

**BIOLOGICAL ASSESSMENT OF EAST SKI ISLAND  
MISSION BAY EELGRASS TRANSPLANT  
ONE YEAR POST-TRANSPLANT SURVEY**

**Prepared for:**

**City of San Diego  
Parks and Recreation Department**

**Prepared by:**

  
\_\_\_\_\_  
**Michael D. Curtis  
Senior Scientist**

**MBC Applied Environmental Sciences  
3040 Redhill Avenue  
Costa Mesa, California 92626**

**October 1996**

**BIOLOGICAL ASSESSMENT OF EAST SKI ISLAND  
MISSION BAY EELGRASS TRANSPLANT  
ONE YEAR POST-TRANSPLANT SURVEY**

17 JULY 1996

**INTRODUCTION**

On 19 April 1995, MBC Applied Environmental Sciences (MBC) and Merkel and Associates (M&A), as a subcontractor to MBC, contracted with the City of San Diego Parks and Recreation Department to assist with the Phase 1 and Phase 2 Shoreline Stabilization Project. As part of the project, several transplants of eelgrass were proposed as mitigation for various dredge projects in the bay. The first site selected for transplanting was on the dredge footprint of the former East Ski Island.

A reconnaissance survey was conducted on 20 and 21 June 1995 to define the boundaries of the dredge footprint and prepare the site for the transplant. Divers placed polypropylene line on the bottom, outlining 32 sections ranging in area from 61 ft<sup>2</sup> (0.001 acre) to 10,890 ft<sup>2</sup> (0.25 acre), to facilitate the transplant and accurately relocate the site during subsequent surveys (Figure 1). As it was not practical to exactly outline the meanderings of the footprint boundary of the dredge area, the entire dredged area was sectioned into smaller areas that were easily quantifiable, but unavoidably contained some patches of native eelgrass. During this survey, it was noted that two relatively small areas were shallower than dredge specifications.

The demarcated area totaled 243,305 ft<sup>2</sup>, or 5.59 acres. However, the area of the dredge footprint was calculated to be 223,199 ft<sup>2</sup>, or 5.13 acres. The remainder of the demarcated area consisted of native eelgrass covering an area of 13,523 ft<sup>2</sup> (0.31 acre) and unvegetated native bay bottom totaling an additional 6,583 ft<sup>2</sup> (0.15 acre). As a result, the net area transplanted was 5.28 acres.

The transplant was conducted over a period of 13 days, commencing on 26 June and continuing until 19 July 1995. Altogether, 24,119 turion bundles (averaging approximately 12 turions per bundle) were planted at the site, resulting in an average turion density of 13.6 turions per m<sup>2</sup> or approximately 1.7 turions per 0.125 m<sup>2</sup>. An adjacent eelgrass bed with similar depths that was subject to similar conditions as found at the mitigation site eelgrass bed was designated as the control bed. Five 50-m transects through the control bed and perpendicular to transplant site Sections 21 and 21A were selected to compare any fluctuations (caused by changing environmental conditions) in the status of the transplanted bed (Figure 1).

The area was surveyed at three and six months after the transplant. Survey results from the three-month survey determined that there were 0.37 acre (1,493 m<sup>2</sup>) of barren area (no turions within a one meter square area) within the transplant site. As total area of the original transplant was 5.28 acres, including the unvegetated native bay bottom planted, the area of the transplant remaining vegetated was 4.91 acres or 93% of the total area.

Survey results from the six-month survey (excluding the two areas that were dredged to remove the high spots) determined that there were 0.17 acre (707 m<sup>2</sup>) of barren area within the transplant site. As a result of the remedial dredging to remove the high spots an additional 0.35 acre was barren. The total barren area in the transplant site was 0.52 acre. As total area of the original transplant was 5.28 acres, including the unvegetated native bay bottom planted, the area of the transplant remaining vegetated was 4.76 acres or 90% of the total area.

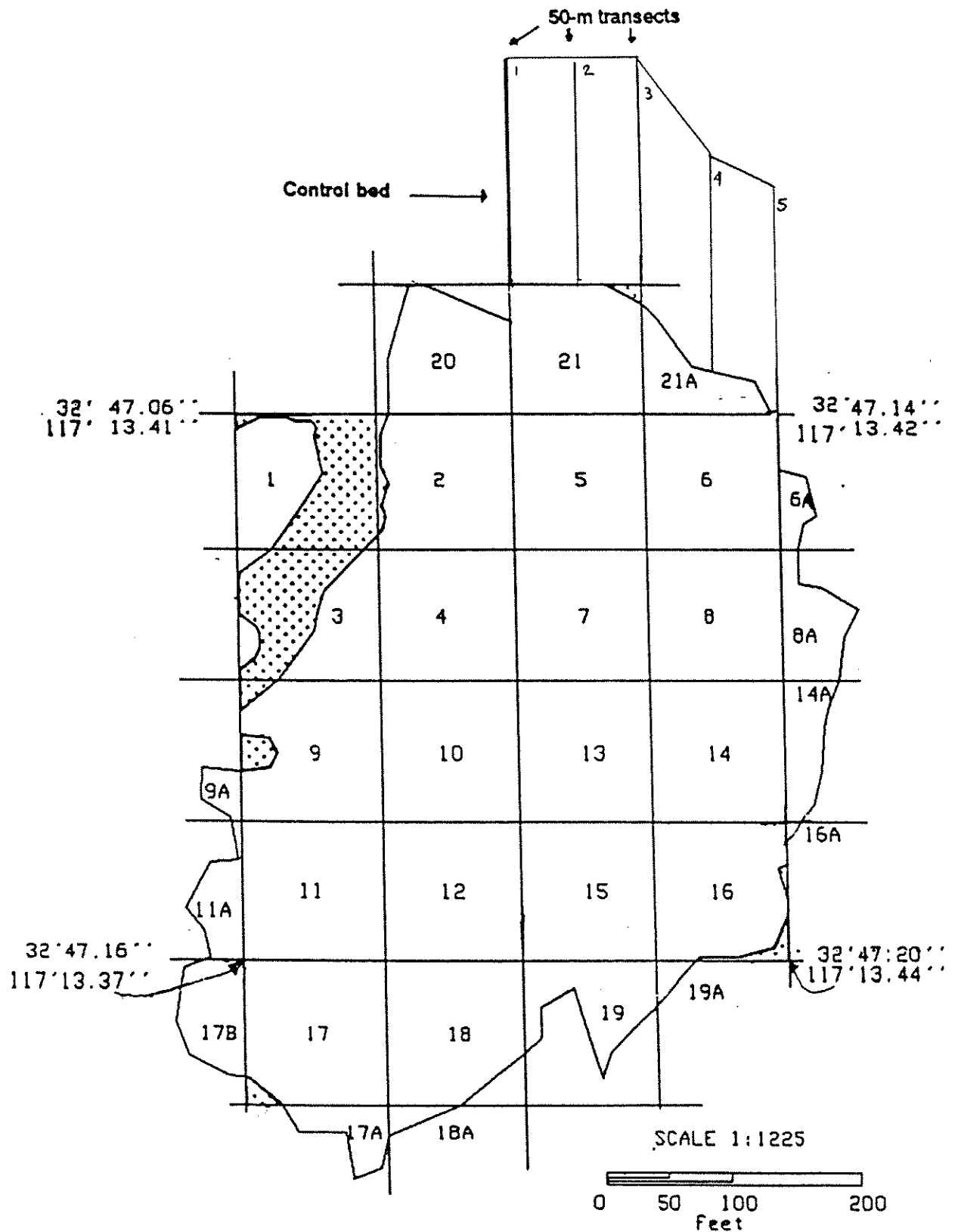


Figure 1. Eelgrass transplant site, Mission Bay, San Diego, CA.

On 28 June 1996, biologist-divers surveyed the two barren areas resulting from the remedial dredging designed to eliminate two high spots. Both areas were substantially advanced in the process of being recolonized from the surrounding transplant area. However, areas in the middle of each were still barren. As a remedial action, 650 turion bundles were retransplanted into the two barren areas at the East Ski Island site.

On 17 July 1996, biologist-divers reoccupied the mitigation and control sites for a one-year biological assessment of the project goals. Unvegetated areas were noted along each of the transects and densities of eelgrass turion bundles were determined at random locations in the transplant.

## METHODS

During the monitoring survey of the mitigation site, biologist-divers swam 16 transects adjacent to grid lines in the mitigation site (a total distance of 1,899 m). Locations that were unvegetated (greater than one square meter) were noted along each of the transects and densities of eelgrass turion bundles were noted throughout the transplant. Results were recorded on underwater slates.

Total area vegetated was determined by totaling unvegetated areas more than one meter square along one side of the transect and extrapolating to the total transplant area to determine the total area unvegetated. The area of the entire transplant site (5.28 acres = 21,367 m<sup>2</sup>) divided by the area of the transects (1,899 m<sup>2</sup>) indicated that the transects covered an area approximating 8.9% of the mitigation site area.

Turion density determinations for the one-year post-transplant survey were random as coverage between turion bundles was total and the transplanted bed was no longer distinguishable from the adjacent control bed. Therefore, turion density determinations were made by randomly placing quadrats throughout the transplant site. Counts were recorded at 24 locations and were reported as turions per 0.125 m<sup>2</sup>.

Utilizing tape measures and 0.125 m<sup>2</sup> quadrats, turion densities also were recorded every 10 m along five 50-m transects through the control bed. These density determinations were made every ten meters, with the exception that if the area was unvegetated, the quadrat was moved to the nearest vegetated area. Barren areas along each transect were also noted for determination of eelgrass areal coverage.

## RESULTS

Survey results from 16 transects (excluding the two areas that were dredged to remove the high spots) determined that there were 0.24 acre (1,902 m<sup>2</sup>) of barren area (no turions within a one meter square area) within the transplant site (Table 1). The barren areas (0.35 acre) resulting from the remedial dredging to remove the high spots were sparsely filled in on the perimeter of each area. The remaining barren area near the center of each area, totaling 0.16 acre (650 m<sup>2</sup>), had recently been revegetated with transplant material. Although, the turion bundles had been transplanted only one month prior to the survey, they appeared to be healthy and were already taking root. The total unvegetated area in the transplant site, excluding the revegetated barren areas, was 0.24 acre. As total area of the original transplant site was 5.28 acres, the area of the transplant remaining vegetated was now 5.04 acres or 95.4% of the total area.

**Table 1. One year eelgrass transplant survey data compared to earlier surveys.**

	Date: Survey Type:	July 1995 Initial	October 1995 3 month	Feb/Mar 1996 6 month	July 1996 12 month
Transplanted bed remaining		5.28	4.95	4.76	5.04
% of transplanted area vegetated		100%	93%	90%	95%
Loss of vegetated area (acres)		0.0	0.33	0.52	0.24
Transplant turion density (m <sup>2</sup> )		13.6	11.5	96.0	221.6
Density of transplant bed vs control bed		12%	10%	88%	114%
Control bed coverage (%)		68%	68%	82%	91%
Control turion density (m <sup>2</sup> )		118	118	109	195.2

Eelgrass turion density calculations indicated that the turion density at one-year varied within the site, ranging from 15 to 44 turions per 0.125 m<sup>2</sup> and averaging 27.7 turions per 0.125 m<sup>2</sup> (221.6 turions per m<sup>2</sup>).

Control bed turion densities ranged from 14 to 48 turions per 0.125 m<sup>2</sup> and averaged 24.4 turions per 0.125 m<sup>2</sup> (195.2 per m<sup>2</sup>) (Table 2). Eelgrass coverage along the five 50 m transects ranged from 85 to 100% and averaged 91% overall.

**Table 2. Control bed eelgrass turion densities and coverage along 50-m transects.**

Distance (m) along transect	Control Bed Density (turions per 0.125 m <sup>2</sup> )					Average
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	
10	28	29	35	14	15	-
20	29	24	48	14	32	-
30	24	28	18	21	21	-
40	31	28	18	34	26	-
50	19	20	23	15	18	-
Average Density	26.2	25.8	28.4	19.6	22.4	24.4
Length of 50 m transect vegetated (m)	46.0	42.5	42.5	50.0	46.0	45.4

## DISCUSSION

Criteria for success of the transplant at one-year following transplant are predicated on 70% areal coverage of eelgrass over the transplant area and that the transplanted eelgrass reach 30% of the density of the control bed by the end of the first year. At the three-month post transplant survey, coverage was 93% and density was 9.7% (11.5 turions per m<sup>2</sup>) of the control bed. At the six-month survey, as a result of remedial dredging to eliminate high spots, two areas

totaling about 0.35 acre were denuded of eelgrass resulting in a coverage drop to 90%, but the overall density was high at 96 turions per m<sup>2</sup> (88% of that of the control bed). The one-year survey results of 95% coverage and density of 113% of that of the control bed far exceeds the success criteria mandated for the end of the first year of the transplant project.

Turions generally were long (greater than one meter) and developing well; large sponges and speckled bay scallops, typical of bay bottoms, have recruited into the transplant area making it, superficially at least, resemble the control bed.

Fish such as black and shiner surfperch, yellowfin croakers, sargo, and top smelt were common in the bed, indicating the presence of a developing forage resource in and surrounding the eelgrass bed. Round stingrays were still common in the transplant site, but the very large barren sites with high concentrations of stingrays, noted during prior surveys, were absent. Instead, small areas were noted throughout the transplant, with the largest area noted being about 8 m<sup>2</sup>. There was no indication that the small patches of Senhouse's mussels noted during the transplant had multiplied to affect the eelgrass during the ensuing year.

MBC's recommendation on the remedially dredged area was to wait until the one year survey; if the barren areas were not substantially vegetated by then, a supplemental transplant from the surrounding mitigation site would be performed. As a result of concerns about shallow areas at East Ski Island, part of the area was resurveyed prior to the one-year survey. During that survey it was determined that approximately 650 m<sup>2</sup> were still denuded. At that time, biologists were performing an eelgrass transplant at other area locations in the bay, so excess planting material was bundled and transplanted to the two barren areas of East Ski Island.

## CONCLUSION

The transplant site is developing well and greatly exceeds the criteria for the one-year survey. It appears, on the strength of the data available, at the one-year survey, that the transplant is well on the way to being a success.