ADDENDUM No. 3

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
Procurement Section
3800 Commonwealth Boulevard, MS#93
Tallahassee, Florida 32399-3000

March 3, 2017

Addendum To: DEP Solicitation No. 2016002C, entitled
"Seagrass Damage Assessment and Restoration Planning and Implementation in NW Florida"

The Department hereby answers questions posed by prospective Respondents. Unless expressly indicated, these answers do not amend the terms of the solicitation. This addendum does not need to be returned with the proposal. The Department hereby answers the following questions:

1. Was it addressed in the meeting on whether we need to find NEW seagrass scars other than the severe areas determined by the Department for ALL AP's?

   Answer #1: No, However when the contractor performs the survey for each of the designated Aquatic Preserves (St. Joseph Bay, St. Andrews, and Alligator Harbor) they will be identifying and assessing **all** existing prop scar damage.

2. Will we need to perform drone aerials in the entire St Joe fringe of seagrass beds to find new scars or only focus on the severe southern areas, then assess the other AP areas through drone aerials, and determine among the three AP sites, the worst seagrass prop scars to restore?

   Answer #2: The entire St. Joe Bay Aquatic Preserve area will be mapped to determine extent of prop scarring, as well as all of St. Andrews AP and Alligator Harbor AP. (Refer to answer to question #1.)

3. Has the type of sand/shell been identified for use in the tubes? If so, please provide the specifications.

   Answer #3: No. Specifications for the fill material are not provided by the Department. The type of sand/shell to be used for fill in sediment tubes should be similar to that of the local sediment where the prop scarring will be recovered, and will be determined by the selected contractor. Please refer to Section 1.06 Part 1 Technical Response Package Paragraph 5. Proposed Project Approach.

4. Have specifications been developed for the type of material to be used for the tubes other than biodegradable? Ex. target 3 month life span? Grade of cotton or other treatments?

   Answer #4: No, this is to be proposed by the contractor in their implementation plan and approved by DEP.

5. (a) A confusion from reading the state RFP , "Seagrass Damage Assessment and Restoration Planning and Implementation in NW Florida" which I have is whether the rfp calls for the vendor to reply to the rfp in terms of implementing the complete restoration of DEP selected- (after survey) boat scars and also implement seagrass restoration, and implement monitoring itself or if it is only consultant services for placing the materials for scar restoration and for materials and implementation of seagrass restoration in terms of those two tasks and the subsequent monitoring of the sediment restoration of boat scars and monitoring of seagrass restoration.
   This is the confusing part of the RFP
   "The design and permitting for the Florida Seagrass Recovery Project (Project) will require specific disciplines and a well-planned approach. The Respondent shall demonstrate that it has, through current employees and subcontractors, the technical expertise and prior experience necessary to perform the services described herein. Based on work performed on projects of similar type, size and complexity, along with the Respondent's knowledge and experience in the design, permitting and implementation of SAV projects and familiarity with local coastal conditions found in NW Florida will determine their ranking in the evaluation. These qualifications include but are not limited to the following: i. Knowledge and experience in

planning assessment, design, permitting and implementation of SAV recovery or restoration projects located within estuaries, bays and near shore coastal systems in NW Florida to include, collection and interpretation of high resolution aerial imagery (especially through the use of unmanned aerial systems (UAS) in obtaining high level (centimeter level) resolution aerial photography), preparation of assessment and restoration plans, applying for and obtaining applicable environmental permits (if necessary), developing competitive non-proprietary technical specifications meeting the states procurement policies and providing limited consulting services during the project implementation and monitoring phases;"

(b) Is the survey to include **all** the moderately and severely scarred areas in the far Southern portion of St Joseph? or only somewhat more than sufficient scars to fulfill the project?
(c) Can the portions of St. Andrews and Alligator survey of scars be carried out after the DEP decisions about scar selections in the St. Joseph estuary? ***Or are they mandatory during the same St. Joseph time period?***

Answer #5: (a) The selected contractor is to (1) map and assess seagrass damage in the three (3) AP's; (2) review the assessment findings with DEP and determine the areas to be recovered to meet the project goals starting with St. Joseph Bay AP; (3) prepare the Implementation Plan; and (4) perform the recovery operations in accordance with the approved final plan. Implementation Monitoring and post construction monitoring will be conducted by the Department through Central Panhandle Aquatic Preserves (CPAP) staff.

(b) the selected contractor is to survey and map all three (3) AP's identified in the solicitation.

(c) It is the Department's desire that all three AP's identified in the solicitation be surveyed, mapped and assessed for prop scarring at the same time.

6. Is it implied by the Department that High Resolution Aerial Imagery means orthophotos?

   Answer #6: Yes, it is the desire of the Department that the aerial imagery be produced as orthophoto or orthophotograph (an aerial photograph that has been geometrically corrected (orthorectified)) that allows for accurate measurement.

7. What is the deliverable format for the aerial imagery?

   Answer #7: Shapefiles for ArcGIS.

8. Part II Price Proposal provides that Proposals shall also list any contingencies felt possible by the contractor and costs for such. Section II also provides that the respondent use the Form provided in Section 6. The form in Section 6 does not have a space to which include contingency costs. Where does a respondent list contingency cost?

   Answer #8: The requirement in Part II Price Proposal for the Contractor **"to list any contingencies felt possible…"** is not required. Part II Price Proposal in the RFP is hereby replaced with the following (Revised page 11 of the RFP is attached to this addendum):

   Part II, Price Proposal (Not included in page count)**:** Proposals not submitted on the Response Form (Section 6.00) shall be rejected. The Respondent's Response Form must be submitted on the forms provided in the Solicitation. Submit the price proposal in a separately sealed package marked Price Proposal. The proposal shall include a fixed fee cost to prepare the assessment surveys of all three APs, plans and specifications for the seagrass restoration and implementation of the restoration plan within St. Joseph Bay AP.

   On the Response Form provided in Section 6.00, the Respondent shall provide a cost for each of the services/products listed. The prices must include the cost of all things necessary to provide the services described in this Solicitation and the Respondent's proposal, including, but not limited to, personnel and labor costs, travel and incidental expenses (other than travel in conjunction with unscheduled/emergency maintenance trips), miscellaneous expenses (i.e. postage), and the application of any multipliers (i.e. overhead, fringe benefits, etc.). Failure by the Respondent to provide a cost for any of the services/products listed in Section 6.00 shall result in the response being deemed non-responsive and therefore, rejected. Footnotes, notations, and exceptions made to this form will not be considered.

9. Weather and water clarity will be a significant factor in collecting quality aerial photographs. If acceptable conditions do not present themselves within a reasonable period once the Notice to Proceed is let to the successful vendor, will there be a Departmental contingency to allocate additional time for project completion?

   Answer #9: Yes, additional time will be considered for conditions outside the contractor's control.

10. Section 6 response form implies that project is proposed as a fixed cost. However, Section 13 provides direction on how to request cost reimbursements. Please provide clarification as to how invoicing and payment will proceed. Fixed price with monthly invoicing or Cost Reimbursement Contract?

    Answer #10: Section 13 does not apply to this contract. Invoicing and payment shall proceed upon completion of tasks identified in item numbers 1 – 3 or subtasks identified on the form in Section 6.0 of the solicitation. Invoicing for the work identified in Item 4 may be on a monthly basis based upon amount of work completed, calculated to the nearest 0.01 acre.

11. Is the sign-in sheet available from the pre-solicitation meeting?

    Answer #11: Yes, it is provided as an attachment to this addendum.

12. Has an estimated budget been identified for the scope of work? If so, what is the estimated value?

    Answer #12: The estimated project budget, based upon the work identified in the solicitation, is approximately $900K.

13. To what value to the client is imagery where seagrass and/or other significant resources do not exist? Is it for the purpose of collecting a complete orthorectified image?

    Answer #13: All imagery of the Aquatic Preserves is of value to the Department even if significant resources (seagrass) do not exist in certain areas of the AP.

14. Even though UAS aerial imagery is preferred, will other high resolution aerial imagery options be considered?

    Answer #14: Yes, however the Department and CPAP prefer that UAV/UAS technology be utilized to obtain the aerial imagery to develop the maps for use on this project.

15. Are there any established control points available for use for aerial imagery acquisition?

    Answer #15: It is the responsibility of the contractor to establish the control points for use on this project.

16. How is the area of prop scars to be computed? Can the acreage be computed as a line feature, i.e. the sum of the length and an assumed width to equal 2.0 acres, or does this need to be delineated as a polygon for each scar?

    Answer #16: The method of quantifying the amount of prop scarring should be proposed in the respondent's proposal. Computing it as a line feature is acceptable. The assumed scar width should be based upon sound judgement, accuracy of the UAS, and field confirmation.

17. If the acreage can be computed as a line feature, what is the assumed scar width that can be utilized in area computations? Published studies have demonstrated values ranging from 0.19 to 0.30 m.

    Answer #17: The minimum scar width to be considered for this project shall be no less than .20M.

18. What is the definition of "severely scarred habitat" that is to be used in selecting the prop scars to be restored?

    Answer #18: Severely scarred habitat are areas of SAV where scarring is greater than 20%.

19. Prop scars are sometimes accompanied by blow-holes which result when a vessel is grounded and the operator attempts to free the vessel, increasing power and ejecting sediment and seagrass from the seafloor. Are blow holes to be considered part of the acreage target and if so, given their very different dimensions and fill requirements, how will they be counted in the acreage total?

    Answer #19: Restoring "Blowholes" will only be considered if there are not enough prop scars to meet the 2 acre goal.

20. Please clarify the need for autonomous vehicles during surveys; does this apply only to aerial vehicles or also to vehicles operating on the water surface?

    Answer #20: This only applies to the vehicles performing the aerial imagery.

21. For the electronic submittal, do you want all the documents (copies) together or on separate CDs?

    Answer #21: The vendor can submit the Technical and Pricing on one C.D. but would need two (2) copies on separate C.D.'s.

22. Is the project set on using sediment tubes or are other methods/processes acceptable?

    Answer #22: This solicitation is requiring the use of biodegradable sediment tubes to enhance seagrass recovery in prop scarred areas.

23. Can we prove or demonstrate that the use of sediment tubes has been successful in Aquatic Preserves? In the Panhandle?

    Answer #23: Yes, sediment tubes have been used successfully for prop scarring restoration in St. Andrews Bay AP. Literature regarding this project is provided as an attachment to this addendum.

24. Who is on the review board?

    Answer #24: This is subject to change but at the present time the review board will be made up of three members of the DEP project team: Lisa Robertson, Jonathan Brucker, and Kim Wren.

25. Clarification on the resolution of the UAV imagery – 6cm? Less? More?

    Answer #25: The resolution for the UAV imagery shall be no more than 6cm per pixel.

26. Is the identification of acceptable prop scars to be restored going to follow NOAA protocols? (width and depth)

    Answer #26: Refer to answer to question #17. The final determination of prop scars to be restored shall be made after aerial surveys and assessments have been finalized and reviewed with DEP and CPAP.

27. Is the project looking only at prop scars, or will "blowouts" be acceptable?

    Answer #27: Refer to answer to question #19.

28. Are shapefiles of existing seagrass coverage available?

    Answer #28: Yes, Respondents desiring copies of the existing shapefiles of existing seagrass coverage may request a copy by emailing Lori.L.Anderson@dep.state.fl.us.

29. Are slides from the presentation going to made available?

    Answer #29: Respondents desiring a copy of the slides presented at the pre-solicitation meeting may request a copy by emailing Lori.L.Anderson@dep.state.fl.us.

30. What is the maximum water depth that the scars can occur at?

    Answer #30: As referenced in the solicitation Section 1.0 Introduction, the areas being reviewed for prop scarring recovery are in depths of 1.5 meters or less.

31. Is the transaction fee going to be waived?

    Answer #31: No, the transaction fee described in Section 4.22 will not be waived.

32. The RFP indicates on Page 12 that two electronic copies are required. Do the technical proposals and cost proposals need to be on separate CDs (i.e., 2 technical and 2 cost = 4 CDs total)?

    Answer #32: Refer to answer to question #21.

33. Regarding Past Performance/Client References, if a respondent has done work for the Department as a subcontractor to another firm, will our past performance be automatically reviewed (even though we are not listed as the prime contractor)? Or, can we submit a Client Reference Form listing the prime contractor as our client?

    Answer #33: The respondent may list the prime contractor as a former client.

34. Can the Department please provide the shapefiles of the scarred areas shown during the pre-solicitation conference?

    Answer #34: Refer to the answer to question #28.

35. Please clarify what resolution (pixel size) is required for the aerial imagery. Is it 6cm or 15cm?Answer

    #35: 6cm per pixel.

36. What is the horizontal spatial accuracy requirement for the imagery?

    Answer #36: A horizontal spatial accuracy requirement for the imagery has not been set by the DEP for this project. The intent of this RFP is to engage a firm, individual or team that has the experience and expertise in the use of UAV for aerial surveying and the ability to prepare maps that will enable the contractor and the DEP/CPAP team to accurately assess the extent of prop scarring in the selected AP's.

37. Can the Department please provide detailed maps delineating the areas to be flown for each Aquatic Preserve (St. Joseph Bay, St. Andrew Bay, and Alligator Harbor)? This is stated on page 17 of 57, under 3.03 1.A. "Prepare conceptual implementation work plans using maps provided by the Department that will delineate the areas to be flown for obtaining high level resolution aerial photography…".

    Answer #37: The maps that will be provided by the Department will show the boundaries of the AP's.

38. If the Department plans to provide maps, can they provide the digital files as well (e.g. CAD, shapefile, geodatabase)?

    Answer #38: Yes, the Department can provide the digital files in a shapefile format.

39. Can the Department clarify their "determination of the success of the SAV restoration/recovery project…"? In terms of measurable metrics such as percent cover, survivability of plantings, etc. with respect to recovery time? Page 18 of 57, last paragraph, sentence number 6.

    Answer #39: The success of the SAV restoration/recover project will be determined by DEP/CPAP during monitoring of implementation of the project in accordance with the final restoration implementation plan prepared by the contractor and approved by DEP/CPAP.

40. Are sediment tubes required or can it be an approved alternative?

    Answer #40: Refer to answer to question #22.

41. Does the depth of a scar proposed for filling follow NOAA/State protocol of greater than 20 cm (>20 cm)?

    Answer #41: Refer to answer to question #26.

42. If the Department is unsure about how many scars need to be filled, should the respondent's cost basis assume that all scars receive sediment fill?

    Answer #42: The project goal is to recover two (2) acres of prop scarring. The cost proposal form in Section 6.0 of the Solicitation requires the respondent to provide a cost/acre for implementation of the seagrass recovery. As stated in the Solicitation, the method of recovery implementation is by the use of sediment tubes.

43. Can the restoration plan include seagrass transplants to stabilize shallow prop scars using a compressed succession method (NOAA study with FWRI)?

    Answer #43: This Solicitation is requesting the use of sediment tubes for restoration.

44. Is there a minimum/maximum number of bird stakes per the plan for each area (Aquatic Preserve)?

    Answer #44: It is expected that the respondent, in their plan, based upon their experience will determine the number of bird stakes.

45. Can the cost proposal which is based on cost per acre, be provided "with" and "without" sediment fill?

    Answer #45: The cost proposal should be based upon the use of sediment tubes.

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ATTENDANCE LOG FOR SEAGRASS RECOVERY PRE-SOLICITATION CONFERENCE

DATE: FEBRUARY 9, 2017

PLACE: St. Joseph Bay Buffer Preserve Offices

Name	Company	e-mail address	Contact Phone #
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Carter Henne	Sea and Shoreline	Carter@SeaandShoreline.com	863-412-8275

ATTENDANCE LOG FOR SEAGRASS RECOVERY PRE-SOLICITATION CONFERENCE

DATE: FEBRUARY 9, 2017

PLACE: St. Joseph Bay Buffer Preserve Offices

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RESTORATION, MONITORING AND MANAGEMENT OF BOAT PROPELLER SCARS IN ST. ANDREWS BAY, FLORIDA

DATE: August 16, 2010

PROJECT AUTHORS: Chris Gudeman, Ron Mezich, Kent Smith and Paul Carlson

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PROJECT NUMBER: FWS – T-13-R-1 - CFDA# 15.634

ABSTRACT

The Florida Fish and Wildlife Conservation Commission (FWC) partnered with the Florida Department of Environmental Protection (FDEP) to address seagrass habitat that has been severely impacted by propeller scars within St. Andrews Bay Aquatic Preserve in Bay County, Florida. This project employed multiple techniques including prop scar rehabilitation through the use of Sediment Tubes®, non-regulatory resource management actions and public education. Low altitude aerial photography was used to assess level of propeller scarring with these combined management actions in effect. After almost 3 years of monitoring, our assessment offers evidence that the sediment tubes accelerated the recovery of prop scars at our sites; however; managers should carefully consider whether the use of sediment tubes is both ecologically and economically meaningful in restoration activities planned to address propeller scarring. In conjunction with efforts to repair existing prop scars this project implemented several management strategies to reduce the reoccurrence of prop scars in this area. The study areas lay along, or were adjacent to paths used by large numbers of recreational boaters navigating to access island beaches. Based on the findings of this study, the management strategies employed were not found to be effective toward the focal project goal of reducing propeller scarring in seagrass.

ACKNOWLEDGEMENTS

We thank Tova Spector of the Florida Department of Environmental Protection's (FDEP) State Parks staff and volunteers who were an integral part of this project through data collection, public outreach efforts and the placement of non-regulatory "Caution Seagrass" signs. We also thank the following contributors to this project for their efforts in data collection and analysis, Shelley Alexander and Ben Russell of the FDEP - Coastal Aquatic Management Areas (CAMA), Heather Reed of Ecological Consulting Services, Maria Merrill (FWC), and Paul Carlson and Paul Julian (FWC) for propeller scar photo interpretation and analysis.

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INTRODUCTION

One of the growing human effects on seagrass communities are losses related to propeller scarring (Sargent et al.1995). Propeller scarring can result in minor damage to above ground seagrass short shoots or it can result in more extensive damage to roots and rhizomes (Fig. 1). Deep propeller scars result in the excavation of a trench, removing sediments and pushing them along the side of the scar as overburden and severing the seagrass rhizomes. Propeller scars of this nature often require several years to recover and be recolonized by seagrasses to their original densities. This is due to a combination of photo inhibition of seagrass rhizome growth, sediment displacement along the edge of the trench, and bioturbation (Hamerstrom, et al. 2007). The slow recovery rates of turtlegrass (*Thalassia testudinum*) can lead to even further meadow degradation from boat wakes, tidal currents, or the passage of severe storms (Whitfield et al. 2002, Whitfield et al. 2004), and some disturbances may in fact never recover (Zieman, 1976).

The Florida Fish and Wildlife Conservation Commission (FWC) – Marine and Estuarine Sub-Section (M/ESS) partnered with FWC – Florida Wildlife Research Institute (FWRI) and the Florida Department of Environmental Protection's (FDEP) – Florida Park Service (FPS) and Coastal and Aquatic Managed Areas (CAMA) to address seagrass habitat

Figure 1. Numerous propeller scars are adversely affecting the seagrass beds on the bayside of Shell Island in St. Andrews Bay Aquatic Preserve.

severely impacted by propeller scars within St. Andrews Bay Aquatic Preserve.

The project site is located in Bay County, Florida on the bayside of Shell Island within the boundaries of the St. Andrews Bay Aquatic Preserve (an Outstanding Florida Water) and adjacent to St. Andrews Bay State Park. St. Andrews Bay Aquatic Preserve consists of approximately 25,000 acres of sovereign submerged land (Fig. 2). St. Andrews Bay has the largest expanse of seagrass beds in the Florida panhandle. Handley et al. (2007) reported a 17 percent decline in seagrass cover in St Andrews Bay between 1953 and 1992, and of the remaining seagrasses in St. Andrews Bay, more than 50 percent have been scarred by boat propellers.

This project employed a three-pronged approach to restore existing prop scars and address the underlying causes for the ongoing prop scarring at identified project sites. The designed approach included prop scar rehabilitation through the use of Sediment Tubes®, non-regulatory resource management actions including placement of seagrass caution signs along the deep bed edge of seagrass meadows and public education.

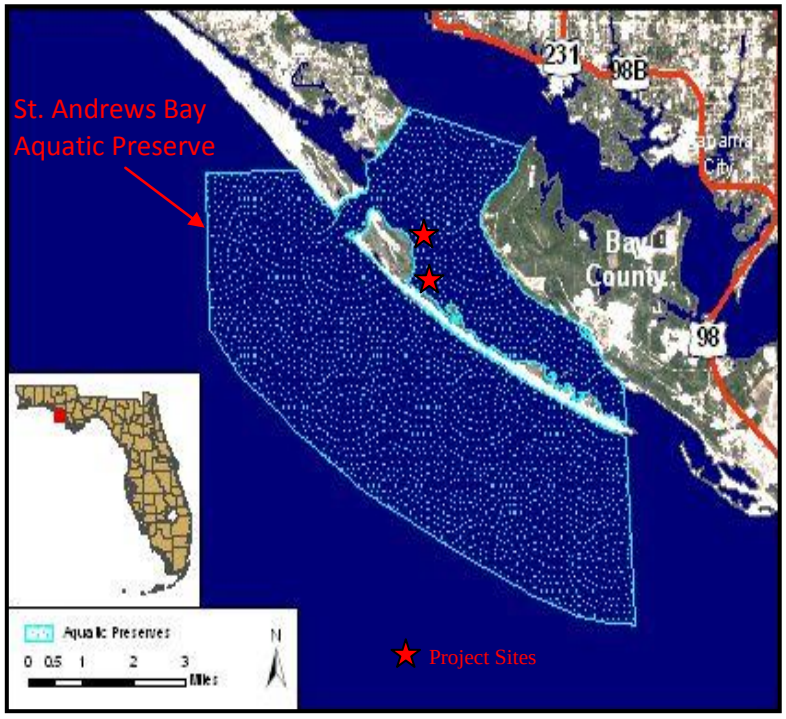


Figure 2. St. Andrews Bay Aquatic Preserve in Panama City Beach, Florida. The project sites were located on the bayside of Shell Island.

The monitoring protocol established for this project allowed us to evaluate;

1) the efficacy of restoring seagrass in prop scars by placement of sediment tubes in propeller scar trenches (This restoration technique, which has been successfully employed in the calcareous sediment regime of Florida Bay had yet to be tested in Northwest Florida with quartz sand sediments.).

2) recovery rates of prop scars filled with sediment tubes relative to adjacent scars that were left untreated.

3) the value of non-regulatory seagrass signs in conjunction with providing the boating public with seagrass information as a strategy to reduce repetitive prop scarring.

METHODS

Treatment:

In the most severely trenched prop scars, topographical restoration of disturbed sediments to ambient grade can expedite seagrass community recovery (Hall et al. 2006). Sediment Tubes® created and patented by Seagrass Recovery, Inc. (hereafter referred to as sediment tubes), are composed of a

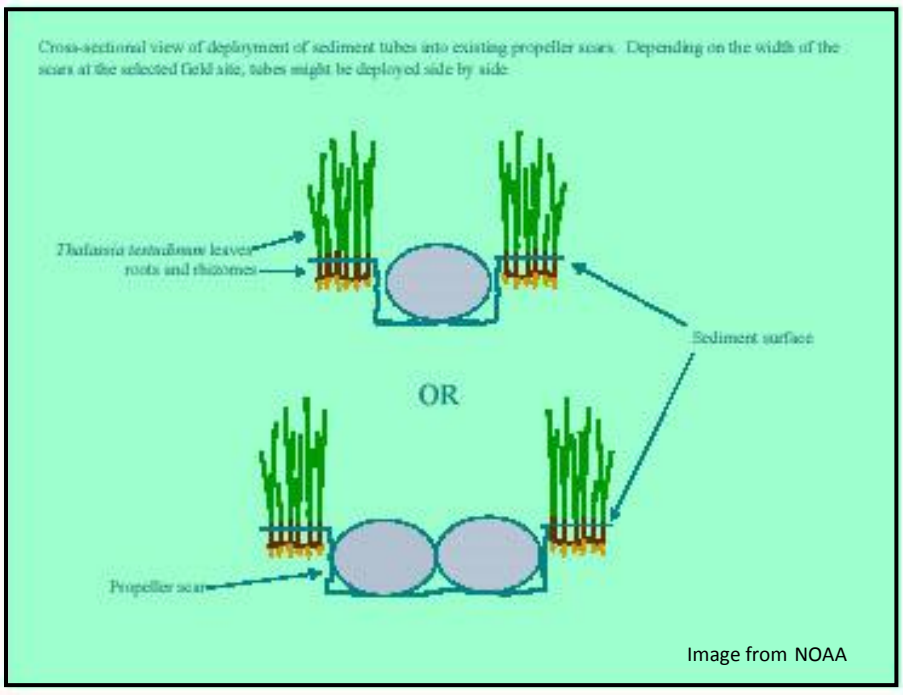


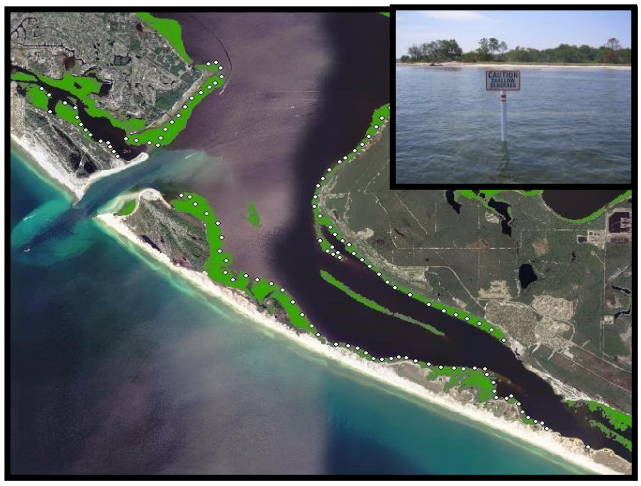
Figure 3. Cross-sectional view of sediment tubes in an existing propeller scar.

biodegradable, cotton fabric that are filled with locally compatible sediments and laid directly into an excavated prop scar or a vessel grounding site (Fig. 3). Sediment tubes have been used successfully in the Lignumvitae Key Submerged Land Management Area (McNeese et al. 2006), and in Tampa Bay (Hall et. al. 2006). For this project, prop scars were selected for treatment, based on size (linear length > 3 m) and depth (> 0.15 m) criteria. Each sediment tube was 1-m in length and 0.2-m in diameter. Propeller scars that were of sufficient depth and width within the project sites were chosen for treatment. During the week of 22 October 2007, 1,200 sediment tubes were placed into a combination of 24 prop scars and boat groundings. This effectively restored each prop scar elevation to ambient grade for the purpose of creating suitable conditions for seagrass recruitment from undamaged seagrasses on either side of the scar.

Management Strategy:

In conjunction with the FWC's State Wildlife Grant funded use of sediment tubes for seagrass restoration, the Department of Environmental Protection's State Park staff developed and funded a two-step management strategy to decrease propeller scarring. The State Park's approach included conducting a public outreach program aimed at educating vessel operators about seagrass communities and the impacts that boats can have on seagrasses and installing "Caution Shallow Seagrass" signs along the edge of seagrass communities within St. Andrews Bay Aquatic Preserve. During March and April of 2005, FDEP-FPS with volunteers from the Panama City Marine Institute, Friends of St. Andrews Bay and the U.S. Coast Guard Auxiliary conducted 187 boater surveys at St. Andrews State Park and Carl Grey Park, during U.S. Coast Guard vessel inspections. In September of 2005, 120 non regulatory seagrass markers were installed and strategically placed throughout the project area along the 1m depth contour adjacent

Figure 4. St. Andrews Bay **"**Caution Seagrass" sign locations are indicated in white.



to, or in seagrass beds threatened with potential prop scaring (Fig. 4). This established a non-regulatory seagrass protection zone that alerted boaters to the locations of shallow seagrass beds at eye-level on the water. This effort was supplemented with informational Kiosks and pamphlets that were provided at local boat ramps providing vessel operators information emphasizing the ecological benefits of seagrass and how to avoid prop scarring (Fig. 5). Data based on observations of vessels and their operator including boat speed, vessel groundings, sediment displacement from propellers, operators tilting motors and vessel operators avoiding areas signed with "Caution Shallow Seagrass" signs were collected to determine the relative effects before and after management strategies were employed by park staff. These data were collected and analyzed based on vessel operator behavior within the aquatic preserve areas marked with "Caution Shallow Seagrass" signs. A detailed account of this study is currently being drafted for publication by Tova Spector (FDEP-FPS).

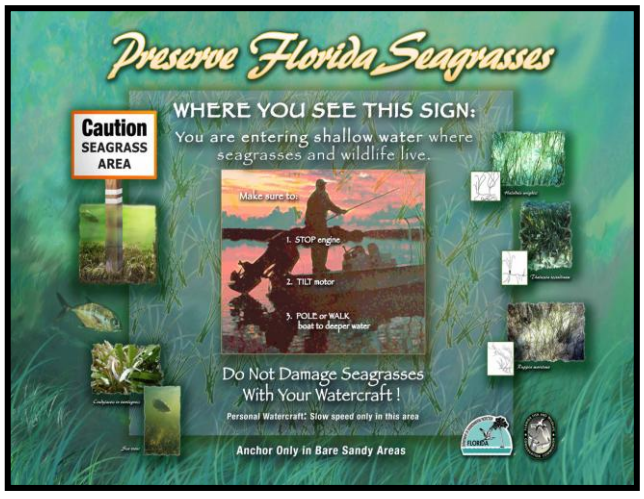


Figure 5. St. Andrews Bay **s**eagrass Information that has been placed in Kiosks at local boat ramps

On 28 April 2009, the non-regulatory "Caution Shallow Seagrass" signs were individually inspected for damage or loss and then photographed by staff from FWC-M/ESS and FDEP-FPS. Replacement signs, poles, and tape were purchased with grant

funds to cover future maintenance and repairs so that the program can continue for additional years beyond the timeline of the grant.

Monitoring

Two separate areas of prop scars were selected for monitoring and designated as sites A (Cove) and B (Point; Fig. 5). Monitoring of this project consisted of in-water surveys of selected prop scars both treated with sediment tubes and scars left untreated, to determine if sediment tubes create conditions more suitable for rapid seagrass recovery. In addition, low-altitude aerial photographic surveys of prop scars at pre-determined locations were conducted. Aerial photographic images were then geo-referenced, analyzed and interpreted for changes in prop scar occurrence over time to assess the effectiveness of the sign installations.

In-water Transects

Of the 24 scars that were filled with sediment tubes, ten were randomly chosen and are identified as "treated". An additional four scars that did not receive sediment tubes were selected for

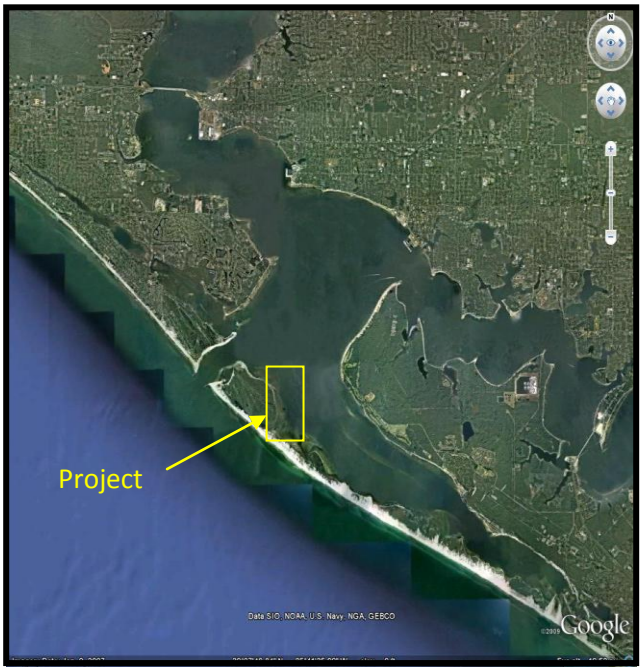


Figure 6. St. Andrews Bay and the location of propeller scar treatment sites.

Figure 7. **L**ocations of propeller scar treatment site A (The Cove) and site B (The Point).

comparison purposes, due to their similarity in length and depth and their proximity to the treated scars. These four prop scars are identified as "untreated". PVC stakes were prepared and driven into the sediment at the terminal ends of each treated and untreated prop scar to facilitate relocation of each assessed scar. GPS coordinates were recorded for these stakes so they could be relocated for repeated monitoring events.

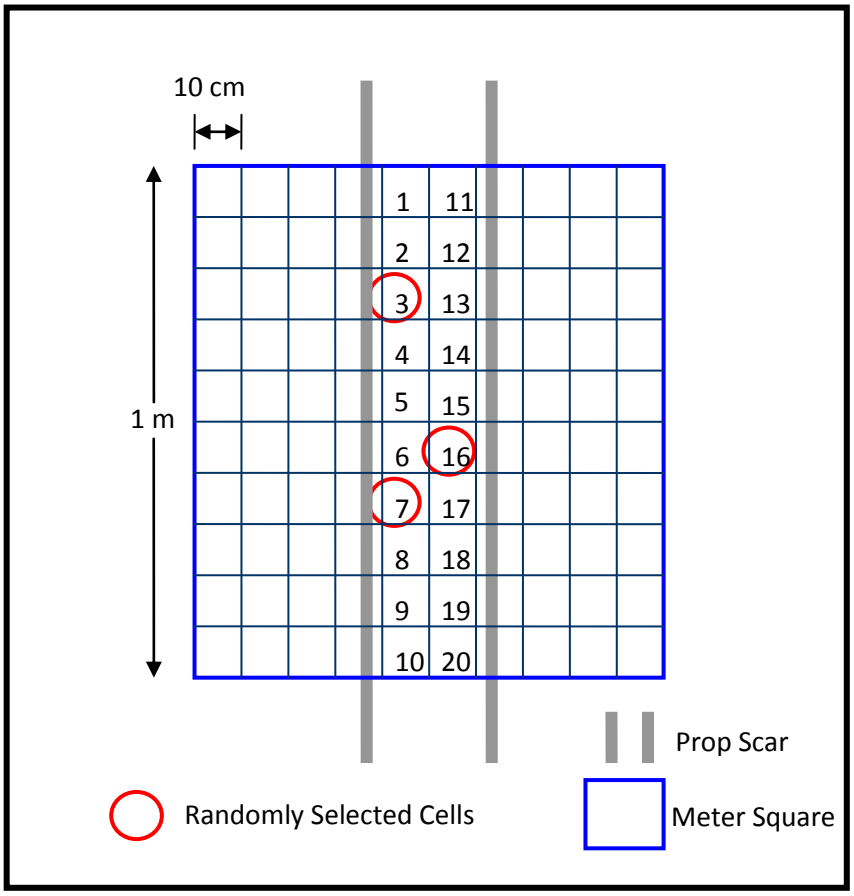


Figure 8. Example of meter square grids that were used to collect seagrass shoot counts and Braun-Blanquet assessments at control, treated and untreated propeller scar sites.

All 14 scars were monitored on 16 September 2008 (11 months after the sediment tubes were placed in the treated prop scars). Replicate measurements were made at three substations within each identified scar; one was located approximately in the middle of the scar and the other two were located 1m inside of both ends of the scar. For each treated substation there was an adjacent corresponding control substation in unaffected seagrass. At each substation, a square-meter quadrat divided into 100 – 10-cm^2 cells, was placed over the treated or untreated scar. Two vertical lines of cells (20 cells total) from the center of the quadrat and fully within the boundaries of the scar (seagrass edge to seagrass edge) were identified and

used for subsequent assessments (Fig. 8). At both the treated, untreated and control substations, data were collected using a modified Braun-Blanquet (1965) assessment to determine vegetative cover- abundance within twenty 10-cm^2 cells, and seagrass density was determined by conducting short shoot counts within 3 randomly selected 10- cm^2 cells at each substation. On 23 and 24 June 2010, a second monitoring session was conducted 32 months after the sediment tubes were placed in the prop scars. During this monitoring event only twelve of the original 14 scars were relocated and assessed. Data collected from these monitoring assessments has been used to document the recovery of seagrass within each treated and untreated scar over the 2.7 year time frame. The seagrass short shoot count data collected during the 2008 and 2010 monitoring events were analyzed using two-tailed paired t-tests at an experiment-wise error rate of 0.05% using Microsoft Excel software (Microsoft Office Suite, 2007, Redmond, WA). Tests of statistical differences between paired data set means were deemed significant at the 95% ($p<0.05$) confidence level.

Aerial Photography

Aerial surveys were conducted using a tethered helium balloon that carried a digital camera, with a 35mm focal length lens, to an altitude between 100 m and 125 m. Each photograph

Figure 9. FWRI staff with helium balloon used for propeller scar aerial photography in St. Andrews Bay Aquatic Preserve.

Figure 10. Balloon aerial photography of existing propeller scars at project site A (Cove) in St. Andrews Bay Aquatic Preserve.

encompassed an area approximately 70 m x 40 m. Within each monitoring site, five photo plots were selected. Within each plot, four semi-permanent stakes were installed at the corners of a square with sides approximately 20 m long. A Trimble® (model: GeoXH; sub-foot accuracy) handheld device was used to obtain the geographic coordinates of each stake and the distances between stakes. Prior to each set of photos, tall stakes were installed adjacent to the semi permanent stakes, and colored, floating targets were slipped over the tall stakes. The targets serve two purposes for geo-interpreting the photographs. They 1) provide variations in the color-coded identification of individual photo plots, and 2) serve as references for known distances between targets offering an appropriate scale to rectify the imagery. Although the features are visible, they are not always easily identifiable. In this case, geo-interpreting the balloon involved identifying the individual prop scars and digitizing them onto a map. This provides a record of the locations and morphologies of each scar that is identified. Final analysis was conducted to show the changes in the number, length, and cover of prop scars providing

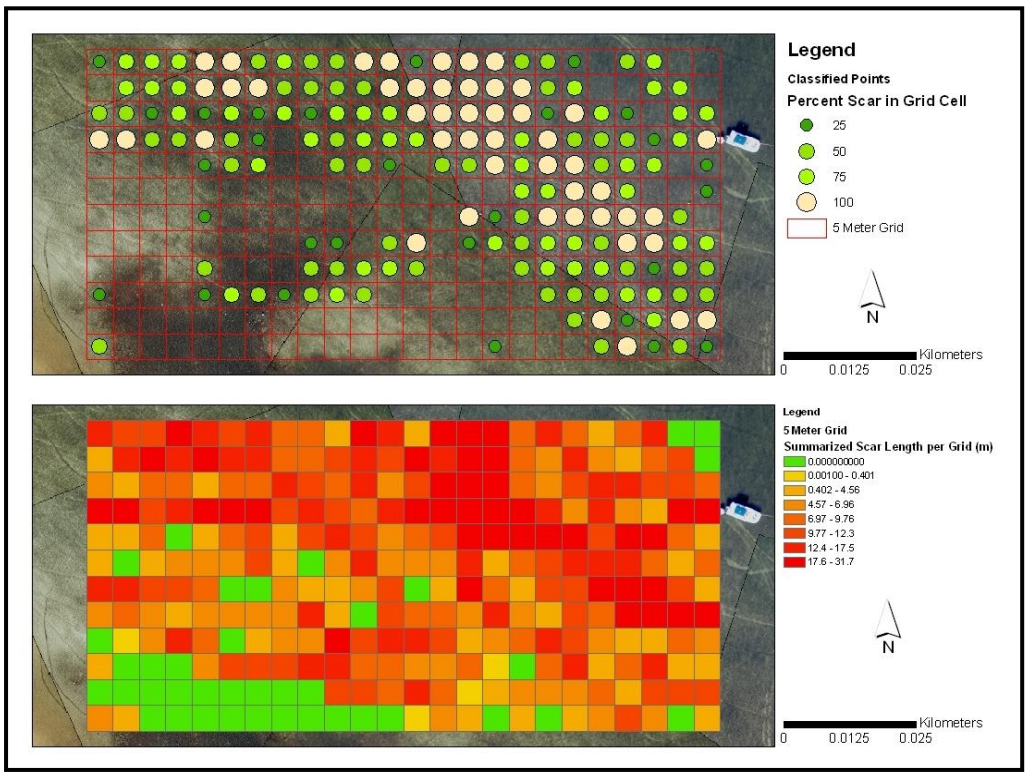


Figure 11. Two techniques used by FWRI to interpret propeller scar aerial photographs located within project sites A (Cove) and B (Point) in St. Andrews Bay Aquatic Preserve.

evidence of increasing or decreasing prop scars within identified monitoring plots.

The low-altitude aerial photographs were taken at the project site in November 2007 and 2008 and October 2009 by staff from FWC-M/ESS and FWC-FWRI. All aerial photographs were geo-referenced, and scar patterns were analyzed and interpreted by FWC-FWRI staff. In addition to the low altitude balloon photography, prop scar analysis was also completed on 2007, 2008 and 2009 Florida Department of Transportation's geo-referenced aerial photography of the project area.

The aerial photography data were analyzed using a grid approach. All classifications were conducted at a resolution of 1:250. Project site A (Cove) was classified using a 5-m grid with Hawths Tools (Beyer 2004) in ArcGIS (ESRI, Ver. 9.3) and then converted to a point centeroids using XTools. To aid in the classification and interpretation of the scars, a 2.5m grid was produced with Hawths Tools. At project site B (Point), the images were classified in the same manner, but with the addition of a 15-m grid on the periphery of the 5-m grid. To aid in the interpretation of this site, another grid at a size of 7.5 m was generated with Hawths Tools.

Table 1. Classification categories for percent of grid cells with propeller scars.

Value	**Percent Scar Present/Description**
None	No scars present within grid
Low	25% scars present, a scar running through one section of interpretation grid
Medium	50% scars present, a scar running through two sections of interpretation grid
High	75% to 100% scars present, a scar running through three sections of interpretation grid

A second classification approach was also used categorize the data. Separate polyline shapefiles were generated for both study areas. Once the prop scars were digitized the Identity Tool ArcGIS (Ver 9.3, Yr) was used to relate the polyline data to the 5-m grid employed in the grid classification approach. The lines were clipped to the grid cells and the total length of the

scars in each grid cell was calculated. Total scar length (in meters) for each cell was multiplied by 0.5 m to calculate total impact area within each cell and divided by 25 m^2 to calculate percent scarred area for each cell. Aerial prop scar data were then classified into the following categories.

Table 2. Classification categories for total impact area from propeller scars in each of grid cell.

Category	Description
None	0.0% scar impact area for each cell
Light	0.01% to 10% scar impact area for each cell
Moderate	10% to 20% scar impact area for each cell
Heavy	>20% scar impact area for each cell

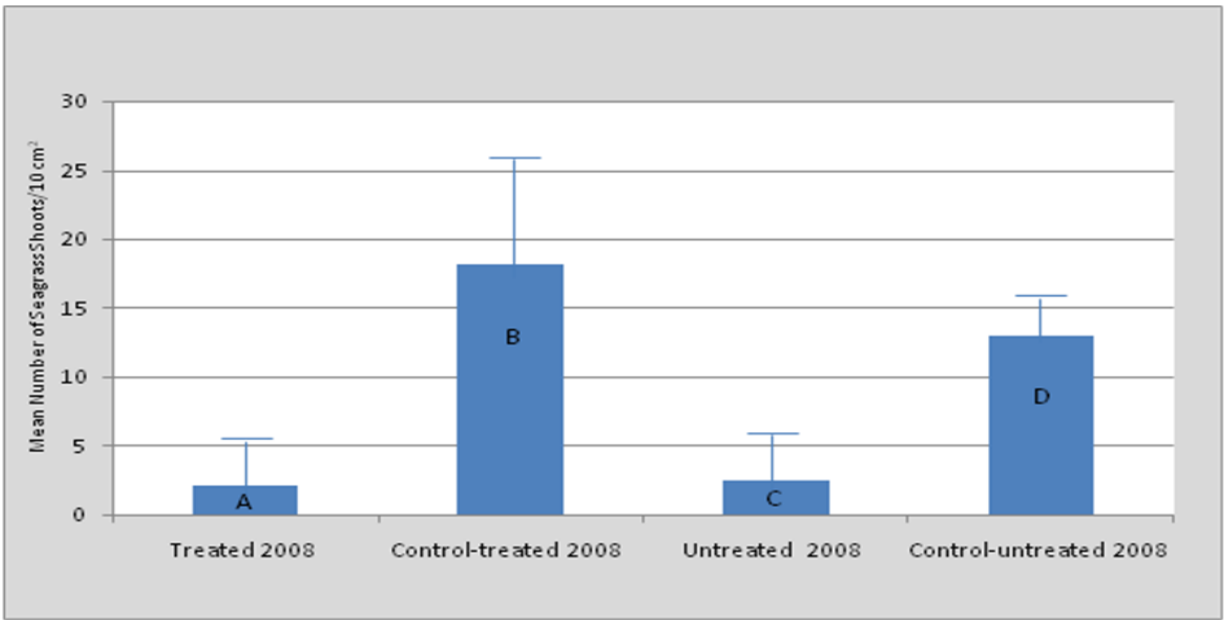
RESULTS

Treatment

Project sites A (Cove) and B (Point) were sampled on 16 September 2008, 11 months after 24 existing prop scars were treated with sediment tubes. Data collected during this initial monitoring consisted of short shoot counts of 2 species of seagrass, Turtlegrass and shoal grass (*Halodule wrightii*), which are displayed in Figure 12. At this time, no significant difference ($n - 1 = 11$, $p = 0.75$) was discerned between the mean number of seagrass short shoots that were counted within those scars treated (Column A) with sediment tubes versus those that were untreated (Column C). Means for short shoot counts for both the treated propeller scars ($n - 1 = 23$, $p = 0.0000000002$) and the untreated propeller scars ($n - 1 = 11$, $p = 0.0000016$) were highly significantly different from their respective control (unaffected seagrass adjacent to the scars) shoot count means (Column A vs. Column B, and Column C vs. Column D).

A second sampling effort was conducted on 23 – 24 June 2010, 19 months after the first monitoring event and 2 years and 6 months after placement of the sediment tubes in treated

Figure 12. Mean number of **s**eagrass shoot counts in treated and untreated propeller scars in 2008.



scars. Data for this sampling effort are displayed in Figure 13. Means for seagrass short shoot counts between the sediment tube treated (Column E) and untreated (Column G) propeller scars were significantly different from one another ($n - 1 = 11$, $p = 0.010350031$) at this time.

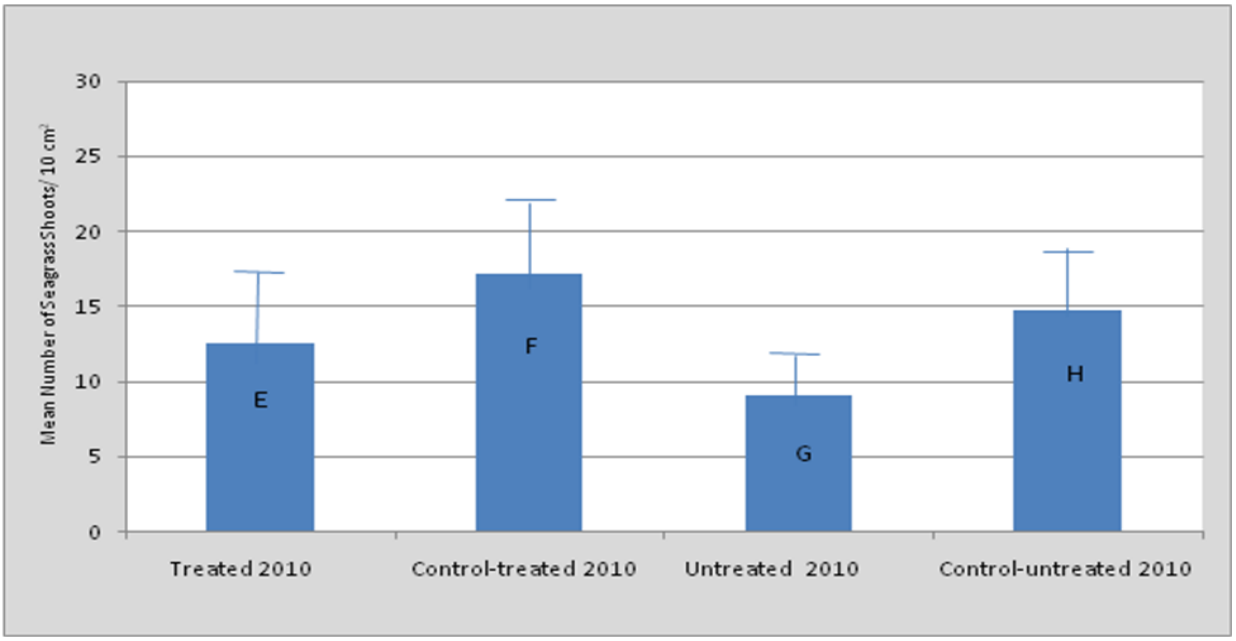


Figure 13. Mean number of **s**eagrass shoot counts in treated and untreated propeller scars in 2010.

Comparison of the means of shoot counts for the treated (Column E) scars and their respective controls (Column F) continued to be significantly different ($n - 1 = 23$, $p = 0.002780829$), as did that for the untreated (Column G) scars and their respective controls (Column H) ($n - 1 = 11$, $p = 0.002188639$).

Mean shoot counts for collected data were compared between the 2008 and 2010 monitoring periods (Figure 14) in order to assess the relative level of seagrass recovery for both treated and untreated scars. Scars treated with sediment tubes in 2010 (column E) had mean shoot counts that were significantly different from those measured at the same locations in 2008 (column A) ($n - 1 = 23$, $p = 0.000000039$). The same was true for mean shoot counts between untreated scars in 2010 (Column G) vs. those measured in 2008 (Column C) ($n - 1 = 11$, $p = 0.00012$). These results are contrasted with the finding that mean shoot counts for both sets of controls were statistically indiscernible over the same comparative time period (Column F vs. Column B; $n - 1 = 23$, $p = 0.59$, and Column H vs. Column D; $n - 1 = 11$, $p = 0.34$).

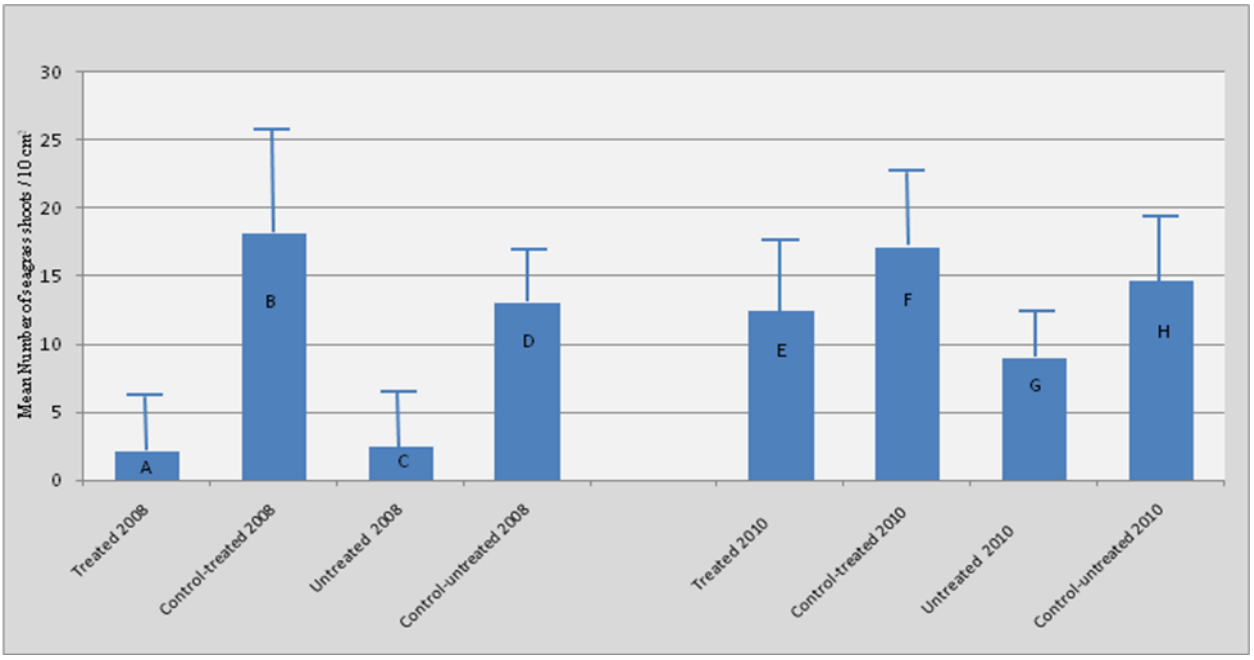


Figure 14. Mean number of seagrass shoot counts in treated and untreated propeller scars in 2008 and 2010.

Collected and analyzed data indicate a trend toward recovery for both the scars treated with sediment tubes and those that were left untreated. By the third seagrass growing season post treatment, both the treated (Columns A & E) and untreated prop scars (Columns C & G) continue on seagrass shoot density trajectories that would lead to eventual recovery. However, between the first and second monitoring events, the treated prop scars (Column E) show a significant difference ($n - 1 = 11$, $p = 0.010$) in the mean number of seagrass shoots documented within the prop scars when compared to the mean shoot count for the untreated scars (Column G).

Aerial Photography

Aerial imagery from 2007, 2008 and 2009 was acquired from an FWC-FWRI ground based helium balloon camera system at known aerial photo stations. The imagery was then analyzed each year for both Site A and Site B to document the occurrence of prop scars in individual cells created through the grid classification system. This prop scar data indicates that light prop scaring decreased from 2007 to 2009, but moderate and heavy scaring increased over the same period of time (Fig, 15). In addition, the percent of cell that did not have prop scars decreased overall from 2007 to 2009, which also supports the premise that

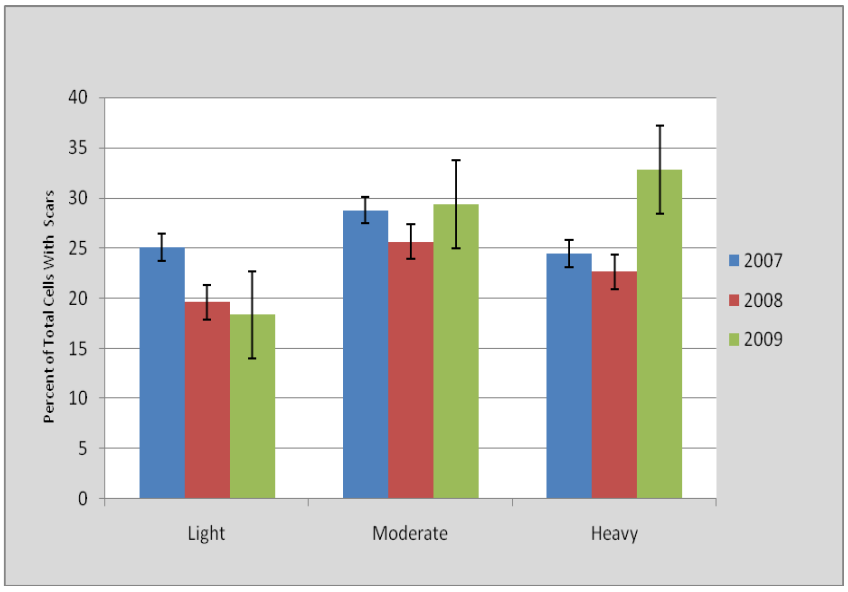
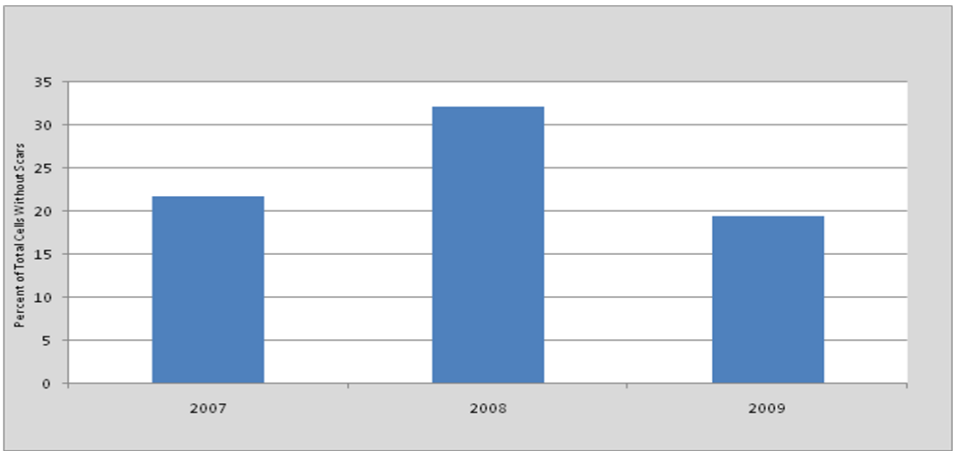


Figure 15. Balloon aerial photography indicating percent of cells containing propeller scars during 2007, 2008 and 2009.

Figure 16. Percent of total grid cells without prop scars at Site B (2007 – 2009)



that there was no reduction in the occurrence of prop scars during the study period (Fig. 16).

FWC-FWRI also acquired FDOT aerial imagery to determine if these products could be used in a similar fashion to analyze the occurrence of prop scars over time. A comparison of the FWRI balloon imagery and the FDOT aerial imagery was conducted to determine if there was a bias in either photographic methodology. Figure 17 illustrates that both techniques compared favorably in identifying prop scars within designated grid cells within known locations.

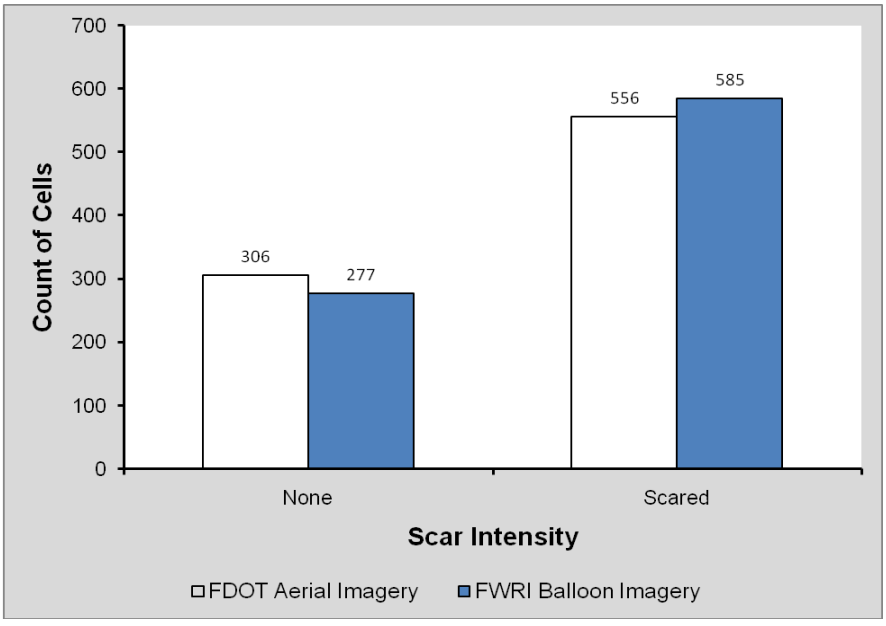


Figure 17. Comparison of propeller scar cell counts of FDOT aerial surveys and FWRI balloon aerial surveys.

After analyzing the data from both the FWRI balloon imagery and the FDOT aerial imagery, it was determined that there was no significant decrease in the occurrence of prop scaring or the intensity of prop scars in the study sites.

DISCUSSION

This project was initiated in part to test the viability of placing sediment tubes into propeller scars as a technique to facilitate and enhance the regrowth of seagrasses in these damaged areas. Data collected during this study demonstrates that sediment tubes over time provided a benefit in the form of more seagrass short shoot growth within recovering prop scars when compared to prop scars that were left untreated. Although both treated and untreated scars were on a trajectory for recovery, a significantly greater number of short shoots were counted in prop scars treated with sediment tubes than those without tubes. How this relates to the total time for recovery for either type of scar is unknown since this project did not follow treated and untreated scars to the point of full recovery, though in both cases it appeared that they would reach recovery within the 3 to 7 year time frame suggested in past studies (Durako et al. 1992, Hall et al., 2006). Managers deciding whether to expend funds for sediment tubes to expedite prop scar recovery will need to determine whether the quicker recovery is ecologically meaningful enough to warrant the added cost of treating the scars with sediment tubes. For this study, costs were approximately $15 per linear foot of sediment tube installed, but expenses can be expected to vary based on

Figure 18. St. Andrews Bay Aquatic Preserve propeller scar with recently placed sediment tubes.

access to appropriately permit-authorized sediment, mobilization and labor. An added consideration for managers is determining if the prop scars are in areas where there is an increased probability of further seagrass bed degradation due to waves, boat wakes, currents or frequent storm conditions. In these cases sediment tubes would offer added stabilization and provide an additional incentive that may warrant their use.

Several management actions were taken prior to implementing the prop scar restoration portion of this project to educate vessel operators of the importance of seagrass communities and to warn them of the environmental damage resulting from boating damage to shallow seagrasses in the project area. In this case, 4 years after the initiation of FDEP's boater education efforts and over 3-1/2 years after the placement of seagrass protection signs, our monitoring efforts related to the occurrence of prop scars in focally assessed areas has provided strong evidence that these educational efforts were unsuccessful. The observed lack of prop scar reduction may be due to several factors. Project site A is a destination area for recreational boaters who want to reach Shell Island beaches from the bay side and then cross over the dunes by foot to the ocean side. Many of the recreational boaters are using rental pontoon boats, which indicates the vessel operators are not local and are likely unfamiliar with the shallow nature of the waters in the area. The Point project area may be receiving repeated prop scars because it is within the vessel transit zone to the cove for many of these boaters. Managers working to resolve prop scar issues need to consider the root cause for prop scarred area under their jurisdiction. In some cases, boater education and non-regulatory signs may be appropriate, but as we found in this case, these management actions were insufficient and our project area continues to receive repeated prop scar insults which nullifies the benefits of the restoration activities we employed. As recommended by Sargent et al. (1995), management programs that address scarring of seagrasses

should be based on an approach that involves education, channel marking, increased enforcement and limited-motoring-zones. Not all of these options are viable in this instance. Channel marking and limited-motoring zones solely for the protection of seagrasses are not feasible due to statutory restrictions that do not allow for these techniques to be employed only for the purpose of resource protection. However in this case, the project area is in a Florida Aquatic Preserve. Under current Florida law, vessel operators that are responsible for damaging seagrasses can be fined using a uniform citation process. Occasional directed education and enforcement efforts by marine enforcement officers may heighten awareness of the problems of the area and lead to a reduction of the incidence of prop scars.

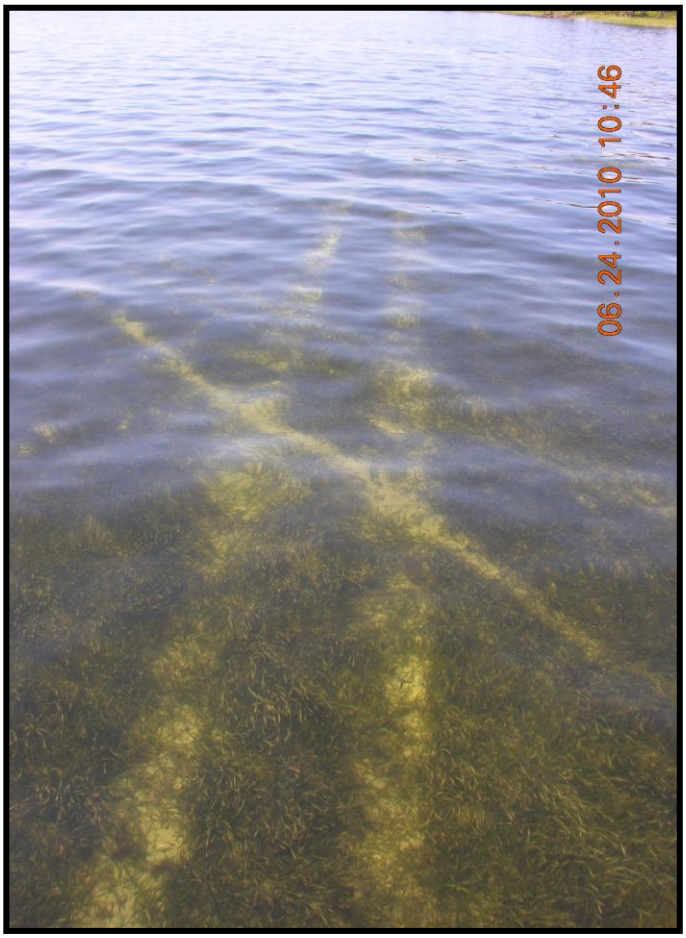


Figure 19. Recovering treated propeller scar at project site B with new intersecting propeller scar.

MANAGEMENT IMPLICATIONS

This assessment does offer evidence that the seagrass recovery process for prop scars accelerated with the use of sediment tubes. However, managers should carefully consider whether the use of sediment tubes is both ecologically and economically meaningful in restoration activities planned to address propeller scarring.

Effective reduction of the area of visible propeller scars was not achieved

during the duration of this study using non-regulatory "Caution Shallow Seagrass Signs" placed at the edge of the seagrass community. The region of this study is in a highly visited warm season boating destination, and sampling locations lie along or adjacent to paths used by recreational boaters to access Shell Island beaches. Based on the findings of this study, the management strategies employed were not found to be effective toward the focal project goal of reducing propeller scarring in seagrass.

CONCLUSIONS

The monitoring protocol established for this project was designed to evaluate three questions; 1) whether sediment tubes are effective in repairing propeller scars in NW Florida, 2) if scars treated with sediment tubes recover more quickly than untreated prop scars, and 3) if informational seagrass signs and vessel operator education efforts reduce propeller scar occurrence. We believe those questions were answered during this project as follows:

Figure 20. Recent propeller scar located in project site B in St. Andrews Bay Aquatic Preserve.

Propeller scars without sediment tube augmentation show recovery based on increased abundance and density of seagrass, but those augmented with sediment tubes demonstrate significantly greater seagrass recovery over the same

period of observation.

Non-regulatory shallow seagrass informational signs placed in the configuration and at the depth for this assessment did not result in reduced aerial densities of recognizable propeller scars.

Aerial photography to monitor prop scars at the two projects is an effective technique to examine the occurrence and density of propeller scars over time.

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non-Department references. The total number of clients who will be contacted to complete an evaluation for any proposal shall be two (2).

A Department representative will contact the references via telephone to complete the Evaluation of Past Performance form (Section 10.00). The Department will attempt to contact each selected reference by phone up to two (2) times during the duration of one (1) week. In the event that the contact person cannot be reached following the specified number of attempts, the Respondent shall receive a score of zero (0) for that reference evaluation. The Department will not attempt to correct incorrectly supplied information.

Failure to provide the required information for a minimum of five (5) separate and verifiable clients in the spaces provided on the Client Reference Form (Section 8.00), or failure to provide the required information for each reference shall result in the Respondent receiving a score of zero (0) for the Past Performance section of the evaluation criteria.

A. Respondent/Subcontractor Summary Form (Tab D): On the Respondent/Subcontractor Summary Form (Section 11.00) provided the Respondent shall list the name of the Respondent(s), that portion of the scope of work the subcontractor shall be responsible for and indicate the **one** business category of the Respondent.

B. State Project Plan (Tab E): The Respondent shall submit a written plan addressing the State's five (5) objectives listed in Section 1.19, State Project Plan, to the extent applicable to the items/services covered by this Solicitation. The Department expects Respondents to address each objective. Objectives not addressed in the selected contractor's proposal must be addressed prior to contract execution.

C. Additional Documents (Tab F): This section of the proposal shall contain the following:

- Certification of Drug-Free Workplace, Section 7.00 (if applicable).

- **Part II, Price Proposal** (Not included in page count)**:** Proposals not submitted on the Response Form (Section 6.00) shall be rejected. The Respondent's Response Form must be submitted on the forms provided in the Solicitation. Submit the price proposal in a separately sealed package marked Price Proposal. The proposal shall include a fixed fee cost to prepare the assessment surveys of all three APs, plans and specifications for the seagrass restoration and implementation of the restoration plan within St. Joseph Bay AP. ~~The cost proposal shall also include additional costs should restoration activities be necessary in Alligator Harbor AP and St. Andrews AP. Proposals shall also list any contingencies felt possible by the Contractor and costs for such.~~ Revised per Addendum 3, 03/02/2017.

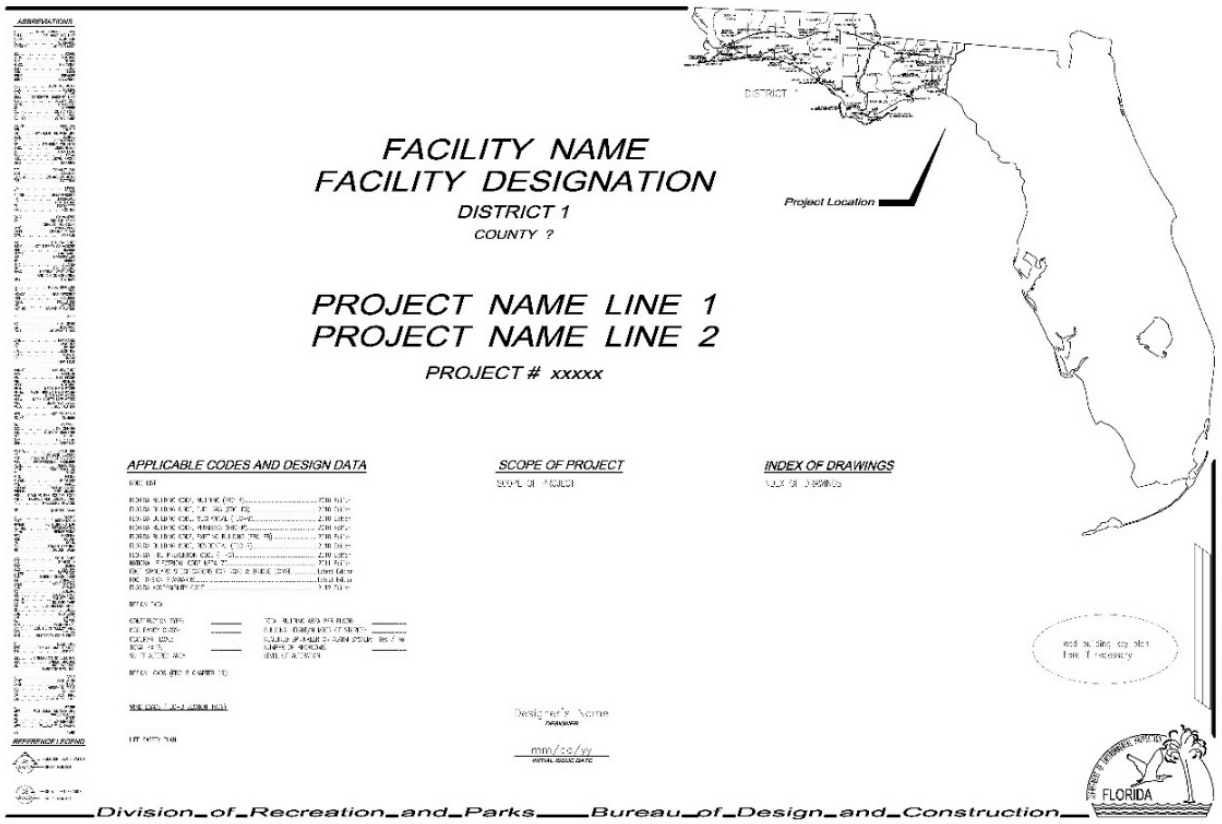
  On the Response Form provided in Section 6.00, the Respondent shall provide a cost for each of the services/products listed. The prices must include the cost of all things necessary to provide the services described in this Solicitation and the Respondent's proposal, including, but not limited to, personnel and labor costs, travel and incidental expenses (other than travel in conjunction with unscheduled/emergency maintenance trips), miscellaneous expenses (i.e. postage), and the application of any multipliers (i.e. overhead, fringe benefits, etc.). Failure by the Respondent to provide a cost for any of the services/products listed in Section 6.00 shall result in the response being deemed non-responsive and therefore, rejected. Footnotes, notations, and exceptions made to this form will not be considered.

1.01. Submittal of Proposal. Both Technical and Price Proposals (Proposal) must be received in accordance with the Schedule of Events. Sealed Proposals must be executed and submitted in two (2) parts and be marked as follows:

- Part I – Technical Proposal (One Separately Sealed package for Technical Proposal); and
- Part II – Price Proposal (One Separately Sealed package for Price Proposal)

THE SEPARATELY SEALED PACKAGES MAY BE MAILED TOGETHER IN ONE ENVELOPE OR BOX.

The face of the envelope shall contain the Solicitation number and opening date. All Solicitations are subject to the conditions specified herein. Those that do not comply with these conditions are subject to rejection.



3.01. Document Compliance with Natural Resources Damage Assessment Program (NRDA) Requirements. All projects listed within this Solicitation are funded with Deepwater Horizon Early Restoration NRDA funds. Accordingly, the selected Contractor will be required to ensure that all prepared documents fully conform to all applicable NRDA requirements.

3.02. Bid Phase Construction Support Services. Not Applicable.

3.03. Anticipated Schedule. It is the intent of the Department to enter into a contract with the selected Respondent for preparation of the SAV recovery/restoration implementation plan no later than ~~January~~ **May**, 2017. Revised per Addendum 3, 03/02/2017. The selected Respondent will be required to produce final plans for the SAV recovery/restoration implementation acceptable to the DEP Project Manager, obtain all required permits and complete the implementation plan no later than nine (9) months from receipt of the Notice to Proceed (NTP), unless circumstances beyond the Respondent's control can be documented and an amendment authorizing a time extension is approved by the DEP Project Manager.

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shall comply with Section 247A(e) of the Immigration and Nationalization Act, the Americans with Disabilities Act, and all prohibitions against discrimination on the basis of race, religion, sex, creed, national origin, handicap, marital status, or veteran's status. Violation of any such applicable laws, roles, codes, ordinances and licensing requirements, shall be grounds for Contract termination.

4.06. Conflict of Interest. The Respondent covenants that it presently has no interest and shall not acquire any interest, direct or indirect, which would conflict in any manner or degree with the performance of the services required to be performed under the contract.

4.07. Disclosure. Information will be disclosed to Respondents in accordance with State statutes and rules applicable to this solicitation after evaluations are complete.

4.08. Disclosure of Litigation. The contractor shall promptly notify the Department of any criminal litigation, investigations or proceedings which arise during the term involving the contractor, or, to the extent the contractor is aware, any of the contractor's subcontractors or any of the foregoing entities' then-current officers or directors. In addition, the contractor shall promptly notify the Department of any civil litigation, arbitration or proceeding which arises during the term of the contract and extensions thereto, to which the contractor (or, to the extent the contractor is aware, any Subcontractor hereunder) is a party, and which involves:

a) a claim or written allegation of fraud against the contractor or, to the extent the contractor is aware, any subcontractor hereunder by a governmental or public entity arising out of their business dealings with governmental or public entities. All notices under this section must be provided to the Department within thirty (30) business days following the date on which the contractor first becomes aware of any such litigation, investigation, arbitration or other proceeding (collectively, a Proceeding). Details of settlements, which are prevented from disclosure by the terms of the settlement, may be annotated as such.

4.09. E-VERIFY Program for Employment Verification.

A. The employment of unauthorized aliens by any contractor/vendor is considered a violation of Section 274A(e) of the Immigration and Nationality Act. If the contractor/vendor knowingly employs unauthorized aliens, such violation shall be cause for unilateral cancellation of the contract. The contractor shall be responsible for including this provision in all subcontracts with private organizations issued as a result of this contract.

B. Pursuant to State of Florida Executive Order No. 11-116, contractor is required to utilize the U.S. Department of Homeland Security's E-Verify system (www.dhs.gov) to verify the employment eligibility of all new employees hired by the contractor during the contract term. Also, the contractor shall include in related subcontracts a requirement that subcontractors performing work or providing services pursuant to the state contract utilize the E-Verify system to verify employment of all new employees hired by the subcontractor during the contract term.

4.10. Financial Consequences.

A. No payment will be made for deliverables deemed unsatisfactory by the Department. In the event that a deliverable is deemed unsatisfactory by the Department, the Contractor shall re-perform the services needed for submittal of a satisfactory deliverable, at no additional cost to Department, within thirty (30) days of being notified of the unsatisfactory deliverable.

B. If a satisfactory deliverable is not submitted within the specified time frame, the Department may, in its sole discretion: 1) assess liquidated damages if specified in the Contract or its attachments; 2) request from the Contractor agreement to a reduction in the amount payable; 3) suspend all Work until satisfactory performance is achieved, or 4) terminate the Contract for failure to perform.

4.11. Firm Response. The Department may make an award within ~~ninety (90)~~ one hundred and eighty (180) days after the date of the response opening, during which period the response submitted shall remain firm and shall not be withdrawn. If an award is not made within ~~ninety (90)~~ one hundred and eighty days (180) after the response opening date, the response Revised per Addendum 3, 03/02/2017