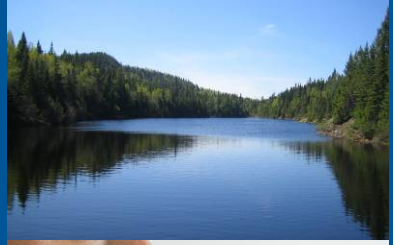
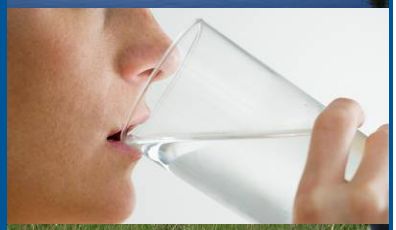






Real-Time Water Quality Deployment Report

Vale Nickel Project

Long Harbour

Newfoundland and Labrador

Annual Report 2011

Government of Newfoundland & Labrador

Department of Environment and Conservation

Water Resources Management Division

St. John's, NL, A1B 4J6 Canada

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Acknowledgements

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Introduction

Background

Continuous water quality monitoring has been underway on Rattling Brook for five years since the deployment of Bridge station in 2006. At present, three surface water quality stations provide water quality data in near-real time at Big Pond station, Bridge station, and Plant Discharge station (Figure 1).

Figure 1: Rattling Brook Water Quality Network

Big Pond was established in the fall of 2009 with the aim of maintaining a record of baseline water quality in the Rattling Brook network. Bridge station, established in late 2006, was established as a baseline monitoring

site prior to any work by Vale in the area. Lastly, Plant Discharge station was commissioned in 2009 to capture the discharge of overland runoff and stormwater from the construction of the Hydromet plant site.

Each of the three stations monitor water temperature, pH, specific conductivity, total dissolved solids, dissolved oxygen, turbidity, and stage level/flow. Additionally, during routine QA/QC procedures, grab samples are retrieved and analysed for physical parameters and metal concentrations.

In 2011, effort moved forward from major earthworks into the infrastructure construction phase of the Hydromet facility. As a result, a general reduction in turbidity has been observed over 2011 and is expected to decline into the future as vegetation begins to stabilize soils, drainage structures are refined, and roadways are improved.

Maintenance and Calibration

Maintenance and calibrations visits are generally scheduled for 30 day deployment periods. In 2011, the mean deployment interval was approximately 32 days. Bridge and Plant Discharge stations were active for 96.4% of 2011 while Big Pond, due to unstable ice conditions, was active for 77.3% of 2011.

Table 1: Maintenance and Calibration Schedule for Rattling Brook Big Pond, 2011

Deployment Date	Removal Date	Duration of Deployment (Days)	Remarks
2010-12-17	2011-01-20	33	S/n 47904 deployed.
2011-01-21	2011-02-24	33	S/n 46319 deployed; removed due to ice conditions
2011-04-29	2011-06-16	47	First deployment since ice removal. S/n 47904 deployed.
2011-06-17	2011-07-20	33	
2011-07-21	2011-08-11	20	
2011-08-12	2011-09-27	45	
2011-09-28	2011-11-03	35	
2011-11-04	2011-12-01	27	
2011-12-02	2012-01-12	40	
Average Duration of Deployment:	31.9 days		
Deployment Efficiency:	282 of 365 days (77.3%)		

Table 2: Maintenance and Calibration Schedule for Rattling Brook below Bridge, 2011

Deployment Date	Removal Date	Duration of Deployment (Days)	Remarks
2010-12-17	2011-01-20	33	S/n 44604 deployed
2011-01-21	2011-02-24	33	
2011-02-25	2011-03-31	36	S/n 46319 deployed due to pH bulb damage on S/n 44604.
2011-03-31	2011-04-28	28	S/n 44604 deployed.
2011-04-29	2011-06-16	47	
2011-06-17	2011-07-20	33	
2011-07-21	2011-08-11	20	

Deployment Date	Removal Date	Duration of Deployment (Days)	Remarks
2011-08-12	2011-09-27	45	
2011-09-28	2011-11-03	35	
2011-11-04	2011-12-01	27	
2011-12-01	2012-01-12	41	S/n 44604 switched out with S/n 60393.
Average Duration of Deployment:	32 days		
Deployment Efficiency:	352 of 365 days (96.4 %)		

Table 3: Maintenance and Calibration Schedule for Rattling Brook below Plant Discharge, 2011

Deployment Date	Removal Date	Duration of Deployment (Days)	Remarks
2010-12-17	2011-01-20	33	
2011-01-20	2011-02-24	34	
2011-02-25	2011-03-31	36	
2011-03-31	2011-04-28	28	
2011-04-29	2011-06-16	47	
2011-06-17	2011-07-20	33	
2011-07-21	2011-08-11	20	
2011-08-12	2011-09-27	45	
2011-09-28	2011-11-03	35	
2011-11-04	2011-12-01	27	
2011-12-02	2012-01-12	40	
Average Duration of Deployment:	32 days		
Deployment Efficiency:	352 of 365 days (96.4 %)		

Results and Discussion

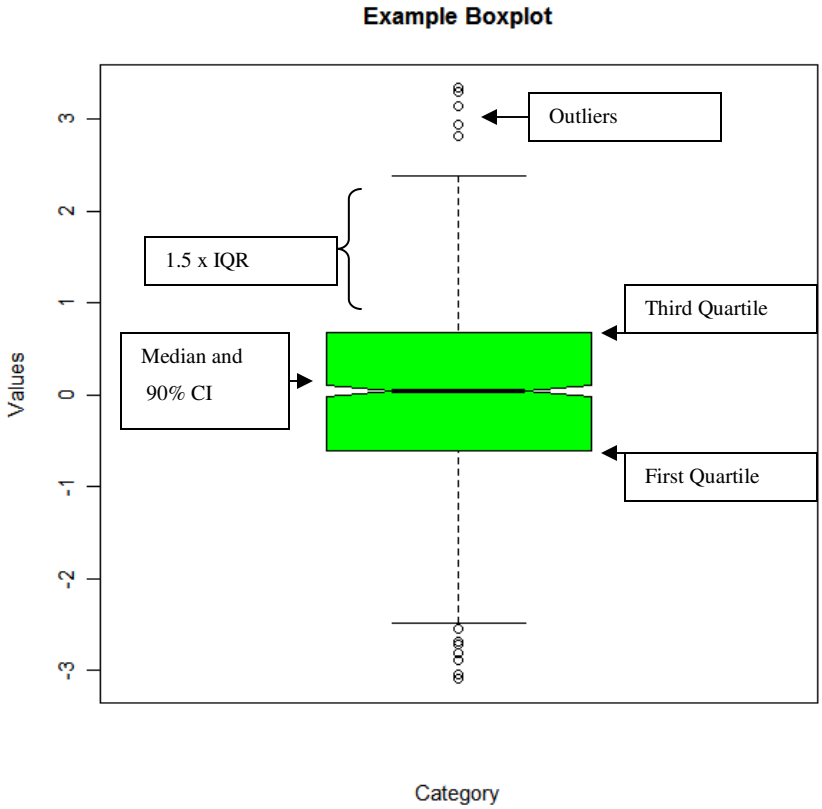
In the following sections, water quality trends are examined at a high-level. For detailed explanations of individual events, please see the respective monthly report.

Parameters by Year

The following graphs and discussions detail major water quality parameters for each station year by year. This perspective gives a glimpse at potential long term changes in water quality. For Rattling Brook Big Pond and below Plant Discharge Stations, this represents approximately 27 months (October 2009 – December 2011) whereas Bridge station represents approximately 48 months (January 2008 – December 2011).

This section makes extensive use of the boxplot as shown in Figure 2. A boxplot is useful for illustrating the range of values encountered and presenting the skew of a distribution through the relative placement of first, second (median) and third quantiles. Outliers, or extreme values, are expressed as individual hollow circles once they are outside 1.5 times the interquartile range (IQR). See Figure 2 for details.

Figure 2: Anatomy of a Boxplot



Rattling Brook Big Pond

Commissioned in September 2009, this station is an upgrade to a previously deployed hydrometric station managed solely by the Water Survey of Canada. Since this station is at the top of the Rattling Brook watershed, ideally, the data recorded represents background values for the Rattling Brook system.

Note that since the station was deployed in the fall of 2009, a complete record for that year is not available. The following boxplots illustrating 2009 are presented for general interest.

Water Temperature

Figure 3: Water Temperature at Rattling Brook Big Pond, 2009 – 2011

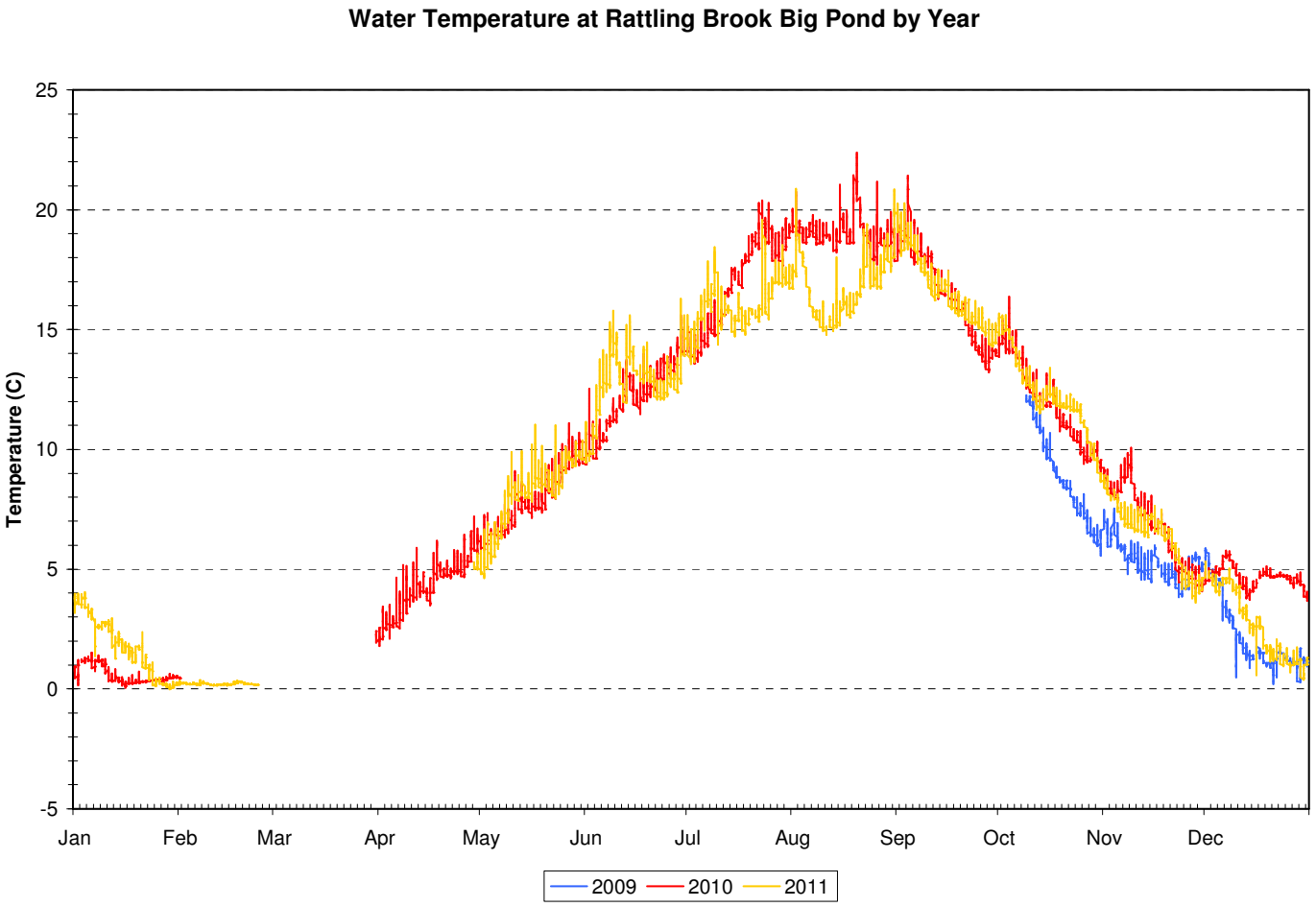
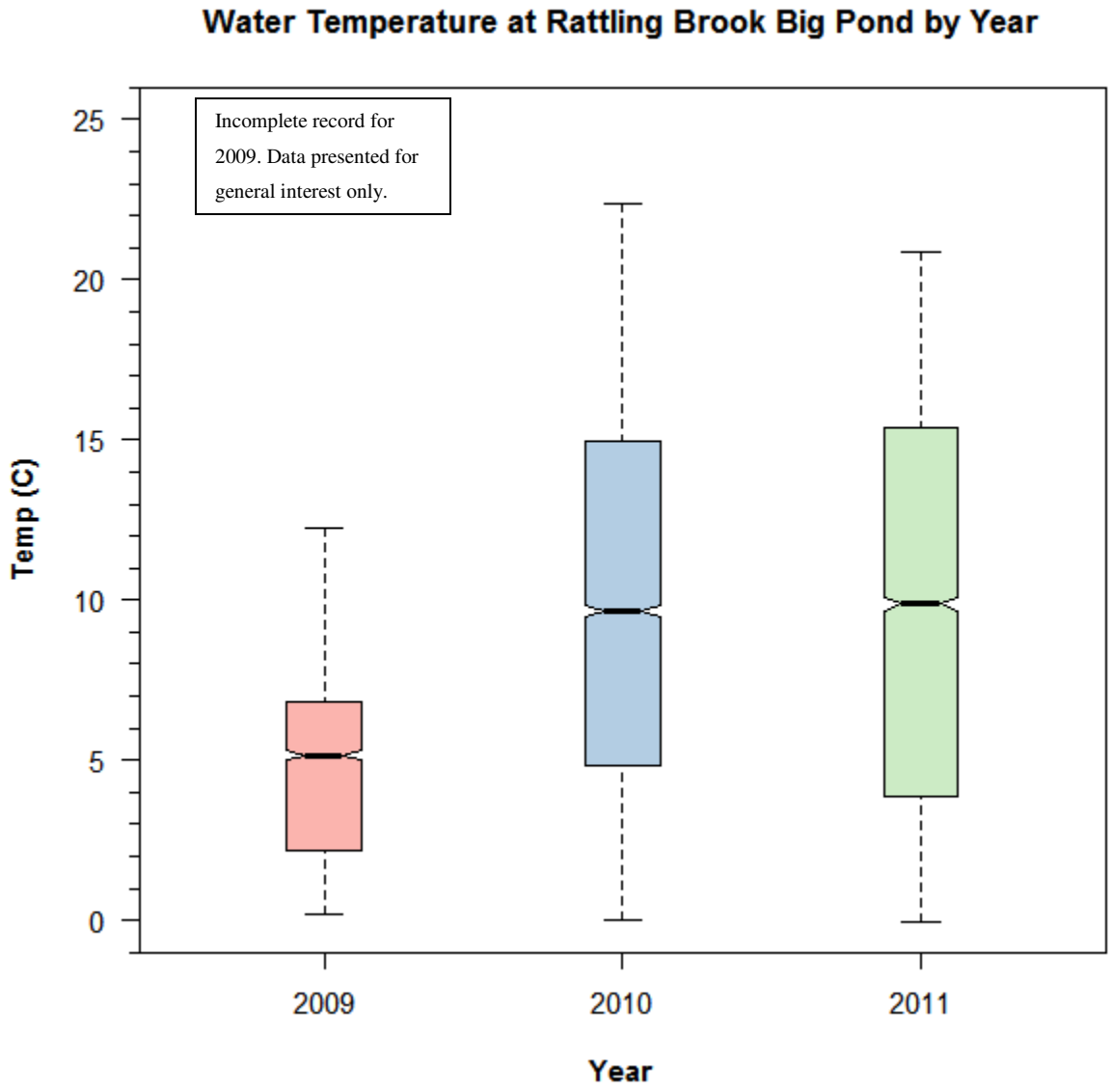


Figure 3 depicts water temperatures at Big Pond station for all of 2010 and 2011 and part of 2009. An annual high of approximately 20°C is apparent from 2010, however poor summer conditions in 2011 illustrates the lack of a clear annual maximum and instead a prolonged plateau near 17°C for the majority of the summer.

In 2011, water temperature ranged from -0.02°C – 20.88°C with a median value of 9.87°C (90% CI: 9.76 – 10.13°C.

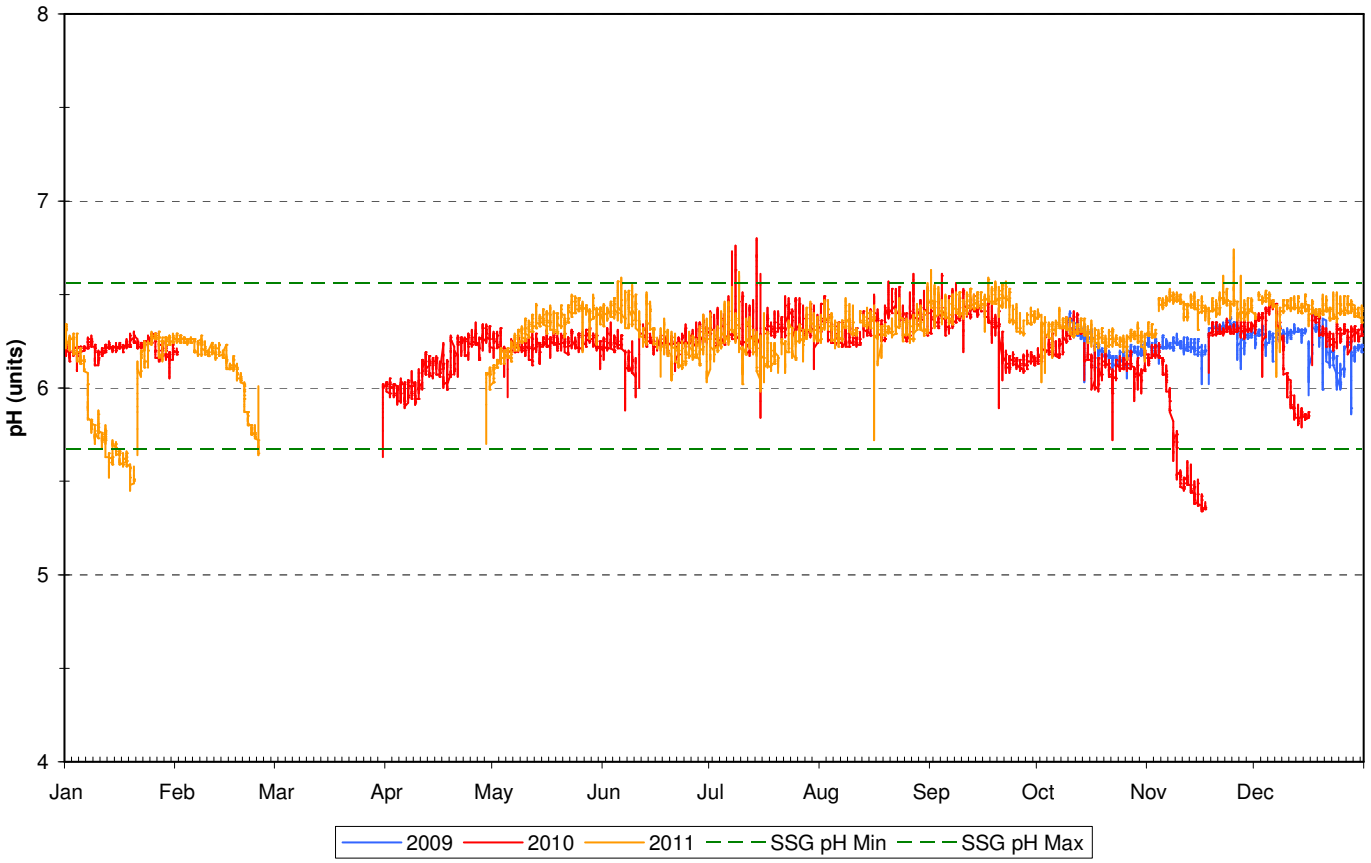
Figure 4: Boxplots of Water Temperature at Rattling Brook Big Pond, 2009 – 2011



Water temperatures are comparable between 2010 and 2011. Since the station was commissioned in October 2009, warm summer temperature values were missed, skewing the distribution towards lower values.

pH

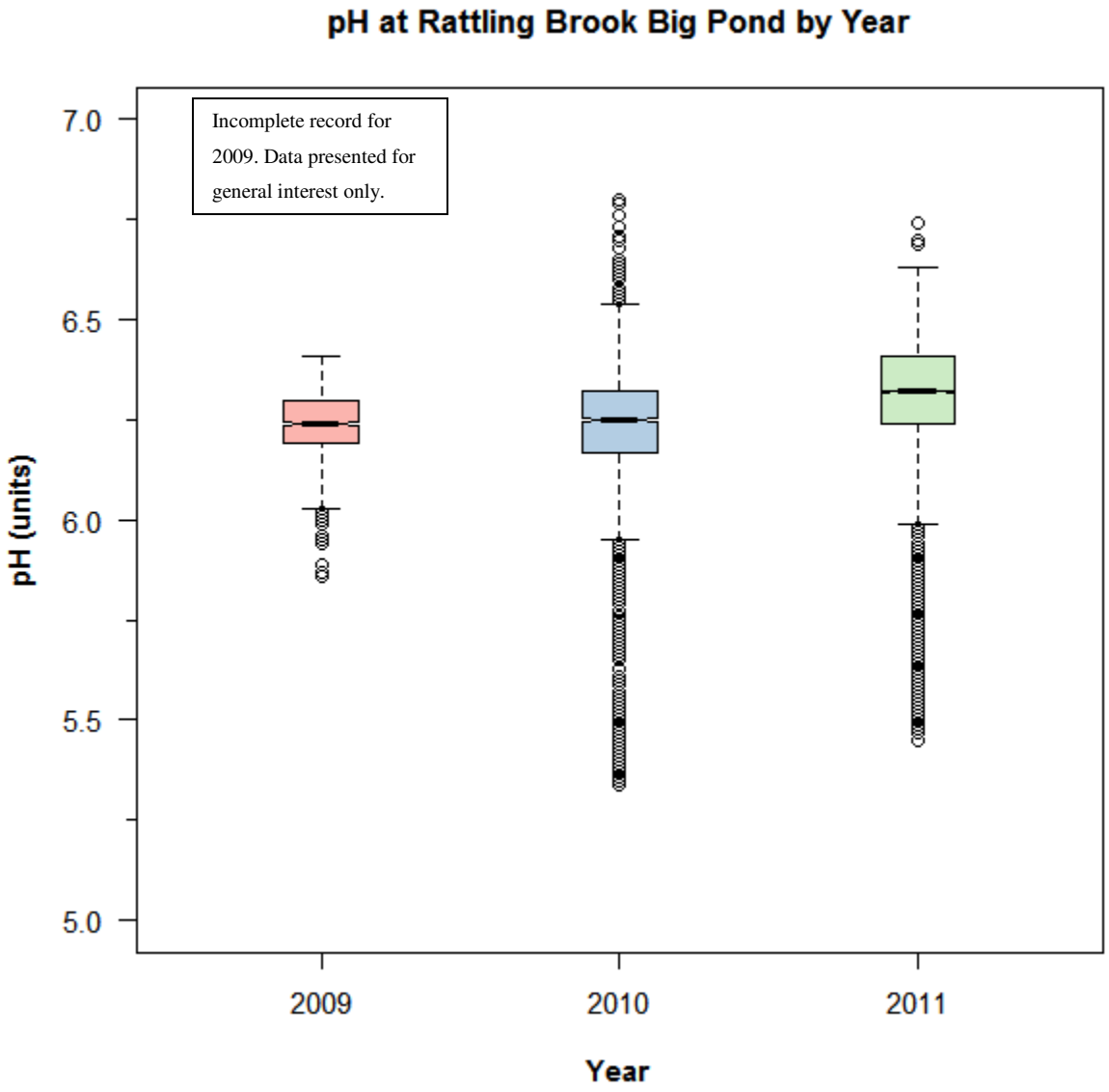
Figure 5: pH at Rattling Brook Big Pond, 2009 – 2011



In 2011, only 2.5% of pH readings were found to fall outside the site specific guidelines developed for the Rattling Brook river system (176 of 7038 records). Since the guidelines were developed using the 5th and 95th percentiles for the river system as a whole, up to 10% of all Rattling Brook values could be expected to fall outside the guidelines.

In 2011, pH values ranged between 5.45 and 6.74 with a median of 6.32 (90% CI: 6.32 – 6.33).

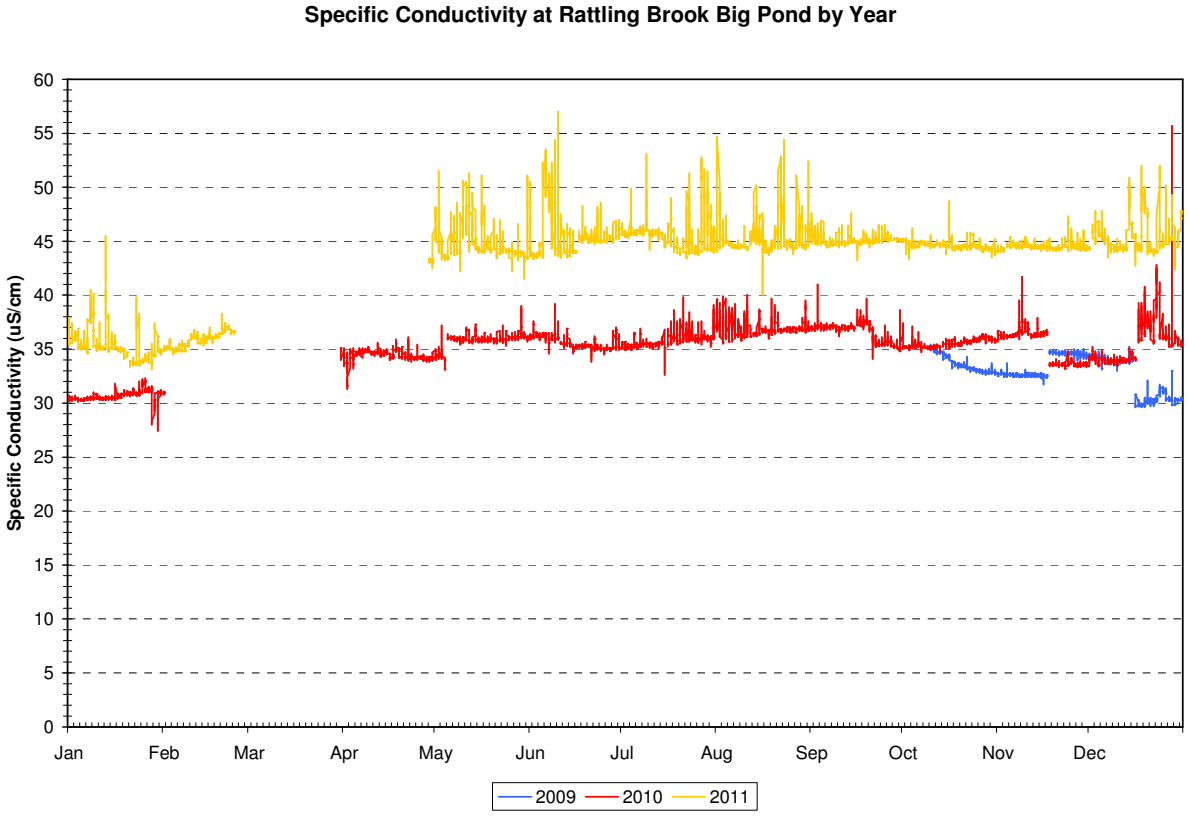
Figure 6: Boxplots of pH at Rattling Brook Big Pond, 2009 – 2011



Observing Figure 6 indicates that the median pH value in 2011 is higher than it was in 2010. Indeed, the median value calculated in 2010 was 6.25 versus 6.32 in 2011. This may be due to many factors including natural variation or some construction efforts in the area around Big Pond station. In 2011 some earth works were completed in the development of a water intake structure. Disturbance of the land in the area could result in the mobilization of soil solids that could affect pH.

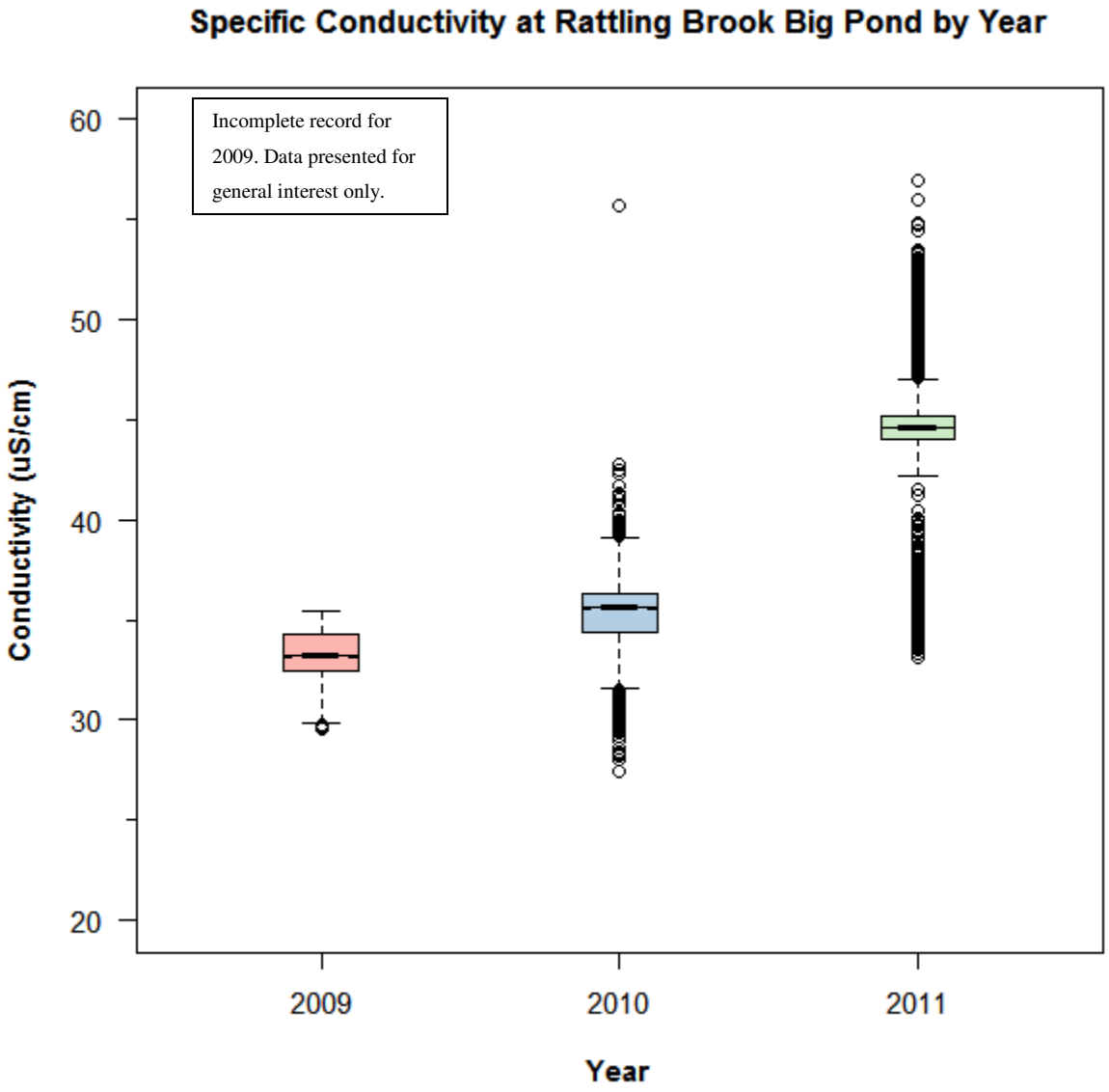
Specific Conductivity

Figure 7: Specific Conductivity at Rattling Brook Big Pond, 2009 – 2011



Specific conductivity fell between 33.1 and 57.0 µS/cm during 2011 with a median of 44.6 µS/cm (90% CI: 44.5 µS/cm – 44.6 µS/cm). Natural variability and the development of a nearby intake structure are likely major factors in the disparity in conductivity values between 2010 and 2011.

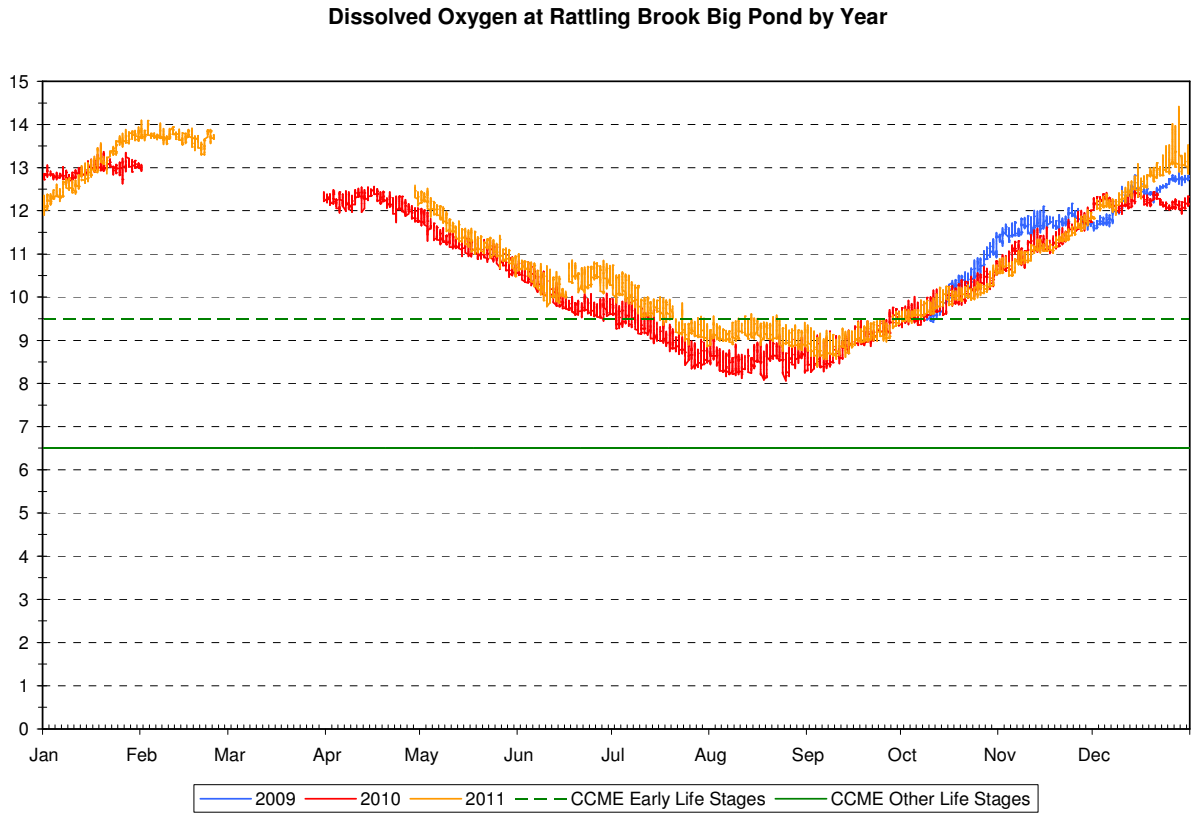
Figure 8: Boxplots of Specific Conductivity at Rattling Brook Big Pond, 2009 – 2011



A significant difference is oserved in the range of conductivity from 2010 to 2011. In 2010, a median value of 35.6 µS/cm was calculated compared to 44.6 µS/cm in 2011.

Dissolved Oxygen

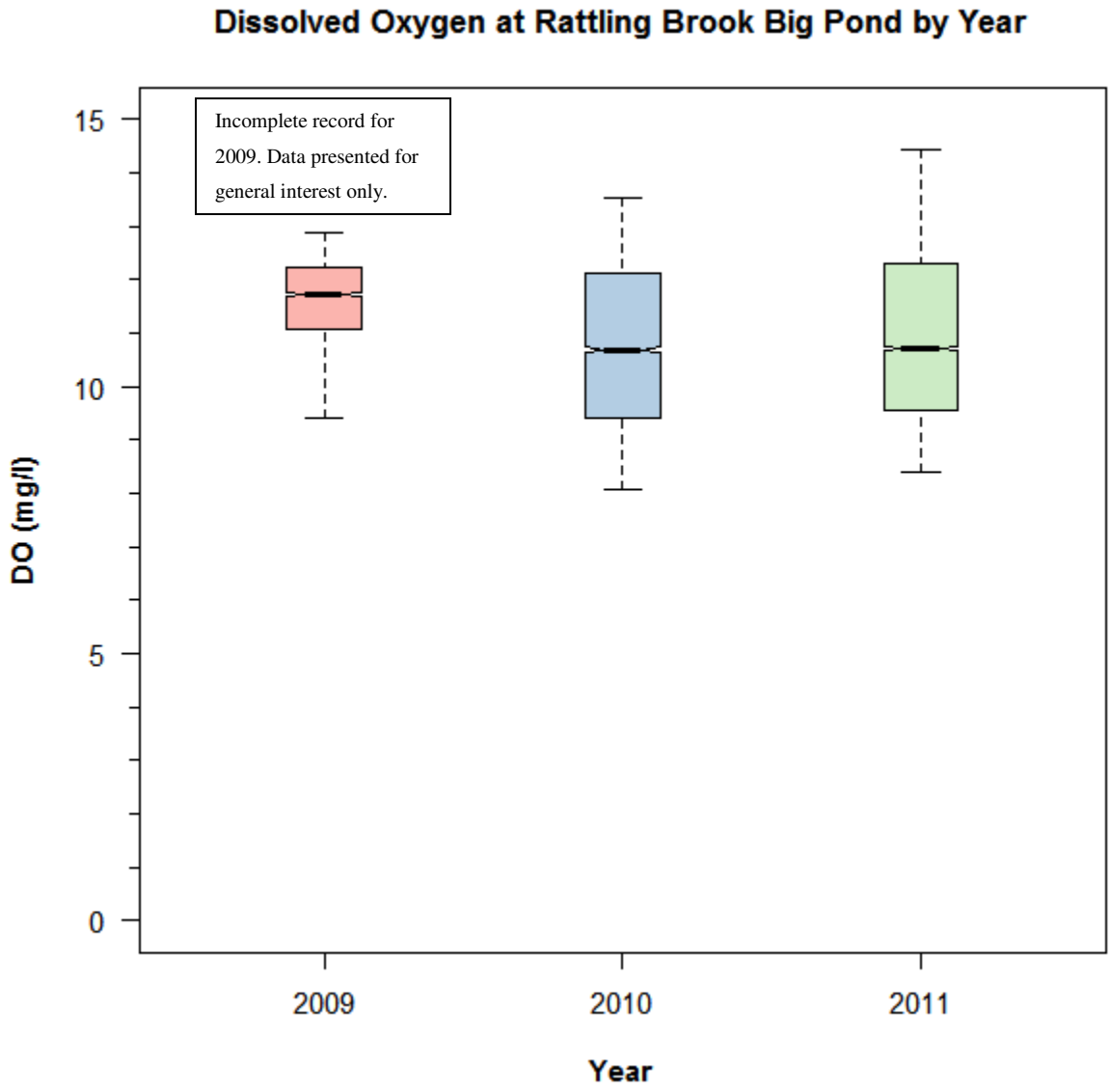
Figure 9: Dissolved Oxygen at Rattling Brook Big Pond, 2009 – 2011



The natural annual cycle in dissolved oxygen concentration is seen above. Due to the inverse relationship between oxygen solubility and water temperature, concentrations of DO are highest in cold winter waters and lowest in warm summer waters. In the limited history of DO values at Big Pond station, at no time has oxygen concentration dropped below the CCME guideline of 6.5 mg/l for the protection of non-juvenile life stage biota.

In 2011, DO concentrations fell between 8.39 mg/l and 14.42 mg/l with a median value of 10.71 mg/l (90% CI: 10.67 mg/l – 10.77 mg/l).

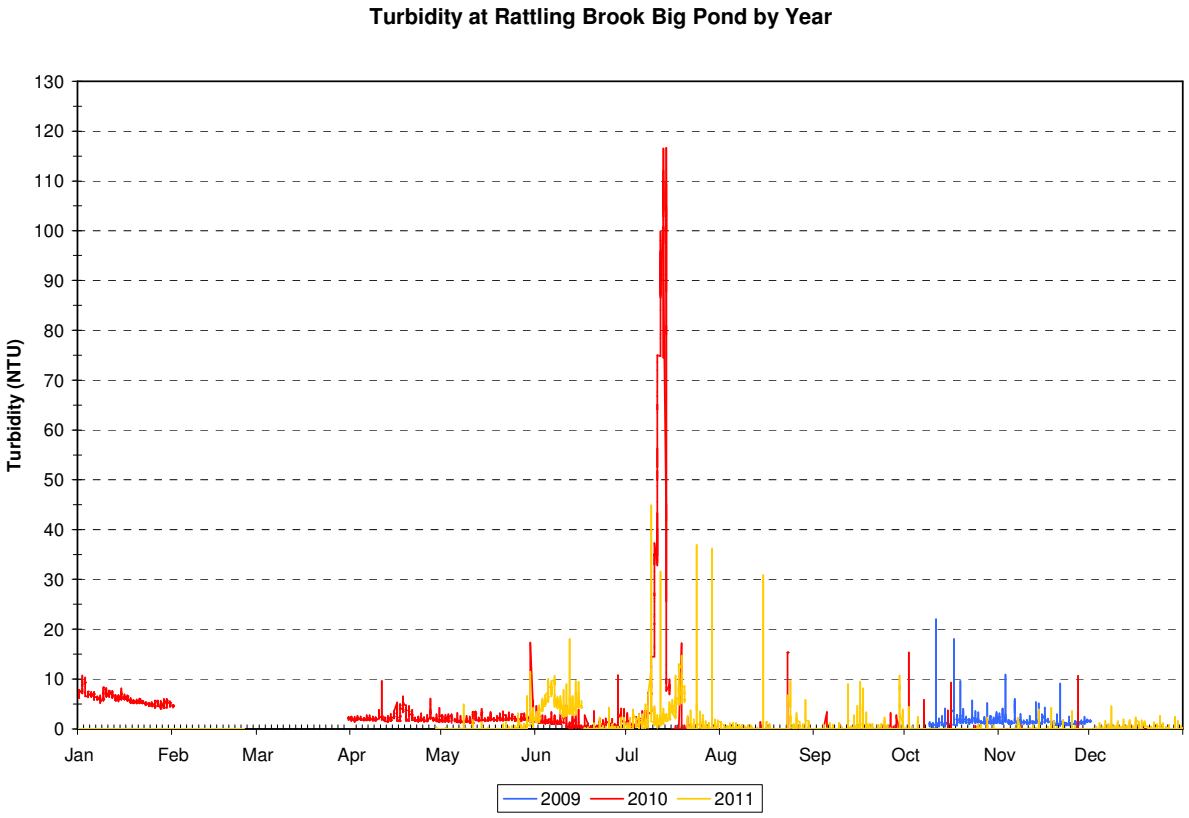
Figure 10: Boxplots of Dissolved Oxygen at Rattling Brook Big Pond, 2009 – 2011



A slight difference between 2010 and 2011 DO values is expected because of the cooler summer temperatures in 2011. In 2010, the median DO value was calculated as 10.69 mg/l versus 10.71 mg/l.

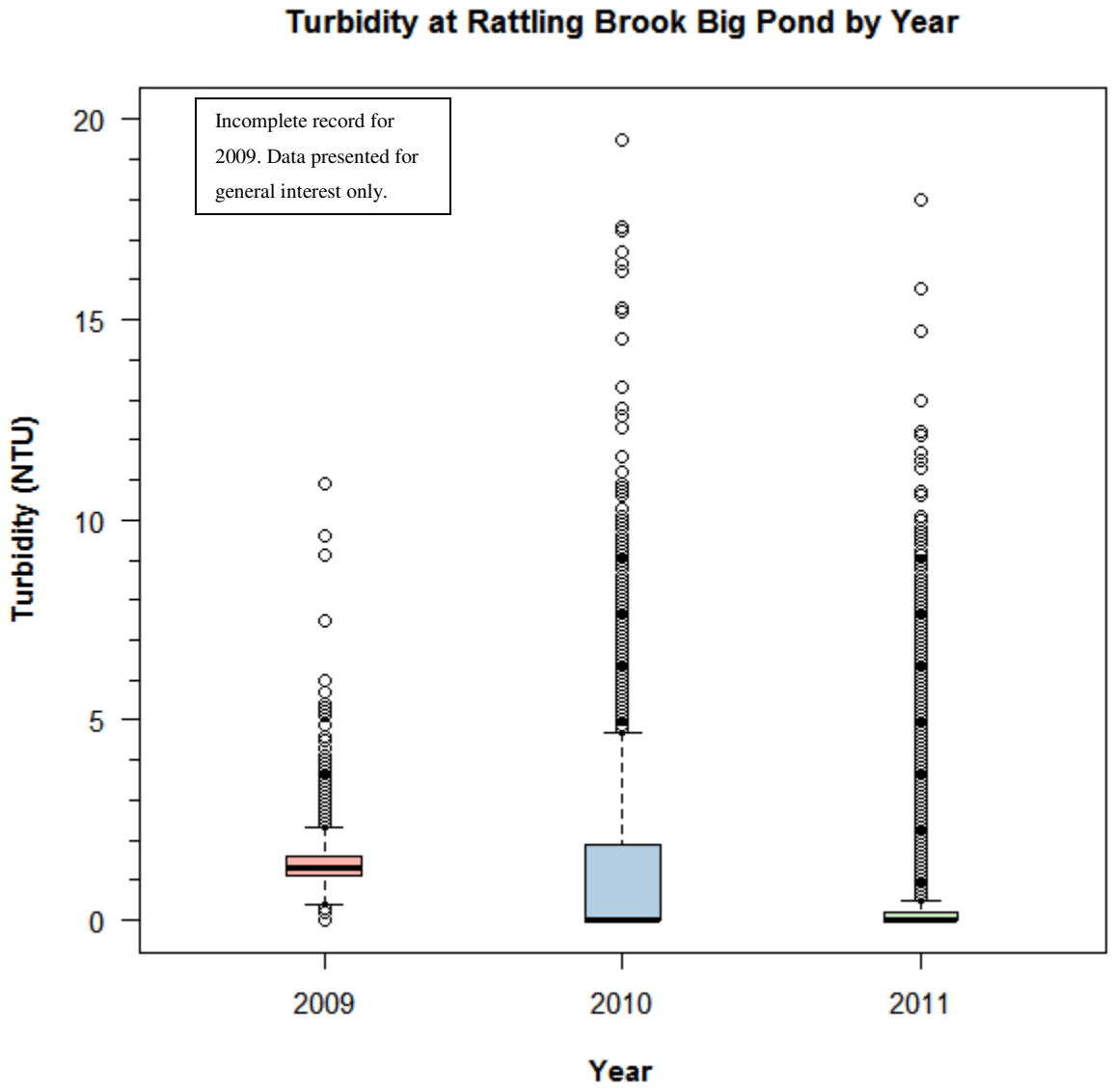
Turbidity

Figure 11: Turbidity at Rattling Brook Big Pond, 2009 – 2011



Turbidity values in 2011 ranged from 0.0 NTU to 44.9 NTU with a median value of 0.0 NTU (90% CI: 0.0 NTU – 0.0 NTU). This clearly indicates that greater than 505 of all recordings in this report year showed an absence of measurable turbidity.

Figure 12: Boxplots of Turbidity at Rattling Brook Big Pond, 2009 – 2011

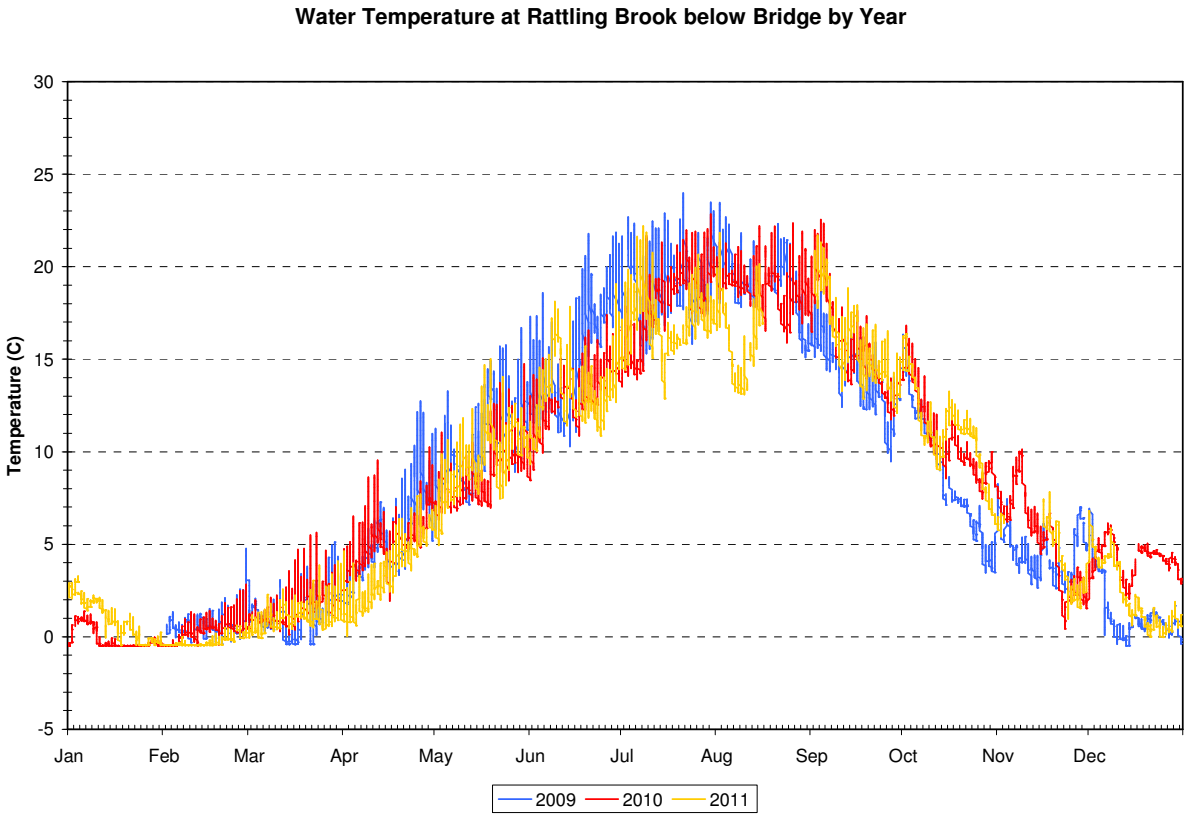


It is clear from the figure above that upper-range turbidity values have decreased substantially from 2010. While median values from both years were found to be 0.0 NTU, the third quartile of turbidity values in 2010 was 1.9 NTU versus 0.2 NTU in 2011.

Rattling Brook below Bridge

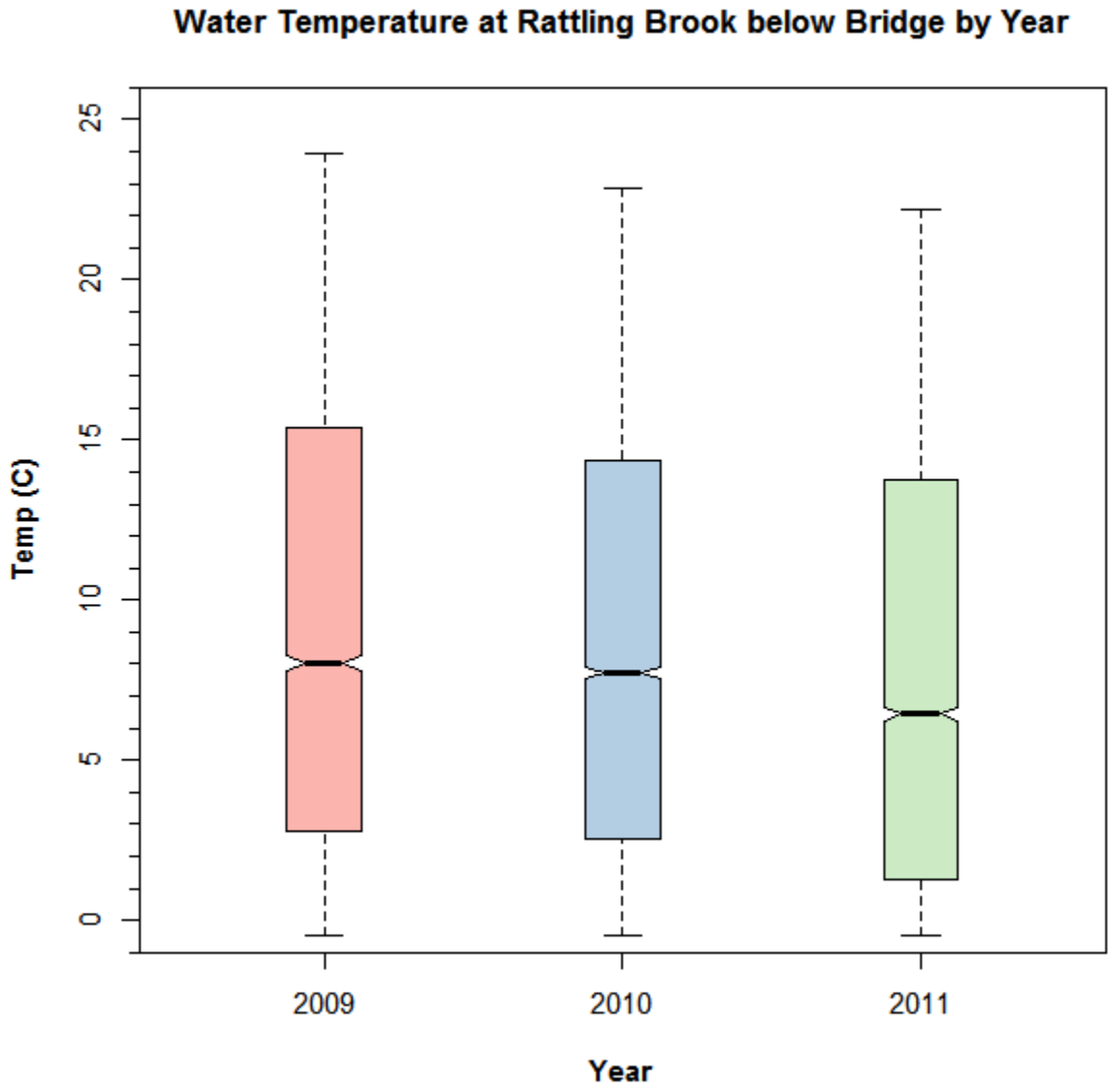
Water Temperature

Figure 13: Water Temperature at Rattling Brook below Bridge, 2009 – 2011



Water temperature ranged from -0.48°C to 22.2°C with a median of 3.97°C (90% CI: 3.80 – 4.14°C). Compared to previous years, it is apparent that summer water temperatures in 2011 were cooler than 2009 and 2010.

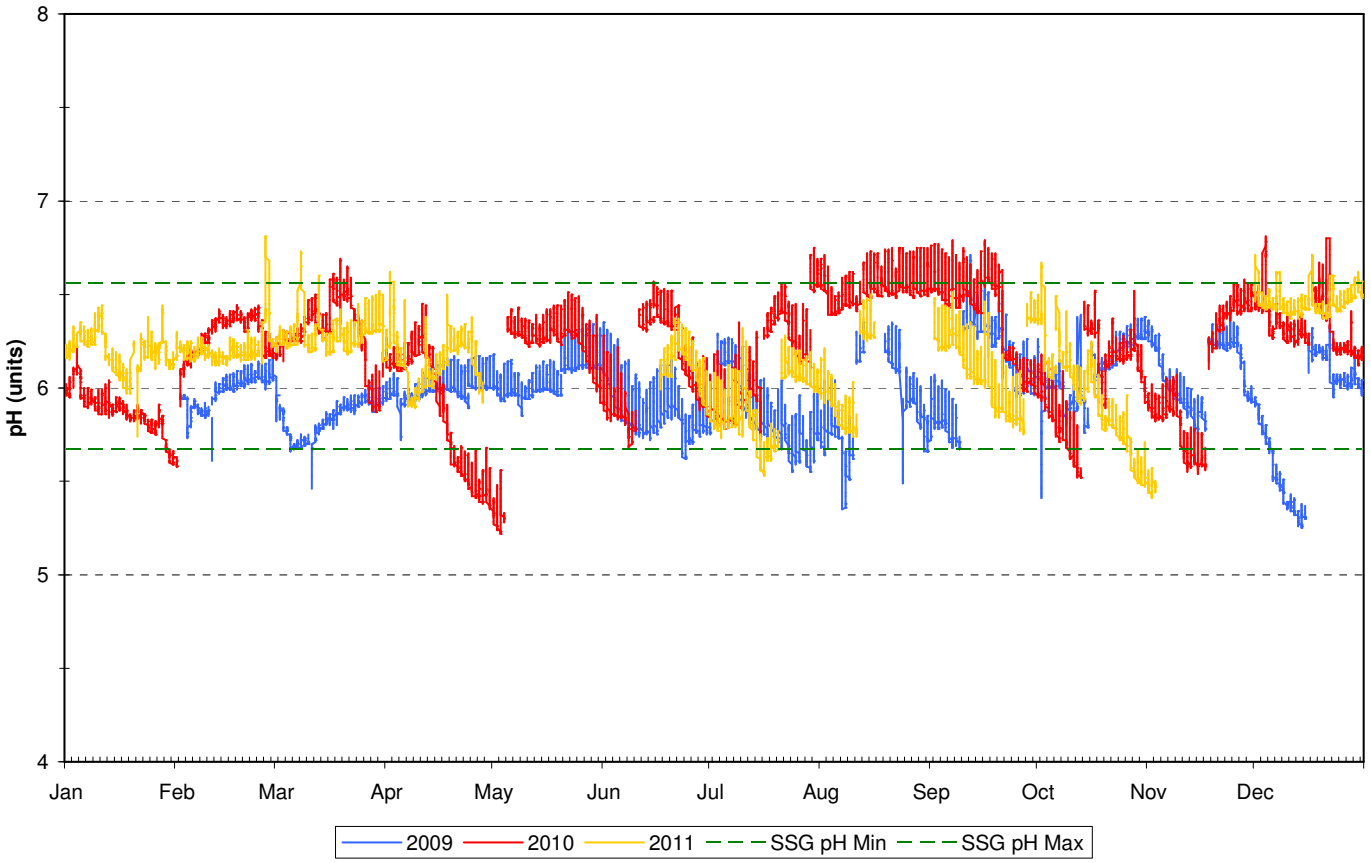
Figure 14: Boxplots of Water Temperature at Rattling Brook below Bridge, 2009 – 2011



While the median water temperatures in 2009 and 2010 are close (indicated by overlapping notches on the boxplots) there is a clear difference between 2011 and previous years.

pH

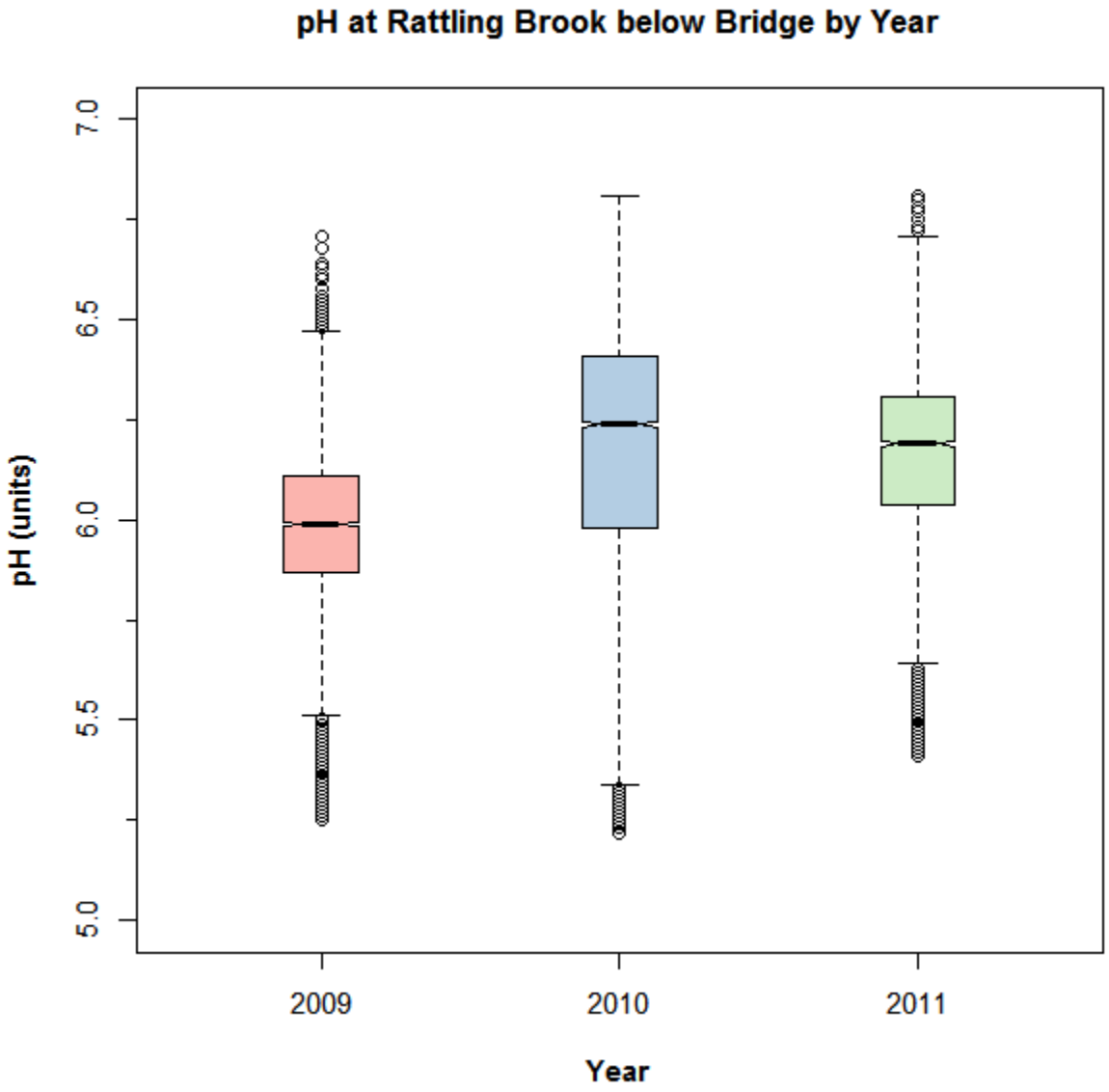
Figure 15: pH at Rattling Brook below Bridge, 2009 – 2011



In 2011, 7.67% of pH values fell outside the site specific guidelines of 5.67 – 6.56 (468 of 6101). This is below the allowed 10% of values.

pH values fell between 5.14 and 6.81 during 2011 with a median value of 6.19 (90% CI: 6.18 – 6.19).

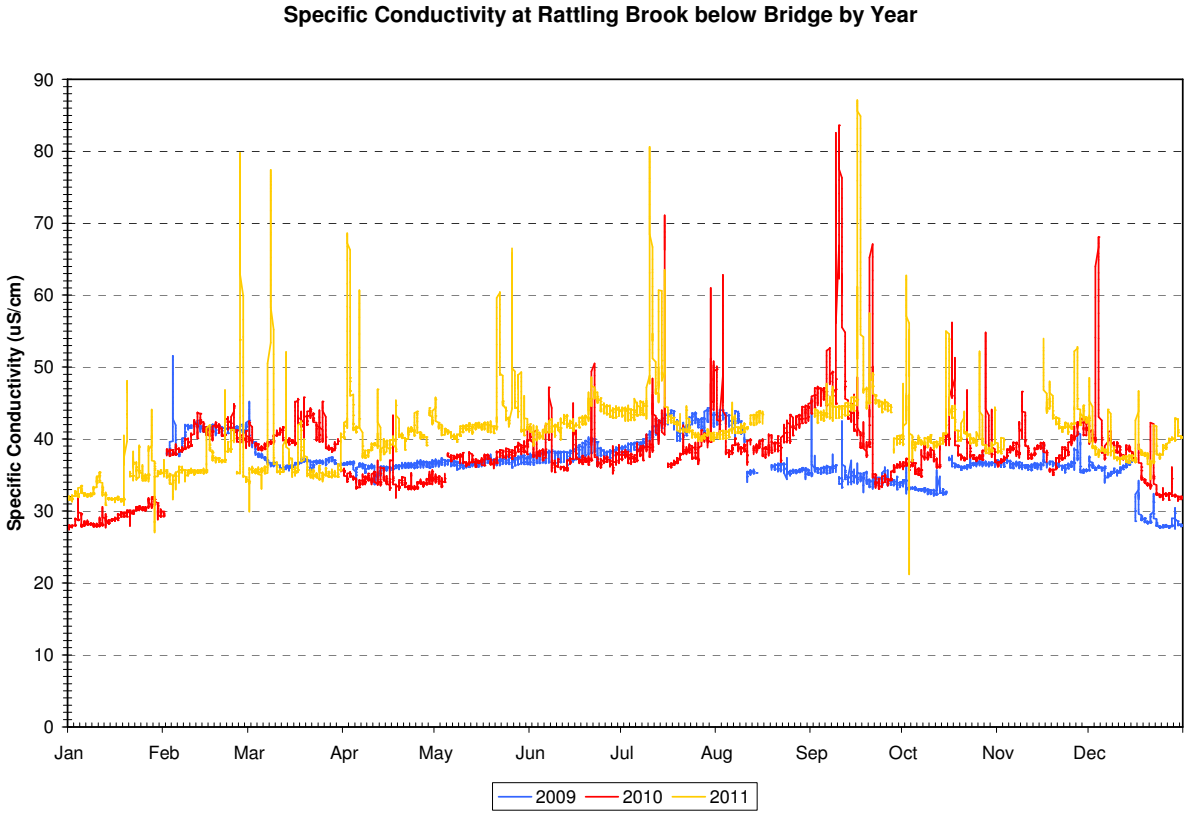
Figure 16: Boxplots of pH at Rattling Brook below Bridge, 2009 – 2011



The median pH value in 2011 was higher than in 2009, but lower than 2010. Further, the tendency of pH values to be somewhat spread out from the median in 2010 has been reduced to a more defined distribution in 2011. In 2010, a median pH value of 6.24 was calculated versus 6.19 in 2011.

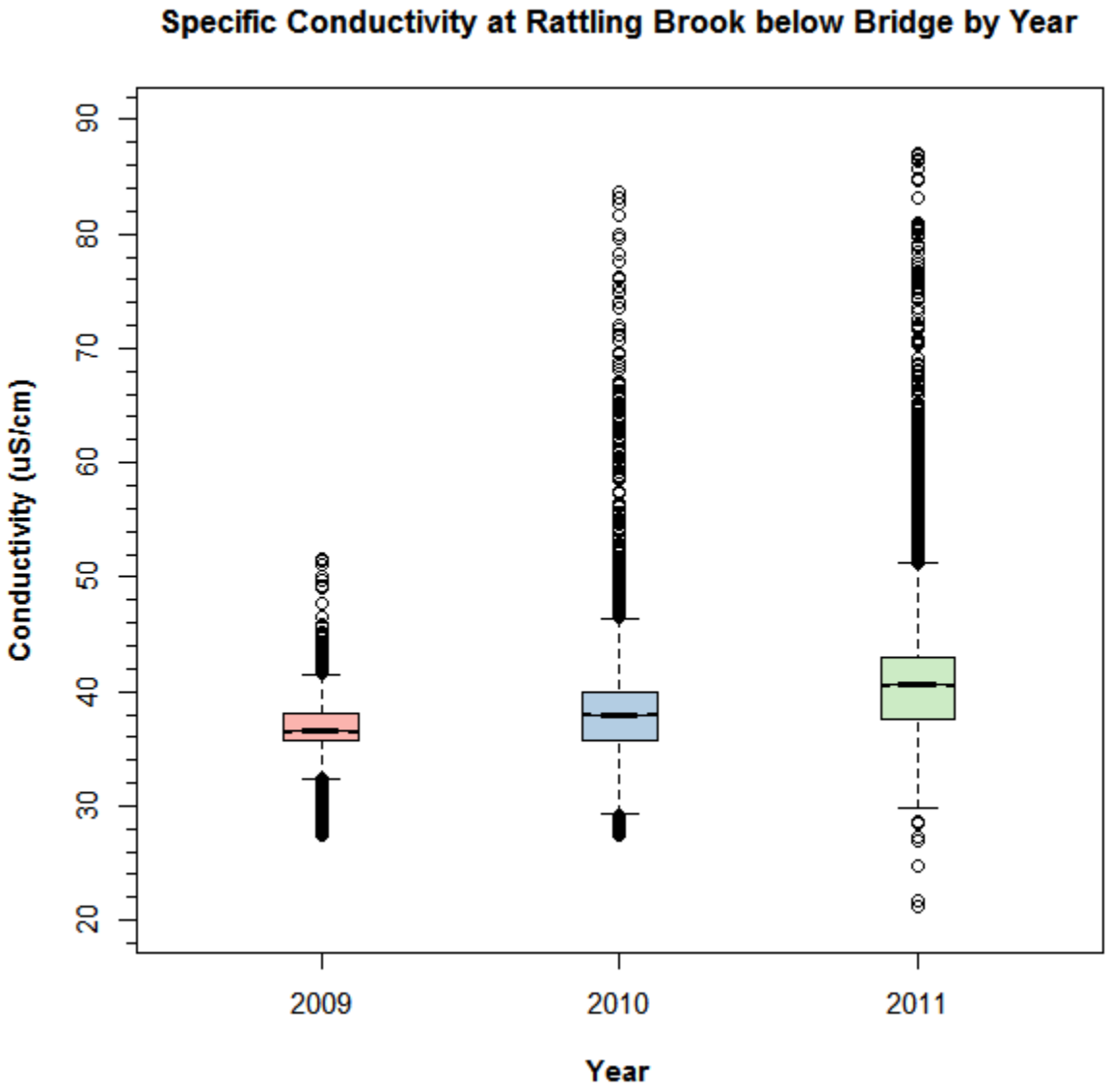
Specific Conductivity

Figure 17: Specific Conductivity at Rattling Brook below Bridge, 2009 – 2011



Specific Conductivity values fell between 21.1 µS/cm to 87.1 µS/cm with a median value of 39.7 µS/cm (90% CI: 39.6 µS/cm – 39.9 µS/cm).

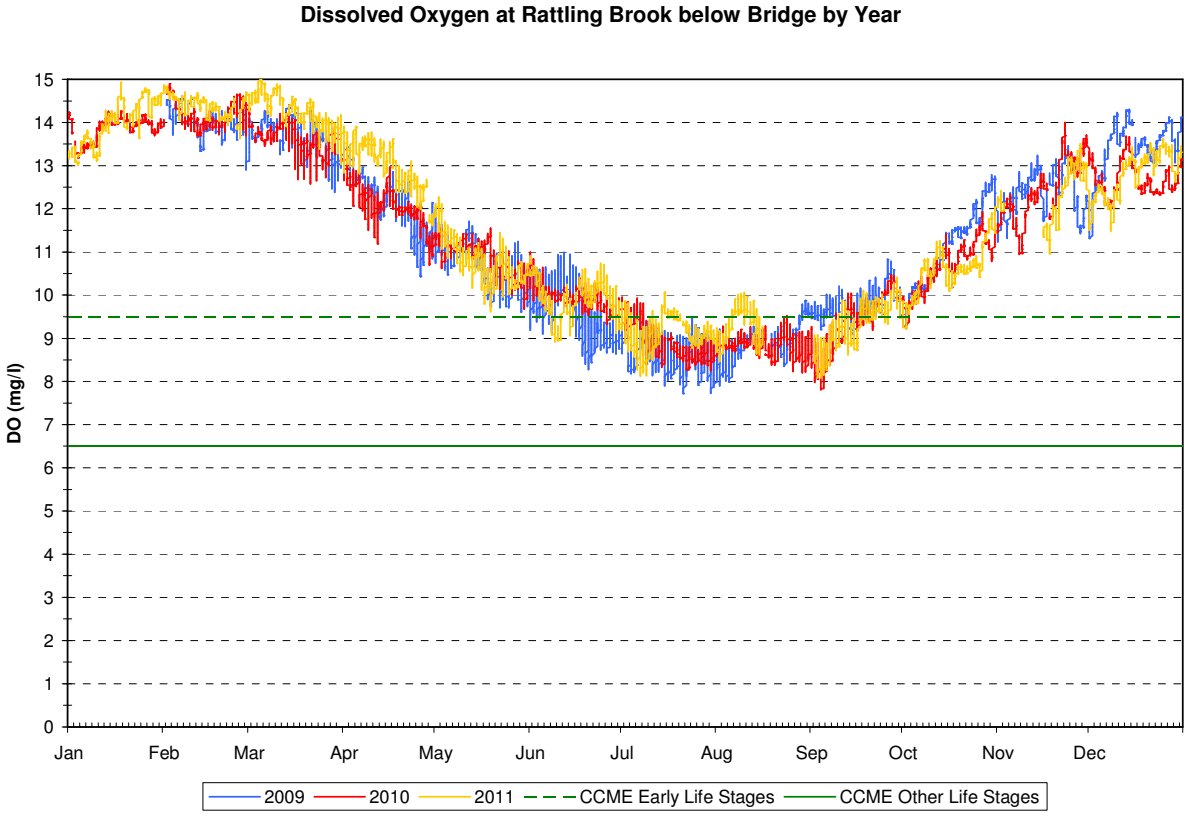
Figure 18: Boxplots of Specific Conductivity at Rattling Brook below Bridge, 2009 – 2011



Specific conductivity values increased once again since 2009. With large earth movement, tree removal and traffic through the area, the mobilization of previously bound sediments and soil elements, in addition to runoff from the construction site, this is expected to occur.

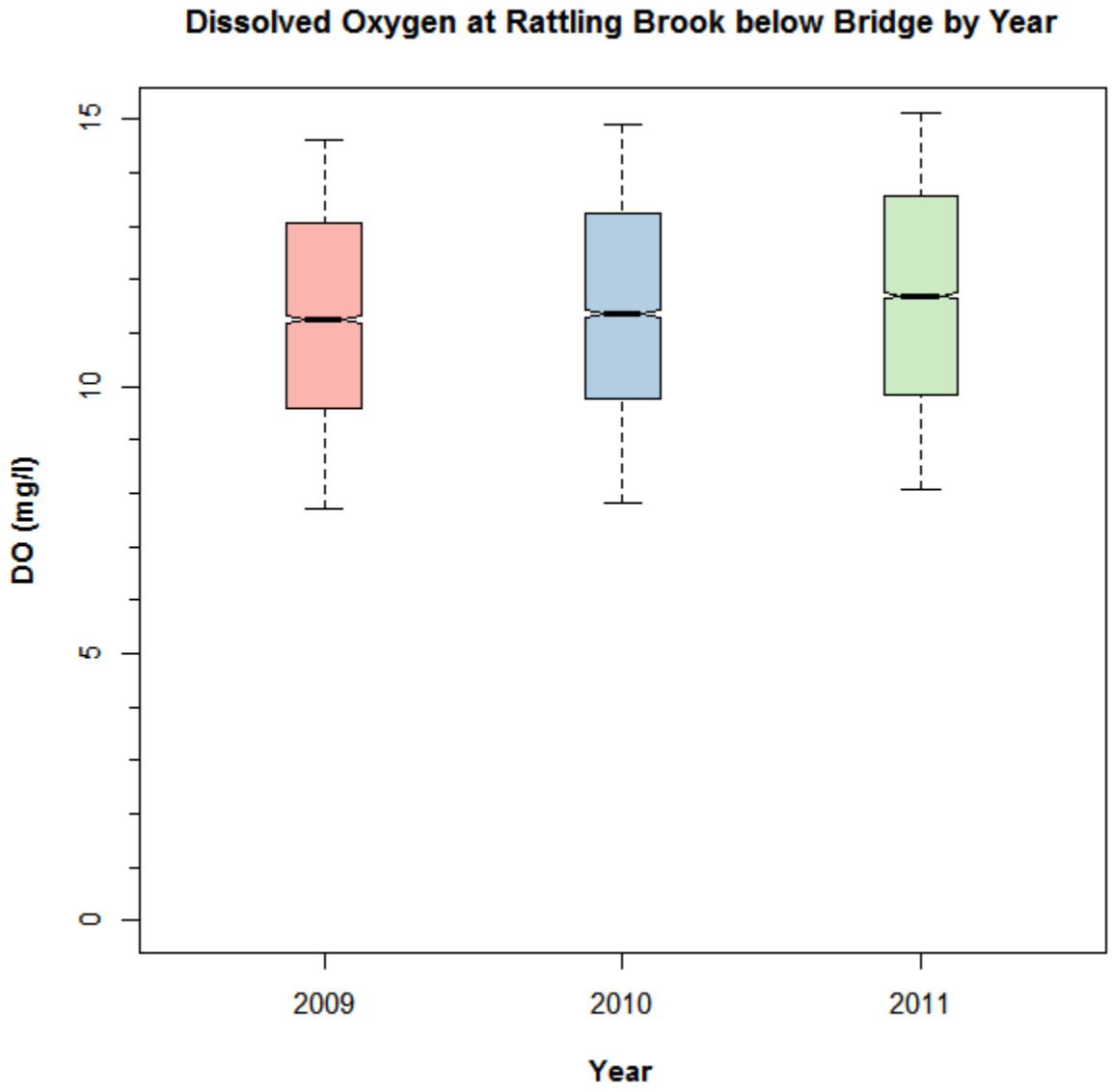
Dissolved Oxygen

Figure 19: Dissolved Oxygen at Rattling Brook below Bridge, 2009 – 2011



All dissolved oxygen values in 2011 were found to be above the CCME guideline of 6.5 mg/l for the protection of non-juvenile aquatic biota. Values ranged from 8.08 mg/l to 15.11 mg/l with a median value of 11.70 mg/l (90% CI: 11.58 mg/l – 11.86 mg/l).

Figure 20: Boxplots of Water Temperature at Rattling Brook below Bridge, 2009 – 2011

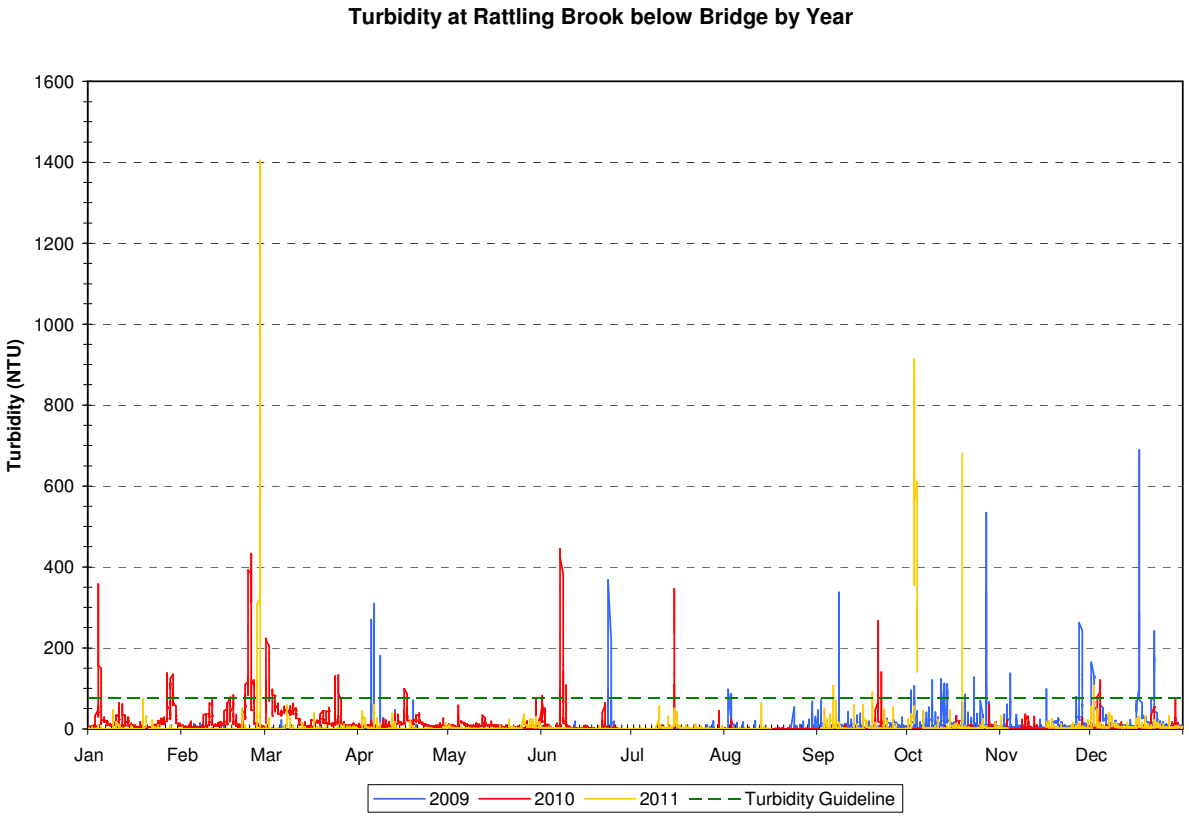


Dissolved oxygen concentrations tend to follow the same range from year-to-year at below Bridge station. In 2010, however, the median DO concentration was found to be 11.36* mg/l versus 11.70 mg/l in 2011 due to the lower summer water temperatures.

* This value has been revised since the initial publication of the 2010 Annual Report. In 2010, the median DO concentration was reported as 10.69 mg/l (90% CI: 10.62 mg/l – 10.76 mg/l).

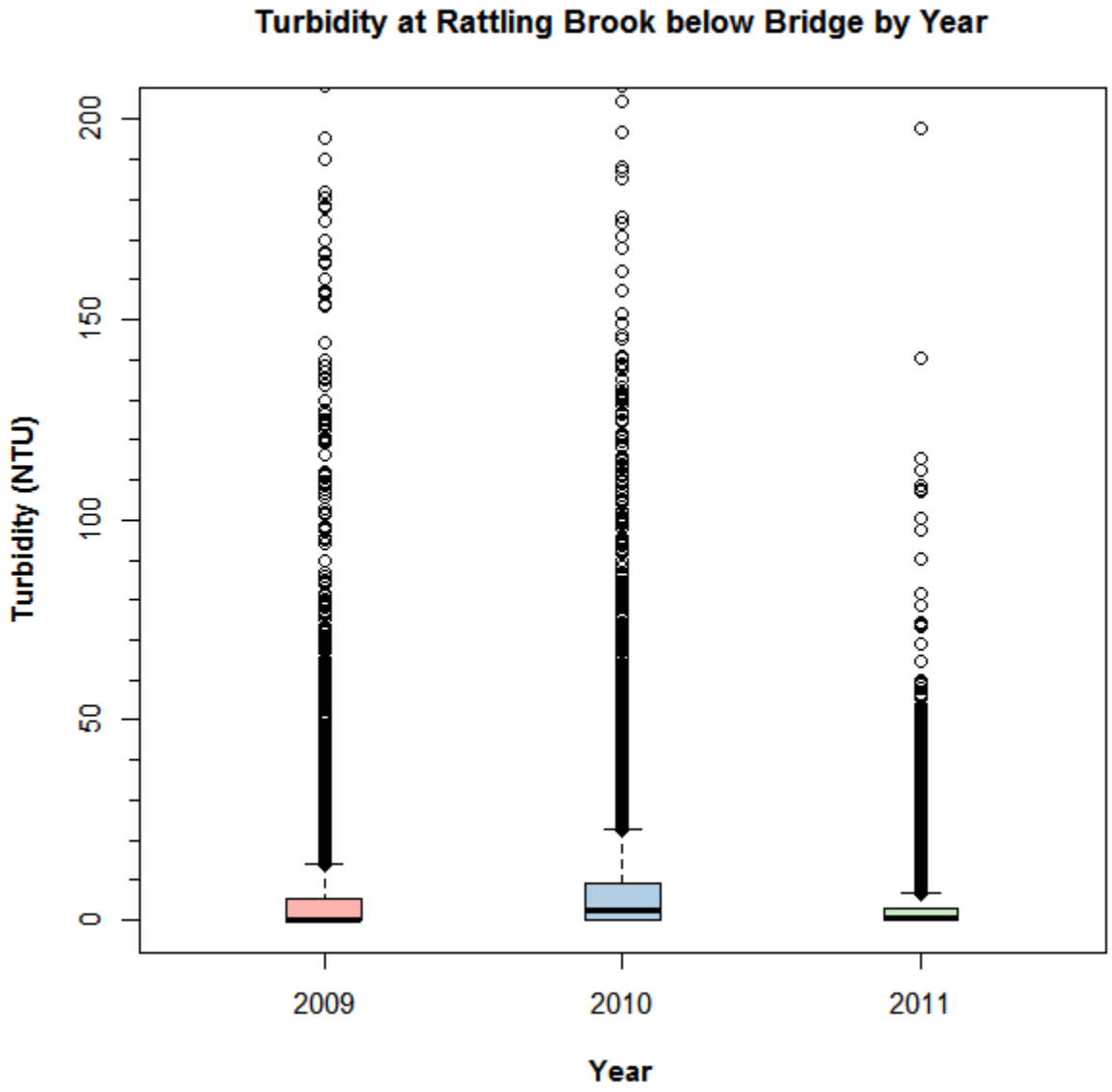
Turbidity

Figure 21: Turbidity at Rattling Brook below Bridge, 2009 – 2011



In 2011, after reviewing and removing obvious erroneous turbidity readings, only 0.59% of turbidity measurements were above the turbidity threshold of 75 NTU (36 readings of 6101). Values fell between 0.0 NTU and 1405 NTU with a median value of 0.1 NTU (90% CI: 0.0 – 0.1 NTU) for the year.

Figure 22: Boxplots of Turbidity at Rattling Brook below Bridge, 2009 – 2011

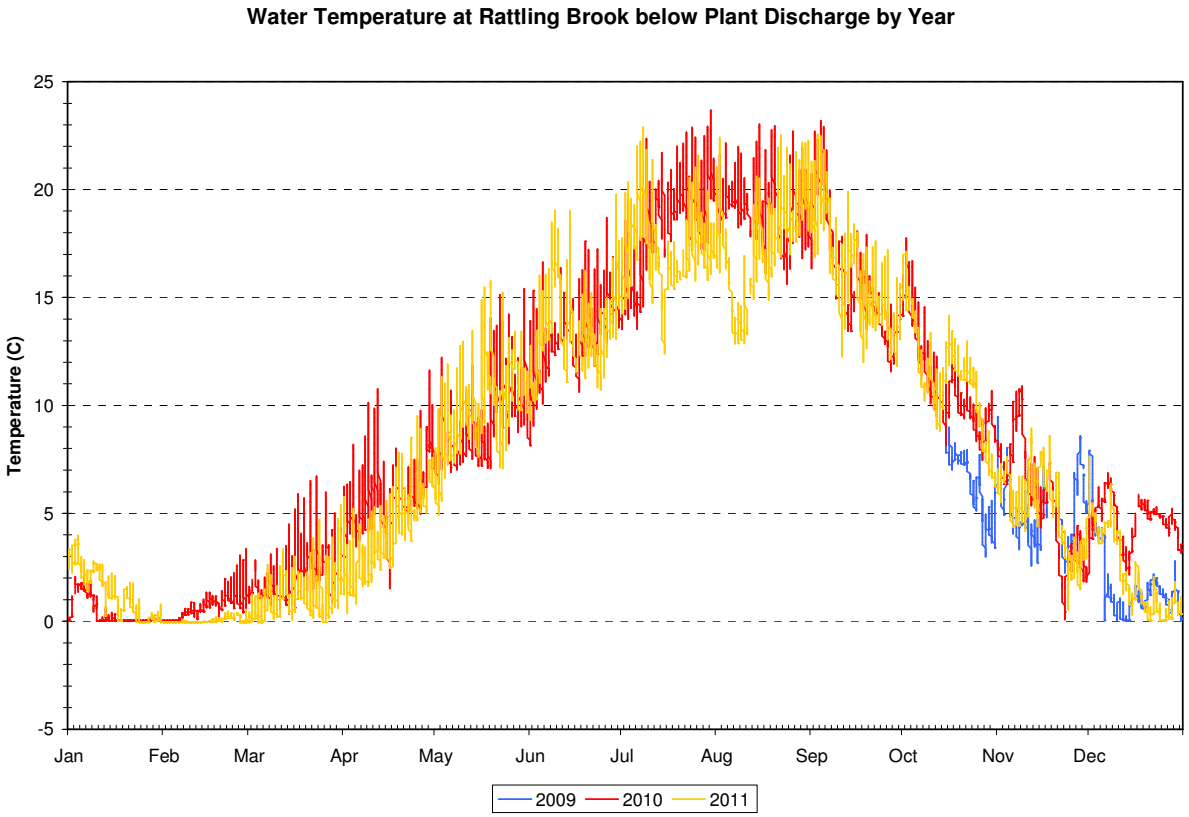


It appears that turbidity levels at below Bridge station have fallen significantly since 2010. This may be attributed to the settling of soil after heavy earthworks in the previous year and the establishment of effective drainage and settling methods.

Rattling Brook below Plant Discharge

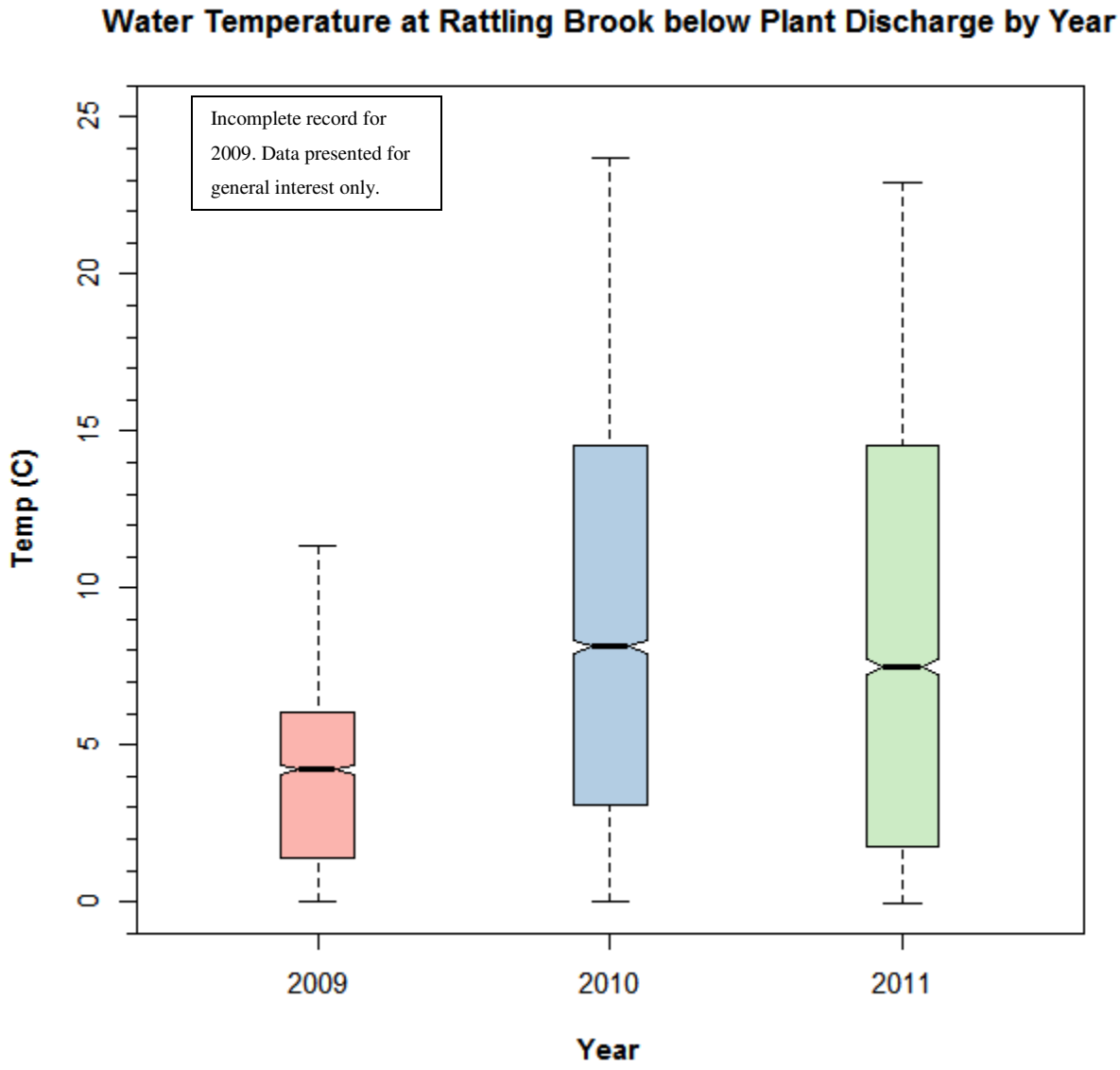
Water Temperature

Figure 23: Water Temperature at Rattling Brook below Plant Discahrge, 2009 – 2011



In 2011, water temperature at Discharge station ranged from -0.07°C to 22.89°C with a median value of 7.49°C (90% CI: 7.17°C – 7.79°C). As seen in the other stations, water temperatures did not show a defined peak in August as would be expected. Instead, temperatures were unusually cool, dipping below 15°C when values above 20°C could be expected.

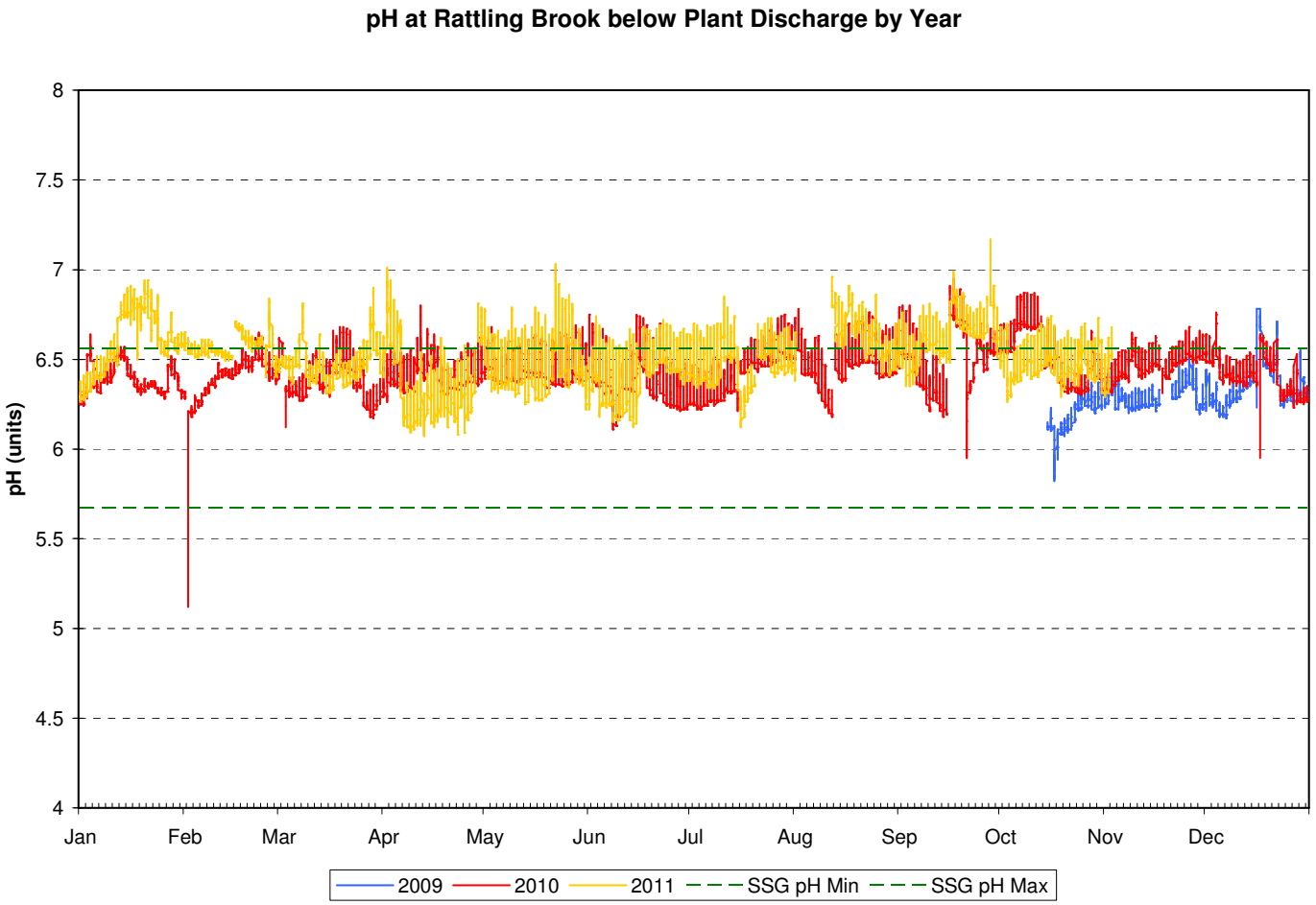
Figure 24: Boxplots of Water Temperature at Rattling Brook below Plant Discharge, 2009 – 2011



First quartile and median temperatures were lower in 2011 compared to 2010 as expected from Figure 23.

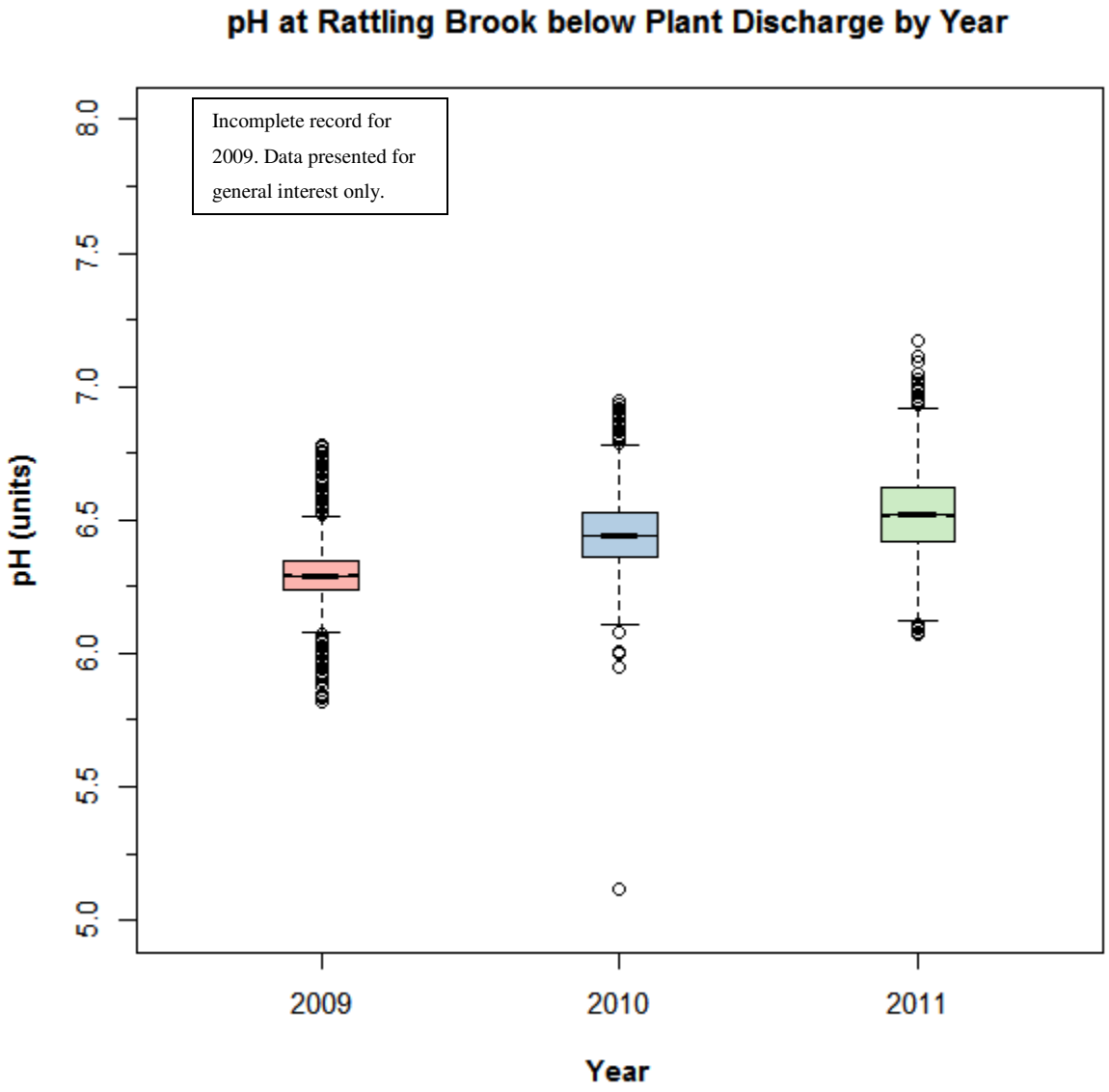
pH

Figure 25: pH at Rattling Brook below Plant Discahrge, 2009 – 2011



pH at below Plant Discharge station fell between 6.07 and 7.17 in 2011 with a median value of 6.52 (90% CI: 6.52 – 6.53).

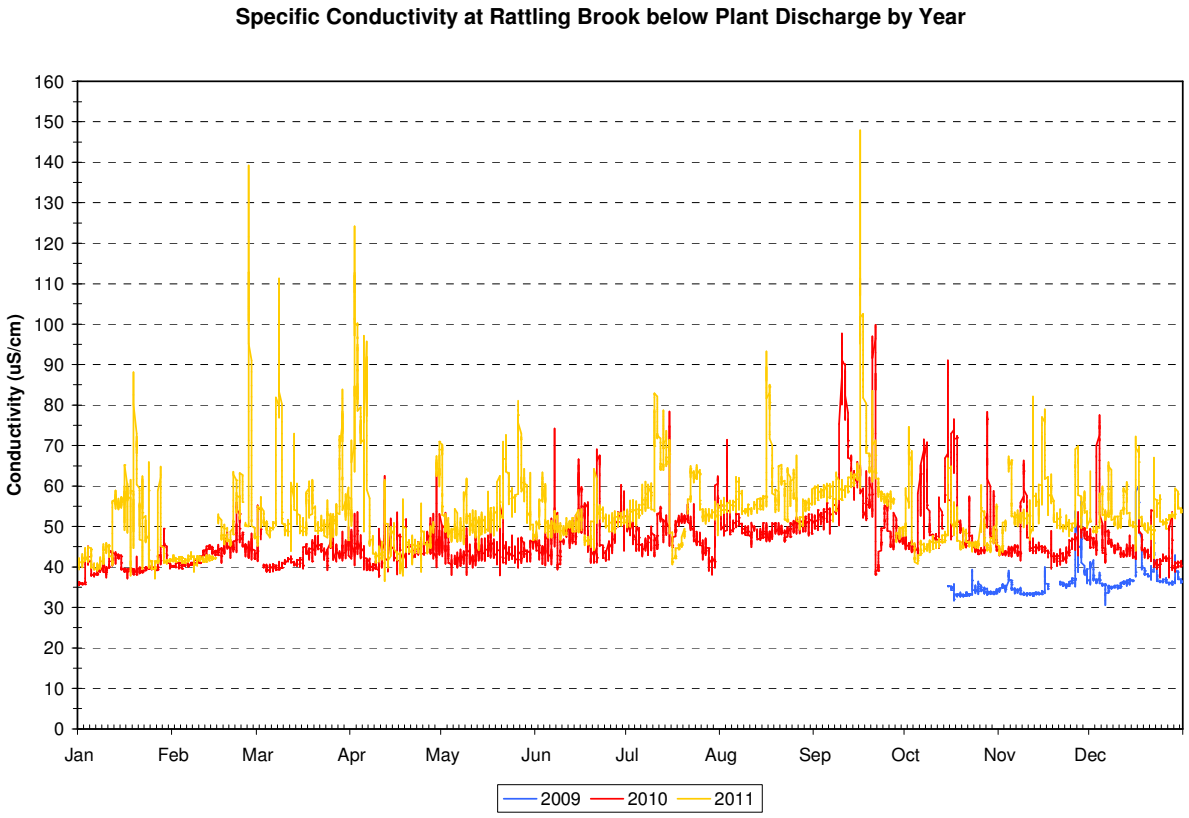
Figure 26: Boxplots of pH at Rattling Brook below Plant Discharge, 2009 – 2011



Only a partial record for pH exists in 2009 so no conclusions should be drawn regarding trends from 2009 onward. However, a slight upward trend does appear to exist moving from 2010 to 2011 – this will be monitored in the future.

Specific Conductivity

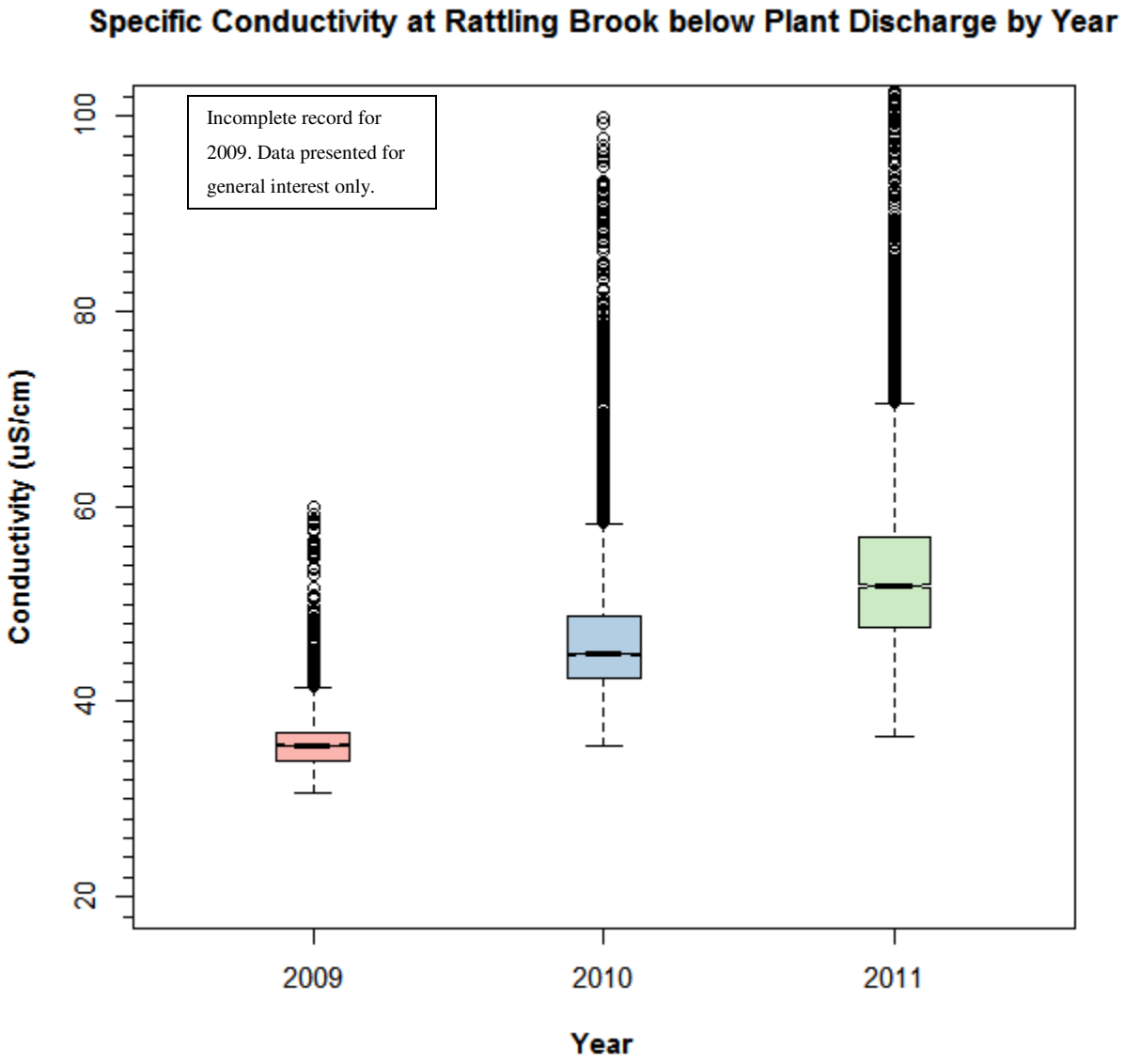
Figure 27: Specific Conductivity at Rattling Brook below Plant Discharge, 2009 – 2011



Specific conductivity tends to be lowest in the winter with the highest values found in mid-September, a period of low-flow. With only two full years of data, it is difficult to determine if this is a consistent characteristic, however, it is consistent for 2010 and 2011.

Conductivity values fell between 36.5 µS/cm and 147.9 µS/cm with a median value of 51.9 µS/cm (90% CI: 51.7 µS/cm – 52.0 µS/cm).

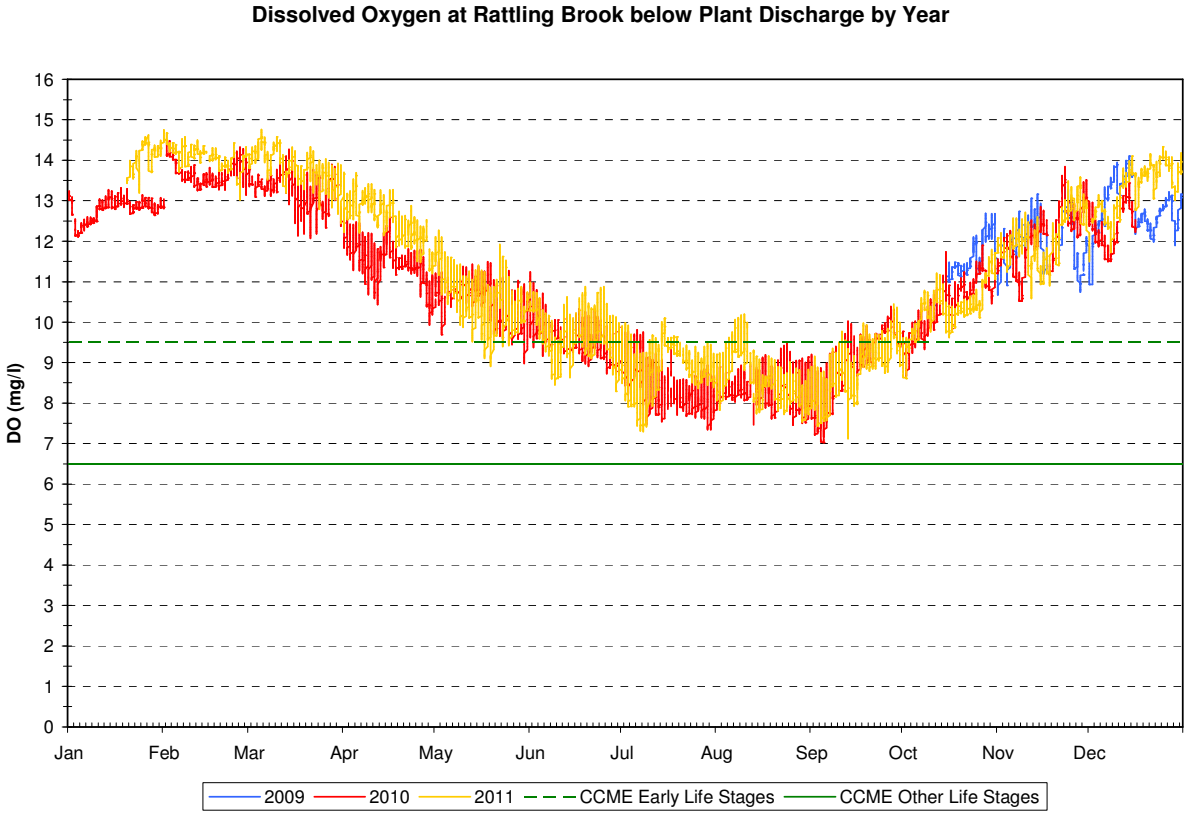
Figure 28: Boxplots of Specific Conductivity at Rattling Brook below Plant Discharge, 2009 – 2011



From 2010 to 2011 there was a notable increase in conductivity. This increase can be attributed to the intense ground work and construction in the area, resulting in increased runoff into the river. With the addition of functional settling ponds and runoff management, conductivity should be reduced over time.

Dissolved Oxygen

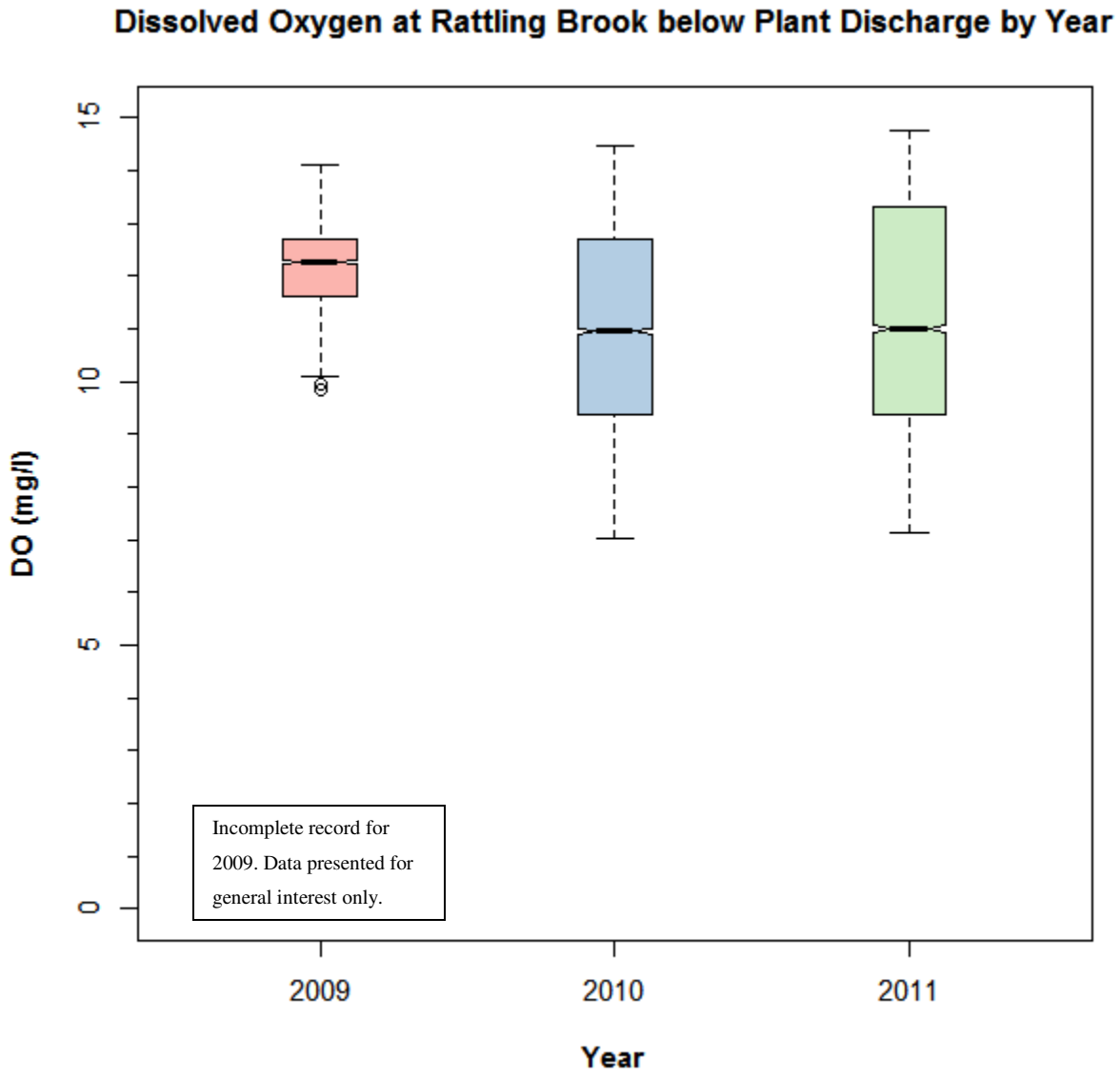
Figure 29: Dissolved Oxygen at Rattling Brook below Plant Discahrge, 2009 – 2011



In 2011, the concentration of dissolved oxygen was consistently above the CCME guideline of 6.5 mg/l for the protection of cold water biota. Dissolved oxygen fell below the guideline for the protection of early life stage cold water biota between mid-may and early October.

Dissolved oxygen levels fell between 7.12 mg/l and 14.76 mg/l during the year with a median value of 10.99 mg/l (90% CI: 10.9 mg/l – 11.1 mg/l).

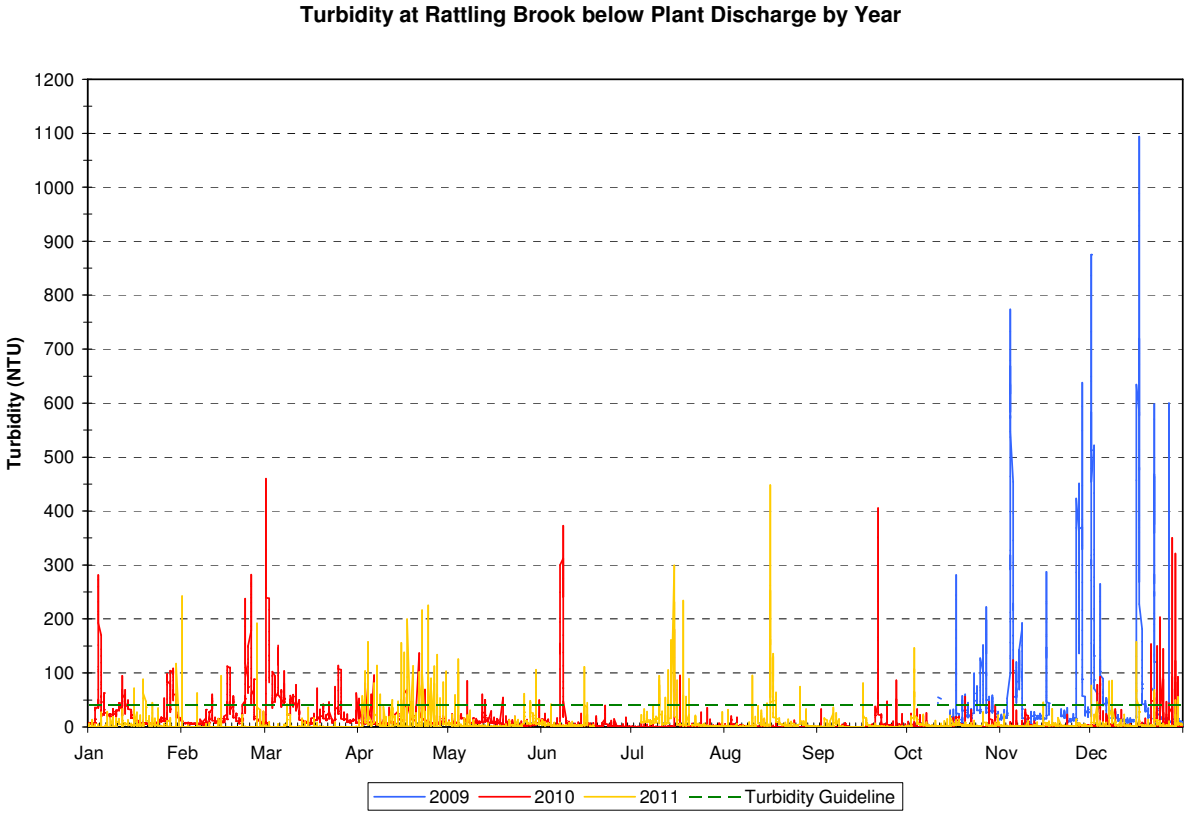
Figure 30: Boxplots of Dissolved Oxygen at Rattling Brook below Plant Discharge, 2009 – 2011



The median concentration of dissolved oxygen did not show great change from 2010 to 2011 – only an increase in the upper spread of values due to the cool summer (lower temperature, higher DO values).

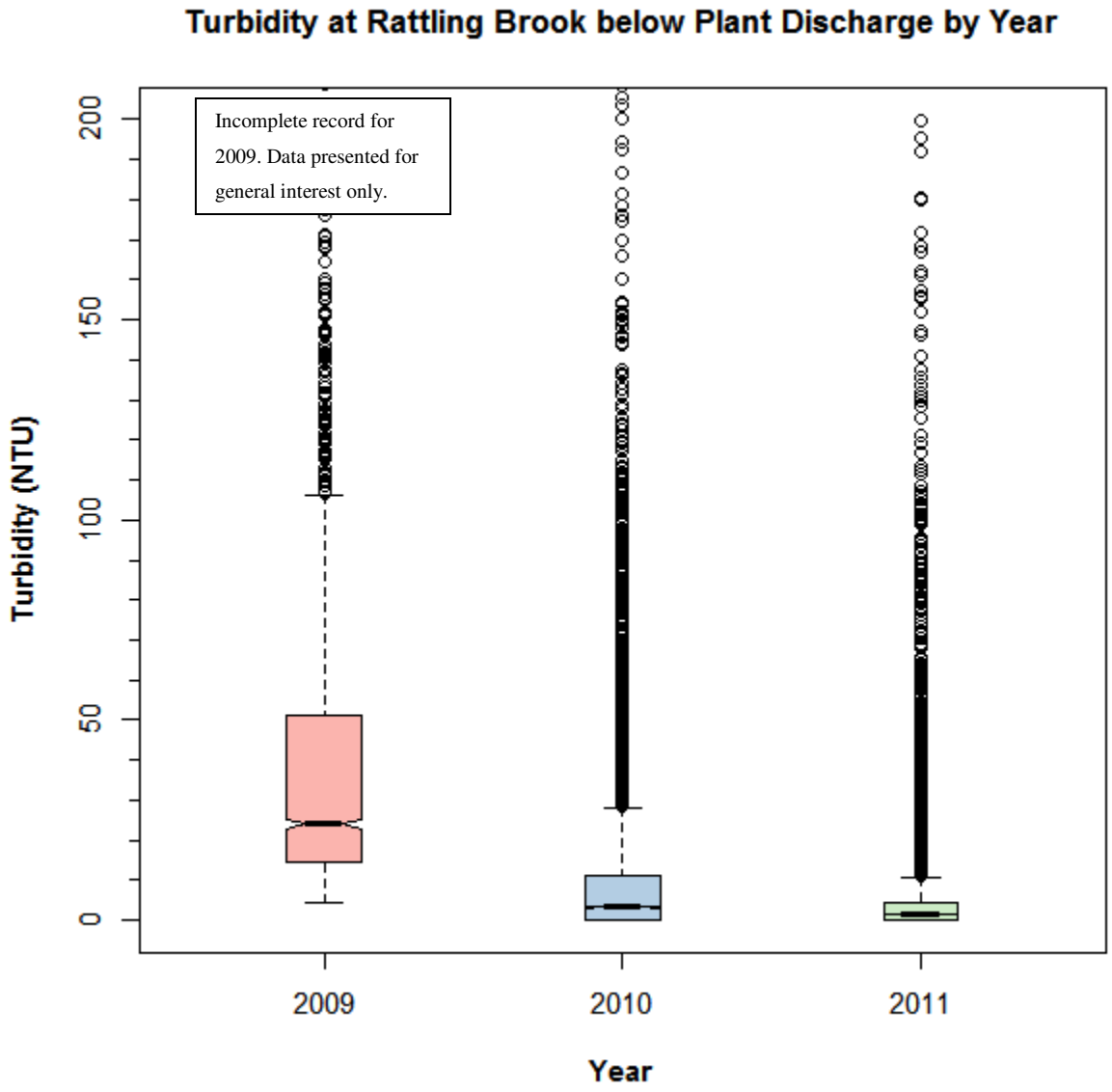
Turbidity

Figure 31: Turbidity at Rattling Brook below Plant Discharge, 2009 – 2011



A total of 903 turbidity alerts (values > 40 NTU) were encountered in 2011 for this station. This accounts for 10.3% of all records. Turbidity values fell between 0 NTU and 448 NTU with a median of 1.6 NTU (90% CI: 1.6 NTU – 1.7 NTU). Turbidity tends to be unsettled and highly variable especially in the spring season – likely due to high runoff from melt water. Likewise, summer appears to be a time of relatively clear waters, perhaps due to low-flow conditions.

Figure 32: Boxplots of Turbidity at Rattling Brook below Plant Discharge, 2009 – 2011



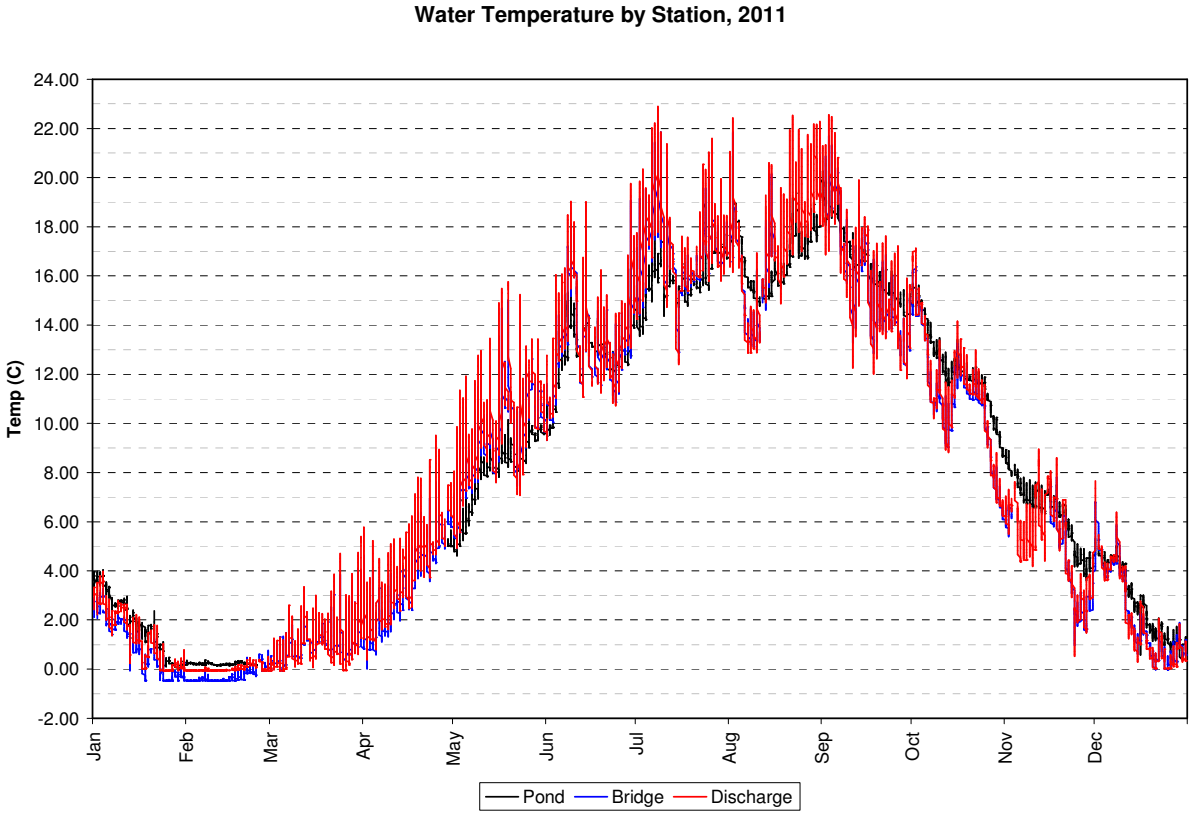
A decline in turbidity from 2010 to 2011 is clear from Figure 32. The incorporation of stronger runoff management policies and sedimentation ponds appear to have assisted a great deal at this particular station. A further reduction in turbidity is expected as time goes on but will be monitored closely.

Parameters by Station

A comparison of parameters between stations for the same year helps gives an impression of how water quality changes going down stream. Rattling Brook faces an increasing amount of potential impacts from Big Pond at the top of the watershed to Plant Discharge towards the bottom of the watershed.

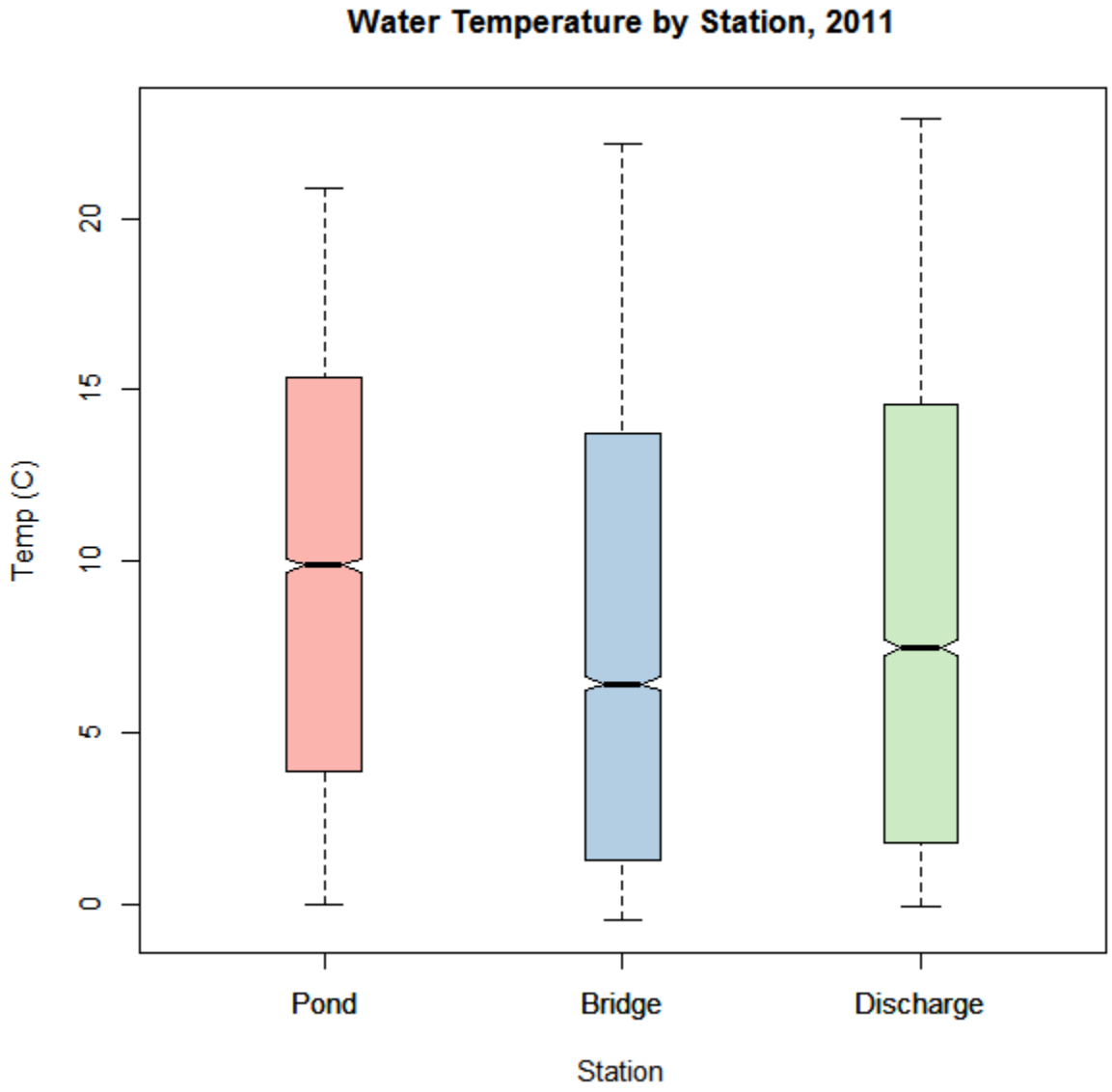
Water Temperature

Figure 33: Water Temperature at Rattling Brook Big Pond, Bridge, and Plant Discharge stations in 2011



As expected, stations lower in the Rattling Brook system are quicker to warm in the spring and quicker to cool in the fall compared to Big Pond station. Big Pond also seems to stay warmer in the winter but cooler in the summer than Bridge and Plant Discharge stations.

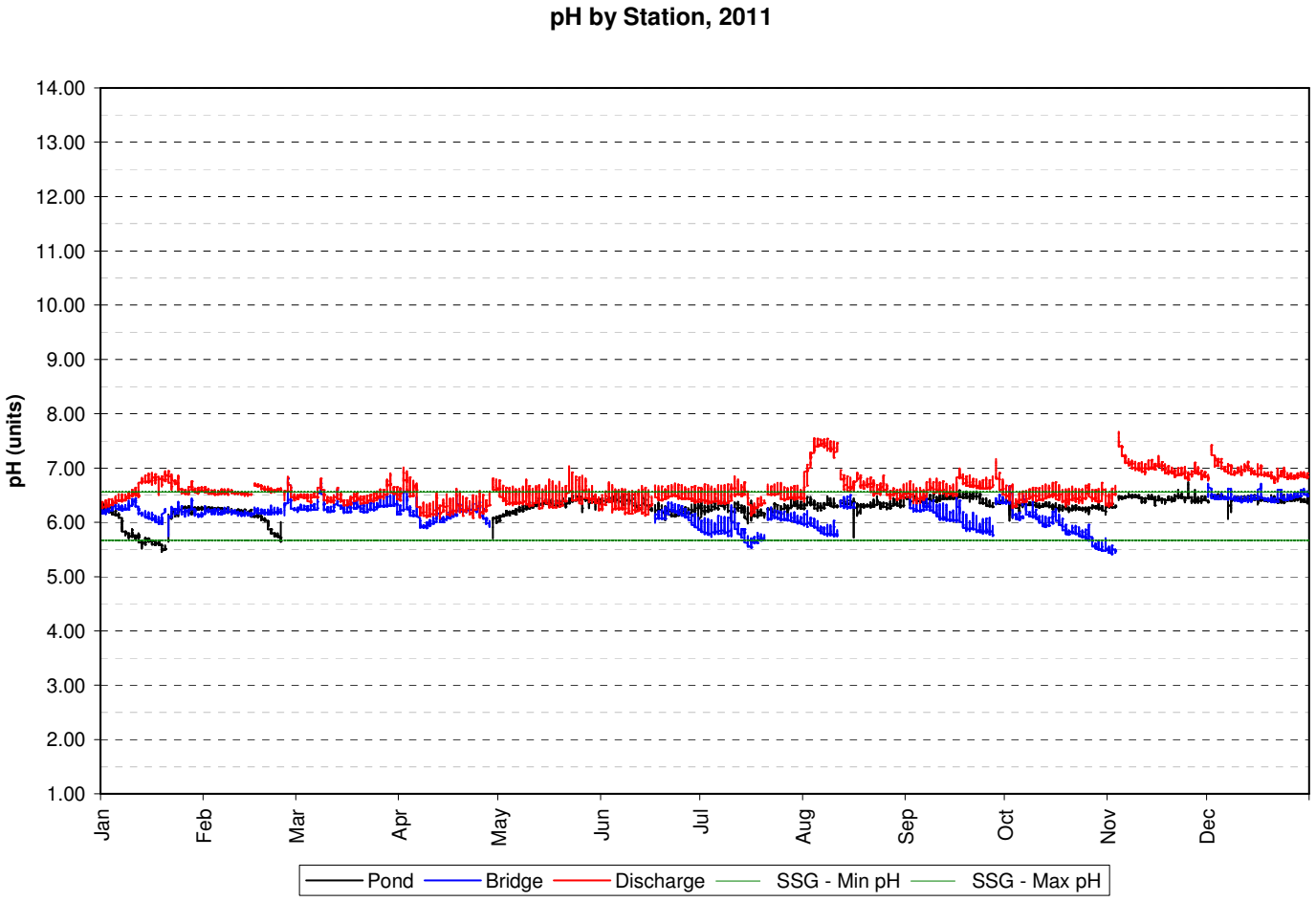
Figure 34: Boxplots of Water Temperature for Rattling Brook Big Pond, Bridge, and Plant Discharge stations in 2011



The median temperature at Big Pond tends to be warmer than both Bridge and Discharge stations. However, Bridge is unexpectedly lower than Discharge. This could be the result of cool groundwater influx near Bridge station but it is difficult to be certain.

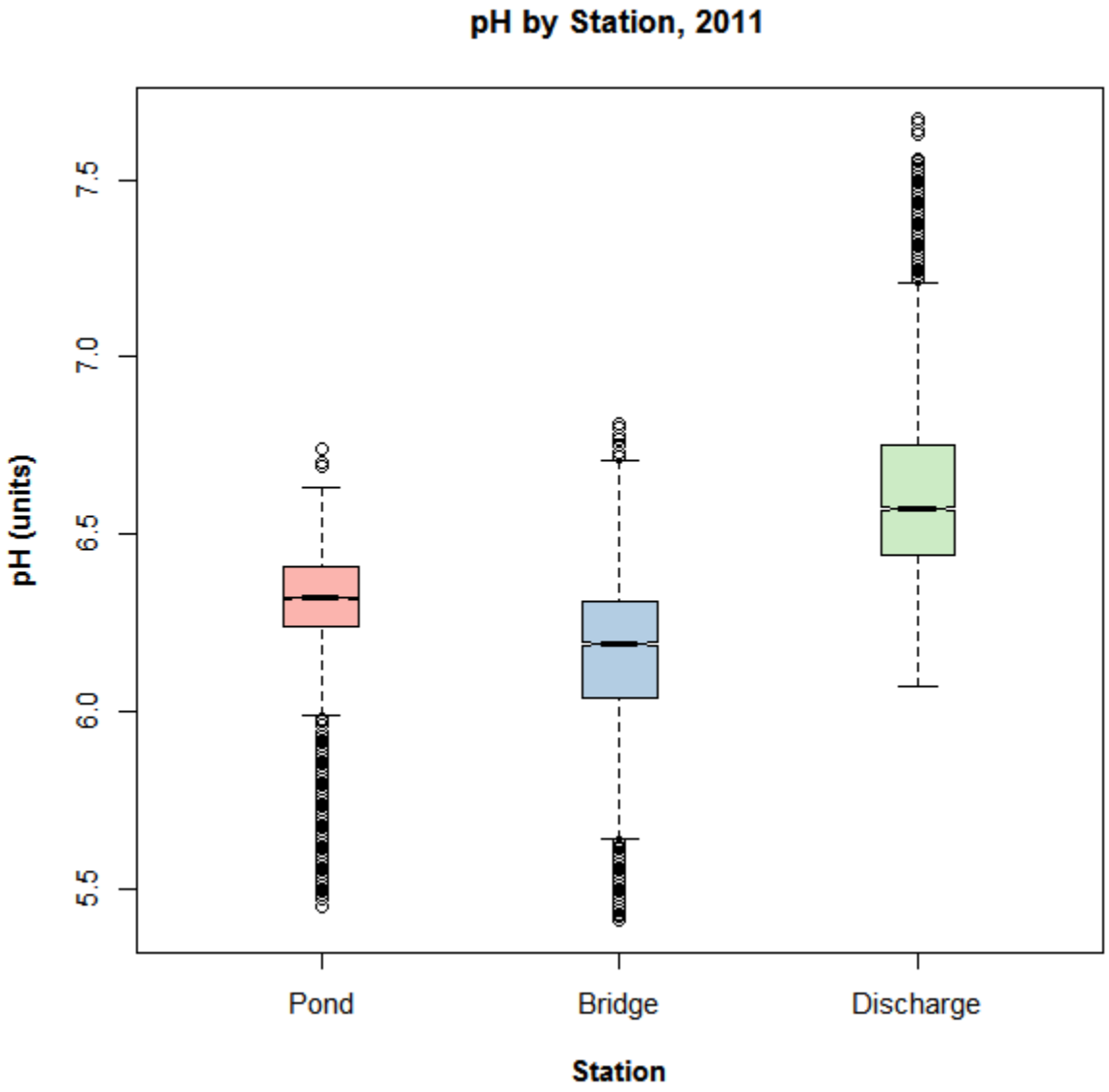
pH

Figure 35: pH at Rattling Brook Big Pond, Bridge, and Plant Discharge stations in 2011



pH values generally fall within the site specific guidelines of 5.67 – 6.56 units, however, 4790 records did fall outside of the stated range. This number of records accounts for 21.9% of all pH records – clearly above the expected 10% given the calculation method for these site specific guidelines (5^{th} and 95^{th} percentiles).

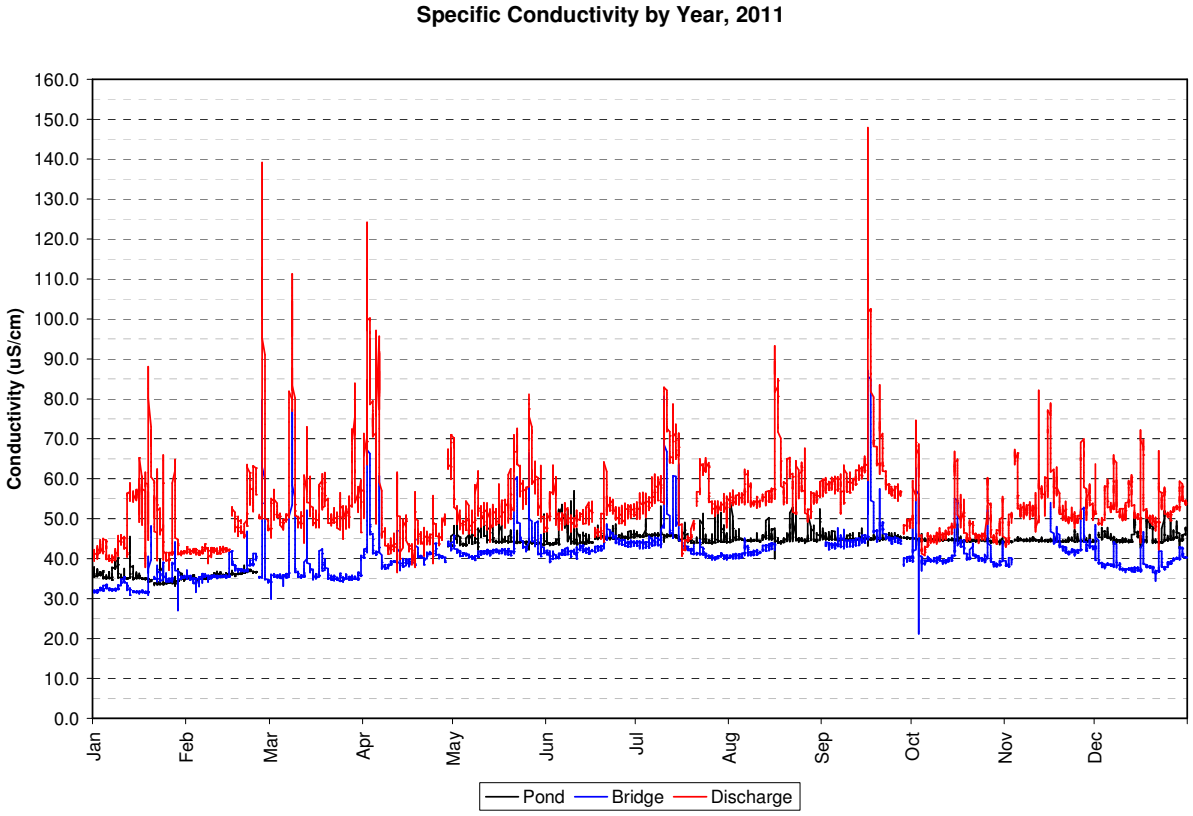
Figure 36: Boxplots of pH for Rattling Brook Big Pond, Bridge, and Plant Discharge stations in 2011



A narrow and steady pH level is characteristic of Big Pond station where relatively still water predominates. Downstream, Bridge and Discharge stations show greater variability in pH values as shown by the breadth of boxplots in Figure 36. Interestingly, Bridge station's pH levels tend to be lower than both Big Pond and Discharge station. pH is a very complex parameter involving abiotic (stream turbulence and surrounding geology) and biotic factors (macrophytes and algae). Since so many factors can influence pH, it is difficult to ascertain why Bridge station would have the most acidic waters.

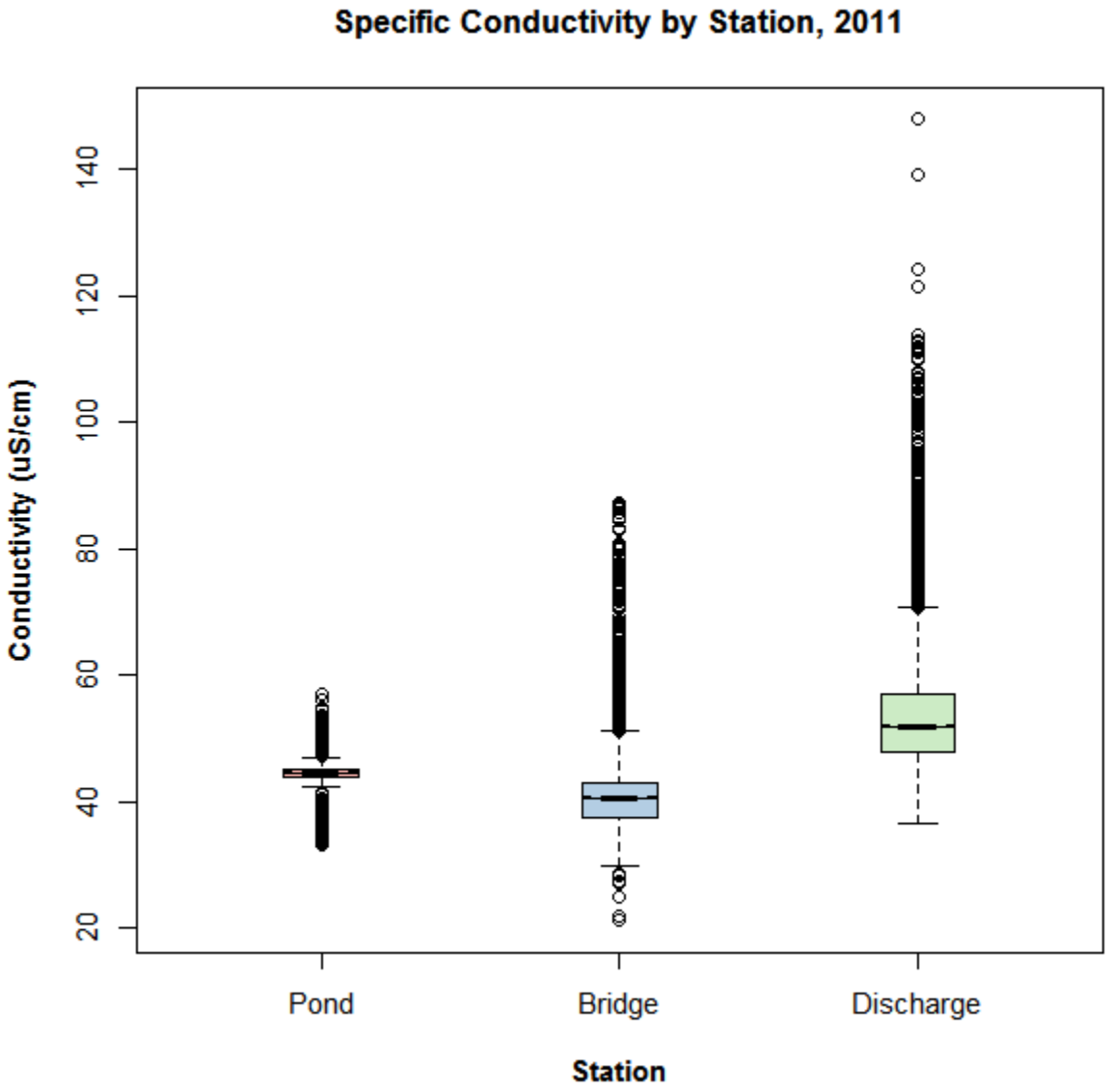
Specific Conductivity

Figure 37: Specific Conductivity at Rattling Brook Big Pond, Bridge, and Plant Discharge stations in 2011



Specific conductivity was consistently highest at Discharge station during 2011. Though conductivity spikes tend to be the highest in winter months, in general, conductivity is at its max during the summer months and declines going into fall.

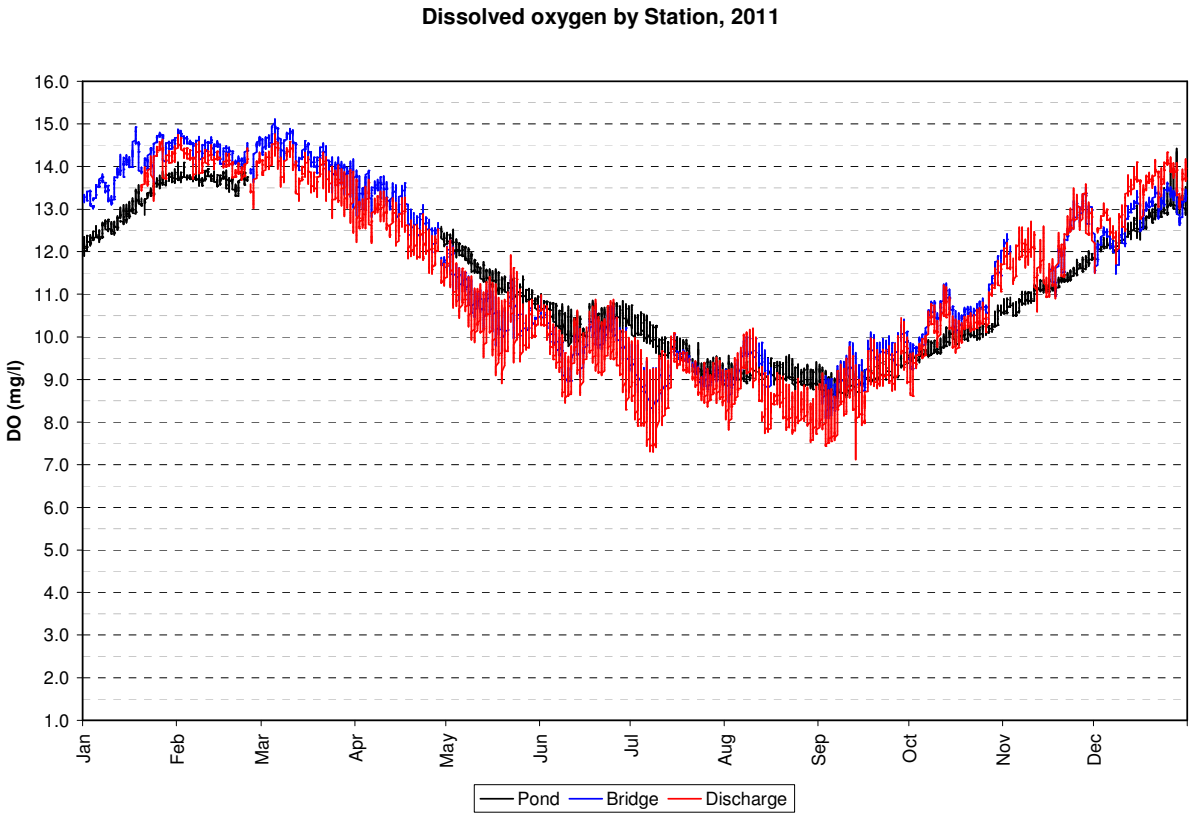
Figure 38: Boxplots of Specific Conductivity for Rattling Brook Big Pond, Bridge, and Plant Discharge stations in 2011



Normally, conductivity would be expected to increase as water traverses through the watershed. In 2010, this was found to be the case where conductivity increased from Big Pond to Bridge to Discharge. In 2011, however, conductivity decreased from Pond to Bridge. A significant change from 2010 to 2011 was ground preparation (tree and overburden removal) along the shore of Big Pond and the construction of a new water intake structure for the plant site. This work is probably responsible for the large shift in conductivity

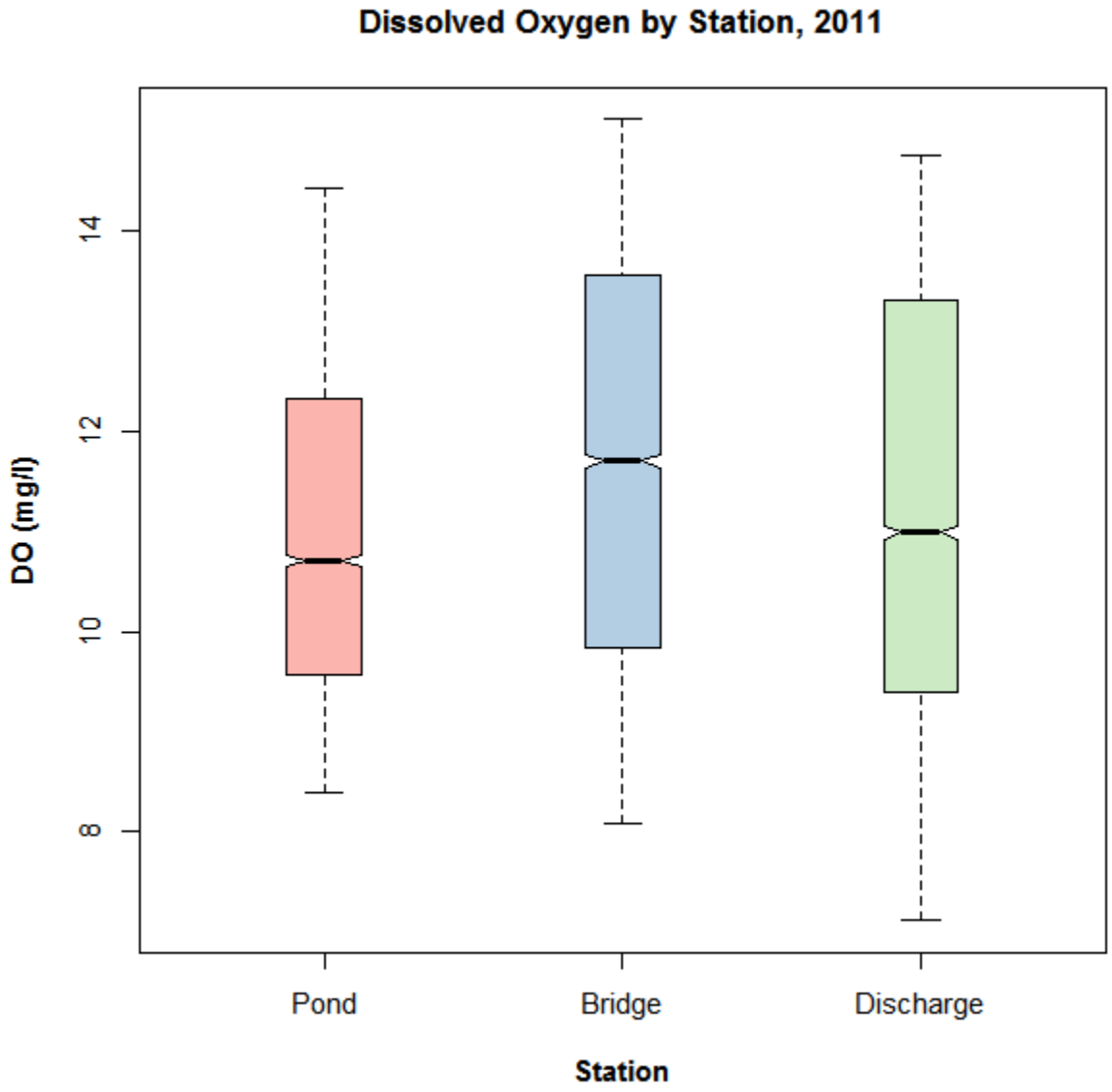
Dissolved Oxygen

Figure 39: Dissolved Oxygen at Rattling Brook Big Pond, Bridge, and Plant Discharge stations in 2011



Big Pond DO concentration is out of phase in respect to change over time compared to Bridge and Discharge stations. DO concentrations remain lower in Big Pond during the winter due to warmer water temperatures and a lack of turbulent flow to suspend oxygen in the water column. Additionally, Big Pond holds more oxygen in the summer because of cooler water temperatures.

Figure 40: Boxplots of Dissolved Oxygen for Rattling Brook Big Pond, Bridge, and Plant Discharge stations in 2011



Dissolved oxygen levels at Plant Discharge are slightly higher than those at Big Pond station, as expected, given the flowing conditions in a river environment versus a pond. Bridge station recorded the highest DO concentrations, related to the cooler waters.

Turbidity

Figure 41: pH at Rattling Brook Big Pond, Bridge, and Plant Discharge stations in 2011

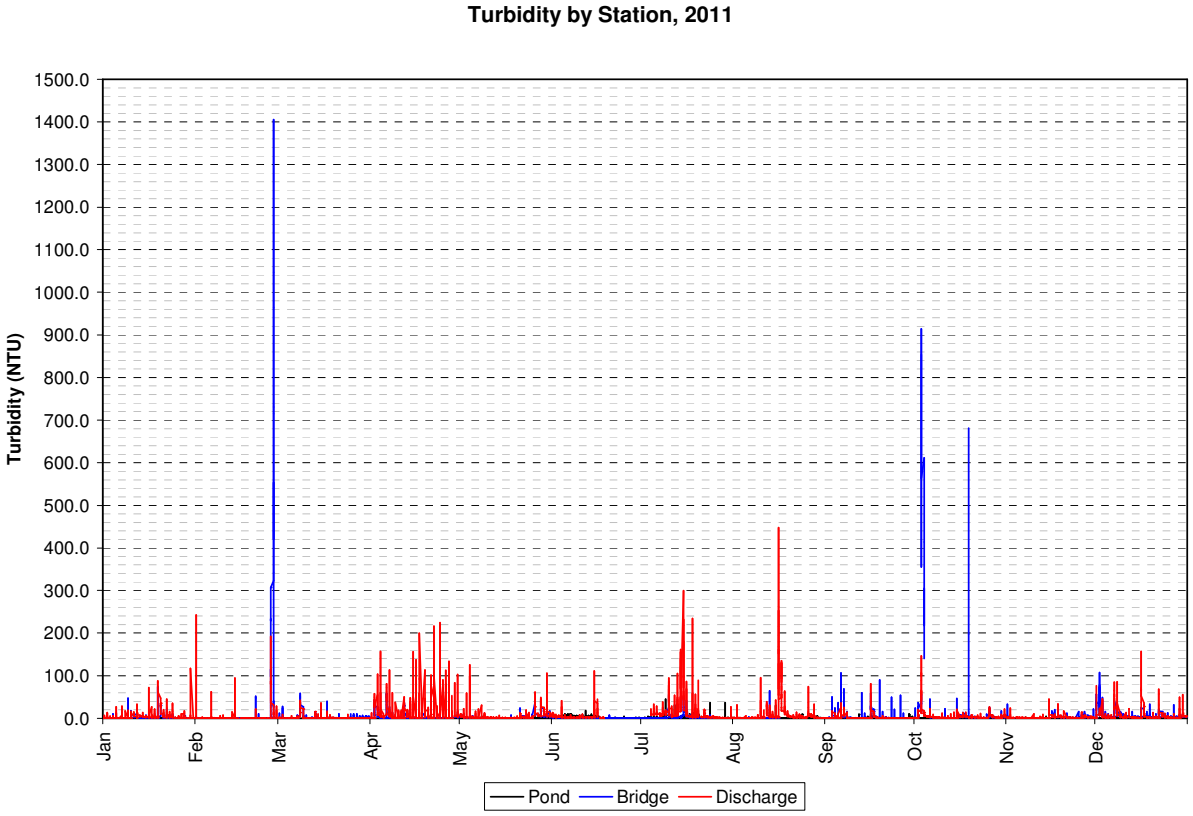
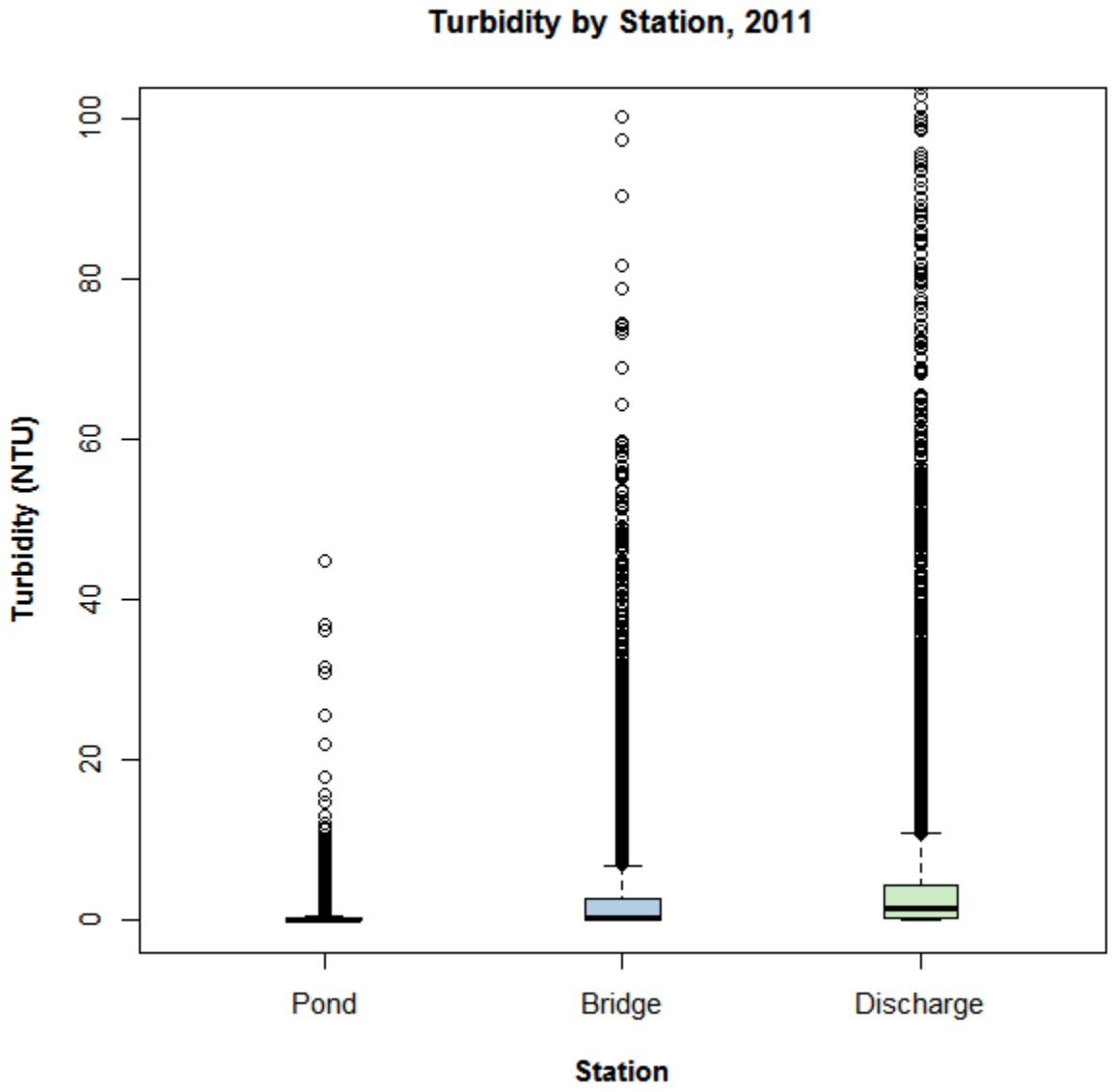


Figure 41 illustrates that turbidity dominates at Plant Discharge station. Only a handful of peaks from Bridge station supersede those of Plant Discharge.

Figure 42: Boxplots of Turbidity for Rattling Brook Big Pond, Bridge, and Plant Discharge stations in 2011



Conditions downstream near Bridge and Plant Discharge stations are considerably more dynamic than those at Big Pond station. Turbulent, flowing water carrying debris and silt results in a higher amount of turbidity as seen in Figure 42. At Big Pond station, the interquartile range exhibited by the height of the box is minimal compared to Bridge and Plant Discharge stations. Additionally, turbidity at Discharge station is even higher than that of Bridge station, due to the greater watershed area contributing to the silt load.

Conclusions

Turbidity measurements have been challenging in the waters of Rattling Brook because of intense macrophitic growth at Plant Discharge station and turbulent flow at Bridge station. These factors are frequently implicated in causing erroneous turbidity measurements and result in burdensome grab sampling by Vale staff. This problem is being investigated thoroughly and could involve changes to the deployment technique and measuring paradigm.

The deployments of Big Pond and Plant Discharge stations are still relatively new with minimal background. At this time it is difficult to determine if major long-term trends are present at these stations, however, it bears noting that pH and specific conductivity may be rising at Big Pond and Plant Discharge stations. The nature of these changes are not yet understood requires further monitoring. Meanwhile, Bridge station appears to have a downward trending turbidity record but an increasing specific conductivity record.

Path Forward

- As construction moves forward at the Long Harbour construction site from 2011 to 2012, there is a need to gather background groundwater quality data prior to commissioning of the Tailings Management Area (TMA). The drilling of five monitoring wells in the vicinity of Sandy Pond is slated to begin in the spring of 2012 with establishment of monitoring stations in the early summer.
- Concern regarding turbidity monitoring is well-founded and is an area being examined closely by Real-Time staff. Effort is being put into establishing a categorisation method for automated turbidity alerts and research into more appropriate monitoring paradigms is under way.
- Deployment periods of 30 days will be maintained to ensure an appropriate balance between field visits and data integrity. Additionally, monthly reporting will continue and open lines of communication between ENVC and Vale will be maintained.
- A series of sensor issues were encountered in 2011 that will be addressed with further consultation with equipment suppliers and manufacturers.
- Additional value-added products such as predictive models using statistical regression techniques are being studied for their accuracy and efficacy.

Errata

The following errata were uncovered during the preparation of the 2011 Annual report:

Table 4: Temperature errata at Rattling Brook Big Pond in Annual Report 2010

	Median	90% Confidence Interval	
		5th Percentile	95th Percentile
Original value	9.66	9.49	9.84
Revised value	8.96	8.68	9.23

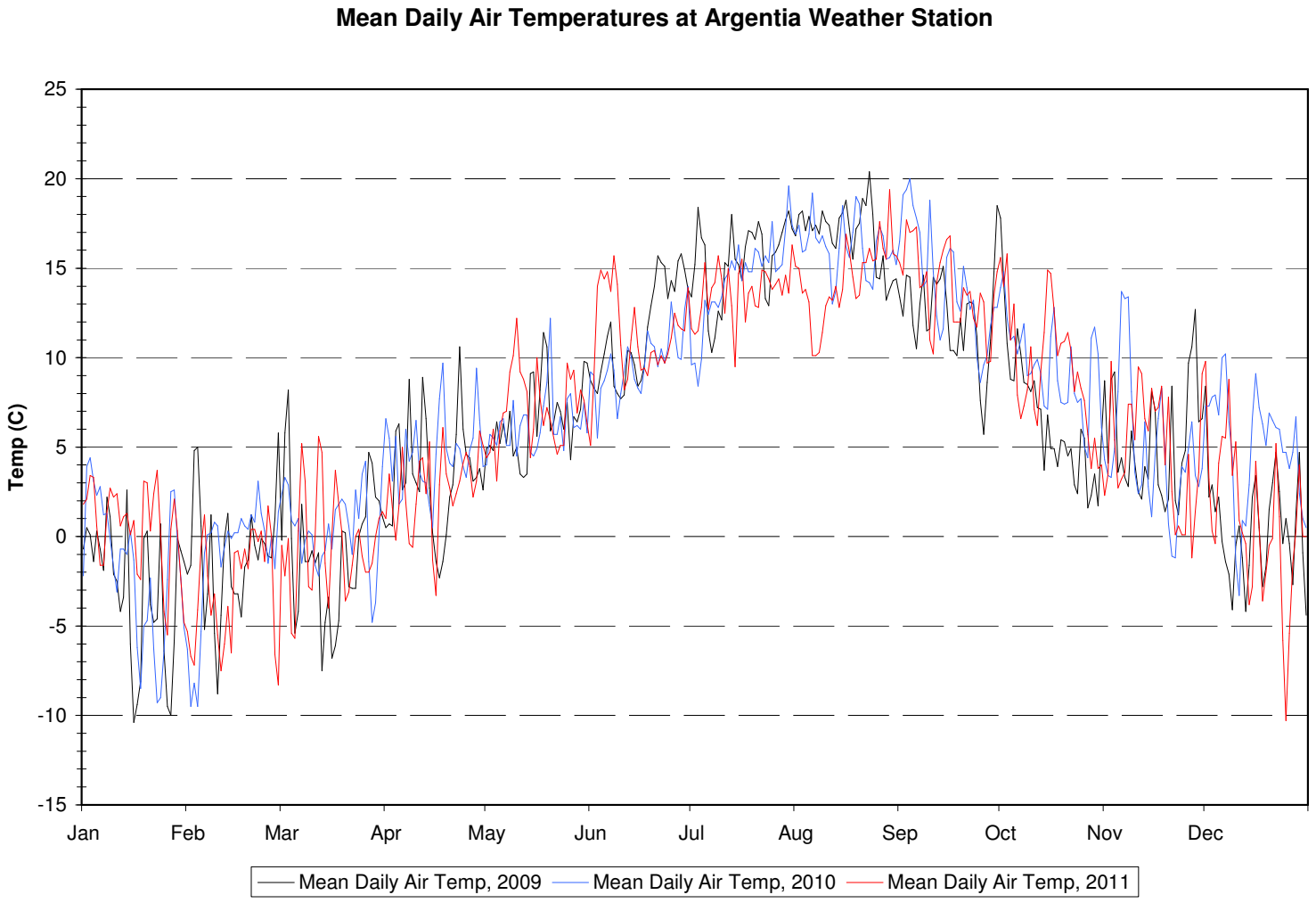
Table 5: Dissolved Oxygen errata at Rattling Brook below Bridge in Annual Report 2010

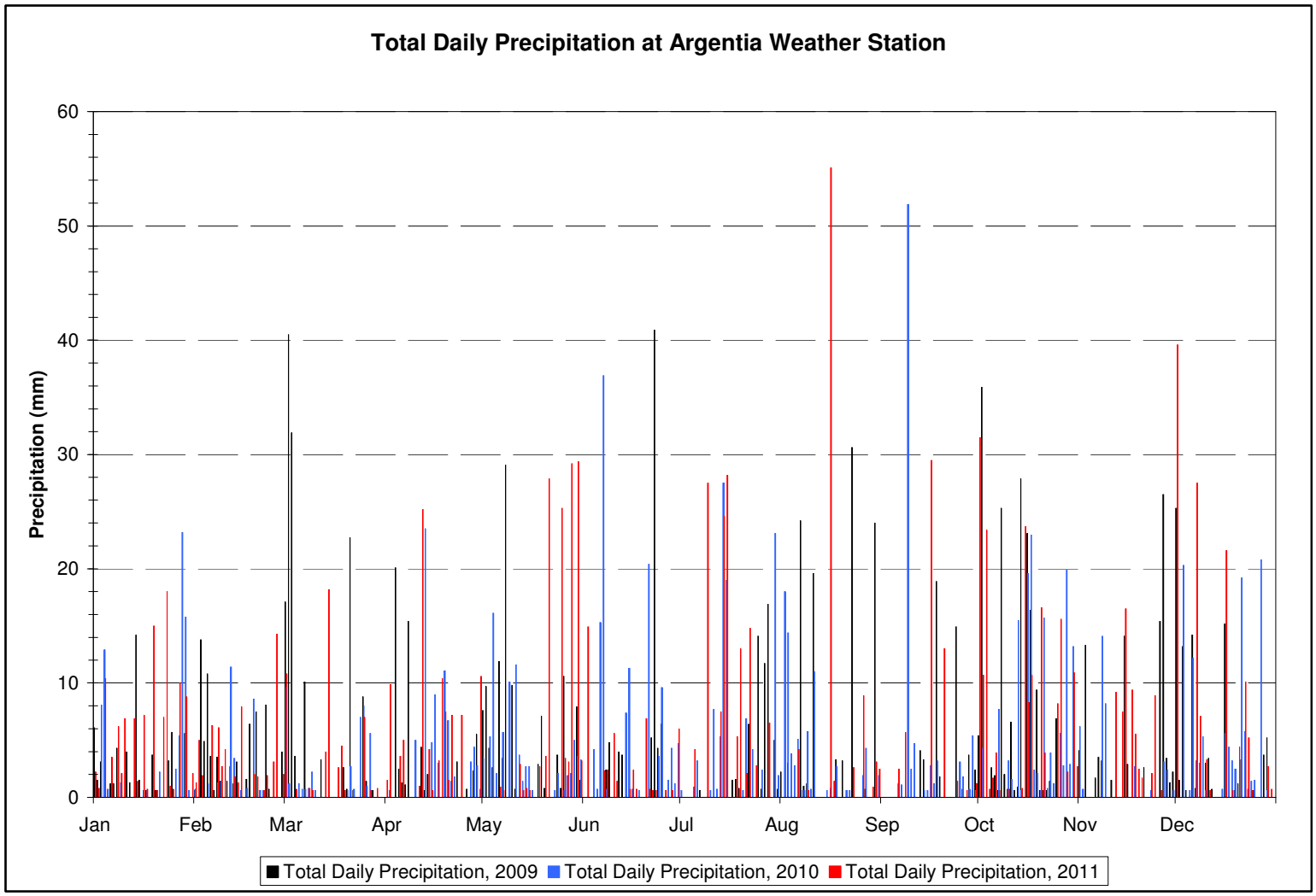
	Median	90% Confidence Interval	
		5th Percentile	95th Percentile
Original value	10.69	10.62	10.76
Revised value	11.36	11.28	11.43

Table 6: Dissolved Oxygen errata at Rattling Brook below Plant Discharge in Annual Report 2010

	Median	90% Confidence Interval	
		5th Percentile	95th Percentile
Original value	10.94	94.0	94.2
Revised value	10.96	10.91	11.01

Appendix


Mean Daily Air Temperatures at Argentia Weather Station
Temp (C)
25
20
15
10
5
0
-5
-10
-15
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Mean Daily Air Temp, 2009
Mean Daily Air Temp, 2010
Mean Daily Air Temp, 2011


Total Daily Precipitation at Argentia Weather Station
Precipitation (mm)
60
50
40
30
20
10
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Total Daily Precipitation, 2009
Total Daily Precipitation, 2010
Total Daily Precipitation, 2011