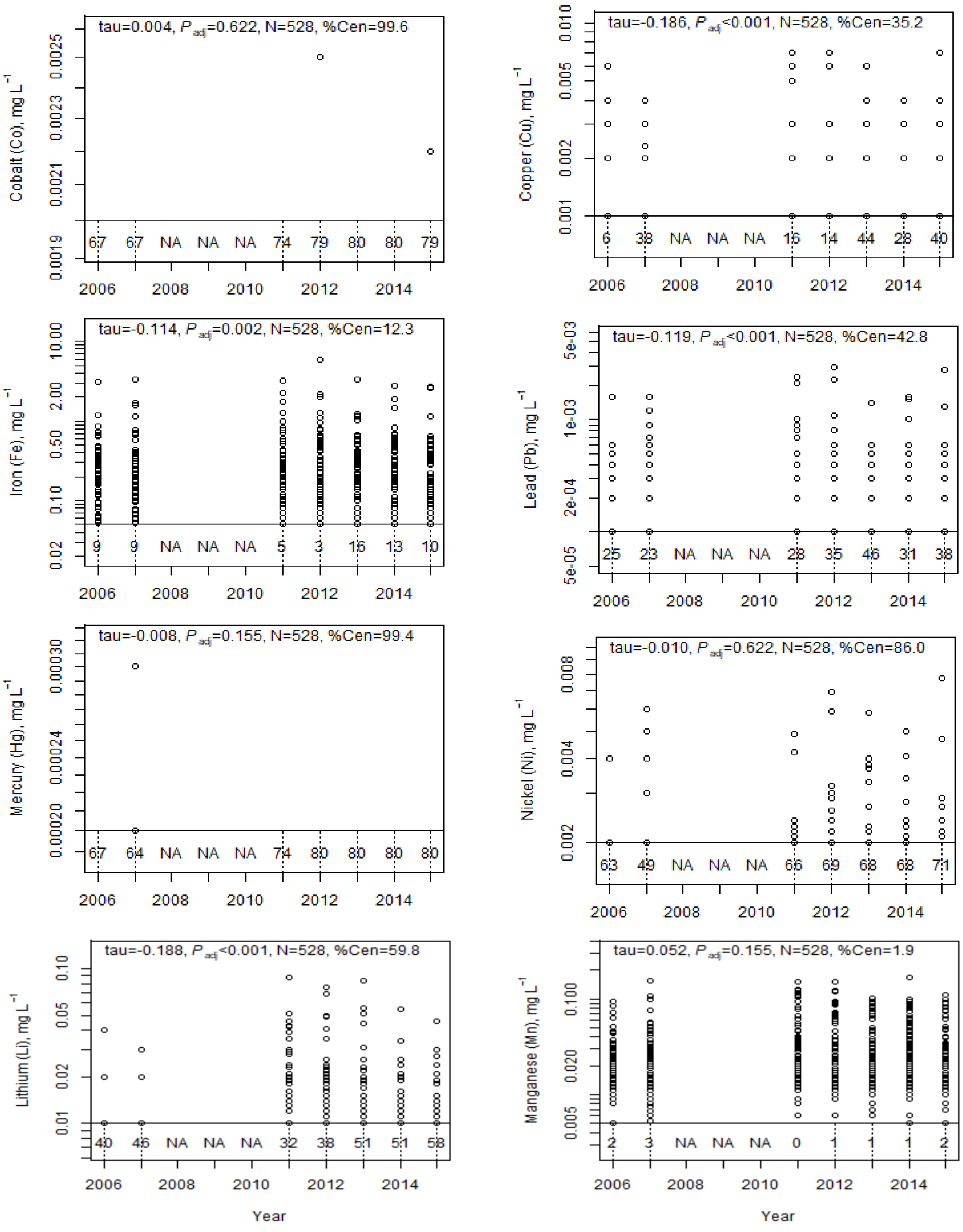

Figure 3.1 *continued.*

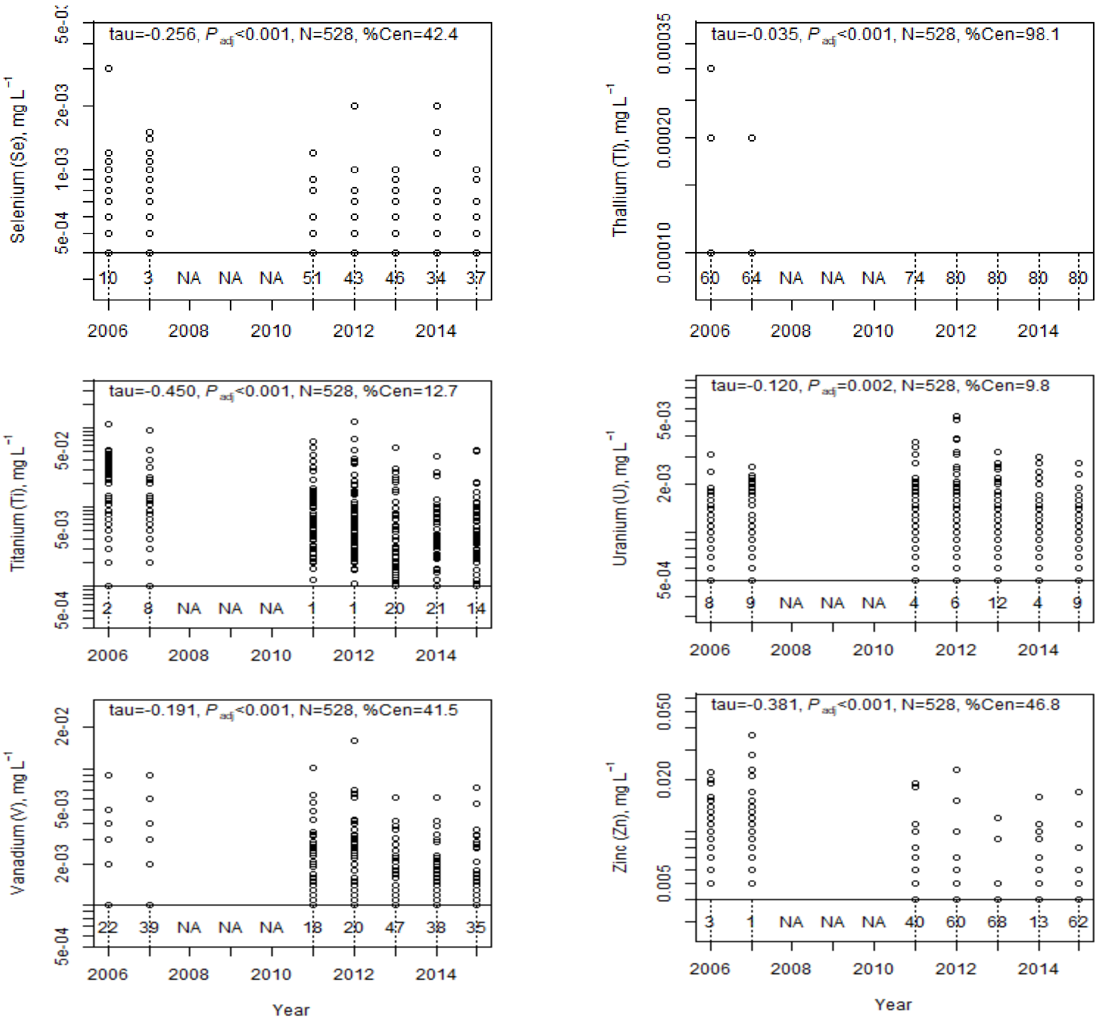

Figure 3.1 *continued.*

4 Conclusions

Temporal trend analyses were performed on 44 water quality parameters measured in 2006 to 2007 and 2011 to 2018 in Alberta's irrigation districts. Overall, of the total parameter-by-site datasets (3,520 individual values), 8.7% had negative trends, 0.4% had positive tends, and 90.0% had no trend (or no analysis was performed, which can generally be interpreted as the lack of a meaningful trend). This indicates relative stability in water quality during the study period at the resolution of individual sites. However, regional trend analysis showed trends in 25 out of 38 parameters tested, 24 of which were negative, indicating net regional improvement in water quality during the study, although it should be noted that trends were generally weak. The strongest regional trends were moderate and negative for pH and concentrations of TN, TDS, 2,4-D, aluminum, titanium, and zinc. One very weak positive regional trend occurred for TSS. Continued monitoring would be valuable to determine whether the observed trends are stable, for at this point it is possible that many negative trends were driven by random inter-annual variation causing 2006 and 2007 to have relatively higher concentrations in a number of parameters, or by long-term cycles that were not fully captured.

Further analyses would be necessary to understand the causes and magnitudes of trends, but the results herein can be used to identify areas for further exploration. The presence or absence of trends in water quality parameters can be used to help guide water quality management actions at regional and site-specific scales. Regional trends could help inform overarching priorities, while trends at individual sites, especially where they are positive (i.e., deteriorating water quality with time) and inconsistent with regional trends, could be useful for more localized management applications.

The results of these trend analyses, in conjunction with the results of the water quality index assessment in Volume 7 of this IDWQ report series (Kerr et al 2021), indicate that irrigation water in Alberta is generally of good quality and is mostly stable or improving within the irrigation districts. A few areas of current or imminent water quality concern exist in the irrigation districts, and targeted application of beneficial management practices for water quality improvement should be considered to manage these concerns.

5 References

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Appendix A- Supplementary data

Table A.1. Definitions of symbols and abbreviations used in Tables A.2 to A.5. Parameter abbreviations are listed in Table 2.2.

Summ	Summary of the test results.
nt	Test was not run because less than 7 years of data were available or because less than two values were above the method detection limit.
ns	Not statistically significant. Test did not indicate the presence of a trend.
+	Trend was positive and statistically significant (α = 0.05) after false-discovery-rate (FDR) P-value adjustment for multiple tests.
-	Trend was negative and statistically significant (α = 0.05) after FDR P-value adjustment for multiple tests.
(+)	Trend was positive and statistically significant (α = 0.05) before FDR P-value adjustment for multiple tests, but not afterwards.
(-)	Trend was negative and statistically significant (α = 0.05) before FDR P-value adjustment for multiple tests, but not afterwards.
Nyrs	Number of years in which data were collected for a given dataset.
N	Number of measurements used in the given test.
%BDL	Percentage of values that were below the method detection limit.
Test	The statistical test used to assess the presence of a temporal trend.
CK	The Censored Mann-Kendall test was perfomed.
SK	The Seasonal Kendall test was perfomed.
tau	Kendall’s correlation coefficient for the test.
P_{orig}	P-value of the test before applying FDR P-value adjustment for multiple tests.
P_{adj}	P-value of the test after applying FDR P-value adjustment for multiple tests.

Table A.2. Full results of regional trend analysis of nutrient, salinity, physical, bacteriological, and pesticide parameters. Symbols and abbreviations are defined in Table 2.2 and Table A.1.

Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
Summ	ns	-	ns	-	-	-	-	+	ns	-	ns	nt	ns	-	-	ns	-	-	-
Nyrs	10	8	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
N	756	622	546	756	756	756	756	756	756	756	756	756	756	756	756	622	756	756	622
%BDL	82.0	0.0	64.5	72.4	0.0	0.0	0.0	16.7	0.4	18.0	98.9	99.9	99.7	98.8	77.4	99.0	72.0	92.3	98.1
tau	-0.004	-0.309	0.002	-0.041	-0.352	-0.320	-0.196	0.091	0.014	-0.394	0.001		0.002	-0.021	-0.156	0.009	-0.118	-0.063	-0.017
P_{orig}	0.655	0.000	0.421	0.030	0.000	0.000	0.000	0.001	0.674	0.000	0.951		0.538	0.000	0.000	0.102	0.000	0.000	0.022
P_{adj}	0.732	0.000	0.551	0.046	0.000	0.000	0.000	0.002	0.732	0.000	0.951		0.622	0.000	0.000	0.149	0.000	0.000	0.035

Table A.3. Full results of regional trend analysis of metals parameters. Symbols and abbreviations are defined in Table 2.2 and Table A.1.

Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li
Summ	nt	-	ns	-	ns	nt	nt	ns	ns	-	-	ns	-
Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7
N	528	528	528	528	528	528	528	528	528	528	528	528	528
%BDL	100.0	7.0	1.7	90.5	0.0	100.0	100.0	99.6	99.6	35.2	12.3	99.4	59.8
tau		-0.342	-0.011	-0.139	0.006			0.004	-0.003	-0.186	-0.114	-0.008	-0.188
P_{orig}		0.000	0.808	0.000	0.745			0.540	0.447	0.000	0.001	0.112	0.000
P_{adj}		0.000	0.830	0.000	0.786			0.622	0.566	0.000	0.002	0.155	0.000

Table A.3. *continued*.

Variable	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
Summ	ns	nt	ns	-	-	-	nt	-	-	-	-	-
Nyrs	7	7	7	7	7	7	7	7	7	7	7	7
N	528	528	528	528	528	528	528	528	528	528	528	528
%BDL	1.9	100.0	86.0	42.8	85.6	42.4	100.0	12.7	98.1	9.8	41.5	46.8
tau	0.052		-0.010	-0.119	-0.275	-0.256		-0.450	-0.035	-0.120	-0.192	-0.381
P_{orig}	0.114		0.537	0.000	0.000	0.000		0.000	0.000	0.001	0.000	0.000
P_{adj}	0.155		0.622	0.000	0.000	0.000		0.000	0.000	0.002	0.000	0.000

Table A.4. Full results of parameter-by-site trend analyses for nutrient, salinity, physical, bacteriological, and pesticide parameters. Symbols and abbreviations are defined in Table 2.2 and Table A.1.

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
MVID	MV-P1	Summ	ns	-	ns	-	ns	-	ns	ns	(+)	(-)	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	40	40	40	40	40	40	40	40	39	32	40	40	32
		%BDL	95.0	0.0	64.3	27.5	0.0	0.0	0.0	40.0	20.0	67.5	100.0	100.0	97.5	100.0	100.0	100.0	97.5	100.0	100.0
		Test	CK	CK	CK	CK	SK	CK	SK	CK	CK	CK									
		tau	-0.010	-0.403	0.042	-0.409	0.139	-0.387	-0.128	0.024	0.238	-0.274									
		P_{orig}	0.905	0.001	0.738	0.000	0.282	0.000	0.325	0.828	0.029	0.008									
		P_{adj}	0.977	0.018	0.896	0.006	0.522	0.010	0.575	0.942	0.119	0.055									
	MV-R1	Summ	ns	ns	(+)	ns	ns	(-)	ns	ns	(+)	ns	nt	nt	nt	nt	nt	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	39	31	27	39	39	39	39	39	39	39	39	39	39	39	39	31	39	39	31
		%BDL	79.5	3.2	51.9	17.9	0.0	0.0	0.0	7.7	0.0	59.0	100.0	100.0	100.0	100.0	100.0	100.0	92.3	100.0	100.0
		Test	CK	CK	CK	CK	CK	CK	CK	CK	CK	CK							CK		
		tau	-0.084	0.026	0.251	-0.092	0.144	-0.273	-0.209	-0.142	0.240	-0.174							0.069		
		P_{orig}	0.373	0.851	0.044	0.401	0.199	0.013	0.062	0.206	0.032	0.103							0.437		
		P_{adj}	0.618	0.956	0.157	0.651	0.430	0.073	0.200	0.439	0.127	0.286							0.684		
AID	A-R1	Summ	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	nt	nt	nt	nt	(-)	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	38	30	28	38	38	38	38	38	38	38	38	38	38	38	38	30	38	38	30
		%BDL	78.9	0.0	35.7	23.7	0.0	0.0	0.0	26.3	0.0	23.7	100.0	97.4	100.0	100.0	84.2	100.0	89.5	100.0	100.0
		Test	CK	SK	CK	CK	SK	CK	SK	CK	CK	SK					CK		CK		
		tau	-0.135	-0.086	0.198	-0.125	0.181	-0.340	-0.137	-0.147	0.203	-0.130					-0.215		0.117		
		P_{orig}	0.156	0.681	0.122	0.256	0.162	0.002	0.268	0.192	0.074	0.303					0.029		0.208		
		P_{adj}	0.367	0.869	0.313	0.500	0.375	0.027	0.513	0.420	0.225	0.551					0.117		0.441		
UID	U-P1	Summ	ns	ns	ns	ns	ns	ns	ns	(+)	ns	ns	nt	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	32.5	3.1	85.7	77.5	0.0	0.0	0.0	55.0	0.0	95.0	100.0	97.5	100.0	100.0	92.5	100.0	92.5	100.0	96.9
		Test	SK	SK	CK	CK	SK	CK	SK	SK	CK	CK					CK		CK		
		tau	0.017	-0.196	0.159	-0.056	-0.033	-0.105	-0.122	0.211	0.199	0.055					-0.023		0.079		
		P_{orig}	0.922	0.186	0.157	0.578	0.822	0.337	0.347	0.039	0.072	0.513					0.803		0.344		
		P_{adj}	0.983	0.413	0.368	0.806	0.940	0.587	0.596	0.144	0.224	0.756					0.933		0.593		

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	U-S1	Summ	ns	-	ns	(-)	ns	ns	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	85.0	0.0	75.0	40.0	0.0	0.0	0.0	47.5	22.5	65.0	100.0	97.5	97.5	100.0	40.0	100.0	87.5	100.0	96.9
		Test	CK	SK	CK	CK	SK	CK	CK	CK	CK	SK					SK		SK		
		tau	-0.083	-0.464	0.098	-0.214	-0.172	-0.164	-0.165	-0.018	-0.024	-0.122					0.033		0.106		
		P_{orig}	0.349	0.001	0.417	0.042	0.178	0.133	0.136	0.876	0.832	0.224					0.811		0.114		
		P_{adj}	0.598	0.020	0.667	0.152	0.400	0.330	0.333	0.967	0.945	0.461					0.938		0.299		
	U-R2	Summ	ns	(-)	ns	ns	ns	(-)	ns	ns	(-)	(-)	nt	nt	nt	nt	ns	nt	ns	nt	
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	39	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	85.0	0.0	7.1	75.0	0.0	0.0	0.0	15.0	0.0	32.5	100.0	100.0	100.0	100.0	27.5	100.0	80.0	97.5	100.0
		Test	CK	CK	CK	SK	SK	CK	CK	SK	CK	SK					SK		CK		
		tau	0.004	-0.284	-0.241	-0.144	-0.233	-0.264	-0.211	0.033	-0.241	-0.306					0.117		0.054		
		P_{orig}	0.977	0.023	0.056	0.128	0.066	0.016	0.061	0.821	0.029	0.012					0.355		0.578		
		P_{adj}	1.000	0.101	0.189	0.321	0.209	0.082	0.197	0.940	0.120	0.070					0.602		0.806		
MID	M-P1	Summ	-	(-)	ns	ns	ns	(-)	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	26	40	40	40	40	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	12.5	0.0	88.5	67.5	0.0	0.0	0.0	32.5	2.5	53.8	100.0	100.0	97.4	100.0	92.3	100.0	92.3	100.0	100.0
		Test	CK	SK	CK	CK	CK	CK	SK	CK	CK	CK					CK		CK		
		tau	-0.364	-0.295	0.132	-0.053	-0.163	-0.231	-0.039	0.138	-0.079	-0.173					-0.012		0.053		
		P_{orig}	0.001	0.043	0.253	0.611	0.141	0.034	0.788	0.197	0.473	0.109					0.905		0.565		
		P_{adj}	0.016	0.154	0.495	0.826	0.343	0.132	0.925	0.427	0.718	0.291					0.977		0.795		
	M-S1	Summ	-	-	nt	-	ns	ns	ns	ns	(+)	(-)	nt	nt	ns	nt	ns	nt	ns	nt	nt
		Nyrs	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		N	32	32	18	32	32	32	32	32	32	31	31	31	31	31	31	31	31	31	31
		%BDL	37.5	0.0	5.6	9.4	0.0	0.0	0.0	12.5	0.0	35.5	100.0	96.8	93.5	100.0	87.1	100.0	71.0	100.0	100.0
		Test	CK	CK		CK	SK	CK	CK	SK	SK	CK			CK		CK		CK		
		tau	-0.480	-0.490		-0.337	-0.286	-0.129	-0.220	-0.232	0.313	-0.282			0.019		-0.133		0.026		
		P_{orig}	0.000	0.000		0.006	0.053	0.297	0.080	0.115	0.035	0.025			0.878		0.221		0.831		
		P_{adj}	0.005	0.005		0.045	0.181	0.544	0.239	0.301	0.135	0.106			0.968		0.457		0.945		
	M-R1	Summ	(-)	(-)	ns	ns	-	-	-	ns	ns	(-)	nt	nt	ns	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	26	40	40	40	40	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	47.5	0.0	15.4	2.5	0.0	0.0	0.0	2.5	0.0	43.6	100.0	97.4	94.9	100.0	84.6	100.0	74.4	100.0	96.8
		Test	CK	SK	SK	CK	CK	CK	CK	CK	SK	CK			CK		CK		SK		
		tau	-0.251	-0.304	-0.256	-0.101	-0.306	-0.319	-0.308	-0.013	0.139	-0.227			0.036		-0.036		-0.043		
		P_{orig}	0.018	0.039	0.125	0.360	0.006	0.003	0.005	0.916	0.283	0.036			0.719		0.697		0.593		
		P_{adj}	0.087	0.146	0.317	0.607	0.043	0.032	0.042	0.982	0.524	0.138			0.885		0.877		0.815		

Table A.4. continued.

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
RID	R-P1	Summ	-	(-)	ns	ns	ns	(-)	ns	ns	(+)	(-)	nt	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	26	40	40	40	40	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	42.5	0.0	84.6	37.5	0.0	0.0	0.0	12.5	0.0	20.5	100.0	100.0	97.4	100.0	92.3	100.0	82.1	100.0	100.0
		Test	CK	CK	CK	CK	SK	CK	SK	SK	CK	CK					CK		CK		
		tau	-0.308	-0.284	0.114	-0.042	-0.139	-0.288	-0.206	0.167	0.264	-0.243					-0.053		0.045		
		P_{orig}	0.004	0.023	0.344	0.686	0.279	0.008	0.106	0.174	0.017	0.030					0.564		0.648		
		P_{adj}	0.035	0.101	0.593	0.870	0.520	0.055	0.290	0.397	0.084	0.121					0.795		0.848		
	R-R1	Summ	-	-	ns	ns	ns	ns	ns	(-)	(-)	-	nt	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	26	40	40	40	39	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8	100.0	100.0	97.4	100.0	76.9	100.0	71.8	97.4	96.8
		Test	CK	CK	SK	CK	SK	SK	CK	CK	CK	CK					CK		CK		
		tau	-0.301	-0.435	0.005	-0.203	-0.228	0.094	-0.070	-0.256	-0.264	-0.389					-0.094		-0.092		
		P_{orig}	0.003	0.000	1.000	0.066	0.073	0.457	0.537	0.020	0.017	0.001					0.343		0.372		
		P_{adj}	0.032	0.012	1.000	0.209	0.225	0.704	0.777	0.094	0.085	0.012					0.593		0.618		
	R-R2	Summ	ns	ns	ns	ns	(-)	(-)	-	(-)	ns	(-)	nt	nt	ns	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	39	31	26	39	39	39	39	39	39	38	38	38	38	38	38	30	38	38	30
		%BDL	84.6	0.0	0.0	28.2	0.0	0.0	0.0	5.1	0.0	23.7	100.0	100.0	92.1	100.0	92.1	100.0	81.6	100.0	100.0
		Test	CK	CK	CK	SK	SK	CK	SK	SK	CK	CK			CK		CK		CK		
		tau	-0.135	-0.183	0.040	-0.048	-0.259	-0.274	-0.360	-0.273	-0.032	-0.269			0.063		-0.011		0.097		
		P_{orig}	0.127	0.152	0.785	0.698	0.040	0.013	0.005	0.033	0.781	0.017			0.540		0.910		0.331		
		P_{adj}	0.321	0.363	0.924	0.877	0.148	0.074	0.039	0.129	0.923	0.086			0.777		0.980		0.583		
LNID	LN-P1	Summ	ns	ns	ns	ns	ns	(-)	(-)	ns	ns	ns	nt	nt	nt	nt	nt	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	39	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	7.5	0.0	85.2	55.0	0.0	0.0	0.0	15.0	0.0	90.0	100.0	100.0	97.5	100.0	100.0	100.0	95.0	100.0	100.0
		Test	CK	CK	CK	CK	CK	CK	SK	SK	CK	CK							CK		
		tau	-0.096	-0.038	0.154	-0.059	0.086	-0.253	-0.335	-0.006	-0.050	-0.051							0.040		
		P_{orig}	0.385	0.770	0.183	0.585	0.439	0.020	0.008	1.000	0.658	0.578							0.649		
		P_{adj}	0.632	0.917	0.409	0.811	0.686	0.092	0.057	1.000	0.852	0.806							0.848		
	LN-S1	Summ	ns	(-)	ns	ns	ns	(-)	(-)	ns	ns	ns	nt	nt	ns	nt	nt	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	39	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	22.5	0.0	81.5	37.5	0.0	0.0	0.0	10.0	0.0	75.0	100.0	100.0	95.0	100.0	97.5	100.0	95.0	100.0	100.0
		Test	CK	CK	CK	CK	CK	CK	SK	SK	CK	SK			CK				CK		
		tau	-0.050	-0.254	0.205	-0.101	0.100	-0.228	-0.314	0.006	-0.051	-0.022			0.045				0.053		
		P_{orig}	0.653	0.042	0.083	0.349	0.367	0.036	0.014	1.000	0.649	0.843			0.649				0.532		
		P_{adj}	0.849	0.152	0.244	0.598	0.613	0.137	0.076	1.000	0.848	0.949			0.848				0.773		

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	LN-S2	Summ	nt	ns	ns	ns	(-)	(-)	(-)	ns	ns	-	nt	nt	nt	nt	nt	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	100.0	0.0	85.2	27.5	0.0	0.0	0.0	20.0	7.5	22.5	100.0	100.0	100.0	100.0	100.0	100.0	85.0	100.0	100.0
		Test		CK	CK	CK	SK	CK	SK	SK	SK	CK							CK		
		tau		-0.238	0.080	-0.072	-0.283	-0.286	-0.267	-0.150	-0.011	-0.337							0.079		
		P_{orig}		0.057	0.498	0.499	0.025	0.008	0.035	0.218	0.964	0.002							0.387		
		P_{adj}		0.190	0.743	0.743	0.105	0.057	0.135	0.453	1.000	0.026							0.632		
	LN-S3	Summ	ns	-	ns	ns	(-)	(-)	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	60.0	0.0	70.4	27.5	0.0	0.0	0.0	45.0	15.0	35.0	100.0	97.5	97.5	100.0	80.0	100.0	65.0	97.5	100.0
		Test	CK	CK	CK	CK	SK	CK	SK	CK	SK	CK					CK		CK		
		tau	-0.109	-0.391	0.145	-0.005	-0.267	-0.288	-0.083	0.200	-0.078	-0.159					-0.023		-0.012		
		P_{orig}	0.294	0.002	0.252	0.971	0.035	0.009	0.531	0.062	0.555	0.147					0.811		0.919		
		P_{adj}	0.541	0.024	0.495	1.000	0.135	0.058	0.772	0.199	0.787	0.355					0.938		0.983		
LNID	LN-S4	Summ	nt	-	ns	ns	(-)	(-)	(-)	ns	ns	-	nt	nt	ns	nt	nt	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	39	39	40	40	40	40	40	40	32	40	40	32
		%BDL	97.5	0.0	77.8	15.0	0.0	0.0	0.0	0.0	0.0	20.0	100.0	100.0	95.0	100.0	97.5	100.0	75.0	100.0	96.9
		Test		CK	CK	CK	SK	CK	SK	SK	CK	CK			CK				CK		
		tau		-0.413	0.145	-0.105	-0.283	-0.282	-0.317	0.224	0.206	-0.315			0.047				0.035		
		P_{orig}		0.001	0.228	0.331	0.025	0.010	0.012	0.085	0.066	0.004			0.630				0.733		
		P_{adj}		0.016	0.466	0.583	0.105	0.063	0.071	0.250	0.208	0.036			0.837				0.895		
	LN-S5	Summ	ns	ns	ns	ns	-	ns	ns	ns	(-)	-	nt	nt	nt	nt	ns	nt	ns	ns	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	95.0	0.0	70.4	17.5	0.0	0.0	0.0	12.5	7.5	15.0	97.5	100.0	100.0	100.0	82.5	96.9	65.0	95.0	100.0
		Test	CK	CK	CK	CK	SK	SK	SK	SK	SK	CK					CK		CK	CK	
		tau	-0.037	-0.190	0.225	0.085	-0.372	0.039	-0.217	0.228	-0.294	-0.381					0.026		0.069	-0.058	
		P_{orig}	0.635	0.131	0.073	0.430	0.003	0.785	0.089	0.066	0.019	0.001					0.784		0.505	0.460	
		P_{adj}	0.840	0.326	0.225	0.680	0.030	0.924	0.257	0.208	0.089	0.012					0.924		0.749	0.707	
	LN-R1	Summ	ns	ns	ns	ns	-	(-)	ns	ns	ns	-	nt	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	39	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	67.5	0.0	29.6	2.5	0.0	0.0	0.0	0.0	0.0	17.5	100.0	100.0	100.0	100.0	95.0	100.0	75.0	100.0	100.0
		Test	CK	CK	CK	SK	SK	CK	SK	SK	CK	CK					CK		CK		
		tau	-0.036	-0.220	0.054	-0.006	-0.511	-0.247	-0.172	-0.033	-0.082	-0.419					0.001		0.029		
		P_{orig}	0.729	0.079	0.686	1.000	0.000	0.022	0.211	0.822	0.463	0.000					1.000		0.767		
		P_{adj}	0.893	0.239	0.870	1.000	0.004	0.099	0.445	0.940	0.710	0.006					1.000		0.915		

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	LN-R2	Summ	+	ns	ns	ns	+	(-)	(-)	+	ns	-	ns	ns	nt	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	39	40	40	40	40	40	40	32	40	40	32
		%BDL	20.0	0.0	22.2	25.0	0.0	0.0	0.0	0.0	0.0	25.0	92.5	95.0	97.5	97.5	70.0	100.0	37.5	100.0	100.0
		Test	CK	CK	SK	SK	SK	CK	SK	CK	CK	CK	SK	CK			CK		CK		
		tau	0.396	-0.101	0.042	0.217	0.356	-0.250	-0.333	0.412	0.022	-0.309	0.100	-0.037			0.108		-0.042		
		P_{orig}	0.000	0.426	0.808	0.080	0.005	0.022	0.008	0.000	0.856	0.005	0.058	0.667			0.249		0.703		
		P_{adj}	0.010	0.676	0.936	0.239	0.039	0.098	0.057	0.007	0.958	0.041	0.193	0.858			0.490		0.878		
	LN-R3	Summ	ns	-	nt	ns	-	(-)	ns	ns	ns	-	nt	nt	ns	nt	ns	nt	ns	nt	nt
		Nyrs	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		N	29	29	17	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
		%BDL	58.6	0.0	35.3	62.1	0.0	0.0	0.0	3.4	0.0	13.8	100.0	96.6	93.1	100.0	82.8	100.0	58.6	96.6	100.0
		Test	CK	CK		SK	SK	CK	SK	CK	SK	CK			CK		CK		CK		
		tau	-0.025	-0.392		0.186	-0.620	-0.276	-0.067	0.244	0.078	-0.446			0.012		0.005		-0.057		
		P_{orig}	0.844	0.003		0.163	0.000	0.032	0.673	0.065	0.572	0.001			0.933		0.982		0.652		
		P_{adj}	0.950	0.030		0.377	0.005	0.126	0.863	0.206	0.802	0.015			0.985		1.000		0.848		
	LN-R4	Summ	ns	(-)	nt	ns	(-)	(-)	ns	ns	+	-	nt	nt	ns	nt	ns	nt	(-)	ns	nt
		Nyrs	7	7	4	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	28	16	28	27	27	28	27	28	28	28	28	28	28	28	28	28	28	28
		%BDL	81.5	0.0	75.0	3.6	0.0	0.0	0.0	40.7	3.6	17.9	100.0	96.4	92.9	100.0	67.9	100.0	35.7	85.7	100.0
		Test	CK	CK		CK	SK	CK	CK	CK	CK	CK			CK		CK		CK	CK	
		tau	0.120	-0.288		-0.153	-0.402	-0.356	-0.029	0.014	0.484	-0.540			0.003		-0.108		-0.325	-0.159	
		P_{orig}	0.153	0.033		0.244	0.015	0.009	0.843	0.931	0.000	0.000			1.000		0.386		0.014	0.140	
		P_{adj}	0.364	0.128		0.483	0.078	0.059	0.949	0.985	0.010	0.005			1.000		0.632		0.076	0.341	
TID	T-P1a	Summ	ns	-	(+)	ns	-	(-)	ns	ns	ns	(-)	nt	nt	ns	nt	nt	nt	ns	nt	nt
		Nyrs	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		N	32	32	31	32	32	32	32	31	32	32	32	32	32	32	32	32	32	32	32
		%BDL	90.6	0.0	48.4	15.6	0.0	0.0	0.0	29.0	0.0	3.1	96.9	100.0	90.6	100.0	100.0	100.0	65.6	100.0	100.0
		Test	CK	CK	CK	CK	SK	SK	SK	SK	SK	CK			CK				CK		
		tau	0.040	-0.466	0.256	-0.133	-0.571	-0.366	-0.027	0.002	0.080	-0.333			0.036				-0.188		
		P_{orig}	0.431	0.000	0.024	0.273	0.000	0.011	0.901	1.000	0.617	0.008			0.759				0.098		
		P_{adj}	0.680	0.007	0.105	0.516	0.005	0.066	0.976	1.000	0.830	0.055			0.909				0.277		
	T-P2	Summ	ns	-	(+)	ns	-	(-)	ns	ns	ns	ns	ns	ns	ns	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	39	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	87.5	0.0	74.4	35.0	0.0	0.0	0.0	22.5	0.0	2.5	95.0	92.5	95.0	97.5	90.0	96.9	62.5	100.0	100.0
		Test	CK	CK	CK	CK	SK	CK	SK	SK	SK	CK	CK	CK	CK		CK		CK		
		tau	0.019	-0.484	0.233	0.126	-0.444	-0.240	-0.211	0.061	0.017	-0.169	-0.017	0.023	0.035		-0.145		-0.124		
		P_{orig}	0.833	0.000	0.018	0.238	0.000	0.027	0.097	0.638	0.928	0.127	0.840	0.800	0.730		0.109		0.233		
		P_{adj}	0.945	0.006	0.087	0.476	0.011	0.114	0.276	0.842	0.985	0.321	0.948	0.932	0.894		0.291		0.469		

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	T-S2	Summ	ns	(-)	ns	ns	-	ns	ns	ns	-	-	ns	nt	ns	-	ns	ns	(-)	ns	nt
		Nyrs	10	8	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	39	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	87.5	0.0	38.5	52.5	0.0	0.0	0.0	25.0	7.5	2.5	95.0	100.0	95.0	92.5	72.5	81.3	60.0	92.5	100.0
		Test	CK	CK	SK	SK	SK	SK	SK	CK	SK	SK	CK		CK	CK	SK	CK	CK	CK	
		tau	-0.046	-0.298	-0.094	-0.206	-0.422	-0.194	-0.156	-0.086	-0.344	-0.411	0.009		0.058	-0.141	-0.178	0.127	-0.260	-0.077	
		P_{orig}	0.598	0.017	0.434	0.069	0.001	0.124	0.227	0.437	0.006	0.001	0.920		0.554	0.000	0.053	0.265	0.012	0.324	
		P_{adj}	0.817	0.085	0.682	0.214	0.015	0.315	0.466	0.684	0.046	0.018	0.983		0.786	0.009	0.180	0.509	0.069	0.575	
	T-S3	Summ	ns	ns	+	ns	-	ns	ns	ns	ns	(-)	ns	nt	nt	-	-	ns	-	ns	nt
		Nyrs	10	8	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	39	31	38	39	39	39	40	39	39	40	40	40	40	40	40	32	40	40	32
		%BDL	84.6	0.0	63.2	69.2	0.0	0.0	0.0	33.3	0.0	2.5	95.0	97.5	97.5	95.0	50.0	78.1	47.5	95.0	100.0
		Test	CK	CK	CK	SK	SK	SK	SK	CK	SK	SK	CK			CK	SK	CK	CK	CK	
		tau	-0.038	-0.142	0.313	0.141	-0.400	-0.107	-0.011	0.146	-0.164	-0.322	0.009			-0.099	-0.367	0.058	-0.314	-0.099	
		P_{orig}	0.684	0.269	0.003	0.182	0.002	0.397	0.964	0.189	0.194	0.011	0.920			0.000	0.001	0.616	0.003	0.201	
		P_{adj}	0.869	0.513	0.028	0.406	0.025	0.647	1.000	0.415	0.422	0.066	0.983			0.005	0.015	0.830	0.029	0.432	
	T-R1	Summ	ns	ns	ns	ns	-	ns	ns	ns	ns	-	nt	nt	ns	-	(-)	ns	ns	nt	nt
		Nyrs	10	8	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	39	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	52.5	0.0	33.3	37.5	0.0	0.0	0.0	7.5	2.5	2.5	97.5	97.5	92.5	95.0	60.0	78.1	57.5	97.5	100.0
		Test	CK	CK	SK	SK	SK	SK	SK	CK	CK	SK			CK	CK	SK	CK	SK		
		tau	0.071	-0.190	0.077	0.061	-0.467	-0.028	-0.017	0.159	0.022	-0.389			0.038	-0.099	-0.244	0.153	-0.206		
		P_{orig}	0.507	0.131	0.498	0.633	0.000	0.854	0.929	0.149	0.852	0.002			0.700	0.000	0.019	0.182	0.058		
		P_{adj}	0.751	0.327	0.743	0.839	0.007	0.956	0.985	0.358	0.956	0.026			0.878	0.005	0.091	0.406	0.193		
	T-R2	Summ	ns	ns	+	ns	-	ns	ns	ns	ns	-	ns	ns	nt	-	-	ns	-	ns	nt
		Nyrs	10	8	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	39	40	39	40	40	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	67.5	0.0	59.0	12.5	0.0	0.0	0.0	42.5	0.0	0.0	94.9	94.9	97.4	94.9	38.5	77.4	46.2	94.9	100.0
		Test	CK	CK	CK	CK	SK	SK	SK	SK	CK	SK	CK	CK		CK	SK	CK	CK	CK	
		tau	0.173	0.010	0.352	0.169	-0.390	-0.067	-0.078	-0.206	0.018	-0.410	0.012	0.047		-0.101	-0.575	0.108	-0.356	-0.080	
		P_{orig}	0.086	0.948	0.001	0.121	0.003	0.617	0.559	0.076	0.880	0.001	0.890	0.590		0.000	0.000	0.359	0.001	0.316	
		P_{adj}	0.251	0.993	0.015	0.311	0.028	0.830	0.791	0.232	0.968	0.018	0.972	0.814		0.005	0.000	0.607	0.015	0.565	
SMRID	SMW-P1	Summ	(-)	ns	ns	ns	(-)	-	ns	ns	ns	-	nt	nt	nt	nt	nt	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	45.0	0.0	70.4	30.0	0.0	0.0	0.0	2.5	2.5	22.5	100.0	100.0	97.5	97.5	97.5	100.0	82.5	100.0	100.0
		Test	CK	SK	CK	CK	SK	CK	SK	CK	CK	CK							CK		
		tau	-0.255	-0.232	0.219	-0.049	-0.311	-0.350	-0.228	0.212	0.197	-0.333							-0.053		
		P_{orig}	0.016	0.121	0.079	0.644	0.013	0.001	0.073	0.054	0.074	0.002							0.591		
		P_{adj}	0.084	0.310	0.238	0.848	0.074	0.019	0.224	0.182	0.225	0.027							0.815		

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	SMW-S2	Summ	ns	ns	nt	ns	ns	-	ns	ns	ns	ns	nt	nt	nt	nt	nt	nt	ns	nt	nt
		Nyrs	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		N	32	32	19	32	32	32	32	32	32	31	31	31	31	31	31	31	31	31	31
		%BDL	59.4	0.0	63.2	21.9	0.0	0.0	0.0	0.0	0.0	12.9	100.0	96.8	96.8	100.0	96.8	100.0	77.4	100.0	100.0
		Test	CK	SK		CK	SK	CK	CK	SK	CK	SK							CK		
		tau	-0.095	-0.214		-0.185	-0.143	-0.383	-0.159	0.027	0.097	-0.071							-0.144		
		P_{orig}	0.385	0.153		0.122	0.345	0.002	0.206	0.900	0.445	0.648							0.187		
		P_{adj}	0.632	0.364		0.313	0.593	0.024	0.439	0.975	0.692	0.848							0.414		
	SMW-R1	Summ	ns	-	ns	(-)	ns	ns	ns	ns	ns	ns	nt	nt	ns	nt	(-)	nt	(-)	ns	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	72.5	0.0	40.7	15.0	0.0	0.0	0.0	5.0	0.0	10.0	97.5	100.0	92.5	97.5	82.5	100.0	60.0	95.0	100.0
		Test	CK	CK	CK	CK	SK	CK	CK	CK	CK	SK			CK		CK		SK	CK	
		tau	-0.113	-0.369	0.217	-0.229	-0.233	-0.163	-0.010	0.015	-0.060	-0.117			0.038		-0.244		-0.244	-0.022	
		P_{orig}	0.252	0.003	0.104	0.035	0.066	0.133	0.935	0.898	0.592	0.370			0.704		0.012		0.018	0.788	
		P_{adj}	0.495	0.030	0.287	0.135	0.208	0.330	0.985	0.975	0.815	0.616			0.878		0.071		0.087	0.925	
	SMW-R2	Summ	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	nt	nt	nt	nt	-	ns	-	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	50.0	0.0	51.9	5.0	0.0	0.0	0.0	5.0	0.0	5.0	97.5	100.0	97.5	97.5	70.0	93.8	60.0	100.0	100.0
		Test	CK	CK	CK	CK	CK	SK	CK	SK	CK	SK					CK	CK	SK		
		tau	-0.112	-0.244	0.199	-0.182	-0.300	-0.150	-0.069	0.161	0.188	-0.028					-0.306	-0.018	-0.322		
		P_{orig}	0.293	0.051	0.132	0.094	0.007	0.236	0.536	0.207	0.089	0.858					0.002	0.876	0.002		
		P_{adj}	0.539	0.175	0.327	0.269	0.048	0.474	0.777	0.441	0.257	0.959					0.027	0.967	0.026		
	SMC-P1	Summ	ns	(-)	ns	ns	-	-	ns	ns	ns	(-)	nt	nt	ns	nt	ns	nt	(-)	nt	nt
		Nyrs	10	8	8	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	39	31	27	39	39	39	39	39	39	39	39	39	39	39	39	31	39	39	31
		%BDL	87.2	0.0	74.1	28.2	0.0	0.0	0.0	15.4	5.1	2.6	97.4	100.0	92.3	97.4	89.7	100.0	59.0	100.0	100.0
		Test	CK	CK	CK	CK	SK	CK	SK	SK	CK	SK			CK		CK		CK		
		tau	-0.080	-0.282	0.063	-0.003	-0.417	-0.301	-0.132	0.216	-0.007	-0.261			0.042		-0.184		-0.209		
		P_{orig}	0.368	0.027	0.619	0.990	0.001	0.006	0.308	0.091	0.961	0.042			0.682		0.050		0.048		
		P_{adj}	0.615	0.112	0.830	1.000	0.018	0.047	0.556	0.261	1.000	0.152			0.869		0.174		0.168		
	SMC-S1	Summ	ns	(-)	ns	ns	-	ns	ns	ns	ns	ns	nt	nt	nt	nt	nt	ns	-	ns	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	39	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	82.5	0.0	66.7	22.5	0.0	0.0	0.0	37.5	2.5	0.0	97.4	97.4	100.0	100.0	100.0	87.1	61.5	92.3	100.0
		Test	CK	CK	CK	CK	CK	CK	SK	CK	SK	CK						CK	CK	CK	
		tau	-0.018	-0.321	0.108	-0.023	-0.472	-0.133	0.023	0.176	0.244	-0.202						0.086	-0.347	-0.074	
		P_{orig}	0.853	0.010	0.399	0.838	0.000	0.222	0.926	0.102	0.051	0.071						0.448	0.001	0.353	
		P_{adj}	0.956	0.064	0.649	0.946	0.002	0.458	0.985	0.284	0.175	0.221						0.695	0.016	0.602	

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	SMC-S2	Summ	ns	(-)	ns	ns	-	ns	ns	(+)	ns	ns	ns	nt	ns	nt	nt	ns	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	90.0	0.0	48.1	7.5	0.0	0.0	0.0	12.5	0.0	2.6	94.9	97.4	94.9	100.0	97.4	83.9	64.1	97.4	100.0
		Test	CK	CK	CK	CK	CK	CK	SK	CK	SK	CK	CK		CK			CK	CK		
		tau	0.045	-0.278	-0.046	-0.167	-0.583	-0.167	-0.006	0.221	0.144	-0.036	0.015		0.045			0.116	-0.128		
		P_{orig}	0.596	0.026	0.742	0.128	0.000	0.128	1.000	0.044	0.263	0.753	0.863		0.654			0.312	0.219		
		P_{adj}	0.815	0.110	0.901	0.321	0.000	0.321	1.000	0.157	0.507	0.905	0.961		0.850			0.562	0.454		
	SMC-S3	Summ	ns	-	ns	ns	(-)	(-)	(-)	ns	ns	ns	nt	nt	nt	nt	ns	ns	-	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	77.5	0.0	74.1	27.5	0.0	0.0	0.0	7.5	0.0	0.0	97.4	100.0	97.4	97.4	89.7	90.3	48.7	100.0	100.0
		Test	CK	CK	CK	CK	SK	CK	SK	SK	CK	SK					CK	CK	SK		
		tau	-0.099	-0.442	0.108	-0.056	-0.328	-0.249	-0.278	0.011	-0.133	-0.109					-0.181	0.028	-0.318		
		P_{orig}	0.300	0.000	0.382	0.604	0.009	0.022	0.028	0.964	0.228	0.354					0.054	0.812	0.004		
		P_{adj}	0.548	0.011	0.628	0.822	0.061	0.099	0.116	1.000	0.466	0.602					0.183	0.938	0.035		
	SMC-R1	Summ	ns	-	ns	ns	-	-	(-)	ns	ns	ns	ns	nt	nt	nt	nt	ns	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	62.5	0.0	48.1	5.0	0.0	0.0	0.0	15.0	0.0	2.6	92.3	100.0	97.4	100.0	97.4	77.4	69.2	97.4	100.0
		Test	CK	CK	CK	CK	CK	CK	SK	CK	CK	CK	CK					CK	CK		
		tau	0.082	-0.349	0.108	-0.165	-0.486	-0.374	-0.250	-0.067	0.099	-0.162	0.020					0.024	-0.171		
		P_{orig}	0.428	0.005	0.422	0.130	0.000	0.001	0.049	0.550	0.376	0.150	0.817					0.850	0.091		
		P_{adj}	0.679	0.042	0.671	0.325	0.001	0.013	0.169	0.782	0.621	0.360	0.940					0.955	0.261		
	SMC-R3	Summ	ns	ns	ns	ns	-	-	ns	ns	+	ns	nt	nt	nt	nt	ns	ns	ns	ns	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	55.0	0.0	33.3	7.5	0.0	0.0	0.0	15.0	2.5	0.0	97.4	100.0	97.4	100.0	94.9	90.3	66.7	94.9	100.0
		Test	CK	CK	CK	CK	CK	CK	SK	CK	CK	CK					CK	CK	CK	CK	
		tau	-0.005	-0.169	0.000	-0.141	-0.386	-0.379	-0.206	-0.029	0.341	-0.038					-0.069	0.041	-0.162	-0.028	
		P_{orig}	0.971	0.178	1.000	0.199	0.000	0.001	0.106	0.796	0.002	0.744					0.445	0.720	0.115	0.717	
		P_{adj}	1.000	0.401	1.000	0.430	0.012	0.012	0.289	0.929	0.026	0.901					0.692	0.886	0.301	0.885	
	SMC-R4	Summ	ns	-	ns	ns	-	-	ns	(+)	ns	ns	ns	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	87.5	0.0	66.7	27.5	0.0	0.0	0.0	10.0	0.0	2.6	92.3	97.4	100.0	97.4	92.3	100.0	59.0	97.4	100.0
		Test	CK	CK	CK	CK	SK	CK	SK	CK	CK	SK	CK				CK		SK		
		tau	-0.096	-0.395	0.160	0.127	-0.422	-0.412	-0.206	0.260	0.060	-0.023	-0.001				-0.131		-0.106		
		P_{orig}	0.264	0.002	0.212	0.234	0.001	0.000	0.105	0.018	0.592	0.889	1.000				0.154		0.276		
		P_{adj}	0.509	0.022	0.445	0.470	0.015	0.006	0.287	0.087	0.815	0.972	1.000				0.364		0.516		

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	SME-P1	Summ	ns	ns	(+)	ns	(-)	-	(-)	ns	ns	-	ns	nt	nt	-	ns	nt	-	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	39	40	38	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	85.0	0.0	63.0	82.5	0.0	0.0	0.0	7.5	20.0	5.1	92.3	100.0	97.4	94.9	84.6	100.0	48.7	100.0	100.0
		Test	CK	CK	CK	SK	CK	CK	SK	CK	SK	CK	CK			CK	CK		CK		
		tau	0.029	-0.137	0.316	-0.094	-0.262	-0.323	-0.345	0.108	0.150	-0.367	0.018			-0.100	-0.146		-0.456		
		P_{orig}	0.747	0.276	0.013	0.228	0.019	0.003	0.008	0.325	0.231	0.001	0.837			0.000	0.131		0.000		
		P_{adj}	0.903	0.516	0.074	0.466	0.091	0.030	0.056	0.575	0.467	0.018	0.946			0.006	0.327		0.002		
	SME-S1	Summ	ns	ns	ns	(+)	(-)	ns	ns	ns	ns	ns	nt	nt	nt	nt	nt	nt	(-)	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	39	32	40	40	32
		%BDL	75.0	0.0	44.4	22.5	0.0	0.0	0.0	5.0	10.0	5.0	97.5	100.0	100.0	100.0	100.0	100.0	70.0	97.5	100.0
		Test	CK	SK	CK	SK	SK	SK	SK	SK	CK	CK							CK		
		tau	0.041	-0.071	0.137	0.250	-0.278	-0.178	-0.183	0.217	0.122	-0.188							-0.241		
		P_{orig}	0.677	0.665	0.311	0.042	0.028	0.157	0.151	0.087	0.271	0.089							0.015		
		P_{adj}	0.867	0.857	0.561	0.152	0.117	0.367	0.362	0.254	0.515	0.257							0.079		
	SME-R1a	Summ	(+)	ns	nt	(+)	-	ns	ns	ns	ns	ns	nt	nt	nt	nt	nt	nt	ns	ns	nt
		Nyrs	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		N	32	32	19	32	32	32	31	32	32	32	32	32	32	32	32	32	32	32	32
		%BDL	53.1	0.0	26.3	25.0	0.0	0.0	0.0	12.5	3.1	0.0	100.0	100.0	96.9	100.0	96.9	100.0	81.3	93.8	100.0
		Test	CK	SK		SK	SK	SK	CK	SK	SK	CK							CK	CK	
		tau	0.244	0.080		0.339	-0.714	-0.179	-0.239	0.054	0.071	-0.204							0.030	-0.022	
		P_{orig}	0.030	0.620		0.017	0.000	0.219	0.061	0.756	0.664	0.105							0.786	0.821	
		P_{adj}	0.123	0.831		0.085	0.000	0.454	0.198	0.906	0.856	0.287							0.925	0.940	
	SME-R2	Summ	ns	ns	nt	ns	-	-	ns	-	ns	ns	nt	nt	nt	nt	nt	nt	ns	nt	nt
		Nyrs	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		N	32	32	19	32	32	32	31	32	32	32	32	32	32	32	32	32	32	32	32
		%BDL	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.9	100.0	96.9	100.0	96.9	100.0	81.3	100.0	100.0
		Test	CK	CK		CK	CK	CK	SK	CK	SK	CK							CK		
		tau	0.228	-0.230		-0.153	-0.575	-0.333	-0.134	-0.498	0.063	-0.181							-0.040		
		P_{orig}	0.068	0.067		0.222	0.000	0.006	0.366	0.000	0.710	0.149							0.713		
		P_{adj}	0.212	0.209		0.458	0.001	0.045	0.613	0.005	0.881	0.358							0.883		

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
WID	W-P1	Summ	ns	ns	ns	ns	ns	ns	ns	ns	ns	(-)	nt	nt	nt	nt	-	nt	ns	-	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	39	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	77.5	0.0	57.1	27.5	0.0	0.0	0.0	20.0	7.5	5.0	100.0	100.0	100.0	100.0	62.5	100.0	80.0	52.5	100.0
		Test	CK	CK	CK	CK	SK	SK	SK	CK	CK	CK					CK		CK	CK	
		tau	0.059	-0.159	0.103	0.005	-0.239	-0.200	-0.212	-0.145	-0.090	-0.295					-0.367		-0.037	-0.403	
		P_{orig}	0.539	0.205	0.415	0.971	0.060	0.109	0.103	0.185	0.420	0.008					0.000		0.699	0.000	
		P_{adj}	0.777	0.439	0.667	1.000	0.195	0.291	0.286	0.411	0.671	0.054					0.012		0.877	0.006	
	W-P2	Summ	ns	-	ns	(-)	(-)	ns	ns	ns	(-)	(-)	nt	nt	nt	nt	-	nt	ns	-	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	39	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	50.0	0.0	82.1	22.5	0.0	0.0	0.0	17.5	0.0	2.6	100.0	100.0	97.4	100.0	53.8	100.0	76.9	33.3	100.0
		Test	CK	CK	CK	CK	SK	SK	SK	CK	CK	CK					CK		CK	CK	
		tau	-0.171	-0.413	-0.098	-0.210	-0.267	-0.178	0.000	-0.045	-0.232	-0.274					-0.339		-0.163	-0.377	
		P_{orig}	0.108	0.001	0.384	0.039	0.036	0.153	1.000	0.687	0.035	0.015					0.002		0.094	0.001	
		P_{adj}	0.291	0.016	0.631	0.146	0.136	0.363	1.000	0.871	0.135	0.078					0.023		0.270	0.013	
	W-S1	Summ	ns	(-)	ns	ns	ns	(-)	ns	(-)	-	-	nt	nt	nt	-	-	nt	-	-	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	38	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	65.0	0.0	60.7	15.0	0.0	0.0	0.0	12.5	0.0	5.0	100.0	97.5	97.5	95.0	62.5	100.0	70.0	57.5	100.0
		Test	CK	CK	CK	CK	SK	CK	SK	CK	CK	CK				CK	CK		SK	CK	
		tau	-0.187	-0.290	0.034	-0.110	-0.172	-0.237	-0.075	-0.232	-0.377	-0.388				-0.078	-0.404		-0.272	-0.368	
		P_{orig}	0.062	0.020	0.797	0.304	0.179	0.030	0.630	0.035	0.001	0.000				0.002	0.000		0.002	0.000	
		P_{adj}	0.199	0.093	0.931	0.552	0.403	0.123	0.837	0.135	0.013	0.012				0.025	0.006		0.025	0.010	
	W-S2	Summ	ns	ns	ns	ns	ns	ns	(-)	ns	-	-	nt	nt	nt	nt	-	nt	ns	(-)	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	39	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	90.0	0.0	67.9	17.5	0.0	0.0	0.0	20.0	0.0	5.0	100.0	100.0	97.5	100.0	72.5	100.0	65.0	72.5	100.0
		Test	CK	CK	SK	CK	SK	CK	SK	CK	CK	CK					CK		SK	CK	
		tau	-0.085	-0.214	-0.226	-0.174	-0.217	-0.071	-0.303	-0.044	-0.356	-0.338					-0.308		-0.089	-0.236	
		P_{orig}	0.311	0.088	0.058	0.104	0.088	0.525	0.018	0.699	0.001	0.002					0.002		0.395	0.014	
		P_{adj}	0.561	0.257	0.193	0.287	0.257	0.766	0.088	0.877	0.019	0.026					0.027		0.644	0.077	
	W-S3	Summ	ns	(-)	ns	ns	ns	ns	ns	ns	ns	-	nt	nt	ns	nt	-	nt	ns	-	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	37	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	85.0	0.0	35.7	72.5	0.0	0.0	0.0	12.5	0.0	2.5	97.5	100.0	95.0	97.5	62.5	100.0	65.0	40.0	100.0
		Test	CK	CK	SK	SK	SK	CK	SK	CK	CK	SK			CK		CK		CK	CK	
		tau	-0.063	-0.304	0.131	-0.078	-0.128	-0.086	0.007	-0.136	-0.051	-0.389			0.050		-0.351		-0.028	-0.362	
		P_{orig}	0.472	0.015	0.399	0.433	0.325	0.436	1.000	0.216	0.649	0.002			0.609		0.001		0.788	0.001	
		P_{adj}	0.717	0.079	0.648	0.681	0.575	0.684	1.000	0.451	0.848	0.026			0.824		0.015		0.925	0.015	

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	W-S4	Summ	(-)	ns	ns	ns	ns	ns	ns	ns	ns	-	nt	nt	ns	nt	(-)	nt	ns	-	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	39	39	40	40	40	40	40	40	40	32	40	40	32
		%BDL	80.0	0.0	67.9	15.0	0.0	0.0	0.0	20.5	0.0	2.5	100.0	97.5	90.0	97.5	65.0	100.0	75.0	40.0	100.0
		Test	CK	CK	SK	CK	SK	CK	SK	SK	CK	CK			CK		CK		CK	CK	
		tau	-0.204	-0.204	-0.036	-0.129	-0.067	-0.114	0.135	0.155	0.032	-0.369			0.001		-0.226		-0.006	-0.385	
		P_{orig}	0.023	0.104	0.823	0.230	0.623	0.301	0.330	0.226	0.779	0.001			1.000		0.028		0.957	0.000	
		P_{adj}	0.100	0.287	0.940	0.467	0.832	0.548	0.581	0.464	0.923	0.015			1.000		0.116		1.000	0.010	
	W-R1a	Summ	ns	ns	nt	ns	ns	ns	ns	ns	ns	(-)	nt	nt	nt	nt	ns	nt	ns	ns	nt
		Nyrs	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		N	32	32	20	32	32	32	31	32	32	32	32	32	32	32	32	32	32	32	32
		%BDL	78.1	0.0	35.0	12.5	0.0	0.0	0.0	6.3	0.0	3.1	100.0	96.9	96.9	100.0	78.1	100.0	71.9	53.1	100.0
		Test	CK	CK		CK	SK	CK	SK	CK	CK	CK					CK		CK	CK	
		tau	-0.036	-0.206		-0.192	-0.196	-0.159	0.115	0.208	0.238	-0.304					-0.058		0.097	-0.208	
		P_{orig}	0.679	0.101		0.114	0.194	0.199	0.517	0.096	0.058	0.015					0.610		0.345	0.075	
		P_{adj}	0.868	0.281		0.300	0.422	0.430	0.759	0.274	0.192	0.079					0.824		0.593	0.227	
	W-R2	Summ	ns	ns	ns	ns	ns	ns	(-)	ns	ns	-	nt	ns	ns	nt	-	nt	ns	(-)	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	39	40	40	39	39	39	39	39	39	31	39	39	31
		%BDL	70.0	0.0	3.6	2.5	0.0	0.0	0.0	5.0	0.0	5.1	100.0	87.2	94.9	100.0	74.4	100.0	59.0	84.6	100.0
		Test	CK	CK	SK	CK	SK	CK	SK	CK	CK	CK		CK	CK		CK		CK	CK	
		tau	-0.077	-0.151	0.202	-0.049	-0.156	-0.186	-0.293	0.006	0.058	-0.430		-0.162	0.012		-0.294		0.022	-0.208	
		P_{orig}	0.434	0.230	0.216	0.666	0.227	0.083	0.023	0.963	0.608	0.000		0.083	0.911		0.004		0.848	0.016	
		P_{adj}	0.682	0.467	0.450	0.857	0.466	0.244	0.101	1.000	0.823	0.006		0.244	0.981		0.033		0.953	0.082	
BRID	BR-P1	Summ	ns	-	ns	ns	-	-	-	ns	(+)	(-)	nt	nt	ns	nt	nt	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	92.5	0.0	88.9	50.0	0.0	0.0	0.0	55.0	12.5	5.0	100.0	100.0	95.0	100.0	97.5	100.0	80.0	100.0	100.0
		Test	CK	CK	CK	CK	CK	CK	SK	CK	CK	CK			CK				CK		
		tau	0.024	-0.452	0.120	-0.117	-0.717	-0.374	-0.394	0.109	0.237	-0.285			0.065				0.010		
		P_{orig}	0.770	0.000	0.287	0.259	0.000	0.001	0.002	0.295	0.031	0.010			0.506				0.923		
		P_{adj}	0.917	0.010	0.530	0.503	0.000	0.012	0.024	0.541	0.124	0.064			0.750				0.984		
	BR-S1	Summ	ns	-	ns	ns	-	-	-	ns	ns	-	nt	nt	ns	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	90.0	0.0	88.9	37.5	0.0	0.0	0.0	55.0	2.5	5.0	97.5	97.5	95.0	100.0	92.5	100.0	72.5	100.0	100.0
		Test	CK	CK	CK	CK	CK	CK	SK	CK	SK	CK			CK		SK		CK		
		tau	-0.135	-0.373	0.080	0.012	-0.353	-0.294	-0.350	0.053	-0.244	-0.386			0.045		0.033		-0.055		
		P_{orig}	0.105	0.003	0.483	0.921	0.001	0.007	0.005	0.623	0.053	0.000			0.649		0.578		0.584		
		P_{adj}	0.287	0.028	0.728	0.983	0.021	0.049	0.043	0.832	0.180	0.012			0.848		0.806		0.810		

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	BR-S2	Summ	ns	nt	(-)	ns	(-)	ns	ns	(+)	ns	-	nt	nt	ns	-	-	nt	ns	nt	nt
		Nyrs	7	5	7	7	7	7	7	7	7	7	7	7	7	7	7	5	7	7	5
		N	28	20	27	28	28	28	28	28	28	28	28	28	28	28	28	20	28	28	20
		%BDL	67.9	0.0	48.1	14.3	0.0	0.0	0.0	0.0	10.7	7.1	96.4	100.0	92.9	92.9	78.6	100.0	71.4	96.4	45.0
		Test	CK		SK	SK	CK	SK	SK	SK	CK	CK			CK	CK	CK		CK		
		tau	-0.090		-0.383	-0.048	-0.331	-0.167	-0.226	0.405	0.019	-0.611			-0.071	-0.119	-0.347		-0.201		
		P_{orig}	0.473		0.014	0.819	0.014	0.317	0.175	0.013	0.905	0.000			0.540	0.002	0.004		0.097		
		P_{adj}	0.718		0.078	0.940	0.077	0.566	0.398	0.073	0.977	0.001			0.777	0.026	0.033		0.276		
	BR-S3	Summ	ns	-	ns	ns	-	(-)	-	ns	ns	-	nt	nt	nt	nt	nt	nt	(-)	nt	ns
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	39	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	90.0	0.0	81.5	37.5	0.0	0.0	0.0	20.0	0.0	7.5	100.0	100.0	97.5	100.0	97.5	100.0	72.5	97.5	84.4
		Test	CK	CK	CK	CK	CK	CK	SK	CK	SK	CK							CK		CK
		tau	-0.006	-0.502	0.074	0.038	-0.679	-0.263	-0.348	-0.004	0.033	-0.410							-0.232		-0.192
		P_{orig}	0.950	0.000	0.535	0.726	0.000	0.014	0.005	0.981	0.821	0.000							0.017		0.108
		P_{adj}	0.994	0.005	0.776	0.891	0.000	0.076	0.042	1.000	0.940	0.007							0.086		0.291
	BR-S4a	Summ	(-)	-	nt	ns	-	(-)	ns	ns	ns	(-)	nt	nt	nt	nt	ns	nt	ns	nt	ns
		Nyrs	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		N	32	32	19	32	32	32	31	32	32	31	31	31	31	31	31	31	31	31	31
		%BDL	81.3	0.0	89.5	18.8	0.0	0.0	0.0	59.4	3.1	6.5	100.0	100.0	100.0	100.0	90.3	100.0	87.1	100.0	90.3
		Test	CK	CK		CK	CK	CK	SK	CK	CK	CK					CK		CK		CK
		tau	-0.185	-0.446		-0.046	-0.810	-0.323	-0.275	0.004	-0.103	-0.303					-0.043		0.026		-0.067
		P_{orig}	0.017	0.000		0.702	0.000	0.007	0.092	0.986	0.416	0.017					0.688		0.799		0.587
		P_{adj}	0.084	0.010		0.878	0.000	0.051	0.264	1.000	0.667	0.086					0.872		0.932		0.813
	BR-S5	Summ	ns	ns	ns	(+)	-	(-)	(-)	ns	ns	-	nt	nt	nt	nt	(-)	nt	ns	nt	ns
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	87.5	0.0	85.2	17.5	0.0	0.0	0.0	20.0	12.5	5.0	100.0	100.0	100.0	100.0	87.5	96.9	77.5	100.0	81.3
		Test	CK	SK	CK	CK	CK	CK	SK	CK	CK	CK					CK		CK		CK
		tau	-0.010	-0.071	0.171	0.253	-0.571	-0.286	-0.267	0.206	-0.058	-0.551					-0.188		-0.117		-0.151
		P_{orig}	0.916	0.664	0.139	0.020	0.000	0.009	0.035	0.058	0.606	0.000					0.041		0.224		0.207
		P_{adj}	0.982	0.856	0.339	0.091	0.000	0.060	0.135	0.193	0.823	0.000					0.150		0.461		0.441
	BR-R1	Summ	ns	-	ns	(-)	-	(-)	ns	ns	ns	-	nt	nt	nt	nt	nt	nt	ns	nt	ns
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	87.5	0.0	59.3	22.5	0.0	0.0	0.0	80.0	0.0	15.0	100.0	100.0	97.5	100.0	100.0	100.0	75.0	100.0	93.8
		Test	CK	CK	CK	CK	CK	CK	SK	CK	SK	CK							CK		CK
		tau	-0.058	-0.560	0.066	-0.212	-0.691	-0.282	-0.217	0.074	-0.022	-0.436							-0.156		-0.038
		P_{orig}	0.496	0.000	0.618	0.045	0.000	0.009	0.089	0.459	0.893	0.000							0.103		0.754
		P_{adj}	0.742	0.001	0.830	0.158	0.000	0.061	0.257	0.707	0.973	0.005							0.286		0.905

Table A.4. continued.

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	BR-R2	Summ	ns	(-)	ns	ns	-	(-)	(-)	ns	ns	-	nt	ns	nt	-	(-)	nt	ns	nt	ns
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	39	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	67.5	0.0	0.0	5.0	0.0	0.0	0.0	5.0	0.0	7.5	97.5	87.5	97.5	87.5	77.5	100.0	62.5	97.5	78.1
		Test	CK	CK	CK	CK	CK	CK	SK	SK	CK	CK		SK		CK	CK		CK		CK
		tau	-0.136	-0.296	-0.125	-0.213	-0.612	-0.247	-0.330	-0.083	-0.055	-0.396		-0.028		-0.186	-0.209		-0.024		-0.117
		P_{orig}	0.173	0.018	0.350	0.052	0.000	0.021	0.012	0.525	0.624	0.000		0.725		0.001	0.031		0.822		0.332
		P_{adj}	0.395	0.087	0.600	0.177	0.000	0.095	0.071	0.766	0.832	0.010		0.891		0.015	0.124		0.940		0.583
	BR-R3	Summ	ns	ns	ns	(+)	ns	ns	ns	(+)	ns	-	nt	nt	nt	-	(-)	ns	ns	nt	ns
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	39	40	39	39	39	39	39	39	39	31	39	39	31
		%BDL	57.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.3	100.0	100.0	97.4	94.9	87.2	87.1	79.5	100.0	83.9
		Test	CK	CK	CK	CK	CK	CK	SK	CK	CK	CK				CK	CK	CK	CK		CK
		tau	0.138	0.192	0.046	0.226	0.103	0.041	0.000	0.253	-0.201	-0.433				-0.090	-0.202	0.060	0.013		-0.125
		P_{orig}	0.188	0.127	0.751	0.040	0.357	0.715	1.000	0.022	0.073	0.000				0.000	0.032	0.598	0.900		0.304
		P_{adj}	0.415	0.321	0.904	0.148	0.606	0.884	1.000	0.099	0.225	0.006				0.012	0.126	0.817	0.975		0.552
	BR-R4	Summ	ns	ns	ns	ns	-	ns	(-)	(+)	ns	-	ns	ns	ns	-	(-)	nt	ns	nt	(-)
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	82.5	0.0	18.5	10.0	0.0	0.0	0.0	17.5	0.0	47.5	95.0	95.0	95.0	95.0	85.0	96.9	85.0	100.0	87.5
		Test	CK	CK	CK	CK	CK	CK	SK	CK	SK	CK	CK	CK	CK	CK	CK		CK		CK
		tau	-0.058	-0.052	0.197	0.006	-0.418	-0.049	-0.283	0.247	0.161	-0.441	-0.027	0.040	0.017	-0.091	-0.196		0.124		-0.234
		P_{orig}	0.530	0.685	0.145	0.962	0.000	0.658	0.025	0.024	0.210	0.000	0.737	0.645	0.872	0.000	0.037		0.174		0.048
		P_{adj}	0.772	0.869	0.351	1.000	0.006	0.852	0.106	0.103	0.443	0.004	0.895	0.848	0.966	0.010	0.141		0.396		0.168
	BR-R5	Summ	ns	ns	ns	ns	-	-	-	+	ns	-	nt	nt	nt	nt	(-)	nt	ns	nt	ns
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	38	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	77.5	0.0	88.9	25.0	0.0	0.0	0.0	50.0	0.0	5.0	100.0	100.0	97.5	100.0	85.0	96.9	77.5	97.5	81.3
		Test	CK	CK	CK	CK	CK	CK	SK	CK	CK	CK					CK		CK		CK
		tau	-0.086	-0.177	0.006	0.045	-0.599	-0.315	-0.369	0.337	-0.096	-0.412					-0.196		-0.091		-0.151
		P_{orig}	0.352	0.158	0.979	0.682	0.000	0.004	0.005	0.002	0.388	0.000					0.037		0.344		0.207
		P_{adj}	0.601	0.369	1.000	0.869	0.000	0.033	0.042	0.023	0.634	0.007					0.141		0.593		0.441
EID	E-P1	Summ	ns	ns	ns	ns	ns	(-)	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	ns	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	38	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	0.0	0.0	75.0	30.0	0.0	0.0	0.0	5.0	0.0	42.5	100.0	100.0	100.0	100.0	95.0	100.0	95.0	90.0	100.0
		Test	SK	SK	CK	CK	SK	CK	SK	SK	CK	CK					CK		CK	CK	
		tau	0.000	0.000	0.061	-0.056	-0.022	-0.251	-0.117	0.156	-0.019	-0.163					0.004		0.044	-0.054	
		P_{orig}	1.000	1.000	0.618	0.600	0.892	0.020	0.386	0.223	0.870	0.135					0.976		0.616	0.512	
		P_{adj}	1.000	1.000	0.830	0.818	0.973	0.094	0.632	0.459	0.966	0.331					1.000		0.830	0.756	

Table A.4. continued.

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	E-S1	Summ	ns	ns	ns	ns	ns	(-)	ns	ns	ns	-	nt	nt	nt	nt	-	nt	nt	ns	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	38	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	62.5	0.0	78.6	17.5	0.0	0.0	0.0	27.5	20.0	37.5	100.0	100.0	100.0	100.0	77.5	100.0	97.5	92.5	100.0
		Test	CK	CK	CK	CK	CK	CK	SK	SK	CK	CK					CK			CK	
		tau	-0.112	-0.244	0.090	-0.100	0.056	-0.250	-0.171	-0.078	-0.027	-0.582					-0.306			-0.082	
		P_{orig}	0.276	0.051	0.445	0.354	0.616	0.021	0.177	0.540	0.814	0.000					0.002			0.312	
		P_{adj}	0.516	0.175	0.692	0.602	0.830	0.095	0.400	0.777	0.938	0.000					0.026			0.562	
	E-S2	Summ	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	ns	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	39	31	27	39	39	39	38	39	39	38	38	38	38	38	38	30	38	38	30
		%BDL	2.6	0.0	81.5	30.8	0.0	0.0	0.0	10.3	0.0	44.7	100.0	97.4	100.0	100.0	89.5	100.0	81.6	86.8	100.0
		Test	CK	SK	CK	CK	SK	CK	SK	CK	CK	CK					CK		CK	CK	
		tau	-0.032	0.120	0.046	0.019	0.024	-0.323	-0.222	0.161	-0.016	-0.211					-0.131		0.114	-0.036	
		P_{orig}	0.780	0.430	0.709	0.865	0.852	0.003	0.114	0.152	0.894	0.060					0.156		0.252	0.704	
		P_{adj}	0.923	0.680	0.881	0.963	0.956	0.031	0.299	0.363	0.973	0.196					0.367		0.495	0.878	
	E-S3	Summ	(+)	ns	ns	ns	ns	(-)	ns	ns	ns	-	nt	nt	nt	nt	ns	nt	ns	ns	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	28	40	40	40	39	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	10.0	0.0	78.6	85.0	0.0	0.0	0.0	7.5	0.0	42.5	100.0	100.0	100.0	100.0	80.0	100.0	92.5	90.0	100.0
		Test	CK	CK	CK	SK	SK	CK	SK	CK	CK	CK					CK		CK	CK	
		tau	0.287	0.018	0.016	-0.039	0.244	-0.244	-0.080	0.173	0.018	-0.351					-0.127		-0.059	-0.047	
		P_{orig}	0.009	0.897	0.908	0.662	0.054	0.023	0.546	0.118	0.879	0.001					0.184		0.497	0.565	
		P_{adj}	0.061	0.975	0.979	0.856	0.183	0.100	0.780	0.305	0.968	0.018					0.409		0.743	0.795	
	E-S4	Summ	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	nt	nt	nt	nt	ns	nt	nt	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	90.0	0.0	92.6	52.5	0.0	0.0	0.0	40.0	7.5	37.5	100.0	100.0	100.0	100.0	80.0	100.0	97.5	100.0	100.0
		Test	CK	CK	CK	CK	CK	CK	SK	CK	CK	CK					CK				
		tau	-0.053	-0.113	-0.054	-0.068	0.031	-0.177	-0.150	0.060	0.032	-0.388					-0.137				
		P_{orig}	0.533	0.370	0.615	0.516	0.789	0.100	0.244	0.580	0.778	0.000					0.157				
		P_{adj}	0.775	0.616	0.830	0.758	0.925	0.280	0.482	0.807	0.922	0.010					0.367				
	E-S5	Summ	ns	ns	ns	ns	ns	(-)	ns	ns	ns	-	nt	nt	nt	nt	nt	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	92.5	0.0	88.9	57.5	0.0	0.0	0.0	60.0	15.0	27.5	100.0	100.0	100.0	100.0	100.0	100.0	92.5	100.0	100.0
		Test	CK	CK	CK	CK	SK	CK	SK	CK	SK	CK							CK		
		tau	-0.042	-0.044	-0.063	-0.041	0.094	-0.217	-0.128	-0.018	0.144	-0.500							0.067		
		P_{orig}	0.604	0.731	0.576	0.698	0.472	0.045	0.324	0.873	0.246	0.000							0.453		
		P_{adj}	0.822	0.894	0.805	0.877	0.717	0.159	0.575	0.966	0.485	0.001							0.700		

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	E-S6	Summ	ns	ns	ns	ns	(+)	ns	ns	ns	ns	-	nt	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	10	8	7	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8
		N	40	32	27	40	40	40	40	40	40	40	40	40	40	40	40	32	40	40	32
		%BDL	80.0	0.0	59.3	70.0	0.0	0.0	0.0	32.5	2.5	67.5	100.0	100.0	100.0	100.0	92.5	100.0	95.0	97.5	100.0
		Test	CK	SK	CK	SK	SK	CK	SK	SK	SK	CK					CK		CK		
		tau	-0.099	-0.223	-0.009	-0.144	0.272	-0.191	-0.161	0.089	0.178	-0.323					-0.041		0.042		
		P_{orig}	0.272	0.135	0.963	0.120	0.031	0.082	0.209	0.472	0.160	0.001					0.648		0.627		
		P_{adj}	0.516	0.331	1.000	0.309	0.124	0.244	0.442	0.717	0.372	0.021					0.848		0.835		
	E-S8	Summ	ns	(-)	nt	-	-	-	ns	ns	ns	-	nt	nt	nt	nt	(-)	nt	ns	ns	nt
		Nyrs	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		N	32	32	20	32	32	32	31	32	32	32	32	32	32	32	32	32	32	32	32
		%BDL	81.3	0.0	0.0	6.3	0.0	0.0	0.0	12.5	6.3	18.8	100.0	100.0	96.9	100.0	18.8	100.0	81.3	78.1	96.9
		Test	CK	SK		SK	SK	SK	CK	SK	SK	SK					SK		SK	CK	
		tau	-0.048	-0.321		-0.607	-0.446	-0.429	-0.037	-0.027	0.135	-0.509					-0.339		0.027	-0.161	
		P_{orig}	0.545	0.030		0.000	0.002	0.003	0.786	0.898	0.281	0.000					0.021		0.836	0.119	
		P_{adj}	0.780	0.121		0.003	0.027	0.027	0.924	0.975	0.521	0.012					0.095		0.946	0.308	
	E-R1	Summ	ns	(-)	nt	ns	ns	ns	ns	ns	-	-	nt	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	9	7	6	9	9	9	9	9	9	9	9	9	9	9	9	7	9	9	7
		N	36	28	24	36	36	36	33	36	36	36	36	36	36	36	36	28	36	36	28
		%BDL	86.1	0.0	58.3	19.4	0.0	0.0	0.0	58.3	2.8	55.6	100.0	100.0	100.0	100.0	47.2	100.0	94.4	97.2	100.0
		Test	CK	CK		CK	SK	CK	SK	CK	SK	CK					CK		CK		
		tau	-0.027	-0.312		0.157	0.208	-0.192	-0.051	-0.087	-0.396	-0.497					-0.210		0.040		
		P_{orig}	0.779	0.021		0.158	0.129	0.100	0.681	0.442	0.003	0.000					0.066		0.679		
		P_{adj}	0.923	0.095		0.369	0.322	0.280	0.869	0.689	0.032	0.001					0.209		0.868		
	E-R2	Summ	ns	ns	nt	ns	ns	-	ns	ns	ns	-	ns	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	9	7	6	9	9	9	9	9	9	9	9	9	9	9	9	7	9	9	7
		N	36	28	24	36	36	36	34	36	36	36	36	36	36	36	36	28	36	36	28
		%BDL	63.9	0.0	25.0	75.0	0.0	0.0	0.0	22.2	0.0	47.2	94.4	97.2	100.0	100.0	38.9	100.0	94.4	100.0	100.0
		Test	CK	CK		SK	CK	CK	SK	SK	SK	CK	CK				CK		CK		
		tau	0.138	-0.016		-0.188	-0.216	-0.325	-0.046	0.007	-0.153	-0.435	0.087				-0.202		-0.014		
		P_{orig}	0.206	0.921		0.055	0.066	0.005	0.821	1.000	0.271	0.000	0.306				0.079		0.887		
		P_{adj}	0.439	0.983		0.187	0.208	0.040	0.940	1.000	0.515	0.006	0.554				0.238		0.972		
	E-R2a	Summ	ns	ns	nt	ns	ns	-	ns	ns	ns	ns	nt	nt	nt	nt	ns	nt	ns	nt	nt
		Nyrs	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		N	28	28	16	28	28	28	27	27	28	28	28	28	28	28	28	28	28	28	28
		%BDL	25.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	35.7	100.0	96.4	96.4	100.0	39.3	100.0	82.1	100.0	100.0
		Test	CK	CK		CK	SK	CK	CK	SK	CK	SK					CK		CK		
		tau	0.050	-0.095		-0.214	0.083	-0.357	-0.088	-0.048	-0.040	-0.261					-0.146		-0.087		
		P_{orig}	0.718	0.489		0.112	0.563	0.006	0.531	0.763	0.782	0.068					0.271		0.410		
		P_{adj}	0.885	0.735		0.297	0.795	0.044	0.772	0.911	0.923	0.213					0.515		0.660		

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
	E-R3	Summ	ns	ns	nt	ns	ns	ns	ns	ns	ns	(-)	nt	nt	nt	nt	ns	nt	ns	ns	nt
		Nyrs	9	7	6	9	9	9	9	9	9	9	9	9	9	9	9	7	9	9	7
		N	36	28	24	36	36	36	36	35	36	36	36	36	36	36	36	28	36	36	28
		%BDL	36.1	0.0	79.2	22.2	0.0	0.0	0.0	37.1	0.0	33.3	97.2	97.2	100.0	100.0	52.8	96.4	86.1	91.7	100.0
		Test	CK	CK		CK	SK	CK	SK	CK	CK	CK					CK		CK	CK	
		tau	0.216	-0.153		-0.127	0.049	-0.129	0.063	0.187	0.079	-0.278					-0.057		-0.027	-0.063	
		P_{orig}	0.061	0.259		0.263	0.754	0.266	0.676	0.108	0.504	0.016					0.619		0.792	0.463	
		P_{adj}	0.198	0.503		0.507	0.905	0.510	0.866	0.291	0.748	0.084					0.830		0.927	0.710	
	E-R4a	Summ	ns	ns	nt	ns	ns	(-)	ns	ns	ns	(-)	nt	nt	nt	nt	(-)	nt	ns	nt	nt
		Nyrs	7	7	4	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	28	16	28	27	27	27	27	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.2	0.0	81.3	32.1	0.0	0.0	0.0	59.3	3.6	53.6	100.0	96.4	100.0	100.0	46.4	100.0	89.3	96.4	100.0
		Test	CK	CK		CK	SK	CK	SK	CK	CK	CK					CK		CK		
		tau	-0.043	-0.114		-0.130	-0.274	-0.302	-0.042	-0.037	-0.103	-0.344					-0.272		0.085		
		P_{orig}	0.579	0.405		0.265	0.112	0.026	0.937	0.782	0.452	0.009					0.036		0.417		
		P_{adj}	0.806	0.656		0.509	0.297	0.110	0.985	0.923	0.699	0.058					0.137		0.667		
	E-R5	Summ	ns	ns	nt	ns	ns	-	ns	ns	ns	-	nt	nt	nt	nt	ns	nt	nt	nt	nt
		Nyrs	9	7	6	9	9	9	9	9	9	9	9	9	9	9	9	7	9	9	7
		N	36	28	24	36	36	36	36	36	36	36	36	36	36	36	36	28	36	36	28
		%BDL	88.9	0.0	95.8	63.9	0.0	0.0	0.0	69.4	0.0	30.6	100.0	100.0	100.0	100.0	72.2	100.0	97.2	100.0	100.0
		Test	CK	CK		CK	SK	CK	SK	CK	SK	CK					CK				
		tau	-0.038	-0.148		-0.192	0.167	-0.325	-0.049	0.002	-0.035	-0.383					0.033				
		P_{orig}	0.684	0.276		0.068	0.229	0.005	0.754	1.000	0.834	0.001					0.762				
		P_{adj}	0.869	0.516		0.213	0.467	0.038	0.905	1.000	0.945	0.017					0.911				
	E-R8a	Summ	ns	ns	nt	ns	(-)	-	ns	ns	ns	(-)	nt	nt	ns	nt	ns	nt	ns	nt	nt
		Nyrs	8	8	4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
		N	28	29	16	29	28	28	27	28	29	28	28	28	28	28	28	28	28	28	28
		%BDL	89.3	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	21.4	100.0	96.4	92.9	100.0	17.9	100.0	67.9	96.4	96.4
		Test	SK	SK		CK	SK	SK	SK	CK	CK	SK			CK		SK		CK		
		tau	-0.133	0.018		-0.106	-0.440	-0.428	-0.158	-0.209	0.052	-0.393			0.024		-0.249		0.008		
		P_{orig}	0.082	1.000		0.430	0.008	0.006	0.392	0.121	0.707	0.021			0.859		0.136		0.965		
		P_{adj}	0.244	1.000		0.680	0.054	0.047	0.640	0.310	0.880	0.095			0.960		0.334		1.000		

Table A.4. *continued.*

District	Site	Variable	NO_3-N	TN	PO_4-P	TP	TDS	pH	Temp	TSS	Ecoli	2,4D	Atra	Brox	Clop	Dcpr	Dicm	EPTC	MCPA	MCPP	Sima
AEP canal	AEP-P2	Summ	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	nt	nt	ns	nt	ns	ns	nt
		Nyrs	7	5	7	7	7	7	7	7	7	7	7	7	7	7	7	5	7	7	5
		N	28	20	28	28	28	28	28	28	28	28	28	28	28	28	28	20	28	28	20
		%BDL	14.3	0.0	67.9	39.3	0.0	0.0	0.0	17.9	0.0	14.3	100.0	92.9	96.4	96.4	71.4	100.0	85.7	57.1	100.0
		Test	CK		CK	CK	CK	CK	CK	SK	CK	CK		CK			CK		CK	CK	
		tau	0.159		0.161	0.000	-0.082	-0.071	-0.254	0.214	-0.074	-0.026		0.013			-0.016		0.048	-0.106	
		P_{orig}	0.241		0.189	1.000	0.553	0.598	0.060	0.182	0.593	0.859		0.918			0.912		0.681	0.397	
		P_{adj}	0.480		0.415	1.000	0.786	0.817	0.197	0.406	0.815	0.960		0.982			0.981		0.869	0.647	
	AEP-P3	Summ	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	nt	nt	nt	nt	nt	nt	nt	(-)	nt
		Nyrs	7	5	7	7	7	7	7	7	7	7	7	7	7	7	7	5	7	7	5
		%BDL	3.6	0.0	64.3	35.7	0.0	0.0	0.0	17.9	0.0	40.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	81.5	100.0
		Test	SK		CK	CK	SK	CK	SK	SK	CK	CK								CK	
		tau	-0.119		0.098	-0.130	-0.107	-0.135	-0.107	0.238	-0.090	-0.120								-0.228	
		P_{orig}	0.497		0.434	0.321	0.547	0.304	0.547	0.149	0.514	0.377								0.034	
		P_{adj}	0.742		0.682	0.572	0.780	0.552	0.780	0.358	0.757	0.623								0.132	
	AEP-S2	Summ	ns	nt	ns	ns	ns	ns	ns	+	(+)	ns	nt	nt	nt	nt	nt	nt	ns	nt	nt
		Nyrs	7	5	7	7	7	7	7	7	7	7	7	7	7	7	7	5	7	7	5
		N	28	20	26	28	28	28	28	28	28	28	28	28	28	28	28	20	28	28	20
		%BDL	39.3	0.0	84.6	46.4	0.0	0.0	0.0	3.6	0.0	71.4	100.0	100.0	96.4	100.0	96.4	100.0	92.9	100.0	100.0
		Test	SK		CK	CK	CK	CK	SK	SK	SK	CK							CK		
		tau	0.179		0.114	0.090	0.209	-0.016	-0.202	0.583	0.357	-0.048							0.093		
		P_{orig}	0.213		0.344	0.472	0.123	0.920	0.228	0.000	0.029	0.679							0.369		
		P_{adj}	0.445		0.593	0.717	0.313	0.983	0.466	0.009	0.120	0.868							0.616		

Table A.5. Full results of parameter-by-site trend analyses for total metals parameters. Symbols and abbreviations are defined in Table 2.2 and Table A.1.

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
MVID	MV-P1	Summ	ns	-	ns	ns	ns	nt	ns	nt	nt	nt	ns	nt	ns	(-)	nt	ns	ns	-	ns	nt	-	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	78.6	21.4	0.0	21.4	0.0	100.0	92.9	96.4	100.0	96.4	21.4	100.0	28.6	0.0	100.0	92.9	82.1	75.0	85.7	100.0	32.1	100.0	64.3	28.6	14.3
		Test	CK	CK	SK	CK	SK		CK				CK		CK	CK		CK	CK	CK	CK		CK		CK	CK	CK
		tau	-0.013	-0.376	-0.179	-0.212	0.310		-0.082				-0.204		-0.093	-0.347		0.069	-0.082	-0.333	-0.167		-0.397		-0.066	0.119	-0.426
		P_{orig}	0.927	0.005	0.271	0.103	0.060		0.439				0.126		0.436	0.010		0.519	0.314	0.002	0.106		0.002		0.544	0.354	0.001
		P_{adj}	0.985	0.039	0.515	0.286	0.197		0.686				0.320		0.684	0.064		0.760	0.564	0.026	0.289		0.027		0.779	0.602	0.020
	MV-R1	Summ	ns	-	ns	(-)	ns	nt	ns	ns	ns	ns	(-)	nt	ns	ns	nt	ns	(-)	-	(-)	nt	-	nt	ns	(-)	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	81.5	0.0	0.0	22.2	0.0	100.0	81.5	37.0	77.8	74.1	0.0	100.0	25.9	3.7	96.3	51.9	22.2	70.4	70.4	100.0	0.0	100.0	55.6	11.1	3.7
		Test	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK		CK	SK		CK	CK	CK	CK		CK		SK	CK	CK
		tau	-0.040	-0.413	-0.171	-0.279	-0.017		-0.085	-0.014	-0.080	-0.177	-0.353		-0.074	-0.059		0.117	-0.333	-0.353	-0.288		-0.470		0.249	-0.276	-0.413
		P_{orig}	0.749	0.003	0.212	0.036	0.917		0.477	0.928	0.516	0.074	0.010		0.566	0.873		0.376	0.012	0.002	0.013		0.001		0.073	0.043	0.002
		P_{adj}	0.903	0.028	0.445	0.136	0.982		0.722	0.985	0.758	0.225	0.064		0.797	0.966		0.622	0.069	0.024	0.075		0.013		0.225	0.156	0.027
AID	A-R1	Summ	ns	-	ns	(-)	(+)	nt	ns	ns	ns	ns	(-)	nt	ns	ns	nt	ns	(-)	(-)	ns	nt	-	nt	ns	(-)	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	75.0	0.0	0.0	17.9	0.0	100.0	78.6	39.3	82.1	57.1	0.0	96.4	28.6	3.6	100.0	50.0	14.3	78.6	82.1	100.0	0.0	96.4	60.7	3.6	0.0
		Test	CK	CK	SK	CK	SK		CK	CK	CK	CK	CK		CK	SK		CK	CK	CK	CK		CK		SK	CK	CK
		tau	-0.029	-0.481	-0.083	-0.267	0.321		-0.217	-0.204	-0.172	-0.206	-0.352		-0.098	-0.048		0.045	-0.336	-0.257	-0.164		-0.593		0.083	-0.310	-0.545
		P_{orig}	0.822	0.000	0.643	0.042	0.047		0.063	0.106	0.133	0.072	0.009		0.436	0.821		0.736	0.009	0.018	0.115		0.000		0.534	0.021	0.000
		P_{adj}	0.940	0.010	0.848	0.152	0.165		0.201	0.290	0.330	0.224	0.060		0.684	0.940		0.895	0.060	0.087	0.301		0.001		0.775	0.096	0.004
UID	U-P1	Summ	ns	ns	(+)	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	(+)	nt	ns	(+)	(-)	ns	nt	(-)	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	89.3	7.1	60.7	21.4	0.0	96.4	82.1	78.6	82.1	85.7	42.9	96.4	28.6	67.9	100.0	89.3	64.3	82.1	89.3	100.0	35.7	100.0	71.4	28.6	17.9
		Test	CK	SK	SK	CK	SK		CK	CK	CK	CK	SK		CK	SK		CK	SK	CK	CK		SK		CK	CK	CK
		tau	0.013	-0.048	0.286	-0.175	-0.119		-0.050	-0.040	-0.053	0.077	0.238		0.056	0.226		0.053	0.226	-0.265	-0.135		-0.321		-0.011	-0.005	-0.397
		P_{orig}	0.920	0.820	0.027	0.176	0.491		0.672	0.748	0.656	0.284	0.097		0.646	0.048		0.636	0.045	0.011	0.168		0.031		0.932	0.983	0.003
		P_{adj}	0.983	0.940	0.114	0.399	0.737		0.862	0.903	0.850	0.525	0.276		0.848	0.168		0.841	0.158	0.065	0.387		0.124		0.985	1.000	0.029
	U-S1	Summ	ns	-	ns	(-)	ns	nt	ns	ns	nt	nt	ns	nt	ns	ns	nt	nt	nt	-	(-)	nt	-	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.7	10.7	0.0	21.4	0.0	100.0	92.9	85.7	100.0	96.4	39.3	96.4	28.6	0.0	100.0	96.4	96.4	78.6	82.1	100.0	17.9	100.0	71.4	28.6	25.0
		Test	CK	CK	SK	CK	SK		CK	CK			CK		CK	CK				CK	CK		CK		SK	CK	CK
		tau	0.032	-0.370	0.167	-0.275	-0.083		-0.077	-0.058			-0.204		-0.132	0.048				-0.344	-0.235		-0.513		0.107	-0.175	-0.550
		P_{orig}	0.791	0.006	0.259	0.035	0.651		0.467	0.611			0.114		0.301	0.736				0.001	0.023		0.000		0.362	0.169	0.000
		P_{adj}	0.926	0.043	0.503	0.135	0.848		0.715	0.826			0.299		0.548	0.895				0.017	0.101		0.006		0.608	0.387	0.003

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	U-S1	Summ	ns	-	ns	(-)	ns	nt	ns	ns	nt	nt	ns	nt	ns	ns	nt	nt	nt	-	(-)	nt	-	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.7	10.7	0.0	21.4	0.0	100.0	92.9	85.7	100.0	96.4	39.3	96.4	28.6	0.0	100.0	96.4	96.4	78.6	82.1	100.0	17.9	100.0	71.4	28.6	25.0
		Test	CK	CK	SK	CK	SK		CK	CK			CK		CK	CK				CK	CK		CK		SK	CK	CK
		tau	0.032	-0.370	0.167	-0.275	-0.083		-0.077	-0.058			-0.204		-0.132	0.048				-0.344	-0.235		-0.513		0.107	-0.175	-0.550
		P_{orig}	0.791	0.006	0.259	0.035	0.651		0.467	0.611			0.114		0.301	0.736				0.001	0.023		0.000		0.362	0.169	0.000
		P_{adj}	0.926	0.043	0.503	0.135	0.848		0.715	0.826			0.299		0.548	0.895				0.017	0.101		0.006		0.608	0.387	0.003
	U-R2	Summ	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	+	ns	ns	ns	-	ns	nt	ns	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	60.7	0.0	0.0	21.4	0.0	96.4	39.3	28.6	67.9	42.9	0.0	100.0	25.0	0.0	92.9	42.9	0.0	78.6	60.7	100.0	0.0	96.4	46.4	3.6	0.0
		Test	CK	SK	SK	CK	CK		CK	CK	CK	SK	SK		CK	SK	CK	CK	SK	CK	CK		SK		SK	SK	CK
		tau	-0.066	-0.048	0.024	-0.249	-0.103		-0.101	-0.042	-0.108	-0.071	0.095		-0.214	0.464	-0.058	-0.111	-0.012	-0.328	0.090		-0.143		-0.024	-0.190	-0.534
		P_{orig}	0.605	0.822	0.938	0.057	0.452		0.433	0.746	0.384	0.659	0.599		0.096	0.004	0.585	0.398	1.000	0.002	0.482		0.409		0.930	0.257	0.000
		P_{adj}	0.823	0.940	0.985	0.191	0.699		0.681	0.903	0.631	0.853	0.817		0.274	0.036	0.812	0.648	1.000	0.027	0.727		0.659		0.985	0.502	0.005
MID	M-P1	Summ	ns	ns	ns	(-)	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	-	ns	nt	-	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	78.6	7.1	3.6	17.9	0.0	100.0	89.3	92.9	96.4	75.0	32.1	96.4	28.6	50.0	100.0	85.7	75.0	75.0	60.7	100.0	3.6	100.0	71.4	21.4	25.0
		Test	CK	CK	CK	CK	CK		CK	CK		CK	CK		CK	CK		CK	CK	CK	CK		CK		SK	CK	CK
		tau	0.013	-0.222	0.098	-0.272	0.122		-0.119	-0.019		-0.148	-0.246		-0.071	0.037		-0.066	-0.119	-0.323	-0.119		-0.397		-0.155	-0.063	-0.373
		P_{orig}	0.927	0.100	0.458	0.037	0.373		0.275	0.876		0.122	0.062		0.570	0.773		0.557	0.241	0.002	0.334		0.003		0.175	0.636	0.005
		P_{adj}	0.985	0.280	0.705	0.140	0.619		0.516	0.967		0.313	0.200		0.801	0.918		0.788	0.480	0.026	0.585		0.030		0.398	0.841	0.039
	M-S1	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		N	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
		%BDL	60.0	0.0	0.0	0.0	0.0	95.0	20.0	0.0	70.0	45.0	0.0	90.0	0.0	0.0	100.0	10.0	10.0	95.0	25.0	100.0	0.0	100.0	25.0	30.0	0.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	M-R1	Summ	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	ns	ns	(+)	nt	ns	ns	-	ns	nt	ns	nt	ns	ns	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	27	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	27	28	28	27	28
		%BDL	53.6	0.0	3.7	17.9	3.6	96.4	28.6	28.6	32.1	14.3	3.6	85.7	17.9	3.6	96.4	59.3	3.6	71.4	7.1	96.4	3.7	96.4	3.6	7.4	10.7
		Test	CK	SK	SK	CK	CK		CK	CK	CK	SK	SK	CK	CK	SK		SK	SK	CK	CK		SK		CK	SK	CK
		tau	-0.087	0.119	0.133	-0.283	0.246		-0.103	-0.013	-0.108	0.024	0.286	-0.003	-0.087	0.369		0.160	0.167	-0.347	-0.087		-0.086		-0.093	0.007	-0.175
		P_{orig}	0.499	0.499	0.421	0.032	0.069		0.421	0.933	0.407	0.935	0.084	1.000	0.519	0.024		0.278	0.320	0.002	0.523		0.582		0.501	1.000	0.191
		P_{adj}	0.743	0.743	0.671	0.126	0.214		0.671	0.985	0.657	0.985	0.247	1.000	0.761	0.103		0.518	0.570	0.026	0.765		0.808		0.744	1.000	0.419

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
RID	R-P1	Summ	ns	(-)	ns	ns	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	(-)	(-)	nt	-	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	82.1	0.0	3.6	21.4	0.0	100.0	85.7	78.6	96.4	71.4	3.6	96.4	28.6	0.0	100.0	82.1	60.7	85.7	28.6	100.0	3.6	100.0	42.9	21.4	21.4
		Test	CK	CK	CK	CK	CK		CK	CK		SK	SK		CK	CK		CK	CK	CK	CK		CK		SK	CK	CK
		tau	-0.090	-0.352	0.119	-0.235	0.008		-0.161	-0.085		-0.107	-0.155		-0.116	-0.045		-0.008	-0.217	-0.238	-0.270		-0.392		-0.083	-0.243	-0.328
		P_{orig}	0.441	0.009	0.372	0.071	0.968		0.150	0.476		0.358	0.366		0.362	0.750		0.963	0.059	0.015	0.040		0.003		0.593	0.062	0.012
		P_{adj}	0.688	0.058	0.618	0.219	1.000		0.360	0.721		0.606	0.613		0.608	0.904		1.000	0.194	0.081	0.147		0.032		0.815	0.198	0.072
	R-R1	Summ	ns	ns	ns	-	ns	nt	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	-	ns	nt	-	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	53.6	0.0	0.0	21.4	0.0	96.4	32.1	28.6	39.3	7.1	0.0	96.4	21.4	0.0	64.3	17.9	3.6	67.9	3.6	100.0	3.6	96.4	0.0	3.6	3.6
		Test	CK	CK	SK	CK	CK		CK	CK	CK	CK	CK		CK	CK	CK	CK	CK	CK	CK		CK		CK	CK	CK
		tau	-0.228	-0.235	0.101	-0.362	-0.040		-0.180	-0.161	-0.225	-0.272	-0.164		-0.045	-0.153	-0.085	-0.032	-0.214	-0.354	-0.061		-0.389		0.101	-0.254	-0.399
		P_{orig}	0.073	0.082	0.521	0.006	0.782		0.155	0.210	0.082	0.026	0.228		0.747	0.260	0.497	0.825	0.107	0.003	0.659		0.004		0.463	0.059	0.003
		P_{adj}	0.224	0.244	0.763	0.044	0.923		0.366	0.443	0.243	0.111	0.466		0.903	0.504	0.742	0.941	0.290	0.028	0.853		0.034		0.710	0.193	0.028
	R-R2	Summ	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	nt	ns	(-)	(-)	ns	nt	-	ns	ns	-	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	27	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	28	27	27
		%BDL	64.3	0.0	0.0	25.0	0.0	85.7	53.6	32.1	57.1	25.0	0.0	92.9	82.1	0.0	100.0	74.1	10.7	78.6	14.3	100.0	3.6	92.9	17.9	7.4	33.3
		Test	CK	CK	SK	CK	CK	CK	CK	CK	CK	SK	CK	CK	SK	SK		SK	CK	CK	CK		CK	CK	SK	SK	SK
		tau	-0.156	-0.460	-0.059	-0.243	-0.053	-0.140	-0.124	-0.124	-0.183	-0.190	-0.381	-0.053	-0.024	-0.214		-0.049	-0.315	-0.225	-0.243		-0.410	-0.082	-0.214	-0.504	-0.363
		P_{orig}	0.212	0.001	0.747	0.061	0.707	0.209	0.333	0.337	0.151	0.234	0.005	0.667	0.894	0.202		0.720	0.018	0.044	0.068		0.002	0.424	0.187	0.002	0.018
		P_{adj}	0.445	0.013	0.903	0.197	0.880	0.442	0.584	0.587	0.362	0.470	0.039	0.858	0.973	0.433		0.886	0.088	0.156	0.213		0.027	0.674	0.414	0.026	0.088
LNID	LN-P1	Summ	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns	nt	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	27	28	28	27	27
		%BDL	67.9	0.0	21.4	21.4	0.0	85.7	50.0	57.1	64.3	32.1	0.0	100.0	28.6	35.7	96.4	57.1	29.6	75.0	10.7	100.0	0.0	92.9	50.0	40.7	44.4
		Test	CK	SK	CK	CK	CK	CK	CK	CK	CK	CK	SK		CK	SK		CK	SK	CK	CK		SK	CK	CK	SK	SK
		tau	-0.077	0.143	0.148	-0.196	0.198	-0.061	-0.177	-0.082	-0.116	0.172	0.238		-0.048	0.250		-0.016	0.163	-0.246	-0.042		-0.069	-0.032	0.111	0.064	-0.165
		P_{orig}	0.543	0.409	0.266	0.134	0.143	0.595	0.167	0.525	0.357	0.182	0.154		0.710	0.113		0.916	0.314	0.028	0.752		0.752	0.777	0.360	0.731	0.242
		P_{adj}	0.778	0.659	0.510	0.330	0.348	0.815	0.384	0.766	0.606	0.406	0.364		0.881	0.297		0.982	0.564	0.117	0.905		0.905	0.922	0.607	0.894	0.481
	LN-S1	Summ	ns	ns	ns	(-)	ns	ns	ns	ns	ns	ns	ns	ns	ns	(+)	nt	ns	ns	(-)	ns	nt	ns	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	27	28	28	27	28
		%BDL	57.1	0.0	17.9	21.4	0.0	89.3	39.3	50.0	57.1	25.0	0.0	89.3	28.6	21.4	96.4	50.0	11.1	71.4	7.1	100.0	0.0	96.4	42.9	37.0	7.1
		Test	CK	SK	CK	CK	CK	CK	CK	CK	CK	SK	SK	CK	CK	SK		CK	SK	CK	CK		SK		CK	SK	CK
		tau	0.056	0.024	0.180	-0.270	0.140	-0.034	-0.151	-0.082	-0.119	-0.024	0.155	-0.019	-0.063	0.321		0.013	0.077	-0.267	-0.021		-0.072		0.135	0.064	-0.331
		P_{orig}	0.672	0.940	0.177	0.037	0.303	0.765	0.242	0.528	0.354	0.933	0.366	0.892	0.621	0.043		0.934	0.676	0.021	0.886		0.694		0.284	0.731	0.013
		P_{adj}	0.862	0.986	0.399	0.141	0.551	0.913	0.481	0.770	0.602	0.985	0.613	0.973	0.831	0.156		0.985	0.866	0.095	0.972		0.875		0.525	0.894	0.074

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	LN-S2	Summ	ns	ns	-	(-)	(+)	nt	ns	ns	nt	ns	ns	nt	(-)	ns	ns	ns	ns	(-)	ns	nt	-	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	82.1	0.0	0.0	21.4	0.0	100.0	85.7	50.0	96.4	28.6	3.6	100.0	25.0	3.6	57.1	42.9	67.9	67.9	17.9	100.0	7.1	100.0	3.6	14.3	21.4
		Test	CK	CK	SK	CK	CK		CK	CK		CK	SK		CK	SK	CK	CK	CK	CK	CK		CK		SK	CK	CK
		tau	-0.008	-0.249	-0.548	-0.333	0.344		-0.159	0.032		-0.161	0.107		-0.288	0.107	0.011	0.151	0.032	-0.315	-0.074		-0.437		0.024	-0.130	-0.278
		P_{orig}	0.963	0.065	0.001	0.011	0.011		0.157	0.812		0.167	0.547		0.023	0.547	0.947	0.239	0.786	0.008	0.581		0.001		0.932	0.332	0.033
		P_{adj}	1.000	0.208	0.013	0.065	0.065		0.367	0.938		0.385	0.780		0.102	0.780	0.992	0.478	0.924	0.055	0.808		0.018		0.985	0.583	0.131
	LN-S3	Summ	ns	(-)	ns	(-)	ns	nt	ns	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	(-)	ns	nt	-	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28
		%BDL	82.1	14.3	3.6	21.4	0.0	100.0	85.7	71.4	100.0	71.4	35.7	92.9	82.1	7.1	75.0	75.0	92.9	82.1	0.0	100.0	14.3	100.0	7.1	25.0	35.7
		Test	CK	CK	CK	CK	CK		CK	CK		CK	CK	CK	SK	CK	CK	CK	CK	CK	SK		CK		SK	CK	CK
		tau	0.042	-0.328	-0.021	-0.312	-0.003		-0.159	-0.114		0.045	-0.005	-0.024	-0.048	-0.021	-0.026	0.087	-0.016	-0.257	-0.116		-0.370		0.226	-0.180	-0.307
		P_{orig}	0.726	0.014	0.889	0.017	1.000		0.157	0.351		0.670	0.984	0.856	0.665	0.890	0.836	0.474	0.808	0.013	0.563		0.006		0.159	0.170	0.019
		P_{adj}	0.891	0.078	0.972	0.084	1.000		0.367	0.600		0.861	1.000	0.958	0.857	0.972	0.946	0.719	0.936	0.074	0.795		0.043		0.369	0.389	0.089
	LN-S4	Summ	ns	ns	-	-	ns	nt	ns	ns	ns	ns	ns	ns	(-)	ns	ns	ns	ns	(-)	ns	nt	(-)	nt	ns	ns	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	67.9	0.0	0.0	21.4	0.0	100.0	57.1	28.6	60.7	14.3	0.0	92.9	25.0	0.0	60.7	32.1	21.4	78.6	21.4	100.0	3.6	100.0	3.6	7.1	10.7
		Test	CK	CK	SK	CK	SK		CK	CK	CK	SK	CK	CK	CK	CK	CK	CK	CK	CK	CK		CK		SK	CK	CK
		tau	0.042	-0.185	-0.464	-0.352	0.274		-0.098	0.048	-0.037	0.024	-0.032	0.000	-0.288	0.217	0.037	0.220	0.000	-0.259	0.061		-0.270		-0.060	-0.143	-0.246
		P_{orig}	0.743	0.173	0.004	0.007	0.098		0.444	0.713	0.782	0.927	0.828	1.000	0.024	0.109	0.773	0.093	1.000	0.017	0.647		0.045		0.736	0.291	0.063
		P_{adj}	0.901	0.394	0.033	0.049	0.276		0.692	0.883	0.923	0.985	0.942	1.000	0.103	0.291	0.918	0.265	1.000	0.084	0.848		0.159		0.895	0.537	0.202
	LN-S5	Summ	ns	-	ns	(-)	ns	nt	ns	ns	ns	ns	ns	nt	(-)	ns	ns	ns	ns	(-)	ns	nt	-	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	78.6	3.6	0.0	21.4	0.0	100.0	82.1	39.3	89.3	67.9	0.0	96.4	21.4	3.6	53.6	39.3	78.6	82.1	25.0	96.4	3.6	100.0	3.6	7.1	28.6
		Test	CK	CK	CK	CK	SK		CK	CK	CK	SK	SK		CK	SK	CK	CK	CK	CK	CK		CK		SK	CK	CK
		tau	0.013	-0.370	-0.167	-0.317	0.012		-0.071	0.021	0.021	-0.024	-0.119		-0.307	0.083	0.053	0.116	0.003	-0.265	-0.220		-0.407		0.083	-0.021	-0.339
		P_{orig}	0.927	0.006	0.218	0.014	1.000		0.544	0.881	0.862	0.917	0.491		0.016	0.650	0.671	0.373	1.000	0.011	0.091		0.002		0.624	0.887	0.010
		P_{adj}	0.985	0.044	0.453	0.078	1.000		0.779	0.969	0.961	0.982	0.737		0.082	0.848	0.862	0.619	1.000	0.065	0.263		0.027		0.832	0.972	0.064
	LN-R1	Summ	ns	(-)	(-)	-	ns	ns	ns	ns	(-)	ns	ns	ns	(-)	ns	ns	ns	ns	-	ns	nt	-	ns	(-)	(-)	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	28	28	28
		%BDL	42.9	0.0	0.0	21.4	0.0	53.6	28.6	21.4	17.9	0.0	0.0	85.7	50.0	0.0	57.1	3.7	3.6	64.3	14.3	100.0	0.0	67.9	0.0	3.6	3.6
		Test	CK	CK	CK	CK	CK	CK	CK	CK	CK	CK	SK	CK	SK	SK	CK	SK	CK	CK	CK		CK	CK	SK	CK	CK
		tau	-0.159	-0.286	-0.344	-0.450	-0.029	-0.222	-0.151	-0.206	-0.310	-0.198	-0.190	-0.016	-0.286	-0.083	0.048	-0.084	-0.161	-0.474	-0.087		-0.386	-0.167	-0.369	-0.328	-0.302
		P_{orig}	0.218	0.035	0.010	0.001	0.843	0.077	0.243	0.118	0.019	0.128	0.260	0.910	0.047	0.651	0.705	0.692	0.231	0.000	0.519		0.004	0.177	0.016	0.015	0.024
		P_{adj}	0.453	0.134	0.064	0.012	0.949	0.234	0.482	0.305	0.091	0.321	0.504	0.980	0.166	0.848	0.880	0.874	0.467	0.005	0.760		0.036	0.400	0.083	0.078	0.105

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	LN-R2	Summ	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	ns	ns	(+)	ns	ns	ns	(-)	ns	nt	-	nt	(+)	ns	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.7	0.0	0.0	21.4	0.0	100.0	42.9	28.6	67.9	10.7	0.0	89.3	21.4	0.0	42.9	32.1	3.6	82.1	21.4	100.0	3.6	100.0	0.0	3.6	10.7
		Test	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK	CK	CK	CK	CK	CK	CK	CK	CK		CK		SK	CK	CK
		tau	-0.103	-0.177	-0.148	-0.270	0.230		-0.077	0.122	-0.029	0.045	0.193	0.016	-0.071	0.347	0.085	0.164	0.071	-0.267	-0.098		-0.407		0.429	-0.180	-0.045
		P_{orig}	0.361	0.192	0.273	0.039	0.088		0.554	0.333	0.828	0.726	0.154	0.910	0.594	0.010	0.470	0.208	0.577	0.010	0.467		0.002		0.007	0.177	0.748
		P_{adj}	0.608	0.419	0.516	0.145	0.257		0.786	0.584	0.942	0.891	0.365	0.980	0.815	0.064	0.717	0.441	0.806	0.064	0.715		0.027		0.054	0.400	0.903
	LN-R3	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		N	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
		%BDL	88.9	0.0	0.0	0.0	0.0	100.0	50.0	11.1	77.8	16.7	0.0	94.4	0.0	0.0	27.8	11.1	33.3	94.4	27.8	100.0	0.0	100.0	0.0	0.0	0.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	LN-R4	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		N	16	16	16	16	16	16	16	16	16	16	16	15	16	16	16	16	16	16	16	16	16	16	16	16	16
		%BDL	87.5	12.5	0.0	0.0	0.0	100.0	100.0	31.3	100.0	68.8	12.5	100.0	56.3	0.0	50.0	50.0	100.0	93.8	0.0	100.0	6.3	100.0	0.0	56.3	0.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
TID	T-P1a	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		N	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
		%BDL	90.0	0.0	0.0	0.0	0.0	100.0	75.0	65.0	95.0	30.0	10.0	95.0	0.0	0.0	90.0	40.0	80.0	95.0	15.0	95.0	0.0	100.0	0.0	0.0	25.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	T-P2	Summ	nt	ns	ns	-	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	nt	ns	ns	-	ns	nt	ns	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	96.3	0.0	0.0	25.9	0.0	100.0	77.8	66.7	88.9	40.7	7.4	96.3	77.8	0.0	96.3	55.6	70.4	74.1	14.8	100.0	3.7	100.0	0.0	59.3	22.2
		Test		SK	CK	CK	CK		CK	CK	CK	SK	SK		SK	SK		CK	SK	CK	CK		SK		SK	SK	CK
		tau		-0.306	0.197	-0.413	-0.105		-0.225	-0.114	-0.123	-0.027	0.057		-0.049	0.333		0.040	-0.086	-0.348	-0.179		-0.254		-0.047	0.010	-0.407
		P_{orig}		0.078	0.149	0.002	0.451		0.060	0.370	0.272	0.929	0.751		0.715	0.051		0.772	0.496	0.002	0.186		0.153		0.804	1.000	0.003
		P_{adj}		0.235	0.358	0.023	0.699		0.196	0.616	0.516	0.985	0.904		0.884	0.175		0.918	0.742	0.026	0.413		0.363		0.933	1.000	0.027

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	T-S2	Summ	ns	(-)	ns	-	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	(-)	ns	nt	(-)	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	88.9	25.9	0.0	25.9	0.0	100.0	88.9	29.6	92.6	70.4	37.0	100.0	14.8	0.0	77.8	33.3	88.9	85.2	18.5	100.0	22.2	96.3	0.0	7.4	25.9
		Test	CK	CK	CK	CK	SK		CK	CK	CK	CK	CK		CK	CK	CK	CK	CK	CK	SK		CK		SK	CK	CK
		tau	-0.014	-0.345	-0.105	-0.430	-0.052		-0.120	-0.151	-0.077	-0.157	-0.131		-0.151	0.020	-0.134	-0.020	-0.003	-0.265	0.094		-0.345		0.220	-0.037	-0.325
		P_{orig}	0.917	0.011	0.451	0.001	0.813		0.284	0.230	0.480	0.135	0.327		0.275	0.900	0.266	0.895	1.000	0.009	0.571		0.011		0.201	0.801	0.016
		P_{adj}	0.982	0.066	0.699	0.018	0.938		0.525	0.467	0.725	0.331	0.577		0.516	0.975	0.510	0.973	1.000	0.060	0.801		0.069		0.431	0.932	0.082
	T-S3	Summ	nt	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	(-)	ns	nt	ns	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
		%BDL	100.0	42.3	0.0	26.9	0.0	100.0	73.1	42.3	88.5	50.0	46.2	100.0	23.1	0.0	65.4	30.8	80.8	76.9	19.2	100.0	46.2	100.0	0.0	26.9	23.1
		Test		CK	SK	CK	SK		CK	CK	CK	CK	CK		CK	CK	CK	CK	CK	CK	CK		CK		SK	CK	CK
		tau		-0.197	-0.010	-0.357	-0.159		-0.114	-0.098	-0.006	-0.037	0.077		-0.049	0.151	-0.169	-0.172	0.071	-0.289	-0.206		-0.126		0.036	0.151	-0.329
		P_{orig}		0.140	1.000	0.008	0.318		0.369	0.461	0.978	0.788	0.563		0.735	0.289	0.179	0.208	0.428	0.010	0.137		0.361		0.863	0.276	0.017
		P_{adj}		0.341	1.000	0.055	0.568		0.616	0.709	1.000	0.925	0.795		0.895	0.533	0.403	0.441	0.679	0.063	0.335		0.608		0.961	0.516	0.085
	T-R1	Summ	ns	-	ns	-	ns	nt	ns	ns	ns	(-)	(-)	nt	ns	ns	ns	ns	ns	(-)	ns	nt	(-)	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	81.5	0.0	0.0	25.9	0.0	100.0	88.9	29.6	92.6	63.0	0.0	100.0	11.1	0.0	74.1	29.6	40.7	70.4	11.1	96.3	0.0	100.0	0.0	7.4	3.7
		Test	CK	CK	CK	CK	SK		CK	CK	CK	CK	SK		CK	CK	CK	CK	SK	CK	SK		CK		SK	CK	CK
		tau	-0.094	-0.382	-0.068	-0.456	-0.168		-0.125	-0.182	-0.085	-0.236	-0.346		-0.091	0.068	-0.137	0.054	-0.190	-0.274	-0.207		-0.302		0.035	0.003	-0.481
		P_{orig}	0.432	0.005	0.630	0.000	0.343		0.261	0.129	0.430	0.036	0.040		0.515	0.631	0.261	0.691	0.161	0.022	0.212		0.028		0.936	1.000	0.000
		P_{adj}	0.681	0.042	0.837	0.012	0.593		0.505	0.322	0.680	0.137	0.147		0.758	0.837	0.505	0.874	0.374	0.099	0.445		0.116		0.985	1.000	0.010
	T-R2	Summ	ns	-	ns	-	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	-	-	(-)	nt	-	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	92.6	25.9	0.0	25.9	0.0	100.0	85.2	29.6	100.0	44.4	11.1	100.0	22.2	0.0	66.7	40.7	66.7	70.4	14.8	100.0	22.2	100.0	0.0	18.5	11.1
		Test	CK	CK	CK	CK	SK		CK	CK		CK	CK		CK	SK	CK	CK	CK	CK	CK		CK		SK	CK	CK
		tau	-0.088	-0.527	-0.040	-0.419	-0.010		-0.177	-0.123		-0.074	-0.160		-0.074	0.025	-0.199	-0.026	-0.353	-0.353	-0.274		-0.493		-0.077	-0.177	-0.442
		P_{orig}	0.415	0.000	0.785	0.001	1.000		0.123	0.334		0.573	0.248		0.595	0.874	0.107	0.860	0.001	0.003	0.043		0.000		0.685	0.196	0.001
		P_{adj}	0.667	0.005	0.924	0.021	1.000		0.313	0.585		0.803	0.490		0.815	0.966	0.291	0.961	0.018	0.029	0.155		0.010		0.870	0.426	0.018
SMRID	SMW-P1	Summ	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	-	(-)	ns	nt	(-)	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	82.1	0.0	0.0	25.0	0.0	100.0	78.6	60.7	82.1	60.7	0.0	92.9	25.0	0.0	100.0	71.4	32.1	82.1	53.6	100.0	0.0	100.0	42.9	21.4	32.1
		Test	CK	SK	CK	CK	CK		CK	CK	CK	CK	CK	CK	CK	CK		CK	CK	CK	CK		CK		SK	CK	CK
		tau	-0.045	-0.262	0.140	-0.283	0.122		-0.140	-0.130	-0.140	0.016	-0.249	-0.008	-0.204	-0.106		-0.040	-0.347	-0.275	-0.085		-0.310		-0.155	-0.106	-0.317
		P_{orig}	0.707	0.113	0.294	0.029	0.372		0.233	0.301	0.221	0.906	0.066	0.964	0.113	0.437		0.757	0.006	0.008	0.517		0.022		0.289	0.429	0.016
		P_{adj}	0.880	0.297	0.541	0.117	0.618		0.469	0.548	0.457	0.978	0.208	1.000	0.298	0.684		0.907	0.047	0.055	0.759		0.098		0.533	0.680	0.082

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	SMW-S2	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		N	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
		%BDL	80.0	0.0	0.0	0.0	0.0	100.0	50.0	20.0	80.0	45.0	0.0	95.0	0.0	0.0	100.0	50.0	30.0	100.0	50.0	100.0	0.0	100.0	25.0	0.0	15.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	SMW-R1	Summ	ns	(-)	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	nt	ns	ns	(-)	ns	nt	(-)	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	82.1	0.0	0.0	25.0	0.0	100.0	39.3	28.6	57.1	25.0	0.0	96.4	25.0	0.0	96.4	50.0	3.6	85.7	42.9	100.0	0.0	100.0	3.6	3.6	3.6
		Test	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK		CK	CK		CK	CK	CK	CK		CK		SK	CK	CK
		tau	-0.082	-0.341	0.130	-0.246	-0.146		-0.148	-0.077	-0.190	-0.090	-0.169		-0.148	0.206		0.034	-0.212	-0.241	-0.069		-0.296		-0.024	-0.214	-0.378
		P_{orig}	0.480	0.011	0.338	0.057	0.285		0.241	0.554	0.131	0.486	0.213		0.257	0.128		0.802	0.104	0.014	0.607		0.028		0.936	0.112	0.004
		P_{adj}	0.725	0.068	0.589	0.191	0.527		0.480	0.786	0.327	0.731	0.445		0.501	0.321		0.932	0.287	0.077	0.823		0.117		0.985	0.297	0.038
	SMW-R2	Summ	ns	(-)	ns	ns	ns	nt	(-)	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	-	ns	nt	-	nt	ns	(-)	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	92.9	0.0	0.0	25.0	0.0	100.0	64.3	32.1	82.1	46.4	0.0	96.4	25.0	0.0	89.3	50.0	10.7	82.1	57.1	100.0	0.0	100.0	10.7	17.9	7.1
		Test	CK	CK	CK	CK	SK		CK	CK	CK	SK	SK		CK	SK	CK	CK	SK	CK	CK		CK		SK	SK	CK
		tau	-0.024	-0.341	-0.074	-0.204	-0.036		-0.241	-0.164	-0.151	-0.048	-0.202		-0.161	0.024	-0.003	-0.124	-0.238	-0.288	-0.085		-0.394		0.000	-0.357	-0.286
		P_{orig}	0.835	0.011	0.590	0.117	0.879		0.050	0.187	0.189	0.777	0.228		0.218	0.939	1.000	0.335	0.099	0.004	0.512		0.003		1.000	0.024	0.031
		P_{adj}	0.946	0.068	0.814	0.304	0.968		0.173	0.413	0.415	0.922	0.466		0.453	0.986	1.000	0.585	0.279	0.032	0.756		0.032		1.000	0.102	0.124
	SMC-P1	Summ	ns	ns	ns	-	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	nt	ns	ns	-	ns	nt	-	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
		%BDL	88.5	0.0	0.0	26.9	0.0	100.0	73.1	61.5	84.6	30.8	7.7	96.2	26.9	0.0	96.2	50.0	53.8	76.9	23.1	100.0	0.0	100.0	0.0	50.0	23.1
		Test	CK	SK	CK	CK	CK		CK	CK	CK	CK	SK		CK	SK		CK	SK	CK	CK		SK		SK	SK	CK
		tau	-0.083	-0.295	0.086	-0.372	0.105		-0.138	-0.102	-0.142	-0.043	-0.195		-0.249	0.210		-0.129	-0.118	-0.342	-0.132		-0.513		-0.031	-0.118	-0.403
		P_{orig}	0.475	0.079	0.543	0.005	0.466		0.273	0.441	0.232	0.760	0.278		0.064	0.268		0.339	0.402	0.002	0.343		0.003		0.861	0.420	0.003
		P_{adj}	0.720	0.239	0.779	0.042	0.715		0.516	0.689	0.468	0.910	0.518		0.204	0.513		0.590	0.651	0.026	0.593		0.028		0.961	0.671	0.031
	SMC-S1	Summ	ns	-	ns	-	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	nt	(-)	ns	nt	(-)	ns	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	92.9	42.9	0.0	25.0	0.0	100.0	92.9	82.1	96.4	57.1	64.3	100.0	25.0	0.0	71.4	42.9	96.4	82.1	32.1	96.4	53.6	92.9	0.0	28.6	28.6
		Test	CK	CK	SK	CK	CK		CK	CK		CK	CK		CK	SK	CK	CK		CK	CK		CK	CK	CK	CK	CK
		tau	-0.029	-0.431	-0.083	-0.386	-0.225		-0.085	-0.087		-0.029	-0.069		-0.209	0.036	-0.140	0.008		-0.233	0.153		-0.304	-0.069	0.037	-0.169	-0.328
		P_{orig}	0.795	0.001	0.639	0.003	0.096		0.421	0.452		0.819	0.530		0.109	0.879	0.245	0.967		0.025	0.236		0.018	0.503	0.795	0.191	0.012
		P_{adj}	0.929	0.014	0.843	0.028	0.274		0.671	0.699		0.940	0.772		0.291	0.968	0.485	1.000		0.106	0.474		0.087	0.747	0.929	0.418	0.071

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	SMC-S2	Summ	ns	ns	ns	(-)	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	(+)	(-)	ns	nt	ns	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	89.3	10.7	0.0	25.0	0.0	100.0	82.1	57.1	96.4	42.9	32.1	96.4	14.3	0.0	78.6	39.3	82.1	85.7	28.6	100.0	21.4	96.4	0.0	21.4	14.3
		Test	CK	CK	SK	CK	CK		CK	CK		CK	SK		CK	CK	CK	CK	CK	CK	CK		SK		SK	CK	CK
		tau	-0.021	-0.114	-0.226	-0.315	-0.074		-0.135	-0.071		-0.119	0.143		-0.257	-0.127	-0.175	0.021	0.167	-0.238	0.050		-0.143		0.071	-0.082	-0.429
		P_{orig}	0.861	0.404	0.170	0.015	0.592		0.240	0.576		0.328	0.382		0.053	0.351	0.133	0.884	0.038	0.015	0.713		0.400		0.696	0.542	0.001
		P_{adj}	0.961	0.654	0.390	0.079	0.815		0.479	0.805		0.579	0.628		0.179	0.600	0.330	0.971	0.141	0.081	0.883		0.649		0.877	0.778	0.019
	SMC-S3	Summ	ns	(-)	ns	-	ns	nt	ns	ns	ns	ns	ns	ns	(-)	ns	nt	ns	ns	-	ns	nt	(-)	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.7	0.0	0.0	21.4	0.0	96.4	57.1	46.4	82.1	28.6	0.0	92.9	25.0	0.0	96.4	42.9	28.6	78.6	17.9	100.0	0.0	100.0	0.0	32.1	10.7
		Test	CK	CK	CK	CK	CK		CK	CK	CK	SK	CK	CK	CK	SK		CK	CK	CK	CK		CK		SK	SK	CK
		tau	0.003	-0.299	0.048	-0.405	-0.061		-0.077	-0.016	-0.058	-0.190	-0.193	0.032	-0.317	0.190		-0.029	-0.185	-0.299	-0.212		-0.339		-0.012	-0.202	-0.368
		P_{orig}	1.000	0.027	0.732	0.002	0.663		0.547	0.916	0.622	0.215	0.155	0.804	0.014	0.255		0.837	0.160	0.004	0.109		0.012		1.000	0.201	0.005
		P_{adj}	1.000	0.112	0.895	0.024	0.856		0.780	0.982	0.832	0.450	0.365	0.933	0.076	0.498		0.946	0.372	0.035	0.291		0.070		1.000	0.431	0.043
	SMC-R1	Summ	ns	(-)	ns	-	ns	nt	ns	ns	ns	ns	ns	nt	(-)	ns	ns	ns	ns	(-)	ns	nt	(-)	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	82.1	3.6	0.0	25.0	0.0	96.4	78.6	53.6	89.3	32.1	0.0	100.0	10.7	0.0	75.0	42.9	53.6	78.6	25.0	100.0	0.0	96.4	0.0	14.3	14.3
		Test	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK		CK	CK	CK	CK	CK	CK	CK		CK		SK	CK	CK
		tau	0.019	-0.339	-0.140	-0.357	-0.050		-0.183	-0.204	-0.124	-0.077	-0.048		-0.328	-0.003	-0.204	-0.061	-0.132	-0.262	0.000		-0.315		0.071	-0.175	-0.333
		P_{orig}	0.888	0.012	0.301	0.006	0.721		0.119	0.107	0.251	0.549	0.737		0.013	1.000	0.084	0.646	0.275	0.016	1.000		0.019		0.698	0.188	0.012
		P_{adj}	0.972	0.069	0.548	0.044	0.887		0.307	0.291	0.493	0.782	0.895		0.074	1.000	0.247	0.848	0.516	0.081	1.000		0.091		0.877	0.415	0.069
	SMC-R3	Summ	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	(+)	nt	-	ns	ns	ns	ns	(-)	ns	nt	ns	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.7	0.0	0.0	89.3	0.0	100.0	78.6	35.7	92.9	35.7	0.0	96.4	10.7	0.0	71.4	32.1	71.4	75.0	28.6	100.0	0.0	96.4	0.0	14.3	10.7
		Test	CK	CK	CK	SK	CK		CK	CK	CK	CK	CK		CK	CK	CK	CK	CK	CK	CK		CK		CK	CK	CK
		tau	-0.040	0.013	-0.212	-0.107	0.119		-0.172	-0.143	-0.085	-0.087	0.347		-0.397	0.071	-0.201	0.140	0.095	-0.241	0.050		-0.132		-0.050	-0.172	-0.320
		P_{orig}	0.735	0.937	0.117	0.180	0.383		0.141	0.260	0.421	0.492	0.010		0.003	0.607	0.092	0.280	0.354	0.032	0.713		0.330		0.716	0.200	0.014
		P_{adj}	0.895	0.985	0.305	0.404	0.631		0.342	0.504	0.671	0.738	0.064		0.028	0.823	0.264	0.521	0.602	0.127	0.883		0.581		0.885	0.430	0.077
	SMC-R4	Summ	ns	ns	ns	-	ns	nt	ns	ns	ns	ns	ns	nt	-	(+)	nt	ns	ns	-	ns	nt	ns	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.7	0.0	0.0	21.4	0.0	96.4	57.1	28.6	75.0	14.3	0.0	100.0	21.4	0.0	96.4	39.3	17.9	75.0	7.1	100.0	0.0	100.0	0.0	7.1	0.0
		Test	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK		CK	CK		CK	CK	CK	CK		CK		SK	CK	CK
		tau	-0.058	-0.056	0.146	-0.426	0.071		0.045	0.106	-0.019	0.000	0.135		-0.373	0.333		0.146	-0.016	-0.339	-0.209		-0.257		-0.024	0.000	-0.341
		P_{orig}	0.612	0.692	0.280	0.001	0.607		0.731	0.403	0.893	1.000	0.323		0.004	0.013		0.261	0.919	0.002	0.109		0.058		0.937	1.000	0.010
		P_{adj}	0.827	0.874	0.521	0.018	0.823		0.894	0.653	0.973	1.000	0.574		0.036	0.074		0.505	0.983	0.025	0.291		0.192		0.985	1.000	0.064

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	SME-P1	Summ	ns	-	ns	(-)	ns	nt	ns	ns	nt	(-)	(-)	ns	ns	ns	ns	ns	ns	-	ns	nt	-	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	89.3	3.6	0.0	25.0	0.0	100.0	85.7	50.0	96.4	60.7	28.6	92.9	21.4	0.0	67.9	39.3	78.6	75.0	35.7	100.0	7.1	100.0	3.6	14.3	21.4
		Test	CK	CK	SK	CK	CK		CK	CK		CK	SK	CK	CK	SK	CK	CK	CK	CK	SK		CK		CK	CK	CK
		tau	-0.130	-0.439	-0.250	-0.307	0.111		-0.167	-0.140		-0.225	-0.333	0.003	-0.167	0.119	-0.188	-0.071	-0.140	-0.315	-0.179		-0.407		-0.119	-0.101	-0.270
		P_{orig}	0.231	0.001	0.125	0.018	0.417		0.134	0.265		0.047	0.036	1.000	0.210	0.497	0.123	0.588	0.115	0.005	0.233		0.002		0.380	0.456	0.041
		P_{adj}	0.467	0.018	0.317	0.087	0.667		0.331	0.509		0.163	0.137	1.000	0.443	0.742	0.314	0.814	0.300	0.041	0.469		0.027		0.627	0.704	0.150
	SME-S1	Summ	ns	(-)	ns	-	ns	nt	ns	ns	ns	(-)	ns	ns	ns	ns	ns	ns	ns	(-)	ns	nt	-	ns	ns	ns	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.7	3.6	0.0	25.0	0.0	100.0	75.0	28.6	82.1	21.4	0.0	92.9	7.1	0.0	42.9	25.0	35.7	85.7	21.4	96.4	3.6	92.9	0.0	7.1	14.3
		Test	CK	CK	SK	CK	SK		CK	CK	CK	CK	CK	CK	CK	CK	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK
		tau	-0.061	-0.278	-0.143	-0.370	-0.310		-0.098	0.101	-0.066	-0.296	-0.151	-0.063	-0.074	-0.175	-0.108	-0.034	-0.079	-0.246	-0.024		-0.399	-0.114	-0.053	-0.069	-0.233
		P_{orig}	0.595	0.039	0.406	0.004	0.059		0.417	0.428	0.573	0.016	0.268	0.602	0.590	0.199	0.358	0.804	0.546	0.012	0.870		0.003	0.241	0.702	0.620	0.081
		P_{adj}	0.815	0.146	0.656	0.036	0.194		0.667	0.679	0.803	0.082	0.513	0.819	0.814	0.430	0.606	0.933	0.780	0.071	0.966		0.030	0.480	0.878	0.830	0.242
	SME-R1a	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		N	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
		%BDL	80.0	10.0	0.0	0.0	0.0	100.0	70.0	5.0	80.0	20.0	0.0	95.0	0.0	0.0	15.0	0.0	35.0	90.0	20.0	100.0	5.0	100.0	0.0	0.0	0.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	SME-R2	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		N	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
		%BDL	95.0	0.0	0.0	0.0	0.0	100.0	45.0	5.0	65.0	20.0	0.0	90.0	0.0	0.0	5.0	55.0	5.0	90.0	10.0	100.0	0.0	100.0	0.0	0.0	0.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
WID	W-P1	Summ	ns	(-)	-	-	ns	nt	ns	ns	ns	-	ns	nt	-	ns	ns	ns	(-)	(-)	ns	nt	-	nt	(-)	(-)	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	88.9	0.0	0.0	22.2	0.0	100.0	77.8	55.6	92.6	63.0	18.5	100.0	18.5	0.0	63.0	55.6	63.0	77.8	3.7	100.0	0.0	100.0	0.0	14.8	37.0
		Test	CK	CK	CK	CK	SK		CK	CK	CK	CK	CK		CK	CK	CK	CK	CK	CK	CK		CK		SK	CK	CK
		tau	0.026	-0.359	-0.399	-0.362	0.079		-0.066	0.048	0.020	-0.356	-0.140		-0.387	0.014	-0.003	-0.011	-0.271	-0.276	-0.234		-0.544		-0.358	-0.285	-0.211
		P_{orig}	0.834	0.009	0.003	0.006	0.633		0.596	0.714	0.870	0.002	0.314		0.004	0.933	1.000	0.947	0.017	0.010	0.085		0.000		0.018	0.034	0.111
		P_{adj}	0.945	0.060	0.028	0.047	0.839		0.815	0.884	0.966	0.023	0.563		0.032	0.985	1.000	0.992	0.086	0.065	0.250		0.005		0.087	0.133	0.296

***Table A.5.** continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	W-P2	Summ	ns	(-)	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	(-)	ns	ns	ns	(-)	(-)	nt	-	nt	ns	ns	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	85.2	0.0	0.0	25.9	0.0	100.0	33.3	74.1	92.6	55.6	3.7	96.3	25.9	0.0	66.7	63.0	37.0	74.1	3.7	100.0	3.7	100.0	0.0	18.5	14.8
		Test	CK	CK	CK	CK	CK		CK	CK	CK	SK	CK		CK	CK	CK	CK	CK	CK	CK		CK		SK	CK	CK
		tau	-0.028	-0.368	-0.228	-0.242	0.000		-0.114	-0.074	0.023	0.032	-0.208		-0.194	-0.276	-0.006	0.048	-0.177	-0.311	-0.268		-0.496		-0.044	-0.228	-0.256
		P_{orig}	0.820	0.007	0.087	0.066	1.000		0.363	0.552	0.849	0.894	0.132		0.140	0.044	0.981	0.717	0.169	0.007	0.048		0.000		0.868	0.084	0.051
		P_{adj}	0.940	0.052	0.255	0.209	1.000		0.609	0.785	0.954	0.973	0.327		0.341	0.157	1.000	0.885	0.388	0.051	0.168		0.010		0.965	0.247	0.175
	W-S1	Summ	ns	-	(-)	(-)	ns	nt	ns	ns	ns	-	(-)	nt	ns	ns	ns	ns	-	-	ns	nt	-	nt	ns	(-)	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	88.9	3.7	0.0	25.9	0.0	100.0	70.4	48.1	88.9	51.9	7.4	96.3	85.2	3.7	66.7	55.6	48.1	77.8	7.4	100.0	0.0	100.0	0.0	51.9	25.9
		Test	CK	CK	SK	CK	SK		CK	CK	CK	SK	SK		SK	SK	CK	CK	CK	CK	CK		CK		SK	SK	CK
		tau	0.026	-0.530	-0.412	-0.299	-0.054		-0.117	-0.060	-0.028	-0.316	-0.360		-0.094	-0.301	-0.023	-0.071	-0.425	-0.316	-0.157		-0.516		-0.269	-0.378	-0.308
		P_{orig}	0.834	0.000	0.011	0.023	0.873		0.350	0.652	0.814	0.004	0.039		0.341	0.080	0.871	0.594	0.001	0.002	0.251		0.000		0.082	0.011	0.021
		P_{adj}	0.945	0.006	0.068	0.101	0.966		0.600	0.848	0.938	0.035	0.145		0.591	0.239	0.966	0.815	0.015	0.026	0.493		0.007		0.243	0.068	0.095
	W-S2	Summ	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	-	nt	ns	(-)	(-)	-	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	85.2	0.0	0.0	25.9	0.0	100.0	59.3	48.1	85.2	37.0	3.7	85.2	85.2	3.7	55.6	40.7	40.7	77.8	3.7	100.0	0.0	85.2	0.0	0.0	7.4
		Test	CK	CK	SK	CK	CK		CK	CK	CK	SK	CK	CK	SK	CK	CK	CK	CK	CK	CK		CK	CK	SK	CK	CK
		tau	0.031	-0.165	-0.168	-0.271	-0.140		-0.060	0.063	0.077	-0.205	-0.034	-0.114	-0.064	-0.205	-0.066	0.009	-0.174	-0.333	-0.385		-0.217	-0.214	-0.400	-0.373	-0.302
		P_{orig}	0.800	0.234	0.351	0.040	0.317		0.650	0.639	0.511	0.199	0.818	0.355	0.525	0.138	0.618	0.965	0.184	0.002	0.004		0.117	0.036	0.011	0.006	0.025
		P_{adj}	0.932	0.470	0.600	0.148	0.566		0.848	0.843	0.755	0.430	0.940	0.602	0.766	0.337	0.830	1.000	0.409	0.026	0.036		0.305	0.136	0.068	0.048	0.107
	W-S3	Summ	ns	(-)	ns	(-)	ns	nt	ns	ns	ns	-	(-)	ns	ns	ns	ns	ns	(-)	-	(-)	ns	-	(-)	ns	-	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	81.5	0.0	0.0	22.2	0.0	100.0	70.4	59.3	81.5	33.3	0.0	92.6	74.1	0.0	70.4	44.4	25.9	81.5	0.0	92.6	0.0	85.2	0.0	0.0	7.4
		Test	CK	CK	SK	CK	CK		CK	CK	CK	SK	CK	CK	SK	CK	CK	CK	CK	CK	CK	CK	CK	CK	SK	CK	CK
		tau	0.097	-0.356	-0.025	-0.271	-0.254		-0.145	0.051	-0.066	-0.514	-0.339	-0.088	-0.109	-0.219	0.031	0.048	-0.302	-0.299	-0.276	-0.020	-0.419	-0.245	0.057	-0.396	-0.142
		P_{orig}	0.416	0.010	1.000	0.042	0.066		0.240	0.699	0.588	0.001	0.014	0.472	0.341	0.112	0.814	0.727	0.022	0.003	0.037	0.870	0.002	0.016	0.745	0.004	0.299
		P_{adj}	0.667	0.063	1.000	0.152	0.208		0.479	0.877	0.814	0.014	0.076	0.717	0.591	0.297	0.938	0.892	0.100	0.032	0.139	0.966	0.027	0.082	0.902	0.032	0.547
	W-S4	Summ	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	-	ns	nt	ns	ns	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	81.5	0.0	3.7	25.9	0.0	100.0	55.6	55.6	70.4	59.3	7.4	100.0	22.2	7.4	70.4	48.1	33.3	74.1	7.4	100.0	7.4	92.6	0.0	44.4	7.4
		Test	CK	SK	SK	CK	CK		CK	CK	CK	SK	SK		CK	SK	CK	CK	SK	CK	CK		SK	CK	SK	SK	CK
		tau	0.028	-0.151	0.225	-0.219	-0.037		-0.094	0.085	-0.048	-0.153	-0.005		-0.208	0.190	0.028	0.094	-0.057	-0.382	-0.140		-0.111	-0.140	0.005	0.002	-0.328
		P_{orig}	0.825	0.386	0.168	0.097	0.801		0.468	0.513	0.709	0.238	1.000		0.116	0.299	0.833	0.482	0.732	0.000	0.309		0.582	0.162	1.000	1.000	0.013
		P_{adj}	0.941	0.632	0.386	0.276	0.932		0.716	0.756	0.881	0.476	1.000		0.303	0.547	0.945	0.727	0.894	0.012	0.558		0.808	0.375	1.000	1.000	0.074

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	W-R1a	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		N	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
		%BDL	78.9	0.0	0.0	0.0	0.0	100.0	36.8	21.1	84.2	42.1	0.0	100.0	0.0	5.3	52.6	26.3	26.3	100.0	0.0	100.0	0.0	100.0	0.0	21.1	0.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	W-R2	Summ	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	-	(-)	nt	ns	ns	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	77.8	0.0	3.7	66.7	0.0	92.6	33.3	29.6	51.9	3.7	0.0	96.3	7.4	0.0	29.6	25.9	0.0	29.6	11.1	100.0	0.0	85.2	0.0	3.7	0.0
		Test	CK	CK	SK	SK	CK	CK	CK	CK	CK	CK	CK		SK	CK	CK	SK	CK	CK	CK		CK	CK	SK	CK	CK
		tau	-0.020	-0.217	0.136	-0.160	-0.182	-0.071	-0.057	-0.009	-0.040	-0.208	-0.162		-0.040	0.066	-0.114	0.037	-0.085	-0.396	-0.302		-0.205	-0.191	0.020	-0.245	-0.396
		P_{orig}	0.885	0.118	0.370	0.222	0.189	0.514	0.667	0.965	0.773	0.108	0.243		0.873	0.646	0.362	0.809	0.536	0.003	0.025		0.139	0.072	1.000	0.076	0.004
		P_{adj}	0.972	0.305	0.616	0.458	0.415	0.757	0.858	1.000	0.918	0.291	0.482		0.966	0.848	0.608	0.937	0.777	0.028	0.106		0.339	0.224	1.000	0.230	0.032
BRID	BR-P1	Summ	ns	ns	+	-	ns	nt	ns	ns	nt	(-)	ns	nt	(-)	ns	ns	ns	nt	-	ns	nt	-	nt	-	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.7	46.4	3.6	21.4	0.0	100.0	89.3	78.6	96.4	42.9	57.1	96.4	3.6	14.3	28.6	21.4	96.4	75.0	25.0	96.4	32.1	100.0	0.0	25.0	28.6
		Test	CK	CK	CK	CK	CK		CK	CK		CK	CK		CK	CK	CK	CK		CK	CK		CK		CK	CK	CK
		tau	-0.048	-0.209	0.434	-0.455	-0.193		-0.119	-0.045		-0.291	-0.040		-0.344	-0.251	0.066	-0.029		-0.325	-0.082		-0.368		-0.442	-0.093	-0.336
		P_{orig}	0.683	0.107	0.001	0.000	0.153		0.275	0.713		0.020	0.752		0.010	0.060	0.541	0.838		0.004	0.537		0.006		0.001	0.480	0.010
		P_{adj}	0.869	0.291	0.016	0.012	0.363		0.516	0.883		0.092	0.905		0.064	0.197	0.777	0.946		0.033	0.777		0.043		0.016	0.725	0.064
	BR-S1	Summ	ns	ns	+	(-)	ns	nt	ns	ns	nt	(-)	ns	ns	ns	(+)	ns	ns	nt	(-)	ns	nt	(-)	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	89.3	39.3	3.6	21.4	0.0	100.0	89.3	75.0	96.4	46.4	57.1	92.9	3.6	0.0	28.6	32.1	100.0	78.6	46.4	100.0	35.7	96.4	0.0	28.6	32.1
		Test	CK	CK	CK	CK	CK		CK	CK		CK	CK	CK	CK	CK	CK	CK		CK	CK		CK		CK	CK	CK
		tau	0.003	-0.196	0.511	-0.283	0.069		-0.119	0.050		-0.280	0.037	-0.003	-0.063	0.272	0.066	0.114		-0.265	-0.172		-0.294		-0.172	0.071	-0.386
		P_{orig}	1.000	0.134	0.000	0.030	0.619		0.275	0.684		0.019	0.769	1.000	0.647	0.043	0.541	0.386		0.015	0.179		0.026		0.201	0.586	0.003
		P_{adj}	1.000	0.331	0.006	0.123	0.830		0.516	0.869		0.091	0.917	1.000	0.848	0.155	0.777	0.632		0.078	0.403		0.111		0.431	0.812	0.030
	BR-S2	Summ	ns	ns	-	-	(-)	nt	ns	ns	ns	(-)	ns	ns	-	ns	ns	ns	ns	ns	(-)	nt	ns	ns	ns	(-)	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	27	28
		%BDL	89.3	3.6	0.0	21.4	0.0	100.0	71.4	28.6	75.0	35.7	0.0	92.9	3.6	0.0	25.0	10.7	33.3	50.0	39.3	96.4	7.1	89.3	0.0	0.0	10.7
		Test	CK	SK	SK	CK	CK		CK	CK	CK	CK	SK	CK	CK	CK	CK	CK	SK	CK	CK		CK	CK	CK	SK	CK
		tau	-0.003	-0.155	-0.536	-0.434	-0.317		0.013	0.127	-0.056	-0.280	0.071	-0.087	-0.386	0.235	-0.042	0.164	0.022	-0.167	-0.259		-0.172	-0.153	-0.019	-0.353	-0.206
		P_{orig}	1.000	0.363	0.001	0.001	0.019		0.930	0.319	0.653	0.030	0.707	0.470	0.004	0.082	0.702	0.221	1.000	0.190	0.045		0.204	0.117	0.904	0.031	0.121
		P_{adj}	1.000	0.609	0.015	0.016	0.089		0.985	0.569	0.849	0.120	0.880	0.717	0.034	0.244	0.878	0.457	1.000	0.417	0.159		0.436	0.304	0.977	0.125	0.312

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	BR-S3	Summ	ns	-	ns	-	(-)	nt	ns	ns	nt	(-)	ns	nt	(-)	ns	ns	ns	ns	-	ns	nt	-	nt	-	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	89.3	7.1	0.0	21.4	0.0	100.0	89.3	32.1	100.0	32.1	0.0	96.4	3.6	3.6	25.0	25.0	78.6	67.9	14.3	100.0	7.1	96.4	0.0	14.3	25.0
		Test	CK	CK	SK	CK	CK		CK	CK		CK	CK		CK	CK	CK	CK	CK	CK	CK		CK		CK	CK	CK
		tau	0.003	-0.365	0.310	-0.468	-0.331		-0.119	0.056		-0.299	-0.085		-0.270	0.029	0.066	0.024	-0.156	-0.320	-0.177		-0.373		-0.468	-0.053	-0.317
		P_{orig}	1.000	0.007	0.055	0.000	0.014		0.275	0.652		0.015	0.538		0.044	0.843	0.541	0.870	0.100	0.006	0.176		0.005		0.000	0.701	0.016
		P_{adj}	1.000	0.048	0.186	0.010	0.076		0.516	0.848		0.078	0.777		0.156	0.949	0.777	0.966	0.280	0.045	0.398		0.043		0.012	0.878	0.084
	BR-S4a	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		N	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
		%BDL	70.0	50.0	0.0	0.0	0.0	100.0	80.0	40.0	90.0	55.0	50.0	100.0	0.0	0.0	0.0	5.0	100.0	90.0	20.0	100.0	30.0	100.0	0.0	5.0	20.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	BR-S5	Summ	ns	ns	ns	-	(-)	nt	ns	ns	nt	(-)	ns	nt	ns	ns	ns	ns	ns	(-)	ns	nt	(-)	nt	(-)	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28
		%BDL	85.7	35.7	0.0	21.4	0.0	100.0	89.3	28.6	96.4	53.6	25.0	100.0	3.6	0.0	28.6	21.4	85.7	78.6	17.9	100.0	28.6	96.4	0.0	59.3	32.1
		Test	CK	CK	SK	CK	CK		CK	CK		CK	CK		CK	CK	CK	CK	CK	CK	CK		CK		CK	SK	CK
		tau	-0.003	-0.151	0.214	-0.458	-0.331		-0.119	0.040		-0.235	-0.040		-0.188	0.169	0.066	-0.093	0.008	-0.278	-0.214		-0.354		-0.275	-0.128	-0.312
		P_{orig}	1.000	0.258	0.193	0.000	0.014		0.275	0.754		0.046	0.777		0.162	0.213	0.541	0.486	0.946	0.010	0.103		0.008		0.039	0.263	0.017
		P_{adj}	1.000	0.502	0.421	0.012	0.077		0.516	0.905		0.160	0.922		0.375	0.445	0.777	0.731	0.992	0.064	0.286		0.055		0.146	0.507	0.085
	BR-R1	Summ	ns	(-)	ns	-	ns	nt	ns	ns	ns	(-)	ns	nt	-	ns	ns	ns	ns	-	(-)	nt	(-)	nt	-	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.7	42.9	3.6	21.4	0.0	100.0	89.3	67.9	92.9	60.7	42.9	100.0	3.6	10.7	28.6	25.0	85.7	67.9	10.7	100.0	35.7	100.0	0.0	28.6	21.4
		Test	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK		CK	CK	CK	CK	CK	CK	CK		CK		CK	CK	CK
		tau	-0.040	-0.283	0.161	-0.394	-0.222		-0.119	-0.029	-0.013	-0.291	-0.119		-0.365	-0.021	0.061	-0.063	-0.077	-0.368	-0.325		-0.349		-0.410	-0.058	-0.386
		P_{orig}	0.737	0.028	0.218	0.003	0.100		0.275	0.824	0.918	0.010	0.359		0.006	0.890	0.589	0.638	0.342	0.002	0.012		0.008		0.002	0.661	0.003
		P_{adj}	0.895	0.115	0.453	0.027	0.280		0.516	0.940	0.982	0.064	0.606		0.047	0.972	0.814	0.842	0.593	0.022	0.070		0.057		0.026	0.855	0.032
	BR-R2	Summ	ns	-	ns	-	(-)	nt	ns	ns	ns	-	(-)	nt	-	(-)	ns	ns	ns	(-)	(-)	nt	-	nt	(-)	(-)	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	27	28	28	28	28	28	28	27	28
		%BDL	85.7	0.0	0.0	21.4	0.0	100.0	64.3	28.6	75.0	14.3	0.0	96.4	3.6	0.0	28.6	44.4	18.5	67.9	28.6	100.0	3.6	100.0	0.0	18.5	3.6
		Test	CK	CK	CK	CK	CK		CK	CK	CK	CK	SK		CK	SK	CK	SK	SK	CK	CK		CK		SK	SK	CK
		tau	-0.045	-0.450	0.045	-0.426	-0.275		-0.061	0.032	-0.138	-0.492	-0.333		-0.365	-0.381	-0.024	0.148	-0.284	-0.286	-0.286		-0.505		-0.369	-0.402	-0.413
		P_{orig}	0.701	0.001	0.751	0.001	0.041		0.634	0.815	0.254	0.000	0.041		0.006	0.019	0.853	0.306	0.077	0.016	0.030		0.000		0.019	0.016	0.002
		P_{adj}	0.878	0.015	0.904	0.018	0.151		0.839	0.939	0.497	0.006	0.151		0.046	0.091	0.956	0.554	0.234	0.082	0.121		0.006		0.089	0.083	0.025

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	BR-R3	Summ	ns	ns	ns	ns	(-)	nt	ns	ns	ns	-	ns	nt	ns	(+)	ns	ns	ns	(-)	ns	nt	-	ns	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	71.4	0.0	0.0	17.9	0.0	100.0	46.4	28.6	67.9	14.3	0.0	96.3	3.6	0.0	25.0	14.3	3.6	64.3	14.3	100.0	3.6	92.9	0.0	3.6	7.1
		Test	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK		CK	CK	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK
		tau	-0.082	-0.265	0.257	-0.037	-0.270		-0.093	-0.087	-0.235	-0.405	0.008		0.217	0.312	-0.148	0.011	-0.040	-0.312	-0.190		-0.442	-0.116	0.140	-0.177	-0.402
		P_{orig}	0.508	0.050	0.057	0.795	0.046		0.470	0.498	0.056	0.001	0.968		0.108	0.021	0.232	0.952	0.770	0.009	0.151		0.001	0.231	0.302	0.187	0.002
		P_{adj}	0.752	0.174	0.191	0.929	0.161		0.717	0.743	0.189	0.018	1.000		0.291	0.095	0.468	0.996	0.917	0.059	0.362		0.017	0.468	0.550	0.414	0.026
	BR-R4	Summ	ns	ns	ns	-	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	ns	-	-	nt	-	nt	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	92.9	25.0	0.0	21.4	0.0	100.0	85.7	35.7	96.4	71.4	0.0	100.0	3.6	0.0	39.3	21.4	85.7	75.0	67.9	100.0	14.3	100.0	0.0	17.9	14.3
		Test	CK	CK	CK	CK	CK		CK	CK		CK	CK		CK	CK	CK	CK	CK	CK	CK		CK		SK	CK	CK
		tau	-0.024	-0.251	0.124	-0.362	-0.056		-0.108	-0.061		-0.143	0.193		-0.135	0.138	-0.093	-0.021	0.048	-0.333	-0.357		-0.434		-0.024	-0.061	-0.460
		P_{orig}	0.836	0.059	0.362	0.006	0.692		0.337	0.631		0.161	0.154		0.313	0.313	0.472	0.886	0.562	0.002	0.002		0.001		0.939	0.655	0.001
		P_{adj}	0.946	0.194	0.608	0.044	0.874		0.587	0.837		0.374	0.364		0.563	0.563	0.717	0.972	0.795	0.026	0.026		0.018		0.986	0.850	0.012
	BR-R5	Summ	ns	ns	ns	-	ns	nt	ns	ns	nt	-	ns	nt	(-)	ns	ns	ns	ns	-	ns	nt	(-)	nt	-	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	89.3	53.6	0.0	21.4	0.0	100.0	89.3	53.6	96.4	46.4	46.4	96.4	3.6	7.1	28.6	25.0	92.9	82.1	17.9	96.4	46.4	100.0	0.0	25.0	28.6
		Test	CK	CK	SK	CK	CK		CK	CK		CK	CK		CK	CK	CK	CK	CK	CK	CK		CK		CK	CK	CK
		tau	0.008	-0.180	0.202	-0.460	-0.077		-0.119	-0.019		-0.360	0.095		-0.307	0.019	0.066	0.021	-0.056	-0.286	-0.180		-0.296		-0.397	-0.116	-0.336
		P_{orig}	0.960	0.157	0.213	0.000	0.580		0.275	0.897		0.003	0.455		0.022	0.905	0.541	0.884	0.332	0.006	0.174		0.023		0.003	0.377	0.011
		P_{adj}	1.000	0.368	0.445	0.012	0.807		0.516	0.975		0.031	0.703		0.098	0.977	0.777	0.971	0.583	0.044	0.396		0.101		0.029	0.622	0.065
EID	E-P1	Summ	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	(-)	ns	nt	(-)	ns	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	75.0	0.0	0.0	25.0	0.0	100.0	28.6	35.7	75.0	35.7	0.0	100.0	28.6	3.6	64.3	46.4	10.7	85.7	7.1	100.0	3.6	85.7	0.0	57.1	7.1
		Test	CK	SK	SK	CK	CK		CK	CK	CK	SK	SK		CK	SK	CK	CK	SK	CK	CK		SK	CK	CK	SK	CK
		tau	-0.032	-0.298	0.000	0.058	0.130		-0.177	0.021	-0.130	-0.012	-0.167		-0.019	-0.095	0.185	0.108	-0.131	-0.243	-0.148		-0.369	-0.159	-0.124	-0.119	-0.278
		P_{orig}	0.804	0.069	1.000	0.663	0.341		0.152	0.881	0.281	1.000	0.326		0.897	0.595	0.126	0.406	0.412	0.013	0.269		0.024	0.124	0.319	0.374	0.037
		P_{adj}	0.933	0.215	1.000	0.856	0.591		0.363	0.969	0.521	1.000	0.577		0.975	0.815	0.319	0.656	0.662	0.074	0.513		0.103	0.315	0.569	0.620	0.141
	E-S1	Summ	ns	ns	ns	ns	ns	nt	ns	ns	nt	(-)	ns	ns	ns	(+)	ns	ns	ns	-	(-)	nt	(-)	ns	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.7	14.3	0.0	25.0	0.0	100.0	82.1	42.9	100.0	57.1	35.7	92.9	25.0	0.0	39.3	46.4	89.3	78.6	17.9	100.0	10.7	92.9	0.0	25.0	25.0
		Test	CK	CK	SK	CK	CK		CK	CK		CK	SK	CK	CK	SK	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK
		tau	0.045	-0.196	0.214	-0.212	-0.034		-0.114	0.135		-0.270	-0.083	-0.037	-0.206	0.393	0.077	0.225	0.071	-0.283	-0.304		-0.270	-0.122	-0.111	-0.103	-0.352
		P_{orig}	0.699	0.147	0.183	0.101	0.812		0.324	0.267		0.020	0.623	0.768	0.104	0.015	0.500	0.080	0.221	0.007	0.019		0.045	0.209	0.362	0.432	0.008
		P_{adj}	0.877	0.355	0.407	0.281	0.938		0.575	0.512		0.091	0.832	0.916	0.287	0.078	0.743	0.240	0.457	0.049	0.090		0.159	0.442	0.608	0.681	0.054

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	E-S2	Summ	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	(-)	ns	nt	-	ns	ns	ns	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	81.5	0.0	0.0	25.9	0.0	100.0	33.3	37.0	81.5	40.7	0.0	96.3	29.6	0.0	63.0	51.9	29.6	81.5	7.4	100.0	0.0	92.6	0.0	74.1	11.1
		Test	CK	SK	SK	CK	CK		CK	CK	CK	CK	SK		CK	SK	CK	CK	SK	CK	CK		SK	CK	CK	SK	CK
		tau	0.017	-0.074	0.178	-0.054	0.182		-0.054	0.048	-0.091	0.066	0.183		-0.034	0.146	0.125	0.248	0.089	-0.248	-0.177		-0.506	-0.105	0.003	0.086	-0.222
		P_{orig}	0.902	0.692	0.270	0.691	0.188		0.680	0.720	0.446	0.606	0.299		0.802	0.424	0.313	0.056	0.600	0.021	0.192		0.003	0.294	1.000	0.492	0.101
		P_{adj}	0.976	0.874	0.514	0.874	0.414		0.868	0.886	0.692	0.823	0.547		0.932	0.674	0.563	0.188	0.818	0.095	0.420		0.028	0.541	1.000	0.738	0.281
	E-S3	Summ	ns	+	(-)	ns	(+)	nt	ns	ns	ns	(+)	+	nt	ns	ns	ns	ns	+	(-)	ns	nt	ns	ns	ns	ns	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	75.0	0.0	0.0	25.0	0.0	96.4	28.6	28.6	53.6	32.1	0.0	100.0	25.0	0.0	53.6	39.3	21.4	85.7	14.3	100.0	7.1	92.9	0.0	28.6	10.7
		Test	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK		CK	SK	CK	CK	CK	CK	CK		CK	CK	CK	CK	CK
		tau	-0.008	0.376	-0.312	-0.032	0.347		-0.005	0.008	-0.130	0.317	0.450		-0.201	-0.262	0.119	0.180	0.389	-0.251	-0.101		0.172	-0.074	0.188	0.225	-0.090
		P_{orig}	0.964	0.005	0.019	0.819	0.010		0.983	0.967	0.312	0.013	0.001		0.100	0.113	0.324	0.169	0.003	0.010	0.453		0.206	0.469	0.127	0.088	0.508
		P_{adj}	1.000	0.042	0.090	0.940	0.064		1.000	1.000	0.562	0.074	0.015		0.280	0.297	0.575	0.387	0.032	0.065	0.700		0.439	0.717	0.321	0.257	0.752
	E-S4	Summ	ns	-	(+)	ns	(+)	nt	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	ns	(-)	(-)	nt	-	ns	ns	ns	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	82.1	21.4	0.0	25.0	0.0	100.0	85.7	85.7	92.9	75.0	53.6	96.4	25.0	0.0	32.1	46.4	89.3	82.1	17.9	100.0	17.9	92.9	0.0	25.0	78.6
		Test	CK	CK	SK	CK	SK		CK	CK	CK	CK	CK		CK	CK	CK	CK	CK	CK	CK		CK	CK	CK	CK	SK
		tau	0.021	-0.397	0.321	-0.209	0.369		-0.143	0.003	-0.063	-0.034	-0.069		-0.238	0.079	-0.003	0.220	0.000	-0.254	-0.278		-0.407	-0.108	0.135	-0.021	-0.107
		P_{orig}	0.869	0.003	0.040	0.107	0.023		0.201	1.000	0.538	0.736	0.575		0.062	0.564	1.000	0.088	1.000	0.014	0.032		0.002	0.264	0.278	0.882	0.345
		P_{adj}	0.966	0.029	0.146	0.290	0.101		0.431	1.000	0.777	0.895	0.805		0.198	0.795	1.000	0.257	1.000	0.077	0.127		0.027	0.509	0.519	0.970	0.593
	E-S5	Summ	ns	-	(+)	ns	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	nt	-	(-)	nt	(-)	ns	ns	ns	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	85.7	50.0	0.0	25.0	0.0	100.0	85.7	92.9	100.0	82.1	57.1	100.0	25.0	0.0	32.1	32.1	100.0	78.6	50.0	100.0	57.1	92.9	0.0	32.1	21.4
		Test	CK	CK	SK	CK	SK		CK	CK		CK	CK		CK	SK	CK	CK		CK	CK		CK	CK	CK	CK	CK
		tau	0.040	-0.349	0.321	-0.249	0.274		-0.169	-0.053		-0.016	0.019		-0.103	-0.226	-0.003	0.177		-0.341	-0.272		-0.299	-0.124	-0.019	0.029	-0.397
		P_{orig}	0.735	0.005	0.046	0.054	0.096		0.127	0.622		0.867	0.889		0.426	0.159	1.000	0.173		0.001	0.031		0.018	0.199	0.899	0.830	0.003
		P_{adj}	0.895	0.041	0.162	0.183	0.273		0.321	0.832		0.965	0.972		0.676	0.369	1.000	0.394		0.018	0.125		0.088	0.430	0.975	0.944	0.028
	E-S6	Summ	ns	(-)	ns	-	ns	nt	ns	ns	nt	ns	ns	nt	ns	ns	ns	ns	-	-	-	nt	(-)	ns	ns	(-)	-
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		%BDL	82.1	32.1	0.0	25.0	0.0	100.0	85.7	42.9	96.4	67.9	42.9	100.0	3.6	3.6	28.6	28.6	89.3	75.0	67.9	100.0	21.4	89.3	3.6	28.6	21.4
		Test	CK	SK	SK	CK	CK		CK	CK		CK	SK		CK	SK	CK	CK	CK	CK	CK		CK	CK	CK	SK	CK
		tau	0.032	-0.405	-0.083	-0.389	0.217		-0.177	0.119		-0.116	-0.286		0.087	-0.143	0.063	0.188	-0.172	-0.317	-0.389		-0.307	-0.175	-0.201	-0.345	-0.577
		P_{orig}	0.796	0.010	0.650	0.003	0.109		0.111	0.348		0.274	0.060		0.517	0.406	0.589	0.148	0.003	0.004	0.001		0.022	0.073	0.104	0.019	0.000
		P_{adj}	0.930	0.064	0.848	0.028	0.291		0.295	0.597		0.516	0.197		0.759	0.656	0.814	0.358	0.028	0.032	0.013		0.099	0.225	0.287	0.090	0.001

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	E-S8	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		N	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
		%BDL	70.0	15.0	0.0	0.0	0.0	100.0	75.0	0.0	85.0	50.0	15.0	95.0	0.0	0.0	10.0	0.0	60.0	85.0	25.0	100.0	0.0	100.0	0.0	0.0	10.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	E-R1	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		N	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
		%BDL	91.7	37.5	0.0	29.2	0.0	100.0	91.7	45.8	100.0	62.5	45.8	95.8	29.2	0.0	37.5	37.5	83.3	75.0	37.5	100.0	45.8	100.0	0.0	33.3	16.7
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	E-R2	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		N	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
		%BDL	83.3	4.2	0.0	29.2	0.0	100.0	66.7	33.3	100.0	37.5	0.0	91.7	0.0	0.0	33.3	8.3	25.0	75.0	12.5	100.0	4.2	95.8	0.0	45.8	4.2
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	E-R2a	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		N	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
		%BDL	17.6	0.0	0.0	0.0	0.0	23.5	0.0	0.0	11.8	0.0	0.0	70.6	0.0	0.0	5.9	0.0	0.0	64.7	5.9	94.1	0.0	41.2	0.0	0.0	0.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	E-R3	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		N	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
		%BDL	79.2	8.3	0.0	29.2	0.0	100.0	75.0	33.3	95.8	58.3	4.2	91.7	29.2	0.0	37.5	37.5	75.0	70.8	12.5	100.0	33.3	95.8	0.0	33.3	12.5
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	E-R4a	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		N	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
		%BDL	81.3	81.3	0.0	0.0	0.0	100.0	100.0	62.5	100.0	75.0	75.0	93.8	0.0	0.0	6.3	12.5	93.8	100.0	37.5	100.0	43.8	100.0	0.0	0.0	12.5
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	E-R5	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		N	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
		%BDL	87.5	45.8	0.0	29.2	0.0	100.0	100.0	87.5	100.0	91.7	50.0	95.8	29.2	0.0	41.7	33.3	95.8	79.2	70.8	100.0	50.0	95.8	0.0	37.5	16.7
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
	E-R8a	Summ	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
		Nyrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		N	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
		%BDL	58.8	0.0	0.0	0.0	0.0	100.0	5.9	0.0	64.7	0.0	0.0	94.1	0.0	0.0	5.9	0.0	0.0	88.2	17.6	100.0	0.0	100.0	0.0	0.0	0.0
		Test																									
		tau																									
		P_{orig}																									
		P_{adj}																									
AEP canal	AEP-P2	Summ	ns	ns	ns	(-)	ns	nt	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	(-)	nt	ns	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	81.5	3.7	22.2	22.2	0.0	100.0	33.3	59.3	74.1	48.1	0.0	92.6	25.9	0.0	81.5	48.1	0.0	59.3	0.0	100.0	11.1	96.3	0.0	63.0	3.7
		Test	CK	SK	SK	CK	CK		CK	CK	CK	SK	SK	CK	CK	SK	CK	CK	CK	CK	CK		SK		CK	SK	CK
		tau	0.003	-0.156	-0.111	-0.285	-0.011		-0.171	-0.125	-0.074	-0.059	0.022	-0.046	-0.225	0.089	-0.017	0.063	-0.154	-0.450	-0.313		-0.109		-0.217	-0.116	-0.285
		P_{orig}	1.000	0.384	0.560	0.032	0.950		0.193	0.331	0.555	0.769	0.937	0.717	0.082	0.631	0.902	0.645	0.255	0.000	0.021		0.633		0.109	0.413	0.038
		P_{adj}	1.000	0.631	0.792	0.126	0.994		0.420	0.583	0.787	0.917	0.985	0.885	0.243	0.837	0.976	0.848	0.498	0.009	0.096		0.839		0.291	0.665	0.141
	AEP-P3	Summ	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	nt	ns	nt	ns	ns	(-)
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
		%BDL	77.8	3.7	48.1	25.9	0.0	92.6	40.7	74.1	74.1	59.3	22.2	92.6	25.9	11.1	59.3	59.3	22.2	77.8	18.5	100.0	33.3	96.3	0.0	77.8	3.7
		Test	CK	SK	SK	CK	SK	CK	CK	CK	CK	SK	SK	CK	CK	SK	CK	CK	SK	CK	CK		SK		CK	SK	CK
		tau	0.026	-0.153	0.062	-0.154	0.195	-0.031	-0.017	-0.006	0.000	-0.086	0.198	0.006	-0.171	0.131	0.120	-0.023	-0.044	-0.328	-0.068		-0.054		0.028	-0.044	-0.348
		P_{orig}	0.847	0.340	0.702	0.246	0.231	0.786	0.911	0.981	1.000	0.541	0.243	0.981	0.180	0.470	0.341	0.875	0.798	0.003	0.624		0.790		0.832	0.697	0.010
		P_{adj}	0.953	0.591	0.878	0.485	0.467	0.924	0.981	1.000	1.000	0.777	0.482	1.000	0.403	0.717	0.591	0.967	0.932	0.031	0.832		0.926		0.945	0.877	0.064

Table A.5. *continued.*

District	Site	Variable	Ag	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Hg	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Ti	Tl	U	V	Zn
	AEP-S2	Summ	ns	ns	ns	ns	ns	nt	ns	ns	ns	ns	(+)	nt	ns	ns	nt	ns	(+)	(-)	ns	nt	ns	nt	ns	ns	ns
		Nyrs	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
		N	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	28	28	28	27	28	28	27	27
		%BDL	75.0	0.0	3.6	17.9	0.0	100.0	67.9	67.9	82.1	82.1	3.6	100.0	28.6	7.1	100.0	82.1	22.2	78.6	78.6	100.0	3.7	100.0	71.4	70.4	59.3
		Test	CK	SK	CK	CK	SK		CK	CK	CK	CK	SK		CK	SK		CK	SK	CK	CK		SK		CK	SK	SK
		tau	0.000	0.310	0.127	-0.217	0.238		-0.071	0.016	-0.037	-0.061	0.369		0.013	0.226		0.013	0.393	-0.272	-0.082		0.091		-0.011	0.049	-0.079
		P_{orig}	1.000	0.059	0.335	0.098	0.151		0.570	0.913	0.762	0.462	0.024		0.930	0.167		0.926	0.014	0.012	0.481		0.694		0.933	0.825	0.570
		P_{adj}	1.000	0.194	0.586	0.276	0.362		0.801	0.981	0.911	0.709	0.103		0.985	0.385		0.985	0.076	0.069	0.726		0.875		0.985	0.941	0.801