Implementation and Verification of BMPs for Reducing P Loading from the Everglades Agricultural Area:

Floating Aquatic Vegetation Impact on Farm Phosphorus Load

2015 Annual Report

Submitted to the

Everglades Agricultural Area Environmental Protection District

And

The South Florida Water Management District

By

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Acknowledgments

This project is primarily funded by the Everglades Agricultural Area (EAA) Environmental Protection District, a special district representing landowners within the EAA Basin, that was created for the purpose of ensuring environmental protection by means of conducting scientific research on environmental matters related to air and water and land management practices and implementing the financing, construction, and operation of works and facilities designed to prevent, control, abate or correct environmental problems and improve the environmental quality in the EAA.

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Abbreviations

BMP	Best Management Practice
DDb	Dry Bulk Density
WDb	Wet Bulk Density
DOP	Dissolved Organic Phosphorus
EAA	Everglades Agricultural Area
ENP	Everglades National Park
EPA	Environmental Protection Agency
EPD	Environmental Protection District
EREC	Everglades Research and Education Center
FAV	Floating Aquatic Vegetation
FLREC	Fort Lauderdale Research and Education Center
IFAS	Institute of Food and Agricultural Sciences
LOI	Loss on Ignition
OM	Organic Matter
PP	Particulate Phosphorus
SAV	Submerged Aquatic Vegetation
SFWMD	South Florida Water Management District
SOP	Standard Operating Procedure
SRP	Soluble Reactive Phosphorus
STA	Stormwater Treatment Area
TDP	Total Dissolved Phosphorus
TP	Total Phosphorus
TSS	Total Suspended Solids
UF	University of Florida
WCA	Water Conservation Area

Executive Summary

This document is the **fifth Annual Report** which presents research results for the project titled "***Implementation and Verification of BMPs to Reduce Everglades Agricultural Area Farm P Loads: Floating Aquatic Vegetation Impact on Farm P Load***". The research work is conducted as part of Everglades Agricultural Area – Environmental Protection District (EAA-EPD) Master Best Management Practice (BMP) Permit under F.A.C. Rule 40E-63. The objective of this research is the development of practices to manage floating aquatic vegetation to produce denser canal sediments that are less likely to be re-suspended and transported off the farm during drainage events. The goal is to provide growers an additional tool in their efforts to reduce off-farm P loading in the Everglades Agricultural Area. This report presents data mainly for the period between May 1st 2014 and April 30th 2015, but with many references to data collected earlier between November 2010 and April 30, 2014.

This report describes the eight project farms within the S5A and S6 sub-basin where research is being conducted. Under the approved 2010 scope of work, the following have been accomplished: (1) bathymetric surveys of farm main canals conducted in November 2014 and April 2015, (2) post-wet season sediment analyses of farm main canals collected in November 2014 and pre-wet season sediment analyses collected in April 2015, (3) water quality analyses of ambient farm main canal and farm drainage waters: total P (TP), total dissolved phosphorus (TDP), particulate phosphorus (PP), soluble reactive phosphorus (SRP), dissolved organic phosphorus (DOP), total suspended solids (TSS), total dissolved calcium (Ca), and pH, (4) bimonthly qualitative and quantitative assessment of floating aquatic vegetation, (5) monitoring of farm canal drainage flow rates, canal elevations, rainfall, and farm drainage volume during drainage events, and (6) monitoring of additional water quality parameters using *in situ* multi-parameter sondes: canal water temperature, oxidation reduction potential, and specific conductivity. In addition to these activities, regular maintenance and calibration of field and laboratory equipment, along with quality control and assurance are also conducted by our team. Our lab is NELAP certified for Total P and Soluble P http://www.nelac-institute.org/ .

This water year May 1, 2014 – April 30th, 2015 also marks two full water years since the start of treatments for farm pairs 0401/2501; 1813/6117; 3102 / 3103 and one full year for farm pair 4701/4702. This last farm pair required another year of calibration which delayed the start of the treatment. The report, in addition to showing the results in various Tables and Figures, includes detailed data in the appendices.

An important aspect of the Everglades Agricultural Area (EAA) Master Permit Scope of Work is training and continued education of farm personnel in BMP implementation techniques. Two BMP training workshops were conducted during this reporting period: September 2014 and April 2015 for growers in the EAA with a total of 167 participants. At each training workshop, guest speakers participated from various agencies and farm personnel. Pesticide CEU and Crop Certified Advisor CEU credits were offered. The April 2015 training was conducted entirely in Spanish for the convenience of our Spanish speaking personnel.

The EAA surpassed the required 25 percent reduction performance by achieving a 41 percent TP load reduction for WY2013 as compared with the rainfall adjusted pre-BMP baseline predicted load[1]. This equates to a 108 metric ton (mt) reduction due to BMP implementation for WY2013. The total cumulative reduction in TP loads since WY1996 is 2,673 mt, which represents a long-term reduction of 55 percent. This is an achievement accomplished by continued education and research collaboration between UF/IFAS, EAA growers and the SFWMD.

[1] *Source: SFWMD, SFER, 2014.*

Introduction

Background

Located in the geographic center of the South Florida watershed, the Everglades Agricultural Area (EAA) basin comprises approximately 250,000 ha of farms and several small communities south and east of Lake Okeechobee. The EAA has highly productive agricultural land comprised of rich organic muck soils. Sugarcane, vegetables, sod, and rice are grown in the EAA and annually provide south Florida with jobs and over one billion dollars to Florida's economy (Florida Department of Agriculture and Consumer Services, 2004). The EAA plays an important role in the Everglades water supply, either directly through agricultural drainage runoff or indirectly by serving as a conduit for large water transfers from Lake Okeechobee to the Water Conservation Areas (WCAs). The primary mode of drainage in the EAA is by shallow subsurface flow, which may be by capillary action through the organic soils, or through fractures in the marl-soil interface. On-farm water management is achieved by using subsurface flow and the water level in open field ditches to raise or lower field water tables. Rainfall is highly seasonal and frequently intense. Drainage discharge is achieved by pumping with high volume, low head, axial-flow pumps. Drainage water from the EAA, after treatment in Stormwater Treatment Areas (STAs), is ultimately discharged to the downstream WCAs, Everglades National Park (ENP), or the South Florida coastal estuaries.

The EAA basin as a whole is required by the Everglades Forever Act (EFA) of 1994 and its revision of 2003 to achieve phosphorus (P) load reductions of 25% or greater relative to a baseline P load average (derived from 1979 to 1988 monitoring data) that is adjusted for rainfall distribution and amount. In addition, the EFA requires EAA landowners, through the EAA-Environmental Protection District (EPD) to sponsor farm-scale research in Best Management Practices (BMPs). Thus, the University of Florida's Institute of Food and Agricultural Services (UF/IFAS) has conducted comprehensive research on BMP effectiveness and implementation since 1992 under the EAA-EPD BMP Master Permit Scope of Work. in Best Management Practices' implementation has been mandatory since 1995 for all farms that discharge drainage water into South Florida Water Management District (SFWMD) conveyance canals. The SFWMD monitors EAA basin P load via a network of monitoring stations, i.e. pump stations and control structures that border the EAA. With WY2013 marking the 18th consecutive year of

basin compliance and a long-term reduction of 55 percent relative to the baseline period, the EAA Basin achieved a 41 percent reduction in its TP load (SFER, 2014). Some of the BMPs that are currently implemented are divided into three categories: nutrient control, water management, and particulate and sediment control. Within each of these three categories there are numerous individual practices that farmers can implement to minimize movement of P off-farm: minimize the volume of drainage water discharged, reduce the dissolved P concentration in drainage waters, or minimize the export of P containing particulate matter and canal sediment.

Further reductions in farm P loads may be achieved by targeting P containing sediments and particulates that are generated in farm canals and transported off-farm during drainage events. Particulate P comprises 40-60% of the P loads discharged from EAA farms (Stuck, 1996, Daroub et al., 2005). Approximately 50% of the particulate P in EAA farm canals originates from in-stream biological growth rather than from soil erosion (Stuck, 1996, Daroub et al., 2005). Particulate P that contributes significantly to farm P export has been determined to be, for the most part, recently deposited biological material such as settled plankton, filamentous algae, and macrophyte detritus. There are several sediment control practices in the SFWMD-EAA BMP table from which EAA farmers are able to choose and implement on their farms (SFER, 2013). One of the sediment control practices is the control of aquatic vegetation in farm canals. In addition, most growers control to varying degrees the growth of Floating Aquatic Vegetation (FAV) in their canals. However, there is inadequate scientific knowledge regarding this practice's efficacy and its proper implementation methods.

Several research projects involving EAA farms have identified FAV as a source of readily transportable sediments and particulate P. Limiting the growth of FAV in farm canals is a practice that has the known benefit of improving the conveyance of drainage and irrigation waters throughout the farm. Control of FAV biomass growth may lead to further reductions in farm P load by changing the physical and chemical properties (and transportability) of sediments generated in a farm canal (Murphy et al., 1983; Reddy et al., 1987; Danen-Louwerse et al., 1995). It is hypothesized that with better light penetration into the canal water column more P will be co-precipitated with Ca and Mg carbonates and form cohesive, denser sediments that are less likely to be re-suspended and transported off the farm during drainage events. In addition,

lower P loads from EAA farms should help the performance of STAs, more so for those STAs performing at less than expected outflow concentrations.

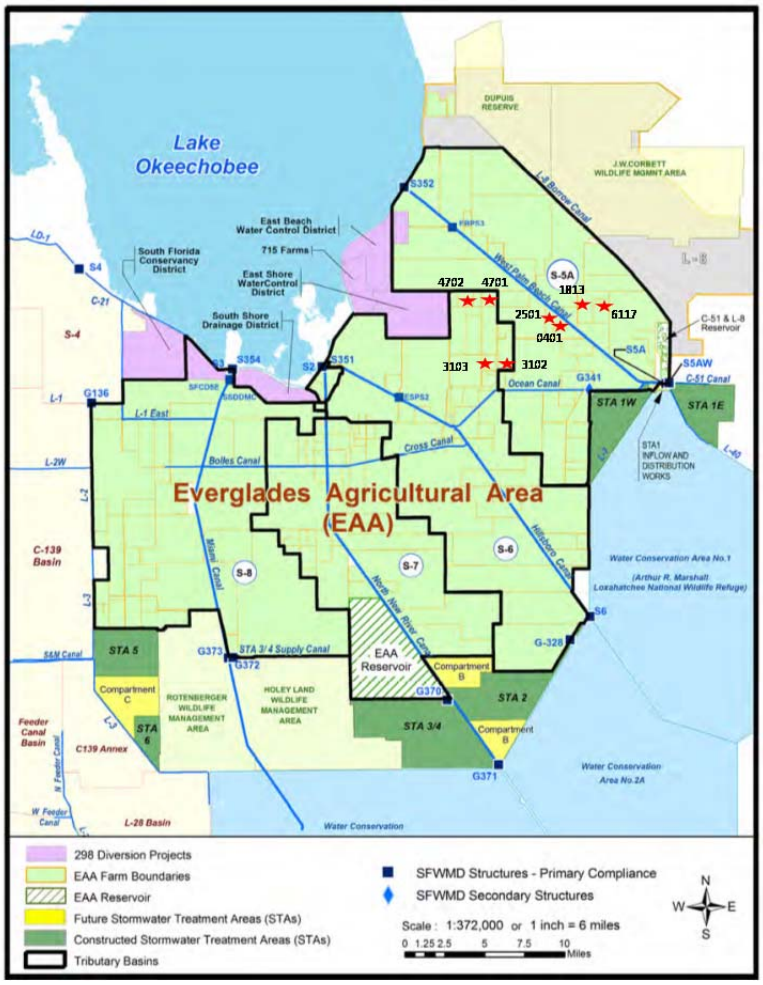
No studies have been conducted to isolate and measure the effects of limiting FAV growth in farm canals on sediment properties and farm P load. In addition, several studies in the Everglades have found that sediments accumulated in newly constructed wetlands are organic with low bulk density, but that calcium phosphates may play a significant role in P storage. Studies have shown that precipitation of P with Ca may occur in hard waters when FAV is eliminated and submerged aquatic vegetation (SAV) and other algal species are present in the water column (Reddy et al., 1987; Danen-Louwerse et al., 1995). This research project attempts to quantify the effects of two different canal FAV management practices on farm P load, drainage water P speciation, and canal sediment physical and chemical properties.

This project titled "***Implementation and verification of BMPs to reduce Everglades Agricultural Area farm P loads: Floating aquatic vegetation impact on farm P load",*** quantifies changes in sediment composition, P species in canal waters and overall total P loads as influenced by FAV management in Eight EAA sugarcane farms. This report is the **5th Annual Report** document since the inception of this project, and focuses on the activities conducted during the time period from May 1, 2014, to April 30, 2015. As mentioned earlier, this current 5-year permit (2010-2015) scope of work research on BMPs in the EAA investigates the impact FAV on sediment properties and farm P loads from eight cooperating farms with the ultimate goal of developing a new BMP that is cost effective and when implemented will further reduce farm P loads. The new BMP will be added to the list of approved BMPs by the SFWMD for growers to choose if it is appropriate to their farm conditions. The scope of work for this project was approved by the SFWMD in January 2010. Selection of three farm pairs was approved by the SFWMD in August 2010, while the final farm pair was approved by SFWMD in September 2010. Farms included in the project were selected by project personnel and the Water Resources and BMP advisory committee, a committee comprised of representatives of EAA growers. Four farms pairs were selected for this study in the S5A and S6 basin for a total of eight farms (Figure 1). The project started limited grab sampling Nov. 2010 and drainage sampling in Feb 2011.

Objectives

The specific objectives of the project are:

1. Evaluate two FAV management practices in the Everglades Agricultural Area farm canals for impact on farm drainage water phosphorus load.
2. Evaluate the effect of two FAV management practices on P speciation of farm drainage water and on farm canal sediment physical and chemical properties.
3. Use the information from the research for the development of a BMP for managing FAV to produce denser sediments. The goal is to provide growers an additional tool in their efforts to reduce off-farm P loading in the Everglades Agricultural Area.



Map courtesy of SFWMD.

Figure 1. Map of the Everglades Agricultural Area and farm locations; red stars indicate the location of the eight collaborating farms.

Farm Descriptions

Farm Pair 1

Figure 2. Aerial map of farms 0401 (green) and 2501 (red) with pumphouse and canal transect locations.

Farm Pair 1 comprises two sugarcane farms located in the S5A sub basin: Farm 0401 and farm 2501 (Figure 2). The farms are adjacent to one another and are located on the southwest side of the West Palm Beach canal approximately 12 miles from the Lake Okeechobee outflow structure S-352. Both farms receive irrigation water from and discharge their drainage waters directly into the West Palm Beach canal.

Farm 0401 is a 908 acre sugarcane farm with a single exit discharge pump station that contains one electric and one diesel pump. The majority of the drainage pumping is achieved via the electric pump. The diesel pump is utilized only after extreme rainfall events and in case of electrical failure. In the spring of 2012 Farm 0401 grew sweet corn in approximately 16% of the cropping area; in the spring of 2013 Farm 0401 grew 100% cane. In spring 2014, Farm 0401 grew sweet corn in approximately 23% of the area while the rest was sugarcane. In spring 2015, Farm 0401 grew sweet corn in approximately 26%, while the rest was used to grow sugarcane (Appendix Table A1). Farm 2501 is an 824 acre sugarcane farm that lies adjacent north and west to Farm basin 0401. It has a single discharge station containing two diesel-powered box pumps.

In the spring of 2012 Farm 2501 was fallow about 30%; in the spring of 2013 Farm 2501 grew sweet corn on approximately 12% of the farm the rest was covered by sugarcane. After harvest sweet corn acreage remained fallow during the summer. In Spring 2014, Farm 2501 had 12% planted to sweet corn and the rest was in sugarcane. In spring 2015, Farm 2501 had about 20% planted in sweet corn and 80% was used for sugarcane (Appendix Table A2).

Farm Pair 2

Figure 3. Aerial map of farms 1813 (red) and 6117 (green) with pumphouse and canal transect locations.

Farm Pair 2 consists of two sugarcane farms in the S5A sub-basin: farm 1813 and farm 6117 (Figure 3). The farms are adjacent to one another and located on the northeast side of the West Palm Beach canal approximately 12 miles from Lake Okeechobee outflow structure S-352. Farm 1813 receives irrigation water from and discharges drainage water directly into the West Palm Beach canal; farm 6117 receives irrigation water from and drains excess water into a north-south secondary canal that is connected to the West Palm Beach Canal approximately one mile south of farm 6117 discharge structure.

Farm 1813 is a sugarcane farm of 594 acres with a single exit pump station containing a single diesel powered pump. Sweet corn was grown on 100% of the farm's cropped area in the spring of 2012. In spring 2013 sweet corn was grown on 21% of the farms crop area. In spring 2014 Farm 1813 grew 100% sugarcane. In spring 2015, Farm 1813 consisted of about 16% sweetcorn or fallow, while 84% was planted with sugarcane (Appendix Table A3). Farm 6117 is a sugarcane farm of 781 acres; it is drained by a single diesel pump, which discharges into a secondary canal that connects to the West Palm Beach canal. The distance from the pump station to the West Palm Beach canal is approximately one mile. Sugarcane occupied approximately 90% of the cropped fields in spring 2012, while in spring 2013 20% was covered by sweet corn. In spring 2014, Farm 6117 grew 100% sugarcane. In spring 2015, Farm 6117 consists of approximately 30% sweet corn and 70% planted with sugarcane (Appendix Table A4).

Farm Pair 3

Figure 4. Aerial map of farms 3102 (green) and 3103 (red) with pumphouse and canal transect locations.

Farm Pair 3 is located in the S6 sub-basin just north of the intersection of Airport Road and Sam Center Road. The pair consists of two sugarcane farms: Farm 3102 and farm 3103 (Figure 4). Farm 3103 discharges into a tertiary canal while Farm 3102 discharges into a secondary canal.

Farm 3102 is a 1387 acre sugarcane farm that is bordered to the south by the Airport road extension and to the north by SR80. This farm has a single exit pump station containing three diesel pumps for drainage. Approximately 50% of the farm was fallow in spring 2012, while 100% was covered by sugarcane in spring 2013. In spring 2014, 11-30% of the area in Farm 3102 was planted with leafy vegetables while the rest was cropped to sugarcane. In spring 2015, Farm 3102 comprised of 22% fallow fields, 8% leafy vegetables, and the rest was planted with sugarcane (Appendix Table A7). Farm basin 3103 is a 609 acre sugarcane farm that is located west across the canal from farm basin 3102 and has Hatton Highway as a western boundary and Airport Road as its southern boundary. It has a single exit pump station containing one diesel powered pump. Approximately 25% of the farm was planted with beans between October to December 2012, whereas corn was planted on 25% of the farm between February to May 2013. In spring 2014, Farm 3103 had 25 % of the area in flooded rice after fallow, 25% corn and 50% sugarcane. In spring 2015, Farm 3103 planted 100% sugarcane. (Appendix Table A8).

Farm Pair 4

Figure 5. Aerial map of farms 4701 (green) and 4702 (red) with pumphouse and canal transect locations.

Farm Pair 4 is located in the S6 sub-basin near its northern boundary and consists of two sugarcane farms: farm 4701 and farm 4702 (Figure 5). Both farms receive irrigation water from and discharge into an east-west secondary district canal that eventually connects with the Hillsboro Canal via the Ocean Canal. Farm 4701 is a 630 sugarcane farm with a single diesel discharge pump station with a single diesel powered pump that discharges drainage water into a tertiary canal that feeds into the secondary district canal that runs north from Sam Center road, and eventually discharges into the Ocean canal at Sam Center Road and SR880. Sugarcane occupied all the cropped fields on this farm from April 2012 to May 2013, except 50% of farm was fallow between November and December 2012. In spring 2014, Farm 4701 had 50% sugarcane and 50% flooded rice after fallow. In Spring 2014, Farm 4701 had planted 50% sweet corn and 50% sugarcane (Appendix Table A5). Farm 4702 is a 640 acre sugarcane farm which is located one-half mile east of farm basin 4701. Farm 4702 has a single pump station with a single diesel pump for drainage discharge. Sugarcane occupied 50% of the fields from May to September 2012, while the rest had rice planted. Spring 2013 and 2014, 4702 had almost 100% sugarcane cover. In spring 2015, Farm 4702 had planted 100% sugarcane (Appendix Table A6).

Methods

The research plan of the project includes a 2-year calibration and a 3-year treatment period for the four farm pairs. After the 2-year calibration period, three of the four farm pairs **3102/3103, 2501/0401, 1813/6117** were designated as control and treatment farms. However farm pair **4701/4702** required 3- year calibration period due to lack of sufficient data points that resulted in a poor P load regression relationship.

The control farms are: 3102, 2501, 1813, and 4701, while the treatment farms chosen are: 3103, 0401, 6117, and 4702, respectively. May 1, 2013 is the start of the treatment period where control of the FAV was imposed on the three treatment farms (3103, 0401, and 6117), while May 1, 2014 is the start of the treatment for controlling FAV in farm 4702. The FAV treatment is accomplished through vigilant monitoring of FAV growth and spot spraying of approved aquatic herbicides to control the FAV of the treatment farm in a pair.

All farms are monitored at least every two weeks, the presence of any FAV is noted, and if there is >25% coverage of FAV in treatment farms it is spot sprayed. The two main herbicides

that employed for FAV control are Diquat and Glyphosate and are applied according to label rates. Other approved aquatic herbicides may be used as needed. Filamentous algae and duck weed are not controlled; filamentous algae is mostly submerged and is not affected by application of the herbicide, duck weed on the other hand is easily transportable and its coverage is highly variable from one day to the next. Duckweed generally has only a slight reducing effect on solar radiation penetration into the canal water column due to its low biomss.

Statistical analysis of the study data will be conducted using SAS (SAS, 2008). The main study is a paired watershed design with repeated measures over time (USEPA, 1993). Incorporation of multiple covariates into ANCOVA models has been suggested for paired watershed data analysis (Hewlett and Peinaar, 1973; Loftis et al., 2001; Bishop et al., 2005). Drainage flow, canal level, canal head difference, velocity, rainfall and other data collected will be included in the regression analysis as covariates if significant. Covariates will be used to explain the significance of the treatment regression equation, the significance of the overall regression (calibration and treatment period), the difference in the slopes of the calibration and the treatment regressions, and the difference between the intercepts of the calibration and treatment regressions (if the slopes are the same). At a minimum, a bivariate plot of paired observations together with the calibration and treatment regression equation, and a plot of deviations as a function of time during the treatment will be presented. An estimate of the percentage change based on the mean TP predicted and TP observed values will be estimated as an approximate of performance. There are two treatments: nearly complete FAV management and typical FAV management in farm canals. The analyses will use regressions to compare P load parameter responses to treatment between paired farms. The data may also be pooled and analyzed by sub-basin.

Farm Canal Surveys

Farm canal surveys are conducted to assess individual farm canal dimensions (length, width, area), the thickness of sediments present in the canals, and their physical and chemical characteristics. Surveys are conducted twice a year to monitor changes in sediment thickness or composition. Farm canal sediment thickness was measured seven times since Feb 2011. Table 1 summarizes sediment depth by transect and date in each of the eight farms main canal for the calibration and treatment period. This report summarizes detailed results from two surveys conducted in November 2014 and April 2015. For earlier surveys please see earlier reports.

Methods

Sediment Surveys and Depth

Water depth to sediment surface was measured by a neutral buoyancy water column measuring pad, which is a circular (10 inches) wooden pad attached to a graduated staff. The pad-staff is slowly submerged in the canal until the pad gently touches the sediment surface with minimal disturbance. Sediment thickness at each 2 ft lateral increments within each transect of individual canals was measured by subtracting the water column measuring pad value from its corresponding calibrated penetrometer value. Three separate transect locations were selected within a single canal, and sediment thickness was measured along a transect across the canal width. Transect A was closest to the pump station, transect B was in the middle of the canal, while transect C was confined at the back end of the canal. These three locations were adjacent to where grab water samples are collected. At each transect location two iron rebars were installed at the edge of the water on each side of the canal. During surveying, a steel cable is attached to the rebar to anchor a boat used during measurements. Along a transect measurements were recorded at 2 ft (0.61 m) intervals. A measuring pad was used to record the depth of the water column; a graduated penetrometer was used to record the depth of the water column + sediment. The average thickness of sediment along each transect (A, B, and C) was reported for all eight farm canals during November 2014, and April 2015.

Physical and Chemical Characterization of Sediments

Sediment characterization of the eight farms was conducted in December 2014 and April 2015. Intact sediment cores (approximately 25 cm depth) were collected from the middle of the

three transects along main farm canal of each farm. The sediments were collected between December 02-05, 2014 and April 06-09, 2015, using a piston type, in-house constructed, sediment sampling device. The sediment sampler used polycarbonate tubes of 7.0 cm diameter and 50 cm length. Sample cores were transported to the laboratory on the same day of collection, sectioned into 0-2.5cm and 2.5-5.0 cm core lengths respectively, and stored at 4^0C. Sediment sampling locations were recorded using a hand held GPS device. Sample preparation and analyses were conducted at the laboratory located at the Everglades Research and Education Center located Belle Glade, FL. Properties analyzed were sediment pH, organic matter (OM), total P (TP), wet bulk density (WDb) and dry bulk density (DDb).

Sediment core sections were mixed thoroughly before taking any sub-samples for chemical analyses. pH was measured by scooping 10 ml volume of wet sediment into a volumetric flask, to that adding 20 ml of DI water, well shaken, and allowed to settle. pH is measured using a Thermo Orion (model 720) pH meter. For TP analyses, known weights of wet sample were ashed at 550^oC for four hours in a muffle furnace and were grounded in a pestle and mortar before analyses (Andersen, 1974). Results are reported on an oven dry-weight basis.

Both wet and dry bulk densities were performed on the sediments without any sieving or pre-treatments using EREC-SOP Bulk Density (adapted from Soil Survey Laboratory Methods Manual, 2004). Organic matter and ash content were determined using EREC-SOP Organic Matter (adapted from Soil Survey Laboratory Methods Manual, 2004). Total P was determined using method described by Andersen (1974) and analyzed by EPA method 365.4 (EPA, 1993).

Results

Sediment Surveys and Depth

November 2014

During the November 2014 survey event, farm 3102 had a mean sediment thickness of 0.45, 0.33, and 0.56 m along transects A, B, and C respectively. Farm 3103 had a mean sediment thickness of 0.40, 0.88, and 0.59 m along transects A, B, and C respectively. Farm 2501 had a mean sediment thickness of 0.58, 0.31, and 0.47 m along transects A, B, and C respectively. Farm 0401 had a mean sediment thickness of 0.67, 0.35, and 0.54 m along transects A, B, and C

respectively. Farm 1813 had a mean sediment thickness of 0.74, 0.79, and 0.59 m along transects A, B, and C respectively. Farm 6117 had a mean sediment thickness of 0.86, 0.32, and 0.51 m along transects A, B, and C respectively. Farm 4701 had a mean sediment thickness of 0.84, 0.69, and 0.65 m along transects A, B, and C respectively. Farm 4702 had a mean sediment thickness of 0.47, 0.58, and 0.60 m along transects A, B, and C respectively. The sediment profiles of the individual farm canals are illustrated in Figures 6 to 13.

April 2015

During the April 2015 survey event, farm 3102 had a mean sediment thickness of 0.36, 0.85, and 0.58 m along transects A, B, and C respectively. Farm 3103 had a mean sediment thickness of 0.38, 0.85, and 0.60 m along transects A, B, and C respectively. Farm 2501 had a mean sediment thickness of 0.52, 0.32, and 0.42 m along transects A, B, and C respectively. Farm 0401 had a mean sediment thickness of 0.61, 0.40, and 0.69 m along transects A, B, and C respectively. Farm 1813 had a mean sediment thickness of 0.70, 0.80, and 0.63 m along transects A, B, and C respectively. Farm 6117 had a mean sediment thickness of 0.76, 0.32, and 0.91 m along transects A, B, and C respectively. Farm 4701 had a mean sediment thickness of 0.90, 0.80, and 0.87 m along transects A, B, and C respectively. Farm 4702 had a mean sediment thickness of 0.42, 0.57, and 0.72 m along transects A, B, and C respectively. The sediment profiles of the individual farm canals have been shown in Figures 14 to 21.

Physical and Chemical Characteristic of Sediments

December 2014: A summary of the results is reported in Table 2. In December 2014, the mean OM and TP content of the sediments from all eight farms were 44.5 ±12.2 % and 936 ±380.1 mg/kg respectively. Mean wet bulk density was 1.11 ±0.07 g/cm^3, while the mean dried bulk density was 0.24 ±0.095 g/cm^3.

April 2015: A summary of the results are reported in Table 3. In April 2015, the mean OM and TP content of the sediments from all eight farms were 33.2 ±8.5 % and 1085.4 ±273 mg/kg respectively. Mean wet bulk density was 1.1 ±0.1 g/cm^3, while the mean dry bulk density was 0.3 ±0.1 g/cm^3.

Table 1. Main farm canal sediment thickness by transect and date. Sediment thickness represents the average thickness of the sediment profile along a transect.

		Sediment Thickness (m)							
	Transect	**3102**	**3103**	**2501**	**0401**	**1813**	**6117**	**4701**	**4702**
	Calibration period								
Feb-11	**A**	0.45	0.36	0.82	0.70	0.58	1.00	1.02	0.40
Feb-11	**B**	0.47	0.74	0.28	0.46	0.89	0.33	0.75	0.49
Feb-11	**C**	0.74	0.58	0.51	0.59	0.59	0.99	0.45	0.63
Nov-11	**A**	0.34	0.42	0.73	0.66	0.69	0.95	0.86	0.49
Nov-11	**B**	0.54	0.66	0.29	0.40	0.86	0.30	0.59	0.45
Nov-11	**C**	0.77	0.61	0.48	0.58	0.68	0.89	0.54	0.60
May-12	**A**	0.26	0.41	0.76	0.49	0.79	0.99	0.83	0.25
May-12	**B**	0.49	0.67	0.22	0.06	0.98	0.33	0.84	0.39
May-12	**C**	0.68	0.59	0.37	0.50	0.55	0.98	0.67	0.58
Nov-12	**A**	0.28	0.27	0.72	0.48	0.74	0.98	0.79	0.38
Nov-12	**B**	0.45	0.16	0.23	0.27	0.91	0.30	0.84	0.49
Nov-12	**C**	0.66	0.59	0.39	0.50	0.58	1.04	0.62	0.75
Apr-13	**A**	0.34	0.45	0.87	0.56	0.67	1.02	0.81	0.33
Apr-13	**B**	0.50	0.98	0.18	0.36	0.91	0.32	0.75	0.42
Apr-13	**C**	0.54	0.77	0.36	0.52	0.62	1.10	0.55	0.62
	Commencement of treatment								
Nov-13	**A**	0.34	0.41	0.84	0.73	0.74	1.04	0.95	0.37
Nov-13	**B**	0.48	0.82	0.32	0.42	0.78	0.31	0.69	0.47
Nov-13	**C**	0.86	0.68	0.52	0.66	0.62	1.02	0.63	0.55
Apr-14	**A**	0.37	0.44	0.78	0.57	0.66	0.80	0.87	0.39
Apr-14	**B**	0.45	0.82	0.30	0.45	0.88	0.27	0.84	0.42
Apr-14	**C**	0.67	0.43	0.40	0.55	0.51	0.78	0.63	0.73
								Commencement of treatment	
Nov-14	**A**	0.45	0.40	0.58	0.67	0.74	0.86	0.84	0.47
Nov-14	**B**	0.33	0.88	0.31	0.35	0.79	0.32	0.69	0.58
Nov-14	**C**	0.56	0.59	0.47	0.54	0.59	0.78	0.65	0.60
Apr-15	**A**	0.36	0.38	0.52	0.61	0.70	0.76	0.90	0.42
Apr-15	**B**	0.85	0.85	0.32	0.41	0.80	0.32	0.80	0.58
Apr-15	**C**	0.58	0.60	0.42	0.69	0.63	0.91	0.87	0.72

Table 2. Physical and chemical properties of sediments collected November 2014 from the eight farms.

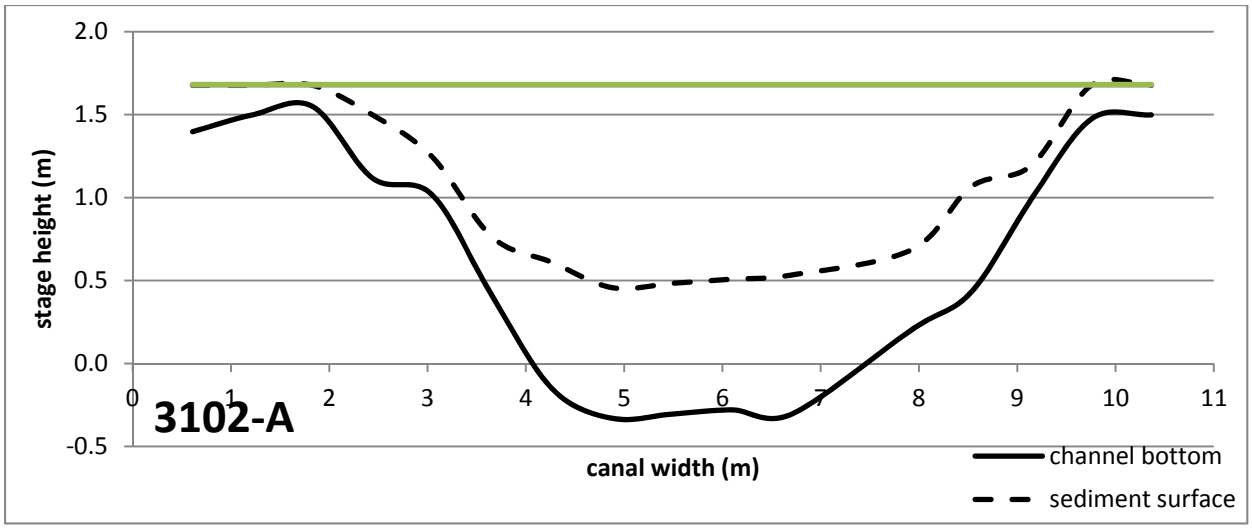
Farm ID[1]	Transect	Depth (cm)	OM (%)	WDb (g/cm^3)	DDb (g/cm^3)	TP (mg/kg)
3102	A	0-2.5	34.1	1.16	0.29	765
3102	A	2.5-5	29.0	1.34	0.51	660
3102	B	0-2.5	19.7	1.27	0.48	470
3102	B	2.5-5	15.5	1.29	0.63	380
3102	C	0-2.5	51.4	1.04	0.15	1770
3102	C	2.5-5	38.4	1.15	0.27	1078
3103	A	0-2.5	51.5	1.11	0.24	1449
3103	A	2.5-5	59.5	1.20	0.35	2479
3103	B	0-2.5	42.7	1.19	0.21	1331
3103	B	2.5-5	44.2	1.14	0.23	1240
3103	C	0-2.5	40.8	1.05	0.16	1530
3103	C	2.5-5	40.7	1.23	0.24	1397
2501	A	0-2.5	45.1	1.08	0.15	968
2501	A	2.5-5	42.8	1.06	0.18	924
2501	B	0-2.5	44.5	1.09	0.15	942
2501	B	2.5-5	45.1	1.13	0.17	952
2501	C	0-2.5	35.3	1.01	0.16	842
2501	C	2.5-5	35.1	1.09	0.19	677
0401	A	0-2.5	25.1	1.13	0.37	NR
0401	A	2.5-5	31.2	1.16	0.30	688
0401	B	0-2.5	40.6	1.14	0.27	1334
0401	B	2.5-5	65.0	1.15	0.24	565
0401	C	0-2.5	38.3	1.07	0.15	735
0401	C	2.5-5	38.4	1.08	0.20	603
1813	A	0-2.5	52.1	0.98	0.14	894
1813	A	2.5-5	60.6	1.06	0.16	737
1813	B	0-2.5	49.9	1.02	0.13	1095
1813	B	2.5-5	36.7	1.09	0.21	1456
1813	C	0-2.5	51.4	0.99	0.13	918
1813	C	2.5-5	49.4	1.15	0.17	812
6117	A	0-2.5	60.1	1.01	0.15	967
6117	A	2.5-5	57.6	1.10	0.20	1030
6117	B	0-2.5	66.1	1.07	0.17	851
6117	B	2.5-5	66.6	1.17	0.23	882
6117	C	0-2.5	62.4	1.04	0.18	792
6117	C	2.5-5	71.7	1.13	0.20	784
4701	A	0-2.5	49.0	1.10	0.15	787
4701	A	2.5-5	38.8	1.12	0.23	836
4701	B	0-2.5	47.5	1.01	0.26	1084
4701	B	2.5-5	71.1	1.09	0.17	1064
4701	C	0-2.5	32.8	1.10	0.27	791
4701	C	2.5-5	44.9	1.15	0.25	797
4702	A	0-2.5	41.7	1.00	0.22	779
4702	A	2.5-5	50.2	1.10	0.20	612
4702	B	0-2.5	41.6	1.04	0.19	583
4702	B	2.5-5	34.8	1.18	0.30	534
4702	C	0-2.5	41.8	1.12	0.27	734
4702	C	2.5-5	36.0	1.10	0.26	417

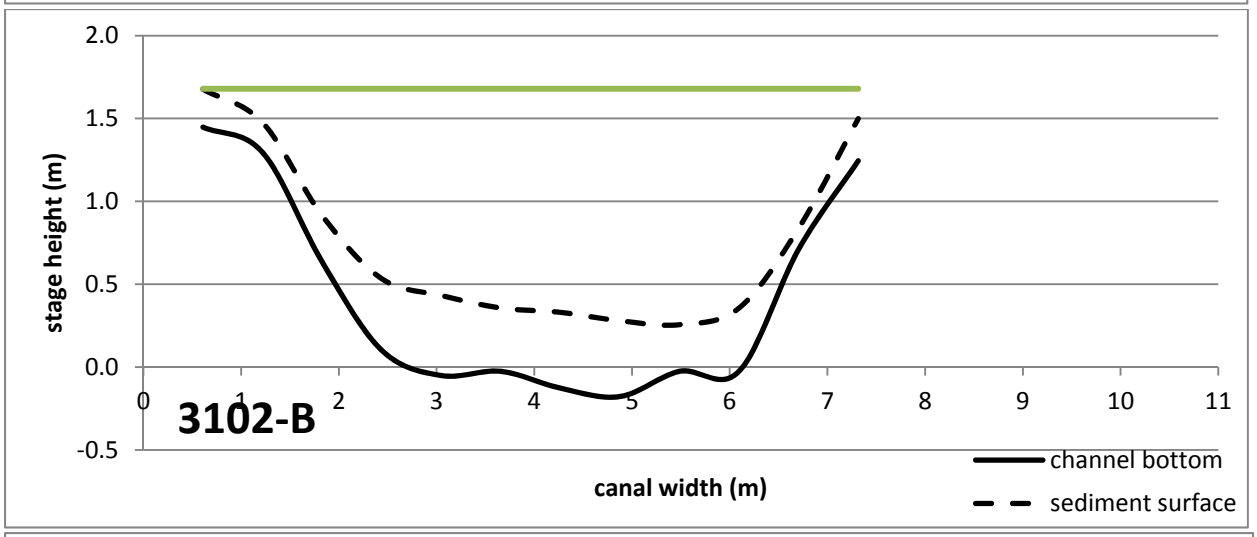
[1]OM = organic matter; WDb = wet bulk density; DDb = dry bulk density; TP = total phosphorus; NR = non-reported

Table 3 Physical and chemical properties of sediments collected on April 2015 from the eight farms.

Farm ID[1]	Transect	Depth (cm)	OM (%)	WDb (g/cm ^{3})	DDb (g/cm^3)	TP (mg/kg)
3102	A	0-2.5	27.0	1.37	0.56	899
3102	A	2.5-5	24.7	1.36	0.64	832
3102	B	0-2.5	25.2	1.12	0.25	1163
3102	B	2.5-5	20.6	1.12	0.34	703
3102	C	0-2.5	37.7	1.10	0.19	1649
3102	C	2.5-5	23.0	1.14	0.34	723
3103	A	0-2.5	35.5	1.10	0.25	1484
3103	A	2.5-5	37.8	1.04	0.22	1255
3103	B	0-2.5	13.0	1.27	0.59	551
3103	B	2.5-5	14.5	1.42	0.61	775
3103	C	0-2.5	28.6	1.13	0.34	1574
3103	C	2.5-5	30.4	1.14	0.27	1369
2501	A	0-2.5	35.1	1.09	0.33	1209
2501	A	2.5-5	28.3	1.16	0.19	904
2501	B	0-2.5	37.5	1.15	0.29	1391
2501	B	2.5-5	37.7	1.06	0.08	1252
2501	C	0-2.5	27.8	1.08	0.10	1135
2501	C	2.5-5	29.5	1.09	0.16	1323
0401	A	0-2.5	18.8	1.23	0.20	1249
0401	A	2.5-5	17.9	1.27	0.37	1107
0401	B	0-2.5	36.8	1.15	0.35	1416
0401	B	2.5-5	38.4	1.29	0.40	1027
0401	C	0-2.5	36.0	1.07	0.22	1004
0401	C	2.5-5	35.9	1.06	0.29	896
1813	A	0-2.5	29.3	1.06	0.20	1117
1813	A	2.5-5	36.0	1.18	0.32	1058
1813	B	0-2.5	34.8	1.07	0.30	1320
1813	B	2.5-5	33.8	1.12	0.21	1420
1813	C	0-2.5	36.2	1.09	0.21	1175
1813	C	2.5-5	34.8	1.05	0.18	1107
6117	A	0-2.5	42.5	1.04	0.13	1143
6117	A	2.5-5	43.9	1.15	0.15	1126
6117	B	0-2.5	37.1	1.04	0.15	1014
6117	B	2.5-5	39.7	1.08	0.16	1000
6117	C	0-2.5	45.1	1.27	0.18	406
6117	C	2.5-5	37.6	1.21	0.26	772
4701	A	0-2.5	29.8	1.06	0.17	1469
4701	A	2.5-5	29.6	1.17	0.35	881
4701	B	0-2.5	36.8	1.00	0.28	1401
4701	B	2.5-5	37.0	1.05	0.12	1269
4701	C	0-2.5	32.9	1.07	0.15	1106
4701	C	2.5-5	32.5	1.05	0.11	1038
4702	A	0-2.5	37.0	1.07	0.18	1077
4702	A	2.5-5	37.0	1.12	0.20	1256
4702	B	0-2.5	50.0	0.95	0.15	987
4702	B	2.5-5	52.6	1.13	0.25	912
4702	C	0-2.5	48.0	0.97	0.14	934
4702	C	2.5-5	42.1	1.23	0.18	523

[1]OM = organic matter; WDb = wet bulk density; DDb = dry bulk density; TP = total phosphorus





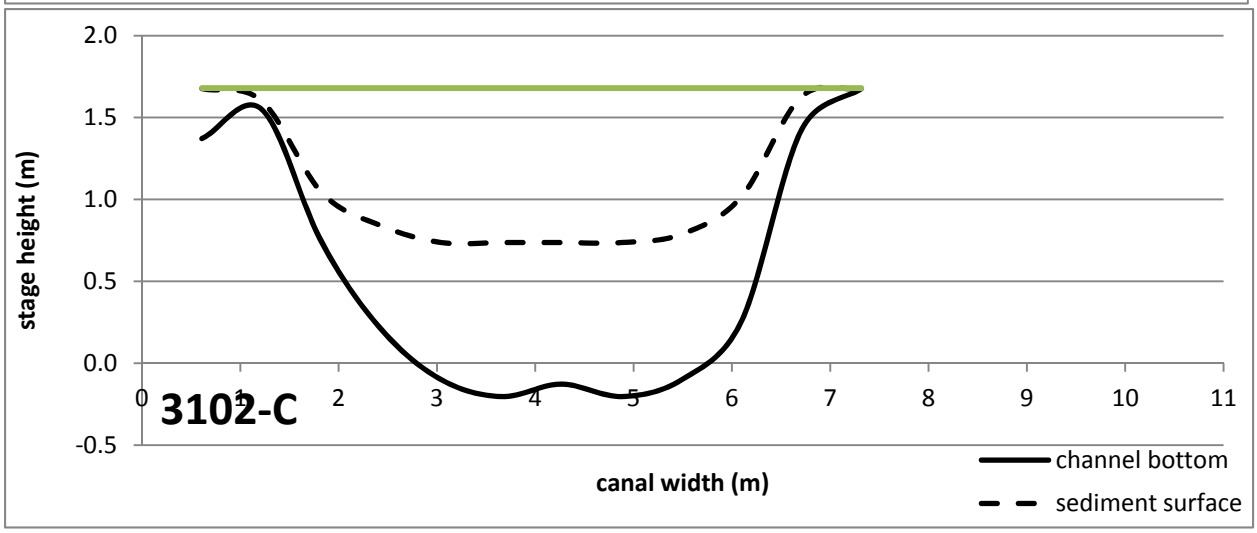


Figure 6. Sediment profile of main canal of farm 3102 at three transects, A, B, and C, surveyed in November 2014. Green line corresponds to height of water. Negative stage height indicates below sea-level.

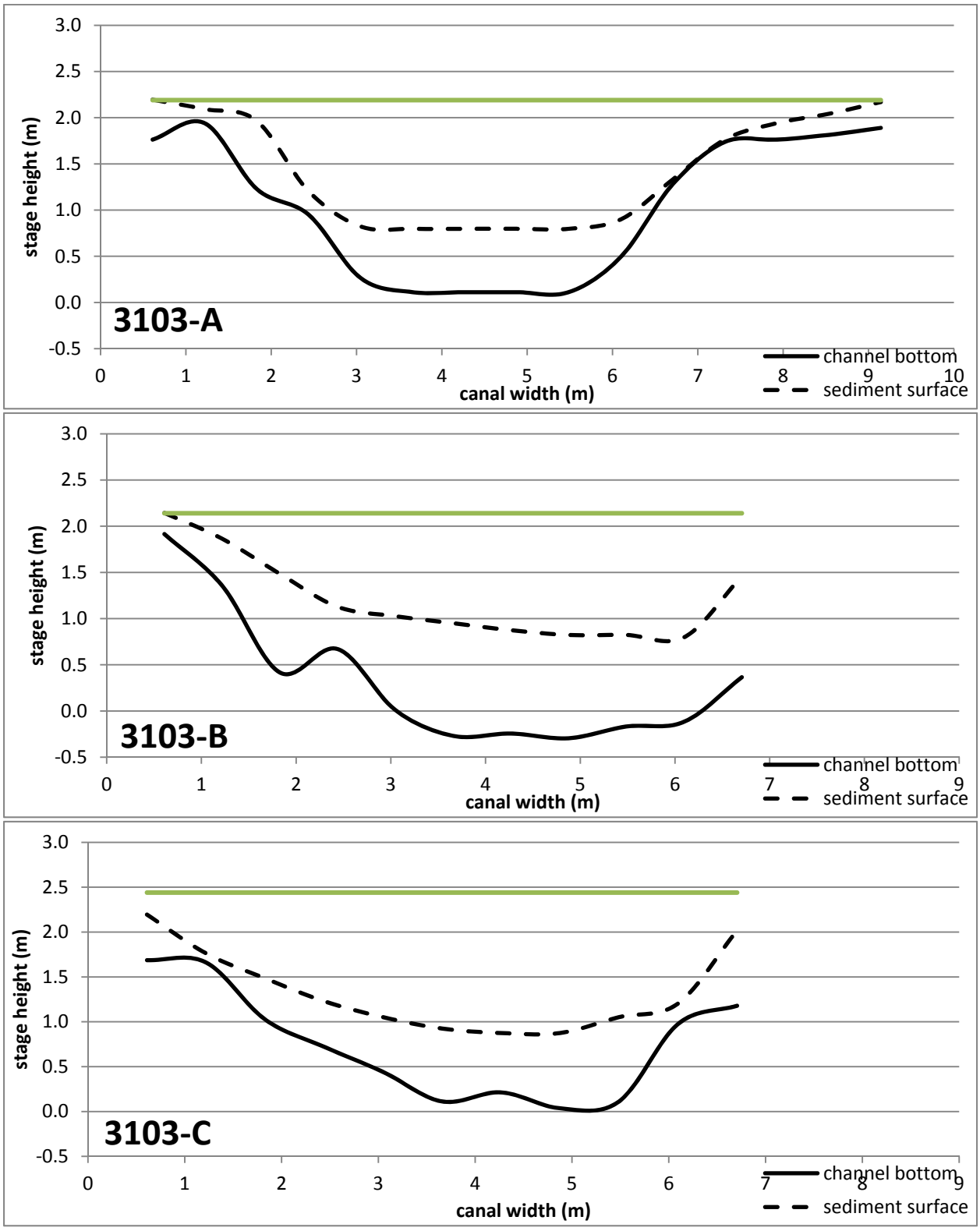


Figure 7. Sediment profile of main canal of farm 3103 at three transects, A, B, and C, surveyed in November 2014. Green line corresponds to height of water. Negative stage height indicates below sea-level.

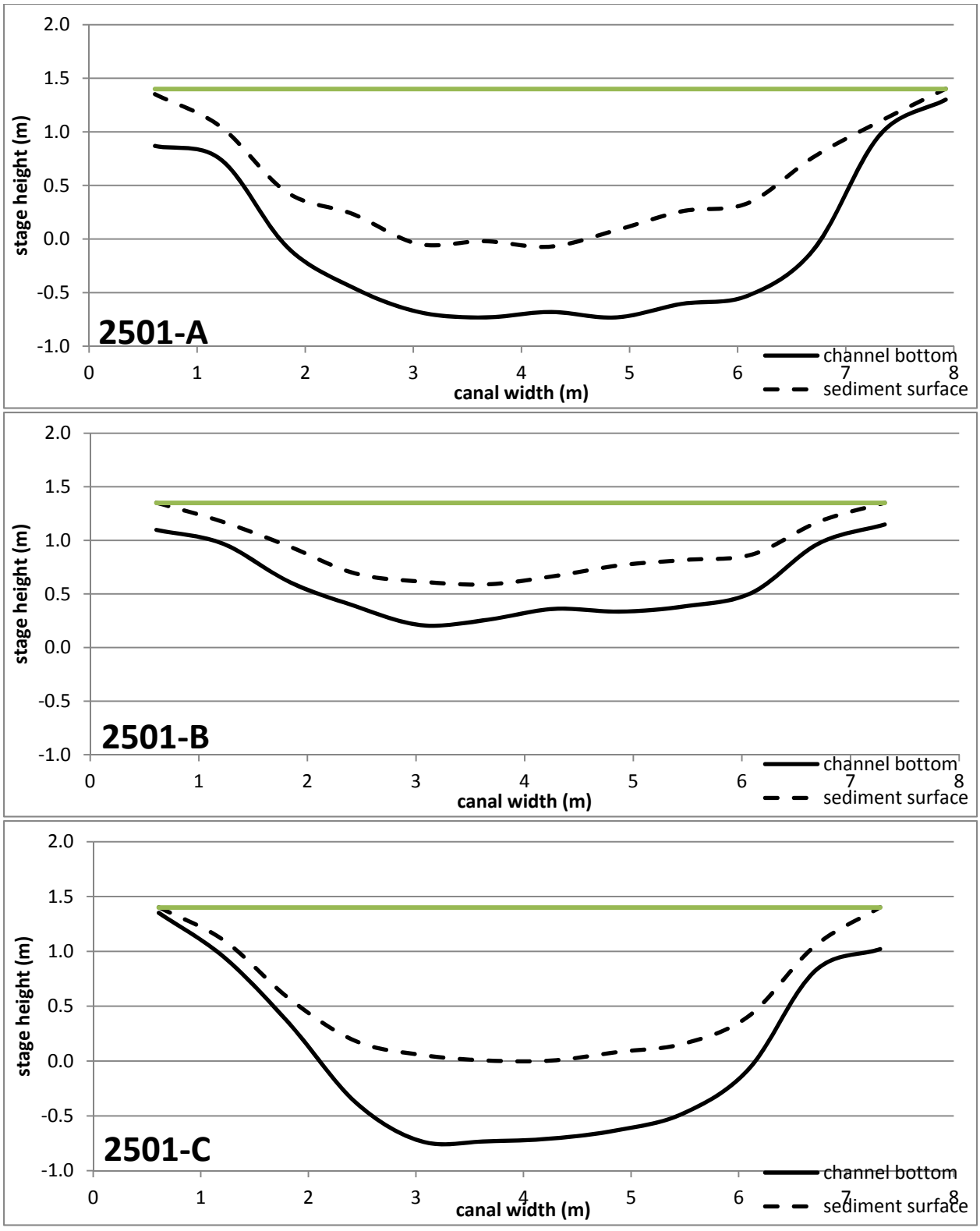


Figure 8. Sediment profile of main canal of farm 2501 at three transects, A, B, and C, surveyed in November 2014. Green line corresponds to height of water. Negative stage height indicates below sea-level.

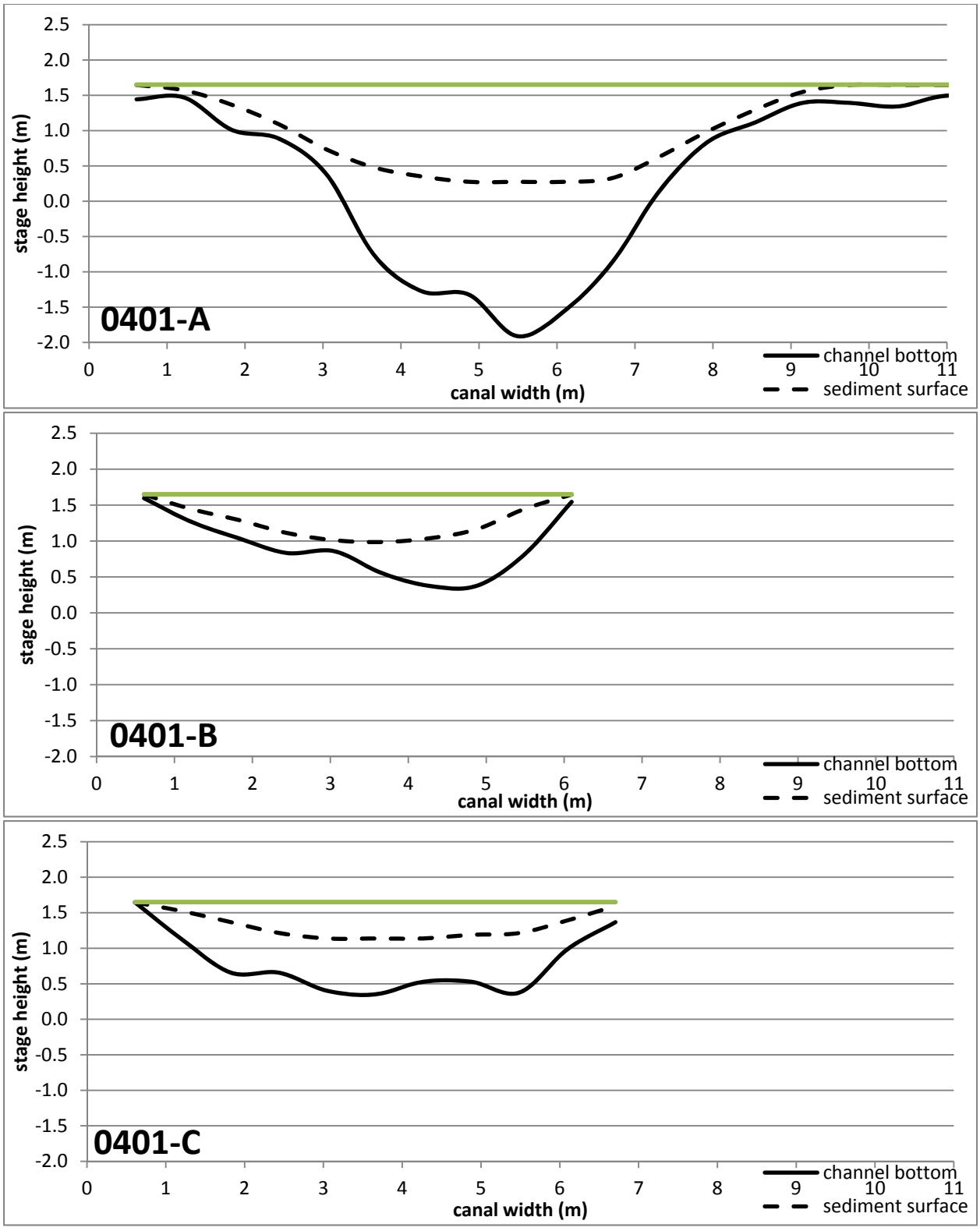


Figure 9. Sediment profile of main canal of farm 0401 at three transects, A, B, and C, surveyed in November 2014. Green line corresponds to height of water. Negative stage height indicates below sea-level.

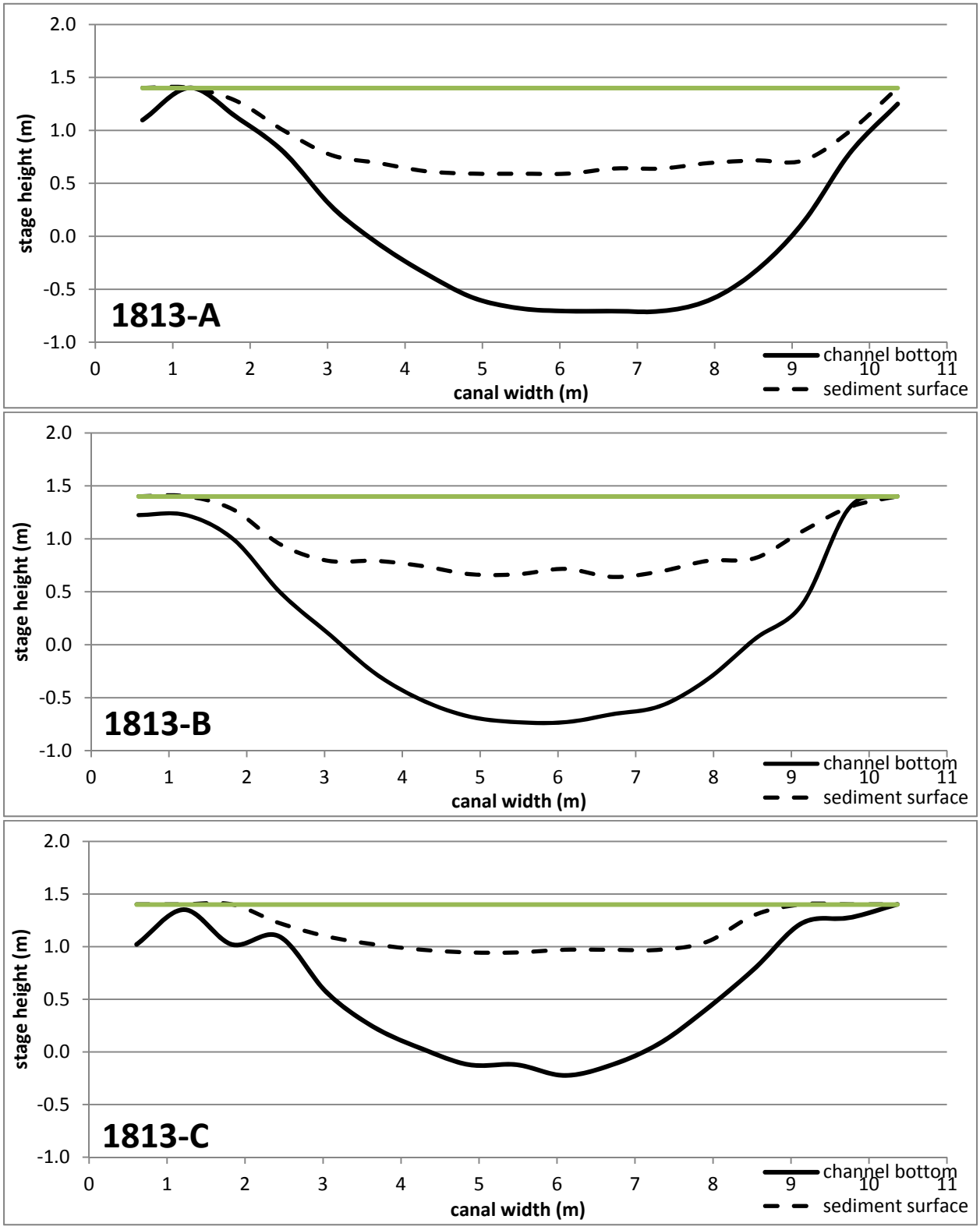


Figure 10. Sediment profile of main canal of farm 1813 at three transects, A, B, and C, surveyed in November 2014. Green line corresponds to height of water. Negative stage height indicates below sea-level.

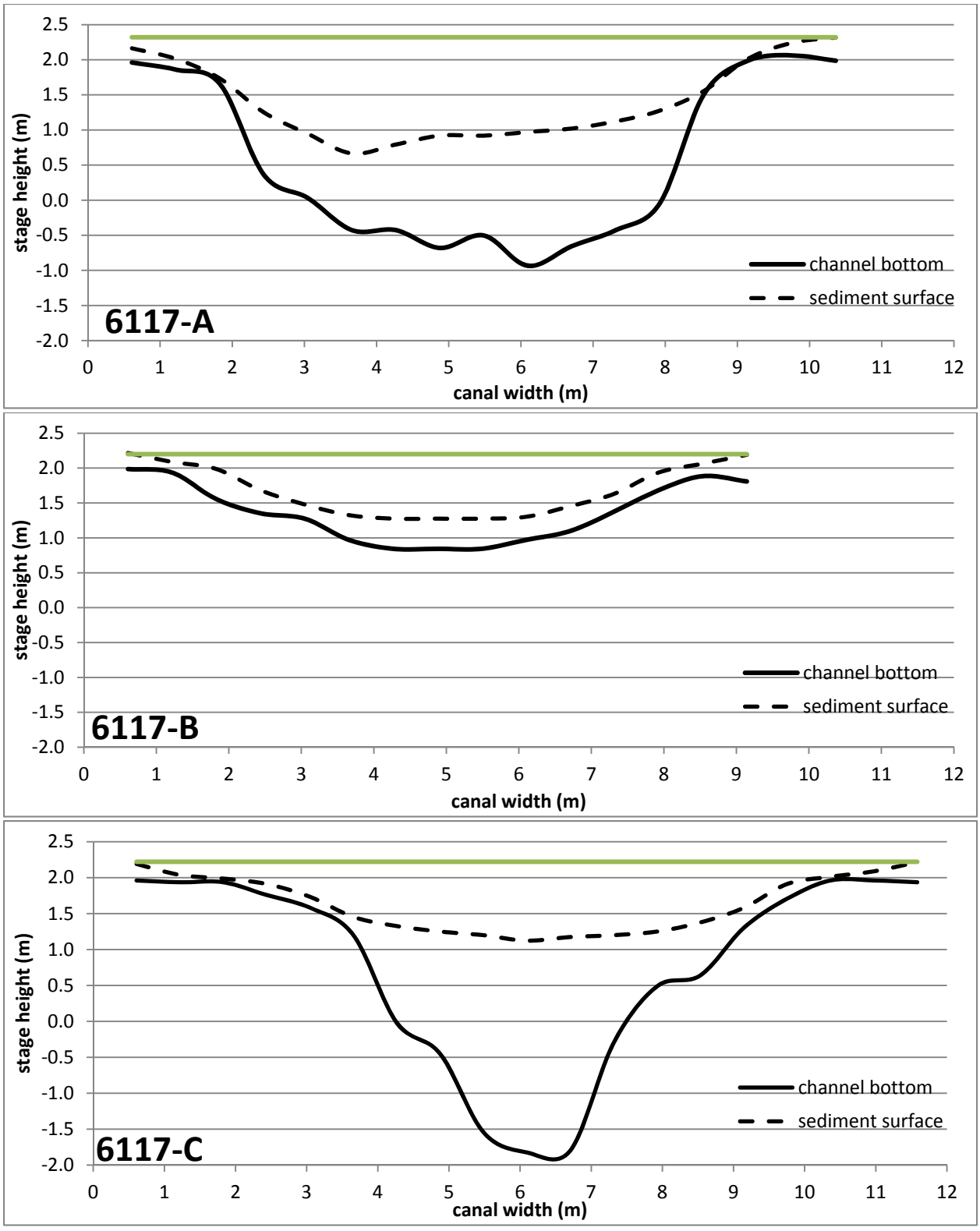


Figure 11. Sediment profile of main canal of farm 6117 at three transects, A, B, and C, surveyed in November 2014. Green line corresponds to height of water. Negative stage height indicates below sea-level.

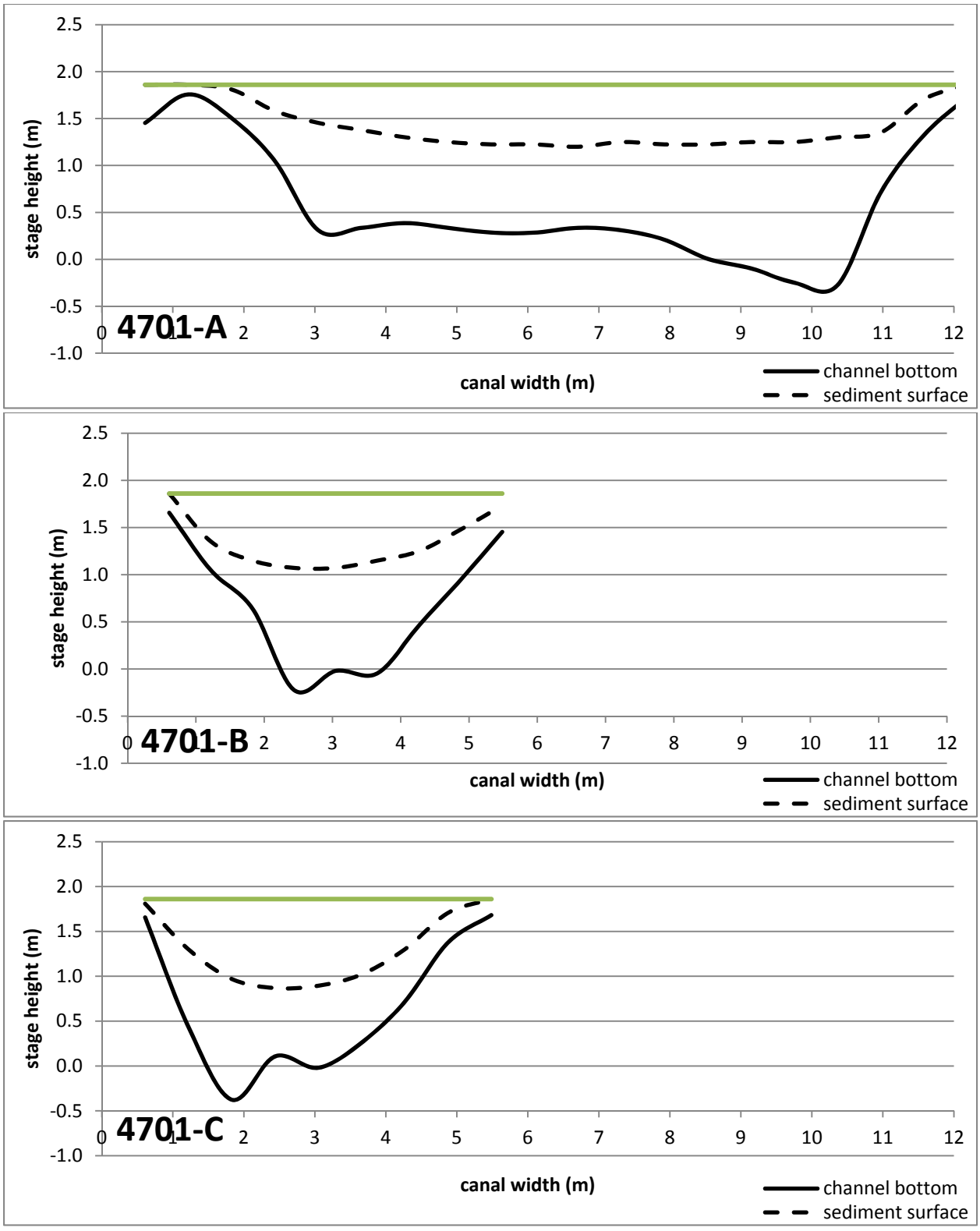


Figure 12. Sediment profile of main canal of farm 4701 at three transects, A, B, and C, surveyed in November 2014. Green line corresponds to height of water. Negative stage height indicates below sea-level.

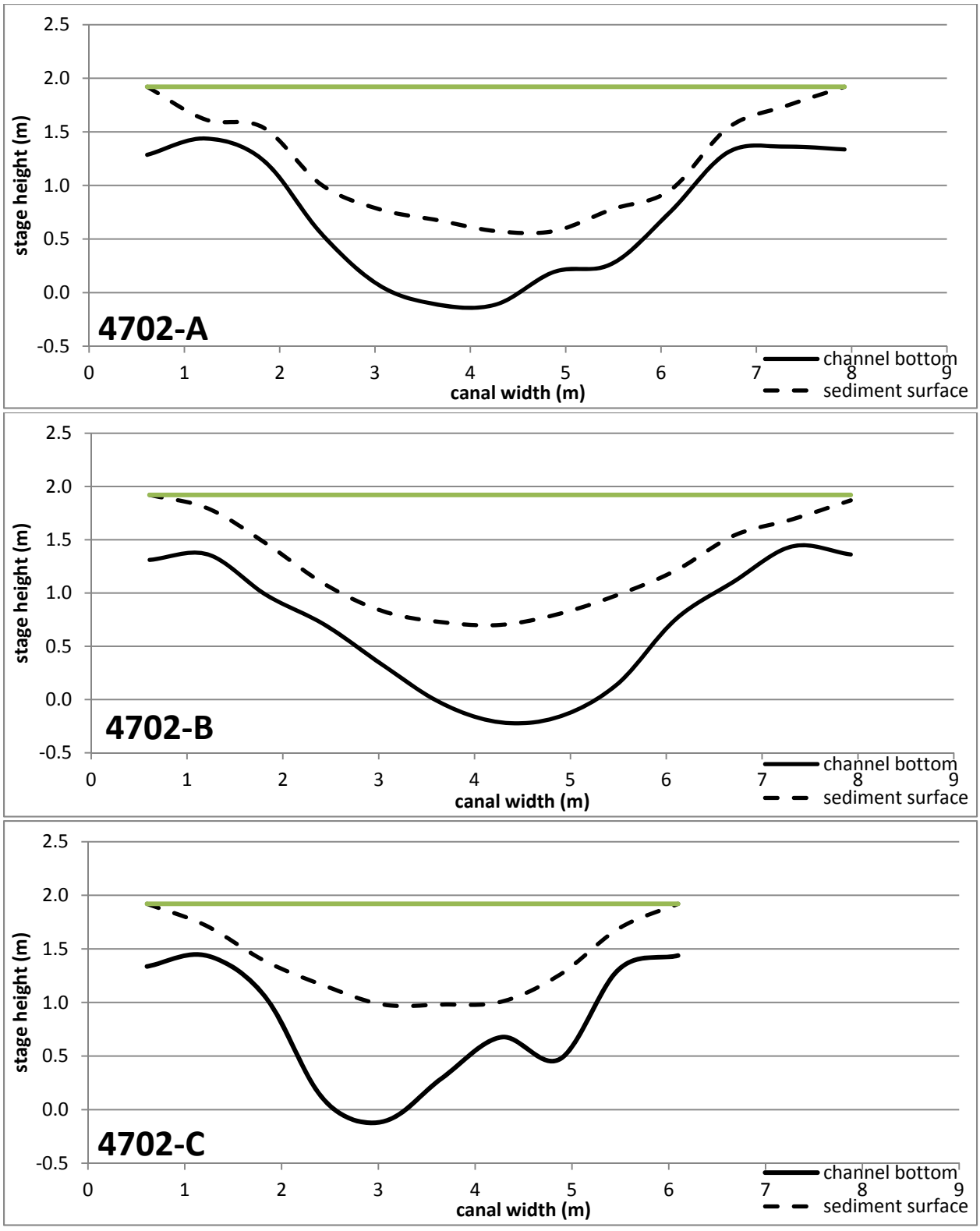


Figure 13. Sediment profile of main canal of farm 4702 at three transects, A, B, and C, surveyed in November 2014. Green line corresponds to height of water. Negative stage height indicates below sea-level.

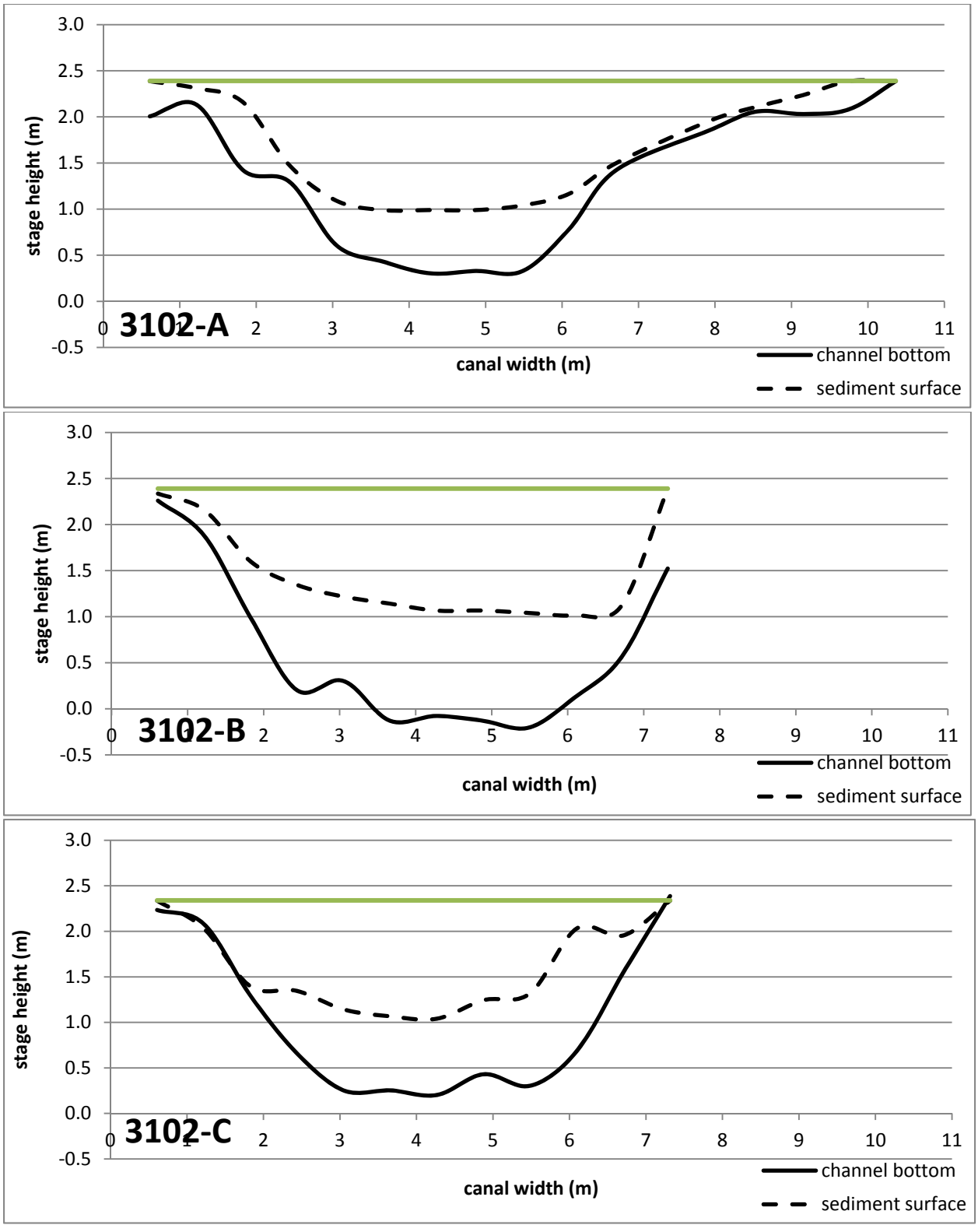
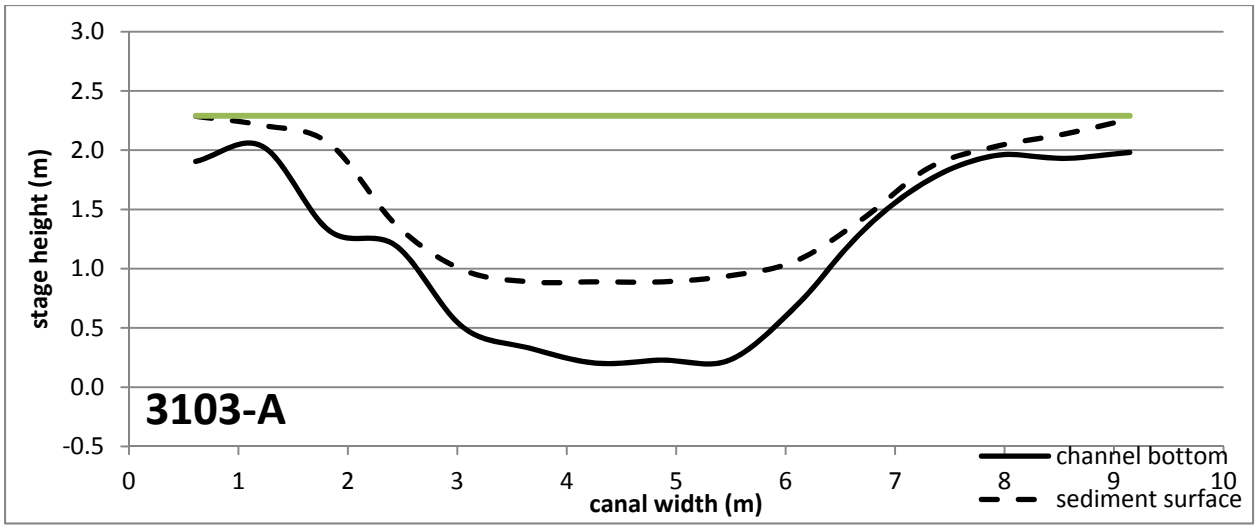
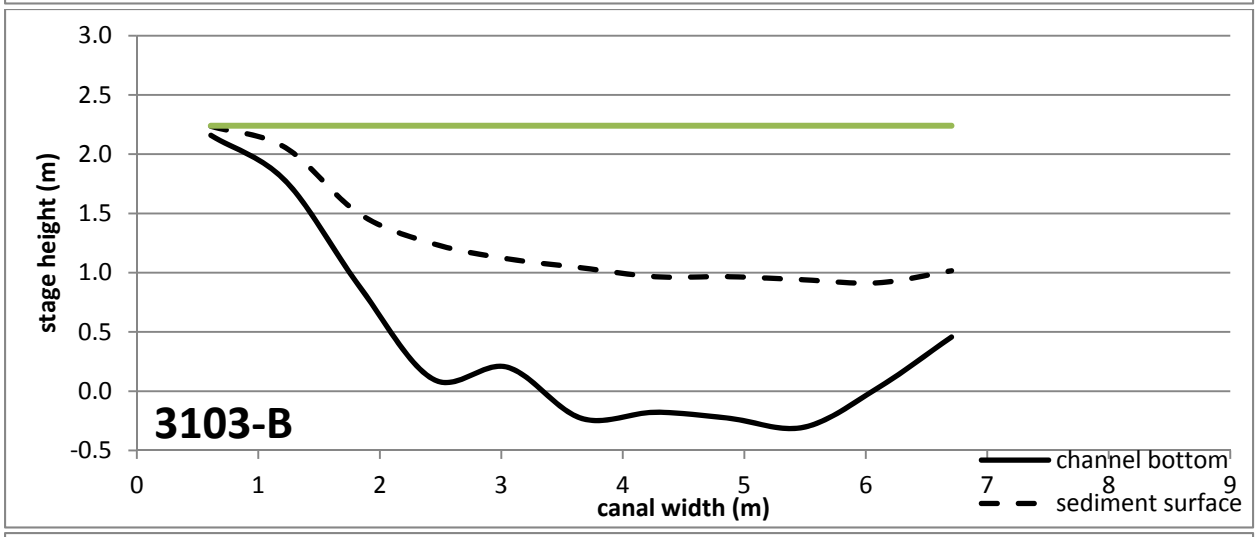


Figure 14. Sediment profile of main canal of farm 3102 at three transects, A, B, and C, surveyed in April 2015. Green line corresponds to height of water. Negative stage height indicates below sea-level.





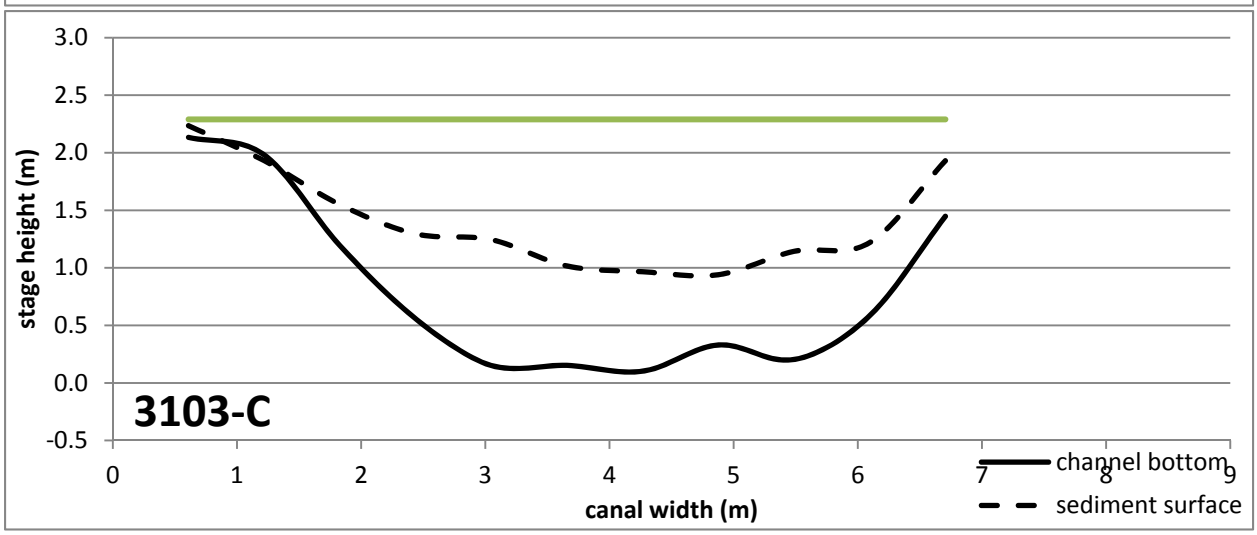


Figure 15. Sediment profile of main canal of farm 3103 at three transects, A, B, and C, surveyed in April 2015. Green line corresponds to height of water. Negative stage height indicates below sea-level.

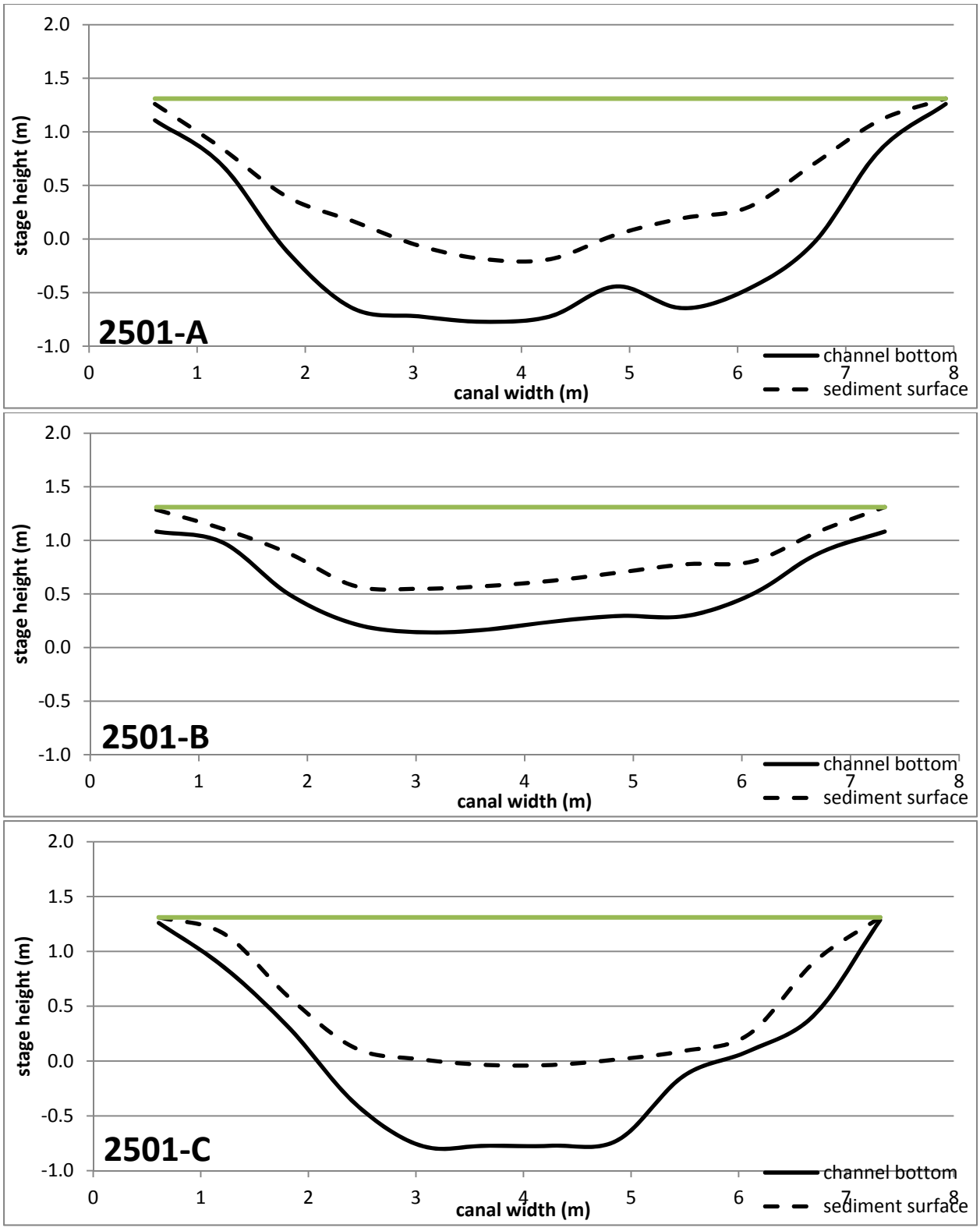


Figure 16. Sediment profile of main canal of farm 2501 at three transects, A, B, and C, surveyed in April 2015. Green line corresponds to height of water. Negative stage height indicates below sea-level.

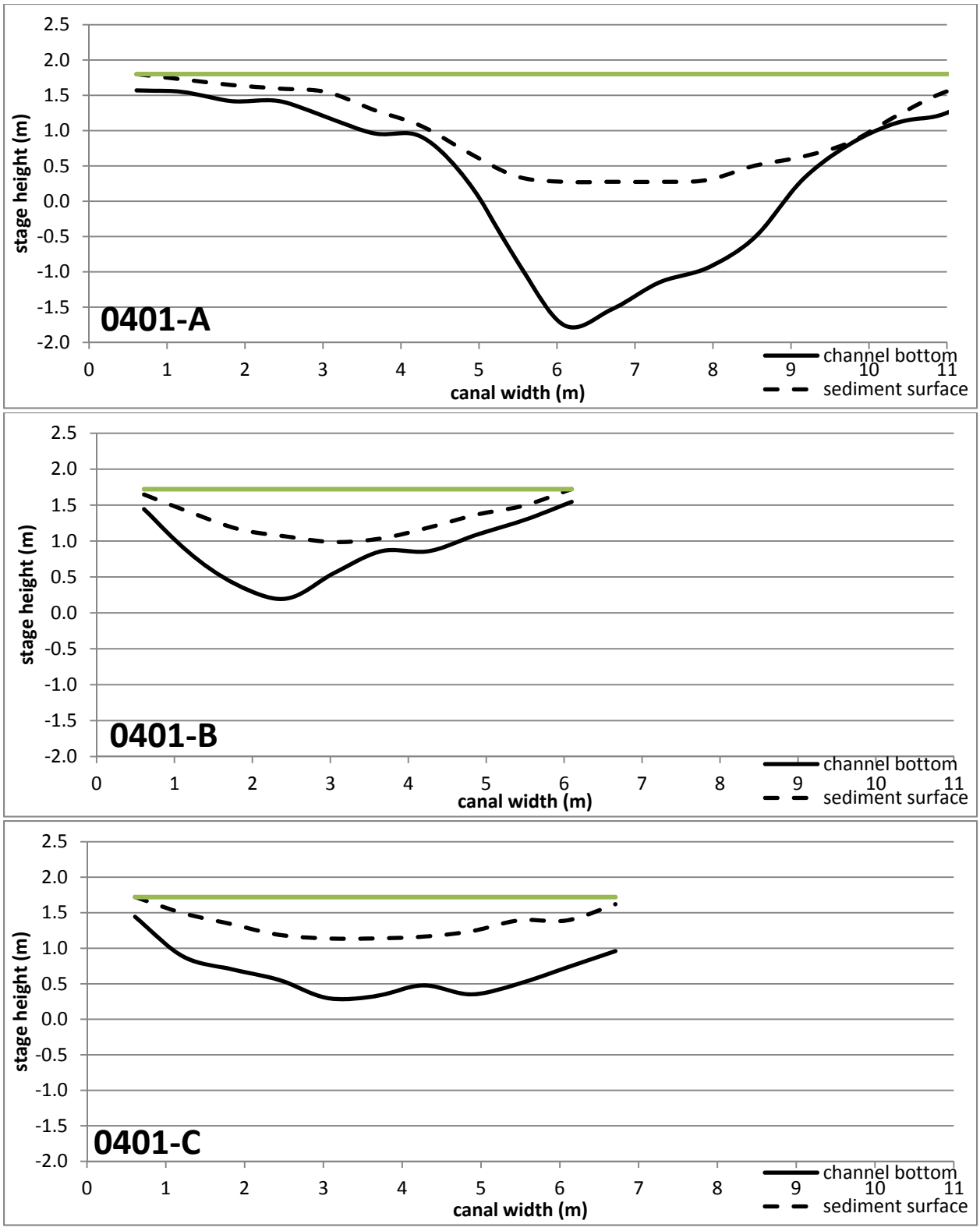


Figure 17. Sediment profile of main canal of farm 0401 at three transects, A, B, and C, surveyed in April 2015. Green line corresponds to height of water. Negative stage height indicates below sea-level.

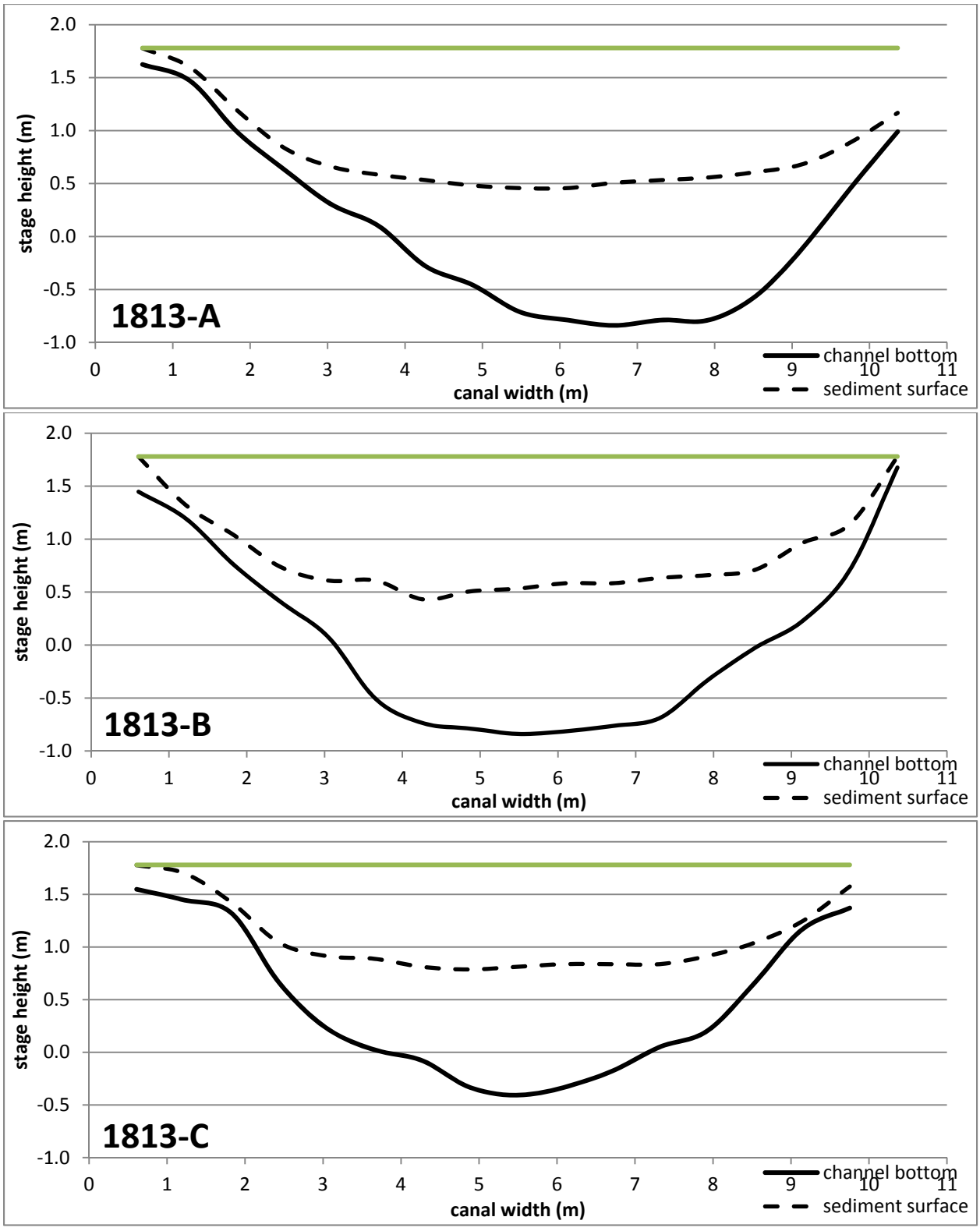


Figure 18. Sediment profile of main canal of farm 1813 at three transects, A, B, and C, surveyed in April 2015. Green line corresponds to height of water. Negative stage height indicates below sea-level.

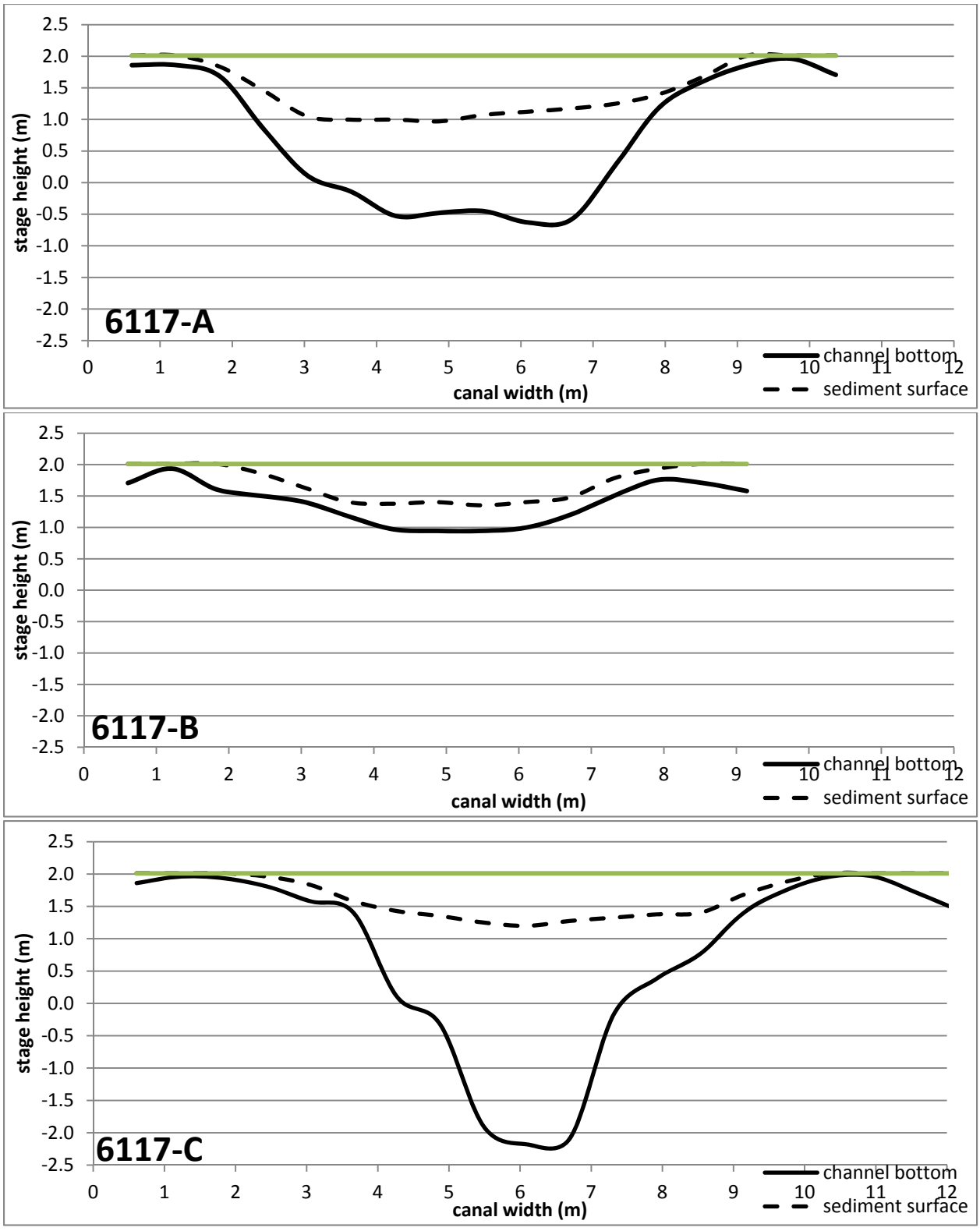


Figure 19. Sediment profile of main canal of farm 6117 at three transects, A, B, and C, surveyed in April 2015. Green line corresponds to height of water. Negative stage height indicates below sea-level.

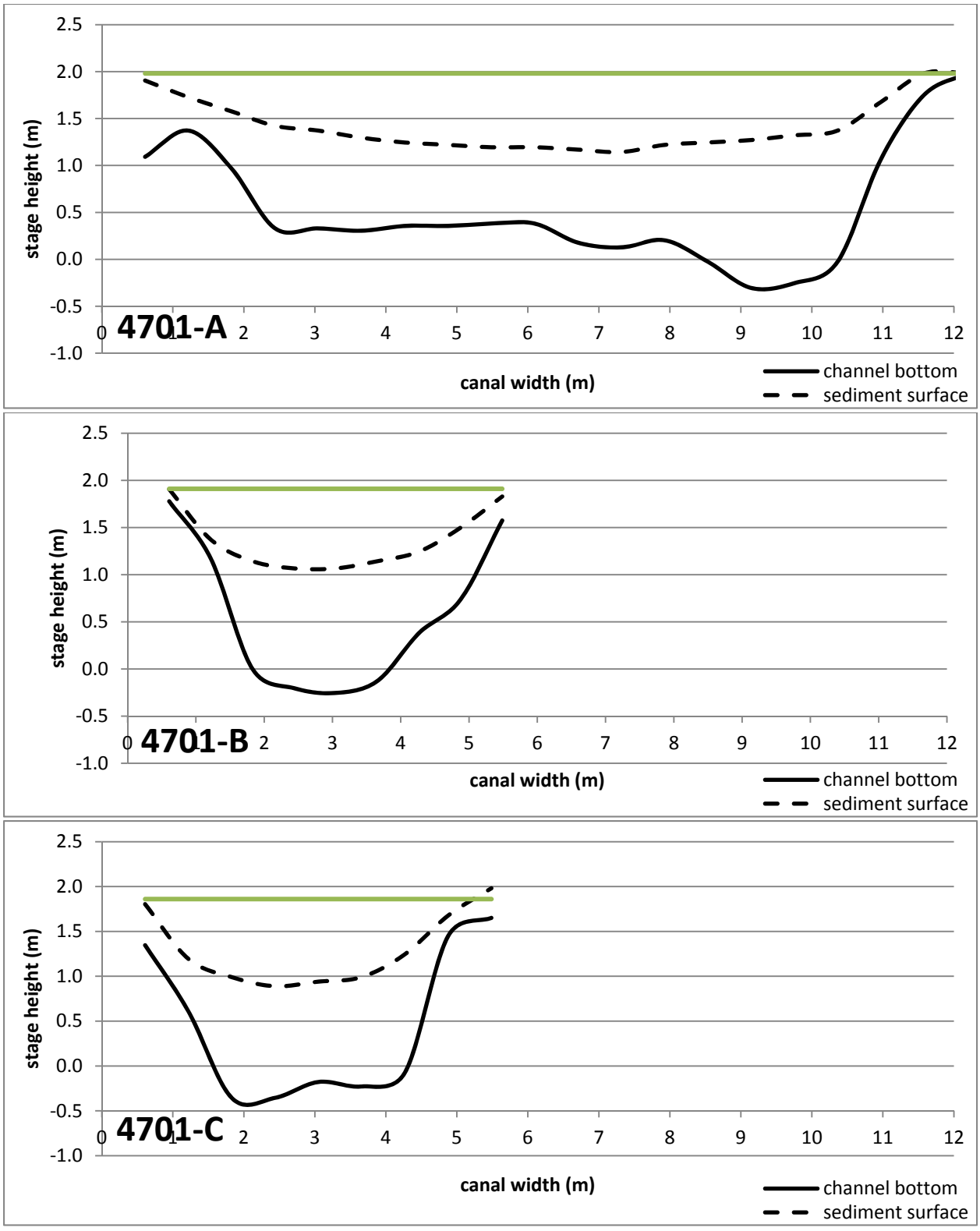


Figure 20. Sediment profile of main canal of farm 4701 at three transects, A, B, and C, surveyed in April 2015. Green line corresponds to height of water. Negative stage height indicates below sea-level.

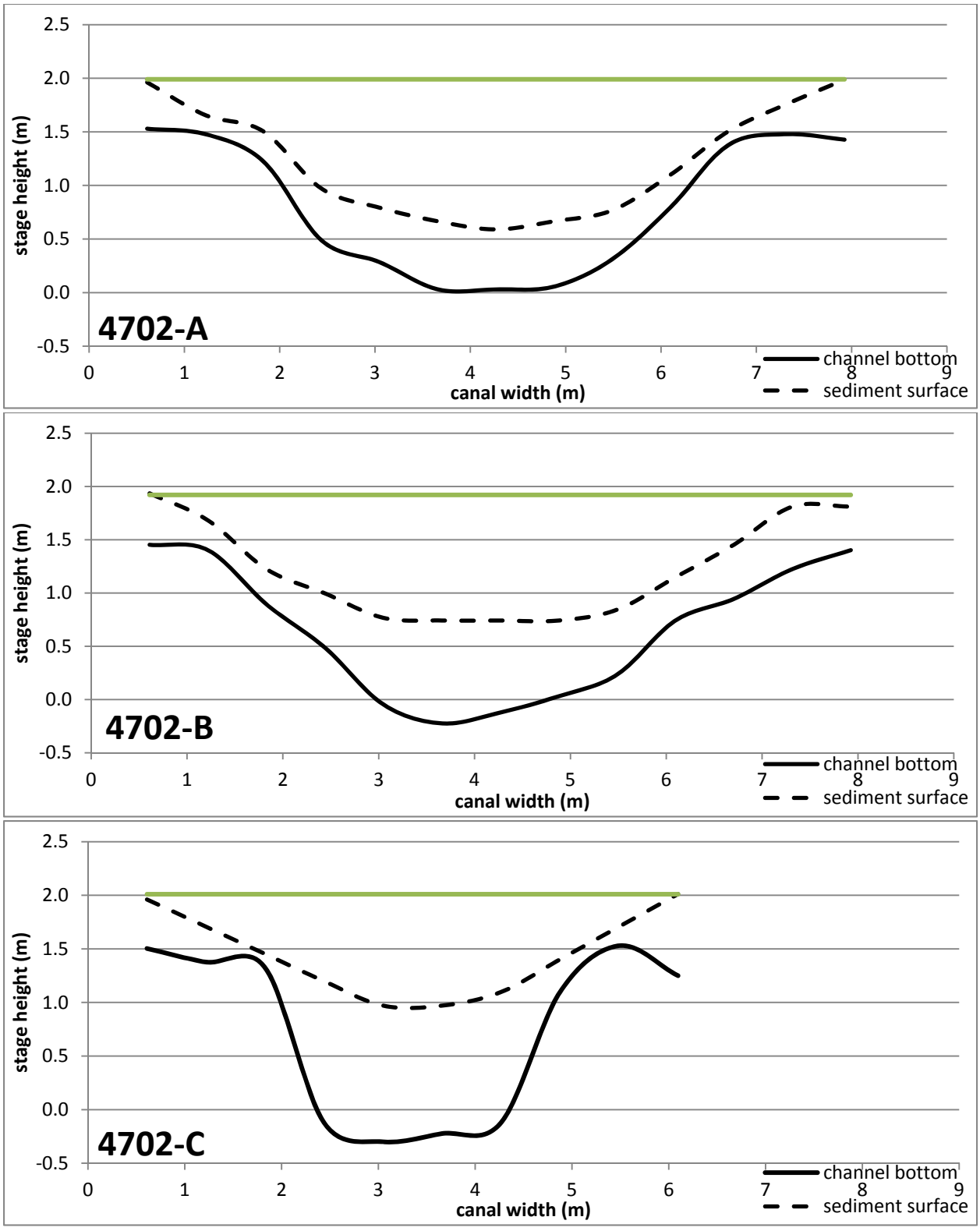


Figure 21. Sediment profile of main canal of farm 4702 at three transects, A, B, and C, surveyed in April 2015. Green line corresponds to height of water. Negative stage height indicates below sea-level.

Floating Aquatic Vegetation: Coverage, Species and TP Content

An overall assessment of FAV was conducted approximately every two months to determine percent coverage, species composition and total P content of plant biomass. In this report we include the data collected from May 2014 to April 2015 (total five sampling events). Two representative samples were collected from each farm. Sampling locations were selected at each farm based on spatial coverage of FAV.

FAV Sampling Procedure and Analyses

A one-meter-square floating PVC retainer is placed on the FAV biomass to be sampled. All FAV within the square is harvested and placed in mesh bags to drain. Total fresh weight is recorded after draining. The entire sample mass is air dried to constant weight with forced air at 50° C. The weight of the dry sample mass is recorded, and the mass is ground to less than 1 mm in a cyclone mill. The ground material is blended well and stored in an airtight container until analysis. Samples were analyzed for water content and TP. Percent moisture content was calculated based on difference between wet mass of FAV versus oven dry mass, while the dry grounded biomass was analyzed for TP using method 200.7 (USEPA, 2003) on an Inductively Coupled Plasma Mass Spectroscope (IFAS, Analytical Research Lab, Gainesville, FL). The total P in individual farm FAV biomass was calculated as the product of the dry FAV biomass P concentration (mg/kg) times the mass of FAV (kg) present in the canals based on the percent coverage.

Results

Table 4 shows the percent FAV coverage from the start of the project during the calibration and treatment periods. Tables 5-9 show detailed FAV characterization and TP content of FAV biomass from five sampling trips between May 2014 to April 2015.

Table 4. Percent FAV coverage of main farm canals by date and farm.

	Percent FAV Coverage							
Month-Year	**3102**	**3103**	**2501**	**0401**	**1813**	**6117**	**4701**	**4702**
	Calibration period							
Jan-11	10	3	NC	40	NC	20	3	7
Mar-11	5	2	15	15	NC	25	5	2
May-11	40	10	50	70	NC	30	30	5
Jun-11	40	40	5	40	NC	40	1	5
Aug-11	40	40	40	60	NC	10	10	15
Oct-11	30	10	15	40	NC	10	10	15
Jan-12	30	40	15	20	NC	30	15	10
Apr-12	30	30	70	50	NC	75	30	NC
Jun-12	30	45	30	2	NC	38	30	20
Aug-12	60	40	30	20	NC	45	15	30
Oct-12	10	20	10	85	NC	5	10	15
Dec-12	30	30	10	70	NC	10	10	30
Feb-13	25	15	20	20	NC	10	5	35
Apr-13	20	10	5	70	NC	10	5	15
	Commencement of treatment							
Jun-13	35	10	10	10	NC	10	20	40
Aug-13	35	25	45	85*	NC	25	10	55
Oct-13	70	20	40	25	10	25	10	5
Dec-13	45	<5	15	<5	25	<5	NC	5
Feb-14	20	NC	NC	NC	25	15	NC	NC
Apr-14	20	NC	40	NC	NC	35†	NC	NC
							Commencement of treatment	
Jun-14	30	<5	<5	15	<5	25	30	NC
Aug-14	40	NC	25	35*	NC	90†	25	NC
Oct-14	50	20	30	20	NC	60†	60	NC
Feb-15	45	60†	NC	NC	NC	NC	20	NC
Apr-15	60	20	25	40*	NC	NC	40	NC

NC = No coverage; *mostly filamentous algae †mostly duckweed

Coverage greater than 25% of water lettuce is spot-sprayed in the treatment farms.

June 2014

Farm 3102: Overall about 30% coverage, dominated by water-lettuce and torpedo grass.

Farm 3103: Overall less than 5% coverage.

Farm 2501: Overall less than 5% coverage.

Farm 0401: Overall 15% cover, mostly filamentous algae.

Farm 1813: Overall less than 5% coverage.

Farm 6117: Overall 25% mostly duck-weed.

Farm 4701: Overall 30% coverage mostly filamentous algae, some water lettuce, alligator weed.

Farm 4702: Overall clean canal. No coverage.

Table 5.FAV sample composition, water content, TP concentration, and mass of TP in farm canal FAV for June 2014.

Farm ID	Water content (%)	[TP] of dry FAV (mg/kg)	TP in Farm FAV Mass (kg)	Sample description
3102	93	2555	2.0	water lettuce and torpedo grass
3103				<5% coverage
2501				<5% coverage
0401	92	1684	0.9	filamentous algae
1813				<5% coverage
6117	93	2043	0.7	duck-weed
4701	89	2558	4.0	filamentous algae
4702				No coverage

August 2014

Farm 3102: Overall about 40% of the canal covered with water lettuce and torpedo grass.

Farm 3103: Overall very clear canal. No buildup of FAV.

Farm 2501: Overall 25% coverage mostly filamentous algae, torpedo grass.

Farm 0401: Overall 35% cover, mostly filamentous algae some water lettuce, alligator weed.

Farm 1813: Overall very clear canal. No buildup of FAV.

Farm 6117: Overall 90% of canal covered with duckweed.

Farm 4701: Overall 25% coverage mostly filamentous algae, some water lettuce, alligator weed.

Farm 4702: Overall very clear canal. No buildup of FAV.

Table 6. FAV sample composition, water content, TP concentration, and mass of TP in farm canal FAV for August 2014.

Farm ID	Water content (%)	[TP] of dry FAV (mg/kg)	TP in Farm FAV Mass (kg)	Sample description
3102	97	4640	6	water lettuce, torpedo grass
3103				No FAV coverage
2501	93	1381	1.0	filamentous algae, torpedo grass
0401	92	868	1.0	filamentous algae, water lettuce, alligator weed
1813				No FAV coverage
6117	97	1810	1.3	duck-weed
4701	96	2326	1.2	filamentous algae, water lettuce, alligator weed
4702				No FAV coverage

October 2014

Farm 3102: Overall about 50% of the canal covered with water lettuce, alligator weed, and torpedo grass.

Farm 3103: Overall 20% coverage comprising of duck weed, torpedo grass and alligator weed.

Farm 2501: Overall 30% coverage mostly filamentous algae, some torpedo grass.

Farm 0401: Overall 20% coverage, mostly filamentous algae, some alligator weed.

Farm 1813: Overall very clear canal. No buildup of FAV.

Farm 6117: Overall 60% of canal covered with duckweed.

Farm 4701: Overall 60% coverage mostly alligator weed, torpedo grass and water lettuce.

Farm 4702: Overall very clear canal. No buildup of FAV.

Table 7. FAV sample composition, water content, TP concentration, and mass of TP in farm canal FAV for October 2014.

Farm ID	Water content (%)	[TP] of dry FAV (mg/kg)	TP in Farm FAV Mass (kg)	Sample description
3102	97	4640	6.0	water lettuce, alligator weed, torpedo grass
3103	96	4344	0.8	duck weed, torpedo grass, alligator weed
2501	92	2703	2.0	filamentous algae, torpedo grass
0401	91	1446	1.0	filamentous algae, alligator weed
1813				No FAV coverage
6117	96	3179	1.4	duck-weed
4701	93	4343	6.6	alligator weed, torpedo grass, water lettuce
4702				No FAV coverage

February 2015

Farm 3102: Overall about 45% of the canal covered with water lettuce, alligator weed.

Farm 3103: Overall 60% coverage comprising of duck weed.

Farm 2501: Overall clean, no buildup of FAV.

Farm 0401: Overall clean, no buildup of FAV.

Farm 1813: Overall clean, no buildup of FAV.

Farm 6117: Overall clean, no buildup of FAV.

Farm 4701: Overall 20% coverage mostly alligator weed, filamentous algae and water lettuce.

Farm 4702: Overall clean, no buildup of FAV.

Table 8. FAV sample composition, water content, TP concentration, and mass of TP in farm canal FAV for February 2015.

Farm ID	Water content (%)	[TP] of dry FAV (mg/kg)	TP in Farm FAV Mass (kg)	Sample description
3102	95	2871	4.0	water lettuce, alligator weed
3103	97	3210	0.8	duck weed
2501				No FAV coverage
0401				No FAV coverage
1813				No FAV coverage
6117				No FAV coverage
4701	92	1176	0.8	alligator weed, filamentous algae, water lettuce
4702				No FAV coverage

April 2015

Farm 3102: Overall about 60% of the canal was covered, water lettuce, alligator weed and torpedo grass.

Farm 3103: Overall 20% coverage comprising of duck weed, alligator weed, torpedo grass.

Farm 2501: Overall 25% coverage, alligator weed, torpedo grass, filamentous algae.

Farm 0401: Overall 40% coverage, filamentous algae, torpedo grass and alligator weed.

Farm 1813: Overall clean, no buildup of FAV.

Farm 6117: Overall clean, no buildup of FAV.

Farm 4701: Overall 40% coverage mostly alligator weed, filamentous algae and water lettuce.

Farm 4702: Overall clean, no buildup of FAV.

Table 9. FAV sample composition, water content, TP concentration, and mass of TP in farm canal FAV for April 2015.

Farm ID	Water content (%)	[TP] of dry FAV (mg/kg)	TP in Farm FAV Mass (kg)	Sample description
3102	94	2906	5.0	water lettuce, alligator weed and torpedo grass
3103	95	3902	1.2	duck weed, alligator weed, torpedo grass
2501	93	2075	1.9	alligator weed, torpedo grass, filamentous algae
0401	92	893	0.8	filamentous algae, torpedo grass and alligator weed
1813				No FAV coverage
6117				No FAV coverage
4701	90	1739	2.4	alligator weed, filamentous algae and water lettuce
4702				No FAV coverage

Assessment of FAV in Farm Canal Pairs

An assessment of FAV was conducted on farm canal pairs for the data collected from May 1, 2014 to April 30, 2015. Dried mass (kg) of FAV, average TP concentration of FAV (mg/kg), percent FAV coverage in individual farm canals as well as total mass of P associated with FAV from individual farm canals have been reported here for five sampling dates (Figures 22 to 25).

Results from farm pair 3102 and 3103, indicate the highest mass of dried FAV was observed in the control farm 3102 at 1637 kg during April 2015 probably because 60% of the canal was covered by water lettuce, torpedo grass, alligator weed, while on two occasions June 2014, and August 2014 the treatment farm 3103 no vegetation coverage (Figure 22). The highest mass of P in canals was 5.8 kg observed in 3102 during October 2014, while on two occasions June 2014, and August 2014 no mass of P was being generated in treatment farm 3103, possibly an effect of keeping the canals clean by spot spraying the buildup of water lettuce in the canal. Note

the coverage in Feb 2015 in Farm 3103 was 60% duckweed, but the mass of dried biomass and mass of P were low due to very little plant biomass of the duckweed (Figure 22)

Comparing farm pair 0401 and 2501, the highest mass of dried FAV was observed in treatment farm 0401 at 1092 kg during August 2014, resulting from 35% coverage of mostly filamentous algae, torpedo grass, alligator weed; and on one occasion February 2015 there was no vegetation coverage. Note, that we are not spot spraying for filamentous algae. Control farm 2501 showed the highest buildup of dried FAV in April 2015 at 921 kg, resulting from 25% coverage of alligator weed, torpedo grass, filamentous algae; and on two occasions June 2014 and, February 2015 displayed no vegetation coverage (Figure 23). The highest P mass was observed in control Farm 2501 at 2.1 kg observed in October 2014, resulting from 30% of filamentous algae, and some torpedo grass; while there was no FAV coverage observed during June 2014 and February 2015. Treatment farm 0401 showed highest P mass of 1.0 kg on two occasions, first during August 2014, resulting from 35% coverage of mostly filamentous algae, torpedo grass, alligator weed, and also in October 2014 resulting mostly from filamentous algae,

and some alligator weed. On one occasion February 2015 there was no FAV coverage in farm 0401.

Comparing farm pair 1813 and 6117, we noticed that control farm 1813 was clean throughout the year. The highest buildup of FAV was observed in treatment farm 6117 during August 2014 at 732 kg, resulting from almost 90% coverage of duckweed. The highest mass of P was 1.4 kg observed in October 2014 in farm 6117. On two occasions February 2015 and April 2015 farm 6117 displayed no vegetation coverage (Figure 24).

Comparing farm pair 4701 and 4702, we observed that treatment farm 4702 was clean throughout the year. The highest mass of dried FAV was observed in farm 4701 at 1620 kg during October 2014 resulting from 60% coverage of mostly alligator weed, torpedo grass and water lettuce (Figure 25). The highest mass of P was also observed in farm 4701 at 6.6 kg during October 2014 resulting from the 60% coverage of mostly alligator weed, torpedo grass and water lettuce.

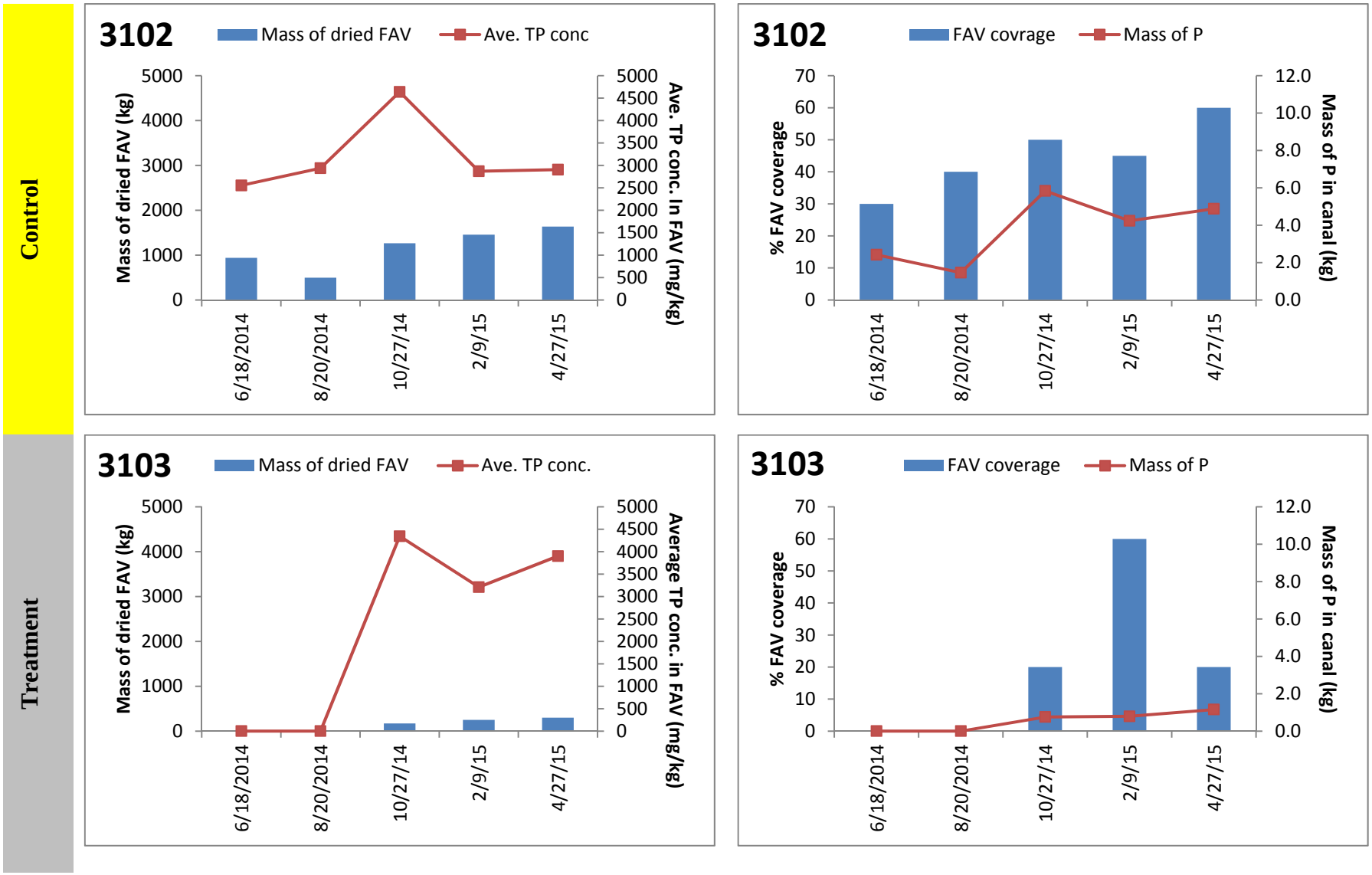


Figure 22. Comparison of FAV in main canals of farms 3102 and 3103. (Left) Changes in mass of dried FAV and average TP concentration of FAV over time. (Right) Changes in percent FAV coverage and mass of P in FAV over time.

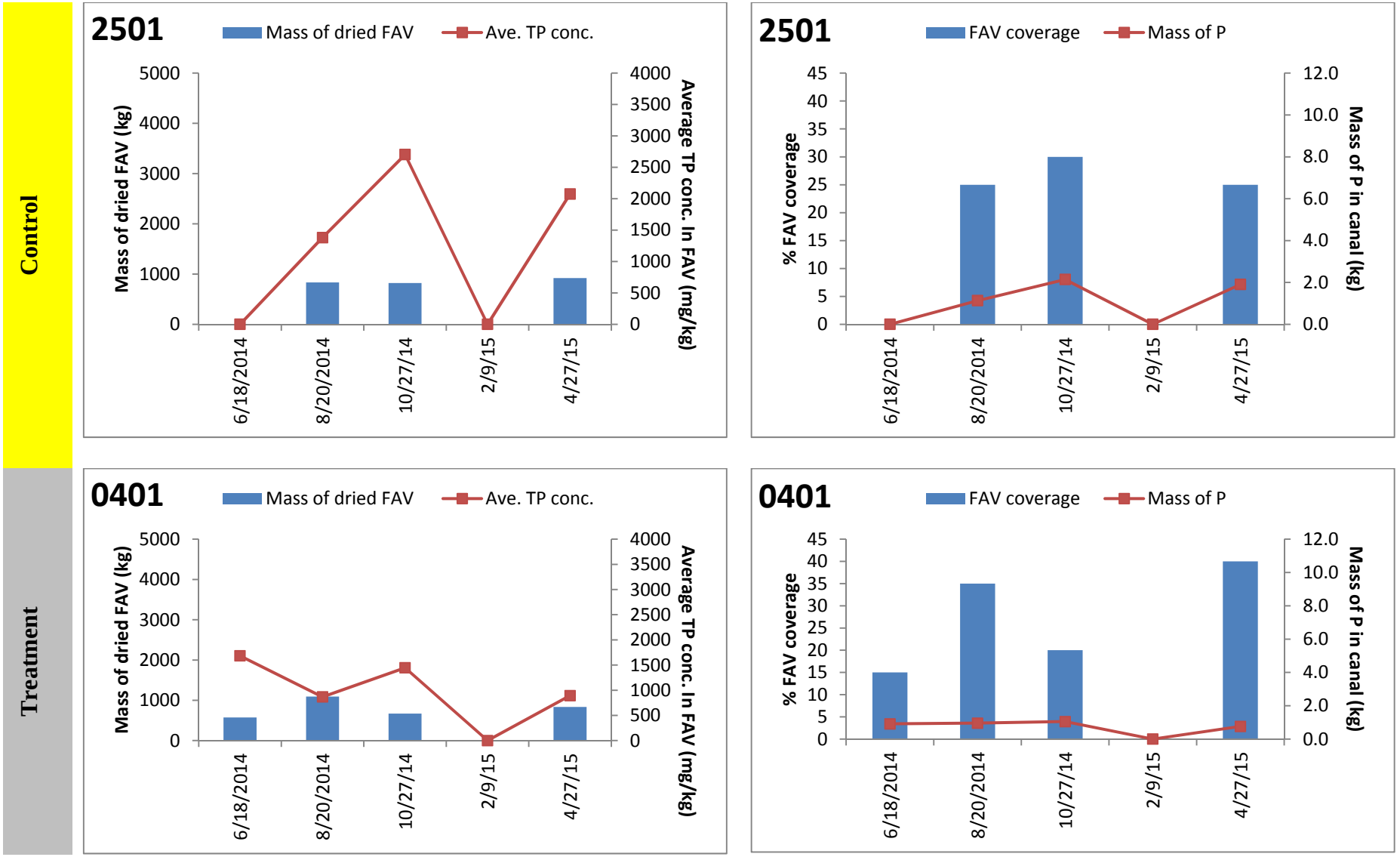


Figure 23.Comparison of FAV in main canals of farms 2501 and 0401. (Left) Changes in mass of dried FAV and average TP concentration of FAV over time. (Right) Changes in percent FAV coverage and mass of P in FAV over time.

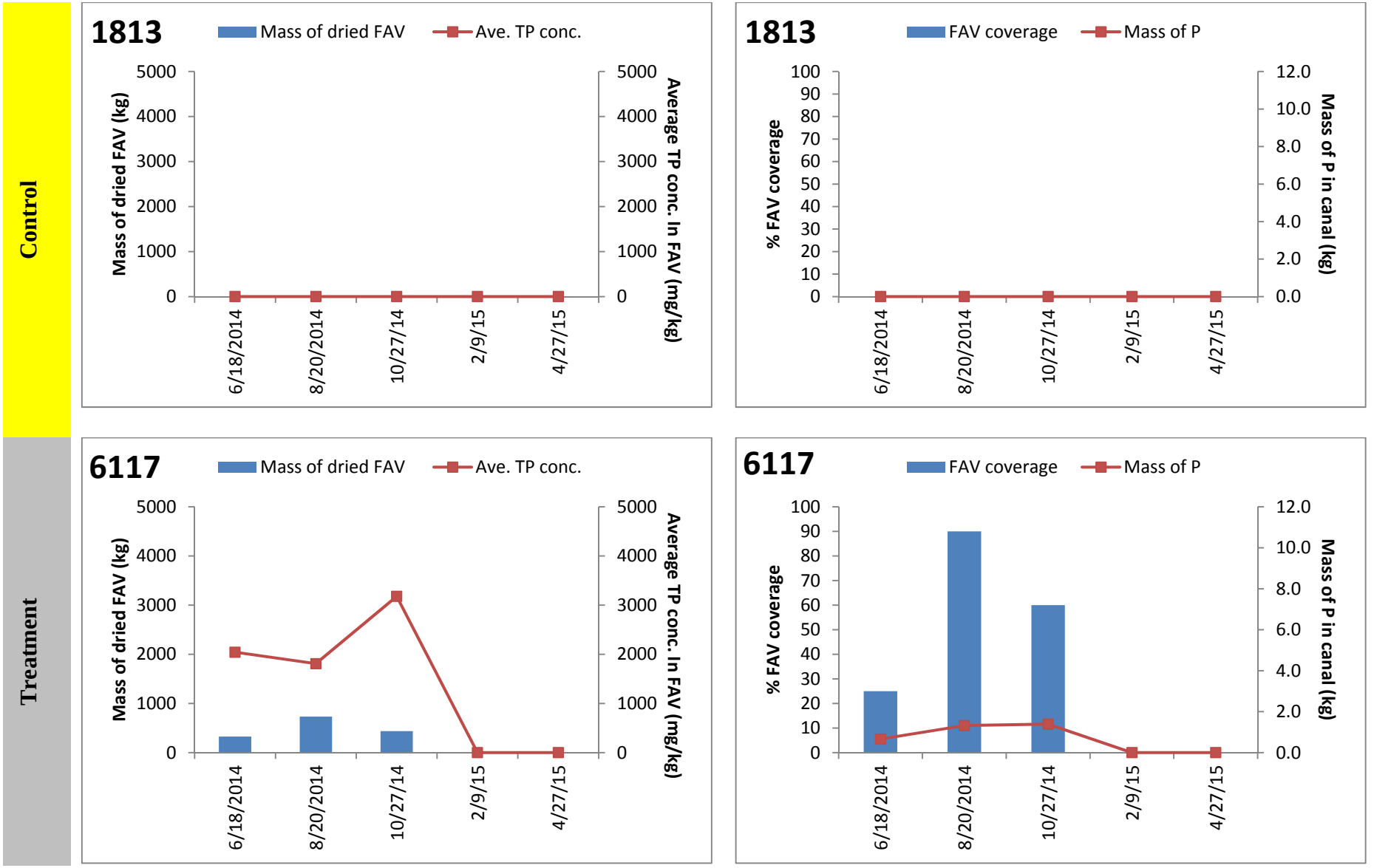


Figure 24. Comparison of FAV in main canals of farms 1813 and 6117. (Left) Changes in mass of dried FAV and average TP concentration of FAV over time. (Right) Changes in percent FAV coverage and mass of P in FAV over time.

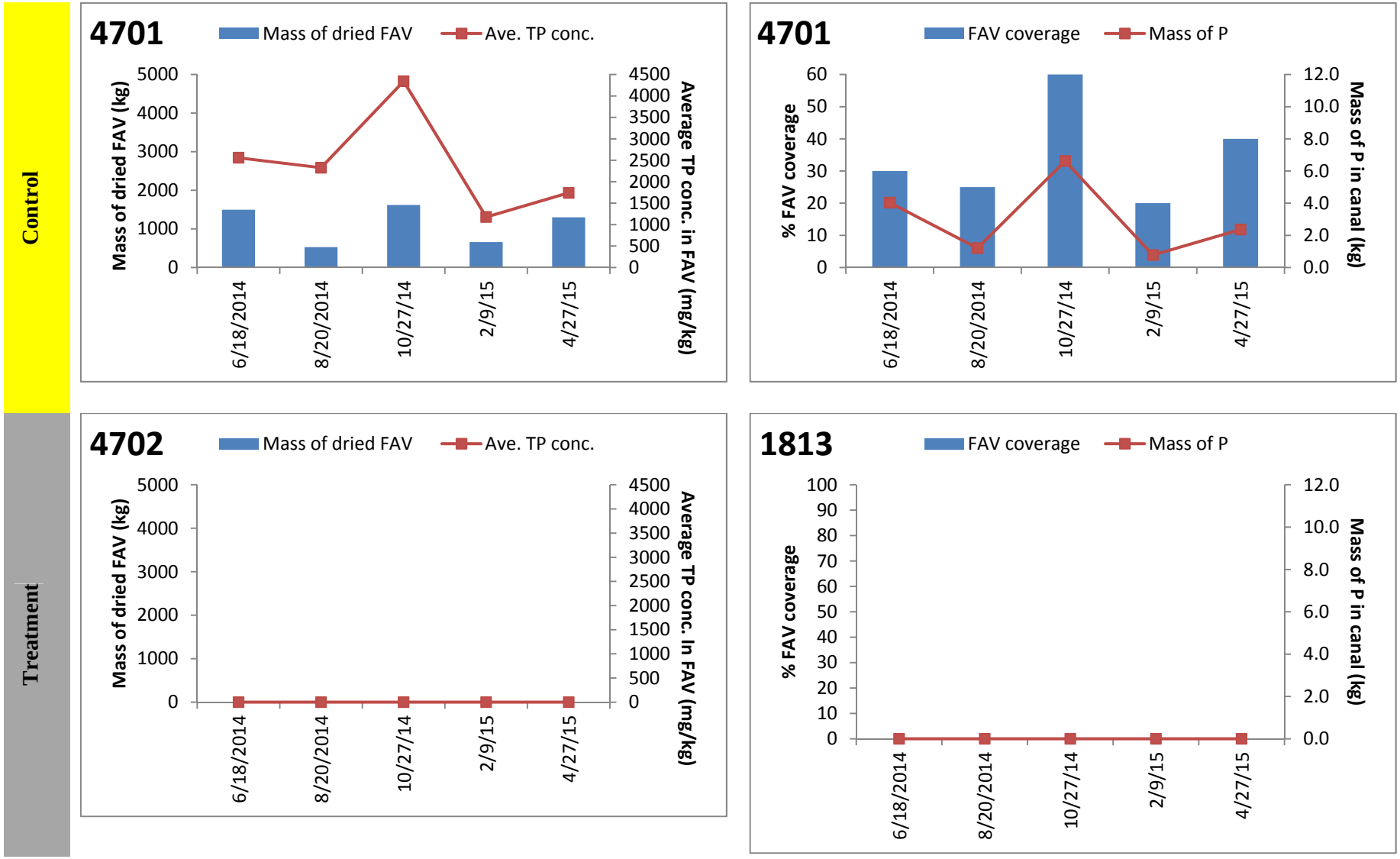


Figure 25.Comparison of FAV in main canals of farms 4701 and 4702. (Left) Changes in mass of dried FAV and average TP concentration of FAV over time. (Right) Changes in percent FAV coverage and mass of P in FAV over time.

Water Quality Monitoring

Eight farms (four pairs) are being monitored for water quality since Fall 2010 in this research project. There are two conditions when canal waters are sampled: (i) ambient condition (canal water grab samples), and (ii) drainage condition (flow-composited, drainage water samples). Grab water samples are collected regularly from all eight farms' main canals at three locations per main farm canal, i.e., A, B, and C. The three grab sampling locations are in proximity of sediment sampling transect locations as shown in the aerial farm maps (Figures 2 to 5; see Farm Description section for more detail). The sampling location A is located halfway between the main canal length midpoint and the pumphouse, location B is located at the halfway point of the main farm canal, and location C is located halfway between location B and the end of the main canal. The periodicity of grab water sampling was at least two times per month. However, grab water samples are not collected during weeks when a farm was actively discharging drainage water. Drainage water samples were collected on a flow-weighted basis by auto-sampler during drainage events (active pumping of water off the farm).

Water Sampling Procedures

Ambient canal water samples are collected using an in-house grab sampling technique, which uses a 1.25 L Nalgene bottle harnessed by insulated wire to one end of an aluminum pole. The pole is gently immersed approximately 0.5 m below the canal surface while the sample bottle fills with water. The bottles are immersed upside down so as to prevent any debris from entering the bottle. The bottles are labeled and preserved on ice while being transported to the EREC lab for analyses. Once the samples are collected in field they are transported on ice to the lab in less than 2 hours, where they are immediately filtered and acidified appropriately for the different analyses. Field blanks and field duplicates are collected at every sampling event as per QA-QC guidelines (Quality Manual ver. 7.1, Josan et al., 2010).

Drainage water samples are collected daily as a flow-composite sample. The composite sample is collected by auto-sampler using solar power that is triggered by a data logger set at farm-specific flow discharge volume intervals. Drainage water samples are stored on-site in refrigerated containers until sample collection. Sample collection occurs within 24-36 hours of the initial drainage water sample collection.

Laboratory Analyses

All water samples were analyzed for total P (TP), total dissolved P (TDP), soluble reactive P (SRP), total suspended solids (TSS), pH, and dissolved calcium (Ca). Particulate P (PP) was calculated as the difference between TP and TDP, whereas dissolved organic P (DOP) was calculated as a difference between TDP and SRP. The water samples were filtered through 0.45 µm filter and the filtrates were analyzed for TDP (after acid digestion) and SRP. For TP and TDP analysis water samples were digested in the presence of concentrated sulfuric acid, ammonium persulfate using method 365.1 (USEPA, 2003). All samples were analyzed for ortho-P using ascorbic acid method (Murphy and Riley, 1962) using an automated air segmented continuous flow analyzer, Auto Analyzer 3 (AA3) manufactured by Seal. For SRP, samples were analyzed in a range between 0.00 and 0.50 mg/l. Samples with a concentration greater than 0.50 mg/l were diluted to fall in the applicable range. For the WY2014, the respective method detection limits for TP, TDP, and SRP were 0.01, 0.01, and 0.002 mg/l respectively. Detailed analytical procedures are contained in the Standard Methods for the Examination of Water and Wastewater (APHA, 1998), and EREC Quality Manual Ver. 7.1. (Josan et al. 2010, SOP 28 Rev. 1).

For the TSS analysis, a well-mixed water sample (minimum 500 ml, equilibrated to controlled room temperature) was filtered through a pre-weighted standard glass fiber filter and the residue retained on the filter was dried to a constant weight at 105°C. The increase in weight of the filter was recorded and TSS concentrations were calculated on per liter basis. The practical range of the determination is 1 mg/l to 20,000 mg/l. The outlined procedure is based on method 160.2 (USEPA, 2004) and details of the method are available in EREC Quality Manual Ver. 7.1 (SOP 13 Rev. 3). The total suspended solid were calculated using the following equation:

$$TSS(mg/L) = \frac{(weightofdryfilter + residue + dish - weightofdryfilter + dish) \times 1000000}{Samplevolume}$$

The pH of the water samples was determined using a combination glass electrode. The total dissolved Ca levels, hereafter referred as Ca, were analyzed using an atomic absorption spectrophotometer.

Results

Ambient Farm Canal Water Monitoring Results

Phosphorus species' concentrations during ambient canal conditions at three set main farm canal transect locations on each farm are summarized in Tables 10 to 13. Tables 10 and 11 correspond to farms in the S5A sub-basin, while tables 12 and 13 correspond to farms in the S6 sub-basin. Additionally, box-plots of ambient canal water TP concentration by matching farm pairs are presented in the appendix (Figures A1-A2). The box-plots provide an exploratory data distribution analysis via visual summaries of P concentrations in ambient canal water during the calibration period (November 2010-April 2013) and from start of treatment period (May1, 2013-April, 30 2015) for three farm pairs. While the data for 4701/4702 is calibration period (November 2010 -April, 30 2014) and from start of treatment period (May1, 2014-April,30 2015). Complete detailed data of parameters for ambient canal water samples are presented in Tables A9 through A16 in the Appendix. These tables present water quality parameters at each farm location for individual sampling dates for each of the three transects per farm. For example, Table A9 shows the water quality parameters of grab canal water samples collected from farm 0401during each sampling event from November 2010 through April 2015.[2]

For farm pair 0401 and 2501 the average TP concentration in the ambient canal waters was 0.047 mg L^{-1} and 0.056 mg L^{-1} respectively (Table 10) from November 2010 to April 2013; whereas from May 2013 to April 2015 the average TP values were 0.064 and 0.075 mg L^{-1} respectively (Table 11). During the calibration period, the highest TP values of 0.215 and 0.270 mg L^{-1} were observed on 4/3/2013 and 3/16/2011 for farms 0401 and 2501, respectively (Tables A9 and A10). For farm pair 1813 and 6117 the average TP concentration in the ambient canal waters was 0.072 mg L^{-1} and 0.093 mg L^{-1}, respectively from November 2010 to April 2013 (Table 10); whereas from May 2013 to April 2015 the average TP values were 0.062 and 0.107 mg L^{-1}, respectively (Table 11). During the calibration period, the maximum TP values of 0.242 and 0.334 mg L^{-1} were observed on 3/12/2012 and 12/11/2013 for farms 1813 and 6117, respectively (Tables A11 and A12).

[2] Grab sampling started in November 2010 while drainage sampling started in February 2011

For the farm pair 3102 and 3103 the average TP concentrations in the ambient canal waters were 0.104 and 0.087 mg L^{-1}, respectively from November 2010 to April 2013 (Table 12); whereas from May 2013 to April 2015 the average TP concentrations were 0.072 and 0.111 mg L^{-1}, respectively (Table 13). During the calibration period, the maximum TP values of 0.341 and 0.348 mg L^{-1} were observed on 3/16/2011 and 4/23/2012 for farm 3102 and 3103, respectively (Tables A13 and A14). For farm pair 4701 and 4702 the average TP concentrations in the ambient canal waters was 0.045 and 0.062 mg L^{-1} respectively during November 2010 and April 2013 (Table 12), whereas between May 2013 and April 2015 the average TP concentrations were 0.058 and 0.059 mg L^{-1} respectively (Table 13). During the calibration period, the maximum TP values of 0.201 and 0.259 mg L^{-1} were observed on 4/17/2013 and 11/15/2012 for farms 4701 and 4702, respectively (Tables A15 and A16).

Bar graphs of ambient canal water average P speciation concentrations and percent total P fraction by farm are shown in Figures 26 and 27. During the calibration period, the average contribution of PP to the TP in the ambient canal water samples ranged from as low as 29% for the farm 3102 to as high as 56% for the farm 1813. During the calibration period, the average contribution of SRP to the TP in the ambient canal water samples ranged from as low as 23% for the farm 4701 to as high as 57% for the farm 3102 (Figure 26). During the treatment period, the average contribution of PP to the TP in the ambient canal water samples ranged from as low as 32% for the farm 3103 to as high as 63% for the farm 1813. During the treatment period, the average contribution of SRP to the TP in the ambient canal water samples ranged from as low as 15% for the farm 0401 to as high as 54% for the farm 3103 (Figure 27).

A summary of ambient canal water pH, dissolved Ca and TSS for all eight farms is presented in Tables 14 and 15. Table 14 corresponds to data from November 2010 to April 2013, whereas Table 15 corresponds to data from May 2013 to April 2015. During the November 2010 to April 2013 period the pH values ranged from 6.93 to 8.92; the Ca concentrations varied from 28.8 to 183.4 mg L^{-1}; the TSS content ranged from 1.0 to 286.4 mg L^{-1}. During the May 2013 to April 2015 period the pH values ranged from 7.10 to 8.70; the Ca concentrations varied from 34.4 to 155.1 mg L^{-1}; while the TSS content ranged from 2.4 to 302.8 mg L^{-1}.

Table 10. Summary statistics of concentrations of phosphorus species in ambient canal waters for farm pairs in S5A sub-basin during the Calibration Period, November 2010-April 2013

Farm ID	Variable[1]	N	Mean (mg L^{-1})	Std dev[2]	Minimum (mg L^{-1})	Maximum (mg L^{-1})	Median (mg L^{-1})
2501	TP	108	0.056	0.048	0.004	0.270	0.044
	TDP	108	0.033	0.038	0.003	0.238	0.021
	PP	108	0.024	0.026	0.000	0.226	0.019
	SRP	108	0.024	0.032	0.000	0.225	0.012
	DOP	108	0.010	0.016	0.000	0.154	0.007
0401	TP	108	0.047	0.043	0.003	0.215	0.032
	TDP	108	0.025	0.030	0.000	0.192	0.014
	PP	108	0.024	0.032	0.000	0.195	0.014
	SRP	108	0.019	0.025	0.001	0.183	0.008
	DOP	108	0.010	0.018	0.000	0.165	0.005
1813	TP	105	0.072	0.042	0.028	0.242	0.060
	TDP	105	0.030	0.029	0.006	0.161	0.019
	PP	105	0.042	0.025	0.010	0.229	0.036
	SRP	105	0.020	0.023	0.000	0.110	0.010
	DOP	105	0.013	0.024	0.000	0.160	0.008
6117	TP	105	0.093	0.041	0.028	0.258	0.085
	TDP	105	0.049	0.041	0.004	0.291	0.036
	PP	105	0.048	0.028	0.005	0.167	0.042
	SRP	105	0.031	0.030	0.002	0.124	0.021
	DOP	105	0.014	0.012	0.000	0.083	0.013

[1] TP = total phosphorus, TDP = total dissolved phosphorus; PP = particulate phosphorus; SRP = soluble reactive phosphorus, DOP = dissolved organic phosphorus.
[2] Std dev = standard deviation.

Table 11. Summary statistics of concentrations of phosphorus species in ambient canal waters for farm pairs in S5A sub-basin during the Treatment Period, May 2013-April 2015

Farm ID	Variable[1]	N	Mean (mg L^{-1})	Std dev[2]	Minimum (mg L^{-1})	Maximum (mg L^{-1})	Median (mg L^{-1})
2501	TP	60	0.075	0.048	0.012	0.204	0.070
	TDP	60	0.038	0.025	0.006	0.107	0.033
	PP	60	0.037	0.031	0.002	0.152	0.029
	SRP	60	0.029	0.022	0.002	0.077	0.028
	DOP	60	0.011	0.009	0.001	0.048	0.008
0401	TP	56	0.064	0.041	0.011	0.209	0.057
	TDP	56	0.025	0.027	0.001	0.173	0.020
	PP	56	0.039	0.028	0.005	0.152	0.035
	SRP	56	0.010	0.006	0.003	0.034	0.009
	DOP	56	0.017	0.025	0.000	0.161	0.009
1813	TP	57	0.062	0.022	0.031	0.127	0.057
	TDP	57	0.022	0.012	0.004	0.061	0.021
	PP	57	0.040	0.017	0.009	0.097	0.038
	SRP	57	0.012	0.012	0.001	0.055	0.008
	DOP	57	0.011	0.007	0.000	0.039	0.009
6117	TP	57	0.107	0.061	0.040	0.334	0.095
	TDP	57	0.049	0.041	0.011	0.228	0.034
	PP	57	0.058	0.041	0.011	0.229	0.043
	SRP	57	0.031	0.035	0.001	0.184	0.018
	DOP	57	0.018	0.010	0.001	0.045	0.016

[1] TP = total phosphorus, TDP = total dissolved phosphorus; PP = particulate phosphorus; SRP = soluble reactive phosphorus, DOP = dissolved organic phosphorus.
[2] Std dev = standard deviation.

Table 12. Summary statistics of concentrations of phosphorus species in ambient canal waters for farm pairs in S6 sub-basin for the Calibration Period†.

Farm ID	Variable[1]	N	Mean (mg L^{-1})	Std Dev[2]	Minimum (mg L^{-1})	Maximum (mg L^{-1})	Median (mg L^{-1})
3102	TP	105	0.104	0.070	0.025	0.341	0.083
	TDP	105	0.073	0.051	0.015	0.291	0.056
	PP	105	0.031	0.048	0.001	0.281	0.019
	SRP	105	0.061	0.047	0.008	0.269	0.047
	DOP	105	0.014	0.014	0.000	0.081	0.011
3103	TP	105	0.087	0.055	0.024	0.348	0.072
	TDP	105	0.058	0.054	0.010	0.322	0.041
	PP	105	0.029	0.020	0.004	0.102	0.025
	SRP	105	0.043	0.051	0.004	0.318	0.026
	DOP	105	0.015	0.013	0.000	0.076	0.012
4701	TP	138	0.045	0.029	0.015	0.201	0.036
	TDP	138	0.022	0.018	0.001	0.087	0.016
	PP	138	0.024	0.023	0.005	0.159	0.019
	SRP	138	0.011	0.013	0.002	0.075	0.007
	DOP	138	0.012	0.012	0.000	0.071	0.009
4702	TP	138	0.062	0.037	0.020	0.259	0.050
	TDP	138	0.035	0.034	0.004	0.237	0.021
	PP	138	0.028	0.021	0.004	0.142	0.023
	SRP	138	0.024	0.029	0.002	0.205	0.014
	DOP	138	0.012	0.012	0.000	0.068	0.007

† Calibration period: November 2010 through April 30, 2013 for 3102/3103 and November 2010 through April 30, 2014 for 4701/4702

[1] TP = total phosphorus, TDP = total dissolved phosphorus; PP = particulate phosphorus; SRP = soluble reactive phosphorus, DOP = dissolved organic phosphorus.

[2] Std dev = standard deviation.

Table 13. Summary statistics of concentrations of phosphorus species in ambient canal waters for farm pairs in S6 sub-basin Treatment period†.

Farm ID	Variable[1]	N	Mean (mg L^{-1})	Std Dev[2]	Minimum (mg L^{-1})	Maximum (mg L^{-1})	Median (mg L^{-1})
3102	TP	56	0.072	0.021	0.040	0.127	0.067
	TDP	56	0.045	0.021	0.013	0.082	0.036
	PP	56	0.027	0.014	0.003	0.067	0.025
	SRP	56	0.035	0.019	0.006	0.073	0.030
	DOP	56	0.010	0.008	0.001	0.046	0.008
3103	TP	56	0.111	0.037	0.064	0.268	0.103
	TDP	56	0.075	0.041	0.017	0.258	0.070
	PP	56	0.036	0.016	0.009	0.081	0.033
	SRP	56	0.060	0.040	0.012	0.228	0.054
	DOP	56	0.016	0.011	0.001	0.043	0.012
4701	TP	26	0.058	0.025	0.026	0.130	0.052
	TDP	26	0.028	0.017	0.009	0.079	0.022
	PP	26	0.031	0.019	0.009	0.100	0.025
	SRP	26	0.017	0.014	0.004	0.054	0.010
	DOP	26	0.009	0.006	0.001	0.025	0.010
4702	TP	27	0.059	0.024	0.024	0.136	0.057
	TDP	27	0.026	0.016	0.011	0.081	0.022
	PP	27	0.033	0.016	0.007	0.063	0.031
	SRP	27	0.015	0.011	0.006	0.053	0.012
	DOP	27	0.012	0.009	0.000	0.030	0.010

†Treatment period: May1, 2013 to April 30, 2015 for 3102/3103 and May 1, 2014 to April 30, 2015 for 4701/4702

1 TP = total phosphorus, TDP = total dissolved phosphorus; PP = particulate phosphorus; SRP = soluble reactive phosphorus, DOP = dissolved organic phosphorus.

2 Std dev = standard deviation.

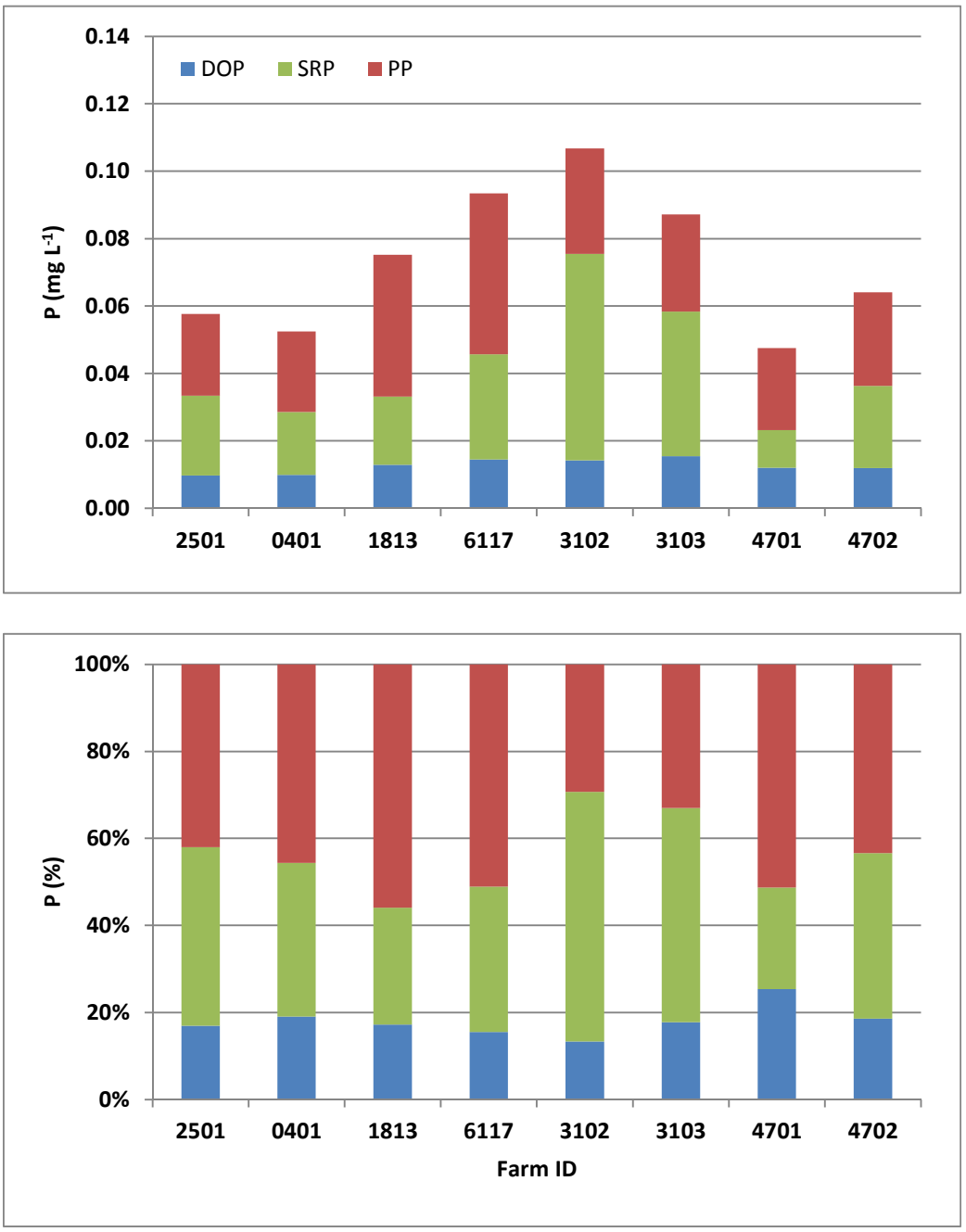
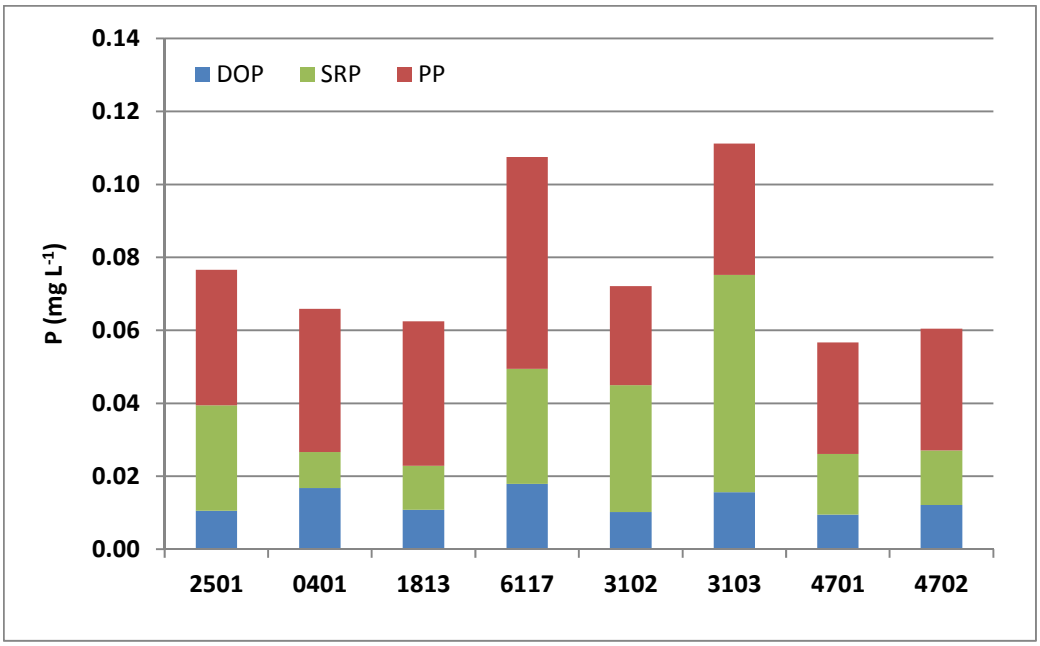


Figure 26. Average ambient canal water P speciation concentrations and percent total P by farm for Calibration period[3].

[3] Calibration period: November 2010 through April 30, 2013 for the first three farm pairs and November 2010 through April 30, 2014 for 4701/4702



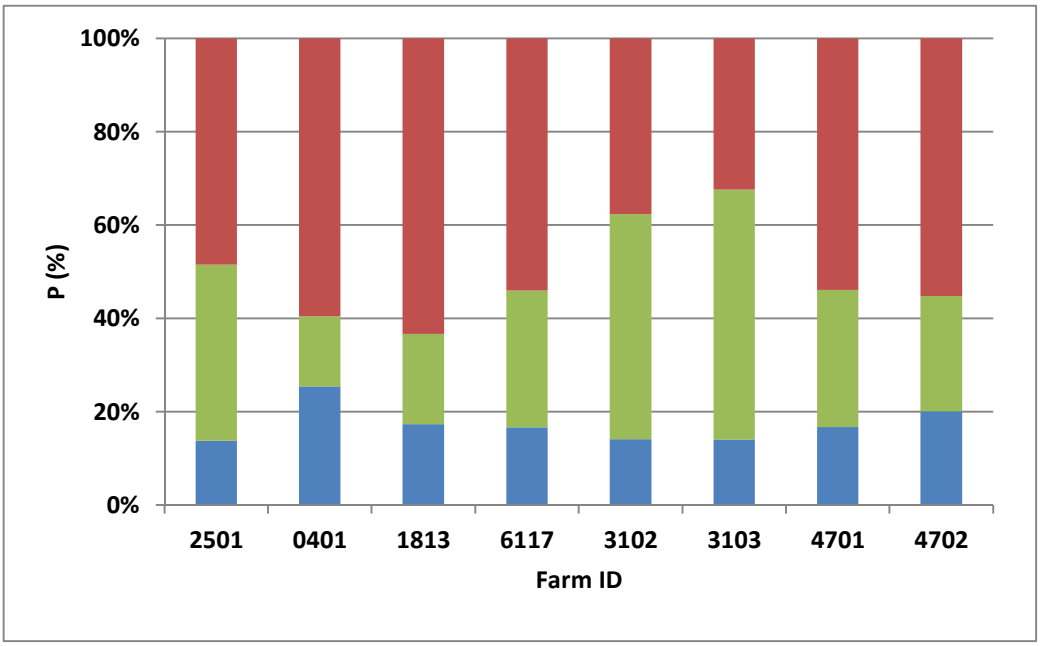


Figure 27. Average ambient canal water P speciation concentrations and percent total P by farm for Treatment period[4].

[4] Treatment period: May1, 2013 to April 30, 2015 for the first three farm pairs and May 1, 2014 to April 30, 2015 for 4701/4702

Table 14. Summary statistics of ambient canal water pH, total suspended solids, and calcium for S5A and S6 sub-basin farm pairs during the calibration period†.

Farm ID	Variable	N	Mean	Std Dev[1]	Minimum	Maximum	Median
2501	pH	108	8.22	0.35	7.09	8.92	8.28
	TSS (mg L^{-1})	108	9.2	14.3	1.4	137.8	6.7
	Ca (mg L^{-1})	105	55.9	15.1	28.8	108.9	53.5
0401	pH	108	7.98	0.36	7.23	8.92	7.97
	TSS (mg L^{-1})	108	13.5	32.6	1.2	286.4	5.7
	Ca (mg L^{-1})	105	62.1	17.8	33.2	142.5	59.9
1813	pH	105	8.19	0.28	7.52	8.79	8.14
	TSS (mg L^{-1})	105	9.9	5.7	2.6	32.6	8.0
	Ca (mg L^{-1})	102	77.3	24.1	33.8	131.8	75.6
6117	pH	105	7.82	0.27	7.11	8.37	7.81
	TSS (mg L^{-1})	105	12.2	7.6	2.2	44.4	10.2
	Ca (mg L^{-1})	102	73.5	20.2	33.7	116.6	71.2
3102	pH	105	7.69	0.33	6.93	8.41	7.73
	TSS (mg L^{-1})	105	8.4	11.9	1.2	110.3	5.8
	Ca (mg L^{-1})	102	77.0	27.8	35.5	132.6	73.1
3103	pH	106	7.76	0.25	7.20	8.33	7.74
	TSS (mg L^{-1})	106	7.3	5.0	1.0	25.8	6.1
	Ca (mg L^{-1})	103	98.6	29.2	38.2	145.9	109.6
4701	pH	138	8.1	0.3	7.1	8.7	8.1
	TSS (mg L^{-1})	138	7.4	7.5	1.0	84.2	6.3
	Ca (mg L^{-1})	132	74.9	27.9	36.1	167.2	67.9
4702	pH	138	7.8	0.3	7.1	8.4	7.9
	TSS (mg L^{-1})	138	7.9	6.9	1.0	72.8	6.5
	Ca (mg L^{-1})	132	97.3	32.5	39.1	183.4	102.9

† Calibration period: November 2010 through April 30, 2013 for the first three farm pairs and November 2010 through April 30, 2014 for 4701/4702

[1] Std dev = standard deviation.

Table 15. Summary statistics of ambient canal water pH, total suspended solids, and calcium for S5A and S6 sub-basin farm pairs during the Treatment Period†

Farm ID	Variable	N	Mean	Std Dev[1]	Minimum	Maximum	Median
2501	pH	60	8.0	0.3	7.4	8.7	8.0
	TSS (mg L^{-1})	57	13.0	19.2	2.6	144.8	8.6
	Ca (mg L^{-1})	51	47.9	9.5	34.4	94.0	44.9
0401	pH	56	8.1	0.2	7.6	8.5	8.1
	TSS (mg L^{-1})	53	11.4	7.6	3.2	50.8	10.4
	Ca (mg L^{-1})	50	77.2	21.5	43.1	125.5	81.9
1813	pH	57	7.9	0.2	7.5	8.3	7.9
	TSS (mg L^{-1})	54	10.9	4.7	3.2	26.2	10.0
	Ca (mg L^{-1})	51	71.8	15.2	43.5	101.9	70.5
6117	pH	57	7.8	0.2	7.3	8.5	7.8
	TSS (mg L^{-1})	54	18.6	39.8	4.2	302.8	12.4
	Ca (mg L^{-1})	51	96.4	12.3	79.4	127.5	92.7
3102	pH	56	7.6	0.2	7.1	8.0	7.6
	TSS (mg L^{-1})	52	8.6	4.3	2.8	23.2	7.5
	Ca (mg L^{-1})	50	62.9	22.1	44.4	129.3	54.1
3103	pH	56	7.7	0.2	7.1	8.2	7.7
	TSS (mg L^{-1})	53	9.8	8.1	3.0	55.6	8.0
	Ca (mg L^{-1})	50	106.5	26.7	47.7	144.0	115.5
4701	pH	26	7.7	0.4	7.1	8.2	7.6
	TSS (mg L^{-1})	26	8.4	4.2	1.0	16.6	8.4
	Ca (mg L^{-1})	23	96.9	34.5	49.8	155.1	84.1
4702	pH	27	7.8	0.1	7.6	8.1	7.8
	TSS (mg L^{-1})	27	8.1	3.7	1.0	13.6	9.0
	Ca (mg L^{-1})	24	93.5	20.3	55.9	132.7	86.9

†Treatment period: May1, 2013 to April 30, 2015 for the first three farm pairs and May 1, 2014 to April 30, 2015 for 4701/4702

[1] Std dev = standard deviation.

Farm Canal *In Situ* Monitoring

A monitoring program was established in October 2011 to measure water quality parameters that may influence P cycling within farm canals. Hydrolab MiniSonde® Series 5 multi-*parameter* water quality data loggers are used to measure and record temperature, pH, specific conductance (conductivity), and oxidation-reduction potential (ORP) and depth *in situ*. The MiniSonde® units are calibrated according to company specifications and programmed for a seven-day run (programmed to record a measurement every hour).

The units are deployed in the center of each of the farm's main canal at transect B at a depth of 0.25 meter above of the sediment surface in the middle of the canal transect. After the MiniSonde® seven day programmed run ends, it is retrieved from the field, and the data are downloaded to a computer and stored in electronic format. A post-run assessment for drift of the instrument's sensors is also immediately conducted. The instruments are then cleaned, maintained, and re-calibrated in the laboratory. The units are returned to the field for deployment during the following week's monitoring cycle. All field and laboratory activities strictly follow appropriate Standard Operating Procedures. Quality control criteria regarding sensor drift and biofouling are as follows: pH <0.2 at pH=7.0 (Fisher Certified Standard: SB108-20 6.99 – 7.01 @ 25° C); conductivity < 100 µS/cm at 1413 µS/cm (0.01 M KCl); and redox < 20 mv of Zobell Solution (APHA-Redox Standard: 9880-1, + 428 mV against standard Hydrogen reference electrode at 25° C).

The summary statistics of hourly *in situ* water quality measurement for all eight farms during the ***Calibration Period, October 2011 till April 2013 (till April 2014 for 4701/4702*)** are presented in Table 16. A similar summary statistics of hourly in situ water quality measurement for all eight farms during the ***Treatment Period, May 2013 to April 2015 (May 2014 to April 2015 for 4701/4702)*** are presented in Table 17. The ambient canal water temperature ranged as low as 11.9°C for the farm 4702 to as high as 34.6°C for the farm 0401 (Table 16) during the calibration period. During treatment, the highest temperature was at 48.3°C in farm 1813 while the lowest temperature was 10.4°C in farm 2501 (Table 17). The pH values varied from as low as 5.6 in farm 4702 to as high as of 9.9 in the farm 4702 during calibration period (Table 16). During treatment period, the highest pH was observed in farm 1813, 0401 and 6117 at 9.6 and

the lowest pH was observed in farm 4702 at 6.1 (Table 17). Specific conductivity values ranged from as low as 256 µS cm^{-1} in farm 1813 to as high as 2051 µS cm^{-1} in farm 3103 during calibration period (Table 16). During treatment period, the highest specific conductance was observed in farm 3103 at 2577 µS cm^{-1} and the lowest specific conductance was observed at farm 4701 at 326 µS cm^{-1} (Table 17). During the calibration period, the lowest ORP value of -349 mV was observed in the farm 3102, whereas the maximum ORP value of 694 mV was observed in the farm 0401 (Table 16). During treatment period, the highest ORP value was observed in farm 3102 at 737 mV and the lowest ORP value was observed in farm 0401 at -350 mV (Table 17).

Table 16. Summary statistics of hourly *in situ* water quality measurements collected during Calibration period†

Farm	Variable[1]	N	Mean	Std dev[2]	Minimum	Maximum	Median
2501	Temperature (°C)	6232	24.7	3.9	13.0	34.5	24.6
	pH	6232	8.1	0.5	6.5	9.0	8.1
	ORP (mV)	6232	523	86	-102	690	522
	SpCond (µS/cm)	6232	892	265	448	1529	884
0401	Temperature (°C)	6141	24.3	3.9	13.9	34.6	24.0
	pH	6141	7.8	0.4	7.0	9.7	7.7
	ORP (mV)	6141	450	200	-255	694	496
	SpCond (µS/cm)	6141	1027	314	477	1980	1050
1813	Temperature (°C)	6256	24.4	3.9	13.0	33.4	24.3
	pH	6256	7.9	0.4	6.8	9.3	7.9
	ORP (mV)	6256	453	114	-172	656	469
	SpCond (µS/cm)	6091	957	225	256	1514	984
6117	Temperature (°C)	6254	24.3	3.4	13.3	32.9	24.3
	pH	6254	7.7	0.4	6.9	8.8	7.7
	ORP (mV)	6254	451	188	-237	688	499
	SpCond (µS/cm)	6254	934	233	328	1528	975
3102	Temperature (°C)	6448	23.6	3.6	13.0	32.2	23.8
	pH	6448	7.7	0.4	6.7	9.1	7.7
	ORP (mV)	6448	392	251	-349	679	478
	SpCond (µS/cm)	6444	1243	285	402	1793	1323
3103	Temperature (°C)	6110	23.3	3.5	12.9	29.9	23.0
	pH	6110	7.7	0.4	6.9	9.2	7.6
	ORP (mV)	6110	413	198	-237	669	470
	SpCond (µS/cm)	6019	1375	275	574	2051	1383
4701	Temperature (°C)	9021	24.0	3.9	12.1	35.0	24.2
	pH	9024	8.0	0.5	6.7	9.6	8.0
	ORP (mV)	9024	424	118	-179	653	442
	SpCond (µS/cm)	8977	1044	286	363	1952	1114
4702	Temperature (°C)	9333	23.8	3.7	11.9	31.8	24.0
	pH	9498	7.7	0.5	5.6	9.9	7.8
	ORP (mV)	9333	405	185	-236	687	452
	SpCond (µS/cm)	9498	1236	234	521	1858	1272

† Calibration period Hydrolab data: October 2011 through April 30, 2013 for the first three farm pairs and October 2011 through April 30, 2014 for 4701/4702

[1]SpCond= specific conductivity, ORP = oxidation reduction potential.

[2] Std Dev = standard deviation.

Table 17. Summary statistics of hourly *in situ* water quality measurements collected during the Treatment period

Farm	Variable[1]	N	Mean	Std dev[2]	Minimum	Maximum	Median
0401	Temperature (°C)	8026	25.5	3.9	13.4	34.0	26.4
	pH	8026	7.7	0.5	6.8	9.6	7.7
	ORP (mV)	8026	427	213	-350	688	486
	SpCond (µS/cm)	8026	1231	471	390	2530	1074
2501	Temperature (°C)	6909	25.7	4.1	10.4	35.7	26.5
	pH	6909	7.9	0.5	6.9	9.4	7.8
	ORP (mV)	6909	504	135	-184	712	531
	SpCond (µS/cm)	6909	835	358	341	1723	755
1813	Temperature (°C)	7402	25.7	4.0	14.4	48.3	26.5
	pH	7266	7.7	0.4	6.7	9.6	7.7
	ORP (mV)	7402	456	138	-226	654	477
	SpCond (µS/cm)	7258	988	337	310	2412	1006
6117	Temperature (°C)	6174	25.6	4.1	13.4	34.9	26.4
	pH	6174	7.6	0.4	6.8	9.6	7.6
	ORP (mV)	6174	478	145	-225	704	502
	SpCond (µS/cm)	6174	1079	252	426	1750	1073
3102	Temperature (°C)	7867	25.0	3.9	13.8	34.1	25.7
	pH	7867	7.3	1.1	6.7	9.5	7.4
	ORP (mV)	7867	466	199	-250	737	518
	SpCond (µS/cm)	7540	1088	475	409	1932	1212
3103	Temperature (°C)	7591	25.1	3.8	14.7	33.3	25.9
	pH	7591	7.6	0.4	6.7	9.2	7.6
	ORP (mV)	7591	388	220	-259	666	463
	SpCond (µS/cm)	7591	1500	378	379	2577	1539
4701	Temperature (°C)	3416	26.2	2.1	19.6	32.0	26.3
	pH	3416	7.2	0.5	6.5	8.4	7.1
	ORP (mV)	3416	177	293	-266	669	176
	SpCond (µS/cm)	3416	1194	441	326	2059	1297
4702	Temperature (°C)	2889	27.6	2.1	20.4	32.1	28.1
	pH	2889	7.5	0.5	6.1	8.7	7.6
	ORP (mV)	2889	330	217	-218	651	402
	SpCond (µS/cm)	2889	1073	389	415	1768	1126

†Treatment period May1, 2013 to April 30, 2015 for the first three farm pairs and May 1, 2014 to April 30, 2015 for 4701/4702

[1]SpCond= specific conductivity, ORP = oxidation reduction potential.

[2] Std Dev = standard deviation.

Farm Drainage Water

Drainage water concentrations and summary statistics of P species are presented in Tables 18 - 21. Secondary water quality parameter statistical summaries for pH, Ca, and TSS for farm drainage waters are presented in Tables 22 and 23. Graphs of daily rainfall, drainage volume, and P load by farm pair are presented in Appendix Figures A29 through A40.

Overall, the TP concentrations in farm pairs located in the S5A basin during the calibration period ranged from a minimum of 0.036 mg L^{-1} at farm 1813 to a maximum of 0.925 mg L^{-1} at farm 0401 (Table 18). During the calibration period, the TDP concentrations in the farm pairs located in the S5A basin ranged from a minimum of 0.002 mg L^{-1} in farm 6117 to a maximum of 0.763 mg L^{-1} in farm 6117 (Table 18). During the calibration period, farm pairs located in S5A basin the PP concentration ranged from 0.005 mg L^{-1} in farms 1813 to a maximum of 0.662 mg L^{-1} in farm 1813. During the calibration period, the SRP concentration in the farm pairs located in S5A basin ranged from 0.003 mg L^{-1} in farm 1813 to 0.877 mg L^{-1} in farm 6117. During the calibration period, the TP concentration in the farm pairs located in the S6 basin ranged from as low as 0.015 mg L^{-1} in farm 4701 to 1.118 mg L^{-1} in farm 3103 (Table 20). During the calibration period, the TDP concentration in the farm pairs located in the S6 basin ranged from 0.000 mg L^{-1} in farm 4701 to 0.946 mg L^{-1} in farm 3102 (Table 20). During the calibration period, the PP concentration in the farm pairs located in S6 basin ranged from 0.002 mg L^{-1} in farm 4701 to 0.906 mg L^{-1} in farm 3103. During the calibration period, the SRP concentrations in S6 basin ranged from 0.003 mg L^{-1} in farm 3102 to 1.074 mg L^{-1} in farm 3102 (Table 20).

Overall, the TP concentrations in farm pairs located in the S5A basin during the treatment period ranged from a minimum of 0.026 mg L^{-1} at farm 0401 to a maximum of 0.731 mg L^{-1} at farm 0401 (Tables 19). During the treatment period, the TDP concentrations in the farm pairs located in the S5A basin ranged from a minimum of 0.000 mg L^{-1} in farm 6117 to a maximum of 0.653 mg L^{-1} in farm 0401 (Table 19). During the treatment period, farm pairs located in S5A basin the PP concentration ranged from 0.000 mg L^{-1} in farms 0401 and 1813 to a maximum of 0.466 mg L^{-1} in farm 6117. During the treatment period, the SRP concentration in the farm pairs located in S5A basin ranged from 0.001 mg L^{-1} in farm 1813 to 0.740 mg L^{-1} in farm 0401 (Table 19). During the treatment period, the TP concentration in the farm pairs located in the S6

basin ranged from as low as 0.013 mg L^{-1} in farm 3103 to 0.865 mg L^{-1} in farm 3102 (Table 21). During the treatment period, the TDP concentration in the farm pairs located in the S6 basin ranged from 0.005 mg L^{-1} in farm 4701, 4702 and 3103 to 0.653 mg L^{-1} in farm 3102 (Table 21). During the treatment period, the PP concentration in the farm pairs located in S6 basin ranged from 0.005 mg L^{-1} in farm 3102, 3103 and 4701 to 0.721 mg L^{-1} in farm 3102. During the treatment period, the SRP concentrations in S6 basin ranged from 0.002 mg L^{-1} in farm 3103 to 0.624 mg L^{-1} in farm 3102 (Table 21).

Box plots of drainage water TP, TDP, SRP, PP, DOP are presented in the Appendix (Figures A15 through A24). The P speciation of farm drainage water is potentially affected by many factors. In this research project, we are investigating possible relationships between P speciation and FAV growth and its management. Bar graphs of drainage water average P speciation concentrations and percent total P fraction by farm are shown in Figures 28 and 29. During the calibration period, the average contribution of PP to the TP in the drainage water samples ranged from as low as 38% for the farm 3103 to as high as 63% for the farm 4701. During the calibration period, the average contribution of SRP to the TP in the drainage water samples ranged from as low as 23% for the farm 4701 to as high as 57% for the farm 3103 (Figure 28). During the treatment period, the average contribution of PP to the TP in the drainage water samples ranged from as low as 40% for the farm 1813 to as high as 73% for the farm 4701. During the treatment period, the average contribution of SRP to the TP in the drainage water samples ranged from as low as 21% for the farm 4701 to as high as 49% for the farm 3102 (Figure 29). Farm drainage water means for pH, Ca, and TSS are summarized in Tables 22 and 23. During the calibration period, the pH in the drainage water ranged from 5.59 in farm 3103 to 8.63 in farm 6117. During the treatment period, the pH in the drainage water ranged from 7.12 in farm 6117 to 8.51 in farm 3103. During the calibration period the TSS concentration in the drainage water ranged from 1.2 mg L^{-1} in farm 2501 to 301.2 mg L^{-1} in farm 3103 (Table 22). During the calibration period the Ca concentration in the drainage water ranged from 35.3 mg L^{-1} in farm 3103 to 179.9 mg L^{-1} in farm 4702. During the treatment period, the TSS concentration in the drainage water ranged from 4.4 mg L-1 in farm 3103 to 268.2 mg L-1 in farm 3102. During the treatment period, the Ca concentration in the drainage water ranged from 34.9 mg L^{-1} in farm 2501 to 178.6 mg L^{-1} in farm 4702.

Table 18. Summary statistics of drainage water phosphorus concentrations of farm pairs in the S5A sub-basin during the Calibration Period- November 2010 through April 2013

Farm ID	Variable[1]	N	Mean (mg L^{-1})	Std dev[2]	Minimum (mg L^{-1})	Maximum (mg L^{-1})	Median (mg L^{-1})
2501	TP	57	0.119	0.129	0.042	0.908	0.087
	TDP	57	0.067	0.088	0.016	0.463	0.042
	PP	57	0.052	0.057	0.011	0.445	0.043
	SRP	57	0.058	0.086	0.008	0.448	0.033
	DOP	57	0.010	0.008	0.000	0.041	0.008
0401	TP	71	0.128	0.136	0.041	0.925	0.084
	TDP	71	0.067	0.104	0.013	0.503	0.035
	PP	71	0.061	0.056	0.013	0.422	0.041
	SRP	71	0.061	0.101	0.004	0.490	0.026
	DOP	71	0.008	0.006	0.001	0.038	0.008
1813	TP	77	0.145	0.154	0.036	0.750	0.084
	TDP	77	0.095	0.136	0.009	0.572	0.042
	PP	77	0.050	0.074	0.005	0.662	0.040
	SRP	77	0.086	0.139	0.003	0.666	0.035
	DOP	77	0.012	0.011	0.000	0.054	0.009
6117	TP	66	0.246	0.194	0.068	0.829	0.161
	TDP	66	0.155	0.191	0.002	0.763	0.075
	PP	66	0.092	0.062	0.023	0.344	0.071
	SRP	66	0.144	0.206	0.005	0.877	0.059
	DOP	66	0.017	0.013	0.003	0.060	0.014

[1] TP = total phosphorus, TDP = total dissolved phosphorus; PP = particulate phosphorus; SRP = soluble reactive phosphorus, DOP = dissolved organic phosphorus.
[2] Std dev = standard deviation.

Table 19. Summary statistics of drainage water phosphorus concentrations of farm pairs in the S5A sub-basin – Treatment Period, May 2013 through April 2015

Farm ID	Variable[1]	N	Mean (mg L^{-1})	Std dev[2]	Minimum (mg L^{-1})	Maximum (mg L^{-1})	Median (mg L^{-1})
2501	TP	90	0.121	0.091	0.032	0.509	0.097
	TDP	90	0.055	0.060	0.008	0.438	0.038
	PP	90	0.066	0.055	0.018	0.405	0.053
	SRP	90	0.047	0.061	0.005	0.485	0.029
	DOP	90	0.010	0.009	0.000	0.061	0.008
0401	TP	70	0.128	0.117	0.026	0.731	0.089
	TDP	70	0.066	0.105	0.005	0.653	0.031
	PP	70	0.063	0.052	0.000	0.306	0.043
	SRP	70	0.060	0.112	0.003	0.740	0.023
	DOP	70	0.011	0.017	0.000	0.130	0.005
1813	TP	169	0.099	0.083	0.032	0.459	0.069
	TDP	169	0.059	0.084	0.005	0.438	0.031
	PP	169	0.040	0.021	0.000	0.172	0.036
	SRP	169	0.048	0.073	0.001	0.391	0.021
	DOP	169	0.013	0.017	0.000	0.157	0.008
6117	TP	104	0.191	0.110	0.037	0.544	0.165
	TDP	104	0.105	0.101	0.000	0.524	0.077
	PP	104	0.086	0.066	0.005	0.466	0.069
	SRP	104	0.086	0.097	0.004	0.531	0.057
	DOP	104	0.024	0.034	0.003	0.324	0.017

1 TP = total phosphorus, TDP = total dissolved phosphorus; PP = particulate phosphorus; SRP = soluble reactive phosphorus, DOP = dissolved organic phosphorus.
2 Std dev = standard deviation.

Table 20. Summary statistics of drainage water phosphorus concentrations of farm pairs in the S6 sub-basin during the Calibration period†

Farm ID	Variable[1]	N	Mean (mg L^{-1})	Std dev[2]	Minimum (mg L^{-1})	Maximum (mg L^{-1})	Median (mg L^{-1})
3102	TP	100	0.307	0.188	0.100	1.039	0.254
	TDP	100	0.180	0.144	0.023	0.946	0.149
	PP	100	0.127	0.122	0.022	0.604	0.088
	SRP	100	0.177	0.174	0.003	1.074	0.135
	DOP	100	0.016	0.014	0.002	0.081	0.013
3103	TP	112	0.284	0.198	0.067	1.118	0.220
	TDP	112	0.119	0.083	0.012	0.415	0.100
	PP	112	0.165	0.160	0.019	0.906	0.110
	SRP	112	0.109	0.087	0.010	0.500	0.092
	DOP	112	0.013	0.011	0.000	0.061	0.010
4701	TP	86	0.057	0.054	0.015	0.463	0.042
	TDP	86	0.018	0.015	0.000	0.080	0.014
	PP	86	0.039	0.051	0.002	0.456	0.029
	SRP	86	0.014	0.010	0.002	0.068	0.012
	DOP	86	0.008	0.008	0.000	0.043	0.005
4702	TP	69	0.081	0.027	0.032	0.207	0.082
	TDP	69	0.046	0.019	0.012	0.090	0.046
	PP	69	0.035	0.018	0.012	0.117	0.030
	SRP	69	0.042	0.018	0.007	0.082	0.046
	DOP	69	0.008	0.005	0.000	0.022	0.005

† Calibration period: November 2010 through April 30, 2013 for 3102/3103 and November 2010 through April 30, 2014 for 4701/4702

[1] TP = total phosphorus, TDP = total dissolved phosphorus; PP = particulate phosphorus; SRP = soluble reactive phosphorus, DOP = dissolved organic phosphorus.

[2] Std dev = standard deviation.

Table 21. Summary statistics of drainage water phosphorus concentrations of farm pairs in the S6 sub-basin- Treatment Period†.

Farm ID	Variable[1]	N	Mean (mg L^{-1})	Std dev[2]	Minimum (mg L^{-1})	Maximum (mg L^{-1})	Median (mg L^{-1})
3102	TP	83	0.219	0.133	0.103	0.865	0.176
	TDP	83	0.125	0.105	0.001	0.653	0.099
	PP	83	0.095	0.099	0.005	0.721	0.069
	SRP	83	0.108	0.100	0.004	0.624	0.080
	DOP	83	0.018	0.016	0.001	0.086	0.014
3103	TP	133	0.200	0.090	0.013	0.553	0.186
	TDP	133	0.106	0.072	0.005	0.388	0.093
	PP	133	0.096	0.055	0.005	0.422	0.085
	SRP	133	0.089	0.068	0.002	0.368	0.074
	DOP	133	0.019	0.015	0.001	0.102	0.015
4701	TP	24	0.078	0.025	0.044	0.131	0.073
	TDP	24	0.018	0.012	0.005	0.059	0.015
	PP	24	0.061	0.021	0.028	0.096	0.054
	SRP	24	0.017	0.007	0.009	0.035	0.015
	DOP	24	0.005	0.006	0.000	0.029	0.005
4702	TP	27	0.076	0.016	0.040	0.105	0.079
	TDP	27	0.035	0.019	0.005	0.072	0.033
	PP	27	0.041	0.019	0.007	0.075	0.041
	SRP	27	0.037	0.019	0.011	0.078	0.034
	DOP	27	0.005	0.003	0.000	0.015	0.005

†Treatment period: May1, 2013 to April 30, 2015 for 3102/3103 and May 1, 2014 to April 30, 2015 for 4701/4702

[1] TP = total phosphorus, TDP = total dissolved phosphorus; PP = particulate phosphorus; SRP = soluble reactive phosphorus, DOP = dissolved organic phosphorus.

[2] Std dev = standard deviation.

Table 22. Summary statistics of drainage water pH, calcium, and total suspended solids in S5A and S6 basin farms during the Calibration period†

Farm ID	[1]Variable	N	Mean	Std dev[2]	Minimum	Maximum	Median
2501	pH	57	7.72	0.21	7.14	8.24	7.72
	TSS (mg L^{-1})	56	13.6	9.9	1.2	50.0	12.0
	Ca (mg L^{-1})	56	119.0	30.7	37.1	157.4	129.4
0401	pH	70	7.84	0.22	7.17	8.37	7.87
	TSS (mg L^{-1})	67	22.8	17.2	3.8	76.9	18.4
	Ca (mg L^{-1})	69	117.6	30.7	36.2	167.0	123.7
1813	pH	75	7.88	0.26	7.15	8.56	7.93
	TSS (mg L^{-1})	71	15.3	11.8	3.0	60.4	11.6
	Ca (mg L^{-1})	72	108.1	23.1	42.3	140.2	113.6
6117	pH	66	7.72	0.25	7.03	8.63	7.73
	TSS (mg L^{-1})	64	22.3	30.2	3.4	223.6	13.0
	Ca (mg L^{-1})	65	109.4	25.9	51.9	157.3	116.2
3102	pH	100	7.72	0.22	7.39	8.60	7.69
	TSS (mg L^{-1})	93	33.8	38.2	3.8	270.2	25.4
	Ca (mg L^{-1})	98	115.8	22.6	37.7	148.9	121.8
3103	pH	112	7.78	0.30	5.59	8.31	7.79
	TSS (mg L^{-1})	108	50.7	49.4	2.4	301.2	31.4
	Ca (mg L^{-1})	106	129.2	22.7	35.3	155.0	134.1
4701	pH	86	7.80	0.3	7.3	8.9	7.8
	TSS (mg L^{-1})	86	7.5	6.6	1.0	42.6	5.9
	Ca (mg L^{-1})	85	108.9	21.9	44.7	151.9	112.9
4702	pH	69	7.74	0.2	7.4	8.2	7.7
	TSS (mg L^{-1})	69	9.2	8.1	1.0	55.0	7.2
	Ca (mg L^{-1})	68	125.3	28.1	46.6	179.9	133.4

† Calibration period: November 2010 through April 30, 2013 for the first three farm pairs and October 2011 through April 30, 2014 for 4701/4702

[1] Ca = dissolved calcium (mg\ l), TSS = total suspended solids (mg\ l).

[2] Std dev = standard deviation.

Table 23. Summary statistics of drainage water pH, calcium, and total suspended solids in S5A and S6 basin farms - Treatment period†

Farm ID	[1]Variable	N	Mean	Std dev[2]	Minimum	Maximum	Median
2501	pH	88	7.7	0.2	7.2	8.3	7.7
	TSS (mg L^{-1})	82	13.3	7.6	2.4	47.4	12.3
	Ca (mg L^{-1})	89	122.1	28.7	34.9	166.6	129.8
0401	pH	70	7.8	0.2	7.4	8.2	7.8
	TSS (mg L^{-1})	62	17.4	22.2	4.0	126.8	10.7
	Ca (mg L^{-1})	70	136.6	26.4	36.6	178.4	144.0
1813	pH	168	7.8	0.2	7.0	8.4	7.8
	TSS (mg L^{-1})	146	11.1	6.6	3.0	38.0	9.6
	Ca (mg L^{-1})	167	110.8	23.5	50.2	148.0	118.8
6117	pH	103	7.8	0.3	7.1	8.3	7.8
	TSS (mg L^{-1})	89	13.4	10.7	2.6	67.0	9.6
	Ca (mg L^{-1})	102	128.5	21.7	51.2	162.7	132.1
3102	pH	82	7.8	0.2	7.4	8.4	7.7
	TSS (mg L^{-1})	68	21.9	37.7	2.4	268.2	11.8
	Ca (mg L^{-1})	82	114.1	22.2	47.7	151.0	121.4
3103	pH	133	7.8	0.2	7.4	8.5	7.8
	TSS (mg L^{-1})	115	18.0	15.4	4.4	115.0	13.6
	Ca (mg L^{-1})	131	124.7	22.9	0.3	156.4	130.7
4701	pH	24	7.77	0.2	7.4	8.1	7.7
	TSS (mg L^{-1})	24	15.0	16.5	1.0	65.2	9.4
	Ca (mg L^{-1})	24	122.3	24.7	66.6	160.7	123.8
4702	pH	24	7.77	0.2	7.4	8.2	7.6
	TSS (mg L^{-1})	27	10.1	5.7	1.0	34.2	8.8
	Ca (mg L^{-1})	26	146.7	26.5	81.2	178.6	156.0

†Treatment period: May1, 2013 to April 30, 2015 for the first three farm pairs and May 1, 2014 to April 30, 2015 for 4701/4702

[1] Ca = dissolved calcium (mg\ l), TSS = total suspended solids (mg\ l).

[2] Std dev = standard deviation.

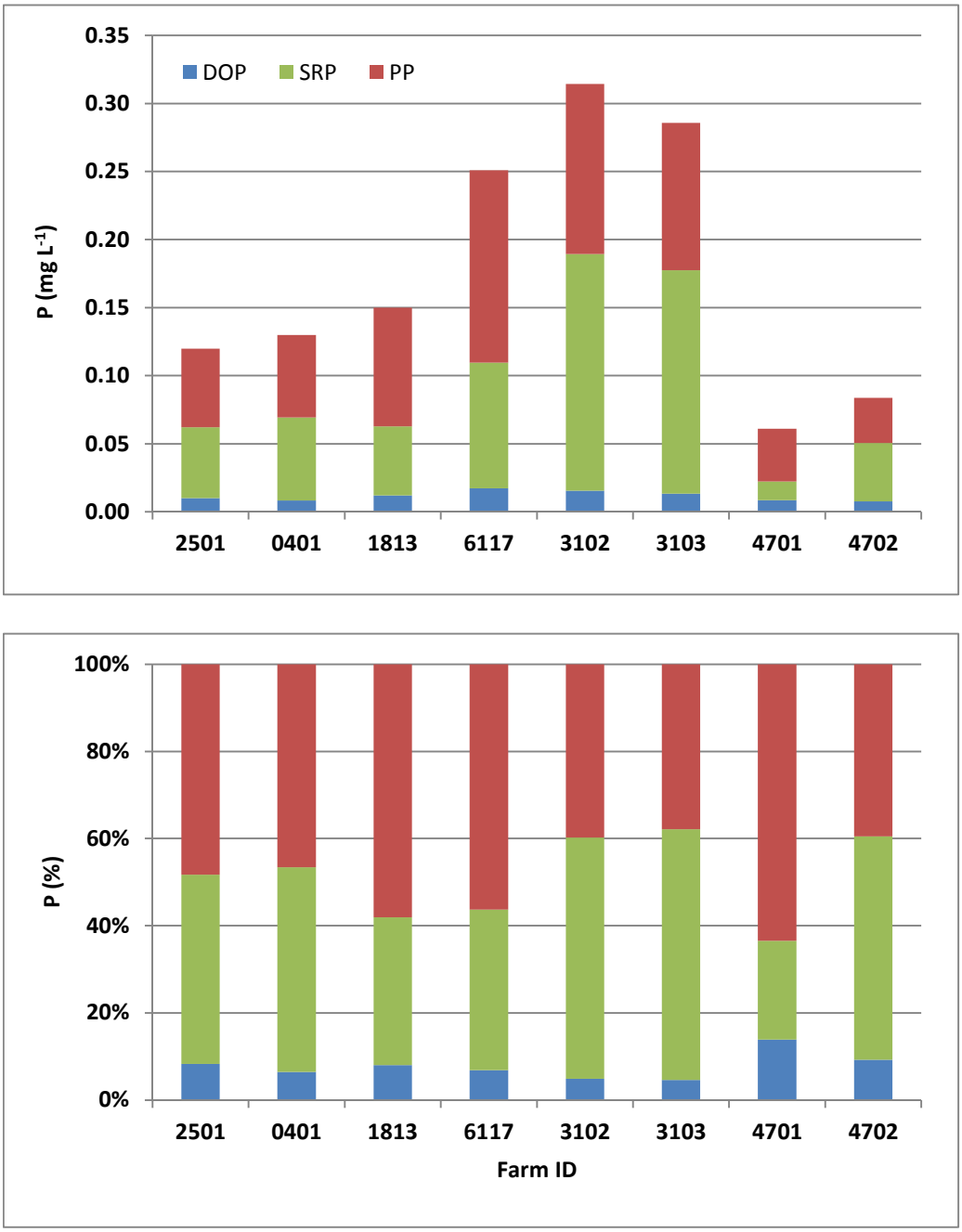


Figure 28. Average drainage water P speciation concentrations and percent of total P by farm for Calibration period[5].

[5] Calibration period: November 2010 through April 30, 2013 for the first three farm pairs and November 2010 through April 30, 2014 for 4701/4702

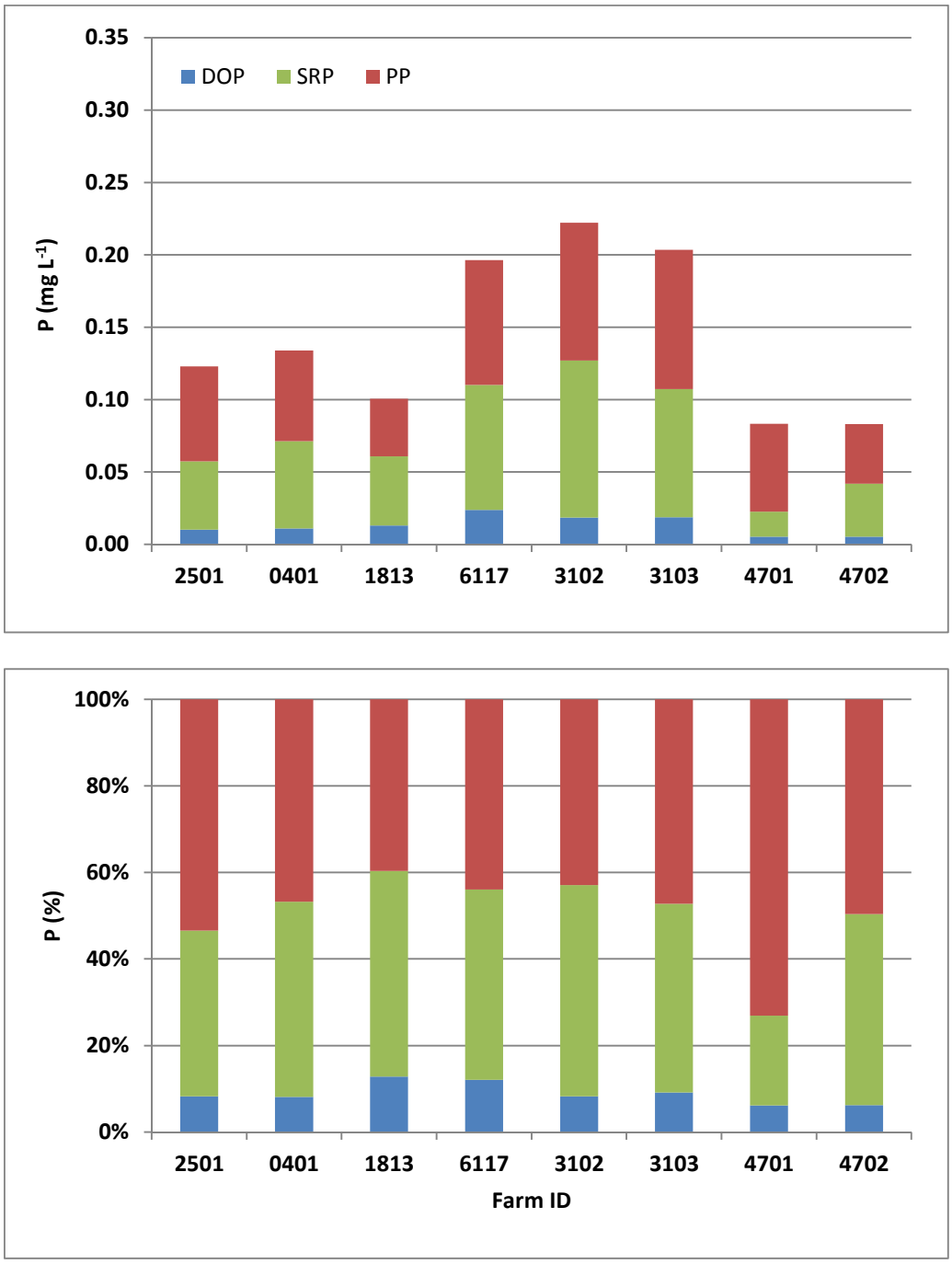


Figure 29. Average drainage water P speciation concentrations and percent of total P by farm for Treatment period[6].

[6] Treatment period: May1, 2013 to April 30, 2015 for the first three farm pairs and May 1, 2014 to April 30, 2015 for 4701/4702

BMP Training Workshops

Two BMP training sessions were conducted between May1, 2014 and April 30, 2015 with a total of 167 people attending. Sessions were held on September 25, 2014 and April 23, 2015. On both occasions, there was an excellent turnout of attendees with 108 people attending in September and 67 people attending in April. Based on previous years training evaluations and comments, we realized that there was a need to conduct training in Spanish. The training on April 23rd was the second annual BMP training conducted entirely in Spanish targeting specifically Spanish speaking personnel. Both workshops lasted for over 4 hours and included talks by experts on topics pertinent to the EAA basin and South Florida ecosystem restoration. The evaluations received from participants at the conclusion of both sessions were very positive.

The speakers and their presentation titles are listed in the table below:

Table 24. Speakers, affiliations, and presentations for BMP training workshops held in September 2014 and April 2015.

Speaker	Affiliation	Presentation Title
Ximena Pernett	SFWMD	**BMP Regulatory Program (Rule 40E-63) And BMP Verification Methodology**
Luis Girado	Sugar Farms Cooperative	**Sediment Controls and BMP Economics**
Mark Howell	Florida Crystals	**Farm Drainage BMPs**
Mabry McCray	UF/IFAS- EREC	**Nutrient Application Practices**
Ron Rice	UF/ IFAS Palm Beach County Extension	**Wise Use of Atrazine and Ametryn**
Samira Daroub	UF/IFAS- EREC	**BMP Research Update**

April 23, 2015	**Spanish BMP Training**	
Ximena Pernett	SFWMD	**BMP Regulatory Program (Rule 40E-63) And BMP Verification Methodology**
Paul Grose	King Ranch	**Farmer's Experience with BMP Implementation**
Luis Girado	Sugar Farms Cooperative	**Sediment Controls and BMP Economics**
Pepe Lopez	US Sugarcane Cooperative	**Farm Drainage BMPs**
Orlando Diaz	SFWMD	**Nutrient Application Practices**
Cesar Asuaje	UF/IFAS Palm Beach County Extension	**Wise Use of Atrazine and Ametryn**
Viviana Nadal	UF/IFAS- EREC	**BMP Research Update**

The BMP Regulatory Program (Rule 40E-63 F.A.C.) and BMP verification methodology was explained in detail by **Ximena Pernett**, BS Engineering PE, Senior Scientist, SFWMD. The BMP rule history and regulations were reviewed and discussed. The requirements and terms of the rule regarding EAA farming operations were explained. The methodology and verification requirements that the SFWMD uses to verify proper BMP implementation was presented including rationale, history, and documentation. Specific requirements and terms of the rule regarding EAA farming operations were explained and discussed with the participants.

Mr. Luis Girado, Environmental Specialist with Sugar Farms Cooperative presented in the relationships between inflow and outflow concentrations, aquatic vegetation, holding times, and other environmental variables that affect P loads. Historical and future trends of water quality and stage level were also presented; and potential treatment options were explored. He gave the presentation in English in September and in Spanish in April

First-hand experience of Farm Drainage BMPs was provided by **Mr. Mark Howell,** Civil Engineering, Environmental Engineer, Florida Crystals in September and **Mr. Pepe Lopez**, Civil Engineering and Environmental Engineer with US Sugar Corporation in April. Both explained the practices and requirements for successful implementation of this integral BMP. They

thoroughly discussed pump log requirements, rainfall determinations for pump operations, canal level start and stop elevations, and recognized exception events.

Dr. Mabry McCray PhD Soil Science, Research Scientist, UF/IFAS -EREC, presented various methods to reduce impacts of P fertilizer application, including soil testing, banding, P sources, fertilizer spill prevention, and soil pH and P availability relationships. The same topic was presented in Spanish by **Dr. Orlando Diaz, PhD**, SFWMD in April

The wise use of Atrazine and Ametryn, two commonly applied sugarcane herbicides was covered by **Dr. Ron Rice,** PhD Agronomy in September and **Mr. Cesar Asuaje** in April, both with UF/ IFAS extension service. The importance of safe handling and application of all pesticides, but especially these two indicator pesticides was explained in terms and consequences that the participants could identify. Techniques to minimize risks to environment and applicators were stressed which included anti-siphon check valves, setbacks from water bodies, importance of pesticide labels, meaning of LD50 and half-life, and others.

Mr. Paul Grose, Vice President King Ranch – Florida discussed in April with open interaction the Effective techniques gleaned from 15 years of experience implementing BMPs in the EAA as an innovative, progressive grower

Dr. Samira Daroub, PhD, UF/IFAS (September) and **Ms. Viviana Nadal,** Senior Research Chemist, UF/IFAS (April) discussed the latest results and recommendations from water quality and farm management research. Ongoing and future research projects were also presented and open for feedback.

Photo 1. Images of selected speakers from BMP training sessions held at the EREC in September 2014 and April 2015.

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Appendix

List of Appendix Tables

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Table A 1. Crop acreages by month for farm 0401.

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
0401	Jan-2011	498	55	410	45	0	0	0	0	0	0	0	0	908
0401	Feb-2011	557	61	205	23	0	0	88	10	59	6	0	0	908
0401	Mar-2011	586	65	59	6	0	0	205	23	59	6	0	0	908
0401	Apr-2011	644	71	0	0	0	0	205	23	59	6	0	0	908
0401	May-2011	557	61	0	0	0	0	351	39	0	0	0	0	908
0401	Jun-2011	557	61	234	26	0	0	117	13	0	0	0	0	908
0401	Jul-2011	557	61	234	26	0	0	117	13	0	0	0	0	908
0401	Aug-2011	557	61	351	39	0	0	0	0	0	0	0	0	908
0401	Sep-2011	557	61	351	39	0	0	0	0	0	0	0	0	908
0401	Oct-2011	557	61	351	39	0	0	0	0	0	0	0	0	908
0401	Nov-2011	849	94	59	6	0	0	0	0	0	0	0	0	908
0401	Dec-2011	762	84	146	16	0	0	0	0	0	0	0	0	908
0401	Jan-2012	615	68	293	32	0	0	0	0	0	0	0	0	908
0401	Feb-2012	762	84	0	0	0	0	146	16	0	0	0	0	908
0401	Mar-2012	762	84	0	0	0	0	146	16	0	0	0	0	908
0401	Apr-2012	762	84	0	0	0	0	146	16	0	0	0	0	908
0401	May-2012	762	84	146	16	0	0	0	0	0	0	0	0	908
0401	Jun-2012	762	84	146	16	0	0	0	0	0	0	0	0	908
0401	Jul-2012	762	84	146	16	0	0	0	0	0	0	0	0	908
0401	Aug-2012	762	84	146	16	0	0	0	0	0	0	0	0	908
0401	Sep-2012	762	84	146	16	0	0	0	0	0	0	0	0	908
0401	Oct-2012	762	84	117	13	0	0	29	3	0	0	0	0	908
0401	Nov-2012	762	84	117	13	0	0	29	3	0	0	0	0	908
0401	Dec-2012	879	97	0	0	0	0	29	3	0	0	0	0	908
0401	Jan-2013	879	97	29	3	0	0	0	0	0	0	0	0	908
0401	Feb-2013	908	100	0	0	0	0	0	0	0	0	0	0	908
0401	Mar-2013	908	100	0	0	0	0	0	0	0	0	0	0	908
0401	Apr-2013	908	100	0	0	0	0	0	0	0	0	0	0	908

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
0401	May-2013	908	100	0	0	0	0	0	0	0	0	0	0	908
0401	Jun-2013	908	100	0	0	0	0	0	0	0	0	0	0	908
0401	Jul-2013	908	100	0	0	0	0	0	0	0	0	0	0	908
0401	Aug-2013	908	100	0	0	0	0	0	0	0	0	0	0	908
0401	Sep-2013	908	100	0	0	0	0	0	0	0	0	0	0	908
0401	Oct-2013	908	100	0	0	0	0	0	0	0	0	0	0	908
0401	Nov-2013	908	100	0	0	0	0	0	0	0	0	0	0	908
0401	Dec-2013	557	61	351	39	0	0	0	0	0	0	0	0	908
0401	Jan-2014	879	97	29	3	0	0	0	0	0	0	0	0	908
0401	Feb-2014	703	77	205	23	0	0	0	0	0	0	0	0	908
0401	Mar-2014	703	77	0	0	0	0	205	23	0	0	0	0	908
0401	Apr-2014	703	77	0	0	0	0	205	23	0	0	0	0	908
0401	May-2014	703	77	0	0	0	0	205	23	0	0	0	0	908
0401	Jun-2014	703	77	0	0	0	0	205	23	0	0	0	0	908
0401	Jul-2014	703	77	205	23	0	0	0	0	0	0	0	0	908
0401	Aug-2014	703	77	205	23	0	0	0	0	0	0	0	0	908
0401	Sep-2014	703	77	205	23	0	0	0	0	0	0	0	0	908
0401	Oct-2014	703	77	205	23	0	0	0	0	0	0	0	0	908
0401	Nov-2014	703	77	205	23	0	0	0	0	0	0	0	0	908
0401	Dec-2014	293	32	615	68	0	0	0	0	0	0	0	0	908
0401	Jan-2015	644	71	264	29	0	0	0	0	0	0	0	0	908
0401	Feb-2015	644	71	29	3	0	0	234	26	0	0	0	0	908
0401	Mar-2015	674	74	0	0	0	0	234	26	0	0	0	0	908
0401	Apr-2015	674	74	0	0	0	0	234	26	0	0	0	0	908

Table A 2. Crop acreages by month for farm 2501.

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
2501	Jan-2011	691	84	132	16	0	0	0	0	0	0	0	0	823
2501	Feb-2011	691	84	132	16	0	0	0	0	0	0	0	0	823
2501	Mar-2011	691	84	0	0	0	0	132	16	0	0	0	0	823
2501	Apr-2011	658	80	33	4	0	0	132	16	0	0	0	0	823
2501	May-2011	658	80	33	4	0	0	132	16	0	0	0	0	823
2501	Jun-2011	658	80	165	20	0	0	0	0	0	0	0	0	823
2501	Jul-2011	658	80	165	20	0	0	0	0	0	0	0	0	823
2501	Aug-2011	658	80	165	20	0	0	0	0	0	0	0	0	823
2501	Sep-2011	658	80	165	20	0	0	0	0	0	0	0	0	823
2501	Oct-2011	658	80	165	20	0	0	0	0	0	0	0	0	823
2501	Nov-2011	593	72	230	28	0	0	0	0	0	0	0	0	823
2501	Dec-2011	691	84	132	16	0	0	0	0	0	0	0	0	823
2501	Jan-2012	428	52	395	48	0	0	0	0	0	0	0	0	823
2501	Feb-2012	691	84	99	12	0	0	33	4	0	0	0	0	823
2501	Mar-2012	790	96	0	0	0	0	33	4	0	0	0	0	823
2501	Apr-2012	790	96	0	0	0	0	33	4	0	0	0	0	823
2501	May-2012	790	96	0	0	0	0	33	4	0	0	0	0	823
2501	Jun-2012	790	96	33	4	0	0	0	0	0	0	0	0	823
2501	Jul-2012	790	96	33	4	0	0	0	0	0	0	0	0	823
2501	Aug-2012	790	96	33	4	0	0	0	0	0	0	0	0	823
2501	Sep-2012	790	96	33	4	0	0	0	0	0	0	0	0	823
2501	Oct-2012	790	96	33	4	0	0	0	0	0	0	0	0	823
2501	Nov-2012	790	96	33	4	0	0	0	0	0	0	0	0	823
2501	Dec-2012	593	72	230	28	0	0	0	0	0	0	0	0	823
2501	Jan-2013	724	88	99	12	0	0	0	0	0	0	0	0	823
2501	Feb-2013	724	88	99	12	0	0	0	0	0	0	0	0	823

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
2501	Mar-2013	724	88	0	0	0	0	99	12	0	0	0	0	823
2501	Apr-2013	658	80	66	8	0	0	99	12	0	0	0	0	823
2501	May-2013	658	80	132	16	0	0	33	4	0	0	0	0	823
2501	Jun-2013	625	76	198	24	0	0	0	0	0	0	0	0	823
2501	Jul-2013	625	76	198	24	0	0	0	0	0	0	0	0	823
2501	Aug-2013	625	76	198	24	0	0	0	0	0	0	0	0	823
2501	Sep-2013	625	76	198	24	0	0	0	0	0	0	0	0	823
2501	Oct-2013	625	76	198	24	0	0	0	0	0	0	0	0	823
2501	Nov-2013	428	52	395	48	0	0	0	0	0	0	0	0	823
2501	Dec-2013	428	52	395	48	0	0	0	0	0	0	0	0	823
2501	Jan-2014	823	100	0	0	0	0	0	0	0	0	0	0	823
2501	Feb-2014	724	88	99	12	0	0	0	0	0	0	0	0	823
2501	Mar-2014	724	88	0	0	0	0	99	12	0	0	0	0	823
2501	Apr-2014	691	84	33	4	0	0	99	12	0	0	0	0	823
2501	May-2014	691	84	33	4	0	0	99	12	0	0	0	0	823
2501	Jun-2014	691	84	132	16	0	0	0	0	0	0	0	0	823
2501	Jul-2014	691	84	132	16	0	0	0	0	0	0	0	0	823
2501	Aug-2014	691	84	132	16	0	0	0	0	0	0	0	0	823
2501	Sep-2014	691	84	132	16	0	0	0	0	0	0	0	0	823
2501	Oct-2014	691	84	132	16	0	0	0	0	0	0	0	0	823
2501	Nov-2014	658	80	165	20	0	0	0	0	0	0	0	0	823
2501	Dec-2014	395	48	428	52	0	0	0	0	0	0	0	0	823
2501	Jan-2015	362	44	461	56	0	0	0	0	0	0	0	0	823
2501	Feb-2015	593	72	230	28	0	0	0	0	0	0	0	0	823
2501	Mar-2015	658	80	132	16	0	0	33	4	0	0	0	0	823
2501	Apr-2015	658	80	132	16	0	0	33	4	0	0	0	0	823

Table A 3. Crop acreages by month for farm 1813.

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
1813	Jan-2011	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Feb-2011	500	84	94	16	0	0	0	0	0	0	0	0	594
1813	Mar-2011	500	84	0	0	0	0	94	16	0	0	0	0	594
1813	Apr-2011	500	84	0	0	0	0	94	16	0	0	0	0	594
1813	May-2011	500	84	0	0	0	0	94	16	0	0	0	0	594
1813	Jun-2011	500	84	94	16	0	0	0	0	0	0	0	0	594
1813	Jul-2011	500	84	94	16	0	0	0	0	0	0	0	0	594
1813	Aug-2011	500	84	94	16	0	0	0	0	0	0	0	0	594
1813	Sep-2011	500	84	94	16	0	0	0	0	0	0	0	0	594
1813	Oct-2011	500	84	94	16	0	0	0	0	0	0	0	0	594
1813	Nov-2011	500	84	94	16	0	0	0	0	0	0	0	0	594
1813	Dec-2011	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Jan-2012	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Feb-2012	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Mar-2012	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Apr-2012	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	May-2012	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Jun-2012	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Jul-2012	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Aug-2012	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Sep-2012	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Oct-2012	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Nov-2012	219	37	375	63	0	0	0	0	0	0	0	0	594
1813	Dec-2012	438	74	156	26	0	0	0	0	0	0	0	0	594
1813	Jan-2013	469	79	125	21	0	0	0	0	0	0	0	0	594
1813	Feb-2013	469	79	125	21	0	0	0	0	0	0	0	0	594
1813	Mar-2013	469	79	125	21	0	0	0	0	0	0	0	0	594
1813	Apr-2013	469	79	0	0	0	0	125	21	0	0	0	0	594

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
1813	May-2013	469	79	0	0	0	0	125	21	0	0	0	0	594
1813	Jun-2013	469	79	0	0	0	0	125	21	0	0	0	0	594
1813	Jul-2013	469	79	0	0	0	0	125	21	0	0	0	0	594
1813	Aug-2013	469	79	0	0	0	0	125	21	0	0	0	0	594
1813	Sep-2013	469	79	0	0	0	0	125	21	0	0	0	0	594
1813	Oct-2013	469	79	125	21	0	0	0	0	0	0	0	0	594
1813	Nov-2013	0	0	594	100	0	0	0	0	0	0	0	0	594
1813	Dec-2013	469	0	125	21	0	0	0	0	0	0	0	0	594
1813	Jan-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Feb-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Mar-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Apr-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	May-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Jun-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Jul-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Aug-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Sep-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Oct-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Nov-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Dec-2014	594	100	0	0	0	0	0	0	0	0	0	0	594
1813	Jan-2015	500	84	94	16	0	0	0	0	0	0	0	0	594
1813	Feb-2015	500	84	94	16	0	0	0	0	0	0	0	0	594
1813	Mar-2015	500	84	0	0	0	0	94	16	0	0	0	0	594
1813	Apr-2015	500	84	0	0	0	0	94	16	0	0	0	0	594

Table A 4. Crop acreages by month for farm 6117.

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
6117	Jan-2011	703	90	78	10	0	0	0	0	0	0	0	0	781
6117	Feb-2011	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Mar-2011	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Apr-2011	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	May-2011	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Jun-2011	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Jul-2011	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Aug-2011	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Sep-2011	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Oct-2011	566	73	215	28	0	0	0	0	0	0	0	0	781
6117	Nov-2011	547	70	234	30	0	0	0	0	0	0	0	0	781
6117	Dec-2011	547	70	234	30	0	0	0	0	0	0	0	0	781
6117	Jan-2012	59	8	722	93	0	0	0	0	0	0	0	0	781
6117	Feb-2012	703	90	78	10	0	0	0	0	0	0	0	0	781
6117	Mar-2012	703	90	0	0	0	0	0	0	78	10	0	0	781
6117	Apr-2012	703	90	0	0	0	0	0	0	78	10	0	0	781
6117	May-2012	703	90	78	10	0	0	0	0	0	0	0	0	781
6117	Jun-2012	703	90	78	10	0	0	0	0	0	0	0	0	781
6117	Jul-2012	703	90	78	10	0	0	0	0	0	0	0	0	781
6117	Aug-2012	703	90	78	10	0	0	0	0	0	0	0	0	781
6117	Sep-2012	703	90	78	10	0	0	0	0	0	0	0	0	781
6117	Oct-2012	391	50	391	50	0	0	0	0	0	0	0	0	781
6117	Nov-2012	469	60	312	40	0	0	0	0	0	0	0	0	781
6117	Dec-2012	625	80	156	20	0	0	0	0	0	0	0	0	781
6117	Jan-2013	625	80	156	20	0	0	0	0	0	0	0	0	781
6117	Feb-2013	625	80	156	20	0	0	0	0	0	0	0	0	781
6117	Mar-2013	625	80	78	10	0	0	78	10	0	0	0	0	781
6117	Apr-2013	625	80	0	0	0	0	156	20	0	0	0	0	781

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
6117	May-2013	625	80	0	0	0	0	156	20	0	0	0	0	781
6117	Jun-2013	625	80	156	20	0	0	0	0	0	0	0	0	781
6117	Jul-2013	625	80	156	20	0	0	0	0	0	0	0	0	781
6117	Aug-2013	625	80	156	20	0	0	0	0	0	0	0	0	781
6117	Sep-2013	625	80	156	20	0	0	0	0	0	0	0	0	781
6117	Oct-2013	469	60	312	40	0	0	0	0	0	0	0	0	781
6117	Nov-2013	0	0	781	100	0	0	0	0	0	0	0	0	781
6117	Dec-2013	0	0	781	100	0	0	0	0	0	0	0	0	781
6117	Jan-2014	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Feb-2014	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Mar-2014	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Apr-2014	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	May-2014	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Jun-2014	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Jul-2014	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Aug-2014	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Sep-2014	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Oct-2014	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Nov-2014	625	80	156	20	0	0	0	0	0	0	0	0	781
6117	Dec-2014	781	100	0	0	0	0	0	0	0	0	0	0	781
6117	Jan-2015	0	0	781	100	0	0	0	0	0	0	0	0	781
6117	Feb-2015	703	90	78	10	0	0	0	0	0	0	0	0	781
6117	Mar-2015	547	70	0	0	0	0	234	30	0	0	0	0	781
6117	Apr-2015	547	70	0	0	0	0	234	30	0	0	0	0	781

Table A 5. Crop acreages by month for farm 4701.

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
4701	Jan-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Feb-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Mar-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Apr-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	May-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Jun-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Jul-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Aug-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Sep-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Oct-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Nov-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Dec-2011	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Jan-2012	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Feb-2012	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Mar-2012	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Apr-2012	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	May-2012	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Jun-2012	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Jul-2012	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Aug-2012	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Sep-2012	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Oct-2012	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Nov-2012	315	50	315	50	0	0	0	0	0	0	0	0	630
4701	Dec-2012	315	50	315	50	0	0	0	0	0	0	0	0	630
4701	Jan-2013	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Feb-2013	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Mar-2013	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Apr-2013	630	100	0	0	0	0	0	0	0	0	0	0	630

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
4701	May-2013	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Jun-2013	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Jul-2013	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Aug-2013	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Sep-2013	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Oct-2013	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Nov-2013	591	94	39	6	0	0	0	0	0	0	0	0	630
4701	Dec-2013	591	94	39	6	0	0	0	0	0	0	0	0	630
4701	Jan-2014	630	100	0	0	0	0	0	0	0	0	0	0	630
4701	Feb-2014	315	50	315	50	0	0	0	0	0	0	0	0	630
4701	Mar-2014	315	50	315	50	0	0	0	0	0	0	0	0	630
4701	Apr-2014	315	50	0	0	315	50	0	0	0	0	0	0	630
4701	May-2014	315	50	0	0	315	50	0	0	0	0	0	0	630
4701	Jun-2014	315	50	0	0	315	50	0	0	0	0	0	0	630
4701	Jul-2014	315	50	0	0	315	50	0	0	0	0	0	0	630
4701	Aug-2014	315	50	0	0	315	50	0	0	0	0	0	0	630
4701	Sep-2014	315	50	0	0	315	50	0	0	0	0	0	0	630
4701	Oct-2014	315	50	0	0	315	50	0	0	0	0	0	0	630
4701	Nov-2014	315	50	315	50	0	0	0	0	0	0	0	0	630
4701	Dec-2014	315	50	315	50	0	0	0	0	0	0	0	0	630
4701	Jan-2015	315	50	315	50	0	0	0	0	0	0	0	0	630
4701	Feb-2015	315	50	315	50	0	0	0	0	0	0	0	0	630
4701	Mar-2015	315	50	0	0	0	0	315	50	0	0	0	0	630
4701	Apr-2015	315	50	0	0	0	0	315	50	0	0	0	0	630

Table A 6. Crop acreages by month for farm 4702.

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
4702	Jan-2011	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Feb-2011	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Mar-2011	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Apr-2011	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	May-2011	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Jun-2011	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Jul-2011	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Aug-2011	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Sep-2011	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Oct-2011	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Nov-2011	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Dec-2011	320	50	320	50	0	0	0	0	0	0	0	0	640
4702	Jan-2012	320	50	320	50	0	0	0	0	0	0	0	0	640
4702	Feb-2012	320	50	320	50	0	0	0	0	0	0	0	0	640
4702	Mar-2012	320	50	320	50	0	0	0	0	0	0	0	0	640
4702	Apr-2012	320	50	0	0	320	50	0	0	0	0	0	0	640
4702	May-2012	320	50	0	0	320	50	0	0	0	0	0	0	640
4702	Jun-2012	320	50	0	0	320	50	0	0	0	0	0	0	640
4702	Jul-2012	320	50	0	0	320	50	0	0	0	0	0	0	640
4702	Aug-2012	320	50	0	0	320	50	0	0	0	0	0	0	640
4702	Sep-2012	320	50	0	0	320	50	0	0	0	0	0	0	640
4702	Oct-2012	320	50	320	50	0	0	0	0	0	0	0	0	640
4702	Nov-2012	320	50	320	50	0	0	0	0	0	0	0	0	640
4702	Dec-2012	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Jan-2013	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Feb-2013	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Mar-2013	400	63	240	38	0	0	0	0	0	0	0	0	640
4702	Apr-2013	640	100	0	0	0	0	0	0	0	0	0	0	640

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
4702	May-2013	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Jun-2013	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Jul-2013	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Aug-2013	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Sep-2013	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Oct-2013	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Nov-2013	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Dec-2013	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Jan-2014	320	50	320	50	0	0	0	0	0	0	0	0	640
4702	Feb-2014	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Mar-2014	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Apr-2014	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	May-2014	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Jun-2014	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Jul-2014	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Aug-2014	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Sep-2014	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Oct-2014	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Nov-2014	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Dec-2014	120	19	520	81	0	0	0	0	0	0	0	0	640
4702	Jan-2015	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Feb-2015	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Mar-2015	640	100	0	0	0	0	0	0	0	0	0	0	640
4702	Apr-2015	640	100	0	0	0	0	0	0	0	0	0	0	640

Table A 7. Crop acreages by month for farm 3102.

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
3102	Jan-2011	1040	75	347	25	0	0	0	0	0	0	0	0	1387
3102	Feb-2011	77	6	1002	72	0	0	308	22	0	0	0	0	1387
3102	Mar-2011	270	19	308	22	0	0	732	53	77	6	0	0	1387
3102	Apr-2011	539	39	39	3	0	0	732	53	77	6	0	0	1387
3102	May-2011	578	42	77	6	0	0	732	53	0	0	0	0	1387
3102	Jun-2011	578	42	809	58	0	0	0	0	0	0	0	0	1387
3102	Jul-2011	462	33	578	42	347	25	0	0	0	0	0	0	1387
3102	Aug-2011	462	33	578	42	347	25	0	0	0	0	0	0	1387
3102	Sep-2011	462	33	925	67	0	0	0	0	0	0	0	0	1387
3102	Oct-2011	462	33	462	33	0	0	462	33	0	0	0	0	1387
3102	Nov-2011	424	31	424	31	0	0	424	31	116	8	0	0	1387
3102	Dec-2011	462	33	771	56	0	0	77	6	77	6	0	0	1387
3102	Jan-2012	462	33	732	53	0	0	0	0	116	8	77	6	1387
3102	Feb-2012	424	31	694	50	0	0	0	0	193	14	77	6	1387
3102	Mar-2012	1079	78	0	0	0	0	0	0	231	17	77	6	1387
3102	Apr-2012	1079	78	193	14	0	0	0	0	39	3	77	6	1387
3102	May-2012	1079	78	231	17	0	0	0	0	0	0	77	6	1387
3102	Jun-2012	1079	78	231	17	0	0	0	0	0	0	77	6	1387
3102	Jul-2012	1079	78	231	17	0	0	0	0	0	0	77	6	1387
3102	Aug-2012	1079	78	231	17	0	0	0	0	0	0	77	6	1387
3102	Sep-2012	1079	78	308	22	0	0	0	0	0	0	0	0	1387
3102	Oct-2012	1079	78	116	8	0	0	77	6	116	8	0	0	1387
3102	Nov-2012	1079	78	154	11	0	0	77	6	77	6	0	0	1387
3102	Dec-2012	1117	81	193	14	0	0	77	6	0	0	0	0	1387
3102	Jan-2013	925	67	462	33	0	0	0	0	0	0	0	0	1387
3102	Feb-2013	1310	94	77	6	0	0	0	0	0	0	0	0	1387
3102	Mar-2013	1387	100	0	0	0	0	0	0	0	0	0	0	1387
3102	Apr-2013	1387	100	0	0	0	0	0	0	0	0	0	0	1387

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
3102	May-2013	1387	100	0	0	0	0	0	0	0	0	0	0	1387
3102	Jun-2013	1387	100	0	0	0	0	0	0	0	0	0	0	1387
3102	Jul-2013	1387	100	0	0	0	0	0	0	0	0	0	0	1387
3102	Aug-2013	1387	100	0	0	0	0	0	0	0	0	0	0	1387
3102	Sep-2013	1387	100	0	0	0	0	0	0	0	0	0	0	1387
3102	Oct-2013	1387	100	0	0	0	0	0	0	0	0	0	0	1387
3102	Nov-2013	1079	78	308	22	0	0	0	0	0	0	0	0	1387
3102	Dec-2013	809	58	539	39	0	0	0	0	0	0	39	3	1387
3102	Jan-2014	809	58	539	39	0	0	0	0	0	0	39	3	1387
3102	Feb-2014	1117	81	116	8	0	0	0	0	0	0	154	11	1387
3102	Mar-2014	886	64	77	6	0	0	0	0	0	0	424	31	1387
3102	Apr-2014	1079	78	77	6	0	0	0	0	0	0	231	17	1387
3102	May-2014	1079	78	270	19	0	0	0	0	0	0	39	3	1387
3102	Jun-2014	1079	78	308	22	0	0	0	0	0	0	0	0	1387
3102	Jul-2014	1079	78	154	11	154	11	0	0	0	0	0	0	1387
3102	Aug-2014	1079	78	154	11	154	11	0	0	0	0	0	0	1387
3102	Sep-2014	1079	78	154	11	154	11	0	0	0	0	0	0	1387
3102	Oct-2014	1079	78	116	8	116	8	0	0	0	0	0	0	1310
3102	Nov-2014	1079	78	385	28	0	0	0	0	0	0	0	0	1464
3102	Dec-2014	809	58	501	36	0	0	0	0	0	0	77	6	1387
3102	Jan-2015	655	47	539	39	0	0	0	0	0	0	193	14	1387
3102	Feb-2015	1194	86	0	0	0	0	0	0	0	0	193	14	1387
3102	Mar-2015	925	67	308	22	0	0	39	3	0	0	116	8	1387
3102	Apr-2015	925	67	308	22	0	0	39	3	0	0	116	8	1387

Table A 8. Crop acreages by month for farm 3103.

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
3103	Jan-2011	457	75	0	0	0	0	0	0	0	0	152	25	609
3103	Feb-2011	305	50	152	25	0	0	0	0	0	0	152	25	609
3103	Mar-2011	152	25	305	50	0	0	0	0	0	0	152	25	609
3103	Apr-2011	457	75	0	0	0	0	0	0	0	0	152	25	609
3103	May-2011	457	75	152	25	0	0	0	0	0	0	0	0	609
3103	Jun-2011	457	75	0	0	152	25	0	0	0	0	0	0	609
3103	Jul-2011	457	75	0	0	152	25	0	0	0	0	0	0	609
3103	Aug-2011	457	75	152	25	0	0	0	0	0	0	0	0	609
3103	Sep-2011	457	75	152	25	0	0	0	0	0	0	0	0	609
3103	Oct-2011	457	75	0	0	0	0	38	6	114	19	0	0	609
3103	Nov-2011	457	75	0	0	0	0	38	6	114	19	0	0	609
3103	Dec-2011	305	50	266	44	0	0	38	6	0	0	0	0	609
3103	Jan-2012	305	50	305	50	0	0	0	0	0	0	0	0	609
3103	Feb-2012	305	50	305	50	0	0	0	0	0	0	0	0	609
3103	Mar-2012	457	75	0	0	0	0	152	25	0	0	0	0	609
3103	Apr-2012	457	75	0	0	0	0	152	25	0	0	0	0	609
3103	May-2012	457	75	0	0	0	0	152	25	0	0	0	0	609
3103	Jun-2012	457	75	152	25	0	0	0	0	0	0	0	0	609
3103	Jul-2012	457	75	152	25	0	0	0	0	0	0	0	0	609
3103	Aug-2012	457	75	152	25	0	0	0	0	0	0	0	0	609
3103	Sep-2012	457	75	152	25	0	0	0	0	0	0	0	0	609
3103	Oct-2012	457	75	0	0	0	0	0	0	152	25	0	0	609
3103	Nov-2012	457	75	0	0	0	0	0	0	152	25	0	0	609
3103	Dec-2012	305	50	152	25	0	0	0	0	152	25	0	0	609
3103	Jan-2013	305	50	305	50	0	0	0	0	0	0	0	0	609
3103	Feb-2013	305	50	152	25	0	0	152	25	0	0	0	0	609
3103	Mar-2013	457	75	0	0	0	0	152	25	0	0	0	0	609
3103	Apr-2013	457	75	0	0	0	0	152	25	0	0	0	0	609

Farm ID	Month/Year	Cane		Fallow		Flooded/Rice		Corn		Beans		Leaf		Total
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
3103	May-2013	457	75	0	0	0	0	152	25	0	0	0	0	609
3103	Jun-2013	457	75	0	0	0	0	152	25	0	0	0	0	609
3103	Jul-2013	457	75	0	0	0	0	152	25	0	0	0	0	609
3103	Aug-2013	457	75	0	0	0	0	152	25	0	0	0	0	609
3103	Sep-2013	457	75	0	0	0	0	152	25	0	0	0	0	609
3103	Oct-2013	609	100	0	0	0	0	0	0	0	0	0	0	609
3103	Nov-2013	457	75	152	25	0	0	0	0	0	0	0	0	609
3103	Dec-2013	457	75	152	25	0	0	0	0	0	0	0	0	609
3103	Jan-2014	609	100	0	0	0	0	0	0	0	0	0	0	609
3103	Feb-2014	609	100	0	0	0	0	0	0	0	0	0	0	609
3103	Mar-2014	305	50	152	25	152	25	0	0	0	0	0	0	609
3103	Apr-2014	305	50	0	0	152	25	152	25	0	0	0	0	609
3103	May-2014	305	50	0	0	152	25	152	25	0	0	0	0	609
3103	Jun-2014	305	50	152	25	152	25	0	0	0	0	0	0	609
3103	Jul-2014	305	50	152	25	152	25	0	0	0	0	0	0	609
3103	Aug-2014	305	50	152	25	152	25	0	0	0	0	0	0	609
3103	Sep-2014	305	50	152	25	152	25	0	0	0	0	0	0	609
3103	Oct-2014	305	50	152	25	152	25	0	0	0	0	0	0	609
3103	Nov-2014	305	50	305	50	0	0	0	0	0	0	0	0	609
3103	Dec-2014	305	50	305	50	0	0	0	0	0	0	0	0	609
3103	Jan-2015	609	100	0	0	0	0	0	0	0	0	0	0	609
3103	Feb-2015	609	100	0	0	0	0	0	0	0	0	0	0	609
3103	Mar-2015	609	100	0	0	0	0	0	0	0	0	0	0	609
3103	Apr-2015	609	100	0	0	0	0	0	0	0	0	0	0	609

Table A 9. Detailed water quality parameters of ambient canal water samples collected from Farm 0401 from November 2010 through April 2015.

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
11/9/2010	A	nd	nd	nd	0.030	nd	0.5	60.4	nd
11/9/2010	B	nd	nd	nd	0.011	nd	6.9	64.4	nd
11/9/2010	C	nd	nd	nd	0.010	nd	0.5	56.7	nd
11/23/2010	A	0.046	0.038	0.008	0.033	0.005	2.0	37.3	7.23
11/23/2010	B	0.028	0.010	0.018	0.008	0.002	15.7	47.3	8.08
11/23/2010	C	0.028	0.006	0.022	0.007	#	1.2	47.9	8.45
01/04/2011	A	0.013	0.025	#	0.016	0.009	2.2	34.6	7.94
01/04/2011	B	0.007	0.000	0.007	0.006	#	1.2	36.2	8.14
01/04/2011	C	0.022	0.001	0.021	0.005	#	1.8	39.1	8.52
01/18/2011	A	0.050	0.041	0.009	0.002	0.039	1.8	62.3	7.99
01/18/2011	B	0.011	0.002	0.009	0.002	0.000	1.0	62.3	7.93
01/18/2011	C	0.003	0.002	0.001	0.037	#	2.2	42.4	8.54
02/02/2011	A	0.127	0.067	0.060	0.004	0.063	31.4	70.6	7.63
02/02/2011	B	0.034	0.003	0.031	0.018	#	2.6	67.5	7.95
02/02/2011	C	0.016	0.019	#	0.002	0.017	4.0	55.2	8.40
02/09/2011	A	0.173	0.167	0.006	0.002	0.165	1.8	74.6	7.84
02/09/2011	B	0.020	0.009	0.011	0.007	0.002	2.2	69.8	8.25
02/09/2011	C	0.023	0.006	0.017	0.004	0.002	2.2	69.0	8.16
02/23/2011	A	0.207	0.192	0.015	0.183	0.009	2.6	73.8	8.10
02/23/2011	B	0.059	0.043	0.016	0.049	#	2.8	68.2	8.34
02/23/2011	C	0.013	0.004	0.009	0.005	#	7.6	63.8	8.49
03/02/2011	A	0.106	0.124	#	0.085	0.040	6.2	46.8	7.81
03/02/2011	B	0.018	0.059	#	0.006	0.053	2.4	45.6	8.13
03/02/2011	C	0.024	0.045	#	0.006	0.039	88.2	50.0	8.47
03/16/2011	A	0.070	0.044	0.026	0.041	0.003	20.0	39.2	7.74
03/16/2011	B	0.020	0.009	0.011	0.062	#	3.0	39.8	7.98
03/16/2011	C	0.021	0.009	0.012	0.003	0.006	4.0	33.2	8.67
03/30/2011	A	0.052	0.030	0.022	0.050	#	29.0	55.9	7.47
03/30/2011	B	0.036	0.016	0.020	0.046	#	4.8	59.1	7.61
03/30/2011	C	0.019	0.006	0.013	0.005	0.001	2.4	66.1	7.88
04/13/2011	A	0.119	0.087	0.032	0.069	0.018	9.5	36.3	8.30
04/13/2011	B	0.072	0.069	0.003	0.052	0.017	8.0	63.6	8.11
04/13/2011	C	0.011	0.012	#	0.008	0.004	88.7	65.3	8.40
04/25/2011	A	0.090	0.056	0.034	0.051	0.006	11.2	38.1	8.23
04/25/2011	B	0.048	0.034	0.014	0.029	0.005	2.3	39.4	7.88
04/25/2011	C	0.013	0.009	0.004	0.004	0.005	1.9	38.5	8.34
05/04/2011	A	0.070	0.042	0.028	0.035	0.007	7.1	54.9	7.69
05/04/2011	B	0.032	0.016	0.016	0.032	#	2.3	56.7	7.63
05/04/2011	C	0.011	0.010	0.001	0.004	0.006	4.7	50.8	8.27
05/19/2011	A	0.086	0.046	0.040	0.037	0.009	2.7	53.7	7.42
05/19/2011	B	0.037	0.027	0.010	0.008	0.019	3.0	64.7	7.31
05/19/2011	C	0.012	0.005	0.007	0.005	#	7.6	44.6	8.21
06/07/2011	A	0.063	0.047	0.016	0.013	0.034	4.4	57.8	7.68
06/07/2011	B	0.019	0.006	0.013	0.002	0.005	2.9	56.5	7.58
06/07/2011	C	0.004	0.000	0.004	0.001	#	2.8	44.6	8.60
06/22/2011	A	0.049	0.024	0.025	0.018	0.006	5.6	54.6	7.85
06/22/2011	B	0.024	0.021	0.003	0.002	0.019	13.6	56.7	7.40
06/22/2011	C	0.027	0.025	0.003	0.001	0.023	1.8	56.0	7.96
08/17/2011	A	0.054	0.041	0.013	0.032	0.009	4.4	84.9	7.47
08/17/2011	B	0.044	0.029	0.015	0.018	0.011	3.3	79.5	7.31

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
08/17/2011	C	0.024	0.011	0.013	0.004	0.007	4.5	78.7	7.28
12/06/2011	A	0.077	0.046	0.031	0.048	#	8.4	54.0	7.94
12/06/2011	B	0.047	0.025	0.022	0.021	0.004	8.8	65.1	8.19
12/06/2011	C	0.014	0.008	0.006	0.006	0.002	7.4	86.3	8.28
12/20/2011	A	0.067	0.054	0.013	0.048	0.007	3.4	60.4	8.07
12/20/2011	B	0.038	0.024	0.014	0.013	0.011	3.8	58.9	8.37
12/20/2011	C	0.017	0.011	0.006	0.048	#	3.4	52.1	8.48
01/11/2012	A	0.042	0.042	0.000	0.030	0.012	5.8	78.2	8.12
01/11/2012	B	0.019	0.008	0.011	0.003	0.005	3.6	71.0	8.15
01/11/2012	C	0.012	0.005	0.007	0.002	0.003	3.2	66.5	8.10
01/25/2012	A	0.055	0.027	0.028	0.029	#	6.9	58.2	7.93
01/25/2012	B	0.042	0.007	0.035	0.014	#	6.4	58.3	8.18
01/25/2012	C	0.013	0.002	0.011	0.002	0.000	5.7	59.3	8.24
02/08/2012	A	0.082	0.051	0.031	0.052	#	10.0	57.5	7.74
02/08/2012	B	0.068	0.038	0.030	0.035	0.003	10.0	58.3	7.70
02/08/2012	C	0.016	0.007	0.009	0.003	0.004	5.8	62.7	7.68
02/27/2012	A	0.056	0.037	0.019	0.034	0.003	8.0	66.5	8.04
02/27/2012	B	0.033	0.015	0.018	0.007	0.009	6.1	73.3	8.16
02/27/2012	C	0.015	0.010	0.005	0.003	0.007	2.3	62.4	8.03
03/12/2012	A	0.059	0.036	0.023	0.039	#	7.7	94.0	7.54
03/12/2012	B	0.087	0.066	0.021	0.067	#	6.8	78.4	7.66
03/12/2012	C	0.182	0.009	0.173	0.006	0.003	9.3	76.6	7.56
03/28/2012	A	0.028	0.013	0.015	0.013	0.000	4.5	88.1	7.75
03/28/2012	B	0.018	0.009	0.009	0.010	#	4.4	98.4	8.26
03/28/2012	C	0.181	0.013	0.168	0.006	0.008	36.2	56.4	8.08
04/09/2012	A	0.110	0.057	0.053	0.054	0.003	19.1	52.5	7.91
04/09/2012	B	0.030	0.014	0.016	0.009	0.005	4.8	74.7	7.69
04/09/2012	C	0.011	0.009	0.002	0.005	0.004	3.5	38.9	7.73
04/23/2012	A	0.031	0.017	0.014	0.017	0.000	6.2	52.8	7.73
04/23/2012	B	0.024	0.011	0.013	0.009	0.002	9.0	44.7	8.39
04/23/2012	C	0.010	0.004	0.006	0.004	0.000	5.2	40.9	8.41
05/07/2012	A	0.032	0.009	0.023	0.007	0.002	7.7	nd	7.58
05/07/2012	B	0.023	0.004	0.019	0.007	#	8.9	nd	7.80
05/07/2012	C	0.009	0.003	0.006	0.004	#	5.4	nd	7.98
08/16/2012	A	0.036	0.015	0.021	0.010	0.006	6.4	86.5	7.77
08/16/2012	B	0.012	0.004	0.008	0.008	#	3.8	65.5	8.45
08/16/2012	C	0.017	0.009	0.008	0.008	0.001	11.8	46.6	8.66
11/15/2012	A	0.050	0.017	0.033	0.010	0.008	11.2	82.5	7.84
11/15/2012	B	0.104	0.018	0.086	0.009	0.009	9.2	48.7	8.92
11/15/2012	C	0.090	0.020	0.070	0.005	0.015	8.0	70.3	8.06
11/29/2012	A	0.056	0.027	0.029	0.021	0.006	7.0	73.7	7.75
11/29/2012	B	0.016	0.010	0.006	0.010	#	2.4	61.9	7.80
11/29/2012	C	0.023	0.010	0.013	0.002	0.008	5.2	34.2	8.44
01/09/2013	A	0.035	0.014	0.021	0.005	0.009	3.6	87.4	7.60
01/09/2013	B	0.018	0.005	0.013	0.002	0.003	5.8	62.0	8.23
01/09/2013	C	0.011	0.008	0.003	0.002	0.007	5.0	54.1	7.70
01/23/2013	A	0.026	0.016	0.010	0.005	0.011	5.2	88.7	7.65
01/23/2013	B	0.079	0.009	0.070	0.002	0.007	7.6	69.6	7.83
01/23/2013	C	0.030	0.012	0.018	0.002	0.010	9.0	74.1	7.49
02/06/2013	A	0.129	0.071	0.058	0.061	0.010	27.4	58.2	8.01
02/06/2013	B	0.022	0.009	0.013	0.003	0.007	29.4	49.8	8.31
02/06/2013	C	0.030	0.008	0.022	0.003	0.005	40.8	61.9	8.20
03/06/2013	A	0.025	0.003	0.022	0.008	#	6.0	103.0	7.97

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/06/2013	B	0.063	-0.004	0.067	0.005	#	29.8	59.9	8.18
03/06/2013	C	0.010	-0.001	0.011	0.007	#	6.2	66.6	8.63
04/03/2013	A	0.028	0.018	0.010	0.004	0.014	10.2	100.0	7.94
04/03/2013	B	0.215	0.020	0.195	0.008	0.013	120.8	64.1	7.50
04/03/2013	C	0.068	0.017	0.051	0.005	0.012	15.0	52.4	8.29
04/17/2013	A	0.067	0.007	0.060	0.013	#	286.4	84.6	7.49
04/17/2013	B	0.113	0.016	0.097	0.009	0.007	96.0	91.0	7.47
04/17/2013	C	0.036	0.006	0.030	0.010	#	2.4	142.5	7.31
08/21/2013	A	0.104	0.071	0.033	0.007	0.064	15.6	nd	7.78
08/21/2013	B	0.092	0.049	0.043	0.011	0.038	28.0	nd	7.88
08/21/2013	C	0.186	0.034	0.152	0.011	0.023	50.8	nd	7.96
10/29/2013	A	0.049	0.019	0.030	0.013	0.006	3.4	68.8	7.65
10/29/2013	B	0.035	0.015	0.020	0.011	0.004	5.0	83.2	7.95
10/29/2013	C	0.076	0.022	0.054	0.006	0.016	15.4	125.5	8.33
11/13/2013	A	0.072	0.032	0.040	0.010	0.022	4.0	85.2	7.68
11/13/2013	B	0.057	0.030	0.027	0.011	0.019	10.0	88.5	7.91
11/13/2013	C	0.107	0.040	0.067	0.011	0.029	12.4	82.9	8.36
12/11/2013	A	0.209	0.173	0.036	0.012	0.161	4.6	89.8	7.62
12/11/2013	B	0.058	0.039	0.019	0.011	0.028	3.2	93.3	7.87
12/11/2013	C	0.147	0.100	0.047	0.011	0.089	11.4	97.5	8.09
12/26/2013	A	0.047	0.023	0.024	0.012	0.011	6.6	88.2	nd
12/26/2013	B	0.047	0.028	0.019	0.012	0.016	15.4	90.3	nd
12/26/2013	C	0.118	0.062	0.056	0.012	0.050	4.8	97.8	nd
01/8/2014	A	0.050	0.029	0.021	0.013	0.016	8.2	90.0	7.84
01/8/2014	B	0.029	0.015	0.014	0.012	0.003	6.8	88.2	8.06
01/8/2014	C	0.065	0.027	0.038	0.011	0.016	14.2	85.3	8.20
01/22/2014	A	0.043	0.023	0.020	0.006	0.017	6.6	96.1	7.91
01/22/2014	B	0.033	0.020	0.013	0.006	0.014	5.8	102.4	8.30
01/22/2014	C	0.072	0.026	0.046	0.006	0.020	12.4	104.9	8.43
04/2/2014	A	0.052	0.013	0.039	0.010	0.003	10.0	92.2	8.01
04/2/2014	B	0.058	0.018	0.040	0.009	0.009	15.4	93.0	8.29
04/2/2014	C	0.096	0.018	0.078	0.008	0.010	15.0	110.6	8.28
04/14/2014	A	0.070	0.020	0.050	0.015	0.005	14.0	47.2	7.87
04/14/2014	B	0.076	0.015	0.061	0.006	0.009	11.0	44.4	8.36
04/14/2014	C	0.103	0.022	0.081	0.010	0.012	10.4	85.0	8.33
04/30/2014	A	0.072	0.030	0.042	0.027	0.003	12.6	44.5	8.13
04/30/2014	B	0.072	0.009	0.063	0.006	0.003	5.4	43.1	8.39
04/30/2014	C	0.097	0.015	0.082	0.003	0.012	7.4	75.8	8.27
5/14/2014	A	0.052	0.024	0.028	0.006	0.018	7.80	56.81	8.11
5/14/2014	B	0.095	0.042	0.053	0.005	0.037	17.40	47.98	7.97
5/14/2014	C	0.158	0.028	0.130	0.007	0.021	19.20	66.47	8.14
5/28/2014	A	0.052	0.035	0.017	0.018	0.017	4.60	49.64	7.76
5/28/2014	B	0.039	0.023	0.016	0.008	0.015	18.00	50.11	8.10
5/28/2014	C	0.082	0.026	0.056	0.009	0.017	12.40	55.01	8.12
6/11/2014	A	0.073	0.032	0.041	0.034	#	8.80	45.54	7.73
6/11/2014	B	0.057	0.008	0.049	0.008	0.000	12.40	46.07	7.86
6/11/2014	C	0.039	0.007	0.032	0.010	#	12.00	69.40	8.02
12/11/2014	A	0.028	0.006	0.022	0.008	#	5.20	102.77	7.72
12/11/2014	B	0.022	0.007	0.015	0.008	#	5.00	104.08	8.30
12/11/2014	C	0.016	0.006	0.010	0.006	#	5.80	110.11	8.23
1/14/2015	A	0.032	0.005	0.027	0.009	#	5.60	83.08	7.72
1/14/2015	B	0.018	0.003	0.015	0.007	#	10.00	80.54	8.27
1/14/2015	C	0.021	0.001	0.020	0.006	#	10.80	72.46	8.21

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
1/28/2015	B	0.020	0.009	0.011	0.006	0.003	6.00	78.67	8.46
1/28/2015	C	0.011	0.006	0.005	0.003	0.003	14.40	73.48	8.38
2/25/2015	A	0.047	0.011	0.036	0.006	0.005	16.40	53.57	7.92
2/25/2015	B	0.067	0.008	0.059	0.004	0.004	7.80	47.22	8.24
2/25/2015	C	0.061	0.007	0.054	0.003	0.004	19.20	46.67	8.29
3/18/2015	A	0.042	0.010	0.032	0.007	0.003	16.80	80.13	7.57
3/18/2015	B	0.020	0.011	0.009	0.005	0.006	16.40	64.48	8.27
3/18/2015	C	0.024	0.008	0.016	0.003	0.005	6.60	80.80	8.01

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 10. Detailed water quality parameters of grab canal water samples collected from Farm 2501 from November 2010 through April 2015.

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
11/9/2010	A	nd	nd	nd	0.035	nd	3.7	58.3	nd
11/9/2010	B	nd	nd	nd	0.009	nd	4.0	56.2	nd
11/9/2010	C	nd	nd	nd	0.009	nd	2.8	55.0	nd
11/23/2010	A	0.069	0.049	0.020	0.042	0.007	14.1	32.4	8.45
11/23/2010	B	0.057	0.025	0.032	0.015	0.010	5.5	32.9	8.56
11/23/2010	C	0.045	0.017	0.028	0.013	0.004	6.4	33.8	8.53
01/04/2011	A	0.033	0.018	0.015	0.022	#	8.2	31.6	8.29
01/04/2011	B	0.058	0.017	0.041	0.022	#	7.0	31.4	8.13
01/04/2011	C	0.035	0.007	0.028	0.010	#	4.0	32.4	8.52
01/18/2011	A	0.045	0.024	0.021	0.022	0.002	4.8	60.2	8.15
01/18/2011	B	0.050	0.018	0.032	0.007	0.011	8.6	55.3	8.44
01/18/2011	C	0.029	0.012	0.017	0.005	0.007	3.6	47.0	8.18
02/02/2011	A	0.200	0.201	#	0.167	0.034	6.0	70.7	8.04
02/02/2011	B	0.073	0.036	0.037	0.015	0.021	8.8	59.6	8.55
02/02/2011	C	0.041	0.005	0.036	0.003	0.002	16.0	50.9	8.47
02/09/2011	A	0.254	0.235	0.019	0.225	0.010	4.4	77.5	8.09
02/09/2011	B	0.129	0.094	0.035	0.084	0.010	7.2	71.3	8.75
02/09/2011	C	0.038	0.012	0.026	0.007	0.005	7.2	55.0	8.56
02/23/2011	A	0.261	0.238	0.023	0.084	0.154	5.4	69.8	8.05
02/23/2011	B	0.135	0.109	0.026	0.094	0.015	13.0	65.0	8.83
02/23/2011	C	0.073	0.058	0.015	0.049	0.009	7.2	63.7	8.69
03/02/2011	A	0.120	0.073	0.047	0.070	0.003	13.6	34.5	8.32
03/02/2011	B	0.068	0.058	0.010	0.044	0.014	137.8	36.2	8.92
03/02/2011	C	0.081	0.036	0.045	0.030	0.006	9.4	49.4	8.66
03/16/2011	A	0.270	0.044	0.226	0.042	0.002	27.6	35.7	8.39
03/16/2011	B	0.112	0.022	0.090	0.015	0.007	7.8	34.7	8.58
03/16/2011	C	0.091	0.013	0.078	0.006	0.007	1.4	32.5	8.80
03/30/2011	A	0.048	0.027	0.021	0.015	0.012	11.3	41.1	7.09
03/30/2011	B	0.040	0.019	0.021	0.012	0.008	8.0	41.4	8.17
03/30/2011	C	0.034	0.021	0.013	0.013	0.008	8.0	42.4	7.97
04/13/2011	A	0.092	0.062	0.030	0.056	0.007	13.2	40.5	8.49
04/13/2011	B	0.073	0.045	0.028	0.039	0.006	9.9	66.9	8.48
04/13/2011	C	0.031	0.013	0.018	0.009	0.004	9.5	62.2	8.49
04/25/2011	A	0.067	0.047	0.020	0.046	0.001	6.9	38.3	8.48
04/25/2011	B	0.035	0.023	0.012	0.017	0.006	2.9	36.4	8.61
04/25/2011	C	0.021	0.013	0.008	0.004	0.009	4.3	28.8	8.77
05/04/2011	A	0.067	0.048	0.019	0.040	0.009	3.1	53.3	8.62
05/04/2011	B	0.034	0.033	0.001	0.013	0.020	3.1	50.3	8.59
05/04/2011	C	0.011	0.058	#	0.004	0.054	5.7	43.9	8.68
05/19/2011	A	0.064	0.048	0.016	0.040	0.008	7.0	52.0	8.24
05/19/2011	B	0.055	0.033	0.022	0.024	0.009	8.6	55.5	8.50
05/19/2011	C	0.020	0.011	0.009	0.005	0.007	6.7	56.4	8.32
06/07/2011	A	0.047	0.033	0.014	0.026	0.007	10.3	54.4	8.14
06/07/2011	B	0.013	0.007	0.006	0.004	0.003	13.7	50.3	8.05
06/07/2011	C	0.014	0.003	0.011	0.000	0.003	13.0	40.9	8.41
06/22/2011	A	0.032	0.024	0.008	0.011	0.013	9.7	50.2	8.68
06/22/2011	B	0.015	0.005	0.010	0.003	0.002	2.1	50.9	8.42
06/22/2011	C	0.013	0.013	0.000	0.002	0.011	0.7	40.8	8.58

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
08/17/2011	A	0.040	0.021	0.019	0.010	0.011	3.9	77.9	7.74
08/17/2011	B	0.026	0.014	0.012	0.005	0.009	5.9	73.4	7.72
08/17/2011	C	0.026	0.010	0.016	0.004	0.007	5.3	71.0	7.76
12/06/2011	A	0.077	0.043	0.034	0.043	0.000	7.0	52.4	7.99
12/06/2011	B	0.035	0.013	0.022	0.006	0.008	10.0	51.7	8.33
12/06/2011	C	0.017	0.011	0.006	0.006	0.005	12.3	75.6	8.38
12/20/2011	A	0.074	0.057	0.017	0.000	0.057	5.5	59.8	8.13
12/20/2011	B	0.042	0.028	0.014	0.016	0.012	6.8	54.9	8.58
12/20/2011	C	0.021	0.018	0.003	0.004	0.015	4.8	54.8	8.50
01/11/2012	A	0.023	0.015	0.008	0.006	0.009	4.7	63.4	8.11
01/11/2012	B	0.032	0.017	0.015	0.011	0.006	4.2	62.5	8.09
01/11/2012	C	0.049	0.031	0.018	0.027	0.004	3.3	74.3	8.46
01/25/2012	A	0.073	0.040	0.033	0.036	0.004	7.3	54.9	8.04
01/25/2012	B	0.045	0.019	0.026	0.018	0.001	5.3	51.8	8.27
01/25/2012	C	0.020	0.006	0.014	0.005	0.001	4.6	53.7	8.40
02/08/2012	A	0.091	0.057	0.034	0.057	#	7.8	65.3	7.68
02/08/2012	B	0.073	0.045	0.028	0.045	#	8.0	57.2	7.84
02/08/2012	C	0.028	0.016	0.012	0.011	0.006	7.1	57.0	8.00
02/27/2012	A	0.064	0.043	0.021	0.038	0.005	6.0	52.4	7.89
02/27/2012	B	0.032	0.020	0.012	0.007	0.013	4.9	66.2	8.40
02/27/2012	C	0.026	0.015	0.011	0.004	0.011	4.8	58.1	8.32
03/12/2012	A	0.078	0.053	0.025	0.049	0.004	8.5	75.3	7.63
03/12/2012	B	0.076	0.057	0.019	0.052	0.005	7.7	79.5	7.61
03/12/2012	C	0.046	0.031	0.015	0.025	0.006	6.2	71.1	7.67
03/28/2012	A	0.084	0.044	0.040	0.047	#	5.7	53.7	7.89
03/28/2012	B	0.029	0.021	0.008	0.011	0.010	4.3	51.4	8.33
03/28/2012	C	0.021	0.008	0.013	0.004	0.004	4.8	64.5	8.46
04/09/2012	A	0.087	0.052	0.035	0.051	0.001	9.8	53.5	7.84
04/09/2012	B	0.043	0.023	0.020	0.021	0.002	5.5	52.3	8.13
04/09/2012	C	0.018	0.008	0.010	0.003	0.005	4.1	49.7	8.55
04/23/2012	A	0.076	0.049	0.027	0.042	0.007	8.6	64.7	7.95
04/23/2012	B	0.027	0.014	0.013	0.006	0.008	5.6	46.2	8.20
04/23/2012	C	0.014	0.009	0.005	0.002	0.007	4.5	39.3	8.58
05/07/2012	A	0.019	-0.007	0.026	0.003	#	6.8	nd	8.29
05/07/2012	B	0.051	0.007	0.044	0.019	#	5.2	nd	7.95
05/07/2012	C	0.051	0.019	0.032	0.019	#	13.8	nd	7.82
08/16/2012	A	0.054	0.034	0.020	0.030	0.004	6.4	77.9	7.61
08/16/2012	B	0.027	0.009	0.018	0.006	0.003	3.8	74.2	7.62
08/16/2012	C	0.012	0.006	0.006	0.005	0.001	5.8	71.1	7.99
11/15/2012	A	0.133	0.073	0.060	0.068	0.005	10.0	44.2	7.91
11/15/2012	B	0.028	0.017	0.011	0.005	0.012	12.0	48.4	8.19
11/15/2012	C	0.019	0.015	0.004	0.003	0.012	12.0	90.4	8.15
11/29/2012	A	0.119	0.056	0.063	0.052	0.004	12.6	51.0	7.90
11/29/2012	B	0.053	0.018	0.035	0.012	0.007	5.6	51.9	8.09
11/29/2012	C	0.018	0.010	0.008	0.002	0.008	7.0	51.6	8.14
01/09/2013	A	0.065	0.037	0.028	0.028	0.009	7.2	49.9	7.75
01/09/2013	B	0.039	0.014	0.025	0.008	0.006	4.6	49.9	8.03
01/09/2013	C	0.030	0.012	0.018	0.003	0.009	5.6	50.4	8.20
01/23/2013	A	0.069	0.044	0.025	0.036	0.008	5.8	52.1	7.80
01/23/2013	B	0.036	0.012	0.024	0.009	0.004	3.4	54.8	8.21
01/23/2013	C	0.020	0.013	0.007	0.003	0.010	3.8	57.3	8.28
02/06/2013	A	0.047	0.027	0.020	0.019	0.008	43.8	58.4	8.29
02/06/2013	B	0.021	0.009	0.012	0.002	0.007	5.8	48.6	8.77

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
02/06/2013	C	0.021	0.010	0.011	0.002	0.008	8.0	48.7	8.67
03/06/2013	A	0.027	0.027	0.000	0.005	0.022	6.4	108.9	8.30
03/06/2013	B	0.050	0.010	0.040	0.008	0.002	9.4	86.9	8.44
03/06/2013	C	0.004	bdl	0.005	0.000	#	5.2	85.4	8.39
04/03/2013	A	0.103	0.047	0.056	0.039	0.008	8.2	49.3	7.88
04/03/2013	B	0.117	0.021	0.096	0.005	0.016	58.2	54.1	8.28
04/03/2013	C	0.029	0.019	0.010	0.004	0.015	9.0	88.0	8.18
04/17/2013	A	0.062	0.025	0.037	0.008	0.017	4.0	51.5	7.84
04/17/2013	B	0.027	0.010	0.017	0.005	0.005	1.8	74.4	7.49
04/17/2013	C	0.025	0.013	0.012	0.005	0.008	2.4	85.5	7.42
08/21/2013	A	0.192	0.107	0.085	0.074	0.033	5.6	nd	7.78
08/21/2013	B	0.136	0.053	0.083	0.034	0.019	3.8	nd	7.89
08/21/2013	C	0.048	0.018	0.030	0.003	0.015	6.0	nd	8.15
08/21/2013	D	0.145	0.053	0.092	0.027	0.026	9.8	nd	8.08
08/21/2013	E	0.068	0.018	0.050	0.004	0.014	144.8	nd	7.81
08/21/2013	F	0.042	0.019	0.023	0.004	0.016	11.6	nd	7.74
10/29/2013	A	0.077	0.058	0.019	0.053	0.005	7.6	39.1	7.80
10/29/2013	B	0.061	0.039	0.022	0.031	0.008	14.0	40.1	7.99
10/29/2013	C	0.033	0.018	0.015	0.006	0.012	2.6	54.0	8.33
11/13/2013	A	0.108	0.081	0.027	0.059	0.022	14.2	44.8	7.91
11/13/2013	B	0.083	0.059	0.024	0.035	0.025	6.0	50.9	8.03
11/13/2013	C	0.075	0.044	0.031	0.018	0.026	4.0	45.7	8.20
12/11/2013	A	0.081	0.051	0.030	0.047	0.004	3.2	44.3	7.68
12/11/2013	B	0.035	0.025	0.010	0.018	0.007	8.0	46.4	7.97
12/11/2013	C	0.032	0.021	0.011	0.009	0.012	6.4	59.7	8.25
12/26/2013	A	0.084	0.052	0.032	0.048	0.004	9.6	43.3	nd
12/26/2013	B	0.052	0.032	0.020	0.031	0.002	4.0	44.3	nd
12/26/2013	C	0.030	0.016	0.014	0.010	0.006	4.2	44.9	nd
01/8/2014	A	0.146	0.073	0.073	0.076	#	6.4	47.5	7.84
01/8/2014	B	0.077	0.047	0.030	0.048	#	6.0	45.6	7.96
01/8/2014	C	0.018	0.009	0.009	0.008	0.002	6.8	48.1	8.43
01/22/2014	A	0.116	0.041	0.075	0.048	#	11.8	47.2	7.99
01/22/2014	B	0.061	0.045	0.016	0.034	0.012	10.4	62.5	8.22
01/22/2014	C	0.028	0.024	0.004	0.010	0.014	7.6	56.8	8.50
04/2/2014	A	0.040	0.017	0.023	0.008	0.009	16.8	94.0	7.86
04/2/2014	B	0.024	0.011	0.013	0.003	0.008	4.0	65.6	8.10
04/2/2014	C	0.016	0.013	0.003	0.002	0.011	3.2	39.3	8.57
04/14/2014	A	0.143	0.062	0.081	0.058	0.004	9.0	42.5	8.01
04/14/2014	B	0.031	0.010	0.021	0.007	0.003	10.8	44.7	7.95
04/14/2014	C	0.015	0.006	0.009	0.002	0.004	13.2	44.1	8.45
04/30/2014	A	0.120	0.078	0.042	0.072	0.006	8.2	44.5	7.59
04/30/2014	B	0.132	0.039	0.093	0.032	0.007	8.2	41.6	8.14
04/30/2014	C	0.016	0.008	0.008	0.003	0.005	3.8	60.1	8.27
5/14/2014	A	0.145	0.095	0.050	0.077	0.018	9.20	43.63	7.47
5/14/2014	B	0.060	0.045	0.015	0.030	0.015	5.20	41.97	7.78
5/14/2014	C	0.049	0.011	0.038	0.002	0.009	7.20	39.46	8.54
5/28/2014	A	0.108	0.079	0.029	0.062	0.017	11.40	44.46	7.64
5/28/2014	B	0.089	0.092	#	0.044	0.048	8.00	44.67	7.70
5/28/2014	C	0.028	0.025	0.003	0.005	0.020	7.80	34.41	8.48
6/11/2014	A	0.089	0.028	0.061	0.024	0.004	19.80	47.06	8.04
6/11/2014	B	0.082	0.034	0.048	0.029	0.005	14.80	48.99	7.74
6/11/2014	C	0.029	0.014	0.015	0.006	0.008	6.00	48.61	7.82
12/11/2014	A	0.115	0.059	0.056	0.047	0.012	11.80	43.78	7.87

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
12/11/2014	B	0.055	0.027	0.028	0.020	0.007	13.80	45.90	8.23
12/11/2014	C	0.012	0.010	0.002	0.008	0.002	10.20	65.56	8.29
1/14/2015	A	0.075	0.039	0.036	0.043	#	8.60	55.98	8.10
1/14/2015	B	0.064	0.031	0.033	0.033	#	7.20	53.60	8.10
1/14/2015	C	0.026	0.011	0.015	0.010	0.001	8.80	47.47	8.18
1/28/2015	A	0.204	0.052	0.152	0.054	#	40.20	38.87	7.90
1/28/2015	B	0.174	0.049	0.125	0.049	#	34.00	39.59	8.15
1/28/2015	C	0.096	0.048	0.048	0.042	0.006	10.40	42.05	8.01
2/25/2015	A	0.120	0.055	0.065	0.045	0.010	28.40	43.18	8.21
2/25/2015	B	0.084	0.026	0.058	0.017	0.009	22.20	46.67	7.99
2/25/2015	C	0.052	0.034	0.018	0.005	0.029	17.60	51.89	8.67
3/18/2015	A	0.107	0.057	0.050	0.048	0.009	20.60	43.85	7.73
3/18/2015	B	0.072	0.024	0.048	0.018	0.006	19.20	42.06	7.43
3/18/2015	C	0.023	0.014	0.009	0.008	0.007	6.40	48.52	8.18

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 11. Detailed water quality parameters of grab canal water samples collected from Farm 1813 from November 2010 through April 2015.

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
11/9/2010	A	nd	nd	nd	0.021	nd	6.0	82.8	nd
11/9/2010	B	nd	nd	nd	0.016	nd	6.6	80.9	nd
11/9/2010	C	nd	nd	nd	0.016	nd	4.3	85.3	nd
11/23/2010	A	0.070	0.049	0.021	0.043	0.007	16.8	33.8	8.12
11/23/2010	B	0.065	0.033	0.032	0.028	0.006	13.3	42.8	8.05
11/23/2010	C	0.047	0.016	0.031	0.010	0.006	9.3	61.5	8.32
01/04/2011	A	0.039	0.017	0.022	0.010	0.007	15.0	77.2	7.88
01/04/2011	B	0.063	0.015	0.048	0.010	0.005	16.0	74.8	8.16
01/04/2011	C	0.043	0.020	0.023	0.018	0.002	13.6	75.6	7.76
01/19/2011	A	0.068	0.035	0.033	0.031	0.005	4.4	90.6	7.79
01/19/2011	B	0.064	0.022	0.042	0.016	0.006	5.0	87.0	7.91
01/19/2011	C	0.067	0.016	0.051	0.009	0.007	9.6	84.8	8.05
02/02/2011	A	0.108	0.060	0.048	0.104	#	5.8	86.3	8.03
02/02/2011	B	0.106	0.040	0.066	0.032	0.008	10.4	81.2	8.25
02/02/2011	C	0.141	0.073	0.068	0.061	0.012	11.0	79.2	8.21
02/10/2011	A	0.154	0.118	0.036	0.110	0.008	3.4	82.5	8.04
02/10/2011	B	0.126	0.041	0.085	0.033	0.008	9.8	87.4	8.28
02/10/2011	C	0.092	0.082	0.010	0.010	0.072	7.8	87.6	8.33
02/23/2011	A	0.132	0.066	0.066	0.104	#	7.0	83.8	8.59
02/23/2011	B	0.113	0.061	0.052	0.048	0.013	5.0	80.6	8.57
02/23/2011	C	0.091	0.033	0.058	0.017	0.016	12.4	81.8	8.65
03/02/2011	A	0.101	0.071	0.030	0.048	0.023	6.4	59.6	8.48
03/02/2011	B	0.109	0.057	0.052	0.052	0.005	14.0	62.1	8.50
03/02/2011	C	0.088	0.028	0.060	0.009	0.019	18.2	68.2	8.54
03/16/2011	A	0.060	0.018	0.042	0.051	#	9.6	44.8	8.51
03/16/2011	B	0.073	0.017	0.056	0.005	0.012	17.8	44.5	8.55
03/16/2011	C	0.057	0.021	0.036	0.004	0.018	7.2	53.9	8.59
03/30/2011	A	0.076	0.021	0.055	0.021	0.000	24.8	52.3	8.08
03/30/2011	B	0.072	0.016	0.056	0.004	0.012	22.2	53.2	7.97
03/30/2011	C	0.114	0.051	0.063	0.036	0.015	22.0	57.4	7.99
04/13/2011	A	0.040	0.013	0.027	0.009	0.004	9.2	77.1	8.36
04/13/2011	B	0.044	0.013	0.031	0.005	0.008	10.6	75.2	8.36
04/13/2011	C	0.034	0.016	0.018	0.003	0.013	9.3	67.9	8.38
04/25/2011	A	0.042	0.019	0.023	0.032	#	6.3	39.4	8.73
04/25/2011	B	0.044	0.017	0.027	0.055	#	8.0	40.0	8.73
04/25/2011	C	0.040	0.017	0.023	0.005	0.012	5.0	43.9	8.50
05/04/2011	A	0.069	0.029	0.040	0.021	0.008	7.7	57.0	8.66
05/04/2011	B	0.095	0.035	0.060	0.053	#	9.7	54.9	8.79
05/04/2011	C	0.048	0.013	0.035	0.005	0.008	3.6	56.3	8.66
05/19/2011	A	0.046	0.013	0.033	0.003	0.010	6.2	59.5	8.76
05/19/2011	B	0.042	0.011	0.031	0.052	#	8.0	57.5	8.75
05/19/2011	C	0.045	0.014	0.031	0.006	0.009	6.8	70.8	8.46
06/07/2011	A	0.048	0.017	0.031	0.006	0.011	7.7	54.2	8.57
06/07/2011	B	0.041	0.015	0.026	0.014	0.002	10.7	55.3	8.47
06/07/2011	C	0.028	0.010	0.018	0.000	0.010	4.9	59.3	8.49
06/23/2011	A	0.231	0.149	0.082	0.013	0.136	7.2	54.7	8.23
06/23/2011	B	0.226	0.154	0.072	0.016	0.138	7.3	54.9	8.20
06/23/2011	C	0.208	0.161	0.047	0.001	0.160	3.9	57.3	8.32
08/17/2011	A	0.048	0.017	0.031	0.005	0.012	11.2	86.9	7.82
08/17/2011	B	0.040	0.011	0.029	0.007	0.005	19.9	88.2	7.90

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
08/17/2011	C	0.041	0.017	0.024	0.005	0.012	17.5	96.6	7.87
12/06/2011	A	0.081	0.033	0.048	0.024	0.009	11.9	98.5	8.00
12/06/2011	B	0.086	0.035	0.051	0.021	0.014	6.5	101.5	8.20
12/06/2011	C	0.069	0.027	0.042	0.009	0.018	12.0	111.8	8.28
12/20/2011	A	0.111	0.060	0.051	0.063	#	10.5	98.5	7.52
12/20/2011	B	0.147	0.068	0.079	0.055	0.013	13.3	115.3	7.76
12/20/2011	C	0.154	0.091	0.063	0.080	0.011	18.2	118.5	7.60
01/11/2012	A	0.060	0.012	0.048	0.011	0.001	32.6	110.2	7.98
01/11/2012	B	0.089	0.014	0.075	0.012	0.003	29.0	114.7	8.03
01/11/2012	C	0.079	0.019	0.060	0.009	0.010	5.1	128.0	8.21
01/25/2012	A	0.069	0.021	0.048	0.033	#	7.1	56.5	7.89
01/25/2012	B	0.069	0.027	0.042	0.033	#	3.1	55.8	7.86
01/25/2012	C	0.072	0.010	0.062	0.009	0.001	8.2	76.8	7.99
02/08/2012	A	0.069	0.038	0.031	0.036	0.002	8.0	84.0	7.83
02/08/2012	B	0.073	0.044	0.029	0.041	0.003	9.6	62.0	7.78
02/08/2012	C	0.068	0.021	0.047	0.012	0.009	19.3	60.8	7.91
02/27/2012	A	0.052	0.024	0.028	0.019	0.005	7.1	69.3	8.24
02/27/2012	B	0.043	0.015	0.028	0.005	0.010	5.7	74.7	8.36
02/27/2012	C	0.038	0.016	0.022	0.003	0.014	6.8	72.6	8.34
03/12/2012	A	0.242	0.013	0.229	0.004	0.009	4.5	66.9	8.74
03/12/2012	B	0.058	0.015	0.043	0.005	0.010	4.0	67.6	8.50
03/12/2012	C	0.039	0.014	0.025	0.003	0.011	4.9	69.8	8.16
03/28/2012	A	0.081	0.035	0.046	0.033	0.002	9.8	53.8	8.13
03/28/2012	B	0.071	0.031	0.040	0.031	0.000	9.5	55.2	8.12
03/28/2012	C	0.051	0.014	0.037	0.004	0.010	7.1	81.7	8.33
04/09/2012	A	0.112	0.052	0.060	0.054	#	16.1	52.2	7.95
04/09/2012	B	0.101	0.044	0.057	0.047	#	14.2	52.4	8.01
04/09/2012	C	0.056	0.019	0.037	0.012	0.007	10.7	56.9	8.15
04/23/2012	A	0.064	0.021	0.043	0.019	0.002	11.8	46.8	8.19
04/23/2012	B	0.059	0.019	0.040	0.014	0.005	9.5	46.7	8.21
04/23/2012	C	0.044	0.014	0.030	0.003	0.011	8.1	51.4	8.27
05/07/2012	A	0.033	0.008	0.025	0.006	0.002	6.9	nd	8.07
05/07/2012	B	0.042	0.012	0.030	0.006	0.006	5.9	nd	8.06
05/07/2012	C	0.038	0.007	0.031	0.003	0.004	8.0	nd	8.11
08/16/2012	A	0.038	0.016	0.022	0.008	0.008	3.4	109.0	7.99
08/16/2012	B	0.041	0.019	0.022	0.008	0.011	5.0	108.2	7.95
08/16/2012	C	0.035	0.016	0.019	0.007	0.009	5.2	105.0	8.09
11/15/2012	A	0.053	0.022	0.031	0.005	0.017	6.8	128.7	8.07
11/15/2012	B	0.053	0.019	0.034	0.005	0.014	6.6	129.9	8.08
11/15/2012	C	0.041	0.018	0.023	0.004	0.014	8.6	131.8	8.13
11/29/2012	A	0.079	0.024	0.055	0.019	0.005	10.8	75.7	7.87
11/29/2012	B	0.063	0.016	0.047	0.011	0.005	10.8	83.3	7.95
11/29/2012	C	0.042	0.012	0.030	0.003	0.009	8.0	113.4	8.14
01/09/2013	A	0.042	0.022	0.020	0.013	0.009	5.6	82.0	7.89
01/09/2013	B	0.048	0.025	0.023	0.012	0.013	4.4	83.8	7.90
01/09/2013	C	0.053	0.018	0.035	0.007	0.012	2.6	94.0	8.00
01/23/2013	A	0.047	0.028	0.019	0.012	0.016	5.8	80.3	7.96
01/23/2013	B	0.048	0.027	0.021	0.011	0.016	4.4	80.8	8.00
01/23/2013	C	0.039	0.021	0.018	0.003	0.018	11.4	86.9	8.04
02/06/2013	A	0.040	0.011	0.029	0.004	0.007	7.6	61.8	8.05
02/06/2013	B	0.034	0.011	0.023	0.003	0.008	6.8	64.2	8.19
02/06/2013	C	0.031	0.011	0.020	0.002	0.009	6.2	76.8	8.12
03/06/2013	A	0.069	0.006	0.063	0.007	#	6.0	115.6	8.24

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/06/2013	B	0.102	0.011	0.091	0.008	0.003	12.0	115.5	8.31
03/06/2013	C	0.077	0.020	0.057	0.008	0.012	9.8	114.4	8.32
04/03/2013	A	0.053	0.019	0.034	0.003	0.016	15.6	116.7	8.01
04/03/2013	B	0.048	0.012	0.036	0.003	0.009	7.8	115.5	8.01
04/03/2013	C	0.051	0.010	0.041	0.003	0.007	27.6	119.0	8.16
8/21/2013	A	0.054	0.018	0.036	0.005	0.013	4.6	nd	7.87
8/21/2013	B	0.052	0.020	0.032	0.007	0.013	12.4	nd	7.80
8/21/2013	C	0.054	0.020	0.034	0.004	0.016	8.6	nd	8.16
10/29/2013	A	0.048	0.015	0.033	0.009	0.006	16.0	84.4	8.04
10/29/2013	B	0.037	0.013	0.024	0.010	0.003	4.6	101.1	8.09
10/29/2013	C	0.045	0.013	0.032	0.008	0.005	5.6	101.9	8.22
12/11/2013	A	0.061	0.043	0.018	0.030	0.013	6.2	87.5	7.57
12/11/2013	B	0.054	0.029	0.025	0.018	0.011	7.4	87.9	7.53
12/11/2013	C	0.071	0.032	0.039	0.016	0.016	10.6	84.1	7.66
12/26/2013	A	0.048	0.022	0.026	0.018	0.004	3.2	72.2	nd
12/26/2013	B	0.059	0.031	0.028	0.027	0.004	14.8	65.9	nd
12/26/2013	C	0.065	0.028	0.037	0.023	0.005	7.0	65.2	nd
01/8/2014	A	0.046	0.024	0.022	0.024	0.000	11.4	80.7	7.72
01/8/2014	B	0.036	0.023	0.013	0.017	0.006	6.0	72.8	7.99
01/8/2014	C	0.050	0.010	0.040	0.006	0.004	8.8	73.4	8.10
01/22/2014	A	0.040	0.029	0.011	0.012	0.017	6.8	93.0	7.81
01/22/2014	B	0.031	0.021	0.010	0.007	0.014	8.6	99.3	7.91
01/22/2014	C	0.047	0.019	0.028	0.006	0.013	6.6	90.6	8.28
04/2/2014	A	0.060	0.022	0.038	0.006	0.016	7.8	92.1	7.90
04/2/2014	B	0.054	0.024	0.030	0.006	0.018	7.0	89.2	7.89
04/2/2014	C	0.070	0.034	0.036	0.007	0.027	10.0	76.7	8.09
04/14/2014	A	0.072	0.027	0.045	0.008	0.019	8.4	65.7	8.00
04/14/2014	B	0.058	0.026	0.032	0.006	0.020	7.8	68.6	7.87
04/14/2014	C	0.055	0.022	0.033	0.004	0.018	8.4	66.4	8.05
04/30/2014	A	0.059	0.018	0.041	0.008	0.010	10.4	56.0	7.96
04/30/2014	B	0.061	0.019	0.042	0.004	0.015	6.2	58.5	7.83
04/30/2014	C	0.055	0.015	0.040	0.001	0.014	13.8	61.4	8.15
5/14/2014	A	0.048	0.019	0.029	0.004	0.015	9.00	75.24	7.95
5/14/2014	B	0.043	0.034	0.009	0.004	0.030	10.00	72.49	7.78
5/14/2014	C	0.046	0.016	0.030	0.001	0.015	8.40	70.33	8.08
5/28/2014	B	0.055	0.015	0.040	0.008	0.007	10.60	70.51	7.78
5/28/2014	C	0.065	0.012	0.053	0.004	0.008	16.60	65.86	8.22
6/11/2014	A	0.048	0.015	0.033	0.007	0.008	9.00	78.70	7.90
6/11/2014	B	0.041	0.011	0.030	0.006	0.005	7.80	80.33	7.90
6/11/2014	C	0.035	0.009	0.026	0.004	0.005	5.80	87.63	8.03
12/11/2014	A	0.048	0.010	0.038	0.006	0.004	12.00	91.81	7.68
12/11/2014	B	0.062	0.013	0.049	0.005	0.008	11.60	84.83	7.85
12/11/2014	C	0.054	0.013	0.041	0.003	0.010	10.60	75.54	7.99
1/14/2015	A	0.055	0.009	0.046	0.009	#	17.60	66.63	7.82
1/14/2015	B	0.057	0.010	0.047	0.008	0.002	12.80	60.90	7.85
1/14/2015	C	0.059	0.014	0.045	0.006	0.008	14.40	57.52	7.97
1/28/2015	A	0.062	0.021	0.041	0.013	0.008	26.20	56.79	7.83
1/28/2015	B	0.093	0.032	0.061	0.024	0.008	16.20	47.85	7.78
1/28/2015	C	0.114	0.040	0.074	0.035	0.005	24.80	46.04	7.76
2/25/2015	A	0.079	0.022	0.057	0.005	0.017	17.20	67.59	8.19
2/25/2015	B	0.071	0.024	0.047	0.003	0.021	12.60	67.60	8.25
2/25/2015	C	0.082	0.041	0.041	0.002	0.039	9.80	67.71	8.01
3/18/2015	A	0.081	0.023	0.058	0.009	0.014	15.20	57.01	7.56

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
3/18/2015	B	0.087	0.026	0.061	0.013	0.013	17.40	55.42	7.53
3/18/2015	C	0.072	0.045	0.027	0.036	0.009	9.80	44.58	7.56

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 12. Detailed water quality parameters of grab canal water samples collected from Farm 6117 from November 2010 through April 2015.

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
11/9/2010	A	nd	nd	nd	0.060	nd	0.5	73.7	nd
11/9/2010	B	nd	nd	nd	0.034	nd	7.4	70.6	nd
11/9/2010	C	nd	nd	nd	0.016	nd	6.9	78.4	nd
11/23/2010	A	0.078	0.046	0.032	0.037	0.010	10.8	78.8	7.96
11/23/2010	B	0.075	0.032	0.043	0.034	#	9.9	79.9	8.21
11/23/2010	C	0.124	0.098	0.026	0.047	0.051	5.2	76.7	7.96
01/04/2011	A	0.258	0.160	0.098	0.078	0.083	12.6	83.7	7.65
01/04/2011	B	0.235	0.154	0.081	0.106	0.048	11.8	90.1	7.63
01/04/2011	C	0.193	0.138	0.055	0.121	0.017	18.4	114.9	7.73
01/19/2011	A	0.120	0.102	0.018	0.095	0.007	4.4	71.0	7.65
01/19/2011	B	0.113	0.089	0.024	0.102	#	15.6	71.2	7.59
01/19/2011	C	0.084	0.054	0.030	0.035	0.019	4.0	83.5	8.07
02/02/2011	A	0.092	0.081	0.011	0.051	0.030	9.8	71.2	7.98
02/02/2011	B	0.117	0.064	0.053	0.102	#	10.2	73.2	7.86
02/02/2011	C	0.078	0.037	0.041	0.014	0.024	4.8	77.0	8.25
02/10/2011	A	0.088	0.061	0.027	0.051	0.010	7.6	73.5	7.59
02/10/2011	B	0.092	0.047	0.045	0.034	0.013	10.2	73.9	7.79
02/10/2011	C	0.088	0.023	0.065	0.005	0.018	12.0	77.4	8.13
02/23/2011	A	0.097	0.052	0.045	0.045	0.007	11.6	67.4	7.73
02/23/2011	B	0.213	0.046	0.167	0.041	0.005	12.4	71.2	7.66
02/23/2011	C	0.134	0.022	0.112	0.009	0.013	36.4	73.0	8.19
03/02/2011	A	0.161	0.060	0.101	0.039	0.021	6.6	59.2	7.39
03/02/2011	B	0.082	0.055	0.027	0.033	0.022	9.2	62.0	7.64
03/02/2011	C	0.127	0.041	0.086	0.010	0.031	44.4	66.6	7.96
03/16/2011	A	0.095	0.056	0.039	0.046	0.010	6.2	38.6	7.90
03/16/2011	B	0.094	0.052	0.042	0.037	0.016	2.2	35.2	7.88
03/16/2011	C	0.074	0.027	0.047	0.012	0.015	15.4	33.7	8.21
03/30/2011	A	0.084	0.035	0.049	0.024	0.011	19.2	51.9	7.49
03/30/2011	B	0.090	0.026	0.064	0.012	0.014	20.4	49.5	7.72
03/30/2011	C	0.085	0.028	0.057	0.013	0.015	10.4	46.4	7.71
04/13/2011	A	0.081	0.056	0.025	0.043	0.013	8.5	62.5	7.74
04/13/2011	B	0.117	0.071	0.046	0.050	0.021	7.7	62.5	7.75
04/13/2011	C	0.074	0.025	0.049	0.005	0.020	8.2	63.5	7.50
04/25/2011	A	0.072	0.048	0.024	0.036	0.012	7.9	39.2	7.84
04/25/2011	B	0.065	0.033	0.032	0.020	0.013	10.6	36.8	8.24
04/25/2011	C	0.073	0.023	0.050	0.005	0.018	21.9	50.6	8.33
05/04/2011	A	0.098	0.030	0.068	0.026	0.004	7.2	55.1	7.89
05/04/2011	B	0.054	0.027	0.027	0.018	0.009	5.7	58.0	8.25
05/04/2011	C	0.054	0.014	0.040	0.005	0.009	12.4	64.7	8.26
05/19/2011	A	0.073	0.022	0.051	0.006	0.016	12.3	77.3	8.37
05/19/2011	B	0.095	0.032	0.063	0.015	0.017	15.1	70.9	7.48
05/19/2011	C	0.058	0.018	0.040	0.005	0.014	11.3	71.2	7.95
06/07/2011	A	0.076	0.025	0.051	0.009	0.016	13.2	82.5	7.87
06/07/2011	B	0.061	0.020	0.041	0.004	0.016	12.0	82.2	8.16
06/07/2011	C	0.101	0.024	0.077	0.004	0.020	23.4	83.2	8.15
06/22/2011	A	0.081	0.033	0.048	nd	nd	8.7	67.5	7.78
06/22/2011	B	0.083	0.291	#	nd	nd	13.7	65.9	7.98
06/22/2011	C	0.066	0.145	#	nd	nd	10.7	58.7	8.28
08/18/2011	A	0.107	0.026	0.081	0.007	0.019	7.1	102.5	7.20
08/18/2011	B	0.100	0.022	0.078	0.008	0.014	16.3	96.1	7.37

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
08/18/2011	C	0.087	0.024	0.063	0.006	0.018	16.3	96.1	7.41
12/06/2011	A	0.096	0.073	0.023	0.062	0.011	9.8	99.2	7.59
12/06/2011	B	0.074	0.037	0.037	0.024	0.013	11.5	99.0	8.00
12/06/2011	C	0.090	0.040	0.050	0.012	0.028	14.8	110.8	8.26
12/20/2011	A	0.110	0.077	0.033	0.064	0.013	6.4	95.8	7.46
12/20/2011	B	0.108	0.081	0.027	0.072	0.009	8.5	96.3	7.72
12/20/2011	C	0.084	0.031	0.053	0.010	0.022	13.3	96.0	8.10
01/11/2012	A	0.133	0.089	0.044	0.093	#	9.3	101.6	7.51
01/11/2012	B	0.104	0.065	0.039	0.068	#	25.8	102.1	7.71
01/11/2012	C	0.092	0.028	0.064	0.016	0.012	25.5	102.8	7.96
01/25/2012	A	0.070	0.039	0.031	0.042	#	5.2	54.2	7.65
01/25/2012	B	0.066	0.033	0.033	0.038	#	4.5	54.0	7.81
01/25/2012	C	0.057	0.029	0.028	0.023	0.006	8.3	56.4	7.84
02/08/2012	A	0.163	0.138	0.025	0.124	0.014	7.2	83.7	7.36
02/08/2012	B	0.129	0.116	0.013	0.094	0.022	9.4	81.2	7.63
02/08/2012	C	0.087	0.028	0.059	0.007	0.021	16.6	84.5	7.98
02/27/2012	A	0.055	0.038	0.017	0.030	0.008	6.6	74.4	7.81
02/27/2012	B	0.056	0.034	0.022	0.026	0.008	7.2	77.2	7.94
02/27/2012	C	0.045	0.023	0.022	0.012	0.011	14.2	79.5	7.98
03/12/2012	A	0.091	0.031	0.060	0.019	0.012	13.8	72.0	7.73
03/12/2012	B	0.075	0.033	0.042	0.021	0.012	32.2	70.8	7.62
03/12/2012	C	0.090	0.035	0.055	0.022	0.013	27.7	75.0	7.71
03/28/2012	A	0.069	0.041	0.028	0.042	#	4.6	54.9	7.89
03/28/2012	B	0.068	0.041	0.027	0.040	0.001	4.5	53.6	7.85
03/28/2012	C	0.069	0.036	0.033	0.036	0.000	18.3	53.7	7.82
04/09/2012	A	0.060	0.032	0.028	0.030	0.002	9.1	54.1	7.49
04/09/2012	B	0.061	0.036	0.025	0.033	0.003	8.0	57.8	7.62
04/09/2012	C	0.062	0.028	0.034	0.025	0.003	14.8	55.4	7.78
04/23/2012	A	0.039	0.016	0.023	0.011	0.005	6.0	57.9	7.93
04/23/2012	B	0.038	0.014	0.024	0.011	0.003	8.7	53.5	7.66
04/23/2012	C	0.054	0.022	0.032	0.017	0.005	10.6	53.7	7.89
05/07/2012	A	0.043	0.014	0.029	0.008	0.006	8.0	nd	7.32
05/07/2012	B	0.028	0.012	0.016	0.006	0.006	6.2	nd	7.85
05/07/2012	C	0.053	0.009	0.044	0.005	0.004	11.2	nd	7.90
08/16/2012	A	0.057	0.036	0.021	0.014	0.022	12.8	107.9	7.11
08/16/2012	B	0.087	0.044	0.043	0.008	0.036	6.8	103.9	7.29
08/16/2012	C	0.089	0.050	0.039	0.007	0.043	3.2	101.3	7.68
11/15/2012	A	0.206	0.147	0.059	0.121	0.026	6.8	105.9	7.49
11/15/2012	B	0.149	0.063	0.086	0.036	0.027	6.2	104.4	7.87
11/15/2012	C	0.108	0.040	0.068	0.005	0.035	8.4	115.1	8.01
11/29/2012	A	0.153	0.077	0.076	0.079	#	13.8	48.3	7.89
11/29/2012	B	0.147	0.071	0.076	0.069	0.002	15.0	46.5	7.71
11/29/2012	C	0.138	0.065	0.073	0.049	0.016	15.0	48.5	7.79
01/09/2013	A	0.100	0.070	0.030	0.054	0.016	3.8	67.1	7.55
01/09/2013	B	0.100	0.063	0.037	0.049	0.014	4.4	62.4	7.76
01/09/2013	C	0.085	0.020	0.065	0.006	0.014	5.2	63.5	8.07
01/23/2013	A	0.076	0.041	0.035	0.026	0.015	9.6	64.5	7.67
01/23/2013	B	0.065	0.036	0.029	0.021	0.015	8.8	58.1	7.61
01/23/2013	C	0.083	0.021	0.062	0.004	0.017	19.2	72.0	8.10
02/06/2013	A	0.041	0.022	0.019	0.015	0.007	7.4	56.1	7.79
02/06/2013	B	0.043	0.021	0.022	0.014	0.007	10.0	55.6	7.73
02/06/2013	C	0.054	0.010	0.044	0.002	0.008	10.6	58.6	7.99
03/06/2013	A	0.078	0.004	0.074	0.007	#	19.4	88.8	7.96

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/06/2013	B	0.089	0.005	0.084	0.008	#	12.2	90.7	7.98
03/06/2013	C	0.175	0.019	0.156	0.009	0.010	29.6	98.8	8.37
04/03/2013	A	0.082	0.030	0.052	0.005	0.025	9.4	98.0	7.69
04/03/2013	B	0.109	0.024	0.085	0.004	0.020	26.0	103.8	7.98
04/03/2013	C	0.136	0.030	0.106	0.004	0.026	37.6	116.6	8.13
08/21/2013	A	0.142	0.033	0.109	0.008	0.025	20.4	nd	7.52
08/21/2013	B	0.150	0.031	0.119	0.007	0.024	38.2	nd	7.85
08/21/2013	C	0.281	0.052	0.229	0.010	0.042	302.8	nd	7.98
10/29/2013	A	0.111	0.040	0.071	0.020	0.020	4.2	103.8	7.78
10/29/2013	B	0.120	0.027	0.093	0.011	0.016	14.8	106.5	8.06
10/29/2013	C	0.139	0.032	0.107	0.012	0.020	22.4	115.1	8.00
11/13/2013	A	0.233	0.139	0.094	0.111	0.029	9.6	87.2	7.33
12/11/2013	A	0.283	0.188	0.095	0.144	0.044	15.4	124.4	7.87
12/11/2013	B	0.334	0.228	0.106	0.184	0.044	18.0	127.5	7.86
12/11/2013	C	0.195	0.121	0.074	0.076	0.045	18.0	110.2	7.76
12/26/2013	A	0.129	0.091	0.038	0.076	0.015	7.6	88.7	nd
12/26/2013	B	0.104	0.073	0.031	0.062	0.011	12.8	90.1	nd
12/26/2013	C	0.089	0.038	0.051	0.025	0.013	12.2	97.3	nd
01/8/2014	A	0.102	0.071	0.031	0.063	0.008	12.4	89.9	7.66
01/8/2014	B	0.107	0.079	0.028	0.072	0.007	5.0	87.9	7.92
01/8/2014	C	0.210	0.021	0.189	0.009	0.012	11.0	117.4	8.23
01/22/2014	A	0.101	0.076	0.025	0.062	0.014	10.6	91.1	7.78
01/22/2014	B	0.100	0.073	0.027	0.058	0.015	11.0	96.2	8.01
01/22/2014	C	0.097	0.027	0.070	0.001	0.026	17.4	104.7	8.52
04/2/2014	A	0.071	0.033	0.038	0.017	0.016	12.2	92.0	7.73
04/2/2014	B	0.066	0.036	0.030	0.021	0.015	9.4	92.4	7.70
04/2/2014	C	0.082	0.028	0.054	0.007	0.021	17.0	100.6	7.95
04/14/2014	A	0.073	0.030	0.043	0.016	0.014	16.0	81.0	7.79
04/14/2014	B	0.059	0.028	0.031	0.014	0.014	8.8	80.7	7.83
04/14/2014	C	0.079	0.018	0.061	0.008	0.010	20.0	108.6	8.00
04/30/2014	A	0.072	0.019	0.053	0.006	0.013	11.0	82.2	7.57
04/30/2014	B	0.069	0.020	0.049	0.010	0.010	13.8	85.3	7.66
04/30/2014	C	0.052	0.011	0.041	0.004	0.007	13.6	110.0	7.89
5/14/2014	A	0.059	0.023	0.036	0.005	0.018	10.20	96.85	7.69
5/14/2014	B	0.051	0.031	0.020	0.016	0.015	13.40	105.94	7.88
5/14/2014	C	0.055	0.035	0.020	0.022	0.013	17.00	108.75	7.82
5/28/2014	A	0.068	0.036	0.032	0.012	0.024	15.20	83.42	7.76
5/28/2014	B	0.124	0.106	0.018	0.070	0.036	12.40	112.63	7.38
5/28/2014	C	0.114	0.095	0.019	0.062	0.033	11.60	92.17	7.50
6/11/2014	A	0.062	0.017	0.045	0.010	0.007	12.00	94.78	7.59
6/11/2014	B	0.085	0.039	0.046	0.026	0.013	20.40	110.93	7.76
6/11/2014	C	0.079	0.037	0.042	0.025	0.012	8.80	99.07	7.72
12/11/2014	A	0.070	0.044	0.026	0.026	0.019	8.80	105.02	7.54
12/11/2014	B	0.076	0.044	0.032	0.024	0.020	9.00	105.79	7.57
12/11/2014	C	0.044	0.031	0.013	0.013	0.018	8.20	113.23	7.80
1/14/2015	A	0.087	0.044	0.043	0.038	0.006	6.80	91.17	7.44
1/14/2015	B	0.070	0.034	0.036	0.028	0.006	16.60	89.93	7.50
1/14/2015	C	0.051	0.029	0.022	0.016	0.013	13.40	92.67	7.80
1/28/2015	A	0.100	0.057	0.043	0.040	0.017	12.00	82.02	7.59
1/28/2015	B	0.080	0.044	0.036	0.026	0.018	12.80	82.88	7.84
1/28/2015	C	0.040	0.029	0.011	0.010	0.019	7.00	84.65	8.10
2/25/2015	A	0.103	0.046	0.057	0.021	0.025	13.40	82.55	7.57
2/25/2015	B	0.095	0.032	0.063	0.006	0.026	9.20	83.94	8.05

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
2/25/2015	C	0.055	0.028	0.027	0.005	0.023	8.20	82.13	8.20
3/18/2015	A	0.106	0.032	0.074	0.011	0.021	14.80	81.61	7.42
3/18/2015	B	0.111	0.026	0.085	0.007	0.019	20.20	79.37	7.59
3/18/2015	C	0.069	0.033	0.036	0.008	0.025	17.60	93.25	7.54

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 13. Detailed water quality parameters of grab canal water samples collected from Farm 3102 from November 2010 through April 2015.

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
11/9/2010	A	nd	nd	nd	0.060	nd	1.9	68.0	nd
11/9/2010	B	nd	nd	nd	0.038	nd	5.4	57.5	nd
11/9/2010	C	nd	nd	nd	0.040	nd	2.9	58.3	nd
11/23/2010	A	0.036	0.030	0.006	0.023	0.007	8.5	61.4	8.13
11/23/2010	B	0.063	0.055	0.008	0.043	0.013	10.8	55.7	8.40
11/23/2010	C	0.047	0.049	#	0.041	0.008	11.5	72.1	8.41
01/04/2011	A	0.025	0.018	0.007	0.045	#	0.8	40.1	8.06
01/04/2011	B	0.034	0.015	0.019	0.017	#	0.6	38.9	8.16
01/04/2011	C	0.025	0.016	0.009	0.018	#	1.2	40.4	8.14
01/18/2011	A	0.128	0.116	0.012	0.117	#	4.0	72.9	7.57
01/18/2011	B	0.059	0.042	0.017	0.036	0.006	3.8	71.1	8.40
01/18/2011	C	0.053	0.035	0.018	0.031	0.004	5.8	74.0	8.10
02/02/2011	A	0.110	0.097	0.013	0.087	0.010	2.4	69.5	7.62
02/02/2011	B	0.216	0.214	0.002	0.194	0.021	10.6	76.0	7.97
02/02/2011	C	0.118	0.099	0.019	0.085	0.014	18.0	74.8	7.98
02/09/2011	A	0.097	0.087	0.010	0.077	0.011	2.8	70.7	7.99
02/09/2011	B	0.099	0.080	0.019	0.079	0.001	2.4	70.5	8.06
02/09/2011	C	0.106	0.087	0.019	0.086	0.001	4.8	73.7	8.08
02/23/2011	A	0.055	0.046	0.009	0.084	#	2.4	66.1	7.76
02/23/2011	B	0.122	0.099	0.023	0.087	0.012	9.0	74.4	8.17
02/23/2011	C	0.090	0.059	0.031	0.054	0.005	19.8	73.2	8.15
03/02/2011	A	0.050	0.043	0.007	0.029	0.014	2.4	35.5	7.99
03/02/2011	B	0.058	0.046	0.012	0.043	0.003	4.2	37.3	8.05
03/02/2011	C	0.092	0.088	0.004	0.053	0.035	7.2	38.8	8.01
03/16/2011	A	0.297	0.055	0.242	0.044	0.011	3.6	41.9	7.73
03/16/2011	B	0.340	0.059	0.281	0.053	0.006	4.2	40.5	8.22
03/16/2011	C	0.341	0.096	0.245	0.080	0.016	6.0	48.2	7.98
03/30/2011	A	0.127	0.107	0.020	0.096	0.011	7.4	48.6	7.54
03/30/2011	B	0.141	0.120	0.021	0.053	0.068	8.6	43.3	7.64
03/30/2011	C	0.115	0.092	0.023	0.081	0.011	14.0	51.1	7.74
04/13/2011	A	0.058	0.045	0.013	0.105	#	8.2	41.3	7.82
04/13/2011	B	0.053	0.041	0.012	0.030	0.011	9.4	41.5	7.78
04/13/2011	C	0.057	0.040	0.017	0.028	0.012	10.6	42.8	7.73
04/25/2011	A	0.028	0.023	0.005	0.017	0.006	5.4	40.6	7.43
04/25/2011	B	0.041	0.021	0.020	0.031	#	4.9	39.0	8.12
04/25/2011	C	0.044	0.025	0.019	0.014	0.011	4.0	38.2	7.96
05/04/2011	A	0.066	0.060	0.006	0.048	0.013	2.3	57.2	7.83
05/04/2011	B	0.060	0.054	0.006	0.034	0.020	3.7	56.4	7.81
05/04/2011	C	0.120	0.065	0.055	0.045	0.020	8.6	54.1	7.76
05/19/2011	A	0.030	0.019	0.011	0.011	0.008	1.9	53.3	7.41
05/19/2011	B	0.035	0.022	0.013	0.038	#	3.0	52.6	7.75
05/19/2011	C	0.039	0.027	0.012	0.013	0.014	3.4	53.4	7.56
06/07/2011	A	0.245	0.029	0.216	0.015	0.014	110.3	58.8	7.20
06/07/2011	B	0.049	0.024	0.025	0.014	0.010	3.7	54.6	7.59
06/07/2011	C	0.043	0.029	0.014	0.008	0.021	9.7	55.7	7.66
06/22/2011	A	0.157	0.132	0.025	0.107	0.025	4.3	95.5	7.20
06/22/2011	B	0.123	0.093	0.030	0.017	0.077	3.7	101.3	7.45
06/22/2011	C	0.130	0.105	0.025	0.075	0.030	1.7	100.9	7.53
08/17/2011	A	0.319	0.291	0.028	0.269	0.022	3.6	113.4	6.93
08/17/2011	B	0.163	0.141	0.022	0.131	0.010	4.7	132.6	6.98

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
08/17/2011	C	0.199	0.168	0.031	0.149	0.019	4.3	106.5	6.97
12/06/2011	A	0.088	0.080	0.008	0.079	0.001	6.5	118.9	8.00
12/06/2011	B	0.083	0.073	0.010	0.072	0.001	6.5	116.2	8.02
12/06/2011	C	0.075	0.064	0.011	0.063	0.002	5.8	113.2	8.00
12/20/2011	A	0.137	0.116	0.021	0.115	0.001	5.6	121.1	7.59
12/20/2011	B	0.041	0.030	0.011	0.027	0.003	3.4	122.9	7.70
12/20/2011	C	0.069	0.056	0.013	0.058	#	4.8	117.4	7.96
01/11/2012	A	0.081	0.085	#	0.065	0.020	4.2	104.4	7.48
01/11/2012	B	0.049	0.033	0.016	0.032	0.001	6.0	114.2	7.65
01/11/2012	C	0.066	0.045	0.021	0.047	#	6.0	115.0	7.83
01/25/2012	A	0.103	0.092	0.011	0.075	0.017	5.1	99.6	7.72
01/25/2012	B	0.036	0.031	0.005	0.017	0.014	7.8	100.4	7.72
01/25/2012	C	0.052	0.029	0.023	0.030	#	9.5	122.1	7.85
02/08/2012	A	0.124	0.088	0.036	0.080	0.008	8.4	79.3	7.36
02/08/2012	B	0.056	0.041	0.015	0.017	0.024	3.8	81.2	7.23
02/08/2012	C	0.075	0.047	0.028	0.045	0.002	17.0	110.5	7.73
02/27/2012	A	0.142	0.106	0.036	0.087	0.019	6.0	113.7	7.81
02/27/2012	B	0.128	0.047	0.081	0.027	0.020	48.0	86.1	7.42
02/27/2012	C	0.049	0.041	0.008	0.025	0.016	4.9	87.2	7.36
03/12/2012	A	0.131	0.084	0.047	0.063	0.021	27.4	102.6	7.77
03/12/2012	B	0.181	0.023	0.158	0.008	0.015	27.0	84.1	7.14
03/12/2012	C	0.111	0.070	0.041	0.051	0.019	26.3	105.4	7.69
03/28/2012	A	0.065	0.046	0.019	0.045	0.001	3.4	56.9	7.74
03/28/2012	B	0.070	0.048	0.022	0.048	0.000	8.9	55.4	7.75
03/28/2012	C	0.055	0.036	0.019	0.036	#	3.1	57.0	7.59
04/09/2012	A	0.074	0.051	0.023	0.042	0.009	9.4	56.6	7.49
04/09/2012	B	0.030	0.021	0.009	0.013	0.008	5.6	68.4	7.08
04/09/2012	C	0.080	0.050	0.030	0.036	0.014	16.6	65.2	7.59
04/23/2012	A	0.172	0.159	0.013	0.151	0.008	9.2	89.5	7.47
04/23/2012	B	0.249	0.222	0.027	0.215	0.008	9.4	88.6	7.46
04/23/2012	C	0.189	0.176	0.013	0.169	0.007	5.1	91.6	7.71
05/07/2012	A	0.215	0.139	0.076	0.095	0.044	13.5	nd	7.33
05/07/2012	B	0.318	0.252	0.066	0.195	0.057	5.0	nd	7.09
05/07/2012	C	0.067	0.030	0.037	0.029	0.001	6.9	nd	7.49
08/16/2012	A	0.182	0.132	0.050	0.119	0.013	5.6	128.5	7.34
08/16/2012	B	0.166	0.134	0.032	0.127	0.007	6.0	131.5	7.19
08/16/2012	C	0.166	0.135	0.031	0.125	0.010	3.6	131.7	7.22
11/15/2012	A	0.091	0.076	0.015	0.065	0.011	4.6	73.4	7.24
11/15/2012	B	0.103	0.082	0.021	0.071	0.011	4.8	108.5	7.53
11/15/2012	C	0.117	0.074	0.043	0.052	0.022	9.4	125.4	7.92
11/29/2012	A	0.102	0.070	0.032	0.061	0.009	4.4	68.7	7.75
11/29/2012	B	0.103	0.077	0.026	0.066	0.011	5.0	69.3	7.76
11/29/2012	C	0.101	0.068	0.033	0.059	0.009	8.4	73.0	7.77
01/09/2013	A	0.138	0.118	0.020	0.091	0.027	5.6	85.5	7.36
01/09/2013	B	0.150	0.110	0.040	0.087	0.024	10.8	88.9	7.62
01/09/2013	C	0.114	0.086	0.028	0.065	0.021	6.4	94.7	7.80
01/23/2013	A	0.052	0.051	0.001	0.034	0.017	4.0	46.5	7.26
01/23/2013	B	0.061	0.050	0.011	0.034	0.016	6.4	45.7	7.45
01/23/2013	C	0.063	0.051	0.012	0.035	0.016	6.2	45.0	7.56
02/06/2013	A	0.081	0.042	0.039	0.029	0.014	6.2	48.4	7.51
02/06/2013	B	0.068	0.046	0.022	0.031	0.016	5.4	50.5	7.24
02/06/2013	C	0.080	0.062	0.018	0.043	0.020	6.6	69.3	7.58
03/06/2013	A	0.053	0.051	0.002	0.038	0.013	nd	92.9	8.02

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/06/2013	B	0.118	0.053	0.065	0.038	0.016	7.2	92.3	8.04
03/06/2013	C	0.064	0.043	0.021	0.035	0.008	7.8	92.3	8.04
04/03/2013	A	0.085	0.036	0.049	0.012	0.024	8.4	90.0	7.58
04/03/2013	B	0.084	0.045	0.039	0.019	0.026	8.2	98.5	7.86
04/03/2013	C	0.065	0.035	0.030	0.013	0.022	9.4	109.0	7.83
08/21/2013	A	0.091	0.070	0.021	0.055	0.015	3.6	nd	7.77
08/21/2013	B	0.086	0.055	0.031	0.036	0.019	8.4	nd	7.86
08/21/2013	C	0.085	0.046	0.039	0.029	0.017	6.0	nd	7.88
10/29/2013	A	0.042	0.037	0.005	0.028	0.009	2.8	86.6	7.35
10/29/2013	B	0.049	0.025	0.024	0.022	0.003	4.6	129.3	7.67
10/29/2013	C	0.060	0.018	0.042	0.017	0.001	8.8	129.1	7.50
11/13/2013	A	0.094	0.078	0.016	0.049	0.029	0.6	48.2	7.13
11/13/2013	B	0.098	0.070	0.028	0.042	0.028	5.8	47.5	7.40
11/13/2013	C	0.108	0.069	0.039	0.043	0.026	11.4	50.0	7.38
12/11/2013	A	0.096	0.048	0.048	0.037	0.011	14.2	53.3	7.41
12/11/2013	B	0.071	0.055	0.016	0.042	0.013	4.2	53.7	7.60
12/11/2013	C	0.067	0.048	0.019	0.040	0.008	6.2	54.5	7.62
12/26/2013	A	0.062	0.028	0.034	0.022	0.006	7.0	50.8	nd
12/26/2013	B	0.042	0.026	0.016	0.021	0.005	5.2	50.2	nd
12/26/2013	C	0.047	0.028	0.019	0.024	0.005	5.8	51.1	nd
01/8/2014	A	0.042	0.033	0.009	0.029	0.004	5.8	49.8	7.56
01/8/2014	B	0.049	0.036	0.013	0.035	0.001	8.0	64.2	7.69
01/8/2014	C	0.058	0.036	0.022	0.031	0.005	6.6	64.9	7.98
01/22/2014	A	0.090	0.078	0.012	0.071	0.007	6.8	92.8	7.66
01/22/2014	B	0.101	0.082	0.019	0.073	0.009	8.6	91.8	7.72
01/22/2014	C	0.100	0.074	0.026	0.062	0.012	6.2	92.8	7.72
04/2/2014	A	0.070	0.056	0.014	0.043	0.013	7.4	83.5	7.49
04/2/2014	B	0.059	0.025	0.034	0.011	0.014	19.2	112.1	8.04
04/2/2014	C	0.060	0.020	0.040	0.013	0.007	13.2	110.7	7.82
04/14/2014	A	0.077	0.061	0.016	0.051	0.010	7.6	57.5	7.54
04/14/2014	B	0.060	0.036	0.024	0.023	0.013	8.0	66.1	7.79
04/14/2014	C	0.068	0.019	0.049	0.006	0.013	12.8	76.9	8.00
04/30/2014	A	0.089	0.071	0.018	0.064	0.007	4.8	52.5	7.61
04/30/2014	B	0.089	0.072	0.017	0.065	0.007	6.0	55.2	7.60
04/30/2014	C	0.087	0.054	0.033	0.046	0.008	14.6	49.2	7.59
5/14/2014	B	0.063	0.030	0.033	0.024	0.006	6.40	44.41	7.59
5/14/2014	C	0.080	0.034	0.046	0.029	0.005	19.60	44.49	7.66
5/28/2014	A	0.081	0.078	0.003	0.061	0.017	7.60	45.93	7.47
5/28/2014	C	0.085	0.077	0.008	0.058	0.019	15.00	46.44	7.49
6/11/2014	A	0.045	0.029	0.016	0.022	0.007	6.80	59.32	7.23
6/11/2014	B	0.041	0.034	0.007	0.017	0.017	12.00	58.50	7.47
6/11/2014	C	0.060	0.032	0.028	0.025	0.007	9.80	63.67	7.70
12/11/2014	A	0.060	0.036	0.024	0.021	0.015	3.60	53.76	7.35
12/11/2014	B	0.048	0.031	0.017	0.021	0.010	3.00	57.81	7.36
12/11/2014	C	0.097	0.030	0.067	0.018	0.012	2.80	57.64	7.49
1/14/2015	A	0.052	0.029	0.023	0.028	0.001	8.60	49.47	7.13
1/14/2015	B	0.055	0.032	0.023	0.030	0.002	7.80	46.93	7.51
1/14/2015	C	0.040	0.024	0.016	0.022	0.002	7.40	57.01	7.34
1/28/2015	A	0.063	0.033	0.030	0.041	#	6.20	68.89	7.24
1/28/2015	B	0.059	0.020	0.039	0.017	0.003	8.80	59.12	7.66
1/28/2015	C	0.049	0.056	#	0.010	0.046	8.60	89.39	7.84
2/25/2015	A	0.071	0.042	0.029	0.031	0.011	12.60	45.79	7.62
2/25/2015	B	0.078	0.045	0.033	0.037	0.009	6.40	45.05	7.56

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
2/25/2015	C	0.093	0.056	0.037	0.035	0.021	10.80	44.75	7.39
3/18/2015	A	0.112	0.077	0.035	0.072	0.005	9.80	44.58	7.22
3/18/2015	B	0.112	0.076	0.036	0.069	0.007	12.80	46.30	7.23
3/18/2015	C	0.127	0.073	0.054	0.068	0.005	23.20	47.13	7.56

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 14. Detailed water quality parameters of grab canal water samples collected from Farm 3103 from November 2010 through April 2015.

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
11/9/2010	A	nd	nd	nd	0.042	nd	2.6	87.9	nd
11/9/2010	B	nd	nd	nd	0.018	nd	2.8	84.3	nd
11/9/2010	C	nd	nd	nd	0.016	nd	4.6	88.0	nd
11/23/2010	A	0.051	0.038	0.013	0.038	0.000	4.3	78.6	7.68
11/23/2010	B	0.034	0.016	0.018	0.015	0.001	4.7	83.0	8.09
11/23/2010	C	0.024	0.014	0.010	0.014	#	5.8	82.1	8.22
01/04/2011	A	0.072	0.058	0.014	0.031	0.027	1.6	61.6	7.75
01/04/2011	B	0.049	0.023	0.026	0.021	0.002	2.0	62.5	8.10
01/04/2011	C	0.042	0.019	0.023	0.017	0.002	1.0	62.4	8.16
01/18/2011	A	0.073	0.061	0.012	0.011	0.050	2.8	63.8	7.72
01/18/2011	B	0.075	0.036	0.039	0.027	0.010	2.8	70.3	8.11
01/18/2011	C	0.044	0.027	0.017	0.015	0.012	3.2	72.8	8.31
02/02/2011	A	0.090	0.086	0.004	0.010	0.076	7.6	70.7	7.63
02/02/2011	B	0.076	0.064	0.012	0.047	0.017	4.8	82.0	7.78
02/02/2011	C	0.081	0.069	0.012	0.057	0.012	2.4	87.1	7.79
02/09/2011	A	0.108	0.076	0.032	0.052	0.024	7.6	71.9	8.05
02/09/2011	B	0.083	0.063	0.020	0.061	0.002	4.8	72.0	8.08
02/09/2011	C	0.066	0.041	0.025	0.037	0.004	2.4	72.3	8.07
02/23/2011	A	0.047	0.010	0.037	0.010	#	21.0	65.2	7.94
02/23/2011	B	0.044	0.010	0.034	0.009	0.001	8.2	65.5	8.27
02/23/2011	C	0.042	0.015	0.027	0.011	0.004	5.4	67.1	8.32
03/02/2011	A	0.067	0.020	0.047	0.015	0.005	18.2	61.0	8.05
03/02/2011	B	0.047	0.020	0.027	0.012	0.008	7.4	63.0	8.33
03/02/2011	C	0.044	0.040	0.004	0.014	0.026	4.0	65.2	8.21
03/16/2011	A	0.071	0.049	0.022	0.038	0.011	13.8	61.4	7.67
03/16/2011	B	0.067	0.039	0.028	0.018	0.021	6.6	64.2	8.00
03/16/2011	C	0.052	0.028	0.024	0.008	0.021	2.0	59.6	8.15
03/30/2011	A	0.163	0.135	0.028	0.126	0.009	7.4	78.9	7.63
03/30/2011	B	0.170	0.130	0.040	0.121	0.009	6.2	72.2	7.63
03/30/2011	C	0.080	0.040	0.040	0.030	0.010	4.4	74.6	7.62
04/13/2011	A	0.079	0.018	0.061	0.012	0.006	13.5	61.9	7.70
04/13/2011	B	0.077	0.019	0.058	0.012	0.007	12.3	62.9	7.99
04/13/2011	C	0.057	0.019	0.038	0.010	0.009	9.6	65.6	8.13
04/25/2011	A	0.042	0.020	0.022	0.008	0.012	9.3	39.6	7.85
04/25/2011	B	0.039	0.018	0.021	0.008	0.010	6.4	38.2	8.05
04/25/2011	C	0.042	0.021	0.021	0.009	0.013	4.2	39.1	8.22
05/04/2011	A	0.058	0.028	0.030	0.013	0.015	7.0	54.1	7.99
05/04/2011	B	0.073	0.051	0.022	0.036	0.015	3.1	56.6	7.75
05/04/2011	C	0.070	0.062	0.008	0.049	0.013	3.3	56.2	7.76
05/19/2011	A	0.057	0.016	0.041	0.007	0.009	10.3	66.9	7.83
05/19/2011	B	0.078	0.059	0.019	0.015	0.044	5.7	72.3	7.72
05/19/2011	C	0.074	0.043	0.031	0.023	0.020	4.0	70.2	7.59
06/07/2011	A	0.045	0.018	0.027	0.007	0.011	10.3	111.4	7.46
06/07/2011	B	0.075	0.025	0.050	0.014	0.011	11.1	118.4	7.49
06/07/2011	C	0.059	0.015	0.044	0.009	0.006	4.1	135.0	7.31
06/22/2011	A	0.125	0.036	0.089	0.013	0.023	14.0	129.3	7.81
06/22/2011	B	0.143	0.041	0.102	0.016	0.025	0.4	144.5	7.70
06/22/2011	C	0.126	0.030	0.096	0.014	0.016	7.6	135.4	7.57
08/17/2011	A	0.098	0.066	0.032	0.049	0.017	3.2	108.0	7.35
08/17/2011	B	0.072	0.050	0.022	0.042	0.008	3.1	108.7	7.29

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
08/17/2011	C	0.125	0.098	0.027	0.088	0.010	5.2	111.8	7.28
12/06/2011	A	0.078	0.041	0.037	0.034	0.007	9.2	122.6	8.00
12/06/2011	B	0.062	0.037	0.025	0.030	0.007	6.7	124.2	8.13
12/06/2011	C	0.075	0.029	0.046	0.026	0.003	24.3	109.4	7.80
12/20/2011	A	0.131	0.118	0.013	0.111	0.007	6.8	116.1	7.58
12/20/2011	B	0.143	0.120	0.023	0.110	0.010	3.2	114.6	7.71
12/20/2011	C	0.046	0.038	0.008	0.032	0.006	3.4	115.4	7.62
01/11/2012	A	0.056	0.046	0.010	0.036	0.010	2.2	117.8	7.54
01/11/2012	B	0.042	0.034	0.008	0.032	0.003	3.8	117.7	7.69
01/11/2012	C	0.042	0.025	0.017	0.024	0.002	4.2	115.8	7.66
01/25/2012	A	0.078	0.054	0.024	0.042	0.013	8.0	116.2	7.64
01/25/2012	B	0.046	0.037	0.009	0.030	0.007	8.2	120.0	7.80
01/25/2012	C	0.031	0.024	0.007	0.019	0.005	4.3	117.9	7.73
02/08/2012	A	0.137	0.107	0.030	0.096	0.011	24.0	120.0	7.41
02/08/2012	B	0.093	0.071	0.022	0.060	0.011	7.8	117.4	7.62
02/08/2012	C	0.045	0.033	0.012	0.024	0.009	10.0	117.1	7.57
02/27/2012	A	0.062	0.049	0.013	0.035	0.014	3.5	113.3	7.59
02/27/2012	B	0.051	0.040	0.011	0.026	0.014	4.0	116.2	7.75
02/27/2012	C	0.048	0.024	0.024	0.012	0.012	11.7	124.4	7.62
03/12/2012	A	0.134	0.054	0.080	0.030	0.024	22.4	118.5	7.52
03/12/2012	B	0.050	0.042	0.008	0.014	0.029	9.3	114.4	7.74
03/12/2012	C	0.052	0.038	0.014	0.016	0.022	7.0	122.1	7.66
03/28/2012	A	0.073	0.037	0.036	0.019	0.018	4.1	113.4	7.78
03/28/2012	B	0.087	0.049	0.038	0.027	0.023	4.8	123.6	7.79
03/28/2012	C	0.069	0.043	0.026	0.018	0.025	4.8	139.5	7.84
04/09/2012	A	0.054	0.057	#	0.013	0.044	9.8	93.4	7.59
04/09/2012	B	0.044	0.022	0.022	0.008	0.014	5.3	78.6	7.63
04/09/2012	C	0.040	0.016	0.024	0.004	0.012	9.6	62.6	7.71
04/23/2012	A	0.220	0.183	0.037	0.187	#	4.8	109.6	7.51
04/23/2012	B	0.348	0.322	0.026	0.318	0.004	6.5	106.4	7.45
04/23/2012	C	0.184	0.173	0.011	0.163	0.010	4.3	109.2	7.51
05/07/2012	A	0.095	0.051	0.044	0.020	0.031	6.6	nd	7.57
05/07/2012	B	0.073	0.039	0.034	0.013	0.026	6.2	nd	7.67
05/07/2012	C	0.075	0.030	0.045	0.025	0.005	6.0	nd	7.68
08/16/2012	A	0.052	0.020	0.032	0.015	0.005	3.6	144.6	7.52
08/16/2012	B	0.040	0.015	0.025	0.013	0.002	4.8	145.9	7.56
08/16/2012	C	0.139	0.041	0.098	0.040	0.001	12.2	141.6	7.20
11/15/2012	A	0.077	0.043	0.034	0.027	0.016	10.0	132.0	7.82
11/15/2012	B	0.068	0.039	0.029	0.027	0.013	16.0	139.0	7.92
11/15/2012	C	0.098	0.049	0.049	0.033	0.017	2.0	136.4	7.74
11/29/2012	A	0.095	0.070	0.025	0.053	0.017	4.2	86.2	7.78
11/29/2012	B	0.068	0.051	0.017	0.034	0.017	5.2	85.9	7.93
11/29/2012	C	0.072	0.053	0.019	0.037	0.016	3.6	110.6	7.82
01/09/2013	A	0.275	0.268	0.007	0.221	0.047	4.8	109.7	7.33
01/09/2013	B	0.215	0.196	0.019	0.155	0.041	7.2	110.8	7.64
01/09/2013	C	0.132	0.117	0.015	0.085	0.032	5.2	111.6	7.78
01/23/2013	A	0.170	0.111	0.059	0.080	0.031	25.8	123.5	7.42
01/23/2013	B	0.170	0.119	0.051	0.090	0.029	16.2	125.9	7.43
01/23/2013	C	0.199	0.132	0.067	0.100	0.032	11.6	128.0	7.42
02/06/2013	A	0.233	0.237	#	0.195	0.042	6.0	102.8	7.38
02/06/2013	B	0.184	0.165	0.019	0.131	0.034	4.4	113.8	7.74
02/06/2013	C	0.084	0.065	0.019	0.041	0.024	8.2	124.9	7.81
03/06/2013	A	0.082	0.060	0.022	0.046	0.014	7.0	104.8	8.02

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/06/2013	B	0.071	0.050	0.021	0.041	0.009	6.6	137.3	8.01
03/06/2013	C	0.047	0.034	0.013	0.024	0.010	8.0	127.5	7.86
04/03/2013	A	0.072	0.038	0.034	0.021	0.017	8.6	115.1	7.88
04/03/2013	B	0.068	0.033	0.035	0.010	0.023	8.0	138.6	8.02
04/03/2013	C	0.063	0.037	0.026	0.015	0.022	9.6	137.5	7.72
08/21/2013	A	0.094	0.061	0.033	0.037	0.024	7.8	nd	7.73
08/21/2013	B	0.091	0.059	0.032	0.040	0.019	9.4	nd	7.83
08/21/2013	C	0.099	0.055	0.044	0.036	0.019	9.6	nd	7.69
10/29/2013	A	0.064	0.045	0.019	0.038	0.007	9.6	124.4	7.44
10/29/2013	B	0.069	0.042	0.027	0.030	0.012	5.2	127.4	7.92
11/13/2013	A	0.268	0.258	0.010	0.228	0.030	3.0	126.5	7.32
11/13/2013	B	0.181	0.154	0.027	0.121	0.033	4.8	108.5	7.68
11/13/2013	C	0.139	0.094	0.045	0.057	0.038	8.8	105.7	7.86
12/11/2013	A	0.150	0.122	0.028	0.102	0.021	6.4	104.4	7.47
12/11/2013	B	0.160	0.137	0.023	0.118	0.019	6.6	110.1	7.86
12/11/2013	C	0.131	0.113	0.018	0.086	0.027	7.4	112.5	8.00
12/26/2013	A	0.124	0.113	0.011	0.104	0.009	5.0	101.5	nd
12/26/2013	B	0.107	0.086	0.021	0.082	0.004	4.6	115.1	nd
12/26/2013	C	0.100	0.070	0.030	0.055	0.015	7.8	119.8	nd
01/8/2014	A	0.105	0.096	0.009	0.088	0.008	4.0	102.9	7.71
01/8/2014	B	0.100	0.082	0.018	0.074	0.008	8.4	112.6	8.12
01/8/2014	C	0.091	0.046	0.045	0.030	0.016	6.2	125.3	8.19
01/22/2014	A	0.117	0.090	0.027	0.089	0.001	9.2	91.9	7.57
01/22/2014	B	0.114	0.065	0.049	0.060	0.005	6.3	104.3	7.91
01/22/2014	C	0.123	0.057	0.066	0.046	0.011	8.0	112.5	8.01
04/2/2014	A	0.099	0.046	0.053	0.025	0.021	9.4	120.6	7.75
04/2/2014	B	0.130	0.049	0.081	0.022	0.027	13.6	128.4	7.96
04/2/2014	C	0.092	0.030	0.062	0.012	0.018	16.6	130.7	8.14
04/14/2014	A	0.098	0.074	0.024	0.068	0.006	6.6	48.8	7.72
04/14/2014	B	0.096	0.070	0.026	0.061	0.009	6.9	49.4	7.69
04/14/2014	C	0.065	0.043	0.022	0.034	0.009	8.8	63.7	7.82
04/30/2014	A	0.087	0.058	0.029	0.048	0.010	6.4	52.5	7.71
04/30/2014	B	0.079	0.056	0.023	0.046	0.010	5.8	50.0	7.71
04/30/2014	C	0.077	0.052	0.025	0.044	0.008	4.8	47.7	7.77
5/14/2014	A	0.091	0.048	0.043	0.036	0.012	8.00	96.95	7.57
5/14/2014	B	0.103	0.069	0.034	0.059	0.011	3.60	116.00	7.35
5/14/2014	C	0.078	0.039	0.039	0.034	0.005	6.40	50.71	7.57
5/28/2014	A	0.102	0.074	0.028	0.059	0.016	7.60	120.33	7.13
5/28/2014	B	0.084	0.070	0.014	0.064	0.006	8.20	90.17	7.17
5/28/2014	C	0.090	0.074	0.016	0.065	0.009	7.80	50.72	7.48
6/11/2014	A	0.215	0.172	0.043	0.168	0.004	7.40	106.41	7.48
6/11/2014	B	0.172	0.132	0.040	0.126	0.006	7.80	117.12	7.37
6/11/2014	C	0.128	0.076	0.052	0.074	0.002	7.40	125.77	7.33
12/11/2014	A	0.137	0.113	0.024	0.081	0.032	9.40	135.50	7.82
12/11/2014	B	0.118	0.090	0.028	0.059	0.031	10.40	140.03	7.99
12/11/2014	C	0.134	0.082	0.052	0.053	0.029	9.00	144.02	7.89
1/14/2015	A	0.152	0.101	0.051	0.097	0.004	7.20	116.13	7.63
1/14/2015	B	0.111	0.072	0.039	0.066	0.006	8.00	121.98	7.89
1/14/2015	C	0.090	0.046	0.044	0.042	0.004	11.20	129.69	7.96
1/28/2015	A	0.136	0.108	0.028	0.086	0.022	8.60	118.21	7.70
1/28/2015	B	0.108	0.062	0.046	0.028	0.034	8.60	132.17	8.02
1/28/2015	C	0.115	0.063	0.052	0.032	0.031	8.60	131.71	7.99
2/25/2015	A	0.107	0.075	0.032	0.032	0.043	55.60	103.41	7.86

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
2/25/2015	B	0.087	0.058	0.029	0.021	0.037	34.20	115.87	8.04
2/25/2015	C	0.102	0.057	0.045	0.029	0.028	17.20	119.36	7.91
3/18/2015	A	0.119	0.077	0.042	0.055	0.022	13.20	105.60	7.43
3/18/2015	B	0.103	0.049	0.054	0.031	0.018	15.20	118.88	7.76
3/18/2015	C	0.104	0.044	0.060	0.023	0.021	20.40	120.24	7.68

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 15. Detailed water quality parameters of grab canal water samples collected from Farm 4701 from November 2010 through April 2015.

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
11/9/2010	A	nd	nd	nd	0.015	nd	9.5	46.5	nd
11/9/2010	B	nd	nd	nd	0.008	nd	5.3	56.2	nd
11/9/2010	C	nd	nd	nd	0.011	nd	6.4	52.1	nd
11/23/2010	A	0.045	0.012	0.033	0.009	0.004	9.8	50.3	8.54
11/23/2010	B	0.036	0.013	0.023	0.008	0.005	7.1	51.7	8.45
11/23/2010	C	0.040	0.011	0.029	0.007	0.004	5.6	45.3	8.41
01/04/2011	A	0.081	0.017	0.064	0.005	0.012	4.4	36.8	8.66
01/04/2011	B	0.031	0.069	#	0.006	0.063	1.0	38.0	8.47
01/04/2011	C	0.029	0.011	0.018	0.006	0.005	1.8	40.6	8.31
01/18/2011	A	0.035	0.009	0.026	0.005	0.004	2.4	68.7	8.31
01/18/2011	B	0.030	0.006	0.024	0.004	0.002	4.8	53.8	8.40
01/18/2011	C	0.031	0.009	0.022	0.005	0.004	2.8	59.2	8.24
02/02/2011	A	0.024	0.002	0.022	0.006	#	6.6	65.3	8.33
02/02/2011	B	0.018	0.003	0.015	0.004	#	10.2	55.1	8.36
02/02/2011	C	0.028	0.001	0.027	0.005	#	4.2	57.8	8.25
02/09/2011	A	0.032	0.006	0.026	0.005	0.001	3.8	73.5	8.45
02/09/2011	B	0.027	0.005	0.022	0.004	0.001	3.6	59.4	8.34
02/09/2011	C	0.040	0.009	0.031	0.007	0.003	3.6	63.9	8.30
02/23/2011	A	0.033	0.006	0.027	0.007	#	0.2	68.4	8.52
02/23/2011	B	0.039	0.004	0.035	0.005	#	5.8	57.7	8.39
02/23/2011	C	0.025	0.004	0.021	0.006	#	4.8	60.7	8.39
03/02/2011	A	0.033	0.045	#	0.006	0.039	11.0	58.2	8.56
03/02/2011	B	0.026	0.044	#	0.007	0.038	8.6	55.2	8.36
03/02/2011	C	0.027	0.051	#	0.010	0.042	9.6	56.4	8.40
03/16/2011	A	0.149	0.012	0.137	0.002	0.010	6.2	37.5	8.49
03/16/2011	B	0.131	0.013	0.118	0.002	0.011	5.6	38.6	8.25
03/16/2011	C	0.132	0.012	0.120	0.003	0.009	13.0	45.7	8.31
03/30/2011	A	0.018	0.011	0.007	0.003	0.008	5.0	37.9	8.32
03/30/2011	B	0.020	0.011	0.009	0.003	0.008	3.8	41.9	8.07
03/30/2011	C	0.021	0.015	0.006	0.013	0.002	3.2	43.4	7.97
04/13/2011	A	0.038	0.013	0.025	0.004	0.009	10.7	46.8	8.29
04/13/2011	B	0.040	0.017	0.023	0.046	#	8.7	46.6	8.23
04/13/2011	C	0.043	0.016	0.027	0.005	0.011	19.3	47.1	8.28
04/25/2011	A	0.040	0.023	0.017	0.011	0.012	5.4	36.1	8.00
04/25/2011	B	0.035	0.017	0.018	0.006	0.011	4.1	38.6	8.08
04/25/2011	C	0.026	0.011	0.015	0.005	0.007	5.7	40.6	8.22
05/04/2011	A	0.032	0.018	0.014	0.008	0.010	2.5	56.2	8.30
05/04/2011	B	0.024	0.016	0.008	0.008	0.008	10.8	56.4	8.12
05/04/2011	C	0.023	0.015	0.008	0.005	0.010	1.7	59.4	7.11
05/19/2011	A	0.038	0.023	0.015	0.006	0.017	4.1	50.5	8.06
05/19/2011	B	0.027	0.011	0.016	0.010	0.001	5.3	52.9	8.02
05/19/2011	C	0.031	0.010	0.021	0.010	0.000	6.3	53.6	8.06
06/07/2011	A	0.023	0.016	0.007	0.006	0.010	6.7	49.8	8.14
06/07/2011	B	0.029	0.016	0.013	0.005	0.011	8.7	51.0	8.00
06/07/2011	C	0.031	0.011	0.020	0.002	0.009	9.0	51.3	7.94
06/22/2011	A	0.028	0.060	#	0.004	0.056	4.6	51.9	8.24
06/22/2011	B	0.089	0.075	0.014	0.004	0.071	12.0	50.4	8.04
06/22/2011	C	0.080	0.044	0.036	0.003	0.041	1.0	54.7	8.01
08/17/2011	A	0.031	0.011	0.020	0.008	0.003	4.6	78.6	7.85
08/17/2011	B	0.030	0.008	0.022	0.008	#	4.0	84.5	7.88

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
08/17/2011	C	0.025	0.011	0.014	0.010	0.002	4.2	86.4	7.93
12/06/2011	A	0.041	0.033	0.008	0.031	0.002	5.7	103.0	8.08
12/06/2011	B	0.040	0.034	0.006	0.031	0.003	9.5	104.3	8.02
12/06/2011	C	0.045	0.030	0.015	0.026	0.005	7.5	106.5	8.14
12/20/2011	A	0.022	0.015	0.007	0.007	0.008	1.0	92.3	8.36
12/20/2011	B	0.045	0.019	0.026	0.007	0.012	10.5	98.7	8.23
12/20/2011	C	0.058	0.020	0.038	0.009	0.011	9.8	103.0	8.04
01/11/2012	A	0.019	0.014	0.005	0.006	0.008	3.8	97.4	8.20
01/11/2012	B	0.030	0.019	0.011	0.007	0.012	5.8	103.4	8.22
01/11/2012	C	0.029	0.012	0.017	0.006	0.006	10.0	102.3	8.21
01/25/2012	A	0.030	0.019	0.011	0.004	0.015	7.5	86.8	8.11
01/25/2012	B	0.038	0.016	0.022	0.004	0.012	4.8	85.5	8.06
01/25/2012	C	0.048	0.032	0.016	0.003	0.029	6.6	93.6	8.20
02/08/2012	A	0.028	0.014	0.014	0.003	0.011	7.4	66.2	8.29
02/08/2012	B	0.030	0.014	0.016	0.003	0.011	8.8	76.2	8.01
02/08/2012	C	0.036	0.018	0.018	0.003	0.015	6.2	84.9	7.98
02/27/2012	A	0.028	0.017	0.011	0.003	0.014	5.7	64.2	8.42
02/27/2012	B	0.034	0.020	0.014	0.003	0.017	6.3	69.5	8.18
02/27/2012	C	0.043	0.021	0.022	0.004	0.017	8.0	81.8	8.09
03/12/2012	A	0.024	0.012	0.012	0.003	0.009	9.6	64.6	8.57
03/12/2012	B	0.035	0.016	0.019	0.004	0.012	11.5	74.4	8.09
03/12/2012	C	0.045	0.017	0.028	0.004	0.013	10.0	75.4	7.92
03/28/2012	A	0.023	0.008	0.015	0.003	0.005	3.3	66.3	8.27
03/28/2012	B	0.026	0.011	0.015	0.004	0.008	3.2	67.3	8.22
03/28/2012	C	0.027	0.013	0.014	0.004	0.009	5.3	68.6	7.99
04/09/2012	A	0.036	0.022	0.014	0.014	0.008	10.2	57.1	8.06
04/09/2012	B	0.021	0.010	0.011	0.003	0.007	6.4	57.5	8.35
04/09/2012	C	0.026	0.012	0.014	0.003	0.009	5.6	63.4	8.15
04/23/2012	A	0.029	0.011	0.018	0.009	0.002	4.3	61.0	7.60
04/23/2012	B	0.028	0.016	0.012	0.012	0.004	7.7	63.7	7.66
04/23/2012	C	0.032	0.012	0.020	0.012	0.000	5.7	66.3	7.65
05/07/2012	A	0.032	0.011	0.021	0.008	0.003	10.3	nd	7.83
05/07/2012	B	0.032	0.008	0.024	0.007	0.001	8.1	nd	8.13
05/07/2012	C	0.025	0.019	0.006	0.008	0.011	7.4	nd	8.04
08/16/2012	A	0.025	0.008	0.017	0.014	#	4.4	167.2	7.17
08/16/2012	B	0.025	0.009	0.016	0.014	#	3.8	150.4	7.47
08/16/2012	C	0.028	0.010	0.018	0.012	#	4.8	139.4	7.79
11/15/2012	A	0.091	0.072	0.019	0.059	0.013	7.8	125.7	7.91
11/15/2012	B	0.099	0.074	0.025	0.057	0.017	6.0	126.6	7.95
11/15/2012	C	0.084	0.054	0.030	0.041	0.014	10.0	126.4	7.93
11/29/2012	A	0.110	0.087	0.023	0.075	0.012	7.4	73.8	7.84
11/29/2012	B	0.103	0.084	0.019	0.068	0.016	6.6	76.7	7.87
11/29/2012	C	0.054	0.030	0.024	0.014	0.016	7.0	73.3	8.21
01/09/2013	A	0.088	0.052	0.036	0.020	0.032	6.6	92.6	8.18
01/09/2013	B	0.059	0.033	0.026	0.016	0.017	6.4	91.1	8.02
01/09/2013	C	0.034	0.022	0.012	0.006	0.016	6.8	88.3	8.02
01/23/2013	A	0.058	0.028	0.030	0.003	0.025	7.2	96.3	8.29
01/23/2013	B	0.048	0.027	0.021	0.003	0.024	9.6	88.9	8.30
01/23/2013	C	0.039	0.020	0.019	0.002	0.018	3.2	95.4	8.14
02/06/2013	A	0.057	0.028	0.029	0.014	0.014	8.6	50.4	8.21
02/06/2013	B	0.036	0.012	0.024	0.002	0.010	7.4	49.9	8.62
02/06/2013	C	0.035	0.015	0.020	0.003	0.012	6.4	55.4	8.17
03/06/2013	A	0.042	0.017	0.025	0.004	0.013	5.6	80.2	8.25

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/06/2013	B	0.066	0.006	0.060	0.002	0.004	6.8	80.9	8.23
03/06/2013	C	0.037	0.009	0.028	0.011	#	11.2	83.1	7.99
04/03/2013	A	0.142	0.067	0.075	0.049	0.018	29.0	96.7	8.26
04/03/2013	B	0.040	0.023	0.017	0.005	0.018	12.0	73.6	8.29
04/03/2013	C	0.040	0.020	0.020	0.004	0.016	9.6	99.7	8.12
04/17/2013	A	0.201	0.042	0.159	0.044	#	84.2	117.1	7.25
04/17/2013	B	0.072	0.015	0.057	0.017	#	8.6	109.9	7.49
04/17/2013	C	0.055	0.020	0.035	0.008	0.012	14.8	75.1	8.13
08/21/2013	A	0.071	0.052	0.019	0.043	0.009	13.6	nd	7.83
08/21/2013	B	0.054	0.034	0.020	0.026	0.008	3.2	nd	8.08
08/21/2013	C	0.044	0.018	0.026	0.010	0.008	6.0	nd	8.09
10/29/2013	A	0.058	0.047	0.011	0.036	0.011	2.4	127.1	8.01
10/29/2013	B	0.056	0.044	0.012	0.032	0.012	5.2	137.6	8.02
10/29/2013	C	0.047	0.030	0.017	0.020	0.010	2.6	136.7	7.91
11/13/2013	A	0.059	0.037	0.022	0.006	0.032	12.0	49.3	7.95
11/13/2013	B	0.066	0.033	0.033	0.006	0.027	13.0	50.2	7.78
11/13/2013	C	0.064	0.032	0.032	0.005	0.027	8.0	50.5	7.70
12/11/2013	A	0.038	0.021	0.017	0.007	0.014	3.2	49.3	8.12
12/11/2013	B	0.040	0.023	0.017	0.007	0.016	3.6	49.1	7.86
12/11/2013	C	0.059	0.077	#	0.010	0.067	5.8	50.2	7.82
12/26/2013	A	0.018	0.010	0.008	0.005	0.005	3.8	52.2	nd
12/26/2013	B	0.017	0.010	0.007	0.005	0.005	4.8	53.3	nd
12/26/2013	C	0.028	0.015	0.013	0.009	0.006	6.0	55.3	nd
01/8/2014	A	0.015	0.006	0.009	0.015	#	4.6	111.0	8.15
01/8/2014	B	0.018	0.007	0.011	0.008	#	5.2	81.2	8.28
01/8/2014	C	0.023	0.011	0.012	0.005	0.006	5.6	66.7	8.09
01/22/2014	A	0.023	0.015	0.008	0.005	0.010	9.0	102.0	8.33
01/22/2014	B	0.024	0.019	0.005	0.008	0.011	6.6	80.5	8.30
01/22/2014	C	0.030	0.018	0.012	0.005	0.013	6.8	87.0	8.03
04/2/2014	A	0.060	0.017	0.043	0.010	0.007	11.6	115.9	7.67
04/2/2014	B	0.065	0.025	0.040	0.016	0.009	9.8	108.0	7.56
04/2/2014	C	0.064	0.018	0.046	0.013	0.005	12.0	111.1	7.86
04/14/2014	A	0.079	0.020	0.059	0.011	0.009	10.6	69.6	7.88
04/14/2014	B	0.049	0.028	0.021	0.015	0.013	9.2	76.3	7.83
04/14/2014	C	0.047	0.026	0.021	0.011	0.015	6.0	80.9	7.85
04/30/2014	A	0.100	0.013	0.087	0.007	0.006	8.6	118.8	7.27
04/30/2014	B	0.061	0.010	0.051	0.013	#	4.2	129.2	7.28
04/30/2014	C	0.049	0.012	0.037	0.014	#	6.2	132.0	7.33
5/14/2014	A	0.033	0.024	0.009	0.009	0.015	11.00	133.21	7.10
5/14/2014	B	0.091	0.033	0.058	0.038	#	12.20	155.06	7.18
5/14/2014	C	0.077	0.043	0.034	0.042	0.001	8.20	142.40	7.20
5/28/2014	A	0.058	0.037	0.021	0.019	0.018	10.20	79.57	7.32
5/28/2014	B	0.060	0.049	0.011	0.032	0.018	8.00	93.59	7.25
5/28/2014	C	0.071	0.046	0.025	0.031	0.016	8.80	113.55	7.20
6/11/2014	A	0.036	0.010	0.026	0.009	0.001	6.00	111.08	7.31
6/11/2014	B	0.038	0.016	0.022		0.016	6.40	130.68	7.42
6/11/2014	C	0.064	0.028	0.036	0.035	#	3.20	144.59	7.34
12/11/2014	A	0.055	0.030	0.025	0.019	0.011	6.00	134.90	8.23
12/11/2014	B	0.087	0.063	0.024		0.063	6.40	123.85	7.99
12/11/2014	C	0.098	0.079	0.019	0.054	0.025	7.60	133.39	7.84
1/14/2015	A	0.040	0.020	0.020	0.019	0.001	13.60	76.60	7.64
1/14/2015	B	0.030	0.013	0.017	0.011	0.002	6.40	62.92	7.69
1/14/2015	C	0.046	0.009	0.037	0.006	0.003	11.40	56.63	8.08

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
1/28/2015	A	0.045	0.013	0.032	0.005	0.008	10.20	49.83	8.17
1/28/2015	B	0.026	0.015	0.011	0.006	0.009	3.40	53.56	8.15
2/25/2015	A	0.048	0.018	0.030	0.004	0.015	12.40	66.29	8.02
2/25/2015	B	0.031	0.016	0.015	0.005	0.011	13.80	59.27	7.86
2/25/2015	C	0.037	0.018	0.019	0.006	0.012	12.00	58.72	8.05
3/18/2015	A	0.064	0.016	0.048	0.005	0.012	16.60	84.06	8.09
3/18/2015	B	0.047	0.018	0.029	0.008	0.010	8.60	84.09	7.56
3/18/2015	C	0.037	0.015	0.022	0.007	0.008	12.40	81.54	7.55

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 16. Detailed water quality parameters of grab canal water samples collected from Farm 4702 from November 2010 through April 2015.

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
11/9/2010	A	nd	nd	nd	0.015	nd	2.7	53.0	nd
11/9/2010	B	nd	nd	nd	0.010	nd	3.4	54.1	nd
11/9/2010	C	nd	nd	nd	0.009	nd	3.0	51.3	nd
11/23/2010	A	0.028	0.018	0.010	0.014	0.004	3.9	54.6	7.95
11/23/2010	B	0.033	0.017	0.016	0.014	0.004	5.9	52.6	7.92
11/23/2010	C	0.057	0.012	0.045	0.008	0.004	6.0	45.4	8.26
01/04/2011	A	0.040	0.008	0.032	0.008	#	1.0	39.1	8.09
01/04/2011	B	0.020	0.010	0.010	0.008	0.003	1.0	39.7	8.02
01/04/2011	C	0.021	0.010	0.011	0.006	0.004	0.8	40.1	8.15
01/18/2011	A	0.063	0.040	0.023	0.045	#	6.4	56.8	7.64
01/18/2011	B	0.070	0.047	0.023	0.041	0.006	4.4	55.8	7.65
01/18/2011	C	0.059	0.041	0.018	0.041	0.000	6.0	53.8	7.64
02/02/2011	A	0.046	0.021	0.025	0.014	0.007	11.6	73.4	8.08
02/02/2011	B	0.065	0.020	0.045	0.010	0.010	9.6	71.0	8.20
02/02/2011	C	0.053	0.009	0.044	0.010	#	9.8	69.0	8.19
02/09/2011	A	0.077	0.022	0.055	0.013	0.009	6.6	85.8	8.09
02/09/2011	B	0.066	0.018	0.048	0.011	0.007	8.0	81.6	8.29
02/09/2011	C	0.065	0.014	0.051	0.011	0.003	7.0	80.9	8.30
02/23/2011	A	0.050	0.015	0.035	0.015	0.000	11.8	88.6	8.08
02/23/2011	B	0.046	0.013	0.033	0.014	#	11.0	82.2	8.24
02/23/2011	C	0.039	0.010	0.029	0.013	#	8.4	78.8	8.23
03/02/2011	A	0.067	0.018	0.049	0.021	#	9.6	79.1	8.09
03/02/2011	B	0.047	0.048	#	0.014	0.034	9.4	79.3	8.27
03/02/2011	C	0.048	0.044	0.004	0.013	0.031	8.4	80.5	8.32
03/16/2011	A	0.103	0.014	0.089	0.004	0.010	5.8	52.8	8.09
03/16/2011	B	0.104	0.012	0.092	0.006	0.006	5.6	61.0	8.11
03/16/2011	C	0.102	0.015	0.087	0.006	0.009	5.6	65.9	8.11
03/30/2011	A	0.037	0.024	0.013	0.021	0.003	3.6	47.2	7.66
03/30/2011	B	0.034	0.018	0.016	0.013	0.005	5.6	43.4	7.90
03/30/2011	C	0.025	0.016	0.009	0.014	0.002	4.4	42.4	7.94
04/13/2011	A	0.041	0.020	0.021	0.006	0.014	8.2	58.5	7.92
04/13/2011	B	0.041	0.016	0.025	0.005	0.011	7.9	57.8	7.84
04/13/2011	C	0.033	0.016	0.017	0.005	0.011	8.1	53.8	8.06
04/25/2011	A	0.040	0.020	0.020	0.011	0.009	6.5	39.3	7.80
04/25/2011	B	0.035	0.018	0.017	0.010	0.008	11.4	59.8	7.86
04/25/2011	C	0.032	0.019	0.013	0.007	0.012	6.3	50.6	8.02
05/04/2011	A	0.029	0.020	0.009	0.005	0.015	6.5	67.0	7.88
05/04/2011	B	0.032	0.017	0.015	0.006	0.011	2.8	79.7	7.82
05/04/2011	C	0.030	0.017	0.013	0.007	0.010	3.7	91.6	7.87
05/19/2011	A	0.037	0.016	0.021	0.011	0.005	4.1	104.1	7.79
05/19/2011	B	0.040	0.016	0.024	0.005	0.011	5.0	105.3	7.89
05/19/2011	C	0.029	0.015	0.014	0.005	0.011	1.6	95.3	7.86
06/07/2011	A	0.035	0.012	0.023	0.007	0.005	5.2	95.7	7.94
06/07/2011	B	0.033	0.014	0.019	0.009	0.005	5.6	117.9	8.00
06/07/2011	C	0.032	0.015	0.017	0.008	0.008	4.8	106.4	8.09
06/22/2011	A	0.046	0.051	#	0.016	0.035	3.2	123.9	7.90
06/22/2011	B	0.043	0.061	#	0.032	0.029	2.9	135.6	7.90
06/22/2011	C	0.036	0.054	#	0.013	0.041	3.7	123.9	7.88
08/17/2011	A	0.034	0.015	0.019	0.013	0.002	9.9	130.2	7.48
08/17/2011	B	0.031	0.011	0.020	0.013	#	5.5	135.5	7.85

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
08/17/2011	C	0.030	0.010	0.020	0.012	#	3.7	131.5	7.95
12/06/2011	A	0.067	0.061	0.006	0.060	0.002	5.8	112.0	7.75
12/06/2011	B	0.072	0.063	0.009	0.050	0.013	7.5	113.2	7.75
12/06/2011	C	0.072	0.065	0.007	0.062	0.003	3.9	116.3	7.64
12/20/2011	A	0.082	0.044	0.038	0.028	0.016	3.8	115.2	7.86
12/20/2011	B	0.064	0.038	0.026	0.020	0.018	3.9	113.4	7.98
12/20/2011	C	0.039	0.030	0.009	0.015	0.015	1.3	110.8	7.95
01/11/2012	A	0.109	0.113	#	0.045	0.068	22.0	105.1	7.75
01/11/2012	B	0.112	0.082	0.030	0.040	0.042	18.2	103.5	7.79
01/11/2012	C	0.108	0.078	0.030	0.036	0.042	11.0	102.9	7.85
01/25/2012	A	0.090	0.074	0.016	0.045	0.029	5.4	81.0	7.74
01/25/2012	B	0.078	0.064	0.014	0.028	0.036	2.6	84.9	7.84
01/25/2012	C	0.071	0.083	#	0.030	0.053	9.0	90.5	7.93
02/08/2012	A	0.063	0.045	0.018	0.053	#	10.2	134.0	7.42
02/08/2012	B	0.064	0.046	0.018	0.057	#	17.8	137.7	7.34
02/08/2012	C	0.079	0.049	0.030	0.063	#	24.2	140.6	7.16
02/27/2012	A	0.140	0.127	0.013	0.133	#	11.2	140.2	7.33
02/27/2012	B	0.125	0.130	#	0.114	0.017	9.5	138.8	7.49
02/27/2012	C	0.079	0.054	0.025	0.056	#	17.5	139.8	7.92
03/12/2012	A	0.080	0.038	0.042	0.036	0.002	21.2	119.3	7.67
03/12/2012	B	0.051	0.022	0.029	0.015	0.008	8.5	113.9	7.96
03/12/2012	C	0.045	0.015	0.030	0.012	0.003	9.1	114.6	8.01
03/28/2012	A	0.060	0.026	0.034	0.024	0.002	3.1	98.8	7.88
03/28/2012	B	0.045	0.015	0.030	0.011	0.004	5.1	95.5	7.88
03/28/2012	C	0.049	0.017	0.032	0.014	0.003	5.9	106.6	7.98
04/09/2012	A	0.063	0.018	0.045	0.023	#	8.5	140.3	7.15
04/09/2012	B	0.065	0.019	0.046	0.023	#	13.5	142.0	7.23
04/09/2012	C	0.077	0.023	0.054	0.031	#	14.1	163.7	7.20
04/23/2012	A	0.045	0.027	0.018	0.023	0.005	4.8	99.6	7.48
04/23/2012	B	0.039	0.022	0.017	0.014	0.008	7.7	92.6	7.59
04/23/2012	C	0.041	0.021	0.020	0.013	0.008	10.2	103.6	7.72
05/07/2012	A	0.098	0.018	0.080	0.017	0.001	11.9	nd	7.39
05/07/2012	B	0.101	0.017	0.084	0.014	0.003	6.2	nd	7.56
05/07/2012	C	0.102	0.024	0.078	0.019	0.005	11.7	nd	7.51
08/16/2012	A	0.048	0.018	0.030	0.025	#	4.4	169.2	7.17
08/16/2012	B	0.062	0.021	0.041	0.023	#	6.0	167.4	7.17
08/16/2012	C	0.055	0.022	0.033	0.028	#	3.6	183.4	7.11
11/15/2012	A	0.259	0.237	0.022	0.205	0.032	9.2	138.5	7.93
11/15/2012	B	0.215	0.184	0.031	0.155	0.030	9.2	140.3	7.82
11/15/2012	C	0.172	0.146	0.026	0.122	0.024	4.0	140.8	7.89
11/29/2012	A	0.143	0.092	0.051	0.069	0.023	5.2	111.8	7.79
11/29/2012	B	0.082	0.059	0.023	0.041	0.018	4.4	139.1	7.88
11/29/2012	C	0.093	0.062	0.031	0.038	0.024	5.0	145.5	7.88
01/09/2013	A	0.079	0.054	0.025	0.029	0.025	11.0	124.7	7.77
01/09/2013	B	0.057	0.035	0.022	0.016	0.020	5.8	122.9	8.04
01/09/2013	C	0.070	0.041	0.029	0.015	0.026	5.8	121.3	8.06
01/23/2013	A	0.054	0.040	0.014	0.019	0.021	6.0	124.7	8.17
01/23/2013	B	0.047	0.034	0.013	0.012	0.023	7.4	124.1	7.97
01/23/2013	C	0.045	0.033	0.012	0.015	0.018	7.0	123.0	8.00
02/06/2013	A	0.065	0.029	0.036	0.014	0.015	5.8	68.5	7.80
02/06/2013	B	0.046	0.024	0.022	0.009	0.015	4.2	71.7	7.62
02/06/2013	C	0.046	0.018	0.028	0.003	0.015	5.8	69.8	7.83
03/06/2013	A	0.039	0.016	0.023	0.018	#	8.4	123.9	7.74

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/06/2013	B	0.027	0.012	0.015	0.015	#	6.8	121.4	7.76
03/06/2013	C	0.038	0.004	0.034	0.002	0.002	8.6	116.5	7.91
04/03/2013	A	0.071	0.055	0.016	0.029	0.027	10.2	117.6	7.67
04/03/2013	B	0.057	0.033	0.024	0.010	0.023	12.4	118.1	7.76
04/03/2013	C	0.049	0.027	0.022	0.006	0.021	12.0	118.3	7.97
04/17/2013	A	0.114	0.033	0.081	0.068	#	4.6	117.1	7.39
04/17/2013	B	0.125	0.087	0.038	0.081	0.006	5.6	109.6	7.52
04/17/2013	C	0.117	0.088	0.029	0.081	0.007	-0.2	104.6	7.63
08/21/2013	A	0.164	0.022	0.142	0.015	0.007	72.8	nd	7.69
08/21/2013	B	0.040	0.017	0.023	0.011	0.007	3.6	nd	7.64
08/21/2013	C	0.037	0.015	0.022	0.012	0.003	6.6	nd	7.53
10/29/2013	A	0.054	0.031	0.023	0.016	0.015	3.4	135.4	8.09
10/29/2013	B	0.033	0.019	0.014	0.017	0.002	7.8	141.2	8.08
10/29/2013	C	0.030	0.016	0.014	0.017	#	7.2	143.8	8.19
11/13/2013	A	0.078	0.064	0.014	0.016	0.049	14.4	65.0	7.90
11/13/2013	B	0.084	0.042	0.042	0.009	0.033	10.0	66.2	7.92
11/13/2013	C	0.080	0.048	0.032	0.015	0.033	11.0	67.3	7.95
12/11/2013	A	0.047	0.031	0.016	0.021	0.011	6.0	50.3	7.78
12/11/2013	B	0.050	0.030	0.020	0.019	0.011	5.2	55.2	7.76
12/11/2013	C	0.051	0.030	0.021	0.016	0.014	9.2	61.3	7.67
12/26/2013	A	0.038	0.023	0.015	0.021	0.002	18.8	77.3	nd
12/26/2013	B	0.031	0.017	0.014	0.013	0.005	6.8	70.3	nd
12/26/2013	C	0.033	0.017	0.016	0.010	0.007	4.2	63.7	nd
01/8/2014	A	0.030	0.015	0.015	0.016	#	8.4	83.6	7.97
01/8/2014	B	0.035	0.013	0.022	0.012	0.001	7.4	82.7	8.06
01/8/2014	C	0.038	0.026	0.012	0.030	#	9.8	105.9	7.74
01/22/2014	A	0.031	0.019	0.012	0.007	0.012	6.0	84.9	7.97
01/22/2014	B	0.032	0.020	0.012	0.007	0.013	7.6	92.1	8.05
01/22/2014	C	0.039	0.023	0.016	0.007	0.016	4.0	103.4	8.01
04/2/2014	A	0.049	0.018	0.031	0.012	0.006	6.6	108.0	7.93
04/2/2014	B	0.051	0.016	0.035	0.010	0.006	12.2	109.5	8.02
04/2/2014	C	0.044	0.018	0.026	0.008	0.010	6.8	107.2	7.97
04/14/2014	A	0.057	0.021	0.036	0.015	0.006	5.4	101.1	7.64
04/14/2014	B	0.042	0.015	0.027	0.013	0.002	6.8	102.8	7.86
04/14/2014	C	0.042	0.016	0.026	0.012	0.004	6.6	104.4	7.86
04/30/2014	A	0.050	0.011	0.039	0.003	0.008	6.2	60.3	8.40
04/30/2014	B	0.045	0.009	0.036	0.002	0.007	4.0	62.2	7.93
04/30/2014	C	0.129	0.009	0.120	0.005	0.004	3.8	67.9	7.84
5/14/2014	A	0.057	0.038	0.019	0.008	0.030	12.20	68.07	7.81
5/14/2014	B	0.081	0.018	0.063	0.008	0.010	9.20	77.76	7.91
5/14/2014	C	0.050	0.016	0.034	0.008	0.009	11.00	85.42	7.88
5/28/2014	A	0.083	0.062	0.021	0.038	0.024	13.60	55.88	7.78
5/28/2014	B	0.065	0.034	0.031	0.009	0.025	7.40	65.14	7.71
5/28/2014	C	0.077	0.040	0.037	0.015	0.025	9.40	84.07	7.68
6/11/2014	A	0.073	0.019	0.054	0.019	0.000	4.60	114.30	7.76
6/11/2014	B	0.059	0.014	0.045	0.018	#	8.80	112.61	7.78
6/11/2014	C	0.072	0.015	0.057	0.019	#	9.80	107.24	7.71
12/11/2014	A	0.043	0.023	0.020	0.016	0.007	11.60	130.55	7.99
12/11/2014	B	0.030	0.023	0.007	0.013	0.010	0.00	132.68	8.09
12/11/2014	C	0.024	0.015	0.009	0.011	0.004	11.20	125.90	7.99
1/14/2015	A	0.041	0.022	0.019	0.018	0.004	6.60	80.56	7.72
1/14/2015	B	0.039	0.014	0.025	0.012	0.002	9.00	102.80	8.09
1/14/2015	C	0.038	0.011	0.027	0.012	#	7.40	109.22	7.85

Sampling Date	Transect	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
1/28/2015	A	0.048	0.015	0.033	0.011	0.004	7.20	84.53	7.67
1/28/2015	B	0.039	0.014	0.025	0.007	0.007	9.00	73.71	7.96
1/28/2015	C	0.035	0.019	0.016	0.009	0.010	6.80	100.77	7.81
2/25/2015	A	0.051	0.027	0.024	0.010	0.017	9.00	87.05	7.64
2/25/2015	B	0.043	0.023	0.020	0.009	0.015	8.00	92.22	7.81
2/25/2015	C	0.041	0.022	0.019	0.007	0.015	8.20	96.86	7.96
3/18/2015	A	0.093	0.039	0.054	0.014	0.025	9.80	84.32	7.75
3/18/2015	B	0.076	0.028	0.048	0.007	0.022	13.40	86.72	7.81
3/18/2015	C	0.064	0.020	0.044	0.006	0.015	12.20	85.71	7.77

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

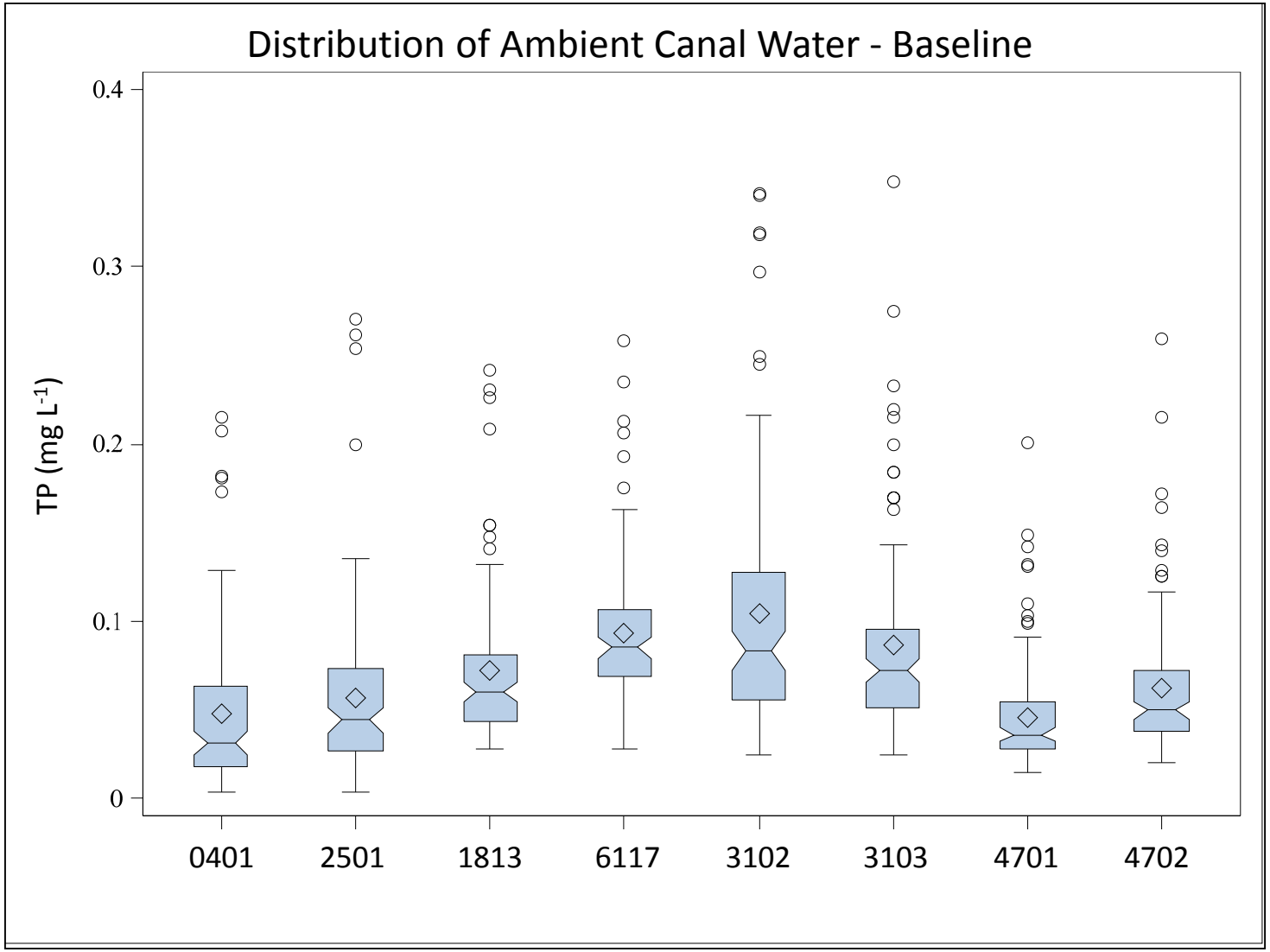

Figure A 1. Distribution of total P (TP) concentrations in ambient canal water samples from calibration period.
The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

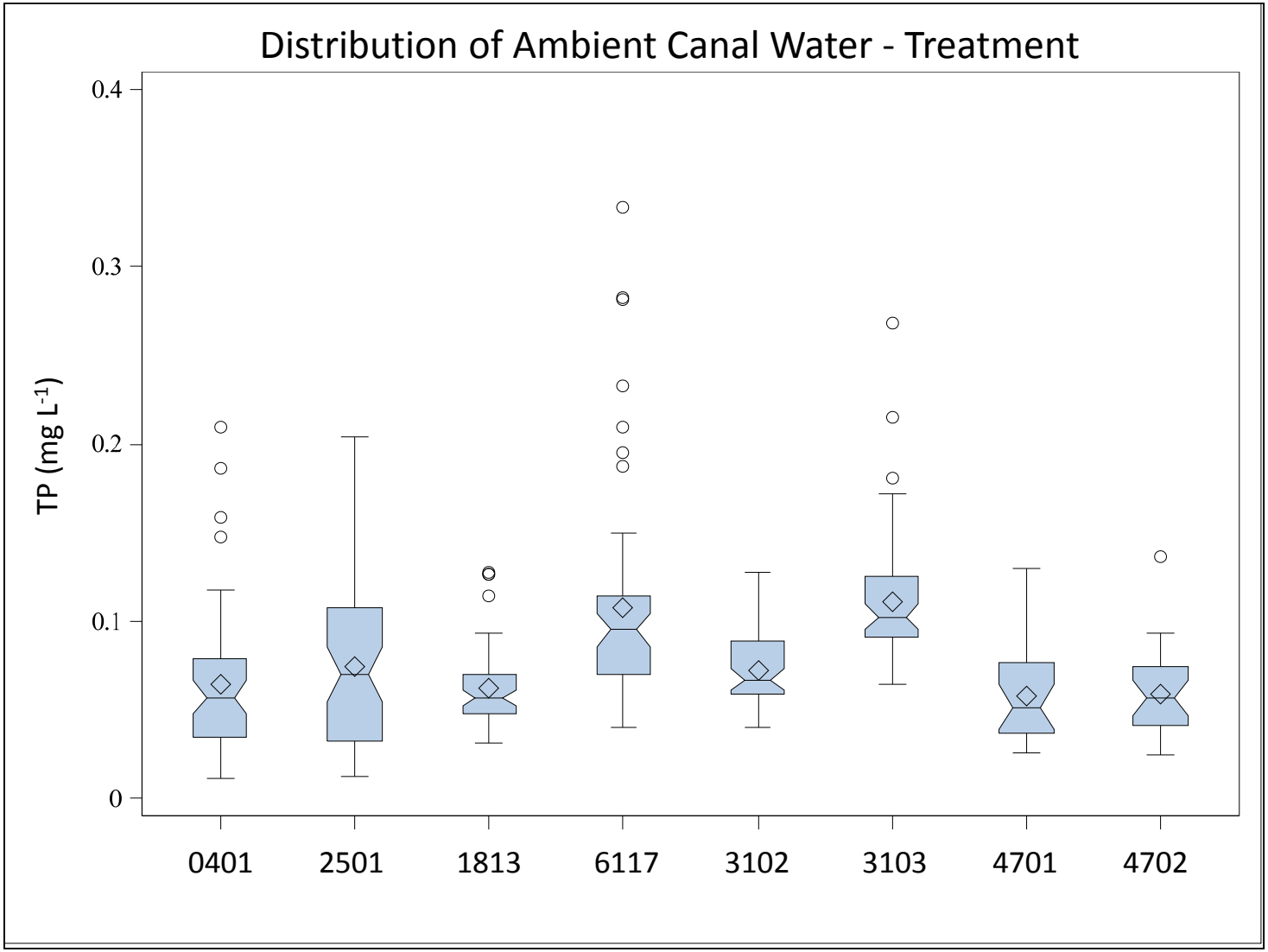

Figure A 2. Distribution of total P (TP) concentrations in ambient canal water samples from treatment period.
The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

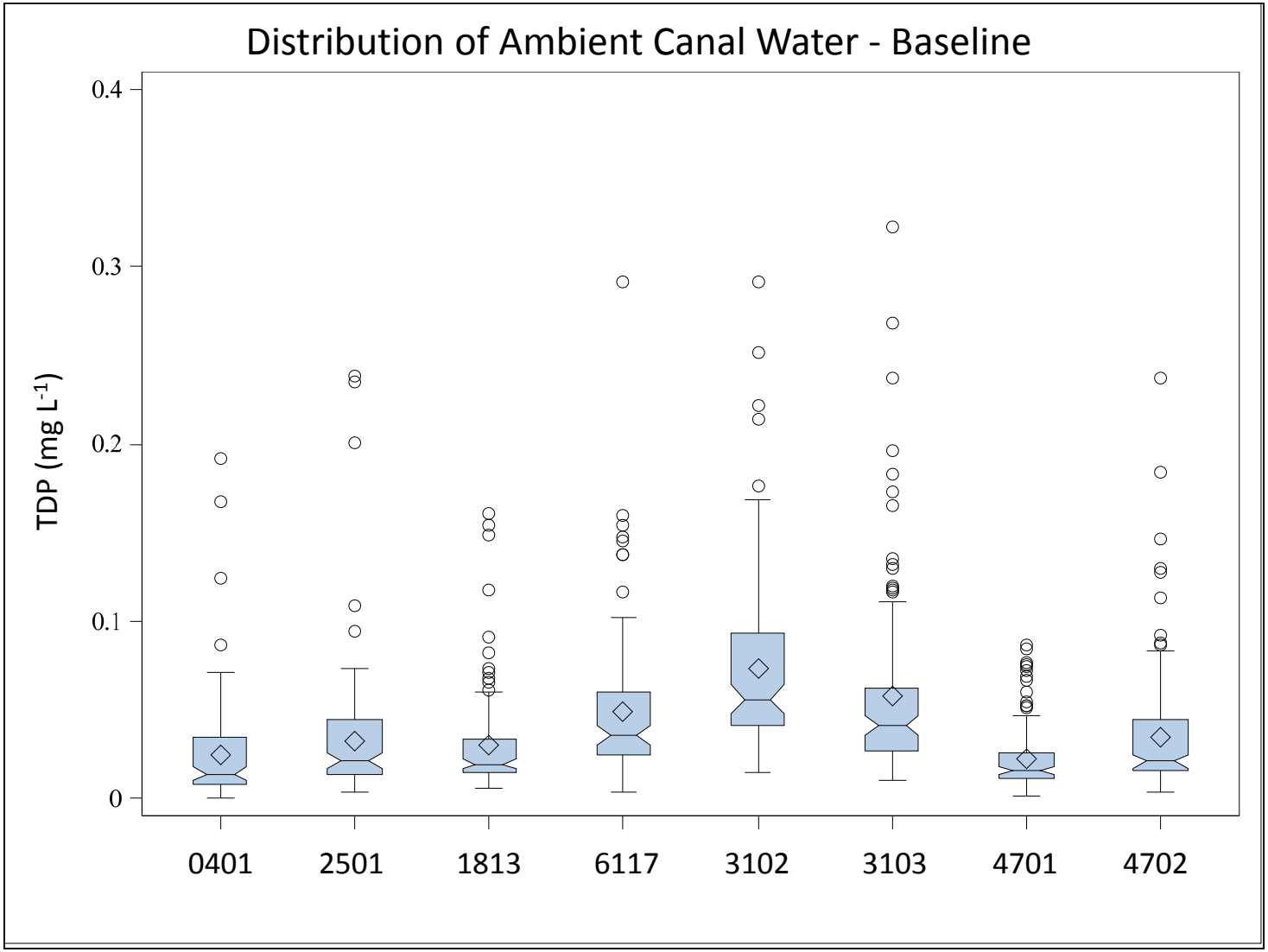

Figure A 3. Distribution of total dissolved P (TDP) concentrations in ambient canal water samples from calibration period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

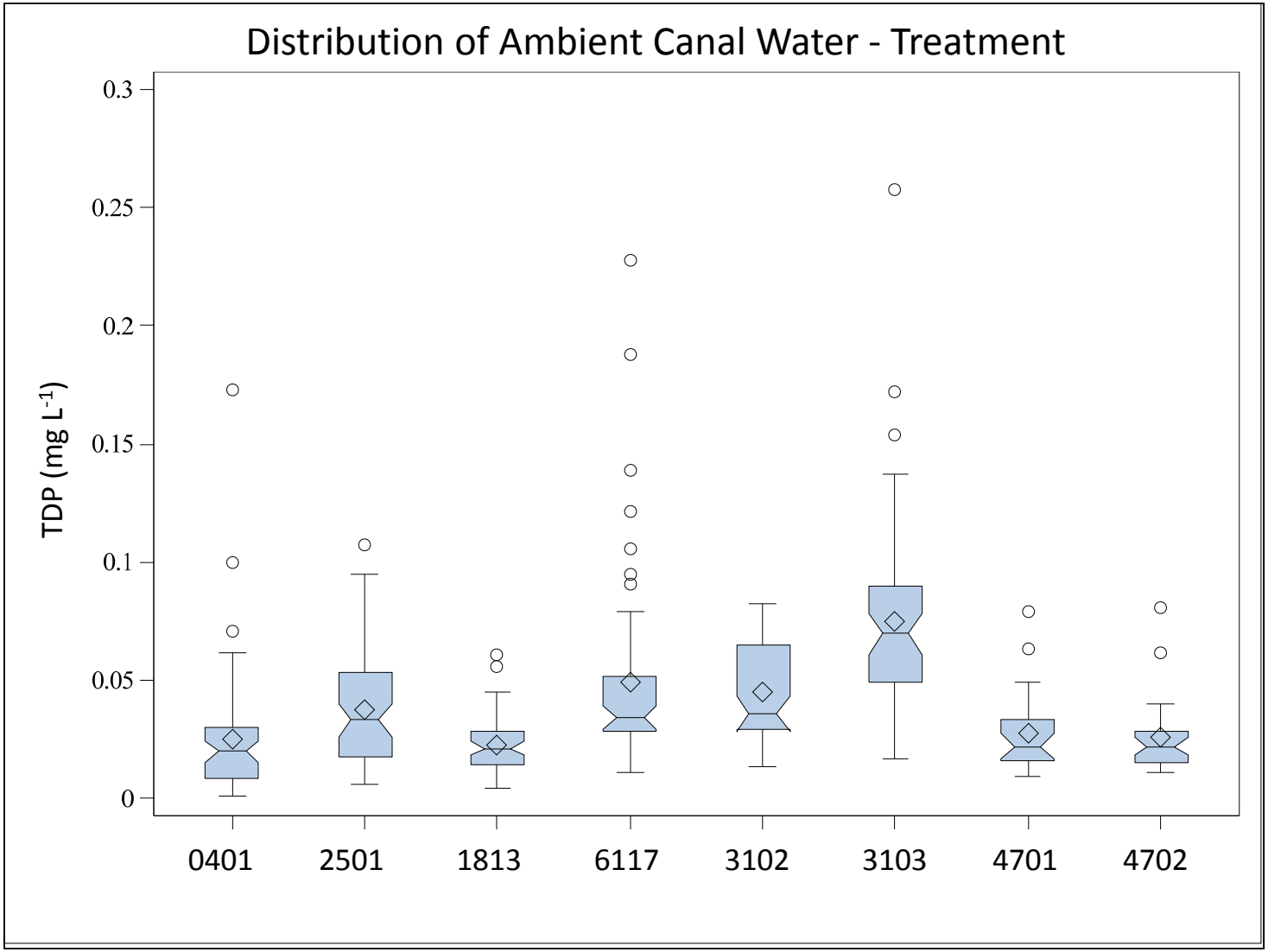

Figure A 4. Distribution of total dissolved P (TDP) concentrations in ambient canal water samples from treatment period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

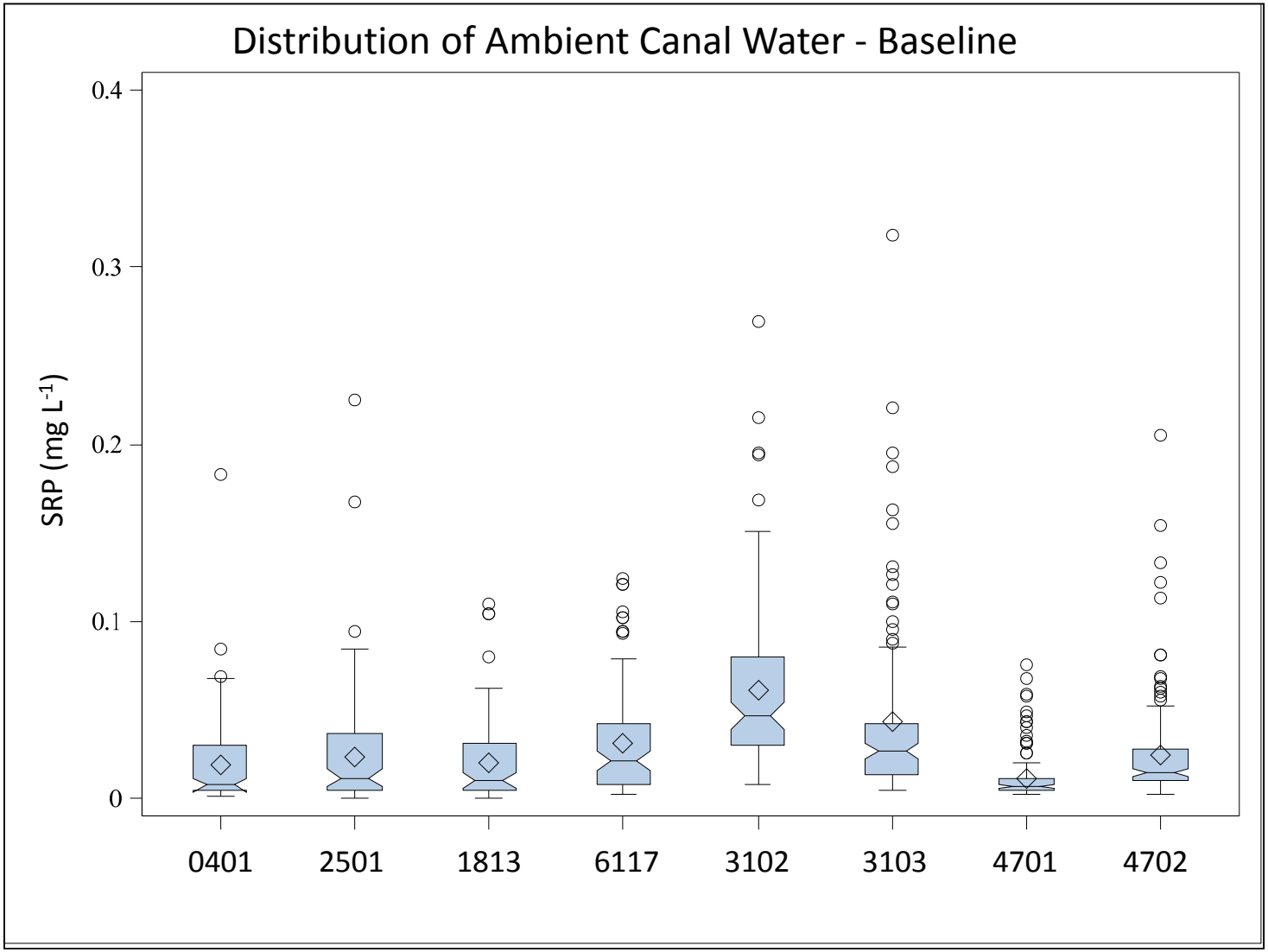

Figure A 5. Distribution of soluble reactive P (SRP) concentrations in ambient canal water samples from calibration period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

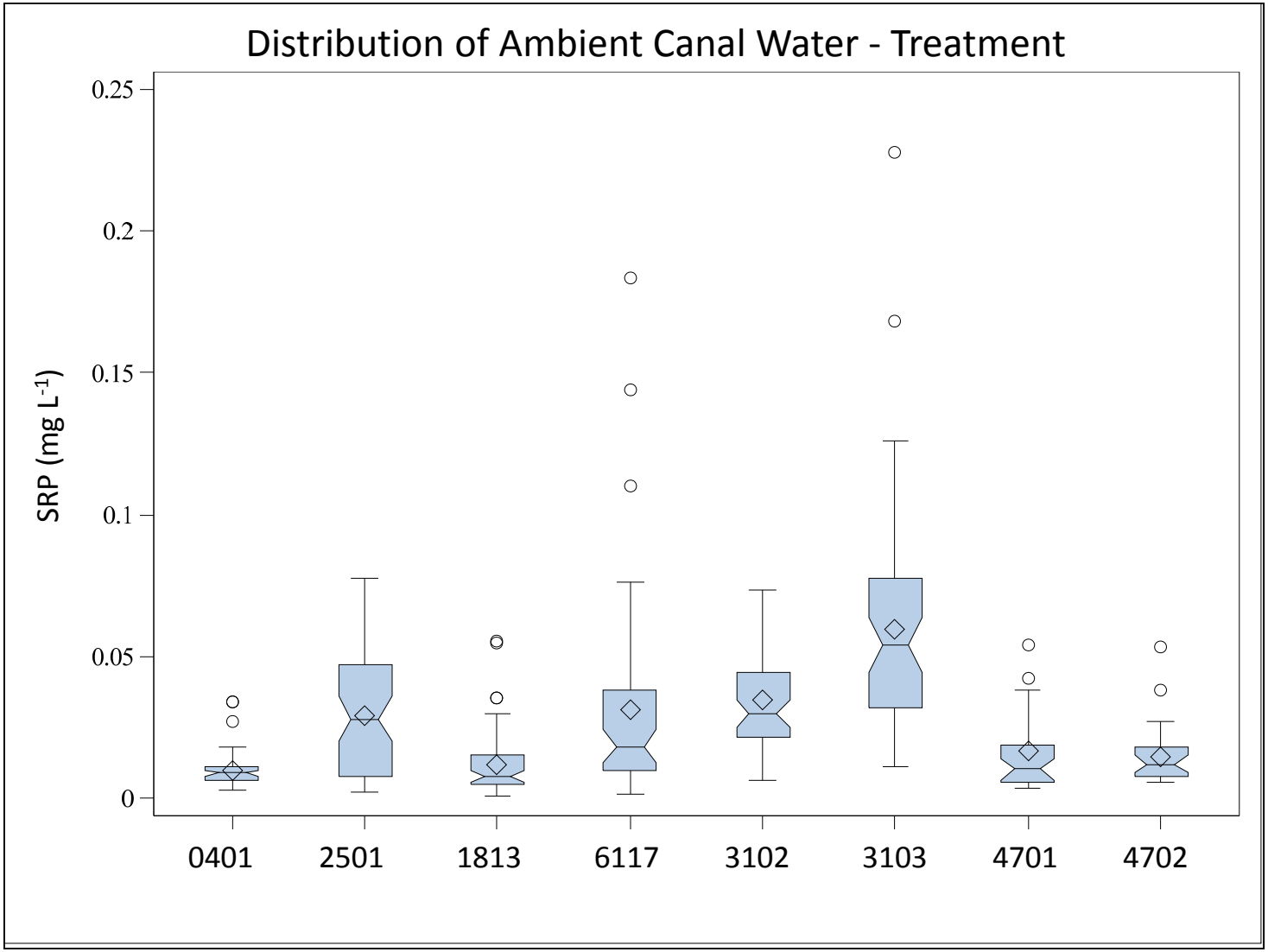

Figure A 6. Distribution of soluble reactive P (SRP) concentrations in ambient canal water samples from treatment period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

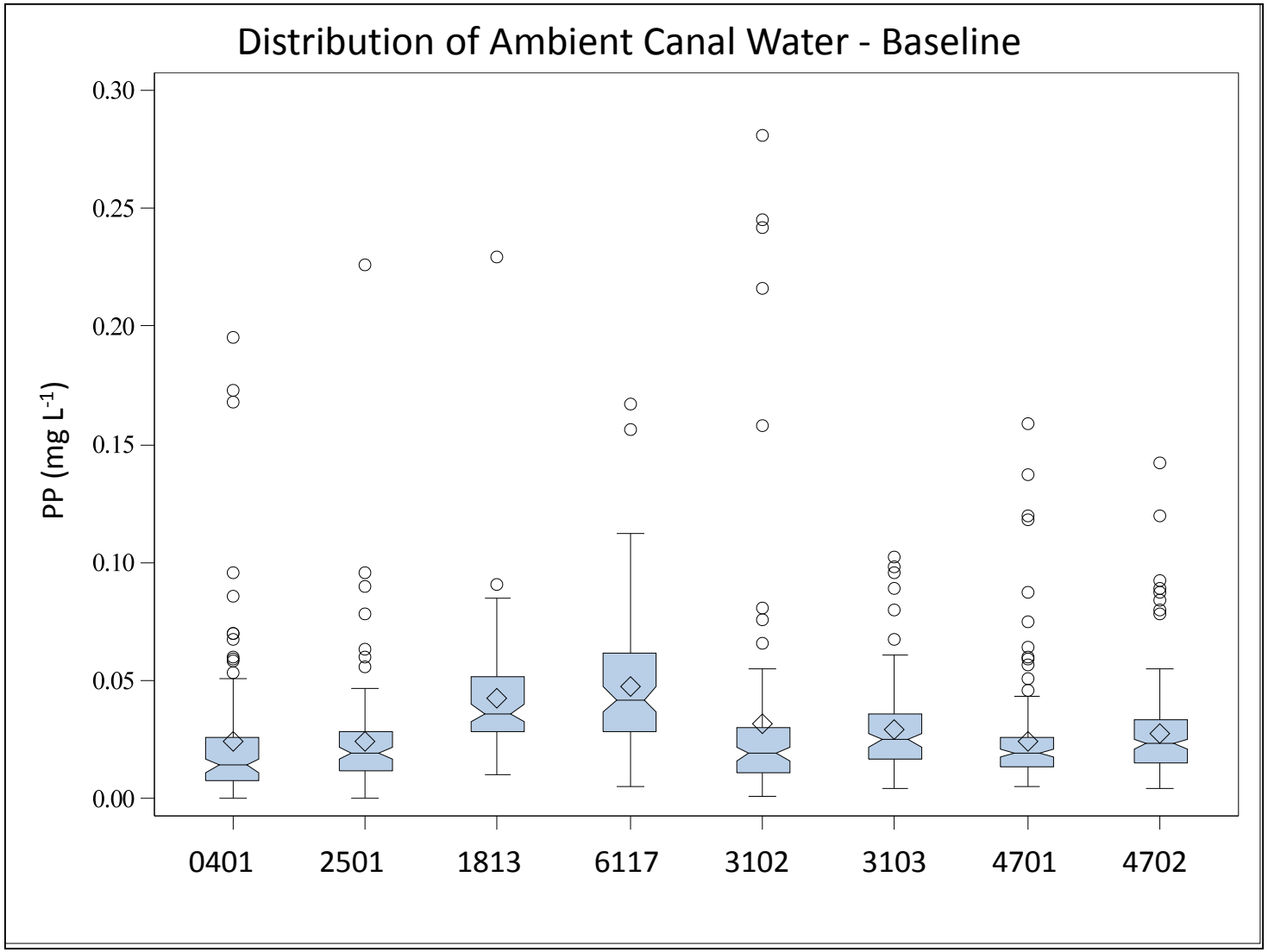

Figure A 7. Distribution of particulate P (PP) concentrations in ambient canal water samples from calibration period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

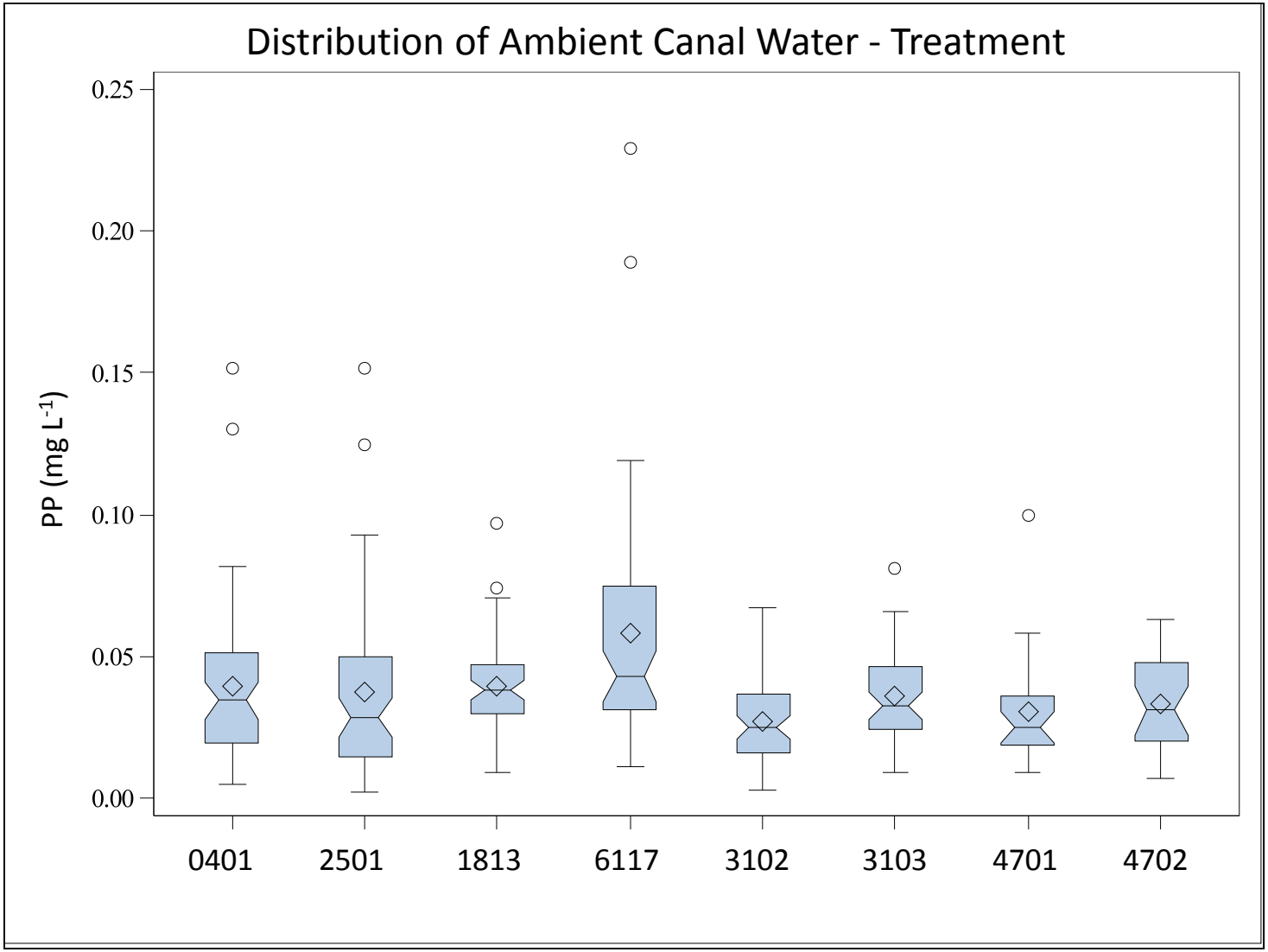

Figure A 8**. Distribution of particulate P (PP) concentrations in ambient canal water samples from treatment period.** The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

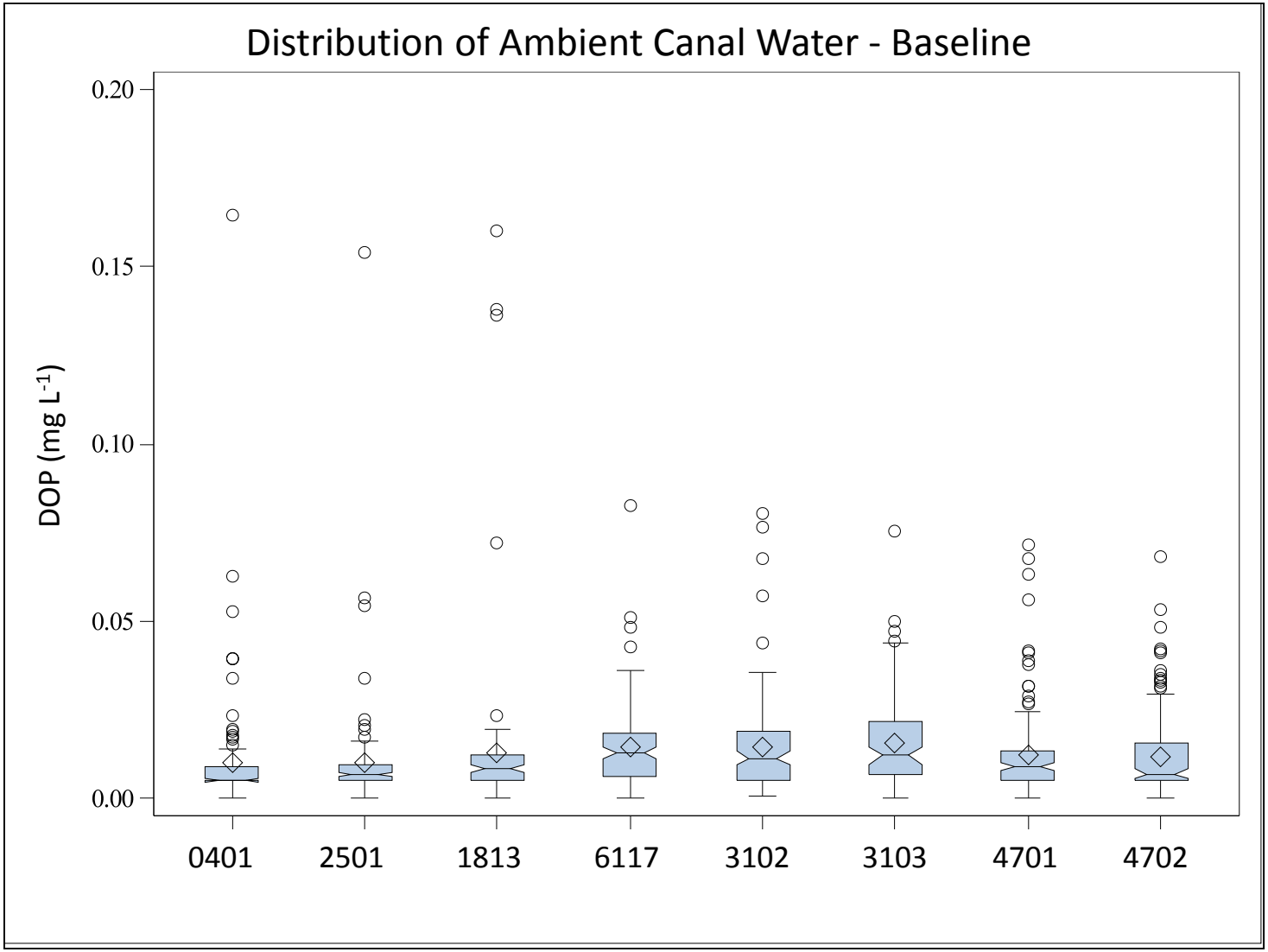

Figure A 9. Distribution of dissolved organic P (DOP) concentrations in ambient canal water samples from calibration period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

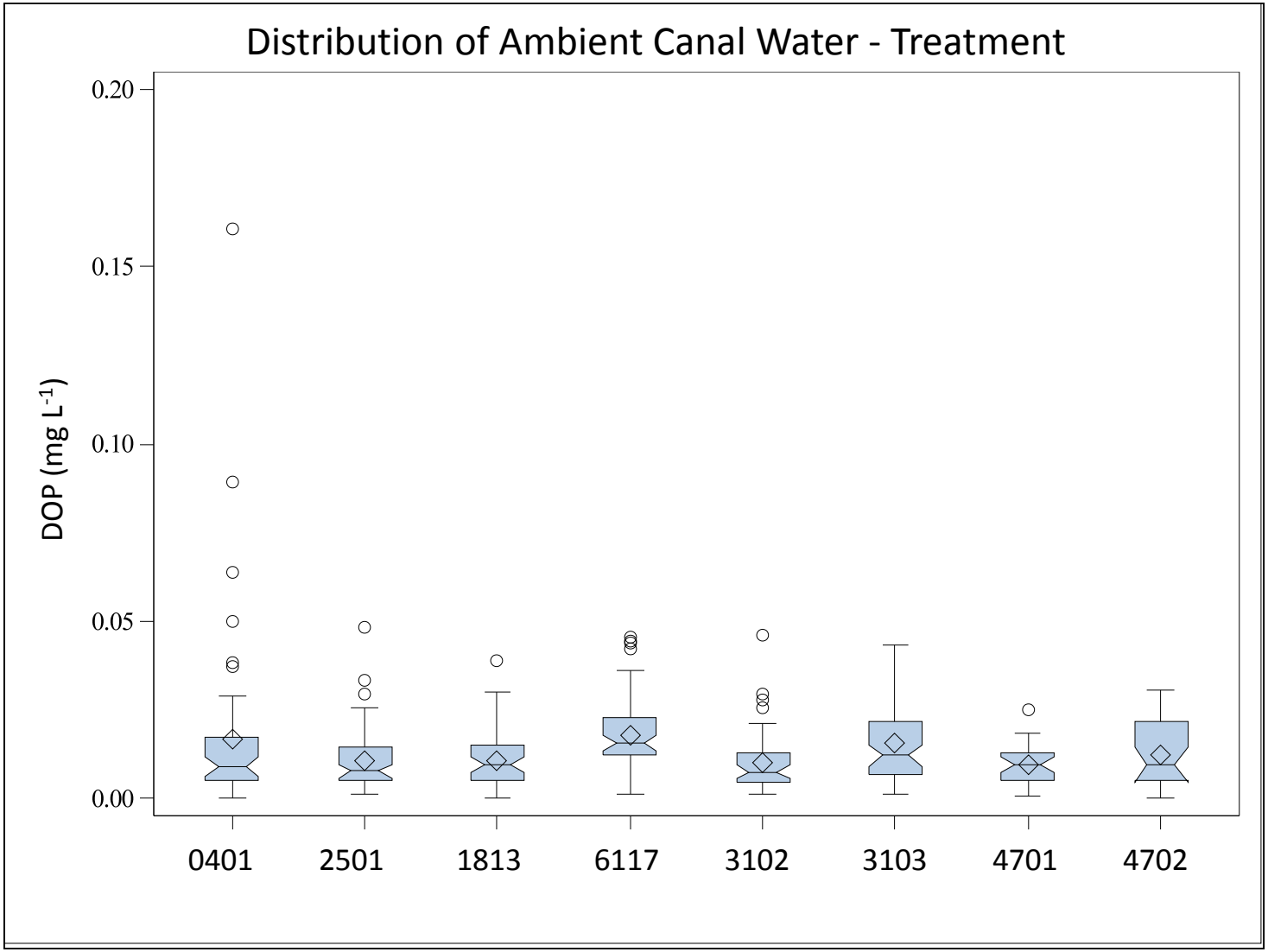

Figure A 10.Distribution of dissolved organic P (DOP) concentrations in ambient canal water samples from treatment period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

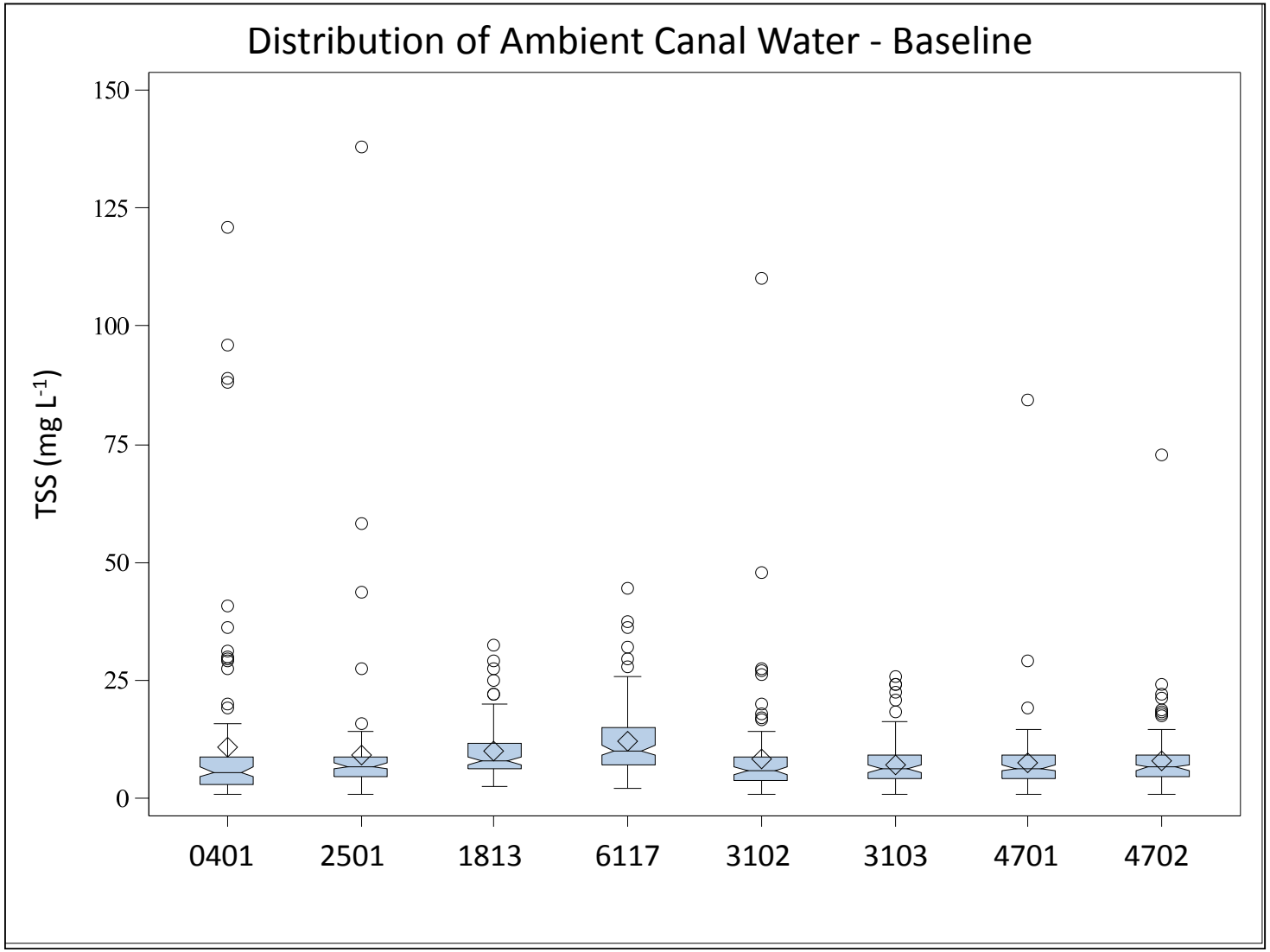

Figure A 11. Distribution of total dissolved solids (TSS) concentrations in ambient canal water samples from calibration period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

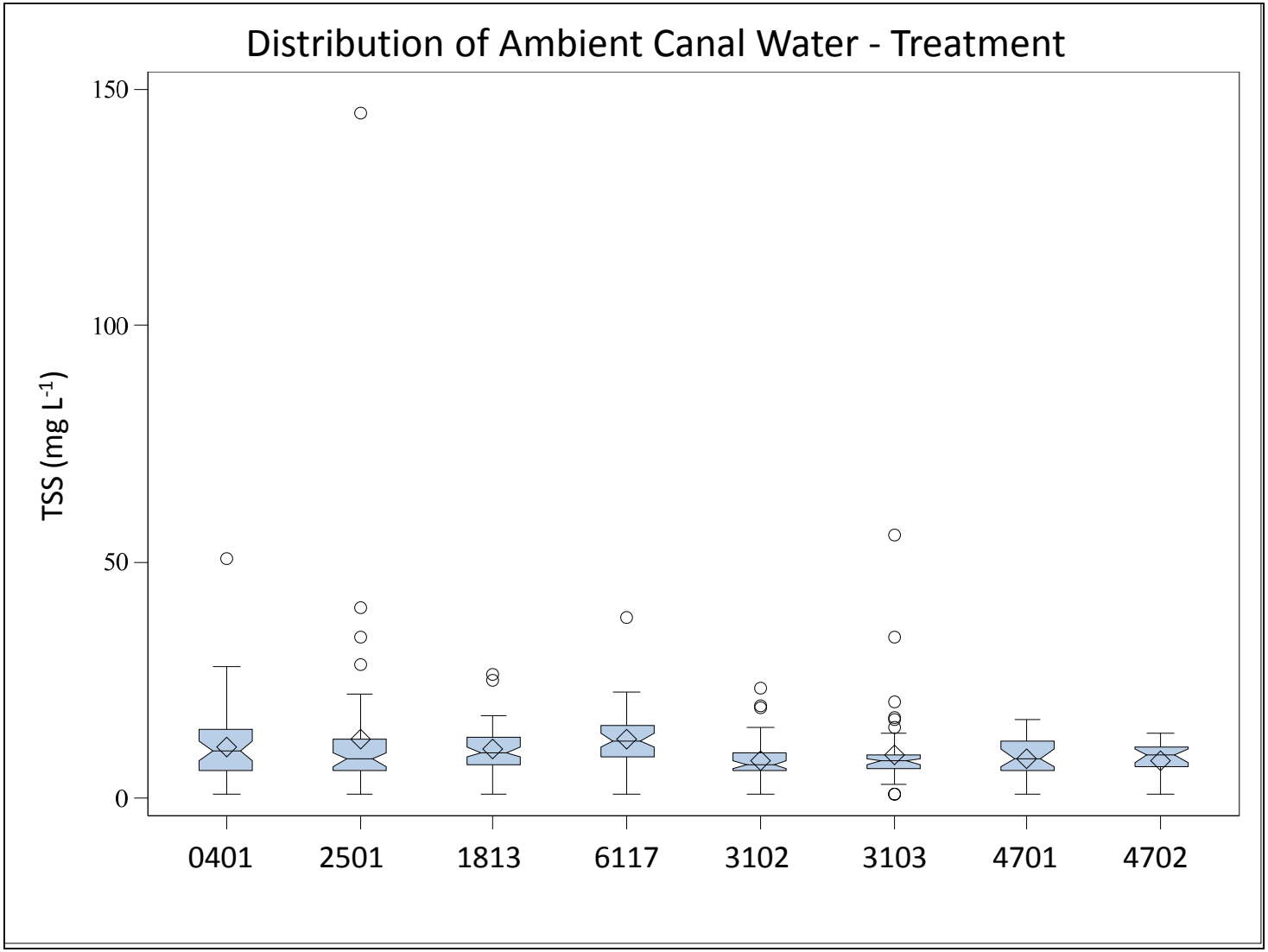

Figure A 12. Distribution of total dissolved solids (TSS) concentrations in ambient canal water samples from treatment period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

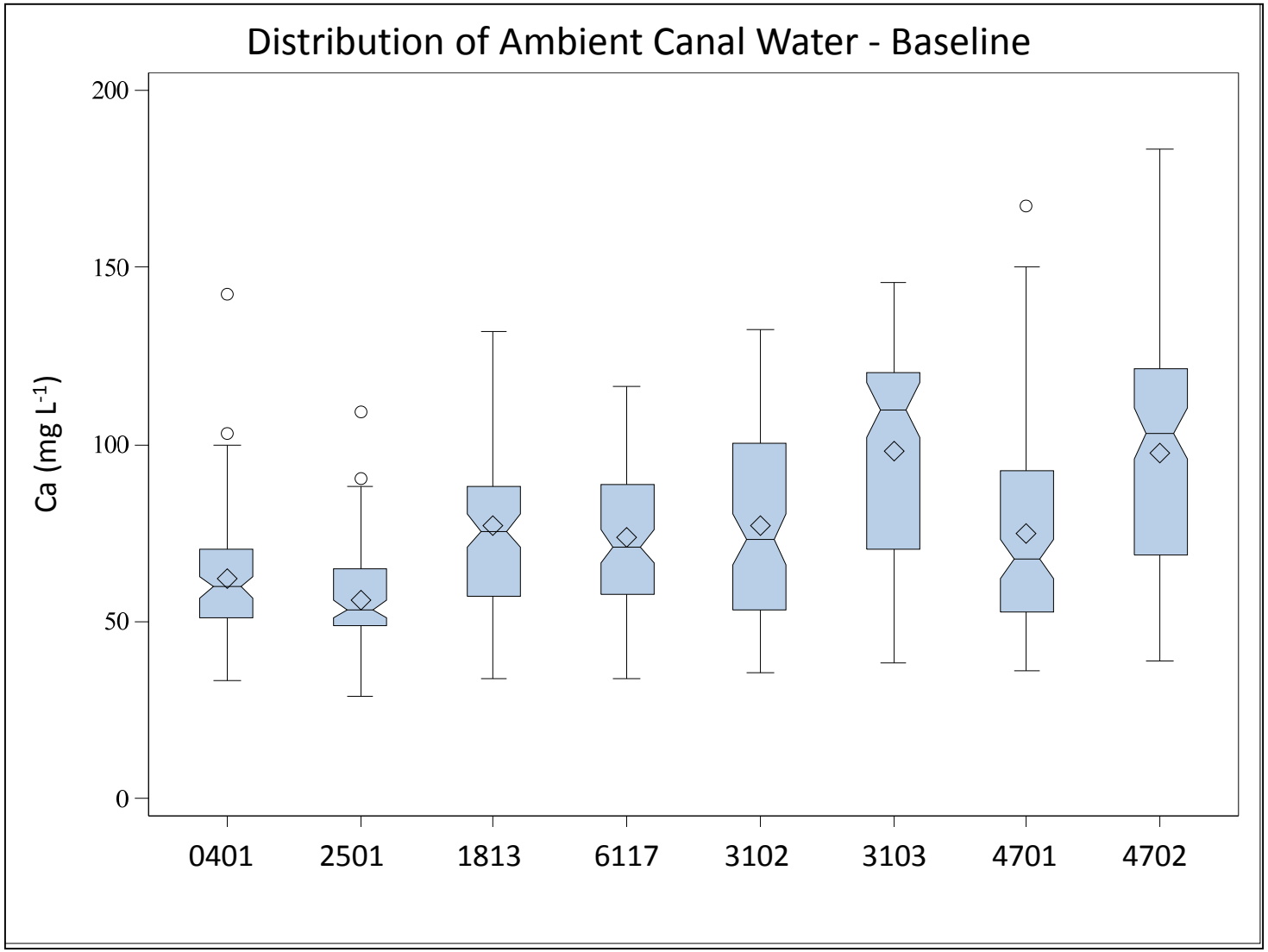

Figure A 13.Distribution of Calcium (Ca) concentrations in ambient canal water samples from calibration period.
The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

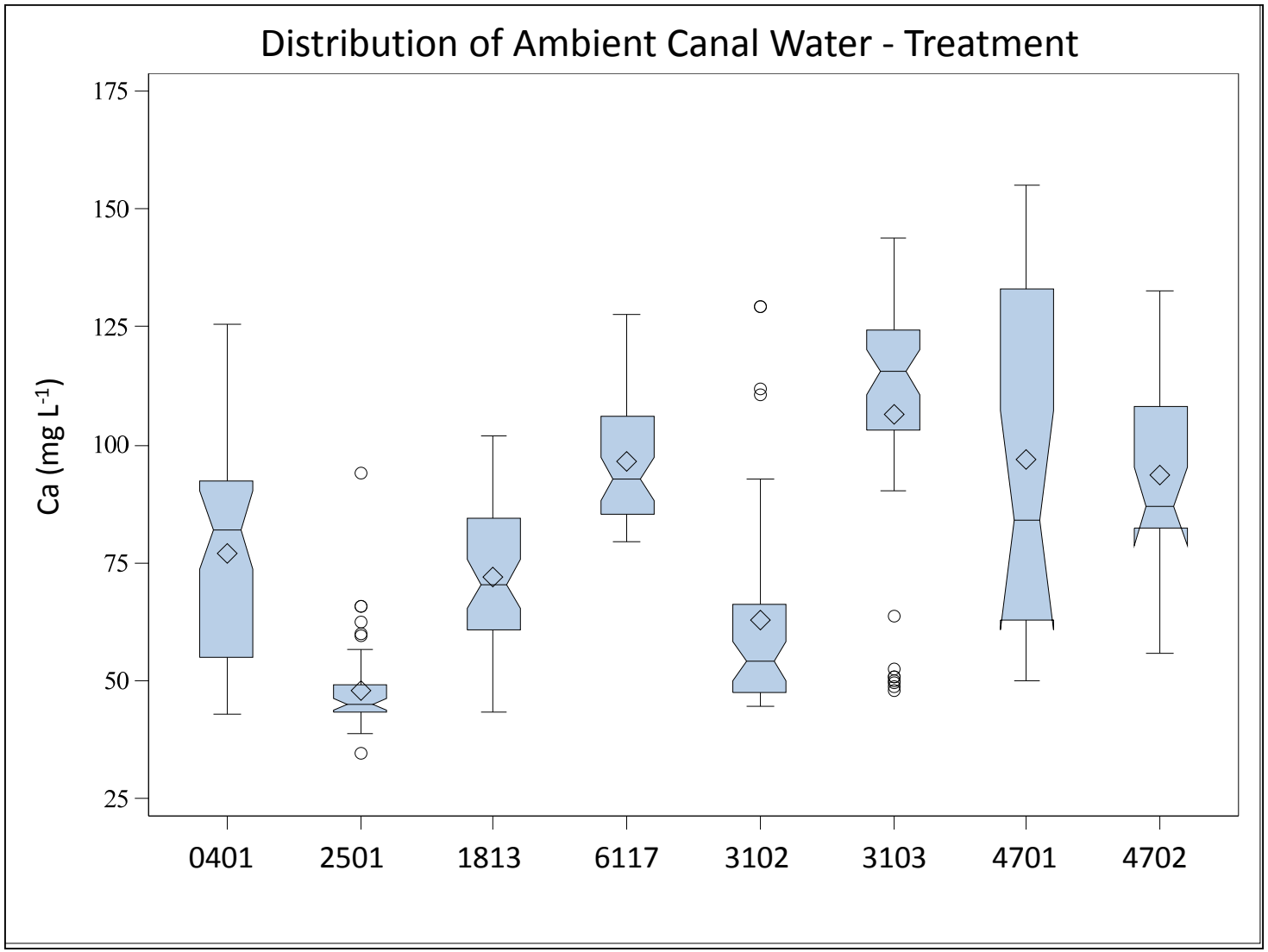

Figure A 14. Distribution of Calcium (Ca) concentrations in ambient canal water samples from treatment period.
The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

Table A 17. Detailed water quality parameters of drainage water samples collected from farm 0401 from February 2011 through April 2015.

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/29/2011	0.097	0.028	0.069	0.021	0.076	27.6	36.2	7.65
03/31/2011	0.084	0.020	0.064	0.026	0.058	20.5	52.3	8.05
07/05/2011	0.087	0.052	0.035	0.042	0.045	17.1	99.1	7.86
07/06/2011	0.055	0.042	0.013	0.031	0.024	4.3	112.5	7.53
07/08/2011	0.064	0.028	0.036	0.019	0.045	10.3	148.0	7.88
07/09/2011	0.059	0.034	0.025	0.025	0.034	7.0	147.5	7.66
07/10/2011	0.085	0.050	0.035	0.043	0.042	15.6	148.0	7.68
07/11/2011	0.095	0.029	0.066	0.032	0.063	37.1	143.6	7.82
07/15/2011	0.053	0.026	0.027	0.022	0.031	6.7	124.3	7.87
07/19/2011	0.059	0.027	0.032	0.020	0.039	8.2	113.7	7.96
07/22/2011	0.162	0.029	0.133	0.022	0.140	24.3	100.8	7.94
07/23/2011	0.124	0.031	0.093	0.021	0.103	49.3	96.1	8.01
08/19/2011	0.046	0.029	0.017	0.021	0.026	7.5	84.4	7.36
08/20/2011	0.096	0.029	0.067	0.025	0.071	31.0	121.9	7.51
08/22/2011	0.190	0.027	0.163	0.026	0.164	76.9	123.7	7.72
08/24/2011	0.084	0.043	0.041	0.024	0.060	20.4	129.9	7.76
08/26/2011	0.059	0.031	0.028	0.021	0.038	26.9	132.1	7.66
08/29/2011	0.178	0.048	0.130	0.040	0.139	62.5	103.6	7.71
09/02/2011	0.065	0.038	0.027	0.033	0.032	6.8	129.9	7.73
09/05/2011	0.052	0.030	0.022	0.022	0.030	19.7	nd	8.12
09/09/2011	0.148	0.055	0.093	0.042	0.106	14.8	115.0	7.83
09/12/2011	0.063	0.028	0.035	0.019	0.045	13.9	137.8	7.84
09/19/2011	0.158	0.050	0.108	0.042	0.116	18.1	106.8	7.79
09/26/2011	0.175	0.044	0.131	0.045	0.130	33.9	92.3	7.78
09/29/2011	0.092	0.040	0.052	0.039	0.053	29.2	100.5	7.86
10/01/2011	0.123	0.044	0.079	0.041	0.082	46.4	98.9	7.87
10/09/2011	0.162	0.037	0.125	0.043	0.120	56.4	106.0	8.07
10/19/2011	0.084	0.047	0.037	0.046	0.038	12.4	112.8	7.68
10/24/2011	0.123	0.051	0.072	0.049	0.074	31.2	132.2	7.82
10/31/2011	0.193	0.072	0.121	0.064	0.129	59.3	116.9	7.91
11/02/2011	0.098	0.066	0.032	0.067	0.031	14.6	143.0	7.77
11/04/2011	0.127	0.044	0.083	0.070	0.057	20.8	137.4	7.93
11/07/2011	0.057	0.043	0.014	0.058	#	nd	138.8	8.18
11/08/2011	0.089	0.047	0.042	0.064	0.025	39.9	127.5	7.89
11/22/2011	0.058	0.025	0.033	0.024	0.034	21.7	nd	7.91
05/18/2012	0.054	0.016	0.038	0.007	0.048	nd	82.7	7.98
05/21/2012	0.057	0.019	0.038	0.010	0.047	20.5	112.0	8.03
05/23/2012	0.041	0.018	0.023	0.010	0.031	3.8	140.1	7.94
05/29/2012	0.132	0.091	0.041	0.080	0.052	10.2	123.5	7.87
05/30/2012	0.076	0.054	0.022	0.050	0.026	5.1	141.4	7.72
05/31/2012	0.046	0.030	0.016	0.029	0.018	20.3	136.4	7.95
06/01/2012	0.047	0.021	0.026	0.022	0.025	3.8	139.1	7.80
06/11/2012	0.074	0.025	0.049	0.016	0.058	9.0	124.2	8.01
06/15/2012	0.070	0.033	0.037	0.013	0.057	11.5	124.5	7.96

Sampling Date	**TP**[1] (mg/l)	**TDP** (mg/l)	**PP** (mg/l)	**SRP** (mg/l)	**DOP** (mg/l)	**TSS** (mg/l)	**Ca** (mg/l)	**pH**
06/18/2012	0.140	0.028	0.112	0.024	0.116	63.6	114.1	7.93
06/22/2012	0.085	0.018	0.067	0.010	0.075	10.0	105.9	8.05
06/27/2012	0.058	0.023	0.035	0.020	0.038	6.0	140.9	8.18
08/27/2012	0.362	0.263	0.099	0.261	0.101	20.6	61.1	7.79
08/28/2012	0.389	0.336	0.053	0.324	0.066	8.8	40.1	7.49
08/29/2012	0.487	0.441	0.046	0.431	0.056	14.0	39.2	7.17
08/30/2012	0.925	0.503	0.422	0.490	0.435	6.0	48.5	7.27
08/31/2012	0.366	0.339	0.027	0.319	0.047	7.6	109.2	7.60
09/01/2012	0.234	0.118	0.116	0.120	0.114	62.2	146.4	7.91
09/03/2012	0.169	0.072	0.097	0.072	0.097	44.4	159.5	7.93
09/05/2012	0.502	0.470	0.032	0.432	0.070	4.0	86.3	7.36
09/06/2012	0.094	0.045	0.049	0.041	0.053	12.5	155.6	7.64
09/10/2012	0.135	0.040	0.095	0.013	0.122	23.6	138.1	8.22
09/12/2012	0.139	0.057	0.082	0.029	0.110	23.8	126.2	7.64
09/15/2012	0.076	0.035	0.041	0.025	0.051	8.4	167.0	8.16
09/17/2012	0.084	0.044	0.040	0.032	0.053	32.0	164.2	7.98
09/19/2012	0.080	0.040	0.040	0.039	0.041	16.2	163.1	7.73
09/21/2012	0.067	0.035	0.032	0.022	0.045	9.4	158.3	8.05
09/24/2012	0.074	0.036	0.038	0.030	0.044	31.0	146.1	7.97
10/02/2012	0.074	0.026	0.048	0.018	0.056	27.6	126.3	7.89
10/08/2012	0.055	0.025	0.030	0.022	0.033	41.8	121.7	7.92
10/10/2012	0.057	0.029	0.028	0.021	0.036	14.0	144.8	7.97
10/22/2012	0.082	0.026	0.056	0.012	0.070	36.4	113.0	8.12
02/16/2013	0.069	0.016	0.053	0.004	0.065	18.4	68.7	8.03
02/18/2013	0.045	0.020	0.025	0.009	0.036	nd	92.0	nd
04/18/2013	0.045	0.016	0.029	0.013	0.032	10.2	110.8	7.81
04/19/2013	0.049	0.013	0.036	0.014	0.035	nd	128.2	8.37
06/2/2013	0.065	0.049	0.016	0.034	0.015	5.6	136.7	7.88
06/3/2013	0.061	0.027	0.034	0.014	0.013	nd	144.0	8.12
06/5/2013	0.174	0.025	0.149	0.017	0.008	11.8	145.2	7.61
06/7/2013	0.293	0.265	0.028	0.221	0.044	5.4	122.5	7.72
06/8/2013	0.555	0.469	0.086	0.493	#	5.4	67.4	7.73
06/10/2013	0.731	0.653	0.078	0.740	#	23.4	36.6	7.38
06/11/2013	0.264	0.235	0.029	0.213	0.022	5.5	137.9	7.91
06/13/2013	0.156	0.083	0.073	0.063	0.020	4.0	155.5	7.74
06/16/2013	0.080	0.048	0.032	0.030	0.018	5.4	157.3	7.92
06/22/2013	0.349	0.293	0.056	0.244	0.049	10.2	91.0	7.54
06/24/2013	0.162	0.129	0.033	0.195	#	17.5	141.8	7.90
07/5/2013	0.066	0.037	0.029	0.023	0.015	6.0	165.2	7.77
07/8/2013	0.046	0.031	0.015	0.020	0.011	6.4	160.9	7.68
07/12/2013	0.084	0.020	0.064	0.013	0.007	99.8	148.9	7.61
07/15/2013	0.097	0.028	0.069	0.025	0.003	22.8	159.9	7.66
07/16/2013	0.185	0.036	0.149	0.145	#	9.6	109.4	7.58
07/17/2013	0.122	0.081	0.041	0.067	0.014	4.6	141.1	7.57
07/18/2013	0.115	0.075	0.040	0.071	0.004	7.2	149.9	7.74
07/24/2013	0.076	0.046	0.030	0.027	0.019	12.8	164.7	7.86
07/29/2013	0.073	0.031	0.042	0.020	0.011	11.8	151.8	7.62

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
08/30/2013	0.092	0.032	0.060	0.008	0.025	10.2	126.2	7.74
08/31/2013	0.065	0.019	0.046	0.008	0.011	16.6	149.7	7.77
09/12/2013	0.049	0.015	0.034	0.010	0.005	13.8	148.3	7.73
09/13/2013	0.051	0.015	0.036	0.014	0.001	7.6	153.8	7.68
09/16/2013	0.039	0.009	0.030	0.014	#	7.4	167.5	7.62
09/17/2013	0.055	0.018	0.037	0.021	#	6.0	159.6	7.48
09/18/2013	0.064	0.027	0.037	0.025	0.002	5.8	146.6	7.85
09/19/2013	0.222	0.039	0.183	0.055	#	nd	152.1	8.00
09/23/2013	0.056	0.028	0.028	0.025	0.003	10.8	160.0	7.84
09/26/2013	0.106	0.030	0.076	0.026	0.004	34.2	151.9	7.66
09/28/2013	0.057	0.018	0.039	0.015	0.003	nd	158.0	8.15
12/2/2013	0.065	0.143	#	0.013	0.130	nd	92.5	7.99
01/13/2014	0.096	0.035	0.061	0.016	0.019	9.6	103.9	7.94
01/31/2014	0.237	0.165	0.072	0.143	0.022	10.2	102.6	7.74
02/1/2014	0.187	0.123	0.064	0.110	0.013	10.6	134.2	7.45
02/3/2014	0.097	0.054	0.043	0.047	0.007	8.6	115.6	7.93
02/4/2014	0.078	0.038	0.040	0.034	0.004	9.6	146.0	8.03
02/6/2014	0.148	0.077	0.071	0.067	0.010	11.8	137.0	7.89
02/12/2014	0.087	0.044	0.043	0.035	0.009	12.2	157.9	7.93
03/7/2014	0.134	0.023	0.111	0.018	0.005	nd	104.5	8.04
6/16/2014	0.054	0.015	0.039	0.013	0.002	6.60	92.34	7.72
6/20/2014	0.151	0.102	0.049	0.079	0.023	6.80	129.84	7.65
6/23/2014	0.091	0.054	0.037	0.051	0.003	8.20	140.14	7.94
7/10/2014	0.075	0.021	0.054	0.015	0.006	11.80	123.20	7.83
7/17/2014	0.063	0.033	0.030	0.023	0.010	9.60	146.62	7.62
7/21/2014	0.042	0.017	0.025	0.014	0.003	8.80	152.14	7.86
7/22/2014	0.026	#	0.027	0.010	#	8.80	143.97	7.60
8/4/2014	0.050	0.012	0.038	0.011	0.001	14.60	122.86	8.02
8/5/2014	0.032	0.024	0.008	0.015	0.009	11.40	136.67	7.72
8/6/2014	0.027	0.009	0.018	0.007	0.002	8.20	152.99	8.01
8/9/2014	0.037	0.010	0.027	0.008	0.002	7.80	161.61	8.23
9/22/2014	0.044	#	0.050	0.009	#	9.40	107.14	7.80
9/23/2014	0.302	#	0.306	0.012	#	nd	122.03	8.10
9/25/2014	0.058	#	0.069	0.008	#	13.60	136.79	7.93
9/27/2014	0.125	0.011	0.114	0.009	0.002	126.80	128.11	8.18
10/1/2014	0.223	0.080	0.143	0.081	#	36.20	139.18	7.48
10/2/2014	0.224	0.145	0.079	0.121	0.024	37.00	148.72	7.63
10/3/2014	0.317	0.092	0.225	0.087	0.005	36.80	162.14	7.54
10/7/2014	0.103	0.035	0.068	0.031	0.004	10.80	168.53	7.92
10/13/2014	0.166	0.018	0.148	nd	0.018	93.40	175.07	8.11
10/22/2014	0.080	0.028	0.052	0.019	0.009	11.00	136.79	7.72
10/23/2014	0.102	0.026	0.076	0.025	0.001	18.20	155.07	7.53
10/25/2014	0.065	0.031	0.034	0.027	0.004	13.25	178.44	8.11
11/11/2014	0.054	0.014	0.040	0.014	0.000	11.80	114.99	7.87
3/2/2015	0.116	0.033	0.083	0.029	0.005	24.20	85.99	7.76
3/4/2015	0.188	0.015	0.173	0.015	#	18.00	108.03	7.97

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P;

TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 18. Detailed water quality parameters of drainage water samples collected from farm 2501 from February 2011 through April 2015.

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/29/2011	0.071	0.060	0.011	0.065	0.006	23.8	37.1	7.77
03/31/2011	0.067	0.038	0.029	0.020	0.048	12.9	43.8	8.07
07/05/2011	0.072	0.038	0.034	0.028	0.044	16.3	93.6	7.96
07/06/2011	0.046	0.033	0.013	0.018	0.028	3.2	114.3	7.63
07/07/2011	0.057	0.033	0.024	0.025	0.032	3.8	137.3	7.78
07/08/2011	0.052	0.037	0.015	0.031	0.021	4.5	128.0	7.73
07/10/2011	0.057	0.031	0.026	0.026	0.031	2.4	140.1	7.75
07/11/2011	0.042	0.025	0.017	0.022	0.020	3.2	143.9	8.01
07/14/2011	0.053	0.020	0.033	0.013	0.041	3.1	125.9	7.95
07/15/2011	0.064	0.016	0.048	0.014	0.050	18.7	121.6	8.21
08/20/2011	0.085	0.033	0.052	0.021	0.064	29.9	98.3	7.42
08/24/2011	0.135	0.083	0.052	0.049	0.086	30.6	136.5	7.55
08/25/2011	0.061	0.042	0.019	0.033	0.028	8.0	142.7	7.42
08/26/2011	0.046	0.034	0.012	0.034	0.013	5.1	136.4	7.54
09/02/2011	0.061	0.030	0.031	0.023	0.038	20.2	127.4	7.74
09/09/2011	0.074	0.017	0.057	0.011	0.063	6.7	136.1	7.75
09/10/2011	0.109	0.052	0.057	0.044	0.065	14.5	126.4	7.95
09/12/2011	0.070	0.029	0.041	0.026	0.044	21.0	142.9	7.85
09/30/2011	0.088	0.026	0.062	0.018	0.071	19.5	114.5	7.80
10/20/2011	0.132	0.031	0.101	0.026	0.106	24.7	126.2	7.64
10/21/2011	0.073	0.038	0.035	0.033	0.040	12.5	139.9	7.66
10/31/2011	0.101	0.026	0.075	0.019	0.082	30.2	132.2	7.79
11/01/2011	0.109	0.073	0.036	0.059	0.050	14.5	81.8	7.69
11/02/2011	0.080	0.052	0.028	0.052	0.028	5.3	146.5	7.73
11/03/2011	0.084	0.058	0.026	0.056	0.028	11.5	145.2	7.69
11/04/2011	0.121	0.069	0.052	0.052	0.069	10.9	144.6	7.78
11/07/2011	0.072	0.043	0.029	0.050	0.022	nd	148.0	8.09
05/17/2012	0.107	0.040	0.067	0.021	0.086	27.6	nd	7.73
05/18/2012	0.090	0.037	0.053	0.008	0.082	10.9	91.3	7.81
05/21/2012	0.121	0.054	0.067	0.040	0.081	14.5	119.5	7.94
05/22/2012	0.088	0.045	0.043	0.039	0.049	3.4	120.2	7.88
05/23/2012	0.082	0.043	0.039	0.036	0.046	6.3	116.3	8.00
05/29/2012	0.087	0.038	0.049	0.025	0.062	6.6	111.9	7.89
05/30/2012	0.050	0.027	0.023	0.024	0.026	2.5	131.5	7.68
06/26/2012	0.058	0.030	0.028	0.022	0.036	16.4	124.6	7.76
06/27/2012	0.080	0.044	0.036	0.043	0.037	11.0	118.9	7.65
08/27/2012	0.253	0.160	0.093	0.153	0.100	16.4	64.3	7.62
08/28/2012	0.256	0.206	0.050	0.193	0.063	46.0	51.6	7.62
08/29/2012	0.407	0.357	0.050	0.341	0.066	14.0	43.8	7.14
08/30/2012	0.908	0.463	0.445	0.448	0.460	9.2	49.0	7.20
08/31/2012	0.433	0.403	0.030	0.383	0.050	5.0	80.2	7.45
09/01/2012	0.161	0.121	0.040	0.115	0.046	50.0	120.4	7.52
09/02/2012	0.118	0.066	0.052	0.055	0.063	12.4	139.1	7.62
09/03/2012	0.115	0.044	0.071	0.040	0.075	12.6	133.3	7.62

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
09/04/2012	0.097	0.040	0.057	0.033	0.064	13.8	130.8	7.72
09/06/2012	0.079	0.031	0.048	0.028	0.051	8.4	138.4	8.24
09/13/2012	0.160	0.058	0.102	0.043	0.117	15.0	111.5	7.63
09/14/2012	0.168	0.086	0.082	0.045	0.123	10.0	140.5	7.59
09/17/2012	0.086	0.037	0.049	0.033	0.053	10.2	149.1	7.57
09/18/2012	0.094	0.042	0.052	0.037	0.057	12.6	144.5	7.61
09/24/2012	0.071	0.024	0.047	0.020	0.051	10.8	157.4	7.74
09/25/2012	0.096	0.042	0.054	0.028	0.069	9.7	138.0	7.82
10/01/2012	0.074	0.035	0.039	0.024	0.050	10.6	141.0	7.72
10/04/2012	0.093	0.050	0.043	0.033	0.060	12.8	143.4	7.64
10/05/2012	0.087	0.044	0.043	0.035	0.052	1.2	139.8	7.70
10/09/2012	0.093	0.050	0.043	0.038	0.055	9.0	134.7	7.64
02/16/2013	0.098	0.047	0.051	0.041	0.057	13.2	70.5	7.51
05/3/2013	0.143	0.083	0.060	0.071	0.012	18.8	66.3	7.68
06/2/2013	0.194	0.097	0.097	0.078	0.019	nd	109.2	7.83
06/3/2013	0.138	0.075	0.063	0.059	0.016	nd	126.9	7.72
06/5/2013	0.094	0.067	0.027	0.053	0.014	nd	127.4	7.70
06/6/2013	0.111	0.064	0.047	0.052	0.013	nd	124.9	7.81
06/7/2013	0.349	0.209	0.140	0.183	0.026	nd	96.2	7.71
06/8/2013	0.397	0.251	0.146	0.228	0.023	nd	70.9	7.70
06/10/2013	0.509	0.438	0.071	0.485	#	nd	34.9	7.25
06/24/2013	0.139	0.094	0.045	0.107	#	nd	137.7	7.61
07/2/2013	0.150	0.048	0.102	0.034	0.015	nd	135.1	7.61
07/9/2013	0.098	0.033	0.065	0.014	0.020	9.0	139.4	7.79
07/10/2013	0.080	0.021	0.059	0.011	0.010	8.0	134.1	7.85
07/15/2013	0.079	0.030	0.049	0.020	0.010	10.2	135.8	7.86
07/16/2013	0.091	0.013	0.078	0.045	#	10.2	124.9	7.69
07/17/2013	0.097	0.048	0.049	0.042	0.006	7.0	127.9	7.59
07/18/2013	0.070	0.038	0.032	0.034	0.004	4.4	144.9	7.70
07/19/2013	0.068	0.030	0.038	0.018	0.013	2.4	147.9	7.76
07/22/2013	0.056	0.023	0.033	0.009	0.014	5.4	147.3	7.89
07/29/2013	0.100	0.040	0.060	0.023	0.017	5.0	130.5	7.78
07/31/2013	0.064	0.021	0.043	0.016	0.006	8.6	131.2	7.68
08/30/2013	0.143	0.043	0.100	0.023	0.020	25.0	98.2	7.59
08/31/2013	0.154	0.031	0.123	0.017	0.014	nd	115.2	8.06
09/2/2013	0.103	0.022	0.081	0.011	0.011	12.4	146.7	7.93
09/6/2013	0.189	0.025	0.164	0.010	0.015	nd	136.6	7.90
09/11/2013	0.085	0.018	0.067	0.012	0.006	18.0	nd	7.66
09/12/2013	0.080	0.018	0.062	0.016	0.002	15.8	138.9	7.70
09/13/2013	0.135	0.033	0.102	0.023	0.010	0.0	137.9	8.33
09/14/2013	0.091	0.021	0.070	0.016	0.005	nd	143.2	7.52
09/17/2013	0.075	0.018	0.057	0.017	0.001	12.4	145.0	7.47
09/18/2013	0.112	0.041	0.071	0.048	#	nd	118.5	7.71
09/19/2013	0.118	0.064	0.054	0.061	0.003	7.0	118.6	7.71
09/20/2013	0.092	0.056	0.036	0.056	0.000	3.8	141.8	7.61
09/23/2013	0.071	0.029	0.042	0.019	0.010	4.4	147.3	7.87
09/25/2013	0.096	0.023	0.073	0.015	0.008	6.8	142.9	7.64

Sampling Date	**TP**[1] (mg/l)	**TDP** (mg/l)	**PP** (mg/l)	**SRP** (mg/l)	**DOP** (mg/l)	**TSS** (mg/l)	**Ca** (mg/l)	**pH**
09/27/2013	0.092	0.025	0.067	0.017	0.008	6.0	149.3	7.91
02/1/2014	0.497	0.092	0.405	0.080	0.012	11.0	60.0	7.16
02/2/2014	0.124	0.081	0.043	0.061	0.020	22.2	105.6	7.76
02/3/2014	0.116	0.064	0.052	0.062	0.002	24.0	100.7	7.84
02/4/2014	0.132	0.068	0.064	0.063	0.005	24.0	110.7	7.84
02/5/2014	0.136	0.075	0.061	0.070	0.005	12.2	114.3	7.88
02/6/2014	0.205	0.141	0.064	0.126	0.015	14.0	101.7	7.85
02/7/2014	0.156	0.087	0.069	0.073	0.014	13.8	124.6	7.94
02/10/2014	0.120	0.096	0.024	0.086	0.010	12.2	126.6	7.93
03/7/2014	0.454	0.241	0.213	0.180	0.061	nd	114.9	7.84
03/9/2014	0.131	0.081	0.050	0.066	0.015	nd	126.9	7.95
6/14/2014	0.186	0.124	0.062	0.098	0.026	20.20	76.03	7.66
6/16/2014	0.107	0.066	0.041	0.055	0.011	12.80	96.07	7.65
6/17/2014	0.073	0.042	0.031	0.038	0.004	7.20	119.80	7.71
6/20/2014	0.104	0.043	0.061	0.034	0.009	18.80	119.19	7.75
6/23/2014	0.099	0.035	0.064	0.030	0.005	7.60	136.96	7.78
7/9/2014	0.252	0.109	0.143	0.101	0.008	13.80	49.52	7.59
7/10/2014	0.102	0.034	0.068	0.036	#	23.40	103.08	7.85
7/11/2014	0.083	0.048	0.035	0.025	0.023	16.60	134.21	7.75
7/14/2014	0.071	0.038	0.033	0.019	0.019	24.40	137.59	7.75
7/17/2014	0.081	0.024	0.057	0.018	0.006	17.20	133.86	7.65
7/18/2014	0.062	0.035	0.027	0.025	0.010	8.00	141.36	7.66
7/19/2014	0.059	0.024	0.035	0.026	#	14.20	141.51	7.62
7/23/2014	0.055	0.010	0.045	0.006	0.004	7.20	128.59	7.63
7/24/2014	0.054	0.011	0.043	0.005	0.006	7.20	132.14	7.55
7/28/2014	0.040	0.008	0.032	0.008	0.000	8.20	129.76	7.82
8/5/2014	0.032	0.014	0.018	0.020	#	8.60	121.66	7.65
8/6/2014	0.053	0.008	0.045	0.007	0.001	18.40	144.89	7.64
8/7/2014	0.052	0.014	0.038	0.006	0.008	10.20	142.80	7.76
8/9/2014	0.071	0.010	0.061	0.006	0.004	8.20	144.16	7.81
8/11/2014	0.049	0.009	0.040	0.006	0.003	8.00	152.91	7.76
8/12/2014	0.069	0.013	0.056	0.005	0.008	nd	148.71	8.19
9/22/2014	0.098	0.028	0.070	0.025	0.003	11.40	92.58	7.50
9/23/2014	0.050	0.019	0.031	0.022	#	5.80	118.20	7.74
9/24/2014	0.049	0.010	0.039	0.021	#	18.00	105.88	7.92
9/27/2014	0.315	0.013	0.302	0.014	#	6.40	133.72	7.85
9/29/2014	0.065	0.020	0.045	0.020	0.000	8.00	131.91	7.81
10/1/2014	0.087	0.033	0.054	0.028	0.005	17.40	127.10	7.53
10/2/2014	0.099	0.069	0.030	0.053	0.016	13.40	142.86	7.40
10/3/2014	0.073	0.038	0.035	0.036	0.002	9.80	157.19	7.46
10/4/2014	0.076	0.028	0.048	0.021	0.007	13.60	147.52	7.55
10/7/2014	0.062	0.027	0.035	0.027	0.000	7.00	159.52	7.50
10/22/2014	0.175	0.061	0.114	0.053	0.008	36.60	113.22	7.65
10/23/2014	0.080	0.036	0.044	0.034	0.002	12.60	149.52	7.42
10/24/2014	0.089	0.055	0.034	0.049	0.006	13.40	164.03	7.48
10/25/2014	0.087	0.060	0.027	0.048	0.012	12.80	166.61	7.60
10/27/2014	0.104	0.065	0.039	0.059	0.006	15.40	166.08	7.61

2/10/2015	0.147	0.061	0.086	0.053	0.008	22.00	51.36	nd
3/2/2015	0.111	0.075	0.036	0.055	0.020	14.60	75.99	7.58
3/3/2015	0.130	0.073	0.057	0.045	0.028	15.20	87.67	7.67
3/30/2015	0.104	0.068	0.036	0.046	0.022	22.00	61.07	7.69
4/29/2015	0.075	0.039	0.036	0.027	0.012	19.20	56.33	nd
4/30/2015	0.087	0.030	0.057	0.026	0.004	17.00	79.18	7.81

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 19. Detailed water quality parameters of drainage water samples collected from farm 1813 from February 2011 through April 2015.

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
07/05/2011	0.123	0.089	0.034	0.076	0.047	9.7	106.4	7.76
07/08/2011	0.134	0.100	0.034	0.081	0.053	5.8	135.6	7.84
07/10/2011	0.157	0.118	0.039	0.103	0.054	4.9	120.7	7.95
07/11/2011	0.127	0.060	0.067	0.051	0.077	4.1	121.9	8.03
07/15/2011	0.077	0.020	0.057	0.011	0.067	9.5	113.8	8.07
08/19/2011	0.063	0.017	0.046	0.006	0.057	8.9	102.8	7.54
08/24/2011	0.056	0.019	0.037	0.008	0.049	11.6	117.0	7.65
08/27/2011	0.045	0.013	0.032	0.008	0.037	21.0	122.5	7.78
08/30/2011	0.051	0.012	0.039	0.006	0.045	18.9	120.8	7.98
09/02/2011	0.038	0.012	0.026	0.009	0.029	9.9	119.5	7.89
09/08/2011	0.061	0.015	0.046	0.009	0.052	11.5	114.5	7.90
09/12/2011	0.046	0.017	0.029	0.013	0.033	8.4	113.5	7.74
09/13/2011	0.080	0.037	0.043	0.032	0.048	5.6	114.3	7.95
09/27/2011	0.067	0.020	0.047	0.015	0.052	24.0	109.6	8.06
10/09/2011	0.064	0.015	0.049	0.012	0.052	21.8	104.4	8.05
10/20/2011	0.068	0.032	0.036	0.032	0.037	11.3	108.0	7.67
10/21/2011	0.082	0.039	0.043	0.034	0.048	17.3	117.4	7.79
10/24/2011	0.079	0.057	0.022	0.035	0.044	9.4	117.2	7.93
10/25/2011	0.071	0.045	0.026	0.041	0.030	15.6	118.9	7.94
10/31/2011	0.093	0.037	0.056	0.032	0.061	12.8	100.7	7.63
11/01/2011	0.176	0.150	0.026	0.129	0.047	8.2	135.2	7.44
11/02/2011	0.122	0.092	0.030	0.086	0.036	14.1	110.5	7.77
11/03/2011	0.101	0.081	0.020	0.080	0.021	17.1	121.2	7.78
11/07/2011	0.059	0.042	0.017	0.055	0.004	14.9	134.3	7.93
11/08/2011	0.057	0.037	0.020	0.053	0.004	16.5	125.9	7.98
11/18/2011	0.127	0.043	0.084	0.055	0.072	19.0	132.6	8.30
11/23/2011	0.070	0.023	0.047	0.053	0.018	16.0	nd	8.07
12/15/2011	0.103	0.036	0.067	0.048	0.055	nd	97.3	7.89
05/18/2012	0.051	0.022	0.029	0.004	0.047	13.3	85.2	7.88
05/21/2012	0.085	0.043	0.042	0.033	0.053	19.2	104.0	7.73
05/23/2012	0.077	0.031	0.046	0.022	0.055	12.9	109.3	8.03
05/25/2012	0.064	0.016	0.048	0.006	0.058	28.2	108.1	7.96
05/29/2012	0.084	0.042	0.042	0.033	0.051	6.9	110.6	7.81
05/30/2012	0.093	0.049	0.044	0.041	0.052	3.5	117.7	7.71
05/31/2012	0.080	0.046	0.034	0.039	0.041	7.3	120.9	7.87
06/11/2012	0.068	0.016	0.052	0.020	0.048	29.6	109.3	7.97
06/18/2012	0.062	0.016	0.046	0.013	0.049	16.8	110.4	8.13
06/21/2012	0.071	0.020	0.051	0.012	0.059	nd	110.6	8.18
06/22/2012	0.071	0.014	0.057	0.008	0.063	7.4	107.1	7.98
06/25/2012	0.076	0.045	0.031	0.036	0.040	8.8	113.8	7.75
06/28/2012	0.084	0.061	0.023	0.059	0.025	11.2	122.3	8.03
07/24/2012	0.060	0.015	0.045	0.011	0.049	18.6	118.6	8.02
08/28/2012	0.211	0.162	0.049	0.144	0.067	8.2	64.2	7.71
08/29/2012	0.343	0.311	0.032	0.294	0.050	7.8	50.8	7.19

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
08/30/2012	0.438	0.394	0.044	0.376	0.062	3.8	43.8	7.15
08/31/2012	0.496	0.467	0.029	0.439	0.057	42.0	42.3	7.58
09/01/2012	0.472	0.432	0.040	0.438	0.034	4.2	49.8	7.25
09/02/2012	0.633	0.554	0.079	0.509	0.124	4.2	48.7	7.32
09/03/2012	0.750	0.572	0.178	0.666	0.084	6.4	56.3	7.42
09/04/2012	0.547	0.528	0.019	0.580	#	8.0	67.8	7.41
09/06/2012	0.411	0.377	0.034	0.338	0.073	7.4	105.5	7.91
09/10/2012	0.344	0.310	0.034	0.269	0.075	7.0	119.9	7.91
09/12/2012	0.175	0.143	0.032	0.106	0.069	6.0	108.4	7.51
09/13/2012	0.250	0.220	0.030	0.188	0.062	6.2	99.4	7.76
09/15/2012	0.164	0.142	0.022	0.124	0.040	3.0	125.1	8.02
09/17/2012	0.148	0.118	0.030	0.108	0.040	6.8	128.6	7.93
09/18/2012	0.120	0.103	0.017	0.095	0.025	4.2	130.4	7.69
09/20/2012	0.111	0.087	0.024	0.082	0.029	44.6	136.8	8.03
09/21/2012	0.093	0.073	0.020	0.052	0.041	18.7	137.9	8.01
09/24/2012	0.076	0.045	0.031	0.047	0.029	10.8	140.2	8.00
10/03/2012	0.084	0.042	0.042	0.035	0.049	12.2	129.5	8.12
10/05/2012	0.093	0.053	0.040	0.042	0.051	6.0	nd	8.16
10/09/2012	0.103	0.024	0.079	0.014	0.089	23.4	126.1	8.07
10/15/2012	0.671	0.009	0.662	0.008	0.663	60.4	129.1	7.93
10/27/2012	0.084	0.028	0.056	0.013	0.071	59.6	121.2	8.28
12/07/2012	0.091	0.036	0.055	0.020	0.071	nd	83.0	7.89
02/15/2013	0.085	0.027	0.058	0.013	0.072	28.4	83.2	7.87
02/16/2013	0.077	0.033	0.044	0.023	0.054	26.0	103.4	8.01
02/18/2013	0.064	0.036	0.028	0.025	0.039	nd	107.9	8.04
02/22/2013	0.074	0.068	0.006	0.020	0.054	12.8	nd	8.01
02/28/2013	0.094	0.012	0.082	0.003	0.091	30.2	114.8	8.14
03/21/2013	0.097	0.026	0.071	0.006	0.091	27.8	104.5	8.25
03/27/2013	0.075	0.021	0.054	0.003	0.072	12.8	115.4	8.56
04/06/2013	0.078	0.041	0.037	0.006	0.072	23.4	105.8	8.20
04/18/2013	0.067	0.009	0.058	0.011	0.057	30.0	97.7	8.31
05/6/2013	0.060	0.024	0.036	0.019	0.005	10.6	109.0	7.93
06/2/2013	0.162	0.131	0.031	0.092	0.039	8.6	119.9	7.55
06/3/2013	0.195	0.178	0.017	0.139	0.039	4.2	119.6	7.57
06/5/2013	0.181	0.154	0.027	0.132	0.022	9.0	125.0	7.47
06/6/2013	0.157	0.126	0.031	0.110	0.017	5.4	114.9	7.77
06/7/2013	0.350	0.313	0.037	0.267	0.046	5.0	91.8	7.43
06/8/2013	0.450	0.415	0.035	0.361	0.054	7.8	72.8	7.31
06/10/2013	0.444	0.424	0.020	0.363	0.061	11.0	50.2	7.22
06/11/2013	0.459	0.438	0.021	0.391	0.047	5.8	62.6	7.26
06/12/2013	0.443	0.424	0.019	0.363	0.062	8.0	95.6	7.23
06/13/2013	0.370	0.345	0.025	0.289	0.056	7.0	120.3	7.30
06/14/2013	0.324	0.304	0.020	0.258	0.046	6.0	126.2	7.27
06/16/2013	0.256	0.226	0.030	0.196	0.031	3.2	132.9	7.78
06/18/2013	0.166	0.110	0.056	0.084	0.026	nd	136.8	7.58
06/21/2013	0.114	0.031	0.083	0.012	0.019	8.2	134.7	7.38
06/22/2013	0.127	0.068	0.059	0.055	0.013	9.8	127.1	7.77

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
06/24/2013	0.116	0.066	0.050	0.008	0.058	10.3	130.8	7.95
06/25/2013	0.088	0.062	0.026	0.057	0.005	8.2	140.8	7.81
06/27/2013	0.077	0.020	0.057	0.014	0.006	8.2	139.9	8.13
07/1/2013	0.085	0.037	0.048	0.019	0.018	6.4	134.0	8.10
07/2/2013	0.072	0.011	0.061	0.009	0.002	7.0	130.0	7.93
07/4/2013	0.070	0.041	0.029	0.032	0.009	4.4	134.4	8.15
07/6/2013	0.087	0.054	0.033	0.039	0.015	7.0	128.7	7.99
07/8/2013	0.085	0.057	0.028	0.045	0.012	6.8	130.4	7.76
07/9/2013	0.080	0.045	0.035	0.030	0.015	nd	131.2	7.88
07/12/2013	0.104	0.055	0.049	0.038	0.017	14.2	126.0	7.63
07/15/2013	0.153	0.123	0.030	0.108	0.015	5.0	115.7	8.00
07/16/2013	0.297	0.297	0.000	0.257	0.040	3.8	86.8	7.43
07/17/2013	0.275	0.228	0.047	0.207	0.021	4.0	95.8	7.54
07/22/2013	0.192	0.159	0.033	0.003	0.157	3.4	125.5	7.53
07/24/2013	0.095	0.061	0.034	0.048	0.013	5.6	144.6	8.02
07/25/2013	0.074	0.024	0.050	0.020	0.005	10.8	137.2	7.80
07/29/2013	0.076	0.011	0.065	0.010	0.001	5.6	129.0	7.82
08/8/2013	0.110	0.034	0.076	0.016	0.018	3.4	130.9	7.84
08/28/2013	0.164	0.062	0.102	0.040	0.022	nd	84.6	7.95
08/30/2013	0.125	0.062	0.063	0.047	0.016	18.0	105.9	7.75
08/31/2013	0.108	0.058	0.050	0.041	0.017	nd	113.6	8.07
09/2/2013	0.095	0.048	0.047	0.029	0.019	11.3	120.4	7.62
09/4/2013	0.079	0.027	0.052	0.024	0.003	nd	126.0	7.93
09/6/2013	0.072	0.028	0.044	0.013	0.015	nd	130.5	7.98
09/9/2013	0.063	0.018	0.045	0.011	0.007	11.4	115.5	7.80
09/10/2013	0.063	0.016	0.047	0.013	0.003	nd	116.2	8.04
09/12/2013	0.061	0.023	0.038	0.017	0.006	12.6	113.3	7.68
09/13/2013	0.058	0.023	0.035	0.024	#	11.2	121.3	7.81
09/14/2013	0.050	0.028	0.022	0.026	0.002	14.6	123.9	7.79
09/16/2013	0.041	0.018	0.023	0.021	#	8.2	121.0	7.54
09/17/2013	0.059	0.033	0.026	0.034	#	15.2	116.7	7.54
09/18/2013	0.101	0.044	0.057	0.045	#	12.4	114.8	7.80
09/19/2013	0.065	0.044	0.021	0.039	0.005	6.0	124.5	7.73
09/20/2013	0.067	0.046	0.021	0.044	0.003	7.6	123.9	7.79
09/23/2013	0.068	0.041	0.027	0.035	0.006	7.1	128.5	7.83
09/24/2013	0.064	0.035	0.029	0.025	0.010	nd	131.2	7.92
09/25/2013	0.082	0.034	0.048	0.028	0.006	nd	125.6	7.97
09/26/2013	0.065	0.043	0.022	0.035	0.008	4.2	126.2	7.75
09/27/2013	0.074	0.048	0.026	0.043	0.005	6.4	127.6	8.17
09/28/2013	0.069	0.045	0.024	0.036	0.009	10.7	129.5	8.15
09/30/2013	0.062	0.037	0.025	0.035	0.003	3.6	132.0	7.87
10/8/2013	0.060	0.019	0.041	0.016	0.003	8.4	nd	7.97
10/9/2013	0.071	0.013	0.058	0.011	0.002	nd	132.5	8.33
10/11/2013	0.064	0.011	0.053	0.013	#	nd	129.4	7.99
11/22/2013	0.159	0.107	0.052	0.093	0.014	4.8	58.4	7.73
11/25/2013	0.080	0.045	0.035	0.037	0.008	9.4	71.8	7.53
11/27/2013	0.063	0.039	0.024	0.033	0.006	10.6	80.3	nd

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
12/2/2013	0.065	0.046	0.019	0.026	0.020	28.0	82.2	7.93
12/3/2013	0.059	0.039	0.020	0.031	0.008	38.0	87.1	7.76
12/16/2013	0.043	0.012	0.031	0.012	0.000	nd	87.9	7.93
12/18/2013	0.047	0.028	0.019	0.024	0.004	7.8	83.3	8.06
12/23/2013	0.038	0.007	0.031	0.008	#	nd	84.8	nd
01/6/2014	0.069	0.028	0.041	0.029	#	nd	68.3	nd
01/9/2014	0.050	0.025	0.025	nd	0.025	nd	81.5	7.79
01/13/2014	0.061	0.031	0.030	0.025	0.007	nd	91.3	8.02
01/31/2014	0.406	0.234	0.172	0.204	0.031	13.6	81.6	7.63
02/1/2014	0.126	0.098	0.028	0.102	#	6.0	91.9	7.82
02/2/2014	0.156	0.135	0.021	0.122	0.013	12.0	104.1	7.89
02/4/2014	0.071	0.047	0.024	0.043	0.004	5.0	115.0	7.86
02/7/2014	0.137	0.115	0.022	0.103	0.012	10.4	120.6	7.85
02/10/2014	0.101	0.082	0.019	0.073	0.009	16.2	124.7	8.01
02/14/2014	0.065	0.028	0.037	0.028	0.000	5.0	129.3	8.13
02/26/2014	0.079	0.043	0.036	0.035	0.008	30.0	125.3	7.98
03/7/2014	0.080	0.029	0.051	0.021	0.008	nd	114.3	8.00
03/9/2014	0.069	0.035	0.034	0.033	0.002	nd	126.8	8.03
03/12/2014	0.077	0.039	0.038	0.028	0.011	nd	124.8	7.99
03/26/2014	0.089	0.037	0.052	0.014	0.023	nd	88.9	8.13
04/1/2014	0.068	0.029	0.039	0.014	0.015	7.2	99.0	8.03
04/18/2014	0.083	0.026	0.057	0.006	0.020	nd	63.1	nd
5/7/2014	0.075	0.005	0.070	0.001	0.004	nd	61.65	7.66
6/3/2014	0.064	0.011	0.053	0.008	0.003	36.67	85.60	8.04
6/8/2014	0.042	0.016	0.026	0.008	0.008		97.03	8.05
6/13/2014	0.089	0.052	0.037	0.005	0.047	8.60	92.13	7.96
6/14/2014	0.064	0.023	0.041	0.009	0.014	10.60	115.06	7.87
6/16/2014	0.054	0.035	0.019	0.026	0.009	9.40	109.24	7.98
6/17/2014	0.041	0.019	0.022	0.012	0.007	7.80	120.33	7.91
6/19/2014	0.069	0.030	0.039	0.017	0.013	9.60	115.71	7.94
6/20/2014	0.091	0.061	0.030	0.051	0.010	12.00	111.84	7.93
6/23/2014	0.061	0.031	0.030	0.029	0.002	7.40	118.85	8.11
6/27/2014	0.060	0.015	0.045	0.009	0.006	nd	120.56	8.18
6/30/2014	0.048	0.010	0.038	0.009	0.001	4.60	118.80	8.14
7/2/2014	0.045	0.031	0.014	0.008	0.023	nd	113.65	8.12
7/7/2014	0.038	0.016	0.022	0.011	0.005	17.80	100.88	8.36
7/9/2014	0.078	0.042	0.036	0.013	0.029	3.60	103.46	7.66
7/10/2014	0.080	0.040	0.040	0.018	0.022	9.60	124.43	7.78
7/14/2014	0.050	0.030	0.020	0.014	0.016	7.80	127.85	7.80
7/15/2014	0.043	0.012	0.031	0.011	0.001	8.20	127.45	7.96
7/17/2014	0.042	0.008	0.034	0.006	0.002	8.00	122.19	7.80
7/18/2014	0.040	0.011	0.029	0.008	0.003	10.20	124.16	7.80
7/21/2014	0.035	0.010	0.025	0.019	#	9.40	127.87	7.56
7/22/2014	0.032	#	0.035	0.006	#	9.80	129.28	7.73
7/23/2014	0.044	0.009	0.035	0.009	0.000	8.40	131.22	7.85
7/24/2014	0.044	0.016	0.028	0.014	0.002	15.40	135.61	7.95
7/28/2014	0.130	0.009	0.121	0.009	0.000	9.80	142.73	7.98

8/1/2014	0.055	0.010	0.045	0.008	0.002	13.60	131.74	7.85
8/4/2014	0.052	0.016	0.036	0.009	0.007		129.00	8.07
8/6/2014	0.052	0.010	0.042	0.007	0.003	10.80	136.08	7.73
8/9/2014	0.051	0.008	0.043	0.009	#	9.60	138.20	7.99
8/11/2014	0.053	0.016	0.037	0.008	0.008	5.20	143.39	8.08
8/12/2014	0.049	0.012	0.037	0.007	0.005	9.60	140.36	8.00
8/18/2014	0.063	0.025	0.038	0.019	0.006	19.20	124.77	8.37
9/4/2014	0.064	0.007	0.057	0.014	#	11.40	108.43	7.92
9/9/2014	0.046	#	0.051	0.012	#	11.80	93.03	7.74
9/13/2014	0.063	0.019	0.044	0.011	0.008	9.60	93.17	7.73
9/19/2014	0.057	0.014	0.043	0.014	0.000	6.00	118.81	7.83
9/22/2014	0.060	0.014	0.046	0.012	0.002	13.60	117.97	7.78
9/23/2014	0.058	0.023	0.035	0.018	0.005	3.00	124.19	8.01
9/24/2014	0.056	0.019	0.037	0.022	#	25.80	124.12	7.79
9/27/2014	0.047	0.035	0.012	0.022	0.013	9.00	130.00	8.23
9/30/2014	0.091	0.033	0.058	0.029	0.004	6.40	118.52	7.68
10/1/2014	0.135	0.098	0.037	0.084	0.014	17.80	108.83	7.79
10/2/2014	0.210	0.181	0.029	0.155	0.026	7.40	98.40	7.39
10/3/2014	0.153	0.029	0.124	0.100	#	18.20	116.39	7.30
10/4/2014	0.152	0.118	0.034	0.104	0.014	8.20	119.71	7.83
10/7/2014	0.078	0.064	0.014	0.053	0.011	5.00	132.37	7.72
10/9/2014	0.152	0.047	0.105	0.034	0.013	8.60	140.61	7.73
10/13/2014	0.080	0.034	0.046	0.025	0.009	8.40	144.20	7.94
10/14/2014	0.072	0.019	0.053	0.011	0.008	9.40	133.99	7.85
10/22/2014	0.072	0.015	0.057	0.006	0.009	16.60	123.59	7.92
10/23/2014	0.064	0.029	0.035	0.018	0.011	7.40	135.68	7.80
10/25/2014	0.082	0.044	0.038	0.036	0.008	26.29	148.02	7.58
10/29/2014	0.059	0.015	0.044	0.011	0.004	14.67	146.70	8.06
11/7/2014	0.047	0.012	0.035	0.007	0.005	6.00	66.28	7.73
11/10/2014	0.049	0.026	0.023	0.018	0.008	12.20	66.56	7.72
11/11/2014	0.061	0.033	0.028	0.031	0.002	11.20	83.38	7.59
11/11/2014	0.061	0.033	0.028	0.031	0.002	11.80	83.38	7.59
11/12/2014	0.060	0.032	0.028	0.030	0.002	15.71	102.31	7.77
11/14/2014	0.063	0.036	0.027	0.032	0.004	16.44	110.49	7.79
11/19/2014	0.053	0.021	0.032	0.018	0.003	12.80	112.97	7.81
11/24/2014	0.052	0.016	0.036	0.007	0.009	13.18	107.47	7.94
11/26/2014	0.055	0.020	0.035	0.011	0.010	10.40	80.48	8.04
12/8/2014	0.050	0.009	0.041	0.006	0.003	10.00	94.05	7.03
1/5/2015	0.092	0.019	0.073	0.021	#	21.94	66.87	7.81
1/8/2015	0.065	0.015	0.050	0.019	#	21.25	67.32	7.79
1/26/2015	0.058	0.013	0.045	0.010	0.003	15.20	78.99	7.70
2/5/2015	0.100	0.012	0.088	0.011	0.001	27.14	56.41	7.78
2/6/2015	0.095	0.027	0.068	0.018	0.009	25.00	56.03	7.85
2/9/2015	0.087	0.036	0.051	0.025	0.011	18.00	63.65	7.61
2/27/2015	0.060	0.012	0.048	0.004	0.008	16.60	72.53	7.76
3/2/2015	0.079	0.038	0.041	0.016	0.022	17.80	80.87	7.78
3/3/2015	0.061	0.031	0.030	0.016	0.015	10.80	85.72	7.87
3/16/2015	0.074	0.026	0.048	0.020	0.006	4.40	82.36	7.65
3/23/2015	0.074	0.016	0.058	0.006	0.010	15.20	58.13	7.76

3/30/2015	0.067	0.035	0.032	0.028	0.007	13.80	nd	7.78
4/7/2015	0.066	0.010	0.056	0.012	#	19.20	82.14	7.89
4/30/2015	0.062	0.005	0.057	0.013	#	14.00	70.28	7.64

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 20. Detailed water quality parameters of drainage water samples collected from farm 6117 from February 2011 through April 2015.

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
07/05/2011	0.093	0.043	0.050	0.031	0.063	5.3	111.9	7.79
07/06/2011	0.112	0.072	0.040	0.059	0.053	5.4	124.0	7.64
07/10/2011	0.133	0.042	0.091	0.030	0.104	4.7	123.2	7.71
07/15/2011	0.102	0.041	0.061	0.029	0.073	5.8	117.3	7.93
08/19/2011	0.114	0.026	0.088	0.012	0.102	4.7	105.6	7.40
08/24/2011	0.129	0.087	0.042	0.059	0.070	25.8	119.3	8.04
08/27/2011	0.120	0.031	0.089	0.018	0.102	10.0	116.4	7.65
09/02/2011	0.115	0.039	0.076	0.026	0.090	25.3	121.3	7.78
09/03/2011	0.103	0.048	0.055	0.031	0.072	11.2	132.1	8.01
09/05/2011	0.104	0.057	0.047	0.041	0.064	14.4	137.6	8.21
09/08/2011	0.115	0.043	0.072	0.027	0.089	10.3	130.4	7.76
09/12/2011	0.137	0.071	0.066	0.059	0.078	9.8	134.0	7.60
09/25/2011	0.132	0.030	0.102	0.020	0.112	18.8	121.4	7.84
10/01/2011	0.310	0.068	0.242	0.070	0.240	33.3	118.5	7.66
10/10/2011	0.147	0.078	0.069	0.075	0.073	13.1	116.2	7.56
10/20/2011	0.140	0.093	0.047	0.079	0.061	5.4	125.8	7.53
10/21/2011	0.179	0.141	0.038	0.138	0.041	8.4	131.7	7.50
10/28/2011	0.221	0.068	0.153	0.043	0.178	38.2	125.7	7.74
10/31/2011	0.173	0.108	0.065	0.048	0.125	10.0	122.6	7.53
11/01/2011	0.175	0.136	0.039	0.128	0.047	12.6	140.7	7.46
11/02/2011	0.203	0.153	0.050	0.145	0.058	10.9	133.9	7.51
11/07/2011	0.108	0.072	0.036	0.090	0.018	11.5	141.8	7.91
05/18/2012	0.068	0.028	0.040	0.005	0.063	5.4	78.4	7.73
05/21/2012	0.086	0.035	0.051	0.026	0.060	23.1	95.3	7.73
05/29/2012	0.078	0.039	0.039	0.028	0.050	10.9	110.6	7.75
05/30/2012	0.070	0.038	0.032	0.028	0.042	12.4	130.2	7.57
05/31/2012	0.088	0.040	0.048	0.032	0.056	9.6	128.4	7.64
06/11/2012	0.101	0.046	0.055	0.036	0.065	10.8	108.6	7.85
06/18/2012	0.093	0.027	0.066	0.022	0.072	66.6	102.4	7.79
06/25/2012	0.106	0.061	0.045	0.043	0.063	13.2	110.6	7.76
07/24/2012	0.121	0.045	0.076	0.029	0.092	30.4	111.0	7.81
08/27/2012	0.300	0.119	0.181	0.072	0.228	38.8	88.6	8.01
08/28/2012	0.359	0.250	0.109	0.228	0.131	7.8	63.0	7.56
08/29/2012	0.393	0.326	0.067	0.300	0.093	9.6	65.2	7.35
08/30/2012	0.468	0.394	0.074	0.366	0.102	8.0	61.5	7.29
08/31/2012	0.506	0.455	0.051	0.421	0.086	6.0	60.0	7.34
09/02/2012	0.594	0.571	0.023	0.546	0.049	7.0	57.4	7.35
09/03/2012	0.753	0.691	0.062	0.679	0.074	8.4	51.9	7.32
09/04/2012	0.771	0.742	0.029	0.807	#	3.4	54.2	7.42
09/05/2012	0.829	0.763	0.066	0.877	#	9.4	67.6	7.48
09/06/2012	0.760	0.691	0.069	0.783	#	9.0	85.5	7.63
09/07/2012	0.578	0.497	0.081	0.562	0.016	17.0	105.0	7.89
09/10/2012	0.652	0.520	0.132	0.464	0.188	15.6	141.8	7.72
09/11/2012	0.369	0.224	0.145	0.164	0.205	46.8	146.1	7.63
09/13/2012	0.357	0.276	0.081	0.241	0.116	11.0	157.3	7.55

09/14/2012	0.269	0.157	0.112	0.145	0.124	20.6	137.0	7.74
09/17/2012	0.292	0.163	0.129	0.140	0.152	12.8	138.7	7.80
09/20/2012	0.224	0.098	0.126	0.078	0.146	17.0	136.9	7.65
09/25/2012	0.178	0.083	0.095	0.058	0.120	17.6	132.5	7.03
10/05/2012	0.452	0.133	0.319	0.110	0.342	223.6	120.0	7.81
10/08/2012	0.294	0.108	0.186	0.098	0.196	56.8	126.3	7.66
10/10/2012	0.444	0.100	0.344	0.119	0.325	65.2	133.8	7.68
10/22/2012	0.280	0.107	0.173	0.083	0.197	60.6	117.8	7.72
12/13/2012	0.272	0.127	0.145	0.098	0.174	20.0	82.5	7.58
12/14/2012	0.248	0.149	0.099	0.124	0.124	22.8	95.5	7.74
02/15/2013	0.102	0.047	0.055	0.034	0.069	17.8	66.6	7.77
02/16/2013	0.110	0.053	0.057	0.036	0.074	nd	79.9	8.09
02/18/2013	0.131	0.094	0.037	0.086	0.045	nd	95.3	8.63
02/19/2013	0.112	0.055	0.057	0.044	0.068	11.0	97.1	7.96
02/22/2013	0.151	0.032	0.119	0.018	0.134	21.8	nd	7.95
02/25/2013	0.165	0.041	0.124	0.032	0.133	30.0	101.4	8.02
02/28/2013	0.253	0.087	0.166	0.072	0.181	69.1	102.1	7.85
03/22/2013	0.152	0.054	0.098	0.025	0.128	17.4	102.9	7.76
03/27/2013	0.156	0.060	0.096	0.036	0.120	15.0	112.2	8.01
04/06/2013	0.165	0.002	0.163	0.024	0.141	34.6	100.8	8.09
04/18/2013	0.130	0.024	0.106	0.017	0.113	17.0	99.5	7.86
05/3/2013	0.195	0.065	0.130	0.054	0.012	nd	99.8	8.04
05/6/2013	0.187	0.084	0.103	0.073	0.011	19.0	113.7	7.81
05/15/2013	0.127	0.034	0.093	0.015	0.019	nd	104.3	8.03
05/24/2013	0.146	0.060	0.086	0.026	0.034	23.4	108.0	7.84
06/2/2013	0.254	0.208	0.046	0.160	0.048	8.2	134.9	7.54
06/3/2013	0.225	0.191	0.034	0.148	0.043	10.0	139.3	7.67
06/5/2013	0.144	0.065	0.079	0.034	0.031	7.8	129.1	7.43
06/6/2013	0.121	0.025	0.096	0.008	0.018	7.6	122.2	7.44
06/7/2013	0.209	0.118	0.091	0.092	0.026	10.8	108.6	7.46
06/8/2013	0.457	0.426	0.031	0.102	0.324	7.0	61.0	7.30
06/10/2013	0.534	0.524	0.010	0.531	#	11.6	51.2	7.14
06/11/2013	0.495	0.436	0.059	0.368	0.068	8.4	54.3	7.14
06/12/2013	0.511	0.466	0.045	0.483	#	7.4	66.3	7.12
06/13/2013	0.527	0.464	0.063	0.400	0.064	7.0	99.4	7.44
06/14/2013	0.452	0.407	0.045	0.359	0.048	6.8	139.3	7.41
06/18/2013	0.206	0.057	0.149	0.009	0.048	7.4	140.1	7.52
06/21/2013	0.275	0.172	0.103	0.120	0.052	8.4	131.1	7.24
06/22/2013	0.096	0.030	0.066	0.016	0.014	10.8	137.8	7.59
06/24/2013	0.254	0.209	0.045	0.269	#	10.6	142.0	7.41
06/25/2013	0.228	0.025	0.203	0.027	#	8.2	129.2	8.13
06/27/2013	0.100	0.115	#	0.007	0.109	8.2	117.3	8.08
07/1/2013	0.194	0.017	0.177	0.094	#	3.8	125.6	7.90
07/2/2013	0.166	0.048	0.118	0.030	0.018	5.0	107.3	7.88
07/4/2013	0.109	0.042	0.067	0.015	0.027	6.0	113.6	8.20
07/5/2013	0.189	0.128	0.061	0.095	0.033	7.2	129.1	7.71
07/6/2013	0.087	0.025	0.062	0.008	0.017	nd	130.0	7.73
07/8/2013	0.059	0.018	0.041	0.004	0.014	6.2	131.3	7.69
07/9/2013	0.199	0.117	0.082	0.094	0.024	7.0	124.6	7.54
07/10/2013	0.092	0.026	0.066	0.008	0.018	8.4	123.4	7.76

07/12/2013	0.046	0.015	0.031	0.006	0.009	7.4	126.1	7.73
07/15/2013	0.037	0.014	0.023	0.005	0.009	2.6	112.7	7.60
07/16/2013	0.061	0.009	0.052	0.006	0.003	9.6	120.7	7.45
07/17/2013	0.039	0.020	0.019	0.011	0.009	6.0	135.5	7.41
07/22/2013	0.110	0.062	0.048	0.058	0.004	4.8	148.6	7.72
07/24/2013	0.068	0.000	0.068	0.008	#	7.8	125.0	8.19
07/25/2013	0.148	0.044	0.104	0.022	0.022	12.6	138.7	7.51
09/9/2013	0.257	0.054	0.203	0.023	0.031	nd	114.9	8.06
09/10/2013	0.140	0.038	0.102	0.024	0.014	nd	116.3	8.08
09/12/2013	0.164	0.107	0.057	0.088	0.019	23.2	131.6	7.52
09/13/2013	0.309	0.131	0.178	0.090	0.041	nd	138.7	7.96
09/14/2013	0.245	0.161	0.084	0.104	0.057	8.0	141.4	7.86
09/17/2013	0.209	0.111	0.098	0.103	0.008	24.4	139.5	7.37
09/18/2013	0.268	0.137	0.131	0.141	#	nd	141.1	8.00
09/19/2013	0.283	0.157	0.126	0.148	0.010	nd	148.4	7.92
09/20/2013	0.188	0.129	0.059	0.129	0.000	17.8	145.6	7.63
09/24/2013	0.222	0.079	0.143	0.050	0.029	33.6	139.5	7.78
09/25/2013	0.544	0.078	0.466	0.065	0.013	nd	138.1	7.83
09/26/2013	0.199	0.147	0.052	0.130	0.017	13.6	142.6	7.74
09/27/2013	0.241	0.174	0.067	0.148	0.026	22.0	143.4	8.02
09/28/2013	0.231	0.158	0.073	0.135	0.023	19.3	139.9	8.12
09/30/2013	0.250	0.129	0.121	0.114	0.015	52.8	144.6	7.80
10/8/2013	0.217	0.028	0.189	0.013	0.015	40.8	nd	7.98
10/10/2013	0.080	0.015	0.065	0.018	#	nd	148.5	8.03
11/29/2013	0.473	0.087	0.386	0.051	0.037	31.8	105.3	7.87
12/3/2013	0.212	0.143	0.069	nd	0.143	nd	113.5	7.89
12/9/2013	0.243	0.118	0.125	0.062	0.056	22.0	121.9	8.08
01/11/2014	0.215	0.031	0.184	0.020	0.011	nd	100.6	nd
01/13/2014	0.159	0.042	0.117	0.029	0.013	nd	113.4	8.10
01/31/2014	0.155	0.074	0.081	0.058	0.016	30.0	104.6	7.92
02/1/2014	0.199	0.150	0.049	0.151	#	9.6	140.4	7.65
02/2/2014	0.255	0.186	0.069	0.167	0.019	23.0	149.7	8.08
02/3/2014	0.240	0.150	0.090	0.144	0.006	10.0	135.1	8.05
02/7/2014	0.296	0.164	0.132	0.147	0.017	11.4	153.0	7.98
02/10/2014	0.283	0.152	0.131	0.139	0.013	17.0	144.2	8.06
02/26/2014	0.163	0.048	0.115	0.029	0.019	16.0	119.5	8.04
03/7/2014	0.137	0.054	0.083	0.035	0.019	nd	121.3	7.91
5/19/2014	0.255	0.077	0.178	0.066	0.011	28.00	nd	7.73
6/3/2014	0.091	0.040	0.051	0.029	0.011	nd	112.83	7.97
6/8/2014	0.055	0.015	0.040	0.012	0.003	nd	124.47	8.28
6/14/2014	0.107	0.067	0.040	0.056	0.011	11.20	149.98	7.89
6/16/2014	0.099	0.059	0.040	0.050	0.009	4.20	156.10	7.50
6/17/2014	0.130	0.076	0.054	0.066	0.010	3.20	158.72	7.82
6/19/2014	0.104	0.068	0.036	0.041	0.027	9.80	152.21	7.72
6/20/2014	0.131	0.092	0.039	0.083	0.009	6.80	151.01	7.79
6/23/2014	0.132	0.094	0.038	0.088	0.006	11.00	147.87	7.76
7/8/2014	0.190	0.023	0.167	0.017	0.006	6.00	100.02	7.82
7/9/2014	0.109	0.071	0.038	0.043	0.028	19.40	125.50	7.88
7/10/2014	0.134	0.064	0.070	0.049	0.015	7.60	132.50	7.80
7/14/2014	0.152	0.082	0.070	0.048	0.034	6.40	135.35	7.76

7/15/2014	0.135	0.062	0.073	0.040	0.022	13.80	136.66	7.87
7/17/2014	0.133	0.082	0.051	0.055	0.027	7.60	142.10	7.68
7/18/2014	0.143	0.089	0.054	0.067	0.022	11.80	129.52	7.84
7/22/2014	0.128	0.048	0.080	0.052	#	12.60	136.17	7.78
7/24/2014	0.140	0.072	0.068	0.060	0.012	8.00	136.29	7.94
8/5/2014	0.074	0.040	0.034	0.036	0.004	17.20	125.57	7.39
8/6/2014	0.140	0.064	0.076	0.049	0.015	14.80	138.58	7.68
8/11/2014	0.199	0.083	0.116	0.051	0.032	10.40	143.13	8.09
9/30/2014	0.189	0.047	0.142	0.034	0.013	7.40	131.36	7.58
10/1/2014	0.140	0.077	0.063	0.066	0.011	8.60	155.34	7.51
10/2/2014	0.148	0.114	0.034	0.084	0.030	6.40	153.50	7.37
10/3/2014	0.155	0.119	0.036	0.092	0.027	10.40	161.37	8.05
10/4/2014	0.159	0.118	0.041	0.105	0.013	6.20	157.25	7.71
10/8/2014	0.167	0.108	0.059	0.090	0.018	9.00	154.99	7.62
10/9/2014	0.080	0.097	#	0.326	#	7.00	162.70	7.57
10/22/2014	0.180	0.109	0.071	0.076	0.033	6.00	133.15	7.67
10/23/2014	0.174	0.116	0.058	0.099	0.017	13.20	152.42	7.58
12/8/2014	0.079	0.034	0.045	0.020	0.014	11.40	108.13	7.94
3/2/2015	0.122	0.071	0.051	0.053	0.018	34.60	106.38	7.63
3/30/2015	0.129	0.052	0.077	0.035	0.017	12.80	88.55	7.92

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 21. Detailed water quality parameters of drainage water samples collected from farm 3102 from February 2011 through April 2015.

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/31/2011	0.153	0.106	0.047	0.093	0.060	33.1	51.5	8.06
04/01/2011	0.151	0.101	0.050	0.085	0.066	nd	56.8	8.60
07/05/2011	0.274	0.207	0.067	0.184	0.090	91.2	129.1	7.81
07/07/2011	0.259	0.187	0.072	0.162	0.098	15.5	123.6	7.65
07/12/2011	0.200	0.166	0.034	0.146	0.055	5.6	98.0	7.81
07/15/2011	0.311	0.211	0.100	0.193	0.118	18.3	109.7	7.78
07/16/2011	0.297	0.131	0.166	0.143	0.154	24.7	113.2	7.87
07/19/2011	0.130	0.083	0.047	0.089	0.041	8.5	121.4	7.74
08/20/2011	0.193	0.163	0.030	0.146	0.047	10.5	127.0	7.57
08/23/2011	0.289	0.215	0.074	0.194	0.095	6.7	123.3	7.60
08/24/2011	0.261	0.203	0.058	0.172	0.089	19.4	124.6	7.46
08/25/2011	0.216	0.165	0.051	0.151	0.065	22.1	127.2	7.61
08/26/2011	0.230	0.152	0.078	0.144	0.086	21.5	123.8	7.62
08/27/2011	0.251	0.132	0.119	0.121	0.130	76.3	123.9	7.81
09/03/2011	0.181	0.156	0.025	0.139	0.042	6.0	121.9	7.58
09/05/2011	0.172	0.147	0.025	0.142	0.030	5.7	129.3	7.84
09/08/2011	0.279	0.144	0.135	0.134	0.145	25.0	120.6	7.41
09/09/2011	0.403	0.264	0.139	0.248	0.155	28.7	126.4	7.70
09/10/2011	0.551	0.270	0.281	0.245	0.306	27.9	136.1	7.85
09/12/2011	0.429	0.234	0.195	0.210	0.219	40.0	124.1	7.85
09/13/2011	0.661	0.184	0.477	0.161	0.500	93.2	126.0	8.26
09/27/2011	0.321	0.177	0.144	0.190	0.131	29.1	103.7	7.80
09/29/2011	0.416	0.244	0.172	0.273	0.143	16.1	108.1	7.62
09/30/2011	0.231	0.181	0.050	0.195	0.036	21.7	121.3	7.71
10/11/2011	0.295	0.195	0.100	0.202	0.093	26.6	119.6	7.83
10/20/2011	0.329	0.243	0.086	0.255	0.075	11.2	121.7	7.44
10/21/2011	0.256	0.212	0.044	0.180	0.076	28.4	130.7	7.46
10/24/2011	0.323	0.212	0.111	0.214	0.109	93.2	132.6	8.01
10/31/2011	0.347	0.231	0.116	0.213	0.134	26.5	119.6	7.48
11/01/2011	0.312	0.207	0.105	0.196	0.116	34.8	130.6	7.41
11/02/2011	0.305	0.150	0.155	0.147	0.158	nd	134.3	7.84
02/10/2012	0.302	0.105	0.197	0.088	0.214	nd	81.4	7.78
04/21/2012	0.126	0.066	0.060	0.059	0.067	11.8	67.3	7.58
04/23/2012	0.189	0.152	0.037	0.158	0.031	15.8	84.1	7.50
04/30/2012	0.151	0.104	0.047	0.087	0.064	16.8	88.5	7.68
05/02/2012	0.143	0.121	0.022	0.115	0.028	8.3	nd	7.71
05/14/2012	0.159	0.115	0.044	0.101	0.058	13.0	nd	7.86
05/18/2012	0.277	0.188	0.089	0.121	0.156	35.3	107.4	7.70
05/21/2012	0.447	0.205	0.242	0.182	0.265	208.6	112.7	7.44
05/22/2012	0.521	0.164	0.357	0.159	0.362	270.2	114.3	7.64
05/23/2012	0.214	0.132	0.082	0.127	0.087	54.0	118.6	7.85
05/24/2012	0.201	0.106	0.095	0.100	0.101	11.5	119.9	7.75
05/25/2012	0.212	0.129	0.083	0.123	0.089	33.4	122.0	7.81
05/29/2012	0.182	0.057	0.125	0.092	0.090	24.2	122.7	7.74

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
06/11/2012	0.221	0.112	0.109	0.098	0.123	54.4	121.2	7.86
06/15/2012	0.175	0.102	0.073	0.100	0.075	48.8	121.9	7.56
06/18/2012	0.364	0.114	0.250	0.116	0.249	48.8	122.6	7.71
06/21/2012	0.161	0.098	0.063	0.094	0.067	18.8	121.9	7.67
06/22/2012	0.173	0.133	0.040	0.130	0.043	12.2	123.1	7.69
06/25/2012	0.157	0.100	0.057	0.103	0.054	26.0	123.2	7.58
06/26/2012	0.262	0.114	0.148	0.117	0.145	54.2	121.3	7.48
06/28/2012	0.227	0.141	0.086	0.142	0.085	36.6	126.0	7.75
07/17/2012	0.434	0.117	0.317	0.112	0.323	127.6	134.1	7.61
07/24/2012	0.194	0.063	0.131	0.060	0.134	55.0	133.6	7.90
08/07/2012	0.157	0.105	0.052	0.092	0.065	14.8	125.3	7.67
08/27/2012	0.769	0.282	0.487	0.201	0.568	17.6	115.0	7.62
08/28/2012	1.039	0.435	0.604	0.549	0.490	29.8	37.7	7.59
08/29/2012	0.849	0.698	0.151	0.846	0.003	14.2	50.0	7.40
08/30/2012	0.984	0.946	0.038	1.074	#	20.8	54.3	7.39
08/31/2012	0.909	0.887	0.022	1.059	#	14.0	66.0	7.47
09/01/2012	0.677	0.098	0.579	0.583	0.095	36.8	94.2	7.53
09/02/2012	0.508	0.478	0.030	0.462	0.046	8.4	99.5	7.62
09/03/2012	0.529	0.480	0.049	0.474	0.055	11.0	101.9	7.47
09/06/2012	0.522	0.392	0.130	0.374	0.148	15.0	119.3	7.62
09/07/2012	0.392	0.360	0.032	0.310	0.082	17.6	136.5	8.00
09/10/2012	0.286	0.187	0.099	0.147	0.140	20.6	138.6	7.94
09/11/2012	0.229	0.152	0.077	0.087	0.142	32.0	119.8	7.88
09/12/2012	0.615	0.213	0.402	0.175	0.440	89.0	109.7	7.53
09/13/2012	0.331	0.226	0.105	0.210	0.121	18.6	122.7	7.49
09/14/2012	0.269	0.169	0.100	0.155	0.114	29.8	128.0	7.61
09/15/2012	0.210	0.158	0.052	0.130	0.080	12.4	141.6	7.64
09/17/2012	0.538	0.173	0.365	0.160	0.378	15.2	134.2	7.69
09/18/2012	0.200	0.127	0.073	0.114	0.086	26.8	146.0	7.61
09/19/2012	0.240	0.112	0.128	0.106	0.134	50.2	132.7	7.66
09/20/2012	0.407	0.123	0.284	0.110	0.297	45.8	135.9	7.56
09/21/2012	0.331	0.129	0.202	0.114	0.217	30.0	142.5	7.69
09/23/2012	0.193	0.152	0.041	0.131	0.062	9.8	147.4	7.66
09/24/2012	0.185	0.147	0.038	0.139	0.046	15.2	148.9	7.69
09/27/2012	0.262	0.119	0.143	0.083	0.179	nd	142.6	8.31
09/30/2012	0.124	0.063	0.061	0.056	0.068	12.4	136.1	7.70
10/01/2012	0.144	0.097	0.047	0.090	0.054	7.4	141.6	7.75
10/03/2012	0.227	0.095	0.132	0.093	0.134	63.7	131.8	8.08
10/04/2012	0.269	0.129	0.140	0.114	0.155	41.3	119.6	8.11
10/05/2012	0.221	0.137	0.084	0.120	0.101	3.8	134.2	7.76
10/08/2012	0.303	0.174	0.129	0.160	0.143	25.4	119.0	7.56
10/09/2012	0.290	0.197	0.093	0.182	0.108	6.4	128.7	7.39
10/10/2012	0.300	0.156	0.144	0.131	0.169	46.0	133.1	7.73
10/22/2012	0.580	0.048	0.532	0.019	0.561	32.7	118.6	8.06
10/23/2012	0.191	0.043	0.148	0.018	0.174	nd	116.7	8.24
10/27/2012	0.148	0.051	0.097	0.026	0.123	26.8	131.6	8.06
12/13/2012	0.163	0.023	0.140	0.003	0.160	25.8	86.5	7.53

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
02/15/2013	0.218	0.146	0.072	0.124	0.094	28.0	76.2	7.49
02/16/2013	0.220	0.177	0.043	0.143	0.077	9.0	99.2	7.79
02/18/2013	0.194	0.154	0.040	0.136	0.058	nd	101.8	8.09
03/20/2013	0.135	0.091	0.044	0.084	0.051	51.4	81.4	7.70
03/27/2013	0.166	0.108	0.058	0.089	0.077	nd	102.7	8.17
04/05/2013	0.158	0.086	0.072	0.064	0.094	29.0	103.0	7.82
04/06/2013	0.215	0.111	0.104	0.105	0.110	34.6	114.0	7.57
04/17/2013	0.186	0.122	0.064	0.111	0.075	29.2	120.2	7.60
05/2/2013	0.144	0.078	0.066	0.065	0.013	16.6	113.1	7.88
05/14/2013	0.141	0.072	0.069	0.065	0.007	27.4	120.5	7.73
05/24/2013	0.235	0.111	0.124	0.069	0.042	52.8	120.7	7.86
06/2/2013	0.172	0.132	0.040	0.108	0.024	8.2	133.3	7.71
06/3/2013	0.138	0.109	0.029	0.090	0.019	nd	131.3	8.05
06/5/2013	0.124	0.092	0.032	0.080	0.013	9.0	132.4	7.53
06/6/2013	0.117	0.089	0.028	0.079	0.010	6.2	133.0	7.59
06/7/2013	0.176	0.144	0.032	0.130	0.014	8.0	134.8	7.47
06/10/2013	0.641	0.653	#	0.624	0.029	4.4	70.7	7.48
06/11/2013	0.319	0.288	0.031	0.268	0.020	9.4	122.1	7.44
06/12/2013	0.234	0.208	0.026	0.192	0.016	nd	132.1	7.40
06/22/2013	0.222	0.177	0.045	0.150	0.027	10.0	130.4	7.49
06/24/2013	0.218	0.175	0.043	0.152	0.023	5.6	131.3	7.86
07/12/2013	0.166	0.104	0.062	0.074	0.030	nd	127.3	7.78
07/15/2013	0.242	0.203	0.039	0.181	0.022	3.4	131.2	7.89
07/16/2013	0.473	0.394	0.079	0.386	0.008	3.4	83.4	7.53
07/17/2013	0.538	0.422	0.116	0.357	0.065	7.6	71.9	7.58
07/18/2013	0.518	0.488	0.030	0.460	0.028	6.6	87.5	7.50
07/19/2013	0.390	0.308	0.082	0.306	0.002	15.8	115.3	7.49
07/22/2013	0.311	0.263	0.048	0.231	0.033	nd	126.8	7.98
08/2/2013	0.865	0.144	0.721	0.117	0.027	268.2	116.8	7.66
08/7/2013	0.219	0.131	0.088	0.114	0.017	7.2	121.2	7.86
08/28/2013	0.263	0.076	0.187	0.041	0.035	13.2	61.7	7.71
08/30/2013	0.175	0.111	0.064	0.088	0.023	30.6	98.6	7.68
09/2/2013	0.219	0.084	0.135	0.058	0.026	166.5	109.5	8.20
09/3/2013	0.156	0.087	0.069	0.096	#	nd	137.8	8.29
09/9/2013	0.127	0.153	#	0.067	0.086	6.0	122.8	7.70
09/10/2013	0.276	0.074	0.202	0.059	0.015	nd	122.4	8.09
09/12/2013	0.166	0.074	0.092	0.066	0.008	nd	124.3	7.90
09/14/2013	0.199	0.049	0.150	0.047	0.002	7.6	125.4	7.66
09/17/2013	0.185	0.049	0.136	0.041	0.008	59.8	126.0	7.79
09/18/2013	0.136	0.070	0.066	0.058	0.012	11.0	132.7	7.76
09/19/2013	0.108	0.061	0.047	0.062	#	11.6	132.7	7.60
09/20/2013	0.125	0.057	0.068	0.057	0.000	6.6	130.3	7.67
09/23/2013	0.137	0.073	0.064	0.055	0.018	nd	112.7	8.13
09/24/2013	0.110	0.044	0.066	0.045	#	7.8	135.3	7.78
09/25/2013	0.145	0.057	0.088	0.031	0.026	nd	124.8	7.98
09/26/2013	0.109	0.065	0.044	0.060	0.005	4.0	134.5	7.64
09/28/2013	0.147	0.081	0.066	0.060	0.021	12.4	124.5	8.20

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
10/1/2013	0.164	0.054	0.110	0.030	0.024	nd	111.2	8.09
10/9/2013	0.120	0.089	0.031	0.084	0.005	15.8	135.2	7.50
01/11/2014	0.266	0.169	0.097	0.148	0.021	37.0	81.8	7.60
01/13/2014	0.203	0.105	0.098	0.109	#	19.0	92.2	7.74
01/16/2014	0.155	0.083	0.072	0.060	0.023	nd	97.7	7.88
02/1/2014	0.413	0.322	0.091	0.315	0.007	13.2	105.9	7.51
02/2/2014	0.160	0.152	0.008	0.136	0.016	14.6	114.7	7.52
02/3/2014	0.178	0.128	0.050	0.113	0.015	13.2	110.8	7.57
02/4/2014	0.116	0.092	0.024	0.090	0.002	13.2	117.2	7.47
02/5/2014	0.135	0.001	0.134	0.078	#	4.4	nd	7.55
02/7/2014	0.364	0.124	0.240	0.052	0.072	11.0	120.8	8.39
02/14/2014	0.108	0.045	0.063	0.037	0.009	9.0	124.2	7.76
02/26/2014	0.212	0.074	0.138	0.057	0.017	38.8	102.6	7.96
03/7/2014	0.265	0.004	0.261	0.049	#	27.2	94.6	7.83
6/13/2014	0.192	0.089	0.103	0.088	0.001	10.20	72.23	7.69
6/14/2014	0.119	0.066	0.053	0.058	0.008	nd	86.13	7.97
6/16/2014	0.171	0.111	0.060	0.107	0.004	10.00	98.15	7.83
6/19/2014	0.168	0.095	0.073	0.082	0.013	19.20	105.40	7.71
6/20/2014	0.150	0.099	0.051	0.092	0.007	9.80	114.71	7.85
6/27/2014	0.230	0.126	0.104	0.105	0.021	40.40	107.74	7.86
6/30/2014	0.224	0.162	0.062	0.106	0.056	8.60	121.52	8.14
7/9/2014	0.642	0.110	0.532	0.100	0.010	20.40	114.09	7.69
7/10/2014	0.235	0.099	0.136	0.087	0.012	8.20	122.55	8.05
7/11/2014	0.173	0.126	0.047	0.070	0.056	19.40	125.13	7.90
7/14/2014	0.168	0.086	0.082	0.071	0.015	12.00	121.68	7.85
7/16/2014	0.253	0.119	0.134	0.085	0.034	12.00	114.43	7.75
7/17/2014	0.120	0.065	0.055	0.052	0.013	10.20	124.92	7.47
8/5/2014	0.207	0.128	0.079	0.127	0.001	9.60	114.19	7.54
8/6/2014	0.191	0.130	0.061	0.076	0.054	20.00	125.54	7.58
8/7/2014	0.206	0.108	0.098	0.093	0.015	-0.40	120.68	7.98
8/18/2014	0.158	0.073	0.085	0.058	0.015	17.00	149.82	7.81
9/24/2014	0.189	0.022	0.167	0.030	#	12.60	137.34	7.45
9/25/2014	0.352	0.185	0.167	0.135	0.050	8.40	111.96	7.59
10/3/2014	0.150	0.036	0.114	0.020	0.016	nd	132.03	7.96
10/22/2014	0.139	0.023	0.116	0.012	0.011	24.60	141.44	8.05
10/27/2014	0.200	0.046	0.154	0.038	0.008	nd	151.05	7.71
2/27/2015	0.105	0.010	0.095	0.004	0.006	2.44	47.70	nd
3/2/2015	0.103	0.077	0.026	0.065	0.012	16.80	61.06	7.45
3/28/2015	0.205	0.113	0.092	0.098	0.015	35.80	64.74	8.03
3/30/2015	0.262	0.168	0.094	0.158	0.010	64.60	70.47	7.58
4/27/2015	0.166	0.113	0.053	0.102	0.011	13.00	66.24	7.42

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 22.Detailed water quality parameters of drainage water samples collected from farm 3103 from February 2011 through April 2015.

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/28/2011	0.097	0.044	0.053	0.057	0.040	23.8	56.3	7.84
03/29/2011	0.115	0.063	0.052	0.046	0.069	15.2	60.6	8.07
03/31/2011	0.198	0.137	0.061	0.122	0.076	16.6	77.4	8.08
06/20/2011	0.083	0.018	0.065	0.015	0.068	32.9	126.2	7.81
06/29/2011	0.133	0.056	0.077	0.041	0.093	6.5	136.1	7.02
07/05/2011	0.146	0.127	0.019	0.113	0.033	3.8	141.4	7.96
07/07/2011	0.154	0.115	0.039	0.110	0.044	5.5	146.2	5.59
07/12/2011	0.118	0.086	0.032	0.081	0.037	2.4	132.2	7.62
07/14/2011	0.142	0.094	0.048	0.087	0.055	6.9	127.1	7.65
07/15/2011	0.105	0.077	0.028	0.073	0.033	10.2	131.2	7.52
07/23/2011	0.110	0.041	0.069	0.038	0.072	22.8	123.2	7.72
08/06/2011	0.070	0.026	0.044	0.013	0.057	12.8	132.8	7.78
08/12/2011	0.125	0.038	0.087	0.011	0.114	10.9	113.8	7.69
08/19/2011	0.128	0.094	0.034	0.081	0.047	14.1	105.8	7.63
08/20/2011	0.147	0.071	0.076	0.059	0.088	22.5	119.9	7.76
08/23/2011	0.136	0.069	0.067	0.055	0.081	7.8	124.8	7.70
08/25/2011	0.083	0.042	0.041	0.032	0.051	19.4	136.7	7.57
08/27/2011	0.198	0.023	0.175	0.014	0.184	28.5	138.1	7.45
09/02/2011	0.174	0.068	0.106	0.060	0.115	20.5	nd	7.60
09/05/2011	0.146	0.095	0.051	0.091	0.055	33.8	127.7	8.11
09/06/2011	0.265	0.146	0.119	0.132	0.133	14.0	140.0	7.91
09/07/2011	0.208	0.105	0.103	0.097	0.111	28.6	136.6	7.94
09/08/2011	0.180	0.089	0.091	0.079	0.102	34.5	133.2	7.78
09/09/2011	0.257	0.114	0.143	0.087	0.170	20.8	142.2	7.78
09/10/2011	0.206	0.061	0.145	0.051	0.155	33.9	115.0	7.87
09/12/2011	0.227	0.123	0.104	0.101	0.126	32.4	140.5	7.65
09/27/2011	0.214	0.145	0.069	0.151	0.063	5.5	123.6	7.76
09/29/2011	0.271	0.168	0.103	0.183	0.088	30.7	127.5	7.73
09/30/2011	0.308	0.143	0.165	0.149	0.159	86.9	138.9	7.62
10/10/2011	0.179	0.104	0.075	0.101	0.078	30.8	130.4	7.79
10/20/2011	0.242	0.186	0.056	0.179	0.063	7.8	123.1	7.61
10/24/2011	0.159	0.129	0.030	0.132	0.027	7.3	143.2	7.94
10/31/2011	0.380	0.234	0.146	0.213	0.167	12.4	125.0	7.58
11/01/2011	0.377	0.257	0.120	0.235	0.142	12.0	132.8	7.69
02/10/2012	0.173	0.102	0.071	0.082	0.091	nd	120.2	8.19
04/21/2012	0.193	0.085	0.108	0.079	0.114	22.6	71.3	7.77
04/23/2012	0.217	0.141	0.076	0.146	0.071	25.7	107.5	7.84
04/30/2012	0.276	0.083	0.193	0.075	0.201	82.5	102.8	7.86
05/02/2012	0.220	0.094	0.126	0.095	0.125	56.4	nd	7.89
05/14/2012	0.165	0.063	0.102	0.048	0.117	47.8	nd	8.09
05/16/2012	0.198	0.079	0.119	0.063	0.135	22.5	nd	7.79
05/17/2012	0.319	0.109	0.210	0.101	0.218	136.0	nd	7.89
05/18/2012	0.203	0.106	0.097	0.106	0.098	35.7	121.8	7.90
05/21/2012	0.315	0.104	0.211	0.095	0.220	99.0	126.0	7.84

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
05/22/2012	0.352	0.094	0.258	0.088	0.264	nd	131.6	8.09
05/23/2012	0.375	0.057	0.318	0.048	0.327	167.5	134.3	7.92
05/29/2012	0.167	0.057	0.110	0.045	0.122	17.9	125.9	7.89
05/30/2012	0.154	0.066	0.088	0.061	0.093	104.6	134.0	7.94
05/31/2012	0.195	0.078	0.117	0.070	0.125	84.7	136.1	7.91
06/15/2012	0.121	0.025	0.096	0.010	0.111	19.8	115.9	7.99
06/18/2012	0.214	0.058	0.156	0.049	0.165	49.2	124.9	8.25
06/22/2012	0.279	0.101	0.178	0.095	0.184	115.0	130.4	8.01
06/25/2012	0.220	0.099	0.121	0.091	0.129	64.2	128.6	7.84
06/26/2012	0.221	0.143	0.078	0.143	0.078	36.8	131.2	8.04
06/28/2012	0.150	0.096	0.054	0.093	0.057	18.6	135.3	8.00
07/13/2012	0.146	0.048	0.098	0.038	0.108	nd	138.5	8.16
07/17/2012	0.140	0.044	0.096	0.039	0.101	32.0	138.5	7.89
07/23/2012	0.067	0.022	0.045	0.011	0.056	17.4	137.7	8.02
07/24/2012	0.162	0.043	0.119	0.036	0.126	64.4	143.7	7.95
07/25/2012	0.112	0.027	0.085	0.021	0.091	26.4	143.6	7.89
07/26/2012	0.242	0.012	0.230	0.013	0.229	142.8	147.7	7.84
07/31/2012	0.127	0.023	0.104	0.019	0.108	44.0	147.3	7.90
08/07/2012	0.141	0.075	0.066	0.068	0.073	14.4	137.1	7.74
08/08/2012	0.178	0.068	0.110	0.068	0.111	44.0	142.2	7.67
08/13/2012	0.294	0.031	0.263	0.030	0.264	127.2	146.2	7.84
08/18/2012	0.138	0.023	0.115	0.012	0.126	24.8	147.4	8.24
08/23/2012	0.193	0.025	0.168	0.011	0.182	30.0	137.8	8.12
08/27/2012	0.610	0.116	0.494	0.101	0.509	48.0	118.2	7.67
08/28/2012	0.653	0.323	0.330	0.303	0.350	30.4	35.3	7.58
08/29/2012	0.400	0.377	0.023	0.355	0.045	22.6	42.1	7.38
08/30/2012	0.493	0.415	0.078	0.482	0.011	16.0	57.8	7.37
08/31/2012	0.451	0.397	0.054	0.500	#	23.6	92.3	7.71
09/01/2012	0.636	0.319	0.317	0.309	0.327	126.0	144.3	7.59
09/03/2012	0.385	0.302	0.083	0.297	0.088	10.2	142.4	7.52
09/04/2012	0.530	0.200	0.330	0.164	0.366	144.4	135.0	7.84
09/05/2012	0.578	0.159	0.419	0.134	0.444	301.2	132.9	7.71
09/06/2012	0.500	0.173	0.327	0.163	0.337	63.6	135.0	7.81
09/10/2012	1.118	0.212	0.906	0.180	0.938	136.8	150.5	7.81
09/11/2012	0.415	0.178	0.237	0.130	0.285	124.4	154.4	7.76
09/12/2012	0.657	0.294	0.363	0.246	0.412	152.2	124.0	7.71
09/13/2012	0.517	0.183	0.334	0.167	0.350	135.6	143.8	7.54
09/15/2012	0.575	0.186	0.389	0.165	0.410	125.2	151.0	7.93
09/17/2012	0.854	0.275	0.579	0.252	0.602	6.1	147.5	7.56
09/18/2012	0.788	0.140	0.648	0.126	0.662	89.2	152.3	7.66
09/19/2012	0.288	0.116	0.172	0.111	0.177	36.2	153.0	7.50
09/20/2012	0.993	0.197	0.796	0.191	0.802	75.6	132.4	7.62
09/21/2012	0.368	0.142	0.226	0.127	0.241	61.2	150.0	7.79
09/23/2012	0.381	0.222	0.159	0.206	0.175	22.6	155.0	8.19
09/25/2012	0.573	0.242	0.331	0.220	0.353	142.0	141.1	7.76
09/27/2012	0.423	0.130	0.293	0.118	0.306	147.4	148.1	7.97
10/01/2012	0.302	0.165	0.137	0.150	0.152	54.4	138.5	7.99

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
10/03/2012	0.374	0.100	0.274	0.101	0.274	59.4	142.6	7.75
10/04/2012	0.350	0.084	0.266	0.070	0.280	136.3	132.9	8.16
10/05/2012	0.235	0.076	0.159	0.060	0.176	39.4	135.7	7.78
10/08/2012	0.296	0.112	0.184	0.105	0.191	77.4	137.1	7.62
10/09/2012	0.284	0.066	0.218	0.052	0.233	30.5	143.5	7.89
10/22/2012	0.909	0.112	0.797	0.051	0.858	5.9	129.9	7.82
10/27/2012	0.284	0.068	0.216	0.041	0.243	110.4	153.5	7.81
12/13/2012	0.285	0.088	0.197	0.060	0.225	77.4	122.1	7.63
02/15/2013	0.292	0.226	0.066	0.196	0.096	12.6	nd	7.70
02/16/2013	0.309	0.200	0.109	0.163	0.146	23.6	138.5	7.76
02/19/2013	0.257	0.167	0.090	0.147	0.110	52.8	135.3	7.97
03/20/2013	0.183	0.096	0.087	0.069	0.114	33.8	124.9	7.59
03/25/2013	0.305	0.164	0.141	0.115	0.190	48.0	124.1	8.13
03/27/2013	0.151	0.080	0.071	0.057	0.094	nd	133.2	8.31
04/05/2013	0.145	0.079	0.066	0.069	0.077	14.4	130.4	7.77
04/08/2013	0.239	0.110	0.129	0.105	0.134	58.2	138.9	7.88
04/09/2013	0.134	0.076	0.058	0.102	0.033	22.8	147.0	7.91
04/17/2013	0.145	0.100	0.045	0.093	0.052	16.8	131.3	7.58
04/18/2013	0.229	0.108	0.121	0.123	0.106	63.4	150.0	7.22
04/22/2013	0.098	0.061	0.037	0.054	0.044	11.4	153.7	7.35
05/01/2013	0.120	0.036	0.084	0.031	0.089	36.0	116.2	7.77
05/1/2013	0.120	0.036	0.084	0.031	0.005	36.0	116.2	7.77
05/3/2013	0.154	0.078	0.076	0.056	0.022	13.6	128.9	7.85
05/24/2013	0.226	0.080	0.146	0.038	0.042	72.8	123.2	7.82
06/2/2013	0.159	0.095	0.064	0.062	0.033	8.6	134.0	7.79
06/3/2013	0.179	0.115	0.064	0.089	0.027	nd	128.7	8.13
06/5/2013	0.135	0.093	0.042	0.083	0.010	9.2	142.3	7.71
06/7/2013	0.215	0.160	0.055	0.139	0.021	15.0	109.1	7.58
06/8/2013	0.267	0.203	0.064	0.192	0.011	4.4	92.3	7.63
06/10/2013	0.437	0.350	0.087	0.314	0.036	5.8	62.9	7.50
06/11/2013	0.307	0.245	0.062	0.216	0.029	7.0	139.5	7.63
06/14/2013	0.339	0.252	0.087	0.200	0.052	9.0	138.7	7.59
06/16/2013	0.299	0.220	0.079	0.182	0.038	13.7	147.7	7.64
06/18/2013	0.270	0.164	0.106	0.110	0.054	10.4	137.5	7.64
06/22/2013	0.245	0.132	0.113	0.102	0.030	8.6	135.6	7.73
06/25/2013	0.206	0.121	0.085	0.109	0.012	7.0	136.6	7.86
07/1/2013	0.186	0.085	0.101	0.071	0.014	5.2	133.1	7.93
07/4/2013	0.179	0.128	0.051	0.108	0.020	6.0	133.1	8.22
07/9/2013	0.187	0.113	0.074	0.075	0.038	6.8	138.5	7.85
07/11/2013	0.162	0.094	0.068	0.071	0.024	5.8	140.2	7.70
07/12/2013	0.200	0.100	0.100	0.081	0.019	nd	128.6	7.95
07/15/2013	0.334	0.185	0.149	0.167	0.018	15.0	95.7	7.67
07/16/2013	0.348	0.182	0.166	0.207	#	15.0	52.8	7.60
07/17/2013	0.488	0.277	0.211	0.243	0.034	nd	41.4	7.61
07/18/2013	0.509	0.360	0.149	0.336	0.024	17.8	60.1	7.50
07/19/2013	0.553	0.388	0.165	0.368	0.020	nd	95.2	7.47
07/24/2013	0.381	0.243	0.138	0.197	0.046	25.6	144.0	7.79

Sampling Date	**TP**[1] (mg/l)	**TDP** (mg/l)	**PP** (mg/l)	**SRP** (mg/l)	**DOP** (mg/l)	**TSS** (mg/l)	**Ca** (mg/l)	**pH**
08/2/2013	0.247	0.112	0.135	0.095	0.017	72.4	120.3	7.44
08/7/2013	0.202	0.117	0.085	0.104	0.013	9.6	127.5	7.64
08/8/2013	0.216	0.141	0.075	0.088	0.053	4.4	139.8	nd
08/9/2013	0.255	0.110	0.145	0.044	0.066	5.0	139.2	7.86
08/28/2013	0.232	0.109	0.123	0.063	0.046	nd	129.8	7.96
08/30/2013	0.199	0.128	0.071	0.104	0.024	7.6	116.8	7.61
09/2/2013	0.225	0.130	0.095	0.105	0.025	19.2	139.1	7.82
09/3/2013	0.176	0.118	0.058	0.059	0.059	10.6	108.9	7.56
09/9/2013	0.496	0.074	0.422	0.052	0.022	11.1	134.8	7.56
09/10/2013	0.219	0.084	0.135	0.075	0.009	nd	141.4	7.93
09/12/2013	0.239	0.065	0.174	0.059	0.006	nd	138.6	7.95
09/13/2013	0.173	0.074	0.099	0.053	0.021	nd	139.4	8.51
09/14/2013	0.180	0.063	0.117	0.054	0.009	nd	140.7	7.84
09/17/2013	0.201	0.047	0.154	0.043	0.004	41.6	137.9	7.68
09/18/2013	0.284	0.097	0.187	0.082	0.015	nd	114.1	7.97
09/19/2013	0.181	0.123	0.058	0.118	0.005	12.8	144.1	7.59
09/23/2013	0.222	0.096	0.126	0.083	0.013	nd	145.8	8.32
09/24/2013	0.239	0.060	0.179	0.047	0.013	62.6	145.1	7.67
09/26/2013	0.229	0.065	0.164	0.058	0.007	nd	131.9	7.91
09/27/2013	0.252	0.080	0.172	0.070	0.010	nd	134.2	nd
09/28/2013	0.277	0.049	0.228	0.044	0.005	115.0	143.4	8.15
10/1/2013	0.193	0.042	0.151	0.032	0.010	51.6	141.2	7.96
10/9/2013	0.240	0.105	0.135	0.092	0.013	17.0	129.8	7.77
10/10/2013	0.228	0.176	0.052	0.162	0.014	nd	142.8	7.91
10/11/2013	0.171	0.090	0.081	0.088	0.002	nd	149.6	7.94
01/11/2014	0.341	0.270	0.071	0.236	0.034	23.2	103.0	7.63
01/13/2014	0.235	0.139	0.096	0.141	#	-0.6	137.3	7.73
01/31/2014	0.233	0.181	0.052	0.155	0.026	9.4	89.1	7.76
02/1/2014	0.371	0.333	0.038	0.343	#	11.0	68.6	7.69
02/2/2014	0.229	0.237	#	0.212	0.025	13.0	127.3	7.63
02/3/2014	0.196	0.144	0.052	0.134	0.011	12.4	114.8	7.63
02/4/2014	0.218	0.133	0.085	0.127	0.006	12.4	120.3	7.90
02/6/2014	0.153	0.109	0.044	0.110	#	24.0	134.5	7.86
02/7/2014	0.154	0.106	0.048	0.101	0.005	24.4	152.3	7.94
02/11/2014	0.158	0.111	0.047	0.085	0.026	10.8	126.0	7.98
02/12/2014	0.137	0.069	0.068	0.053	0.016	13.3	131.5	8.15
02/14/2014	0.121	0.067	0.054	0.051	0.016	10.6	134.0	7.96
02/26/2014	0.143	0.036	0.107	0.021	0.015	13.8	132.2	7.97
02/28/2014	0.112	0.049	0.063	0.032	0.017	8.4	130.4	7.97
03/7/2014	0.133	0.066	0.067	0.024	0.042	nd	124.8	7.82
03/12/2014	0.107	0.044	0.063	0.029	0.015	nd	115.5	8.11
03/26/2014	0.171	0.057	0.114	0.035	0.022	nd	101.8	8.01
03/28/2014	0.137	0.064	0.073	0.049	0.015	nd	115.8	8.21
5/5/2014	0.045	0.008	0.037	0.002	0.006	28.20	nd	7.67
5/16/2014	0.075	0.023	0.052	0.013	0.010	7.40	104.63	7.87
5/19/2014	0.092	0.029	0.063	0.011	0.019	9.00	nd	7.99
5/22/2014	0.079	0.013	0.066	0.020	#	10.00	117.59	7.70

5/27/2014	0.076	0.026	0.050	0.016	0.010	8.80	0.26	7.81
6/3/2014	0.086	0.038	0.048	0.033	0.005	6.80	123.38	7.60
6/4/2014	0.118	0.088	0.030	0.084	0.004	nd	115.83	7.83
6/9/2014	0.076	0.034	0.042	0.029	0.005	7.40	102.17	7.96
6/10/2014	0.114	0.051	0.063	0.039	0.012	11.80	90.57	7.97
6/13/2014	0.141	0.073	0.068	0.074	#	22.80	129.15	7.57
6/14/2014	0.210	0.110	0.100	0.101	0.009	17.20	133.75	7.59
6/16/2014	0.163	0.114	0.049	0.114	0.001	10.80	138.62	7.57
6/19/2014	0.333	0.131	0.202	0.111	0.020	17.40	120.53	7.56
6/20/2014	0.254	0.149	0.105	0.139	0.010	32.34	123.96	7.60
6/23/2014	0.211	0.115	0.096	0.104	0.011	10.00	135.73	7.59
6/25/2014	0.127	0.060	0.067	0.054	0.006	13.60	134.20	7.63
6/27/2014	0.160	0.083	0.077	0.057	0.026	15.20	135.76	7.77
7/1/2014	0.146	0.048	0.098	0.043	0.005	27.20	134.05	7.79
7/7/2014	0.167	0.008	0.159	0.012	#	5.60	136.44	8.28
7/9/2014	0.225	0.107	0.118	0.103	0.004	36.20	119.61	7.50
7/11/2014	0.260	0.045	0.215	0.098	#	24.80	122.47	7.65
7/14/2014	0.162	0.076	0.086	0.068	0.008	15.48	134.62	7.56
7/16/2014	0.236	0.093	0.143	0.074	0.019	14.80	116.95	7.72
7/17/2014	0.198	0.123	0.075	0.108	0.015	11.20	122.02	7.40
7/18/2014	0.150	0.081	0.069	0.070	0.011	22.80	130.23	7.83
7/19/2014	0.145	0.074	0.071	0.070	0.004	14.20	140.33	7.65
7/21/2014	0.129	0.040	0.089	0.036	0.004	8.60	139.02	7.85
8/4/2014	0.098	0.025	0.073	0.009	0.016	12.00	125.67	7.88
8/6/2014	0.199	0.093	0.106	0.115	#	17.40	111.23	7.53
8/7/2014	0.236	0.127	0.109	0.100	0.027	17.40	111.57	8.04
8/9/2014	0.186	0.113	0.073	0.096	0.017	8.40	119.90	7.62
8/11/2014	0.157	0.055	0.102	0.030	0.025	8.00	125.15	8.11
8/18/2014	0.114	0.028	0.086	0.011	0.017	27.60	148.19	7.80
9/5/2014	0.291	0.024	0.267	0.013	0.011	nd	143.19	7.91
9/9/2014	0.155	#	0.156	0.011	#	14.60	132.32	7.93
9/22/2014	0.099	0.007	0.092	0.010	#	13.80	139.77	7.64
9/23/2014	0.196	0.099	0.097	0.085	0.014	36.00	130.68	7.49
9/24/2014	0.148	0.066	0.082	0.065	0.001	9.80	139.93	7.65
9/25/2014	0.107	0.023	0.084	0.020	0.003	17.80	144.41	7.82
9/27/2014	0.050	0.203	#	0.159	0.044	18.60	130.66	7.82
10/2/2014	0.305	0.117	0.188	0.069	0.048	46.00	129.07	8.08
10/3/2014	0.229	0.107	0.122	0.087	0.020	10.00	131.12	8.13
10/4/2014	0.202	0.071	0.131	0.054	0.017	28.40	143.67	7.84
10/25/2014	0.262	0.212	0.050	0.180	0.032	11.60	156.42	7.40
10/29/2014	0.222	0.123	0.099	0.089	0.034	11.67	152.99	8.10
11/10/2014	0.168	0.062	0.106	0.052	0.010	19.00	141.85	8.08
11/11/2014	0.166	0.111	0.055	0.094	0.017	11.40	153.46	8.01
11/20/2014	0.151	0.087	0.064	0.070	0.017	13.20	143.60	8.06
11/26/2014	0.165	0.168	#	0.066	0.102	19.40	131.61	8.09
1/5/2015	0.175	0.082	0.093	0.066	0.016	20.62	121.84	8.10
2/6/2015	0.132	0.076	0.056	0.049	0.027	6.80	120.59	7.95
3/2/2015	0.138	0.056	0.082	0.037	0.020	29.80	118.20	7.55
3/3/2015	0.179	0.084	0.095	0.067	0.017	31.00	127.49	8.12
3/16/2015	0.141	0.025	0.116	0.003	0.022	12.40	101.03	8.08

3/28/2015	0.207	0.112	0.095	0.077	0.035	25.80	121.24	7.88
3/30/2015	0.229	0.143	0.086	0.125	0.018	15.40	130.45	8.08
3/31/2015	0.197	0.139	0.058	0.115	0.024	12.20	124.59	7.91
4/27/2015	0.119	0.042	0.077	0.029	0.013	24.20	92.30	7.71
4/29/2015	0.087	0.036	0.051	0.027	0.009	18.40	75.66	7.91
4/30/2015	0.151	0.066	0.085	0.054	0.012	15.80	106.78	7.83

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 23. Detailed water quality parameters of drainage water samples collected from farm 4701 from February 2011 through April 2015.

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/31/2011	0.038	0.036	0.002	0.004	0.034	6.5	44.7	8.03
07/05/2011	0.041	0.014	0.027	0.007	0.034	3.9	99.9	7.76
07/06/2011	0.029	0.015	0.014	0.010	0.019	3.3	103.6	7.48
07/12/2011	0.053	0.035	0.018	0.017	0.036	10.9	87.4	8.15
07/15/2011	0.034	0.010	0.024	0.013	0.021	3.9	93.1	7.76
07/16/2011	0.047	0.015	0.032	0.011	0.036	12.0	99.9	8.14
08/23/2011	0.036	0.009	0.027	0.008	0.028	5.4	96.7	7.73
08/24/2011	0.058	0.020	0.038	0.011	0.048	14.2	103.9	7.45
09/05/2011	0.034	0.008	0.026	0.010	0.024	6.2	97.3	7.74
09/07/2011	0.031	0.009	0.022	0.011	0.020	7.5	106.0	7.64
09/10/2011	0.048	0.006	0.042	0.013	0.035	6.6	142.2	7.98
09/30/2011	0.058	0.012	0.046	0.012	0.046	17.7	106.2	7.86
10/20/2011	0.052	0.023	0.029	0.017	0.035	5.3	111.5	7.68
10/21/2011	0.037	0.014	0.023	0.018	0.019	12.7	103.0	7.75
10/31/2011	0.046	0.018	0.028	0.016	0.030	6.4	114.9	7.60
11/01/2011	0.033	0.014	0.019	0.019	0.014	5.2	120.5	7.54
11/02/2011	0.032	0.017	0.015	0.026	0.007	2.9	121.6	7.56
11/03/2011	0.049	0.020	0.029	0.029	0.020	22.0	121.0	7.79
04/23/2012	0.030	0.009	0.021	0.008	0.022	2.4	67.6	7.79
05/18/2012	0.036	0.014	0.022	0.007	0.029	4.1	85.0	7.75
06/25/2012	0.045	0.015	0.030	0.021	0.024	4.4	98.6	7.73
06/26/2012	0.036	0.015	0.021	0.012	0.025	9.8	103.0	7.67
06/27/2012	0.028	0.010	0.018	0.014	0.015	3.4	102.3	7.96
06/29/2012	0.030	0.010	0.020	0.010	0.020	5.8	106.1	7.41
07/02/2012	0.037	0.013	0.024	0.015	0.022	7.3	121.8	8.06
08/28/2012	0.074	0.041	0.033	0.029	0.045	14.4	112.9	7.54
08/29/2012	0.048	0.018	0.030	0.009	0.039	4.0	88.4	7.36
08/30/2012	0.054	0.014	0.040	0.011	0.043	4.2	69.9	7.35
08/31/2012	0.072	0.037	0.035	0.018	0.054	4.1	66.5	7.46
09/01/2012	0.079	0.043	0.036	0.025	0.054	5.2	62.0	7.39
09/02/2012	0.097	0.056	0.041	0.030	0.067	14.0	60.9	7.45
09/03/2012	0.110	0.067	0.043	0.044	0.066	2.4	59.9	7.28
09/04/2012	0.096	0.062	0.034	0.041	0.055	4.0	73.3	7.54
09/05/2012	0.089	0.058	0.031	0.034	0.055	5.6	96.5	7.51
09/06/2012	0.037	0.012	0.025	0.010	0.028	6.2	114.8	7.65
09/07/2012	0.042	0.035	0.007	0.011	0.031	2.4	123.4	7.93
09/10/2012	0.052	0.029	0.023	0.014	0.039	4.0	126.2	7.92
09/13/2012	0.077	0.014	0.063	0.013	0.064	9.0	130.1	7.58
09/14/2012	0.048	0.011	0.037	0.015	0.033	13.8	128.7	8.16
09/18/2012	0.050	0.015	0.035	0.014	0.036	7.2	130.0	7.63
10/02/2012	0.205	0.080	0.125	0.068	0.137	35.4	120.6	7.94
10/04/2012	0.037	0.017	0.020	0.012	0.025	4.4	121.7	7.80
10/27/2012	0.135	0.028	0.107	0.016	0.119	42.6	104.2	8.05
02/16/2013	0.052	0.020	0.032	0.009	0.043	12.8	67.9	7.79

Sampling Date	**TP**[1] (mg/l)	**TDP** (mg/l)	**PP** (mg/l)	**SRP** (mg/l)	**DOP** (mg/l)	**TSS** (mg/l)	**Ca** (mg/l)	**pH**
03/20/2013	0.052	0.024	0.028	0.006	0.046	19.0	67.4	7.85
03/21/2013	0.042	0.018	0.024	0.004	0.038	6.0	86.5	7.70
05/24/2013	0.074	0.016	0.058	0.003	0.013	10.6	101.6	7.78
06/2/2013	0.034	0.046	#	0.003	0.043	4.8	111.9	7.77
06/3/2013	0.032	0.007	0.025	0.003	0.004	5.4	117.4	7.81
06/5/2013	0.034	0.009	0.025	0.003	0.006	9.2	118.8	7.68
06/7/2013	0.041	0.009	0.032	0.003	0.006	5.6	124.8	7.74
06/8/2013	0.040	0.010	0.030	0.003	0.007	6.2	120.4	7.79
06/10/2013	0.046	0.022	0.024	0.003	0.019	8.0	107.9	7.66
06/11/2013	0.060	0.012	0.048	0.002	0.010	11.7	112.8	8.08
06/12/2013	0.042	0.011	0.031	0.002	0.009	7.2	123.2	7.91
06/14/2013	0.065	0.019	0.046	0.005	0.014	5.4	126.9	7.99
06/22/2013	0.123	0.016	0.107	0.006	0.010	7.4	121.0	8.14
06/25/2013	0.463	0.007	0.456	0.012	#	nd	127.5	8.00
07/4/2013	0.180	0.033	0.147	0.019	0.014	nd	112.9	8.26
07/15/2013	0.033	0.024	0.009	0.019	0.005	3.2	116.9	8.87
07/16/2013	0.015	0.006	0.009	0.011	#	3.2	135.6	7.47
07/17/2013	0.028	0.004	0.024	0.010	#	7.4	137.3	7.40
07/18/2013	0.023	0.009	0.014	0.012	#	5.0	nd	7.47
07/19/2013	0.022	bdl	0.026	0.012	#	3.6	140.0	7.50
07/22/2013	0.032	0.000	0.032	0.014	#	nd	143.3	8.38
08/1/2013	0.089	0.026	0.063	0.021	0.005	nd	110.0	8.48
09/2/2013	0.067	0.015	0.052	0.007	0.008	17.8	115.4	7.78
09/3/2013	0.038	0.011	0.027	0.009	0.002	nd	117.6	7.62
09/4/2013	0.046	0.011	0.035	0.011	0.000	12.8	118.5	7.96
09/6/2013	0.040	0.003	0.037	0.009	#	10.2	122.4	7.62
09/9/2013	0.042	0.002	0.040	0.009	#	3.4	123.5	7.72
09/10/2013	0.036	0.007	0.029	0.018	#	nd	123.8	8.12
09/18/2013	0.038	-0.003	0.041	0.014	#	9.6	118.3	7.72
09/19/2013	0.019	0.005	0.014	0.016	#	5.6	135.1	7.56
09/20/2013	0.023	0.010	0.013	0.017	#	4.0	134.1	7.57
09/23/2013	0.026	0.011	0.015	0.020	#	9.4	137.0	8.14
09/28/2013	0.033	0.008	0.025	0.014	#	5.5	132.1	7.79
09/30/2013	0.039	0.010	0.029	0.017	#	nd	132.5	8.28
01/11/2014	0.077	0.017	0.060	0.014	0.003	nd	89.8	8.15
01/31/2014	0.057	0.017	0.040	0.006	0.011	6.8	83.9	7.74
02/2/2014	0.036	0.010	0.026	0.008	0.002	6.8	105.2	7.66
02/3/2014	0.037	0.013	0.024	0.010	0.003	7.8	151.9	7.93
02/4/2014	0.039	0.009	0.030	0.011	#	7.8	103.6	7.78
02/14/2014	0.059	0.023	0.036	0.019	0.004	nd	108.6	8.16
6/14/2014	0.048	0.009	0.039	0.009	0.000	10.60	90.43	7.70
6/16/2014	0.044	0.016	0.028	0.015	0.001	8.40	88.34	7.63
6/27/2014	0.095	0.013	0.082	0.015	#	5.80	128.26	7.70
6/30/2014	0.075	0.013	0.062	0.015	#	8.40	66.55	7.97
7/2/2014	0.113	0.059	0.054	0.030	0.029	27.20	115.67	7.94
7/9/2014	0.076	0.011	0.065	0.016	#	18.80	106.32	7.75
7/10/2014	0.103	0.017	0.086	0.023	#	nd	114.89	8.09

7/11/2014	0.069	0.016	0.053	0.013	0.003	14.80	103.70	7.70
7/14/2014	0.062	0.017	0.045	0.014	0.003	8.00	116.80	7.93
7/15/2014	0.095	0.014	0.081	0.017	#	7.60	126.80	7.83
7/17/2014	0.095	0.011	0.084	0.013	#	6.80	94.20	7.81
7/18/2014	0.055	0.015	0.040	0.015	0.000	5.20	96.14	7.42
7/23/2014	0.105	0.014	0.091	0.013	0.001	10.40	127.74	7.85
8/5/2014	0.067	0.009	0.058	0.021	#	5.80	132.10	7.49
8/6/2014	0.047	0.008	0.039	0.013	#	4.60	133.51	7.48
8/9/2014	0.071	0.023	0.048	0.012	0.011	11.20	146.28	7.63
8/18/2014	0.062	0.014	0.048	0.012	0.002	14.40	135.86	7.60
9/25/2014	0.088	#	0.094	0.012	#	14.60	150.99	7.61
10/2/2014	0.060	0.011	0.049	0.013	#	21.40	152.29	7.66
10/22/2014	0.080	0.026	0.054	0.028	#	64.80	160.72	7.61
10/23/2014	0.131	0.035	0.096	0.035	0.000	65.20	151.98	7.50
10/25/2014	0.124	0.039	0.085	0.028	0.011	12.40	159.76	8.02

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

Table A 24. Detailed water quality parameters of drainage water samples collected from farm 4702 from February 2011 through April 2015.

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
03/31/2011	0.050	0.012	0.038	0.007	0.043	11.3	46.6	8.07
07/05/2011	0.061	0.049	0.012	0.031	0.030	2.8	154.0	7.55
07/06/2011	0.070	0.052	0.018	0.032	0.038	4.5	148.5	7.41
07/07/2011	0.077	0.062	0.015	0.053	0.024	10.0	149.9	7.90
07/08/2011	0.068	0.043	0.025	0.046	0.022	8.6	155.2	7.80
07/12/2011	0.053	0.022	0.031	0.025	0.028	4.2	144.5	8.02
07/15/2011	0.051	0.017	0.034	0.023	0.029	3.7	141.3	7.73
08/23/2011	0.036	0.019	0.017	0.012	0.024	4.8	122.6	7.48
09/05/2011	0.049	0.020	0.029	0.026	0.023	4.3	127.9	7.63
09/08/2011	0.045	0.023	0.022	0.026	0.019	6.9	140.6	7.67
10/20/2011	0.093	0.052	0.041	0.058	0.035	21.4	125.3	7.45
10/31/2011	0.068	0.035	0.033	0.037	0.031	7.5	130.9	7.53
11/01/2011	0.084	0.045	0.039	0.050	0.034	16.8	144.0	7.68
11/02/2011	0.057	0.039	0.018	0.054	0.004	5.4	151.0	7.69
11/03/2011	0.048	0.033	0.015	0.054	#	6.5	148.4	7.68
11/04/2011	0.087	0.040	0.047	0.033	0.054	18.4	145.6	7.57
02/10/2012	0.104	0.055	0.049	0.048	0.056	14.2	132.9	7.90
02/13/2012	0.059	0.036	0.023	0.048	0.011	10.0	138.5	7.78
02/15/2012	0.051	0.027	0.024	0.041	0.010	16.0	137.8	7.99
02/22/2012	0.084	0.058	0.026	0.070	0.014	13.0	140.8	7.63
06/26/2012	0.077	0.050	0.027	0.056	0.021	6.6	150.2	7.54
06/27/2012	0.076	0.046	0.030	0.050	0.026	11.0	120.6	7.56
06/28/2012	0.078	0.041	0.037	0.032	0.046	12.4	89.0	7.71
06/29/2012	0.100	0.059	0.041	0.054	0.046	15.6	100.3	7.68
07/02/2012	0.127	0.063	0.064	0.059	0.068	17.2	121.5	7.73
08/28/2012	0.043	0.016	0.027	0.016	0.027	20.2	102.6	7.90
08/29/2012	0.040	0.015	0.025	0.015	0.025	3.8	67.0	7.61
08/30/2012	0.054	0.020	0.034	0.013	0.041	6.6	59.8	7.49
08/31/2012	0.061	0.031	0.030	0.020	0.041	3.8	56.7	7.51
09/01/2012	0.077	0.040	0.037	0.025	0.052	3.2	51.9	7.58
09/02/2012	0.102	0.051	0.051	0.029	0.073	5.0	57.6	7.56
09/03/2012	0.098	0.069	0.029	0.051	0.048	3.6	77.5	7.57
09/10/2012	0.088	0.037	0.051	0.017	0.071	7.6	136.6	7.95
09/25/2012	0.086	0.056	0.030	0.051	0.035	15.2	179.9	7.93
03/20/2013	0.060	0.033	0.027	0.015	0.045	55.0	89.8	7.80
03/21/2013	0.094	0.064	0.030	0.049	0.045	nd	114.8	8.03
05/24/2013	0.074	0.025	0.049	0.011	0.014	5.2	123.8	7.78
06/2/2013	0.094	0.059	0.035	0.048	0.011	3.4	126.8	7.72
06/3/2013	0.103	0.084	0.019	0.069	0.015	2.4	130.9	7.81
06/5/2013	0.107	0.075	0.032	0.068	0.007	9.2	133.8	7.67
06/7/2013	0.084	0.059	0.025	0.056	0.003	1.8	135.1	7.54
06/8/2013	0.123	0.069	0.054	0.065	0.004	6.2	131.7	7.80
06/10/2013	0.079	0.055	0.024	0.046	0.009	9.6	139.1	7.52
06/11/2013	0.110	0.087	0.023	0.082	0.005	9.2	139.3	7.75

Sampling Date	TP[1] (mg/l)	TDP (mg/l)	PP (mg/l)	SRP (mg/l)	DOP (mg/l)	TSS (mg/l)	Ca (mg/l)	pH
06/12/2013	0.094	0.079	0.015	0.076	0.004	7.8	146.8	7.71
06/13/2013	0.096	0.082	0.014	0.073	0.009	21.8	146.3	7.65
06/14/2013	0.070	0.055	0.015	0.045	0.010	7.0	148.9	7.66
07/15/2013	0.076	0.046	0.030	0.043	0.003	nd	131.0	7.90
08/1/2013	0.092	0.058	0.034	0.060	#	5.2	139.4	7.74
09/2/2013	0.090	0.041	0.049	0.034	0.007	8.8	128.4	7.58
09/3/2013	0.091	0.064	0.027	0.054	0.010	4.4	139.8	8.02
09/4/2013	0.085	0.056	0.029	0.056	0.000	nd	135.7	7.88
09/5/2013	0.108	0.064	0.044	0.053	0.011	10.0	141.0	7.55
09/6/2013	0.108	0.065	0.043	0.067	#	nd	151.7	8.21
09/9/2013	0.114	0.053	0.061	0.057	#	17.2	138.9	7.59
09/12/2013	0.089	0.030	0.059	0.038	#	9.6	142.7	7.64
09/13/2013	0.087	0.032	0.055	0.033	#	6.0	137.7	7.72
09/18/2013	0.098	0.019	0.079	0.039	#	nd	149.0	7.96
01/13/2014	0.065	0.039	0.026	0.037	0.002	9.4	95.0	8.19
01/31/2014	0.067	0.024	0.043	0.015	0.009	11.8	87.3	8.02
02/2/2014	0.086	0.061	0.025	0.058	0.003	10.0	113.5	7.99
02/3/2014	0.082	0.054	0.028	0.057	#	23.6	119.1	8.10
02/4/2014	0.072	0.052	0.020	0.044	0.008	23.6	nd	7.84
6/14/2014	0.088	0.018	0.070	0.016	0.002	9.00	122.28	7.83
6/25/2014	0.084	0.072	0.012	0.078	#	8.20	136.55	8.19
7/11/2014	0.086	0.011	0.075	0.014	#	11.20	135.29	7.78
7/17/2014	0.081	0.026	0.055	0.021	0.005	12.00	95.02	7.69
7/18/2014	0.105	0.055	0.050	0.040	0.015	9.00	117.91	7.52
7/19/2014	0.076	0.064	0.012	0.067	#	10.20	nd	7.47
7/23/2014	0.064	0.026	0.038	0.032	#	7.80	158.82	7.54
7/28/2014	0.040	0.033	0.007	0.043	#	7.00	167.12	7.55
8/4/2014	0.045	0.015	0.030	0.020	#	8.80	155.31	7.62
8/5/2014	0.056	0.049	0.007	0.049	0.000	6.60	154.34	7.36
8/6/2014	0.081	0.049	0.032	0.051	#	8.00	171.85	7.55
8/7/2014	0.079	0.060	0.019	0.061	#	8.00	174.56	7.79
8/9/2014	0.086	0.047	0.039	0.043	0.004	9.40	155.96	7.45
8/11/2014	0.090	0.058	0.032	0.057	0.001	6.38	162.98	7.80
8/18/2014	0.074	0.020	0.054	0.017	0.003	17.00	159.12	7.72
8/19/2014	0.096	0.061	0.035	0.062	#	-0.40	165.91	7.73
9/2/2014	0.080	0.005	0.075	0.034	#	12.00	151.24	7.56
9/22/2014	0.074	0.007	0.067	0.019	#	12.00	139.05	7.66
9/24/2014	0.082	0.041	0.041	0.054	#	6.60	162.46	7.60
9/29/2014	0.070	0.018	0.052	0.028	#	7.00	171.94	8.23
10/2/2014	0.070	0.014	0.056	0.015	#	9.00	155.95	7.59
10/3/2014	0.098	0.045	0.053	0.043	0.002	8.60	178.55	nd
10/22/2014	0.070	0.035	0.035	0.025	0.010	7.78	164.17	7.72
10/23/2014	0.075	0.026	0.049	0.032	#	15.00	163.36	7.36
2/10/2015	0.049	0.020	0.029	0.011	0.009	8.40	81.20	nd
3/2/2015	0.094	0.049	0.045	0.041	0.008	34.20	100.73	7.62
3/3/2015	0.067	0.023	0.044	0.017	0.006	13.00	112.54	nd

[1]TP=total-P; TDP=total dissolved-P; PP=particulate-P; SRP=soluble reactive-P; DOP=dissolved organic-P; TSS=total suspended solids; Ca=total dissolved calcium. nd = not determined. bdl = below detection limit. # indicates a negative value as the difference between TDP and SRP; or between TP and TDP.

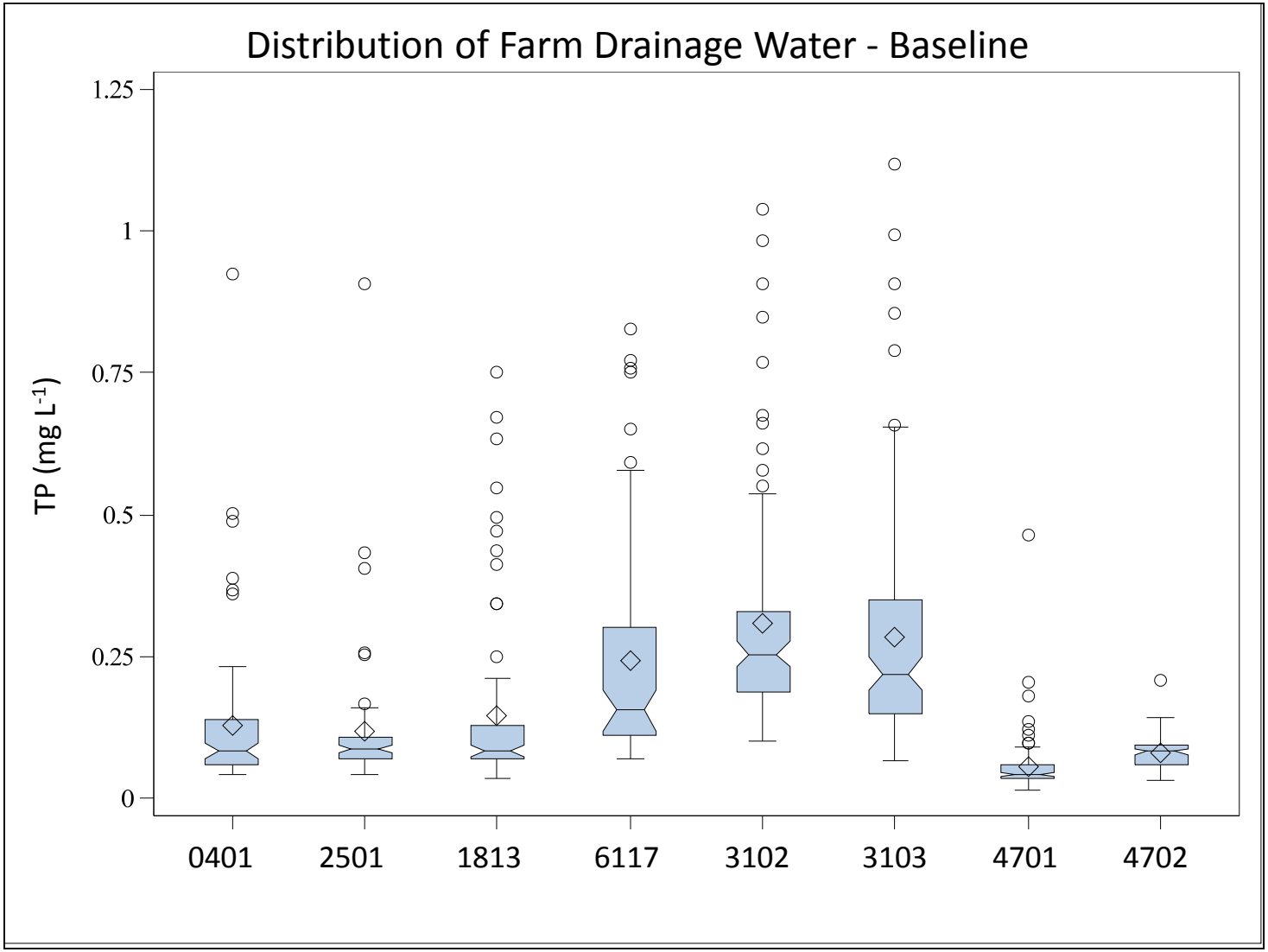

Figure A 15. Distribution of total P (TP) concentrations in drainage water samples from calibration period.
The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

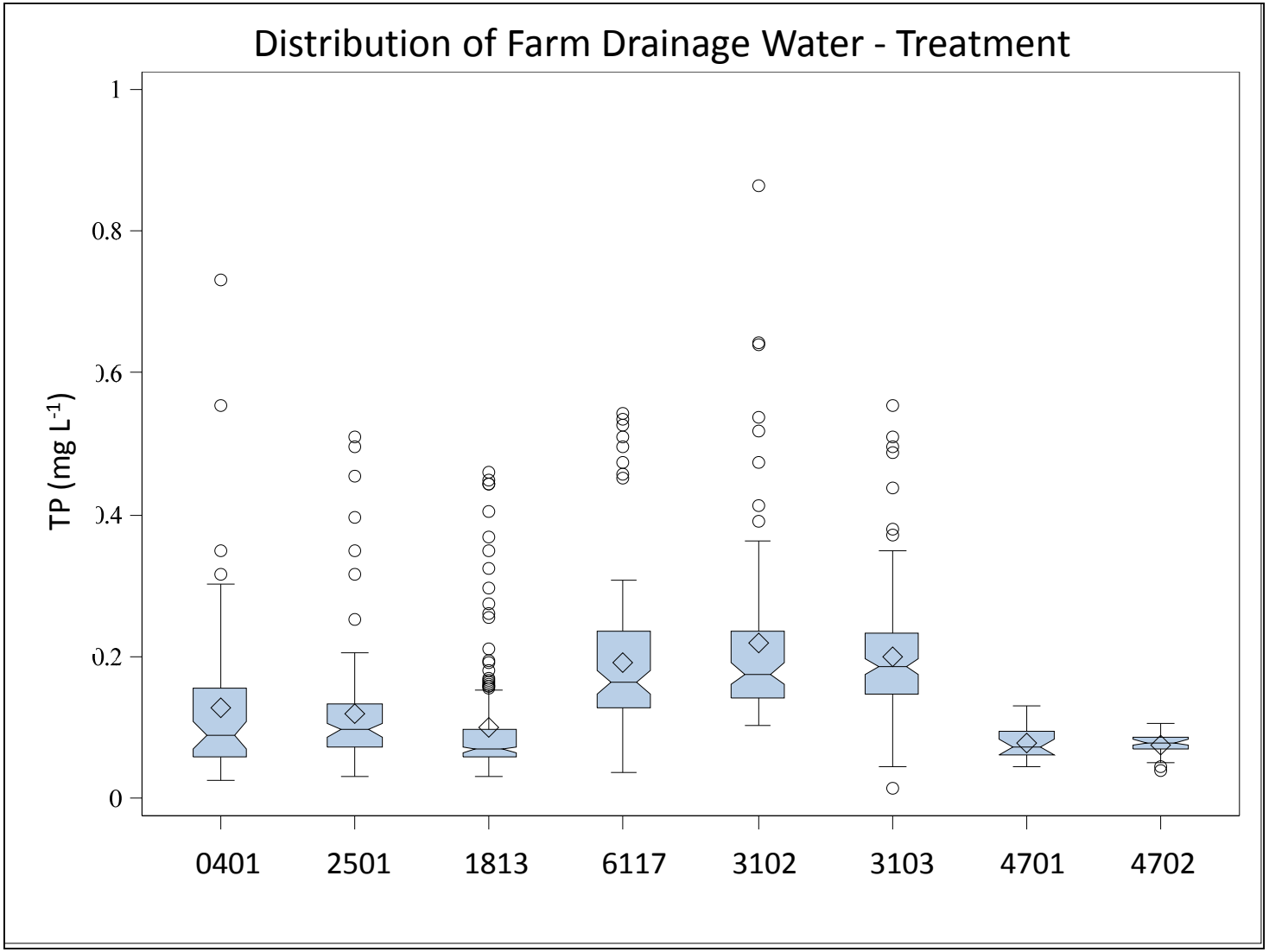

Figure A 16. Distribution of total P (TP) concentrations in drainage water samples from treatment period.
The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

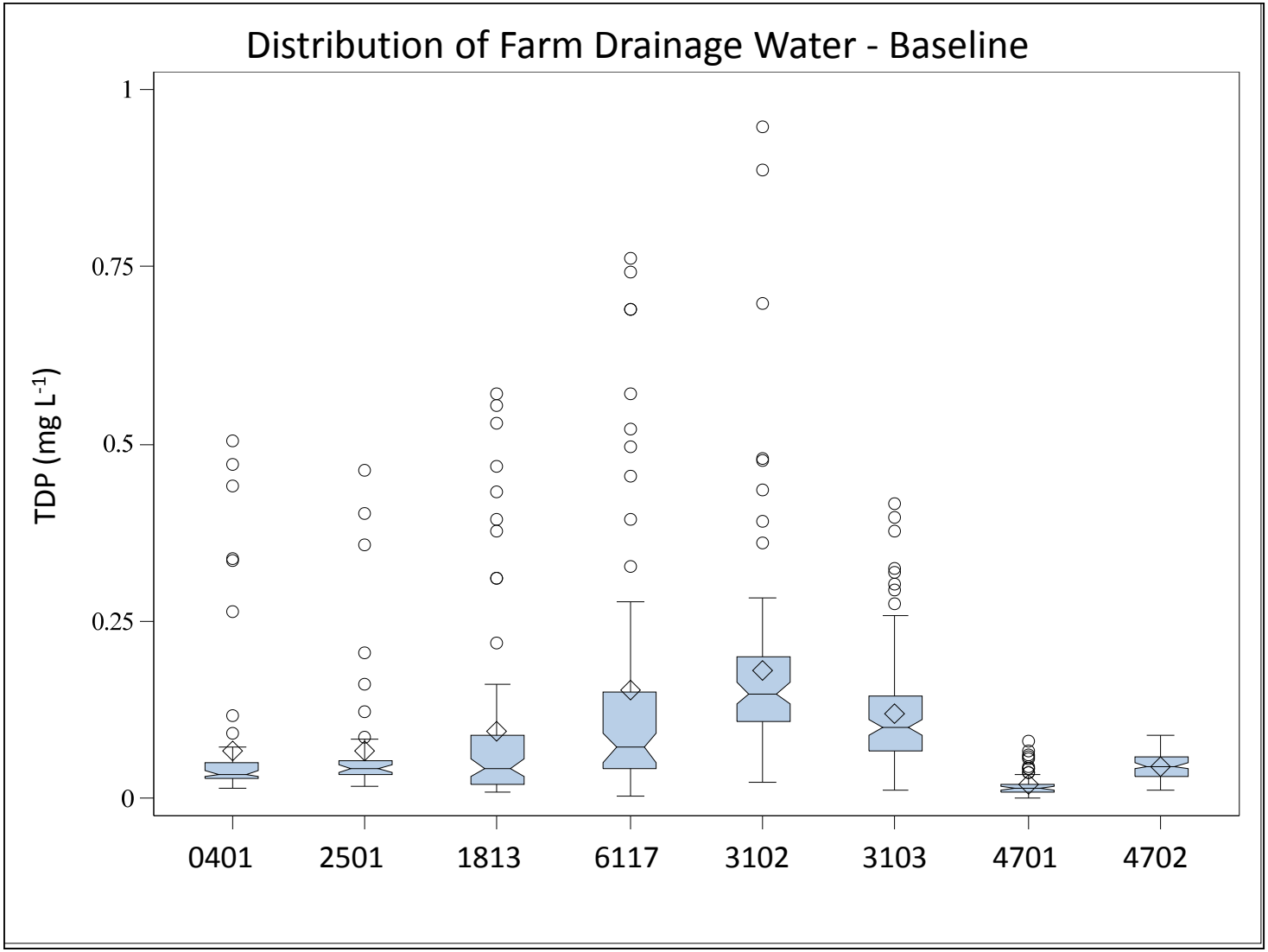

Figure A 17. Distribution of total dissolved P (TDP) concentrations in drainage water samples from calibration period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

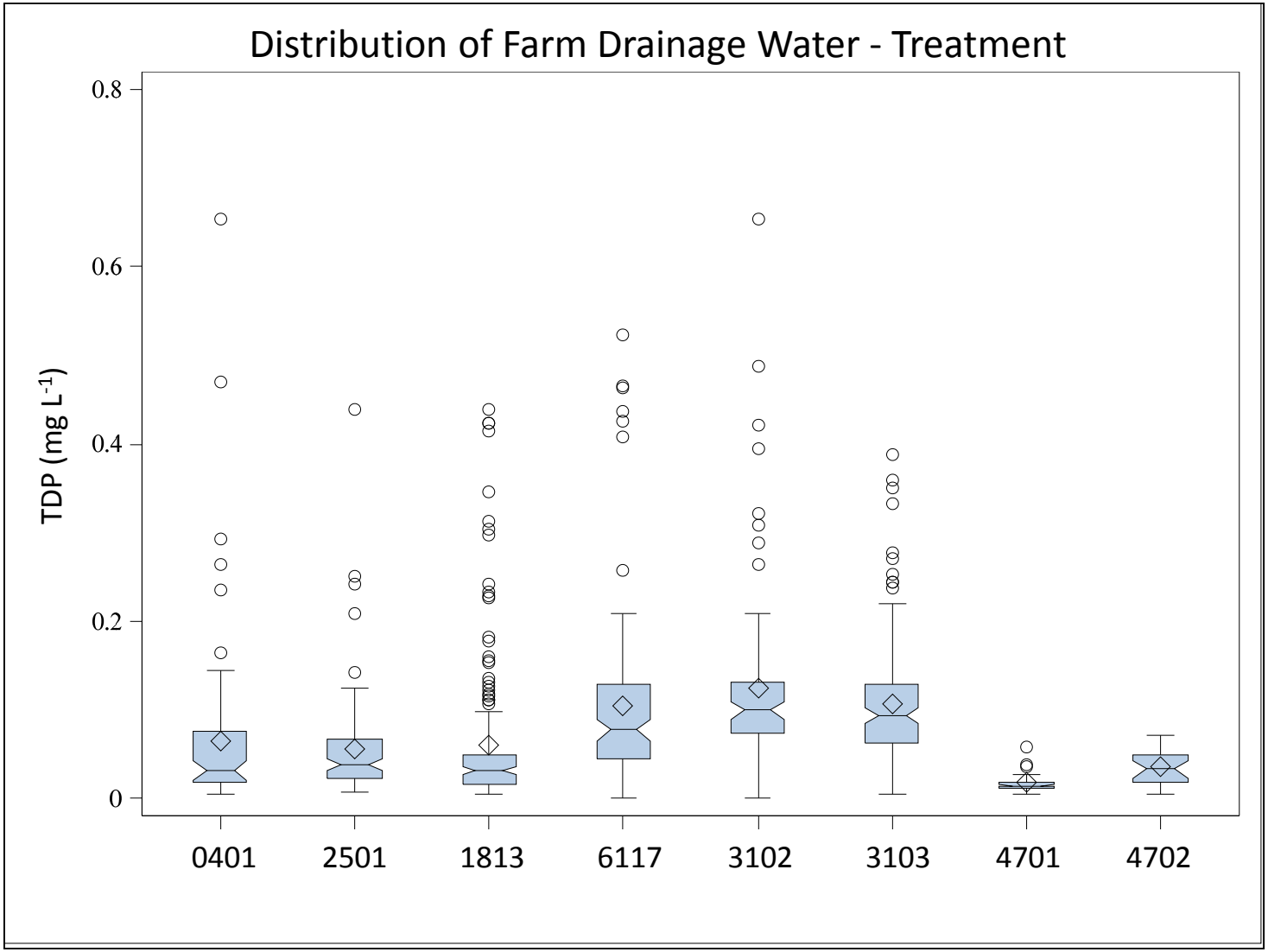

Figure A 18. Distribution of total dissolved P (TDP) concentrations in drainage water samples from treatment period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

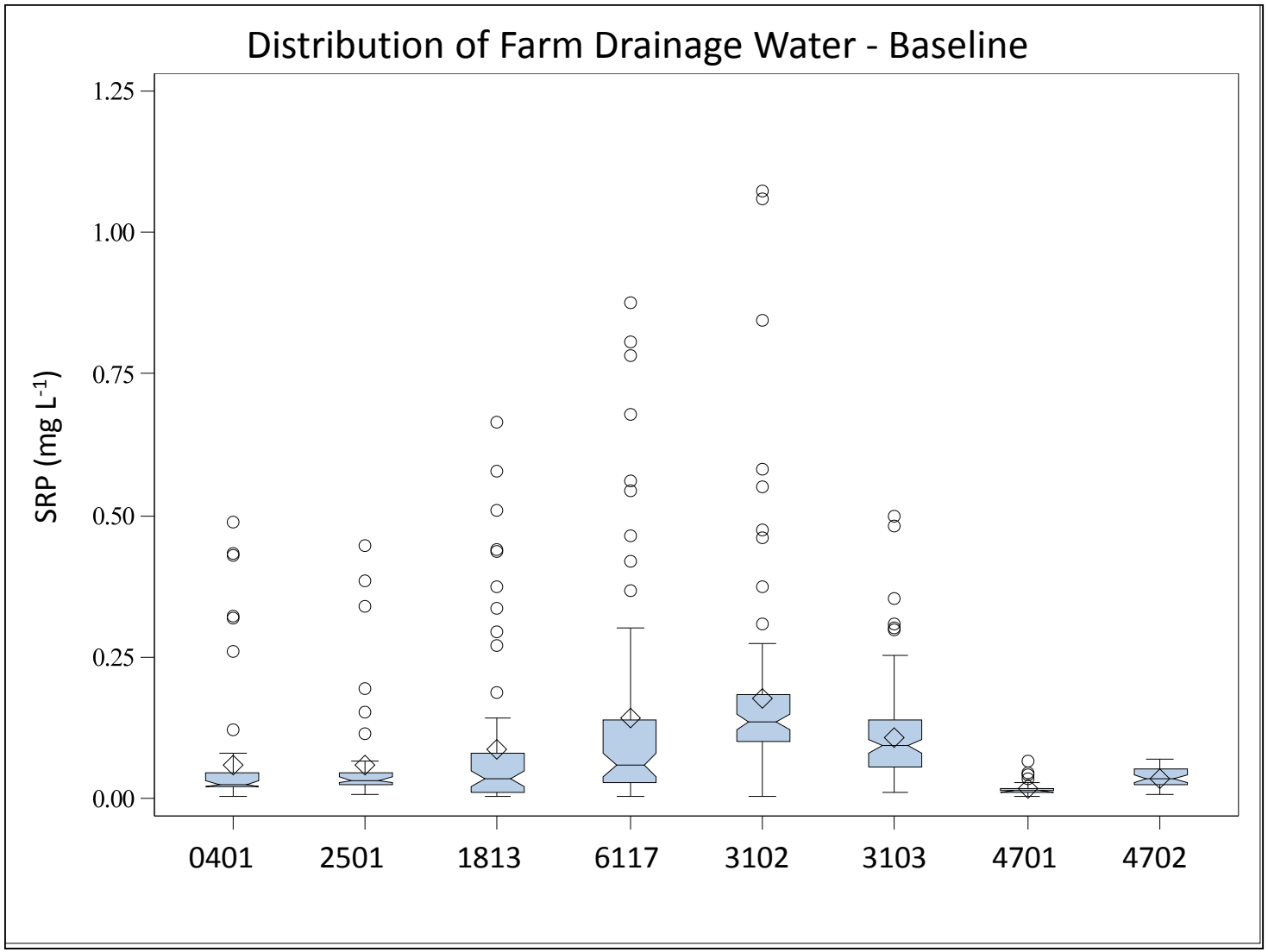

Figure A 19. Distribution of soluble reactive P (SRP) concentrations in drainage water samples from calibration period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

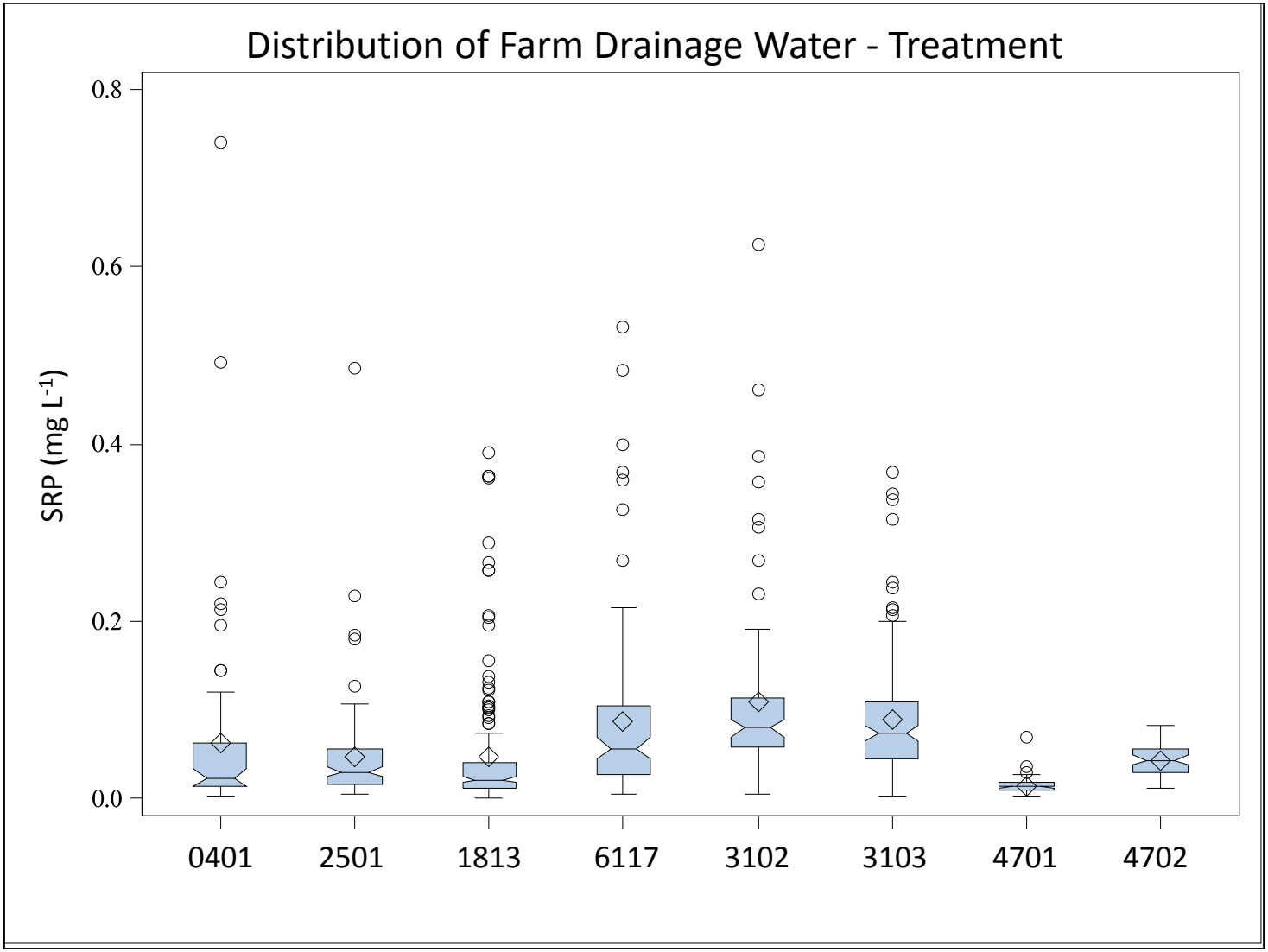

Figure A 20. Distribution of soluble reactive P (SRP) concentrations in drainage water samples from treatment period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

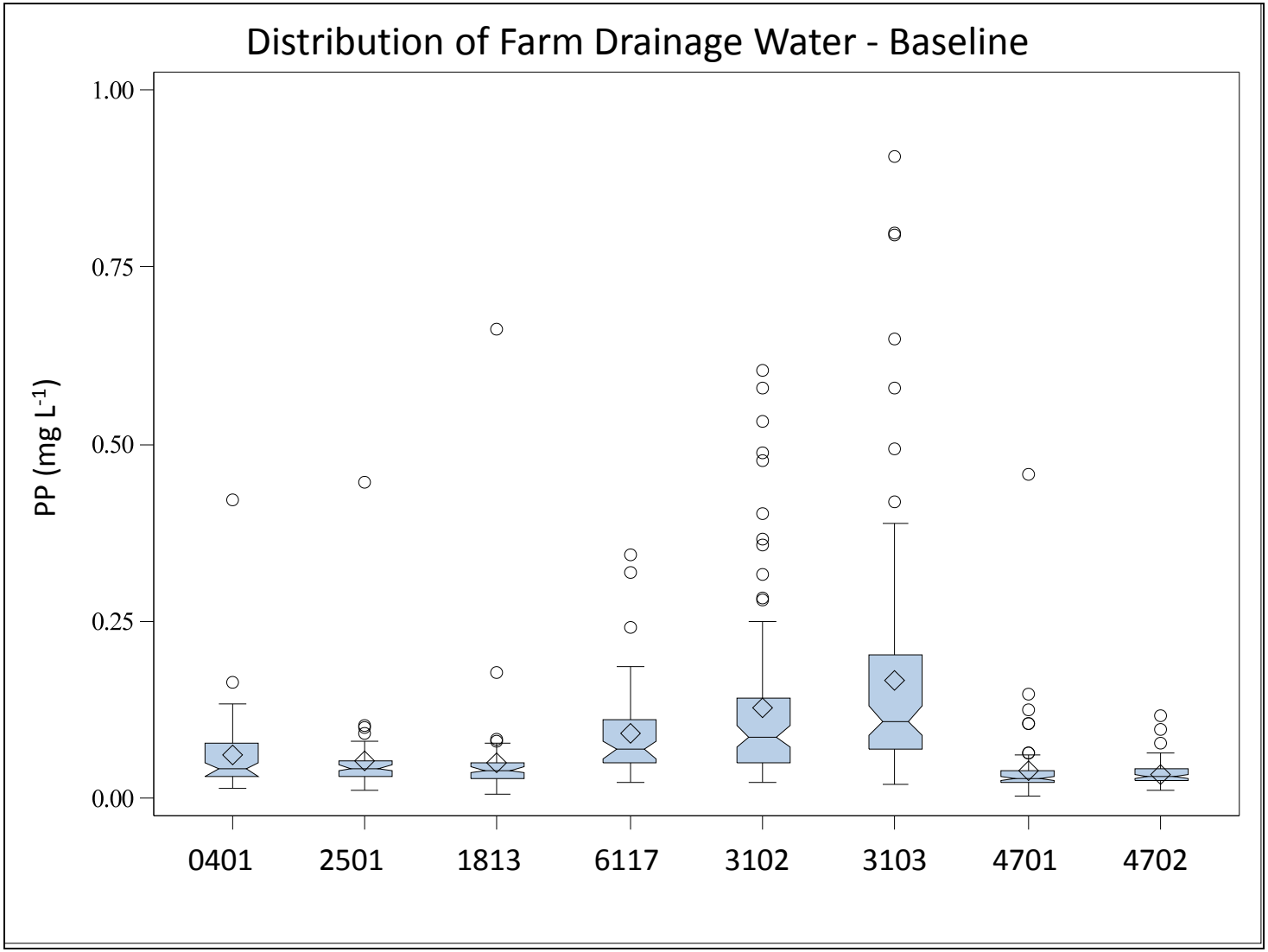

Figure A 21. Distribution of particulate P (PP) concentrations in drainage water samples from calibration period.
The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

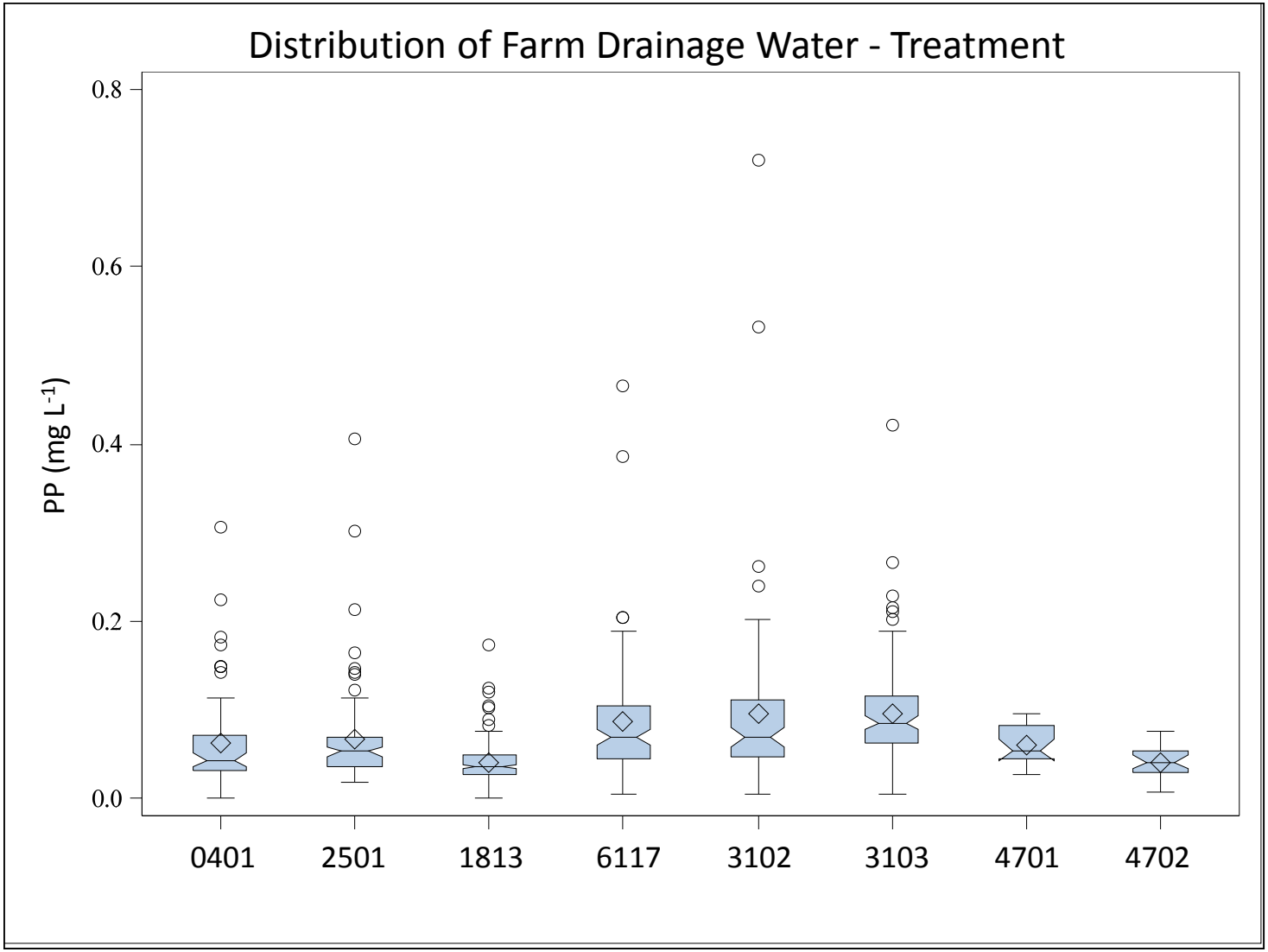

Figure A 22. Distribution of particulate P (PP) concentrations in drainage water samples from treatment period.
The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

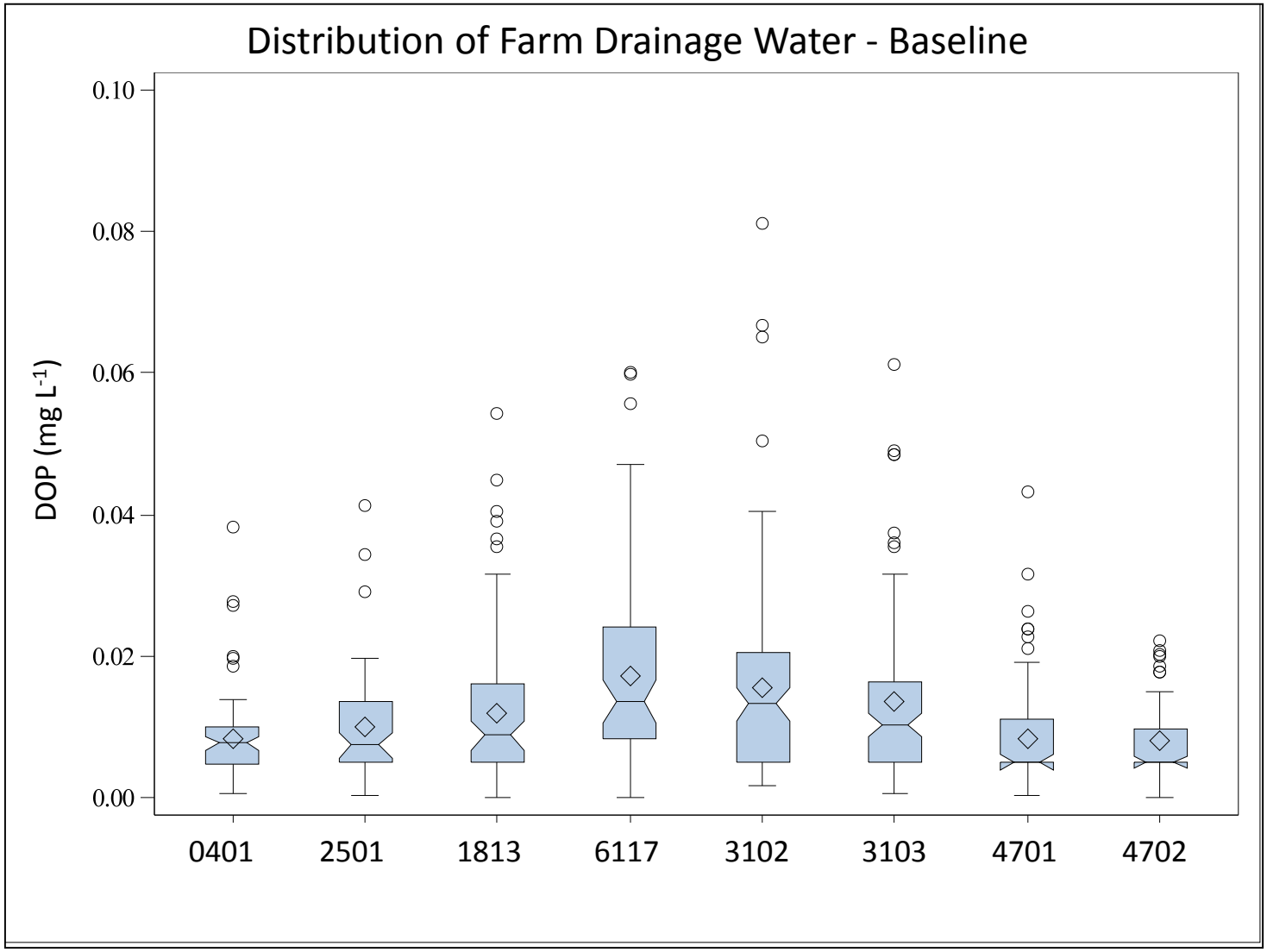

Figure A 23. Distribution of dissolved organic P (DOP) concentrations in drainage water samples from calibration period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

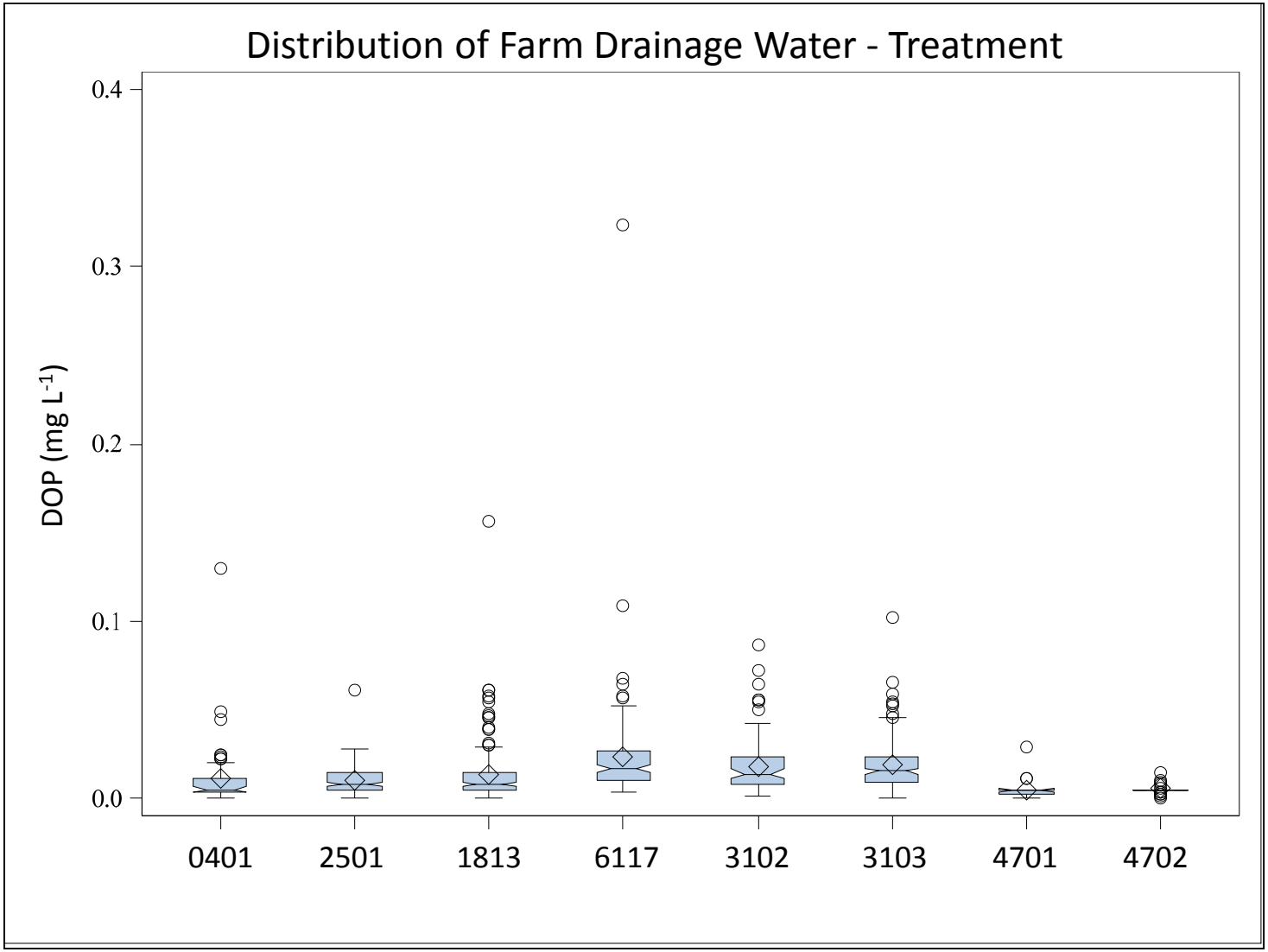

Figure A 24. Distribution of dissolved organic P (DOP) concentrations in drainage water samples from treatment period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

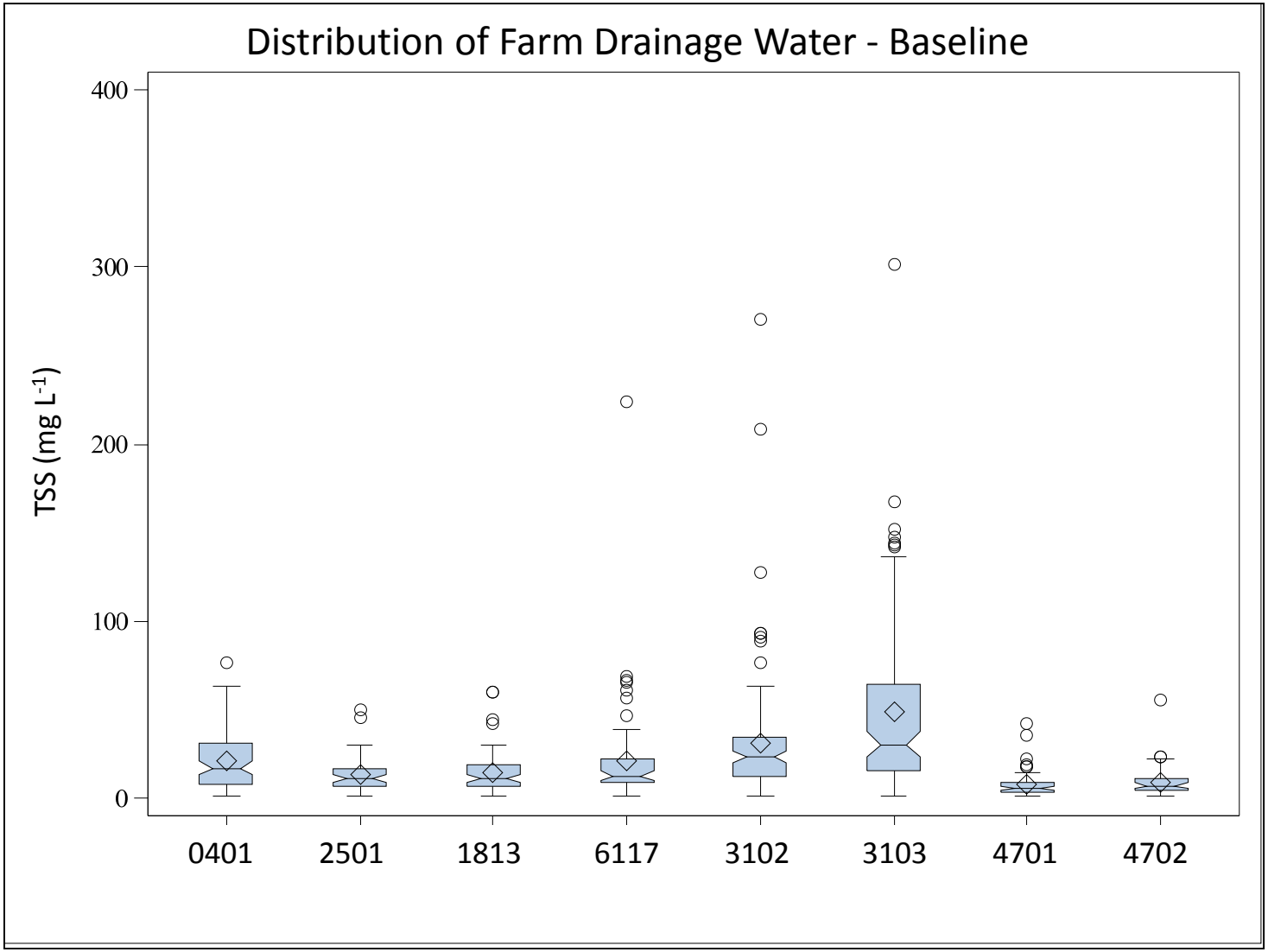

Figure A 25. Distribution of total suspended solids (TSS) concentrations in drainage water samples from calibration period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

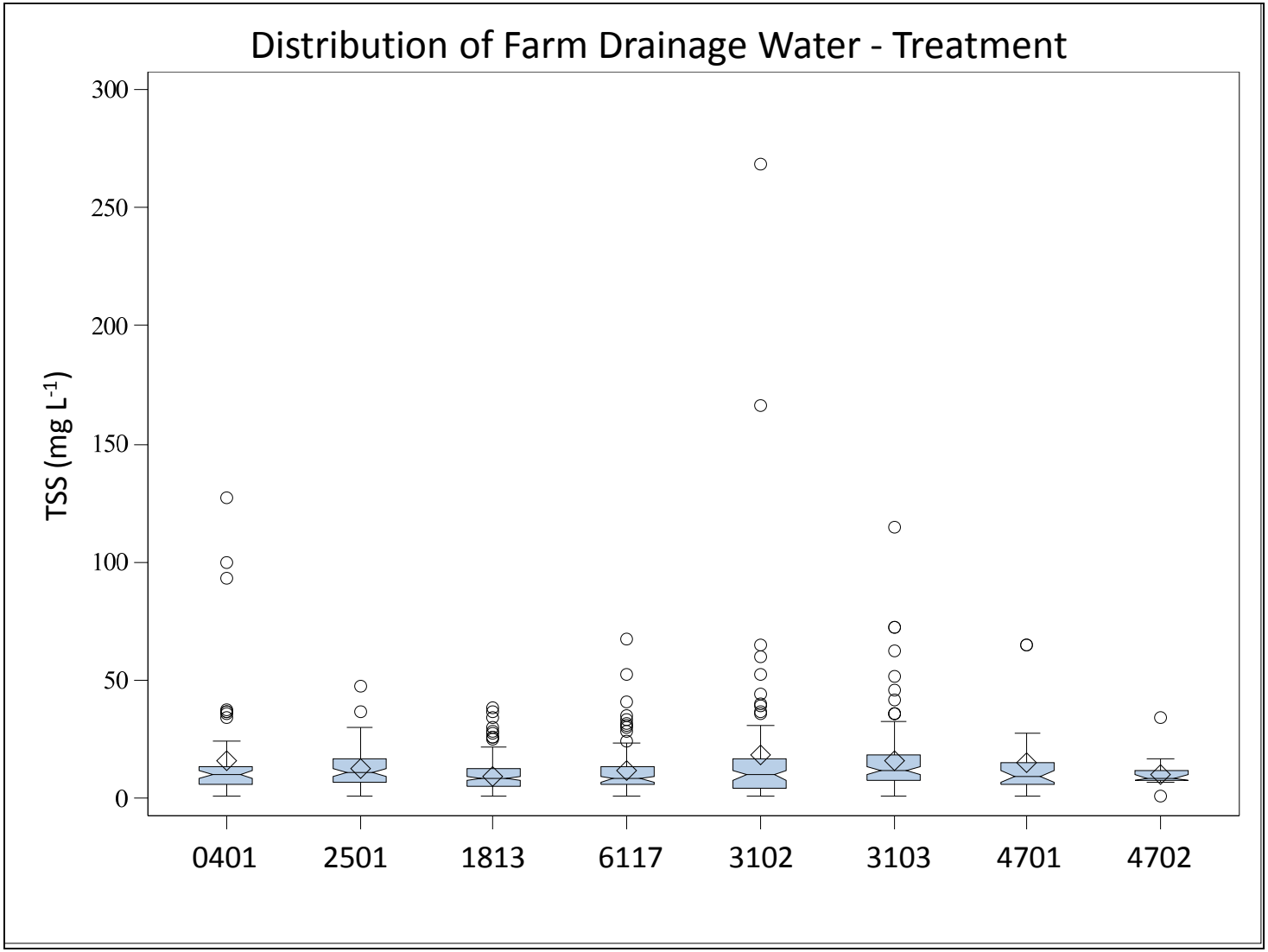

Figure A 26. Distribution of total suspended solids (TSS) concentrations in drainage water samples from treatment period. The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

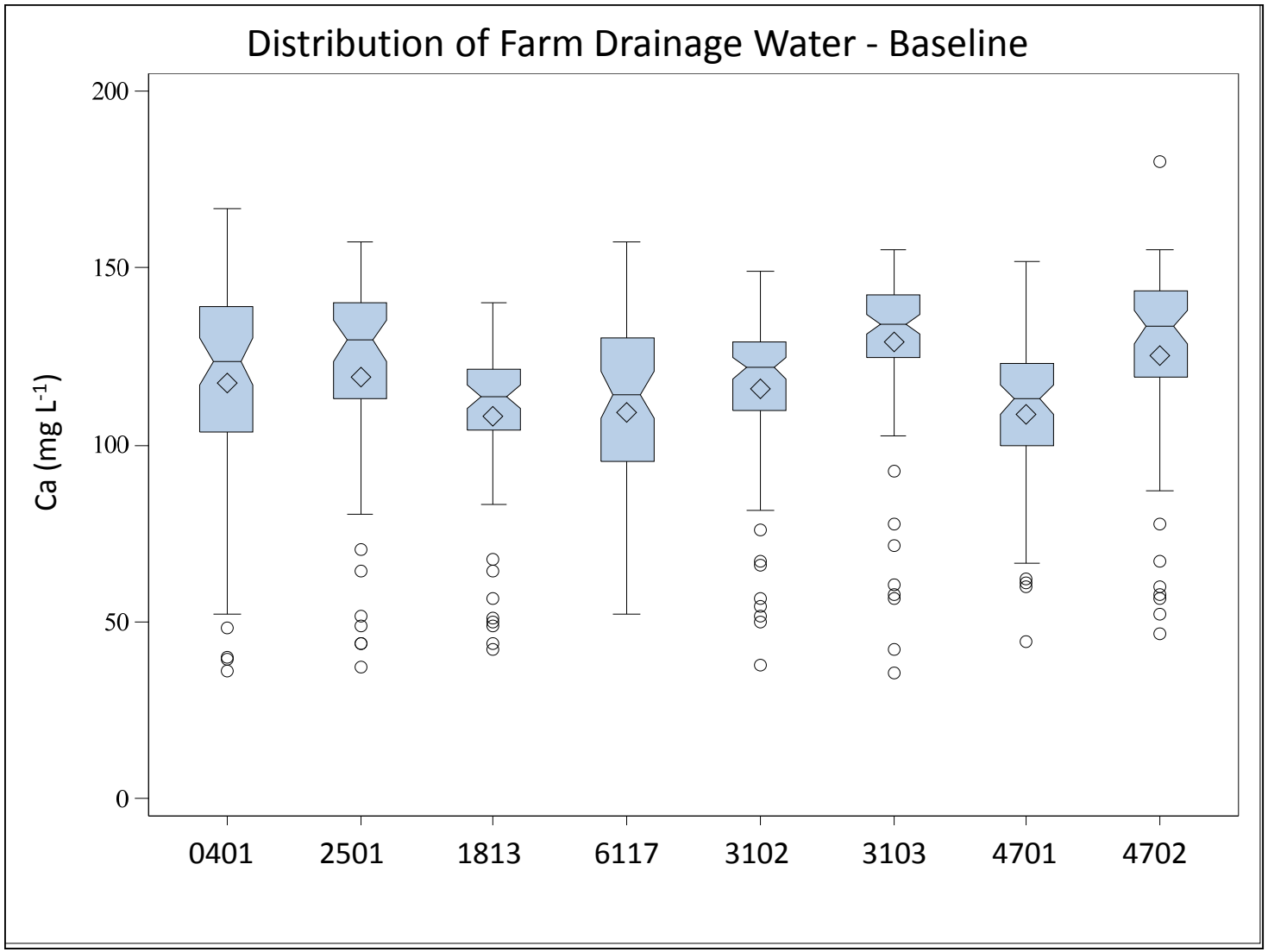

Figure A 27. Distribution of calcium (Ca) concentrations in drainage water samples from calibration period.
The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

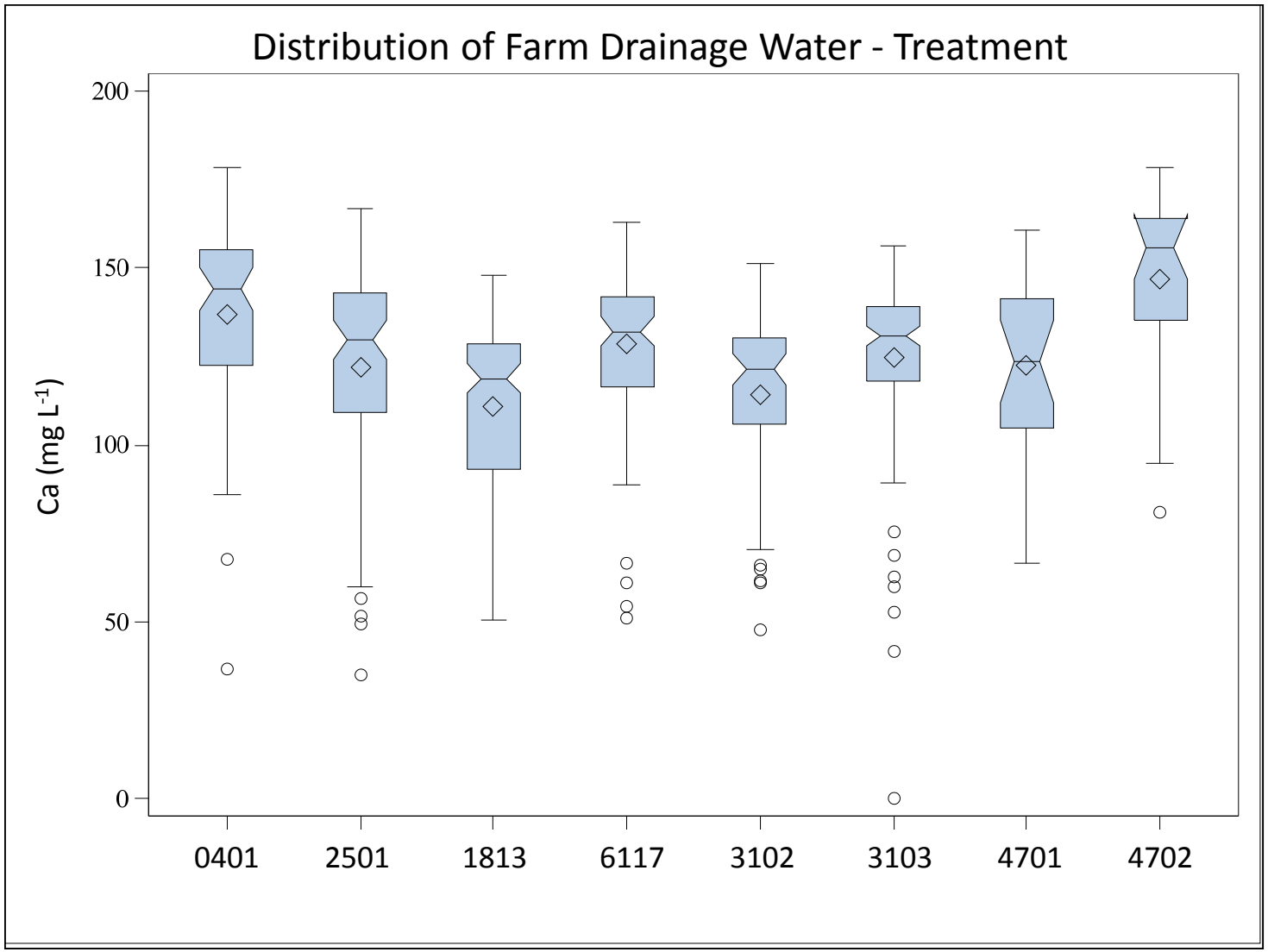

Figure A 28. Distribution of calcium (Ca) concentrations in drainage water samples from treatment period.
The 'diamond' sign in the box is the mean, horizontal line in the box is the median, the top and bottom of the box represents 75th and 25th percentile, whereas the whiskers define the 5th and 95th percentile observations, and 'o' sign outside the boxes are outliers.

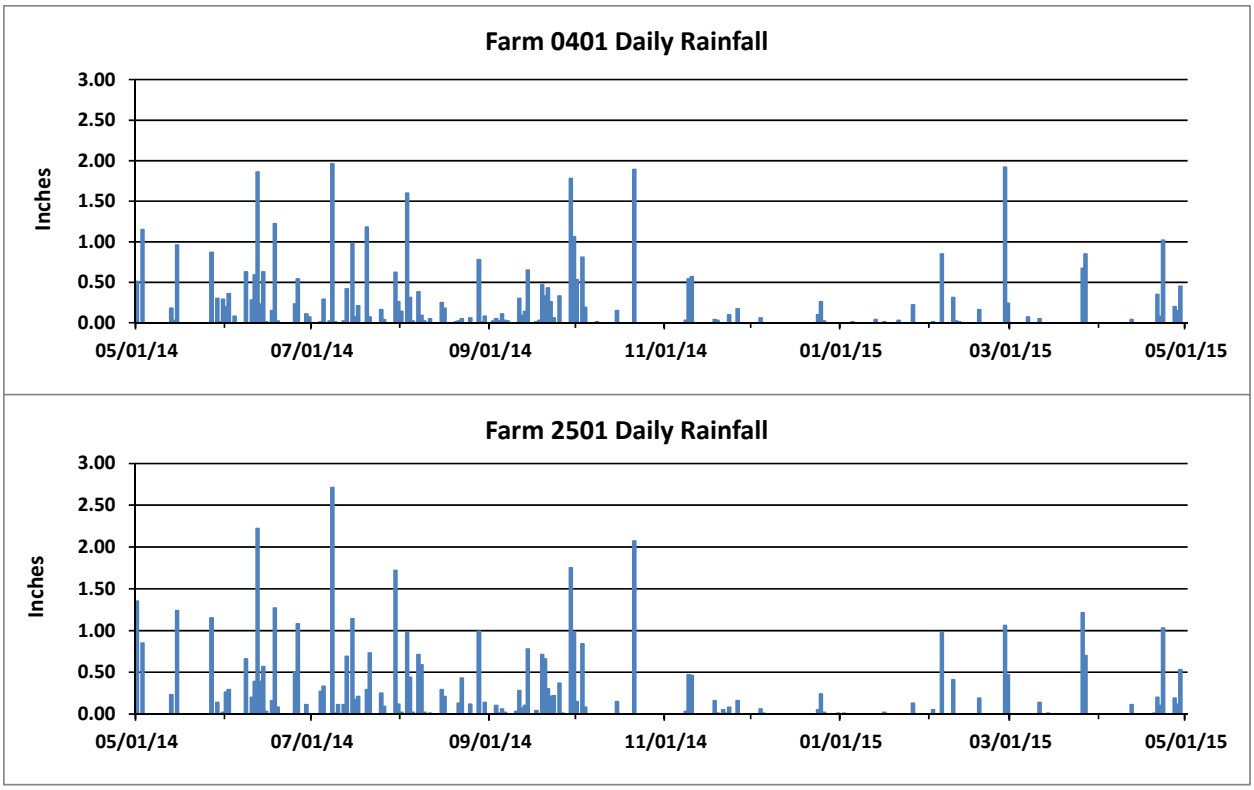

Figure A 29. Daily rainfall on farms 0401 and 2501 for WY 2015.

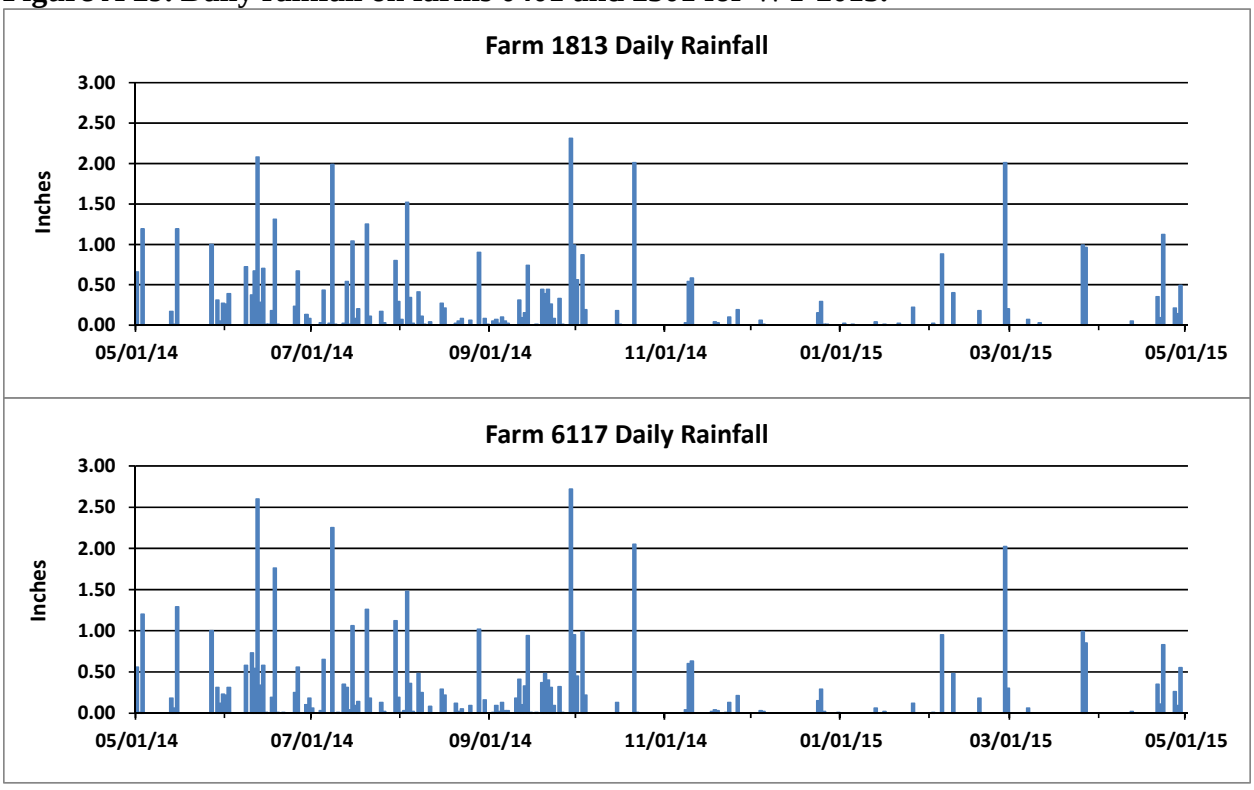

Figure A 30. Daily rainfall for farms 1813 and 6117 for WY 2015.

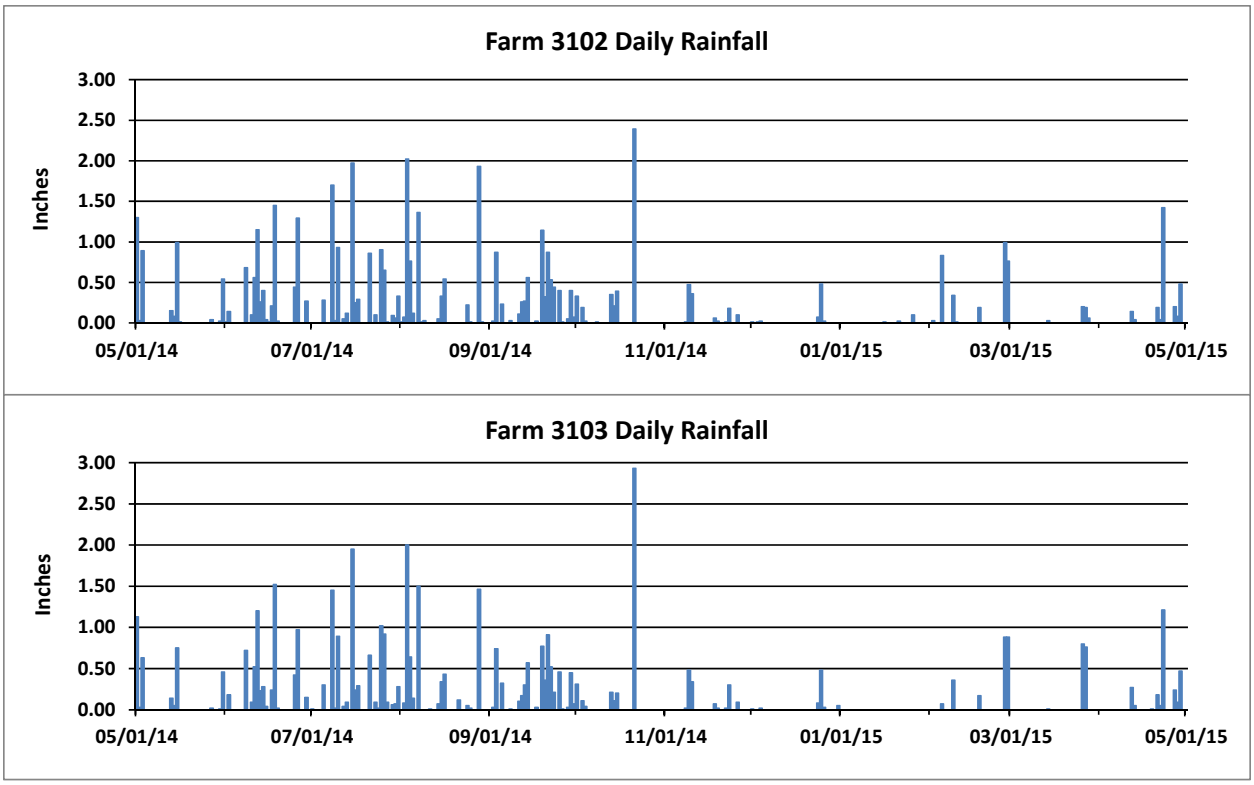

Figure A 31. Daily rainfall for farms 3102 and 3103 for WY 2015.

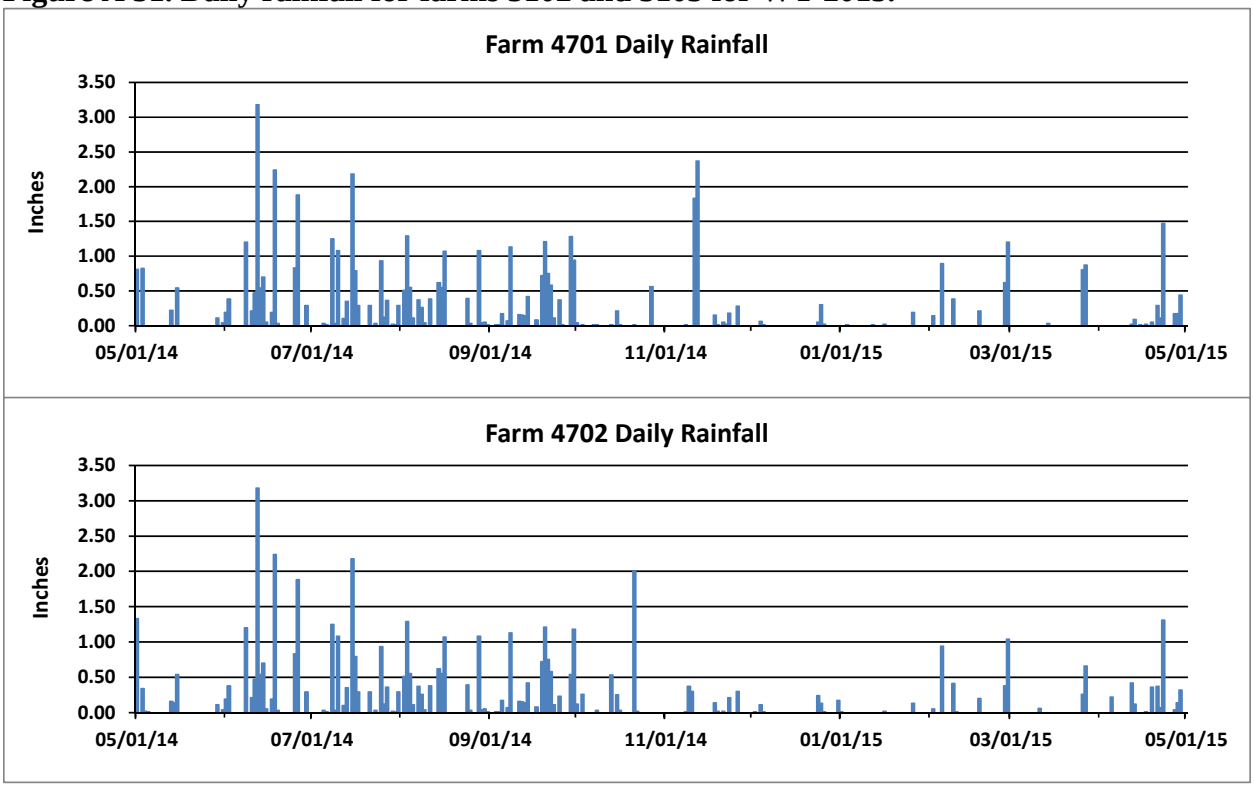

Figure A 32. Daily rainfall for farms 4701 and 4702 for WY 2015.

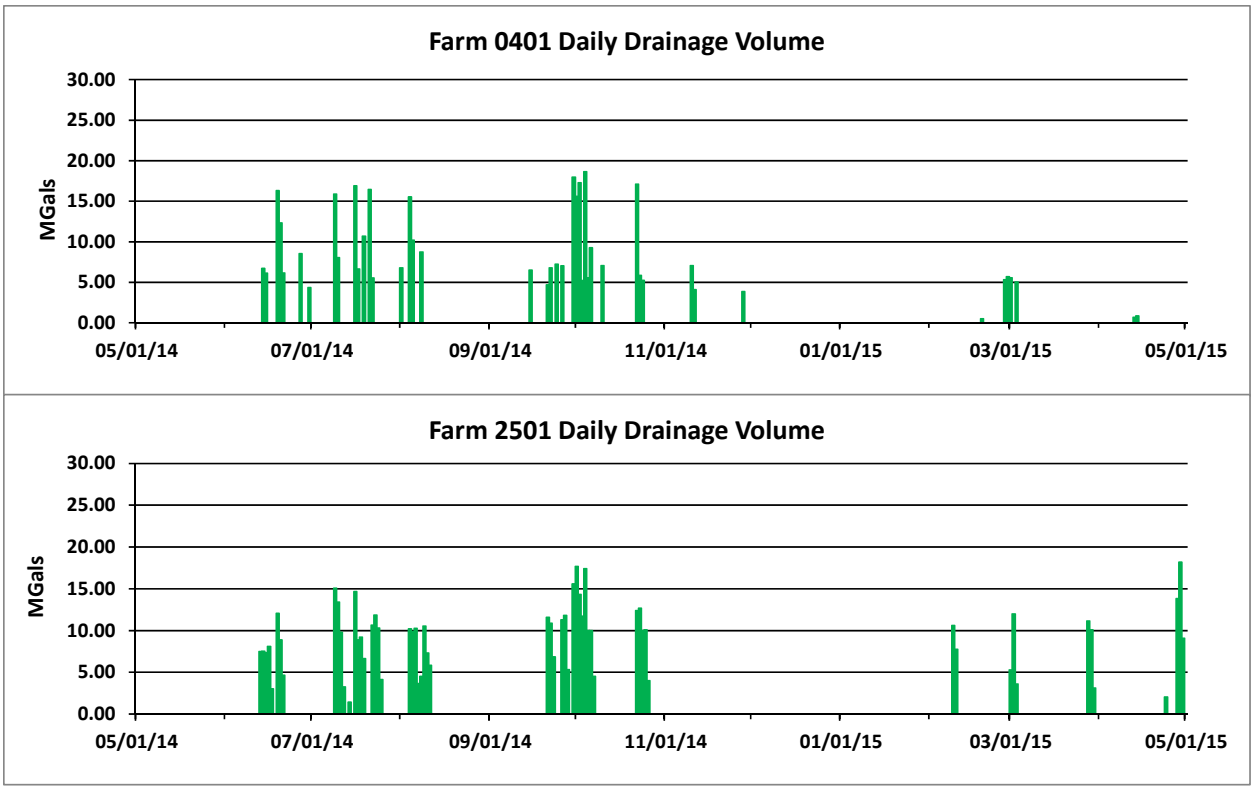

Figure A 33. Daily drainage volume for farms 0401 and 2501 for WY2015.

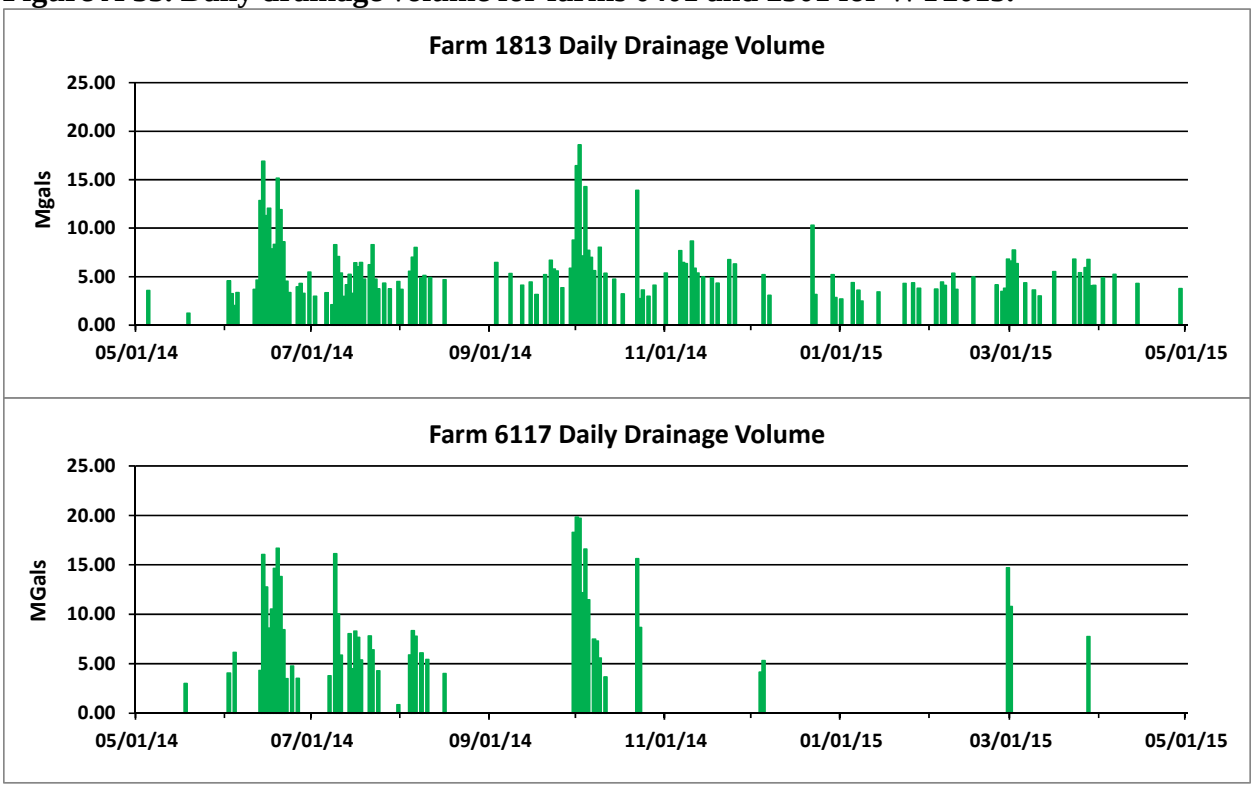

Figure A 34. Daily drainage volume for farms 1813 and 6117 for WY 2015.

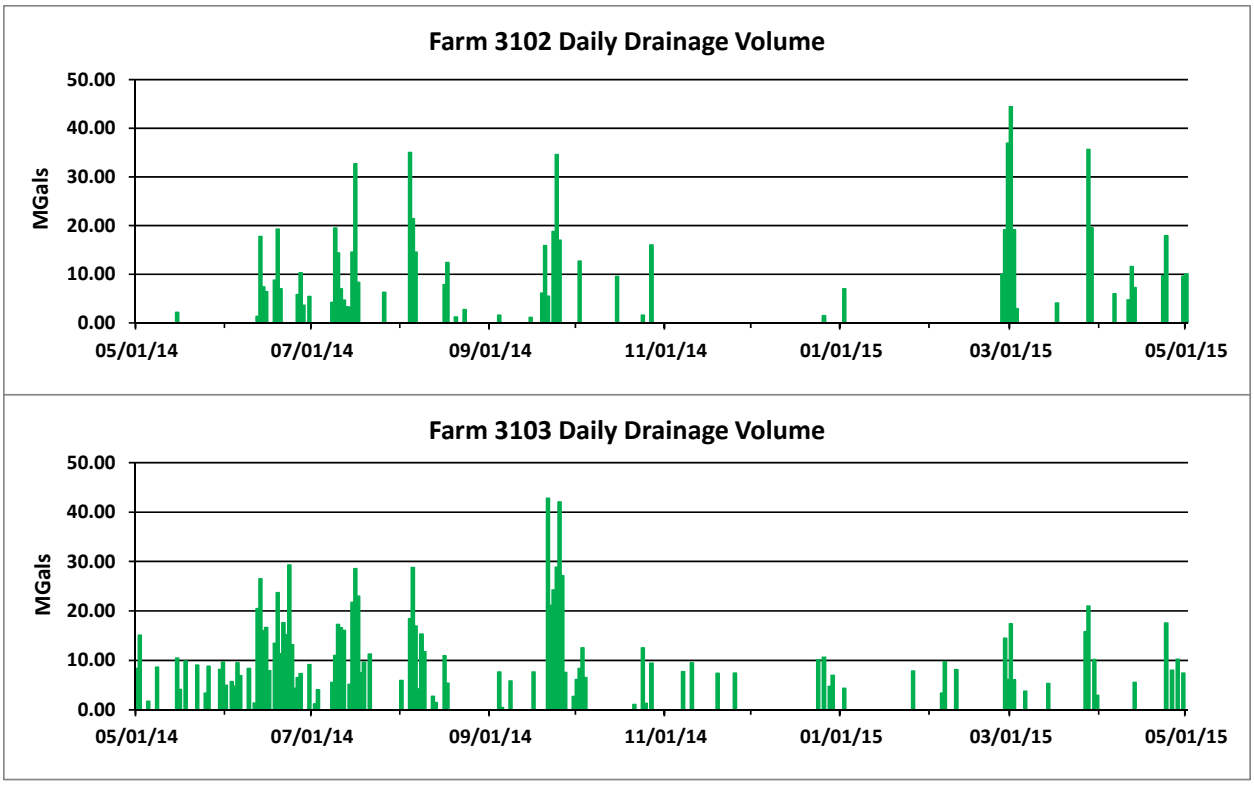

Figure A 35. Daily drainage volume for farms 3102 and 3103 for WY2015.

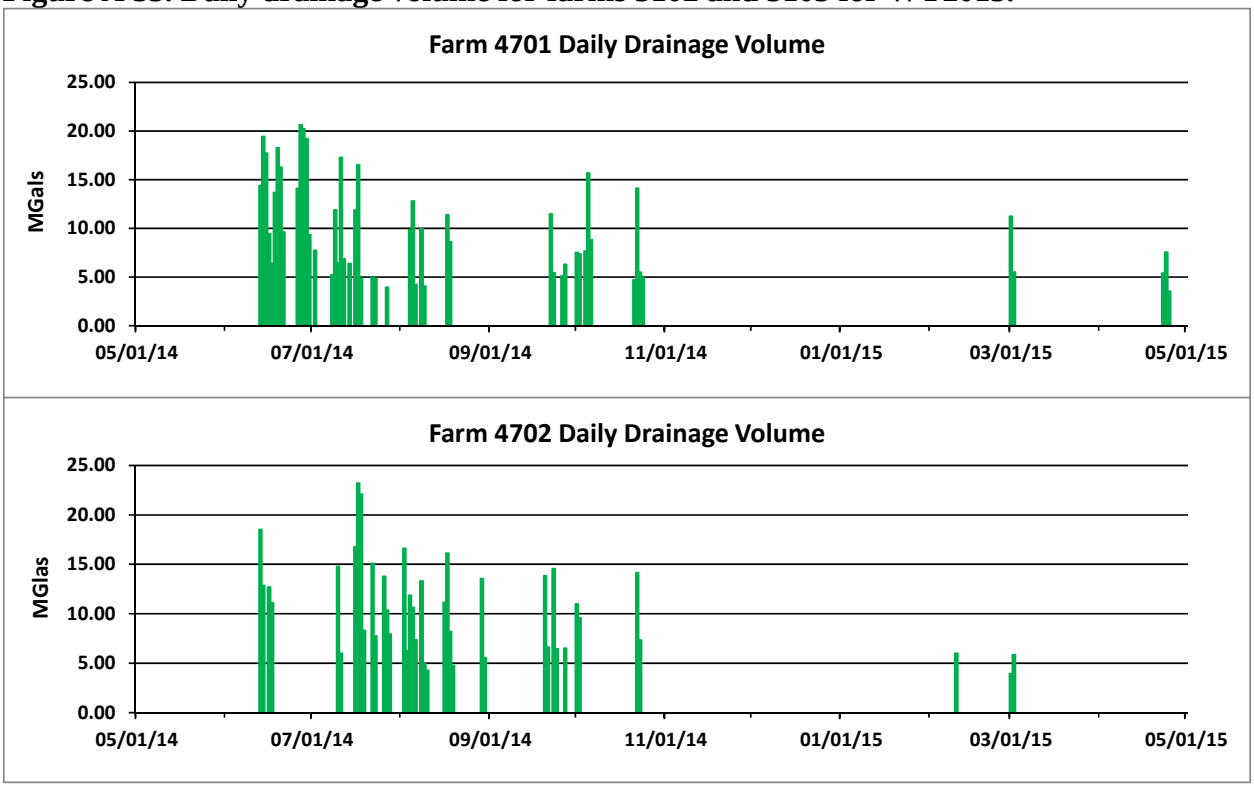

Figure A 36. Daily drainage volume for farms 4701 and 4702 for WY2015.

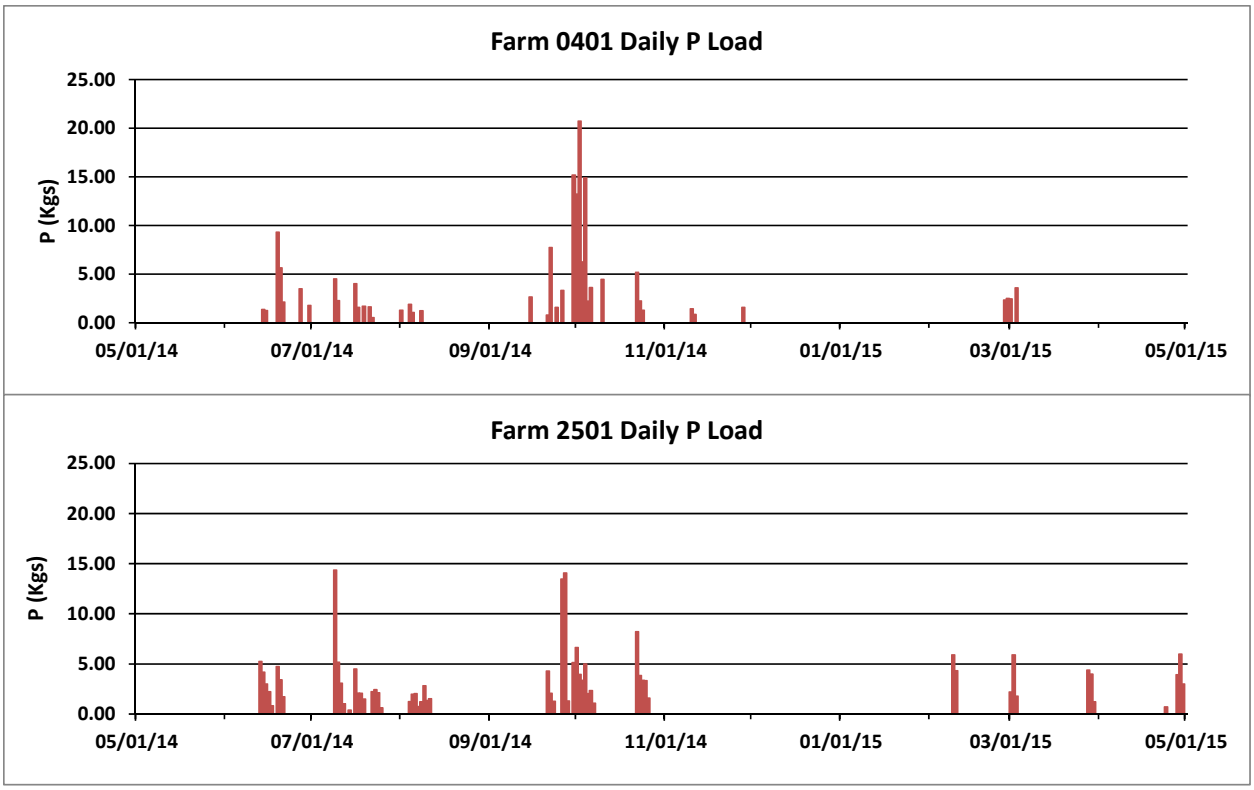

Figure A 37. Daily P export for farms 0401 and 2501 for WY2015.

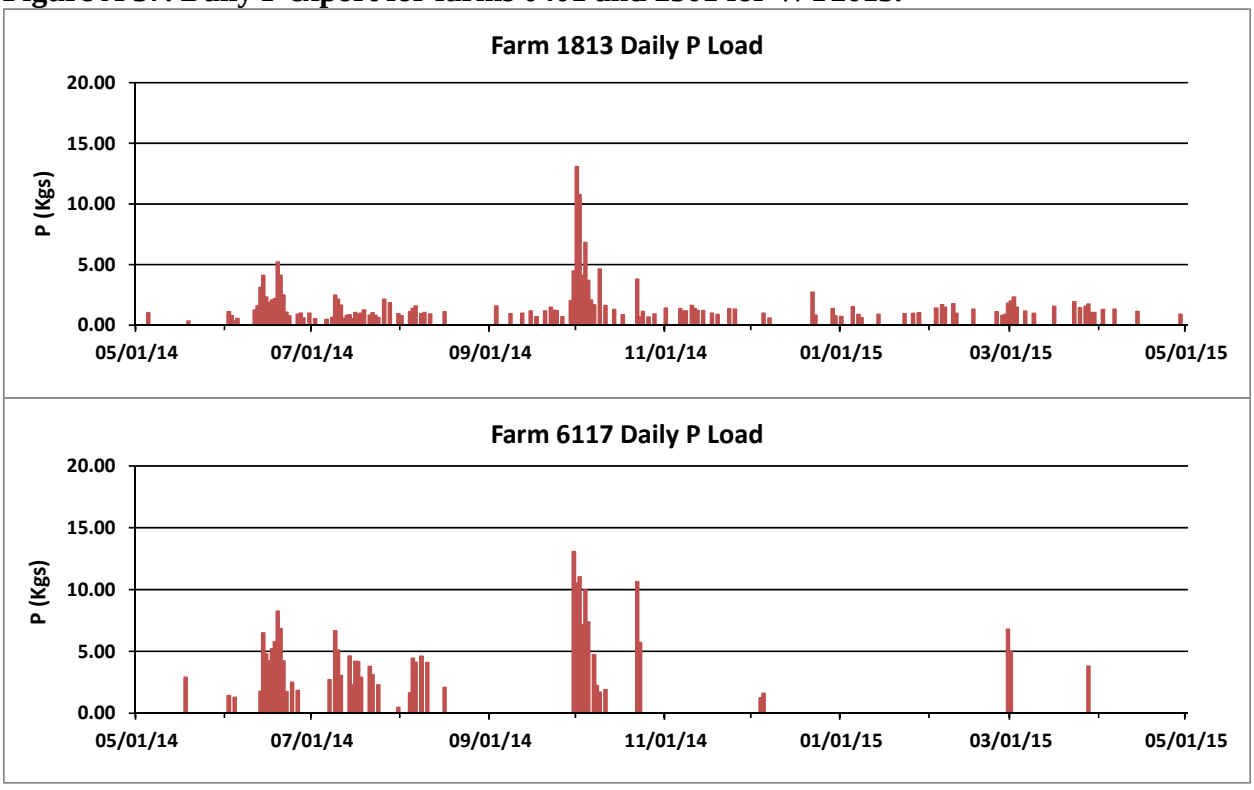

Figure A 38. Daily P export for farms 1813 and 6117 for WY2015.

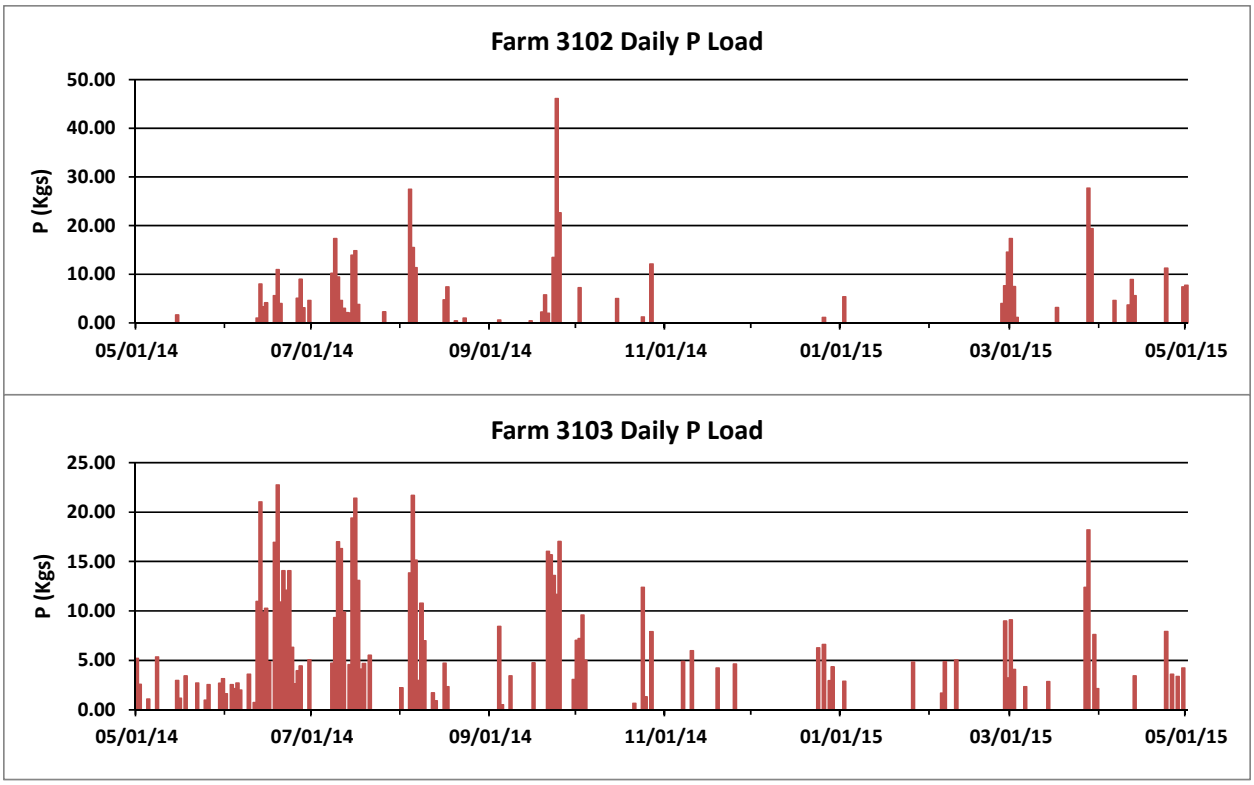

Figure A 39. Daily P export for farms 3102 and 3103 for WY2015.

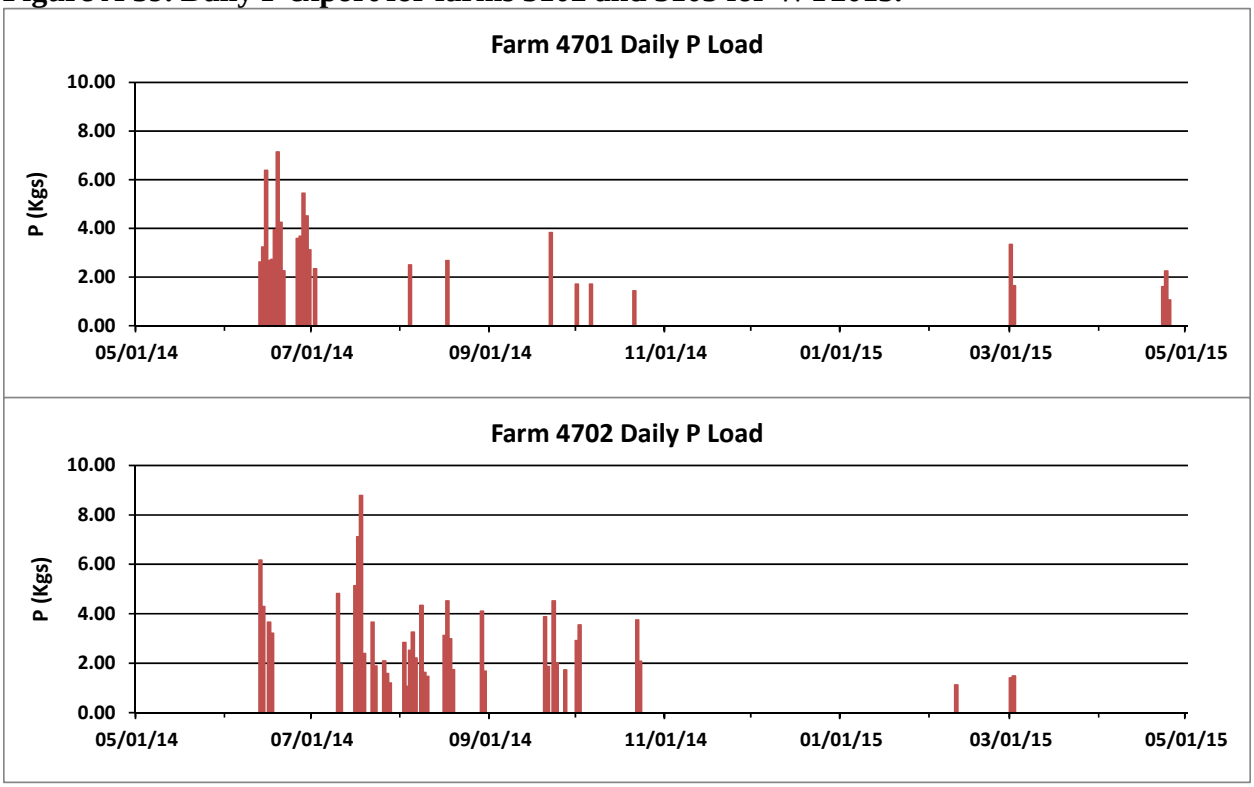

Figure A 40. Daily P export for farms 4701 and 4702 for WY2015.

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