ANOXIA AND HYPOXIA

IN THE SEVERN RIVER, CHESAPEAKE BAY

A THESIS SUBMITTED TO
THE GLOBAL ENVIRONMENTAL SCIENCE
UNDERGRADUATE DIVISION IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF

BACHELOR OF SCIENCE

IN

GLOBAL ENVIRONMENTAL SCIENCE

AUGUST 2009

By

Christine J. Sandvik

Thesis Advisors

Dr. Eric De Carlo
Dr. Pierre Henkart
Dr. Katherine Johnson

I certify that I have read this thesis and that, in my opinion, it is satisfactory in scope and quality as a thesis for the degree of Bachelor of Science in Global Environmental Science.

THESIS ADVISOR

_____

Eric H. De Carlo
Department of Oceanography

DEDICATIONS

This paper is dedicated to my friends and family who have supported me my whole life and been hoping for this for eight years. Your support has been invaluable.

I would also like to specifically dedicate this to my grandmother and grandfather, Jane and Donald Pynnonen and my parents Linda and David Sandvik who also supported me financially through this degree.

ACKNOWLEDGEMENTS

I would like to thank Dr. Pierre Henkart and all of the staff at The Severn Riverkeeper Program for their guidance and assistance in data collection for this project, and Dr. Eric De Carlo, Dr. Jane Schoonmaker, Dr. Margaret McManus, and Dr. Katherine Johnson for providing assistance with data analysis and thesis compilation. I would also like to thank David, Linda, and Liz Sandvik, and Meghan Calhoon for their help editing this paper. Last, but certainly not least, I would like to thank the Gowland family for letting me stay in their home while I was conducting my research.

THANK YOU!

ABSTRACT

Repeated observations have shown that water quality in bodies of water with developed coastlines and watersheds is often compromised. In this study water quality in the Severn River, a tributary to the Chesapeake Bay, was monitored to determine the extent of hypoxic and/or anoxic conditions. Fifteen sites were monitored weekly throughout the summer of 2008; temperature, salinity, and dissolved oxygen were measured as a function of depth at each site. A secchi depth measurement was also made to determine water clarity at each site. Differing degrees of hypoxia and anoxia were observed at each site. Some areas experienced prolonged anoxia due to natural conditions, but in other areas anoxia appeared to be related to runoff caused by development and poor land management, which ultimately adversely affected water quality. While it is difficult to restore damaged watersheds, better management of the Severn watershed could help maintain or restore water quality in the Severn River.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

SC (n) – Severn River tributary monitoring stations
SR (n) – Severn River mainstream monitoring stations
CBL – Chesapeake Bay Laboratories
DNR – Department of Natural Resources
NASA - National Aeronautics and Space Administration
NOAA - National Oceanic and Atmospheric Administration
USGS - United States Geological Survey
DO – Dissolved Oxygen
TOC – Total Organic Carbon
C – Degrees in Celsius
P - Pressure
T - Temperature
ppt – parts per thousand
m – meter
km – kilometer
mg – milligram
l – liter
ft – feet

CHAPTER ONE. INTRODUCTION

Conditions on the Severn River, a tributary to the Chesapeake Bay, located in Maryland, have changed in recent years. Fish kills and general poor ecosystem health have been reported by various researchers (Delach, 2007; Winegrad, 2008; Furgurson, 2007). These conditions have generated an interest in determining the factors that control the water quality in the Severn River and its tributaries. The current study examined dissolved oxygen (DO) and water clarity as first indicators of the overall water quality in the Severn River.

Historical Background

The land around the Chesapeake Bay was explored and settled by Europeans between 1560 A.D. and 1600 A.D. (Walker et al., 2000), at which time, approximately 20,000 native people inhabited the region (http://www.friendsofthejohnsmithtrail.org/native_americans.html, retrieved 7/11/09). The population reached 100,000 people by 1750, and 250,000 people by 1775 (Walker et al., 2000). The population in the Chesapeake Bay continues to soar today. According to the United States Geological Survey (USGS) and the U.S. Census Bureau, the watershed experienced a 5.8% population increase in recent years, growing from 15.8 million in 2000 to 16.6 million in 2006. The population is projected to reach 18 million by the year 2020.

As the population in the Chesapeake Bay area increased, so did environmental impacts. Large areas of forest were cleared for urban development and to create farmland (D'Elia et al., 2003). Both of these activities led to increased runoff and, consequently, increased nutrient inputs to the bay. Sewage discharge into the bay also added nutrients (D'Elia et al., 2003). Therefore, as development increased, so did nutrient input and hypoxic, then anoxic conditions began to develop in the water column (D'Elia et al., 2003; Zimmerman and Canuel, 2002). The occurrence of hypoxia and anoxia was evidenced by the presence of biomarkers, unique biological components that are found in sediments. Zimmerman and Canuel (2002) used such biomarkers to evaluate sediment cores that dated back before European colonization; cores showed evidence of anoxia/hypoxia as early as 1790. The cores also showed that by 1880, the quantity of organic matter deposited in the Chesapeake Bay was rapidly increasing (Zimmerman and Canuel, 2002).

The Chesapeake Biological Laboratory (CBL) was founded in the mid-1920's and has provided the scientific community with invaluable historical data (D'Elia et al., 2003). Located on the Patuxent River, the CBL has one of the longest records of nutrient and DO measurements for any water body in the United States (D'Elia et al., 2003). The early data from the CBL provide an important baseline for analysis of the

effects of anthropogenic activity on Chesapeake Bay waters throughout the last century (D'Elia et al., 2003).

For example, DO levels in the Chesapeake Bay, as illustrated in Figure 1 by DO in bottom waters of the Patuxent River in July, showed a steady decrease between the period 1936-1940 through the mid 1980's (Costantini et al., 2008). There has been a slight recovery in recent years, yet, DO levels remain substantially lower than those recorded in the earlier CBL data.

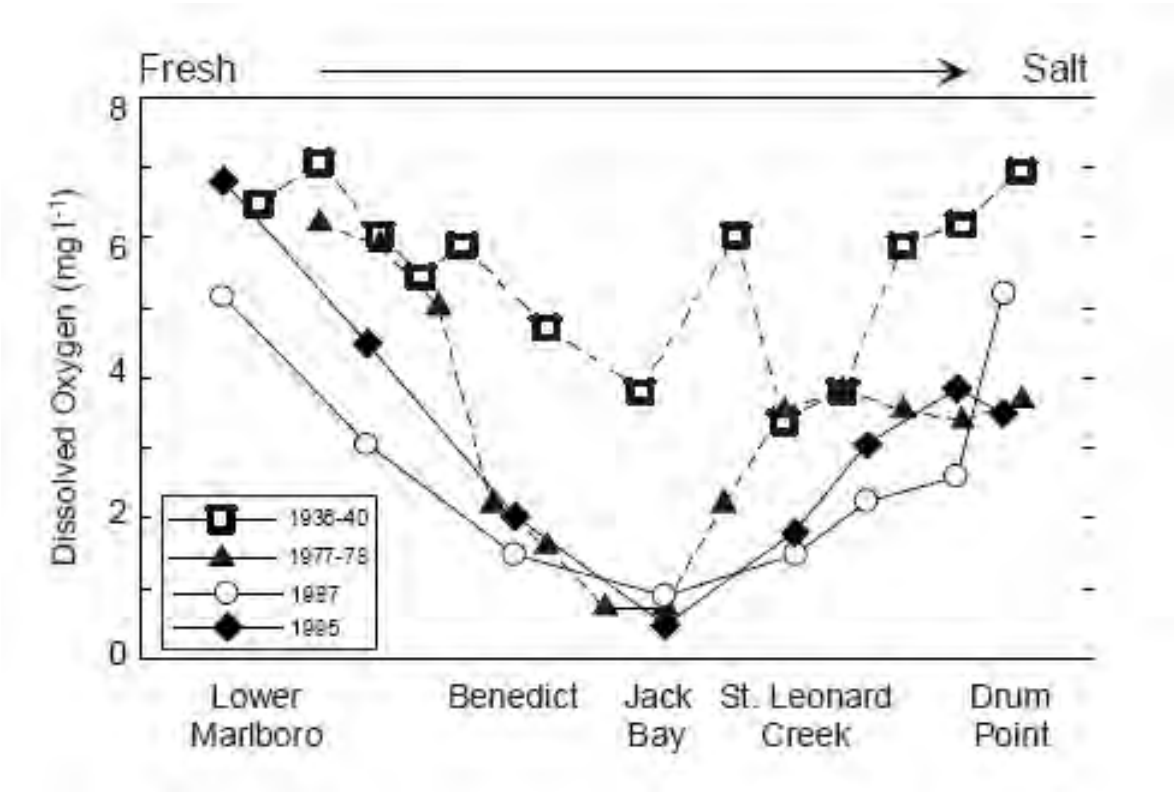


Figure 1: July dissolved oxygen in the Patuxent River.

To this day, the Chesapeake Bay continues to experience frequent and severe hypoxic/anoxic events (Costantini et al., 2008). Areas of the Chesapeake Bay commonly experience both diurnal hypoxia as well as

prolonged anoxia following heavy rainfall (Shen et al., 2008). Some areas of the bay remain anoxic seasonally. The anoxic conditions have had a negative impact on both fish and benthic species (Shen et al., 2008; Jewett et al., 2005; Costantini et al., 2008).

Geographical Background

The Chesapeake Bay is the largest estuarine system in the United States (Cerco and Cole, 2008). It is prone to anoxic conditions that arise from the natural features of the bay (Costantini et al., 2008; Jewett et al., 2005). These natural occurrences combined with anthropogenic effects which promote anoxia, have led the deep mesohaline channels in the Chesapeake Bay to experience prolonged periods of anoxic conditions.

The Chesapeake Bay is predisposed to low DO concentrations in its waters because of its tidal nature. This is largely driven by salinity changes that arise from tidal flow, because higher salinity water holds less oxygen than freshwater (Garrels and Christ, 1965). Additionally, salinity as well as temperature changes help create a density gradient throughout the water column and cause waters to become stratified (Shen et al., 2008; Jewett et al., 2005; Costantini et al., 2008). Stratification inhibits oxygen exchange between the deep and surface waters and leads to lower DO in bottom waters. While there is

evidence that the deep mesohaline channels have also experienced hypoxic events in the past, the Chesapeake Bay was not believed to be anoxic (Costantini et al., 2008). More importantly, past hypoxic or anoxic events are not believed to have been prolonged (Costantini et al., 2008).

General Background

Hypoxic and anoxic conditions are typically the result of a common phenomenom known as eutrophication. Eutrophication is caused by an over-enrichment of nutrients in aquatic systems which lead to blooms of photosynthesizing plankton and the accumulation of organic matter (Shen et al., 2008). Excess nutrients which enter water bodies as runoff from the watershed stimulate phytoplankton blooms (Shen et al., 2008). After these nutrients have been depleted, the phytoplankton population crashes, and dead organic matter falls to the bottom of the water column, where it is degraded and consumed by bacteria (Shen et al., 2008). Bacterial respiration consumes substantial amounts of oxygen and can often lead to hypoxia, a condition characterized by <4 mg O_2/l, or even anoxia, a condition in which no oxygen is present (Costantini et al., 2008). The brackish waters of the Chesapeake Bay already have lower oxygen carrying capacity than freshwater due to salinity, as mentioned above (Garrels and Christ, 1965). Additionally in bodies of water like the Chesapeake

Bay, stratification created by changes in temperature and salinity can inhibit mixing of the water column and prolong hypoxic and anoxic events (Jewett et al., 2005).

Nutrient inputs into water systems can be caused by natural processes or by anthropogenic activity. Rain naturally drains from land, causes some extent of erosion, and flows into receiving waters as runoff. The runoff carries suspended sediment containing organic matter and nutrients, which are then delivered to water bodies. Erosion and nutrient inputs associated with runoff can be increased by anthropogenic activity such as clearing of land for either urban or agricultural development. The watershed surrounding the Chesapeake Bay area comprised one of the first areas in the Eastern United States to be colonized by European settlers; throughout time anthropogenic activity in this area expanded and has led to adverse impacts on the health of the waters (Walker et al., 2000).

The occurrence of and the effects resulting from anoxic conditions are issues of growing concern in the Chesapeake Bay. The fish kills that result from anoxia and the subsequent smell of hydrogen sulfide in the air owing to anaerobic oxidation of organic matter that develop in residential inlets are bringing more attention to this issue (Delach, 2007; Furgurson, 2007). The number of native aquatic species in the Chesapeake Bay waters has also been declining and, in

their absence, less desirable species are taking over, changing over a century of fishing tradition in several decades (Jewett et al., 2005).

Scientific Background

Records held in historical sediment cores reveals that the Chesapeake Bay has a natural inclination towards hypoxic conditions. The hypoxic waters are the result of a combination of factors, including brackish waters, natural nutrient influx from land and tidal effects, and natural stratification which exists in the deep mesohaline channels. These, of course are exacerbated by anthropogenic stress. In a further study of three previously mentioned cores, Zimmerman and Canuel (2002) found evidence of an anoxic/hypoxic event in 1915 in all cores. They reached these conclusions because the cores were enriched in two different types of plankton biomarkers: total organic carbon (TOC) and biogenic silica, and one bacterial marker (lipids) that are indicative of plankton blooms and subsequent bacterial decomposition. The terrestrial biomarkers (sterol, alcohol, and fatty acids) showed no increase in abundance in the cores over time, indicating that the increase in carbon deposition was not a consequence of enhanced deposition of eroded terrestrial material, but instead reflected an autochthonous aquatic productivity event (Zimmerman and Canuel, 2002). Because the source of nutrients in

these cores was not the watershed, it can be concluded that that they were a product of tidal effects. Similar events have been observed in studies of other brackish bodies of water. For example, Bianchi et al. (2000) found a strong correlation between the onset of brackish water conditions and cyanobacterial blooms in cores from the Baltic Sea, which they attributed to the introduction of phosphorus-rich seawater. It is also possible that anoxic conditions are naturally amplified in the Chesapeake because of phosphorus-rich seawater influx.

Additional historical information on the Patuxent River, on which the Chesapeake Biological Laboratory is located, provides the longest recorded history of DO measurements in the Chesapeake Bay (D'Elia et al., 2003). Over 50 years of data are available (D'Elia et al., 2003). Those data, along with other historical data complied by D'Elia (2003) show a pattern of increasing pollution, decreasing DO, loss of species, and changing ecosystems. Restoration projects on the Patuxent River and increased regulations imposed in the 1990's have yielded positive results showing the first increase in DO since 1936 (D'Elia et al, 2003).

Current low oxygen concentrations in the waters of the Chesapeake Bay continue to have significant adverse effects on the ecosystems. A complete loss of benthic organisms has been seen in some areas, while shifts in species composition and distribution are seen in others (Jewett et al., 2005). Native species are being driven

out by low DO and replaced by less favorable, invasive species. In some more extreme cases, fish kills are observed (Jewett et al., 2005; Costantini et al., 2008; Delach, 2007; Furgurson, 2007).

It remains unknown if ecosystems in the Chesapeake Bay will recover and native species will make a comeback, but restoration projects, more stringent regulations, and enforcement thereof could help prevent further harm. A substantial amount of research is currently in progress to determine the relative effectiveness of watershed restoration projects. These include using catchment ponds to slow runoff and reduce land-based nutrient input, shoreline restoration projects, and installation of buffer zones, as well as projects within the bay waters themselves, such as oyster bed restoration. All of these will hopefully lead to better management practices.

Hypotheses

This study was conducted to determine the factors that control anoxia and hypoxia in the Severn River. Three working hypotheses were considered:

1) The concentration of DO in the water column will decrease as the summer season progresses,

2) Anoxia and hypoxia will be observed to a greater extent deeper in the water column than at in surface waters, and

3) Salinity, temperature, and runoff will have an effect on DO concentrations.

The easily testable null hypothesis is that: no factors influence DO concentrations in the Severn River. DO content should therefore remain constant throughout space and time.

CHAPTER TWO: METHODS

Site Description

Data were collected weekly at 15 sites along the Severn River and its tributaries from early June through early September of 2008. Ten mainstream monitoring stations (SR) on the Severn River and five creek stations (SC) on tributaries were selected for monitoring (Figure 2). The stations were numbered beginning at the mouth of the river with numbers increasing towards the headwaters.

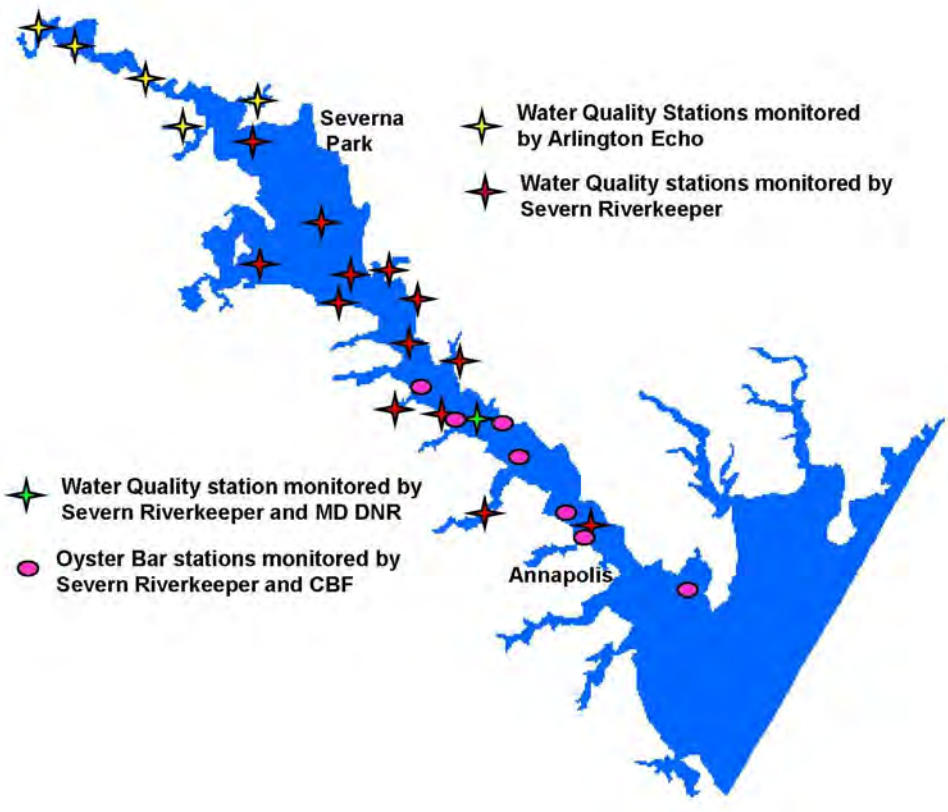


Figure 2: Map of Stations (Courtesy of Pierre Henkart)

Site SR1 “Carey’s” (Figure 3) is located 1 km upstream of the mouth of the Severn River, and is 6.5 to 7 meters deep. The site is located in the center of the mainstream Severn River and is the closest station to the Chesapeake at latitude 38.9902 N. longitude 76.4828 W. Water quality measurements were made at the bottom, 5, 3, 1, and 0.3 meters of water depth.

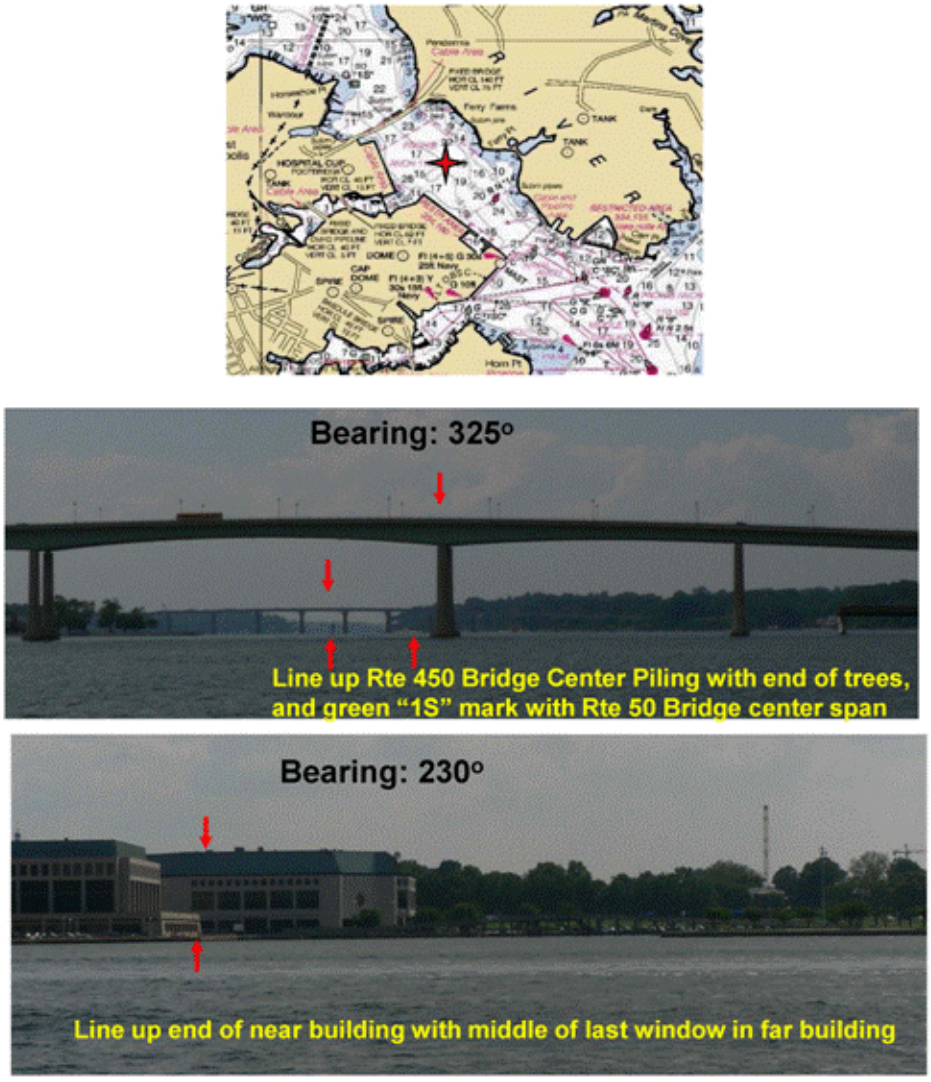
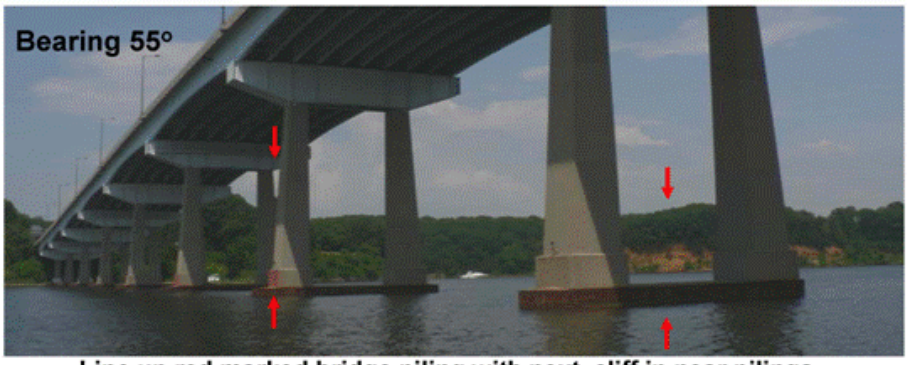


Figure 3: SR1 Map and Triangulation Points (Photo’s Courtesy of Pierre Henkart)

Site SR2 “Rte 50 Bridge” (Figure 4) is located 3.7 km upstream from the mouth of the Severn River, and is 6.5 to 7 meters deep. The site location is just off of a pier from the Route 50 Bridge at latitude 39.0068 N, longitude 76.50.46 W. Measurements were made at the bottom, 5, 3, 1, and 0.3 meters of depth.



Line up red marked bridge piling with next, cliff in near pilings

Figure 4: SR2 Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Site SR3 “Joyce” (Figure 5) is located 6.3 km upstream from the mouth of the Severn River, and is 13 meters deep. The site is a deep hole that is located in the center of the mainstream Severn River near Joyce Creek at latitude 39.0225 N. longitude 76.5250 W. Measurements were made at the bottom, 13, 11, 7, 9, 5, 3, 1, and 0.3 meters of depth.

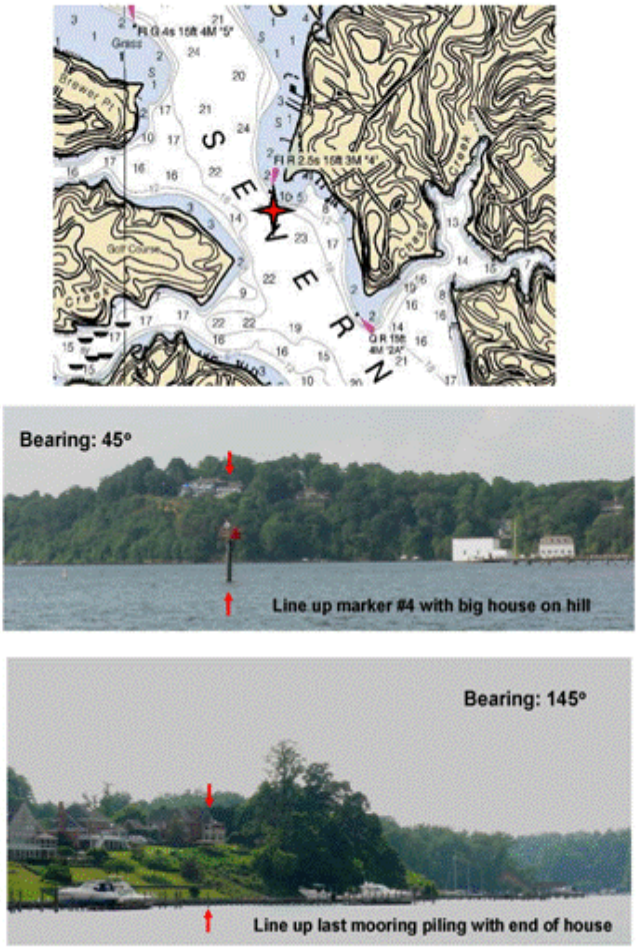


Figure 5: SR3 Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Site SR4 “Sherwood Forest Pier” (Figure 6) is located on Round Bay around 9.5 km upstream from the mouth of the Severn River, and is five meters deep. The site is located 100 ft off of the recreational pier for the Sherwood Forest neighborhood at latitude 39.0320 N. longitude 76.5455 W. Measurements were made at the bottom, 5, 3, 1, and 0.3 meters of depth.

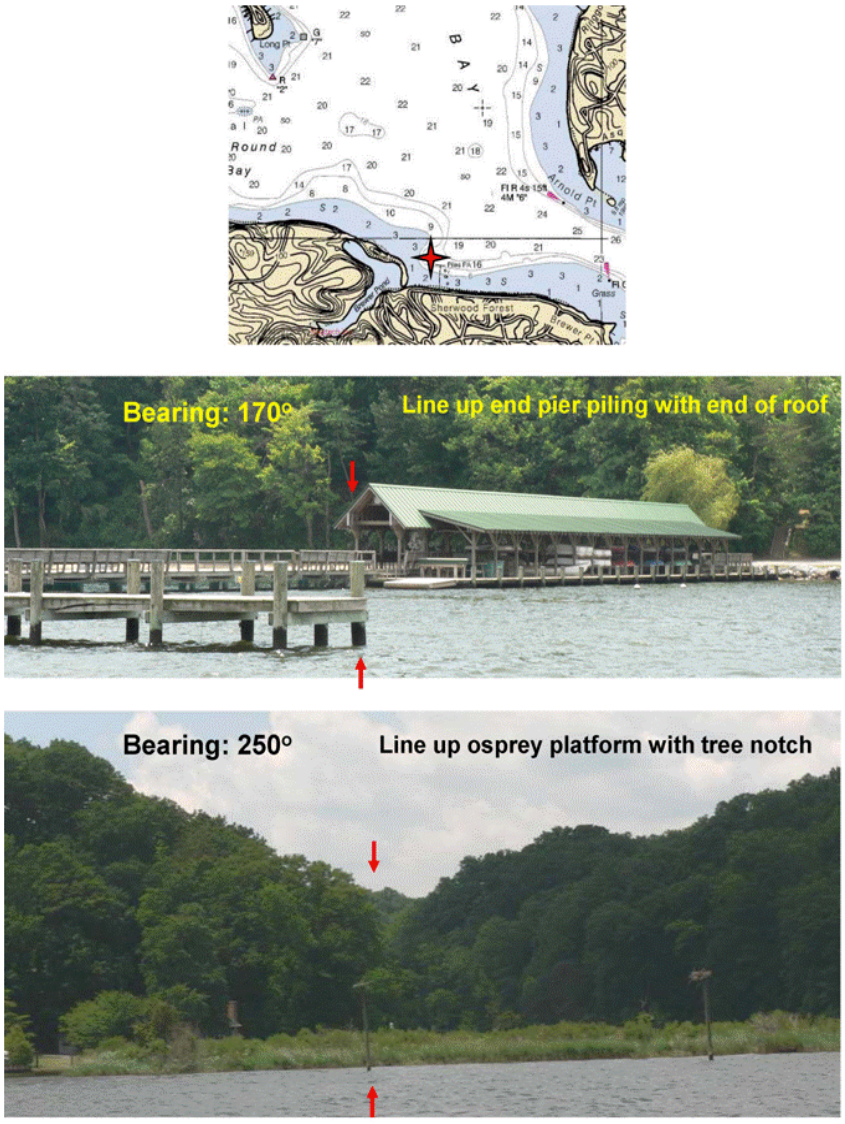


Figure 6: SR4 Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Site SR5 “Round Bay” (Figure 7) is located 9.5 km upstream from the mouth of the Severn River, and is seven meters deep. The site is located in the center of Round Bay which is the largest feature of the Severn River at latitude 39.0482 N. longitude 76.5465 W. Measurements were made at the bottom, 7, 5, 3, 1, and 0.3 meters of depth.

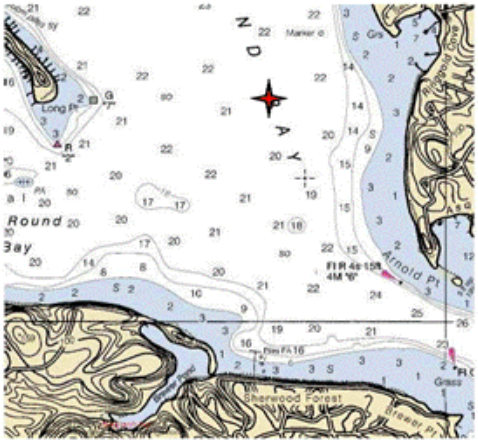
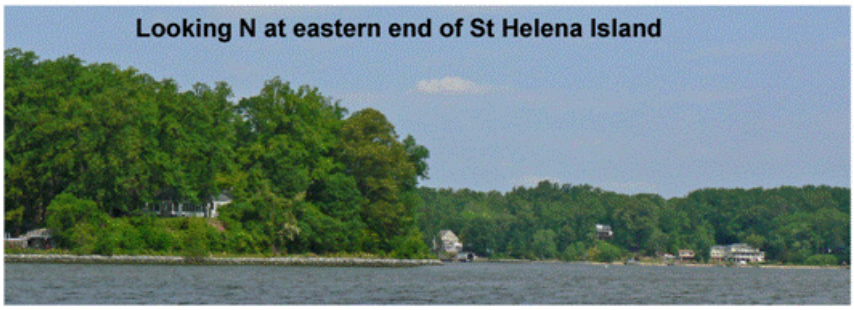


Figure 7: SR5 Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Site RBW “Round Bay West” (Figure 8) is located ten km upstream from the mouth of the Severn River, and is six meters deep. The site is located in Round Bay and was added because of prolonged anoxia observed previously in Round Bay by The Severn Riverkeeper Program. The site is located at latitude 39.0380 N. longitude 76.5430 W. Measurements were made at the bottom, 5, 3, 1, and 0.3 meters of depth.



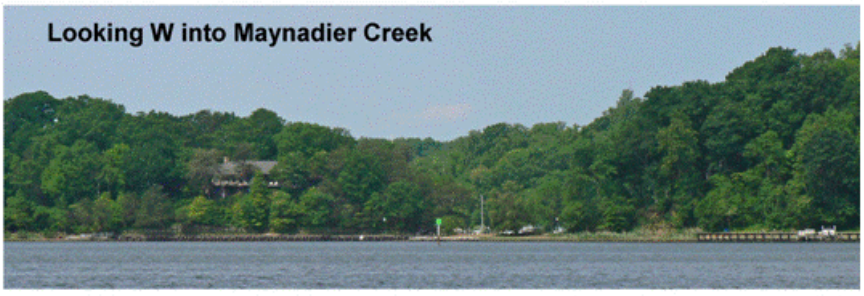


Figure 8: RBW Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Site RBN “Round Bay North” (Figure 9) is located 11.5 km upstream from the mouth of the Severn River, and is 6.5 meters deep. This site is also located in Round Bay and was selected because of the observed prolonged anoxia in Round Bay. The site is located at latitude 39.0597 N. longitude 76.5618 W. Measurements were made at the bottom, 6, 5, 4, 2, and 0.3 meters of depth.

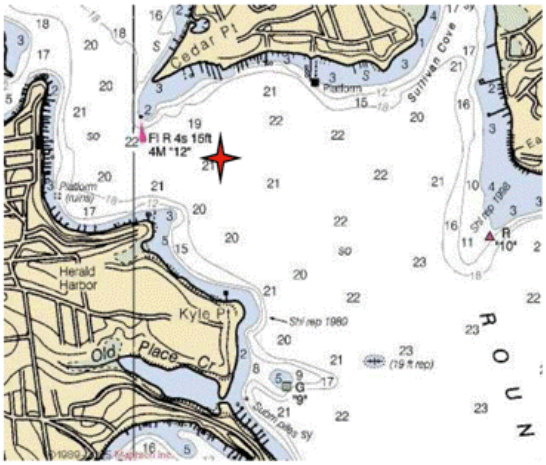


Figure 9: RBN Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Site RBS “Round Bay South” (Figure 10) is located 8.2 km upstream from the mouth of the Severn River, and is 7.5 meters deep. This is the third site located in Round Bay that was selected because of the known anoxia in Round Bay. The site is located at latitude 39.0357 N. longitude 76.5427 W. Measurements were made at the bottom, 5, 3, 1, and 0.3 meters of depth.

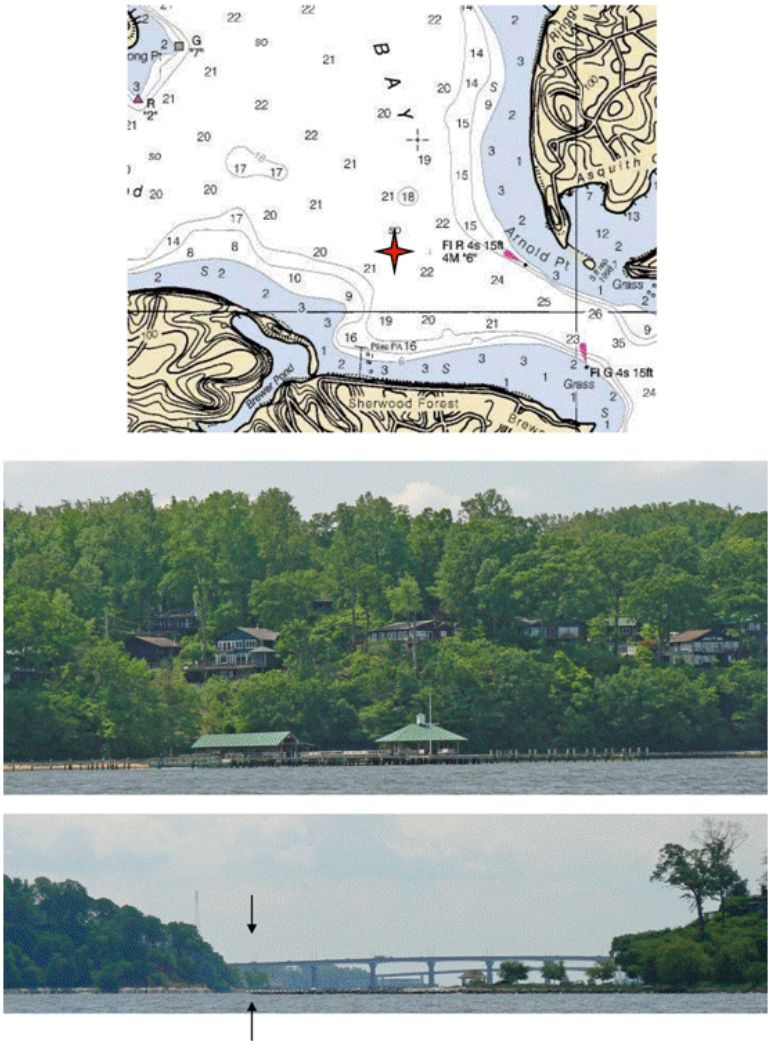


Figure 10: RBS Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Site SR6 “Narrows” (Figure 11) is located 13.4 km upstream from the mouth of the Severn River, and is five meters deep. The site is located near the headwaters of the Severn River and is the deepest hole in the Upper Severn. The site is located at latitude 39.0702 N. longitude 76.5833 W. Measurements were made at the bottom, 5, 4, 3, 2, 1, and 0.3 meters of depth.

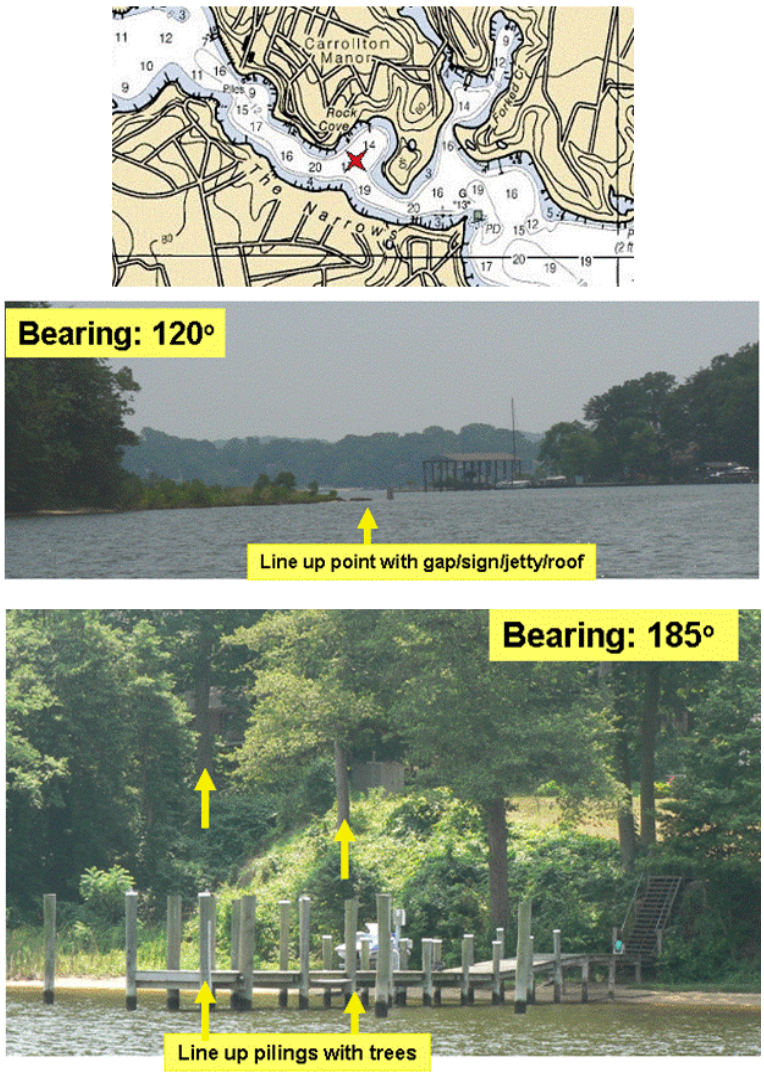


Figure 11: SR6 Maps and Triangulation (Photo's Courtesy of Pierre Henkart)

Site SR7 “Indian Landing” (Figure 12) is located 16 km upstream from the mouth of the Severn River, and is only one meter deep. The site is thought to be the head of the tidal Severn and is close to a former Department of Natural Resources (DNR) monitoring station (located adjacent to the Ben Oaks community). The site is located at latitude 39.0814 N. longitude 76.6112 W. Measurements were made at the bottom (1), and at 0.3 meters of depth.

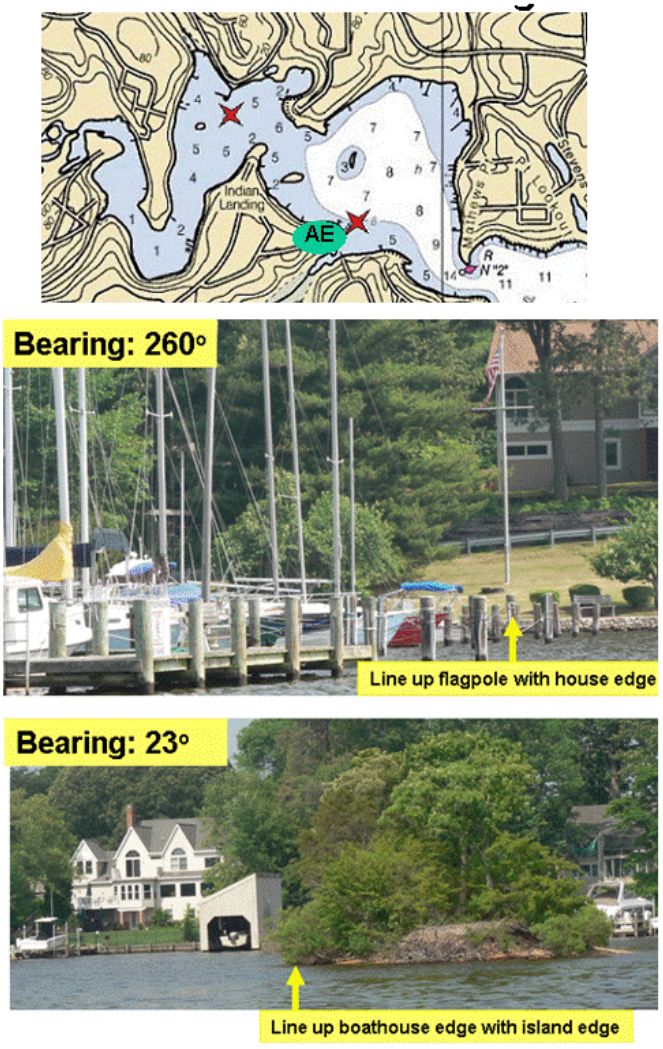


Figure 12: SR7 Maps and Triangulation (Photo's Courtesy of Pierre Henkart)

Site SC1 “Weems Creek” (Figure 13) is the stream location that is closest to the Chesapeake Bay. The site is located between two heavily used bridges in a very developed area at latitude 38.9920 N. longitude 76.5087 W. Measurements were made at the bottom, 3, 1, and 0.3 meters of depth.

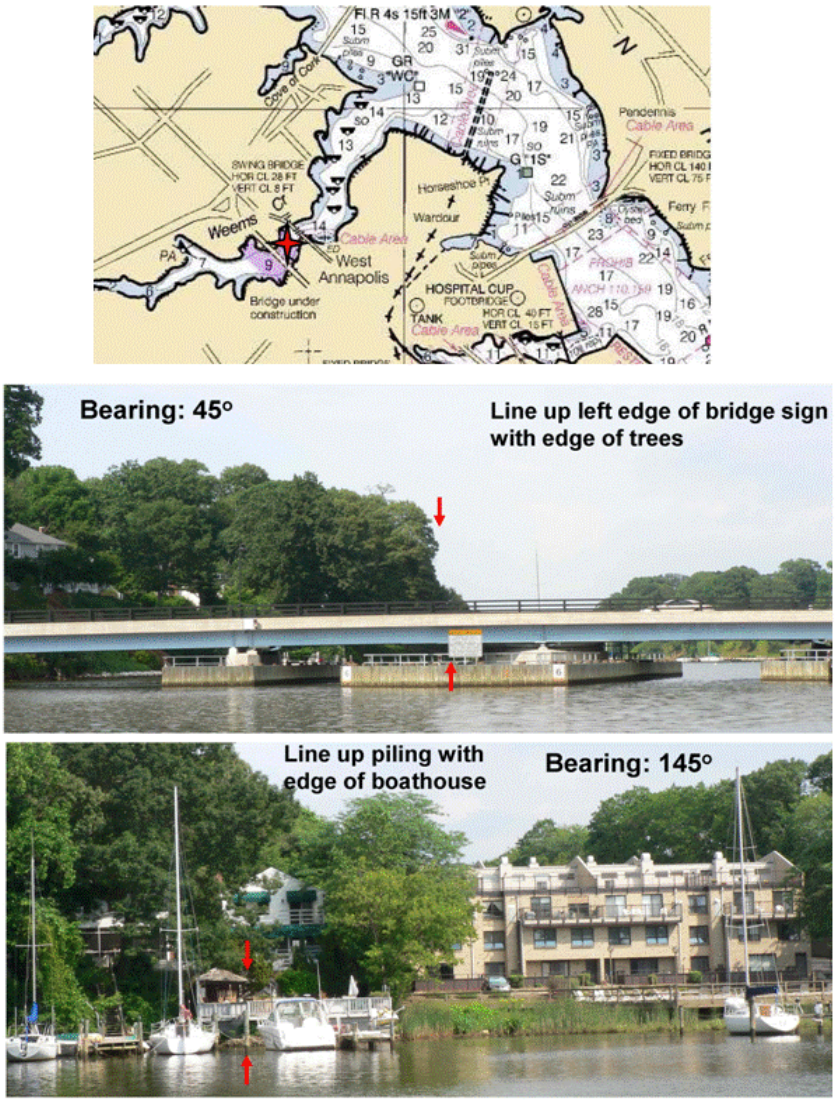


Figure 13: SC1 Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Site SC3 “Saltworks Creek” (Figure 14) is a stream location that was monitored because it has a large amount of fresh water inflow. This site is located at latitude 39.0087 N. longitude 76.5325 W. Measurements were made at the bottom, 3, 2, 1, and 0.3 meters of depth.

Figure 14: SC3 Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Site SC4 “Chase Creek” (Figure 15) is a creek with limited fresh water flow and a wide entrance to the Severn River. The site is located at latitude 39.0270 N. longitude 76.5127 W. Measurements were made at the bottom, 4, 3, 2, 1, and 0.3 meters of depth.

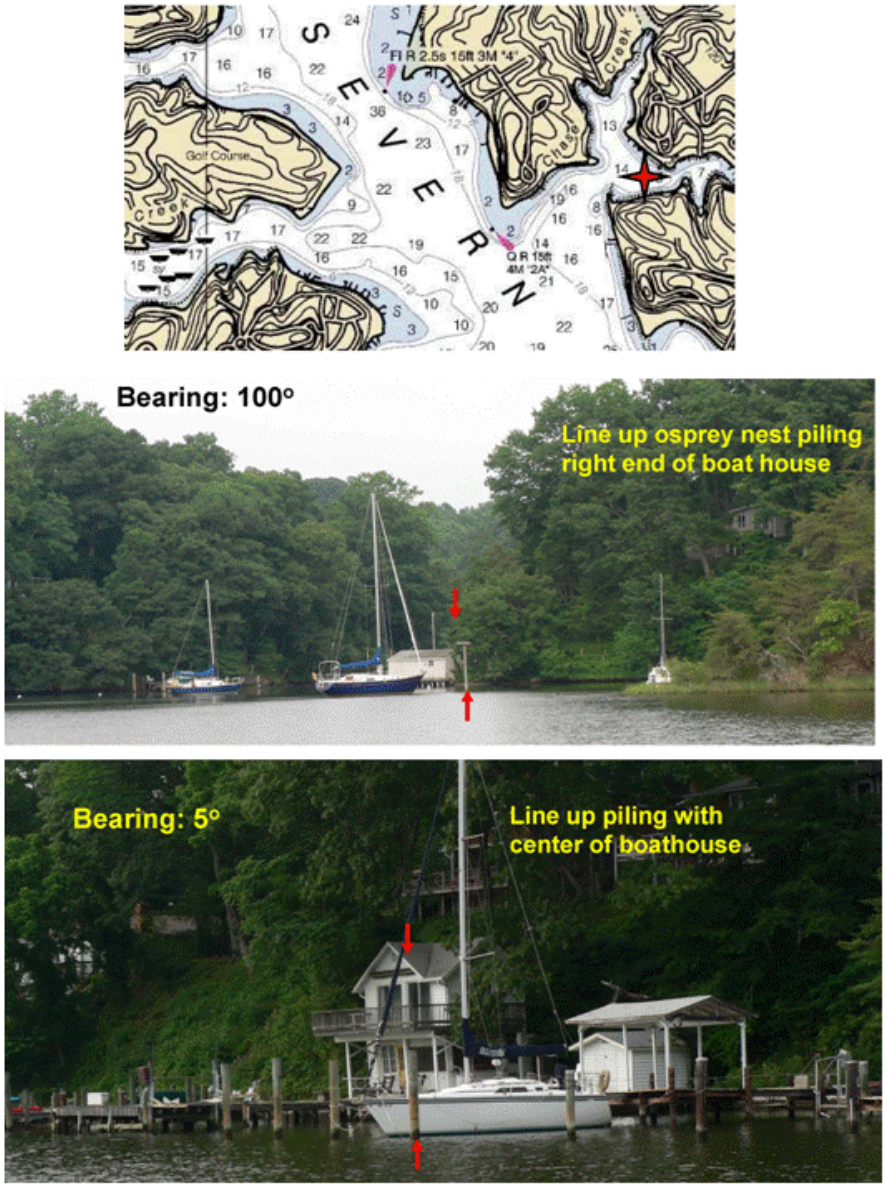


Figure 15: SC4 Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Site SC5 “Brewer Creek” (Figure 16) is a creek which was selected because it is the site of a restoration project. The freshwater stream which leads into the brackish portion of the creek and marsh at the head waters have both been restored by re-creating tidal marshland and softening shorelines by installing living shorelines. The site is located at latitude 39.0231 N. longitude 76.5427 W. Measurements were made at the bottom, 3, 2, 1, and 0.3 meters of depth.

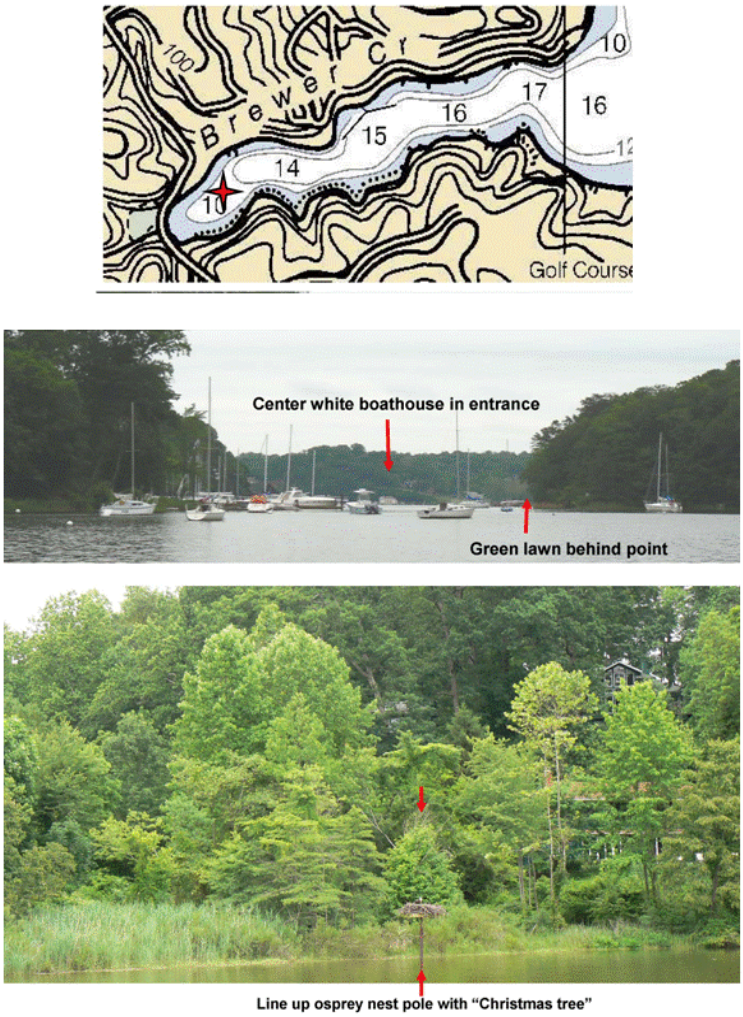


Figure 16: SC5 Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Site SC6 “Asquith Creek” (Figure 17) is a short creek with a broad mouth. A shallow sill and thick submerged aquatic vegetation bed prevent water exchange throughout the summer. This leads to cold, anoxic water that has little exchange with the mainstream Severn. The site is located at latitude 39.0367 N. longitude 76.5298 W. Measurements were made at the bottom, 4, 3, 2, 1, and 0.3 meters of depth.

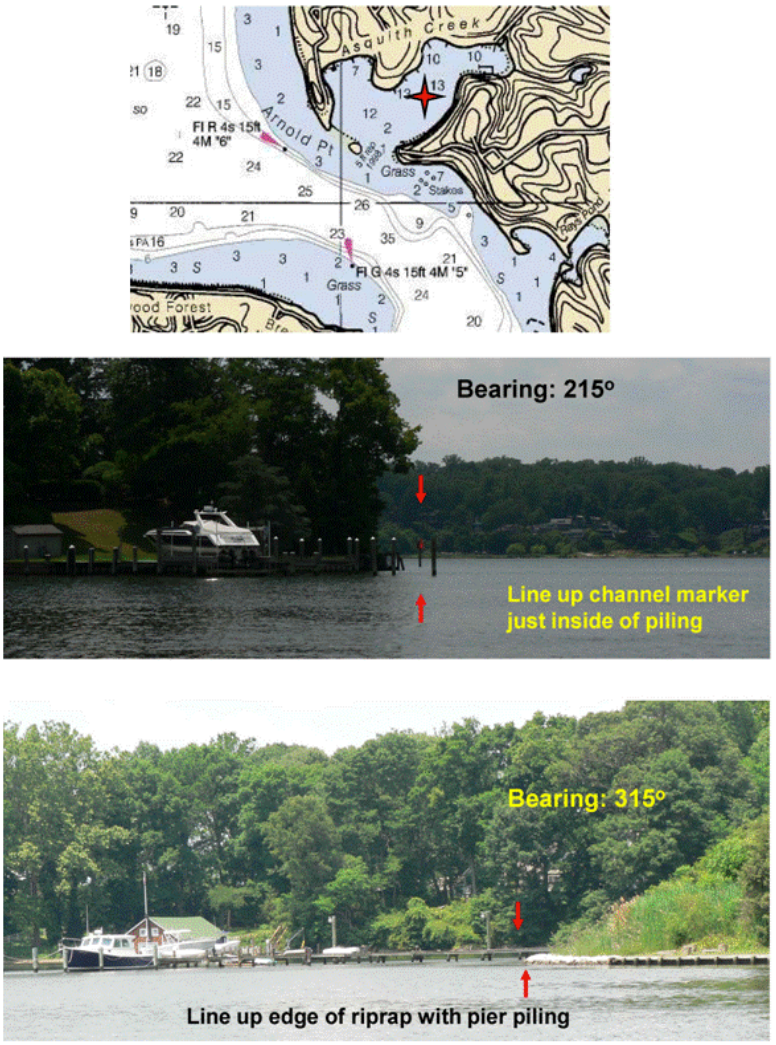


Figure 17: SC6 Map and Triangulation Points (Photo's Courtesy of Pierre Henkart)

Methods: Water Column Measurements

YSI 85 meters were used to measure DO (%), DO concentration (mg/l), salinity, and temperature (°C). Calibration procedures followed the manufacturer's recommendations. Oxygen was calibrated at least daily by the air saturation method. Salinity was calibrated using deionized water and with 5, 10, 15, and 20 ppt standard NaCl solutions. Temperature did not need to be calibrated because of known thermistor behavior.

Measurements made as a function of depth were used to define the oxygen profile in the water column and determine where oxygen became limited. A secchi disk was used to determine water clarity at each site. Two YSI 85 meters were used and two secchi readings were taken at each site by different researchers. The measurements were recorded individually, then averaged.

Ancillary data for precipitation, stream flow, and insolation were obtained from the National Oceanic and Atmospheric Administration (NOAA), the United States Geological Survey (USGS), and National Aeronautics and Space Administration (NASA), respectively and can be found in Appendix B. These data were used to help analyze trends in water quality data from the various stations.

CHAPTER 3: RESULTS

Data collected during this study are compiled in appendix A. Selected data from this compilation will be used to illustrate the processes and conditions that resulted in the observed trends. Four sites were chosen to observe spatial trends. Site SR1 represents the mouth of the Severn River, site SR5 represents midstream sites, and SR6 represents the head of the river. Site SR7 is a shallow site and essentially a creek site but it was included to represent the head of the tidal Severn. Five dates were chosen to illustrate temporal variations. June 5th represents the beginning of the summer, June 24th and July 30th are the midsummer dates, and August 23rd is the date considered to be the end of summer as water column mixing occurred on September 6th as a result of tropical storm Hanna. September 9th is shown to illustrate the effects of tropical storm Hanna.

Temperature

Temperature was measured to determine its effect on hypoxic and anoxic conditions observed in the Severn River. Temperature can affect DO concentrations because the solubility of gasses in water decreases with increasing temperature (Chang, 2005). A general trend of increasing temperature was seen in both surface (Figure 18) and bottom (Figure 19) measurements in all mainstream sites from June through July with a decrease in temperature observed on August

23rd and September 9th (Figures 20 and 21). Figures 20-25 show temperature profiles at the estuarine sites and the headwaters of the Severn River.

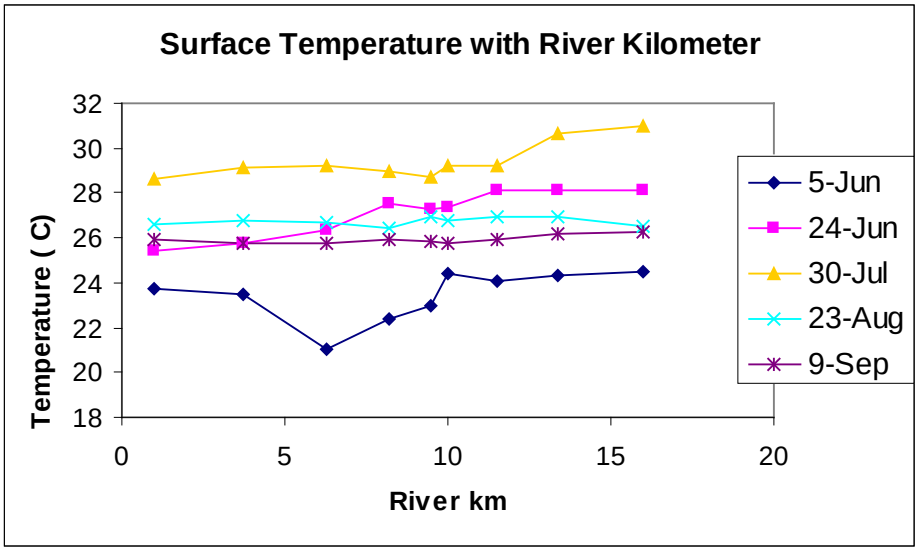


Figure 18: Surface temperature as a function of distance upstream from nine sites along the Severn River. Temperature is lowest on June 5th and peaked on July 30th. The surface temperature increased by an average of 6.0 degrees Celsius.

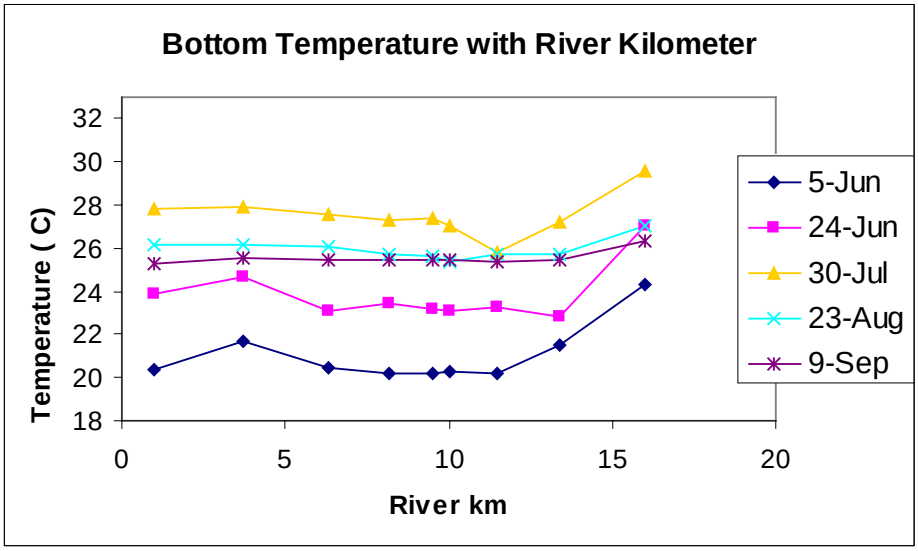


Figure 19: Bottom temperature as a function of distance upstream from nine sites along the Severn River. Temperature is lowest on June 5th and peaked on July 30th. The bottom temperature increased by an average of 6.5 degrees Celsius

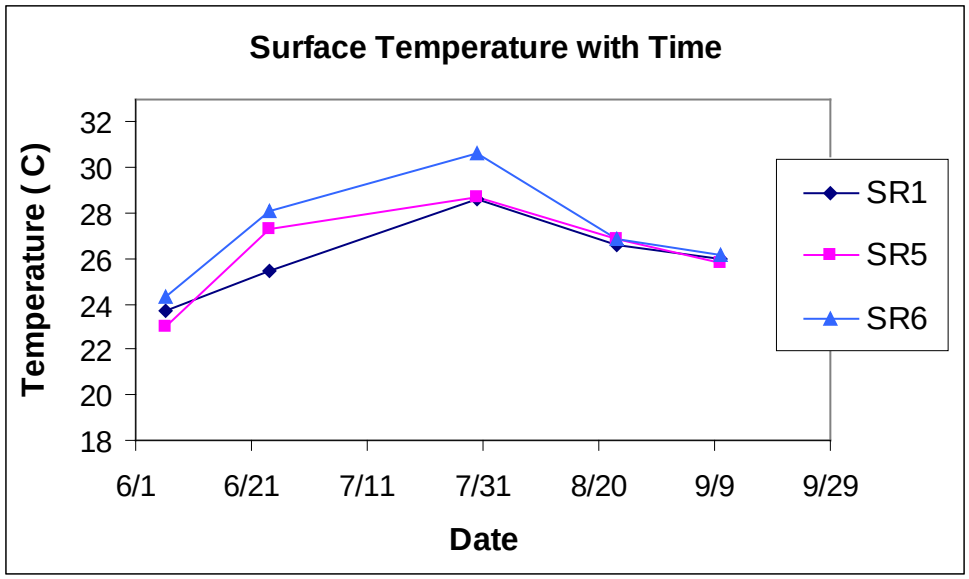


Figure 20: Surface temperature as a function of time at SR1 (mouth), SR5 (midstream), and SR6 (head). Surface temperature peaked on July 30th at all three representative sites.

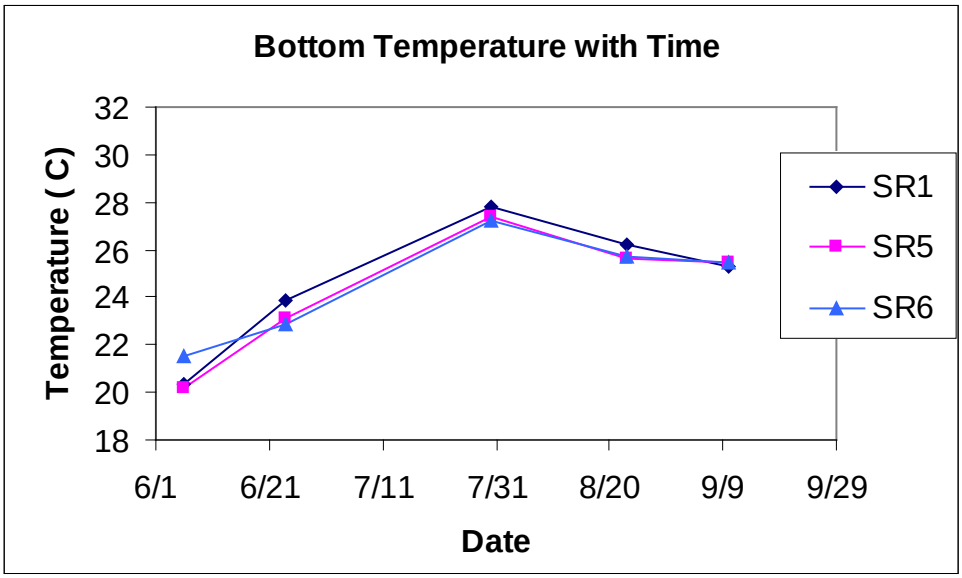


Figure 21: Bottom temperature as a function of time at SR1 (mouth), SR5 (midstream), and SR6 (head). Surface temperature peaked on July 30th at all three representative sites.

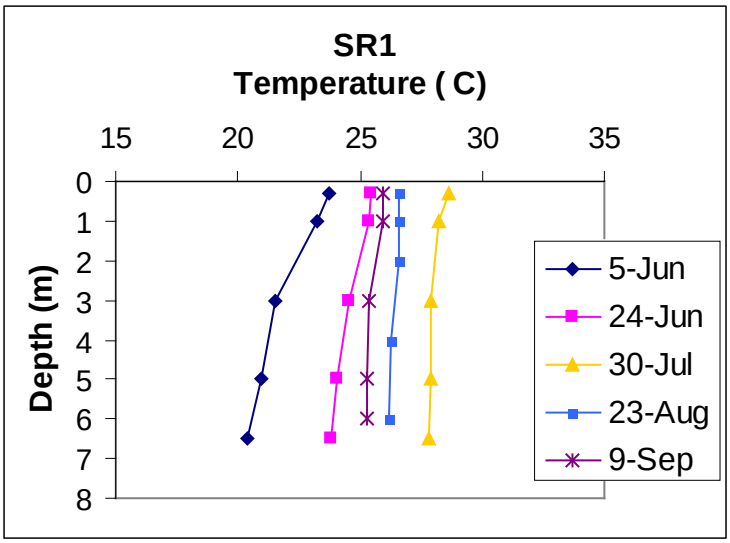


Figure 22: Temperature depth profiles for site SR1; the site closest to the Chesapeake Bay. Temperature is lowest on June 5th and peaked on July 30th with a maximum surface difference of 4.7 degrees Celsius and a maximum bottom difference of 7.5 degrees Celsius. Mixing from tropical storm Hanna mixed the water column on September 9th.

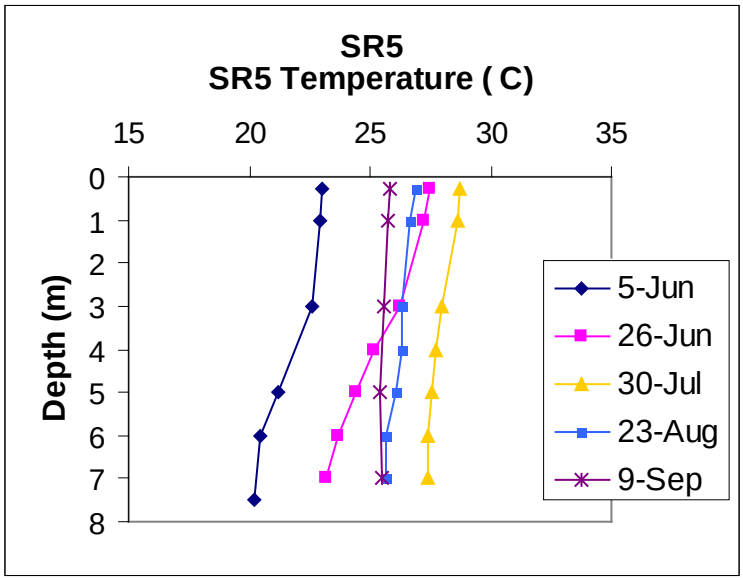


Figure 23: Temperature with depth for site SR5, located in Round Bay. Temperature is lowest on June 5th and peaked on July 30th with a maximum surface difference of 5.7 degrees Celsius and a maximum bottom difference of 7.2 degrees Celsius. Mixing from tropical storm Hanna mixed the water column on September 9th.

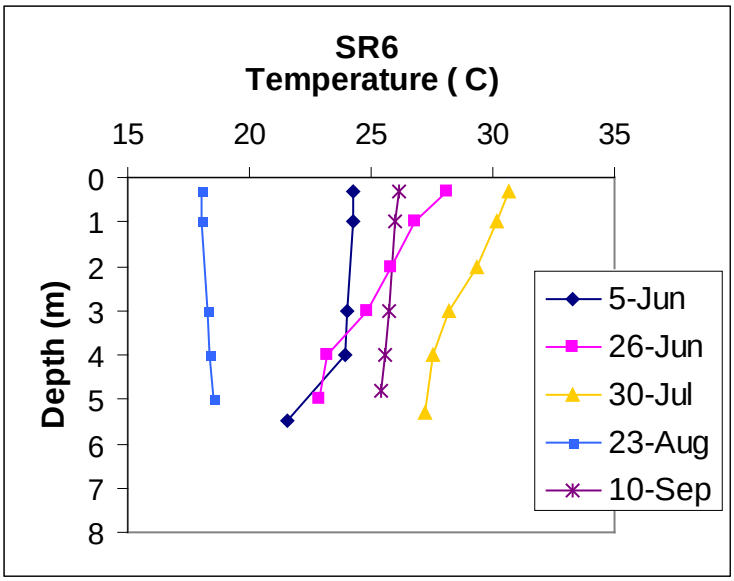


Figure 24: Temperature with depth for site SR6, the up river site. Temperature is lowest on June 5th and peaked on July 30th with a maximum surface difference of 6.4 degrees Celsius and a maximum bottom difference of 5.7 degrees Celsius.

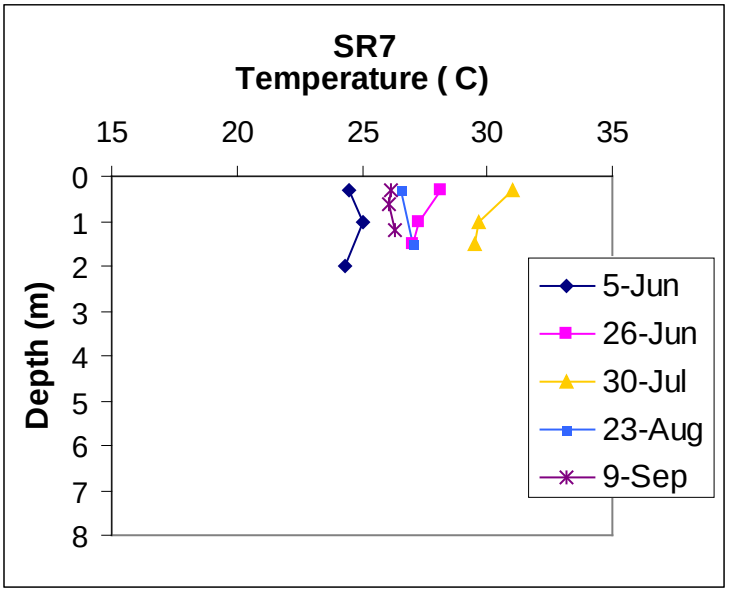


Figure 25: Temperature with depth for site SR7, the shallow head of the tidal Severn River. Temperature is lowest on June 5th and peaked on July 30th with a maximum surface difference of 6.5 and a maximum bottom difference of 5.19 degrees Celsius. Mixing from tropical storm Hanna caused the well mixed water column on September 9th.

Salinity

Salinity was monitored to determine its effect of on oxygen concentrations. The solubility of oxygen in water generally decreases with increasing salinity (Garrels and Christ, 1965). Salinity generally decreased upstream (Figures 26 and 27) but increased throughout the summer (Figures 28 and 29) both at the surface and at the bottom. Figures 30-33 show depth profiles of salinity. Salinity increased progressively throughout the summer at sites SR1 and SR5. Salinity trends for sites SR6 and SR7 were similar to those of SR1 and SR5 with the exception of very slightly lower salinities at the former sites on September 9th, which was likely due to increased freshwater input associated with tropical storm Hannah. The later is particularly noticeable in Figure 28.

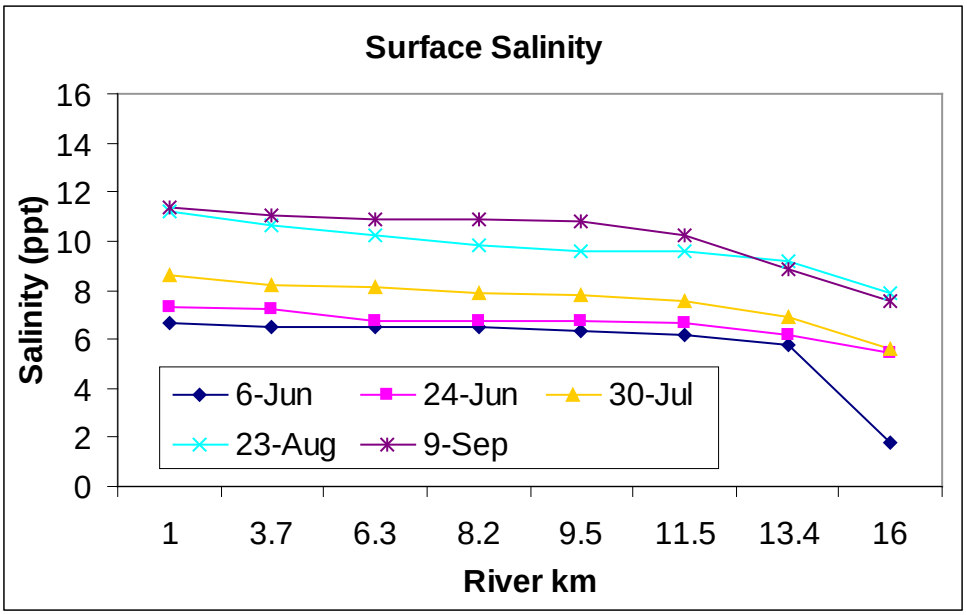


Figure 26: Surface salinity as a function of distance upstream from nine sites along the Severn River. Salinity increased throughout the summer and decreased upstream.

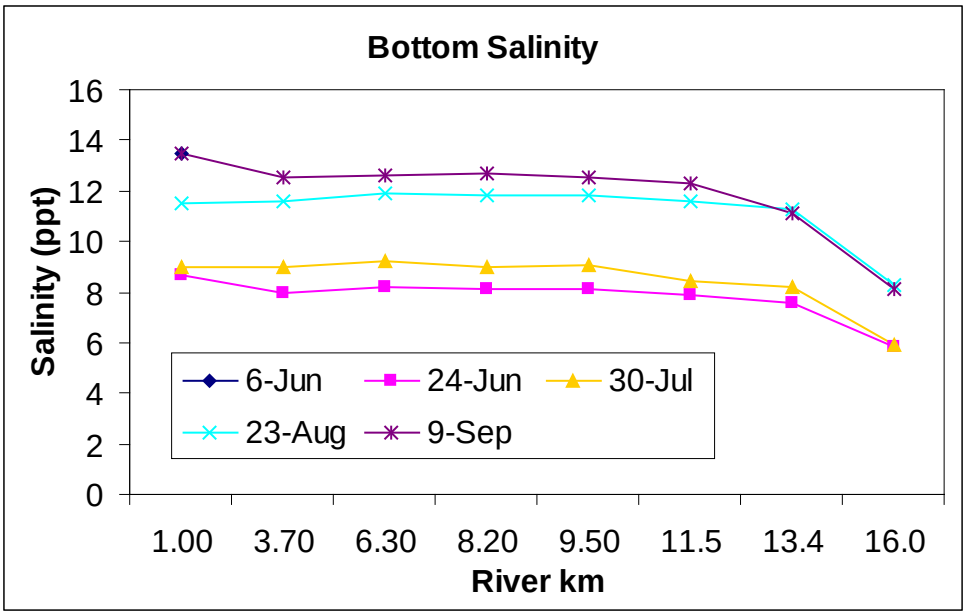


Figure 27: Surface salinity as a function of distance upstream from nine sites along the Severn River. Bottom salinity showed a trend of increasing salinity throughout the summer and decreasing salinity upstream.

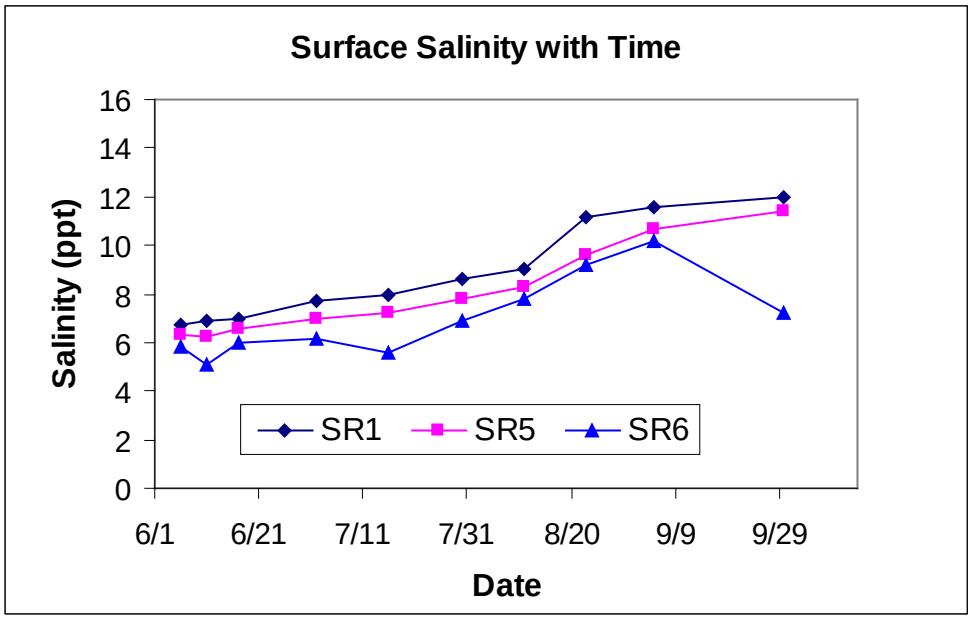


Figure 28: Surface salinity as a function of time at SR1 (mouth), SR5 (midstream), and SR6 (head). Salinity increased throughout the summer with an exception at SR6 on September 9th which was likely caused by increased freshwater input from rainfall associated with tropical storm Hannah.

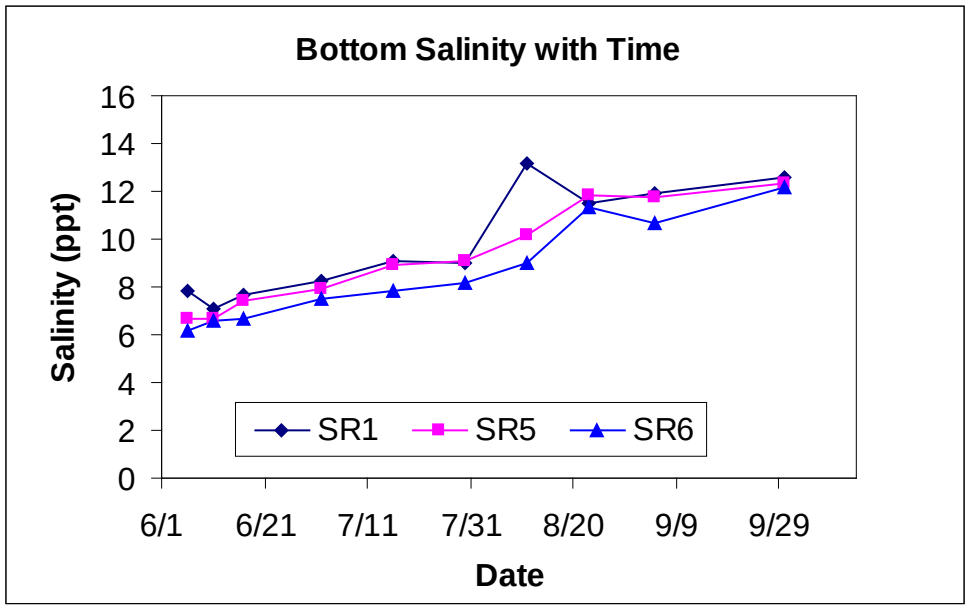


Figure 29: Bottom salinity as a function of time shows an increasing trend at all 3 representative sites.

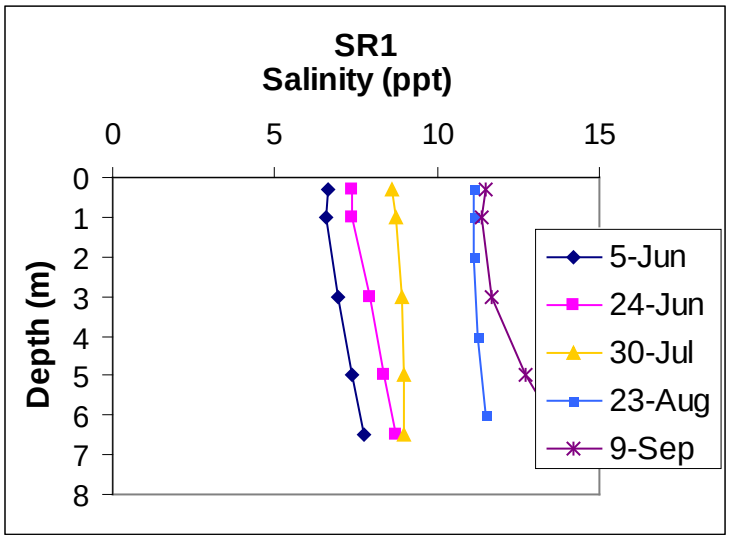


Figure 30: Salinity with depth for site SR1, the site closest to the Chesapeake Bay. Salinity showed a trend of increasing salinity throughout the summer; surface salinity increased 4.7 ppm, and bottom salinity increased 5.7 ppm during this time.

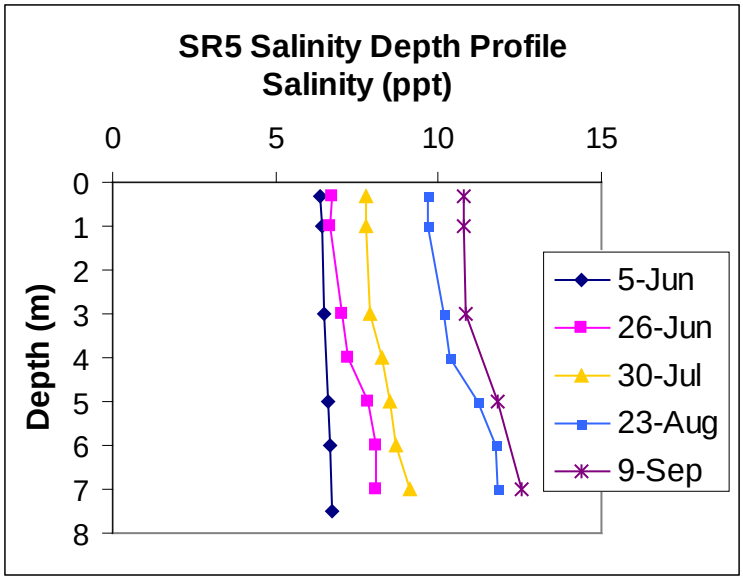


Figure 31: Salinity with depth for site SR5, located in Round Bay. Salinity showed a trend of increasing salinity throughout the summer; surface salinity increased 4.5 ppm, and bottom salinity increased 5.9 ppmduring this time.

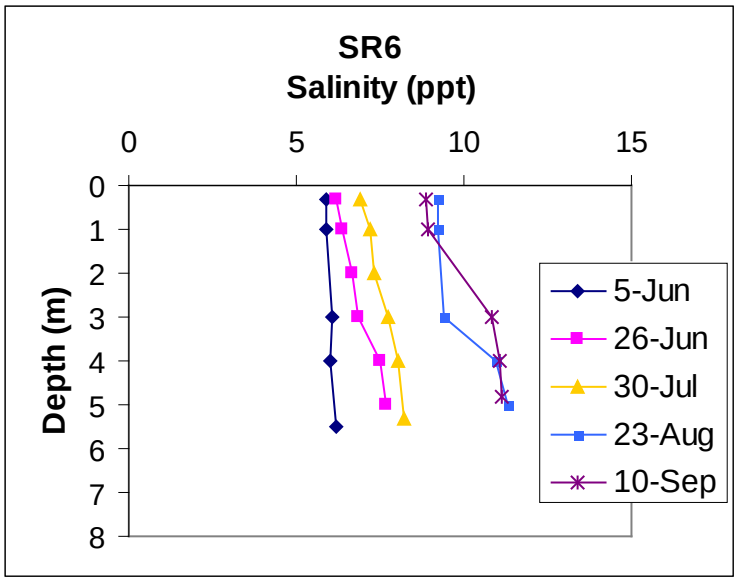


Figure 32: Salinity with depth for site SR6, the up river site. Salinity showed a trend of increasing salinity throughout the summer; surface salinity increased 3.05 ppm, and bottom salinity increased 5 ppm. Surface salinity was lower on August 23 than on September 10th.

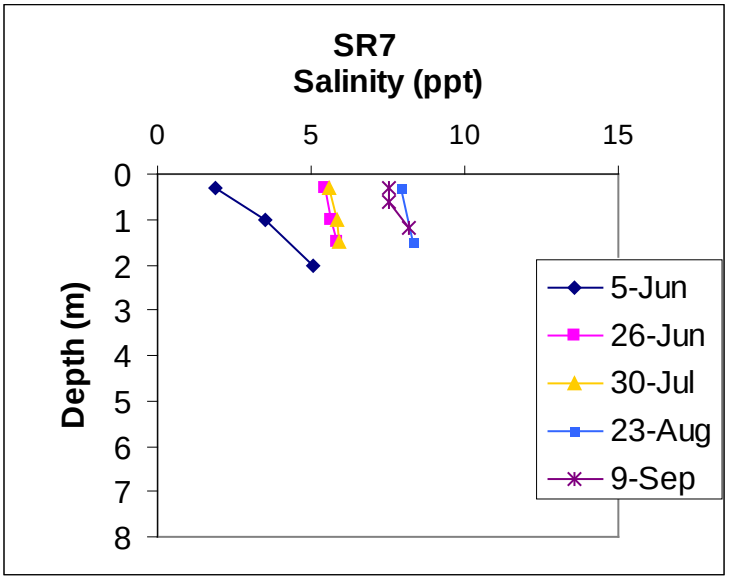


Figure 33: Salinity with depth for site SR7, the shallow head of the tidal Severn River. Salinity showed a trend of increasing salinity throughout the summer; surface salinity increased 5.8 ppm, and bottom salinity increased 3.1 ppm. Surface salinity was lower on August 23 than on September 10th.

Dissolved Oxygen

Dissolved oxygen concentrations can be used as a first order indicator of water quality because DO levels have a direct impact on the biota in the body of water. Figure 34 shows surface DO concentrations as a function of distance during multiple sampling dates. The red line indicates 4 mg/l which is the upper limit considered here to represent hypoxic conditions. Only one hypoxic (<4 mg/l) reading was observed at SR2 on September 9th; the surface waters, however, were never anoxic. Concentrations of DO in bottom waters are shown in Figure 35; nearly all measurements are hypoxic with a large area of prolonged anoxia from river kilometers eight through twelve (Round Bay). Figures 36-39 show oxygen depth profiles for June 5th, June 24th, July 23rd, August 23rd, and September 9th. Depth profiles all show lower DO levels deeper in the water column, and lower DO concentrations upstream, farther from the mouth of the Severn River. Site SR1, closest to the mouth of the Severn River, was found to be hypoxic at depth throughout most of the summer, but was never anoxic. The mid stream and upstream sites, SR5 and SR6, respectively, displayed anoxic conditions deep in the water column. Site SR7 (Figure 36), the shallow head of the tidal Severn River, showed large variations in DO. All available data from site SR5 are shown in Figure 40.

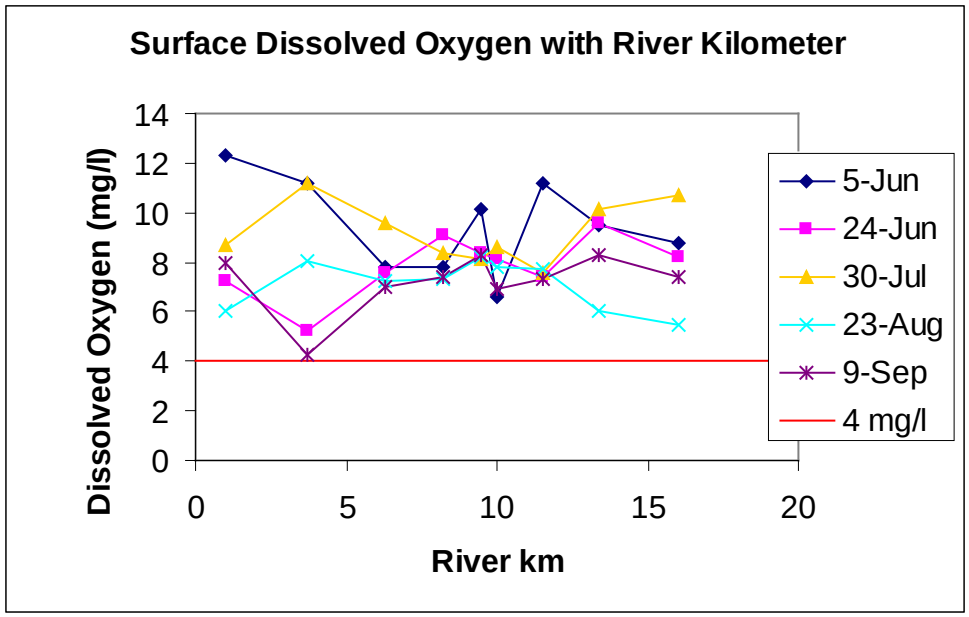


Figure 34: Surface Dissolved Oxygen as a function of distance upstream from nine sites along the Severn River. The red line indicates 4 mg/l oxygen; below this level, waters are considered to be hypoxic.

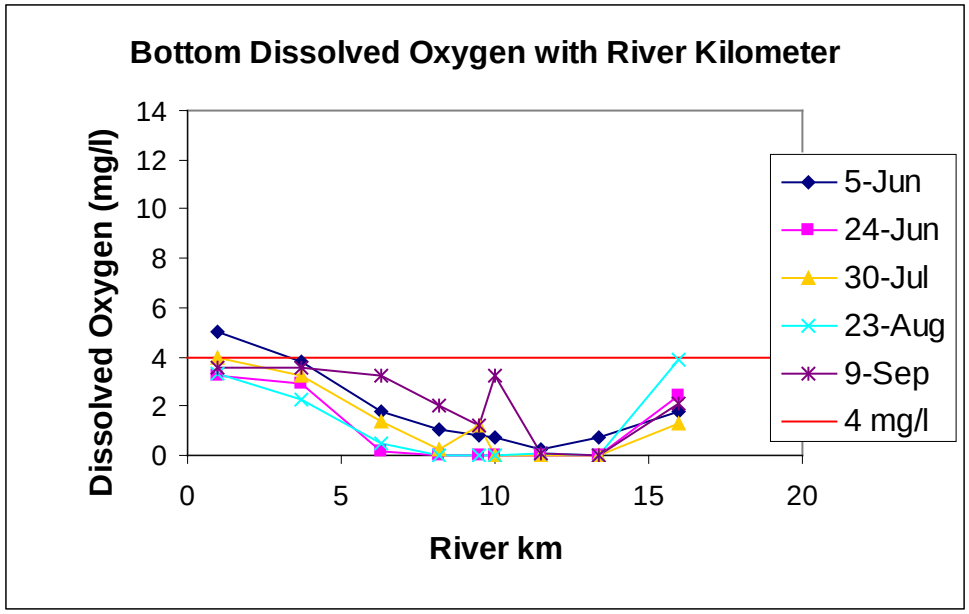


Figure 35: Bottom Dissolved Oxygen as a function of distance upstream from nine sites along the Severn River. The red line indicates 4 mg/l oxygen; below this level, waters are considered to be hypoxic. Note that nearly all measurements were hypoxic if not anoxic (no oxygen). The sites between river kilometers 8.2 and 11.5 are in Round Bay, which frequently experiences anoxic conditions.

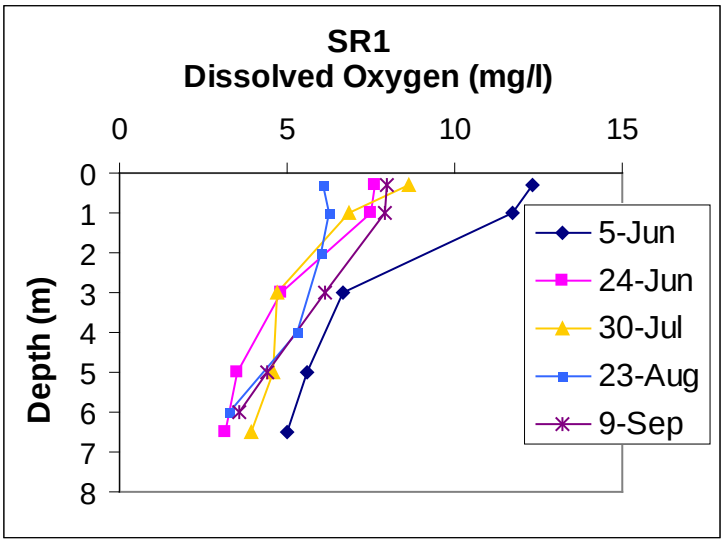


Figure 36: Dissolved oxygen concentration with depth for site SR1; the site closest to the Chesapeake Bay. This plot shows hypoxia on dates after June 5th, but no anoxia.

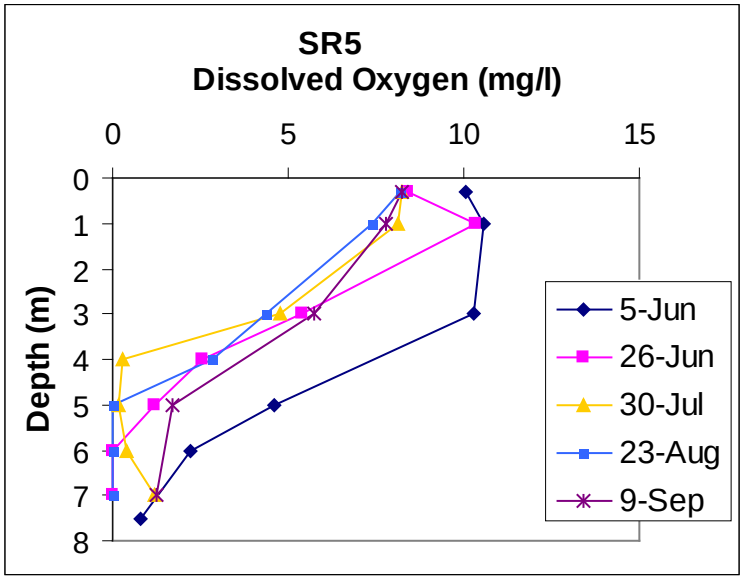
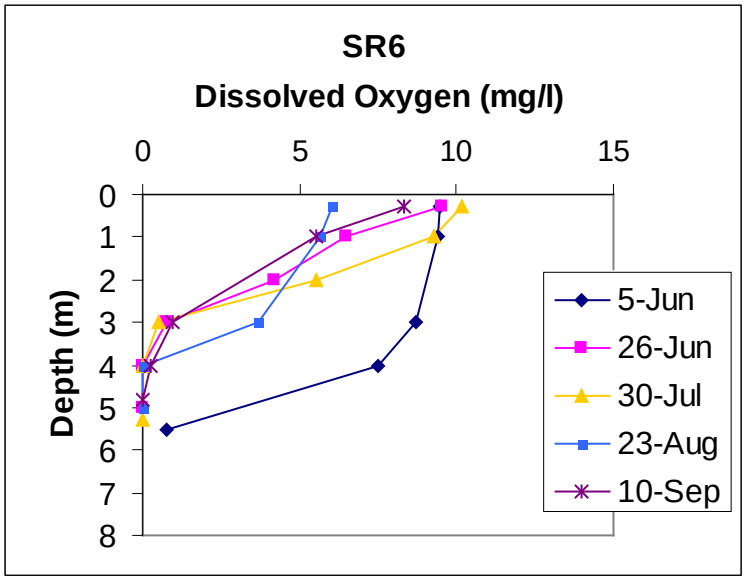


Figure 37: Dissolved oxygen concentration with depth for site SR5, located in Round Bay showing hypoxic and anoxic conditions from June 5th through September 9th.



=

Figure 38: Dissolved oxygen concentration with depth for site SR6, the up river site. Bottom waters were anoxic from June 26th through September 10th.

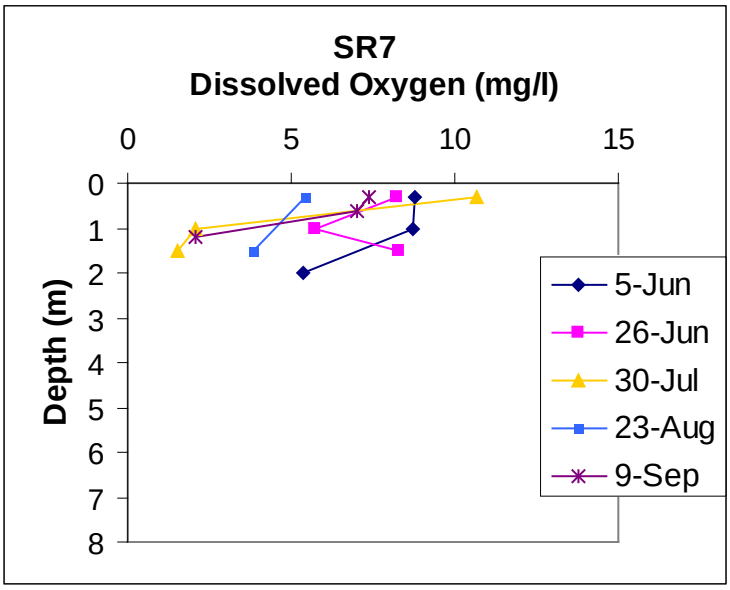


Figure 39: Dissolved oxygen concentration with depth for site SR7, the shallow head of the tidal Severn River.

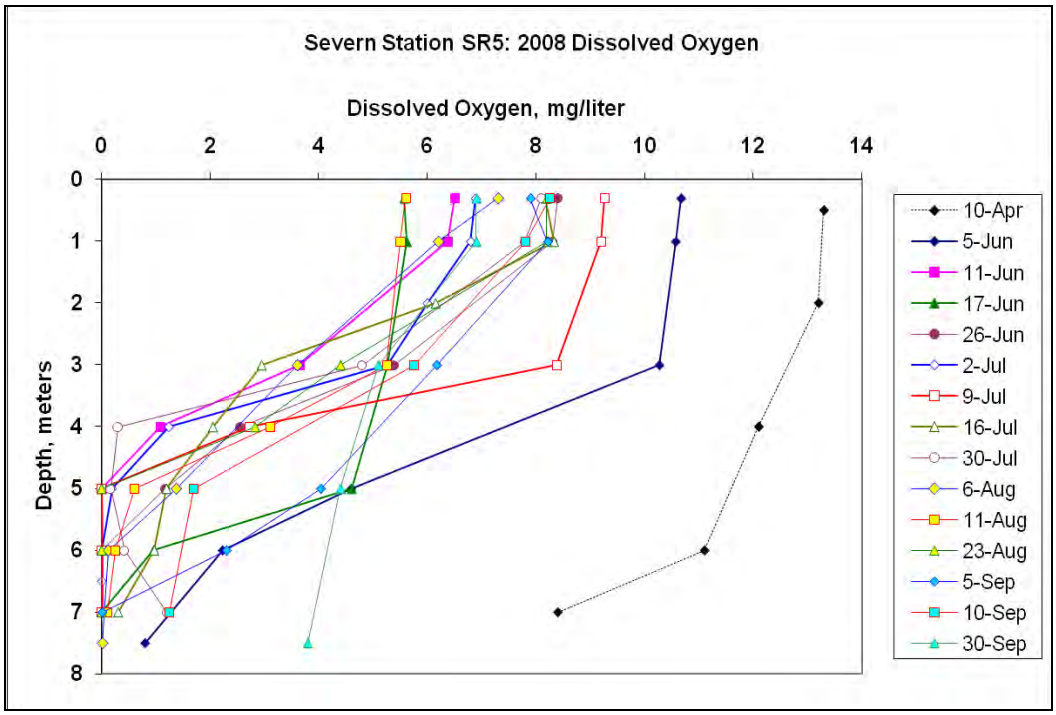


Figure 40: Dissolved oxygen profile for site SR5 in Round Bay with all monitored dates including a spring measurement made on April 10th (courtesy of Dr. Pierre Henkart).

Secchi Depth

Secchi depths at mainstream Severn River locations are shown in Figure 41. The overall trend in the temporal variation is consistent at all sites except SR7. Separately, the creek secchi data also showed consistent temporal trends from station to station (Figure 42). Because of the relative consistency of the observed trends, secchi depth data from mainstream sites were averaged for each sampling date as were creek data (Figure 43). The measurement made at SR4 on July 16th seems anomalous, although the reason remains unclear; it was removed from the average in an effort to obtain a more representative average of the mainstream Severn River sites. The inverse secchi depth (one divided by the secchi reading) was calculated and plotted (Figure 44) to allow comparison with rainfall (Figure 45) and stream flow data (Figure 46) and evaluate if these parameters impacted secchi depth.

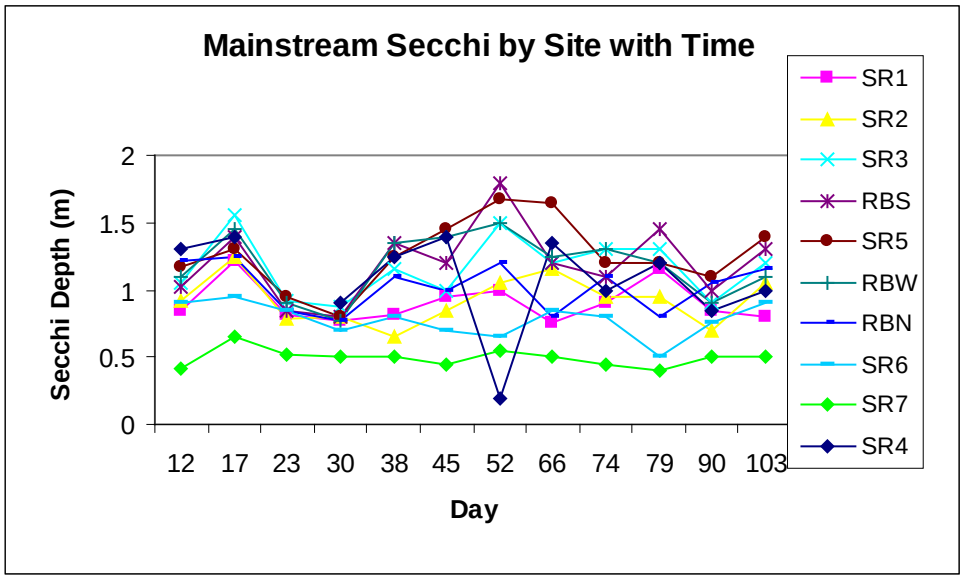


Figure 41: Secchi depth in meters as a function of time in days for ten mainstream sites. Mainstream secchi measurements had good temporal correlation with the exception of the anomalous measurement for SR4 on day 53.

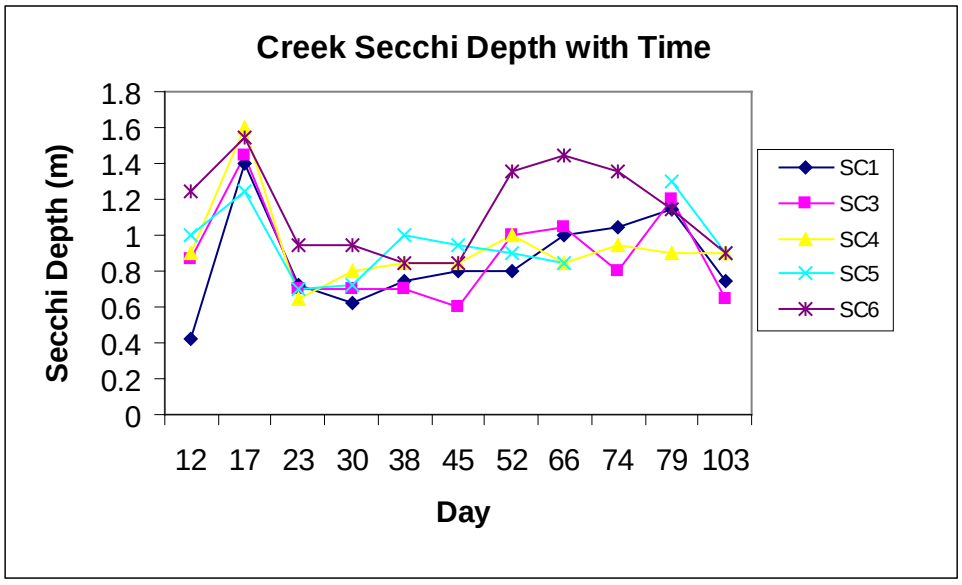


Figure 42: Secchi depth in meters as a function of time in days for five creek sites.

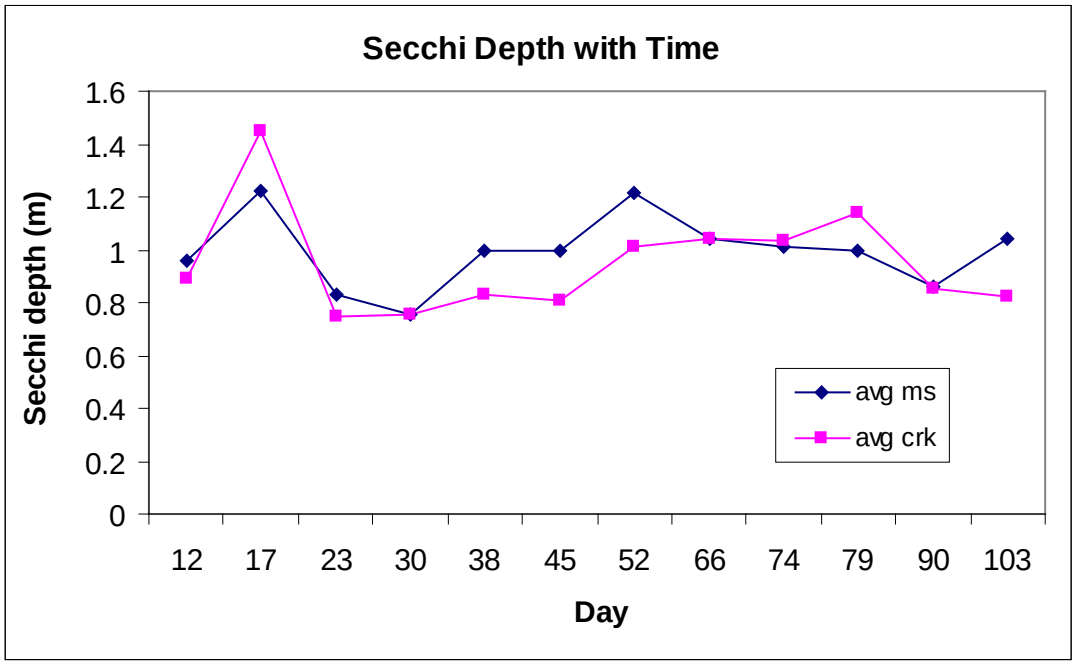


Figure 43: Average secchi depth of mainstream sites (blue) and creek sites (pink) in meters as a function of time in days.

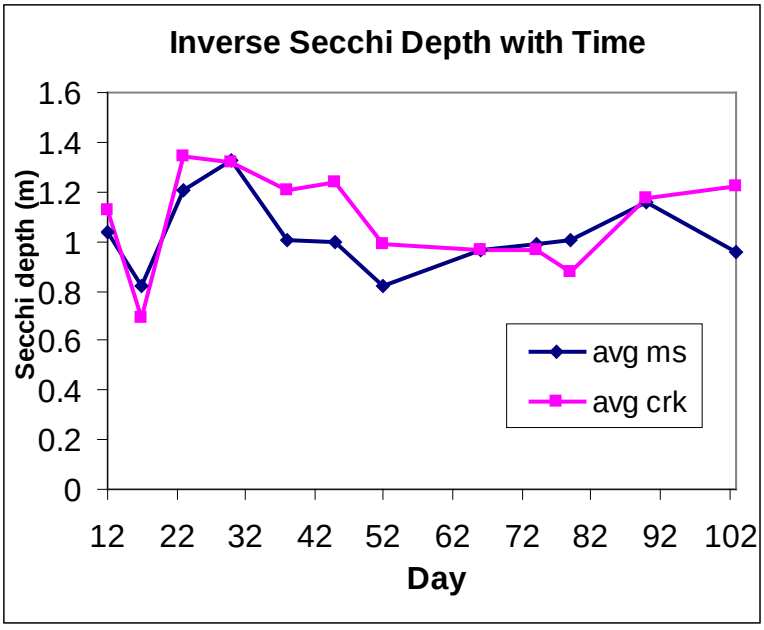


Figure 44: Inverse average secchi depth of mainstream sites (blue) and creek sites (pink) in meters as a function of time in days.

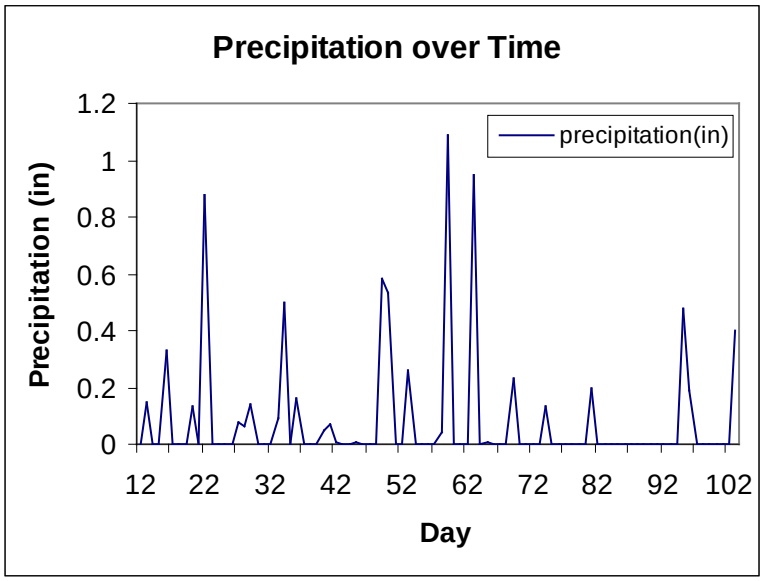


Figure 45: Precipitation in inches as a function of time in days.

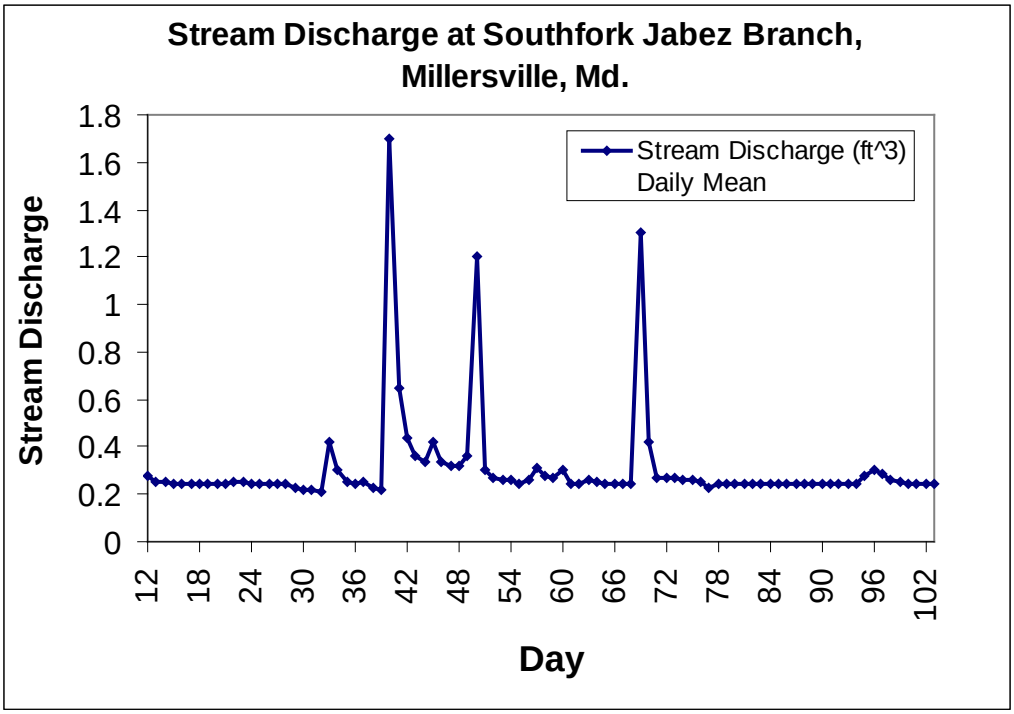


Figure 46: Stream discharge in cubic feet as a function of time in days.

CHAPTER 4: DISCUSSION

Three represenative sites, SR1, SR5, and SR6, were selected for data analysis. Data from three dates, June 5th, July 30th, and August 23rd were chosen to illustrate temporal variations. Data were examined to evaluate the factors which affect water quality in the Severn River. This discussion will evaluate relationships between 1) measured dissolved oxygen, temperature, and salinity; 2) water clarity measurements, precipitation, and stream flow; and 3) measured dissolved oxygen concentrations and calculated maximum oxygen saturation.

Temperature

Temperature affects dissolved oxygen concentrations because the solubility of gasses in water decreases with increasing temperature. As described in the previous section, water temperature increased through July, after which a decreasing trend was observed. These trends were observed in both surface (Figure 18) and bottom (Figure 19) waters. The water temperature increased and decreased with the air temperature clearly reflecting the seasonal influence on water temperature.

Changes in the DO content of water do not appear to be significantly affected by water temperature (Figures 43-45). The nearly vertical trends of DO as a function of temperature suggest

another parameter is driving DO variations in the water column. Most likely respiration of organic matter in deep waters depletes the DO and stratification induced by temperature and salinity differences inhibit DO replenishment. This is discussed in greater length below.

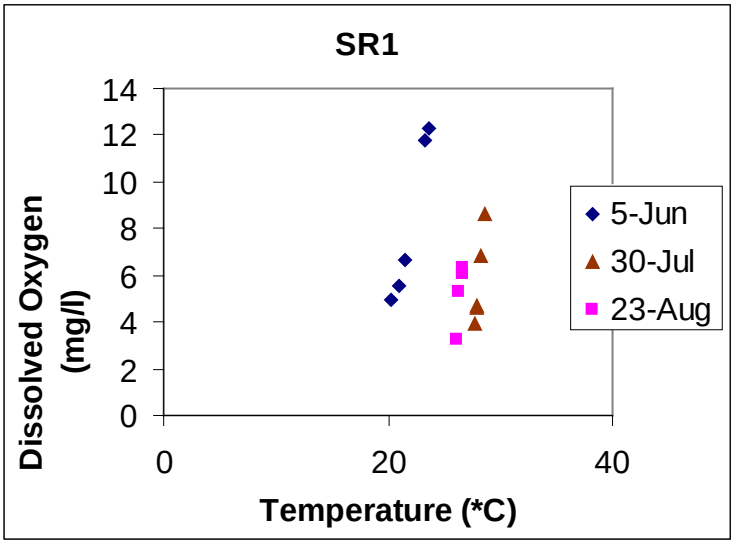


Figure 47: SR1 dissolved oxygen concentrations as a function of temperature.

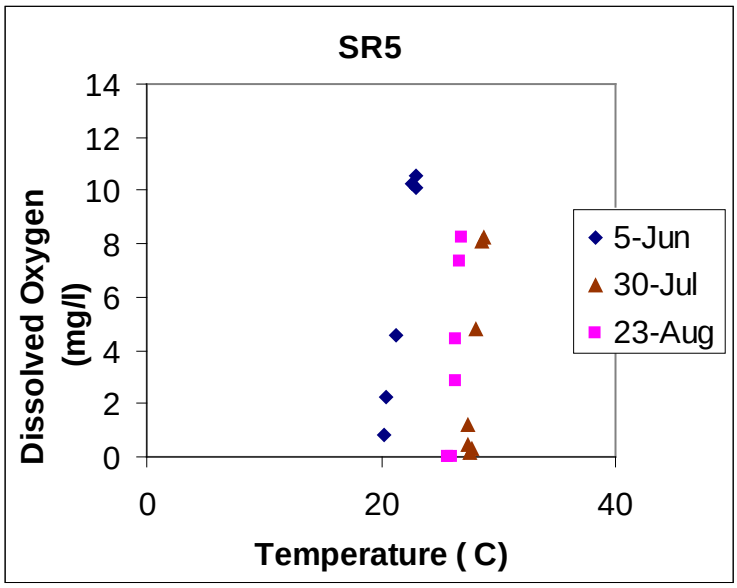


Figure 48: SR5 dissolved oxygen concentrations as a function of temperature.

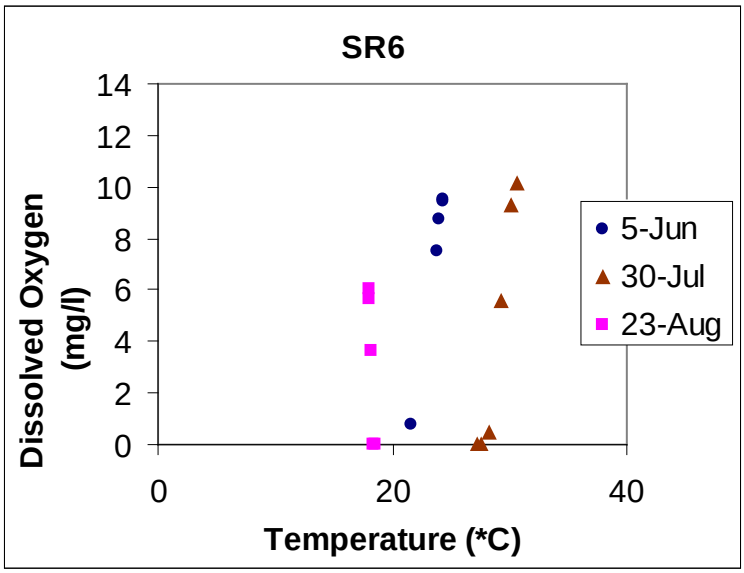


Figure 49: SR6 dissolved oxygen concentrations as a function of temperature.

Salinity

Salinity was also monitored to determine its effect on DO concentrations in the Severn River. The solubility of oxygen generally decreases with increasing salinity and it was expected that an inverse correlation would be seen between salinity and dissolved oxygen. Surface water data (Figure 24) and bottom water data (Figure 25) showed that salinity decreased from the mouth of the river towards upstream sites. Salinity was also observed to increase with time at each site during the course of this study. For example, salinity increased throughout the summer in sites SR1 and SR5. Salinity trends for sites SR6 and SR7, however, differed from those of SR1 and SR5 on September 9th likely due to the input of freshwater from increased rainfall caused by tropical storm Hannah, thereby decreasing

surface salinity. At site SR7, a shallow site at the head of the tidal Severn River, a less consistent trend in salinity was found, again likely due to freshwater influx from rainfall and runoff.

Plots of DO (Figures 46-48) as a function of salinity do not clearly indicate if changes in salinity have a significant effect on DO at any given site. For example, at site SR1, a temporal trend of increased salinity was clearly observed from June through August and, as salinity increased, DO appeared to decrease. Changes in DO due to salinity were greater in August than in June for all three sites on the representative dates.

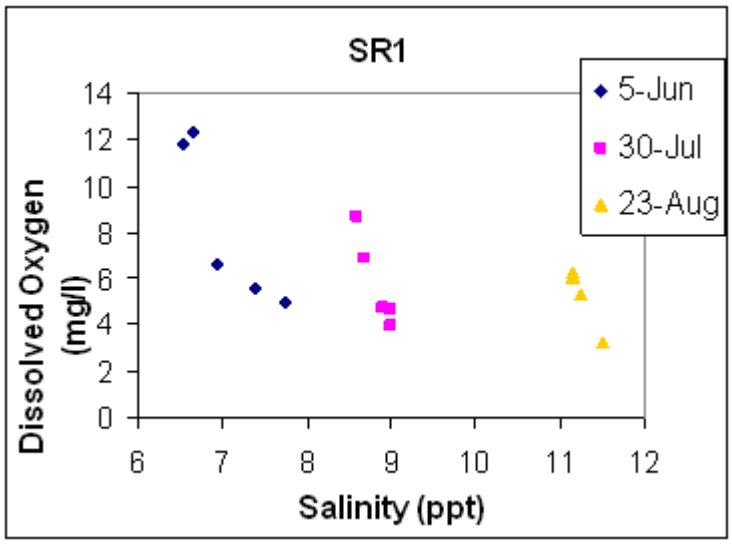


Figure 50: SR1 dissolved oxygen concentrations as a function of salinity.

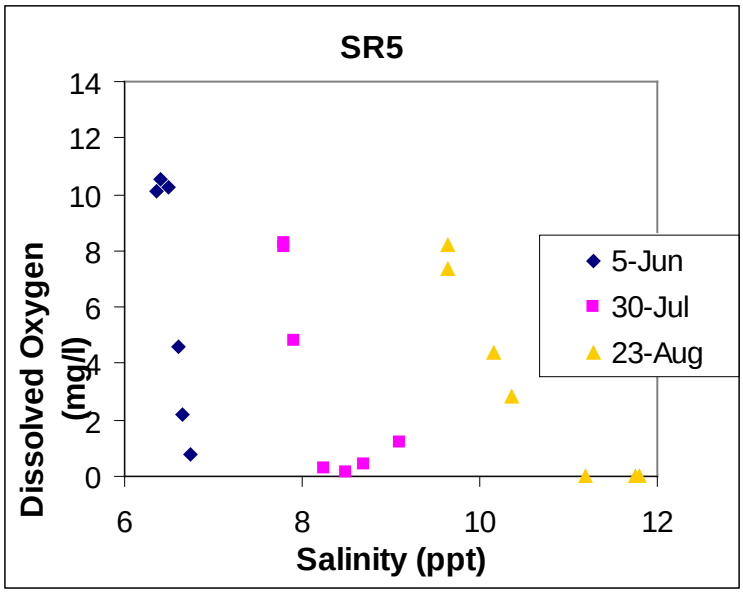


Figure 51: SR5 dissolved oxygen concentrations as a function of salinity.

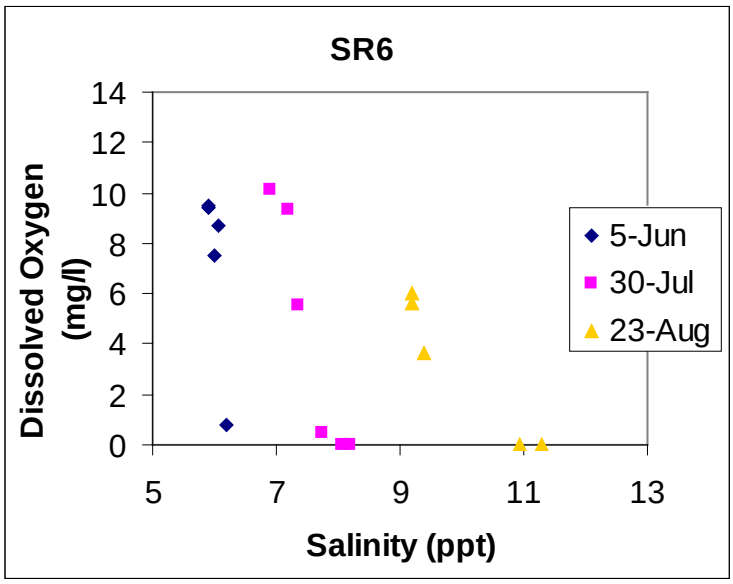


Figure 52: SR6 dissolved oxygen concentrations as a function of salinity.

Oxygen Depletion

Dissolved oxygen is a significant determinant of water quality and plays an important role in estuarine ecosystems. Dissolved

oxygen concentrations are affected indirectly by nutrient runoff/inputs through their effect on photosynthetic activity, and directly by both respiration associated with the degradation of organic matter and by aeration of the water column due to mixing induced by storm events.

In order to attempt to elucidate which parameters played key roles in DO concentrations in the Severn River during this study, the theoretical oxygen solubility (i.e. saturation) was calculated for each of the three sites for each date using measured salinity and temperature values. The equation, taken from the USGS Dissolved Oxygen and Salinity Calculator, is shown below (Equation 1).

Equation 1:

$$\ln DO = Al + A2\ 100/T + A3 \ln T/1OO + A4\ T/1OO + S\ [B1 + B2\ T/100 + B3\ (T/100)2]$$

Al = -173.4292 Bl = -0.033096
A2 = 249.6339 B2 = 0.014259
A3 = 143.3483 B3 = -0.0017
A4 = -21.8492

T= temperature in Kelvins (K)
K = 273.15 + t (temperature in degrees C)

Measured DO levels were subtracted from calculated dissolved oxygen saturations to determine oxygen depletion or enrichment. The difference between calculated and measured DO concentrations are shown in Figures 49 through 51. Negative values along the x-axis indicate oxygen enrichment whereas positive values indicate oxygen depletion.

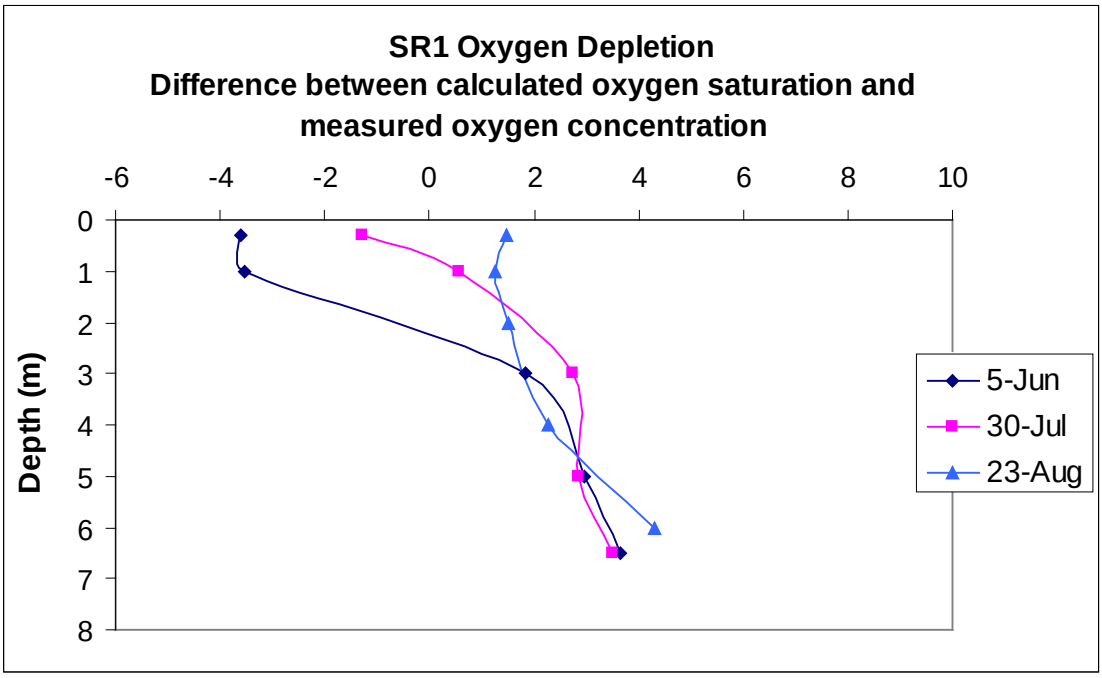


Figure 53: Oxygen depletion at SR1 as determined by subtracting measured dissolved oxygen concentration from calculated oxygen saturation. Positive numbers indicate oxygen depletion (respiration) and negative numbers indicate oxygen enrichment (photosynthesis).

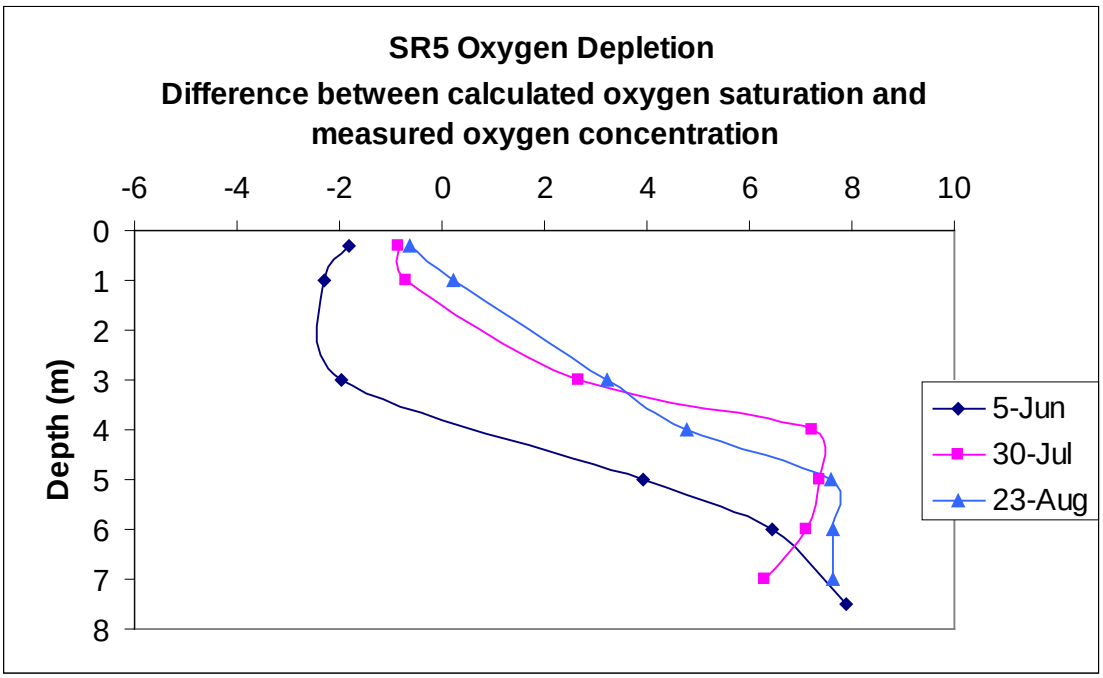


Figure 54: Oxygen depletion at SR5 as determined by subtracting measured dissolved oxygen concentration from calculated oxygen saturation. Positive numbers indicate oxygen depletion (respiration) and negative numbers indicate oxygen enrichment (photosynthesis).

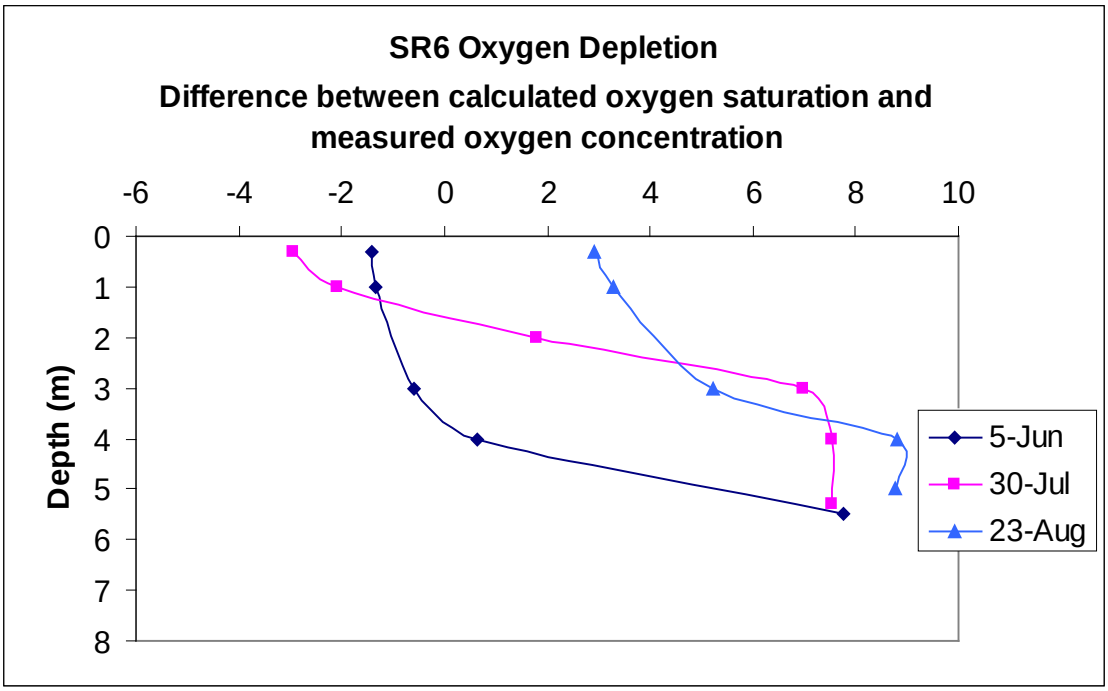


Figure 55: Oxygen depletion at SR6 as determined by subtracting measured dissolved oxygen concentration from calculated oxygen saturation. Positive numbers indicate oxygen depletion (respiration) and negative numbers indicate oxygen enrichment (photosynthesis).

The spreadsheet containing calculated saturation values is located in Appendix C. In June and July an enrichment of oxygen relative to saturation was observed at all three sites. The excess oxygen is likely due to photosynthesis as produced by Equation 2.

Equation 2:

$$6H_2O + 6CO_2 \rightarrow C_6H_{12}O_6 + 6O_2$$

In August, SR5 was the only site of the three examined that showed oxygen enrichment at the surface. Readings below one meter were generally indicative of respiration (Equation 3) with one

exception at three meters on June 5th at site SR6. This site also exhibited unusual behavior, as DO depletion in the water down to one meter was higher in July than in June.

Equation 3:

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6H_2O + 6CO_2$$

Temporal changes from June to August indicate that DO depletion increased throughout the summer above three meters (except as noted above for site SR5 in July), but DO (depletion) levels are temporally similar below three meters at all three sites. Spatially, sites closer to the headwaters had a greater extent of oxygen depletion than waters at the mouth. A comparison of oxygen depletion figures (Figures 53-55) with stream flow showed a greater extent of surface photosynthesis during and after higher stream flow (Figure 46).

Secchi

Secchi depth data were collected at the time of each DO, T, and salinity measurement to determine water clarity. Water clarity can have an impact on DO concentrations for several reasons. First, turbid water can be due to the influx of nutrient rich soil into the water which decreases clarity (i.e. more soil particles in the water) and can also

promote phytoplankton blooms which will cause a decrease in water clarity owing to the presence of a greater number of phytoplankton in the water column. Alternatively, decreased secchi depth can simply result from decreased clarity associated only with plankton blooms (i.e. in the absence of soil particles). As plankton die, they sink to the bottom waters where they are degraded/respired by detrirovores which then consumes oxygen leading to lower DO concentrations.

Precipitation and stream flow are known to influence water clarity through the generation of runoff that enters streams and other water bodies. Therefore, secchi depth, a measure of water clarity, was expected to be inversely proportional to runoff. In order to facilitate comparisons, the inverse of the average secchi depth from Figure 39 was plotted in Figure 40 and compared with precipitation data (Figure 41), stream flow data (Figure 42), and solar insolation from NOAA, USGS, and NASA. No correlation between these parameters was found. The lack of correlation likely results from the experimental design because secchi data were only collected weekly in this study and weather and stream flow data are collected at much higher temporal frequency. Measurements of water quality parameters were made from a boat, and for safety reasons, data were not collected during storm events because of lightning. This sampling scheme therefore prevented the acquisition of data during periods in which

high turbidity would have been likely due to runoff. The lack of correlation between inverse secchi depth and insolation data likely results from the use of daily averages, which did not reflect the actual insolation at the time of our field measurements. Sites were not monitored at the same times each day, further rendering comparisons difficult. In hindsight, secchi depth measurements should have been made more frequently and at the same time of day at each individual site. This would likely produce results that would be more useful for determination of any relationship between secchi depth, rainfall, runoff, and plankton blooms.

There are many chemical and physical parameters that can affect DO concentrations in bodies of water. Temperature and salinity both impact the solubility of oxygen (and other gasses), hence how much oxygen can be stored in natural waters under various conditions. The solubility of all gasses decreases with increasing temperature. Therefore, warm water can hold less oxygen than colder water. Similarly, the solubility of oxygen also decreases with increasing salinity, hence salt water holds less oxygen than fresh water under otherwise similar conditions (i.e. T and P).

Various physical and chemical processes in nature can also affect DO concentrations. Because pressure increases with increasing depth, DO concentrations can vary through pressure effects on its solubility.

Photosynthesis adds oxygen to surface water which also receives oxygen through atmospheric exchange, hence surface waters are often saturated or super saturated with oxygen. Additionally, surface waters are mixed by wind and rain; both of these processes help to introduce oxygen below the surface. In contrast to surface waters, bottom waters in freshwater bodies experience little to no exchange of oxygen with overlaying surface waters at temperatures greater than four degrees Celsius, the temperature of maximum density of freshwater. Thus freshwater bodies in temperate climates only overturn seasonally when the density of the upper water column increases above that of the bottom waters. The seasonal overturning occurs in the late fall to early winter when surface waters cool to 4 degrees Celsius and the density of the surface water increases above that of the still warmer bottom waters. The reverse process can occur in the late spring when surface waters warm to 4 degrees Celsius and the density of surface water exceeds that of the colder bottom water. As a result of overturning, seasonal effects usually result in oxygenated bottom water in the spring and less oxygenated bottom water at the end of the summer and into the fall (Figure 36). Storm events are usually accompanied by either high winds or strong water flow, both of which can mix waters and increase DO levels throughout the water column.

CHAPTER 5: CONCLUSIONS

Profiles of DO, salinity, and temperature at each of the monitoring sites chosen to represent important parts of the Severn River estuary system show variations with depth well as seasonal trends. A seasonal trend of higher DO in the spring and decreasing concentrations with time as the summer progressed was generally observed at each station. Additionally, at several locations monitoring data from March and April showed particularly high DO concentrations that could likely be attributed to winter turnover. The September 10th and 30th dissolved oxygen levels, however, were unexpectedly high. These can be attributed to tropical storm Hanna which hit the Chesapeake Bay area on September 6, 2008. High winds mixed the waters, increasing oxygen levels throughout all of the study sites.

Further analysis and comparison of observed DO levels with calculated DO saturation at selected sites helped identify the areas of oxygen enrichment and areas of oxygen depletion. Surface waters were commonly found to be enriched in DO, likely due to enhanced photosynthesis occurring in these areas during the warm and sunny summer days. Deeper waters, however, exhibited a depletion of DO beyond that which would be expected only from the effects of increases in temperature and salinity on the solubility of oxygen. This depletion was likely due to enhanced respiration over photosynthesis

at depth as a result of breakdown of excess organic matter falling through the water column. Hence, it appears that surface waters of the Severn River were net autotrophic whereas deeper waters were net heterotrophic during the course of this study. Additional analysis of DO and saturation levels and a comparison with stream flow data showed a relationship between increased stream flow and oxygen enrichment. This connection indicates that oxygen enrichment was likely driven by photosynthesis increases with increased runoff. As nutrients are used up and photosynthetic activity wanes, respiration takes over and leads to oxygen depletion, especially lower in the water column.

SR1

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	3:30	SRK2	BW + NF	6.5	59	5.08	7.8	20.4	0.9
				5	67.3	5.71	7.4	20.9	
				3	81.4	6.88	7	21.5	
				1	148.9	12.2	6.5	23.1	
				0.3	158.6	12.94	6.7	23.7	
	3:30	SRK3	AA/CS	6	57.4	4.9	7.7	20.3	0.8
				5	64.5	5.45	7.4	21	
				3	75	6.4	6.9	21.5	
				1	138.4	11.3	6.6	23.4	
				0.3	143.7	11.7	6.6	23.7	
6/10/08	10:50	SRK2	CJS+NWF	6.5	32.1	2.65	7.2	22.3	1.25
				6	39.1	3.17	7.2	22.3	
				5	42.6	3.46	7.2	23.7	
				3	80.8	6.37	7	25.7	
				1	93.1	7.18	6.9	26.6	
				0.3	97.6	7.14	6.9	27.9	
	11:00	SRK3	PH+AA	6.8	28	2.2	7	23.2	1.2
				5	48	4	7	23.9	
				3	82	6.4	6.8	25.4	
				1	88	6.8	6.8	26.2	
				0.3	92	6.7	7	27.9	
6/17/08	8:30	SRK3	PH + Aaron	6.5	41	3.3	7.6	23.8	0.8
				5	44	3.6	7.5	24	
				3	54	4.4	7.1	24.4	
				1	59	4.8	7	24.4	
				0.3	62	5	7	24.5	
	8:30	SRK2	BW + NF	6.5	36.3	2.92	7.8	23.8	0.85
				5	44.3	3.59	7.6	24	

SR1

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				3	60.4	4.78	7.2	24.4	
				1	61.7	5.07	7.2	24.5	
				0.3	65.2	5.25	7.1	24.5	
6/24/08	12:35	SRK3	Nate + Aaron	6.5	41	3.2	8.6	23.8	0.8
				5	38	3.2	8.2	24.2	
				3	59	4.7	7.8	24.6	
				1	85	6.7	7.3	25.4	
				0.3	89.6	7	7.3	25.4	
	12:30	SRK2	AB+CJS	6.5	40	3.17	8.8	23.9	0.75
				5	44	3.54	8.5	24	
				3	60.5	4.8	8	24.5	
				1	95.5	7.5	7.4	25.3	
				0.3	98	7.64	7.4	25.5	
7/2/08	4:30	SRK3	CJS+BMW	7	58.3	4.55	8.2	25.5	0.85
				6	57.8	4.51	8.2	25.5	
				5	60.1	4.68	8.2	25.5	
				3	82.9	6.39	7.9	26.4	
				1	96.5	7.45	7.7	27	
				0.3	100.5	7.6	7.7	27.1	
	4:30	SRK2	Aaron/Nate	6.5	58	4.5	8.3	25.6	0.8
				6	59.4	4.6	8.3	25.5	
				5	61.1	4.8	8.3	25.6	
				3	85	6.5	8	26.4	
				1	94.2	7.4	7.8	27.1	
				0.3	100.4	7.7	7.8	27.1	
7/9/08	9:15	SRK2	AB + RG	7	30	2.4	9.1	26	1
				6	35	2.7	9.1	26.2	
				5	67	5.1	8.7	26.8	
				3	81.3	6.2	8.4	27	
				1	90	6.8	8.3	27	

SR1

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	92.3	7	8.3	27	
	9:30	SRK3	CJS +BMW	6.5	26.5	2.05	9.1	26.1	0.9
				5	53	4.04	8.7	26.8	
				3	64.6	4.93	8.4	27	
				1	72.3	5.5	8.3	27	
				0.3	73.6	5.6	8.3	27	
7/16/08	8:40	SRK3	PJ/Aaron	6	45.2	3.4	9.1	26.8	1
				4	53.6	4.08	8.8	27.1	
				2	67	5.02	8.6	27.3	
				0.3	93	7.08	8	27.6	
	8:40	SRK2	NF + PH	6	43	3.2	9.1	26.8	1
				4	57	4.4	8.8	27.1	
				2	74	5.6	8.4	27.3	
				1	102	7.7	No Data	No Data	
				0.3	101	7.7	8	27.5	
7/30/08	10:35	SRK2	PH	6.5	50	3.8	9	27.8	0.8
				5	60	4.4	9	27.9	
				3	63	4.8	8.9	27.9	
				1	97	7	8.7	28.2	
				0.3	119	9.2	8.6	28.6	
	10:35	SRK3	AC NF	6.5	54.7	4.1	9	27.8	0.7
				5	58.3	4.8	9	27.9	
				3	62.5	4.6	8.9	27.9	
				1	90.1	6.7	8.7	28.2	
				0.3	110.2	8.1	8.6	28.6	
8/6/08	8:45	SRK3	AA & PH	6.5	48	3.6	9.2	27.2	0.9
				5	63	4.7	9	27.4	
				3	73	5.5	8.7	27.5	
				1	76	5.7	8.6	27.6	
				0.3	77	5.8	8.6	27.6	

SR1

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
	8:45	SRK2	NF & AC	6.5	57	4.2	9.2	27.1	0.9
				5	75	5.6	9	27.3	
				3	92	6.9	8.6	26.7	
				1	97	7.4	8.5	27.6	
				0.3	99	7.4	8.6	27.6	
8/11/08	12:10	SRK3	AA & PH	6.3	12	0.8	13.2	25.8	1.1
				5	14	1.2	12.8	25.8	
				3	57	4.6	10	26.4	
				1	87	6.8	9.1	26.7	
				0.3	96	7.4	9	26.9	
	12:10	SRK2	NF & AC	6.5	7	0.6	13.1	25.7	1.2
				5	12	0.9	12.8	25.8	
				3	59	4.5	9.9	26.4	
				1	83	6.3	9.2	26.7	
				0.3	90	6.9	9	26.8	
8/23/08	1158	SRK3	AB/WB	6	45	3.7	11.5	26.2	0.9
				4	78	5.8	11.2	26.3	
				2	83	6.4	11.1	26.6	
				1	90	6.9	11.1	26.6	
				0.3	88	6.5	11.1	26.6	
				6	37	2.83	11.5	26.2	0.8
		SRK2	CS/PJ	4	62	4.77	11.3	26.2	
				2	75.6	5.65	11.2	26.6	
				1	76	5.65	11.2	26.6	
				0.3	74	5.63	11.2	26.6	
9/5/08	1413	SRK3	AA+PH	7	50	3.8	12	25.7	0.8
				5	53	3.9	11.7	25.8	
				3	74	5.6	11.7	26.2	
				1	126	9.4	11.6	26.8	
		SRK2	NF+AC	6.5	31.2	2.38	11.9	25.7	0.8

SR1

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				5	32.1	2.49	11.7	25.8	
				4	66.3	5.1	11.7	26	
				3	85.4	6	11.7	26.1	
				1	137	10.65	11.6	26.8	
				0.3	145.8	10.95	11.6	26.9	
9/10/08	1650	SRK2	AA+DH	6	43	3.3	13.6	25.3	1
				5	57	4.5	12.9	25.3	
				3	82	6.3	11.7	25.4	
				1	101	7.9	11.4	25.8	
				0.3	110	8	11.5	25.9	
		SRK3	PH +Mark	6	53	3.9	13.3	25.3	1
				5	57	4.3	12.6	25.3	
				3	76	6	11.6	25.4	
				1	104	7.9	11.3	26	
9/30/08	1350	SRK3	PH & AA	7	80	6.4	12.5	21.3	1
				5	75	6.3	12.4	21.4	
				3	76	6.3	12.2	21.4	
				1	96	7.4	12.1	21.7	
				0.3	92	7.6	12.1	21.7	
		SRK2	NF & AC	7	74.6	6.08	12.8	21.4	1
				5	78	6.34	12.3	21.4	
				3	76	6.23	12.2	21.4	
				1	96.6	7.68	12	21.6	
				0.3	96.6	7.92	12	21.7	

SR2

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	0.1875	SRK3	AA/CS	6.2	57.4	4.7	6.8	21.7	0.9
				5	64.5	5.5	6.8	21.6	
				3	91.5	7.6	6.7	22	
				1	127.7	10.5	6.5	23.4	
				0.3	130	10.6	6.5	23.5	
	0.1875	SRK2	NF + BW	6.5	59.6	2.9	6.9	21.7	0.95
				5	72.2	6.02	11.9	21.6	
				3	90	8.4	6.6	22	
				1	138.7	11.4	6.6	23.5	
				0.3	143.4	11.72	6.6	23.5	
6/10/08	0.490278	SRK3	PH+AA	6.9	19	1.5	6.9	23.6	1.2
				5	27	2.1	6.9	24	
				3	47	3.8	6.8	25.3	
				1	76	5.9	6.7	26.7	
				0.3	89	6.8	6.6	27.4	
	0.490278	SRK2	CJS+NWF	6.5	17.8	1.48	7.1	23.7	1.3
				6	21.3	1.72	7.1	23.8	
				5	27.2	2.12	7.1	23.9	
				3	49.5	3.91	7	25.4	
				1	80.8	6.22	6.8	26.8	
				0.3	92	7.02	6.7	27.5	
6/17/08	0.398611	SRK2	BW + NF	6.5	34	2.75	7.6	24.2	0.75
				5	55.7	4.46	7	25	
				3	64.1	5.06	6.9	25.2	
				1	66.4	5.25	6.8	25.3	
				0.3	67.8	5.36	6.8	25.8	
	9.34	SRK3	PH + Aaron	6.5	37	2.9	7.4	24.3	0.8
				5	52	4.1	6.9	25	
				3	61	4.8	6.7	25.2	
				1	65	5.1	6.7	25.3	
				0.3	66	5.2	6.7	25.3	

SR2

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/26/08	0.40625	SRK2	Christie	7	36	3	7.9	24.7	0.8
				6	44	3.5	7.9	24.8	
				5	64.3	5	7.8	25.1	
				3	87.3	6.83	7.5	25.6	
				1	104	8.11	7.2	25.8	
				0.3	104.6	8.15	7.2	25.8	
	0.40625	SRK2	Nate	6.5	37.2	2.81	8.11	24.7	0.8
				5	61.8	4.85	8	25.1	
				3	83.7	6.58	7.6	25.6	
				1	99.6	7.74	7.4	25.8	
				0.3	102.2	7.94	7.3	25.8	
7/2/08	0.145833	SRK3	CJS+BMW	6.5	56	4.32	7.9	26	0.7
				5	56	4.36	7.8	26.1	
				4	70.6	5.35	7.6	26.5	
				3	79.7	6.12	7.5	26.8	
				1	93	7.34	7.3	27.5	
				0.3	116.2	8.66	7.2	28.2	
	0.145139	SRK2	Aaron/Nate	6.5	52.3	4.1	8	26.1	0.6
				6	53.7	4.2	8	26	
				5	55.5	4.3	8	26.1	
				4	68.7	5.4	7.8	26.4	
				3	82	6.4	7.6	26.8	
				1	110.8	8.3	7.4	27.1	
				0.3	114.6	8.6	7.4	28.1	
7/9/08	0.4375	SRK2	AB + CS	7	29.5	2.5	8.3	26.7	0.8
				6	43.5	3.3	8.3	26.8	
				5	49	3.7	8.3	26.9	
				4	52.3	4	8.3	27	
				3	64	4.8	8.2	27.2	
				1	83	6.3	7.9	27.1	
				0.3	85.6	6.5	7.9	27.1	

SR2

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
	0.4375	SRK3	AC + BMW	7	35	2.9	8.3	26.7	0.9
				5	46.7	3.5	8.3	26.9	
				3	60	4.6	8.2	27.1	
				1	80	6.1	7.9	27.1	
				0.3	85.3	6.5	7.9	27.1	
7/16/08	0.402778	SRK3	Nate/Aaron	6.5	27.8	2.1	9.1	26.7	1
				6	39	2.9	8.9	26.9	
				5	40.5	3.05	8.7	27	
				4	46	3.4	8.3	27.3	
				3	70	5.3	8	27.6	
				1	90	6.8	7.7	27.7	
				0.3	97	7.3	7.7	27.7	
	0.402778	SRK2	Brooke/Ellie	6.5	25.7	2	8.9	26.8	1.1
				5	39.8	3.02	8.7	27.2	
				4	42.4	3.2	8.3	27.2	
				3	77	5.5	7.9	27.6	
				1	93.5	7.05	7.7	27.6	
				0.3	94.4	7.11	7.6	27.7	
7/30/08	0.479167	SRK2	PH	6.5	39	2.9	8.9	27.9	1.1
				5	47	3.6	8.8	28	
				3	72	5.2	8.6	28.2	
				1	130	10.3	8.2	28.9	
				0.3	164	11.4	8.2	29.1	
	0.479167	SRK3	AC NF	6.5	47	3.5	9	27.8	1.2
				5	49.8	3.7	8.8	27.9	
				3	67.7	5.1	8.6	28.2	
				1	123.6	9	8.2	29.1	
				0.3	149.3	10.9	8.2	29.1	0.8
8/6/08	0.409722	SRK3	AA & PH	7.2	53	3.9	8.8	27.6	0.9
				5	60	4.5	8.5	27.9	
				3	72	5.4	8.4	28	

SR2

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	75	5.6	8.3	28	
				0.3	77	5.8	8.3	28.1	
	0.409722	SRK2	NF & AC	6.5	47	3.5	8.8	27.6	1
				5	64	4.8	8.6	27.9	
				3	79	5.5	8.4	28	
				1	78	5.8	8.3	28.1	
				0.3	81	6.1	8.3	28.1	
8/11/08	0.493056	SRK3	AA & PH	6.5	43	3.5	10.2	26.6	1
				5	70	5.2	9.1	26.8	
				3	91	6.9	8.7	26.8	
				1	100	7.5	8.7	26.9	
				0.3	100	7.7	8.7	26.9	
	0.497917	SRK2	NF & AC	6	35	2.6	10.2	26.6	0.9
				5	51	3.9	9.4	26.7	
				4	73	5.6	8.8	26.8	
				3	79	6	8.7	26.1	
				1	86	6.6	8.7	26.8	
				0.3	89	6.8	8.7	26.8	
8/23/08	1139	SRK3	AB/WB	8	33	2.3	11.6	26.2	0.7
				7	35	2.7	11.6	26.2	
				5	50	3.9	11.2	26.3	
				3	85	6.1	10.7	26.5	
				1	102	8	10.6	26.7	
				0.3	110	8.3	10.6	26.7	
	1139	SRK2	CS/PJ	7	28.5	2.12	11.6	26.2	0.7
				5	42.4	3.2	11.4	26.3	
				3	78.5	5.9	10.7	26.5	
				1	91.5	6.9	10.7	26.7	
				0.3	103.1	7.76	10.6	26.8	
9/5/08	1334	SRK3	AA+PH	6.5	32	2.4	11.7	25.5	1.1
				5	49	3.8	11.5	26	

SR2

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				3	96	7.6	11.4	26.3	
				1	114	8.5	11.4	26.9	
		SRK2	NF+AC	6.5	12.8	1.8	11.7	25.5	1
				5	43.4	3.32	11.5	26.5	
				4	66.6	5	11.5	26.2	
				3	92.5	6.92	11.4	26.3	
				1	100	7.5	11.4	26.8	
				0.3	103	7.3	11.4	26.9	
9/10/08	1635	SRK2	AA+DH	6	44	3.3	12.5	25.6	1
				5	58	4.4	12	25.7	
				3	73	5.6	11.3	25.5	
				1	110	8.4	11.1	25.7	
				0.3	111	8.5	11.1	26	
		SRK3	PH +Mark	6	50	3.8	12.5	25.5	1.2
				5	57	4.4	11.9	25.6	
				3	76	5.2	11.4	25.5	
				1	104	7.6	11	25.9	
9/30/08	1305	SRK3	PH & AA	6.5	70	5.5	13	21.5	1.2
				5	65	5.4	12.5	21.5	
				3	75	6.2	12	21.6	
				1	86	6.9	11.8	21.7	
				0.3	86	7.2	11.8	21.8	
		SRK2	NF & AC	6.5	63.3	5.41	12.6	21.5	1.1
				5	69.7	5.62	12.4	21.5	
				3	79.8	6.46	11.9	21.6	
				1	91.4	7.32	11.7	21.7	
				0.3	93.1	7.61	11.7	21.7	

SR3

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	2:00	SRK2	AA	6	31.7	3.1	6.7	21	1
				5	62	5.2	6.7	21.6	
				3	86.2	7.1	6.7	22.3	
				1	95.5	7.9	6.7	22.9	
				0.3	96.7	7.9	6.7	23	
	2:00	SRK3	CJS/NWF	13.5	21.1	1.74	6.6	20.5	1.1
				13	20.4	1.8	6.6	20.5	
				11	19	1.59	6.6	20.4	
				10	24.3	2.1	6.6	20.8	
				9	28.6	2.46	6.6	20.9	
				7	31.2	2.69	6.6	21	
				5	46.4	3.94	6.6	21.4	
				3	77.1	6.46	6.5	22.2	
				1	91.3	7.59	6.5	22.9	
				0.3	93.2	7.67	6.5	23	
6/10/08	12:10	SRK2	CJS+NWF	7	7.6	0.63	6.9	22.9	1.6
				6	11.8	0.98	6.9	23.2	
				5	20.6	1.65	6.9	23.5	
				4	23.6	1.92	6.9	23.7	
				3	47.2	3.72	6.8	25.3	
				2	73.6	5.64	6.6	27.1	
				1	83.3	6.25	6.6	28.1	
				0.3	85.7	6.4	6.5	28.4	
	12:10	SRK3	PH+AA	12	1.1	0.1	6.7	21.9	1.5
				11	2	0.2	6.7	22	
				9	5.6	0.5	6.8	22.4	
				7	10	0.8	6.8	22.6	
				5	17	1.4	6.8	23.2	
				3	45	4.6	6.7	25.4	
				1	79	5.9	6.4	28.1	
				0.3	82	6.2	6.4	28.5	

SR3

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/17/08	9:55	SRK3	PH + Aaron	13.5	21	1.7	7.6	24	0.9
				11	21	1.7	7.5	24.1	
				9	17	1.3	7.4	24.2	
				7	16.4	1.3	7.3	24.4	
				5	28	2.3	6.9	25	
				3	63	5	6.6	25.3	
				1	66	5.2	6.6	25.4	
				0.3	67	5.3	6.6	25.4	
	10:05	SRK2	BW + NF	7	15.1	1.29	7.4	24.4	9.5
				5	31.2	2.5	7.2	24.9	
				3	66.1	5.23	6.8	25.3	
				1	67.8	5.37	6.8	25.3	
				0.3	67.9	5.36	6.8	25.4	
6/26/08	2:00	SRK3	Nate + Aaron	12.5	2.2	0.18	8.2	23.1	0.9
				11	2.4	0.19	8.2	23.1	
				10	2.5	0.2	8.2	23.1	
				9	3.5	0.3	8.2	23.2	
				8	6.3	0.54	8.1	23.4	
				7	11.6	0.9	8	23.6	
				6	20	2	7.8	24.2	
				5	27	2.1	7.6	24.3	
				4	38	3	7.4	24.6	
				3	50	4	7.2	25	
				1	93	7.3	6.7	26.9	
				0.3	97.7	7.6	6.7	26.3	
	2:00	SRK2	AB+CJS	6	20	1.2	8	23.9	0.85
				5	22.3	1.9	7.7	24.4	
				3	44.9	3.6	7.4	24.9	
				1	80	6.8	6.9	26	
				0.3	97	7.6	6.8	26.4	
7/2/08	1:55	SRK2	Aaron/Nate	6	21.7	1.7	8.1	25.9	1.3

SR3

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				5	23.5	1.8	8.1	25.8	
				4	32	2.5	8	26	
				3	52	4	7.6	26.4	
				2	72	5	7.5	26.6	
				1	94.7	7.1	7.1	27.5	
				0.3	96	7.3	7.1	27.6	
	1:53	SRK3	CJS+BMW	12.5	8.1	0.64	8.1	25.1	1
				10	10.1	0.81	8	25.2	
				8	9.9	0.78	8	25.2	
				6	19.2	1.51	8	25.6	
				5	36	2.79	7.8	26.1	
				4	35.9	2.79	7.8	26.1	
				3	58.4	4.5	7.4	26.5	
				2	70.2	5.38	7.3	26.7	
				1	99	7.52	7	27.5	
				0.3	100.5	7.59	7	27.7	
7/9/08	11:35	SRK2	CJS + RG	7	2.7	0.2	8.3	25.7	1
				6	11	0.83	8.2	26	
				5	20.6	1.57	8.1	26.4	
				4	36	2.82	8.1	26.8	
				3	60	4.46	7.9	27.2	
				1	98.9	7.49	7.7	27.4	
				0.3	100	7.49	7.7	27.4	
	11:33	SRK3	Aaron+Brooke	12.5	0.2	0.01	8.2	24.4	1
				12	0.1	0.01	8.2	24.9	
				11	0.1	0	8.2	24.9	
				10	0	0	8.3	25.1	
				9	0	0	8.3	25.4	
				8	0.1	0.01	8.3	25.5	
				7	2.8	0.22	8.2	25.7	
				6	7.2	0.56	8.2	25.9	

SR3

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				5	21.2	1.63	8.1	26.5	
				3	77.6	5.84	7.8	27.3	
				1	96.6	7.38	7.6	27.3	
				0.3	99.7	7.75	7.6	27.3	
7/16/08	10:28	SRK3	Nate/Aaron	12.5	22	1.6	9.2	26.5	1.5
				11	13.8	1.8	9.22	26.6	
				9	24.2	1.84	9.2	26.6	
				7	27.2	2.06	9	26.7	
				5	25	1.9	8.9	26.8	
				3	54.2	3.9	7.9	27.4	
				1	95	7	7.5	28	
				0.3	107.9	8.04	7.4	28.4	
	10:26	SRK2	Brooke/Ellie	6	25.5	1.92	8.9	26.8	1.5
				5	24.8	1.88	8.9	26.8	
				4	22.7	1.79	8.4	27	
				3	66.8	6.3	8	27.4	
				1	102.9	7.65	7.4	28.1	
				0.3	111.2	8.31	7.3	28.5	
7/30/08	1:30	SRK2	AB PH	7	25	1.8	8.8	27.8	1.2
				5	41	3.2	8.5	28	
				3	85	6.2	8.1	28.3	
				1	134	9.9	8.2	29.1	
				0.3	140	10.3	8.1	29.2	
	1:30	SRK3	AC NF	13.5	18	1.4	9.3	27.4	1.2
				11	19	1.4	9.2	27.5	
				9	26.6	1.5	9	27.6	
				7	22.7	1.7	8.9	27.7	
				5	44.4	3.4	8.5	28.1	
				3	80	5.9	8.2	28.4	
				1	117.7	8.6	8.2	29	
				0.3	122	8.9	8.2	29.2	

SR3

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
8/7/08	11:15	SRK3	AA & PH	13	21	1.6	11	26.9	1.3
				11	22	1.6	10.9	26.9	
				9	23	1.7	10.7	27	
				7	37	2.4	9.9	27.4	
				5	48	3.6	8.6	27.9	
				3	63	4.8	8.4	28	
				1	75	5.6	8.3	28.2	
				0.3	85	6.2	8.3	28.5	
	11:15	SRK2	NF & AC	7	42	3.2	9.3	27.7	1.3
				6	52	3.6	8.9	27.9	
				5	53	3.9	8.7	27.7	
				4	59	4.4	8.5	27.9	
				3	65	4.8	8.4	28	
				1	82	6.1	8.3	28.2	
				0.3	93	6.9	8.3	28.5	
8/11/08	11:30	SRK3	AA & PH	12.5	7	0.6	12.7	25.9	1.2
				11	8.5	0.7	12.7	25.9	
				9	11	0.8	12.6	25.9	
				7	14	1	11.1	26.3	
				5	11	0.8	10.5	26.5	
				3	42	3.4	9.1	26.7	
				1	88	7	8.1	26.7	
				0.3	92	7.1	8.4	26.4	
	11:30	SRK2	NF & AC	7	14	1	11	26.3	1.4
				6	11	0.8	10.9	26.4	
				5	9	0.7	10.6	26.5	
				4	10	0.7	10.3	26.6	
				3	42	3.1	9.3	26.8	
				2	68	5.2	8.8	26.7	
				1	86	6.6	8.5	26.7	
				0.3	87	6.7	8.5	26.8	

SR3

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
8/23/08	11:09	SRK3	AB/WB	13	1.3	0.5	11.9	26.1	0.9
				11	0.5	0.1	11.9	26	
				9	0.3	0	11.9	26	
				7	1.2	0.1	11.8	26.1	
				5	12.3	0.7	11.2	26.3	
				3	74	5.3	10.4	26.5	
				1	96	7.9	10.2	26.6	
				0.3	98	7.5	10.2	26.6	
		SRK2	CS/PJ	7	1.4	0.09	11.8	26	0.9
				5	8	0.59	11.5	26.2	
				3	52	4.4	10.5	26.5	
				1	90	6.77	10.3	26.7	
				0.3	92	6.99	10.2	26.8	
9/5/08	12:55	SRK3	AA+PH	13	0.8	0.05	11.8	24.9	1.1
				11	0.4	0.03	11.8	25	
				9	0.2	0.02	11.7	25.1	
				7	0.2	0.01	11.6	25.3	
				5	48	3.8	11.3	25.9	
				3	98	7.8	11.1	26.4	
				1	115	9	11.2	26.8	
		SRK2	NF+AC	7	1.8	0.15	11.6	25.5	1.3
				6	10.9	1.07	11.5	25.5	
				5	41.2	3.4	11.3	25.9	
				3	104.3	7.86	11.2	26.6	
				1	111.5	8.4	11.2	26.7	
				0.3	110.5	8.34	11.2	26.8	
9/10/08	16:15	SRK2	AA+DH	7	43	3.2	12.6	25.6	1.3
				5	49	3.7	12	25.7	
				3	64	4.9	11.2	25.5	
				1	90	6.9	10.9	25.7	
				0.3	97	7.4	11	26	

SR3

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
		SRK3	PH +Mark	12.5	43	3.2	12.7	25.5	1.5
				11	45	3.5	12.7	25.5	
				9	43	3.3	12.6	25.5	
				7	42	3.2	12.4	25.6	
				5	48	3.8	11.8	25.7	
				3	56	4.3	11.4	25.6	
				1	79	6.1	10.8	25.6	
9/30/08	12:30	SRK3	PH & AA	13	61	5	13.2	21.5	1.2
				11	60	5	13.1	21.5	
				9	60	4.9	13	21.5	
				7	60	5	12.7	21.5	
				5	59	4.8	12.2	21.5	
				3	68	5.8	11.9	21.5	
				1	80	7	11.8	21.7	
				0.3	90	7.7	11.7	21.8	
		SRK2	NF	7	65.3	5.2	12.6	21.5	1.4
				5	62.1	5.11	12.1	21.5	
				3	75.3	5.88	11.4	21.5	
				1	97.2	7.99	11.6	21.7	
				0.3	99.1	8.25	11.6	21.8	

SR4

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	11:20	SRK3	CJS/PH	5.5	75	6.4	6.4	21.7	1.3
				3	78	6.6	6.4	21.8	
				1	96	8	6.3	22.4	
				0.3	104	8.4	6.3	22.5	
	11:05	SRK2	SC/NF	5.5	80.7	6.88	6.5	21	
				5	81.3	6.9	6.5	21.6	
				3	81.8	6.94	6.5	21.8	
				1	103.3	8.64	6.5	223	
				0.3	104.8	8.76	6.4	22.4	
6/11/08	10:43	SRK2	AA+BW	5	3.3	0.2	6.6	23.4	1.4
				4	80.9	6.1	6.4	27.5	
				3	80.7	6.1	6.4	27.3	
				1	81.2	6.2	6.4	27.6	
				0.3	80.5	6.2	6.4	27.6	
	10:43	SRK3	CJS+NWF	5	3.5	0.29	6.5	23.3	1.4
				4	78.7	6.02	6.2	27.4	
				3	80.7	6.15	6.2	27.5	
				1	81.3	6.2	6.2	27.6	
				0.3	82	6.24	6.2	27.7	
6/26/08	11:10	SRK2	Nate	5.5	10.5	0.82	7.9	24.1	0.9
				4	62.6	4.81	7	25.5	
				3	65.5	5.13	7	25.5	
				1	82.7	6.16	7	25.8	
				0.3	98.4	7.29	6.9	26.6	
	11:10	SRK3	Christie	5.5	12.4	1.04	7.8	24	0.9
				4	61.2	4.82	6.9	25.5	
				3	65.2	5.11	6.9	25.6	
				1	79.5	6.2	6.8	25.8	

SR4

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	95	7.31	6.8	26.6	
7/2/08	9:10	SRK2	Aaron/Nate	5	0	0	7.6	23.9	0.7
				4	0	0	7.5	24.1	
				3	0	0	7.5	24.6	
				2	26	2	6.7	25.9	
				1	58	4.5	6.2	26.1	
				0.3	62.5	4.8	6.2	26.1	
	9:10	SRK3	CJS+BMW	5	0	0	7.5	23.9	0.9
				4	0	0	7.5	24.3	
				3	0	0	7.4	24.8	
				2	32	2.39	6.5	25.9	
				1	60.8	4.73	6.2	26.1	
				0.3	67.5	5.17	6.1	26.2	
7/9/08	4:00	SRK3	CJS	5	0.1	0.01	8	24.9	1.5
				4	9	0.68	7.7	26	
				3	90	6.75	7.2	27.5	
				1	121.7	9	7.2	28.5	
				0.3	137	9.77	7	29.6	
	4:00	SRK2	PJ	5.5	0.1	0.01	8	25.1	1.3
				4	8.8	0.6	7.6	25.9	
				3	0.96	7.4	7.1	27.6	
				2	107	8.37	7.1	28	
				1	115.1	8.5	7.1	28.5	
				0.3	138	10.16	6.9	29.7	
7/16/08	13:04	SRK3	PJ + Nate	5	0.6	0.05	8.2	26.2	0.2
				4	2.5	0.23	7.6	26.9	
				3	89.6	6.63	7.3	27.7	
				1	106	7.6	7.3	29.7	

SR4

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	110	7.95	7.4	29.9	
	1:04	SRK2	Brooke/Ellie	5	0.1	0	8.2	26.2	0.2
				4	0.1	0	7.8	26.6	
				3	109	8.15	7.3	28	
				1	122.8	8.96	7.3	29.7	
				0.3	123.3	8.96	7.3	29.9	
7/30/08	2:32	SRK2	AB PH	5	27.1	2	8.4	27.9	1.2
				3	89	6.6	8	28.3	
				1	114	8.4	7.9	29	
				0.3	120	8.8	7.9	29.4	
	2:32	SRK3	AC NF	5.5	25.5	1.9	8.4	27.8	1.5
				3	44	3.1	8.2	28	
				1	87	6.6	8	28.3	
				0.3	111	8.1	7.3	29.5	
8/6/08	10:20	SRK3	AA & PH	5.5	53	3.9	8.3	28	1
				3	69	5.2	8.2	28	
				1	79	5.8	8.1	28.2	
				0.3	84	6.3	8.1	28.6	
	10:20	SRK2	NF & AC	5.2	48	3.5	8.3	27.9	1
				4	65	4.8	8.3	28	
				3	71	5.3	8.2	28	
				1	80	6	8.1	28.1	
				0.3	87	6.4	8.1	28.3	
8/11/08	10:28	SRK3	AA & PH	5	6 to 11	0.5 to 1.1	9.4	27	1.2
				4	105 to 111	7.9 to 8.5	8.3	26.5	
				3	104 to 118	7.9 to 8.3	8.3	26.5	
				1	106 to 113	7.9 to 8.4	8.3	26.6	
				0.3	113 to 118	8.1 to 8.5	8.3	26.5	

SR4

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
	10:33	SRK2	NF & AC	5.2	8 to 36	0.4	9.3	27	1.2
				4	65 to 84	6.4 to 6.9	8.3	26.3	
				3	90	6.9	8.3	26.5	
				1	94	7.2	8.3	26.5	
				0.3	94	7.2	8.3	26.5	
8/23/08	10:30	SRK3	AB/WB	5	0	0	11.2	26.1	0.9
				4	69	5.5	9.9	26.1	
				3	88	6	9.6	26.4	
				1	90	7.4	9.6	26.5	
				0.3	103	7.1	9.6	26.6	
		SRK2	CS/PJ	5	0	0	11.4	25.9	0.8
				4	62	4.68	10	26.1	
				3	70	5.34	9.8	25.9	
				1	87	6.66	9.7	26.5	
				0.3	89	6.76	9.7	26.6	
9/5/08	11:35	SRK3	AA+PH	5.5	2	0.2	11.6	25.3	1
				4	16	1.3	11	25.7	
				3	65	5.1	10.8	26	
				1	90	6.7	10.8	26.3	
		SRK2	NF+AC	5.5	0.2	0.01	11.6	25.2	1
				5	0	0	11.5	25.2	
				4	10.2	0.76	11	25.7	
				3	56.9	4.34	10.8	26.1	
				1	75.8	5.7	10.8	26.5	
				0.3	77.1	5.34	10.7	26.6	
9/10/08	15:15	SRK2	AA+DH	5	94	7.2	10.9	26	0.9
				3	100	7.8	10.9	26	
				1	114	8.7	10.9	26.1	

SR4

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	118	8.9	10.9	26.2	
		SRK3	PH +Mark	5	92	6.8	10.8	25.9	0.9
				3	92	6.9	10.8	26	
				1	104	7.8	10.8	26.1	
9/30/08	10:25	SRK3	PH & AA	6	69	5.6	12.2	21.4	1.2
				5	64	5.2	11.8	21.4	
				3	85	7.2	11.5	21.4	
				1	97	8	11.4	21.4	
				0.3	100	8	11.4	21.4	
		SRK2	NF & AC	5.5	47.5	3.95	12.1	21.1	1.1
				4	66.4	5.76	11.4	21.3	
				3	76.8	6.48	11.3	21.4	
				1	88	7.36	11.3	21.5	
				0.3	89	7.34	11.3	21.3	

RBS

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	11:57	SRK3	CJS/PH	7.7	12	1	6.7	20.1	1.05
				7	17	1.4	6.6	20.3	
				6	30.8	2.6	6.6	20.8	
				5	57	4.8	6.5	21.4	
				3	77	6.5	6.5	22	
				0.3	88	7.4	6.5	22.4	
	12:00	SRK2	SC/NF	7.5	13.5	1.14	6.8	20.3	1
				5	57.8	4.94	6.6	21.3	
				3	85.4	7.21	6.6	21.9	
				1	98.1	8.21	6.6	22.3	
				0.3	98.2	8.21	6.6	22.4	
6/11/08	10:55	SRK3	CJS+NWF	7.5	0.6	0.06	6.6	21.8	1.3
				6	0.8	0.06	6.7	22.3	
				5	0.3	0.02	6.6	22.8	
				4	25.4	2.01	6.5	24.5	
				3	77.7	5.98	6.6	27.4	
				1	83	6.33	6.3	27.6	
				0.3	84.3	6.42	6.3	27.6	
	10:50	SRK2	AA+BW	7	0.2	0	6.8	22	1.5
				6	0	0	6.8	22.2	
				5	0.3	0	6.7	22.5	
				4	15	1.3	6.7	24	
				3	76.4	5.9	6.4	27.3	
				1	79.4	6	6.4	27.5	
				0.3	79.6	6	6.4	27.6	
6/17/08	10:20	SRK3	PH + Aaron	7.5	0.8	0.06	7.4	22.4	0.8
				6.5	11.8	0.95	7.2	24.2	
				5	62	4.9	6.6	25.2	
				3	68	5.9	6.5	25.4	
				1	74	5.8	6.5	25.4	

RBS

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	76	6	6.5	25.5	
	10:20	SRK2	BW + NF	7.5	0.1	0	7.6	22.5	0.9
				6.5	13.2	0.82	7.3	24.3	
				5	48.5	3.45	6.7	25.3	
				3	70.2	5.55	6.7	25.4	
				1	74	5.7	6.7	25.4	
				0.3	75	5.49	6.7	25.5	
6/24/08	8:45	SRK3	Christie	7.25	0.5	0.04	8.1	23.3	0.8
				6	1.7	0.14	8	23.8	
				5	31.8	2.41	7.5	25	
				4	43.5	3.42	7.4	25.3	
				3	40.8	3.04	7.3	25.3	
				2	94.9	7.34	6.8	27	
				1	108.9	8.23	6.7	27.2	
				0.3	113.5	8.62	6.7	27.5	
	8:49	SRK2	Nate	7.5	0.03	0.03	8.1	23.6	0.8
				6	1.7	0.11	8	23.8	
				5	26.4	2.05	7.6	24.8	
				4	45.2	3.45	7.5	25.3	
				3	43.8	3.38	7.4	25.2	
				2	105.3	8.08	6.8	26.9	
				1	114.3	8.04	6.8	27.2	
				0.3	124.2	9.54	6.8	27.5	
7/2/08	11:55	SRK3	CJS+BMW	7	0	0	8	23.6	1.3
				6	0	0	7.9	24.5	
				5	5.5	0.46	7.6	25.4	
				4	82.2	6.34	7	26.6	
				3	79	6.13	6.9	26.5	
				1	96.5	7.4	6.9	27.1	
				0.3	98.1	7.49	6.9	27.2	

RBS

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
	11:51	SRK2	Aaron/Nate	7	0.1	0	8.1	23.9	1.4
				6	0	0	8.1	24.4	
				5	0.3	0.03	7.9	24.8	
				4	80	6.26	7.2	26.5	
				3	72.1	5.5	7	26.5	
				1	90.2	6.92	7	27.1	
				0.3	92.3	7.08	7	27.2	
7/10/08	4:30	SRK2	PJ	7	0	0	8.1	24.8	1.2
				6	0	0	8.1	25.1	
				5	0.2	0	8	25.5	
				4	15.8	1.54	7.7	26.4	
				3	37	2.7	7.3	26.7	
				2	109	7.06	7.1	27.8	
				1	124.1	9.36	7.1	28.8	
				0.3	126.6	9.42	7.1	28.9	
	4:30	SRK3	CJS	7	0	0	8.2	24.4	1.2
				6	0	0	8.2	25	
				5	0.5	0.4	8.1	25.5	
				4	24.5	1.81	7.8	26.4	
				3	38	2.94	7.4	26.7	
				2	99.5	7.44	7.2	27.5	
				1	121.7	9.06	7.1	28.3	
				0.3	126.7	9.36	7.1	28.9	
7/16/08	1:27	SRK2	Brooke/Nate	7	14.4	1.12	9	26.6	1.8
				6	0	0	8.4	25.8	
				5	0	0	8.3	25.7	
				4	17.6	1.34	8	26.9	
				3	49.4	3.73	7.4	27.9	
				1	131.1	9.74	7.3	28.7	
				0.3	131.6	9.7	7.3	29.3	

Date	Time	Meter	Observer	RBS Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
	13:27	SRK3	PJ/Aaron	7	16.5	1.2	9	26.4	1.8
				6	3	0.2	8.5	25.8	
				5	1.3	0.09	8.3	26.2	
				4	15.7	1.15	8.1	26.8	
				3	45	3.1	7.7	27.3	
				1	118.5	8.8	7.3	29	
				0.3	122.8	8.9	7.4	29.7	
7/30/08	2:07	SRK2	AB PH	7.5	5	0.4	9	27.3	1.3
				7.5	1.3	0.1	9	27.2	1
				6	0	0	8.6	27	
				5	14	1.1	8.5	27.8	
				4	21	1.5	8.2	27.8	
				3	60	4.5	8.1	28	
				1	112	8.2	7.9	28.8	
			.	0.3	118	8.9	7.9	29	
	2:07	SRK3	AC NF	7.5	2.6	0.2	9	27.3	1.2
				6	0.1	0	8.5	26.9	
				5	20.7	1.5	8.5	27.7	
				4	16.2	1.2	8.2	27.8	
				3	54.7	4.1	8.1	28.1	
				1	98	7.3	7.9	29	
				0.3	107.5	7.9	7.9	29	
8/6/08	10:35	SRK3	AA & PH	7.5	25	1.9	10.5	27.1	-
				5	64	4.8	8.2	28	
				3	73	5.4	8.2	28	
				1	86	6.4	8.2	28.1	
				0.3	96	7.1	8.2	28.8	
	10:35	SRK2	NF & AC	7	27	2.1	10.1	27.2	1.1
				6	40	3.1	8.8	27.7	
				5	65	4.9	8.3	27.9	

RBS

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				3	74	5.5	8.2	28	
				1	92	6.8	8.2	28.1	
				0.3	98	7.3	8.2	28.4	
8/11/08	10:50	SRK3	AA & PH	7.5	5	0.3	12.3	25.9	1.4
				6	7	0.6	10.6	26.4	
				5	22	1.9	9.4	26.9	
				4	71	5.5	8.4	26.5	
				3	81	6.1	8.4	26.5	
				1	84	6.4	8.4	26.6	
				0.3	88	6.7	8.4	26.6	
	10:50	SRK2	NF & AC	7.2	3	0.2	12.3	25.9	1.5
				6	5.1	0.4	11	26.2	
				5	11	0.8	9.6	26.9	
				4	73	5.5	8.4	26.5	
				3	74	5.6	8.4	26.5	
				1	75	5.8	8.4	26.6	
				0.3	77	5.9	8.4	26.6	
8/23/08	0:00	SRK3	AB/WB	7	0	0	11.8	25.7	1
				6	0.3	0	11.8	25.7	
				5	0.2	0	11.6	26	
				4	74	5.4	10.1	26.2	
				3	82	6.2	9.9	26.1	
				1	104	7.7	9.8	26.4	
				0.3	105	7.8	9.8	26.4	
	0:00	SRK2	CS/PJ	7	0	0	11.9	25.7	1
				6	0	0	11.8	25.7	
				5	0	0	11.7	26	
				4	65	4.93	10.5	26.3	
				3	71	5.38	10	26.1	
				1	87	6.61	9.8	26.4	

RBS

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	90	6.84	9.9	26.4	
9/5/08	0:00	SRK3	AA+PH	7.5	0.3	0.02	11.9	24.8	1.3
				7	0.1	0.01	11.7	25	
				6	0.1	0.01	11.5	25.2	
				5	48	4	11.2	26	
				3	60	4.6	11.1	26.1	
				1	96	7.4	10.7	26.6	
		SRK2	NF+AC	7	0	0	11.7	25	nd
				6	0	0	11.6	25.2	
				5	41.5	3.06	11.4	25.8	
				3	65	5	11.1	26.1	
				1	94.5	7.2	10.7	26.7	
				0.3	95.2	7.17	10.7	26.7	
9/10/08	0:00	SRK2	AA+DH	7	24	1.8	12.7	25.5	1.3
				5	52	4	11.4	25.4	
				3	83	6.3	10.9	25.6	
				1	93	7.2	10.9	25.9	
				0.3	97	7.4	10.9	26	
		SRK3	PH +Mark	7.5	30	2.2	12.7	25.5	1.3
				5	47	3.7	11.3	25.5	
				3	76	5.8	10.8	25.6	
				1	91	7	10.8	25.8	
9/30/08	0:00	SRK3	PH & AA	7.5	70	5.6	12.6	21.4	1.3
				5	66	5.4	12.1	21.5	
				3	81	6.7	11.5	21.5	
				1	86	7.2	11.4	21.5	
				0.3	88	7.3	11.4	21.5	
		SRK2	NF & AC	7.5	70	5.6	12.6	21.4	1.3
				5	66	5.4	12.1	21.5	
				3	81	6.7	11.5	21.5	

RBS

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	86	7.2	11.4	21.5	
				0.3	88	7.3	11.4	21.5	

SR5

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
4/10/08	14:00	SRK3	PH & AAB	7	85	8.4	5.7	12.6	nd
				6	109	11.1	5.7	13.1	
				4	120	12.1	5.6	13.6	
				2	132	13.2	5.6	14.1	
				0.5	140	13.3	5.6	15.6	
6/5/08	11:40	SRK2	SC/NF	7.5	9.1	0.81	6.8	20.4	1.3
				6	23.4	2.23	6.7	20.4	
				5	53.3	4.6	6.6	21.2	
				3	123.5	10.27	6.5	22.6	
				1	127.7	10.57	6.4	22.9	
				0.3	129	10.67	6.4	23	
	11:38	SRK3	CJS/PH	7.5	9.2	0.8	6.7	20	1.25
				6	25	2.19	6.6	20.5	
				4	96	8	6.4	22.3	
				2	112	9.3	6.3	22.8	
				0.3	115	9.5	6.3	23	
6/11/08	9:50	SRK3	CJS+NWF	7	0.6	0.04	6.6	21	2.25
				6	0.2	0.02	6.6	21.2	H2S +
				5	0.2	0.02	6.6	22.2	
				4	18	1.46	6.5	23.7	
				3	50.2	3.9	6.4	25.4	
				1	91.6	7.05	6.1	27.1	
				0.3	95.2	7.31	6.1	27.2	
	9:51	SRK2	AA+BW	6.8	0	0	6.7	20.8	1.3
				5	0	0	6.8	22.1	H2S +
				4	9.5	0.7	6.6	23.7	
				3	47.9	3.4	6.5	26.4	
				1	74.1	5.7	6.3	27.1	
				0.3	74.8	5.7	6.3	27.2	
6/17/08	10:55	SRK3	PH + Aaron	7	0.3	0.02	7.3	7.3	1
				6	19	1.4	7.1	7.1	
				5	55	4.3	6.5	6.5	

SR5

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				3	55	5.3	6.4	6.4	
				1	70	5.6	6.5	6.5	
				0.3	71	5.5	6.5	6.5	
	10:55	SRK2	BW + NF	7	0.1	0	7.5	23.1	0.9
				6	10.1	0.5	6.7	24.8	
				5	62.2	4.9	6.6	25.2	
				3	68	5.24	6.6	25.3	
				1	71.1	5.63	6.6	25.4	
				0.3	71.5	5.64	6.6	25.4	
6/26/08	10:15	SRK3	Christie	7	0	0	8.1	23.4	0.8
				6	0.1	0.01	8.1	23.6	
				5	15.3	1.2	7.8	24.4	
				4	34	2.57	7.2	25.1	
				3	70.1	5.39	7	26.2	
				1	110.5	8.33	6.7	27.3	
				0.3	117	8.78	6.7	27.7	
	10:15	SRK2	Nate	7	0	0	8.1	22.9	0.8
				6	0	0	8.1	23.7	
				5	14.1	1.13	7.9	24.4	
				4	33.3	2.54	7.3	25.2	
				3	67.5	5.37	7.1	26.3	
				1	8.13	12.34	6.7	27.1	
				0.3	109.3	8.02	6.8	27.3	
7/2/08	10:15	SRK2	Aaron/Nate	6.5	0.1	0.01	8	23.9	1.3
				6	0	0	8	24.2	
				5	1.3	0.1	8.1	24.7	
				4	15	1.1	7.8	25.6	
				3	63	4.9	7	26.4	
				2	80	6	7	26.6	
				1	86	6.6	7	26.8	
				0.3	87.3	6.7	7	26.9	
	10:13	SRK3	CJS+BMW	6.5	0	0	7.9	24	1.2

SR5

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				6	0	0	7.9	24.4	
				5	3.7	0.28	8	24.9	
				4	17.7	1.38	7.6	25.7	
				3	73	5.62	6.9	26.5	
				1	91	7	6.9	26.8	
				0.3	92	7.08	6.9	26.8	
7/9/08	2:56	SRK3	PH + BMW	7	0.2	0.01	8.1	23.4	1.5
				6	0.1	0.01	8	25	
				5	0.1	0.01	7.8	25.3	
				4	31	2.5	7.6	27.1	
				3	105	8	7.2	27.9	
				1	119	9	7.1	28.2	
				0.3	121	9.1	7.1	28.3	
	3:00	SRK2	CJS + RG	7	0	0	8.1	23.3	1.4
				6	0	0	7.8	26.2	
				5	0	0	7.8	25.7	
				4	36.6	2.97	7.7	27.1	
				3	116.5	8.78	7.2	27.8	
				1	125	9.41	7.2	28.2	
				0.3	126.1	9.43	7.2	28.3	
7/16/08	9:15	SRK2	CJS	7	6	0.48	9	26.5	1.55
				6	14.3	1.05	8.8	26.8	
				5	14.4	1.09	8.5	27	
				4	31.5	2.29	8	27.3	
				3	39.5	2.95	7.6	27.6	
				2	113	8.37	7.3	28.6	
				1	110	8.22	7.2	28.7	
				0.3	107.9	8.05	7.2	28.8	
	9:15	PJ1	PJ/Ellie	7	1.9	0.14	8.8	25.6	1.8
				6	11.9	0.9	8.9	26.7	
				5	17.1	1.31	8.6	27	
				4	24.4	1.82	8.1	27.2	

SR5

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				3	8.3	0.61	7.7	27.2	
				2	52.4	3.93	7.5	27.8	
				1	113.4	8.44	7.2	28.6	
				0.3	111.7	8.29	7.1	28.8	
7/30/08	8:57	SRK2	AB PH	7	15.9	1.1	9.1	27.4	1.7
				6	2.2	0.23	8.6	27.4	
				5	0.4	0.03	8.5	27.5	
				4	5.4	0.4	8.2	27.7	
				3	79	6.2	7.8	28.1	
				1	110	8.2	7.8	28.6	
				0.3	111	8.2	7.8	28.7	
	8:57	SRK3	AC NF	7	17	1.3	9.1	27.4	1.6
				6	8.6	0.6	8.8	27.4	
				5	4.4	0.3	8.5	27.6	
				4	2.9	0.2	8.3	27.7	
				3	45.2	3.4	8	27.9	
				2	101	7.4	7.8	28.6	
				1	108.1	8	7.8	28.6	
				0.3	111.6	8.3	7.8	28.7	
8/6/08	10:40	SRK3	AA & PH	7.5	0.2	0.01	8.7	26.3	1.2
				6	0.2	0.2	8.4	27.7	
				5	13	0.94	8.3	27.8	
				3	46	3.5	8.1	27.8	
				1	83	6.2	8.1	28.2	
				0.3	?	?	?		(skipped)
	10:40	SRK2	NF & AC	7	0.1	0.01	8.6	26.8	1.2
				6	0.1	0.03	8.4	27.7	
				5	25	1.8	8.2	27.8	
				4	42	3.7	8.1	27.8	
				3	57	4.3	8.1	27.8	
				2	94	7.2	8.1	28	
				0.3	97	7.3	8.1	28.1	

SR5

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
8/11/06	9:45	SRK3	AA & PH	7	2	0.2	10.2	26.8	1.2
				6	5	.2-.8	10.1	27	
				5	14	0.8	9.6	27	
				3	75	5.9	8.4	26.7	
				1	78	6	8.3	26.7	
				0.3	82	6.3	8.3	26.7	
	9:50	SRK2	NF & AC	7	0.2	0.02	10.2	26.8	1.2
				6	0	0	10.1	26.9	
				5	4.9	0.4	9.6	27	
				4	40	3.1	8.5	26.7	
				3	59	4.6	8.3	26.7	
				2	65	4.9	8.3	26.6	
				1	66	5.1	8.3	26.6	
				0.3	67	5.1	8.3	26.6	
8/23/08	9:45	SRK3	AB/WB	7	0.5	0	11.8	25.6	1.1
				6	0.1	0	11.7	25.7	
				5	0.1	0	11.1	26.1	
				4	38	3	10.3	26.3	
				3	50-70	4.5-4.9	10.2	26.3	
				1	113	8.2	9.6	26.9	
				0.3	113	8.7	9.6	26.9	
	9:45	SRK2	CS/PJ	7	0	0	11.8	25.7	1.1
				6	0	0	11.8	25.7	
				5	0	0	11.3	26.1	
				4	35	2.65	10.4	26.3	
				3	53.4	4.06	10.1	26.3	
				2	88	6.52	9.7	26.4	
				0.3	102	7.7	9.7	26.9	
9/5/08	11:00	SRK3	AA+PH	7	0.7	0.04	11.7	25.1	1.4
				6	34	2.6	11.3	25.8	
				5	56	4.4	11.2	25.8	
				3	84	6.7	10.9	25.9	

SR5

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	115	8.6	10.7	26.8	
		SRK2	NF+AC	7	0.1	0	11.8	25	1.4
				6	27.5	2.01	11.4	25.3	
				5	48.2	3.68	11.2	25.9	
				3	73	5.65	10.9	25.9	
				1	104	7.83	10.7	26.8	
				0.3	102	7.53	10.7	26.9	
9/10/08	14:20	SRK2	AA+DH	7	15.9	1.2	12.6	25.5	1
				5	18.3	1.4	11.9	25.4	
				3	75.7	5.8	10.9	25.5	
				1	703	7.9	10.8	25.6	
				0.3	110	8.3	10.8	25.8	
		SRK3	PH +Mark	7	18	1.3	12.5	25.5	0.9
				5	20	2	11.7	25.5	
				3	72	5.7	10.8	25.7	
				1	80	7.7	10.8	25.9	
				0.3	108	8.2	10.8	25.9	
9/30/08	10:05	SRK3	PH & AA	7.5	47	3.8	12.3	21.4	1.2
				5	54	4.4	12.1	21.6	
				3	60	5.1	12	21.9	
				1	65	6.9	11.4	21.2	
				0.3	65	6.9	11.4	21.2	

RBW

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	11:05	SRK2	SC/NF	6.5	5.5	0.48	6.7	20.2	1.1
				5	42	3.58	6.6	20.8	
				3	97.4	8.22	6.5	22	
				1	132.6	10.86	6.4	23.1	
				0.3	151	12.2	6.3	24.4	
	11:05	SRK3	CJS/PH	6	12	0.97	6.5	20.3	1.1
				5	35	2.99	6.5	20.8	
				3	86	7.3	6.4	22.1	
				1	113	9.4	6.3	23.2	
6/11/08	10:15	SRK2	AA+BW	6	0.2	0	6.6	21.6	1.4
				5	0	0	6.6	22.7	H2S +
				4	28.6	2.1	6.5	24.2	1.45
				3	73.3	5.8	6.4	27	
				1	80.6	6.1	6.4	27.3	
				0.3	81	6.2	6.4	27.3	
	10:20	SRK3	CJS+NWF	6.3	0.6	0.04	6.5	21.2	1.5
				5	0.2	0.02	6.6	22.3	H2S +
				4	24.8	1.98	6.4	24.5	
				3	93.3	7.15	6.2	27.1	
				1	100.4	7.69	6.3	27.3	
				0.3	101.7	7.79	6.2	27.3	
6/17/08	12:40	SRK2	BW +CJS	6	0	0	7.4	22.6	0.9
				5	0	0	7.2	22.6	
				4	22.3	1.68	6.7	23.3	
				2	65.1	5.15	6.6	24.5	
				0.3	67.4	5.34	6.6	25.3	
	12:40	SRK3	PH + Aaron	6.2	0.4	0.02	7.3	22.6	0.9
				5	0.2	0.01	6.9	23.1	
				4	18	1.6	6.5	24.7	
				2	64	5.1	6.4	25.4	

RBW

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	67.4	5.3	6.4	25.5	
6/27/08	9:30	SRK2	Nate	6	0	0	8.1	22.9	0.8
				5	0	0	7.7	23.6	
				4	14	1.14	7	24.8	
				3	41.3	3.24	6.4	25.6	
				2	79.8	6.013	6.3	26.5	
				1	104.8	7.88	6.8	27.3	
				0.3	105.5	7.74	6.8	27.5	
	9:30	SRK3	Christie	6	0	0	7.8	23.2	0.75
				5	0.1	0.01	7.6	23.6	H2S+
				4	15.4	1.2	6.9	24.9	
				3	43.5	3.4	6.8	25.6	
				2	71.5	5.4	6.8	26.1	
				1	107	8.14	6.7	27.2	
				0.3	111.9	8.45	6.7	27.3	
7/2/08	10:50	SRK3	CJS+BMW	6	0	0	7.8	23.4	1.3
				5	0	0	7.8	24	
				4	8.2	0.55	7.4	25.1	
				3	59.5	4.67	6.9	26.4	
				1	85.1	5.59	6.8	26.6	
				0.3	88.1	6.77	6.8	26.9	
	10:50	SRK2	Aaron/Nate	5.5	0	0	7.9	23.7	1.4
				5	0	0	8	24.4	
				4	5.9	0.49	7.6	25.2	
				3	52.4	5.04	7.2	26.4	
				2	81.2	6.32	7	26.6	
				1	82	6.28	7	26.8	
				0.3	81.7	6.28	7	26.8	
7/9/08	3:35	SRK2	CJS + RG	6	0	0	7.9	24.1	1.4
				5	0	0	7.7	25.3	

RBW

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				4	0	0	7.6	25.7	
				3	88.1	6.73	7.3	27.1	
				1	102.4	7.77	7.3	27.4	
				0.3	105.5	8	7.3	27.5	
	3:35	SRK3	PH + BMW	7	0.2	0.01	8	23.8	
				6	0.1	0.01	7.9	24	
				5	0.1	0.01	7.8	24.7	
				4	40-50	1.0-2.0	7.4	26.6	
				3	70	5.4	7.3	27.2	
				1	86	6.5	7.2	27.3	
				0.3	41	6.9	7.2	27.4	
7/17/08	8:45	PJ1	PJ/Ellie	6	3.4	0.24	7.8	25.5	1.5
				5	7.6	0.62	7.9	26.8	
				4	2.2	0.19	7.6	27.2	
				3	40.9	1.09	7.4	28.1	
				2	8.7	6.63	7.3	28.3	
				0.3	95	7.09	7.1	28.4	
	8:45	SRK2	CJS	6	0.2	0.02	8	25.1	1.5
				5	0.1	0.01	7.9	25.6	
				4	11.5	0.85	7.9	27	
				3	13.6	1.3	7.6	27.6	
				2	70	5	7.4	28.2	
				1	92	6.88	7.3	28.3	
				0.3	93	6.92	7.3	28.4	
7/30/08	3:00	SRK2	AB PH	6.5	0	0	8.4	27.1	1.3
				5	0	0	8.2	37.6	
				4	1.7	0.1	8	37.8	
				3	6.7	0.5	8	28	
				2	101	7.4	7.9	28.8	
				1	120	9	7.8	29.1	

RBW

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	125	9.3	7.8	29.2	
	3:00	SRK3	AC NF	6	0.5	0.01	8.4	26.9	1.2
				5	0.1	0.01	8.2	27.5	
				4	0.5	0.03	8	27.8	
				3	21.5	1.5	7.9	28.1	
				2	85.8	6.5	7.8	28.9	
				1	99.8	7.4	7.8	29.1	
				0.3	106.9	7.9	7.8	29.2	
8/7/08	9:55	SRK3	AA & PH	6.5	0.4	0.03	8.4	27	1.3
				5	4	0.4	8.3	27.7	
				3	62	4.7	8.1	27.9	
				1	71	5.3	8.1	28.1	
				0.3	72	5.4	8.1	28.3	
	10:00	SRK2	NF & AC	6	0.2	0.02	8.4	27.6	1.3
				5	13	0.9	8.3	27.8	
				4	63	4.7	8.1	27.9	
				3	64	4.8	8.1	27.9	
				1	70	5.3	8.1	27.9	
				0.3	72	5.3	8.1	28.2	
8/11/08	10:04	SRK3	AA & PH	6	.5-1.5	0.04	10	26.9	1.2
				5	20	1.6	8.9	26.8	
				4	57	4.4	8.4	26.3	
				3	59	4.8	8.4	26.4	
				1	68	5.5	8.4	26.4	
				0.3	75	5.9	8.4	26.4	
	10:04	SRK2	NF & AC	6	0.2	0.01	10	26.8	1.2
				5	14	1.1	8.9	26.8	
				4	41	3.3	8.5	26.4	
				3	57	4.4	8.4	26.4	
				2	60	4.6	8.4	26.4	

RBW

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	60	4.6	8.4	26.4	
				0.3	60	4.8	8.3	26.4	
8/23/08	10:10	SRK3	AB/WB	6	0.2	0	11.5	25.4	0.9
				5	0.2	0	11.1	26	
				4	11	0.2	10.2	26.4	
				3	96	7.6	9.7	26.4	
				1	110	8.7	9.6	26.8	
				0.3	113	8.7	9.6	26.8	
	10:10	SRK2	CS/PJ	6	0	0	11.7	25.4	0.9
				5	0	0	11.2	26	
				4	0.1	0.01	10.3	26.4	
				3	75	5.8	9.8	26.4	
				1	89	6.76	9.6	26.7	
				0.3	92	6.94	9.6	26.8	
9/5/08	11:20	SRK3	AA+PH	6.5	0.2	0.01	11.6	25.1	1.1
				5	0.1	0.01	11.2	25.5	
				4	10	0.79	11.2	25.7	
				3	50	4.1	10.7	26.3	
				1	95	7.3	10.6	26.8	
		SRK2	NF+AC	6	0	0	11.6	25.2	1.1
				5	0	0	11.3	25.5	
				4	2.1	0.5	11.2	25.7	
				3	58	4.3	10.8	26.3	
				1	90.3	6.7	10.7	26.6	
				0.3	90.8	6.9	10.7	27.1	
9/10/08	14:40	SRK2	AA+DH	6	68	3.2	10.9	25.5	1.1
				5	74	5.8	10.8	25.4	
				3	84	6.4	10.8	25.5	
				1	86	6.6	10.8	25.6	
				0.3	90	6.9	10.7	25.8	

RBW

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
		SRK3	PH +Mark	5.5	70	5.3	10.8	25.4	1.3
				3	80	6.2	10.7	25.5	
				1	86	6.6	10.7	25.7	
9/30/08	10:15	SRK3	PH & AA	6	61	4.8	12.2	21.5	1.1
				5	48	3.9	12.1	21.6	
				3	64	5.2	11.8	21.6	
				1	93	7.8	11.2	21.2	
				0.3	105	8.7	11.2	21.3	
		SRK2	NF & AC	6	39.4	3.2	12.1	21.5	1.2
		meter appears okay now		5	33.3	2.7	12	21.6	
				4	43.9	3.6	11.9	21.5	
				3	52.1	4.2	11.7	21.6	
				1	91.7	7.6	11.2	21.2	
				0.3	97.6	7.9	11.2	21.2	

RBN

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	10:30	SRK3	CJS/PH	7	3.1	0.27	6.7	20	1.3
				6	8	0.72	6.6	20.2	
				5	47	4.4	6.4	21.8	
				4	114	9.5	6.3	23.2	
				2	127	10.4	6.2	23.9	
				0.3	133	10.4	6.2	24.1	
	10:30	SRK2	SC/NF	7	3.3	2.29	6.8	20.1	1.15
				6	10.4	0.91	6.7	20.3	
				5	48	4.5	6.6	21.7	
				4	128.7	10.62	6.4	20.1	
				2	146.5	11.95	6.3	23.9	
				0.3	149.3	12.11	6.3	24.1	
6/11/08	9:30	SRK3	CJS+NWF	6.5	1.8	0.13	6.5	21.5	1.1
				5	1.3	0.13	6.5	22.5	
				4	0.25	0.02	6.4	23.2	
				3	9.7	0.76	6.3	23.9	
				2	31.6	2.46	6.2	25	
				1	82.6	6.37	6.1	27.1	
				0.3	86.8	6.66	6.1	27.3	
	9:30	SRK2	0.395833	6.5	0	0	6.7	20.7	1.4
				5	0	0	6.7	22.5	
				4	0.1	0	6.6	23.1	
				3	5.4	0.48	6.5	23.8	
				1	67.5	5.2	6.3	26.9	
6/17/08	11:20	SRK2	BW + NF	6.5	0	0	6.9	21	0.9
				5.5	0	0	6.9	23.6	
				4.5	17.7	1.45	6.8	24.2	
				3.5	62.7	4.94	6.6	25.2	
				1	69.9	5.47	6.6	25.4	
				0.3	69.5	5.54	6.6	25.4	
	11:20	SRK3	PH + Aaron	6.5	0.7	0.05	6.7	21.6	0.8

RBN

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				5.5	0.3	0.02	6.7	23.8	
				4.5	~20	~2	6.6	24.4	
				3.5	64	5.1	6.4	25.3	
				2	69	5.4	6.4	25.4	
6/27/08	10:45	SRK2	Nate	6.5	0	0	8	23.3	0.8
				5	0	0	7.8	23.7	
				4	0	0	7.2	24.3	
				3	49.4	3.88	7.8	25.4	
				2	67.1	5.17	6.8	26	
				1	96.5	7.3	6.7	26.9	
				0.3	109.5	6.12	6.7	28.2	
	10:45	SRK3	Christie	6.5	0	0	7.8	23.2	0.75
				5	0	0	7.5	23.7	
				4	1.6	0.09	7.2	24.3	
				3	48	3.75	6.7	25.5	
				2	66	5.2	6.7	26	
				1	102.8	7.7	6.6	26.9	
				0.3	116	8.68	6.6	28.1	
7/2/08	9:47	SRK2	Aaron/Nate	6	0.2	0.1	7.9	23.1	1.1
				5	0	0	7.7	23.9	
				4	0	0	7.6	25.2	
				3	2.1	0.16	7.5	25.6	
				2	66.6	5.2	6.9	26.3	
				1	64.5	5	6.8	26.2	
				0.3	61.1	4.8	6.8	26.2	
	9:45	SRK3	CJS+BMW	6.5	0	0	7.9	22.7	1.1
				5	0	0	7.6	24.4	
				4	0.1	0.01	7.5	25.2	
				3	3.5	0.28	7.3	25.6	
				2	44.4	4.33	7	26.2	
				1	62.5	4.88	6.7	26.2	

RBN

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	62.2	4.86	6.7	26.2	
7/9/08	2:30	SRK2	CJS + NWF	6.5	0	0	7.8	23.5	1
				5	0	0	7.7	25.1	
				4	0.3	0.05	7.5	26.3	
				3	59.5	4.25	7.4	27.5	
				1	129	9.46	6.9	28.6	
				0.3	131	9.76	6.8	28.6	
	14:29	SRK3	PH + BMW	7	0.2	0.01	7.9	23.1	
				6	0.1	0	7.8	23.9	
				5	0	0	7.5	25	
				4	2.2	0.15	7.3	26.4	
				3	60.5	4.61	7.4	27.4	
				2	115	8.6	7	28.4	
				1	124	9.3	6.9	28.6	
				0.3	125	9.3	6.9	28.6	
7/17/08	9:45	PJ1	PJ/Ellie	7	0.9	0.07	8	23.9	1.1
				6	0.8	0.07	8	24.5	
				5	0.8	0.06	8.1	25.3	
				4	0.7	0.06	8.1	26.1	
				3	1.8	0.13	7.6	27.3	
				2	50.1	3.55	7.5	28.1	
				1	87.7	6.56	7.1	28.7	
				0.3	93.1	6.89	7	28.9	
	9:45	SRK2	CJS	7	0	0	8.1	24	1.3
				6	0	0	8.1	24.5	
				5	0	0	8.1	25.3	
				4	0	0	8.1	26.1	
				3	2	0.17	7.6	27.5	
				2	50	3.6	7.5	28.2	
				1	89	6.5	7	28.8	
				0.3	91	6.75	7	29	

RBN

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
7/30/08	9:25	SRK2	AB PH	7	0	0	8.4	25.8	0.8
				6	0	0	8.4	26.8	
				5	0	0	8.3	27.5	
				4	0	0	8.2	27.6	
				3	28.4	2.3	7.8	28.2	
				2	70	5.2	7.7	28.6	
				1	97.9	7.2	7.5	29.1	
				0.3	105	7.8	7.5	29.2	
	9:25	SRK3	AC NF	7	0.06	0.04	8.5	25.8	0.8
				6	0.3	0.02	8.5	27	
				5	0.2	0.01	8.3	27.5	
				4	0.1	0	8.2	27.6	
				3	17.2	1.3	8	28.1	
				2	60	4.5	7.7	28.7	
				1	91	6.7	7.6	29.2	
				0.3	100.1	7.4	7.6	29.3	
8/7/08	9:30	SRK3	AA & PH	7.3	0.5	0.03	8.7	26.1	1.1
				6	0.2	0.02	8.4	27.3	
				5	0.1	0.01	8.3	27.7	
				4	6.1	0.6	8.2	27.8	
				3	41	3.1	8	27.5	
				1	52	3.9	7.8	27.5	
				0.3	55	4.1	7.8	27.8	
	9:30	SRK2	NF & AC	7	0.3	0	8.6	26.6	1.1
				6	0	0	8.5	27.1	
				5	0	0	8.3	27.6	
				4	8.4	0.4	8.2	27.7	
				3	45	3.4	8.1	27.5	
				2	32	2.4	8.1	27.6	
				1	53	3.9	7.9	27.6	
				0.3	55	4.1	7.9	27.6	

RBN

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
8/11/08	9:15	SRK3	AA & PH	6.8	0.3	0.02	10.1	26.9	0.7
				5	0.2	0.01	9.9	27.1	
				4	0.1	0.01	9.2	27	
				3	7.6	0.6	8.5	26.6	
				1	62-72	4.5-5.4	8.3	26.3	
				0.3	70	5.4	8.2	26.3	
	9:15	SRK2	NF & AC	7	0.01	0	10.1	26.7	0.9
				6	0	0	10.1	27	
				5	0	0	9.9	27.1	
				4	0	0	9.1	26.9	
				3	4.8	0.4	8.6	26.7	
				2	20-35	1.5-2.5	8.4	26.5	
				1	43	3.3	8.2	26.4	
				0.3	48	3.8	8.2	26.3	
8/23/08	8:50	SRK3	AB/WB	6	0	0.1	11.6	25.7	1
				5	0.3	0	11.4	25.9	
				4	0.2	0	10.7	26.3	
				3	40-60	4.3-4.6	9.8	26.7	
				1	97	7.8	9.6	26.9	
				0.3	109	8.7	9.6	26.9	
	8:50	SRK2	CS/PJ	6	0	0	11.7	25.7	1.1
				5	0	0	11.5	25.8	
				4	0	0	11	26.1	
				3	7-18	0.5	10	26.6	
				2	83	6.2	9.7	26.9	
				0.3	89	6.76	9.6	26.9	
9/5/08	10:40	SRK3	AA+PH	7	0.2	0.02	11.8	24.8	1.2
				6	0.2	0.01	11.6	25.1	
				5	0.7	0.04	11.2	25.6	
				4	69	5.2	10.8	26.3	
				3	93	7	10.8	26.5	

RBN

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	94	7.3	10.6	27.3	
		SRK2	NF+AC	7	0	0	11.8	24.9	1.1
				6	0	0	11.6	25.1	
				5	0.1	0.01	11.1	25.7	
				4	71	5.5	10.8	26.3	
				3	90.2	6.8	10.8	26.5	
				1	92	6.8	10.6	27.2	
				0.3	100	7.3	10.5	27.4	
9/10/08	14:00	SRK2	AA+DH	6.3	2.3	0.1	12.3	25.4	0.9
				5	7	0.4	11.6	25.5	
				3	66	5.2	11	25.6	
				1	97	7.4	10.2	25.7	
				0.3	113	7.6	10.2	26	
		SRK3	PH +Mark	6.5	0.7	0.03	12.3	25.4	1.1
				5	3.2	0.26	11.7	25.5	
				3	66	5.1	10.8	25.5	
				1	87	6.9	10.2	25.9	
9/30/08	9:45	SRK3	PH & AA	7.5	41	3.4	12.2	21.7	1.5
				5	54	4.3	12.1	21.6	
				3	60	5.2	12.1	21.7	
				1	65	5.3	11.8	21.7	
				0.3	65	5.5	11.1	21.3	

SR6

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	10:06	SRK3	CJS/PH	5.5	8.3	0.7	6.2	21.6	1.1
				4	91	7.5	6	23.9	
				3	101	8.2	6	24.1	
				1	107	8.7	5.8	24.3	
				0.3	108	8.8	5.8	24.3	
	10:07	SRK2	SC/NF	5	9.5	0.82	6.2	21.5	0.8
				3	103.5	9.23	6.1	24	
				1	125.5	10.13	6	24.3	
				0.3	126.9	10.2	6	24.3	
6/11/08	9:10	SRK2	AA+BW	5	0	0	6.6	21.7	1.1
				4	0	0	6.6	21.8	
				3	0	0	6.5	22.8	
				2	14.5	1.1	0.3	24.8	
				1	65	4.9	5.6	27.5	
				0.3	75.7	5.7	5.1	27.9	
	9:10	SRK3	CJS+NWF	5.3	0.5	0.04	6.5	21.5	0.8
				4	0.3	0.02	6.4	21.7	
				3	0.1	0.01	6.4	22.8	
				2	22.4	1.77	6.6	25.4	
				1	90.7	6.91	5.1	20	
				0.3	95.7	7.3	5	27.9	
6/17/08	11:50	SRK2	BW + NF	5	0	0	6.7	21.8	0.9
				4	0.7	0.04	6.5	23.9	
				3	32.6	2.61	6.3	24.5	
				2	48.2	4	6.2	24.7	
				1	65.3	5.25	6	24.9	
				0.3	66.7	5.32	6	24.9	
	11:50	SRK3	PH + Aaron	5.2	0.5	0.04	6.6	21.7	0.8
				4	0.3	0.01	6.5	23.2	
				3	24	1.8	6.2	24.5	

SR6

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	62	5	5.9	24.9	
				0.3	65	5.2	5.9	25	
6/26/08	11:15	SRK3	Christie	5	0	0	7.6	22.9	0.7
				4	0	0	7.4	23.3	
				3	10	0.8	6.8	24.9	
				2	53.4	4	6.7	25.4	
				1	96.7	7.15	6.3	26.7	
				0.3	130.3	9.75	6.1	28.2	
	11:14	SRK2	Nate	5	0	0	7.7	22.8	0.7
				4	0	0	7.6	23.1	
				3	9	0.72	6.9	24.8	
				2	58.3	4.36	6.6	26.2	
				1	71.9	5.83	6.4	26.9	
				0.3	128.4	9.33	6.3	28	
7/2/08	9:10	SRK2	Aaron/Nate	5	0	0	7.6	23.9	0.7
				4	0	0	7.5	24.1	
				3	0	0	7.5	24.6	
				2	26	2	6.7	25.9	
				1	58	4.5	6.2	26.1	
				0.3	62.5	4.8	6.2	26.1	
	9:10	SRK3	CJS+BMW	5	0	0	7.5	23.9	0.9
				4	0	0	7.5	24.3	
				3	0	0	7.4	24.8	
				2	32	2.39	6.5	25.9	
				1	60.8	4.73	6.2	26.1	
				0.3	67.5	5.17	6.1	26.2	
7/9/08	14:08	SRK3	PH + BMW	5	0.1	0.01	7.6	24	0.7
				4	0	0	7.2	25.2	
				3	0.1	0.01	6.9	26.5	
				2	88	6.7	6.3	28.1	

SR6

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	95	7.3	6	28.2	
				0.3	101	7.6	5.9	28.3	
	2:08	SRK2	CJS + NWF	5	0	0	7.6	24.1	0.7
				4	0	0	7.5	24.5	
				3	0	0	6.9	26.2	
				2	47	3.4	6.7	27.5	
				1	102.8	7.69	6	28.1	
				0.3	108.5	7.98	6	28.3	
7/16/08	10:20	SRK2	CJS	5.5	0	0	7.9	25.3	0.7
				5	0	0	7.8	25.3	
				4	0	0	7.7	26.1	
				3	0	0	7.6	27	
				2	34.4	2.51	6.8	28.5	
				1	65	4.7	5.9	28.6	
				0.3	93.5	6.8	5.6	29.4	
	10:20	PJ1	PJ/Ellie	5.5	0.7	0.06	7.8	25.3	0.6
				5	0.6	0.05	7.8	25.4	
				4	0.6	0.04	7.7	26	
				3	0.6	0.05	7.6	27.1	
				2	35.1	2.63	6.7	28.5	
				1	62.9	4.7	5.8	28.6	
				0.3	94.6	6.9	5.6	29.2	
7/30/08	4:22	SRK2	AB PH	5.3	0.1	0.01	8.2	27.3	0.8
				4	0	0	8.1	27.5	
				3	8.1	0.6	7.8	28.2	
				2	68	5.4	7.4	29.2	
				1	120	8.9	7.2	30.2	
				0.3	139	10.1	7	30.5	
	4:22	SRK3	AC NF	5	0.7	0.05	8.2	27.2	0.9
				4	0.5	0.03	8	27.5	

SR6

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				3	5.2	0.4	7.7	28.2	
				2	77.2	5.7	7.3	29.5	
				1	128	9.7	7.2	30.2	
				0.3	141.5	10.2	6.8	30.8	
8/7/08	9:05	SRK3	AA & PH	5.4	1.1	0.08	8.5	27	0.8 (reddish water)
				4	0.7	0.05	8.4	27.1	
				3	0.3	0.02	8.2	27.4	
				2	16	1.1	7.8	27.7	
				1	46	3.5	7.5	27.5	
				0.3	58	4.4	7.3	27.5	
	9:05	SRK2	NF & AC	5.2	0.1	0.01	8.5	26.9	0.8
				4	0	0	8.4	27.1	
				3	0	0	8.2	27.5	
				2	23	1.8	7.7	27.6	
				1	49	3.7	7.5	27.5	
				0.3	56	4.2	7.4	27.5	
8/11/08	8:55	SRK3	AA & PH	5.1	0.5	0.03	9.1	26.7	0.5 (reddish water)
				4	0.3	0.02	8.6	26.7	
				3	22	1.7	8	26.4	
				1	32	2.5	7.9	26.4	
				0.3	34	2.6	7.8	26.4	
	8:58	SRK2	NF & AC	5	0.3	0.02	8.9	26.6	0.5
				4	0.1	0.01	8.5	26.7	
				3	16.6	1.3	8	26.5	
				2	11.4	0.9	8	26.5	
				1	32.2	2.5	7.8	26.4	
				0.3	36.9	2.8	7.8	26.4	

SR6

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
8/23/08	8:20	SRK3	AB/WB	5	0.4	0	11.3	11.3	0.8
				4	0.2	0	10.9	10.9	
				3	45	3.6	9.4	9.4	
				1	80	5.6	9.2	9.2	
				0.3	82	6.2	9.2	9.2	
		SRK2	CS/PJ	5	0	0	11.3	25.7	0.7
				4	0	0	11	25.9	
				3	49	3.74	9.4	27.1	
				2	75	5.56	9.2	26.9	
				1	76	5.7	9.2	26.9	
				0.3	78	5.9	9.2	26.9	
9/5/08	10:20	SRK3	AA+PH	5	1	0.07	10.5	26.3	0.9
				4	35	2.9	10.5	26.7	
				3	84	6.6	10.3	27.1	
				1	106	8.1	10.2	27.2	
				0.3	114	8.4	10.2	27.5	
		SRK2	NF+AC	5	0.3	0.03	10.8	25.5	0.9
				4	16.6	1.4	10.4	26.7	
				3	68.1	5	10.3	27.1	
				1	93.1	6.89	10.3	27.4	
				0.3	96.6	7.21	10.2	27.5	
9/10/08	13:35	SRK2	AA+DH	4.8	0.1	0.01	11.1	25.5	0.7
				4	5	0.4	11.1	25.6	
				3	14	1.1	10.9	25.8	
				1	109	4	8.9	26	
				0.3	113	8.6	8.9	26.1	0.7
		SRK3	PH +Mark	5	0.3	0.02	11.2	25.4	
				4	1.4	0.11	11.1	25.5	
				3	10.9	0.84	10.8	29.7	
				1	90	7.1	9	26	

SR6

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	103	8	8.8	26.2	
9/30/08	9:30	SRK3	PH & AA	5.3	44	3.5	12.2	21.7	0.8
				3	41	3.4	12.1	21.8	
				1	21	2	10.8	21.8	
				0.3	50	5	7.2	19.5	

SR7

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	9:40	SRK2	SC/NF	2	72.1	5.94	5.1	24.3	0.4
				1	115	9.42	3.2	24.9	
				0.3	108.5	9.05	1.8	24.4	
	9:38	SRK3	CJS/PH	2	55	4.8	5	24.4	0.45
				1	100	8	3.8	25.2	
				0.3	103	8.5	2	24.6	
6/11/08	8:45	SRK3	CJS+NWF	1	26.2	2.04	4.7	27.9	0.6
				0.3	93.5	7.18	4	28.1	
	8:45	SRK2	AA+BW	1	17	1.2	5	27.6	0.7
				0.3	76.7	5.8	4	28	
6/17/08	12:12	SRK3	PH + Aaron	1	84	6.6	5.2	25.4	0.5
				0.3	85	6.8	5.2	25.5	
	12:12	SRK2	BW +CJS	1	86.5	6.36	5.4	25.3	0.55
				0.3	94.6	7.46	5.3	25.6	
6/26/08	11:43	SRK2	Nate	1.5	21.3	14.15	6	26.9	0.5
				1	78.6	5.45	5.7	27.3	
				0.3	118	7.62	5.5	27.9	
	11:41	SRK3	Christie	1.5	22.4	2.4	5.7	27.1	0.5
				1	77	6.05	5.6	27.3	
				0.3	118.7	8.79	5.4	28.4	
7/2/08	8:45	SRK3	CJS+BMW	1.5	40.2	3.14	5.5	26.1	0.5
				1	46.5	3.61	5.5	26.1	
				0.3	61	4.95	5.5	26.1	
	8:48	SRK2	Aaron/Nate	1	21.5	1.26	5.8	26.2	0.5
				0.3	59.8	4.69	5.3	26	
7/9/08	11:55	SRK2	CJS + NWF	1.5	80.5	6.05	5.3	28.3	0.4
				1	88.5	6.68	5.2	28.4	
				0.3	90.5	6.8	5.2	28.4	
	13:48	SRK3	PH + BMW	1.5	86	5.8	5.2	28.4	0.5
				1	92	7	5.2	28.4	
				0.3	99	7.5	5.2	28.5	

SR7

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
7/16/08	10:45	PJ1	PJ/Ellie	1.5	0.9	0.07	5.3	29.1	0.5
				1	72	5.2	5	29.1	
				0.3	112.2	8.24	4.3	30.1	
	10:45	SRK2	CJS/Ellie	1.5	0.1	0.01	5.2	29.2	0.6
				1	74	5.35	5	29.1	
				0.3	109	8.02	4.3	30	
7/30/08	3:54	SRK2	AB PH	1.5	19	1.5	5.9	29.5	0.5
				1	41	3.1	5.8	29.9	
				0.3	148	10.7	5.6	31.1	
	3:54	SRK3	AC NF	1	14.6	1.09	5.9	29.4	0.5
				0.3	XXX	XXX	5.6	30.9	
8/7/08	8:40	SRK3	AA & PH	1.2	0.8	0.06	7.6	27.5	0.4 (reddish water)
				0.6	39	3	6.4	27	
				0.3	43	3.3	6.4	27	
	8:40	SRK2	NF & AC	1.2	0.6	0.04	7.4	27.5	0.5
				0.6	38	3	6.4	27	
				0.3	40	3.1	6.4	27	
8/11/08	8:40	SRK3	AA & PH	1.1	19	1.5	7.2	25.9	0.4 (reddish water)
				0.3	39	3.2	7	25.7	
	8:40	SRK2	NF & AC	1.1	12	1.3	7	25.6	0.4
				0.3	47	3.7	6.6	25.7	
8/23/08	7:58	SRK3	AB/WB	1.5	50	3.6	8.4	27.1	0.5
				0.3	74	5.8	7.9	26.6	
		SRK2	CS/PJ	1.5	54	4.14	8.2	27	0.5
				0.3	66	5.1	7.9	26.5	
9/5/08	10:05	SRK3	AA+PH	1.5	42	3	9.5	27.2	0.5
				1	67	5.1	9.1	27.3	
				0.3	80	6.1	8.7	27.4	
		SRK2	NF+AC	1.5	45	3.7	9.4	27.2	0.5

SR7

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	78	5.4	8.8	27.3	
				0.3	100	7.5	8.3	27.5	
9/10/08	13:17	SRK2	AA+DH	1	45	1.6	8.3	26.3	0.6
				0.3	90	7.2	7.6	26.1	
		SRK3	PH +Mark	1.2	30	2.6	8	26.3	0.6
				0.6	88	7	7.5	26.1	
				0.3	95	7.6	7.5	26.2	
9/30/08	9:15	SRK3	PH & AA	1.5	0.8	0.06	11.7	22.1	0.6
				1	0.6	0.04	10.8	21.9	
				0.3	20	1.8	6.6	20.2	
		SRK2	NF & AC	1.5	0.4	0.03	11.4	21.9	
				1	0.6	0.05	10.4	21.8	
				0.3	21	21	7.2	20.3	

SC1

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	4:05	SRK2	Nate/Brooke	3	21	1.73	6.8	21	0.45
				2	58.1	5.04	6.7	21.6	
				1	84.3	7.11	6.1	22.1	
				0.3	181.9	14	4.5	26	
	4:05	SRK3	AA/CS	3.5	18.1	1.6	6.7	21	0.4
				3	23	1.9	6.7	21	
				2	59	5	6.5	21.7	
				1	95	8	5.6	22.7	
				0.3	160	13.6	4.5	26	
6/11/08	11:20	SRK3	PH+AA	3.5	27	1.8	6.6	24.1	1.4
				3	43	3.6	6.6	24.6	
				2	63	5.3	6.5	26.1	
				1	95	7.2	6.5	27.3	
				0.3	106	7.9	6.4	28.4	
	11:25	SRK2	CJS+NWF	3.5	22.7	1.84	6.7	24.3	1.4
				3	33	2.55	6.6	27.6	
				2	62.6	4.9	6.6	26.2	
				1	94.2	7.21	6.6	27.5	
				0.3	110.3	8.24	6.5	2.3	
6/17/08	9:00	SRK3	PH + Aaron	3.5	20	1.6	6.7	25.5	0.7
				2	54	4.3	6.4	25.5	
				1	63	4.8	6.3	25.4	
				0.3	62.3	5	6.3	25	
	9:00	SRK2	BW + NF	3.5	17	1.12	6.9	25.3	0.75
				2	63.7	5.01	6.6	25.6	
				1	68	5.48	6.5	25.4	
				0.3	71	5.63	6.5	25.4	
6/26/08	1:15	SRK3	Nate + Aaron	3.5	43.5	3.4	7.3	25.1	0.6
				2	64.3	5.1	6.8	25.3	
				1	84.4	6.4	6.5	26.2	
				0.3	90.1	6.8	6.5	26.1	

SC1

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
	1:15	SRK2	AB+CJS	3	30.1	2.72	7.4	25.1	0.65
				2	60	4.81	7.1	25	
				1	85	6.6	6.7	25.6	
				0.3	96	7.18	6.7	26.7	
7/2/08	4:04	SRK2	Aaron/Nate	3	30	2.6	7.8	26.2	0.7
				2	49	3.7	7.5	16.8	
				1	125	9.3	6.9	28.3	
				0.3	133	9.9	6.9	28.8	
	4:04	SRK3	CJS+BMW	3	30.5	2.33	7.8	26.1	0.8
				2	47	3.66	7.4	26.8	
				1	122	9.86	6.8	28.5	
				0.3	131.2	9.84	6.8	28.8	
7/9/08	9:50	SRK3	CJS +BMW	3.5	5	0.38	8.2	26.2	0.8
				3	13.1	1.05	8.2	26.4	
				2	36.3	2.78	8	26.7	
				1	57.5	4.43	7.9	26.9	
				0.3	58.9	4.5	7.8	26.9	
	9:50	SRK2	NF+RG	3.5	2.5	0.18	8.1	26.2	0.8
				3	23.3	1.39	8.2	26.4	
				2	37.3	2.84	8	26.8	
				1	56.5	4.3	7.8	26.9	
				0.3	59	4.5	7.8	26.9	
7/16/08	9:05	SRK2	Brooke/Ellie	3.5	2.1	0.19	8.2	27.3	0.9
				3	14.4	1.15	8.1	27.5	
				2	67.4	5.13	7.9	28.2	
				1	109.5	8.07	7.7	28.9	
				0.3	153.5	11.35	6.8	28.5	
	9:05	SRK3	Nate/Aaron	3.5	3.4	0.24	8.2	27.1	0.7
				3	16.3	1.25	8.2	27.6	
				2	40.5	3.02	8.1	27.8	
				1	90	6.63	7.9	28.7	

SC1

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	127.7	9.65	6.8	28.4	
7/30/08	11:02	SRK2	PH	3.2	2.2	0.15	8.7	27.9	1
				2.5	5	0.44	8.6	28.2	
				1.5	6	4.9	8.3	29	
				0.3	136	10.1	8	25.9	
	11:02	SRK3	AC NF	3.2	1.5	0.1	8.7	26	1
				2.5	6.7	0.4	8.6	28.1	
				1.5	39	2.9	8.4	28.6	
				0.3	136	9.9	8	29.7	
8/6/08	9:15	SRK3	AA & PH	3.5	33	2.4	8.4	28.1	1
				2	45	3.4	8.2	28.2	
				1	55	4.1	8.2	28.2	
				0.3	58	4.4	8.2	28.2	
	9:15	SRK2	NF & AC	3.5	24	1.8	8.4	28.1	1.1
				2	36	2.7	8.3	28.2	
				1	50	3.7	8.2	28.2	
				0.3	53	4.2	8.1	28.1	
8/12/08	11:12	SRK3	AA & AC	3	55 to 58	4.3	9.2	26.3	1.2
				2	66	4.6	8.6	26.2	
				1	71	5.6	8.6	26.3	
				0.3	79	6.1	8.6	26.5	
	11:12	SRK2	NF	3	53	4.3	9.3	26.2	1.1
				2	54	4.7	8.6	26.2	
				1	79	6.1	8.6	26.3	
				0.3	80	6.5	8.6	26.5	
9/5/08	13:45	SRK3	AA+PH	3	43	3.2	11.4	25.9	0.7
				2	50	3.5	11.5	25.9	
				1	113	9	11.2	26.4	
				0.3	120	9.2	11.1	27.1	
		SRK2	NF+AC	3	18.8	1.4	11.5	25.8	0.8
				2	26	1.7	11.5	25.8	

SC1

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	48.7	3.7	11.1	26.1	
				0.3	133.2	9.6	11	27.6	
9/30/08	13:25	SRK3	PH & AA	3.5	35	3.5	11.9	21	0.7
				2.5	58	4.5	11.9	21.4	
				1	76	6.3	11.8	21.7	
				0.3	108	9.1	10.9	21.8	
		SRK2	NF & AC	3	26.2	2.22	11.8	21.1	0.9
				2	64.3	5.3	11.8	21.3	
				1	67.1	5.68	11.7	21.7	
				0.3	119.6	10.22	11.7	21.7	

SC3

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	3:00	SRK3	CJS/NWF	3	38.1	3.24	6.5	21.8	0.85
				2	90.5	7.57	6.5	22.5	
				1	126.8	10.28	6.1	24	
				0.3	125.4	9.9	4.6	26.2	
	3:00	SRK2	AA	3	25.8	3	6.7	21.8	0.9
				2	81.3	6.7	6.6	22.4	
				1	132	10.6	6.2	24.3	
				0.3	133	10.6	5.7	24.8	
6/11/08	9:50	SRK2	Nate	3.2	11.6	0.91	6.6	24.3	1.5
				2	40.8	2.88	6.5	25.9	
				1	51	3.99	6.5	25	
				0.3	66	5.02	6.1	27.6	
	9:50	SRK3	PH	3.2	13.8	1.16	6.4	24.2	1.4
				2	47	3.3	6.4	25.8	
				1	63	4.9	6.4	26.6	
				0.3	68	4.9	6.1	27.4	
6/18/08	9:45	SRK3	PH + CJS	3.5	52	4	6.5	24.7	0.7
				2	49	3.9	6.5	24.7	
				1	49	4	6.5	24.7	
				0.3	53	4.4	6.5	24.8	
	9:55	SRK2	Aaron	3	49	3.9	6.7	24.6	
				2	48	3.9	6.7	24.7	
				1	49	4	6.7	24.7	
				0.3	52.2	4.2	6.7	24.7	
6/24/08	9:45	SRK2	AB+CJS	3	30	2.2	7.1	25.3	0.7
				2	53	4.1	7.1	25.6	
				1	73.5	5.5	7	25.9	
				0.3	104	8.1	6.4	26.2	
	9:25	SRK3	Nate + Aaron	3	31.7	2.4	6.9	24.3	0.7
				2	57	4.5	7	25.6	
				1	82	6.4	6.9	25.7	

SC3

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	110	8.7	6.2	26.2	
7/2/08	3:04	SRK2	Aaron/Nate	3	12	0.6	7.4	26.4	0.6
				2	49	4.1	7.4	26.8	
				1	90	6	7.2	27.3	
				0.3	136.6	10	6.7	27.6	
	3:04	SRK3	CJS+BMW	3	18	1.47	7.3	26.5	0.8
				2	60.7	4.59	7.2	26.9	
				1	94	6.95	7	27.4	
				0.3	117	8.62	6.7	28.4	
7/9/08	0:00	SRK3	CJS	2.5	32.1	2.55	7.5	27.1	0.6
				2	74	5.57	7.6	27.8	
				1	107.3	7.97	7.5	29	
				0.3	113.4	8.29	7.4	29.5	
	0:00	SRK2	PJ	2.5	29.9	2.51	7.5	27.2	0.6
				2	58.8	4.77	7.5	27.5	
				1	103.3	7.72	7.5	28.5	
				0.3	111.6	8.24	7.4	29.4	
7/16/08	14:00	SRK3	PJ/Aaron	3	26	1.98	7.8	27.9	1
				2	61.3	4.59	7.6	28.1	
				1	129	9.5	7.5	29.5	
				0.3	136	9.8	7.5	29.9	
	2:00	SRK2	Brooke/Nate	3	11.5	0.88	7.8	27.8	1
				2	83	6.01	7.6	28.1	
				1	133.8	9.88	7.5	28.8	
				0.3	145.2	10.57	7.5	29.9	
8/1/08	0:00	SRK3	AA & PH	3	20-40	2.3-2.7	8.2	28.2	1.1
				2	47	3.7	8.2	28.2	
				1	54	4.1	8.2	28.3	
				0.3	58	4.4	8.2	28.4	
	0:00	SRK2	NF & AC	3	20-40	3.2-1	8.2	28.2	1
				2	50.3	3.6	8.1	28.1	

SC3

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	54	4	8	28.2	
				0.3	62	4.6	8.1	28.4	
8/7/08	11:40	SRK3	AA & PH	3	26	1.9	8.3	28.1	0.8
				2	41	3.1	8.2	28	
				1	55	4.2	8.1	27.9	
				0.3	64	4.9	8	28.3	
	11:40	SRK2	NF & AC	3	10	0.6	8.3	28	0.8
				2	25	2	8.3	28	
				1	54	4	8	27.8	
				0.3	63	4.6	8	28	
8/12/08	9:39	SRK3	AA & AC	2.8	30	2.2	9	26.7	1.2
				2	35	2.8	8.8	26.3	
				1	41 to 44	3.4	8.6	26.2	
				0.3	47	3.8	8.6	26.3	
	9:39	SRK2	NF	2.5	29	2.4	9	26.7	1.2
				2	37	2.6	8.9	26.6	
				1	39	2.8	8.7	26.2	
				0.3	41	3.1	8.6	26.2	
9/5/08	14:30	SRK3	AA+PH	3	56	4.1	11.3	26.1	0.7
				2	44	3.1	11.2	26.2	
				1	54	4.2	11.1	26.4	
				0.3	111	7.4	10.6	28.7	
		SRK2	NF+AC	2.8	33.7	2.8	11.3	26.2	0.6
				2	30	2.2	11.2	26.2	
				1	51.2	4.1	11.2	26.5	
				0.3	123	8.9	10.6	28.8	
9/30/08	8:25	SRK3	PH	3.2	45	3.6	11.8	21.5	0.9
				2	66	5.1	11.8	21.5	
				1	70	5.6	11.6	21.6	
				0.3	49	4	11.2	20.9	
		SRK2	AA&NF	3.2	44	3.6	11.8	21.5	0.9

SC3

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				2	61	4.9	11.7	21.7	
				1	65	5.3	11.5	21.5	
				0.3	44	3.7	11.2	20.9	

SC4

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/10/08	10:20	SRK3	PH	4.5	10	0.83	6.7	23.2	1.6
				4	11	0.9	6.6	23.3	
				3	29.7	2.5	6.6	24.8	
				2	54	4.4	6.5	26.4	
				1	70	5.4	6.4	27.7	
				0.3	75	5.7	6.4	29.1	
	10:25	SRK2	CJS+NWF	4.5	12.5	1.02	6.8	23.6	1.6
				4	11.2	0.91	6.8	23.4	
				3	33.5	2.72	6.7	25.1	
				2	54.3	4.26	6.7	26.3	
				1	74.6	5.66	6.6	27.8	
				0.3	74.7	5.59	6.5	28.5	
6/17/08	2:05	SRK2	BW +CJS	4.3	53.9	4.23	6.8	25.2	0.7
				3	65.5	5.07	6.8	25.6	
				2	75	5.83	6.8	25.8	
				1	83.5	6.55	6.8	26.1	
				0.3	86.6	6.77	6.8	26.2	
	2:05	SRK3	PH + Aaron	4.5	55	4.4	6.6	25.2	0.6
				3	65	5.1	6.6	25.6	
				2	76	5.9	6.6	25.9	
				1	32	6.4	6.6	26	
				0.3	84	6.6	6.6	26.1	
6/26/08	10:05	SRk2	Nate	4.5	28.6	2.24	7.7	25	0.9
				3	53.3	4.01	7.5	25.6	
				1	98	7.45	7.1	26.3	
				0.3	126.4	9.02	7.1	26.6	
	10:15	SRK3	Christie	4.5	41	3.29	7.5	25.1	0.7
				3	58.3	4.53	7.3	25.6	
				1	10.6	8.45	7	26.3	
				0.3	130.5	10.08	6.9	26.6	
7/2/08	2:45	SRK3	CJS+BMW	4	25.5	2.04	7.9	26	0.8

SC4

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				3	46.6	3.67	7.6	26.5	
				2	48.7	3.77	7.1	26.7	
				1	119	9.2	7.2	28.4	
				0.3	124	9.25	7.2	28.8	
	2:41	SRK2	Aaron/Nate	4	21.3	1.8	7.9	26	0.9
				3	50.1*	3.9	7.7	26.6	
				2	41*	3	7.6	26.7	
				1	118	8.7	7.4	28.3	
				0.3	120.2	8.9	7.4	28.7	
7/9/08	11:05	SRK3	NF + BMW	4.5	30.5	2.25	8.1	26.9	0.9
				4	36.7	2.78	8.1	26.9	
				3	41.1	3.14	8	27.1	
				2	85.9	6.52	7.7	27.5	
				1	104	7.86	7.7	27.6	
				0.3	114.4	8.63	7.6	27.7	
	11:05	SRK2	AB + CS	4.5	20	1.7	8.1	26.8	0.8
				4	37.3	2.7	8.1	26.7	
				3	43.5	3.3	8.1	27	
				2	93.5	7.2	7.7	27.6	
				1	114	8.6	7.7	27.6	
				0.3	114.5	8.7	7.6	27.6	
7/16/08	10:05	SRK2	Brooke/Ellie	4.5	1.6	0.11	8.3	27.1	0.9
				4	13.8	1.02	8.2	27.2	
				3	47.3	3.63	8	27.6	
				2	104.3	7.81	7.8	27.7	
				1	122.7	9.22	7.9	28	
				0.3	131.4	9.85	7.8	28.3	
	10:05	SRK3	Nate/Aaron	4	9	0.6	8.3	27.1	0.8
				3	35.5	2.66	8.1	27.5	
				2	91.7	6.92	7.9	27.7	
				0.3	117.4	1.8	7.9	28.2	

SC4

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
7/30/08		SRK2	PH	4.2	25	2	8.6	28.1	
				3	57	3.9	8.5	28.3	
				1	157	12	8.2	29.1	
				0.3	148	14	8.1	30.2	
		SRK3	AC NF	4.2	31.7	2.4	8.6	28	0.9
				3	56.5	4.2	8.5	28.3	
				1	102.4	7.3	8.3	28.9	
				0.3	127.5	9.4	8.2	29.6	
8/7/08	11:00	SRK3	AA & PH	3.5	64	4.8	8.2	27.9	1
				2	66	4.9	8.2	28	
				1	86	6.3	8.2	28.4	
				0.3	80	5.9	8.1	28.6	
	11:00	SRK2	NF & AC	3.3	60	4.5	8.2	27.9	1
				1	79	5.9	8.2	28.1	
				0.3	87	6.4	8.2	28.4	
8/12/08	10:40	SRK3	AA & AC	4	26 to 30	2.4	10	26.4	0.9
				3	46	3.5	9.3	26.4	
				2	66 to 70	5.2 to 5.5	8.8	26	
				1	85 to 90	6.3 to 6.8	8.8	26	
				0.3	97 to 102	7.4 to 7.8	8.8	26.2	
	10:40	SRK2	NF	4	29	1.8	9.8	26.6	0.9
				3	50	3.8	9.2	26.3	
				2	71	5.3	8.9	26	
				1	87	6.7	8.8	26.1	
				0.3	92	6.8	8.8	26.2	
9/5/08	13:15	SRK3	AA+PH	4.5	75	5.8	11.4	26.3	0.9
				3	92	7.1	11.3	26.6	
				1	144	11.2	11.1	27.5	
		SRK2	NF+AC	4	63	4.8	11.4	26.4	
				3	80	6.1	11.3	26.6	
				1	138	10.4	11.1	27.4	

SC4

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				0.3	147.5	11	11.1	27.9	
9/30/08	12:50	SRK3	PH & AA	4.5	69	5.5	12.2	21.6	1.2
				3	70	5.8	12	21.7	
				1	80	6.7	11.9	21.6	
				0.3	85	7	11.9	21.8	
		SRK2	NF & AC	4.5	55.2	4.4	12.1	21.6	1.2
				4	65.2	5.24	12	21.7	
				1	78.8	6.31	11.8	21.5	
				0.3	84.4	6.71	11.8	21.8	

SC5

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/5/08	8:40	SRK2	SC/NF	3.5	77.6	6.52	6.6	22	0.9
				3	78.2	6.59	6.6	22	
				2	102.1	8.53	6.5	22.5	
				1	131.1	10.68	6.4	23.4	
				0.3	145.9	11.84	6.2	24	
	8:40	SRK3	CJS/PH	4	59	5.1	6.5	21.9	1.1
				3	76	6.3	6.5	22.2	
				2	92	7.7	6.4	22.6	
				1	112	9.2	6.3	23.3	
				0.3	128	10.4	6.1	24	
6/11/08	11:45	SRK3	CJS+NWF	3.3	21.5	1.72	6.5	24.9	1.2
				2	47.8	3.71	6.4	26.7	
				1	69.1	5.28	6.3	27.6	
				0.3	98.6	5.94	6.2	28.2	
	11:45	SRK2	AA+BW	3	19.6	1.5	6.6	25.2	1.3
				2	49.7	3.8	6.6	26.6	
				1	73	5.5	6.4	27.4	
				0.3	77.5	5.8	6.4	28	
6/17/08	2:30	SRK3	PH + Aaron	3	39	3.1	6.8	25.2	
				2	45	3.5	6.6	25.3	
				1	59	4.7	6.5	25.4	
				0.3	70	5.5	6.5	26	
	2:30	SRK2	BW +CJS	3	37	2.96	6.9	25.2	0.7
				2	41.9	3.33	6.8	25.3	
				1	59	4.75	6.7	25.4	
				0.3	67	5.07	6.7	25.7	
6/26/08	2:55	SRK3	Nate + Aaron	3	43	3.34	6.9	25.4	0.6
				2	50.6	4.01	6.9	25.7	
				1	75.5	7.55	6.8	26	
				0.3	102	7.73	6.7	27.1	
	2:50	SRK2	AB+CJS	3	28.5	2.3	7.1	25.2	0.7
				2	56.3	4.3	7	25.7	

SC5

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	80	6.5	6.9	26.1	
				0.3	97	7.4	6.9	26.4	
7/2/08	12:30	SRK2	Aaron/Nate	3	32	2.7	7.5	26.5	1
				2	33.4	3.02	7.4	26.7	
				1	70	5.4	7.2	27.1	
				0.3	109	8.3	7.1	27.6	
	12:31	SRK3	CJS+BMW	3	37.1	2.87	7.3	26.6	1
				2	48	3.4	7.3	26.6	
				1	93	6.8	7	27.1	
				0.3	119	8.93	7	28.1	
7/9/08	5:45	SRK2	PJ	3	95	7.1	7.2	27.8	0.9
				2	113	8.4	7.4	28.3	
				1	121	8.94	7.4	28.9	
				0.3	115	8.4	7.3	29.9	
	5:45	SRK3	CJS	3	83	6.31	7.5	27.7	1
				2	117.9	8.8	7.4	28.4	
				1	124.5	9.17	7.5	29.3	
				0.3	119.5	8.66	7.3	29.6	
7/16/08	11:26	SRK2	Brooke/Ellie	3.2	16.9	1.27	7.8	27.3	0.9
				2	55.2	4.19	7.6	27.4	
				1	105.2	7.87	7.6	28.2	
				0.3	98	7.22	7.6	28.9	
	11:26	SRK3	PJ + Nate	3	15.6	1.19	7.9	27.3	0.9
				2	53	4.02	7.6	27.4	
				1	77.6	5.8	7.7	27.9	
				0.3	89.5	6.63	7.6	28.7	
8/1/08	9:05	SRK3	AA & PH	3.3	28	2.1	8.4	28.2	0.9
				2	49	3.7	8.2	28.1	
				1	50	3.7	8.2	28.1	
				0.3	52	3.9	8.1	28.2	
	9:05	SRK2	NF & AC	3.3	11.1	0.6	8.4	28	0.8
				2	51.2	3.84	8.1	28.1	

SC5

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				1	49.9	3.7	8	28.1	
				0.3	54.1	4.01	8	28.2	
8/12/08	10:17	SRK3	AA & AC	3	57	4.5	8.6	25.9	1.3
				2	60	4.7	8.7	25.9	
				1	69	5.2	8.6	26.2	
				0.3	70	5.6	8.6	26.1	
	10:17	SRK2	NF	3	46	3.5	8.7	25.8	?
				2	46	3.5	8.7	25.9	
				1	51	3.9	8.7	26	
				0.3	54	4.1	8.7	26.1	0.9
9/5/08	12:35	SRK3	AA+PH	3	41	3.2	11.1		
				2	61	4.7	11.1		
				1	92	7.5	11		
				0.3			10.8		
		SRK2	NF+AC	3	24.7	1.8	11.1		0.9
				2	45	3.5	11.1		
				1	100	7.5	10.9		
				0.3	105.3	7.6	10.8		
9/30/08	11:20	SRK3	PH & AA	3.2	70	5.5	11.9	21.6	1
				2	70	5.7	11.7	21.5	
				1	77	6.3	11.6	21.5	
				0.3	80	6.6	11.6	21.7	
		SRK2	NF & AC	3.2	48	4	11.8	21.6	1.1
				2	62.8	5.2	11.6	21.5	
				1	66.5	5.4	11.6	21.5	
				0.3	70.3	5.8	11.6	21.6	

SC6

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
3/31/08	15:45	SRK3	PH&AAB	4.5	1	0.09	12.2	9.1	nd
				3.5	20	3.9	9.4	9.5	
				2.5	143	15.9	6.3	10.2	
				1.5	137	14.9	6.1	10.1	
				0.5	133	14.6	5.4	9.6	
4/18/08	13:40	SRK3	PH & AAB	4.5	1	0.05	12.1	9.8	nd
				3.5	161	16.6	9	12.6	
				2.5	154	15.3	5.6	13.8	
				1.5	141	13.8	5.6	14.7	
				0.5	146	13.7	5.6	16.5	
6/5/08	12:30	SRK3	CJS/PH	4.5	0.4	0.02	11.9	15.4	1.3
				3.5	6	0.51	6.5	20.6	
				2.5	50	4.2	6.4	21.8	
				1.5	80	6.7	6.3	22.8	
				0.3	120	9.2	6.1	24.6	
	12:30	SRK2	SC/NF	4.5	0	0	12.1	15.5	1.2
				3.5	2.6	0.23	6.6	20.5	
				3	49.4	3.96	6.5	21.5	
				2	83.5	7.01	6.5	22.3	
				1	125.2	10.17	6.4	23.3	
				0.3	137.8	11.9	6.1	24.4	
6/11/08	11:15	SRK3	CJS+NWF	4.5	0.4	0.04	11.9	15.8	1.6
				3	0.2	0.02	6.4	23.1	H2S +
				2	24.3	1.87	6.3	26	
				1	81.5	6.07	6.2	29	
				0.3	83	6.18	6.2	29	
	11:18	SRK2	AA+BW	4	0	0	12	16.1	1.5
				3	0	0	6.6	22.4	H2S +
				2	15	1.3	6.5	25.1	
				1	83.2	6.2	6.4	28.8	
				0.3	82.3	6.1	6.4	29	

SC6

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
6/18/08	2:00	SRK3	Aaron + CJS	4	0.4	0.02	9.6	17.7	0.9
				3	46.2	3.7	6.5	24.2	H2S +
				2	67	5.3	6.4	25.1	
				1	79	6.2	6.4	25.9	
				0.3	88	6.8	6.4	26.6	
	2:00	SRK2	PH + NWF	4	0	0	10	18.2	1
				3	58.6	4.4	6.6	24.3	H2S +
				2	79.4	6.34	6.5	25.1	
				1	96.3	7.48	6.6	26.3	
				0.3	97.5	7.58	6.5	26.4	
6/26/08	10:35	SRK3	Christie	4.5	0.1	0	11.1	18.5	0.9
				4	0.2	0	6.7	22.9	H2S+
				3	23	1.78	6.6	25.3	
				2	74	5.8	6.6	26.4	
				1	93.7	7.19	6.5	26.9	
				0.3	102.3	7.8	6.5	27.6	
	10:35	SRK2	Nate	4.5	0	0	12.2	16.2	1
				4	0	0	7	22.2	H2S+
				3	25.8	1.92	6.8	25.1	
				2	59.1	5.04	6.7	26.2	
				1	99.4	7.61	6.7	26.9	
				0.3	102.2	7.9	6.6	27.5	
7/2/08	1:05	SRK3	CJS+BMW	4.5	0.1	0.01	11.5	17.7	0.8
				4	0	0	10.5	19	
				3	19.5	1.34	6.8	26	
				2	58.7	4.49	6.7	27.1	
				1	80.6	6.18	6.6	27.7	
				0.3	100.6	7.59	6.6	28.7	
	1:07	SRK2	Aaron/Nate	4.5	0	0	11.6	18.2	0.9
				4	0	0	9.1	20.8	
				3	19.9	1.7	6.9	20.9	

SC6

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				2	70.3	5.31	6.8	27.1	
				1	91.8	6.93	6.8	27.5	
				0.3	100.5	7.52	6.8	28.3	
7/9/08	5:05	SRK3	CJS	4	0	0	9.6	21.1	0.8
				3	0.5	0.05	7.2	26.2	
				2	70	5.2	7.1	27.8	
				1	114.5	8.44	7	28.9	
				0.3	121.2	8.9	6.9	29.5	
	5:05	SRK2	PJ	4	0	0	10.1	20.5	0.9
				3	0.1	0.02	7.2	26.7	
				2	74.2	5.4	7	27.8	
				1	112.4	8.44	6.9	28.5	
				0.3	119	8.81	6.9	29.4	
7/16/200	10:58	SRK2	Brooke/Ellie	4.5	0	0	11.4	18.6	1.5
				4	0	0	9.4	21.9	
				3	24.5	1.85	7.4	27.6	
				2	72.6	5.44	7.3	28.2	
				1	107.8	8.03	7.1	28.5	
				0.3	108.6	8.01	7.1	29.2	
	11:00	SRK3	Nate/Aaron	4.5	3.5	0.29	11.5	19.5	1.2
				4	1	0.08	8.6	22.7	
				3	8	0.63	7.5	26.7	
				2	54.2	4.13	7.2	28	
				1	77.6	5.85	7.2	28.4	
				0.3	85.5	6.34	7.2	29	
8/1/08	8:35	SRK3	AA & PH	4.8	0.5	0.04	11.2	22.2	1.5
				4	5.5	1	8.1	27.5	
				3	33	2.6	7.9	28.3	
				2	58	4.3	7.8	28.4	
				1	65	4.9	7.8	28.5	
				0.3	68	5	7.8	28.5	

SC6

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
	8:35	SRK2	NF & AC	4.5	0	0	11.4	21	1.4
				4	0	0	8.1	21.4	
				3	39	2.8	7.9	28.1	
				2	66	5	7.8	28.4	
				1	75	5.5	7.7	28.5	
				0.3	75	5.5	7.7	28.5	
8/6/08	11:20	SRK3	AA & PH	4.5	2	0.1	10.4	23.8	1.3
				3	26	2	7.9	28	
				1	59	4.4	7.8	28.3	
				0.3	70	5.3	7.8	28.6	
	11:22	SRK2	NF & AC	4.5	0	0	10.8	23.1	1.4
				4	0	1.4	8	27.6	
				3	28	2.2	7.9	27.9	
				2	55	4.1	7.8	28.1	
				1	70	5.3	7.8	28.3	
				0.3	71	5.3	7.8	28.4	
8/11/08	11:10	SRK3	AA & PH	4	3	0.3	8.4	26.2	1.1
				3	72	5.4	8	27	
				2	82	6.2	8	27.1	
				1	80	6	8	27.2	
				0.3	82	6.3	8	27.3	
	11:17	SRK2	NF & AC	4	0	0	9.1	25.6	1.2
				3	58.4	4.4	8.1	26.9	
				2	68.6	5.2	8.1	27	
				1	69.4	5.2	8.1	27.1	
				0.3	69.8	5.3	8.1	27.2	
9/5/08	12:10	SRK3	AA+PH	4.5	1.7	0.09	10.7	24.1	0.9
				4	0.5	0.04	10.6	25.6	
				3	30	2.1	10.6	26.3	
				1	98	7.7	10.5	27.3	
		SRK2	NF+AC	4.5	0.1	0.01	10.6	24.9	0.9

SC6

Date	Time	Meter	Observer	Depth (m)	DO (%)	DO (mg/l)	Salinity (ppt)	Temp (C)	Secchi (m)
				4	0	0	10.6	25.7	
				3	32.5	2.46	10.6	26.3	
				2	48.7	3.72	10.6	26.5	
				1	103	7.31	10.5	27.4	
				0.3	107.8	7.31	10.5	27.7	
9/10/08	15:50	SRK2	AA+DH	4	2	0.1	10.7	25.3	0.8
				3	40	3	10.6	25.7	
				1	72	5.4	10.6	23.2	
				0.3	72	5.4	10.5	26.7	0.9
		SRK3	PH +Mark	4	25	2	10.6	25.4	
				3	32	2.5	10.5	25.8	
				1	70	5.3	10.5	26.4	
9/30/08	10:55	SRK3	PH & AA		29	2.4	11.9	21.4	0.9
					48	4	11.8	21.6	
					73	6.2	11.6	21.5	
					78	6.5	11.6	21.4	
		SRK2	NF & AC	4.8	13.4	1.24	11.8	21.4	1
				3	49.7	4.09	11.7	21.6	
				1	73.3	5.96	11.5	21.5	
				0.3	77.9	6.49	11.5	21.9	

APPENDIX B: PRECIPITATION, STREAM FLOW and INSOLATION DATA

Date	day	precipitation(in)	stream discharge (ft^3) daily mean	Insolation
26-May	1	0	0.34	474
27-May	2	0	0.34	474.88
28-May	3	0	0.32	475.72
29-May	4	0	0.32	476.53
30-May	5	0	0.32	477.3
31-May	6	1.45	0.38	478.03
1-Jun	7	0	0.34	478.73
2-Jun	8	0	0.32	479.38
3-Jun	9	0.79	0.38	480
4-Jun	10	1.49	1.6	480.59
5-Jun	11	0	0.82	481.13
6-Jun	12	0	0.28	481.64
7-Jun	13	0.15	0.25	482.11
8-Jun	14	0	0.25	482.55
9-Jun	15	0	0.24	482.94
10-Jun	16	0.33	0.24	483.3
11-Jun	17	0	0.24	483.62
12-Jun	18	0	0.24	483.9
13-Jun	19	0	0.24	484.15
14-Jun	20	0.13	0.24	484.36
15-Jun	21	0	0.24	484.53
16-Jun	22	0.88	0.25	484.66
17-Jun	23	0	0.25	484.76
18-Jun	24	0	0.24	484.82
19-Jun	25	0	0.24	484.84
20-Jun	26	0	0.24	484.82
21-Jun	27	0.08	0.24	484.77
22-Jun	28	0.06	0.24	484.68
23-Jun	29	0.14	0.23	484.55
24-Jun	30	0	0.22	484.38
25-Jun	31	0	0.22	484.18
26-Jun	32	0	0.21	483.94
27-Jun	33	0.09	0.42	483.66
28-Jun	34	0.5	0.3	483.35
29-Jun	35	0	0.25	483
30-Jun	36	0.16	0.24	482.61
1-Jul	37	0	0.25	482.19
2-Jul	38	0	0.23	481.73
3-Jul	39	0	0.22	481.23
4-Jul	40	0.05	1.7	480.7
5-Jul	41	0.07	0.65	480.13
6-Jul	42	0.01	0.44	479.52
7-Jul	43	0	0.36	478.88
8-Jul	44	0	0.34	478.2
9-Jul	45	0.01	0.42	477.49

Date	day	precipitation(in)	stream discharge (ft^3) daily mean	Insolation
10-Jul	46	0	0.34	476.74
11-Jul	47	0	0.32	475.96
12-Jul	48	0	0.32	475.13
13-Jul	49	0.58	0.36	474.28
14-Jul	50	0.53	1.2	473.39
15-Jul	51	0	0.3	472.46
16-Jul	52	0	0.27	471.5
17-Jul	53	0.26	0.26	470.51
18-Jul	54	0	0.26	469.48
19-Jul	55	0	0.24	468.41
20-Jul	56	0	0.26	467.31
21-Jul	57	0	0.31	466.18
22-Jul	58	0.04	0.28	465.01
23-Jul	59	1.09	0.27	463.81
24-Jul	60	0	0.3	462.58
25-Jul	61	0	0.24	461.31
26-Jul	62	0	0.24	460.01
27-Jul	63	0.95	0.26	458.68
28-Jul	64	0	0.25	457.31
29	65	0.01	0.24	455.91
30-Jul	66	0	0.24	454.48
31-Jul	67	0	0.24	453.02
1-Aug	68	0	0.24	451.52
2-Aug	69	0.23	1.3	449.99
3-Aug	70	0	0.42	448.43
4-Aug	71	0	0.27	446.84
5-Aug	72	0	0.27	445.22
6-Aug	73	0	0.27	443.57
7-Aug	74	0.13	0.26	441.88
8-Aug	75	0	0.26	440.17
9-Aug	76	0	0.25	438.42
10-Aug	77	0	0.23	436.65
11-Aug	78	0	0.24	434.84
12-Aug	79	0	0.24	433.01
13-Aug	80	0	0.24	431.15
14-Aug	81	0.2	0.24	429.25
15-Aug	82	0	0.24	427.33
16-Aug	83	0	0.24	425.38
17-Aug	84	0	0.24	423.41
18-Aug	85	0	0.24	421.4
19-Aug	86	0	0.24	419.37
20-Aug	87	0	0.24	417.31
21-Aug	88	0	0.24	415.22
22-Aug	89	0	0.24	413.11
23-Aug	90	0	0.24	410.97
24-Aug	91	0	0.24	408.8
25-Aug	92	0	0.24	406.61
26-Aug	93	0	0.24	404.4
27-Aug	94	0	0.24	402.16

Date	day	precipitation(in)	stream discharge (ft^3) daily mean	Insolation
28-Aug	95	0.48	0.28	399.89
29-Aug	96	0.19	0.3	397.6
30-Aug	97	0	0.29	395.29
31-Aug	98	0	0.26	392.96
1-Sep	99	0	0.25	390.6
2-Sep	100	0	0.24	388.22
3-Sep	101	0	0.24	385.82
4-Sep	102	0	0.24	383.4
5-Sep	103	0.4	0.24	380.95
6-Sep	104	3.5	1.1	378.49
7-Sep	105	0	0.33	376.01
8-Sep	106	0	0.28	373.51
9-Sep	107	0.18	0.3	370.99
10-Sep	108	0	0.36	368.45
11-Sep	109	0	0.27	365.89

APPENDIX C: OXYGEN DEPLETION DATA

SR1	Temp *C	Temp, K	Salinity, g/kg	ln(DO)	DO, ml/L	DO, mg/L	measured DO	O2 depletion	Depth (m)
5-Jun	20.35	293.35	7.75	1.80	6.04	8.63	4.99	3.64	6.5
	20.95	293.95	7.4	1.79	5.99	8.55	5.58	2.97	5
	21.5	294.5	6.95	1.78	5.94	8.48	6.64	1.84	3
	23.25	296.25	6.55	1.75	5.76	8.22	11.75	-3.53	1
	23.7	296.7	6.65	1.74	5.71	8.14	11.75	-3.61	0.3
30-Jul	27.8	300.8	9	1.65	5.23	7.46	3.95	3.51	6.5
	27.9	300.9	9	1.65	5.22	7.45	4.60	2.85	5
	27.9	300.9	8.9	1.65	5.22	7.45	4.70	2.75	3
	28.2	301.2	8.7	1.65	5.20	7.42	6.85	0.57	1
	28.6	301.6	8.6	1.64	5.17	7.38	8.65	-1.27	0.3
23-Aug	26.2	299.2	11.5	1.67	5.30	7.57	3.27	4.31	6
	26.25	299.25	11.25	1.67	5.31	7.57	5.29	2.29	4
	26.6	299.6	11.15	1.66	5.28	7.53	6.03	1.51	2
	26.6	299.6	11.15	1.66	5.28	7.53	6.28	1.26	1
	26.6	299.6	11.15	1.66	5.28	7.53	6.07	1.47	0.3

SR5	Temp *C	Temp, K	Salinity, g/kg	ln(DO)	DO, ml/L	DO, mg/L	measured DO	O2 depletion	Depth (m)
5-Jun	20.2	293.2	6.75	1.81	6.10	8.70	0.805	7.90	7.5
	20.45	293.45	6.65	1.80	6.07	8.67	2.21	6.46	6
	21.2	294.2	6.6	1.79	5.98	8.54	4.6	3.94	5
	22.6	295.6	6.5	1.76	5.83	8.32	10.27	-1.95	3
	22.9	295.9	6.4	1.76	5.80	8.28	10.57	-2.29	1
	23	296	6.35	1.76	5.79	8.27	10.085	-1.82	0.3
30-Jul	27.4	300.4	9.1	1.66	5.26	7.51	1.2	6.31	7
	27.4	300.4	8.7	1.66	5.27	7.53	0.415	7.11	6
	27.55	300.55	8.5	1.66	5.27	7.52	0.165	7.35	5
	27.7	300.7	8.25	1.66	5.26	7.51	0.3	7.21	4
	28	301	7.9	1.66	5.24	7.48	4.8	2.68	3
	28.6	301.6	7.8	1.65	5.19	7.41	8.1	-0.69	1
	28.7	301.7	7.8	1.65	5.18	7.40	8.25	-0.85	0.3
23-Aug	25.65	298.65	11.8	1.68	5.35	7.63	0	7.63	7
	25.7	298.7	11.75	1.68	5.34	7.63	0	7.63	6
	26.1	299.1	11.2	1.67	5.32	7.60	0	7.60	5
	26.3	299.3	10.35	1.67	5.33	7.61	2.825	4.78	4
	26.3	299.3	10.15	1.67	5.33	7.61	4.38	3.23	3
	26.65	299.65	9.65	1.67	5.32	7.59	7.36	0.23	1
	26.9	299.9	9.65	1.67	5.29	7.56	8.2	-0.64	0.3

SR6	Temp *C	Temp, K	Salinity, g/kg	ln(DO)	DO, ml/L	DO, mg/L	measured DO	O2 depletion	Depth (m)
5-Jun	21.55	294.55	6.2	1.78	5.96	8.51	0.76	7.75	5.5
	23.9	296.9	6	1.74	5.71	8.14	7.5	0.64	4
	24.05	297.05	6.05	1.74	5.69	8.12	8.715	-0.60	3
	24.3	297.3	5.9	1.73	5.67	8.09	9.415	-1.33	1
	24.3	297.3	5.9	1.73	5.67	8.09	9.5	-1.41	0.3
30-Jul	27.25	300.25	8.2	1.67	5.30	7.57	0.03	7.54	5.3
	27.5	300.5	8.05	1.66	5.28	7.54	0.015	7.53	4
	28.2	301.2	7.75	1.65	5.23	7.46	0.5	6.96	3
	29.35	302.35	7.35	1.64	5.14	7.33	5.55	1.78	2
	30.2	303.2	7.2	1.62	5.07	7.23	9.3	-2.07	1
	30.65	303.65	6.9	1.62	5.04	7.19	10.15	-2.96	0.3
23-Aug	18.5	291.5	11.3	1.81	6.14	8.76	0	8.76	5
	18.4	291.4	10.95	1.82	6.16	8.80	0	8.80	4
	18.25	291.25	9.4	1.83	6.24	8.91	3.67	5.24	3
	18.05	291.05	9.2	1.84	6.27	8.95	5.65	3.30	1
	18.05	291.05	9.2	1.84	6.27	8.95	6.05	2.90	0.3

REFERENCES

Arnold, Richard, Cornwell, Jeffery, Dennison, William, and Stevenson, Court. 2000. "Sediment-Based Reconstruction of Submersed Aquatic Vegetation Distribution in the Severn River, a Sub-Estuary of the Chesapeake Bay." Journal of Coastal Research. Vol. 16. No. 1. p. 188-195.

Bianchi, Thomas, Engelhaupt, Erika, Westman, Per, Andren, Thomas, Roloff, Carl, and Elmgren, Ragnar. 2008. "Cyanobacterial Blooms in the Baltic Sea: Natural or Human Induced?" Limnology and Oceanography. Vol. 45. No. 3. p. 716-726.

Brush, Grace. 2009. "Historical Land Use, Nitrogen, and Coastal Eutrophication: A Paleoecological Perspective." Estuaries and Coasts. No. 32. p. 18-28.

Cerco, Carl and Cole, Thomas. 1993. "Three-Dimentional Eutrophication Model of Chesapeake Bay." Journal of environmental Engineering. Vol. 119. No. 6. p.1006-1025.

Cerco, Carl and Noel, Mark. 2007. "Can Oyster Restoration Reverse Cultural Eutrophication in the Chesapeake Bay?" Estuaries and Coasts. Vol. 30. No. 2. p. 331-343.

Chang, Raymond. 2005. "Chemistry: eighth edition." McGraw-Hill. New York, NY.

Costantini, Marco, Ludsin, Stuart, Mason, Doran, Zhang, Xinsheng, Boicourt, William, and Brandt, Stephen. 2008. "Effect of hypoxia on habitat quality of striped bass (*Morone saxatilis*) in Chesapeake Bay." Canadian Journal of Fish and Aquatic Sciences. Vol. 65. p. 989-1002.

Delatch, Aimee. 2007. "Red Tide, Brown Tide: Widespread Algal Blooms Wreak Havoc." River Views. Vol. 14. No. 3. p. 2.

Elia, Christopher, Boynton, Walter, and Sanders, James. 2003. "A Watershed Perspective on Nutrient Enrichment, Science, and Policy in the Patuxent River, Maryland: 1960-2002." Estuaries. Vol. 26. No. 2A. p.171-185.

Furgurson, E.B. "Low oxygen levels blamed in Weems Creek fish kill." The Capitol. Annapolis, MD. June 30, 2007.

Garrels, Robert and Christ, Charles. 1965. "Solutions, Minerals, and Equilibria." Freeman, Cooper and Company. San Francisco, CA.

Jewett, E., Hines, A., and Ruiz, G.. 2005 "Epifaunal disturbance by periodic low levels of dissolved oxygen: native vs. invasive species response." Vol. 304. p. 31-44.

Pieterse, N., Bleuten, W., and Jorgensen, S.. 2003. "Contribution of point sources and diffuse sources to nitrogen and phosphorus loads in lowland rivers and estuaries." Journal of Hydrology. Vol. 271. p. 213-225.

Schlesinger, William. 1997. "Biogeochemistry: An Analysis of Global Change." Academic Press. San Diego, CA.

Shen, Jian, Wang, Taiping, Herman, Julie, Mason, Pam, and Arnold, Gretchen. 2008. "Hypoxia in a Coastal Embayment of the Chesapeake Bay: A Model Diagnostic Study of Oxygen Dynamics." Estuaries and Coasts. Vol. 31. p. 652-663.

Strumm, Werner and Morgan, James. 1996. "Aquatic Chemistry: Chemical Equilibria Rates in Natural Waters." Wiley-Interscience Publications. New York, NY.

Walker, Henry, Latimer, James, and Dettman, Edward. 2000. "Assessing the Effects of Natural and Anthropogenic Stressors in the Potomac Estuary: Implications for Long-term Monitoring." Environmental Monitoring and Assessment. Vol. 63. p. 237-251.

Winegrad, Gerald. "Restoring the Scenic Severn River". Severn River Association: State of the Severn. Presented October 21, 2008.

www.aom.giss.nasa.gov

www.chesapeakebay.net/news_population2006.aspx

www.friendsofthejohnsmithtrail.org/native_americans.html. Retrieved 7/11/09.

www.water.usgs.gov/admin/memo/QW/qw81.11

www.waterdata.usgs.gov/nwis

www.weather.gov/climate/getclimate.php?wfo=lwx

Year 2020 Panel Report. 1988. "Population growth and development in the Chesapeake Bay watershed to the year 2020. A report to the

Chesapeake Executive Council." Chesapeake Bay Commission. Annapolis, MD.

Zimmerman, Andrew, and Canuel, Elizabeth. 2002. "Sediment geochemical records of eutrophication in the mesohaline Chesapeake Bay." Limnology Oceanographer. Vol. 47. No. 4. p. 1084-1093.

Zimmerman, Andrew, and Canuel, Elizabeth. 2000. "A geochemical record of eutrophication and anoxia in Chesapeake Bay sediments: anthropogenic influence on organic matter composition." Marine Chemistry. Vol. 69. No. 1-2. p. 117-137.