

Seagrass Conservation Plan for Texas: Ten-Year Review and Update – 2012



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Texas Commission on Environmental Quality
Texas Parks and Wildlife Department
U.S. Fish and Wildlife Service
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List of Acronyms

BMP's = Best Management Practices
CBBEP = Coastal Bend Bays & Estuaries Program
CCB= Corpus Christi Bay
d = Day
E & O = Education and Outreach
e.g. = Example
EPA = Environmental Protection Agency
ES = Ecosystems Services
GIS – Geographic Information Systems
GLO = Texas General Land Office
ha = Hectare
km = Kilometer
LLM = Lower Laguna Madre
Mgt = Management
N = Nitrogen
NGO = Non-governmental Organization
NMFS = National Marine Fisheries Service
NOAA = National Oceanic and Atmospheric Administration
NPR = National Public Radio
PAM = Pulse Amplitude Modulation
PBS = Public Broadcasting Service
RAPD = Random Amplification of Polymorphic DNA
RBSSA = Redfish Bay State Scientific Area
RMA = Regional Management Area
RSMP = Regional Spatial Management Planning
SCPT = Seagrass Conservation Plan for Texas
SEP = Supplemental Environmental Project
SHC = Strategic Habitat Conservation
SLR = Sea-level Rise
SMWG = Seagrass Monitoring Workgroup
SSA = State Scientific Area
SWQS = Surface Water Quality Standards
TCEQ = Texas Commission on Environmental Quality
TNC = The Nature Conservancy
TPWD= Texas Parks and Wildlife Department
USACE = United States Army Corps of Engineers
 $\text{yr}^{-1} \text{ ha}^{-1}$ = per year per hectare

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A special thanks goes to all the members of the Texas Seagrass Monitoring Workgroup for their review of this updated Plan and their participation in the 2009 Seagrass Workshop held in Corpus Christi, Texas. The keynote speaker for the Workshop, Bill Dennison from the Chesapeake Bay Program, was brought in to discuss the problems and efforts to protect seagrass communities in the Chesapeake Bay region, as well as his other experiences around the world. Other keynote speakers that we greatly appreciated their time were L'Oreal Stepney (TCEQ), Larry Laine (GLO), and Carter Smith (TPWD). After the Workshop, a planning team consisting of Chris Onuf, Warren Pulich, Ken Dunton, Patrick Larkin, Beau Hardegree, Paul Carangelo, Jace Tunnell, and Karen Meador was assembled to begin the actual process of formulating and writing the updated Plan. While the various chapters were written by these individuals, editing of the document was performed by Chris Onuf, with help from Jace Tunnell.

The Texas Parks and Wildlife Department, specifically Nathan Kuhn, played a particularly important role in organizing and moderating the numerous meetings. The diligent work of all members of three Chapter Committees (Research, Management, and Education & Outreach) is gratefully acknowledged. Many of the critical issues described in this updated Plan were initially proposed by these committee members.

We especially appreciate the Coastal Bend Bays & Estuaries Program for managing the contract for the 2009 Workshop and for hosting the many meetings necessary for organizing and planning this review.

Seagrass Conservation Plan for Texas: Ten-Year Review and Update – 2012

INTRODUCTION

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In the mid-1990s, government and academic research scientists, natural resource managers, conservationists, and coastal economic interests in Texas recognized the need for a better-integrated approach to management of the state's rich seagrass endowment. A group of these stakeholders embarked on a process of consultation and discussion that culminated in the publication of the [Seagrass Conservation Plan for Texas \(SCPT\)](#) in 1999 by Texas Parks and Wildlife Department with endorsement by the heads of the three state agencies that share responsibility for management of coastal natural resources: Texas Parks and Wildlife Department, Texas General Land Office, and Texas Natural Resources Conservation Commission (now Texas Commission on Environmental Quality).

One outgrowth of this planning effort was the formation of the Seagrass Monitoring Workgroup (SMWG) spearheaded by Texas Parks and Wildlife Department. This informal workgroup included staff from state and federal agencies as well as local university researchers. The SMWG's initial objective was to participate in the development of a statewide seagrass monitoring plan. The quarterly meetings proved to be such a useful forum for eliciting input from and informing members about projects and emerging issues that it is still in operation.

As the tenth anniversary of publication of the SCPT approached, members of the SMWG saw a need to take stock. What have we accomplished? What has worked and what hasn't? What are emerging issues? What changes might enhance the effectiveness or the direction of the plan? Three panels of approximately ten members each met in July or September 2008 to carry out a preliminary assessment of these questions in the three topical areas of the 1999 Plan: Research, Management, and Education and Public Outreach. The reports of each scoping meeting then served as the springboard for review of the Plan by a broader audience at the Texas Seagrass Conservation Plan Review Workshop held at the Solomon Ortiz Center in Corpus Christi, 11-12 June 2009. Exactly 100 people participated in the workshop. The participants in each 2008 panel and at the 2009 workshop are provided in Appendix C.

The workshop began with a keynote address by Dr. Bill Dennison, Vice President for Science Applications, University of Maryland Center for Environmental Science, Integration & Application Network, informing participants about essential elements of successful seagrass conservation programs. Paramount among these elements is a

monitoring and reporting system that engages the public. Co-chairpersons then reported the findings of the research, management, and education scoping meetings to serve as starting points for breakout sessions on the three topics. Participants in the different breakout sessions are listed in Appendix D. There were 26 participants in Research, 26 in Management, and 13 in Education and Outreach. Each breakout group broke into subgroups with their own facilitators and note-takers for 30 minutes to discuss all aspects of a single plan objective then reconvened as a whole for 15 minutes to integrate the inputs of the subgroups. This process was repeated for all objectives. Overnight, the co-chairpersons digested all of the input and reported the results in a plenary session the next morning so that attendees could hear and add to the findings of the sessions they did not participate in.

Following the workshop, co-chairpersons prepared written reports on the deliberations of their breakout groups and submitted revised versions of the plans for their topical areas. These were sent out for review to workshop participants and revised. Then, the material for each topical area was sent out to all members of the Texas Seagrass Monitoring Workgroup and became the main order of business for three successive meetings of the workgroup: Research was discussed during the meeting in September 2009, Education and Outreach during the meeting in December, and Management in the March 2010 meeting. All inputs were considered in preparation of final versions of chapter text and the resulting plan for each topical area. Since some suggested changes could be contradictory or ambiguous or controversial, the chapter co-chairpersons necessarily were the final arbiters of what objectives, strategies, and actions were included and how they were expressed.

Recommended changes in the Plan statements for each topical area are noted in **bold**, even though this method cannot show deletions and is silent on what the change is and why. Where deemed important, these matters are dealt with in a narrative section preceding the Plan statement for each topical area. The 2008 scoping reports (Appendix A), seagrass management overview (Appendix B), list of participants at the June 2009 Seagrass Workshop held in Corpus Christi, Texas (Appendix C), original comments and notes for each workshop breakout session (Appendix D), the written comments received at or after the workshop (Appendix E), and the responses to comments on the management chapter (Appendix F) are included so that a reader can retrace the development of any element of the Plan from original materials where any question arises that is inadequately or not treated in the chapter narratives. The [1999 Seagrass Conservation Plan](#) is also available on the TPWD website for a look at the original Plan. To facilitate use of and communication about the Plan for each topical area, a hierarchical numbering scheme was instituted identifying unambiguously Objectives (Roman numeral) and associated Strategies (first Arabic numeral) and Actions (second Arabic numeral), (this hierarchy corresponds to Priority Problems, Objectives, and Strategies for the Seagrass Management Issues section of the Plan). Thus, Action III.1.2 in the Seagrass Research Plan is the second proposed action for carrying out the first strategy under the third objective.

The resulting report recommends several areas of improvement and change to the 1999 Plan; however, it should not be regarded as a replacement for the 1999 plan. No attempt has been made here to provide the essential background and historical information synthesized in the 1999 Plan document. All that material is as germane today as it was a decade earlier. Rather, the 2012 report is a supplement to the 1999 plan, updating it with the accumulated experience of the intervening ten years. Also, the fact that much of the 1999 plan carries over into the updated version should not be construed as a lack of accomplishment. Indeed, a great deal has been accomplished, as has been noted in the Chapter narratives and enumerated in Appendix B. Rather, many of the activities must be ongoing in order for seagrass conservation to be successful, as is the case for responding to emerging issues and exploiting new tools in Research (Chapter 1), coordinating much more fully among all interest groups in Management (Chapter 2), and continuing efforts toward all objectives in Education and Outreach (Chapter 3).

Chapter 1
Seagrass Research

CHAPTER 1. RESEARCH

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One inevitable outcome of the process that culminated in adoption of the Seagrass Conservation Plan for Texas (SCPT) in 1999 was recognition that informed stewardship of the State’s seagrass endowment depended on a thorough understanding of the life requirements of seagrasses and their responses to natural and human-caused environmental changes. Out of this recognition a Seagrass Research Plan emerged as a chapter within the SCPT, consisting of a long list of research needs. Ten years later, this to-do list was revisited in a series of pre-workshop “scoping” meetings followed by an update of the SCPT at the Texas Seagrass Conservation Plan Review Workshop in June 2009, where three panels of researchers and natural resource managers reevaluated every aspect of the research plan. The strong consensus of the assembly was that all needs identified in the original plan continued to merit attention. Changes to the research agenda were limited to clarifications of statement, with others focused on identifying short and long-term research priorities.

In all, 26 individuals representing four academic institutions, one federal and two state agencies, one non-governmental organization, and two private companies participated in the research breakout sessions of the Texas Seagrass Conservation Plan Review Workshop held at the Ortiz Center in Corpus Christi, Texas June 11-12, 2009. They reviewed the original Seagrass Research Plan as it appeared in the Seagrass Conservation Plan for Texas (1999), Chapter 2, “Research Issues for Texas”, p. 41-43, and as revised at the Research section pre-workshop scoping meeting in September 2008. The group reviewed each of the four major objectives, along with supporting strategies and action items. Modifications were made that reflect progress made in specific areas, changing priorities in regard to new information, and emerging issues that have arisen over the last decade.

The discussions of the 2009 workshop emphasized that seagrass research activities are (1) vital to the integrity of the SCPT and (2) an on-going activity that provide critical information for successful management of this valuable resource. A substantial amount of research (much of it peer-reviewed) has been conducted on Texas seagrasses over the last decade, and much more is planned by State agencies, academic scientists, and graduate students. To guide future research, we have summarized research contributions conducted on Texas seagrasses from 1999 to the present under the four objectives of the Seagrass Research Plan. Although many reports and publications address more than one objective, they are presented here only once.

Objective I: Status and Trends of Seagrass Distribution.

Much has been accomplished since the original research plan was formulated in 1996. One significant development has been the establishment by Texas Parks and Wildlife of the Redfish Bay State Scientific Area, a 32,000 acre (50 mi²) preserve that contains 14,000 acres of submerged seagrass beds, including the northernmost extensive stands of *Halodule wrightii* and *Thalassia testudinum* on the Texas coast. Significant progress has also been made in mapping and analyzing seagrass coverage. Onuf (2007), Pulich (2007a,b), and Pulich and Onuf (2007) respectively have compiled seagrass status and trends information for the 1950s through the 1990s at approximately decade intervals for the entire Laguna Madre, the Galveston Bay system, the Coastal Bend (Corpus Christi-Rockport-Aransas Wildlife Refuge area); and they also summarized current seagrass status for the whole coast of Texas. In addition, these reports provide information on the distribution of different species, seagrass health, and probable causes of changes in distribution. The status and change information is too complex to summarize here, and the cause analyses are covered in descriptions of the original reports under Objective 2. These reports provide useful reviews of the historical record through 2002.

The past decade has witnessed a significant increase in the application of remote sensing techniques such as aerial photography and geographical information science to the mapping of submerged aquatic habitat. Pulich et al. (2006) and Fletcher et al. (2009) developed a semi-automated technique for interpreting high resolution (1:9600) color aerial photography using transformation from red, green, blue color space to intensity, hue, saturation color space and a threshold value that accurately distinguishes between bare and vegetated bottom at a ground-scale of 1 m. The method also showed promise in distinguishing by hue between pure seagrass and accumulations of benthic macroalgae. Detection of changes at a scale of 1 m would allow management intervention before seagrass beds are lost. Although aerial photography is still recognized as the traditional cost-effective remote sensing medium for seagrass mapping, future efforts could also include high resolution satellite and aerial imagery (1m resolution) when it is available and costs permit.

Another significant result has been the creation of the Texas Seagrass Monitoring Program Strategic Plan (2003), a detailed document that contains specific recommendations for the conceptual design of a statewide seagrass mapping, monitoring, sampling and data management plan. Many of the recommendations from this plan have been tested, refined and included in a detailed Implementation Plan for Seagrass Monitoring developed for the Coastal Bend Bays & Estuaries Program (Dunton et al. 2011). Research panel members agreed that the focus of this objective needs to move from design development to implementation. The wording in Strategy I.1 has thus been changed and four action items have been added. First is the need to identify a central entity responsible for coordinating implementation of the plan. A State source for long-term, dedicated funding for implementation of the plan also must be identified. As emphasized by Dr. Bill Dennison, the workshop's keynote speaker and a leader in the field of coastal restoration, temporary grant funding is not a viable solution. Responsibility for data collection and monitoring also needs to be identified. Preliminary discussions at a research scoping meeting in September, 2008, suggested dividing the monitoring area into 5-6 regions, with specific institutional monitoring responsibilities

for the collection of data, although this is hardly practical with nearly half the seagrass resources of the entire state located south of Port Mansfield in the Lower Laguna.

Strategy I.2 has also been modified to describe mapping goals and requirements more precisely. Action items have been clarified to include specific guidelines. An additional item was included specifying the need for a rigorous Quality Assurance/Quality Control protocol for management of data. Discussion at both the September 2008 and June 2009 meetings covered the need to establish a subcommittee within the Seagrass Monitoring Working Group specifically dedicated to remote sensing issues. The subcommittee would help coordinate data collection efforts and reduce unnecessary duplication. It was also proposed that all mapped data be archived into a common, statewide GIS or equivalent database, such as that maintained by the Texas Natural Resources Information System.

Objective II: Determining causes of change in composition and coverage.

Predicting changes in the seagrass “seascape” requires a broad understanding of both seagrass biology and ecology, and their response to key environmental parameters such as light and nutrients. A large body of research on the life requisites of *Thalassia* in Texas has accumulated over the last ten years. Lee and Dunton (1999a, b, 2000a) have documented major differences in *Thalassia* production, biomass, and biomass and nitrogen allocation between Corpus Christi Bay (CCB) and Lower Laguna Madre (LLM) populations related to much higher ammonium availability at CCB. Sediment ammonium fertilization had relatively little effect at CCB but greatly increased leaf production and biomass, leaf width and length, and tissue N at LLM. Sulfides in highly organic sediments commonly can reach high enough concentrations as to be toxic to aquatic vascular plants. Lee and Dunton (2000b) documented higher pore water sulfide concentrations under *Thalassia* than in adjacent bare patches and how oxygen produced during photosynthesis and translocated to the rhizomes neutralized toxicity around the roots by oxidizing sulfide to sulfate. Kaldy and Dunton (2000) using leaf and rhizome marking techniques found seasonal, annual, and site differences in production and biomass in *Thalassia* at nearby sites in LLM differing only in depth and available light. They also established that rhizomes accounted for 35% of total production and that about 15% of total aboveground biomass was allocated to reproduction. They concluded that environmental parameters (in this case, temperature and light) are the primary factors controlling seasonal growth rates and production and that determinations of total plant productivity must take into account seasonal patterns, reproductive costs, and the large fraction of production occurring in below-ground tissues.

Major and Dunton (2002) comparing light harvesting characteristics of *Thalassia* grown under high and low light conditions reported a previously unsuspected capability of the species for photoacclimation. Light availability is generally acknowledged as the primary determinant of the maximum depth to which a seagrass meadow can grow, and available light is strongly influenced by human alterations of the ecosystem such as nutrient additions and activities that affect the concentration of suspended sediments. Consequently, monitoring the underwater light regime is likely to be an integral part of any monitoring program in support of seagrass conservation. Onuf (2006) documented that biofouling of sensors will be an important limitation on continuous monitoring efforts over most of the year in Texas, that servicing monitors at least weekly will be

required, and that a self-wiping monitor design is likely to be the most cost-effective approach. Onuf (2000) related reductions in biomass and losses of seagrass in deeper parts of Upper Laguna Madre between 1988 and 1997 to light reduction caused by the Texas brown tide, a long-persisting phytoplankton bloom. He argued that nutrients regenerated from dying seagrasses partially accounted for the persistence of the brown tide, but noted that seagrasses did not recover as predicted after abatement of the brown tide. The lagoon now seems to be more prone to episodic blooms and recently established seagrasses cannot survive, perhaps as a result of larger nutrient inputs from a watershed altered by agricultural and residential development.

The impact of drift macroalgae on seagrass beds has also been investigated. Kopecky and Dunton (2006) found similar high abundances of drift macroalgae in 32 km² study sites in Redfish Bay and Lower Laguna Madre, but distribution was highly variable within sites. In Redfish Bay, macroalgae accumulations occurred in bare patches within seagrass meadows, whereas in Lower Laguna Madre, macroalgae accumulated most where *Thalassia* was densest. They attributed the difference to differences in the hydrodynamics of the two sites. Water column nutrient concentrations did not explain any of the distributional pattern; however, very high levels of macroalgae in Redfish Bay in the August-September 2002 sampling followed an abnormally high freshwater inflow event in July 2002. The authors discuss the weakness of infrequent nutrient sampling in relating macroalgal abundance and dynamics to nutrient inputs even when nutrient loading unquestionably is the driving force.

Additional evidence that hydrodynamics contribute to macroalgae accumulation was demonstrated by Pulich et al. (2007) from comparative landscape analysis of sites at Terminal Flats in Redfish Bay and East Flats in Corpus Christi Bay during a 2004 – 2006 study. Both of these sites exhibited similar spatial extents of dense macroalgae deposits from aerial photography over 2 years of study (ca 4.5 % or 11 ha of the study site in Redfish Bay and 3.1% or 5.7 ha of the study site in East Flats), and the algal accumulations within the sites corresponded to locations where prevailing fetch/current patterns and bathymetric features were in alignment. These data also provide some evidence that increased nutrient loading may have contributed to the more extensive macroalgal areas (4.5%) in Redfish Bay compared to the reduced macroalgal areas (3.1 %) at East Flats with putatively lower nutrients.

Other studies investigated potential mechanisms of population expansion. Kaldy and Dunton (1999) using measurements of currents and duration of *Thalassia* fruit and seedling buoyancy estimated net transport to the north of 1.6 km d⁻¹, consistent with the much more rapid expansion rate of *Thalassia* in the lagoon than can be explained by rhizome growth. Estimates of seedling production were consistent with observed recruitment to bare patches, but survival in the field was much lower than in laboratory culture, probably as a result of grazing and physical disturbance of the sediments. Kaldy et al. (1999) comparing age determination in *Thalassia* using a marking technique and a commonly reported technique counting leaf scars and assuming equal time intervals between additions of successive leaves (plastochron method) found seasonal, annual, and site differences that limit the validity of the plastochron method for age determination and prediction of population growth from age-frequency distributions.

Even with these developments, discussion of Objective 2 at the 2009 meeting emphasized the continued need to perform basic research on seagrass biology and population and landscape ecology from all regions of the Texas coast, especially those processes amenable to monitoring. Additional items have been added to Strategy II.1 reflecting the potential impact of global climate change and the importance of genetic variation for seagrass conservation. For example, Larkin et al. (2006) found higher genetic diversity by random amplification of polymorphic DNA (RAPD) analysis in a *Thalassia* population from Lower Laguna Madre than in one from Redfish Bay near the northern limit of its range in Texas. In another study (Larkin et al. 2008) a comparison of three populations of *Halodule* from the heart of its range in South Texas found higher genetic diversity in the site subject to the largest environmental fluctuations.

Minor changes were suggested for Strategy II.2, such as the wording in Action Item II.2.1 so that it no longer seems to imply that the 1999 status of seagrass “health” and distribution are the final goal. Additional physico-chemical items were also included, such as the impact of freshwater inflow on seagrass bed condition.

An additional action item was suggested for the Strategy II.3. The need to collect current (e.g. GIS) and historical information on mitigation efforts, e.g. US Army Corps of Engineers and section 404/10 permits, has been added.

Objective III: Identifying habitat functions, productivity, and linkages.

The objective and strategies in this section have not changed substantially but the organization of action items and “tasks” from the 1999 SCPT have. These include the addition of several new “tasks” and “subtasks”, such as the examination of habitat value according to species; characterization of associated infaunal, epiphyte, and macroalgal communities; abiotic and biotic factors that may influence colonization and species succession; and the effects of landscape morphology on bed function and genetic exchange. For example, genetic variation within and among seagrass populations has a bearing on their responses to stresses and/or alterations to their environment. However, Larkin et al. (2010) detected little effect of propeller scarring intensity on the genetic diversity of *Halodule* up to 20% loss of vegetation by propeller scarring, though it was noted that insufficient time may have elapsed to notice an effect at the population level. Genetic variation among populations can also influence their appropriateness for use in restoration. Angel (2002) determined by RAPD analysis of *Halodule* that a population originating in Upper Laguna Madre was genetically more closely related to one from Florida Bay than the three populations sampled from Christmas Bay. On this basis, she recommended against using donor material from Laguna Madre to restore populations in the Galveston Bay system, because it might introduce maladaptive genes to the region for some conditions that the more southerly populations have not experienced. Travis and Sheridan (2006) using amplified fragment length polymorphism analysis tested the appropriateness of restoration strategies by assessing the genetic structure of natural and restored *Halodule* populations mostly in the Matagorda and Galveston Bay systems, near their northern limit. Key elements in assuring adequate genetic diversity for transplant success appear to be to use material from multiple donor sites and to capture the clonal diversity within sites by distributing the collection of transplant stock within sites.

One task, the economic valuation of seagrass beds (ecosystem services) has been elevated to a strategy (III.2). Data regarding the value of ecosystem services provided by seagrasses is sparse. One widely cited study (Costanza, 1997) gives a figure of approximately \$9000 yr⁻¹ha⁻¹, but this figure is out of date. Bill Dennison quoted a value of ca. \$30,000 yr⁻¹ha⁻¹ at the 2009 meeting, but the data used to derive this figure is unclear and likely to vary according to location, density of coverage, species, or other criteria.

Objective IV: Providing data for management policies.

One of the primary goals of seagrass research is to provide data to managers and policy makers regarding best practices for seagrass conservation. Efforts over the past ten years have resulted in a number of improvements in our ability to detect and classify changes in seagrass bed morphology. For example, Dunton and Schonberg (2002) using a published method for quantifying and classifying the intensity of propeller scarring from high resolution aerial photography documented damage ranging from mostly light to moderate affecting 16% of the seagrass beds sampled in Upper Laguna Madre to mostly moderate to severe affecting 97% of the seagrass beds sampled in the Estes Flats area of Redfish Bay. Martin et al. (2008) in a study confined to Padre Island National Seashore applied the same technique and a more objective GIS approach. Propeller scarring was much lower in Padre Island National Seashore than farther north in Laguna Madre and the sites in Corpus Christi Bay and Redfish Bay analyzed by Dunton and Schonberg (2002). The vector grid cell and buffer approach of Martin et al. (2008) provides a more objective basis for time series analysis and for assessing ecological impacts that certainly extend beyond the edges of scars than the technique used by Dunton and Schonberg (2002). While work by the Texas Parks and Wildlife Department has shown that propeller scars in *Halodule* appear to recover in <3 years, the generation of new scars means that the intensity of scarring may not have improved in many bay systems, and may well have increased.

Information is also coming to light regarding the influence of propeller scars on seagrass bed function. In one study Burfeind and Stunz (2005) were unable to detect a significant effect of propeller scarring on nekton density at any scarring level up to the maximum of ~27% scarring included in the analysis. In another analysis, they found reduced growth rates of white shrimp (*Litopenaeus setiferus*) in areas of severe propeller scarring but no effect on pinfish (*Lagodon rhomboides*) (Burfeind and Stunz, 2007). They concluded that an effect of scarring on growth rate may depend on the mobility of the organism and that while light to moderate scarring may have little effect, severe scarring may reduce the functionality of seagrass habitat. Fellows and Dunton (2005) conducted an experimental assessment of the effects of trampling on *Halodule* meadows in the spring and in the fall at three locations in Padre Island National Seashore. Responses were strongly site and season dependent. At one site the short-term effects were rather small, but recovery over the next year was limited. Conversely, at the second site the short-term effects were large, but recovery over the next year was complete. At the third site the short-term effects were severe, and recovery over the next year was limited; however, there was a complete die-off in one of the controls at this site. Based on Park usage statistics, they concluded that even the low intensity trampling treatment was much higher than current usage and that other factors had a greater impact on seagrass condition than trampling. For example,

pore water ammonium concentration was high enough to be potentially toxic at the site where there was a die-off in the control plot.

Other developments included the use of fluorescence, molecular and acoustics-based technology to examine stress, measure biomass and investigate the relationship between epiphytes and their seagrass hosts. Lamote and Dunton (2006) using experimental reductions of light available to *Thalassia* by screening and macroalgal addition treatments determined that Pulse Amplitude Modulation (PAM) measurements of chlorophyll fluorescence in the field provided a sensitive, non-destructive indication of stress that holds promise in monitoring seagrass condition. Wilson and Dunton (2009) in a laboratory study demonstrated a strong relationship between underwater sound speed and seagrass biomass that might be useful in remote sensing of seagrass meadows; however, *Thalassia*, *Syringodium filiforme*, and *Halodule* differed in their acoustic properties because of their morphology, and the standard equation for relating underwater sound speed to volumetric concentration of the gas phase was not predictive for seagrass biomass. Much more development would be required for laboratory, let alone field, application of sonar to seagrass mapping and biomass estimation.

Epiphytes frequently are the agents of harm to seagrasses under conditions of eutrophication, yet little progress has been made in determining structure and the function of these communities. Currently, a suite of methods are in development to quantify and characterize the community and measure effects on the seagrass host, but results are not yet available (Cammarata et al., 2009). A fluorescence-based digital imaging method was developed to quantify on individual seagrass leaves photosynthetic epiphytes containing phycobilin and fucoxanthin accessory pigments. Bacterial components are being profiled using 16S rDNA and denaturing gradient gel electrophoresis. Stress response genes are being cloned from *Halodule* to develop indicators that identify seagrasses under stress early enough for management intervention to be more likely to avert loss (Dovalina, 2011).

More traditional management-based research saw Kaldy et al. (2004) testing the effectiveness of transplanting *Halodule* to accelerate revegetation and stabilization of recent dredge deposits by monitoring environmental conditions and plant parameters at two dredge disposal areas and two sites away from recent dredging. Although light was marginally sufficient, the transplants failed within six months, apparently because sediment ammonium concentrations were high enough to be toxic to below-ground tissues. Even though neither low light nor high sediment ammonium by itself would cause mortality, the two together apparently did. There was also rapid erosion of the sediments.

Burd and Dunton (2001) developed a model predicting biomass changes in *Halodule* with light as the only forcing function that agreed quite well with observed values over the course of one year but diverged over longer periods. They concluded that treating both above- and belowground components of whole plant biomass and a long-term, high frequency database on light and biomass were critical to the success of the model. They argued further for the value of the simple model as a management tool to explore different scenarios and perhaps identify other influential factors where model predictions and observations diverge.

Kowalski et al (2007) documented the re-discovery of the invasive, tropical green macroalga *Penicillus capitatus* Lamarck in seagrass beds in the Lower Laguna Madre. While its extent along the Texas coast is still unknown, its presence poses a potential problem, as *P. capitatus* can quickly and completely fill in potholes within seagrass beds.

In regards to strategies, group members from the September 2008 scoping meeting felt that Strategy IV.1 (review of existing information on Texas seagrasses and establishment of a data clearing-house) was adequately incorporated into Objectives I (Strategies I and II) and II (Strategy II.3). Strategy IV.1 was thus changed at the June (main meeting) and September (Seagrass Working Group) 2009 meetings to reflect the need to identify/describe the socioeconomic values associated with seagrass habitat.

Strategy IV.2 was changed slightly to reflect the need to continue to support applied studies related to management needs. Particular action items were described in more detail while others were combined where sensible (e.g. “Effects of boating impacts” and “Effects of prop scar damage”). Additional action items were included to address the impact of changes in coastal land use (population growth, urbanization, non-point source pollution, etc.), invasive species, and shading from bridges and piers.

Two additional strategies were identified: IV.3, the need to identify and prioritize areas for management and conservation, and IV.4, the need to apply adaptive management principles to evaluate current management/conservation policies.

SEAGRASS RESEARCH PLAN 2012

Significant changes to Seagrass Conservation Plan for Texas (1999) in **Bold**

OBJECTIVE I: Regularly assess status and trends of seagrass distribution on a coast-wide basis.

Strategy I.1: **Refine and implement** the Seagrass Monitoring Program Strategic Plan (Texas Parks and Wildlife Department, 2003) that shall include seagrass biological parameters as well as sediment and water quality indicators.

Action I.1.1: Designate an entity responsible for overall implementation of the plan.

Action I.1.2: Coordinate efforts among invested state and federal agencies, local government, academic institutions, non-governmental organizations and the private sector to better plan the collection, sharing and archiving of data.

Action I.1.3: Establish and implement a rigorous Quality Assurance/Quality Control protocol for all monitoring and mapping efforts.

Action I.1.4: Extend mapping and monitoring efforts to low coverage areas, especially along central and upper coast (e.g. Matagorda, Christmas, Galveston Bays, etc.)

Strategy I.2: **Develop a data management plan to incorporate data collected under the monitoring plan.**

Action I.2.1: Establish and implement a rigorous Quality Assurance/Quality Control protocol for management of data obtained under the monitoring plan.

Action I.2.2: Ensure all remotely sensed data collection efforts follow Federal Geographic Data Committee guidelines.

Action I.2.3: Integrate historical and current mapping data on cover, composition, productivity, indicators, etc.

Action I.2.4: Archive all mapped data into GIS or equivalent database, such as that maintained by the Texas Natural Resources Information System, according to standard protocols.

OBJECTIVE II: **Continue to** determine causes of changes in seagrass species composition and coverage (acreage), including areal losses and gains **on a regional basis.**

Strategy II.1: **Continue to** conduct process-oriented (basic) research on seagrasses that **serves to identify key indicators for monitoring**, including: physiology, production

ecology, reproduction, **genetic variation**, indicator development, landscape ecology, and demography.

Action II.1.1: Conduct physiological studies: photosynthesis, nutrient acquisition by leaves vs. below ground tissues, stable isotope ratios, carbohydrate concentrations and biochemical stress responses.

Action II.1.2: Conduct studies of reproductive biology **and genetic variation**: flowering, seed production/survival, factors influencing vegetative vs. sexual reproduction, genetic diversity **and gene flow**.

Action II.1.3: Conduct studies on landscape ecology to address relationship between population changes (**seagrass bed morphology, viability and landscape patterns**) and environmental perturbations, including **those related to climate change (changes in sea level, water temperature, salinity, and currents), algal blooms, deposition of drift macroalgae**, physical disturbance (e.g. propeller scarring, dredging) or other large-scale disturbances (e.g. hurricanes, **droughts**) etc.

Action II.1.4: Conduct studies on indicator development that addresses rapid morphological, biomass, density and/or physiological (e.g. C:N:P ratio) changes in plant tissues and associated fauna that readily reflects degradation of seagrass habitat.

Action II.1.5: Apply information from seagrass research **performed worldwide**.

Action II.1.6: Conduct studies on population ecology and assessment of susceptibility of seagrasses to diseases based on exposure to environmental stressors.

Strategy II.2: Conduct process-oriented research on water column and sediment factors that affect seagrasses.

Action II.2.1: **Determine the range** of physico-chemical parameters (e.g. salinity, temperature, etc.) **necessary to sustain seagrass habitat**.

Action II.2.2: **Determine how** changes in light quantity, mass transport and **freshwater inflow** affect seagrass **bed condition and depth limits**. **Assess how these changes are affected by** nutrient loading and stimulation of phytoplankton blooms (e.g. brown tide), epiphytes and drift macroalgae.

Action II.2.3: Assess the biogeochemical environments occupied by below-ground tissues, including:

- pore water composition (NH₄, FeS, DIN, P, H₂S, etc.)
- physical characteristics (grain size, composition, porosity, organic carbon)
- benthic nutrient flux

- microbially mediated processes
- seagrass-sediment pore water interactions as they affect density and distribution of seagrasses.

Strategy II.3: Conduct experimental research on seagrass bed creation and restoration.

Action II.3.1: Compile and evaluate recent (e.g. GIS) and historical information from public agencies (e.g. US Army Corps of Engineers) and private entities on Section 404/10 permits and federal projects to determine effectiveness of permit mitigation techniques.

Action II.3.2: Determine how donor stocks should be chosen to achieve maximum success, **including genetic analyses of donor and restoration site bed material.**

Action II.3.3: Determine rates of natural recruitment and address methods to accelerate recruitment of seagrasses (**e.g. establishment of breakwaters or similar landscape features**).

Action II.3.4: Develop methods for evaluating ecological functioning of restored seagrass beds.

OBJECTIVE III: Identify habitat functions and productivity of seagrass community types and identify linkages with other habitats to support habitat conservation, creation, enhancement and restoration

Strategy III.1: Conduct process-oriented research on **seagrass landscapes** and community ecology of grassbeds

Action III.1.1: Evaluate ecological processes associated with seagrass community structure and function

- **Characterize functional difference of seagrass bed types, including:**
 - **habitat values among species**
 - **infaunal communities**
 - **secondary production and trophic structure**
 - **other primary producers (epiphytes, macroalgae)**
- **Identify factors influencing colonization and species succession, including:**
 - **abiotic factors (e.g. salinity, temperature, sediment properties, hydrology, etc.)**
 - **biotic factors (e.g. mesograzers, benthic fauna)**
 - **sediment biogeochemical processes**

- **genetic factors (e.g. diversity within founding population)**
- **Evaluate influence of landscape morphology on:**
 - **size of seagrass habitat patches in relation to secondary production**
 - **seagrass bed function**
 - **genetic diversity and population differentiation**

Action III.1.2 Evaluate Importance of linkages among seagrass habitats, and between seagrasses and other habitats (marsh grasses, oyster reefs, wind tidal flats, etc.) with respect to community composition, connectivity and productivity.

- **relation to other systems (e.g. Mexican Laguna)**
- **seagrass beds as sinks and sources of carbon, nitrogen or other nutrients**

Strategy III.2: Establish level of ecosystem services provided by seagrass habitats

Action III.2.1 Identify and inventory ecosystem services of seagrass in a GIS database, including:

- **pollution assimilation**
- **sediment stabilization**
- **nutrient cycling**

Action III.2.2 Calculate region-specific values for seagrass associated ecosystem services.

OBJECTIVE IV. Provide data for development of management policies in response to human induced impacts.

Strategy IV.1: Identify socioeconomic values of seagrass habitats.

Strategy IV.2: **Continue to support** applied studies to provide science-based answers to specific management questions.

1. effects of boating **and other recreational** impacts (e.g. **propeller scarring**, trawling, sailboats, jet skis, motor boats)
2. effects of municipal, industrial **and aquaculture** discharges on seagrass beds
3. **effects of changes of coastal and inland land use (e.g. development, non-point source pollution, user impacts)**
4. effects of oil, gas and mineral exploration and development
5. global climate change: increases in mean sea level, **water temperature and possible changes in current patterns.**

6. **direct and indirect effects of dredging (e.g. bed burial, light attenuation)**
7. development and verification of seagrass models **related to secondary impacts of shading from bridges and piers.**
8. **impact of invasive species and range expansion of native species.**
9. development of watershed management plans.
10. potential for natural recovery to facilitate restoration of damaged seagrass beds.

Strategy IV.3: Identify and prioritize areas for management and conservation.

Strategy IV.4: Apply adaptive management principles to evaluate policies.

Future Considerations

A great deal of progress in seagrass-related research has been made since the Seagrass Conservation Plan for Texas was first published in 1999. The establishment of an aquatic State Scientific Area, creation of a detailed seagrass monitoring plan, innovation in the application of remote sensing methodology, increased understanding of the role nutrients, toxins, physical disturbance and light levels have on plant growth and development, how currents can contribute to the establishments of new populations, and the measurement and mapping of population genetic variation represent a few of these achievements. More recent work shows a promising role for fluorescence, acoustic and molecular-based technologies for the estimation of biomass in the field and early detection of seagrass stress responses.

Much work still remains to be done. We need a better understanding of seagrass biology, reproduction and genetics if we are to predict how they will respond to environmental change, both natural and anthropogenic. We need to increase our knowledge of how environmental perturbations (nutrient loading, sea level, water temperature) will affect seagrass bed morphology and viability. We need to identify, inventory and calculate the value of the many ecosystem services seagrasses provide, free of charge, to the people of Texas.

Perhaps most immediately, there is a need to implement a monitoring plan to detect short- and long-term trends in the status of Texas seagrasses. This was the consensus of the attendees at both the 2008 scoping meeting as well as the 2009 Workshop. Such a plan has been developed, and includes a combination of remote sensing, field and laboratory based techniques. However, a long-term source of funding remains to be identified, as well as a lead entity responsible for overall management of the plan. **These are issues that urgently need to be decided in the near future.** The value of seagrass ecosystems is well-established. We take a significant risk in not having a concrete monitoring plan to ensure their conservation.

Chapter 2
Seagrass Management

CHAPTER 2. MANAGEMENT

Paul Carangelo, Port of Corpus Christi Authority Beau Hardegree, U S Fish and Wildlife

Twenty-six individuals representing one academic institution, one regional, five state, and four federal agencies, one non-governmental organization, and three private companies participated in the management breakout sessions of the Texas Seagrass Conservation Plan Review Workshop. Participants reviewed the Seagrass Management issues as they appeared in the Seagrass Conservation Plan for Texas (1999), Chapter 3, “Management Issues for Texas”, p. 57-59, and as revised at the Management scoping meeting in July 2008. The breakout group reviewed the four priority problems, along with associated objectives and supporting strategies.

In contrast to deliberations on the Research and Education and Outreach Plans where agreement approached consensus on needs and approaches, much greater divergence of opinion was evident in consideration of the Management Plan, where regulatory, private, governance and development interests are necessarily represented and often are at odds. Consequently, the breakout review process resulted in finding areas of tolerable middle ground wherein issues were identified and ascended into the 1999 plan apparently as modest revisions or additions. Superficially, it could appear there was no call to make major changes to the Plan. However, that would be an incorrect assessment. During the plan review process several cogent suggestions, several new ideas, a few unrealized 1999 Plan opportunities, and several controversial issues were brought into the 2009 review. Some “New” and some “Controversial” issues potentially have status as new “Priority Problems” (e.g. Relative Sea Level Rise), but at a minimum they represent the future of seagrass conservation management in Texas. Accordingly, the management review concluded that the scope of influence and relevance of these issues to seagrass conservation planning in Texas requires significant revision to the management plan. Plan modifications are necessary in order to place more emphasis on specific outcomes and structure the path forward to address these “New” and “Controversial” issues as well as previously identified management needs. The following sections identify and describe these issues. Additional information is provided in Appendix B.

What are the New Issues

- Sea Level Rise - Climate Change
- Regional Spatial Planning – Ecosystem Services Provisioning
- Additional State Scientific Areas (SSAs) or Protected Areas
- Mitigation Rules – Role of.
- Dedicated Funding for Seagrass Conservation Programs

Controversial Issues

In the context of the management plan review process, a controversial issue is one where dissimilar and/or opposing views were expressed. Also, in the context of plan review, “What’s New” may also be controversial. Regardless of the range of opinion on such issues, the issues are found to be both substantive and needing resolution.

- Lack of Regulatory Coordination
- Water Quality – 401; 402; Use Designation; Standards; Screening; Criteria; Implementation
- Mitigation – Policy; Sequence; Alternatives; Siting; Guidelines; Success Measurement; USACE Tracking
- Research – Direction of: Applied vs. Pure; Interpretation; Utility to Mgt; Causality
- Statewide Monitoring Plan - Scope; Scale; Focus; Need; Criteria/Key Parameters; Applicability (to Programs)
- Resource/Regulatory Policy - Regulatory Process Based; Ecosystem Services/Habitat Needs Based
- Knowledge Base (of Regulators and Regulated)
- Seagrass Management Institutional Structure – Relationship between Management and Research and Education and Outreach and the Seagrass Monitoring Workgroup.
- Role of Seagrass Monitoring Workgroup and Expanded Membership to Workgroup

The new issues have been more fully discussed in Chapter 4 “Implementation of Seagrass Plan Objectives”. Many of the controversial issues have not been explored but a few have been incorporated into the Short and Long-Term strategies for implementation.

REVISIONS TO 1999 PLAN, SUMMARY OF ACCOMPLISHMENTS AND 2009 REVIEW OUTCOMES

The following summary describes significant changes to the language of the 1999 Plan Priority Problem, Objective or Strategy statements, and what is “new”. However, it will be necessary to consult the appendices to sample the range of opinion and discourse that formed the basis of the 2009 changes and additions to the 1999 plan. These new issues and changes represent a significant revision to the management section of the plan. In addition to the appendices that apply specifically to the Management Chapter, the co-chairmen compiled all comments submitted on the Comment Forms distributed at the Workshop and classified them according to the topical areas that they addressed. These are also provided as Appendix E.

Priority Problem I. Seagrass beds are being lost or degraded, and/or species composition is changing.

Although no text changes were suggested for Priority Problem I and it remains an issue of the highest concern, increased emphasis on understanding the causes of seagrass condition or species change was called for. This information is needed to distinguish between naturally occurring and human-caused changes. Relating changes in seagrasses to natural or human causes has important ramifications for management, for example, naturally occurring changes may inadvertently result in an unneeded regulatory burden or unwarranted management decisions if the original cause is not fully understood. Also relating to the topic of change in species composition, it is important to determine if there are significant fisheries dependent differences between different seagrass species or if they are functionally equivalent. Regardless of cause of change this information is necessary in deciding whether to set resource management objectives based on the characteristics of a particular species (such as its longer recovery time, or a perceived intrinsic value, or uniqueness in geographic range) or because of different functional attributes (such as possible reduction in nursery function as *Syringodium* replaces *Halodule* in Upper Laguna Madre.).

The statement of Objective I.1 on ensuring water and sediment quality remains unchanged from the 1999 Plan; however, the first strategy about incorporating seagrass into the Texas Surface Water Quality Standards has been accomplished and has been deleted. The need to develop appropriate water quality criteria continues as Strategy I.1.1. The challenge is how to focus research and monitoring to determine the causal relationship between point or non-point discharges on seagrass condition and if so determined, to integrate the effects of these discharges at the spatial scale relevant to sustaining seagrass populations. This set of concerns is reflected in new Strategy I.1.2, aimed specifically at the bay sub-segment level where seagrass are known to occur. Please see Appendix B, the Draft Executive Summary for the Management Chapter, p. 7-9, for a much fuller discussion of this topic. The Strategy on Best Management Practices of the 1999 Plan remains relevant but has been moved to Objective 1.4.

Objective I.2 and Strategy I.2.1 remained unchanged in 2009; however, there remains a need to integrate compensation measures into the objectives and strategies under I.3.

Three new Strategies were added to Objective I.3 on seagrass restoration to provide better guidance about implementation on a bay by bay basis. Strategy I.3.2 proposes an ecosystem services needs assessment to identify what types of habitat projects not exclusive to seagrass are of most interest. Strategy I.3.3 calls for acreage targets. Strategy I.3.4 revisits an unrealized opportunity presented in the 1999 Plan and recommends an approach for identifying landscape-scale habitat construction, restoration or conservation sites or projects where resources should be pooled and activities sequenced to achieve regional goals.

The scope of Objective I.4 has been broadened to include all coastal development projects. Strategy I.4.1 on Best Management Practices has been expanded to include development of a guidebook of BMPs of proven effectiveness and feasibility.

Priority Problem II: Lack of coordination, conflicting policies, and difficulties in resolving conflicting policies may prevent adequate management.

The only major accomplishments on this Priority Problem have been consensus agreements for the 2003 Corpus Christi Ship Channel – Channel Improvement Project and the 2005 Laguna Madre 216 Study. Nevertheless, workshop participants agreed on the continuing relevance of the Priority Problem and the Strategies to address it. Consequently, the Priority Problem statement has been rewritten to capture the recognition that difficulties remain in resolving conflicting policy, two objectives consolidated, two of the existing Strategies revised slightly and one deleted, and two new Strategies added in the hope of providing a clearer path forward.

Strategy II.1.1 has been amended to acknowledge the accomplishments of the 2003 Corpus Christi Ship Channel – Channel Improvement Project and the 2005 Laguna Madre 216 Study to demonstrate the range of consensus agreements. For Strategy II.1.2, initially it was considered that compilations of agency policy might best be performed by an outside contractor. After further consideration, the chapter authors decided that each agency was in the best position to be knowledgeable about the information called for in the Strategy and to collate it, which then can be independently evaluated. The information may reveal opportunities, as one example, to pool and sequence compensatory mitigation and grant funds for projects and activities that secure habitat conservation or creation projects of regional interest. Strategy II.1.3 on developing databases on seagrass loss/damage and mitigation redirects the parent Strategy of the 1999 Plan to further the need for region-specific assessment and acknowledges that agency collaboration is called for. Strategy II.1.4 is new and recommends Texas Parks and Wildlife Department's seagrass webpage as a seagrass document clearinghouse for the State. Strategy II.1.5 is also new and suggests an additional role for the Seagrass Monitoring Working Group in coordinating agency policy and addressing conflicts, respectively. This would be a substantial change to the SMWG's current role of assisting in the development of a State-wide seagrass monitoring plan and serving as a forum where seagrass conservation and research is discussed. This new strategy is flagged as controversial and would require substantial change in the Group's mission and membership. The Strategy of the 1999 Plan calling for review of mitigation policies has been deleted from this Priority Problem because it is already identified under Strategy I.2.1. Mitigation policy and implementation is flagged a significant and controversial issue.

Priority Problem III. Data synthesis and monitoring are insufficient for management decisions and need to be focused on management needs.

The Objective statement and the two Strategies have been brought forward from the 1999 Plan unchanged. However, considerable divergence of opinion on this issue was evident

during plan review, particularly on the ongoing research/monitoring and its utility to management. Please see Appendix B, the Draft Executive Summary for the Management Chapter. Nonetheless, some progress has been made on Strategy III.1.1, establishing a data clearinghouse for seagrass-related information. The Gulf of Mexico Alliance has set up its Regional Ecosystem Data Management system that could provide the link between users and databases relevant to the management of Texas seagrasses regardless of where they might be housed. The Texas Natural Resources Information System could house TPWD data, aerial photography, and remote sensing data. Numerous ongoing research activities address seagrass management needs, as called for in Strategy III.1.2; however, information provisioning would undoubtedly benefit if each agency identified and prioritized its research interests and if a standardized coast-wide monitoring protocol could be established and kept up to date for research purposes by all agencies. This last concern prompted adoption of a new Strategy, Strategy III.1.3, calling for establishment of a 10-year cycle for updating seagrass status and trends determinations using a standardized monitoring protocol. Recently the Seagrass Monitoring Workgroup reviewed a tiered monitoring approach for a statewide seagrass monitoring program. This tiered approach is currently in an evaluation phase. Once this evaluation is complete the Seagrass Monitoring Workgroup will be in a better position to recommend a Statewide monitoring program. Going forward, timely entry of monitoring data and research findings into the data management system is needed.

Priority Problem IV: Public Outreach is too limited to achieve the goal of public awareness.

The Priority Problem and Objective statements of the 1999 Plan are still deemed relevant and have been brought forward unchanged into the 2012 Plan. However, the three accompanying Strategies about writing information at an appropriate level for the public sector, listening to stakeholders, and strengthening agency commitment to outreach programs were judged to be under the purview of the Education and Outreach Panel and were deleted from the Seagrass Management Issues Plan. In their place a single new Strategy, Strategy IV.1.1, was adopted, urging better coordination between those responsible for management programs and individuals conducting outreach. Presumably, closer liaison between Education and Outreach and Management should foster the desired “sense of community stewardship and individual responsibility for the conservation of seagrass” (Objective IV.1) that will build a constituency for projects and management programs.

2012 CHANGES TO 1999 SEAGRASS MANAGEMENT ISSUES TEXT

Significant text changes to the Priority Goals, Problems, Objectives and Strategies presented in the Seagrass Conservation Plan for Texas (1999) are in **Bold**. However, the 2009 - 2012 review process concluded that even though only modest change to the elements presented in the 1999 plan were brought forward (see following), significant revision to the management plan is needed to structure the path to address the several new and the controversial issues that represent the future of seagrass conservation

management in Texas. These new and controversial issues are discussed in Chapter 4. Implementation of Seagrass Plan Objectives.

PRIORITY GOAL: To develop a sound management process that coordinates agency policies, public concern, and existing knowledge from research, to achieve effective seagrass conservation.

PRIORITY PROBLEM I: Seagrass beds are being lost or degraded, and/ or species composition is changing.

Objective I.1: Ensure water and sediment quality beneficial to the seagrass community

Strategy I.1.1: Designate water quality criteria for seagrass in Texas Water Quality Standards.

Strategy I.1.2: Define the range of environmental conditions that provide for seagrass propagation within the identified bay sub-segments and propose load limits and associated water quality criteria within the Texas State Water Quality Standards that protect the conditions.

Objective I.2: Protect seagrass through effective application of the mitigation sequence: avoidance, minimization, compensation

Strategy I.2.1: Develop consistent and effective mitigation policies

Objective I.3: Restore/enhance/create functions and values of seagrass at a watershed/system-wide level, where feasible

Strategy I.3.1: Develop guidelines for site selection, planting methods, and monitoring of seagrass restoration, enhancement and/or creation projects.

Strategy I.3.2: Conduct bay by bay ecosystem services needs assessment for seagrass and other use habitats.

Strategy I.3.3: Develop bay by bay seagrass cover acreage targets to be achieved or maintained by protection, restoration, enhancement, or creation/construction.

Strategy I.3.4: Identify landscape scale seagrass habitat preservation/protection, maintenance, restoration, enhancement and/or creation project site locations for each bay.

Objective I.4: Design **coastal** development projects to effectively reduce impacts upon seagrass.

Strategy I.4.1: Best management practices are needed to protect seagrass while allowing for economic development of coastal resources. **Develop a guidebook on BMPs that have been verified for effectiveness and feasibility.**

PRIORITY PROBLEM II: Lack of agency coordination, **conflicting** policies, or **difficulties in resolving conflicting policies** may prevent adequate management.

Objective II.1: Reduce conflicts between policies of different agencies and improve agency coordination.

Strategy II.1.1: Model consensus agreements or plans after examples such as the 1994 Beneficial Uses Group for the Houston Ship Channel deep-draft navigation project, **the 2005 Laguna Madre 216 Study, or the 2003 Corpus Christi Ship Channel- Channel Improvement Project.**

Strategy II.1.2: Produce a concise summary of written and unwritten **State and Federal** agency policies **concerning seagrass**, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories **for subsequent independent review.**

Strategy II.1.3: Agencies should collaborate and develop an updated data base on seagrass loss/damage **to track regional changes in seagrass distribution/abundance**, the amount of compensatory mitigation performed, and the mitigation success rates in order to measure policy effectiveness.

Strategy II.1.4: Use TPWD's seagrass web page to include links to other agency information and become the seagrass document clearinghouse for the State.

Strategy II.1.5: Redefining the role of the Seagrass Monitoring Workgroup (SMWG) to include assisting with coordinating agency policy and addressing agency conflicts related to seagrass management. ***WARNING NEW Strategy II.1.5 is Controversial and would require substantial changes to the SMWGs mission and membership.***

PRIORITY PROBLEM III: Data synthesis and monitoring are insufficient for management decisions and need to be focused on management needs.

Objective III.1: Conduct research and seagrass resources data acquisition and analysis that provide a sound technical basis for management actions.

- Strategy III.1.1: Establish a data clearinghouse for seagrass-related information.
- Strategy III.1.2: Focus research on seagrass management needs for Texas estuarine systems, including such issues as seagrass status and trends, water quality criteria, adequate mitigation ratios, and best mitigation practices.
- Strategy III.1.3: Establish a 10-year cycle for updating seagrass distribution maps, and status and trends using a standardized coast wide monitoring protocol.**

PRIORITY PROBLEM IV: Public Outreach is too limited to achieve the goal of public awareness.

Objective 1: Develop a sense of community stewardship and individual responsibility for the conservation of seagrass.

- Strategy IV.1.1: Establish better coordination between management and individuals conducting seagrass educational outreach.**

FUTURE CONSIDERATIONS

The 2012 management review reaffirmed that all priority problems identified in the 1999 plan were still relevant today. The review also identified several new issues that represent future challenges for seagrass conservation management in Texas. Five fundamental topics for seagrass management were agreed upon as primary focus areas in the near future.

1. Management of seagrass resources will require that we plan for, and adapt to a changing climate and rising sea-level. A very brief mention in the 1999 plan now appears as a dominant issue that presents significant challenges for all aspects of seagrass management. *Sea Level Rise (SLR) has been and will continue to be a significant driver of change of the quantity and distribution of seagrass.*

2. Moving forward, seagrass management should be implemented in the context of Regional Spatial Management Planning (RSMP) i.e., ecosystem services (ES) informed management. Regional Spatial Management Planning (landscape scale) should provide several benefits to management of coastal resources as well as the administration of regulatory programs.

3. It is likely that future seagrass conservation will require designation of additional State Scientific Areas (SSA) or similar, Resource Management Areas (RMA). SSAs, Coastal Preserves and RMAs have potential for managing seagrass resources by accommodating and reducing user conflicts. Resource Management Areas may provide long-term spatial protection of specific areas with concentrations of high value seagrass

resources that otherwise cannot be achieved by project-by-project regulatory permitting programs.

4. An additional tool for seagrass management may be in the use of Mitigation Banks or analogous planning agreements. The possible application of the March 2008 USACE-EPA Mitigation Rule in the context of regional habitat needs has not been explored for facilitating management and financing of seagrass (and other coastal natural resources) projects.

5. Effective management of seagrass resources and Texas seagrass conservation programs will require funding from a variety of sources. Dedicated funding for programs such as state wide monitoring is needed. This dedicated funding could come in the form of State budget line item support to TPWD or other state natural resource agencies.

Resolution of these topics by the approaches discussed here would represent a fundamental change to how seagrass and other coastal habitat conservation and management are implemented in Texas.

Chapter 3
Seagrass Education and Outreach

CHAPTER 3. EDUCATION AND OUTREACH

Jace Tunnell, Coastal Bend Bays & Estuaries Program Karen Meador, Texas Parks and Wildlife Department

Thirteen individuals representing two academic institutions, one federal and two state agencies, and three nongovernmental organizations participated in the education and outreach breakout sessions of the Texas Seagrass Conservation Plan Review Workshop. They reviewed the Seagrass Education Plan as it appeared in the Seagrass Conservation Plan for Texas (1999), Chapter 4, “Environmental Awareness Through Education and Public Outreach”, p. 68-69, and as revised at the Education and Outreach scoping meeting in July 2008. The group reviewed the two major objectives, along with supporting strategies and action items. Modifications were made that reflect progress made in specific areas, changing priorities in regard to new information, and emerging issues that have arisen over the last decade. Please see Table 1.1 for a compilation of accomplishments in education and public outreach about seagrasses for Texas since 1999 by TPWD. Other accomplishments by various groups are integrated within this chapter.

Objective I: To educate the public on the status, values, ecology and conservation of seagrasses in Texas. Out of the three Strategies and 14 Actions under this objective in the 1999 Seagrass Education Plan that in general focus on educational programs, brochures, and using technology for getting information out about seagrasses, nine Actions were found to be accomplished and continue to be successful. Some of the highlighted accomplishments have been the creation of numerous printed materials about seagrass importance over the past 10 years and their distribution to various educational programs and Chambers of Commerce. Press releases via the newspaper, radio, and websites (Figure 4.1) have all proven to be effective as well as the creation of a website by The Nature Conservancy specifically geared toward seagrass education: www.saveourseagrass.org. Texas Parks and Wildlife Department created a DVD about seagrasses which has been used to reach adults in its Boaters Education Program. Also, an attempt has been made to distribute materials to formal educational groups.

Most of the changes in wording between the 1999 and 2012 versions of the Seagrass Education Plan are an acknowledgment of accomplishments that now must be continued. Accordingly, “Continue” now begins the statement of two Strategies and five Actions, and another Action begins with “Maintain”.

Strategy I.1 addresses ways to deliver messages about seagrass conservation to targeted audiences. Three out of four of the Actions have been accomplished; however, two were judged to benefit from expanded effort. Action I.1.1 was modified to call for translation of printed educational materials into Spanish, and the geographic coverage of Action I.1.2 was expanded to target programs and communities in some inland areas. The Action not completed concerned development of materials to be incorporated into the AquaSmart program for children. This has been brought forward as Action I.1.3 in combination with the adult Boaters Education Program to target a broader range of bay user groups.

Table 1.1. TPWD accomplishments in seagrass education and outreach efforts over the past decade (2000 to 2010).

Event/Media Type	Totals	Venues
Presentations	67	Guide's Associations, Conservation Groups, Fishing Tournaments, Rotary and Lion's Club Members, Outdoor Writers, EXPO, Bass Pro Shop, Orvis, Local Resource Agency Staff and Researchers, Local City Council Members, Justice of the Peace Officials
Pre-launch Brochure Dispersal	50 Days	Handed Out to Boaters Launching at Ramps Surrounding RBSSA
Boater Education Courses	40 Cities	Fort Worth, Harlingen, Lewisville, Ft Worth / Grand Prairie, Odessa, San Angelo, Houston, Victoria, Sherman, Tyler, Plano, Corpus Christi, Beaumont, San Antonio areas
General Brochure Dispersal	49,000	Boat Shows, Fishing Tournaments, Outfitter Shops, Bait Stands, Local Chambers of Commerce
One-on-one personal contact	10,835	All the various events attended by TPWD
Magazine	22 Articles	Gulf Coast Connections, Texas Parks and Wildlife Magazine, Texas Fish and Game, Texas Outdoors Journal, Redfish Nation, Shallow Water Angler, etc.
Newspaper / Newsletter	36 Articles	Saltwater Texas, Corpus Christi Caller Times, Austin American-Statesman, San Antonio Express-News, etc.
Radio	4 Programs	NPR, Brian Hughes Morning Show, Passport to Texas
TV	8 Programs	PBS, Public Service Announcements On Coastal Bend News Channels and Univision, San Antonio channel
TPWD Website	>10,000 Hits	Regulation, Seagrass information, Maps and Web - http://www.tpwd.state.tx.us/seagrass
Total Media Impressions	10.6 Million	All the various media outlets, including TV and websites



Figure 4.1. Various media materials for educating the public about the importance of Texas seagrasses. Images courtesy of TPWD.

Strategy I.2 outlines ways to inform the general public by using various media types such as press releases, radio announcements, media events, educational videos, and websites. Except for the websites, these activities are ongoing and opportunistic, depending on project completions, time of year, funding availability. The websites are maintained continuously, one by The Nature Conservancy dedicated specifically to seagrasses and one by Texas Parks and Wildlife Department, hosting a webpage with links to the Seagrass Conservation Plan for Texas, Seagrass Monitoring Plan, and information about the Seagrass Monitoring Workgroup. Two other Actions under this strategy in the 1999 Seagrass Education Plan have been modified to have more realistic goals, such as eliminating inserts with voter registrations and adding information in with hunting and fishing license brochures.

Strategy I.3 treats formal education. Only one of the three Actions for this strategy in the 1999 Plan has been achieved to date, the creation of supplemental materials for K-12 curricula. The inclusion of seagrass coverage on Channel One and training seagrass conservation experts to deliver grade appropriate lessons was never accomplished. In order to make better progress on this Strategy, the three Actions have been reworked with new approaches that focus on targeted groups and a curriculum based educational guide for each.

Both the 2008 meeting (see Appendix A) and the 2009 workshop (see Appendix D) highly recommended that educational materials be developed about climate change and

the possible impacts to seagrasses, including sea level rise, invasive species, increased water temperature, extreme weather events, and eutrophication issues. Although not explicitly included in the revised Plan, all new and revisions of existing educational materials should address possible impacts of climate change.

Objective II: To convince the public to take action to conserve and restore Texas seagrasses. Similar to Objective I, there are three strategies under this objective, with 15 Actions addressing issues from initiating demonstration programs to supporting responsible behavior and providing seagrass restoration opportunities. Out of the 15 action items, eight were found to be accomplished. A number of the highlighted accomplishments have been the distribution of informational brochures about seagrasses at boat shows and other boating/fishing events, inclusion of seagrass impacts into permit applications and reviews, deployment of educational signs and seagrass bed markers around heavily used areas, and the establishment of a State Scientific Area along the Texas coast: Redfish Bay (Figure 4.2).

Strategy II.1 for the most part is being accomplished through the work of several different agencies/organizations; presenting information at boat/fishing shows, and also reviewing and commenting on permit applications about the importance of seagrass. The establishment of a TPWD/GLO/Sea Grant/NMFS seagrass restoration extension program was never accomplished but could still prove to be an important initiative. The agencies involved should consider discussing ways of setting up the partnerships necessary for a successful seagrass extension program that deals with educating the bay users on the importance of the resource.

Strategy II.2 focused on two important issues. The first involved informing the public about the where, how, and why of seagrass conservation with respect to boating by posting educational signs at boat ramps, adding signage to mark seagrass areas, developing maps with designated seagrass habitats, and utilizing before and after aerial images of prop scar areas to show people the importance of not damaging seagrass. TPWD and the TNC have taken the lead on adding signs at boat ramps that provide information about seagrasses and posting heavily used channels with signs that mark where boaters should stay in order to avoid damaging seagrasses. A couple of maps are available that show fishing spots and areas where seagrasses are located. The second issue dealt with the efficacy of “no wake” zones. Both the 2008 meeting and the 2009 workshop agreed that designating “no wake” zones for seagrass areas either was not feasible or that wakes caused little damage in most areas. Instead, efforts should be focused on different areas of educating the public. Dr. Bill Dennison discussed the idea of making seagrass education a celebration rather than telling boaters what they can and can't do. The idea is that keeping things positive will motivate people to do their part in protecting the resource, rather than creating rules that might have a negative impact on the boating community that might be associated back to seagrasses. Consequently, the Action of designating “no wake” zones in the 1999 Seagrass Education Plan has been removed from the 2012 Plan.

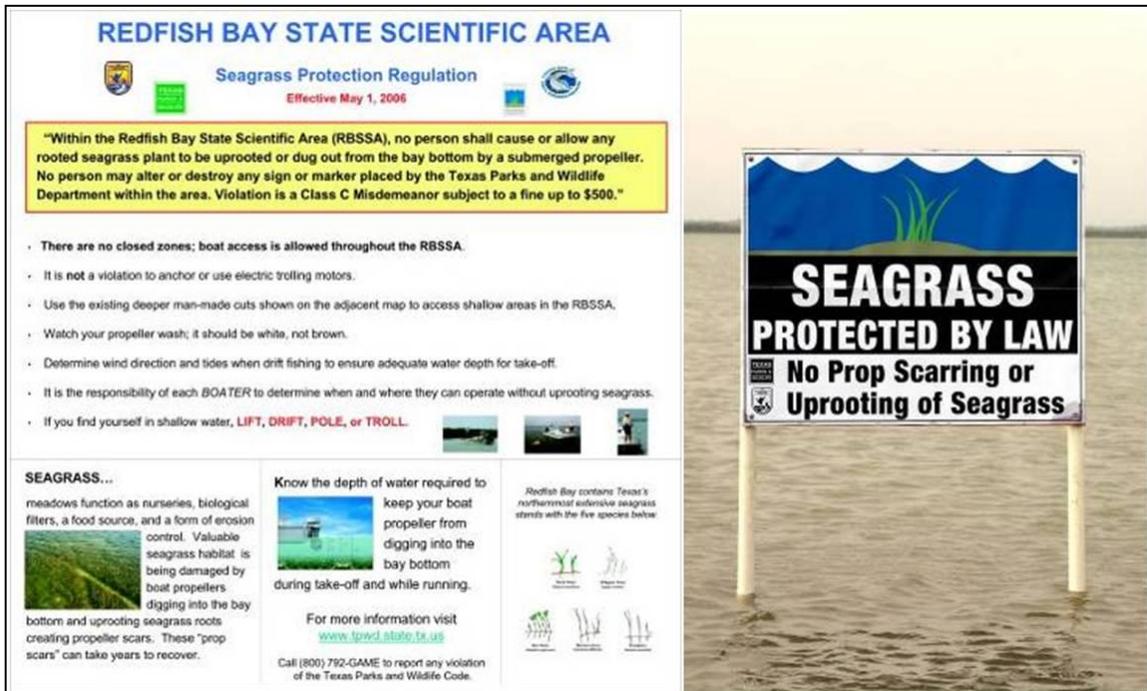


Figure 4.2. Signage located within the Redfish Bay State Scientific Area. Pictures courtesy of TPWD.

Strategy II.3 was developed to provide opportunities for people that wanted to be involved in seagrass conservation and restoration activities. The 2008 and 2009 groups felt that teaching the community about and developing a sense of stewardship toward seagrasses are critical elements of effective conservation but that actual plantings should be left to professionals, since specific techniques are required for planting a successful restoration project. Consequently, the groups suggested merging Actions 2 through 5 of the 1999 Seagrass Education Plan in order to create a realistic and achievable goal for conservation education by getting volunteers involved in all aspects of seagrass projects except actual planting. Giving the public a greater stake in conservation activities might result in greater advocacy for them.

SEAGRASS EDUCATION PLAN 2012

Significant changes to Seagrass Conservation Plan for Texas (1999) in **Bold**

OBJECTIVE I: To educate the public on the status, values, ecology and conservation of seagrasses in Texas.

Strategy I.1: **Continue** to develop and deliver messages for targeted audiences.

Action I.1.1: **Expand current** printed educational material **to include entire Texas coast and** provide copies **in Spanish.**

Action I.1.2: **Continue** to provide handouts to Chambers of Commerce **along the Texas coastline and into some inland areas.**

Action I.1.3: Provide a supplement to the AquaSmart education program **and the adult Boaters Education Program which consists of brochures and a class curriculum.**

Action I.1.4: **Continue to distribute existing materials and develop a new package of educational materials on seagrasses to distribute to** informal education groups e.g., Girl Scouts, Boy Scouts, 4-H.

Strategy I.2: **Continue** developing and delivering messages for the general public through various media.

Action I.2.1: Continue to provide press releases and public information messages on seagrass conservation activities, research, and education. (Combined original 1 & 2)

Action I.2.2: **Continue to** hold media events associated with seagrass conservation activities.

Action I.2.3: **Improve links within seagrass websites (videos, downloadable reports, etc) and utilize tracking tools to target public interest.**

Action I.2.4: Distribute informational inserts **(in English and Spanish)** to be included with utility bills, hurricane preparedness guides, **hunting and fishing license brochures, etc.**

Action I.2.5: Maintain current seagrass audio recordings on TPWD Passport to Texas webpage.

Action I.2.6: Continue to provide “Boating in Seagrass” DVD to boating public and develop educational video for K-12 audience.

Strategy I.3: Develop and deliver messages for formal education.

Action I.3.1: Continue to include seagrass educational material in TPWD Coastal Trunks, CBBEP school packages, and TNC science curriculum.

Action I.3.2: **Collaborate with television show Channel One to get seagrass educational material included on their programs and website (<http://www.channelone.com>).**

Action I.3.3: **Host workshops to provide seagrass conservation experts with materials for and training at grade-appropriate levels.**

OBJECTIVE 2: To convince the public to take action to conserve and restore Texas seagrasses.

Strategy II.1: Develop skills through demonstration programs and projects.

Action II.1.1: Provide shallow water boating demonstration **video displays at boat shows and other boating/fishing events.**

Action II.1.2: Deliver boater education seminars on seagrass protection skills at boat and fishing shows; **include visual learning tools such as aerial photography of undamaged vs. prop-scarred seagrass beds.**

Action II.1.3: **Continue to** provide detailed information on seagrass protection methods in Corps of Engineers permit applications.

Action II.1.4: Provide seagrass conservation **updates and education** to personnel who review and process applications.

Action II.1.5: **Develop a** TPWD/GLO/Sea Grant/NMFS seagrass restoration **education** program.

Strategy II.2: Provide supplemental material and aids which support responsible behavior.

Action II.2.1: Put up boat ramp signs **regarding the location of seagrass and their** protection.

Action II.2.2: **Maintain existing markers and signage in** seagrass areas **and expand to entire coast and create mechanism for long-term finance strategy.**

Action II.2.3: Designate seagrass habitats on **boating/fishing** maps as areas to **use extreme caution and distribute maps to bay users.**

Strategy II.3: Provide opportunities for conserving and restoring seagrasses.

Action II.3.1: **Maintain** seagrass conservation project **in the Redfish Bay State Scientific Area and duplicate efforts in other appropriate areas such as Christmas Bay and South Bay.**

Action II.3.2: **Promote community involvement in planning, funding, creating, educating, and implementing seagrass conservation projects.**
(Combined 2 thru 5)

FUTURE CONSIDERATIONS

One of the objectives of the Education and Outreach Committee was to highlight the accomplishments that have taken place over the past decade and to give credit to those entities that have had a positive impact on how the public views the valuable resource of seagrass. The other objective of this process was to identify key issues and successful programs that should influence future seagrass education and outreach work in Texas.

Through this review process there are several key issues that were identified, including the need to expand education and outreach beyond the current areas, moving inland since a large percentage of bay users live away from the coast. Also, seagrass educational materials need to be distributed to smaller coastal communities outside of Nueces, San Patricio, and Aransas counties where the majority of work is currently being conducted. Another important priority for future activities needs to be keep up with internet technology, by enhancing websites with educational videos, downloadable seagrass project reports, and update links on existing Texas seagrass websites to other seagrass information pages. Climate change was discussed in every meeting and the idea of creating ways to educate the public on possible changes it may have on seagrasses, including: sea level rise, invasive species, extreme weather events, water chemistry changes, and increases in water temperatures. The reaching out to and education of local governments and NGO's about the importance of seagrasses and how that can be incorporated into planning and development was marked as being a priority concern. Another significant idea for reaching a broader audience and more bay users was to convert existing seagrass educational materials into Spanish in order to reach that segment of bay users. Lastly, a great deal of educational material exists within technical reports on seagrasses so the concept of working on translating these reports into easy to understand documents for the general public was conceived to try and get timely scientific information out in layman's terms. All of these key issues were incorporated into the education and outreach chapter objectives and strategies as a way to add to the already successful programs being conducted by various groups. In terms of future activities, all of these concepts have been incorporated into the *Seagrass Education Plan 2012* strategies so that they may be integrated in with the already successful seagrass programs being conducted by the various groups involved with this important resource.

Chapter 4

Integration and Implementation of Updated Seagrass Plan Issues

CHAPTER 4. INTEGRATION AND IMPLEMENTATION OF UPDATED SEAGRASS PLAN ISSUES

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CHAPTER OVERVIEWS

This Seagrass Conservation Plan review process has identified a number of both long-standing, and also recently emerging issues (synonymous with Plan objectives), which will continue to require effort and careful integration in order to successfully advance seagrass conservation in Texas. The chapter review leads have compiled summaries of these key outstanding issues for their respective review chapters. This material is presented below in a format that provides a logical basis to prioritize and integrate strategies and actions for effective implementation. In the following sections for each chapter, these common issues are identified in bolded italics to indicate where potential overlap between issues and strategies may exist. During implementation, common solutions could then be anticipated and developed.

I. Research Chapter Issues

Seagrass-related research has made great progress since the Seagrass Conservation Plan for Texas was first published in 1999, represented by achievements such as: *the 2000 establishment of an aquatic State Scientific Area in Redfish Bay; development of a detailed Strategic Seagrass Monitoring Plan (2003) and Implementation Plan (2010)*; innovation in the application of remote sensing methodology for analysis of seagrass landscapes; increased understanding of the role that nutrients, toxins, physical disturbance and light levels have on plant growth and development; better understanding of how water currents can contribute to the establishments of new populations; and the measurement and mapping of population genetic variations. More recent work shows a promising role for fluorescence, acoustic and molecular-based technologies for the estimation of biomass in the field and early detection of seagrass stress responses.

In the future, additional research work still remains to be done. *We need better understanding of seagrass biology, reproduction and genetics if we are to predict how the plants will respond to environmental change, both natural and anthropogenic. We need to increase our knowledge especially of how environmental perturbations (including nutrient loading, sea level change, and water temperature) will affect seagrass bed morphology and viability. We need to identify and calculate the value of the many ecosystem services that seagrasses naturally provide to coastal residents and environments of Texas, such as fishery habitat, sediment stabilization, and coastal productivity. These ecosystem values would be important for setting seagrass acreage targets in each bay system for resource conservation and management.*

The consensus of the attendees at both the 2008 scoping meeting, as well as the 2009 Workshop, was that implementation of a Seagrass Monitoring Program to detect short-

and long-term trends in the status of Texas seagrasses was critical and long overdue. Resulting monitoring trend data would determine our progress towards meeting seagrass target goals. Both the strategic planning for (2003) and the technical implementation design (2010) of such a program have been accomplished. The methodology design includes a combination of remote sensing techniques, field sampling surveys, and laboratory-based analytical techniques. *A long-term source of funding remains to be identified, as well as a lead entity responsible for overall management of the monitoring program.* These issues require urgent attention and management decisions in the near future. Although the values of seagrass ecosystems are accepted, we take a significant risk in not having a concrete monitoring program to ensure conservation of the resource.

II. Management Chapter Issues

The 2009 management review reaffirmed that all priority problems identified in the 1999 plan were still relevant today. The review also identified several new issues that represent future challenges for seagrass conservation management in Texas. Management chapter reviewers concluded that the significance and relevance of such issues require them to be vetted and resolved in a structured but timely manner. These issues have not only an overarching effect on the Texas Seagrass Conservation Plan, but potentially on state and federal agency regulatory programs and/or natural resource management policy.

In addition to new issues, several topics within the plan were identified by the reviewers as “controversial”, meaning there was not a clear consensus among participants on the strategies or actions to address the priority problems; and in-fact, there were often opposing viewpoints expressed. These issues for which solutions need ongoing dialog and debate, for the most part, centered on regulations pertaining to seagrass water quality standards, permits and mitigation, monitoring and research and their relevance to management, and the role of the existing Seagrass Monitoring Workgroup (SMWG). Controversial strategies and actions may never be fully resolved because of the inherent nature of regulatory activities. However, in order to move forward, management plan implementation will require that agencies and stakeholders work together to address these very fundamental issues and challenges.

In contrast, five fundamental topics for seagrass management were agreed upon by most participants as primary focus areas in the near future.

1. Management of seagrass resources will require that we plan for, and adapt to, a changing climate and rising sea-level. A very brief mention in the 1999 plan now appears as a dominant issue that presents significant challenges for all aspects of seagrass management. *Sea Level Rise (SLR) has been and will continue to be a significant driver of change of the quantity and distribution of seagrass.* In some regions, relative SLR has caused an increase in acreage at the expense of other habitats (e.g. sand and or mudflats), and in other areas, it is implicated in losses. *SLR is expected to significantly impact resource management policies* that have largely been formulated for “steady

state” physical environment conditions. Climate change impacts including SLR will complicate existing problems in the near-term and have fundamental consequences in the mid- to long-term. Examples of specific recommendations include, but are not limited to:

- Texas state agency agreement on Regional (bay system specific) SLR scenarios (cannot plan or design without estimates)
- Developing seagrass distribution/quantity projections based on SLR estimate scenarios
- Regional Contingency plans for SLR (adaptive retreat – services reprioritization)
- Description of how projected SLR may affect regulatory programs and natural resources policies (e.g. TCEQ State Water Quality Standards; State and Federal mitigation policy)
- Proposals to develop and implement alternate regulatory and resource management adaptation strategies.

2. Moving forward, seagrass management should be implemented in the context of Regional Spatial Management Planning (RSMP) i.e., ecosystem services (ES) informed management. Regional Spatial Management Planning (landscape scale) should provide several benefits to management of coastal resources as well as the administration of regulatory programs. Use of an ecosystem services approach, whereby specific habitat acreage and service targets are established for each bay system, would provide defensible habitat preservation, creation and restoration goals. ***The reviewers recommend that this Strategic Habitat Conservation (SHC) be employed. The U.S. Fish and Wildlife Service and the USGS are using this SHC approach as a strategy to provide landscape level conservation of natural resources.*** Once acreage and service targets have been determined, it is much easier to measure success in reaching these goals.

3. It is likely that future seagrass conservation will require designation of additional State Scientific Areas (SSA) or similar, Resource Management Areas (RMA). SSAs, Coastal Preserves and RMAs have potential for managing seagrass resources by accommodating and reducing use conflicts. Resource Management Areas may provide long-term spatial protection of specific areas with concentrations of high value seagrass resources that otherwise cannot be achieved by project-by-project regulatory permitting programs. There is an opportunity to identify potential locations and propose additional Resource Management Areas with input through the public review process. Resource Management Areas may be considered independent from Regional Spatial Management Planning and/or Ecosystems Services and habitat acreage provisioning, yet can also be considered within the Regional Spatial Management Planning and/or Ecosystems Services-acreage contextual framework and a Strategic Habitat Conservation approach.

4. An additional tool for seagrass management may be in the use of Mitigation Banks or analogous planning agreements. The possible application of the March 2008 USACE-EPA Mitigation Rule in the context of regional habitat needs has not been

explored for facilitating management and financing of seagrass (and other coastal natural resources) projects. Although mitigation in all forms is generally considered independently from Regional Spatial Management Planning and Ecosystems Services-acreage provisioning, potential opportunities exist to leverage financing and maximize mitigation benefits within the Regional Spatial Management/ Ecosystems Services or Strategic Habitat Conservation planning framework.

5. Effective management of seagrass resources and Texas seagrass conservation programs will require funding from a variety of sources. Dedicated funding for programs such as state wide monitoring is needed. This dedicated funding could come in the form of State budget line item support to TPWD or other state natural resource agencies. ***Use of Supplemental Environmental Program (SEP) funds and compensatory mitigation in-lieu of dollars should be sought for seagrass conservation programs such as Resource Management Areas management, including enforcement.***

Resolution of these topics by approaches discussed here would represent a fundamental change to how seagrass and other coastal habitat conservation and management are implemented in Texas.

III. Education and Outreach Emerging Issues

There have been many accomplishments in education and outreach since the 1999 SCPT was adopted. Numerous actions were taken to address the concerns of the original group that wrote the plan. However the 2008-2009 plan review still identified ***several items in the seagrass Education and Outreach (E & O) arena that should be addressed in the future, including expansion of outreach area, conversion of English educational literature to Spanish, and the use of new technologies.***

There is a real need to expand education and outreach beyond the current geographic areas, moving inland since a large percentage of bay users live away from the coast. Also, seagrass educational materials need to be distributed to smaller coastal communities outside of Nueces, San Patricio, and Aransas counties where the majority of work is currently being conducted.

Many seagrass E & O materials were developed over the last 10 years, but few are in Spanish. ***It is recognized that Texas has a growing Spanish-speaking population and, therefore, in order to reach these people seagrass E & O materials will need to be produced in Spanish.*** This should include brochures, signage, videos and public service announcements. When new materials are developed, creating Spanish versions should be included in the work plan.

As more information is acquired through high technological sources, information regarding seagrasses should not be left out. ***The use of visual learning tools and online resources should be a priority to raise awareness of the importance of seagrass habitat.*** Seagrass beds are some of the most highly valued and diverse habitats, on even par with a

coral reef or rain forest. There should be high caliber (e.g., National Geographic type) videos produced that include underwater photography for “Life in a Seagrass Bed”, for example. Comparison of high resolution aerial photography taken in scarred and unscarred areas should be an essential component of the education and awareness effort. The “Boating in Seagrass” DVD should be widely distributed wherever boats are purchased and/or licensed. Age-appropriate videos utilizing all these items should also be made available to K-12 institutions at little or no cost and widely aired on educational television programs such as Channel One.

Other emerging issues include educating the public on climate change impacts to seagrass, converting scientific technical papers to information that a layman can read, and the need to continue to educate our policy makers, local governments, and NGOs on the importance of this resource.

PRIORITIZATION AND INTEGRATION OF OUTSTANDING ISSUES

The previous overview of key outstanding issues that were identified from the 2009 SCPT review process indicates that **significant overlap existed between the 3 chapters on a number of these issues. All chapters identified urgent needs to prioritize and address these common issues in a timely manner and integrate solutions into ongoing seagrass conservation measures. The most efficient approach would be to coordinate strategies/actions which address the following objectives:**

1. Implement a coast-wide seagrass monitoring program consisting of standardized field sampling and landscape analysis protocols, and provide for the required dedicated funding source.
2. Perform studies that relate seagrass impacts to sea-level rise and effects of climate change.
3. Design new Education & Outreach methods for communicating knowledge/information on the importance of seagrass resources to the public.
4. Identify and calculate the value of the many ecosystem services that seagrasses provide naturally to the Texas coastal zone.
5. Protect critical seagrass areas in Texas coastal waters by establishment of more State Scientific Areas (SSA) or similar Resource Management Areas (RMA), or Coastal Preserves, based on demonstrated needs.
6. Perform applied research studies that provide solutions to targeted management issues.

In addition to the items listed above which were generally agreed upon by all attendees at the workshop, several other “controversial” management issues will require more discussion and debate to achieve acceptable, perhaps consensus, solutions. These complex issues will entail development of creative solutions to complicated management problems. This stems primarily from the inherently controversial nature of regulatory solutions for management issues, including: establishing water quality criteria for seagrass protection; permitting and mitigation

processes; and reducing conflicts between coastal wetlands policies of different agencies and improving interagency coordination. These latter objectives (which were previously listed in the original SCPT) still remain as necessary and meaningful. Resolution of such controversial issues requires that consistent strategies based on more complete data and reliable information must be developed and incorporated into policies among appropriate agencies.

RECOMMENDATIONS

As alluded to earlier, the Seagrass Monitoring Workgroup (SMWG) has on occasion played an informal advisory role on monitoring and other seagrass conservation issues, providing feedback to presenters on a wide range of seagrass topics. In this capacity, the SMWG recommends renewed commitment to the following short-term and long-term strategies aimed at achieving seagrass conservation and management objectives in the SCPT.

Key Short-Term Strategies

Short-term merely implies that work on these strategies should be initiated in the near-term (1-5 years) to accomplish meaningful seagrass protection. These short-term strategies are considered equally important and priorities would be determined by workloads and budgetary resources of the appropriate agency or entity.

1. Objective: Protect water and sediment quality in seagrass beds.
 - Determine water quality criteria for seagrass in Texas Surface Water Quality Standards.
 - Define the range of environmental conditions that provide for seagrass propagation within the identified bay sub-segments and propose load limits and associated water quality criteria that protect the environmental conditions.
2. Objective: Restore/enhance/create functions and values of seagrass at a watershed/system-wide level, where feasible.
 - Conduct bay-by-bay ecosystem services needs assessments for seagrass and other fish and wildlife habitats.
 - Develop bay-by-bay seagrass cover acreage targets to be achieved or maintained by protection, restoration, enhancement, or creation/construction.
 - Identify landscape scale seagrass habitat preservation/protection, maintenance, restoration, enhancement and/or creation project site locations for each bay.
3. Objective: Reduce conflicts between policies of different agencies relating to seagrasses and improve agency coordination.
 - Produce a concise summary of written and unwritten State and Federal agency policies concerning seagrass, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories for subsequent independent review.

- Use TPWD’s seagrass web page to include links to other agency information and become the seagrass document clearinghouse for the State.
4. Objective: Conduct applied research and seagrass resources data acquisition and analysis that provide a sound technical basis for management actions.
 - Implement a Seagrass Monitoring Program for Texas (e.g., Dunton et al. 2010).
 - Transfer Texas research findings and monitoring results into official State data base within 1 year from data acquisition by collecting entities/agencies.
 5. Objective: Develop a sense of community stewardship and individual responsibility for the conservation of seagrass.
 - Establish better coordination between management and individuals conducting seagrass educational outreach.

Key Long-Term Strategies

Long-term strategies should be viewed from the perspective that they depend on a foundation of short-term accomplishments. Practically, they reflect a time-line of 5-10 years for initiation.

1. Determine Sea-level rise scenarios for each bay system.
 - Agreement between Texas state agencies on Regional (bay system specific) SLR scenarios (cannot adequately plan or design without estimates).
 - Describe how projected SLR will/may affect regulatory programs and natural resources policies (e.g. State and Federal agencies with regulatory jurisdiction over coastal natural resources and environmental protection)
 - Long-term management of seagrass resources will require a better understanding of the effects of climate change and sea-level rise.
2. Design a long-term adaptive management program based on regional spatial planning.
3. Where needed, coordinate and establish additional State Scientific Areas or Seagrass Resource Management areas.
4. Develop Seagrass Mitigation Banks.
5. Procure dedicated funding for seagrass conservation and monitoring.

IMPLEMENTATION OF SEAGRASS PLAN REVIEW RECOMMENDATIONS

Since the first edition of the SCPT was published in 1999, the Texas habitat conservation community overall has strongly endorsed the Plan’s objectives and strategies for seagrass protection. Over the intervening twelve years, many recommended conservation actions have been successfully implemented. It is noteworthy that several of these actions

involve coastal wetlands management initiatives between TPWD and its sister agencies, TCEQ and GLO. Acting together with the support of the scientific and environmental communities, and public stakeholders, these agencies have responded positively with protective actions that range from initiating Water Quality Standards to establishment of State Scientific Areas for habitat enhancement. It is anticipated that such actions will continue to increase, as exemplified by the State seagrass monitoring program which is now in the process of being adopted. Restoration projects by NOAA and USFWS (notably in the West Galveston Bay area) have been responsible for increasing seagrasses where they had previously disappeared and Section 10 and 404 permitting agreements between the USACE and GLO have helped to reduce policy conflicts between these agencies. In addition, the Coastal Bend Bays & Estuaries Program (a leading proactive NGO) has been at the forefront supporting numerous seagrass projects recommended in the Plan, ranging from monitoring research to education and outreach.

Since 1999, some issues have risen to a level of higher priority, even more urgent, than previously. These emerging issues, and a few old ones, are now recognized as critical for renewed long-term protection of seagrasses. Technical challenges like sea level rise, while readily observable, may seem intractable, and will certainly require concerted near- and long-term efforts by policy makers and government agencies. Policy issues related to management actions may be rather complicated, due to the oftentimes controversial nature of management solutions which involve regulatory mechanisms, but effective policies based on sound technical underpinnings must be developed. As identified in the management section, the solutions to implement 1) Water quality protection, 2) Permitting and mitigation process improvements, and 3) Consistency between agency policies, may be contentious and debatable, but there is an urgent need to address these issues. Special attention by the resource agencies and the scientific community is needed and this could focus on developing and supporting applied research and adaptive management processes based on regional spatial planning.

In conclusion, many short-term strategies from the original Plan have been achieved, and now longer-term ones await implementation. Recommendations from the SMWG clearly list these short- and long-range strategies, and the management chapter details the complexities associated with developing solutions to move forward. As reiterated from the original SCPT, proactive, rather than reactive, solutions to these priority problems and issues appear to be most appropriate. **Integrated management actions through applied research, public education/outreach, and stakeholder involvement should be the highest priority for effective seagrass conservation. It is from this perspective that the Seagrass Monitoring Workgroup offers the recommendations made in this 2012 review of the original SCPT (1999).**

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Seagrass Conservation Plan for Texas: Ten-Year Review and Update – 2012

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Appendix A

Scoping Meetings Summaries:

- **Research**
- **Management**
- **Education and Outreach**

Appendix A
Research Scoping Meeting Summary

Seagrass Technical Working Group
Research Subcommittee - Seagrass Conservation Plan Review
Texas A&M University-Corpus Christi, Harte Research Institute 127
September 9, 2008

Meeting Agenda

8:30-9 am Coffee & Tea

I. Morning Session 9 am – 12 noon

1. Introductions
2. Objective I: Status and trends of seagrass distribution
3. 10:20 am – Coffee Break (15 min.)
4. Objective II: Causes of change in seagrass species composition and coverage

Lunch (on your own – campus facilities available) 12 noon – 1pm

II. Afternoon Session I, 1pm – 4 pm

1. Objective III: Habitat functions, productivity and linkages
2. 2:20 pm – Coffee break (15 min.)
3. Objective IV: Development of management policies

III. Afternoon Session II, 4pm -5pm

1. Seagrass monitoring plan
2. Summary and conclusions

Adjourn

Driving directions to Texas A&M University-Corpus Christi, 6300 Ocean Dr, Corpus Christi, TX

1. Head **southeast** on **I-37 S**
2. Take exit **4A** to merge onto **N Padre Island Dr/TX-358 E** toward **Airport/Padre Island/NAS-CCAD**
3. Take the exit toward **Nile Dr**
4. Merge onto **S Padre Island Dr**
5. Turn **left** at **Nile Dr**
6. Turn **left** at **Ennis Joslin Rd**
7. Turn **right** at **Ocean Dr**

Texas A&M University-Corpus Christi. 6300 Ocean Dr, Corpus Christi, TX

First Entrance. Stop at Kiosk for temporary parking permit. Parking available in lot next to HRI.



- | | | |
|--|--|--|
| 1 Corpus Christi Hall | 15 Early Childhood Development Center | 29 Momentum Sculpture |
| 2 University Services Center | 16 Environmental Studies | 30 South Texas school of Christian studies |
| 3 Performing Arts Center | 17 Harte Research Institute | 31 Newman Center |
| 4 Center for the Arts | 18 Carlos F. Truan Natural Resource Center | |
| 5 Student Services Center | 19 Conrad Blucher Institute | |
| 6 Bay Hall | 20 Classroom East | |
| 7 Bell Library (SUBWAY) | 21 Driftwood (Counseling Center) | |
| 8 Faculty Center | 22 Sandpiper (Health Services) | |
| 9 Ctr Instruction (TORTILLA FRESCA) | 23 Physical Plant | |
| 10 Center for the Sciences | 24 Miramar University Apartments | |
| 11 Science and Technology | 25 Modular 1 | |
| 12 University Center (CAFETERIA) | 26 University Beach | |
| 13 Glasscock Fitness Center | 27 Islanders Baseball Field | |
| 14 Moody Sustainers Field House | 28 Islanders Softball Field | |

SGWG Research Subcommittee
Meeting Report 9/9/08
Harte Research Institute, Texas A&M University - Corpus Christi

Members in attendance: Nathan Kuhn (TPWD), Beau Hardegree (USFWS), Warren Pulich (Texas State U.), John Wood (HRI), Jim Simons (TPWD), Kirk Cammarata (TAMUCC), Faye Grubbs (TPWD), Pat Radloff (TPWD), Jennifer Stephens (TGLO), Cindy Contreras (TPWD), Charlie Belaire (Belaire Environmental), Ken Dunton (UTMSI, Committee Co-chair), Jim Tolan (TPWD), Joseph Kowalski (UTPA), Hudson DeYoe (UTPA), Patrick Larkin (TAMUCC, Committee Co-Chair).

16 members of the Seagrass Working Group Research Subcommittee met at the Harte Research Institute on the campus of Texas A&M University - Corpus Christi on Sept. 9, 2008 to review the Goals and Objectives outlined in the Seagrass Conservation Plan for Texas (SCPT), in anticipation of a statewide meeting to be held in June 2009. Much has been accomplished since the original G&O's were formulated in 1996. One significant outcome has been the creation of the Texas Seagrass Monitoring Program – 2000 Strategic Plan, a detailed document that contains specific recommendations for the design of a statewide seagrass mapping, monitoring, sampling and data management plan. The subcommittee reviewed each of the four major objectives from the SCPT research section and recommended changes that reflect progress made in specific areas, changing priorities in regards to new information, and emerging issues that have arisen over the last decade. A summary of the subcommittee's review of each objective is provided below. New recommendations have been incorporated into a revised version of the SCPT Seagrass Research Plan.

Objective I: Status and Trends of Seagrass Distribution. As noted, the Seagrass Monitoring Program Plan has incorporated many of the SCPT's recommendations in a detailed manner. Discussion of monitoring efforts focused on the need for a rigorous Quality Assurance/Quality Control protocol for all efforts related to sampling, mapping, monitoring, data storage and distribution. This will be especially important if monitoring data will be used to support enforcement of current regulations, or development of new ones. The QA/QC protocol should contain specific recommendations regarding temporal and spatial scales for sampling, mapping resolution, and database management. It was also emphasized that all data collected on Texas seagrasses need to be entered into a collective database, preferably in a manner that allows it to be queried or referenced by GIS applications. While the Seagrass Monitoring Plan is a very good start, it could be refined to incorporate strategies developed by others (e.g. Hilary Neckles), including higher resolution mapping at specific locales (e.g. Corpus Christi Bay), rapid assessment procedures, and the establishment of permanent transects to monitor biomass, species composition, light conditions, etc. Discussions also centered on the idea of dividing the coast into approximately 5 regions, with specific institutional monitoring responsibilities (e.g. UTPA for lower Laguna Madre), in order to more adequately and consistently monitor seagrass conditions.

Objective II: Determining causes of change in composition and coverage. This section remained largely unchanged, except to emphasize the continued need to perform basic research on seagrass physiology, genetics, stress responses and landscape ecology, which has not kept up with mapping studies over the last decade. While much work has been done outside of Texas (compiled in the 2006 text, *Seagrasses: Biology, Ecology and Conservation*), it has primarily focused on genera and species not found in the Gulf of Mexico/Caribbean Sea.

Objective III: Identifying habitat functions, productivity, and linkages. Discussion of this objective resulted in several specific action items being added. These included items related to the functional differences of seagrass bed types, factors influencing colonization and species succession and the influence of landscape morphology on bed production, function and genetic variation. Action items were also added to the second strategy, concerning adaptive resource management. In particular, it is believed that the USACOE possesses a great deal of information regarding past and current mitigation efforts. This data should be captured and contacts at the USACOE should be cultivated to keep current with this type of information.

Objective IV: Providing data for management policies. This section also remained largely unchanged, reflecting the continued importance and lack of data concerning many of the action items listed in the SCPT. Notes were made to include existing information into a current metadatabase (GOMA PHINS?). Additional action items were also included to address the impact of changes in coastal land use (population growth, urbanization, non-point source pollution, etc.) and invasive species.

As a whole, the meeting seemed to be successful in that several action items were either revised or added to reflect new information and emerging issues. Large scale mapping efforts appear to have shown the most progress over the past decade, while more labor intensive (more expensive?) studies on seagrass physiology, genetics, ecology and restoration have lagged, most likely due to a lack of research personnel and funding. This could change as the public is made more aware of the importance of seagrasses to the productivity and sustainability of coastal ecosystems.

Seagrass Technical Working Group
Research Subcommittee
Seagrass Conservation Plan Review
September 9, 2008

OBJECTIVE I: Regularly assess status and trends of seagrass distribution on a coast-wide basis

Strategy 1: Develop a strategic long-term monitoring plan that includes seagrass biological parameters as well as sediment and water quality indicators.

Strategy 2: Perform coordinated, standardized mapping of seagrass beds at appropriate temporal and spatial scales.

1. Integrate mapping and ground truth information on composition, productivity, indicators, etc.
2. Specify data standards of mapping efforts.
3. Archive mapped data into GIS or equivalent database standard protocols

New Issues:

Additional Notes:

OBJECTIVE II: Determine causes of changes in seagrass species composition and coverage (acreage), including areal losses and gains.

Strategy 1: Conduct process-oriented (basic) research on seagrass autoecology including: physiology, production ecology, reproduction, indicator development, landscape ecology, and demography.

1. Physiological studies: photosynthesis, nutrient acquisition by leaves vs. below ground tissues, C:N:P ratios, carbohydrate concentrations and stress responses.

2. Studies of reproductive biology: genetic diversity, seed production/survival, vegetative vs. sexual trigger factors.

3. Research in landscape ecology to address population changes due to drift algae, episodic loading events, physical factors and large-scale disturbance events (e.g. hurricanes).

4. Indicator development that addresses rapid morphological and/or physiological changes in plant tissues and associated fauna that readily reflects degradation of seagrass habitat.

5. Apply information on seagrass research from outside of Texas.

6. Population ecology and assessment of susceptibility of seagrasses to diseases based on exposure to environmental stressors.

New Issues / Additional Notes:

OBJECTIVE II (cont'd.)

Strategy 2: Conduct process-oriented research on water column and sediment factors that affect seagrasses.

1. Assess specific physico-chemical parameters required to maintain the current health and distribution of seagrasses.

2. Assess changes in light quality and quantity as they affect seagrass health, and relate them to nutrient loading and stimulation of phytoplankton blooms (brown tide), epiphytes and drift macroalgae.

3. Assess biogeochemical environments occupied by below-ground tissues
 - a. Pore water composition (NH₄, FeS, DIN, P, H₂S, etc.)
 - b. Physical characteristics (grain size, composition, porosity, organic carbon)
 - c. Benthic nutrient flux
 - d. Microbially mediated processes
 - e. Seagrass-sediment pore water interactions as they affect density and distribution of seagrasses.

New Issues:

Additional Notes:

OBJECTIVE II (cont'd.)

Strategy 3: Conduct experimental research on seagrass bed creation and restoration.

1. Determine how donor stocks should be chosen to achieve maximum success.
2. Determine if there are methods to accelerate natural recruitment of seagrasses.
3. Develop methods for evaluating ecological functioning of restored seagrass beds.

New Issues:

Additional Notes:

OBJECTIVE III: Identify habitat functions and productivity of natural seagrass community types and identify linkages with other habitats to support habitat conservation, creation, enhancement and restoration

Strategy 1: Conduct process-oriented research on **seagrass landscapes and community ecology of grassbeds**

1. Ecological processes associated with seagrass community structure and function
 - a. Functional difference of seagrass bed types
 - i. **Species differences**
 - ii. **Secondary production and trophic structure**
 - iii. **Other primary producers (epiphytes, macroalgae)**
 - b. **Factors influencing colonization and species succession**
 - i. **Abiotic factors (e.g. salinity, temperature, sediment properties, hydrological, etc.)**
 - ii. **Biotic factors (e.g. mesograzers, benthic fauna)**
 - iii. **Sediment biogeochemical processes**
 - c. **Seagrass diseases and interactions with environmental stressors**
 - d. **Biotic and abiotic factors that influence genetic variation**
 - e. **Influence of landscape morphology on:**
 - i. **Size of habitat patches in relation to secondary production**
 - ii. **Effect of habitat fragmentation on function**
 - iii. **Genetic diversity and gene flow**
2. Importance of linkages between seagrass and other habitats with respect to community composition and productivity.
 - a. Relation to other systems (e.g. Mexican Laguna)
 - b. **Seagrass beds as sinks and sources of carbon, nitrogen or other nutrients**

Strategy 2: Evaluation of success of mitigation through examination of existing projects (apply adaptive resource management to seagrass restoration and enhancement)

1. Develop GIS database of all seagrass creation/mitigation/restoration projects in state and private waters.
 - a. **Capture COE data regarding monthly permitting information – should include mitigation efforts. Goes back decades**
 - b. **Establish contact at COE (Lloyd Mullins, COE?)**
 - c. **Develop/include means for evaluating success of mitigation efforts**
2. Establish functional equivalency of mitigation projects as a function of age.
 - a. Some studies indicate it takes at least 20 years before functional equivalence is achieved.

OBJECTIVE IV. Provide data for development of management policies in response to natural or human induced impacts.

Strategy 1. Review existing information, enter into GOMA PHINS metadata base, and add new data as becomes available.

Strategy 2. Continue to support applied studies to provide science-based answers to specific management questions.

1. Effects of boating impacts (trawling, boat traffic (sailboats, jet skis, motor boats))
2. Effects of municipal and industrial discharges on seagrass beds
3. Effects of aquaculture discharges on seagrass beds
4. Socioeconomic values of seagrass beds and associated impacts of management on users
5. Effects of changes in coastal land use (e.g. population changes, non-point nutrient loading, user impacts)
6. Effects of oil, gas and mineral exploration and development
7. Global climate change: increases in mean sea level.
8. Effects of prop scar damage.
9. Dredging effects on light attenuation
10. Stabilization of dredged material disposal
11. Indirect effects of dredged materials
12. Development and verification of seagrass models
13. impact of invasive species

14. Development of watershed management plans.
Additional Notes:

SEAGRASS MANAGEMENT ISSUES PLAN

PRIORITY GOAL: To develop a sound management process that coordinates agency policies, public concern, and existing knowledge from research, to achieve effective seagrass conservation.

Priority Problem I: Seagrass beds are being lost or degraded, and/or species composition is changing*.

*Need to understand the cause of species composition changes, since some changes naturally occur.

Objective 1: Ensure water and sediment quality beneficial to the seagrass community

Strategy: Designate seagrass as a high or exceptional Aquatic Life Use in Texas Surface Water Quality Standards.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments	"Use" designation for seagrass propagation in Chapter 307 of SWQS – Water-quality-related existing use which applies to salt water with significant stands of submerged seagrass.	TCEQ	July 2000
Not Accomplished			
New Issues			
Future Focus	Move forward with implementation. Utilization of statewide map from TPWD. Designate segments in WQS that have this use.		

Strategy: Designate water quality criteria for seagrasses in Texas Surface Water Quality Standards.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments			
Not Accomplished	Work in progress	Researchers, TCEQ	
New Issues	Seagrass as an endpoint for nutrient criteria as part of ongoing GOMA efforts. i.e., their response to nutrient changes		
Future Focus	Defining and achieving the research/monitoring necessary for criteria development	Researchers et al.	

Strategy: Develop and implement water-based Best Management Practices.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
<p>Accomplishments</p>	<p>Laguna Madre research by Ken Dunton. Incorporated into LM supplemental EIS. Seagrass timing "Window" now utilized by Corps on more of a coast wide in dredging, particularly for open bay disposal. Greatly reduced frequency of dredging by Corps now for GIWW. Threshold for storm water permits reduced from 5 acres to 1 acre of land disturbance.</p>	<p>US. Army Corps ICT for Laguna Madre dredging US Army Corps TCEQ</p>	
<p>Not Accomplished</p>	<p>No coordination with USDA programs for farmlands regarding runoff issues, buffer strips, etc.</p>		
<p>New Issues</p>			
<p>Future Focus</p>	<p>Apply approach to other issues such as Water quality. Better coordination with USDA programs for farmlands regarding runoff issues, buffer strips, etc. Insure that follow up monitoring occurs to verify effectiveness of BMP's and adaptively manage as necessary.</p>		

Objective 2: Protect Seagrass beds through effective application of the mitigation sequence: avoidance, minimization, compensation.

Strategy: Develop consistent and effective mitigation guidelines.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments	Being accomplished through permit review application process for direct impacts.	All permit review agencies	ongoing
Not Accomplished	Verbal tradition of 3:1 mitigation ratios		
New Issues			
Future Focus	Functional assessment tool to determine mitigation requirements/ratios.		

Objective 3: Restore/enhance create lost functions and values of seagrasses at a watershed/system-wide level, where feasible.

Strategy: Develop guidelines for site selection on a watershed/system-wide level, planting methods, and monitoring of seagrass restoration projects.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments	Good planting methods have been developed (Fonseca et al.)		
Not Accomplished	Monitoring guidelines established		
New Issues	No watershed planning to address seagrass Consider the importance of other habitat types in meeting seagrass conservation goals.		
Future Focus	Assess success or failure of past mitigation efforts/sites.		

Objective 4: Design dredging or shoreline development projects to effectively reduce impacts upon seagrasses.

Strategy: Best management practices are needed to protect seagrasses while allowing economic development of coastal resources.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments			
Not Accomplished			
New Issues			
Future Focus			

DELETE. ROLLS INTO OBJECTIVE 1, STRATEGY 3 AND OBJECTIVE 3..

Priority Problem II: Lack of Agency coordination (compromise?) or ways to resolve conflicting policies may prevent adequate management*.

Consider re-writing?

Objective 1: Develop consensus agreements or plans among users of the seagrass resource.

Strategy: Model consensus agreements or plans after examples such as the successful 1994 Beneficial Uses Group Plan for the Houston Ship channel deep-draft navigation project.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments	Laguna Madre ICT Texas Seagrass Monitoring Workgroup Corpus Christi Ship Channel Improvement Project seagrass creation	US Army Corps TPWD	ongoing
Not Accomplished	No policies have changed		
New Issues	How to memorialize problem statement 1		
Future Focus	Define and formalize charge to Interagency Seagrass Monitoring Workgroup		

Objective 2: Facilitate agency policy coordination by improving communication and consistency of actions related to seagrass management.

Strategy: Develop and disseminate a brief, concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments			
Not Accomplished	Not done		
New Issues			
Future Focus	Find and fund contractor		

Strategy: Develop an updated data base on seagrass loss/damage, the amount of compensatory mitigation performed, and mitigation success rates in order to measure policy effectiveness.

KEY ISSUE – FOUNDATION FOR MULTIPLE OTHER OBJECTIVES

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments	Some status and trends on broad scale and sometimes on a bay specific scale, but no data base created		
Not Accomplished	Generally not done		
New Issues			
Future Focus	Do		

Strategy: Review policies involving in-kind and in-system mitigation for current application by both management and research teams.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments			
Not Accomplished	Not done		
New Issues			
Future Focus	Link to key Problem 1, Objective 2, Strategy 1 and Objective 3, Strategy 1		

Priority Problem III: Data synthesis and monitoring are insufficient for management decisions and need to be focused on management needs.

Objective 1: Conduct research and seagrass resource data acquisition and analysis that provide a sound technical basis for management actions.

Strategy: Establish a data clearinghouse for seagrass-related information.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments	Using GOMA PHINS as data clearinghouse TNRIS for TPW (and others?) aerial photography and remote sensing databases	TPWD, TCEQ, TGLO, plus anyone else with data they're willing to share	ongoing
Not Accomplished			
New Issues			
Future Focus			

Strategy: Focus research on seagrass management needs for Texas estuarine systems, including such issues as seagrass status and trends, water quality criteria, adequate mitigation ratios, and best mitigation practices.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments	Numerous but ongoing	Various	
Not Accomplished			
New Issues			
Future Focus	Continue with research as issues become		

Priority Problem IV: Public outreach is too limited to achieve the goal of public awareness.

Objective 1: Develop a sense of community stewardship and individual responsibility for the conservation of seagrass.

New Strategy: Coordinate better with individuals involved in conducting seagrass educational outreach.

Strategy: Write information clearly, accurately, and with common-sense ideas for the public sector, including schools, universities, stakeholders, and the general public.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments			
Not Accomplished			
New Issues			
Future Focus			

Strategy: Listen to stakeholder ideas, exchange information, and make information relevant.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments	RFBSSA: Seagrass Taskforce, TPW Website		
Not Accomplished			
New Issues			
Future Focus			

Move to discussion of future role of Seagrass Monitoring Workgroup

Strategy: Strengthen commitment of state and federal agencies to outreach programs.

ACTION	DESCRIPTION	PERFORMING ENTITY	DATE COMPLETED
Accomplishments	RFBSSA		
Not Accomplished			
New Issues			
Future Focus			

Recommend incorporation of strategies into Education/Outreach section of Plan.

KEY ISSUE: ESTABLISH AND IMPLEMENT LONG TERM MANAGEMENT/ROUTINE MONITORING STRATEGY.

KEY ISSUE: FIT SEAGRASS INTO ECOSYSTEM BASED MANAGEMENT PLANNING.

Appendix A

Education and Outreach Scoping Meeting Summary

Seagrass Conservation Plan of Texas Review Meeting Education & Outreach Subcommittee

Date: July 29, 2008
Time: 10:00am to 3:00pm
Location: CBBEP Conference Room, Corpus Christi, TX
Participants: Jace Tunnell (CBBEP), Karen Meador (TPWD), Sonia Najera (TNC), Liz Smith (TAMUCC), Pat Bacak-Clements (USFWS), Chad Leister (MA-NERR), Ann Bracher Vaughan (Port Aransas Chamber of Commerce), Nathan Kuhn (TPWD)

I. Agenda Followed:

10:00 – 10:05am	Welcome & Introductions
10:05 – 10:15am	Overview
10:15 – 11:15am	Discuss Objective 1 accomplishments, non-accomplishments, new issues, and future focus
11:15 – 12:15pm	Discuss Objective 2 accomplishments, non-accomplishments, new issues, and future focus
12:15 – 12:30pm	WORKING LUNCH (will be provided)
12:30 – 12:45pm	Broad view of Future Focus for Seagrass E&O
12:45 – 1:30pm	Key seagrass issues to focus on and how to present the info at the June 2009 Workshop
1:30 – 2:00pm	Possible inclusion of the Texas Seagrass Monitoring Plan into the Seagrass Conservation Plan.
2:00 – 2:45pm	Volunteers for active participants in the June 2009 Workshop (presenters, organizers, etc.) and discuss roles
2:45 – 3:30pm	Next steps in planning process. Any other issues?
3:30pm	Adjourn

II. Overview:

Jace Tunnell gave a brief overview on the background of the Seagrass Conservation Plan of Texas, reason for the review, the process to implement the review, expected outcomes, and what would be accomplished in today's meeting.

III. Discussion:

Everyone contributed to a detailed discussion for each action item within the education and outreach section of the Seagrass Conservation Plan on what had been accomplished, not accomplished and why, any new issues, and where the focus should be concentrated in future years. Below is the list of objectives, strategies, and actions taken from the Education and Outreach chapter of the Seagrass Conservation Plan. Also included are the summary notes produced from the review meeting that show accomplishments and possible new focus for seagrass education and outreach along the Texas coast.

Objective 1: To educate the public on the status, values, ecology and conservation of seagrasses in Texas.

• **Strategy 1.** Develop and deliver messages for targeted audiences
Suggested Actions:

1. Printed material will be created to supplement current educational programs or delivery systems, e.g., the Ethical Angler program.

Accomplished: YES

Accomplishments: Multiple educational handouts created by TPWD, CBBEP, TNC, and TGLO and distributed to various groups over the past 10 years. These educational handouts continue to be distributed.

Future Focus: Continue creating and distributing the handouts as well as develop a new brochure that includes seagrasses along the entire state of Texas coastline and could be distributed to everyone, including inland stakeholders that visit the coast. The brochures should also be available in Spanish, especially for the southern region of Texas.

2. Handouts could be produced for Chambers of Commerce in coastal municipalities.

Accomplished: YES, however not explicitly produced for Chambers.

Accomplishments: TPWD has distributed and currently distributes RBSSA seagrass brochures to the Chambers of Commerce in Aransas Pass, Port Aransas, and Rockport. TNC currently distributes education seagrass brochures to the Corpus Christi Chamber of Commerce.

Future Focus: Continue to supply educational material about seagrass to Chamber of Commerce and expand the distribution to all Chamber of Commerce along the Texas coast and some inland areas, including: Port Mansfield, Port O'Connor, Bay City, Kingsville, Brownsville, San Antonio, Austin, South Padre Island, Port Lavaca, Port Isabel, Riviera Beach, Naval Air Station Corpus Christi (they have a department called MWR - Moral Recreation & Welfare - that distributes fliers etc. to personnel & their families),...

3. Provide a supplement to the AquaSmart education program.

Accomplished: NO

Accomplishments: TPWD has been utilizing and will continue to show an educational video about boating in seagrasses in the adult Boater Ed course. The classroom text includes a component about seagrasses in Texas.

Future Focus: The AquaSmart program is primarily geared towards children, so an expansion of this action item to also include adult educational programs would prove to be beneficial in educating a larger spectrum of bay users.

Other Comments: This action item should be modified to read: Provide a supplement to the AquaSmart education program and the Adult Boaters Education Program which consists of brochures and a class curriculum.

4. Provide materials for informal education groups, e.g., Girl Scouts, Boy Scouts, 4-H.

Accomplished: YES, but can be more consistent and improved.

Accomplishments: TPWD includes seagrasses as a portion of a Boy Scout course to earn a Conservation Patch, but is infrequently taught.

Future Focus: Create a package of educational material on seagrasses to distribute at these various groups during summer camps and other outings.

• **Strategy 2.** Develop and deliver messages for the general public through various media
Suggested Actions:

1. Provide press releases and public information messages on current research and restoration projects.

Accomplished: YES, but only in the Coastal Bend.

Accomplishments: TPWD, CBBEP, and TNC have all participated in and will continue to participate in promoting research and completed restoration projects as they become available.

Future Focus: Seek out and build relationships with individuals within the TV, newspaper, and magazine community in order to promote seagrass projects as they occur. Utilize the relationships built to have articles written or TV stories aired about seagrasses during heavy bay use times such as the beginning of summer or holidays. Expand promotional area to include San Antonio and the rest of Texas coastal residents.

2. Generate and distribute press releases, radio public service announcements.

Accomplished: YES, but mainly in the Coastal Bend.

Accomplishments: TPWD, CBBEP, and TNC have performed and will continue to perform as opportunities arise.

Future Focus: Similar to the above action item, seagrass education and outreach advocates need to utilize relationships built to create opportunities for more frequent press releases and radio public service announcements. When these tools are used consistently, they can be very effective in educating large groups of bay users. Expand to inland users as well.

3. Hold media events associated with seagrass conservation activities.

Accomplished: YES

Accomplishments: TPWD, TNC, and CBBEP have all held media events during or after seagrass restoration or conservation activities have been performed. For example, CBBEP and TNC on Shamrock Island seagrass restoration project, TNC on Seagrass Channel Markers project in the Upper Laguna Madre, and TPWD on the Redfish Bay State Scientific Area signage and prop scar study after the enactment of the no uprooting regulation.

Future Focus: Continue to hold media events as opportunities arise.

4. Create a seagrass conservation website.

Accomplished: YES

Accomplishments: TPWD (www.tpwd.state.tx.us/seagrass) and TNC (www.saveourseagrass.org) both have dedicated web pages for educating people about Texas coastal seagrasses.

Future Focus: Improve links within the web pages to go to other outside sources for seagrass information, update electronic resources on the web pages (videos, links, downloadable reports, etc.) and utilize tracking tools on the web page to see how many people are viewing what topics in order to find out what the public is most interested.

5. Distribute informational inserts to be included with voter registration, utility bills, etc.

Accomplished: NO

Why Not Accomplished: Possibly funding or lack of coordination with correct entities.

Future Focus: Contact utility companies for inclusion of educational material about seagrasses as a flyer along with the bill. Possibly piggy back with other informative inserts that are commonly found with the bills such as the hurricane preparedness guide. Should also have the information available in Spanish as well as English.

6. Add seagrass conservation messages to Conservation Passports.

Accomplished: NO

Accomplishments: No message has been add to the Conservation Passport. Although, an audio recording about seagrass importance is available on the www.passporttotexas.com website. Seagrass information is found under the “visit the listening library” link; then click “Conservation”; there are multiple audio recordings about seagrasses.

Future Focus: Might should reword this action item to include Passport to Texas. Maintain current audio recording on Passport to Texas as well as additional educational seagrass material. Try to get the information in a better location on the website so it is easier for people to find.

7. Make an educational video to inform organizations.

Accomplished: YES

Accomplishments: TPWD created a 20 minute DVD in 2003 about boating and seagrasses that is currently available upon request.

Future Focus: The current DVD is geared more towards adults and boating, so the future focus could be to keep utilizing the existing DVD and then also create an educational DVD developed for children from K through 12 about Texas seagrasses could be distributed to schools and used in science class. Could look at other states (i.e. Florida) to see if this type of video already exists and if so then distribute that video to Texas schools in coastal communities.

• **Strategy 3.** Develop and deliver messages for formal education

Suggested Actions:

1. Make supplemental materials for K-12 curricula such as Project WILD, Project WET, Project Aquatic WILD.

Accomplished: YES

Accomplishments: TPWD packages up educational seagrass material into a “Coastal Trunk” to distribute to programs. CBBEP packages environmental pamphlets and books together, which include seagrass education, and gives to schools around the Coastal Bend

area. TNC developed a curriculum that they use for teaching science and a component of it is seagrass related.

Future Focus: Add a K-12 seagrass DVD and reading materials about seagrasses to the packages already developed.

2. Obtain coverage of seagrass conservation activities on the school channel (Channel One).

Accomplished: NO

Why Not Accomplished: This was not attempted.

Future Focus: Should try to get seagrass educational material on the Channel One website (<http://www.channelone.com/>) and onto TV in the classrooms that have Channel One.

3. Train seagrass conservation experts to deliver a grade appropriate lessons.

Accomplished: NO

Why Not Accomplished: Never attempted.

Future Focus: Host workshops to train conservation experts and have seagrass educational packages available for the desired grade level to be learned and then taught.

Objective 2: To convince the public to take action to conserve and restore Texas seagrasses.

• **Strategy 1.** Develop skills through demonstration programs and workshops.

Suggested Actions:

1. Provide shallow water boating demonstrations.

Accomplished: YES, but not live demonstrations.

Accomplishments: TPWD and CBBEP currently have commercials airing in the Coastal Bend area about lift, drift, pole and troll when entering the Redfish Bay State Scientific Area where areas of regulation are in effect.

Future Focus: Get airtime for other bay users that live in non-coastal areas (i.e. San Antonio). This is currently being attempted by TPWD, CCA, and SEA but airtime in major cities is expensive. Could also add electronic screens into displays at boat shows and other events that show how to boat in shallow areas where seagrasses are present.

2. Deliver boater education seminars on seagrass protection skills at boat shows and fishing shows.

Accomplished: YES

Accomplishments: TPWD currently has educational material about seagrasses available at their annual EXPO in Austin and at several boat shows and other boating/fishing related events.

Future Focus: Continue providing educational material at these shows and events and expand to inland areas to educate boaters where feasible.

Other Comments: Reword action item to include the action item from Objective 2, Strategy 2, Action Item 5 and it should state: Deliver boater education seminars on seagrass protection skills at boat shows and fishing shows and use visual learning tools

such as aerial photographs of undamaged vs. prop-scarred seagrass beds as illustrations to how damaging boats can be.

3. Provide detailed information on seagrass protection methods in Corps of Engineers permit applications.

Accomplished: YES

Accomplishments: TPWD, TGLO, USFWS, and NMFS review permits and give reasons why it is required to mitigate for seagrass when it is impacted. The reviewing agencies also provide how the seagrass will be impacted based on what project type is being proposed. The Permitting Assistance Program gives detailed information regarding seagrass for all permit applicants.

Future Focus: Continue this practice.

4. Provide a workshop on seagrass conservation for Corps personnel who review and process applications.

Accomplished: YES

Accomplishments: The USACE provides a seagrass conservation course to all new employees.

Future Focus: Continue this practice.

5. TPW/TGLO/Sea Grant/NMFS seagrass restoration extension program.

Accomplished: NO

Why Not Accomplished: Never attempted.

Future Focus: Discuss the possibility of developing a seagrass restoration program.

• **Strategy 2.** Provide supplemental material and aids which support responsible behavior.
Suggested Actions:

1. Put up signs about seagrass protection at boat ramps.

Accomplished: YES

Accomplishments: TPWD, USFWS, and CBBEP have worked together to post signs since 1998 at boat ramps around the Coastal Bend area with seagrass information and education, pictures and maps.

Future Focus: Maintain existing signs and add signs to the entire coast of Texas at heavily used boat ramps that do not currently have signs or newly constructed boat ramps.

Other Comments: Reword this action item to state: Put up boat ramp signs regarding the location of seagrass and their protection.

2. Mark seagrass areas with buoys or signage.

Accomplished: YES

Accomplishments: Since 2000, TPWD has posted numerous boundary and informational signs in the Redfish Bay State Scientific Area. TNC has channel markers in the Upper Laguna Madre in order to keep boaters in the channel rather than in the seagrass beds. South Bay also has signs marking channels.

Future Focus: Maintain existing channel markers and signage and create new signs for sensitive or heavily used seagrass areas along other parts of the Texas coast. Need to set up a mechanism to fund the maintenance of these signs over the long term.

3. Get mapmakers to designate seagrass habitats on fishing maps as areas to avoid.

Accomplished: NO

Why Not Accomplished: Avoiding entire areas from use is not realistic and needs to be termed as an “avoid damaging seagrass areas”.

Future Focus: Rephrase action item to state: Designate seagrass habitats on boating/fishing maps as areas to use extreme caution. Identify these areas on maps and distribute to bay users.

Other Comments: Several boating/fishing maps exist (Hot Spot Fishing Maps, Shoreline Publishing Maps, etc.) that include seagrass beds. By educating people where seagrasses are, their importance, and how to avoid uprooting them, maybe less damage to seagrass will occur.

4. Designate “no wake” zones in seagrass areas.

Accomplished: NO

Why Not Accomplished: Not realistic and not that damaging in most areas.

Future Focus: Delete this action item from the Seagrass Conservation Plan.

5. Provide “before and after” aerial photographs of damaged seagrasses to boating organizations or dealers.

Accomplished: YES, but could be improved since most educational material really only have the “after” shots.

Accomplishments: TPWD has before and after photos of prop scarred areas that they present to boaters at boat shows and other boating/fishing events.

Future Focus: Merge this action item in with Objective 2, Strategy 1, Action Item 2. So delete this action item from the Seagrass Conservation Plan.

• **Strategy 3.** Provide opportunities for conserving and restoring seagrasses
Suggested Actions:

1. Establish seagrass conservation demonstration projects.

Accomplished: YES

Accomplishments: TPWD has created several State Scientific areas along the Texas coast including: Redfish Bay, Christmas Bay, and South Bay.

Future Focus: Like Redfish Bay, concentrate more seagrass education efforts into Christmas Bay and South Bay and then try to establish other large areas for conservation.

The Action Items listed below (2-5) should be merged together in order to create a realistic and achievable goal for getting volunteers involved in seagrass projects and conservation.

2. Create an “Adopt-A-Seagrass-Bed” program.

Accomplished: NO. **Reason:** Difficult to identify what responsibility the “adopter” (funding party) would have.

3. Develop volunteer restoration projects.

Accomplished: NO. **Reason:** Takes a specific technique to plant seagrass in order for it to be successful.

4. Initiate conservation plantings for public service projects.

Accomplished: NO. **Reason:** Takes a specific technique to plant seagrass in order for it to be successful.

5. Include seagrass conservation efforts in elder hostel and other retiree programs.

Accomplished: NO. **Reason:** Not attempted.

The “new” action item (from merging 2-5) should state the following:

2. Develop community involvement in planning, funding, creating, educating, and implementing seagrass conservation projects.

IV. Text Updates:

The group overall felt that the text within the Seagrass Conservation Plan in the Education and Outreach Chapter was written well and in such general terms that it can apply over the years. However, on page 61 there are percentages of acreages of seagrass found along the Texas coast that might have changed since 1994 when the percentages were calculated originally. The group suggested updating the percentages to the latest data available.

V. Key Issues:

One of the objectives of the E & O Committee was to come up with key issues that would be important to concentrate on during the larger June 11-12, 2009 Workshop. It is hoped that these key issues would be analyzed in detail at the workshop and hopefully influence the future seagrass education and outreach work in Texas. Through this review process the following key issues were identified:

- Expand education and outreach beyond the current areas, moving inland since a large percentage of bay users live away from the coast. Also distribute seagrass educational materials to smaller coastal communities outside of Nueces, San Patricio, and Aransas counties where the majority of work is currently being conducted.
- Keep up with internet technology, by enhancing websites with educational videos, downloadable seagrass project reports, and update links on existing Texas seagrass websites to other seagrass information pages.
- Add a strategy about climate change that discusses ways to educate the public on possible changes it may have on seagrasses, including: sea level rise, invasive species, extreme weather events, water chemistry changes, increase in water temperatures.
- Add an action item under Objective 1, Strategy 2 that addressed the 2008-2009 TPWD Outdoor Annual that is currently being published. This would be a good place to add general seagrass information. Anglers look at this to get the current regulations, they could see a well-placed message.

- Educate local governments and NGO's about the importance of seagrasses and how that can be incorporated into planning and development.
- Convert existing seagrass educational materials into Spanish in order to reach that segment of bay users.
- Work on translating technical reports into easy to understand documents for the general public.

VI. Texas Seagrass Monitoring Plan:

The group discussed the possibility of including the Texas Seagrass Monitoring Plan as part of the appendices that will be written during this review process and adding it to the back of the Seagrass Conservation Plan.

The group unanimously voted against adding the Monitoring Plan to the back of the Seagrass Conservation Plan for a couple of reasons:

- 1) The Monitoring Plan was written as a separate document called for by the Seagrass Conservation Plan.
- 2) The Monitoring Plan might need to be updated more often, possibly every 5 years (or after a milestone project is completed and it determines that there is another issue to be monitored that was not originally discussed in the Monitoring Plan). The Seagrass Conservation Plan will be possibly updated every 10 years. The group agreed that there should be a summary of the Monitoring Plan within the review appendices being developed and a location (website) in the text of the summary that states where a copy of the Monitoring Plan can be retrieved.

VII. Volunteers:

Several people from the E&O Subcommittee volunteered their time to help with the organization of the June 2009 Workshop. So far the list includes Pat Clements (non-presenter), Liz Smith (non-presenter), Chad Leister (organizer/facilitator/presenter), Jaimie Ingold (general volunteer), Karen Meador (general volunteer or presenter), Jace Tunnell (general volunteer or presenter).

VIII. Next Step in Planning Process:

Jace Tunnell and Nathan Kuhn explained that the next steps to take in planning for the June 2009 Seagrass Workshop are to write up a meeting summary of this E&O Subcommittee Meeting and send out to all participants to review. After all comments are received, we will concentrate on Key Issues to present at the June 2009 Workshop. Other information gathered throughout the review process will be written up and considered in setting the workshop agenda. The Steering Committee will meet several times throughout the next few months in order to figure out logistics of the workshop and plan out how the information gathered from the subcommittees should be presented. Volunteers from the various subcommittees will probably be contacted closer to the workshop date in 2009 in order to figure out their role in helping out. The E&O Subcommittee Chairs will keep the subcommittee members up to date with how the workshop planning and organization is progressing and may sometimes ask the members for technical assistance.

IX. New Ideas:

As the E&O Subcommittee went through the Seagrass Conservation Plan, several ideas for what could be done in trying to educate bay users about seagrasses were talked about. Below is a list of ideas that were discussed:

- Prioritize the audience that should be targeted first so that available resources are spent on the group of bay users that have the largest impact on seagrasses. Utilize the list that has already been created in the Seagrass Conservation Plan on page 65, but prioritize in an order that has the primary users listed first and so on.
- Create a new Strategy under Objective 1 that states: Create a database clearing house for Education and Outreach items that have been achieved. This has already been done in-house at TPWD but could be expanded to include works from CBBEP, TNC, USFWS, and other organizations promoting seagrasses.
- In the “proceedings” that are being developed from the 2009 Workshop there should be a summary within it that has what each entity has accomplished and is currently working on that have anything to do with promoting seagrasses.
- Add locations, pictures, and any relevant information about boat ramps to the TPWD website, especially the ones near seagrass beds. Could have educational information associated with each boat ramp on the website. Also add prop scar information and photos about Redfish Bay State Scientific Area on the TPWD website.
- Need to target boat dealers for educating public about seagrasses. TPWD initially visited with Coastal Bend dealers and provided a poster visually describing running depths versus seagrass depths.
- Have the governor of Texas create a Seagrass Awareness Month or at least a day where seagrasses are recognized and can be highlighted throughout the media to educate people about their importance.
- Add seagrasses as a layer onto GPS units.

XI. Other Topics:

Nathan Kuhn mentioned that Carter Smith might be signing the letter of support that would be going out in order to seek funding support for the June 2009 Workshop.

Appendix B
Management Overview

Appendix B Management Overview

EXECUTIVE SUMMARY

Evaluation of Workshop Management Breakout Comments

[Reminder: Not a consensus workshop- a provisioning of ideas workshop]

General Observations

Lots of ideas, a broad range of concerns, interests, and positions expressed.

One of several challenges for Reviewers was to identify and succinctly describe recommended improvement(s) to the SCPT that reflect the range of ideas provided at the breakout. An additional challenge was that the comments/ideas were recorded at the broad Priority Problem and Objective level and rarely with a specific reference about a particular Strategy.

Another challenge was that the majority of comments to the **question*** were of a non-specific nature. [***The question being: “What changes/modifications do you suggest be made to the Seagrass Conservation Plan for Texas?”***] Thus, interpretation of what someone “meant” by their comments or by expression of their opinion, was often by necessity subjective on the part of the Reviewers. In general, comments varied widely in content and not necessarily in context of the topic (e.g. Objective) being evaluated. It was often difficult to attribute a comment/idea to one specific SCPT issue (e.g. Management, Research, Education), and/ or determine its (potential) applicability to a Management/Policy category such as “Regulatory”, or “Education”, as example.

Sometimes, there appeared to be a disconnect between the content of ideas recorded and the content of the Summary of Ideas/Statements recorded. Frequently, ideas provided by an individual Table participant (see Miscellaneous Notes from Table Participants, Appendix A)_were recorded within the list of recorded Table ideas.

Where there was no specific call by a table to repudiate or change a Priority Problem and/or an Objective and/or a Strategy and/or statement in the 1999 SCPT, the reviewers interpreted this as “supportive” of the Priority Problem and/or Objective and/or Strategy in the 1999 SCPT.

When more “specific” comments were provided, the majority were of a tactical rather than of a strategic nature. Tactical meaning they presented opinions on specific actions believed by the commenter/Table to be appropriate for seagrass conservation. Typical tactical comments represented opinions and/or preferences concerning the scope and/or direction and/or implementation of

policy and regulatory issues, research issues, and education issues. As said above, comments varied widely in content.

That being said, there were several strategic ideas/key issues provided during the Workshop recorded as Table ideas or in the Summary of Ideas/Statements, or provided on workshop Comment Form(s). Additional strategic/key issues were contributed as part of the 31 July 2008 pre-workshop discussions.

Nonetheless, the comment(s) recorded by each Workshop Table Notetaker, on the workshop Comment Form(s), and contributed as part of 31 July 2008 pre-workshop discussions, were carefully evaluated by the Reviewers. The comments were annotated/flagged as applicable to one or more SCPT primary domain, i.e. Management (M), Research (R), and Education (E). In addition, where considered appropriate, a comment may also have been flagged as having a more specific subset/attribute or a directed applicability to, e.g., policy (p), or regulatory (r). Also, several **Controversial**** ideas and/or issues were identified and flagged.

(Controversial = dissimilar and/or opposing ideas expressed)**

These classifications were done: (1) as a courtesy to the other Chapter lead reviewers so they could assess if there may have been something that came out of the Management Breakout that might be applicable to their breakout, and; (2) to assist the Management Chapter Reviewers on the possible disposition of an item (e.g. combine as similar with) and/or (3) identify the suite of items/topic/issues that should be redressed by a separate discussion focused on a particular subject (e.g. Mitigation) for later advancement into the Management Chapter and/or SCPT review.

NOTE: The compiled Management Chapter Review Notetaker Notes, the July 31, 2008 Management Subcommittee Pre-workshop Evaluation, and the M, R and/or E flagged workshop notes, and the Comment Form comments, are provided in the Appendix.

Lastly, overall it appears that there are several changes to the text to a few management issue Objectives, and/or Strategies provided to the 1999 Seagrass Conservation Plan for Texas are suggested. However, there are several issues identified as Objectives and Strategies or narrated in the 1999 SCPT that were ignored or not emphasized in the intervening period, or that have taken on renewed relevance and apparent significance, are no longer relevant, or have been overtaken by events occurring between 1999 and 2009, and even events occurring after the 2009 workshop. The issue's status may be also related to having been accomplished, or is no longer relevant due to it now addressed as a matter of continual improvement within a now existing program. Nonetheless, several cogent suggestions, a few "new" ideas, a few unrealized 1999 SCPT opportunities revisited, and several controversial ideas and/or issues have been identified during the 10-year SCPT review process. Some "New" and some

“Controversial” issues potentially have status as new “Problem Problems” (e.g. Relative Sea Level Rise), but at a minimum they represent the future of seagrass conservation management in Texas. Therefore it appears that going forward that a substantive update, or more likely a substantive revision to the strategic and narrative content of the SCPT, is recommend.

The Reviewers describe some of these below and provide some recommendations on how to address them going forward.

What’s New (or “Newish”?)

- Sea Level Rise - Climate Change
- Regional Spatial Planning – Ecosystem Services Provisioning
- Additional State Scientific Areas (SSAs) or Like Protected Areas
- Mitigation Bank Rules – Role of.
- Dedicated Funding for Seagrass Conservation Programs

Sea Level Rise - Climate Change. A very brief mention in the 1999 plan now appears as a dominate issue that presents significant challenges for all aspects of seagrass management. SLR has been and will continue to be a significant driver of change of the quantity and distribution of seagrass. In some regions relative SLR has caused an increase in acreage at the expense of other habitats (e.g. sand and or mudflats) and in other areas implicated in losses. SLR is expected to significantly impact resource management policies that have largely been formulated for “steady state” physical environment conditions. Examples of specific recommendations include but are not limited to:

- Texas state agency agreement on Regional (bay system specific) SLR scenarios (can’t plan or design w/o estimates)
- Develop SLR estimate scenario based seagrass distribution/quantity projections
- Regional Contingency plans for SLR (adaptive retreat – services reprioritization)
- Describe how projected SLR will/may affect regulatory programs and natural resources policies e.g. TCEQ/TSWQS, State and Federal mitigation policy, etc) and;
- Develop and propose alternate regulatory and resource management adaptation strategies.

Regional Spatial Planning – Ecosystem Services Informed Management

Regional spatial (landscape scale) planning should provide several benefits to management of coastal resources including seagrass, as well as the administration of regulatory programs. The potential opportunity for decisions that address regional ecosystem services provisioning in comparison to place-based impacted habitat specific management. Fit seagrass management into a ecosystem services informed habitat management plan for preservation, creation and restoration goals specific to acreage and services targets established for each bay system. The Reviewers recommend that this strategic habitat conservation (SHC) be employed. The U.S. Fish and Wildlife Service and the USGS, as a strategy to provide landscape level conservation of natural resources, are using this SHC approach.

Additional State Scientific Area or Similar Resource Management Areas Designations

SSAs, coastal preserves and similar resource management areas (RMAs) have potential for managing seagrass resources by accommodating and reducing use conflicts. “RMAs” may provide long-term spatial protection for specific areas with concentrations of high value seagrass resources that otherwise cannot be achieved by project by project regulatory permitting programs. There is an opportunity to identify potential locations and to proposing additional “RMAs” with vetting through the public review process. RMAs may be considered independent from Regional Spatial Planning – Ecosystem Services Provisioning yet can also be considered within that contextual framework.

Mitigation Bank Rules –Role of.

The potential opportunities to facilitate management of the seagrass resource in context of regional habitat needs and possible applicability of the March 2008 USACE-EPA Mitigation Rule have not been considered. Mitigation in all forms for all habitats including seagrass may be considered independent from Regional Spatial Planning – Ecosystem Services Provisioning yet can also be implemented or leveraged within that framework.

Dedicated Funding for Texas Seagrass Conservation Programs

State budget line item support to TPWD, or SEP money or use mitigation dollars for seagrass conservation programs such as “RMA” management, including enforcement.

What’s Controversial

Controversial = Dissimilar and/or Opposing Views Expressed

NOTE: “*What’s New*” may also be “*What’s Controversial*”

- Regulatory Coordination – Lack of,
- Water Quality – 401; 402; Use Designation; Standards; Screening; Criteria; Implementation
- Mitigation – Policy; Sequence; Alternatives; Siting; Guidelines; Success Measurement; COE Tracking.
- Research – Direction of: Applied vs. Pure; Interpretation; Utility to Mgt; Causality

- Statewide Monitoring Plan - Scope; Scale; Focus; Need; Criteria/Key Parameters.
- Resource/Regulatory Policy - Regulatory Process Based; Ecosystem Needs/Services Based.
- Knowledge Base (of Regulators and Regulated)
- Seagrass Mgt Institutional Structure – Relationship between MGT and RES and EDU and Seagrass Monitoring Workgroup.
- Role of Seagrass Monitoring Workgroup and Expanded Membership to Workgroup

NOTE: *General: We think, because all comments were “anonymous”, that there appears to be a wide chasm between the “regulators” and the “regulated”. Some regulators (we think) seem to believe that the context of existing regulatory framework is fine and additional regulation and prescriptive controls are necessary to conserve seagrass, and the regulated (we think) seem to believe that existing regulatory programs are not fine and/or proposed regulations are often not-scientifically supportable and/or alternative, innovative approaches and regulatory flexibility are necessary to conserve and manage seagrass ecosystems.*

It is our speculation that these differences may be because the regulators are “seagrass centric” [the 1999 plan page 66 used a term “biocentric” to describe ecologists and wildlife specialists] and the regulated are not – i.e. the regulated consider other factors [the 1999 use the term “anthropocentric” to describe economists and public policy experts]. Based on the workshop comments we are not confident the regulators or the regulated are either “biocentric” or “anthropocentric”.

NOTE: *A General Administrative Comment. When revising all the Plan Chapters, label the Strategies as “a”, “b”, “c...or 1, 2, 3 to provide a means to quicker reference and to aid communication.*

Management Issues for Texas (Review)

In 2008 the Seagrass Monitoring Working Group (SMWG) decided to conduct a thorough review of the Seagrass Conservation Plan for Texas. This 10-year review was designed to evaluate if key components of the plan were still relevant and reflective of our current state of knowledge.

The review of Chapter 3 was initiated by a subcommittee co-chaired by Mr. Paul Carangelo Port of Corpus Christi Authority and Mr. Beau Hardegree, U.S. Department of the Interior, Fish and Wildlife Services. The subcommittee had a meeting at Texas A&M University on July 31, 2008. The subcommittee was asked to review each item in the SCPT and:

1. Decide what to re-indorse and the basis for that decision;
2. List things or issues that need further discussion/change or are controversial, and;
3. Determine anything not clearly mentioned in the plan that should be added.

The subcommittee meeting was attended by Co-Chairs Beau Hardegree, USFWS, and Paul Carangelo, PCCA, with Rob Youker Boating Trades Organization, Alex Nunez TPWD, Leslie Williams TPWD, Nathan Kuhn, TPWD, Dennis Pridgen TPWD, Mark Fisher TCEQ, and Rafael Calderon TNC. Raul Cantu TDOT, and Tom Calnan GLO, could not attend but provided written comments

The June 11-12, 2009 Workshop Management Breakout session was attended by Nicole Hausler PHA and Note Taker, Amy Nunez GLO and Facilitator, Kathryn Tunnell GLO, Jennifer Stephens GLO, Pat Radloff TPWD, Jeff Raasch TPWD, Will Cupit TPWD, Perry Trial TPWD, Ray Allen CBBEP John Huffman USFWS and Facilitator, Kristopher Benson, NOAA and Note taker, Barbara Keeler EPA and Alternate Note taker, Mark Fisher TCEQ, H. E. Hegan TPWD, Bob Hewgley, GLO, Scott Sullivan, TXDOT, Christine Kolbe TCEQ and Note taker, Alex Nunez TPWD and Facilitator, Jason Zeplin GLO, Jay Gardner NEI, Terrell Roberts USACOE, Daniel Allen HNTB, Bill Dennison Univ. Maryland, Leo Trevino CBBEP, and Co-Chairs and Chapter 3 Reviewer's Paul Carangelo PCCA and Beau Hardegree USFWS.

The information from the July 31, 2008 pre-workshop meeting along with results from the Workshop held June 11 – 12, 2009 at the Solomon Ortiz Center in Corpus Christi were compiled and reviewed by the co-chairs and the results are presented below.

PRIORITY GOAL: To develop a sound management process that coordinates agency policies, public concern, and existing knowledge from research, to achieve effective seagrass conservation.

It was recognized that this is still a priority goal and no text changes suggested or proposed.

Priority Problem I *Seagrass beds are being lost or degraded, and/ or species composition is changing.*

Recognized that this is still a relevant issue. No text changes suggested or proposed.

However, the 2008 pre-workshop management subcommittee review suggested there was an increased emphasis to understand ***the cause of species composition changes, since some changes naturally occur.***

In addition, it is important to clarify if there are significant fisheries dependant differences between different seagrass species or if they are essentially functionally equivalent on an ecosystem basis. This information would be useful when communicating potential resource management objectives for intrinsic values (e.g. *Thalassia* in Redfish Bay) versus function (*Halodule* replacement by *Syringodium* in Upper Laguna Madre)

Objective 1. *Ensure water and sediment quality beneficial to the seagrass community*

Continued recognition as a relevant issue..No text changes suggested or proposed to Objective 1.

- **Strategy:** [1] Designate seagrass as a high or exceptional Aquatic Life Use in the Texas Surface water Quality Standards

It was recognized the “Use” designation for seagrass propagation in Chapter 307 of the TSWQS occurred as a part of the 2000 TWQS revisions. This designation was listed as an accomplishment during 31 July 2008 Pre-workshop Management Subcommittee Review and the 2009 workshop.

Note: *There has been no known publicly vetted proposal to designate the waters in which seagrass occur as high or exceptional. It is not known if TCEQ believes these designations are no longer needed or if water criteria development would accomplish the desired objective.*

The 31 July 2008 Pre-workshop Management Subcommittee review indicated that a future focus under this strategy was to use statewide maps from TPWD to designate [bay system] segments in the TSWQS. Based on workshop comments this action was categorized as “Controversial”. See next strategy for discussion.

Continue recognition as a relevant issue. However, suggested text revision:

- **Strategy [1]: Designate seagrass propagation as an Aquatic Life Use in the Texas Surface Water Standards.**

This change reflects what has actually occurred and does not preclude further standards development. However, because this has already been done the reviews recommend deleting Strategy [1].

- **Strategy: [2] Designate water quality criteria for seagrass in Texas Water Quality Standards.**

During the workshop this strategy was recognized as a relevant Management issue. However, the issue is also characterized as a Controversial issue.

During the 31 July 2008 pre-workshop Management Subcommittee review the use of seagrass as an endpoint, i.e. their response to nutrient changes, was identified as a part of ongoing Gulf of Mexico Alliance (GOMA) efforts. However, no action under the SCPT was suggested or proposed.

Comments at the 2009 workshop suggested a need to prioritize research and monitoring efforts to focus on causal effect of point source discharge on seagrass condition as well as combined loads with at NPS from a variety of coastal development activities and agriculture, the development of region specific water quality criteria focused on those portions of bays with ecologically significant concentrations of seagrass, development of predictive model identifying the causal physical environmental and water chemistry factors that support seagrass, that policy and criteria formulation understand and recognize natural spatial and temporal variability of both seagrass condition and distribution. There were suggestions during the 2008 Pre-workshop and 2009 Breakout that utilization of statewide seagrass maps from TPWD and designation of segment with seagrass be incorporated in the WQS.

Note: *It is the Reviewers' understanding that during the 2007 triennial review of the TSWQS no specific water quality criteria for seagrass were drafted for public review . Public comment was solicited from the TSWQS 2007 Triennial Review Workgroup on a draft proposal to revise the 2000 TSWQS to list entire bay segments within which seagrass had been mapped, and to include the maps themselves. These and other related draft proposal revision(s) and associated implementation guidance were contentious during the 2007 triennial review WQS Workgroup process and at the 2009 Workshop. The draft proposal revision(s) to 2000 TSWQS were not offered in the proposed amendments to Chapter 307.1 – 307.10, Texas Register Volume 35, Number 5, January 29, 2010. It is not known why water quality criteria, segment designation, maps, or other draft proposed revision(s) related to seagrass were not proposed for public comment in the January 2010 TxREG.*

Prior to moving forward with Strategy 2 it is important to understand why changes were not made during the TSWQS 2007 Triennial Review. Based on the range of comments we believe sound science is pre-requisite for developing water quality criteria and a continued future focus and discussion by Management toward defining and achieving the research and monitoring necessary for criteria development, appear warranted. We recommend the following:

New: Strategy [3]: Define the range of environmental conditions that provide for seagrass propagation within the identified bay sub-segments and propose load limits and associated water quality criteria within the Texas State Water Quality Standards that protect the conditions.

Note: *In order to accomplish NEW Strategy [3] we recommend that monitoring and research be conducted to determine the causal relationship between point and non-point loading with the range of conditions occurring within specific bay system sub-segments that support significant concentration and density of seagrass.*

Note: *See PP III, Obj I, Strategy [1], which is broad compared to the focus of PP I Obj 1 Revised Strategy [2] and New Strategy [3], this Objective.*

- **Strategy [3]:** Develop and implement water-based Best Management Practices.

Workshop participants continue to support development of BMPs. Comments included suggestion of development of a guidebook to specific BMPs. However, there were a range of comment on possible content and scope to providing for protection of seagrass and economic activity. Accomplishments associated with this strategy are believed to include as an example, environmental windows for dredging in the Laguna Madre. It was not readily apparent from workshop comments what additional specific BMPs were being contemplated and it is not apparent if the BMPs would be proposed within the Texas Administrative Code, or as a joint federal/state policy guidance document, or as a non-regulatory BMP handbook. A future focus idea from the 31 July 2008 meeting was on better coordination with USDA programs, and verification of BMP effectiveness and feasibility, and the 2009 breakout suggested BMPs that provide for protection of seagrass, support economic activity, and that do not curtail other designated uses.

Reviews recommend to DELETE Former PP I Objective 1 Strategy [3] and recommend Roll-up into/combine this strategy with PP I Objective 4 Strategy [1] below

The Priority Problem I summary: Objective 1 stays. 1999 Strategy [1] is deleted, 1999 Strategy [2] becomes 2009 Strategy [1], proposed new Strategy [3] become new 2009 Strategy [2], and 1999 Strategy [3] is deleted but idea rolled up into Objective 4, below.

Objective 2: *Protect seagrass through effective application of the mitigation sequence: avoidance, minimization, compensation*

- **Strategy:** [1] Develop consistent and effective mitigation policies

Based on the range of comments made concerning mitigation during the breakout, the issue is considered still relevant but Controversial. Some comments concerning mitigation included but were not limited to: policy, the sequence (e.g. agencies doing a good job; need more avoidance); enforcement; education; alternatives to in-kind – create other habitat; no preservation banks for seagrass; memorialize 3:1 ratio; base on functional assessment; permit enforceable conditions/conflicting agendas impeding betterments.

The reviews recommend no change to the text. However this is a critical issue and could be addressed through better ecosystem planning (see Executive Summary Regional Spatial Planning – Ecosystem Services Informed Management).

Objective 3: *Restore/enhance/create lost functions and values of seagrass at a watershed/system-wide level, where feasible.*

REVISED Objective 3: *Restore/enhance/create functions and values of seagrass at a watershed/system-wide level, where feasible*

NOTE: *Delete “Lost”. Considered a extraneous modifier.*

- **Strategy:** [1] Develop guidelines for site selection on a watershed/system wide level, planting methods, and monitoring of seagrass restoration projects.

Revise: Strategy [1]: Develop guidelines for site selection, planting methods, and monitoring of seagrass restoration, enhancement and/or creation projects.

Note: *Delete “on a watershed/system wide basis”. Create new strategy [2]*

Based on numerous comments concerning development of watershed protection plans, clearing house of restoration/enhancement/creation techniques, bay system and statewide seagrass acreage goals, base goals on ecosystem needs, the reviewers concluded that more clarity was needed within the strategies; therefore 3 new strategies were developed as follows:

New: Strategy [2]: Conduct bay by bay ecosystem services needs assessment for seagrass and other use habitats.

New: Strategy [3]: Develop bay by bay seagrass cover acreage targets to be achieved or maintained by protection, restoration, enhancement, or creation/construction.

New: Strategy [4]: Identify landscape scale seagrass habitat preservation/protection maintenance, restoration, enhancement and/or creation project site locations for each bay .

Objective 4: *Design dredging and shoreline development projects to effectively reduce impacts upon seagrass.*

REVISED Objective 4: *Design coastal development projects to effectively reduce impacts upon seagrass.*

- **Strategy:** [1]; Best management practices are needed to protect seagrass while allowing for economic development of coastal resources.

REVISED Strategy [1]: Best management practices are needed to protect seagrass while allowing for economic development of coastal resources. Develop a guidebook on BMPs that have been verified for effectiveness and feasibility.

Based on the variety of comments received at the 2009 workshop the Reviewers believe that BMP's would need to be developed for each of several coastal development activities including but not limited to: oil and gas, dredging and use of dredge material, shoreline developments, non-point sources in the watershed, setback requirements, and the activities within coastal natural resource areas addressed in the Texas Coastal Zone Management Plan.

NOTE: *The workshop discussion and comments concerning Priority Problem 2, below, have material bearing on the PP 1 Objectives [2] and [3] and [4]. The general workshop recognition that multiple agency policies and regulations, and potentially individual staff interpretations of policy and regulation and/or personal agendas, often make it difficult to reach agreement. Please see Priority Problem 2, below. The identification by each participating agency to I develop and disseminate a brief concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories again appears in 2009 as a needed step, also identified in 1999. From that body of information an identification of conflicting policies/standards/permit conditions/agendas should be completed. Following that step, a process to resolve those conflicts in context of implementing a regional/watershed ecosystem services/habitat maintenance/ restoration/creation/adaptation goal(s) can be accomplished, as specifically applicable to PP1 and the SCPT in general. Please see Priority Problem 2, below.*

Priority Problem II: Agency coordination or policies may prevent adequate management.

It was recognized that this is still a relevant issue both at the 31 July 2008 pre-workshop review and the June 2009 Workshop. The pre-workshop review suggested a re-write of the Priority Problem II text to state:

Priority Problem II: “Lack of agency coordination (compromise?) or ways to resolve conflicting policies may prevent adequate management”.

The lack of compromise/coordination may be the result of conflicting policies that are promulgated under differing legislative authorities and mandates. Please also refer to Priority Problem II, Objective 2 discussion below. However, there is also the perception the lack of coordination is potentially due to a lack of willingness to compromise, or due to agency overreach.

The Reviewers recommend that the Priority Problem II be rewritten:

NEW Priority Problem II: Lack of agency coordination, conflicting policies, or ways to resolve conflicting policies may prevent adequate management.

Objective 1. *Develop consensus agreements or plans among the users of the seagrass resource.*

It was recognized that this is still a relevant Management objective. However at the 2009 Workshop it was recognized that this was a controversial issue some of the comments included: “not a lack of coordination but “complicated”, identify conflicting standards and guidelines, lack of agency mechanisms to resolve conflicting policies as some examples.

- **Strategy:** [1] Model consensus agreements or plans such as the successful 1994 Beneficial Uses Group for the Houston Ship Channel deep-draft navigation project.

It was also recognized during the 2008 and 2009 review that under Objective 1: “Develop consensus agreements or plans among users of the seagrass resource”, there were accomplishments including examples like the Laguna Madre 216 Study and the Corpus Christi Ship Channel Channel Improvement Project and these should be highlighted in the SCPT under the PP II, Objective 1, Strategy [1].

No specific text change to Strategy [1] were originally proposed, however, the Chapter Reviewer’s now recommend the Strategy be revised and include the more recent planning processes that had direct linkage to seagrass management outcomes.

Strategy [1]: Model consensus agreements or plans after examples such as the 1994 Beneficial Uses Group for the Houston Ship Channel deep-draft navigation project, the 2005 Laguna Madre 216 Study, or the 2003 Corpus Christi Ship Channel- Channel Improvement Project.

There was also recognition that no agency coordination policies were changed as a result of the plan.

Comments made during the 2008 Pre-workshop and the 2009 Breakout session concerned the role of the Seagrass Monitoring Workgroup (SMW) be better defined, and the membership of the SMW be expanded to facilitate more coordination and participation because the Workgroup could be a good place to start addressing conflicting policies and build consensus on matters associated with statewide seagrass conservation. However, it was also suggested that additional Federal and State agencies participate (or more fully participate) in the SMW e.g. United States Department of Agriculture, Texas Soil and Water Conservation Board, US Army Corps of Engineers, etc, as there are several potential technical and policy issues being considered that could affect their missions.

Objective 2: *Facilitate agency policy coordination by improving communications and consistency of actions related top seagrass management.*

- **Strategy:** [1] Develop and disseminate a brief concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories.

The 2008 pre-workshop review indicated that no progress had been made under Objective 2 Strategy [1] but that it was still relevant and no text changes were proposed at the Workshop. Several comments during the 2009 breakout session also highlighted interest in accomplishing this strategy as it appears to have material relationship to Priority Problem II (revised), and Objective 1, and Strategy [1] (revised), above. A future focus suggestion from the 2008 pre-workshop review was to hire a contractor to bring this information together. However, the Chapter Reviewer's now suggest that each participating agency is the best position to be knowledgeable about the information indicated in Strategy [2] and to collate it. Then, if necessary, the information could be submitted to a contractor for analysis and synthesis. Accordingly, the Review's recommend the Strategy be revised to state:

Strategy [1]: Each participating agency shall develop and disseminate a brief concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories.

- **Strategy:**[2] Develop an updated data base on seagrass loss/damage, the amount of compensatory mitigation performed, and the mitigation success rates in order to measure policy effectiveness.

The 2008 pre-workshop review suggested that some accomplishments on status and trends had been made under Strategy [2] characterizing the progress as: "some status and trends on broad scale and sometimes on a bay specific scale, but no data base created". See also Priority Problem 3 New Strategy [3] Establish a 10-year update cycle. Please see that section.

Nonetheless, the 2008 review also characterized progress as "generally not accomplished" particularly with regard to the compensatory mitigation aspects of this strategy. Multiple comments during the 2009 Workshop concerning mitigation performance tracking, compensatory mitigation in general were recorded under Priority Problem I, Objective 2, Strategy [1]. Develop consistent and effective mitigation policies. Please see that section.

The 2008 pre-workshop management review indicated Strategy [2] of PP II, Objective 2, is a **KEY ISSUE** and a "**foundation for multiple other objectives**".

- **Strategy:** [3] Review in kind policies involving in-kind and in-system mitigation for current application by both management and research teams.

The 2008 pre-workshop management review identified a future focus to link Strategy [3] to priority Problem I, Objective 2, Strategy [1] and Objective 3, Strategy [1]. Ideas presented at the 2009 Workshop also suggested Strategy [3] of PP II, Objective 2 should be combined with Priority Problem 1. There was also a recommendation made during the Workshop that the {sic} Strategy [2] and Strategy [3] of PP II, Objective 2 could be addressed combined and the new strategies written to obtain the new objective.

Note: Priority Problem II and Objective 2. Chapter 3 Workshop presentations identified several activities outlined in the 1999 plan text that have not been accomplished and which, based on interpretation of the range on comments, still have direct relevance to the Priority Problem II and Objective 2. Please refer to Policy Coordination, Page 55, and the 1999 plan. It appears that accomplishment of these activities would have substantive potential benefit by reducing the perception that the lack of coordination is for example due to a lack of willingness to compromise, or due to agency regulatory mandate, or due to agency overreach.

One NEW IDEA that was offered was to have a “formal charter that identifies each agencies responsibilities and helps secure appropriate resources”. However, this issue was also identified as CONTROVERSIAL particularly with suggestions that there was a “benefit to informality because it allows more timely implementation”.

As a result of the evaluation of the Workshop comments the Reviewers recommend that the Priority Problem and the two objectives be rewritten to more accurately represent a clear path forward. In addition the strategies need to be clarified and included under one objective as follows:

NEW Priority Problem II: Lack of agency coordination, conflicting policies, or ways to resolve conflicting policies may prevent adequate management.
NEW Objective 1. Reduce conflicting agency policies and improve agency coordination.

NEW Strategy [1]: Model consensus agreements or plans after examples such as the 1994 Beneficial Uses Group for the Houston Ship Channel deep-draft navigation project, the 2005 Laguna Madre 216 Study, or the 2003 Corpus Christi Ship Channel- Channel Improvement Project.

NEW Strategy [2]: Each participating agency shall develop and disseminate a brief concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories.

NEW Strategy [3]: Agencies should collaborate and develop an updated data base on seagrass loss/damage to track regional changes in seagrass distribution/abundance, the amount of compensatory mitigation performed, and the mitigation success rates in order to measure policy effectiveness.

NEW Strategy [4]: Use TPWD's seagrass web page to include links to other agency information and become the seagrass document clearinghouse for the State.

NEW Strategy [5]: Define the role of the Seagrass Monitoring Working Group (SMWG) in coordinating agency policy and addressing agency conflicts related to seagrass management. ***WARNING NEW Strategy [5] is Controversial and as addressed above would require substantial changes to the SMWGs mission and membership.***

Priority Problem III

Data synthesis and monitoring are insufficient for management decisions and need to be focused on management needs

Objective 1: Conduct research and seagrass resources data acquisition and analysis that provide a sound technical basis for management actions.

- Strategy: [1] Establish a data clearinghouse for seagrass-related information
- Strategy: [2] Focus research on seagrass management needs for Texas estuarine systems, including such issues as seagrass status and trends, water quality criteria, adequate mitigation ratios, and best mitigation practices.

Revise: Strategy **[1]:** Establish a data clearinghouse for seagrass-related information

Revise Strategy **[2]:** Focus research on seagrass management needs for Texas estuarine systems, including such issues as seagrass status and trends, water quality criteria, adequate mitigation ratios, and best mitigation practices.

Comments during the 2009 breakout indicated the issue of data synthesis and monitoring are still relevant, but there were divergent interests or needs for technical clarifications. Concerning Strategy [1], the 2008 pre-workshop noted accomplishments such using GOMA PHINS as data clearing house and TNRIS for TWWD data, aerial photography and remote sensing database, and concerning Strategy [2], there were numerous ongoing research activities. Comments in 2009 indicated that information provision could benefit if each agency identified and prioritized its research interests and activities, establish a standardized coast wide monitoring protocol used by all agencies, upgrading version controls of maps and databases, prioritization upgrading the use GOMA PHINS, that PHINS has been superseded by REDM as the data clearinghouse, a new idea to establish a 10-year cycle for updating seagrass distribution maps and status and trends, use of the TPWD webpage to link or post documents and the development of an annotated bibliography of seagrass related papers. The Reviews recommend the addition of a new strategy:

New Strategy [3]: Establish a 10-year cycle for updating seagrass distribution maps, and status and trends using a standardized coast wide monitoring protocol.

NOTE: *There were several individual comments and during other PP breakout that were indirectly related to the PP IV Objective 1, Strategy [2] but possibly also be related to PP 1 Objective 3 but which were so significant they were identified as NEW ISSUES. Some of these would be better addressed under “Mitigation” such as a guidebook on seagrass restoration techniques, the overarching effect of relative se level rise SLR on all aspects of coastal resources management and addressing seagrass as part of need assessments in the context of ecosystem services provisioning.*

Priority Problem IV Public Outreach is too limited to achieve the goal of public awareness.

Objective 1: Develop a sense of community stewardship and individual responsibility for the conservation of seagrass

- Strategy: [1] Write information clearly, accurately, and with common-sense ideas for the public sector, including schools, universities, and the general public
- Strategy:[2] Listen to stakeholder ideas, exchange information, and make information relevant.
- Strategy: [3] Strengthen commitment of state and federal agencies to outreach programs

Comments provided from the Pre-workshop review and the 2009 Workshop continue to support the relevance of the Priority Problem and the Objective 1. No revisions to the text of the Priority Problem or Objective 1 are suggested. Several accomplishments were also noted concerning Strategy [2] and Strategy [3] including outreach during the development of the Redfish Bay State Scientific Area, the Seagrass taskforce, and the TPWD Website. However, the 2008 pre-workshop review also recommended the incorporation of Strategy [1], Strategy [2] and Strategy [3] into the Education/Outreach section of the plan.

During the 2009 Workshop it was suggested that a liaison between Education/Outreach and Management could ensure the right topics are communicated and products developed for the proper medium and for the appropriate target audiences. Also, the 31 July 2008 pre-workshop review similarly noted and also recommended a new Strategy for Management.

Strategy [New Strategy 1]: Better coordination between management and with individuals conducting seagrass educational outreach.

Therefore original 1999 plan strategies [1][2][3] would be deleted from PP IV and the new Strategy [1] ascended under PP IV Objective 1

REVIEWERS RECOMMENDATIONS

dated 3.22.10 2 PM

Reviewers: Beau Hardegree, US Fish and Wildlife Service
Paul Carangelo, Port of Corpus Christi Authority

PRIORITY GOAL: To develop a sound management process that coordinates agency policies, public concern, and existing knowledge from research, to achieve effective seagrass conservation.

PRIORITY PROBLEM I. *Seagrass beds are being lost or degraded, and/ or species composition is changing.*

Objective 1. *Ensure water and sediment quality beneficial to the seagrass community*

- **Strategy 1:** Designate water quality criteria for seagrass in Texas Water Quality Standards.
- **Strategy 2:** Define the range of environmental conditions that provide for seagrass propagation within the identified bay sub-segments and propose load limits and associated water quality criteria within the Texas State Water Quality Standards that protect the conditions.

Objective 2. *Protect seagrass through effective application of the mitigation sequence: avoidance, minimization, compensation*

- **Strategy 1:** Develop consistent and effective mitigation policies

Objective 3. *Restore/enhance/create functions and values of seagrass at a watershed/system-wide level, where feasible*

- **Strategy 1:** Develop guidelines for site selection, planting methods, and monitoring of seagrass restoration, enhancement and/or creation projects.
- **Strategy 2:** Conduct bay by bay ecosystem services needs assessment for seagrass and other use habitats.
- **Strategy 3:** Develop bay by bay seagrass cover acreage targets to be achieved or maintained by protection, restoration, enhancement, or creation/construction.
- **Strategy 4:** Identify landscape scale seagrass habitat preservation/protection maintenance, restoration, enhancement and/or creation project site locations for each bay .

Objective 4: *Design coastal development projects to effectively reduce impacts upon seagrass.*

- **Strategy 1:** Best management practices are needed to protect seagrass while allowing for economic development of coastal resources. Develop a guidebook on BMPs that have been verified for effectiveness and feasibility.

PRIORITY PROBLEM II: *Lack of agency coordination, conflicting policies, or ways to resolve conflicting policies may prevent adequate management.*

Objective 1. *Reduce conflicting agency policies and improve agency coordination.*

- **Strategy 1:** Model consensus agreements or plans after examples such as the 1994 Beneficial Uses Group for the Houston Ship Channel deep-draft navigation project, the 2005 Laguna Madre 216 Study, or the 2003 Corpus Christi Ship Channel- Channel Improvement Project.
- **Strategy 2:** Each participating agency shall develop and disseminate a brief concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories.
- **Strategy 3:** Agencies should collaborate and develop an updated data base on seagrass loss/damage to track regional changes in seagrass distribution/abundance, the amount of compensatory mitigation performed, and the mitigation success rates in order to measure policy effectiveness.
- **Strategy 4:** Use TPWD's seagrass web page to include links to other agency information and become the seagrass document clearinghouse for the State.
- **Strategy 5:** Define the role of the Seagrass Monitoring Working Group (SMWG) in coordinating agency policy and addressing agency conflicts related to seagrass management. ***WARNING NEW Strategy [5] is Controversial and would require substantial changes to the SMWGs mission and membership.***

PRIORITY PROBLEM III. *Data synthesis and monitoring are insufficient for management decisions and need to be focused on management needs*

Objective 1: *Conduct research and seagrass resources data acquisition and analysis that provide a sound technical basis for management actions.*

- **Strategy 1:** Establish a data clearinghouse for seagrass-related information

- **Strategy 2:** Focus research on seagrass management needs for Texas estuarine systems, including such issues as seagrass status and trends, water quality criteria, adequate mitigation ratios, and best mitigation practices.
- **Strategy 3:** Establish a 10-year cycle for updating seagrass distribution maps, and status and trends using a standardized coastwide monitoring protocol.

PRIORITY PROBLEM IV. *Public Outreach is too limited to achieve the goal of public awareness.*

Objective 1: *Develop a sense of community stewardship and individual responsibility for the conservation of seagrass*

- **Strategy 1:** Better coordination between management and with individuals conducting seagrass educational outreach.

Appendix C

June 2009 Workshop List of Participants

Appendix C Participant List

TEXAS SEAGRASS CONSERVATION PLAN
Review Workshop
June 11-12, 2009
The Ortiz Center, Corpus Christi, TX

Name	Organization	City	State
Ahemad Sade	Aquaculture Resource Management	Sabah Corpus	Malaysia
Al Oswalt	Texas General Land Office	Christi Corpus	TX
Alex Nunez	Texas Parks and Wildlife	Christi	TX
Alison Baker	World Affairs Council of South Texas	Corpus	
Alyssa Dailey	Texas A&M University	Christi Corpus	TX
Amy Nunez	Texas General Land Office	Christi	TX
Angela Schrift	Texas Parks and Wildlife	Austin	TX
Ashley Summers	Texas Parks and Wildlife	Austin	TX
Barbara Keeler	US Environmental Protection Agency	Dallas Corpus	TX
Beau Hardegree	US Fish and Wildlife Service	Christi	TX
Benjamin Chen	Bio-West, Inc.	Houston	TX
Bill Dennison	Chesapeake Bay Program & University of Maryland Center for Environmental Science	Baltimore	MD
Bob Hewgley	Texas General Land Office	Austin	TX
Bridgette Froeschke	Harte Research Institute for Gulf of Mexico Studies	Corpus Christi	TX
Carter Smith	Texas Parks and Wildlife Department	Austin	TX
Chad Leister	UTMSI	Austin	TX
Chris Onuf		Santa Fe	NM
Christine Kolb	Texas Commission on Environmental Quality	Austin	TX
Cindy Contreras	Texas Parks and Wildlife	Austin	TX
Clarus Chu	World Wildlife Fund - Hong Kong	Central	Hong Kong
Daniel Allen	HNTB	Buda Corpus	TX
David Yoskowitz Donald	Harte Research Institute	Christi	TX
Hockaday Emily	University of Texas - Pan American	Port Isabel Corpus	TX
Williamson	Texas A&M University	Christi	TX
Faye Grubbs	Texas Parks and Wildlife	Rockport	TX
H.E. Hegan	Texas Parks and Wildlife	Rockport	TX
Hudson DeYoe	University of Texas - Pan American	Edinburg Corpus	TX
Ismael Nava	Coastal Bend Bays Foundation	Christi	TX

Jace Tunnell	Costal Bend Bays and Estuaries Program	Corpus Christi	TX
Jackie Staggs	Texas Parks and Wildlife	Corpus Christi	TX
James Simons	Texas Parks and Wildlife	Aransas Pass	TX
James Tolan	Texas Parks and Wildlife	Corpus Christi	TX
Jamili Nais	The Board of Trustees of the Sabah Parks	Sabah	Malaysia
Janet Nelson	Texas Parks and Wildlife	Austin	TX
Jason Singhurst	Texas Parks and Wildlife	Austin	TX
Jason Zeplin	Texas General Land Office	Corpus Christi	TX
Jay Gardner	Naismith Engineering	Corpus Christi	TX
Jeff Raasch	Texas Parks and Wildlife	Austin	TX
Jennifer Stephens	Texas General Land Office	Corpus Christi	TX
Jesse Solis	General Land Office	Austin	TX
John Huffman	US Fish and Wildlife Service	Houston	TX
John Wood	Texas A&M University	CORPUS CHRISTI	TX
Joseph Kowalski	University of Texas - Pan American	McAllen	TX
Kaitlan Jones	Texas Parks and Wildlife	Corpus Christi	TX
Karen Meador	Texas Parks and Wildlife	Rockport	TX
Kathryn Tunnell	Texas General Land Office	Corpus Christi	TX
Kelley McKay		Beaufort	NC
Ken Dunton	UTMSI	Corpus Christi	TX
Kirk Cammarata	Texas A&M University	Corpus Christi	TX
Kris Shipman	Texas Parks and Wildlife	Austin	TX
Kristopher Benson	NOAA	St. Petersburg	FL
Larry Laine	Texas General Land Office	Austin	TX
Larry McKinney	Texas A&M University	Corpus Christi	TX
Leo Trevino	Coastal Bend Bays and Estuaries Program	Corpus Christi	TX
Lonnie Hilliard			
L'Oreal Stepney	Texas Commission on Environmental Quality	Austin	TX
Manuel Freytes	Texas General Land Office	Corpus Christi	TX
Mark Fisher	Texas Commission on Environmental Quality	Austin	TX
Marty Heaney	Bio-West, Inc.	Houston	TX
Marty Johnson	World Affairs Council of South Texas		
Meredith Byrd	Texas Parks and Wildlife	Austin	TX
Michael Gonzales	San Antonio River Authority	San Antonio	TX
Michael Weeks	PBS&J	Austin	TX
Mike Ray	Texas Parks and Wildlife	Austin	TX
Mike Smith	Gulf of Mexico Foundation	Corpus Christi	TX

Mindy Paturzzio	Texas A&M University - Corpus Christi	Christi Corpus Christi	TX
Muhammad Mochtar	Destructive Fishing Watch Indonesia	Jakarta	Indonesia
Nalinee Thongtham	Phuket Marine Biological Center		Thailand
Nathan Kuhn	Texas Parks and Wildlife	Austin	TX
Nicole Hausler	Port of Houston Authority		
Pat Radloff	Texas Parks and Wildlife	Austin	TX
Patricia Clements	US Fish and Wildlife Service	Corpus Christi	TX
Patrick Larkin	Texas A&M University - Corpus Christi	Corpus Christi	TX
Paul Carangelo	Port of Corpus Christi Authority	Corpus Christi	TX
Paul Montagna	Harte Research Institute	Corpus Christi	TX
Paul Silva	Texas Parks and Wildlife	Christi	TX
Perry Trial	Texas Parks and Wildlife	Corpus Christi	TX
Rafael Calderon	The Nature Conservancy	Corpus Christi	TX
Ray Allen	Costal Bend Bays and Estuaries Program	Christi	TX
Rebecca Hensley	Texas Parks and Wildlife	Dickinson Corpus	TX
Richard Gonzalez	Gulf of Mexico Foundation	Christi	TX
Robert Burgess	Texas Commission on Environmental Quality	Austin	TX
Robin Riechers	Texas Parks and Wildlife	Austin	TX
Rosario Martinez	Coastal Bend Bays and Estuaries Program	Corpus Christi	TX
Ruby Sahali	Province of Tawi-Tawi	Cesis, Dzintara	Philippine s
Russell Williams	Texas Parks and Wildlife	Corpus Christi	TX
Rusty Swafford	National Oceanic and Atmospheric Administration	Galveston	TX
Sakanan Plathong	Excellent Centre for Biodiversity of Peninsular Thailand	Hat Yai, Songkla	Thailand
Scot Sullivan	Texas Department of Transportation	Austin	TX
Susan Paul			
Tabitha Schonnacher	Texas A&M University - Corpus Christi	Corpus Christi	TX
Terrell Roberts	US Army Corps of Engineers	Texas City	TX
Thomas Whelan III	University of Texas - Pan American	McAllen	TX
Tom Calnan	Texas General Land Office	Austin	TX
Tom Harvey	Texas Parks and Wildlife	Austin	TX
Veda Santiaji	World Wildlife Fund - Indonesia	Sulawesi Tenggara	Indonesia
Warren Pulich	River Systems Institute		
Wen Lee	Texas Parks and Wildlife	Austin	TX

Wes Tunnell	Texas A&M University	Corpus Christi	TX
William Schubert	Texas Parks and Wildlife	Dickinson	TX
Willy Cupit	Texas Parks and Wildlife	Corpus Christi	TX

Appendix D

June 2009 Workshop Breakout Session Notes:

- **Research**
- **Management**
- **Education and Outreach**

Appendix D

Research - Workshop Breakout Notes

Seagrass Conservation Plan for Texas Review Workshop

RESEARCH BREAKOUT SESSION

Meeting Notes

June 11, 2009

Seagrass Conservation Plan for Texas Workshop

Notes by Kelly McKay Darnell

Table Group: Ken Dunton, Kelly McKay Darnell, Kaitlan Jones, Jackie Staggs, Angela Schrift, Meredith Byrd, Wen Lee, Michael Gonzales, Ashley Summers

1:15-2:45pm

Objective 1: Regularly assess status and trends of seagrass distribution on a coast-wide basis

Questions: Are the strategies sound?

Ken- What else are we missing? What are some other approaches for mapping? What can we do to improve? The things have only been partially implemented.

Jackie- low coverage areas as important as high coverage areas. **NEED A BASELINE.**

Meridith- Good strategy because might want to do comparison between high and low coverage areas, but need baseline data.

Jackie- In terms of QA/QA, water quality has good guidelines already set-up.

Angela- Are there partnerships with NOAA, etc, so you know about research ongoing so you can get money, associate or share data? **Need a clearinghouse for data**

Ashley- **Texas Natural Resource Information Systems** should be provided data, but not all data updated. For data to be made available, data needs to be submitted. **Currently don't have quality control for data**, so end user is responsible for how they use it. **Tell them before you fly a project, so maybe others will pitch in money, etc.** End up with a better project that others can use. TENRS has a good website.

Michael- Takes a while to get data into system. Most expensive part is getting plane in the area, and once that's done you can get A LOT done.

Merideth- maybe there can be a distribution list for them to email others who might be interested in knowing about the flight. It might eliminate duplicates.

Michael- can reach them through stakeholder group to get the word out.

Ken- imagery is useless if no groundtruthing.

Jackie- everyone needs to know qa/qc protocols.

Ashley- Final step should be submitting data to clearinghouse! Not just finishing the research.

Maybe hold back portion of grant until submitted?!

Ashley- No qa/qc protocols. Analog or digital data? Need to choose one, so can actually groundtruth. We're not past the point to choose one, though. If want to do digital, need to agree on it. For imagery, **CHOOSE BETWEEN ANALOG OR DIGITAL photographs!**

Jackie- **Data may be collected in different datums. Need to standardize datum!** What do to about historical data that can't be compared?

Ashley- can pay flyer to rectify it or you can lay targets down. With in-flight GPS, it's all taken care of, which is great. Need to collect similarly, so don't need to rectify later on. Use UTM zones on local scale because are accurate when using visual imagery. **NAD83 datum in UTM (North American Datum)** is currently used. Have stopped using 27 because it's based off of a point in Kansas, and it's 15-20m off from real world positions. ITRF is very accurate, but it's not widely used and probably not feasible.

Ashley- Scale is important if are monitoring. Need to standardize the scale. What scale to use? **Use of appropriate scale depending on the pattern is necessary.**

Ken- is 1:24000 sufficient at what we're looking at?

Ashley – NOAA used 1:24000 data and they did a lot of groundtruthing with it, and used ANV software (train software to find what you're looking for, then go back and tweak when it's wrong). That's not part of our repertoire.

Ken- Just stick to mapping seagrasses? Should other feature be mapped?

Jackie- **Maybe landscape modules.** It's not imagery, but a landscape approach looking at benthic communities which are shaped by vegetative communities which are shaped by water quality. Map landscape features (sediment types, inputs from watershed, or lack thereof, hydrology, like metadata information)

Ashley- the only thing holding you back is groundtruthing

Ken- IR vs true color?

Ashley- RGB data best right now, but hyperspectral might be OK, but know little about thus far.

Wen- How are we going to understand the status and trend of seagrass distribution with the data we collect? How are we going to assess it? **We need an action below Objective 1, Strategy 1 to state "Develop a quantitative assessment of seagrass status based on baseline data and newly acquired remotely sensed data."**

Patrick's Group

Strategy 1: Refine and implement statement...add terms such as **Non-governmental organizations, Academia, NOAA, Corp of Engineers, etc.**

Form a specific subcommittee of Seagrass Working group related to remote sensing, dedicated to creating protocols for sharing of data, planning of flight acquisitions (so not to be repeated), creating standards, etc.

Strategy 2: Standard protocol for collection of GIS-type data should be FGDC (Federal Geographical Data Committee) standards (GIS standard for data)

Warren's Group

We need to implement Seagrass Monitoring Program Plan (2003 document)

Need a statement about adopting and implementing plan, designating a responsible entity. Pin down one of the 3 agencies. Maybe get Park and Wildlife to put something in their code for seagrass monitoring (gives TPW leverage for funding). Would become new Strategy 2, and actions items would transfer to under 'designating a responsible party'

Change current Strategy 2 to Strategy 3. Move current actions items to new strategy 2. New Strategy 3, new #4: TNRIS will be clearinghouse for remotely-sensed data, tier 2 and 3 data would have to be housed elsewhere (TPW?) Under Strat 3, add 5th action item: develop standard survey protocols for monitoring and documenting COE and GLO permits and leases.

Objective 2: Continue to determine causes of changes in seagrass species composition and coverage (acreage), including areal losses and gains on a regional basis.

Jackie- everything under Strategy 1 is important. **Add looking at wrack material (seagrass detritus) or macro-organic matter in general, under Strategy 1, number 3.**

Angela- Genotypes/genetics may be an important factor, maybe concerning seagrass preference for different sediment types. **Perhaps genotypes should be looked into for possible seagrass preferences.**

Merideth- Strategy 2, #2: Epiphytes accumulate brevetoxin from HABs, could trophic-wide implications. Good that epiphytes are included!

Wen- Strategy 2, #1: Include nutrient loading, freshwater inflow.

Ken- We should also **incorporate water flow, water flow regimes, into research.**

Angela- Could coordinate of data gathering for freshwater inflow.

Wen- Try to modify a freshwater inflow model to give us possible effects on a larger scale.

Ken- should we include something about climate change?

Jackie- Climate change may affect future locations of seagrass. The data outlined for collection here should give us that information. **Put climate change it into the motherhood document- Consideration should be given to climate change.**

Angela- For replanting, we need to focus on not impacting species that are hard to replant.

Ashley- should include GIS into that.

Patrick's Group

#5 under Strategy 1: Change from 'outside Texas' to 'worldwide'

Strategy 2: 'required to support vibrant sustainable seagrass communities'

Strat 3, Action item 3: develop methods for evaluating ecological functioning of restored seagrass beds compared to natural beds.

Warren's Group

Obj 2, Strat 1, Action Item 3: address relationships between population changes, including seagrass bed morphology and patterns, and environmental perturbations. Include 'wrack' (see Ken's notes). Following 'brown tide', add climate change and sea level rise

Strat 3- change 1st action item 'compile and evaluate historical information of public agencies (USA Corps of Engineers) and private entities on 404 permits to determine effectiveness of permit mitigation techniques. Change 1 to 2.

Delete Action Item 3 because added action item to obj 3, strat 2, action item 2

3:00-3:45pm

Objective 3: Identify habitat functions and productivity of natural seagrass community types...

Paul Montagna- **Seagrass systems are corridors for larval exchange. Should be noted.**

Jackie- same with seagrass propagules. Landscape should be specifically spatially defined. **Also, define below-ground structure, infaunal communities**

Kelly- **Maybe include importance of larger grazers under biotic factors of Point 1.** (fish, urchins)

Jackie- **Maybe include that the effect of biological components on physical parameters.** (ie shading effect of chl a in the water column)

Ashley- TPW makes web applications where data will be accessible, not sure if TNRS would more than imagery data

Michael- **Make it part of a permit that replanters submit data to TENRS, so we can get a localization of replanting success data.**

Merideth- **Add TENRS to Objective 1! And make them aware of us, and the services they could provide.**

Patrick's Group

Strat 1, Action item 2, add another bullet: Relationship with other habitats (e.g. marsh grasses, oyster reefs, wind tidal flats etc)

Strategy 2. Action item 2- Develop methods to establish functional equivalency of mitigation projects (including species equivalency, temporal development).

Warren's Group

Omit word 'natural' in Obj 3 descriptive statement

Strat 1, task 1, bullet 1, 1st bullet: 'differences in habitat value between species'

Seagrass disease bullet: omit because is redundant?

'Influence of landscape morphology' bullet: 1st bullet under that— change to 'size of seagrass habitat patches'

Add Strat 3: 'Establish level of ecosystem services provided by seagrass habitats. Bullet underneath strat 3: pollution assimilation, sediment stabilization, nutrient cycling

4:00-4:45pm

Objective 4: Provide data for development of management policies in response to natural human induced impacts

Jackie- **change #1 to 'Boating and other recreational impacts'** (ie specific fishing methods)

Wen- **Combine #1 and #8**

Jackie- **Combine #2 and #3, and in Objective 4 statement, take out the word 'natural' because all the numbered points refer to human-induced impacts.**

Ken- **Combine #9- 11 to 'Direct and Indirect effects of dredging'**

Michael- **Change #5 to 'coastal and inland land use' and combine #14 and 5**

Ashley- **Determine the maximum carrying capacity of the Bay!** like a report card. What goal are we reaching for?

Ken- you could do it using seagrass light needs, bathymetry data, etc. to come up with an estimate. Estimates could be calculated for each separate Bay.

Ashley- **Input collected data into GIS to find appropriate restoration areas.**

Ashley- **Move Obj 4, Strat 1 to Obj 1, Strat 2**

Patrick's Group

Move strat 2, action item 4 to it's own strategy, and change 'users' to 'ecosystem services'. Dave will send action items to be listed under this new strategy. Name new strategy 'Identify socioeconomic values of seagrass beds and associated impacts of management on ecosystem services.'

Warren's Group

Combine #9-11

Move #8 into #1

#13- Change to 'Impact of invasive species and range expansion of native species'

Add another action item: 'Effect of shading from bridges and piers'

Add another action item: 'Studies to identify and prioritize conservation/management areas'

Add another action item: 'Apply adaptive management principles to evaluate policies'

Appendix D Management Breakout Notes

PRIORITY PROBLEM I

TABLE 1

Nicole Hausler – PHA – Note Taker
 Amy Nunez – GLO Facilitator
 Kathryn Tunnell – GLO
 Jennifer Stephens – GLO
 Pat Radloff – TPWD
 Jeff Raasch – TPWD
 Will Cupit – TPWD
 Perry Trial – TPWD
 Ray Allen – CBBEP

Priority Problem I (page 57):

Page 1 of 4

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 1: Ensure water and sediment quality beneficial to the seagrass community.

- TCEQ “seagrass use” is a great thing, but currently is more of a placeholder – will provide some additional protection
- Will be important long term to bring seagrass fully under Clean Water Act protection
- Need focused research the straddles science and management; need index of community health that includes natural variability (report cards, index, etc.); cost effective, simple to administer, easy to translate to the entire cost – can it be added to the “parameters” already studying
- Seagrass are very dynamic (aerial coverage, species diversity) – don’t really understand how sediment /water quality really impact seagrass variability (short term and smaller scale)
- Most TCEQ regulations are point source, probably doing good enough NPS – look at these – could be impacted by turbidity and dredging and sediment resuspension

Summary of Ideas/Statements

- Need to identify research priorities to give to research group two ways to address issues “front door” permits; “backdoor” monitoring and assessment and the 303d
- Process is moving forward, but not fast enough
- Need to prioritize the ideas for the researchers – let managers help set the priorities
- Dunton & Pulich has proposed a set of parameters to use for determination in a coast wide monitoring system – be able to identify areas that are failing and see if it can be determined why it is failing

Comment [PC1]:
 ISSUE CODE
 M = Management
 R = Research
 E = Education
 +C = Controversial
 ISSUE MODIFIER CODE
 (p) = Policy
 (r) = Regulatory

Comment [PC2]: M, R & E

Comment [PC3]: M, R, E

Comment [PC4]: M, R

Comment [PC5]: M

Comment [PC6]: M, R

- Need to look at more education/controls of NPS other than MS4 and CAFO; look for opportunities to work with USDA or other ag group to identify BMPs and area that may see future developments with the ability impacts to seagrass
- Some of the non point sources could include increased development and dredging – ag may not really be the big target
- Need to determine what might have caused the loss of seagrass in more northern Texas coastal areas

Comment [PC7]: M, E

Comment [PC8]: M, R + Controversial

Comment [PC9]: E

Priority Problem I (page 57):

Page 2 of 4

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 2: Protect seagrass beds through effective application of the mitigation sequence: avoidance, minimization, compensation.

- Sequence is the most important component, agencies are doing a good job
- Huge focus of the beginning of program avoidance
- Concerns by TXDOT and port authorities to be able to dispose of clean dredge material within the seagrass protection areas
- “after the fact permits” – starting to be an issue – where people do work and then when found are required to get permits
 - Failure of permit system; there are penalties such as fines and need to remove – stipulated fee system is starting to push the avoidance idea because penalties are getting high enough
 - May need to get the word out that not getting a permit will cost you.
- Would seagrass protection be enhanced if TCEQ had its funding/mandate authority for 401 re-established? – currently TCEQ is required to waive certification on smaller projects?
- Could the state do a better job of set guidelines so that development knows what areas should be avoided if possible

Comment [PC10]: M(r) +Controversial

Comment [PC11]: M(p) +Controversial

Comment [PC12]: M (r), E

Comment [PC13]: M(p), R(p), E +Controversial

Comment [PC14]: M(p), R(p), E

Summary of Ideas/Statements

- Should the state write guidelines for industry and municipalities to identify where to put material.
- Should the site determination be part of the state oversight
- Are the mixing zone calculations in TPDES looking at seagrass
- GLO does have standards for what they require but don't include
 - No height requirement
 - No grading for light penetration
- Really need to add more weight to preserving seagrasses – may not really get an equal weight
- How is sea level rise incorporated into the process – is it considered when decides where to mitigate

Comment [PC15]: M(p)

Comment [PC16]: M(p)

Comment [PC17]: M(p), E

Comment [PC18]: M(p), E

Comment [PC19]: M(p)(r)

Comment [PC20]: M(p)

- Seagrass scarring – is there any enforcement or penalty for scarring
 - Very limited area has enforcement
 - There are fines and penalties that are being paid
 - TPWD is limited to state scientific areas, currently not statewide
- Education is very important to make sure people keep doing the right thing
- May want to look at expanding the TPWD anti-uprooting authority to statewide
- Offers protection to areas that just starting to recover
- Substantial penalties up front might bring compliance up
- Reach a greater number of people that may only visit seagrass occasionally

- Comment [PC21]: M(p)(r), E
- Comment [PC22]: E
- Comment [PC23]: M(p)(r)
- Comment [PC24]: E
- Comment [PC25]: E
- Comment [PC26]: E

Priority Problem I (page 57):

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 3: Restore/enhance/create lost functions and values of seagrasses at a watershed/system-wide level, where feasible.

- Comment [PC27]: Delete "lost"
- Comment [PC28]: Delete "lost"
- Comment [PC29]: M(r)
- Comment [PC30]: M(p), R
- Comment [PC31]: M(p)(r)
- Comment [PC32]: M(p)(r)
- Comment [PC33]: M(p)(r)
- Comment [PC34]: M(p)(r)

- May need to clarify the objective through re-write
- Important to make sure mitigation is successful
- Must look to see where the nutrients are loading the system
 - Does this impact the ability to restore lost functions
- EPA has started to require states to set nutrient levels – soon will get to setting levels for bays and estuaries
- Must have appropriate water quality before planting is starting
- Should make planting plans have a priority for water quality and then choose the right type and time of grass planting
- Need to bridge the gap between regulatory community and the local implementers to ensure a common goal, e.g. set an appropriate time for planting (after achieve water quality)
- Watershed protections plans are a vehicle to bring together all of the aspects through community involvement
- Should watershed protection plans be expanded to include seagrass guidelines in the applicable areas

Summary of Ideas/Statements

- Create a framework for the entire coast but with specific goals for subsections
- What do changes in species composition mean, how does that impact seagrass, should it be part of a monitoring program?
- Should the mitigation requirement be based on the type of seagrass being impacted because some seagrasses are harder to re-establish

- Comment [PC35]: M
- Comment [PC36]: R then M(p)(r)
- Comment [PC37]: M(p), E(r)

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 4: Design dredging or shoreline development projects to effectively reduce impacts upon seagrasses.

- Key components are water quality but must also look at footprint - look at sensitive habitat
- Green printing: identify areas for conservation and areas for development
- Is it regulatorily possible/practical to have set guidelines for subsections of the coast
- Guidance can be set for dredge projects and shoreline could include
 - When is the right time of year to build
 - Preference for regional WWTP
 - Smart growth evaluation (should principles be adopted)
- Need literature and research on what are good dredging practices, how to minimize impacts, what best practices are for small scale
- Need ideas of how to handle the dredge material from residential projects before you dredge
- We may not know enough about this objective to roll it into others
- Need to answer core questions – like how does duration and timing impact seagrass

Comment [PC38]: M(p)

Comment [PC39]: M(p), E(r)

Comment [PC40]: M(p)(r)

Comment [PC41]: M(p), E(r)

Comment [PC42]: M(p), E(r)

Comment [PC43]: E(r)

Summary of Ideas/Statements

- Need to split the objective into dredging and a second objective for shoreline development
- No statewide guidance or oversight for siting of projects

Comment [PC44]: M(p)

Comment [PC45]: M(p)(r), E(r)

**Miscellaneous Notes from Table 1 Participants - A, B & C, combined
Priority Problem I
Objective 1**

- IBI for seagrass
- Links let natural variability and water quality
- Research priority list
- More emphasis needs to be placed on nonpoint sources and sediment resuspension
- Be proactive in outreach and education to homeowners in communities adjacent to seagrasses (“Bays”) regarding watershed management
- Management to aid in prioritizing research

- Increase public outreach / education in reducing non-part source pollution – billboards, commercials, mailouts (English & Spanish)
- Natural variability

Priority Problem I

Objective 2

- Place a higher emphasis on preservation of seagrass beds and the adjacent areas that could impact those beds
- Boardspacing and pier height
- Preservation

Priority Problem I

Objective 3

- Possible re-write focusing on mitigation
- Address issues to make an area suitable for seagrasses
- Mitigation monitoring – success / failure
- Why? What caused the failure, what aided to the success?
 - Poor site – water quality / depth; soil quality
 - Human intrusion – boats, waders

Priority Problem I

Objective 4

- Minimize footprint of projects
- Minimize footprint of the projects
- Boardspacing / structure height
- Reduce “runoff” of dredge projects – silt curtains
- Run brine water discharge lines out past shoreline (not in Bays)
- Divide dredge & develop?
- Keep on own?
- Research dredge methods
- Seasonal dredging – when seagrass is dormant

TABLE 2

John Huffman – USFWS – Facilitator
Kristopher Benson – NOAA – Note taker
Barbara Keeler – EPA – Alternate Note taker
Mark Fisher – TCEQ
H. E. Hegan – TPWD
Bob Hewgley – GLO
Scott Sullivan – TXDOT

Priority Problem I (page 57):

Page 1 of 4

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 1: Ensure water and sediment quality beneficial to the seagrass community.

- Seagrass use designation was added to satisfy the strategy (designation in Texas Surface Water Quality Standards)
- Plan wording doesn't match, but goal was achieved
- Prioritize/emphasize research need to achieve strategy 2 (expand future focus for strategy 2, document dependence on research to achieve strategy 2, note geographic differences)
- Add; Evaluate cumulative losses, particularly where loss is overlooked due to thresholds, NWP process, etc. (for strategy 3)

Comment [PC46]: M(p), R

Comment [PC47]: M(p)(r), R(r), E(r)

Summary of Ideas/Statements

- New objective – promote additional conservation of high quality seagrass habitat (additional coastal preserves, state scientific areas, (GEMS, RAMSAR sites, etc.), perhaps also valuable adjacent uplands? Include these designation in watershed plans

Comment [PC48]: NEW IDEA

Comment [PC49]: M(p)

Priority Problem I (page 57):

Page 2 of 4

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 2: Protect seagrass beds through effective application of the mitigation sequence: avoidance, minimization, compensation.

- Disallow preservation-based mitigation for seagrass in Texas
- Consider shoreline preservation to offset future sea level rise – we should identify and prioritize these areas now
- Integrate language about value of uplands and/or other valuable and adjacent habitats into the mitigation calculation
- Work toward special Texas consideration for seagrasses so that mitigation doesn't happen out of kind

Comment [PC50]: M(p)(r) + Controversial

Comment [PC51]: M(p)

Comment [PC52]: M(p)(r) + Controversial

Comment [PC53]: M(p)(r) + Controversial

- There is no method to understand functional values appropriately; this tool should be developed

Comment [PC54]: M(p), R, E(r)

Summary of Ideas/Statements

- New objective: Incorporate SLR impacts analysis in planning for seagrass conservation

Comment [PC55]: NEW IDEA

Comment [PC56]: M(p), R, E(r) and M(p)

Priority Problem I (page 57):

Page 3 of 4

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 3: Restore/enhance/create lost functions and values of seagrasses at a watershed/system-wide level, where feasible.

- Need better assessment tools
- Evaluate cumulative losses / death by 1000 cuts (see note for objective 1)
- Prioritization geographically of restoration projects is opportunistic; planning for geographic priorities should be advanced with result of a “master improvement plan” developed per watershed
- Should be ecosystem based, not independent habitat types
- Should be long term
- Should incorporate state-wide goal for seagrass acreage
- Minimize hardening of shorelines
- Role of local governments should be emphasized
- Incentive / suggestion for regulatory entities to meet for implementation of seagrass plan in land use planning context at a regional / local/ watershed scale.

Comment [PC57]: M(p)(r), R(r), E(r)

Comment [PC58]: M(p)(r), R(r), E(r)

Comment [PC59]: M(p)(r)

Comment [PC60]: M(p) + Controversial

Comment [PC61]: M(p)

Comment [PC62]: M(p)(r)

Comment [PC63]: M(p)

Comment [PC64]: M(p)

Comment [PC65]: M(p) + Controversial

Summary of Ideas/Statements

- No comments offered.

Priority Problem I (page 57):

Page 4 of 4

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 4: Design dredging or shoreline development projects to effectively reduce impacts upon seagrasses.

- Endorse deletion

Comment [PC66]: M

Summary of Ideas/Statements

- No comments offered.

Miscellaneous Notes from Table 2 Participants - A & B, combined

Priority Problem I
Objective 1

- What does “apply approach to other issue such as water quality”
- Archive TPWD wetlands map
- No preservation – for mitigation
- Seek in-kind only mitigation
- Need better functional assessment tool
- Seagrass propagation – as “use” – accomplished
- Anything on sediment quality? None known
- No basis for setting water quality standard
- Key cross cutting issues across research, management and education
- Some management objectives require / dependent on research / education
- Dredging projects how are these affecting

Priority Problem I
Objective 2

- Prescribe mitigation ratio
- Strengthen / clarify compensatory mitigation requirements to prevent preservation credits
- Some channels dredging projects not significant impacts
- GLO partner to mitigation banks / Port Isabel Seagrass Bank Mitigation Bank
- What about cumulative impacts from small projects (NWP)
- What is efficacy of SAV mitigation / success of restoration
 - Mitigation rations (none)
 - Don’t use preservation as mitigation or for banks
- Shoreline preservation in light of SLR
- Future focus: promote preservation of potential future SAV/Wetland
 - Add uplands in mitigation planning to accommodate SLR
 - Value added by buffer / adjacent habitats
 - No out of kind mitigation management plan for Texas
- Action: no HGM for SAV or flats. Functional assessment model to access values and contribute

Priority Problem I
Objective 3

- Better assessment tools
- Better assessment tool
- Evaluate cumulative losses
- Link to water quality connecting
- Strategy - Need inventory of priority restoration sites
- Strategy - Establish a state/regional goal for seagrass acreage
- Minimize hardening of shorelines

Priority Problem I
Objective 4

- Encourage local governments to make guidelines
- Regulatory agency have routine meeting to discuss BMPs
- New objective: conservation of existing beds. Promote additional preserves, RAMSAR site, SSA, Identify most important areas to protect
- Objective: incorporate climate change / subsidence RSLR in planning / management of SAV

TABLE 3

Christine Kolbe – TCEQ – Note taker
Alex Nunez – TPWD – Facilitator
Jason Zeplin – GLO
Jay Gardner – Naismith Engineering
Terrell Roberts – USCOE
Daniel Allen – HNTB
Bill Dennison – Univ. Maryland
Leo Trevino - CBBEP

Priority Problem I (page 57):

Page 1 of 4

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 1: Ensure water and sediment quality beneficial to the seagrass community.

- Need to follow-up on developing criteria for seagrass to be added to the TSWQS; Chla, TSS, water clarity, nutrients, used in other areas
- Need to develop what indicators would best characterize the seagrass
- Need standards to set BMPs and permitting limitations
- Maps, water quality data synthesis – not research just compile
- Think about regionalizing criteria based on areas of the coast
- We probably have the data, maps that can be used to look at potential indicators criteria; year round
- Keep it simple
- First step needs to be to designate the water bodies with the seagrass use; second to develop criteria; third to develop and assessment methodology for 305(b) 303(d) process

- Comment [PC67]: M(p), R
- Comment [PC68]: M(p), R
- Comment [PC69]: M(p)
- Comment [PC70]: M(p), R
- Comment [PC71]: M(p)(r), R
- Comment [PC72]: M(p) R
- Comment [PC73]: M(p)(r) +Controversial

Summary of Ideas/Statements

- To protect seagrass areas need to continue to work on developing actual criteria. These would create the standard to set BMPs and permit limits. First need to get actual bays added to the TSWQS as seagrass use before actual standards can be developed. Final step once these have been completed the seagrass use can be added to the 303(b) 303(d) process to determine standards compliance – MULTI-YEAR PROCESS
 1. Add seagrass as a use to TSWQS
 2. Designate bay segments with seagrass use
 3. Develop criteria to protect seagrass use
 4. Develop methodology to assess attainment of seagrass use (305(b)/303(d) process)
- Possible just will take a few years
- Regionalize criteria based on areas of the coast
- Increase the development of watershed protections for watersheds draining to seagrass areas; 319 funded program TSSWCB. See objective 3.

- Comment [PC74]: M(p), R +Controversial
- Comment [PC75]: M(p)(r), R
- Comment [PC76]: M(p), E

- Regulatory need for the successful protection of seagrass resources.

Comment [PC77]: M(p)(r), E(r) +Controversial

Priority Problem I (page 57):

Page 2 of 4

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 2: Protect seagrass beds through effective application of the mitigation sequence: avoidance, minimization, compensation.

- No feedback, COE doesn't have funding to do follow-up monitoring to see if mitigation successful.
- 3:1 ratio problem – area may not be suitable for seagrass propagation. Potential loss of tidal habitat trying to grow seagrass.
- Re-establishing seagrass once damaged is difficult, where do you work?
- Missing consistency in COE permits some required to monitor progress of mitigation; others not.
- Ability to place more priority on avoidance within the permit process.
- Equivalent functional value for future permits.
- Focus on cumulative impact of building structures.

Comment [PC78]: M, R(r), E(r)

Comment [PC79]: M(p)(r), R, E(r)

Comment [PC80]: M(p)(r)

Comment [PC81]: M(p)(r)

Comment [PC82]: M(p)(r)

Comment [PC83]: M(p)(r), R, E(r)

Comment [PC84]: M(p)(r)

Summary of Ideas/Statements

- Pay attention to "ALL" rules when issuing a permit.
- Develop consistent language/requirements in COE permits; require all permittees to monitor progress of mitigation.
- Place more priority on avoidance within the permit process.
- Migration corridors as part of mitigation process.
- State needs to look at cumulative impact of building structures, such as a series of residential piers w/rip rap.
- Protected embayments creates depositional areas living shoreline approach, soft engineering solutions, as alternatives in permits.
- Living shoreline could be a mitigation alternative.
- Instead of 3:1 ratio use the living shoreline to increase/promote/protect seagrass growth. Requires monitor; this would require some interagency agreements.

Comment [PC85]: M(p)(r)

Comment [PC86]: M(p)(r)

Comment [PC87]: M(p)(r)

Comment [PC88]: M(p)(r), R

Comment [PC89]: M(p)(r)

Comment [PC90]: M(p)(r)

Comment [PC91]: M(p)(r), R, E

Comment [PC92]: M(p)(r), R, E

Priority Problem I (page 57):

Page 3 of 4

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 3: Restore/enhance/create lost functions and values of seagrasses at a watershed/system-wide level, where feasible.

- Encourage the development of watershed protection plans in the watersheds draining to designated seagrass areas.

Comment [PC93]: M(p)(r), R

- Clearinghouse of engineering techniques; Use local demonstrations to show effectiveness.
- Huge watershed going to bays may need to look at things going on in subwatersheds that might not apply to the entire watershed. Customize watershed protection planning in relation to seagrass.
- Look into newer planting methods that can be tied permitting.
- 10% of mitigation dollars should fund monitoring.
- Database for mitigation sites, monitoring of the sites is needed.

Comment [PC94]: M(p)(r), E

Comment [PC95]: M(p)(r), R, E

Comment [PC96]: M(p)(r)

Comment [PC97]: M(p)(r)

Summary of Ideas/Statements

- Clearinghouse of engineering techniques – offer alternatives to traditional mitigation techniques and successes.
- Database for mitigation sites, monitoring and end point criteria.
- Huge watersheds draining to bays, need to customize plans to address individuals issues in subwatersheds.

Comment [PC98]: M(p)(r), E(r)

Comment [PC99]: M(p)(r), R(r), E(r)

Comment [PC100]: M(p), E(r)

Priority Problem I (page 57):

Seagrass beds are being lost or degraded, and/or species composition is changing.

Objective 4: Design dredging or shoreline development projects to effectively reduce impacts upon seagrasses.

- Create coastal practices to reduce impact, natural banks vs. bulkhead at piers.
- Promote techniques that reduce wave action.
- Some practices costly – may be reduced by replacing the 3:1 ratio w/innovative techniques.
- Need to find a way to generate sustainable funding for the protection of seagrasses.
- Community marinas or docks instead of individual docks.

Comment [PC101]: M(p), E

Comment [PC102]: M(p), E

Comment [PC103]: M(p)(r), E(r)
+Controversial

Comment [PC104]: M(p)

Comment [PC105]: M(p)(r)

Summary of Ideas/Statements

- Promote techniques that reduce wave action and protect seagrasses (natural banks vs. bulkhead piers).
- Consider replacing 3:1 ratio with innovative techniques.

Comment [PC106]: M(p), E

Comment [PC107]: M(p)(r), E(r)
+Controversial

Miscellaneous Notes from Table 3 Participants – A.
Priority Problem I
Objective 1

- Recommend that USDA of Soil Conservation partake in Watershed Management Plan

Comment [PC108]: M(p)

**Priority Problem I
Objective 2**

- Pay more attention to migration corridor for future expansion due to sea level
- Recommend that agencies work together to achieve more successful rates of seagrass creation i.e. only requiring a 1:1 for seagrass when it is associated with attendant structure that protect and ensure the success of the mitigation

Comment [PC109]: M(p), R

Comment [PC110]: M(p)(r) +Controversial

**Priority Problem I
Objective 3**

- Clearinghouse for mitigation monitoring successful rates

Comment [PC111]: M(p)

**Priority Problem I
Objective 4**

- Look at sills or other types of seagrass protection / migration corridor requirements from the regulatory end (if a project is federalized)
- Look at ways to discourage bulkheads if a project is not federalized

Comment [PC112]: M(p)(r)

Comment [PC113]: M(p)(r)

PRIORITY PROBLEM II

TABLE 1

Amy Nunez – GLO
 Kathryn Tunnell – GLO
 Jennifer Stephens – GLO
 Pat Radloff – TPWD
 Jeff Raasch – TPWD
 Will Cupit – TPWD
 Nicole Hausler – PHA – Note Taker
 Perry Trial – TPWD
 Ray Allen - CBBEP

Priority Problem II (page 58):

Page 1 of 2

Agency coordination or policies may prevent adequate management.

Objective 1: Develop consensus agreements or plans among users of the seagrass resource.

- Knowing what each agency’s position on seagrass is important
- Need to change “user” to stakeholders or some more encompassing term
- Positive to have interagency work
- Different viewpoints are a positive, good discussion on seagrass
- Consensus may not have to be reached for successful discussion
- Evaluate having a formal charter that identifies each agency’s responsibilities and helps to get appropriate resources
- Need clarification on Objective 1 “New Issues”? What is meant by memorialize
- Seagrass monitoring W.G. is working well, similar to interagency coordination team
- Need to identify any conflicting interest – so that the issues can be discussed and transparent – to identify areas that require coordination
- Benefit to having some informality because it allows for more timely implementation

Comment [PC1]: ISSUE CODE
 M = Management
 R = Research
 E = Education
 +C = Controversial
 ISSUE MODIFIER CODE
 (p) = Policy
 (r) = Regulatory

Comment [PC2]: M(p)

Comment [PC3]: M(p)

Comment [PC4]: M(p)(r)

Comment [PC5]: NEW IDEA
 M(p) + Controversial

Comment [PC6]: M(p)(r)

Summary of Ideas/Statements

- The revision to the plan should include a mention of the seagrass monitoring work group but not formalize to the point of paralysis (no MOU/MOA)

Comment [PC7]: NEW IDEA
 M(p)(r) +Controversial,

Agency coordination or policies may prevent adequate management.

Objective 2: Facilitate agency policy coordination by improving communication and consistency of actions relates to seagrass management.

- In favor of Strategy 1 idea to identify interagency responsibilities, policies, etc. – make it clearly documents
- Database w/maps & photos to illustrate seagrass mitigation – will be hard to develop but very valuable
- Need to have a better system for following up with mitigation
- Problem may be with monitoring after the agency requirements end
- Seagrass WG may be a good forum to hold the system that houses all of the mitigation activity in the state
- Public should have access to Corps permit info via website
- Start making database with what is out there but don't stop because data in past was hard to find – build starting with today
- Provide assistance to Corps to get the system online
- Engage Corps more with the state activities regarding seagrass

Comment [PC8]: M(p)(r)

Comment [PC9]: M(p)(r), R(r), E(r)

Comment [PC10]: M(p)(r), R(r)

Comment [PC11]: M(p)(r)

Comment [PC12]: M(p)(r)

Comment [PC13]: M(p)(r), E(r),

Comment [PC14]: M(p)(r), R(r)

Comment [PC15]: M(p)(r)

Comment [PC16]: M(p)(r)

Summary of Ideas/Statements

- No comments offered.

Miscellaneous Notes from Table 1 Participants

- [Rewrite] Objective 1: Develop a *comprehensive plan among interested parties* of the seagrass resource.

TABLE 2

John Huffman – USFWS – Facilitator
Kristopher Benson – NOAA – Note taker
Barbara Keeler – EPA – Alternate Note taker
Mark Fisher – TCEQ
H. E. Hegan – TPWD
Bob Hewgley – GLO
Scott Sullivan – TXDOT

Priority Problem II (page 58)

Page 1 of 2

Agency coordination or policies may prevent adequate management.

Objective 1: Develop consensus agreements or plans among users of the seagrass resource.

- Change future focus – define and formalize charge to interagency seagrass “regulatory” workgroup
- Statement formalizing concept of seagrass monitoring and/or regulatory and/or “other” workgroup memorandum or agencies to sign on to in agreement with plan
- Plan as a whole shouldn’t b or be referred to as a product of only 3 agencies...expand endorsements to include other agencies

Comment [PC17]: ISSUE CODE
M = Management
R = Research
E = Education
+C = Controversial
ISSUE MODIFIER CODE
(p) = Policy
(r) = Regulatory

Comment [PC18]: NEW IDEA
M(p) + Controversial

Comment [PC19]: NEW IDEA
M(p)

Comment [PC20]: NEW IDEA
M(p) + Controversial

Summary of Ideas/Statements

- Problem II – Lack of agency mechanisms to resolve conflicting policies.
- Strike objectives 1 & 2 as stated, replace with “Establish a coordinated federal and state natural resource management agency approach to seagrass management.”

Comment [PC21]: M(p)(r)

Comment [PC22]: NEW IDEA
M(p)(r)

Priority Problem II (page 58):

Page 2 of 2

Agency coordination or policies may prevent adequate management.

Objective 2: Facilitate agency policy coordination by improving communication and consistency of actions relates to seagrass management.

- No comments offered.

Summary of Ideas/Statements

- No comments offered.

Miscellaneous Notes from Table 2 Participants

Priority Problem II

Objective 1

- Holistic planning essential to incorporate issues/needs of all users.
- Ensure consistency in application of regulatory policies.
- Get stakeholder organizations letter of endorsement/support as part of the document
- Develop MOU for federal/state agencies in endorsing/support of seagrass plan
- Formalize seagrass workgroup
- Eliminate objective 1 and combine 1 & 2
- New objective
- Bring other user groups into planning of seagrass management

Priority Problem II

Objective 2

- No comments offered.

TABLE 3

Christine Kolbe – TCEQ – Note taker
Alex Nunez – TPWD – Facilitator
Jason Zeplin – GLO
Jay Gardner – Naismith Engineering
Terrell Roberts – USCOE
Daniel Allen – HNTB
Bill Dennison – Univ. Maryland
Leo Trevino - CBBEP

Priority Problem II (page 58)

Page 1 of 2

Agency coordination or policies may prevent adequate management.

**Objective 1: Develop consensus agreements or plans among users of the seagrass resource.
Objective 1**

- Problem – multiple agencies with multiple priorities often difficult to reach a consensus.
- Priority Problem II statement needs work; not a lack of coordination but “complicated”, “ways to resolve conflicting priorities”
- Is there a way to suggest change in interpretation and guidance (federal)? Rules on federal level from top down. Can plan request come from state (governor level)?
- Identify conflicting standards and guidelines between agencies, regional
- Development of MOU between agencies to address regional issues. (For example, watershed rules can be developed to address discharge issues) Lake Houston example more protective.

Comment [PC23]: ISSUE CODE
M = Management
R = Research
E = Education
+C = Controversial
ISSUE MODIFIER CODE
(p) = Policy
(r) = Regulatory

Comment [PC24]: NEW IDEA
M(p)(r) + Controversial

Comment [PC25]: M(p)(r)

Comment [PC26]: M(p)(r)

Comment [PC27]: M(p)(r)

Summary of Ideas/Statements

- Is there a way to suggest change in interpretation and guidance (federal)? Rules on federal level from top down. Can plan request come from state (governor level)?
- Identify conflicting standards and guidelines between agencies, regional
- Development of MOU between agencies to address regional issues. (For example, watershed rules can be developed to address discharge issues) Lake Houston example more protective.

Comment [PC28]: NEW IDEA
M(p)(r) + Controversial

Comment [PC29]: M(p)(r)

Comment [PC30]: M(p)(r)

Agency coordination or policies may prevent adequate management.

Objective 2: Facilitate agency policy coordination by improving communication and consistency of actions relates to seagrass management.

- COE needs to develop an updated database on seagrass mitigation projects.
- Begin to post relevant documents or link to relevant documents at other agency web sites relating to seagrass on the TPWD seagrass website. (example link to TCEQ page with TSWQS that cite the designation of seagrasses as a use). Line or post COE policy document.
- Encourage agencies to formally document unwritten policies.
- Use the TPWD seagrass web page as a “seagrass document clearinghouse”.
- Turn maps into hyperlink documents so they are readily available.
- Make the information transparent; don’t make the user dig through multiple levels of links.
- A clearinghouse with portals to the information make it simpler to use.
- Create a book on Texas seagrass maps, info, photos, threats, etc.
- Cooperative effort of major agencies
- Set products that would help develop goals and priorities
- Issue agreement – generates management goals
- Issue disagreement – generates research goals
- Make it for a broader audience – 7th grade level
- Bill Dennison – how he develops booklet
- Create a visual representation of the issue to allow interaction with the public
- Draw picture; use picture to link to issues (to develop booklet/book)
- Workshop to sketch the picture
- Collaborative effort; set layout at workshop – assign sections to appropriate person; not one person is responsible for the entire document.
- Science Communication present information in a short simple format unlike science writing which is more exacting.
- Good for schools, museums, visitor centers, parks, etc.
- Hire University of Maryland to train on science communication. Can come to Texas to do training to large audience. Rather than send a couple individuals to Maryland.

Comment [PC31]: NEW IDEA
M(p)(r) + Controversial

Comment [PC32]: M(p)(r), R, E

Comment [PC33]: M(p)(r)

Comment [PC34]: M(p)

Comment [PC35]: M, R, E

Comment [PC36]: M, R, E

Comment [PC37]: M, R, E

Comment [PC38]: M, R, E

Summary of Ideas/Statements

- COE needs to develop an updated database on seagrass mitigation projects.
- Begin to post relevant documents or link to relevant documents at other agency web sites relating to seagrass on the TPWD seagrass website. (example link to TCEQ page with TSWQS that cite the designation of seagrasses as a use). Line or post COE policy document.
- Identify conflicting regional standards / permit condition between agencies

Comment [PC39]: NEW IDEA
M(p)(r) + Controversial

Comment [PC40]: M(p)(r), R, E

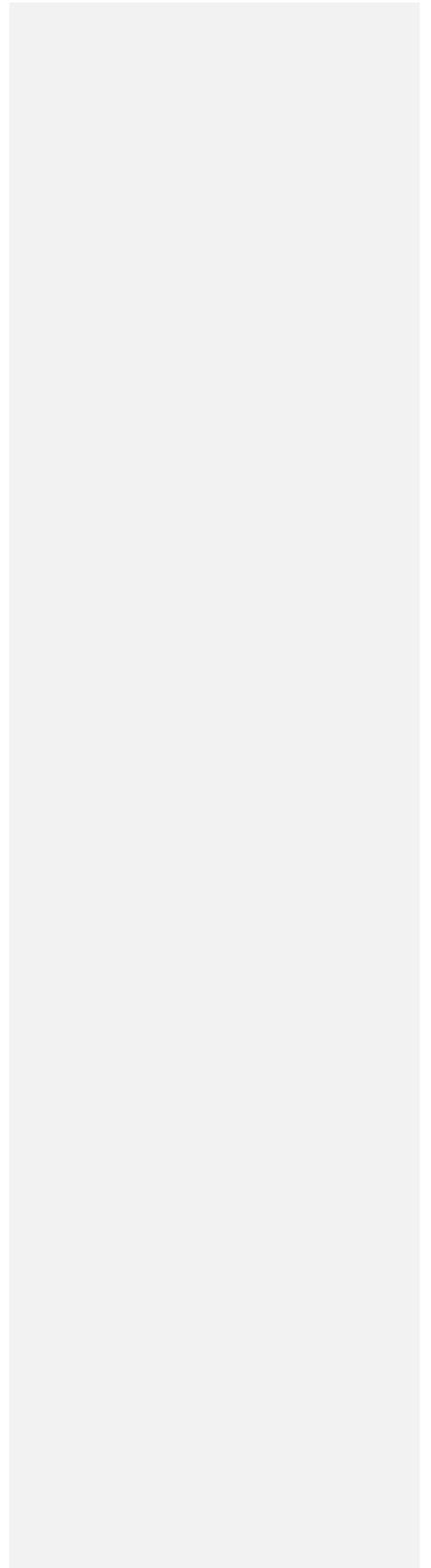
Comment [PC41]: M(p)(r)

Miscellaneous Notes from Table 3 Participants
Priority Problem II Objective 1

- Identify conflicting regional standards / permit condition between agencies.

Priority Problem II Objective 2

- No comments offered.



PRIORITY PROBLEM III

TABLE 1

Nicole Hausler – PHA – Note taker
 Amy Nunez – GLO
 Kathryn Tunnell – GLO
 Jennifer Stephens – GLO
 Pat Radloff – TPWD
 Jeff Raasch – TPWD
 Will Cupit – TPWD
 Perry Trial – TPWD
 Ray Allen - CBBEP

Priority Problem III (page 59):

Page 1 of 1

Data synthesis and monitoring are insufficient for management decisions and need to be focused on management needs.

Objective 1: Conduct research and seagrass resource data acquisition and analysis that provide a sound technical basis for management actions.

- Prioritize research activities from each agency
- Use seagrass workgroup as the forum to funnel the priorities through
- In support of partnership of research and management
- Outreach to university faculty to let them know the needs – can be small manageable projects
- May be able to help fund master’s students
- Need to evaluate seagrasses at all parts of spectrum with the same protocols so that we can evaluate failing and successful to glean additional information
- Provide support and encouragement to GMA PHINS use and data population
- Evaluate making GMA PHINS a priority projects; identify what each agency can contribute (i.e. habitat types from GLO) and the academic groups and identify if other data sources exist.

Comment [PC1]: ISSUE CODE
 M = Management
 R = Research
 E = Education
 +C = Controversial
ISSUE MODIFIER CODE
 (p) = Policy
 (r) = Regulatory

Comment [PC2]: M(p), R

Comment [PC3]: M(p)

Comment [PC4]: M(p)

Comment [PC5]: M(p)

Comment [PC6]: M(p)(r), R

Comment [PC7]: M(p), R, E

Comment [PC8]: M(p), R +Controversial

Summary of Ideas/Statements

- Standardized coastwise monitoring plan will help standardize methods for data collection – needs to be multi-agency
- Should be a goal to continue implementation and needs to have a good mechanism to retrieve data and share data

Comment [PC9]: M(p)(r), R

Comment [PC10]: M(p), R +Controversial

Miscellaneous Notes from Table 1 Participants

- No comments offered.

TABLE 2

John Huffman – USFWS – Facilitator
Kristopher Benson – NOAA – Note taker
Barbara Keeler – EPA – Alternate Note taker
Mark Fisher – TCEQ
H. E. Hegan – TPWD
Bob Hewgley – GLO
Scott Sullivan – TXDOT

Priority Problem III (page 59):

Page 1 of 1

Data synthesis and monitoring are insufficient for management decisions and need to be focused on management needs.

Objective 1: Conduct research and seagrass resource data acquisition and analysis that provide a sound technical basis for management actions.

- Map version control, archiving are key
- Recognize geographic differences in seagrass populations and relevance of research results regionally vs state-wide (i.e. regional-specific data needed for management).
- Develop predictive model of seagrass characteristics, cause/effect relationships, etc., prior to regional interpretation/application of results
- PHINS has been superseded by REDM & will probably serve as a sufficient database clearinghouse.
- Need to understand where seagrasses could expand, based on criteria and limiting factors, i.e. identify causal factors that prevent seagrass expansion.
- Establish a 10-year cycle for updating seagrass maps and status and trends studies

Comment [PC11]: M(p)

Comment [PC12]: M(p)(r), R(r), E

Comment [PC13]: M(p)(r), R

Comment [PC14]: M(p), R +Controversial

Comment [PC15]: M(p)(r), R, E(r)

Comment [PC16]: NEW IDEA
M(p), R, +Controversial

Summary of Ideas/Statements

- No comments offered.

Miscellaneous Notes from Table 2 Participants

- Just as trends analysis are important, it is important to monitor seagrass increase/decrease rate of change. This rate of change could then guide how often to have the status and trends analysis/report done.
- Mapping key
- Region specific info on why SAV grow or die
- Develop seagrass model; what are data gaps
- Map potential seagrass habitat not just where it exists now
- Strategies: Set a goal for a 10-year (?) trend analysis

TABLE 3

Christine Kolbe – TCEQ – Note taker
Alex Nunez – TPWD – Facilitator
Jason Zeplin – GLO
Jay Gardner – Naismith Engineering
Terrell Roberts – USCOE
Daniel Allen – HNTB
Bill Dennison – Univ. Maryland
Leo Trevino - CBBEP

Priority Problem III (page 59):

Page 1 of 1

Data synthesis and monitoring are insufficient for management decisions and need to be focused on management needs.

Objective 1: Conduct research and seagrass resource data acquisition and analysis that provide a sound technical basis for management actions.

- See priority problem II
- Also use TPWD website to link to or post appropriate documents. Develop a bibliography seagrass related research papers
- Link to other seagrass related pages.

Comment [PC17]: M(p), R, E

Comment [PC18]: M(p), R, E

Summary of Ideas/Statements

- See priority problem II
- Also use TPWD website to link to or post appropriate documents. Develop a bibliography seagrass related research papers
- Link to other seagrass related pages.

Comment [PC19]: M(p), R, E

Comment [PC20]: M(p), R, E

Miscellaneous Notes from Table 3 Participants

- Booklets
- Define clear goals
- Research management research education / outreach
- Sketch local seagrass areas of
- Storyboard approach to making a pamphlet

PRIORITY PROBLEM IV

TABLE 1

Nicole Hausler – PHA – Note taker
 Amy Nunez – GLO - Facilitator
 Kathryn Tunnell – GLO
 Jennifer Stephens – GLO
 Pat Radloff – TPWD
 Jeff Raasch – TPWD
 Will Cupit – TPWD
 Perry Trial – TPWD
 Ray Allen - CBBEP

Priority Problem IV (page 59):

Page 1 of 1

Public outreach is too limited to achieve the goal of public awareness.

Objective 1: Develop a sense of community stewardship and individual responsibility of the conservation of seagrass.

- Need to have a communication plan for management
- Need to have liaison between E & O / management to ensure the right topics are communicate
- The current organization of the plan may need to be adjusted to avoid redundancy of component group and to show inter relationship between the components
- Evaluate changing the structure to have management as the umbrella group that is supported by other groups ensure that it is a two way flow management provides needs and receives recommendation
- Agree that priority 4 needs to be revised, need to look at how the elements interact, instead of just throwing education into the management group
- Education and research are both very important components of management

Comment [PC1]: ISSUE CODE
 M = Management
 R = Research
 E = Education
 +C = Controversial
 ISSUE MODIFIER CODE
 (p) = Policy
 (r) = Regulatory

Comment [PC2]: M, E

Comment [PC3]: M, E

Comment [PC4]: M(p)

Comment [PC5]: M(p)

Comment [PC6]: M(p)

Comment [PC7]: M

Summary of Ideas/Statements

- In order for management to be effective must educate larger groups than just coastal – illustrate to inland communities their impact on seagrass and how it affects their lives (seafood consumption)
- Work to engage more types of stakeholders
- Adopt A Seagrass Bed – get interest
- Add a seagrass exhibit SeaCenter Texas, at Sea World Aquariums
- Put PSA’s on more channels in more markets

Comment [PC8]: M(p) E

Comment [PC9]: M(p), E

Comment [PC10]: M(p), E

Comment [PC11]: M, E

Comment [PC12]: M, E

Miscellaneous Notes from Table 1 Participants

- No comments offered.

TABLE 2

John Huffman – USFWS – Facilitator
Kristopher Benson – NOAA – Note taker
Barbara Keeler – EPA – Alternate Note taker
Mark Fisher – TCEQ
H. E. Hegan – TPWD
Bob Hewgley – GLO
Scott Sullivan – TXDOT

Priority Problem IV (page 59):

Page 1 of 1

Public outreach is too limited to achieve the goal of public awareness.

Objective 1: Develop a sense of community stewardship and individual responsibility of the conservation of seagrass.

- Clarify for the public and resource managers what is the connection between the resource (seagrass) and its ecological services
- Publicize successes
- Develop an ecosystem services model with an economic output to better scale the balance of economic gain from an impact with the resource cost of that impact
- Educate the people who use the resource for economic again (fishing guides). Get the stakeholders involved in the resource management
- Develop a stakeholder list serve

Comment [PC13]: M, E(r)

Comment [PC14]: M, E

Comment [PC15]: M(p) R, +Controversial

Comment [PC16]: M, E

Comment [PC17]: M, E

Summary of Ideas/Statements

- No comments offered.

Miscellaneous Notes from Table 2 Participants – A.

- Awareness by managers in seagrass management
- Connect services to habitat
- Communicate successes
- Establish a stakeholder group to discuss seagrass taskforce – add to monitoring group

TABLE 3

Christine Kolbe – TCEQ – Note taker
Alex Nunez – TPWD – Facilitator
Jason Zeplin – GLO
Jay Gardner – Naismith Engineering
Terrell Roberts – USCOE
Daniel Allen – HNTB
Bill Dennison – Univ. Maryland
Leo Trevino - CBBEP

Priority Problem IV (page 59):

Page 1 of 1

Public outreach is too limited to achieve the goal of public awareness.

Objective 1: Develop a sense of community stewardship and individual responsibility of the conservation of seagrass.

- Evaluate effectiveness pre and post efforts
- What are the messages we actually need to get across that is most effective? Where is the whole, what are we missing?
- What is the thing that will capture the public attention?
- Measure behaviors that impact seagrasses; Identify biggest threat to seagrass
- How much seagrass is actually lost to boating?
- The threats could be very different based on areas. Urban runoff not a problem in lower Laguna Madre but is in Redfish Bay
- Use surveys to determine where boaters are coming from; can be used to target public service announcement
- Develop key questions that get at impact to seagrass from recreational boater

Comment [PC18]: M, E

Comment [PC19]: M, E

Comment [PC20]: M(p)(r), E

Comment [PC21]: M(p), R

Comment [PC22]: M(r), E(r), R(r)

Comment [PC23]: M(p), E

Comment [PC24]: M, R, E

Summary of Ideas/Statements

- No comments offered.

Miscellaneous Notes from Table 3 Participants

- No comments offered.

Appendix D

Education and Outreach 2009 Workshop Breakout Notes

Seagrass Conservation Plan for Texas Review Workshop
EDUCATION AND OUTREACH CHAPTER
Meeting Notes
June 11, 2009

Below are 6 questions that were discussed during the Seagrass Conservation Plan for Texas Review Workshop. There were two tables set up during the breakout session that answered each question separately. The two table names were Halodule and Thalassia. All notes typed up below are taken directly from hand written notes that the participants wrote and supplied to the chapter Chairs: Jace Tunnell and Karen Meador.

Question 1: Which bay user groups and programs could be targeted for education about seagrasses?

HALODULE

Team Members: Thomas Whelan, Don Hockaday, Pat Clements, Jesse Solis, Richard Gonzales, Ismael Nava (“Smiley”)

Realtors/developers- educate them that seagrasses are an amenity for sales just like golf courses
Condo rentals – casual visitors could be targeted to educate, especially where there are rental boats available

Upstream (Watershed) users, managers, upstream residents/communities
Science & Spa Club Network
Coastal Bend Guide Association

THALASSIA

Team Members: Al Oswalt, Chad Leister, Paul Silva, Kris Shipman, Tom Harvey

Floating cabin users
Bait stand operators & users
Boater Education – Austin/smaller cities
Nature Centers / Sea Center
CCA – quarterly newsletter
TX Marine Education Assoc
Coastal Bend Informal Assoc
Outdoor retailers
Informal Science Educators Assoc
Marine boat storage, boatyards
Children/students – K-8 (TPWD magazine-kid insert)

Question 2: Where could informational inserts and videos be distributed in order to reach maximum use?

HALODULE

Airport – photo exhibit/contest
Utilize Current Technology - Use Facebook / Twitter / You Tube – set up websites about seagrasses that people can join and discuss seagrass issues
Retailers of outdoor equipment – in store placement of digital photo frame and play educational material about seagrasses for a visual learning experience
For educators – make good images available to use in teaching
Rest stops – visitor centers and posters on kiosks
Bait and fishing shops
Remaining agency sponsor webpage (TGLO, TCEQ)
Develop a Poster – land grass to seagrass to distribute
Videos on the website

THALASSIA

Post seagrass web links of TPWD and TNC on fishing websites.
Fishing tournaments
Pass out materials with fishing and boating license registration
CAST (Conference for Advancement Science Teachers) in order to reach a large audience that is interested in science and they teach kids
Outdoor Guide – TPWD / sponsors
Expand Signage - Put signs in Upper Laguna Madre boat ramps/navigation districts and other high use areas

Question 3: What types of technology could be used to educate people about seagrasses?

HALODULE

Web links
Sites on websites
Calendars/Posters – contest
World Seagrass Assoc – photos, videos of seagrass
Tactile/visual games

THALASSIA

TGLO Oil spill
Create a website – Texas Seagrass.org to redirect to TPWD website
Simple technology – coloring books for children, floatable key chains
Sticker on boat for “seagrass course”
Boating maps – GPS/depth finder, example, red = seagrass

Question 4: What materials could be used to support responsible behavior around seagrasses?

HALODULE

Sticker that show water depths needed to motor safely. Could add bag limits and fish species as well as pledge responsibility
Brochures for valet marina places
Insurance companies that insure boats – clause for safe boating
Get materials to the watershed groups and river authorities
Additional channel markers in high use boating areas and maintain
Need more educational signage at boat ramps

THALASSIA

“Top 10” tips to support seagrasses
Bookmarks – for kids / book covers for school books
Frisbees with web address
Tourist bureaus and chambers
Coloring books
Re-usable book covers
Texas Boating Safety course materials
Insert w/ water bill etc.
Downloadable PDF materials on websites (brochures and technical papers)

Question 5: What types of opportunities could be developed in order to get the public involved in seagrass conservation and restoration?

HALODULE

Festivals - Limpianato Parade (in Valley) and Shrimporee (Rockport area)
Monthly forum – presentations – Coastal Bend Bays Foundation, Harte Research Institute
Dr. Bill Dennison - Have surveys of peoples knowledge about the watershed and data is collected about what and where education needs to occur while also educating the public.
Highlight economic benefits of seagrass

THALASSIA

Create curriculum for Sea Camp to Texas State Aquarium, libraries, Learn & Serve
Estuaries Live! – beef up seagrass
Seagrass Habitat Scavenger Hunt (List 30 “cryptic creatures”)
Hands on demonstrations
Create a volunteer program
Incorporate seagrasses into kayak trails
Sea Camp seagrass sessions

Question 6: What recommendations can you give to enhance the Texas Seagrass Conservation Plan E&O Chapter?

HALODULE

Decide what you want people to do – develop a marketing plan – What behavior change do we want to effect and in what target group?

Need to do similar work with other targeted groups – like farmers, residents of coastal communities

Need to put a certain amount of effort at the school age groups

Need to focus on curriculum based information

Pick a target group

Develop a market strategy

Make outreach replicable state wide

THALASSIA

TX Marine Ed Assoc – seagrass workshop

TGLO – Train the Teachers Program

Create a Jr. Master Naturalist Program

Involve the kayakers – summer kayak camp for kids (TA&MCC – Jim Needham)

Power Point presentation available to use for anybody/ Why important, life cycles, curriculum all available online

Forward thinking – 20 years

Bilingual – Trilingual, Vietnamese/Spanish

Reach kids early

Involve Texas Master Naturalist Program

Canned presentations, videos, lesson plans

ITEMS NOT ACCOMPLISHED

THALASSIA

- Informal Ed. Groups – Keep yes TMN, 4-14 Expand, TX-Ag Life Marine Co. Ag Assoc., H2o shed steward workshops
- Video Adult Boater Ed – Aqua Smart Program – for kids @ H2O quality; “Jr. Naturalist”; expand to video clips/produce; write curriculum; Richard Gonzales – CMP grant and seagrass curriculum; look @ other models for curriculum; PLT – for scouts as subs for outdoor badge; project learning tree develop for various groups
- Channel 1 – some schools have; wouldn’t pay attention – eliminate, not priority
- Seagrass experts trained to teach grade appropriate lessons – grant money for teacher training; re-word – modify to train teachers/volunteers; TX Marine Ed Assoc – provide training to them
- “No Wake” seagrass zones – cant patrol it/enforce it; maintain; cost benefit is low; camera decoys; take off; use \$ to enforce Redfish Bay area
- Media on people who have been cited – example: 11 convictions for Redfish Bay; TPWD magazine – enforcement section

- Provide seagrass planting opportunities p spend lots of \$ not good project; sponsors for restoration area

GENERAL COMMENT FORMS RECEIVED

- Need to include a message to communicate to the public. The 1998 Conservation Plan focused a lot of attention on prop scars so maybe the 2010 update could focus on impacts of nutrients to seagrass beds.
- Need educate people about environmental windows and when might be the best time to build a dock, say spring time, for example.
- Could educate people on seagrass wrack and what the function is to the overall system and what it could be used for.

Appendix E

June 2009 Workshop Written Comments

Appendix E June 2009 Workshop Written Comments

Note: The following are additional comments submitted provided on the Comment Form available at the June 2009 Workshop. They are listed in the order the forms were reviewed. Labels A, B, C, et cetera, added by compiler.

COMMENT FORM

What changes/modifications do you suggest be made to the Seagrass Conservation Plan for Texas?

Comment A

Develop ecosystem services model with an economic output to better scale the balance of economic gain from an impact with the resource cost of that impact.

Look at spatial and temporal scales of what a healthy seagrass area is on a bay scale. Not worry about movement of areas within a system, but the larger scale persistence of the resource.

Optional Information: No optional information provided.

Relevant Chapter: None were circled.

Comment B

Concerning climate change and:

- Water level change predictions/estimates.

What are the applicable regional SLR expectations for each area with significant concentrations of seagrass (regardless of the cause of water level rise)?

There needs to be agreement between NOAA, EPA, USACE, NAS, General Land Office on target relative sea level rise (SLR) elevations. Currently the SLR estimates are all over the map (literally & figuratively), change with every new "peer reviewed" publication, or are political agenda driven.

Revised Plan should include "consensus" SLR estimate(s). Going forward, these estimates will be the framework supporting strategic conservation planning and provide a basis for accountability and direction to resource management decisions and expenditures.

- Water temperature. Are changes in species abundance, e.g. Halodule to Syringodium in the Upper Laguna Madre LM as one example, caused by higher winter temperature or?
- How does TCEQ plan to address predicted climate change in the TWQS, and permit conditions?

Comment [PC1]: ISSUE CODE
M = Management
R = Research
E = Education
+C = Controversial
ISSUE MODIFIER CODE
(p) = Policy
(r) = Regulatory

Comment [PC2]: M(p)(r), R,E
+Controversial

Comment [PC3]: M(p)(r), R

Comment [PC4]: R, M,E

Comment [PC5]: M(p)(r)

Comment [PC6]: M(p)(r),
NEW IDEA

Comment [PC7]: R

Comment [PC8]: M(p)(r)

Optional Information: No optional information provided.

Relevant Chapter: None were circled.

Comment C

Need scientifically sound but socially and fiscally acceptable identification of ecologically significant concentration of seagrass in Corpus Christi Bay, the Upper and Lower Laguna Madre, Aransas/Copano, San Antonio & Matagorda Bays. Redfish Bay and East Flats are probably significant to the Corpus Christi Bay estuary compared to all other locations where seagrass can be found.

Comment [PC9]: M(p)(r), R

Right now, in the regulatory for sure and perhaps the fisheries/wildlife management in general, every blade and piece of every species is critical – and that’s not so. It also seems that certain agency personnel believe or actually think that all bare bay bottoms in Texas should support seagrass and could do so, “if” and/or “only if” the “bad people went away”, push/require seagrass mitigation for any imagined effect on existing seagrass but “possible future” seagrasses, are pushing for water quality standards and/or discharge criteria that the natural system would violate. We are long past the luxury of thinking each blade is critical and to continue acceptance of regulatory practices or water quality agendas on the basis that they are somehow “precautionary” they are thus “legitimate”. Policy and policy implementation/practices should focus on key areas of seagrass concentrations and be supported by sound cause and effect science.

Comment [PC10]: M(p)(r), E(r)
+ Controversial

Optional Information: No optional information provided.

Relevant Chapter: All were circled.

Comment D

Need to identify, maintain, control modifications, archive changes and make an “official” plan seagrass layer. This official map would be used for status and trends and other map based needs from the plan.

Comment [PC11]: M(p)

Need research to link physical, chemical (biological?) landscape, factors to the presence/absence of seagrass.

Comment [PC12]: M(p), R

Need a predictive model of where/when seagrass occurs and the ability to identify causal factors that prevent seagrass so that treatments of those limiting factors could be implemented to expand the overall area of seagrass through mitigation and/or restoration.

Comment [PC13]: M(p)(r), R

Optional Information: No optional information provided.

Relevant Chapter: None were circled.

Comment E

Seagrass restoration and creation. Preparing a “how to” guide on seagrass restoration and creation may “talk” technical and it is possible to generalize what site selection parameters are needed for seagrass, but, by necessity, it will only be a general guide on what an experienced services provider has to consider and deliver. Habitat restoration and creation is a professional craft that involve a variety of technical skills and evaluation of criteria such as landscape position, hydrology, plant technologies, species specific methods, construction practices, etc, toward suitable site selection/seagrass establishment. Some criteria are pretty obvious but some are based on experience and some on “instinct”. But expecting a “seagrass habitat creation manual for dummies” tell all is naïve, and insulting. It’ll be talk and not “the walk”.

Comment [PC14]: M(p)

Update the plan on this topic.

Comment [PC15]: M(p)
NEW IDEA

Optional Information: No optional information provided.

Relevant Chapter: None were circled.

Comment F

Incorporate information on climate change /sea level rise estimates into management strategies / objectives.

Comment [PC16]: M(p)

Optional Information: No optional information provided.

Relevant Chapter: Management was circled.

Comment G

- The plan would be useful if it was pragmatic and goal/measurable end-point oriented, and prioritized.
- Discussion on developing regionally specific water quality criteria is appropriate and perhaps ultimately needed, however these should be first fully investigated and vetted within those parts of the bays where the largest concentrations occur.
- Bay system specific acreage targets should be set, rationally. Identify and propose boundaries of priority “critical” area of extrinsic and intrinsic value.
- Bay system ecosystem service requirements (seagrass acreage targets as a subset) should be identified and should be based on social preference and economic factors and not just purely environmental considerations.
- The above can be applied to decisions concerning regional planning, and assessing trade-offs and selecting impact restitution/mitigation alternatives.

Comment [PC17]: M(p)

Comment [PC18]: M(p)(r), R

Comment [PC19]: M(p), R

Comment [PC20]: M(p)(r) +Controversial

Comment [PC21]: M(p)(r) + Controversial

Optional Information: No optional information provided.

Relevant Chapter: None were circled.

Comment H

1. Put boots on the ground to ensure RFBSSA is in recovery mode.
2. Need dedicated financial commitment (any source SEP or mitigation \$ or legislated or agency budget line item) from/to TPWD to do maintenance of boating lanes, enforcement of no uprooting, monitoring.
3. Do not expand [state wide monitoring] plan until the “science and management problems” are solved here.

Comment [PC22]: M(r)

Comment [PC23]: M(p) NEW IDEA

Comment [PC24]: M(p) + Controversial

Optional Information: No optional information provided.

Relevant Chapter: None were circled.

Comment I

Several comments on the July 31, 2009 Management Subcommittee’s suggested revisions, were submitted by Raul Cantu, TXDOT, pre-workshop.

PP1, Objective 1, first Strategy “Designate Seagrass ...in TSWQS”

Re Accomplishments: “(Didn’t know there was data supporting water quality degradation that has lead to significant degradation of seagrasses to create special use areas to prevent their demise.”

Re Future Focus: “Statewide maps indicate location of seagrasses but don’t indicate the conditions (nutrients, salinity, water quality, sediment quality, bathymetry, et al) that provide seagrasses to propagate. Locations of seagrasses change as ambient conditions change and it is not a true indicator for propagation areas.”

Comment [PC25]: M(p)(r), R + Controversial

PP1, Objective 1, third Strategy “Develop...BMPs”

Re Accomplishments: “(This strategy would greatly affect a resource of great value in fighting or neutralizing coastal erosion. Dredged material has not been addressed as a resource for beneficial use projects, especially within this seagrass management plan. As discovered in the Laguna Madre research, seagrasses have propagated around the fringes of emergent placement areas, especially in the Upper Laguna Madre.)”

Re Future Focus: “(Dredged material needs to be addressed as a resource for beneficial use projects, especially within this seagrass management plan.)”

Comment [PC26]: M(p)(r)

PP1, Objective 4, first Strategy “BMP’s... to protect seagrass...while allowing economic development..”

Re Accomplishments: “(Best management practices are needed to protect seagrasses and ensure that navigation continues while allowing economic development of coastal resources. Texas has authorized and federally approved a Coastal Management Program to determine the consistency of proposed dredging and shoreline development projects.)”

Comment [PC27]: M(p)(r), R, E

Re Future Focus: “(Research to identify the best management practices applicable to state’s coastal areas and publish them as a guidebook for public, agencies and regulators.)”

Comment [PC28]: M(p)(r), R, E
NEW IDEA

h:\pdc\seagrass workshop\revised workshop notes and comment nov 09\seagrass comment form comments revision 112409.doc

Appendix F

Management Chapter Response to Public Comments in August 2010

Appendix F

Management Chapter Response to Public Comments in August 2010

Response to Comments on the Seagrass Conservation Plan for Texas. Management Issues for Texas (Review) dated 3.22.2010

The Chapter Reviewers received six (6) sets of comments . Response to these are in no particular order, however, all comments received were evaluated before the Reviewer's responses were developed. We wish to thank all commenter's .

The recommendations of the Chapter Reviewers remains concordant with our Executive Summary dated 3/22/1010 in that we maintain the future of seagrass conservation in Texas concerns those issues that we characterized as "New" and/or "Controversial". We also maintain that the Plan narrative needs substantial revision to focus on these issues.

The comments received in response to the following email by Angela Schrift dated 3/25/10.

From: Angela Schrift [mailto:Angela.Schrift@tpwd.state.tx.us]

Sent: Thursday, March 25, 2010 8:47 AM

To: Alex Nunez; Ali McKenzie; Amy Nunez; Andre Landry; Andrew Sullivan; Angela Schrift; Anna Armitage; Anne Hulse; Antonietta Quiq; Ashley Summers; Barbara Keeler; Beau Hardegree; Belynda Begnaud; Beth Almaraz; Bill Balboa; Bill Harrison; Bill Stevenson; Britt Bumguardner; Burt Moritz; Carol Malcolm; Carolyn Murphy; Cathy Anderson; Chad Ahlgren; Charlie Howell; Cherie OBrien; Chris Caudle; Chris Onuf; Christopher Mace; Cindy Contreras; Darwin Ockerman; Dave Buzan; David Grise; David Kennebeck; Deborah Overath; Dennis Brezina; Diane Altsman; Dustin Cravey; Ed Hegen; Faye Grubbs; Fred Anthamatten; Gerardo Arrambide; Grace Chen; Greg Stunz; Hudson Deyoe; Jace Tunnell; Jaimie Ingold; James Simons; James Tolan; Jan Culbertson; Janet Nelson; Jeff Dallarossa; Jerry Mambretti; Jesse Solis; Jim Davenport; John Huffman; John Wood; Jonette Childs; Joseph Kowalski; Karen Meador; Karl Brown; Kay Jenkins; Ken Dunton; Ken Teague; Kevin Hartke; Kim Ludeke; Kim Withers; Kirk Cammarata; Kyle Spiller; Lance Robinson; Larry McKinney; Len Polasek; Leo Trevino; Leslie Hartman; Leslie Williams; Linda Broach; Lloyd Mullins; Mark Dumesnil; Mark Finkbeiner; Mark Fisher; Mark Fisher; Martin Heaney; Meredith Byrd; Michael Lee; Mike Duran; Mike Ray; Mike Weeks; Mollie McIver; Nathan Kuhn; Norman Boyd; Pat Clements; Patricia Radloff; Patrick Larkin; Paul Carangelo; Paul Silva; Paul Zimba; Perry Trial; Peter Schaefer; Philip Crocker; Raphael Calderon; Raul Cantu; Ray Allen; Rebecca Hensley; Rene Garcia; Richard Gonzales; Robert Barron; Robert Hansen; Robert Joseph; Robert McAdory; Robert Sweeney; Robert Weber; Roy Lehman; Scot Sullivan; Seneca Holland; Shawn Hillen; Sonia Najera; Sterling Harris; Steve Schwelling; Susan Horton; Terry Roberts; Thomas Whelan; Tom Calnan; Tom Minello; Tracy Villareal; Warren Pulich; Warren Pulich(2); Will Myers; William Karel; William Schubert; Willy Cupit; Woody Woodrow

Subject: Seagrass Meeting Document Review: Chapter 3 Management Issues For Texas

Workgroup Members,

Please review the attached documents and come to the March 31st Seagrass Meeting prepared to discuss the Management Section (Chapter 3) of the Seagrass Conservation Plan.

The file "Draft Chapter 3 Management Review" is the step by step analysis of the pre-workshop and workshop input. It is our (Paul and Beau's) attempt to look at all of the input received and to the best of our ability document the suggested modifications. This document also has an introductory Executive Summary that will be very helpful to Chis and others as they review our work and try to make real changes to the Text section of Chapter 3. The document "Reviewers Summary of Recommendations" is what we believe should be the new Priority Problems, Objectives and Strategies moving forward. The other documents are the pre-workshop and workshop notes. The workshop notes are organized by Priority Problem and are the individual Table by Table comments. Also included are the General Comment Forms we received. These notes were typed as exact copies of the hand written input we received from the workshop. We added comments to these Table by Table and the General Comment notes to help us organize our thoughts as well as let the other Chapter leads know what was discussed during our Breakouts that might be relevant to their sections. These pre-workshop and workshop notes are intended to be an appendix to our "Draft Chapter 3 Management Review".

Cheers,

<*)><{ <*)>><{ <*)>><{ <*)>><{ <*)>><{

Angela Schrift
(512) 389-8031

Keeler.Barbara@epamail.epa.gov

To PAUL@pocca.com, beau_hardegree@fws.gov
cc

03/31/2010 11:00 AM

Subject Fw: Seagrass Meeting Document Review: Chapter 3 Management Issues For Texas

See below for one minor comment in light of a lack of seagrass mitigation banks.

Barbara Keeler
Coastal & Wetlands Planning Coordinator
EPA Region 6 (6WQ-EC)
1445 Ross Ave., Suite 1200
Dallas, TX 75202-2733
tel: 214-665-6698
fax: 214-665-6689
e-mail: keeler.barbara@epa.gov

From: Keeler.Barbara@epamail.epa.gov [mailto:Keeler.Barbara@epamail.epa.gov]
Sent: Thursday, March 25, 2010 3:42 PM
To: Angela Schrift
Subject: Re: Seagrass Meeting Document Review: Chapter 3 Management Issues For Texas

Thanks for all the updates!

I just opened one document, the draft Ch. 3 Management Review and have one suggestion. The listing for "Mitigation **Bank** Rules – Role of" would probably more correctly be listed as " Mitigation Rules – Role of."

Barbara Keeler
Coastal & Wetlands Planning Coordinator
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RESPONSE: *Thank you for your comment. Correction noted.*

Comment: *The potential for mitigation management in context of regional plans is a potential benefit of the Mitigation Rule. The Chapter Reviewers recommendations are intended to frame the conservation management of seagrass (and other 404/401 resources) in context of regional ecosystem services provisioning vs. regulatory compliance accounting. The Reviewers call-out for needs assessments, acreage targets, goal setting, tradeoffs, etc are some steps toward regional plan development and adoption of same for regulatory application. Implementation of a regional plan supported from an identification of ecosystem services provisioning/needs assessments may actually quantify risk for entrepreneurial banks, and/or the application of compensatory mitigation dollars.*

>>> "Patricia Radloff" <Patricia.Radloff@tpwd.state.tx.us> 4/8/2010 1:41 PM >>>

Beau and Paul,

Cindy Contreras and I have reviewed the recommended revisions to Chapter 3 of the Seagrass Conservation Plan (SCP). First we'd like to offer our compliments to you. The suggestions and viewpoints offered at the workshop in 2009 varied widely, and you did a commendable job pulling the material together.

We have some suggestions:

1. Priority Problem 1. Objective 1. The strategy related to designating a seagrass use in the water quality standards has been deleted, based on TCEQ's adoption of a seagrass propagation use in the 2000 water quality standards. We believe it is important to keep a record of that accomplishment in the SCP, even if it moves to a separate accomplishments section. Seagrass protection under the water quality standards will continue to be critical over time, and the development of criteria is an appropriate strategy that remains to be accomplished. A reader of the SCP should be able to see

clearly the connection between the accomplishment of adopting seagrass propagation as a use, and the need to develop criteria to support that use.

RESPONSE: Agree

2. Priority Problem 1. Objective 1. The two listed strategies (Strategy 1 and Strategy 2) are the same. Strategy 2 is a detailed, action-oriented (tactical?) exposition of Strategy 1. As such, we recommend retaining Strategy 1, which is more general, and deleting Strategy 2, which seems too specific for a planning document. We concur with the need to establish the range of environmental conditions that provide for seagrass propagation, and would support a strategy that read, "Define the range of environmental conditions that provide for seagrass propagation." However, it is getting ahead of the data to recommend this for "bay sub-segments." Let the data determine the scale at which that needs to occur.

RESPONSE: The Reviewers evaluation of the workshop resulted in recommendations for increased specificity in the planning document. While it is possible that Strategy 2 could be structured as an action, as such, it would not establish a directive upon where causality relationships needs to be spatially assessed. The bay-sub segment(s) where significant concentrations of seagrasses occur are where the range of environmental conditions that provide for seagrass propagation need to be established. If the data then indicate that sources/inputs to a bay segment scale are found to have a quantifiable negative effect on seagrass propagation in those subsegments where significant concentrations of seagrass occur, then the scope of management could redirect. It is the Reviewer's position that it is the bay segment scale that is way ahead of the existing data, and the data gaps need to be plugged where the concentrations of seagrass resources exist. This topic was noted by the Reviewers as "Controversial"

3. Priority Problem 1. Objective 1. We note that the strategy from the previous SCP relating to best management practices has been deleted. We feel this is a mistake, and the strategy, "Develop and implement water-based Best Management Practices," should be retained. We are aware that best management practices are addressed to some extent in Objective 4, Strategy 1. However, that strategy is limited to coastal development projects and it does not address urban stormwater runoff, agricultural stormwater runoff, industrial housekeeping, etc., all of which can contribute to management of nutrients and total suspended solids. We recommend that the more general statement be reinstated.

RESPONSE: Coastal Development Projects include development activities that occur in the coastal zone that may result in "urban stormwater runoff, agricultural stormwater runoff, industrial housekeeping, etc". As a result of the comment we recommend the plan clarify the use/scope of the general term Coastal Development Projects where applicable to BMPs. Please also see Reviewers' text provided under PP1, under Revised Objective 4, under Revised Strategy 1: "Based on the variety of comments received at the 2009 workshop the Reviewers believe that BMP's would need to be developed for each of several coastal development activities including but not limited to: oil and gas, dredging and use of dredge material, shoreline developments, non-point sources in the watershed, setback requirements, and the activities within coastal natural resource areas addressed in the Texas Coastal Zone Management Plan".

4. Priority Problem 1. Objective 3. Strategy 2 has been added to create a "needs assessment" related to seagrass ecosystem services. We don't understand what a "needs assessment" is in this context.

Does it reflect the needs of seagrasses, or the needs of people? The ecosystem services provided by seagrass beds are well-established in the literature, and important in Texas. Also, we are concerned that ecosystem needs assessments are proposed for “other use habitats.” While this may be a worthy goal, it is not clear why other habitats would be included in the seagrass conservation plan.

RESPONSE: *An ecosystem services needs assessment includes the needs and wants of humans, and the resources and activities upon which humans are supported. Other habitats are recommended to be included in the Seagrass Conservation Plan because the management/conservation of seagrass is not a separable element in context of ecosystem services provisioning. The Reviewer’s recommendation is to revise, update and redirect the (“seagrass centric”?) perspective of the 1999 plan and position seagrass habitat in context of other habitat “needs” and/or ecosystem services provisioning interests, not just seagrass in and of itself.*

5. Priority Problem 2. Objective 1. In Strategy 2, change “shall” to “should.”

RESPONSE: *We recommended “shall” since this was an issue which has been neglected for 10 years and was a non-controversial output from the workshop. The Reviewer’s believe that “shall” would clarify the commitment by the applicable agencies to complete this activity. If there is another accountable way for the applicable agencies to completing this activity as a date certain priority, then we would offer that as a recommendation.*

6. Priority Problem 2. Objective 1. We disagree with inclusion of new Strategy 5. We can see a benefit to having high-level coordination among the various state and federal agencies that have a role in seagrass management. However, that is not the mission of the Seagrass Monitoring Workgroup. From TPWD’s website, “The seagrass monitoring workgroup was created by TPWD as an outgrowth of their efforts to implement the Texas seagrass monitoring plan which is a key part of the state seagrass conservation plan...” The main focus of these meetings is to improve communication and coordination between the various entities and individuals working to conserve and protect seagrasses in the state of Texas, thus aiding implementation of various aspects of the Texas seagrass monitoring plan.” It does not seem possible that one group could serve both functions, and we do not support changing the mission or focus of the Seagrass Monitoring Workgroup.

RESPONSE: *The Reviewer’s indicated this recommendation was “CONTROVERSIAL” and provided a “WARNING” associated with the recommendation. If the mission of the Seagrass Monitoring Workgroup is to implement the seagrass monitoring plans of the SCPT, then the monitoring workgroup would be dedicated to improving communication and coordination between the various entities and individuals on monitoring, only. However, the SMWG also takes on the role of coordination policy aspects – it has by fiat taken on both functions. The Reviewer’s recommendation inherently recognized the conflicts or contradiction between the stated mission and the actions of the SMWG. The ambiguity/lack of management cohesiveness concerning seagrass conservation underscores the “CONTROVERSIAL” aspects of the role of the SMWG and indicates it be clarified/addressed in the UPDATE.*

7. Priority Problem 3. Objective 1. In Strategy 2, we support focusing research on seagrass management needs and encourage adding something about “defining the range of environmental conditions for seagrass propagation” to the list of needs.

RESPONSE: *Comment noted.*

Thanks for the opportunity to provide input.

Cindy and Pat

>>> "Mark Fisher" <MFISHER@tceq.state.tx.us> 4/30/2010 5:27 PM >>>

Hello Beau and Paul

Attached are TCEQ's comments on the draft Chapter 3 Seagrass Management Review. We appreciate the opportunity to review the document and hope the comments are helpful.

Please feel free to contact me if you have any questions.

Thanks,
Mark

DRAFT As of 3-22-10 330 PM

EXECUTIVE SUMMARY - DRAFT – Preliminary

Evaluation of Workshop Management Breakout Comments

[Reminder: Not a consensus workshop- a provisioning of ideas workshop]

General Observations

Lots of ideas, a broad range of concerns, interests, and positions expressed.

One of several challenges for Reviewers was to identify and succinctly describe recommended improvement(s) to the SCPT that reflect the range of ideas provided at the breakout. An additional challenge was that the comments/ideas were recorded at the broad Priority Problem and Objective level and rarely with a specific reference about a particular Strategy.

Another challenge was that the majority of comments to the **question*** were of a non-specific nature. [***The question being: "What changes/modifications do you suggest be made to the Seagrass Conservation Plan for Texas?"***] Thus, interpretation of what someone "meant" by their comments or by expression of their opinion, was often by necessity subjective on the part of the Reviewers. In general, comments varied widely in content and not necessarily in context of the topic (e.g. Objective) being evaluated. It was often difficult to attribute a comment/idea to one specific SCPT issue (e.g. Management, Research, Education), and/ or determine its (potential) applicability to a Management/Policy category such as "Regulatory", or "Education", as example.

Sometimes, there appeared to be a disconnect between the content of ideas recorded and the content of the Summary of Ideas/Statements recorded. Frequently, ideas provided by an

individual Table participant (see Miscellaneous Notes from Table Participants, Appendix A) were recorded within the list of recorded Table ideas.

Where there was no specific call by a table to repudiate or change a Priority Problem and/or an Objective and/or a Strategy and/or statement in the 1999 SCPT, the reviewers interpreted this as “supportive” of the Priority Problem and/or Objective and/or Strategy in the 1999 SCPT.

When more “specific” comments were provided, the majority were of a tactical rather than of a strategic nature. Tactical meaning they presented opinions on specific actions believed by the commenter/Table to be appropriate for seagrass conservation. Typical tactical comments represented opinions and/or preferences concerning the scope and/or direction and/or implementation of policy and regulatory issues, research issues, and education issues. As said above, comments varied widely in content.

That being said, there were several strategic ideas/key issues provided during the Workshop recorded as Table ideas or in the Summary of Ideas/Statements, or provided on workshop Comment Form(s). Additional strategic/key issues were contributed as part of the 31 July 2008 pre-workshop discussions.

Nonetheless, the comment(s) recorded by each Workshop Table Notetaker, on the workshop Comment Form(s), and contributed as part of 31 July 2008 pre-workshop discussions, were carefully evaluated by the Reviewers. The comments were annotated/flagged as applicable to one or more SCPT primary domain, i.e. Management (M), Research (R), and Education (E). In addition, where considered appropriate, a comment may also have been flagged as having a more specific subset/attribute or a directed applicability to, e.g., policy (p), or regulatory (r). Also, several **Controversial**** ideas and/or issues were identified and flagged. (****Controversial = dissimilar and/or opposing ideas expressed**)

These classifications were done: (1) as a courtesy to the other Chapter lead reviewers so they could assess if there may have been something that came out of the Management Breakout that might be applicable to their breakout, and; (2) to assist the Management Chapter Reviewers on the possible disposition of an item (e.g. combine as similar with) and/or (3) identify the suite of items/topic/issues that should be redressed by a separate discussion focused on a particular subject (e.g. Mitigation) for later advancement into the Management Chapter and/or SCPT review.

NOTE: The compiled Management Chapter Review Notetaker Notes, the July 31, 2008 Management Subcommittee Pre-workshop Evaluation, and the M, R and/or E flagged workshop notes, and the Comment Form comments, are provided, APPENDIX A.

Lastly, overall it appears that there are several changes to the text to a few management issue Objectives, and/or Strategies provided to the 1999 Seagrass Conservation Plan for Texas (SCPT) are suggested. However, there are several issues identified as Objectives and Strategies or narrated in the 1999 SCPT that were ignored or not emphasized in the intervening period, or that have taken on renewed relevance and apparent significance, are no longer relevant, or have been overtaken by events occurring between 1999 and 2009, and even events

occurring after the 2009 workshop. The issue's status may be also related to having been accomplished, or is no longer relevant due to it now addressed as a matter of continual improvement within a now existing program. Nonetheless, several cogent suggestions, a few "new" ideas, a few unrealized 1999 SCPT opportunities revisited, and several controversial ideas and/or issues have been identified during the 10-year SCPT review process. Some "New" and some "Controversial" issues potentially have status as new "Problem Problems" (e.g. Relative Sea Level Rise), but at a minimum they represent the future of seagrass conservation management in Texas. Therefore it appears that going forward that a substantive update, or more likely a substantive revision to the strategic and narrative content of the SCPT, is recommend.

The Reviewers describe some of these below and provide some recommendations on how to address them going forward.

What's New (or "Newish"?)

- Sea Level Rise - Climate Change
- Regional Spatial Planning – Ecosystem Services Provisioning
- Additional State Scientific Areas (SSAs) or Like Protected Areas
- Mitigation Bank Rules – Role of.
- Dedicated Funding for Seagrass Conservation Programs

Sea Level Rise - Climate Change. A very brief mention in the 1999 plan now appears as a dominate issue that presents significant challenges for all aspects of seagrass management. SLR has been and will continue to be a significant driver of change of the quantity and distribution of seagrass. In some regions relative SLR has caused an increase in acreage at the expense of other habitats (e.g. sand and or mudflats) and in other areas implicated in losses. SLR is expected to significantly impact resource management policies that have largely been formulated for "steady state" physical environment conditions. Examples of specific recommendations include but are not limited to:

- Texas state agency agreement on Regional (bay system specific) SLR scenarios (can't plan or design w/o estimates)
- Develop SLR estimate scenario based seagrass distribution/quantity projections
- Regional Contingency plans for SLR (adaptive retreat – services reprioritization)
- Describe how projected SLR will/may affect regulatory programs and natural resources policies e.g. TCEQ/TSWQS, State and Federal mitigation policy, etc) and;
- Develop and propose alternate regulatory and resource management adaptation strategies.

Regional Spatial Planning – Ecosystem Services Informed Management

Regional spatial (landscape scale) planning should provide several benefits to management of coastal resources including seagrass, as well as the administration of regulatory programs. The potential opportunity for decisions that address regional ecosystem services provisioning in comparison to place-based impacted habitat specific management. Fit seagrass management into a ecosystem services informed habitat management plan for preservation, creation and restoration goals specific to acreage and services targets established for each bay system. The Reviewers recommend that this strategic habitat conservation (SHC) be employed. The U.S. Fish and Wildlife Service and the USGS, as a strategy to provide landscape level conservation of natural resources, are using this SHC approach.

Additional State Scientific Area or Similar Resource Management Areas Designations

SSAs, coastal preserves and similar resource management areas (RMAs) have potential for managing seagrass resources by accommodating and reducing use conflicts. “RMAs” may provide long-term spatial protection for specific areas with concentrations of high value seagrass resources that otherwise cannot be achieved by project by project regulatory permitting programs. There is an opportunity to identify potential locations and to proposing additional “RMAs” with vetting through the public review process. RMAs may be considered independent from Regional Spatial Planning – Ecosystem Services Provisioning yet can also be considered within that contextual framework.

Mitigation Bank Rules –Role of.

The potential opportunities to facilitate management of the seagrass resource in context of regional habitat needs and possible applicability of the March 2008 USACE-EPA Mitigation Rule have not been considered. Mitigation in all forms for all habitats including seagrass may be considered independent from Regional Spatial Planning – Ecosystem Services Provisioning yet can also be implemented or leveraged within that framework.

Dedicated Funding for Texas Seagrass Conservation Programs

State budget line item support to TPWD, or SEP money or use mitigation dollars for seagrass conservation programs such as “RMA” management, including enforcement.

What’s Controversial

Controversial = Dissimilar and/or Opposing Views Expressed

NOTE: *“What’s New” may also be “What’s Controversial”*

1. Regulatory Coordination – Lack of,
2. Water Quality – 401; 402; Use Designation; Standards; Screening; Criteria; Implementation
3. Mitigation – Policy; Sequence; Alternatives; Siting; Guidelines; Success Measurement; COE Tracking.
4. Research – Direction of: Applied vs. Pure; Interpretation; Utility to Mgt; Causality

5. Statewide Monitoring Plan - Scope; Scale; Focus; Need; Criteria/Key Parameters.
6. Resource/Regulatory Policy - Regulatory Process Based; Ecosystem Needs/Services Based.
7. Knowledge Base (of Regulators and Regulated)
8. Seagrass Mgt Institutional Structure – Relationship between MGT and RES and EDU and Seagrass Monitoring Workgroup.
9. Role of Seagrass Monitoring Workgroup and Expanded Membership to Workgroup

Comment [m1]: Seems limiting to only prescribe two categories to stakeholders. Suggest just using the general term “stakeholders”.

RESPONSE: Comment m1 noted. The Reviewer’s noted this as a “CONTROVERSIAL” issue. “Stakeholders” may be an appropriate term to make the affiliation of participation ambiguous yet the context of the discussion was political. In this context who other that the regulated and the regulators are in the room?

NOTE: General: We think, because all comments were “anonymous”, that there appears to be a wide chasm between the “regulators” and the “regulated”. Some regulators (we think) seem to believe that the context of existing regulatory framework is fine and additional regulation and prescriptive controls are necessary to conserve seagrass, and the regulated (we think) seem to believe that existing regulatory programs are not fine and/or proposed regulations are often not scientifically supportable and/or alternative, innovative approaches and regulatory flexibility are necessary to conserve and manage seagrass ecosystems.

Comment [m2]: To highlight the challenges of only identifying two ends of a spectrum, there may be some regulators that support regulation, but also support creative solutions to meet the objectives of that regulation.

RESPONSE: Comment m2 noted. We are reporting on the Workshop.

It is our speculation that these differences may be because the regulators are “seagrass centric” [the 1999 plan page 66 used a term “biocentric” to describe ecologists and wildlife specialists] and the regulated are not – i.e. the regulated consider other factors [the 1999 use the term “anthropocentric” to describe economists and public policy experts]. Based on the workshop comments we are not confident the regulators or the regulated are either “biocentric” or “anthropocentric”.

Comment [m3]: Repeat the dangers of limiting the position of stakeholders to only two categories. Suggest this text could be used to define boundaries of the range of stakeholders interest but do not believe it represents all participants.

RESPONSE: Comment m3 noted. We are reporting on the Workshop

NOTE: A General Administrative Comment. When revising all the Plan Chapters, label the Strategies as “a”, “b”, “c...or 1, 2, 3 to provide a means to quicker reference and to aid communication.

Seagrass Conservation Plan for Texas

Chapter 3. Management Issues for Texas (Review)

In 2008 the Seagrass Monitoring Working Group (SMWG) decided to conduct a thorough review of the Seagrass Conservation Plan for Texas. This 10-year review was designed to evaluate if key components of the plan were still relevant and reflective of our current state of knowledge.

The review of Chapter 3 was initiated by a subcommittee co-chaired by Mr. Paul Carangelo Port of Corpus Christi Authority and Mr. Beau Hardegree, U.S. Department of the Interior, Fish and Wildlife Services. The subcommittee had a meeting at Texas A&M University on July 31, 2008. The subcommittee was as asked to review each item in the SCPT and:

1. Decide what to re-indorse and the basis for that decision;
2. List things or issues that need further discussion/change or are controversial, and;
3. Determine anything not clearly mentioned in the plan that should be added.

The subcommittee meeting was attended by Co-Chairs Beau Hardegree, USFWS, and Paul Carangelo, PCCA, with Rob Youker Boating Trades Organization, Alex Nunez TPWD, Leslie Williams TPWD, Nathan Kuhn, TPWD, Dennis Pridgen TPWD, Mark Fisher TCEQ, and Rafael Calderon TNC. Raul Cantu TDOT, and Tom Calnan GLO, could not attend but provided written comments

The June 11-12, 2009 Workshop Management Breakout session was attended by Nicole Hausler PHA and Note Taker, Amy Nunez GLO and Facilitator, Kathryn Tunnell GLO, Jennifer Stephens GLO, Pat Radloff TPWD, Jeff Raasch TPWD, Will Cupit TPWD, Perry Trial TPWD, Ray Allen CBBEP John Huffman USFWS and Facilitator, Kristopher Benson, NOAA and Note taker, Barbara Keeler EPA and Alternate Note taker, Mark Fisher TCEQ, H. E. Hegan TPWD, Bob Hewgley, GLO, Scott Sullivan, TXDOT, Christine Kolbe TCEQ and Note taker, Alex Nunez TPWD and Facilitator, Jason Zeplin GLO, Jay Gardner NEI, Terrell Roberts USACOE, Daniel Allen HNTB, Bill Dennison Univ. Maryland, Leo Trevino CBBEP, and Co-Chairs and Chapter 3 Reviewer's Paul Carangelo PCCA and Beau Hardegree USFWS.

The information from the July 31, 2008 pre-workshop meeting along with results from the Workshop held June 11 – 12, 2009 at the Solomon Ortiz Center in Corpus Christi were compiled and reviewed by the co-chairs and the results are presented below.

PRIORITY GOAL: To develop a sound management process that coordinates agency policies, public concern, and existing knowledge from research, to achieve effective seagrass conservation.

It was recognized that this is still a priority goal and no text changes suggested or proposed.

Priority Problem I *Seagrass beds are being lost or degraded, and/ or species composition is changing.*

Recognized that this is still a relevant issue. No text changes suggested or proposed.

However, the 2008 pre-workshop management subcommittee review suggested that there was an increased emphasis to understand ***the cause of species composition changes, since some changes naturally occur.***

In addition, it is important to clarify if there are significant fisheries dependant differences between different seagrass species or if they are essentially functionally equivalent on an

ecosystem basis. This information would be useful when communicating potential resource management objectives for intrinsic values (e.g. *Thalassia* in Redfish Bay) versus function (*Halodule* replacement by *Syringodium* in Upper Laguna Madre)

Objective 1. *Ensure water and sediment quality beneficial to the seagrass community*

Continued recognition as a relevant issue..No text changes suggested or proposed to Objective 1.

- **Strategy:** [1] Designate seagrass as a high or exceptional Aquatic Life Use in the Texas Surface water Quality Standards

It was recognized the “Use” designation for seagrass propagation in Chapter 307 of the TSWQS occurred as a part of the 2000 TWQS revisions. This designation was listed as an accomplishment during 31 July 2008 Pre-workshop Management Subcommittee Review and the 2009 workshop.

Note: *There has been no known publicly vetted proposal to designate the waters in which seagrass occur as high or exceptional. It is not known if TCEQ believes these designations are no longer needed or if water criteria development would accomplish the desired objective.*

RESPONSE: *Comment lh4 noted.*

The 31 July 2008 Pre-workshop Management Subcommittee review indicated that a future focus under this strategy was to use statewide maps from TPWD to designate [bay system] segments in the TSWQS. Based on workshop comments this action was categorized as “Controversial”. See next strategy for discussion.

Continue recognition as a relevant issue. However, suggested text revision:

- **Strategy [1]:** Designate seagrass propagation as an Aquatic Life Use in the Texas Surface Water Standards.

This change reflects what has actually occurred and does not preclude further standards development. However, because this has already been done the reviews recommend deleting Strategy [1].

RESPONSE: *Comment m5 noted. The Reviewer’s agree the UPDATE NARRATIVE should capture the successes of the 1999 plan, and we agree with deleting Strategy 1.*

- **Strategy:** [2] Designate water quality criteria for seagrass in Texas Water Quality Standards.

Comment [lh4]: The TCEQ acknowledges the interest in designating individual segments for a seagrass use, and because of that interest, draft designations were presented to the water quality standards advisory workgroup during the 2010 Texas Surface Water Quality Standards revision process. The TCEQ was unable to resolve substantial stakeholder concerns about unintended negative regulatory impacts of these designations on navigation in coastal waterways; therefore, a designated seagrass use for individual segments was not included in the proposed rule. Provisions that were added in the previous standards revisions, such as the specification of seagrass as a protected use in §307.7(b)(5), remain in place, so that an important tier of protection is still provided. The TCEQ will continue to coordinate with stakeholders to better monitor, assess, and protect seagrasses along the Texas coast.

Comment [m5]: Support deletion of this strategy moving forward, however, there does need to be some mechanism to capture the successes from the 1998 plan in the update.. Also need to clarify (especially important if strategy is not deleted) that neither the existing WQS language nor the 2009 proposed draft designations used the “high or exceptional” language in association with seagrass use.

During the workshop this strategy was recognized as a relevant Management issue. However, the issue is also characterized as a Controversial issue.

During the 31 July 2008 pre-workshop Management Subcommittee review the use of seagrass as an endpoint, i.e. their response to nutrient changes, was identified as a part of ongoing Gulf of Mexico Alliance (GOMA) efforts. However, no action under the SCPT was suggested or proposed.

Comments at the 2009 workshop suggested a need to prioritize research and monitoring efforts to focus on causal effect of point source discharge on seagrass condition as well as combined loads with at NPS from a variety of coastal development activities and agriculture, the development of region specific water quality criteria focused on those portions of bays with ecologically significant concentrations of seagrass, development of predictive model identifying the causal physical environmental and water chemistry factors that support seagrass, that policy and criteria formulation understand and recognize natural spatial and temporal variability of both seagrass condition and distribution. There were suggestions during the 2008 Pre-workshop and 2009 Breakout that utilization of statewide seagrass maps from TPWD and designation of segment with seagrass be incorporated in the WQS.

Note: *It is the Reviewers' understanding that during the 2007 triennial review of the TSWQS no specific water quality criteria for seagrass were drafted for public review . Public comment was solicited from the TSWQS 2007 Triennial Review Workgroup on a draft proposal to revise the 2000 TSWQS to list entire bay segments within which seagrass had been mapped, and to include the maps themselves. These and other related draft proposal revision(s) and associated implementation guidances were contentious during the 2007 triennial review WQS Workgroup process and at the 2009 Workshop. The draft proposal revision(s) to 2000 TSWQS were not offered in the proposed amendments to Chapter 307.1 – 307.10, Texas Register Volume 35, Number 5, January 29, 2010. It is not known why water quality criteria, segment designation, maps, or other draft proposed revision(s) related to seagrass were not proposed for public comment in the January 2010 TxREG.*

RESPONSE: *Comment lh6 noted.*

Prior to moving forward with Strategy 2 it is important to understand why changes were not made during the TSWQS 2007 Triennial Review. Based on the range of comments we believe sound science is pre-requisite for developing water quality criteria and a continued future focus and discussion by Management toward defining and achieving the research and monitoring necessary for criteria development, appear warranted. We recommend the following:

New: Strategy [3]: Define the range of environmental conditions that provide for seagrass propagation within the identified bay sub-segments and propose water quality criteria within the Texas State Water Quality Standards that protect the conditions.

Comment [lh6]: The TCEQ presented draft designations of individual segments for a seagrass use and procedures on how to implement the seagrass use in permitting to the water quality standards advisory workgroup. The TCEQ was unable to resolve substantial stakeholder concerns about unintended negative regulatory impacts of these designations on navigation in coastal waterways; therefore, a designated seagrass use for individual segments was not included in the proposed rule.

Comment [m7]: Load limits imply a prescriptive regulatory approach of a Total Maximum Daily Load (TMDL). Typically TMDL's are developed to meet criteria after they have been exceeded.

RESPONSE: Comment m7 noted. Thank you for the information.

Note: In order to accomplish NEW Strategy [3] we recommend that monitoring and research be conducted to determine the causal relationship between point and non-point loading with the range of conditions occurring within specific bay system sub-segments that support significant concentration and density of seagrass.

Note: See PP III, Obj I, Strategy [1], which is broad compared to the focus of PP I Obj 1 Revised Strategy [2] and New Strategy [3], this Objective.

- **Strategy [3]:** Develop and implement water-based Best Management Practices.

Workshop participants continue to support development of BMPs. Comments included suggestion of development of a guidebook to specific BMPs. However, there were a range of comment on possible content and scope to providing for protection of seagrass and economic activity. Accomplishments associated with this strategy are believed to include as an example, environmental windows for dredging in the Laguna Madre. It was not readily apparent from workshop comments what additional specific BMPs were being contemplated and it is not apparent if the BMPs would be proposed within the Texas Administrative Code, or as a joint federal/state policy guidance document, or as a non-regulatory BMP handbook. A future focus idea from the 31 July 2008 meeting was on better coordination with USDA programs, and verification of BMP effectiveness and feasibility, and the 2009 breakout suggested BMPs that provide for protection of seagrass, support economic activity, and that do not curtail other designated uses.

Reviews recommend to DELETE Former PP I Objective 1 Strategy [3] and recommend Roll-up into/combine this strategy with PP I Objective 4 Strategy [1] below

The Priority Problem I summary: Objective 1 stays. 1999 Strategy [1] is deleted, 1999 Strategy [2] becomes 2009 Strategy [1], proposed new Strategy [3] become new 2009 Strategy [2], and 1999 Strategy [3] is deleted but idea rolled up into Objective 4, below.

Objective 2: *Protect seagrass through effective application of the mitigation sequence: avoidance, minimization, compensation*

- **Strategy:** [1] Develop consistent and effective mitigation policies

Based on the range of comments made concerning mitigation during the breakout, the issue is considered still relevant but Controversial. Some comments concerning mitigation included but were not limited to: policy, the sequence (e.g. agencies doing a good job; need more avoidance); enforcement; education; alternatives to in-kind – create other habitat; no preservation banks for seagrass; memorialize 3:1 ratio; base on functional assessment; permit enforceable conditions/conflicting agendas impeding betterments.

The reviews recommend no change to the text. However this is a critical issue and could be addressed through better ecosystem planning (see Executive Summary Regional Spatial Planning – Ecosystem Services Informed Management).

Objective 3: *Restore/enhance/create lost functions and values of seagrass at a watershed/system-wide level, where feasible.*

REVISED Objective 3: *Restore/enhance/create functions and values of seagrass at a watershed/system-wide level, where feasible*

NOTE: *Delete “Lost”. Considered a extraneous modifier.*

- **Strategy:** [1] Develop guidelines for site selection on a watershed/system wide level, planting methods, and monitoring of seagrass restoration projects.

Revise: Strategy [1]: Develop guidelines for site selection, planting methods, and monitoring of seagrass restoration, enhancement and/or creation projects.

Note: *Delete “on a watershed/system wide basis”. Create new strategy [2]*

Based on numerous comments concerning development of watershed protection plans, clearing house of restoration/enhancement/creation techniques, bay system and statewide seagrass acreage goals, base goals on ecosystem needs, the reviewers concluded that more clarity was needed within the strategies; therefore 3 new strategies were developed as follows:

New: Strategy [2]: Conduct bay by bay ecosystem services needs assessment for seagrass and other use habitats.

RESPONSE: *Comment m8 noted. The UPDATE NARRATIVE should characterize the linkage and sequencing implicit in the numerical order of the NEW strategy 2,3,4, listings recommended by the Reviewer’s. However, the narrative should also describe that while ideally New Strategy 2 could provide facts/information supporting New Strategy 3 and Strategy 4, in many situations the use of decision support tools can result in actions from all three strategies moving forward in parallel with the intended outcome a more robust management/conservation/provisioning of ecosystem services.*

New: Strategy [3]: Develop bay by bay seagrass cover acreage targets to be achieved or maintained by protection, restoration, enhancement, or creation/construction.

New: Strategy [4]: Identify landscape scale seagrass habitat preservation/protection maintenance, restoration, enhancement and/or creation project site locations for each bay .

RESPONSE: *Comment m8 noted. The Reviewer’s look forward to providing additional guidance by which these seeming complex outcomes can be accomplished/achieved.*

Objective 4: *Design dredging and shoreline development projects to effectively reduce impacts upon seagrass.*

Comment [m8]: Need some text sequencing and or integration of this strategy with strategy 3 and 4. The results of this strategy should be the basis for strategy 3 and 4.

Comment [m9]: Need clarification on how these locations would be selected including appropriate consideration of willing participants. Dangerous to identify sites without current landowners concurrence.

REVISED Objective 4: *Design coastal development projects to effectively reduce impacts upon seagrass.*

- **Strategy:** [1]; Best management practices are needed to protect seagrass while allowing for economic development of coastal resources.

REVISED Strategy [1]: *Best management practices are needed to protect seagrass while allowing for economic development of coastal resources. Develop a guidebook on BMPs.*

RESPONSE: *Comment m10 noted.*

Based on the variety of comments received at the 2009 workshop the Reviewers believe that BMP's would need to be developed for each of several coastal development activities including but not limited to: oil and gas, dredging and use of dredge material, shoreline developments, non-point sources in the watershed, setback requirements, and the activities within coastal natural resource areas addressed in the Texas Coastal Zone Management Plan.

NOTE: *The workshop discussion and comments concerning Priority Problem 2, below, have material bearing on the PP 1 Objectives [2] and [3] and [4]. The general workshop recognition that multiple agency policies and regulations, and potentially individual staff interpretations of policy and regulation and/or personal agendas, often make it difficult to reach agreement.*

RESPONSE: *Comment m11 noted, see RESPONSE to m3.*

RESPONSE: *Comment m12 noted. We are reporting on the Workshop.*

Please see Priority Problem 2, below. The identification by each participating agency to develop and disseminate a brief concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories again appears in 2009 as a needed step, also identified in 1999. From that body of information an identification of conflicting policies/standards/permit conditions/agendas should be completed. Following that step, a process to resolve those conflicts in context of implementing a regional/watershed ecosystem services/habitat maintenance/ restoration/creation/adaptation goal(s) can be accomplished, as specifically applicable to PP1 and the SCPT in general. Please see Priority Problem 2, below.

RESPONSE: *Comment m13 noted. The suggested text would be "...unwritten agency practices..."*

Priority Problem II: Agency coordination or policies may prevent adequate management.

It was recognized that this is still a relevant issue both at the 31 July 2008 pre-workshop review and the June 2009 Workshop. The pre-workshop review suggested a re-write of the Priority Problem II text to state:

Comment [m10]: BMP's are best management practices and are generally considered a reasonable non-regulatory approach to water quality protection. There are a number of best management practices that should be encouraged without the cost of testing them all for effectiveness and feasibility e.g. encouraging waterfront property owners to minimize fertilizer application.

Comment [m11]: See m3

Comment [m12]: There was agreement that different agencies have different mandates and different opinions. These statements appears to discredit those differences regardless of their legitimacy.

Comment [m13]: Suggest use of a different term such as current practices.

Priority Problem II: “Lack of agency coordination (compromise?) or ways to resolve conflicting policies may prevent adequate management”.

The lack of compromise/coordination may be the result of conflicting policies that are promulgated under differing legislative authorities and mandates. Please also refer to Priority Problem II, Objective 2 discussion below. The Reviewers recommend that the Priority Problem II be rewritten:

NEW Priority Problem II: Lack of agency coordination, conflicting policies, or ways to resolve conflicting policies may prevent adequate management.

Objective 1. *Develop consensus agreements or plans among the users of the seagrass resource.*

It was recognized that this is still a relevant Management objective. However at the 2009 Workshop it was recognized that this was a controversial issue some of the comments included: “not a lack of coordination but “complicated”, identify conflicting standards and guidelines, lack of agency mechanisms to resolve conflicting policies as some examples.

- **Strategy:** [1] Model consensus agreements or plans such as the successful 1994 Beneficial Uses Group for the Houston Ship Channel deep-draft navigation project.

It was also recognized during the 2008 and 2009 review that under Objective 1: “Develop consensus agreements or plans among users of the seagrass resource”, there were accomplishments including examples like the Laguna Madre 216 Study and the Corpus Christi Ship Channel Channel Improvement Project and these should be highlighted in the SCPT under the PP II, Objective 1, Strategy [1].

No specific text change to Strategy [1] were originally proposed, however, the Chapter Reviewer’s now recommend the Strategy be revised and include the more recent planning processes that had direct linkage to seagrass management outcomes.

Strategy [1]: Model consensus agreements or plans after examples of Interagency Coordination Teams that have been used for major federal projects.

RESPONSE: *Comment m14 noted.*

RESPONSE: *Comment m15 noted. The Reviewer’s have identified this issue as “CONTROVERSIAL” and m15 underscores that finding. The Reviewer’s recommends the revision narrative highlight these specific projects in the SCPT as they represent the range of processes by which significant federal navigation project plans were successfully achieved including two more recent that that have direct linkage to seagrass management outcomes.*

There was also recognition that no agency coordination policies were changed as a result of the plan.

Comment [m14]: Success for other parts of the plan are to be handled outside the strategy section..

Comment [m15]: In 1998 the ICT approach was still relatively novel so it was important to highlight the Houston ship channel example.. There are now multiple examples of the success of the ICT approach. There is no need to highlight just a few. Using generic language also avoids the need to explain how the use of CWA section 404(r) builds consensus with the 401 /CMP process.

Comments made during the 2008 Pre-workshop and the 2009 Breakout session concerned the role of the Seagrass Monitoring Workgroup (SMW) be better defined, and the membership of the SMW be expanded to facilitate more coordination and participation because the Workgroup could be a good place to start addressing conflicting policies and build consensus on matters associated with statewide seagrass conservation. However, it was also suggested that additional Federal and State agencies participate (or more fully participate) in the SMW e.g. United States Department of Agriculture, Texas Soil and Water Conservation Board, US Army Corps of Engineers, etc, as there are several potential technical and policy issues being considered that could affect their missions.

Objective 2: *Facilitate agency policy coordination by improving communications and consistency of actions related top seagrass management.*

- **Strategy:** [1] Develop and disseminate a brief concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories.

The 2008 pre-workshop review indicated that no progress had been made under Objective 2 Strategy [1] but that it was still relevant and no text changes were proposed at the Workshop. Several comments during the 2009 breakout session also highlighted interest in accomplishing this strategy as it appears to have material relationship to Priority Problem II (revised), and Objective 1, and Strategy [1] (revised), above. A future focus suggestion from the 2008 pre-workshop review was to hire a contractor to bring this information together. However, the Chapter Reviewer's now suggest that each participating agency is the best position to be knowledgeable about the information indicated in Strategy [2] and to collate it. Then, if necessary, the information could be submitted to a contractor for analysis and synthesis. Accordingly, the Review's recommend the Strategy be revised to state:

Strategy [1]: Each participating agency shall develop and disseminate a brief concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories.

- **Strategy:**[2] Develop an updated data base on seagrass loss/damage, the amount of compensatory mitigation performed, and the mitigation success rates in order to measure policy effectiveness.

The 2008 pre-workshop review suggested that some accomplishments on status and trends had been made under Strategy [2] characterizing the progress as: "some status and trends on broad scale and sometimes on a bay specific scale, but no data base created". See also Priority Problem 3 New Strategy [3] Establish a 10-year update cycle. Please see that section.

Nonetheless, the 2008 review also characterized progress as “generally not accomplished” particularly with regard to the compensatory mitigation aspects of this strategy. Multiple comments during the 2009 Workshop concerning mitigation performance tracking, compensatory mitigation in general were recorded under Priority Problem I, Objective 2, Strategy [1]. Develop consistent and effective mitigation policies. Please see that section.

The 2008 pre-workshop management review indicated Strategy [2] of PP II, Objective 2, is a **KEY ISSUE** and a “**foundation for multiple other objectives**”.

- **Strategy:** [3] Review in kind policies involving in-kind and in-system mitigation for current application by both management and research teams.

The 2008 pre-workshop management review identified a future focus to link Strategy [3] to priority Problem I, Objective 2, Strategy [1] and Objective 3, Strategy [1]. Ideas presented at the 2009 Workshop also suggested Strategy [3] of PP II, Objective 2 should be combined with Priority Problem 1. There was also a recommendation made during the Workshop that the {sic} Strategy [2] and Strategy [3] of PP II, Objective 2 could be addressed combined and the new strategies written to obtain the new objective.

Note: Priority Problem II and Objective 2. Chapter 3 Workshop presentations identified several activities outlined in the 1999 plan text that have not been accomplished and which, based on interpretation of the range on comments, still have direct relevance to the Priority Problem II and Objective 2. Please refer to Policy Coordination, Page 55, and the 1999 plan. It appears that accomplishment of these activities would have substantive potential benefit by reducing the perception that the lack of coordination is for example due to a lack of willingness to compromise, or due to agency regulatory mandate, or due to agency overreach.

One NEW IDEA that was offered was to have a “formal charter that identifies each agencies responsibilities and helps secure appropriate resources”. However, this issue was also identified as CONTROVERSIAL particularly with suggestions that there was a “benefit to informality because it allows more timely implementation”.

As a result of the evaluation of the Workshop comments the Reviewers recommend that the Priority Problem and the two objectives be rewritten to more accurately represent a clear path forward. In addition the strategies need to be clarified and included under one objective as follows:

NEW Priority Problem II: Lack of agency coordination, conflicting policies, or ways to resolve conflicting policies may prevent adequate management.

NEW Objective 1. Reduce conflicting agency policies and improve agency coordination.

NEW Strategy [1]: Model consensus agreements or plans after examples such as the 1994 Beneficial Uses Group for the Houston Ship Channel deep-draft navigation project, the 2005 Laguna Madre 216 Study, or the 2003 Corpus Christi Ship Channel- Channel Improvement Project.

NEW Strategy [2]: Each participating agency shall develop and disseminate a brief concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories.

NEW Strategy [3]: Agencies should collaborate and develop an updated data base on seagrass loss/damage to track regional changes in seagrass distribution/abundance, the amount of compensatory mitigation performed, and the mitigation success rates in order to measure policy effectiveness.

NEW Strategy [4]: Use TPWD's seagrass web page to include links to other agency information and become the seagrass document clearinghouse for the State.

NEW Strategy [5]: Define the role of the Seagrass Monitoring Working Group (SMWG) in coordinating agency policy and addressing agency conflicts related to seagrass management. ***WARNING NEW Strategy [5] is Controversial and as addressed above would require substantial changes to the SMWGs mission and membership.***

Priority Problem III

Data synthesis and monitoring are insufficient for management decisions and need to be focused on management needs

Objective 1: Conduct research and seagrass resources data acquisition and analysis that provide a sound technical basis for management actions.

- Strategy: [1] Establish a data clearinghouse for seagrass-related information
- Strategy: [2] Focus research on seagrass management needs for Texas estuarine systems, including such issues as seagrass status and trends, water quality criteria, adequate mitigation ratios, and best mitigation practices.

Revise: Strategy **[1]:** Establish a data clearinghouse for seagrass-related information

Revise Strategy **[2]:** Focus research on seagrass management needs for Texas estuarine systems, including such issues as seagrass status and trends, water quality criteria, adequate mitigation ratios, and best mitigation practices.

Comments during the 2009 breakout indicated the issue of data synthesis and monitoring are still relevant, but there were divergent interests or needs for technical clarifications. Concerning Strategy [1], the 2008 pre-workshop noted accomplishments such using GOMA PHINS as data clearing house and TNRIS for TWWDD data, aerial photography and remote sensing database, and concerning Strategy [2], there were numerous ongoing research activities. Comments in 2009 indicated that information provision could benefit if each agency

identified and prioritized its research interests and activities, establish a standardized coastwide monitoring protocol used by all agencies, upgrading version controls of maps and databases, prioritization upgrading the use GOMA PHINS, that PHINS has been superceded by REDM as the data clearinghouse, a new idea to establish a 10-year cycle for updating seagrass distribution maps and status and trends, use of the TPWD webpage to link or post documents and the development of an annotated bibliography of seagrass related papers. The Reviews recommend the addition of a new strategy:

New Strategy [3]: Establish a 10-year cycle for updating seagrass distribution maps, and status and trends using a standardized coastwide monitoring protocol.

NOTE: *There were several individual comments and during other PP breakouts that were indirectly related to the PP IV Objective 1, Strategy [2] but possibly also be related to PP 1 Objective 3 but which were so significant they were identified as NEW ISSUES. Some of these would be better addressed under "Mitigation" such as a guidebook on seagrass restoration techniques, the overarching effect of relative se level rise SLR on all aspects of coastal resources management and addressing seagrass as part of need assessments in the context of ecosystem services provisioning.*

Priority Problem IV Public Outreach is too limited to achieve the goal of public awareness.

Objective 1: Develop a sense of community stewardship and individual responsibility for the conservation of seagrass

- Strategy: [1] Write information clearly, accurately, and with common-sense ideas for the public sector, including schools, universities, and the general public
- Strategy:[2] Listen to stakeholder ideas, exchange information, and make information relevant.
- Strategy: [3] Strengthen commitment of state and federal agencies to outreach programs

Comments provided from the Pre-workshop review and the 2009 Workshop continue to support the relevance of the Priority Problem and the Objective 1. No revisions to the text of the Priority Problem or Objective 1 are suggested. Several accomplishments were also noted concerning Strategy [2] and Strategy [3] including outreach during the development of the Redfish Bay State Scientific Area, the Seagrass taskforce, and the TPWD Website. However, the 2008 pre-workshop review also recommended the incorporation of Strategy [1], Strategy [2] and Strategy [3] into the Education/Outreach section of the plan.

During the 2009 Workshop it was suggested that a liaison between Education/Outreach and Management could ensure the right topics are communicated and products developed for the proper medium and for the appropriate target audiences. Also, the 31 July 2008 pre-workshop review similarly noted and also recommended a new Strategy for Management.

Strategy [New Strategy 1]: Better coordination between management and with individuals conducting seagrass educational outreach.

Therefore original 1999 plan strategies [1][2][3] would be deleted from PP IV and the new Strategy [1] ascended under PP IV Objective 1

CHAPTER 3 REVIEWERS RECOMMENDATIONS

dated 3.22.10 2 PM

Reviewers: Beau Hardegree, US Fish and Wildlife Service
Paul Carangelo, Port of Corpus Christi Authority

PRIORITY GOAL: To develop a sound management process that coordinates agency policies, public concern, and existing knowledge from research, to achieve effective seagrass conservation.

PRIORITY PROBLEM I. *Seagrass beds are being lost or degraded, and/ or species composition is changing.*

Objective 1. *Ensure water and sediment quality beneficial to the seagrass community*

- **Strategy 1:** Designate water quality criteria for seagrass in Texas Water Quality Standards.
- **Strategy 2:** Define the range of environmental conditions that provide for seagrass propagation within the identified bay sub-segments and propose load limits and associated water quality criteria within the Texas State Water Quality Standards that protect the conditions.

Objective 2. *Protect seagrass through effective application of the mitigation sequence: avoidance, minimization, compensation*

- **Strategy 1:** Develop consistent and effective mitigation policies

Objective 3. *Restore/enhance/create functions and values of seagrass at a watershed/system-wide level, where feasible*

- **Strategy 1:** Develop guidelines for site selection, planting methods, and monitoring of seagrass restoration, enhancement and/or creation projects.
- **Strategy 2:** Conduct bay by bay ecosystem services needs assessment for seagrass and other use habitats.
- **Strategy 3:** Develop bay by bay seagrass cover acreage targets to be achieved or maintained by protection, restoration, enhancement, or creation/construction.
- **Strategy 4:** Identify landscape scale seagrass habitat preservation/protection maintenance, restoration, enhancement and/or creation project site locations for each bay

Objective 4: *Design coastal development projects to effectively reduce impacts upon seagrass.*

- **Strategy 1:** Best management practices are needed to protect seagrass while allowing for economic development of coastal resources. Develop a guidebook on BMPs that have been verified for effectiveness and feasibility.

PRIORITY PROBLEM II: *Lack of agency coordination, conflicting policies, or ways to resolve conflicting policies may prevent adequate management.*

Objective 1. *Reduce conflicting agency policies and improve agency coordination.*

- **Strategy 1:** Model consensus agreements or plans after examples such as the 1994 Beneficial Uses Group for the Houston Ship Channel deep-draft navigation project, the 2005 Laguna Madre 216 Study, or the 2003 Corpus Christi Ship Channel- Channel Improvement Project.
- **Strategy 2:** Each participating agency shall develop and disseminate a brief concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories.
- **Strategy 3:** Agencies should collaborate and develop an updated data base on seagrass loss/damage to track regional changes in seagrass distribution/abundance, the amount of compensatory mitigation performed, and the mitigation success rates in order to measure policy effectiveness.
- **Strategy 4:** Use TPWD's seagrass web page to include links to other agency information and become the seagrass document clearinghouse for the State.
- **Strategy 5:** Define the role of the Seagrass Monitoring Working Group (SMWG) in coordinating agency policy and addressing agency conflicts related to seagrass management. ***WARNING NEW Strategy [5] is Controversial and would require substantial changes to the SMWGs mission and membership.***

PRIORITY PROBLEM III. *Data synthesis and monitoring are insufficient for management decisions and need to be focused on management needs*

Objective 1: *Conduct research and seagrass resources data acquisition and analysis that provide a sound technical basis for management actions.*

- **Strategy 1:** Establish a data clearinghouse for seagrass-related information
- **Strategy 2:** Focus research on seagrass management needs for Texas estuarine systems, including such issues as seagrass status and trends, water quality criteria, adequate mitigation ratios, and best mitigation practices.

- **Strategy 3:** Establish a 10-year cycle for updating seagrass distribution maps, and status and trends using a standardized coastwide monitoring protocol.

PRIORITY PROBLEM IV. *Public Outreach is too limited to achieve the goal of public awareness.*

Objective 1: *Develop a sense of community stewardship and individual responsibility for the conservation of seagrass*

- **Strategy 1:** Better coordination between management and with individuals conducting seagrass educational outreach.

Chapter 5 Implementation of Seagrass Plan Objectives

Look to the list and clarify what has been done, what has not but has been overtaken by events, and what has not been done and is still relevant. Thoroughly address: Who, What, When, Where, and Why, and How, for each.

Provide list of subjects (What's' New), (What's Controversial) and assemble a comprehensive list of the associated ideas/issues /ideas for future subject specific redress. Use the annotated notes provided in APPENDIX A as a resource for these activities.

Set Priorities

- Short Term for Short term now for 1 – 2 years
- Short Term for Mid Term now to 1 year for 10 year
- Mid Term for Long Term 1-2 years for 20 – 30 years

What are these priorities and why. Thoroughly address: Who, What, When, Where, and Why, and How, for each.

APPENDIX A

1. the July 31, 2008 Management Subcommittee Pre-workshop Evaluation
 2. the compiled Management Chapter Review Notetaker Notes
 3. the Management Chapter Reviewer's M, R and/or E flagged workshop notes, and
 4. the Workshop Comment Form comments, and comments to the 31 July 2008 Evaluation.
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>>> Hudson Deyoe <hdeyoe@utpa.edu> 3/28/2010 5:18 PM >>>
Dear All,

I am a bit confused by Mr. Sullivan's comments on the "Chapter 3 Reviewer's Recommendations". I thought it was Beau and Paul's job to capture the essence of the workshop comments and relay them to the group. Were the comments ambiguous and open to alternative interpretations? Maybe I am missing something?

Hudson DeYoe
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RESPONSE: Comment noted. Thank you for your comment.

>>> "Scot Sullivan" <SSULLIV@dot.state.tx.us> 3/26/2010 2:38 PM >>>

This is a very sticky wicket, to capture comments from the workshop as Paul and Beau did, or to suggest revisions based on an overall goal of development of an updated management plan.

Not sure how true to the workshop feedback we need to stay, but for those of you with time to read, here are some major management chapter revision suggestions to consider in advance. I added a sea level rise problem and removed many things that seemed to already be covered or should be covered in the research or education chapters. If possible, I tried to include specific versus broad language/actions. It was a quick exercise on my part but maybe something useful will come out of it.

Scot

Congratulations to Texas Adopt-a-Highway volunteers for 25 years of keeping our state litter-free.
Find out how you can get involved at
www.dot.state.tx.us/trv/aah/

RESPONSE: Comment noted. The Reviewer's developed their recommendations after a comprehensive evaluation of all the Workshop products.

However, regardless, the Reviewer's also presented in the EXECUTIVE SUMMARY several key issues listed as "New or Newish" and/or "Controversial" that the Reviewer's stated: "...have status as new "Problem Problems" (e.g. Relative Sea Level Rise), but at a minimum they represent the future of seagrass conservation management in Texas. Therefore it appears that going forward that a substantive update, or more likely a substantive revision to the strategic and narrative content of the SCPT, is recommend."

and the Reviewers describe some of these, including sea level rise, and provided some recommendations on how to address them going forward. The Reviewer's also presented recommendations for Chapter 5 – Plan Implementation, to prioritize issues and set goals based on set time tables.

Per the attachment to the 3/26/10 email:

CHAPTER 3 REVIEWERS RECOMMENDATIONS

dated 3.22.10 3 PM

Reviewers: Beau Hardegree, US Fish and Wildlife Service
Paul Carangelo, Port of Corpus Christi Authority

PRIORITY GOAL: To develop a ~~sound management~~ process that coordinates agency policies, public concern, and existing knowledge from research, to **manage seagrass resources**. ~~achieve effective seagrass conservation.~~

RESPONSE: *The Reviewer's support an updated SCPT that emphasize the management of the seagrass resource.*

PRIORITY PROBLEM I. ~~Seagrass beds are being lost or degraded, and/ or species composition is changing.~~ **Minimum management policies exist to address threats to seagrass communities**

RESPONSE: *Thank you for your comment.*

Objective 1. ~~Ensure water and sediment quality beneficial to the seagrass community~~

- **Strategy 1:** Designate/**improve** water quality criteria for **algae control** seagrass in Texas Water Quality Standards.

RESPONSE: *Thank you for your comment. The Reviewer's support an updated SCPT that emphasize research and monitoring that targets establishing the range of conditions and causal relationships between water quality and seagrass condition.*

- ~~**Strategy 2:** Define the range of environmental conditions that provide for seagrass propagation within the identified bay sub-segments and propose load limits and associated water quality criteria within the Texas State Water Quality Standards that protect the conditions.~~

Objective 2. ~~Protect seagrass through effective application of the mitigation sequence: avoidance, minimization, compensation~~

Objective 3 2. Restore/enhance/create/mitigate functions and values of seagrass at a watershed/system-wide level, where feasible

RESPONSE: Thank you for your comment.

- **Strategy 1:** Develop guidelines/BMPs that promote avoidance and minimization of impacts to seagrass communities. Develop consistent and effective mitigation policies

RESPONSE: Thank you for your comment. Mitigation policies typically include avoidance and minimization and certain BMPs can be appropriate in specific circumstances. However, deployment or generalized use of several BMPs are promoted or required as conditions to avoid or minimize impacts from activities that left unabated would have no measurable ecological effect on seagrass.

- **Strategy 4 2:** Develop guidelines for site selection, planting methods, and monitoring of seagrass mitigation, restoration, enhancement and/or creation projects.

RESPONSE: Thank you for your comment. Site selection criteria for restoration, enhancement or creation projects can be applicable to mitigation projects as they are often implemented for mitigation.

- **Strategy-2 3:** Conduct bay by bay ecosystem services needs assessment for seagrass and other use habitats.
- **Strategy-3 4:** Develop bay by bay seagrass cover acreage targets to be achieved or maintained by protection, mitigation, restoration, enhancement, or creation/construction.

RESPONSE: Agree.

- **Strategy-4 5:** Identify landscape scale seagrass habitat preservation/protection maintenance, mitigation, restoration, enhancement and/or creation project site locations for each bay .

RESPONSE: Agree.

Objective-4 3: Develop management policies to address sea level rise impacts on seagrass resources. Design coastal development projects to effectively reduce impacts upon seagrass.

- **Strategy 1:** Identify potential impacts of sea level rise on seagrass resources and recommend adaptive seagrass management strategies to respond to future sea inundation. Best management practices are needed to protect seagrass while allowing for economic development of coastal resources. Develop a guidebook on BMPs that have been verified for effectiveness and feasibility.

RESPONSE: Thank you for your comment but we do not agree with the suggested edit.. The Reviewer's identify SLR in the EXECUTIVE SUMMARY to be a dominate issue that presents significant challenges for all aspects of seagrass management and recommends it be ascended as a Priority Problem. The Reviewer's also provided several

specific recommendations on SLR including but not limited to development of regulatory and resources management adaptation strategies.

PRIORITY PROBLEM II: *Lack of agency coordination, conflicting policies, or ways to resolve conflicting policies may prevent adequate management.*

Objective 1. ~~Reduce conflicting agency policies and improve agency coordination.~~ **Improve agency coordination**

- ~~**Strategy 1:** Model consensus agreements or plans after examples such as the 1994 Beneficial Uses Group for the Houston Ship Channel deep draft navigation project, the 2005 Laguna Madre 246 Study, or the 2003 Corpus Christi Ship Channel Channel Improvement Project.~~
- ~~**Strategy 2:** Each participating agency shall develop and disseminate a brief concise summary of applicable, existing written and unwritten agency policies, including footnotes and full summaries and text of enabling legislation, regulation, pertinent case law and administrative histories.~~
- ~~**Strategy 3:** Agencies should collaborate and develop an updated data base on seagrass loss/damage to track regional changes in seagrass distribution/abundance, the amount of compensatory mitigation performed, and the mitigation success rates in order to measure policy effectiveness.~~
- ~~**Strategy 4:** Use TPWD's seagrass web page to include links to other agency information and become the seagrass document clearinghouse for the State.~~

RESPONSE: *Thank you for your comment but the Reviewers do not agree with suggested edits. The Reviewer's are reporting out the Workshop and recommend accomplishing activities which have substantive relevance to Priority Problem II, Objective 1 and represent a clear path forward on the priority problem.*

- **Strategy—5 1:** Define the role of the Seagrass Monitoring Working Group (SMWG) in coordinating agency policy and addressing agency conflicts related to seagrass management. **WARNING NEW Strategy [5] is Controversial and would require substantial changes to the SMWGs mission and membership.**

RESPONSE: *Thank you for your suggestion. While identified as "Controversial", the Reviewer's recommend defining the role of the SMWG be addressed in the UPDATE.*

PRIORITY PROBLEM III. *Data synthesis and monitoring are insufficient for management decisions and need to be focused on management needs*

Objective 1: ~~Conduct research and seagrass resources data acquisition and analysis that provide a sound technical basis for management actions.~~ **Assist researchers to design/develop studies to improve management of seagrass resources.**

RESPONSE: *Thank you for your suggestion. The Reviewer's recommend seagrass research and monitoring be focused by management for management applications.*

- ~~Strategy 1: Establish a data clearinghouse for seagrass-related information~~

RESPONSE: *Thank you for your suggestion. The Reviewers evaluation of the workshop resulted in the recommendation.*

- ~~Strategy 2: Focus research on Identify seagrass management needs for Texas estuarine systems, including such issues as seagrass status and trends, water quality criteria, adequate mitigation ratios, and best mitigation practices.~~

RESPONSE: *Agree that identification of management needs including such issues as seagrass status and trends, water quality criteria, adequate mitigation ratios, and best mitigation practices are necessary to focus research and monitoring. No change proposed as result of comment.*

- ~~Strategy 3: Establish a 10-year cycle for updating seagrass distribution maps, and status and trends using a standardized coastwide monitoring protocol.~~

RESPONSE: *Thank you for your suggestion. The Reviewers evaluation of the workshop resulted in the recommendation for increased specificity in the planning document. Reviewer's recommendation would be for a minimum cycle unless funding is available for more frequent updates.*

PRIORITY PROBLEM IV. ~~Public Outreach is too limited to achieve the goal of public awareness~~ **Poor public awareness of issues related to seagrass conservation and management.**

Objective 1: ~~Develop a sense of community stewardship and individual responsibility for the conservation of seagrass~~ **Communicate current seagrass management and conservation information with the public.**

- ~~Strategy 1: Better coordination between management and with individuals conducting seagrass educational outreach.~~ **Annually (Seagrass Festival of Knowledge) provide media outlets with information regarding seagrass conservation and management issues.**

RESPONSE: *Thank you for your comments on PP IV. The Reviewers evaluation of the workshop resulted in these recommendations. We understand there could be several potential public outreach activities that would develop for management applications in consultation with Public Outreach and Education. No changes to PP IV are proposed as result of comment.*

>>> "Jace Tunnell" <jtunnell@cbbep.org> 3/25/2010 10:37 AM >>>
Excellent job! I think this looks great!
Jace

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RESPONSE: *Thank you for your comment.*
