2018

REND LAKE

WATER QUALITY

REPORT

U.S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT
ENVIRONMENTAL QUALITY SECTION – WATER QUALITY

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Executive Summary

The purpose of this report is to provide an annual analysis of the water quality in the lake for the past year. Rend Lake is located in Franklin and Jefferson Counties of southern Illinois. The dam is located on the Big Muddy River, 103.7 miles upstream from its confluence with the Mississippi River and approximately 3 miles northwest of Benton, Illinois. At pool elevation 405, the lake has a water surface area of 18,900 acres, shoreline of 162 miles and is 13 miles long. Two sub-impoundment dams are located on the Big Muddy and Casey Fork tributaries in the upper reaches of the lake. The State of Illinois is responsible for managing and maintaining these sub-impoundment dams. These dams are operated to maximize wildlife management and development. The lake is also a source for a public water supply.

Rend Lake is a shallow reservoir susceptible to high winds. These conditions prevent the lake from stratifying for long periods during the summer months. The project area has several pollution potentials, with agriculture probably being the major contributor, but at present time, no major form of degradation to the lake or streams is apparent. Water quality sampling in 2018 revealed some minor issues. All sampling sites met the appropriate state standards during 2018 with the following exceptions. Phosphorus was high at all lake sites. Total Suspended Solids (TSS) was high at sites 3, 4 and 8. Manganese was high at site 1 and 2-5. Dissolved oxygen was low at sites 1 and 5 as well as at site 7. Phosphorus and TSS levels have exceeded the state standard on a routine basis. Sites 2, 3, and 8 were above a pH of 9 in July. Routine water quality monitoring will continue to check future degradation of the watershed.

WATER QUALITY MONITORING PROGRAM

1.0 GENERAL OVERVIEW

This report summarizes water quality activities of the St. Louis District for Fiscal Year 2018 in accordance with ER 1110-2-8154 Water Quality & Environmental management for Corps Civil Works Projects and ETL 1110-2-362 Environmental Engineering Initiatives for Water Management.

Water quality monitoring remains one of the Sections major responsibilities. The objective is to maintain a reasonable environmental monitoring program for the Mississippi River and the 5 lakes under the St. Louis District's control. The District's reservoirs consist of Mark Twain and Wappapello Lakes in Missouri, and Shelbyville, Carlyle and Rend Lakes in Illinois. Water quality sampling is conducted within the lakes and their tributaries to establish trend analysis and to maintain water quality at or above state and federal regulations.

The main objective is to provide technical expertise of an environmental nature to all Corps elements requesting assistance in accordance with ER 1110-2-8154. This would include updating the water quality management priorities for the district's projects to ensure water quality meets the state and federal regulations, for protection of human health and the environment, and for the safety and economic welfare of those at Corps projects. Ongoing goals include ensuring that downstream water quality meets all state and federal regulations, and is suitable for aquatic and human life, and to continue to evaluate trend analysis in relation to baseline conditions at all projects.

Water quality data is provided to the Illinois Environmental Protection Agency (IEPA) to be used in the Illinois Integrated Water Quality Report which is required every two years by the Clean Water Act Sections 303(d) and 305(b). IEPA does not typically monitor the three Corps lakes in Illinois. However, IEPA has stated that since the Corps lakes are the 3 largest lakes in the state, it is critical that their quality be routinely assessed. The state indicated that having the federally collected water quality data available now and in the future is critical to the state of Illinois meeting their mission in complying with the Clean Water Act Sections 305(b) and 303(d).

The National Water Quality Inventory Report to Congress 305(b) report is the primary vehicle for informing Congress and the public about general water quality conditions in the United States. This document characterizes our water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect our waters.

Under Section 303(d) of the 1972 Clean Water Act, states, territories and authorized tribes are required to develop a list of water quality limited segments. These waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for water on the lists and develop action plans, called Total Maximum Daily Loads (TMDL), to improve water quality.

Currently the Illinois Environmental Protection Agency (IEPA) has listed Rend Lake impaired for total suspended solids and mercury. The Big Muddy River upstream of Rend Lake is listed as impaired for dissolved oxygen, phosphorus, and sedimentation. The lists of sources for these impairments are urban runoff, crop production, shore modifications, recreational pollution, and unknown sources. Continued monitoring of the lake and its tributaries is vital in assisting the future assessment of the lake for these and other possible impairments. The water quality monitoring program represents the single metric that encompasses the overall health of the watershed as it is a direct measure of how well the environmental stewardship programs are working. In addition, much of the Big Muddy River downstream of Rend Lake is listed as impaired for sedimentation, sulfates, fecal coliform, TSS, dissolved oxygen, phosphorus, iron, and manganese.

1.1 INTRODUCTION

Rend Lake is within the Big Muddy River basin in south central Illinois. The lake serves as a heavy recreational usage lake and as a water supply to numerous communities. The land surrounding the lake is used predominately for agriculture and mining. Surrounding communities have existing industrial/commercial operations and residents which discharge wastewater into municipal wastewater treatment plants that ultimately discharge treated water into the Big Muddy River basin. Agricultural and coal mine runoff and municipal wastewater treatment facilities are the primary potential source of pollution into the Rend Lake watershed. Additional sources are marinas, nearby subdivisions, industrial activities, recreational watercraft discharges and the golf course adjacent to the lake property.

Water quality monitoring was conducted during 2018 to assure safe conditions for human recreation, wildlife and aquatic life as maintained and managed within the lake system. In 2018 4 sampling events were conducted at seven sites took place between February and September. The sampling sites include the following: Site 1 (Ren-1) Spillway, Site 2 (Ren-02) Lake side in front of Dam, Site 3 (Ren-3) Casey Fork Arm near Ina, Site 4 (Ren-4) Big Muddy Arm, Site 5 (Ren-5) Big Muddy at Hwy 15, Site 7 (Ren-7), Casey Fork at Hwy 37, and Site 8 (Ren-8), Gun Creek Arm. During the sampling period one site was selected for quality control duplication and denoted as REN-15. The locations of the seven sampling sites are depicted on the lake map in Figure 1.

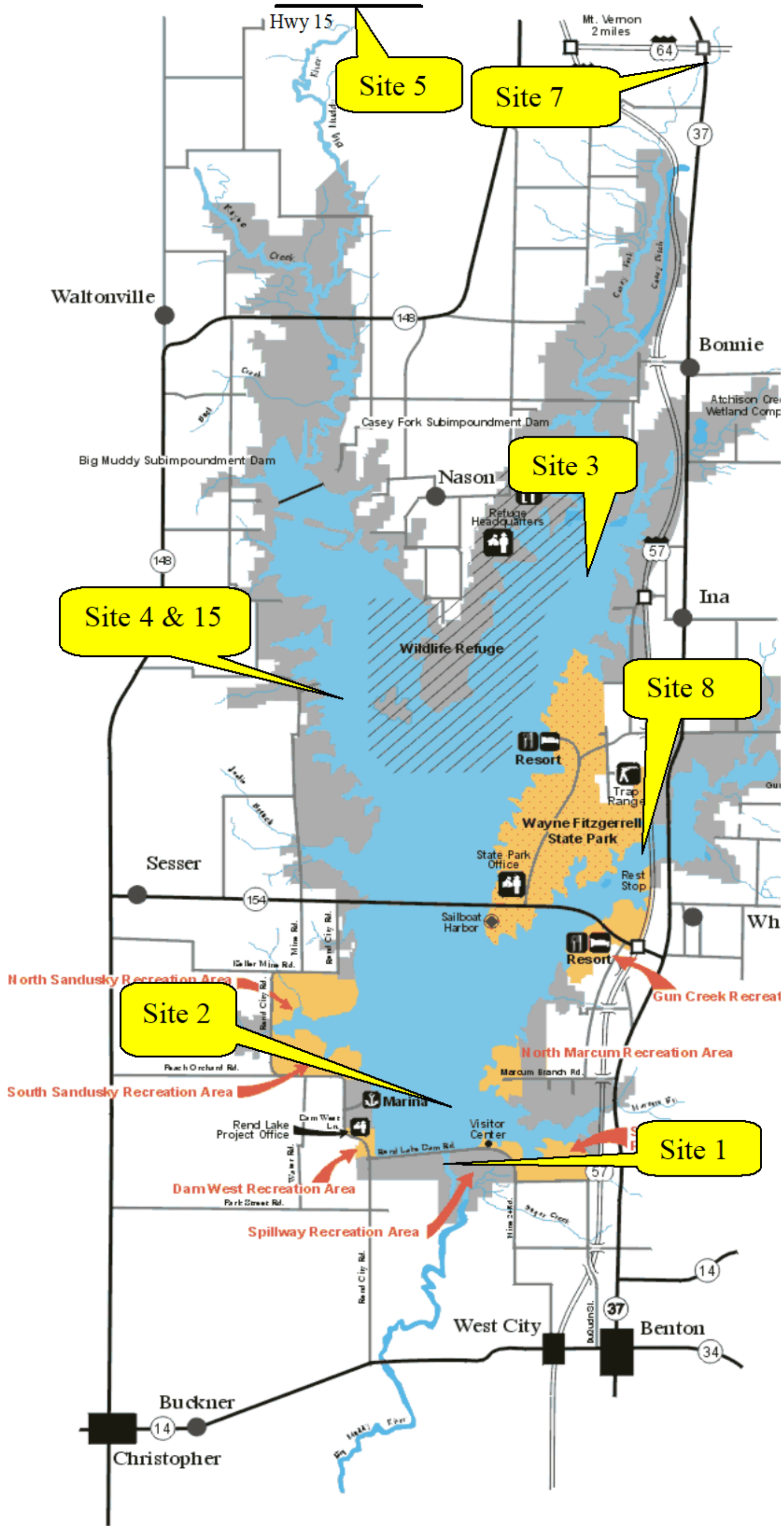


Figure 1
Location of sample sites

2.0 WATER QUALITY ASSESSMENT CRITERIA

2.1 Water Quality

The water quality assessment criteria, which has been generally accepted criteria for sustaining adequate aquatic plant and animal growth were based upon the State of Illinois regulatory limits for certain contaminants. The sampling and analysis which were conducted at the Rend Lake sites reflect the minimal set of parameters needed to analyze the current status of water quality for the Rend Lake system.

The following parameters were analyzed in the Fiscal Year 2018 sampling at Rend Lake: Total Organic Carbon (TOC), iron, manganese, ammonia-nitrogen, nitrate-nitrogen, orthophosphate, total phosphate, Total Suspended Solids (TSS), Total Volatile Suspended Solids (TVSS), Escherichia coliform (E. coli), pH, temperature, dissolved oxygen, specific conductance, oxidation-reduction potential (ORP), chlorophyll, pheophytin-a, and pesticides and herbicides.

The Illinois Environmental Protection Agency in Title 35, Subtitle, C, classifies water quality criteria based on end usage. Subpart B contains regulations for general use water, while subparts C and D delineate those for public and food processing water and secondary contact and indigenous aquatic life standards, respectively. These standards are used to determine the aquatic water quality of the lake. Table 2.1 provides a listing of the regulatory limits where a limit has been established for the parameters analyzed.

TABLE 2.1

State of Illinois
Water Quality Standards

PARAMETER	LIMIT
Temperature	Rise of 2.8^{o}C above normal seasonal temp
Ammonia Nitrogen	15 mg/L
Nitrate Nitrogen	10 mg/L
Total Iron	2.0 mg/L (2nd Contact & Aquatic Life)
Manganese	1.0 mg/L
Total Phosphate	0.05 mg/L Lakes; 0.61 mg/L Streams
E. Coli	Illinois standard is 235 E. coli per 100ml for single sample or 126 for geometric mean.
pH	Range: 6.5 to 9.0
DO	> 5.0 mg/L
Conductivity	1,667 *u*S/cm≈TDS of 1,000 mg/L
Total Suspended Solids (TSS)	116mg/L (Streams); >=12mg/L (Lakes)
Atrazine	0.003 mg/L[1]; 82ug/L[2]; 9ug/L[3]
Alachlor	0.002 mg/L (Drinking Water Standard)

Cyanazine	370ug/L Acute; 30ug/L Chronic
Metolachlor	1.7mg/L Acute
Simazine	4.0ug/L [1]
Trifluralin	26ug/L Acute; 1.1ug/L Chronic

[1] Drinking Water Standard
[2] Acute
[3] Chronic

Nitrogen is an essential component of proteins, genetic material, chlorophyll, and other key organic molecules. All organisms require nitrogen in order to survive. Nitrogen exists in several forms. These forms include gaseous nitrogen (N_2), nitrites (NO_2), nitrate (NO_3), ammonia nitrogen (NH_3-N), and ammonium (NH_4). Ammonia can be toxic to fish and other aquatic organisms at certain levels. Unlike ammonia, ammonium (NH4) is not toxic to aquatic organisms and is readily available for uptake by plankton and macrophytes. Nitrogen levels have increased as human activities have accelerated the rate of fixed nitrogen being put into circulation. High nitrogen levels can cause eutrophication. Eutrophication increases biomass of phytoplankton, decreases water transparency, and causes oxygen depletion. Ammonia nitrogen is monitored so that the effects on fish spawning, hatching, growth rate and pathologic changes in gills, liver and kidney tissue can be related to the detected levels of ammonia nitrogen. Nitrate-nitrogen degrades to nitrite or produces ammonia which has a detrimental effect on aquatic life and, therefore, has been monitored to assure levels are below the regulatory "safe" limit.

Phosphate has been analyzed as phosphorus and has been monitored due to the potential for uptake by nuisance algae. Levels of phosphate can indicate the potential for rapid growth of algae (algae bloom) which can cause serious oxygen depletion during the algae decay process. Phosphorus is typically the limiting nutrient in a water body. Therefore, addition of phosphorus to the ecosystem stimulates the growth of plants and algae. Phosphorus is delivered to lakes and streams by way of storm water runoff from agricultural fields, residential property, and construction sites. Other sources of phosphorus are anaerobic (absent of oxygen) decomposition of organic matter, leaking sewer systems, waterfowl, and point source pollution. The general standard for phosphorus in lake water is 0.05mg/L. Dissolved phosphorus, also called ortho-phosphorus, is generally found in much smaller concentrations than total phosphorus and is readily available for uptake. For this reason dissolved phosphorus concentrations are variable and difficult to use as an indicator of nutrient availability.

The metals manganese and iron are nutrients for both plants and animals. Living organisms require trace amounts of metals. However, excessive amounts can be harmful to the organism. Heavy metals exist in surface waters in three forms, colloidal, particulate, and dissolved. Water chemistry determines the rate of adsorption and desorption of metals to and from sediment. Metals are desorbed from the sediment if the water experiences increases in salinity, decreases in redox potential, or decreases in pH. Metals in surface waters can be from natural or human sources. Currently human sources contribute more metals than natural sources. Metal levels in surface water may pose a health risk to humans and the environment.

Photosynthetic activity can be hindered by the levels of total suspended solids. Total suspended solids concentrations, which cause the photosynthetic activity to be reduced by more than 10% from the seasonably established norm, can have a detrimental effect on aquatic life. Soil particles, organic material, and other debris comprise suspended solids in the water column. Secchi disk measurements are inverse to suspended solid measurements. As total suspended solids (TSS) increase, the secchi disk depth or water transparency decreases. Total suspended solids can be an important indicator of the type and degree of turbidity. TSS measurements represent a combination volatile suspended solids (VSS) that consist of organic material and nonvolatile suspended solids (NVSS), which is comprised of inorganic mineral particles in the water. In order to more accurately determine the types and amounts of suspended solids, volatile suspended solids (VSS) are analyzed. VSS concentration represents the organic portion of the total suspended solids. Organic material often includes plankton and additional plant and animal debris that is present in water. Total volatile suspended solids indicate the presence of organics in suspension; and, therefore, show additional demand levels of oxygen. Illinois does not currently have a standard for TSS or TVSS. However, literature suggests that NVSS above 15mg/L could highly impair recreational lake use. A NVSS of 3 to 7mg/L might cause slight impairment.

Chlorophyll and pheophytin-a are monitored to provide indicators of algae growth and, therefore, potential oxygen depletion activity. Chlorophyll is measured in lakes to estimate the type and amount of algal productivity in the water column. Chlorophyll a is present in green algae, blue-green algae, and in diatoms. Chlorophyll a is often used to indicate the degree of eutrophication. Chlorophyll b and c are used to estimate the extent of algal diversity and productivity. Chlorophyll b is common in green algae and is used as an auxiliary pigment for photosynthesis. Chlorophyll c is most common in diatom species and serves as an auxiliary pigment. Algal productivity and diversity can be determined by the concentrations of the individual pigments. For example high concentrations of chlorophyll a and b would indicate that green algae is abundant. High concentrations of chlorophyll a would indicate abundance of blue-green algae and high concentrations of chlorophyll a and c would indicate diatoms are the dominant species. Chlorophyll production is currently being connected with hypoxia.

Fecal coliform bacteria is monitored for the protection of human health as it relates to full body contact of recreational waters. People can be exposed to disease-causing organisms, such as bacteria, viruses and protozoa in beach and recreational waters mainly through accidental ingestion of contaminated water or through skin contact. These organisms, called pathogens, usually come from the feces of humans and other warm-blooded animals. If taken into the body, pathogens can cause various illnesses and on rare occasions, even death. Waterborne illnesses include diseases resulting from bacteria infection such as cholera, salmonellosis, and gastroenteritis, viral infections such as hepatitis, gastroenteritis, and intestinal diseases, and protozoan infections such as amoebic dysentery and giardiasis. The most commonly monitored recreational water indicator organisms are fecal coliform, Escherichia coli, (E. coli) and enterococci. Fecal coliform are bacteria that live in the intestinal tracts of warm-blooded animals. The standard for fecal coliform is less than 235 colonies per 100ml per single sample water or geometric mean of 126 colonies per 100ml. Fecal coliform was originally recommended in 1968 by the Federal Water Pollution Control Administration (predecessor to EPA) as an effective water quality indicator organism for recreational waters. Recent studies indicate that fecal coliform show less correlation to illness than other indicator organisms such as E. coli and enterococci. The Environmental Protection Agency (EPA) currently recommends E. coli or enterococci as an indicator organism for fresh waters. Since 2009 the St. Louis District has been using E. coli as the standard indicator.

Atrazine and Alachlor herbicides are commonly used agricultural chemicals which can be readily transported by rainfall runoff. Both compounds are suspected of causing cancer; and therefore, were monitored for the protection of human and aquatic health. Organic compounds include many pesticides. A pesticide can be any substance that is intended to prevent, destroy, repel, or mitigate any pest. This includes insecticides, herbicides, fungicides, fumigants, algaecides and other substances. Herbicides which are pesticides used to kill vegetation are the most widely used and sampled. Ten of the most frequently used herbicides detected in water are Atrazine, Metolachlor, Alachlor, 2,4-D, Trifluralin, Glyphosate, Dicamba, Cyanazine, Simazine, and 2,4,5-T. Two of the most widely used pesticides are Atrazine and Alachlor. Atrazine is a preemergence or postemergence herbicide use to control broadleaf weeds and annual grasses. Atrazine is most commonly detected in ground and surface water due to its wide use, and its ability to persist in soil and move in water. Alachlor is a Restricted Use Pesticide (RUP) due to the potential to contaminate groundwater. The drinking water standard for Atrazine is 0.003mg/L and 0.002 mg/L for Alachlor.

Temperature, dissolved oxygen and pH are monitored for the protection of aquatic life. Temperature is important because it controls several aspects of water quality. Colder water holds more dissolved oxygen which is required by aquatic organisms. Plants grow more rapidly and use more oxygen in warmer water. Decomposition of organic matter which uses oxygen is accelerated in warmer water. Temperature can also determine the availability of toxic compounds such as ammonia. Since aquatic organisms are cold blooded, water temperature regulates their metabolism and ability to survive. The number and kinds of organisms that are found in streams or lakes is directly related to temperature. Certain organisms require a specific temperature range, such as trout, which require water temperatures below 20^{o}C. Most aquatic organisms require a minimum concentration of dissolved oxygen to survive (5 mg/l or above). In spring, surface waters of the lake mix with the water below by wind and thermal action. This mixing diminishes as the upper layer of water becomes warmer and less dense. Solar insulation during the summer months stratifies the lake into three zones. The upper warmer water zone is called the epilimnion and the lower cooler water zone is called the hypolimnion. The epilimnion and the hypolimnion zones are divided by a transition zone known as the metalimnion. A rapid change in temperature within the metalimnion occurs and is referred to as a thermocline. During the summer months the hypolimnion may become anaerobic. In this anaerobic zone, chemical reduction of iron and manganese, or the production of methane and sulfides can occur. Iron rapidly oxidizes in aerobic environments, but manganese oxidizes slowly and can remain in the reduced state for long distances downstream even in aerobic environments. The degree of acidity of water is measured by a logarithmetic scale ranging from 0 to 14 and is known as the pH scale. A reading of 7 indicates a neutral pH while readings below seven are acidic and above are alkaline. Most Illinois lakes range from 6 to 9 on the pH scale. If a body of water is alkaline, then it has the ability of act as buffer which can neutralize incoming acidic conditions. A high alkalinity concentration indicates an increased ability to neutralize pH and resist changes; whereas a low alkalinity concentration indicates that a water body is vulnerable to changes in pH.

Conductivity is a measure of water's ability to conduct an electrical current. The ability to carry a current is often driven by the dissolved materials present in a water column. These materials can include dissolved ions and other materials in the water and thus are directly proportional to the concentration of total dissolved solids (TDS) present in the water column. Typically TDS concentrations represent 50-60% of the conductivity measurements. Conductivity is also affected by water temperature. The warmer the water, the higher the conductivity. Conductivity in streams and rivers is affected by the geology of the area. Streams running through granite areas tend to have lower conductivity due to granite being composed of inert material, materials that do not ionize or dissolve into ionic compounds in water. Conversely, streams that run through areas of limestone or clay soils tend to have higher conductivity readings because of the presence of materials that ionize. Conductivity is useful as a general measure of water quality. A stream tends to have a relatively constant range of conductivity that once established can be used as a baseline. Significant changes, either high or low, might indicate a source of pollution has been introduced into the water. The pollution source could be a treatment plant, which raises the conductivity; or an oil spill, which would lower the conductivity.

Redox or Oxidation-Reduction Potential (ORP) is a measurement of oxygen reduction activity. Oxidation involves an exchange of electrons between 2 atoms. The atom that loses an electron is oxidized and the one that gains an electron is reduced. ORP sensors measure the electrochemical potential between the solution and a reference electrode. Readings are expressed in millivolts. Positive readings indicate increased oxidizing potential while negative readings indicate increased reduction. The ORP probe is essentially a millivolt meter, measuring the voltage across 2 electrodes with the water in between. ORP values are used much like pH values to determine water quality. While pH readings characterize the state of a system relative to the receiving or donating hydrogen ions (base or acid), ORP readings characterize the relative state of losing or gaining electrons. The conversion of ammonia (NH_3) requires an oxidating environment to convert it into nitrites (NO_2) and nitrates (NO_3). Ammonia levels as low as 0.002mg/L can be harmful to fish. Generally ORP readings above 400mV are harmful to aquatic life. However, ORP is a non-specific measurement which is a reflection of a combination of effects of all the dissolved materials in the water.

Therefore, the measurement of ORP in relatively clean water has only limited utility unless a predominant redox-active material is known to be present.

Water clarity is intuitively used by the public to judge water quality. Secchi depth has been used for many years as a limnological characterization tool for characterizing water clarity. Secchi depth is a measure of light penetration into a waterbody and is a function of the absorption and scattering of light in the water. There are three characteristics of water which affect the penetration of light: (1) color of water, (2) amount of phytoplankton in the water column, and (3) amount of inorganic material in the water column. Secchi depth integrates the combined impacts of all three of these factors. Water transparency was measured using a Secchi disk. Secchi disk readings were taken at all lake sites.

2.2 Sediment

In accordance with EM-1110-2-1201, sediment samples should be taken to monitor and assess potential impacts to aquatic and human health. For potential ecological risk from inorganic contaminants, seven metals are typically of "most concern" with regards to fish and wildlife: Arsenic, Copper, Cadmium, Selenium, Mercury, Lead, and Zinc. Avian species are thought to be particularly sensitive to arsenic, which is considered a carcinogenic, mutagenic, and teratogenic contaminant in a variety of species in elevated doses over time. Avian species are also known to be particularly sensitive to lead in the environment with effects ranging from mortality, reduced growth and reproductive output, behavior changes, blood chemistry alterations, and lesions of major organs. Finally, the embryo stages in fish and avian species are known to be the most sensitive to selenium affecting reproductive success.

3.0 <u>SUMMARY OF MONITORING RESULTS</u>

The monitoring program for Rend Lake during Fiscal Year 2018 revealed good water quality when compared to limits established by the IEPA for general use, secondary contact, and indigenous aquatic life. Agricultural nutrient runoffs were primary concerns for the lake's water quality. Better land management practices, erosion control and buffering zones are methods used to reduce such contaminants from entering the lake. Normally seasonal change brings on gradual lake stratification during the summer months.

E. coli are sampled at the marinas to ensure that the marina areas are not being contaminated by boats with restroom facilities. The E. coli samples that were taken at Dam West Marina were within the Illinois standard of 235 per 100ml of sample water. The September 26 sample was 200, but still within the Illinois standard. In addition, the project office samples the swimming beaches every 2 weeks during the recreation season. Rainfall events can trigger high levels of E. coli. The E. coli standard of 235 per 100ml was not exceeded at any of the swimming beaches for the 2018 season.

Total iron and total manganese are sampled above the dam near the bottom of the channel (Ren-2-5) and in the spillway area (Ren-1). As was previously stated living organisms require trace amounts of metals, however excessive amounts can be harmful to the organism. All samples of iron and all but two manganese samples, the May 15 samples at REN-1 and REN-2-5, were within the state standards during the 2018 sampling season. Iron cycling is a function of oxidation-reduction processes. Elevated levels of iron near the bottom of the lake is not detrimental to the overall lake system unless maintained for a prolong period of time. Iron oxidizes relatively rapidly (minutes to hours); therefore any iron released through the spillway will be oxidized in a short period of time.

Nitrogen and phosphates are sampled at all sites. Nitrates did not exceed the state standard. However, the 2018 phosphate results at the lake sites were above the 0.05 mg/L standard and on September 26 REN-5 a tributary site was above the 0.61 mg/L standard for streams. Because phosphorus in water is not considered directly toxic to humans and animals no drinking water standards have been established for phosphorus. However, phosphorus can cause health threats through the stimulation of toxic algal blooms and the resulting oxygen depletion. Nitrates can pose a threat to human and animal health. The lake appears to sink nitrogen which reduces nutrient levels released from the lake. This reduction of nutrient levels traveling downstream results in an improvement of water quality. Nitrate in water is toxic at high levels and has been linked to toxic effects of livestock and to blue baby disease (methemoglobinemia) in infants. The Maximum Contaminant Level (MCL) for nitrate-N in drinking water is 10mg/L to protect babies 3 to 6 months of age. The Illinois Water Quality Standard for ammonia nitrogen (NH_3-N) is 15mg/L. The increased levels of phosphate in combination with nitrogen and other lake conditions, such as temperature, pH and stagnant lake conditions, can lead to increased algae growth. Eutrophication is currently the most widespread water quality problem in the U.S. and many other countries. Restoration of eutrophic waters requires the reduction of nonpoint inputs of phosphorus and nitrogen. The resulting detrimental effects of algae toxins and oxygen depletion could result in health problems for fish and other aquatic species as well as land animals utilizing the water supply.

Chlorophyll *a* was sampled at 4 sites, Ren-2, Ren-3, Ren-4, Ren-8 and Ren-15 (duplicate of Ren-4). Chlorophyll *a* is a green pigment found in plants. Chlorophyll *a* concentrations are an indicator of phytoplankton abundance and biomass. They can be an effective measure of trophic status, and used as a measure of water quality. High levels often indicate poor water quality and low levels suggest good conditions. However, elevated levels are not necessarily bad. It is the long term persistence of elevated levels that is the problem. It is natural for chlorophyll *a* levels to fluctuate over time. Chlorophyll *a* tends to be higher after storm events and during the summer months when water temperatures and light levels are elevated. Chlorophyll can reduce the clarity of the water and the amount of oxygen available to other organisms. Illinois does not currently have a standard for chlorophyll. Chlorophyll is monitored to provide indicators of algae growth and therefore, potential oxygen depletion activity. Chlorophyll concentrations and cyanobacteria cell counts serve as proxies for the actual presence of algal toxins. Exposure to cyanobacteria or their toxins may produce allergic reactions such as skin rashes, eye irritations, respiratory symptoms, and in some cases more severe health effects. Microcystin is currently believed to be the most common cyanotoxin in lakes. While EPA does not currently have water quality criteria for algal toxins, the World Health Organization (WHO) has established recreational exposure guidelines for Chlorophyll *a*, cyanobacterial cell counts, and microcystin. Levels of chlorophyll 50 mg/cu m and greater are considered to create moderate risk according to the WHO. Rend Lake was in the moderate risk of exposure category for chlorophyll. Illinois does not currently have a standard for chlorophyll. The data indicates a normal increase in chlorophyll levels during the warmer summer months, which is not a concern.

Atrazine and Alachlor are pesticides that were sampled at all sites. These chemicals are herbicides used to control weed growth. Normally pesticides are detected early in the year, in the months of April and May when farmers apply the chemicals. Cyanizine, Metolachlor, Trifluralin and Simazine were also analyized as part of the pesticide screening. There were no exceedances for pesticides recorded during 2018. These substances can enter water bodies as a result of drift during spraying, surface runoff, and leaching through soil. Often, significant rain events can temporarily increase concentrations in surface waters. In order to eliminate pesticide contamination of waters it is important for the public to be educated and institute best management practices when using these chemicals.

Total Suspended Solids (TSS) and Total Volatile Suspended Solids (TVSS) samples are collected at all sites. During 2018 the solids measured near the dam were much less than in the upper parts of the lake. Suspended solid levels tend to be lower the closer you get to the dam because sediments drop out of the water column as they travel down the lake. Solids can affect water quality by increasing temperature through the absorption of sunlight by the particles in the water, which also affects the clarity of the water. This can then affect the amount of oxygen in the water. Illinois recommends a TSS standard of 116mg/L for streams and ≥12mg/L for lakes. Tributary sites were below the 116 mg/L suggested standard and most of the lake sites were above the suggested standard of 12mg/L.

Total Organic Carbon (TOC) is collected at all sites. Data indicates that TOC is higher in the upper portions of the lake. TOC is an indicator of the organic character of water. The larger the carbon or organic content, the more oxygen is consumed. Illinois does not currently have a standard for TOC. Since Illinois does not have a standard for this parameter, observations of high or low are relative to the current sampling period.

Temperature and dissolved oxygen levels were taken at all sites. Measurements were taken at 1 meter intervals at the lake sites. During the summer months the lake can sometimes stratify and a boundary is formed between the upper warmer water and the lower cooler water. This transition area is known as the thermocline, the area where the temperature drops significantly. Oxygen levels can also change drastically as a function of depth. This area where the oxygen level significantly drops is called the oxycline. The depth of the thermocline and oxycline can have an effect on the aquatic organisms. Occasionally the thermocline and oxycline are at or near the same depth. For the 2018 sampling season temperature readings were within the normal range while dissolved oxygen readings were below the standard of 5 mg/L multiple times. Specifically, oxygen was very low on May 15 (2.07 mg/L) at site 1 just below the tailrace. This was likely due to a dry period in combination with the absence of flow resulting from multiple days of gate maintenance. DO was also slightly below 5 mg/L at site 5 every sample day except March, and slightly below 5 mg/L at site 7 on September 26.

pH is taken at all sites and at 1 meter intervals at lake sites. There were multiple events where pH was recorded higher than 9 at the following lake sites: 2, 3, and 8 on July 24. Variances in pH can be caused by increased runoff due to rainfall, unusual temperature extremes, erosion from land disturbances, and/or an increase in algal activity. High pH in Rend lake occurred in 2016 as well in the warmer period. This is not considered a major concern at this time.

Conductivity and redox are taken at all sites and at 1 meter intervals at lake sites. Illinois does not currently have a standard for redox, but does have a standard of less than 1,667 uS/cm for conductivity. All sampling sites were well within this standard.

Secchi readings were taken at lake sites to measure water transparency. Secchi disk readings were highest in front of the dam. This normally occurs because sediments drop out of the water column as the water moves down stream toward the dam. This results is improved water quality downstream.

3.2 Sediment Summary

Sediment sampling was conducted at sites 2, 3, 4, and 8 on July 24, 2018. Ideally sediment sampling would be conducted every 5 years if funding is available, but was last conducted in 2007. Discrete sediment samples were collected using a ponar dredge. The following parameters were analyzed for: pesticides (same suite as water samples), arsenic, barium, boron, cadmium, chromium, copper, iron, manganese, lead, mercury, nickel, selenium, silver, zinc, total organic carbon, kjeldahl nitrogen, nitrate nitrogen, and total phosphorus. Illinois does not have human health standards for sediment, therefore test results were compared to background levels referenced in Illinois Title 35, 742, appendix A, table G. As with any environmental sampling, results only apply to the specific locations where the sample was taken from. A more comprehensive sampling design may lead to different overall results. Although, these samples represent only a snapshot in space and time of sediment in Rend Lake, the data is useful in establishing baselines for future assessments.   All pesticides tested for were below the detection limits.

In Table 3.2 the 2018 sediment results are compared to samples taken in 2007. For this comparison, all results labeled ND were below detection limits (not detected). All red text indicates the result exceeds the reference background level.

Table 3.2 Sediment Comparison				
Site #	Parameter	2018 Result	2007 Result	Units
REN-2	Alachlor	ND	ND	UG/KG
REN-3	Alachlor	ND	ND	UG/KG
REN-4	Alachlor	ND	ND	UG/KG
REN-8	Alachlor	ND	ND	UG/KG
REN-2	Arsenic	8.06	7.00	MG/KG
REN-3	Arsenic	6.62	5	MG/KG
REN-4	Arsenic	7.00	7	MG/KG
REN-8	Arsenic	4.30	4	MG/KG
REN-2	Atrazine	ND	ND	UG/KG
REN-3	Atrazine	ND	ND	UG/KG
REN-4	Atrazine	ND	ND	UG/KG
REN-8	Atrazine	ND	ND	UG/KG
REN-2	Barium	208	186	MG/KG
REN-3	Barium	163	133	MG/KG
REN-4	Barium	154	144	MG/KG
REN-8	Barium	63.9	29	MG/KG
REN-2	Boron	ND	ND	MG/KG
REN-3	Boron	ND	ND	MG/KG
REN-4	Boron	ND	ND	MG/KG
REN-8	Boron	ND	ND	MG/KG
REN-2	Cadmium	ND	ND	MG/KG
REN-3	Cadmium	ND	ND	MG/KG
REN-4	Cadmium	ND	ND	MG/KG
REN-8	Cadmium	ND	ND	MG/KG
REN-2	Chlorpyrifos	ND	ND	UG/KG
REN-3	Chlorpyrifos	ND	ND	UG/KG
REN-4	Chlorpyrifos	ND	ND	UG/KG
REN-8	Chlorpyrifos	ND	ND	UG/KG
REN-2	Chromium	22.7	23.9	MG/KG
REN-3	Chromium	22.5	23.6	MG/KG
REN-4	Chromium	21.9	25.1	MG/KG
REN-8	Chromium	7.88	6.6	MG/KG
REN-2	Copper	18.3	19	MG/KG
REN-3	Copper	16.1	13	MG/KG
REN-4	Copper	16.9	16	MG/KG
REN-8	Copper	5.17	4	MG/KG
REN-2	Cyanazine	ND	ND	UG/KG
REN-3	Cyanazine	ND	ND	UG/KG
REN-4	Cyanazine	ND	ND	UG/KG
REN-8	Cyanazine	ND	ND	UG/KG
REN-2	Iron	24300	26000	MG/KG
REN-3	Iron	22700	20000	MG/KG
REN-4	Iron	22100	22300	MG/KG
REN-8	Iron	7600	7330	MG/KG
REN-2	Kjeldahl nitrogen	2660	906	MG/KG

REN-3	Kjeldahl nitrogen	1530	1590	MG/KG
REN-4	Kjeldahl nitrogen	2080	1870	MG/KG
REN-8	Kjeldahl nitrogen	633	509	MG/KG
REN-2	Lead	20.2	16	MG/KG
REN-3	Lead	18.1	13	MG/KG
REN-4	Lead	20.8	16	MG/KG
REN-8	Lead	9.92	7	MG/KG
REN-2	Manganese	2160	2180	MG/KG
REN-3	Manganese	967	824	MG/KG
REN-4	Manganese	806	1030	MG/KG
REN-8	Manganese	418	440	MG/KG
REN-2	Mercury	ND	ND	MG/KG
REN-3	Mercury	ND	ND	MG/KG
REN-4	Mercury	ND	ND	MG/KG
REN-8	Mercury	ND	ND	MG/KG
REN-2	Metolachlor	ND	ND	UG/KG
REN-3	Metolachlor	ND	ND	UG/KG
REN-4	Metolachlor	ND	ND	UG/KG
REN-8	Metolachlor	ND	ND	UG/KG
REN-2	Metribuzin	ND	ND	UG/KG
REN-3	Metribuzin	ND	ND	UG/KG
REN-4	Metribuzin	ND	ND	UG/KG
REN-8	Metribuzin	ND	ND	UG/KG
REN-2	Nickel	18.9	20	MG/KG
REN-3	Nickel	15.7	14	MG/KG
REN-4	Nickel	16.9	17	MG/KG
REN-8	Nickel	5.34	5	MG/KG
REN-2	Nitrate-N	ND	ND	MG/KG
REN-3	Nitrate-N	ND	ND	MG/KG
REN-4	Nitrate-N	ND	ND	MG/KG
REN-8	Nitrate-N	ND	ND	MG/KG
REN-2	Pendimethalin	ND	ND	UG/KG
REN-3	Pendimethalin	ND	ND	UG/KG
REN-4	Pendimethalin	ND	ND	UG/KG
REN-8	Pendimethalin	ND	ND	UG/KG
REN-2	Phosphorus, total	1010	857	MG/KG
REN-3	Phosphorus, total	552	607	MG/KG
REN-4	Phosphorus, total	619	717	MG/KG
REN-8	Phosphorus, total	337	491	MG/KG
REN-2	Selenium	ND	ND	MG/KG
REN-3	Selenium	ND	ND	MG/KG
REN-4	Selenium	ND	ND	MG/KG
REN-8	Selenium	ND	ND	MG/KG
REN-2	Silver	ND	ND	MG/KG
REN-3	Silver	ND	ND	MG/KG
REN-4	Silver	ND	ND	MG/KG
REN-8	Silver	ND	ND	MG/KG
REN-2	Total Organic Carbon	20000	17400	MG/KG
REN-3	Total Organic Carbon	13000	12400	MG/KG

REN-4	Total Organic Carbon	17000	18400	MG/KG
REN-8	Total Organic Carbon	7000	7190	MG/KG
REN-2	Trifluralin	ND	ND	UG/KG
REN-3	Trifluralin	ND	ND	UG/KG
REN-4	Trifluralin	ND	ND	UG/KG
REN-8	Trifluralin	ND	ND	UG/KG
REN-2	Zinc	66.2	66	MG/KG
REN-3	Zinc	62.8	53	MG/KG
REN-4	Zinc	66.4	61	MG/KG
REN-8	Zinc	20.9	16	MG/KG

Metals were compared to the background soil concentrations listed in Illinois Title 35. The following metals were found to be above background levels in 2018: barium, chromium, iron, manganese, and nickel. Other metals were not detected (boron, cadmium, mercury, selenium, and silver) in both 2018 and 2007 sample periods while the overall levels remained consistent. Metals tend to be higher at site 2 near the dam and the lowest at site 8.

Nutrients nitrate-nitrogen, Kjeldahl nitrogen, and total phosphorus were analyzed for in 2018. There are no nutrient level comparison standards in the above references. Nitrate-nitrogen was not detected in both 2018 and 2007 sampling events. Kjeldahl nitrogen levels were higher on the upper parts of the lake than sites 2 and 8 in 2007. Conversely, in 2018 Kjeldahl nitrogen was highest at site 2. Total phosphorus levels were similar during both sample periods with the higher concentrations recorded at site 2.

Total organic carbon (TOC) was also analyzed for. Overall, TOC levels remained similar between 2018 and 2007 with site 2 recording the highest concentration in 2018 (slightly greater than 2007).

4.0 PLANNED 2019 STUDIES

The Rend Lake water quality monitoring will continue in Fiscal Year 2019. As in the previous year, there will be 4 water sampling events in 2019. The greater number of sampling events there are, the better the ability to evaluate water quality trends, to better defend project operations (lake levels, releases, maintenance projects, construction projects, etc.), to better confirm that we meet state water quality standards, and to better confirm that human health and safety are adequately protected. As with any record keeping or data analysis, the greater the sample size, the more reliable the findings. Rend Lake is a source for drinking water for many communities and is a high usage recreational lake. The monitoring of water quality is imperative to assure the water quality is within acceptable limits for the designated usage.

The sampling sites include the following: Site 1 Ren-1 Spillway, Site 2 Ren-02 Lake side in front of Dam, Site 3 Ren-3 Casey Fork Arm near Ina, Site 4 Ren-4 Big

Muddy Arm, Site 5 Ren-5 Big Muddy at Hwy 15, Site 7 Ren-7, Casey Fork at Hwy 37, and Site 8 Ren-8, Gun Creek Arm. This combination of sites effectively represents the incoming contaminants and their effects on the lake.

APPENDIX A

DATA

Lab Data

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
REN-1	3/15/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	5/15/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	7/24/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	9/26/2018	Alachlor	<	0.20	0.200	0.200	UG/L
REN-15-0	3/15/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	5/15/2018	Alachlor	<	0.20	0.200	0.200	UG/L
	7/24/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	9/26/2018	Alachlor	<	0.20	0.200	0.200	UG/L
REN-2-0	3/15/2018	Alachlor	<	0.20	0.200	0.200	UG/L
	5/15/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	7/24/2018	Alachlor	<	0.20	0.200	0.200	UG/L
	9/26/2018	Alachlor	<	0.20	0.200	0.200	UG/L
REN-3	3/15/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	5/15/2018	Alachlor	<	0.25	0.250	0.250	UG/L
	7/24/2018	Alachlor	<	0.20	0.200	0.200	UG/L
	9/26/2018	Alachlor	<	0.22	0.222	0.222	UG/L
REN-4	3/15/2018	Alachlor	<	0.20	0.200	0.200	UG/L
	5/15/2018	Alachlor	<	0.20	0.200	0.200	UG/L
	7/24/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	9/26/2018	Alachlor	<	0.22	0.222	0.222	UG/L
REN-5	3/15/2018	Alachlor	<	0.20	0.200	0.200	UG/L
	5/15/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	7/24/2018	Alachlor	<	0.25	0.250	0.250	UG/L
	9/26/2018	Alachlor	<	0.20	0.200	0.200	UG/L
REN-7	3/15/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	5/15/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	7/24/2018	Alachlor	<	0.25	0.250	0.250	UG/L
	9/26/2018	Alachlor	<	0.20	0.200	0.200	UG/L
REN-8	3/15/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	5/15/2018	Alachlor	<	0.22	0.222	0.222	UG/L
	7/24/2018	Alachlor	<	0.20	0.200	0.200	UG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	9/26/2018	Alachlor	<	0.20	0.200	0.200	UG/L
REN-1	3/15/2018	Atrazine		0.28	0.222	0.222	UG/L
	5/15/2018	Atrazine	<	0.22	0.222	0.222	UG/L
	7/24/2018	Atrazine	<	0.22	0.222	0.222	UG/L
	9/26/2018	Atrazine	<	0.20	0.200	0.200	UG/L
REN-15-0	3/15/2018	Atrazine	<	0.22	0.222	0.222	UG/L
	5/15/2018	Atrazine	<	0.20	0.200	0.200	UG/L
	7/24/2018	Atrazine		0.38	0.222	0.222	UG/L
	9/26/2018	Atrazine	<	0.20	0.200	0.200	UG/L
REN-2-0	3/15/2018	Atrazine		0.26	0.200	0.200	UG/L
	5/15/2018	Atrazine	<	0.22	0.222	0.222	UG/L
	7/24/2018	Atrazine	<	0.20	0.200	0.200	UG/L
	9/26/2018	Atrazine	<	0.20	0.200	0.200	UG/L
REN-3	3/15/2018	Atrazine	<	0.22	0.222	0.222	UG/L
	5/15/2018	Atrazine	<	0.25	0.250	0.250	UG/L
	7/24/2018	Atrazine		0.22	0.200	0.200	UG/L
	9/26/2018	Atrazine	<	0.22	0.222	0.222	UG/L
REN-4	3/15/2018	Atrazine	<	0.20	0.200	0.200	UG/L
	5/15/2018	Atrazine	<	0.20	0.200	0.200	UG/L
	7/24/2018	Atrazine		0.39	0.222	0.222	UG/L
	9/26/2018	Atrazine	<	0.22	0.222	0.222	UG/L
REN-5	3/15/2018	Atrazine	<	0.20	0.200	0.200	UG/L
	5/15/2018	Atrazine	<	0.22	0.222	0.222	UG/L
	7/24/2018	Atrazine	<	0.25	0.250	0.250	UG/L
	9/26/2018	Atrazine	<	0.20	0.200	0.200	UG/L
REN-7	3/15/2018	Atrazine	<	0.22	0.222	0.222	UG/L
	5/15/2018	Atrazine	<	0.22	0.222	0.222	UG/L
	7/24/2018	Atrazine	<	0.25	0.250	0.250	UG/L
	9/26/2018	Atrazine	<	0.20	0.200	0.200	UG/L
REN-8	3/15/2018	Atrazine	<	0.22	0.222	0.222	UG/L
	5/15/2018	Atrazine	<	0.22	0.222	0.222	UG/L
	7/24/2018	Atrazine		0.31	0.200	0.200	UG/L
	9/26/2018	Atrazine	<	0.20	0.200	0.200	UG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
REN-15-0	3/15/2018	Chlorophyll-a		25.60	0.002	0.002	MG/CU.M.
	5/15/2018	Chlorophyll-a		15.80	1.000	1.000	MG/CU.M.
	7/24/2018	Chlorophyll-a		102.00	1.000	1.000	MG/CU.M.
	9/26/2018	Chlorophyll-a		35.90	1.000	1.000	MG/CU.M.
REN-2-0	3/15/2018	Chlorophyll-a		31.50	0.003	0.003	MG/CU.M.
	5/15/2018	Chlorophyll-a		15.80	1.000	1.000	MG/CU.M.
	7/24/2018	Chlorophyll-a		109.00	1.000	1.000	MG/CU.M.
	9/26/2018	Chlorophyll-a		32.50	1.000	1.000	MG/CU.M.
REN-3	3/15/2018	Chlorophyll-a		33.60	0.003	0.003	MG/CU.M.
	5/15/2018	Chlorophyll-a		14.10	1.000	1.000	MG/CU.M.
	7/24/2018	Chlorophyll-a		99.10	1.000	1.000	MG/CU.M.
	9/26/2018	Chlorophyll-a		53.00	1.000	1.000	MG/CU.M.
REN-4	3/15/2018	Chlorophyll-a		23.50	0.002	0.002	MG/CU.M.
	5/15/2018	Chlorophyll-a		15.00	1.000	1.000	MG/CU.M.
	7/24/2018	Chlorophyll-a		96.50	1.000	1.000	MG/CU.M.
	9/26/2018	Chlorophyll-a		32.50	1.000	1.000	MG/CU.M.
REN-8	3/15/2018	Chlorophyll-a		66.50	0.003	0.003	MG/CU.M.
	5/15/2018	Chlorophyll-a		29.30	1.000	1.000	MG/CU.M.
	7/24/2018	Chlorophyll-a		121.00	1.000	1.000	MG/CU.M.
	9/26/2018	Chlorophyll-a		36.70	1.000	1.000	MG/CU.M.
REN-1	3/15/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	5/15/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	7/24/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	9/26/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
REN-15-0	3/15/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	5/15/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
	7/24/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	9/26/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
REN-2-0	3/15/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
	5/15/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	7/24/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
	9/26/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
REN-3	3/15/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	5/15/2018	Chlorpyrifos	<	0.25	0.250	0.250	UG/L
	7/24/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
	9/26/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
REN-4	3/15/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
	5/15/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
	7/24/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	9/26/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
REN-5	3/15/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
	5/15/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	7/24/2018	Chlorpyrifos	<	0.25	0.250	0.250	UG/L
	9/26/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
REN-7	3/15/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	5/15/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	7/24/2018	Chlorpyrifos	<	0.25	0.250	0.250	UG/L
	9/26/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
REN-8	3/15/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	5/15/2018	Chlorpyrifos	<	0.22	0.222	0.222	UG/L
	7/24/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
	9/26/2018	Chlorpyrifos	<	0.20	0.200	0.200	UG/L
REN-1	3/15/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	5/15/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	7/24/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	9/26/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
REN-15-0	3/15/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	5/15/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
	7/24/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	9/26/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
REN-2-0	3/15/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
	5/15/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	7/24/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
	9/26/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
REN-3	3/15/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	5/15/2018	Cyanazine	<	0.25	0.250	0.250	UG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	7/24/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
	9/26/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
REN-4	3/15/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
	5/15/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
	7/24/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	9/26/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
REN-5	3/15/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
	5/15/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	7/24/2018	Cyanazine	<	0.25	0.250	0.250	UG/L
	9/26/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
REN-7	3/15/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	5/15/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	7/24/2018	Cyanazine	<	0.25	0.250	0.250	UG/L
	9/26/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
REN-8	3/15/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	5/15/2018	Cyanazine	<	0.22	0.222	0.222	UG/L
	7/24/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
	9/26/2018	Cyanazine	<	0.20	0.200	0.200	UG/L
Dam West Mar	7/24/2018	E. Coliform		42.00	1.000	1.000	COL/100 ML
Dam West Mar	5/15/2018	E. Coliform		36.00	1.000	1.000	COL/100 ML
Dam West Mar	9/26/2018	E. Coliform		200.00	1.000	1.000	COL/100 ML
REN-1	3/15/2018	Iron		0.34	0.050	0.100	MG/L
	5/15/2018	Iron		0.35	0.050	0.100	MG/L
	7/24/2018	Iron		0.29	0.050	0.100	MG/L
	9/26/2018	Iron		0.21	0.040	0.050	MG/L
REN-2-5	3/15/2018	Iron		0.66	0.050	0.100	MG/L
	5/15/2018	Iron		0.71	0.050	0.100	MG/L
	7/24/2018	Iron		0.17	0.050	0.100	MG/L
	9/26/2018	Iron		0.22	0.040	0.050	MG/L
REN-1	3/15/2018	Manganese		0.32	0.005	0.010	MG/L
	5/15/2018	Manganese		1.94	0.005	0.010	MG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	7/24/2018	Manganese		0.84	0.005	0.010	MG/L
	9/26/2018	Manganese		0.25	0.004	0.005	MG/L
REN-2-5	3/15/2018	Manganese		0.19	0.005	0.010	MG/L
	5/15/2018	Manganese		1.66	0.005	0.010	MG/L
	7/24/2018	Manganese		0.54	0.005	0.010	MG/L
	9/26/2018	Manganese		0.31	0.004	0.005	MG/L
REN-1	3/15/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	5/15/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	7/24/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	9/26/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
REN-15-0	3/15/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	5/15/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
	7/24/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	9/26/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
REN-2-0	3/15/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
	5/15/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	7/24/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
	9/26/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
REN-3	3/15/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	5/15/2018	Metolachlor	<	0.25	0.250	0.250	UG/L
	7/24/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
	9/26/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
REN-4	3/15/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
	5/15/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
	7/24/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	9/26/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
REN-5	3/15/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
	5/15/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	7/24/2018	Metolachlor		0.34	0.250	0.250	UG/L
	9/26/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
REN-7	3/15/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	5/15/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	7/24/2018	Metolachlor	<	0.25	0.250	0.250	UG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	9/26/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
REN-8	3/15/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	5/15/2018	Metolachlor	<	0.22	0.222	0.222	UG/L
	7/24/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
	9/26/2018	Metolachlor	<	0.20	0.200	0.200	UG/L
REN-1	3/15/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	9/26/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
REN-15-0	3/15/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
	7/24/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	9/26/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
REN-2-0	3/15/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
	5/15/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
	9/26/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
REN-3	3/15/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Metribuzin	<	0.25	0.250	0.250	UG/L
	7/24/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
	9/26/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
REN-4	3/15/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
	5/15/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
	7/24/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	9/26/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
REN-5	3/15/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
	5/15/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Metribuzin	<	0.25	0.250	0.250	UG/L
	9/26/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
REN-7	3/15/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Metribuzin	<	0.25	0.250	0.250	UG/L
	9/26/2018	Metribuzin	<	0.20	0.200	0.200	UG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
REN-8	3/15/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Metribuzin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
	9/26/2018	Metribuzin	<	0.20	0.200	0.200	UG/L
REN-1	3/15/2018	Nitrate-N		0.17	0.038	0.040	MG/L
	5/15/2018	Nitrate-N	<	0.04	0.038	0.040	MG/L
	7/24/2018	Nitrate-N	<	0.02	0.019	0.020	MG/L
	9/26/2018	Nitrate-N		0.15	0.019	0.020	MG/L
REN-15-0	3/15/2018	Nitrate-N		0.17	0.038	0.040	MG/L
	5/15/2018	Nitrate-N		0.08	0.038	0.040	MG/L
	7/24/2018	Nitrate-N	<	0.02	0.019	0.020	MG/L
	9/26/2018	Nitrate-N	<	0.02	0.019	0.020	MG/L
REN-2-0	3/15/2018	Nitrate-N	<	0.04	0.038	0.040	MG/L
	5/15/2018	Nitrate-N	<	0.04	0.038	0.040	MG/L
	7/24/2018	Nitrate-N	<	0.02	0.019	0.020	MG/L
	9/26/2018	Nitrate-N		0.14	0.019	0.020	MG/L
REN-2-5	3/15/2018	Nitrate-N	<	0.04	0.038	0.040	MG/L
	5/15/2018	Nitrate-N	<	0.04	0.038	0.040	MG/L
	7/24/2018	Nitrate-N		0.03	0.019	0.020	MG/L
	9/26/2018	Nitrate-N		0.12	0.019	0.020	MG/L
REN-3	3/15/2018	Nitrate-N	<	0.04	0.038	0.040	MG/L
	5/15/2018	Nitrate-N	<	0.04	0.038	0.040	MG/L
	7/24/2018	Nitrate-N	<	0.02	0.019	0.020	MG/L
	9/26/2018	Nitrate-N	<	0.02	0.019	0.020	MG/L
REN-4	3/15/2018	Nitrate-N		0.14	0.038	0.040	MG/L
	5/15/2018	Nitrate-N	<	0.04	0.038	0.040	MG/L
	7/24/2018	Nitrate-N	<	0.02	0.019	0.020	MG/L
	9/26/2018	Nitrate-N	<	0.02	0.019	0.020	MG/L
REN-5	3/15/2018	Nitrate-N		0.24	0.038	0.040	MG/L
	5/15/2018	Nitrate-N		0.13	0.038	0.040	MG/L
	7/24/2018	Nitrate-N		0.16	0.019	0.020	MG/L
	9/26/2018	Nitrate-N		0.37	0.019	0.020	MG/L
REN-7	3/15/2018	Nitrate-N		0.78	0.038	0.040	MG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	5/15/2018	Nitrate-N		1.39	0.038	0.040	MG/L
	7/24/2018	Nitrate-N		2.27	0.038	0.040	MG/L
	9/26/2018	Nitrate-N		0.06	0.019	0.020	MG/L
REN-8	3/15/2018	Nitrate-N		0.18	0.038	0.040	MG/L
	5/15/2018	Nitrate-N	<	0.04	0.038	0.040	MG/L
	7/24/2018	Nitrate-N	<	0.02	0.019	0.020	MG/L
	9/26/2018	Nitrate-N		0.06	0.019	0.020	MG/L
REN-1	3/15/2018	Nitrogen, ammonia		0.09	0.020	0.030	MG/L
	5/15/2018	Nitrogen, ammonia		0.22	0.020	0.030	MG/L
	7/24/2018	Nitrogen, ammonia		0.21	0.020	0.030	MG/L
	9/26/2018	Nitrogen, ammonia		0.07	0.020	0.030	MG/L
REN-15-0	3/15/2018	Nitrogen, ammonia		0.05	0.020	0.030	MG/L
	5/15/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
	7/24/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
	9/26/2018	Nitrogen, ammonia		0.09	0.020	0.030	MG/L
REN-2-0	3/15/2018	Nitrogen, ammonia		0.08	0.020	0.030	MG/L
	5/15/2018	Nitrogen, ammonia	J	0.02	0.020	0.030	MG/L
	7/24/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
	9/26/2018	Nitrogen, ammonia		0.10	0.020	0.030	MG/L
REN-2-5	3/15/2018	Nitrogen, ammonia		0.08	0.020	0.030	MG/L
	5/15/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
	7/24/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
	9/26/2018	Nitrogen, ammonia		0.18	0.020	0.030	MG/L
REN-3	3/15/2018	Nitrogen, ammonia		0.09	0.020	0.030	MG/L
	5/15/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
	7/24/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
	9/26/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
REN-4	3/15/2018	Nitrogen, ammonia		0.09	0.020	0.030	MG/L
	5/15/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
	7/24/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
	9/26/2018	Nitrogen, ammonia		0.09	0.020	0.030	MG/L
REN-5	3/15/2018	Nitrogen, ammonia		0.10	0.020	0.030	MG/L
	5/15/2018	Nitrogen, ammonia		0.16	0.020	0.030	MG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	7/24/2018	Nitrogen, ammonia		0.11	0.020	0.030	MG/L
	9/26/2018	Nitrogen, ammonia		0.11	0.020	0.030	MG/L
REN-7	3/15/2018	Nitrogen, ammonia		0.10	0.020	0.030	MG/L
	5/15/2018	Nitrogen, ammonia		0.15	0.020	0.030	MG/L
	7/24/2018	Nitrogen, ammonia		0.05	0.020	0.030	MG/L
	9/26/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
REN-8	3/15/2018	Nitrogen, ammonia		0.07	0.020	0.030	MG/L
	5/15/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
	7/24/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
	9/26/2018	Nitrogen, ammonia	<	0.02	0.020	0.030	MG/L
REN-1	3/15/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	9/26/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
REN-15-0	3/15/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
	7/24/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	9/26/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
REN-2-0	3/15/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
	5/15/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
	9/26/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
REN-3	3/15/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Pendimethalin	<	0.25	0.250	0.250	UG/L
	7/24/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
	9/26/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
REN-4	3/15/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
	5/15/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
	7/24/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	9/26/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
REN-5	3/15/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
	5/15/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Pendimethalin	<	0.25	0.250	0.250	UG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	9/26/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
REN-7	3/15/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Pendimethalin	<	0.25	0.250	0.250	UG/L
	9/26/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
REN-8	3/15/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Pendimethalin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
	9/26/2018	Pendimethalin	<	0.20	0.200	0.200	UG/L
REN-15-0	3/15/2018	Pheophytin-a		4.60	0.002	0.002	MG/CU.M.
	5/15/2018	Pheophytin-a		3.90	1.000	1.000	MG/CU.M.
	7/24/2018	Pheophytin-a		13.80	1.000	1.000	MG/CU.M.
	9/26/2018	Pheophytin-a		15.60	1.000	1.000	MG/CU.M.
REN-2-0	3/15/2018	Pheophytin-a		8.50	0.003	0.003	MG/CU.M.
	5/15/2018	Pheophytin-a		3.90	1.000	1.000	MG/CU.M.
	7/24/2018	Pheophytin-a		7.30	1.000	1.000	MG/CU.M.
	9/26/2018	Pheophytin-a		10.60	1.000	1.000	MG/CU.M.
REN-3	3/15/2018	Pheophytin-a		6.60	0.003	0.003	MG/CU.M.
	5/15/2018	Pheophytin-a		3.10	1.000	1.000	MG/CU.M.
	7/24/2018	Pheophytin-a		9.70	1.000	1.000	MG/CU.M.
	9/26/2018	Pheophytin-a		18.80	1.000	1.000	MG/CU.M.
REN-4	3/15/2018	Pheophytin-a		4.90	0.002	0.002	MG/CU.M.
	5/15/2018	Pheophytin-a		3.00	1.000	1.000	MG/CU.M.
	7/24/2018	Pheophytin-a		15.90	1.000	1.000	MG/CU.M.
	9/26/2018	Pheophytin-a		11.80	1.000	1.000	MG/CU.M.
REN-8	3/15/2018	Pheophytin-a		7.80	0.003	0.003	MG/CU.M.
	5/15/2018	Pheophytin-a		7.00	1.000	1.000	MG/CU.M.
	7/24/2018	Pheophytin-a		17.10	1.000	1.000	MG/CU.M.
	9/26/2018	Pheophytin-a		5.70	1.000	1.000	MG/CU.M.
REN-1	3/15/2018	Phosphorus, ortho-		0.02	0.008	0.010	MG/L
	5/15/2018	Phosphorus, ortho-		0.07	0.008	0.010	MG/L
	7/24/2018	Phosphorus, ortho-		0.12	0.008	0.010	MG/L
	9/26/2018	Phosphorus, ortho-		0.13	0.008	0.010	MG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
REN-15-0	3/15/2018	Phosphorus, ortho-		0.05	0.008	0.010	MG/L
	5/15/2018	Phosphorus, ortho-		0.02	0.008	0.010	MG/L
	7/24/2018	Phosphorus, ortho-		0.25	0.008	0.010	MG/L
	9/26/2018	Phosphorus, ortho-		0.15	0.008	0.010	MG/L
REN-2-0	3/15/2018	Phosphorus, ortho-	<	0.01	0.008	0.010	MG/L
	5/15/2018	Phosphorus, ortho-		0.01	0.008	0.010	MG/L
	7/24/2018	Phosphorus, ortho-		0.10	0.008	0.010	MG/L
	9/26/2018	Phosphorus, ortho-		0.14	0.008	0.010	MG/L
REN-2-5	3/15/2018	Phosphorus, ortho-		0.01	0.008	0.010	MG/L
	5/15/2018	Phosphorus, ortho-		0.02	0.008	0.010	MG/L
	7/24/2018	Phosphorus, ortho-		0.09	0.008	0.010	MG/L
	9/26/2018	Phosphorus, ortho-		0.15	0.008	0.010	MG/L
REN-3	3/15/2018	Phosphorus, ortho-		0.02	0.008	0.010	MG/L
	5/15/2018	Phosphorus, ortho-		0.01	0.008	0.010	MG/L
	7/24/2018	Phosphorus, ortho-		0.20	0.008	0.010	MG/L
	9/26/2018	Phosphorus, ortho-		0.09	0.008	0.010	MG/L
REN-4	3/15/2018	Phosphorus, ortho-		0.03	0.008	0.010	MG/L
	5/15/2018	Phosphorus, ortho-		0.01	0.008	0.010	MG/L
	7/24/2018	Phosphorus, ortho-		0.25	0.008	0.010	MG/L
	9/26/2018	Phosphorus, ortho-		0.13	0.008	0.010	MG/L
REN-5	3/15/2018	Phosphorus, ortho-	<	0.01	0.008	0.010	MG/L
	5/15/2018	Phosphorus, ortho-		0.04	0.008	0.010	MG/L
	7/24/2018	Phosphorus, ortho-		0.09	0.008	0.010	MG/L
	9/26/2018	Phosphorus, ortho-		0.31	0.008	0.010	MG/L
REN-7	3/15/2018	Phosphorus, ortho-		0.01	0.008	0.010	MG/L
	5/15/2018	Phosphorus, ortho-		0.04	0.008	0.010	MG/L
	7/24/2018	Phosphorus, ortho-		0.08	0.008	0.010	MG/L
	9/26/2018	Phosphorus, ortho-		0.27	0.008	0.010	MG/L
REN-8	3/15/2018	Phosphorus, ortho-		0.05	0.008	0.010	MG/L
	5/15/2018	Phosphorus, ortho-		0.02	0.008	0.010	MG/L
	7/24/2018	Phosphorus, ortho-		0.10	0.008	0.010	MG/L
	9/26/2018	Phosphorus, ortho-		0.09	0.008	0.010	MG/L
REN-1	3/15/2018	Phosphorus, total		0.11	0.008	0.010	MG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	5/15/2018	Phosphorus, total		0.16	0.008	0.010	MG/L
	7/24/2018	Phosphorus, total		0.25	0.008	0.010	MG/L
	9/26/2018	Phosphorus, total		0.25	0.008	0.010	MG/L
REN-15-0	3/15/2018	Phosphorus, total		0.19	0.008	0.010	MG/L
	5/15/2018	Phosphorus, total		0.09	0.008	0.010	MG/L
	7/24/2018	Phosphorus, total		0.46	0.008	0.010	MG/L
	9/26/2018	Phosphorus, total		0.28	0.008	0.010	MG/L
REN-2-0	3/15/2018	Phosphorus, total		0.15	0.008	0.010	MG/L
	5/15/2018	Phosphorus, total		0.08	0.008	0.010	MG/L
	7/24/2018	Phosphorus, total		0.24	0.008	0.010	MG/L
	9/26/2018	Phosphorus, total		0.23	0.008	0.010	MG/L
REN-2-5	3/15/2018	Phosphorus, total		0.71	0.008	0.010	MG/L
	5/15/2018	Phosphorus, total		0.13	0.008	0.010	MG/L
	7/24/2018	Phosphorus, total		0.24	0.008	0.010	MG/L
	9/26/2018	Phosphorus, total		0.24	0.008	0.010	MG/L
REN-3	3/15/2018	Phosphorus, total		0.16	0.008	0.010	MG/L
	5/15/2018	Phosphorus, total		0.09	0.008	0.010	MG/L
	7/24/2018	Phosphorus, total		0.37	0.008	0.010	MG/L
	9/26/2018	Phosphorus, total		0.33	0.008	0.010	MG/L
REN-4	3/15/2018	Phosphorus, total		0.19	0.008	0.010	MG/L
	5/15/2018	Phosphorus, total		0.09	0.008	0.010	MG/L
	7/24/2018	Phosphorus, total		0.46	0.008	0.010	MG/L
	9/26/2018	Phosphorus, total		0.30	0.008	0.010	MG/L
REN-5	3/15/2018	Phosphorus, total		0.10	0.008	0.010	MG/L
	5/15/2018	Phosphorus, total		0.13	0.008	0.010	MG/L
	7/24/2018	Phosphorus, total		0.18	0.008	0.010	MG/L
	9/26/2018	Phosphorus, total		0.71	0.008	0.010	MG/L
REN-7	3/15/2018	Phosphorus, total		0.09	0.008	0.010	MG/L
	5/15/2018	Phosphorus, total		0.12	0.008	0.010	MG/L
	7/24/2018	Phosphorus, total		0.31	0.008	0.010	MG/L
	9/26/2018	Phosphorus, total		0.52	0.008	0.010	MG/L
REN-8	3/15/2018	Phosphorus, total		0.27	0.008	0.010	MG/L
	5/15/2018	Phosphorus, total		0.13	0.008	0.010	MG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	7/24/2018	Phosphorus, total		0.16	0.008	0.010	MG/L
	9/26/2018	Phosphorus, total		0.30	0.008	0.010	MG/L
REN-1	3/15/2018	Solids, total suspended		8.50	2.500	2.500	MG/L
	5/15/2018	Solids, total suspended		10.80	4.000	4.000	MG/L
	7/24/2018	Solids, total suspended		14.40	4.000	4.000	MG/L
	9/26/2018	Solids, total suspended		11.30	6.670	6.670	MG/L
REN-15-0	3/15/2018	Solids, total suspended		12.50	1.670	1.670	MG/L
	5/15/2018	Solids, total suspended		9.60	2.000	2.000	MG/L
	7/24/2018	Solids, total suspended		23.20	4.000	4.000	MG/L
	9/26/2018	Solids, total suspended		16.70	6.670	6.670	MG/L
REN-2-0	3/15/2018	Solids, total suspended		9.71	2.860	2.860	MG/L
	5/15/2018	Solids, total suspended		6.89	2.220	2.220	MG/L
	7/24/2018	Solids, total suspended		12.00	4.000	4.000	MG/L
	9/26/2018	Solids, total suspended		9.33	6.670	6.670	MG/L
REN-2-5	3/15/2018	Solids, total suspended		17.10	2.860	2.860	MG/L
	5/15/2018	Solids, total suspended		28.00	5.000	5.000	MG/L
	7/24/2018	Solids, total suspended		14.00	4.000	4.000	MG/L
	9/26/2018	Solids, total suspended		12.00	6.670	6.670	MG/L
REN-3	3/15/2018	Solids, total suspended		15.30	2.220	2.220	MG/L
	5/15/2018	Solids, total suspended		12.90	2.220	2.220	MG/L
	7/24/2018	Solids, total suspended		22.80	4.000	4.000	MG/L
	9/26/2018	Solids, total suspended		24.70	6.670	6.670	MG/L
REN-4	3/15/2018	Solids, total suspended		12.40	2.000	2.000	MG/L
	5/15/2018	Solids, total suspended		10.80	2.500	2.500	MG/L
	7/24/2018	Solids, total suspended		27.60	4.000	4.000	MG/L
	9/26/2018	Solids, total suspended		17.30	6.670	6.670	MG/L
REN-5	3/15/2018	Solids, total suspended		7.89	1.110	1.110	MG/L
	5/15/2018	Solids, total suspended		14.40	2.000	2.000	MG/L
	7/24/2018	Solids, total suspended		7.20	2.000	2.000	MG/L
	9/26/2018	Solids, total suspended		65.30	6.670	6.670	MG/L
REN-7	3/15/2018	Solids, total suspended		5.67	1.110	1.110	MG/L
	5/15/2018	Solids, total suspended		6.88	1.250	1.250	MG/L
	7/24/2018	Solids, total suspended		10.00	2.000	2.000	MG/L

Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	9/26/2018	Solids, total suspended		56.00	6.670	6.670	MG/L
REN-8	3/15/2018	Solids, total suspended		19.70	2.860	2.860	MG/L
	5/15/2018	Solids, total suspended		11.60	2.000	2.000	MG/L
	7/24/2018	Solids, total suspended		21.20	4.000	4.000	MG/L
	9/26/2018	Solids, total suspended		22.00	6.670	6.670	MG/L
REN-1	3/15/2018	Solids, Volaltile Suspended		3.75	2.500	2.500	MG/L
	5/15/2018	Solids, Volaltile Suspended	<	4.00	4.000	4.000	MG/L
	7/24/2018	Solids, Volaltile Suspended		9.20	4.000	4.000	MG/L
	9/26/2018	Solids, Volaltile Suspended	<	6.67	6.670	6.670	MG/L
REN-15-0	3/15/2018	Solids, Volaltile Suspended		3.50	1.670	1.670	MG/L
	5/15/2018	Solids, Volaltile Suspended		3.40	2.000	2.000	MG/L
	7/24/2018	Solids, Volaltile Suspended		12.00	4.000	4.000	MG/L
	9/26/2018	Solids, Volaltile Suspended	<	6.67	6.670	6.670	MG/L
REN-2-0	3/15/2018	Solids, Volaltile Suspended		5.43	2.860	2.860	MG/L
	5/15/2018	Solids, Volaltile Suspended		3.33	2.220	2.220	MG/L
	7/24/2018	Solids, Volaltile Suspended		9.20	4.000	4.000	MG/L
	9/26/2018	Solids, Volaltile Suspended	<	6.67	6.670	6.670	MG/L
REN-2-5	3/15/2018	Solids, Volaltile Suspended		6.00	2.860	2.860	MG/L
	5/15/2018	Solids, Volaltile Suspended	<	5.00	5.000	5.000	MG/L
	7/24/2018	Solids, Volaltile Suspended		10.40	4.000	4.000	MG/L
	9/26/2018	Solids, Volaltile Suspended	<	6.67	6.670	6.670	MG/L
REN-3	3/15/2018	Solids, Volaltile Suspended		4.89	2.220	2.220	MG/L
	5/15/2018	Solids, Volaltile Suspended		4.22	2.220	2.220	MG/L
	7/24/2018	Solids, Volaltile Suspended		12.40	4.000	4.000	MG/L
	9/26/2018	Solids, Volaltile Suspended	<	6.67	6.670	6.670	MG/L
REN-4	3/15/2018	Solids, Volaltile Suspended		3.60	2.000	2.000	MG/L
	5/15/2018	Solids, Volaltile Suspended		3.75	2.500	2.500	MG/L
	7/24/2018	Solids, Volaltile Suspended		12.80	4.000	4.000	MG/L
	9/26/2018	Solids, Volaltile Suspended		8.67	6.670	6.670	MG/L
REN-5	3/15/2018	Solids, Volaltile Suspended	<	1.11	1.110	1.110	MG/L
	5/15/2018	Solids, Volaltile Suspended	<	2.00	2.000	2.000	MG/L
	7/24/2018	Solids, Volaltile Suspended	<	2.00	2.000	2.000	MG/L
	9/26/2018	Solids, Volaltile Suspended	<	6.67	6.670	6.670	MG/L

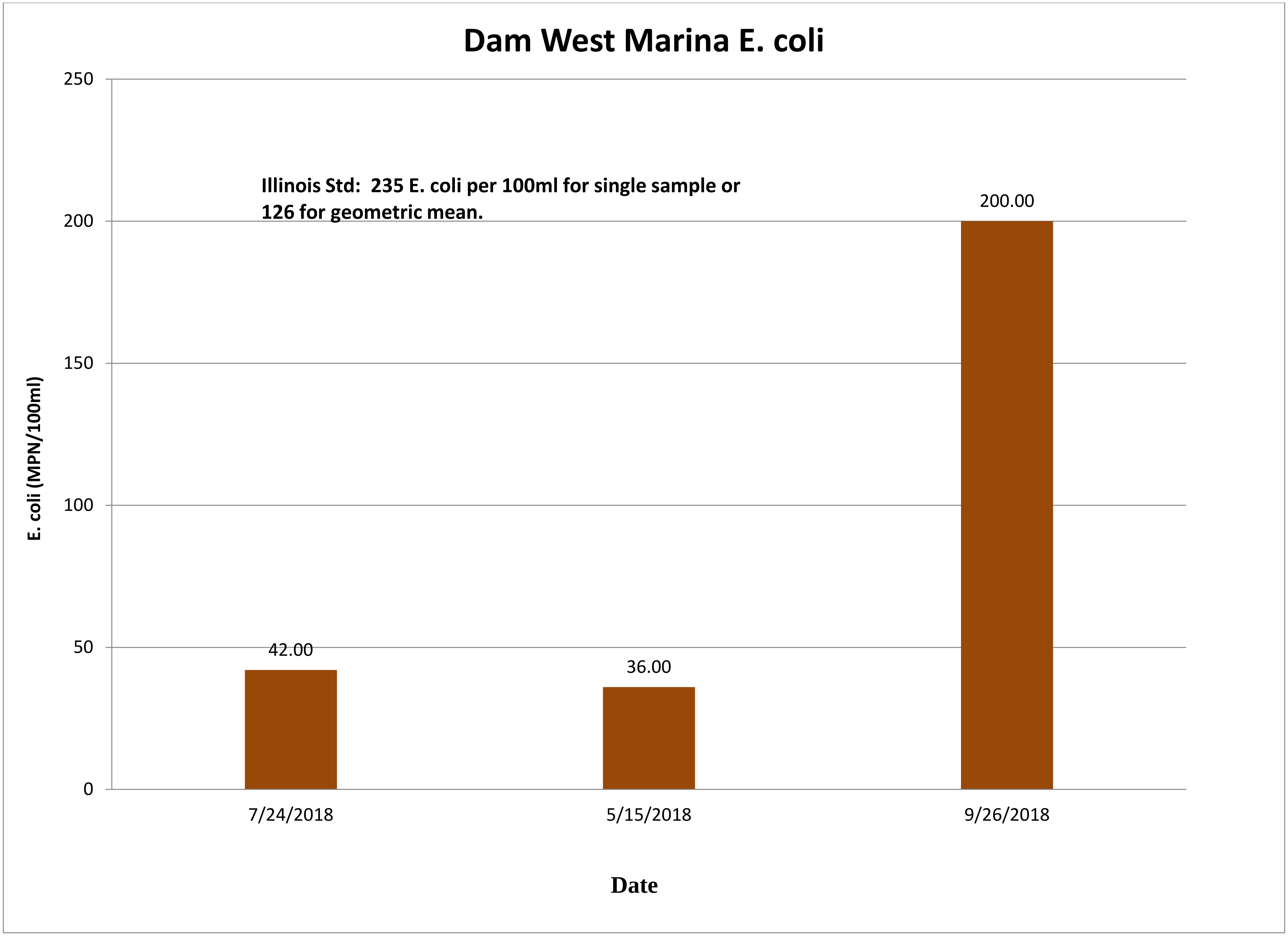
Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
REN-7	3/15/2018	Solids, Volaltile Suspended	<	1.11	1.110	1.110	MG/L
	5/15/2018	Solids, Volaltile Suspended	<	1.25	1.250	1.250	MG/L
	7/24/2018	Solids, Volaltile Suspended	<	2.00	2.000	2.000	MG/L
	9/26/2018	Solids, Volaltile Suspended	<	6.67	6.670	6.670	MG/L
REN-8	3/15/2018	Solids, Volaltile Suspended		6.00	2.860	2.860	MG/L
	5/15/2018	Solids, Volaltile Suspended		6.60	2.000	2.000	MG/L
	7/24/2018	Solids, Volaltile Suspended		13.20	4.000	4.000	MG/L
	9/26/2018	Solids, Volaltile Suspended	<	6.67	6.670	6.670	MG/L
REN-1	3/15/2018	Total Organic Carbon		4.70	0.500	1.000	MG/L
	5/15/2018	Total Organic Carbon		5.80	0.500	1.000	MG/L
	7/24/2018	Total Organic Carbon		6.20	0.500	1.000	MG/L
	9/26/2018	Total Organic Carbon		5.90	0.500	1.000	MG/L
REN-15-0	3/15/2018	Total Organic Carbon		4.30	0.500	1.000	MG/L
	5/15/2018	Total Organic Carbon		6.40	0.500	1.000	MG/L
	7/24/2018	Total Organic Carbon		7.50	0.500	1.000	MG/L
	9/26/2018	Total Organic Carbon		6.10	0.500	1.000	MG/L
REN-2-0	3/15/2018	Total Organic Carbon		4.30	0.500	1.000	MG/L
	5/15/2018	Total Organic Carbon		6.40	0.500	1.000	MG/L
	7/24/2018	Total Organic Carbon		6.80	0.500	1.000	MG/L
	9/26/2018	Total Organic Carbon		6.10	0.500	1.000	MG/L
REN-2-5	3/15/2018	Total Organic Carbon		4.80	0.500	1.000	MG/L
	5/15/2018	Total Organic Carbon		6.50	0.500	1.000	MG/L
	7/24/2018	Total Organic Carbon		7.40	0.500	1.000	MG/L
	9/26/2018	Total Organic Carbon		6.60	0.500	1.000	MG/L
REN-3	3/15/2018	Total Organic Carbon		4.50	0.500	1.000	MG/L
	5/15/2018	Total Organic Carbon		6.60	0.500	1.000	MG/L
	7/24/2018	Total Organic Carbon		7.50	0.500	1.000	MG/L
	9/26/2018	Total Organic Carbon		6.10	0.500	1.000	MG/L
REN-4	3/15/2018	Total Organic Carbon		4.40	0.500	1.000	MG/L
	5/15/2018	Total Organic Carbon		6.30	0.500	1.000	MG/L
	7/24/2018	Total Organic Carbon		7.90	0.500	1.000	MG/L
	9/26/2018	Total Organic Carbon		6.60	0.500	1.000	MG/L
REN-5	3/15/2018	Total Organic Carbon		3.40	0.500	1.000	MG/L

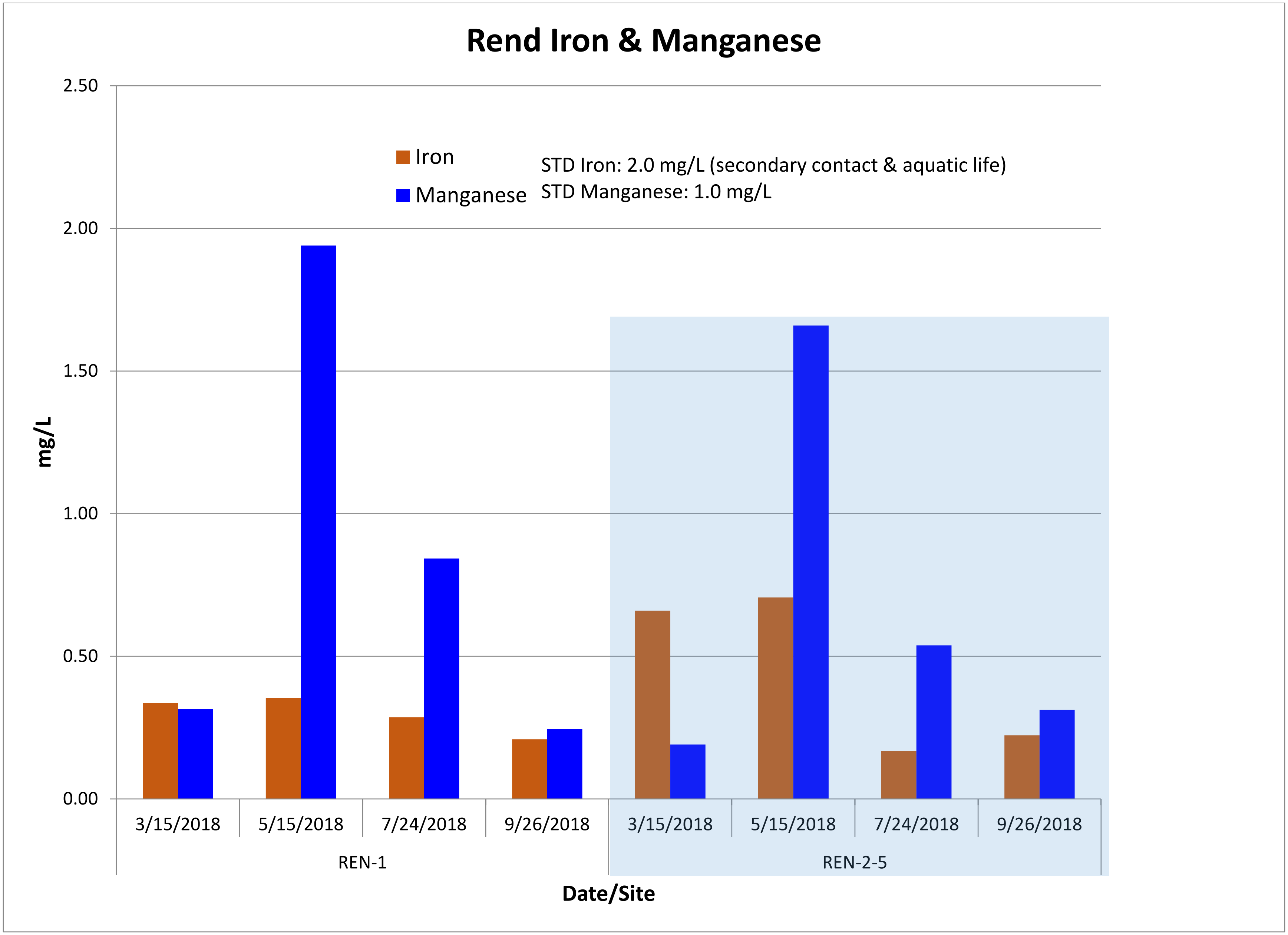
Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	5/15/2018	Total Organic Carbon		7.50	0.500	1.000	MG/L
	7/24/2018	Total Organic Carbon		8.60	0.500	1.000	MG/L
	9/26/2018	Total Organic Carbon		12.00	1.000	2.000	MG/L
REN-7	3/15/2018	Total Organic Carbon		3.20	0.500	1.000	MG/L
	5/15/2018	Total Organic Carbon		6.70	0.500	1.000	MG/L
	7/24/2018	Total Organic Carbon		7.70	0.500	1.000	MG/L
	9/26/2018	Total Organic Carbon		14.00	1.000	2.000	MG/L
REN-8	3/15/2018	Total Organic Carbon		5.00	0.500	1.000	MG/L
	5/15/2018	Total Organic Carbon		8.30	0.500	1.000	MG/L
	7/24/2018	Total Organic Carbon		8.10	0.500	1.000	MG/L
	9/26/2018	Total Organic Carbon		7.50	0.500	1.000	MG/L
REN-1	3/15/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	9/26/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
REN-15-0	3/15/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
	7/24/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	9/26/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
REN-2-0	3/15/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
	5/15/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
	9/26/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
REN-3	3/15/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Trifluralin	<	0.25	0.250	0.250	UG/L
	7/24/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
	9/26/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
REN-4	3/15/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
	5/15/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
	7/24/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	9/26/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
REN-5	3/15/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
	5/15/2018	Trifluralin	<	0.22	0.222	0.222	UG/L

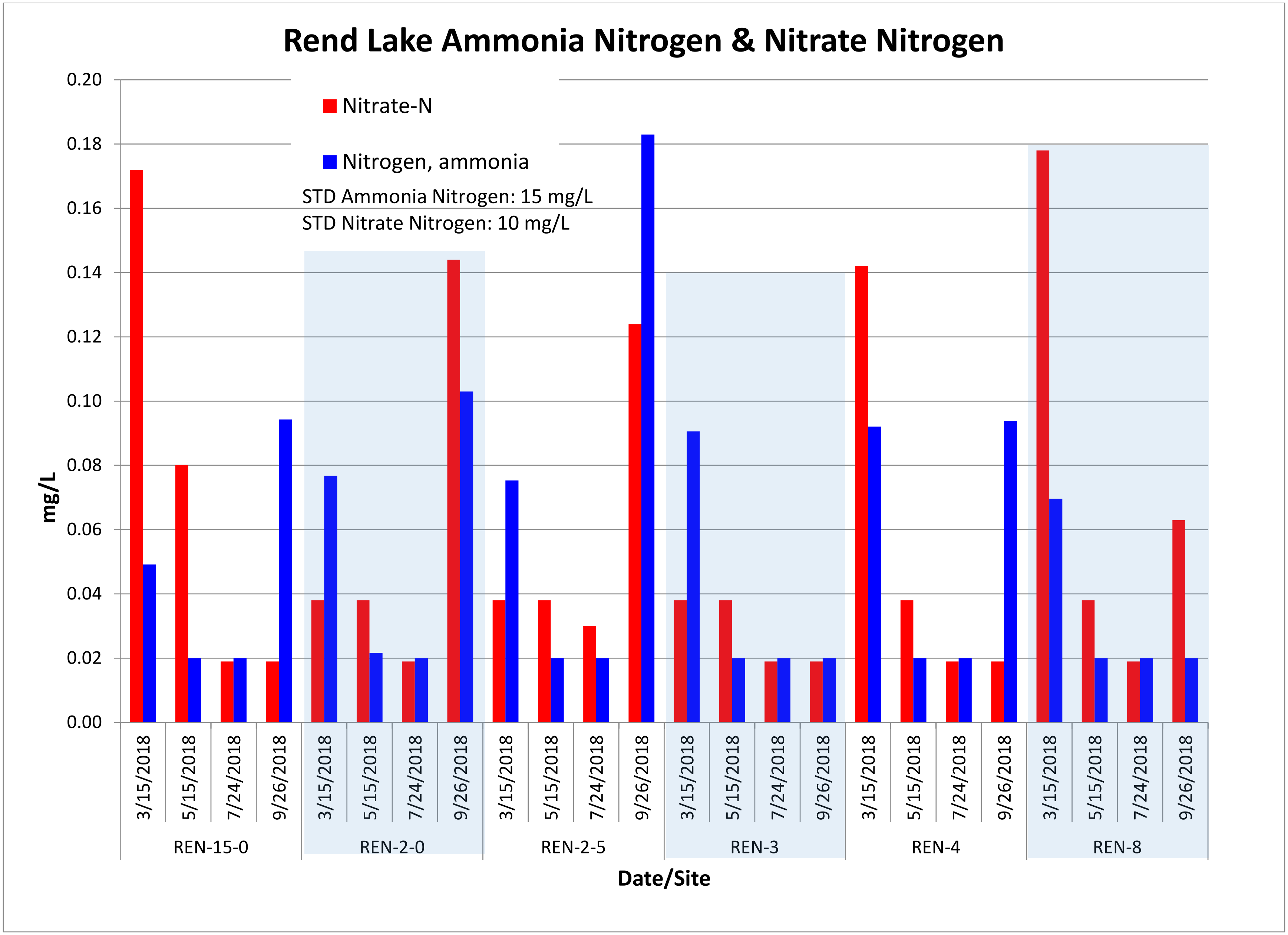
Site #	Collection Date	Parameter	Flag	Reported Result	MDL	PQL	Units
	7/24/2018	Trifluralin	<	0.25	0.250	0.250	UG/L
	9/26/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
REN-7	3/15/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Trifluralin	<	0.25	0.250	0.250	UG/L
	9/26/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
REN-8	3/15/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	5/15/2018	Trifluralin	<	0.22	0.222	0.222	UG/L
	7/24/2018	Trifluralin	<	0.20	0.200	0.200	UG/L
	9/26/2018	Trifluralin	<	0.20	0.200	0.200	UG/L

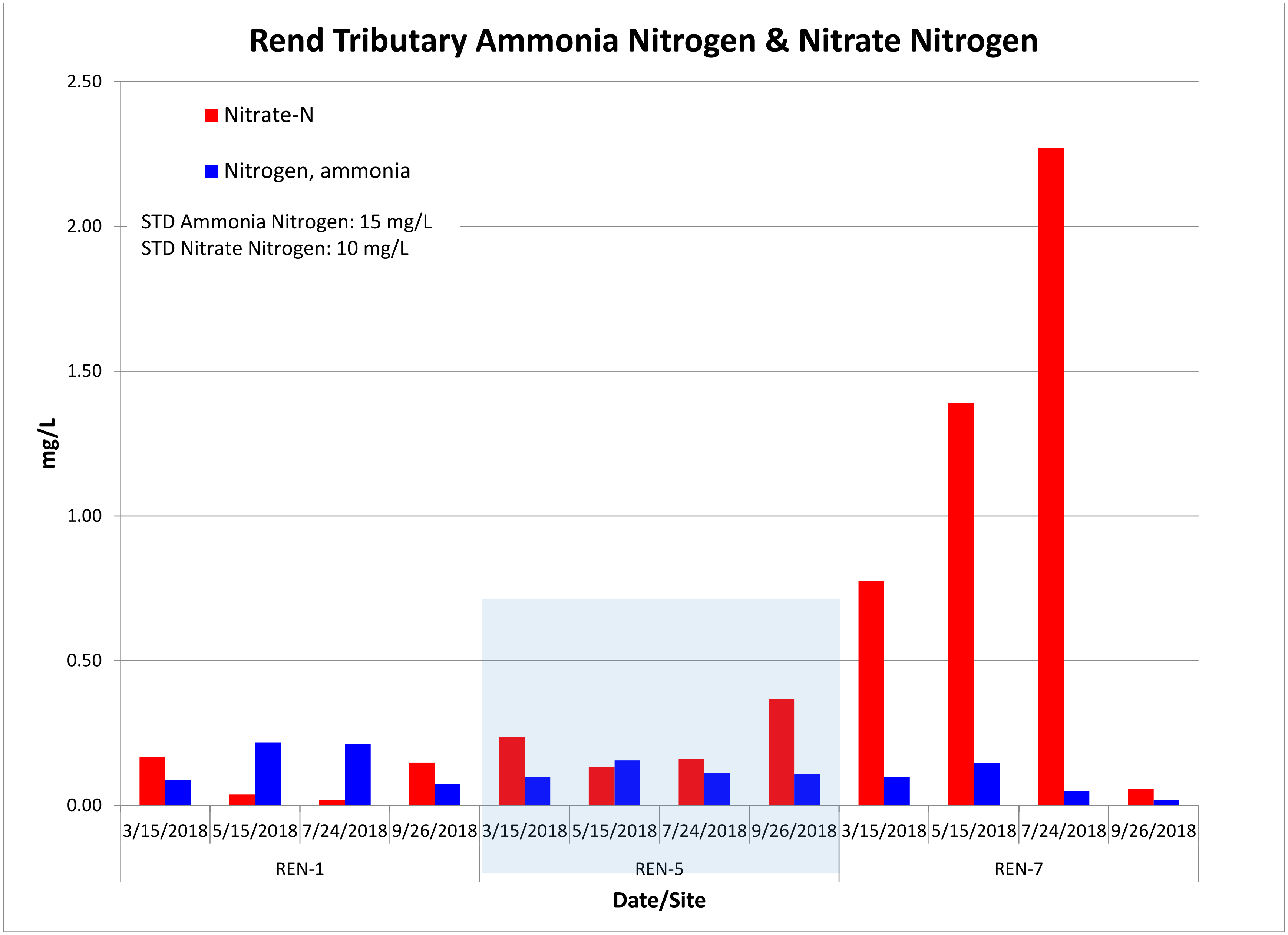
APPENDIX B

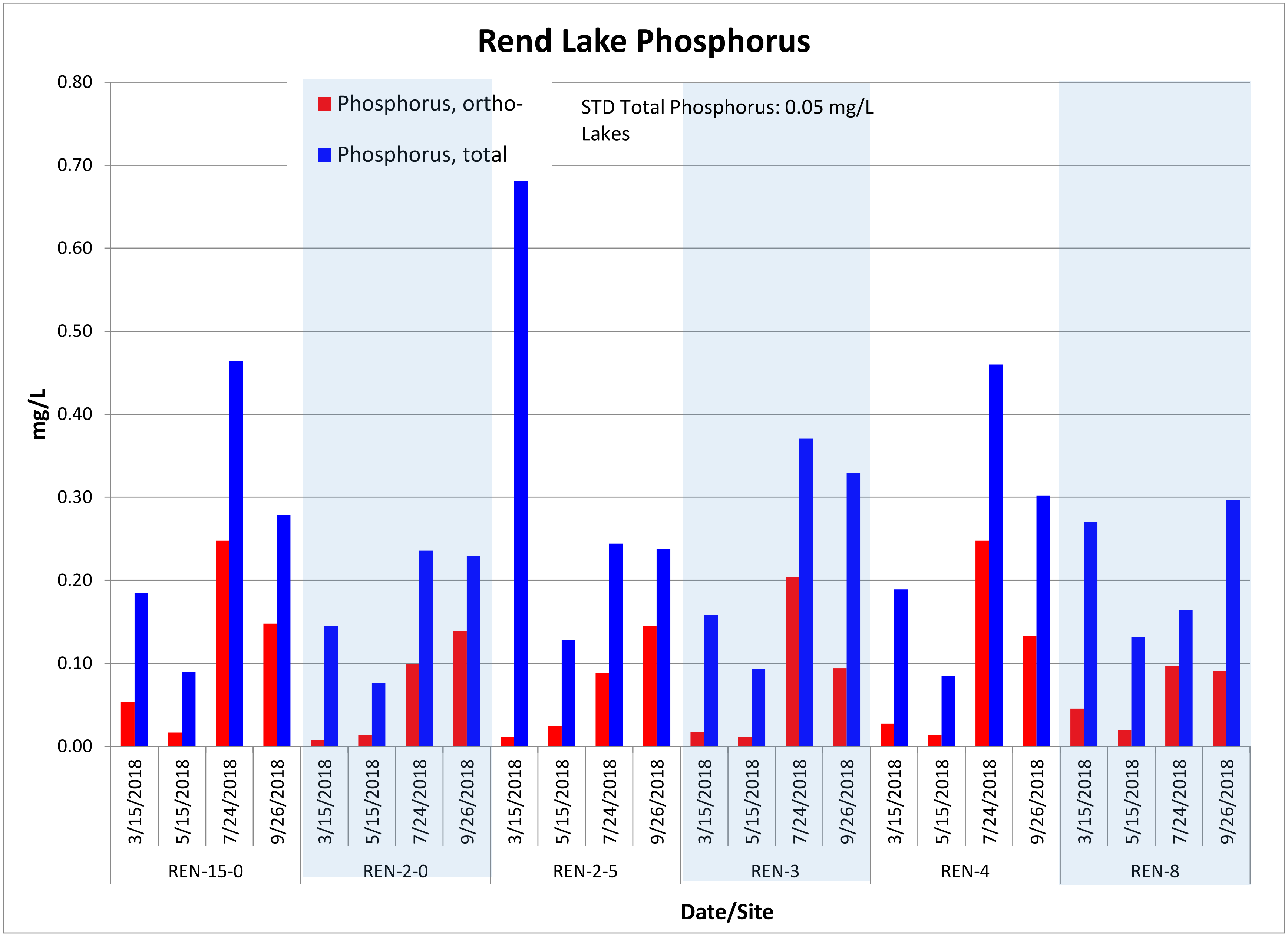
LAB DATA
GRAPHS

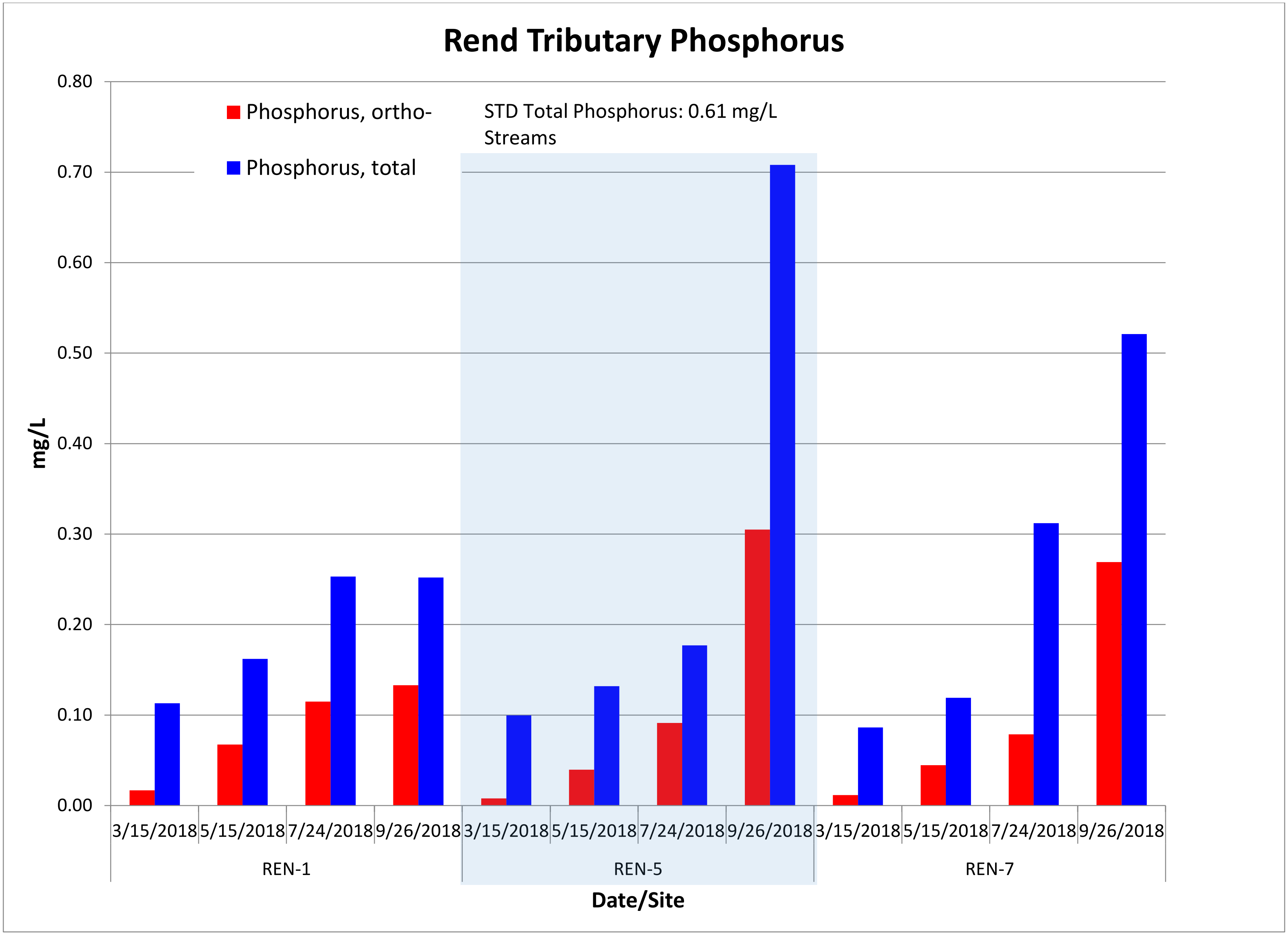

Dam West Marina E. coli
250
200
150
100
50
0
E. coli (MPN/100ml)
Illinois Std: 235 E. coli per 100ml for single sample or
126 for geometric mean.
42.00
36.00
200.00
7/24/2018
5/15/2018
9/26/2018
Date

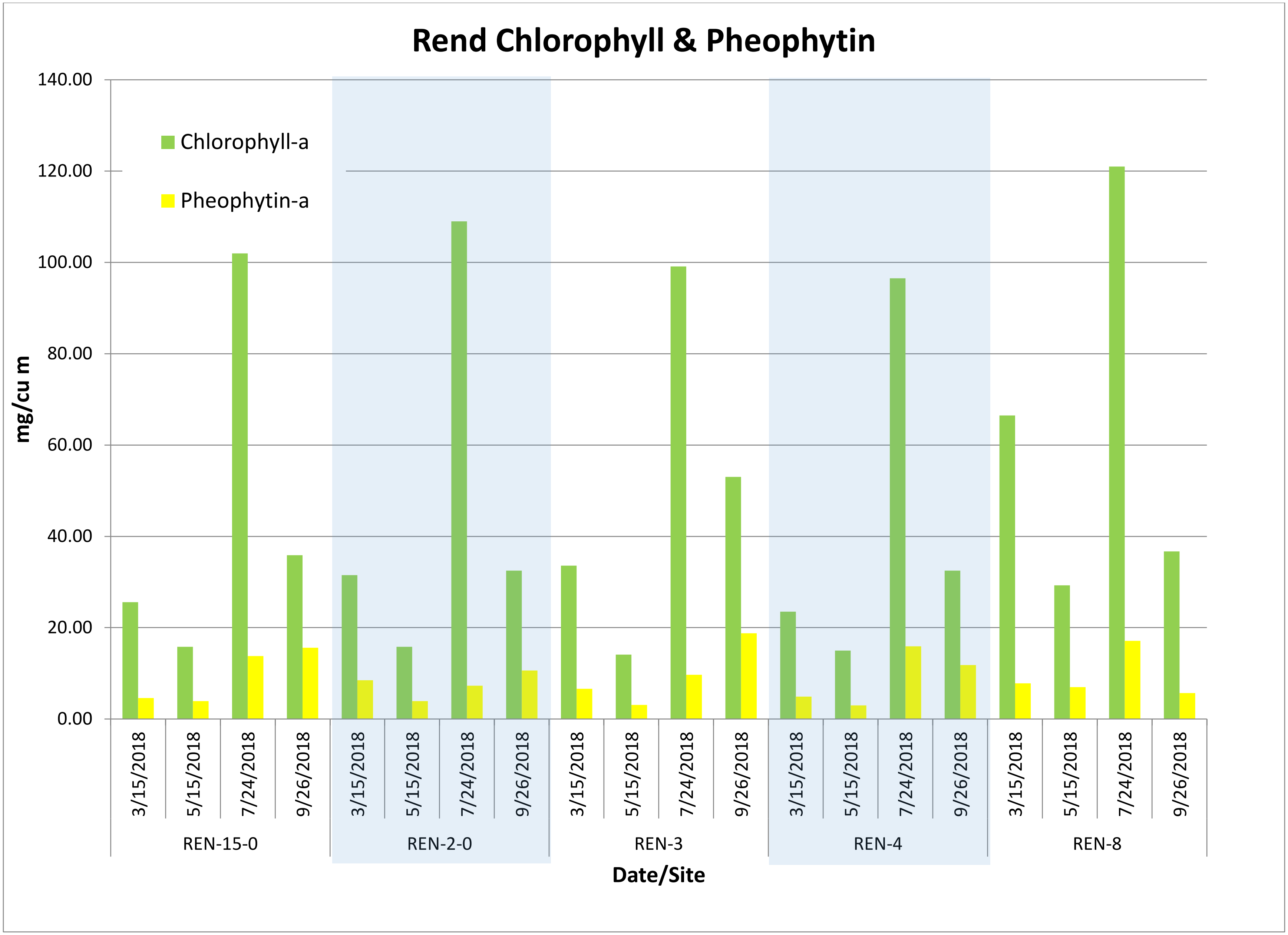

Rend Iron & Manganese
2.50
2.00
1.50
1.00
0.50
0.00
mg/L
Iron
Manganese
STD Iron: 2.0 mg/L (secondary contact & aquatic life)
STD Manganese: 1.0 mg/L
3/15/2018
5/15/2018
7/24/2018
9/26/2018
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-1
REN-2-5
Date/Site

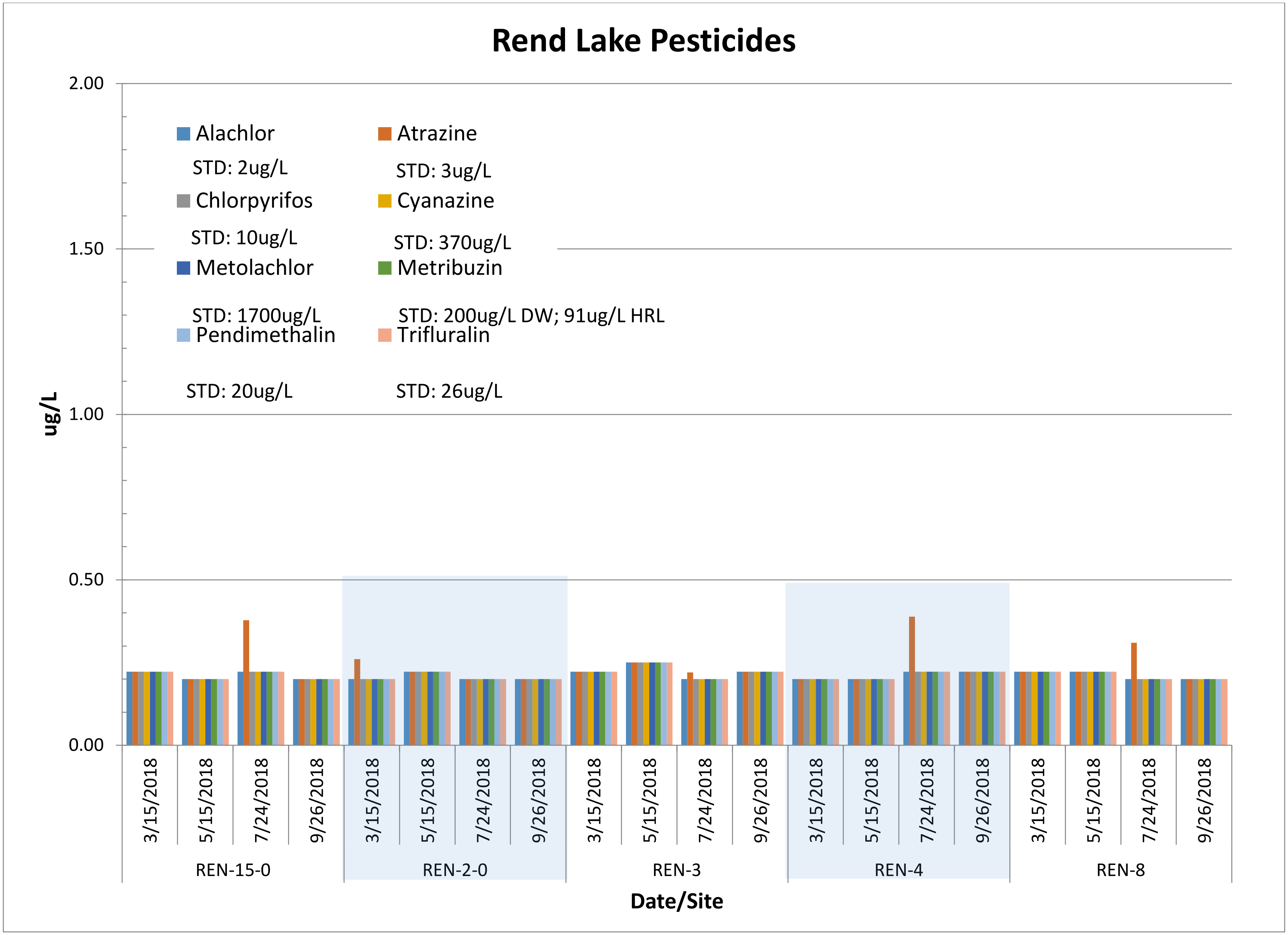

Rend Lake Ammonia Nitrogen & Nitrate Nitrogen
Nitrate-N
Nitrogen, ammonia
STD Ammonia Nitrogen: 15 mg/L
STD Nitrate Nitrogen: 10 mg/L
mg/L
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-15-0
REN-2-0
REN-2-5
REN-3
REN-4
REN-8
Date/Site

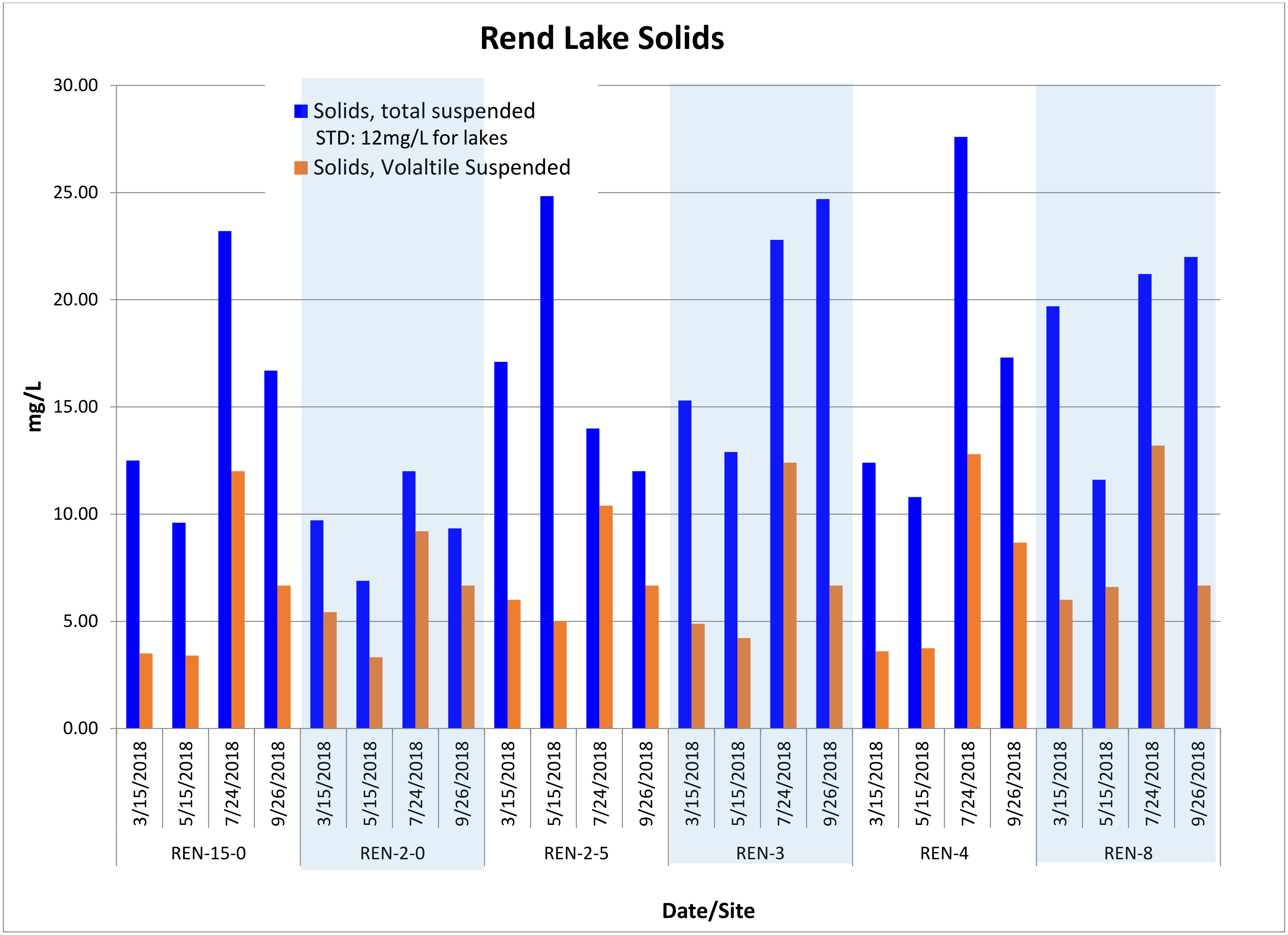

Rend Tributary Ammonia Nitrogen & Nitrate Nitrogen
2.50
2.00
1.50
1.00
0.50
0.00
mg/L
Nitrate-N
Nitrogen, ammonia
STD Ammonia Nitrogen: 15 mg/L
STD Nitrate Nitrogen: 10 mg/L
3/15/2018
5/15/2018
7/24/2018
9/26/2018
3/15/2018
5/15/2018
7/24/2018
9/26/2018
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-1
REN-5
REN-7
Date/Site

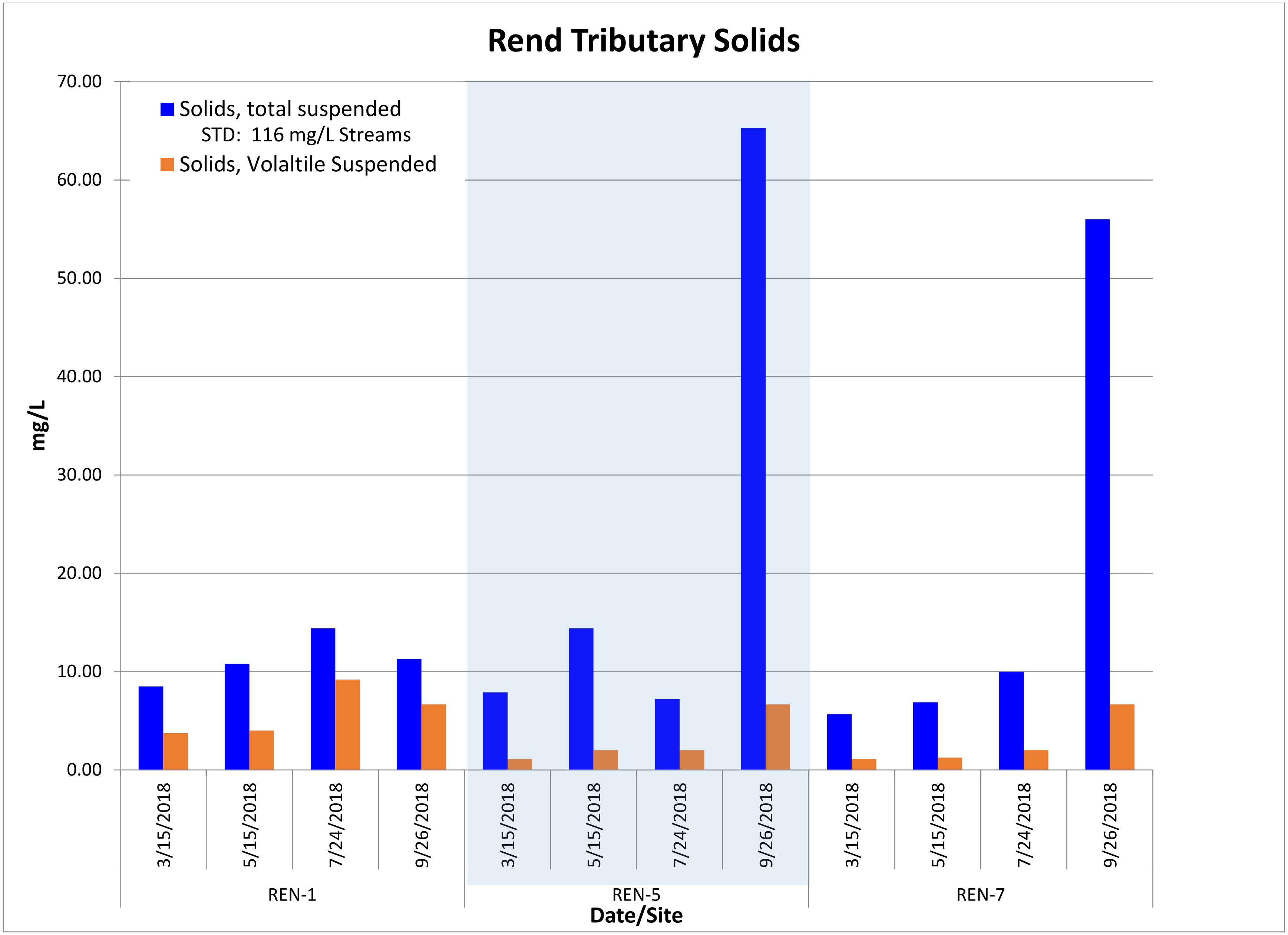

Rend Lake Phosphorus
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
mg/L
Phosphorus, ortho-
Phosphorus, total
STD Total Phosphorus: 0.05 mg/L
Lakes
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-15-0
REN-2-0
REN-2-5
REN-3
REN-4
REN-8
Date/Site

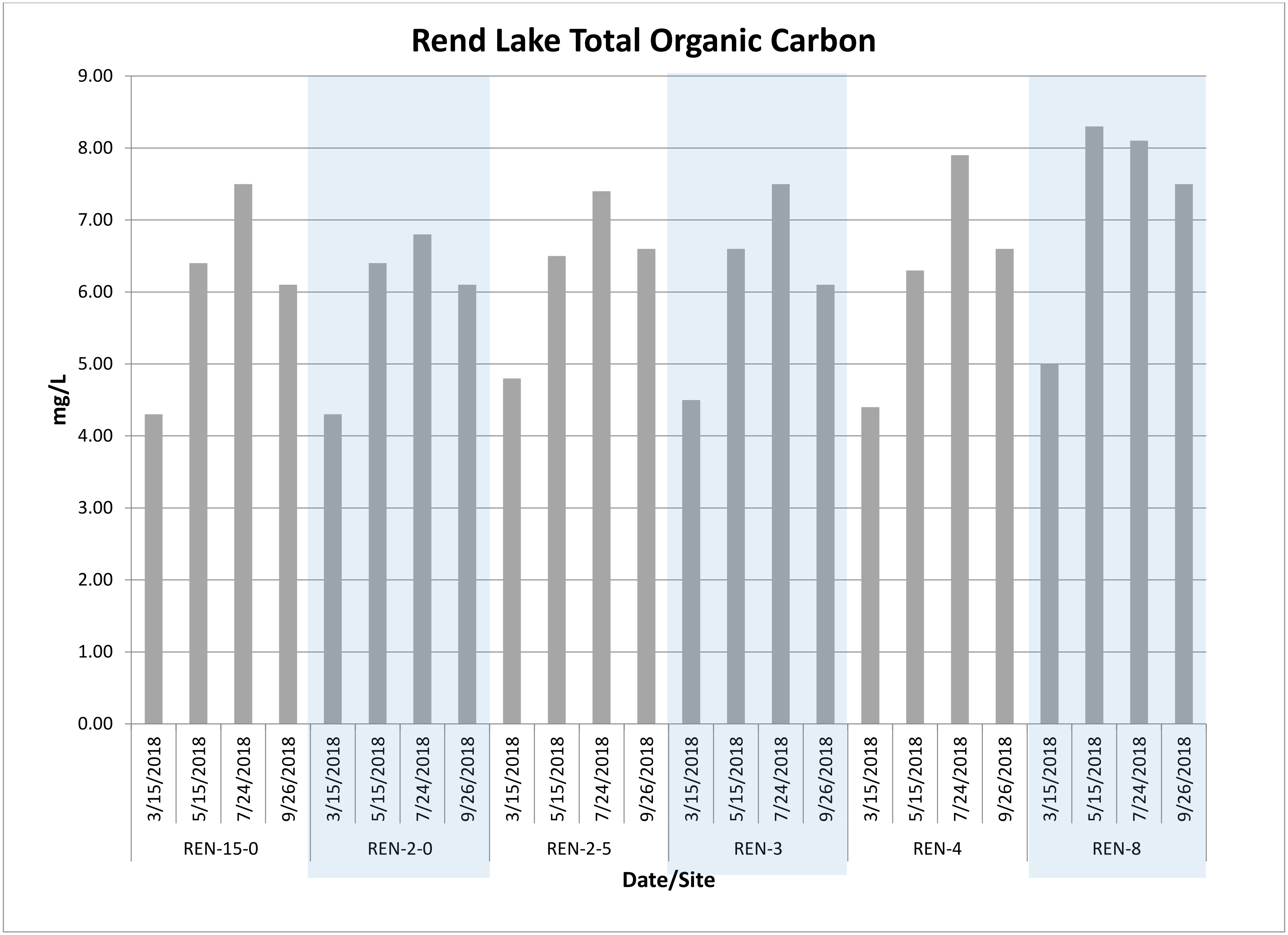

Rend Tributary Phosphorus
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
mg/L
Phosphorus, ortho-
Phosphorus, total
STD Total Phosphorus: 0.61 mg/L
Streams
3/15/2018
5/15/2018
7/24/2018
9/26/2018
3/15/2018
5/15/2018
7/24/2018
9/26/2018
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-1
REN-5
REN-7
Date/Site

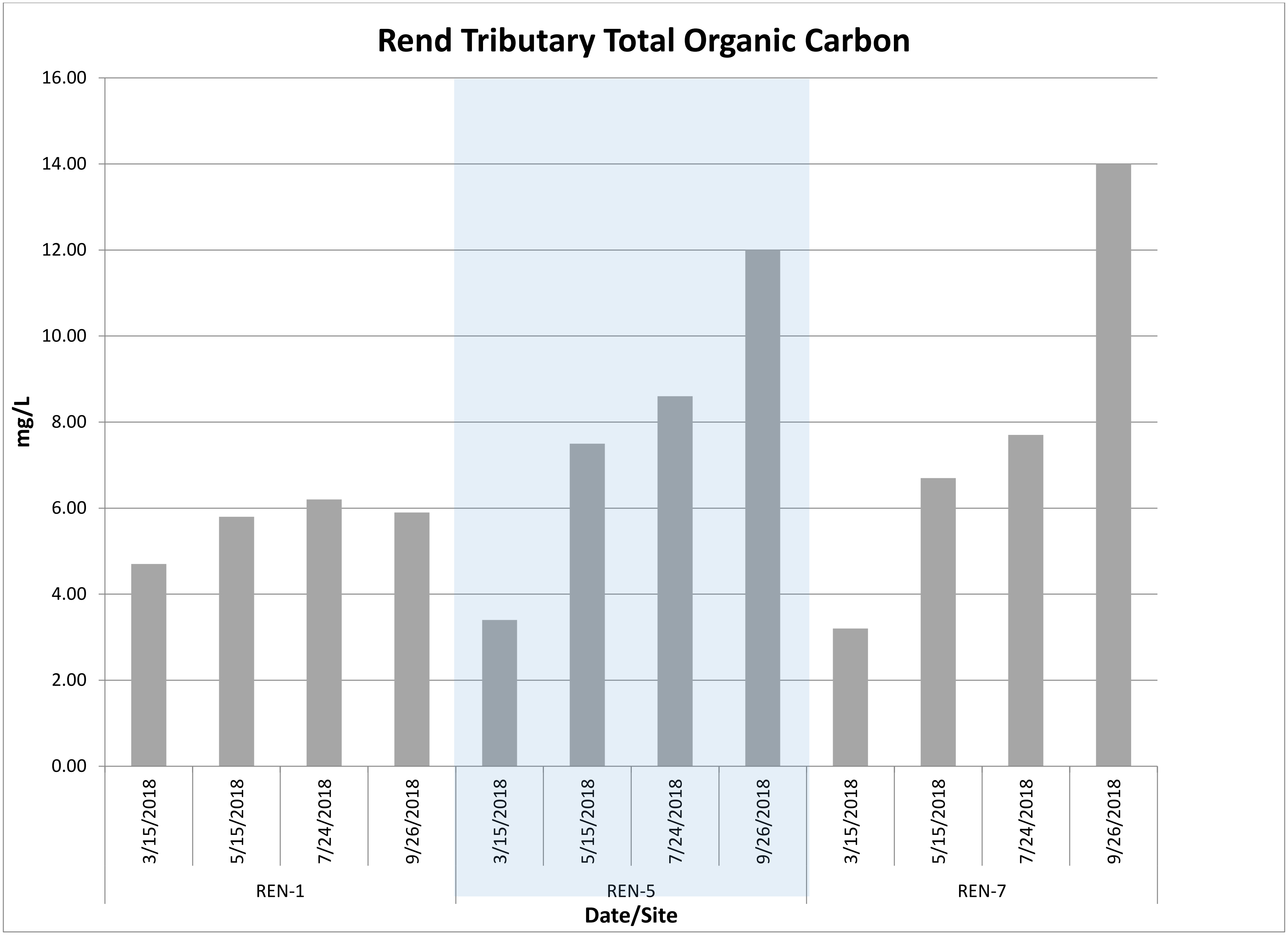

Rend Chlorophyll & Pheophytin
Chlorophyll-a
Pheophytin-a
mg/cu m
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-15-0
REN-2-0
REN-3
REN-4
REN-8
Date/Site


Rend Lake Pesticides
2.00
1.50
1.00
0.50
0.00
ug/L
Alachlor
STD: 2ug/L
Atrazine
STD: 3ug/L
Chlorpyrifos
STD: 10ug/L
Cyanazine
STD: 370ug/L
Metolachlor
STD: 1700ug/L
Metribuzin
STD: 200ug/L DW; 91ug/L HRL
Pendimethalin
STD: 20ug/L
Trifluralin
STD: 26ug/L
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-15-0
REN-2-0
REN-3
REN-4
REN-8
Date/Site


Rend Lake Solids
Solids, total suspended
STD: 12mg/L for lakes
Solids, Volaltile Suspended
mg/L
30.00
25.00
20.00
15.00
10.00
5.00
0.00
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-15-0
REN-2-0
REN-2-5
REN-3
REN-4
REN-8
Date/Site


Rend Tributary Solids
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
mg/L
Solids, total suspended
STD: 116 mg/L Streams
Solids, Volaltile Suspended
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-1
REN-5
REN-7
Date/Site


Rend Lake Total Organic Carbon
mg/L
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-15-0
REN-2-0
REN-2-5
REN-3
REN-4
REN-8
Date/Site


Rend Tributary Total Organic Carbon
mg/L
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
3/15/2018
5/15/2018
7/24/2018
9/26/2018
3/15/2018
5/15/2018
7/24/2018
9/26/2018
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-1
REN-5
REN-7
Date/Site

APPENDIX C

FIELD DATA & GRAPHS

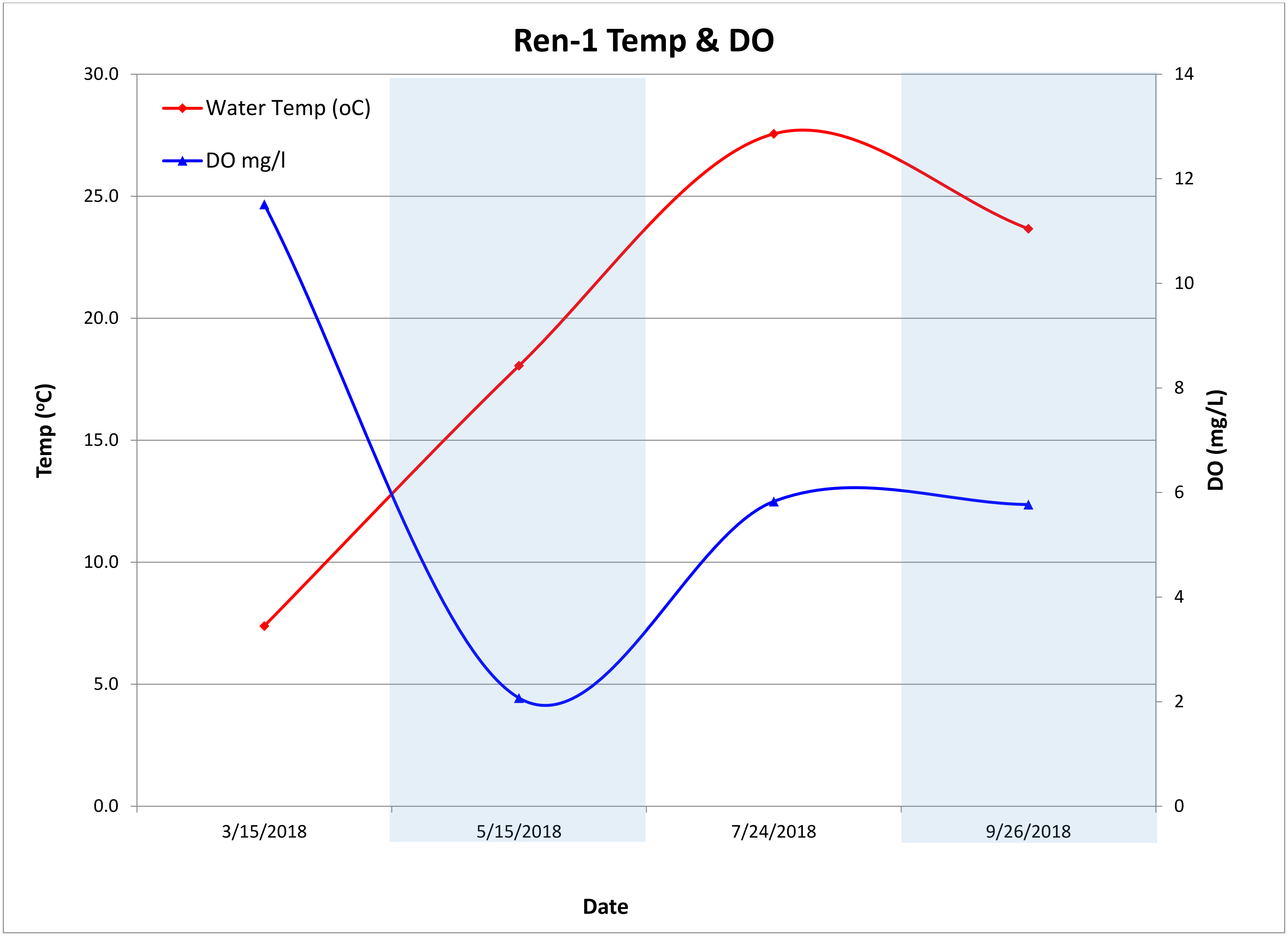
Field Data

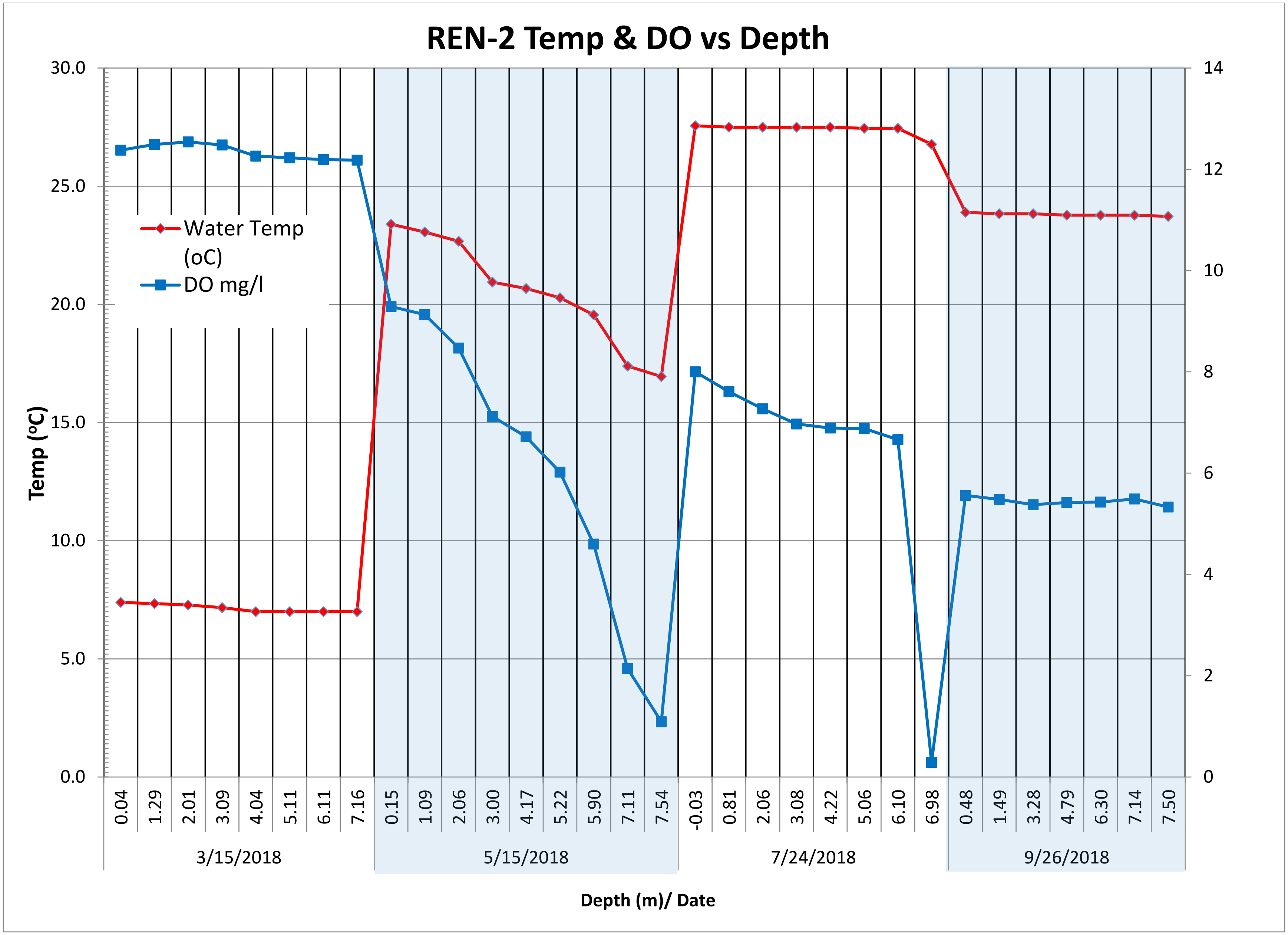
Site	Date	Depth	Water Tem (ºC)	Redox (mv)	Cond (uS)	DO %	DO mg/L	pH	Time	Seechi (in)	Total Depth
REN-1	3/15/2018	1.06	7.4	119.5	383.3	95.9	11.51	7.73	9:45		
	5/15/2018	0.99	18.1	224.5	268.1	21.9	2.07	6.99	9:51		
	7/24/2018	0.66	27.6	-15	276.1	74	5.83	8.83	11:42		
	9/26/2018	0.89	23.7	398.7	264.2	68.1	5.77	7.91	10:06		
REN-2	3/15/2018	0.04	7.4	121.5	282	103.1	12.38	8.28	10:53	28	26
		1.29	7.3	123.5	281.7	103.8	12.49	8.31	10:54		
		2.01	7.3	130.7	282	104.1	12.54	8.22	10:54		
		3.09	7.2	132.7	282.1	103.3	12.48	8.19	10:55		
		4.04	7.0	133.8	282.4	101.2	12.26	8.15	10:56		
		5.11	7.0	134.7	282.4	100.8	12.23	8.11	10:56		
		6.11	7.0	136.3	282.5	100.5	12.19	8.07	10:57		
		7.16	7.0	135.2	282.5	100.5	12.18	8.09	10:57		
	5/15/2018	0.15	23.4	199.7	260.8	109.2	9.29	7.96	10:40	25	27
		1.09	23.1	214.1	260.5	106.6	9.13	7.65	10:40		
		2.06	22.7	222.9	260.9	98.2	8.47	7.31	10:41		
		3.00	20.9	229.6	260.1	79.8	7.12	7.07	10:42		
		4.17	20.7	232.1	260.6	74.9	6.72	6.98	10:42		
		5.22	20.3	236.5	260.4	66.6	6.02	6.85	10:43		
		5.90	19.6	242.7	260.9	50.2	4.6	6.66	10:44		
		7.11	17.4	244.9	269.4	22.4	2.14	6.61	10:44		
		7.54	16.9	162.5	272.6	11.3	1.09	6.58	10:44		
	7/24/2018	-0.03	27.6	94	269.1	101.5	8	9.29	9:12	15	23
		0.81	27.5	84.9	269.3	96.5	7.61	9.24	9:13		
		2.06	27.5	79.6	269.4	92.1	7.27	9.21	9:13		
		3.08	27.5	67.4	269.5	88.3	6.97	9.2	9:14		
		4.22	27.5	59.7	269.6	87.3	6.89	9.18	9:15		
		5.06	27.4	56.8	269.6	87.1	6.88	9.2	9:16		
		6.10	27.4	53.8	269.8	84.2	6.66	9.18	9:16		
		6.98	26.8	-272.9	401.5	3.6	0.29	7.32	9:17		
	9/26/2018	0.48	23.9	147.3	263.1	66	5.56	7.78	12:29	24	25
		1.49	23.8	143.9	263.1	64.9	5.48	7.76	12:28		
		3.28	23.8	137.4	263.1	63.8	5.38	7.75	12:28		

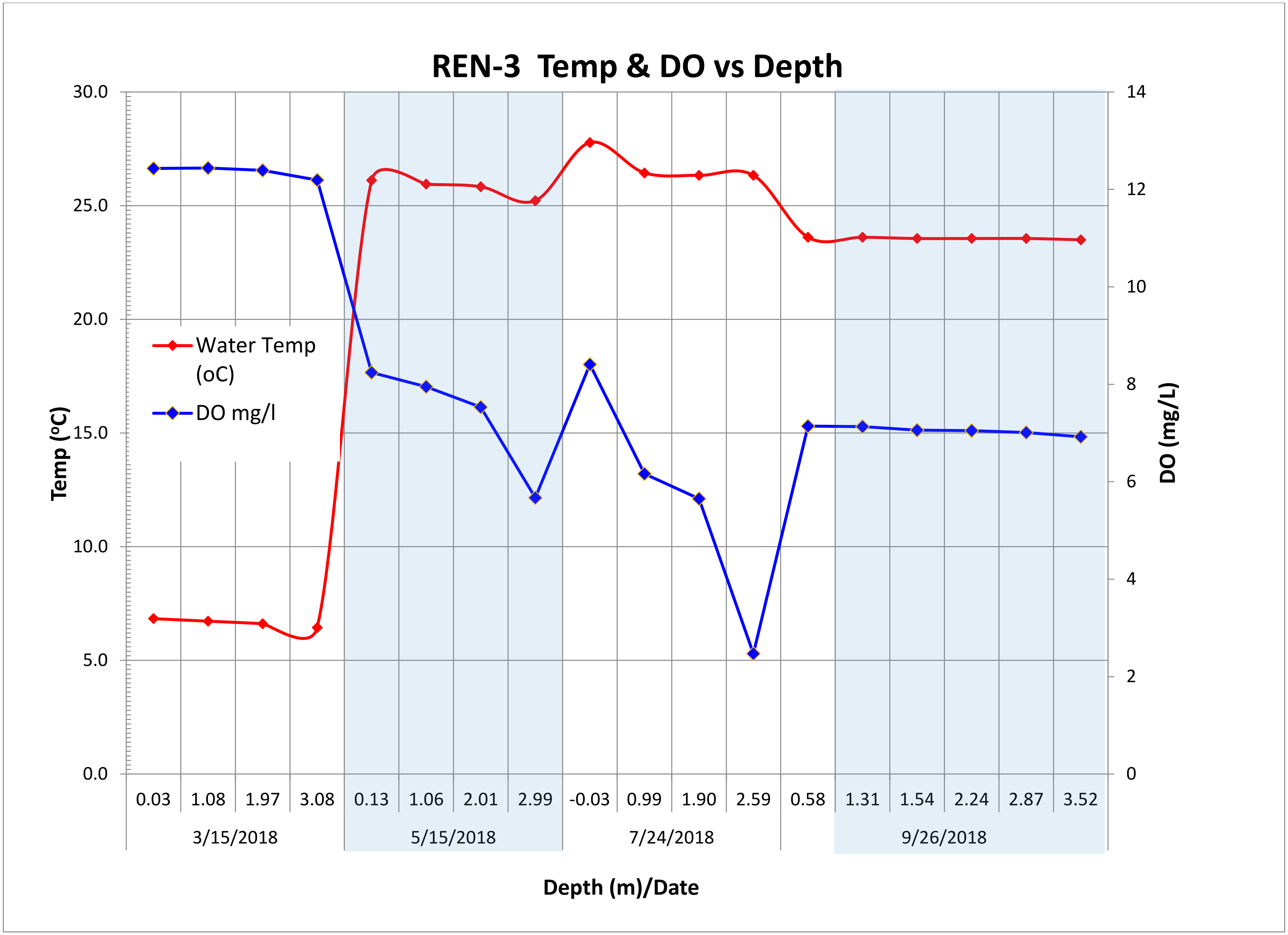
Site	Date	Depth	Water Tem (ºC)	Redox (mv)	Cond (uS)	DO %	DO mg/L	pH	Time	Seechi (in)	Total Depth
		4.79	23.8	127.4	263	64.2	5.42	7.76	12:27		
		6.30	23.8	112.6	263	64.3	5.43	7.77	12:27		
		7.14	23.8	96.5	263	65	5.49	7.78	12:26		
		7.50	23.7	43.4	263.4	63	5.33	7.79	12:25		
REN-3	3/15/2018	0.03	6.8	116.2	261.2	102	12.43	8.2	11:57	15	12
		1.08	6.7	117.9	259.7	101.8	12.44	8.16	11:57		
		1.97	6.6	120.5	259.6	101.2	12.39	8.1	11:58		
		3.08	6.4	125.2	259.7	99.2	12.19	7.98	11:58		
	5/15/2018	0.13	26.1	174.2	268.5	101.8	8.24	7.91	11:31	12	13
		1.06	25.9	196.6	270.5	98	7.95	7.53	11:32		
		2.01	25.8	203.7	271.2	92.6	7.53	7.4	11:32		
		2.99	25.2	209.8	271.2	69	5.67	7.06	11:33		
	7/24/2018	-0.03	27.8	28.7	278.9	107	8.41	9.13	10:14	11	8.4
		0.99	26.4	11.4	282.3	76.7	6.16	8.74	10:15		
		1.90	26.3	3.9	281.7	70.1	5.65	8.62	10:15		
		2.59	26.3	-48.7	283.6	30.6	2.47	8.33	10:16		
	9/26/2018	0.58	23.6	393.8	212.5	84.2	7.14	8.05	11:29	9	12.6
		1.31	23.6	392.1	212.4	84.1	7.13	8.05	11:29		
		1.54	23.6	394.4	212.8	83.3	7.06	8.06	11:30		
		2.24	23.6	393.4	212.9	83.1	7.05	8.06	11:30		
		2.87	23.6	390.8	213.1	82.6	7.01	8.04	11:31		
		3.52	23.5	256.6	213.2	81.5	6.92	7.99	11:32		
REN-4	3/15/2018	0.03	6.9	109	247.6	95.9	11.67	8.08	12:19	15	11
		1.03	6.8	110.3	248	95.7	11.67	8	12:19		
		2.12	6.8	114.1	248.6	95.6	11.66	7.89	12:20		
		3.08	6.7	120.7	250.3	95	11.6	7.75	12:21		
	5/15/2018	0.00	25.1	179.4	274.5	97.2	8.01	7.61	11:51	10	11
		0.98	24.6	205.9	274.3	90.9	7.57	7.14	11:51		
		2.01	24.3	212.6	272.1	84.4	7.07	7.01	11:52		
		3.01	23.6	204.7	275.4	48.2	4.09	6.78	11:53		
	7/24/2018	-0.04	27.4	-8.7	289.5	100.7	7.96	8.82	10:36	11	8.5
		1.04	27.0	-9.5	289.1	91.1	7.26	8.75	10:37		
		2.07	26.8	-10.2	288.6	78.1	6.24	8.6	10:37		

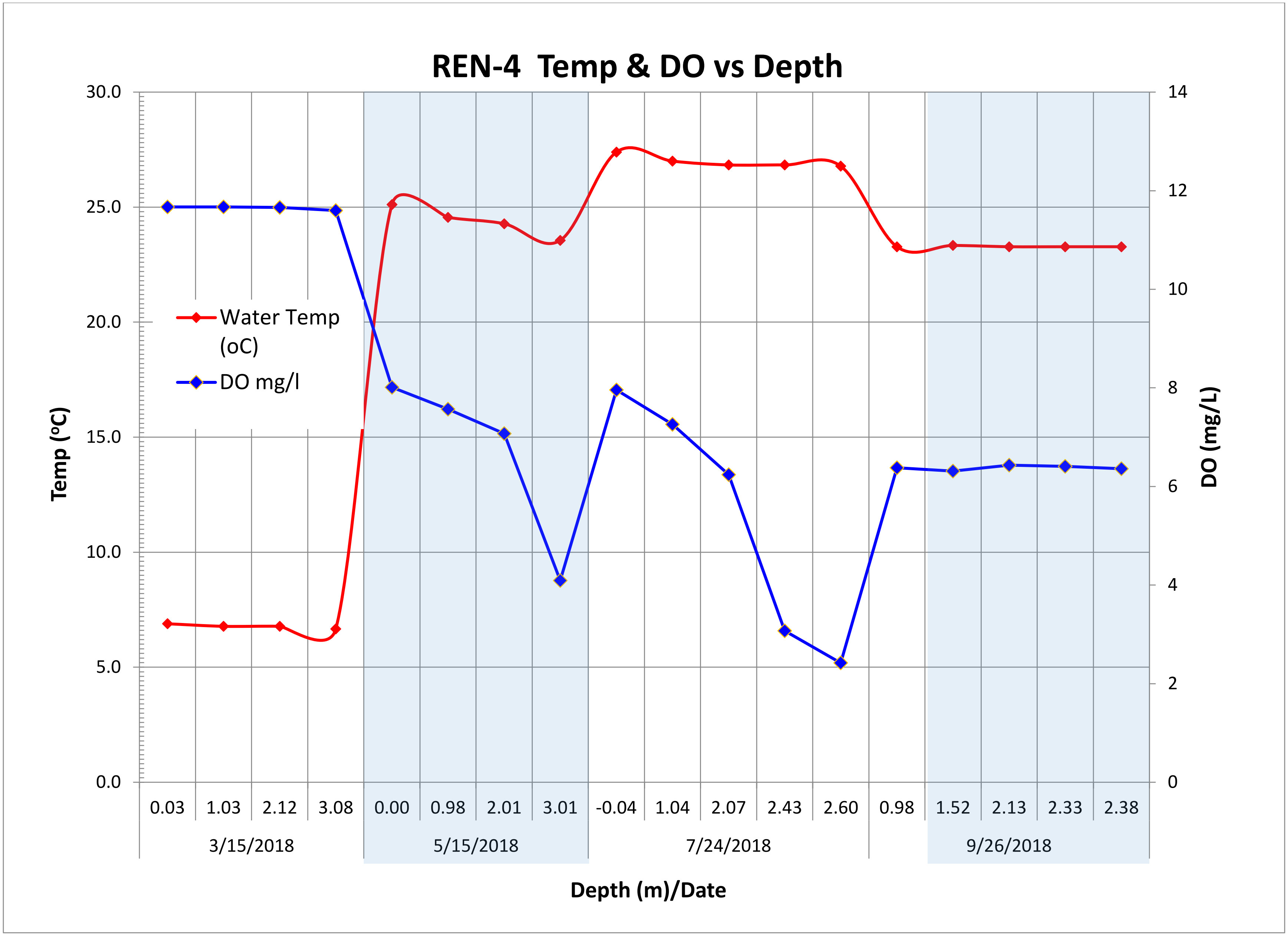
Site	Date	Depth	Water Tem (ºC)	Redox (mv)	Cond (uS)	DO %	DO mg/L	pH	Time	Seechi (in)	Total Depth
		2.43	26.8	-143.2	289.3	38.5	3.07	8.52	10:37		
		2.60	26.8	-122.3	294.1	30.3	2.42	8.28	10:37		
	9/26/2018	0.98	23.3	402.4	215.7	74.9	6.38	7.81	11:05	10	10
		1.52	23.3	401.5	217	74.1	6.31	7.78	11:04		
		2.13	23.3	400	215.3	75.4	6.43	7.82	11:06		
		2.33	23.3	350.2	215.3	75.2	6.41	7.8	11:06		
		2.38	23.3	289	215.1	74.6	6.36	7.79	11:07		
REN-5	3/15/2018	0.58	4.9	148.2	695.1	88.5	11.32	7.57	7:49		
	5/15/2018	0.32	22.4	182.5	892.9	46	3.98	7.49	8:50		
	7/24/2018	0.26	23.0	150	500.7	31.2	2.67	7.44	8:11		
	9/26/2018	0.65	21.8	401.3	252.8	56.8	4.98	7.29	9:00		
REN-7	3/15/2018	1.04	8.2	183.6	610.1	98.7	11.6	7.82	13:38		
	5/15/2018	0.90	23.9	219.7	721.3	67.6	5.69	7.19	13:20		
	7/24/2018	0.54	24.8	68.2	690.8	85.8	7.1	7.69	12:31		
	9/26/2018	0.55	23.6	395.7	181.1	52.7	4.47	7.04	13:37		
REN-8	3/15/2018	0.08	7.2	104.7	187.8	104	12.56	8.33	11:27	11	15
		1.03	7.1	104.5	187.5	103.8	12.57	8.32	11:27		
		2.09	7.1	105.2	187.8	104.2	12.62	8.29	11:28		
		3.04	7.1	108.8	187.3	104.3	12.64	8.23	11:28		
		4.16	7.1	110.3	187.4	103.8	12.58	8.18	11:29		
	5/15/2018	0.00	26.9	176.6	239.3	123.2	9.82	8.63	11:05	22	14
		1.11	26.9	171.2	239.4	124.8	9.95	8.82	11:05		
		2.10	26.8	173.8	239.6	120	9.6	8.74	11:06		
		3.07	26.1	193.4	244.5	87.1	7.05	7.81	11:07		
		3.47	25.9	196.2	245.1	80.3	6.53	7.72	11:07		
	7/24/2018	-0.04	27.8	4.4	264.3	95.8	7.52	9.22	9:45	12	9.2
		1.08	27.2	22.6	264.9	59.2	4.69	8.33	9:46		
		2.12	27.1	22.7	265.3	56.6	4.5	8.36	9:47		
		2.82	27.1	-12.8	266.1	49.4	3.92	8.19	9:47		
	9/26/2018	0.25	24.0	147.4	133.2	72.3	6.09	7.3	11:59	12	10.5
		1.11	23.8	142.3	132.1	68.1	5.74	7.24	11:59		
		1.85	23.6	128.1	131.4	60.6	5.14	7.19	11:59		
		2.84	23.4	-119.7	227.5	6.8	0.57	7.2	11:56		

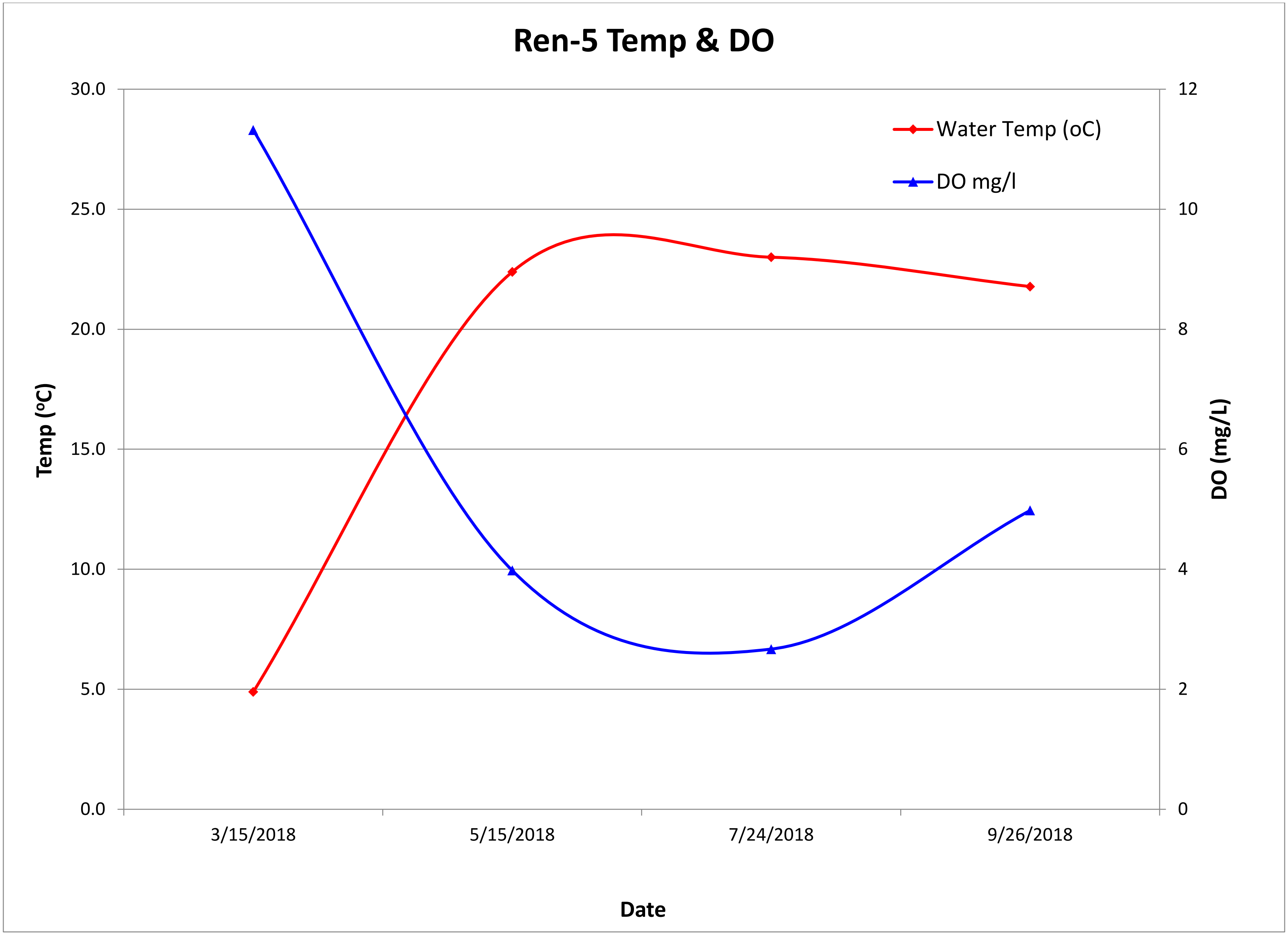
Site	Date	Depth	Water Tem (ºC)	Redox (mv)	Cond (uS)	DO %	DO mg/L	pH	Time	Seechi (in)	Total Depth
REN-MAR	7/24/2018	1.05	27.4	139.7	271.7	73.2	5.78	8.63	11:06		
REN-MAR	9/26/2018	1.03	23.7	413.6	262.7	43	3.64	7.58	10:42		
REN-MAR	9/26/2018	2.08	23.7	411.1	263.1	40.1	3.4	7.54	10:43		
REN-MAR	5/15/2018	0.51	22.7	209.4	261.8	95.4	8.23	7.35	12:16		

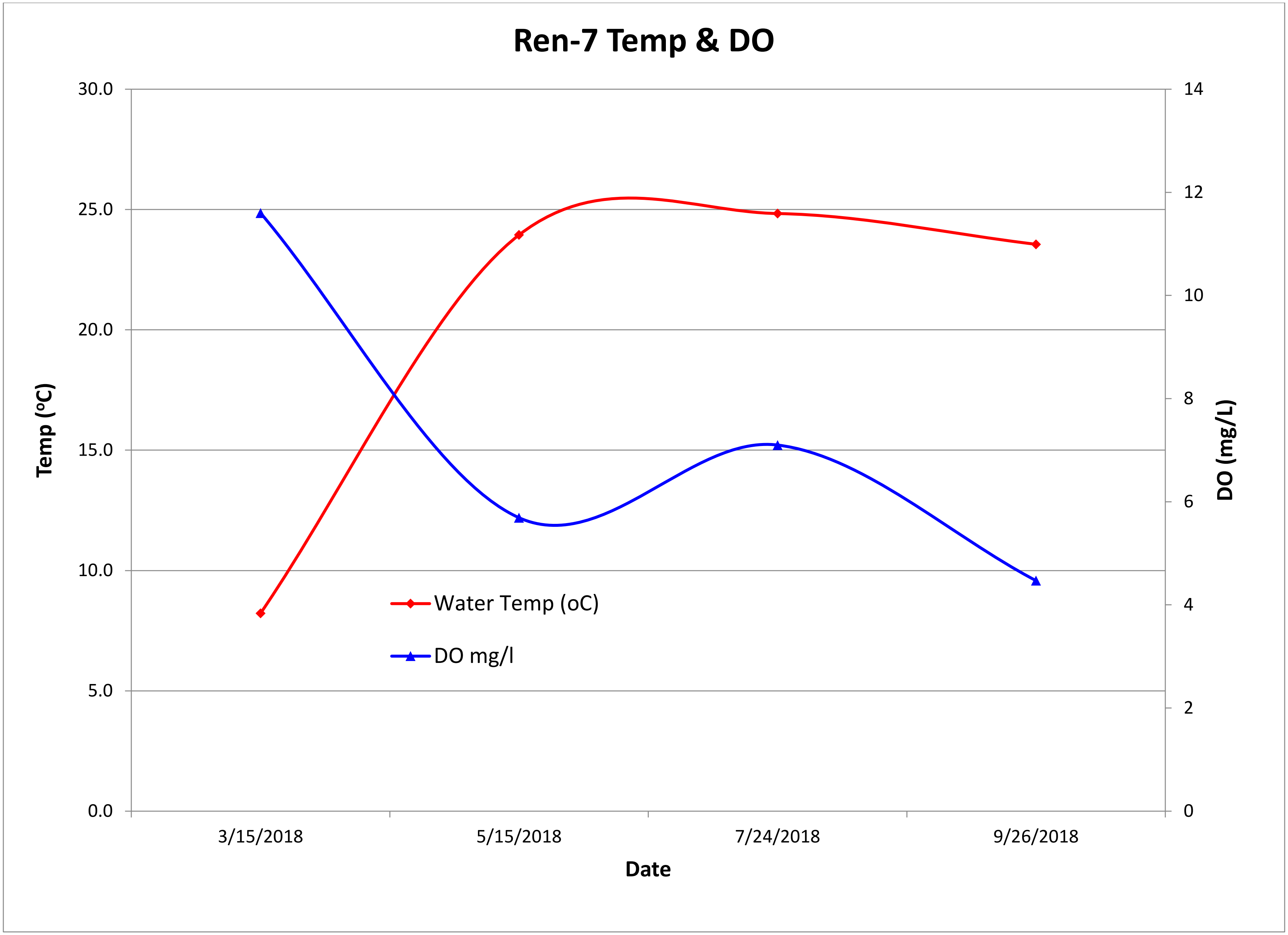

Ren-1 Temp & DO
Water Temp (oC)
DO mg/l
Temp (ºC)
DO (mg/L)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
14
12
10
8
6
4
2
0
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Date

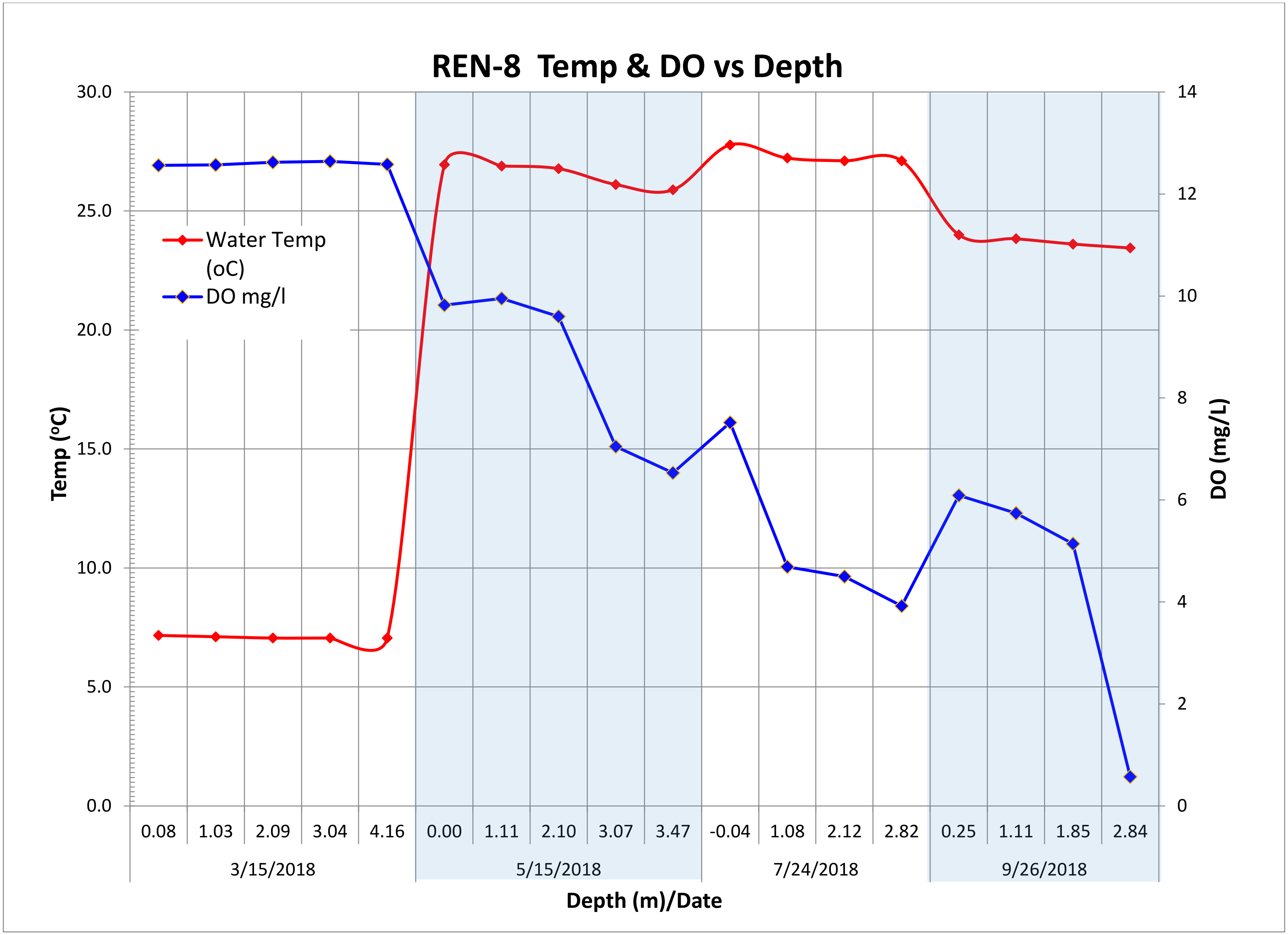

REN-2 Temp & DO vs Depth
Water Temp (oC)
DO mg/l
Temp (ºC)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
14
12
10
8
6
4
2
0
0.04
1.29
2.01
3.09
4.04
5.11
6.11
7.16
0.15
1.09
2.06
3.00
4.17
5.22
5.90
7.11
7.54
-0.03
0.81
2.06
3.08
4.22
5.06
6.10
6.98
0.48
1.49
3.28
4.79
6.30
7.14
7.50
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth (m)/ Date

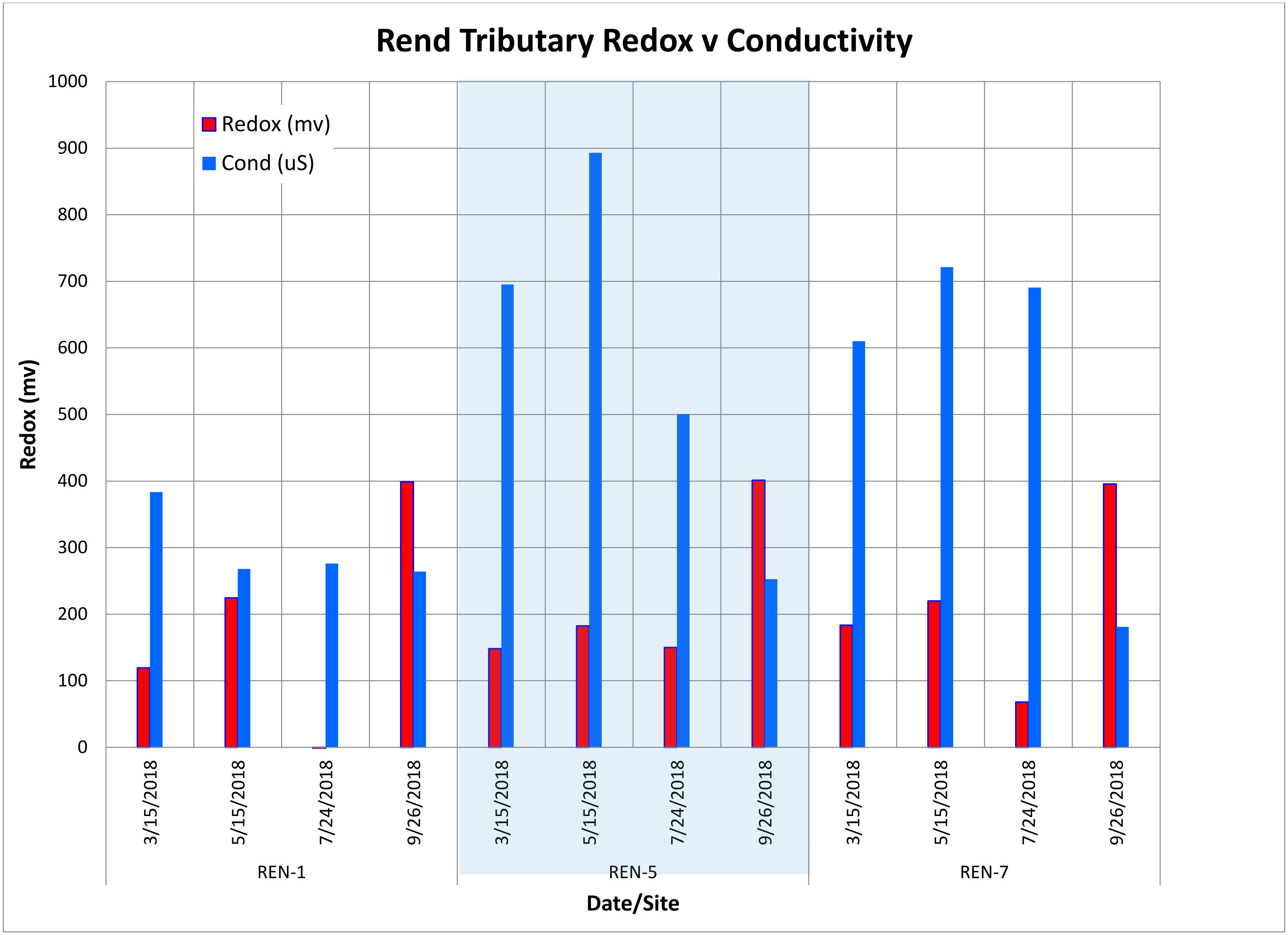

REN-3 Temp & DO vs Depth
Temp (ºC)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
DO (mg/L)
14
12
10
8
6
4
2
0
Water Temp (oC)
DO mg/l
0.03
1.08
1.97
3.08
0.13
1.06
2.01
2.99
-0.03
0.99
1.90
2.59
0.58
1.31
1.54
2.24
2.87
3.52
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth (m)/Date

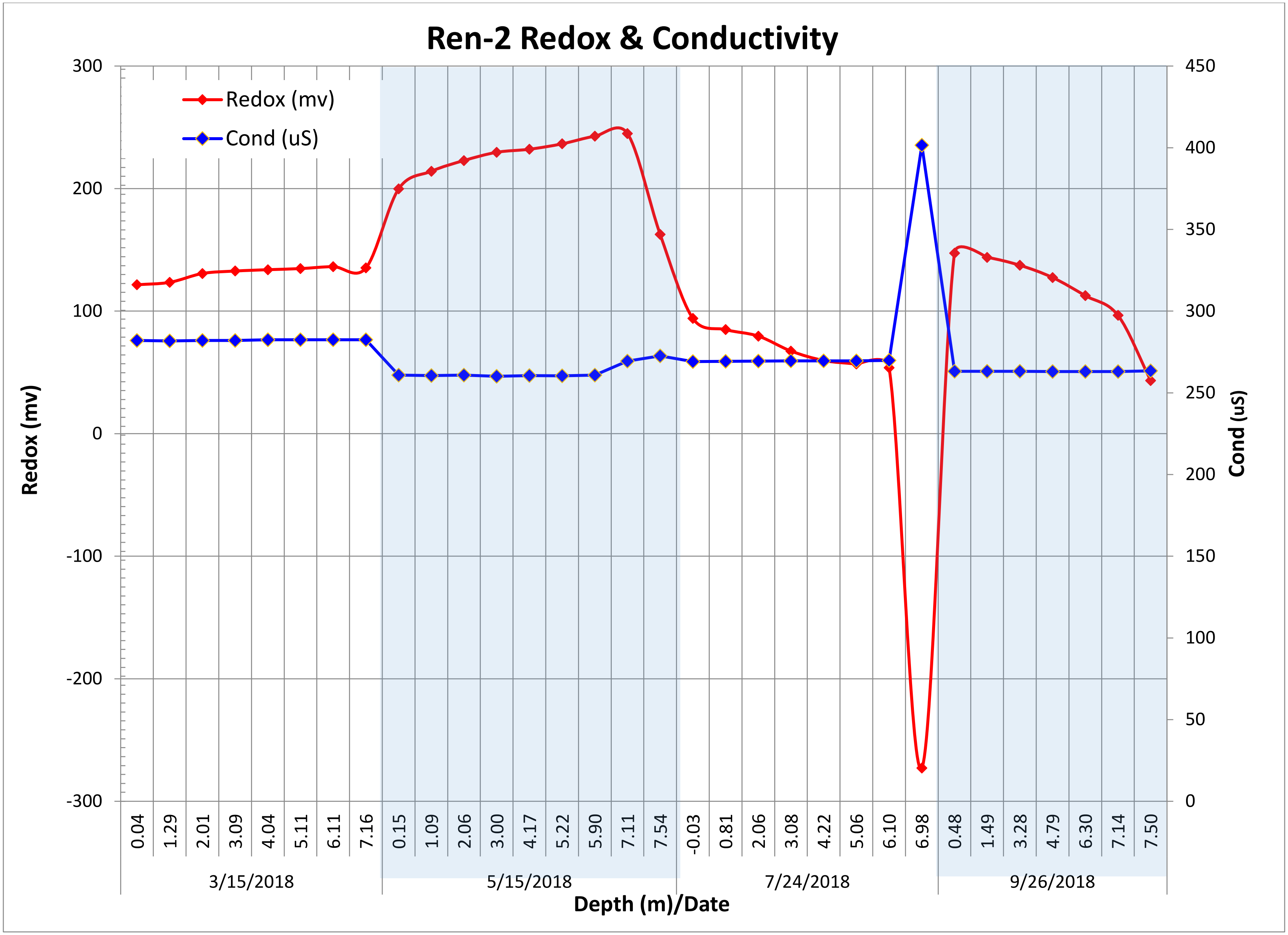

REN-4 Temp & DO vs Depth
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Temp (ºC)
14
12
10
8
6
4
2
0
DO (mg/L)
Water Temp (oC)
DO mg/l
0.03 1.03 2.12 3.08 0.00 0.98 2.01 3.01 -0.04 1.04 2.07 2.43 2.60 0.98 1.52 2.13 2.33 2.38
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth (m)/Date


Ren-5 Temp & DO
Water Temp (oC)
DO mg/l
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12
10
8
6
4
2
0
Temp (ºC)
DO (mg/L)
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Date

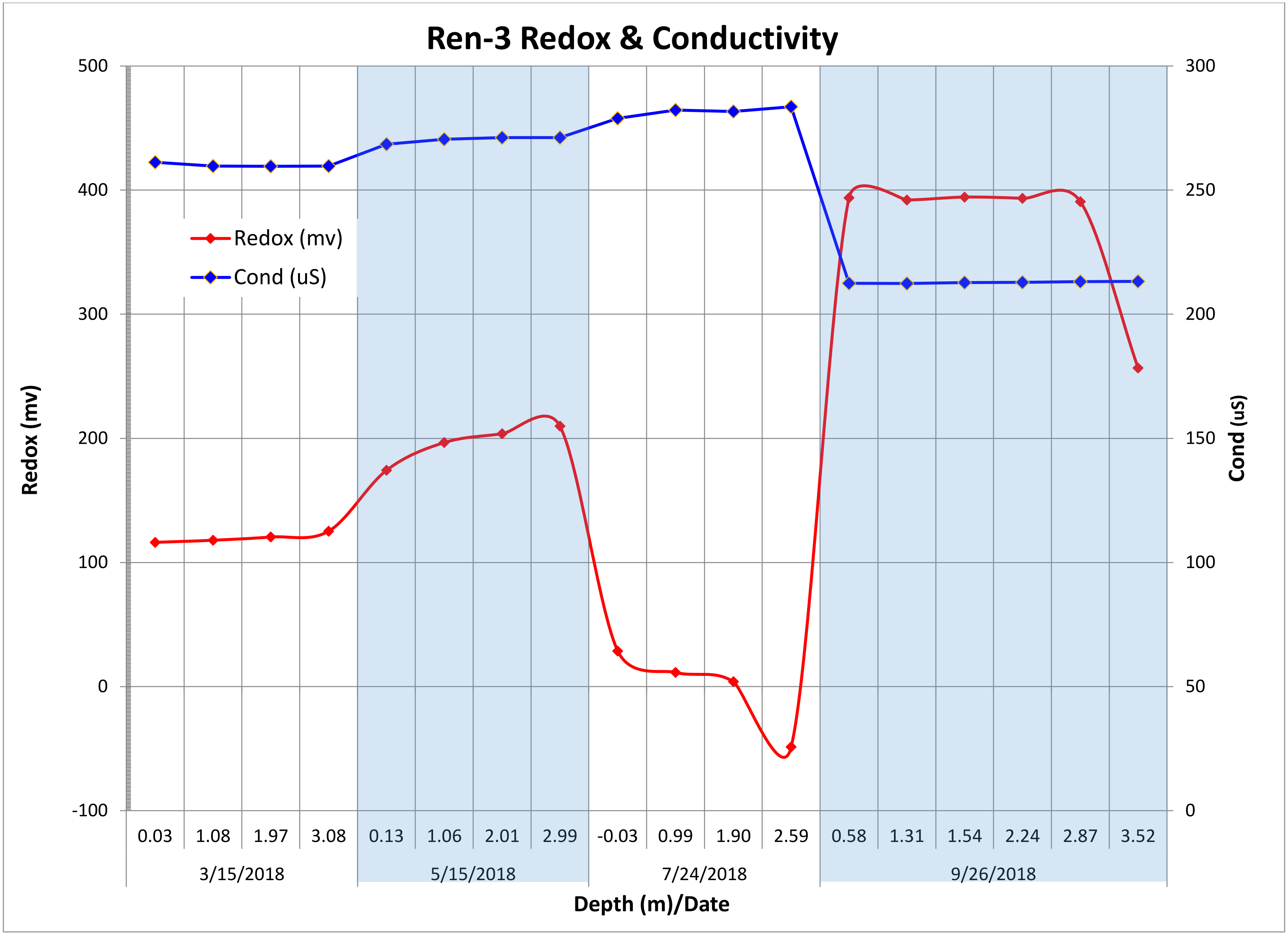

Ren-7 Temp & DO
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Temp (ºC)
14
12
10
8
6
4
2
0
DO (mg/L)
Water Temp (oC)
DO mg/l
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Date


REN-8 Temp & DO vs Depth
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Temp (ºC)
14
12
10
8
6
4
2
0
DO (mg/L)
Water Temp (oC)
DO mg/l
0.08
1.03
2.09
3.04
4.16
0.00
1.11
2.10
3.07
3.47
-0.04
1.08
2.12
2.82
0.25
1.11
1.85
2.84
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth (m)/Date

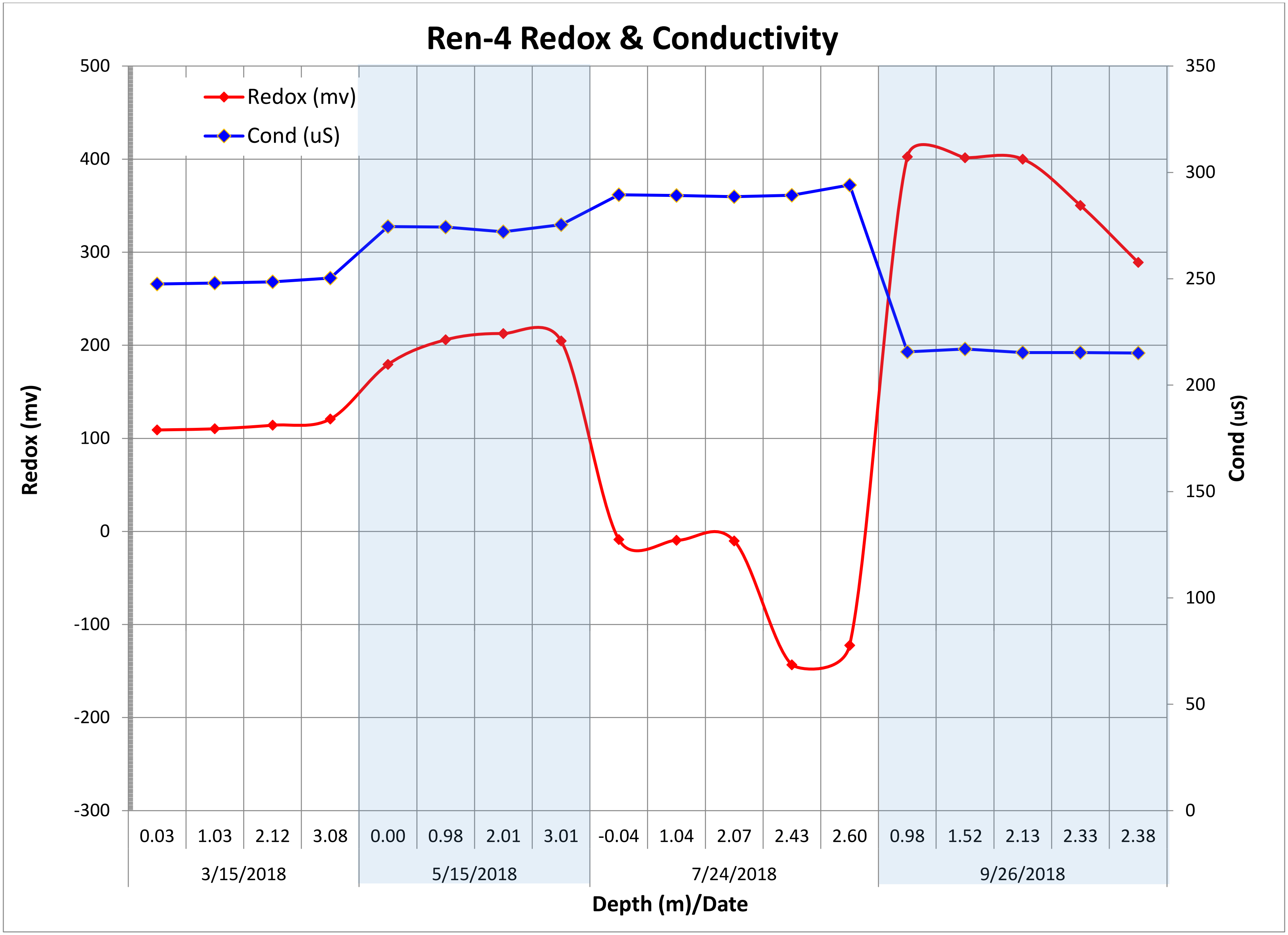

Rend Tributary Redox v Conductivity
Redox (mv)
Cond (uS)
1000
900
800
700
600
500
400
300
200
100
0
Redox (mv)
3/15/2018
5/15/2018
7/24/2018
9/26/2018
3/15/2018
5/15/2018
7/24/2018
9/26/2018
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-1
REN-5
REN-7
Date/Site

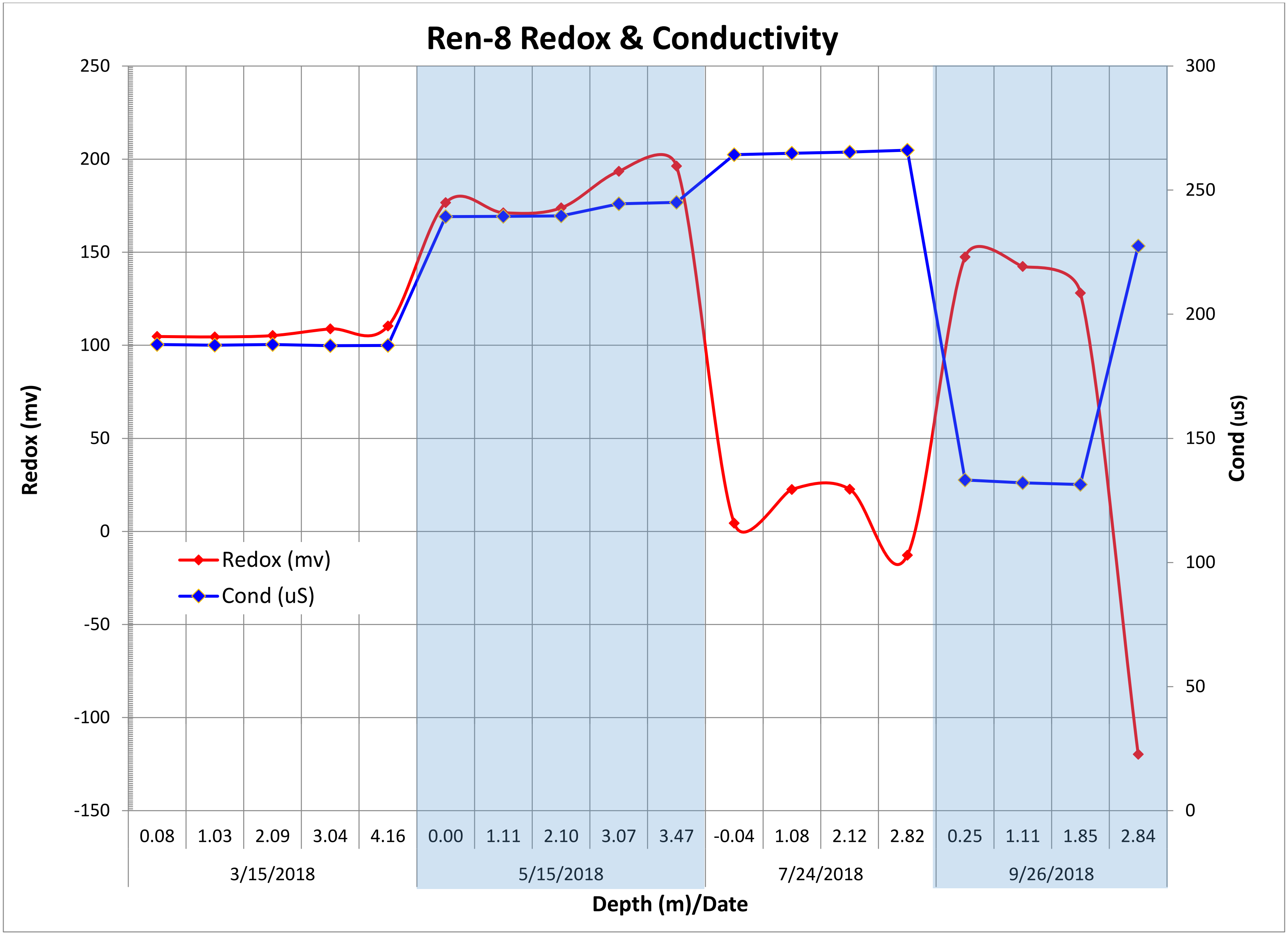


Ren-2 Redox & Conductivity
Redox (mv)
Cond (uS)
300
200
100
0
-100
-200
-300
450
400
350
300
250
200
150
100
50
0
Redox (mv)
Cond (us)
0.04
1.29
2.01
3.09
4.04
5.11
6.11
7.16
0.15
1.09
2.06
3.00
4.17
5.22
5.90
7.11
7.54
-0.03
0.81
2.06
3.08
4.22
5.06
6.10
6.98
0.48
1.49
3.28
4.79
6.30
7.14
7.50
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth (m)/Date

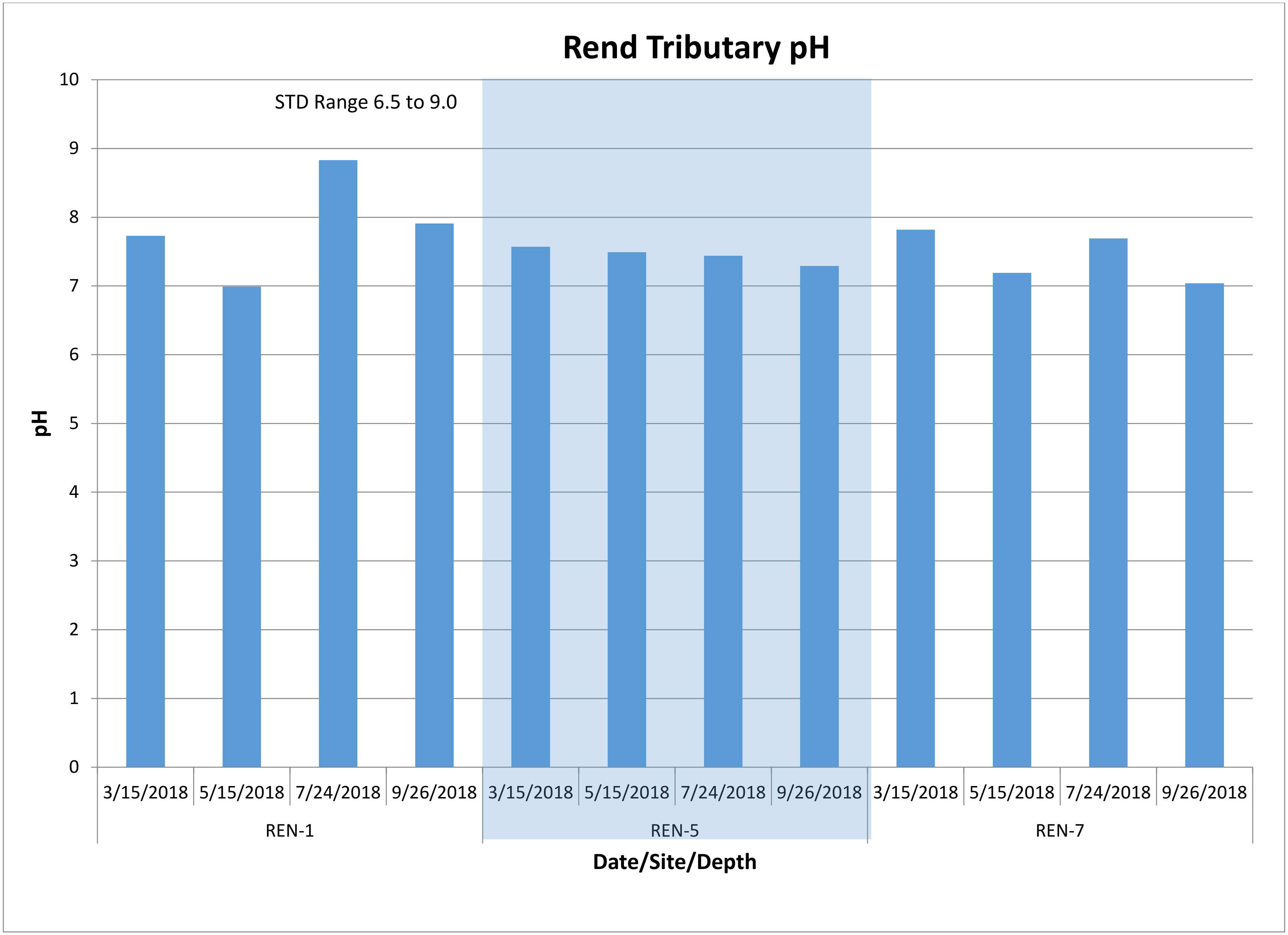


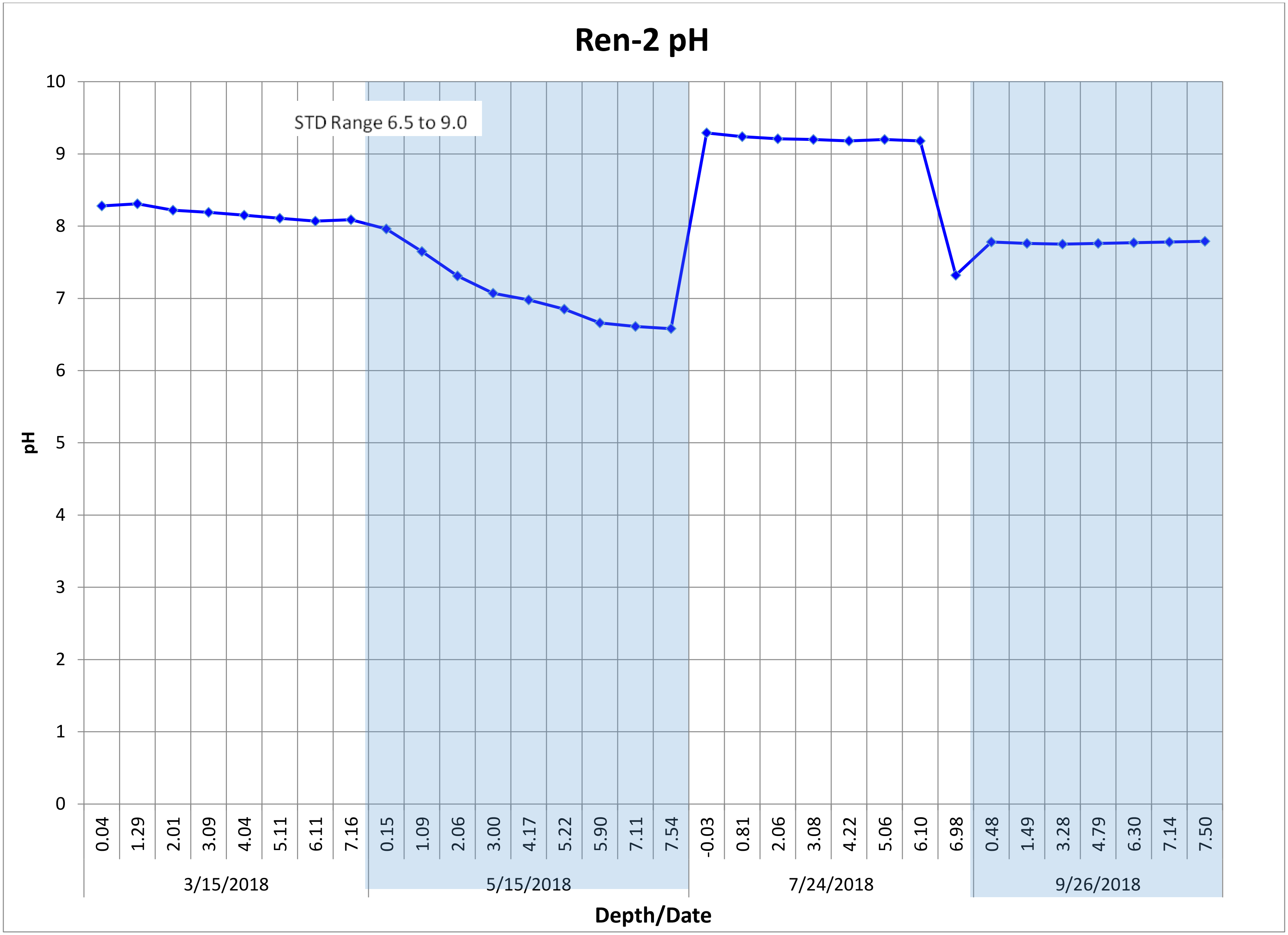
Ren-3 Redox & Conductivity
Redox (mv)
Cond (uS)
500
400
300
200
100
0
-100
300
250
200
150
100
50
0
0.03
1.08
1.97
3.08
0.13
1.06
2.01
2.99
-0.03
0.99
1.90
2.59
0.58
1.31
1.54
2.24
2.87
3.52
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth (m)/Date


Ren-4 Redox & Conductivity
Redox (mv)
Cond (uS)
500
400
300
200
100
0
-100
-200
-300
350
300
250
200
150
100
50
0
Redox (mv)
Cond (uS)
0.03
1.03
2.12
3.08
0.00
0.98
2.01
3.01
-0.04
1.04
2.07
2.43
2.60
0.98
1.52
2.13
2.33
2.38
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth (m)/Date

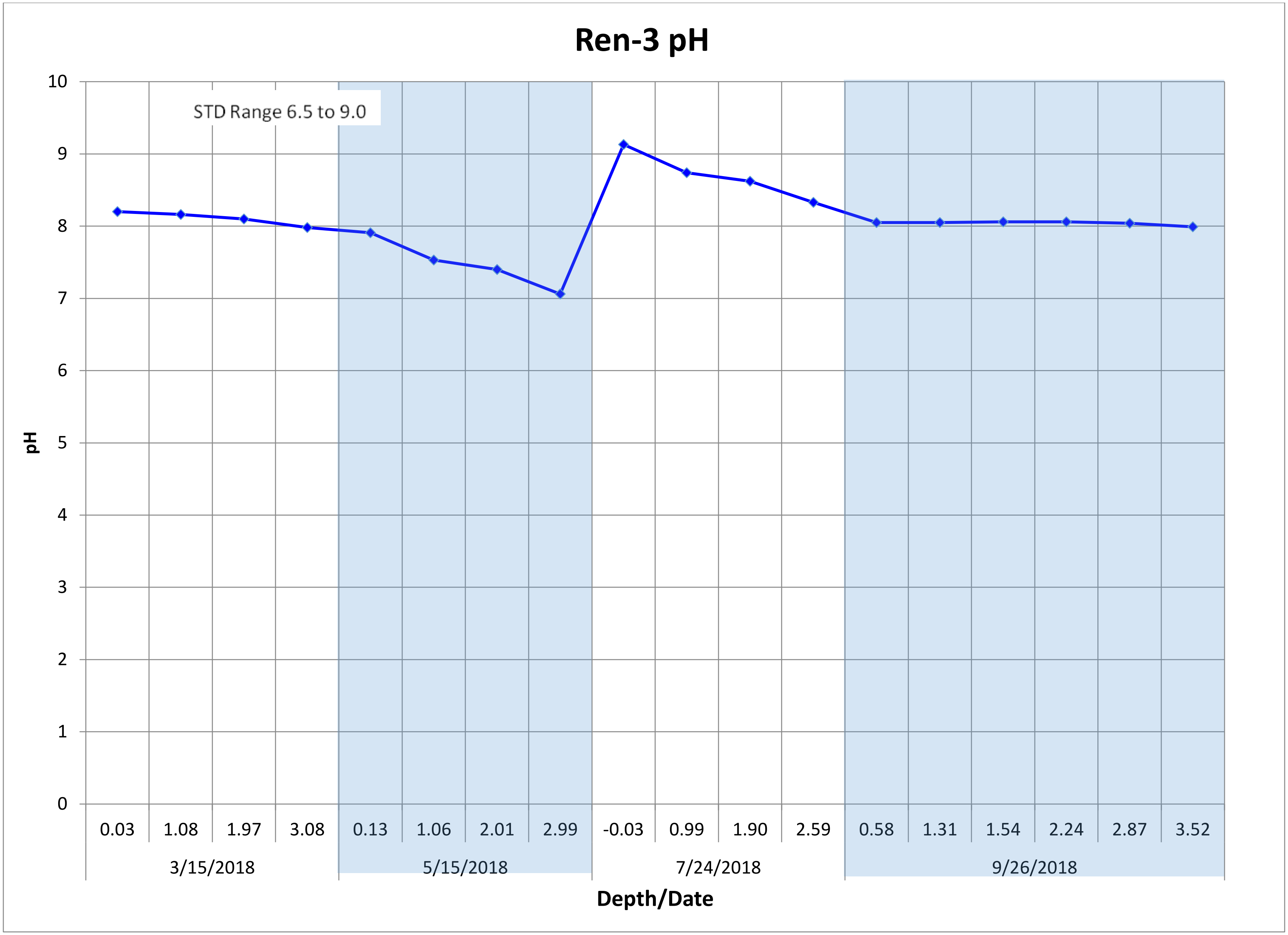


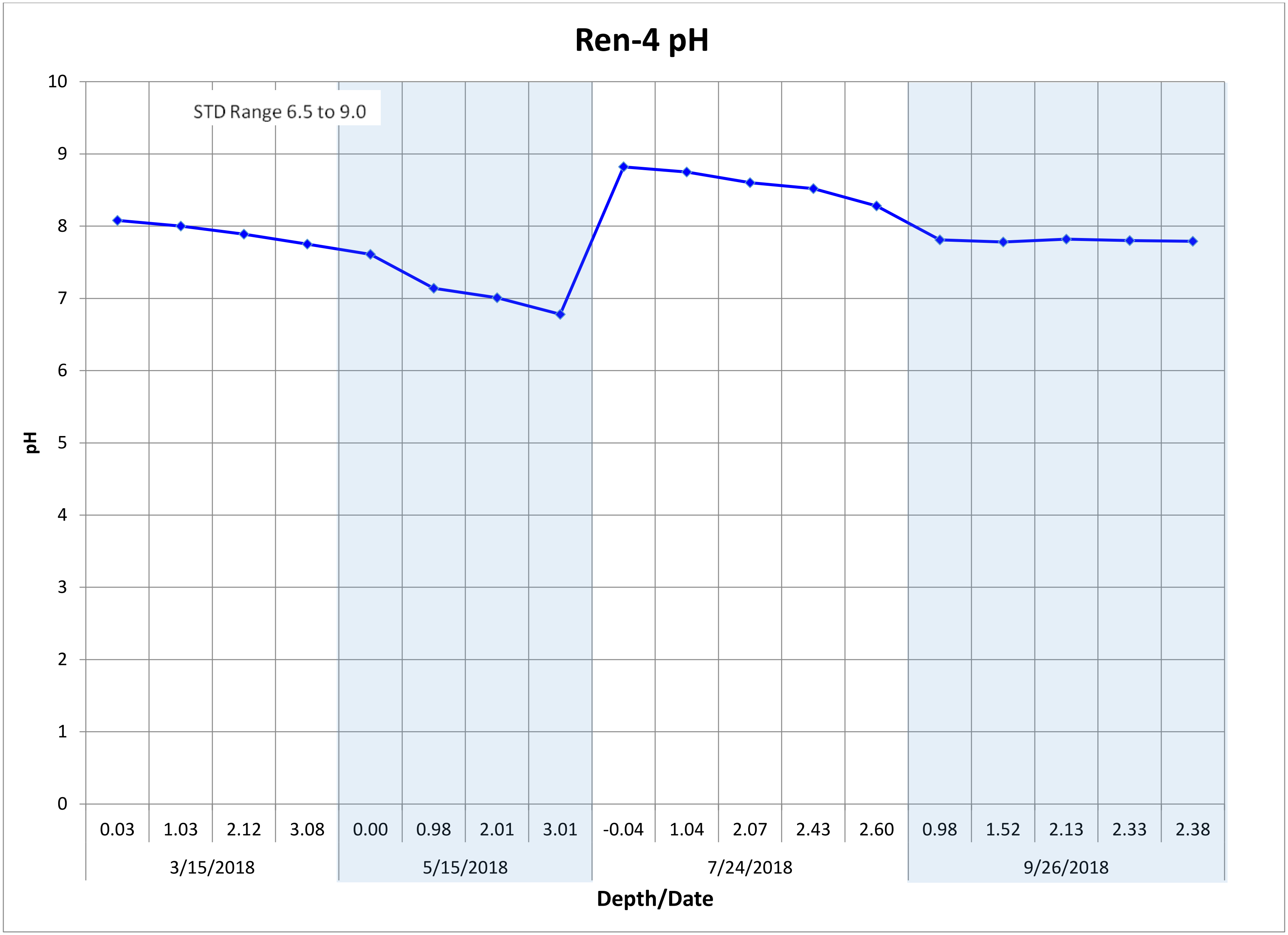
Ren-8 Redox & Conductivity
Redox (mv)
250
200
150
100
50
0
-50
-100
-150
Cond (us)
300
250
200
150
100
50
0
Redox (mv)
Cond (uS)
0.08
1.03
2.09
3.04
4.16
0.00
1.11
2.10
3.07
3.47
-0.04
1.08
2.12
2.82
0.25
1.11
1.85
2.84
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth (m)/Date

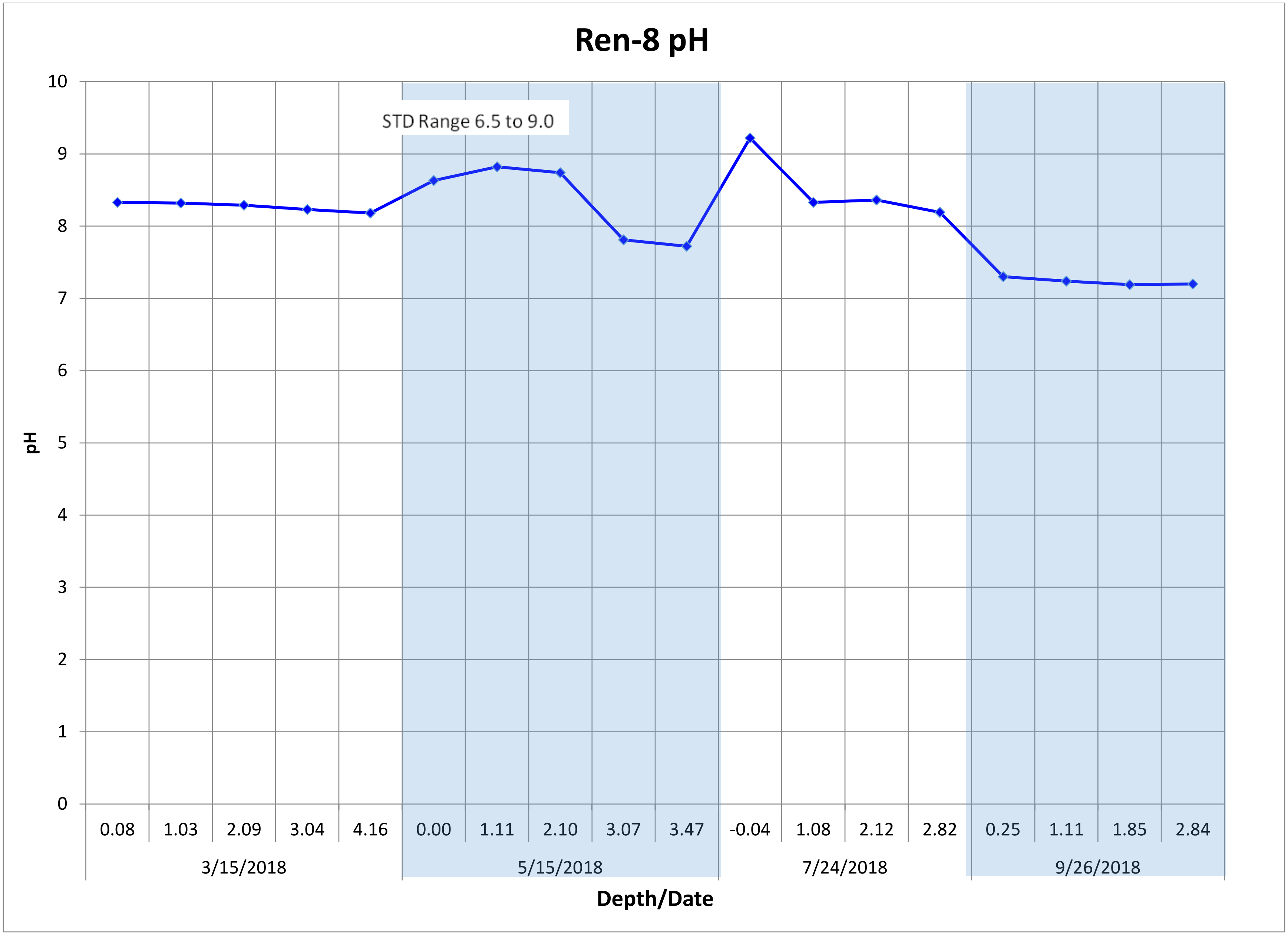

Rend Tributary pH
STD Range 6.5 to 9.0
pH
10
9
8
7
6
5
4
3
2
1
0
3/15/2018
5/15/2018
7/24/2018
9/26/2018
3/15/2018
5/15/2018
7/24/2018
9/26/2018
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-1
REN-5
REN-7
Date/Site/Depth



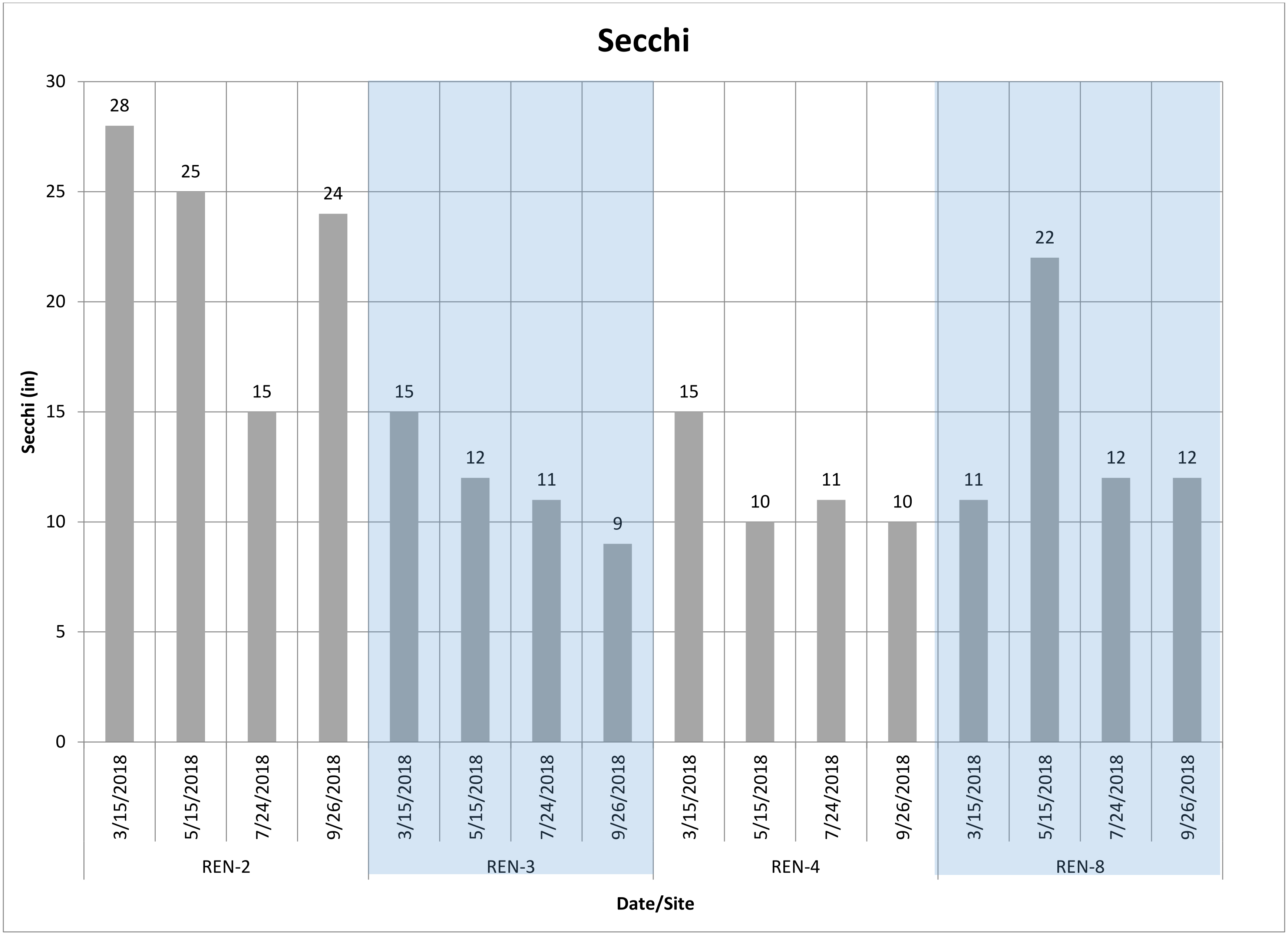
Ren-2 pH
STD Range 6.5 to 9.0
pH
10
9
8
7
6
5
4
3
2
1
0
0.04
1.29
2.01
3.09
4.04
5.11
6.11
7.16
0.15
1.09
2.06
3.00
4.17
5.22
5.90
7.11
7.54
-0.03
0.81
2.06
3.08
4.22
5.06
6.10
6.98
0.48
1.49
3.28
4.79
6.30
7.14
7.50
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth/Date


Ren-3 pH
STD Range 6.5 to 9.0
pH
10
9
8
7
6
5
4
3
2
1
0
0.03
1.08
1.97
3.08
0.13
1.06
2.01
2.99
-0.03
0.99
1.90
2.59
0.58
1.31
1.54
2.24
2.87
3.52
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth/Date


Ren-4 pH
STD Range 6.5 to 9.0
pH
10
9
8
7
6
5
4
3
2
1
0
0.03
1.03
2.12
3.08
0.00
0.98
2.01
3.01
-0.04
1.04
2.07
2.43
2.60
0.98
1.52
2.13
2.33
2.38
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth/Date



Ren-8 pH
STD Range 6.5 to 9.0
10
9
8
7
6
5
4
3
2
1
0
pH
0.08
1.03
2.09
3.04
4.16
0.00
1.11
2.10
3.07
3.47
-0.04
1.08
2.12
2.82
0.25
1.11
1.85
2.84
3/15/2018
5/15/2018
7/24/2018
9/26/2018
Depth/Date



Secchi
Secchi (in)
30
25
20
15
10
5
0
28
25
15
24
15
12
11
9
15
10
11
10
11
22
12
12
3/15/2018
5/15/2018
7/24/2018
9/26/2018
REN-2
REN-3
REN-4
REN-8
Date/Site

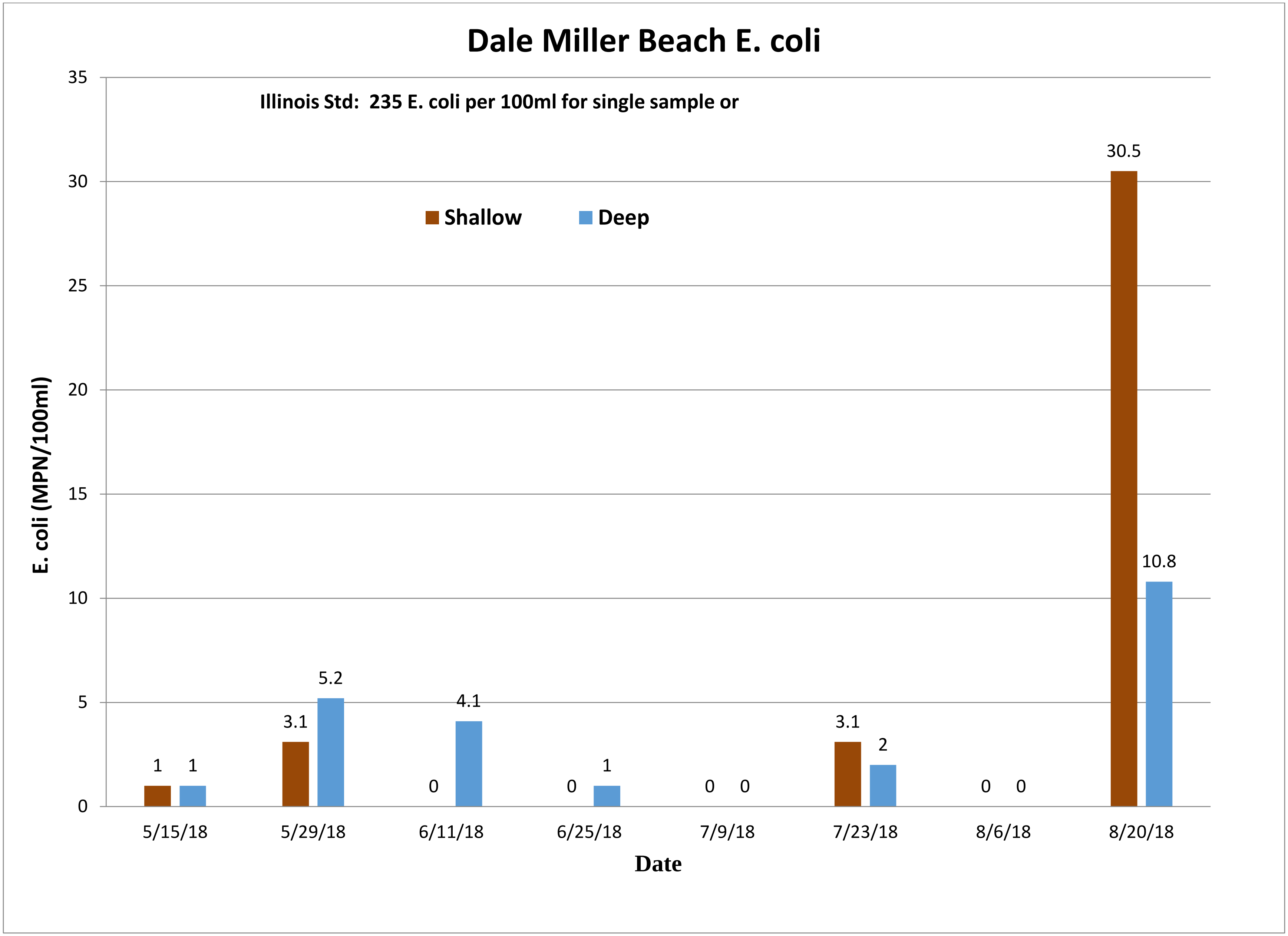
APPENDIX D

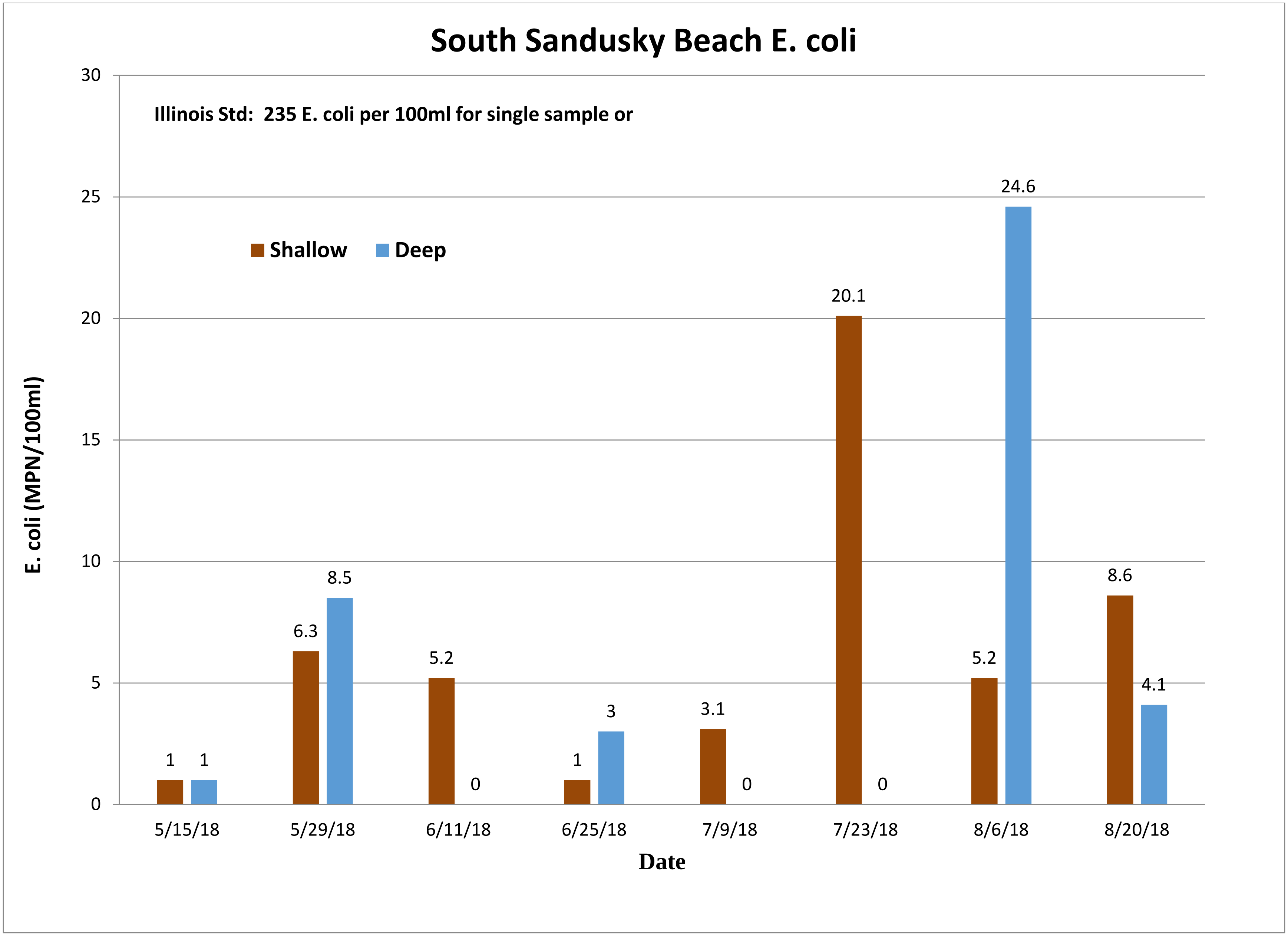
BEACH DATA & GRAPHS

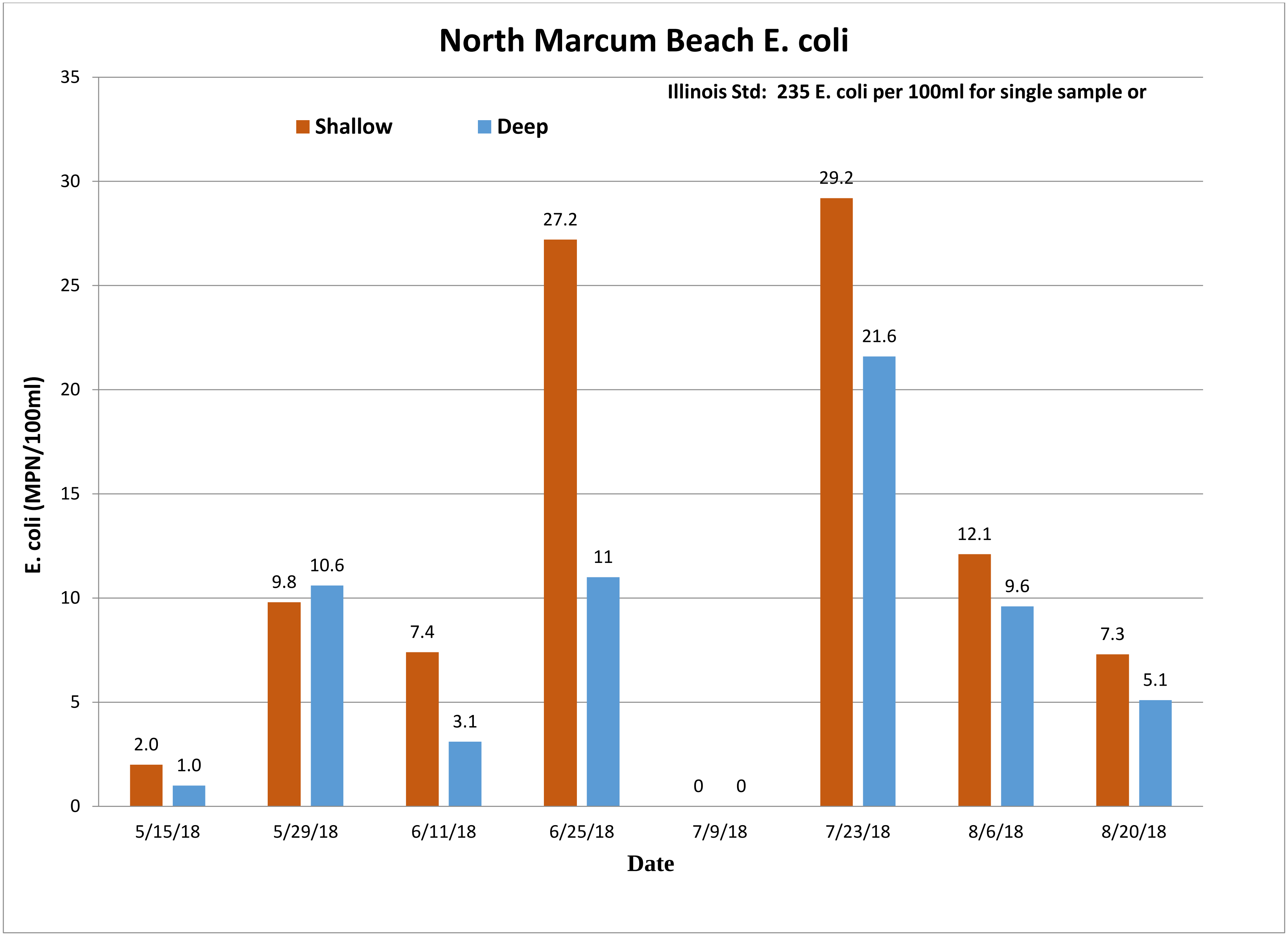
E. Coli Beach Data

Site	Date Collected	Shallow	Deep
Dale Miller Beach	5/15/2018	1	1
Dale Miller Beach	5/29/2018	3.1	5.2
Dale Miller Beach	6/11/2018	0	4.1
Dale Miller Beach	6/25/2018	0	1
Dale Miller Beach	7/9/2018	0	0
Dale Miller Beach	7/23/2018	3.1	2
Dale Miller Beach	8/6/2018	0	0
Dale Miller Beach	8/20/2018	30.5	10.8
North Marcum	5/15/2018	2.0	1.0
North Marcum	5/29/2018	9.8	10.6
North Marcum	6/11/2018	7.4	3.1
North Marcum	6/25/2018	27.2	11
North Marcum	7/9/2018	0	0
North Marcum	7/23/2018	29.2	21.6
North Marcum	8/6/2018	12.1	9.6
North Marcum	8/20/2018	7.3	5.1
Sandusky	5/15/2018	1	1
Sandusky	5/29/2018	6.3	8.5
Sandusky	6/11/2018	5.2	0
Sandusky	6/25/2018	1	3
Sandusky	7/9/2018	3.1	0
Sandusky	7/23/2018	20.1	0
Sandusky	8/6/2018	5.2	24.6
Sandusky	8/20/2018	8.6	4.1

Data provided by the project office which contracted with Illinois Department of Health for the analysis.
Illinois standard is 235 E. coli per 100ml for single sample and 126 for geometric mean.


Dale Miller Beach E. coli
Illinois Std: 235 E. coli per 100ml for single sample or
Shallow
Deep
E. coli (MPN/100ml)
35
30
25
20
15
10
5
0
1
1
3.1
5.2
0
4.1
0
1
0
0
3.1
2
0
0
30.5
10.8
5/15/18
5/29/18
6/11/18
6/25/18
7/9/18
7/23/18
8/6/18
8/20/18
Date


South Sandusky Beach E. coli
Illinois Std: 235 E. coli per 100ml for single sample or
Shallow
Deep
E. coli (MPN/100ml)
30
25
20
15
10
5
0
1
1
6.3
8.5
5.2
0
1
3
3.1
0
20.1
0
5.2
24.6
8.6
4.1
5/15/18
5/29/18
6/11/18
6/25/18
7/9/18
7/23/18
8/6/18
8/20/18
Date


North Marcum Beach E. coli
Illinois Std: 235 E. coli per 100ml for single sample or
Shallow
Deep
E. coli (MPN/100ml)
35
30
25
20
15
10
5
0
2.0
1.0
9.8
10.6
7.4
3.1
27.2
11
0
0
29.2
21.6
12.1
9.6
7.3
5.1
5/15/18
5/29/18
6/11/18
6/25/18
7/9/18
7/23/18
8/6/18
8/20/18
Date

APPENDIX E

SEDIMENT DATA
& GRAPHS

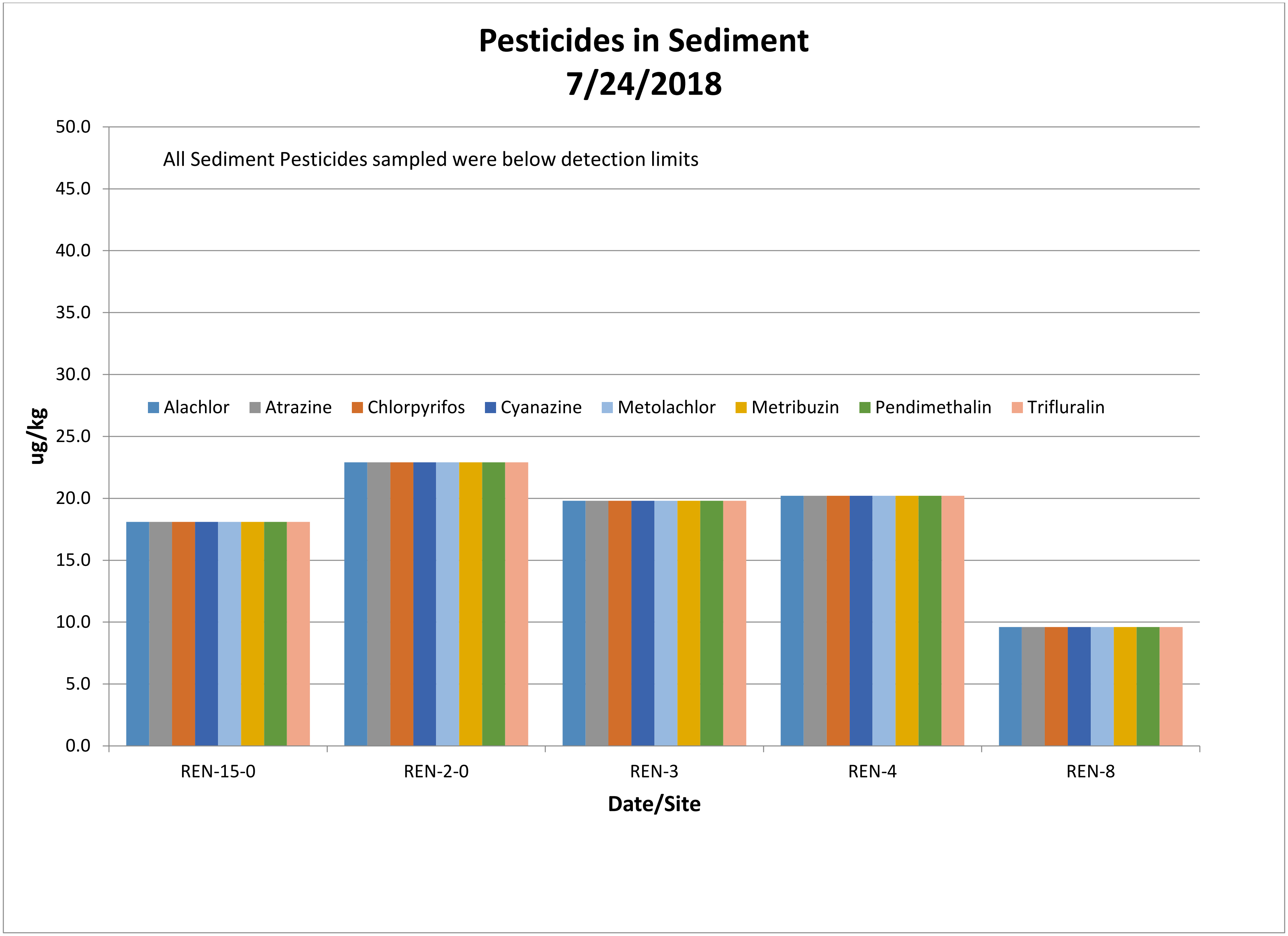
Collection Date	Site #	Parameter	Flag	Reported Result	MDL	PQL	Units
REN-15-0	7/24/2018	Arsenic		7.13	0.741	1.48	MG/KG
REN-2-0	7/24/2018	Arsenic		8.06	0.953	1.91	MG/KG
REN-3	7/24/2018	Arsenic		6.62	0.810	1.62	MG/KG
REN-4	7/24/2018	Arsenic		7.00	0.851	1.70	MG/KG
REN-8	7/24/2018	Arsenic		4.30	0.415	0.829	MG/KG
REN-15-0	7/24/2018	Barium		143	2.47	4.94	MG/KG
REN-2-0	7/24/2018	Barium		208	3.18	6.35	MG/KG
REN-3	7/24/2018	Barium		163	2.70	5.40	MG/KG
REN-4	7/24/2018	Barium		154	2.84	5.67	MG/KG
REN-8	7/24/2018	Barium		63.9	1.38	2.76	MG/KG
REN-15-0	7/24/2018	Boron	<	7.41	7.41	14.8	MG/KG
REN-2-0	7/24/2018	Boron	<	9.53	9.53	19.1	MG/KG
REN-3	7/24/2018	Boron	<	8.10	8.10	16.2	MG/KG
REN-4	7/24/2018	Boron	<	8.51	8.51	17.0	MG/KG
REN-8	7/24/2018	Boron	<	4.15	4.15	8.29	MG/KG
REN-15-0	7/24/2018	Cadmium	<	0.494	0.494	0.987	MG/KG
REN-2-0	7/24/2018	Cadmium	<	0.635	0.635	1.27	MG/KG
REN-3	7/24/2018	Cadmium	<	0.540	0.540	1.08	MG/KG
REN-4	7/24/2018	Cadmium	<	0.567	0.567	1.13	MG/KG
REN-8	7/24/2018	Cadmium	<	0.276	0.276	0.553	MG/KG
REN-15-0	7/24/2018	Chromium		21.0	1.23	2.47	MG/KG
REN-2-0	7/24/2018	Chromium		22.7	1.59	3.18	MG/KG
REN-3	7/24/2018	Chromium		22.5	1.35	2.70	MG/KG
REN-4	7/24/2018	Chromium		21.9	1.42	2.84	MG/KG
REN-8	7/24/2018	Chromium		7.88	0.691	1.38	MG/KG
REN-15-0	7/24/2018	Copper		16.2	2.47	4.94	MG/KG
REN-2-0	7/24/2018	Copper		18.3	3.18	6.35	MG/KG
REN-3	7/24/2018	Copper		16.1	2.70	5.40	MG/KG
REN-4	7/24/2018	Copper		16.9	2.84	5.67	MG/KG
REN-8	7/24/2018	Copper		5.17	1.38	2.76	MG/KG
REN-15-0	7/24/2018	Iron		20800	12.3	24.7	MG/KG
REN-2-0	7/24/2018	Iron		24300	15.9	31.8	MG/KG

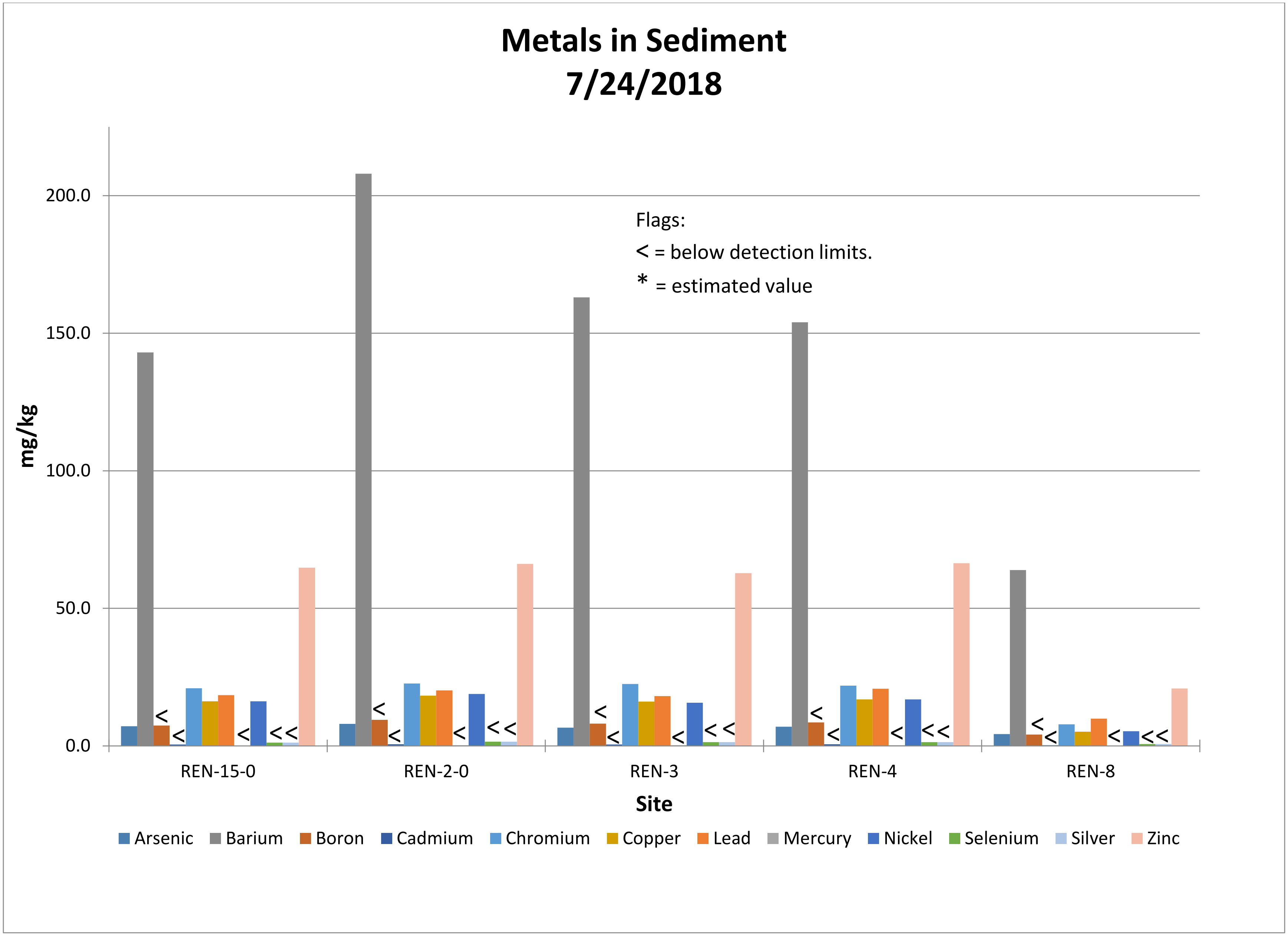
Collection Date	Site #	Parameter	Flag	Reported Result	MDL	PQL	Units
REN-3	7/24/2018	Iron		22700	13.5	27.0	MG/KG
REN-4	7/24/2018	Iron		22100	14.2	28.4	MG/KG
REN-8	7/24/2018	Iron		7600	6.91	13.8	MG/KG
REN-15-0	7/24/2018	Kjeldahl nitrogen		1730	220	231	MG/KG
REN-2-0	7/24/2018	Kjeldahl nitrogen		2660	267	282	MG/KG
REN-3	7/24/2018	Kjeldahl nitrogen		1530	258	272	MG/KG
REN-4	7/24/2018	Kjeldahl nitrogen		2080	284	299	MG/KG
REN-8	7/24/2018	Kjeldahl nitrogen		633	74.1	78.0	MG/KG
REN-15-0	7/24/2018	Lead		18.5	0.741	1.48	MG/KG
REN-2-0	7/24/2018	Lead		20.2	0.953	1.91	MG/KG
REN-3	7/24/2018	Lead		18.1	0.810	1.62	MG/KG
REN-4	7/24/2018	Lead		20.8	0.851	1.70	MG/KG
REN-8	7/24/2018	Lead		9.92	0.415	0.829	MG/KG
REN-15-0	7/24/2018	Manganese		702	1.23	2.47	MG/KG
REN-2-0	7/24/2018	Manganese		2160	1.59	3.18	MG/KG
REN-3	7/24/2018	Manganese		967	1.35	2.70	MG/KG
REN-4	7/24/2018	Manganese		806	1.42	2.84	MG/KG
REN-8	7/24/2018	Manganese		418	0.691	1.38	MG/KG
REN-15-0	7/24/2018	Mercury	<	0.213	0.213	0.532	MG/KG
REN-2-0	7/24/2018	Mercury	<	0.271	0.271	0.678	MG/KG
REN-3	7/24/2018	Mercury	<	0.234	0.234	0.584	MG/KG
REN-4	7/24/2018	Mercury	<	0.239	0.239	0.596	MG/KG
REN-8	7/24/2018	Mercury	<	0.113	0.113	0.284	MG/KG
REN-15-0	7/24/2018	Nickel		16.2	3.70	7.41	MG/KG
REN-2-0	7/24/2018	Nickel		18.9	4.76	9.53	MG/KG
REN-3	7/24/2018	Nickel		15.7	4.05	8.10	MG/KG
REN-4	7/24/2018	Nickel		16.9	4.25	8.51	MG/KG
REN-8	7/24/2018	Nickel		5.34	2.07	4.15	MG/KG
REN-15-0	7/24/2018	Nitrate-N	<	4.51	4.51	4.51	MG/KG
REN-2-0	7/24/2018	Nitrate-N	<	6.76	6.76	6.76	MG/KG
REN-3	7/24/2018	Nitrate-N	<	5.14	5.14	5.14	MG/KG
REN-4	7/24/2018	Nitrate-N	<	5.93	5.93	5.93	MG/KG
REN-8	7/24/2018	Nitrate-N	<	2.84	2.84	2.84	MG/KG

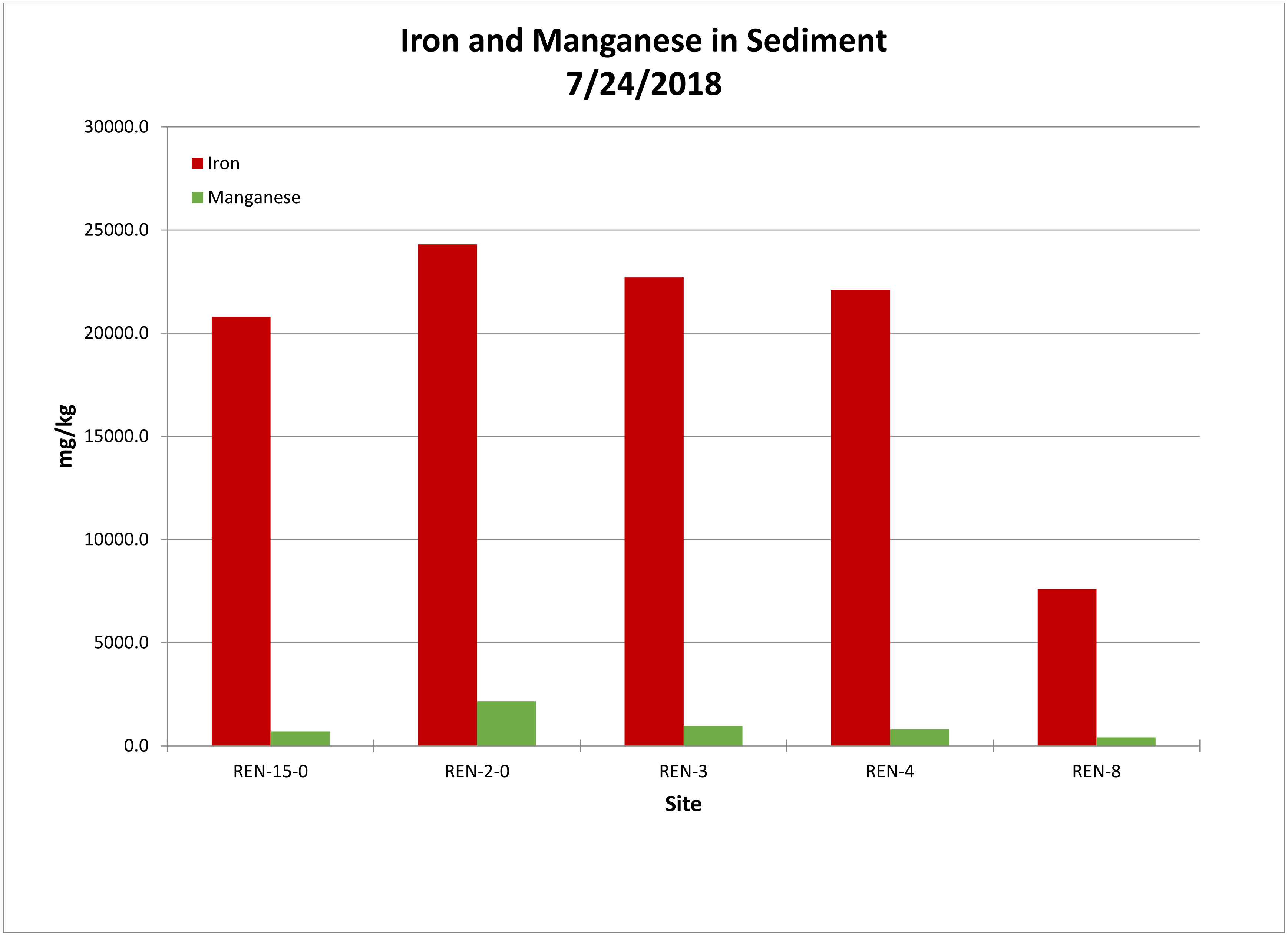
Collection Date	Site #	Parameter	Flag	Reported Result	MDL	PQL	Units
REN-15-0	7/24/2018	Phosphorus, total		582	5.75	7.19	MG/KG
REN-2-0	7/24/2018	Phosphorus, total		1010	9.13	11.4	MG/KG
REN-3	7/24/2018	Phosphorus, total		552	6.88	8.60	MG/KG
REN-4	7/24/2018	Phosphorus, total		619	7.17	8.96	MG/KG
REN-8	7/24/2018	Phosphorus, total		337	1.65	2.06	MG/KG
REN-15-0	7/24/2018	Selenium	<	1.23	1.23	2.47	MG/KG
REN-2-0	7/24/2018	Selenium	<	1.59	1.59	3.18	MG/KG
REN-3	7/24/2018	Selenium	<	1.35	1.35	2.70	MG/KG
REN-4	7/24/2018	Selenium	<	1.42	1.42	2.84	MG/KG
REN-8	7/24/2018	Selenium	<	0.691	0.691	1.38	MG/KG
REN-15-0	7/24/2018	Silver	<	1.23	1.23	2.47	MG/KG
REN-2-0	7/24/2018	Silver	<	1.59	1.59	3.18	MG/KG
REN-3	7/24/2018	Silver	<	1.35	1.35	2.70	MG/KG
REN-4	7/24/2018	Silver	<	1.42	1.42	2.84	MG/KG
REN-8	7/24/2018	Silver	<	0.691	0.691	1.38	MG/KG
REN-15-0	7/24/2018	Total Organic Carbon		16000	3000	5000	MG/KG
REN-2-0	7/24/2018	Total Organic Carbon		20000	3000	5000	MG/KG
REN-3	7/24/2018	Total Organic Carbon		13000	3000	5000	MG/KG
REN-4	7/24/2018	Total Organic Carbon		17000	3000	5000	MG/KG
REN-8	7/24/2018	Total Organic Carbon		7000	3000	5000	MG/KG
REN-15-0	7/24/2018	Zinc		64.8	1.23	2.47	MG/KG
REN-2-0	7/24/2018	Zinc		66.2	1.59	3.18	MG/KG
REN-3	7/24/2018	Zinc		62.8	1.35	2.70	MG/KG
REN-4	7/24/2018	Zinc		66.4	1.42	2.84	MG/KG
REN-8	7/24/2018	Zinc		20.9	0.691	1.38	MG/KG
REN-15-0	7/24/2018	Alachlor	<	18.1	18.1	18.1	UG/KG
REN-2-0	7/24/2018	Alachlor	<	22.9	22.9	22.9	UG/KG
REN-3	7/24/2018	Alachlor	<	19.8	19.8	19.8	UG/KG
REN-4	7/24/2018	Alachlor	<	20.2	20.2	20.2	UG/KG
REN-8	7/24/2018	Alachlor	<	9.61	9.61	9.61	UG/KG
REN-15-0	7/24/2018	Atrazine	<	18.1	18.1	18.1	UG/KG
REN-2-0	7/24/2018	Atrazine	<	22.9	22.9	22.9	UG/KG

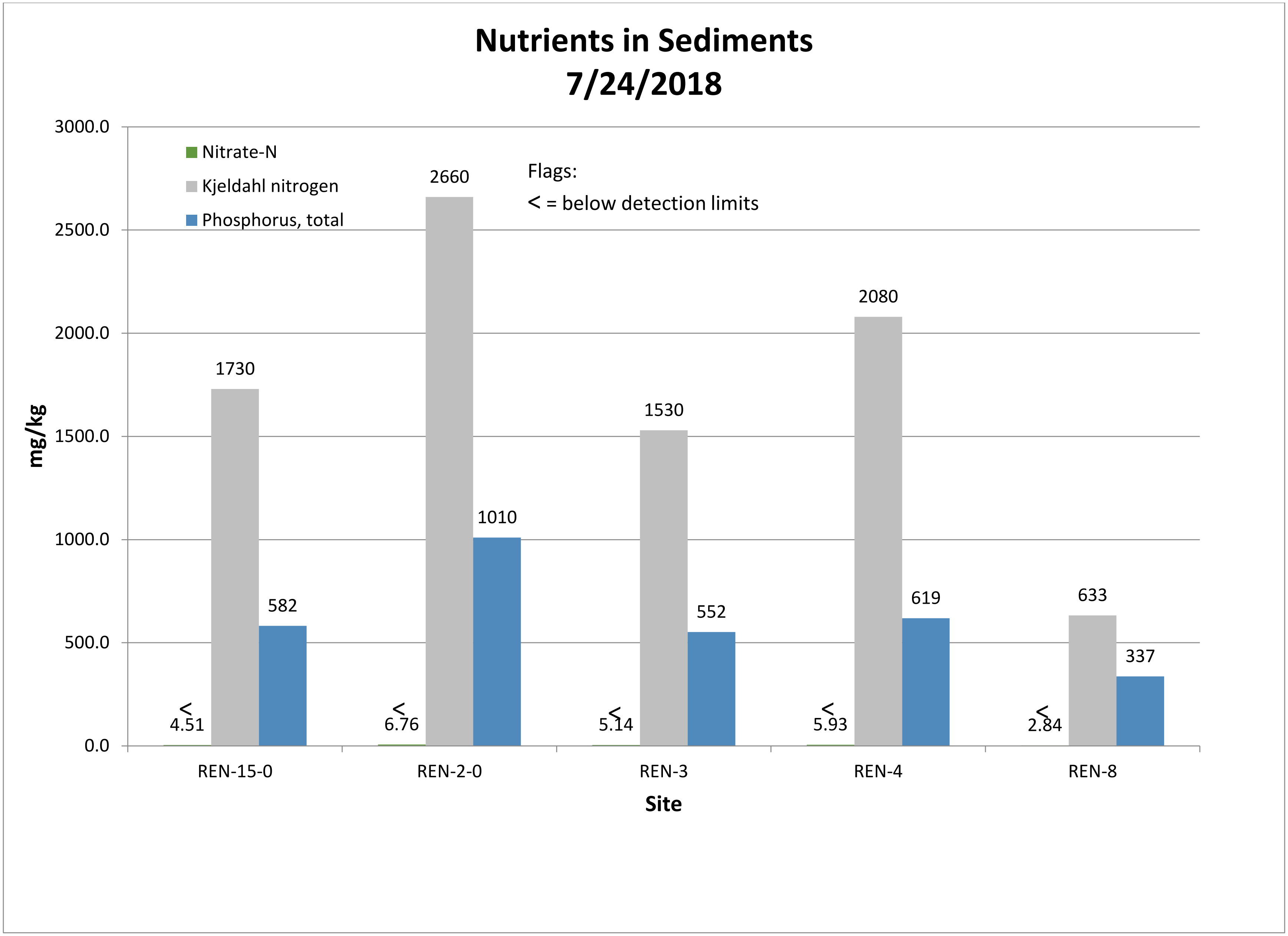
Collection Date	Site #	Parameter	Flag	Reported Result	MDL	PQL	Units
REN-3	7/24/2018	Atrazine	<	19.8	19.8	19.8	UG/KG
REN-4	7/24/2018	Atrazine	<	20.2	20.2	20.2	UG/KG
REN-8	7/24/2018	Atrazine	<	9.61	9.61	9.61	UG/KG
REN-15-0	7/24/2018	Chlorpyrifos	<	18.1	18.1	18.1	UG/KG
REN-2-0	7/24/2018	Chlorpyrifos	<	22.9	22.9	22.9	UG/KG
REN-3	7/24/2018	Chlorpyrifos	<	19.8	19.8	19.8	UG/KG
REN-4	7/24/2018	Chlorpyrifos	<	20.2	20.2	20.2	UG/KG
REN-8	7/24/2018	Chlorpyrifos	<	9.61	9.61	9.61	UG/KG
REN-15-0	7/24/2018	Cyanazine	<	18.1	18.1	18.1	UG/KG
REN-2-0	7/24/2018	Cyanazine	<	22.9	22.9	22.9	UG/KG
REN-3	7/24/2018	Cyanazine	<	19.8	19.8	19.8	UG/KG
REN-4	7/24/2018	Cyanazine	<	20.2	20.2	20.2	UG/KG
REN-8	7/24/2018	Cyanazine	<	9.61	9.61	9.61	UG/KG
REN-15-0	7/24/2018	Metolachlor	<	18.1	18.1	18.1	UG/KG
REN-2-0	7/24/2018	Metolachlor	<	22.9	22.9	22.9	UG/KG
REN-3	7/24/2018	Metolachlor	<	19.8	19.8	19.8	UG/KG
REN-4	7/24/2018	Metolachlor	<	20.2	20.2	20.2	UG/KG
REN-8	7/24/2018	Metolachlor	<	9.61	9.61	9.61	UG/KG
REN-15-0	7/24/2018	Metribuzin	<	18.1	18.1	18.1	UG/KG
REN-2-0	7/24/2018	Metribuzin	<	22.9	22.9	22.9	UG/KG
REN-3	7/24/2018	Metribuzin	<	19.8	19.8	19.8	UG/KG
REN-4	7/24/2018	Metribuzin	<	20.2	20.2	20.2	UG/KG
REN-8	7/24/2018	Metribuzin	<	9.61	9.61	9.61	UG/KG
REN-15-0	7/24/2018	Pendimethalin	<	18.1	18.1	18.1	UG/KG
REN-2-0	7/24/2018	Pendimethalin	<	22.9	22.9	22.9	UG/KG
REN-3	7/24/2018	Pendimethalin	<	19.8	19.8	19.8	UG/KG
REN-4	7/24/2018	Pendimethalin	<	20.2	20.2	20.2	UG/KG
REN-8	7/24/2018	Pendimethalin	<	9.61	9.61	9.61	UG/KG
REN-15-0	7/24/2018	Trifluralin	<	18.1	18.1	18.1	UG/KG
REN-2-0	7/24/2018	Trifluralin	<	22.9	22.9	22.9	UG/KG
REN-3	7/24/2018	Trifluralin	<	19.8	19.8	19.8	UG/KG
REN-4	7/24/2018	Trifluralin	<	20.2	20.2	20.2	UG/KG

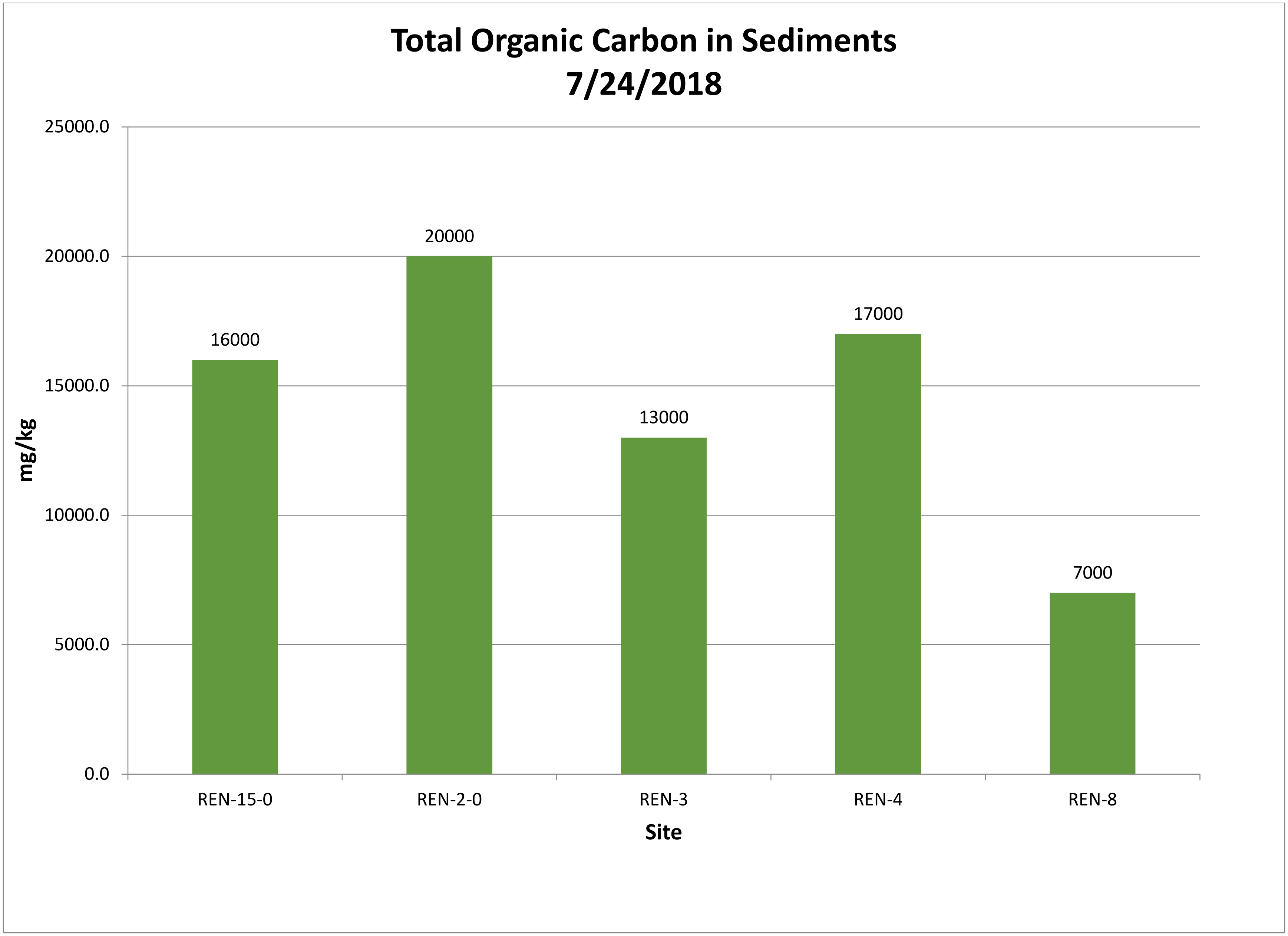
Collection Date	Site #	Parameter	Flag	Reported Result	MDL	PQL	Units
REN-8	7/24/2018	Trifluralin	<	9.61	9.61	9.61	UG/KG
REN-15-0	7/24/2018	Solids, total		37.3	0.100	0.100	%
REN-2-0	7/24/2018	Solids, total		29.6	0.100	0.100	%
REN-3	7/24/2018	Solids, total		34.1	0.100	0.100	%
REN-4	7/24/2018	Solids, total		33.4	0.100	0.100	%
REN-8	7/24/2018	Solids, total		69.7	0.100	0.100	%


Pesticides in Sediment
7/24/2018
All Sediment Pesticides sampled were below detection limits
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
ug/kg
Alachlor
Atrazine
Chlorpyrifos
Cyanazine
Metolachlor
Metribuzin
Pendimethalin
Trifluralin
REN-15-0
REN-2-0
REN-3
REN-4
REN-8
Date/Site


Metals in Sediment
7/24/2018
mg/kg
200.0
150.0
100.0
50.0
0.0
Flags:
< = below detection limits.
* = estimated value
REN-15-0
REN-2-0
REN-3
REN-4
REN-8
Site
Arsenic
Barium
Boron
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Selenium
Silver
Zinc


Iron and Manganese in Sediment
7/24/2018
30000.0
25000.0
20000.0
15000.0
10000.0
5000.0
0.0
mg/kg
Iron
Manganese
REN-15-0
REN-2-0
REN-3
REN-4
REN-8
Site


Nutrients in Sediments
7/24/2018
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
mg/kg
Nitrate-N
Kjeldahl nitrogen
Phosphorus, total
Flags:
< = below detection limits
1730
582
< 4.51
2660
1010
< 6.76
1530
552
< 5.14
2080
619
< 5.93
633
337
< 2.84
REN-15-0
REN-2-0
REN-3
REN-4
REN-8
Site


Total Organic Carbon in Sediments
7/24/2018
25000.0
20000.0
15000.0
10000.0
5000.0
0.0
mg/kg
16000
20000
13000
17000
7000
REN-15-0
REN-2-0
REN-3
REN-4
REN-8
Site