Sand Tracer Study of a Nearshore Berm in South Padre Island, TX

Final Report

Prepared by

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Executive Summary

This report details the results from the laboratory analysis of 950 surface-sediment grab samples collected at nearshore seabed and dry beach locations near South Padre Island (SPI) over the course of a 15-month field study between August 2018 and November 2019. The field sampling campaign was part of a sediment tracer study to elucidate sediment transport pathways in the nearshore region of SPI after tracer release over a submerged feeder berm.

Unconfined sediment feeder systems can be a desirable alternative to traditional direct beach placement of nourishment material because the feeder systems are less intrusive to the beach environment and often less expensive. Placing sediment as close to the active beach profile, as practicable, and relying on natural nearshore processes to slowly distribute the sediment to the beach can keep a finite resource within the littoral zone.

Tracer particle counts were obtained from nine sediment sampling campaigns covering a grid of 60 seabed and 50 dry beach locations. Tracer counts were performed in the laboratory making use of the fluorescent and ferrimagnetic properties of the engineered particles to separate them from other sediment material. A cylindrical high-power magnet was rolled over a mono-layer of sediment to extract the ferrimagnetic tracer particles. Blue light illumination was used to visualize the fluorescent tracer particles for counting.

Results indicate that although the highest tracer counts remained near the initial release site of the feeder berm during the duration of the study, appreciable amounts of tracer moved throughout the study region and were found within the bounds of the active profile. Even though fluctuations of tracer migration were observed, the most prominent appearance of tracer particles outside the initial placement site occurred south and immediately west of it, indicating net alongshore and onshore transport in those directions. Relatively few tracer particles were found on the dry beach, indicating appreciable deposition of feeder material there may take years rather than months.

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1 INTRODUCTION

At South Padre Island (SPI), Texas, a submerged "feeder" berm located outside the surf zone in nearshore waters (Work and Otay, 1997) is being evaluated as an alternative means to supply sediment to the beach and reduce ongoing coastal erosion. Fig. 1 shows an overview map of the project site. Since 1988 SPI has undertaken intermittent submerged berm nourishment projects as part of a Beneficial Use of Dredged Materials (BUDM) scheme (Aidala et al., 1992). Sediment removed by maintenance dredging is regularly placed back into the littoral system, and thus available for cross-shore and alongshore sediment transport to the beaches. For nearshore placement, maintenance material is placed by a hopper dredge in nearshore "feeder" berm sites (Fig. 2). Previous monitoring of material placed at these feeder berms indicated movement toward the beach and dispersal with movement primarily from alongshore sediment transport (both north and south) but direct tracer verification had not been accomplished prior to this study. An emergency dredging contract has been utilized to remove material from the Brownsville Santiago Pass. For this project, the dredged material was again placed at the feeder-berm sites 2A and 2B closer to the beach, rather than in the available Ocean Dredge Material Disposal Site (ODMDS) as shown in Fig. 2. Although nearshore placement is typically less expensive than beach placement, quantitative evidence is needed to understand how the material spreads and to determine whether it is eventually delivered to the active surf zone and deposited on the upper beach template.

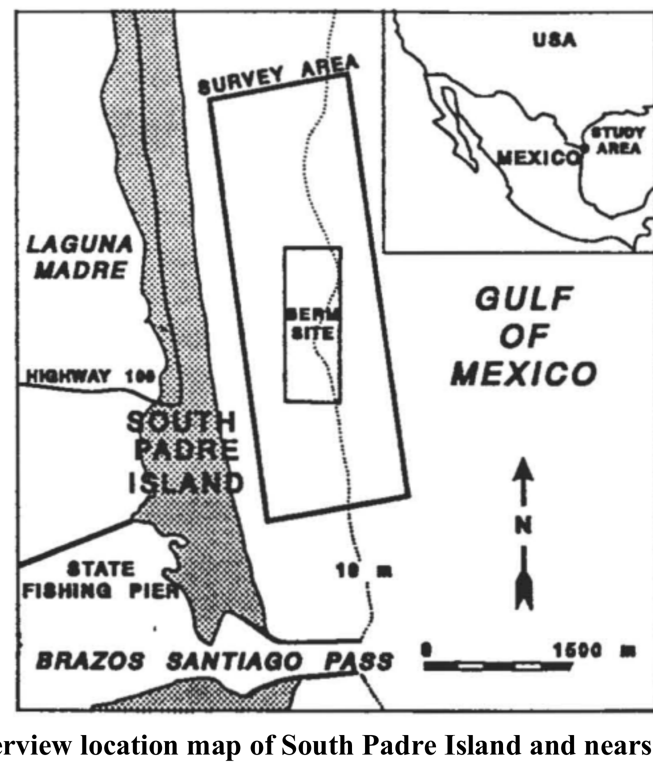

Figure 1. Overview location map of South Padre Island and nearshore berm site.

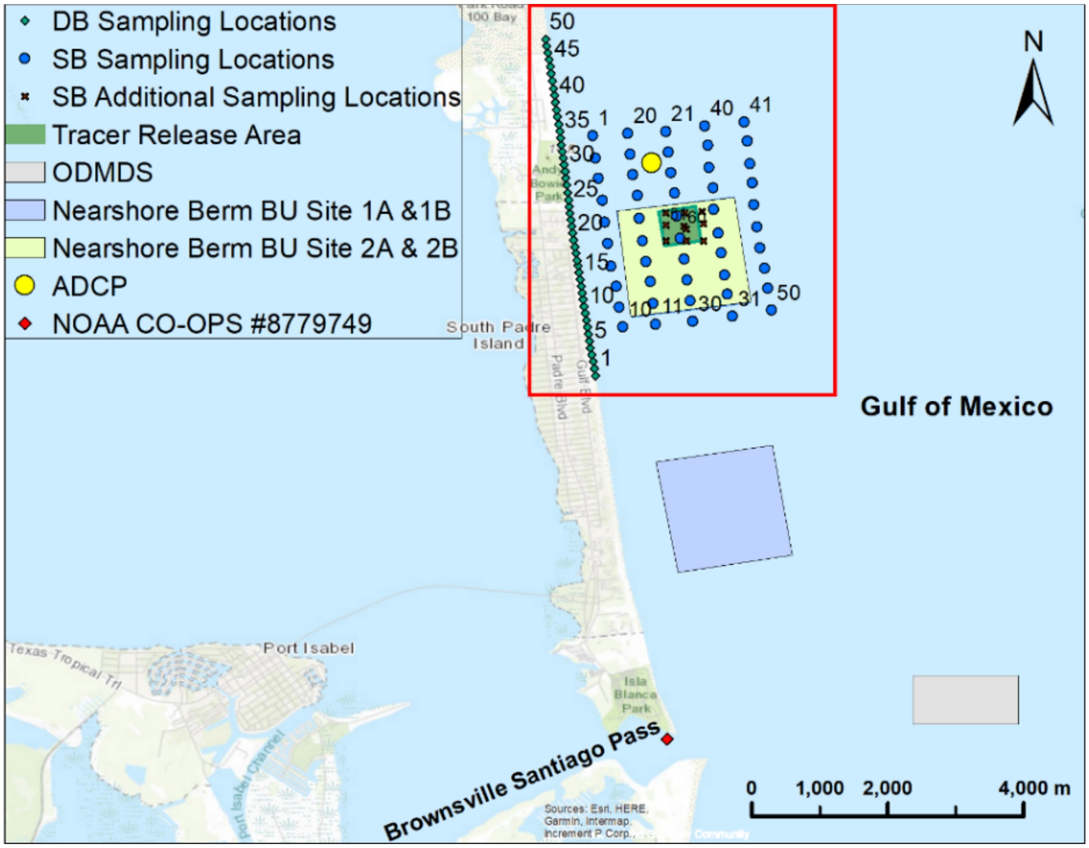

Figure 2. Map of SPI and nearshore berm site (DB: dry beach; SB: seabed). All base maps throughout this document were created using ArcGIS® software (ArcMap 10.4.2) by Esri (Esri, 2006). Base map data were downloaded from the ArcGIS® online data base (Esri, 2012).

As part of the most recent BUDM placement, a 15-month sediment tracer study was conducted as a collaboration between the City of SPI, U.S. Army Corps of Engineers Galveston District (USACE SWG), U.S. Geological Survey (USGS), Partrac GeoMarine Inc., and Texas A&M University (TAMU). A total of 2,000 kg (4,400 lb) of engineered ferrimagnetic fluorescent tracer particles were deployed to map sediment pathways after initial placement on the berm. Prior to the tracer deployment, USACE SWG placed more than 382,000 m^3 (500,000 cu.yd) of dredged material from nearby Brazos Santiago Pass approximately 1,220 m (4,000 ft) offshore at a depth of 9.1 m (30 ft). During the duration of the study, more than 900 surface-sediment grab samples from dry beach (at low tide) and offshore grid points in water depths ranging from approximately 7.9 m (26 ft) to 11 m (36 ft) were collected at increasing time intervals after initial tracer deployment. In this report the results from the laboratory tracer analysis are presented.

2 METHODOLOGY

2.1 Field Sampling

On August 15, 2018, 2000 kg (4,400 lb*)* of dual-signature tracer particles (ferrimagnetic and fluorescent) were released as a slurry at the location of the newly created submerged feeder berm in approximately 9.1 m (30 ft) of water 1,220 m (4,000 ft) offshore of SPI (Fig. 3). The method applied during this study reflects the method presented by Poleykett et al. (2018) and follows the methodological framework for the use of sediment tracers in marine and coastal environments detailed by Black et al. (2017). The particles were manufactured by Partrac Ltd. to closely match the hydraulic characteristics of the beneficial use dredged material making up the feeder berm ($d_{50} = 0.19$ mm, sediment density $\rho_s = 2{,}600$ kg/m^3, Gaussian distribution). The resultant tracer was a unimodal, well sorted fine sand (σ = 0.044 mm) (Folk, 1980). The settling velocities of the tracer particles were determined using the Soulsby criterion (Soulsby, 1997): wd_{10}, wd_{50}, wd_{90} = 0.007 cm/s, 0.014 cm/s, 0.024 cm/s, respectively. The slurry release into the water was accomplished via a chute over the side of a slowly moving vessel. The area of tracer deployment spanned approximately 500 m by 500 m (1,640 ft by 1,640 ft).

Figure 3. Photo of tracer deployment. 2000 kg (4,400 lb*)* of ferrimagnetic fluorescent tracer particles (top left inset) engineered to match the hydraulic characteristics of the dredged material were released via a chute on the side of the boat (bottom right inset) over the top of the nearshore berm in August 2018.

An initial grid of offshore surface-sediment grab sampling locations consisting of 10 alongshore points ($dy = 300$ m or 984 ft) by five cross-shore points ($dx = 300$ m or 984 ft) was set up. These 50 seabed (SB) sampling locations were complemented by an additional 10 SB locations near the initial tracer placement area. In addition, 50 dry beach (DB) sampling locations were set up along the SPI shoreline ($dx = 100$ m or 328 ft) as indicated in the left panel of Fig. 4. Nine sediment-sampling campaigns were completed at increasing time intervals commencing 24 hours after tracer deployment (Table 1). Ten pre-deployment DB and SB grab samples, respectively, were collected to establish base-line conditions (campaign 0). Starting with campaign 7, the sampling grid was modified slightly in response to measured tracer counts (see right panel of Fig. 4). The line of 10 farthest offshore grid points was removed and replaced by 10 alongshore points, five north and five south of the initial offshore grid, respectively. In addition, the five northernmost DB locations were moved to the south and renamed. The last campaign (campaign 9) only included DB samples. Photos detailing the surface-sediment grab sampling procedure are shown in Fig. 5.

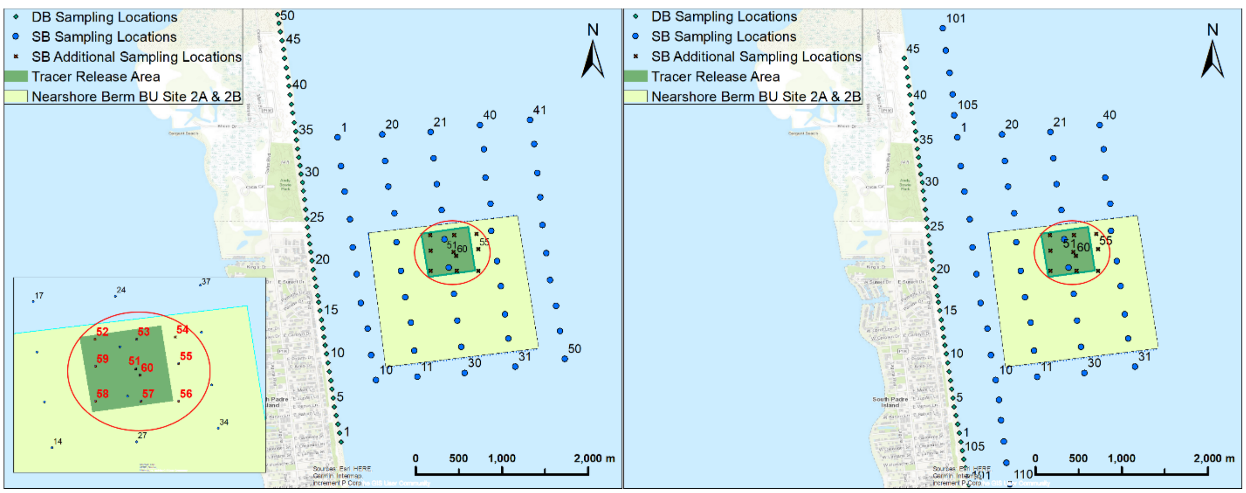

Figure 4. Grid layout for surface-sediment grab samples. Left panel: sampling locations for sampling campaigns 1 – 6. Right panel: modified sample-location scheme for sampling campaigns 7 – 9.

Table 1: Sediment Sampling Campaign Overview.

Campaign	Time past initial tracer deployment	# of surface-sediment grab samples (DB / SB)
0	pre-deployment	10 / 10
1	24 hours	50 / 60
2	3 days	50 / 60
3	1 week	50 / 60
4	2 weeks	50 / 60
5	1 month	50 / 60
6	2.5 months	50 / 60
7	6.5 months	50 / 60
8	10 months	50 / 60
9	15 months	50 / NA
	Total # of Samples:	950

Note: Campaigns 1-8 were conducted by the USGS and Campaign 9 was conducted by Partrac GeoMarine Inc. and City of SPI.

Figure 5. Photos showing the process of surface-sediment grab sampling at seabed locations. The grab sampling device was lowered to the seabed from the vessel. Collected sediment material was transferred to sealable plastic bags and catalogued.

2.2 Laboratory Analysis

All 950 surface-sediment grab samples were analyzed at the TAMU Coastal Engineering Laboratory (CEL) on the Galveston Campus. Each sample consisted of approximately 1.0 kg (2.2 lb) of sediment from the top 2 – 4 cm (0.79 – 1.58 in) of the bed. The main goal of this analysis was the determination of tracer particle counts (*N*) for each collected sample. The analysis followed the guidance presented in Partrac Ltd. (2018). In the following, the procedure to determine *N* is described in detail:

- The wet samples from each campaign arrived in sealable plastic bags on the Texas A&M University Galveston campus. For each campaign the bags were stored in large plastic crates with lids. Upon receipt of the samples for each campaign, separate log sheets were created and each sample was labeled.
- The wet weight of each sample was recorded using a digital high-precision scale to three decimal places.
- Samples were dried in special drying pans before further analysis. The drying process included 24 hours of air-drying at room temperature, followed by 24 hours in a sediment oven at 40° C (105° F), and an additional 24 hours of air-drying afterwards to remove all moisture content. The weight of water removed through drying typically ranged between 10 and 30% of the total wet sample weight.
- During oven-drying the weight of the samples was checked every 3 hours to ensure all moisture content was being removed. Consistent weight over several 3-hour intervals was the determining factor to allow removal of the samples from the oven after 24 hours of drying.
- The dry weight of each sample was recorded using a digital high-precision scale to three decimal places.
- Each dried sample was evenly spread out to an approximate grain monolayer on a 1 by 2 m (3.3 by 6.6 ft) black PVC tray. Lumped particle accumulations were gently separated using a hand-held rolling pin.
- The monolayer was inspected visually with a blue light torch (~ 395 nm) in a dark room. Fig. 6 shows photos of this process. Under the blue light torch, the fluorescent tracer particles appear bright green and are easily discernible. The bright green appearance is due to the inclusion of a chartreuse dye pigment in the tracer manufacturing process.
- Qualitative tracer counting was conducted by categorizing each sample based on approximate contained tracer particle amounts. This categorization is detailed in Table 2.

Table 2. Categories for qualitative tracer count analysis.

Category	Approximate tracer count
High	> 1000
Medium	> 100
Low	> 10
Very low	> 0
None	= 0

- If the qualitative tracer count was classified as “low” or “very low”, exact counts were determined and recorded directly.
- If the qualitative tracer count was classified as “medium” or “high”, counts were determined after separating the tracer particles from the sample. The separating technique is described in the next steps.
- The ferrimagnetic fluorescent tracer particles were extracted from the sample by using a 12,000 Gauss neodymium magnet. The magnet was cylindrical with a diameter of 25 mm (0.98 in) and a length of 300 mm (11.81 in) and was enclosed in a removable plastic sheath.
- The cylindrical sheath with the magnet was rolled over the sediment monolayer surface repeatedly. Ferrimagnetic particles attached themselves to the outer surface of the sheath and were transferred to a separate tray by removing the magnet from inside the sheath. The resulting residue contained both native dark gray non-fluorescent iron-bearing sediment particles and the green fluorescent, ferrimagnetic tracer material.
- The weight of the residue was recorded.
- Tracer particle counting was then completed manually for the residue material using the blue light torch and a hand tally counter in the same manner as described above.
- If high tracer counts were observed during the qualitative check, a subsampling procedure was employed to reduce the manual counting effort. The sediment monolayer was divided into six rectangles of equal size and counting was done for two of them only. The resulting particle counts were then multiplied by three to stay consistent across all samples. The error associated with manually counting tracer particles was estimated to be below 10%.

Figure 6. Photos of laboratory tracer count assessment using blue light illumination. Surface grab samples were dried and spread out on a flat PVC tray for that purpose.

Anytime samples were not actively being processed, they were stored in dry, enclosed crates sealed in a double layer of sealable plastic bags to prevent contamination and sample mixing. It was also observed that some samples contained micro-plastic fibers of 2–5 mm (0.079–0.197 in) length exhibiting a blue reflection. Owing to their distinctive shape, the plastic fibers were easily identifiable and were not included in the tracer count. Individual drying pans and plastic bags were always inspected under the blue light torch after transfer of sediment material and any tracer particles detected from the residual sediment was added to the final tracer count. Two different researchers repeated the procedure independently for each sample and all samples were kept in dark, dry storage protected by double-sealed plastic bags for potential future analyses. Wet and dry weight of each sample along with tracer count results were recorded in table format (see Appendix) and displayed graphically using geographic information system (GIS) software as shown in the next chapter.

3 RESULTS AND DISCUSSION

The results for the tracer particle counts varied based on tracer distribution at the time of sample collection. Particle counts ranged from zero to just below 3,000 for individual samples. The assumption is that the tracer particles behave in a similar way as the placed beneficial-use dredged sediment because they were designed to have the same hydraulic characteristics. Sediment and tracer movement is inherently tied to the complex nearshore dynamics at the site and is influenced by currents, water level fluctuations, waves, surf-zone processes, and morphology evolution (Ingle, 2011). It is understood that tracer particle counts merely represent snapshots in time and grab samples were only collected near the sediment surface. This means tracer particles observed at a specific location at previous time steps can become buried by new sediment with none or varying amounts of tracer. Sample wet and dry weights, as well as tracer particle counts at all grid points for sampling campaigns 1 through 8 are tabulated in the Appendix. A portion of the tabulated results is shown in Table 3 as an example.

Table 3. Example of Tracer Analysis Data for Campaigns 1-4 for Seabed Points 1-10

	C1			C2			C3			C4		
#	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N
SB01	1609.1	1353.4	0	1694.5	1402.0	0	1646.4	1319.4	12	2138.2	1764.6	18
SB02	787.1	636.9	0	1911.4	1577.9	0	1987.0	1625.1	33	1754.9	1381.9	6
SB03	1081.2	875.6	0	1100.7	899.0	0	1986.8	1635.7	72	1020.9	792.6	69
SB04	800.8	641.8	0	1841.7	1504.0	0	2201.8	1808.2	12	1470.7	1196.3	9
SB05	1333.1	1098.5	0	1456.4	1188.5	0	2210.9	1832.3	18	1152.8	893.9	3
SB06	1284.9	1039.0	0	1941.2	1588.6	0	2353.3	1943.9	9	1374.0	1058.3	3
SB07	723.1	585.5	0	1391.9	1135.1	0	2237.7	1824.1	12	1650.4	1352.3	3
SB08	1225.1	980.2	0	1551.2	1272.5	0	1651.7	1349.7	18	1724.3	1404.0	0
SB09	2063.0	1709.3	1	2024.7	1663.9	0	2416.4	1976.0	6	1694.0	1308.9	9
SB10	1804.3	1477.6	0	1762.6	1453.3	0	2380.0	1972.3	36	1434.1	1095.7	3

#: Sample location; W_w: wet weight of sediment sample; W_d: dry weight of sediment sample; N: number of tracer particles contained

The results reveal patterns of tracer movement. Figs. 7 and 8 provide graphical representations of measured tracer counts, N, over the study area for all sediment-sampling campaigns where tracer counts are represented by circle size and corresponding number at each sample point by using GIS visualization techniques (Esri, 2006). Throughout the entire study period, the highest tracer counts were found at or near the initial release location (up to nearly 3,000). These findings indicate that it takes on the order of years rather than months to fully redistribute sediment placed at the feeder berm under the given hydrodynamic conditions. However, a portion of tracer particles moved out of the initial placement area within 24 hours (campaign 1) after placement: large numbers (between N = 15 and N = 189) of tracer particles were detected just offshore and south of their original location outside the initial placement area indicating a predominantly southward littoral drift was likely during the initial 24 hours. This pattern continued over the next week manifesting itself in the results from campaign 2 where tracer numbers between N = 21 and N = 2,337 were recorded at all sampling locations south and immediately offshore of the initial placement area. Several locations just north and offshore of the initial placement area also showed elevated numbers of tracer particles between N = 3 and N = 36 indicating that dispersion of sediment was not purely unidirectional. During this first week, only negligible amounts of tracer migrated onshore and only sporadic counts of six or less tracer particles were found in DB samples.

By week 1 (campaign 3) the pattern had slightly changed (see Fig. 7). While a majority of elevated tracer counts outside the initial placement area were still located south of it, a fair amount of particles per sample had migrated onshore (between $N = 6$ and $N = 156$) as well as north (between $N = 12$ and $N = 72$) showing up in most samples collected at the two most shoreward alongshore rows of sampling locations. This means that onshore migration and alongshore transport in both directions had occurred. Incidentally, no appreciable tracer amounts were found in the shore-parallel farthest most offshore row of samples during campaign 3, further highlighting the shift to onshore sediment movement during the preceding time step.

Campaign 4 (two weeks post deployment) revealed yet another shift in sediment dynamics. Large numbers of tracer particles were collected both south and shoreward ($N = 14$ to as much as $N = 3,240$ per sample) and north and shoreward ($N = 18$ to as much as $N = 320$ per sample) of the original placement area as well as in the nearshore region between the feeder berm and the beach with decreasing concentration toward the shoreline. About half of the DB points also registered small amounts ($N = 3$ to 12) of tracer particles indicating that onshore transport from the feeder berm and deposition on the dry beach was occurring, albeit at low volume. After one month (campaign 5), the highest concentrations were still apparent in the initial placement area; some tracer was found at most SB sampling locations, although at reduced concentrations from those observed in campaign 4, a week prior. The only exceptions were some sampling locations on the southern edge of the measurement grid, where an increase in numbers from double digits to triple digits was observed. This increase went hand-in-hand with a decrease in counts at locations between the original placement area and the southern edge of the grid, highlighting the possibility for particles to move southward out of the sampling area.

Campaign 6 (2.5 months post deployment) showed appreciable overall count reductions outside the initial placement area, to mostly zero offshore and lower two-digit numbers in the area shoreward of it. This could indicate that tracer particles had migrated out of the sampling area or had been covered by additional sediment as a result of storm activity as discussed below. DB samples did not show any appreciable tracer counts. These observations prompted the modification of the sampling grid detailed in the methodology section for the remaining campaigns (Fig. 8).

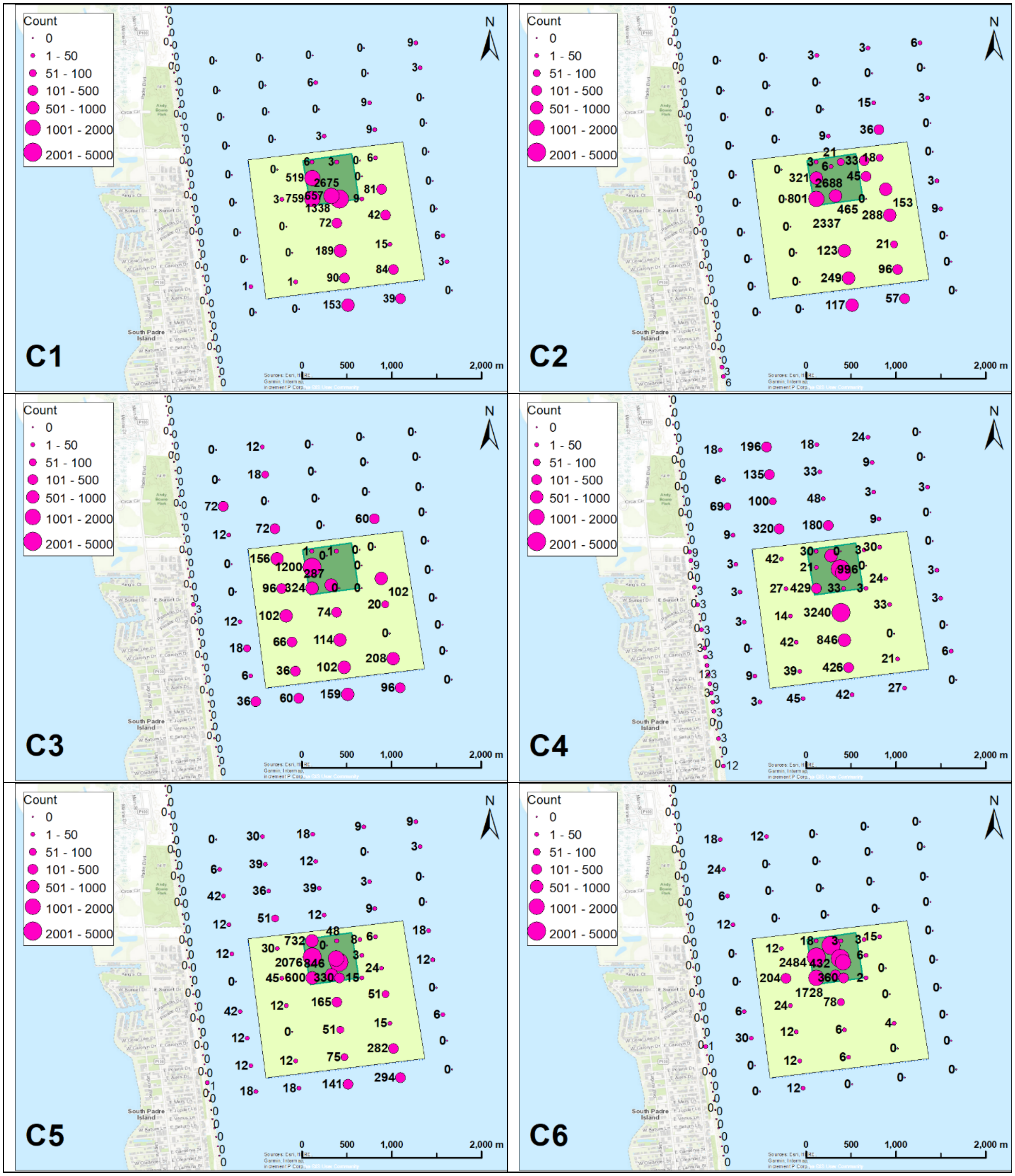

Figure 7. Tracer count results post release for sampling campaigns 1 – 6. C1 (24 hours), C2 (3 days), C3 (1 week), C4 (2 weeks), C5 (1 month), C6 (2.5 months). The number of tracer particles, *N*, is given at each sampling location and visualized by circle size.

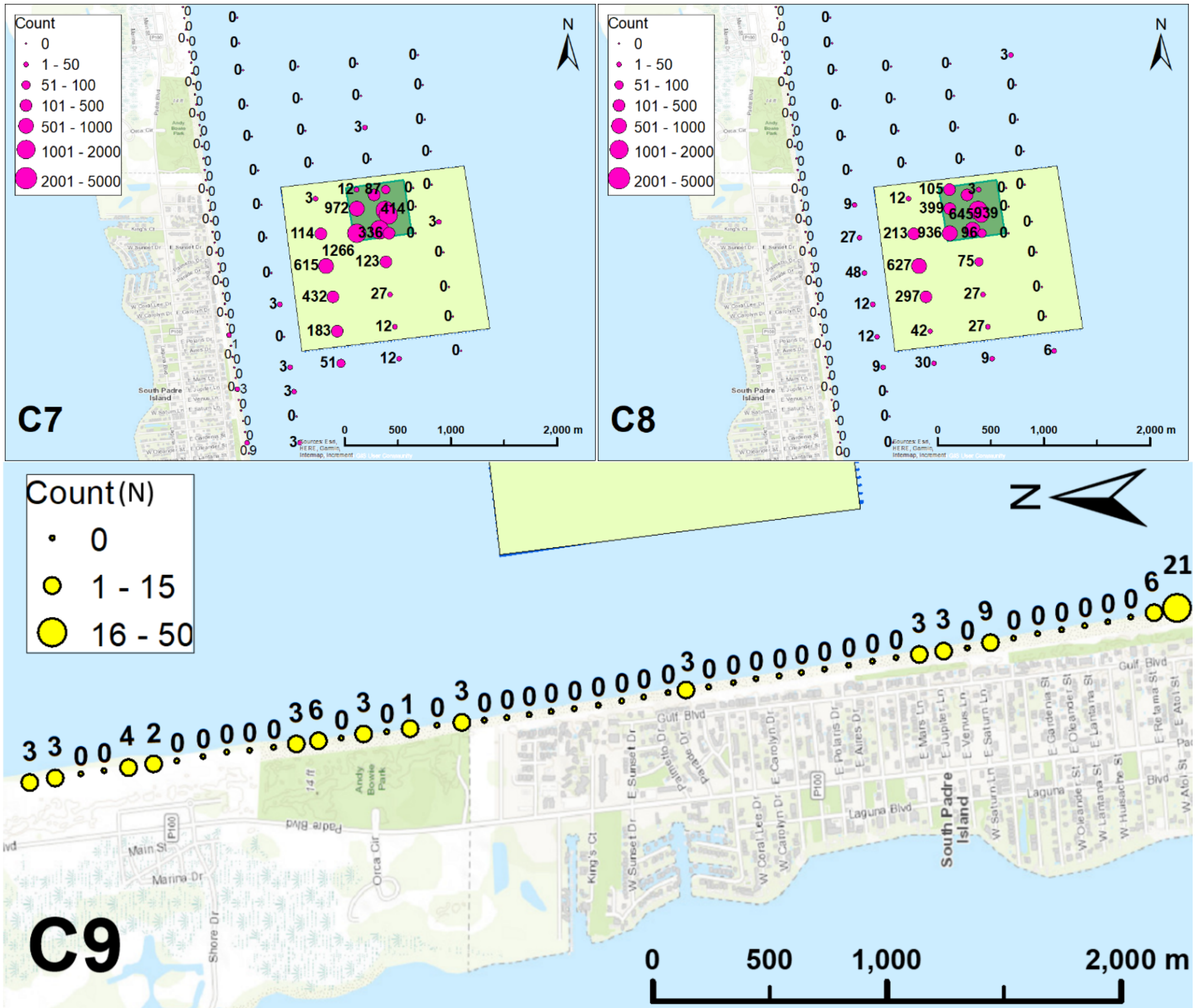

Figure 8. Tracer count results post release for sampling campaigns 7 – 9. C7 (6.5 months), C8 (10 months), C9 (15 months, DB samples only). The number of tracer particles, *N*, is given at each sampling location and visualized by circle size.

Six and a half months into the field experiment (campaign 7), the measured tracer distribution resembled that after 1 week but with an apparent onshore shift of appreciable tracer counts across almost all sampling locations. At that point, the majority of tracer particles outside of the initial placement area could be found south and onshore of it with numbers ranging from the low tens to 615 per sample. Only one DB location south of the feeder berm recorded nine tracer particles.

Ten months post initial deployment (campaign 8), the count numbers looked similar but sampling locations shore- and southward of the initial tracer release area revealed increased particle counts. This indicates that some onshore movement of sediment occurred over the three and a half months between campaign 7 and 8. The final campaign after 15 months (campaign 9) only consisted of DB samples. Counts ranged from zero to $N = 21$ tracer particles per sample, with zero counts making up over half of the samples. Only one sample with a count over nine particles ($N = 21$) was found. This sample was from the most southward DB location. This pattern in tracer particle counts indicates that onshore transport and deposition on the dry beach likely occurred but the stretch of beach with the most benefit may not be the one immediately landward of the feeder berm depending on the prevailing nearshore dynamics. The tracer results show that placed material moved to within 150 m (500 ft) of the beach face, and therefore well within the closure depth. The residence time for material this close to the beach face, and its subsequent along-shore or cross-shore transport pathways, are not known. It is clear, however, from the present study that material moves from the nearshore berm to within the closure depth, and therefore is capable of nourishing the beach.

4 CONCLUSIONS

A 15-month long particle tracer study was conducted to map sediment pathways in the nearshore region of South Padre Island (SPI), Texas. In this report, the results from the laboratory tracer particle analysis are presented. The laboratory analysis of collected field samples consisted of counting fluorescent ferrimagnetic tracer particles. A total of 950 surface-sediment grab samples from nine sampling campaigns plus base-line samples collected from around the feeder-berm area and on the dry beach were analyzed. The results showed that the highest concentration of tracer particles in all campaigns remained at the location of the initial tracer release. This indicates that the time scale may be on the order of years rather than months to fully redistribute sediment placed at the feeder berm under the given hydrodynamic conditions.

Outside of the feeder-berm area, tracer counts indicated sediment movement primarily toward the south and onshore, but with temporal and spatial variability hinting at the complexity of prevailing hydrodynamics in that area. Offshore loss of sediment from the feeder berm was not apparent from the tracer results. A small number of tracer particles were observed on the dry beach north and south of the feeder berm at times throughout the study period. These results indicate that a portion of the placed sediment can move to the dry beach and potentially help mitigate shoreline erosion, although the actual tracer particle numbers recorded near the shoreline remained low throughout.

Results of this study indicate that an appreciable amount of material moved onshore from the nearshore berm to within the closure depth. This material would be capable of nourishing the beach. In summary, the results of this tracer and data collection effort support the case that portions of the dredged material placed in a nearshore berm at this location will eventually be incorporated into the active beach profile as a result of background and episodic coastal processes. Furthermore, it is noted that based on the presented results, placement of sediment material in a nearshore berm may be a useful, cost effective alternative to direct placement of sediment material on the beach when direct placement is not feasible because of funding or seasonality constraints.

5 ACKNOWLEDGEMENTS

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7 APPENDIX

The following tables contain the data from the laboratory tracer analysis of each sediment sample. Sample locations are denoted by “SB” or “DB” for seabed and dry beach sample locations, respectively. Sample numbers correspond to the locations in the field as indicated in Fig. 4. Listed parameters include the sample wet weight Ww, the sample dry weight Wd after removal of all moisture content, and the number of tracer particles contained in each sample. The results for campaigns 1-4 are given in Table A1. The results for campaigns 5-8 are given in Table A2.

Table A1. Laboratory Tracer Analysis Data for Campaigns 1 through 4

	C1			**C2**			**C3**			**C4**		
#	W_w **(g)**	W_d **(g)**	N	W_w **(g)**	W_d **(g)**	N	W_w **(g)**	W_d **(g)**	N	W_w **(g)**	W_d **(g)**	N
SB01	1609.1	1353.4	0	1694.5	1402.0	0	1646.4	1319.4	12	2138.2	1764.6	18
SB02	787.1	636.9	0	1911.4	1577.9	0	1987.0	1625.1	33	1754.9	1381.9	6
SB03	1081.2	875.6	0	1100.7	899.0	0	1986.8	1635.7	72	1020.9	792.6	69
SB04	800.8	641.8	0	1841.7	1504.0	0	2201.8	1808.2	12	1470.7	1196.3	9
SB05	1333.1	1098.5	0	1456.4	1188.5	0	2210.9	1832.3	18	1152.8	893.9	3
SB06	1284.9	1039.0	0	1941.2	1588.6	0	2353.3	1943.9	9	1374.0	1058.3	3
SB07	723.1	585.5	0	1391.9	1135.1	0	2237.7	1824.1	12	1650.4	1352.3	3
SB08	1225.1	980.2	0	1551.2	1272.5	0	1651.7	1349.7	18	1724.3	1404.0	0
SB09	2063.0	1709.3	1	2024.7	1663.9	0	2416.4	1976.0	6	1694.0	1308.9	9
SB10	1804.3	1477.6	0	1762.6	1453.3	0	2380.0	1972.3	36	1434.1	1095.7	3
SB11	1484.6	1213.4	0	1365.0	1109.4	0	1921.9	1546.2	60	2024.9	1530.3	45
SB12	1591.2	1248.2	1	1490.7	1215.4	0	1590.2	1259.3	36	1627.7	1302.3	39
SB13	902.9	713.8	0	1548.2	1248.4	0	2053.4	1664.5	66	2029.9	1640.8	42
SB14	1316.2	1021.5	0	1377.4	1121.4	0	1852.0	1487.5	102	1620.6	1318.2	14
SB15	1384.8	1134.4	3	1466.2	1199.7	0	1899.4	1546.1	96	1234.1	923.0	27
SB16	1504.3	1240.1	0	1269.0	1026.6	0	2027.7	1638.7	156	2106.6	1590.6	42
SB17	774.9	610.6	0	1461.1	1174.5	0	1362.0	1099.3	72	1830.5	1381.4	320
SB18	1653.2	1336.8	0	1401.8	1137.5	0	1865.1	1505.9	0	2019.8	1587.3	100
SB19	841.7	686.0	0	795.6	624.2	0	1159.1	932.9	18	1730.9	1321.4	135
SB20	544.9	418.9	0	1429.3	1133.6	0	1727.0	1344.2	12	1647.8	1196.5	196
SB21	654.8	516.4	0	1895.2	1555.4	3	2050.9	1693.7	0	1543.2	1175.9	18

	C1			C2			C3			C4		
#	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N
SB22	1267.1	1035.3	6	1665.7	1353.7	0	2111.6	1814.0	0	1456.7	1105.0	33
SB23	1337.9	1065.2	0	1490.5	1166.8	0	1928.5	1514.1	0	2473.3	1813.3	48
SB24	1175.7	907.9	3	1397.8	1107.1	9	1975.0	1637.5	0	1339.9	979.1	180
SB25	1016.3	800.6	2160	2828.0	2215.5	6	2728.1	2145.3	0	2186.3	1728.9	996
SB26	1064.8	862.5	657	1800.6	1431.6	465	2775.8	2158.8	287	1612.2	1242.8	7056
SB27	681.9	526.1	72	1339.5	1066.5	2337	2003.2	1578.4	74	1534.7	1128.0	3240
SB28	1072.2	829.2	189	2016.7	1622.7	123	2102.8	1661.7	114	2048.1	1625.2	846
SB29	949.9	748.3	90	1639.0	1325.9	249	2106.2	1688.8	102	1740.7	1372.4	426
SB30	572.0	451.0	153	1274.1	1029.5	117	1750.7	1389.2	159	1458.3	1137.7	42
SB31	717.8	572.3	39	2000.7	1636.5	57	2160.4	1832.5	96	740.3	584.0	27
SB32	495.8	386.5	84	1442.4	1190.8	96	1622.2	1370.8	208	1601.6	1296.4	21
SB33	741.2	564.1	15	2424.5	1982.8	21	1237.5	1066.1	0	1950.0	1590.8	0
SB34	1831.1	1467.5	42	1649.7	1302.8	288	1390.9	1121.7	20	865.5	673.6	33
SB35	1029.8	757.1	81	1447.9	1169.4	153	2153.0	1801.5	102	1242.3	1000.1	24
SB36	1363.3	1030.7	6	1860.4	1492.5	18	1732.6	1384.2	0	1650.3	1305.9	30
SB37	588.7	448.9	9	1670.6	1357.9	36	1844.7	1605.9	60	667.3	542.8	9
SB38	746.7	592.5	9	485.4	401.3	15	1141.4	1004.4	0	586.3	491.8	3
SB39	1059.4	796.3	0	1959.5	1610.7	0	1743.9	1506.6	0	1194.0	963.6	9
SB40	758.4	551.6	0	1742.3	1437.6	3	1092.4	938.8	0	860.6	673.4	24
SB41	1423.0	1178.6	9	1975.5	1604.6	6	1956.1	1658.3	0	2414.1	1955.2	0
SB42	1751.9	1377.9	3	3245.4	2411.3	0	1990.1	1396.3	0	1678.9	1234.1	0
SB43	2236.1	1826.6	0	2040.6	1578.8	3	2134.5	1242.9	0	1573.9	1195.8	3
SB44	2598.5	2302.8	0	1979.9	1618.4	0	2927.1	2517.1	0	3488.4	2797.6	0
SB45	1371.8	1138.2	0	1812.6	1475.8	0	2179.5	1900.3	0	1092.4	870.8	0
SB46	1285.8	1011.9	0	1938.9	1584.3	3	1744.5	1465.8	0	1377.9	1104.2	3
SB47	2781.2	2340.7	0	1560.7	1246.1	9	2001.2	1721.7	0	1843.8	1483.7	3
SB48	2278.4	1874.3	6	1279.6	1034.1	0	1801.3	1477.4	0	1689	1363.6	0
SB49	1509.0	1188.0	3	1747.2	1414.8	0	2166.7	1870.3	0	954.5	759.4	6
SB50	2820.1	2385.3	0	1693.3	1386.6	0	2397.8	1957.5	0	1276.1	1024.4	0
SB51	1628.8	1297.6	4548	1254.7	999.2	2742	2371.8	1932.5	10400	1659.2	1291.8	2364
SB52	1006.3	813.1	6	1196.0	961.4	3	1454.0	1254.9	1	1937.9	1523.6	30
SB53	2324.7	1886.4	3	1513.8	1197.6	21	2290.3	1884.1	1	2192.7	1696.6	0
SB54	1750.5	1434.4	0	1394.0	1100.3	33	2328.4	1942.5	0	1343.8	1010.3	3
SB55	1614.2	1287.4	0	2152.0	1700.3	45	2796.3	2206.8	0	1831.1	1341.2	0
SB56	1695.3	1367.1	9	2106.8	1659.4	0	2481.6	1988.3	0	2118.6	1615.6	3
SB57	1770.4	1459.9	1338	1595.2	1238.1	2471	2506.5	2047.4	0	2530.2	1862.2	33
SB58	2411.3	1988.5	759	1552.2	1181.2	801	2120.6	1695.2	324	1767.8	1361.6	429
SB59	2215.4	1833.8	519	1798.0	1425.7	321	1927.5	1534.7	1200	2228.9	1676.2	21
SB60	1851.6	1513.1	2675	2084.4	1661.4	2688	2676.5	2124.8	2250	2264.6	1734.6	1950
DB01	1885.9	1692.1	0	1309.0	1075.2	6	1502.8	1235.0	0	1801.7	1486.1	12
DB02	1648.2	1383.1	0	1363.2	1118.3	3	1578.6	1287. 6	0	1520.9	1240.0	0
DB03	1487.8	1237.8	0	1304.5	1064.3	0	1336.6	1091.8	0	1496.7	1218.2	0
DB04	1343.0	1118.4	0	1326.5	1078.2	0	1485.7	1233.3	0	1490.9	1212.4	3
DB05	1738.6	1485.3	0	1352.3	1105.9	0	1292.1	1051.2	0	1543.8	1253.4	0
DB06	1487.1	1234.2	0	1323.6	1086.9	0	1435.2	1188.4	0	1576.8	1283.6	0
DB07	1445.4	1219.9	0	1232.3	1002.7	0	1450.0	1185.5	0	1493.1	1219.9	3
DB08	1452.1	1206.9	0	1201.4	987.0	0	1365.2	1119.6	0	1353.7	1106.3	3
DB09	1421.5	1172.6	0	1393.4	1134.4	0	1421.3	1159.3	0	1511.6	1230.8	3
DB10	1440.8	1198.7	0	1100.8	903.5	0	1478.8	1207.5	0	1343.2	1101.1	9
DB11	1220.9	1008.9	0	1183.5	974.5	0	1510.1	1241.7	0	1484.6	1213.1	3
DB12	1421.9	1176.5	0	1346.7	1099.7	0	1407.2	1151.3	0	1342.0	1108.3	12
DB13	1361.4	1115.2	0	1331.8	1094.2	0	1469.2	1196.1	0	1466.7	1193.8	3
DB14	1416.6	1173.7	0	1183.4	963.7	0	1551.2	1261.3	0	1402.4	1146.2	3

	C1			C2			C3			C4		
#	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N
DB15	1263.8	1032.0	0	1203.4	984.7	0	1503.4	1220.0	0	1514.2	1239.6	0
DB16	1372.6	1109.9	0	1244.3	1014.9	0	1446.1	1181.7	0	1431.4	1171.1	3
DB17	1375.0	1128.6	0	1280.6	1051.8	0	1410.9	1140.2	0	1413.0	1152.7	0
DB18	1126.6	929.9	0	1205.8	984.1	0	1550.1	1256.6	0	1325.5	1082.5	0
DB19	1291.2	1067.2	0	1251.6	1016.1	0	1455.5	1185.1	3	1525.0	1249.7	3
DB20	1344.5	1105.5	0	1506.0	1232.7	0	1356.3	1102.1	0	1362.9	1124.4	0
DB21	1282.5	1052.4	0	1627.4	1338.5	0	1635.8	1327.8	0	1501.9	1232.9	3
DB22	1342.9	1109.5	0	1654.1	1355.3	0	1415.2	1141.7	0	1357.5	1111.2	0
DB23	1468.0	1200.9	0	1593.3	1294.9	0	1588.1	1300.2	0	1492.1	1219.2	0
DB24	1308.4	1086.5	0	1487.2	1212.5	0	1550.6	1257.7	0	1381.0	1131.1	9
DB25	1228.7	1062.4	0	1443.4	1161.3	0	1671.0	1378.7	0	1454.9	1200.9	9
DB26	1200.1	1045.9	0	1631.8	1336.1	0	1513.0	1227.9	0	1684.6	1349.8	0
DB27	1233.5	1021.6	0	1410.5	1163.3	0	1670.2	1362.2	0	1631.1	1309.4	0
DB28	1264.9	1070.3	0	1332.9	1089.5	0	1725.1	1422.4	0	1759.8	1416.9	0
DB29	1364.5	1165.5	3	1398.7	1140.6	0	1460.8	1205.6	0	1787.1	1444.3	0
DB30	1209.5	1019.2	0	1470.6	1202.7	0	1580.2	1305.1	0	1587.0	1280.0	0
DB31	1423.0	1181.8	0	1412.1	1151.2	0	1695.2	1389.6	0	1868.4	1507.7	0
DB32	1286.0	1095.2	0	1529.3	1248.5	0	1540.9	1269.9	0	1874.0	1508.9	0
DB33	1209.5	1003.9	0	1516.6	1239.9	0	1652.6	1355.2	0	1731.0	1397.2	0
DB34	1340.9	1101.0	0	1497.3	1236.4	0	1628.2	1342.7	0	1734.6	1402.6	0
DB35	1256.0	1056.7	0	1616.1	1328.9	0	1651.2	1358.6	0	1803.7	1479.3	0
DB36	1105.3	926.2	0	1531.7	1250.4	0	1697.7	1385.1	0	1726.2	1390.8	0
DB37	1390.7	1166.0	0	1482.4	1213.7	0	1653.8	1349.8	0	1698.1	1368.1	0
DB38	1263.7	1071.9	0	1529.1	1251.7	0	1639.4	1338.3	0	1671.6	1351.2	0
DB39	1408.0	1183.1	0	1460.0	1196.7	0	1614.8	1331.3	0	1842.7	1487.4	0
DB40	1329.7	1135.5	0	1509.2	1241.8	0	1523.6	1247.1	0	1863.6	1504.8	0
DB41	1183.3	980.2	0	1433.4	1173.7	0	1385.6	1133.7	0	1833.8	1488.2	0
DB42	1225.3	1033.4	0	1367.0	1064.5	0	1595.7	1306.0	0	1802.0	1466.2	0
DB43	1388.0	1146.1	3	1471.1	1205.9	0	1571.7	1299.2	0	1767.9	1436.4	0
DB44	1319.3	1084.0	0	1473.1	1204.6	0	1499.0	1224.5	0	1749.3	1411.7	3
DB45	1096.7	929.3	0	1553.6	1268.8	0	1494.1	1218.2	0	1914.0	1557.3	0
DB46	1529.7	1269.1	0	1381.8	1132.7	0	1538.9	1253.4	0	1662.4	1360.0	0
DB47	1260.4	1052.2	0	1424.7	1162.6	0	1576.1	1290.4	0	1704.3	1374.8	0
DB48	1152.9	979.7	0	1428.3	1166.5	0	1634.9	1327.6	0	1637.8	1328.4	3
DB49	1369.3	1153.4	3	1617.3	1330.6	0	1607.2	1316.3	0	1848.0	1491.3	0
DB50	1287.4	1099.2	0	1485.5	1212.3	0	1649.3	1349.5	0	1764.7	1426.0	3

#: Sample location; W_w: wet weight of sediment sample; W_d: dry weight of sediment sample; N: number of tracer particles contained

Table A2. Laboratory Tracer Analysis Data for Campaigns 5 through 8

	C5			C6				C7			C8		
#	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N	#	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N
SB01	1515.3	1243.9	0	1686.3	1325.5	18	**SB01**	941.6	736.8	0	1575.2	1275.7	0
SB02	1050.3	823.5	6	542.5	437.9	24	**SB02**	726.7	557.8	0	1534.2	1233.7	0
SB03	1825.2	1434.1	42	842.7	644.4	6	**SB03**	804.3	621.8	0	1670.4	1344.0	0
SB04	1653.2	1297.1	12	1119.3	873.7	12	**SB04**	957.5	734.2	0	1733.7	1416.9	0
SB05	1436.6	1157.9	12	1177.1	957.1	0	**SB05**	589.1	448.7	0	1613.5	1309.7	9
SB06	1722.1	1349.3	0	1276.2	998.6	0	**SB06**	607.9	478.3	0	1396.0	1122.5	27
SB07	1405.9	1140.6	42	979.7	755.4	6	**SB07**	473.1	373.3	0	1683.5	1356.6	48
SB08	1633.2	1280.3	12	1239.5	961.1	30	**SB08**	866.8	673.4	3	1544.2	1252.1	12

	C5			C6				C7			C8		
#	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N	#	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N
SB09	1519.9	1161.0	12	1017.9	791.5	0	**SB09**	532.7	410.2	0	1250.5	1008.7	12
SB10	1978.7	1536.9	18	1115.9	894.6	0	**SB10**	583.7	465.1	3	1330.6	1071.9	9
SB11	828.7	664.2	18	913.9	712.4	12	**SB11**	991.4	775.3	51	1559.5	1254.8	30
SB12	623.6	503.8	12	795.5	614.9	12	**SB12**	644.1	495.8	183	2170.2	1734.0	42
SB13	740.0	586.8	0	809.4	621.6	12	**SB13**	479.3	370.5	432	1618.3	1289.9	297
SB14	1087.9	871.8	12	582.0	433.4	24	**SB14**	576.4	441.0	615	1313.8	1056.6	627
SB15	710.5	554.2	45	834.0	635.3	204	**SB15**	450.1	335.3	114	1247.3	1000.3	213
SB16	756.6	571.2	30	532.1	390.8	12	**SB16**	406.1	322.9	3	1316.7	1058.4	12
SB17	607.0	482.7	51	335.1	274.5	0	**SB17**	414.3	320.5	0	1028.4	829.0	0
SB18	922.2	724.9	36	1111.8	848.9	0	**SB18**	556.8	417.2	0	1004.7	788.8	0
SB19	988.6	744.7	39	923.1	725.9	0	**SB19**	580.5	460.8	0	1328.7	1075.0	0
SB20	442.4	324.5	30	882.8	676.4	12	**SB20**	705.4	544.3	0	1520.7	1178.4	0
SB21	973.8	748.7	18	432.1	324.2	0	**SB21**	882.3	686.4	0	996.4	818.0	0
SB22	1437.3	1098.2	12	430.9	333.4	0	**SB22**	1390.7	1112.5	0	1402.1	1148.7	0
SB23	1787.6	1277.3	39	621.0	475.3	0	**SB23**	456.0	358.9	3	1768.6	1423.4	0
SB24	942.8	695.9	12	713.1	562.1	0	**SB24**	1011.2	815.3	0	839.8	682.6	0
SB25	2996.9	2146.4	0	846.5	650.3	2718	**SB25**	713.0	574.3	414	1708.8	1373.6	306
SB26	1498.9	1116.1	846	548.0	414.1	432	**SB26**	535.6	414.1	1056	1277.7	1034.9	939
SB27	1584.2	1174.1	165	1990.4	1530.1	78	**SB27**	465.9	359.5	123	1681.4	1366.1	75
SB28	1621.1	1277.9	51	1418.5	1163.1	6	**SB28**	1225.7	959.8	27	1511.5	1239.2	27
SB29	1385.4	1055.0	75	1730.7	1346.9	6	**SB29**	727.8	568.5	12	1352.2	1097.9	27
SB30	1266.9	982.3	141	1881.6	1463.9	0	**SB30**	1110.3	872.4	12	1380.9	1117.7	9
SB31	2631.4	2056.2	294	842.7	689.7	0	**SB31**	1016.4	819.8	0	1296.7	1061.2	6
SB32	1788.5	1316.7	282	1600.5	1267.4	0	**SB32**	1072.1	868.2	0	1575.6	1294.6	0
SB33	1735.4	1312.5	15	657.5	552.3	4	**SB33**	1030.6	840.1	0	1777.5	1452.9	0
SB34	1653.7	1158.9	51	1007.1	781.0	0	**SB34**	1312.0	1036.4	0	1127.9	914.0	0
SB35	834.2	617.4	24	531.4	419.2	0	**SB35**	827.0	644.1	3	1632.1	1328.7	0
SB36	996.5	793.4	6	705.2	564.2	15	**SB36**	821.4	649.0	0	936.6	766.6	0
SB37	627.7	467.0	9	881.4	717.7	0	**SB37**	1116.8	908.8	0	1023.4	839.8	0
SB38	1519.9	1179.6	3	1632.3	1319.8	0	**SB38**	653.6	534.0	0	1439.5	1195.1	0
SB39	1181.7	881.8	0	886.8	689.8	0	**SB39**	704.6	541.7	0	888.2	719.5	0
SB40	1094.8	858.6	9	1140.9	939.5	0	**SB40**	750.5	579.1	0	1195.3	972.6	3
SB41	2589.6	1823.1	9	1722.6	1323.4	0	**SB51**	456.9	368.3	1380	1827.5	1478.5	1068
SB42	1200.3	850.0	3	2450.0	1939.3	0	**SB52**	994.7	779.2	12	1622.6	1307.9	105
SB43	1611.2	1325.1	0	2190.7	1711.8	0	**SB53**	1346.2	1050.0	87	1024.1	823.4	3
SB44	1602.8	1256.4	0	3445.0	2640.9	0	**SB54**	812.4	664.4	0	1463.5	1170.3	0
SB45	1800.7	1432.7	18	1372.4	1128.0	0	**SB55**	1628.5	1278.1	0	1590.6	1278.8	0
SB46	945.4	752.2	12	2864.7	2248.2	0	**SB56**	962.1	771.8	0	1633.3	1318.3	0
SB47	1506.7	1224.8	0	2542.2	1952.3	0	**SB57**	710.8	548.4	336	1328.5	810.7	96
SB48	1901.8	1427.2	6	1592.5	1250.5	0	**SB58**	923.8	740.1	1266	1710.9	1327.4	936
SB49	1627.4	1119.4	0	209.7	158.4	0	**SB59**	1276.1	1027.1	972	1275.6	1033.3	399
SB50	1453.8	1096.9	0	1880.0	1482.0	0	**SB60**	1048.3	842.7	1212	1177.8	952.8	645
SB51	1002.0	775.0	1962	659.2	510.7	2640	**SB101**	561.6	433.8	6	1660.5	1339.5	0
SB52	1014.7	799.2	732	1271.9	982.9	18	**SB102**	380.0	305.9	6	1277.0	1033.1	0
SB53	1197.6	934.3	48	1129.4	872.6	3	**SB103**	684.5	530.7	0	1313.1	1060.8	0
SB54	1784.0	1315.2	8	709.5	556.7	3	**SB104**	438.1	331.1	0	1291.9	1050.9	0
SB55	1235.9	938.4	3	645.5	513.8	6	**SB105**	821.1	621.0	0	1788.5	1431.5	0
SB56	2103.6	1574.3	15	1926.4	1502.7	2	**SB106**	925.7	748.8	3	1736.1	1407.3	0
SB57	1677.6	1269.2	330	721.5	542.5	360	**SB107**	681.8	521.8	0	1358.3	1095.5	0
SB58	1794.7	1354.0	600	1487.9	1112.5	1728	**SB108**	604.3	467.8	3	1520.5	1222.2	0
SB59	1740.8	1315.4	2076	1125.8	851.5	2484	**SB109**	337.3	257.2	0	1865.2	1502.5	0
SB60	2084.7	1543.9	2310	940.0	712.8	1452	**SB110**	507.2	390.4	0	1773.4	1439.3	0
DB01	1479.6	1219.5	0	1575.0	1286.3	0	**DB01**	1561.2	1293.7	9	1603.3	1305.0	0

	C5			C6				C7			C8		
#	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N	**#**	W_w (g)	W_d (g)	N	W_w (g)	W_d (g)	N
DB02	1529.7	1252.6	0	1535.3	1246.4	0	**DB02**	1692.5	1387.4	0	1637.8	1336.2	0
DB03	1500.1	1240.8	0	1564.7	1226.2	0	**DB03**	1642.1	1347.6	0	1583.7	1301.2	0
DB04	1429.5	1158.4	0	1581.8	1297.0	0	**DB04**	1634.0	1334.7	0	1761.0	1465.4	0
DB05	1484.1	1214.8	0	1435.7	1179.8	0	**DB05**	1395.5	1137.6	0	1514.0	1242.5	0
DB06	1448.4	1187.4	0	1650.1	1326.2	0	**DB06**	1414.8	1171.9	3	1599.1	1303.9	0
DB07	1385.0	1132.0	0	1481.2	1220.2	0	**DB07**	1559.8	1286.0	0	1564.1	1278.1	0
DB08	1316.1	1067.0	0	1362.2	1055.5	0	**DB08**	1534.7	1271.1	0	1483.3	1218.6	0
DB09	1543.3	1265.7	1	1520.7	1258.6	0	**DB09**	1651.6	1359.1	0	1539.5	1262.2	0
DB10	1337.6	1098.0	0	1565.8	1272.2	0	**DB10**	1447.6	1175.9	0	1492.0	1216.3	0
DB11	859.6	700.2	0	1512.0	1227.8	0	**DB11**	1553.6	1267.0	1	1608.4	1313.6	0
DB12	1385.3	1132.5	0	1449.5	1180.8	0	**DB12**	1529.1	1251.2	0	1540.7	1264.0	0
DB13	1257.5	1034.5	0	1498.7	1222.1	1	**DB13**	1563.2	1291.4	0	1612.1	1306.9	0
DB14	1194.3	977.1	0	1481.1	1219.3	0	**DB14**	1537.0	1270.5	0	1488.2	1221.8	0
DB15	1333.2	1096.2	0	1673.2	1367.4	0	**DB15**	1573.7	1284.3	0	1576.1	1271.6	0
DB16	1264.2	1027.6	0	1629.5	1338.2	0	**DB16**	1563.6	1279.1	0	1751.1	1421.9	0
DB17	1363.5	1110.1	0	1485.8	1200.1	0	**DB17**	1533.0	1256.7	0	1651.6	1345.6	0
DB18	1264.2	1020.5	0	1353.4	1107.7	0	**DB18**	1510.9	1241.3	0	1784.3	1453.7	0
DB19	1135.0	928.5	0	1484.8	1201.2	0	**DB19**	1402.8	1147.4	0	1633.3	1329.8	0
DB20	1409.7	1158.9	0	1437.8	1172.5	0	**DB20**	1506.0	1236.5	0	1702.5	1388.3	0
DB21	1420.6	1159.5	0	1350.3	1073.8	0	**DB21**	1470.8	1206.1	0	1547.6	1270.0	0
DB22	1413.1	1149.4	0	1172.3	942.5	0	**DB22**	1501.2	1238.9	0	1541.1	1259.3	0
DB23	1549.1	1269.3	0	1389.1	1133.8	0	**DB23**	1593.5	1315.6	0	1592	1295.5	0
DB24	1431.4	1163.0	0	1318.4	1074.4	0	**DB24**	1368.6	1120.0	0	1451.3	1186	0
DB25	1253.2	1016.5	0	1556.2	1259.5	0	**DB25**	1787.7	1471.7	0	1567.5	1288.7	0
DB26	1393.9	1141.9	0	1247.9	1014.2	0	**DB26**	1478.5	1216.3	0	1626.8	1336.5	0
DB27	1290.6	1053.1	0	1446.0	1148.3	0	**DB27**	1960.9	1619.6	0	1514.4	1241.4	0
DB28	1517.5	1240.3	0	1367.7	1126.3	0	**DB28**	1992.7	1629.8	0	1503.9	1226.5	0
DB29	1256.2	1033.1	0	1436.3	1171.0	0	**DB29**	1463.7	1217.8	0	1808.5	1484.3	0
DB30	1298.5	1057.6	0	1629.6	1296.3	0	**DB30**	1568.6	1283.7	0	1630.6	1332.1	0
DB31	1340.7	1098.7	0	1291.8	1052.9	0	**DB31**	1447.4	1172.5	0	1419.3	1156.3	0
DB32	1465.6	1189.6	0	1172.6	974.2	0	**DB32**	1537.3	1179.2	0	1575.7	1289.5	0
DB33	1457.3	1185.1	0	1457.3	1179.4	0	**DB33**	1510.6	1247.7	0	1745.4	1423.7	0
DB34	1435.4	1171.4	0	1306.7	1075.1	0	**DB34**	1334.0	1101.3	0	1639.1	1336.6	0
DB35	1482.8	1213.2	0	1440.4	1177.7	0	**DB35**	1402.2	1150.1	0	1447.8	1177.5	0
DB36	1448.0	1176.2	0	1323.5	1081.7	0	**DB36**	1545.2	1260.0	0	1573.2	1274.2	0
DB37	1452.4	1191.9	0	1294.2	1054.4	0	**DB37**	1418.2	1159.9	0	1461.4	1203.2	0
DB38	1544.6	1271.2	0	1515.5	1243.4	0	**DB38**	2160.4	1768.3	0	1519.2	1231.3	0
DB39	1557.1	1281.4	0	1538.6	1264.4	0	**DB39**	1511.0	1234.4	0	1510.9	1228.1	0
DB40	1303.1	1063.6	0	1389.1	1146.7	0	**DB40**	1486.5	1216.1	0	1521.3	1244.6	0
DB41	1357.8	1109.3	0	1489.8	1206.6	0	**DB41**	1583.4	1298.4	0	1603.3	1307.2	0
DB42	1365.2	1114.0	0	1411.4	1156.3	0	**DB42**	1944.5	1607.0	0	1549.5	1261.2	0
DB43	1448.3	1184.6	0	1410.3	1174.4	0	**DB43**	1606.5	1315.6	0	1516.7	1230.2	0
DB44	1267.9	1030.9	0	1357.7	1107.4	2	**DB44**	1469.4	1209.7	0	1521.9	1236.5	0
DB45	1405.5	1148.1	0	1670.7	1358.7	1	**DB45**	1620.9	1335.8	0	2051.4	1674.3	0
DB46	1444.8	1185.5	0	1433.1	1168.1	0	**DB101**	1514.2	1267.2	0	1642.9	1348.2	0
DB47	1410.8	1156.3	0	1503.7	1232.4	0	**DB102**	1623.0	1332.4	0	1577.8	1302.8	0
DB48	1408.2	1156.4	0	1518.9	1239.2	0	**DB103**	1485.1	1219.0	0	1679.6	1379.2	0
DB49	1287.4	1099.2	0	1485.5	1212.3	0	**DB104**	1649.3	1349.5	0	1764.7	1426.0	3
DB50	1507.7	1236.6	0	1453.0	1187.0	0	**DB105**	1406.5	1170.4	0	1374.1	1137.8	0

#: Sample location; W_w: wet weight of sediment sample; W_d: dry weight of sediment sample; N: number of tracer particles contained