



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

Continuous Instream Monitoring Report

STREAM CODE: 03345
STREAM NAME: Saucon Creek
HUC:02050503

Most recent revision: 3/3/2012
Revised by: Lookenbill/Butt/Shull

STATION DESCRIPTIONS:

Stream Name	Location Description	County	Latitude	Longitude	Drainage Area
Saucon Creek	Approximately 1,400 meters downstream of UNT 03345 and just downstream (DWS) of Animals In Distress Shelter private drive	Lehigh	40.53909	-75.44145	7.37
Saucon Creek	Approximately 30 meters DWS of Black River	Northampton	40.58534	-75.34840	43.8

BACKGROUND AND HISTORY: Saucon Creek is a tributary to the Lehigh River encompassing portions of Upper Saucon, Upper Milford, and Lower Milford Townships in Lehigh County and Bethlehem City, Hellertown Borough, and Lower Saucon Township in Northampton County (Figure 1). The basin is characterized by relatively flat topography with land use, consisting of approximately 50% forested, 30% agriculture, and 20% urban.

Saucon Creek basin is currently designated Cold Water Fishes, Migratory Fishes (CWF, MF) from source to mouth with the exception of the main stem reach from Black River to SR-412 which is currently designated High Quality - Cold Water Fishes, Migratory Fishes (HQ-CWF, MF). Approximately 35 of the assessed 75 stream miles within the basin including portions of Saucon Creek main stem, Laurel Run, Polk Valley Run, Silver Creek, and East Branch Saucon Creek currently have aquatic life use impairments caused by siltation.

The Continuous Instream Monitoring (CIM) effort was initiated by Lehigh County Conservation District and Lehigh University through a Section 205(j)(1)/604(b) Federal pass-through grant, to characterize impairments caused by siltation. One component of the effort was to collect turbidity and total suspended solids data to determine if a relationship exists between these two parameters. Station locations were selected by Lehigh County Conservation District and Lehigh University. Instream monitoring equipment was serviced and maintained by Lehigh University and PA DEP Division of Water Quality Standards (DWQS).

The primary objective of the CIM assessment was to characterize instream turbidity. Secondary objectives were to characterize instream temperature, conductivity, and pH.

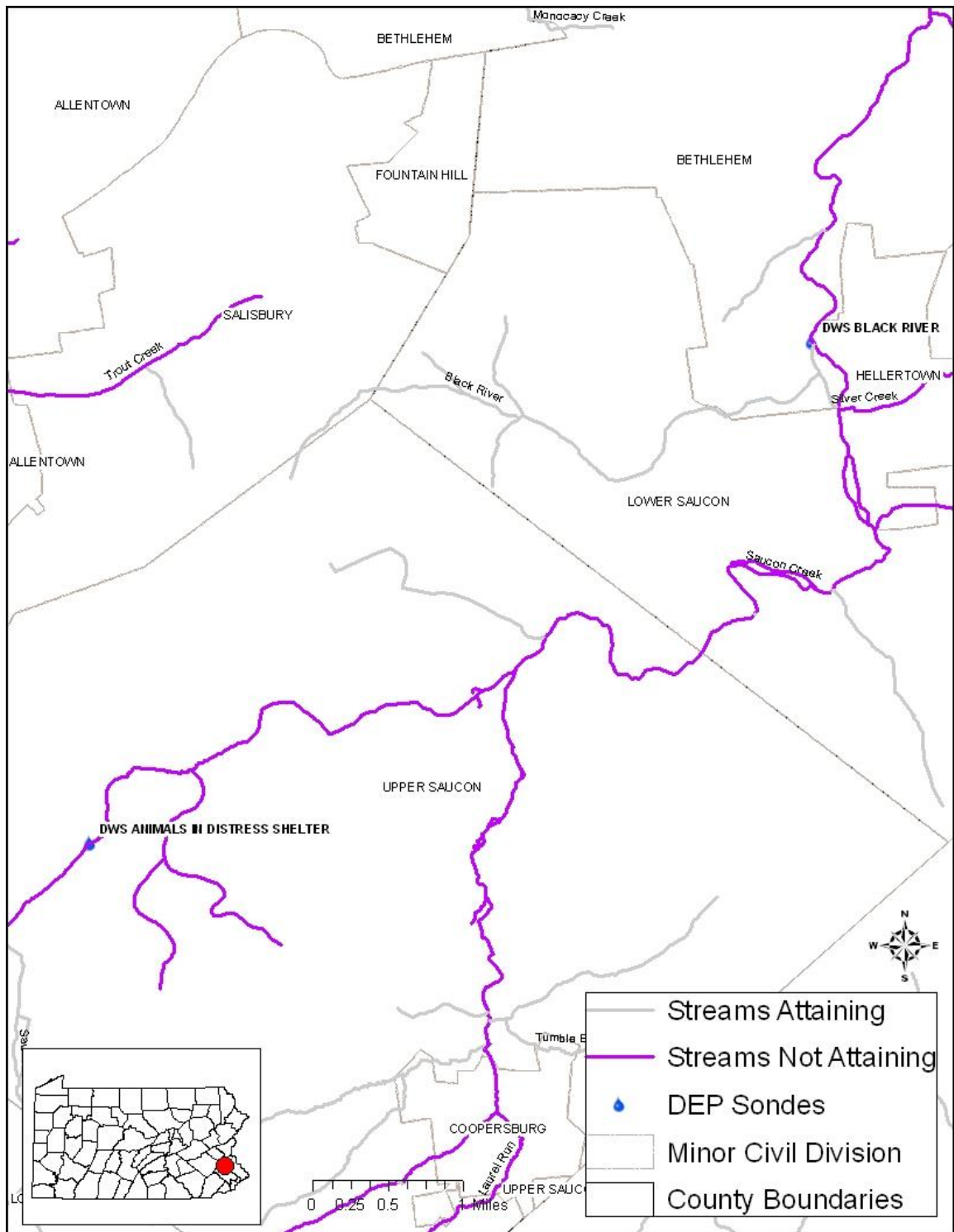


Figure 1. Saucon Creek sonde locations: DWS Animals In Distress Shelter & DWS Black River.

WATER QUALITY PARAMETERS:

Parameter	Units
Turbidity	Nephelometric Turbidity Units (NTU)
Depth	Feet
Water Temperature	°C
pH	standard units
Specific Conductance	µS/cm ^c

EQUIPMENT:

DWS Animals In Distress Shelter

A single Yellow Springs Instruments 6600V2 water-quality sonde, property of Lehigh University, was used at the 'DWS Animals In Distress Shelter' station. The sonde (CN# not recorded) was installed by Lehigh University on August 27, 2011 and began recording at 10:00. Lehigh University maintained the sonde until September 14, 2011 when DWQS began maintaining the sonde. The sonde continued logging until it was pulled on November 30, 2011 @ 09:45.

The sonde was housed in a 24-inch length of 6-inch diameter schedule 80 PVC pipe with holes drilled in it to allow for flow through. The sonde was clipped to a chain attached to the bridge at the Animals in Distress Shelter entrance. The sonde recorded water quality parameters every 15 minutes.

DWS Black River

A single YSI 6920V2 water-quality sonde, property of DWQS, was used at the 'DWS Black River' station. The sonde (CN# 00018B72) was installed by DWQS on August 23, 2011 @ 08:30 and began recording at 12:00. The sonde continued logging until it was pulled on November 30, 2011 @ 08:30. The sonde was maintained by DWQS for the entire period.

The sonde was housed in a 24-inch length of 4-inch diameter schedule 80 PVC pipe with holes drilled in it to allow for flow through. One end of the pipe was capped, and a notch was cut to accommodate the metal attachment bar on the top of the sonde. The attachment bar was clipped to an eye-bolt attached to rebar driven into the stream bed. The attachment bar was also clipped to a cable attached to a second piece of rebar located just upstream of the first. The sonde recorded water quality parameters every 30 minutes.

PERIOD OF RECORD:

DWS Animals In Distress Shelter: August 27, 2011 to November 30, 2011

The station was visited by Lehigh University an unknown number of times for the period August 27, 2011 to September 14, 2011. The station was visited by DWQS four times for the period September 14, 2011 to November 30, 2011 for the purpose of calibrating, cleaning, and servicing the sonde. Water chemistry grabs, manual flow measurements, and benthic macroinvertebrate samples were not collected during these visits.

DWS Black River: August 23, 2011 to November 30, 2011

The station was visited by DWQS six times throughout the period for the purpose of calibrating, cleaning, and servicing the sonde. Water chemistry grabs, manual flow measurements, and benthic macroinvertebrate samples were not collected during these visits.

DATA:

DWS Animals In Distress Shelter

No usable data were collected for the periods August 31, 2011 to September 1, 2011, September 11, 2011 to September 21, 2011 and October 21, 2011 to October 23, 2011. The sonde was removed for service August 31, 2011 to September 1, 2011 and October 21, 2011 to October 23, 2011, and the sonde was not recording properly for unknown reasons September 11, 2011 to September 21, 2011.

DWS Black River

No usable data were collected for the periods August 31, 2011 to September 14, 2011 and November 4, 2011 to November 30, 2011 due to sonde failure.

DWS Animals In Distress Shelter & DWS Black River

Depth: Depth is actually the measure of water column pressure plus atmospheric pressure. Depth is calculated from the pressure exerted by the water column. Depth is calibrated or zeroed with the sonde in air in order to subtract the atmospheric pressure from all subsequent measurements. Changes in atmospheric pressure while the sonde is deployed appear as changes in depth. The error is equal to 0.045 feet for every 1mm Hg change in atmospheric pressure. Frequent calibrations can eliminate most of this error. This data has not been corrected for confounding changes in atmospheric pressure and will be considered qualitative.

DWS Animals In Distress Shelter

Turbidity: Values recorded by the sonde were not checked against a field meter and calibrations/field calibration checks were not recorded for the period 8/27/2011 to 8/14/2011. In addition, a significant amount (> 3.0 NTU or 30% of measured value) of undocumented fouling due to coarse sediment deposition was realized by comparing the last recording from the previous dataset with the in-situ field meter values and the first recording from the subsequent dataset. As a result, data for the period 8/27/2011 to 9/4/2011 could not be confidently validated/corrected, was graded unusable, and deleted from the final dataset.

Values recorded by the sonde were checked against a field meter and calibrations/field calibration checks were recorded during inspections for the period 9/14/2011 to 12/30/2011. The difference between the in-situ sonde and field meter ranged from 0.0 to 0.2 NTU throughout this period. In addition a significant amount (> 3.0 NTU or 30% of measured value) of undocumented fouling due to coarse sediment deposition was realized. Two-point calibrations/field calibration checks were performed for the period 9/14/2011 to 10/21/2011, but not for the period 10/21/2011 to 11/30/2011. Two point calibrations/field calibration checks were

performed using deionized water as 0 NTU standard and an 800 NTU standard on September 14, 2011. Subsequent calibrations/field calibration checks were performed using deionized water as 0 NTU standard and a 123 NTU standard. The 123 NTU standard was submitted to the DEP Bureau of Labs to validate, and was determined to have been diluted to 110.9 NTU. The final field calibration check was performed using deionized water as a 0 NTU standard, single point check. A significant amount of the turbidity data for the 'DWS Animals In Distress Shelter' station for the period 9/14/2011 to 11/30/2011 could not be confidently validated/corrected, was graded 'unusable' and deleted from the final dataset. Turbidity data for the periods 9/21/2011 to 9/23/2011 and 10/4/2011 to 10/14/2011 were graded 'poor' to 'excellent' and are therefore reportable data (Tables A1.1-A1.5, Figures 1 & A1).

DWS Black River

Turbidity: Values recorded by the sonde were checked against a field meter and calibrations/field calibration checks were recorded for the period 8/23/2011 to 11/30/2011. The difference between the in-situ sonde and field meter ranged from 0.0 to 2.3 NTU throughout this period. In addition, a significant amount (> 3.0 NTU or 30% of measured value) of undocumented fouling due to coarse sediment deposition was realized. Two-point calibrations/field calibration checks were performed for the period 9/14/2011 to 10/21/2011, but not for the periods 8/23/2011 to 9/14/2011 and 10/21/2011 to 11/30/2011. Two point calibrations/field calibration checks were performed using deionized water as 0 NTU standard and an 800 NTU standard on 9/14/2011. Subsequent calibrations/field calibration checks, 10/4/2011 to 10/21/2011 were performed using deionized water as 0 NTU standard and a 123 NTU standard. The 123 NTU standard was submitted to the DEP Bureau of Labs to validate, and it was determined to have been diluted to 110.9 NTU. The final field calibration check was performed on 11/30/2011 using deionized water as a 0 NTU standard, single point check. A significant amount of the turbidity data for the 'DWS Black River' station for the period 8/23/2011 to 11/30/2011 could not be confidently validated/corrected, was graded unusable and deleted from the final dataset, or graded unverified but maintained in the final dataset. Turbidity data for the period 9/14/2011 to 10/13/2011 is intermingled with temporally depressed sub-datasets graded good to excellent and are therefore reportable data. Usable data were typically isolated just after calibration. Unverified data were typically greater than the high-range turbidity standard (110.9 or 800 NTU) or not isolated by fouling or calibration checks (Tables A2.1-A2.6, Figures 2 & A2).

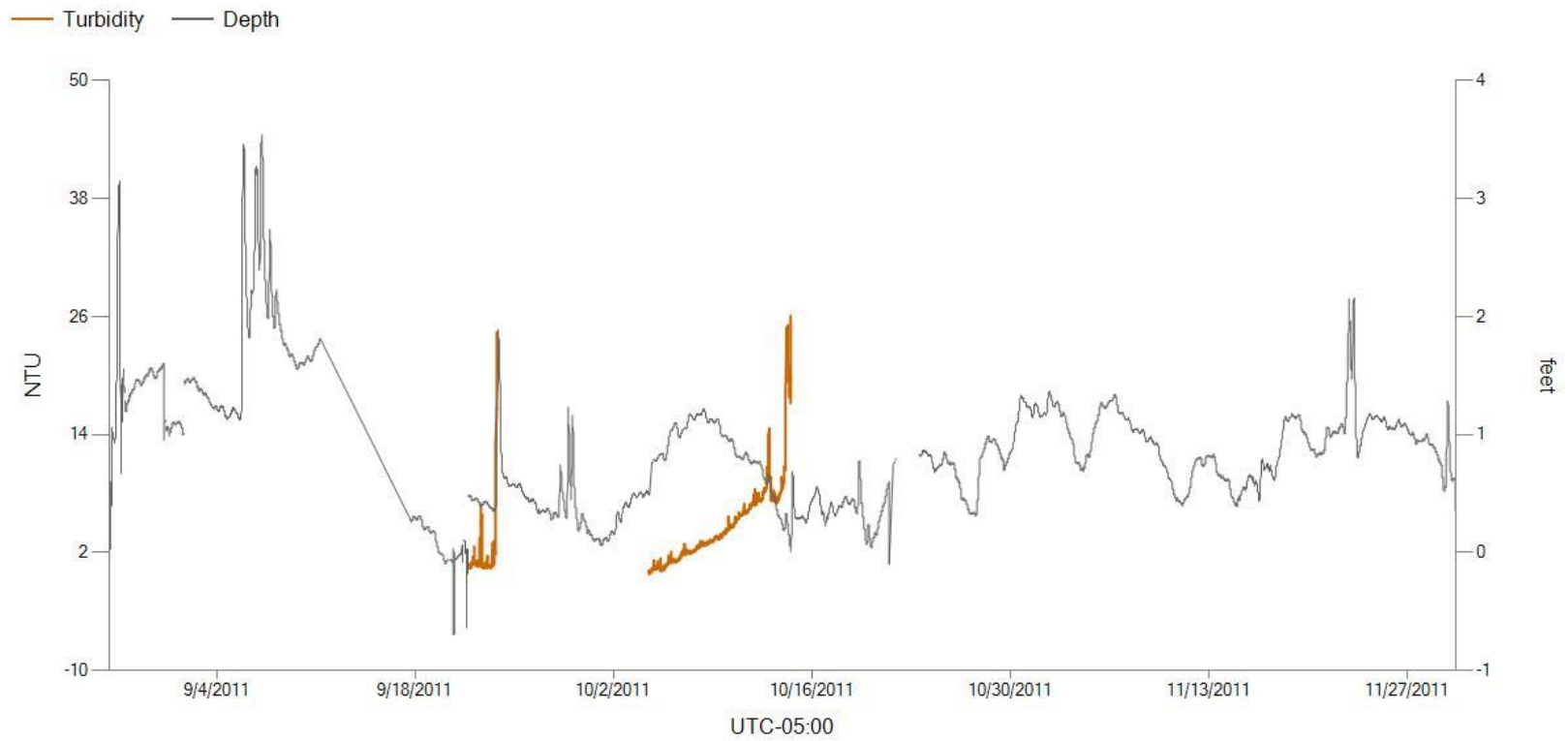


Figure 1. Turbidity vs. Depth: DWS Animals In Distress Shelter

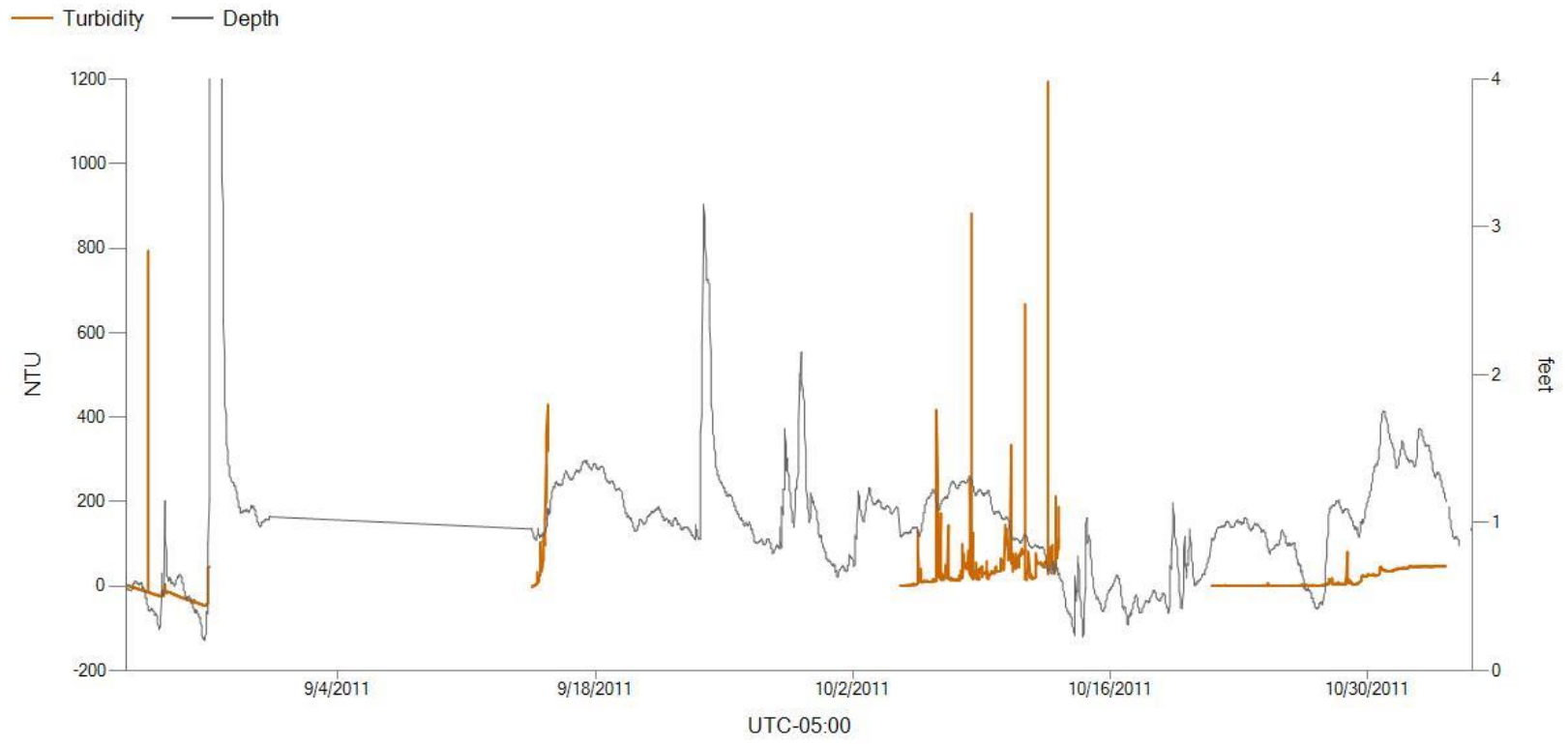


Figure 2. Turbidity vs. Depth: DWS Black River

DWS Animals In Distress Shelter

Water Temperature: Values recorded by the sonde were not checked against a field meter for the period 8/27/2011 to 9/14/2011. Values recorded by the sonde were checked against a field meter during inspections for the period 9/14/2011 to 11/30/2011. The difference between the in-situ sonde and field meter ranged from 0.03 to 0.06 °C throughout this period. Data for the entire period with the exception of 8/31/2011 to 9/1/2011 and 9/11/2011 to 9/21/2011 were graded 'fair' to 'excellent' and therefore usable and reportable data (Table A3, Figures 3 & A3).

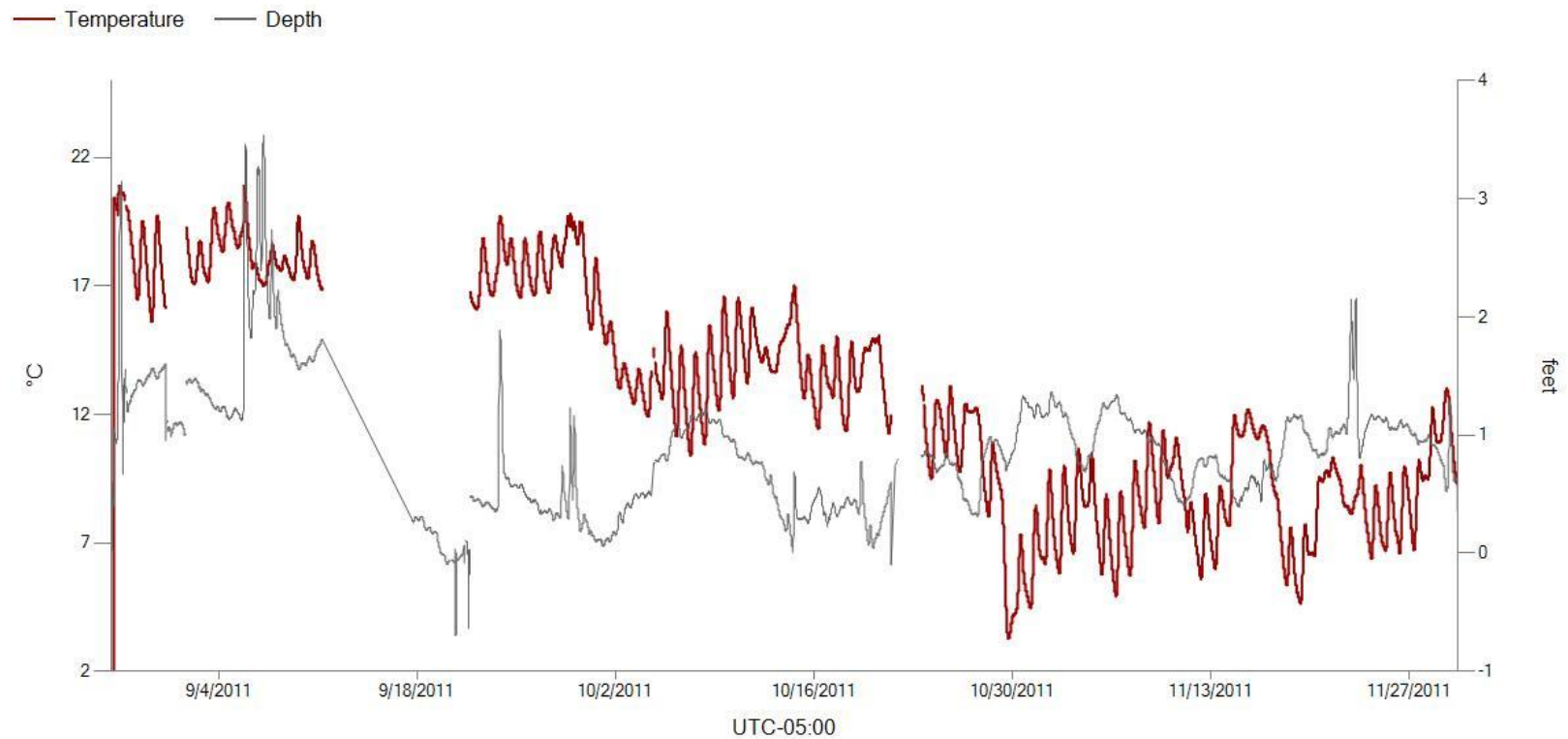


Figure 3. Temperature vs. Depth: DWS Animals In Distress Shelter

DWS Black River

Water Temperature: Values recorded by the sonde were checked against a field meter during inspections for the period 8/23/2011 to 11/30/2011. The difference between the in-situ sonde and field meter ranged from 0.02 to 0.10 °C throughout this period. Data for the entire period with the exception of 8/31/2011 to 9/14/2011 were graded 'excellent' and therefore usable and reportable data (Table A2, Figures 5 & A5).

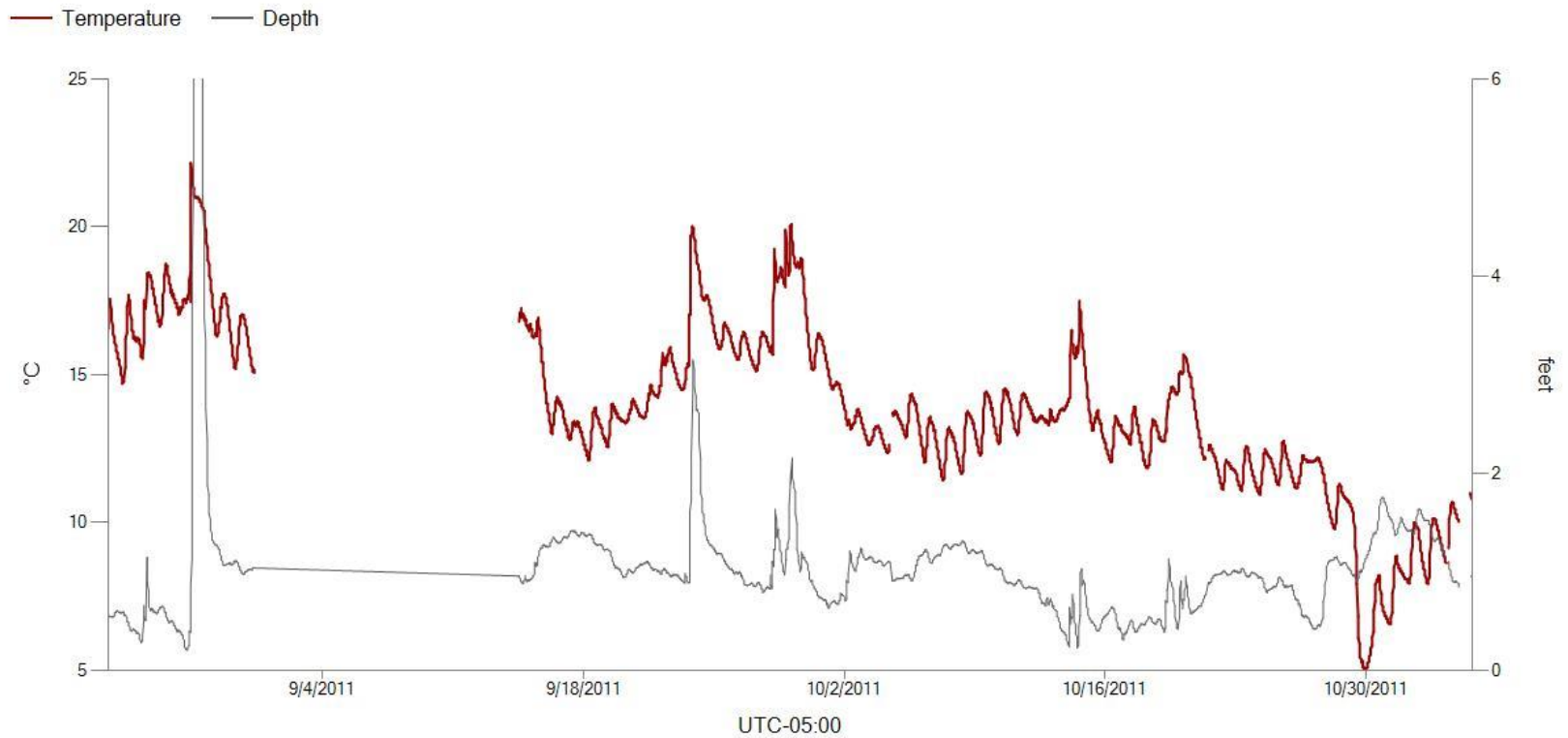


Figure 4. Temperature vs. Depth: DWS Black River

DWS Animals In Distress Shelter

Specific Conductance: Values recorded by the sonde were not checked against a field meter and were unexplainably irregular for the period 8/27/2011 to 9/14/2011. Data for this period was graded 'unusable'. Values recorded by the sonde were checked against a field meter during inspections for the period 9/14/2011 to 11/30/2011. Fouling drift corrections were common due to coarse sediment deposition. Fouling corrections ranged from 0 to 16.9%. Calibration drift was not significant ($> 5 \mu\text{S}/\text{cm}$ or 3% of measured value). Data for the entire period 9/14/2011 to 11/30/2011 with the exception of 10/21/2011 to 10/23/2011 were graded 'poor' to 'excellent' and therefore usable and reportable data (Table A5, Figures 5 & A5).

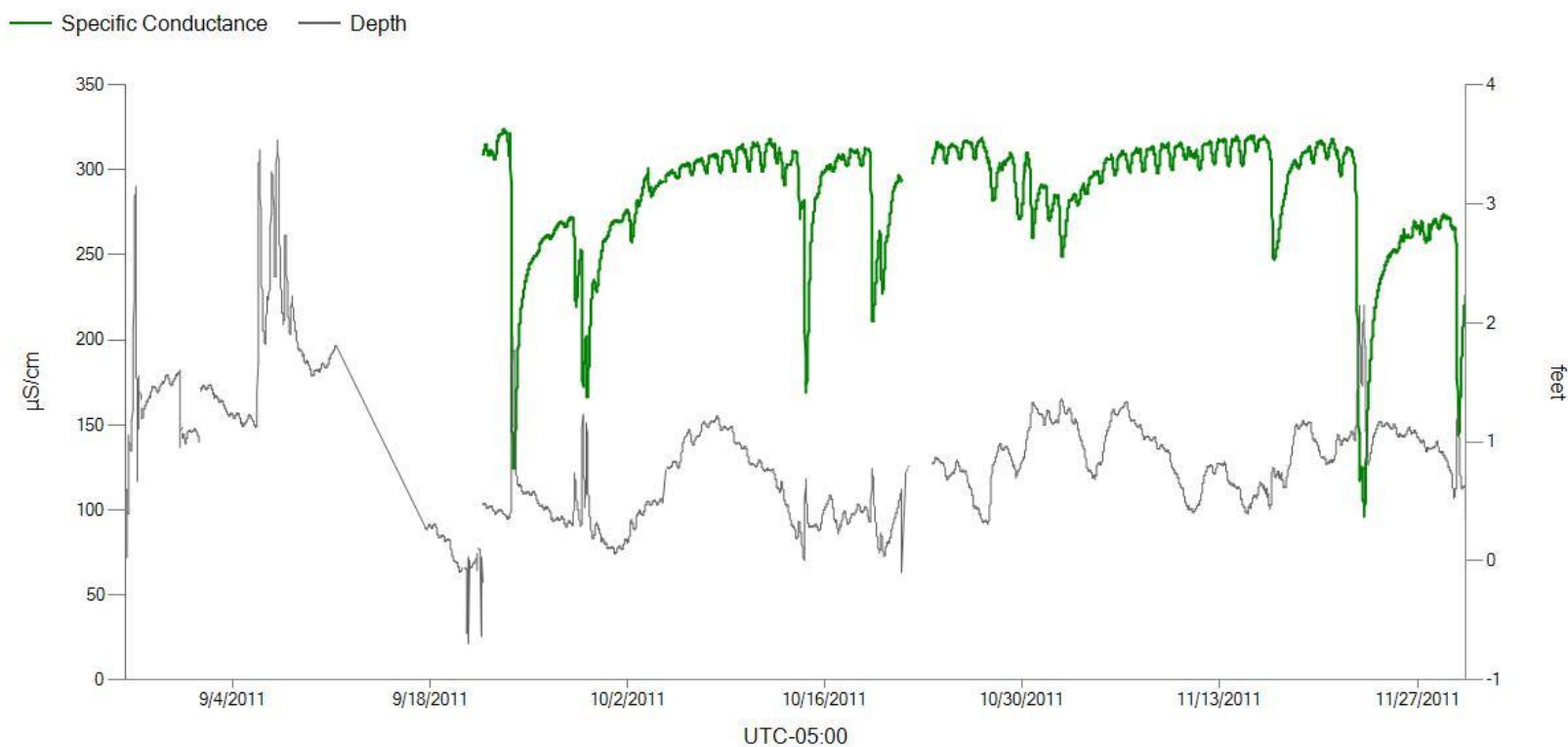


Figure 5. Specific Conductance vs. Depth: DWS Animals In Distress Shelter

DWS Black River

Specific Conductance: Values recorded by the sonde were checked against a field meter during inspections for the period 8/23/2011 to 11/4/2011. Fouling drift corrections were common due to coarse sediment deposition. Fouling corrections ranged from 0.35% to 26.5%, and resulted in 'unusable' data for the period for the period 8/27/2011 to 8/31/2011. Calibration drift was not significant ($< 5 \mu\text{S}/\text{cm}$ or 3% of measured value). Data for the period 10/21/2011 to 11/4/2011 was graded 'unverified' or 'unusable' due to sonde failure. Data for the periods 8/23/2011 to 8/27/2011 and 9/14/2011 to 10/21/2011 were graded 'poor' to 'good' and therefore usable and reportable data (Tables A6.1-A6.4, Figures 6 & A6).

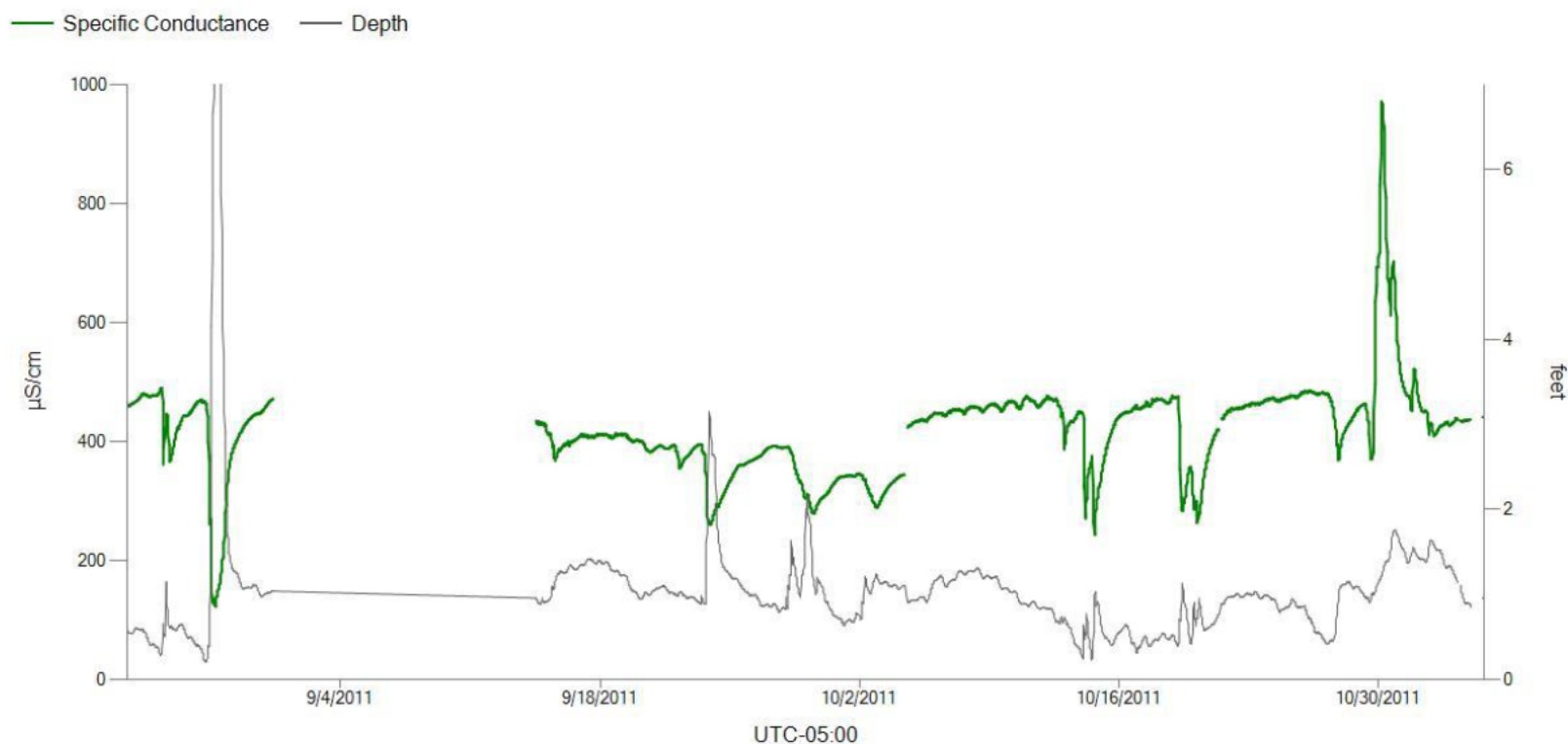


Figure 6. Specific Conductance vs. Depth: DWS Black River

DWS Animals In Distress Shelter

pH: Values recorded by the sonde were not checked against a field meter and were irregular due to a faulty pH probe for the period 8/27/2011 to 9/14/2011. Data for this period was graded 'unusable'. Values recorded by the sonde were checked against a field meter during inspections for the period 9/14/2011 to 11/30/2011. Data for the period 9/14/2011 to 10/4/2011 were again graded 'unusable' due to a faulty pH probe. Fouling drift corrections were common due to coarse sediment deposition. Fouling corrections ranged 0 to (+/-) 1.2 standard pH units. Calibration drift was significant ($> (+/-) 0.2$ pH Units). Calibration corrections ranged 0 to (+/-) 0.31 standard pH units. Data for the period 10/4/2011 to 11/30/2011 were graded 'good' to 'excellent' and therefore usable and reportable data (Table A7, Figures 7 & A7).

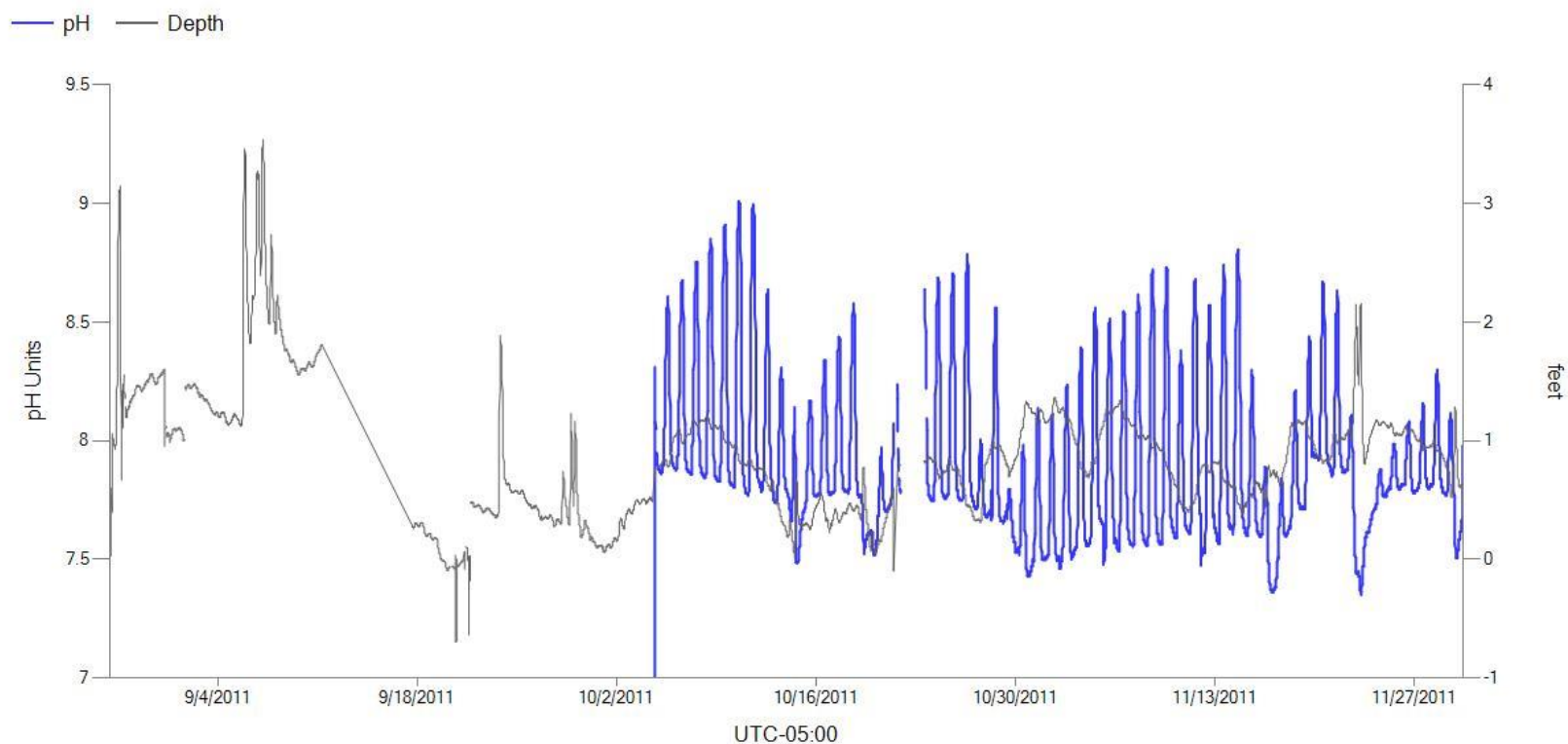


Figure 7. pH vs. Depth: DWS Animals In Distress Shelter

DWS Black River

pH: Values recorded by the sonde were checked against a field meter during inspections for the period 8/23/2011 to 11/30/2011. Fouling drift corrections were common due to coarse sediment deposition. Fouling corrections ranged 0.02 to (+/-) 0.635 standard pH units. Calibration drift was insignificant (less than or less than 0.2 pH Units). Data for the period 10/21/2011 to 11/4/2011 was graded 'unverified' or 'unusable' due to sonde failure. Data for the periods 8/23/2011 to 8/31/2011 and 9/14/2011 to 10/4/2011 were graded 'fair' to 'excellent' and therefore usable and reportable data (Tables A8.1-A8.4, Figures 8 & A8)

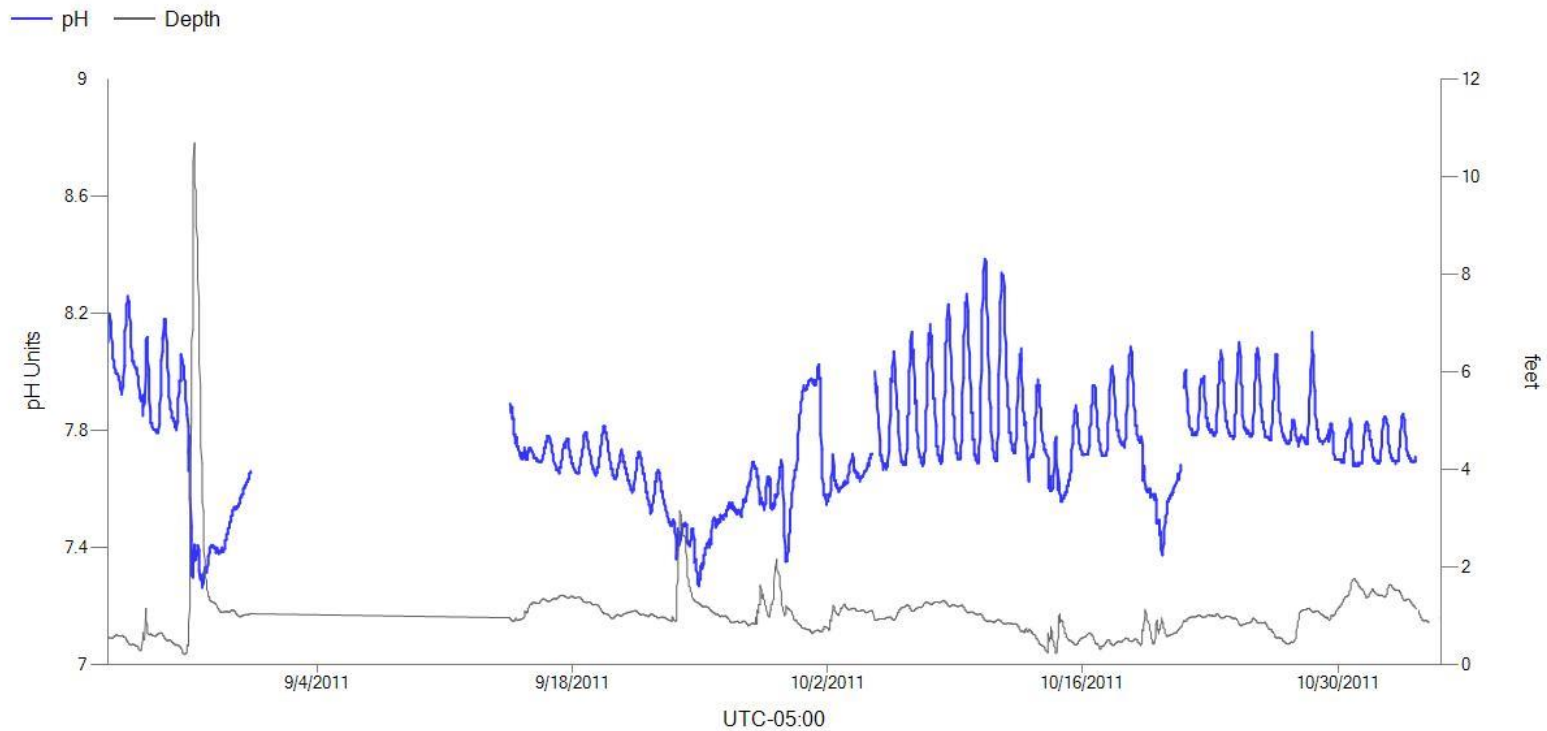


Figure 8. pH vs. Depth: DWS Black River

SUMMARY:

A significant amount of the turbidity data collected at both the 'DWS Animals In Distress Shelter' and 'DWS Black River' stations were graded 'unusable' or 'unverified' due to the lack of multi-point calibrations/field calibration checks. To this point DWQS had not instituted measures, like multi-point turbidity calibrations, that would result in usable, quantitative data. Lack of funding, planning, and experience are to blame for the limited amount of 800 NTU standard that was available to consistently perform the appropriate multi-point calibrations, which were performed on one single occasion (9/14/2011) at both locations. Additional multi-point calibrations were performed, but with 123 NTU standard that was later determined to have been diluted to 110.9 NTU. While the 123 NTU standard did allow for a second calibration point, it did not provide confidence for data greater than 123 NTU.

A significant amount of turbidity and other data at both stations were also lost to fouling due to coarse sediment deposition. Other data (specific conductance, water temperature & pH) are less susceptible to this type of fouling and corrections and grading can often be made to more accurately characterize this data. Turbidity data is collected using an optical probe and is extremely sensitive to sediment accumulating around the sensing mechanism. As deposition occurs, turbidity data begins to show false, elevated data points that do not accurately represent water column turbidity. As deposition continues, the data points become very erratic. This is most likely the result of sediment in and around the probe settling and becoming resuspended as instream flows fluctuate. Typically, when the sonde was properly calibrated, accurate turbidity data was collected just after calibration and through a point at the beginning of a storm event where sediment begins to bury the probe. Multiple storm events did occur during data period including Hurricane Irene (8/28/2011 to 8/29/2011).

At the 'DWS Black River' station, the physical location of the sonde in Saucon Creek was less than ideal as it was likely appreciably influenced by waters discharged by the Black River. The sonde was located less than 30 meters downstream of the Black River confluence, and only a few feet off that stream bank. Depending on the flow ratio of Black River vs. Saucon Creek, the sonde could have been recording either Black River or Saucon Creek water quality.

Appendix A

Data Change Lists and Figures

Table A1.1. Turbidity Change List: DWS Animals In Distress Shelter

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Approval	mlookenbil	Set Approval: 3 - Approved	8/27/2011 10:00	11/30/2011 10:45
Correction	mlookenbil	Delete Region, Unusable	8/27/2011 10:00	9/14/2011 16:00
Grade	mlookenbil	Set Grade: -2 - UNUSABLE; Documented fouling 0 NTU + Calibration drift -244 or -23.37% = Unusable	8/27/2011 10:00	9/14/2011 16:00
Correction	mlookenbil	Documented Fouling Drift value of -2.200NTU.	8/27/2011 10:00	9/14/2011 16:00
Correction	mlookenbil	USGS Multi-point Correction Start point: (0.000NTU,0.000NTU) (800.000NTU,0.000NTU) End point: (0.000NTU,0.700NTU) (800.000NTU,244.000NTU)	8/27/2011 10:00	9/14/2011 16:00
Correction	mlookenbil	Delete Region, suspect data due to sediment deposition.	9/5/2011 23:30	9/17/2011 16:00
Correction	mlookenbil	USGS Multi-point Correction Start point: (0.000NTU,0.000NTU) (110.900NTU,0.000NTU) End point: (0.000NTU,0.000NTU) (110.900NTU,-7.800NTU)	9/14/2011 17:46	10/4/2011 13:15
Correction	mlookenbil	Delete Region, suspect data due to sediment deposition.	9/17/2011 16:00	9/21/2011 18:45

Table A1.2. Turbidity Change List: DWS Animals In Distress Shelter

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Grade	mlookenbil	Set Grade: 51 - EXCELLENT; 9/14/2011-10/4/2011 Applied 2-point calibration correction (0 -0.01 and 110.9--7.8) to entire period. 9/21/2011-9/23/2011 @ 18:00 Corrected vs. Raw = 0.023 - 0.109 NTU = Excellent.	9/21/2011 19:00	9/23/2011 18:00
Grade	mlookenbil	Set Grade: 31 - GOOD; 9/14/2011-10/4/2011 Applied 2-point calibration correction (0 -0.01 and 110.9--7.8) to entire period. On 9/23/2011 @ 18:15 Corrected vs. Raw = 0.44 NTU = Good.	9/23/2011 18:00	9/23/2011 18:15
Grade	mlookenbil	Set Grade: 21 - FAIR; 9/14/2011-10/4/2011 Applied 2-point calibration correction (0 -0.01 and 110.9--7.8) to entire period. On 9/23/2011 @ 18:30 Corrected vs. Raw = 0.551 NTU = Fair.	9/23/2011 18:15	9/23/2011 18:30
Grade	mlookenbil	Set Grade: 11 - POOR; 9/14/2011-10/4/2011 Applied 2-point calibration correction (0 -0.01 and 110.9--7.8) to entire period. 9/23/2011 @ 18:45-9/23/2011 @ 19:00 Corrected vs. Raw 0.0809 - 1.3 NTU = Poor.	9/23/2011 18:30	9/23/2011 19:00

Table A1.3. Turbidity Change List: DWS Animals In Distress Shelter

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Correction	mlookenbil	Delete Region; Unusable	9/23/2011 19:00	10/4/2011 12:00
Grade	mlookenbil	Set Grade: -2 - UNUSABLE; 9/14/2011-10/4/2011 Applied 2-point calibration correction (0 -0.01 and 110.9--7.8) to entire period. On 9/23/2011 @ 19:15(storm event) Corrected vs. Raw becomes > 3.0 NTU = Unusable. 9/23/2011(storm event)-10/4/2011 Documented fouling 0 NTU + Undocumented fouling - 4.9 NTU + Calibration drift 7.75 or 7.52% = Unusable	9/23/2011 19:00	10/4/2011 12:00
Correction	mlookenbil	Undocumented Fouling Drift value of - 4.900NTU.	9/23/2011 21:15	10/4/2011 13:15
Grade	mlookenbil	Set Grade: 51 - EXCELLENT; 10/4/2011-10/21/2011 Applied 2-point calibration correction (0 -0.30 and 110.9--18.9) to entire period. 10/4/2011 @ 16:45-10/12/2011 @ 13:00 Corrected vs. Raw < 0.497 NTU = Excellent.	10/4/2011 16:45	10/12/2011 13:00

Table A1.4. Turbidity Change List: DWS Animals In Distress Shelter

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Correction	mlookenbil	USGS Multi-point correction Start point: (0.000NTU,0.000NTU) (110.900NTU,0.000NTU) End point: (0.000NTU,0.200NTU) (110.900NTU,-11.150NTU)	10/4/2011 16:45	10/21/2011 12:15
Grade	mlookenbil	Set Grade: 31 - GOOD; 10/4/2011-10/21/2011 Applied 2-point calibration correction (0 -0.30 and 110.9--18.9) to entire period. 10/12/2011 @ 13:15-10/12/2011 @ 23:15 Corrected vs. Raw 0.572 - 0.960 NTU = Good.	10/12/2011 13:15	10/12/2011 23:15
Grade	mlookenbil	Set Grade: 21 - FAIR; 10/4/2011-10/21/2011 Applied 2-point calibration correction (0 -0.30 and 110.9--18.9) to entire period. 10/12/2011 @ 23:30-10/14/2011 @ 04:45 Corrected vs. Raw 1.106 - 1.366 = Fair.	10/12/2011 23:15	10/14/2011 4:45

Table A1.5. Turbidity Change List: DWS Animals In Distress Shelter

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Grade	mlookenbil	Set Grade: 11 - POOR; 10/4/2011-10/21/2011 Applied 2-point calibration correction (0 -0.30 and 110.9--18.9) to entire period. 10/14/2011 @ 05:00-10/14/2011 @ 14:15 Corrected vs. Raw 1.671 - 2.595 = Poor.	10/14/2011 4:45	10/14/2011 14:15
Correction	mlookenbil	Delete Region; Unusable	10/14/2011 14:15	10/21/2011 12:15
Correction	mlookenbil	Delete Region; Unusable	10/14/2011 14:15	10/22/2011 1:10
Grade	mlookenbil	Set Grade: -2 - UNUSABLE; 10/4/2011-10/21/2011 Applied 2-point calibration correction (0 -0.30 and 110.9--18.9) to entire period. 10/14/2011 @ 14:30-10/21/2011 Corrected vs. Raw > 3.21 NTU = Unusable, and Documented fouling -15.6 + Calibration drift -11.15 or -9.14% = Unusable	10/14/2011 14:15	10/21/2011 12:15
Correction	mlookenbil	Delete Region; Unusable	10/23/2011 15:00	11/30/2011 10:45
Grade	mlookenbil	Set Grade: -2 - UNUSABLE; No corrections made to the data due to single point calibration check at the end of period. Documented fouling -2.0 + Calibration drift -2.20 or -2.2% = Unusable	10/23/2011 15:00	11/30/2011 10:45

Figure A1. Turbidity Change Graph: DWS Animals In Distress Shelter

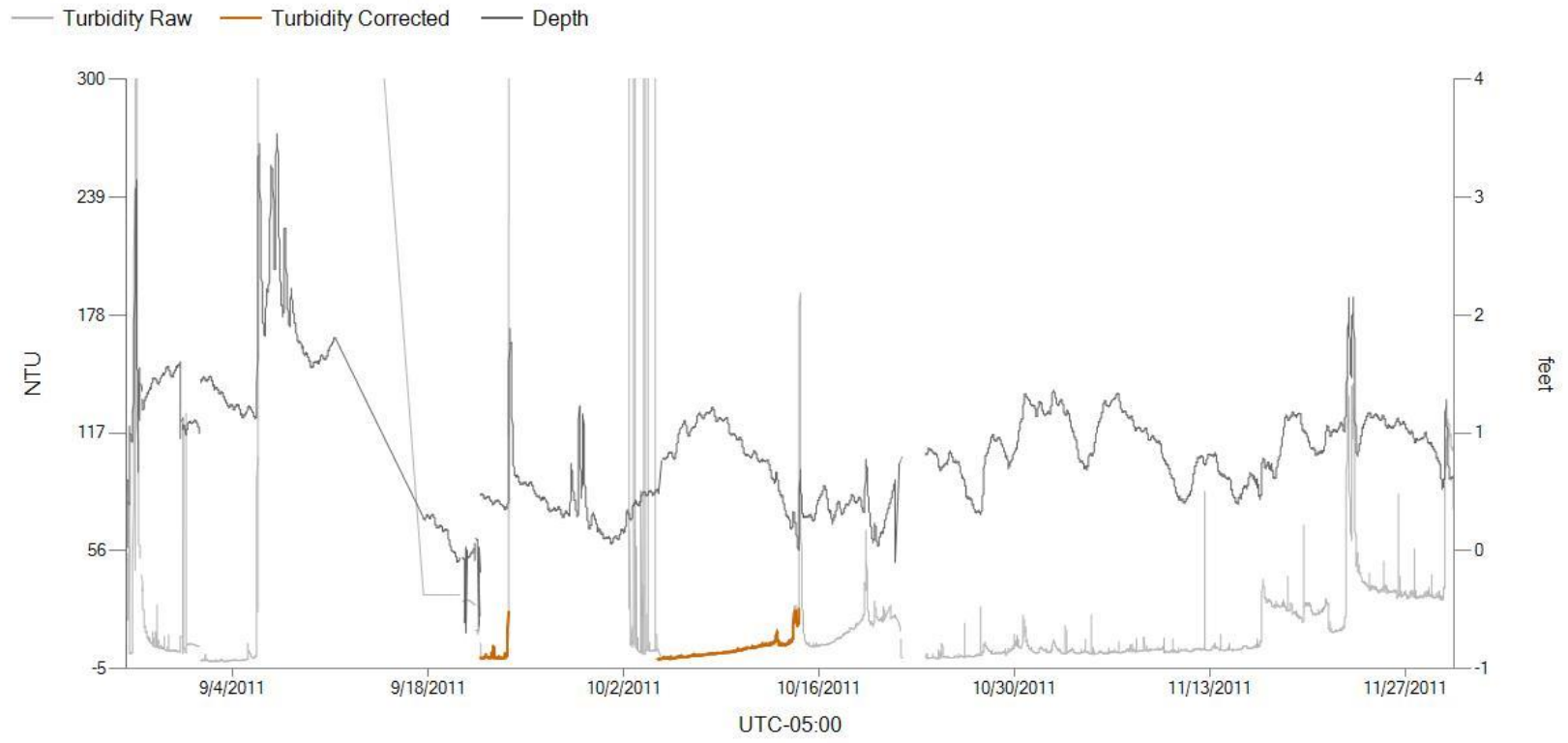


Table A2.1. Turbidity Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Approval	mlookenbil	Set Approval: 3 - Approved	8/23/2011 11:44	8/31/2011 9:07
Grade	jbutt	Set Grade: 1 - UNVERIFIED: no multipoint calibration performed to confirm data range	8/23/2011 12:30	8/24/2011 16:04
Correction	mlookenbil	Undocumented Fouling Drift value of -109.298NTU	8/23/2011 12:30	8/31/2011 9:00
Correction	jbutt	USGS Multi-point correction Start point: (0.000NTU,0.000NTU) End point: (0.000NTU,-0.100NTU)	8/23/2011 12:30	8/31/2011 9:00
Correction	jbutt	Percent Correction with start percentage of 0.000% and end percentage of -68.970%	8/23/2011 12:30	8/31/2011 9:00
Grade	jbutt	Set Grade: -2 - UNUSABLE: Unexplained single reading data spike	8/24/2011 16:30	8/24/2011 17:30
Grade	jbutt	Set Grade: 1 - UNVERIFIED: no multipoint calibration performed to confirm data range	8/24/2011 17:39	8/28/2011 0:00
Correction	mlookenbil	Delete Region	8/28/2011 0:30	8/31/2011 9:00

Table A2.2. Turbidity Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Grade	jbutt	Set Grade: -2 - UNUSABLE: Sonde likely "silted in" due to Hurricane Irene	8/28/2011 0:30	8/31/2011 9:00
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to logging failure on sonde	8/31/2011 9:30	9/14/2011 13:00
Approval	mlookenbil	Set Approval: 3 - Approved	9/14/2011 12:33	9/15/2011 10:53
Grade	jbutt	Set Grade: 31 - GOOD: Sum of absolute values of fouling and calibration drift = 5.08%	9/14/2011 12:33	9/15/2011 10:53
Correction	jbutt	USGS Multi-point correction Start point: (0.000NTU,0.000NTU) (800.000NTU,0.000NTU) End point: (0.000NTU,3.300NTU) (110.835NTU,8.535NTU)	9/14/2011 13:15	10/4/2011 13:12
Correction	jbutt	Percent Correction with start percentage of 0.000% and end percentage of 3.700%	9/14/2011 13:15	10/4/2011 13:12
Correction	mlookenbil	Delete Region	9/15/2011 11:00	10/4/2011 12:57

Table A2.3. Turbidity Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Approval	mlookenbil	Set Approval: 3 - Approved	9/15/2011 11:00	10/4/2011 12:57
Grade	jbutt	Set Grade: -2 - UNUSABLE: Exceed calibration criteria and silting in of sonde	9/15/2011 11:00	10/4/2011 12:57
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to routine sonde maintenance.	10/4/2011 11:30	10/4/2011 14:00
Correction	jbutt	Percent Correction with start percentage of 0.000% and end percentage of 3.700%	10/4/2011 11:42	10/21/2011 10:00
Correction	jbutt	USGS Multi-point correction Start point: (0.000NTU,0.000NTU) (110.835NTU,-12.165NTU) End point: (0.000NTU,0.500NTU) (110.835NTU,-12.165NTU)	10/4/2011 12:51	10/21/2011 10:58
Approval	mlookenbil	Set Approval: 3 - Approved	10/4/2011 13:12	10/6/2011 13:30
Grade	jbutt	Set Grade: 51 - EXCELLENT: Sum of absolute values of fouling and calibration drift = 4.74%	10/4/2011 13:12	10/6/2011 13:30

Table A2.4. Turbidity Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Grade	jbutt	Set Grade: -2 - UNUSABLE: Exceed calibration criteria	10/6/2011 13:55	10/6/2011 16:02
Approval	mlookenbil	Set Approval: 3 - Approved	10/6/2011 13:58	10/13/2011 6:44
Grade	jbutt	Set Grade: 1 - UNVERIFIED: Exceeds calibration criteria	10/6/2011 14:00	10/6/2011 16:00
Grade	jbutt	Set Grade: 51 - EXCELLENT: Sum of absolute values of fouling and calibration drift = 4.74%	10/6/2011 16:11	10/6/2011 18:09
Grade	jbutt	Set Grade: 1 - UNVERIFIED: Exceeds calibration criteria	10/6/2011 18:30	10/6/2011 19:30
Grade	jbutt	Set Grade: 51 - EXCELLENT: Sum of absolute values of fouling and calibration drift = 4.74%	10/6/2011 19:38	10/7/2011 4:25
Grade	jbutt	Set Grade: 1 - UNVERIFIED	10/7/2011 4:30	10/7/2011 5:30
Grade	jbutt	Set Grade: 51 - EXCELLENT: Sum of absolute values of fouling and calibration drift = 4.74%	10/7/2011 6:00	10/8/2011 9:30
Grade	jbutt	Set Grade: 1 - UNVERIFIED: Exceeds calibration criteria	10/8/2011 10:00	10/8/2011 13:30

Table A2.5. Turbidity Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Grade	jbutt	Set Grade: 51 - EXCELLENT: Sum of absolute values of fouling and calibration drift = 4.74%	10/8/2011 13:34	10/10/2011 6:00
Grade	jbutt	Set Grade: 1 - UNVERIFIED	10/10/2011 6:30	10/10/2011 11:00
Grade	jbutt	Set Grade: 51 - EXCELLENT: Sum of absolute values of fouling and calibration drift = 4.74%	10/10/2011 11:30	10/10/2011 14:00
Grade	jbutt	Set Grade: 1 - UNVERIFIED: Exceeds calibration criteria	10/10/2011 14:30	10/10/2011 16:30
Grade	jbutt	Set Grade: 51 - EXCELLENT: Sum of absolute values of fouling and calibration drift = 4.74%	10/10/2011 16:47	10/11/2011 8:34
Grade	jbutt	Set Grade: 1 - UNVERIFIED: Exceeds calibration criteria	10/11/2011 9:00	10/11/2011 10:00
Grade	jbutt	Set Grade: 51 - EXCELLENT: Sum of absolute values of fouling and calibration drift = 4.74%	10/11/2011 10:13	10/12/2011 14:30
Grade	jbutt	Set Grade: 1 - UNVERIFIED: Exceeds calibration criteria	10/12/2011 15:00	10/12/2011 16:00

Table A2.6. Turbidity Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Grade	jbutt	Set Grade: 51 - EXCELLENT: Sum of absolute values of fouling and calibration drift = 4.74%	10/12/2011 16:13	10/13/2011 6:38
Correction	mlookenbil	Delete Region	10/13/2011 7:00	10/21/2011 10:00
Approval	mlookenbil	Set Approval: 3 - Approved	10/13/2011 7:00	10/21/2011 10:00
Grade	jbutt	Set Grade: -2 - UNUSABLE: Exceed calibration criteria	10/13/2011 7:00	10/21/2011 10:00
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to routine sonde maintenance.	10/21/2011 10:30	10/21/2011 13:00
Approval	mlookenbil	Set Approval: 3 - Approved	10/21/2011 12:44	11/3/2011 7:30
Grade	jbutt	Set Grade: 1 - UNVERIFIED: no multipoint calibration performed to confirm data range	10/21/2011 12:44	11/3/2011 7:30
Correction	mlookenbil	Delete Region	11/3/2011 7:24	11/3/2011 7:38
Correction	mlookenbil	Delete Region	11/3/2011 8:00	11/4/2011 16:00
Approval	mlookenbil	Set Approval: 3 - Approved	11/3/2011 8:00	11/4/2011 16:00
Grade	jbutt	Set Grade: -2 - UNUSABLE: Approaching battery failure	11/3/2011 8:00	11/4/2011 16:00

Figure A2. Turbidity Change Graph: DWS Black River

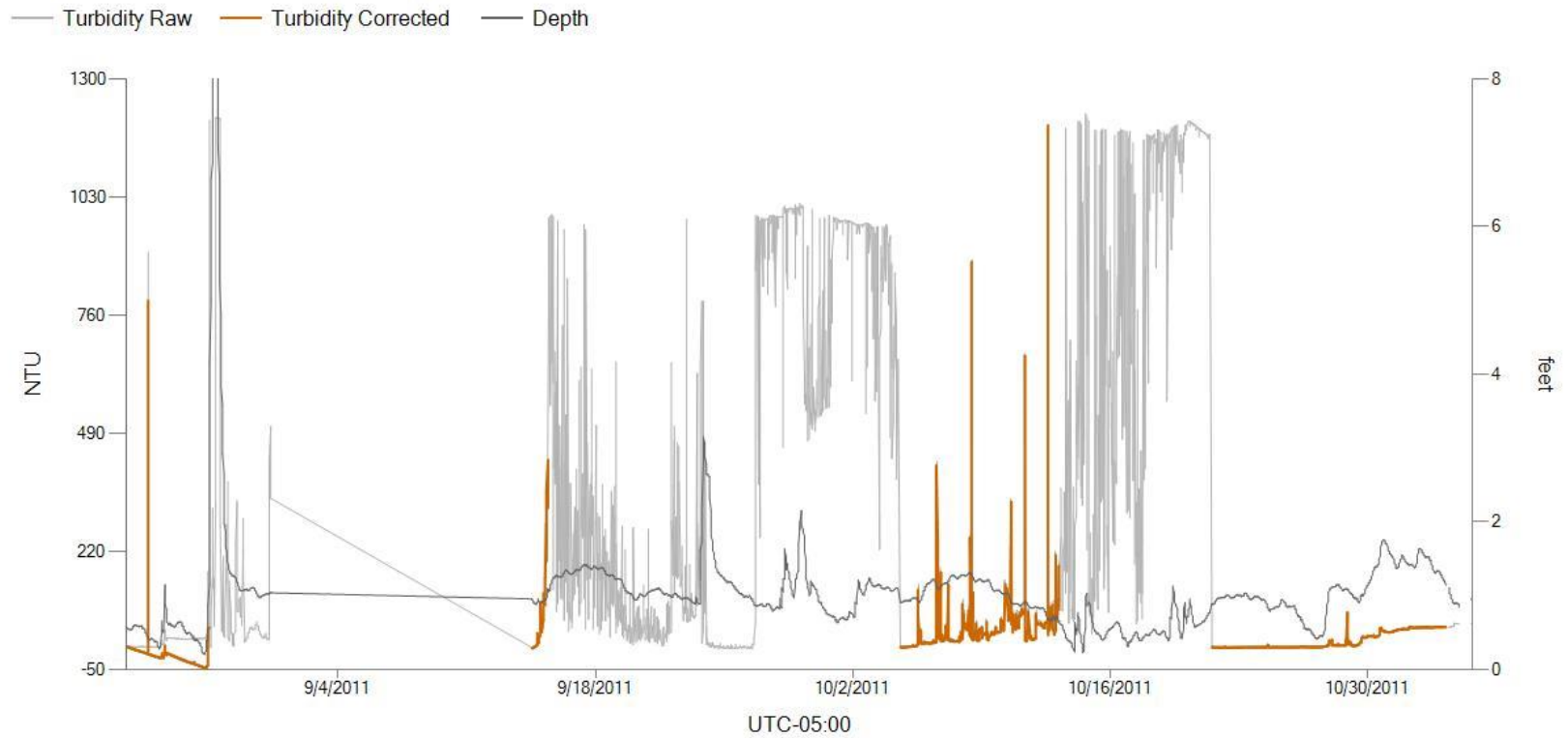


Table A3. Water Temperature Change List: DWS Animals In Distress Shelter

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Approval	mlookenbil	Set Approval: 3 - Approved	8/27/2011 10:00	11/30/2011 10:45
Grade	mlookenbil	Set Grade: 51 - EXCELLENT; Fouling + Calibration < 0.2.	8/27/2011 10:00	11/30/2011 10:45
Correction	mlookenbil	Delete Region, Sonde removed for calibration and maintenance.	8/27/2011 10:00	8/27/2011 15:15
Correction	mlookenbil	Delete Region, Sonde removed for calibration and maintenance.	8/31/2011 7:15	9/1/2011 18:00
Correction	mlookenbil	Delete Region, Sonde removed for calibration and maintenance.	9/17/2011 16:00	9/21/2011 18:30
Correction	mlookenbil	Delete Region, Sonde removed for calibration and maintenance.	10/21/2011 12:15	10/23/2011 15:00

Figure A3. Water Temperature Change Graph: DWS Animals In Distress Shelter

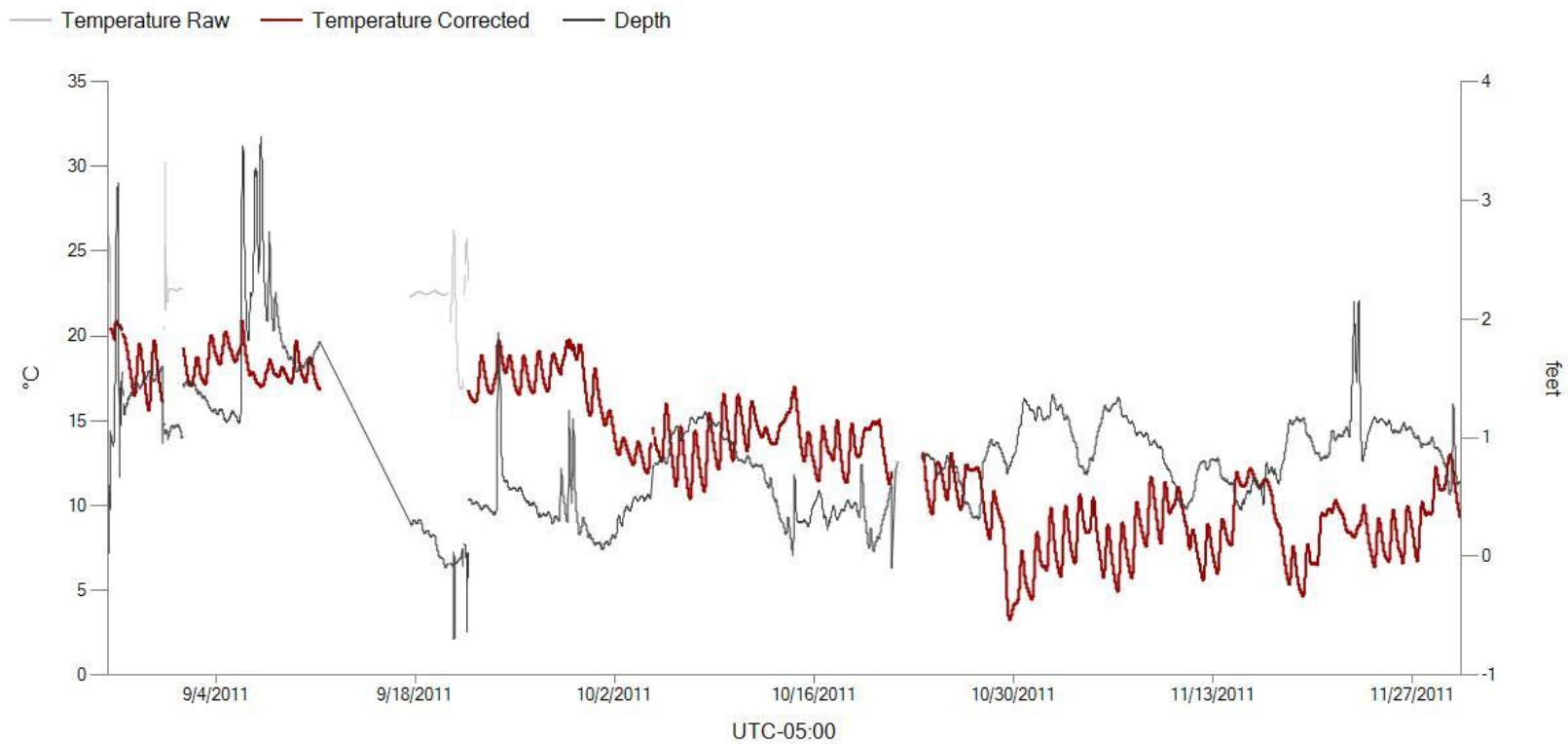


Table A4. Water Temperature Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Approval	mlookenbil	Set Approval: 3 - Approved	8/23/2011 12:00	11/4/2011 16:00
Grade	jbutt	Set Grade: 51 - EXCELLENT: Fouling correction = -0.09C	8/23/2011 12:30	8/31/2011 9:00
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to logging failure on sonde	8/31/2011 9:30	9/14/2011 13:00
Grade	jbutt	Set Grade: 51 - EXCELLENT: Fouling correction = -0.03C	9/14/2011 13:30	10/4/2011 11:00
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to routine sonde maintenance.	10/4/2011 11:30	10/4/2011 14:00
Grade	jbutt	Set Grade: 51 - EXCELLENT: Fouling correction = 0.01C	10/4/2011 14:30	10/21/2011 10:00
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to routine sonde maintenance.	10/21/2011 10:30	10/21/2011 13:00
Grade	jbutt	Set Grade: 51 - EXCELLENT: Fouling correction of 0.00975C	10/21/2011 13:30	11/3/2011 7:30
Grade	jbutt	Set Grade: -2 - UNUSABLE: Approaching battery failure	11/3/2011 8:00	11/4/2011 16:00

Figure A4. Water Temperature Change Graph: DWS Black River

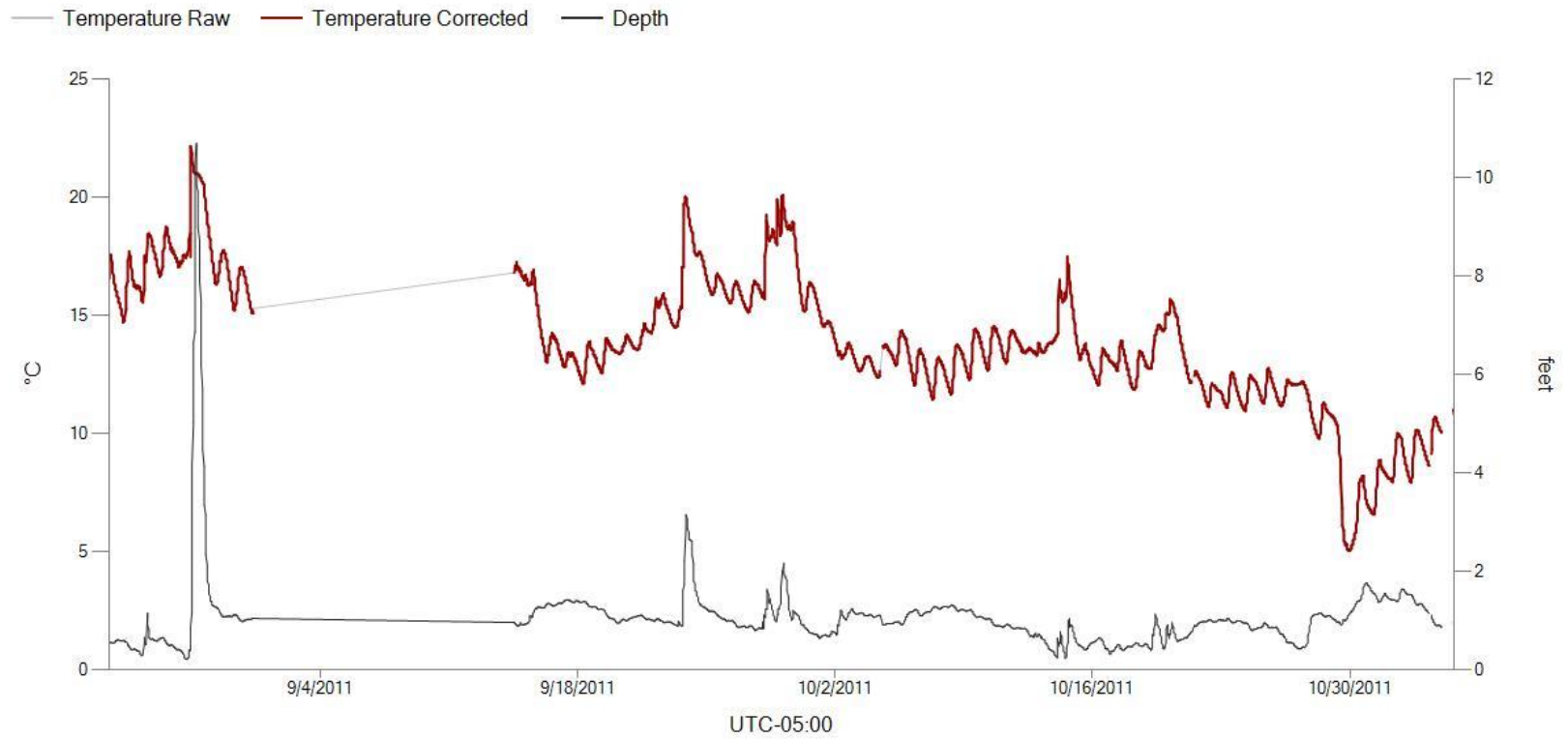


Table A5. Specific Conductance Change List: DWS Animals In Distress Shelter

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Approval	mlookenbil	Set Approval: 3 - Approved	8/27/2011 10:00	11/30/2011 10:45
Correction	mlookenbil	Delete Region; Unverified	8/27/2011 13:45	9/14/2011 16:00
Grade	mlookenbil	Set Grade: 1 - UNVERIFIED; Very irregular data and no documentation of original calibration = Unverified.	8/27/2011 13:45	9/14/2011 16:00
Correction	mlookenbil	Delete Region; Suspect data.	9/17/2011 16:00	9/21/2011 18:45
Grade	mlookenbil	Set Grade: 11 - POOR; Documented fouling - 4.12% + Calibration drift 1.01%/us = Good. Site Monitor Clean value is very inconsistent. This is most likely an error in recording. All fouling is Undocumented and = 49 us or 16.9% @ 290 us = Poor and barely Usable.	9/21/2011 19:00	10/4/2011 13:15
Correction	mlookenbil	Undocumented Fouling Drift value of 49.000µS/cm.	9/21/2011 19:00	10/4/2011 13:15
Grade	mlookenbil	Set Grade: 51 - EXCELLENT; Documented fouling 1.36% + Calibration drift 0 = Excellent.	10/4/2011 16:45	10/21/2011 12:00
Correction	mlookenbil	Delete Region; Suspect data.	10/21/2011 12:15	10/23/2011 15:00
Grade	mlookenbil	Set Grade: 51 - EXCELLENT; Documented fouling 0.82% + Calibration drift -0.99 = Excellent.	10/23/2011 15:15	11/30/2011 10:30

Figure A6. Specific Conductance Change Graph: DWS Animals In Distress Shelter

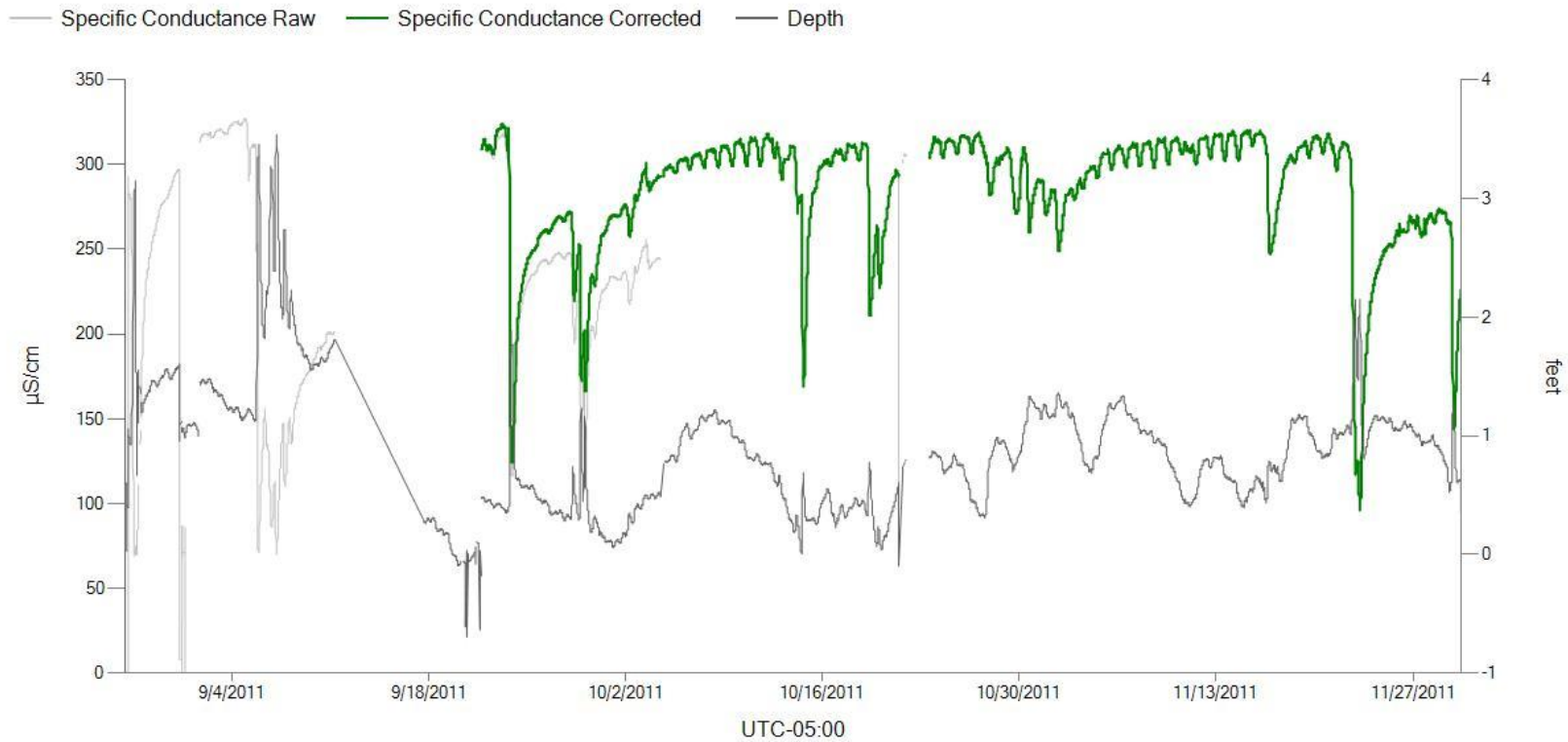


Table A6.1 Specific Conductance Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Approval	mlookenbil	Set Approval: 3 - Approved	8/23/2011 12:30	8/31/2011 9:00
Correction	jbutt	USGS Multi-point correction Start point: (100.000µS/cm,-3.000µS/cm) End point: (1000.000µS/cm,0.000µS/cm) (100.000µS/cm,1.000µS/cm) (1000.000µS/cm,18.000µS/cm)	8/23/2011 12:00	8/31/2011 9:00
Correction	mlookenbil	Percent Fouling Correction with start percentage of 0.000% and end percentage of 4.730%	8/23/2011 12:30	8/31/2011 9:00
Grade	mlookenbil	Set Grade: 31 - GOOD; Calibration + fouling correction (assuming no undocumented fouling) = 12 us or 3.1% = Good	8/23/2011 15:00	8/27/2011 21:30
Grade	mlookenbil	Set Grade: -2 - UNUSABLE; Assumed undocumented fouling drift occurred during 8/27 storm event and applied fouling drift only to the period after 8/27. Calibration + fouling drift = 99us or 26.5% = Unusable	8/27/2011 21:30	8/31/2011 9:00

Table A6.2 Specific Conductance Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Correction	mlookenbil	Undocumented Fouling Drift value of 74.867 μ S/cm	8/27/2011 21:30	8/31/2011 9:00
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to logging failure on sonde	8/31/2011 9:30	9/14/2011 13:00
Approval	mlookenbil	Set Approval: 3 - Approved	9/14/2011 13:30	10/4/2011 11:00
Grade	jbutt	Set Grade: 11 - POOR: Sum of absolute values of fouling, calibration, and undocumented drift = 26.22%	9/14/2011 13:30	10/4/2011 11:00
Correction	mlookenbil	Undocumented Fouling Drift value of 83.794 μ S/cm	9/14/2011 13:30	10/4/2011 11:00
Correction	jbutt	USGS Multi-point correction Start point: (100.000 μ S/cm,-2.000 μ S/cm) (1000.000 μ S/cm,0.000 μ S/cm) End point: (100.000 μ S/cm,-2.000 μ S/cm) (1000.000 μ S/cm,3.000 μ S/cm)	9/14/2011 13:30	10/4/2011 11:00
Correction	jbutt	Percent Correction with start percentage of 0.000% and end percentage of -2.310%	9/14/2011 13:30	10/4/2011 11:00

Table A6.3 Specific Conductance Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to routine sonde maintenance.	10/4/2011 11:30	10/4/2011 14:00
Approval	mlookenbil	Set Approval: 3 - Approved	10/4/2011 14:30	10/21/2011 10:00
Grade	jbutt	Set Grade: 31 - GOOD: Sum of absolute values of fouling, calibration, and undocumented drift = 4.72%	10/4/2011 14:30	10/21/2011 10:00
Correction	mlookenbil	Undocumented Fouling Drift value of 17.015µS/cm	10/4/2011 14:30	10/21/2011 10:00
Correction	jbutt	USGS Multi-point correction Start point: (100.000µS/cm,-2.000µS/cm) (1000.000µS/cm,3.000µS/cm) End point: (100.000µS/cm,-1.000µS/cm) (1000.000µS/cm,5.000µS/cm)	10/4/2011 14:30	10/21/2011 10:00
Correction	jbutt	Percent Correction with start percentage of 0.000% and end percentage of 0.240%	10/4/2011 14:30	10/21/2011 10:00
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to routine sonde maintenance.	10/21/2011 10:30	10/21/2011 13:00

Table A6.4 Specific Conductance Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Approval	mlookenbil	Set Approval: 3 - Approved	10/21/2011 13:30	11/3/2011 7:30
Grade	jbutt	Set Grade: 1 - UNVERIFIED: Drift can't be verified due battery fail beginning on 11/3/2011 and check was not performed until 11/30/2011	10/21/2011 13:30	11/3/2011 7:30
Correction	jbutt	USGS Multi-point correction Start point: (100.000µS/cm,-1.000µS/cm) (1000.000µS/cm,5.000µS/cm) End point: (100.000µS/cm,-1.320µS/cm) (1000.000µS/cm,5.980µS/cm)	10/21/2011 13:30	11/3/2011 7:30
Approval	mlookenbil	Set Approval: 3 - Approved	11/3/2011 8:00	11/4/2011 16:00
Grade	jbutt	Set Grade: -2 - UNUSABLE	11/3/2011 8:00	11/4/2011 16:00

Figure A7. Specific Conductance Change Graph: DWS Black River

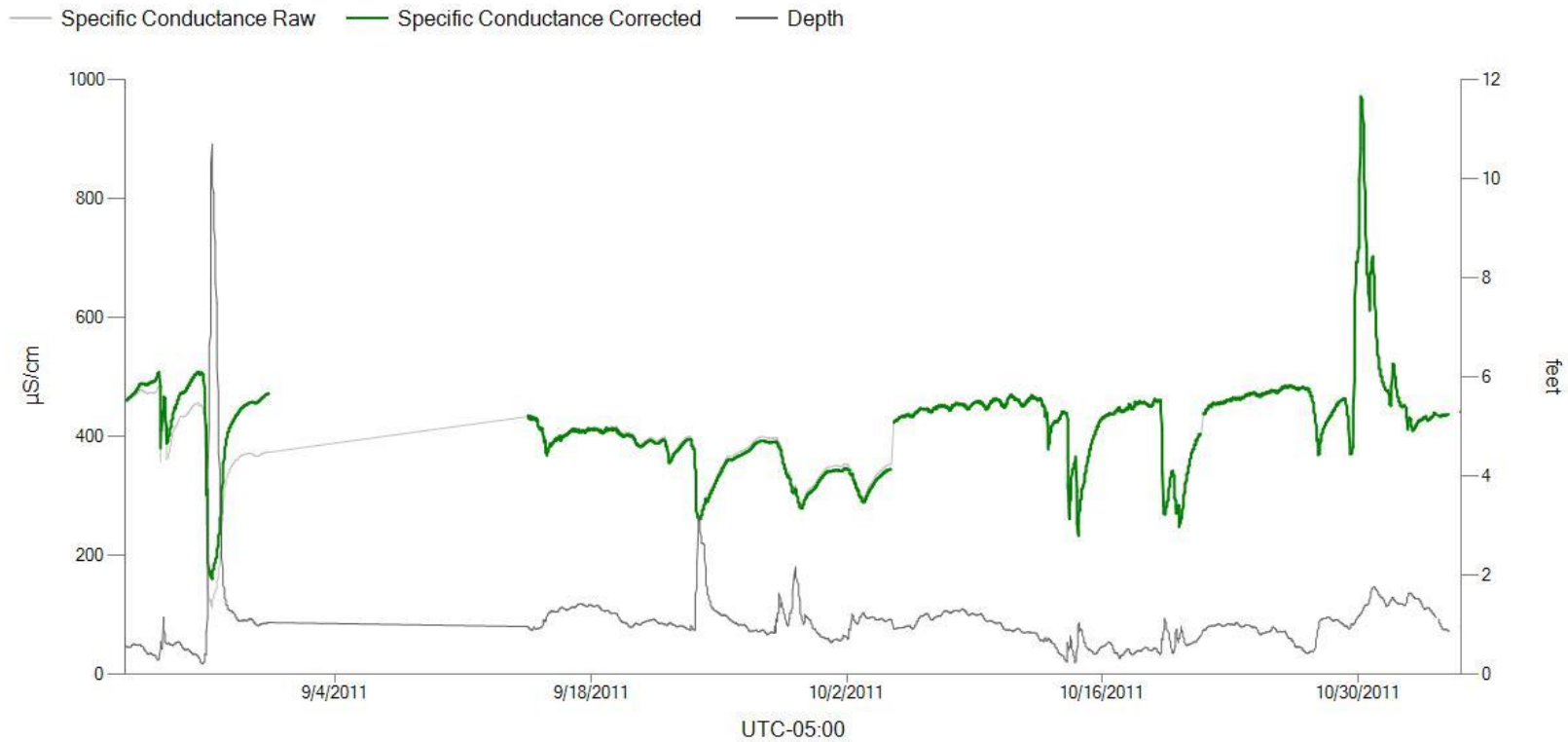


Table A7. pH Change List: DWS Animals In Distress Shelter

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Approval	mlookenbil	Set Approval: 3 - Approved	8/27/2011 10:00	10/4/2011 13:15
Grade	mlookenbil	Set Grade: -2 - UNUSABLE; Calibration checks and pH mv out of range, data unusable.	8/27/2011 10:00	10/4/2011 13:15
Correction	mlookenbil	Delete Region; Calibration checks and pH mv out of range, data unusable.	8/27/2011 10:00	10/4/2011 13:15
Approval	mlookenbil	Set Approval: 3 - Approved	10/4/2011 16:45	10/21/2011 12:15
Grade	mlookenbil	Set Grade: 51 - EXCELLENT; Documented fouling -0.06 + Calibration drift minimal (-0.04 - -0.13) = Excellent. Sonde malfunction caused data gaps shortly after delay start, but data make sense = Excellent	10/4/2011 16:45	10/21/2011 12:15
Correction	mlookenbil	USGS Multi-point correction Start point: (7.060pH Units,0.000pH Units) (4.000pH Units,0.000pH Units) (10.170pH Units,0.000pH Units) End point: (7.060pH Units,-0.390pH Units) (4.000pH Units,-0.760pH Units) (10.170pH Units,0.030pH Units)	10/4/2011 16:45	11/30/2011 10:45
Approval	mlookenbil	Set Approval: 3 - Approved	10/21/2011 17:15	11/30/2011 10:45
Grade	mlookenbil	Set Grade: 31 - GOOD; Documented fouling -0.02 + Calibration drift approx. -0.26 @ pH of 8. = -0.28 = Good.	10/21/2011 17:15	11/30/2011 10:45

Figure A8. pH Change Graph: DWS Animals In Distress

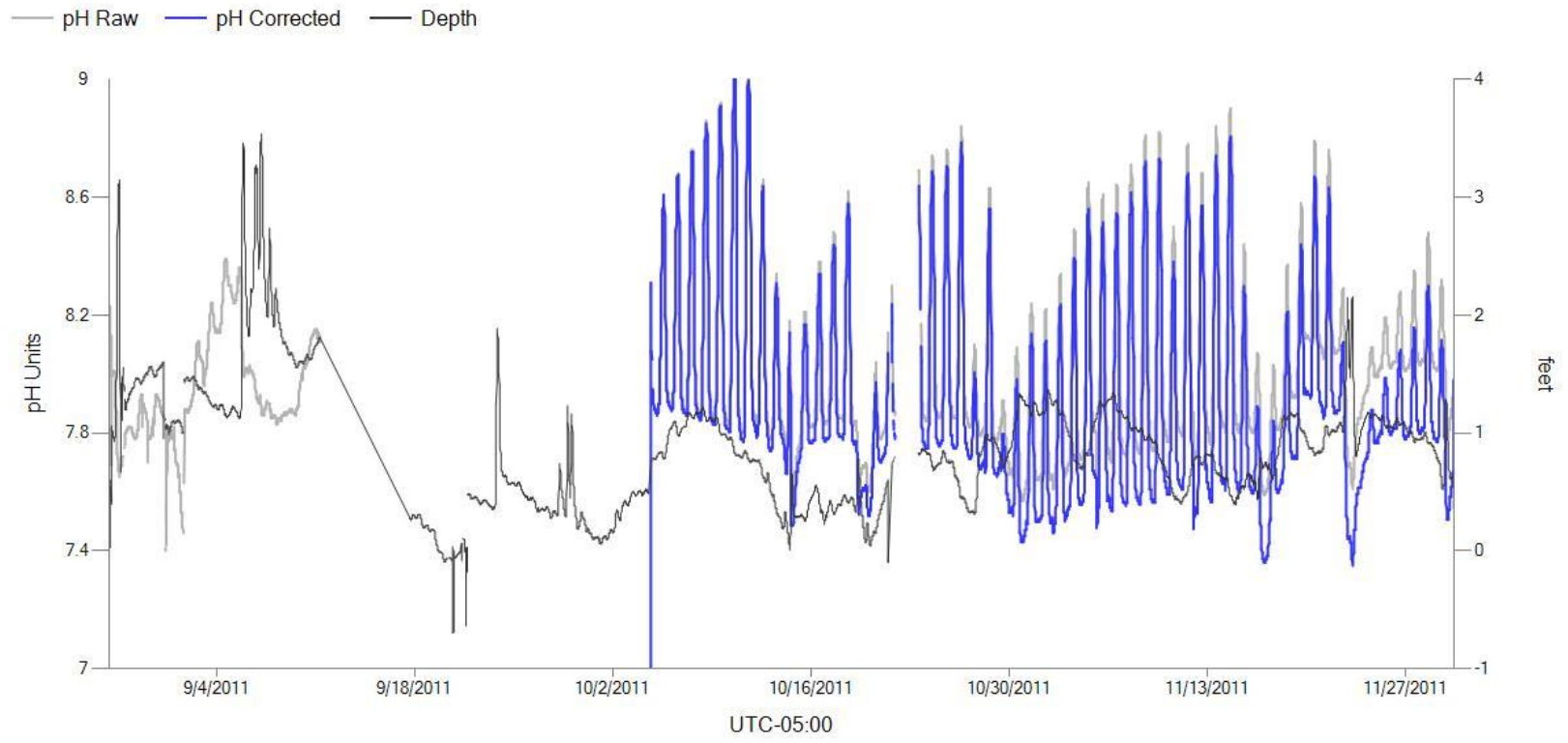


Table A8.1 pH Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Approval	mlookenbil	Set Approval: 3 - Approved	8/23/2011 12:00	8/31/2011 9:00
Grade	jbutt	Set Grade: 31 - GOOD: Sum of absolute values of fouling and calibration at 8/31/2011 only totaled 0.095 pH units which is equivalent to Excellent, however lack of discrete confirming value on 8/28/2011 lead to a downgrading to good	8/23/2011 12:30	8/27/2011 23:30
Correction	jbutt	USGS Multi-point correction Start point: (7.000pH Units,0.000pH Units) (10.000pH Units,0.000pH Units) End point: (7.020pH Units,-0.100pH Units) (10.050pH Units,-0.040pH Units)	8/23/2011 12:30	8/31/2011 9:00

Table A8.2 pH Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Grade	jbutt	Set Grade: 21 - FAIR: Sum of absolute values of fouling, calibration, and undocumented drift = 0.56 pH units	8/28/2011 0:00	8/31/2011 9:00
Correction	mlookenbil	Undocumented Fouling Drift value of 0.465pH Units	8/28/2011 0:00	8/31/2011 9:00
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to logging failure on sonde	8/31/2011 9:30	9/14/2011 13:30
Approval	mlookenbil	Set Approval: 3 - Approved	9/14/2011 14:00	10/4/2011 11:00
Grade	mlookenbil	Set Grade: 51 - EXCELLENT; Calibration drift (0.02) + No fouling = Excellent	9/14/2011 14:00	9/23/2011 18:00
Correction	jbutt	USGS Multi-point correction Start point: (7.020pH Units,0.060pH Units) (10.050pH Units,0.100pH Units) End point: (7.040pH Units,-0.130pH Units) (10.110pH Units,-0.040pH Units)	9/14/2011 14:00	10/4/2011 11:00
Grade	mlookenbil	Set Grade: 21 - FAIR; Sum of fouling (applying all undocumented fouling (0.635) to the period after 9/23 storm event) and calibration = 0.76 = Fair	9/23/2011 18:00	10/4/2011 11:00

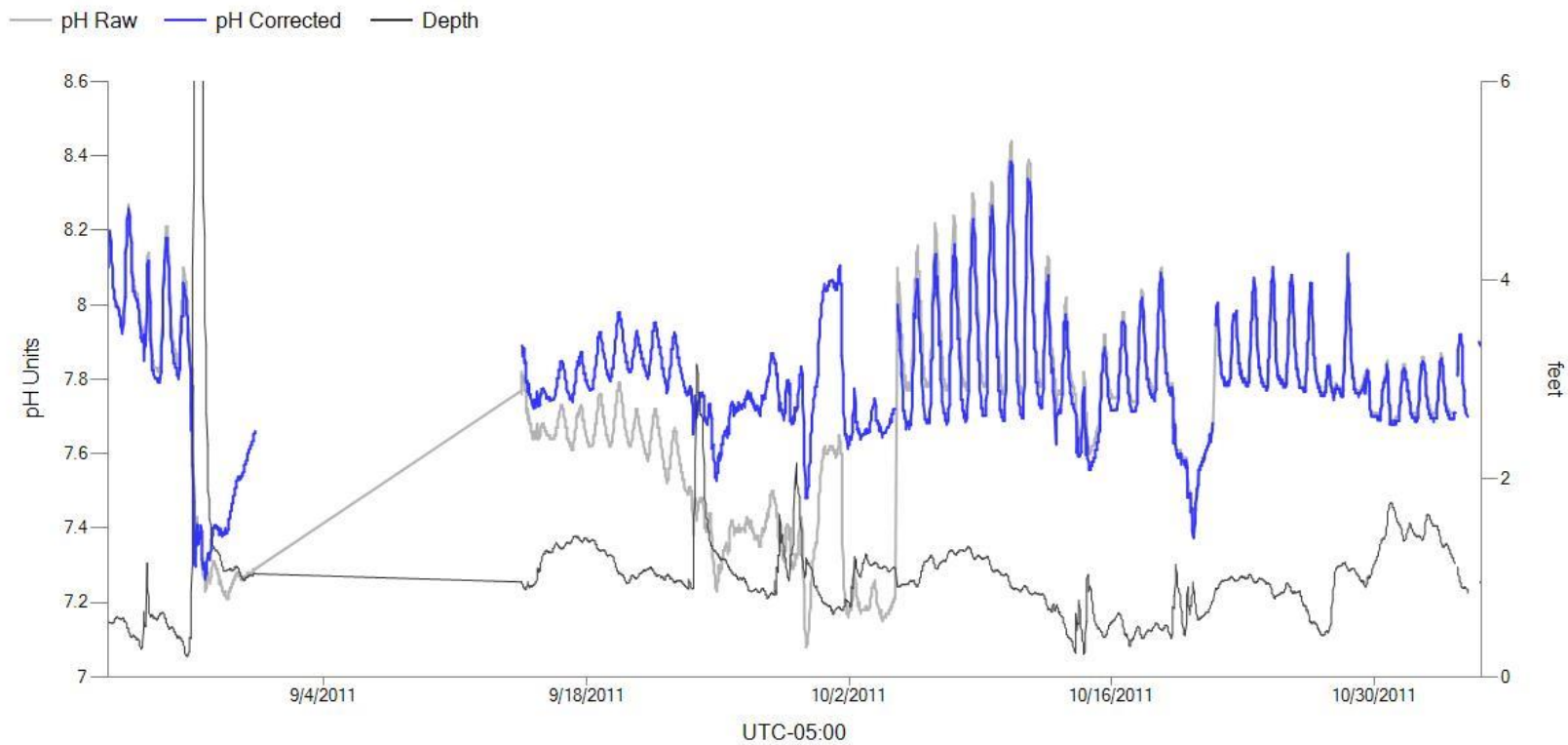
Table A8.3 pH Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Correction	mlookenbil	Undocumented Fouling Drift value of 0.635pH Units	9/23/2011 18:00	10/4/2011 11:00
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to routine sonde maintenance.	10/4/2011 11:30	10/4/2011 14:00
Approval	mlookenbil	Set Approval: 3 - Approved	10/4/2011 14:30	10/21/2011 10:00
Grade	jbutt	Set Grade: 31 - GOOD: sum of absolute values of fouling, calibration, and undocumented drift = 0.21	10/4/2011 14:30	10/21/2011 10:00
Correction	jbutt	USGS Multi-point correction Start point: (7.040pH Units,-0.130pH Units) (10.110pH Units,-0.040pH Units) End point: (7.040pH Units,0.000pH Units) (10.110pH Units,0.010pH Units)	10/4/2011 14:30	10/21/2011 10:00
Correction	jbutt	Delete Region - gap interpolation caused by missing data due to routine sonde maintenance.	10/21/2011 10:30	10/21/2011 13:00
Approval	mlookenbil	Set Approval: 3 - Approved	10/21/2011 13:30	11/3/2011 7:30

Table A8.4 pH Change List: DWS Black River

Type	Creator	Comment	From Time YYYY-MM-DD_HH:MM:SS UTC-05:00	To Time YYYY-MM-DD_HH:MM:SS UTC-05:00
Grade	jbutt	Set Grade: 1 - UNVERIFIED: Drift can't be verified due to battery fail beginning on 11/3/2011 and check against a discrete value was not performed until 11/30/2011	10/21/2011 13:30	11/3/2011 7:30
Correction	jbutt	USGS Multi-point correction Start point: (7.040pH Units,0.000pH Units) (10.110pH Units,0.020pH Units) End point: (7.060pH Units,-0.023pH Units) (10.170pH Units,0.007pH Units)	10/21/2011 13:30	11/3/2011 7:30
Approval	mlookenbil	Set Approval: 3 - Approved	11/3/2011 8:00	11/4/2011 16:00
Correction	mlookenbil	Delete Region	11/3/2011 8:00	11/4/2011 16:00
Grade	jbutt	Set Grade: -2 - UNUSABLE	11/3/2011 8:00	11/4/2011 16:00

Figure A9. pH Change Graph: DWS Black River



Appendix B
Field Forms and Summaries
Saucon Creek DWS Animals In Distress

Appendix C
Field Forms and Summaries
Saucon Creek DWS Black River