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Development and Monitoring of Revegetation Methods: Connecting Students with Restoration Activities at Awcomin Marsh

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DEVELOPMENT AND MONITORING OF REVEGETATION METHODS: CONNECTING STUDENTS WITH RESTORATION ACTIVITIES AT AWCOMIN MARSH

A Final Report to

The New Hampshire Estuaries Project

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NewHampshire EstuariesProject

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Executive Summary

Five classes in a local elementary school participated in an effort to grow and plant high marsh and upper border vegetation at a salt marsh restoration site in spring 2005. Seeds of six marsh upper edge species were successfully germinated and grown into seedlings by third graders. The seedlings were planted by the students in late spring 2005, but only switchgrass and quackgrass plants appeared to have established and survived after one year. Mature shoots of three high marsh species planted by the third graders (salt hay, salt grass and black grass) established successfully and continue to proliferate.

In addition, we assessed an experiment of cordgrass plantings performed by community volunteers in 2002. The experiment was designed to test the effectiveness of three planting techniques at a salt marsh restored by the excavation of old dredge spoil that had been colonized by common reed. After four growing seasons, Plug, Bare Root Shoot, and Seed Head planting techniques exhibited greater cover of cordgrass and total cover of vascular plants when compared with unplanted areas. Cover of perennial plants (e.g., cordgrass), which contributes directly to belowground soil development in salt marshes, dominated the planted plots. Cover of annual species dominated the unplanted plots. Planting cordgrass in areas where dredge spoils and common reed had been excavated from a historic marsh accelerated the development of native vegetation compared with unplanted areas.

Performance and evaluation of the two sets of plantings has provided information about appropriate planting techniques for our region and has involved and educated the local community about the values of salt marsh to promote stewardship. Recommendations included the use of bare root shoot and seed head planting techniques where cordgrass is desired. Outside plots or a greenhouse may be needed for successful propagation of upper edge marsh species from seed, and a planting program that includes mature plants as well as seedlings is recommended to ensure success.

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Introduction

Salt marshes are recognized to provide valuable functions and services to coastal ecosystems, including human interests. Along the Gulf of Maine, many salt marshes have been destroyed or degraded and resource managers have been working with local contractors and scientists to restore them. Awcomin Marsh, located in Rye, New Hampshire, is the site of a restoration project where salt marsh had been filled with spoil from two dredging operations in Rye Harbor. Spoil used to fill the marsh converted some sections to upland, disrupted the hydrology and allowed an invasive exotic variety of common reed (*Phragmites australis*; Saltonstall 2002) to dominate filled marsh areas.

Previous restoration efforts to halt and reduce *Phragmites* focused on restoring tidal and freshwater hydrology (Burdick and Dionne 1994), but also included two test plots where spoil was removed (Figure 1). Hydrologic restoration halted the spread of *Phragmites*, but only the two removal plots led to replacement of *Phragmites* by native marsh vegetation (Burdick et al. 1999), predominantly smooth cordgrass (*Spartina alterniflora;* hereafter cordgrass). A further restoration effort was recently completed. The approach was to remove the dredge spoil from most of the buried marsh to a specific elevation appropriate for smooth cordgrass (4.2 NGVD 1929) as indicated by the Natural Resource Conservation Service (Epping, NH). The excavation, begun in 2001 and completed in 2004, resulted in large areas without vegetation (26 acres) that would require about eight years to revegetate if left to natural processes, based upon the earlier test plots.

In 2002, a planting project was undertaken on the exposed sediments to stimulate rapid revegetation to a typical marsh plant community (Bozek and Burdick 2003). Two acres of *Spartina alterniflora* (cordgrass) were planted using various techniques by over 100 volunteers from the community and the region (Figure 1). Most of the restoration site remains unplanted and plants are colonizing the site naturally. Twenty plots were set up to test three planting techniques against a set of control plots. Peat Plugs of cordgrass and bare root shoots (BRS) were planted on 0.5 m centers and cordgrass seed heads were stapled to the marsh surface on 0.5 by 1.0 m centers. After two years, monitoring data indicated that planting BRS or Plugs work equally well and resulted in greater cover by perennial plants on the marsh compared to planting seed heads or no planting (Bozek and Burdick 2003). However, Seed Head (SH) planting did result in successful establishment of smooth cordgrass, and further monitoring was needed to see if this inexpensive method could catch up to the successful Plug and BRS plantings.

The upper edge of the marsh that remains unvegetated is particularly susceptible to re-invasion by *Phragmites* (Burdick and Konisky 2003). The immediate goal for the project was to stimulate rapid revegetation to a typical marsh plant community on the exposed sediments. Since only low marsh plantings were performed at this site, we investigated inexpensive techniques to revegetate the high marsh and upper border of the marsh. We also gained information about appropriate planting techniques for our region. Due to the variation in success rate with technique, planting density, exposure and climate (Broome et al. 1986, Burdick and Short 1998, Niedowski 2000), successful methods need to be determined by region (e.g., Gulf of Maine). The geographic scope of the project is limited to Awcomin Marsh, but the result will yield important information for many local and regional sites where excavation has been used to restore a marsh and potential for *Phragmites* invasion is a concern. Such sites include those like Awcomin Marsh, Meadow Pond in Hampton, and Sherman Lake in Maine.

Furthermore, we recognize that successful restoration of coastal habitats also needs to involve and educate the local community about the values and functions of salt marshes. We developed a citizen-planting program in 2002 and tested various revegetation methods in areas where vegetation and dredge spoil had been removed. For lower marsh elevations where cordgrass is typically planted, both traditional replanting of live cordgrass and a less costly, but unproven technique (Seed Head planting) were used. In 2005, we teamed up with an elementary school and worked with them to germinate and grow seedlings of upper marsh plants. At a second site around an island, (Figure 1), two types of vegetation were planted by elementary school students. Typical high marsh plants, including salt hay (*Spartina patens*), salt grass (*Distichylis spicata*) and black grass (*Juncus gerardii*) were planted as plugs at mid elevations. At the highest marsh elevations adjacent to the upland, seedlings of six marsh border species were planted.

Project Goals and Objectives

The project had two primary goals. The first goal was to involve school groups in conducting a trial planting of high marsh and upper border vegetation in spring 2005. The second goal was to assess the plantings performed by community volunteers in 2002. Performance and evaluation of the two sets of plantings has provided information about appropriate planting techniques for our region and has involved and educated the local community about the values of salt marsh to promote stewardship.

Methods

Seed heads of nine species of native high marsh plants were collected in fall of 2004 from Awcomin Marsh, Odiorne Point and Meadow Pond (Table 1). They were dried then stored in plastic containers for the winter within an unheated shed in Portsmouth, NH.

Of three schools contacted, only Little Harbour School in Portsmouth indicated they would like to participate in growing and planting wetland plants for Awcomin Marsh. Over the course of several meetings at Little Harbour School in April, four third grade classes and one first grade class elected to participate in the project. Growing materials and conditions were provided to the teachers in early May along with background information on salt marshes, marsh restoration and in particular, Awcomin Marsh. Two meetings were held to organize the field trip for planting the seedlings grown by the students.

In spring (April), the seeds were removed from the seed heads, washed in 10% Clorox solution for 1-2 minutes and dried on paper towels. Dried seeds of each species were placed in labeled envelopes and delivered to Little Harbour School in Portsmouth. Seeds were germinated between wet paper towels then planted into trays of potting soil by four third grade classes at Little Harbour School. One first grade class planted seeds of *Hibiscus*. Plants were grown in widows and under grow lights for four weeks until field planting. On June 13th, 62 third graders and 14 first graders arrived at Awcomin Marsh in Rye with their teachers, chaperones and plants (Table 1).

Third grade students, teachers and chaperones were led out to the southern island (Figure 1) where eight areas were staked off. JEL scientists and graduate students each led four groups of 3 to 4 pairs of students in the planting. Once in smaller groups of 6 to 8 students, they learned planting techniques for the marsh border seedlings and the high marsh plants from the group leader. Besides the seedlings that the students had grown, some high marsh plants previously purchased from Environmental Concern for another project were brought to the site and planted by the students. Plants were installed at the upper tidal zone (seedlings) and the intertidal zone (the extra Plugs of *Spartina patens*, *Juncus gerardii* and *Distichlis spicata*). Later that day, 14 first graders arrived at the site. They planted 24 *Hibiscus* seedlings that they had raised. The planting location was very close to the walkway and access road and had a southwestern exposure (Figure 1).

The planting activity itself was straightforward. Seedlings and plant Plugs were removed from plastic containers and each was placed into a small hole dug with a trowel and partially filled with peat moss. The sandy soil was pushed around the base of the plant by hand. About one-half liter of fresh water was added to the surface of each plant from water jugs.

The Environmental Science class at Portsmouth High School taught by Deidre Barrett indicated they wanted information about the project, but were unable to visit the site. Two presentations were made in fall, 2005 to the class. The first presentation introduced coastal wetlands and their importance to our safety and wellbeing. The second focused on salt marshes and their restoration in New Hampshire.

A Quality Assurance Project Plan (QAPP) was developed for vegetation sampling (Appendix 1). Vegetation was monitored following the QAPP protocols at the end of the summer in 2005 at the new site planted in the spring, and also at the sites previously planted in 2002. Assessments used six sub-sample locations in each plot that were randomly assigned for each sampling date. Sub-samples were collected using a round hoop of 1.0 m^2 area. Percent cover was estimated for each species from a birds-eye-view, and included bare ground, drifted dead vegetation (wrack), algae, and open water. Canopy height, defined as the height of 4/5 of the stems, was measured for the sub-sample as a whole. In sub-samples where *Phragmites* occurred, stems were counted for the plot and heights of the three tallest shoots were collected.

Analysis of the 2002 plantings focuses on the 20 experimental plots, which had four treatments and five replicates per treatment in a randomized block design. Assessment of the 2005 planting was limited to the southern island, which compared four planted plots with four unplanted plots. Residuals were examined for outliers, even distribution of error, and fit to the normal distribution. Significance was indicated using an alpha < 0.05, and multiple comparisons were tested for significance using the Tukey–Kramer multiple comparison test.

Results and Discussion

2002 Plantings

Survival of the Plug and bare root shoot (BRS) planting types were assessed in August and November of 2002 and in August of year two, just after the height of the growing season. Initially, Plugs fared significantly better than bare rooted plants, with over 90% survival for Plugs compared with 43% survival of BRS (Figure 2). However, by November of year one, new shoots had sprouted from bare root plants that had no living aboveground tissue in August, so the apparent survival rate jumped from 43 to 58% while survival of Plugs remained unchanged. In the winter of year one, the BRS plants showed no mortality, but the Plug survival rate fell from 91% in November to 74% by August 2003. The Plugs provide organic matter, and it appears that organic matter helps keep the roots moist and increases summer survival. Plant roots may survive better within Plugs, so by the end of the growing season, these plants may have few roots extending into the surrounding sediment. In the winter when the surface sediments of the marsh freeze, those plants with roots primarily in the peat Plugs may suffer greater mortality than bare root plants, which are forced to extend their roots well into the soil. So after one year, the two techniques showed fairly similar survival rates. Plug survival was 17% higher, but not significantly different than survival of the BRS (Figure 2).

The percent cover of each species growing in the plots was assessed, with particular attention to the planted species (cordgrass), native perennials in general, total plant cover, and the undesirable species (common reed). Cordgrass cover began at low levels even for planted plots in 2002, averaging less than 5% cover. By the close of the third growing season, cordgrass cover for Plugs and BRS averaged 45% (Figure 3a). This was considerably higher than the unplanted plots, which still showed less than 5% cordgrass.

All three planting types had significantly greater cordgrass cover than the unplanted plots by 2005 (Figure 3b). Of particular interest is the cordgrass cover of the plots planted with seed heads in the fall of 2002. An area planted by stapling seed heads to the substratum at an earlier fill removal site adjacent to Rye Harbor failed to produce plants. Other researchers have also found that poor success of cordgrass seeding was due to waves along open shorelines (Broome 1990). Although the Rye Harbor site was only a two-acre plot surrounded by roads, sediment elevations were low enough for tides to flood the area daily. Apparently, the tide and wave energy at Rye Harbor dislodged and swept away the seeds (Bozek and Burdick 2003). In 2002, students were instructed to add one trowel of sediment directly on the seed head. Seed Head plots at Awcomin Marsh were indistinguishable from the unplanted plots through two years, but showed 14% cordgrass cover in 2004 and 26% cover in 2005. Comparisons of 2005 data showed that SH plots had significantly greater cordgrass cover than Bare plots (26% vs. 3%; Figure 3a). Considering the seeds germinated in spring of 2003, SH plots should be a year behind the Plug and BRS plots. In this light the SH plots were performing quite well by year three, equaling cordgrass cover of the Plug and BRS plots in year two (26%, Figure 3b). The regularity of site flooding was similar to that of Rye Harbor, but it was better protected from southwesterly winds. Placement of the sediment on the seed head by the students may have been the important factor that allowed seed germination and successful plant development at this site.

Cover of the invasive common reed was found to be quite low, with no treatment average greater than 1% cover in any of the four years (Figure 4a). In 2004, cover of *Phragmites* appeared to be increasing, but fell when assessed again in 2005. No treatment differences were found in *Phragmites* cover in 2005 (Figure 4b).

Salt marshes in New England are usually dominated by perennial grasses (Nixon 1982), with important contributions from sedges, rushes, and herbaceous plants that have variable life histories. Among the herbaceous plants are: perennials, living for many years; biennials, living for two years; and annuals that flower each year and depend on seeds to regenerate their populations each year. Perennials store significant amounts of organic matter belowground to survive the winter and are the primary source of organic matter that forms peat and builds the marsh in response to sea level rise (Breeding et al. 1974). Therefore, colonization by perennial grasses is a critical step in the restoration of salt marsh. Cordgrass and all of the other plants used for revegetation in this project were perennials. Figure 5 shows the cover of perennial and annual vascular plants from 2002 to 2005. Three years after the site was prepared, annuals provided between 4.6 and 5.6% of cover for the four treatment types (Figure 5a). The unplanted plots had 3.5% cover of perennials, but the planted plots had significantly greater perennial cover: 30 to 51% (Figure 5b). The results show that planting had a strong positive effect on development of perennial vegetation in the marsh, which is important for marsh restoration.

The average number of plant species per plot was also determined and compared among the four treatments (Figure 6). In fall of 2002, the first year of planting, the unplanted Bare and SH plots had less than 0.5 species per plot, on average, while the plots planted with cordgrass showed about 1.5 species per plot. Thus, the effect of planting the cordgrass culms was to add an average of one species per plot. By 2005, however, the cordgrass seeds had germinated in the SH plots so that all three planted plot types had a similar average number of species: just over 3 species per m^2 sub-sample. This was about one more species when compared to the unplanted plot average of 2.3 species per m^2 sub-sample. None of these differences was statistically significant.

By the end of year three, total vascular plant cover, which includes perennials and annual vascular plants but not macroalgae (e.g., *Vaucherria* and *Enteromorphora* spp.), was lowest in the unplanted plots (9%), and highest in the Plug plots (57%; Figure 7). The results indicate that planting whole plants (Plugs, BRS) or seed heads (SH) rapidly increases cover on marshes recovering from fill removal. A photograph of a recently planted BRS plot in 2002 can be compared with the same plot in 2004 (Figure 8). Note the construction equipment is in the background; the construction was completed in 2004.

Development of a canopy over the surface of the marsh sediments is important for shading the marsh from summer sun, which can limit natural revegetation (Shumway and Bertness 1992). Canopy height is also important for certain types of birds in California (Zedler 1993) and perhaps New England (rails, marsh hen). All the plot treatments averaged about 25 cm in canopy height in the middle of the growing season in 2003, but the three planted plot types appeared to increase to about 35 cm canopy height by September 2005 (Figure 9), again showing the planting accelerates vegetation development and marsh restoration.

2005 Plantings

Seeds of six marsh upper edge species were successfully germinated and grown into seedlings by first and third graders. Of these six, more than ten seedlings of five species were produced (rose mallow, stiff-leaf quackgrass, seaside goldenrod, switchgrass, and seaside arrow grass). The seedlings grown by the third and first graders were fairly small and weak, perhaps due to low light availability in the classrooms. Plants adapted to stressful environments appear to need strong light to be successful, but the abilities of seedlings in the presence of competitors are poorly known (Carlyle and Fraser 2006). The *Hibiscus* (rose mallow) seedlings grown and planted by the first graders became dwarfed by surrounding plants and soon were out-competed by the naturally colonizing vegetation.

The plantings by the third graders on the island had mixed results. The seedlings did not appear to fare well, with none of the six species of planted seedlings appearing in the sub-sampling plots. Furthermore, differences in cover of vascular plants and diversity between planted and unplanted control plots were found to be small and statistically insignificant (Table 2). Although rose mallow, seaside goldenrod and seaside arrow grass seedlings appeared to have been out-competed, successful plants of both switchgrass and quackgrass were found at the site. The high marsh plants, planted as Plugs, did survive and expand, so that a visit to the area in the spring and summer of 2006 showed large (0.5 m^2) clumps of black grass, salt grass and salt hay conspicuously surrounding the island.

Community Interactions

Physical restoration of the site is only part of restoration. To be successful, restoration should also reconnect the local community with the resource. Only through development of a conservation ethic among people who live and work in the watershed will ecosystems remain healthy (Young 2000). One of this project's goals was to involve and educate the local community about the values and functions of salt marshes. We performed two sets of activities to this end. At Portsmouth High School, two presentations about the value of wetlands and specifically about wetland restoration in New Hampshire were given to an environmental science class of approximately eighteen students.

At Little Harbour Elementary School, we set up a hands-on program for students to germinate, grow and plant nine species of upper edge marsh plants. Three third grades classes, which have a science unit on plant growth and development, and one first grade class participated. Eighty elementary school students, six teachers and ten chaperone parents were able to have a planting experience on the marsh. Involving volunteers in a hands-on planting project helps to bridge the gap between human values and ecological values so that concern about habitat health continues to promote stewardship of our coastal resources (Kerr and Damon 1995). We certainly expect that the experience of these students, their teachers, and parents will help promote a culture of stewardship for coastal wetlands into the future.

Conclusions

In 2002, volunteers planted cordgrass in an experimental design to test the effectiveness of three planting techniques. The planting site was a salt marsh restored by excavation of old dredge spoil that had been colonized by common reed. An assessment of the experimental plantings was conducted each year and a final assessment was performed in 2005. After four growing seasons, Plug, Bare Root Shoot, and Seed Head planting techniques exhibited greater cover of cordgrass (26% to 48%) and total cover of vascular plants (35% to 57%) when compared with unplanted areas (3% and 9%, respectively). Cover of perennial plants (e.g., cordgrass), which contributes directly to belowground soil development in salt marshes, dominated the planted plots. Cover of annual species made up about 5% cover in all treatments, and dominated the unplanted plots. The number of species was statistically similar for all treatments, but tended to be lower for unplanted plots. Planting cordgrass in areas where dredge spoils and common reed had been excavated from a historic marsh accelerated development of native vegetation compared with unplanted areas.

Seeds of six marsh upper edge species were successfully germinated and grown into seedlings by third graders. Of these six, more than ten seedlings of five species were produced (rose mallow, stiff-leaf quackgrass, seaside goldenrod, switchgrass, and seaside arrow grass). The seedlings were planted by the students in late spring 2005, but were not large and vigorous. Successful switchgrass and quackgrass plants were observed, but were not found in randomly placed plots during the assessment at the close of the growing season. High marsh species planted by the third graders around the southern island included salt hay, salt grass and black grass. These high marsh plants established successfully and continued to proliferate when seen in spring 2006.

Recommendations

Natural revegetation of newly exposed sediments can take many years, so the benefits associated with plant production and soils development in restored marshes can be delayed if no planting program is conducted. Replanting with cordgrass using various techniques is well established on the mid-Atlantic (Niedowski 2000), but planting projects in northern New England have been less successful due to a shorter growing season and ice damage in winter (Burdick and Short 1998). Volunteers planted approximately two acres of bare sediment in 2002 using three techniques: Plugs harvested on-site, Bare Root Shoots (BRS) obtained locally, and Seed Heads (SH) collected locally.

Of the two techniques that used grown plants, the BRS plots exhibited greater summer mortality whereas the Plugs exhibited greater winter mortality. Plugs were not plucked out by freezing and movement of winter ice as has been observed at other sites in New Hampshire (Burdick and Short 1998), but appear to have died in place. By the end of four growing seasons, Plugs showed greater cover of cordgrass (48% vs. 42%) and total vascular plants (57% vs. 48%), but neither difference was statistically significant. What is significant is the difference in cost between the two techniques. Plugs had to be cut individually and planted in holes made with a gas-powered auger (sediment was hard). Even though the BRS were purchased, overall costs were lower because they could be planted in half the time. When using grown plants, BRS planting appear to be a more efficient technique than Plug planting.

Seed heads of cordgrass were also planted in fall of 2002. They grew to maturity in summer of 2003, so SH plots were a year behind the Plug and BRS plantings. Even though they were planted at half the density used for the Plug and BRS techniques (1 x 0.5 meter centers vs. 0.5 x 0l.5 meter centers), by the third growing season cover of cordgrass and total vascular plants in SH plots (26% and 35%, respectively) equaled that of Plug and BRS plots (26% and 34%). Seed heads can be collected and planted easily, requiring much less time than either of the grown plant techniques. Although still experimental, seed head planting does work and should be used in conjunction with one of the grown plant techniques where planting of large, fairly protected areas is planned. For example, Plugs or BRS could be planted in several rows around a perimeter of SH plantings.

Although planting techniques for cordgrass are well established, little information exists about planting high marsh species and especially upper edge species. Seed germination of six upper edge species was successfully accomplished by elementary school students with help from their teachers. However, the seedlings were not vigorous; perhaps they would have benefited from outside or greenhouse growing conditions, rather than the grow lights that were used in the classrooms. The third grade students and their teachers enjoyed the field trip and planting the upper edge and high marsh plants. Two species of upper edge plants were found growing well and all the high marsh species established and proliferated at the site. Similar to the cordgrass planting recommendations, a combination of seedlings and mature shoots should be used for high marsh and upper edge planting to increase the likelihood of success.

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Table 1. Plant species collected, collection site, and seedlings planted in spring, 2005.

Common Name	Latin Name	Collection Site	Number Planted
Marsh Elder	*Iva frutescens*	Odiorne Point	0
Rose Mallow	*Hibiscus moscheutos var. palustris**	Meadow Pond	68
Rough Cordgrass	*Spartina pectinata*	Odiorne Point	0
Salt Marsh Gentian	*Agalinis maritimum*	Odiorne Point	1
Seaside Goldenrod	*Solidago sempervirens*	Odiorne Point	19
Seaside Alkali Grass	*Puccinella maritima*	Odiorne Point	0
Stiff-leaf Quackgrass	*Agropyron pungens*	Odiorne Point	43
Switchgrass	*Panicum virgatum*	Odiorne Point	13
Seaside Arrow Grass	*Triglochin maritimum*	Odiorne Point	11

**This is a native plant previously found south of NH, but found at one site in NH in 2003 and a second site in 2004 (G. Crow personal communication).*

Table 2. Cover and species found for the 2005 high marsh and upper edge planting around the southern island. No statistical significance was found between planted and unplanted treatments when assessed in September 2005 (n = 4).

Plant Cover Type	Planted Plots	Unplanted Plots	Standard Error	Probability>F
Cover (%)				
Common reed	0.13	7.65	3.89	0.221
Smooth cordgrass	0.71	1.56	0.57	0.330
Salt hay	6.35	3.25	2.41	0.397
Salt grass	0.50	0.00	0.17	0.088
Total vascular plant cover	9.23	13.7	6.51	0.644
Total vascular plant – common reed	9.10	6.06	3.25	0.533
Canopy Height (cm)	20.6	37.5	11.8	0.351

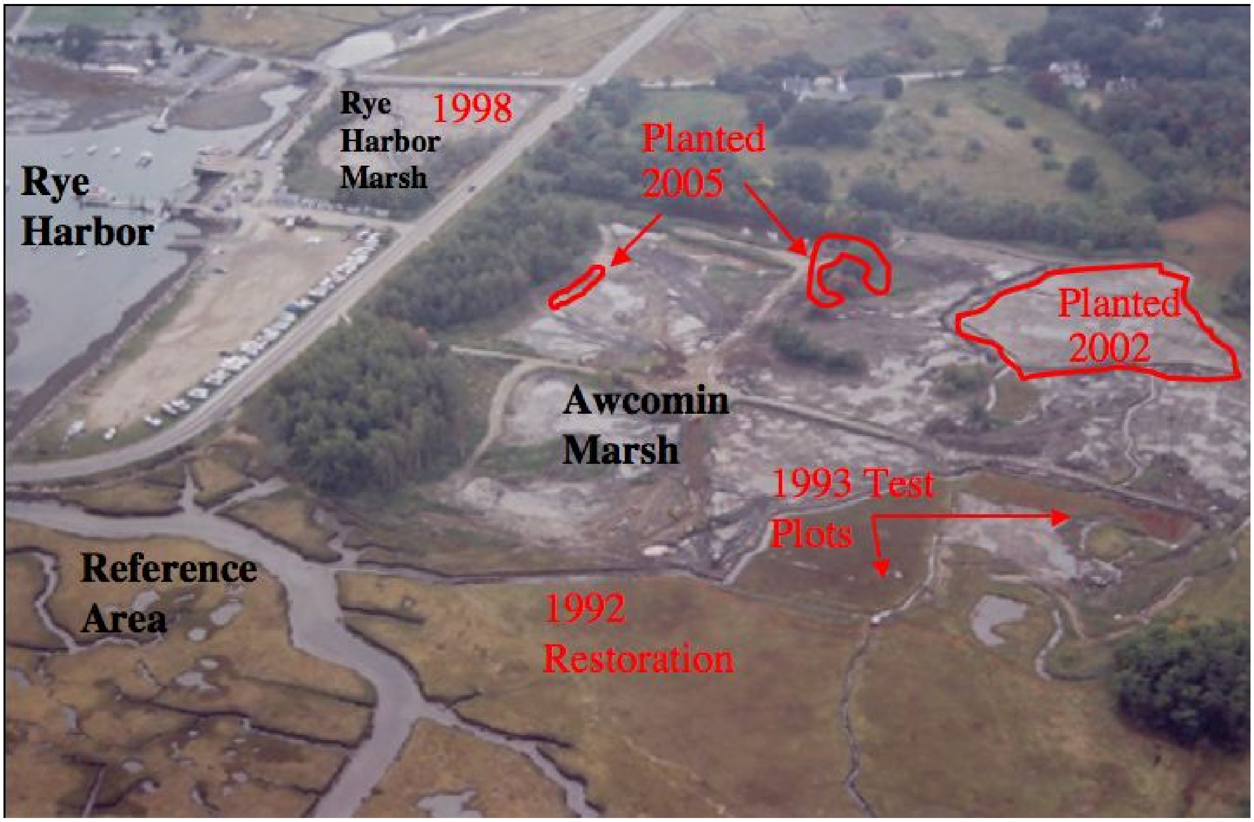


Figure 1. Awcomin Marsh restoration and planting sites (2002 experiment and 2005 seedling planting) from an aerial photograph taken in summer, 2002. Not drawn to scale. Rye Harbor Marsh, which was excavated in 1998 and planted with seed heads in fall, 2000, can also be seen.

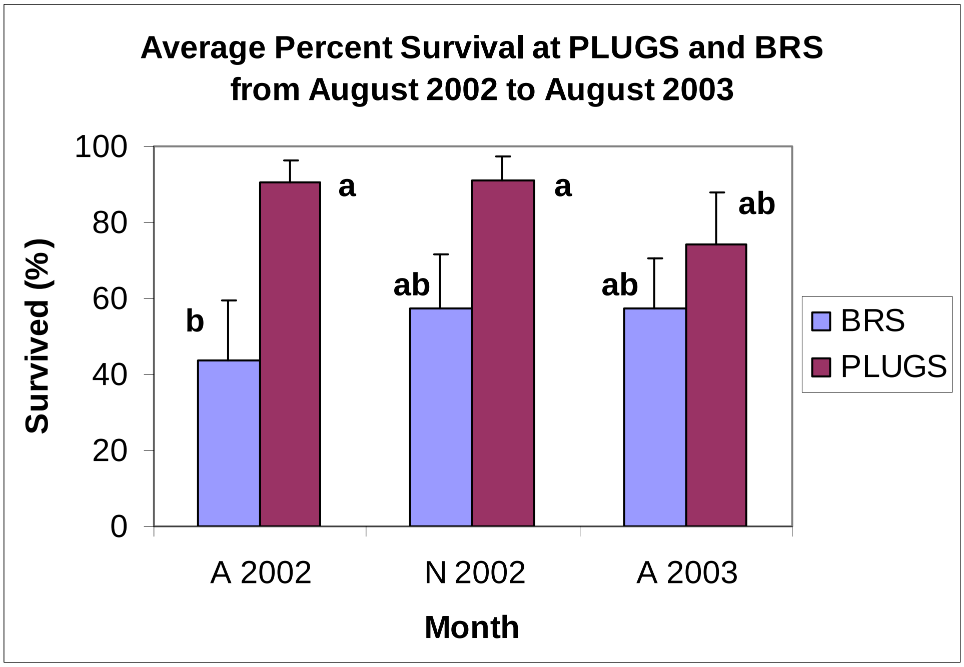


Figure 2. Survival of cordgrass through the second growing season, comparing two common planting techniques: Plugs and Bare Root Shoots.

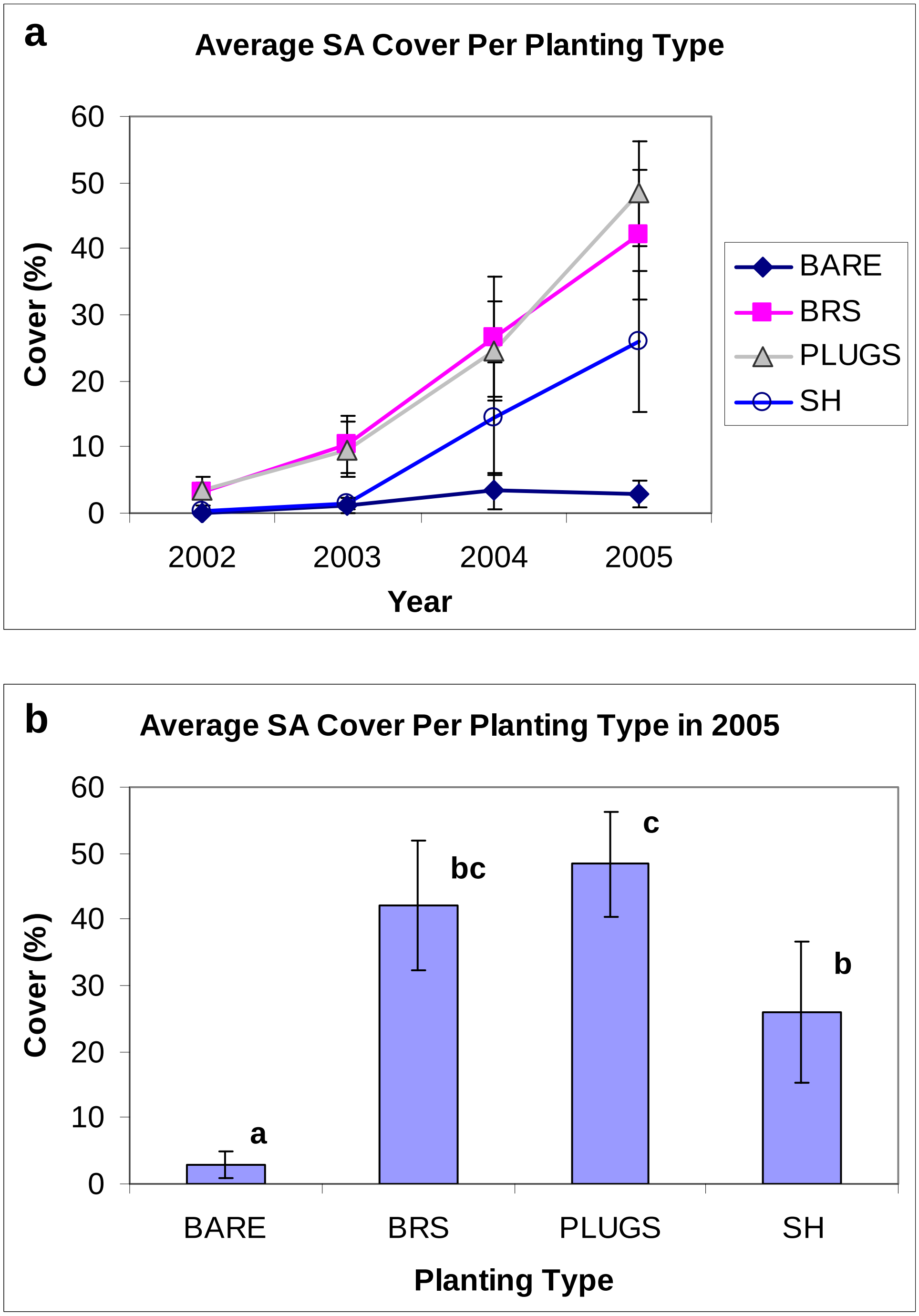
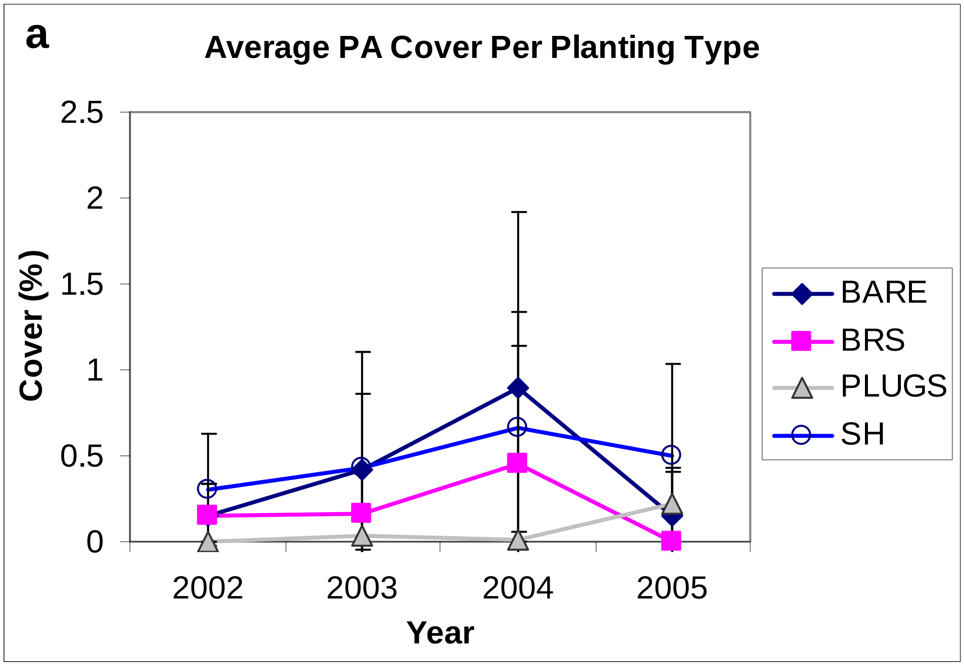


Figure 3. Cover of cordgrass for the 2002 planting experiment. a. Change in cordgrass cover by treatment and over time into the fourth growing season. b. Cordgrass cover in 2005 for the three planting techniques: Bare Root Shoot (BRS), Plugs and Seed Heads (SH) and no planting (Bare). Statistically significant differences are indicated by differ letters on bars at alpha = 0.05 using the Tukey-Kramer multiple comparison test.



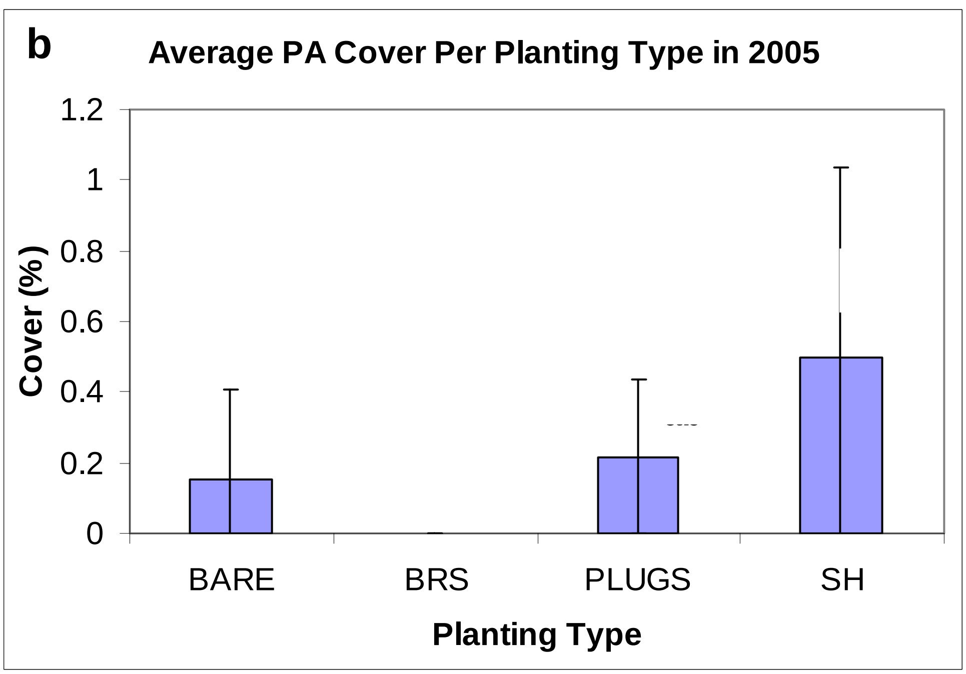
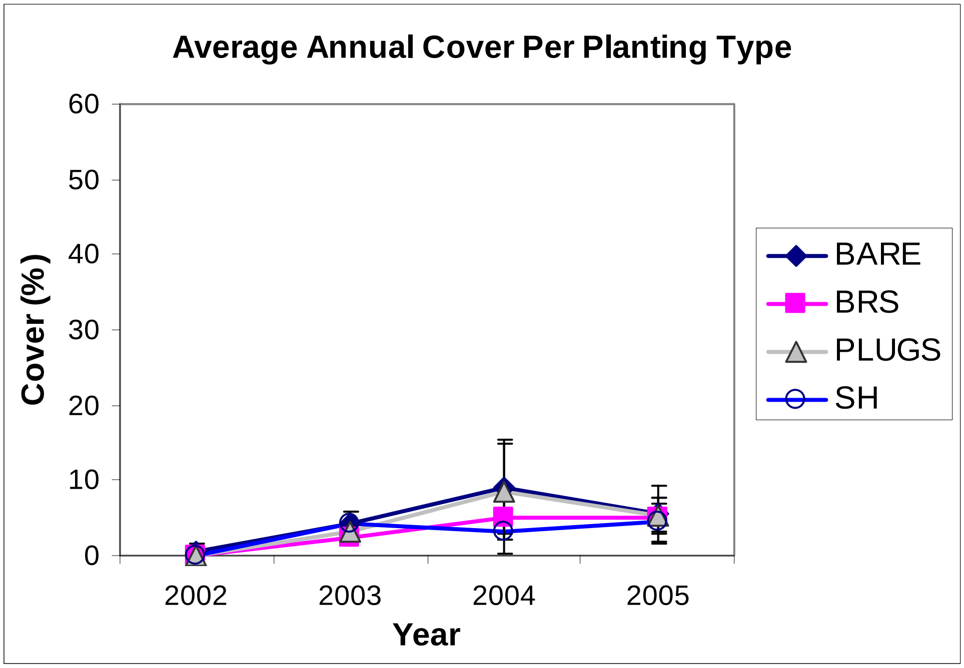


Figure 4. Cover of common reed, *Phragmites australis*, for the 2002 planting experiment. a. Change in *Phragmites* cover by treatment and over time into the fourth growing season. b. *Phragmites* cover in 2005 for the three planting techniques: Bare Root Shoot (BRS), Plugs and Seed Heads (SH) and no planting (Bare). No statistically significant differences were found between treatments at alpha = 0.05 using the Tukey-Kramer multiple comparison test.



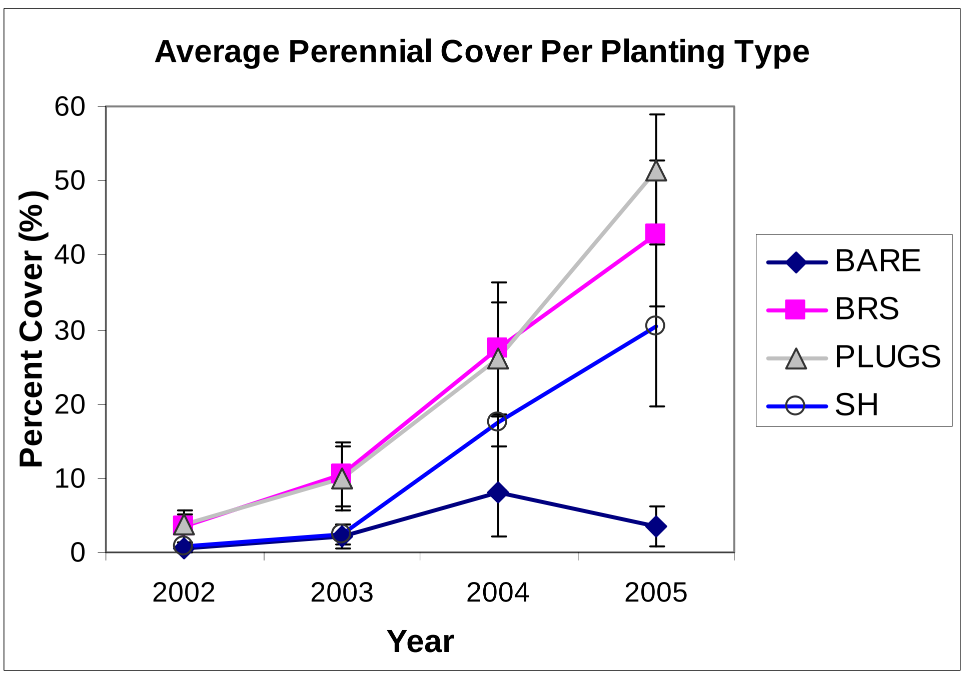


Figure 5. Cover of annual and perennial vascular plants over four growing seasons for the 2002 planting experiment. a. Annual cover for the three planting techniques: Bare Root Shoot (BRS), Plugs and Seed Heads (SH) and no planting (Bare). b. Perennial cover for the plots.

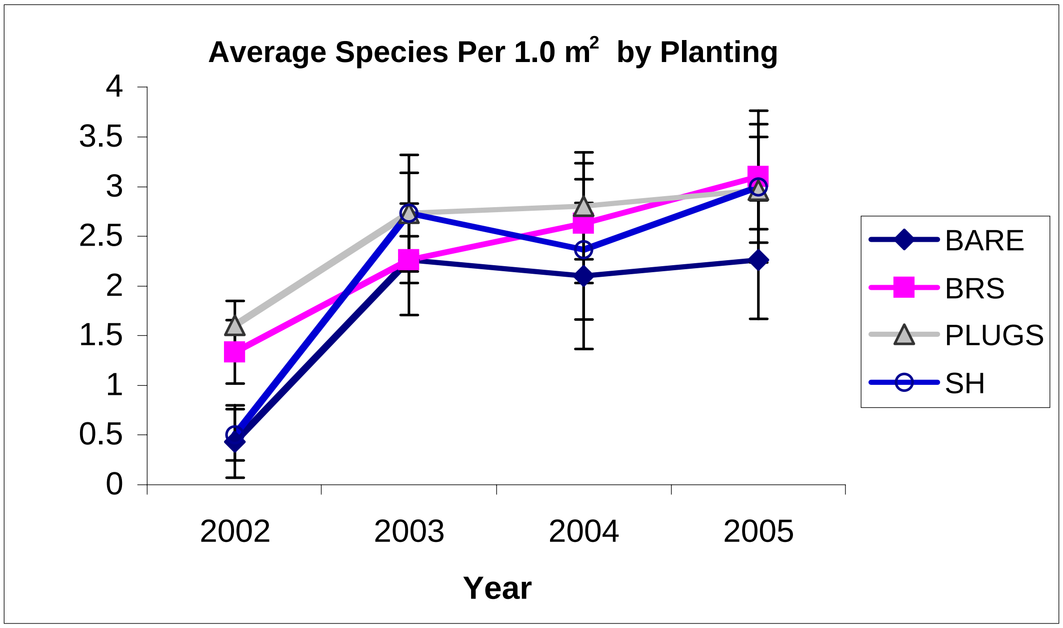


Figure 6. Average number of vascular plant species per sub-sample (1.0 m^2) for each planting type (Plugs, Bare Root Shoots (BRS) and Seed Heads (SH) and no planting (Bare) over four growing seasons in the 2002 experimental planting area.

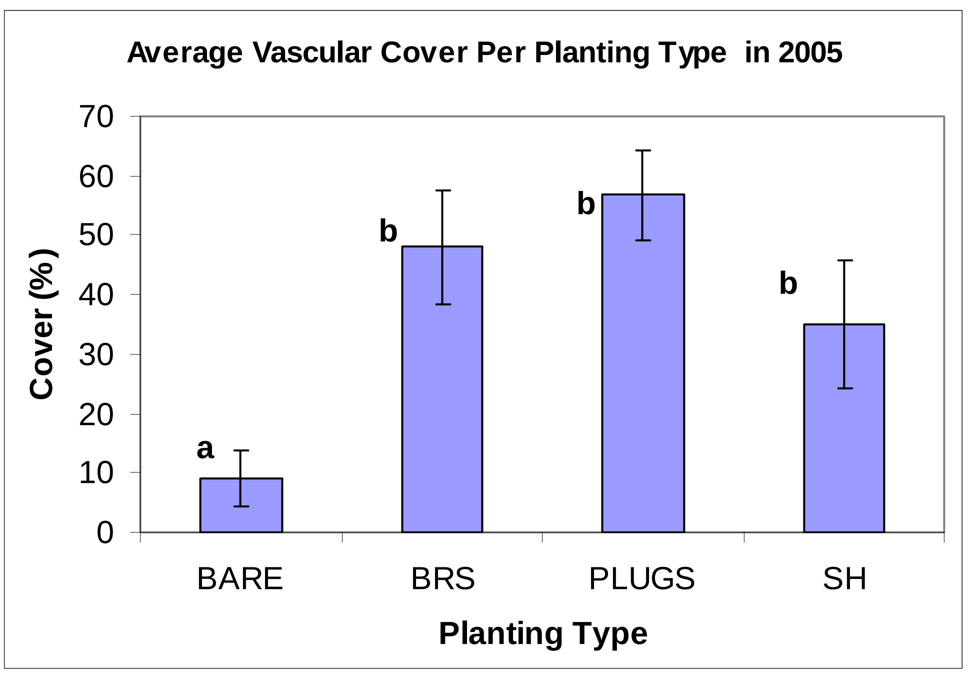


Figure 7. Average cover of vascular plants for each planting type (Plugs, Bare Root Shoots (BRS) and Seed Heads (SH) and no planting (Bare) in the 2005 growing season for the 2002 experimental planting area. Statistically significant differences are indicated by different letters on bars at alpha = 0.05 using the Tukey-Kramer multiple comparison test.

A

B

Figure 8. Bare Root Shoot plot planted in summer 2002, showing plot in 2002 (A) and same plot in foreground in summer 2004 (B).

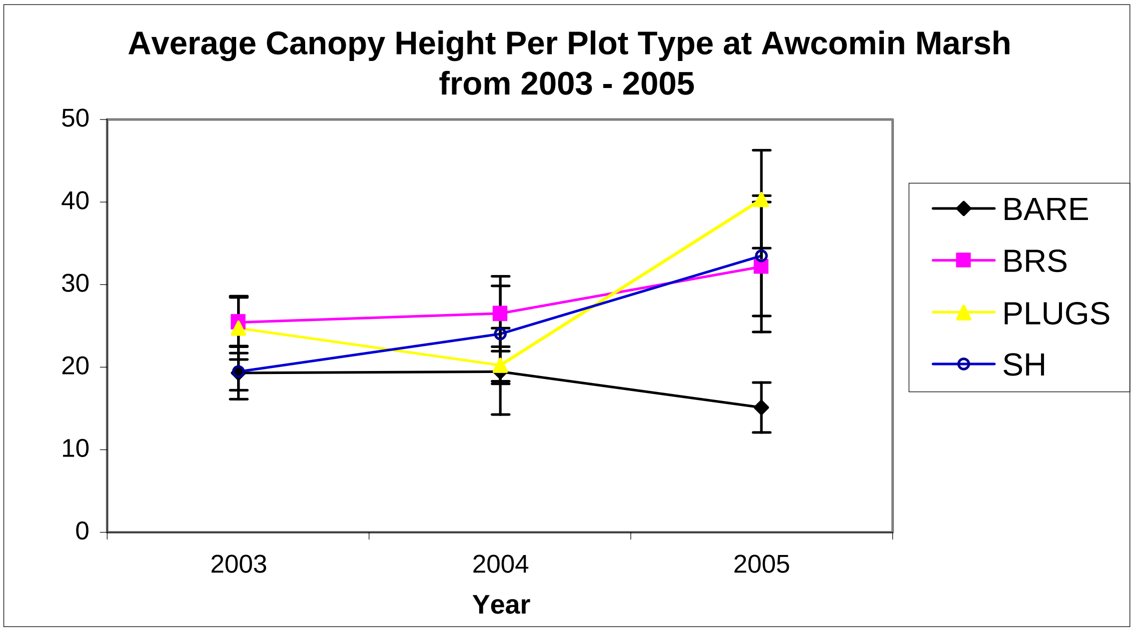


Figure 9. Average canopy height for each planting type: Plugs, Bare Root Shoots (BRS) and Seed Heads (SH) and no planting (Bare) from the second to fourth growing seasons in the 2002 experimental planting area.

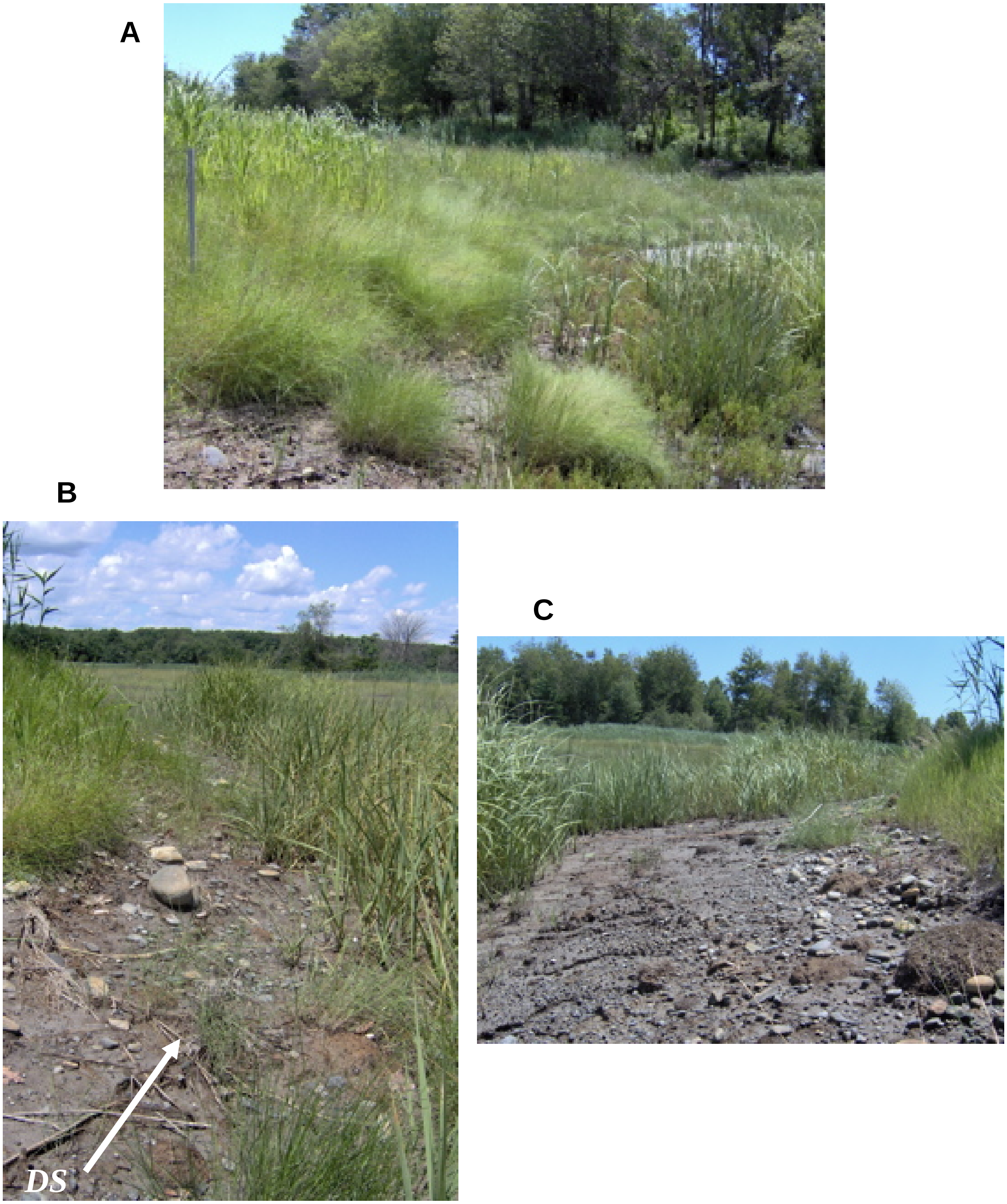


Figure 10. High marsh vegetation planted in 2005 around the southern island. A. Clumps of salt hay (*Spartina patens*) in Plots 1 and 2 (southwestern shore). B. Small clump of salt grass (*Distichlis spicata; DS*) at Plot 6, northern shore. C. Unplanted control Plot 8 on northern shore.

Appendix I
Quality Assurance / Quality Control

This study follows development of the emergent plant community in planted and unplanted plots within a salt marsh where dredge spoils were removed to restore the structure and function of the marsh. Each plot was assessed for plant cover by species with informal and formal quality control checks. No laboratory or instrument measurements were made. Measurements were made using a regionally accepted protocol (Neckles and Dionne 2000) that we believe provides a level of quality needed to fulfill objectives. So long as the protocols are followed, the data quality objectives should be met.

<u>Precision</u>: Precision is a measure of repeatability of the measure at the time and conditions of collection. Two persons contributed visual estimates of plant cover and they intercalibrate their estimates to reach consensus on 9 of 10 plots (informal quality control). The method for visual assessment of cover for 0.5 to 1.0 meter square areas using intercalibration is described in the regional methods for salt marsh restoration assessments (Neckles and Dionne 2000) and is based on methods in Kent and Coker (1992). Every tenth plot was assessed individually with no intercalibration and the results not shared. These data were analyzed and compared to intercalibrated plots to assess precision of the visual estimates.

Cover estimates for smooth cordgrass (*Spartina alterniflora*) and common reed (*Phragmites australis*) and groups of species (vascular plant cover and total plant cover) as well as canopy height and number of species were compared between observers. A two-way fixed effects ANOVA model was used to determine whether significant differences existed between individual observers and between individually observed data and intercalibrated plots. Cover data was transformed using the natural log when needed to ensure evenness of residual error. No observer effects were found to be significant for any of the six variables tested (Table AI-1). The means for the two separate observers were always very close and closer together than the individual observations compared with the intercalibrated observations. The individual observations were made on the exact same plots, whereas intercalibrated observations were always made on different plots, leading to this difference.

<u>Accuracy</u>: Accuracy is a measure of how well the estimates represent the true cover of the plants. Cards representing 1, 2, and 5 % cover were made and set out in the sub-sample plots to help maintain accuracy.

<u>Representativeness</u>: Six randomly selected sub-samples were collected for each plot. The area examined represents about 4% of each plot planted (or unplanted control).

<u>Comparability</u>: The method for visual assessment of plant cover for 0.5 to 1.0 meter square areas is comparable to the regional methods for plant assessments in salt marsh restorations (Neckles et al. 2002).

<u>Sensitivity:</u> Differences between control areas and planted areas are expected to be quite large (> 10% cover for dominants and planted species like *Spartina alterniflora* and *Phragmites australis*). The sample averages of six sub-samples should be sufficient to establish such differences where they exist. Results indicated that we were able to detect significance in cover differences greater than 20% (Figures 3 and 7).

<u>Completeness:</u> All planted and control plots were sampled.

In addition, data were input to spread sheets, printed, checked against original field data and corrected. Two sets of field data are maintained at different locations in the Jackson Estuarine Laboratory.

References

Kent, M., and P. Coker. 1992. Vegetation Description and Analysis: A Practical Approach. CRC Press, Boca Raton, FL. 363 pp.

Neckles, H.A., and M. Dionne. 2000. Regional standards to identify and evaluate tidal wetland restoration in the Gulf of Maine. Wells NERR Technical Report, Wells, ME. 21pp.

Neckles, H., M. Dionne, D. Burdick, R. Buschbaum, T. Diers, E. Hutchins and C. Roman. 2000. A monitoring protocol to assess tidal restoration of salt marshes on local and regional scales. Restoration Ecology 10: 556-563.

Table AI-1. QA/QC analysis of individual versus intercalibrated estimates of cover, canopy height and number of species found in the experiment plots. Variables with an * were transformed using the natural logarithm for analysis.

Plant Variable	**Individual A**	**Individual B**	**Intercalibrated**	**Probability > F**
COVER (%)				
Smooth cordgrass*	22.38	22.63	28.03	0.053
Common reed	0.16	0.11	0.20	0.931
Vascular plants*	25.89	25.98	35.59	0.054
Total plants*	31.01	31.41	42.12	0.086
Canopy Height (cm)	22.2	21.6	27.3	0.141
Number of Species	2.16	2.26	2.64	0.311

DATE ASSESSED	PLANTING TYPE	SET	REP	MONTHS	% SURVIVAL	COVER CORDGRASS	CORDGRASS HEIGHT	# SHOOTS CORDGRASS	CANOPY HEIGHT	COVER C.REED	C.REED HEIGHT	# SHOOTS C.REED	COVER OTHER VASC	COVER ALGAE	OPEN WATER	TOTAL COVER	ANNUAL COVER	PERENNIAL COVER	COVER ALL VASC	# ANNUAL SPP.	# PERENNIAL SPP.	# VASC SPP.
8/7/2002	BRS	1	1	2	100.0	4	37	23		0		0	0	0	0	4	0	4	4	0	1	1
8/7/2002	BRS	1	2	2	100.0	3	44	16		0		0	0	0	0	3	0	3	3	0	1	1
8/7/2002	BRS	1	3	2	83.3	5	47	38		0		0	0	0	0	5	0	5	5	0	1	1
8/7/2002	BRS	1	4	2	85.7	3	31	29		0		0	0	0	0	3	0	3	3	0	1	1
8/7/2002	BRS	1	5	2	100.0	5	59	28		0		0	0	0	0	5	0	5	5	0	1	1
8/7/2002	BRS	1	6	2	100.0	5	46	28		0		0	0	0	0	5	0	5	5	0	1	1
8/7/2002	BRS	2	1	2	33.3	1	18	2		7	63	25	0	0	0	8	0	8	8	0	2	2
8/7/2002	BRS	2	2	2	20.0	1	44	2		1	32	4	0	0	0	2	0	2	2	0	2	2
8/7/2002	BRS	2	3	2	60.0	2	30	8		0		0	0	0	0	2	0	2	2	0	1	1
8/7/2002	BRS	2	4	2	28.6	1	33	6		2	46	7	0	0	0	3	0	3	3	0	2	2
8/7/2002	BRS	2	5	2	28.6	1	36	5		0.5	8	1	0	0	0	1.5	0	1.5	1.5	0	2	2
8/7/2002	BRS	2	6	2	66.7	2	35	7		0		0	0	0	0	2	0	2	2	0	1	1
8/7/2002	BRS	3	1	1.5	16.7	1	30	2		0.5	15	1	0	0	0	1.5	0	1.5	1.5	0	2	2
8/7/2002	BRS	3	2	1.5	0.0	0		0		0		0	0	0	1	0	0	0	0	0	0	0
8/7/2002	BRS	3	3	1.5	50.0	1	35	5		0		0	0	0	0	1	0	1	1	0	1	1
8/7/2002	BRS	3	4	1.5	0.0	0		0		0		0	0	0	0	0	0	0	0	0	0	0
8/7/2002	BRS	3	5	1.5	25.0	1	30	6		0		0	0	0	0	1	0	1	1	0	1	1
8/7/2002	BRS	3	6	1.5	80.0	1	31	8		0		0	0	0	0	1	0	1	1	0	1	1
8/7/2002	BRS	4	1	1.5	20.0	1	37	2		0		0	0	0	0	1	0	1	1	0	1	1
8/7/2002	BRS	4	2	1.5	60.0	1	32	5		0		0	0	0	1	1	0	1	1	0	1	1
8/7/2002	BRS	4	3	1.5	75.0	1	39	4		0		0	0	0	0	1	0	1	1	0	1	1
8/7/2002	BRS	4	4	1.5	20.0	0.5	37	3		0		0	0	0	0	0.5	0	0.5	0.5	0	1	1
8/7/2002	BRS	4	5	1.5	50.0	1	49	11		0		0	0	0	0	1	0	1	1	0	1	1
8/7/2002	BRS	4	6	1.5	40.0	0.5	17	4		0		0	0	0	0	0.5	0	0.5	0.5	0	1	1
8/7/2002	BRS	5	1	1.5	0.0	0		0		0		0	0	0	0	0	0	0	0	0	0	0
8/7/2002	BRS	5	2	1.5	0.0	1		0		0		0	0	0	0	1	0	1	1	0	1	1
8/7/2002	BRS	5	3	1.5	0.0	0		0		0		0	0	0	0	0	0	0	0	0	0	0
8/7/2002	BRS	5	4	1.5	60.0	2	35	7		3	32	5	0	0	0	5	0	5	5	0	2	2
8/7/2002	BRS	5	5	1.5	0.0	0		0		0		0	0	0	0	0	0	0	0	0	0	0
8/7/2002	BRS	5	6	1.5	0.0	0		0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BRS	1	1	5	85.7	8	51	57		0		0	0	0	1	8	0	8	8	0	1	1
11/11/2002	BRS	1	2	5	50.0	5	50	41		0		0	0.5	0	0	5.5	0	5.5	5.5	1	1	2
11/11/2002	BRS	1	3	5	100.0	9	47	135		0		0	0.5	0	0	9.5	0	9.5	9.5	1	1	2
11/11/2002	BRS	1	4	5	100.0	5	41	40		0		0	1	0	1	6	1	5	6	1	1	2
11/11/2002	BRS	1	5	5	80.0	5	53	58		0		0	0	2	1	7	0	5	5	0	1	1
11/11/2002	BRS	1	6	5	100.0	25	74	151		0		0	0.5	0	1	25.5	0.5	25	25.5	1	1	2
11/11/2002	BRS	2	1	5	85.7	6	36	35		1	37	4	0	0	0	7	0	7	7	0	2	2
11/11/2002	BRS	2	2	5	85.7	3	43	28		0.5	29	3	1	0	0	4.5	0.5	4	4.5	1	3	4
11/11/2002	BRS	2	3	5	60.0	3	27	36		0.5	22	3	0	0	0	3.5	0	3.5	3.5	0	2	2
11/11/2002	BRS	2	4	5	75.0	2	44	25		0		0	0	0	1	2	0	2	2	0	1	1
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11/11/2002	BRS	2	6	5	14.3	0.5	10	1		0.5	39	1	0	0	0	1	0	1	1	0	2	2
11/11/2002	BRS	3	1	4.5	50.0	0.5	15	5		0		0	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	BRS	3	2	4.5	20.0	0.5	32	5		0		0	0	0	1	0.5	0	0.5	0.5	0	1	1
11/11/2002	BRS	3	3	4.5	25.0	0.5	4	1		0		0	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	BRS	3	4	4.5	20.0	0.5	14	5		0		0	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	BRS	3	5	4.5	16.7	0.5	13	3		0		0	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	BRS	3	6	4.5	50.0	1	34	12		0		0	0	0	0	1	0	1	1	0	1	1
11/11/2002	BRS	4	1	4.5	75.0	3	41	36		0		0	0	0	1	3	0	3	3	0	1	1
11/11/2002	BRS	4	2	4.5	80.0	4	47	41		0		0	0	0	1	4	0	4	4	0	1	1
11/11/2002	BRS	4	3	4.5	83.3	4	56	39		0		0	0	0	1	4	0	4	4	0	1	1
11/11/2002	BRS	4	4	4.5	40.0	1	38	7		0		0	0	0	0	1	0	1	1	0	1	1
11/11/2002	BRS	4	5	4.5	50.0	1	34	16		0		0	0	0	0	1	0	1	1	0	1	1
11/11/2002	BRS	4	6	4.5	83.3	2	30	26		0		0	0	0	0	2	0	2	2	0	1	1

11/11/2002	BRS	5	1	4.5	0.0	0.5	6	2		0		0	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	BRS	5	2	4.5	0.0	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BRS	5	3	4.5	100.0	3	41	45		0		0	0	0	1	3	0	3	3	0	1	1
11/11/2002	BRS	5	4	4.5	83.3	2	40	32		0		0	0	0	0	2	0	2	2	0	1	1
11/11/2002	BRS	5	5	4.5	20.0	0.5	8	2		0		0	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	BRS	5	6	4.5	50.0	0.5	13	4		0		0	0	0	0	0.5	0	0.5	0.5	0	1	1
8/11/2003	BRS	1	1	14	83.3	30	96	140	33	0		0	5	30	1	65	5	30	35	1	1	2
8/11/2003	BRS	1	2	14	100.0	22	50	130	24	0		0	3	10	1	35	3	22	25	1	1	2
8/11/2003	BRS	1	3	14	100.0	30	70	220	25	0		0	3	50	0	83	3	30	33	1	1	2
8/11/2003	BRS	1	4	14	75.0	18	83	90	33	0		0	1	5	1	24	1	18	19	1	1	2
8/11/2003	BRS	1	5	14	100.0	25	83	240	32	0		0	2	15	0	42	2	25	27	1	1	2
8/11/2003	BRS	1	6	14	50.0	14	87	240	31	0		0	2	30	0	46	2	14	16	1	1	2
8/11/2003	BRS	2	1	14	20.0	5	58	31	32	2	59	11	0.5	0	0	7.5	0.5	7	7.5	1	2	3
8/11/2003	BRS	2	2	14	50.0	5	54	46	23	0		0	1	0	0	6	1	5	6	1	1	2
8/11/2003	BRS	2	3	14	40.0	3	40	32	24	0		0	1	0	0	4	1	3	4	1	1	2
8/11/2003	BRS	2	4	14	83.3	10	81	95	31	1	29	4	5.5	0	1	16.5	5.5	11	16.5	2	2	4
8/11/2003	BRS	2	5	14	40.0	2	34	17	21	2	75	3	0.5	0	0	4.5	0.5	4	4.5	1	2	3
8/11/2003	BRS	2	6	14	57.1	5	63	56	27	0		0	1	0	0	6	1	5	6	1	1	2
8/15/2003	BRS	3	1	14	25.0	2	25	23	14	0		0	3	0	0	5	3	2	5	1	1	2
8/15/2003	BRS	3	2	14	50.0	3	75	29	26	0		0	3	0	0	6	3	3	6	1	1	2
8/15/2003	BRS	3	3	14	20.0	0.5	22	2	15	0		0	4	0	0	4.5	4	0.5	4.5	1	1	2
8/15/2003	BRS	3	4	14	16.7	3	70	19	22	0		0	3	0	0	6	3	3	6	1	1	2
8/15/2003	BRS	3	5	14	25.0	1	26	16	18	0		0	6	0	0	7	6	1	7	2	1	3
8/15/2003	BRS	3	6	14	0.0	0	0	0	19	0		0	6.5	0	0	6.5	6.5	0	6.5	2	0	2
8/15/2003	BRS	4	1	14	83.3	10	40	118	26	0		0	2	0	0	12	2	10	12	1	1	2
8/15/2003	BRS	4	2	14	33.3	15	50	80	27	0		0	4	5	0	24	4	15	19	1	1	2
8/15/2003	BRS	4	3	14	83.3	20	83	150	45	0		0	1	0	0	21	1	20	21	1	1	2
8/15/2003	BRS	4	4	14	100.0	22	64	125	30	0		0	1.5	2	0	25.5	1.5	22	23.5	2	1	3
8/15/2003	BRS	4	5	14	20.0	2	77	15	23	0		0	1	0	0	3	1	2	3	1	1	2
8/15/2003	BRS	4	6	14	60.0	5	44	74	22	0		0	0.5	0	0	5.5	0.5	5	5.5	1	1	2
8/15/2003	BRS	5	1	14	100.0	30	78	175	32	0		0	2	3	1	35	2	30	32	1	1	2
8/15/2003	BRS	5	2	14	33.3	6	45	75	22	0		0	4	0	0	10	4	6	10	2	1	3
8/15/2003	BRS	5	3	14	50.0	6	48	86	23	0		0	3	0.5	0	9.5	3	6	9	1	1	2
8/15/2003	BRS	5	4	14	50.0	5	40	34	18	0		0	1	0	0	6	0.5	5.5	6	1	2	3
8/15/2003	BRS	5	5	14	85.7	7	46	116	21	0		0	3	0	0	10	3	7	10	1	1	2
8/15/2003	BRS	5	6	14	80.0	5	70	55	26	0		0	2	0	0	7	2	5	7	1	1	2
10/27/2004	BRS	1	2	28		60			38	0			1.5	7	0	68.5	1.5	60	61.5	2	1	3
10/27/2004	BRS	1	2	28		15			38	0			0	0	60	15	0	15	15	0	1	1
10/27/2004	BRS	1	2	28		45			36	0			0	10	0	55	0	45	45	0	1	1
10/27/2004	BRS	1	2	28		25				0			0	3	0	28	0	25	25	0	1	1
10/27/2004	BRS	1	2	28		30			34	0			0.5	2	0	32.5	0.5	30	30.5	1	1	2
10/27/2004	BRS	1	2	28		25			30	0			0	2	0	27	0	25	25	0	1	1
10/27/2004	BRS	2	2	28		45			30	0			3	5	80	53	3	45	48	1	1	2
10/27/2004	BRS	2	2	28		55			37	0			8	10	50	73	8	55	63	2	1	3
10/27/2004	BRS	2	2	28		8			26	1			1	0	0	10	1	9	10	1	2	3
10/27/2004	BRS	2	2	28		40			30	0			1.5	0	0	41.5	1.5	40	41.5	2	1	3
10/27/2004	BRS	2	2	28		30			34	5			7	0	0	42	5	37	42	3	3	6
10/27/2004	BRS	2	2	28		35			30	0.5			4.5	3	40	43	3.5	36.5	40	3	3	6
10/27/2004	BRS	3	4	28		0			4	0			4	0	0	4	4	0	4	2	0	2
10/27/2004	BRS	3	4	28		18			34	0			3	3	60	24	3	18	21	2	1	3
10/27/2004	BRS	3	4	28		0			1	0			0.5	0	0	0.5	0.5	0	0.5	1	0	1
10/27/2004	BRS	3	4	28		5			18	0			2	0	0	7	2	5	7	1	1	2
10/27/2004	BRS	3	4	28		0.5			7	0			5	0	0	5.5	4	1.5	5.5	2	2	4
10/27/2004	BRS	3	4	28		3			16	0			4.5	1	0	8.5	4	3.5	7.5	2	2	4
10/27/2004	BRS	4	1	28		25			31	0			6	12	0	43	6	25	31	1	1	2
10/27/2004	BRS	4	1	28		45			31	0			1	2	70	48	1	45	46	1	1	2
10/27/2004	BRS	4	1	28		10			17	0			28	0	0	38	28	10	38	3	1	4

10/27/2004	BRS	4	1	28		35			16	0			3	10	0	48	3	35	38	2	1	3
10/27/2004	BRS	4	1	28		15			34	0			10	0	0	25	10	15	25	1	1	2
10/27/2004	BRS	4	1	28		14			23	0			15	0	0	29	15	14	29	1	1	2
11/3/2004	BRS	5	3	28.5		55			33	1			5	20	0	81	5	56	61	3	1	5
11/3/2004	BRS	5	3	28.5		8			22	0			15	2	0	25	15	8	23	1	1	2
11/3/2004	BRS	5	3	28.5		60			28	0			0.5	0	90	60.5	0.5	60	60.5	1	1	2
11/3/2004	BRS	5	3	28.5		8			34	7	70.6667		21.5	6	0	42.5	21.5	15	36.5	3	2	5
11/3/2004	BRS	5	3	28.5		30			30	0			0.5	5	0	35.5	0.5	30	30.5	1	1	2
11/3/2004	BRS	5	3	28.5		65			26	0			9	12	0	86	7	67	74	1	2	3
9/8/2005	BRS	1	1	39		80			77	0		0	0.5	0	0	80.5	0.5	80	80.5	1	1	2
9/8/2005	BRS	1	2	39		45			36	0		0	2.5	25	0	72.5	2.5	45	47.5	2	1	3
9/8/2005	BRS	1	3	39		45			31	0		0	2	30	0	77	2	45	47	1	1	2
9/8/2005	BRS	1	4	39		45			50	0		0	2	25	0	72	2	45	47	1	1	2
9/8/2005	BRS	1	5	39		55			37	0		0	10	20	0	85	2	63	65	3	2	5
9/8/2005	BRS	1	6	39		75			83	0		0	0	0	0	75	0	75	75	0	1	1
9/13/2005	BRS	2	1	39		40			23	0		0	2	4	0	46	2	40	42	2	1	3
9/13/2005	BRS	2	2	39		50			36	0		0	4	25	0	79	4	50	54	2	1	3
9/13/2005	BRS	2	3	39		30			23	0		0	17.5	3	0	50.5	12.5	35	47.5	3	2	5
9/13/2005	BRS	2	4	39		35			22	0		0	6	2	0	43	6	35	41	2	1	3
9/13/2005	BRS	2	5	39		15			21	0		0	14.5	2	0	31.5	9.5	20	29.5	3	2	5
9/13/2005	BRS	2	6	39		45			27	0		0	11.5	0.5	0	57	8.5	48	56.5	3	2	5
9/13/2005	BRS	3	1	38.5		5			15	0		0	4.5	0	0	9.5	4.5	5	9.5	3	1	4
9/13/2005	BRS	3	2	38.5		0			9	0		0	0.5	0	0	0.5	0.5	0	0.5	1	0	1
9/13/2005	BRS	3	3	38.5		18			19	0		0	7	0	0	25	7	18	25	2	1	3
9/13/2005	BRS	3	4	38.5		25			54	0		0	7	2	0	34	7	25	32	2	1	3
9/13/2005	BRS	3	5	38.5		25			30	0		0	20	5	0	50	18	27	45	2	2	4
9/13/2005	BRS	3	6	38.5		35			19	0		0	0.5	0	0	35.5	0.5	35	35.5	1	1	2
9/13/2005	BRS	4	1	39		65			26	0		0	9	10	0	84	7	67	74	2	3	5
9/13/2005	BRS	4	2	39		40			51	0		0	8.5	10	0	58.5	8.5	40	48.5	3	1	4
9/13/2005	BRS	4	3	39		50			19	0		0	7.5	30	0	87.5	7.5	50	57.5	3	1	4
9/13/2005	BRS	4	4	39		75			47	0		0	7	1	0	83	7	75	82	1	1	2
9/13/2005	BRS	4	5	39		40			16	0		0	5.5	15	0	60.5	5.5	40	45.5	2	1	3
9/13/2005	BRS	4	6	39		25			15	0		0	3.5	5	0	33.5	3.5	25	28.5	2	1	3
9/29/2005	BRS	5	1	39		3			17	0		0	2.5	1	0	6.5	2.5	3	5.5	2	1	3
9/29/2005	BRS	5	2	39		75			46	0		0	5	12	0	92	5	75	80	2	1	3
9/29/2005	BRS	5	3	39		50			29	0		0	5	20	0	75	5	50	55	2	1	3
9/29/2005	BRS	5	4	39		75			23	0		0	0	10	0	85	0	75	75	0	1	1
9/29/2005	BRS	5	5	39		55			34	0		0	12	13	0	80	12	55	67	2	1	3
9/29/2005	BRS	5	6	39		40			29	0		0	1	5	0	46	1	40	41	2	1	3
8/7/2002	PLUGS	1	1	2	71.4	5	47	21		2	28	7	0	0	0	7	0	7	7	0	2	2
8/7/2002	PLUGS	1	2	2	75.0	4	70	14		0		0	0	0	0	4	0	4	4	0	1	1
8/7/2002	PLUGS	1	3	2	83.3	5	48	10		0		0	1.5	0	0	6.5	0	6.5	6.5	0	3	3
8/7/2002	PLUGS	1	4	2	83.3	7	80	36		0		0	0	0	0	7	0	7	7	0	1	1
8/7/2002	PLUGS	1	5	2	100.0	9	55	44		0		0	0.5	0	0	9.5	0	9.5	9.5	0	2	2
8/7/2002	PLUGS	1	6	2	100.0	10	80	37		0		0	0	0	0	10	0	10	10	0	1	1
8/7/2002	PLUGS	2	1	2	100.0	5	49	15		0		0	0	0	0	5	0	5	5	0	1	1
8/7/2002	PLUGS	2	2	2	75.0	5	44	21		0		0	0	0	0	5	0	5	5	0	1	1
8/7/2002	PLUGS	2	3	2	100.0	6	65	22		0.5	12	1	0	0	0	6.5	0	6.5	6.5	0	2	2
8/7/2002	PLUGS	2	4	2	100.0	10	70	29		0		0	0	0	0	10	0	10	10	0	1	1
8/7/2002	PLUGS	2	5	2	100.0	3	48	14		0		0	0	0	0	3	0	3	3	0	1	1
8/7/2002	PLUGS	2	6	2	100.0	7	64	25		0		0	0.5	0	1	7.5	0.5	7	7.5	1	1	2
8/7/2002	PLUGS	3	1	1.5	100.0	4	39	12		1	23	1	0.5	0	0	5.5	0.5	5	5.5	1	2	3
8/7/2002	PLUGS	3	2	1.5	100.0	1	30	12		0.5	25	2	0	0	0	1.5	0	1.5	1.5	0	2	2
8/7/2002	PLUGS	3	3	1.5	100.0	3	40	17		12	40	47	0	0	0	15	0	15	15	0	2	2
8/7/2002	PLUGS	3	4	1.5	100.0	5	31	22		0		0	1	0	1	6	0	6	6	0	2	2
8/7/2002	PLUGS	3	5	1.5	75.0	2	25	6		2	56	8	1	0	0	5	0	5	5	0	3	3
8/7/2002	PLUGS	3	6	1.5	85.7	3	35	15		2	36	8	0.5	0	0	5.5	0	5.5	5.5	0	3	3

8/7/2002	PLUGS	4	1	1.5	100.0	4	39	12		0		0	0	0	1	4	0	4	4	0	1	1
8/7/2002	PLUGS	4	2	1.5	100.0	6	46	24		0		0	0	0	1	6	0	6	6	0	1	1
8/7/2002	PLUGS	4	3	1.5	100.0	5	39	27		0		0	3.5	0	1	8.5	0.5	8	8.5	1	2	3
8/7/2002	PLUGS	4	4	1.5	60.0	6	44	19		0		0	0.5	0	1	6.5	0	6.5	6.5	0	2	2
8/7/2002	PLUGS	4	5	1.5	83.3	3	41	14		0		0	1	0	1	4	0	4	4	0	2	2
8/7/2002	PLUGS	4	6	1.5	100.0	9	37	32		0		0	0	0	0	9	0	9	9	0	1	1
8/7/2002	PLUGS	5	1	1.5	66.7	5	27	21		0		0	0	0	0	5	0	5	5	0	1	1
8/7/2002	PLUGS	5	2	1.5	100.0	4	34	16		0		0	1	0	0	5	0	5	5	0	2	2
8/7/2002	PLUGS	5	3	1.5	80.0	5	31	18		0		0	0	0	0	5	0	5	5	0	1	1
8/7/2002	PLUGS	5	4	1.5	80.0	3	34	9		0		0	0	0	0	3	0	3	3	0	1	1
8/7/2002	PLUGS	5	5	1.5	100.0	3	35	15		1	32	3	1	0	0	5	0	5	5	0	3	3
8/7/2002	PLUGS	5	6	1.5	100.0	2	33	12		1	20	2	0	0	0	3	0	3	3	0	2	2
11/11/2002	PLUGS	1	1	5	100.0	8	55	73		0		0	1	0	0	9	0	9	9	0	2	2
11/11/2002	PLUGS	1	2	5	100.0	8	56	70		0		0	0	0	1	8	0	8	8	0	1	1
11/11/2002	PLUGS	1	3	5	100.0	8	50	93		0		0	1	0	1	9	0	9	9	0	2	2
11/11/2002	PLUGS	1	4	5	85.7	8	78	88		0		0	0.5	0	0	8.5	0	8.5	8.5	0	1	1
11/11/2002	PLUGS	1	5	5	100.0	5	49	84		0		0	1	0	0	6	0	6	6	0	2	2
11/11/2002	PLUGS	1	6	5	100.0	7	47	93		0		0	0.5	0	1	7.5	0	7.5	7.5	0	1	1
11/11/2002	PLUGS	2	1	5	100.0	5	34	69		0		0	0	3	0	8	0	5	5	0	1	1
11/11/2002	PLUGS	2	2	5	80.0	4	71	39		0		0	2	2	0	8	0	4	4	0	1	1
11/11/2002	PLUGS	2	3	5	100.0	2	43	19		0		0	0.5	0	0	2.5	0	2.5	2.5	0	2	2
11/11/2002	PLUGS	2	4	5	100.0	3	45	28		0		0	0.5	0	1	3.5	0	3.5	3.5	0	2	2
11/11/2002	PLUGS	2	5	5	66.7	2	30	16		0		0	0	0	1	2	0	2	2	0	1	1
11/11/2002	PLUGS	2	6	5	85.7	2	37	23		0		0	0.5	2	1	4.5	0	2.5	2.5	0	2	2
11/11/2002	PLUGS	3	1	4.5	100.0	2	25	22		0		0	0.5	0.5	0	3	0	2.5	2.5	0	2	2
11/11/2002	PLUGS	3	2	4.5	80.0	2	17	21		0		0	1.5	0	0	3.5	1	2.5	3.5	0	1	1
11/11/2002	PLUGS	3	3	4.5	80.0	4	78	39		0		0	0	0	1	4	0	4	4	1	2	3
11/11/2002	PLUGS	3	4	4.5	100.0	0.5	91	10		0		0	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	PLUGS	3	5	4.5	75.0	1	24	8		0		0	0	0	1	1	0	1	1	0	1	1
11/11/2002	PLUGS	3	6	4.5	75.0	1	52	21		0		0	0	0	0	1	0	1	1	0	1	1
11/11/2002	PLUGS	4	1	4.5	100.0	3	37	40		0		0	0.5	0	0	3.5	0	3.5	3.5	0	2	2
11/11/2002	PLUGS	4	2	4.5	100.0	3	62	40		0		0	0.5	0	0	3.5	0	3.5	3.5	0	2	2
11/11/2002	PLUGS	4	3	4.5	100.0	2	33	25		0		0	0.5	0	0	2.5	0	2.5	2.5	0	2	2
11/11/2002	PLUGS	4	4	4.5	100.0	4	53	49		0		0	0	0	1	4	0	4	4	0	1	1
11/11/2002	PLUGS	4	5	4.5	100.0	4	39	52		0		0	0.5	0	0	4.5	0	4.5	4.5	0	2	2
11/11/2002	PLUGS	4	6	0.5	75.0	0.5	18	5		0		0	0.5	0	0	1	0	1	1	0	2	2
11/11/2002	PLUGS	5	1	4.5	100.0	5	38	44		0		0	1	0	0	6	0	6	6	0	2	2
11/11/2002	PLUGS	5	2	4.5	100.0	3	36	33		0		0	1	0	0	4	0	4	4	0	2	2
11/11/2002	PLUGS	5	3	4.5	50.0	1	32	6		0		0	0	0	0	1	0	1	1	0	1	1
11/11/2002	PLUGS	5	4	4.5	83.3	3	32	22		0		0	0.5	0.5	0	4	0	3.5	3.5	0	2	2
11/11/2002	PLUGS	5	5	3	100.0	2	75	15		0		0	0.5	0	0	2.5	0	2.5	2.5	0	2	2
11/11/2002	PLUGS	5	6	3	100.0	2	72	20		0		0	0	0	0	2	0	2	2	0	1	1
8/11/2003	PLUGS	1	1	14	100.0	20	43	130	33	0		0	7	0	0	27	3	24	27		2	3
8/11/2003	PLUGS	1	2	14	100.0	18	69	90	36	0		0	3.5	0	0	21.5	3	18.5	21.5	2	2	4
8/11/2003	PLUGS	1	3	14	100.0	20	68	130	37	0		0	5.5	10	0	35.5	5.5	20	25.5	2	1	3
8/11/2003	PLUGS	1	4	14	71.4	12	59	110	24	0		0	2	30	1	44	2	12	14	1	1	2
8/11/2003	PLUGS	1	5	14	100.0	30	79	150	37	0		0	5.5	10	1	45.5	5	30.5	35.5	1	2	3
8/11/2003	PLUGS	1	6	14	66.7	8	44	85	19	0		0	6	5	0	19	6	8	14	1	1	2
8/11/2003	PLUGS	2	1	14	100.0	12	80	125	39	1	53	8	2.5	20	1	35.5	2.5	13	15.5	2	2	4
8/11/2003	PLUGS	2	2	14	100.0	8	79	94	31	0		0	3	0	0	11	3	8	11	2	1	3
8/11/2003	PLUGS	2	3	14	100.0	10	75	186	35	0		0	2.5	10	0	22.5	2.5	10	12.5	2	1	3
8/11/2003	PLUGS	2	4	14	50.0	2	68	21	18	0		0	2	10	0	14	2	2	4	1	1	2
8/11/2003	PLUGS	2	5	14	75.0	5	75	85	23	0		0	2	10	1	17	2	5	7	1	1	2
8/11/2003	PLUGS	2	6	14	71.4	3	41	78	21	0		0	1.5	10	1	14.5	1	3.5	4.5	1	2	3
8/15/2003	PLUGS	3	1	14	80.0	4	37	35	23	0		0	3	0	0	7	2.5	4.5	7	2	2	4
8/15/2003	PLUGS	3	2	14	50.0	10	70	105	24	0		0	3	0	1	13	3	10	13	1	1	2
8/15/2003	PLUGS	3	3	14	60.0	3	72	36	28	0		0	2	0	0	5	2	3	5	2	1	3

8/15/2003 PLUGS	3	4	14	71.4	3	43	70	16	0		0	2	0	0	5	2	3	5	2	1	3
8/15/2003 PLUGS	3	5	14	100.0	30	71	310	29	0		0	5	0	1	35	5	30	35	1	1	2
8/15/2003 PLUGS	3	6	14	0.0	0	0	0	0	0		0	0	0	1	0	0	0	0	0	0	0
8/15/2003 PLUGS	4	1	14	33.3	0.5	25	8	15	0		0	2.5	5	0	8	2	1	3	1	2	3
8/15/2003 PLUGS	4	2	14	14.3	2	65	17	20	0		0	3	15	1	20	3	2	5	1	1	2
8/15/2003 PLUGS	4	3	14	100.0	22	71	142	34	0		0	2	0	0	24	1.5	22.5	24	2	2	4
8/15/2003 PLUGS	4	4	14	20.0	0.5	18	3	17	0		0	2	0	0	2.5	2	0.5	2.5	1	1	2
8/15/2003 PLUGS	4	5	14	100.0	30	48	205	30	0		0	2.5	1	1	33.5	2	30.5	32.5	1	2	3
8/15/2003 PLUGS	4	6	14	0.0	0	0	0	16	0		0	1	2	0	3	1	0	1	1	0	1
8/15/2003 PLUGS	5	1	14	40.0	0.5	23	4	17	0		0	3.5	0	0	4	3	1	4	1	2	3
8/15/2003 PLUGS	5	2	14	66.7	3	47	23	20	0		0	5	0	0	8	5	3	8	2	1	3
8/15/2003 PLUGS	5	3	14	83.3	7	56	83	26	0		0	6	0	0	13	6	7	13	2	1	3
8/15/2003 PLUGS	5	4	14	100.0	9	50	100	26	0		0	8	0	0	17	8	9	17	2	1	3
8/15/2003 PLUGS	5	5	12	100.0	12	48	130	24	0		0	5	0	0	17	4.5	12.5	17	2	2	4
8/15/2003 PLUGS	5	6	12	100.0	5	50	77	25	0		0	9	1	0	15	9	5	14	2	1	3
10/27/2004 PLUGS	1	1	28		18			22	0			0	2	0	20	0	18	18	0	1	1
10/27/2004 PLUGS	1	1	28		22			19	0			0.5	0.5	0	23	0.5	22	22.5	1	1	2
10/27/2004 PLUGS	1	1	28		60			25	0			0	2	0	62	0	60	60	0	1	1
10/27/2004 PLUGS	1	1	28		50			25	0			8	20	0	78	0	58	58	0	3	3
10/27/2004 PLUGS	1	1	28		40			27	0			2	5	0	47	2	40	42	1	1	2
10/27/2004 PLUGS	1	1	28		25			23	0.5			8	0	0	33.5	3	30.5	33.5	1	3	4
10/27/2004 PLUGS	2	4	28		60			23	0			1	20	0	81	0	61	61	0	2	2
10/27/2004 PLUGS	2	4	28		10			15	0			10	7	0	27	3	17	20	2	2	4
10/27/2004 PLUGS	2	4	28		40			24	0			2.5	25	0	67.5	1	41.5	42.5	1	3	4
10/27/2004 PLUGS	2	4	28		25			22	0			3.5	15	0	43.5	3	25.5	28.5	2	2	4
10/27/2004 PLUGS	2	4	28		5			16	0			5	5	0	15	1	9	10	1	3	4
10/27/2004 PLUGS	2	4	28		10			26	0			2	2	70	14	2	10	12	1	1	2
10/27/2004 PLUGS	2	4	28		20			25	0			0	1	100	21	0	20	20	0	1	1
10/27/2004 PLUGS	3	1	28		30			23	0			5.5	4	0	39.5	5.5	30	35.5	2	1	3
10/27/2004 PLUGS	3	1	28		25			25	0			0	3	50	28	0	25	25	0	1	1
10/27/2004 PLUGS	3	1	28		35			20	0			10.5	0	80	45.5	8.5	37	45.5	2	2	4
10/27/2004 PLUGS	3	1	28		25			27	0			13	0	0	38	11	27	38	2	2	4
10/27/2004 PLUGS	3	1	28		10			22	0			6	0	0	16	4	12	16	1	2	3
10/27/2004 PLUGS	3	1	28		60			28	0			0	0	100	60	0	60	60	0	1	1
10/27/2004 PLUGS	4	2	28		6			9	0			2	0	0	8	2	6	8	1	1	2
10/27/2004 PLUGS	4	2	28		12			17	0			12	1	0	25	12	12	24	2	1	3
10/27/2004 PLUGS	4	2	28		35			16	0			4	5	10	44	1	38	39	1	2	3
10/27/2004 PLUGS	4	2	28		18			16	0			5	6	0	29	3	20	23	2	2	4
10/27/2004 PLUGS	4	2	28		25			24	0			0	0	100	25	0	25	25	0	1	1
10/27/2004 PLUGS	4	2	28		2			10	0			15	0	0	17	15	2	17	1	1	2
11/3/2004 PLUGS	5	2	28.5		12			18	0			23	4	0	39	23	12	35	2	1	3
11/3/2004 PLUGS	5	2	28.5		2			17	0			65	10	0	77	65	2	67	2	1	3
11/3/2004 PLUGS	5	2	28.5		30			19	0			32	7	0	69	32	30	62	2	1	3
11/3/2004 PLUGS	5	2	28.5		25			16	0			37	5	0	67	37	25	62	4	1	5
11/3/2004 PLUGS	5	2	28.5		7			12	0			20	1	0	28	18	9	27	2	2	4
11/3/2004 PLUGS	5	2	28.5		15			18	0			22	20	0	57	14	23	37	2	2	4
9/8/2005 PLUGS	1	1	39		65			49	0		0	4.5	10	0	79.5	4.5	65	69.5	2	1	3
9/8/2005 PLUGS	1	2	39		40			43	0.5	15	2	7	1	0	48.5	3	44.5	47.5	2	3	5
9/8/2005 PLUGS	1	3	39		45			31	0		0	10	20	0	75	4	51	55	2	2	4
9/8/2005 PLUGS	1	4	39		75			43	0		0	5.5	5	0	85.5	2.5	78	80.5	2	2	4
9/8/2005 PLUGS	1	5	39		70			45	0		0	6	10	0	86	2	74	76	1	2	3
9/8/2005 PLUGS	1	6	39		45			36	0		0	8	17	0	70	6	47	53	2	2	4
9/8/2005 PLUGS	2	1	39		35			42	0		0	0	15	15	50	0	35	35	0	1	1
9/8/2005 PLUGS	2	2	39		60			43	0		0	10.5	15	0	85.5	10.5	60	70.5	3	1	4
9/8/2005 PLUGS	2	3	39		30			39	0		0	0	35	40	65	0	30	30	0	1	1
9/8/2005 PLUGS	2	4	39		75			56	0		0	6	5	0	86	4	77	81	1	2	3
9/8/2005 PLUGS	2	5	39		65			54	0		0	1.5	5	0	71.5	1.5	65	66.5	2	1	3

9/8/2005	PLUGS	2	6	39	40			32	0		0	6	14	0	60	6	40	46	2	1	3
9/13/2005	PLUGS	3	1	38.5	70			55	0		0	0.5	0	100	70.5	0.5	70	70.5	1	1	2
9/13/2005	PLUGS	3	2	38.5	25			31	0		0	4	2	0	31	3	26	29	2	2	4
9/13/2005	PLUGS	3	3	38.5	5			24	6		23	69	3	0	83	9	71	80	2	3	5
9/13/2005	PLUGS	3	4	38.5	40			77	0		0	0	0	100	40	0	40	40	0	1	1
9/13/2005	PLUGS	3	5	38.5	60			52	0		0	3	6	33	69	3	60	63	1	1	2
9/13/2005	PLUGS	3	6	38.5	60			71	0		0	0	0	100	60	0	60	60	0	1	1
9/29/2005	PLUGS	4	1	39	37			23	0		0	7.5	10	0	54.5	7.5	37	44.5	3	1	4
9/29/2005	PLUGS	4	2	39	55			35	0		0	5	10	0	70	5	55	60	1	1	2
9/29/2005	PLUGS	4	3	39	60			28	0		0	6	20	0	86	6	60	66	2	1	3
9/29/2005	PLUGS	4	4	39	45			27	0		0	5.5	20	0	70.5	5.5	45	50.5	2	1	3
9/29/2005	PLUGS	4	5	39	65			53	0		0	0	0	0	65	0	65	65	0	1	1
9/29/2005	PLUGS	4	6	39	60			37	0		0	20	5	0	85	20	60	80	1	1	2
9/29/2005	PLUGS	5	1	39	40			31	0		0	22	20	0	82	22	40	62	2	1	3
9/29/2005	PLUGS	5	2	39	30			31	0		0	8	10	0	48	6	32	38	2	2	4
9/29/2005	PLUGS	5	3	39	50			32	0		0	11	25	0	86	11	50	61	2	1	3
9/29/2005	PLUGS	5	4	39	20			28	0		0	3	3	0	26	3	20	23	2	1	3
9/29/2005	PLUGS	5	5	39	60			34	0		0	10	15	0	85	8	62	70	2	2	4
9/29/2005	PLUGS	5	6	39	25			28	0		0	6	5	0	36	6	25	31	3	1	4
11/11/2002	SH	1	1	2	0.5	13	14		0		0	0	0	1	0.5	0	0.5	0.5	0	1	1
11/11/2002	SH	1	2	2	4	46	66		0		0	1	0	0	5	0	5	5	0	2	2
11/11/2002	SH	1	3	2	0	0	0		0		0	1	0	1	1	0	1	1	0	1	1
11/11/2002	SH	1	4	2	1	22	18		0		0	0.5	0	0	1.5	0	1.5	1.5	0	1	1
11/11/2002	SH	1	5	2	0	0	0		0		0	2	0	0	2	0	2	2	0	1	1
11/11/2002	SH	1	6	2	0	0	0		0		0	0.5	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	SH	2	1	2	0	0	0		2	49	4	0	0	0	2	0	2	2	0	1	1
11/11/2002	SH	2	2	2	0	0	0		0		0	1	0	0	1	0	1	1	0	1	1
11/11/2002	SH	2	3	2	0	0	0		0.5	18	2	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	SH	2	4	2	0	0	0		2	73	8	0	0	0	2	0	2	2	0	1	1
11/11/2002	SH	2	5	2	0	0	0		3	56	16	0	0	0	3	0	3	3	0	1	1
11/11/2002	SH	2	6	2	0	0	0		2	77	5	0	0	0	2	0	2	2	0	1	1
11/11/2002	SH	3	1	2	0	0	0		0		0	0	0	1	0	0	0	0	0	0	0
11/11/2002	SH	3	2	2	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	SH	3	3	2	0	0	0		0.5	21	3	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	SH	3	4	2	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	SH	3	5	2	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	SH	3	6	2	0	0	0		0		0	0	0	1	0	0	0	0	0	0	0
11/11/2002	SH	4	1	1	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	SH	4	2	1	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	SH	4	3	1	0	0	0		0		0	0	0	1	0	0	0	0	0	0	0
11/11/2002	SH	4	4	1	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	SH	4	5	1	0	0	0		0		0	0	0	1	0	0	0	0	0	0	0
11/11/2002	SH	4	6	1	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	SH	5	1	1	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	SH	5	2	1	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	SH	5	3	1	0	0	0		0.5	24	1	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	SH	5	4	1	0	0	0		0		0	0	0	1	0	0	0	0	0	0	0
11/11/2002	SH	5	5	1	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	SH	5	6	1	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
8/11/2003	SH	1	1	11	6	64	65	24	0		0	5	10	0	21	3	8	11	1	2	3
8/11/2003	SH	1	2	11	6	48	60	19	0		0	2	40	1	48	2	6	8	1	1	2
8/11/2003	SH	1	3	11	2	26	16	19	0		0	15.5	10	1	27.5	5.5	12	17.5	2	3	5
8/11/2003	SH	1	4	11	7	56	120	23	0		0	6	20	1	33	5	8	13	1	2	3
8/11/2003	SH	1	5	11	2	45	43	13	0		0	3	5	1	10	3	2	5	1	1	2
8/11/2003	SH	1	6	11	2	28	17	21	0		0	0	0	1	2	0	2	2	0	1	1
8/11/2003	SH	2	1	11	1	30	8	16	0.5	18	2	4	0	0	5.5	3.5	2	5.5	3	3	6
8/11/2003	SH	2	2	11	0.5	22	3	33	2	85	9	2	0	0	4.5	2	2.5	4.5	2	2	4

8/11/2003	SH	2	3	11	0	0	0	15	0		0	2.5	0	0	2.5	2.5	0	2.5	2	0	2
8/11/2003	SH	2	4	11	4	13	4	19	2	92	7	3.5	0	0	9.5	3	6.5	9.5	1	3	4
8/11/2003	SH	2	5	11	0.5	18	7	17	2	71	17	3	0	0	5.5	3	2.5	5.5	2	2	4
8/11/2003	SH	2	6	11	2	33	32	20	0		0	4	40	1	46	4	2	6	1	1	2
8/15/2003	SH	3	1	11	0.5	19	10	18	0		0	6.5	0.5	0	7.5	5.5	1.5	7	2	3	5
8/15/2003	SH	3	2	11	0.5	17	3	19	0		0	5.5	0	0	6	5.5	0.5	6	2	1	3
8/15/2003	SH	3	3	11	0.5	19	7	19	0.5	15	2	8.5	0	0	9.5	8.5	1	9.5	3	2	5
8/15/2003	SH	3	4	11	0	0	0	18	0		0	6	0	0	6	6	0	6	1	0	1
8/15/2003	SH	3	5	11	0.5	22	7	16	0		0	4	0	0	4.5	4	0.5	4.5	2	1	3
8/15/2003	SH	3	6	11	1	31	26	22	0		0	7	3	1	11	7	1	8	1	1	2
8/15/2003	SH	4	1	10	1	21	11	20	0		0	10	2	1	13	10	1	11	1	1	2
8/15/2003	SH	4	2	10	0	0	0	19	0		0	2	0	0	2	2	0	2	1	0	1
8/15/2003	SH	4	3	10	1	19	10	19	0		0	15.5	0.5	0	17	15.5	1	16.5	2	1	3
8/15/2003	SH	4	4	10	1	23	14	12	0		0	1	0	0	2	1	1	2	1	1	2
8/15/2003	SH	4	5	10	0.5	23	8	20	0		0	3	1	1	4.5	3	0.5	3.5	1	1	2
8/15/2003	SH	4	6	10	1	25	10	17	0		0	10.5	0	0	11.5	10.5	1	11.5	2	1	3
8/15/2003	SH	5	1	10	2	43	36	21	0		0	6	0	0	8	6	2	8	1	1	2
8/15/2003	SH	5	2	10	0	0	0	37	4	79	24	1	0	0	5	1	4	5	2	1	3
8/15/2003	SH	5	3	10	2	67	22	18	0		0	2	0	0	4	2	2	4	1	1	2
8/15/2003	SH	5	4	10	0	0	0	19	2	56	8	3	0	0	5	3	2	5	1	1	2
8/15/2003	SH	5	5	10	0.5	15	2	19	0		0	4	0	0	4.5	4	0.5	4.5	1	1	2
8/15/2003	SH	5	6	10	0.5	21	4	13	0		0	0	0	0	0.5	0	0.5	0.5	0	1	1
10/27/2004	SH	1	3	25.5	30			36	0			32	2	10	64	1	61	62	1	3	4
10/27/2004	SH	1	3	25.5	10			28	0			5	0	90	15	0	15	15	0	0	2
10/27/2004	SH	1	3	25.5	55			43	0			0	5	30	60	0	55	55	0	1	1
10/27/2004	SH	1	3	25.5	55			29	0			7	10	0	72	0	62	62	0	3	3
10/27/2004	SH	1	3	25.5	25			28	0			0	15	0	40	0	25	25	0	1	1
10/27/2004	SH	1	3	25.5	11			21	0			0	7	0	18	0	11	11	0	1	1
10/27/2004	SH	2	3	25.5	0.5			6	0			5.5	0	0	6	3	3	6	1	3	4
10/27/2004	SH	2	3	25.5	15			24	0			5.5	3	20	23.5	4.5	16	20.5	2	2	4
10/27/2004	SH	2	3	25.5	0			35	3			1	4	0	8	0	4	4	0	2	2
10/27/2004	SH	2	3	25.5	2			26	2			10	0	0	14	6	8	14	2	3	5
10/27/2004	SH	2	3	25.5	0			46	4			3	0	0	7	1	6	7	1	3	4
10/27/2004	SH	2	3	25.5	3			11	0			0	0	0	3	0	3	3	0	1	1
10/27/2004	SH	3	3	25.5	4			16	0			6	1	0	11	3	7	10	3	3	6
10/27/2004	SH	3	3	25.5	3			17	0			0.5	0	10	3.5	0.5	3	3.5	1	1	2
10/27/2004	SH	3	3	25.5	1			10	0			1	0.5	0	2.5	1	1	2	1	1	2
10/27/2004	SH	3	3	25.5	2			9	0			1	0	0	3	1	2	3	1	1	2
10/27/2004	SH	3	3	25.5	15			18	0			0	2	100	17	0	15	15	0	1	1
10/27/2004	SH	3	3	25.5	6			17	0			1	0	30	7	1	6	7	2	1	3
10/27/2004	SH	4	3	24.5	65			35	0			0	0	100	65	0	65	65	0	1	1
10/27/2004	SH	4	3	24.5	0			8	0			12	0	0	12	12	0	12	1	0	1
10/27/2004	SH	4	3	24.5	0			8	0			20	0	0	20	20	0	20	1	0	1
10/27/2004	SH	4	3	24.5	0			11	0			30	0	0	30	30	0	30	1	0	1
10/27/2004	SH	4	3	24.5	10			18	0			0	3	90	13	0	10	10	0	1	1
10/27/2004	SH	4	3	24.5	15			26	0			4	3	60	22	1	18	19	1	2	3
11/3/2004	SH	5	4	25	40			44	0			6	0	100	46	5	41	46	1	2	3
11/3/2004	SH	5	4	25	4			16	3	47		0.5	0	0	7.5	0.5	7	7.5	1	2	3
11/3/2004	SH	5	4	25	40			26	0			0	5	100	45	0	40	40	0	1	1
11/3/2004	SH	5	4	25	0			58	6	74.6667		2	0	0	8	0	8	8	0	2	2
11/3/2004	SH	5	4	25	25			29	0			0.5	2		27.5	0.5	25	25.5	1	1	2
11/3/2004	SH	5	4	25	2			22	2	58		18	2		24	3	19	22	2	4	6
9/8/2005	SH	1	1	36	15			35	0		0	3.5	72	70	90.5	0.5	18	18.5	1	2	3
9/8/2005	SH	1	2	36	65			59	0		0	0.5	12	0	77.5	0.5	65	65.5	1	1	2
9/8/2005	SH	1	3	36	35			43	0		0	19	5	0	59	1	53	54	1	2	3
9/8/2005	SH	1	4	36	75			48	0		0	1	0	0	76	1	75	76	1	1	2
9/8/2005	SH	1	5	36	25			50	0		0	2.5	32	50	59.5	0.5	27	27.5	1	2	3

9/8/2005	SH	1	6	36	40			28	0		0	25	5	0	70	10	55	65	2	2	4
9/13/2005	SH	2	1	36	5			29	2	0	3	32	2	0	41	27	12	39	2	4	6
9/13/2005	SH	2	2	36	70			80	0		0	0	0	100	70	0	70	70	0	1	1
9/13/2005	SH	2	3	36	0			20	3	0	3	16	3	0	22	10	9	19	2	3	5
9/13/2005	SH	2	4	36	10			25	1	0	3	8	4	0	23	8	11	19	3	2	5
9/13/2005	SH	2	5	36	6			35	0		0	16.5	1	0	23.5	8	14.5	22.5	3	3	6
9/13/2005	SH	2	6	36	60			60	0		0	7	15	0	82	7	60	67	1	1	2
9/13/2005	SH	3	1	36	15			29	0		0	31	0	0	46	26	20	46	3	2	5
9/13/2005	SH	3	2	36	35			43	0		0	5	8	0	48	5	35	40	1	1	2
9/13/2005	SH	3	3	36	0			6	0		0	0.5	0	0	0.5	0.5	0	0.5	1	0	1
9/13/2005	SH	3	4	36	20			25	0		0	2	0	0	22	2	20	22	1	1	2
9/13/2005	SH	3	5	36	0			28	3	0	8	4	0	0	7	3	4	7	2	2	4
9/13/2005	SH	3	6	36	1			16	0		0	1	0	0	2	1	1	2	1	1	2
9/29/2005	SH	4	1	36	3			13	0		0	2	1	0	6	2	3	5	1	1	2
9/29/2005	SH	4	2	36	0			15	0		0	5	1	0	6	5	0	5	1	0	1
9/29/2005	SH	4	3	36	22			17	0		0	0.5	25	0	47.5	0.5	22	22.5	1	1	2
9/29/2005	SH	4	4	36	20			31	0		0	0.5	7	0	27.5	0.5	20	20.5	1	1	2
9/29/2005	SH	4	5	36	25			24	0		0	3	15	0	43	3	25	28	1	1	2
9/29/2005	SH	4	6	36	5			18	0		0	3	5	0	13	3	5	8	1	1	2
9/29/2005	SH	5	1	36	40			35	1	33	3	1	0	0	42	1	41	42	2	2	4
9/29/2005	SH	5	2	36	40			26	0		0	0.5	15	0	55.5	0.5	40	40.5	1	1	2
9/29/2005	SH	5	3	36	6			39	5	84.3333	17	65	3	0	79	9	67	76	3	5	8
9/29/2005	SH	5	4	36	40			45	0		0	2	14	0	56	1	41	42	1	2	3
9/29/2005	SH	5	5	36	75			54	0		0	1	4	0	80	1	75	76	1	1	2
9/29/2005	SH	5	6	36	25			28	0		0	1	25	0	51	1	25	26	1	1	2
11/11/2002	BARE	1	1	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	1	2	6	0	0	0		0		0	0	1	0	1	0	0	0	0	0	0
11/11/2002	BARE	1	3	6	0.5	6	4		0		0	0	0	1	0.5	0	0.5	0.5	0	1	1
11/11/2002	BARE	1	4	6	1	11	15		0		0	15.5	0	1	16.5	12	4.5	16.5	1	2	3
11/11/2002	BARE	1	5	6	0	0	0		1	22	3	7.5	0	0	8.5	2	6.5	8.5	1	2	3
11/11/2002	BARE	1	6	6	0	0	0		0		0	2	0	1	2	2	0	2	0	1	1
11/11/2002	BARE	2	1	6	0	0	0		0.5	29	1	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	BARE	2	2	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	2	3	6	0	0	0		2	29	14	0	0	0	2	0	2	2	0	1	1
11/11/2002	BARE	2	4	6	0	0	0		0		0	0.5	0	1	0.5	0	0.5	0.5	0	1	1
11/11/2002	BARE	2	5	6	0	0	0		0.5	25	2	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	BARE	2	6	6	0	0	0		0.5	18	2	0	0	0	0.5	0	0.5	0.5	0	1	1
11/11/2002	BARE	3	1	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	3	2	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	3	3	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	3	4	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	3	5	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	3	6	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	4	1	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	4	2	6	0	0	0		0		0	0	0	1	0	0	0	0	0	0	0
11/11/2002	BARE	4	3	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	4	4	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	4	5	6	0	0	0		0		0	0	0	1	0	0	0	0	0	0	0
11/11/2002	BARE	4	6	6	0	0	0		0		0	0	0	1	0	0	0	0	0	0	0
11/11/2002	BARE	5	1	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	5	2	6	0	0	0		0		0	0	0.5	1	0.5	0	0	0	0	0	0
11/11/2002	BARE	5	3	6	0	0	0		0		0	0	0	1	0	0	0	0	0	0	0
11/11/2002	BARE	5	4	6	0	0	0		0		0	0	0	1	0	0	0	0	0	0	0
11/11/2002	BARE	5	5	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
11/11/2002	BARE	5	6	6	0	0	0		0		0	0	0	0	0	0	0	0	0	0	0
8/11/2003	BARE	1	1	14	0	0	0	22	0		0	7	15	0	22	6	1	7	1	1	2
8/11/2003	BARE	1	2	14	5	60	85	21	0		0	3	25	0	33	3	5	8	1	1	2

8/11/2003	BARE	1	3	14	3	83	25	27	0		0	8	2	1	13	3	8	11	1	3	4
8/11/2003	BARE	1	4	14	12	47	340	25	0		0	5	60	0	77	5	12	17	1	1	2
8/11/2003	BARE	1	5	14	2	57	16	28	0		0	9.5	0	1	11.5	2	9.5	11.5	1	3	4
8/11/2003	BARE	1	6	14	0	0	0	14	0		0	2	40	1	42	2	0	2	1	0	1
8/11/2003	BARE	2	1	14	0	0	0	19	0.5	45	2	13	0	0	13.5	13	0.5	13.5	2	1	3
8/11/2003	BARE	2	2	14	0	0	0	18	0		0	9	0	1	9	9	0	9	3	0	3
8/11/2003	BARE	2	3	14	0	0	0	25	3	66	18	2.5	0	0	5.5	2.5	3	5.5	3	1	4
8/11/2003	BARE	2	4	14	0.5	26	3	18	0		0	6.5	0	1	7	6	1	7	1	2	3
8/11/2003	BARE	2	5	14	1	24	3	19	1	41	6	5	0	0	7	4	3	7	2	3	5
8/11/2003	BARE	2	6	14	4	47	19	46	8	83	64	0.5	0	0	12.5	0.5	12	12.5	1	2	3
8/15/2003	BARE	3	1	14	0	0	0	8	0		0	2.5	2	0	4.5	2.5	0	2.5	2	0	2
8/15/2003	BARE	3	2	14	2	39	16	20	0		0	0.5	0	0	2.5	0.5	2	2.5	1	1	2
8/15/2003	BARE	3	3	14	0	0	0	22	0		0	10	0	0	10	10	0	10	1	0	1
8/15/2003	BARE	3	4	14	0.5	22	3	17	0		0	5	0	0	5.5	5	0.5	5.5	1	1	2
8/15/2003	BARE	3	5	14	0.5	16	3	18	0		0	5	0	0	5.5	5	0.5	5.5	3	1	4
8/15/2003	BARE	3	6	14	2	33	30	23	0		0	13.5	0	0	15.5	13.5	2	15.5	3	1	4
8/15/2003	BARE	4	1	14	0.5	32	2	18	0		0	7	0	0	7.5	6.5	1	7.5	2	2	4
8/15/2003	BARE	4	2	14	0	0	0	21	0		0	6	2	0	8	6	0	6	1	0	1
8/15/2003	BARE	4	3	14	0	0	0	12	0		0	0.5	0	0	0.5	0.5	0	0.5	1	0	1
8/15/2003	BARE	4	4	14	0.5	27	6	16	0		0	3	15	1	18.5	3	0.5	3.5	1	1	2
8/15/2003	BARE	4	5	14	0.5	24	6	16	0		0	3	0	0	3.5	3	0.5	3.5	1	1	2
8/15/2003	BARE	4	6	14	0	0	0	19	0		0	4	10	1	14	4	0	4	1	0	1
8/15/2003	BARE	5	1	14	0	0	0	16	0		0	2	0	0	2	2	0	2	1	0	1
8/15/2003	BARE	5	2	14	0	0	0	20	0		0	4	3	0	7	4	0	4	1	0	1
8/15/2003	BARE	5	3	14	0	0	0	18	0		0	2	0	0	2	2	0	2	1	0	1
8/15/2003	BARE	5	4	14	0	0	0	14	0		0	2	0	0	2	2	0	2	1	0	1
8/15/2003	BARE	5	5	14	0	0	0	14	0		0	0.5	0	0	0.5	0.5	0	0.5	1	0	1
8/15/2003	BARE	5	6	14	0	0	0	5	0		0	0.5	0	0	0.5	0.5	0	0.5	1	0	1
10/27/2004	BARE	1	1	29	7			21	0			19	0	25	26	5	21	26	1	3	4
10/27/2004	BARE	1	2	29	15			42	0			10	0	50	25	3	22	25	1	3	4
10/27/2004	BARE	1	3	29	3			34	0			33	5	30	41	7	29	36	1	5	6
10/27/2004	BARE	1	4	29	2			30	0			40.5	3	5	45.5	20	22.5	42.5	1	4	5
10/27/2004	BARE	1	5	29	8			32	0			2	0	95	10	1	9	10	1	2	3
10/27/2004	BARE	1	6	29	30			30	0			37	1.5	5	68.5	1	66	67	1	5	6
10/27/2004	BARE	2	1	29	0			39	10			7	0	0	17	0	17	17	0	2	2
10/27/2004	BARE	2	2	29	0			26	5			0	0	0	5	0	5	5	0	1	1
10/27/2004	BARE	2	3	29	0			24	3			0	0	0	3	0	3	3	0	1	1
10/27/2004	BARE	2	4	29	0			21	5			0	0	0	5	0	5	5	0	1	1
10/27/2004	BARE	2	5	29	2			30	4			2	0	25	8	0	8	8	0	3	3
10/27/2004	BARE	2	6	29	3			34	10			4	0	0	17	3	14	17	1	3	4
10/27/2004	BARE	3	1	29	6			23	0			11	0	0	17	11	6	17	2	1	3
10/27/2004	BARE	3	2	29	2			15	0			0.5	0	0	2.5	0.5	2	2.5	1	1	2
10/27/2004	BARE	3	3	29	0			6	0			5	0	0	5	5	0	5	1	0	1
10/27/2004	BARE	3	4	29	0			6	0			6	0	0	6	6	0	6	1	0	1
10/27/2004	BARE	3	5	29	0			5	0			8	0	0	8	7	1	8	2	1	3
10/27/2004	BARE	3	6	29	3			20	0			1	0	0	4	1	3	4	1	1	2
10/27/2004	BARE	4	1	29	0			9	0			15	0	0	15	15	0	15	1	0	1
10/27/2004	BARE	4	2	29	0			10	0			30	0	0	30	30	0	30	1	0	1
10/27/2004	BARE	4	3	29	6			32	0			0	2	100	8	0	6	6	0	1	1
10/27/2004	BARE	4	4	29	0			6	0			20	0	0	20	20	0	20	1	0	1
10/27/2004	BARE	4	5	29	5			22	0			1	5	100	11	1	5	6	1	1	2
10/27/2004	BARE	4	6	29	0			0	0			0	0	0	0	0	0	0	0	0	0
11/3/2004	BARE	5	1	29	0			11	0			35	0	0	35	35	0	35	1	0	1
11/3/2004	BARE	5	2	29	0			10	0			50	0	0	50	50	0	50	1	0	1
11/3/2004	BARE	5	3	29	0			6	0			35	0	0	35	35	0	35	1	0	1
11/3/2004	BARE	5	4	29	0			9	0			45	0.5	0	45.5	45	0	45	1	0	1
11/3/2004	BARE	5	5	29	0			4	0			3	0	0	3	3	0	3	1	0	1

11/3/2004	BARE	5	6	29		0			9	0			5	0	0	5	5	0	5	1	0	1
9/29/2005	BARE	1	1	40		0			13	0		0	2	0	0	2	2	0	2	2	0	2
9/29/2005	BARE	1	2	40		8			22	0		0	1	10	0	19	1	8	9	1	1	2
9/29/2005	BARE	1	3	40		0			10	0		0	8	0	0	8	8	0	8	3	0	3
9/29/2005	BARE	1	4	40		0.5			26	0		0	3	5	0	8.5	3	0.5	3.5	1	1	2
9/29/2005	BARE	1	5	40		0			11	0		0	2	0	0	2	2	0	2	2	0	2
9/29/2005	BARE	1	6	40		2			11	0		0	0	5	0	7	0	2	2	0	1	1
9/13/2005	BARE	2	1	40		1			13	0		0	14	0	0	15	14	1	15	2	1	3
9/13/2005	BARE	2	2	40		15			28	3	0	19	5	0	0	23	4	19	23	2	3	5
9/13/2005	BARE	2	3	40		8			18	1	0	4	27	2	0	38	17	19	36	3	3	6
9/13/2005	BARE	2	4	40		0			15	0		0	10	0	0	10	10	0	10	2	0	2
9/13/2005	BARE	2	5	40		6			18	0.5	0	1	36.5	0	0	43	36	7	43	2	3	5
9/13/2005	BARE	2	6	40		0			17	0		0	29	0	0	29	27	2	29	2	1	3
9/13/2005	BARE	3	1	40		3			27	0		0	4	0	0	7	4	3	7	2	1	3
9/13/2005	BARE	3	2	40		0.5			14	0		0	2.5	0	0	3	2.5	0.5	3	2	1	3
9/13/2005	BARE	3	3	40		0			15	0		0	8	0	0	8	8	0	8	2	0	2
9/13/2005	BARE	3	4	40		1			14	0		0	5	0	0	6	5	1	6	2	1	3
9/13/2005	BARE	3	5	40		0			18	0		0	4	0	0	4	4	0	4	2	0	2
9/13/2005	BARE	3	6	40		4			19	0		0	1	0	0	5	1	4	5	1	1	2
9/29/2005	BARE	4	1	40		15			15	0		0	0	0	0	15	0	15	15	0	1	1
9/29/2005	BARE	4	2	40		0			16	0		0	1	0	0	1	1	0	1	1	0	1
9/29/2005	BARE	4	3	40		15			19	0		0	2	10	0	27	2	15	17	1	1	2
9/29/2005	BARE	4	4	40		0			0	0		0	0	0	0	0	0	0	0	0	0	0
9/29/2005	BARE	4	5	40		0			0	0		0	0.5	0	0	0.5	0.5	0	0.5	1	0	1
9/29/2005	BARE	4	6	40		2			18	0		0	2	0	0	4	2	2	4	1	1	2
9/29/2005	BARE	5	1	40		0.5			17	0		0	5	1	0	6.5	5	0.5	5.5	1	1	2
9/29/2005	BARE	5	2	40		0			15	0		0	3.5	1	0	4.5	3.5	0	3.5	2	0	2
9/29/2005	BARE	5	3	40		4			19	0		0	2.5	1	0	7.5	2.5	4	6.5	2	1	3
9/29/2005	BARE	5	4	40		0			16	0		0	2	3	0	5	2	0	2	1	0	1
9/29/2005	BARE	5	5	40		0			11	0		0	1.5	1	0	2.5	1.5	0	1.5	2	0	2
9/29/2005	BARE	5	6	40		0			0	0		0	0	0	0	0	0	0	0	0	0	0
8/15/2003	NS	3	1	11	50.0	4	67	45	24	0		0	7	5	0	16	7	4	11	1	1	2
8/15/2003	NS	3	2	11	42.9	3	36	33	21	0		0	2	5	1	10	2	3	5	1	1	2
8/15/2003	NS	3	3	11	33.3	1	34	5	20	0		0	5	0	0	6	5	1	6	1	1	2
8/15/2003	NS	3	4	11	33.3	2	24	23	16	0		0	2	2	0	6	2	2	4	1	1	2
8/15/2003	NS	3	5	11	80.0	4	35	38	22	0		0	2	0	0	6	2	4	6	1	1	2
8/15/2003	NS	3	6	11	100.0	5	50	43	19	0		0	3	0	0	8	3	5	8	1	1	2
8/15/2003	NS	5	1	11	0.0	0	0	0	19	0		0	4	5	1	9	4	0	4	1	0	1
8/15/2003	NS	5	2	11	100.0	5	48	92	26	0		0	3	2	0	10	3	5	8	1	1	2
8/15/2003	NS	5	3	11	0.0	0	0	0	20	0		0	5	15	1	20	5	0	5	1	0	1
8/15/2003	NS	5	4	11	16.7	0.5	40	2	18	0		0	9	3	1	12.5	9	0.5	9.5	1	1	2
8/15/2003	NS	5	5	11	0.0	0.5	5	1	14	0		0	2	1	0	3.5	2	0.5	2.5	1	1	2
8/15/2003	NS	5	6	11	25.0	1	48	10	15	0		0	0.5	2	1	3.5	0.5	1	1.5	1	1	2
10/27/2004	NS	1	1	25		15			23	0			0	15	80	30	0	15	15	0	1	1
10/27/2004	NS	1	2	25		1			10	0			0	0	100	1	0	1	1	0	1	1
10/27/2004	NS	1	3	25		4			17	0			0	2	0	6	0	4	4	0	1	1
10/27/2004	NS	1	4	25		20			24	0			0	15	50	35	0	20	20	0	1	1
10/27/2004	NS	1	5	25		0.5			7	0			6	0	0	6.5	4	2.5	6.5	2	2	4
10/27/2004	NS	1	6	25		8			25	0			2	25	15	35	2	8	10	1	1	2
10/27/2004	NS	2	1	25		10			33	0			4	12	60	26	4	10	14	2	2	3
10/27/2004	NS	2	2	25		8			22	0			12.5	7	0	27.5	12.5	8	20.5	2	1	3
10/27/2004	NS	2	3	25		9			24	0			3	2	70	14	3	9	12	1	2	2
10/27/2004	NS	2	4	25		5			23	0			1	0	0	6	1	5	6	1	1	2
10/27/2004	NS	2	5	25		20			35	0			0	0	0	20	0	20	20	0	1	1
10/27/2004	NS	2	6	25		15			38	0			2	0	50	17	2	15	17	1	1	2
10/4/2005	NS	1	1	36.5		40			41	0		0	3	10	0	53	3	40	43	1	1	2
10/4/2005	NS	1	2	36.5		20			28	0		0	1	5	0	26	1	20	21	1	1	2

10/4/2005	NS	1	3	36.5		60			53	0		0	0.5	0	5	60.5	0.5	60	60.5	1	1	2
10/4/2005	NS	1	4	36.5		50			43	0		0	6	20	0	76	5	51	56	1	2	3
10/4/2005	NS	1	5	36.5		35			24	0		0	2	15	0	52	2	35	37	1	1	2
10/4/2005	NS	1	6	36.5		32			24	0		0	4.5	10	0	46.5	4.5	32	36.5	2	1	3
10/4/2005	NS	1	1	36.5		15			35	0		0	0	0	0	15	0	15	15	0	1	1
10/4/2005	NS	1	2	36.5		40			36	0		0	1.5	6	0	47.5	1.5	40	41.5	2	1	3
10/4/2005	NS	1	3	36.5		30			27	0		0	0.5	5	0	35.5	0.5	30	30.5	1	1	2
10/4/2005	NS	1	4	36.5		15			14	0		0	0.5	5	0	20.5	0.5	15	15.5	1	1	2
10/4/2005	NS	1	5	36.5		15			46	0		0	0.5	15	0	30.5	0.5	15	15.5	1	1	2
10/4/2005	NS	1	6	36.5		25			47	0		0	2.5	12	0	39.5	2.5	25	27.5	2	1	3
8/22/2003	BRSF	1	1	10	25.0	1	36	7	26	0		0	0	0	0	1	0	1	1	0	1	1
8/22/2003	BRSF	1	2	10	0.0	0	0	0	16	0		0	5	0	0	5	5	0	5	1	0	1
8/22/2003	BRSF	1	3	10	0.0	0	0	0	19	0		0	3	0	0	3	3	0	3	1	0	1
8/22/2003	BRSF	1	4	10	20.0	1	35	2	17	0		0	9.5	0	0	10.5	9	1.5	10.5	2	2	4
8/22/2003	BRSF	1	5	10	40.0	1	22	7	19	0		0	4.5	0	0	5.5	4.5	1	5.5	2	1	3
8/22/2003	BRSF	1	6	10	0.0	0	0	0	20	0		0	7.5	0	0	7.5	6.5	1	7.5	2	2	4
8/22/2003	BRSF	2	1	10	20.0	0.5	11	2	18	0		0	18	0	0	18.5	17	1.5	18.5	2	3	5
8/22/2003	BRSF	2	2	10	0.0	0	0	0	21	0		0	7.5	0	0	7.5	7.5	0	7.5	2	0	2
8/22/2003	BRSF	2	3	10	0.0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0
8/22/2003	BRSF	2	4	10	0.0	0	0	0	16	0		0	1	0	0	1	1	0	1	1	0	1
8/22/2003	BRSF	2	5	10	16.7	0.5	22	5	21	0		0	5	0	0	5.5	3.5	2	5.5	2	3	5
8/22/2003	BRSF	2	6	10	0.0	0	0	0	18	0		0	3.5	0	0	3.5	3.5	0	3.5	2	0	2
8/22/2003	BRSF	3	1	10	0.0	0	0	0	18	0		0	2.5	0	0	2.5	2	0.5	2.5	2	1	3
8/22/2003	BRSF	3	2	10	50.0	2	44	19	17	0		0	9.5	5	0	16.5	6	5.5	11.5	3	4	7
8/22/2003	BRSF	3	3	10	0.0	0	0	0	21	0		0	8.5	0	0	8.5	6.5	2	8.5	2	2	4
8/22/2003	BRSF	3	4	10	0.0	0	0	0	27	0		0	20	0	0	20	4	16	20	1	4	5
8/22/2003	BRSF	3	5	10	20.0	0.5	6	1	15	0		0	2	0	0	2.5	2	0.5	2.5	1	1	2
8/22/2003	BRSF	3	6	10	25.0	1	33	8	19	0		0	11.5	0	0	12.5	11.5	1	12.5	3	1	4
8/22/2003	BRSF	4	1	10	0.0	0	0	0	24	0		0	14	0	0	14	12	2	14	1	3	4
8/22/2003	BRSF	4	2	10	25.0	1	34	3	17	0		0	0.5	0	0	1.5	0.5	1	1.5	1	1	2
8/22/2003	BRSF	4	3	10	0.0	0	0	0	23	0		0	8.5	0	0	8.5	8	0.5	8.5	2	1	3
8/22/2003	BRSF	4	4	10	0.0	0	0	0	16	0.5	17	1	1.5	0	0	2	1.5	0.5	2	2	1	3
8/22/2003	BRSF	4	5	10	50.0	3	40	25	21	0		0	18.5	2	0	23.5	8.5	13	21.5	2	4	6
8/22/2003	BRSF	4	6	10	25.0	1	27	4	12	0		0	2.5	0	0	3.5	1.5	2	3.5	2	3	5
8/22/2003	BRSF	5	1	10	40.0	2	32	13	20	0		0	2	0	0	4	2	2	4	1	1	2
8/22/2003	BRSF	5	2	10	0.0	0	0	0	11	0		0	1.5	0	0	1.5	1.5	0	1.5	2	0	2
8/22/2003	BRSF	5	3	10	60.0	2	36	12	21	0		0	1	0	0	3	1	2	3	1	1	2
8/22/2003	BRSF	5	4	10	33.3	2	36	10	17	0		0	4.5	0	0	6.5	4.5	2	6.5	2	1	3
8/22/2003	BRSF	5	5	10	16.7	0.5	24	2	18	0		0	3.5	0	0	4	3.5	0.5	4	2	1	3
8/22/2003	BRSF	5	6	10	0.0	0	0	0	10	0		0	1	0	0	1	1	0	1	1	0	1
11/3/2004	BRSF	1	1	24.5		3			14	0			12	5	0	20	12	3	15	1	1	2
11/3/2004	BRSF	1	2	24.5		16			48	0			14	5	0	35	3.5	26.5	30	2	4	6
11/3/2004	BRSF	1	3	24.5		0			19	0			5	0.5	0	5.5	5	0	5	1	0	1
11/3/2004	BRSF	1	4	24.5		15			31	0			15	15	0	45	15	15	30	1	1	2
11/3/2004	BRSF	1	5	24.5		0				0			1	0	0	1	1	0	1	1	0	1
11/3/2004	BRSF	1	6	24.5		3			20	0			2	0	0	5	2	3	5	1	1	2
11/3/2004	BRSF	2	1	24.5		0			7	0			13	2	0	15	12	1	13	1	1	2
11/3/2004	BRSF	2	2	24.5		0			18	0			26	0	0	26	25	1	26	1	1	2
11/3/2004	BRSF	2	3	24.5		0			0	0			0	0	0	0	0	0	0	0	0	0
11/3/2004	BRSF	2	4	24.5		1			5	0			3	0	0	4	3	1	4	1	1	2
11/3/2004	BRSF	2	5	24.5		1			9	0			23	0	0	24	20	4	24	0	0	3
11/3/2004	BRSF	2	6	24.5		1			8	0.5	27.6667		0.5	0	0	1.5	0	1.5	1.5	0	2	2
11/3/2004	BRSF	2	7	24.5		0			20	2	36.3333		4	0	0	6	4	2	6	1	1	2
11/3/2004	BRSF	2	8	24.5		4			17	0			0.5	0	0	4.5	0	4.5	4.5	0	2	2
11/3/2004	BRSF	3	1	24.5		0			1	0			1	0	0	1	0.5	0.5	1	1	1	2
11/3/2004	BRSF	3	2	24.5		8			28	0			39	0	90	47	1	46	47	1	5	6
11/3/2004	BRSF	3	3	24.5		50			32	0			6	8	0	64	5	51	56	1	2	3

11/3/2004	BRSF	3	4	24.5	20		0		35	5	0	60	3	52	55	1	5	6
11/3/2004	BRSF	3	5	24.5	0	35	0		73	15	10	88	10	63	73	1	4	5
11/3/2004	BRSF	3	6	24.5	5	16	0		39	0	100	44	0	44	44	0	4	4
11/3/2004	BRSF	4	1	24.5	2	18	0		36	7	0	45	35	3	38	1	2	3
11/3/2004	BRSF	4	2	24.5	0		0		0	0	0	0	0	0	0	0	0	0
11/3/2004	BRSF	4	3	24.5	10	18	0		0.5	0	0	10.5	0.5	10	10.5	1	1	2
11/3/2004	BRSF	4	4	24.5	1	10	0		2	0	0	3	2	1	3	1	1	2
11/3/2004	BRSF	4	5	24.5	0		0		0	0	0	0	0	0	0	0	0	0
11/3/2004	BRSF	4	6	24.5	12	47	0		8.5	0	0	20.5	5	15.5	20.5	1	3	4
11/3/2004	BRSF	5	1	24.5	12	39	0		10	0	0	22	10	12	22	1	1	2
11/3/2004	BRSF	5	2	24.5	2		0		2	0	0	4	2	2	4	1	1	2
11/3/2004	BRSF	5	3	24.5	0	5	0		2	0	0	2	2	0	2	1	0	1
11/3/2004	BRSF	5	4	24.5	1	10	0		2	0	0	3	2	1	3	1	1	2
11/3/2004	BRSF	5	5	24.5	2	21	0		1	0	0	3	1	2	3	1	1	2
11/3/2004	BRSF	5	6	24.5	2	19	0		1	0	0	3	1	2	3	1	1	2
10/4/2005	BRSF	1	1	36	12	25	0	0	4.5	5	0	21.5	4	12.5	16.5	2	2	4
10/4/2005	BRSF	1	2	36	18	34	0	0	4	5	0	27	4	18	22	3	1	4
10/4/2005	BRSF	1	3	36	40	73	0	0	2.5	7	0	49.5	2	40.5	42.5	1	2	3
10/4/2005	BRSF	1	4	36	60	44	0	0	6	5	0	71	2	64	66	1	3	4
10/4/2005	BRSF	1	5	36	30	39	0	0	5.5	10	0	45.5	3.5	32	35.5	2	2	4
10/4/2005	BRSF	1	6	36	10	23	0	0	0.5	1	0	11.5	0.5	10	10.5	1	1	2
10/4/2005	BRSF	2	1	36	22	65	0	0	12	20	0	54	9	25	34	2	2	4
10/4/2005	BRSF	2	2	36	35	45	0	0	8	3	0	46	5	38	43	2	3	5
10/4/2005	BRSF	2	3	36	45	38	0	0	5.5	12	0	62.5	4.5	46	50.5	3	2	5
10/4/2005	BRSF	2	4	36	20	25	0	0	0.5	1	0	21.5	0.5	20	20.5	1	1	2
10/4/2005	BRSF	2	5	36	0	9	0	0	12.5	0	0	12.5	12.5	0	12.5	2	0	2
10/4/2005	BRSF	2	6	36	18	39	0	0	9	0	0	27	4	23	27	1	2	3
10/4/2005	BRSF	3	1	36	30	39	0	0	52.5	2	0	84.5	2.5	80	82.5	2	5	7
10/4/2005	BRSF	3	2	36	50	41	0	0	20	10	0	80	5	65	70	3	3	6
10/4/2005	BRSF	3	3	36	25	46	0	0	17	10	0	52	1	41	42	1	3	4
10/4/2005	BRSF	3	4	36	35	28	0	0	2.5	3	0	40.5	0.5	37	37.5	1	2	3
10/4/2005	BRSF	3	5	36	12	27	0	0	1	1	0	14	1	12	13	1	1	2
10/4/2005	BRSF	3	6	36	1	45	0	0	76	0	0	77	1	76	77	1	4	5
10/4/2005	BRSF	4	1	36	17	56	0	0	4.5	5	0	26.5	1.5	20	21.5	2	2	4
10/4/2005	BRSF	4	2	36	35	0	0	0	13.5	2	0	50.5	5	43.5	48.5	1	3	4
10/4/2005	BRSF	4	3	36	4	40	0	0	0.5	0	0	4.5	0.5	4	4.5	1	1	2
10/4/2005	BRSF	4	4	36	3	16	0	0	0.5	0	0	3.5	0.5	3	3.5	1	1	2
10/4/2005	BRSF	4	5	36	20	45	0	0	11.5	1	0	32.5	3.5	28	31.5	2	3	5
10/4/2005	BRSF	4	6	36	2	45	0	0	0.5	0	0	2.5	0.5	2	2.5	1	1	2
10/4/2005	BRSF	5	1	36	1	20	0	0	0.5	0	0	1.5	0.5	1	1.5	1	1	2
10/4/2005	BRSF	5	2	36	20	45	0	0	0.5	0	0	20.5	0.5	20	20.5	1	1	2
10/4/2005	BRSF	5	3	36	2	31	0	0	0	0	0	2	0	2	2	0	1	1
10/4/2005	BRSF	5	4	36	12	38	0	0	0	0	0	12	0	12	12	0	1	1
10/4/2005	BRSF	5	5	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/4/2005	BRSF	5	6	36	6	38	0	0	0.5	0	0	6.5	0.5	6	6.5	1	1	2
10/13/2005	CONT	1	1	36	3	17	0	0	0	4	0	7	0	3	3	0	1	1
10/13/2005	CONT	1	2	36	0.5	9	0	0	0.5	3	0	4	0.5	0.5	1	1	1	2
10/13/2005	CONT	1	3	36	2	18	0	0	0	3	0	5	0	2	2	0	1	1
10/13/2005	CONT	1	4	36	40	27	0	0	6	10	0	56	4	42	46	1	2	3
10/13/2005	CONT	1	5	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/13/2005	CONT	1	6	36	55	40	0	0	3.5	3	100	61.5	0.5	58	58.5	1	2	3
10/13/2005	CONT	2	1	36	3	9	0	0	1.5	1	0	5.5	1.5	3	4.5	2	1	3
10/13/2005	CONT	2	2	36	4	18	0	0	6	2	0	12	5.5	4.5	10	3	2	5
10/13/2005	CONT	2	3	36	0	3	0	0	1	5	0	6	1	0	1	2	0	2
10/13/2005	CONT	2	4	36	35	55	0	0	0.5	25	0	60.5	0.5	35	35.5	1	1	2
10/13/2005	CONT	2	5	36	0.5	11	0	0	0.5	2	0	3	0.5	0.5	1	1	1	2
10/13/2005	CONT	2	6	36	30	33	0	0	3	25	0	58	3	30	33	2	1	3

10/13/2005	CONT	3	1	36	50	81	0	0	27	0	35	77	4	73	77	2	4	6
10/13/2005	CONT	3	2	36	30	55	0	0	1	12	0	43	1	30	31	1	1	2
10/13/2005	CONT	3	3	36	3	18	0	0	0	0.5	0	3.5	0	3	3	0	1	1
10/13/2005	CONT	3	4	36	65	46	0	0	6	5	0	76	5	66	71	1	2	3
10/13/2005	CONT	3	5	36	0.5	12	0	0	1.5	0	0	2	1.5	0.5	2	2	1	3
10/13/2005	CONT	3	6	36	0.5	1	0	0	0	0	0	0.5	0	0.5	0.5	0	1	1

2005 Planting

DATE ASSESSED	QA/QC	PLANT TYPE	PLOT	TRANSECT	SIDE	REP	DATE PLANTED	SA cov	SP cov	DS cov	PA cov	PA Stems	Pa Type	Mean Pa ht (cm)	Vaucherria cov	Bare cov	Dead Cov	WATER cov	Can Ht (cm)	Total Cov	Vascular Cov	Perennial Cov
######	REG	Plante	1	8	Left	1	6/14/2009	0	7	0	1	1		95	0	91	0	0	18	9	9	9
######	REG	Plante	1	8	Right	2	6/14/2009	3	1	3	0	0			0	87	0	0	30	13	13	9
######	REG	Plante	1	18	Left	3	6/14/2009	0	1	0	0	0			0	99	0	0	12	1	1	1
######	REG	Plante	1	18	Right	4	6/14/2009	1	2	0	0	0			0	96	0	0	17	4	4	4
######	REG	Plante	1	27	Left	5	6/14/2009	0	0	0	0	0			0	100	0	0	0	0	0	0
######	REG	Plante	1	27	Right	6	6/14/2009	0	7	0	0	0			0	93	0	0	16	7	7	7
######	REG	Plante	2	6	Left	1	6/14/2009	0	6	0	0	0			0	90	0	0	19	10	10	10
######	REG	Plante	2	6	Right	2	6/14/2009	0	8	0	0	0			0	91.5	0	0	22	8.5	8.5	8
######	REG	Plante	2	11	Left	3	6/14/2009	1	12	7	0	0			0	80	0	0	26	20	20	20
######	REG	Plante	2	11	Right	4	6/14/2009	0	15	0	0	0			0	84.5	0	0	25	15.5	15.5	15
######	REG	Plante	2	18	Left	5	6/14/2009	1	20	0	1	3		42.333	0	70	0	0	36	30	30	27
######	REG	Plante	2	18	Right	6	6/14/2009	0	25	0	0	0			0	75	0	0	30	25	25	25
######	REG	Plante	3	6	Left	1	6/14/2009	0	12	0	0	0			0	86	0	0	28	14	14	13
######	REG	Plante	3	6	Right	2	6/14/2009	0	1	0	0	0			0	96	0	0	12	4	4	1
######	REG	Plante	3	11	Left	3	6/14/2009	1	5	2	0	0			0	86.5	0	0	19	13.5	13.5	10.5
######	REG	Plante	3	11	Right	4	6/14/2009	2	0.5	0	0	0			1	84	0	0	39	5.5	4.5	2.5
######	REG	Plante	3	18	Left	5	6/14/2009	1	9	0	1	1	V	60	0	87	0	0	25	13	13	13
######	REG	Plante	3	18	Right	6	6/14/2009	0	15	0	0	0			1	83	0	0	26	17	16	15
######	REG	Contr	4	3	Left	1	6/14/2009	0	1	0	30	31	R, R, R	135.33	0	67	0	0	91	33	33	33
######	REG	Contr	4	3	Right	2	6/14/2009	0	6	0	5	11	V, V, R	74.667	0	85	0	0	43	15	15	15
######	REG	Contr	4	16	Left	3	6/14/2009	1	0	0	3	1	V	34	0	96	0	0	27	4	4	4
######	REG	Contr	4	16	Right	4	6/14/2009	2	0	0	0	0			0	98	0	0	41	2	2	2
######	REG	Contr	4	25	Left	5	6/14/2009	0	0	0	5	5	V, V, V	88	0	95	0	0	68	5	5	5
######	REG	Contr	4	25	Right	6	6/14/2009	0	20	0	0.5	1	V	23	2	75.5	0	0	36	24.5	22.5	20.5
######	REG	Contr	5	8	Left	1	6/14/2009	0	20	0	50	102	R, R, R	129.33	0	30	0	0	109	70	70	70
######	REG	Contr	5	8	Right	2	6/14/2009	0	17	0	35	35	R, R, R	127.67	0	57.5	0	0	97	52.5	52.5	52
######	REG	Contr	5	14	Left	3	6/14/2009	0	7	0	35	95	R, R, R	114.67	0	58	0	0	83	42	42	42
######	REG	Contr	5	14	Right	4	6/14/2009	3	0	0	5	16	V, V, V	67.333	0	71	0	0	52	29	29	28
######	REG	Contr	5	20	Left	5	6/14/2009	5	0	0	15	25	V, R, R	118.33	0	79.5	0	0	74	20.5	20.5	20.5
######	REG	Contr	5	20	Right	6	6/14/2009	12	1	0	0	0			0	87	0	0	46	13	13	13
######	DUP	Plante	6	7	Left	1	6/14/2009	0	0.5	0	0	0			0	99.5	0	0	21	0.5	0.5	0.5
######	DUP	Plante	6	7	Right	2	6/14/2009	0	0	0	0	0			0	99.5	0	0	17	0.5	0.5	0
######	DUP	Plante	6	31	Left	3	6/14/2009	0	0	0	0	0			0	100	0	0	0	0	0	0
######	DUP	Plante	6	31	Right	4	6/14/2009	0	0.5	0	0	0			0	99.5	0	0	13	0.5	0.5	0.5
######	DUP	Plante	6	46	Left	5	6/14/2009	0	2	0	0	0			0	98	0	0	12	2	2	2
######	DUP	Plante	6	46	Right	6	6/14/2009	7	3	0	0	0			0	90	0	0	31	10	10	10
######	DUP	Contr	7	5	Left	1	6/14/2009	0	0	0	0	0			0	100	0	0	0	0	0	0
######	DUP	Contr	7	5	Right	2	6/14/2009	8	0.5	0	0	0			0	91	0	0	45	8.5	8.5	8.5
######	DUP	Contr	7	11	Left	3	6/14/2009	0	0.5	0	0	0			0	99.5	0	0	8	0.5	0.5	0.5
######	DUP	Contr	7	11	Right	4	6/14/2009	6	0	0	0	0			0	94	0	0	44	6	6	6
######	DUP	Contr	7	16	Left	5	6/14/2009	0	2	0	0	0			0	98	0	0	8	2	2	2
######	DUP	Contr	7	16	Right	6	6/14/2009	0.5	0	0	0	0			0	99.5	0	0	12	0.5	0.5	0.5
######	REG	Contr	8	5	Left	1	6/14/2009	0	2	0	0	0			0	98	0	0	6	2	2	2
######	REG	Contr	8	5	Right	2	6/14/2009	0	0	0	0	0			0	100	0	0	0	0	0	0
######	REG	Contr	8	10	Left	3	6/14/2009	0	0	0	0	0			0	100	0	0	0	0	0	0

######	REG	Contr	8	10	Right	4	6/14/2009	0	1	0	0	0	0	99	0	0	10	1	1	1
######	REG	Contr	8	15	Left	5	6/14/2009	0	0	0	0	0	0	100	0	0	0	0	0	0
######	REG	Contr	8	15	Right	6	6/14/2009	0	0	0	0	0	0	100	0	0	0	0	0	0
######	DUP	Plante	6	7	Left	1	6/14/2009	0	0.5	0	0	0	0	99	0	0	19	1	1	1
######	DUP	Plante	6	7	Right	2	6/14/2009	0	0	0	0	0	0	99	0	0	17	1	1	0
######	DUP	Plante	6	31	Left	3	6/14/2009	0	0	0	0	0	0	100	0	0	0	0	0	0
######	DUP	Plante	6	31	Right	4	6/14/2009	0	1	0	0	0	0	99	0	0	15	1	1	1
######	DUP	Plante	6	46	Left	5	6/14/2009	0	3	0	0	0	0	97	0	0	16	3	3	3
######	DUP	Plante	6	46	Right	6	6/14/2009	5	4	0	0	0	0	91	0	0	30	9	9	9
######	DUP	Contr	7	5	Left	1	6/14/2009	0	0	0	0	0	0	100	0	0	0	0	0	0
######	DUP	Contr	7	5	Right	2	6/14/2009	20	0	0	0	0	0	80	0	0	44	20	20	20
######	DUP	Contr	7	11	Left	3	6/14/2009	0	0.5	0	0	0	0	99.5	0	0	10	0.5	0.5	0.5
######	DUP	Contr	7	11	Right	4	6/14/2009	7	0	0	0	0	0	93	0	0	47	7	7	7
######	DUP	Contr	7	16	Left	5	6/14/2009	0	1	0	0	0	0	99	0	0	6	1	1	1
######	DUP	Contr	7	16	Right	6	6/14/2009	0.5	0	0	0	0	0	99.5	0	0	6	0.5	0.5	0.5

QA/QC Data Set

PLANTTY	SET	ANSE	REP	REP	SA Cov	PA Cov	Algae Cov	CanHt	'asc Co	TotalCO	\pp. Va	nnual C	ennial Cov
BARE	1	1	1	A	0	0	0	13	2	2	2	2	0
BARE	1	1	2	A	8	0	10	22	9	19	2	1	8
BARE	1	2	3	A	0	0	0	10	8	8	3	8	0
BARE	1	3	5	A	0	0	0	11	2	2	2	2	0
BARE	1	3	6	A	2	0	5	11	2	7	1	0	2
BARE	1	2	a4	D	0.5	0	5	26	3.5	8.5	2	3	0.5
BARE	1	2	b4	K	0.5	0	2	25	4	6	3	3.5	0.5
BARE	3	1	1	A	3	0	0	27	7	7	3	4	3
BARE	3	1	2	A	0.5	0	0	14	3	3	3	2.5	0.5
BARE	3	2	4	A	1	0	0	14	6	6	3	5	1
BARE	3	3	5	A	0	0	0	18	4	4	2	4	0
BARE	3	3	6	A	4	0	0	19	5	5	2	1	4
BARE	3	2	a3	D	0	0	0	15	8	8	2	8	0
BARE	3	2	b3	K	0	0	0	11	8	8	2	8	0
BARE	4	1	1	A	15	0	0	15	15	15	1	0	15
BARE	4	1	2	A	0	0	0	16	1	1	1	1	0
BARE	4	2	3	A	15	0	10	19	17	27	2	2	15
BARE	4	3	5	A	0	0	0	0	0.5	0.5	1	0.5	0
BARE	4	3	6	A	2	0	0	18	4	4	2	2	2
BARE	4	2	a4	D	0	0	0	0	0	0	0	0	0
BARE	4	2	b4	K	0	0	0	0	0	0	0	0	0
BARE	5	1	1	A	0.5	0	1	17	5.5	6.5	2	5	0.5
BARE	5	1	2	A	0	0	1	15	3.5	4.5	2	3.5	0
BARE	5	3	5	A	0	0	1	11	1.5	2.5	2	1.5	0
BARE	5	2	a3	D	4	0	1	19	6.5	7.5	3	2.5	4
BARE	5	2	a4	D	0	0	3	16	2	5	1	2	0
BARE	5	3	a6	D	0	0	0	0	0	0	0	0	0
BARE	5	2	b3	K	4	0	2	19	7	9	4	3	4
BARE	5	2	b4	K	0	0	1	15	2	3	1	2	0
BARE	5	3	b6	K	0	0	0	0	0	0	0	0	0
BRS	3	1	1	A	5	0	0	15	9.5	9.5	4	4.5	5
BRS	3	2	3	A	18	0	0	19	25	25	3	7	18
BRS	3	2	4	A	25	0	2	54	32	34	3	7	25
BRS	3	3	5	A	25	0	5	30	45	50	4	18	27

BRS	3	1	a2	D	0	0	0	9	0.5	0.5	1	0.5	0
BRS	3	3	a6	D	35	0	0	19	35.5	35.5	2	0.5	35
BRS	3	1	b2	K	0	0	0	9	0.5	0.5	1	0.5	0
BRS	3	3	b6	K	30	0	12	17	31	43	2	1	30
BRS	4	1	1	A	65	0	10	26	74	84	5	7	67
BRS	4	2	3	A	50	0	30	19	57.5	87.5	4	7.5	50
BRS	4	2	4	A	75	0	1	47	82	83	2	7	75
BRS	4	3	5	A	40	0	15	16	45.5	60.5	3	5.5	40
BRS	4	1	a2	D	40	0	10	51	48.5	58.5	4	8.5	40
BRS	4	3	a6	D	25	0	5	15	28.5	33.5	3	3.5	25
BRS	4	1	b2	K	40	0	10	52	47.5	57.5	4	7.5	40
BRS	4	3	b6	K	30	0	5	18	32.5	37.5	3	2.5	30
BRS	5	1	1	A	3	0	1	17	5.5	6.5	3	2.5	3
BRS	5	1	2	A	75	0	12	46	80	92	3	5	75
BRS	5	2	3	A	50	0	20	29	55	75	3	5	50
BRS	5	3	5	A	55	0	13	34	67	80	3	12	55
BRS	5	3	6	A	40	0	5	29	41	46	3	1	40
BRS	5	2	a4	D	75	0	10	23	75	85	1	0	75
BRS	5	2	b4	K	80	0	15	28	80	95	1	0	80
BRSF	1	1	1	A	12	0	5	25	16.5	21.5	4	4	12.5
BRSF	1	1	2	A	18	0	5	34	22	27	4	4	18
BRSF	1	2	4	A	60	0	5	44	66	71	4	2	64
BRSF	1	3	5	A	30	0	10	39	35.5	45.5	4	3.5	32
BRSF	1	3	6	A	10	0	1	23	10.5	11.5	2	0.5	10
BRSF	1	2	a3	D	40	0	7	73	42.5	49.5	3	2	40.5
BRSF	1	2	b3	K	50	0	30	72	54	84	3	3	51
BRSF	2	1	2	A	35	0	3	45	43	46	5	5	38
BRSF	2	2	3	A	45	0	12	38	50.5	62.5	5	4.5	46
BRSF	2	2	4	A	20	0	1	25	20.5	21.5	2	0.5	20
BRSF	2	3	5	A	0	0	0	9	12.5	12.5	2	12.5	0
BRSF	2	1	a1	D	22	0	20	65	34	54	4	9	25
BRSF	2	3	a6	D	18	0	0	39	27	27	3	4	23
BRSF	2	1	b1	K	30	0	10	63	41.5	51.5	5	9.5	32
BRSF	2	3	b6	K	22	0	2	33	34	36	3	5	29
BRSF	3	1	1	A	30	0	2	39	82.5	84.5	7	2.5	80
BRSF	3	1	2	A	50	0	10	41	70	80	6	5	65
BRSF	3	2	4	A	35	0	3	28	37.5	40.5	3	0.5	37
BRSF	3	3	5	A	12	0	1	27	13	14	2	1	12
BRSF	3	3	6	A	1	0	0	45	77	77	5	1	76
BRSF	3	2	a3	D	25	0	10	46	42	52	4	1	41
BRSF	3	2	b3	K	30	0	10	40	62	72	5	3	59
BRSF	4	1	2	A	35	0	2	0	48.5	50.5	4	5	43.5
BRSF	4	2	3	A	4	0	0	40	4.5	4.5	2	0.5	4
BRSF	4	2	4	A	3	0	0	16	3.5	3.5	2	0.5	3
BRSF	4	3	6	A	2	0	0	45	2.5	2.5	2	0.5	2
BRSF	4	1	a1	D	17	0	5	56	21.5	26.5	4	1.5	20
BRSF	4	3	a5	D	20	0	1	45	31.5	32.5	5	3.5	28
BRSF	4	1	b1	K	15	0	5	38	19.5	24.5	4	1.5	18
BRSF	4	3	b5	K	20	0	0	35	30	30	4	3	27
BRSF	5	1	1	A	1	0	0	20	1.5	1.5	2	0.5	1
BRSF	5	1	2	A	20	0	0	45	20.5	20.5	2	0.5	20

BRSF	5	2	4	A	12	0	0	38	12	12	1	0	12
BRSF	5	3	5	A	0	0	0	0	0	0	0	0	0
BRSF	5	3	6	A	6	0	0	38	6.5	6.5	2	0.5	6
BRSF	5	2	a3	D	2	0	0	31	2	2	1	0	2
BRSF	5	2	b3	K	2	0	0	27	2	2	1	0	2
BRSF	6	1	1	A	20	0	5	34	27	32	5	3.5	23.5
BRSF	6	1	2	A	30	0	3	27	34	37	2	4	30
BRSF	6	2	3	A	28	0	0	53	31.5	31.5	3	0.5	31
BRSF	6	2	4	A	9	0	0	36	12	12	4	3	9
BRSF	6	3	5	A	8	0	0	54	58.5	58.5	6	1.5	57
BRSF	6	3	6	A	20	0	0	44	25	25	2	5	20
BRSF	7	1	1	A	25	0	3	25	29.5	32.5	4	4.5	25
BRSF	7	1	2	A	15	0	20	34	28.5	48.5	6	10.5	18
BRSF	7	2	4	A	5	0	1	17	5	6	1	0	5
BRSF	7	3	5	A	3	0	0	34	3	3	1	0	3
BRSF	7	2	a3	D	40	0	20	32	43.5	63.5	4	2.5	41
BRSF	7	3	a6	D	2	0	0	27	2	2	1	0	2
BRSF	7	2	b3	K	40	0	30	23	43.5	73.5	4	2.5	41
BRSF	7	3	b6	K	2	0	0	22	2	2	1	0	2
CONTF	1	1	1	A	3	0	4	17	3	7	1	0	3
CONTF	1	1	2	A	0.5	0	3	9	1	4	2	0.5	0.5
CONTF	1	2	4	A	40	0	10	27	46	56	3	4	42
CONTF	1	3	5	A	0	0	0	0	0	0	0	0	0
CONTF	1	3	6	A	55	0	3	40	58.5	61.5	3	0.5	58
CONTF	1	2	a3	D	2	0	3	18	2	5	1	0	2
CONTF	1	2	b3	K	2	0	1	15	2	3	1	0	2
CONTF	2	1	2	A	4	0	2	18	10	12	5	5.5	4.5
CONTF	2	2	3	A	0	0	5	3	1	6	2	1	0
CONTF	2	2	4	A	35	0	25	55	35.5	60.5	2	0.5	35
CONTF	2	3	6	A	30	0	25	33	33	58	3	3	30
CONTF	2	1	a1	D	3	0	1	9	4.5	5.5	3	1.5	3
CONTF	2	3	a5	D	0.5	0	2	11	1	3	2	0.5	0.5
CONTF	2	1	b1	K	3	0	1	25	6	7	3	3	3
CONTF	2	3	b5	K	0.5	0	2	11	1	3	2	0.5	0.5
CONTF	3	1	1	A	50	0	0	81	77	77	6	4	73
CONTF	3	1	2	A	30	0	12	55	31	43	2	1	30
CONTF	3	2	4	A	65	0	5	46	71	76	3	5	66
CONTF	3	3	5	A	0.5	0	0	12	2	2	3	1.5	0.5
CONTF	3	2	a3	D	3	0	0.5	18	3	3.5	1	0	3
CONTF	3	3	a6	D	0.5	0	0	1	0.5	0.5	1	0	0.5
CONTF	3	2	b3	K	2	0	0	18	2	2	1	0	2
CONTF	3	3	b6	K	0	0	0	0	0	0	0	0	0
NS	1	1	1	A	40	0	10	41	43	53	2	3	40
NS	1	1	2	A	20	0	5	28	21	26	2	1	20
NS	1	1	2	A	40	0	6	36	41.5	47.5	3	1.5	40
NS	1	2	3	A	30	0	5	27	30.5	35.5	2	0.5	30
NS	1	2	4	A	50	0	20	43	56	76	3	5	51
NS	1	2	4	A	15	0	5	14	15.5	20.5	2	0.5	15
NS	1	3	5	A	35	0	15	24	37	52	2	2	35
NS	1	3	6	A	32	0	10	24	36.5	46.5	3	4.5	32
NS	1	3	6	A	25	0	12	47	27.5	39.5	3	2.5	25

NS	1	1	a1	D	15	0	0	35	15	15	1	0	15
NS	1	2	a3	D	60	0	0	53	60.5	60.5	2	0.5	60
NS	1	3	a5	D	15	0	15	46	15.5	30.5	2	0.5	15
NS	1	1	b1	K	10	0	1	39	10	11	1	0	10
NS	1	2	b3	K	60	0	0	53	60.5	60.5	2	0.5	60
NS	1	3	b5	K	13	0	10	62	14	24	2	1	13
PLUGS	3	1	2	A	25	0	2	31	29	31	4	3	26
PLUGS	3	2	3	A	5	6	3	24	80	83	5	9	71
PLUGS	3	2	4	A	40	0	0	77	40	40	1	0	40
PLUGS	3	3	5	A	60	0	6	52	63	69	2	3	60
PLUGS	3	3	6	A	60	0	0	71	60	60	1	0	60
PLUGS	3	1	a1	D	70	0	0	55	70.5	70.5	2	0.5	70
PLUGS	3	1	b1	K	60	0	1	56	60	61	1	0	60
PLUGS	4	1	1	A	37	0	10	23	44.5	54.5	4	7.5	37
PLUGS	4	1	2	A	55	0	10	35	60	70	2	5	55
PLUGS	4	2	3	A	60	0	20	28	66	86	3	6	60
PLUGS	4	3	5	A	65	0	0	53	65	65	1	0	65
PLUGS	4	3	6	A	60	0	5	37	80	85	2	20	60
PLUGS	4	2	a4	D	45	0	20	27	50.5	70.5	3	5.5	45
PLUGS	4	2	b4	K	40	0	12	25	45	57	3	5	40
PLUGS	5	1	1	A	40	0	20	31	62	82	3	22	40
PLUGS	5	2	3	A	50	0	25	32	61	86	3	11	50
PLUGS	5	2	4	A	20	0	3	28	23	26	3	3	20
PLUGS	5	3	5	A	60	0	15	34	70	85	4	8	62
PLUGS	5	1	a2	D	30	0	10	31	38	48	4	6	32
PLUGS	5	3	a6	D	25	0	5	28	31	36	4	6	25
PLUGS	5	1	b2	K	40	0	20	26	50	70	5	8	42
PLUGS	5	3	b6	K	35	0	10	28	40	50	4	5	35
SH	3	1	1	A	15	0	0	29	46	46	5	26	20
SH	3	1	2	A	35	0	8	43	40	48	2	5	35
SH	3	2	3	A	0	0	0	6	0.5	0.5	1	0.5	0
SH	3	2	4	A	20	0	0	25	22	22	2	2	20
SH	3	3	6	A	1	0	0	16	2	2	2	1	1
SH	3	3	a5	D	0	3	0	28	7	7	4	3	4
SH	3	3	b5	K	0	2	0	22	6	6	4	3	3
SH	4	1	1	A	3	0	1	13	5	6	2	2	3
SH	4	2	3	A	22	0	25	17	22.5	47.5	2	0.5	22
SH	4	2	4	A	20	0	7	31	20.5	27.5	2	0.5	20
SH	4	3	5	A	25	0	15	24	28	43	2	3	25
SH	4	1	a2	D	0	0	1	15	5	6	1	5	0
SH	4	3	a6	D	5	0	5	18	8	13	2	3	5
SH	4	1	b2	K	0	0	0	15	4	4	1	4	0
SH	4	3	b6	K	5	0	2	16	8	10	2	3	5
SH	5	1	1	A	40	1	0	35	42	42	4	1	41
SH	5	2	3	A	6	5	3	39	76	79	8	9	67
SH	5	2	4	A	40	0	14	45	42	56	3	1	41
SH	5	3	5	A	75	0	4	54	76	80	2	1	75
SH	5	3	6	A	25	0	25	28	26	51	2	1	25
SH	5	1	a2	D	40	0	15	26	40.5	55.5	2	0.5	40
SH	5	1	b2	K	35	0	5	29	35.5	40.5	2	0.5	35

Appendix II

Press Clipping:

Students help restore marsh

By MICHAEL GOOT
Portsmouth Times Writer

RYE — For Little Harbour School students, it may have looked like they were getting dirty and having fun in the sun, but they were helping out the ecosystem.

Third- and first-graders from Little Harbour School spent Monday, June 13, planting salt marsh seedlings to help restore the Awcoming Marsh in Rye.

David Burdick, a professor at the University of New Hampshire Jackson Estuarine Lab, said the goal of the project is to plant native varieties of grasses in the hopes they will crowd out the invasive, exotic variety of Phragmites australis, a common reed plant. "This is the problem plant," Burdick said.

The Awcoming Marsh is filled with the sediment the state removed during dredging projects in 1941 and 1962. This was before people knew the importance of protecting salt marsh habitat.

The upper unvegetated edge of the marsh is suspectible to reinvasion by the reeds. Hopefully, Burdick said this problem will be mitigated by planting things like black grass, rough cordgrass, stiff-leaf quack grass, seaside goldenrod, goose tongue, marsh elder and rose mallow.

"Once they colonize, it's harder for other plants to push them out," he said.

Students were given seeds of eight upper marsh perennials. The first- and third-grade students sprouted, planted and grew the seedlings at the school in preparation to plant them along the upper marsh edges.

Burdick said establishment of native vegetation cover on the upper edges of salt marshs, where many species dominate, has never been tried before in the state.

"We're going to get a lot of rain this week. They're going to love them."
—DAVID BURDICK
Professor at the UNH Jackson Estuarine Lab

"Hopefully, we'll change things for the better as you guys plant today," he said.

He said he would be happy if 10 percent of the plants survived. the upcoming weather forecast should help, Burdick said. "We're going to get a lot of rain this week. They're going to love them," he said.

The students were helped by graduate students from the University of New Hampshire Jackson Estuarine Lab, who will show them the best planting sites. The plan is to establish a diverse, upper edge plant community and monitor its development.

The project was sponsored by the New Hampshire Estuaries Program.

Third-grader Emily Buckman, 9, said it was "fun" planting the seedlings and was using her bare hands.

"I don't need a shovel," she said.

Her mother, Dawn, said she thinks it is a very educational project. "I think it's very interesting, a lot of fun for the kids. This is what they like to do — (being) in the sunshine, getting in the dirt," he said.

Third-grader Carly Wile, 9, said she agreed. "I like getting messy and dirty and saving our marshes," she said.

Michael Goot/Democrat photo

DAVID BURDICK, A PROFESSOR WITH THE UNIVERSITY OF NEW HAMPSHIRE JACKSON ESTUARINE LAB, shows Little Harbour School third-grader Emily Buckman, 9, of Portsmouth, how to plant certain types of grasses in the Awcoming Marsh on Monday, June 13. The purpose of the project is to crowd out invasive species and improve the ecosystem of the salt marsh.