Appendix 4B-4: Vegetation Biomass and Nutrient Analysis for STA-1W

DB Environmental, Inc.

Vegetation Biomass and Nutrient Analysis for Stormwater Treatment Area 1 West (STA-1W)

Final Report

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Executive Summary

Introduction

The South Florida Water Management District (District) is continuing research to optimize the Stormwater Treatment Areas' (STAs) capability to reduce phosphorus (P) loadings from Everglades Agricultural Area (EAA) runoff. A portion of STA-1W (formerly known as the Everglades Nutrient Removal Project (ENRP)) has been in operation since 1992. While historical aerial photography and ground truthing efforts have provided a qualitative estimate of vegetation standing crop biomass within the ENRP, quantitative information on species composition and standing crop biomass for dominant vegetation is lacking.

This project had the following objectives:

- To determine the species composition, biomass and tissue nutrient content for dominant vegetation communities along the ENRP nutrient gradient, from inflow to outflow regions
- To determine if seasonality affects the biomass and nutrient content of the dominant floating and submerged aquatic vegetation (SAV) communities
- To compare current cattail (*Typha spp*.) communities with cattail communities during 1995, when the ENRP was still in a "start-up" phase

Submerged Aquatic Vegetation and Floating Macrophytes

For this project we concentrated on two dominant SAV species (*Najas guadalupensis* and *Ceratophyllum demersum*) and two floating aquatic vegetation (FAV) species (*Pistia stratiotes* and *Eichhornia crassipes*) found within the ENRP. We characterized vegetation along the eastern (Cell 1 and 3) and western (Cells 2 and 4) of the ENRP during both the winter and summer seasons. SAV samples were collected using a 1m² box corer, and floating mats were sampled using 1 m² floating quadrats. The collected biomass was analyzed for percent coverage, wet and dry biomass, total phosphorus (TP), nitrogen (N), carbon (C), and ash content.

For both SAV and FAV, we observed no consistent trends in standing crop biomass along the inflow-outflow nutrient gradient established along the flow paths. Vegetation collected along the eastern ENRP flowpath (Cell 1 – Cell 3), which provided the greatest distance between inflow and outflow stations, exhibited more pronounced differences in biomass and tissue composition than did the western flow path samples. *Ceratophyllum* was superior to *Najas*, and *Eichhornia* was superior to *Pistia*, in displaying gradient effects on standing crop biomass and composition.

For both SAV and FAV, standing crop biomass in the ENRP was higher in the summer than in the winter. We observed the opposite trend for tissue nutrient levels: TP and N levels typically were higher in the winter than during the summer.

Typha (Cattail)

Typha samples were collected along the ENRP nutrient gradient during winter 2002. *Typha* samples were collected using a 0.5 m^2 quadrat at three locations along each of the eastern and western flowpaths. The harvested biomass was separated into above-ground-live, above-ground-dead and belowground tissue types and analyzed for wet and dry biomass, total phosphorus (TP), nitrogen (N), carbon (C), and ash content.

In general, *Typha* biomass was highest at the inflow stations, with above-ground-dead tissues comprising the bulk of the standing crop. Belowground tissues typically were the best indicators of nutrient gradient effects along the two flow paths.

Two of the *Typha* locations that we sampled corresponded to stations where *Typha* biomass and composition was characterized by District scientists in the winter of 1995, while the ENRP was in a 'start-up' phase. We found that for all tissue types, the standing crop biomass was higher in 2002 than for 1995. By contrast, at the Cell 1 outflow station, the tissue N and TP content of *Typha* in 2002 was much lower than the tissue nutrient levels observed in 1995.

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Section 1: Introduction and Background

The Everglades wetland ecosystem is the largest subtropical wetland in the United States and is recognized to be an internationally significant ecosystem. Urban and agricultural development have impacted both the hydrologic and nutrient regimes of south Florida, endangering the health of the Everglades ecosystem. Reduction of total phosphorus has been mandated by the Everglades Forever Act (EFA, Section 373.4592, Florida Statues) as a prerequisite to restoring and protecting the remaining natural areas in the Everglades.

Part of the strategy to reduce nutrients is the construction and operation of Stormwater Treatment Areas (STAs) to intercept nutrient-rich waters and treat them prior to their release into the Everglades. STA-1W is located in western Palm Beach County (26 38'N, 80 25'W), 25 miles west of the city of West Palm Beach, Florida. This STA borders the northwest corner of Water Conservation Area 1, the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Figure 1). The STA is a treatment wetland built on converted agricultural land previously farmed for sugar cane, corn and rice. A portion of STA-1W, the Everglades Nutrient Removal Project (ENRP), has been in operation since 1994 and has developed relatively mature wetland plant communities. Aerial photography with ground truthing (Chimney et al. 2000) has provided estimates of coverage of plant communities; and several limited sampling efforts have provided rough estimates of biomass (SFWMD, unpublished data). However, estimates of the biomass ranges and species composition for each dominant vegetation type in the treatment wetlands are lacking. These estimates are desirable for management and treatment optimization, simulation modeling, evaluation of treatment performance, and design of other treatment wetlands in south Florida for future Everglades restoration efforts.

The mature treatment wetlands comprising the ENRP consist of four large marshes, treatment cells 1 through 4. The total effective treatment area is 1,545 hectares (ha) (3,818 acres), ranging in size from 147 ha to 578 ha. Vegetation in each cell has remained relatively stable in composition and distribution since 1997, although variations in water depth and management have altered vegetation patterns occasionally. The dominant vegetative types include large, dense stands of emergents, primarily *Typha* spp. (both *T. latifoloa* and *T. domingensis*), submerged aquatic vegetation (primarily *Najas guadalupensis*, *Ceratophyllum demersum*, and *Chara* spp.), floating plants (primarily *Pistia stratiotes* and *Eichhornia crassipes*), as well as periphyton communities (Chimney et al. 2000). The nutrient-rich agricultural runoff enters the ENRP at the north end of Cell 1 (G303) and splits at the G-255 structure into Cells 1 and 2 (the eastern and western flow paths) (Figure 1). From there the water from Cell 1 flows into Cell 3, and the water from Cell 2 flows into Cell 4.

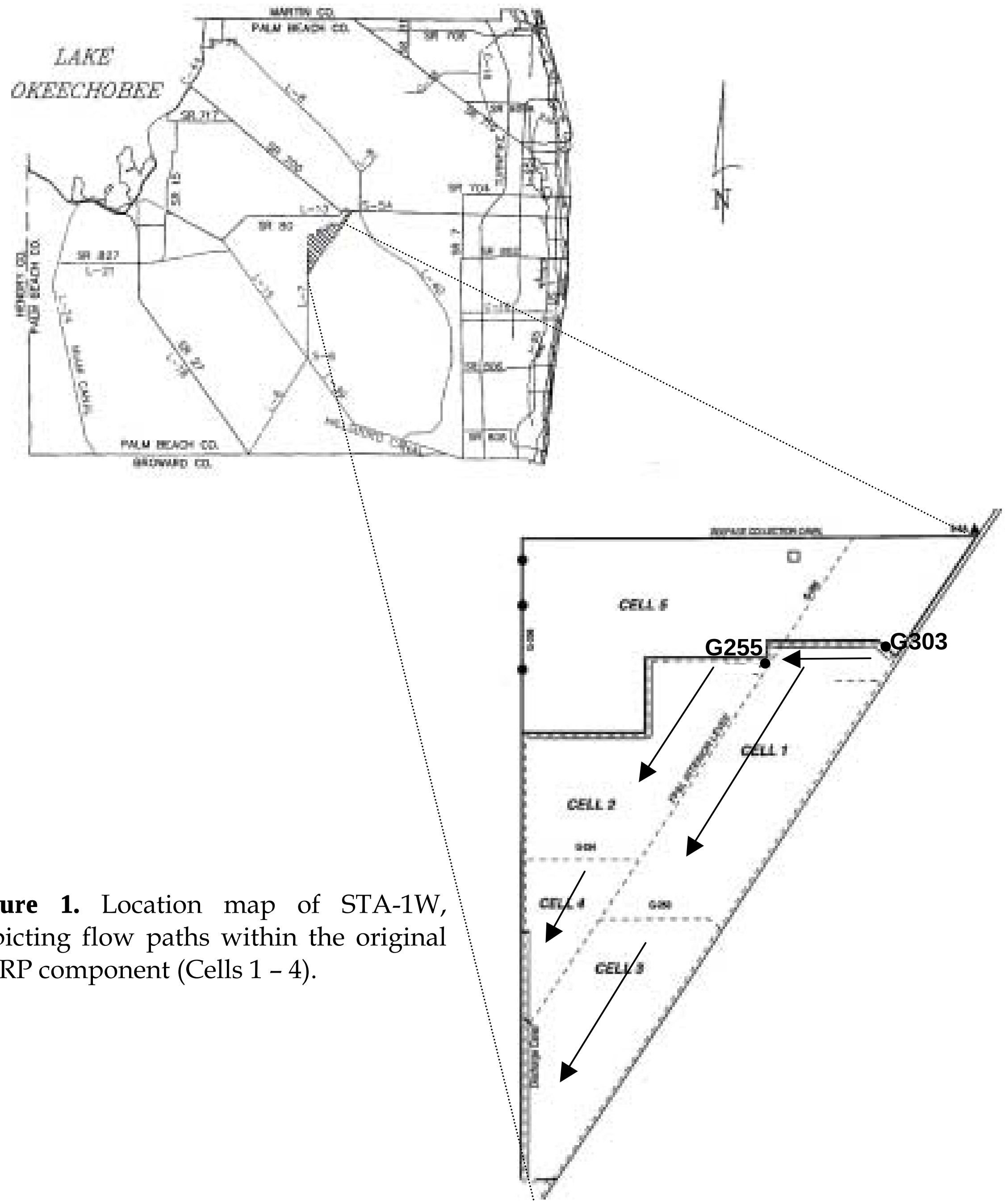


Figure 1. Location map of STA-1W, depicting flow paths within the original ENRP component (Cells 1 – 4).

Section 2: General Project Information

On October 2, 2001 DB Environmental, Inc. (DBE) entered into a 12-month contract with the South Florida Water Management District to collect and analyze vegetation in Cells 1, 2, 3 and 4 of STA-1W (formerly the Everglades Nutrient Removal Project (ENRP)) (Figure 1). The objective of this study was to characterize the percent cover of plant species and estimate biomass of the three dominant vegetation communities along the nutrient gradient in the ENRP. These communities are the emergent macrophytes (*Typha* [cattail]), floating macrophytes (*Pistia stratiotes* [water lettuce] and *Eichhornia crassipes* [water hyacinth]) and submerged aquatic vegetation (*Ceratophyllum demersum* [coontail] and *Najas guadalupensis* [southern naiad]). In addition, we assessed the effects of seasonality on the standing crop and composition of the floating and submerged aquatic vegetation (SAV) species.

Specific research questions addressed in this study were:

1. What is the species composition and the percent cover of the selected plant communities for the sampling points along the ENRP nutrient gradient?
2. What is the biomass (wet and dry weight) and nutrient content of the dominant species in each sample along the ENRP nutrient gradient?
3. Does seasonality affect the biomass and composition of the floating and SAV plant communities?
4. How do the existing *Typha* communities compare with the *Typha* communities during 1995 and 1996, when the ENRP was still in a “start-up” phase?

Question #1 was addressed by the analysis of percent cover by plant species or periphyton type at the sampling stations. To address question #2, we measured the wet and dry biomass and elemental composition (TP, N, C, ash content) of subsamples of the dominant plant species. For question #3, we compared the percent cover, biomass and nutrient analyses of samples collected during winter and summer seasons at the same locations. Question #4 was addressed by comparing *Typha* data acquired during this study with historical District biomass and composition data for *Typha*.

Section 3: Submerged Aquatic Vegetation (SAV) and Floating Macrophytes

3.1 Methods

In February 2002, DBE personnel established sampling locations for the SAV and floating macrophytes (Figure 2) to be collected during the winter (February 2002) and summer (May and June 2002) seasons. These locations were based on the following three criteria: 1) the plant bed needed to be of sufficient size (at least 40 m^2); 2) the bed needed to be dominated by the species of interest; and 3) the vegetation needed to be healthy. Once locations were established, samples were collected for *Ceratophyllum*, *Eichhornia* and *Pistia* in the inflow and outflow regions of Cells 1, 2 and 3. We were unable to locate *Najas* plant beds that met the above criteria in the inflow regions of Cells 2 and 3. Therefore, *Najas* samples were collected in the outflow and mid regions of Cells 4 and 3 respectively, in addition to the inflow and outflow regions of Cell 1, the outflow region of Cell 3 and the mid region of Cell 2 (Figure 2). Four random vegetation samples were collected at each location. GPS coordinates were recorded for each sampling location (see Appendix Table A-1 for coordinates).

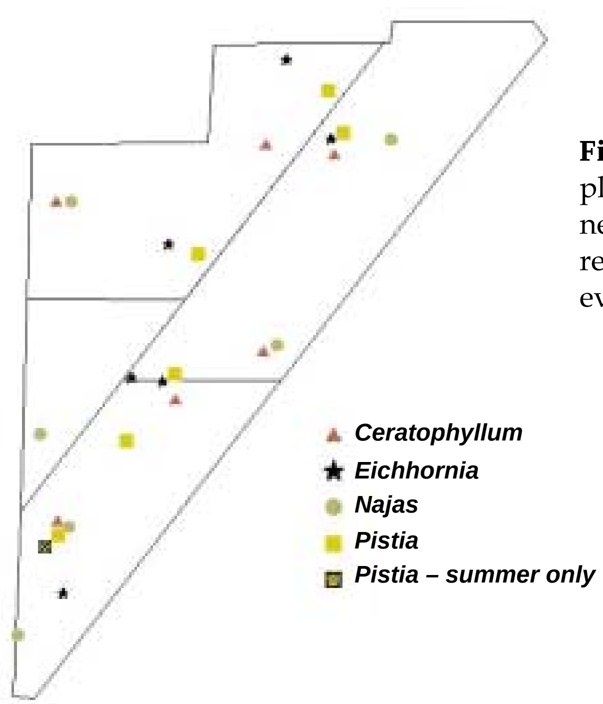


Figure 2. Sampling locations for SAV and floating plant beds in Cells 1 – 4 of STA-1W. Note that a new location was established at the Cell 3 outflow region for *Pistia* during the summer sampling event (see text).

During the summer (May and June 2002) sampling event a new location for *Pistia* in the Cell 3 outflow region had to be established because the original plant community no longer existed (Figure 2). All other stations remained the same throughout the study.

Floating vegetation was collected from within a 1 m^2 PVC quadrat. Upon quadrat placement a photo was taken and percent cover of the surface area within the quadrat was assessed using visual coverage definitions of 25, 50, 75 and 100% (see Appendix for photos and percent cover for each quadrat). Using these coverage definitions, only species comprising at least 25% coverage were identified. It therefore is possible for another species to be present when 100% coverage is observed. Samples were collected by hand-gathering all plant biomass (above and below ground if applicable) within the quadrat, and placing it in a large plastic bag for transportation back to the on-site trailer. At the trailer, samples were rinsed, separated and identified by species. The total wet weight of the entire biomass of the dominant species for each quadrat was determined using a Chatillon hanging spring balance with a 20 kg capacity. A subsample of the dominant species was then collected by randomly selecting three plants. The wet weight of this subsample was recorded using an Ohaus triple beam balance with a 2610 g capacity. The subsample was placed on ice in a cooler and sent to the lab within 24 hours for further biomass and nutrient analyses.

SAV samples were collected using a 1 m^2 box corer that was 0.9 m deep. The sides were constructed of 22 gauge plated steel and reinforced with wooden braces. Upon placement of the box corer a photo was taken and percent vegetation cover of the surface was assessed using the same technique as described for the floating plants (see Appendix for photos and percent cover for each quadrat). Samples were collected by using a rake to hand-gather all plant biomass (above and below ground if applicable) within the box corer. The SAV biomass was then placed in a large plastic bag for transportation back to the laboratory. Upon arrival at the laboratory the samples were rinsed, separated and identified by species. A total wet weight of the entire biomass of the dominant species for each box core was determined using a Chatillon hanging spring balance with a 60 lb capacity. A subsample, consisting of three random handfuls, was then collected. Wet weight biomass was measured using a Sartorius top pan balance with a 6100 g capacity in preparation for further biomass and nutrient analyses.

All samples collected during the winter and summer sampling events were analyzed in the laboratory for wet and dry biomass, TP, N, C and ash content under DBE's Comprehensive Quality Assurance Plan (CompQAP) #910048 using the methods provided in Table 1. Each of the four plots collected within each location was analyzed individually and then averaged (see Appendix Table A-3 – A-7 for the individual values)

Table 1. Methods and detection limits for vegetation analyses.

Parameter	Method	Reference	Detection Limit
Total Phosphorus	COE 3-227/EPA 365.2	EPA/COE 1981; EPA 1990	0.0013 % dry wt
Nitrogen	MVP	DBE 2000	0.400 % dry wt
Carbon	MVP	DBE 2000	1.50 % dry wt
Ash Content	COE 3-59	EPA/COE 1981	0.16% dry wt
Dry/Wet Weight	ASA 21.2	ASA 1982	NA

3.2 Species Composition and Percent Cover

3.2.1 Winter Sampling Event

Table 2 presents the average percent cover of the four random quadrats for each plant bed location collected during winter of 2002. All sampling points had 100% cover for the species of interest except for *Najas* plants sampled in the outflow region of Cell 2 (location was comprised of 75% *Najas* and 25% *Ceratophyllum*) and *Ceratophyllum* sampled from the inflow region of Cell 3 (three of the four sample plots contained 75% *Ceratophyllum* and 25% dead emergent foliage and roots/open water; the fourth sample plot had 100% *Ceratophyllum).*

During the plant rinsing and species separation process, DBE field personnel identified the non-dominant species located within each quadrat. Figure 3 depicts the non-dominant species associated with each plant community location for the *Najas*- and *Ceratophyllum*-dominated beds collected during the winter sampling event. *Hydrilla* was observed in the *Ceratophyllum*-dominated plant beds in both the inflow and outflow locations of Cells 1 and 2, but it was much more prevalent in the Cell 2 locations. *Najas* was observed in small amounts at all sites except for the Cell 3 inflow sampling location in which it was not present. Filamentous periphyton was noted in the outflow locations of Cells 1 and 2 and in the inflow and outflow of Cell 3. A small number of *Eichhornia* and *Pistia* plants were observed in the outflow locations of Cells 2 and 3, respectively. A small amount of *Eleocharis*, as well as a large accumulation of unidentifiable dead emergent stems and roots, was observed in the inflow location of Cell 3.

Table 2. Average percent cover of the four random sampling points for the SAV and floating macrophyte locations sampled during winter 2002 at the inflow and outflow regions of the STA-1W treatment cells.

	Eichhornia	***Pistia***	***Ceratophyllum***	***Najas***
Cell 1 Inflow	100%‡	100%	100%	100%
Cell 1 Outflow	100%	100%	100%	100%
Cell 2 Inflow	100%	100%	100%	NS†
Cell 2 Outflow	100%	100%	100%	✦75% *Najas* 25% *Ceratophyllum*
Cell 3 Inflow	100%	100%	80% *Ceratophyllum* 20% dead emergent foliage and roots/open water✸	100%£
Cell 3 Outflow	100%	100%	100%	100%
Cell 4 Outflow	NS	NS	NS	100%

‡ % for the species of interest at this location.
† Not sampled at this location
✦sampled in the mid region of Cell 2
£ Sampled in the mid region of Cell 3
✸see appendix for individual plot coverages

Hydrilla was found in the *Najas*-dominated plant beds in the outflow and mid locations of Cells 1 and 2, respectively; and as with the *Ceratophyllum*-dominated plant beds, *Hydrilla* was much more prevalent in the Cell 2 location. *Ceratophyllum* also was observed at all *Najas* locations. Of those locations *Ceratophyllum* was most abundant in the mid region of Cell 2 and Cell 3. Filamentous periphyton was noted in the outflow and mid regions of Cells 1 and 2, respectively, and in both locations of Cell 3. Some dead emergent stems and roots were observed in the mid location of Cell 3 (Figure 3).

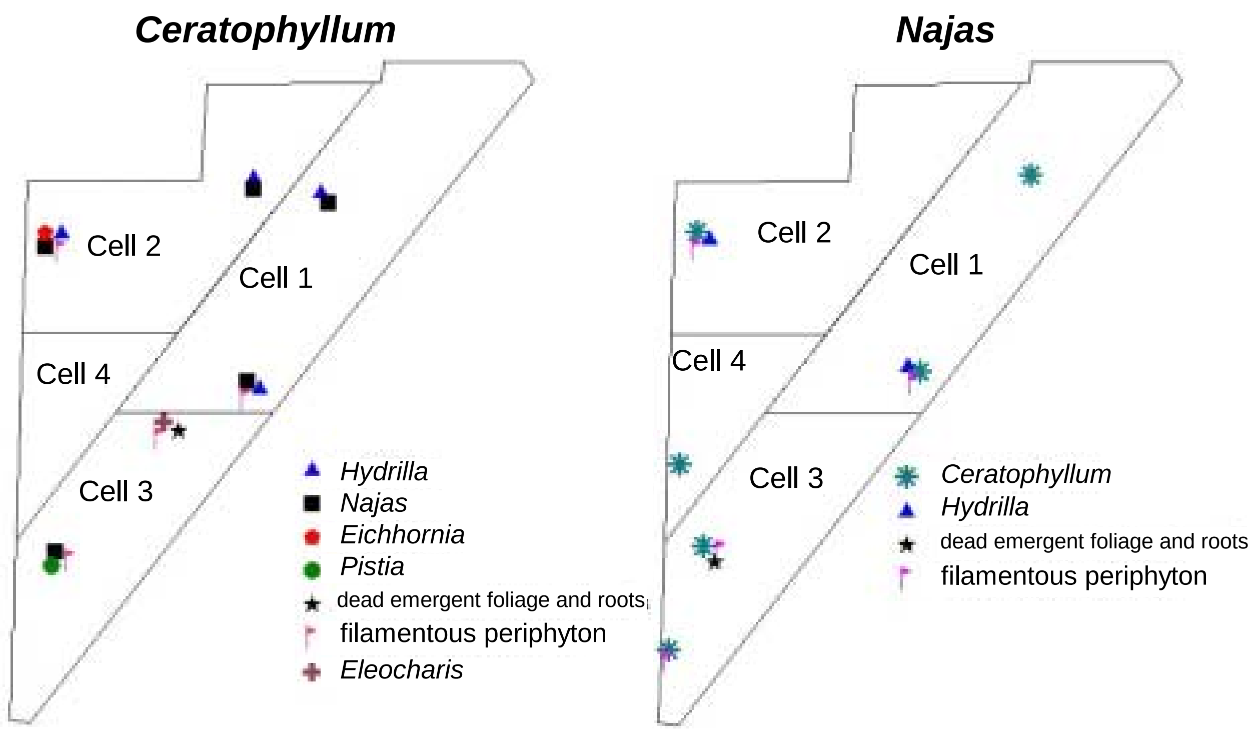


Figure 3. Non-dominant plant species in the *Ceratophyllum*- and *Najas*-dominated plant beds collected during the winter 2002 sampling event.

Figure 4 depicts the non-dominant species associated with each plant bed location (four sampling plots within each bed) for the *Eichhornia* and *Pistia* communities during the winter sampling event. In the *Eichhornia*-dominated plant beds, the most common non-dominant species, *Lemna*, was found at all locations. *Hydrocotyle* and *Pistia* were observed at both the inflow and outflow of Cell 2, and *Salivina* was present at the inflow of Cells 1 and 2. *Polygonum*, *Typha*, *Ceratophyllum* and *Hydrilla* were each observed in at least one of the floating plant beds within STA-1W (Figure 4). No non-dominant species were noted at the Cell 1 outflow location.

As noted in the *Eichhornia*-dominated plant beds, all the *Pistia*-dominated plants beds contained *Lemna*. *Hydrocotyle* was observed at the inflow location of Cell 1 and in both locations in Cell 2. *Typha* was present at both locations in Cell 2 and at the outflow location of Cell 3. Some filamentous periphyton was observed at the outflow of Cell 2. No non-dominant species were noted at the Cell 1 outflow location (Figure 4).

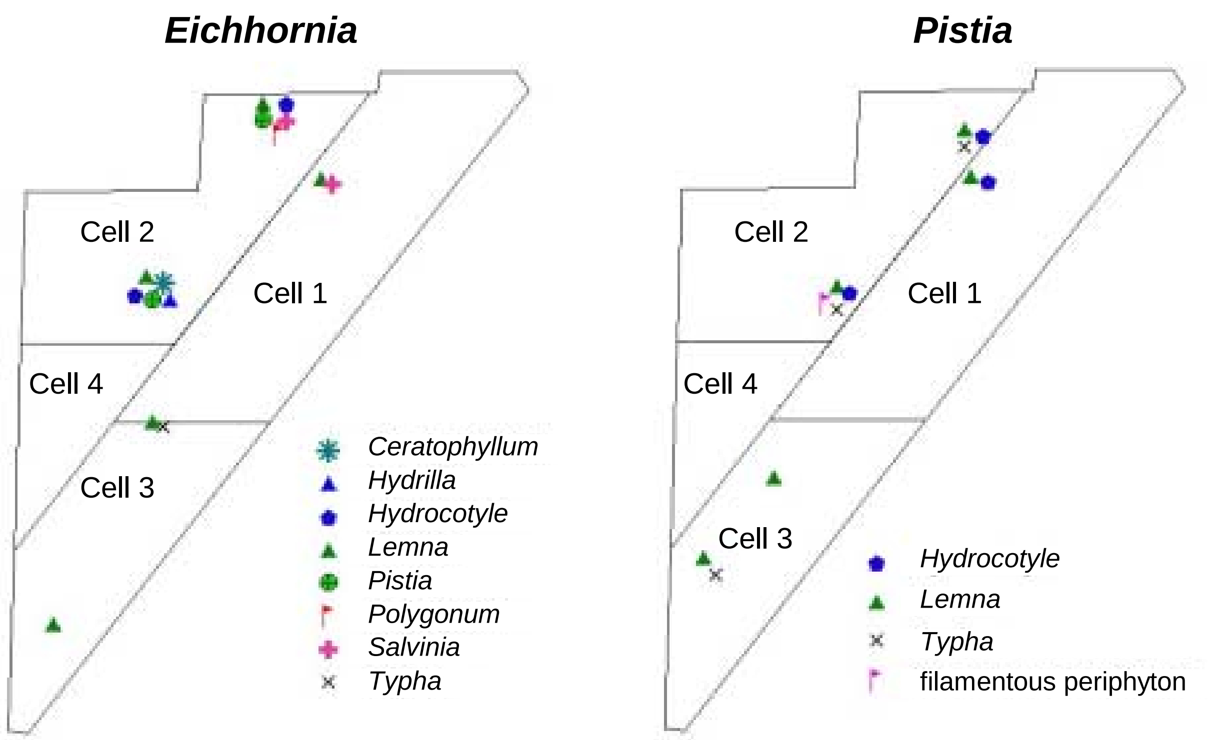


Figure 4. Non-dominant plant species in the *Eichhornia*- and *Pistia*-dominated plant beds collected during the winter 2002 sampling event.

3.2.2 Summer Sampling Event

The average percent cover for each plant bed location collected during summer of 2002 is depicted in Table 3. All but four sampling points had 100% cover for the 'target' species. The exceptions were the Cell 2 mid *Najas* sample (comprised of 50% *Najas* and 50% *Ceratophyllum*), the Cell 2 outflow *Ceratophyllum* sample (comprised of 90% *Ceratophyllum* and 10% *Hydrilla*), the Cell 3 outflow *Eichhornia* sample (comprised of 90% *Eichhornia* and 10% *Typha*) and the Cell 3 outflow *Pistia* sample (comprised of 70% Pistia and 30% *Pontederia*, *Typha* and *Eichhornia*; Table 3).

Table 3. Average percent cover of the four random sampling points for the SAV and floating macrophyte locations sampled during summer 2002 at the inflow and outflow regions of the STA-1W treatment cells.

	Eichhornia	***Pistia***	***Ceratophyllum***	***Najas***
Cell 1 Inflow	100%‡	100%	100%	100%
Cell 1 Outflow	100%	100%	100%	100%
Cell 2 Inflow	100%	100%	100%	NS†
Cell 2 Outflow	100%	100%	90% *Ceratophyllum* 10% *Hydrilla* ✸	✦50% *Najas* 50% *Hydrilla*
Cell 3 Inflow	100%	100%	100%	100%£
Cell 3 Outflow	90% *Eichhornia* 10% *Typha*✸	70% *Pistia* 30% *Pontederia, Typha, Eichhornia*✸	100%	100%
Cell 4 Outflow	NS	NS	NS	100%

‡ % for the species of interest at this location.
† Not sampled at this location
✦ Sampled in the mid region of Cell 2
✸ see appendix for individual plots coverages
£ Sampled in the mid region of Cell 3

Figure 5 depicts the non-dominant species associated with each plant bed location (four sampling plots within each bed) for the *Najas*- and *Ceratophyllum*-dominant communities during the summer sampling event. In the *Najas*-dominated plant beds, *Ceratophyllum* was observed at all locations except for the Cell 4 outflow location. *Hydrilla* was observed at both the Cell 2 mid and Cell 3 outflow location, but it was more prevalent at the Cell 3 location. Filamentous periphyton was noted at all locations except for the inflow and outflow regions of Cell 1. At the Cell 4 outflow location the periphyton observed was dense. *Utricularia* was observed only at the Cell 3 outflow site.

In the *Ceratophyllum*-dominated plant beds, *Najas* was observed at three of the six locations (the inflow and outflow of Cell 1, and the outflow of Cell 2) (Figure 5). *Hydrilla* was noted at both Cell 2 locations, and *Eichhornia* was present at the Cell 1 inflow location. Filamentous periphyton was observed at the Cell 2 outflow location, and both Cell 3 locations. No non-dominant species were observed at the outflow region of Cell 4.

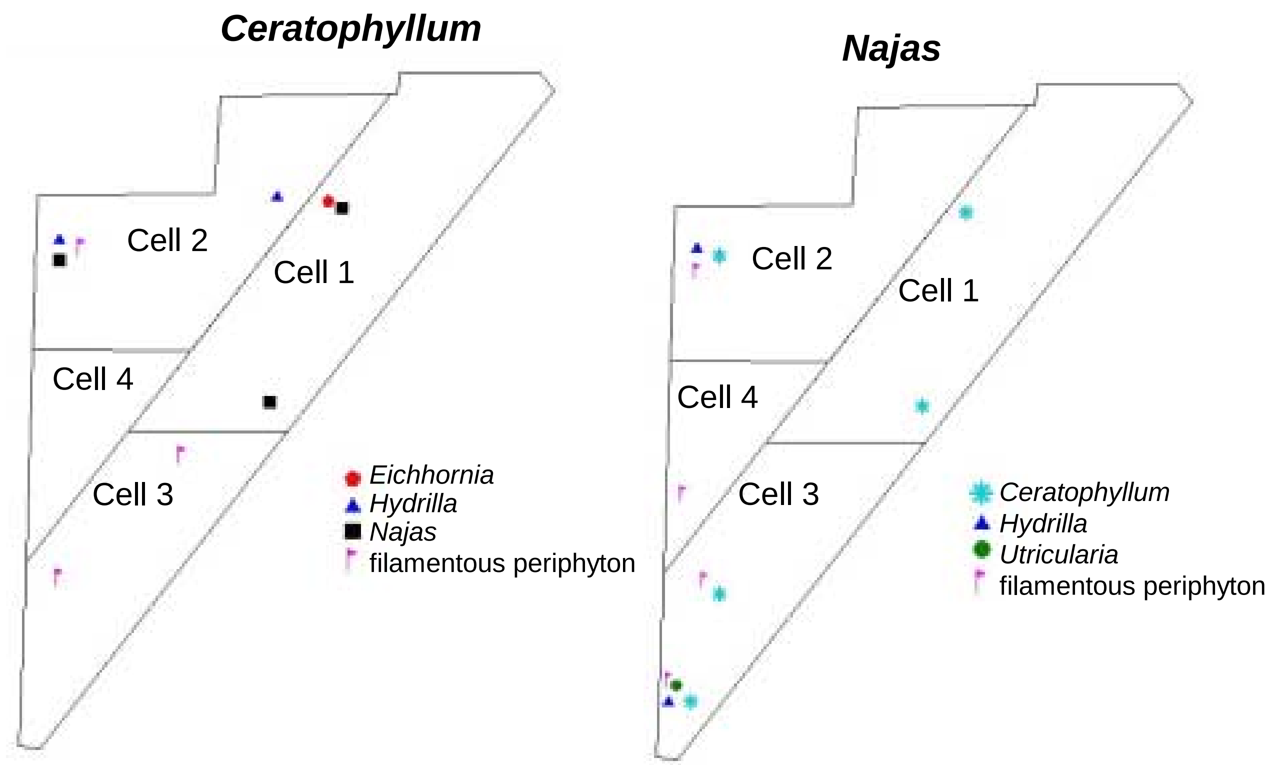


Figure 5. Non-dominant plant species in the *Ceratophyllum*- and *Najas*-dominated plant beds collected during the summer 2002 sampling event.

The non-dominant species associated with each plant bed location (four sampling plots within each bed) for the *Eichhornia* and *Pistia* communities during the summer sampling event are depicted in Figure 6. In the *Eichhornia*-dominated plant beds, *Hydrocotyle* was observed at four of the six locations (Cell 2 inflow, Cell 1 inflow and outflow, and Cell 3 inflow). Both *Ceratophyllum* and *Pistia* were noted at the Cell 1 outflow and Cell 3 inflow location. *Typha* was observed at both locations in Cell 3. In addition to the species mentioned above, the Cell 3 inflow station also contained *Alternanthera*, *Lemna* and *Wolffia* (Figure 6). There were no non-dominant species noted at the Cell 2 outflow location.

Fewer non-dominant species were present at the *Pistia*-dominated locations than the *Eichhornia*-dominated locations. *Hydrocotyle* was observed at both locations in Cell 1 and in the Cell 2 outflow location. *Eichhornia* was noted at the Cell 1 inflow and Cell 3 outflow location. The Cell 3 outflow location also contained *Typha* and *Pontederia* species. There were no non-dominant species observed at the Cell 2 or Cell 3 inflow locations.

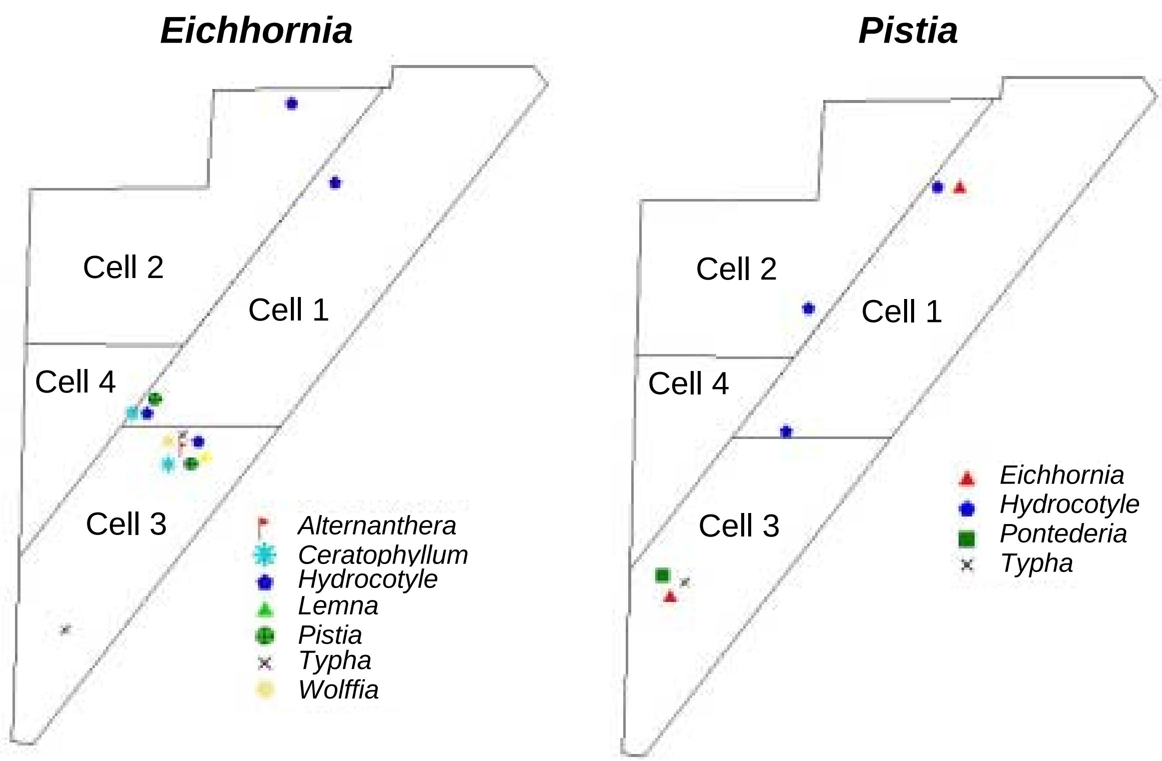


Figure 6. Non-dominant plant species in the *Eichhornia*- and *Pistia*-dominated plant beds collected during the summer 2002 sampling event.

3.3 Standing Crop Biomass and Elemental Composition

3.3.1 Winter Sampling Event

SAV Macrophytes

Eastern Flowpath

Najas-Dominated Plant Beds

At the *Najas*-dominated plant bed locations along the eastern flow path (Cells 1 and 3), the wet and dry standing crop biomass was highest at the Cell 1 inflow station (3,210 and 272 g/m^2, respectively; Table 4; Figure 7). *Najas* biomass from the outflow region of Cell 1 was lower than the inflow, but higher than the mid and outflow region of Cell 3. Within Cell 3 there was little difference between the mid and outflow stations.

Mean total phosphorus (TP) concentrations in the plants were highest at the Cell 1 outflow and Cell 3 mid stations of the *Najas*-dominated plant beds (0.450 and 0.447%, respectively; Table 4; Figure 7). The lowest TP concentration was seen in the Cell 3 outflow station (0.147%). The P standing crop data show a descending trend down the flowpath (Table 4; Figure 7). The highest P standing crop was observed at Cell 1 inflow (0.71 g P/m^2) and the lowest at Cell 3 outflow (0.08 g P/m^2).

Nitrogen (N) and carbon (C) concentrations varied little among the plant bed stations along the eastern flow path (Table 4; Figure 7). Both stations within Cell 3 did show a slightly higher percent of N than the Cell 1 stations. For the N and C standing crop, the trend is similar to that of dry biomass, with Cell 1 inflow providing the highest values (6.56 and 101 g N/m^2, respectively), followed by Cell 1 outflow, and then both stations in Cell 3 (Table 4; Figure 7). Within Cell 3 the outflow station had slightly higher N and C standing crops than the mid station. The greatest variability was documented in the N and C standing crop in Cell 1 inflow of the *Najas*-dominated plant bed (Figure 7).

The Cell 1 outflow station exhibited the highest ash content (28.1%) (Table 4; Figure 7). The ash contents at the other three stations were similar, ranging from 22.9 – 24.6%.

Table 4. Mean biomass and nutrient content (± 1s.d.) for *Najas*-dominated plant bed locations collected along the eastern flowpath of STA-1W during the winter 2002 sampling event. Values represent a mean of four plots sampled at random within the plant bed community.

	Cell 1 Inflow	Cell 1 Outflow	Cell 3 Mid	Cell 3 Outflow
Wet Biomass (g/m^2)	3,210±366	2,500±132	972±504	985±280
Dry Biomass (g/m^2)	272±60.0	128±17.9	35.9±19.8	53.3±20.1
TP (% dry wt)	0.270±0.046	0.450±0.035	0.447±0.018	0.147±0.018
N (% dry wt)	2.38±0.30	2.48±0.12	3.08±0.12	2.85±0.16
C (% dry wt)	37.1±1.4	34.1±1.2	35.4±0.3	35.9±1.7
Ash content (%)	24.6±1.0	28.1±2.3	22.9±1.2	23.6±4.6
P Standing Crop (g P/m^2)	0.71±0.05	0.57±0.05	0.16±0.09	0.08±0.04
N Standing Crop (g N/m^2)	6.56±2.00	3.17±0.46	1.11±0.62	1.50±0.52
C Standing Crop (g C/m^2)	101±28.4	43.6±7.3	12.7±7.0	18.9±6.1

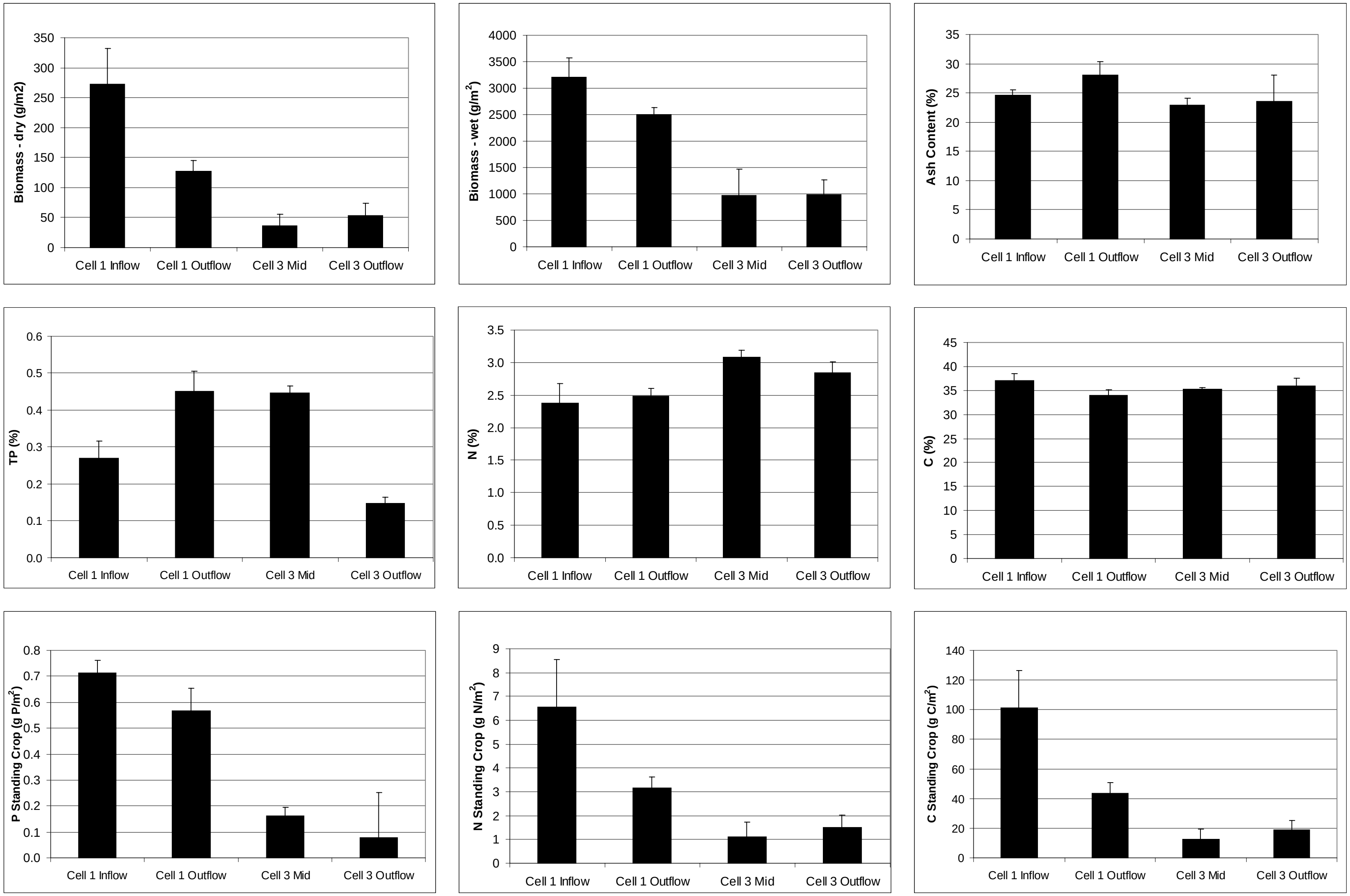


Figure 7. Biomass and nutrient content for *Najas*-dominated plant bed stations collected along the eastern flowpath of STA-1W during the winter 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

Ceratophyllum-Dominated Plant Beds

Along the eastern flowpath, wet and dry standing crop biomass of the *Ceratophyllum*-dominated plant bed was highest in the Cell 3 outflow location (4,620 and 366 g/m^2, respectively) and lowest at the Cell 3 inflow location (1,250 and 76.7 g/m^2, respectively) (Table 5; Figure 8). The biomass was similar for the two Cell 1 locations, and exhibited the highest variability at these sites **(**Figure 8**).**

Table 5. Mean biomass and nutrient content (±1 s.d.) for *Ceratophyllum*-dominated plant bed locations collected along the eastern flowpath of STA-1W during the winter 2002 sampling event. Values represent a mean of four plots sampled at random within the plant bed community.

	Cell 1 Inflow	**Cell 1 Outflow**	**Cell 3 Inflow**	**Cell 3 Outflow**
Wet Biomass (g/m^2)	3,650±992	3,780±1,390	1,250±210	4,620±405
Dry Biomass (g/m^2)	318±98	354±135	76.7±16	366±40
TP (% dry wt)	0.371±0.022	0.379±0.065	0.311±0.034	0.266±0.024
N (% dry wt)	2.21±0.29	2.16±0.24	2.86±0.21	2.11±0.35
C (% dry wt)	28.3±2.0	29.1±2.0	36.5±0.4	34.3±5.0
Ash content (%)	43.8±4.4	41.1±7.3	19.0±2.0	16.7±0.3
P Standing Crop (g P/m^2)	1.16±0.32	1.30±0.40	0.24±0.06	0.97±0.11
N Standing Crop (g N/m^2)	6.99±2.32	7.50±2.46	2.20±0.49	7.77±1.84
C Standing Crop (g C/m^2)	89.4±28	102±34	27.9±5.6	127±28

The P concentrations for the *Ceratophyllum*-dominated beds ranged from 0.266% (Cell 3 outflow) to 0.379% (Cell 1 outflow) (Table 5; Figure 8). The tissue P concentrations for both stations within Cell 3 were slightly lower than those within Cell 1. For the P standing crop, Cell 1 outflow was the highest at 1.30 g P/m^2 and Cell 1 inflow was slightly lower at 1.16 g P/m^2 (Table 5; Figure 8). The lowest P standing crop was observed at the Cell 3 inflow location (0.24 g P/m^2).

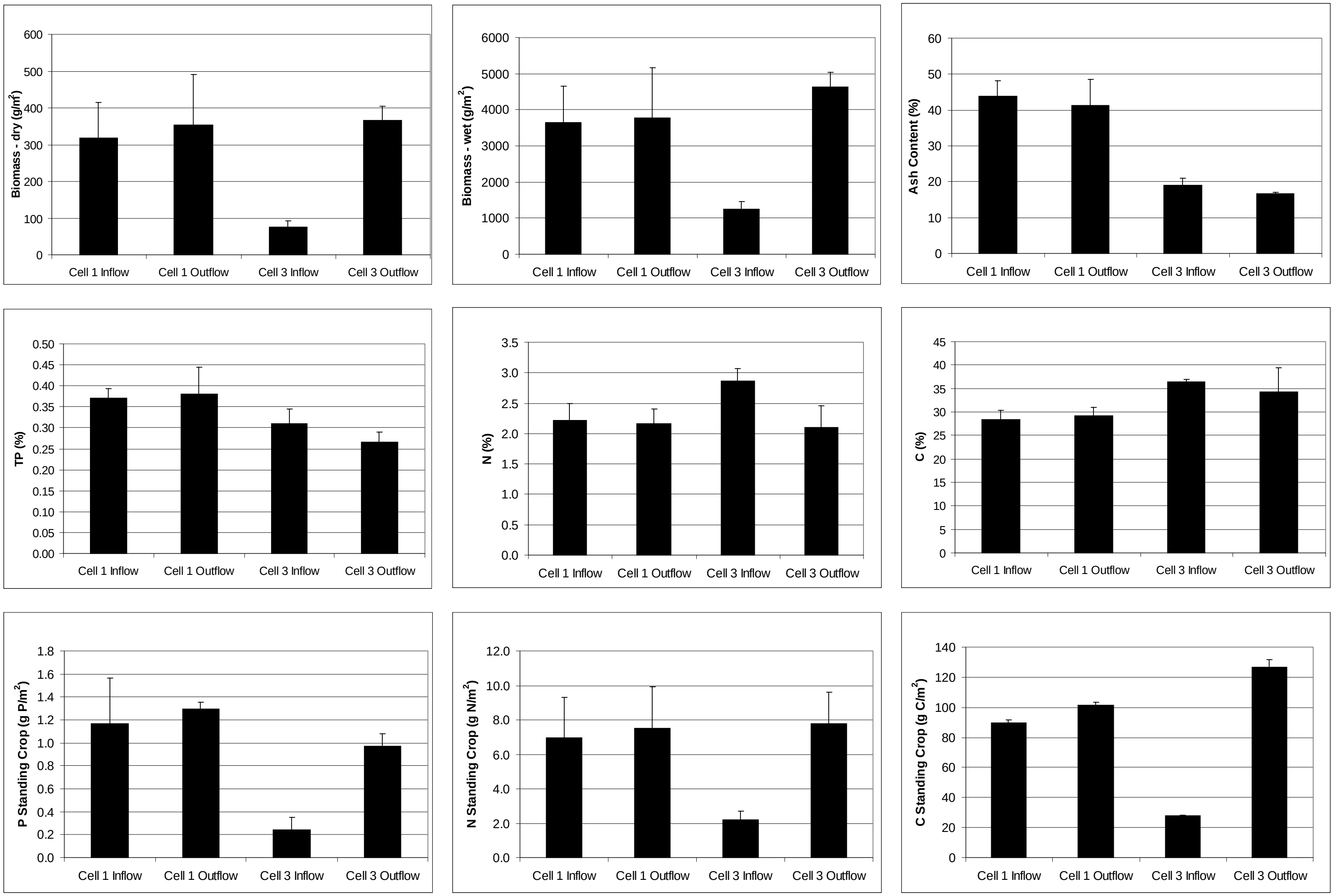


Figure 8. Biomass and nutrient content for *Ceratophyllum*-dominated plant bed stations collected along the eastern flowpath of STA-1W. during the winter 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

The N content for the *Ceratophyllum*-dominated plant beds was highest at the Cell 3 inflow station (2.86%) (Table 5; Figure 8). The other three stations exhibited similar N contents, ranging from 2.11-2.21%. As with the N concentration results, N standing crops for Cell 1 inflow and outflow and Cell 3 outflow were similar, ranging from 6.99 – 7.77 g N/m^2 (Table 5; Figure 8). Cell 3 inflow had the lowest N standing crop of the four locations, at 2.20 g N/m^2. For P and N standing crops (Figure 8), the variability was highest for the inflow and outflow regions of Cell 1.

Similar to the N results, C content was the highest at the Cell 3 inflow (36.5%) (Table 5; Figure 8). Carbon content at both Cell 3 locations was higher than the Cell 1 locations. The C standing crop for the four plant bed locations was highest at the Cell 3 outflow location (126.5 g C/m^2) and lowest at Cell 3 inflow (27.9 g C/m^2) (Table 5; Figure 8). Within Cell 1 the C standing crop was higher at the outflow location than the inflow location (102 and 89.4 g C/m^2, respectively).

A generally declining gradient was observed for ash content along the eastern flowpath, ranging from 43.8% at the Cell 1 inflow location to 16.7% at the Cell 3 outflow location (Table 5; Figure 8**).**

<u>Western Flowpath</u>

Najas-Dominated Plant Beds

Table 6 and Figure 9 depict the biomass and nutrient content of the *Najas*-dominated plant beds sampled in the western flow path of STA-1W (Cells 2 and 4). The wet and dry standing crop biomass for the *Najas*-dominated plant beds was higher at the outflow station of Cell 4 than the mid station of Cell 2. This same trend was also noted for ash content. The TP concentrations were higher in Cell 2 than Cell 4 (0.271 and 0.175%, respectively). The Cell 2 mid station had a slightly higher N content than the Cell 4 outflow (2.35% and 2.06%, respectively). *Najas* from the Cell 2 mid station had a noticeably higher C content than Cell 4 outflow plants (33.8% and 26.7%, respectively). The standing crops for P, C and N all were markedly higher in the outflow station of Cell 4 than the mid station of Cell 2.

Ceratophyllum-Dominated Plant Beds

Biomass and nutrient content of the *Ceratophyllum*-dominated plant beds in the western flowpath of STA-1W (Cells 2 and 4) are presented in Table 6 and Figure 10. The average wet and dry biomass was substantially higher in the Cell 2 outflow station than the Cell 2 inflow station. The ash content was also higher in the outflow station of Cell 2 compared to the inflow station. In addition, the standing crop biomass of *Ceratophyllum* harvested from the outflow region of Cell 2 was highly variable, especially in comparison to the inflow region (Figure 10). Plants from the Cell 2 inflow exhibited higher P, N, and C concentrations than plants from the outflow, with the greatest decrease seen in the P concentrations. The standing crop for P, N and C were 2 to 3 times higher in the outflow region than the inflow region, and as noted for the biomass data, these locations also demonstrated higher variability.

Table 6. Mean biomass and nutrient content (± 1s.d.) for *Najas*- and *Ceratophyllum*-dominated plant bed locations collected along the western flowpath of STA-1W during the winter 2002 sampling event. Values represent a mean of four plots sampled at random within the plant bed community**.**

	Najas		***Ceratophyllum***	
	Cell 2 Mid	**Cell 4 Outflow**	**Cell 2 Inflow**	**Cell 2 Outflow**
Wet Biomass (g/m^2)	1,990±885	5,890±125	1,290±399	3,910±1,690
Dry Biomass (g/m^2)	135±53	636±146	85.0±26	324±120
TP (% dry wt)	0.271±0.050	0.175±0.016	0.485±0.025	0.269±0.025
N (% dry wt)	2.35±0.20	2.06±0.47	2.70±0.13	2.33±0.17
C (% dry wt)	33.8±1.5	26.7±0.9	36.1±0.4	33.5±0.6
Ash content (%)	25.9±5.3	51.9±3.0	17.6±1.5	27.2±1.8
P Standing Crop (g P/m^2)	0.36±0.17	1.10±0.20	0.41±0.11	0.88±0.36
N Standing Crop (g N/m^2)	3.09±1.09	12.63±1.26	2.27±0.63	7.68±3.17
C Standing Crop (g C/m^2)	45.0±16.7	169.0±35.9	30.7±9.4	108.6±39.8

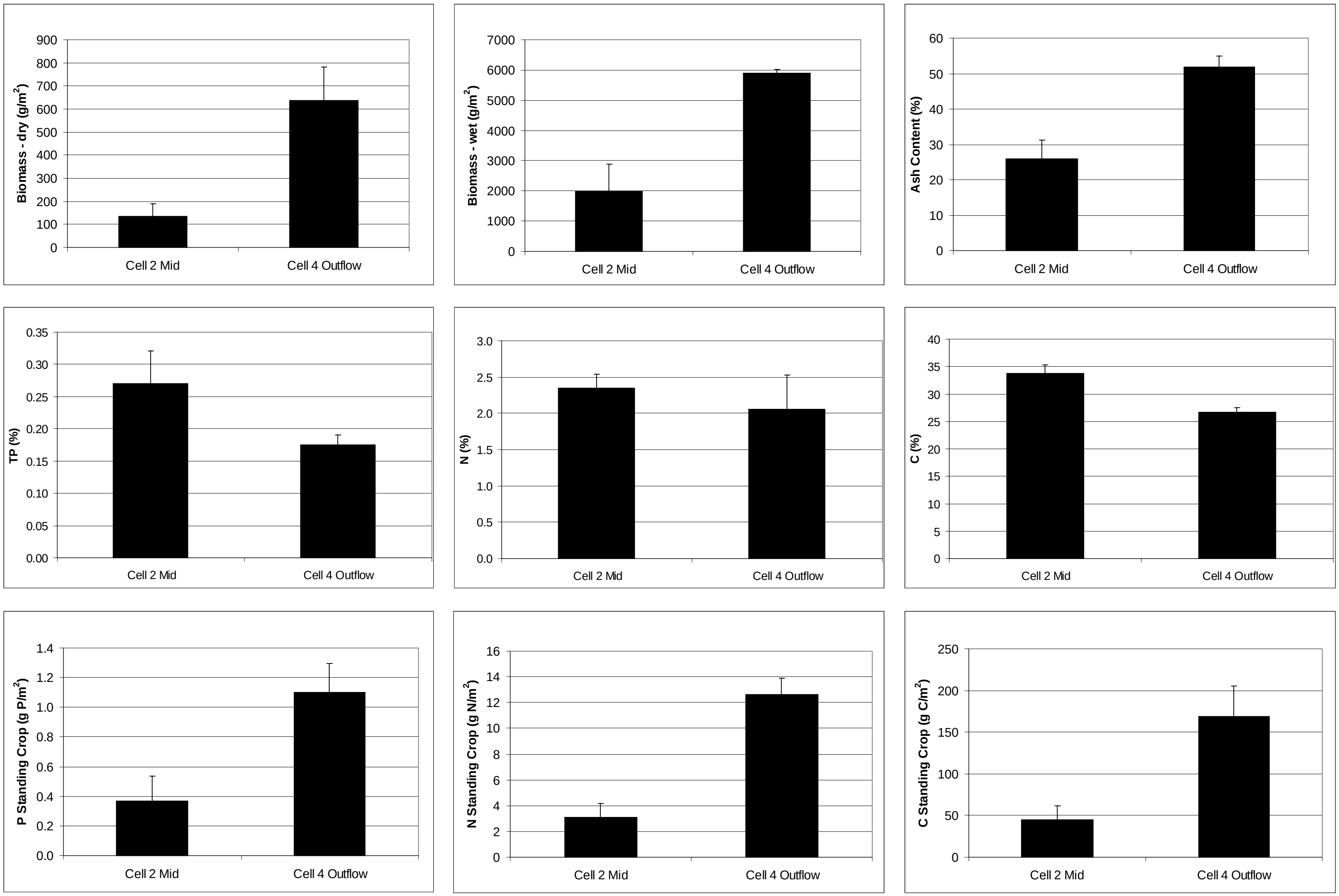


Figure 9. Biomass and nutrient content for *Najas*-dominated plant bed stations collected along the western flowpath of STA-1W during the winter 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

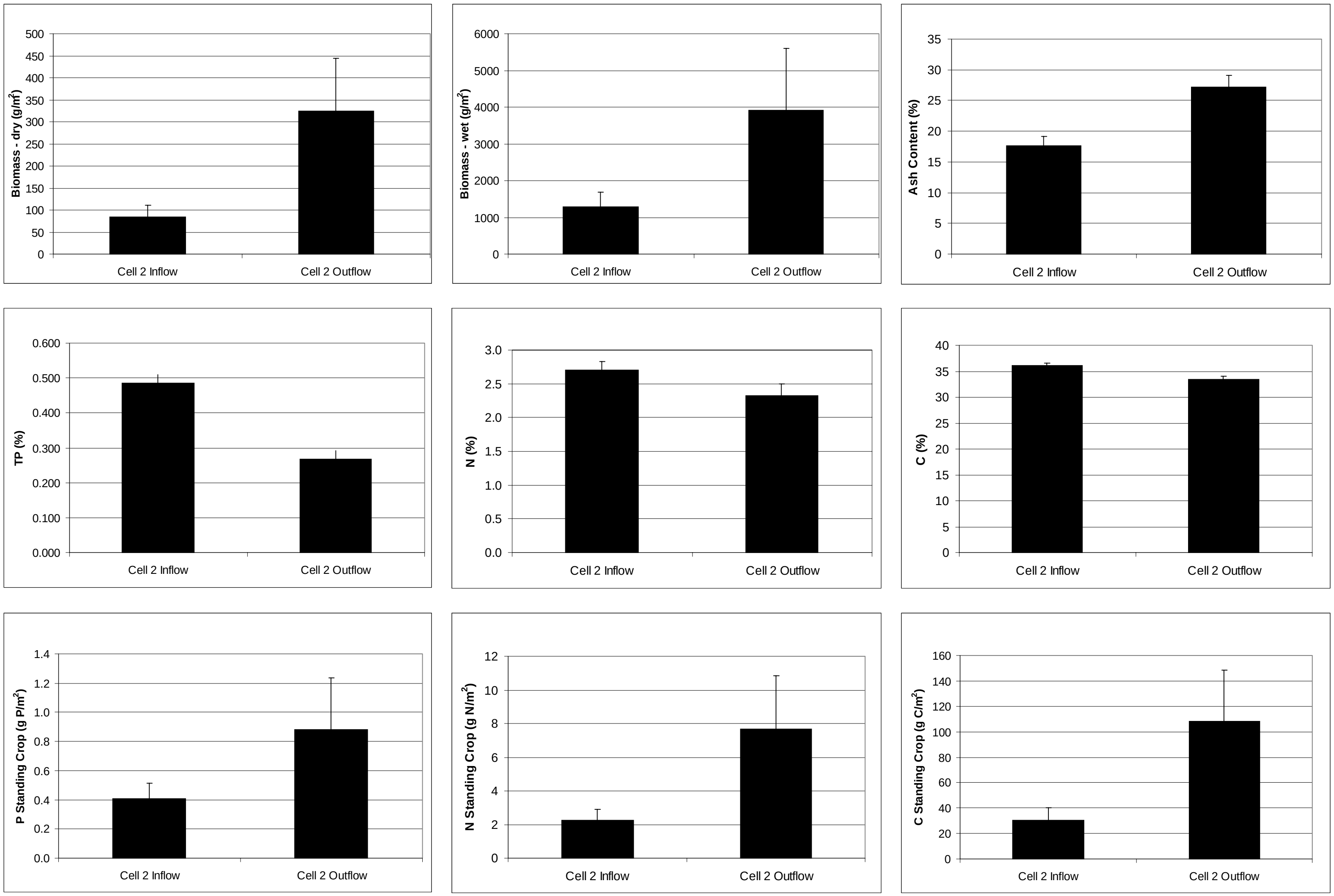


Figure 10. Biomass and nutrient content for *Ceratophyllum*-dominated plant bed stations collected along the western flowpath of STA-1W during the winter 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

Floating Macrophytes

<u>*Eastern Flowpath*</u>

Pistia-Dominated Plant Beds

Along the eastern flowpath, the *Pistia*-dominated plant beds showed an increasing trend for wet and dry standing crop biomass (Figure 4) from the Cell 1 inflow to the Cell 3 inflow location (Table 7; Figure 11). The Cell 3 outflow location produced a lower standing crop biomass.

Table 7. Mean biomass and nutrient content (± 1s.d.) for Pistia-dominated plant bed locations collected along the eastern flowpath of STA-1W during the winter 2002 sampling event. Values represent a mean of four plots sampled at random within the plant bed community.

	Cell 1 Inflow	Cell 1 Outflow	Cell 3 Inflow	Cell 3 Outflow
Wet Biomass (g/m^2)	5,730±1,540	7,480±1,180	12,800±2,490	9,350±1,940
Dry Biomass (g/m^2)	269±84	381±129	456±114	282±114
TP (% dry wt)	0.260±0.015	0.293±0.008	0.380±0.030	0.299±0.021
N (% dry wt)	2.15±0.26	2.34±0.45	2.11±0.09	2.18±0.11
C (% dry wt)	34.5±0.7	34.0±1.3	34.0±0.5	32.0±0.6
Ash content (%)	20.2±0.6	22.5±2.4	20.9±0.7	26.2±3.0
P Standing Crop ($g P/m^2$)	0.70±0.24	1.12±0.38	1.72±0.41	0.83±0.28
N Standing Crop ($g N/m^2$)	5.81±2.00	8.52±1.61	9.54±2.08	6.20±2.59
C Standing Crop ($g C/m^2$)	93.2±30	128±39	155±40	89.8±35

In the *Pistia*-dominated beds, the tissue P concentrations showed a trend similar to the standing crop biomass (Table 7; Figure 11). The highest tissue P concentration was observed at the Cell 3 inflow location and the lowest at the Cell 1 inflow location (0.380 and 0.260%, respectively) (Table 7; Figure 11). The outflow locations for both cells provided similar values. The P standing crop generally followed the same trend as the tissue P concentration data.

The *Pistia* N and C concentrations were generally constant along the eastern flowpath, ranging from 2.11% to 2.34% for N and 32.0% to 34.5% for C (Table 7; Figure 11). The N and C standing crop both showed the same trend described for the dry biomass; an increase in standing crop along the flowpath to the Cell 3 inflow location, with the Cell 3 outflow location results similar to the Cell 1 inflow location (Table 7; Figure 11). The P, N, and C standing crop of the *Pistia*-

dominated plant bed demonstrated high variability at all sampling locations. Ash content was fairly consistent down the flowpath (20.2–22.5**%**) with the exception of Cell 3 outflow which was slightly higher (26.2%) than the other locations (Table 7; Figure 11).

Eichhornia-Dominated Plant Beds

For the *Eichhornia*-dominated plant beds, wet and dry biomass were higher in the outflow locations of Cells 1 and 3 than at the inflow locations (Figure 12; Table 8). The highest dry biomass was found in Cell 1 outflow (1,910 g/m^2) and the highest wet biomass was at the Cell 3 outflow (27,700 g/m^2).

Eichhornia-dominated beds displayed a decreasing trend of TP concentrations (0.222 to 0.098%) along the eastern flowpath with Cell 1 outflow and Cell 3 inflow providing identical mean values (0.163%) (Figure 12; Table 8). The P standing crop was higher at the Cell 1 outflow than at the Cell 1 inflow (3.10 and 2.57 g P/m^2, respectively). Both Cell 3 locations were lower than the Cell 1 locations with respect to P standing crop.

For the *Eichhornia*-dominated community, the tissue N concentrations were highest in the Cell 1 inflow location (2.11%) (Figure 12; Table 8). Both Cell 3 locations were similar to one another (1.37% and 1.46%N) and were lower than the Cell 1 location N values. Carbon concentrations were fairly consistent at all four locations, ranging from 38.4– 41.0%. Both outflow locations were higher than the inflow for both N and C standing crops. The N and C standing crops were the highest in the Cell 1 outflow location (29.9 g N/m^2 and 763 g C/m^2).

Ash content was highest at the Cell 1 inflow location and lowest at the Cell 3 outflow location (13.7% and 8.6%, respectively) (Figure 12; Table 8). In both Cell 1 and 3 inflow locations, ash content was higher than at the outflow locations.

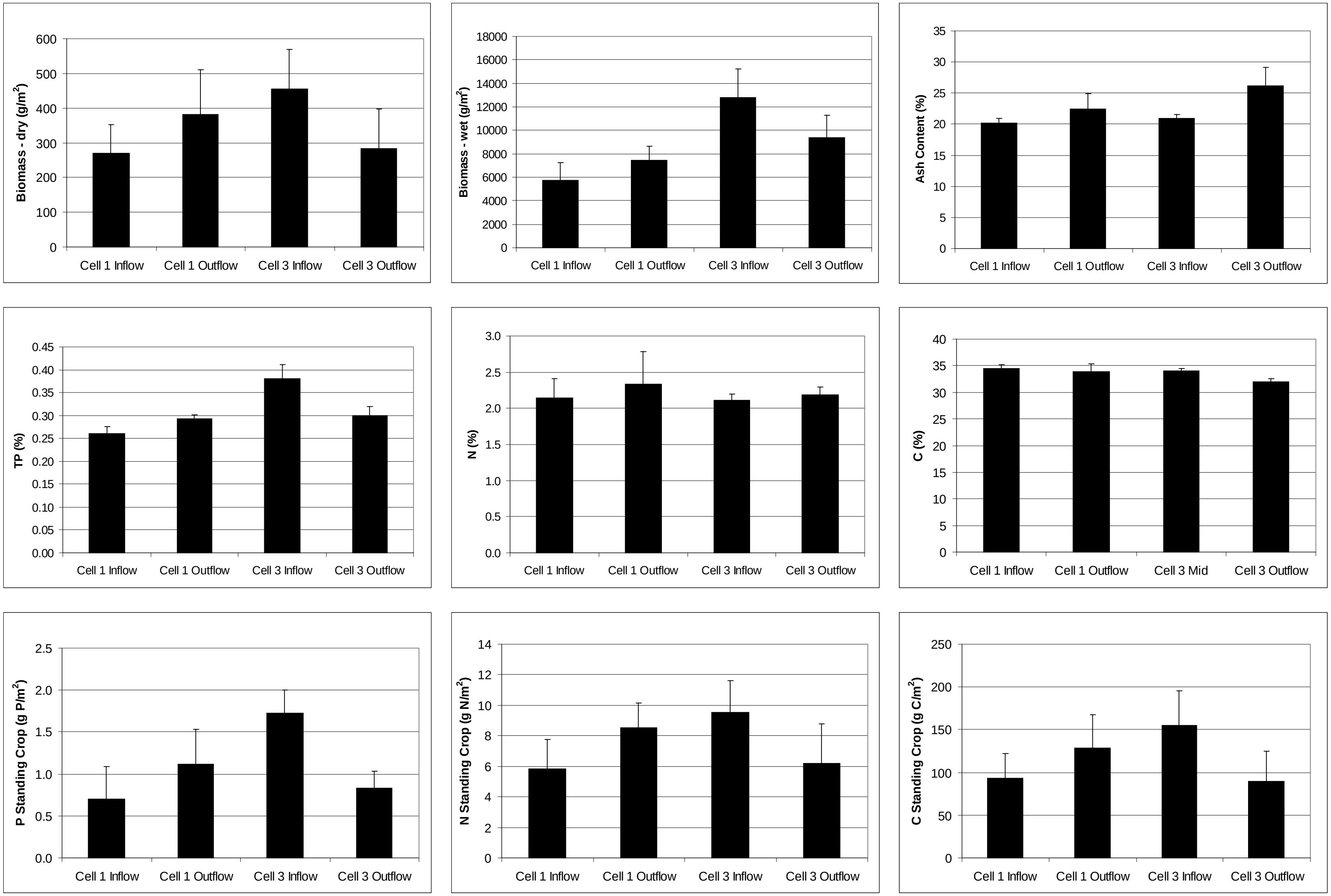


Figure 11. Biomass and nutrient content for *Pistia*-dominated plant bed stations collected along the eastern flowpath of STA-1W during the winter 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

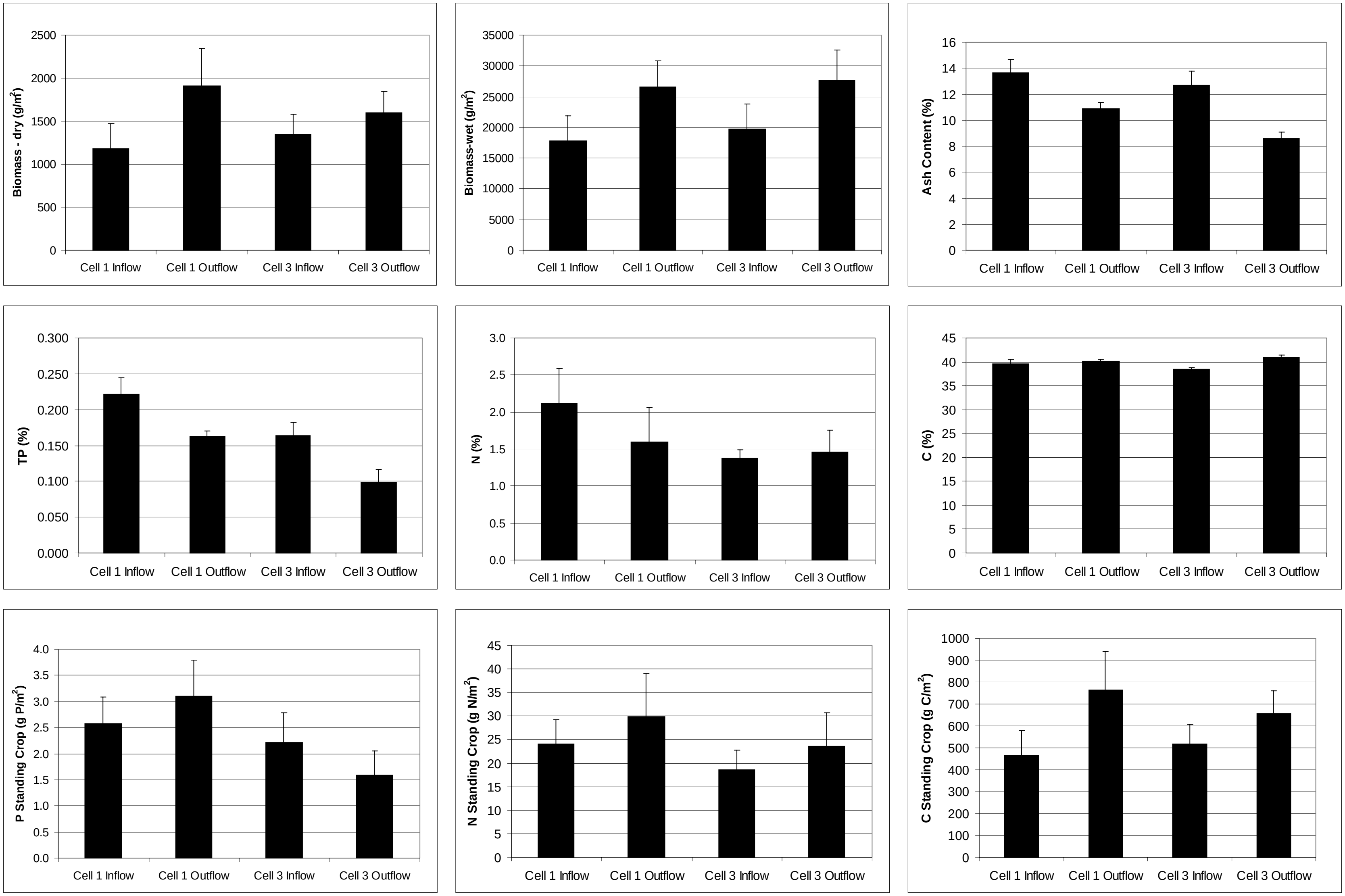


Figure 12. Biomass and nutrient content for *Eichhornia*-dominated plant bed stations collected along the eastern flowpath of STA-1W during the winter 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

Table 8. Mean biomass and nutrient content (± 1s.d.) for *Eichhornia*-dominated plant bed locations collected along the eastern flowpath of STA-1W during the winter 2002 sampling event. Values represent a mean of four plots sampled at random within the plant bed community.

	Cell 1 Inflow	**Cell 1 Outflow**	**Cell 3 Inflow**	**Cell 3 Outflow**
Wet Biomass (g/m^2)	17,800±4,120	26,600±4,260	19,700±4,100	27,700±4,900
Dry Biomass (g/m^2)	1,180±297	1,910±441	1,350±228	1,600±243
TP (% dry wt)	0.222±0.023	0.163±0.007	0.163±0.019	0.098±0.018
N (% dry wt)	2.11±0.47	1.60±0.46	1.37±0.12	1.46±0.30
C (% dry wt)	39.6±0.8	40.1±0.4	38.4±0.4	41.0±0.4
Ash content (%)	13.7±1.0	10.9±0.5	12.7±1.0	8.6±0.5
P Standing Crop ($g\ P/m^2$)	2.57±0.51	3.10±0.69	2.22±0.57	1.59±0.47
N Standing Crop ($g\ N/m^2$)	24.1±5.2	29.9±9.1	18.6±4.0	23.6±7.2
C Standing Crop ($g\ C/m^2$)	465±113	763±175	518±88	656±104

<u>*Western Flowpath*</u>

Pistia-Dominated Plant Beds

Along the western flowpath, *Pistia* samples were collected within the inflow and outflow region of Cell 2. Table 9 and Figure 13 depict the biomass and nutrient content of the *Pistia*-dominated plant beds sampled. Standing crop biomass (both wet and dry basis) was substantially higher at the inflow location than the outflow location, and also demonstrated the highest variability at the inflow site. There was little difference in ash content between the inflow and outflow locations (18.0 and 19.1%, respectively). Phosphorus and N concentrations were greater in the outflow location than the inflow location, whereas the P and N standing crops were markedly greater in the inflow location. While C concentrations were consistent at both locations (34.4 and 35.1%), the C standing crop was more than 6 times greater in the inflow location (150 g C/m^2 and 22.4 g C/m^2).

Table 9. Mean biomass and nutrient content (± 1s.d.) for Pistia- and Eichhornia-dominated plant bed locations collected along the western flowpath of STA-1W during the winter 2002 sampling event. Values represent a mean of four plots sampled at random within the plant bed community.

	Pistia		***Eichhornia***	
	Cell 2 Inflow	**Cell 2 Outflow**	**Cell 2 Inflow**	**Cell 2 Outflow**
Wet Biomass (g/m^2)	9,650±1,170	4,350±860	19,500±2,660	21,100±4,390
Dry Biomass (g/m^2)	435±83	63.7±20	1,315±205	1,430±360
TP (% dry wt)	0.230±0.010	0.387±0.019	0.155±0.010	0.174±0.008
N (% dry wt)	1.53±0.09	2.54±0.19	1.58±0.04	1.15±0.05
C (% dry wt)	34.4±0.8	35.1±0.5	37.6±0.2	38.5±0.7
Ash content (%)	18.0±1.3	19.1±0.5	14.7±0.2	12.9±1.1
P Standing Crop ($g\ P/m^2$)	1.00±0.21	0.24±0.07	2.05±0.40	2.48±0.63
N Standing Crop ($g\ N/m^2$)	6.70±1.52	1.62±0.55	20.8±3.73	16.5±4.56
C Standing Crop ($g\ C/m^2$)	150±27	22.4±7.3	494±78	550±137

Eichhornia-Dominated Plant Beds

Along the western flowpath, *Eichhornia* samples were collected within the inflow and outflow regions of Cell 2. Table 9 and Figure 14 depict the biomass and nutrient content of the *Eichhornia*- dominated plant beds sampled. There was little difference between the wet and dry standing crop biomass between the two locations. Mean tissue P concentrations and P standing crop values were higher at the outflow location, whereas mean N concentrations and N standing crop were higher at the inflow location. Carbon concentrations and C standing crop were fairly consistent at both locations, with the outflow location providing only slightly higher values. Ash contents were slightly higher at the inflow location.

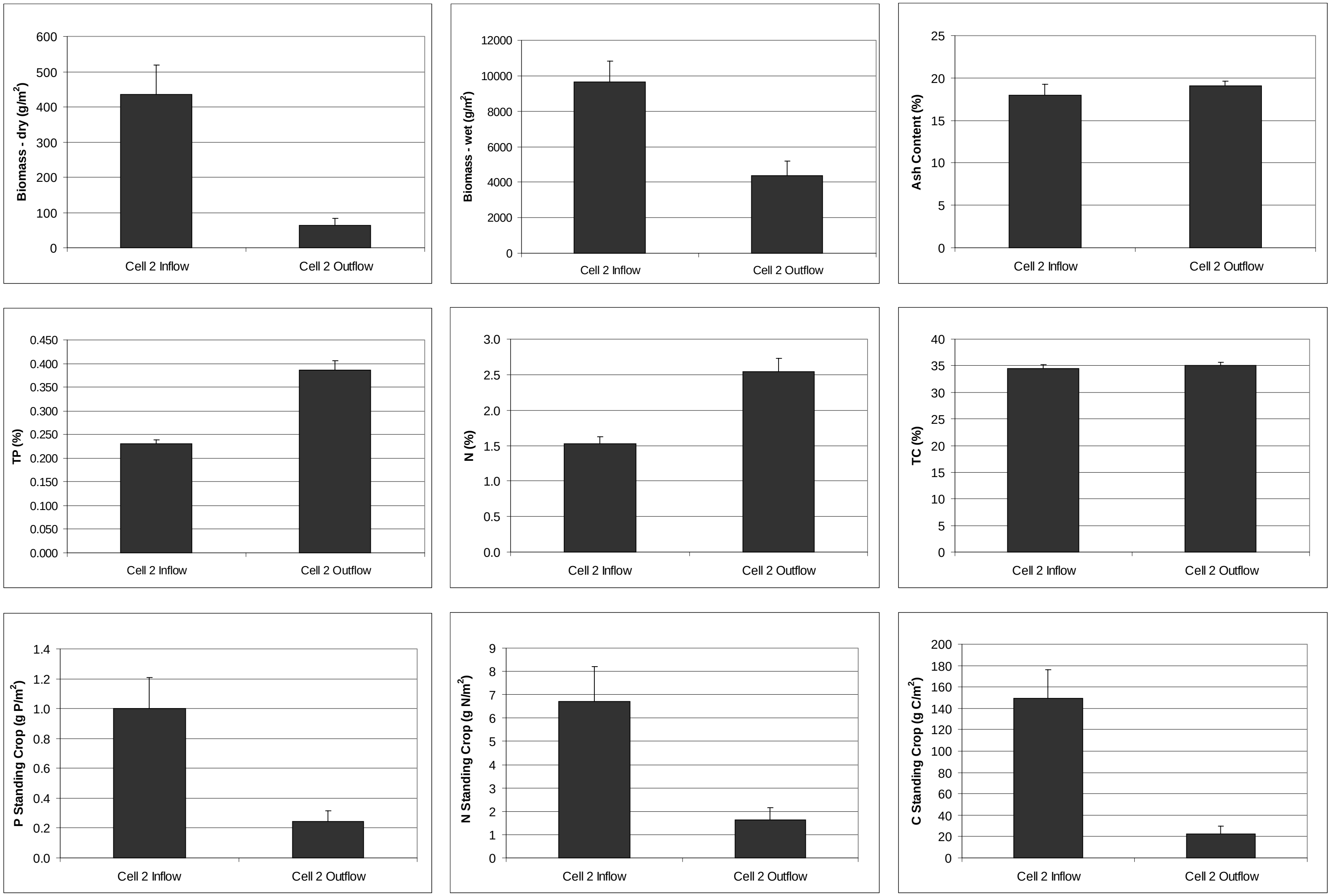


Figure 13. Biomass and nutrient content for *Pistia*-dominated plant bed stations collected along the western flowpath of STA-1W during the winter 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

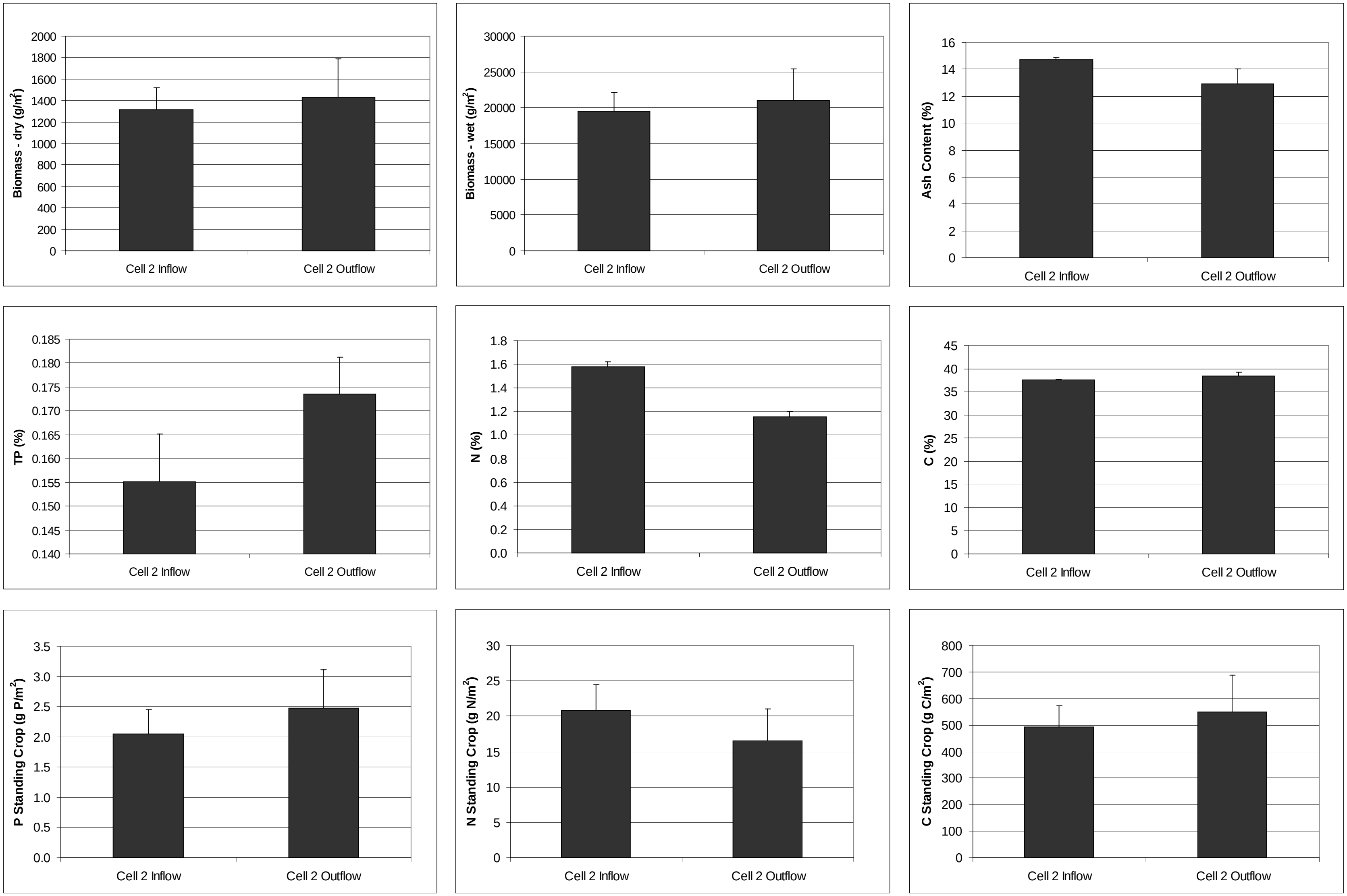


Figure 14. Biomass and nutrient content for *Eichhornia*-dominated plant bed stations collected along the western flowpath of STA-1W during the winter 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

3.3.2 Summer Sampling Event

SAV Macrophytes

Eastern Flowpath

Najas-Dominated Plant Beds

In the *Najas*-dominated plant beds along the eastern flow path, the wet and dry standing crop biomass was highest at the outflow region of Cell 1 (7,650 and 812 g/m², respectively; Table 10; Figure 15). The lowest wet and dry biomass was measured in the outflow region of Cell 3 (1,560 and 114 g/m², respectively), and was approximately one fourth the biomass measured in the Cell 1 outflow site.

Table 10. Mean biomass and nutrient content (± 1s.d.) for *Najas*-dominated plant bed locations collected along the eastern flowpath of STA-1W during the summer (2002) sampling event. Values represent a mean of four plots sampled at random within the plant bed community.

	Cell 1 Inflow	Cell 1 Outflow	Cell 3 Mid	Cell 3 Outflow
Wet Biomass (g/m²)	6,110±455	7,650±1,163	2,950±334	1,560±534
Dry Biomass (g/m²)	575±73	812±155	190±21	114±42
TP (% dry wt)	0.231±0.017	0.163±0.019	0.218±0.031	0.118±0.013
N (% dry wt)	1.94±0.02	1.87±0.20	2.11±0.08	1.90±0.17
C (% dry wt)	26.9±0.7	28.3±1.1	31.9±0.8	32.8±2.1
Ash content (%)	47.1±1.9	43.1±3.2	32.0±2.2	27.5±4.6
P Standing Crop (g P/m²)	1.32±0.17	1.30±0.10	0.413±0.07	0.133±0.05
N Standing Crop (g N/m²)	11.2±1.4	15.0±1.3	3.99±0.4	2.12±0.7
C Standing Crop (g C/m²)	154±16.9	230±46.2	60.5±6.6	37.7±14.9

Phosphorus (P) concentrations were highest in the Cell 1 inflow (0.231% dry wt) and Cell 3 mid stations (0.218% dry wt), and were about half this concentration in their respective outflow regions (0.163 and 0.118% dry wt, respectively; Table 10; Figure 15). The P standing crop was markedly higher in the inflow and outflow regions of Cell 1 (1.32 and 1.30 g P/m², respectively) than the mid and outflow regions of Cell 3 (0.413 and 0.133 g P/m², respectively; Table 10; Figure 15). The highest P standing crop was measured at the Cell 1 inflow site (1.32 g P/m²) and the lowest at the Cell 3 outflow site (0.133 g P/m²).

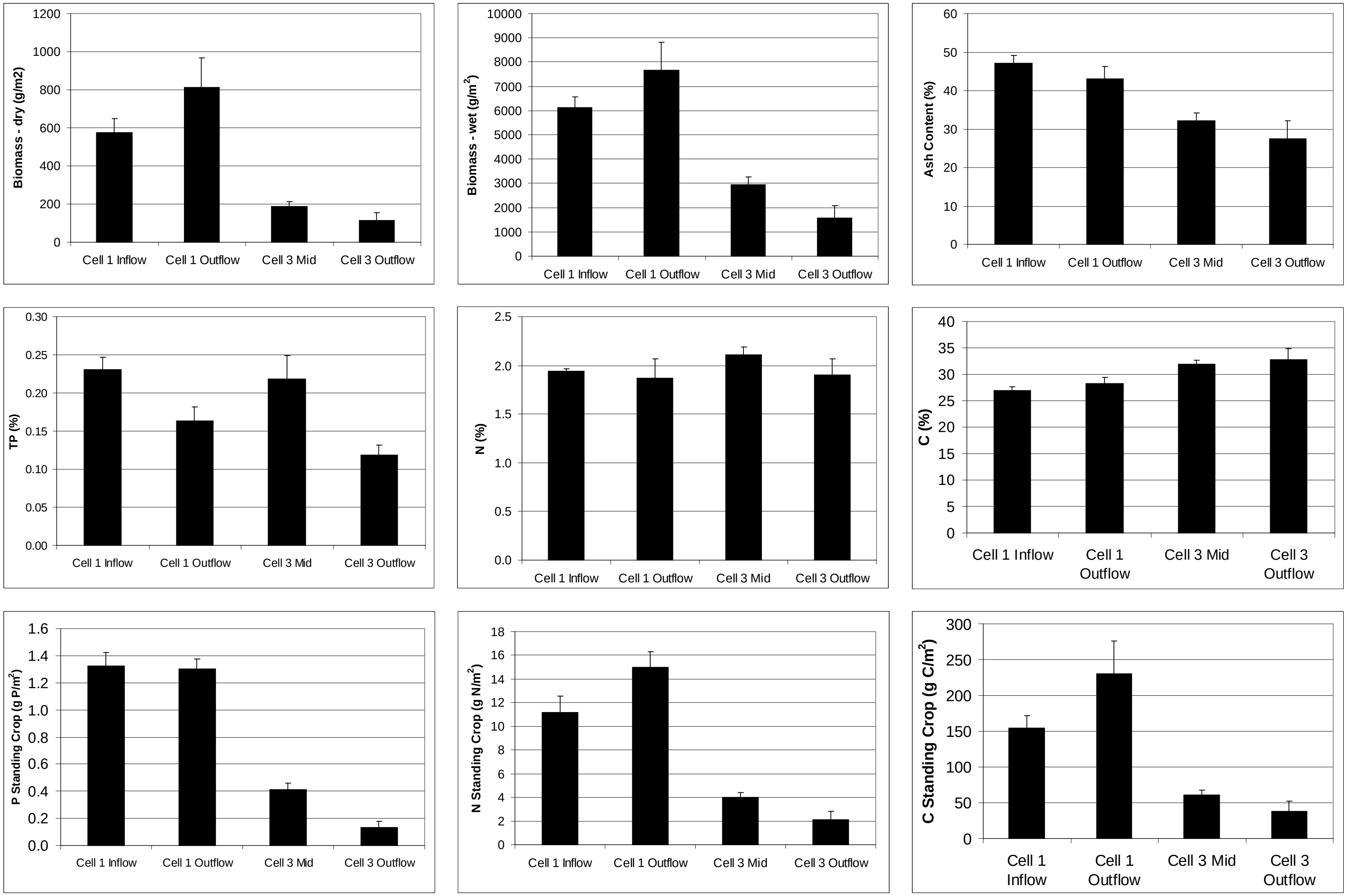


Figure 15. Biomass and nutrient content for *Najas*-dominated plant bed stations along the eastern flowpath of STA-1W collected during the summer 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

For nitrogen, the highest concentration, 2.11% dry wt, was measured in the mid region of Cell 3, while both inflow regions had higher N concentrations than the outflow regions (Table 10; Figure 15). Similar measurements were recorded in the remaining three stations, and were all slightly lower than the Cell 3 mid site. High variability was observed in three of the four stations for nitrogen (Figure 15). An upward trend in carbon content was observed along the eastern flowpath; the lowest concentration occurred at the Cell 1 inflow station (26.9% dry wt) and the highest at the Cell 3 outflow location (32.8% dry wt; Table 10; Figure 15).

The trend for the N and C standing crops is similar to that of the biomass data. The highest values were measured in the outflow region of Cell 1 (15.0 g N/m^2 and 230 g C/m^2, respectively), followed by Cell 1 inflow (11.2 g N/m^2 and 154 g C/m^2), and finally the Cell 3 stations. The Cell 3 stations exhibited approximately one fifth the N standing crop of plants in the inflow and outflow regions of Cell 1, and approximately one third the C standing crop (Table 10; Figure 15).

A downward trend for ash content, 47.1 to 27.5%, was found along the eastern flowpath from the inflow region of Cell 1 to the outflow region of Cell 3 (Table 10; Figure 15). Plants from the inflow and outflow regions of Cell 1 exhibited higher ash levels than plants from both stations in Cell 3.

Ceratophyllum-Dominated Plant Beds

Along the eastern flowpath, the *Ceratophyllum* wet and dry standing crop biomass was highest in the Cell 1 outflow location (10,300 and 1,170 g/m^2, respectively) and lowest at the Cell 3 inflow location (5,100 and 354 g/m^2, respectively) (Table 11; Figure 16). Biomass levels at the inflow and outflow regions of Cell 1 were almost two times higher than the Cell 3 locations. The outflow regions of Cell 1 and Cell 3 had a higher wet and dry biomass than the inflow regions.

Phosphorus concentrations for the *Ceratophyllum*-dominated beds were similar for the inflow regions of Cell 1 and Cell 3 (0.205 and 0.196% dry wt, respectively) (Table 11; Figure 16). The lowest concentration was measured at the Cell 3 outflow (0.105% dry wt). Cell 1 inflow and outflow locations were similar in P standing crop, (1.90 and 2.00 g P/m^2), and were approximately four times greater than the Cell 3 locations (0.69 and 0.49 g P/m^2; Table 11; Figure 16).

Table 11. Mean biomass and nutrient content (± 1s.d.) for *Ceratophyllum*-dominated plant bed locations collected along the eastern flowpath of STA-1W during the summer 2002 sampling event. Values represent a mean of four plots sampled at random within the plant bed community.

	Cell 1 Inflow	Cell 1 Outflow	Cell 3 Inflow	Cell 3 Outflow
Wet Biomass (g/m^2)	7,950±660	10,300±2,864	5,100±1,301	5,260±779
Dry Biomass (g/m^2)	911±177	1,170±358	354±87	477±66
TP (% dry wt)	0.205±0.025	0.171±0.021	0.196±0.028	0.105±0.015
N (% dry wt)	1.58±0.10	1.88±0.11	1.87±0.16	1.40±0.17
C (% dry wt)	21.9±0.7	27.5±1.9	28.0±1.3	25.6±3.5
Ash content (%)	57.2±1.8	43.2±2.6	39.9±5.0	53.1±9.0
P Standing Crop (g P/m^2)	1.90±0.59	2.00±0.61	0.69±0.18	0.49±0.04
N Standing Crop (g N/m^2)	14.5±3.31	22.2±7.82	6.58±1.67	6.64±1.15
C Standing Crop (g C/m^2)	199±42	325±118	98.5±24	122±22

During the summer sampling event, N and C concentrations for the *Ceratophyllum*-dominated plant beds were highest at the outflow region of Cell 1 and the inflow region of Cell 3 (1.88%N dry wt and 27.5%C dry wt, 1.87%N dry wt and 28.0%C dry wt, respectively; Table 11; Figure 16). The inflow (Cell 1 inflow) and outflow (Cell 3 outflow) regions of the eastern flowpath exhibited lower N and C concentrations (1.58%N and 21.9%C, 1.40%N and 25.6%C, respectively) than the inner regions of the flowpath. Nitrogen and carbon standing crop trends were similar to the wet and dry biomass. The outflow regions of both cells were higher than the inflow regions, and the values obtained in Cell 1 were approximately two times higher than Cell 3 (Table 11; Figure 16).

No trend was observed in tissue ash contents in the eastern flowpath during the summer sampling event. The highest values measured were for the inflow region of Cell 1 and the outflow region of Cell 3 (57.2 and 53.4% dry wt, respectively; Table 11; Figure 16). The lowest ash content was observed in the Cell 3 inflow location (39.9 % dry wt).

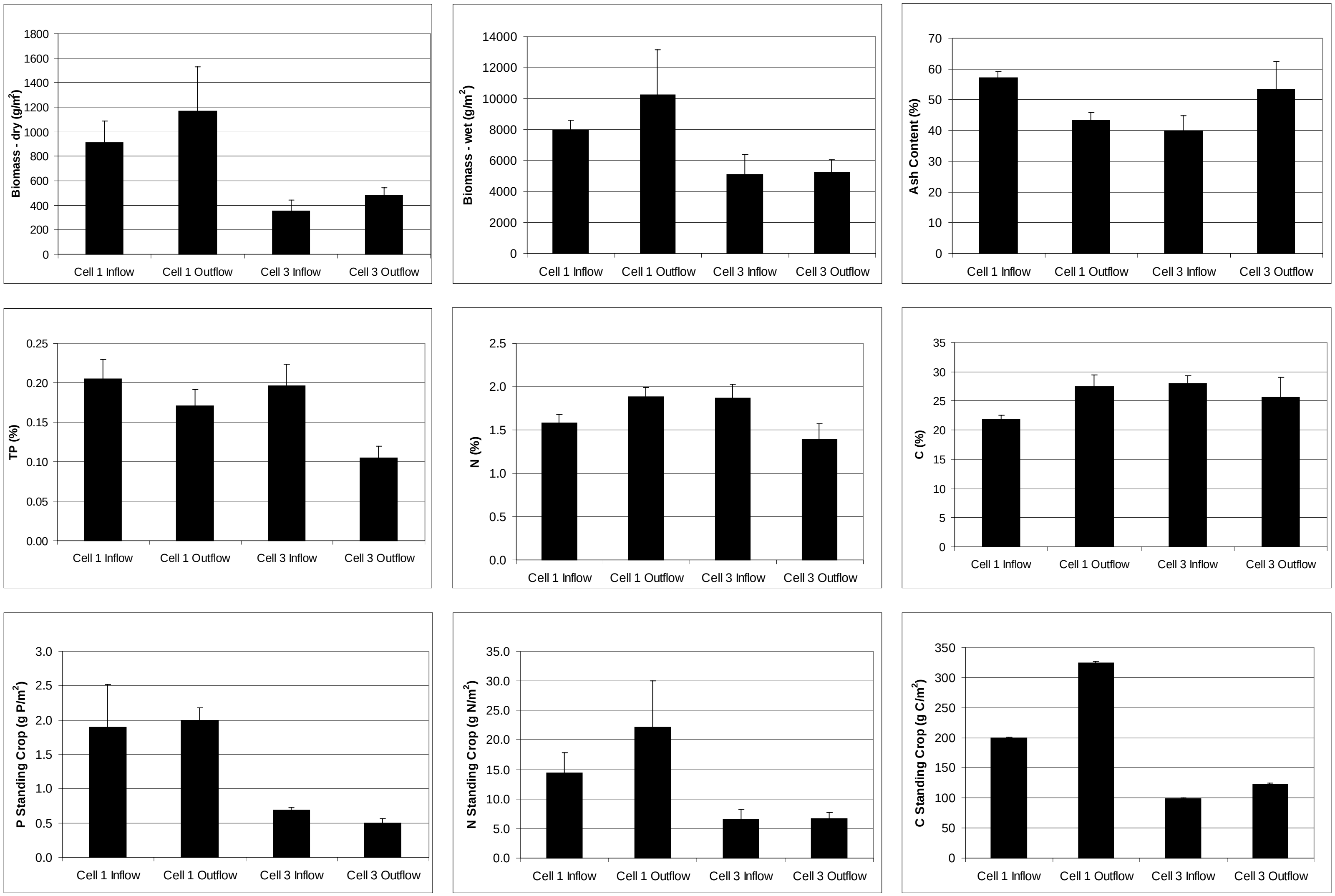


Figure 16. Biomass and nutrient content for *Ceratophyllum*-dominated plant bed stations collected along the eastern flowpath of STA-1W during the summer 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

Western Flowpath

Najas-Dominated Plant Beds

The biomass and nutrient levels for the *Najas*-dominated plant beds for the western flowpath of STA-1W (Cells 2 and 4) are presented in Table 12 and Figure 17. The wet and dry biomass was approximately six times higher at the outflow station of Cell 4 (3,440 g/m^2 and 270 g/m^2, respectively) than the mid station of Cell 2 (502 g/m^2 and 46.4 g/m^2, respectively).

Phosphorus concentrations were slightly higher in Cell 2 (1.61 % dry wt) than Cell 4 (1.18 % dry wt; Table 12; Figure 17). The inflow and outflow regions along the western flowpath were comparable in N and C content (N, 2.24% and 2.21%, and C, 34.0% and 31.8%, respectively). The elemental composition (TP, N, C, and ash content) of samples collected from Cell 2 were higher than Cell 4, although concentrations did not differ greatly between regions.

Table 12. Mean biomass and nutrient content (± 1s.d.) for Najas- and Ceratophyllum-dominated plant bed locations collected along the western flowpath of STA-1W during the summer 2002 sampling event. Values represent a mean of four plots sampled at random within the plant bed community.

	Najas		***Ceratophyllum***	
	Cell 2 Mid	**Cell 4 Outflow**	**Cell 2 Inflow**	**Cell 2 Outflow**
Wet Biomass (g/m^2)	502±4.8	3,440±620	4,410±628	3,330±1,770
Dry Biomass (g/m^2)	46.4±41	270±53	321±44	280±144
TP (% dry wt)	0.161±0.041	0.118±0.016	0.184±0.024	0.140±0.016
N (% dry wt)	2.24±0.36	2.21±0.20	2.27±0.18	1.88±0.17
C (% dry wt)	34.0±4.6	31.8±0.7	29.9±2.8	30.7±1.6
Ash content (%)	32.1±13.9	30.6±1.2	38.2±5.0	35.1±4.9
P Standing Crop (g P/m^2)	0.07±0.04	0.32±0.06	0.59±0.07	0.39±0.19
N Standing Crop (g N/m^2)	0.94±0.70	5.95±1.25	7.26±0.86	5.27±2.63
C Standing Crop (g C/m^2)	14.4±11.0	85.9±17.3	95.9±15.6	85.4±41.9

The standing crops of *Najas*-dominated plant beds for P, C and N were approximately five times higher in samples collected from the outflow station of Cell 4 than the mid station of Cell 2 (Table 12; Figure 17)

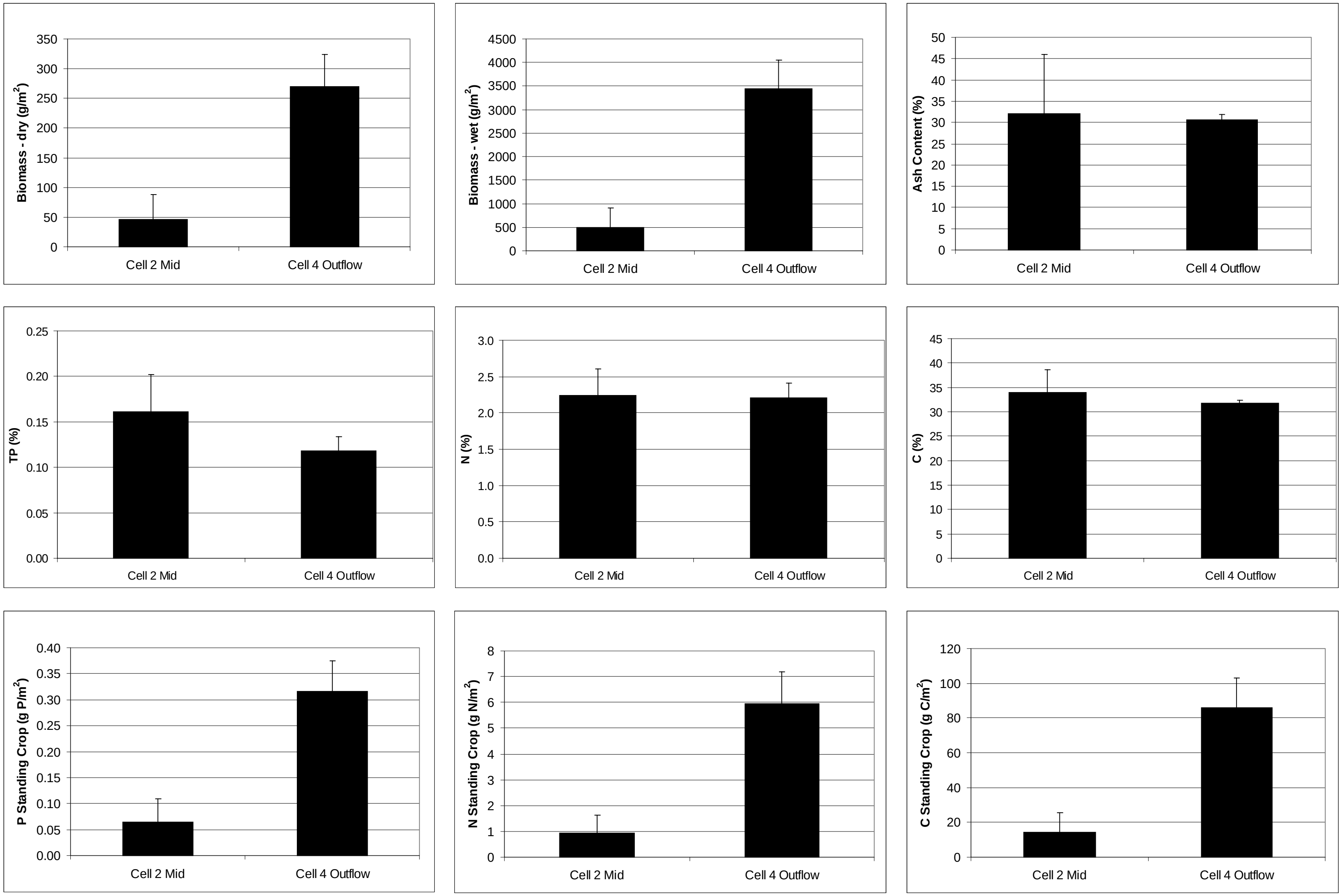


Figure 17. Biomass and nutrient content for *Najas*-dominated plant bed stations collected along the western flowpath of STA-1W during the summer 2002 sampling event. Values represent an average (±1 s.d.) of four plots collected at random within the plant bed community.

Ceratophyllum-Dominated Plant Beds

The biomass and nutrient content of the *Ceratophyllum*-dominated plant beds in the western flowpath of STA-1W (Cells 2 and 4) are depicted in Table 12 and Figure 18. Almost all the parameters measured were higher in the inflow region than the outflow region of Cell 2, although the differences were minor. The only exception was the C content, which was slightly higher in the outflow region.

Floating Macrophytes

Eastern Flowpath

Pistia-Dominated Plant Beds

Along the eastern flowpath, the *Pistia*-dominated plant beds exhibited an increasing trend for wet and dry standing crop biomass from the inflow region of Cell 1 to the inflow region of Cell 3 (Table 13; Figure 19). The wet and dry biomass was lowest for the outflow region of Cell 3. This site also had the lowest standing crop values for P, N, and C.

Table 13. Mean biomass and nutrient content (± 1s.d.) for Pistia-dominated plant bed locations along the eastern flowpath of STA-1W collected during the summer 2002 sampling event. Values represent a mean of four plots sampled at random within the plant bed community.

	Cell 1 Inflow	Cell 1 Outflow	Cell 3 Inflow	Cell 3 Outflow
Wet Biomass (g/m^2)	11,700±1,230	15,100±1,175	19,700±1,785	8,340±1,209
Dry Biomass (g/m^2)	718±66	986±74	1,260±111	583±116
TP (% dry wt)	0.174±0.012	0.186±0.011	0.159±0.020	0.156±0.031
N (% dry wt)	1.53±0.10	1.44±0.07	1.44±0.21	1.86±0.34
C (% dry wt)	34.5±1.0	35.0±0.6	35.2±0.8	36.3±0.7
Ash content (%)	21.3±7.1	16.4±0.4	16.7±0.6	15.9±0.6
P Standing Crop (g P/m^2)	1.25±0.14	1.83±0.13	1.99±0.26	0.89±0.18
N Standing Crop (g N/m^2)	10.9±0.57	14.2±1.63	18.1±2.74	10.6±1.97
C Standing Crop (g C/m^2)	248±25.6	345±21.7	443±40.5	211±40.6

Of the *Pistia*-dominated beds sampled along the eastern flowpath, the wet and dry standing crop biomass of the plants in the outflow of Cell 3 were approximately half that of plants in the inflow (19,700 to 8,340 g wet wt/ m^2, and 1,260 to 583 g dry wt/m^2, respectively; Table 13; Figure 19.

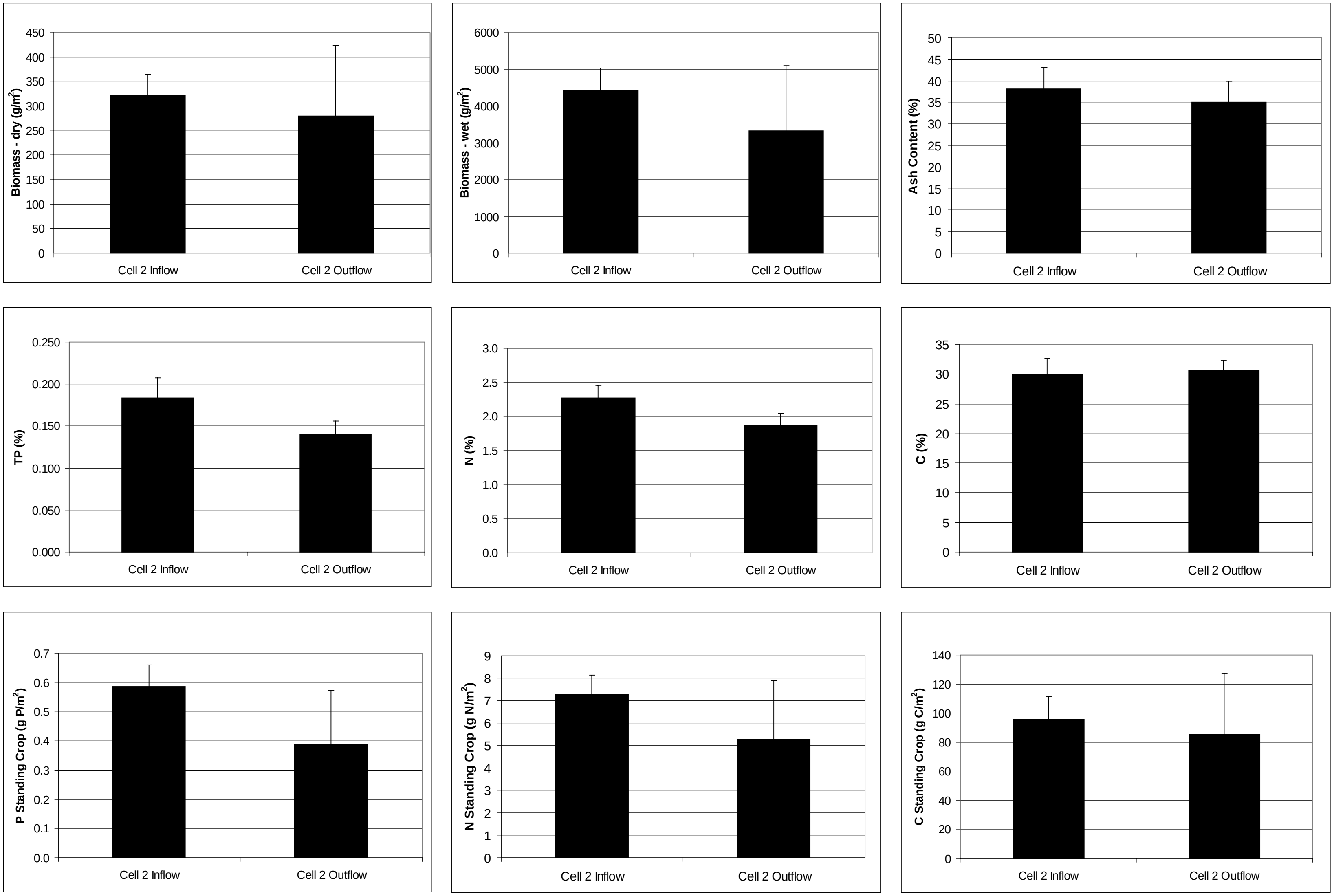


Figure 18. Biomass and nutrient content for *Ceratophyllum*-dominated plant bed stations collected along the western flowpath of STA-1W during the summer 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

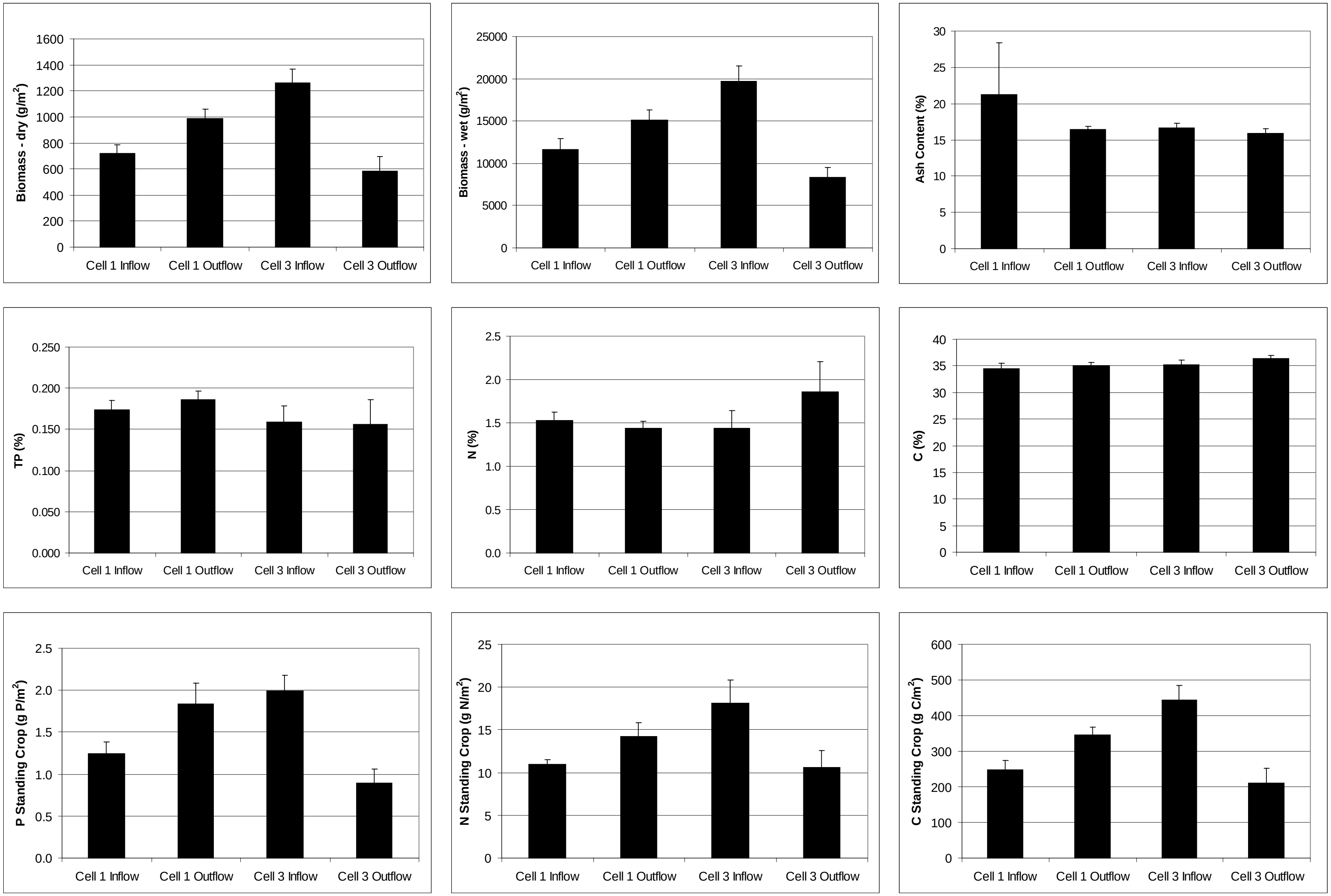


Figure 19. Biomass and nutrient content for *Pistia*-dominated plant bed stations collected along the eastern flowpath of STA-1W during the summer 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

Similar phosphorus concentrations were measured along the flowpath, and ranged from 0.156 (Cell 3 outflow) to 0.186 (Cell 1 outflow) % dry wt (Table 13; Figure 19). The P concentrations measured in the inflow and outflow regions of Cell 1 were slightly higher than those regions of Cell 3.

The N content was similar along the eastern flowpath for both Cell 1 locations and the Cell 3 inflow location, and ranged from 1.44% to 1.53% dry wt (Table 13; Figure 19). An increase in nitrogen concentration, however, was measured in the outflow location of Cell 3 (1.86% dry wt). Carbon concentrations were constant among all locations with the eastern flowpath, including the outflow region of Cell 3, and ranged from 34.5 to 36.3% dry wt (Table 13; Figure 19).

The N and C standing crops exhibited the same trend described for the wet and dry biomass. An increase in standing crop was observed along the eastern flowpath of the *Pistia*-dominated plant beds, down to the Cell 3 inflow location. Samples collected from the outflow of Cell 3 produced lower standing crops; biomass values were about half those of the inflow (Table 13; Figure 19). In contrast to the standing crop data, ash content decreased from the inflow region of Cell 1 to the outflow region of Cell 3 (18.1 and 15.9% dry wt, respectively; Table 13; Figure 19).

Eichhornia-Dominated Plant Beds

For the *Eichhornia*-dominated plant beds along the eastern flowpath, wet and dry biomass was highest in the Cell 1 inflow location (34,200 and 2,810 g/m^2 , respectively) and decreased to the Cell 3 inflow location (16,400 and 1,170 g/m^2, respectively) (Table 14; Figure 20). The Cell 3 outflow exhibited a higher biomass C standing crop than Cell 3 inflow, but not as high as observed at the Cell 1 locations.

An increasing trend in phosphorus was observed along the eastern flowpath from the Cell 1 inflow to the Cell 3 inflow (0.109 to 0.129% dry wt, respectively) (Table 14; Figure 20). Plants at the Cell 3 outflow, however, exhibited the lowest phosphorus concentration (0.086% dry wt).

Table 14 Mean biomass and nutrient content (± 1s.d.) for Eichhornia-dominated plant bed locations collected along the eastern flowpath of STA-1W during the summer 2002 sampling event. Values represent a mean of four plots sampled at random within the plant bed community.

	Cell 1 Inflow	Cell 1 Outflow	Cell 3 Inflow	Cell 3 Outflow
Wet Biomass (g/m^2)	34,200±2,417	32,100±5,655	16,400±4,023	24,200±2,573
Dry Biomass (g/m^2)	2,810±391	2,520±681	1,170±310	1,750±233
TP (% dry wt)	0.109±0.004	0.118±0.010	0.129±0.007	0.086±0.007
N (% dry wt)	0.92±0.10	0.95±0.08	1.45±0.14	1.34±0.26
C (% dry wt)	38.1±0.5	38.8±0.8	38.3±0.3	38.1±±5.4
Ash content (%)	24.1±11.9`	10.7±0.8	13.6±1.3	10.4±0.3
P Standing Crop (g P/m^2)	3.06±0.43	2.97±0.72	1.51±0.46	1.50±0.22
N Standing Crop (g N/m^2)	25.7±1.50	23.9±5.74	16.9±4.69	23.2±4.28
C Standing Crop (g C/m^2)	1,069±140	981±275	448±121	661±80

The P standing crop was similar between the inflow (3.06 g P/m^2) and outflow of Cell 1 (2.97 g P/m^2) and the inflow (1.51 g P/m^2) and outflow of Cell 3 (1.50 g P/m^2). Overall, a decreasing trend was found along the flowpath.

Nitrogen concentrations of the *Eichhornia*-dominated beds sampled along the eastern flowpath were highest in the inflow region of Cell 3 (1.45% dry wt; Table 14; Figure 20). Similar N concentrations were measured in the inflow and outflow locations of Cell 1 (0.92 and 0.95% dry wt, respectively), although these levels were almost half of those measured in Cell 3. Carbon concentrations were comparable at all four locations, and ranged from 38.1 to 38.8% dry wt (Table 14; Figure 20).

The N and C standing crops were highest in the inflow region of Cell 1 (25.7 g N/m^2 and 1070 g C/m^2, respectively) and lowest at the inflow region of Cell 3 (16.9 g N/m^2 and 448 g C/m^2). Ash contents of plants along the eastern flowpath were much higher in the inflow region of Cell 1 (24.1% dry wt), approximately double that in the remaining three sampling locations (Table 14; Figure 20).

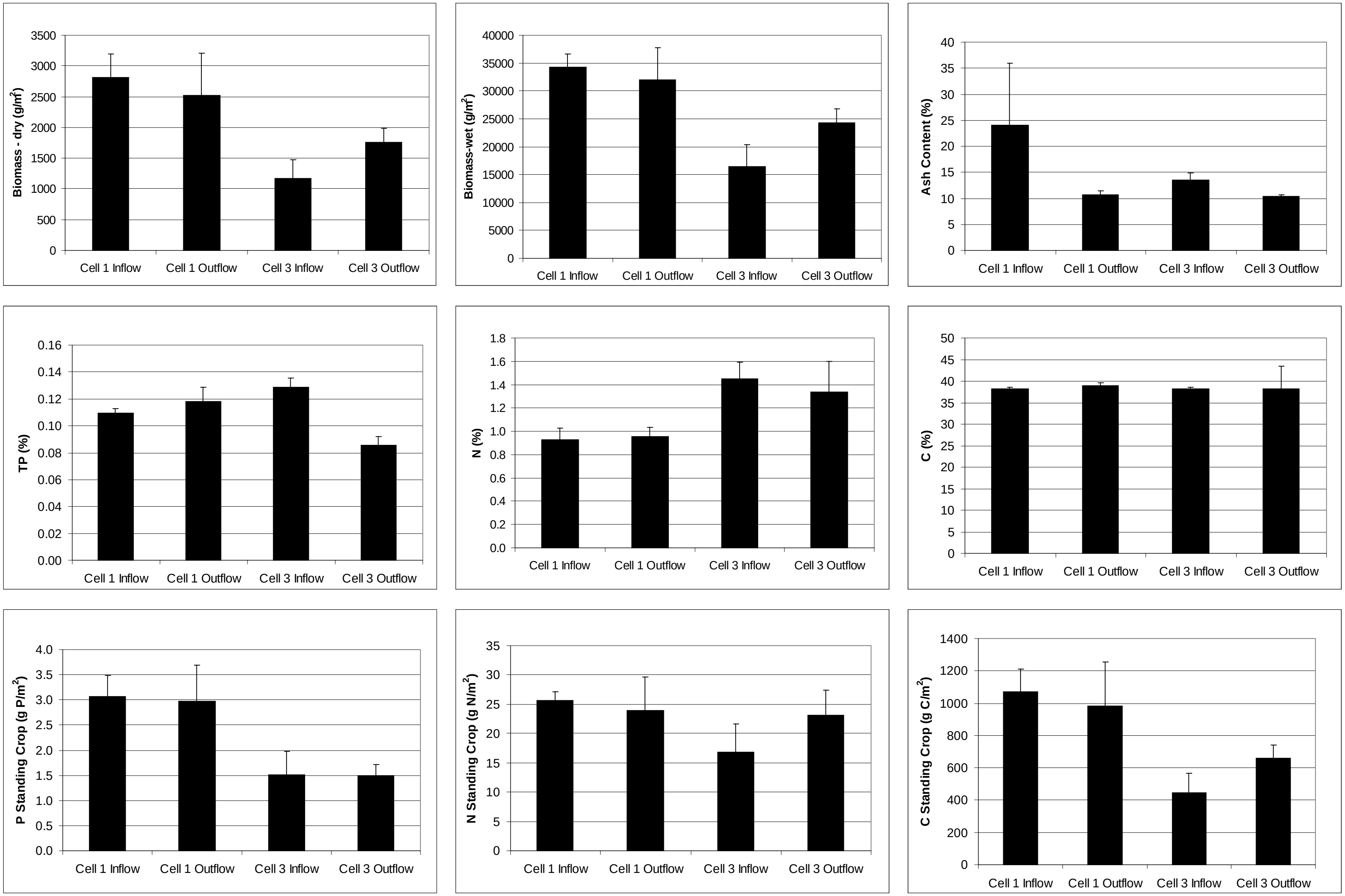


Figure 20. Biomass and nutrient content for *Eichhornia*-dominated plant bed stations collected along the eastern flowpath of STA-1W during the summer 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

Western Flowpath

Pistia-Dominated Plant Beds

Table 15 and Figure 21 describe the biomass and nutrient content of the *Pistia*-dominated plant beds sampled along the western flowpath during the summer sampling event. Biomass samples collected from the inflow region (11,100 g wet wt/m^2 and 722 g dry wt/m^2) were higher than that of plants collected from the outflow region (8650 g wet wt/m^2 and 514 g dry wt/m^2; Table 15; Figure 21).

Conversely, P, N, and C concentrations were higher in the outflow than the inflow locations. Approximately a 50% higher concentration of tissue P was measured in the outflow of Cell 2 than the inflow (Table 15; Figure 21). A slight difference was noted between the inflow and outflow plants for N and C.

The standing crop for P was higher at the outflow location of Cell 2, whereas, N and C standing crops were higher at the inflow location (Table 15; Figure 21). Following the same trend as the N and C standing crops, higher ash contents were measured at the inflow (23.3% dry wt) than the outflow (19.2% dry wt).

Table 15. Mean biomass and nutrient content (± 1s.d.) for *Pistia*- and *Eichhornia*-dominated plant bed locations collected along the western flowpath of STA-1W during the summer 2002 sampling event. Values represent a mean of four plots sampled at random within the plant bed community.

	Pistia		***Eichhornia***	
	Cell 2 Inflow	**Cell 2 Outflow**	**Cell 2 Inflow**	**Cell 2 Outflow**
Wet Biomass (g/m^2)	11,100±2,240	8,650±1,570	31,400±2,740	30,700±6,370
Dry Biomass (g/m^2)	722±142	514±99	2,920±509	2,630±384
TP (% dry wt)	0.132±0.011	0.204±0.015	0.136±0.004	0.133±0.011
N (% dry wt)	1.53±0.03	1.93±0.08	1.12±0.03	1.06±0.02
C (% dry wt)	31.8±0.6	35.2±0.8	38.2±0.3	38.8±0.5
Ash content (%)	23.3±1.9	19.2±0.9	12.5±0.8	11.9±0.6
P Standing Crop (g P/m^2)	0.94±0.17	1.05±0.27	3.98±0.75	3.53±1.15
N Standing Crop (g N/m^2)	11.0±2.36	9.94±2.27	32.6±6.00	28.0±7.42
C Standing Crop (g C/m^2)	230.1±48	180.9±36	1,115.5±202	1,018.7±251

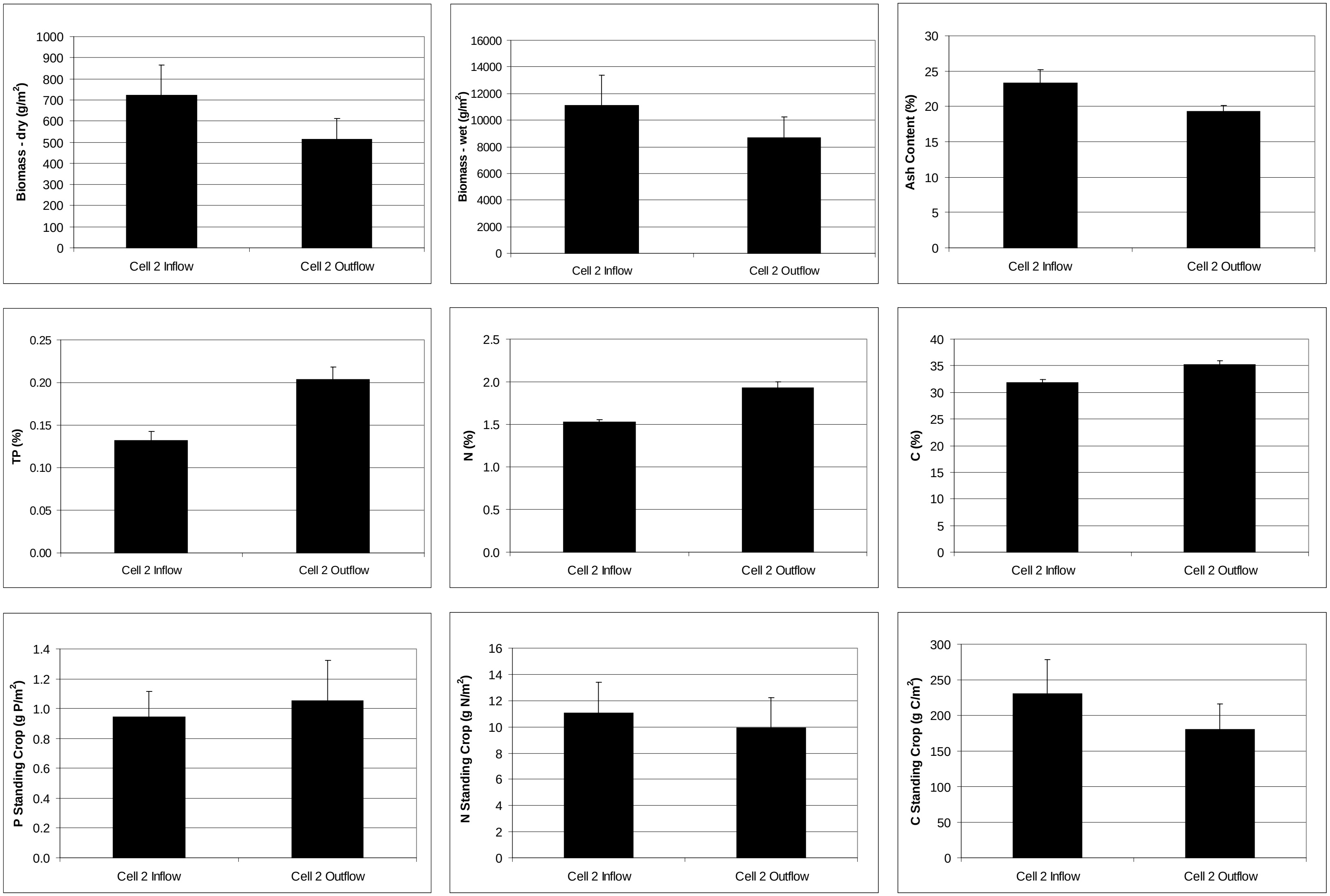


Figure 21. Biomass and nutrient content for *Pistia*-dominated plant bed stations collected along the western flowpath of STA-1W during the summer 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

Eichhornia-Dominated Plant Beds

Biomass and nutrient content of *Eichhornia* samples collected along the western flowpath (the inflow and outflow regions of Cell 2) are presented in Table 15 and Figure 22. For all parameters measured, little difference was found between the samples collected from the inflow and outflow regions. For most instances, however, the samples collected from the inflow were higher in concentration than samples collected from the outflow.

3.4 Seasonality Effects

Seasonality effects on the standing crop biomass and composition of the 'target' SAV and floating species (*Najas*, *Ceratophyllum*, *Pistia* and *Eichhornia*) are addressed in this section. In order to evaluate potential seasonality effects, vegetation samples were collected during the winter season (February 2002) and again at the same locations in the summer season (end of May, beginning of June 2002). We were able to collect plant samples at all locations during each season except for one location, the *Pistia* at the outflow region of Cell 3. When field personnel visited that location during the summer season, it was discovered that only *Typha* was present. A new sampling site, therefore, was established southwest of the original location (Figure 2). As a result, the Cell 3 outflow *Pistia* location will not be included in this seasonality comparison.

In most cases, the dry and wet standing crops were much higher in the summer sampling than for the winter sampling, particularly for *Najas*- and *Ceratophyllum*-dominated plant beds sampled in the inflow and outflow of Cell 1 (Figures 23 and 24). Cell 2 mid and Cell 4 outflow were among the exceptions for the SAV locations where the biomass during the winter sampling was higher than the summer sampling (Figures 23 and 24).

Ash contents were also higher in the summer sampling event within *Najas*- and *Ceratophyllum*-dominated plant communities (Figures 23 and 24) with one exception, *Najas* at the Cell 4 station. Differences in ash content between the summer and winter sampling events were less evident in the *Pistia*-dominated stations, and were minimal in those stations dominated by *Eichhornia* (Figures 25 and 26).

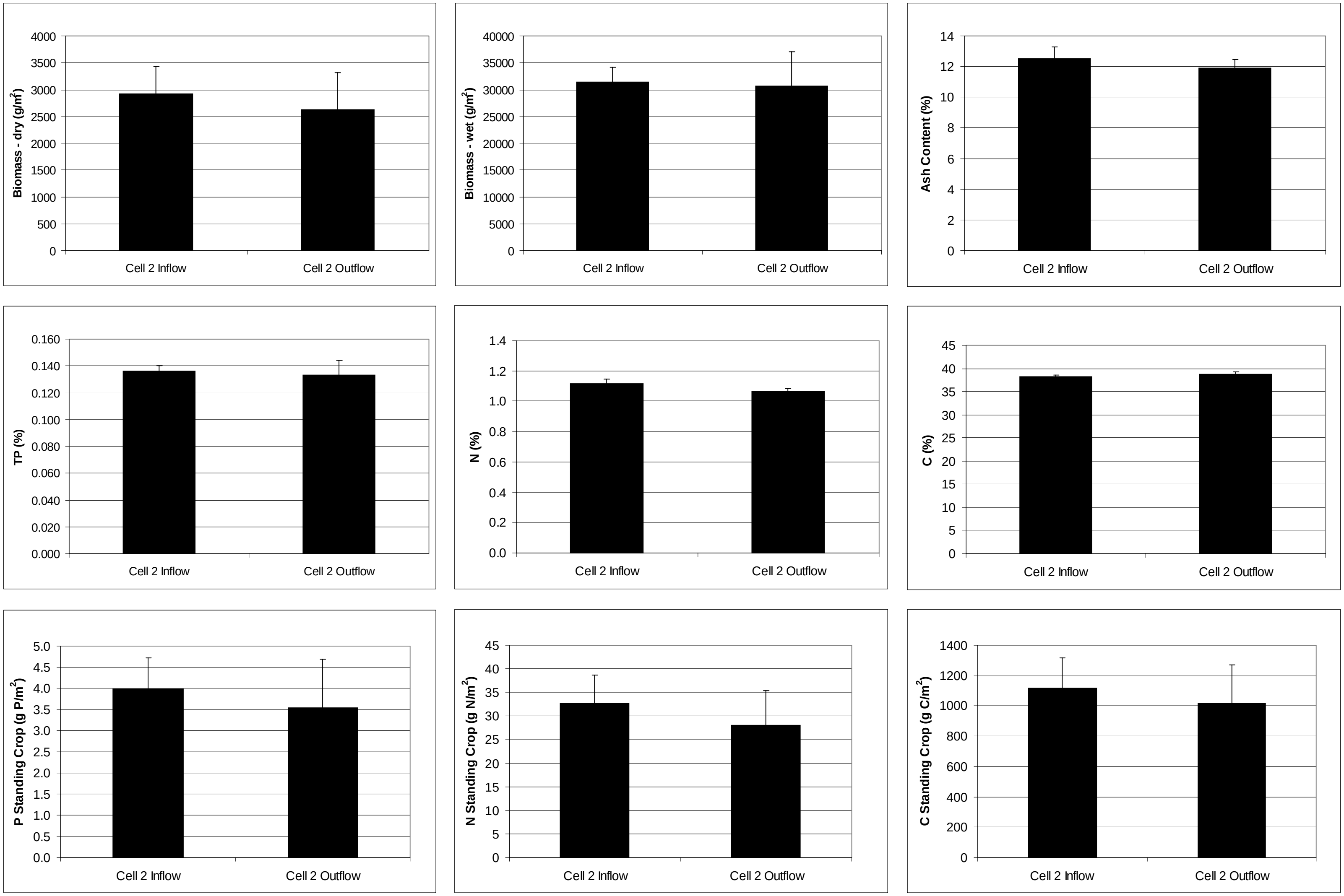


Figure 22. Biomass and nutrient content for *Eichhornia*-dominated plant bed stations collected along the western flowpath of STA-1W during the summer 2002 sampling event. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

Tissue nutrient content (P, N and C) was higher in most all stations sampled in the winter than the summer (Figures 23 to 26). Exceptions occurred most often in the carbon data collected from the *Pistia*- and *Eichhornia*-dominated plant beds, but even then, the summer sampling was only slightly higher in concentration (Figures 25 and 26).

The data that demonstrated the most variability in terms of determining a seasonal trend was the standing crop data. Except for *Eichhornia*-dominated plant beds, the standing crops for P, N, and C were highest in the inflow and outflow locations of Cell 1 during the summer sampling event. For *Pistia*- and *Eichhornia*-dominated plant beds, standing crops were typically higher in samples collected during the summer than in the winter.

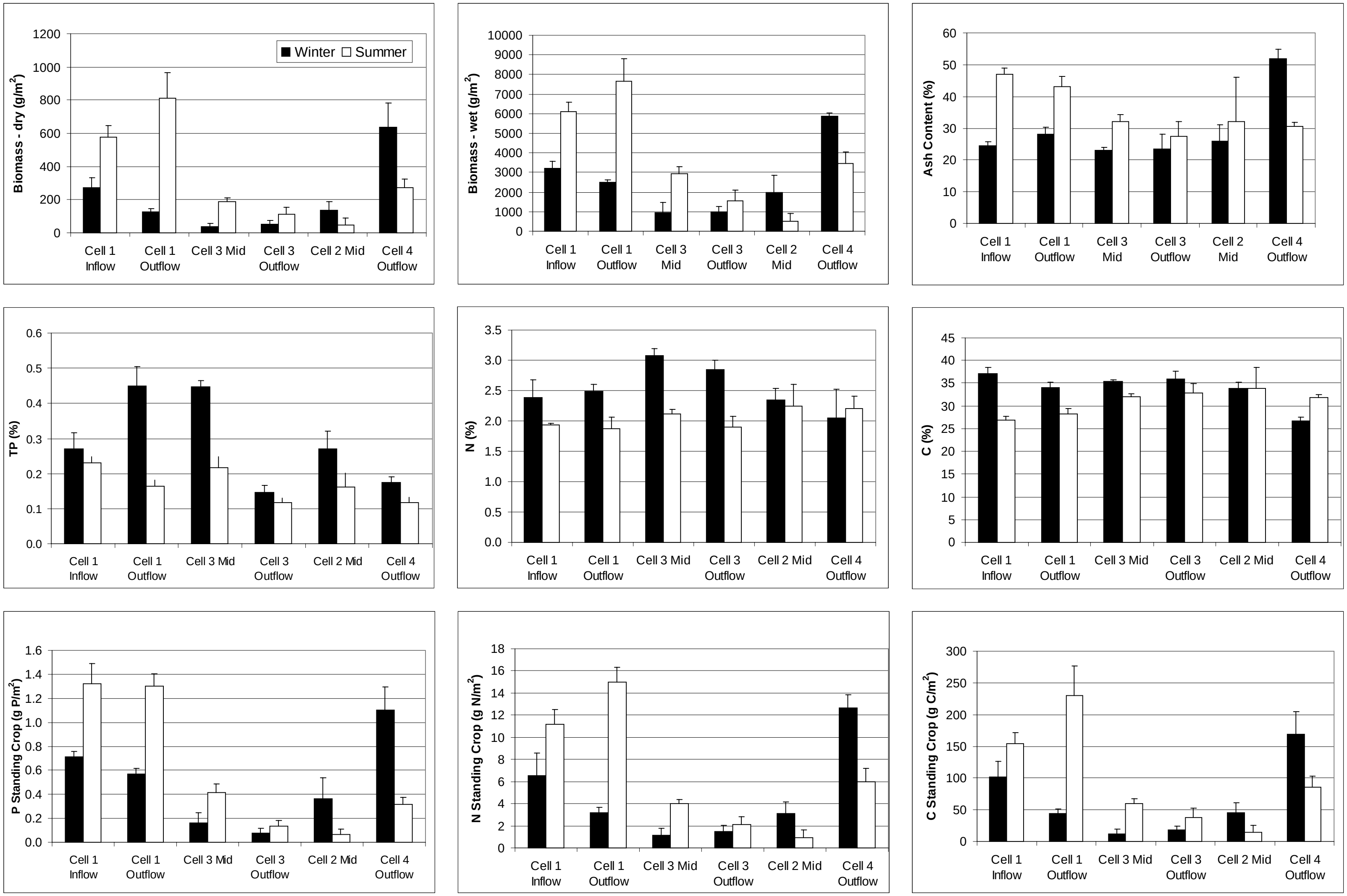


Figure 23. Biomass and nutrient content for *Najas*-dominated plant bed stations collected in STA-1W during the winter (black bars) and summer (white bars) sampling events. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

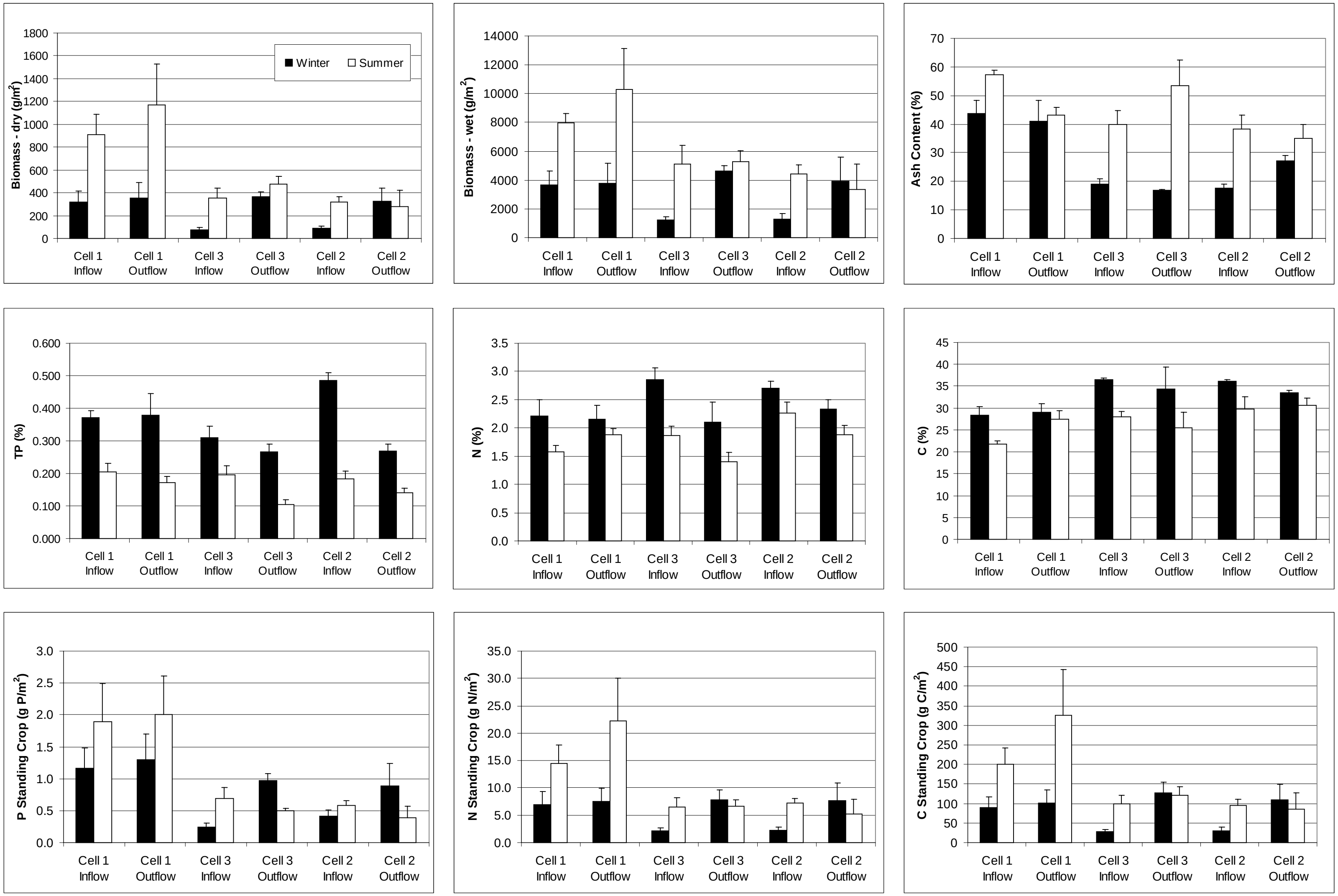


Figure 24. Biomass and nutrient content for *Ceratophyllum*-dominated plant bed stations collected in STA-1W during the winter (black bars) and summer (white bars) sampling events. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

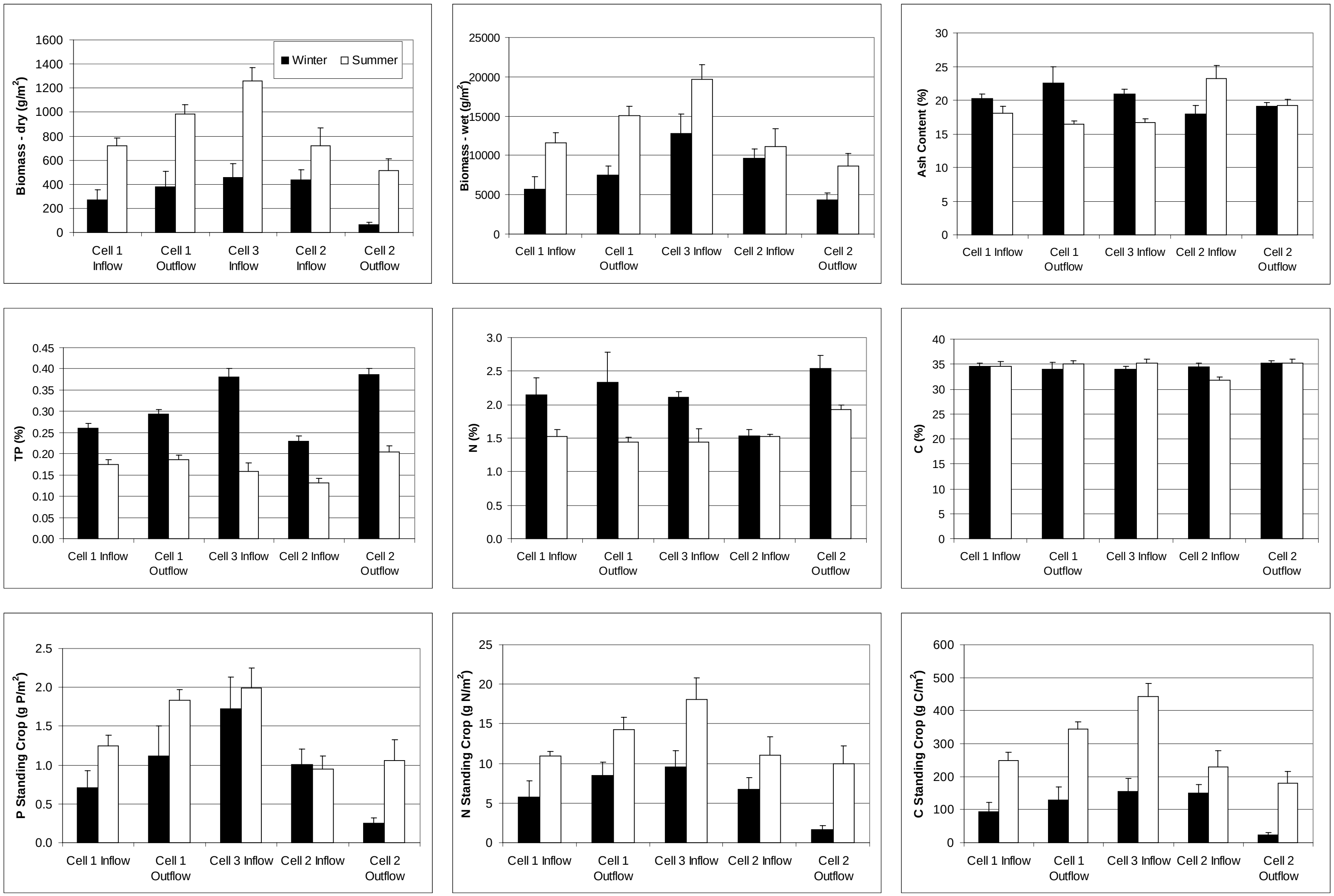


Figure 25. Biomass and nutrient content for *Pistia*-dominated plant bed stations collected in STA-1W during the winter (black bars) and summer (white bars) sampling events. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

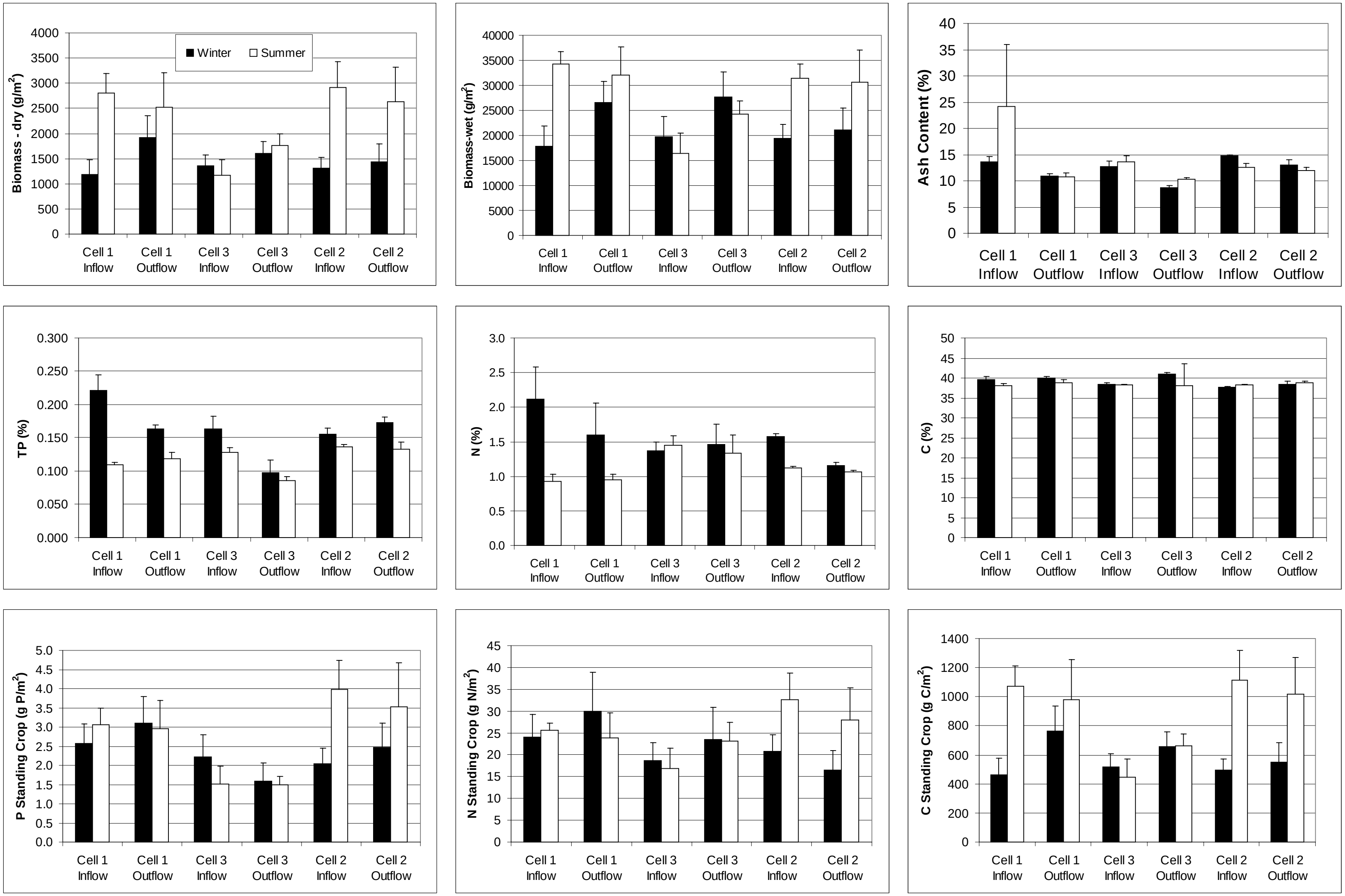


Figure 26. Biomass and nutrient content for ***Eichhornia***-dominated plant bed stations collected in STA-1W during the winter (black bars) and summer (white bars) sampling events. Values represent an average (±1s.d.) of four plots collected at random within the plant bed community.

Section 4: Cattail (Typha)

4.1 Methods

In February 2002, DBE personnel visually established sampling locations for *Typha* communities based on the following four criteria: 1) adequate size of the plant bed (at least 40 m^2); 2) *Typha* dominance of the community; 3) healthy vegetation; and 4) rooted plants (not floating mats). *Typha* samples were then collected in February 2002 in the inflow and outflow regions of Cells 1 and 2, and in the outflow regions of Cells 3 and 4. For Cell 1, the selected inflow and outflow locations coincided with 1995 District sampling locations #16 and #19, respectively (Figure 27). To represent the entire bed, four random samples were collected at each location. GPS coordinates were also recorded for each sampling location (see Appendix Table A-1 for coordinates).

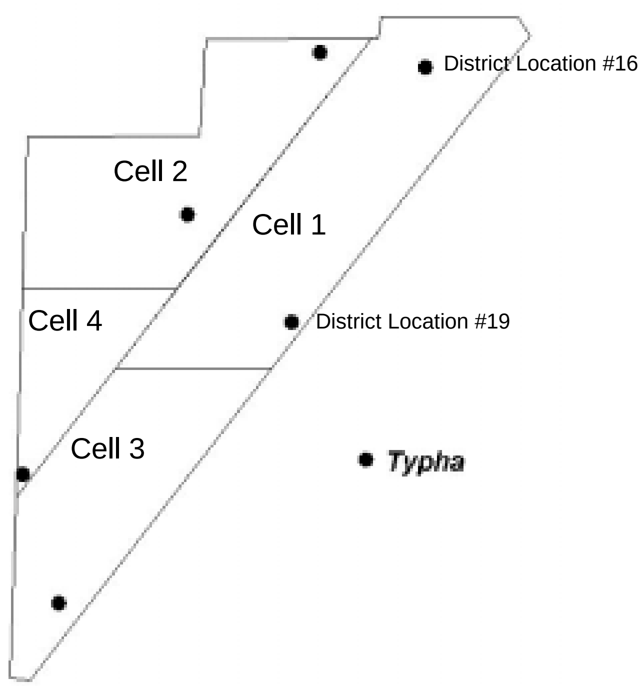


Figure 27. Sampling locations for *Typha* in Cells 1 – 4 of STA-1W.

Typha samples were collected using a 0.5 m^2 PVC quadrat and shovel. Upon quadrat placement a photo was taken and percent surface cover of each species within the quadrat was assessed using visual categories of 25, 50, 75 and 100% (see Appendix for photos and percent cover for each quadrat). To collect the sample, a shovel was used to dig up the roots (separating the plants within the quadrat from the surrounding plants). All plant biomass was then hand-gathered and placed in a large plastic bag for transportation back to the laboratory. Upon arrival at the laboratory, samples were rinsed, separated and identified by species. At this point the work plan stated that a subsample of three random plants would be determined; however, during collection it was difficult to keep the individual plants within the box corer intact. Therefore, we separated the entire quadrat biomass of *Typha* in each quadrat into "above ground live", "above-ground dead" and "below-ground" tissues. The "above-ground" leaves were considered live if >5% of the tissue was green, otherwise it was considered dead. Below-ground consisted of non-photosynthetic tissues, and contained rhizomes, roots and some loose sheath. A total wet weight biomass measurement was determined for each tissue type prior to drying using a Chatillon hanging spring balance with a 60 lb capacity. After the dry weight biomass analysis was completed, a subsample of each tissue type was selected for nutrient analyses.

We performed wet and dry biomass measurements on the "above ground live", "above ground dead" and "below ground" tissues. Elemental and proximate analyses (TP, N, C and ash content) were performed only on the "above ground live" and "below ground" tissues using the methods described in Table 1. Each tissue type within each plot was analyzed individually and averaged to provide a result for that plant bed location.

4.2 Species Composition and Percent Cover

Table 16 depicts the average percent cover of the four random sampling points for each plant bed location. Percent cover was determined by visually assessing the area within the quadrat and noting any species that comprised 25, 50, 75 or 100% of the area. Of the six plant bed locations, three (Cell 1 inflow and outflow and Cell 3 outflow) exhibited 100% percent cover of *Typha*. Cell 2 inflow and outflow samples contained 30 and 50% cover of other species, respectively (see appendix for individual plots). One of the four samples at the Cell 4 outflow location had 25% of *Eleocharis* present, while the rest of the sample locations were comprised of 100% *Typha*.

Table 16. Average percent cover of the four random sampling points for *Typha* locations sampled during February 2002 at the inflow and outflow regions of the STA-1W treatment cells.

	Typha
Cell 1 Inflow	100%‡
Cell 1 Outflow	100%
Cell 2 Inflow	70% *Typha* 30% various floating species†
Cell 2 Outflow	50% *Typha* 40% misc floating and emergent species† 10% *Hydrocotyle*
Cell 3 Outflow	100%
Cell 4 Outflow	95% *Typha* 5% *Eleocharis*

‡ % for the species of interest at this location.
† No single species met the 25% criteria. See the section below for species identification.

Figure 28 shows the non-dominant species associated with each plant bed location (four sampling plots within each bed) for the *Typha* sampling sites. All locations contained at least two non-dominant species with the exception of the Cell 3 outflow, for which no other species were observed. Both *Eleocharis* and *Najas* were present in the Cell 4 outflow sampling location. In Cell 1, *Hydrocotyle*, *Lemna*, *Pistia* and *Salvinia* were noted in the inflow location and *Asclepias*, *Salvinia* and *Ludwigia* were observed in the outflow sampling location. Both *Typha* sampling locations in Cell 2 contained several non-dominant emergent and floating species (Figure 28).

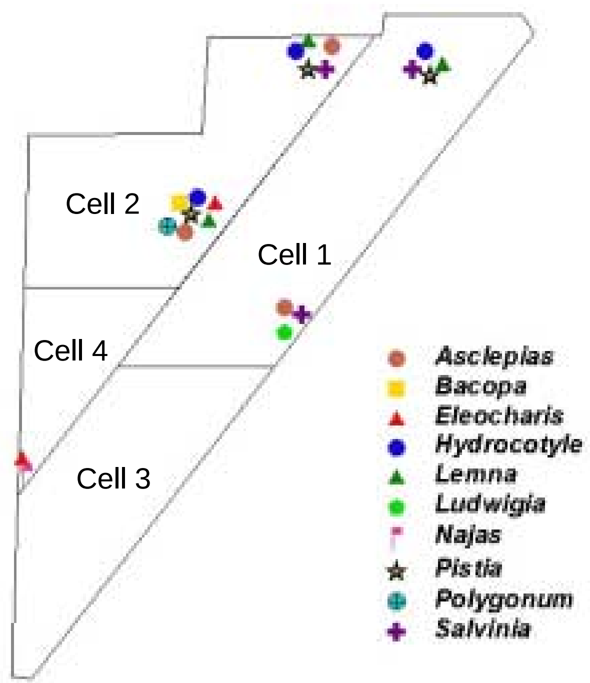


Figure 28. Non-dominant plant species in the *Typha* plant beds.

4.3 Biomass and Nutrient Content

4.3.1 Eastern Flowpath

Along the eastern flowpath, the wet and dry total biomass of the *Typha*-dominated beds was highest at the Cell 1 inflow location (31,700 and 3,660 g/m^2, respectively) and lowest at the Cell 1 outflow location (20,000 and 2,340 g/m^2, respectively) (Figure 29). When comparing the three tissue types (above-ground-live, above-ground-dead and below-ground), the above-ground-dead and below-ground tissues were consistently higher in biomass than the above-ground-live tissue type (Table 17; Figure 29). The biomass of the inflow region of Cell 1 exhibited higher variability among samples than the outflow stations (Figure 29).

The nutrient content of the above-ground-live and below-ground tissues of *Typha* for the locations along the eastern flowpath are depicted in Table 17 and Figure 29. Phosphorus concentrations were higher in the above-ground-live tissues except for the Cell 1 inflow location, where they were essentially equal. The above-ground-live tissue P was highest at the Cell 3 outflow location and lowest at the Cell 1 outflow location (0.130 and 0.097% dry wt, respectively). The below-ground tissue P was highest at the Cell 1 inflow location and lowest at the Cell 1 outflow location (0.125 and 0.055%, respectively). The above-ground-live and below-ground tissues at each location were similar with respect to P standing crop. The P standing crop for both tissues was highest at the Cell 1 inflow location and lowest at the Cell 1 outflow location. Phosphorus and N tissue concentrations, and P, N, and C standing crop demonstrated the highest variability in the inflow region of Cell 1 (Figure 29).

Table 17. Mean biomass and nutrient content (± 1s.d.) for *Typha*-dominated plant bed locations collected along the eastern flowpath of STA-1W during winter 2002. Values represent a mean of four plots sampled at random within the plant bed community.

		Cell 1 Inflow	Cell 1 Outflow	Cell 3 Outflow
Wet Biomass (g/m²)	Above-live	8,070±4,020	4,220±948	5,080±1,230
	Above-dead	10,800±2,920	7,300±975	9,290±2,190
	Below-ground	12,800±4,040	8,490±1,320	7,110±1,600
Dry Biomass (g/m²)	Above-live	1,050±661	551±85	609±125
	Above-dead	1,350±440	983±264	1,540±463
	Below-ground	1,260±542	804±135	867±280
P (% dry wt)	Above-live	0.122±0.033	0.097±0.008	0.130±0.021
	Below-ground	0.125±0.030	0.055±0.013	0.097±0.036
N (% dry wt)	Above-live	1.43±0.90	1.02±0.10	1.36±0.13
	Below-ground	1.10±0.15	1.02±0.20	0.79±0.10
C (% dry wt)	Above-live	44.1±0.6	44.0±0.6	44.4±0.9
	Below-ground	44.5±0.2	45.6±0.7	43.4±0.4
Ash content (%)	Above-live	8.0±1.3	8.4±0.9	9.3±0.7
	Below-ground	7.1±0.9	5.3±0.9	6.4±1.2
P Standing Crop (g P/m²)	Above-live	1.42±1.23	0.54±0.09	0.81±0.31
	Below-ground	1.64±0.97	0.44±0.09	0.81±0.35
N Standing Crop (g N/m²)	Above-live	18.5±22	5.58±0.5	8.29±1.9
	Below-ground	13.5±4.5	8.14±1.5	6.80±2.5
C Standing Crop (g C/m²)	Above-live	463±294	242±35	270±53
	Below-ground	562±244	367±62	377±122

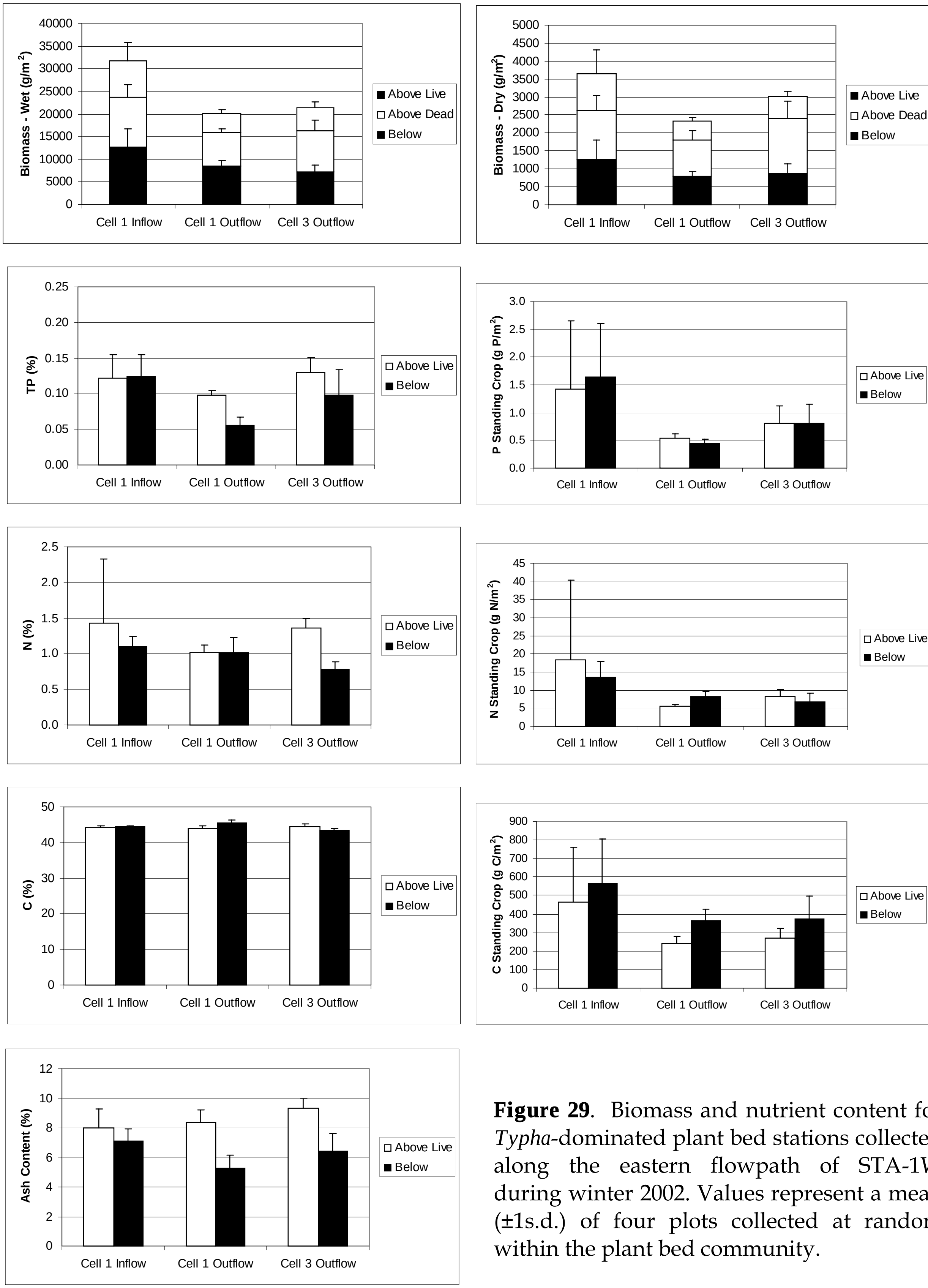


Figure 29. Biomass and nutrient content for *Typha*-dominated plant bed stations collected along the eastern flowpath of STA-1W during winter 2002. Values represent a mean (±1s.d.) of four plots collected at random within the plant bed community.

With the exception of the outflow region of Cell 1, higher N concentrations were measured in the *Typha* tissues from the above-ground-live sections than the below-ground sections of the sampled locations (Table 17; Figure 29). For the outflow region of Cell 1, the N concentrations in the above- and below-ground tissues were equal. The Cell 1 inflow location produced the highest above-ground-live and below-ground N concentrations (1.43% and 1.10%, respectively). Above-ground-live tissue N concentration was lowest at the Cell 1 outflow location, and for below-ground tissues, N concentration was lowest at the Cell 3 outflow location. Nitrogen standing crop for both tissue types was highest in the Cell 1 inflow station. The N standing crop for the above-live tissue was higher than the below-ground at the Cell 1 inflow and Cell 3 outflow station. The *Typha* tissue P and N concentrations, and the standing crop data for P, N, and C, particularly in the inflow region of Cell 1, were highly variable (Figure 29).

The C concentration was relatively constant for both tissue types and for each location down the flowpath, ranging from 44.0–45.6% (Table 17; Figure 29). Carbon standing crop was higher in the below-ground tissues than for the above-ground-live tissues at each station. Cell 1 inflow contained the highest C standing crop for both tissue types, and Cell 1 inflow contained the lowest, although it was similar to the Cell 3 outflow station.

Ash content was higher in the above-ground tissue type than for the below-ground tissue at all three locations in the *Typha*-dominated plant communities (Table 17). Above-ground-live tissues had the highest ash content at the Cell 3 outflow station and the lowest at the Cell 1 inflow station, whereas below-ground tissues were highest at the Cell 1 inflow station and lowest at the Cell 1 outflow station.

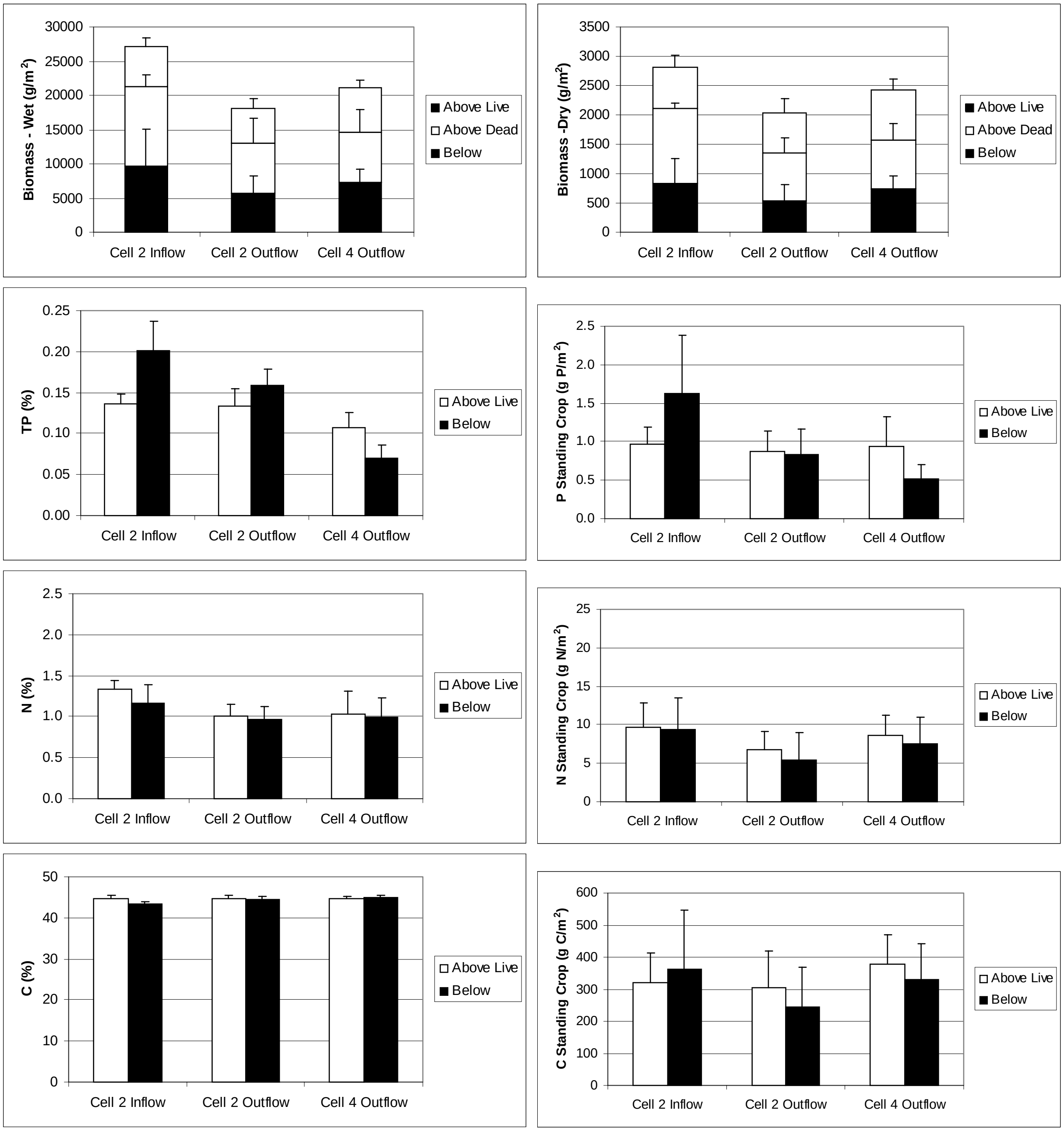
4.3.2 Western Flowpath

For the *Typha* communities along the western flowpath, wet and dry total biomass was highest at the Cell 2 inflow location (27,180 and 2,825 g/m^2, respectively) and lowest at the Cell 2 outflow location (18,100 and 2,038 g/m^2, respectively) (Table 18; Figure 30). Within the three locations, the above-ground-dead tissue wet biomass was higher than the above-ground-live biomass for all locations. Above-ground-dead biomass also was higher than below-ground for the Cell 2 inflow and outflow location (Table 18; Figure 30). The above-ground-dead dry biomass exceeded the above-ground-live dry biomass for all locations, but for the Cell 4 outflow, the two were nearly equal.

Table 18. Mean biomass and nutrient content (± 1s.d.) for *Typha*-dominated plant bed locations collected along the western flowpath of STA-1W during winter 2002. Values represent a mean of four plots sampled at random within the plant bed community.

	Tissue Type	Cell 2 Inflow	Cell 2 Outflow	Cell 4 Outflow
Wet Biomass (g/m^2)	Above-live	5,830±1,320	5,090±1,440	6,520±1,180
	Above-dead	11,600±1,760	7,260±3,730	7,190±3,400
	Below-ground	9,750±5,330	5,750±2,570	7,360±1,910
Dry Biomass (g/m^2)	Above-live	718±193	682±240	849±195
	Above-dead	1,270±100	811±257	833±288
	Below-ground	837±428	545±268	737±230
TP (%dry wt)	Above-live	0.136±0.012	0.133±0.022	0.107±0.018
	Below-ground	0.201±0.037	0.159±0.020	0.071±0.016
N (%dry wt)	Above-live	1.33±0.11	1.01±0.15	1.03±0.27
	Below-ground	1.17±0.22	0.96±0.16	1.00±0.24
C (%dry wt)	Above-live	44.8±0.6	44.6±0.8	44.6±0.6
	Below-ground	43.4±0.6	44.6±0.6	44.9±0.7
Ash content (%)	Above-live	8.3±1.2	7.7±0.8	7.8±0.9
	Below-ground	9.3±0.9	7.0±0.6	6.9±0.9
P Standing Crop ($g P/m^2$)	Above-live	0.97±0.23	0.88±0.26	0.94±0.39
	Below-ground	1.63±0.75	0.84±0.32	0.52±0.18
N Standing Crop ($g N/m^2$)	Above-live	9.65±3.2	6.74±2.4	8.66±2.6
	Below-ground	9.39±4.1	5.46±3.6	7.53±3.4
C Standing Crop ($g C/m^2$)	Above-live	322±90	306±112	379±90
	Below-ground	363±185	244±124	331±108

The nutrient content of the above-ground-live and below-ground tissues for the *Typha* community are depicted in Table 18 and Figure 30. The P concentrations in both the above-ground-live and below-ground tissues showed a decreasing trend down the nutrient gradient. P concentrations were higher in the below-ground tissues than the above-live tissues for the Cell 2 inflow and outflow stations, the Cell 4 outflow station showed just the opposite.



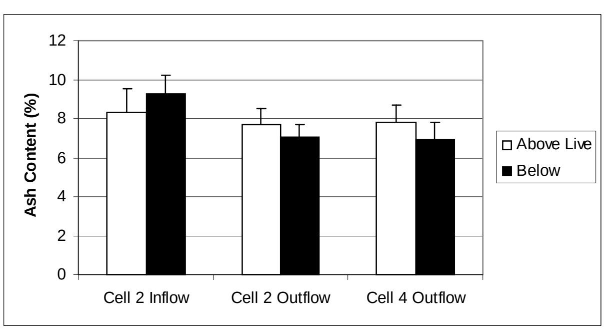


Figure 30. Nutrient content for *Typha*-dominated plant bed stations collected along the western flowpath of STA-1W during winter 2002. Values represent a mean (±1s.d.) of four plots collected at random within the plant bed community.

The N concentrations in both tissue types were highest at the Cell 2 inflow location (Table 18; Figure 30). The other two locations (Cell 2 and Cell 4 outflow) were similar in concentration. At all three locations the above-ground-live N concentration was slightly higher then the below-ground concentration. The C concentration and ash content was fairly consistent for both tissue types within all three locations (Table 18; Figure 30).

The P standing crop was consistent down the nutrient gradient for the above-ground-live tissues, whereas the below-ground tissues showed a downward trend. The above-ground-live tissues were approximately double the below-ground tissues at the Cell 2 inflow location. At the Cell 2 outflow station they were nearly equal and at the Cell 4 outflow station the above-ground-live tissues were approximately 50% lower (Table 18; Figure 30).

The N standing crop was highest at the Cell 2 inflow location and lowest at the Cell 2 outflow location for both tissue types (Table 18; Figure 30). This same pattern was seen for C standing crop in the below-ground tissues but for the above-ground-live tissues the highest C standing crop was at the Cell 4 outflow location and the lowest at the Cell 2 outflow location (Table 18; Figure 30).

We observed that the above-ground-live and below-ground tissues were similar to each other at all three locations for all parameters with two exceptions: the below-ground tissue showed a decreasing trend from Cell 2 inflow to Cell 4 outflow for both TP content and P standing crop. High variability was observed in the P, N, and C standing crop of all three stations, with highest variability observed in the C standing crop (Figure 30).

4.4 Existing *Typha* communities compared with 1995/1996

One of the research questions addressed in this project is how the existing Cell 1 *Typha* communities in STA-1W compare to the Cell 1 *Typha* communities present in 1995 and 1996, when the wetland was in a "start-up" phase. Cell 1 was used for this comparison, since the 1995/1996 sampling was performed only in this portion of the ENR. In the winter of 1995, District personnel collected *Typha* samples throughout Cell 1 using a 1 m^2 quadrat (Figure 31) (see DBE 2002c for sampling methods) and analyzed the above-ground-dead, above-ground-live and below-ground tissues for biomass, TP, N and ash content. The Cell 1 inflow and outflow sampling locations for the present project corresponded to the District 1995 winter sampling locations 16 and 19, respectively (Figure 31), and are compared in the following sections.

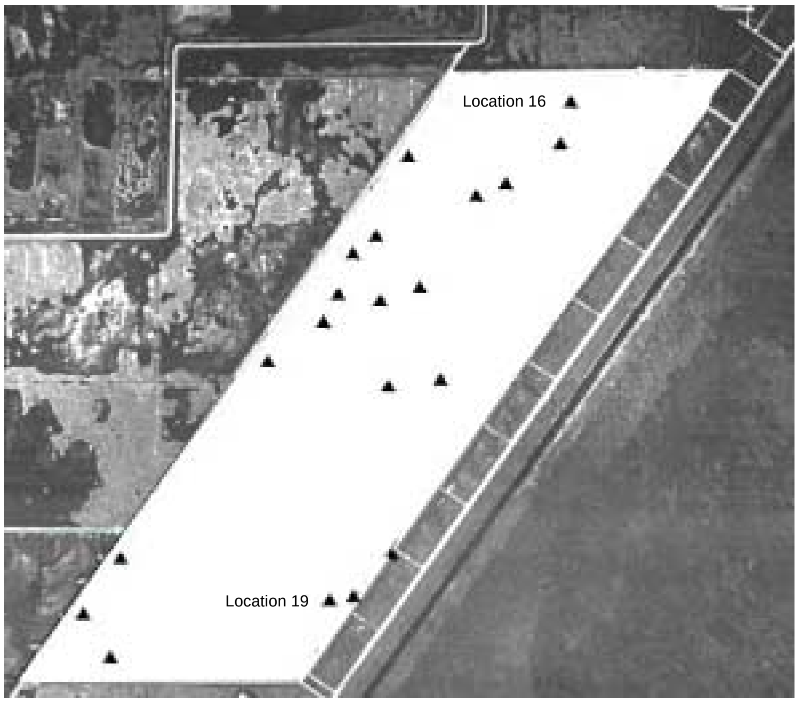


Figure 31. Sampling locations for *Typha* communities collected by the District in the winter of 1995. Locations 16 and 19 correspond to the winter 2002 Cell 1 inflow and outflow stations, respectively.

Figure 32 and Table 19 depict the biomass and nutrient content of the *Typha*-dominated community in Cell 1 in 1995 and 2002. Biomass was determined for all three tissue types (above-ground-dead, above-ground-live and below-ground) on both sampling dates. Total biomass, as well as the biomass for each tissue type, was higher in 2002 at both the inflow and outflow location.

The above-ground-dead *Typha* tissue was not analyzed for nutrient content in the 2002 samples. Therefore, only above-ground-live and below-ground tissues are compared. The Cell 1 inflow station showed a slightly higher TP and N concentration in 1995 than 2002 for both above-ground-live and below-ground tissue types. In 1995 the ash content was markedly higher for the above-ground-live tissues and slightly higher for the below-ground tissues. Phosphorus and N standing crop exhibited higher values in 2002 for both tissue types.

Phosphorus and N concentrations and ash content at the Cell 1 outflow location were much higher for both tissues of *Typha* in 1995 than in 2002. Phosphorus standing crop was higher in 2002 for the above-ground-live tissues, but was substantially lower than 1995 for the below-ground tissues. Nitrogen standing crop was similar between years for the below-ground tissues and higher in 2002 for the above-ground-live tissues.

Table 19. Mean biomass and nutrient content for Cell 1 *Typha*-dominated plant bed locations collected in winter of 1995 and 2002.

		Cell 1 Inflow		**Cell 1 Outflow**	
		1995	**2002**	**1995**	**2002**
Biomass (g dry/m^2)	Above-dead	757	1350	634	983
	Above-live	689	1050	172	551
	Below-ground	925	1260	527	804
TP (%dry wt)	Above-live	0.130	0.122	0.180	0.097
	Below-ground	0.150	0.125	0.180	0.055
N (%dry wt)	Above-live	1.41	1.43	1.96	1.02
	Below-ground	1.35	1.10	1.59	1.02
Ash content (%)	Above-live	36.4	8.0	13.2	8.4
	Below-ground	11.8	7.1	12.3	5.3
P Standing Crop	Above-live	0.90	1.42	0.310	0.536
(g P/m^2)	Below-ground	1.39	1.64	0.948	0.437
N Standing Crop	Above-live	9.72	18.5	3.38	5.58
(g N/m^2)	Below-ground	12.5	13.5	8.38	8.14

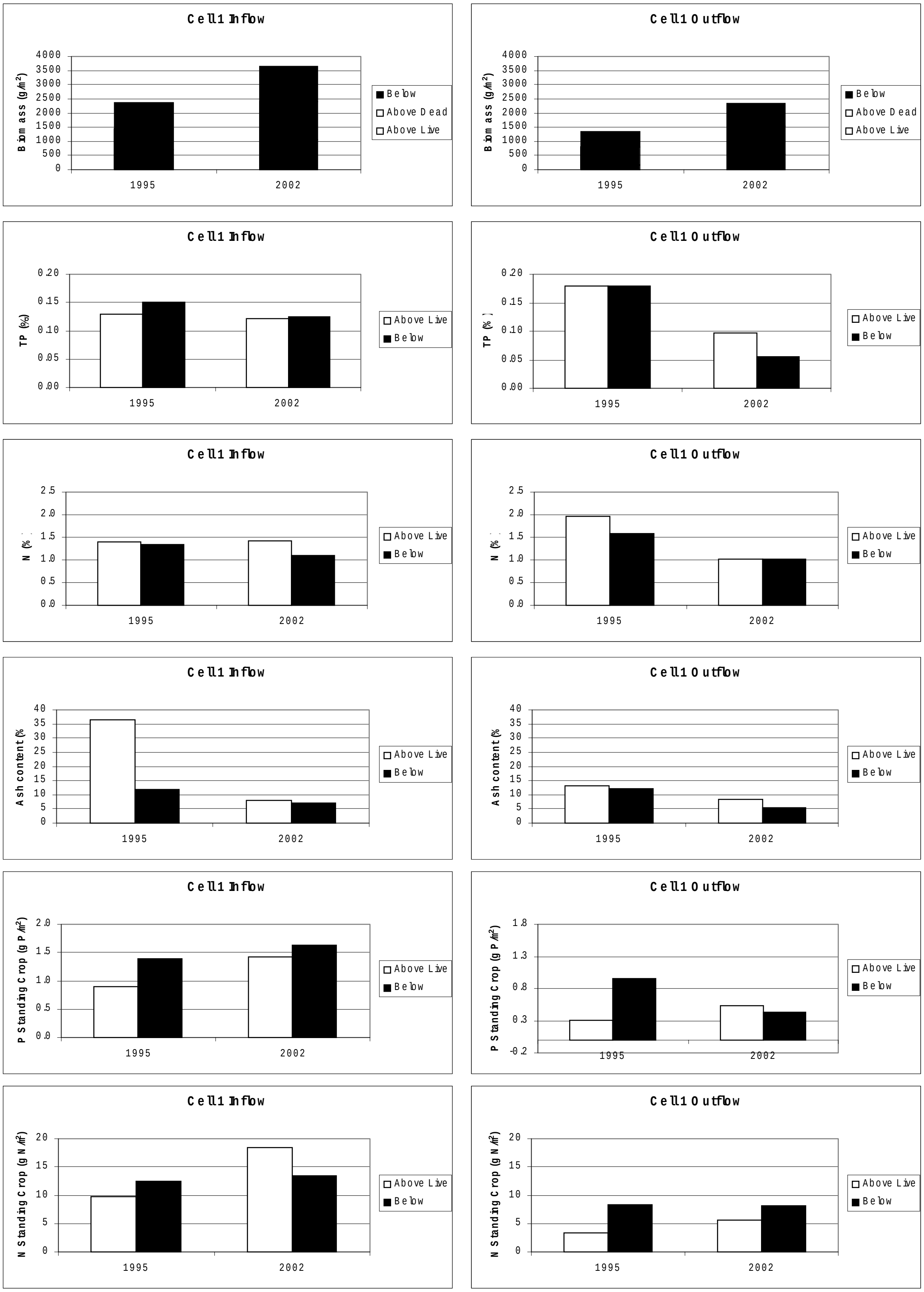


Figure 32. Biomass and nutrient content for two *Typha*-dominated plant bed stations sampled in winter of 1995 and 2002. Cell 1 inflow and Cell 1 outflow corresponds to District locations 16 and 19, respectively (Figure 31).

Section 5: References

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Appendix

Table A-1.Plant bed GPS coordinates

	Latitude (decimal degrees)	Longitude (decimal degrees)
Cell 1 *Ceratophyllum* Inflow	26.647970	-80.416850
Cell 1 *Ceratophyllum* Outflow	26.630170	-80.423267
Cell 2 *Ceratophyllum* Inflow	26.648900	-80.422950
Cell 2 *Ceratophyllum* Outflow	26.643780	-80.441917
Cell 3 *Ceratophyllum* Inflow	26.625750	-80.431200
Cell 3 *Ceratophyllum* Outflow	26.614530	-80.441400
Cell 1 *Najas* Inflow	26.649320	-80.411633
Cell 1 *Najas* Outflow	26.630750	-80.422033
Cell 2 *Najas* Outflow	26.643780	-80.441917
Cell 3 *Najas* Inflow	26.614330	-80.440867
Cell 3 *Najas* Outflow	26.604550	-80.445367
Cell 4 *Najas* Outflow	26.622660	-80.443344
Cell 1 *Eichhornia* Inflow	26.649980	-80.416567
Cell 1 *Eichhornia* Outflow	26.627920	-80.435117
Cell 2 *Eichhornia* Inflow	26.656620	-80.421067
Cell 2 *Eichhornia* Outflow	26.640030	-80.431700
Cell 3 *Eichhornia* Outflow	26.608400	-80.441233
Cell 3 *Eichhornia* Inflow	26.627500	-80.431800
Cell 1 *Pistia* Inflow	26.649980	-80.416567
Cell 1 *Pistia* Outflow	26.628130	-80.431117
Cell 2 *Pistia* Inflow	26.653850	-80.417267
Cell 2 *Pistia* Outflow	26.639030	-80.429017
Cell 3 *Pistia* Inflow	26.622070	-80.435517
Cell 3 *Pistia* Outflow – winter event	26.614470	-80.441533
Cell 3 *Pistia* Outflow – summer event	26.613450	-80.441817
Cell 1 *Typha* Outflow	26.631839	-80.419653
Cell 1 *Typha* Inflow	26.655369	-80.407383
Cell 2 *Typha* Inflow	26.656730	-80.417090
Cell 2 *Typha* Outflow	26.641750	-80.429294
Cell 3 *Typha* Outflow	26.605883	-80.441250
Cell 4 *Typha* Outflow	26.617790	-80.444496

The following pages provide photos for each sample plot location collected during the study. All photos are included on the attached CD in .jpeg format. The caption underneath each photo identifies the file name. The following sample locations did not have a photo taken. Winter event: Cell 3 Pistia Outflow 4. Summer event: Cell 1 Ceratophyllum Outflow 2, Eichhornia Inflow 1 & 2; and Cell 2 Pistia Outflow 1 & 2.

Table A-2. Tables showing date sampled, percent cover and the non-dominant species identified for each sample plot during the sampling events. The sample ID corresponds with the previous photo names. (na = non-dominated species not observed at this location)

Dominant Species	Sample ID	Season	Date Sampled	Percent Cover	Non-Dominant Species
Najas	Cell 1 Naj Inflow 1	Winter	2/8/2002	100 % *Najas*	*Ceratophyllum*
Najas	Cell 1 Naj Inflow 2	Winter	2/8/2002	100 % *Najas*	*Ceratophyllum*
Najas	Cell 1 Naj Inflow 3	Winter	2/8/2002	100 % *Najas*	*Ceratophyllum*
Najas	Cell 1 Naj Inflow 4	Winter	2/8/2002	100 % *Najas*	*Ceratophyllum*
Najas	Cell 1 Naj Outflow 1	Winter	2/8/2002	100 % *Najas*	*Hydrilla*, *Najas*
Najas	Cell 1 Naj Outflow 2	Winter	2/8/2002	100 % *Najas*	*Hydrilla*
Najas	Cell 1 Naj Outflow 3	Winter	2/8/2002	100 % *Najas*	*Ceratophyllum*
Najas	Cell 1 Naj Outflow 4	Winter	2/8/2002	100 % *Najas*	*Hydrilla*, *Ceratophyllum*, filamentous periphyton
Najas	Cell 2 Naj Inflow 1	Winter	2/12/2002	75 % *Najas* 25% *Ceratophyllum*	*Hydrilla*, *Ceratophyllum*
Najas	Cell 2 Naj Inflow 2	Winter	2/12/2002	75 % *Najas* 25% *Ceratophyllum*	*Hydrilla*, *Ceratophyllum*
Najas	Cell 2 Naj Inflow 3	Winter	2/12/2002	75 % *Najas* 25% *Ceratophyllum*	*Hydrilla*, *Ceratophyllum*, filamentous periphyton
Najas	Cell 2 Naj Inflow 4	Winter	2/12/2002	75 % *Najas* 25% *Ceratophyllum*	*Hydrilla*, *Ceratophyllum*
Najas	Cell 3 Naj Inflow 1	Winter	2/14/2002	100 % *Najas*	*Ceratophyllum*, filamentous periphyton
Najas	Cell 3 Naj Inflow 2	Winter	2/14/2002	100 % *Najas*	dead emergent foliage and roots, filamentous periphyton
Najas	Cell 3 Naj Inflow 3	Winter	2/14/2002	100 % *Najas*	dead emergent foliage and roots, filamentous periphyton
Najas	Cell 3 Naj Inflow 4	Winter	2/14/2002	100 % *Najas*	*Ceratophyllum*, filamentous periphyton

Dominant Species	**Sample ID**	**Season**	**Date Sampled**	**Percent Cover**	**Non-Dominant Species**
Najas	Cell 3 Naj Outflow 1	Winter	2/14/2002	100 % *Najas*	*Ceratophyllum*
Najas	Cell 3 Naj Outflow 2	Winter	2/14/2002	100 % *Najas*	na
Najas	Cell 3 Naj Outflow 3	Winter	2/14/2002	100 % *Najas*	*Ceratophyllum*, filamentous periphyton
Najas	Cell 3 Naj Outflow 4	Winter	2/14/2002	100 % *Najas*	na
Najas	Cell 4 Naj Outflow 1	Winter	2/26/2002	100 % *Najas*	*Ceratophyllum*
Najas	Cell 4 Naj Outflow 2	Winter	2/26/2002	100 % *Najas*	na
Najas	Cell 4 Naj Outflow 3	Winter	2/26/2002	100 % *Najas*	na
Najas	Cell 4 Naj Outflow 4	Winter	2/26/2002	100 % *Najas*	*Ceratophyllum*
Najas	Cell 1 Naj Inflow1	Summer	5/28/2002	100% *Najas*	*Ceratophyllum*
Najas	Cell 1 Naj Inflow2	Summer	5/28/2002	100% *Najas*	*Ceratophyllum*
Najas	Cell 1 Naj Inflow3	Summer	5/28/2002	100% *Najas*	*Ceratophyllum*
Najas	Cell 1 Naj Inflow4	Summer	5/28/2002	100% *Najas*	*Ceratophyllum*
Najas	Cell 1 Naj Outflow1	Summer	5/28/2002	100% *Najas*	na
Najas	Cell 1 Naj Outflow2	Summer	5/28/2002	100% *Najas*	*Ceratophyllum*
Najas	Cell 1 Naj Outflow3	Summer	5/28/2002	100% *Najas*	Na
Najas	Cell 1 Naj Outflow4	Summer	5/28/2002	100% *Najas*	*Ceratophyllum*
Najas	Cell 2 Naj Inflow1	Summer	5/30/2002	50% *Najas* 50% *Hydrilla*	*Hydrilla*
Najas	Cell 2 Naj Inflow2	Summer	5/30/2002	50% *Najas* 50% *Hydrilla*	*Hydrilla*
Najas	Cell 2 Naj Inflow3	Summer	5/30/2002	50% *Najas* 50% *Hydrilla*	*Hydrilla*, *Ceratophyllum*, filamentous periphyton
Najas	Cell 2 Naj Inflow4	Summer	5/30/2002	50% *Najas* 50% *Hydrilla*	*Hydrilla*, *Ceratophyllum*, filamentous periphyton
Najas	Cell 3 Naj Inflow1	Summer	6/4/2002	100% *Najas*	filamentous periphyton, *Ceratophyllum*

Dominant Species	Sample ID	Season	Date Sampled	Percent Cover	Non-Dominant Species
Najas	Cell 3 Naj Inflow2	Summer	6/4/2002	100% *Najas*	filamentous periphyton, *Ceratophyllum*
Najas	Cell 3 Naj Inflow3	Summer	6/4/2002	100% *Najas*	filamentous periphyton, *Ceratophyllum*
Najas	Cell 3 Naj Inflow4	Summer	6/4/2002	100% *Najas*	filamentous periphyton, *Ceratophyllum*
Najas	Cell 3 Naj Outflow1	Summer	6/4/2002	100% *Najas*	filamentous periphyton, *Utricularia*
Najas	Cell 3 Naj Outflow2	Summer	6/4/2002	100% *Najas*	filamentous periphyton, *Utricularia*, *Hydrilla*
Najas	Cell 3 Naj Outflow3	Summer	6/4/2002	100% *Najas*	filamentous periphyton, *Utricularia*, *Hydrilla*, *Ceratophyllum*
Najas	Cell 3 Naj Outflow4	Summer	6/4/2002	100% *Najas*	filamentous periphyton, *Utricularia*
Najas	Cell 4 Naj Outflow1	Summer	5/30/2002	100% *Najas*	filamentous periphyton
Najas	Cell 4 Naj Outflow2	Summer	5/30/2002	100% Najas	filamentous periphyton
Najas	Cell 4 Naj Outflow3	Summer	5/30/2002	100% Najas	filamentous periphyton
Najas	Cell 4 Naj Outflow4	Summer	5/30/2002	100% Najas	filamentous periphyton
Ceratophyllum	Cell 1 Cer Inflow 1	Winter	2/8/2002	100 % *Ceratophyllum*	*Hydrilla*
Ceratophyllum	Cell 1 Cer Inflow 2	Winter	2/8/2002	100 % *Ceratophyllum*	*Najas*
Ceratophyllum	Cell 1 Cer Inflow 3	Winter	2/8/2002	100 % *Ceratophyllum*	*Najas*
Ceratophyllum	Cell 1 Cer Inflow 4	Winter	2/8/2002	100 % *Ceratophyllum*	*Hydrilla*
Ceratophyllum	Cell 1 Cer Outflow 1	Winter	2/8/2002	100 % *Ceratophyllum*	*Najas*, *Hydrilla*
Ceratophyllum	Cell 1 Cer Outflow 2	Winter	2/8/2002	100 % *Ceratophyllum*	*Najas*, *Hydrilla*, filamentous periphyton
Ceratophyllum	Cell 1 Cer Outflow 3	Winter	2/8/2002	100 % *Ceratophyllum*	*Najas*
Ceratophyllum	Cell 1 Cer Outflow 4	Winter	2/8/2002	100 % *Ceratophyllum*	*Hydrilla*, *Najas*
Ceratophyllum	Cell 2 Cer Inflow 1	Winter	2/12/2002	100 % *Ceratophyllum*	*Hydrilla*, *Najas*
Ceratophyllum	Cell 2 Cer Inflow 2	Winter	2/12/2002	100 % *Ceratophyllum*	*Hydrilla*, *Najas*
Ceratophyllum	Cell 2 Cer Inflow 3	Winter	2/12/2002	100 % *Ceratophyllum*	*Hydrilla*, *Najas*

Dominant Species	Sample ID	Season	Date Sampled	Percent Cover	Non-Dominant Species
Ceratophyllum	Cell 2 Cer Inflow 4	Winter	2/12/2002	100 % *Ceratophyllum*	*Hydrilla*
Ceratophyllum	Cell 2 Cer Outflow 1	Winter	2/12/2002	100 % *Ceratophyllum*	*Hydrilla, Najas*
Ceratophyllum	Cell 2 Cer Outflow 2	Winter	2/12/2002	100 % *Ceratophyllum*	*Hydrilla, Najas*, filamentous periphyton
Ceratophyllum	Cell 2 Cer Outflow 3	Winter	2/12/2002	100 % *Ceratophyllum*	*Hydrilla, Najas*
Ceratophyllum	Cell 2 Cer Outflow 4	Winter	2/12/2002	100 % *Ceratophyllum*	*Hydrilla, Najas, Hycena*
Ceratophyllum	Cell 3 Cer Inflow 1	Winter	2/14/2002	75 % *Ceratophyllum* 25% dead emergent foliage and roots/open water	dead emergent foliage and roots, filamentous periphyton, *Eleocharis*
Ceratophyllum	Cell 3 Cer Inflow 2	Winter	2/14/2002	100 % *Ceratophyllum*	dead emergent foliage and roots, filamentous periphyton
Ceratophyllum	Cell 3 Cer Inflow 3	Winter	2/14/2002	75 % *Ceratophyllum* 25% dead emergent foliage and roots/open water	dead emergent foliage and roots, filamentous periphyton
Ceratophyllum	Cell 3 Cer Inflow 4	Winter	2/14/2002	75 % *Ceratophyllum* 25% dead emergent foliage and roots/open water	dead emergent foliage and roots, filamentous periphyton
Ceratophyllum	Cell 3 Cer Outflow 1	Winter	2/14/2002	100 % *Ceratophyllum*	*Najas*, filamentous periphyton
Ceratophyllum	Cell 3 Cer Outflow 2	Winter	2/14/2002	100 % *Ceratophyllum*	*Pistia*
Ceratophyllum	Cell 3 Cer Outflow 3	Winter	2/14/2002	100 % *Ceratophyllum*	*Pistia*
Ceratophyllum	Cell 3 Cer Outflow 4	Winter	2/14/2002	100 % *Ceratophyllum*	*Pistia*, filamentous periphyton
Ceratophyllum	Cell 1 Cer Inflow1	Summer	5/28/2002	100% *Ceratophyllum*	na
Ceratophyllum	Cell 1 Cer Inflow2	Summer	5/28/2002	100% *Ceratophyllum*	na
Ceratophyllum	Cell 1 Cer Inflow3	Summer	5/28/2002	100% *Ceratophyllum*	*Eichhornia*

Dominant Species	Sample ID	Season	Date Sampled	Percent Cover	Non-Dominant Species
Ceratophyllum	Cell 1 Cer Inflow4	Summer	5/28/2002	100% *Ceratophyllum*	*Najas, Eichhornia*
Ceratophyllum	Cell 1 Cer Outflow1	Summer	5/28/2002	100% *Ceratophyllum*	*Najas*
Ceratophyllum	Cell 1 Cer Outflow2	Summer	5/28/2002	100% *Ceratophyllum*	na
Ceratophyllum	Cell 1 Cer Outflow3	Summer	5/28/2002	100% *Ceratophyllum*	na
Ceratophyllum	Cell 1 Cer Outflow4	Summer	5/28/2002	100% *Ceratophyllum*	*Najas*
Ceratophyllum	Cell 2 Cer Inflow1	Summer	5/30/2002	100% *Ceratophyllum*	*Hydrilla*
Ceratophyllum	Cell 2 Cer Inflow2	Summer	5/30/2002	100% *Ceratophyllum*	*Hydrilla*
Ceratophyllum	Cell 2 Cer Inflow3	Summer	5/30/2002	100% *Ceratophyllum*	*Hydrilla*
Ceratophyllum	Cell 2 Cer Inflow4	Summer	5/30/2002	100% *Ceratophyllum*	*Hydrilla*
Ceratophyllum	Cell 2 Cer Outflow1	Summer	5/30/2002	50% *Ceratophyllum* 50% *Hydrilla*	*Hydrilla*, filamentous periphyton, *Najas*
Ceratophyllum	Cell 2 Cer Outflow2	Summer	5/30/2002	100% *Ceratophyllum*	*Hydrilla*, filamentous periphyton
Ceratophyllum	Cell 2 Cer Outflow3	Summer	5/30/2002	100% *Ceratophyllum*	*Hydrilla*, filamentous periphyton
Ceratophyllum	Cell 2 Cer Outflow4	Summer	5/30/2002	100% *Ceratophyllum*	*Hydrilla*, filamentous periphyton, *Najas*
Ceratophyllum	Cell 3 Cer Inflow1	Summer	6/4/2002	100% *Ceratophyllum*	filamentous periphyton
Ceratophyllum	Cell 3 Cer Inflow2	Summer	6/4/2002	100% *Ceratophyllum*	na
Ceratophyllum	Cell 3 Cer Inflow3	Summer	6/4/2002	100% *Ceratophyllum*	na
Ceratophyllum	Cell 3 Cer Inflow4	Summer	6/4/2002	100% *Ceratophyllum*	na
Ceratophyllum	Cell 3 Cer Outflow1	Summer	6/4/2002	100% *Ceratophyllum*	filamentous periphyton
Ceratophyllum	Cell 3 Cer Outflow2	Summer	6/4/2002	100% *Ceratophyllum*	na
Ceratophyllum	Cell 3 Cer Outflow3	Summer	6/4/2002	100% *Ceratophyllum*	na
Ceratophyllum	Cell 3 Cer Outflow4	Summer	6/4/2002	100% *Ceratophyllum*	Na
Pistia	Cell 1 Pistia Inflow 1	Winter	2/8/2002	100 % *Pistia*	*Lemna, Hydrocotyle*
Pistia	Cell 1 Pistia Inflow 2	Winter	2/8/2002	100 % *Pistia*	*Lemna, Hydrocotyle*

Dominant Species	Sample ID	Season	Date Sampled	Percent Cover	Non-Dominant Species
Pistia	Cell 1 Pistia Inflow 3	Winter	2/8/2002	100 % *Pistia*	*Lemna, Hydrocotyle*
Pistia	Cell 1 Pistia Inflow 4	Winter	2/8/2002	100 % *Pistia*	*Lemna, Hydrocotyle*
Pistia	Cell 1 Pistia Outflow 1	Winter	2/8/2002	100 % *Pistia*	na
Pistia	Cell 1 Pistia Outflow 2	Winter	2/8/2002	100 % *Pistia*	na
Pistia	Cell 1 Pistia Outflow 3	Winter	2/8/2002	100 % *Pistia*	na
Pistia	Cell 1 Pistia Outflow 4	Winter	2/8/2002	100 % *Pistia*	na
Pistia	Cell 2 Pistia Inflow 1	Winter	2/12/2002	100 % *Pistia*	*Lemna, Hydrocotyle*
Pistia	Cell 2 Pistia Inflow 2	Winter	2/12/2002	100 % *Pistia*	*Lemna, Hydrocotyle*
Pistia	Cell 2 Pistia Inflow 3	Winter	2/12/2002	100 % *Pistia*	*Lemna, Hydrocotyle*
Pistia	Cell 2 Pistia Inflow 4	Winter	2/12/2002	100 % *Pistia*	*Lemna, Hydrocotyle, Typha*
Pistia	Cell 2 Pistia Outflow 1	Winter	2/12/2002	100 % *Pistia*	*Lemna, Hydrocotyle, Typha*
Pistia	Cell 2 Pistia Outflow 2	Winter	2/12/2002	100 % *Pistia*	*Lemna, Hydrocotyle*
Pistia	Cell 2 Pistia Outflow 3	Winter	2/12/2002	100 % *Pistia*	*Lemna*, filamentous periphyton
Pistia	Cell 2 Pistia Outflow 4	Winter	2/12/2002	100 % *Pistia*	*Lemna*
Pistia	Cell 3 Pistia Inflow 1	Winter	2/14/2002	100 % *Pistia*	*Lemna*
Pistia	Cell 3 Pistia Inflow 2	Winter	2/14/2002	100 % *Pistia*	*Lemna*
Pistia	Cell 3 Pistia Inflow 3	Winter	2/14/2002	100 % *Pistia*	na
Pistia	Cell 3 Pistia Inflow 4	Winter	2/14/2002	100 % *Pistia*	na
Pistia	Cell 3 Pistia Outflow 1	Winter	2/14/2002	100 % *Pistia*	*Lemna*
Pistia	Cell 3 Pistia Outflow 2	Winter	2/14/2002	100 % Pistia	*Lemna, Typha*
Pistia	Cell 3 Pistia Outflow 3	Winter	2/14/2002	100 % Pistia	*Lemna*
Pistia	Cell 1 Pistia Inflow1	Summer	5/28/2002	100% *Pistia*	*Hydrocotyle, Eichhornia*
Pistia	Cell 1 Pistia Inflow2	Summer	5/28/2002	100% *Pistia*	*Hydrocotyle, Eichhornia*

Dominant Species	Sample ID	Season	Date Sampled	Percent Cover	Non-Dominant Species
Pistia	Cell 1 Pistia Inflow3	Summer	5/28/2002	100% *Pistia*	*Hydrocotyle, Eichhornia*
Pistia	Cell 1 Pistia Inflow4	Summer	5/28/2002	100% *Pistia*	*Hydrocotyle, Eichhornia*
Pistia	Cell 1 Pistia Outflow1	Summer	5/28/2002	100% *Pistia*	*Hydrocotyle*
Pistia	Cell 1 Pistia Outflow2	Summer	5/28/2002	100% *Pistia*	na
Pistia	Cell 1 Pistia Outflow3	Summer	5/28/2002	100% *Pistia*	*Hydrocotyle*
Pistia	Cell 1 Pistia Outflow4	Summer	5/28/2002	100% *Pistia*	na
Pistia	Cell 2 Pistia Inflow1	Summer	5/30/2002	100% *Pistia*	na
Pistia	Cell 2 Pistia Inflow2	Summer	5/30/2002	100% *Pistia*	na
Pistia	Cell 2 Pistia Inflow3	Summer	5/30/2002	100% *Pistia*	na
Pistia	Cell 2 Pistia Inflow4	Summer	5/30/2002	100% *Pistia*	na
Pistia	Cell 2 Pistia Outflow1	Summer	5/30/2002	100% *Pistia*	*Hydrocotyle*
Pistia	Cell 2 Pistia Outflow2	Summer	5/30/2002	100% *Pistia*	na
Pistia	Cell 2 Pistia Outflow3	Summer	5/30/2002	100% *Pistia*	na
Pistia	Cell 2 Pistia Outflow4	Summer	5/30/2002	100% *Pistia*	na
Pistia	Cell 3 Pistia Inflow1	Summer	6/4/2002	100% *Pistia*	na
Pistia	Cell 3 Pistia Inflow2	Summer	6/4/2002	100% *Pistia*	na
Pistia	Cell 3 Pistia Inflow3	Summer	6/4/2002	100% *Pistia*	na
Pistia	Cell 3 Pistia Inflow4	Summer	6/4/2002	100% *Pistia*	na
Pistia	Cell 3 Pistia Outflow1	Summer	6/4/2002	75%*Pistia* 25% *Pontederia/Typha*	*Pontederia, Typha*
Pistia	Cell 3 Pistia Outflow2	Summer	6/4/2002	75%*Pistia* 25% *Pontederia*	*Pontederia*
Pistia	Cell 3 Pistia Outflow3	Summer	6/4/2002	50%*Pistia* 25%*Typha/Pontederia* 25% *Eichhornia*	*Typha, Pontederia, Eichhornia*

Dominant Species	Sample ID	Season	Date Sampled	Percent Cover	Non-Dominant Species
Pistia	Cell 3 Pistia Outflow4	Summer	6/4/2002	75%*Pistia* 25% *Pontederia*	*Pontederia*
Pistia	Cell 3 Pistia Outflow 4	Summer	2/14/2002	100 % Pistia	*Lemna*
Eichhornia	Cell 1 Eich Inflow 1	Winter	2/8/2002	100 % *Eichhornia*	*Lemna, Salivina*
Eichhornia	Cell 1 Eich Inflow 2	Winter	2/8/2002	100 % *Eichhornia*	*Lemna, Salivina*
Eichhornia	Cell 1 Eich Inflow 3	Winter	2/8/2002	100 % *Eichhornia*	*Lemna, Salivina*
Eichhornia	Cell 1 Eich Inflow 4	Winter	2/8/2002	100 % *Eichhornia*	*Lemna, Salivina*
Eichhornia	Cell 1 Eich Outflow 1	Winter	2/8/2002	100 % *Eichhornia*	na
Eichhornia	Cell 1 Eich Outflow 2	Winter	2/8/2002	100 % *Eichhornia*	na
Eichhornia	Cell 1 Eich Outflow 3	Winter	2/8/2002	100 % *Eichhornia*	na
Eichhornia	Cell 1 Eich Outflow 4	Winter	2/8/2002	100 % *Eichhornia*	na
Eichhornia	Cell 2 Eich Inflow 1	Winter	2/12/2002	100 % *Eichhornia*	*Lemna, Hydrocotyle, Salvinia, Pistia*
Eichhornia	Cell 2 Eich Inflow 2	Winter	2/12/2002	100 % *Eichhornia*	*Lemna, Hydrocotyle, Salvinia, Pistia*
Eichhornia	Cell 2 Eich Inflow 3	Winter	2/12/2002	100 % *Eichhornia*	*Lemna, Hydrocotyle, Polygonum*
Eichhornia	Cell 2 Eich Inflow 4	Winter	2/12/2002	100 % *Eichhornia*	*Lemna, Hydrocotyle, Salvinia*
Eichhornia	Cell 2 Eich Outflow 1	Winter	2/12/2002	100 % *Eichhornia*	*Lemna, Ceratophyllum, Hydrilla*
Eichhornia	Cell 2 Eich Outflow 2	Winter	2/12/2002	100 % *Eichhornia*	*Lemna, Hydrilla*
Eichhornia	Cell 2 Eich Outflow 3	Winter	2/12/2002	100 % *Eichhornia*	*Lemna, Hydrilla, Pistia*
Eichhornia	Cell 2 Eich Outflow 4	Winter	2/12/2002	100 % *Eichhornia*	*Lemna, Hydrilla, Hydrocotyle*
Eichhornia	Cell 3 Eich Inflow 1	Winter	2/14/2002	100 % *Eichhornia*	*Lemna*
Eichhornia	Cell 3 Eich Inflow 2	Winter	2/14/2002	100 % *Eichhornia*	*Lemna*
Eichhornia	Cell 3 Eich Inflow 3	Winter	2/14/2002	100 % *Eichhornia*	*Lemna*
Eichhornia	Cell 3 Eich Inflow 4	Winter	2/14/2002	100 % *Eichhornia*	*Lemna, Typha*

Dominant Species	Sample ID	Season	Date Sampled	Percent Cover	Non-Dominant Species
Eichhornia	Cell 3 Eich Outflow 1	Winter	2/14/2002	100 % *Eichhornia*	*Lemna*
Eichhornia	Cell 3 Eich Outflow 2	Winter	2/14/2002	100 % Eichhornia	*Lemna*
Eichhornia	Cell 3 Eich Outflow 3	Winter	2/14/2002	100 % Eichhornia	*Lemna*
Eichhornia	Cell 3 Eich Outflow 4	Winter	2/14/2002	100 % Eichhornia	*Na*
Eichhornia	Cell 1 Eich Inflow 1	Summer	5/28/2002	100% *Eichhornia*	*Hydrocotyle*
Eichhornia	Cell 1 Eich Inflow2	Summer	5/28/2002	100% *Eichhornia*	*Hydrocotyle*
Eichhornia	Cell 1 Eich Inflow3	Summer	5/28/2002	100% *Eichhornia*	*Hydrocotyle*
Eichhornia	Cell 1 Eich Inflow4	Summer	5/28/2002	100% *Eichhornia*	*Hydrocotyle*
Eichhornia	Cell 1 Eich Outflow1	Summer	5/28/2002	100% *Eichhornia*	*Hydrocotyle, Ceratophyllum, Pistia*
Eichhornia	Cell 1 Eich Outflow2	Summer	5/28/2002	100% *Eichhornia*	*Hydrocotyle, Ceratophyllum*
Eichhornia	Cell 1 Eich Outflow3	Summer	5/28/2002	100% *Eichhornia*	*Hydrocotyle, Ceratophyllum, Pistia*
Eichhornia	Cell 1 Eich Outflow4	Summer	5/28/2002	100% *Eichhornia*	*Hydrocotyle, Ceratophyllum, Pistia*
Eichhornia	Cell 2 Eich Inflow1	Summer	5/30/2002	100% *Eichhornia*	na
Eichhornia	Cell 2 Eich Inflow2	Summer	5/30/2002	100% *Eichhornia*	*Hydrocotyle*
Eichhornia	Cell 2 Eich Inflow3	Summer	5/30/2002	100% *Eichhornia*	na
Eichhornia	Cell 2 Eich Inflow4	Summer	5/30/2002	100% *Eichhornia*	*Hydrocotyle*
Eichhornia	Cell 2 Eich Outflow1	Summer	5/30/2002	100% *Eichhornia*	na
Eichhornia	Cell 2 Eich Outflow2	Summer	5/30/2002	100% *Eichhornia*	na
Eichhornia	Cell 2 Eich Outflow3	Summer	5/30/2002	100% *Eichhornia*	na
Eichhornia	Cell 2 Eich Outflow4	Summer	5/30/2002	100% *Eichhornia*	na
Eichhornia	Cell 3 Eich Inflow1	Summer	6/4/2002	100% *Eichhornia*	*Typha, Hydrocotyle, Wolffia, Pistia*
Eichhornia	Cell 3 Eich Inflow2	Summer	6/4/2002	100% *Eichhornia*	*Pistia, Hydrocotyle, Ceratophyllum, Lemna*
Eichhornia	Cell 3 Eich Inflow3	Summer	6/4/2002	100% *Eichhornia*	*Typha, Hydrocotyle, Pistia, Lemna*

Dominant Species	Sample ID	Season	Date Sampled	Percent Cover	Non-Dominant Species
Eichhornia	Cell 3 Eich Inflow4	Summer	6/4/2002	100% *Eichhornia*	*Lemna, Alternanthera, Hydrocotyle*
Eichhornia	Cell 3 Eich Outflow1	Summer	6/4/2002	75%*Eichhornia* 25% *Typha*	*Typha*
Eichhornia	Cell 3 Eich Outflow2	Summer	6/4/2002	75%*Eichhornia* 25% *Typha*	*Typha*
Eichhornia	Cell 3 Eich Outflow3	Summer	6/4/2002	100% *Eichhornia*	*Typha*
Eichhornia	Cell 3 Eich Outflow4	Summer	6/4/02	100% *Eichhornia*	na
Typha	Cell 1 Typha Outflow 1	Winter	2/20/2002	100 % *Typha*	*Salvinia, Ludwigia*
Typha	Cell 1 Typha Outflow 2	Winter	2/20/2002	100 % *Typha*	*Asclepias*
Typha	Cell 1 Typha Outflow 3	Winter	2/20/2002	100 % *Typha*	*Asclepias, Salvinia*
Typha	Cell 1 Typha Outflow 4	Winter	2/20/2002	100 % *Typha*	*Asclepias*
Typha	Cell 1 Typha Inflow 1	Winter	2/20/2002	100 % *Typha*	*Hydrocotyle, Lemna, Pistia*
Typha	Cell 1 Typha Inflow 2	Winter	2/20/2002	100 % *Typha*	*Hydrocotyle, Lemna, Pistia, Salvinia*
Typha	Cell 1 Typha Inflow 3	Winter	2/20/2002	100 % *Typha*	*Hydrocotyle, Lemna, Pistia*
Typha	Cell 1 Typha Inflow 4	Winter	2/20/2002	100 % *Typha*	*Hydrocotyle, Lemna, Pistia*
Typha	Cell 3 Typha Outflow 1	Winter	2/20/2002	100 % *Typha*	na
Typha	Cell 3 Typha Outflow 2	Winter	2/20/2002	100 % *Typha*	na
Typha	Cell 3 Typha Outflow 3	Winter	2/20/2002	100 % *Typha*	na
Typha	Cell 3 Typha Outflow 4	Winter	2/20/2002	100 % *Typha*	Na
Typha	Cell 4 Typha Outflow 1	Winter	2/26/2002	75 % *Typha* 25 % *Eleocharis*	*Najas*
Typha	Cell 4 Typha Outflow 2	Winter	2/26/2002	100 % *Typha*	*Najas*
Typha	Cell 4 Typha Outflow 3	Winter	2/26/2002	100 % *Typha*	*Eleocharis*
Typha	Cell 4 Typha Outflow 4	Winter	2/26/2002	100 % *Typha*	na

Dominant Species	Sample ID	Season	Date Sampled	Percent Cover	Non-Dominant Species
Typha	Cell 2 Typha Inflow 1	Winter	2/26/2002	75% *Typha* 25% various floating species	*Lemna, Salvinia, Pistia*
Typha	Cell 2 Typha Inflow 2	Winter	2/26/2002	50% *Typha* 50% various floating	*Hydrocotyle, Lemna, Salvinia*
Typha	Cell 2 Typha Inflow 3	Winter	2/26/2002	75% *Typha* 25% various floating species	*Salvinia, Lemna, Hydrocotyle, Pistia*
Typha	Cell 2 Typha Inflow 4	Winter	2/26/2002	75% Typha 25% various floating species	*Lemna, Hydrocotyle*
Typha	Cell 2 Typha Outflow 1	Winter	2/26/2002	75% Typha 25% misc floating/emergents	*Bacopa, Hydrocotyle, Polygonum, Lemna, Pistia*
Typha	Cell 2 Typha Outflow 2	Winter	2/26/2002	75% *Typha* 25% *Hydrocotyle* 25% misc floating/emergents	*Bacopa, Hydrocotyle, Lemna, Eleocharis, Pistia*
Typha	Cell 2 Typha Outflow 3	Winter	2/26/2002	75% *Typha* 25% *Hydrocotyle* 25% misc floating/emergents	*Hydrocotyle, Polygonum, Pistia, Lemna, Eleocharis*
Typha	Cell 2 Typha Outflow 4	Winter	2/26/2002	75% *Typha* 25% misc floating/emergents	*Polygonum, Hydrocotyle, Lemna, Pistia*

Table A-4. Biomass and nutrient content for each SAV/floating macrophyte-dominated sample plot collected along the eastern flowpath of STA-1W during the winter season.

			Cell 1 Inflow				Cell 1 Outflow				Cell 3 Inflow				Cell 3 Outflow			
Parameter	**Unit**	**Sample Plot**	**Najas**	**Ceratophyllum**	**Pistia**	**Eichhornia**	**Najas**	**Ceratophyllum**	**Pistia**	**Eichhornia**	**Najas**	**Ceratophyllum**	**Pistia**	**Eichhornia**	**Najas**	**Ceratophyllum**	**Pistia**	**Eichhornia**
TP	%	1	0.279	0.369	0.261	0.252	0.417	0.310	0.291	0.154	0.440	0.338	0.408	0.148	0.124	0.245	0.313	0.073
TP	%	2	0.204	0.402	0.275	0.202	0.473	0.387	0.306	0.166	0.437	0.276	0.397	0.182	0.160	0.249	0.318	0.096
TP	%	3	0.313	0.359	0.240	0.206	0.393	0.355	0.288	0.170	0.473	0.287	0.377	0.145	0.163	0.271	0.295	0.115
TP	%	4	0.282	0.354	0.266	0.226	0.515	0.465	0.289	0.162	0.436	0.341	0.339	0.178	0.140	0.298	0.271	0.108
		Average	0.270	0.371	0.260	0.222	0.450	0.379	0.293	0.163	0.447	0.311	0.380	0.163	0.147	0.266	0.299	0.098
		St Dev	0.046	0.022	0.015	0.023	0.055	0.065	0.008	0.007	0.018	0.034	0.030	0.019	0.018	0.024	0.021	0.018
N	%	1	2.72	2.05	2.04	2.52	2.38	1.84	2.91	1.48	2.91	2.95	2.05	1.21	2.67	1.6	2.12	1.02
N	%	2	2.53	2.35	1.91	2.08	2.42	2.17	2.05	1.01	3.18	2.64	2.23	1.42	2.75	2.3	2.12	1.56
N	%	3	2.22	1.91	2.51	1.46	2.65	2.43	1.91	2.03	3.11	2.75	2.1	1.49	2.98	2.14	2.34	1.55
N	%	4	2.06	2.54	2.13	2.39	2.48	2.19	2.47	1.88	3.11	3.1	2.05	1.37	2.98	2.38	2.15	1.7
		Average	**2.38**	**2.21**	**2.15**	**2.11**	**2.48**	**2.16**	**2.34**	**1.60**	**3.08**	**2.86**	**2.11**	**1.37**	**2.85**	**2.11**	**2.18**	**1.46**
		St Dev	**0.30**	**0.29**	**0.26**	**0.47**	**0.12**	**0.24**	**0.45**	**0.46**	**0.12**	**0.21**	**0.09**	**0.12**	**0.16**	**0.35**	**0.11**	**0.30**
C	%	1	38.6	26.9	34	40.7	35.4	26.9	35.7	40.2	35.2	36	33.8	38.3	36.5	26.8	32	40.4
C	%	2	37.9	29.5	33.9	38.9	33.3	28.3	33	39.5	35.8	36.8	33.6	37.9	33.5	37.3	32.5	40.9
C	%	3	36.2	26.3	35.5	39.4	34.6	31.5	32.8	40.2	35	36.9	34	38.9	36.2	36.8	32.2	41.3
C	%	4	35.7	30.5	34.7	39.4	32.9	29.7	34.3	40.3	35.4	36.2	34.7	38.4	37.5	36.3	31.2	41.3
		Average	**37.1**	**28.3**	**34.5**	**39.6**	**34.1**	**29.1**	**34.0**	**40.1**	**35.4**	**36.5**	**34.0**	**38.4**	**35.9**	**34.3**	**32.0**	**41.0**
		St Dev	**1.4**	**2.0**	**0.7**	**0.8**	**1.2**	**2.0**	**1.3**	**0.4**	**0.3**	**0.4**	**0.5**	**0.4**	**1.7**	**5.0**	**0.6**	**0.4**
Ash	%	1	23.2	44.9	21	14.8	25.8	41.1	20.4	10.2	23.3	21.3	21.7	12.5	22.5	16.4	25.2	9.1
Ash	%	2	25.5	40.3	20.5	13.6	29.1	51.5	25.7	11.2	21.1	17.3	21.2	13.5	29.9	16.6	24	7.9
Ash	%	3	25	49.5	19.6	12.3	26.6	36.2	23	10.9	23.6	17.2	20.3	11.3	22.8	16.7	25	8.6
Ash	%	4	24.6	40.4	19.8	13.9	30.7	35.7	20.8	11.3	23.5	20	20.4	13.5	19	17.1	30.6	8.8
		Average	**24.6**	**43.8**	**20.2**	**13.7**	**28.1**	**41.1**	**22.5**	**10.9**	**22.9**	**19.0**	**20.9**	**12.7**	**23.6**	**16.7**	**26.2**	**8.6**
		St Dev	**1.0**	**4.4**	**0.6**	**1.0**	**2.3**	**7.3**	**2.4**	**0.5**	**1.2**	**2.0**	**0.7**	**1.0**	**4.6**	**0.3**	**3.0**	**0.5**
Wet Weight	g/m^2	1	3200	4450	4300	12000	2635	4368	7400	31300	680	1447	15600	14000	907	4114	9700	22300
Wet Weight	g/m^2	2	3500	2268	5500	17800	2468	5389	7100	26300	481	1361	10100	21300	1388	5103	6800	27100
Wet Weight	g/m^2	3	2700	3602	5200	21400	2554	3148	9100	27600	1107	966	11400	20000	907	4595	11500	27100
Wet Weight	g/m^2	4	3450	4282	7900	19900	2327	2214	6300	21000	1619	1220	14000	23600	739	4677	9400	34200
		Average	**3213**	**3650**	**5725**	**17775**	**2496**	**3780**	**7475**	**26550**	**972**	**1249**	**12775**	**19725**	**985**	**4622**	**9350**	**27675**
		St Dev	**366**	**992**	**1537**	**4123**	**132**	**1389**	**1179**	**4263**	**504**	**210**	**2485**	**4097**	**280**	**405**	**1936**	**4903**
Dry Weight	g/m^2	1	275.8	393.1	174.7	777.1	143.0	476.1	293.3	2328.2	25.7	93.6	544.5	1066.0	52.5	332.7	219.0	1501.2
Dry Weight	g/m^2	2	352.4	177.7	258.7	1151.3	130.5	457.1	439.8	2028.6	16.2	84.1	337.5	1341.1	82.0	422.2	161.9	1324.4
Dry Weight	g/m^2	3	210.0	324.3	266.1	1468.1	134.9	289.3	533.9	1985.0	40.1	56.9	379.4	1367.7	39.5	358.7	330.1	1688.3
Dry Weight	g/m^2	4	250.5	374.8	378.1	1312.9	101.8	195.1	256.8	1287.0	61.7	72.2	560.5	1623.4	39.1	351.1	417.8	1887.8
		Average	**272.2**	**317.5**	**269.4**	**1177.3**	**127.6**	**354.4**	**380.9**	**1907.2**	**35.9**	**76.7**	**455.5**	**1349.6**	**53.3**	**366.2**	**282.2**	**1600.4**
		St Dev	**60.0**	**97.6**	**83.5**	**296.5**	**17.9**	**135.4**	**129.0**	**440.7**	**19.8**	**15.8**	**113.5**	**227.9**	**20.1**	**38.9**	**114.2**	**242.5**

Table A-8. Biomass and nutrient content for each SAV/floating macrophyte-dominated sample plot collected along the eastern flowpath of STA-1W during the summer season.

			Cell 1 Inflow				Cell 1 Outflow				Cell 3 Inflow				Cell 3 Outflow			
Parameter	**Unit**	**Sample Plot**	***Najas***	***Ceratophyllum***	***Pistia***	***Eichhornia***	***Najas***	***Ceratophyllum***	***Pistia***	***Eichhornia***	***Najas***	***Ceratophyllum***	***Pistia***	***Eichhornia***	***Najas***	***Ceratophyllum***	***Pistia***	***Eichhornia***
TP	%		0.228	0.182	0.157	0.111	0.154	0.186	0.179	0.110	0.184	0.226	0.145	0.133	0.104	0.101	0.178	0.082
TP	%		0.219	0.184	0.180	0.105	0.142	0.191	0.177	0.129	0.240	0.170	0.185	0.118	0.111	0.092	0.111	0.092
TP	%		0.221	0.227	0.177	0.113	0.173	0.153	0.189	0.109	0.200	0.213	0.162	0.131	0.125	0.126	0.172	0.078
TP	%		0.255	0.226	0.182	0.108	0.183	0.153	0.200	0.125	0.248	0.175	0.142	0.132	0.133	0.101	0.162	0.090
		Average	**0.231**	**0.205**	**0.174**	**0.109**	**0.163**	**0.171**	**0.186**	**0.118**	**0.218**	**0.196**	**0.159**	**0.129**	**0.118**	**0.105**	**0.156**	**0.085**
		St Dev	**0.017**	**0.025**	**0.012**	**0.004**	**0.018**	**0.021**	**0.011**	**0.010**	**0.031**	**0.028**	**0.020**	**0.007**	**0.013**	**0.015**	**0.031**	**0.007**
N	%	1	1.94	1.44	1.62	0.84	1.73	1.83	1.49	0.875	2.1	1.99	1.26	1.49	1.76	1.28	2.14	1.4
TN	%	2	1.93	1.64	1.48	0.836	1.67	1.78	1.47	1.07	2.17	1.89	1.7	1.6	1.81	1.64	1.36	1.45
TN	%	3	1.92	1.66	1.41	1.05	2.06	1.88	1.33	0.94	2	1.95	1.5	1.26	1.87	1.39	2.01	0.953
TN	%	4	1.97	1.59	1.6	0.971	2.02	2.04	1.47	0.919	2.17	1.64	1.29	1.44	2.15	1.27	1.92	1.54
		Average	**1.94**	**1.58**	**1.53**	**0.92**	**1.87**	**1.88**	**1.44**	**0.95**	**2.11**	**1.87**	**1.44**	**1.45**	**1.90**	**1.40**	**1.86**	**1.34**
		St Dev	**0.02**	**0.10**	**0.10**	**0.10**	**0.20**	**0.11**	**0.07**	**0.08**	**0.08**	**0.16**	**0.21**	**0.14**	**0.17**	**0.17**	**0.34**	**0.26**
C	%	1	26.7	20.8	35.6	37.9	27.2	26.6	34.5	39.5	32	27.7	35.3	38.4	31.2	22.8	36.8	40.9
C	%	2	27.5	22.3	33.3	37.6	29.1	25.8	34.5	37.8	32.9	28.9	35.9	37.9	31.5	30.4	35.6	40.6
C	%	3	26	22.2	35	38.5	27.6	27.3	35.8	39.3	31	29.1	34	38.2	35.7	25.7	37	30
C	%	4	27.5	22.1	34.1	38.5	29.3	30.2	35.2	38.7	31.8	26.2	35.6	38.5	32.9	23.4	35.8	40.9
		Average	**26.9**	**21.9**	**34.5**	**38.1**	**28.3**	**27.5**	**35.0**	**38.8**	**31.9**	**28.0**	**35.2**	**38.3**	**32.8**	**25.6**	**36.3**	**38.1**
		St Dev	**0.7**	**0.7**	**1.0**	**0.5**	**1.1**	**1.9**	**0.6**	**0.8**	**0.8**	**1.3**	**0.8**	**0.3**	**2.1**	**3.5**	**0.7**	**5.4**
Ash	%	1	49.5	56.8	17.2	38	47.8	45.4	16.6	10.1	31.9	42.8	17.1	12.2	28.8	61.3	16.6	10.1
Ash	%	2	45.3	54.9	19.1	29.5	41.4	43	16.7	11.6	29.8	40.8	16.1	12.8	33.1	41.6	15.7	10.5
Ash	%	3	47.7	58	17.2	17.4	42.6	44.9	15.8	10.4	35	32.5	17.3	14.6	22.3	51.1	15.1	10.7
Ash	%	4	45.9	59.2	18.8	11.6	40.7	39.6	16.6	12.3	31.4	43.3	16.3	14.7	25.7	59.4	16.2	10.1
		Average	**47.1**	**57.2**	**18.1**	**24.1**	**43.1**	**43.2**	**16.4**	**11.1**	**32.0**	**39.9**	**16.7**	**13.6**	**27.5**	**53.4**	**15.9**	**10.4**
		St Dev	**1.9**	**1.8**	**1.0**	**11.9**	**3.2**	**2.6**	**0.4**	**1.0**	**2.2**	**5.0**	**0.6**	**1.3**	**4.6**	**9.0**	**0.6**	**0.3**
Wet Weight	g/m^2	1	6700	7200	12400	36850	7450	12100	15100	38450	2550	6500	17100	19850	1800	5750	6550	21800
Wet Weight	g/m^2	2	5600	7650	12600	35700	9000	9750	16100	34850	3200	5650	21100	12050	1500	5550	8700	27300
Wet Weight	g/m^2	3	6150	8700	11750	32000	7950	6450	13450	25900	3250	3450	20350	13850	2100	4100	8900	22450
Wet Weight	g/m^2	4	6000	8250	9900	32350	6200	12800	15750	29000	2800	4800	20350	19750	850	5650	9200	25400
		Average	**6113**	**7950**	**11663**	**34225**	**7650**	**10275**	**15100**	**32050**	**2950**	**5100**	**19725**	**16375**	**1563**	**5263**	**8338**	**24238**
		St Dev	**455**	**660**	**1230**	**2417**	**1163**	**2864**	**1175**	**5655**	**334**	**1301**	**1785**	**4023**	**534**	**779**	**1209**	**2573**
Dry Weight	g/m^2	1	660	784	710	3308	862	1313	970	3496	173	404	1137	1360	136	514	413	1434
Dry Weight	g/m^2	2	501	737	727	2900	1009	1055	1082	2493	203	407	1222	844	112	492	670	1783
Dry Weight	g/m^2	3	610	1093	797	2404	696	738	902	2013	212	224	1278	973	152	379	640	1994
Dry Weight	g/m^2	4	528	1030	637	2616	682	1576	990	2094	171	379	1401	1497	57	523	608	1800
		Average	**575**	**911**	**718**	**2807**	**812**	**1171**	**986**	**2524**	**190**	**354**	**1259**	**1168**	**114**	**477**	**583**	**1753**
		St Dev	**73**	**177**	**66**	**391**	**155**	**358**	**74**	**681**	**21**	**87**	**111**	**310**	**42**	**66**	**116**	**233**

Table A-5. Biomass and nutrient content for each SAV/floating macrophyte-dominated sample plot collected along the western flowpath of STA-1W during the winter season.

Parameter	Unit	Sample Plot	Cell 2 Inflow Najas	Cell 2 Inflow Ceratophyllum	Cell 2 Inflow Pistia	Cell 2 Inflow Eichhornia	Cell 2 Outflow Ceratophyllum	Cell 2 Outflow Pistia	Cell 2 Outflow Eichhornia	Cell 4 Outflow Najas
TP	%	1	0.291	0.510	0.226	0.143	0.256	0.414	0.163	0.168
TP	%	2	0.197	0.461	0.238	0.157	0.291	0.377	0.173	0.198
TP	%	3	0.289	0.500	0.219	0.168	0.285	0.388	0.180	0.168
TP	%	4	0.307	0.468	0.238	0.154	0.244	0.370	0.179	0.165
		Average	**0.271**	**0.485**	**0.230**	**0.155**	**0.269**	**0.387**	**0.174**	**0.175**
		St Dev	**0.050**	**0.024**	**0.010**	**0.010**	**0.02261**	**0.019**	**0.008**	**0.016**
N	%	1	2.64	2.85	1.45	1.55	2.11	2.65	1.2	2.16
N	%	2	2.26	2.69	1.65	1.53	2.45	2.35	1.17	2.67
N	%	3	2.22	2.72	1.48	1.62	2.47	2.41	1.15	1.79
N	%	4	2.27	2.53	1.55	1.61	2.28	2.75	1.09	1.6
		Average	**2.35**	**2.70**	**1.53**	**1.58**	**2.33**	**2.54**	**1.15**	**2.06**
		St Dev	**0.20**	**0.13**	**0.09**	**0.04**	**0.17**	**0.19**	**0.05**	**0.47**
C	%	1	35.4	36.4	33.7	37.3	32.9	34.7	39.4	25.7
C	%	2	33.2	36	34.1	37.7	34.1	35.1	38.5	27.5
C	%	3	34.6	35.6	35.5	37.7	33	34.9	37.6	27.4
C	%	4	32	36.5	34.4	37.6	33.8	35.8	38.4	26.1
		Average	**33.8**	**36.1**	**34.4**	**37.6**	**33.5**	**35.1**	**38.5**	**26.7**
		St Dev	**1.5**	**0.4**	**0.8**	**0.2**	**0.6**	**0.5**	**0.7**	**0.9**
Ash	%	1	20.7	16.2	18.2	14.9	26.8	19.2	11.7	54
Ash	%	2	28	16.6	19.2	14.7	26.3	18.9	12.4	49.3
Ash	%	3	22.6	19.6	16.2	14.8	29.9	19.8	14.2	49.4
Ash	%	4	32.3	17.9	18.2	14.5	25.8	18.5	13.4	54.9
		Average	**25.9**	**17.6**	**18.0**	**14.7**	**27.2**	**19.1**	**12.9**	**51.9**
		St Dev	**5.3**	**1.5**	**1.3**	**0.2**	**1.8**	**0.5**	**1.1**	**3.0**
Wet Weight	g/m^2	1	708	712	9500	16300	1633	5100	20000	5750
Wet Weight	g/m^2	2	2182	1447	10500	18500	4336	4000	24250	5850
Wet Weight	g/m^2	3	2354	1393	10550	20500	5702	3300	24700	5900
Wet Weight	g/m^2	4	2722	1619	8050	22500	3969	5000	15300	6050
		Average	**1991**	**1293**	**9650**	**19450**	**3910**	**4350**	**21063**	**5888**
		St Dev	**885**	**399**	**1171**	**2660**	**1691**	**858**	**4387**	**125**
Dry Weight	g/m^2	1	59.0	50.1	474.2	1077.0	164.7	37.0	1269.0	590.5
Dry Weight	g/m^2	2	142.4	106.1	531.0	1228.4	325.4	59.2	1893.3	503.6
Dry Weight	g/m^2	3	155.1	80.3	386.5	1405.7	452.9	76.7	1504.5	604.2
Dry Weight	g/m^2	4	182.1	103.3	349.2	1546.9	353.9	81.9	1051.7	843.8
		Average	**134.6**	**85.0**	**435.2**	**1314.5**	**324.2**	**63.7**	**1429.6**	**635.5**
		St Dev	**53.1**	**25.9**	**82.6**	**205.1**	**119.6**	**20.3**	**360.2**	**145.8**

Table A-9. Biomass and nutrient content for each SAV/floating macrophyte-dominated sample plot collected along the western flowpath of STA-1W during the summer season.

			Cell 2 Inflow				Cell 2 Outflow			Cell 4 Outflow
Parameter	**Unit**	**Sample Plot**	***Najas***	***Ceratophyllum***	***Pistia***	***Eichhornia***	***Ceratophyllum***	***Pistia***	***Eichhornia***	***Najas***
TP	%		0.121	0.194	0.123	0.130	0.138	0.202	0.130	0.118
TP	%		0.138	0.156	0.130	0.138	0.125	0.188	0.119	0.100
TP	%		0.213	0.175	0.148	0.138	0.136	0.201	0.139	0.138
TP	%		0.173	0.211	0.125	0.138	0.162	0.223	0.144	0.115
		Average	**0.161**	**0.184**	**0.132**	**0.136**	**0.140**	**0.204**	**0.133**	**0.118**
		St Dev	**0.041**	**0.024**	**0.011**	**0.004**	**0.016**	**0.014**	**0.011**	**0.016**
N	%	1	1.84	2.5	1.48	1.15	1.7	1.83	1.05	2.3
N	%	2	2.05	2.28	1.56	1.08	2.02	1.9	1.09	1.98
N	%	3	2.59	2.25	1.53	1.13	1.77	1.99	1.04	2.43
N	%	4	2.49	2.05	1.53	1.11	2.02	1.98	1.07	2.12
		Average	**2.24**	**2.27**	**1.53**	**1.12**	**1.88**	**1.93**	**1.06**	**2.21**
		St Dev	**0.36**	**0.18**	**0.03**	**0.03**	**0.17**	**0.08**	**0.02**	**0.20**
C	%	1	28.6	31.8	32.3	38.2	29.9	35.4	38.6	32.2
C	%	2	31.6	31.6	32.2	37.8	32.3	35.3	39.3	30.9
C	%	3	37.9	30.2	30.9	38.5	28.9	34.2	39.1	32.4
C	%	4	37.7	25.8	31.8	38.3	31.7	36	38.2	31.7
		Average	**34.0**	**29.9**	**31.8**	**38.2**	**30.7**	**35.2**	**38.8**	**31.8**
		St Dev	**4.6**	**2.8**	**0.6**	**0.3**	**1.6**	**0.8**	**0.5**	**0.7**
Ash	%	1	46.5	34.5	20.4	13.6	33.5	19	12.3	31.6
Ash	%	2	41.6	33.4	24.1	12.2	32	18.5	11.1	31.3
Ash	%	3	20.5	41.3	24.2	12.4	42.3	20.6	11.9	28.9
Ash	%	4	19.8	43.5	24.4	11.8	32.5	18.8	12.3	30.6
		Average	**32.1**	**38.2**	**23.3**	**12.5**	**35.1**	**19.2**	**11.9**	**30.6**
		St Dev	**13.9**	**5.0**	**1.9**	**0.8**	**4.9**	**0.9**	**0.6**	**1.2**
Wet Weight	g/m^2	1	1100	3600	8750	28350	1200	7550	31250	4250
Wet Weight	g/m^2	2	398	4250	13850	30300	4000	7050	28050	3300
Wet Weight	g/m^2	3	317	4800	10000	34750	5350	10050	24200	2750
Wet Weight	g/m^2	4	192.5	5000	11950	32250	2750	9950	39200	3450
		Average	**502**	**4413**	**11138**	**31413**	**3325**	**8650**	**30675**	**3438**
		St Dev	**408**	**628**	**2237**	**2736**	**1770**	**1573**	**6372**	**620**
Dry Weight	g/m^2	1	104	262	625	2581	117	414	2566	335
Dry Weight	g/m^2	2	46	352	892	2570	326	446	2235	257
Dry Weight	g/m^2	3	23	355	586	3653	454	570	2109	207
Dry Weight	g/m^2	4	13	317	786	2868	221	623	3615	281
		Average	**46.4**	**321**	**722**	**2918**	**280**	**514**	**2631**	**270**
		St Dev	**41**	**44**	**142**	**509**	**144**	**99**	**684**	**53**

Table A-6. Biomass and nutrient content for each *Typha*-dominated sample plot collected along the eastern flowpath of STA-1W during the winter season (n.a. = not analyzed).

			Cell 1 Inflow			Cell 1 Outflow			Cell 3 Outflow		
Parameter	**Unit**	**Sample Plot**	**Above Dead**	**Above Live**	**Below**	**Above Dead**	**Above Live**	**Below**	**Above Dead**	**Above Live**	**Below**
TP	%		n.a.	0.1020	0.0994	n.a.	0.1070	0.0572	n.a.	0.1140	0.1340
TP	%		n.a.	0.1030	0.1460	n.a.	0.0974	0.0721	n.a.	0.1170	0.0524
TP	%		n.a.	0.1130	0.0986	n.a.	0.0966	0.0424	n.a.	0.1600	0.0861
TP	%		n.a.	0.1710	0.1540	n.a.	0.0886	0.0486	n.a.	0.1280	0.1170
		Average		**0.1223**	**0.1245**		**0.0974**	**0.0551**		**0.1298**	**0.0974**
		St Dev		**0.0329**	**0.0296**		**0.0075**	**0.0129**		**0.0210**	**0.0359**
N	%	1	n.a.	1.05	1.15	n.a.	1.07	1.14	n.a.	1.36	0.809
N	%	2	n.a.	0.997	1.28	n.a.	0.881	1.24	n.a.	1.21	0.648
N	%	3	n.a.	0.894	1.04	n.a.	1.03	0.811	n.a.	1.34	0.795
N	%	4	n.a.	2.78	0.94	n.a.	1.11	0.902	n.a.	1.53	0.887
		Average		**1.430**	**1.103**		**1.023**	**1.023**		**1.360**	**0.785**
		St Dev		**0.902**	**0.146**		**0.100**	**0.200**		**0.131**	**0.100**
C	%	1	n.a.	43.3	44.3	n.a.	44.1	46.1	n.a.	45.2	43.2
C	%	2	n.a.	44.7	44.6	n.a.	43.1	46.2	n.a.	45	44
C	%	3	n.a.	43.9	44.4	n.a.	44.3	45.3	n.a.	43.9	43.4
C	%	4	n.a.	44.5	44.8	n.a.	44.6	44.7	n.a.	43.4	43
		Average		**44.1**	**44.5**		**44.0**	**45.6**		**44.4**	**43.4**
		St Dev		**0.6**	**0.2**		**0.6**	**0.7**		**0.9**	**0.4**
Ash	%	1	n.a.	6.9	8.2	n.a.	7.4	5.4	n.a.	8.6	8.2
Ash	%	2	n.a.	7.2	6.1	n.a.	9.5	6.4	n.a.	9.3	5.6
Ash	%	3	n.a.	8	7.1	n.a.	8.1	4.4	n.a.	10.2	6.1
Ash	%	4	n.a.	9.8	7	n.a.	8.4	4.9	n.a.	9.2	5.7
		Average		**8.0**	**7.1**		**8.4**	**5.3**		**9.3**	**6.4**
		St Dev		**1.3**	**0.9**		**0.9**	**0.9**		**0.7**	**1.2**
Wet Weight	g/m²	1	9755	9217	8706	7631	3178	8773	6278	4661	4860
Wet Weight	g/m²	2	7382	2156	10518	8214	5135	8045	10584	3948	8030
Wet Weight	g/m²	3	14094	9859	14005	7422	4899	10128	11192	6832	7091
Wet Weight	g/m²	4	12210	11060	17861	5924	3661	6996	9115	4880	8451
		Average	**10860**	**8073**	**12773**	**7298**	**4218**	**8486**	**9292**	**5080**	**7108**
		St Dev	**2921**	**4018**	**4043**	**975**	**948**	**1316**	**2190**	**1234**	**1603**
Dry Weight	g/m²	1	957	987	627	1014	473	814	1000	550	481
Dry Weight	g/m²	2	981	223	1088	1284	632	745	1954	516	1013
Dry Weight	g/m²	3	1649	1170	1416	993	615	986	1904	793	854
Dry Weight	g/m²	4	1797	1829	1912	641	482	671	1319	576	1121
		Average	**1346.0**	**1052.3**	**1260.8**	**983.0**	**550.5**	**804.0**	**1544.3**	**608.8**	**867.3**
		St Dev	**439.6**	**660.6**	**541.5**	**263.7**	**84.7**	**134.7**	**463.4**	**125.3**	**279.9**

Table A-7. Biomass and nutrient content for each *Typha*-dominated sample plot collected along the western flowpath of STA-1W. (n.a. = not analyzed)

			Cell 2 Inflow			Cell 2 Outflow			Cell 4 Outflow		
Parameter	**Unit**	**Sample Plot**	**Above Dead**	**Above Live**	**Below**	**Above Dead**	**Above Live**	**Below**	**Above Dead**	**Above Live**	**Below**
TP	%		n.a.	0.1300	0.1540	n.a.	0.1170	0.1550	n.a.	0.1330	0.0928
TP	%		n.a.	0.1500	0.2370	n.a.	0.1200	0.1820	n.a.	0.0950	0.0688
TP	%		n.a.	0.1230	0.1900	n.a.	0.1640	0.1630	n.a.	0.0935	0.0644
TP	%		n.a.	0.1420	0.2210	n.a.	0.1310	0.1350	n.a.	0.1070	0.0560
		Average		**0.1363**	**0.2005**		**0.1330**	**0.1588**		**0.1071**	**0.0705**
		St Dev		**0.0121**	**0.0366**		**0.0215**	**0.0195**		**0.0183**	**0.0158**
N	%	1	n.a.	1.43	0.86	n.a.	0.912	0.948	n.a.	1.07	1.25
N	%	2	n.a.	1.34	1.37	n.a.	0.863	0.779	n.a.	0.889	0.781
N	%	3	n.a.	1.38	1.22	n.a.	1.18	0.967	n.a.	1.4	1.15
N	%	4	n.a.	1.18	1.23	n.a.	1.07	1.16	n.a.	0.77	0.806
		Average		**1.333**	**1.170**		**1.006**	**0.964**		**1.032**	**0.997**
		St Dev		**0.108**	**0.218**		**0.146**	**0.156**		**0.274**	**0.238**
C	%	1	n.a.	45.4	43.6	n.a.	45	44.4	n.a.	45	44.6
C	%	2	n.a.	44.1	42.6	n.a.	44.3	44.1	n.a.	43.8	44.8
C	%	3	n.a.	44.5	43.7	n.a.	43.6	44.3	n.a.	44.8	45.8
C	%	4	n.a.	45.2	43.8	n.a.	45.5	45.5	n.a.	44.9	44.2
		Average		**44.8**	**43.4**		**44.6**	**44.6**		**44.6**	**44.9**
		St Dev		**0.6**	**0.6**		**0.8**	**0.6**		**0.6**	**0.7**
Ash	%	1	n.a.	7.7	9	n.a.	7.4	6.7	n.a.	7.7	6.5
Ash	%	2	n.a.	10.1	10.7	n.a.	6.7	7.5	n.a.	9.1	7.9
Ash	%	3	n.a.	8	8.7	n.a.	8.6	7.6	n.a.	7.3	5.9
Ash	%	4	n.a.	7.5	8.8	n.a.	8.1	6.3	n.a.	7.1	7.3
		Average		**8.3**	**9.3**		**7.7**	**7.0**		**7.8**	**6.9**
		St Dev		**1.2**	**0.9**		**0.8**	**0.6**		**0.9**	**0.9**
Wet Weight	g/m^2	1	11362	7791	17172	4212	5640	4815	9046	8094	7797
Wet Weight	g/m^2	2	12342	5216	10065	4073	4881	4752	10159	6672	6673
Wet Weight	g/m^2	3	13380	5347	6254	9165	3218	3864	7093	5354	9737
Wet Weight	g/m^2	4	9263	4965	5522	11588	6628	9551	2452	5938	5213
		Average	**11587**	**5830**	**9753**	**7260**	**5092**	**5746**	**7188**	**6515**	**7355**
		St Dev	**1755**	**1317**	**5332**	**3733**	**1439**	**2574**	**3402**	**1183**	**1908**
Dry Weight	g/m^2	1	1386	1002	1351	630	769	463	1011	1124	689
Dry Weight	g/m^2	2	1319	573	1026	554	676	495	1086	779	770
Dry Weight	g/m^2	3	1193	657	446	995	357	296	790	666	1022
Dry Weight	g/m^2	4	1179	638	525	1066	926	925	443.16	828	465
		Average	**1269.3**	**717.5**	**837.0**	**811.3**	**682.0**	**544.8**	**832.5**	**849.3**	**736.5**
		St Dev	**100.1**	**193.0**	**428.2**	**256.7**	**240.0**	**268.1**	**288.4**	**195.3**	**229.9**