

Workshop Summary
Habitat Management Plan for the Corpus Christi Bay Area
Outlining an Ecosystem-based Management Plan for the Corpus Christi Bay

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List of Acronyms

CBBEP	Coastal Bend Bays and Estuaries Program
CCA	Coastal Conservation Association
CCC	City of Corpus Christi
CCS	Center for Coastal Studies, TAMUCC
CIAP	Coastal Impact Assistance Program
CMP	Coastal Management Program
ES	Ecosystem Services
GOMA	Gulf of Mexico Alliance
HRI	Harte Research for Gulf of Mexico Studies, TAMUCC
MANERR	Mission-Aransas National Estuarine Research Reserve
MBCHC	Mollie Beattie Coastal Habitat Community
MEA	Millennium Ecosystem Assessment
NOAA NMFS	National Oceanic and Atmospheric Administration's National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
NSF	National Science Foundation
POCCA	Port of Corpus Christi Authority
SEA	Saltwater-fisheries Enhancement Association
SEP	Supplemental Environmental Projects
TAMUCC	Texas A&M University-Corpus Christi
TGLO	Texas General Land Office
TPWD	Texas Parks and Wildlife
TSSWCB	Texas State Soil and Water Conservation Board
TxDOT	Texas Department of Transportation
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
UTMSI	University of Texas (at Austin) Marine Science Institute

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Many people contributed to the successful execution of the workshop. The authors especially thank Jace Tunnell (CBBEP) who helped plan the workshop, presented a description of the overall goals of the habitat plan project, led one of the groups and assisted in editing this document. Paul Carangelo also provided valuable assistance in planning the workshop and editing this document.

The logistics of the workshop were planned and executed by Allison Knight (HRI) and Carroll Simanek (HRI). Carroll also transcribed the hand-written notes produced at the workshop into digital text.

Several people from HRI volunteered to lead breakout groups at that workshop including Sandra Arismendez, Jennifer Beseres Pollack, Larry Hyde, and Phillip Levasseur.

Finally a big thank you to all the workshop participants who were willing to give so generously of their time to make the workshop and, by extension, this report into a success.

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Introduction

The CBBEP is developing a Habitat Management Plan (HMP) that will be used to direct habitat conservation, protection, and restoration activities in the Corpus Christi Bay and Nueces Bay area. The Plan will facilitate application of fiscal opportunities and resources associated with coastal development, impact resolution, supplemental environmental projects, and community service projects and grants. In developing the HMP, individual meetings with various stakeholder groups were held. Following these meetings, representatives from the local stakeholder groups were invited to participate in a joint workshop.

The workshop was entitled “Outlining an Ecosystem–Based Management Plan for Corpus Christi Bay.” This workshop was held on February 18th 2009 at the Harte Research Institute for Gulf of Mexico Studies.

The objectives of the workshop were to collectively identify:

- 1) priority habitats and ecosystem services,
- 2) the management plan’s geographic coverage,
- 3) the range and scope of activities that should be part of the overall plan, and
- 4) the mechanisms and resources needed to support the plan.

This report is a summary of the results of the joint workshop and is structured by sequentially outlining each objective.

Methods

The workshop was initiated by a short introductory presentation that outlined the purpose of the HMP and how the workshop fitted into the HMP development process (Appendix A). Following the introductory presentation, a short presentation was given about ecosystem services and the agenda of the workshop (Appendix B). Participants of the workshop were divided into seven named breakout groups (Table 1; Appendix C). Each group worked in round tables and were given one hour to discuss each of the four questions. Discussions were initiated by a facilitator. The facilitator was encouraged not to lead the discussions but to initiate the discussion and then promote participation in the discussion. The facilitator was also responsible for keeping the discussion within the bounds of the topic and within the one hour time frame.

Table 1. Group number, name and the facilitator for each group

Group	Group name	Facilitator	Organization
1	Flounder	Jorge Brenner	HRI
2	Croaker	Jace Tunnell	CBBEP
3	Black Drum	Terry Palmer	HRI
4	Pinfish	Sandra Arismendez	HRI
5	Sheepshead	Jennifer Pollack	HRI
6	Sea Trout	Phillip Levasseur	HRI
7	Redfish	Larry Hyde	HRI

Four main questions were created to correspond with the four objectives of this workshop. Each group was asked each of these four questions. The answering of each of the four questions was aided by using individual sub-questions.

Each group was given an hour to answer each of the four main questions. Following an hour long discussion for each topic, the groups were given four to five minutes to present their discussion in front of all of the other groups. The raw answers to the four main questions are provided in Appendices E to H. Summarized answers are given in the main body of this report.

Objective 1. Priority Habitats and Ecosystem Services

Question one addressed the issue of, what habitats and ecosystem services does the Nueces Estuary and surrounding areas provide. The task for answering this question consisted of the development of a “situational map” by each group that identified the habitats and ecosystem services that the area provide. To develop the situational map, each participant obtained a copy of the Corpus Christi and Nueces Bays conceptual model of an estuarine ecosystem from Montagna et al. (1996; Figure 1). Participants obtained clear transparencies and color pens to draw the general location or distribution of the habitats and the services that these habitats provide. Question one was composed of three sub-questions that groups and their participants addressed:

Q1. What habitats and ecosystem services?

Q 1.1 Which habitats are missing from the picture?

Q 1.2 What benefits do habitats provide to people?

Q 1.3 Who receives these benefits?

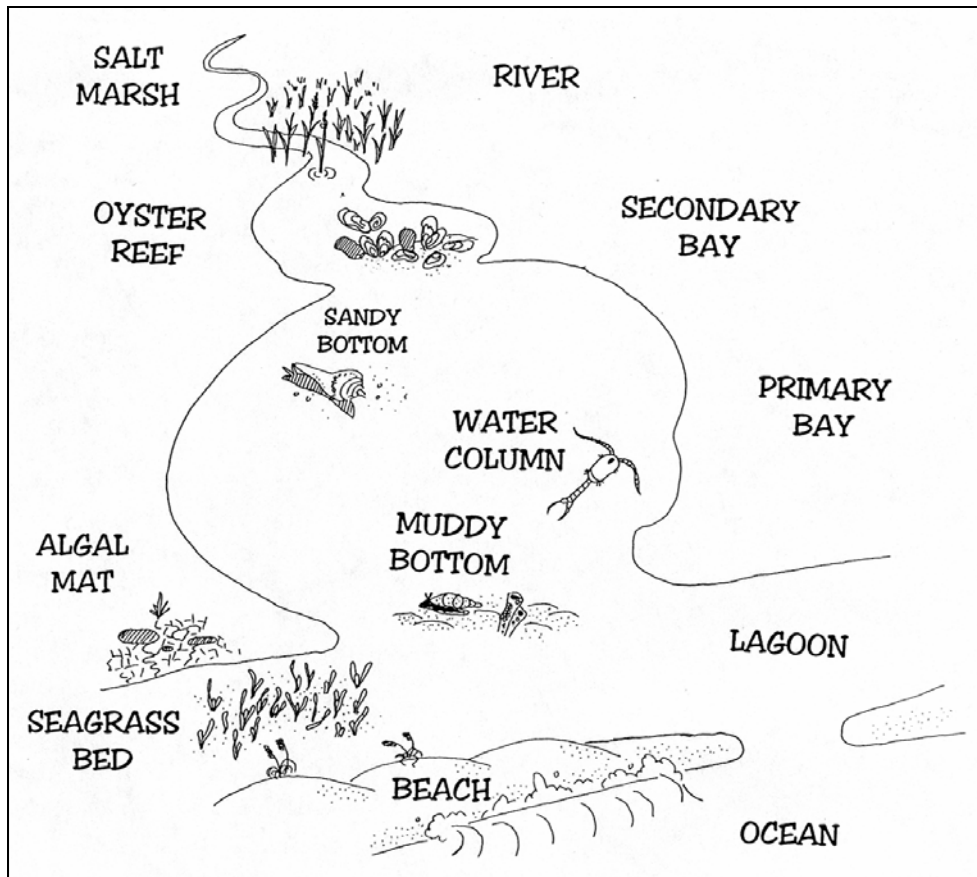


Figure 1. Estuarine ecosystem conceptual model (From Montagna et al. 1996).

The ecosystem services classification proposed by the Millennium Ecosystem Assessment of the United Nations (MEA 2005; Table 2) was used to synthesize the benefits reported by participants. This classification is considered one of the most accepted typology in ecosystem services science and therefore it was used to provide structure to sub-question two. The classification groups benefits into four major types, being: 1) the supportive functions that build other services, 2) services that regulate something for humans, 3) services that provide humans something, and 4) services related to human culture. Some examples of some of the ecosystem services are found in Appendix D.

Table 2. Supportive, regulating, provisioning and cultural services provided by natural and semi-natural ecosystems to citizens (MEA 2005).

Ecosystem services type	Ecosystem service
Supportive	Habitat Net primary production Hydrological cycle Nutrient cycling Pollination and seed dispersal Soil formation
Regulating	Water regulation Disturbance regulation Soil retention Waste regulation Nutrient regulation Gas regulation Biological regulation Climate regulation
Provisioning	Food Water supply Raw materials Genetic resources Medicinal resources Ornamental resources
Cultural	Recreation Aesthetic Science and education Spiritual and holistic

Objective 2. The Management Plan's Geographic Coverage

Objective 2 covered the question “where is the geographic coverage of the proposed plan?” A map with many of the physical features and political boundaries was given to each participant (Figure 2). Participants were asked to use the map to locate and/or list their intended coverage of the plan by answering the following two sub-questions:

Q2. Where is the geographic coverage?

Q 2.1 What specific locations should be included in this plan?

Q 2.2 Why did you choose the specific areas?

Objective 3. The Range and Scope of Activities That Should Be Part of the Overall Plan

Participants were asked to answer the following questions:

Q3. What range of activities should be part of the plan?

Q 3.1 What activities promote sustainable production of goods and services?

Q 3.2 Which activities are most important? Why?

Q 3.3 What criteria would you use to rank activities?

Objective 4. The Mechanisms and Resources Needed to Support the Plan

Participants were asked to answer the following questions:

Q4. How will the plan be supported?

Q 4.1 What governance tools and opportunities are available to implement activities?

Q 4.2 What private or economic tools exist to support activities?

Q 4.3 Are there public or private barriers to implementation?

Q 4.4 Who are the potential partners in accomplishing the activities?

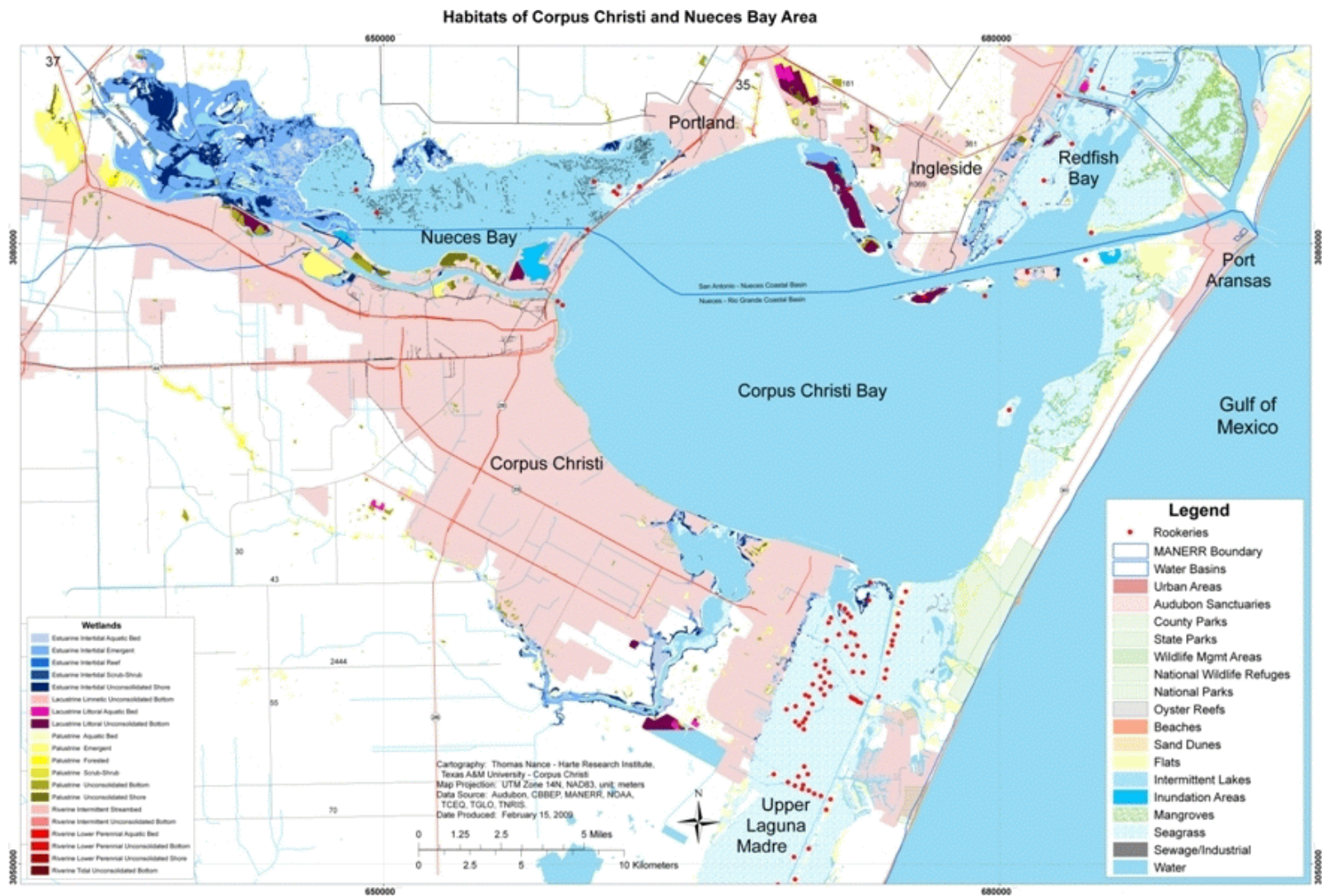


Figure 2. Habitat map of Nueces Estuary that was provided to participants for Objective 2.

Results

Objective 1. Priority Habitats and Ecosystem Services

This section synthesizes the comments from individual groups to provide suggested management needs for habitats and the ecosystem services that the habitats provide to citizens.

Q 1.1 Which habitats are missing from the picture?

Habitats reported missing from the conceptual estuarine ecosystem (Figure 1) by individual groups were grouped into broader environmental domains and classified as being natural, semi-natural or man-made (Table 3). Habitats were also assigned a new working name that will be used in the future to refer to that particular combination of natural elements. Natural or semi-natural habitats consisted of 72.7% of the total.

Specific habitats of the Corpus Christi Bay area were repeatedly reported by different groups (Table 4). The maximum number is seven because there were seven breakout groups workshop. Among the 33 habitats reported by groups, 24 (73 %) were not named or graphically represented in the estuarine conceptual model and thus constitute new additions to the model. Habitats that were reported or mentioned by all seven groups were: dune, freshwater wetland, man made structure and rookery islands. The median number of groups that reported each habitat was four groups.

Table 3. Habitat domain, reported name, new name. * = habitat shown on conceptual model Figure 1).

Domain	Habitat name reported in workshop	New habitat name
All	Whole system	Whole system
Atmosphere	Atmosphere	Atmosphere
Watershed	Watershed / basin	Basin
Terrestrial	Agriculture (incl. row crop, improved pasture, cultivated, rangeland)	Agriculture
	Live oak motte / woodland	Live oak
	Thorn scrub / brush / shrub / Tamaulipan scrub	Thorn scrub
	Coastal prairie	Coastal prairie
	Dune	Dune
	Park / refuge / managed / green-space	Park / refuge
Interface	Beach*	Beach*
	Mangrove	Mangrove
	Tidal / mud / algal* / wind / sand flat	Flat*
	Man made structure (incl. artificial reef, hardened shoreline, jetty, offshore rig, causeway)	Man made structure
	Platform in the bay	Platform in bay
	Wetland (general)	Wetland
	Nueces River delta	River delta
	Fringing salt marsh wetland*	Salt marsh wetland*
	Freshwater wetland / pond (incl. ephemeral marsh wetland)	Freshwater wetland
	Riparian	Riparian
Aquatic	Near shore bar / ocean* / continental shelf	Near shore*
	Tidal inlet	Tidal inlet
	Open bay (incl. primary and secondary bays*, lagoon*)	Open bay*
	Reservoir / dam / lake	Reservoir
	Seagrass bed* (incl. other submerged aquatic vegetation)	Seagrass bed*
	Oyster reef* (incl. shell substrate)	Oyster reef*
	Muddy bottom* / dredge channel / canal / navigation channel / intra coastal water way (incl. residential and industrial)	Muddy bottom* / dredged channel
	Subsurface dredged material (submerged islands)	Submerged dredged material
	Colonial invertebrate reef (incl. serpulid, coquin)	Worm reef
	River* / stream	River*
Island	Barrier island	Barrier island
	Spoil island / dredged material island / bird rookery	Rookery
Subterranean	Subsurface soil	Subsurface soil
	Subsurface groundwater	Groundwater

Table 4. Number of groups that mentioned each habitat. Shaded habitats indicates habitats named or graphically represented in the provided estuarine conceptual model, therefore shaded numbers have limited value as an indicator of group preference because they were a provided-condition.

Domain	Habitat	No. groups mentioned
All	Whole system	1
Atmosphere	Atmosphere	3
Watershed	Basin	2
Terrestrial	Dune	7
	Live oak	6
	Agriculture	5
	Coastal prairie	5
	Park / refuge	4
	Thorn scrub	4
Interface	Freshwater wetland	7
	Man made structure	7
	River delta	6
	Flat	5
	Mangrove	5
	Riparian	5
	Salt marsh wetland	4
	Beach	2
	Platform in bay	2
	Wetland	1
Aquatic	Open bay	5
	River	5
	Muddy bottom / dredged channel	4
	Near shore	4
	Tidal inlet	4
	Oyster reef	3
	Seagrass bed	3
	Reservoir	2
	Submerged dredged material	1
	Worm reef	1
Island	Rookery	7
	Barrier island	2
Subterranean	Subsurface soil	3
	Groundwater	2

Q 1.2 What benefits do habitats provide to people?

The ecosystem services or benefits to people by all groups were compiled and classified (Table 5) using the Millennium Ecosystem Assessment (MEA) classification (MEA 2005, Table 2). Only two habitats were reported without mention to the services that they provide; thorn scrub and wetland.

Table 5. Type of service and services provided by habitats as reported by groups

Domain	Habitat	Ecosystem services type	Ecosystem service
All	Whole system	Cultural	Aesthetic
Atmosphere	Atmosphere	Regulating	Gas regulation Climate regulation
Watershed	Basin	Provisioning	Water supply
		Regulating	Water regulation
		Provisioning	Food Raw materials
	Agriculture	Supportive	Pollination Net primary production Nutrient cycling Habitat
		Provisioning	Genetic resources
	Live oak	Regulating	Soil retention Disturbance regulation
		Supportive	Habitat
Terrestrial	Thorn scrub		
		Cultural	Aesthetic
	Coastal prairie	Provisioning	Genetic resources
		Supportive	Habitat
		Cultural	Recreation
	Dune	Regulating	Disturbance regulation Water regulation
		Supportive	Habitat
	Park / refuge	Cultural	Recreation Aesthetic Spiritual and holistic
	Beach	Regulating	Disturbance regulation Water regulation
		Cultural	Recreation
	Mangrove	Provisioning	Water supply
		Regulating	Soil retention
		Supportive	Habitat
Interface	Flat	Supportive	Habitat
		Cultural	Recreation
	Man made structure	Regulating	Soil retention Disturbance regulation
		Supportive	Hydrological cycle Habitat

Domain	Habitat	Ecosystem services type	Ecosystem service
	Platform in bay	Supportive	Habitat
	Wetland		
	River delta	Cultural	Recreation
		Provisioning	Food Water supply
		Regulating	Gas regulation Water regulation Waste regulation Soil retention Nutrient regulation Biological regulation
		Supportive	Habitat Net primary production
	Salt marsh wetland	Cultural	Recreation Science and education
		Provisioning	Water supply Food
		Regulating	Soil retention Waste regulation Disturbance regulation
		Supportive	Habitat
	Freshwater wetland	Regulating	Nutrient regulation Waste regulation
		Supportive	Habitat
	Riparian	Cultural	Recreation
		Provisioning	Raw materials Food
		Regulating	Soil retention Nutrient regulation Waste regulation
		Supportive	Habitat
Aquatic	Near shore bar	Cultural	Recreation
		Provisioning	Food
		Regulating	Disturbance regulation Gas regulation
		Supportive	Habitat
	Tidal inlet	Cultural	Recreation Aesthetic
		Regulating	Water regulation
		Supportive	Habitat
	Open bay	Cultural	Recreation Aesthetic Spiritual and holistic Science and education
		Provisioning	Food
		Regulating	Nutrient regulation

Domain	Habitat	Ecosystem services type	Ecosystem service
	Reservoir	Supportive	Biological regulation Waste regulation Gas regulation
			Habitat Net primary production
		Cultural	Recreation Science and education
			Provisioning Water supply
		Regulating	Disturbance regulation Water regulation
			Supportive Habitat
		Provisioning	Food
	Seagrass bed	Regulating	Water regulation Biological regulation Soil retention Nutrient regulation
			Supportive Habitat
	Oyster reef	Cultural	Recreation
		Provisioning	Food
	Muddy bottom / dredged channel	Cultural	Recreation
		Provisioning	Raw materials
		Regulating	Water regulation Soil retention
			Supportive Habitat
	Submerged dredged material	Provisioning	Food
		Supportive	Habitat
	Worm reef	Supportive	Habitat
		Cultural	Recreation
	River	Provisioning	Water supply
		Regulating	Water regulation Habitat
			Supportive Net primary production
		Cultural	Aesthetic Recreation
Island	Barrier island	Regulating	Disturbance regulation Water regulation
			Supportive Habitat
		Provisioning	Raw materials
	Rookery	Regulating	Water regulation Disturbance regulation Soil retention
			Supportive Habitat
		Provisioning	Raw materials
Subterranean	Subsurface soil	Regulating	Nutrient regulation Disturbance regulation Waste regulation

Domain	Habitat	Ecosystem services type	Ecosystem service
	Groundwater	Supportive	Habitat
		Provisioning	Water supply
		Regulating	Water regulation
		Supportive	Hydrological cycle

The number of times an ecosystem service was reported to be provided by different habitats was also investigated (Table 6). Ecosystem services were summarized using a reduced number of ecosystem services that participants recognize as the most relevant or key functions provided by each habitat reported. The most popular ecosystem services reported were providing habitat, recreational services, water regulation and disturbance regulation. Twenty-one of the twenty-four MEA ecosystem services classifications were mentioned at least one time by in the workshop. Only three services were not reported as provided by the habitats; soil formation, medicinal resources and ornamental resources.

Table 6. Frequency of ecosystem services reported by groups

Ecosystem services type	Ecosystem service	Number of different habitats
Supportive	Providing habitat	24
	Net primary production	4
	Hydrological cycle	2
	Nutrient cycling	1
	Pollination and seed dispersal	1
	Soil formation	
Regulating	Water regulation	12
	Disturbance regulation	10
	Soil retention	9
	Waste regulation	6
	Nutrient regulation	6
	Gas regulation	4
	Biological regulation	3
	Climate regulation	1
Provisioning	Food	9
	Water supply	7
	Raw materials	5
	Genetic resources	2
	Medicinal resources	
	Ornamental resources	
Cultural	Recreation	15
	Aesthetic	6
	Science and education	3
	Spiritual and holistic	2

Q 1.3 Who receives these benefits?

Participants reported a list of beneficiaries of services provided by ecosystems that were grouped into themes related directly to humans and to nature:

Human related:

People

- All people
- Boaters and birders
- Coastal residents
- Fisherman: recreational (including the guides and piers) and commercial
- Greater population outside of coastal zone
- Port users
- Seafood consumers

Fiscal

- Tax benefits

Business

- Fisheries: recreational (including the guides and piers) and commercial
- Industry (including refineries due to gasoline consumption)
- Local business (including retail outlets, ice houses and boat sellers)
- Port
- Residential development
- Tourism industry (including hotels, restaurants and tourists)

Government

- Army
- City infrastructure (including bridges)
- License issuing
- Navy

Nature related:

- Climate
- Vegetation
- Agriculture
- Wildlife
- Estuary itself

Objective 2. The Range and Scope of Activities That Should Be Part of the Overall Plan

Q2. Where is the geographic coverage?

Individual Questions:

Q 2.1 What specific locations should be included in this plan?

Q 2.2 Why did you choose the specific areas?

Question 2.1, like other questions asked in this workshop, was answered in more than one way. While some groups focused on areas within the given map (Figure 2), some groups also included suggested areal limits to be included in the plan. The areas within the map were grouped into general locations in this analysis for ease of interpretation. All general locations were listed and tallied (Table 7). There were often smaller more specific locations within the general locations. If suggested, these specific locations were also listed and tallied. The number of groups that suggest a location, although related, is not necessarily relative to the importance of a location to be included in the HMP. A true measure of importance would probably involve a survey whereby participants could rank locations.

The Oso Creek Watershed and the Upper Laguna Madre were the only general locations that were suggested to be in the plan by all groups. Rincon Bayou / Nueces Delta, Redfish Bay, Nueces Bay, Corpus Christi Bay and 'tidal inlets' were suggested by all but one group. Oso Bay, Ingleside, Corpus Christi Bay, Mustang Island, Padre Island and the Corpus Christi urban area were suggested by at least half of the seven groups.

Many reasons were listed by participants for suggesting both specific and general locations (Q 2.2). The reasons broadly included current assets and existing concerns with potential future opportunities to be provided for in the plan. The following reasons were grouped into the same general locations in Table 7 and listed below:

Table 7. Specific locations suggested for inclusion in the proposed plan by each group
(✓=habitat suggested, f/w = freshwater)

Location Specific location	Groups							Count
	Black Drum	Croaker	Flounder	Pinfish	Redfish	Seatrout	Sheeps- head	
Oso Creek Watershed	✓	✓	✓	✓	✓	✓	✓	7
Riparian Habitat		✓						1
Botanical Gardens		✓						1
Intersection w/ 286		✓						1
Upper Laguna Madre	✓	✓	✓	✓	✓	✓	✓	7
MBCHC			✓	✓		✓	✓	4
Rookery Islands	✓	✓			✓			3
Seagrass area	✓							1
Western urban shore		✓						1
Blue Hole (channel)			✓					1
Laguna Madre Field Station			✓					1
Tidal flat by Padre Island			✓					1
Rincon Bayou / Nueces Delta	✓	✓	✓	✓	✓	✓		6
Delta Mouth		✓			✓	✓		3
Riparian bottomland and palmetto			✓					1
Nueces Bay	✓	✓	✓	✓	✓	✓		6
Oyster reefs	✓	✓	✓	✓				4
Area north of north NB causeway		✓	✓		✓	✓		4
North side of bay	✓	✓		✓	✓			4
Rookery Islands		✓		✓		✓		3
Gum Hollow		✓		✓				2
Redfish Bay	✓	✓	✓	✓	✓	✓		6
just north of ship channel		✓			✓			2
Mangroves			✓	✓				2
Intracoastal easement			✓					1
Tidal Inlets	✓	✓	✓	✓	✓		✓	6
Packery Channel	✓	✓	✓	✓	✓		✓	6
Aransas Pass (channel)	✓			✓				2
Fish Pass Jetties	✓		✓					2
Port Aransas Jetties	✓							1
Packery Channel Jetties	✓							1
Temporary tidal inlets/washover channels	✓							1
Corpus Christi Bay	✓	✓	✓	✓	✓	✓		6
Backside of Mustang Island / Marsh	✓	✓	✓	✓	✓	✓		6
Hypoxic Zone		✓		✓				2
Spoil islands along ship channel		✓			✓			2
Portland Shoreline		✓						1

Location	Groups								Count
Specific location	Black Drum	Croaker	Flounder	Pinfish	Redfish	Seatrout	Sheeps- head		
NAS Ingleside		✓						1	
Open Bay bottom					✓			1	
Shamrock Island				✓				1	
Port of CC			✓					1	
Ship channel			✓					1	
Oso Bay		✓	✓	✓	✓		✓	5	
Along Ennis Joslin		✓						1	
At intersection w/ west Rodd Field Rd		✓						1	
Mud flats					✓			1	
Areas close to inlets to CC Bay			✓					1	
Mustang Island	✓	✓	✓	✓	✓			5	
Dunes	✓	✓	✓	✓	✓			5	
Barrier island uplands / Prairies	✓		✓		✓			3	
Freshwater wetlands	✓		✓					2	
Beach		✓						1	
Port Aransas				✓				1	
Mustang Island State Park				✓				1	
Ingleside	✓		✓	✓	✓			4	
Live oak / coastal prairie / f/w ponds			✓	✓	✓			3	
Industrial area / port	✓			✓				2	
Kinny Bayou				✓				1	
Padre Island	✓	✓	✓		✓			4	
Scrub/shrub and Packery				✓	✓			2	
Channel Park									
Oak Mottes		✓	✓					2	
Barrier island uplands / prairies	✓		✓					2	
Freshwater wetlands	✓		✓					2	
Dunes	✓							1	
Channelized housing		✓						1	
Padre Island National Seashore				✓				1	
Willow habitat behind PINS				✓				1	
Corpus Christi urban area	✓	✓		✓	✓			4	
Port of Corpus Christi	✓		✓	✓				3	
Shoreline Dr		✓		✓				2	
Hans Suter Park				✓				1	
Flour Bluff				✓				1	
Gulf of Mexico		✓						1	
to 10 miles offshore		✓						1	
Agricultural land surrounding CC Bay					✓			1	
San Jose Island			✓					1	
Oso Creek Watershed									
Current Assets									

Oso Creek Watershed

Current Assets

- Agriculture
 - Crop land
 - Victoria clay soils
 - Maintains drainage
 - Erosion control
- Corpus Christi Botanical Gardens

Existing Concerns

- Urban development
 - Habitat acquisition necessary because of urban expansion
- Agriculture
- Enhance filtration and prevent construction
- Drainages/buffers
- Soil/water conservation
- Fresh water flows and sewage
- Colonias storm runoff and septic drainage flowing into the Oso
- Riparian habitat restoration

Future Opportunities

- Urban development
 - Habitat acquisition necessary because of urban expansion
- Regional Park
- Enhance filtration and prevent construction
- Educate landowners on incentive programs
- Drainages/buffers
- Soil/water conservation
- Conversion of septic systems to city sewer
- Agriculture runoff management
- Education with agriculture owners and the public
- Riparian habitat restoration
- Hike and bike trail
- Kayak access point at highway 286 and Oso Creek

Upper Laguna Madre

Current Assets

Future Opportunities

- Parks as possible enhancement areas
 - Mollie Beattie Coastal Habitat Community
- There are more oysters than shown
- Laguna Madre Field Station from TAMUCC
 - Education

Existing Concerns

- Blue Hole (channel)
 - Fish habitat

- Tidal flats
 - Water circulation restoration
- Rookery islands
- Seagrass
- Removal of old obstructions
- Water quality management
- Sewage retrofit
- Erosion control
- Oak mottes

Future Opportunities

- Restore and manage bird islands with dredge material
 - Sea level rise will claim
- Kayak access

Rincon Bayou/Nueces Delta

Current Assets

- Coastal Bend Bays and Estuaries Program
- CBBEP Erosion control

Existing Concerns

- Riparian bottom land and palmetto
 - Unique because of recreation and water quality
- High diversity of wetland types
 - Submerged vegetation
 - Birds
 - Nursery for fish
 - Water quality
 - Fresh water inflow
- Riparian habitat – limited resource
- Nursery grounds
- Nutrient source to bays, Gulf of Mexico
- Fresh water inflow
- Erosion control

Future Opportunities

- Kayak access
- Restoration and education facilities
- Erosion control
- Improve fresh water inflows
- Water reuse
- River water quality monitoring
- Land runoff management
- River cleanups
- Riparian habitat enhancements

- Sediment management

Nueces Bay

Current Assets

- Sunset Lake Park
 - Wetlands
 - Bird habitat
- Pending CBBEP Marsh Restoration

Existing Concerns

- Sea grass
 - Redhead Ducks
- Oysters
 - Largest extent of oyster reefs in the area
 - Limited Resource
- Rookery islands
- Shoreline erosion
- Open shoreline
- Wildlife Corridor
 - Protects drainage
- Gum Hollow Watershed
 - Often neglected fresh water inflow
- Agriculture runoff

Future Opportunities

- Erosion control
- Raise islands with dredge material
- Create rookery islands
- Bird habitat enhancement and/or acquisition
- Planned marsh creation

Redfish Bay (incl. Harbor Island)

Current Assets / Existing Concerns

- Huge nursery for marine in winter
- Dolphin nursery
- Recreation
- Largest black mangrove extent in the area
- Oysters
- Crabbing
- Marsh area
- Birds
- Fish
- Aesthetic

Existing Concerns

- Erosion control
- Sea grass propeller scars

Future Opportunities

- Intracoastal easement
- Stabilize sediments
- Raise islands with dredge material
- Erosion control
- Protect sea grass and marsh
- Oyster restoration

Tidal Inlets

Existing Concerns

- Inlet
- Flushing of system
- Recreational boating
- Transportation
- Circulation
- Spawning
- Fishpass Channel
 - Sea turtles
- Packery Channel
 - Sea turtles

Future Opportunities

- Jetties for inlets

Corpus Christi Bay

Current Assets

- Fish thermal refuge

Existing Concerns

- Relevant sailing area
- Ship channel
 - Shrimp migration route
 - Fish thermal refuge
- Public Bay/Beach Access
- Artificial reef/shell pads
- Fishing pressure
- Hypoxia
- Open Bay Bottom
- Dredge concern/manage material
- Trawling practice
- Undetermined boundaries
- Erosion going to chip into hackberry rookeries

- Wind turbine construction
- Industry
- Major rookery
- Protects seagrass
- Beds – fishing
- Shoreline Erosion

Future Opportunities

- Beneficial use of dredge material
- Sediment management
- Studying and raising awareness of the hypoxic zone
- Erosion control

Oso Bay

Existing Concerns

- Mangroves
- Birds
- Tidal flats
- Eutrophication
- Waste water plants
- Nursery grounds

Future Opportunities

- Protect mudflat habitat by limiting ATV access
- A planned city park with a retention pond
- Land acquisition along Ennis Joslin and the Oso Bay

Mustang Island

Current Assets

- Packery channel park
- Mustang Island State Park
- Mollie Beattie Coastal Habitat Community

Existing Concerns

- Tidal flats
 - Bird habitats
 - Potential loss to sea level rise
- Sea turtles
- Oak motts
 - Only oak forest on Mustang Island
- Prairies and marshes
- Mollie Beattie Coastal Habitat Community
 - Dunes
 - Storm protection
 - Limited habitat

- Dune swales
- Seagrass
- No regulatory protection exists to protect natural upland habitats
- Need new setbacks in view of sea level rise
- Marsh area
- Birds
- Fish
- Aesthetic
- Fresh water wetlands
- Fore dunes – storm surge protection
- Boat access

Future Opportunities

- Stop hard stabilization
- Allow natural retreat of marsh land and mud flats due to sea level rise
- Mitigate future flood loss due to hurricanes
- Need new setbacks in view of sea level rise
- Preservation of scrub shrub neotropical habitat
 - Why? Only remaining tract like it on Mustang/North Padre Island (Rare)
- Meaningful dune protection
- Stop excavation of canals/channels through bayside habitats
- Storm surge/temporary inlet channels
- Rolling easements
- Erosion control
- Restoration
- Effective wastewater reuse
- Dune stabilization
- Sargassum management
- Freshwater pond management

Ingleside

Existing Concerns

- High density of wetlands
- Oak mottes
 - Largest oak forest area
 - Not protected
 - Limited resource
- Lightening of Natural Gas
- Kinny Bayou
- Fresh water ponds
 - Not protected
 - Limited resource
- Live oak/coastal prairie habitat

- Industry
- Rigs

Future Opportunities

- Acquisition/easement

Padre Island

Future Opportunities

- Parks as possible enhancement areas
 - Padre Island National Seashore
 - Packery Channel Park

Existing Concerns

- Archeology
- Willows
 - Padre Island uplands

Future Opportunities

- Preservation of upland habitat

Corpus Christi Urban Area

Current Assets

- City parks/land

Existing Concerns

- Urban Runoff
- Las Brisas
- Economic growth vs. environmental concerns (Air)
- Invasive Species
- Storm water
- Freshwater ponds
 - Limited Resource
- Oak motts
 - Limited Resource

Future Opportunities

- Parks as possible enhancement areas
 - Hans Suter
 - Greenbelt
- Education
- Increasing green space and parks
- Creating soft shoreline
- Storm drain retrofit for debris and contaminants

Gulf of Mexico

Agricultural Land Surrounding Corpus Christi

San Jose Island

Suggested Plan Boundary Changes / Map Improvements

It was difficult to distinguish between comments made to extend the map and comments made to extend the proposed plan area. Therefore, the two types of comments were amalgamated

- Local watersheds
- City limits
- Ship channel
- Gulf Intracoastal Waterway
- NS Ingleside Study
- Label NERR Boundary
- Show 10 mile off shore reference area
- Get 8 digit USGS Hydrologic Unit Code
- Extend Southern boundary to the National Seashore
 - Extend map to Intercontinental Shelf
 - Extend map to Padre Island National Seashore
 - Show public beach/bay access
 - Show reservoirs/Lake Corpus Christi
 - Extend Western extent to Wesley Seale Dam
 - It is a fresh water source
 - Show Nueces Watershed below Wesley Seale Dam
 - Show the watershed South of Copano Watershed
 - It drains to Nueces and Corpus Christi Bay
 - Extend Northern extent to North end of Redfish Bay
 - Habitats and organisms are intimately connected to Corpus Christi Bay system
 - Extend Eastern extent to show State owned land on the Gulf side of Padre Island
 - It has strong connection to fisheries/shrimp/crab, recreation use, sea turtles, tarpon and other fish migration, and long-shore transport
 - Show the Oso Creek Watershed
 - Extend the Southern extent to the land cut
 - Include Baffin Bay and its watershed
 - Because of Senate Bill 3, seagrass, and fisheries connectivity

Limited Resources

- Riparian Habitat
 - Fresh water ponds – not protected
 - Oak motts
 - Oyster reefs – protection of remaining live reefs
 - Hard substrates
 - Dune/Beach – storm protection
 - Freshwater inflows for each municipality

- Ingleside
- Taft
- Oso
 - City benefit
 - Storm water runoff
 - Nutrition load
 - Debris
- From a watershed viewpoint and municipality viewpoint
- Flood plain
 - Serves as a buffer zone
 - Watershed management as a whole
- Ground water
- Willows

Most at risk

- Sea level rise
- Anthropogenic

General suggestion

- Regional Zoning

Criteria

- Water quality improvement
- Usability of public
- Education component/outreach/make plans available
- Immediate need/erosion/areas being lost fast
- Cost effectiveness
- Quality

Objective 3. The Range and Scope of Activities That Should Be Part of the Overall Plan

What range of activities should be part of the plan?

Q3.1 What activities promote sustainable production of goods and services?

The first part of the breakout involved each group generating ideas for activities that could be included in the proposed plan. The proposed activities mentioned by each group were tallied and divided into four categories; communication, regulatory / planning, specific habitat management and other (Table 8). Education was the only activity mentioned by all groups. Three regulatory activities; the implementation of best management practices (BMP's), smart growth and park space planning were the next three most popularly proposed activities.

Q3.2 Which activities are most important? Why?

There was very little agreement between groups on how to answer the second sub-question; what activities are most important. While some groups ranked some activities, others outlined a few general activities that they thought were most important. At least one group did not indicate the importance of each proposed activity. One group (Flounder) took a totally different approach and labeled each of their proposed activities as either short-term, long-term or ongoing. A synthesis that combines the importance of each activity by each group was not created because of the inconsistency in the approach in answering question 3.2. The importance of each groups' proposed activities can be viewed in Appendix D.

Table 8. Proposed range of activities to be included in plan.

Activity Type	Activity	Count
Communication	Education	7
	Youth / Community Programs	2
	Legislative Outreach	1
	Public Service Announcement	1
	Community Involvement	1
Regulatory / Planning	Best Management Practices (Ag., WWT)	5
	Smart Growth	4
	Parks/ Green-space Planning / Buffer Zones	4
	Conservation Easement	2
	Mitigation Banks	2
	Riparian Zones	2
	Regulatory Success / Monitoring	1
	Sediment Management Plan	1
	Adaptive Management	1
	Wetland Ordinance	1
	Carbon Credits	1
	Rolling Easement	1
	Land Reuse	1
Specific Habitat Management	Marshes	2
	Water Quality	2
	Wetlands	2
	Dunes	1
	Inlet Maintenance	1
	Invasive Species Management	1
	Oyster Reef	1
	Rookery Islands	1
	Sargassum	1
	Seagrass Conservation	1
	Soft Shoreline	1
Other	Acquisition	3
	Fresh Water Inflow	3
	Incentives	3
	Monitoring	3
	Restoration	3
	Drainage	2
	Erosion Control	2
	Technology	1
	Xeriscaping	1
	Prioritized List of Projects	1
	Litter	1
	Modeling (Geohazard)	1
	Economic Valuation	1
	Debris Management	1

Q3.3 What criteria would you use to rank activities?

The criteria used to rank each activity (Q3.3) were also varied and sometimes absent from some group's discussions. There was very little consensus reported among groups on which criteria were used to rank activities. The criteria used by different groups are listed below:

- The System Drivers
- Ecological = Freshwater and Water Quality
- Social = Education
- Most Practical (Time & Opp.) = Land Acquisition
- Unique Habitat = Seagrass Conservation, Oak Mottes
- Intrinsic Value
- Economic Framework
- Funding
- Need
- Politics
- Public Use
- Public Availability
- Cost Effectiveness
- Quality
- Reference Sites
- Sustain Ecosystem Services
- Impact on Future
- Short- vs. Long-term
- Secondary Impacts

Objective 4. Mechanisms and Resources Needed to Support the Plan

How will the plan be supported?

These questions were answered in a variety of ways so it is hard to quantitatively interpret the results. Instead of doing anything quantitatively, a list of answers under each individual question will be made. The ‘croaker’ group answered the overall question totally different than the rest of the groups. The croaker group identified specific tasks and listed relevant opportunities, barriers and potential partners. The response of the croaker group was too difficult to incorporate into some of the individual questions so was partially omitted from the summary below. However, individual responses from each group can be found in Appendix E.

Q 4.1 What governance tools and opportunities are available to implement activities?

Q 4.2 What private or economic tools exist to support activities?

The first two questions were often answered in unison because of the overlap in content of the question. Some groups exclusively included funding opportunities and some listed things such as plans and regulations. For this reason, these questions were divided into ‘funding opportunities’ and ‘other support’ and ‘opportunities for action’:

Funding Opportunities

Funding was divided into federal, state, city and other funding sources:

Federal

- NRCS
 - Equipment
 - Conservation Reserve Program
- NSF
 - K-12 grants
- USACOE
 - 1135 funds – ecosystem funds
- USFWS
 - coastal grants
 - land and erosion control grant
 - wildlife partners conservation

State

- TGLO
 - CMP (needs local sponsor)
 - CIAP
 - Resource division – grant to purchase waterfront property
- TPWD
 - boat ramp grants – specific
 - State Wildlife Grants
- Texas Birding Classic – grants \$20K, \$10K, \$3K – land acquisition, restoration and enhancement
- TSSWDB or TCEQ – 319 funding for impaired water or non-point source grants

City

- CCC
 - Tax Increment Financing (TIF)
 - can have match dollars sometimes.

Other or a combination

- CBBEP project development
- Community Development Block Grants – bond funds, federal housing admin grants
- Industry grants – Flint Hills, DOW, Valero etc.
- Texas Sea Grant – research education
- Fish America Foundation
- Mitigation – SEP (federal and state)
- CCA Texas
- GOMA – education, research, modeling – all NOAA and EPA
- Shell Marine Development
- tax incentives
- Grant soliciting (EPA, in-kind with other agencies)
- Taxes/fees

Other Support

Specific Organizations

- CBBEP
 - good forum supported by locals
 - have existing plan
- CCC
 - regulations and zoning
- GOMA
 - good advocate for list of activities
 - reg (voice) initiatives critical
- Nueces County – dune regulations
- Port of CC
 - ballast water
 - maritime transportation activities
 - owns submerged lands
- TGLO
 - leasing submerged lands – MHHW
- TCEQ
 - wastewater
 - 303D – list of contaminated water bodies
 - 401 water quality
- Texas Department of State Health Services – shellfish monitoring / human health
- TPWD
 - Plan
 - fisheries (with NOAA)
- TWDB
 - streamflows
- USACE / EPA guidelines – landscape and watershed-scale assessments
- USCG
 - homeland security issues
- USFWS
 - migratory birds, endangered species

No Individual Organization Specified

- Building Codes Zoning
- Integrate Nature Conservancy - Ecoregion
- Potential availability of sediment from private dredging
- Tapping into scientists that use existing scientific data - (suggested by one group that HRI act as a leader). Use data to develop regional framework

- Create cheaply funded projects for graduate students
- Combine partnerships of groups with mutual interest
 - e.g. sediment plan w/ COE, POCC, CBBEP
- Cost share - to improve habitat on property etc..
 - TPWD, USFWS, NRCS
- UDC – Unified Development Code - city councils
- Utilization/coalition of NGOs
- Political Action Committees
- Communicating University Research to local level / general public
 - weekly column in paper
 - communicate at a level they can understand
 - PSA, billboards, electronic sign
- conservation easements
- agricultural land set aside conservation reserve programs
- private foundations / endowments
 - TNC, trust for public lands, Texas Historical Commission
- flood plain permits
- Smart Growth
 - Control sprawl
 - Zoning and incentives
 - Enterprise zone
 - Drainage
- Permitting - smart growth
- Building codes / zoning
- Restricting city services/utilities
- Master plan at city planning
- Level 1C support from city council
- U.S. congressional liaison

Opportunities for Action

Incorporation of habitat preservation as an alternative to traditional creation while still meeting the national policy of no net wetland loss.

Partner more closely with the Coastal Bend Bays Foundation

For example, to serve as a liaison between CBBEP and city / county planning boards

To have prioritizing list of mitigation sites (and request information) provided to companies doing mitigation work with cost estimates and other needed information.

Finding a way (financial means) to bridge the gap between least cost disposal of dredge material to more expensive but more environmentally advantageous alternatives.

Working as a liaison between land use managers and local planners.

Taking advantage of grant money to acquire land and land donations by property owners.

The Gulf Coast Joint Venture (P&W, Bary Wilson, Fish and Wildlife) has already developed conservation plans and targeted species requiring conservation. This group could assist in the acquisition of lands/ preparation of grant applications etc.

Development / partnership to allow buyout of lands devastated by flooding hurricanes.

Q 4.3 Are there public or private barriers to implementation?

- Agency buy-in and co-operation
 - disconnect between state and USACE
- Federal Standard - how the USACE calculate what they pay for
- Government
 - regulatory process / bureaucracy
 - local planning and zoning infrastructure
 - stormwater regulations – focus on quantity vs quality
 - incentives
 - standard city council operating procedures
 - lack of economic incentives – (building and zoning)
 - smart growth / quality growth / development
 - project gets funding but not permitted
 - National Pollutant Discharge Elimination System (NPDES) program for municipal water (from USEPA) – treatment regulations for river vs estuarine discharges
 - how far plume can be measured.
- Private barrier
 - private property / land rights
 - lack of incentives
- Public barrier
 - Potential conflicting goals with municipalities
- Conflicting users and user groups
- Unawareness of social and economic cost
- Money
 - match requirements
- lack of grant / proposal writing expertise in small municipalities
- No regulatory protection mandate for valuable upland habitats and 'isolated' freshwater wetlands
- Land Acquisition
 - Lack of active effective land trusts to pursue habitat acquisition and conservation easements.
 - finding / defining the appropriate area for restoration
 - value estimation
 - maintenance and monitoring
- shortsightedness, impatience
- mitigation as it's currently implemented

- project by project (rather than regional need based mitigation)
- historical precedence for access to coastal riparian habitats
 - cultural ethos
 - conflict between access overuse and preservation
- private landowner ethos

Q 4.4 Who are the potential partners in accomplishing the activities?

Government

- Education Service Center
- EPA
- CVB
- Corpus Christi Chamber of Commerce
- ISD's
- Municipalities
 - Counties
 - Cities
- NERR
- NRCS
- POCCA
- TCEQ (SEP?)
- Texas Soil and Water Conservation Districts
- TGLO – CIAP, CMP
- TxDOT
- USACE to use their dredge material
- USCG
- USDA (incl. Farm Services Agency)
- US Navy

Education & Academic:

- Universities & HRI
- Del Mar
- CCISD
- Student Groups
- Coalition of Local / Regional environmental organization

Non Profit organizations

- American Farm Land Trust
- Aransas First
- Corpus Christi Regional Economic Development Corporation
- CBBEP
- CBBF
- CCA Texas
- Ducks Unlimited
- Gulf of Mexico Alliance
- National Rural Electric Cooperative Association

- SEA (Saltwater Fisheries Enhancement Association)
- The Nature Conservancy

Elected Officials

Other

- Corporate sponsors e.g. Flint Hills, Oxychem, Reynolds, HEB, Whataburger
- Corpus Christi Convention and Visitors Bureau
- Education / retention of youth
- Federal Stimulus Plan - local government
- Ingleside Redevelopment Corp.
- Local real estate developers
- People at this workshop
- Political champions
- Private land owners
- Public buy-in

Summary

The workshop held on February 18th 2009 generated a large amount of information that will be important in developing the proposed Habitat Management Plan for the Nueces Estuary region. Input was received from fifty-three local stakeholders, not including the seven breakout group facilitators. The stakeholders represented agencies from the three main levels of government (local, state, federal) in addition to other stakeholders from both private and public organizations. The objectives of the workshop were to collectively identify:

- 1) priority habitats and ecosystem services,
- 2) the management plan's geographic coverage,
- 3) the range and scope of activities that should be part of the overall plan, and
- 4) the mechanisms and resources needed to support the plan.

1) Participants added twenty-two priority habitats in the Nueces Estuary region to the eleven priority habitats already identified (Table 4, Figure 1). The priority habitats most commonly listed were freshwater wetland, man-made structure, rookery island and dune habitats. Twenty-one ecosystem services were reported in the workshop (Table 6). The services with the greatest number of different habitats were providing habitat, water regulation, disturbance regulation, soil retention, food providing and recreational.

2) Over sixty-five specific locations were mentioned with the intention of being included in the future HMP (Table 7). The most commonly mentioned specific locations were Packery Channel, the backside of Mustang Island (incl. Marsh) and Mustang Island sand dunes. When grouped into larger zones, the most frequently mentioned locations were Oso Creek Watershed and Upper Laguna Madre. Many ideas for the areal extent of the HMP such as including the local watersheds for each bay, the area out to ten miles offshore and the Nueces watershed up to the Wesley Seale Dam.

3) Suggestions for the range and scope of activities to be included in the overall plan were determined by asking 'what activities promote sustainable production of goods and services?'. Forty-three potential activities were generated and divided into four categories; communication, regulatory / planning, specific habitat management and other activities (Table 8). There was consensual agreement that education was an important activity in promoting the sustainable production of goods and services. Three other activities; all regulatory, were deemed important activities the implementation of best management practices (BMP's), smart growth and park space planning were the next three most popularly proposed activities.

4) Several federal, state, city and other funding opportunities were identified in the HMP workshop. Other sources of support for implementing activities were also identified. Many private and public barriers were identified that may hinder implementation of actions. Over forty-five potential partners from governmental, educational, non-profit and private organizations were identified as being potential partners in accomplishing the proposed activities in the HMP.

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An Ecosystem Based Management Plan for the Corpus Christi Area

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Coastal Bend Bays & Estuaries Program

- Local non-profit 501(c)(3)
- Established in 1999
- Located in Corpus Christi, TX
- One of 28 National Estuary Programs
- **Mission:** implement the *Coastal Bend Bays Plan*, which is to protect and restore while supporting continued economic growth



EBM Project Purpose

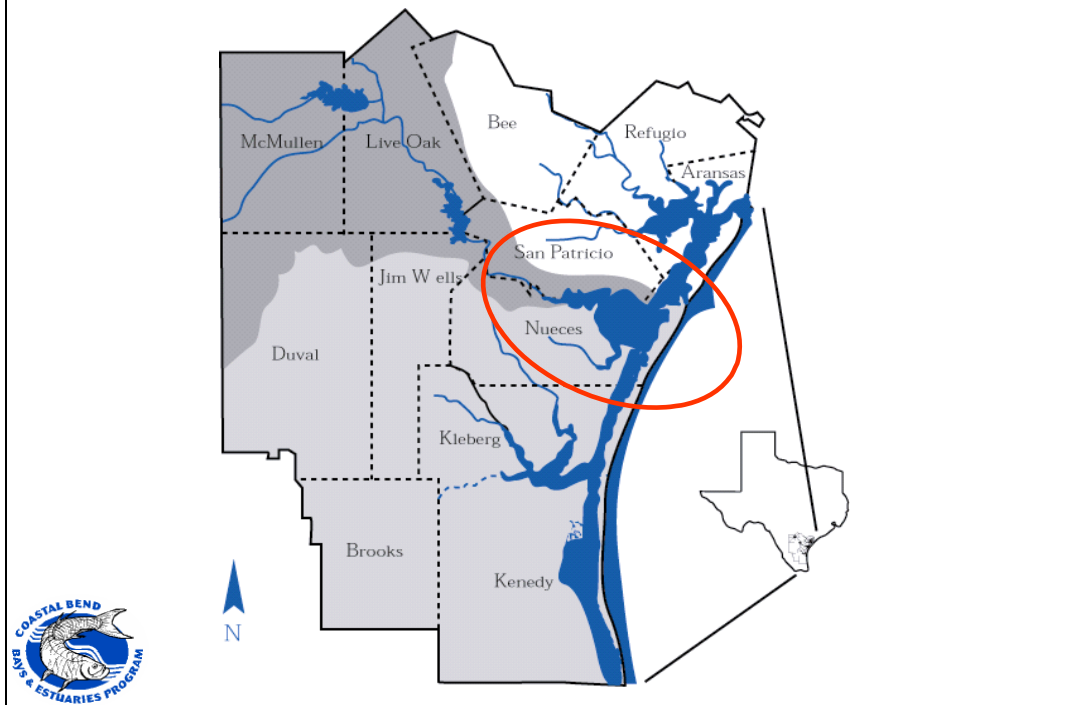
- Develop an ecosystem based management plan with practical implementation of projects on an ecosystem approach
- Utilize ecosystem services as a guide for prioritizing projects



Project Location



Project Boundaries



Project Goals

- Develop plan to address:
 - Coastal habitat protection, enhancement, creation, and conversion projects
 - Base projects on an evaluation of regional ecological needs, social interests, and economic capabilities and security
 - Develop long term goals (20,40,60 yrs.) for a sustainable environment for the area
 - Incorporate climate change impacts



Project Objective

- Develop a comprehensive plan based on a regional needs assessment of ecological and socioeconomic benefits
- Create stakeholder involvement to help implement the Plan



Stakeholders

- City of Corpus Christi
- TAMUCC – Center for Coastal Studies
- Harte Research Institute for Gulf of Mexico Studies
- Conrad Blucher Institute
- Port of Corpus Christi Authority
- Texas Parks and Wildlife Department
- Texas General Land Office
- Texas General Land Office – Oil Spill
- Texas Commission on Environmental Quality
- The Nature Conservancy
- Port Industries of Corpus Christi
- UTMSI – Mission Aransas-National Estuarine Research Reserve
- Nueces River Authority
- TX Department of Transportation
- Gulf of Mexico Foundation
- Coastal Bend Bays Foundation
- US Army Corps of Engineers
- US Geological Survey
- Texas State Soil and Water Conservation Board
- US Environmental Protection Agency
- US Fish and Wildlife Service
- NOAA-National Marine Fisheries Service
- Coastal Conservation Association
- Saltwater-fisheries Enhancement Association
- Coastal Bend Audubon Society
- Ducks Unlimited



Stakeholders

- Beach Access Coalition
- Coastal Bend Sierra Club
- Surfrider Foundation
- Private Engineering Firms
- Texas AgriLife Extension Services
- Texas Sea Grant Program
- C.C. Beach Association
- C.C. Chamber of Commerce
- C.C. Regional Economic Development Corp.
- C.C. Convention and Visitors Bureau
- US Coast Guard
- Texas Safety and Health Services Department
- Texas Railroad Commission
- Master Naturalist
- City of Port Aransas
- Audubon Outdoor Club
- US Natural Resources Conservation Services
- San Patricio County
- Nueces County
- Environmental Defense Foundation

Approach

- What is the approach?
 - Accumulate existing plans, documents, data, and tools
 - Develop a Plan that encompasses not only the ecological needs aspect of the area, but also the relationship to services that humans obtain from ecosystems
 - Plan will include a portfolio of prioritized projects, areas of concern, and maps.



Direct Outcomes

- Written Report
 - identifying the most important drivers and threats of the system
 - identify ecosystem services and a prioritization of projects based on needs and benefits
 - ways to implement and fund the projects
 - long term goals projected 20 to 60 years out
- Map
 - show project boundaries, eco-regions, proposed projects and/or areas of concern
 - will tie in with the written report



Possible Future Outcomes

- Policy changes
- The formation of an in-lieu fee program



Today

- What are the priority habitats and ecosystem services they provide?
- What is the Plans geographic coverage?
- What are the range and scope of activities?
- What are the mechanisms and resources to support the Plan?



Today

- Discuss the needs assessment and ecosystem services
- Breakout groups
- Answer questions
- Eat lunch
- Answer questions
- Have a short review

Appendix B: Ecosystem Services Presentation



Harte Research Institute
for Gulf of Mexico Studies



Planning Approach

Jorge Brenner

Post Doctoral Research Associate



An Ecosystem-Based Management Plan for the Corpus Christi Area
Coastal Bend bays and Estuaries Program


February 18, 2009



Ecosystem-Based Management



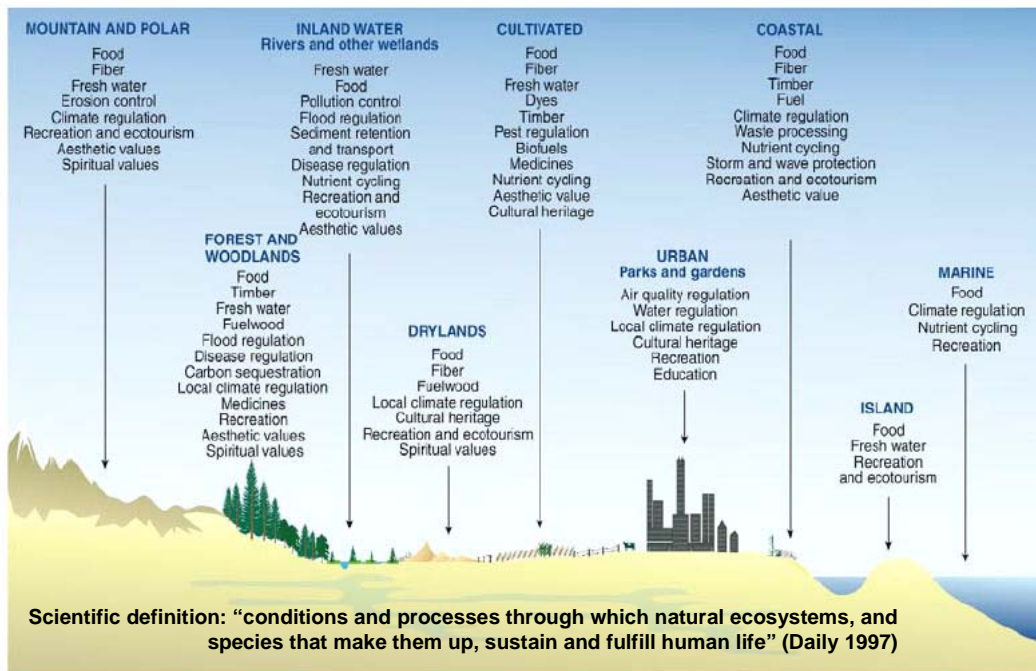
“Science-based ecosystem management”

FROM  **TO**

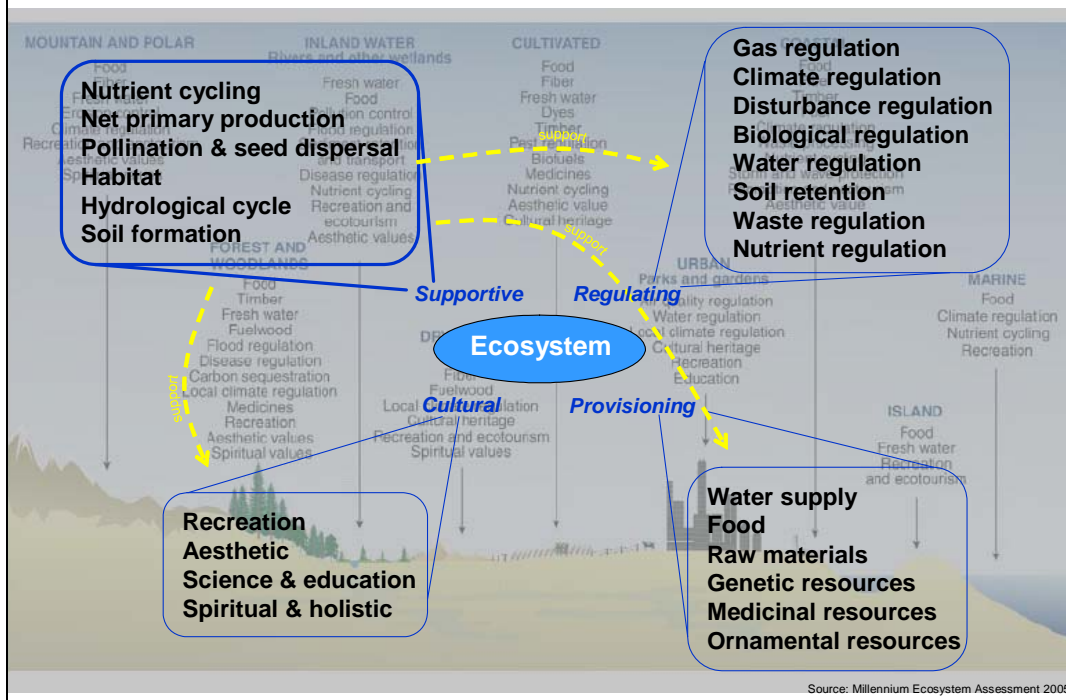
Individual species	➡	Whole ecosystem
Small spatial scales	➡	Multiple scales
Short term perspective	➡	Long term perspective
Humans: independent of ecosystem	➡	Humans: integral part of ecosystem
Management divorced from research	➡	Adaptive & integrated management
Managing commodities	➡	<u>Sustainable production of goods and services</u>



Ecosystem Services: *“the benefits people obtain from ecosystems”*

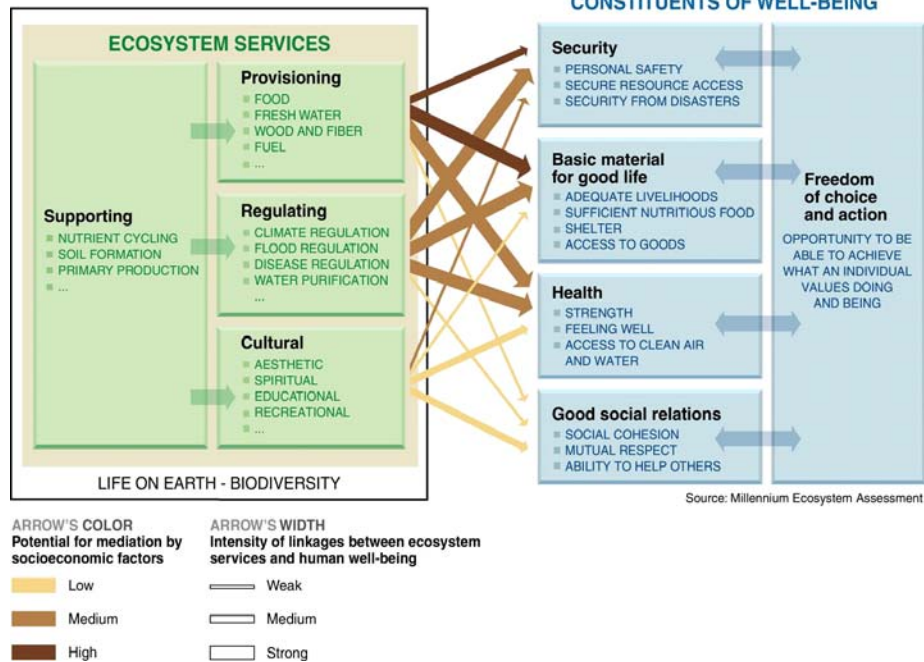


Ecosystem Services Classification

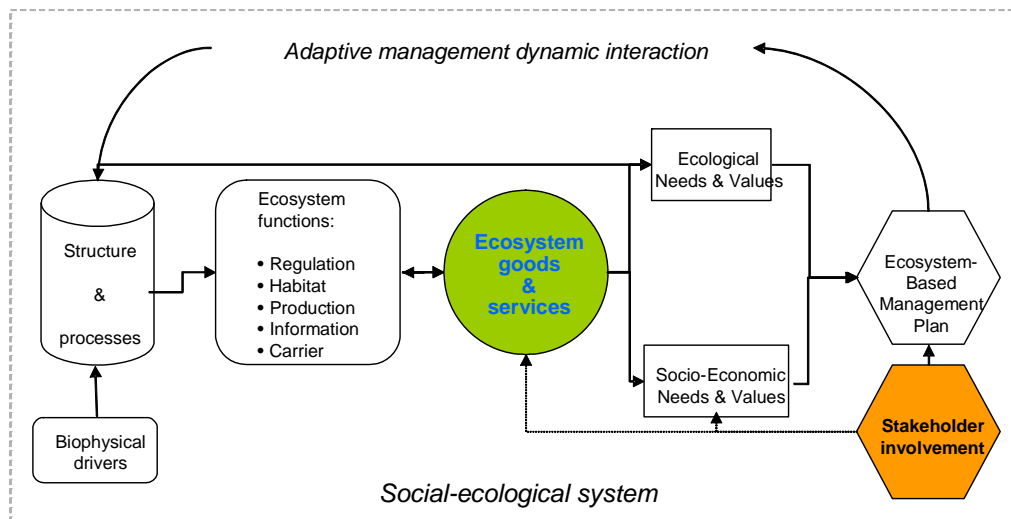




Relevance to Human Well-Being



Planning Approach: Needs Assessment

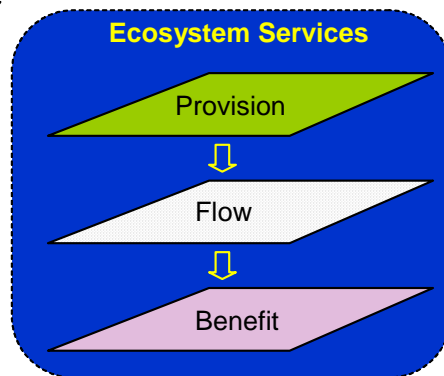


Adapted from de Groot et al. 2002



GOVERNANCE

ECOSYSTEM-BASED MANAGEMENT



NEEDS & VALUES

Non-monetary Monetary

Modified from: Turner et al. 2008



Stakeholder Workshop



Outlining an Ecosystem-Based Management Plan for Corpus Christi Bay

Goal of this workshop: Obtain stakeholder input to direct habitat conservation, protection, and restoration activities in the Corpus Christi/Nueces Bays.

Objectives: obtain your input in:

1. Plans geographic coverage
2. Priority habitats and ecosystem services
3. Range and scope of activities that should be part of this plan
4. Mechanisms and resources to support the Plan



Questions to Address Collectively



1. What is the Plans geographic coverage?

Review the proposed coverage in the map provided
Discuss advantages/disadvantages
If needed, suggest alternatives

2. What are the priority habitats and ecosystem services they provide?

- Identify relevant coastal species, communities, habitats & landscapes
- Identify the benefits that they provide to citizens in the coastal zone

3. What are the range and scope of activities?

- Propose conservation activities that promote a sustainable production of goods and services
- Rank priorities for the these activities

4. What are the mechanisms and resources to support the Plan?

- Identify governance mechanisms to implement the activities
- Identify potential partners in accomplishing the activities



Tasks



At the workshop:

- Breakout groups to:
 - Discuss collectively
 - Answer each question
 - Report back to all groups
- Eat lunch!
- Continue addressing questions
- Finish by 4:30 pm

} (60 min)
(30 min)

After the workshop:

- Analyze and synthesize the information
- Produce report with study area map to the CBBEP (08/09)

Appendix C: Facilitators and Participants of the Workshop

Group: BLACK DRUM

Facilitator: Terry Palmer, HRI

Participants:

- Raul Cantu - TXDOT
- Scott Carr - USGS
- Justin Esslinger - TPWD
- Ryan Fykes - Gulf of Mexico Foundation
- Rene Garcia - SEA
- James Gibeaut - TAMUCC, HRI
- Jake Herring - CBBEP
- Barbara Keeler - US EPA, Coastal & Wetlands Planning
- Marc Woodin - US Geological Survey

Group: CROAKER

Facilitator: Jace Tunnell, CBBEP

Participants:

- John Blaha - CCA Texas
- Mark Fisher - TCEQ
- Manuel Freytes - TGLO
- Kiersten Madden - UT, Mission Aransas NERR
- David McKee - TAMUCC
- Leah Pummill - Audubon Outdoor Club
- Joshua Wentworth - City of Corpus Christi, Parks and Rec Dept.
- Leslie Williams - TPWD

Group: FLOUNDER

Facilitator: Jorge Brenner-HRI

Participants:

- Terry Roberts - USACE-Galveston
- Steve Buschang - TGLO
- Linda May-Price Sierra Club
- Sharon Bailey Lewis - City of Corpus Christi Env. Services (filling in for Jim Bowman)
- Kristin Connor - City of Portland (filling in for Mike Tanner)
- Sally Morehead - MANERR
- Andy Garza - TX Soil and Water Conservation Board
- Richard Thompson - City of Corpus Christi Parks and Rec Dept.
- Elizabeth Smith - CCS, TAMUCC

Group: PINFISH

Facilitator: Sandra Arismendez, HRI

Participants:

- Oscar Adame - City of Ingleside

Pam Arredondo - SEA
Kristopher Benson - NOAA Restoration Center
Erin Hill - CCS, TAMUCC
Amy Nunez - TGLO
Jack Carroll - Citgo
Henry Mullins - USACE

Group: REDFISH

Facilitator: Larry Hyde, HRI

Participants:

- Todd Merendino - Ducks Unlimited
- David Newstead - Audubon Society
- Paul Silva - TPWD, Coastal Fisheries Div.
- Greg Stunz - TAMUCC, HRI
- Heather Young - NOAA NMFS.

Group: SEATROUT

Facilitator: Phillip Levasseur, HRI

Participants:

- Ray Allen - CBBEP
- Barbara Dorf - TPWD
- Rosario Martinez - CBBEP
- Brien Nicolau - Gulf of Mexico Foundation
- Peggy Summer - City of Corpus Christi, Environ. Serv.
- Rusty Swafford - NOAA NMFS, Habitat Conservation Div.
- Wes Tunnell - TAMUCC, HRI

Group: SHEEPSHEAD

Facilitator: Jennifer Pollack, HRI

Participants:

- Rafael Calderon - The Nature Conservancy
- Paul Carangelo - Port of Corpus Christi Authority
- Pat Clements - US FWS
- Rocky Freund - Nueces River Authority
- Larry McKinney - TAMUCC, HRI
- Jeff Pollack - HDR Inc.
- Stacie Talbert - City of Corpus Christi, Parks & Rec. Dept.
- Leo Trevino - CBBEP

Appendix D: Examples of Ecosystem Services

Habitat: Contiguous patches of landscape with sufficient area to hold naturally functioning ecosystems support a diversity of plant and animal life. As patch size decreases, and as patches of habitat become more isolated from each other, population sizes can decrease below the thresholds needed to maintain genetic variation, withstand stochastic events (such as storms or droughts) and population oscillations, and meet social requirements like breeding and migration. Large contiguous habitat blocks, such as intact seagrass beds, forests or wetlands, thus function as critical population sources for plant and animal species that humans value for both aesthetic value and functional reasons.

Pollination and seed dispersal: More than 87 % of the world's flowering plants, including 80 % of the world's species of food plants, rely on pollinator species for reproduction. Over 100,000 invertebrate species such as bees, moths, butterflies, beetles, and flies serve as pollinators worldwide. At least 1,035 species of vertebrates, including birds, mammals, and reptiles, also pollinate many plant species. The US Fish and Wildlife Service lists over 50 pollinators as threatened or endangered, and wild honeybee populations have dropped 25 % since 1990. Pollination is essential for many agricultural crops, and substitutes for local pollinators are increasingly expensive.

Soil retention/formation: Soils provide many of the services, including water storage and filtering, waste assimilation, and a medium for plant growth. Natural systems, terrestrial and seagrasses both create and enrich soil through weathering and decomposition and retain soil by preventing its being washed away during rainstorms.

Water regulation/supply: The availability of fresh and clean water is essential to life, and is one of humanity's most valuable natural assets. When water supplies fail, water must be imported from elsewhere at great expense, must be more extensively treated (as in the case of low stream flows or well levels), or must be produced using more expensive means (such as desalinization). Forests and their underlying soil, and wetlands, play an important role in ensuring that rainwater is stored and released gradually, rather than allowed to immediately flow downstream as runoff.

Disturbance regulation: Many landscapes provide a buffering function that protects humans from destructive perturbations. For example, beaches, wetlands and floodplains help mitigate the effects of storms and floods by trapping and containing storm water. Coastal island vegetation, beaches and seagrass communities can also reduce the damage of wave action and storm surges.

Waste regulation: Forests, wetlands and coastal waters, specially seagrass communities, provide a natural buffer between human activities and water supplies, filtering out pathogens such as *Giardia* or *Escherichia*, nutrients such as nitrogen and phosphorous, and metals and sediments. This service benefits both humans by providing cleaner drinking water and plants and animals by reducing harmful algae blooms, increasing dissolved oxygen and reducing excessive sediment in water. Trees also improve air quality by filtering out particulates and toxic compounds from air, making it more breathable and healthy.

Nutrient regulation/cycling: The proper functioning of any ecosystem is dependent on the ability of plants/algae and animals to utilize nutrients such as nitrogen, potassium and sulphur. For example, soil and water, with the assistance of certain bacteria algae (cyanobacteria), take nitrogen in the atmosphere and fix it so that it can be readily absorbed by the roots of plants. When plants die or are consumed by animals, nitrogen is recycled into the atmosphere.

Gas/climate regulation: Life on earth exists within a narrow band of chemical balance in the atmosphere and oceans, and alterations in that balance can have positive or negative impacts on natural and economic processes. Biotic and abiotic processes and components of natural and semi-natural ecosystems influence this chemical balance in many ways including the CO₂/O₂ balance, maintenance of the ozone-layer (O₃), and regulation of NO_x levels.

Biological regulation: Natural populations of species are regulated by complex trophic dynamics. Those dynamics can be easily altered by the absence of keystone species. Over harvesting or over fishing promote not only the depletion of population stocks but from other species by by-catch. In a natural ecosystem top predators will regulate prey species and prevent from over consumption of other species, such as herbivory reduction.

Genetic resources: Biotic resources are sources of unique biological materials and products. Because of our limited knowledge it is not possible to account for all products that biodiversity could provide to human societies in the future. Known products are medicines, other science materials, genes for resistance of plant pathogens and crop pests and ornamental species. However, it is very likely that genetic resources constitute the most unknown services that ecosystems provide to human well-being.

Recreation and aesthetic: Intact natural ecosystems that attract people who fish, hunt, hike, canoe or kayak, bring direct economic benefits to the areas surrounding those natural areas. People's willingness to pay for local meals and lodging and to spend time and money on travel to these sites, are economic indicators of the value they place on natural areas. Real estate values, and therefore local tax revenues, often increase for houses located near protected open space. People are also often willing to pay to maintain or preserve the integrity of a natural site to protect the perceived beauty and quality of that site.

Spiritual and holistic: Landscapes are typically identified with spiritual and historic values. One of its most high expressions can be found in religions. Nature has been used as motive in books, film, painting, folklore, national symbols, architecture, advertising, etc.

Appendix E: Individual Responses: Objective 1 - Priority Habitats and Ecosystem Services

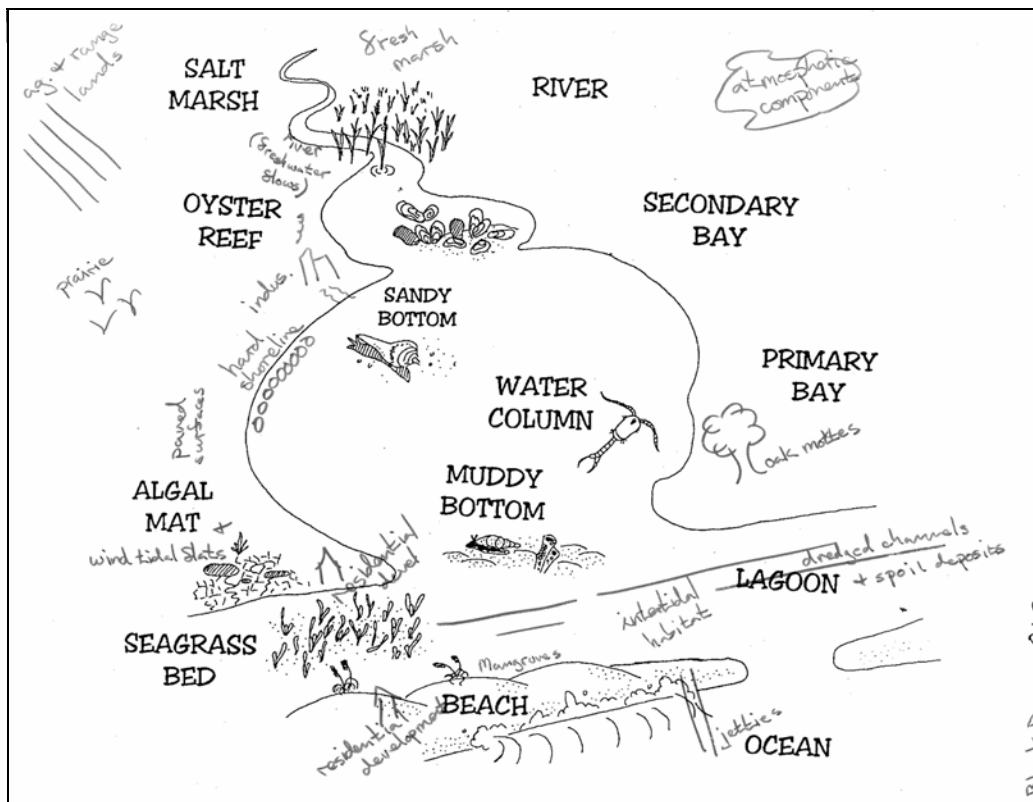
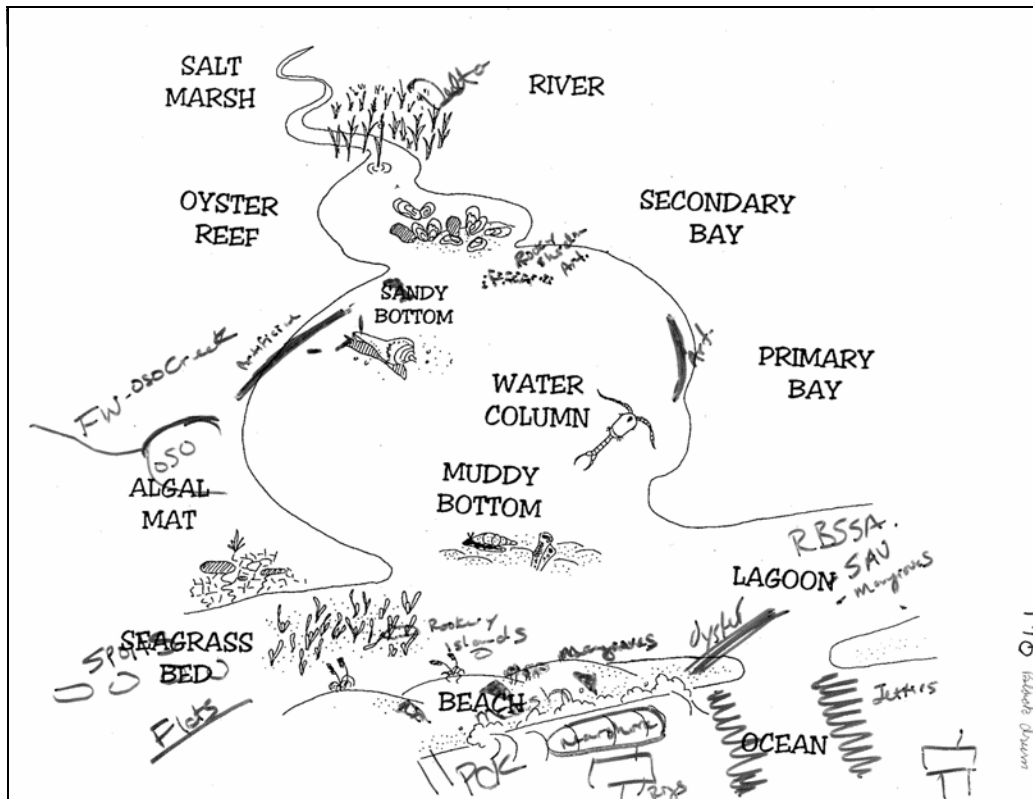
Black Drum	56
Croaker	60
Flounder	65
Pinfish	68
Redfish	71
Sea Trout	78
Sheepshead	83

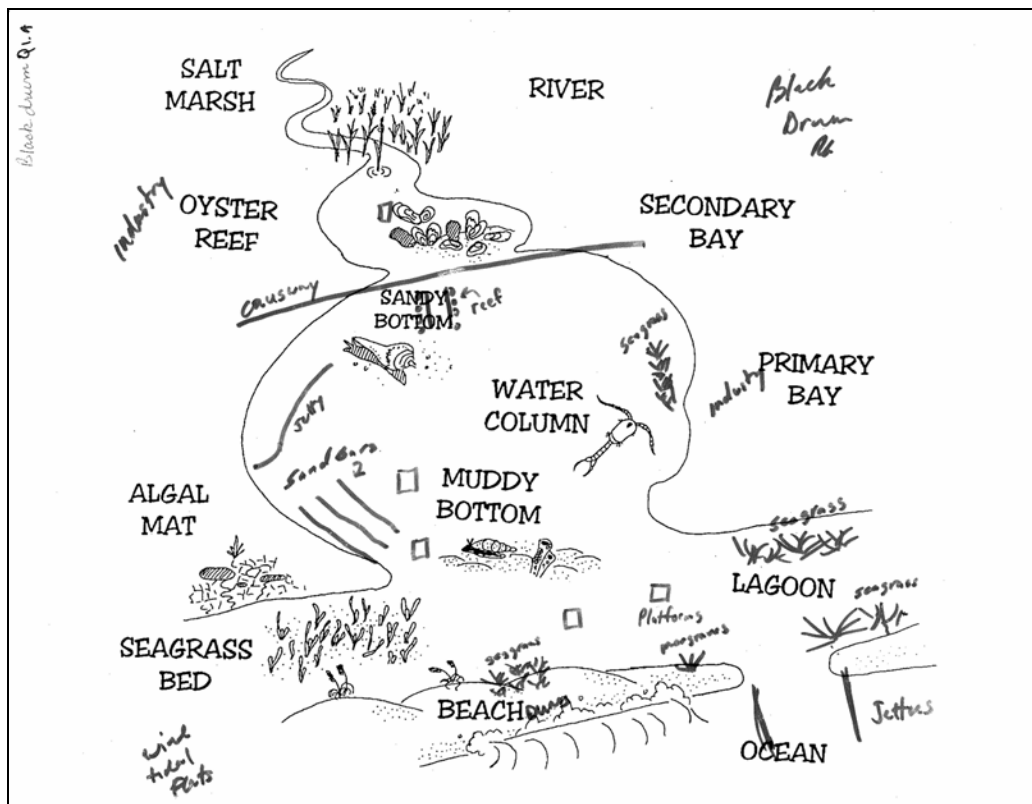
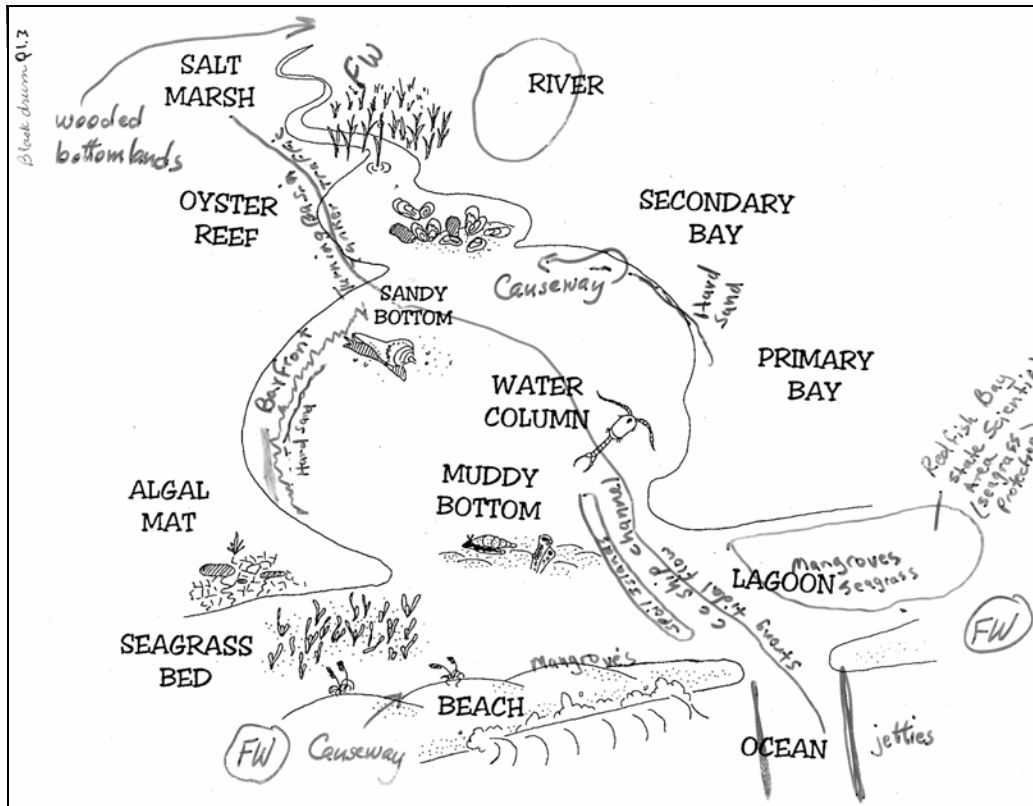
Facilitator: Terry Palmer
Note taker: Ryan Fykes
Reporter: Ryan Fykes

Summary of habitats:



Habitat figures drawn by individuals:





Who receives these benefits? (habitat - benefactor)

Habitats & ecosystem services:

- Bay platforms - add habitat (recruitment)
- Near shore bars
 - Storm diss., recreation, habitat
- Wooded bottom lands (depends upon distance)
 - Habitat
- Thorn scrub
- Jetties
 - Shipping support in stabilization
 - Add habitat - anglers
- Dunes
 - Storm protection (residents) aesthetic, habitat, recreation
- Tidal inlet
 - Water exchange, fish (biophysicochemical pathways), boaters, anglers
- Salt marsh flats (fringing marsh)
 - Water quality, stabilization, fish habitat (anglers, boaters, recreation)
- Mangroves
 - Habitat for crabs, fish, water quality, hunters, stabilization
- Freshwater wetlands
- Bayhead delta
 - habitat freshwater and saltwater marsh
- Secondary Bay (Oso Creek)
 - Habitat for birds
- - Dredge channel (spoil rookery islands)
- - Habitat, recreation, economic importance for the port
- Hardened shorelines (bay front)
 - Protection, city, residents, property owners
- Agriculture land
 - Economic benefits, nutrient increase, wildlife benefits
- Oak mottes
 - Habitat, storm damage reduction
- Coastal prairies
 - Habitat
- Wind tidal flats (algal)
 - Habitat

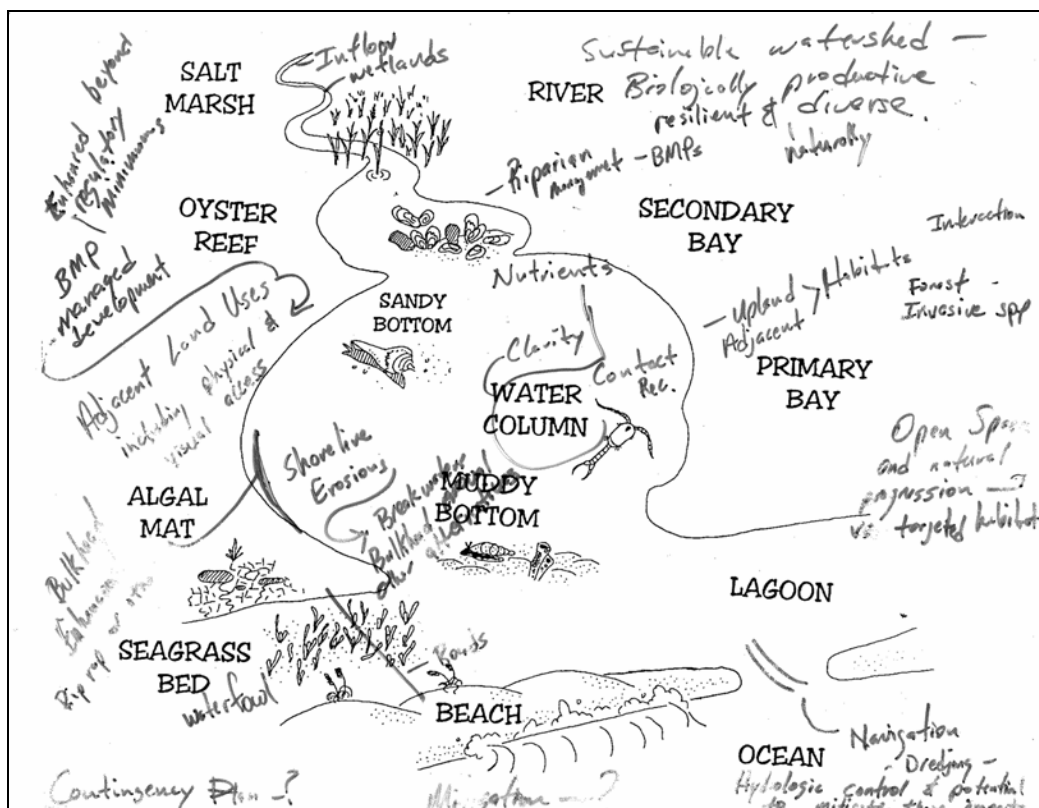
Croaker

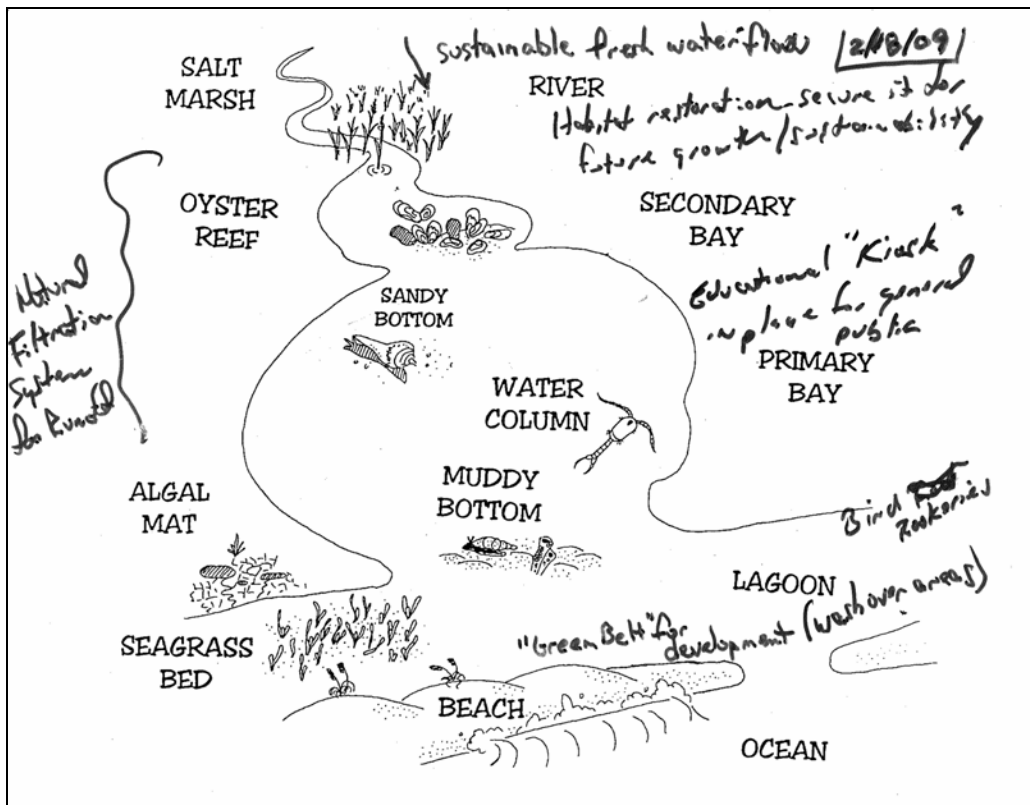
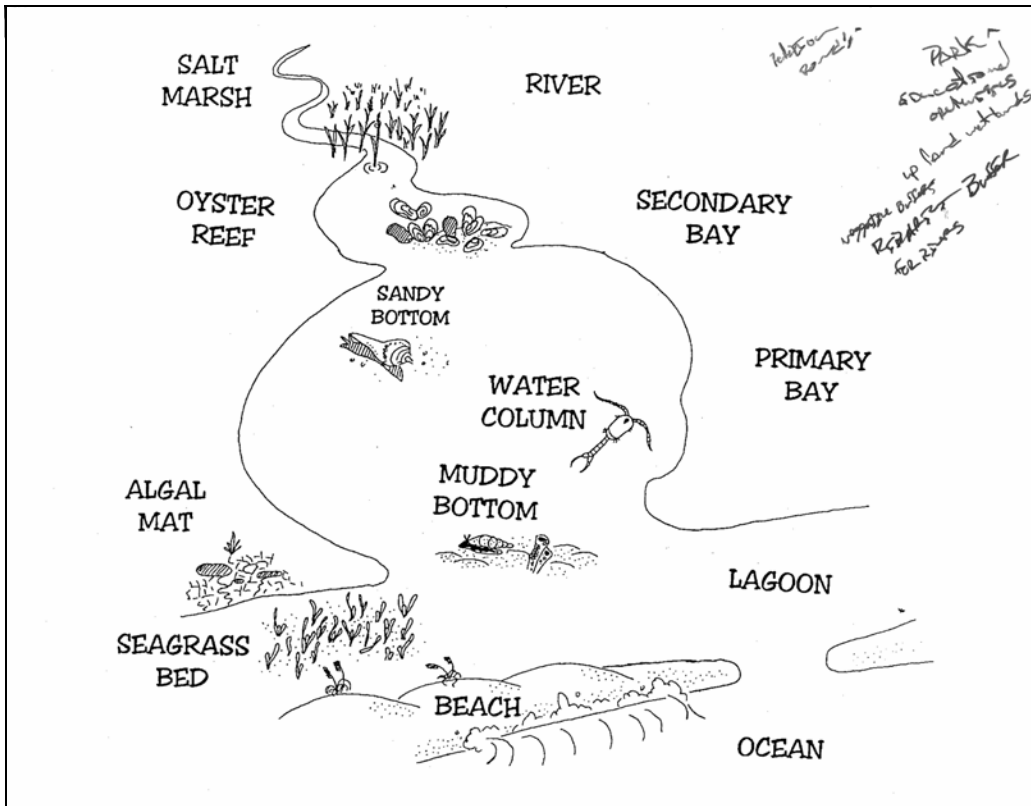
Facilitator: Jace Tunnell-CBBEP

Note taker: Jace Tunnell, Kiersten Madden

Reporter:

Habitats as well as human impacts (or flow) were listed in the following transparencies:





Habitats:

- Tidal/mud flats
- Dunes
- Rookeries
- Parks
- Kayak paddling trails - activity
- BR (?)
- Birding platforms
- Invasive species control
- Erosion protection

Notes # 2: by Jace Tunnell

Habitats

- Rivers
- Wetlands
- Riparian areas, wetland
- Oak mottes, all adjacent uplands
- Prairies
- Mangroves
- Dunes - ponds
- Flats - tidal/algal
- Rookeries ↔ island, disposal areas

Human infrastructure:

- Marinas, piers
- Parks
- Boat ramps
- Road bridges
- Navigation channels - trails
- Bulk heads
- Oil platforms
- Land use
- Access

Riparian areas:

- Rivers-systems
- Wetlands
- Oak mottes
- Prairies
- Mangroves
- Flats/dunes
- Rookeries

Public lands:

- Marinas
- Parks
- Trails

- Access

Educational:

- Equal access/proximity
- Social mapping

Wastewater

- managed and dispersed
- Runoff modeling
- Inundation areas
- Social mapping
- Wastewater managed and dispersed
- Recreation
- Aesthetics
- Fisheries

Human component:

- ICWW
- Rookeyr island
- Artificial breakwaters
- Piers, bait stands, marinas
- Bridges
- Boat traffic
- Trash

Access:

- Boat ramps
- Fisherman
- Bird watchers
- Tourists
- General public

Outreach:

- Trash management

Notes # 3: by Dr. Kiersten Madden-MANERR

Habitats:

- Mangroves
- Coastal prairies
- Oak mottes / forestland
- Public lands
- Parks
- Beach access points
- Bird rookeries / sanctuaries
- Birding access/platforms
- Educational wetlands
- Erosion control areas
- Invasive species removal areas
- Urban areas

- Potential development areas
- Long-term research & monitoring areas
- Human uses:
 - Piers/docks/jetties
 - Breakwaters
 - Spoil islands
 - Boat traffic/ICWW
 - Drainage areas
 - Highways/bridges
- Inundation areas (i.e., plume models)
- Riparian wetlands
- Potential restoration areas
- Social mapping
- Benefits:
 - Recreation/aesthetics
 - Food/habitat
 - Ecotourism
 - Education opportunities
 - Flood regulation
 - Storm/wave protection
 - Waste processing
 - Nutrient cycling
- Who benefits?
 - People
 - Wildlife
 - Vegetation
 - Climate

What benefits do habitats provide to people?

Habitats & ecosystem services:

- Natural filtration system for runoff
- Guarantee of freshwater inflows
- "Any habitat project new I restored has security but in place for its sustainability and growth"
- "Greenbelts" for future development. Have buffer zones for the system were building does not have place on washouts"

Flounder

Facilitator: Jorge Brenner

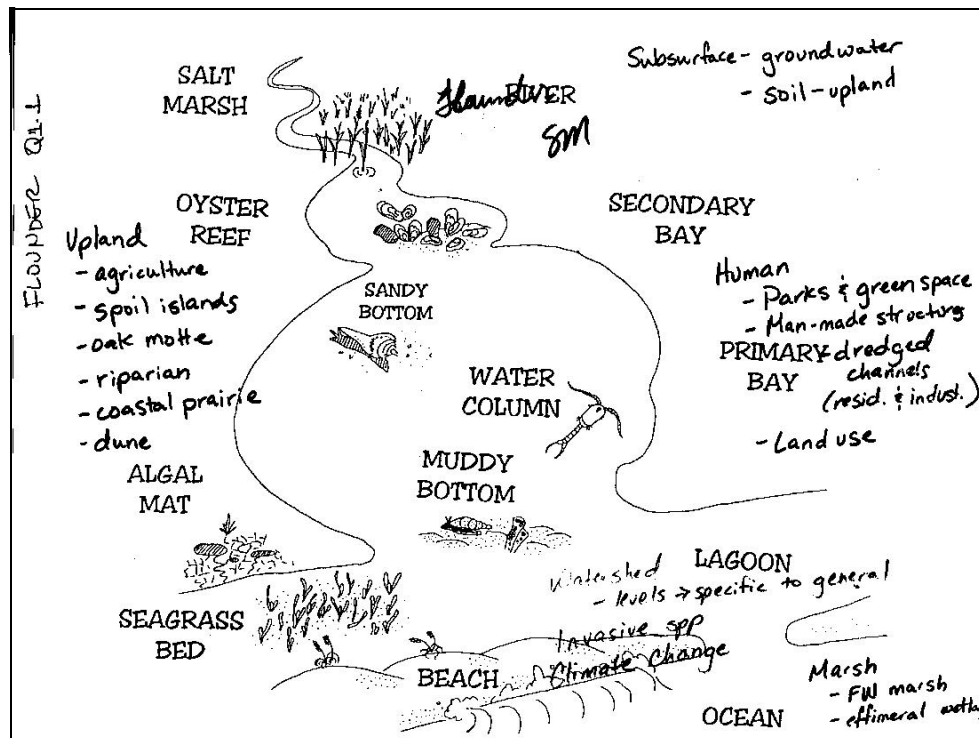
Note taker: Sally Morehead

Reporter: Sally Morehead

Comments from participants:

- Expand inputs upstream but do not use the same level of detail in the analysis
- There will be impacts outside the system that the plan will not be able to account for but should be aware of
- Use long term while planning (up to 80 yrs), but prioritize for immediate effects/impacts
- Include invasive species for all habitats in the plan
- Include climate change effects in the plan
- E. Smith commented that some of this work has been done by them (CCS) before and it is documented in CBBEP reports (#49, and other document produced in 2004 but not currently in CBBEP publications list)

Habitats as well as human impacts (or flow) were listed in the following transparencies:



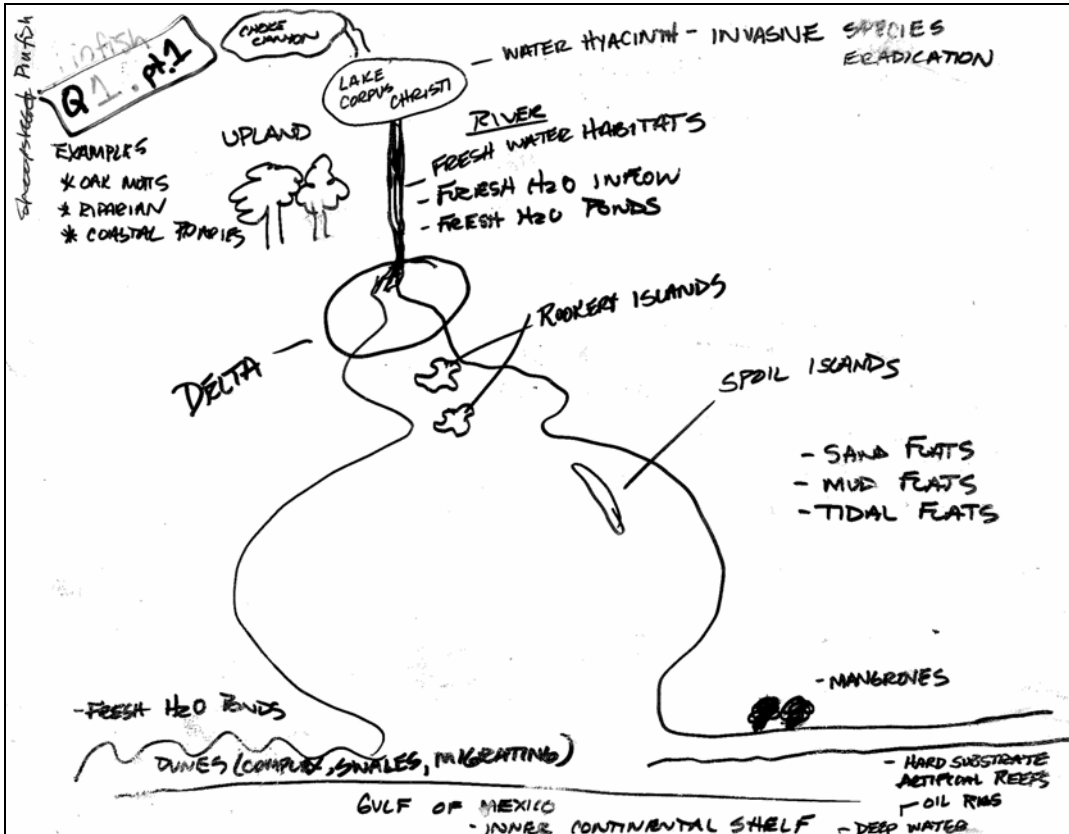
A table was created with some of the habitats listed, together with their top three ecosystem services provided:

Habitat	Ecosystem services
Subsurface-groundwater	Water supply Hydrological cycle Water regulation
Subsurface-soil (upland)	Nutrient cycle Raw materials Disturbance regulation Waste regulation
Upland-oak mottes	Habitat Soil retention Genetic resources
Upland-riparian	Habitat Soil retention Nutrient regulation
Upland-coastal prairie	Habitat Genetic resources Aesthetic
Upland-spoil islands	Habitat (rookeries) Water regulation (circulation) Disturbance regulation Soil retention (erosion control)
Freshwater marshes (ephemeral wetlands)	Habitat Nutrient cycling Waste regulation
Human-man made structures (artificial reefs, hard armor)	Soil retention Hydrological cycle (runoff) Disturbance regulation
Upland-dunes	Disturbance regulation (storm) Habitat Recreation
Upland-agriculture (row crop, improved pasture, cultivated, rangeland)	Pollination Food Net primary production Raw materials
Human-parks & greenspace (land use)	Recreation Aesthetic Spiritual & holistic
Muddy bottom-dredge channels (residential & industrial)	Raw materials Water regulation (salinity changes, circulation) Soil retention (sediment sink)

Pinfish

Facilitator: Sandra Arismendez

Habitats as well as human impacts (or flow) were listed in the following transparencies:



1. RESERVOIRS

I. BENEFIT

- F. H₂O SUPPLY
- RECREATION - ECONOMICS
- HAZARD MITIGATION
- FLOOD CONTROL
- WILDLIFE HABITAT
- EDUCATION
- ECOTOURISM
- FRESH H₂O RELEASES TO ESTUARY

II. DETRIMENTAL

- LACK OF SEDIMENT LOAD TO ESTUARY
- H₂O HYACINTH - INVASIVE ^① SPECIES CONTROL W/ CHEMICALS ^②

3. RIVER

- SEDIMENT & H₂O SUPPLY
- ANIMAL CORRIDOR
- NUTRIENT SUPPLY
- FLOOD RETENTION
- RECREATION
- FLUSHING OF DELTA/ESTUARY

Pinfish

Q1-2.
ft.

2. UPLAND

- MIGRATORY BIRD HABITAT
- EROSION REDUCTION POTENTIAL
- FILTRATION FOR H₂O QUALITY
- AQUIFER RECHARGE
- CATTLE GRAZING
- HUNTING GAME
- GAS EXCHANGE O₂ PRODUCTION

4. DELTA

- NURSERY GROUNDS
- NUTRIENT SOURCE
- FILTERING OF POLLUTANTS
- SINK FOR POLLUTANTS & NUTRIENTS
- CRABBING - ECONOMICS
- DUCK HUNTING

8. MANGROVES

- NURSERY GROUND
- SEDIMENT TRAP
- FILTRATION FOR H₂O QUALITY

Pinfish Q1
2
pt.

9. INNER CONTINENTAL SHELF / DEEP H₂O GOM

- FISHING
- SPawning GROUNDS
- MARITIME & RECREATIONAL TRANSPORTATION
- INLETS FOR LARVAL TRANSPORT TO BAY
- PATHWAY FOR MIGRATORY FISH IS. SNOOK, BIRDS
- DREDGE MATERIAL PLACEMENT

Additionally, participants developed a matrix with benefits and who receives the benefit.

5. BAYS

- SHRIMPING - COMMERCIAL FISHING
- MARINE TRANSPORTATION
- OIL & GAS PRODUCTION / EXTRACTION / EXPLORATION / REEFS
- SPILL ISLANDS
 - RECREATION
 - ANIMAL CORRIDORS (ARTIFICIAL)
- RECREATION - SAILING / SPORTING EVENTS / MARINA / CLUB
- LARVAL - CURRENTS
- GAS EXCHANGE W/ ATM. O₂
- CREATED HABITATS - GEO TUBES

Pinfish Q1
2
pt.2

6. LAGOON & SEA GRASSES

- NURSERY HABITAT
- NUTRIENT
- H₂O QUALITY ENHANCEMENT
- DUCK / BIRD FEEDING GROUNDS / ROOKERY ISLANDS
- RECREATION FISHING / BOATING / WIND SURFING
- ECONOMICS - FISHING LICENSES, HUNTING LICENSE
- CULTURAL / SPIRITUAL

7. BARRIER ISLAND

- HURRICANE PROTECTION
- ARCHAEOLOGY
- STORM PROTECTION
- AESTHETICS
- TOURISM
- OIL & GAS PRODUCTION / EXPLORATION
- NATIONAL / STATE PARKS
- EROSION
- BIRD STOP OVER
- ENDANGERED SPECIES, PIPING PLOVER, SEA TURTLE

WHO RECEIVES THESE BENEFITS

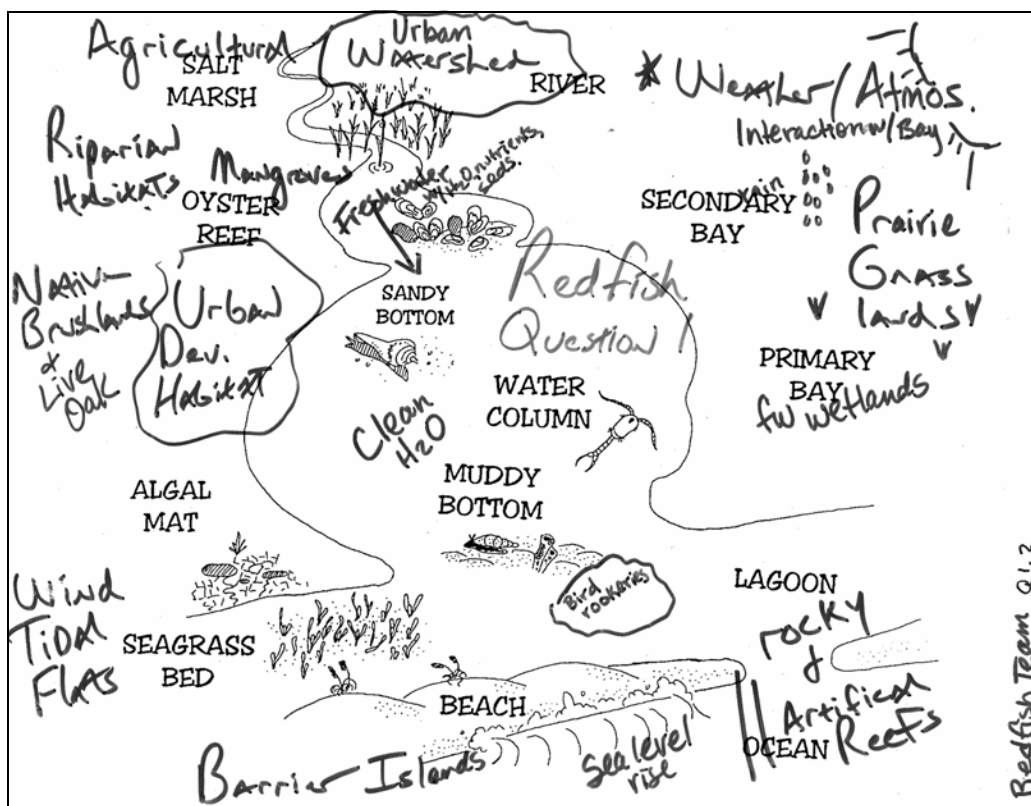
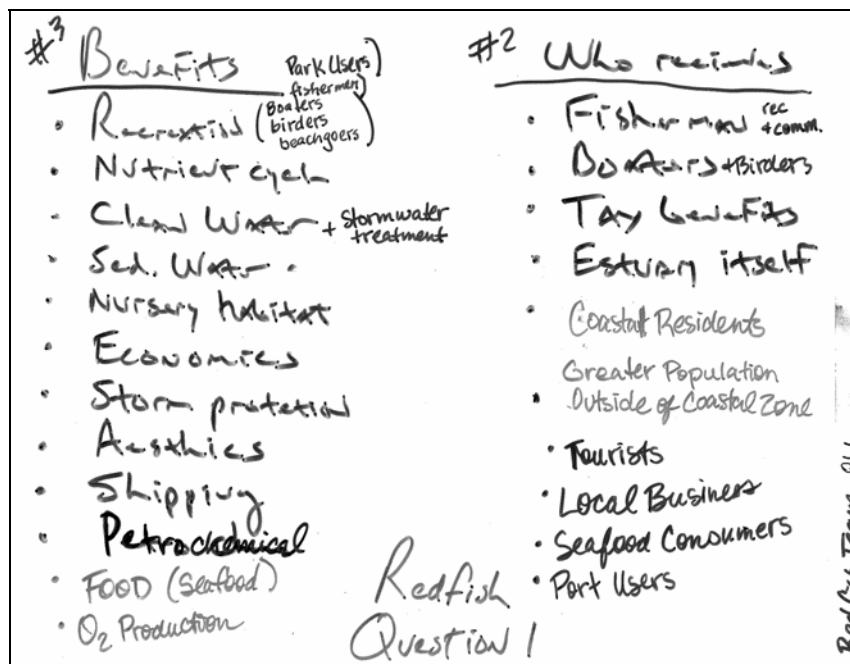
Pinfish 3. Q1
A.

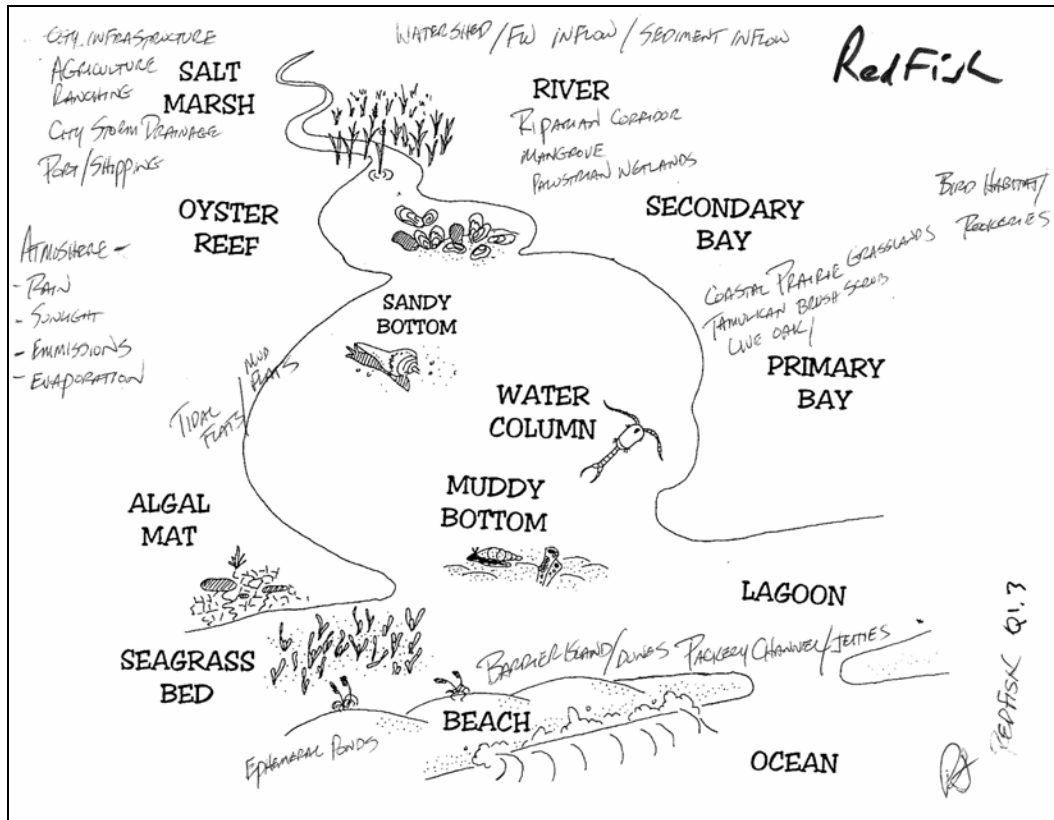
	Fishing Guides	Gov't	Industrial	Local Business	Hotel	Piers	Restaurants	Wildlife
RECREATION	X	X		X	X	X	X	
STORM PROTECTION	X	X	X	X	X	X	X	X
TRANSPORTATION		X	X				X	X (DREDGED CHANNELS FOR LAVAL TRANSPORT)
FISHERIES	X	X		X	X	X	X	
ENERGY EXPLORATION/PROD.		X	X					
AESTHETICS								
NURSERY HABITAT								
TOURISM								X

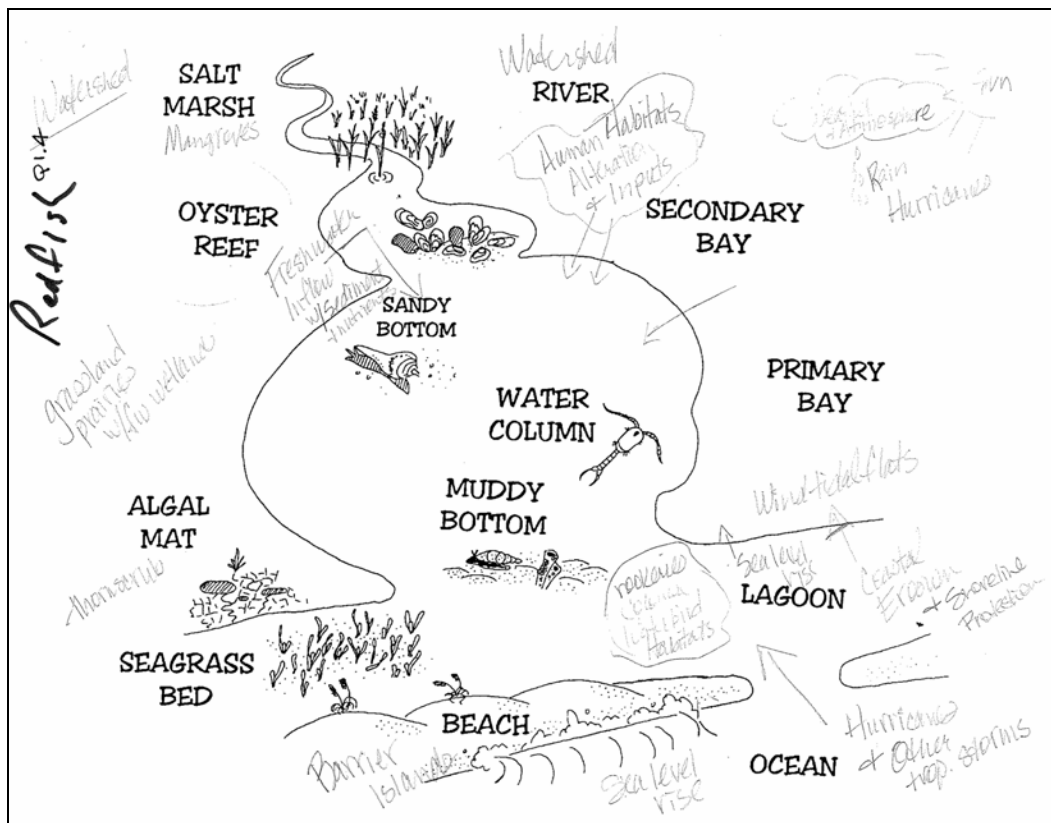
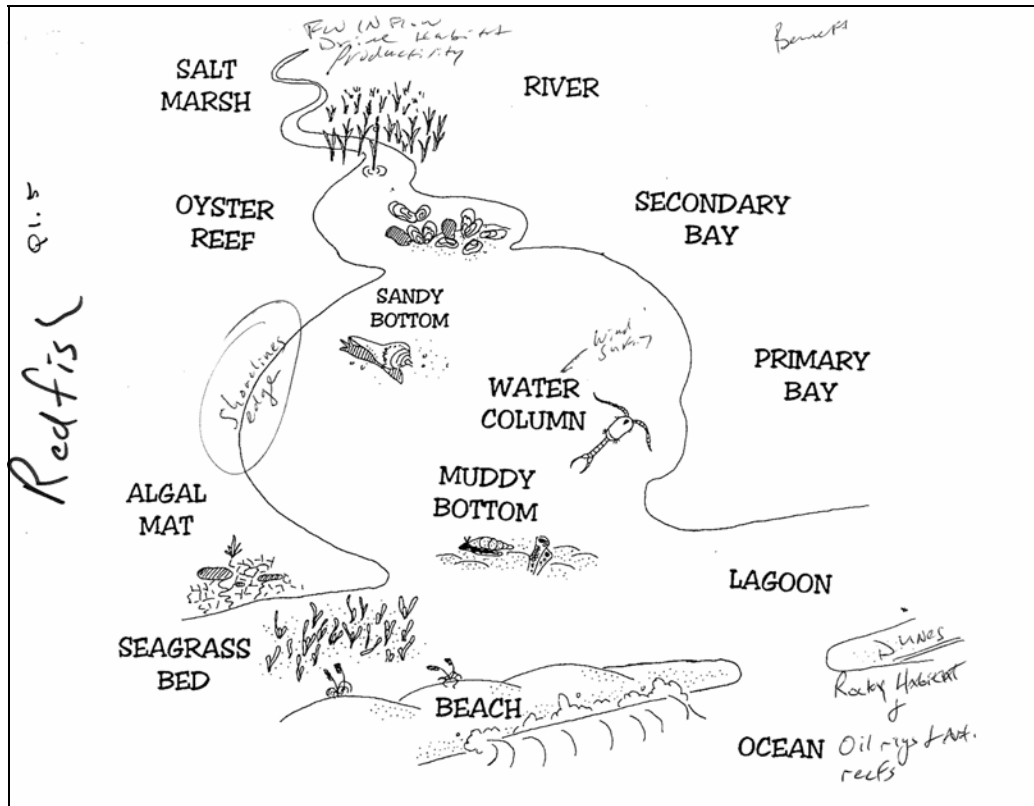
Redfish

Facilitator: Larry Hyde

Habitats as well as human impacts (or flow) were listed in the following transparencies:







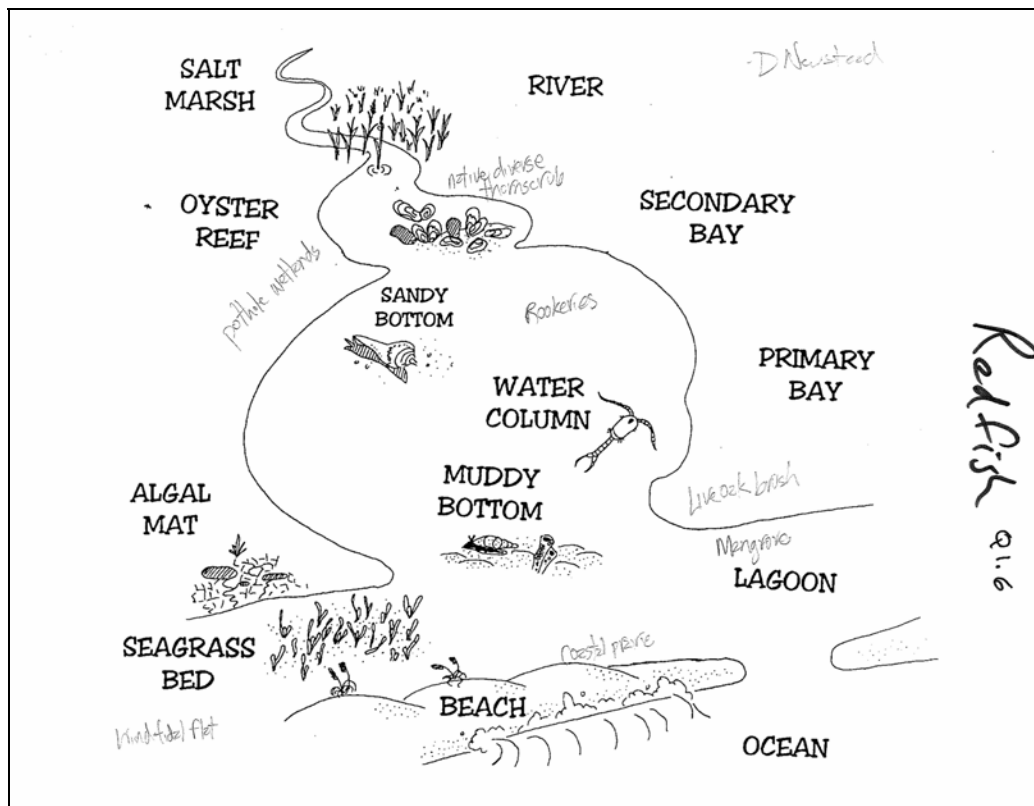
It was interpreted from the first transparency what benefits are provided and who receive them:

- Benefits:

- Recreation
- Nutrient cycling
- Clean water and storm water treatment
- Sediment
- Nursery and habitat
- Economics
- Storm protection
- Aesthetics
- Shipping
- Petrochemical
- Food (seafood)
- Oxygen production

- Who receives them?

Fisherman: recreational and commercial
Boaters and birders
Tax benefits
Estuary itself
Coastal residents
Greater population outside of coastal zone



Tourists
Local business
Seafood consumers
Port users

Participants identified the following habitats and ecosystem services (when stated) in their notes:

Notes # 1:

Habitats and ecosystem services:

- Human habitat and human inputs
 - Aesthetic
 - Livelihood / economic
 - Industrial / commercial
- Atmospheric habitat and wetland interaction with system
 - Precipitation
 - Climate control / regulation
- Upland habitat
 - Ranching
 - Agriculture
 - Watershed
 - Recreation
 - Urban watershed
 - Barrier island (dune)
 - Thorn scrub brush habitat
 - Grassland prairies with freshwater wetlands
- Bay habitats
 - Bird rookeries

Notes # 2: by Greg Stunz

Habitats missing from the cartoon:

Freshwater delta
Riparian
Upland habitat
Mangrove
Wind tidal flats
Colonial bird rookeries
Jetties - rocky intertidal shore
Seashore palustrine wetlands
Prairie grasslands
Tamaulipan thorn scrub
Live oak brush - barrier sand plane
Atmosphere (sun)
Anthropogenic habitat (land use/land covers)

Benefits to people:

- Recreation
- Quality of life - intrinsic value
- Consumer uses:
 - Fishing
 - Hunting
- Non consumptive:
 - Kayak
 - Birding
 - Boating
- Nutrient cycling
- Clean water
- Primary production
- Storm protection
- Dunes
- Seagrass:
 - Food source
 - Nursery habitat
 - Turbidity reduction
 - Stabilization of sediments
 - Nutrient recycling
- River / watershed issues:
 - Freshwater inflows
 - Sediment input

Notes # 3:

Habitats and benefits:

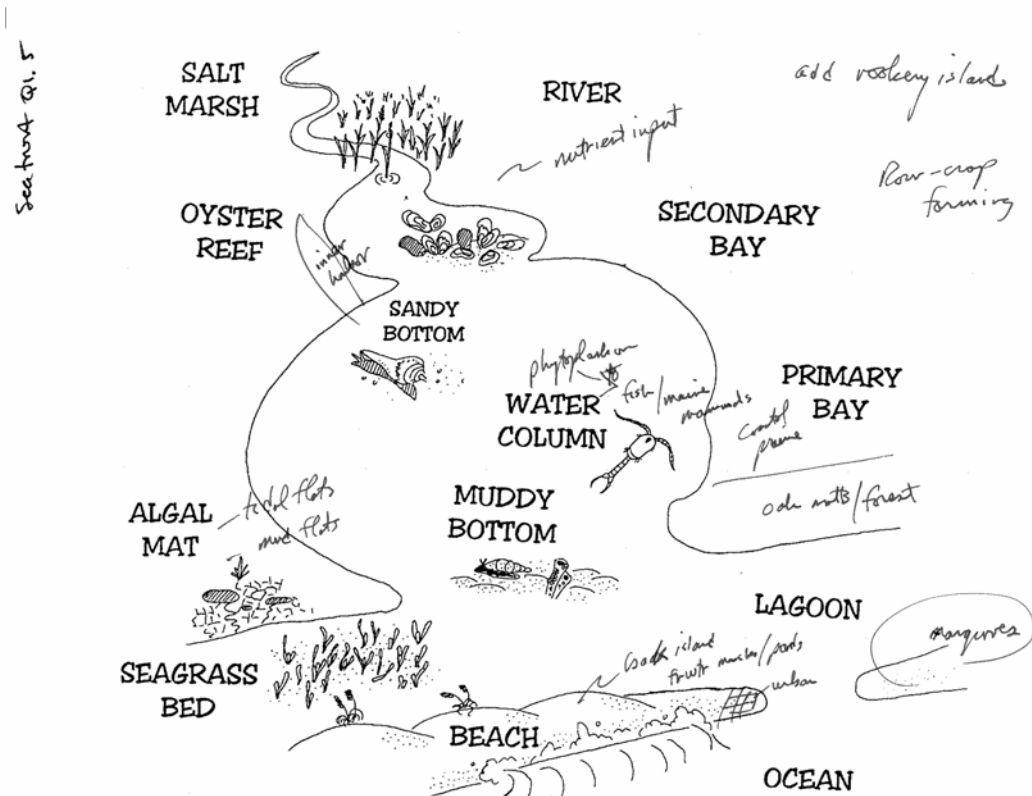
- Oysters
 - Recreation, money, ecotourism, windsurf
 - Non consumptive: birding, kayaking
 - Consumptive: fishing and hunting
- Water
 - Windsurf
 - Boating
 - Food (shrimp, crab, oyster)
- River flow
 - Primary production
- Whole system
 - Aesthetic
- Beach, barrier island, dune
 - Damper storm surge, flooding
- Seagrass
 - Juvenile habitat

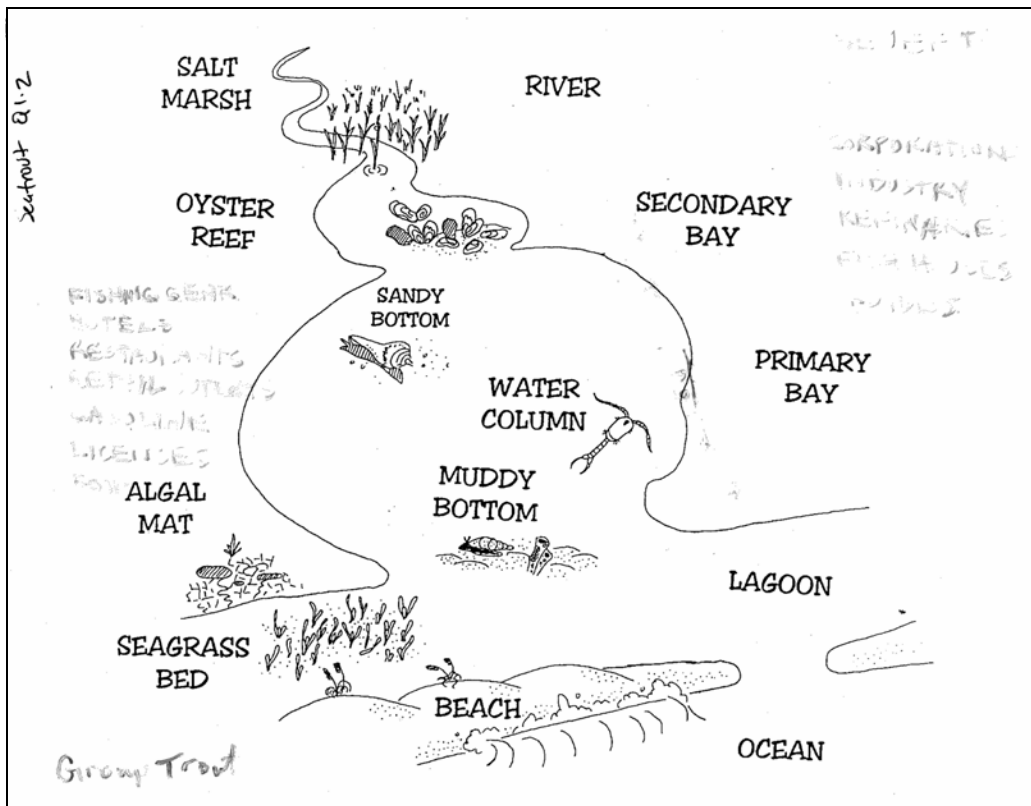
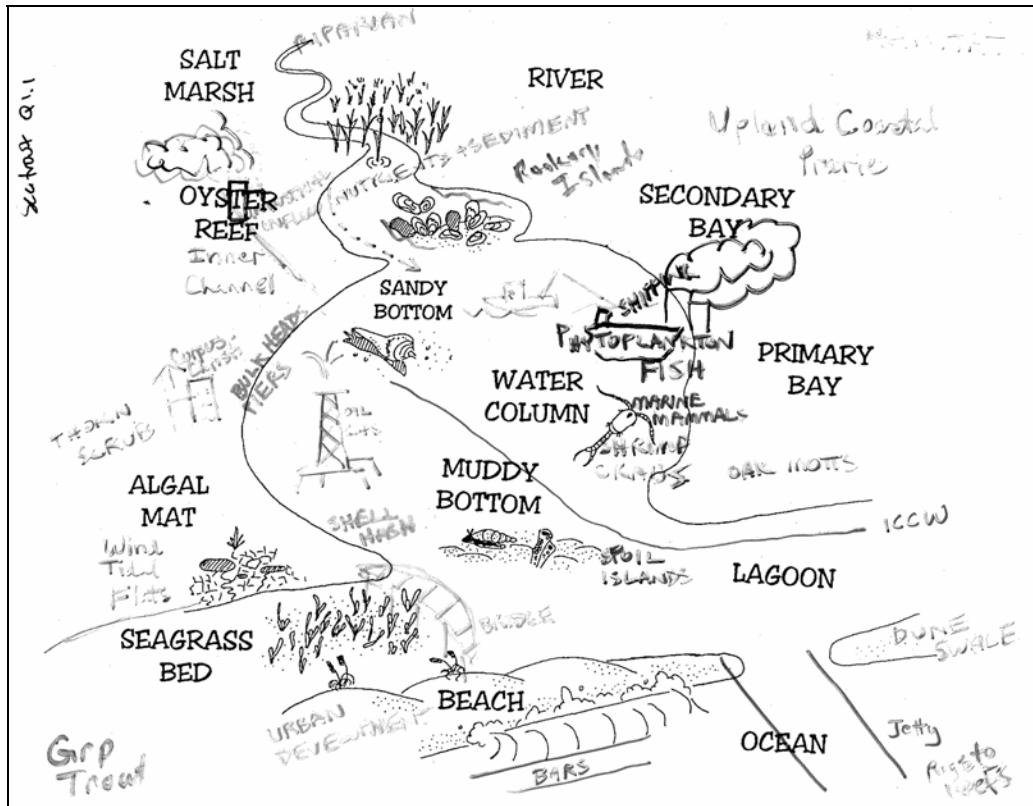
Food source for ducks
Water clarity / quality
Support fish-eating birds

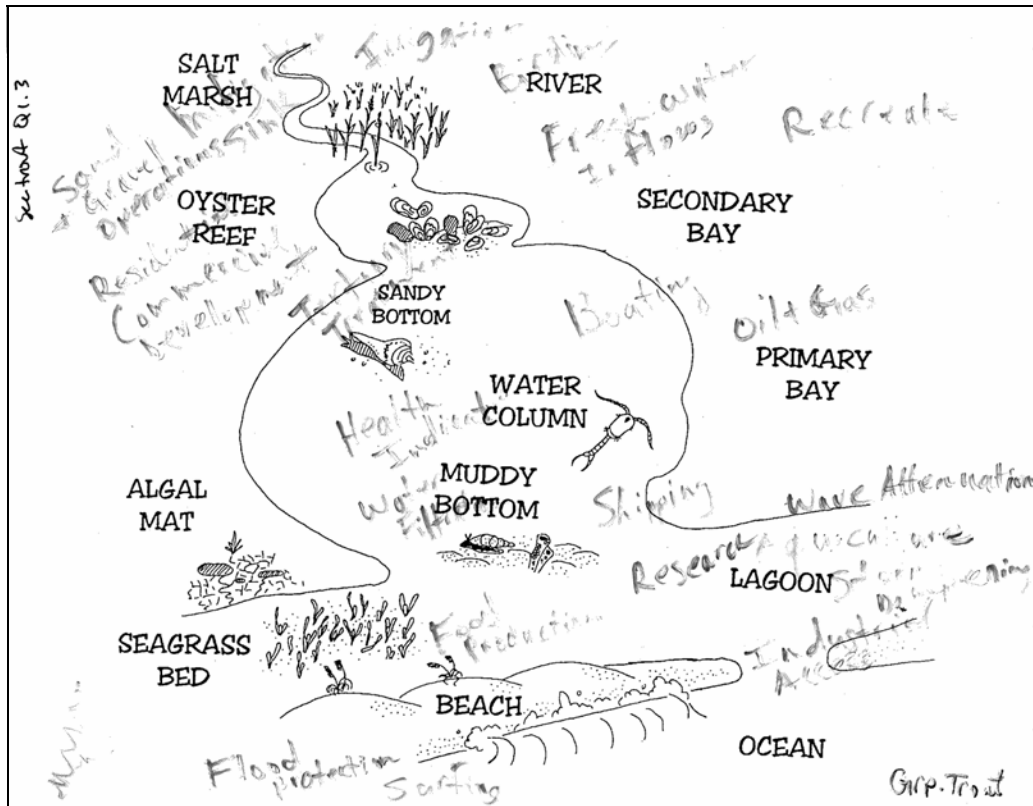
Sea Trout

Facilitator: Phillip Levasseur

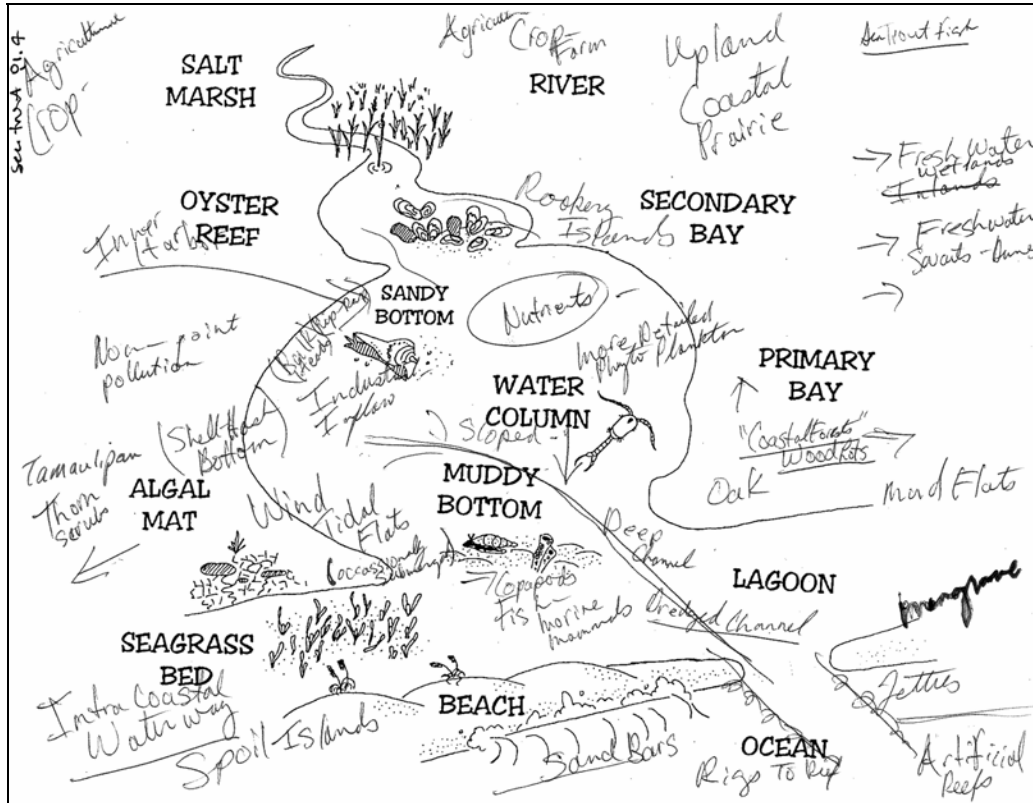
Habitats as well as human impacts (or flow) and recommendations for project boundaries were listed in the following transparencies:







Participants identified the following habitats and ecosystem services in their notes:



Habitats:

- Salt marsh
 - Birding
 - Nursery - supporting fisheries
 - Research
 - Food
 - Water filtration
 - Tertiary treatment
 - Storm dampening
 - Mitigation sink
- River - freshwater
 - Supplies - commercial, residential
 - Irrigation
- Riparian corridor
 - Sediment and nutrients inflow
 - Sediment and nutrient trap
 - Birding - favorite location
 - Sand and gravel operations
 - Food
- Gulf Bay Complex (not a ? sink)
- Evaporation - precipitation
- City - urban heat island
- Hardened marsh
- Sea level rise
 - 1-2 ft in 50 years
 - Allow for retreat
 - Ongoing retreat
 - Wind tidal flats conversion - seagrass, virgin marsh
 - Broadly the management plan should focus on the natural progression and retreat of the basin
 - Recognize new set backs
- Bayside setbacks - permitting
 - Storm protection
 - Wave action
- Oyster cultivated
- Sea level rise
 - Oso Creek
 - Know where the water rise is going to be
- Oso - fresh water marsh - created with waste water effluents
- Freshwater ponds - State owned
- Acquisition and easements
 - Federal, State, local
 - Insurance

- More rookeries islands
- Soil and water conservation
- Invasive species

Beneficiaries

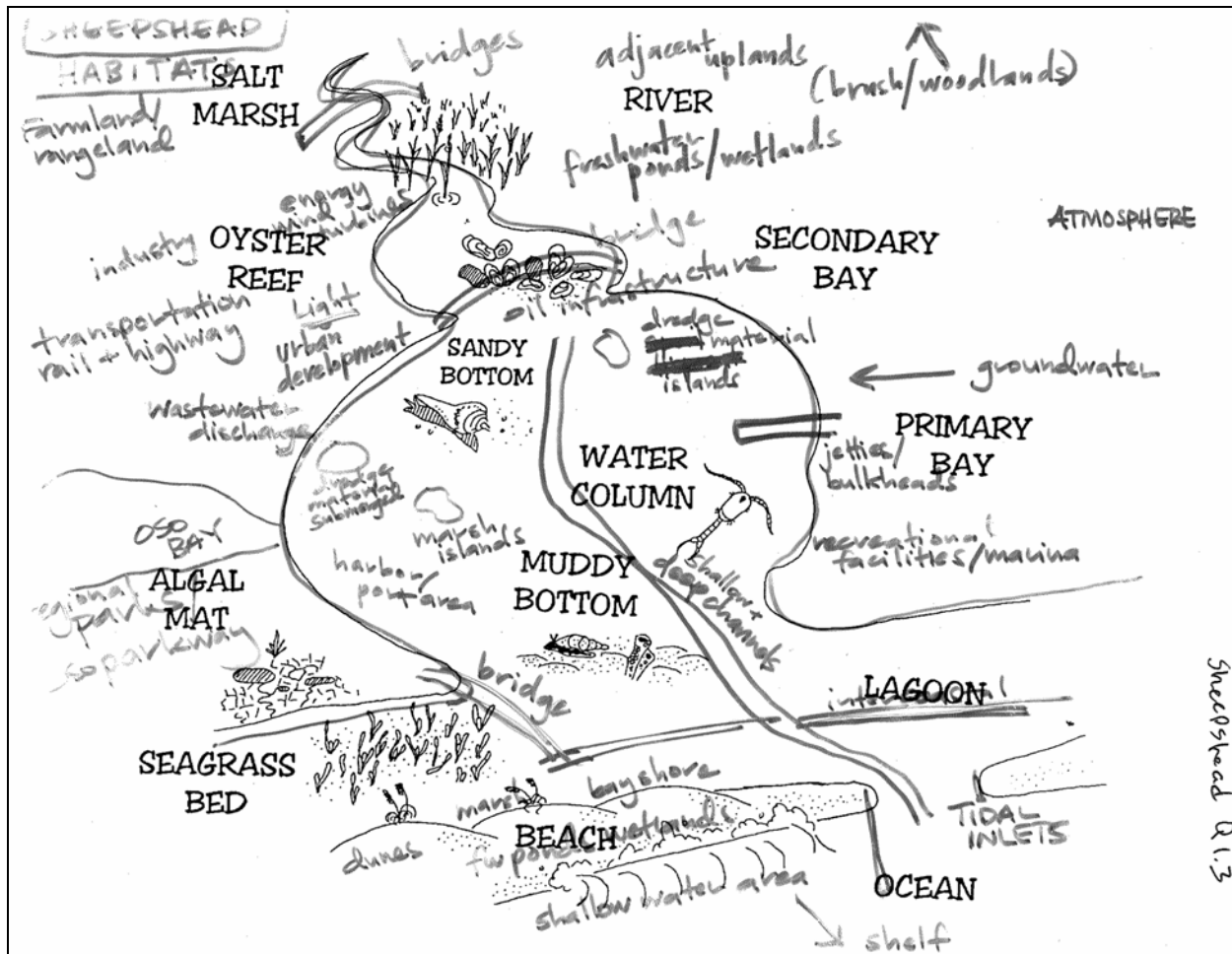
People who sell boats
 Hotels
 Restaurants
 Retail Outlets
 Gasoline
 Licensing (Support)
 Ice Houses
 Various Commercial Industries
 Regional & National Corporations
 Refineries
 Reynolds
 Sherwin Aluminum
 Kiewit
 DuPont
 HEB - (Coors - Bud)
 The Federal Government
 U.S. Navy
 U.S. Army
 Agricultural complex
 Stabilization and maintenance of climate
 All citizens
 Infrastructure
 National significance

Sheepshead

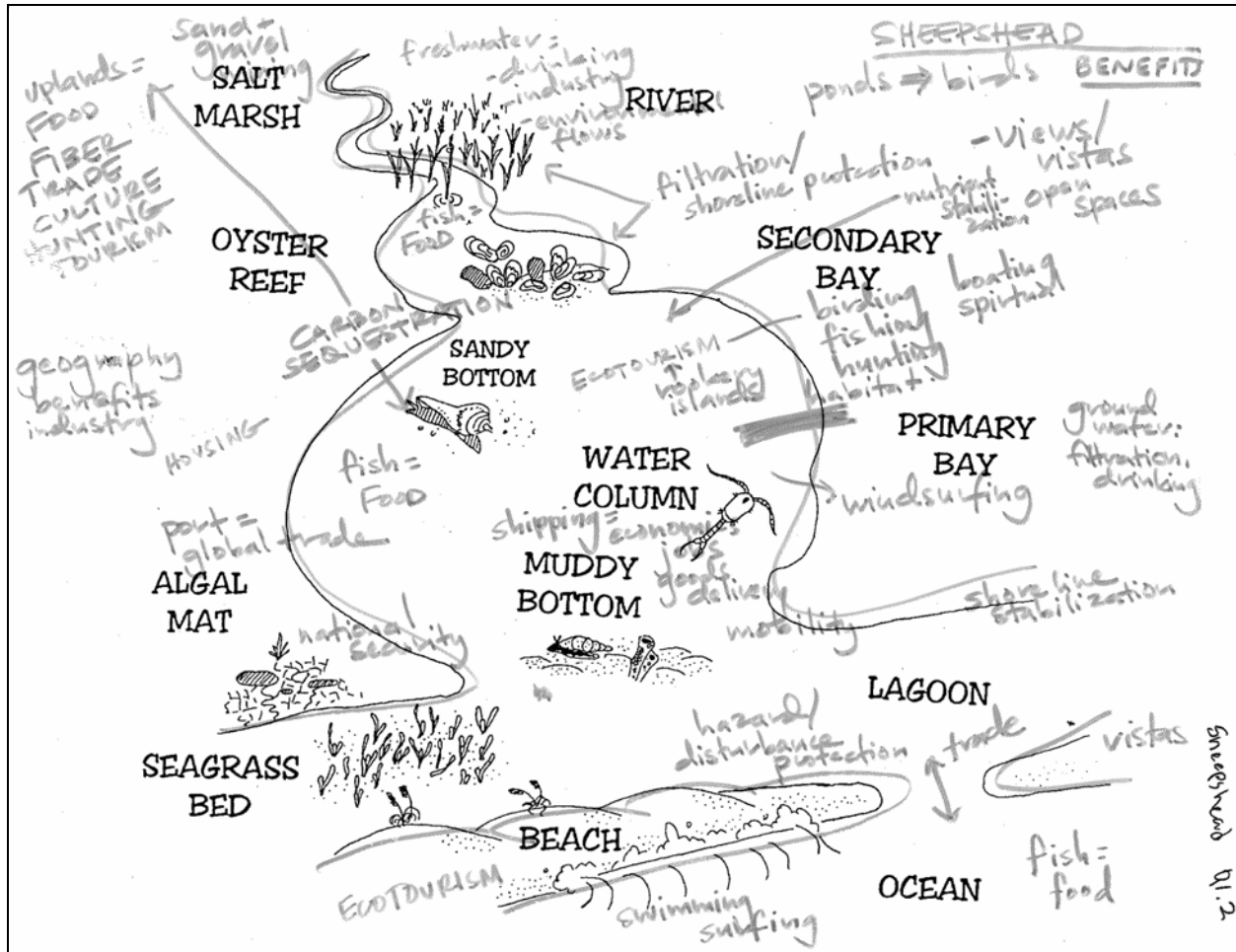
Facilitator: Jennifer Pollack

Habitats as well as human impacts (or flow) and recommendations for project boundaries were listed in the following transparencies:

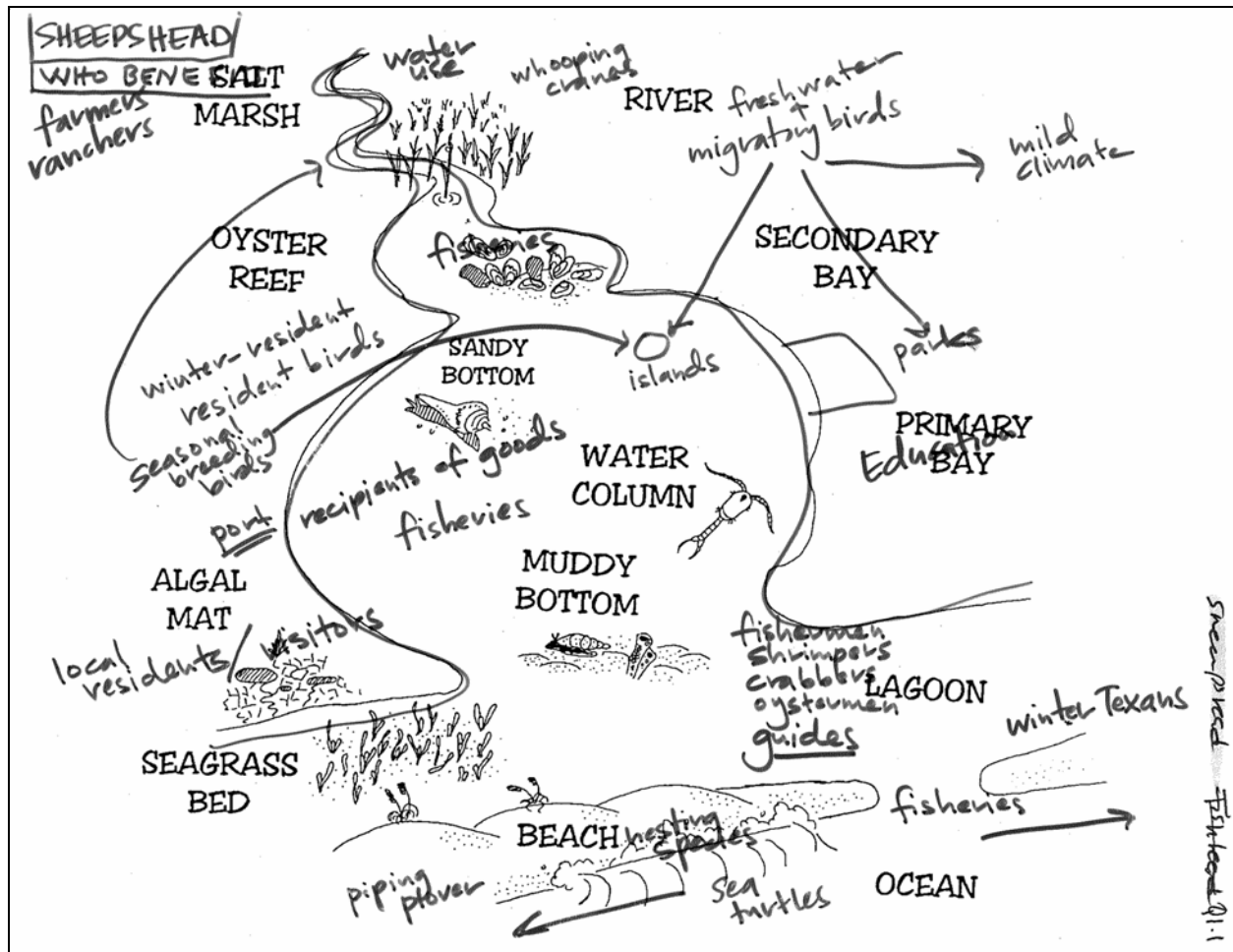
Which habitats are missing from the picture?



What benefits do habitats provide to people?



Who receives these benefits?



Sheep Head Fishhead 01.1

Appendix F: Individual Responses: Objective 2 - The Management Plan's Geographic Coverage

Q2. Where is the geographic coverage?

Q 2.1 What specific locations should be included in this plan?

Q 2.2 Why did you choose the specific areas?

Black Drum

- Rincon Bayou/Nueces Delta
 - Fresh water inflow
- Nueces Bay
 - Open shoreline
 - Oyster reefs
- Port of Corpus Christi
 - Industry
- City of Corpus Christi
 - Storm water
- Oso Creek Watershed
 - Fresh water flows and sewage
- Ingleside
 - Industry
 - Rigs
- Redfish Bay and Bay side of Padre Island
 - Marsh area
 - Birds
 - Fish
 - Aesthetic
- Gulf side of Padre Island
 - Padre Island uplands
 - Fresh water wetlands
 - Fore dunes - storm surge habitat
 - Jetties for inlets
 - Storm surge/temporary inlet channels
- Upper Laguna Madre
 - Sea grass area/rookeries threatened

Croaker

- Rincon Bayou/Nueces Delta
 - Fresh water inflows and water reuse
 - River water quality monitoring
 - Land runoff management
 - River cleanups
 - Riparian habitat enhancements

- Sediment management
- Restoration and education facilities
- Erosion control
- Kayak access
- Nueces Bay
 - Erosion control
 - Create rookery islands
 - Bird habitat enhancement and/or acquisition
 - Planned marsh creation
- Oso Creek Watershed
 - Kayak access point at 286 and Oso Creek
 - Hike and bike trail
 - Education with agriculture owners and the public
 - Riparian habitat restoration
 - Agriculture runoff management
 - Colonias draining into the Oso
 - Conversion of septic systems to city sewer
- Oso Bay
 - A planned city park with a retention pond
 - Land acquisition along Ennis Joslin and the Oso Bay
- City of Corpus Christi
 - Increasing green space and parks
 - Creating soft shoreline
 - Storm drain retrofit for debris and contaminants
 - Education
- Corpus Christi Bay
 - Beneficial use of dredge material
 - Sediment management
 - Studying and raising awareness of the hypoxic zone
 - Erosion control
- Redfish Bay.
 - Oyster restoration
 - Erosion control
- Bay side of Padre Island
 - Rolling easements
 - Boat access
 - Erosion control
 - Restoration
 - Effective wastewater reuse
- Gulf side of Padre Island from Port Aransas to the State Park
 - Dune stabilization
 - Sargassum management
 - Turtles
 - Nesting birds

- Freshwater pond management
- Upper Laguna Madre
 - Rookery island management
 - Kayak access
 - Water quality management
 - Sewage retrofit
 - Erosion control
 - Oak mottes

Suggested Map Improvements

- Local watersheds
- City limits
- Ship channel
- Intracoastal Water Way
- NAS Ingleside Study
- Label NERR Boundary
- Show 10 mile off shore reference area
- Get 8 digit Hydrological Unit Code
- Extend Southern boundary to the National Seashore

Criteria

- Water quality improvement
- Usability of public
- Education component/outreach/make plans available
- Immediate need/erosion/areas being lost fast
- Cost effectiveness
- Quality

Flounder

- Rincon Bayou/Nueces Delta
 - Riparian bottom land and palmetto
 - o Unique because of recreation and water quality
 - High diversity of wetland types
 - o Submerged vegetation
 - o Birds
 - o Nursery for fish
 - o Water quality
 - o Fresh water inflow
- Nueces Bay
 - Sea grass
 - o Redhead Ducks
 - Oysters
 - o Largest extent of oyster reefs in the area

- Sunset Lake Park
 - o Wetlands
 - o Bird habitat
- Port of Corpus Christi
 - Fish thermal refuge
- Oso Creek Watershed
 - Agriculture
 - o Crop land
 - o Victoria clay soils
 - o Maintains drainage
 - o Erosion control
 - Urban development
 - o Habitat acquisition necessary because of urban expansion
- Oso Bay
 - Mangroves
 - Birds
 - Tidal flats
- Corpus Christi Bay
 - Relevant sailing area
 - Ship channel
 - o Shrimp migration route
 - o Fish thermal refuge
- Ingleside
 - High density of wetlands
 - Oak mottes
 - o Largest oak forest area
- Redfish Bay
 - Huge nursery for marine in winter
 - Dolphin nursery
 - Sea grass propeller scars
 - Recreation
 - Intracoastal easement
 - Mangroves
 - Oysters
 - Largest black mangrove extent in the area
 - Crabbing
- Gulf side of Padre Island
 - Tidal flats
 - o Bird habitats
 - Sea turtles
 - Dunes
 - Fish Pass Channel
 - o Sea turtles
 - Packery Channel

- o Sea turtles
- Oak motts
 - o Only oak forest on Mustang Island
- Prairies and marshes
- Upper Laguna Madre
 - Blue Hole (channel)
 - o Fish habitat
 - There are more oysters than shown
 - Tidal flats
 - o Water circulation restoration
 - Laguna Madre Field Station from TAMUCC
 - o Education

Pinfish

- Rincon Bayou/Nueces Delta
 - Riparian habitat - limited resource
 - Nursery grounds
 - Nutrient source to bays, Gulf of Mexico
- Nueces Bay
 - Rookery islands
 - Shoreline erosion
 - Oyster reefs - Limited Resource
 - Gum Hollow - often neglected fresh water inflow
 - Agriculture runoff
- Port of Corpus Christi
 - Wind turbine construction
 - Las Brisas
 - Economic growth vs. environmental concerns (Air)
- City of Corpus Christi
 - Parks as possible enhancement areas
 - Hans Suter
 - Greenbelt
 - Mustang Island
 - Padre Island National Seashore
 - Mollie Beattie Coastal Habitat Community
 - Packery Channel Park
- Oso Creek Watershed
 - Agriculture
- Oso Bay
 - Eutrophication
 - Waste water plants
 - Nursery grounds
 - Freshwater ponds - Limited Resource
 - Oak motts - Limited Resource

- Corpus Christi Bay
 - Public Bay/Beach Access
 - Artificial reef/shell pads
 - Fishing pressure
 - Hypoxia
- Shamrock Island
 - Major rookery
 - Protects sea grass
 - Beds - fishing
 - Shoreline Erosion
- Ingleside
 - Lightening of Natural Gas
 - Kinny Bayou
 - Fresh water ponds - not protected and limited resource
 - Oak motts - not protected and limited resource
- Redfish Bay
 - Mangroves
 - Nursery grounds
 - Stabilize sediments
- Port Aransas
 - Inlet
 - Flushing of system
 - Recreational boating
 - Transportation
 - Circulation
 - Spawning
- Bay side of Padre Island
 - Sea grass
 - Tidal flats - potential loss to sea level rise
 - Dune swales
- Gulf side of Padre Island
 - Dunes - storm protection, limited habitat
 - Mustang Island State Park
 - Mollie Beattie Coastal Habitat Community
 - Oak motts
 - Packery channel park
 - Packery channel inlet
 - Archeology
 - Willows
- Upper Laguna Madre
 - Rookery islands
 - Sea grass
 - Removal of old obstructions
- Suggested Map Improvements

- Extend map to Intercontinental Shelf
- Extend map to Padre Island National Seashore
- Show public beach/bay access
- Show reservoirs/Lake Corpus Christi
- Limited Resources
 - Riparian Habitat
 - Fresh water ponds - not protected
 - Oak motts
 - Oyster reefs - protection of remaining live reefs
 - Hard substrates
 - Dune/Beach - storm protection
 - Freshwater inflows for each municipality
 - o Ingleside
 - o Taft
 - o Oso
 - City benefit
 - Storm water runoff
 - Nutrition load
 - Debris
 - o From a watershed viewpoint and municipality viewpoint
 - Flood plain
 - o Serves as a buffer zone
 - o Watershed management as a whole
 - Ground water
 - Willows

Redfish

- Rincon Bayou/Nueces Delta
 - Coastal Bend Bays and Estuaries Program
 - CBBEP Erosion control
- Nueces Bay
 - Wildlife Corridor - protects drainage
 - CBBEP Marsh Restoration
- City of Corpus Christi
 - Urban Runoff
 - Education
 - Invasive Species
- Oso Creek Watershed
 - Agriculture
 - Soil/water conservation
 - Drainages/buffers
 - Educate landowners on incentive programs
- Oso Bay

- Protect mudflat habitat by limiting ATV access
- Corpus Christi Bay
 - Open Bay Bottom
 - Dredge concern/manage material
 - Trawling practice
 - Undetermined boundaries
 - Erosion going to chip into hackberry rookeries
- Ingleside
 - Live oak/coastal prairie habitat
 - Acquisition/easement
- Redfish Bay
 - Erosion control
 - Protect sea grass and marsh
- Bay side of Padre Island
 - Stop excavation of canals/channels through bayside habitats
 - Need new setbacks in view of SLR
 - Show Croaker Hole
 - Preservation of scrub shrub neotropical habitat
 - Why? Only remaining tract like it on Mustang/North Padre Island (Rare)
- Gulf side of Padre Island
 - Preservation of upland habitat
 - Meaningful dune protection
 - No regulatory protection exists to protect natural upland habitats
 - Mitigate future flood loss due to hurricanes
 - Need new setbacks in view of SLR
 - Show Packery Channel
- Upper Laguna Madre
 - Restore and manage bird islands
 - Utilize dredge material
 - Why? SLR will claim low lying habitats

Sea Trout

- Rincon Bayou/Nueces Delta
- Nueces Bay
- Oso Creek Watershed
- Redfish Bay
- Bay side of Padre Island
 - Most at risk
 - Sea rise
 - Anthropogenic
- Upper Laguna Madre

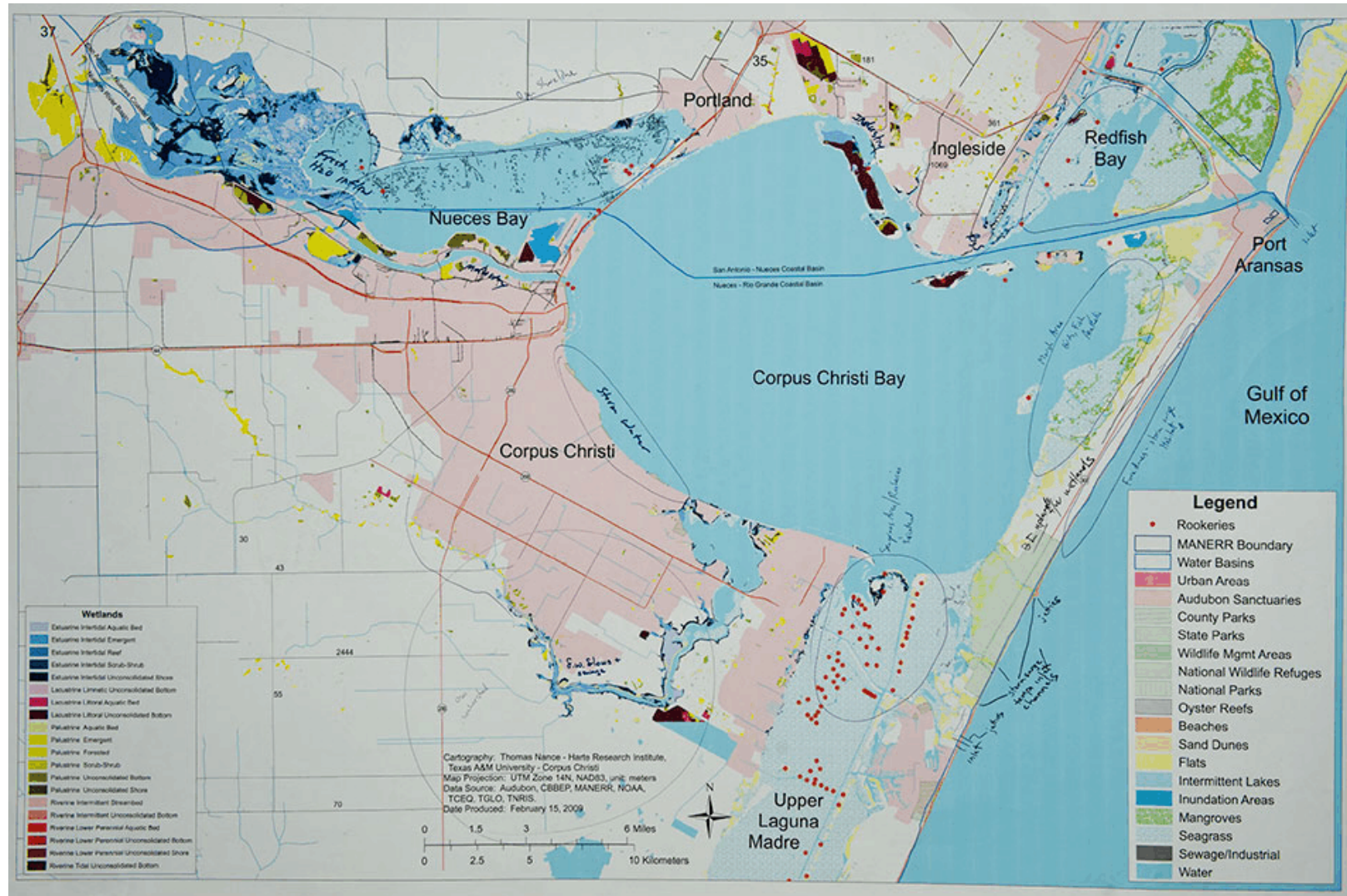
Sheepshead

- General suggestion
 - Regional Zoning
- Oso Creek Watershed
 - Regional Park
- Gulf side of Padre Island
- Mollie Beattie Coastal Habitat Community
- Packery Channel

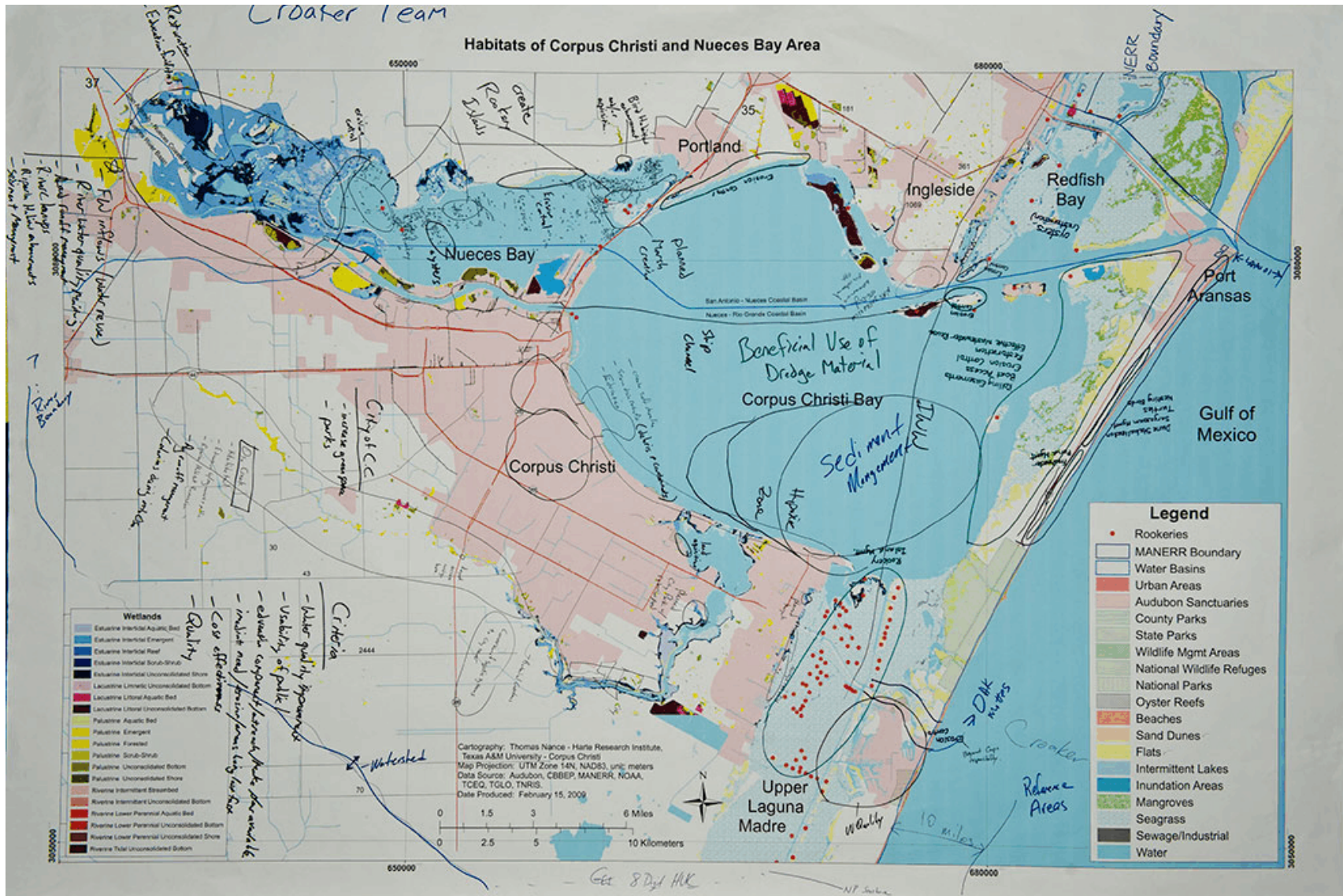
Suggested Map Improvements

- Extend Western extent to Wesley Seale Dam
 - o It is a fresh water source
- Show Nueces Watershed below Wesley Seale Dam
- Show the watershed South of Copano Watershed
 - o It drains to Nueces and Corpus Christi Bay
- Extend Northern extent to North end of Redfish Bay
 - o Habitats and organisms are intimately connected to Corpus Christi Bay system
- Extend Eastern extent to show State owned land on the Gulf side of Padre Island
 - o It has strong connection to fisheries/shrimp/crab, recreation use, sea turtles, tarpon and other fish migration, and long-shore transport
- Show the Oso Creek Watershed
- Extend the Southern extent to the land cut
- Include Baffin Bay and its watershed
 - o Because of Senate Bill 3, sea grass, and fisheries connectivity

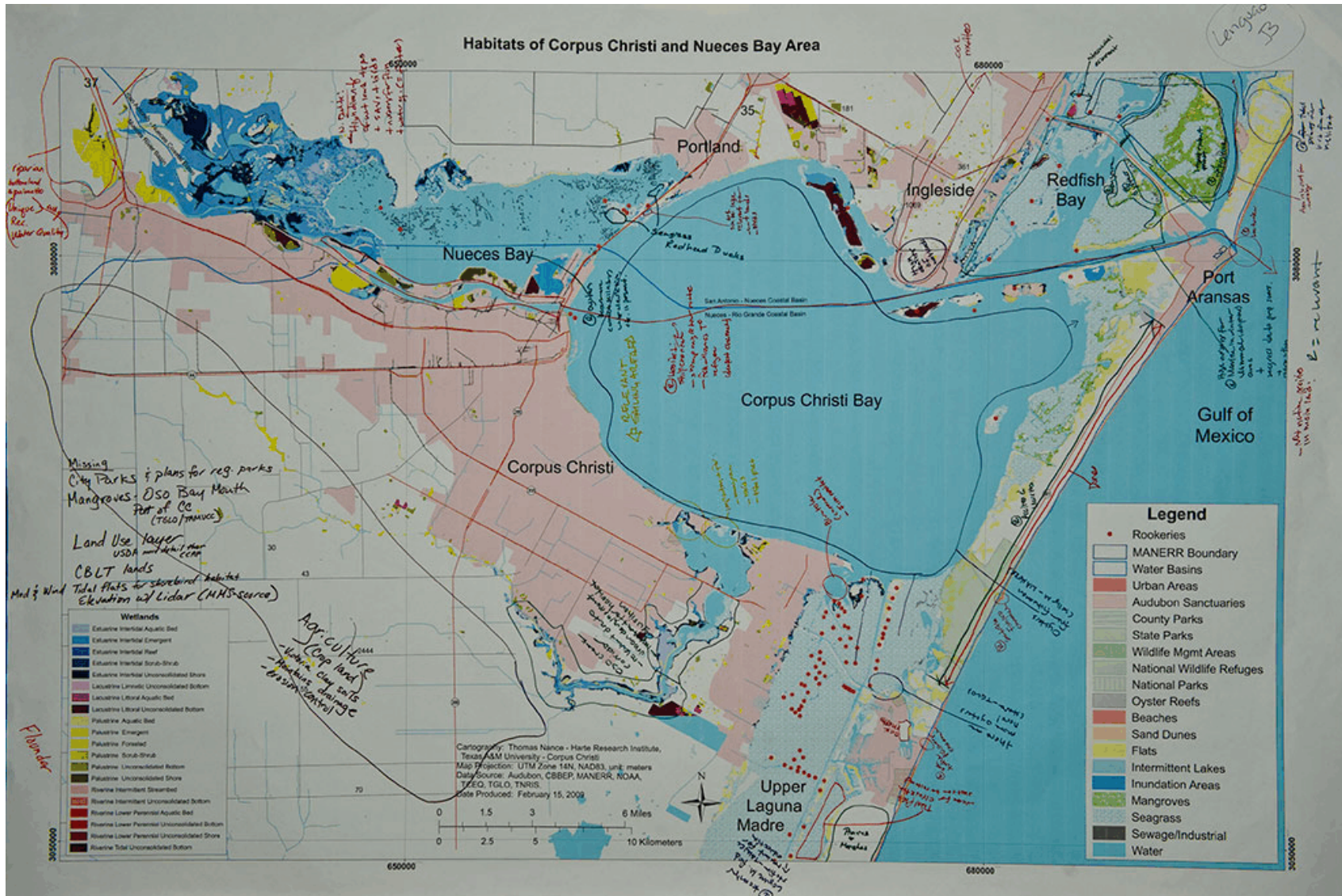
Black Drum



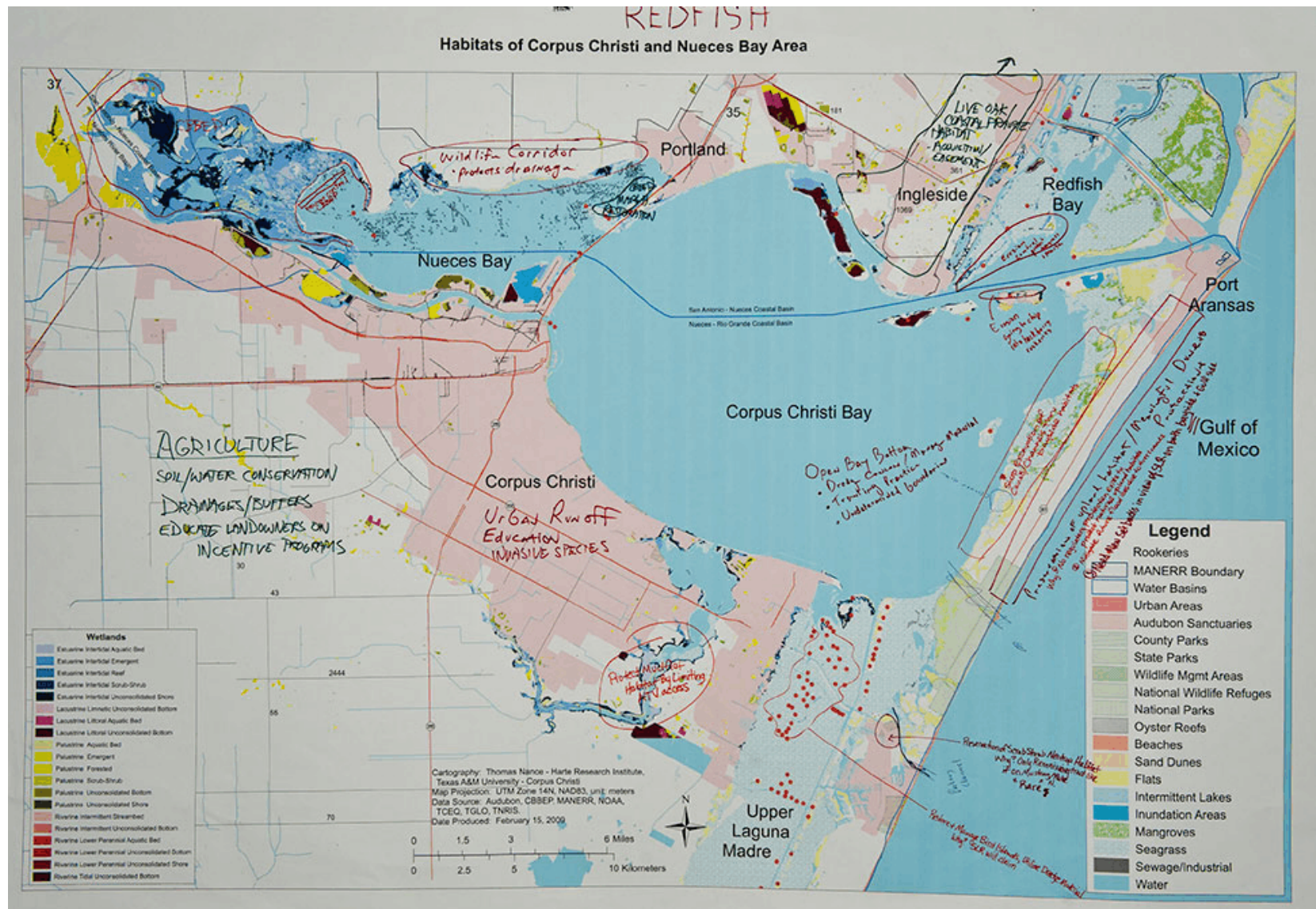
Croaker



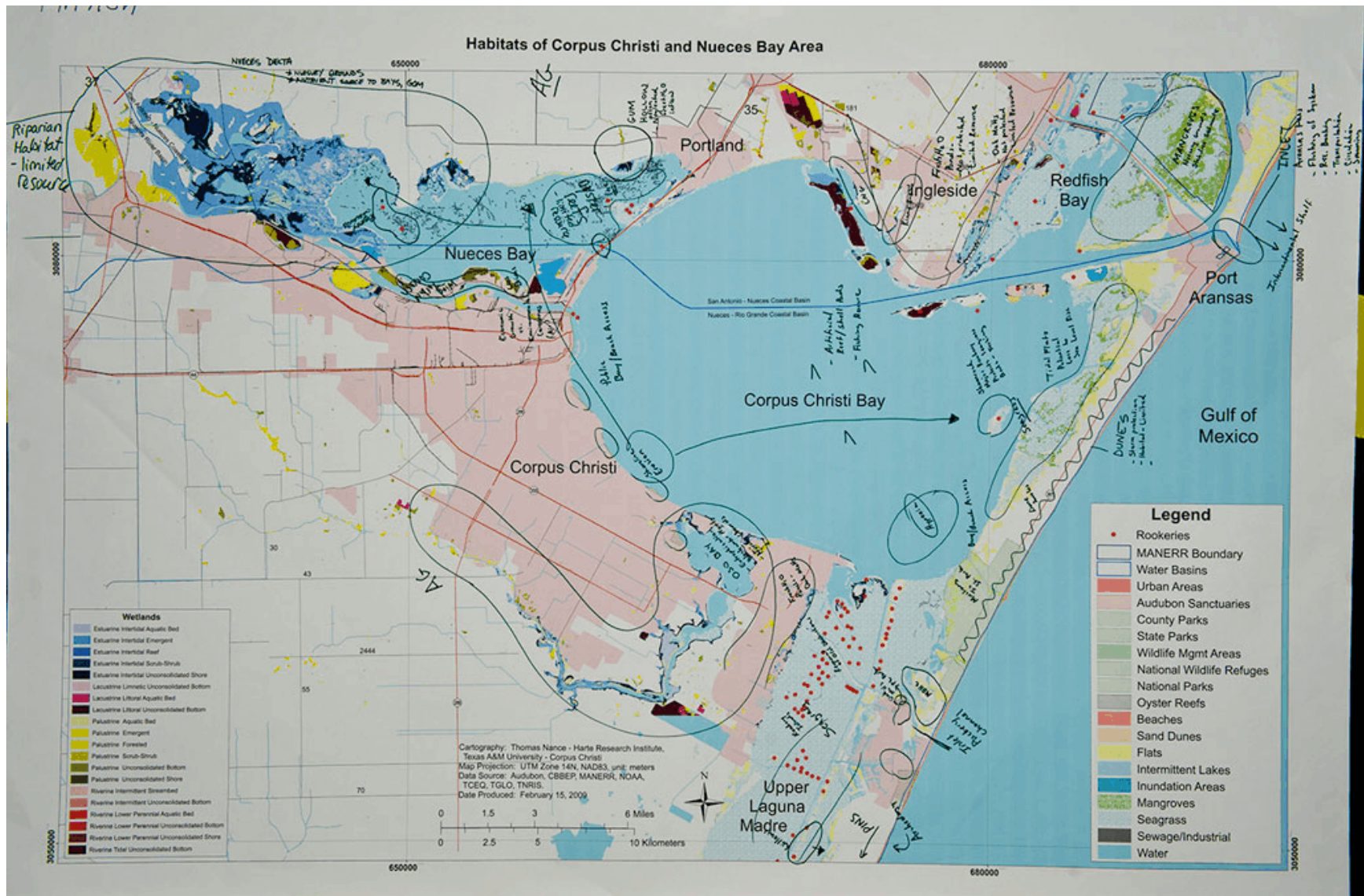
Flounder



Redfish

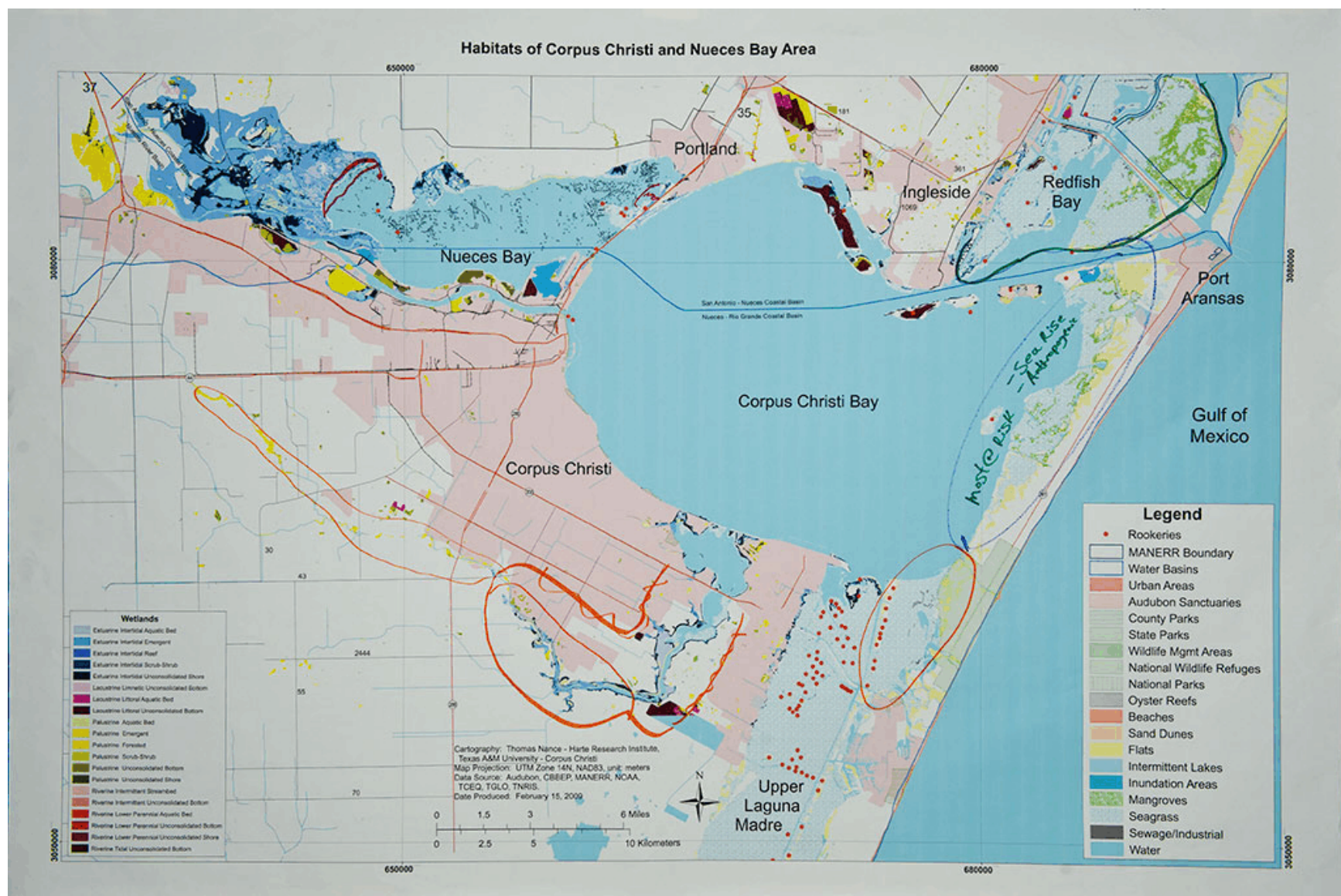


Pinfish

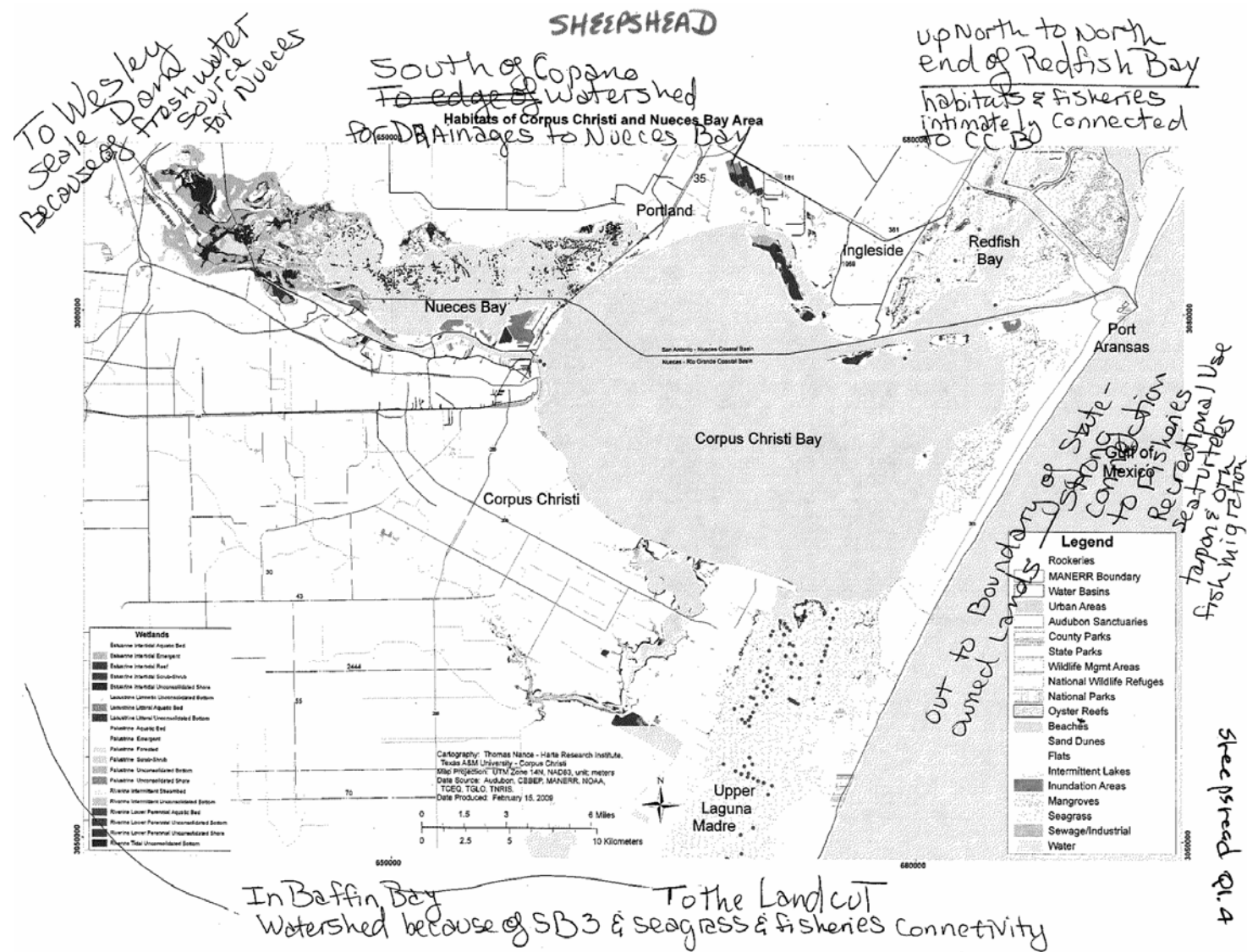


Section 21.6





Sheepshead



Appendix G: Individual Responses: Objective 3 - The Range and Scope of Activities That Should Be Part of the Overall Plan

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Pinfish	106
Redfish	107
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*The response of the Croaker team was either undocumented or lost after completing the workshop.

Black Drum

Range of activities (* indicates one of the five most important activities):

- Sediment Management
 - beneficial use, beach nourishment
- Tidal Inlet Maintenance
- *Seagrass Conservation (similar w/other habitats)
 - Prop scars
 - Recreation/commercial
 - Continued education
- Debris management (eg. Oak mottes)
 - Dumpster placement
- *Conservation easement (Land Acquisition Procurement)
 - Delta / Nueces Bay Shoreline
 - Mustang Island
 - Pocket parks
 - Oso Bay watershed
- City planning for parks/green space as part of regional planning efforts
- *Water Quality
 - Studies (pollutants, fish tissue, etc.)
 - Outflow standards (storm water treatment)
 - Septic system inspection hydrology
- *Optimize hydrology
 - Rincon Bayou
 - Oso Creek
- Oyster reef protection
 - In accordance w/ sediment plan
 - FW inflow
- Rookery Islands
 - Sediment addition
 - Predator control
 - Habitat management

- Species management
- Local wetlands ordinance regulation
 - Wetland migration buffer zone
- *Education
 - Boaters (no prop zone)
 - Sargassum (ecological imp.)
 - General pop. (avg. citizen)
 - Upstream watershed users (FW)
- Commercial involvement (restoration)

Reasoning: (Importance of activities)

What are the system drivers?

Ecological = F/w and Water Quality

Social = Education

Most practical (Time & Opp.) = Land Acquisition

Unique habitat = Seagrass Cons Oak Mottes

Flounder

The participants proposed projects for mainly two groups: 1) water quality related issues, and 2) terrestrial habitats and impacts.

Water quality (activity - temporal rank):

Increase city infrastructure to direct development -

Compile a database on environmental education materials and create a clearinghouse, and an institute of environmental education - ongoing

Use natural water filter systems at the edge of the water to treat water from outfalls before their drain into the bay. Such as mangroves or other wetland type systems - long term

"Watch" type programs. Such as TGLO current Beach Watch Program that monitors water quality through on site sampling of bacteria, etc. - short term

Quantification of the fresh water inflow needed to support bay functions and services - ongoing

Best management practices (BMP) for waste disposal or beneficial material use. These will be needed when the ship channel is expanded in the near future - ongoing

Waste treatment plant in Oso Creek. The status of the Bonnie Davis Plant was unknown to participants - long term

Environmental technology to mitigate the effects of existing and future channels in the bay (fingers) - ongoing & long term

Restoration projects to increase the size of vegetation buffers around the rivers and streams - ongoing & long term

Create mitigation banks for other wildlife besides the existing ones for wetlands and seagrass (because they are regulatory habitats) - long term

Expand/enhance the "zero scaping initiative" of Corpus Christi City to all residential areas, universities, city utilities, industry, etc. - ongoing & long term

Sites proposed for activities implementation: outfalls, beaches along the Gulf coast, ship channel, Nueces, Oso Rivers and Laguna Madre (for vegetation buffers restoration).

Terrestrial (activity - temporal rank):

Carbon credit system. Needed to protect oak motes - long term

Tax incentives such as exemptions for wildlife, similar to the ones for agriculture - ongoing

Create a "conservation development guide" document that developers and cities can use for smart growth (this should be linked to the educational approach) - long term

Land reuse program. This is a current City of Corpus Christi program to fill city gaps using brown fields - ongoing & long term

Land acquisition of specific sites such as the oak motes in Mustang Island near Packery Channel, south of Ingleside (see map) and fresh water ponds on Fluor Bluff (not well identified in the map).

Criteria used to rank:

- 1) Activities that promote a sustainable production of ES
- 2) Long term impact of activities for future generations (sustainability)
- 3) Ongoing activities, projects or programs (< 2-10 yrs)
- 4) Future or long term activities, projects or programs (>= 10 yrs)

Pinfish

Activities (in order of importance):

1) Education / outreach

- High school engagement programs (wildlife photography, competitions, etc)
- at local level, "Captain Clean Crab" or "Youth That car" type initiatives
- at state / fed level, legislative outreach

2) BMPs

- agriculture, wastewater

3) Adaptive Management

- flexibility in implementing conservation, restoration work

4) Regulatory

effective

- success over long term (mitigation monitoring etc.)
- new options for mitigation (banks?)
- local and state regs that protect resources not protected at the federal level
- proactively respond to SLR,
- proactively go after litter bugs

5) Acquisitions

- for conservation, multi-use purposes

6) Monitoring

- water monitoring, sediment monitoring, air quality monitoring

7) Smart Growth principles implementation

8) Engagement of under represented

- develop plans for engagement

- target incentives and on-the-ground projects to benefit/ impact these communities (e.g. address drainage problems in colonias)

Criteria:

- funding ability
- need
- political reality

Redfish

Range of activities:

1. Activities promoting goods & services

- Targeted Education
 - Specific user groups (rec. fisherman, boaters, campers farmers and ranchers, businesses car wash, auto service)
- Public outreach from
 - legislative outreach
 - focus groups for common involvement
 - use local entities to help train - CC Botanical Garden, NPS, TPWD
- General Education
 - public service, PSA
- Acquisition of property / conservation easement
 - tax breaks
 - federal support payment for easements cersus donation
 - getting small land owners to donate habitat that in total have
 - significant benefits
- Prioritized list
 - private owner loop
 - conservation land trust
 - BMP

2. Activities most important

- Working with local government
 - To increase better defined buffer zones
 - Looking at bay side set back rules in addition to dune side protection bay side protection
 - Preservation, green areas
- Taking advantage of recession conditions (\$180 million NOAA for habitat restorations) cost to benefit ratios will vary - high in coastal bird rookeries compared to upland habitats
- Getting experienced land trust involved to co-partner
 - Seizing opportunities to acquire property acquisition of land adjacent to currently managed land would be desirable
 - Developing a prioritized list of sites to be developed, restored, enhanced through dredge disposal or mitigation efforts, establish a with list of sites
 - Rookery defined laws

3. Criteria to rank activities

- Unresolved disturbance criteria related to rookeries - protection and preservation of natural nurseries
- City incentive for water and energy conservation
- Biggest bang for bucks
- Secondary impacts
- Larger tract

Sea Trout

Range of activities:

1. Promote sustainable goods & services
 - Sensitive Support
 - Protect
 - Preserve
 - Rebuild
 - Work shop
 - Education (Promotion of scientific education)
 - Planning
 - " Education
 - Ecology 101
 - Why habitats are important - engaging the users
 - Developers vs. the public good (land)
2. Non Service Value
 - Intrinsic
 - Economic incentives - Tax breaks
 - Develop and propose - incentive based
 - Static
 - Provide for incentives to influence behavior
3. Private activities
 - Smart growth development short term
 - Regional sediment management
 - Manage all macro & micro allocations
 - In and out where are your sources soil and sediments is a resource
 - Gulf alliance
 - Benefit / Cost (Why)
 - Preservation and augmentation of marsh
 - Bird nesting - Rookery islands augmentation
 - We will need to provide habitat maintained - Beneficially using this resource.
 - Do we need to provide algal flats.....etc.
4. Site specific
 - Private dredge material - Identify storage areas - staging areas. This allows for contaminants to utilize resource.

Creation of wetlands provides for and support for the indigenous foundation

- Habitat
- Knock back invasive trees
- Invasive species
 - Salt cedar
 - Pepper tree
 - Hyacinth
- Aquatic Species
 - Giant salvinia
- Garden Centers
 - Banning Sale of Invasive Fish and Vegetation

Rank & Index value of these processes:

- A. Education
 - 1. Habitat Average and Pro (Incentive based)
 - 2. Sediment management
 - 3. Restore damaged wetlands/habitats
 - 4. Invasive species
- B. Community goals
 - 1. Orientation
- C. Preserve what you have first
 - 1. Then utilize political will
- D. Oyster reef protection

Sheepshead

Range of activities:

- 1) Map of areas affected by sea level rise
 - a) Geohazards analysis - planning tool
 Prioritize conservation and acquisitions /compilation of existing data
- 2) Acquiring data layers for each habitat
 - Acquiring data layers for zoning/planning
 - b) Models of land use/growth to inform and use to establish baselines for measuring change
 - c) Model predictions of water quality based on population growth and regulatory mechanisms
 - d) move ahead /conservation/land acquisition projects based on above plans need to be proactive, not real-time or reactive take regional plans into account when considering individual projects
- 3) Continued monitoring & research (i.e. Continued data collection)
- 4) Education, conservation, land stewardship
- 5) Viable economy (i.e. less of a sense of economic desperation which spawns shortsighted decisions about growth)
- 6) Education:
 - a) stabilize banks

- b) non-point source pollution
 - c) drought tolerant plants
 - d) water reuse
- 7) Preserve fresh water environmental flows through water conservation practices

Appendix H: Individual Responses: Objective 4 - Mechanisms and Resources Needed to Support the Plan

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Sheepshead	117

Black Drum

Q 4.1 What governance tools and opportunities are available to implement activities?

Q 4.2 What private or economic tools exist to support activities?

- Integrate Nature Conservancy - Ecoregion
- Coastal Bend Bays Plan
- TPWD Plan
- CCC-TIF tax
- Potential availability of sediment from private dredging
- Tapping into scientists that are using existing scientific data - HRI as a leader
 - use to develop regional framework
- Create cheaply funded projects for graduate students
- Combine partnerships of groups with mutual interest
 - e.g. sediment plan w/ USACE, POCCA, CBBEP
- Costshare - to improve habitat on property etc.
 - TPWD, USFWS, NRCS
- CMP funding maybe
- CCC can have match dollars sometimes.

Q 4.3 Are there public or private barriers to implementation?

- Federal Standard - how the USACE calculate what they pay for
- Unawareness of social and economic cost
- Private barrier
 - private property / land rights
 - lack of incentives
- Public barrier
 - Potential conflicting goals with municipalities
- Conflicting users and user groups

Q 4.4 Who are the potential partners in accomplishing the activities?

- CCC - applies for match
- TPWD - boat ramps maybe
- Municipalities - County, State

- Universities
- NGO trust for public lands - acquisition
- Local government - regulatory
- Private land owners
- Corporate sponsors e.g. Flint Hills, Oxychem, Reynolds
- Federal Stimulus Plan - local government (plan ready to use money the wisest)
- Work with USACE to use their dredge spoil?

Croaker

The Croaker work group approached the questions differently by using specific tasks and listing opportunities, barriers and potential partners. This approach was difficult to incorporate into the synthesis of question 4, so is stated below:

1. Rookery Islands

Funding - CMP, CIAP, CBBEP, Industry Grants, Mitigation, USACE 1135 funds, USFWS-coastal grants

Barriers - navigation, permitting, seasons, sea level rise, finding matching funds, local support, regulatory support

Partners - conservation groups / in kind match potential, general public, resource agencies

2. Erosion Control Projects

Funding - CMP, CIAP, CBBEP, Industry Grants, Mitigation, USACE 1135 funds, USFWS-coastal grants

Barriers - land owner, permitting, sea level rise, finding matching funds, local regulatory support, timing, contractors

Partners - land owners, cities, counties, contractors, resource agencies

3. Education Programs

Funding - CMP, CIAP, CBBEP, CBBEP, Industry Grants, conservation organizations, CDBG, USFWS-coastal grants, NSF - K-12 grant

Barriers - funding, getting message to stick, scientific translation, public support, audience appropriate lessons

Partners - TPWD, MANERR, resource agencies, universities, TCEQ, CCA, conservation organizations, HEB

4. Sediment Management Projects

Funding - Port of CC, 1135 funding, CBBEP

Barriers - permitting, timing, (funding and navigation need)

Partners - USGS, conservation groups, USACE, resource agencies, TxDOT

Flounder

Mechanisms, barriers and partners for five activities were described by most of participants:

- Filter and storm water outfalls
 - LA parkway by Cole Park (alta vista reef)
 - pilot project
 - *Barriers* - \$\$
 - *maintenance*
 - *agency buy in* (i.e. NMFS) and cooperation
 - *Partners* - City, NMFS, TCEQ, USACE
- Mitigation banks
 - long term sea level rise (e.g. Indian Point)
 - laws exist in local regulations
 - *Barriers* - \$\$
 - finding / defining the appropriate area for restoration
 - agency co-ordination (disconnect w/ state and USACE
 - willing owner
 - changing rules and guidelines
 - allow preservation as a credit
 - *Partners* - resource agencies, developers, land owners, industry
- Land acquisition
 - funding available - CIAP, CELCP, USFWS NOCWA, CMP
 - Acq plan w/ priority areas of agencies
 - Barriers* - value estimation
 - length of time
 - match requirements
 - maintenance and monitoring
 - Partners* - *Industries, Aransas First, CBBEP, TNC, NERR, counties, cities, Ducks Unlimited, CCA, SEA, American farm land trust*
- Erosion control, BMPs, vegetation buffers
 - Cost share assistance programs
 - *Barriers* - \$\$
 - inertia
 - private property rights
 - no reg authority
 - *Partners* - USDA, NRCS, Farm services, rural electric co-ops, FSA (farm services agency), local soil water conservation districts
- Education / K-12
 - Eductaional Service Center
 - Annual meeting / workshop
 - *Barriers* - Co-operation, \$\$, manpower, direction and dissemination
 - *Partners* - univ. every agency

Pinfish

Q 4.1 What governance tools and opportunities are available to implement activities?

Q 4.2 What private or economic tools exist to support activities?

- GOMA - good advocate for list of activities
 - reg (voice) initiatives critical
- CBBEP - good forum supported by locals
- Utilization/coalition of NGOs
- Political Action Committees
- Communicating University Research to local level / general public
 - weekly column in paper
 - communicate at a level they can understand
 - PSA, billboards, electronic sign

Q 4.3 Are there public or private barriers to implementation?

- project gets funding but not permitted
- \$
- lack of grant / proposal writing expertise in small municipalities

Q 4.4 Who are the potential partners in accomplishing the activities?

- NGOs - CCA
 - SEA (Saltwater Fisheries Enhancement Association)
 - CBBF
 - CCA
- Corporations
- Government - state and federal

Example activity:

Education campaign at a large scale

1. Legislature - state level
2. Local government
3. General public
4. Schools
5. Target programs that reach out to all socioeconomic sectors

What/Who:

- Resource agencies - TGLO, TCEQ, TxDOT, CCC, ...
- Universities - 1 and 2
- CBBEP staff - General Public and Schools
- Adopt-A-Wetland Program
- Community leadership spokesperson
 - PSA on local network / Domingo Live / PBS
 - Town Hall meetings
 - local celebrity / respected person
 - Mascot

- Outreach to economic development committee about ecological sustainability
 - focus on unique natural asset and renewable resources

Redfish

Q 4.1 What governance tools and opportunities are available to implement activities?

Q 4.2 What private or economic tools exist to support activities?

- Incorporation of habitat preservation as an alternative to traditional creation still meeting the national policy of no net wetland loss.
- Partner more closely with the Coastal Bend Bays Foundation
 - E.g. to serve as a liaison between CBBEP and city / county planning boards
- To have prioritizing list of mitigation sites (and request information) provided to companies doing mitigation work with cost estimates and other needed information.
- Finding a way (financial means) to bridge the gap between least cost disposal of dredge material to more expensive but more environmentally advantageous alternatives.
- Working as a liaison between land use managers and local planners.
- Taking advantage of grant money to acquire land and land donations by property owners.
- The Gulf Coast Joint Venture (P&W, Bary Wilson, USFWS) has already developed conservation plans and targeted species requiring conservation. This group could assist in the acquisition of lands/ preparation of grant applications etc.
- Development / partnership to allow buyout of lands devastated by flooding hurricanes.

Q 4.3 Are there public or private barriers to implementation?

- 1) No regulatory protection mandate for valuable upland habitats and 'isolated' freshwater wetlands
- 2) Lack of active effective land trusts to pursue habitat acquisition and conservation easements.

Q 4.4 Who are the potential partners in accomplishing the activities?

-not answered

Sea Trout

Q 4.1 What governance tools and opportunities are available to implement activities?

Q 4.2 What private or economic tools exist to support activities?

Q 4.3 Are there public or private barriers to implementation?

- United Development Code adoption
- Zoning
- Building codes
- Taxes/fees
- Restricting city services/utilities
- Master plan at city planning
- Level 1C support from city council
- Permitting
- Smart Growth
 - Control sprawl
 - Zoning and incentives
 - Enterprise zone
 - Drainage
- U.S. congressional liaison
- Grant soliciting (EPA, in-kind with other agencies)

Q 4.4 Who are the potential partners in accomplishing the activities?

Government

- TGLO - CIAP, CMP
- County
- US Navy
- City
- TCEQ (SEP)
- EPA
- CVB
- Chamber of CC
- ISD's
- POCCA
- TxDOT
- USCG

Education & Academic:

- University & HRI
- Del Mar College
- CCISD
- Student Groups
- Coalition of Local / Regional environmental organization

Non Profit organizations

- CBBF
- CCA

- CBBEP
- Gulf of Mexico Alliance

Elected Officials

Other

- Ingleside Redevelopment Corp.

Sheepshead

Q 4.1 What governance tools and opportunities are available to implement activities?

- USACE/EPA guidelines - landscape and watershed-scale assessments
- TGLO - leasing submerged lands - MHHW
- TCEQ
 - wastewater
 - 401 water quality
 - TWDB - streamflows
- City of CC - regulations zoning
- TCEQ 303D - list of contaminated water bodies
- TX department of state health services - shellfish monitoring / human health
- Nueces county - dune regulations
- Port of CC
 - ballast water
 - maritime transportation activities
 - own state submerged lands
- USCG - homeland security issues
- TPWD/NOAA - fisheries
- USFWS - migratory birds, endangered species

Q 4.2 What private or economic tools exist to support activities?

- tax incentives
- conservation easements
- grant \$: CMP CIAP
- ag land set aside conservation reserve programs
- private foundations / endowments
 - TNC, trust for public lands, Texas historical commission
- floodplain permits
- mitigation dollars

Q 4.3 Are there public or private barriers to implementation?

- shortsightedness, impatience
- regulatory process / bureaucracy
 - local planning and zoning infrastructure
 - stormwater regulations - focus on quantity vs quality
 - incentives

- standard city operating procedures
- mitigation as its currently implemented
 - project by project
- NPDES program for municipal water - treatment regulations for river vs estuarine discharges
 - how far plume can be measured.
- lack of economic incentives - (building and zoning)
 - smart growth / quality growth / development
- historical precedence for access to coastal riparian habitats
 - cultural ethos
 - conflict between access overuse and preservation
- private landowner ethos

Q 4.4 Who are the potential partners in accomplishing the activities?

- public buy-in
- political champions
- Port of CC
- HEB/ Flint Hills/ Whataburger - big community partners
- Education / Retention of youth
- local real estate developers
- chamber of commerce
- economic development corporation
- visitors and convention bureau
- people here today
- city staff - planning commission