SIX MONTH POST-TRANSPLANT EELGRASS SURVEY EAST SKI ISLAND MISSION BAY

Prepared for:

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BIOLOGICAL ASSESSMENT OF EAST SKI ISLAND
MISSION BAY EELGRASS TRANSPLANT
SIX MONTH POST-TRANSPLANT SURVEY

28 MARCH 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 2 Shoreline Stabilization Project. As part of the project, several transplants of eelgrass were proposed as mitigation for various dredge projects in Mission Bay. The first site selected for transplanting was on the dredge footprint of the former East Ski Island.

A reconnaissance survey was completed 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 separate sections ranging in area from 61 ft^2 (0.001 acre) to 10,890 ft^2 (0.25 acre), to facilitate the transplant and to exactly relocate the site during subsequent surveys. As it was not practical to exactly outline the meanderings of the footprint of the dredge area, the entire dredge area was sectioned into smaller areas that were easily quantifiable, but unavoidably contained some patches of native eelgrass. During the surveys, it was noted that two relatively small areas were shallower than dredge specifications.

The gridded area totaled 243,305 ft^2 or 5.59 acres. However, the area of the dredge footprint was calculated to be 223,199 ft^2 or 5.13 acres. The remainder of the gridded area consisted of native eelgrass covering an area of 13,523 ft^2 (0.31 acre) and unvegetated native bay bottom totaling an additional 6,583 ft^2 (0.15 acre).

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^2 or approximately 1.7 turions per 0.125 m^2. An adjacent eelgrass bed of similar depths and 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).

On 17 October 1995, biologist-divers reoccupied the mitigation and control sites for the three-month biological assessment of the project goals. Missing turion bundles were noted along each of the transects and densities of eelgrass turion bundles were determined in each of the 32 sections of the transplant.

Survey results from the 25 transects determined that there were 1,493 m^2 (0.37 acres) of barren area (no turions within a one meter square area) within the transplant site at the three-month survey. The total length of each transect that was unvegetated ranged from 0 to 23 m and averaged 9.6 m per 155-m transect. As total area of the original transplant was 5.28 acres, including the unvegetated native bay bottom planted, the area of the transplant remaining

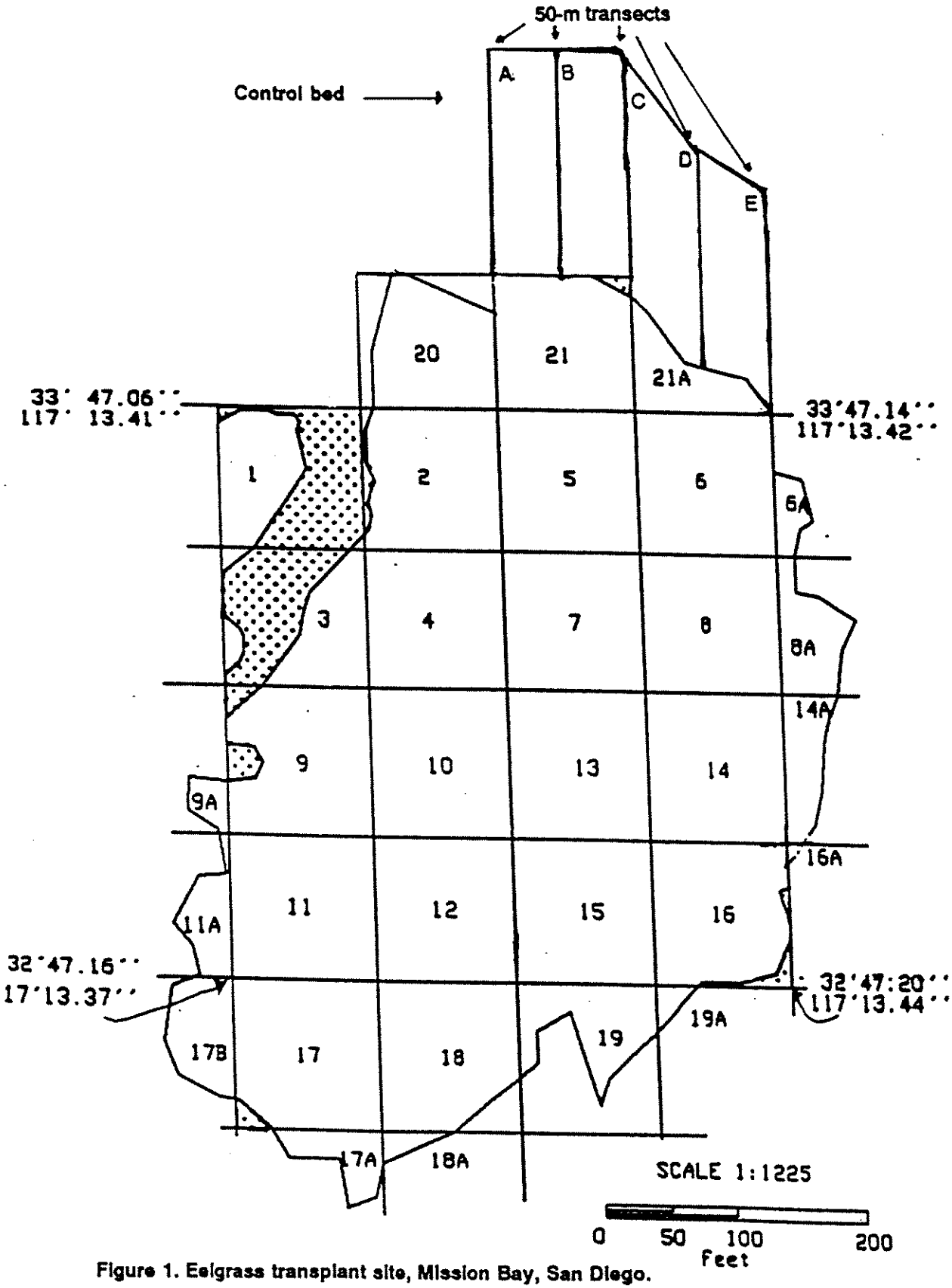

Figure 1. Eelgrass transplant site, Mission Bay, San Diego.

vegetated was 4.91 acres or 93% of the total area. The total area of the project transplant was 5.13 acres and the remaining vegetated project acreage was 4.77 acres.

On 5 February 1996, MBC was contacted by the dredge company and requested to place buoys surrounding the exact perimeter of the two remaining shallow spots within the eelgrass transplant area. The following day, 6 February 1996, MBC personnel placed buoys surrounding the two shallow areas to be dredged and removed all transect lines that would be at risk during dredging operations.

MBC returned to the transplant site on 15 February 1996 to replace the grid lines and begin the six-month survey. The two shallow areas had been dredged and the average depth in the area was now -6 ft MLLW. However, an area substantially larger than anticipated had been disturbed by the dredging operation, impacting the grid lines and a portion of the eelgrass transplant. Consequently, only a portion of the survey was conducted on 15 February and the remainder was conducted on 14 and 28 March 1996. Within this period, most of the missing grid lines were replaced, allowing MBC to complete the six-month biological assessment of project goals.

METHODS

During the six-month monitoring survey of the mitigation site, biologist-divers swam 25 transects adjacent to grid lines in the mitigation site (a total distance of 3,413 m) and observed the area one meter wide along one side of the transects (a total of 3,413m^2). Missing turion bundles were noted along each transect and densities of eelgrass turion bundles were determined in each section of the transplant area.

The transects covered an area approximating 16% of the 5.28-acre (21,367 m^2) mitigation site area. Assuming an area of one m^2 per missing turion bundle, the total of the missing bundles observed for the transects was extrapolated to the entire transplant area to determine the total missing bundles and area unvegetated.

Locations for turion density determinations for the six-month survey at the mitigation site were non-random as for the three-month survey. The turion bundles had developed well and area coverage by most of the individual turion bundles was greater than 0.125 m^2. However, because the turions were not yet evenly distributed over the area, counts in randomly-placed quadrats would elicit little meaningful information at this early stage of the transplant. Therefore, eelgrass bundles, representative of the area as determined by each biologist-diver, were selected for density counts which were reported as turions per m^2. In total, 40 determinations of density were recorded, 25 focused in most of the individual sections and 15 at haphazard locations throughout the transplant site. At the one-year survey, growth will be determined by randomly placing quadrats within the site.

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

RESULTS

Survey results from the 25 transects (excluding the two shallow areas that were recently dredged) determined that there were 707 m^2 (0.17 acre) of barren area (no turions within a one meter square area) within the transplant site. As a result of the remedial shallow-area dredging, an additional 0.35 acre was barren. The total barren area in the transplant site was 0.52 acre (Table 1). 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 now 4.76 acres or 90% of the total area. The total area of the project transplant was 5.13 acres, and the remaining vegetated project acreage was 4.61 acres.

Density calculations indicated that the turion density at six months averaged 96.7 turions per m^2. Turion densities per section varied within the site, ranging from 56 to 160 turions per m^2.

Control bed turion densities ranged from 7 to 21 turions per 0.125 m^2 and averaged 13.6 per 0.125 m^2 (109 per m^2) (Table 2). Eelgrass coverage along the five 50-m transects ranged from 69 to 100% and averaged 82% overall.

Table 1. East Ski Island transplant area, percent survival, and eelgrass density.

Survey Type	Date:	July 1995 Initial	October 1995 3 month	Feb/Mar 1996 6 month
Transplanted acres remaining		5.28	4.95	4.76
% of transplanted acres vegetated		100%	93%	90%
Loss of vegetated area (acres)		0.0	0.33	0.52
Dredge footprint transplanted (acres)		5.13	4.81	4.61
Native bay bottom transplanted (acres)		0.15	0.14	0.15
Transplant turion density (m^2)		13.6	11.5	96.0
Control bed density (m^2)		118	118	109
Control bed area coverage (%)		68%	68%	82%

Table 2. Control bed turion densities per transect per 0.125m^2.

Distance (m)	Control 1 Density (0.125m^2)	Control 2 Density (0.125m^2)	Control 3 Density (0.125m^2)	Control 4 Density (0.125m^2)	Control 5 Density (0.125m^2)	Average
10	18	12	16	16	8	14
20	16	8	15	15	13	13
30	9	9	9	17	12	11
40	14	15	12	7	17	13
50	14	21	15	20	13	17
Average Densities 0.125m^2	14.2	13	13.4	15	12.6	13.6
Length of 50 m Transect Vegetated (m)	50	39	42	40	35	41

DISCUSSION

Criteria for success of the 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 survey, coverage was 93% and density was 9.7% (11.5 turions per m^2) of the control bed. At the six-month survey, coverage was lower at 90%, but the overall density was considerably higher (96 turions per m^2). This density was seven times higher than the planted density of 13.6/m^2 and 88% of the control bed density (109 turions per m^2). Coverage would have been considerably higher at the six-month survey if the two potentially dangerous shallow areas had not been recently dredged. The two barren areas will be monitored and, if they are not substantially vegetated by the June/July one-year survey, a remedial transplant from the surrounding mitigation site will be conducted.

No success criteria were mandated for the six-month survey, but the survey was the second indication as to whether the transplant is likely to be a success. Very low coverage and density far below the planting density would be an indication that the transplant is not performing to expectations. Most turion bundles were developing well; rhizomes covered much of the distance (one meter) between the transplant units and in many areas the exact location of some transplant units was no longer discernable. The survey extension into March revealed the positive effect of longer day length on growth.

Round stingrays have been very common in the transplant site and appear to be responsible for much of the barren area noted (excluding the remedial dredging). They were particularly concentrated in certain sections. Areas that the stingrays prefer will not be able to support eelgrass, not because the areas are biologically unsuitable, but because the stingrays root through the planted eelgrass, destroying it. There was no indication that the small patches of Senhouse's mussels noted during the transplant had affected the eelgrass during the ensuing six months.

Many speckled bay scallop, *Argopecten circularis*, were observed within the eelgrass bed.

CONCLUSION

The transplant site is developing well and already meets or exceeds the criteria for the one-year survey. It appears, on the strength of the data available at the six-month survey, that the transplant is a success.