# ABSTRACT

Title of Thesis: Nutrient Leaching from Leaf-and-Grass Compost Addition to Stormwater Submerged Gravel Wetlands

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Submerged Gravel Wetlands (SGWs) are subsurface-flow wetlands, and are effective stormwater control measures (SCM). Compost addition has many properties beneficial to SGWs but may also lead to leaching of nitrogen (N) and phosphorus (P). To investigate nutrient leaching effects of leaf-and-grass compost addition in SGWs, mesocosm studies were conducted using bioretention soil media (BSM) mixed with 30% and 15% compost, by volume. Synthetic stormwater was applied to mesocosms and effluent analyzed for N and P. Compost-added mesocosms were found to leach N and P. Maximum N concentrations of 16 and 6.4 mg-N/L were reached after 1.7 and 3.0 cm of rainfall for 15% and 30%, respectively. Maximum P concentrations of 2.9 and 0.52 mg-P/L were both reached after 2.5 cm for 30% and 15%, respectively. Particulate P was the dominant P species found in effluent samples, while N species were mixed. Although compost addition led to leaching of N and P, treatment of both nutrients was achieved, with the 15%, reaching a net-zero export of P after the equivalent of 20 cm of rainfall. Nitrogen treatment was attributed to denitrification and plant and microbial uptake. Phosphorus treatment was attributed primarily to adsorption.

# NUTRIENT LEACHING FROM LEAF-AND-GRASS COMPOST ADDITION TO STORMWATER SUBMERGED GRAVEL WETLANDS

By

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Thesis submitted to the Faculty of the Graduate School of the
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Dedicated to Brittany Mangum for her unwavering love and support,
and to Juliet Mangum, the newest light of my world.

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# Chapter 1: Introduction

In 2014 the State of Maryland passed House Bill 878 (HB878), which promotes the use of compost used in highway construction projects. By increasing the demand for compost and compost-based products, the new law aims to divert from landfills compostable material, such as yard waste and other organic material. In addition to extending the life cycle of municipal waste landfills, a high demand for compost and compost-based products stimulates growth in a new compost market. In response to this legislation, the Maryland State Highway Administration (SHA) is investigating ways to incorporate compost into stormwater control measures (SCMs), such as bioretention and stormwater wetlands. Currently, there is a limited body of knowledge regarding the effects on water quality that the addition of compost will have when incorporated into SCMs. In order to expand this body of knowledge, this study investigates the effects of compost on stormwater quality when added to soil media used in submerged gravel wetlands (SGWs).

Urban stormwater runoff has been identified as a significant source of pollution and degradation of surface waters (USEPA, 2009). Pollutants of particular interest in urban runoff include the nutrients nitrogen and phosphorus, which accumulate on roads and other impervious surfaces and are then carried to lakes and streams during storm events. This excess amount of nitrogen and phosphorus leads to eutrophication and water quality impairment in surface waters. The effects of nitrogen and phosphorus found in stormwater runoff has led to programs such as the Chesapeake Bay Total Maximum Daily Load (TMDL) which sets limitations for total phosphorus (TP) and total nitrogen (TN) discharged to the Chesapeake Bay. While TMDLs are determined uniquely for each watershed, the United States Environmental Protection Agency (USEPA) recommends nutrient criteria for the Eastern Shore of Maryland of 31.25 μg-P/L and 0.71 mg-N/L for TP and TN, respectively (USEPA, 2014). These criteria are well below the 0.3 mg-P/L and 2.0 mg-N/L found in typical urban stormwater runoff for TP and TN, respectively (MDE, 2009). In an effort to treat and remove these nutrients, increasing emphasis has been placed on stormwater management practices using "green" infrastructure techniques meant to mimic natural hydrologic conditions more closely than conventional "grey" infrastructure (NRC, 2009). SGWs are one such green infrastructure SCM being employed.

### *Submerged Gravel Wetlands*

SGWs (Figure 1-1) are a specific type of constructed wetland (CW) used in the State of Maryland as small-scale SCMs for use in small catchment areas and in locations with poor draining soils or high water tables. As defined by the Maryland Department of the Environment (MDE) Stormwater Design Manual (2009), a SGW uses "wetland plants in a rock media to provide water quality treatment." Runoff is conveyed to the SGW via overland or piped flow and distributed throughout the SGW. SGWs are designed to achieve treatment in the gravel substrate layer, where algal and microbial communities attach to aggregates to form biofilm layers (MDE, 2009). Additional nutrient treatment is obtained through plant uptake, as well as chemical transformations and physical interactions, such as filtration and adsorption (Kadlec and Wallace, 2009).

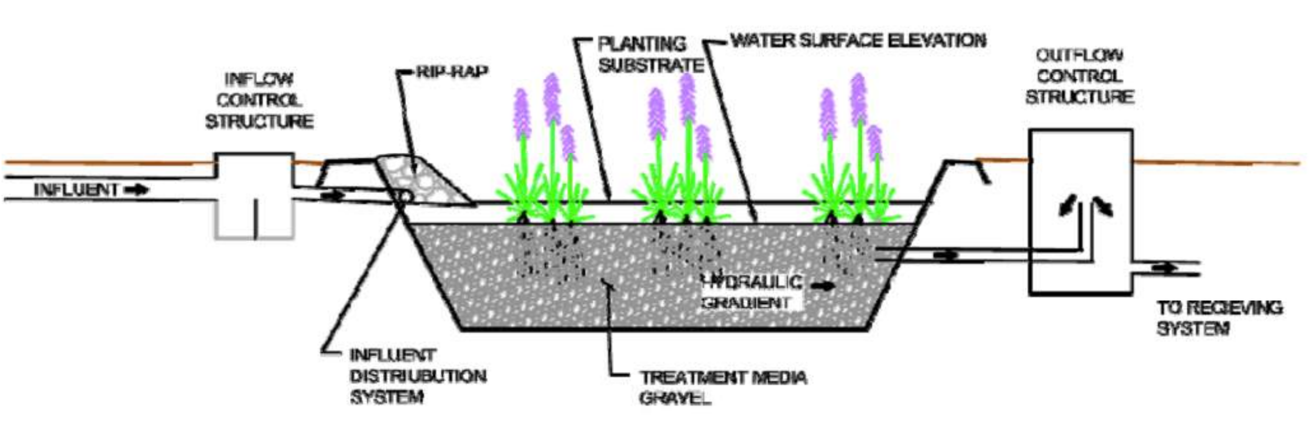



*Figure 1 - 1: Submerged Gravel Wetland Example. MDE example of submerged gravel wetland (SGW), from MDE Stormwater Design Manual (2009).*

In literature, CWs are typically defined by flow direction (horizontal or vertical) and whether the water surface elevation is maintained above the planting substrate (free water surface) or below (subsurface flow). The term "submerged gravel wetland" is rare in current scientific publications; however, SGWs are similar in form and function to horizontal, subsurface flow (HSSF) wetlands. Furthermore, Kadlec and Wallace (2009) describe HSSF wetlands as consisting of "gravel or soil beds planted with wetland vegetation." As such, it is pertinent to compare the results of the SGW mesocosms in this study with other studies regarding HSSF wetlands as well as other types of CWs.

CWs have been shown to be effective at reducing loadings and concentrations of nitrogen and phosphorus, as well as reducing total suspended solids (TSS) and metals such as copper (Wadzuk, 2010; Moore et al., 2011; Choi et al., 2015); however, removal rates have been found to be highly variable across installed structures. Removal efficiency of total nitrogen in stormwater wetlands averages 60% ± 30% (Koch et al., 2014). Vymazal (2007) reported total phosphorus removal between 40% and 60% in various types of constructed wetlands, while Hu and Shan (2009) were able to achieve 89% removal in a HSSF wetland treating reclaimed water. The high variability seen in nutrient removal rates is largely due to differences in influent nutrient loading rates as well as physical CW design characteristics. Hydraulic retention time (HRT) plays a large role in performance variability and is dependent on flow rates and wetland size. Many studies have shown that longer HRT results in higher removal rates (Kadlec and Wallace, 2009; Wadzuk et al., 2010; Choi et al., 2015). Another factor affecting removal rates of phosphorus is wetland age. Given that the primary removal mechanisms of phosphorus in CWs include sedimentation, adsorption, precipitation, and plant and microbial uptake, stormwater wetlands act as a sink for phosphorus removal early in their lifespan, but will become saturated at some point, which leads to decreased phosphorus removal rates (Kadlec and Wallace, 2009).

### *Compost in SCMs*

Composting is a microbially mediated process in which raw organic materials are decomposed and degraded into a more stable, humic-like substance rich in nutrients (USEPA, 1998). Compost is typically categorized based on the source material it is created from, which can include municipal biosolids, manure, food waste, and yard trimmings. While compost is well known for its uses in agriculture and gardening, compost is also often added in small amounts to soil mixes used in SCMs to provide a source of organic matter, and thus a carbon source. For instance, the University of New Hampshire's Stormwater Center recommends organic matter content greater than 15% and that compost may be used to achieve this. In addition to this, compost has been shown to be beneficial when added to SCMs, as it provides vegetation with vital nutrients, increases water retention (Singer et al., 2006) and is capable of retaining heavy metals (Seelsaen et al., 2007). Compost has also been investigated with respect to wetlands, although most research focuses on the result of additional carbon sources, and not compost specifically. Sutton-Grier et al. (2009) did find that increased amounts of compost added to restored urban wetlands increased the denitrification potential of the microbial community, and Gruyer et al. (2013) found that constructed wetlands amended with compost achieved 99% nitrate removal in nitrate-rich wastewaters.

While the potential benefits of adding compost in SGWs and other SCMs are generally accepted, there are potential drawbacks. For instance, the increased water retention ability of compost may lead to reduced hydraulic conductivity, which may be undesirable in SCMs designed for high filtration rates (Paus et al. 2014). Perhaps the most serious drawback is the potential for nutrient-rich composts to leach nitrogen and phosphorus, as well as metals such as copper (Logsdon and Sauer, 2016; Chahal et al., 2016); furthermore, Mullane et al. (2015) observed increases in nutrient leaching from compost columns following dry days between simulated storm events. Much of the research regarding compost in SCMs focuses on bioretention, therefore, further research should be conducted to investigate the effects of compost addition in additional types of SCMs, such as submerged gravel wetlands.

### *Research Goals and Hypotheses*

The primary goal of this study was to evaluate the water quality effects of adding leaf-and-grass-based compost to a bioretention soil media (BSM) used in submerged gravel wetlands to treat urban stormwater runoff. To accomplish this, different types of compost were first characterized using soil extraction methods to determine nitrogen and phosphorus contents. Three SGW mesocosms were then constructed at the University of Maryland Research Greenhouse using off-the-shelf prefabricated plastic storage bins. Each mesocosm contained a gravel substrate at the bottom, followed by a layer of sand, and a planting layer composed of either BSM, BSM and 30% compost by volume, or BSM and 15% compost by volume. Storm events were simulated by applying a synthetic stormwater solution made up of common stormwater pollutants at the surface of one side of the mesocosm at a flow rate of 140 mL/min. This flow rate was chosen to mimic a storm event that would equal the approximate pore volume of 50.4 L over a six-hour period. To evaluate the effects of compost on nutrient leaching, influent and effluent samples were collected and measured for TN, TP, and pH. In order to understand mechanisms of leaching and possible transformations of nitrogen and phosphorus, subsets of samples from each storm were evaluated for nitrogen and phosphorus speciation, including nitrate, nitrite, ammonium, organic nitrogen, particulate phosphorus (PP), dissolved organic phosphorus (DOP) and soluble reactive phosphorus (SRP).

A minimum of eight storm events was applied to each mesocosm. The 30% trial was conducted for an extended period of time to evaluate long term effects, with additional storms simulated using only tap water. Additional storms of synthetic urban stormwater were conducted on the 15% trial to compare sources of nitrogen (organic versus inorganic). In order to evaluate the effects of changes in flowrate, flow was modified during two storm events on both the 30% trial and the 15% trial. The results of all investigations were compared to similar research regarding compost in stormwater wetlands and other SCMs, such as bioretention.

It is hypothesized based on the available literature that the addition of compost will cause a leaching of nitrogen and phosphorus, but that concentrations leached will be reduced over time. Furthermore, higher amounts of added compost will lead to higher concentrations of leached nutrients.

## Chapter 2: Materials and Methods

### *Materials*

Compost chosen for analysis in this study was provided by Dickerson Composting Facility in Dickerson, MD and is marketed under the name Leafgro®. Leafgro® is a Maryland State Highway Administration (SHA) approved compost material and is designed to meet SHA construction specification 920.02.05 regarding compost materials used in soil mixes (Figure 2-1). Stancill's Inc. (Waldorf, MD) provided all sand, aggregate and bioretention soil media (BSM) materials. The BSM used in this study is approved for use in SHA construction projects and is designed to meet SHA

SHA specifications for compost are listed in the SHA *Standard Specifications for Construction and Materials* (July 2008), Part III, Technical Requirements, Section 920.02.05 (updated February 2015):

***920.02.05 Compost.***

***(a) Compost Types.*** *Compost shall be an agricultural product of biosolids or source-separated materials manufactured and labeled for sale in Maryland.*

***(b) Stability.*** *Compost shall be biologically mature and no longer able to reheat to thermophilic temperatures.*

***(c) pH.*** *Compost shall have a pH of 6.0 to 7.5.*

***(d) Soluble Salts.*** *Compost shall have a soluble salt concentration less than 10.0 mmhos/cm.*

***(e) Moisture.*** *Compost shall have a moisture content of 30 to 55 percent. When delivered, compost shall have a weight of 1,400 lb per cubic yard or less.*

***(f) Particle Size and Grading.*** *Compost shall be screened so that it has a uniform particle size of 0.5 in. or less, with grading analysis as follows.*

| ***COMPOST GRADING ANALYSIS*** | |
|---|---|
| ***SIEVE SIZE mm*** | ***PASSING BY VOLUME Maximum %*** |
| *4.75* | *90* |
| *0.425* | *25* |
| *0.75* | *2.2* |

*Figure 2-1: Maryland State Highway Administration Compost Specification. Specifications for the use of compost in the construction of stormwater control measures on state highway projects (MDOT, 2008).*

specification 920.01.05, which requires the particle size distribution shown in Table 2-1 and a minimum organic matter content of 1.5% by weight (MDOT, 2008). Prior to use, all compost, sand, and BSM were sieved with a 1 cm sieve to ensure a more homogenous distribution. All sand and gravel materials were washed until well after wash water ran clear and no suspended particles were visible.

*Table 2-1: BSM Particle Distribution. Required particle size distribution of BSM as specified in section 920.01.05 of the Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials 2008.*

| **Particle** | | **% Passing by Weight** | |
|---|---|---|---|
| **Size** | **mm** | **Minimum** | **Maximum** |
| Sand | 2.0 – 0.050 | 55 | 85 |
| Silt | 0.050 – 0.002 | – | 20 |
| Clay | less than 0.002 | 1 | 8 |

### *Submerged Gravel Wetland Mesocosm*

Three submerged gravel wetland (SGW) mesocosms were constructed using prefabricated plastic Sterilite® 45 gallon storage totes measuring approximately 93 cm L X 53.3 cm W X 49.5 cm H. For each mesocosm, the container was lined with two layers of 3 mm plastic sheeting and reinforced with a wooden framing to add structural support. Three effluent ports were drilled in one end and fitted with 12.70 mm to 9.53 mm threaded reducing elbows. To form the outlet structure, the three effluent lines of 7.9 mm inner diameter Masterflex Tygon E-Lab tubing were connected using a cross fitting to achieve a singular effluent flow for sampling. The single effluent line containing the combined flow from the three outlets was then turned vertically upward, as seen in the side and top views of the mesocosm in Figure 2-2. The height of the effluent line was set to maintain the water level at just above the soil surface in the mesocosm (44.5 cm above the bottom of the mesocosm). The effluent lines were shielded from sunlight with aluminum foil to prevent growth of photosynthetic organisms.

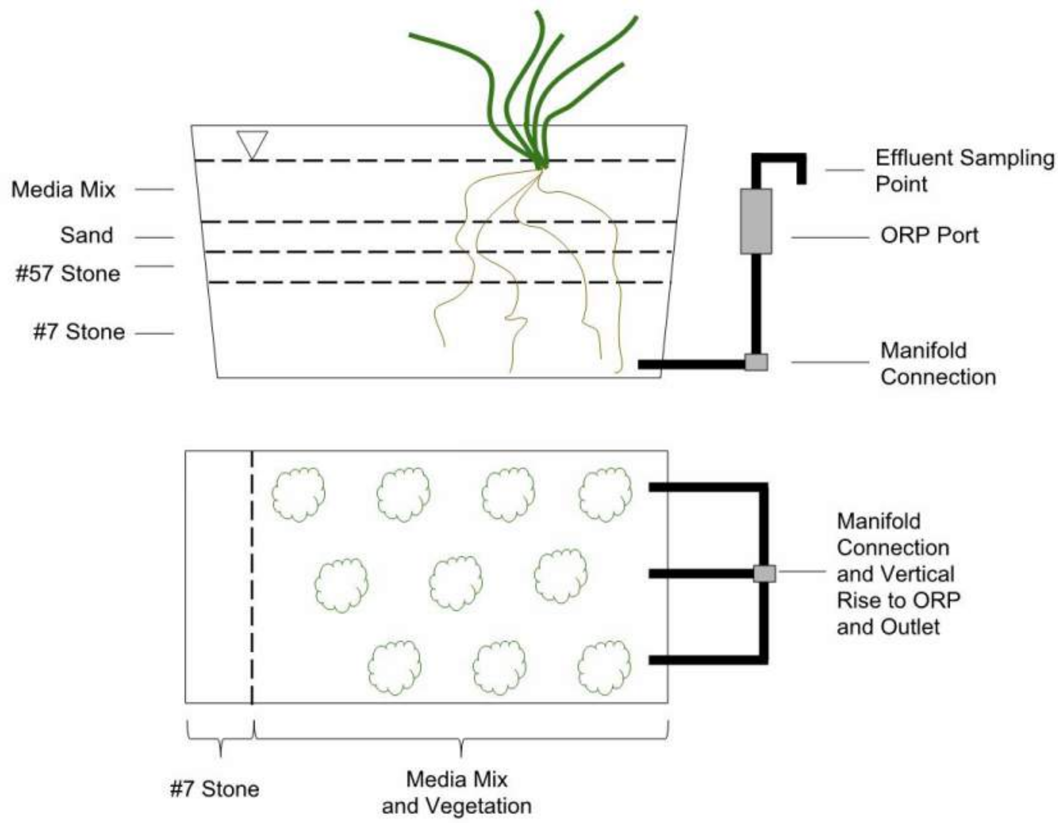



*Figure 2-2: A: Side view of mesocosm and outlet structure. B: Top view of mesocosm and outlet structure.*

Based on conversations with SHA employees, typical SGW designs have 71 cm of aggregate material, followed by 10 cm of sand, and topped with 20 cm of BSM. In order to fit the smaller available depth of the SGW mesocosm, the internal structure of was modified from the SHA typical design. Internal components of the mesocosm included a 20.3 cm base layer of aggregate material matching #57 aggregate, 5.1 cm of #7 aggregate, 5.1 cm layer of washed sand, and 14 cm of soil mix consisting of only BSM for the control mesocosm (Control), BSM and 30% compost by volume for the 30% mesocosm trial (30% trial), and BSM and 15% compost by volume for the 15%

mesocosm trial (15% trial). #57 aggregate consists of stone ranging from 38 mm to 2.4 mm, while #7 aggregate ranges from 19 mm to 2.4 mm. Figure 2-3 (Top) shows a cross section of the completed mesocosm. Media mixes were created by using the volumetric ratio of 3:7 compost to BSM for the 30% mix and, 1.5:8.5 compost to BSM for the 15% mix. Buckets calibrated to 19 liters were used to measure out the approximate volumes of each material, which were then added to a clean Rubbermaid® (Winchester, VA) 167 L trash can. The materials were mixed using shovels until well after the mix appeared homogenous to the naked eye.

During placement of the aggregate and sand layers, uniform compaction was achieved by manually tamping the material down periodically using segments of 2x4 wood pieces. The soil mix was not compacted during placement. At the end opposite of the effluent ports, the #7 aggregate was continued to the surface following the placement of the 5.1 cm layer of sand for a length of approximately 13 cm (Figure 2-2, Bottom and Figure 2-3, Bottom). This was included to assist with distribution of the influent flow, which was applied at the surface of this gravel inlet structure.

Three obligate wetland plant species that are native to Maryland wetlands were chosen for planting. An obligate wetland plant is defined by the United States Army Corps of Engineers as a plant that almost always occurs in wetlands under natural conditions (Lichvar et al., 2012). Three each of *Asclepias incarnata* and *Juncus effusus*, and four *Iris versicolor* were planted in each mesocosm. For the 30% trial, plants were added between the fourth and fifth storm events. For the 15% trial and the Control, the plants were planted prior to the first stormwater event. Immediately prior to planting, root balls of each individual were gently cleared of soil by hand as much as possible to

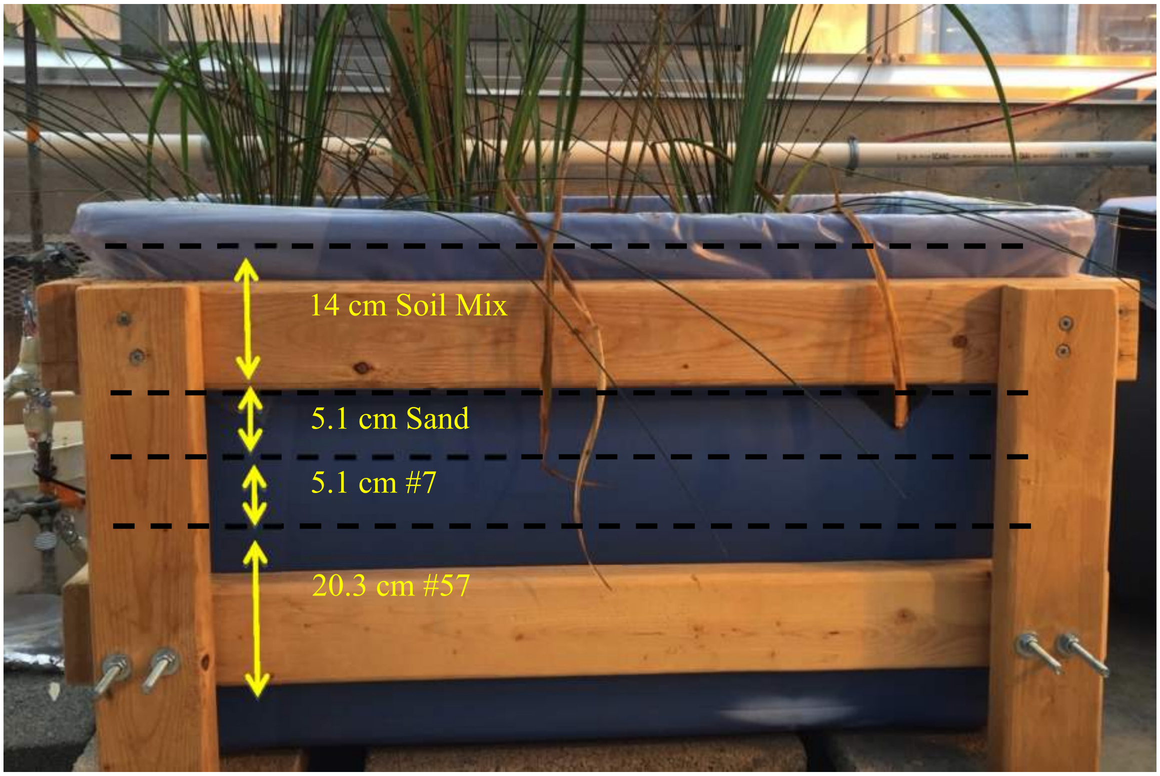



*Figure 2-3: Completed Mesocosm Side and Top Views. (Top) Side view of 30% Dickerson wetland mesocosm setup with bedding thicknesses. Bedding thicknesses not drawn to scale. (Bottom) Top view of 30% Dickerson wetland mesocosm setup prior to planting. Seen at right is the gravel inlet structure.*

minimize potential additional sources of nutrient leaching. Care was taken to not damage plants during this process; however, it is possible that the removal of soil from the roots of the plants resulted in the destruction of fine roots hairs, impairing the ability of the plant to establish and begin uptake of nutrients and water prior to repairing its root system. All mesocosm trials were conducted in a climate-controlled greenhouse with a target temperature setting of 24°C. All mesocosms were exposed to natural light cycles and no artificial lighting was used.

### *Synthetic Stormwater Preparation*

A synthetic stormwater solution was created based on common pollutant constituents found in local and national urban stormwater runoff and is supplied in Table 2-2 (Collins et al., 2010; O'Neill and Davis, 2012; Stagge et al. 2012, Liu and Davis 2014, Li and Davis 2014). Due to phosphorus concentrations in the tap water exceeding 0.20 mg/L, phosphorus was not added to the synthetic stormwater after the first two storm events applied to the 30% trial. In order to neutralize chlorine present in the tap water, 2.2 mg/L of sodium bisulfate (CAS 7631-90-5, Fischer Chemical) was added to the synthetic stormwater solution. Quantities up to 150 L of the synthetic stormwater solution were made.

*Table 2-2: Synthetic Stormwater Solution Makeup. Target concentrations of components and compounds used in the making of synthetic stormwater solutions modified from O'Neill and Davis 2012 per Project Proposal guidelines.*

| Component | Value | Source (CAS) | Manufacturer |
|---|---|---|---|
| Inorganic Nitrogen: $NO_3^-$ | 1 mg/L as N | $NaNO_3$ (7631-99-4) | Amresco® |
| Organic N | 2 mg/L as N | Glycine (56-40-6) | Alfa Aesar® |
| Phosphorus | 0.2 mg/L as P | $Na_2HPO_4$ (7558-79-4) | Amresco® |
| Copper | 0.06 mg/L | $CuCl_2$ (10125-13-0) | Alfa Aesar® |
| Zinc | 0.5 mg/L | $ZnCl_2$ (7646-85-7) | Amresco® |
| Dissolved Solids | 80 mg/L | $CaCl_2$ (10043-52-4) | Amresco |
| Dissolved Solids (Salts) | 100 mg/L | NaCl (7647-14-5) | Amresco® |

### *Simulated Storm Events*

To simulate storm events, the synthetic stormwater was applied for six hours, which is the median rainfall duration for the State of Maryland (Kreeb 2003). The stormwater solution was applied at 140 mL/min using Cole Parmer peristaltic pumps. This flow rate applied over six hours results in a total volume of approximately 50 L, which is the estimated pore volume of the mesocosm structure; therefore one mesocosm pore volume is replaced during each storm event. The applied flow resulted in a superficial velocity of 0.82 m/d, which is calculated as the flow through the cross-sectional area of the mesocosm. A porosity of 0.22 was estimated based on the 50 L needed to fill the wetland. This resulted in a pore space velocity of 3.72 m/d, which is consistent with a loamy sand (Kadlec and Wallace, 2009).

Synthetic stormwater was applied to the 30% trial on eight separate occasions for six hours each with an average of twelve days between each run. Following the eighth run, long-term performance of the system was investigated by conducting 18 additional six-hour storm events using tap water-only with an average of eight days between each run, after which another run (Run 9) was conducted with synthetic storm water 148 days after the eighth run. Another eleven runs of tap water were conducted before another stormwater run (Run 10) was conducted.

Synthetic stormwater was applied to the 15% trial on 14 separate occasions for six hours each with an average of eight days between each run. During the 15% trial, the makeup of the influent synthetic stormwater solution was modified on two occasions. During one storm event (Run 11), 3.0 mg-N/L of glycine was added while no nitrate was added other than the background concentration found in the tap water. During another storm event (Run 13), the influent stormwater solution was modified to include 3.0 mg-N/L of nitrate with no glycine added. Flow was modified on two separate occasions for both the 15% and 30% trials. The flow was increased to 280 mL/min (doubled) for one six-hour storm and decreased to 70 mL/min (halved) for another six-hour storm. Flow was not modified during the control trial.

Synthetic stormwater was applied to the Control trial eight separate times for six hours each with an average of seven days between each run.

### *Water Quality Monitoring and Sampling*

Influent and effluent samples were collected in 250 mL Nalgene bottles and analyzed for nitrogen, phosphorus, and pH. Samples taken during the 15% and control mesocosms were also measured for oxidation-reduction potential (ORP) using a port attached to the outlet. Influent samples were taken at the start of stormwater application, after 3 hours, and after 6 hours. Effluent samples were taken every thirty minutes for the first two hours, followed by one every hour until the trial was completed, with the final sample being taken at the end of the six hours. Due to evaporation and transpiration occurring between each storm, outflow from the mesocosm did not begin until the water level in the mesocosm reached the outflow level. In some cases, as much as two hours passed before outflow. As such, samples are denoted by the amount of flow applied to the mesocosm and may not match the effluent flow. Applied flow is displayed as centimeters of equivalent rainfall over the defined watershed area and is calculated in Equation 1.

$$\textit{Equivalent Rainfall (cm)} = Qt/A_w \qquad (1)$$

Where $Q$ is equal to the applied flow in mL/min, $t$ is the elapsed time in minutes that the flow has been applied and $A_w$ is the equivalent watershed area. $A_w$ was calculated using the Equation (2) below.

$$A_w = \frac{Q}{P} \qquad (2)$$

$Q$ is equal to the flow of 140 mL/min, and $P$ is the rainfall depth. A "first flush" rainfall depth of 2.54 cm equates to a treated watershed area of 19,800 $cm^2$, resulting in a wetland area to drainage area ratio of 20%. This is substantially larger than Wossink and Hunt's (2003) recommended 1.5% for 50% impervious areas and translates to a smaller treatment area because of the concessions made in scaling down the mesocosm.

### *Flow Characteristics – Tracer Study*

A tracer test was conducted in order to evaluate the mixing characteristics of the 15% submerged gravel wetland mesocosm and define dispersion parameters. The concentration of an inert compound (the tracer) is monitored in effluent samples while the feed water is spiked with inert compound. NaCl was used as the tracer in this tracer test, and NaCl concentration in effluent samples was monitored by electrical conductivity.

Prior to the start of the tracer test, the 15% mesocosm was flushed with tap water at a flow of 140 mL/min for 24 hours to minimize background concentrations of interfering compounds. The influent feed water was then switched to tap water spiked with 100 mg/L of NaCl. Electrical conductivity (EC) of the effluent was measured every thirty minutes from the application of the spiked feed water. The tracer test was terminated when EC measurements stopped increasing. EC measurements were normalized and plotted against elapsed time to create an $F$-curve. The constituent residence time ($t_c$), variance ($\sigma^2$), dimensionless variance ($\sigma_t^2$), and the equivalent number of completely mixed flow reactors in series (n-CMFRs) were defined using the EC measurements and the following equations:

$$t_c = \sum t_i dF(t) \tag{3}$$

$$\sigma^2 = \sum t_i^2 \, dF(t) - t_c^2 \tag{4}$$

$$n - CMFRs = \frac{t_c^2}{\sigma^2} \tag{5}$$

Where $c_{p,i}$ is the concentration of the tracer in the effluent sample at time $t_i$, and $\Delta t_i$ is the sampling interval at the $i^{th}$ sample (Weber 2001).

### *Analytical Procedures*

#### Media Extractions

Nitrogen and phosphorus content of the compost, sand and BSM materials were characterized using a series of media extractions. Water-soluble phosphorus was extracted from 1.0 g (dry mass) samples of compost, sand and BSM using the "Water- or Dilute Salt-Extractable Phosphorus in Soil" $CaCl_2$ standard method (Moore and Joern, 2009). This method of phosphorus extraction was chosen due to its simple testing method and well known correlation with SRP in stormwater runoff (Pote et al., 1996). After filtration, samples were analyzed for total phosphorus content using the method described below under *Total Phosphorus and Phosphorus Speciation* with the exception that samples were not digested prior to analysis. Samples were recorded as mg-P/kg of dry material, with the lowest standard equating to 1.25 mg-P/kg. Phosphorus content of the compost, sand and BSM were also characterized using the Mehlich 3 soil extraction method (Pierzynski and Kovar, 2000). This extraction method was chosen due to its widely accepted use for determining phosphorus content in a wide range of soil types and acidities. As in the dilute salt extraction method, Mehlich 3 extractions were analyzed for phosphorus content using the total phosphorus method described below, without digestion, and with a lowest standard of 0.5-mg P/kg.

20 mL of 2 M KCl solution was used to extract nitrogen from 5 g of field moist samples of each compost, sand, and BSM for the determination of total inorganic

nitrogen (Carter, 1993). This method was chosen due to its wide acceptance for describing nitrogen content of soils. Extracted solutions were then analyzed using the total nitrogen method described below.

**Bulk Density and Moisture Content**

To calculate the amount of compost and BSM added to each mesocosm, a calibrated five liter bucket was filled with uncompacted material while lightly tapping the sides and then weighed. The process was repeated four times for each material, and the average of the four measurements was taken to represent the field-moist mass to volume conversion. Dry mass was calculated by using moisture contents for each material. The moisture content for each material was measured by weighing triplicate samples of that material before and after samples were oven-dried at 105° C for 24 hours. Oven-dried samples were measured again after seven days to ensure all moisture had evaporated, and no changes were observed.

**pH and Oxidation-Reduction Potential (ORP)**

Samples were measured for pH following collection. Sample pH measurements were obtained using a glass electrode pH meter with Ag/AgCl reference (Mettler Toledo LE409, Schwerzenbach, Switzerland). A port for a Thermo Scientific™ Orion™ ORP electrode was installed in the 15% trial and the control along the effluent line to read in-situ potential in effluent samples prior to the samples being exposed to oxygen. This setup (See Figure 2-4) allowed access to the probe to allow for maintenance or moving the probe between experimental setups. Readouts from the ORP electrode were recorded at the midpoint of the collection of each sample.

*Figure 2-4: Mesocosm Front View. Front view of effluent ports with ORP electrode setup on 15% Dickerson wetland mesocosm.*

**Total Phosphorus and Phosphorus Speciation**

Samples were analyzed for total phosphorus (TP), dissolved phosphorus (DP), and soluble reactive phosphorus (SRP). TP was analyzed by first digesting samples using the potassium persulfate method (4500-P B.5) and measuring phosphorus concentration through colorimetric determination with the ascorbic acid molybdenum blue method (4500-P E) at a wavelength of 880 nm (Shimadzu UV-160, Kyoto, Japan) as described in APHA (2005). For DP and SRP, samples were filtered through a 0.22 µm mixed cellulose membrane filter (Merck Millipore, Cork, Ireland) and then analyzed in the same method used for TP measurement, with the exception that SRP samples were not digested prior to colorimetric analysis. A lowest standard of 0.02 mg-P/L was used in all phosphorus analyses. Particulate phosphorus (PP) was calculated by subtracting DP from TP using the following formula:

$$PP = TP - DP \qquad (6)$$

Dissolved organic phosphorus (DOP) was calculated by subtracting soluble SRP from DP using the following formula:

$$DOP = DP - SRP \qquad (7)$$

**Total Nitrogen and Nitrogen Speciation**

Samples were analyzed for nitrogen content by measuring total nitrogen (TN), ammonium ($NH_4^+$), nitrate ($NO_3^-$), and nitrite ($NO_2^-$). TN was measured using a Shimadzu SSM-5000A with Total Nitrogen Measuring Unit (Kyoto, Japan) and a lowest standard of 0.05 mg-N/L. Standard checks were conducted for approximately every 10 samples. Samples for $NH_4^+$ analysis were prepared using the phenate method (4500-$NH_3$ F) and measured using colorimetric determination at a wavelength of 640 nm (Shimadzu UV-160, Kyoto, Japan) with a lowest standard of 0.05 mg-N/L (APHA, 2005).

Samples for $NO_3^-$ analysis were filtered to 0.22 µm, and samples and standards were transferred into 5.0 mL polyvials and sealed with filter caps. Samples were analyzed by ion chromatography, using a Dionex ICS-1100 with ASRS 4 mm suppressor and IonPac AS22 anion column (Sunnyvale, California). An eluent solution of 4.5 mM $Na_2CO_3$ and 1.4 mM $NaHCO_3$ was used applied at 1.2 mL/min with a suppressing current of 34 mA. Each sample measuring time was set to a maximum of 12 minutes. Standard checks were conducted approximately every 10 samples, with a minimum of two standard checks per run. Following sample analysis, peaks were checked at enlarged scales to check baseline measurements. The baseline was adjusted, if necessary, as shown in Figure 2-5.

$NO_2^-$ samples were measured using ion chromatography in the same method as $NO_3^-$. In addition, samples were checked using the colorimetric method (4500-$NO_2^-$ B) as described in APHA (2005), when sample coloring allowed and dissolved organic content

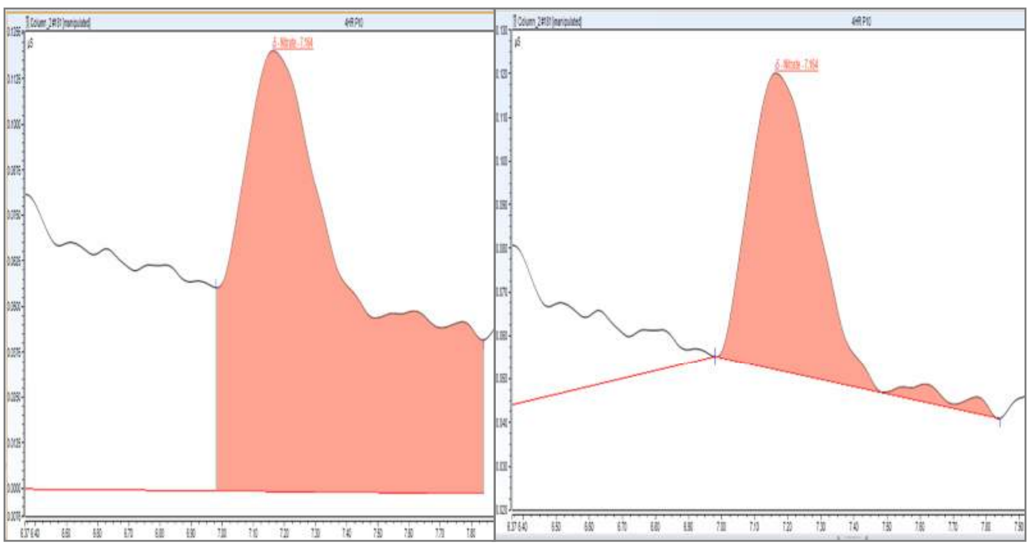


*Figure 2-5: Nitrate baseline adjustment.*

did not interfere.

Organic nitrogen content was calculated by subtracting nitrate, nitrite, and ammonium from total nitrogen:

$$\text{Org N} = \text{TN} - ([NO_3^- \text{-N}] + [NO_2^- \text{-N}] + [NH_4^+ \text{-N}]) \tag{8}$$

**Cumulative Mass Export**

The cumulative mass export of nitrogen, phosphorus, and their respective species was calculated by approximating the area under the curve of the concentration of the compound vs. the equivalent rainfall (applied) using the trapezoidal rule as defined as

$$\frac{1}{2}\sum_{k=1}^{N}\left(x_{k+1} - x_k\right)\left(f(x_{k+1}) + f(x_k)\right) \tag{9}$$

Where $x$ is the equivalent rainfall in liters at the $k^{th}$ sample, and $f(x_k)$ is the concentration of the contaminant at the $k^{th}$ sample.

**Quality Assurance and Quality Control (QA/QC)**

Prior to use, all sample containers, filtration equipment and glassware were cleaned using Alconox® powdered dish detergent (White Plains, NY), and then bathed in a 0.5 M HCl solution for a minimum of 12 hours. Once removed from the acid bath, all glassware and materials were rinsed in 18 MΩ deionized water and air-dried. Samples that could be analyzed within 24 hours were refrigerated at 5°C. Samples that were not analyzed within 24 hours were frozen until analysis could be completed.

**Data Handling and Statistical Analyses**

Concentrations measured below the lowest standard were considered to be ½ the lowest standard when used in statistical analysis. A summary of the lowest standards of the compounds measured and the methods used, as described above, is provided in Table 2-3.

The Mann-Whitney *U*-test was used to evaluate statistical difference between the first eight runs of each mesocosm trial. Statistical difference was calculated for total phosphorus, total nitrogen, SRP, PP, DOP, $NO_3^-$, $NH_4^+$, and Org N. Due to varying sample intervals, event mean concentrations (EMCs) were calculated for each storm using Equation 10, and the Mann-Whitney *U*-test was applied to the EMCs. The null hypothesis used stated that two data sets had equal means, and a two-tailed test was used with a 95% confidence interval ($p < 0.05$).

$$EMC = \frac{M_j}{V} \quad (10)$$

Where $M_j$ is equal to the cumulative mass exported in milligrams of the stated constituent during the chosen storm and V is equal to the volume of the applied stormwater in Liters.

*Table 2-3: Analysis Methods. Methods, corresponding instruments, and lowest standard used for water quality analyses.*

| **Method** | **Instrument** | **Measured** | **Lowest Standard** |
|---|---|---|---|
| 4500-P Phosphorus | Shimadzu UV160U | TP, mg-P/L | 0.02 |
| 4500-P Phosphorus, filtered | Shimadzu UV160U | DP, mg-P/L | 0.02 |
| 4500-P Phosphorus, filtered and undigested | Shimadzu UV160U | SRP, mg-P/L | 0.02 |
| Total Nitrogen | Shimadzu SSM-5000A TNMU | TN, mg-N/L | 0.05 |
| 4110-$NO_3^-$ Ion Chromatography | Dionex ICS-1100 | $NO_3^-$, mg-N/L | 0.05 |
| 4500-$NO_2^-$ C- Ion Chromatography | Dionex ICS-1100 | $NO_2^-$, mg-N/L | 0.02 |
| 4500-$NH_3$ F | Shimadzu UV160U | $NH_4^+$, mg-N/L | 0.02 |

# Chapter 3: Results and Discussion

Mesocosm studies were undertaken to determine water quality effects of amending BSM with leaf-and-grass-based compost. The first mesocosm trial conducted was the 30% trial containing BSM mixed with 30% Dickerson compost by volume. The 15% trial was the second trial conducted and contained 15% Dickerson compost by volume. The Control trial was conducted last and contained BSM with no amendments. The results from each mesocosm trial are discussed in the sections below.

## *Media Characterization*

The BSM, sand, and compost used in the SGW mesocosms were analyzed for nutrient contents as described in Chapter 2 and using soil extractions commonly used for characterizing soils for agricultural use. These materials were evaluated alongside other types of composts used in a small column study that preceded this study and is described in Owen (2016, unpublished). Figure 3-1 shows the KCl extractable nitrogen ($N_{KCl}$), Mehlich 3 extractable phosphorus ($P_{M3}$), and $CaCl_2$ extractable phosphorus ($P_{CaCl2}$) of the Dickerson compost compared to two biosolids compost (Baltimore and Aberdeen), a hardwood compost (Pogo), and a cattle manure compost (USDA). $P_{M3}$ and $P_{CaCl2}$ have been shown to correlate well with phosphorus leaching of soils with higher $P_{M3}$ and $P_{CaCl2}$ leading to higher rates of phosphorus leaching (Maguire and Sims, 2002). $N_{KCl}$ is a measurement of inorganic nitrogen and includes nitrate, nitrite and exchangeable ammonium (Carter, 1993).

The Dickerson compost yielded lower $N_{KCl}$ and $P_{CaCl2}$ when compared to the biosolids- and manure-based composts (780 mg-N/kg dry compost and 10 mg-P/kg dry compost, respectively), but higher $N_{KCl}$ and $P_{CaCl2}$ when compared to the hardwood-based compost. The $P_{M3}$ for Dickerson (670 mg-P/kg dry compost) was the second highest of the materials tested, behind USDA (1370 mg-P/kg dry compost). Table 3-1 shows the same extraction data with BSM and Sand included in the table, which both exhibited much lower amounts of extractable nutrients. From these results, phosphorus would be expected to leach at lower rates than nitrogen with respect to the Dickerson compost, and the Dickerson compost should have lower rates of phosphorus and nitrogen leaching when compared to both biosolids compost and the USDA compost.

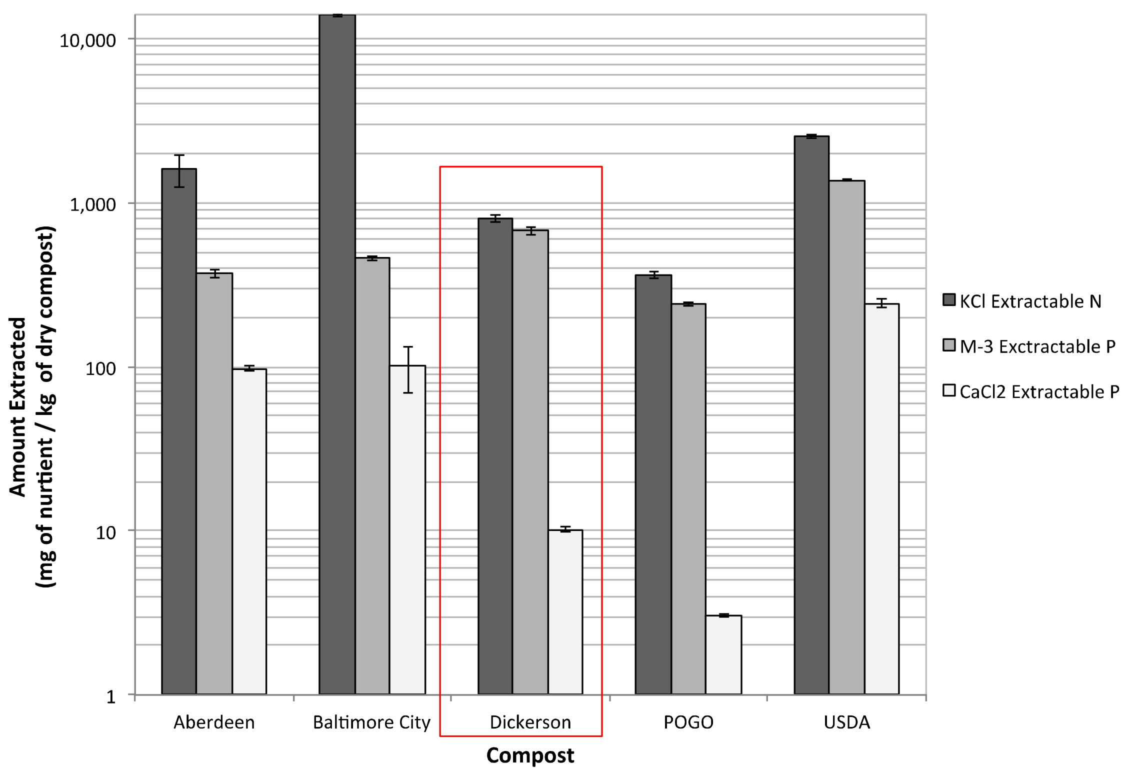



*Figure 3 - 1: Media Extraction Results. Extraction test results for composts used in small column trials. Aberdeen and Baltimore City are composts made from biosolids materials from the wastewater treatment plants in Aberdeen, MD and Baltimore MD, respectively. Pogo and USDA composts are source-separated composts, made from hardwood and cattle manure, respectively. Dickerson compost, highlighted with a red box, is the grass-based compost and was chosen for use in wetland mesocosm experiments for further investigation.*

*Table 3 - 1: Media Extraction Results. Extraction test results data shown in Figure 3-1, represented here in tabular form. Results for BSM and Sand are also included.*

| | KCl Extractable N (mg-N/kg) | M-3 Extractable P (mg-P/kg) | CaCl2 Extractable P (mg-P/kg) |
|---|---|---|---|
| Aberdeen | 1,600 | 372 | 97.7 |
| Baltimore City | 13,900 | 456 | 100 |
| Dickerson | 799 | 673 | 10.2 |
| Pogo | 364 | 241 | 3.06 |
| USDA | 2,540 | 1,370 | 244 |
| BSM | 4.33 | 0.93 | 0.044 |
| Sand | 2.07 | 0.31 | 0.153 |

## *Mesocosm Trials*

### Flow and Volume

Figure 3-2 shows the elapsed days on which each synthetic storm event was conducted. For the 30% trial, a total of ten synthetic storm events were conducted using synthetic stormwater between the dates of August 8$^{th}$, 2015 and June 29$^{th}$, 2016, and are numbered here as Runs 1-10. An additional 29 storm events were applied to the 30% trial using tap water only. Eighteen of the tap water storms were applied between Run 8 and Run 9, and eleven tap water storms were applied between Run 9 and Run 10. Influent solutions were applied at a flow rate of 140 mL/min, with the exception of synthetic stormwater Runs 6 and 7. For Run 6, the flow rate was doubled (280 mL/min), and for Run 7, the flow rate was halved (70 mL/min). A total of 426 L of synthetic stormwater solution was applied prior to the application of the tap water only storms, equivalent to 21.5 cm of rain over an area with a wetland to watershed treatment area ratio (WWR) of 1:5, or 20%. A total of 1,460 L of tap water was applied, 907 L (45.7 cm) between Run 8 and Run 9, and 554 L (27.9 cm) between Run 9 and Run 10. All simulated storm events combined resulted in a total rainfall depth of 100 cm.

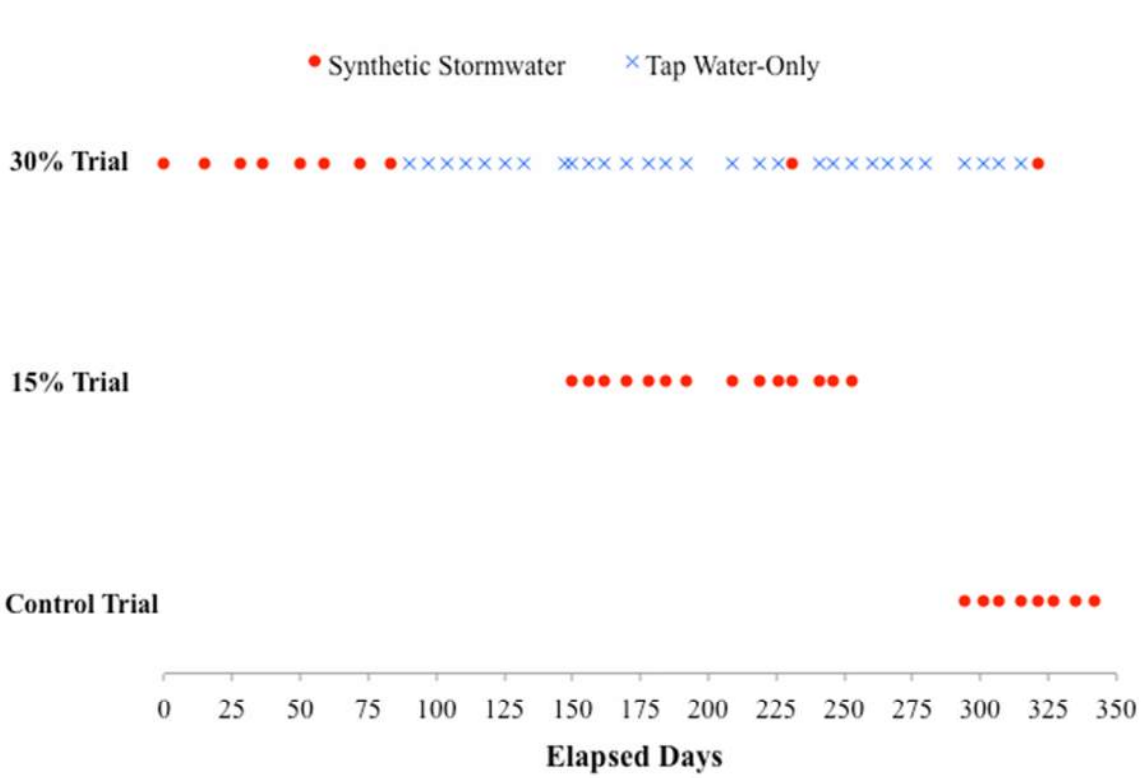



*Figure 3-2: Mesocosm Run Schedule. Days on which synthetic storm events were conducted for each mesocosm trial. Elapsed days is defined as the number of days since the first storm event conducted on the 30% mesocosm. Storm events using synthetic stormwater (Table 2-2) are shown as red circles. Storm events in which tap water-only was applied are shown as a blue "X". More detail is provided in the appendix.*

For the 15% trial, a total of fourteen synthetic storm events were conducted using synthetic stormwater between the dates of January 8th, 2016 and April 20th, 2016, and are numbered here as Runs 1-14. Like the 30% trial, influent solutions were applied to the 15% trial at a flow rate of 140 mL/min with the exception of Run 6, when the flow rate was doubled (280 mL/min), and for Run 7, when the flow rate was halved (70 mL/min). To investigate the effects of different nitrogen sources, the synthetic stormwater solution was modified for Run 11 and Run 13. For Run 11, no nitrate was added to the influent solution, and glycine was increased to 3 mg-N/L. For Run 13, no glycine was added, and nitrate was increased to 3 mg-N/L. A total of 731 L of synthetic solution was applied to the 15% mesocosm, equivalent to 28.5 cm of rainfall over an area with a WWR of 20%.

Eight synthetic storm events were applied to the Control trial between May 31st, 2016, and July 18th, 2016 using synthetic stormwater. For all storm events, influent was applied to the Control trial at a flow rate of 140 mL/min. A total of 403 L of synthetic stormwater was applied to the Control mesocosm, equivalent to 20.3 cm of rainfall over an area with WWR of 20%.

Concentrations of nitrogen and phosphorus in the influent synthetic stormwater differed from the target concentrations found in Table 2-2 due to background concentrations present in the tap water used in the makeup of the synthetic stormwater solution. The influent synthetic stormwater solution had a mean TN of 3.7, 4.2, and 4.2 mg-N/L for the 30%, 15% and Control trials, respectively. The influent also had a mean $NO_3^-$ of 1.9, 2.6 and 1.9 mg-N/L, and a mean $NH_4^+$ of 0.08, 0.09, and 0.38 mg-N/L for the 30%, 15% and Control trials, respectively. As seen from Table 3-2, the variations in TN were mainly due to the variations of $NO_3^-$ in the tap water.

After the first two runs in the 30% trial, and for all subsequent mesocosm trials, inorganic phosphorus was no longer added to the stormwater solutions, due to the concentration in the tap water meeting or exceeding target concentrations. The mean TP and SRP of the first two runs of the 30% trial was 0.46 and 0.42 mg-P/L. The mean TP and SRP of the influent synthetic stormwater for the remaining runs was 0.28 and 0.25 mg-P/L, respectively (Table 3-3). Influent mean TP for the 15% and Control trials was 0.31 and 0.40 mg-P/L respectively, and influent mean SRP was 0.26 and 0.34 mg-P/L, respectively.

*Table 3 - 2: Nitrogen Influent Characteristics. Average values and standard deviations of total nitrogen and nitrogen speciation concentrations for the influent solution and tap water used in mesocosm trials.*

30% Trial

| | Influent (mg-N/L) | | | Tap (mg-N/L) | | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | n | Mean | Standard Deviation | n |
| TN | 3.7 | 0.59 | 25 | 0.91 | 0.4 | 9 |
| $NH_4^+$ | 0.08 | 0.03 | 10 | 0.050 | 0.050 | 9 |
| $NO_3^-$ | 1.9 | 0.37 | 7 | 0.88 | 0.42 | 6 |
| DON | 1.5 | 0.6 | 7 | 0.10 | 0.14 | 6 |

15% Trial

| | Influent (mg-N/L) | | | Tap (mg-N/L) | | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | n | Mean | Standard Deviation | n |
| TN | 4.2 | 0.29 | 35 | 1.6 | 0.26 | 13 |
| $NH_4^+$ | 0.092 | 0.033 | 12 | 0.032 | 0.028 | 13 |
| $NO_3^-$ | 2.6 | 0.31 | 12 | 1.5 | 0.24 | 11 |
| DON | 1.5 | 0.23 | 12 | 0.059 | 0.082 | 12 |

Control

| | Influent (mg-N/L) | | | Tap (mg-N/L) | | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | n | Mean | Standard Deviation | n |
| TN | 4.2 | 0.34 | 21 | 1.4 | 0.16 | 8 |
| $NH_4^+$ | 0.38 | 0.34 | 7 | 0.025 | 0.016 | 6 |
| $NO_3^-$ | 1.9 | 0.17 | 7 | 1.2 | 0.23 | 7 |
| DON | 2.0 | 0.43 | 7 | 0.33 | 0.47 | 7 |

*Table 3 - 3: Phosphorus Influent Characteristics. Average values and standard deviations of total phosphorus and SRP concentrations for the influent solution and tap water used in mesocosm trials. PP and DOP are calculated using other measured values, and thus can result in negative values. Due to high background of SRP in the Tap, phosphorus was not added in the 30% trial after the first two runs, nor in any subsequent trial. As a result, influent values for the 30% trial do not include samples from the first 2 runs. TP and SRP from the first two runs of the 30% trial were 0.46 and 0.42 mg-P/L, respectively.*

30% Trial

| | Influent (mg-P/L) | | | Tap (mg-P/L) | | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | n | Mean | Standard Deviation | n |
| TP | 0.28 | 0.039 | 21 | 0.26 | 0.044 | 9 |
| SRP | 0.25 | 0.045 | 7 | 0.24 | 0.061 | 6 |
| PP | -0.034 | 0.019 | 5 | 0.020 | 0.023 | 4 |
| DOP | -0.0060 | 0.012 | 4 | -0.012 | 0.010 | 3 |

15% Trial

| | Influent (mg-P/L) | | | Tap (mg-P/L) | | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | n | Mean | Standard Deviation | n |
| TP | 0.31 | 0.09 | 29 | 0.32 | 0.09 | 12 |
| SRP | 0.26 | 0.09 | 14 | 0.29 | 0.08 | 13 |
| PP | 0.05 | 0.03 | 14 | 0.02 | 0.01 | 12 |
| DOP | 0.01 | 0.04 | 14 | 0.00 | 0.01 | 13 |

Control

| | Influent (mg-P/L) | | | Tap (mg-P/L) | | |
|---|---|---|---|---|---|---|
| | Mean | Standard Deviation | n | Mean | Standard Deviation | n |
| TP | 0.40 | 0.10 | 21 | 0.39 | 0.039 | 7 |
| SRP | 0.34 | 0.041 | 7 | 0.352 | 0.050 | 7 |
| PP | 0.058 | 0.082 | 7 | 0.018 | 0.012 | 7 |
| DOP | 0.021 | 0.030 | 7 | 0.015 | 0.018 | 7 |

*Sampling*

Effluent samples collected from the 30% trial exhibited a dark brownish yellow color that became darker from the first to second simulated storm event and then gradually became lighter as the trial progressed. Early samples appeared cloudy, possibly from higher levels of suspended solids, particulate matter and organic content. This was supported by the fact that the samples were at first difficult and slow to filter, but gradually became easier for later samples. Figure 3-3A shows samples from Run 2. The first sample (left) is much darker than the last sample (right). Figure 3-3B shows the difference between the first sample from Run 1 (left) and the first sample from Run 2 (right). Samples eventually became much clearer, which appeared to correspond with lower concentrations of nitrogen and phosphorus. Effluent samples from the 15% trial were lighter and less cloudy (Figure 3-3C) and gradually became lighter and clearer. lighter and less cloudy (Figure 3-3C) and gradually became lighter and clearer. Samples from the Control trial were the clearest, as shown in Figure 3-3D.

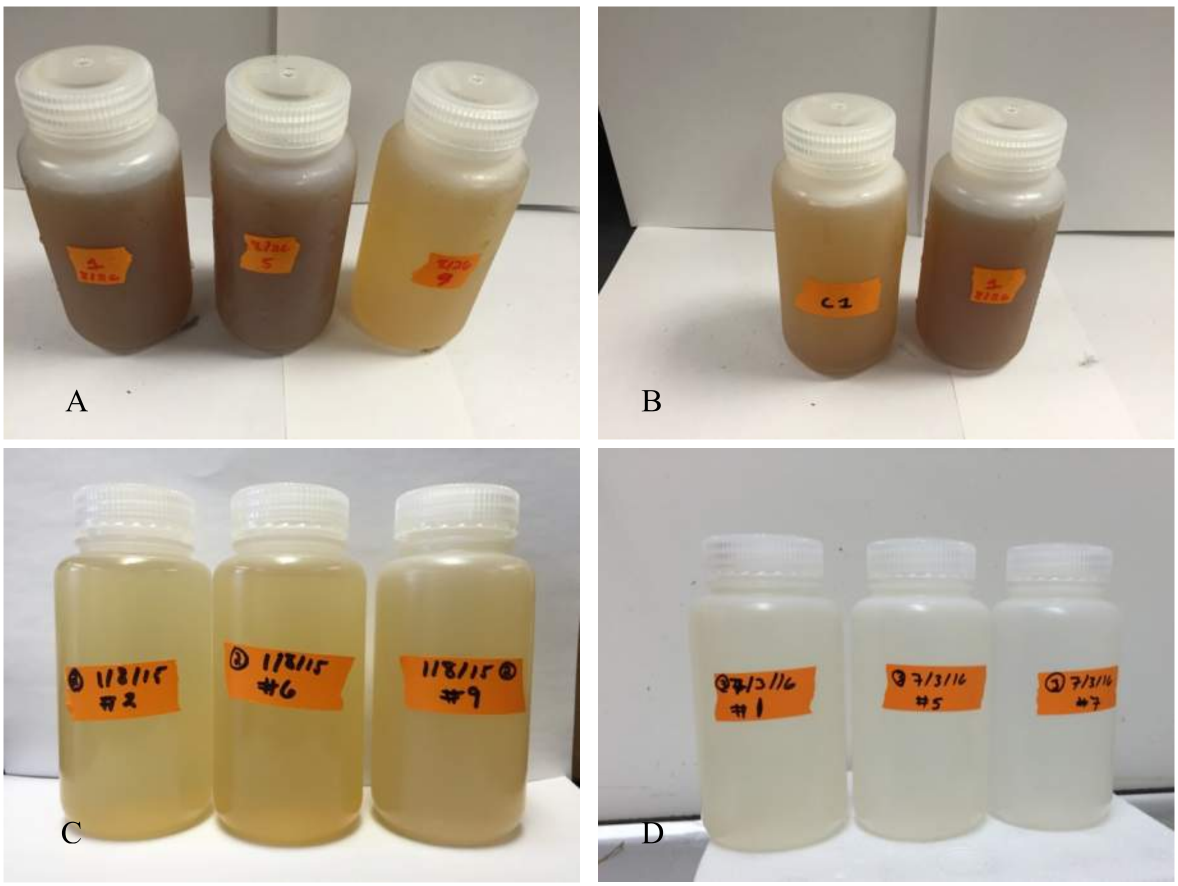



*Figure 3-3: Effluent Samples. (A) From left, effluent samples 1, 5 and 9 from Run 2 of the 30% Trial. (B) From left, effluent sample 1 from Run 1 and effluent sample 1 from Run 2. (C) Effluent samples from Run 1 of the 15% Trial. (D) Effluent samples from run 6 of the Control Trial.*

### *Nitrogen*

Figure 3-4 shows the total nitrogen of influent and effluent samples in the 30%, 15% and Control trials. Influent total nitrogen is represented as the average value of influent samples taken from the applied stormwater solution at various times during the event. Variations between runs in influent total nitrogen was likely due to variations in the nitrogen content of the tap water used in the make-up of the stormwater solution. As seen in the figure, the 30% trial resulted in higher rates of total nitrogen in the effluent than the 15% trial and Control trial and was significantly different from both. The Control trial resulted in the lowest of the total nitrogen values in the effluent, however the 15% trial and the Control trial were not found to be significantly different through the course of eight runs.

Initial total nitrogen of the 30% trial started at 8.3 mg-N/L and then sharply increased to a maximum of 15.8 mg-N/L before decreasing to 15.0 mg-N/L at the end of the first storm, approximately 2.5 cm of equivalent rainfall, which is equal to the flow of applied water over a WWR of 20%. Total nitrogen in the 15% trial peaked much lower than the 30% trial, 6.4 mg-N/L after 3.3 cm, and then decreased to below influent levels. Effluent from the Control trial did not exceed the influent total nitrogen, and peaked at 3.7 mg-N/L. Although a statistical difference in total nitrogen was not observed over the course of eight storm events, the 15% trial did result in higher levels of total effluent nitrogen in the early storms than in the Control.

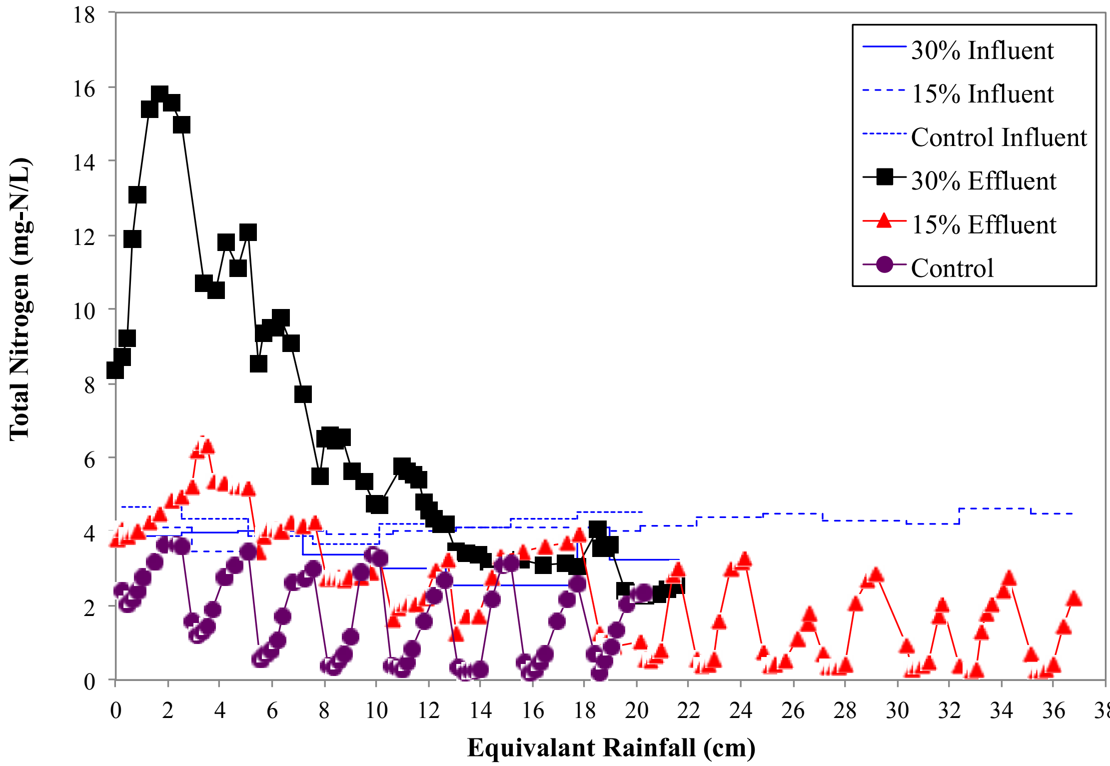



*Figure 3 - 4: Total Nitrogen Results. Total nitrogen results for 30% Dickerson, 15% and Control trial. Results are shown for effluent samples and for influent stormwater solution. Results shown for the 30% trial are for the first eight storm events.*

After 17.7 cm, the influent total nitrogen in the 30% trial, which varied between 3 and 4 mg-N/L, was higher than the effluent total nitrogen, indicating that some total nitrogen removal occurred within the mesocosm. The 15% trial saw nitrogen removal after 8.1 cm in the 15% trial, while the Control trial effluent total nitrogen never exceeded influent.

Total nitrogen from each trial exhibited a "peaking" characteristic, with lower total nitrogen in earlier samples, which then increased as storm events progressed. This pattern of peaks was repeated with each storm in each trial; however, the peaking pattern was most prominent in the 15% and Control trials. Because nitrogen was lowest in the first samples taken after the period of inactivity between storms, it is likely that nitrogen removal occurred between storms. As storms progressed, total nitrogen in the 15% and

Control trials increased toward the influent nitrogen levels. This indicates that most nitrogen removal occurred between storm events, and during storm events little nitrogen removal occurred. This is consistent with reduced pollutant removal observed in many studies during storm events, when HRT is reduced due to increased flow (Garcia-Garcia 2009; Wadzuk et al., 2010). In addition to this, the replacement of the antecedent water in anoxic layer of the wetland with “fresh,” oxygenated stormwater would have reduced the denitrification potential during and immediately after storm events. Observations related to oxidation-reduction potential of the wetland are discussed further below. The ultimate result is that the SGW mesocosms behaved like batch reactors between storm events, while contact time in these mesocosms is too short to fully remove nitrogen via denitrification during the storm events. It is possible that larger pores in the gravel layer, where denitrification was more likely to occur, drained more quickly than the smaller pores in the upper layer where nitrogen from the compost remained, or that short-circuiting of the mesocosms may have contributed to short detention times; however, the tracer study performed on the 15% trial and discussed later in this chapter resulted in a $t_c$ of 5.7 hours, indicating that very little short-circuiting occurred.

Total nitrogen results for Run 9 (Figure 3-5) and Run 10 (Figure 3-6) of the 30% trial were much lower than those shown in Figure 3-4 for the same trial. Total nitrogen for Run 9 was as low as 0.55 mg-N/L before reaching 1.90 mg-N/L at the end of the event. Total nitrogen for Run 10 had a low of 0.79 mg-N/L and reached 1.63 mg-N/L by the end of the run. Both runs resulted in effluent samples well below the 4.29 and 4.20 mg-N/L of the applied water; however, this may be due to the fact that the water applied between Runs 8, 9 and 10 did not include added nitrogen.

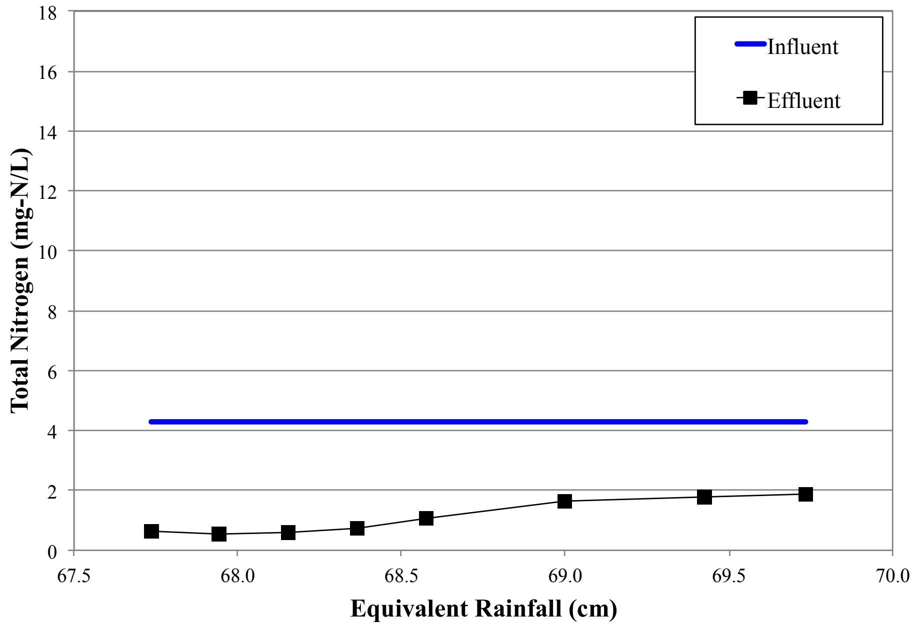



*Figure 3 - 5: 30% Trial Run 9 Total Nitrogen Results. Total nitrogen results for Run 9 of the 30% Dickerson wetland mesocosm. Results are shown at the same vertical scale for comparison to Figure 3-4. Run 9 was conducted after the application of 46 cm of tap water over 18 storms.*

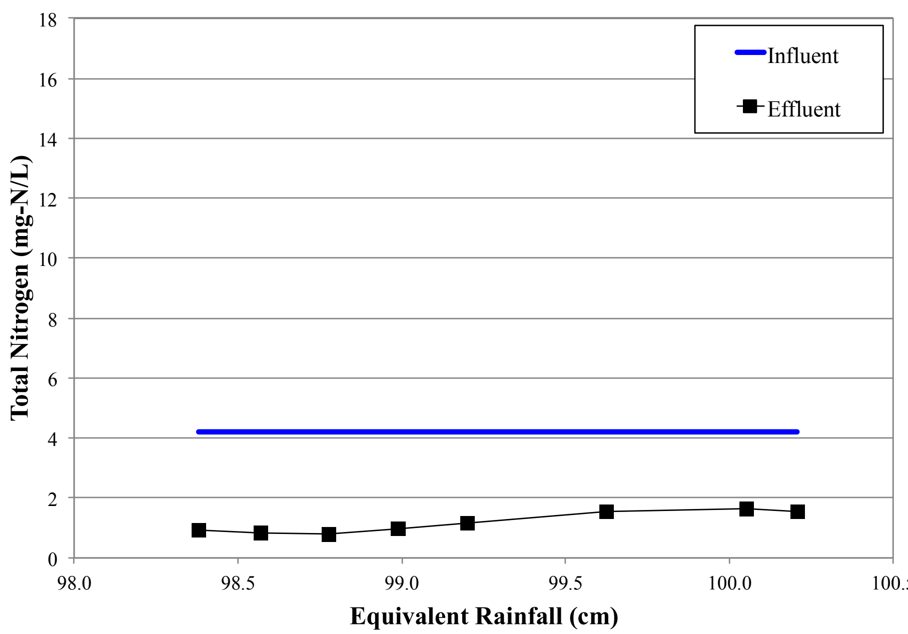
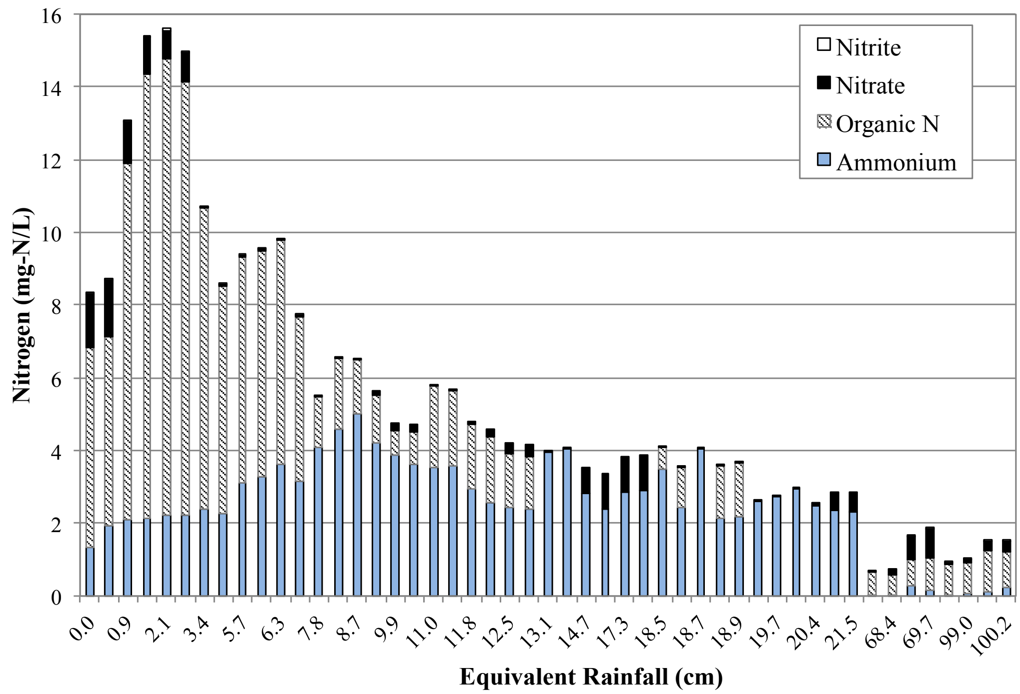



*Figure 3 - 6: 30% Trial Run 10 Total Nitrogen Results. Total nitrogen results for Run 9 of the 30% Dickerson wetland mesocosm. Results are shown at the same vertical scale for comparison to Figure 3-4. Run 10 was conducted after Run 9 following the application of 28 cm of tap water over 11 storms.*

Figure 3-7 shows results of nitrogen speciation analysis on effluent samples for the 30% trial (top) and the 15% trial (bottom). Initially, Org N was the dominant nitrogen species in the 30% trial and reached a maximum of 12.6 mg-N/L, before giving way to ammonium after 7.8 cm, which reached a maximum of 5.0 mg-N/L. After Run 8 in the 30% trial, ammonium was greatly reduced in the effluent, ranging from as low as below detection (0.05 mg/L) to 0.29 mg-L/N. Nitrate was detected periodically throughout the 30% trial ranging from undetectable (0.05 mg/L) to 1.6 mg-N/L and was most prevalent in the first 2.6 cm, from 14.7 cm to 17.7 cm, and from 67.7 cm to 69.1 cm. These periods correspond with: the first storm, in which the mobile nitrate is being flushed from the compost material; Run 6, when double flow was applied; and Run 9, which contained the highest amount of nitrate found in the tap water. In each of these cases, nitrate was being readily passed through the wetland mesocosm.

Nitrite was not measured in Runs 3 through 8 of the 30% trial, due to loss of filtered sample; however, results from Runs 1, 2, 9 and 10 show that the amount of nitrite present remained small when compared to total nitrogen concentration. Of the samples measured, the highest concentration of nitrite occurred at 0.86 cm and was 0.07 mg-N/L. It is unlikely that the nitrite present in the compost material would have persisted with repeated applications of storms, and the nitrite present in samples from Run 9 and Run 10 may be a result of nitrification and denitrification cycles. Ten of the 20 samples measured for nitrite measured as 0.02 mg-N/L or lower. As a result, Org N concentrations for samples from Runs 3 through 8 may be artificially high; however, due to the small amount of nitrite present in measured samples and the instability of nitrite in general, it may be assumed that these errors are small.



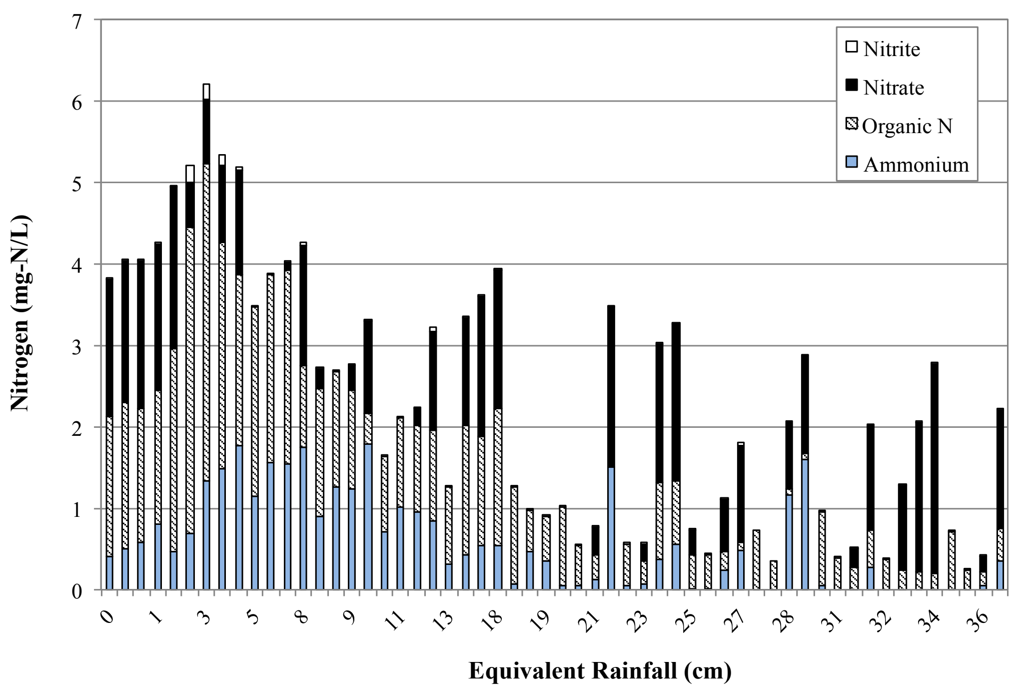




*Figure 3- 7: Nitrogen Speciation for 30% and 15% Trials. Nitrogen speciation concentrations for (Top) 30% Trial and (Bottom) 15% Trial. All values below the detection limit of that species are represented at one-half the specific detection limit. (Detection limits: TN, Ammonium, and Nitrate 0.05 mg/L; Nitrite, 0.01 mg/L). Nitrite was not measured for 30% Trial samples taken from 7.8 cm to 21.5 cm. Note that the x-axis is not linear, and the y-axis is set at different scales for each trial.*

Speciation for the 15% trial (Figure 3-7, bottom) was similar to the 30% trial in that Org N and ammonium were present in higher amounts at the beginning of the trial and decreased as the trial continued. Org N and ammonium reached maximums of 3.89 mg-N/L (3.1 cm) and 1.78 mg-N/L (5.1), respectively. As in the 30% trial, nitrate was present in samples from early runs, and then increased from undetectable to greater than 1.0 mg-N/L during later runs. A maximum nitrate level of 2.56 mg-N/L occurred during the nitrate-only run at 34.2 cm. The highest nitrate level under standard conditions, 1.97 mg-N/L, occurred at 2.5 cm and 21.6 cm. Nitrite was below detection (0.005 mg-N/L) for most samples, but did reach 0.21 mg-N/L at 2.9 cm.

Speciation results for the Control trial (Figure 3-8) differed from the 30% and 15% trials. Org N and ammonium were generally much lower in the Control trial and reached maximums of 1.76 and 1.33 mg-N/L at 2.5 and 7.6 cm, respectively. Nitrate reached a maximum of 1.56 mg-N/L at 1.9 cm. Nitrite was highest in the first run and reached a maximum of 0.15 mg-N/L at 0.83 cm. Many subsequent samples were below detection (0.005 mg-N/L).

Nitrate and Org N were not found to be significantly different between trials through eight runs. Ammonium was found to be significantly different between the 30% trial and the other two trials, but ammonium was not significantly different between the 15% trial and the control trial. While the lack of significant difference implies that the compost added trials were indistinguishable from the control trials after eight runs, with the exception of ammonium and total nitrogen in the 30% trial, a clear difference in total nitrogen and nitrogen species was observed in the first several storms. This becomes more apparent when examining the cumulative nitrogen exported.

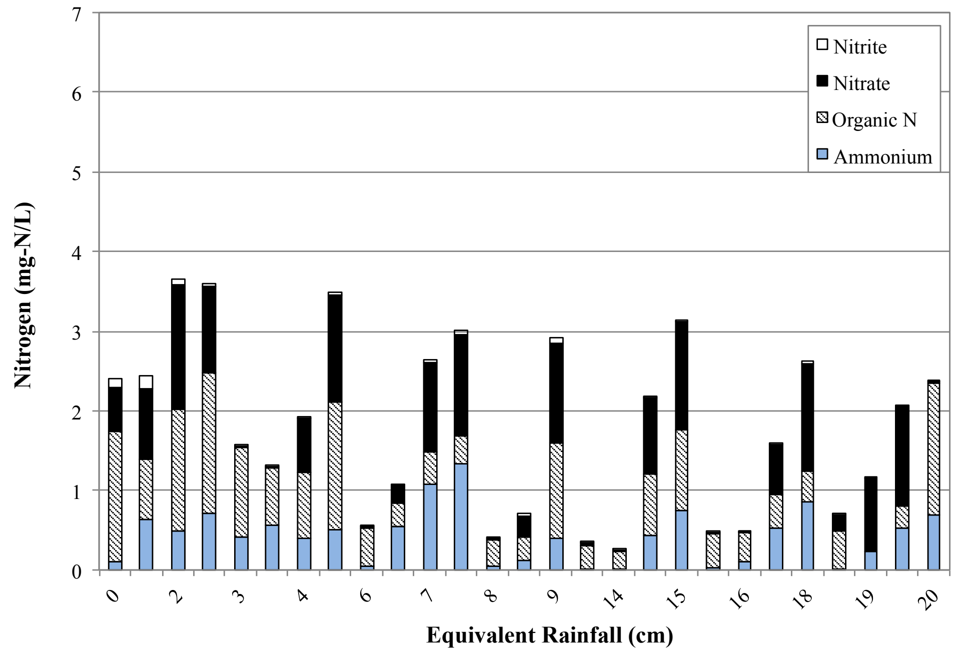



*Figure 3-8: Nitrogen Speciation Results for Control Trial. All values below the detection limit of that species are represented at one-half the specific detection limit. (Detection limits: TN, Ammonium, and Nitrate 0.05 mg/L; Nitrite, 0.01 mg/L). Note that the x-axis is not linear.*

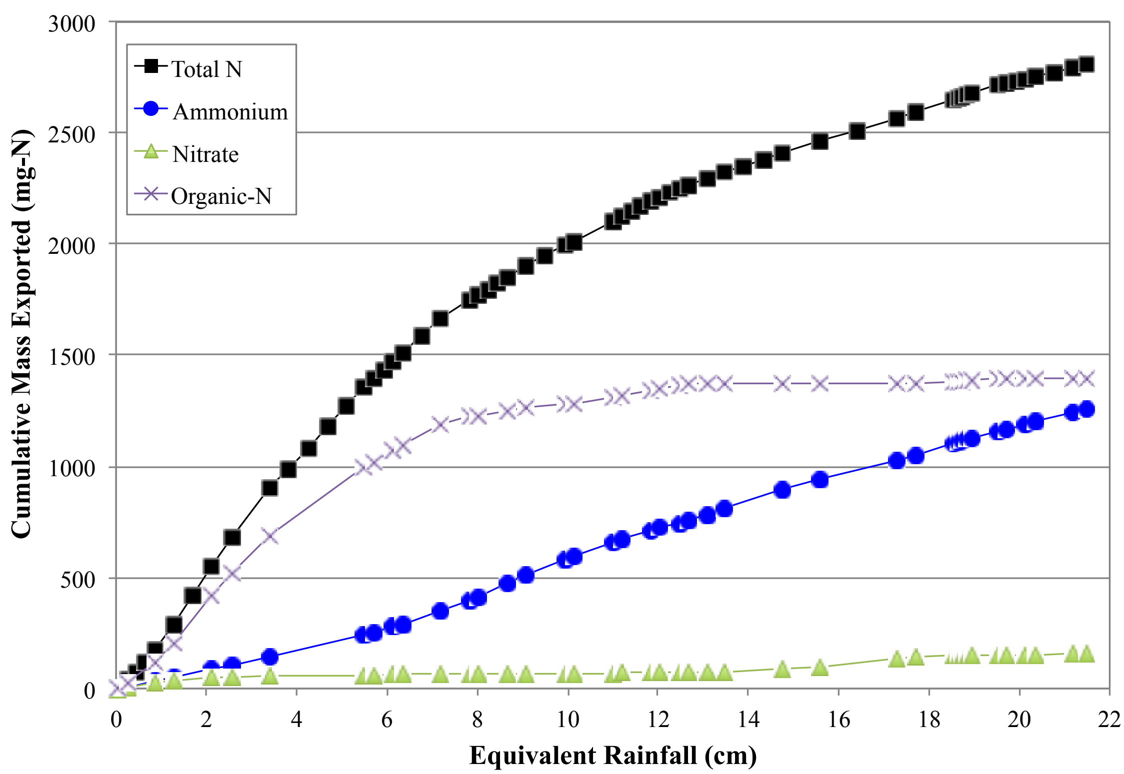



*Figure 3 - 9: 30% Trial Nitrogen Cumulative Mass Export. Cumulative mass export for total nitrogen and nitrogen species from source separated Dickerson 30% wetland mesocosm during Runs 1 through 8. Nitrite is not shown.*

Figure 3-9 shows the cumulative mass of nitrogen and nitrogen species exported during the first eight storms of the 30% trial, with the exception of nitrite. The graph shows that nitrogen is exported at a steady pace within the first eight centimeters of applied stormwater before the rate decreases. Total exported nitrogen reached a maximum of 2,800 mg-N during the first eight storms. Figure 3-9 also shows how each species contributed to the total mass of nitrogen exported from the wetland mesocosm. Organic nitrogen accounted for the majority of exported total nitrogen for most of the trial, reaching a maximum of 1,400 mg-N, which is 50% of total nitrogen; however, as the trial proceeded, nitrogen exported as ammonium approached that of the organic nitrogen exported. Nitrate-nitrogen accounts for approximately 160 mg-N, or 5.5% of total nitrogen exported. Nitrite is not shown in Figure 3-9, due to the lack of data as well as the low amounts of nitrite found in the samples that were measured.

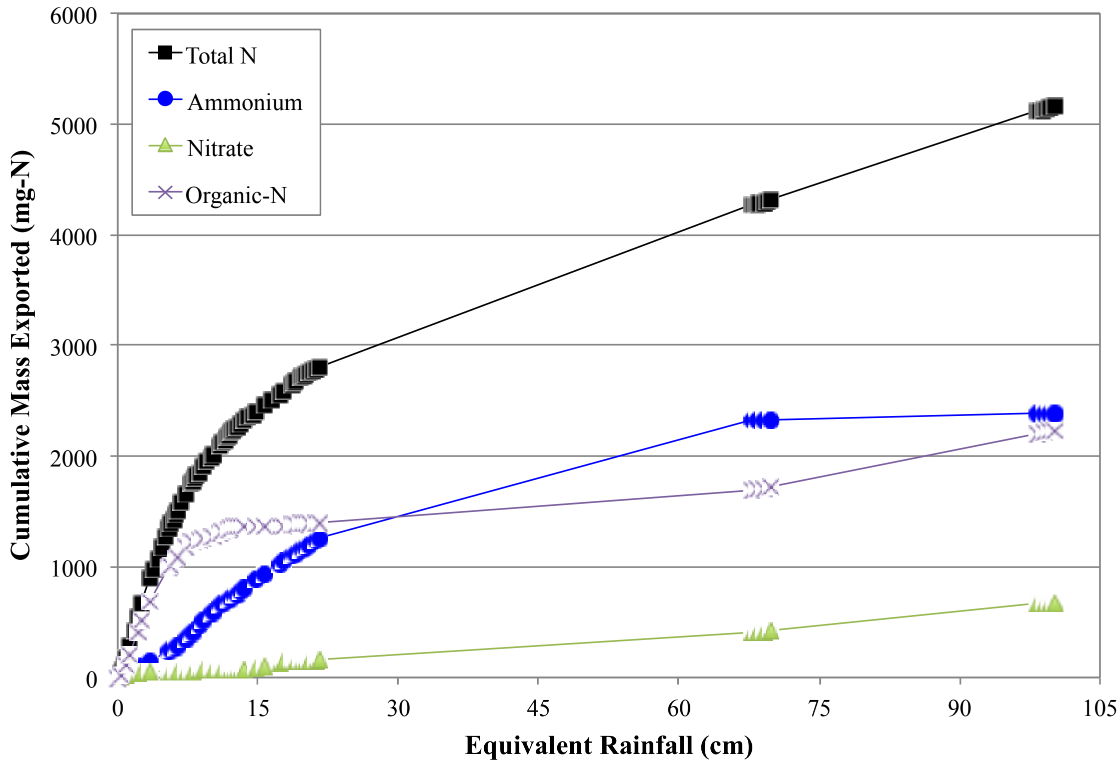



*Figure 3 - 10: 30% Trial Nitrogen Cumulative Mass Export Through Run 10. Cumulative mass export for total nitrogen and nitrogen species from source separated Dickerson 30% wetland mesocosm during Runs 1 through 10. Nitrite is not shown.*

Figure 3-10 shows the same data as Figure 3-9, with the addition of Run 9 and Run 10. After 100 cm of applied water, total exported nitrogen reached 5,200 mg-N compost and appeared to reach a steady rate of export. Org N, after appearing to have leveled out after Run 8, increased to 2,200 mg-N, but decreased to 43% of total nitrogen exported. Ammonium passed Org N as the main contributor of nitrogen exported with 2,400 mg-N (43% of total nitrogen), and nitrate increased to 13% of total nitrogen exported with 680 mg-N.

Figures 3-9 and 3-10 do not include the nitrogen removal (total nitrogen concentrations lower in effluent samples than influent samples) that was observed in Runs 8, 9 and 10. The average nitrogen removal (TN influent – TN effluent) of these three runs was 2.1 mg-N/L. If this rate remained constant, it would take an additional 63 cm of applied water before the 2800 mg-N exported during the first 21 cm of applied water has been mitigated by nitrogen removed from the influent. This equates to a period of 9.5 months (assuming 104 cm/yr) in the state of Maryland before an installed device matching this wetland design reaches a net-zero of total nitrogen export.

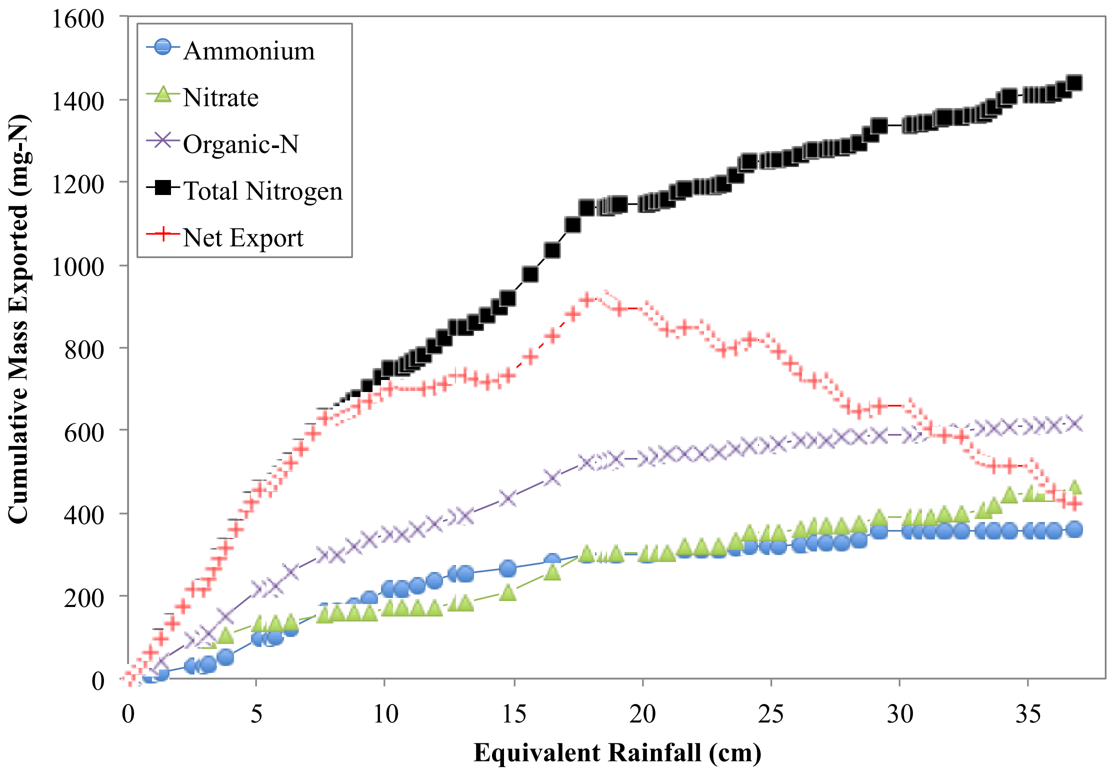



*Figure 3 – 11: 15% Trial Nitrogen Cumulative Mass Export. Cumulative mass export for total nitrogen and nitrogen species from Dickerson 15% wetland mesocosm. Nitrite is not shown. Net Export (red) is calculated as the summation of the mass of effluent total nitrogen minus the mass of influent total nitrogen, and represents the amount of nitrogen removed from the influent flow.*

Figure 3-11 and Figure 3-12 show the nitrogen mass export for the 15% trial and Control trial, respectively. Total nitrogen exported for the 15% trial reached 1,440 mg-N after 36.8 cm. Exported nitrogen in the 15% trial was spread among ammonium, nitrate and organic nitrogen species, which accounted for 32%, 25%, and 43% of TN, respectively. Nitrogen removal exceeded nitrogen export after 17.8 cm of equivalent rainfall. The removal rate through the end of the trial averaged 2.1 mg-N/L, and if kept constant would require an additional 10.1 cm of equivalent rainfall before total mass of nitrogen removed from the influent exceeded total nitrogen of nitrogen exported. This would equal a total of rainfall of 46.9 cm, or 5.4 months of rainfall in the State of Maryland.

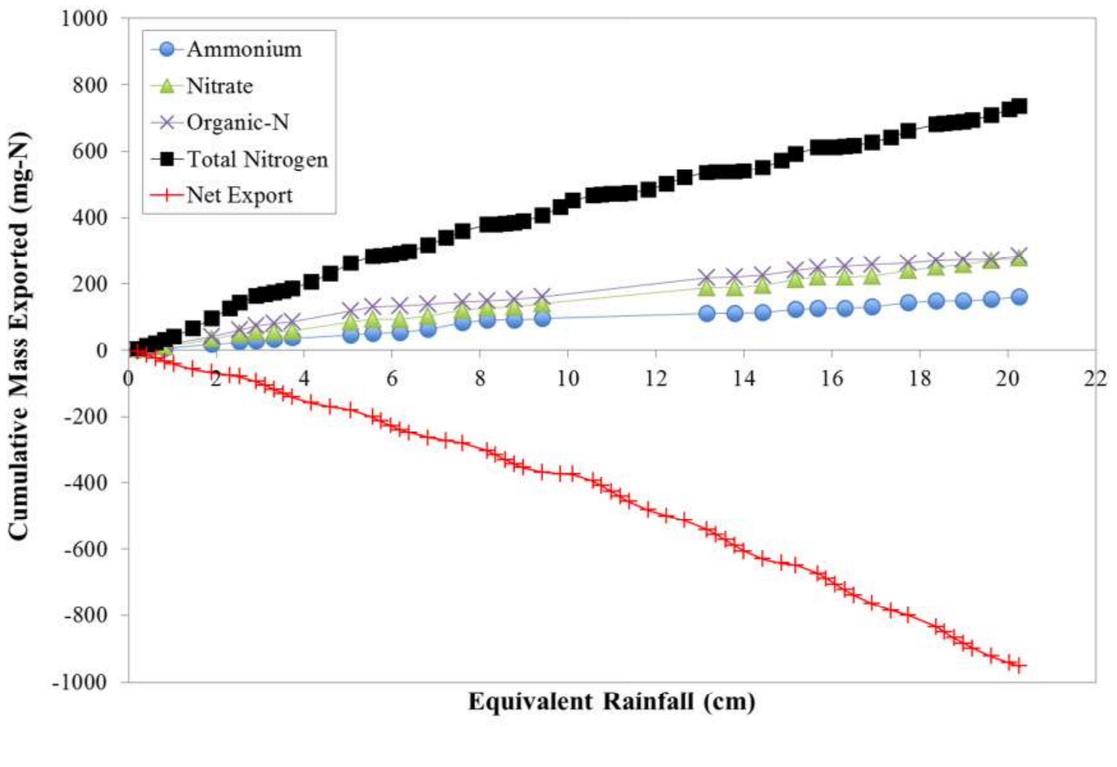



*Figure 3 - 12: Control Trial Nitrogen Cumulative Mass Export. Cumulative mass export for total nitrogen and nitrogen species from the Control trial. Nitrite is not shown. Net export is not shown, due to net export being 0 for the entire trial.*

Total nitrogen exported in the Control trial reached 763 mg-N after 20.3 cm,. Speciation of nitrogen export for the Control trial was also spread among ammonium, nitrate and organic nitrogen species, accounting for 22%, 38% and 39% of TN. Influent nitrogen always exceeded effluent nitrogen, and more nitrogen was removed (950 mg-N) than exported. The nitrogen treatment observed in the control trial is likely due to denitrification and plant and microbial uptake.

A comparison of the nitrogen exported in all mesocosms at 20 cm of equivalent rainfall (Figure 3-13) shows that the added compost resulted in increased nitrogen exported, mostly as a result of increased export of ammonium and organic nitrogen. Nitrate varied little between the Control trial and the 15% trial and decreased in the 30% trial. Given that nitrogen was applied to each mesoscosm as nitrate and organic nitrogen, it is likely that the presence of ammonium in the effluent was due to the degradation of organic nitrogen. In addition, the higher amounts of organic nitrogen present in the 15% and 30% trial with respect to the Control trial suggests that the compost added was a source of organic nitrogen. Removal of nitrate through denitrification and plant uptake does not appear to be affected by the addition of compost.

Using the annual input load of nitrogen of 14.0 $kg\ ha^{-1}\ yr^{-1}$, as found in a bioretention system studied by Li and Davis (2014), cumulative mass export of nitrogen was converted into years of watershed nitrogen with equation 10, where $M_N$ is the mass of nitrogen exported and $A_w$ is the watershed area, which equaled 19,800 $cm^2$ for each mesocosm.

$$Years\ of\ watershed\ N = \frac{M_N}{A_w} / (14.0\ kg \cdot ha^{-1} \cdot yr^{-1}) \qquad (11)$$

Using equation 11, the 30% trial exported 1.9 years of nitrogen after 1.0 years of MD rainfall and 1.0 years of nitrogen after 0.19 years of MD rainfall. The 15% trial exported 0.52 years of nitrogen after 0.35 years of MD rainfall and 0.45 years of nitrogen after 0.19 years of MD rainfall. The control trial exported 0.27 years of nitrogen after 0.19 years of MD rainfall.

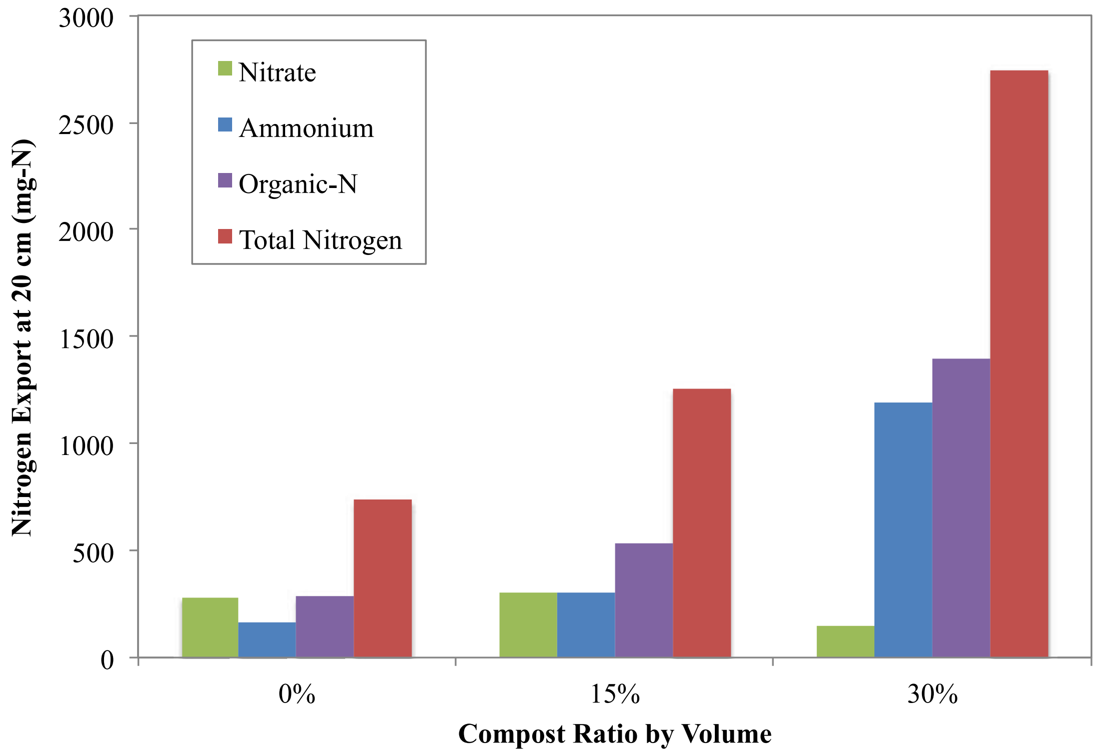



*Figure 3 – 13: Nitrogen Export Comparison. Total nitrogen exported and nitrogen exported by species for each of the three mesocosms at 20 cm of equivalent rainfall.*

### *Phosphorus*

Total phosphorus for the effluent and influent of the first eight runs of the 30% trial, and all of the 15% and Control trials are presented in Figure 3-14. Like influent total nitrogen, influent total phosphorus was measured as the average of samples taken throughout each storm event. Variations in influent total phosphorus were a result of variations in background total phosphorus present in the tap water used for stormwater solution make-up. The 30% and Control trial were found to be significantly different with regards to total phosphorus, while the 15% trial was not significantly different from the 30% or the Control trial. Initially, total phosphorus was highest in the 30% trial, followed by the 15% trial. After 5 cm, the 30% and 15% behaved much like the Control trial. Total phosphorus in effluent samples of the 30% trial began at 1.4 mg-P/L and increased to a maximum of 2.9 mg-P/L at the end of 2.5 cm of applied stormwater. After 2.5 cm, effluent total phosphorus quickly decreased to below influent levels and averaged 0.13 mg-P/L through the remainder of the experimental setup. These results indicate total phosphorus removal occurred within the 30% mesocosm setup following 4.7 cm of applied water.

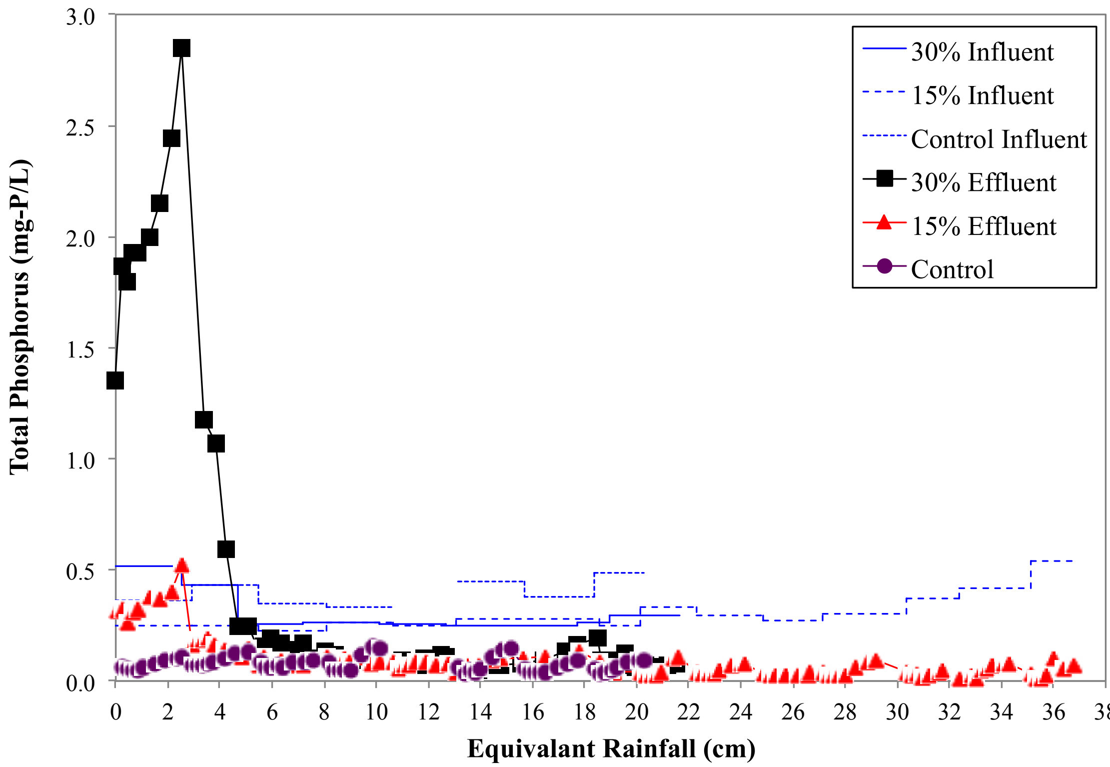



*Figure 3 - 14: Total Phosphorus Results. Total phosphorus results for 30% Dickerson, 15% and Control trial. Results are shown for effluent samples and for influent stormwater solution. Results shown for the 30% trial are for the first eight storm events.*

Effluent total phosphorus of the 15% began at 0.31 mg-P/L and increased to 0.52 mg-P/L after 2.54 cm. Phosphorus removal was achieved after 2.54 cm of equivalent rainfall over the calculated watershed area, when effluent total phosphorus fell below influent total phosphorus and averaged 0.07 mg-L/P for the remainder of the trial. Effluent total phosphorus for the Control trial began at 0.07 mg-P/L, reached a maximum of 0.16 mg-P/L at 9.83 cm and averaged 0.08 mg-P/L.

Figures 3-15 and 3-16 show total phosphorus results of the 30% trial for Run 9 and Run 10, respectively. Total phosphorus concentrations averaged 0.04 mg-P/L during these two runs, and were much lower than the influent total phosphorus of 0.31 mg-P/L for Run 9 and 0.36 mg-P/L for Run 10. The tap water applied between synthetic stormwater runs still contained phosphorus, therefore it is unlikely that the removal of phosphorus observed would be much different if synthetic stormwater had been applied instead.

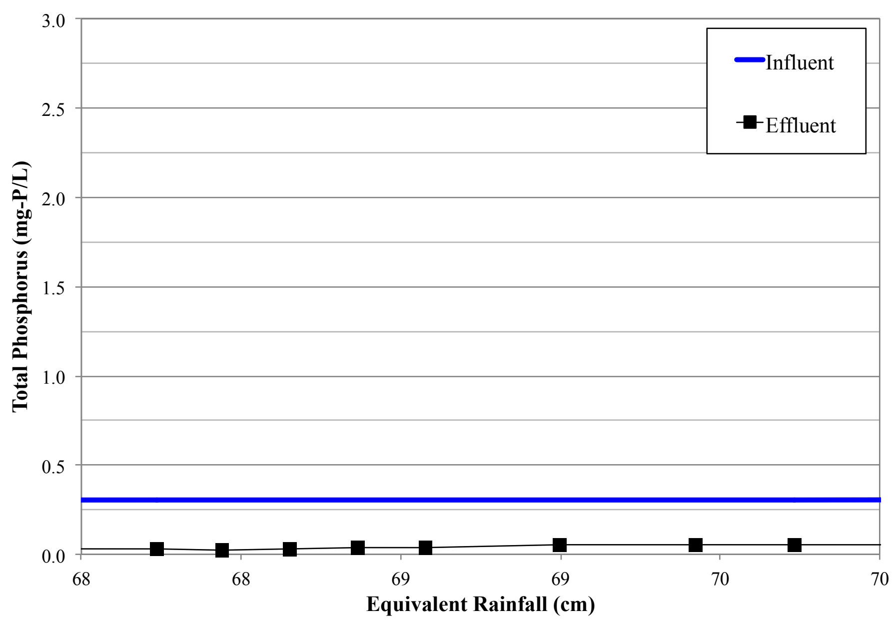



*Figure 3 - 15: 30% Trial Run 9 Total Phosphorus Results. Total phosphorus results for Run 9 of the 30% Dickerson wetland mesocosm. Results are shown at the same vertical scale for comparison to Figure 3-14. Run 9 was conducted after the application of 46 cm of tap water over 18 storms.*

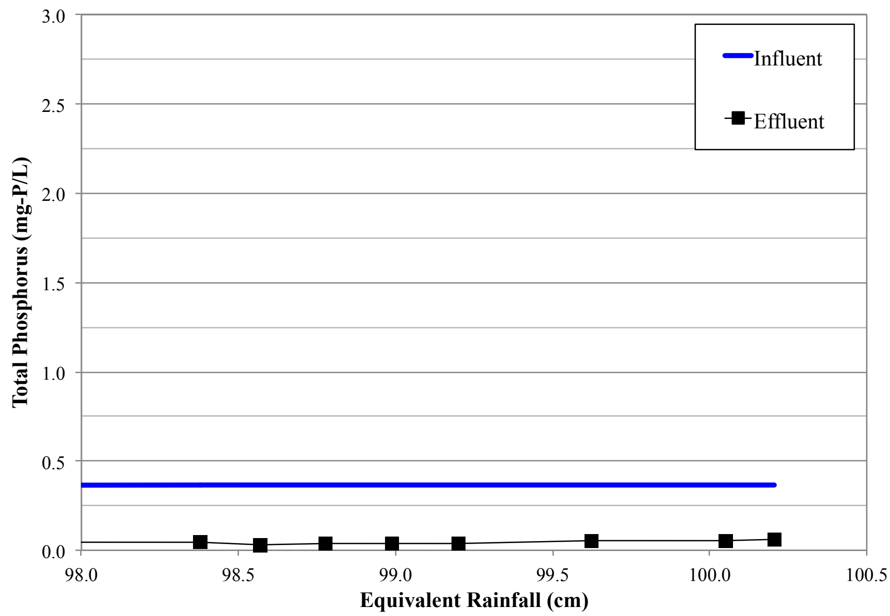



*Figure 3 - 16: 30% Trial Run 10 Total Phosphorus Results. Total phosphorus results for Run 10 of the 30% Dickerson wetland mesocosm. Results are shown at the same vertical scale for comparison to Figure 3-14. Run 10 was conducted after Run 9 following the application of 28 cm of tap water over 11 storms.*

Effluent samples were analyzed for phosphorus speciation and results for the 30% trial are displayed in Figure 3-17. Particulate phosphorus was the dominant contributor to total phosphorus for most samples. In samples taken during the first 3.4 cm, PP ranged from 0.95 to 2.6 mg-P/L before being reduced to below 0.2 mg-P/L for the remainder of the experiment. In Run 9 and Run 10, PP is 0.02 mg-P/L or less. A maximum SRP of 0.18 mg-P/L was recorded at 2.5 cm. Like SRP, DOP was highest in earlier samples, reaching a maximum of 0.22 mg-P/L after 2.1 cm. In later samples, DOP was near-zero and averaged less than 0.02 mg-P/L after 2.5 cm of stormwater solution.

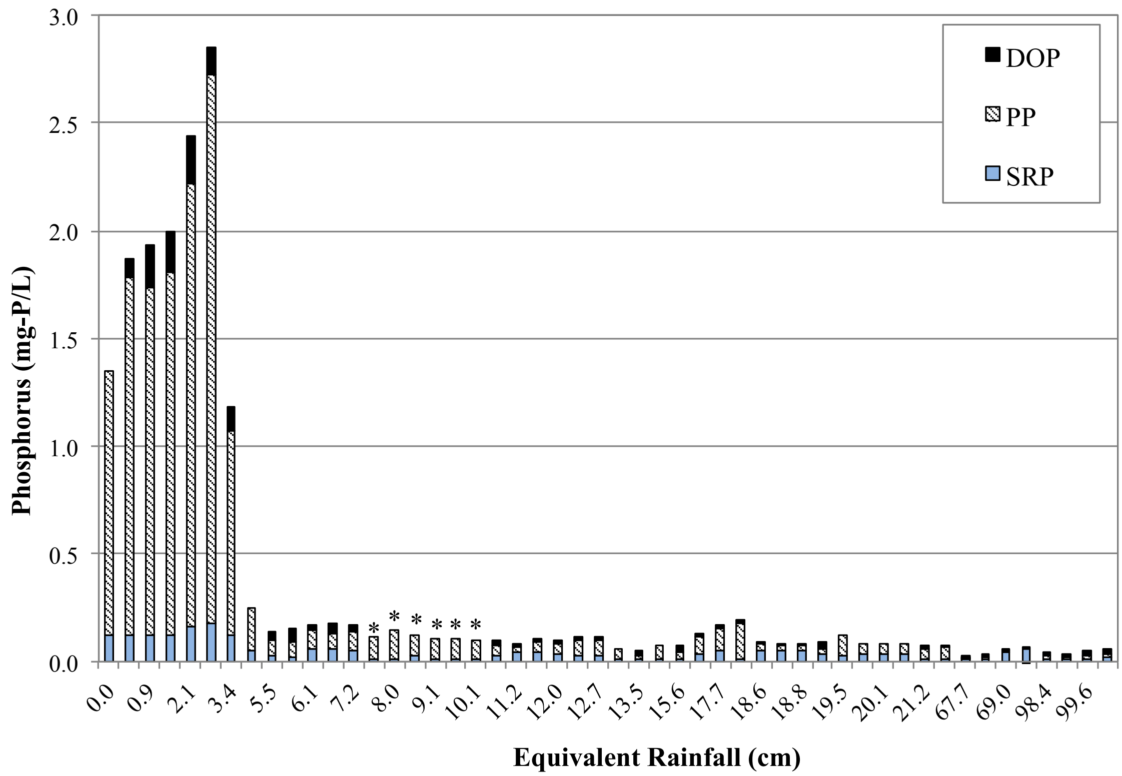
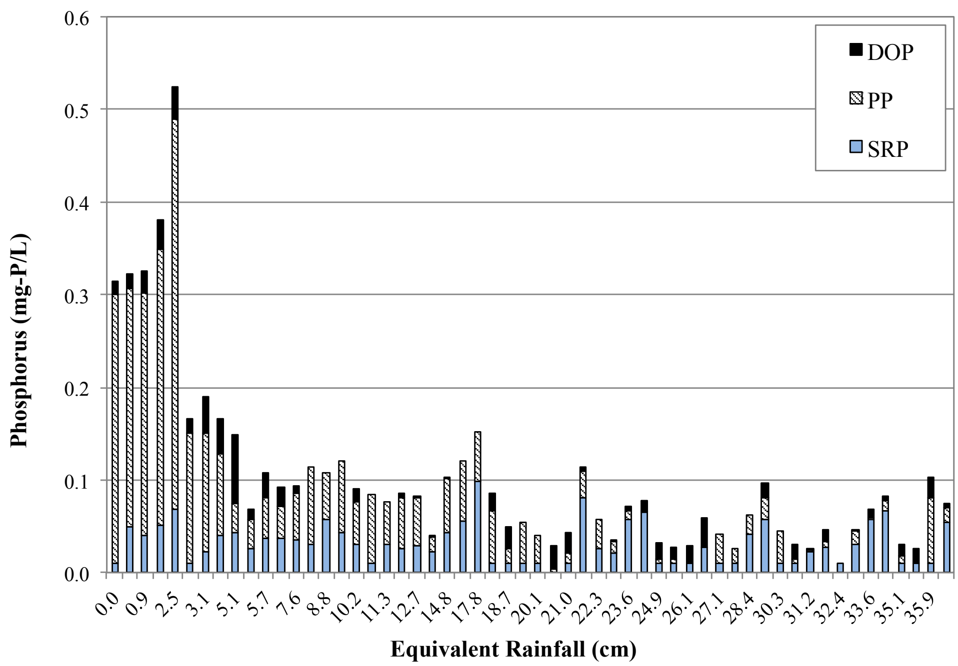



*Figure 3 - 17: Phosphorus Speciation for 30% Trial. Phosphorus speciation concentrations for the 30% Dickerson wetland mesocosm trial. All values below the detection limit of are represented as one-half the detection limit for that test. (Detection limits: TP, SRP, and DOP are 0.05 mg-P/L). Samples denoted with an asterisk could not be measured for DP, and the PP shown represents PP and DOP. Note that the x-axis is not linear.*

Speciation results for the 15% trial (Figure 3-18, Top) appear similar to the results of the 30% trial, with PP being the dominant species in the first several runs. PP for the 15% trial ranged from 0.09 to 0.42 mg-P/L during the first 3.4 cm, and measured 0.08 mg-P/L or below after. Maximum SRP of 0.10 mg-P/L was observed at 17.8 cm, and many samples were below detection (0.05 mg-P/L). DOP reached a maximum of 0.07 mg-P/L at 5.08 cm. Speciation results for the Control trial (Figure 3-18, bottom), differ from the 15% and 30% trials. Notable are the lower amounts of PP in the first few runs, which only reached a maximum of 0.10 mg-P/L at 5.06 cm, as well as the lack of DOP in many samples. Because PP it is not seen in the control trial, the release of PP early in the

30% and 15% trials is likely due to fine particulate matter found in the compost being washed out.

As expected, PP was found to be significantly different between the 30% trial and the Control trial; although, SRP was not found to be significantly different between any of the trials, and DOP in the 30% and 15% was significantly different from the control trial but not each other. The lack of significant difference between the three trials vis-à-vis SRP indicates that the presence of compost does not greatly contribute SRP to the effluent, and that treatment of SRP is relatively the same in each of the three mesocosms; however, this may be due to slightly elevated levels of SRP in the influent solution, as seen in Table 3-3. The statistical comparison for DOP indicates that compost addition contributes DOP to the effluent, however the amount of compost does not appear to affect the amount of DOP found in effluent samples.



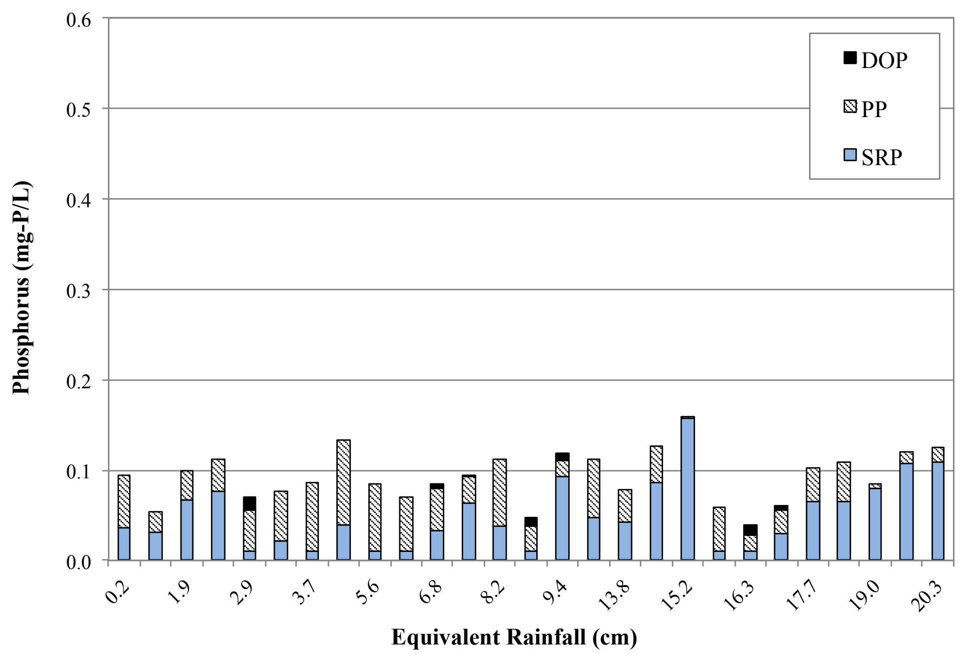




*Figure 3- 18: Phosphorus Speciation for 30% and 15% Trials. Phosphorus speciation concentrations for (Top) 15% Trial and (Bottom) Control Trial. All values below the detection limit of are represented as one-half the detection limit for that test. (Detection limits: TP, SRP, and DOP are 0.05 mg-P/L) Note that the x-axis is not linear.*

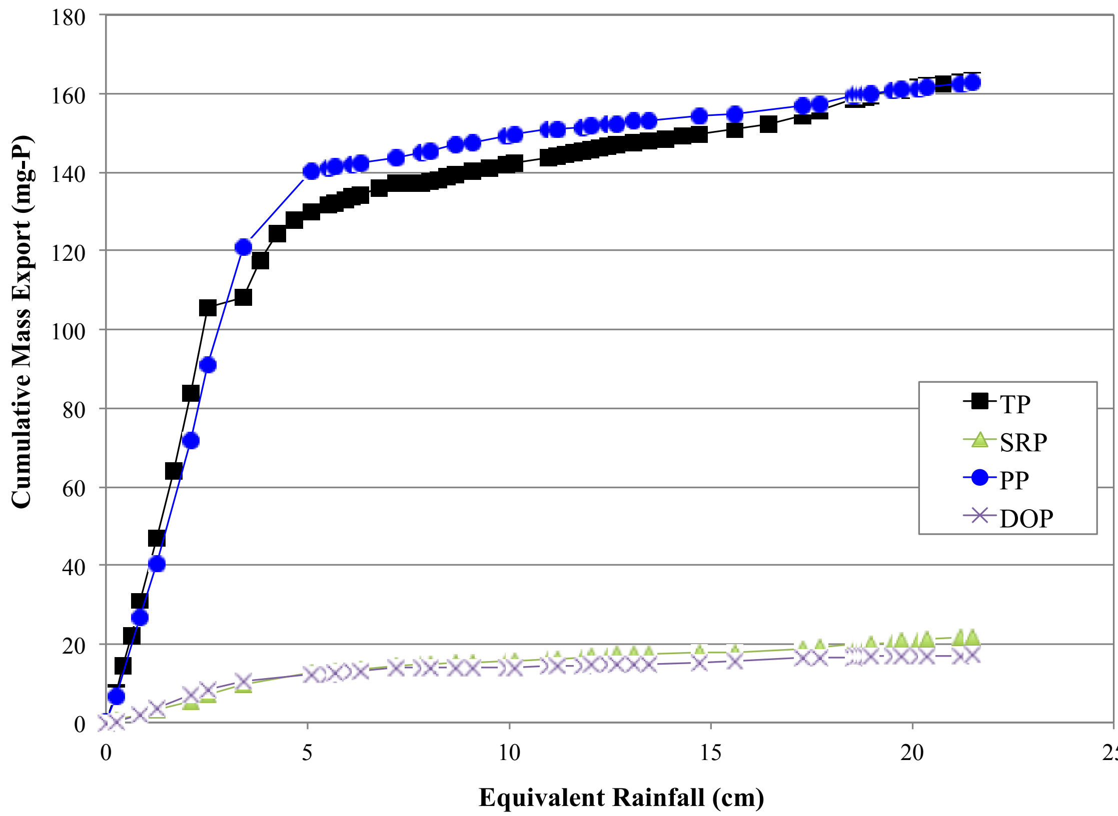



*Figure 3 - 19: 30% Trial Phosphorus Cumulative Mass Export Runs 1-8. Mass export of total phosphorus and phosphorus species (mg-P) for the 30% Dickerson submerged gravel wetland mesocosm for Runs 1 through 8.*

Figure 3-19 shows the total mass of phosphorus exported during the first eight events, as total phosphorus and as phosphorus species SRP, PP and DOP. As seen in the graph, the majority of total phosphorus exported was measured as PP. As PP leveled off after 5.0 cm, total phosphorus also leveled off. SRP accounted for 21.6 mg-P of exported phosphorus and increased at a slower rate after 5.0 cm. Like SRP, DOP represented a small fraction of total phosphorus exported and increased only slightly after 5.0 cm. Figure 4-19 shows the same data with the addition of phosphorus results for Runs 9 and 10 and net export. The decrease in PP in Runs 9 and 10 led to less contribution of PP to overall phosphorus concentrations. SRP and DOP were exported at or near the same rate as before Run 9.

As noted above, phosphorus removal began to occur after 4.2 cm of applied solution and continued through the end of the setup. The total phosphorus removed after eight storm events, calculated by summing the cumulative mass export for periods where effluent was less than influent, is 51 mg-P and is 31% of the total phosphorus exported at that point. Assuming that the rate of phosphorus removal remained constant between stormwater runs, total phosphorus removal exceeded export after approximately 51 cm, and this is represented by the net export shown in Figure 3-20.

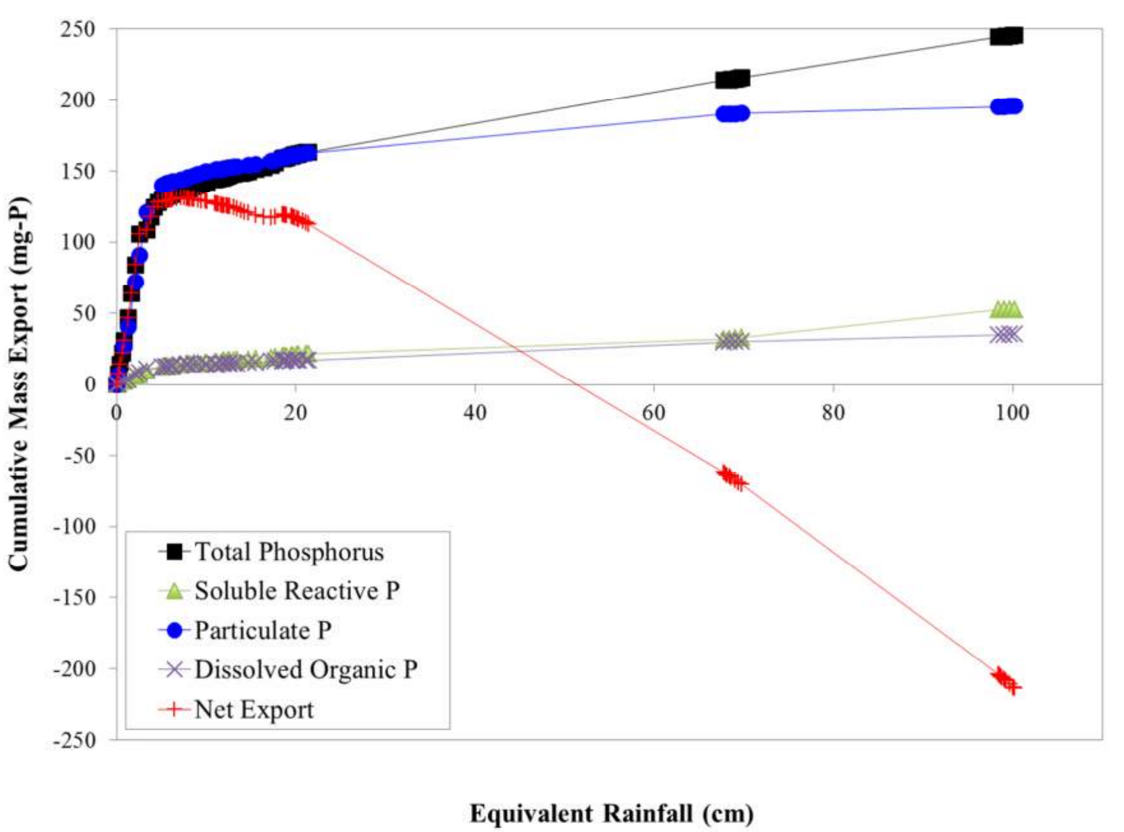
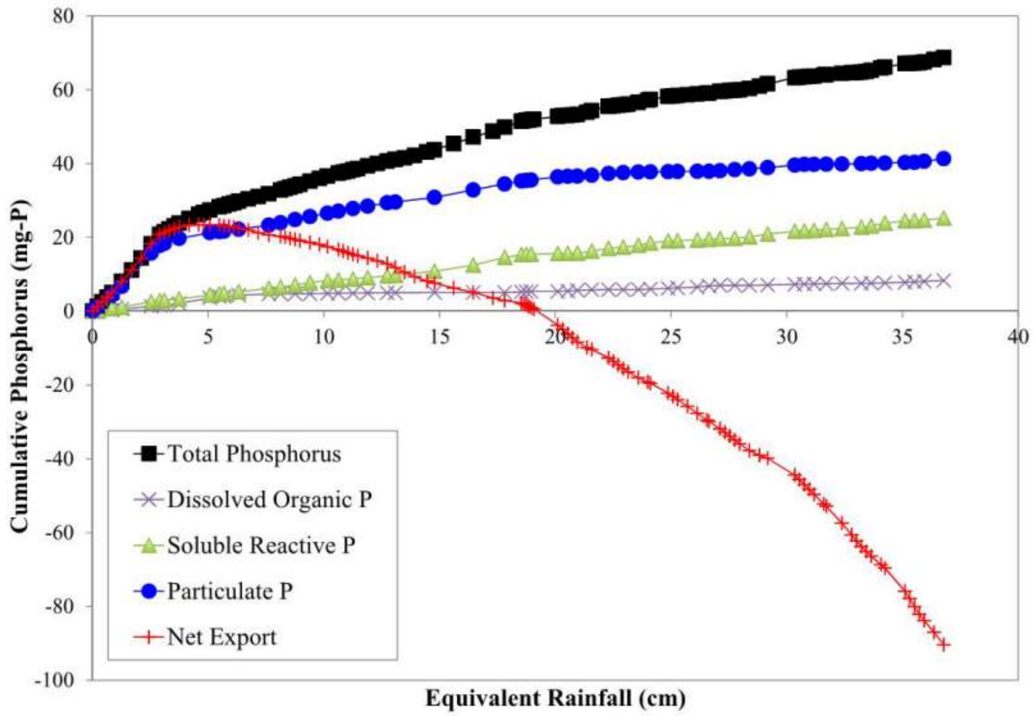



*Figure 3 - 20: 30% Trial Phosphorus Cumulative Mass Export Runs 1-10. Mass export for total phosphorus and phosphorus species from source separated Dickerson 30% wetland mesocosm for all storm events. Net Export (red) is calculated as the summation of the mass of effluent total phosphorus minus the mass of influent total phosphorus, and represents the amount of phosphorus removed from the influent flow.*



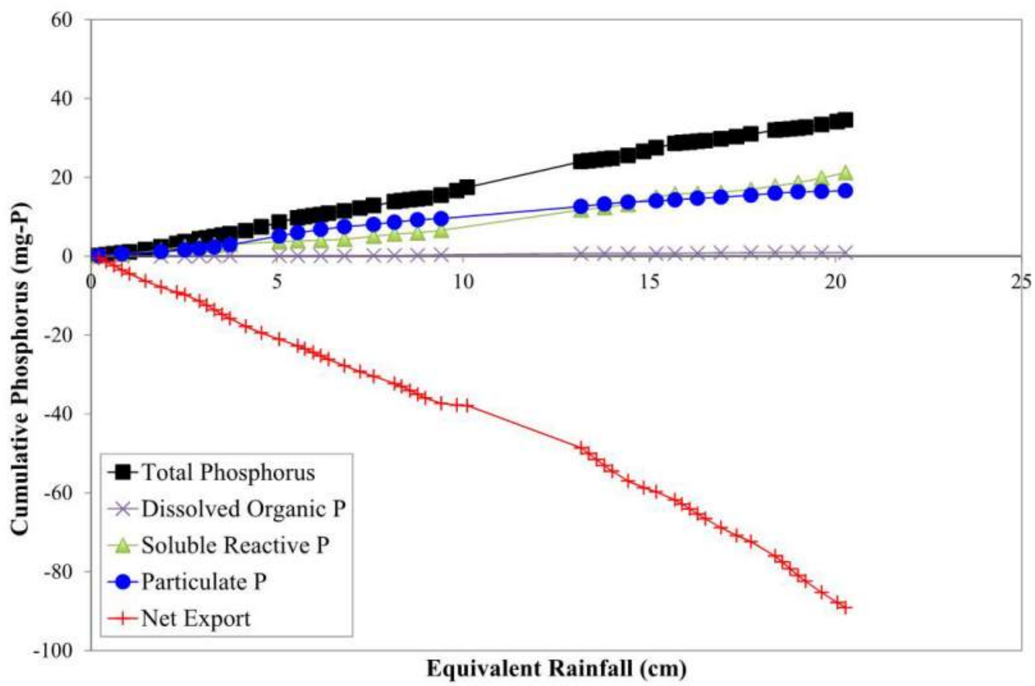




*Figure 3-21: 15% Trial and Control Phosphorus Cumulative Mass Export. Mass export for total phosphorus and phosphorus species from source separated Dickerson 15% trial (top) and Control (bottom). Net Export (red) is calculated as the mass of effluent total phosphorus minus the mass of influent total phosphorus, and represents the amount of phosphorus removed from the influent flow. Net export is not shown for the Control trial, due to net export being less than zero from the beginning of the trial.*

The mass of phosphorus exported during the 15% trial (Figure 3-21, top) reached 68.8 mg-P by the end of the trial. The majority of exported phosphorus was exported as PP (41.4 mg-P, 60%). SRP was the second most dominant species, accounting for 25.2 mg-P (37%). DOP accounted for 12% of TP with 8.3 mg-P. The mass of phosphorus exported during the Control trial (Figure 3-20, bottom) 34.5 mg-P after 20.3 cm. Exported SRP (21.2 mg-P) exceeded PP (16.6 mg-P) and DOP (0.92 mg-P). SRP, PP and DOP accounted for 61%, 48%, and 3% of TP, respectively.

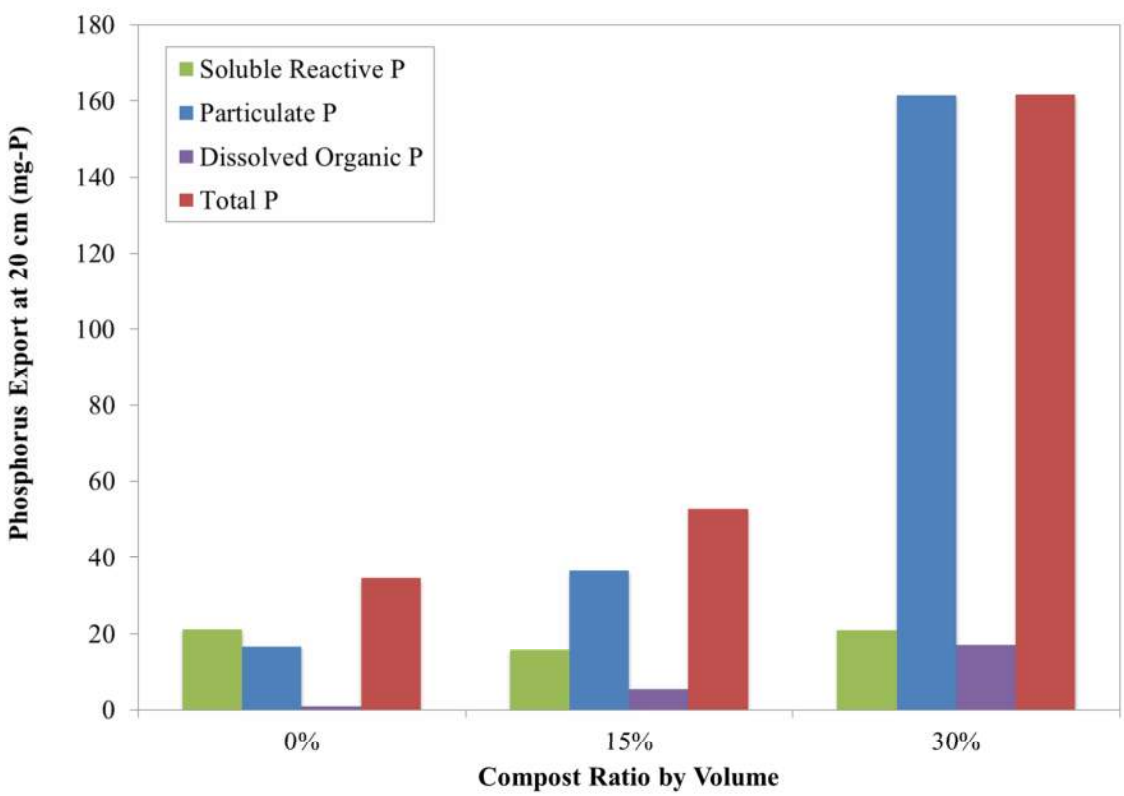



*Figure 3 – 22: Phosphorus Export Comparison. Total phosphorus exported and phosphorus exported by species for each of the three mesocosms at 20 cm of equivalent rainfall.*

A comparison of the phosphorus exported after 20 cm of equivalent rainfall in each of the mesocosms is presented in Figure 3-22. As seen in the figure, exported phosphorus increased with increasing compost addition. It is notable that the increase in total exported phosphorus did not increase linearly with increased amounts of compost.

PP is greatly increased in the 30% trial over the 15% and Control trial. DOP also increased with increasing addition of compost. SRP is approximately the same in all three trials, which is supported by the lack of statistical difference as discussed above. This again seems to indicate that the presence of compost does not affect the amount of SRP in the effluent.

As with nitrogen, phosphorus export was converted to years of watershed phosphorus using the average annual input load of phosphorus (3.0 kg-P $ha^{-1}$ $yr^{-1}$) for a bioretention system (Liu and Davis 2013). Using equation 11, where $M_P$ is mass of phosphorus exported and $A_w$ is the watershed area (19,800 $cm^2$).

$$Years\ of\ watershed\ P = M_p A_w / (3.0\ kg \cdot ha^{-1} \cdot yr^{-1}) \qquad (12)$$

Using equation 12, the 30% trial exported 0.41 years of phosphorus after 1.0 years of MD rainfall and 0.27 years of phosphrous after 0.19 years of MD rainfall. The 15% trial exported 0.12 years of phosphorus after 0.35 years of MD rainfall and 0.09 years of phosphorus after 0.19 years of MD rainfall. The control trial exported 0.06 years of phosphorus after 0.19 years of MD rainfall. These results indicate that these SGW mesocosms achieved phosphorus treatment and exported less phosphorus than what an urban watershed typically exports. Therefore, despite compost addition and early phosphorus leaching, effective phosphorus treatment was achieved in all three mesocosms.

### *pH and ORP*

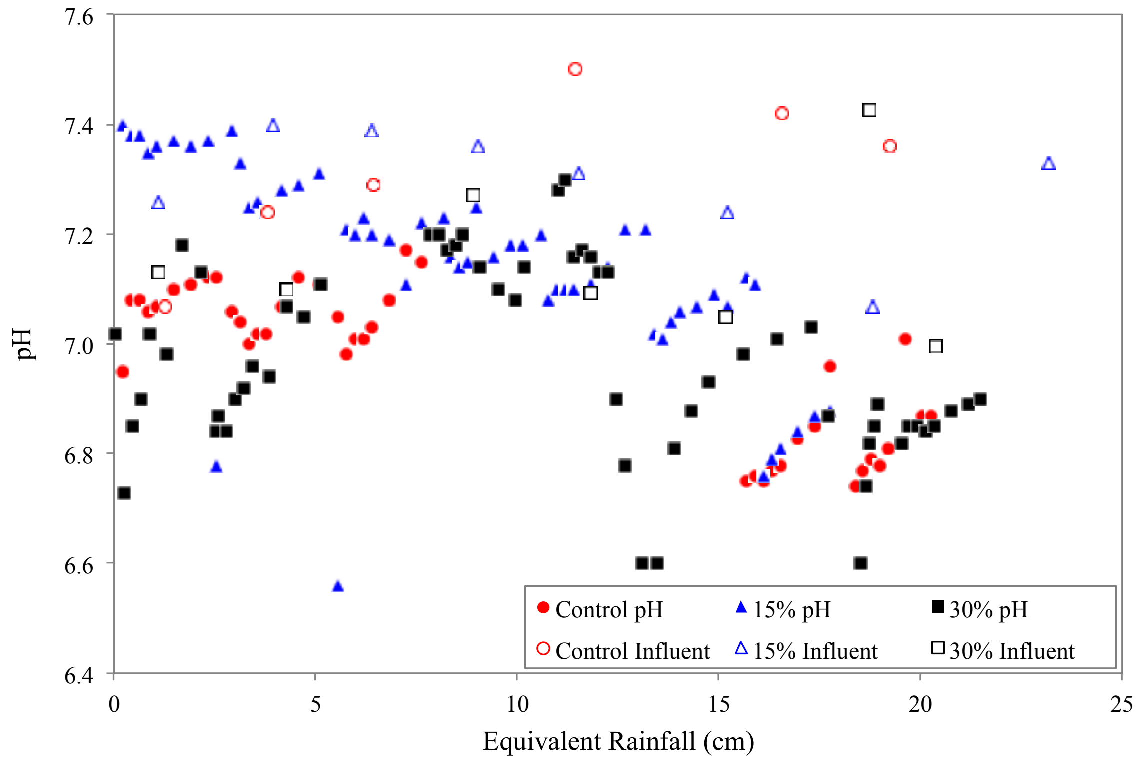



*Figure 3 - 23: Effluent and Influent pH Measurements. Effluent pH and average influent pH for Control, 15%, and 30% trials. Influent pH is the average of three samples.*

The pH of effluent samples from each trial was generally lower than influent pH (Figure 3-23), but approached influent pH levels as each storm event progressed. Overall, pH decreased as each trial progressed. Influent pH levels ranged from 7.0-7.5 for the 30% trial, 7.1-7.4 for the 15% trial, and 7.1-7.5 for the control trial. Effluent pH levels ranged from 6.2-7.2 for the 30%, 6.7-7.3 for the 15% trial, and 6.8-7.1 for the Control trial. Changes in pH do not appear to correspond with changes in speciation of nitrogen or phosphorus, however, nitrifiers prefer pH values above 7.1 and denitrifiers are most efficient from 6.5 to 7.5 (Kadlec and Wallace 2009). Wetlands are generally associated with more acidic conditions, but can range from a pH 3.0 to 8.0, and vary diurnally.

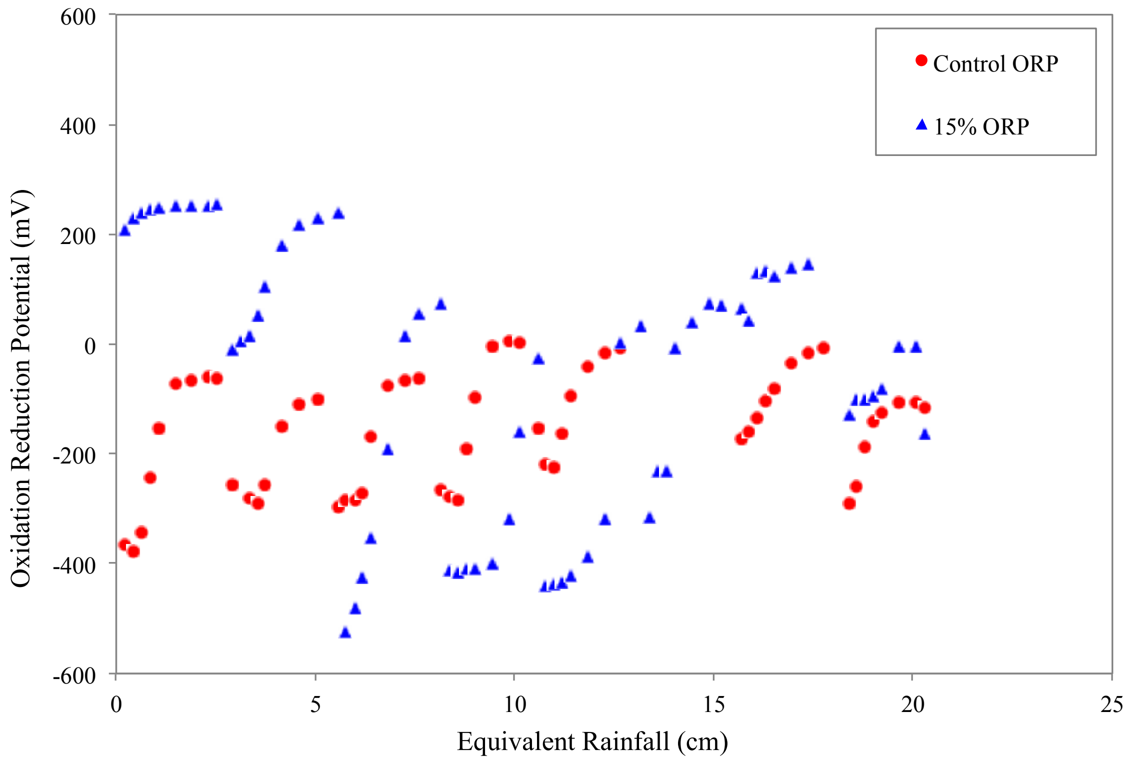
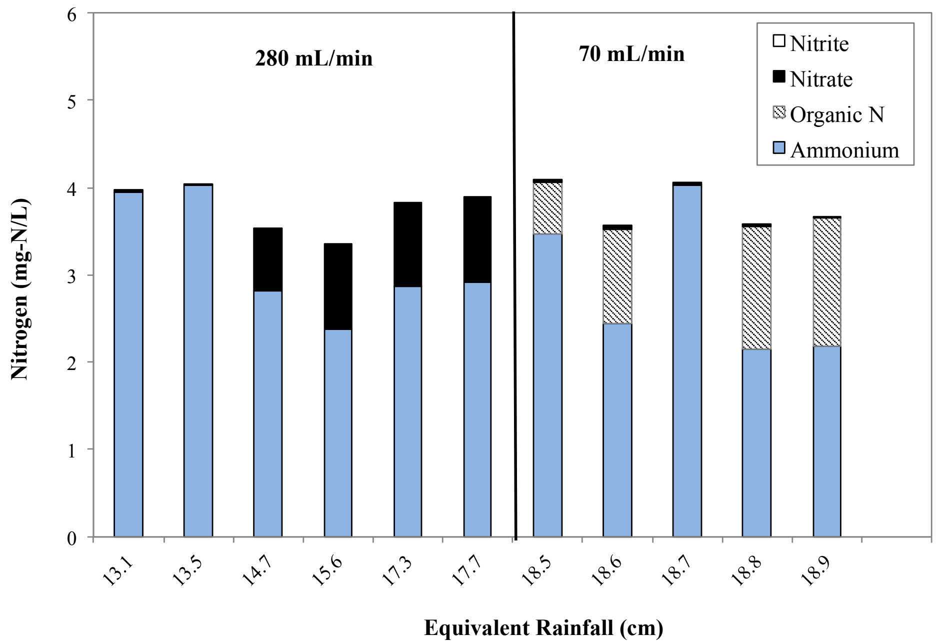



*Figure 3 – 24: ORP of Control and 15% Trial. Oxidation reduction potential (ORP) of effluent samples from Control and 15% trials.*

The oxidation-reduction potential (ORP) is a measure of the potential for chemical species to be reduced (Benjamin, 2014). ORP was measured in situ for effluent samples from the 15% trial and the Control trial (Figure 3-24). ORP for the Control trial ranged from -380 to 7.6 mV, while the 15% trial ranged from -520 to 260 mV. Like pH, ORP increased as each event progressed, presumably approaching the influent ORP. While influent ORP was not measured, ORP was likely in oxic ranges (100+mV) given that tap water was used for influent solution makeup. In addition to the influent solution, several other factors appeared to affect ORP, such as length of time between runs and the amount of evaporation. It is also possible that the amount of plant growth affected ORP by oxygenating the rhizosphere (Stottmeister et al., 2003). More negative ORP levels indicate more reducing conditions are present, which favor denitrification and typically indicate anoxic environments. From Figure 3-24 it can be seen that the addition of compost did not negatively impact denitrification potential; however, ORP was increased above reducing conditions during most storm events in both the Control and 15% trials, thus limiting denitrification potential during storm events. In field applications, increases in ORP during storm events would depend largely on the ORP of influent stormwater, as well as the amount of antecedent water being displaced. As such, it is possible that adequately sized SGWs may not see major increases in ORP like those observed in these mesocosm trials.

### *Flow Comparison*

To test the effects of flow on TN, TP and speciation, the flow rate of 140 mL/min was doubled to 280 mL/min during the sixth storm event and halved to 70 mL/min during seventh storm event for both the 30% trial and 15% trial. Figures 3-25 and 3-26, respectively, show the nitrogen speciation and phosphorus speciation data during doubled and halved flows for both trials. In both the 30% trial and 15% trial, nitrate levels were higher in the doubled flow than the halved flow. This may be due to a lower hydraulic retention time (HRT) associated with a higher flow, which allowed for less time for the nitrate to be assimilated into plant or microbial mass or for denitrification to occur, as well as the fact that the doubled flow rate quickly displaces the antecedent water in the mesocosm, while the halved flow rate does not fully displace the antecedent water. For the 15% trial, a noticeable reduction in total nitrogen is apparent, largely due to the lack of nitrate, which again can be attributed to the fact that the antecedent water was not fully displaced and nitrate was able to be treated during the time between storms. This is supported by Kearney et al. (2013) who showed that constructed urban wetlands were



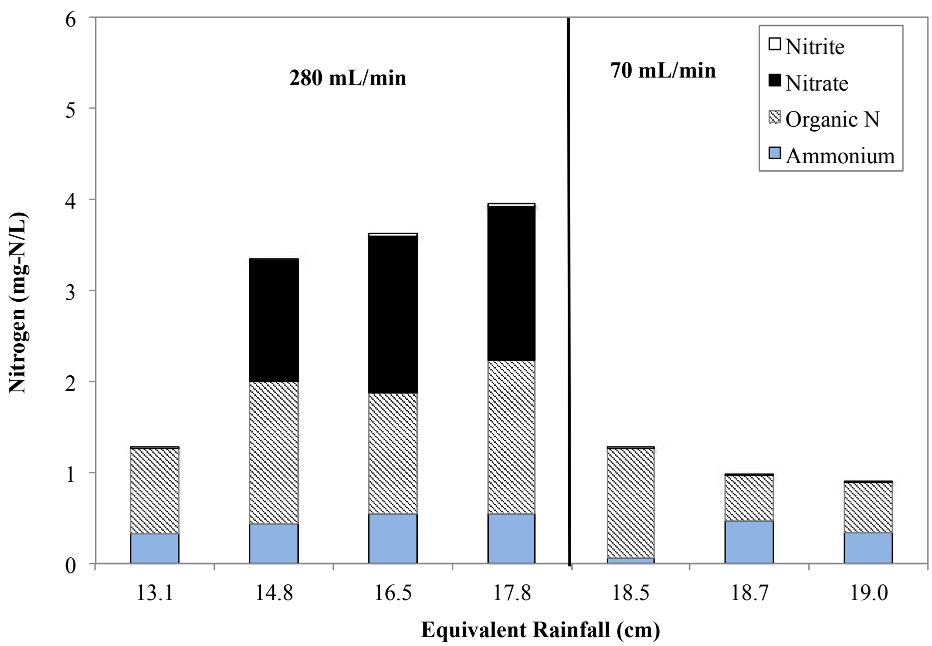
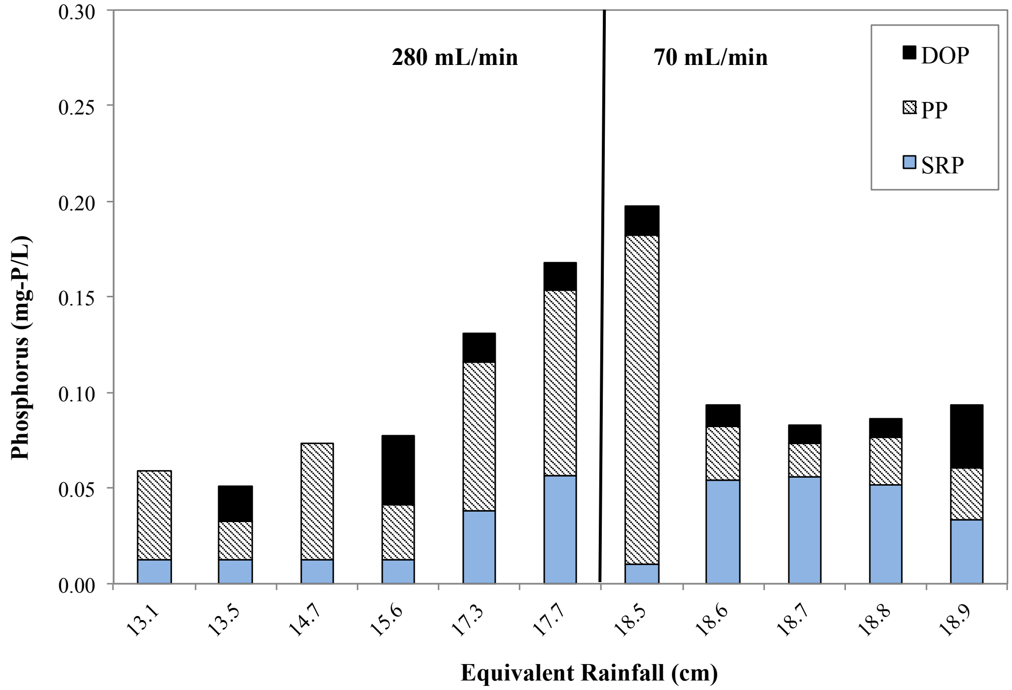




*Figure 3 - 25: Flow Rate and Nitrogen Comparison Results 15% and 30% Trials. Comparison of nitrogen speciation during doubled (280 mL/min) and halved (70 mL/min) flow rates for the 30% trial (top) and 15% trial (bottom). Doubled flow rate samples were taken at 13.1 cm through 17.7 cm during the 30% trial and 13.1 cm through 17.8 cm for the 15% trial. Halved flow rate samples were taken at 18.5 cm through 18.9 cm for the 30% trial and 18.5 cm through 19.0 cm for the 15% trial. Influent TN averaged 2.5, 4.1, 4.1, and 4.0 mg-N/L for the 30% doubled, 30% halved, 15% doubled and 15% halved flows, respectively. All values below the detection limit of that species are represented at one-half the specific detection limit. (Detection limits: TN, Ammonium, and Nitrate 0.05 mg/L; Nitrite, 0.01 mg/L). Note that the x-axis is not linear.*

capable of removing dissolved inorganic forms of nitrogen (nitrate and ammonium, specifically) under base flow conditions, but had less success during storm events when HRT was greatly reduced. A reduction in total nitrogen was not apparent in the 30% trial, but this may be attributed to the uncharacteristically low influent nitrogen (2.5 mg-N/L) measured during the doubled flow storm event compared to the higher influent nitrogen (4.1 mg-N/L) measured in the halved flow event.

With the exception of the first sample in the seventh simulated storm, phosphorus speciation results for the 30% trial (Figure 3-26, top) indicate an increase in PP with doubled flow rates. The PP in the first sample of the seventh simulated storm at 18.5 cm may be a result of particulate washout from the previously doubled flow rate; however, total phosphorus results for all samples during this period were below the influent phosphorus amounts. This pattern was not repeated in the 15% trial (Figure 3-26, bottom), however, this may have been due to the generally lower PP levels in the 15% trial. The 15% trial did exhibit higher SRP levels in the doubled flow compared to the halved flow, but this pattern was not evident the 30% trial.



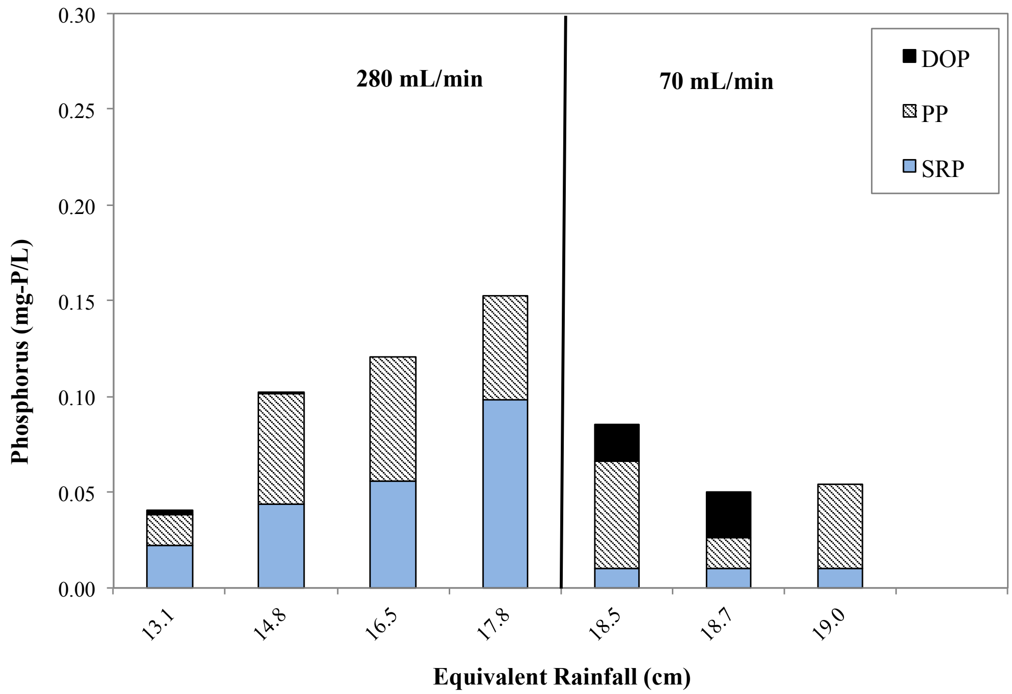




*Figure 3 - 26: Flow Rate and Phosphorus Comparison Results 15% and 30% Trials. Comparison of phosphorus speciation during doubled (280 mL/min) and halved (70 mL/min) flow rates for the 30% trial (top) and 15% trial (bottom). Doubled flow rate samples were taken at 13.1 cm through 17.7 cm during the 30% trial and 13.1 cm through 17.8 cm for the 15% trial. Halved flow rate samples were taken at 18.5 cm through 18.9 cm for the 30% trial and 18.5 cm through 19.0 cm for the 15% trial. Influent TP measured 0.26, 0.25, 0.28 and 0.25 mg-P/L for the 30% doubled, 30% halved, 15% doubled and 15% halved flows, respectively. All values below the detection limit of are represented as one-half the detection limit for that test. (Detection limits: TP, SRP, and DOP are 0.05 mg-P/L) Note that the x-axis is not linear.*

### *Flow Characterization – Tracer Test*

A tracer test was performed on the 15% trial following Run 14 to determine the mixing characteristics. After flushing the system with tap water at a rate of 140 mL/min for 24 hours, feed water was spiked with 100 mg/L of NaCl and applied at 140 mL/min until EC became relatively constant. Figure 3-26 shows EC of effluent samples normalized to the maximum and the starting EC of the effluent samples and is also known as a step curve. The EC of effluent samples when application of the spiked feed water began was 480 μS/cm and effluent samples reached a maximum of 1180 μS/cm after 705 minutes. The tracer test was terminated after 750 minutes when the EC of effluent samples stopped increasing.

The constituent residence time ($t_c$) was calculated as 340 minutes, or approximately 5.7 hours. The HRT of the SGW mesocosms in this study was six hours, given that the flow applied over six hours equaled the estimated pore volume of the mesocosm. The measured $t_c$ is within 5% of the HRT. The $\sigma^2$ was calculated as 13,100 minutes and was used to calculate *n-CMFRs*, which was found to be 9.1. The *n-CMFRs* term is used to compare actual reactors to ideal completely mixed flow reactors (*n-CMFRs* = 1.0) and ideal plug flow reactors (*n-CMFRs* = ∞). A *n-CMFRs* of 9.1 is indicative of mixing characteristics more closely resembling a plug flow reactor than a CMFR. It was hypothesized during the mesocosm trials that the different layers of media in the mesocosms as well as the presence of plants may lead to preferential flow paths and that $t_c$ may have been much lower than HRT, however, these results indicate that the

15% mesocosm had little preferential flow and behaved hydraulically more or less as designed.

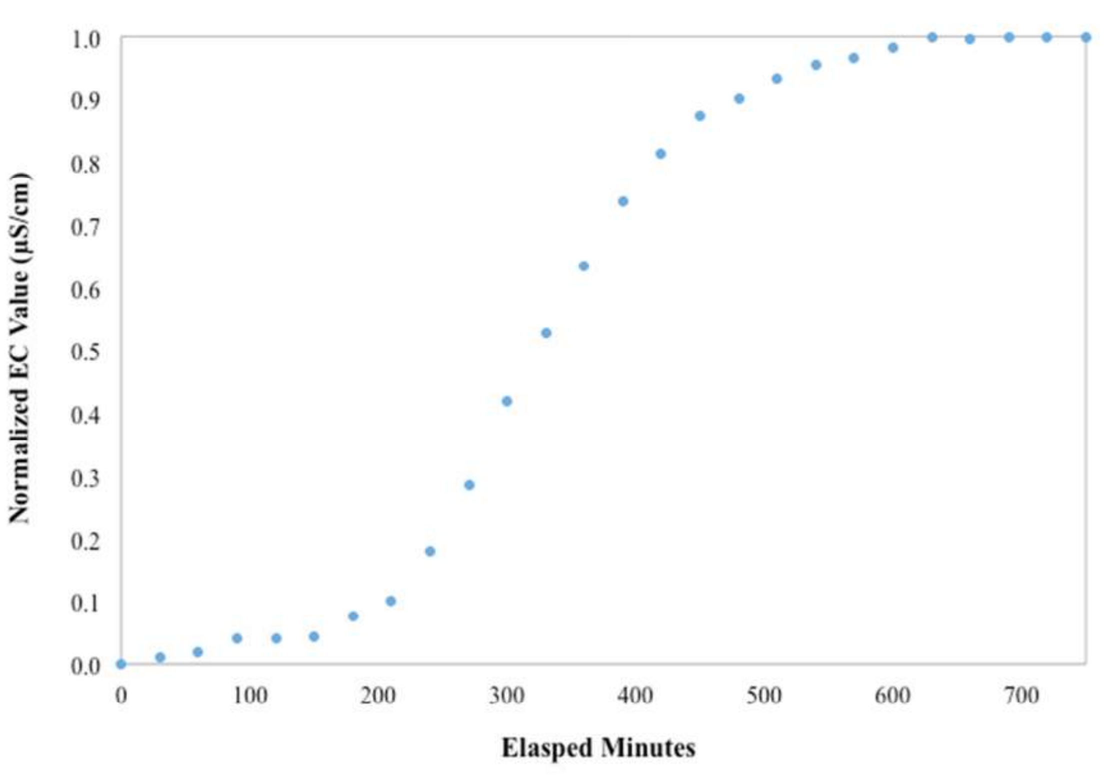



*Figure 3-27: Tracer Study Step Curve for the 15% trial. EC measurements were normalized and used to calculate mixing parameters of SGW mesocosms.*

### *Mesocosm Summary*

Results from the 30% and 15% mesocosm trials show an increase in the amount of phosphorus leached when compost is added as compared to the results of the control trial; however, after approximately 20 cm of rainfall (0.19 years of Maryland rainfall), EMC of total phosphorus observed in the 15% trial was not significantly different (Mann-Whitney *U*-test, $p<0.05$) than that of the Control trial. In the 30% and 15% trials, phosphorus concentrations in the effluent reached 2.9 mg-P/L and 0.52 mg-P/L, respectively, after 2.54 cm, while the Control only reached 0.16 mg-P/L later in the trial (9.83 cm). Phosphorus was exported from the 15% and 30% mesocosms predominately as PP, the majority of which occurred in the first several storms, whereas PP was observed at much lower concentrations in the Control trial. Once this store of PP was generally exhausted, phosphorus removal began to occur in both mesocosms. From this result, it can be concluded that exported phosphorus in the form of PP was a direct result of adding compost to the mesocosms.

SRP effluent concentrations were not significantly different among control trials, and the presence of compost did not appear to affect treatment of SRP. DOP levels in effluent were significantly different in compost trials when compared to the control trial; however, there was no significant difference between the 15% and 30% trials, indicating that while compost increased DOP in treated effluent, the amount of compost did not affect the amount of DOP.

To illustrate how phosphorus moves through the compost-added SGW mesocosms, Figure 3-28 shows a simplified diagram of the phosphorus cycle in wetlands, modified from Reddy and DeLaune (2008). The figure uses general trends observed in phosphorus species of the 30% trial to show how compost addition affects phosphorus concentrations in effluent at three points during the trial: (1) the first several storms, (2) later storms, and (3) the first few samples taken during later storm events. Compost-added trials saw phosphorus primarily as a result of PP, which was not seen in the control trial. The majority of PP was exported during the first 5 cm of applied stormwater. In addition, PP was elevated during the first few samples of each storm event, likely as a result of drying and weathering effects in between storms. This implies that phosphorus leaching in the compost-added mesocosms may be strongly related to fine particulate matter present in the compost. Reducing the fine material present in the compost may help reduce phosphorus leaching in the form of PP.

Following the washout of PP, SRP was the dominant species observed during each storm event but was lower than influent levels. Removal of phosphorus occurred after initial PP flushing in both compost mesocosms, and is likely due to treatment pathways typical of wetlands, including adsorption, filtration, sedimentation and plant and microbial uptake (Kadlec and Wallace, 2009). The 15% trial saw removal of phosphorus begin to occur after only 4 cm of equivalent rainfall, which is equal to approximately half a month of rainfall in the state of Maryland, and after 20 cm (2.3 months), phosphorus removal surpassed phosphorus export.

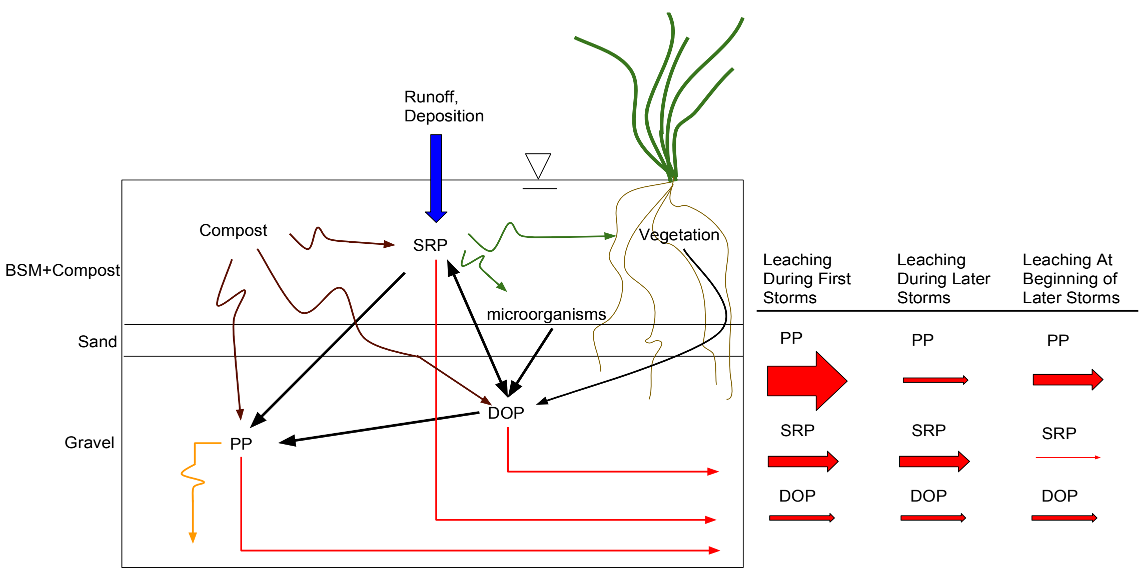



*Figure 3 - 28: Phosphorus Cycle and Phosphorus Export. Simplified phosphorus cycling in submerged gravel wetland, modified from Reddy and DeLaune (2008) and includes phosphorus contributions from compost (brown arrows), outflow of constituents (red), sedimentation (orange), and plant and microbial uptake (green). Leaching of phosphorus species during the first few storms, later storms, and beginning of later storms is shown to the right. Locations of constituents in figure are not to imply the actual locations in which transformations and reactions take place. Sizes of arrows are meant to imply general size in relation to each other and are not drawn to scale.*

Results from the three mesocosms show that increased amounts of added compost led to an increase in nitrogen concentration in effluent samples; however, like the phosphorus results, after approximately 20 cm of rainfall (0.19 years of Maryland rainfall), EMC of total nitrogen observed in the 15% trial was not significantly different (Mann-Whitney *U*-test, $p<0.05$) than that of the Control trial. The majority of nitrogen exported in the compost-added mesocosms occurred early in the trials, when high concentrations of total nitrogen (15.8 mg-N/L and 6.4 mg-N/L for 30% and 15% trial, respectively) were observed within the first several storms applied to the compost-added mesocosms. Nitrogen removal was achieved after 17.7 cm (0.17 years) and 8.1 cm (0.08 years) in the 30% and 15% mesocosms, respectively. During later storms, nitrogen concentrations in effluent samples were low at the beginning of the storm and then increased as the storm progressed, indicating that nitrogen removal primarily took place between storm events. Nitrogen treatment between storm events was most likely due to mineralization of organic sources of nitrogen followed by denitrification and plant and microbial uptake.

After 20 cm of applied stormwater, exported nitrogen in the 30% trial was predominately due to the presence of organic nitrogen and ammonium, while nitrogen exported in 15% trial was more evenly distributed between organic nitrogen, ammonium and nitrate species. A significant difference between mesocosms was not detected (Mann-Whitney *U*-test, $p<0.05$) after 20 cm for organic nitrogen or nitrate, but a significant difference in ammonium was detected between the 30% trial and the other two trial.

To illustrate how nitrogen moves through the compost-added SGW mesocosms, Figure 3-29 shows a simplified diagram of the nitrogen cycle modified from Reddy and

DeLaune (2008). The figure uses general trends observed in nitrogen species of the 30% trial to show compost addition affect nitrogen concentrations in effluent at the same three points used in Figure 3-28. Organic nitrogen was the dominant nitrogen species observed in the compost-added trials during the first several storms. Ammonium and nitrate were also observed in the effluent, but at lower concentrations than organic nitrogen. During later storms, organic nitrogen was greatly reduced, and nitrogen speciation was generally split between the three species. The earliest samples taken during storm events were very low in nitrate and ammonium, and nitrite was generally undetectable.

Given that ammonium is a product of the degradation of organic nitrogen, it is likely that the organic nitrogen present in the added compost was the main source of both organic nitrogen and ammonium in early stages. In later stages, the organic nitrogen and ammonium in the effluent may have been the result of continued leaching from the added compost, as well as the organic nitrogen applied to the system in the influent. In addition to this, a background concentration of organic nitrogen would be expected due to the presence of microbial and plant communities and their associated wastes and byproducts (Moore et al., 2011).

Once the organic nitrogen was exhausted, nitrogen treatment began to occur; however, as shown in the flow analysis (Figure 3-24) and supported by several constructed wetland studies (Yu et al., 2012; Kearney et al., 2013), nitrogen treatment in the mesocosm trials occurred mostly between flow events. This was demonstrated by the lack of nitrate and ammonium in early samples during later storm events and is represented in Figure 3-29. As storm events progressed, nitrate levels in the effluent rose.

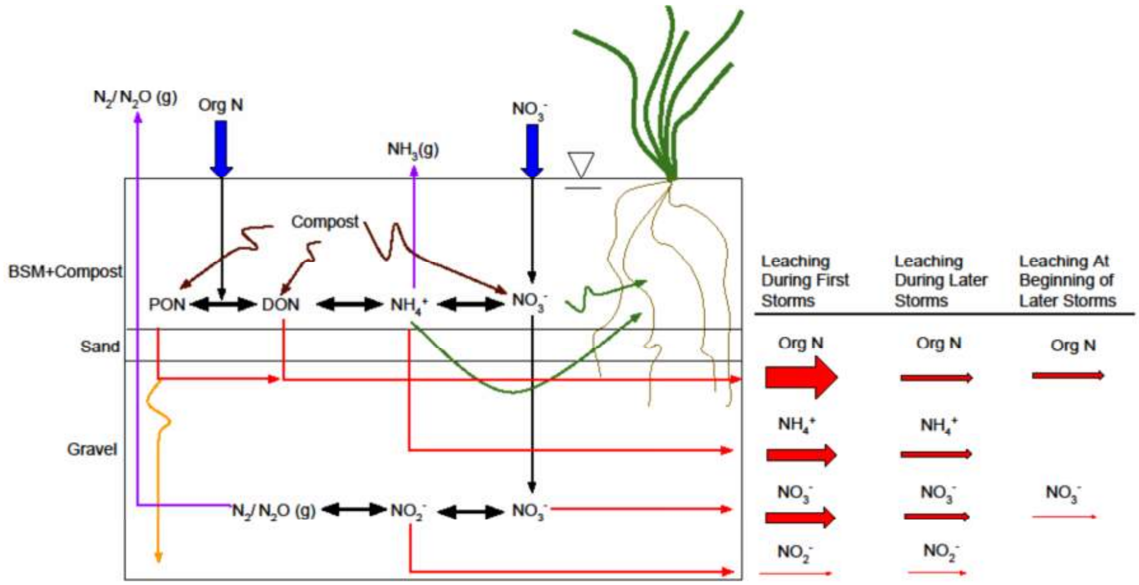



*Figure 3 - 29: Nitrogen Cycle and Nitrogen Export. Simplified nitrogen cycling in submerged gravel wetland, modified from Reddy and DeLaune (2008) and includes nitrogen contributions from compost (brown arrows), outflow of constituents (red), sedimentation (orange), volatilization (purple), and plant and microbial uptake (green). Leaching of nitrogen species during the first few storms, later storms, and beginning of later storms is shown to the right. Locations of constituents in figure are not to imply the actual locations in which transformations and reactions take place. Sizes of arrows are meant to imply general size in relation to each other and are not drawn to scale.*

This may have been due to a lack of sufficient contact time to allow for denitrification, as well as the increasingly aerobic conditions as observed by ORP. The lowest ORP levels were observed at the beginning of storm events and coincided with the lowest levels of nitrate. Microbial denitrification between storm events during the increased contact time and anoxic conditions was the likely method of nitrogen removal. While plant and microbial uptake may have also contributed to nitrogen removal, it is estimated that this may only account for up to 30% of nitrogen removal in vegetated wetlands (Lee et al., 2009).

Mesocosms acted as batch reactors, with nitrogen removal increasing with greater retention time as well as length between storms. This may be due to increasingly anoxic conditions or increased contact time, both of which are related to HRT. As such, increasing the design volume of the SGW, and therefore increasing HRT, as well as time between overflow events, should lead to increased nitrogen removal rates. Despite the lack of efficient nitrogen removal during storms, the 15% mesocosm saw a reduction in effluent nitrogen levels over influent levels after approximately 19 cm of equivalent rainfall. This equates to approximately 2 months of rainfall in the state of Maryland.

# Chapter 4: Conclusions and Recommendations

The overall goal of this research was to evaluate the water quality effects of amending BSM in SGWs with compost. The information gathered in this study can be used to help inform decisions on the types, amounts and ways to incorporate compost into SGWs. Three SGW mesocosms were constructed using BSM mixes of 0%, 15% or 30% compost by volume. Synthetic urban stormwater runoff was applied at the surface inlet of each mesocosm to simulate storm events. Samples were collected and evaluated for nitrogen and phosphorus content.

### *Conclusions*

The results of this study show that the addition of leaf-and-grass compost led to a leaching of nutrients and that the amount of nutrients leached increases with the amount of compost added. After 20 cm of equivalent rainfall, the 30% trial resulted in a three-fold increase in phosphorus exported over the 15% trial, and a more than two-fold increase in exported nitrogen; however, a significant difference between the 15% and Control trial was not detected. Increasing the amount of compost added led to an increase in the amount of nitrogen and phosphorus leached; however, not enough data are available to determine if the relationship is linear.

The majority of nitrogen exported in compost-added trials was exported during the first storm events when total nitrogen was highest. Organic nitrogen was the dominant species of nitrogen observed during this time. Nitrogen removal occurred once organic nitrogen was exhausted, at which point nitrogen speciation in the effluent is generally evenly split between ammonium, organic nitrogen and nitrate. During later storms, the lowest concentrations were observed in early samples and increased as the storm progressed, indicating that nitrogen treatment takes place more effectively in between storms via denitrification. This was supported by concentrations of nitrate increasing during storm events. Nitrogen treatment was attributed primarily to denitrification, with microbial uptake and plant uptake likely occurring at lower rates.

Like nitrogen, the majority of phosphorus in the compost-added mesocosms occurred during the first several storms and was observed as particulate phosphorus. Particulate phosphorus was attributed to the fine particulate matter in the compost. After particulate phosphorus was washed from the system, phosphorus treatment was observed. The 15% trial resulted in a net-zero phosphorus export, removing more phosphorus than it exported after 20 cm.

### *Recommendations for Compost Use in SGWs*

While the 15% trial overcame initial nutrient leaching and resulted in no detectable significant difference from the Control trial in total nitrogen and total phosphorus, the compost-added SGWs did not out-perform the Control trial with respect to nitrogen and phosphorus removal. Based on these results, leaf-and-grass compost should not be added to SGWs at amounts of 30% by volume or greater. At levels of 15% by volume, the effects of initial leaching of nutrients should be carefully considered.

When adding compost to SGWs, the source material must be considered carefully. Composts yielding higher nutrient extractions than the leaf-and-grass compost used in this study will likely lead to more nutrient leaching than observed here and should be avoided. Additional treatment methods may need to be added to account for the additional nutrients leached from adding any type of compost to media mixes.

### *Recommendations for Further Research*

Results from the 15% mesocosm are promising due to effective phosphorus treatment based on years of watershed phosphorus exported. Further investigations may be expanded to field studies where using media depths and wetland sizing more consistent with actual design guidelines could be accomplished, as this may affect the amount of nitrogen and phosphorus exported. Hardwood-based compost, such as the Pogo compost characterized in this study, could also be explored as an alternative to leaf-and-grass based compost, as it may yield lower nutrient exports, indicated by lower extraction values.

Furthermore, compost fractions of less than 15% should result in less nutrient export and could also be investigated further. While lower amounts of compost added should lead to less nutrient leaching, media mixes may need to include amendments for increased phosphorus treatment, such as water treatment residuals (O'Neil and Davis 2012) or media layers designed to better filter out particulate phosphorus. For increased nitrogen removal, designs need to be augmented to improve storage volume and HRT for increased denitrification potential. SGWs could also be coupled with other SCMs to improve effluent quality after initial installation. Once the initial leaching of nutrients is controlled, or at compost levels below 15%, SGWs amended with compost may perform indistinguishably from those constructed using BSM-only planting layers.

# Appendix

| | KCl Extractable N | M-3 Exctractable P | CaCl2 Extractable P | KCl Std Dev | Mehlich 3 Std Dev | CaCl2 Std Dev |
|---|---|---|---|---|---|---|
| | mg N / kg | mg P / kg | mg P / kg | mg N / kg | mg P / kg | mg P / kg |
| **Aberdeen** | 1596.85 | 372.30 | 97.69 | 353.59 | 22.34 | 4.06 |
| **Baltimore City** | 13867.97 | 456.26 | 100.40 | 272.84 | 11.98 | 31.23 |
| **Dickerson** | 798.7 | 673.35 | 10.18 | 42.472 | 35.13 | 0.31 |
| **Pogo** | 364.4 | 241.40 | 3.06 | 18.76 | 7.22 | 0.07 |
| **USDA** | 2543.5 | 1374.91 | 243.95 | 69.52 | 14.39 | 14.65 |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | Run | Flow | Date | Start Time | End Time | Mesocosm Start Time |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - |
| 1 | 1 | 140 | 8/11/2015 | 1:35:00 PM | 1:39:00 PM | 1:35:00 PM |
| 2 | 1 | 140 | 8/11/2015 | 2:07:00 PM | 2:12:00 PM | 1:35:00 PM |
| 3 | 1 | 140 | 8/11/2015 | 2:35:00 PM | 2:37:00 PM | 1:35:00 PM |
| 4 | 1 | 140 | 8/11/2015 | 3:05:00 PM | 3:08:00 PM | 1:35:00 PM |
| 5 | 1 | 140 | 8/11/2015 | 3:35:00 PM | 3:40:00 PM | 1:35:00 PM |
| 6 | 1 | 140 | 8/11/2015 | 4:35:00 PM | 4:37:00 PM | 1:35:00 PM |
| 7 | 1 | 140 | 8/11/2015 | 5:35:00 PM | 5:37:00 PM | 1:35:00 PM |
| 8 | 1 | 140 | 8/11/2015 | 6:35:00 PM | 6:38:00 PM | 1:35:00 PM |
| 9 | 1 | 140 | 8/11/2015 | 7:35:00 PM | 7:37:00 PM | 1:35:00 PM |
| 10 | 2 | 140 | 8/26/2015 | 4:16:00 PM | 4:21:00 PM | 2:18:30 PM |
| 11 | 2 | 140 | 8/26/2015 | 5:16:00 PM | 5:17:00 PM | 2:18:30 PM |
| 12 | 2 | 140 | 8/26/2015 | 6:16:00 PM | 6:18:00 PM | 2:18:30 PM |
| 13 | 2 | 140 | 8/26/2015 | 7:16:00 PM | 7:19:00 PM | 2:18:30 PM |
| 14 | 2 | 140 | 8/26/2015 | 8:16:00 PM | 8:18:00 PM | 2:18:30 PM |
| 15 | 3 | 140 | 9/8/2015 | 2:54:00 PM | 2:59:00 PM | 2:00:00 PM |
| 16 | 3 | 140 | 9/8/2015 | 3:24:00 PM | 3:26:00 PM | 2:00:00 PM |
| 17 | 3 | 140 | 9/8/2015 | 3:55:00 PM | 3:57:00 PM | 2:00:00 PM |
| 18 | 3 | 140 | 9/8/2015 | 4:24:00 PM | 4:27:00 PM | 2:00:00 PM |
| 19 | 3 | 140 | 9/8/2015 | 4:54:00 PM | 4:56:00 PM | 2:00:00 PM |
| 20 | 3 | 140 | 9/8/2015 | 5:54:00 PM | 5:56:00 PM | 2:00:00 PM |
| 21 | 3 | 140 | 9/8/2015 | 6:54:00 PM | 6:56:00 PM | 2:00:00 PM |
| 22 | 3 | 140 | 9/8/2015 | 7:54:00 PM | 7:56:00 PM | 2:00:00 PM |
| 23 | 4 | 140 | 9/16/2015 | 1:02:00 PM | 1:09:00 PM | 12:33:00 PM |
| 24 | 4 | 140 | 9/16/2015 | 1:32:00 PM | 1:34:00 PM | 12:33:00 PM |
| 25 | 4 | 140 | 9/16/2015 | 2:02:00 PM | 2:04:00 PM | 12:33:00 PM |
| 26 | 4 | 140 | 9/16/2015 | 2:32:00 PM | 2:34:00 PM | 12:33:00 PM |
| 27 | 4 | 140 | 9/16/2015 | 3:02:00 PM | 3:03:00 PM | 12:33:00 PM |
| 28 | 4 | 140 | 9/16/2015 | 4:01:00 PM | 4:03:00 PM | 12:33:00 PM |
| 29 | 4 | 140 | 9/16/2015 | 5:02:00 PM | 5:04:00 PM | 12:33:00 PM |
| 30 | 4 | 140 | 9/16/2015 | 6:02:00 PM | 6:04:00 PM | 12:33:00 PM |
| 31 | 4 | 140 | 9/16/2015 | 6:32:00 PM | 6:34:00 PM | 12:33:00 PM |
| 32 | 5 | 140 | 9/30/2015 | 1:48:00 PM | 1:54:00 PM | 11:50:00 AM |
| 33 | 5 | 140 | 9/30/2015 | 2:18:00 PM | 2:20:00 PM | 11:50:00 AM |
| 34 | 5 | 140 | 9/30/2015 | 2:48:00 PM | 2:50:00 PM | 11:50:00 AM |
| 35 | 5 | 140 | 9/30/2015 | 3:18:00 PM | 3:20:00 PM | 11:50:00 AM |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | Run | Flow | Date | Start Time | End Time | Mesocosm Start Time |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - |
| 36 | 5 | 140 | 9/30/2015 | 3:48:00 PM | 3:50:00 PM | 11:50:00 AM |
| 37 | 5 | 140 | 9/30/2015 | 4:18:00 PM | 4:20:00 PM | 11:50:00 AM |
| 38 | 5 | 140 | 9/30/2015 | 4:48:00 PM | 4:50:00 PM | 11:50:00 AM |
| 39 | 5 | 140 | 9/30/2015 | 5:18:00 PM | 5:20:00 PM | 11:50:00 AM |
| 40 | 5 | 140 | 9/30/2015 | 5:48:00 PM | 5:50:00 PM | 11:50:00 AM |
| 41 | 6 | 280 | 10/9/2015 | 12:30:00 PM | 12:34:00 PM | 12:04:00 PM |
| 42 | 6 | 280 | 10/9/2015 | 1:00:00 PM | 1:01:00 PM | 12:04:00 PM |
| 43 | 6 | 280 | 10/9/2015 | 1:30:00 PM | 1:31:00 PM | 12:04:00 PM |
| 44 | 6 | 280 | 10/9/2015 | 2:00:00 PM | 2:01:00 PM | 12:04:00 PM |
| 45 | 6 | 280 | 10/9/2015 | 2:30:00 PM | 2:31:00 PM | 12:04:00 PM |
| 46 | 6 | 280 | 10/9/2015 | 3:30:00 PM | 3:31:00 PM | 12:04:00 PM |
| 47 | 6 | 280 | 10/9/2015 | 4:30:00 PM | 4:31:00 PM | 12:04:00 PM |
| 48 | 6 | 280 | 10/9/2015 | 5:30:00 PM | 5:31:00 PM | 12:04:00 PM |
| 49 | 6 | 280 | 10/9/2015 | 6:00:00 PM | 6:01:00 PM | 12:04:00 PM |
| 50 | 7 | 70 | 10/22/2015 | 3:25:00 PM | 3:33:00 PM | 11:34:00 AM |
| 51 | 7 | 70 | 10/22/2015 | 3:55:00 PM | 4:00:00 PM | 11:34:00 AM |
| 52 | 7 | 70 | 10/22/2015 | 4:25:00 PM | 4:29:00 PM | 11:34:00 AM |
| 53 | 7 | 70 | 10/22/2015 | 4:55:00 PM | 4:59:00 PM | 11:34:00 AM |
| 54 | 7 | 70 | 10/22/2015 | 5:25:00 PM | 5:29:00 PM | 11:34:00 AM |
| 55 | 8 | 140 | 11/2/2015 | 12:28:00 PM | 12:33:00 PM | 11:10:00 AM |
| 56 | 8 | 140 | 11/2/2015 | 12:58:00 PM | 1:00:00 PM | 11:10:00 AM |
| 57 | 8 | 140 | 11/2/2015 | 1:28:00 PM | 1:30:00 PM | 11:10:00 AM |
| 58 | 8 | 140 | 11/2/2015 | 1:58:00 PM | 2:00:00 PM | 11:10:00 AM |
| 59 | 8 | 140 | 11/2/2015 | 2:28:00 PM | 2:30:00 PM | 11:10:00 AM |
| 60 | 8 | 140 | 11/2/2015 | 3:28:00 PM | 3:30:00 PM | 11:10:00 AM |
| 61 | 8 | 140 | 11/2/2015 | 4:28:00 PM | 4:30:00 PM | 11:10:00 AM |
| 62 | 8 | 140 | 11/2/2015 | 5:08:00 PM | 5:10:00 PM | 11:10:00 AM |
| 63 | 9 | 140 | 3/29/2016 | 2:50:00 PM | 2:54:00 PM | 1:36:00 PM |
| 64 | 9 | 140 | 3/29/2016 | 3:20:00 PM | 3:22:00 PM | 1:36:00 PM |
| 65 | 9 | 140 | 3/29/2016 | 3:50:00 PM | 3:52:00 PM | 1:36:00 PM |
| 66 | 9 | 140 | 3/29/2016 | 4:20:00 PM | 4:22:00 PM | 1:36:00 PM |
| 67 | 9 | 140 | 3/29/2016 | 4:50:00 PM | 4:52:00 PM | 1:36:00 PM |
| 68 | 9 | 140 | 3/29/2016 | 5:50:00 PM | 5:52:00 PM | 1:36:00 PM |
| 69 | 9 | 140 | 3/29/2016 | 6:50:00 PM | 6:52:00 PM | 1:36:00 PM |
| 70 | 9 | 140 | 3/29/2016 | 7:34:00 PM | 7:36:00 PM | 1:36:00 PM |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | Run | Flow | Date | Start Time | End Time | Mesocosm Start Time |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - |
| 71 | 10 | 140 | 6/27/2016 | 11:42:00 AM | 11:50:00 AM | 10:06:00 AM |
| 72 | 10 | 140 | 6/27/2016 | 12:12:00 PM | 12:14:00 PM | 10:06:00 AM |
| 73 | 10 | 140 | 6/27/2016 | 12:42:00 PM | 12:43:00 PM | 10:06:00 AM |
| 74 | 10 | 140 | 6/27/2016 | 1:12:00 PM | 1:13:00 PM | 10:06:00 AM |
| 75 | 10 | 140 | 6/27/2016 | 1:42:00 PM | 1:43:00 PM | 10:06:00 AM |
| 76 | 10 | 140 | 6/27/2016 | 2:42:00 PM | 2:43:00 PM | 10:06:00 AM |
| 77 | 10 | 140 | 6/27/2016 | 3:42:00 PM | 3:44:00 PM | 10:06:00 AM |
| 78 | 10 | 140 | 6/27/2016 | 4:04:00 PM | 4:06:00 PM | 10:06:00 AM |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative | Elapsed From Drip |
|---|---|---|---|---|---|
| - | - | - | (hrs) | (hrs) | (hrs) |
| 1 | 1:35:00 PM | 1:37:00 PM | 0.03 | 0.03 | 0.03 |
| 2 | 1:35:00 PM | 2:09:30 PM | 0.58 | 0.58 | 0.58 |
| 3 | 1:35:00 PM | 2:36:00 PM | 1.02 | 1.02 | 1.02 |
| 4 | 1:35:00 PM | 3:06:30 PM | 1.53 | 1.53 | 1.53 |
| 5 | 1:35:00 PM | 3:37:30 PM | 2.04 | 2.04 | 2.04 |
| 6 | 1:35:00 PM | 4:36:00 PM | 3.02 | 3.02 | 3.02 |
| 7 | 1:35:00 PM | 5:36:00 PM | 4.02 | 4.02 | 4.02 |
| 8 | 1:35:00 PM | 6:36:30 PM | 5.03 | 5.03 | 5.03 |
| 9 | 1:35:00 PM | 7:36:00 PM | 6.02 | 6.02 | 6.02 |
| 10 | 4:16:00 PM | 4:18:30 PM | 2.04 | 8.06 | 0.04 |
| 11 | 5:16:00 PM | 5:16:30 PM | 3.01 | 9.03 | 1.01 |
| 12 | 6:16:00 PM | 6:17:00 PM | 4.02 | 10.03 | 2.02 |
| 13 | 7:16:00 PM | 7:17:30 PM | 5.03 | 11.04 | 3.03 |
| 14 | 8:16:00 PM | 8:17:00 PM | 6.02 | 12.03 | 4.02 |
| 15 | 2:54:00 PM | 2:56:30 PM | 0.94 | 12.98 | 0.04 |
| 16 | 2:54:00 PM | 3:25:00 PM | 1.42 | 13.45 | 0.52 |
| 17 | 2:54:00 PM | 3:56:00 PM | 1.93 | 13.97 | 1.03 |
| 18 | 2:54:00 PM | 4:25:30 PM | 2.43 | 14.46 | 1.53 |
| 19 | 2:54:00 PM | 4:55:00 PM | 2.92 | 14.95 | 2.02 |
| 20 | 2:54:00 PM | 5:55:00 PM | 3.92 | 15.95 | 3.02 |
| 21 | 2:54:00 PM | 6:55:00 PM | 4.92 | 16.95 | 4.02 |
| 22 | 2:54:00 PM | 7:55:00 PM | 5.92 | 17.95 | 5.02 |
| 23 | 1:02:00 PM | 1:05:30 PM | 0.54 | 18.49 | 0.06 |
| 24 | 1:02:00 PM | 1:33:00 PM | 1.00 | 18.95 | 0.52 |
| 25 | 1:02:00 PM | 2:03:00 PM | 1.50 | 19.45 | 1.02 |
| 26 | 1:02:00 PM | 2:33:00 PM | 2.00 | 19.95 | 1.52 |
| 27 | 1:02:00 PM | 3:02:30 PM | 2.49 | 20.44 | 2.01 |
| 28 | 1:02:00 PM | 4:02:00 PM | 3.48 | 21.43 | 3.00 |
| 29 | 1:02:00 PM | 5:03:00 PM | 4.50 | 22.45 | 4.02 |
| 30 | 1:02:00 PM | 6:03:00 PM | 5.50 | 23.45 | 5.02 |
| 31 | 1:02:00 PM | 6:33:00 PM | 6.00 | 23.95 | 5.52 |
| 32 | 1:48:00 PM | 1:51:00 PM | 2.02 | 25.97 | 0.05 |
| 33 | 1:48:00 PM | 2:19:00 PM | 2.48 | 26.43 | 0.52 |
| 34 | 1:48:00 PM | 2:49:00 PM | 2.98 | 26.93 | 1.02 |
| 35 | 1:48:00 PM | 3:19:00 PM | 3.48 | 27.43 | 1.52 |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative | Elapsed From Drip |
|---|---|---|---|---|---|
| - | - | - | (hrs) | (hrs) | (hrs) |
| 36 | 1:48:00 PM | 3:49:00 PM | 3.98 | 27.93 | 2.02 |
| 37 | 1:48:00 PM | 4:19:00 PM | 4.48 | 28.43 | 2.52 |
| 38 | 1:48:00 PM | 4:49:00 PM | 4.98 | 28.93 | 3.02 |
| 39 | 1:48:00 PM | 5:19:00 PM | 5.48 | 29.43 | 3.52 |
| 40 | 1:48:00 PM | 5:49:00 PM | 5.98 | 29.93 | 4.02 |
| 41 | 12:30:00 PM | 12:32:00 PM | 0.47 | 30.40 | 0.03 |
| 42 | 12:30:00 PM | 1:00:30 PM | 0.94 | 30.88 | 0.51 |
| 43 | 12:30:00 PM | 1:30:30 PM | 1.44 | 31.38 | 1.01 |
| 44 | 12:30:00 PM | 2:00:30 PM | 1.94 | 31.88 | 1.51 |
| 45 | 12:30:00 PM | 2:30:30 PM | 2.44 | 32.38 | 2.01 |
| 46 | 12:30:00 PM | 3:30:30 PM | 3.44 | 33.38 | 3.01 |
| 47 | 12:30:00 PM | 4:30:30 PM | 4.44 | 34.38 | 4.01 |
| 48 | 12:30:00 PM | 5:30:30 PM | 5.44 | 35.38 | 5.01 |
| 49 | 12:30:00 PM | 6:00:30 PM | 5.94 | 35.88 | 5.51 |
| 50 | 3:25:00 PM | 3:29:00 PM | 3.92 | 39.79 | 0.07 |
| 51 | 3:25:00 PM | 3:57:30 PM | 4.39 | 40.27 | 0.54 |
| 52 | 3:25:00 PM | 4:27:00 PM | 4.88 | 40.76 | 1.03 |
| 53 | 3:25:00 PM | 4:57:00 PM | 5.38 | 41.26 | 1.53 |
| 54 | 3:25:00 PM | 5:27:00 PM | 5.88 | 41.76 | 2.03 |
| 55 | 12:28:00 PM | 12:30:30 PM | 1.34 | 43.10 | 0.04 |
| 56 | 12:28:00 PM | 12:59:00 PM | 1.82 | 43.58 | 0.52 |
| 57 | 12:28:00 PM | 1:29:00 PM | 2.32 | 44.08 | 1.02 |
| 58 | 12:28:00 PM | 1:59:00 PM | 2.82 | 44.58 | 1.52 |
| 59 | 12:28:00 PM | 2:29:00 PM | 3.32 | 45.08 | 2.02 |
| 60 | 12:28:00 PM | 3:29:00 PM | 4.32 | 46.08 | 3.02 |
| 61 | 12:28:00 PM | 4:29:00 PM | 5.32 | 47.08 | 4.02 |
| 62 | 12:28:00 PM | 5:09:00 PM | 5.98 | 47.74 | 4.68 |
| 63 | 2:50:00 PM | 2:52:00 PM | 1.27 | 49.01 | 0.03 |
| 64 | 2:50:00 PM | 3:21:00 PM | 1.75 | 49.49 | 0.52 |
| 65 | 2:50:00 PM | 3:51:00 PM | 2.25 | 49.99 | 1.02 |
| 66 | 2:50:00 PM | 4:21:00 PM | 2.75 | 50.49 | 1.52 |
| 67 | 2:50:00 PM | 4:51:00 PM | 3.25 | 50.99 | 2.02 |
| 68 | 2:50:00 PM | 5:51:00 PM | 4.25 | 51.99 | 3.02 |
| 69 | 2:50:00 PM | 6:51:00 PM | 5.25 | 52.99 | 4.02 |
| 70 | 2:50:00 PM | 7:35:00 PM | 5.98 | 53.73 | 4.75 |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative | Elapsed From Drip |
|---|---|---|---|---|---|
| - | - | - | (hrs) | (hrs) | (hrs) |
| 71 | 11:42:00 AM | 11:46:00 AM | 1.67 | 55.39 | 0.07 |
| 72 | 11:42:00 AM | 12:13:00 PM | 2.12 | 55.84 | 0.52 |
| 73 | 11:42:00 AM | 12:42:30 PM | 2.61 | 56.33 | 1.01 |
| 74 | 11:42:00 AM | 1:12:30 PM | 3.11 | 56.83 | 1.51 |
| 75 | 11:42:00 AM | 1:42:30 PM | 3.61 | 57.33 | 2.01 |
| 76 | 11:42:00 AM | 2:42:30 PM | 4.61 | 58.33 | 3.01 |
| 77 | 11:42:00 AM | 3:43:00 PM | 5.62 | 59.34 | 4.02 |
| 78 | 11:42:00 AM | 4:05:00 PM | 5.98 | 59.71 | 4.38 |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TN | TN |
|---|---|---|---|---|---|
| - | (hrs) | (cm) | (L) | (mg/L) | (mg) |
| 1 | 0.03 | 0.01 | 0.28 | 8.34 | 1.17 |
| 2 | 0.58 | 0.24 | 4.83 | 8.73 | 38.83 |
| 3 | 1.02 | 0.43 | 8.54 | 9.21 | 33.28 |
| 4 | 1.53 | 0.65 | 12.81 | 11.90 | 45.07 |
| 5 | 2.04 | 0.86 | 17.15 | 13.10 | 54.25 |
| 6 | 3.02 | 1.28 | 25.34 | 15.40 | 116.71 |
| 7 | 4.02 | 1.70 | 33.74 | 15.80 | 131.04 |
| 8 | 5.03 | 2.13 | 42.21 | 15.60 | 132.98 |
| 9 | 6.02 | 2.55 | 50.54 | 15.00 | 127.45 |
| 10 | 6.06 | 3.41 | 67.69 | 10.70 | 220.38 |
| 11 | 7.03 | 3.82 | 75.81 | 10.50 | 86.07 |
| 12 | 8.03 | 4.25 | 84.28 | 11.80 | 94.44 |
| 13 | 9.04 | 4.67 | 92.75 | 11.12 | 97.07 |
| 14 | 10.03 | 5.09 | 101.08 | 12.10 | 96.71 |
| 15 | 10.08 | 5.49 | 108.99 | 8.54 | 81.63 |
| 16 | 10.55 | 5.69 | 112.98 | 9.34 | 35.67 |
| 17 | 11.07 | 5.91 | 117.32 | 9.48 | 40.84 |
| 18 | 11.56 | 6.12 | 121.45 | 9.52 | 39.24 |
| 19 | 12.05 | 6.33 | 125.58 | 9.78 | 39.85 |
| 20 | 13.05 | 6.75 | 133.98 | 9.09 | 79.25 |
| 21 | 14.05 | 7.18 | 142.38 | 7.71 | 70.56 |
| 22 | 15.05 | 7.18 | 142.38 | N/A | N/A |
| 23 | 15.11 | 7.83 | 155.33 | 5.49 | 85.47 |
| 24 | 15.57 | 8.02 | 159.18 | 6.53 | 23.14 |
| 25 | 16.07 | 8.23 | 163.38 | 6.58 | 27.53 |
| 26 | 16.57 | 8.45 | 167.58 | 6.48 | 27.43 |
| 27 | 17.06 | 8.65 | 171.71 | 6.55 | 26.90 |
| 28 | 18.05 | 9.07 | 180.04 | 5.65 | 50.79 |
| 29 | 19.07 | 9.50 | 188.58 | 5.35 | 46.95 |
| 30 | 20.07 | 9.93 | 196.98 | 4.78 | 42.51 |
| 31 | 20.57 | 10.14 | 201.18 | 4.70 | 19.90 |
| 32 | 20.62 | 10.99 | 218.12 | 5.80 | 88.88 |
| 33 | 21.08 | 11.19 | 222.04 | 5.64 | 22.42 |
| 34 | 21.58 | 11.40 | 226.24 | 5.53 | 23.47 |
| 35 | 22.08 | 11.61 | 230.44 | 5.40 | 22.96 |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TN | TN |
|---|---|---|---|---|---|
| - | (hrs) | (cm) | (L) | (mg/L) | (mg) |
| 36 | 22.58 | 11.83 | 234.64 | 4.82 | 21.46 |
| 37 | 23.08 | 12.04 | 238.84 | 4.58 | 19.74 |
| 38 | 23.58 | 12.25 | 243.04 | 4.36 | 18.79 |
| 39 | 24.08 | 12.46 | 247.24 | 4.21 | 18.00 |
| 40 | 24.58 | 12.67 | 251.44 | 4.19 | 17.62 |
| 41 | 24.62 | 13.07 | 259.28 | 3.47 | 30.03 |
| 42 | 25.09 | 13.47 | 267.26 | 3.43 | 27.55 |
| 43 | 25.59 | 13.89 | 275.66 | 3.39 | 28.64 |
| 44 | 26.09 | 14.32 | 284.06 | 3.21 | 27.72 |
| 45 | 26.59 | 14.74 | 292.46 | 3.17 | 26.80 |
| 46 | 27.59 | 15.59 | 309.26 | 3.25 | 53.94 |
| 47 | 28.59 | 16.43 | 326.06 | 3.08 | 53.23 |
| 48 | 29.59 | 17.28 | 342.86 | 3.13 | 52.23 |
| 49 | 30.09 | 17.70 | 351.26 | 3.08 | 26.08 |
| 50 | 30.16 | 18.53 | 367.71 | 4.09 | 58.94 |
| 51 | 30.63 | 18.63 | 369.71 | 3.57 | 7.64 |
| 52 | 31.13 | 18.74 | 371.77 | 3.63 | 7.43 |
| 53 | 31.63 | 18.84 | 373.87 | 3.58 | 7.57 |
| 54 | 32.13 | 18.95 | 375.97 | 3.67 | 7.62 |
| 55 | 32.17 | 19.52 | 387.24 | 2.41 | 34.29 |
| 56 | 32.64 | 19.72 | 391.23 | 2.29 | 9.39 |
| 57 | 33.14 | 19.93 | 395.43 | 2.31 | 9.67 |
| 58 | 33.64 | 20.14 | 399.63 | 2.37 | 9.84 |
| 59 | 34.14 | 20.35 | 403.83 | 2.27 | 9.74 |
| 60 | 35.14 | 20.78 | 412.23 | 2.32 | 19.25 |
| 61 | 36.14 | 21.20 | 420.63 | 2.46 | 20.06 |
| 62 | 36.81 | 21.48 | 426.23 | 2.53 | 13.96 |
| 63 | 36.84 | 67.74 | 1344.07 | 0.67 | 1465.79 |
| 64 | 37.33 | 67.94 | 1348.13 | 0.55 | 2.46 |
| 65 | 37.83 | 68.15 | 1352.33 | 0.58 | 2.36 |
| 66 | 38.33 | 68.36 | 1356.53 | 0.73 | 2.74 |
| 67 | 38.83 | 68.58 | 1360.73 | 1.08 | 3.79 |
| 68 | 39.83 | 69.00 | 1369.13 | 1.65 | 11.44 |
| 69 | 40.83 | 69.42 | 1377.53 | 1.79 | 14.44 |
| 70 | 41.56 | 69.73 | 1383.69 | 1.90 | 11.36 |

Mesocosm 1 - 30% Trial

Nitrogen

| Sample | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TN | TN |
|---|---|---|---|---|---|
| - | (hrs) | (cm) | (L) | (mg/L) | (mg) |
| 71 | 41.63 | 98.38 | 1952.09 | 0.93 | 802.50 |
| 72 | 42.08 | 98.57 | 1955.87 | 0.85 | 3.36 |
| 73 | 42.57 | 98.78 | 1960.00 | 0.79 | 3.39 |
| 74 | 43.07 | 98.99 | 1964.20 | 0.98 | 3.72 |
| 75 | 43.57 | 99.20 | 1968.40 | 1.17 | 4.50 |
| 76 | 44.57 | 99.62 | 1976.80 | 1.55 | 11.39 |
| 77 | 45.58 | 100.05 | 1985.27 | 1.63 | 13.45 |
| 78 | 45.94 | 100.21 | 1988.35 | 1.56 | 4.91 |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | Cumulative TN | Years of Watershed N | Influent TN | Influent TN | Cumulative Influent TN |
|---|---|---|---|---|---|
| - | (mg) | (yrs) | (mg/L) | (mg) | (mg) |
| 1 | 1.17 | 0.00 | 3.90 | 0.55 | 0.55 |
| 2 | 40.00 | 0.01 | 3.90 | 17.72 | 18.27 |
| 3 | 73.28 | 0.03 | 3.90 | 14.45 | 32.72 |
| 4 | 118.35 | 0.04 | 3.90 | 16.63 | 49.35 |
| 5 | 172.60 | 0.06 | 3.90 | 16.90 | 66.25 |
| 6 | 289.31 | 0.10 | 3.90 | 31.90 | 98.15 |
| 7 | 420.35 | 0.15 | 3.90 | 32.72 | 130.87 |
| 8 | 553.33 | 0.20 | 3.90 | 32.99 | 163.86 |
| 9 | 680.78 | 0.25 | 3.90 | 32.45 | 196.31 |
| 10 | 901.15 | 0.33 | 3.99 | 67.61 | 263.92 |
| 11 | 987.23 | 0.36 | 3.99 | 32.40 | 296.32 |
| 12 | 1081.67 | 0.39 | 3.99 | 33.80 | 330.12 |
| 13 | 1178.73 | 0.43 | 3.99 | 33.80 | 363.91 |
| 14 | 1275.44 | 0.46 | 3.99 | 33.24 | 397.15 |
| 15 | 1357.07 | 0.49 | 4.01 | 31.65 | 428.80 |
| 16 | 1392.75 | 0.50 | 4.01 | 16.01 | 444.81 |
| 17 | 1433.58 | 0.52 | 4.01 | 17.41 | 462.22 |
| 18 | 1472.82 | 0.53 | 4.01 | 16.57 | 478.80 |
| 19 | 1512.67 | 0.55 | 4.01 | 16.57 | 495.37 |
| 20 | 1591.93 | 0.57 | 4.01 | 33.71 | 529.08 |
| 21 | 1662.49 | 0.60 | 4.01 | 33.71 | 562.78 |
| 22 | N/A | N/A | N/A | N/A | N/A |
| 23 | 1747.96 | 0.63 | 3.38 | 47.86 | 610.64 |
| 24 | 1771.10 | 0.64 | 3.38 | 13.01 | 623.65 |
| 25 | 1798.63 | 0.65 | 3.38 | 14.19 | 637.84 |
| 26 | 1826.05 | 0.66 | 3.38 | 14.19 | 652.03 |
| 27 | 1852.95 | 0.67 | 3.38 | 13.95 | 665.98 |
| 28 | 1903.74 | 0.69 | 3.38 | 28.14 | 694.13 |
| 29 | 1950.69 | 0.70 | 3.38 | 28.85 | 722.98 |
| 30 | 1993.20 | 0.72 | 3.38 | 28.38 | 751.36 |
| 31 | 2013.10 | 0.73 | 3.38 | 14.19 | 765.55 |
| 32 | 2101.98 | 0.76 | 3.02 | 54.21 | 819.76 |
| 33 | 2124.40 | 0.77 | 3.02 | 11.84 | 831.61 |
| 34 | 2147.87 | 0.77 | 3.02 | 12.69 | 844.30 |
| 35 | 2170.83 | 0.78 | 3.02 | 12.69 | 856.99 |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | Cumulative TN | Years of Watershed N | Influent TN | Influent TN | Cumulative Influent TN |
|---|---|---|---|---|---|
| - | (mg) | (yrs) | (mg/L) | (mg) | (mg) |
| 36 | 2192.29 | 0.79 | 3.02 | 12.69 | 869.68 |
| 37 | 2212.03 | 0.80 | 3.02 | 12.69 | 882.37 |
| 38 | 2230.82 | 0.80 | 3.02 | 12.69 | 895.06 |
| 39 | 2248.82 | 0.81 | 3.02 | 12.69 | 907.75 |
| 40 | 2266.44 | 0.82 | 3.02 | 12.69 | 920.44 |
| 41 | 2296.47 | 0.83 | 2.53 | 21.75 | 942.19 |
| 42 | 2324.02 | 0.84 | 2.53 | 20.17 | 962.36 |
| 43 | 2352.66 | 0.85 | 2.53 | 21.23 | 983.59 |
| 44 | 2380.38 | 0.86 | 2.53 | 21.23 | 1004.82 |
| 45 | 2407.18 | 0.87 | 2.53 | 21.23 | 1026.05 |
| 46 | 2461.12 | 0.89 | 2.53 | 42.46 | 1068.51 |
| 47 | 2514.35 | 0.91 | 2.53 | 42.46 | 1110.96 |
| 48 | 2566.58 | 0.93 | 2.53 | 42.46 | 1153.42 |
| 49 | 2592.66 | 0.94 | 2.53 | 21.23 | 1174.65 |
| 50 | 2651.60 | 0.96 | 4.14 | 54.81 | 1229.46 |
| 51 | 2659.24 | 0.96 | 4.14 | 8.25 | 1237.71 |
| 52 | 2666.67 | 0.96 | 4.14 | 8.54 | 1246.26 |
| 53 | 2674.23 | 0.96 | 4.14 | 8.69 | 1254.94 |
| 54 | 2681.85 | 0.97 | 4.14 | 8.69 | 1263.63 |
| 55 | 2716.14 | 0.98 | 3.22 | 41.47 | 1305.10 |
| 56 | 2725.53 | 0.98 | 3.22 | 12.86 | 1317.96 |
| 57 | 2735.20 | 0.99 | 3.22 | 13.54 | 1331.50 |
| 58 | 2745.04 | 0.99 | 3.22 | 13.54 | 1345.04 |
| 59 | 2754.78 | 0.99 | 3.22 | 13.54 | 1358.58 |
| 60 | 2774.04 | 1.00 | 3.22 | 27.08 | 1385.65 |
| 61 | 2794.10 | 1.01 | 3.22 | 27.08 | 1412.73 |
| 62 | 2808.06 | 1.01 | 3.22 | 18.05 | 1430.78 |
| 63 | 4273.85 | 1.54 | 4.29 | 3448.02 | 4878.80 |
| 64 | 4276.31 | 1.54 | 4.29 | 17.42 | 4896.21 |
| 65 | 4278.67 | 1.54 | 4.29 | 18.02 | 4914.23 |
| 66 | 4281.41 | 1.54 | 4.29 | 18.02 | 4932.25 |
| 67 | 4285.20 | 1.55 | 4.29 | 18.02 | 4950.27 |
| 68 | 4296.64 | 1.55 | 4.29 | 36.04 | 4986.30 |
| 69 | 4311.09 | 1.56 | 4.29 | 36.04 | 5022.34 |
| 70 | 4322.44 | 1.56 | 4.29 | 26.43 | 5048.77 |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | Cumulative TN | Years of Watershed N | Influent TN | Influent TN | Cumulative Influent TN |
|---|---|---|---|---|---|
| - | (mg) | (yrs) | (mg/L) | (mg) | (mg) |
| 71 | 5124.94 | 1.85 | 4.20 | 2412.86 | 7461.62 |
| 72 | 5128.30 | 1.85 | 4.20 | 15.88 | 7477.50 |
| 73 | 5131.69 | 1.85 | 4.20 | 17.35 | 7494.85 |
| 74 | 5135.42 | 1.85 | 4.20 | 17.64 | 7512.49 |
| 75 | 5139.92 | 1.85 | 4.20 | 17.64 | 7530.13 |
| 76 | 5151.31 | 1.86 | 4.20 | 35.28 | 7565.41 |
| 77 | 5164.76 | 1.86 | 4.20 | 35.57 | 7600.98 |
| 78 | 5169.66 | 1.86 | 4.20 | 12.94 | 7613.92 |

## Mesocosm 1 - 30% Trial
## Nitrogen

| Sample | TN Removal | Net Export | pH |
|---|---|---|---|
| - | (mg) | (mg) | - |
| 1 | 0.00 | 1.17 | 7.02 |
| 2 | 0.00 | 40.00 | 6.73 |
| 3 | 0.00 | 73.28 | 6.85 |
| 4 | 0.00 | 118.35 | 6.90 |
| 5 | 0.00 | 172.60 | 7.02 |
| 6 | 0.00 | 289.31 | 6.98 |
| 7 | 0.00 | 420.35 | 7.18 |
| 8 | 0.00 | 553.33 | 7.13 |
| 9 | 0.00 | 680.78 | 6.84 |
| 10 | 0.00 | 901.15 | 6.96 |
| 11 | 0.00 | 987.23 | 6.94 |
| 12 | 0.00 | 1081.67 | 7.07 |
| 13 | 0.00 | 1178.73 | 7.05 |
| 14 | 0.00 | 1275.44 | 7.11 |
| 15 | 0.00 | 1357.07 | N/A |
| 16 | 0.00 | 1392.75 | N/A |
| 17 | 0.00 | 1433.58 | N/A |
| 18 | 0.00 | 1472.82 | N/A |
| 19 | 0.00 | 1512.67 | N/A |
| 20 | 0.00 | 1591.93 | N/A |
| 21 | 0.00 | 1662.49 | N/A |
| 22 | N/A | N/A | N/A |
| 23 | 0.00 | 1747.96 | 7.20 |
| 24 | 0.00 | 1771.10 | 7.20 |
| 25 | 0.00 | 1798.63 | 7.17 |
| 26 | 0.00 | 1826.05 | 7.18 |
| 27 | 0.00 | 1852.95 | 7.20 |
| 28 | 0.00 | 1903.74 | 7.14 |
| 29 | 0.00 | 1950.69 | 7.10 |
| 30 | 0.00 | 1993.20 | 7.08 |
| 31 | 0.00 | 2013.10 | 7.14 |
| 32 | 0.00 | 2101.98 | 7.28 |
| 33 | 0.00 | 2124.40 | 7.30 |
| 34 | 0.00 | 2147.87 | 7.16 |
| 35 | 0.00 | 2170.83 | 7.16 |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | TN Removal | Net Export | pH |
|---|---|---|---|
| - | (mg) | (mg) | - |
| 36 | 0.00 | 2192.29 | 7.17 |
| 37 | 0.00 | 2212.03 | 7.16 |
| 38 | 0.00 | 2230.82 | 7.13 |
| 39 | 0.00 | 2248.82 | 6.90 |
| 40 | 0.00 | 2266.44 | 6.78 |
| 41 | 0.00 | 2296.47 | 6.60 |
| 42 | 0.00 | 2324.02 | 6.60 |
| 43 | 0.00 | 2352.66 | 6.81 |
| 44 | 0.00 | 2380.38 | 6.88 |
| 45 | 0.00 | 2407.18 | 6.93 |
| 46 | 0.00 | 2461.12 | 6.98 |
| 47 | 0.00 | 2514.35 | 7.01 |
| 48 | 0.00 | 2566.58 | 7.03 |
| 49 | 0.00 | 2592.66 | 6.87 |
| 50 | 0.00 | 2651.60 | 6.60 |
| 51 | 0.61 | 2650.99 | 6.74 |
| 52 | 1.73 | 2649.87 | 6.82 |
| 53 | 2.85 | 2648.75 | 6.85 |
| 54 | 3.92 | 2647.68 | 6.89 |
| 55 | 11.10 | 2640.50 | 6.82 |
| 56 | 14.58 | 2637.03 | 6.85 |
| 57 | 18.44 | 2633.16 | 6.85 |
| 58 | 22.14 | 2629.46 | 6.84 |
| 59 | 25.93 | 2625.67 | 6.85 |
| 60 | 33.76 | 2617.85 | 6.88 |
| 61 | 40.77 | 2610.83 | 6.89 |
| 62 | 44.86 | 2606.74 | 6.90 |
| 63 | 44.86 | 2606.74 | 6.34 |
| 64 | 59.82 | 2591.79 | 6.37 |
| 65 | 75.48 | 2576.13 | 6.36 |
| 66 | 90.76 | 2560.85 | 6.36 |
| 67 | 104.98 | 2546.62 | 6.35 |
| 68 | 129.58 | 2522.03 | 6.37 |
| 69 | 151.17 | 2500.44 | 6.39 |
| 70 | 166.24 | 2485.37 | 6.68 |

Mesocosm 1 - 30% Trial
Nitrogen

| Sample | TN Removal | Net Export | pH |
|---|---|---|---|
| - | (mg) | (mg) | - |
| 71 | 166.24 | 2485.37 | 6.22 |
| 72 | 178.75 | 2472.85 | 6.16 |
| 73 | 192.71 | 2458.90 | 6.18 |
| 74 | 206.62 | 2444.98 | 6.18 |
| 75 | 219.76 | 2431.85 | 6.25 |
| 76 | 243.65 | 2407.95 | 6.32 |
| 77 | 265.78 | 2385.83 | 6.31 |
| 78 | 273.80 | 2377.80 | 6.33 |

Mesocosm 1 - 30% Trial
Nitrogen Speciation

| Sample | Ammonium | Ammonium | Cumulative Ammonium | Nitrate | Nitrate |
|---|---|---|---|---|---|
| - | (mg/L) | (mg) | (mg) | (mg/L) | (mg) |
| 1 | 1.32 | 0.18 | 0.18 | 1.49 | 0.21 |
| 2 | 1.92 | 7.37 | 7.56 | 1.56 | 6.94 |
| 5 | 2.09 | 24.70 | 32.26 | 1.14 | 16.62 |
| 6 | 2.15 | 17.36 | 49.62 | 1.01 | 8.79 |
| 8 | 2.22 | 36.86 | 86.48 | 0.76 | 14.88 |
| 9 | 2.22 | 18.49 | 104.97 | 0.79 | 6.43 |
| 14 | 2.38 | 39.45 | 144.42 | 0.03 | 6.96 |
| 19 | 2.28 | 96.23 | 240.65 | 0.03 | 1.03 |
| 20 | 3.10 | 10.73 | 251.38 | 0.03 | 0.10 |
| 22 | 3.26 | 26.93 | 278.32 | 0.03 | 0.21 |
| 23 | 3.64 | 14.25 | 292.56 | 0.03 | 0.10 |
| 25 | 3.16 | 57.12 | 349.68 | 0.03 | 0.42 |
| 27 | 4.08 | 46.90 | 396.59 | 0.03 | 0.32 |
| 28 | 4.60 | 16.72 | 413.31 | 0.03 | 0.10 |
| 31 | 5.01 | 60.22 | 473.53 | 0.05 | 0.47 |
| 32 | 4.23 | 38.47 | 512.00 | 0.13 | 0.74 |
| 34 | 3.86 | 68.49 | 580.49 | 0.21 | 2.89 |
| 35 | 3.64 | 15.74 | 596.23 | 0.18 | 0.83 |
| 36 | 3.52 | 60.62 | 656.85 | 0.03 | 1.77 |
| 37 | 3.56 | 13.88 | 670.73 | 0.03 | 0.10 |
| 40 | 2.96 | 41.08 | 711.81 | 0.10 | 0.77 |
| 41 | 2.54 | 11.56 | 723.37 | 0.19 | 0.60 |
| 43 | 2.42 | 20.86 | 744.23 | 0.27 | 1.93 |
| 44 | 2.39 | 10.11 | 754.35 | 0.36 | 1.32 |
| 45 | 3.95 | 24.87 | 779.22 | 0.03 | 1.50 |
| 46 | 4.02 | 31.82 | 811.03 | 0.03 | 0.20 |
| 49 | 2.82 | 86.23 | 897.26 | 0.72 | 9.33 |
| 50 | 2.38 | 43.72 | 940.98 | 0.97 | 14.17 |
| 52 | 2.86 | 88.12 | 1029.11 | 0.97 | 32.65 |
| 53 | 2.91 | 24.25 | 1053.36 | 0.98 | 8.18 |
| 54 | 3.47 | 52.52 | 1105.88 | 0.03 | 8.23 |
| 55 | 2.44 | 5.90 | 1111.79 | 0.05 | 0.08 |
| 56 | 4.03 | 6.69 | 1118.47 | 0.03 | 0.08 |
| 57 | 2.16 | 6.50 | 1124.97 | 0.03 | 0.05 |
| 58 | 2.18 | 4.55 | 1129.52 | 0.03 | 0.05 |
| 59 | 2.59 | 26.86 | 1156.38 | 0.03 | 0.28 |
| 60 | 2.73 | 10.62 | 1167.00 | 0.03 | 0.10 |

Mesocosm 1 - 30% Trial
Nitrogen Speciation

| Sample | Ammonium | Ammonium | Cumulative Ammonium | Nitrate | Nitrate |
|---|---|---|---|---|---|
| - | (mg/L) | (mg) | (mg) | (mg/L) | (mg) |
| 62 | 2.93 | 23.76 | 1190.76 | 0.03 | 0.21 |
| 63 | 2.47 | 11.33 | 1202.08 | 0.10 | 0.27 |
| 65 | 2.37 | 40.61 | 1242.69 | 0.49 | 4.95 |
| 66 | 2.32 | 13.12 | 1255.82 | 0.54 | 2.87 |
| 67 | 0.01 | 1069.43 | 2325.25 | 0.01 | 253.09 |
| 70 | 0.04 | 0.34 | 2325.58 | 0.16 | 1.07 |
| 72 | 0.29 | 2.08 | 2327.66 | 0.63 | 5.00 |
| 74 | 0.17 | 3.35 | 2331.01 | 0.81 | 10.49 |
| 75 | 0.04 | 61.42 | 2392.43 | 0.04 | 241.54 |
| 78 | 0.05 | 0.60 | 2393.03 | 0.05 | 0.55 |
| 80 | 0.13 | 1.14 | 2394.17 | 0.28 | 2.09 |
| 82 | 0.25 | 2.15 | 2396.33 | 0.31 | 3.44 |

Mesocosm 1 - 30% Trial
Nitrogen Speciation

| Sample | Cumulative Nitrate | Nitrite |
|---|---|---|
| - | (mg) | (mg/L) |
| 1 | 0.21 | 0.03 |
| 2 | 7.15 | 0.04 |
| 5 | 23.77 | 0.05 |
| 6 | 32.56 | 0.04 |
| 8 | 47.44 | 0.06 |
| 9 | 53.87 | 0.07 |
| 14 | 60.83 | 0.03 |
| 19 | 61.87 | 0.01 |
| 20 | 61.97 | 0.01 |
| 22 | 62.18 | 0.01 |
| 23 | 62.28 | 0.01 |
| 25 | 62.70 | 0.02 |
| 27 | 63.03 | N/A |
| 28 | 63.12 | N/A |
| 31 | 63.59 | N/A |
| 32 | 64.33 | N/A |
| 34 | 67.22 | N/A |
| 35 | 68.06 | N/A |
| 36 | 69.83 | N/A |
| 37 | 69.92 | N/A |
| 40 | 70.70 | N/A |
| 41 | 71.30 | N/A |
| 43 | 73.23 | N/A |
| 44 | 74.55 | N/A |
| 45 | 76.05 | N/A |
| 46 | 76.25 | N/A |
| 49 | 85.58 | N/A |
| 50 | 99.75 | N/A |
| 52 | 132.40 | N/A |
| 53 | 140.59 | N/A |
| 54 | 148.82 | N/A |
| 55 | 148.89 | N/A |
| 56 | 148.97 | N/A |
| 57 | 149.02 | N/A |
| 58 | 149.08 | N/A |
| 59 | 149.36 | N/A |
| 60 | 149.46 | N/A |

Mesocosm 1 - 30% Trial
Nitrogen Speciation

| Sample | Cumulative Nitrate | Nitrite |
|---|---|---|
| - | (mg) | (mg/L) |
| 62 | 149.67 | N/A |
| 63 | 149.94 | N/A |
| 65 | 154.89 | N/A |
| 66 | 157.76 | N/A |
| 67 | 410.85 | N/A |
| 70 | 411.92 | N/A |
| 72 | 416.92 | 0.03 |
| 74 | 427.41 | 0.06 |
| 75 | 668.94 | 0.01 |
| 78 | 669.49 | 0.01 |
| 80 | 671.58 | 0.02 |
| 82 | 675.02 | 0.05 |

Mesocosm 1 - 30% Trial
Nitrogen Speciation

| Sample | Org N | Org N | Cumulative DON |
|---|---|---|---|
| - | (mg/L) | (mg) | (mg) |
| 1 | 5.50 | 0.77 | 0.77 |
| 2 | 5.22 | 24.38 | 25.15 |
| 5 | 9.82 | 92.63 | 117.78 |
| 6 | 12.21 | 90.21 | 207.99 |
| 8 | 12.56 | 208.89 | 416.88 |
| 9 | 11.93 | 101.98 | 518.85 |
| 14 | 8.29 | 173.32 | 692.17 |
| 19 | 6.26 | 300.37 | 992.55 |
| 20 | 6.23 | 24.91 | 1017.46 |
| 22 | 6.25 | 52.84 | 1070.30 |
| 23 | 6.14 | 25.58 | 1095.88 |
| 25 | 4.53 | 89.59 | 1185.48 |
| 27 | 1.41 | 38.41 | 1223.89 |
| 28 | 1.93 | 6.42 | 1230.31 |
| 31 | 1.48 | 21.38 | 1251.69 |
| 32 | 1.30 | 11.58 | 1263.27 |
| 34 | 0.70 | 16.93 | 1280.20 |
| 35 | 0.88 | 3.32 | 1283.53 |
| 36 | 2.27 | 26.70 | 1310.23 |
| 37 | 2.09 | 8.54 | 1318.77 |
| 40 | 1.76 | 24.21 | 1342.98 |
| 41 | 1.85 | 7.58 | 1350.56 |
| 43 | 1.51 | 14.12 | 1364.67 |
| 44 | 1.44 | 6.19 | 1370.86 |
| 45 | 0.00 | 5.63 | 1376.49 |
| 46 | 0.00 | 0.00 | 1376.49 |
| 49 | 0.00 | 0.00 | 1376.49 |
| 50 | 0.00 | 0.00 | 1376.49 |
| 52 | 0.00 | 0.00 | 1376.49 |
| 53 | 0.00 | 0.00 | 1376.49 |
| 54 | 0.62 | 5.07 | 1381.57 |
| 55 | 1.07 | 1.68 | 1383.25 |
| 56 | 0.00 | 1.11 | 1384.36 |
| 57 | 1.42 | 1.50 | 1385.85 |
| 58 | 1.50 | 3.07 | 1388.92 |
| 59 | 0.00 | 8.44 | 1397.36 |
| 60 | 0.00 | 0.00 | 1397.36 |

Mesocosm 1 - 30% Trial
Nitrogen Speciation

| Sample | Org N | Org N | Cumulative DON |
|---|---|---|---|
| - | (mg/L) | (mg) | (mg) |
| 62 | 0.00 | 0.00 | 1397.36 |
| 63 | 0.00 | 0.00 | 1397.36 |
| 65 | 0.00 | 0.00 | 1397.36 |
| 66 | 0.00 | 0.00 | 1397.36 |
| 67 | 0.66 | 301.05 | 1698.41 |
| 70 | 0.53 | 7.37 | 1705.78 |
| 72 | 0.70 | 7.71 | 1713.49 |
| 74 | 0.86 | 11.31 | 1724.81 |
| 75 | 0.84 | 482.49 | 2207.29 |
| 78 | 0.88 | 10.41 | 2217.70 |
| 80 | 1.11 | 12.54 | 2230.24 |
| 82 | 0.95 | 11.94 | 2242.18 |

Mesocosm 1 - 30% Trial
Phosphorus

| Sample | Run | Flow | Date | Start Time | End Time | Mesocosm Start time |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - |
| 1 | 1 | 140 | 8/11/2015 | 1:35:00 PM | 1:39:00 PM | 1:35:00 PM |
| 2 | 1 | 140 | 8/11/2015 | 2:07:00 PM | 2:12:00 PM | 1:35:00 PM |
| 3 | 1 | 140 | 8/11/2015 | 2:35:00 PM | 2:37:00 PM | 1:35:00 PM |
| 4 | 1 | 140 | 8/11/2015 | 3:05:00 PM | 3:08:00 PM | 1:35:00 PM |
| 5 | 1 | 140 | 8/11/2015 | 3:35:00 PM | 3:40:00 PM | 1:35:00 PM |
| 6 | 1 | 140 | 8/11/2015 | 4:35:00 PM | 4:37:00 PM | 1:35:00 PM |
| 7 | 1 | 140 | 8/11/2015 | 5:35:00 PM | 5:37:00 PM | 1:35:00 PM |
| 8 | 1 | 140 | 8/11/2015 | 6:35:00 PM | 6:38:00 PM | 1:35:00 PM |
| 9 | 1 | 140 | 8/11/2015 | 7:35:00 PM | 7:37:00 PM | 1:35:00 PM |
| 10 | 2 | 140 | 8/26/2015 | 4:16:00 PM | 4:21:00 PM | 2:18:30 PM |
| 11 | 2 | 140 | 8/26/2015 | 5:16:00 PM | 5:17:00 PM | 2:18:30 PM |
| 12 | 2 | 140 | 8/26/2015 | 6:16:00 PM | 6:18:00 PM | 2:18:30 PM |
| 13 | 2 | 140 | 8/26/2015 | 7:16:00 PM | 7:19:00 PM | 2:18:30 PM |
| 14 | 2 | 140 | 8/26/2015 | 8:16:00 PM | 8:18:00 PM | 2:18:30 PM |
| 15 | 3 | 140 | 9/8/2015 | 2:54:00 PM | 2:59:00 PM | 2:00:00 PM |
| 16 | 3 | 140 | 9/8/2015 | 3:24:00 PM | 3:26:00 PM | 2:00:00 PM |
| 17 | 3 | 140 | 9/8/2015 | 3:55:00 PM | 3:57:00 PM | 2:00:00 PM |
| 18 | 3 | 140 | 9/8/2015 | 4:24:00 PM | 4:27:00 PM | 2:00:00 PM |
| 19 | 3 | 140 | 9/8/2015 | 4:54:00 PM | 4:56:00 PM | 2:00:00 PM |
| 20 | 3 | 140 | 9/8/2015 | 5:54:00 PM | 5:56:00 PM | 2:00:00 PM |
| 21 | 3 | 140 | 9/8/2015 | 6:54:00 PM | 6:56:00 PM | 2:00:00 PM |
| 22 | 3 | 140 | 9/8/2015 | 7:54:00 PM | 7:56:00 PM | 2:00:00 PM |
| 23 | 4 | 140 | 9/16/2015 | 1:02:00 PM | 1:09:00 PM | 12:33:00 PM |
| 24 | 4 | 140 | 9/16/2015 | 1:32:00 PM | 1:34:00 PM | 12:33:00 PM |
| 25 | 4 | 140 | 9/16/2015 | 2:02:00 PM | 2:04:00 PM | 12:33:00 PM |
| 26 | 4 | 140 | 9/16/2015 | 2:32:00 PM | 2:34:00 PM | 12:33:00 PM |
| 27 | 4 | 140 | 9/16/2015 | 3:02:00 PM | 3:03:00 PM | 12:33:00 PM |
| 28 | 4 | 140 | 9/16/2015 | 4:01:00 PM | 4:03:00 PM | 12:33:00 PM |
| 29 | 4 | 140 | 9/16/2015 | 5:02:00 PM | 5:04:00 PM | 12:33:00 PM |
| 30 | 4 | 140 | 9/16/2015 | 6:02:00 PM | 6:04:00 PM | 12:33:00 PM |
| 31 | 4 | 140 | 9/16/2015 | 6:32:00 PM | 6:34:00 PM | 12:33:00 PM |
| 32 | 5 | 140 | 9/30/2015 | 1:48:00 PM | 1:54:00 PM | 11:50:00 AM |
| 33 | 5 | 140 | 9/30/2015 | 2:18:00 PM | 2:20:00 PM | 11:50:00 AM |
| 34 | 5 | 140 | 9/30/2015 | 2:48:00 PM | 2:50:00 PM | 11:50:00 AM |
| 35 | 5 | 140 | 9/30/2015 | 3:18:00 PM | 3:20:00 PM | 11:50:00 AM |
| 36 | 5 | 140 | 9/30/2015 | 3:48:00 PM | 3:50:00 PM | 11:50:00 AM |
| 37 | 5 | 140 | 9/30/2015 | 4:18:00 PM | 4:20:00 PM | 11:50:00 AM |
| 38 | 5 | 140 | 9/30/2015 | 4:48:00 PM | 4:50:00 PM | 11:50:00 AM |
| 39 | 5 | 140 | 9/30/2015 | 5:18:00 PM | 5:20:00 PM | 11:50:00 AM |
| 40 | 5 | 140 | 9/30/2015 | 5:48:00 PM | 5:50:00 PM | 11:50:00 AM |
| 41 | 6 | 280 | 10/9/2015 | 12:30:00 PM | 12:34:00 PM | 12:04:00 PM |
| 42 | 6 | 280 | 10/9/2015 | 1:00:00 PM | 1:01:00 PM | 12:04:00 PM |
| 43 | 6 | 280 | 10/9/2015 | 1:30:00 PM | 1:31:00 PM | 12:04:00 PM |
| 44 | 6 | 280 | 10/9/2015 | 2:00:00 PM | 2:01:00 PM | 12:04:00 PM |

Mesocosm 1 - 30% Trial
Phosphorus

| Sample | Run | Flow | Date | Start Time | End Time | Mesocosm Start time |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - |
| 45 | 6 | 280 | 10/9/2015 | 2:30:00 PM | 2:31:00 PM | 12:04:00 PM |
| 46 | 6 | 280 | 10/9/2015 | 3:30:00 PM | 3:31:00 PM | 12:04:00 PM |
| 47 | 6 | 280 | 10/9/2015 | 4:30:00 PM | 4:31:00 PM | 12:04:00 PM |
| 48 | 6 | 280 | 10/9/2015 | 5:30:00 PM | 5:31:00 PM | 12:04:00 PM |
| 49 | 6 | 280 | 10/9/2015 | 6:00:00 PM | 6:01:00 PM | 12:04:00 PM |
| 50 | 7 | 70 | 10/22/2015 | 3:25:00 PM | 3:33:00 PM | 11:34:00 AM |
| 51 | 7 | 70 | 10/22/2015 | 3:55:00 PM | 4:00:00 PM | 11:34:00 AM |
| 52 | 7 | 70 | 10/22/2015 | 4:25:00 PM | 4:29:00 PM | 11:34:00 AM |
| 53 | 7 | 70 | 10/22/2015 | 4:55:00 PM | 4:59:00 PM | 11:34:00 AM |
| 54 | 7 | 70 | 10/22/2015 | 5:25:00 PM | 5:29:00 PM | 11:34:00 AM |
| 55 | 8 | 140 | 11/2/2015 | 12:28:00 PM | 12:33:00 PM | 11:10:00 AM |
| 56 | 8 | 140 | 11/2/2015 | 12:58:00 PM | 1:00:00 PM | 11:10:00 AM |
| 57 | 8 | 140 | 11/2/2015 | 1:28:00 PM | 1:30:00 PM | 11:10:00 AM |
| 58 | 8 | 140 | 11/2/2015 | 1:58:00 PM | 2:00:00 PM | 11:10:00 AM |
| 59 | 8 | 140 | 11/2/2015 | 2:28:00 PM | 2:30:00 PM | 11:10:00 AM |
| 60 | 8 | 140 | 11/2/2015 | 3:28:00 PM | 3:30:00 PM | 11:10:00 AM |
| 61 | 8 | 140 | 11/2/2015 | 4:28:00 PM | 4:30:00 PM | 11:10:00 AM |
| 62 | 8 | 140 | 11/2/2015 | 5:08:00 PM | 5:10:00 PM | 11:10:00 AM |
| 63 | 9 | 140 | 3/29/2016 | 2:50:00 PM | 2:54:00 PM | 1:36:00 PM |
| 64 | 9 | 140 | 3/29/2016 | 3:20:00 PM | 3:22:00 PM | 1:36:00 PM |
| 65 | 9 | 140 | 3/29/2016 | 3:50:00 PM | 3:52:00 PM | 1:36:00 PM |
| 66 | 9 | 140 | 3/29/2016 | 4:20:00 PM | 4:22:00 PM | 1:36:00 PM |
| 67 | 9 | 140 | 3/29/2016 | 4:50:00 PM | 4:52:00 PM | 1:36:00 PM |
| 68 | 9 | 140 | 3/29/2016 | 5:50:00 PM | 5:52:00 PM | 1:36:00 PM |
| 69 | 9 | 140 | 3/29/2016 | 6:50:00 PM | 6:52:00 PM | 1:36:00 PM |
| 70 | 9 | 140 | 3/29/2016 | 7:34:00 PM | 7:36:00 PM | 1:36:00 PM |
| 71 | 10 | 140 | 6/27/2016 | 11:42:00 AM | 11:50:00 AM | 10:06:00 AM |
| 72 | 10 | 140 | 6/27/2016 | 12:12:00 PM | 12:14:00 PM | 10:06:00 AM |
| 73 | 10 | 140 | 6/27/2016 | 12:42:00 PM | 12:43:00 PM | 10:06:00 AM |
| 74 | 10 | 140 | 6/27/2016 | 1:12:00 PM | 1:13:00 PM | 10:06:00 AM |
| 75 | 10 | 140 | 6/27/2016 | 1:42:00 PM | 1:43:00 PM | 10:06:00 AM |
| 76 | 10 | 140 | 6/27/2016 | 2:42:00 PM | 2:43:00 PM | 10:06:00 AM |
| 77 | 10 | 140 | 6/27/2016 | 3:42:00 PM | 3:44:00 PM | 10:06:00 AM |
| 78 | 10 | 140 | 6/27/2016 | 4:04:00 PM | 4:06:00 PM | 10:06:00 AM |

Mesocosm 1 - 30% Trial
Phosphorus

| Sample | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative | Elapsed From Drip |
|---|---|---|---|---|---|
| - | - | - | (hrs) | (hrs) | (hrs) |
| 1 | 1:35:00 PM | 1:37:00 PM | 0.03 | 0.03 | 0.03 |
| 2 | 1:35:00 PM | 2:09:30 PM | 0.58 | 0.58 | 0.58 |
| 3 | 1:35:00 PM | 2:36:00 PM | 1.02 | 1.02 | 1.02 |
| 4 | 1:35:00 PM | 3:06:30 PM | 1.53 | 1.53 | 1.53 |
| 5 | 1:35:00 PM | 3:37:30 PM | 2.04 | 2.04 | 2.04 |
| 6 | 1:35:00 PM | 4:36:00 PM | 3.02 | 3.02 | 3.02 |
| 7 | 1:35:00 PM | 5:36:00 PM | 4.02 | 4.02 | 4.02 |
| 8 | 1:35:00 PM | 6:36:30 PM | 5.03 | 5.03 | 5.03 |
| 9 | 1:35:00 PM | 7:36:00 PM | 6.02 | 6.02 | 6.02 |
| 10 | 4:16:00 PM | 4:18:30 PM | 2.04 | 8.06 | 0.04 |
| 11 | 4:16:00 PM | 5:16:30 PM | 3.01 | 9.03 | 1.01 |
| 12 | 4:16:00 PM | 6:17:00 PM | 4.02 | 10.03 | 2.02 |
| 13 | 4:16:00 PM | 7:17:30 PM | 5.03 | 11.04 | 3.03 |
| 14 | 4:16:00 PM | 8:17:00 PM | 6.02 | 12.03 | 4.02 |
| 15 | 2:54:00 PM | 2:56:30 PM | 0.94 | 12.98 | 0.04 |
| 16 | 2:54:00 PM | 3:25:00 PM | 1.42 | 13.45 | 0.52 |
| 17 | 2:54:00 PM | 3:56:00 PM | 1.93 | 13.97 | 1.03 |
| 18 | 2:54:00 PM | 4:25:30 PM | 2.43 | 14.46 | 1.53 |
| 19 | 2:54:00 PM | 4:55:00 PM | 2.92 | 14.95 | 2.02 |
| 20 | 2:54:00 PM | 5:55:00 PM | 3.92 | 15.95 | 3.02 |
| 21 | 2:54:00 PM | 6:55:00 PM | 4.92 | 16.95 | 4.02 |
| 22 | 2:54:00 PM | 7:55:00 PM | 5.92 | 17.95 | 5.02 |
| 23 | 1:02:00 PM | 1:05:30 PM | 0.54 | 18.49 | 0.06 |
| 24 | 1:02:00 PM | 1:33:00 PM | 1.00 | 18.95 | 0.52 |
| 25 | 1:02:00 PM | 2:03:00 PM | 1.50 | 19.45 | 1.02 |
| 26 | 1:02:00 PM | 2:33:00 PM | 2.00 | 19.95 | 1.52 |
| 27 | 1:02:00 PM | 3:02:30 PM | 2.49 | 20.44 | 2.01 |
| 28 | 1:02:00 PM | 4:02:00 PM | 3.48 | 21.43 | 3.00 |
| 29 | 1:02:00 PM | 5:03:00 PM | 4.50 | 22.45 | 4.02 |
| 30 | 1:02:00 PM | 6:03:00 PM | 5.50 | 23.45 | 5.02 |
| 31 | 1:02:00 PM | 6:33:00 PM | 6.00 | 23.95 | 5.52 |
| 32 | 1:48:00 PM | 1:51:00 PM | 2.02 | 25.97 | 0.05 |
| 33 | 1:48:00 PM | 2:19:00 PM | 2.48 | 26.43 | 0.52 |
| 34 | 1:48:00 PM | 2:49:00 PM | 2.98 | 26.93 | 1.02 |
| 35 | 1:48:00 PM | 3:19:00 PM | 3.48 | 27.43 | 1.52 |
| 36 | 1:48:00 PM | 3:49:00 PM | 3.98 | 27.93 | 2.02 |
| 37 | 1:48:00 PM | 4:19:00 PM | 4.48 | 28.43 | 2.52 |
| 38 | 1:48:00 PM | 4:49:00 PM | 4.98 | 28.93 | 3.02 |
| 39 | 1:48:00 PM | 5:19:00 PM | 5.48 | 29.43 | 3.52 |
| 40 | 1:48:00 PM | 5:49:00 PM | 5.98 | 29.93 | 4.02 |
| 41 | 12:30:00 PM | 12:32:00 PM | 0.47 | 30.40 | 0.03 |
| 42 | 12:30:00 PM | 1:00:30 PM | 0.94 | 30.88 | 0.51 |
| 43 | 12:30:00 PM | 1:30:30 PM | 1.44 | 31.38 | 1.01 |
| 44 | 12:30:00 PM | 2:00:30 PM | 1.94 | 31.88 | 1.51 |

Mesocosm 1 - 30% Trial
Phosphorus

| Sample | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative | Elapsed From Drip |
|---|---|---|---|---|---|
| - | - | - | (hrs) | (hrs) | (hrs) |
| 45 | 12:30:00 PM | 2:30:30 PM | 2.44 | 32.38 | 2.01 |
| 46 | 12:30:00 PM | 3:30:30 PM | 3.44 | 33.38 | 3.01 |
| 47 | 12:30:00 PM | 4:30:30 PM | 4.44 | 34.38 | 4.01 |
| 48 | 12:30:00 PM | 5:30:30 PM | 5.44 | 35.38 | 5.01 |
| 49 | 12:30:00 PM | 6:00:30 PM | 5.94 | 35.88 | 5.51 |
| 50 | 3:25:00 PM | 3:29:00 PM | 3.92 | 39.79 | 0.07 |
| 51 | 3:25:00 PM | 3:57:30 PM | 4.39 | 40.27 | 0.54 |
| 52 | 3:25:00 PM | 4:27:00 PM | 4.88 | 40.76 | 1.03 |
| 53 | 3:25:00 PM | 4:57:00 PM | 5.38 | 41.26 | 1.53 |
| 54 | 3:25:00 PM | 5:27:00 PM | 5.88 | 41.76 | 2.03 |
| 55 | 12:28:00 PM | 12:30:30 PM | 1.34 | 43.10 | 0.04 |
| 56 | 12:28:00 PM | 12:59:00 PM | 1.82 | 43.58 | 0.52 |
| 57 | 12:28:00 PM | 1:29:00 PM | 2.32 | 44.08 | 1.02 |
| 58 | 12:28:00 PM | 1:59:00 PM | 2.82 | 44.58 | 1.52 |
| 59 | 12:28:00 PM | 2:29:00 PM | 3.32 | 45.08 | 2.02 |
| 60 | 12:28:00 PM | 3:29:00 PM | 4.32 | 46.08 | 3.02 |
| 61 | 12:28:00 PM | 4:29:00 PM | 5.32 | 47.08 | 4.02 |
| 62 | 12:28:00 PM | 5:09:00 PM | 5.98 | 47.74 | 4.68 |
| 63 | 2:50:00 PM | 2:52:00 PM | 1.27 | 49.01 | 0.03 |
| 64 | 2:50:00 PM | 3:21:00 PM | 1.75 | 49.49 | 0.52 |
| 65 | 2:50:00 PM | 3:51:00 PM | 2.25 | 49.99 | 1.02 |
| 66 | 2:50:00 PM | 4:21:00 PM | 2.75 | 50.49 | 1.52 |
| 67 | 2:50:00 PM | 4:51:00 PM | 3.25 | 50.99 | 2.02 |
| 68 | 2:50:00 PM | 5:51:00 PM | 4.25 | 51.99 | 3.02 |
| 69 | 2:50:00 PM | 6:51:00 PM | 5.25 | 52.99 | 4.02 |
| 70 | 2:50:00 PM | 7:35:00 PM | 5.98 | 53.73 | 4.75 |
| 71 | 11:42:00 AM | 11:46:00 AM | 1.67 | 55.39 | 0.07 |
| 72 | 11:42:00 AM | 12:13:00 PM | 2.12 | 55.84 | 0.52 |
| 73 | 11:42:00 AM | 12:42:30 PM | 2.61 | 56.33 | 1.01 |
| 74 | 11:42:00 AM | 1:12:30 PM | 3.11 | 56.83 | 1.51 |
| 75 | 11:42:00 AM | 1:42:30 PM | 3.61 | 57.33 | 2.01 |
| 76 | 11:42:00 AM | 2:42:30 PM | 4.61 | 58.33 | 3.01 |
| 77 | 11:42:00 AM | 3:43:00 PM | 5.62 | 59.34 | 4.02 |
| 78 | 11:42:00 AM | 4:05:00 PM | 5.98 | 59.71 | 4.38 |

Mesocosm 1 - 30% Trial
Phosphorus

| Sample | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TP | TP |
|---|---|---|---|---|---|
| - | (hrs) | (cm) | (L) | (mg/L) | (mg) |
| 1 | 0.03 | 0.01 | 0.28 | 1.35 | 0.19 |
| 2 | 0.58 | 0.24 | 4.83 | 1.87 | 7.33 |
| 3 | 1.02 | 0.43 | 8.54 | 1.80 | 6.81 |
| 4 | 1.53 | 0.65 | 12.81 | 1.93 | 7.96 |
| 5 | 2.04 | 0.86 | 17.15 | 1.93 | 8.38 |
| 6 | 3.02 | 1.28 | 25.34 | 2.00 | 16.09 |
| 7 | 4.02 | 1.70 | 33.74 | 2.15 | 17.43 |
| 8 | 5.03 | 2.13 | 42.21 | 2.44 | 19.44 |
| 9 | 6.02 | 2.55 | 50.54 | 2.85 | 22.03 |
| 10 | 6.06 | 3.41 | 67.69 | 1.18 | 2.64 |
| 11 | 7.03 | 3.82 | 75.81 | 1.07 | 9.14 |
| 12 | 8.03 | 4.25 | 84.28 | 0.59 | 7.03 |
| 13 | 9.04 | 4.67 | 92.75 | 0.25 | 3.56 |
| 14 | 10.03 | 5.09 | 101.08 | 0.25 | 2.08 |
| 15 | 10.08 | 5.49 | 108.99 | 0.14 | 1.55 |
| 16 | 10.55 | 5.69 | 112.98 | 0.16 | 0.60 |
| 17 | 11.07 | 5.91 | 117.32 | 0.19 | 0.76 |
| 18 | 11.56 | 6.12 | 121.45 | 0.17 | 0.75 |
| 19 | 12.05 | 6.33 | 125.58 | 0.18 | 0.72 |
| 20 | 13.05 | 6.75 | 133.98 | 0.14 | 1.33 |
| 21 | 14.05 | 7.18 | 142.38 | 0.17 | 1.32 |
| 22 | 15.05 | 7.18 | 142.38 | N/A | N/A |
| 23 | 15.11 | 7.83 | 155.33 | 0.10 | 0.24 |
| 24 | 15.57 | 8.02 | 159.18 | 0.14 | 0.46 |
| 25 | 16.07 | 8.23 | 163.38 | 0.12 | 0.53 |
| 26 | 16.57 | 8.45 | 167.58 | 0.12 | 0.50 |
| 27 | 17.06 | 8.65 | 171.71 | 0.09 | 0.44 |
| 28 | 18.05 | 9.07 | 180.04 | 0.10 | 0.80 |
| 29 | 19.07 | 9.50 | 188.58 | 0.12 | 0.91 |
| 30 | 20.07 | 9.93 | 196.98 | 0.09 | 0.89 |
| 31 | 20.57 | 10.14 | 201.18 | 0.09 | 0.38 |
| 32 | 20.62 | 10.99 | 218.12 | 0.10 | 1.58 |
| 33 | 21.08 | 11.19 | 222.04 | 0.09 | 0.36 |
| 34 | 21.58 | 11.40 | 226.24 | 0.08 | 0.36 |
| 35 | 22.08 | 11.61 | 230.44 | 0.07 | 0.33 |
| 36 | 22.58 | 11.83 | 234.64 | 0.10 | 0.38 |
| 37 | 23.08 | 12.04 | 238.84 | 0.10 | 0.43 |
| 38 | 23.58 | 12.25 | 243.04 | 0.10 | 0.41 |
| 39 | 24.08 | 12.46 | 247.24 | 0.12 | 0.45 |
| 40 | 24.58 | 12.67 | 251.44 | 0.11 | 0.48 |
| 41 | 24.62 | 13.07 | 259.28 | 0.06 | 0.68 |
| 42 | 25.09 | 13.47 | 267.26 | 0.05 | 0.44 |
| 43 | 25.59 | 13.89 | 275.66 | 0.05 | 0.43 |
| 44 | 26.09 | 14.32 | 284.06 | 0.07 | 0.52 |

Mesocosm 1 - 30% Trial
Phosphorus

| Sample | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TP | TP |
|---|---|---|---|---|---|
| - | (hrs) | (cm) | (L) | (mg/L) | (mg) |
| 45 | 26.59 | 14.74 | 292.46 | 0.07 | 0.62 |
| 46 | 27.59 | 15.59 | 309.26 | 0.08 | 1.27 |
| 47 | 28.59 | 16.43 | 326.06 | 0.09 | 1.44 |
| 48 | 29.59 | 17.28 | 342.86 | 0.13 | 1.89 |
| 49 | 30.09 | 17.70 | 351.26 | 0.17 | 1.26 |
| 50 | 30.16 | 18.53 | 367.71 | 0.20 | 3.01 |
| 51 | 30.63 | 18.63 | 369.71 | 0.09 | 0.29 |
| 52 | 31.13 | 18.74 | 371.77 | 0.08 | 0.18 |
| 53 | 31.63 | 18.84 | 373.87 | 0.09 | 0.18 |
| 54 | 32.13 | 18.95 | 375.97 | 0.09 | 0.19 |
| 55 | 32.17 | 19.52 | 387.24 | 0.12 | 1.22 |
| 56 | 32.64 | 19.72 | 391.23 | 0.07 | 0.38 |
| 57 | 33.14 | 19.93 | 395.43 | 0.07 | 0.29 |
| 58 | 33.64 | 20.14 | 399.63 | 0.07 | 0.30 |
| 59 | 34.14 | 20.35 | 403.83 | 0.07 | 0.31 |
| 60 | 35.14 | 20.78 | 412.23 | 0.07 | 0.59 |
| 61 | 36.14 | 21.20 | 420.63 | 0.07 | 0.60 |
| 62 | 36.81 | 21.48 | 426.23 | 0.08 | 0.43 |
| 63 | 36.84 | 67.74 | 1344.07 | 0.03 | 50.35 |
| 64 | 37.33 | 67.94 | 1348.13 | 0.02 | 0.11 |
| 65 | 37.83 | 68.15 | 1352.33 | 0.03 | 0.11 |
| 66 | 38.33 | 68.36 | 1356.53 | 0.04 | 0.14 |
| 67 | 38.83 | 68.58 | 1360.73 | 0.04 | 0.16 |
| 68 | 39.83 | 69.00 | 1369.13 | 0.05 | 0.39 |
| 69 | 40.83 | 69.42 | 1377.53 | 0.06 | 0.46 |
| 70 | 41.56 | 69.73 | 1383.69 | 0.06 | 0.35 |
| 71 | 41.63 | 98.38 | 1952.09 | 0.04 | 28.57 |
| 72 | 42.08 | 98.57 | 1955.87 | 0.03 | 0.14 |
| 73 | 42.57 | 98.78 | 1960.00 | 0.04 | 0.14 |
| 74 | 43.07 | 98.99 | 1964.20 | 0.04 | 0.17 |
| 75 | 43.57 | 99.20 | 1968.40 | 0.04 | 0.17 |
| 76 | 44.57 | 99.62 | 1976.80 | 0.05 | 0.39 |
| 77 | 45.58 | 100.05 | 1985.27 | 0.06 | 0.45 |
| 78 | 45.94 | 100.21 | 1988.35 | 0.06 | 0.18 |

Mesocosm 1 - 30% Trial
Phosphorus

| Sample | Cumulative TP ( | Years of Watershed P | Influent TP | Influent TP | Cumulative Influent TP |
|---|---|---|---|---|---|
| - | (mg) | (yrs) | (mg/L) | (mg) | (mg) |
| 1 | 0.19 | 0.00 | 0.52 | 0.07 | 0.07 |
| 2 | 7.51 | 0.01 | 0.52 | 2.34 | 2.42 |
| 3 | 14.32 | 0.02 | 0.52 | 1.91 | 4.33 |
| 4 | 22.29 | 0.04 | 0.52 | 2.20 | 6.53 |
| 5 | 30.66 | 0.05 | 0.52 | 2.24 | 8.77 |
| 6 | 46.76 | 0.08 | 0.52 | 4.22 | 12.99 |
| 7 | 64.19 | 0.11 | 0.52 | 4.33 | 17.31 |
| 8 | 83.62 | 0.14 | 0.52 | 4.36 | 21.68 |
| 9 | 105.66 | 0.18 | 0.52 | 4.29 | 25.97 |
| 10 | 108.30 | 0.18 | 0.43 | 0.97 | 26.94 |
| 11 | 117.44 | 0.20 | 0.43 | 3.51 | 30.45 |
| 12 | 124.47 | 0.21 | 0.43 | 3.66 | 34.11 |
| 13 | 128.02 | 0.22 | 0.43 | 3.66 | 37.77 |
| 14 | 130.11 | 0.22 | 0.43 | 3.60 | 41.37 |
| 15 | 131.66 | 0.22 | 0.26 | 2.72 | 44.09 |
| 16 | 132.26 | 0.22 | 0.26 | 1.02 | 45.11 |
| 17 | 133.02 | 0.22 | 0.26 | 1.11 | 46.22 |
| 18 | 133.77 | 0.23 | 0.26 | 1.06 | 47.28 |
| 19 | 134.49 | 0.23 | 0.26 | 1.06 | 48.34 |
| 20 | 135.82 | 0.23 | 0.26 | 2.15 | 50.49 |
| 21 | 137.14 | 0.23 | 0.26 | 2.15 | 52.64 |
| 22 | N/A | N/A | N/A | N/A | N/A |
| 23 | 137.38 | 0.23 | 0.26 | 1.17 | 53.81 |
| 24 | 137.84 | 0.23 | 0.26 | 1.00 | 54.81 |
| 25 | 138.37 | 0.23 | 0.26 | 1.09 | 55.90 |
| 26 | 138.87 | 0.23 | 0.26 | 1.09 | 57.00 |
| 27 | 139.31 | 0.23 | 0.26 | 1.07 | 58.07 |
| 28 | 140.11 | 0.24 | 0.26 | 2.17 | 60.24 |
| 29 | 141.02 | 0.24 | 0.26 | 2.22 | 62.46 |
| 30 | 141.91 | 0.24 | 0.26 | 2.19 | 64.65 |
| 31 | 142.29 | 0.24 | 0.26 | 1.09 | 65.74 |
| 32 | 143.87 | 0.24 | 0.26 | 4.39 | 70.13 |
| 33 | 144.23 | 0.24 | 0.26 | 1.01 | 71.15 |
| 34 | 144.59 | 0.24 | 0.26 | 1.09 | 72.23 |
| 35 | 144.92 | 0.24 | 0.26 | 1.09 | 73.32 |
| 36 | 145.30 | 0.24 | 0.26 | 1.09 | 74.40 |
| 37 | 145.73 | 0.25 | 0.26 | 1.09 | 75.49 |
| 38 | 146.14 | 0.25 | 0.26 | 1.09 | 76.57 |
| 39 | 146.59 | 0.25 | 0.26 | 1.09 | 77.66 |
| 40 | 147.07 | 0.25 | 0.26 | 1.09 | 78.75 |
| 41 | 147.75 | 0.25 | 0.25 | 1.98 | 80.72 |
| 42 | 148.19 | 0.25 | 0.25 | 1.96 | 82.69 |
| 43 | 148.62 | 0.25 | 0.25 | 2.07 | 84.76 |
| 44 | 149.15 | 0.25 | 0.25 | 2.07 | 86.82 |

Mesocosm 1 - 30% Trial
Phosphorus

| Sample | Cumulative TP ( | Years of Watershed P | Influent TP | Influent TP | Cumulative Influent TP |
|---|---|---|---|---|---|
| - | (mg) | (yrs) | (mg/L) | (mg) | (mg) |
| 45 | 149.76 | 0.25 | 0.25 | 2.07 | 88.89 |
| 46 | 151.04 | 0.25 | 0.25 | 4.14 | 93.03 |
| 47 | 152.47 | 0.26 | 0.25 | 4.14 | 97.16 |
| 48 | 154.36 | 0.26 | 0.25 | 4.14 | 101.30 |
| 49 | 155.62 | 0.26 | 0.25 | 2.07 | 103.36 |
| 50 | 158.63 | 0.27 | 0.26 | 4.19 | 107.55 |
| 51 | 158.92 | 0.27 | 0.26 | 0.52 | 108.07 |
| 52 | 159.10 | 0.27 | 0.26 | 0.54 | 108.62 |
| 53 | 159.28 | 0.27 | 0.26 | 0.55 | 109.17 |
| 54 | 159.47 | 0.27 | 0.26 | 0.55 | 109.72 |
| 55 | 160.69 | 0.27 | 0.29 | 3.13 | 112.85 |
| 56 | 161.07 | 0.27 | 0.29 | 1.17 | 114.01 |
| 57 | 161.36 | 0.27 | 0.29 | 1.23 | 115.24 |
| 58 | 161.65 | 0.27 | 0.29 | 1.23 | 116.47 |
| 59 | 161.96 | 0.27 | 0.29 | 1.23 | 117.69 |
| 60 | 162.55 | 0.27 | 0.29 | 2.45 | 120.15 |
| 61 | 163.15 | 0.27 | 0.29 | 2.45 | 122.60 |
| 62 | 163.58 | 0.28 | 0.29 | 1.64 | 124.24 |
| 63 | 213.93 | 0.36 | 0.31 | 275.07 | 399.31 |
| 64 | 214.04 | 0.36 | 0.31 | 1.25 | 400.56 |
| 65 | 214.15 | 0.36 | 0.31 | 1.29 | 401.85 |
| 66 | 214.29 | 0.36 | 0.31 | 1.29 | 403.14 |
| 67 | 214.45 | 0.36 | 0.31 | 1.29 | 404.43 |
| 68 | 214.84 | 0.36 | 0.31 | 2.58 | 407.01 |
| 69 | 215.31 | 0.36 | 0.31 | 2.58 | 409.59 |
| 70 | 215.65 | 0.36 | 0.31 | 1.89 | 411.48 |
| 71 | 244.22 | 0.41 | 0.36 | 190.52 | 602.01 |
| 72 | 244.36 | 0.41 | 0.36 | 1.37 | 603.38 |
| 73 | 244.50 | 0.41 | 0.36 | 1.50 | 604.88 |
| 74 | 244.67 | 0.41 | 0.36 | 1.53 | 606.40 |
| 75 | 244.84 | 0.41 | 0.36 | 1.53 | 607.93 |
| 76 | 245.23 | 0.41 | 0.36 | 3.05 | 610.98 |
| 77 | 245.68 | 0.41 | 0.36 | 3.08 | 614.05 |
| 78 | 245.86 | 0.41 | 0.36 | 1.12 | 615.17 |

Mesocosm 1 - 30% Trial
Phosphorus

| Sample | TP Removal | Net P Export | pH |
|---|---|---|---|
| - | (mg) | (mg) | |
| 1 | 0.00 | 0.19 | 7.02 |
| 2 | 0.00 | 7.51 | 6.73 |
| 3 | 0.00 | 14.32 | 6.85 |
| 4 | 0.00 | 22.29 | 6.90 |
| 5 | 0.00 | 30.66 | 7.02 |
| 6 | 0.00 | 46.76 | 6.98 |
| 7 | 0.00 | 64.19 | 7.18 |
| 8 | 0.00 | 83.62 | 7.13 |
| 9 | 0.00 | 105.66 | 6.84 |
| 10 | 0.02 | 108.28 | 6.96 |
| 11 | 0.02 | 117.42 | 6.94 |
| 12 | 0.02 | 124.45 | 7.07 |
| 13 | 0.12 | 127.90 | 7.05 |
| 14 | 1.64 | 128.47 | 7.11 |
| 15 | 2.81 | 128.85 | N/A |
| 16 | 3.23 | 129.03 | N/A |
| 17 | 3.58 | 129.44 | N/A |
| 18 | 3.88 | 129.88 | N/A |
| 19 | 4.22 | 130.26 | N/A |
| 20 | 5.04 | 130.78 | N/A |
| 21 | 5.87 | 131.27 | N/A |
| 22 | N/A | N/A | N/A |
| 23 | 6.81 | 130.57 | 7.20 |
| 24 | 7.35 | 130.49 | 7.20 |
| 25 | 7.91 | 130.46 | 7.17 |
| 26 | 8.50 | 130.37 | 7.18 |
| 27 | 9.13 | 130.18 | 7.20 |
| 28 | 10.50 | 129.60 | 7.14 |
| 29 | 11.81 | 129.21 | 7.10 |
| 30 | 13.11 | 128.80 | 7.08 |
| 31 | 13.82 | 128.47 | 7.14 |
| 32 | 16.64 | 127.23 | 7.28 |
| 33 | 17.29 | 126.95 | 7.30 |
| 34 | 18.01 | 126.58 | 7.16 |
| 35 | 18.77 | 126.16 | 7.17 |
| 36 | 19.48 | 125.82 | 7.16 |
| 37 | 20.13 | 125.60 | 7.13 |
| 38 | 20.80 | 125.34 | 7.13 |
| 39 | 21.44 | 125.15 | 6.90 |
| 40 | 22.04 | 125.03 | 6.78 |
| 41 | 23.35 | 124.41 | 6.60 |
| 42 | 24.87 | 123.32 | 6.60 |
| 43 | 26.51 | 122.12 | 6.81 |
| 44 | 28.05 | 121.10 | 6.88 |

Mesocosm 1 - 30% Trial
Phosphorus

| Sample | TP Removal | Net P Export | pH |
|---|---|---|---|
| - | (mg) | (mg) | |
| 45 | 29.50 | 120.26 | 6.93 |
| 46 | 32.36 | 118.67 | 6.98 |
| 47 | 35.06 | 117.41 | 7.01 |
| 48 | 37.31 | 117.06 | 7.03 |
| 49 | 38.12 | 117.50 | 6.87 |
| 50 | 39.30 | 119.33 | 6.60 |
| 51 | 39.53 | 119.39 | 6.74 |
| 52 | 39.89 | 119.21 | 6.82 |
| 53 | 40.27 | 119.01 | 6.85 |
| 54 | 40.63 | 118.84 | 6.89 |
| 55 | 42.54 | 118.15 | 6.82 |
| 56 | 43.32 | 117.75 | 6.85 |
| 57 | 44.25 | 117.10 | 6.85 |
| 58 | 45.19 | 116.47 | 6.84 |
| 59 | 46.11 | 115.86 | 6.85 |
| 60 | 47.97 | 114.59 | 6.88 |
| 61 | 49.82 | 113.33 | 6.89 |
| 62 | 51.03 | 112.55 | 6.90 |
| 63 | 275.75 | -61.82 | 6.34 |
| 64 | 276.89 | -62.85 | 6.37 |
| 65 | 278.07 | -63.91 | 6.36 |
| 66 | 279.22 | -64.92 | 6.36 |
| 67 | 280.35 | -65.90 | 6.35 |
| 68 | 282.54 | -67.70 | 6.37 |
| 69 | 284.66 | -69.35 | 6.39 |
| 70 | 286.20 | -70.55 | 6.68 |
| 71 | 448.16 | -203.94 | 6.22 |
| 72 | 449.39 | -205.04 | 6.16 |
| 73 | 450.75 | -206.25 | 6.18 |
| 74 | 452.11 | -207.43 | 6.18 |
| 75 | 453.46 | -208.62 | 6.25 |
| 76 | 456.12 | -210.90 | 6.32 |
| 77 | 458.75 | -213.07 | 6.31 |
| 78 | 459.69 | -213.83 | 6.33 |

Mesocosm 1 - 30% Trial
Phosphorus Speciation

| Sample | DP | SRP | SRP | Cumulative SRP | PP | PP | PP | DOP | DOP |
|---|---|---|---|---|---|---|---|---|---|
| - | (mg/L) | (mg/L) | (mg) | (mg) | (mg/L) | (mg) | (mg) | (mg/L) | (mg) |
| 1 | 0.13 | 0.13 | 0.02 | 0.02 | 1.23 | 0.17 | 0.17 | 0.00 | 0.00 |
| 2 | 0.22 | 0.13 | 0.57 | 0.59 | 1.66 | 6.55 | 6.72 | 0.09 | 0.20 |
| 5 | 0.32 | 0.13 | 1.54 | 2.13 | 1.61 | 20.12 | 26.84 | 0.19 | 1.75 |
| 6 | 0.32 | 0.13 | 1.02 | 3.15 | 1.68 | 13.48 | 40.32 | 0.19 | 1.59 |
| 8 | 0.39 | 0.17 | 2.45 | 5.60 | 2.05 | 31.47 | 71.79 | 0.22 | 3.53 |
| 9 | 0.30 | 0.18 | 1.42 | 7.01 | 2.55 | 19.15 | 90.94 | 0.13 | 1.46 |
| 14 | 0.23 | 0.13 | 2.57 | 9.58 | 0.95 | 30.00 | 120.94 | 0.11 | 1.99 |
| 18 | 0.05 | 0.05 | 2.92 | 12.51 | 0.20 | 19.20 | 140.14 | 0.00 | 1.75 |
| 19 | 0.07 | 0.03 | 0.32 | 12.83 | 0.07 | 1.07 | 141.21 | 0.04 | 0.16 |
| 20 | 0.09 | 0.02 | 0.11 | 12.94 | 0.07 | 0.28 | 141.48 | 0.07 | 0.21 |
| 22 | 0.09 | 0.06 | 0.35 | 13.29 | 0.09 | 0.66 | 142.14 | 0.03 | 0.40 |
| 23 | 0.10 | 0.06 | 0.24 | 13.53 | 0.07 | 0.33 | 142.47 | 0.04 | 0.14 |
| 25 | 0.08 | 0.05 | 0.90 | 14.43 | 0.09 | 1.38 | 143.85 | 0.03 | 0.63 |
| 27 | 0.00 | 0.01 | 0.40 | 14.83 | 0.10 | 1.25 | 145.10 | 0.00 | 0.22 |
| 28 | 0.00 | 0.01 | 0.05 | 14.88 | 0.14 | 0.46 | 145.56 | 0.00 | 0.00 |
| 31 | 0.00 | 0.03 | 0.26 | 15.14 | 0.09 | 1.44 | 147.00 | 0.00 | 0.00 |
| 32 | 0.00 | 0.01 | 0.17 | 15.31 | 0.10 | 0.80 | 147.80 | 0.00 | 0.00 |
| 34 | 0.00 | 0.01 | 0.21 | 15.53 | 0.09 | 1.62 | 149.42 | 0.00 | 0.00 |
| 35 | 0.00 | 0.01 | 0.05 | 15.58 | 0.09 | 0.38 | 149.81 | 0.00 | 0.00 |
| 36 | 0.06 | 0.03 | 0.36 | 15.93 | 0.04 | 1.11 | 150.91 | 0.03 | 0.22 |
| 37 | 0.06 | 0.04 | 0.15 | 16.08 | 0.03 | 0.13 | 151.05 | 0.02 | 0.08 |
| 40 | 0.06 | 0.05 | 0.58 | 16.66 | 0.05 | 0.45 | 151.49 | 0.01 | 0.18 |
| 41 | 0.05 | 0.03 | 0.17 | 16.83 | 0.05 | 0.20 | 151.69 | 0.02 | 0.06 |
| 43 | 0.04 | 0.03 | 0.25 | 17.08 | 0.07 | 0.51 | 152.20 | 0.02 | 0.15 |
| 44 | 0.04 | 0.03 | 0.11 | 17.19 | 0.07 | 0.31 | 152.51 | 0.02 | 0.07 |
| 45 | 0.01 | 0.01 | 0.15 | 17.34 | 0.05 | 0.47 | 152.98 | 0.00 | 0.06 |
| 46 | 0.03 | 0.01 | 0.10 | 17.44 | 0.02 | 0.27 | 153.25 | 0.02 | 0.07 |
| 49 | 0.01 | 0.01 | 0.32 | 17.75 | 0.06 | 1.02 | 154.27 | 0.00 | 0.24 |
| 50 | 0.05 | 0.01 | 0.21 | 17.96 | 0.03 | 0.75 | 155.02 | 0.04 | 0.31 |
| 52 | 0.05 | 0.04 | 0.85 | 18.81 | 0.08 | 1.79 | 156.82 | 0.02 | 0.87 |
| 53 | 0.07 | 0.06 | 0.39 | 19.20 | 0.10 | 0.74 | 157.55 | 0.01 | 0.12 |
| 54 | 0.03 | 0.01 | 0.54 | 19.75 | 0.17 | 2.22 | 159.78 | 0.02 | 0.24 |
| 55 | 0.07 | 0.05 | 0.06 | 19.81 | 0.03 | 0.20 | 159.98 | 0.01 | 0.03 |
| 56 | 0.07 | 0.06 | 0.11 | 19.92 | 0.02 | 0.05 | 160.02 | 0.01 | 0.02 |
| 57 | 0.06 | 0.05 | 0.11 | 20.04 | 0.02 | 0.04 | 160.07 | 0.01 | 0.02 |
| 58 | 0.07 | 0.03 | 0.09 | 20.13 | 0.03 | 0.05 | 160.12 | 0.03 | 0.04 |
| 59 | 0.03 | 0.03 | 0.34 | 20.47 | 0.10 | 0.71 | 160.83 | 0.00 | 0.18 |

Mesocosm 1 - 30% Trial
Phosphorus Speciation

| Sample | DP | SRP | SRP | Cumulative SRP | PP | PP | PP | DOP | DOP |
|---|---|---|---|---|---|---|---|---|---|
| - | (mg/L) | (mg/L) | (mg) | (mg) | (mg/L) | (mg) | (mg) | (mg/L) | (mg) |
| 60 | 0.03 | 0.04 | 0.13 | 20.60 | 0.04 | 0.28 | 161.12 | 0.00 | 0.00 |
| 62 | 0.03 | 0.04 | 0.32 | 20.92 | 0.05 | 0.39 | 161.50 | 0.00 | 0.00 |
| 63 | 0.03 | 0.04 | 0.16 | 21.08 | 0.05 | 0.20 | 161.71 | 0.00 | 0.00 |
| 65 | 0.03 | 0.01 | 0.44 | 21.52 | 0.05 | 0.82 | 162.52 | 0.01 | 0.10 |
| 66 | 0.03 | 0.01 | 0.07 | 21.59 | 0.05 | 0.29 | 162.81 | 0.01 | 0.07 |
| 67 | 0.03 | 0.01 | 10.33 | 31.91 | 0.01 | 27.40 | 190.21 | 0.02 | 12.62 |
| 70 | 0.03 | 0.01 | 0.12 | 32.04 | 0.01 | 0.11 | 190.32 | 0.02 | 0.19 |
| 72 | 0.04 | 0.04 | 0.33 | 32.36 | 0.01 | 0.13 | 190.45 | 0.00 | 0.10 |
| 74 | 0.06 | 0.06 | 0.72 | 33.09 | 0.00 | 0.06 | 190.52 | 0.00 | 0.01 |
| 75 | 0.03 | 0.01 | 19.19 | 52.27 | 0.02 | 4.90 | 195.41 | 0.02 | 4.48 |
| 78 | 0.03 | 0.01 | 0.12 | 52.39 | 0.01 | 0.16 | 195.57 | 0.02 | 0.23 |
| 80 | 0.04 | 0.01 | 0.13 | 52.52 | 0.02 | 0.14 | 195.72 | 0.03 | 0.31 |
| 82 | 0.04 | 0.02 | 0.18 | 52.69 | 0.02 | 0.20 | 195.91 | 0.02 | 0.27 |

Mesocosm 1 - 30% Trial
Phosphorus Speciation

| Sample | DOP |
|---|---|
| - | (mg) |
| 1 | 0.00 |
| 2 | 0.20 |
| 5 | 1.96 |
| 6 | 3.55 |
| 8 | 7.08 |
| 9 | 8.55 |
| 14 | 10.53 |
| 18 | 12.29 |
| 19 | 12.45 |
| 20 | 12.66 |
| 22 | 13.06 |
| 23 | 13.20 |
| 25 | 13.84 |
| 27 | 14.06 |
| 28 | 14.06 |
| 31 | 14.06 |
| 32 | 14.06 |
| 34 | 14.06 |
| 35 | 14.06 |
| 36 | 14.28 |
| 37 | 14.36 |
| 40 | 14.54 |
| 41 | 14.60 |
| 43 | 14.75 |
| 44 | 14.82 |
| 45 | 14.88 |
| 46 | 14.96 |
| 49 | 15.19 |
| 50 | 15.50 |
| 52 | 16.37 |
| 53 | 16.50 |
| 54 | 16.74 |
| 55 | 16.76 |
| 56 | 16.79 |
| 57 | 16.81 |
| 58 | 16.85 |
| 59 | 17.03 |

Mesocosm 1 - 30% Trial
Phosphorus Speciation

| Sample | DOP |
|---|---|
| - | (mg) |
| 60 | 17.03 |
| 62 | 17.03 |
| 63 | 17.03 |
| 65 | 17.14 |
| 66 | 17.21 |
| 67 | 29.83 |
| 70 | 30.01 |
| 72 | 30.12 |
| 74 | 30.13 |
| 75 | 34.62 |
| 78 | 34.85 |
| 80 | 35.16 |
| 82 | 35.43 |

## Mesocosm 2 - 15% Trial
## Nitrogen

| Sample | Run | Flow | Date | Start Time | End Time | Mesocosm Start Time |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - |
| 1 | 1 | 140 | 1/8/2016 | 12:14:00 PM | 12:22:00 PM | 12:14:00 PM |
| 2 | 1 | 140 | 1/8/2016 | 12:44:00 PM | 12:45:35 PM | 12:14:00 PM |
| 3 | 1 | 140 | 1/8/2016 | 1:14:00 PM | 1:15:50 PM | 12:14:00 PM |
| 4 | 1 | 140 | 1/8/2016 | 1:44:00 PM | 1:45:00 PM | 12:14:00 PM |
| 5 | 1 | 140 | 1/8/2016 | 2:14:00 PM | 2:15:00 PM | 12:14:00 PM |
| 6 | 1 | 140 | 1/8/2016 | 3:14:00 PM | 3:15:00 PM | 12:14:00 PM |
| 7 | 1 | 140 | 1/8/2016 | 4:14:00 PM | 4:15:00 PM | 12:14:00 PM |
| 8 | 1 | 140 | 1/8/2016 | 5:14:00 PM | 5:15:00 PM | 12:14:00 PM |
| 9 | 1 | 140 | 1/8/2016 | 6:14:00 PM | 6:15:00 PM | 12:14:00 PM |
| 10 | 2 | 140 | 1/14/2016 | 11:26:00 AM | 11:31:00 AM | 10:36:00 AM |
| 11 | 2 | 140 | 1/14/2016 | 11:56:00 AM | 11:58:35 AM | 10:36:00 AM |
| 12 | 2 | 140 | 1/14/2016 | 12:26:00 PM | 12:27:30 PM | 10:36:00 AM |
| 13 | 2 | 140 | 1/14/2016 | 12:56:00 PM | 12:57:47 PM | 10:36:00 AM |
| 14 | 2 | 140 | 1/14/2016 | 1:26:00 PM | 1:28:00 PM | 10:36:00 AM |
| 15 | 2 | 140 | 1/14/2016 | 2:26:00 PM | 2:28:00 PM | 10:36:00 AM |
| 16 | 2 | 140 | 1/14/2016 | 3:26:00 PM | 3:28:00 PM | 10:36:00 AM |
| 17 | 2 | 140 | 1/14/2016 | 3:56:00 PM | 3:58:00 PM | 10:36:00 AM |
| 18 | 2 | 140 | 1/14/2016 | 4:35:00 PM | 4:36:00 PM | 10:36:00 AM |
| 19 | 3 | 140 | 1/20/2016 | 12:25:00 PM | 12:30:00 PM | 11:30:00 AM |
| 20 | 3 | 140 | 1/20/2016 | 12:55:00 PM | 12:57:40 PM | 11:30:00 AM |
| 21 | 3 | 140 | 1/20/2016 | 1:25:15 PM | 1:27:30 PM | 11:30:00 AM |
| 22 | 3 | 140 | 1/20/2016 | 1:55:00 PM | 1:57:00 PM | 11:30:00 AM |
| 23 | 3 | 140 | 1/20/2016 | 2:25:00 PM | 2:26:40 PM | 11:30:00 AM |
| 24 | 3 | 140 | 1/20/2016 | 3:25:00 PM | 3:26:00 PM | 11:30:00 AM |
| 25 | 3 | 140 | 1/20/2016 | 4:25:00 PM | 4:26:00 PM | 11:30:00 AM |
| 26 | 3 | 140 | 1/20/2016 | 5:30:00 PM | 5:31:00 PM | 11:30:00 AM |
| 27 | 4 | 140 | 1/28/2016 | 1:28:00 PM | 1:33:00 PM | 12:19:00 PM |
| 28 | 4 | 140 | 1/28/2016 | 1:58:00 PM | 2:01:00 PM | 12:19:00 PM |
| 29 | 4 | 140 | 1/28/2016 | 2:28:00 PM | 2:31:00 PM | 12:19:00 PM |
| 30 | 4 | 140 | 1/28/2016 | 2:59:00 PM | 3:02:00 PM | 12:19:00 PM |
| 31 | 4 | 140 | 1/28/2016 | 3:28:00 PM | 3:31:00 PM | 12:19:00 PM |
| 32 | 4 | 140 | 1/28/2016 | 4:30:00 PM | 4:32:00 PM | 12:19:00 PM |
| 33 | 4 | 140 | 1/28/2016 | 5:28:00 PM | 5:31:00 PM | 12:19:00 PM |
| 34 | 4 | 140 | 1/28/2016 | 6:17:00 PM | 6:19:00 PM | 12:19:00 PM |
| 35 | 5 | 140 | 2/5/2016 | 11:15:00 AM | 11:20:00 AM | 10:10:00 AM |
| 36 | 5 | 140 | 2/5/2016 | 11:45:00 AM | 11:47:30 AM | 10:10:00 AM |
| 37 | 5 | 140 | 2/5/2016 | 12:15:00 PM | 12:17:10 PM | 10:10:00 AM |
| 38 | 5 | 140 | 2/5/2016 | 12:45:00 PM | 12:47:00 PM | 10:10:00 AM |
| 39 | 5 | 140 | 2/5/2016 | 1:15:00 PM | 1:17:00 PM | 10:10:00 AM |
| 40 | 5 | 140 | 2/5/2016 | 2:15:00 PM | 2:17:00 PM | 10:10:00 AM |
| 41 | 5 | 140 | 2/5/2016 | 3:15:00 PM | 3:17:00 PM | 10:10:00 AM |
| 42 | 5 | 140 | 2/5/2016 | 4:15:00 PM | 4:17:00 PM | 10:10:00 AM |
| 43 | 6 | 280 | 2/11/2016 | 10:48:00 AM | 10:51:45 AM | 10:25:00 AM |

Mesocosm 2 - 15% Trial

Nitrogen

| Sample | Run | Flow | Date | Start Time | End Time | Mesocosm Start Time |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - |
| 44 | 6 | 280 | 2/11/2016 | 11:18:00 AM | 11:18:25 AM | 10:25:00 AM |
| 45 | 6 | 280 | 2/11/2016 | 11:48:00 AM | 11:50:01 AM | 10:25:00 AM |
| 46 | 6 | 280 | 2/11/2016 | 12:26:00 PM | 12:27:00 PM | 10:25:00 AM |
| 47 | 6 | 280 | 2/11/2016 | 12:49:00 PM | 12:50:20 PM | 10:25:00 AM |
| 48 | 6 | 280 | 2/11/2016 | 1:48:00 PM | 1:49:00 PM | 10:25:00 AM |
| 49 | 6 | 280 | 2/11/2016 | 2:48:00 PM | 2:49:00 PM | 10:25:00 AM |
| 50 | 6 | 280 | 2/11/2016 | 3:48:00 PM | 3:49:00 PM | 10:25:00 AM |
| 51 | 6 | 280 | 2/11/2016 | 4:24:00 PM | 4:25:00 PM | 10:25:00 AM |
| 52 | 7 | 70 | 2/19/2016 | 2:48:00 PM | 2:54:00 PM | 11:25:00 AM |
| 53 | 7 | 70 | 2/19/2016 | 3:18:00 PM | 3:22:00 PM | 11:25:00 AM |
| 54 | 7 | 70 | 2/19/2016 | 3:48:00 PM | 3:53:00 PM | 11:25:00 AM |
| 55 | 7 | 70 | 2/19/2016 | 4:18:00 PM | 4:23:00 PM | 11:25:00 AM |
| 56 | 7 | 70 | 2/19/2016 | 4:48:00 PM | 4:52:00 PM | 11:25:00 AM |
| 57 | 7 | 70 | 2/19/2016 | 5:23:00 PM | 5:25:00 PM | 11:25:00 AM |
| 58 | 8 | 140 | 3/7/2016 | 1:54:00 PM | 1:58:00 PM | 11:30:00 AM |
| 59 | 8 | 140 | 3/7/2016 | 2:25:00 PM | 2:28:00 PM | 11:30:00 AM |
| 60 | 8 | 140 | 3/7/2016 | 2:56:00 PM | 2:58:00 PM | 11:30:00 AM |
| 61 | 8 | 140 | 3/7/2016 | 3:24:00 PM | 3:28:00 PM | 11:30:00 AM |
| 62 | 8 | 140 | 3/7/2016 | 3:54:00 PM | 3:58:00 PM | 11:30:00 AM |
| 63 | 8 | 140 | 3/7/2016 | 4:54:00 PM | 4:56:00 PM | 11:30:00 AM |
| 64 | 8 | 140 | 3/7/2016 | 5:24:00 PM | 5:25:00 PM | 11:30:00 AM |
| 65 | 9 | 140 | 3/17/2016 | 12:56:00 PM | 12:59:00 PM | 11:15:00 AM |
| 66 | 9 | 140 | 3/17/2016 | 1:26:00 PM | 1:28:30 PM | 11:15:00 AM |
| 67 | 9 | 140 | 3/17/2016 | 1:56:00 PM | 1:58:00 PM | 11:15:00 AM |
| 68 | 9 | 140 | 3/17/2016 | 2:26:00 PM | 2:28:00 PM | 11:15:00 AM |
| 69 | 9 | 140 | 3/17/2016 | 2:56:00 PM | 2:58:00 PM | 11:15:00 AM |
| 70 | 9 | 140 | 3/17/2016 | 3:59:00 PM | 4:01:00 PM | 11:15:00 AM |
| 71 | 9 | 140 | 3/17/2016 | 4:56:00 PM | 4:59:00 PM | 11:15:00 AM |
| 72 | 9 | 140 | 3/17/2016 | 5:13:00 PM | 5:15:00 PM | 11:15:00 AM |
| 73 | 10 | 140 | 3/24/2016 | 12:43:00 PM | 12:50:00 PM | 10:58:00 AM |
| 74 | 10 | 140 | 3/24/2016 | 1:14:00 PM | 1:17:00 PM | 10:58:00 AM |
| 75 | 10 | 140 | 3/24/2016 | 1:43:00 PM | 1:46:00 PM | 10:58:00 AM |
| 76 | 10 | 140 | 3/24/2016 | 2:43:00 PM | 2:45:00 PM | 10:58:00 AM |
| 77 | 10 | 140 | 3/24/2016 | 3:43:00 PM | 3:46:00 PM | 10:58:00 AM |
| 78 | 10 | 140 | 3/24/2016 | 4:42:00 PM | 4:44:00 PM | 10:58:00 AM |
| 79 | 10 | 140 | 3/24/2016 | 4:55:00 PM | 4:58:00 PM | 10:58:00 AM |
| 80 | 11 | 140 | 3/29/2016 | 2:42:00 PM | 2:46:00 PM | 1:36:00 PM |
| 81 | 11 | 140 | 3/29/2016 | 3:12:00 PM | 3:15:00 PM | 1:36:00 PM |
| 82 | 11 | 140 | 3/29/2016 | 3:42:00 PM | 3:44:00 PM | 1:36:00 PM |
| 83 | 11 | 140 | 3/29/2016 | 4:12:00 PM | 4:14:00 PM | 1:36:00 PM |
| 84 | 11 | 140 | 3/29/2016 | 4:42:00 PM | 4:44:00 PM | 1:36:00 PM |
| 85 | 11 | 140 | 3/29/2016 | 5:42:00 PM | 5:44:00 PM | 1:36:00 PM |
| 86 | 11 | 140 | 3/29/2016 | 6:44:00 PM | 6:46:00 PM | 1:36:00 PM |

Mesocosm 2 - 15% Trial
Nitrogen

| Sample | Run | Flow | Date | Start Time | End Time | Mesocosm Start Time |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - |
| 87 | 11 | 140 | 3/29/2016 | 7:34:00 PM | 7:36:00 PM | 1:36:00 PM |
| 88 | 12 | 140 | 4/8/2016 | 2:28:00 PM | 2:35:00 PM | 11:45:00 AM |
| 89 | 12 | 140 | 4/8/2016 | 2:58:00 PM | 3:01:00 PM | 11:45:00 AM |
| 90 | 12 | 140 | 4/8/2016 | 3:28:00 PM | 3:31:00 PM | 11:45:00 AM |
| 91 | 12 | 140 | 4/8/2016 | 3:58:00 PM | 4:00:00 PM | 11:45:00 AM |
| 92 | 12 | 140 | 4/8/2016 | 4:28:00 PM | 4:30:00 PM | 11:45:00 AM |
| 93 | 12 | 140 | 4/8/2016 | 5:28:00 PM | 5:30:00 PM | 11:45:00 AM |
| 94 | 12 | 140 | 4/8/2016 | 5:43:00 PM | 5:45:00 PM | 11:45:00 AM |
| 95 | 13 | 140 | 4/13/2016 | 1:04:00 PM | 1:09:00 PM | 11:30:00 AM |
| 96 | 13 | 140 | 4/13/2016 | 2:04:00 PM | 2:06:00 PM | 11:30:00 AM |
| 97 | 13 | 140 | 4/13/2016 | 2:34:00 PM | 2:36:00 PM | 11:30:00 AM |
| 98 | 13 | 140 | 4/13/2016 | 3:04:00 PM | 3:06:00 PM | 11:30:00 AM |
| 99 | 13 | 140 | 4/13/2016 | 3:34:00 PM | 3:36:00 PM | 11:30:00 AM |
| 100 | 13 | 140 | 4/13/2016 | 4:04:00 PM | 4:06:00 PM | 11:30:00 AM |
| 101 | 13 | 140 | 4/13/2016 | 5:04:00 PM | 5:06:00 PM | 11:30:00 AM |
| 102 | 13 | 140 | 4/13/2016 | 5:28:00 PM | 5:30:00 PM | 11:30:00 AM |
| 103 | 14 | 140 | 4/20/2016 | 12:30:00 PM | 12:36:00 PM | 10:30:00 AM |
| 104 | 14 | 140 | 4/20/2016 | 1:00:00 PM | 1:03:00 PM | 10:30:00 AM |
| 105 | 14 | 140 | 4/20/2016 | 1:30:00 PM | 1:33:00 PM | 10:30:00 AM |
| 106 | 14 | 140 | 4/20/2016 | 2:00:00 PM | 2:02:00 PM | 10:30:00 AM |
| 107 | 14 | 140 | 4/20/2016 | 2:30:00 PM | 2:32:00 PM | 10:30:00 AM |
| 108 | 14 | 140 | 4/20/2016 | 3:30:00 PM | 3:32:00 PM | 10:30:00 AM |
| 109 | 14 | 140 | 4/20/2016 | 4:30:00 PM | 4:32:00 PM | 10:30:00 AM |

Mesocosm 2 - 15% Trial
Nitrogen

| Sample | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative | Elapsed From Drip |
|---|---|---|---|---|---|
| - | - | - | (hrs) | (hrs) | (hrs) |
| 1 | 12:14:00 PM | 12:18:00 PM | 0.07 | 0.07 | 0.07 |
| 2 | 12:14:00 PM | 12:44:47 PM | 0.51 | 0.51 | 0.51 |
| 3 | 12:14:00 PM | 1:14:55 PM | 1.02 | 1.02 | 1.02 |
| 4 | 12:14:00 PM | 1:44:30 PM | 1.51 | 1.51 | 1.51 |
| 5 | 12:14:00 PM | 2:14:30 PM | 2.01 | 2.01 | 2.01 |
| 6 | 12:14:00 PM | 3:14:30 PM | 3.01 | 3.01 | 3.01 |
| 7 | 12:14:00 PM | 4:14:30 PM | 4.01 | 4.01 | 4.01 |
| 8 | 12:14:00 PM | 5:14:30 PM | 5.01 | 5.01 | 5.01 |
| 9 | 12:14:00 PM | 6:14:30 PM | 6.01 | 6.01 | 6.01 |
| 10 | 11:26:00 AM | 11:28:30 AM | 0.88 | 6.88 | 0.04 |
| 11 | 11:26:00 AM | 11:57:18 AM | 1.35 | 7.36 | 0.52 |
| 12 | 11:26:00 AM | 12:26:45 PM | 1.85 | 7.85 | 1.01 |
| 13 | 11:26:00 AM | 12:56:53 PM | 2.35 | 8.36 | 1.51 |
| 14 | 11:26:00 AM | 1:27:00 PM | 2.85 | 8.86 | 2.02 |
| 15 | 11:26:00 AM | 2:27:00 PM | 3.85 | 9.86 | 3.02 |
| 16 | 11:26:00 AM | 3:27:00 PM | 4.85 | 10.86 | 4.02 |
| 17 | 11:26:00 AM | 3:57:00 PM | 5.35 | 11.36 | 4.52 |
| 18 | 11:26:00 AM | 4:35:30 PM | 5.99 | 12.00 | 5.16 |
| 19 | 12:25:00 PM | 12:27:30 PM | 0.96 | 12.96 | 0.04 |
| 20 | 12:25:00 PM | 12:56:20 PM | 1.44 | 13.44 | 0.52 |
| 21 | 12:25:00 PM | 1:26:23 PM | 1.94 | 13.94 | 1.02 |
| 22 | 12:25:00 PM | 1:56:00 PM | 2.43 | 14.43 | 1.52 |
| 23 | 12:25:00 PM | 2:25:50 PM | 2.93 | 14.93 | 2.01 |
| 24 | 12:25:00 PM | 3:25:30 PM | 3.93 | 15.93 | 3.01 |
| 25 | 12:25:00 PM | 4:25:30 PM | 4.93 | 16.93 | 4.01 |
| 26 | 12:25:00 PM | 5:30:30 PM | 6.01 | 18.01 | 5.09 |
| 27 | 1:28:00 PM | 1:30:30 PM | 1.19 | 19.20 | 0.04 |
| 28 | 1:28:00 PM | 1:59:30 PM | 1.68 | 19.68 | 0.53 |
| 29 | 1:28:00 PM | 2:29:30 PM | 2.18 | 20.18 | 1.03 |
| 30 | 1:28:00 PM | 3:00:30 PM | 2.69 | 20.70 | 1.54 |
| 31 | 1:28:00 PM | 3:29:30 PM | 3.18 | 21.18 | 2.03 |
| 32 | 1:28:00 PM | 4:31:00 PM | 4.20 | 22.21 | 3.05 |
| 33 | 1:28:00 PM | 5:29:30 PM | 5.18 | 23.18 | 4.03 |
| 34 | 1:28:00 PM | 6:18:00 PM | 5.98 | 23.99 | 4.83 |
| 35 | 11:15:00 AM | 11:17:30 AM | 1.13 | 25.12 | 0.04 |
| 36 | 11:15:00 AM | 11:46:15 AM | 1.60 | 25.60 | 0.52 |
| 37 | 11:15:00 AM | 12:16:05 PM | 2.10 | 26.09 | 1.02 |
| 38 | 11:15:00 AM | 12:46:00 PM | 2.60 | 26.59 | 1.52 |
| 39 | 11:15:00 AM | 1:16:00 PM | 3.10 | 27.09 | 2.02 |
| 40 | 11:15:00 AM | 2:16:00 PM | 4.10 | 28.09 | 3.02 |
| 41 | 11:15:00 AM | 3:16:00 PM | 5.10 | 29.09 | 4.02 |
| 42 | 11:15:00 AM | 4:16:00 PM | 6.10 | 30.09 | 5.02 |
| 43 | 10:48:00 AM | 10:49:52 AM | 0.41 | 30.51 | 0.03 |

Mesocosm 2 - 15% Trial

Nitrogen

| Sample | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative | Elapsed From Drip |
|---|---|---|---|---|---|
| - | - | - | (hrs) | (hrs) | (hrs) |
| 44 | 10:48:00 AM | 11:18:12 AM | 0.89 | 30.98 | 0.50 |
| 45 | 10:48:00 AM | 11:49:01 AM | 1.40 | 31.49 | 1.02 |
| 46 | 10:48:00 AM | 12:26:30 PM | 2.03 | 32.12 | 1.64 |
| 47 | 10:48:00 AM | 12:49:40 PM | 2.41 | 32.50 | 2.03 |
| 48 | 10:48:00 AM | 1:48:30 PM | 3.39 | 33.48 | 3.01 |
| 49 | 10:48:00 AM | 2:48:30 PM | 4.39 | 34.48 | 4.01 |
| 50 | 10:48:00 AM | 3:48:30 PM | 5.39 | 35.48 | 5.01 |
| 51 | 10:48:00 AM | 4:24:30 PM | 5.99 | 36.08 | 5.61 |
| 52 | 2:48:00 PM | 2:51:00 PM | 3.43 | 39.52 | 0.05 |
| 53 | 2:48:00 PM | 3:20:00 PM | 3.92 | 40.00 | 0.53 |
| 54 | 2:48:00 PM | 3:50:30 PM | 4.43 | 40.51 | 1.04 |
| 55 | 2:48:00 PM | 4:20:30 PM | 4.93 | 41.01 | 1.54 |
| 56 | 2:48:00 PM | 4:50:00 PM | 5.42 | 41.50 | 2.03 |
| 57 | 2:48:00 PM | 5:24:00 PM | 5.98 | 42.07 | 2.60 |
| 58 | 1:54:00 PM | 1:56:00 PM | 2.43 | 44.50 | 0.03 |
| 59 | 1:54:00 PM | 2:26:30 PM | 2.94 | 45.01 | 0.54 |
| 60 | 1:54:00 PM | 2:57:00 PM | 3.45 | 45.52 | 1.05 |
| 61 | 1:54:00 PM | 3:26:00 PM | 3.93 | 46.00 | 1.53 |
| 62 | 1:54:00 PM | 3:56:00 PM | 4.43 | 46.50 | 2.03 |
| 63 | 1:54:00 PM | 4:55:00 PM | 5.42 | 47.48 | 3.02 |
| 64 | 1:54:00 PM | 5:24:30 PM | 5.91 | 47.98 | 3.51 |
| 65 | 12:56:00 PM | 12:57:30 PM | 1.71 | 49.68 | 0.03 |
| 66 | 12:56:00 PM | 1:27:15 PM | 2.20 | 50.18 | 0.52 |
| 67 | 12:56:00 PM | 1:57:00 PM | 2.70 | 50.68 | 1.02 |
| 68 | 12:56:00 PM | 2:27:00 PM | 3.20 | 51.18 | 1.52 |
| 69 | 12:56:00 PM | 2:57:00 PM | 3.70 | 51.68 | 2.02 |
| 70 | 12:56:00 PM | 4:00:00 PM | 4.75 | 52.73 | 3.07 |
| 71 | 12:56:00 PM | 4:57:30 PM | 5.71 | 53.68 | 4.03 |
| 72 | 12:56:00 PM | 5:14:00 PM | 5.98 | 53.96 | 4.30 |
| 73 | 12:43:00 PM | 12:46:30 PM | 1.81 | 55.77 | 0.06 |
| 74 | 12:43:00 PM | 1:15:30 PM | 2.29 | 56.25 | 0.54 |
| 75 | 12:43:00 PM | 1:44:30 PM | 2.78 | 56.73 | 1.03 |
| 76 | 12:43:00 PM | 2:44:00 PM | 3.77 | 57.73 | 2.02 |
| 77 | 12:43:00 PM | 3:44:30 PM | 4.78 | 58.73 | 3.03 |
| 78 | 12:43:00 PM | 4:43:00 PM | 5.75 | 59.71 | 4.00 |
| 79 | 12:43:00 PM | 4:56:30 PM | 5.98 | 59.93 | 4.23 |
| 80 | 2:42:00 PM | 2:44:00 PM | 1.13 | 61.07 | 0.03 |
| 81 | 2:42:00 PM | 3:13:30 PM | 1.63 | 61.56 | 0.52 |
| 82 | 2:42:00 PM | 3:43:00 PM | 2.12 | 62.05 | 1.02 |
| 83 | 2:42:00 PM | 4:13:00 PM | 2.62 | 62.55 | 1.52 |
| 84 | 2:42:00 PM | 4:43:00 PM | 3.12 | 63.05 | 2.02 |
| 85 | 2:42:00 PM | 5:43:00 PM | 4.12 | 64.05 | 3.02 |
| 86 | 2:42:00 PM | 6:45:00 PM | 5.15 | 65.08 | 4.05 |

Mesocosm 2 - 15% Trial
Nitrogen

| Sample | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative | Elapsed From Drip |
|---|---|---|---|---|---|
| - | - | - | (hrs) | (hrs) | (hrs) |
| 87 | 2:42:00 PM | 7:35:00 PM | 5.98 | 65.92 | 4.88 |
| 88 | 2:28:00 PM | 2:31:30 PM | 2.78 | 68.69 | 0.06 |
| 89 | 2:28:00 PM | 2:59:30 PM | 3.24 | 69.16 | 0.52 |
| 90 | 2:28:00 PM | 3:29:30 PM | 3.74 | 69.66 | 1.03 |
| 91 | 2:28:00 PM | 3:59:00 PM | 4.23 | 70.15 | 1.52 |
| 92 | 2:28:00 PM | 4:29:00 PM | 4.73 | 70.65 | 2.02 |
| 93 | 2:28:00 PM | 5:29:00 PM | 5.73 | 71.65 | 3.02 |
| 94 | 2:28:00 PM | 5:44:00 PM | 5.98 | 71.90 | 3.27 |
| 95 | 1:04:00 PM | 1:06:30 PM | 1.61 | 73.51 | 0.04 |
| 96 | 1:04:00 PM | 2:05:00 PM | 2.58 | 74.48 | 1.02 |
| 97 | 1:04:00 PM | 2:35:00 PM | 3.08 | 74.98 | 1.52 |
| 98 | 1:04:00 PM | 3:05:00 PM | 3.58 | 75.48 | 2.02 |
| 99 | 1:04:00 PM | 3:35:00 PM | 4.08 | 75.98 | 2.52 |
| 100 | 1:04:00 PM | 4:05:00 PM | 4.58 | 76.48 | 3.02 |
| 101 | 1:04:00 PM | 5:05:00 PM | 5.58 | 77.48 | 4.02 |
| 102 | 1:04:00 PM | 5:29:00 PM | 5.98 | 77.88 | 4.42 |
| 103 | 12:30:00 PM | 12:33:00 PM | 2.05 | 79.93 | 0.05 |
| 104 | 12:30:00 PM | 1:01:30 PM | 2.53 | 80.41 | 0.52 |
| 105 | 12:30:00 PM | 1:31:30 PM | 3.03 | 80.91 | 1.03 |
| 106 | 12:30:00 PM | 2:01:00 PM | 3.52 | 81.40 | 1.52 |
| 107 | 12:30:00 PM | 2:31:00 PM | 4.02 | 81.90 | 2.02 |
| 108 | 12:30:00 PM | 3:31:00 PM | 5.02 | 82.90 | 3.02 |
| 109 | 12:30:00 PM | 4:31:00 PM | 6.02 | 83.90 | 4.02 |

Mesocosm 2 - 15% Trial
Nitrogen

| Sample | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TN | TN | Cumulative TN |
|---|---|---|---|---|---|---|
| - | (hrs) | (cm) | (L) | (mg/L) | (mg) | (mg) |
| 1 | 0.07 | 0.03 | 0.56 | 3.81 | 1.07 | 1.07 |
| 2 | 0.51 | 0.22 | 4.31 | 4.05 | 14.74 | 15.80 |
| 3 | 1.02 | 0.43 | 8.53 | 3.90 | 16.76 | 32.56 |
| 4 | 1.51 | 0.64 | 12.67 | 4.02 | 16.40 | 48.96 |
| 5 | 2.01 | 0.85 | 16.87 | 4.04 | 16.92 | 65.88 |
| 6 | 3.01 | 1.27 | 25.27 | 4.27 | 34.88 | 100.76 |
| 7 | 4.01 | 1.70 | 33.67 | 4.50 | 36.80 | 137.56 |
| 8 | 5.01 | 2.12 | 42.07 | 4.83 | 39.19 | 176.75 |
| 9 | 6.01 | 2.54 | 50.47 | 4.95 | 41.08 | 217.83 |
| 10 | 6.05 | 2.91 | 57.82 | 5.21 | 1.78 | 219.61 |
| 11 | 6.53 | 3.12 | 61.85 | 6.21 | 23.00 | 242.61 |
| 12 | 7.02 | 3.32 | 65.98 | 6.42 | 26.04 | 268.65 |
| 13 | 7.52 | 3.54 | 70.19 | 6.34 | 26.92 | 295.56 |
| 14 | 8.03 | 3.75 | 74.41 | 5.34 | 24.60 | 320.17 |
| 15 | 9.03 | 4.17 | 82.81 | 5.31 | 44.72 | 364.88 |
| 16 | 10.03 | 4.60 | 91.21 | 5.23 | 44.26 | 409.14 |
| 17 | 10.53 | 4.81 | 95.41 | 5.23 | 21.95 | 431.09 |
| 18 | 11.17 | 5.08 | 100.80 | 5.19 | 28.07 | 459.17 |
| 19 | 11.21 | 5.49 | 108.85 | 3.47 | 1.51 | 460.68 |
| 20 | 11.69 | 5.69 | 112.89 | 3.88 | 14.82 | 475.50 |
| 21 | 12.19 | 5.90 | 117.09 | 4.05 | 16.67 | 492.17 |
| 22 | 12.68 | 6.11 | 121.24 | 4.09 | 16.89 | 509.06 |
| 23 | 13.18 | 6.32 | 125.42 | 4.04 | 16.98 | 526.04 |
| 24 | 14.18 | 6.74 | 133.77 | 4.26 | 34.66 | 560.70 |
| 25 | 15.18 | 7.16 | 142.17 | 4.18 | 35.43 | 596.13 |
| 26 | 16.26 | 7.62 | 151.27 | 4.26 | 38.38 | 634.51 |
| 27 | 16.30 | 8.13 | 161.28 | 2.73 | 1.22 | 635.73 |
| 28 | 16.78 | 8.33 | 165.34 | 2.78 | 11.17 | 646.91 |
| 29 | 17.28 | 8.54 | 169.54 | 2.79 | 11.68 | 658.59 |
| 30 | 17.80 | 8.76 | 173.88 | 2.68 | 11.87 | 670.46 |
| 31 | 18.28 | 8.97 | 177.94 | 2.77 | 11.08 | 681.54 |
| 32 | 19.31 | 9.40 | 186.55 | 2.77 | 23.86 | 705.40 |
| 33 | 20.28 | 9.81 | 194.74 | 2.94 | 23.35 | 728.75 |
| 34 | 21.09 | 10.16 | 201.53 | 3.32 | 21.25 | 750.00 |
| 35 | 21.13 | 10.63 | 210.98 | 1.64 | 0.87 | 750.87 |
| 36 | 21.61 | 10.84 | 215.01 | 1.96 | 7.25 | 758.11 |
| 37 | 22.11 | 11.05 | 219.18 | 2.04 | 8.36 | 766.47 |
| 38 | 22.61 | 11.26 | 223.37 | 2.11 | 8.69 | 775.16 |
| 39 | 23.11 | 11.47 | 227.57 | 2.05 | 8.72 | 783.88 |
| 40 | 24.11 | 11.89 | 235.97 | 2.24 | 18.01 | 801.89 |
| 41 | 25.11 | 12.32 | 244.37 | 2.95 | 21.79 | 823.68 |
| 42 | 26.11 | 12.74 | 252.77 | 3.22 | 25.91 | 849.60 |
| 43 | 26.14 | 13.09 | 259.74 | 1.27 | 1.18 | 850.78 |

Mesocosm 2 - 15% Trial
Nitrogen

| Sample | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TN | TN | Cumulative TN |
|---|---|---|---|---|---|---|
| - | (hrs) | (cm) | (L) | (mg/L) | (mg) | (mg) |
| 44 | 26.61 | 13.49 | 267.67 | 1.72 | 11.83 | 862.60 |
| 45 | 27.13 | 13.92 | 276.29 | 1.70 | 14.73 | 877.33 |
| 46 | 27.75 | 14.45 | 286.79 | 2.78 | 23.49 | 900.83 |
| 47 | 28.14 | 14.78 | 293.28 | 3.34 | 19.83 | 920.66 |
| 48 | 29.12 | 15.61 | 309.75 | 3.49 | 56.22 | 976.88 |
| 49 | 30.12 | 16.46 | 326.55 | 3.62 | 59.67 | 1036.54 |
| 50 | 31.12 | 17.30 | 343.35 | 3.71 | 61.55 | 1098.09 |
| 51 | 31.72 | 17.81 | 353.43 | 3.95 | 38.59 | 1136.68 |
| 52 | 31.77 | 18.54 | 367.85 | 1.27 | 0.55 | 1137.23 |
| 53 | 32.25 | 18.64 | 369.88 | 0.80 | 2.10 | 1139.33 |
| 54 | 32.76 | 18.75 | 372.02 | 0.97 | 1.89 | 1141.22 |
| 55 | 33.26 | 18.85 | 374.12 | 1.01 | 2.09 | 1143.31 |
| 56 | 33.75 | 18.96 | 376.18 | 0.90 | 1.97 | 1145.29 |
| 57 | 34.32 | 19.08 | 378.56 | 0.90 | 2.14 | 1147.43 |
| 58 | 34.35 | 20.11 | 399.00 | 1.02 | 0.27 | 1147.70 |
| 59 | 34.86 | 20.32 | 403.27 | 0.58 | 3.41 | 1151.11 |
| 60 | 35.37 | 20.54 | 407.54 | 0.55 | 2.40 | 1153.50 |
| 61 | 35.85 | 20.74 | 411.60 | 0.66 | 2.45 | 1155.95 |
| 62 | 36.35 | 20.96 | 415.80 | 0.78 | 3.03 | 1158.98 |
| 63 | 37.33 | 21.37 | 424.06 | 2.81 | 14.84 | 1173.81 |
| 64 | 37.83 | 21.58 | 428.19 | 3.00 | 12.00 | 1185.81 |
| 65 | 37.85 | 22.30 | 442.54 | 0.57 | 0.37 | 1186.19 |
| 66 | 38.35 | 22.51 | 446.71 | 0.38 | 1.98 | 1188.17 |
| 67 | 38.84 | 22.72 | 450.87 | 0.43 | 1.69 | 1189.86 |
| 68 | 39.34 | 22.93 | 455.07 | 0.56 | 2.09 | 1191.95 |
| 69 | 39.84 | 23.15 | 459.27 | 1.58 | 4.50 | 1196.45 |
| 70 | 40.89 | 23.59 | 468.09 | 3.03 | 20.32 | 1216.77 |
| 71 | 41.85 | 24.00 | 476.14 | 3.22 | 25.13 | 1241.90 |
| 72 | 42.13 | 24.11 | 478.45 | 3.29 | 7.51 | 1249.41 |
| 73 | 42.18 | 24.88 | 493.64 | 0.74 | 0.99 | 1250.39 |
| 74 | 42.67 | 25.08 | 497.70 | 0.38 | 2.26 | 1252.65 |
| 75 | 43.15 | 25.29 | 501.76 | 0.43 | 1.64 | 1254.30 |
| 76 | 44.14 | 25.71 | 510.09 | 0.54 | 4.06 | 1258.35 |
| 77 | 45.15 | 26.13 | 518.56 | 1.12 | 7.04 | 1265.40 |
| 78 | 46.13 | 26.55 | 526.75 | 1.55 | 10.95 | 1276.35 |
| 79 | 46.35 | 26.64 | 528.64 | 1.81 | 3.17 | 1279.53 |
| 80 | 46.38 | 27.12 | 538.16 | 0.73 | 0.35 | 1279.88 |
| 81 | 46.88 | 27.33 | 542.29 | 0.32 | 2.17 | 1282.05 |
| 82 | 47.37 | 27.54 | 546.42 | 0.35 | 1.39 | 1283.43 |
| 83 | 47.87 | 27.75 | 550.62 | 0.34 | 1.46 | 1284.89 |
| 84 | 48.37 | 27.96 | 554.82 | 0.41 | 1.59 | 1286.48 |
| 85 | 49.37 | 28.38 | 563.22 | 2.07 | 10.45 | 1296.93 |
| 86 | 50.40 | 28.82 | 571.90 | 2.71 | 20.74 | 1317.67 |

Mesocosm 2 - 15% Trial
Nitrogen

| Sample | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TN | TN | Cumulative TN |
|---|---|---|---|---|---|---|
| - | (hrs) | (cm) | (L) | (mg/L) | (mg) | (mg) |
| 87 | 51.23 | 29.17 | 578.90 | 2.88 | 19.53 | 1337.20 |
| 88 | 51.29 | 30.35 | 602.21 | 0.96 | 0.94 | 1338.14 |
| 89 | 51.76 | 30.55 | 606.13 | 0.28 | 2.43 | 1340.57 |
| 90 | 52.26 | 30.76 | 610.33 | 0.40 | 1.42 | 1341.99 |
| 91 | 52.75 | 30.97 | 614.46 | 0.39 | 1.63 | 1343.62 |
| 92 | 53.25 | 31.18 | 618.66 | 0.50 | 1.87 | 1345.49 |
| 93 | 54.25 | 31.60 | 627.06 | 1.74 | 9.40 | 1354.89 |
| 94 | 54.50 | 31.71 | 629.16 | 2.03 | 3.95 | 1358.84 |
| 95 | 54.54 | 32.39 | 642.67 | 0.37 | 0.42 | 1359.26 |
| 96 | 55.52 | 32.80 | 650.86 | 0.24 | 2.50 | 1361.76 |
| 97 | 56.02 | 33.01 | 655.06 | 0.30 | 1.14 | 1362.90 |
| 98 | 56.52 | 33.22 | 659.26 | 1.29 | 3.33 | 1366.23 |
| 99 | 57.02 | 33.44 | 663.46 | 1.83 | 6.54 | 1372.77 |
| 100 | 57.52 | 33.65 | 667.66 | 2.06 | 8.17 | 1380.95 |
| 101 | 58.52 | 34.07 | 676.06 | 2.43 | 18.87 | 1399.82 |
| 102 | 58.92 | 34.24 | 679.42 | 2.77 | 8.74 | 1408.56 |
| 103 | 58.97 | 35.11 | 696.64 | 0.71 | 0.73 | 1409.29 |
| 104 | 59.44 | 35.31 | 700.63 | 0.24 | 1.89 | 1411.18 |
| 105 | 59.94 | 35.52 | 704.83 | 0.24 | 1.00 | 1412.18 |
| 106 | 60.43 | 35.73 | 708.96 | 0.29 | 1.09 | 1413.26 |
| 107 | 60.93 | 35.94 | 713.16 | 0.42 | 1.49 | 1414.76 |
| 108 | 61.93 | 36.36 | 721.56 | 1.46 | 7.90 | 1422.66 |
| 109 | 62.93 | 36.79 | 729.96 | 2.23 | 15.48 | 1438.14 |

Mesocosm 2 - 15% Trial

Nitrogen

| Sample | Years of Watershed N | Influent TN | Influent TN | Cumulative Influent TN | TN Removal |
|---|---|---|---|---|---|
| - | (yrs) | (mg/L) | (mg) | (mg) | (mg) |
| 1 | 0.00 | 4.10 | 1.1 | 1.1 | 0.08 |
| 2 | 0.01 | 4.10 | 15.4 | 16.5 | 0.72 |
| 3 | 0.01 | 4.10 | 17.3 | 33.8 | 1.24 |
| 4 | 0.02 | 4.10 | 17.0 | 50.8 | 1.82 |
| 5 | 0.02 | 4.10 | 17.2 | 68.0 | 2.11 |
| 6 | 0.04 | 4.10 | 34.4 | 102.4 | 2.11 |
| 7 | 0.05 | 4.10 | 34.4 | 136.8 | 2.11 |
| 8 | 0.06 | 4.10 | 34.4 | 171.3 | 2.11 |
| 9 | 0.08 | 4.10 | 34.4 | 205.7 | 2.11 |
| 10 | 0.08 | 3.45 | 1.3 | 207.0 | 2.11 |
| 11 | 0.09 | 3.45 | 13.9 | 220.9 | 2.11 |
| 12 | 0.10 | 3.45 | 14.2 | 235.1 | 2.11 |
| 13 | 0.11 | 3.45 | 14.5 | 249.7 | 2.11 |
| 14 | 0.12 | 3.45 | 14.5 | 264.2 | 2.11 |
| 15 | 0.13 | 3.45 | 29.0 | 293.2 | 2.11 |
| 16 | 0.15 | 3.45 | 29.0 | 322.1 | 2.11 |
| 17 | 0.16 | 3.45 | 14.5 | 336.6 | 2.11 |
| 18 | 0.17 | 3.45 | 18.6 | 355.2 | 2.11 |
| 19 | 0.17 | 4.02 | 1.3 | 356.5 | 2.11 |
| 20 | 0.17 | 4.02 | 16.2 | 372.7 | 3.51 |
| 21 | 0.18 | 4.02 | 16.9 | 389.6 | 3.74 |
| 22 | 0.18 | 4.02 | 16.7 | 406.3 | 3.74 |
| 23 | 0.19 | 4.02 | 16.8 | 423.1 | 3.74 |
| 24 | 0.20 | 4.02 | 33.6 | 456.7 | 3.74 |
| 25 | 0.22 | 4.02 | 33.8 | 490.4 | 3.74 |
| 26 | 0.23 | 4.02 | 36.6 | 527.0 | 3.74 |
| 27 | 0.23 | 3.93 | 1.4 | 528.4 | 3.91 |
| 28 | 0.23 | 3.93 | 15.9 | 544.3 | 8.68 |
| 29 | 0.24 | 3.93 | 16.5 | 560.8 | 13.49 |
| 30 | 0.24 | 3.93 | 17.0 | 577.9 | 18.66 |
| 31 | 0.25 | 3.93 | 15.9 | 593.8 | 23.52 |
| 32 | 0.25 | 3.93 | 33.8 | 627.6 | 33.47 |
| 33 | 0.26 | 3.93 | 32.2 | 659.8 | 42.28 |
| 34 | 0.27 | 3.93 | 26.7 | 686.4 | 47.70 |
| 35 | 0.27 | 4.01 | 1.4 | 687.8 | 48.22 |
| 36 | 0.27 | 4.01 | 16.1 | 704.0 | 57.11 |
| 37 | 0.28 | 4.01 | 16.8 | 720.7 | 65.51 |
| 38 | 0.28 | 4.01 | 16.8 | 737.5 | 73.62 |
| 39 | 0.28 | 4.01 | 16.8 | 754.4 | 81.74 |
| 40 | 0.29 | 4.01 | 33.7 | 788.0 | 97.42 |
| 41 | 0.30 | 4.01 | 33.7 | 821.7 | 109.32 |
| 42 | 0.31 | 4.01 | 33.7 | 855.4 | 117.09 |
| 43 | 0.31 | 4.13 | 2.1 | 857.6 | 118.05 |

Mesocosm 2 - 15% Trial
Nitrogen

| Sample | Years of Watershed N | Influent TN | Influent TN | Cumulative Influent TN | TN Removal |
|---|---|---|---|---|---|
| - | (yrs) | (mg/L) | (mg) | (mg) | (mg) |
| 44 | 0.31 | 4.13 | 32.8 | 890.3 | 139.00 |
| 45 | 0.32 | 4.13 | 35.6 | 926.0 | 159.90 |
| 46 | 0.32 | 4.13 | 43.4 | 969.3 | 179.78 |
| 47 | 0.33 | 4.13 | 26.8 | 996.1 | 186.75 |
| 48 | 0.35 | 4.13 | 68.1 | 1064.2 | 198.60 |
| 49 | 0.37 | 4.13 | 69.4 | 1133.6 | 208.34 |
| 50 | 0.40 | 4.13 | 69.4 | 1203.0 | 216.21 |
| 51 | 0.41 | 4.13 | 41.6 | 1244.7 | 219.26 |
| 52 | 0.41 | 4.03 | 0.9 | 1245.5 | 219.57 |
| 53 | 0.41 | 4.03 | 8.2 | 1253.7 | 225.65 |
| 54 | 0.41 | 4.03 | 8.6 | 1262.3 | 232.35 |
| 55 | 0.41 | 4.03 | 8.5 | 1270.8 | 238.72 |
| 56 | 0.41 | 4.03 | 8.3 | 1279.1 | 245.07 |
| 57 | 0.41 | 4.03 | 9.6 | 1288.7 | 252.51 |
| 58 | 0.41 | 4.15 | 1.1 | 1289.8 | 253.39 |
| 59 | 0.42 | 4.15 | 17.7 | 1307.5 | 267.71 |
| 60 | 0.42 | 4.15 | 17.7 | 1325.3 | 283.04 |
| 61 | 0.42 | 4.15 | 16.9 | 1342.1 | 297.46 |
| 62 | 0.42 | 4.15 | 17.4 | 1359.6 | 311.87 |
| 63 | 0.42 | 4.15 | 34.3 | 1393.9 | 331.34 |
| 64 | 0.43 | 4.15 | 17.2 | 1411.0 | 336.49 |
| 65 | 0.43 | 4.38 | 0.9 | 1411.9 | 337.01 |
| 66 | 0.43 | 4.38 | 18.2 | 1430.2 | 353.27 |
| 67 | 0.43 | 4.38 | 18.2 | 1448.4 | 369.83 |
| 68 | 0.43 | 4.38 | 18.4 | 1466.8 | 386.14 |
| 69 | 0.43 | 4.38 | 18.4 | 1485.2 | 400.04 |
| 70 | 0.44 | 4.38 | 38.6 | 1523.9 | 418.36 |
| 71 | 0.45 | 4.38 | 35.3 | 1559.1 | 428.50 |
| 72 | 0.45 | 4.38 | 10.1 | 1569.3 | 431.11 |
| 73 | 0.45 | 4.47 | 2.2 | 1571.4 | 432.29 |
| 74 | 0.45 | 4.47 | 18.1 | 1589.6 | 448.17 |
| 75 | 0.45 | 4.47 | 18.1 | 1607.7 | 464.66 |
| 76 | 0.45 | 4.47 | 37.2 | 1644.9 | 497.81 |
| 77 | 0.46 | 4.47 | 37.8 | 1682.7 | 528.61 |
| 78 | 0.46 | 4.47 | 36.6 | 1719.3 | 554.24 |
| 79 | 0.46 | 4.47 | 8.4 | 1727.8 | 559.51 |
| 80 | 0.46 | 4.29 | 1.2 | 1729.0 | 560.38 |
| 81 | 0.46 | 4.29 | 17.7 | 1746.7 | 575.94 |
| 82 | 0.46 | 4.29 | 17.7 | 1764.4 | 592.29 |
| 83 | 0.46 | 4.29 | 18.0 | 1782.5 | 608.86 |
| 84 | 0.46 | 4.29 | 18.0 | 1800.5 | 625.30 |
| 85 | 0.47 | 4.29 | 36.1 | 1836.6 | 650.91 |
| 86 | 0.48 | 4.29 | 37.3 | 1873.8 | 667.44 |

Mesocosm 2 - 15% Trial
Nitrogen

| Sample | Years of Watershed N | Influent TN | Influent TN | Cumulative Influent TN | TN Removal |
|---|---|---|---|---|---|
| - | (yrs) | (mg/L) | (mg) | (mg) | (mg) |
| 87 | 0.48 | 4.29 | 30.1 | 1903.9 | 677.95 |
| 88 | 0.48 | 4.20 | 2.1 | 1906.0 | 679.10 |
| 89 | 0.48 | 4.20 | 16.5 | 1922.4 | 693.14 |
| 90 | 0.48 | 4.20 | 17.7 | 1940.1 | 709.37 |
| 91 | 0.48 | 4.20 | 17.4 | 1957.5 | 725.10 |
| 92 | 0.49 | 4.20 | 17.7 | 1975.1 | 740.88 |
| 93 | 0.49 | 4.20 | 35.3 | 2010.4 | 766.79 |
| 94 | 0.49 | 4.20 | 8.8 | 2019.2 | 771.66 |
| 95 | 0.49 | 4.63 | 1.5 | 2020.8 | 772.79 |
| 96 | 0.49 | 4.63 | 37.9 | 2058.7 | 808.19 |
| 97 | 0.49 | 4.63 | 19.4 | 2078.1 | 826.49 |
| 98 | 0.49 | 4.63 | 19.4 | 2097.6 | 842.60 |
| 99 | 0.50 | 4.63 | 19.4 | 2117.0 | 855.50 |
| 100 | 0.50 | 4.63 | 19.4 | 2136.4 | 866.77 |
| 101 | 0.50 | 4.63 | 38.9 | 2175.3 | 886.78 |
| 102 | 0.51 | 4.63 | 15.6 | 2190.9 | 893.59 |
| 103 | 0.51 | 4.47 | 1.9 | 2192.8 | 894.77 |
| 104 | 0.51 | 4.47 | 17.8 | 2210.6 | 910.72 |
| 105 | 0.51 | 4.47 | 18.8 | 2229.4 | 928.50 |
| 106 | 0.51 | 4.47 | 18.5 | 2247.9 | 945.87 |
| 107 | 0.51 | 4.47 | 18.8 | 2266.6 | 963.16 |
| 108 | 0.51 | 4.47 | 37.6 | 2304.2 | 992.81 |
| 109 | 0.52 | 4.47 | 37.6 | 2341.8 | 1014.88 |

Mesocosm 2 - 15% Trial
Nitrogen

| Sample | Net Export | pH | Eh |
|---|---|---|---|
| - | (mg) | - | (mV) |
| 1 | 0.99 | 7.40 | 209 |
| 2 | 15.09 | 7.38 | 229 |
| 3 | 31.32 | 7.38 | 239 |
| 4 | 47.14 | 7.35 | 246 |
| 5 | 63.77 | 7.36 | 250 |
| 6 | 98.65 | 7.37 | 251 |
| 7 | 135.45 | 7.36 | 251 |
| 8 | 174.64 | 7.37 | 253 |
| 9 | 215.72 | 6.78 | 255 |
| 10 | 217.50 | 7.39 | -8 |
| 11 | 240.50 | 7.33 | 5 |
| 12 | 266.54 | 7.25 | 16 |
| 13 | 293.46 | 7.26 | 52 |
| 14 | 318.06 | 7.24 | 105 |
| 15 | 362.77 | 7.28 | 180 |
| 16 | 407.03 | 7.29 | 218 |
| 17 | 428.99 | 7.31 | 231 |
| 18 | 457.06 | 6.56 | 239 |
| 19 | 458.57 | 7.21 | -523 |
| 20 | 471.99 | 7.20 | -480 |
| 21 | 488.43 | 7.23 | -423 |
| 22 | 505.32 | 7.20 | -351 |
| 23 | 522.30 | 7.19 | -189 |
| 24 | 556.95 | 7.11 | 17 |
| 25 | 592.39 | 7.22 | 57 |
| 26 | 630.77 | 7.23 | 74 |
| 27 | 631.82 | 7.16 | -412 |
| 28 | 638.22 | 7.14 | -415 |
| 29 | 645.10 | 7.15 | -407 |
| 30 | 651.80 | 7.25 | -407 |
| 31 | 658.02 | 7.16 | -398 |
| 32 | 671.92 | 7.18 | -317 |
| 33 | 686.47 | 7.18 | -159 |
| 34 | 702.30 | 7.20 | -24 |
| 35 | 702.65 | 7.08 | -440 |
| 36 | 701.00 | 7.10 | -436 |
| 37 | 700.96 | 7.10 | -433 |
| 38 | 701.54 | 7.10 | -419 |
| 39 | 702.14 | 7.11 | -387 |
| 40 | 704.48 | 7.14 | -317 |
| 41 | 714.37 | 7.21 | 2 |
| 42 | 732.50 | 7.21 | 35 |
| 43 | 732.72 | 7.02 | -314 |

Mesocosm 2 - 15% Trial
Nitrogen

| Sample | Net Export | pH | Eh |
|---|---|---|---|
| - | (mg) | - | (mV) |
| 44 | 723.60 | 7.01 | -229 |
| 45 | 717.43 | 7.04 | -231 |
| 46 | 721.05 | 7.06 | -7 |
| 47 | 733.91 | 7.07 | 42 |
| 48 | 778.28 | 7.09 | 74 |
| 49 | 828.20 | 7.07 | 73 |
| 50 | 881.88 | 7.12 | 65 |
| 51 | 917.41 | 7.11 | 44 |
| 52 | 917.65 | 6.76 | 131 |
| 53 | 913.68 | 6.79 | 132 |
| 54 | 908.87 | 6.81 | 124 |
| 55 | 904.59 | 6.84 | 141 |
| 56 | 900.22 | 6.87 | 146 |
| 57 | 894.92 | 6.88 | N/A |
| 58 | 894.31 | N/A | -126 |
| 59 | 883.40 | N/A | -101 |
| 60 | 870.46 | N/A | -99 |
| 61 | 858.49 | N/A | -95 |
| 62 | 847.10 | N/A | -81 |
| 63 | 842.48 | N/A | -4 |
| 64 | 849.33 | N/A | -2 |
| 65 | 849.18 | 6.85 | -162 |
| 66 | 834.89 | 6.85 | -165 |
| 67 | 820.03 | 6.84 | -153 |
| 68 | 805.81 | 6.82 | -141 |
| 69 | 796.42 | 6.84 | -92 |
| 70 | 798.41 | 6.87 | -53 |
| 71 | 813.40 | 6.90 | -35 |
| 72 | 818.30 | 6.90 | -21 |
| 73 | 818.10 | 6.92 | -159 |
| 74 | 804.48 | 6.68 | -128 |
| 75 | 789.64 | 6.66 | -114 |
| 76 | 760.54 | 6.63 | -81 |
| 77 | 736.79 | 6.64 | -54 |
| 78 | 722.11 | 6.67 | -40 |
| 79 | 720.02 | 6.69 | -32 |
| 80 | 719.50 | 6.37 | -253 |
| 81 | 706.11 | 6.48 | -224 |
| 82 | 691.15 | 6.56 | -221 |
| 83 | 676.03 | 6.58 | -203 |
| 84 | 661.18 | 6.57 | -171 |
| 85 | 646.01 | 6.63 | -2 |
| 86 | 650.23 | 6.70 | 54 |

Mesocosm 2 - 15% Trial
Nitrogen

| Sample | Net Export | pH | Eh |
|---|---|---|---|
| - | (mg) | - | (mV) |
| 87 | 659.25 | 6.73 | 74 |
| 88 | 659.05 | 6.67 | -142 |
| 89 | 647.44 | 6.70 | -120 |
| 90 | 632.63 | 6.69 | -104 |
| 91 | 618.52 | 6.69 | -96 |
| 92 | 604.61 | 6.68 | -86 |
| 93 | 588.10 | 6.70 | -47 |
| 94 | 587.18 | 6.69 | -41 |
| 95 | 586.47 | 6.83 | -179 |
| 96 | 553.56 | 6.60 | -148 |
| 97 | 536.41 | 6.57 | -140 |
| 98 | 523.63 | 6.55 | -56 |
| 99 | 517.27 | 6.57 | -32 |
| 100 | 514.18 | 6.58 | -25 |
| 101 | 513.04 | 6.57 | -14 |
| 102 | 514.97 | 6.60 | -9 |
| 103 | 514.52 | N/A | -214 |
| 104 | 500.46 | N/A | -190 |
| 105 | 483.68 | N/A | -149 |
| 106 | 467.39 | N/A | -128 |
| 107 | 451.60 | N/A | -111 |
| 108 | 429.85 | N/A | -34 |
| 109 | 423.26 | N/A | -8 |

Mesocosm 2 - 15% Trial
Nitrogen Speciation

| Sample | Ammonium | Ammonium | Cumulative Ammonium | Nitrate |
|---|---|---|---|---|
| - | (mg/L) | (mg) | (mg) | (mg/L) |
| 1 | 0.41 | 0.1 | 0.1 | 1.68 |
| 2 | 0.50 | 1.7 | 1.8 | 1.74 |
| 5 | 0.57 | 6.7 | 8.6 | 1.80 |
| 6 | 0.81 | 5.8 | 14.4 | 1.80 |
| 9 | 0.47 | 16.2 | 30.5 | 1.97 |
| 10 | 0.70 | 0.2 | 30.7 | 0.54 |
| 11 | 1.34 | 4.1 | 34.8 | 0.80 |
| 14 | 1.49 | 17.8 | 52.6 | 0.95 |
| 18 | 1.78 | 43.1 | 95.7 | 1.30 |
| 19 | 1.15 | 0.5 | 96.2 | 0.00 |
| 20 | 1.57 | 5.5 | 101.7 | 0.00 |
| 23 | 1.54 | 19.5 | 121.1 | 0.11 |
| 26 | 1.74 | 42.4 | 163.5 | 1.49 |
| 27 | 0.90 | 0.5 | 164.0 | 0.26 |
| 30 | 1.26 | 13.6 | 177.6 | 0.00 |
| 32 | 1.24 | 15.8 | 193.4 | 0.30 |
| 34 | 1.78 | 22.6 | 216.0 | 1.12 |
| 35 | 0.71 | 0.4 | 216.4 | 0.00 |
| 38 | 1.01 | 10.6 | 227.1 | 0.00 |
| 40 | 0.96 | 12.4 | 239.5 | 0.21 |
| 42 | 0.84 | 15.1 | 254.5 | 1.21 |
| 43 | 0.32 | 0.3 | 254.8 | 0.00 |
| 47 | 0.43 | 12.7 | 267.5 | 1.32 |
| 49 | 0.54 | 16.2 | 283.7 | 1.71 |
| 51 | 0.54 | 14.5 | 298.2 | 1.70 |
| 52 | 0.07 | 0.1 | 298.3 | 0.00 |
| 54 | 0.47 | 1.1 | 299.4 | 0.00 |
| 56 | 0.35 | 1.7 | 301.1 | 0.00 |
| 58 | 0.05 | 0.5 | 301.6 | 0.00 |
| 60 | 0.05 | 0.4 | 302.1 | 0.00 |
| 62 | 0.13 | 0.8 | 302.8 | 0.35 |
| 64 | 1.50 | 10.1 | 312.9 | 1.97 |
| 65 | 0.04 | 0.2 | 313.1 | 0.00 |
| 68 | 0.07 | 0.7 | 313.8 | 0.22 |
| 70 | 0.37 | 2.9 | 316.7 | 1.69 |
| 72 | 0.56 | 4.8 | 321.5 | 1.92 |
| 73 | 0.01 | 0.1 | 321.6 | 0.30 |
| 75 | 0.01 | 0.1 | 321.7 | 0.00 |
| 77 | 0.24 | 2.1 | 323.8 | 0.63 |
| 79 | 0.48 | 3.7 | 327.5 | 1.19 |
| 80 | 0.00 | 0.1 | 327.6 | 0.00 |
| 83 | 0.00 | 0.0 | 327.6 | 0.00 |
| 85 | 1.16 | 7.3 | 334.9 | 0.84 |
| 87 | 1.60 | 21.7 | 356.6 | 1.20 |
| 88 | 0.05 | 0.4 | 357.0 | 0.00 |
| 90 | 0.00 | 0.2 | 357.2 | 0.00 |

Mesocosm 2 - 15% Trial
Nitrogen Speciation

| Sample | Ammonium | Ammonium | Cumulative Ammonium | Nitrate |
|---|---|---|---|---|
| - | (mg/L) | (mg) | (mg) | (mg/L) |
| 92 | 0.00 | 0.0 | 357.2 | 0.23 |
| 94 | 0.29 | 1.5 | 358.7 | 1.28 |
| 95 | 0.00 | 0.0 | 358.7 | 0.00 |
| 98 | 0.00 | 0.0 | 358.7 | 1.03 |
| 100 | 0.00 | 0.0 | 358.7 | 1.84 |
| 102 | 0.00 | 0.0 | 358.7 | 2.56 |
| 103 | 0.00 | 0.0 | 358.7 | 0.00 |
| 105 | 0.00 | 0.0 | 358.7 | 0.00 |
| 107 | 0.05 | 0.2 | 358.9 | 0.19 |
| 109 | 0.36 | 3.5 | 362.4 | 1.46 |

Mesocosm 2 - 15% Trial
Nitrogen Speciation

| Sample | Nitrate | Cumulative Nitrate | Nitrite |
|---|---|---|---|
| - | (mg) | (mg) | (mg/L) |
| 1 | 0.5 | 0.5 | 0.01 |
| 2 | 6.4 | 6.9 | 0.01 |
| 5 | 22.2 | 29.1 | 0.01 |
| 6 | 15.1 | 44.2 | 0.01 |
| 9 | 47.6 | 91.8 | 0.01 |
| 10 | 0.4 | 92.2 | 0.21 |
| 11 | 2.7 | 94.9 | 0.18 |
| 14 | 11.0 | 105.9 | 0.12 |
| 18 | 29.7 | 135.6 | 0.03 |
| 19 | 0.2 | 135.8 | 0.01 |
| 20 | 0.0 | 135.8 | 0.01 |
| 23 | 0.7 | 136.5 | 0.02 |
| 26 | 20.6 | 157.1 | 0.03 |
| 27 | 0.3 | 157.4 | 0.01 |
| 30 | 1.6 | 159.1 | 0.01 |
| 32 | 1.9 | 161.0 | 0.01 |
| 34 | 10.7 | 171.7 | 0.03 |
| 35 | 0.2 | 171.9 | 0.01 |
| 38 | 0.0 | 171.9 | 0.01 |
| 40 | 1.3 | 173.2 | 0.02 |
| 42 | 11.9 | 185.1 | 0.05 |
| 43 | 0.3 | 185.4 | 0.01 |
| 47 | 22.2 | 207.6 | 0.01 |
| 49 | 50.5 | 258.1 | 0.03 |
| 51 | 45.8 | 303.9 | 0.02 |
| 52 | 0.2 | 304.1 | 0.01 |
| 54 | 0.0 | 304.1 | 0.01 |
| 56 | 0.0 | 304.1 | 0.01 |
| 58 | 0.0 | 304.1 | 0.01 |
| 60 | 0.0 | 304.1 | 0.01 |
| 62 | 1.4 | 305.5 | 0.01 |
| 64 | 14.4 | 319.9 | 0.01 |
| 65 | 0.2 | 320.1 | 0.01 |
| 68 | 1.3 | 321.5 | 0.01 |
| 70 | 12.4 | 333.9 | 0.02 |
| 72 | 18.7 | 352.6 | 0.03 |
| 73 | 0.5 | 353.1 | 0.01 |
| 75 | 1.2 | 354.3 | 0.01 |
| 77 | 5.3 | 359.6 | 0.02 |
| 79 | 9.2 | 368.8 | 0.03 |
| 80 | 0.2 | 369.0 | 0.00 |
| 83 | 0.0 | 369.0 | 0.00 |
| 85 | 5.3 | 374.3 | 0.00 |
| 87 | 16.0 | 390.2 | 0.00 |
| 88 | 0.3 | 390.5 | 0.01 |
| 90 | 0.0 | 390.5 | 0.01 |

Mesocosm 2 - 15% Trial
Nitrogen Speciation

| Sample | Nitrate | Cumulative Nitrate | Nitrite |
|---|---|---|---|
| - | (mg) | (mg) | (mg/L) |
| 92 | 0.9 | 391.5 | 0.01 |
| 94 | 7.9 | 399.4 | 0.01 |
| 95 | 0.2 | 399.6 | 0.01 |
| 98 | 8.6 | 408.2 | 0.01 |
| 100 | 12.1 | 420.3 | 0.01 |
| 102 | 25.9 | 446.1 | 0.01 |
| 103 | 0.5 | 446.7 | 0.01 |
| 105 | 0.0 | 446.7 | 0.01 |
| 107 | 0.8 | 447.5 | 0.01 |
| 109 | 13.9 | 461.3 | 0.01 |

Mesocosm 2 - 15% Trial
Nitrogen Speciation

| Sample | Org N | Org N | Cumulative Org N |
|---|---|---|---|
| - | (mg/L) | (mg) | (mg) |
| 1 | 1.72 | 0.5 | 0.5 |
| 2 | 1.80 | 6.6 | 7.1 |
| 5 | 1.66 | 21.7 | 28.8 |
| 6 | 1.63 | 13.8 | 42.6 |
| 9 | 2.49 | 52.0 | 94.6 |
| 10 | 3.75 | 1.1 | 95.7 |
| 11 | 3.89 | 15.4 | 111.1 |
| 14 | 2.77 | 41.8 | 153.0 |
| 18 | 2.08 | 64.0 | 217.0 |
| 19 | 2.31 | 0.8 | 217.8 |
| 20 | 2.30 | 9.3 | 227.1 |
| 23 | 2.38 | 29.3 | 256.4 |
| 26 | 1.00 | 43.7 | 300.1 |
| 27 | 1.56 | 0.4 | 300.5 |
| 30 | 1.42 | 18.8 | 319.3 |
| 32 | 1.22 | 16.7 | 335.9 |
| 34 | 0.39 | 12.0 | 348.0 |
| 35 | 0.93 | 0.2 | 348.2 |
| 38 | 1.09 | 12.5 | 360.7 |
| 40 | 1.06 | 13.5 | 374.2 |
| 42 | 1.12 | 18.3 | 392.5 |
| 43 | 0.94 | 0.5 | 393.0 |
| 47 | 1.57 | 42.1 | 435.2 |
| 49 | 1.34 | 48.4 | 483.6 |
| 51 | 1.69 | 40.7 | 524.2 |
| 52 | 1.20 | 0.3 | 524.5 |
| 54 | 0.50 | 3.5 | 528.1 |
| 56 | 0.55 | 2.2 | 530.2 |
| 58 | 0.96 | 2.0 | 532.3 |
| 60 | 0.49 | 6.2 | 538.5 |
| 62 | 0.30 | 3.2 | 541.7 |
| 64 | 0.00 | 1.8 | 543.5 |
| 65 | 0.52 | 0.1 | 543.6 |
| 68 | 0.27 | 5.0 | 548.6 |
| 70 | 0.95 | 8.0 | 556.5 |
| 72 | 0.78 | 8.9 | 565.5 |
| 73 | 0.42 | 0.3 | 565.8 |
| 75 | 0.42 | 3.4 | 569.2 |
| 77 | 0.23 | 5.4 | 574.6 |
| 79 | 0.10 | 1.7 | 576.3 |
| 80 | 0.73 | 0.1 | 576.4 |
| 83 | 0.34 | 6.7 | 583.1 |
| 85 | 0.07 | 2.6 | 585.7 |
| 87 | 0.07 | 1.1 | 586.9 |
| 88 | 0.90 | 0.2 | 587.1 |
| 90 | 0.39 | 5.2 | 592.4 |

Mesocosm 2 - 15% Trial
Nitrogen Speciation

| Sample | Org N | Org N | Cumulative Org N |
|---|---|---|---|
| - | (mg/L) | (mg) | (mg) |
| 92 | 0.27 | 2.7 | 595.1 |
| 94 | 0.44 | 3.7 | 598.9 |
| 95 | 0.36 | 0.1 | 599.0 |
| 98 | 0.25 | 5.1 | 604.1 |
| 100 | 0.22 | 1.9 | 606.0 |
| 102 | 0.21 | 2.5 | 608.5 |
| 103 | 0.71 | 0.2 | 608.7 |
| 105 | 0.23 | 3.9 | 612.6 |
| 107 | 0.17 | 1.7 | 614.3 |
| 109 | 0.40 | 4.8 | 619.0 |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | Run | Flow | Date | Start Time | End Time |
|---|---|---|---|---|---|
| - | - | - | - | - | - |
| 1 | 1 | 140 | 1/8/2016 | 12:14:00 PM | 12:22:00 PM |
| 2 | 1 | 140 | 1/8/2016 | 12:44:00 PM | 12:45:35 PM |
| 3 | 1 | 140 | 1/8/2016 | 1:14:00 PM | 1:15:50 PM |
| 4 | 1 | 140 | 1/8/2016 | 1:44:00 PM | 1:45:00 PM |
| 5 | 1 | 140 | 1/8/2016 | 2:14:00 PM | 2:15:00 PM |
| 6 | 1 | 140 | 1/8/2016 | 3:14:00 PM | 3:15:00 PM |
| 7 | 1 | 140 | 1/8/2016 | 4:14:00 PM | 4:15:00 PM |
| 8 | 1 | 140 | 1/8/2016 | 5:14:00 PM | 5:15:00 PM |
| 9 | 1 | 140 | 1/8/2016 | 6:14:00 PM | 6:15:00 PM |
| 10 | 2 | 140 | 1/14/2016 | 11:26:00 AM | 11:31:00 AM |
| 11 | 2 | 140 | 1/14/2016 | 11:56:00 AM | 11:58:35 AM |
| 12 | 2 | 140 | 1/14/2016 | 12:26:00 PM | 12:27:30 PM |
| 13 | 2 | 140 | 1/14/2016 | 12:56:00 PM | 12:57:47 PM |
| 14 | 2 | 140 | 1/14/2016 | 1:26:00 PM | 1:28:00 PM |
| 15 | 2 | 140 | 1/14/2016 | 2:26:00 PM | 2:28:00 PM |
| 16 | 2 | 140 | 1/14/2016 | 3:26:00 PM | 3:28:00 PM |
| 17 | 2 | 140 | 1/14/2016 | 3:56:00 PM | 3:58:00 PM |
| 18 | 2 | 140 | 1/14/2016 | 4:35:00 PM | 4:36:00 PM |
| 19 | 3 | 140 | 1/20/2016 | 12:25:00 PM | 12:30:00 PM |
| 20 | 3 | 140 | 1/20/2016 | 12:55:00 PM | 12:57:40 PM |
| 21 | 3 | 140 | 1/20/2016 | 1:25:15 PM | 1:27:30 PM |
| 22 | 3 | 140 | 1/20/2016 | 1:55:00 PM | 1:57:00 PM |
| 23 | 3 | 140 | 1/20/2016 | 2:25:00 PM | 2:26:40 PM |
| 24 | 3 | 140 | 1/20/2016 | 3:25:00 PM | 3:26:00 PM |
| 25 | 3 | 140 | 1/20/2016 | 4:25:00 PM | 4:26:00 PM |
| 26 | 3 | 140 | 1/20/2016 | 5:30:00 PM | 5:31:00 PM |
| 27 | 4 | 140 | 1/28/2016 | 1:28:00 PM | 1:33:00 PM |
| 28 | 4 | 140 | 1/28/2016 | 1:58:00 PM | 2:01:00 PM |
| 29 | 4 | 140 | 1/28/2016 | 2:28:00 PM | 2:31:00 PM |
| 30 | 4 | 140 | 1/28/2016 | 2:59:00 PM | 3:02:00 PM |
| 31 | 4 | 140 | 1/28/2016 | 3:28:00 PM | 3:31:00 PM |
| 32 | 4 | 140 | 1/28/2016 | 4:30:00 PM | 4:32:00 PM |
| 33 | 4 | 140 | 1/28/2016 | 5:28:00 PM | 5:31:00 PM |
| 34 | 4 | 140 | 1/28/2016 | 6:17:00 PM | 6:19:00 PM |
| 35 | 5 | 140 | 2/5/2016 | 11:15:00 AM | 11:20:00 AM |
| 36 | 5 | 140 | 2/5/2016 | 11:45:00 AM | 11:47:30 AM |
| 37 | 5 | 140 | 2/5/2016 | 12:15:00 PM | 12:17:10 PM |
| 38 | 5 | 140 | 2/5/2016 | 12:45:00 PM | 12:47:00 PM |
| 39 | 5 | 140 | 2/5/2016 | 1:15:00 PM | 1:17:00 PM |
| 40 | 5 | 140 | 2/5/2016 | 2:15:00 PM | 2:17:00 PM |
| 41 | 5 | 140 | 2/5/2016 | 3:15:00 PM | 3:17:00 PM |
| 42 | 5 | 140 | 2/5/2016 | 4:15:00 PM | 4:17:00 PM |
| 43 | 6 | 280 | 2/11/2016 | 10:48:00 AM | 10:51:45 AM |
| 44 | 6 | 280 | 2/11/2016 | 11:18:00 AM | 11:18:25 AM |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | Run | Flow | Date | Start Time | End Time |
|---|---|---|---|---|---|
| - | - | - | - | - | - |
| 45 | 6 | 280 | 2/11/2016 | 11:48:00 AM | 11:50:01 AM |
| 46 | 6 | 280 | 2/11/2016 | 12:26:00 PM | 12:27:00 PM |
| 47 | 6 | 280 | 2/11/2016 | 12:49:00 PM | 12:50:20 PM |
| 48 | 6 | 280 | 2/11/2016 | 1:48:00 PM | 1:49:00 PM |
| 49 | 6 | 280 | 2/11/2016 | 2:48:00 PM | 2:49:00 PM |
| 50 | 6 | 280 | 2/11/2016 | 3:48:00 PM | 3:49:00 PM |
| 51 | 6 | 280 | 2/11/2016 | 4:24:00 PM | 4:25:00 PM |
| 52 | 7 | 70 | 2/19/2016 | 2:48:00 PM | 2:54:00 PM |
| 53 | 7 | 70 | 2/19/2016 | 3:18:00 PM | 3:22:00 PM |
| 54 | 7 | 70 | 2/19/2016 | 3:48:00 PM | 3:53:00 PM |
| 55 | 7 | 70 | 2/19/2016 | 4:18:00 PM | 4:23:00 PM |
| 56 | 7 | 70 | 2/19/2016 | 4:48:00 PM | 4:52:00 PM |
| 57 | 7 | 70 | 2/19/2016 | 5:23:00 PM | 5:25:00 PM |
| 58 | 8 | 140 | 3/7/2016 | 1:54:00 PM | 1:58:00 PM |
| 59 | 8 | 140 | 3/7/2016 | 2:25:00 PM | 2:28:00 PM |
| 60 | 8 | 140 | 3/7/2016 | 2:56:00 PM | 2:58:00 PM |
| 61 | 8 | 140 | 3/7/2016 | 3:24:00 PM | 3:28:00 PM |
| 62 | 8 | 140 | 3/7/2016 | 3:54:00 PM | 3:58:00 PM |
| 63 | 8 | 140 | 3/7/2016 | 4:54:00 PM | 4:56:00 PM |
| 64 | 8 | 140 | 3/7/2016 | 5:24:00 PM | 5:25:00 PM |
| 65 | 9 | 140 | 3/17/2016 | 12:56:00 PM | 12:59:00 PM |
| 66 | 9 | 140 | 3/17/2016 | 1:26:00 PM | 1:28:30 PM |
| 67 | 9 | 140 | 3/17/2016 | 1:56:00 PM | 1:58:00 PM |
| 68 | 9 | 140 | 3/17/2016 | 2:26:00 PM | 2:28:00 PM |
| 69 | 9 | 140 | 3/17/2016 | 2:56:00 PM | 2:58:00 PM |
| 70 | 9 | 140 | 3/17/2016 | 3:59:00 PM | 4:01:00 PM |
| 71 | 9 | 140 | 3/17/2016 | 4:56:00 PM | 4:59:00 PM |
| 72 | 9 | 140 | 3/17/2016 | 5:13:00 PM | 5:15:00 PM |
| 73 | 10 | 140 | 3/24/2016 | 12:43:00 PM | 12:50:00 PM |
| 74 | 10 | 140 | 3/24/2016 | 1:14:00 PM | 1:17:00 PM |
| 75 | 10 | 140 | 3/24/2016 | 1:43:00 PM | 1:46:00 PM |
| 76 | 10 | 140 | 3/24/2016 | 2:43:00 PM | 2:45:00 PM |
| 77 | 10 | 140 | 3/24/2016 | 3:43:00 PM | 3:46:00 PM |
| 78 | 10 | 140 | 3/24/2016 | 4:42:00 PM | 4:44:00 PM |
| 79 | 10 | 140 | 3/24/2016 | 4:55:00 PM | 4:58:00 PM |
| 80 | 11 | 140 | 3/29/2016 | 2:42:00 PM | 2:46:00 PM |
| 81 | 11 | 140 | 3/29/2016 | 3:12:00 PM | 3:15:00 PM |
| 82 | 11 | 140 | 3/29/2016 | 3:42:00 PM | 3:44:00 PM |
| 83 | 11 | 140 | 3/29/2016 | 4:12:00 PM | 4:14:00 PM |
| 84 | 11 | 140 | 3/29/2016 | 4:42:00 PM | 4:44:00 PM |
| 85 | 11 | 140 | 3/29/2016 | 5:42:00 PM | 5:44:00 PM |
| 86 | 11 | 140 | 3/29/2016 | 6:44:00 PM | 6:46:00 PM |
| 87 | 11 | 140 | 3/29/2016 | 7:34:00 PM | 7:36:00 PM |
| 88 | 12 | 140 | 4/8/2016 | 2:28:00 PM | 2:35:00 PM |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | Run | Flow | Date | Start Time | End Time |
|---|---|---|---|---|---|
| - | - | - | - | - | - |
| 89 | 12 | 140 | 4/8/2016 | 2:58:00 PM | 3:01:00 PM |
| 90 | 12 | 140 | 4/8/2016 | 3:28:00 PM | 3:31:00 PM |
| 91 | 12 | 140 | 4/8/2016 | 3:58:00 PM | 4:00:00 PM |
| 92 | 12 | 140 | 4/8/2016 | 4:28:00 PM | 4:30:00 PM |
| 93 | 12 | 140 | 4/8/2016 | 5:28:00 PM | 5:30:00 PM |
| 94 | 12 | 140 | 4/8/2016 | 5:43:00 PM | 5:45:00 PM |
| 95 | 13 | 140 | 4/13/2016 | 1:04:00 PM | 1:09:00 PM |
| 96 | 13 | 140 | 4/13/2016 | 2:04:00 PM | 2:06:00 PM |
| 97 | 13 | 140 | 4/13/2016 | 2:34:00 PM | 2:36:00 PM |
| 98 | 13 | 140 | 4/13/2016 | 3:04:00 PM | 3:06:00 PM |
| 99 | 13 | 140 | 4/13/2016 | 3:34:00 PM | 3:36:00 PM |
| 100 | 13 | 140 | 4/13/2016 | 4:04:00 PM | 4:06:00 PM |
| 101 | 13 | 140 | 4/13/2016 | 5:04:00 PM | 5:06:00 PM |
| 102 | 13 | 140 | 4/13/2016 | 5:28:00 PM | 5:30:00 PM |
| 103 | 14 | 140 | 4/20/2016 | 12:30:00 PM | 12:36:00 PM |
| 104 | 14 | 140 | 4/20/2016 | 1:00:00 PM | 1:03:00 PM |
| 105 | 14 | 140 | 4/20/2016 | 1:30:00 PM | 1:33:00 PM |
| 106 | 14 | 140 | 4/20/2016 | 2:00:00 PM | 2:02:00 PM |
| 107 | 14 | 140 | 4/20/2016 | 2:30:00 PM | 2:32:00 PM |
| 108 | 14 | 140 | 4/20/2016 | 3:30:00 PM | 3:32:00 PM |
| 109 | 14 | 140 | 4/20/2016 | 4:30:00 PM | 4:32:00 PM |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | Mesocosm Start time | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative |
|---|---|---|---|---|---|
| - | - | - | - | (hrs) | (hrs) |
| 1 | 12:14 PM | 12:14:00 PM | 12:18:00 PM | 0.07 | 0.07 |
| 2 | 12:14 PM | 12:14:00 PM | 12:44:47 PM | 0.51 | 0.51 |
| 3 | 12:14 PM | 12:14:00 PM | 1:14:55 PM | 1.02 | 1.02 |
| 4 | 12:14 PM | 12:14:00 PM | 1:44:30 PM | 1.51 | 1.51 |
| 5 | 12:14 PM | 12:14:00 PM | 2:14:30 PM | 2.01 | 2.01 |
| 6 | 12:14 PM | 12:14:00 PM | 3:14:30 PM | 3.01 | 3.01 |
| 7 | 12:14 PM | 12:14:00 PM | 4:14:30 PM | 4.01 | 4.01 |
| 8 | 12:14 PM | 12:14:00 PM | 5:14:30 PM | 5.01 | 5.01 |
| 9 | 12:14 PM | 12:14:00 PM | 6:14:30 PM | 6.01 | 6.01 |
| 10 | 10:36:00 AM | 11:26:00 AM | 11:28:30 AM | 0.88 | 6.88 |
| 11 | 10:36:00 AM | 11:26:00 AM | 11:57:18 AM | 1.35 | 7.36 |
| 12 | 10:36:00 AM | 11:26:00 AM | 12:26:45 PM | 1.85 | 7.85 |
| 13 | 10:36:00 AM | 11:26:00 AM | 12:56:53 PM | 2.35 | 8.36 |
| 14 | 10:36:00 AM | 11:26:00 AM | 1:27:00 PM | 2.85 | 8.86 |
| 15 | 10:36:00 AM | 11:26:00 AM | 2:27:00 PM | 3.85 | 9.86 |
| 16 | 10:36:00 AM | 11:26:00 AM | 3:27:00 PM | 4.85 | 10.86 |
| 17 | 10:36:00 AM | 11:26:00 AM | 3:57:00 PM | 5.35 | 11.36 |
| 18 | 10:36:00 AM | 11:26:00 AM | 4:35:30 PM | 5.99 | 12.00 |
| 19 | 11:30:00 AM | 12:25:00 PM | 12:27:30 PM | 0.96 | 12.96 |
| 20 | 11:30:00 AM | 12:25:00 PM | 12:56:20 PM | 1.44 | 13.44 |
| 21 | 11:30:00 AM | 12:25:00 PM | 1:26:23 PM | 1.94 | 13.94 |
| 22 | 11:30:00 AM | 12:25:00 PM | 1:56:00 PM | 2.43 | 14.43 |
| 23 | 11:30:00 AM | 12:25:00 PM | 2:25:50 PM | 2.93 | 14.93 |
| 24 | 11:30:00 AM | 12:25:00 PM | 3:25:30 PM | 3.93 | 15.93 |
| 25 | 11:30:00 AM | 12:25:00 PM | 4:25:30 PM | 4.93 | 16.93 |
| 26 | 11:30:00 AM | 12:25:00 PM | 5:30:30 PM | 6.01 | 18.01 |
| 27 | 12:19:00 PM | 1:28:00 PM | 1:30:30 PM | 1.19 | 19.20 |
| 28 | 12:19:00 PM | 1:28:00 PM | 1:59:30 PM | 1.68 | 19.68 |
| 29 | 12:19:00 PM | 1:28:00 PM | 2:29:30 PM | 2.18 | 20.18 |
| 30 | 12:19:00 PM | 1:28:00 PM | 3:00:30 PM | 2.69 | 20.70 |
| 31 | 12:19:00 PM | 1:28:00 PM | 3:29:30 PM | 3.18 | 21.18 |
| 32 | 12:19:00 PM | 1:28:00 PM | 4:31:00 PM | 4.20 | 22.21 |
| 33 | 12:19:00 PM | 1:28:00 PM | 5:29:30 PM | 5.18 | 23.18 |
| 34 | 12:19:00 PM | 1:28:00 PM | 6:18:00 PM | 5.98 | 23.99 |
| 35 | 10:10 AM | 11:15:00 AM | 11:17:30 AM | 1.13 | 25.12 |
| 36 | 10:10 AM | 11:15:00 AM | 11:46:15 AM | 1.60 | 25.60 |
| 37 | 10:10 AM | 11:15:00 AM | 12:16:05 PM | 2.10 | 26.09 |
| 38 | 10:10 AM | 11:15:00 AM | 12:46:00 PM | 2.60 | 26.59 |
| 39 | 10:10 AM | 11:15:00 AM | 1:16:00 PM | 3.10 | 27.09 |
| 40 | 10:10 AM | 11:15:00 AM | 2:16:00 PM | 4.10 | 28.09 |
| 41 | 10:10 AM | 11:15:00 AM | 3:16:00 PM | 5.10 | 29.09 |
| 42 | 10:10 AM | 11:15:00 AM | 4:16:00 PM | 6.10 | 30.09 |
| 43 | 10:25:00 AM | 10:48:00 AM | 10:49:52 AM | 0.41 | 30.51 |
| 44 | 10:25:00 AM | 10:48:00 AM | 11:18:12 AM | 0.89 | 30.98 |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | Mesocosm Start time | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative |
|---|---|---|---|---|---|
| - | - | - | - | (hrs) | (hrs) |
| 45 | 10:25:00 AM | 10:48:00 AM | 11:49:01 AM | 1.40 | 31.49 |
| 46 | 10:25:00 AM | 10:48:00 AM | 12:26:30 PM | 2.03 | 32.12 |
| 47 | 10:25:00 AM | 10:48:00 AM | 12:49:40 PM | 2.41 | 32.50 |
| 48 | 10:25:00 AM | 10:48:00 AM | 1:48:30 PM | 3.39 | 33.48 |
| 49 | 10:25:00 AM | 10:48:00 AM | 2:48:30 PM | 4.39 | 34.48 |
| 50 | 10:25:00 AM | 10:48:00 AM | 3:48:30 PM | 5.39 | 35.48 |
| 51 | 10:25:00 AM | 10:48:00 AM | 4:24:30 PM | 5.99 | 36.08 |
| 52 | 11:25:00 AM | 2:48:00 PM | 2:51:00 PM | 3.43 | 39.52 |
| 53 | 11:25:00 AM | 2:48:00 PM | 3:20:00 PM | 3.92 | 40.00 |
| 54 | 11:25:00 AM | 2:48:00 PM | 3:50:30 PM | 4.43 | 40.51 |
| 55 | 11:25:00 AM | 2:48:00 PM | 4:20:30 PM | 4.93 | 41.01 |
| 56 | 11:25:00 AM | 2:48:00 PM | 4:50:00 PM | 5.42 | 41.50 |
| 57 | 11:25:00 AM | 2:48:00 PM | 5:24:00 PM | 5.98 | 42.07 |
| 58 | 11:30:00 AM | 1:54:00 PM | 1:56:00 PM | 2.43 | 44.50 |
| 59 | 11:30:00 AM | 1:54:00 PM | 2:26:30 PM | 2.94 | 45.01 |
| 60 | 11:30:00 AM | 1:54:00 PM | 2:57:00 PM | 3.45 | 45.52 |
| 61 | 11:30:00 AM | 1:54:00 PM | 3:26:00 PM | 3.93 | 46.00 |
| 62 | 11:30:00 AM | 1:54:00 PM | 3:56:00 PM | 4.43 | 46.50 |
| 63 | 11:30:00 AM | 1:54:00 PM | 4:55:00 PM | 5.42 | 47.48 |
| 64 | 11:30:00 AM | 1:54:00 PM | 5:24:30 PM | 5.91 | 47.98 |
| 65 | 11:15:00 AM | 12:56:00 PM | 12:57:30 PM | 1.71 | 49.68 |
| 66 | 11:15:00 AM | 12:56:00 PM | 1:27:15 PM | 2.20 | 50.18 |
| 67 | 11:15:00 AM | 12:56:00 PM | 1:57:00 PM | 2.70 | 50.68 |
| 68 | 11:15:00 AM | 12:56:00 PM | 2:27:00 PM | 3.20 | 51.18 |
| 69 | 11:15:00 AM | 12:56:00 PM | 2:57:00 PM | 3.70 | 51.68 |
| 70 | 11:15:00 AM | 12:56:00 PM | 4:00:00 PM | 4.75 | 52.73 |
| 71 | 11:15:00 AM | 12:56:00 PM | 4:57:30 PM | 5.71 | 53.68 |
| 72 | 11:15:00 AM | 12:56:00 PM | 5:14:00 PM | 5.98 | 53.96 |
| 73 | 10:58 AM | 12:43 PM | 12:46:30 PM | 1.81 | 55.77 |
| 74 | 10:58 AM | 12:43 PM | 1:15:30 PM | 2.29 | 56.25 |
| 75 | 10:58 AM | 12:43 PM | 1:44:30 PM | 2.78 | 56.73 |
| 76 | 10:58 AM | 12:43 PM | 2:44:00 PM | 3.77 | 57.73 |
| 77 | 10:58 AM | 12:43 PM | 3:44:30 PM | 4.78 | 58.73 |
| 78 | 10:58 AM | 12:43 PM | 4:43:00 PM | 5.75 | 59.71 |
| 79 | 10:58 AM | 12:43 PM | 4:56:30 PM | 5.98 | 59.93 |
| 80 | 1:36 PM | 2:42 PM | 2:44:00 PM | 1.13 | 61.07 |
| 81 | 1:36 PM | 2:42 PM | 3:13:30 PM | 1.63 | 61.56 |
| 82 | 1:36 PM | 2:42 PM | 3:43:00 PM | 2.12 | 62.05 |
| 83 | 1:36 PM | 2:42 PM | 4:13:00 PM | 2.62 | 62.55 |
| 84 | 1:36 PM | 2:42 PM | 4:43:00 PM | 3.12 | 63.05 |
| 85 | 1:36 PM | 2:42 PM | 5:43:00 PM | 4.12 | 64.05 |
| 86 | 1:36 PM | 2:42 PM | 6:45:00 PM | 5.15 | 65.08 |
| 87 | 1:36 PM | 2:42 PM | 7:35:00 PM | 5.98 | 65.92 |
| 88 | 11:45 AM | 2:28 PM | 2:31:30 PM | 2.78 | 68.69 |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | Mesocosm Start time | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative |
|---|---|---|---|---|---|
| - | - | - | - | (hrs) | (hrs) |
| 89 | 11:45 AM | 2:28 PM | 2:59:30 PM | 3.24 | 69.16 |
| 90 | 11:45 AM | 2:28 PM | 3:29:30 PM | 3.74 | 69.66 |
| 91 | 11:45 AM | 2:28 PM | 3:59:00 PM | 4.23 | 70.15 |
| 92 | 11:45 AM | 2:28 PM | 4:29:00 PM | 4.73 | 70.65 |
| 93 | 11:45 AM | 2:28 PM | 5:29:00 PM | 5.73 | 71.65 |
| 94 | 11:45 AM | 2:28 PM | 5:44:00 PM | 5.98 | 71.90 |
| 95 | 11:30 AM | 1:04 PM | 1:06:30 PM | 1.61 | 73.51 |
| 96 | 11:30 AM | 1:04 PM | 2:05:00 PM | 2.58 | 74.48 |
| 97 | 11:30 AM | 1:04 PM | 2:35:00 PM | 3.08 | 74.98 |
| 98 | 11:30 AM | 1:04 PM | 3:05:00 PM | 3.58 | 75.48 |
| 99 | 11:30 AM | 1:04 PM | 3:35:00 PM | 4.08 | 75.98 |
| 100 | 11:30 AM | 1:04 PM | 4:05:00 PM | 4.58 | 76.48 |
| 101 | 11:30 AM | 1:04 PM | 5:05:00 PM | 5.58 | 77.48 |
| 102 | 11:30 AM | 1:04 PM | 5:29:00 PM | 5.98 | 77.88 |
| 103 | 10:30 AM | 12:30 PM | 12:33:00 PM | 2.05 | 79.93 |
| 104 | 10:30 AM | 12:30 PM | 1:01:30 PM | 2.53 | 80.41 |
| 105 | 10:30 AM | 12:30 PM | 1:31:30 PM | 3.03 | 80.91 |
| 106 | 10:30 AM | 12:30 PM | 2:01:00 PM | 3.52 | 81.40 |
| 107 | 10:30 AM | 12:30 PM | 2:31:00 PM | 4.02 | 81.90 |
| 108 | 10:30 AM | 12:30 PM | 3:31:00 PM | 5.02 | 82.90 |
| 109 | 10:30 AM | 12:30 PM | 4:31:00 PM | 6.02 | 83.90 |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | Elapsed From Drip | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TP |
|---|---|---|---|---|---|
| - | (hrs) | (hrs) | (cm) | (L) | (mg/L) |
| 1 | 0.07 | 0.07 | 0.0282 | 0.56 | 0.31 |
| 2 | 0.51 | 0.51 | 0.2173 | 4.31 | 0.32 |
| 3 | 1.02 | 1.02 | 0.4298 | 8.53 | 0.27 |
| 4 | 1.51 | 1.51 | 0.6385 | 12.67 | 0.31 |
| 5 | 2.01 | 2.01 | 0.8502 | 16.87 | 0.33 |
| 6 | 3.01 | 3.01 | 1.2735 | 25.27 | 0.38 |
| 7 | 4.01 | 4.01 | 1.6969 | 33.67 | 0.37 |
| 8 | 5.01 | 5.01 | 2.1202 | 42.07 | 0.40 |
| 9 | 6.01 | 6.01 | 2.5435 | 50.47 | 0.52 |
| 10 | 0.04 | 6.05 | 2.9139 | 57.82 | 0.17 |
| 11 | 0.52 | 6.53 | 3.1171 | 61.85 | 0.19 |
| 12 | 1.01 | 7.02 | 3.3249 | 65.98 | 0.18 |
| 13 | 1.51 | 7.52 | 3.5376 | 70.19 | 0.20 |
| 14 | 2.02 | 8.03 | 3.7500 | 74.41 | 0.17 |
| 15 | 3.02 | 9.03 | 4.1734 | 82.81 | 0.14 |
| 16 | 4.02 | 10.03 | 4.5967 | 91.21 | 0.11 |
| 17 | 4.52 | 10.53 | 4.8084 | 95.41 | 0.11 |
| 18 | 5.16 | 11.17 | 5.0800 | 100.80 | 0.15 |
| 19 | 0.04 | 11.21 | 5.4857 | 108.85 | 0.07 |
| 20 | 0.52 | 11.69 | 5.6891 | 112.89 | 0.11 |
| 21 | 1.02 | 12.19 | 5.9011 | 117.09 | 0.09 |
| 22 | 1.52 | 12.68 | 6.1101 | 121.24 | 0.08 |
| 23 | 2.01 | 13.18 | 6.3206 | 125.42 | 0.09 |
| 24 | 3.01 | 14.18 | 6.7416 | 133.77 | 0.07 |
| 25 | 4.01 | 15.18 | 7.1649 | 142.17 | 0.07 |
| 26 | 5.09 | 16.26 | 7.6235 | 151.27 | 0.09 |
| 27 | 0.04 | 16.30 | 8.1280 | 161.28 | 0.11 |
| 28 | 0.53 | 16.78 | 8.3326 | 165.34 | 0.09 |
| 29 | 1.03 | 17.28 | 8.5443 | 169.54 | 0.09 |
| 30 | 1.54 | 17.80 | 8.7630 | 173.88 | 0.1 |
| 31 | 2.03 | 18.28 | 8.9676 | 177.94 | 0.09 |
| 32 | 3.05 | 19.31 | 9.4015 | 186.55 | 0.11 |
| 33 | 4.03 | 20.28 | 9.8143 | 194.74 | 0.08 |
| 34 | 4.83 | 21.09 | 10.1565 | 201.53 | 0.09 |
| 35 | 0.04 | 21.13 | 10.6327 | 210.98 | 0.08 |
| 36 | 0.52 | 21.61 | 10.8356 | 215.01 | 0.06 |
| 37 | 1.02 | 22.11 | 11.0461 | 219.18 | 0.07 |
| 38 | 1.52 | 22.61 | 11.2571 | 223.37 | 0.07 |
| 39 | 2.02 | 23.11 | 11.4688 | 227.57 | 0.09 |
| 40 | 3.02 | 24.11 | 11.8921 | 235.97 | 0.09 |
| 41 | 4.02 | 25.11 | 12.3155 | 244.37 | 0.07 |
| 42 | 5.02 | 26.11 | 12.7388 | 252.77 | 0.08 |
| 43 | 0.03 | 26.14 | 13.0898 | 259.74 | 0.04 |
| 44 | 0.50 | 26.61 | 13.4896 | 267.67 | 0.07 |

Mesocosm 2 - 15% Trial

Phosphorus

| Sample | Elapsed From Drip | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TP |
|---|---|---|---|---|---|
| - | (hrs) | (hrs) | (cm) | (L) | (mg/L) |
| 45 | 1.02 | 27.13 | 13.9243 | 276.29 | 0.07 |
| 46 | 1.64 | 27.75 | 14.4533 | 286.79 | 0.10 |
| 47 | 2.03 | 28.14 | 14.7802 | 293.28 | 0.10 |
| 48 | 3.01 | 29.12 | 15.6104 | 309.75 | 0.10 |
| 49 | 4.01 | 30.12 | 16.4571 | 326.55 | 0.11 |
| 50 | 5.01 | 31.12 | 17.3038 | 343.35 | 0.08 |
| 51 | 5.61 | 31.72 | 17.8118 | 353.43 | 0.14 |
| 52 | 0.05 | 31.77 | 18.5385 | 367.85 | 0.09 |
| 53 | 0.53 | 32.25 | 18.6408 | 369.88 | 0.05 |
| 54 | 1.04 | 32.76 | 18.7484 | 372.02 | 0.05 |
| 55 | 1.54 | 33.26 | 18.8542 | 374.12 | 0.04 |
| 56 | 2.03 | 33.75 | 18.9583 | 376.18 | 0.04 |
| 57 | 2.60 | 34.32 | 19.0782 | 378.56 | 0.04 |
| 58 | 0.03 | 34.35 | 20.1083 | 399.00 | 0.04 |
| 59 | 0.54 | 34.86 | 20.3235 | 403.27 | 0.03 |
| 60 | 1.05 | 35.37 | 20.5387 | 407.54 | 0.03 |
| 61 | 1.53 | 35.85 | 20.7433 | 411.60 | 0.03 |
| 62 | 2.03 | 36.35 | 20.9550 | 415.80 | 0.04 |
| 63 | 3.02 | 37.33 | 21.3713 | 424.06 | 0.10 |
| 64 | 3.51 | 37.83 | 21.5794 | 428.19 | 0.11 |
| 65 | 0.03 | 37.85 | 22.3026 | 442.54 | 0.04 |
| 66 | 0.52 | 38.35 | 22.5125 | 446.71 | 0.03 |
| 67 | 1.02 | 38.84 | 22.7224 | 450.87 | 0.03 |
| 68 | 1.52 | 39.34 | 22.9341 | 455.07 | 0.03 |
| 69 | 2.02 | 39.84 | 23.1458 | 459.27 | 0.05 |
| 70 | 3.07 | 40.89 | 23.5903 | 468.09 | 0.07 |
| 71 | 4.03 | 41.85 | 23.9959 | 476.14 | 0.08 |
| 72 | 4.30 | 42.13 | 24.1124 | 478.45 | 0.08 |
| 73 | 0.06 | 42.18 | 24.8779 | 493.64 | 0.03 |
| 74 | 0.54 | 42.67 | 25.0825 | 497.70 | 0.03 |
| 75 | 1.03 | 43.15 | 25.2871 | 501.76 | 0.03 |
| 76 | 2.02 | 44.14 | 25.7069 | 510.09 | 0.03 |
| 77 | 3.03 | 45.15 | 26.1338 | 518.56 | 0.02 |
| 78 | 4.00 | 46.13 | 26.5465 | 526.75 | 0.03 |
| 79 | 4.23 | 46.35 | 26.6418 | 528.64 | 0.04 |
| 80 | 0.03 | 46.38 | 27.1216 | 538.16 | 0.04 |
| 81 | 0.52 | 46.88 | 27.3297 | 542.29 | 0.03 |
| 82 | 1.02 | 47.37 | 27.5378 | 546.42 | 0.02 |
| 83 | 1.52 | 47.87 | 27.7495 | 550.62 | 0.03 |
| 84 | 2.02 | 48.37 | 27.9612 | 554.82 | 0.02 |
| 85 | 3.02 | 49.37 | 28.3845 | 563.22 | 0.06 |
| 86 | 4.05 | 50.40 | 28.8219 | 571.90 | 0.09 |
| 87 | 4.88 | 51.23 | 29.1747 | 578.90 | 0.10 |
| 88 | 0.06 | 51.29 | 30.3495 | 602.21 | 0.04 |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | Elapsed From Drip | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TP |
|---|---|---|---|---|---|
| - | (hrs) | (hrs) | (cm) | (L) | (mg/L) |
| 89 | 0.52 | 51.76 | 30.5470 | 606.13 | 0.02 |
| 90 | 1.03 | 52.26 | 30.7587 | 610.33 | 0.03 |
| 91 | 1.52 | 52.75 | 30.9668 | 614.46 | 0.02 |
| 92 | 2.02 | 53.25 | 31.1785 | 618.66 | 0.02 |
| 93 | 3.02 | 54.25 | 31.6018 | 627.06 | 0.04 |
| 94 | 3.27 | 54.50 | 31.7077 | 629.16 | 0.05 |
| 95 | 0.04 | 54.54 | 32.3885 | 642.67 | 0.01 |
| 96 | 1.02 | 55.52 | 32.8013 | 650.86 | 0.02 |
| 97 | 1.52 | 56.02 | 33.0129 | 655.06 | 0.01 |
| 98 | 2.02 | 56.52 | 33.2246 | 659.26 | 0.05 |
| 99 | 2.52 | 57.02 | 33.4363 | 663.46 | 0.06 |
| 100 | 3.02 | 57.52 | 33.6479 | 667.66 | 0.07 |
| 101 | 4.02 | 58.52 | 34.0713 | 676.06 | 0.08 |
| 102 | 4.42 | 58.92 | 34.2406 | 679.42 | 0.08 |
| 103 | 0.05 | 58.97 | 35.1084 | 696.64 | 0.03 |
| 104 | 0.52 | 59.44 | 35.3095 | 700.63 | 0.01 |
| 105 | 1.03 | 59.94 | 35.5212 | 704.83 | 0.01 |
| 106 | 1.52 | 60.43 | 35.7293 | 708.96 | 0.02 |
| 107 | 2.02 | 60.93 | 35.9410 | 713.16 | 0.10 |
| 108 | 3.02 | 61.93 | 36.3643 | 721.56 | 0.06 |
| 109 | 4.02 | 62.93 | 36.7877 | 729.96 | 0.07 |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | TP | Cumulative TP ( | Years of Watershed P | Influent TP | Influent TP |
|---|---|---|---|---|---|
| - | (mg) | (mg) | (yrs) | (mg/L) | (mg) |
| 1 | 0.1 | 0.1 | 0.00 | 0.25 | 0.1 |
| 2 | 1.2 | 1.3 | 0.00 | 0.25 | 0.9 |
| 3 | 1.2 | 2.5 | 0.00 | 0.25 | 1.0 |
| 4 | 1.2 | 3.7 | 0.01 | 0.25 | 1.0 |
| 5 | 1.3 | 5.0 | 0.01 | 0.25 | 1.0 |
| 6 | 3.0 | 8.0 | 0.01 | 0.25 | 2.1 |
| 7 | 3.2 | 11.2 | 0.02 | 0.25 | 2.1 |
| 8 | 3.2 | 14.4 | 0.02 | 0.25 | 2.1 |
| 9 | 3.9 | 18.3 | 0.03 | 0.25 | 2.1 |
| 10 | 2.5 | 20.8 | 0.04 | 0.24 | 1.8 |
| 11 | 0.7 | 21.6 | 0.04 | 0.24 | 1.0 |
| 12 | 0.8 | 22.3 | 0.04 | 0.24 | 1.0 |
| 13 | 0.8 | 23.1 | 0.04 | 0.24 | 1.0 |
| 14 | 0.8 | 23.9 | 0.04 | 0.24 | 1.0 |
| 15 | 1.3 | 25.2 | 0.04 | 0.24 | 2.1 |
| 16 | 1.1 | 26.2 | 0.04 | 0.24 | 2.1 |
| 17 | 0.5 | 26.7 | 0.04 | 0.24 | 1.0 |
| 18 | 0.7 | 27.4 | 0.05 | 0.24 | 1.3 |
| 19 | 0.9 | 28.3 | 0.05 | 0.23 | 1.9 |
| 20 | 0.4 | 28.6 | 0.05 | 0.23 | 0.9 |
| 21 | 0.4 | 29.1 | 0.05 | 0.23 | 1.0 |
| 22 | 0.4 | 29.4 | 0.05 | 0.23 | 0.9 |
| 23 | 0.4 | 29.8 | 0.05 | 0.23 | 0.9 |
| 24 | 0.7 | 30.5 | 0.05 | 0.23 | 1.9 |
| 25 | 0.6 | 31.0 | 0.05 | 0.23 | 1.9 |
| 26 | 0.7 | 31.8 | 0.05 | 0.23 | 2.1 |
| 27 | 1.0 | 32.8 | 0.06 | 0.26 | 2.4 |
| 28 | 0.4 | 33.2 | 0.06 | 0.26 | 1.1 |
| 29 | 0.4 | 33.6 | 0.06 | 0.26 | 1.1 |
| 30 | 0.4 | 34.0 | 0.06 | 0.26 | 1.1 |
| 31 | 0.4 | 34.4 | 0.06 | 0.26 | 1.1 |
| 32 | 0.9 | 35.3 | 0.06 | 0.26 | 2.2 |
| 33 | 0.8 | 36.0 | 0.06 | 0.26 | 2.1 |
| 34 | 0.6 | 36.6 | 0.06 | 0.26 | 1.8 |
| 35 | 0.8 | 37.4 | 0.06 | 0.25 | 2.4 |
| 36 | 0.3 | 37.7 | 0.06 | 0.25 | 1.0 |
| 37 | 0.3 | 38.0 | 0.06 | 0.25 | 1.0 |
| 38 | 0.3 | 38.3 | 0.06 | 0.25 | 1.0 |
| 39 | 0.3 | 38.6 | 0.07 | 0.25 | 1.0 |
| 40 | 0.7 | 39.4 | 0.07 | 0.25 | 2.1 |
| 41 | 0.7 | 40.0 | 0.07 | 0.25 | 2.1 |
| 42 | 0.7 | 40.7 | 0.07 | 0.25 | 2.1 |
| 43 | 0.4 | 41.1 | 0.07 | 0.28 | 1.9 |
| 44 | 0.4 | 41.6 | 0.07 | 0.28 | 2.2 |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | TP | Cumulative TP ( | Years of Watershed P | Influent TP | Influent TP |
|---|---|---|---|---|---|
| - | (mg) | (mg) | (yrs) | (mg/L) | (mg) |
| 45 | 0.6 | 42.2 | 0.07 | 0.28 | 2.4 |
| 46 | 0.9 | 43.1 | 0.07 | 0.28 | 3.0 |
| 47 | 0.6 | 43.8 | 0.07 | 0.28 | 1.8 |
| 48 | 1.7 | 45.4 | 0.08 | 0.28 | 4.7 |
| 49 | 1.8 | 47.2 | 0.08 | 0.28 | 4.8 |
| 50 | 1.6 | 48.8 | 0.08 | 0.28 | 4.8 |
| 51 | 1.1 | 49.9 | 0.08 | 0.28 | 2.9 |
| 52 | 1.6 | 51.5 | 0.09 | 0.25 | 3.9 |
| 53 | 0.1 | 51.6 | 0.09 | 0.25 | 0.5 |
| 54 | 0.1 | 51.7 | 0.09 | 0.25 | 0.5 |
| 55 | 0.1 | 51.8 | 0.09 | 0.25 | 0.5 |
| 56 | 0.1 | 51.9 | 0.09 | 0.25 | 0.5 |
| 57 | 0.1 | 52.0 | 0.09 | 0.25 | 0.6 |
| 58 | 0.8 | 52.8 | 0.09 | 0.33 | 6.0 |
| 59 | 0.1 | 53.0 | 0.09 | 0.33 | 1.4 |
| 60 | 0.1 | 53.1 | 0.09 | 0.33 | 1.4 |
| 61 | 0.1 | 53.2 | 0.09 | 0.33 | 1.4 |
| 62 | 0.1 | 53.4 | 0.09 | 0.33 | 1.4 |
| 63 | 0.6 | 54.0 | 0.09 | 0.33 | 2.8 |
| 64 | 0.4 | 54.4 | 0.09 | 0.33 | 1.4 |
| 65 | 1.1 | 55.5 | 0.09 | 0.30 | 4.5 |
| 66 | 0.2 | 55.7 | 0.09 | 0.30 | 1.2 |
| 67 | 0.1 | 55.8 | 0.09 | 0.30 | 1.2 |
| 68 | 0.1 | 55.9 | 0.09 | 0.30 | 1.2 |
| 69 | 0.2 | 56.1 | 0.09 | 0.30 | 1.2 |
| 70 | 0.5 | 56.6 | 0.10 | 0.30 | 2.6 |
| 71 | 0.6 | 57.2 | 0.10 | 0.30 | 2.4 |
| 72 | 0.2 | 57.4 | 0.10 | 0.30 | 0.7 |
| 73 | 0.8 | 58.2 | 0.10 | 0.27 | 4.3 |
| 74 | 0.1 | 58.3 | 0.10 | 0.27 | 1.1 |
| 75 | 0.1 | 58.5 | 0.10 | 0.27 | 1.1 |
| 76 | 0.2 | 58.7 | 0.10 | 0.27 | 2.3 |
| 77 | 0.2 | 58.9 | 0.10 | 0.27 | 2.3 |
| 78 | 0.2 | 59.1 | 0.10 | 0.27 | 2.2 |
| 79 | 0.1 | 59.2 | 0.10 | 0.27 | 0.5 |
| 80 | 0.4 | 59.5 | 0.10 | 0.30 | 2.7 |
| 81 | 0.1 | 59.7 | 0.10 | 0.30 | 1.2 |
| 82 | 0.1 | 59.8 | 0.10 | 0.30 | 1.2 |
| 83 | 0.1 | 59.9 | 0.10 | 0.30 | 1.3 |
| 84 | 0.1 | 60.0 | 0.10 | 0.30 | 1.3 |
| 85 | 0.4 | 60.3 | 0.10 | 0.30 | 2.5 |
| 86 | 0.7 | 61.0 | 0.10 | 0.30 | 2.6 |
| 87 | 0.7 | 61.7 | 0.10 | 0.30 | 2.1 |
| 88 | 1.6 | 63.3 | 0.11 | 0.37 | 7.8 |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | TP | Cumulative TP ( | Years of Watershed P | Influent TP | Influent TP |
|---|---|---|---|---|---|
| - | (mg) | (mg) | (yrs) | (mg/L) | (mg) |
| 89 | 0.1 | 63.4 | 0.11 | 0.37 | 1.5 |
| 90 | 0.1 | 63.5 | 0.11 | 0.37 | 1.6 |
| 91 | 0.1 | 63.6 | 0.11 | 0.37 | 1.5 |
| 92 | 0.1 | 63.7 | 0.11 | 0.37 | 1.6 |
| 93 | 0.3 | 64.0 | 0.11 | 0.37 | 3.1 |
| 94 | 0.1 | 64.1 | 0.11 | 0.37 | 0.8 |
| 95 | 0.4 | 64.5 | 0.11 | 0.42 | 5.4 |
| 96 | 0.1 | 64.6 | 0.11 | 0.42 | 3.5 |
| 97 | 0.1 | 64.7 | 0.11 | 0.42 | 1.8 |
| 98 | 0.1 | 64.8 | 0.11 | 0.42 | 1.8 |
| 99 | 0.2 | 65.0 | 0.11 | 0.42 | 1.8 |
| 100 | 0.3 | 65.3 | 0.11 | 0.42 | 1.8 |
| 101 | 0.6 | 65.9 | 0.11 | 0.42 | 3.5 |
| 102 | 0.3 | 66.2 | 0.11 | 0.42 | 1.4 |
| 103 | 1.0 | 67.1 | 0.11 | 0.54 | 8.2 |
| 104 | 0.1 | 67.2 | 0.11 | 0.54 | 2.1 |
| 105 | 0.0 | 67.2 | 0.11 | 0.54 | 2.3 |
| 106 | 0.1 | 67.3 | 0.11 | 0.54 | 2.2 |
| 107 | 0.3 | 67.6 | 0.11 | 0.54 | 2.3 |
| 108 | 0.7 | 68.3 | 0.11 | 0.54 | 4.5 |
| 109 | 0.6 | 68.8 | 0.12 | 0.54 | 4.5 |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | Cumulative Influent TP | TP Removal | Net P Export | pH | Eh |
|---|---|---|---|---|---|
| - | (mg) | (mg) | (mg) | | (mV) |
| 1 | 0.1 | 0.0 | 0.1 | 7.40 | 209 |
| 2 | 1.0 | 0.0 | 1.3 | 7.38 | 229 |
| 3 | 2.0 | 0.0 | 2.5 | 7.38 | 239 |
| 4 | 3.0 | 0.0 | 3.7 | 7.35 | 246 |
| 5 | 4.1 | 0.0 | 5.0 | 7.36 | 250 |
| 6 | 6.1 | 0.0 | 8.0 | 7.37 | 251 |
| 7 | 8.2 | 0.0 | 11.2 | 7.36 | 251 |
| 8 | 10.3 | 0.0 | 14.4 | 7.37 | 253 |
| 9 | 12.3 | 0.0 | 18.3 | 6.78 | 255 |
| 10 | 14.1 | 0.0 | 20.8 | 7.39 | -8 |
| 11 | 15.1 | 0.3 | 21.3 | 7.33 | 5 |
| 12 | 16.1 | 0.5 | 21.8 | 7.25 | 16 |
| 13 | 17.2 | 0.7 | 22.4 | 7.26 | 52 |
| 14 | 18.2 | 1.0 | 22.9 | 7.24 | 105 |
| 15 | 20.2 | 1.8 | 23.4 | 7.28 | 180 |
| 16 | 22.3 | 2.8 | 23.4 | 7.29 | 218 |
| 17 | 23.3 | 3.3 | 23.4 | 7.31 | 231 |
| 18 | 24.7 | 4.0 | 23.5 | 6.56 | 239 |
| 19 | 26.5 | 5.0 | 23.3 | 7.21 | -523 |
| 20 | 27.5 | 5.5 | 23.1 | 7.20 | -480 |
| 21 | 28.4 | 6.1 | 23.0 | 7.23 | -423 |
| 22 | 29.4 | 6.7 | 22.8 | 7.20 | -351 |
| 23 | 30.3 | 7.2 | 22.6 | 7.19 | -189 |
| 24 | 32.2 | 8.4 | 22.0 | 7.11 | 17 |
| 25 | 34.1 | 9.8 | 21.3 | 7.22 | 57 |
| 26 | 36.2 | 11.1 | 20.7 | 7.23 | 74 |
| 27 | 38.6 | 12.5 | 20.3 | 7.16 | -412 |
| 28 | 39.6 | 13.1 | 20.1 | 7.14 | -415 |
| 29 | 40.7 | 13.9 | 19.7 | 7.15 | -407 |
| 30 | 41.9 | 14.6 | 19.4 | 7.25 | -407 |
| 31 | 42.9 | 15.2 | 19.2 | 7.16 | -398 |
| 32 | 45.1 | 16.6 | 18.6 | 7.18 | -317 |
| 33 | 47.3 | 18.0 | 18.1 | 7.18 | -159 |
| 34 | 49.0 | 19.1 | 17.5 | 7.20 | -24 |
| 35 | 51.4 | 20.7 | 16.7 | 7.08 | -440 |
| 36 | 52.4 | 21.4 | 16.3 | 7.10 | -436 |
| 37 | 53.5 | 22.2 | 15.8 | 7.10 | -433 |
| 38 | 54.5 | 22.9 | 15.4 | 7.10 | -419 |
| 39 | 55.6 | 23.6 | 15.0 | 7.11 | -387 |
| 40 | 57.6 | 25.0 | 14.4 | 7.14 | -317 |
| 41 | 59.7 | 26.4 | 13.7 | 7.21 | 2 |
| 42 | 61.8 | 27.8 | 12.9 | 7.21 | 35 |
| 43 | 63.7 | 29.2 | 11.9 | 7.02 | -314 |
| 44 | 65.9 | 31.0 | 10.5 | 7.01 | -229 |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | Cumulative Influent TP | TP Removal | Net P Export | pH | Eh |
|---|---|---|---|---|---|
| - | (mg) | (mg) | (mg) | | (mV) |
| 45 | 68.3 | 32.8 | 9.4 | 7.04 | -231 |
| 46 | 71.3 | 34.9 | 8.2 | 7.06 | -7 |
| 47 | 73.2 | 36.1 | 7.6 | 7.07 | 42 |
| 48 | 77.8 | 39.1 | 6.3 | 7.09 | 74 |
| 49 | 82.6 | 42.1 | 5.1 | 7.07 | 73 |
| 50 | 87.3 | 45.2 | 3.6 | 7.12 | 65 |
| 51 | 90.2 | 47.0 | 2.9 | 7.11 | 44 |
| 52 | 94.0 | 49.2 | 2.2 | 6.76 | 131 |
| 53 | 94.5 | 49.6 | 2.0 | 6.79 | 132 |
| 54 | 95.1 | 50.1 | 1.7 | 6.81 | 124 |
| 55 | 95.6 | 50.5 | 1.3 | 6.84 | 141 |
| 56 | 96.1 | 50.9 | 1.0 | 6.87 | 146 |
| 57 | 96.7 | 51.4 | 0.6 | 6.88 | |
| 58 | 102.7 | 56.6 | -3.8 | | -126 |
| 59 | 104.1 | 57.9 | -4.9 | | -101 |
| 60 | 105.6 | 59.2 | -6.1 | | -99 |
| 61 | 106.9 | 60.4 | -7.2 | | -95 |
| 62 | 108.3 | 61.7 | -8.3 | | -81 |
| 63 | 111.1 | 63.8 | -9.9 | | -4 |
| 64 | 112.5 | 64.8 | -10.4 | | -2 |
| 65 | 117.0 | 68.2 | -12.7 | 6.85 | -162 |
| 66 | 118.2 | 69.3 | -13.6 | 6.85 | -165 |
| 67 | 119.5 | 70.4 | -14.6 | 6.84 | -153 |
| 68 | 120.7 | 71.5 | -15.5 | 6.82 | -141 |
| 69 | 121.9 | 72.6 | -16.5 | 6.84 | -92 |
| 70 | 124.6 | 74.7 | -18.0 | 6.87 | -53 |
| 71 | 126.9 | 76.4 | -19.2 | 6.9 | -35 |
| 72 | 127.6 | 76.9 | -19.5 | 6.9 | -21 |
| 73 | 132.0 | 80.4 | -22.2 | 6.92 | -159 |
| 74 | 133.1 | 81.4 | -23.1 | 6.68 | -128 |
| 75 | 134.2 | 82.4 | -24.0 | 6.66 | -114 |
| 76 | 136.4 | 84.5 | -25.8 | 6.63 | -81 |
| 77 | 138.7 | 86.6 | -27.7 | 6.64 | -54 |
| 78 | 141.0 | 88.6 | -29.5 | 6.67 | -40 |
| 79 | 141.5 | 89.0 | -29.9 | 6.69 | -32 |
| 80 | 144.2 | 91.4 | -31.9 | 6.37 | -253 |
| 81 | 145.5 | 92.5 | -32.8 | 6.48 | -224 |
| 82 | 146.7 | 93.6 | -33.8 | 6.56 | -221 |
| 83 | 148.0 | 94.8 | -34.9 | 6.58 | -203 |
| 84 | 149.2 | 95.9 | -35.9 | 6.57 | -171 |
| 85 | 151.7 | 98.1 | -37.8 | 6.63 | -2 |
| 86 | 154.3 | 100.1 | -39.1 | 6.7 | 54 |
| 87 | 156.4 | 101.5 | -39.8 | 6.73 | 74 |
| 88 | 164.3 | 107.7 | -44.4 | 6.67 | -142 |

Mesocosm 2 - 15% Trial
Phosphorus

| Sample | Cumulative Influent TP | TP Removal | Net P Export | pH | Eh |
|---|---|---|---|---|---|
| - | (mg) | (mg) | (mg) | | (mV) |
| 89 | 165.7 | 109.0 | -45.6 | 6.7 | -120 |
| 90 | 167.3 | 110.5 | -47.0 | 6.69 | -104 |
| 91 | 168.9 | 111.9 | -48.3 | 6.69 | -96 |
| 92 | 170.4 | 113.4 | -49.6 | 6.68 | -86 |
| 93 | 173.6 | 116.3 | -52.2 | 6.7 | -47 |
| 94 | 174.3 | 116.9 | -52.8 | 6.69 | -41 |
| 95 | 179.7 | 121.9 | -57.4 | 6.83 | -179 |
| 96 | 183.2 | 125.2 | -60.6 | 6.6 | -148 |
| 97 | 184.9 | 127.0 | -62.3 | 6.57 | -140 |
| 98 | 186.7 | 128.6 | -63.8 | 6.55 | -56 |
| 99 | 188.5 | 130.2 | -65.1 | 6.57 | -32 |
| 100 | 190.2 | 131.7 | -66.4 | 6.58 | -25 |
| 101 | 193.8 | 134.6 | -68.7 | 6.57 | -14 |
| 102 | 195.2 | 135.7 | -69.6 | 6.6 | -9 |
| 103 | 203.4 | 143.0 | -75.9 | | -214 |
| 104 | 205.6 | 145.1 | -77.9 | | -190 |
| 105 | 207.8 | 147.3 | -80.0 | | -149 |
| 106 | 210.0 | 149.4 | -82.1 | | -128 |
| 107 | 212.3 | 151.4 | -83.9 | | -111 |
| 108 | 216.8 | 155.3 | -87.0 | | -34 |
| 109 | 221.3 | 159.2 | -90.4 | | -8 |

Mesocosm 2 - 15% Trial
Phosphorus Speciation

| Sample | DP | SRP | SRP | Cumulative SRP | PP | PP | PP | DOP | DOP |
|---|---|---|---|---|---|---|---|---|---|
| - | (mg/L) | (mg/L) | (mg) | (mg) | (mg/L) | (mg) | (mg) | (mg/L) | (mg) |
| 1 | 0.03 | 0.01 | 0.00 | 0.00 | 0.29 | 0.08 | 0.08 | 0.02 | 0.00 |
| 2 | 0.06 | 0.05 | 0.11 | 0.11 | 0.26 | 1.03 | 1.11 | 0.02 | 0.06 |
| 5 | 0.06 | 0.04 | 0.57 | 0.68 | 0.26 | 3.25 | 4.36 | 0.02 | 0.25 |
| 6 | 0.08 | 0.05 | 0.39 | 1.07 | 0.30 | 2.35 | 6.71 | 0.03 | 0.23 |
| 9 | 0.10 | 0.07 | 1.51 | 2.58 | 0.42 | 9.06 | 15.77 | 0.03 | 0.83 |
| 10 | 0.03 | 0.01 | 0.29 | 2.87 | 0.14 | 2.06 | 17.83 | 0.02 | 0.18 |
| 11 | 0.06 | 0.02 | 0.06 | 2.93 | 0.13 | 0.54 | 18.38 | 0.04 | 0.11 |
| 14 | 0.08 | 0.04 | 0.39 | 3.33 | 0.09 | 1.36 | 19.73 | 0.04 | 0.49 |
| 18 | 0.12 | 0.04 | 1.10 | 4.43 | 0.03 | 1.56 | 21.30 | 0.07 | 1.48 |
| 19 | 0.04 | 0.03 | 0.28 | 4.71 | 0.03 | 0.25 | 21.55 | 0.01 | 0.35 |
| 20 | 0.06 | 0.04 | 0.13 | 4.83 | 0.04 | 0.15 | 21.70 | 0.03 | 0.08 |
| 23 | 0.06 | 0.04 | 0.46 | 5.29 | 0.04 | 0.50 | 22.21 | 0.02 | 0.29 |
| 26 | 0.04 | 0.03 | 0.92 | 6.21 | 0.05 | 1.12 | 23.32 | 0.01 | 0.37 |
| 27 | 0.03 | 0.03 | 0.33 | 6.54 | 0.08 | 0.67 | 23.99 | 0.00 | 0.04 |
| 30 | 0.05 | 0.06 | 0.56 | 7.10 | 0.05 | 0.84 | 24.83 | 0.00 | 0.00 |
| 32 | 0.03 | 0.04 | 0.64 | 7.74 | 0.08 | 0.80 | 25.63 | 0.00 | 0.00 |
| 34 | 0.04 | 0.03 | 0.56 | 8.30 | 0.05 | 0.91 | 26.54 | 0.01 | 0.10 |
| 35 | 0.01 | 0.01 | 0.19 | 8.49 | 0.07 | 0.56 | 27.11 | 0.00 | 0.07 |
| 38 | 0.03 | 0.03 | 0.26 | 8.75 | 0.04 | 0.74 | 27.85 | 0.00 | 0.00 |
| 40 | 0.03 | 0.03 | 0.36 | 9.11 | 0.06 | 0.63 | 28.48 | 0.00 | 0.03 |
| 42 | 0.03 | 0.03 | 0.46 | 9.57 | 0.05 | 0.90 | 29.38 | 0.00 | 0.05 |
| 43 | 0.02 | 0.02 | 0.18 | 9.75 | 0.02 | 0.23 | 29.61 | 0.00 | 0.01 |
| 47 | 0.04 | 0.04 | 1.10 | 10.86 | 0.06 | 1.23 | 30.85 | 0.00 | 0.06 |
| 49 | 0.05 | 0.06 | 1.65 | 12.51 | 0.06 | 2.04 | 32.89 | 0.00 | 0.02 |
| 51 | 0.08 | 0.10 | 2.06 | 14.57 | 0.05 | 1.61 | 34.49 | 0.00 | 0.00 |
| 52 | 0.03 | 0.01 | 0.78 | 15.35 | 0.06 | 0.80 | 35.29 | 0.02 | 0.14 |
| 54 | 0.03 | 0.01 | 0.04 | 15.39 | 0.02 | 0.15 | 35.44 | 0.02 | 0.09 |
| 56 | 0.00 | 0.01 | 0.04 | 15.43 | 0.04 | 0.13 | 35.57 | 0.00 | 0.05 |
| 58 | 0.01 | 0.01 | 0.23 | 15.66 | 0.03 | 0.86 | 36.42 | 0.00 | 0.00 |
| 60 | 0.03 | 0.00 | 0.04 | 15.70 | 0.00 | 0.15 | 36.57 | 0.03 | 0.11 |
| 62 | 0.03 | 0.01 | 0.04 | 15.74 | 0.01 | 0.06 | 36.64 | 0.02 | 0.20 |
| 64 | 0.09 | 0.08 | 0.56 | 16.30 | 0.03 | 0.25 | 36.88 | 0.00 | 0.17 |
| 65 | 0.01 | 0.03 | 0.76 | 17.07 | 0.03 | 0.43 | 37.31 | 0.00 | 0.03 |
| 68 | 0.02 | 0.02 | 0.29 | 17.36 | 0.01 | 0.27 | 37.59 | 0.00 | 0.00 |
| 70 | 0.06 | 0.06 | 0.51 | 17.87 | 0.01 | 0.14 | 37.73 | 0.00 | 0.03 |
| 72 | 0.08 | 0.06 | 0.63 | 18.50 | 0.00 | 0.06 | 37.79 | 0.01 | 0.08 |

Mesocosm 2 - 15% Trial
Phosphorus Speciation

| Sample | DP | SRP | SRP | Cumulative SRP | PP | PP | PP | DOP | DOP |
|---|---|---|---|---|---|---|---|---|---|
| - | (mg/L) | (mg/L) | (mg) | (mg) | (mg/L) | (mg) | (mg) | (mg/L) | (mg) |
| 73 | 0.03 | 0.01 | 0.57 | 19.07 | 0.00 | 0.05 | 37.84 | 0.02 | 0.22 |
| 75 | 0.02 | 0.01 | 0.08 | 19.15 | 0.01 | 0.04 | 37.88 | 0.01 | 0.12 |
| 77 | 0.03 | 0.01 | 0.17 | 19.32 | 0.00 | 0.05 | 37.92 | 0.02 | 0.26 |
| 79 | 0.06 | 0.03 | 0.19 | 19.50 | 0.00 | 0.00 | 37.92 | 0.03 | 0.26 |
| 80 | 0.01 | 0.01 | 0.18 | 19.68 | 0.03 | 0.15 | 38.07 | 0.00 | 0.15 |
| 83 | 0.01 | 0.01 | 0.12 | 19.81 | 0.02 | 0.29 | 38.37 | 0.00 | 0.00 |
| 85 | 0.04 | 0.04 | 0.33 | 20.13 | 0.02 | 0.22 | 38.59 | 0.00 | 0.00 |
| 87 | 0.07 | 0.06 | 0.78 | 20.91 | 0.02 | 0.34 | 38.93 | 0.01 | 0.12 |
| 88 | 0.01 | 0.01 | 0.79 | 21.70 | 0.03 | 0.68 | 39.61 | 0.00 | 0.17 |
| 90 | 0.03 | 0.01 | 0.08 | 21.78 | 0.01 | 0.16 | 39.77 | 0.02 | 0.06 |
| 92 | 0.02 | 0.02 | 0.13 | 21.92 | 0.00 | 0.03 | 39.80 | 0.00 | 0.07 |
| 94 | 0.04 | 0.03 | 0.26 | 22.18 | 0.01 | 0.04 | 39.84 | 0.01 | 0.07 |
| 95 | 0.01 | 0.01 | 0.25 | 22.43 | 0.00 | 0.05 | 39.89 | 0.00 | 0.08 |
| 98 | 0.03 | 0.03 | 0.33 | 22.76 | 0.02 | 0.13 | 40.02 | 0.00 | 0.01 |
| 100 | 0.07 | 0.06 | 0.37 | 23.13 | 0.00 | 0.07 | 40.09 | 0.01 | 0.04 |
| 102 | 0.07 | 0.07 | 0.74 | 23.87 | 0.01 | 0.07 | 40.15 | 0.00 | 0.08 |
| 103 | 0.02 | 0.01 | 0.67 | 24.53 | 0.01 | 0.15 | 40.31 | 0.01 | 0.15 |
| 105 | 0.03 | 0.01 | 0.08 | 24.62 | 0.00 | 0.03 | 40.34 | 0.02 | 0.12 |
| 107 | 0.03 | 0.01 | 0.08 | 24.70 | 0.07 | 0.30 | 40.64 | 0.02 | 0.16 |
| 109 | 0.06 | 0.05 | 0.54 | 25.24 | 0.01 | 0.72 | 41.36 | 0.00 | 0.22 |

Mesocosm 2 - 15% Trial
Phosphorus Speciation

| Sample | DOP |
|---|---|
| - | (mg) |
| 1 | 0.00 |
| 2 | 0.06 |
| 5 | 0.31 |
| 6 | 0.54 |
| 9 | 1.37 |
| 10 | 1.55 |
| 11 | 1.66 |
| 14 | 2.14 |
| 18 | 3.63 |
| 19 | 3.97 |
| 20 | 4.05 |
| 23 | 4.34 |
| 26 | 4.71 |
| 27 | 4.75 |
| 30 | 4.75 |
| 32 | 4.75 |
| 34 | 4.86 |
| 35 | 4.92 |
| 38 | 4.92 |
| 40 | 4.95 |
| 42 | 5.00 |
| 43 | 5.01 |
| 47 | 5.08 |
| 49 | 5.09 |
| 51 | 5.09 |
| 52 | 5.23 |
| 54 | 5.32 |
| 56 | 5.37 |
| 58 | 5.37 |
| 60 | 5.48 |
| 62 | 5.68 |
| 64 | 5.84 |
| 65 | 5.88 |
| 68 | 5.88 |
| 70 | 5.91 |
| 72 | 5.99 |

Mesocosm 2 - 15% Trial
Phosphorus Speciation

| Sample | DOP |
|---|---|
| - | (mg) |
| 73 | 6.21 |
| 75 | 6.32 |
| 77 | 6.59 |
| 79 | 6.85 |
| 80 | 7.00 |
| 83 | 7.00 |
| 85 | 7.00 |
| 87 | 7.12 |
| 88 | 7.29 |
| 90 | 7.35 |
| 92 | 7.42 |
| 94 | 7.49 |
| 95 | 7.57 |
| 98 | 7.57 |
| 100 | 7.62 |
| 102 | 7.70 |
| 103 | 7.85 |
| 105 | 7.96 |
| 107 | 8.12 |
| 109 | 8.35 |

Mesocosm 3 - Control Trial
Nitrogen

| Sample | Run | Flow | Date | Start Time | End Time | Mesocosm Start Time |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - |
| 1 | 1 | 140 | 5/31/2016 | 11:24:00 AM | 11:31:00 AM | 10:57 AM |
| 2 | 1 | 140 | 5/31/2016 | 11:54:00 AM | 11:56:00 AM | 10:57 AM |
| 3 | 1 | 140 | 5/31/2016 | 12:24:00 PM | 12:25:00 PM | 10:57 AM |
| 4 | 1 | 140 | 5/31/2016 | 12:54:00 PM | 12:56:00 PM | 10:57 AM |
| 5 | 1 | 140 | 5/31/2016 | 1:24:00 PM | 1:25:00 PM | 10:57 AM |
| 6 | 1 | 140 | 5/31/2016 | 2:24:00 PM | 2:25:00 PM | 10:57 AM |
| 7 | 1 | 140 | 5/31/2016 | 3:24:00 PM | 3:25:00 PM | 10:57 AM |
| 8 | 1 | 140 | 5/31/2016 | 4:24:00 PM | 4:25:00 PM | 10:57 AM |
| 9 | 1 | 140 | 5/31/2016 | 4:53:00 PM | 4:57:00 PM | 10:57 AM |
| 10 | 2 | 140 | 6/8/2016 | 11:03:00 AM | 11:11:00 AM | 10:12:00 AM |
| 11 | 2 | 140 | 6/8/2016 | 11:33:00 AM | 11:36:00 AM | 10:12:00 AM |
| 12 | 2 | 140 | 6/8/2016 | 12:03:00 PM | 12:05:00 PM | 10:12:00 AM |
| 13 | 2 | 140 | 6/8/2016 | 12:33:00 PM | 12:35:00 PM | 10:12:00 AM |
| 14 | 2 | 140 | 6/8/2016 | 1:03:00 PM | 1:04:00 PM | 10:12:00 AM |
| 15 | 2 | 140 | 6/8/2016 | 2:03:00 PM | 2:04:00 PM | 10:12:00 AM |
| 16 | 2 | 140 | 6/8/2016 | 3:03:00 PM | 3:04:00 PM | 10:12:00 AM |
| 17 | 2 | 140 | 6/8/2016 | 4:10:00 PM | 4:12:00 PM | 10:12:00 AM |
| 18 | 3 | 140 | 6/13/2016 | 12:02:00 PM | 12:09:00 PM | 10:55 AM |
| 19 | 3 | 140 | 6/13/2016 | 12:32:00 PM | 12:33:00 PM | 10:55 AM |
| 20 | 3 | 140 | 6/13/2016 | 1:02:00 PM | 1:06:00 PM | 10:55 AM |
| 21 | 3 | 140 | 6/13/2016 | 1:32:00 PM | 1:34:00 PM | 10:55 AM |
| 22 | 3 | 140 | 6/13/2016 | 2:02:00 PM | 2:04:00 PM | 10:55 AM |
| 23 | 3 | 140 | 6/13/2016 | 3:02:00 PM | 3:04:00 PM | 10:55 AM |
| 24 | 3 | 140 | 6/13/2016 | 4:02:00 PM | 4:04:00 PM | 10:55 AM |
| 25 | 3 | 140 | 6/13/2016 | 4:54:00 PM | 4:55:00 PM | 10:55 AM |
| 26 | 4 | 140 | 6/21/2016 | 12:30:00 PM | 12:34:00 PM | 11:00 AM |
| 27 | 4 | 140 | 6/21/2016 | 1:00:00 PM | 1:02:00 PM | 11:00 AM |
| 28 | 4 | 140 | 6/21/2016 | 1:30:00 PM | 1:32:00 PM | 11:00 AM |
| 29 | 4 | 140 | 6/21/2016 | 2:00:00 PM | 2:02:00 PM | 11:00 AM |
| 30 | 4 | 140 | 6/21/2016 | 2:30:00 PM | 2:32:00 PM | 11:00 AM |
| 31 | 4 | 140 | 6/21/2016 | 3:30:00 PM | 3:32:00 PM | 11:00 AM |
| 32 | 4 | 140 | 6/21/2016 | 4:30:00 PM | 4:32:00 PM | 11:00 AM |
| 33 | 4 | 140 | 6/21/2016 | 4:58:00 PM | 5:00:00 PM | 11:00 AM |
| 34 | 5 | 140 | 6/27/2016 | 11:08:00 AM | 11:14:00 AM | 10:06 AM |
| 35 | 5 | 140 | 6/27/2016 | 11:38:00 AM | 11:39:00 AM | 10:06 AM |
| 36 | 5 | 140 | 6/27/2016 | 12:08:00 PM | 12:10:00 PM | 10:06 AM |
| 37 | 5 | 140 | 6/27/2016 | 12:38:00 PM | 12:40:00 PM | 10:06 AM |
| 38 | 5 | 140 | 6/27/2016 | 1:08:00 PM | 1:09:00 PM | 10:06 AM |
| 39 | 5 | 140 | 6/27/2016 | 2:08:00 PM | 2:10:00 PM | 10:06 AM |
| 40 | 5 | 140 | 6/27/2016 | 3:08:00 PM | 3:10:00 PM | 10:06 AM |
| 41 | 5 | 140 | 6/27/2016 | 4:04:00 PM | 4:06:00 PM | 10:06 AM |
| 42 | 6 | 140 | 7/3/2016 | 8:47:00 AM | 8:51:00 AM | 7:35 AM |
| 43 | 6 | 140 | 7/3/2016 | 9:17:00 AM | 9:19:00 AM | 7:35 AM |
| 44 | 6 | 140 | 7/3/2016 | 9:47:00 AM | 9:49:00 AM | 7:35 AM |

Mesocosm 3 - Control Trial

Nitrogen

| Sample | Run | Flow | Date | Start Time | End Time | Mesocosm Start Time |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - |
| 45 | 6 | 140 | 7/3/2016 | 10:17:00 AM | 10:19:00 AM | 7:35 AM |
| 46 | 6 | 140 | 7/3/2016 | 10:47:00 AM | 10:49:00 AM | 7:35 AM |
| 47 | 6 | 140 | 7/3/2016 | 11:47:00 AM | 11:49:00 AM | 7:35 AM |
| 48 | 6 | 140 | 7/3/2016 | 12:47:00 PM | 12:49:00 PM | 7:35 AM |
| 49 | 6 | 140 | 7/3/2016 | 1:34:00 PM | 1:36:00 PM | 7:35 AM |
| 50 | 7 | 140 | 7/11/2016 | 11:27:00 AM | 11:38:00 AM | 10:21 AM |
| 51 | 7 | 140 | 7/11/2016 | 11:57:00 AM | 12:01:00 PM | 10:21 AM |
| 52 | 7 | 140 | 7/11/2016 | 12:27:00 PM | 12:30:00 PM | 10:21 AM |
| 53 | 7 | 140 | 7/11/2016 | 12:57:00 PM | 1:00:00 PM | 10:21 AM |
| 54 | 7 | 140 | 7/11/2016 | 1:27:00 PM | 1:29:00 PM | 10:21 AM |
| 55 | 7 | 140 | 7/11/2016 | 2:27:00 PM | 2:28:00 PM | 10:21 AM |
| 56 | 7 | 140 | 7/11/2016 | 3:27:00 PM | 3:28:00 PM | 10:21 AM |
| 57 | 7 | 140 | 7/11/2016 | 4:21:00 PM | 4:23:00 PM | 10:21 AM |
| 58 | 8 | 140 | 7/18/2016 | 11:39:00 AM | 11:47:00 AM | 10:11 AM |
| 59 | 8 | 140 | 7/18/2016 | 12:09:00 PM | 12:11:00 PM | 10:11 AM |
| 60 | 8 | 140 | 7/18/2016 | 12:39:00 PM | 12:41:00 PM | 10:11 AM |
| 61 | 8 | 140 | 7/18/2016 | 1:09:00 PM | 1:11:00 PM | 10:11 AM |
| 62 | 8 | 140 | 7/18/2016 | 1:39:00 PM | 1:40:00 PM | 10:11 AM |
| 63 | 8 | 140 | 7/18/2016 | 2:39:00 PM | 2:41:00 PM | 10:11 AM |
| 64 | 8 | 140 | 7/18/2016 | 3:39:00 PM | 3:40:00 PM | 10:11 AM |
| 65 | 8 | 140 | 7/18/2016 | 4:10:00 PM | 4:12:00 PM | 10:11 AM |

Mesocosm 3 - Control Trial
Nitrogen

| Sample | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative | Elapsed From Drip |
|---|---|---|---|---|---|
| - | - | - | (hrs) | (hrs) | (hrs) |
| 1 | 11:24:00 AM | 11:27:30 AM | 0.51 | 0.51 | 0.06 |
| 2 | 11:24:00 AM | 11:55:00 AM | 0.97 | 0.97 | 0.52 |
| 3 | 11:24:00 AM | 12:24:30 PM | 1.46 | 1.46 | 1.01 |
| 4 | 11:24:00 AM | 12:55:00 PM | 1.97 | 1.97 | 1.52 |
| 5 | 11:24:00 AM | 1:24:30 PM | 2.46 | 2.46 | 2.01 |
| 6 | 11:24:00 AM | 2:24:30 PM | 3.46 | 3.46 | 3.01 |
| 7 | 11:24:00 AM | 3:24:30 PM | 4.46 | 4.46 | 4.01 |
| 8 | 11:24:00 AM | 4:24:30 PM | 5.46 | 5.46 | 5.01 |
| 9 | 11:24:00 AM | 4:55:00 PM | 5.97 | 5.97 | 5.52 |
| 10 | 11:03:00 AM | 11:07:00 AM | 0.92 | 6.88 | 0.07 |
| 11 | 11:03:00 AM | 11:34:30 AM | 1.38 | 7.34 | 0.52 |
| 12 | 11:03:00 AM | 12:04:00 PM | 1.87 | 7.83 | 1.02 |
| 13 | 11:03:00 AM | 12:34:00 PM | 2.37 | 8.33 | 1.52 |
| 14 | 11:03:00 AM | 1:03:30 PM | 2.86 | 8.83 | 2.01 |
| 15 | 11:03:00 AM | 2:03:30 PM | 3.86 | 9.83 | 3.01 |
| 16 | 11:03:00 AM | 3:03:30 PM | 4.86 | 10.83 | 4.01 |
| 17 | 11:03:00 AM | 4:11:00 PM | 5.98 | 11.95 | 5.13 |
| 18 | 12:02:00 PM | 12:05:30 PM | 1.18 | 13.13 | 0.06 |
| 19 | 12:02:00 PM | 12:32:30 PM | 1.63 | 13.58 | 0.51 |
| 20 | 12:02:00 PM | 1:04:00 PM | 2.15 | 14.10 | 1.03 |
| 21 | 12:02:00 PM | 1:33:00 PM | 2.63 | 14.58 | 1.52 |
| 22 | 12:02:00 PM | 2:03:00 PM | 3.13 | 15.08 | 2.02 |
| 23 | 12:02:00 PM | 3:03:00 PM | 4.13 | 16.08 | 3.02 |
| 24 | 12:02:00 PM | 4:03:00 PM | 5.13 | 17.08 | 4.02 |
| 25 | 12:02:00 PM | 4:54:30 PM | 5.99 | 17.94 | 4.88 |
| 26 | 12:30:00 PM | 12:32:00 PM | 1.53 | 19.48 | 0.03 |
| 27 | 12:30:00 PM | 1:01:00 PM | 2.02 | 19.96 | 0.52 |
| 28 | 12:30:00 PM | 1:31:00 PM | 2.52 | 20.46 | 1.02 |
| 29 | 12:30:00 PM | 2:01:00 PM | 3.02 | 20.96 | 1.52 |
| 30 | 12:30:00 PM | 2:31:00 PM | 3.52 | 21.46 | 2.02 |
| 31 | 12:30:00 PM | 3:31:00 PM | 4.52 | 22.46 | 3.02 |
| 32 | 12:30:00 PM | 4:31:00 PM | 5.52 | 23.46 | 4.02 |
| 33 | 12:30:00 PM | 4:59:00 PM | 5.98 | 23.93 | 4.48 |
| 34 | 11:08:00 AM | 11:11:00 AM | 1.08 | 25.01 | 0.05 |
| 35 | 11:08:00 AM | 11:38:30 AM | 1.54 | 25.47 | 0.51 |
| 36 | 11:08:00 AM | 12:09:00 PM | 2.05 | 25.98 | 1.02 |
| 37 | 11:08:00 AM | 12:39:00 PM | 2.55 | 26.48 | 1.52 |
| 38 | 11:08:00 AM | 1:08:30 PM | 3.04 | 26.97 | 2.01 |
| 39 | 11:08:00 AM | 2:09:00 PM | 4.05 | 27.98 | 3.02 |
| 40 | 11:08:00 AM | 3:09:00 PM | 5.05 | 28.98 | 4.02 |
| 41 | 11:08:00 AM | 4:05:00 PM | 5.98 | 29.91 | 4.95 |
| 42 | 8:47:00 AM | 8:49:00 AM | 1.23 | 31.14 | 0.03 |
| 43 | 8:47:00 AM | 9:18:00 AM | 1.72 | 31.63 | 0.52 |
| 44 | 8:47:00 AM | 9:48:00 AM | 2.22 | 32.13 | 1.02 |

Mesocosm 3 - Control Trial
Nitrogen

| Sample | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative | Elapsed From Drip |
|---|---|---|---|---|---|
| - | - | - | (hrs) | (hrs) | (hrs) |
| 45 | 8:47:00 AM | 10:18:00 AM | 2.72 | 32.63 | 1.52 |
| 46 | 8:47:00 AM | 10:48:00 AM | 3.22 | 33.13 | 2.02 |
| 47 | 8:47:00 AM | 11:48:00 AM | 4.22 | 34.13 | 3.02 |
| 48 | 8:47:00 AM | 12:48:00 PM | 5.22 | 35.13 | 4.02 |
| 49 | 8:47:00 AM | 1:35:00 PM | 6.00 | 35.91 | 4.80 |
| 50 | 11:27 AM | 11:32:30 AM | 1.19 | 37.10 | 0.09 |
| 51 | 11:27 AM | 11:59:00 AM | 1.63 | 37.54 | 0.53 |
| 52 | 11:27 AM | 12:28:30 PM | 2.13 | 38.03 | 1.03 |
| 53 | 11:27 AM | 12:58:30 PM | 2.63 | 38.53 | 1.53 |
| 54 | 11:27 AM | 1:28:00 PM | 3.12 | 39.03 | 2.02 |
| 55 | 11:27 AM | 2:27:30 PM | 4.11 | 40.02 | 3.01 |
| 56 | 11:27 AM | 3:27:30 PM | 5.11 | 41.02 | 4.01 |
| 57 | 11:27 AM | 4:22:00 PM | 6.02 | 41.93 | 4.92 |
| 58 | 11:39 AM | 11:43:00 AM | 1.53 | 43.46 | 0.07 |
| 59 | 11:39 AM | 12:10:00 PM | 1.98 | 43.91 | 0.52 |
| 60 | 11:39 AM | 12:40:00 PM | 2.48 | 44.41 | 1.02 |
| 61 | 11:39 AM | 1:10:00 PM | 2.98 | 44.91 | 1.52 |
| 62 | 11:39 AM | 1:39:30 PM | 3.48 | 45.40 | 2.01 |
| 63 | 11:39 AM | 2:40:00 PM | 4.48 | 46.41 | 3.02 |
| 64 | 11:39 AM | 3:39:30 PM | 5.48 | 47.40 | 4.01 |
| 65 | 11:39 AM | 4:11:00 PM | 6.00 | 47.93 | 4.53 |

Mesocosm 3 - Control Trial
Nitrogen

| Sample | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TN | TN | Cumulative TN |
|---|---|---|---|---|---|---|
| - | (hrs) | (cm) | (L) | (mg/L) | (mg) | (mg) |
| 1 | 0.06 | 0.22 | 4.27 | 2.40 | 5.12 | 5.12 |
| 2 | 0.52 | 0.41 | 8.12 | 2.02 | 8.51 | 13.63 |
| 3 | 1.01 | 0.62 | 12.25 | 2.20 | 8.72 | 22.36 |
| 4 | 1.52 | 0.83 | 16.52 | 2.43 | 9.89 | 32.25 |
| 5 | 2.01 | 1.04 | 20.65 | 2.77 | 10.74 | 42.99 |
| 6 | 3.01 | 1.46 | 29.05 | 3.19 | 25.03 | 68.01 |
| 7 | 4.01 | 1.89 | 37.45 | 3.65 | 28.72 | 96.73 |
| 8 | 5.01 | 2.31 | 45.85 | 3.68 | 30.76 | 127.49 |
| 9 | 5.52 | 2.53 | 50.12 | 3.60 | 15.54 | 143.03 |
| 10 | 5.58 | 2.91 | 57.82 | 1.57 | 19.90 | 162.92 |
| 11 | 6.04 | 3.11 | 61.67 | 1.23 | 5.39 | 168.31 |
| 12 | 6.53 | 3.32 | 65.80 | 1.32 | 5.26 | 173.57 |
| 13 | 7.03 | 3.53 | 70.00 | 1.45 | 5.80 | 179.38 |
| 14 | 7.53 | 3.74 | 74.13 | 1.92 | 6.95 | 186.32 |
| 15 | 8.53 | 4.16 | 82.53 | 2.80 | 19.82 | 206.15 |
| 16 | 9.53 | 4.58 | 90.93 | 3.11 | 24.81 | 230.95 |
| 17 | 10.65 | 5.06 | 100.38 | 3.49 | 31.17 | 262.12 |
| 18 | 10.71 | 5.56 | 110.25 | 0.56 | 20.01 | 282.12 |
| 19 | 11.16 | 5.75 | 114.03 | 0.72 | 2.43 | 284.56 |
| 20 | 11.68 | 5.97 | 118.44 | 0.81 | 3.38 | 287.94 |
| 21 | 12.17 | 6.17 | 122.50 | 1.08 | 3.83 | 291.77 |
| 22 | 12.67 | 6.39 | 126.70 | 1.72 | 5.88 | 297.65 |
| 23 | 13.67 | 6.81 | 135.10 | 2.63 | 18.29 | 315.94 |
| 24 | 14.67 | 7.23 | 143.50 | 2.75 | 22.61 | 338.55 |
| 25 | 15.53 | 7.60 | 150.71 | 3.00 | 20.74 | 359.29 |
| 26 | 15.56 | 8.16 | 161.84 | 0.41 | 18.97 | 378.26 |
| 27 | 16.04 | 8.35 | 165.62 | 0.33 | 1.40 | 379.65 |
| 28 | 16.54 | 8.57 | 170.03 | 0.51 | 1.84 | 381.50 |
| 29 | 17.04 | 8.77 | 174.09 | 0.71 | 2.46 | 383.96 |
| 30 | 17.54 | 8.99 | 178.29 | 1.17 | 3.94 | 387.90 |
| 31 | 18.54 | 9.41 | 186.69 | 2.92 | 17.19 | 405.09 |
| 32 | 19.54 | 9.83 | 195.09 | 3.37 | 26.45 | 431.55 |
| 33 | 20.01 | 10.11 | 200.62 | 3.29 | 18.42 | 449.96 |
| 34 | 20.06 | 10.57 | 209.72 | 0.39 | 16.72 | 466.69 |
| 35 | 20.52 | 10.76 | 213.57 | 0.32 | 1.36 | 468.05 |
| 36 | 21.03 | 10.98 | 217.84 | 0.31 | 1.35 | 469.40 |
| 37 | 21.53 | 11.19 | 222.04 | 0.50 | 1.71 | 471.10 |
| 38 | 22.02 | 11.40 | 226.17 | 0.85 | 2.78 | 473.89 |
| 39 | 23.03 | 11.83 | 234.64 | 1.58 | 10.29 | 484.17 |
| 40 | 24.03 | 12.25 | 243.04 | 2.25 | 16.11 | 500.28 |
| 41 | 24.96 | 12.64 | 250.88 | 2.68 | 19.34 | 519.62 |
| 42 | 24.99 | 13.17 | 261.24 | 0.35 | 15.67 | 535.30 |
| 43 | 25.48 | 13.37 | 265.30 | 0.20 | 1.11 | 536.41 |
| 44 | 25.98 | 13.58 | 269.50 | 0.24 | 0.92 | 537.33 |

Mesocosm 3 - Control Trial
Nitrogen

| Sample | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TN | TN | Cumulative TN |
|---|---|---|---|---|---|---|
| - | (hrs) | (cm) | (L) | (mg/L) | (mg) | (mg) |
| 45 | 26.48 | 13.79 | 273.70 | 0.26 | 1.04 | 538.37 |
| 46 | 26.98 | 14.01 | 277.90 | 0.29 | 1.17 | 539.54 |
| 47 | 27.98 | 14.43 | 286.30 | 2.18 | 10.40 | 549.93 |
| 48 | 28.98 | 14.85 | 294.70 | 3.11 | 22.22 | 572.15 |
| 49 | 29.76 | 15.18 | 301.28 | 3.13 | 20.51 | 592.66 |
| 50 | 29.85 | 15.69 | 311.29 | 0.48 | 18.06 | 610.73 |
| 51 | 30.29 | 15.88 | 315.00 | 0.20 | 1.26 | 611.99 |
| 52 | 30.78 | 16.08 | 319.13 | 0.27 | 0.98 | 612.96 |
| 53 | 31.28 | 16.29 | 323.33 | 0.49 | 1.61 | 614.57 |
| 54 | 31.78 | 16.50 | 327.46 | 0.72 | 2.50 | 617.07 |
| 55 | 32.77 | 16.92 | 335.79 | 1.60 | 9.64 | 626.71 |
| 56 | 33.77 | 17.35 | 344.19 | 2.19 | 15.90 | 642.61 |
| 57 | 34.68 | 17.73 | 351.82 | 2.62 | 18.33 | 660.94 |
| 58 | 34.74 | 18.38 | 364.70 | 0.71 | 21.41 | 682.35 |
| 59 | 35.19 | 18.57 | 368.48 | 0.21 | 1.74 | 684.09 |
| 60 | 35.69 | 18.78 | 372.68 | 0.52 | 1.54 | 685.63 |
| 61 | 36.19 | 18.99 | 376.88 | 0.91 | 3.00 | 688.63 |
| 62 | 36.68 | 19.20 | 381.01 | 1.34 | 4.64 | 693.27 |
| 63 | 37.69 | 19.63 | 389.48 | 2.06 | 14.41 | 707.68 |
| 64 | 38.68 | 20.05 | 397.81 | 2.32 | 18.26 | 725.94 |
| 65 | 39.21 | 20.27 | 402.22 | 2.37 | 10.34 | 736.28 |

## Mesocosm 3 - Control Trial
## Nitrogen

| Sample | Years of Watershed N | Influent TN | Influent TN | Cumulative Influent TN | TN Removal |
|---|---|---|---|---|---|
| - | (yrs) | (mg/L) | (mg) | (mg) | (mg) |
| 1 | 0.00 | 4.65 | 9.93 | 9.93 | 4.81 |
| 2 | 0.00 | 4.65 | 17.91 | 27.84 | 14.21 |
| 3 | 0.01 | 4.65 | 19.21 | 47.05 | 24.70 |
| 4 | 0.01 | 4.65 | 19.86 | 66.92 | 34.67 |
| 5 | 0.02 | 4.65 | 19.21 | 86.13 | 43.15 |
| 6 | 0.02 | 4.65 | 39.08 | 125.21 | 57.19 |
| 7 | 0.03 | 4.65 | 39.08 | 164.29 | 67.56 |
| 8 | 0.05 | 4.65 | 39.08 | 203.36 | 75.87 |
| 9 | 0.05 | 4.65 | 19.86 | 223.23 | 80.20 |
| 10 | 0.06 | 4.34 | 34.63 | 257.86 | 94.93 |
| 11 | 0.06 | 4.34 | 16.72 | 274.57 | 106.27 |
| 12 | 0.06 | 4.34 | 17.94 | 292.51 | 118.94 |
| 13 | 0.06 | 4.34 | 18.24 | 310.75 | 131.37 |
| 14 | 0.07 | 4.34 | 17.94 | 328.68 | 142.36 |
| 15 | 0.07 | 4.34 | 36.48 | 365.16 | 159.02 |
| 16 | 0.08 | 4.34 | 36.48 | 401.64 | 170.69 |
| 17 | 0.09 | 4.34 | 41.04 | 442.68 | 180.56 |
| 18 | 0.10 | 3.89 | 40.65 | 483.33 | 201.21 |
| 19 | 0.10 | 3.89 | 14.72 | 498.05 | 213.50 |
| 20 | 0.10 | 3.89 | 17.17 | 515.23 | 227.29 |
| 21 | 0.11 | 3.89 | 15.81 | 531.04 | 239.27 |
| 22 | 0.11 | 3.89 | 16.36 | 547.39 | 249.74 |
| 23 | 0.11 | 3.89 | 32.71 | 580.11 | 264.17 |
| 24 | 0.12 | 3.89 | 32.71 | 612.82 | 274.27 |
| 25 | 0.13 | 3.89 | 28.08 | 640.90 | 281.61 |
| 26 | 0.14 | 3.66 | 42.05 | 682.95 | 304.70 |
| 27 | 0.14 | 3.66 | 13.84 | 696.80 | 317.14 |
| 28 | 0.14 | 3.66 | 16.15 | 712.95 | 331.45 |
| 29 | 0.14 | 3.66 | 14.87 | 727.81 | 343.85 |
| 30 | 0.14 | 3.66 | 15.38 | 743.19 | 355.29 |
| 31 | 0.15 | 3.66 | 30.76 | 773.95 | 368.86 |
| 32 | 0.16 | 3.66 | 30.76 | 804.71 | 373.17 |
| 33 | 0.16 | 3.66 | 20.25 | 824.97 | 375.00 |
| 34 | 0.17 | 4.20 | 35.77 | 860.74 | 394.05 |
| 35 | 0.17 | 4.20 | 16.17 | 876.91 | 408.85 |
| 36 | 0.17 | 4.20 | 17.93 | 894.84 | 425.44 |
| 37 | 0.17 | 4.20 | 17.64 | 912.48 | 441.38 |
| 38 | 0.17 | 4.20 | 17.34 | 929.82 | 455.94 |
| 39 | 0.17 | 4.20 | 35.57 | 965.39 | 481.22 |
| 40 | 0.18 | 4.20 | 35.28 | 1000.67 | 500.39 |
| 41 | 0.19 | 4.20 | 32.93 | 1033.59 | 513.97 |
| 42 | 0.19 | 4.12 | 43.11 | 1076.70 | 541.41 |
| 43 | 0.19 | 4.12 | 16.74 | 1093.44 | 557.03 |
| 44 | 0.19 | 4.12 | 17.31 | 1110.75 | 573.42 |

Mesocosm 3 - Control Trial
Nitrogen

| Sample | Years of Watershed N | Influent TN | Influent TN | Cumulative Influent TN | TN Removal |
|---|---|---|---|---|---|
| - | (yrs) | (mg/L) | (mg) | (mg) | (mg) |
| 45 | 0.19 | 4.12 | 17.31 | 1128.07 | 589.69 |
| 46 | 0.19 | 4.12 | 17.31 | 1145.38 | 605.84 |
| 47 | 0.20 | 4.12 | 34.63 | 1180.01 | 630.08 |
| 48 | 0.21 | 4.12 | 34.63 | 1214.64 | 642.48 |
| 49 | 0.21 | 4.12 | 27.12 | 1241.76 | 649.10 |
| 50 | 0.22 | 4.34 | 42.36 | 1284.12 | 673.39 |
| 51 | 0.22 | 4.34 | 16.10 | 1300.22 | 688.23 |
| 52 | 0.22 | 4.34 | 17.93 | 1318.14 | 705.18 |
| 53 | 0.22 | 4.34 | 18.23 | 1336.37 | 721.81 |
| 54 | 0.22 | 4.34 | 17.93 | 1354.30 | 737.23 |
| 55 | 0.23 | 4.34 | 36.15 | 1390.45 | 763.75 |
| 56 | 0.23 | 4.34 | 36.46 | 1426.91 | 784.31 |
| 57 | 0.24 | 4.34 | 33.12 | 1460.03 | 799.09 |
| 58 | 0.25 | 4.55 | 57.24 | 1517.27 | 834.92 |
| 59 | 0.25 | 4.55 | 17.19 | 1534.46 | 850.37 |
| 60 | 0.25 | 4.55 | 19.10 | 1553.56 | 867.93 |
| 61 | 0.25 | 4.55 | 19.10 | 1572.66 | 884.02 |
| 62 | 0.25 | 4.55 | 18.78 | 1591.44 | 898.17 |
| 63 | 0.26 | 4.55 | 38.52 | 1629.95 | 922.28 |
| 64 | 0.26 | 4.55 | 37.88 | 1667.84 | 941.89 |
| 65 | 0.27 | 4.55 | 20.05 | 1687.89 | 951.61 |

Mesocosm 3 - Control Trial
Nitrogen

| Sample | Net Export | pH | Eh |
|---|---|---|---|
| - | (mg) | - | (mV) |
| 1 | -4.81 | 6.95 | -365.50 |
| 2 | -14.21 | 7.08 | -376.80 |
| 3 | -24.70 | 7.08 | -342.50 |
| 4 | -34.67 | 7.06 | -242.90 |
| 5 | -43.15 | 7.07 | -152.60 |
| 6 | -57.19 | 7.10 | -70.50 |
| 7 | -67.56 | 7.11 | -64.60 |
| 8 | -75.87 | 7.12 | -58.40 |
| 9 | -80.20 | 7.12 | -63.50 |
| 10 | -94.93 | 7.06 | -255.70 |
| 11 | -106.27 | 7.04 | |
| 12 | -118.94 | 7.00 | -279.80 |
| 13 | -131.37 | 7.02 | -290.20 |
| 14 | -142.36 | 7.02 | -254.50 |
| 15 | -159.02 | 7.07 | -150.10 |
| 16 | -170.69 | 7.12 | -109.00 |
| 17 | -180.56 | 7.11 | -99.00 |
| 18 | -201.21 | 7.05 | -296.60 |
| 19 | -213.50 | 6.98 | -282.50 |
| 20 | -227.29 | 7.01 | -283.10 |
| 21 | -239.27 | 7.01 | -270.90 |
| 22 | -249.74 | 7.03 | -168.80 |
| 23 | -264.17 | 7.08 | -75.20 |
| 24 | -274.27 | 7.17 | -65.50 |
| 25 | -281.61 | 7.15 | -63.40 |
| 26 | -304.70 | | -264.10 |
| 27 | -317.14 | | -278.60 |
| 28 | -331.45 | | -283.30 |
| 29 | -343.85 | | -190.40 |
| 30 | -355.29 | | -96.60 |
| 31 | -368.86 | | -3.00 |
| 32 | -373.17 | | 7.60 |
| 33 | -375.00 | | 3.70 |
| 34 | -394.05 | 6.76 | -151.70 |
| 35 | -408.85 | 6.82 | -218.40 |
| 36 | -425.44 | 6.82 | -223.60 |
| 37 | -441.38 | 6.84 | -162.60 |
| 38 | -455.94 | 6.86 | -93.30 |
| 39 | -481.22 | 6.87 | -39.00 |
| 40 | -500.39 | 6.89 | -16.50 |
| 41 | -513.97 | 6.90 | -6.90 |
| 42 | -541.41 | | |
| 43 | -557.03 | | |
| 44 | -573.42 | | |

Mesocosm 3 - Control Trial
Nitrogen

| Sample | Net Export | pH | Eh |
|---|---|---|---|
| - | (mg) | - | (mV) |
| 45 | -589.69 | | |
| 46 | -605.84 | | |
| 47 | -630.08 | | |
| 48 | -642.48 | | |
| 49 | -649.10 | | |
| 50 | -673.39 | 6.75 | -172.50 |
| 51 | -688.23 | 6.76 | -158.20 |
| 52 | -705.18 | 6.75 | -134.40 |
| 53 | -721.81 | 6.77 | -103.00 |
| 54 | -737.23 | 6.78 | -82.10 |
| 55 | -763.75 | 6.83 | -35.30 |
| 56 | -784.31 | 6.85 | -14.70 |
| 57 | -799.09 | 6.96 | -6.30 |
| 58 | -834.92 | | |
| 59 | -850.37 | | |
| 60 | -867.93 | | |
| 61 | -884.02 | | |
| 62 | -898.17 | | |
| 63 | -922.28 | | |
| 64 | -941.89 | | |
| 65 | -951.61 | | |

Mesocosm 3 - Control Trial
Nitrogen Speciation

| Sample | Ammonium | Ammonium | Cumulative Ammonium | Nitrate | Nitrate |
|---|---|---|---|---|---|
| - | (mg/L) | (mg) | (mg) | (mg/L) | (mg) |
| 1 | 0.09 | 0.20 | 0.20 | 0.56 | 1.20 |
| 4 | 0.63 | 4.45 | 4.65 | 0.88 | 8.84 |
| 7 | 0.49 | 11.71 | 16.36 | 1.56 | 25.58 |
| 9 | 0.72 | 7.62 | 23.98 | 1.09 | 16.81 |
| 10 | 0.42 | 4.36 | 28.34 | 0.03 | 4.30 |
| 12 | 0.56 | 3.91 | 32.25 | 0.03 | 0.20 |
| 14 | 0.40 | 4.00 | 36.25 | 0.68 | 2.94 |
| 17 | 0.51 | 11.96 | 48.22 | 1.34 | 26.50 |
| 18 | 0.05 | 2.78 | 50.99 | 0.03 | 6.72 |
| 21 | 0.55 | 3.68 | 54.67 | 0.24 | 1.64 |
| 23 | 1.07 | 10.25 | 64.92 | 1.13 | 8.63 |
| 25 | 1.33 | 18.74 | 83.66 | 1.28 | 18.79 |
| 26 | 0.05 | 7.65 | 91.30 | 0.03 | 7.26 |
| 29 | 0.12 | 1.00 | 92.30 | 0.26 | 1.74 |
| 31 | 0.40 | 3.28 | 95.58 | 1.26 | 9.56 |
| 42 | 0.01 | 15.43 | 111.01 | 0.03 | 47.81 |
| 45 | 0.01 | 0.12 | 111.13 | 0.03 | 0.31 |
| 47 | 0.44 | 2.83 | 113.97 | 0.97 | 6.28 |
| 49 | 0.74 | 8.84 | 122.81 | 1.37 | 17.51 |
| 50 | 0.03 | 3.85 | 126.66 | 0.03 | 6.96 |
| 53 | 0.10 | 0.78 | 127.44 | 0.01 | 0.23 |
| 55 | 0.53 | 3.92 | 131.37 | 0.64 | 4.06 |
| 57 | 0.85 | 11.06 | 142.43 | 1.35 | 15.93 |
| 58 | 0.01 | 5.54 | 147.97 | 0.20 | 9.97 |
| 61 | 0.23 | 1.46 | 149.43 | 0.93 | 6.86 |
| 63 | 0.53 | 4.79 | 154.22 | 1.26 | 13.75 |
| 65 | 0.69 | 7.77 | 161.99 | 0.02 | 8.13 |

Mesocosm 3 - Control Trial
Nitrogen Speciation

| Sample | Cumulative Nitrate | Nitrite | Nitrite | Cumulative Nitrite | Org N |
|---|---|---|---|---|---|
| - | (mg) | (mg/L) | (mg) | (mg) | (mg/L) |
| 1 | 1.20 | 0.10 | 0.22 | 0.22 | 1.64 |
| 4 | 10.04 | 0.15 | 1.56 | 1.78 | 0.76 |
| 7 | 35.62 | 0.08 | 2.39 | 4.17 | 1.52 |
| 9 | 52.43 | 0.03 | 0.70 | 4.88 | 1.76 |
| 10 | 56.73 | 0.01 | 0.17 | 5.04 | 1.12 |
| 12 | 56.93 | 0.01 | 0.08 | 5.12 | 0.72 |
| 14 | 59.88 | 0.01 | 0.08 | 5.21 | 0.83 |
| 17 | 86.38 | 0.04 | 0.62 | 5.83 | 1.60 |
| 18 | 93.10 | 0.01 | 0.23 | 6.06 | 0.48 |
| 21 | 94.74 | 0.00 | 0.06 | 6.12 | 0.28 |
| 23 | 103.36 | 0.03 | 0.17 | 6.29 | 0.40 |
| 25 | 122.15 | 0.04 | 0.55 | 6.84 | 0.35 |
| 26 | 129.42 | 0.01 | 0.29 | 7.13 | 0.33 |
| 29 | 131.16 | 0.03 | 0.25 | 7.38 | 0.30 |
| 31 | 140.72 | 0.08 | 0.69 | 8.07 | 1.18 |
| 42 | 188.53 | 0.01 | 3.31 | 11.38 | 0.30 |
| 45 | 188.84 | 0.01 | 0.12 | 11.50 | 0.22 |
| 47 | 195.11 | 0.01 | 0.13 | 11.63 | 0.76 |
| 49 | 212.62 | 0.01 | 0.15 | 11.78 | 1.01 |
| 50 | 219.59 | 0.01 | 0.10 | 11.88 | 0.42 |
| 53 | 219.82 | 0.01 | 0.12 | 12.00 | 0.37 |
| 55 | 223.88 | 0.01 | 0.14 | 12.14 | 0.41 |
| 57 | 239.81 | 0.02 | 0.26 | 12.41 | 0.40 |
| 58 | 249.78 | 0.01 | 0.19 | 12.60 | 0.49 |
| 61 | 256.64 | 0.01 | 0.12 | 12.72 | 0.00 |
| 63 | 270.39 | 0.01 | 0.13 | 12.85 | 0.27 |
| 65 | 278.52 | 0.01 | 0.13 | 12.97 | 1.65 |

Mesocosm 3 - Control Trial
Nitrogen Speciation

| Sample | Org N | Cumulative Org N |
|---|---|---|
| - | (mg) | (mg) |
| 1 | 3.50 | 3.50 |
| 4 | 14.73 | 18.23 |
| 7 | 23.93 | 42.16 |
| 9 | 20.79 | 62.95 |
| 10 | 11.07 | 74.02 |
| 12 | 7.32 | 81.34 |
| 14 | 6.45 | 87.79 |
| 17 | 31.93 | 119.71 |
| 18 | 10.27 | 129.99 |
| 21 | 4.68 | 134.67 |
| 23 | 4.34 | 139.01 |
| 25 | 5.90 | 144.91 |
| 26 | 3.77 | 148.68 |
| 29 | 3.84 | 152.52 |
| 31 | 9.35 | 161.87 |
| 42 | 55.31 | 217.17 |
| 45 | 3.22 | 220.39 |
| 47 | 6.16 | 226.55 |
| 49 | 13.27 | 239.82 |
| 50 | 7.14 | 246.96 |
| 53 | 4.72 | 251.68 |
| 55 | 4.86 | 256.54 |
| 57 | 6.49 | 263.03 |
| 58 | 5.71 | 268.74 |
| 61 | 2.98 | 271.71 |
| 63 | 1.68 | 273.39 |
| 65 | 12.21 | 285.60 |

Mesocosm 3 - Control Trial
Phosphorus

| Sample | Run | Flow | Date | Start Time | End Time |
|---|---|---|---|---|---|
| - | - | - | - | - | - |
| 1 | 1 | 140 | 5/31/2016 | 11:24:00 AM | 11:31:00 AM |
| 2 | 1 | 140 | 5/31/2016 | 11:54:00 AM | 11:56:00 AM |
| 3 | 1 | 140 | 5/31/2016 | 12:24:00 PM | 12:25:00 PM |
| 4 | 1 | 140 | 5/31/2016 | 12:54:00 PM | 12:56:00 PM |
| 5 | 1 | 140 | 5/31/2016 | 1:24:00 PM | 1:25:00 PM |
| 6 | 1 | 140 | 5/31/2016 | 2:24:00 PM | 2:25:00 PM |
| 7 | 1 | 140 | 5/31/2016 | 3:24:00 PM | 3:25:00 PM |
| 8 | 1 | 140 | 5/31/2016 | 4:24:00 PM | 4:25:00 PM |
| 9 | 1 | 140 | 5/31/2016 | 4:53:00 PM | 4:57:00 PM |
| 10 | 2 | 140 | 6/8/2016 | 11:03:00 AM | 11:11:00 AM |
| 11 | 2 | 140 | 6/8/2016 | 11:33:00 AM | 11:36:00 AM |
| 12 | 2 | 140 | 6/8/2016 | 12:03:00 PM | 12:05:00 PM |
| 13 | 2 | 140 | 6/8/2016 | 12:33:00 PM | 12:35:00 PM |
| 14 | 2 | 140 | 6/8/2016 | 1:03:00 PM | 1:04:00 PM |
| 15 | 2 | 140 | 6/8/2016 | 2:03:00 PM | 2:04:00 PM |
| 16 | 2 | 140 | 6/8/2016 | 3:03:00 PM | 3:04:00 PM |
| 17 | 2 | 140 | 6/8/2016 | 4:10:00 PM | 4:12:00 PM |
| 18 | 3 | 140 | 6/13/2016 | 12:02:00 PM | 12:09:00 PM |
| 19 | 3 | 140 | 6/13/2016 | 12:32:00 PM | 12:33:00 PM |
| 20 | 3 | 140 | 6/13/2016 | 1:02:00 PM | 1:06:00 PM |
| 21 | 3 | 140 | 6/13/2016 | 1:32:00 PM | 1:34:00 PM |
| 22 | 3 | 140 | 6/13/2016 | 2:02:00 PM | 2:04:00 PM |
| 23 | 3 | 140 | 6/13/2016 | 3:02:00 PM | 3:04:00 PM |
| 24 | 3 | 140 | 6/13/2016 | 4:02:00 PM | 4:04:00 PM |
| 25 | 3 | 140 | 6/13/2016 | 4:54:00 PM | 4:55:00 PM |
| 26 | 4 | 140 | 6/21/2016 | 12:30:00 PM | 12:09:00 PM |
| 27 | 4 | 140 | 6/21/2016 | 1:00:00 PM | 12:33:00 PM |
| 28 | 4 | 140 | 6/21/2016 | 1:30:00 PM | 1:06:00 PM |
| 29 | 4 | 140 | 6/21/2016 | 2:00:00 PM | 1:34:00 PM |
| 30 | 4 | 140 | 6/21/2016 | 2:30:00 PM | 2:04:00 PM |
| 31 | 4 | 140 | 6/21/2016 | 3:30:00 PM | 3:04:00 PM |
| 32 | 4 | 140 | 6/21/2016 | 4:30:00 PM | 4:04:00 PM |
| 33 | 4 | 140 | 6/21/2016 | 4:58:00 PM | 4:55:00 PM |
| 34 | 5 | 140 | 6/27/2016 | 11:08:00 AM | 11:14:00 AM |
| 35 | 5 | 140 | 6/27/2016 | 11:38:00 AM | 11:39:00 AM |
| 36 | 5 | 140 | 6/27/2016 | 12:08:00 PM | 12:10:00 PM |
| 37 | 5 | 140 | 6/27/2016 | 12:38:00 PM | 12:40:00 PM |
| 38 | 5 | 140 | 6/27/2016 | 1:08:00 PM | 1:09:00 PM |
| 39 | 5 | 140 | 6/27/2016 | 2:08:00 PM | 2:10:00 PM |
| 40 | 5 | 140 | 6/27/2016 | 3:08:00 PM | 3:10:00 PM |
| 41 | 5 | 140 | 6/27/2016 | 4:04:00 PM | 4:06:00 PM |
| 42 | 6 | 140 | 7/3/2016 | 8:47:00 AM | 8:51:00 AM |
| 43 | 6 | 140 | 7/3/2016 | 9:17:00 AM | 9:19:00 AM |
| 44 | 6 | 140 | 7/3/2016 | 9:47:00 AM | 9:49:00 AM |

Mesocosm 3 - Control Trial
Phosphorus

| Sample | Run | Flow | Date | Start Time | End Time |
|---|---|---|---|---|---|
| - | - | - | - | - | - |
| 45 | 6 | 140 | 7/3/2016 | 10:17:00 AM | 10:19:00 AM |
| 46 | 6 | 140 | 7/3/2016 | 10:47:00 AM | 10:49:00 AM |
| 47 | 6 | 140 | 7/3/2016 | 11:47:00 AM | 11:49:00 AM |
| 48 | 6 | 140 | 7/3/2016 | 12:47:00 PM | 12:49:00 PM |
| 49 | 6 | 140 | 7/3/2016 | 1:34:00 PM | 1:36:00 PM |
| 50 | 7 | 140 | 7/11/2016 | 11:27:00 AM | 11:38:00 AM |
| 51 | 7 | 140 | 7/11/2016 | 11:57:00 AM | 12:01:00 PM |
| 52 | 7 | 140 | 7/11/2016 | 12:27:00 PM | 12:30:00 PM |
| 53 | 7 | 140 | 7/11/2016 | 12:57:00 PM | 1:00:00 PM |
| 54 | 7 | 140 | 7/11/2016 | 1:27:00 PM | 1:29:00 PM |
| 55 | 7 | 140 | 7/11/2016 | 2:27:00 PM | 2:28:00 PM |
| 56 | 7 | 140 | 7/11/2016 | 3:27:00 PM | 3:28:00 PM |
| 57 | 7 | 140 | 7/11/2016 | 4:21:00 PM | 4:23:00 PM |
| 58 | 8 | 140 | 7/18/2016 | 11:39:00 AM | 11:47:00 AM |
| 59 | 8 | 140 | 7/18/2016 | 12:09:00 PM | 12:11:00 PM |
| 60 | 8 | 140 | 7/18/2016 | 12:39:00 PM | 12:41:00 PM |
| 61 | 8 | 140 | 7/18/2016 | 1:09:00 PM | 1:11:00 PM |
| 62 | 8 | 140 | 7/18/2016 | 1:39:00 PM | 1:40:00 PM |
| 63 | 8 | 140 | 7/18/2016 | 2:39:00 PM | 2:41:00 PM |
| 64 | 8 | 140 | 7/18/2016 | 3:39:00 PM | 3:40:00 PM |
| 65 | 8 | 140 | 7/18/2016 | 4:10:00 PM | 4:12:00 PM |

Mesocosm 3 - Control Trial
Phosphorus

| Sample | Mesocosm Start time | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative |
|---|---|---|---|---|---|
| - | - | - | - | (hrs) | (hrs) |
| 1 | 10:57:00 AM | 11:24:00 AM | 11:27:30 AM | 0.51 | 0.51 |
| 2 | 10:57:00 AM | 11:24:00 AM | 11:55:00 AM | 0.97 | 0.97 |
| 3 | 10:57:00 AM | 11:24:00 AM | 12:24:30 PM | 1.46 | 1.46 |
| 4 | 10:57:00 AM | 11:24:00 AM | 12:55:00 PM | 1.97 | 1.97 |
| 5 | 10:57:00 AM | 11:24:00 AM | 1:24:30 PM | 2.46 | 2.46 |
| 6 | 10:57:00 AM | 11:24:00 AM | 2:24:30 PM | 3.46 | 3.46 |
| 7 | 10:57:00 AM | 11:24:00 AM | 3:24:30 PM | 4.46 | 4.46 |
| 8 | 10:57:00 AM | 11:24:00 AM | 4:24:30 PM | 5.46 | 5.46 |
| 9 | 10:57:00 AM | 11:24:00 AM | 4:55:00 PM | 5.97 | 5.97 |
| 10 | 10:12:00 AM | 11:03:00 AM | 11:07:00 AM | 0.92 | 6.88 |
| 11 | 10:12:00 AM | 11:03:00 AM | 11:34:30 AM | 1.38 | 7.34 |
| 12 | 10:12:00 AM | 11:03:00 AM | 12:04:00 PM | 1.87 | 7.83 |
| 13 | 10:12:00 AM | 11:03:00 AM | 12:34:00 PM | 2.37 | 8.33 |
| 14 | 10:12:00 AM | 11:03:00 AM | 1:03:30 PM | 2.86 | 8.83 |
| 15 | 10:12:00 AM | 11:03:00 AM | 2:03:30 PM | 3.86 | 9.83 |
| 16 | 10:12:00 AM | 11:03:00 AM | 3:03:30 PM | 4.86 | 10.83 |
| 17 | 10:12:00 AM | 11:03:00 AM | 4:11:00 PM | 5.98 | 11.95 |
| 18 | 10:55:00 AM | 12:02:00 PM | 12:05:30 PM | 1.18 | 13.13 |
| 19 | 10:55:00 AM | 12:02:00 PM | 12:32:30 PM | 1.63 | 13.58 |
| 20 | 10:55:00 AM | 12:02:00 PM | 1:04:00 PM | 2.15 | 14.10 |
| 21 | 10:55:00 AM | 12:02:00 PM | 1:33:00 PM | 2.63 | 14.58 |
| 22 | 10:55:00 AM | 12:02:00 PM | 2:03:00 PM | 3.13 | 15.08 |
| 23 | 10:55:00 AM | 12:02:00 PM | 3:03:00 PM | 4.13 | 16.08 |
| 24 | 10:55:00 AM | 12:02:00 PM | 4:03:00 PM | 5.13 | 17.08 |
| 25 | 10:55:00 AM | 12:02:00 PM | 4:54:30 PM | 5.99 | 17.94 |
| 26 | 11:00:00 AM | 12:09:00 PM | 12:19:30 PM | 1.33 | 19.27 |
| 27 | 11:00:00 AM | 12:09:00 PM | 12:46:30 PM | 1.78 | 19.72 |
| 28 | 11:00:00 AM | 12:09:00 PM | 1:18:00 PM | 2.30 | 20.24 |
| 29 | 11:00:00 AM | 12:09:00 PM | 1:47:00 PM | 2.78 | 20.73 |
| 30 | 11:00:00 AM | 12:09:00 PM | 2:17:00 PM | 3.28 | 21.23 |
| 31 | 11:00:00 AM | 12:09:00 PM | 3:17:00 PM | 4.28 | 22.23 |
| 32 | 11:00:00 AM | 12:09:00 PM | 4:17:00 PM | 5.28 | 23.23 |
| 33 | 11:00:00 AM | 12:09:00 PM | 4:56:30 PM | 5.94 | 23.88 |
| 34 | 10:06:00 AM | 11:08:00 AM | 11:11:00 AM | 1.08 | 24.97 |
| 35 | 10:06:00 AM | 11:08:00 AM | 11:38:30 AM | 1.54 | 25.43 |
| 36 | 10:06:00 AM | 11:08:00 AM | 12:09:00 PM | 2.05 | 25.93 |
| 37 | 10:06:00 AM | 11:08:00 AM | 12:39:00 PM | 2.55 | 26.43 |
| 38 | 10:06:00 AM | 11:08:00 AM | 1:08:30 PM | 3.04 | 26.93 |
| 39 | 10:06:00 AM | 11:08:00 AM | 2:09:00 PM | 4.05 | 27.93 |
| 40 | 10:06:00 AM | 11:08:00 AM | 3:09:00 PM | 5.05 | 28.93 |
| 41 | 10:06:00 AM | 11:08:00 AM | 4:05:00 PM | 5.98 | 29.87 |
| 42 | 7:35:00 AM | 8:47:00 AM | 8:49:00 AM | 1.23 | 31.10 |
| 43 | 7:35:00 AM | 8:47:00 AM | 9:18:00 AM | 1.72 | 31.58 |
| 44 | 7:35:00 AM | 8:47:00 AM | 9:48:00 AM | 2.22 | 32.08 |

Mesocosm 3 - Control Trial
Phosphorus

| Sample | Mesocosm Start time | First Drip Time | Halfpoint Time | Elapsed Hours From Start | Elapsed Hours From Start Cumulative |
|---|---|---|---|---|---|
| - | - | - | - | (hrs) | (hrs) |
| 45 | 7:35:00 AM | 8:47:00 AM | 10:18:00 AM | 2.72 | 32.58 |
| 46 | 7:35:00 AM | 8:47:00 AM | 10:48:00 AM | 3.22 | 33.08 |
| 47 | 7:35:00 AM | 8:47:00 AM | 11:48:00 AM | 4.22 | 34.08 |
| 48 | 7:35:00 AM | 8:47:00 AM | 12:48:00 PM | 5.22 | 35.08 |
| 49 | 7:35:00 AM | 8:47:00 AM | 1:35:00 PM | 6.00 | 35.87 |
| 50 | 10:21:00 AM | 11:27 AM | 11:32:30 AM | 1.19 | 37.06 |
| 51 | 10:21:00 AM | 11:27 AM | 11:59:00 AM | 1.63 | 37.50 |
| 52 | 10:21:00 AM | 11:27 AM | 12:28:30 PM | 2.13 | 37.99 |
| 53 | 10:21:00 AM | 11:27 AM | 12:58:30 PM | 2.63 | 38.49 |
| 54 | 10:21:00 AM | 11:27 AM | 1:28:00 PM | 3.12 | 38.98 |
| 55 | 10:21:00 AM | 11:27 AM | 2:27:30 PM | 4.11 | 39.98 |
| 56 | 10:21:00 AM | 11:27 AM | 3:27:30 PM | 5.11 | 40.98 |
| 57 | 10:21:00 AM | 11:27 AM | 4:22:00 PM | 6.02 | 41.88 |
| 58 | 10:11:00 AM | 11:39 AM | 11:43:00 AM | 1.53 | 43.42 |
| 59 | 10:11:00 AM | 11:39 AM | 12:10:00 PM | 1.98 | 43.87 |
| 60 | 10:11:00 AM | 11:39 AM | 12:40:00 PM | 2.48 | 44.37 |
| 61 | 10:11:00 AM | 11:39 AM | 1:10:00 PM | 2.98 | 44.87 |
| 62 | 10:11:00 AM | 11:39 AM | 1:39:30 PM | 3.48 | 45.36 |
| 63 | 10:11:00 AM | 11:39 AM | 2:40:00 PM | 4.48 | 46.37 |
| 64 | 10:11:00 AM | 11:39 AM | 3:39:30 PM | 5.48 | 47.36 |
| 65 | 10:11:00 AM | 11:39 AM | 4:11:00 PM | 6.00 | 47.88 |

Mesocosm 3 - Control Trial
Phosphorus

| Sample | Elapsed From Drip | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TP |
|---|---|---|---|---|---|
| - | (hrs) | (hrs) | (cm) | (L) | (mg/L) |
| 1 | 0.06 | 0.06 | 0.22 | 4.27 | 0.07 |
| 2 | 0.52 | 0.52 | 0.41 | 8.12 | 0.06 |
| 3 | 1.01 | 1.01 | 0.62 | 12.25 | 0.05 |
| 4 | 1.52 | 1.52 | 0.83 | 16.52 | 0.05 |
| 5 | 2.01 | 2.01 | 1.04 | 20.65 | 0.06 |
| 6 | 3.01 | 3.01 | 1.46 | 29.05 | 0.08 |
| 7 | 4.01 | 4.01 | 1.89 | 37.45 | 0.10 |
| 8 | 5.01 | 5.01 | 2.31 | 45.85 | 0.10 |
| 9 | 5.52 | 5.52 | 2.53 | 50.12 | 0.11 |
| 10 | 0.07 | 5.58 | 2.91 | 57.82 | 0.07 |
| 11 | 0.52 | 6.04 | 3.11 | 61.67 | 0.08 |
| 12 | 1.02 | 6.53 | 3.32 | 65.80 | 0.08 |
| 13 | 1.52 | 7.03 | 3.53 | 70.00 | 0.08 |
| 14 | 2.01 | 7.53 | 3.74 | 74.13 | 0.09 |
| 15 | 3.01 | 8.53 | 4.16 | 82.53 | 0.11 |
| 16 | 4.01 | 9.53 | 4.58 | 90.93 | 0.13 |
| 17 | 5.13 | 10.65 | 5.06 | 100.38 | 0.13 |
| 18 | 0.06 | 10.71 | 5.56 | 110.25 | 0.09 |
| 19 | 0.51 | 11.16 | 5.75 | 114.03 | 0.07 |
| 20 | 1.03 | 11.68 | 5.97 | 118.44 | 0.07 |
| 21 | 1.52 | 12.17 | 6.17 | 122.50 | 0.07 |
| 22 | 2.02 | 12.67 | 6.39 | 126.70 | 0.07 |
| 23 | 3.02 | 13.67 | 6.81 | 135.10 | 0.08 |
| 24 | 4.02 | 14.67 | 7.23 | 143.50 | 0.08 |
| 25 | 4.88 | 15.53 | 7.60 | 150.71 | 0.10 |
| 26 | 0.18 | 15.70 | 8.16 | 161.84 | 0.08 |
| 27 | 0.62 | 16.15 | 8.35 | 165.62 | 0.05 |
| 28 | 1.15 | 16.68 | 8.57 | 170.03 | 0.05 |
| 29 | 1.63 | 17.16 | 8.77 | 174.09 | 0.05 |
| 30 | 2.13 | 17.66 | 8.99 | 178.29 | 0.05 |
| 31 | 3.13 | 18.66 | 9.41 | 186.69 | 0.12 |
| 32 | 4.13 | 19.66 | 9.83 | 195.09 | 0.16 |
| 33 | 4.79 | 20.32 | 10.11 | 200.62 | 0.15 |
| 34 | 0.05 | 20.37 | 10.57 | 209.72 | N/A |
| 35 | 0.51 | 20.83 | 10.76 | 213.57 | N/A |
| 36 | 1.02 | 21.33 | 10.98 | 217.84 | N/A |
| 37 | 1.52 | 21.83 | 11.19 | 222.04 | N/A |
| 38 | 2.01 | 22.33 | 11.40 | 226.17 | N/A |
| 39 | 3.02 | 23.33 | 11.83 | 234.64 | N/A |
| 40 | 4.02 | 24.33 | 12.25 | 243.04 | N/A |
| 41 | 4.95 | 25.27 | 12.64 | 250.88 | N/A |
| 42 | 0.03 | 25.30 | 13.17 | 261.24 | 0.07 |
| 43 | 0.52 | 25.78 | 13.37 | 265.30 | 0.04 |
| 44 | 1.02 | 26.28 | 13.58 | 269.50 | 0.05 |

Mesocosm 3 - Control Trial
Phosphorus

| Sample | Elapsed From Drip | Elapsed From Drip Cumulative | Equivalent Rainfall | Applied Volume | TP |
|---|---|---|---|---|---|
| - | (hrs) | (hrs) | (cm) | (L) | (mg/L) |
| 45 | 1.52 | 26.78 | 13.79 | 273.70 | 0.05 |
| 46 | 2.02 | 27.28 | 14.01 | 277.90 | 0.06 |
| 47 | 3.02 | 28.28 | 14.43 | 286.30 | 0.11 |
| 48 | 4.02 | 29.28 | 14.85 | 294.70 | 0.14 |
| 49 | 4.80 | 30.07 | 15.18 | 301.28 | 0.15 |
| 50 | 0.09 | 30.16 | 15.69 | 311.29 | 0.06 |
| 51 | 0.53 | 30.60 | 15.88 | 315.00 | 0.04 |
| 52 | 1.03 | 31.09 | 16.08 | 319.13 | 0.04 |
| 53 | 1.53 | 31.59 | 16.29 | 323.33 | 0.04 |
| 54 | 2.02 | 32.08 | 16.50 | 327.46 | 0.04 |
| 55 | 3.01 | 33.08 | 16.92 | 335.79 | 0.06 |
| 56 | 4.01 | 34.08 | 17.35 | 344.19 | 0.08 |
| 57 | 4.92 | 34.98 | 17.73 | 351.82 | 0.10 |
| 58 | 0.07 | 35.05 | 18.38 | 364.70 | 0.05 |
| 59 | 0.52 | 35.50 | 18.57 | 368.48 | 0.03 |
| 60 | 1.02 | 36.00 | 18.78 | 372.68 | 0.04 |
| 61 | 1.52 | 36.50 | 18.99 | 376.88 | 0.05 |
| 62 | 2.01 | 36.99 | 19.20 | 381.01 | 0.07 |
| 63 | 3.02 | 38.00 | 19.63 | 389.48 | 0.09 |
| 64 | 4.01 | 38.99 | 20.05 | 397.81 | 0.09 |
| 65 | 4.53 | 39.52 | 20.27 | 402.22 | 0.09 |

Mesocosm 3 - Control Trial
Phosphorus

| Sample | TP | Cumulative TP ( | Years of Watershed P | Influent TP | Influent TP |
|---|---|---|---|---|---|
| - | (mg) | (mg) | (yrs) | (mg/L) | (mg) |
| 1 | 0.14 | 0.14 | 0.00 | 0.36 | 0.76 |
| 2 | 0.24 | 0.39 | 0.00 | 0.36 | 1.37 |
| 3 | 0.23 | 0.61 | 0.00 | 0.36 | 1.47 |
| 4 | 0.22 | 0.84 | 0.00 | 0.36 | 1.52 |
| 5 | 0.24 | 1.08 | 0.00 | 0.36 | 1.47 |
| 6 | 0.58 | 1.66 | 0.00 | 0.36 | 3.00 |
| 7 | 0.73 | 2.39 | 0.00 | 0.36 | 3.00 |
| 8 | 0.84 | 3.23 | 0.01 | 0.36 | 3.00 |
| 9 | 0.46 | 3.69 | 0.01 | 0.36 | 1.52 |
| 10 | 0.69 | 4.39 | 0.01 | 0.43 | 3.02 |
| 11 | 0.28 | 4.67 | 0.01 | 0.43 | 1.65 |
| 12 | 0.31 | 4.98 | 0.01 | 0.43 | 1.77 |
| 13 | 0.33 | 5.31 | 0.01 | 0.43 | 1.80 |
| 14 | 0.34 | 5.65 | 0.01 | 0.43 | 1.77 |
| 15 | 0.81 | 6.46 | 0.01 | 0.43 | 3.59 |
| 16 | 0.97 | 7.43 | 0.01 | 0.43 | 3.59 |
| 17 | 1.21 | 8.65 | 0.01 | 0.43 | 4.04 |
| 18 | 1.07 | 9.72 | 0.02 | 0.35 | 3.82 |
| 19 | 0.28 | 10.00 | 0.02 | 0.35 | 1.31 |
| 20 | 0.29 | 10.30 | 0.02 | 0.35 | 1.53 |
| 21 | 0.28 | 10.58 | 0.02 | 0.35 | 1.41 |
| 22 | 0.29 | 10.87 | 0.02 | 0.35 | 1.46 |
| 23 | 0.64 | 11.50 | 0.02 | 0.35 | 2.92 |
| 24 | 0.71 | 12.21 | 0.02 | 0.35 | 2.92 |
| 25 | 0.65 | 12.86 | 0.02 | 0.35 | 2.50 |
| 26 | 0.99 | 13.86 | 0.02 | 0.33 | 3.77 |
| 27 | 0.25 | 14.10 | 0.02 | 0.33 | 1.25 |
| 28 | 0.21 | 14.32 | 0.02 | 0.33 | 1.46 |
| 29 | 0.20 | 14.51 | 0.02 | 0.33 | 1.34 |
| 30 | 0.21 | 14.72 | 0.02 | 0.33 | 1.39 |
| 31 | 0.72 | 15.44 | 0.03 | 0.33 | 2.78 |
| 32 | 1.16 | 16.60 | 0.03 | 0.33 | 2.78 |
| 33 | 0.85 | 17.46 | 0.03 | 0.33 | 1.83 |
| 34 | N/A | N/A | N/A | N/A | N/A |
| 35 | N/A | N/A | N/A | N/A | N/A |
| 36 | N/A | N/A | N/A | N/A | N/A |
| 37 | N/A | N/A | N/A | N/A | N/A |
| 38 | N/A | N/A | N/A | N/A | N/A |
| 39 | N/A | N/A | N/A | N/A | N/A |
| 40 | N/A | N/A | N/A | N/A | N/A |
| 41 | N/A | N/A | N/A | N/A | N/A |
| 42 | 6.55 | 24.01 | 0.04 | 0.45 | 23.81 |
| 43 | 0.21 | 24.22 | 0.04 | 0.45 | 1.85 |
| 44 | 0.19 | 24.41 | 0.04 | 0.45 | 1.91 |

Mesocosm 3 - Control Trial
Phosphorus

| Sample | TP | Cumulative TP ( | Years of Watershed P | Influent TP | Influent TP |
|---|---|---|---|---|---|
| - | (mg) | (mg) | (yrs) | (mg/L) | (mg) |
| 45 | 0.21 | 24.61 | 0.04 | 0.45 | 1.91 |
| 46 | 0.21 | 24.82 | 0.04 | 0.45 | 1.91 |
| 47 | 0.69 | 25.51 | 0.04 | 0.45 | 3.82 |
| 48 | 1.05 | 26.56 | 0.04 | 0.45 | 3.82 |
| 49 | 0.97 | 27.53 | 0.05 | 0.45 | 2.99 |
| 50 | 1.06 | 28.59 | 0.05 | 0.38 | 4.17 |
| 51 | 0.18 | 28.77 | 0.05 | 0.38 | 1.41 |
| 52 | 0.17 | 28.94 | 0.05 | 0.38 | 1.57 |
| 53 | 0.17 | 29.11 | 0.05 | 0.38 | 1.59 |
| 54 | 0.17 | 29.29 | 0.05 | 0.38 | 1.57 |
| 55 | 0.44 | 29.72 | 0.05 | 0.38 | 3.16 |
| 56 | 0.58 | 30.31 | 0.05 | 0.38 | 3.19 |
| 57 | 0.68 | 30.98 | 0.05 | 0.38 | 2.89 |
| 58 | 0.98 | 31.96 | 0.05 | 0.49 | 5.58 |
| 59 | 0.16 | 32.12 | 0.05 | 0.49 | 1.84 |
| 60 | 0.15 | 32.28 | 0.05 | 0.49 | 2.04 |
| 61 | 0.20 | 32.47 | 0.05 | 0.49 | 2.04 |
| 62 | 0.24 | 32.72 | 0.06 | 0.49 | 2.01 |
| 63 | 0.65 | 33.37 | 0.06 | 0.49 | 4.12 |
| 64 | 0.75 | 34.12 | 0.06 | 0.49 | 4.05 |
| 65 | 0.41 | 34.53 | 0.06 | 0.49 | 2.15 |

Mesocosm 3 - Control Trial
Phosphorus

| Sample | Cumulative Influent TP | TP Removal | Net P Export | pH | Eh |
|---|---|---|---|---|---|
| - | (mg) | (mg) | (mg) | | (mV) |
| 1 | 0.76 | 0.62 | -0.47 | 6.95 | -366 |
| 2 | 2.14 | 1.75 | -1.36 | 7.08 | -377 |
| 3 | 3.61 | 3.00 | -2.38 | 7.08 | -343 |
| 4 | 5.13 | 4.30 | -3.46 | 7.06 | -243 |
| 5 | 6.61 | 5.53 | -4.46 | 7.07 | -153 |
| 6 | 9.61 | 7.95 | -6.28 | 7.10 | -71 |
| 7 | 12.61 | 10.22 | -7.83 | 7.11 | -65 |
| 8 | 15.60 | 12.37 | -9.14 | 7.12 | -58 |
| 9 | 17.13 | 13.44 | -9.74 | 7.12 | -64 |
| 10 | 20.15 | 15.76 | -11.38 | 7.06 | -256 |
| 11 | 21.79 | 17.13 | -12.46 | 7.04 | N/A |
| 12 | 23.56 | 18.58 | -13.60 | 7.00 | -280 |
| 13 | 25.35 | 20.05 | -14.74 | 7.02 | -290 |
| 14 | 27.12 | 21.47 | -15.82 | 7.02 | -255 |
| 15 | 30.71 | 24.25 | -17.79 | 7.07 | -150 |
| 16 | 34.30 | 26.87 | -19.43 | 7.12 | -109 |
| 17 | 38.34 | 29.69 | -21.05 | 7.11 | -99 |
| 18 | 42.16 | 32.44 | -22.73 | 7.05 | -297 |
| 19 | 43.47 | 33.47 | -23.47 | 6.98 | -283 |
| 20 | 45.00 | 34.71 | -24.41 | 7.01 | -283 |
| 21 | 46.41 | 35.84 | -25.26 | 7.01 | -271 |
| 22 | 47.87 | 37.00 | -26.14 | 7.03 | -169 |
| 23 | 50.78 | 39.28 | -27.77 | 7.08 | -75 |
| 24 | 53.70 | 41.48 | -29.27 | 7.17 | -66 |
| 25 | 56.20 | 43.34 | -30.48 | 7.15 | -63 |
| 26 | 59.97 | 46.12 | -32.26 | N/A | -264 |
| 27 | 61.22 | 47.12 | -33.02 | N/A | -279 |
| 28 | 62.68 | 48.37 | -34.05 | N/A | -283 |
| 29 | 64.03 | 49.52 | -35.00 | N/A | -190 |
| 30 | 65.42 | 50.69 | -35.97 | N/A | -97 |
| 31 | 68.20 | 52.76 | -37.31 | N/A | -3 |
| 32 | 70.98 | 54.37 | -37.77 | N/A | 8 |
| 33 | 72.81 | 55.35 | -37.89 | N/A | 4 |
| 34 | N/A | N/A | N/A | 6.76 | -152 |
| 35 | N/A | N/A | N/A | 6.82 | -218 |
| 36 | N/A | N/A | N/A | 6.82 | -224 |
| 37 | N/A | N/A | N/A | 6.84 | -163 |
| 38 | N/A | N/A | N/A | 6.86 | -93 |
| 39 | N/A | N/A | N/A | 6.87 | -39 |
| 40 | N/A | N/A | N/A | 6.89 | -17 |
| 41 | N/A | N/A | N/A | 6.90 | -7 |
| 42 | 98.12 | 72.61 | -48.60 | N/A | N/A |
| 43 | 99.96 | 74.24 | -50.02 | N/A | N/A |
| 44 | 101.87 | 75.96 | -51.55 | N/A | N/A |

## Mesocosm 3 - Control Trial

## Phosphorus

| Sample | Cumulative Influent TP | TP Removal | Net P Export | pH | Eh |
|---|---|---|---|---|---|
| - | (mg) | (mg) | (mg) | | (mV) |
| 45 | 103.78 | 77.66 | -53.05 | N/A | N/A |
| 46 | 105.69 | 79.36 | -54.54 | N/A | N/A |
| 47 | 109.51 | 82.49 | -56.98 | N/A | N/A |
| 48 | 113.33 | 85.26 | -58.70 | N/A | N/A |
| 49 | 116.32 | 87.28 | -59.75 | N/A | N/A |
| 50 | 120.49 | 90.40 | -61.81 | 6.75 | -173 |
| 51 | 121.90 | 91.62 | -62.85 | 6.76 | -158 |
| 52 | 123.46 | 93.02 | -64.08 | 6.75 | -134 |
| 53 | 125.06 | 94.44 | -65.33 | 6.77 | -103 |
| 54 | 126.62 | 95.83 | -66.55 | 6.78 | -82 |
| 55 | 129.78 | 98.55 | -68.83 | 6.83 | -35 |
| 56 | 132.97 | 101.15 | -70.84 | 6.85 | -15 |
| 57 | 135.86 | 103.37 | -72.39 | 6.96 | -6 |
| 58 | 141.44 | 107.97 | -76.00 | 6.74 | -291 |
| 59 | 143.28 | 109.65 | -77.52 | 6.77 | -258 |
| 60 | 145.32 | 111.54 | -79.26 | 6.79 | -185 |
| 61 | 147.36 | 113.38 | -80.91 | 6.78 | -141 |
| 62 | 149.37 | 115.15 | -82.43 | 6.81 | -124 |
| 63 | 153.50 | 118.62 | -85.26 | 7.01 | -106 |
| 64 | 157.55 | 121.93 | -87.81 | 6.87 | -106 |
| 65 | 159.70 | 123.66 | -89.13 | 6.87 | -114 |

Mesocosm 3 - Control Trial

Phosphorus Speciation

| Sample | DP | SRP | SRP | Cumulative SRP | PP | PP | PP | DOP | DOP |
|---|---|---|---|---|---|---|---|---|---|
| - | (mg/L) | (mg/L) | (mg) | (mg) | (mg/L) | (mg) | (mg) | (mg/L) | (mg) |
| 1 | 0.01 | 0.04 | 0.08 | 0.08 | 0.06 | 0.12 | 0.12 | 0.00 | 0.00 |
| 4 | 0.03 | 0.03 | 0.42 | 0.50 | 0.02 | 0.49 | 0.61 | 0.00 | 0.00 |
| 7 | 0.06 | 0.07 | 1.03 | 1.53 | 0.03 | 0.57 | 1.18 | 0.00 | 0.00 |
| 9 | 0.07 | 0.08 | 0.90 | 2.43 | 0.04 | 0.44 | 1.62 | 0.00 | 0.00 |
| 10 | 0.02 | 0.01 | 0.33 | 2.77 | 0.05 | 0.32 | 1.93 | 0.01 | 0.05 |
| 12 | 0.02 | 0.02 | 0.13 | 2.89 | 0.06 | 0.40 | 2.34 | 0.00 | 0.05 |
| 14 | 0.01 | 0.01 | 0.13 | 3.03 | 0.08 | 0.55 | 2.89 | 0.00 | 0.00 |
| 17 | 0.04 | 0.04 | 0.64 | 3.67 | 0.10 | 2.25 | 5.13 | 0.00 | 0.00 |
| 18 | 0.01 | 0.01 | 0.24 | 3.91 | 0.08 | 0.84 | 5.97 | 0.00 | 0.00 |
| 21 | 0.01 | 0.01 | 0.12 | 4.03 | 0.06 | 0.83 | 6.80 | 0.00 | 0.00 |
| 23 | 0.04 | 0.03 | 0.27 | 4.30 | 0.05 | 0.67 | 7.48 | 0.00 | 0.03 |
| 25 | 0.07 | 0.06 | 0.76 | 5.06 | 0.03 | 0.59 | 8.06 | 0.00 | 0.06 |
| 26 | 0.01 | 0.04 | 0.57 | 5.63 | 0.07 | 0.57 | 8.63 | 0.00 | 0.01 |
| 29 | 0.02 | 0.01 | 0.30 | 5.93 | 0.03 | 0.62 | 9.25 | 0.01 | 0.07 |
| 31 | 0.10 | 0.09 | 0.64 | 6.57 | 0.02 | 0.28 | 9.53 | 0.01 | 0.12 |
| 42 | 0.00 | 0.05 | 5.21 | 11.78 | 0.07 | 3.09 | 12.63 | 0.00 | 0.31 |
| 45 | 0.01 | 0.04 | 0.56 | 12.34 | 0.04 | 0.63 | 13.25 | 0.00 | 0.00 |
| 47 | 0.07 | 0.09 | 0.82 | 13.16 | 0.04 | 0.48 | 13.73 | 0.00 | 0.00 |
| 49 | 0.15 | 0.16 | 1.83 | 14.99 | 0.00 | 0.31 | 14.04 | 0.00 | 0.00 |
| 50 | 0.01 | 0.01 | 0.84 | 15.83 | 0.05 | 0.25 | 14.30 | 0.00 | 0.00 |
| 53 | 0.02 | 0.01 | 0.12 | 15.95 | 0.02 | 0.41 | 14.71 | 0.01 | 0.07 |
| 55 | 0.04 | 0.03 | 0.25 | 16.19 | 0.03 | 0.28 | 14.99 | 0.01 | 0.10 |
| 57 | 0.06 | 0.06 | 0.76 | 16.95 | 0.04 | 0.50 | 15.49 | 0.00 | 0.05 |
| 58 | 0.01 | 0.07 | 0.84 | 17.79 | 0.04 | 0.52 | 16.01 | 0.00 | 0.00 |
| 61 | 0.05 | 0.08 | 0.88 | 18.68 | 0.01 | 0.30 | 16.30 | 0.00 | 0.00 |
| 63 | 0.07 | 0.11 | 1.17 | 19.85 | 0.01 | 0.11 | 16.42 | 0.00 | 0.00 |
| 65 | 0.08 | 0.11 | 1.37 | 21.22 | 0.02 | 0.19 | 16.61 | 0.00 | 0.00 |

Mesocosm 3 - Control Trial

Phosphorus Speciation

| **Sample** | **DOP** |
|---|---|
| **-** | **(mg)** |
| 1 | 0.00 |
| 4 | 0.00 |
| 7 | 0.00 |
| 9 | 0.00 |
| 10 | 0.05 |
| 12 | 0.10 |
| 14 | 0.10 |
| 17 | 0.10 |
| 18 | 0.10 |
| 21 | 0.10 |
| 23 | 0.13 |
| 25 | 0.19 |
| 26 | 0.21 |
| 29 | 0.27 |
| 31 | 0.39 |
| 42 | 0.70 |
| 45 | 0.70 |
| 47 | 0.70 |
| 49 | 0.70 |
| 50 | 0.70 |
| 53 | 0.77 |
| 55 | 0.87 |
| 57 | 0.92 |
| 58 | 0.92 |
| 61 | 0.92 |
| 63 | 0.92 |
| 65 | 0.92 |

Mesocosm 1 - 30% Trial
Influent Nitrogen

| Influent | TN1 | TN2 | TN3 | Avg | Ammonium | Nitrate | Org N |
|---|---|---|---|---|---|---|---|
| 8/11/2015 | 3.86 | 3.93 | N/A | 3.90 | 0.06 | N/A | N/A |
| 8/26/2015 | 4.05 | 3.93 | N/A | 3.99 | 0.06 | N/A | N/A |
| 9/8/2015 | 4.05 | 4.00 | 3.99 | 4.01 | 0.06 | N/A | N/A |
| 9/16/2015 | 3.39 | 3.34 | 3.41 | 3.38 | 0.12 | 1.74 | 1.52 |
| 9/30/2015 | 3.02 | 3.03 | N/A | 3.02 | 0.05 | 1.75 | 1.22 |
| 10/9/2015 | 2.74 | 2.22 | 2.62 | 2.53 | 0.12 | 1.66 | 0.74 |
| 10/22/2015 | 4.41 | 4.01 | 4.00 | 4.14 | 0.07 | 1.90 | 2.17 |
| 11/2/2015 | 3.14 | 3.23 | 3.30 | 3.22 | 0.11 | 2.09 | 1.03 |
| 3/29/2016 | 4.29 | N/A | N/A | 4.29 | 0.08 | 2.71 | 1.51 |
| 6/27/2016 | 4.13 | 4.38 | 4.10 | 4.20 | 0.06 | 1.70 | 2.44 |

*All measurements in mg/L

| Tap Water | TN | Ammonium | Nitrate | Org N |
|---|---|---|---|---|
| 8/11/2015 | 0.53 | 0.02 | N/A | N/A |
| 8/26/2015 | 1.26 | 0.01 | N/A | N/A |
| 9/8/2015 | 0.60 | 0.01 | N/A | N/A |
| 9/16/2015 | 0.66 | 0.09 | 0.61 | 0.00 |
| 9/30/2015 | 0.79 | 0.03 | 0.52 | 0.24 |
| 10/9/2015 | 0.67 | 0.07 | 0.55 | 0.05 |
| 10/22/2015 | N/A | N/A | N/A | N/A |
| 11/2/2015 | 1.10 | 0.14 | 1.15 | 0.00 |
| 3/29/2016 | 1.66 | 0.01 | 1.58 | 0.07 |
| 6/27/2016 | 1.33 | 0.04 | 0.93 | 0.35 |

*All measurements in mg/L

Mesocosm 2 - 15% Trial

Influent Nitrogen

| Influent | TN1 | TN2 | TN3 | Avg | Ammonium | Nitrate | Nitrite | Org N |
|---|---|---|---|---|---|---|---|---|
| 1/8/2016 | 4.08 | 4.15 | 4.07 | 4.10 | 0.07 | 2.51 | 0.01 | 1.51 |
| 1/14/2016 | 3.27 | 3.45 | 3.63 | 3.45 | 0.08 | 1.86 | 0.01 | 1.50 |
| 1/20/2016 | 4.07 | 3.97 | | 4.02 | 0.10 | 2.59 | 0.01 | 1.32 |
| 1/28/2016 | 3.35 | 4.20 | 4.23 | 3.93 | 0.10 | 2.88 | 0.01 | 0.94 |
| 2/5/2016 | 3.93 | 4.22 | 3.89 | 4.01 | 0.12 | 2.24 | 0.01 | 1.65 |
| 2/11/2016 | 4.00 | 4.27 | 4.13 | 4.13 | 0.13 | 2.23 | 0.01 | 1.76 |
| 2/19/2016 | 4.00 | 4.03 | 4.06 | 4.03 | 0.10 | 2.66 | 0.01 | 1.27 |
| 3/7/2016 | 4.14 | 4.12 | 4.19 | 4.15 | 0.13 | 2.72 | 0.01 | 1.30 |
| 3/17/2016 | 4.38 | | | 4.38 | 0.09 | 2.90 | 0.01 | 1.38 |
| 3/24/2016 | 4.47 | | | 4.47 | 0.12 | 2.81 | 0.01 | 1.53 |
| 3/29/2016 | 4.29 | | | 4.29 | 0.07 | 1.66 | 0.01 | 2.57 |
| 4/8/2016 | 4.18 | 4.24 | 4.19 | 4.20 | 0.06 | 2.58 | 0.01 | 1.55 |
| 4/13/2016 | 4.66 | 4.59 | 4.64 | 4.63 | 0.01 | 4.49 | 0.01 | 0.12 |
| 4/20/2016 | 4.48 | 4.48 | 4.45 | 4.47 | 0.09 | 2.64 | 0.01 | 1.73 |

*All measurements in mg/L

| Tap Water | TN | Ammonium | Nitrate | Nitrite | Org N |
|---|---|---|---|---|---|
| 1/14/2016 | 1.01 | 0.05 | 0.91 | 0.01 | 0.05 |
| 1/20/2016 | 1.52 | 0.02 | 1.43 | 0.01 | 0.07 |
| 1/28/2016 | 1.62 | 0.03 | 1.66 | 0.01 | 0.00 |
| 2/5/2016 | 1.28 | 0.04 | 1.19 | 0.01 | 0.05 |
| 2/11/2016 | 1.40 | 0.10 | 1.33 | 0.01 | 0.00 |
| 2/19/2016 | 1.56 | 0.08 | 1.41 | 0.01 | 0.06 |
| 3/7/2016 | 1.64 | 0.03 | 1.64 | 0.01 | 0.00 |
| 3/17/2016 | 2.01 | 0.03 | 1.68 | 0.01 | 0.30 |
| 3/24/2016 | 1.89 | 0.01 | | 0.01 | |
| 3/29/2016 | 1.66 | 0.01 | 1.58 | 0.01 | 0.06 |
| 4/8/2016 | 1.69 | 0.01 | 1.64 | 0.01 | 0.03 |
| 4/13/2016 | 1.64 | 0.01 | | 0.01 | |
| 4/20/2016 | 1.77 | 0.02 | 1.66 | 0.01 | 0.09 |

*All measurements in mg/L

Mesocosm 3 - Control Trial
Influent Nitrogen

| Influent | TN1 | TN2 | TN3 | Avg | Ammonium | Nitrate | Nitrite | Org N |
|---|---|---|---|---|---|---|---|---|
| 5/31/2016 | 4.98 | 4.53 | 4.44 | 4.65 | 0.09 | 1.98 | 0.01 | 2.57 |
| 6/7/2016 | 4.31 | 4.38 | 4.34 | 4.34 | 0.17 | 1.76 | 0.01 | 2.40 |
| 6/13/2016 | 3.93 | 3.86 | N/A | 3.89 | 0.08 | 1.81 | 0.01 | 1.99 |
| 6/21/2016 | 3.69 | 3.64 | N/A | 3.66 | 0.09 | 1.58 | 0.01 | 1.97 |
| 6/27/2016 | 4.13 | 4.38 | 4.10 | 4.20 | N/A | N/A | N/A | N/A |
| 7/3/2016 | 4.09 | 4.04 | 4.25 | 4.12 | 0.70 | 2.05 | 0.01 | 1.36 |
| 7/11/2016 | 4.22 | 4.37 | 4.44 | 4.34 | 0.80 | 1.99 | 0.01 | 1.54 |
| 7/18/2016 | 4.17 | 4.93 | N/A | 4.55 | 0.71 | 1.95 | 0.01 | 1.88 |

*All measurements in mg/L

| Tap Water | TN | Ammoni | Nitrate | Nitrite | Org N |
|---|---|---|---|---|---|
| 5/31/2016 | 1.54 | 0.01 | 1.06 | 0.01 | 0.46 |
| 6/7/2016 | 1.65 | 0.04 | 1.56 | 0.01 | 0.04 |
| 6/13/2016 | 1.34 | 0.04 | 1.48 | 0.01 | 0.00 |
| 6/21/2016 | 1.31 | 0.04 | 0.94 | 0.01 | 0.32 |
| 6/27/2016 | 1.33 | N/A | N/A | N/A | N/A |
| 7/3/2016 | 1.22 | 0.01 | 1.10 | 0.01 | 0.09 |
| 7/11/2016 | 1.32 | 0.01 | 1.13 | 0.01 | 0.04 |
| 7/18/2016 | 1.19 | N/A | 1.05 | 0.01 | N/A |

*All measurements in mg/L

Mesocosm 1 - 30% Trial
Influent Phosphorus

| Influent | TP1 | TP2 | TP3 | Avg Inf TP | DP | SRP | DOP | PP |
|---|---|---|---|---|---|---|---|---|
| 8/11/2015 | 0.52 | N/A | N/A | 0.52 | 0.40 | 0.45 | N/A | N/A |
| 8/26/2015 | 0.45 | 0.42 | N/A | 0.43 | N/A | 0.39 | N/A | N/A |
| 9/8/2015 | 0.23 | 0.28 | 0.26 | 0.26 | N/A | N/A | N/A | N/A |
| 9/16/2015 | 0.24 | 0.27 | 0.27 | 0.26 | N/A | 0.24 | N/A | -0.02 |
| 9/30/2015 | 0.26 | N/A | 0.26 | 0.26 | 0.22 | 0.22 | 0.00 | -0.04 |
| 10/9/2015 | 0.25 | 0.24 | 0.25 | 0.25 | 0.23 | 0.21 | -0.02 | -0.04 |
| 10/22/2015 | 0.27 | 0.26 | 0.26 | 0.26 | 0.25 | 0.25 | 0.00 | -0.01 |
| 11/2/2015 | 0.30 | 0.29 | 0.29 | 0.29 | 0.23 | 0.23 | 0.00 | -0.06 |
| 3/29/2016 | 0.31 | N/A | N/A | 0.31 | 0.31 | 0.30 | N/A | N/A |
| 6/27/2016 | 0.37 | 0.37 | 0.35 | 0.36 | 0.33 | 0.33 | N/A | N/A |

*All measurements in mg/L

| Tap | TP | DP | SRP | DOP | PP |
|---|---|---|---|---|---|
| 8/11/2015 | 0.29 | 0.30 | N/A | N/A | 0.00 |
| 8/26/2015 | 0.23 | N/A | N/A | N/A | N/A |
| 9/8/2015 | 0.26 | N/A | N/A | N/A | N/A |
| 9/16/2015 | 0.25 | N/A | 0.22 | N/A | N/A |
| 9/30/2015 | 0.20 | 0.17 | 0.18 | 0.00 | 0.02 |
| 10/9/2015 | 0.24 | 0.19 | 0.20 | -0.01 | 0.06 |
| 11/2/2015 | 0.26 | 0.24 | 0.26 | -0.02 | 0.02 |
| 3/29/2016 | 0.25 | N/A | 0.23 | N/A | N/A |
| 6/27/2016 | 0.36 | 0.35 | 0.35 | N/A | N/A |

*All measurements in mg/L

Mesocosm 2 - 15% Trial

Influent Phosphorus

| Influent | TP1 | TP2 | TP3 | Avg Inf TP | DP | SRP | DOP | PP |
|---|---|---|---|---|---|---|---|---|
| 1/8/2016 | 0.25 | 0.24 | 0.25 | 0.25 | 0.22 | 0.20 | 0.02 | 0.04 |
| 1/14/2016 | 0.27 | 0.23 | 0.23 | 0.24 | 0.18 | 0.17 | 0.01 | 0.09 |
| 1/20/2016 | 0.23 | N/A | N/A | 0.23 | 0.21 | 0.07 | 0.14 | 0.02 |
| 1/28/2016 | N/A | 0.27 | 0.25 | 0.26 | 0.17 | 0.22 | 0.00 | 0.10 |
| 2/5/2016 | 0.25 | 0.25 | 0.24 | 0.25 | 0.17 | 0.22 | 0.00 | 0.08 |
| 2/11/2016 | 0.29 | 0.28 | 0.28 | 0.28 | 0.20 | 0.24 | 0.00 | 0.09 |
| 2/19/2016 | 0.25 | N/A | N/A | 0.25 | 0.21 | 0.21 | 0.00 | 0.04 |
| 3/7/2016 | 0.33 | N/A | N/A | 0.33 | 0.28 | 0.28 | 0.00 | 0.05 |
| 3/17/2016 | 0.30 | N/A | N/A | 0.30 | 0.28 | 0.28 | 0.00 | 0.02 |
| 3/24/2016 | 0.27 | N/A | N/A | 0.27 | 0.27 | 0.27 | 0.00 | 0.00 |
| 3/29/2016 | 0.30 | N/A | N/A | 0.30 | 0.28 | 0.29 | 0.00 | 0.02 |
| 4/8/2016 | 0.38 | 0.37 | 0.37 | 0.37 | 0.35 | 0.35 | 0.00 | 0.03 |
| 4/13/2016 | 0.43 | 0.42 | 0.42 | 0.42 | 0.37 | 0.39 | 0.00 | 0.05 |
| 4/20/2016 | 0.54 | 0.53 | 0.53 | 0.54 | 0.45 | 0.43 | 0.01 | 0.10 |

*All measurements in mg/L

| Tap | TP | DP | SRP | DOP | PP |
|---|---|---|---|---|---|
| 1/8/2016 | N/A | N/A | N/A | N/A | N/A |
| 1/14/2016 | N/A | 0.20 | 0.20 | 0.00 | N/A |
| 1/20/2016 | 0.24 | 0.23 | 0.24 | 0.00 | 0.00 |
| 1/28/2016 | 0.28 | 0.26 | 0.30 | 0.00 | 0.02 |
| 2/5/2016 | 0.26 | 0.22 | 0.24 | 0.00 | 0.03 |
| 2/11/2016 | 0.26 | 0.24 | 0.24 | 0.00 | 0.02 |
| 2/19/2016 | 0.26 | 0.24 | 0.22 | 0.01 | 0.02 |
| 3/7/2016 | 0.32 | 0.29 | 0.30 | 0.00 | 0.03 |
| 3/17/2016 | 0.29 | 0.27 | 0.29 | 0.00 | 0.02 |
| 3/24/2016 | 0.28 | 0.27 | 0.28 | 0.00 | 0.01 |
| 3/29/2016 | 0.25 | 0.25 | 0.23 | 0.02 | 0.01 |
| 4/8/2016 | 0.39 | 0.35 | 0.35 | 0.00 | 0.04 |
| 4/13/2016 | 0.44 | 0.39 | 0.41 | 0.00 | 0.05 |
| 4/20/2016 | 0.51 | 0.47 | 0.47 | 0.00 | 0.04 |

*All measurements in mg/L

Mesocosm 3 - Control Trial
Influent Phosphorus

| Influent | TP1 | TP2 | TP3 | Avg Inf TP | DP | SRP | DOP | PP |
|---|---|---|---|---|---|---|---|---|
| 5/31/2016 | 0.36 | 0.36 | 0.36 | 0.36 | 0.42 | 0.34 | 0.08 | 0.00 |
| 6/7/2016 | 0.43 | 0.43 | 0.42 | 0.43 | 0.41 | 0.41 | 0.00 | 0.02 |
| 6/13/2016 | 0.35 | 0.35 | N/A | 0.35 | 0.33 | 0.33 | 0.00 | 0.02 |
| 6/21/2016 | 0.33 | 0.34 | 0.32 | 0.33 | 0.31 | 0.28 | 0.03 | 0.01 |
| 6/27/2016 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 7/3/2016 | 0.42 | 0.38 | 0.57 | 0.45 | 0.32 | 0.31 | 0.01 | 0.10 |
| 7/11/2016 | 0.38 | 0.38 | 0.37 | 0.38 | 0.36 | 0.33 | 0.02 | 0.03 |
| 7/18/2016 | 0.42 | 0.41 | 0.63 | 0.49 | 0.19 | 0.37 | 0.00 | 0.23 |

*All measurements in mg/L

| Tap | TP | DP | SRP | DOP | PP |
|---|---|---|---|---|---|
| 5/31/2016 | 0.37 | 0.37 | 0.35 | 0.02 | 0.00 |
| 6/7/2016 | 0.44 | 0.43 | 0.43 | -0.01 | 0.01 |
| 6/13/2016 | 0.35 | 0.33 | 0.28 | 0.05 | 0.02 |
| 6/21/2016 | 0.33 | 0.31 | 0.30 | 0.01 | 0.02 |
| 6/27/2016 | N/A | N/A | N/A | N/A | N/A |
| 7/3/2016 | 0.43 | 0.39 | 0.38 | 0.01 | 0.04 |
| 7/11/2016 | 0.39 | 0.36 | 0.36 | 0.00 | 0.03 |
| 7/18/2016 | 0.39 | 0.38 | 0.37 | 0.01 | 0.01 |

*All measurements in mg/L

Tracer Study Data
15% Mesocosm

| Sampling Notes | | | | | |
|---|---|---|---|---|---|
| **Start Time** | **End Time** | **Elasped Min** | **EC Reading** | **Normalized** | **t/tbar** |
| 11:30 AM | 11:30 AM | 75.00 | 480 | 0.0000 | 0.21 |
| 12:00 PM | 12:00 PM | 105.00 | 487 | 0.0100 | 0.29 |
| 12:30 PM | 12:30 PM | 135.00 | 493 | 0.0186 | 0.38 |
| 1:00 PM | 1:00 PM | 165.00 | 509 | 0.0415 | 0.46 |
| 1:30 PM | 1:30 PM | 195.00 | 508 | 0.0401 | 0.54 |
| 2:00 PM | 2:00 PM | 225.00 | 511 | 0.0444 | 0.63 |
| 2:30 PM | 2:30 PM | 255.00 | 533 | 0.0759 | 0.71 |
| 3:00 PM | 3:00 PM | 285.00 | 550 | 0.1003 | 0.79 |
| 3:30 PM | 3:30 PM | 315.00 | 606 | 0.1805 | 0.88 |
| 4:00 PM | 4:00 PM | 345.00 | 680 | 0.2865 | 0.96 |
| 4:30 PM | 4:30 PM | 375.00 | 773 | 0.4198 | 1.04 |
| 5:00 PM | 5:00 PM | 405.00 | 848 | 0.5272 | 1.13 |
| 5:30 PM | 5:30 PM | 435.00 | 922 | 0.6332 | 1.21 |
| 6:00 PM | 6:00 PM | 465.00 | 995 | 0.7378 | 1.29 |
| 6:30 PM | 6:30 PM | 495.00 | 1048 | 0.8138 | 1.38 |
| 7:00 PM | 7:00 PM | 525.00 | 1089 | 0.8725 | 1.46 |
| 7:30 PM | 7:30 PM | 555.00 | 1108 | 0.8997 | 1.54 |
| 8:00 PM | 8:00 PM | 585.00 | 1131 | 0.9327 | 1.63 |
| 8:30 PM | 8:30 PM | 615.00 | 1146 | 0.9542 | 1.71 |
| 9:00 PM | 9:00 PM | 645.00 | 1154 | 0.9656 | 1.79 |
| 9:30 PM | 9:30 PM | 675.00 | 1166 | 0.9828 | 1.88 |
| 10:00 PM | 10:00 PM | 705.00 | 1178 | 1.0000 | 1.96 |
| 10:30 PM | 10:30 PM | 735.00 | 1176 | 0.9971 | 2.04 |
| 11:00 PM | 11:00 PM | 765.00 | 1177 | 0.9986 | 2.13 |
| 11:30 PM | 11:30 PM | 795.00 | 1177 | 0.9986 | 2.21 |
| 12:00 AM | 12:00 AM | 825.00 | 1178 | 1.0000 | 2.29 |

Tracer Study Data
15% Mesocosm

| Elasped Min | Normalized Min | F(t) | t*dF(t) | t^2*dF(t) |
|---|---|---|---|---|
| 75.00 | 0.00 | 0.0000 | | |
| 105.00 | 30.00 | 0.0100 | 0 | 9 |
| 135.00 | 60.00 | 0.0186 | 1 | 31 |
| 165.00 | 90.00 | 0.0415 | 2 | 186 |
| 195.00 | 120.00 | 0.0401 | 0 | -21 |
| 225.00 | 150.00 | 0.0444 | 1 | 97 |
| 255.00 | 180.00 | 0.0759 | 6 | 1021 |
| 285.00 | 210.00 | 0.1003 | 5 | 1074 |
| 315.00 | 240.00 | 0.1805 | 19 | 4621 |
| 345.00 | 270.00 | 0.2865 | 29 | 7729 |
| 375.00 | 300.00 | 0.4198 | 40 | 11991 |
| 405.00 | 330.00 | 0.5272 | 35 | 11701 |
| 435.00 | 360.00 | 0.6332 | 38 | 13740 |
| 465.00 | 390.00 | 0.7378 | 41 | 15907 |
| 495.00 | 420.00 | 0.8138 | 32 | 13394 |
| 525.00 | 450.00 | 0.8725 | 26 | 11895 |
| 555.00 | 480.00 | 0.8997 | 13 | 6272 |
| 585.00 | 510.00 | 0.9327 | 17 | 8571 |
| 615.00 | 540.00 | 0.9542 | 12 | 6266 |
| 645.00 | 570.00 | 0.9656 | 7 | 3724 |
| 675.00 | 600.00 | 0.9828 | 10 | 6189 |
| 705.00 | 630.00 | 1.0000 | 11 | 6823 |
| 735.00 | 660.00 | 0.9971 | -2 | -1248 |
| 765.00 | 690.00 | 0.9986 | 1 | 682 |
| 795.00 | 720.00 | 0.9986 | 0 | 0 |
| 825.00 | 750.00 | 1.0000 | 1 | 806 |
| | | **Summations** | 344 | 131461 |

| | |
|---|---|
| **Constituent Residence Time** | 344.05 |
| **Variance** | 13087 |
| **Dimensionless Variance** | 0.11 |
| **n-CMFRs** | 9.05 |

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