United States v. Fisher et al.

Case No. 92-10027-CIVIL-DAVIS

Report of

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I. Introduction

Early in 1992, officials of the Florida Keys National Marine Sanctuary (the Sanctuary) discovered a large number of excavations or craters that had been made in an area of the Sanctuary known as Coffins Patch. Many of these craters were made in an area of patchy seagrass. Other experts retained in this action have determined that approximately 1.63 acres of seagrass, primarily *Thalassia testudinum*, commonly known as turtlegrass, was destroyed when these craters were made, and that 1.55 acres of seagrass must be restored to compensate for the interim loss services of the destroyed seagrass.

II. On-Site Restoration of Seagrasses at Coffins Patch

Subsequent to the discovery of the craters in Coffins Patch in 1992, I directed a pilot project to determine if the seagrasses at the Coffins Patch damage tract could be restored by on-site replanting of seagrass. However, prior to planting, the craters subsequently partially refilled through storm action and sediment deposition. In May 1993 and September 1994, plantings were made in the refilled craters in the Coffins Patch damage tract. The two plantings were conducted using a standard planting technique. Plantings were conducted both in the refilled craters and on adjacent dead *Thalassia* rhizome mats. The rhizome mat came from living *Thalassia* that was initially covered and killed by ejecta from the craters but was subsequently exposed when storms refilled the craters. However, periodic storm events shifted up to six inches of sediment out of the planting areas. As of the summer of 1996, none of the plantings survived.

As of August 1994, some of the initial May 1993 plantings had survived and were initially spreading. However, planting survival dropped with each successive survey (August 1993: 5-80%; December 1993: 0-56%; May 1994: 0-8%). During the time these plantings survived, they seemed to be doing better on the exposed *Thalassia* rhizome mat.

Based on those May 1993 plantings, we initiated another planting experiment in September 1994. We intended to target rhizome mat plantings. When we went back to Coffins Patch on June 14, 1995, to initiate the planting, the rhizome mats appeared to have disintegrated with no trace remaining. Further, we observed *Thalassia* seedlings that may have been planted as they appeared to be in a regular array, although some were missing. We performed a planting in a nearby area that appeared to be a blowhole (based on our observation of the circular shape of the surrounding, fragmented *Thalassia* bed). We conducted a survey of the planting on August 26, 1995, under low visibility (~3m) conditions and we found no trace of the plantings. We located a cage that was severely mangled and had been dislodged from its corner posts. The fact that the site experienced tropical storm-force conditions in the preceding weeks is a likely cause for loss of the plantings. There appeared to have been significant scour in that we observed much coral rubble having been uncovered in the previously sandy zones. No trace was found of the previously observed *Thalassia* seedlings. I concluded that these plantings were lost. In contrast, I attribute the recovery of seagrass into the exposed, dead *Thalassia* rhizome mat to the added physical stability of the bottom imparted by the mats presence.

On July 24, 1996, Harold Hudson located and video taped most of the September, 1994 open sand planting area, plus what may have been a planting done on the exposed rhizome dating from May 1993 (see Reference). After examining the video, it was apparent that although most of the corner poles for the plots had persisted, no living seagrass was evident within the open sand planted plots. The planting on the exposed rhizome had approximately 75% cover of the bottom with what appeared to be *Halodule wrightii* and some encroachment by *Thalassia*. However, I cannot be certain that this represented planted seagrass as opposed to natural recolonization.

As predicted by Dr. Joseph Zieman, we have been unable to establish persistent plantings with the standard techniques which have been employed with great success in more quiescent settings. To conclude, I have visited the planting site on several occasions since May 1993 and viewed the aforementioned underwater video tape of the planting areas which was made on July 24, 1996. In that video, *Thalassia* runners can be seen beginning to extend into the damaged, unvegetated areas from the adjacent *Thalassia* beds, but these ongoing forays are easily and frequently disrupted by storms and natural recolonization. However, regrowth of the *Thalassia* in the damaged areas has not occurred to any measurable extent. Moreover, no plantings have survived to provide persistent cover of the bottom.

Given the empirical evidence of no demonstrable planting success and the current status of seagrass restoration in general, it is my opinion that further attempts at on-site restoration of seagrasses at Coffins Patch are not feasible or reasonable. No plantings were attempted in uninjured, naturally unvegetated portions of the Coffins Patch as hydrodynamic conditions were similarly limiting. Moreover, such plantings would constitute habitat substitution, and cannot be considered restoration.

III. Off-Site Compensatory Restoration of Seagrasses

Having determined that on-site restoration of the damage tract at Coffins Patch was not feasible, I was asked to assist in selecting a project that would be suitable as off-site restoration of seagrasses to compensate for the lost interim services of the seagrass habitat destroyed at Coffins Patch. The goal of such a seagrass restoration project would be to restore a *Thalassia* community of approximately 1.55 acres.

Recently, I coordinated with Curtis Kruer, who was asked to identify potential sites for off-site compensatory seagrass habitat projects in the Florida Keys. In

December 1996, Mr. Kruer and I conducted an aerial survey, followed by some ground truthing of a number of potential sites, which had been identified as possible candidates. See the Report of Curtis R. Kruer, January 1997. Several project categories were considered. One project was selected over the others based on factors involving injury recovery and the quality of that recovery.

Sites were reviewed for suitability using the following criteria:

1) they were adjacent to natural seagrass beds at similar depths;
2) they were anthropogenically disturbed;
3) they existed in areas that were not subject to chronic storm disruption;
4) they were not undergoing rapid and extensive natural recolonization by seagrasses;
5) seagrass restoration had been successful at similar sites;
6) there was sufficient acreage to conduct the project; and,
7) similar quality habitat would be restored as was lost.

The first project identified in Mr. Kruer's report is the Horseshoe Pit site, which is a road spit that had been built over seagrasses. However, NOAA has rejected this site as an acceptable restoration site for several reasons. This site has high exposure to northeast winds and considerable fetch across the adjacent Bahia Honda Channel, a deep water channel with strong tidal currents. Once the fill is removed, it is unclear how stable the area will be in the near term, or what the effect of vessel traffic would be on plantings at the site.

In addition, according to Brian Julius, the NOAA economist assigned to this case, there is significant recreational use of this site, particularly by fisherman and windsurfers. According to Julius, while removal of the spit would constitute an ecological gain, it would represent a loss to current and future recreational users. Therefore, costs to accurately assess the recreational value of the site likely would exceed the costs to perform the restoration project itself. However, without this information, NOAA would be unable to determine whether the ecological benefits of the project outweigh the human use losses that would result.

Using the aforementioned seven criteria, NOAA has selected the project category Seagrass Transplants into Boat Impacts in Established No-Motor Zones (see Project No. 2 in Kruer Report) as the most viable candidate for off-site restoration in this case. Boat impacts were selected because they are among natural seagrass beds, represent a human-induced injury, can be found in hydrodynamically protected areas, occur as large-scale scarring that is not readily recovering, have been restored both in this geographic area and elsewhere, occur in sufficient acreage and constitute an injury not unlike that found at Coffins Patch (see Report of Curtis R. Kruer, January 1997, for a description of this category).

Injuries to seagrasses in the Sanctuary from boating activities have been widespread (see Reference: Sargent, F.J. et al. 1995. Scarring of Florida's Seagrasses: Assessment and Management Options. Florida Marine Research Institute Technical Reports. TR-1). Consequently, new regulations prohibit the use of motors in certain waters, which have been successful in the reduction of boat impacts to seagrass beds in these areas. However, extensive injuries to seagrass even in these no-motor zones remain. These injuries primarily consist of trench-like scars in seagrass beds from boat hull contact, propeller contact or suction from jet ski intakes. Although these incidents in isolation are less severe than the craters discovered at Coffins Patch, the type of damage is comparable to what was done to seagrass in Coffins Patch in 1992, especially when repeated boat impact injuries are concentrated on a seagrass bed. Also, recent research has demonstrated prop scar restoration to be feasible and effective (see Reference: Progress Report II, Prop Scar Restoration Pilot Study, December 1995).

Consequently, a restoration plan was developed for the implementation of the chosen project (See Exhibit A, SEAGRASS RESTORATION AND MONITORING PLAN: United States vs. Fisher et al. January 1997). The primary components of the plan include identification of methods of site marking, planting techniques, monitoring and success criteria. These components are modeled after that given in Appendix C of "A Guide to Planting Seagrasses in the Gulf of Mexico" by M. Fonseca (1994). (See Reference: Fonseca, M.S. 1994. A Guide to Planting Seagrasses in the Gulf of Mexico. Texas A&M University Sea Grant College Program. TAMU-SG-94-601. 26p).

The plan will use compressed succession to restore slow-growing *Thalassia*. This approach focuses initially on planting another native seagrass species such as *Halodule wrightii* to achieve a more rapid rate of seagrass recovery by temporarily substituting the faster growing *Halodule* for the slower growing *Thalassia*. This sequence promotes more suitable conditions for *Thalassia* to naturally encroach upon the prop scar while stabilizing the site and preventing additional erosion while simultaneously restoring many ecological functions of the seagrass ecosystem.

Monitoring of the restoration project is necessary to provide data required to evaluate the viability of the restoration project based on identified performance standards and to permit timely identification of problems or conditions that may require corrective action to ensure the success of the project.

Project success is quantified by three parameters: survival of planting units, seagrass shoot density, and bottom coverage by the seagrass plantings. Photo documentation is also necessary to provide a common basis of assessment, perception and historical reference. Reporting is also a critical activity to validate planting performance.

IV. Data Or Other Information Considered

In forming my opinions, in addition to my own experience, observations and research, I have relied on the following data and sources: data on the total area of seagrass injury at Coffins Patch provided by Joseph C. Zieman; information on the restoration acreage from Brian Julius, information on compensatory restoration alternatives provided by Curtis Kruer, Judson Kenworthy, Roy R. Lewis; and the references listed below.

V. The following exhibit is attached to this report: SEAGRASS RESTORATION AND MONITORING PLAN: United States v. Fisher et al., January 1997.

VI. References

A. Underwater video tape of Coffins Patch planting site on July 24, 1996, by Dr. Harold Hudson.

B. Progress Report II, Prop Scar Restoration Pilot Study, December 1995.

C. Fonseca, M.S. 1994. A Guide to Planting Seagrasses in the Gulf of Mexico. Texas A&M University Sea Grant College Program. TAMU-SG-94-601. 26p.

D. Sargent, F.J. et al. 1995. Scarring of Florida's Seagrasses: Assessment and Management Options. Florida Marine Research Institute Technical Reports. TR-1.

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Mark S. Fonseca

SEAGRASS RESTORATION AND MONITORING PLAN

United States v. Melvin A. Fisher, et al.,
Civ. No. 92-10027 (S. D. Fla. 1992)

January 1997

I. INTRODUCTION

The objective of this plan is to provide for the restoration of 1.55 acres of seagrasses within the Florida Keys National Marine Sanctuary (hereafter FKNMS or the Sanctuary) in order to compensate, through in-kind replacement of seagrasses, for losses of seagrasses (predominantly turtlegrass, Thalassia testudinum), including associated resource services, caused by the Defendants as a result of treasure salvaging activities in the Sanctuary in 1992. The appropriate scale for the restoration was determined using Habitat Equivalency Analysis (HEA) methodology. HEA calculations using this value result in the 1.55 acre project scale used in this plan.

II. RESTORATION APPROACH

NOAA has identified and evaluated options for seagrass restoration within the Sanctuary. This effort has included consideration of aerial surveys and photography, site visits, and consultation with government, academic and private individuals knowledgeable in the ecology, management and restoration of seagrass in the Florida Keys.

The options for seagrass restoration which have been identified and considered are (1) seagrass transplanting on-site at Coffins Patch (i.e. restoration at the site of injury), (2) seagrass transplanting off-site in shallow water areas where dredge fill has been removed (such as at sites of road spit removal), (3) seagrass transplanting off-site at vessel impact sites (primarily, scars from boat hull contact, propeller contact or suction from jet ski intakes) in managed areas (i.e. no-motor areas), and (4) seagrass transplanting off-site at vessel impact sites (i.e. scars) outside managed areas. Key factors in NOAA's evaluation of these options have been the necessary restoration acreage, the likelihood of achieving Thalassia (the predominate species injured) as a result of restoration actions, and the extent to which potential sites within each option may be otherwise suited or conducive to a successful restoration effort. Criteria used to assess the suitability of potential sites includes proximity to natural seagrass beds at similar depths, the degree or risk of anthropogenic disturbance, the extent or risk of chronic storm disturbance, the extent of or opportunity for natural recolonization, and previous experience with seagrass restoration at similar sites.

In sum, on-site seagrass transplanting at Coffin's Patch is not feasible and is, therefore, not an acceptable option. This is supported by expert opinion and is confirmed by the results of a pilot project on the effectiveness of transplanting techniques at the site, which NOAA initiated in 1993 and 1994. Shallow water sites where dredge fill has been removed generally possess many features conducive to successful transplanting. There are, however, only a few potential sites of this nature and other factors associated with available sites (such as evident natural recolonization, degree of exposure to wind/currents or existing recreational uses) prevent further consideration of this option to compensate for seagrass losses at Coffin's Patch. Vessel impact sites (i.e. scars), both within and outside managed areas of the Sanctuary, also possess features conducive to successful transplanting. Some of these scars, however, are not experiencing quick or reliable natural recolonization and are considered candidates for active seagrass transplanting using seagrass restoration techniques which have proven successful. In selecting planting sites, priority should be given to areas where management actions or other site characteristics minimize the risk of further vessel disruptions at the restoration site.

The restoration of seagrass scars created by vessel impacts within a managed area represents NOAA's preferred approach to seagrass restoration off-site. Restoration efforts will focus on seagrass transplanting of scars in heavily injured Thalassia testudinum (Thalassia) seagrass meadows such as described by Sargent et al. (1995) within the Florida Keys. Thalassia is the seagrass species predominantly injured by the Defendant's actions and Thalassia restoration is the primary objective of this plan. Seagrass beds can be scarred by many activities, but scars are most commonly made when a vessel operates in areas vegetated by seagrasses that are too shallow for the vessel to avoid contact with the seafloor. The vessel's hull and/or propeller tears and cuts up the leaves, stems and roots of the seagrasses, typically leaving long, narrow, trench-like furrows devoid of seagrass. A typical scar created by a small vessel (less than 6.5 m in length) is approximately 0.25-0.5 m wide and 0.1-0.5 m deep. Larger vessels with twin propellers or inboard engines (greater than 6.5 m in length) can produce deeper (0.25-0.75 m) and wider trenches (0.5-1.5 m). While smaller scars may naturally recolonize over several years, some scars, especially in Thalassia seagrass beds experiencing moderate tidal currents or wave action, persist for decades and can enlarge from erosion (Zieman, 1976). The slow growth rate of Thalassia contributes to its comparatively slow recolonization of the bare sediments in scars.

One technique for restoring slow-growing seagrass species such as Thalassia focuses on planting another seagrass species such as shoalgrass, Halodule wrightii (Halodule) to achieve a "compressed succession" (Durako et al., 1992; *sensu* Fonseca, 1994). The compressed succession is a planting technique intended to achieve a more rapid rate of seagrass recovery by temporarily substituting the faster growing Halodule for the slower growing Thalassia. This sequence promotes more suitable conditions for Thalassia to recolonize the scar while stabilizing the sediment and establishing functional seagrass habitat.

Over 15,000 acres of moderately and severely scarred seagrass flats (or habitats) are documented within the Florida Keys (Sargent et al., 1995). In the Sargent report, moderate scarring is defined as 5-20% of the bottom area containing scars while severe scarring is defined as more than 20% of the bottom area containing scars. Given the magnitude of seagrass scarring in the Florida Keys, locating suitable sites for planting 1.55 acres of seagrass within the FKNMS makes restoration of seagrass scars a feasible alternative.

III. RESTORATION SITE SELECTION

Scarring can be an ongoing impact on seagrass meadows and restoration efforts should be conducted at locations that provide protective management, such as through restrictions on power vessel operations, where restoration is less likely to be disturbed by further scarring. Sites that currently meet this criteria and thus will be considered under this plan include, but are not limited to, the Lignumvitae Key State Botanical Site (LBS) and the John Pennekamp Coral Reef State Park (PSP). Additional sites within the FKNMS may be considered outside of such management areas where other site characteristics or circumstances exist which will minimize the threat of future injury from vessel groundings.

Preliminary site selection of scars will encompass the inspection of existing high resolution vertical aerial photography of LBS, PSP, and/or additional areas in the FKNMS. NOAA will assist in securing access to photographic sources, the interpretation of the photographs, and critical evaluation of candidate sites. Low level vertical photos are required to quantitatively delineate areas. Photographs will be inspected, and scars identified and measured to calculate total area. If existing aerial photographs are not adequate, new aerial photography will be collected. Any required additional photography may be subject to delays from weather conditions unsuitable for aerial photography.

Following preliminary selection, the sites will be verified for the presence of seagrass adjacent to the scar and for plantable unconsolidated sediments within the scar. Verification will be conducted by snorkel or SCUBA divers, depending upon water depth at the site. Plantable unconsolidated sediments in a scar will be medium to fine grain and at least 10 cm thick. Sediment thickness will be determined by inserting a probe into the sediment approximately every 5 m along the length of the scar.

IV. METHODS

A. Planting Area, Site Marking and Site Preparation

The compensatory acreage of this plan (1.55 acres) converts to 6,290 m^2. Using a conservative estimate for scar width of 0.5 meters, the planned acreage will require delineating 12,580 linear meters of scar (6,290 /0.5); this estimate is conservative given that narrower scars translates into a greater linear distance needed to restore. The location of each scar selected for planting will be established using a differentially corrected Global Positioning System (GPS). Each end of the selected scar will be identified with a permanent underwater marker for positioning and the distances calculated in a Geographical Information System (GIS). Maps delineating the sites and the location of scars will be produced with GIS.

B. Planting Species and Technique

The selected scars will be planted with planting units of shoalgrass Halodule to achieve a "compressed succession" (Durako et al., 1992; *sensu* Fonseca, 1994). The compressed succession is a planting technique intended to achieve a more rapid rate of seagrass recovery by temporarily substituting the faster growing Halodule for the slower growing turtlegrass Thalassia. This sequence promotes more suitable conditions for Thalassia to recolonize the scar while stabilizing the sediment and establishing functional seagrass habitat.

C. Planting Methods

Planting will occur during April and May, months which present optimal environmental conditions for planting. The planting method to be used will use commercially available "peat pots" (Fonseca et al., 1994). Peat pots (one peat pot = one planting unit) are made of an organic, compressed peat material with a surface area of 7.6 cm^2 and approximately 7 cm deep. A sod plugger of the same dimensions as the peat pot is used to extract plugs from the donor seagrass bed which is then extruded into the peat pots (see Fonseca, 1994 and Fonseca et al, 1994 for detailed description of method). The donor beds will be located on shallow, sandy shoals where Halodule grows at densities of at least 3,000 shoots per m^2 yielding planting unit shoot densities of at least 17 shoots per planting unit. Donor plugs will be extracted at no less than 25 cm between plugs to minimize any effects on the donor beds.

Prior to extruding a plug of Halodule, approximately 10 grams of constant release (70 day) phosphorus fertilizer (0-39-0, nitrogen-phosphorus-potassium) or an equivalent form will be added to each peat pot. Phosphorus has been shown to be a highly limiting nutrient in carbonate sediments such as are found in the Florida Keys (Powell et al., 1989; Fourqurean et al., 1995). A total of 12,580 plugs will then be planted at 1.0 m intervals in the scars selected for restoration.

V. SEAGRASS TRANSPLANT MONITORING

Monitoring of the restoration project is necessary to provide data required to evaluate the viability of the restoration project based on the performance standards identified in Section VI and to permit timely identification of problems or conditions that may require corrective action to ensure the success of the restoration project. Restoration monitoring herein will be in accordance with the following terms and specifications.

A. Monitoring schedule and activities

Field collection of data for performance monitoring will occur for four years after planting. Original plantings will be monitored for three years and potential remedial plantings in Year 2 will be monitored for three years for a total monitoring period of four years. Under this schedule the monitoring would be conducted as follows:

Year 1 - day 60, 180, 365
Year 2 - day 180, 365

Year 3 - day 180, 365
Year 4 - day 180, 365

The precise dates are weather dependent. At day 60 of Year 1, each surviving planting unit will receive an additional spike of constant release phosphorous fertilizer (0-39-0, nitrogen-phosphorus-potassium) to be delivered to each planting unit. Semi-annual refertilization of surviving Halodule planting units will be required at each planting unit.

B. Data Collection

Monitoring will focus on documenting the numbers of apicals at planting time, planting unit survival, shoot density and areal coverage under the following schedule and definitions. This monitoring protocol applies to original plantings for three years (Year 1-3) and to remedial plantings under Section VII for three years (Year 2-4).

1. Apical counts

Prior to planting, one planting unit (i.e. peat pot core) out of every one hundred (100) collected will be examined for the number of rhizome apicals.

2. Survival

Each scar will be examined for survival of all planting units during each survey in Year 1 (60, 180 and 365 days) or until coalescence. Survival of each species will be expressed as a percentage of the original number, but the actual whole number will also be reported.

3. Shoot density

A separate (from survival) random selection of three (3) planting units of Halodule will be assessed for number of shoots per planting unit at each survey time until coalescence begins. After some planting units begin to coalesce, 3 randomly selected locations will be surveyed for shoot density over a 1 meter linear distance along each planted scar at 0.0625 m^2 (25 cm x 25 cm) resolution. Shoot density will be monitored for three (3) years.

4. Areal coverage

Three (3) randomly selected planting units (may be same as shoot density selection) will be surveyed for coverage at each survey time starting at day 180 of Year 1. Measurements will be taken at a 0.0025 m^2 (5 cm x 5 cm) resolution prior to coalescence and over a 1 meter linear distance along a scar at 0.0625m^2 (25 cm x 25 cm) resolution after coalescence for each seagrass species present at each survey time. Areal coverage will be monitored for three (3) years.

5. Video Tape Transects

Five 100 meter transects along randomly selected portions of the planted scars will be video-tape recorded to establish permanent visual documentation of the progression of areal coverage of seagrass through time. A metric tape measure will be laid along the central (long) axis of the scar and will be included in the video tape to allow physical reference of locations within the scar. Video recordings will be taken at each survey time during the monitoring period of three (3) years.

C. Reports

Monitoring reports (up to a total of 9) will include copies of raw data gathered in each survey, an analysis of the data, and a discussion of the analysis. Originals of all video tapes recorded since the previous report will be provided with each new report. Originals of all video tapes and other photography will be turned over to NOAA following project completion by the party conducting the monitoring.

VI. PERFORMANCE STANDARDS

Although it is the overall objective to restore Thalassia at the selected scar sites, performance criteria will be based on the success of the Halodule planting as the planting methodology used is designed to expedite the recovery of Thalassia.

A. Apicals

A minimum average of one horizontal rhizome apical per unit will be maintained in all original planting and remedial planting.

B. Survival

The survival rate shall be considered successful if a minimum of 75% of the planting units have established themselves by the end of Year 1. If it is determined that less than 75% survival has occurred by the end of Year 1, then remedial planting will occur during the next available planting period to bring the percentage survival rate to the minimum standard by the next monitoring survey.

C. Growth

The third success criteria will be the measured growth rate of bottom coverage. The growth rate will be considered successful if, starting after one year, the planted seagrass in the scars (restoration sites) is projected to achieve 1.55 acres of bottom coverage, with 95% statistical confidence, within the three year monitoring period for original plantings. If this criteria is not met, then remedial planting will occur during the next available planting period.

VII. REMEDIAL PLANTINGS AND/OR PROJECT MODIFICATIONS

If data from a monitoring report establishes that the performance standards described in Section V are not being met or are projected not to be met, remedial plantings of those affected seagrass species will occur. If there is a recurring problem with survival of plantings or replantings in a particular area, remedial planting will occur in another scar within the Sanctuary subject to the approval of permitting agencies.

Based on past experience in seagrass restoration efforts, it is assumed that 30% of the planted area will require remedial planting in Year 2. All original plantings will be monitored for three (3) years in accordance with Sections V and VI. Remedial plantings will be monitored for three (3) years subsequent to the date of a remedial planting.

VII. PROJECT PERMITTING

The seagrass restoration and monitoring outlined in this plan will be implemented consistent with any applicable state or federal permitting requirements. The format of the restoration and monitoring plan outlined in this document may be amended in order to comply with applicable permitting requirements.

IX. CONTRACTOR(S)

NOAA will utilize the services of one or more qualified contractors to implement this restoration and monitoring plan.

X. NOAA OVERSIGHT OF SEAGRASS RESTORATION PROJECT

NOAA will oversee the implementation and monitoring of the seagrass restoration project in order to ensure its implementation in accordance with the terms of this plan. Costs which NOAA will incur to provide effective oversight are part of the costs of implementing this seagrass restoration and monitoring plan. Activities which NOAA may undertake in order to provide for effective implementation of this plan include, but are not limited to, the following:

a. actions associated with the identification, selection and hiring of any contractor(s) who will implement any part of this plan, including monitoring or remedial actions,

b. oversight of any field work at the project site, including remedial actions,

c. inspection of any completed field work, including remedial actions, to determine whether implementation is in accordance with this plan, including any applicable contract or permitting requirements,

d. review and evaluation of monitoring reports,

e. identification and direction of any actions needed to bring field work, including remedial actions, into compliance with standards for project performance identified in this plan,

f. actions to address NEPA and permitting processes, and

g. actions associated with final site selection.

XI. REFERENCES

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