

Memorandum

Date: April 9, 2017 **Project No:** E216016800

To: Sam Stone
Peace River Manasota Regional Water Supply Authority
8998 SW County Road 769
Arcadia, FL 34269

CC: Santino Provenzano and Ryan Tickles

From: Kristan Robbins and Sheri Huelster

RE: **HCSP TAG – Decision Memo #1 – HCSP Erroneous and Outlier Data**

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During the December 9, 2016 Technical Advisory Group (TAG) meeting on the 2014 Horse Creek Stewardship Program (HCSP) Annual Report, there was discussion on the removal of erroneous and outlier data from the 2015 HCSP and all other future reports. All those present (PRMRWSA, Cardno, Mosaic, EarthBalance®, Manatee County, Sarasota County, and Charlotte County) agreed that removing this potentially erroneous data was the right action to take as supported by the period of record graphs as well as previous impact assessments. This memorandum is intended to serve as documentation of that decision. It will be included in the appendices of the 2014 Annual report, and it will be referred to in future reports as HCSP TAG – Decision Memo #1.

A list of all data identified as outliers or errors is presented in Table 1, and those results proposed to be removed from the graphs and analysis are indicated in the notes. The four rows in blue indicate acknowledged outliers that are not removed from the analysis because there was no definite indication of laboratory error.

Figures 1 to 14 show the original data set with all data graphed (odd numbered figures) along with erroneous or outlier data removed (even numbered figures). Only ammonia and fluoride had multiple sampling events of data removed because of lab issues with either analysis (ammonia) or minimum detection limits (MDLs) for a duration of time (fluoride). All other data removed were isolated events that affected a measurement at a single station, or was abnormally out of the range at all stations (pH and total radium). Two TKN and TN outliers (the blue rows in Table 1) are also removed from these bottom figures for illustrative purposes, but those results will remain in future analyses in the annual reports.

For the purposes of the HCSP annual reports, the 2014 report will contain the potentially erroneous data in the period of record graphs (Appendix C) as well as data analysis; the 2015 report will have the data removed from both the graphs and data analysis, except for the four rows in blue from Table 1.



Table 1. List of erroneous and outlier data to be removed from 2015 and future reports.

Parameter	Date	HCSW-1	HCSW-2	HCSW-3	HCSW-4	Units	Explanation
pH	1/23/2007	8.8	8.0	8.5	8.9	SU	Compared HCSW-1 and HCSW-4 to SWFWMD measurements for January and February 2007; not an actual exceedance but equipment malfunction. All measurements were elevated. Removed from analysis.
pH	1/4/2011	4.8				SU	When compared measurement to SWFWMD collected that month and to previous months was found to be much lower than other values; not exceedance but equipment malfunction. Removed from analysis.
Ammonia	7/31/2008	0.24	0.41	0.32	0.31	mg/L	Elevated concentrations are either due to laboratory method change or a seasonal fluctuation in the nitrogen cycle. Removed from analysis
Ammonia	8/3/2010	0.06	0.10	0.07	0.05	mg/L	Lab analyzing the data was getting back results that were ten-times higher than other labs. Split sampling conducted in October 2011, verified that it was lab error. All results during time period of higher results (August 2010 to July 2011) removed from analysis.
Ammonia	9/8/2010	0.1	0.12	0.16	0.12	mg/L	
Ammonia	10/6/2010	0.01	0.24	0.01	0.20	mg/L	
Ammonia	11/3/2010	0.01	0.01	0.05	0.01	mg/L	
Ammonia	12/7/2010	0.08	0.11	0.10	0.10	mg/L	
Ammonia	1/4/2011	0.03	0.08	0.14	0.08	mg/L	
Ammonia	2/3/2011	0.18	0.13	0.16	0.20	mg/L	
Ammonia	3/2/2011	0.11	0.13	0.20	0.15	mg/L	
Ammonia	4/5/2011	0.13	0.13	0.13	0.17	mg/L	
Ammonia	5/3/2011	0.12	0.22	0.31	0.19	mg/L	
Ammonia	6/8/2011				0.27	mg/L	
Ammonia	7/5/2011	0.02	0.02	0.10	0.02	mg/L	
Nitrate-Nitrite	6/20/2007			9.5		mg/L	Order of magnitude higher than adjacent sampling events and SWFWMD data from the same month. Likely lab error. Removed from data analysis as an outlier.
TN	6/20/2007			9.7		mg/L	Elevated measurements most likely due to lab analyst or instrument error in the nitrate-nitrite result. The total nitrogen levels recorded are not corroborated by measurements taken before or after the exceedance. Removed from data analysis as an outlier.
TKN	9/27/2006			6.6		mg/L	Outlier based on adjacent sampling events and SWFWMD data from the same month. Likely lab error. Was not removed from analysis.
TN	9/27/2006			6.7		mg/L	Outlier based on TKN sample being higher than adjacent sampling events and SWFWMD data from the same



Parameter	Date	HCSW-1	HCSW-2	HCSW-3	HCSW-4	Units	Explanation
							month. Likely lab error. Was not removed from analysis.
TKN	1/30/2008		4.7			mg/L	Outlier based on adjacent sampling events and SWFWMD data from the same month. Likely lab error. Was not removed from analysis.
TN	1/30/2008		4.8			mg/L	TKN was an outlier based on adjacent sampling events and SWFWMD data from the same month. Likely lab error. Was not removed from analysis.
Fluoride	7/27/2006	2.6				mg/L	Value did not agree with the field duplicate and was an order of magnitude higher than previous values. It also occurred during the MDL elevated period. Removed from analysis.
Fluoride	5/25/2006		0.5			mg/L	All values between May 2006 and Feb 2008 are suspect because the MDL was raised above the previously measured maximum; the lab diluted all samples subject to the EPA 300.0 method because the chloride and sulfate concentrations during the drought period were very high. During this period, all fluoride measurements with a U code are removed from the analysis, and all those with I codes (almost all of the non-U samples) should be considered estimates only.
Fluoride	6/29/2006		0.5			mg/L	
Fluoride	7/27/2006		0.5			mg/L	
Fluoride	8/21/2006		0.5	0.5	0.5	mg/L	
Fluoride	9/27/2006		0.5	0.5	0.5	mg/L	
Fluoride	10/19/2006	1	0.5	1	1	mg/L	
Fluoride	11/9/2006	1	0.5	2.5	2.5	mg/L	
Fluoride	12/13/2006	0.5	0.5	1	2.5	mg/L	
Fluoride	1/23/2007	1	1	2	2.5	mg/L	
Fluoride	2/14/2007	1	0.5	2.5	2.5	mg/L	
Fluoride	3/14/2007	1	1	2.5	5	mg/L	
Fluoride	4/25/2007	1	0.5	0.5	1	mg/L	
Fluoride	5/16/2007		0.5	1	0.5	mg/L	
Fluoride	6/20/2007		0.5	2.5	1	mg/L	
Fluoride	7/18/2007		0.5	1	1	mg/L	
Fluoride	8/27/2007		0.5	0.5	0.5	mg/L	
Fluoride	9/26/2007		0.5	0.5	0.5	mg/L	
Fluoride	11/29/2007		0.26			mg/L	
Fluoride	12/17/2007		0.25			mg/L	
Fluoride	1/30/2008		0.25			mg/L	
Fluoride	2/26/2008		0.25			mg/L	
Total Radium	7/27/2004	4.76	5.12	4.16	3.26	pCi/L	Blank sample results had high values (2.52 pCi/L) for Radium 228. The high blank measurement makes all other Radium 228 values suspect and most likely high by the same amount found in the blank. Removed from analysis.

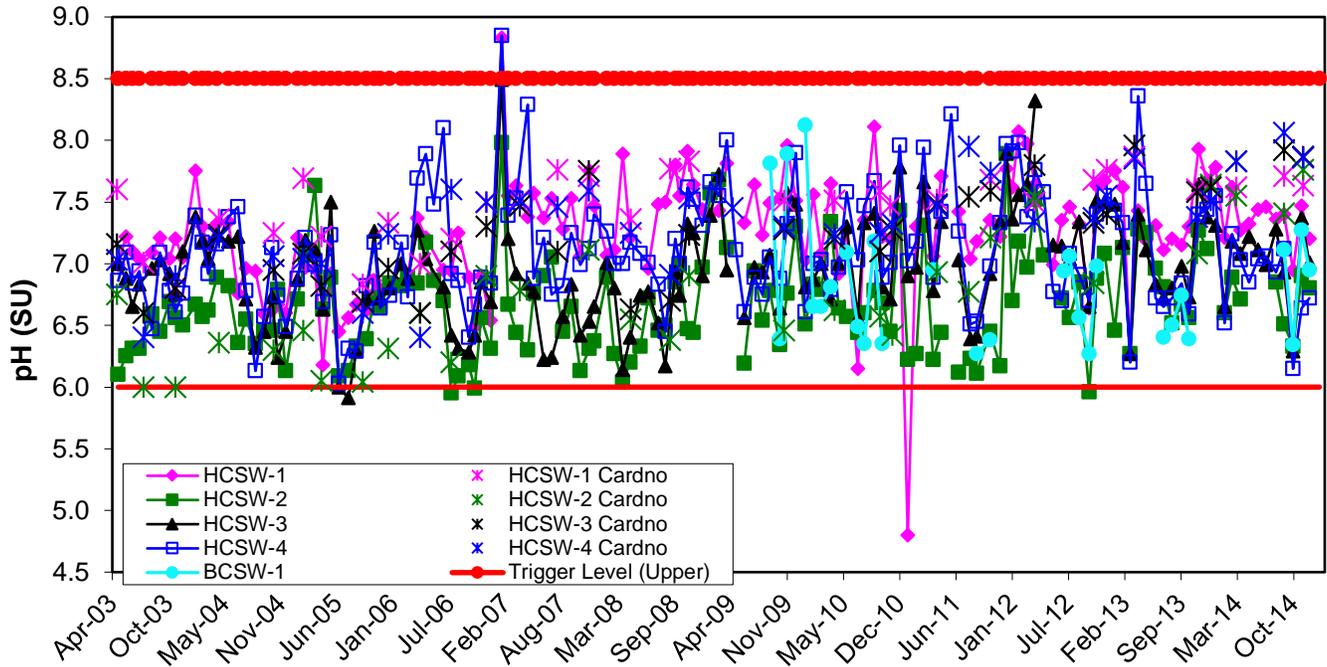


Figure 1. HCSP period of record pH values, all data included.

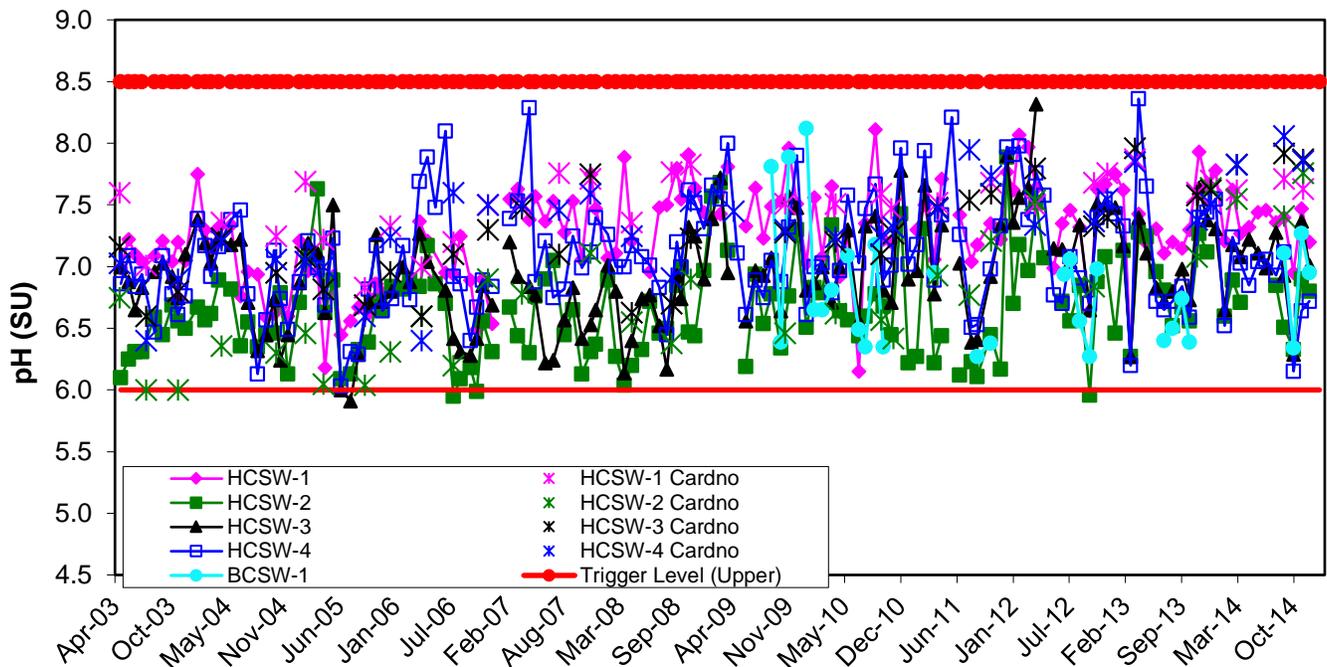


Figure 2. HCSP period of record pH values, erroneous and outlier data removed.

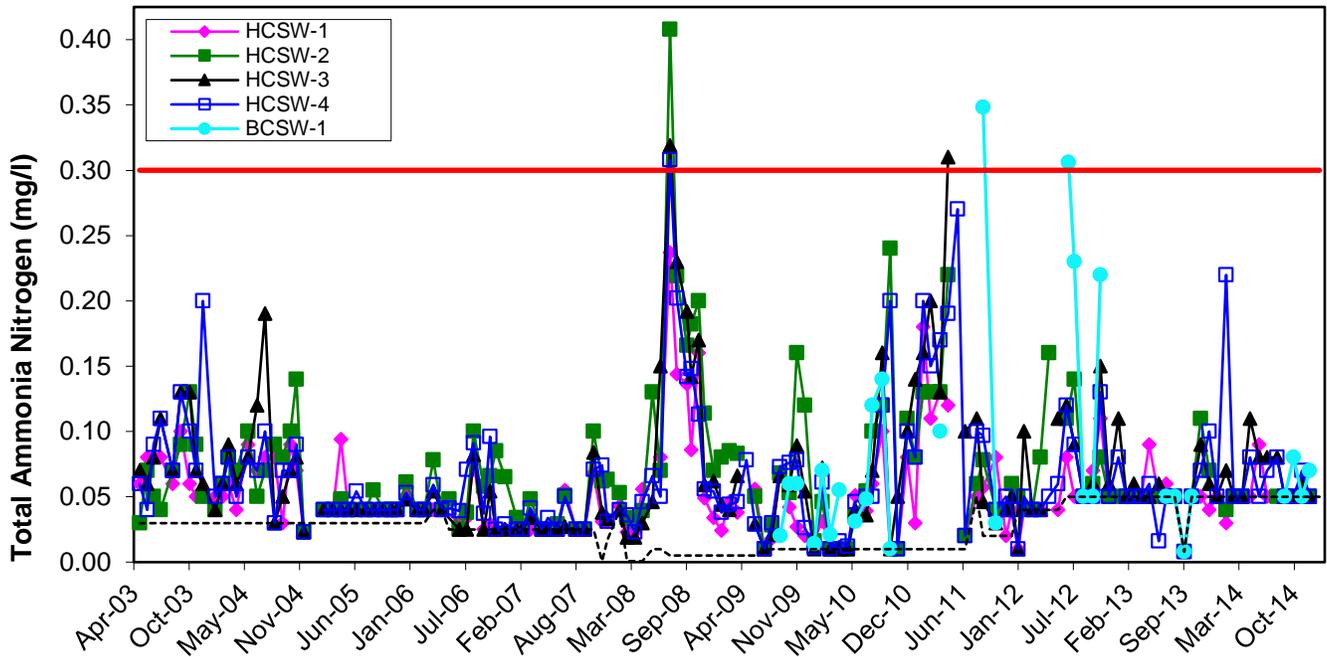


Figure 3. HCSP period of record ammonia values, all data included.

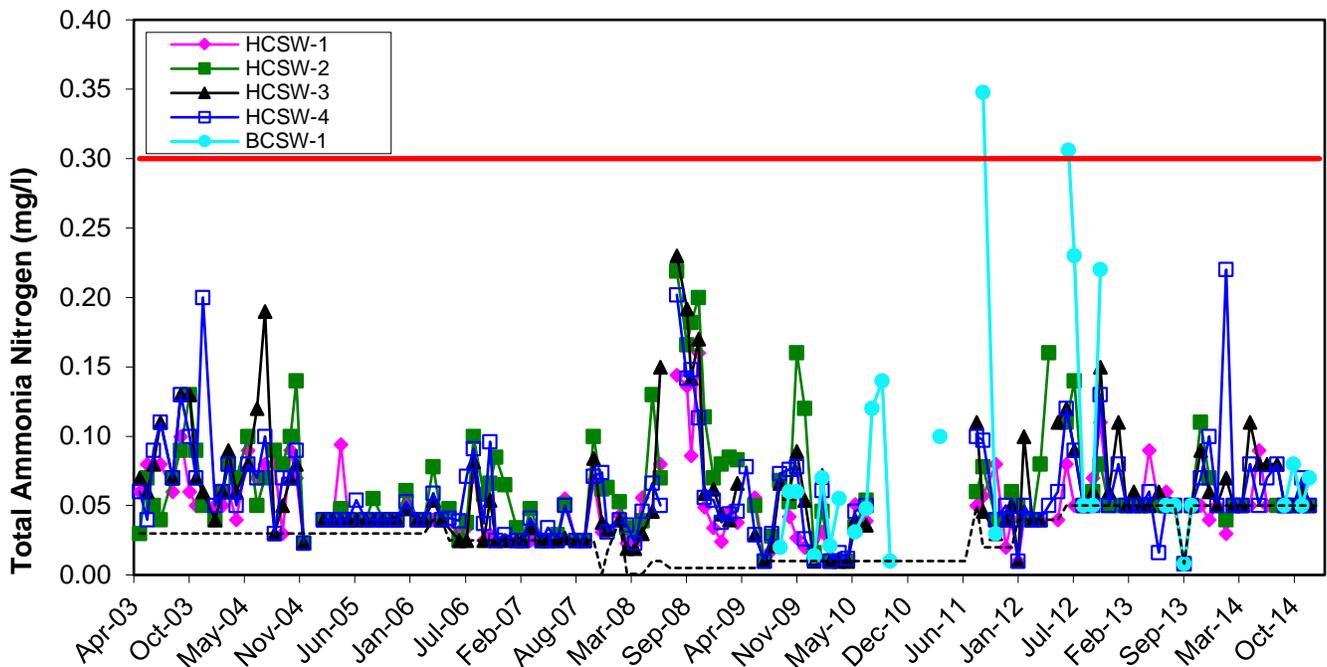


Figure 4. HCSP period of record ammonia values, erroneous and outlier data removed.

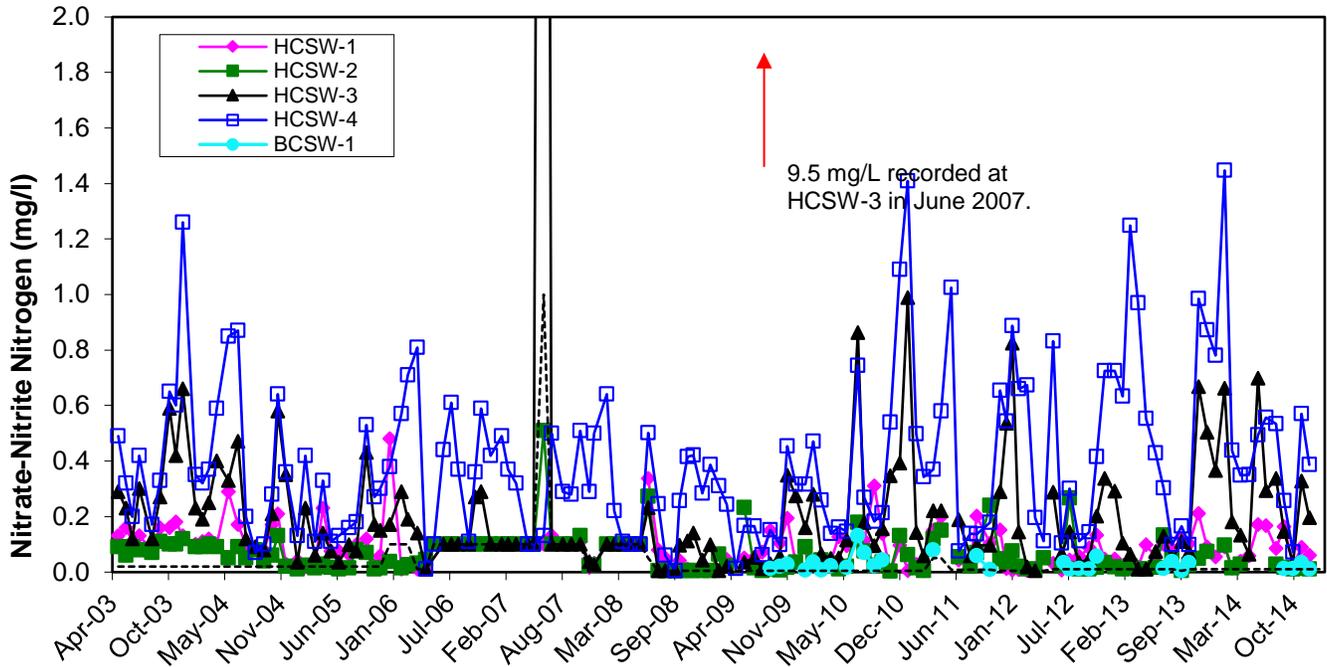


Figure 5. HCSP period of record nitrate-nitrite values, all data included.

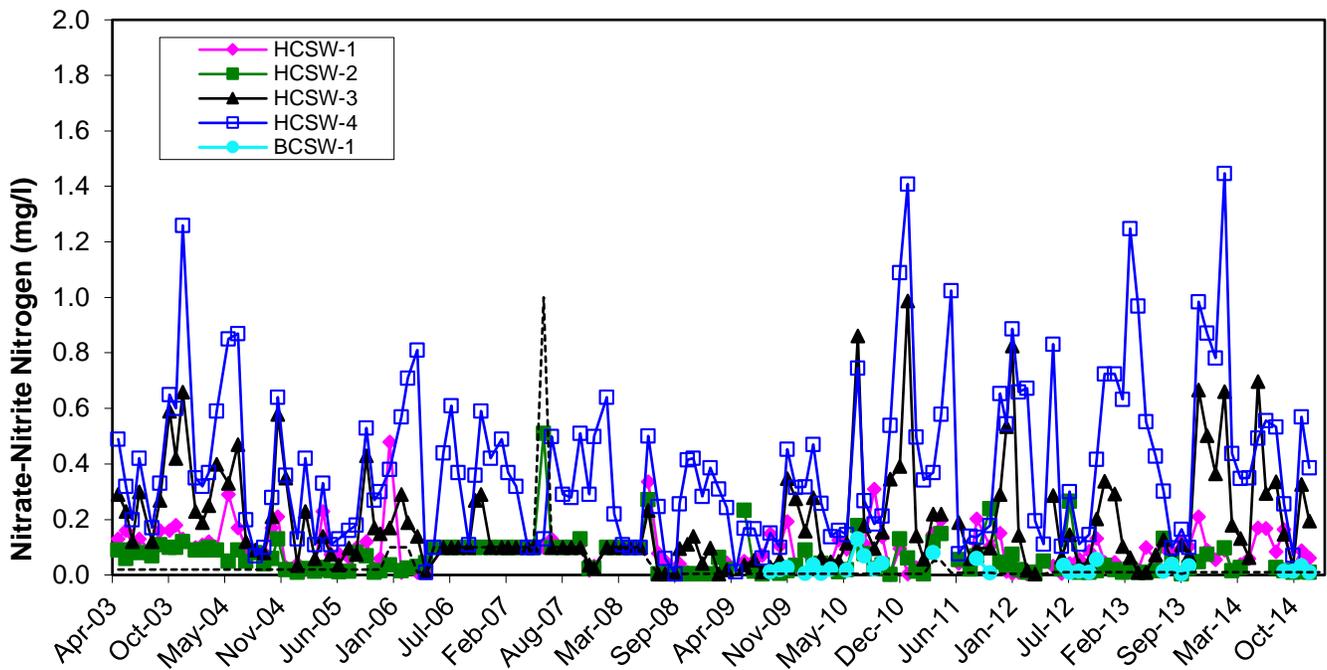


Figure 6. HCSP period of record nitrate-nitrite values, erroneous and outlier data removed.

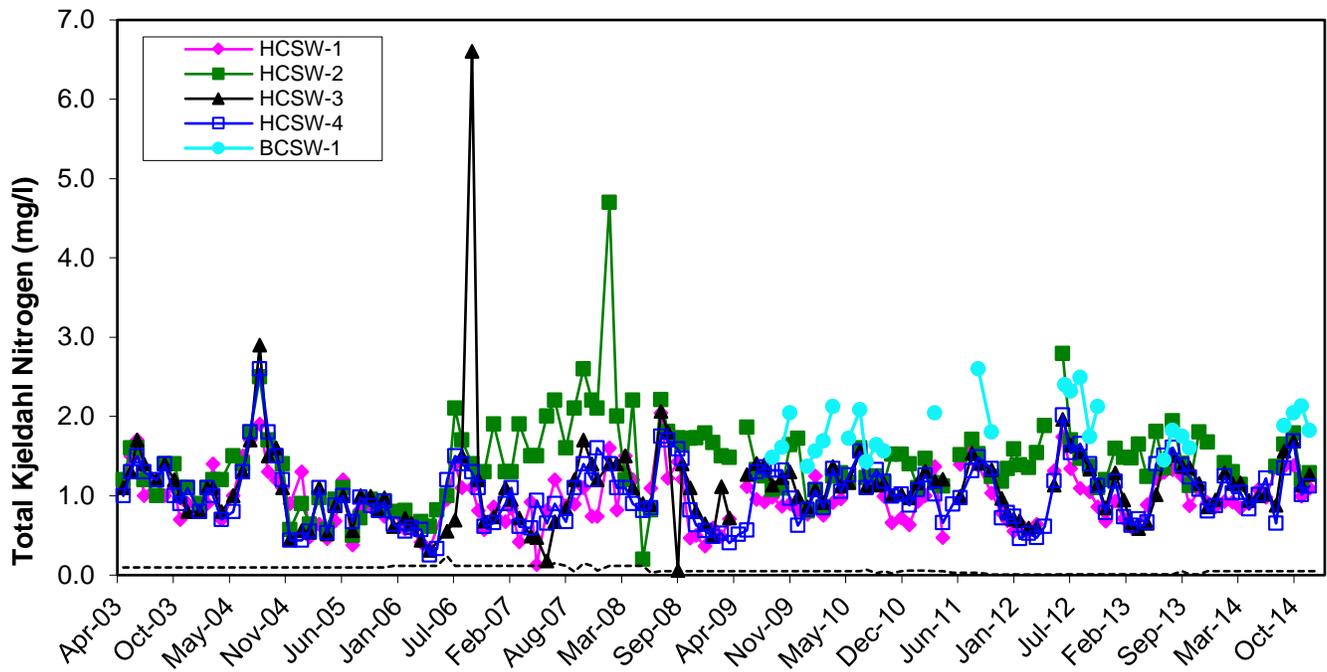


Figure 7. HCSP period of record TKN values, all data included.

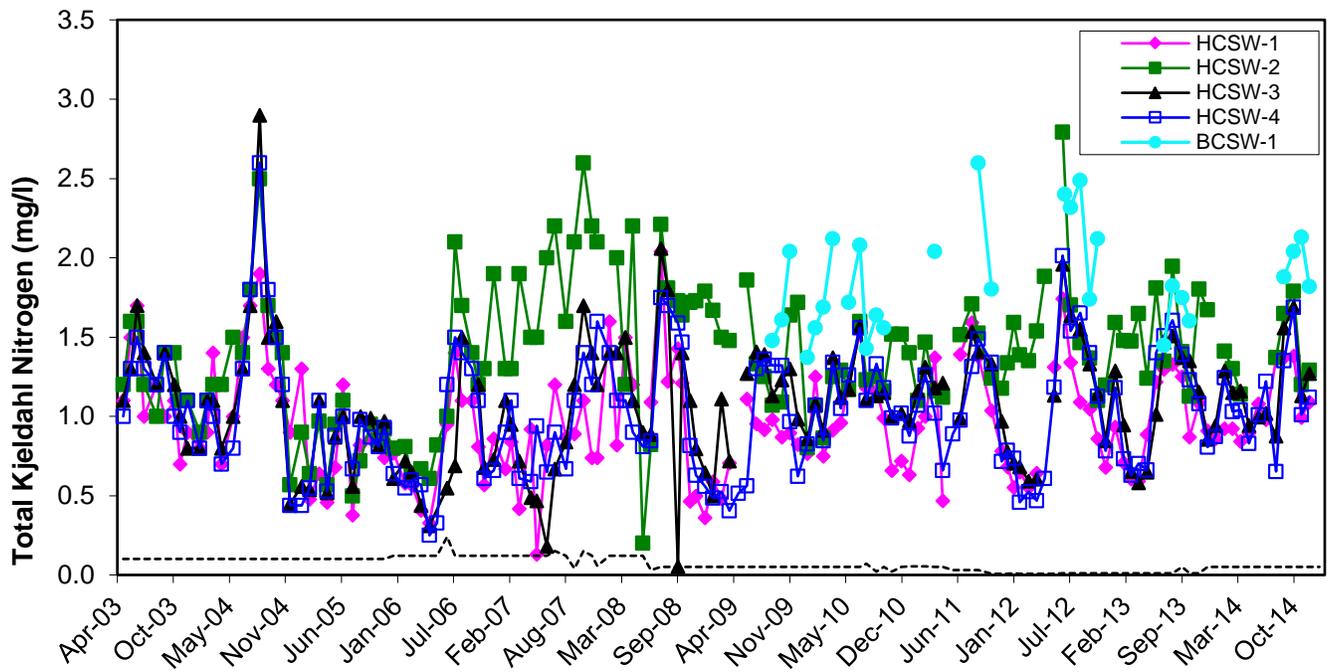


Figure 8. HCSP period of record TKN values, erroneous and outlier data removed.

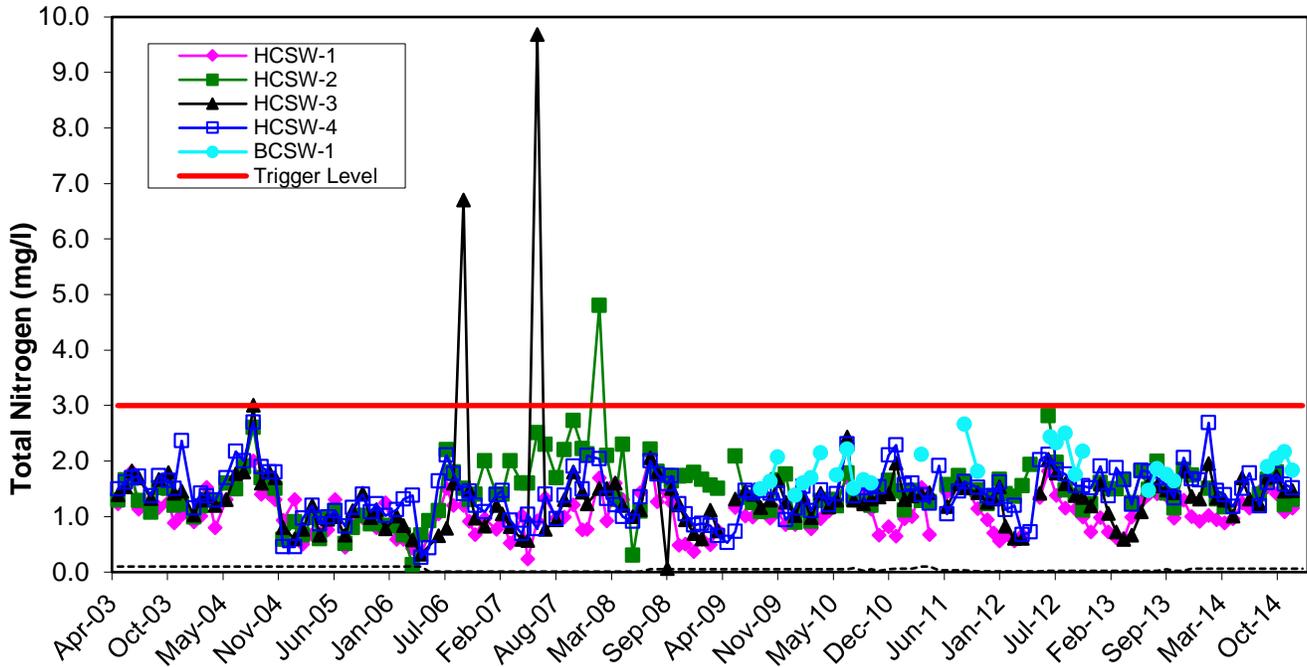


Figure 9. HCSP period of record TN values, all data included.

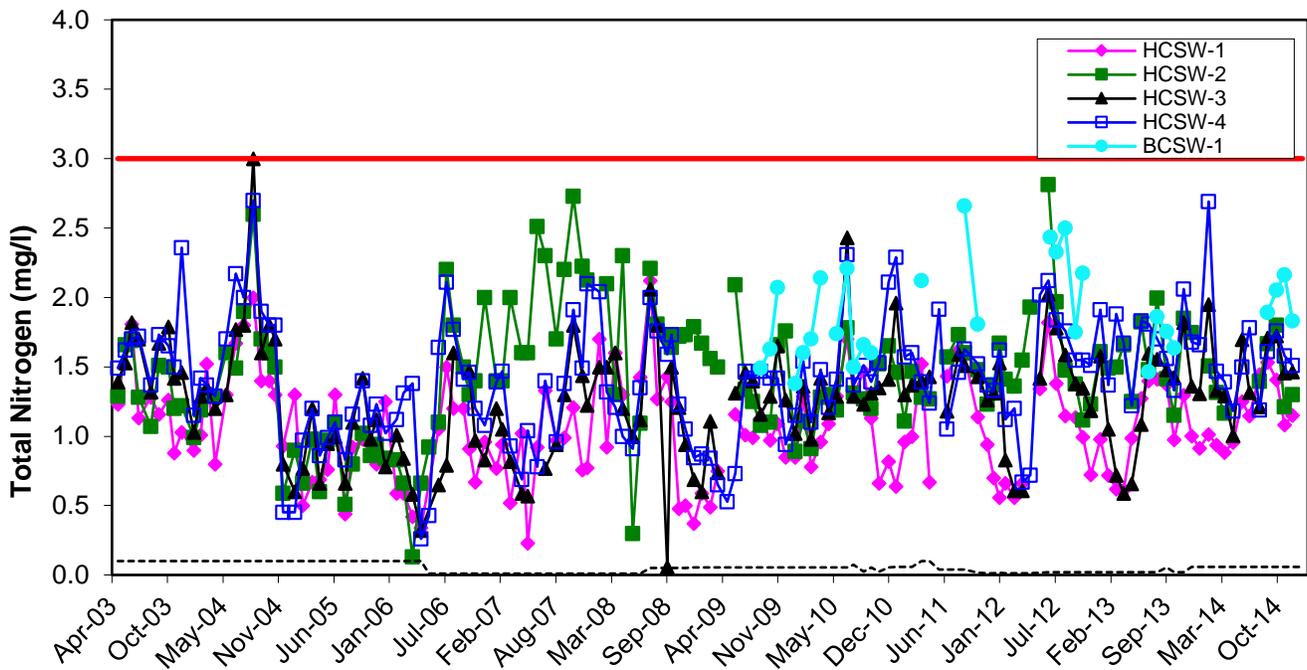


Figure 10. HCSP period of record TN values, erroneous and outlier data removed.

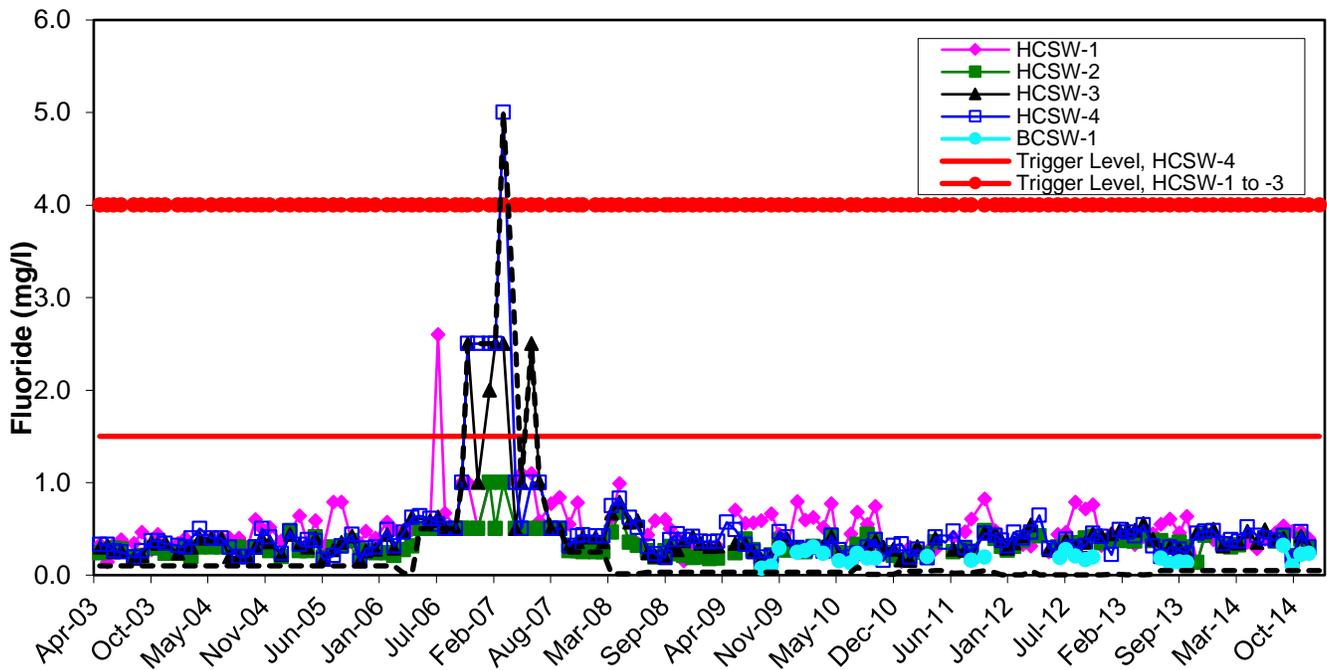


Figure 11. HCSP period of record fluoride values, all data included.

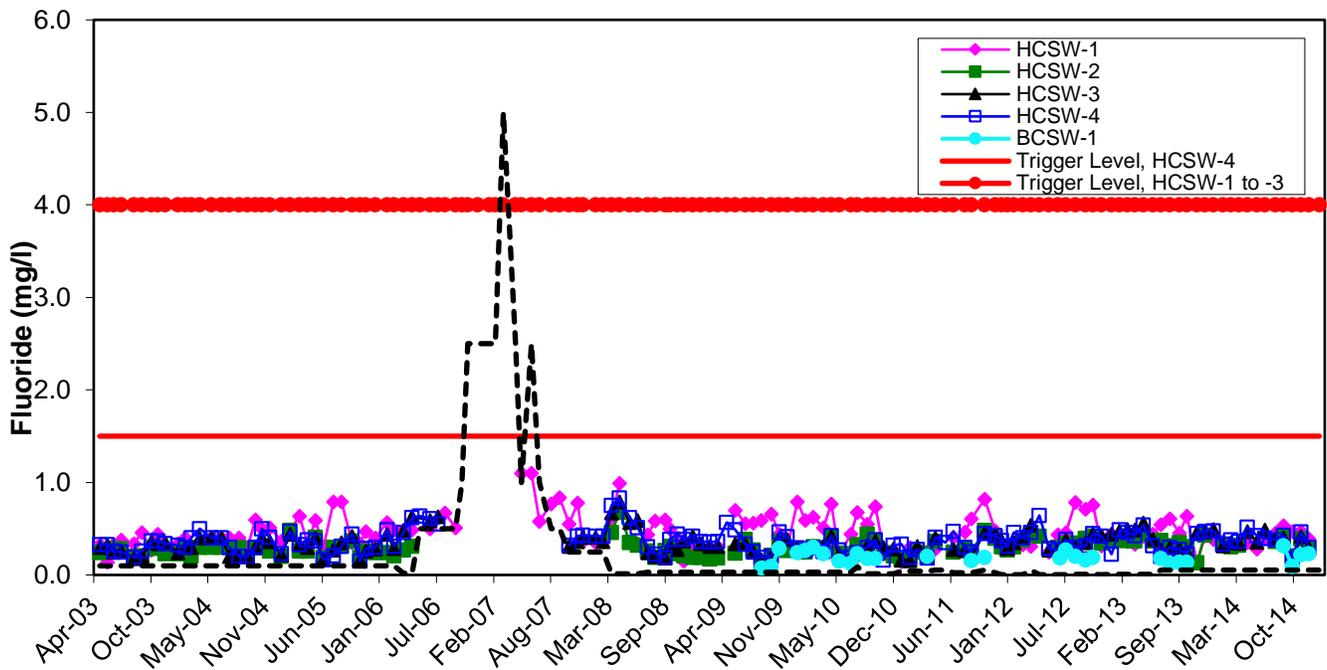


Figure 12. HCSP period of record fluoride values, erroneous and outlier data removed.

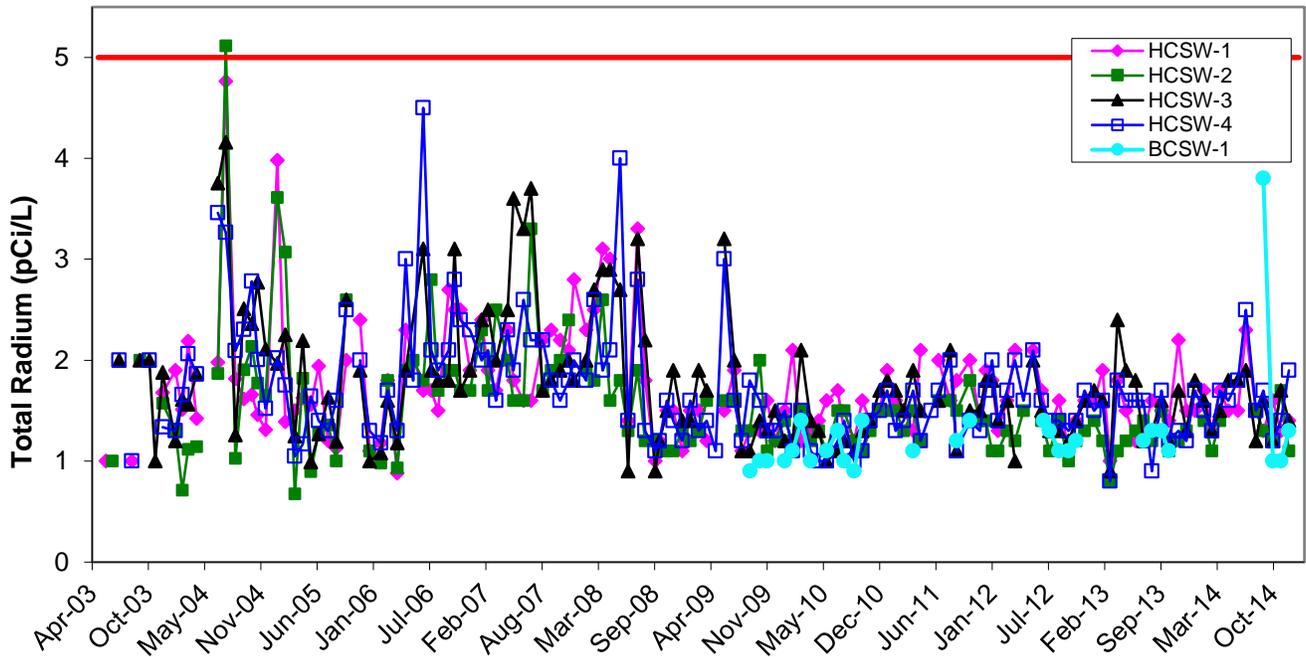


Figure 13. HCSP period of record total radium values, all data included.

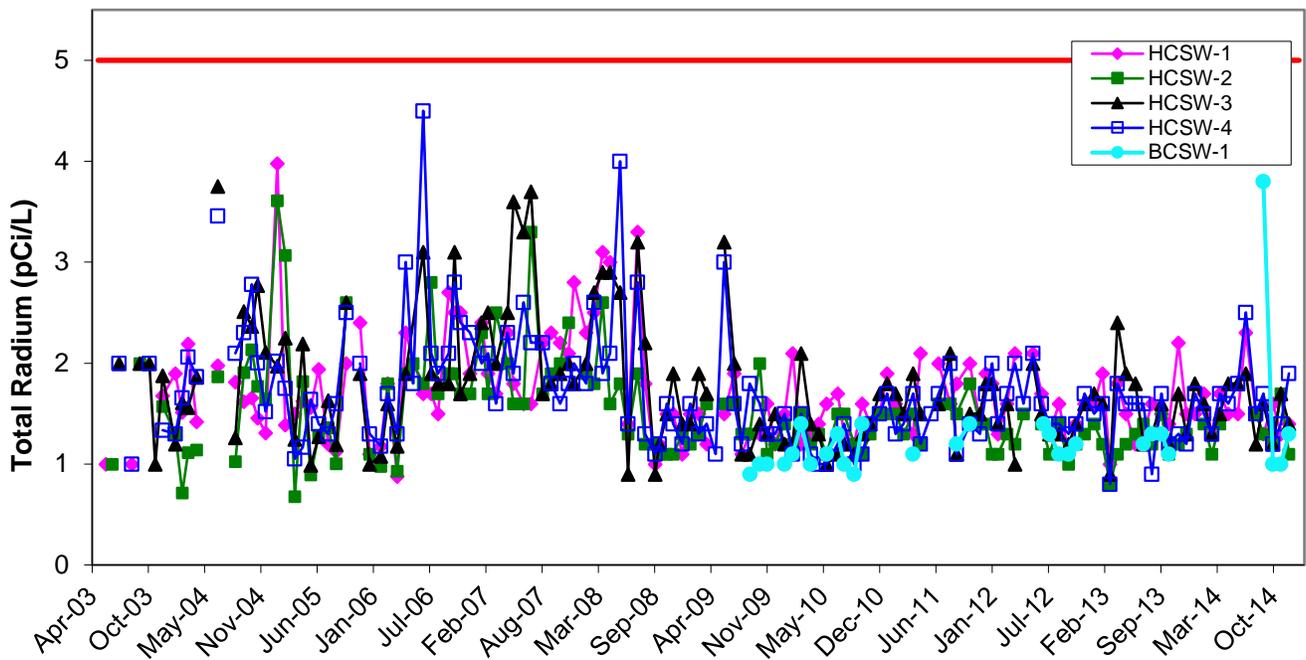


Figure 14. HCSP period of record total radium values, erroneous and outlier data removed.