



Google Earth map showing Northwest Cape Coral (land on right).

Sustainability of the Estuary in Northwest Cape Coral

Meeting Summary Report of the September 29, 2016 Workshop

Northwest Regional Library

The Northwest Cape Coral Neighborhood Association, Inc. (NWN) and the Charlotte Harbor National Estuary Program (CHNEP) held a day-long workshop on Thursday, September 29 from 9:15 a.m. to 5:00 p.m. at the Northwest Regional Library. The meeting was convened to explore current and future challenges, and to identify strategies for balancing current and future growth with restoring and sustaining estuary health in Northwest Cape Coral. This report provides a summary of presentations given during the workshop, as well as input from attendees on goals and future strategies for the area to help residents in Northwest Cape Coral decide priority environmental issues and take actions to address those issues.

The workshop included subject matter expert presentations and brainstorming sessions to accomplish four objectives:

1. Identify hydrology, water quality, and fish and wildlife habitat issues facing the watershed and estuary.
2. Discuss build out projections and future estuary health concerns related to historic alteration of the system, current and future development, and sea level rise.
3. Show the potential for tidal creek restoration west of the North Spreader Canal and discuss the value of such restoration.

4. Provide an opportunity for local residents, regulatory entities, and environmental organizations to consider the varied issues and to begin exploring strategies for ensuring ecosystem preservation and sustainment of area wetlands and estuaries while also achieving economic and quality of life goals of the Northwest Cape Coral community.

The workshop was made possible because of the generosity of the Northwest Neighborhood Association (NWN), the Northwest Cape Coral Foundation, the Charlotte Harbor National Estuary Program (CHNEP), the National Oceanic and Atmospheric Administration (NOAA) and the Friends of Charlotte Harbor Estuary.

- The NWN is an advocate for sensible public policies and development activities that will serve to preserve property values and enhance the quality of life throughout Northwest Cape Coral.
- The Northwest Cape Coral Foundation functions to protect and enhance the quality of life in Northwest Cape Coral including the sustainability of estuaries, wetlands, and aquatic preserves through research, education, and demonstration projects.
- The CHNEP is a partnership to protect the natural environment of southwest Florida from Venice to Bonita Springs to Winter Haven. Learn more at www.CHNEP.org.
- NOAA's mission is to understand and predict changes in climate, weather, oceans and coasts; to share that knowledge and information with others; and to conserve and manage coastal and marine ecosystems and resources

Doug Kidd with NWN, Heidi Stiller with NOAA and Maran Hilgendorf with CHNEP planned the workshop. This report was prepared by Jaime Boswell with CHNEP.

AGENDA

~ Thursday, September 29, 2016 ~

PDF files of presentations, maps and additional materials are available at www.CHNEP.org/NWNA2016.

9:30 – 9:45am	Welcome and Review of Agenda
9:45 – 10:00am	Setting the Stage: Issues and Opportunities for the Northwest Cape Coral Estuary <i>Doug Kidd, Northwest Cape Coral Neighborhood Association Inc.</i> <i>Pascha Donaldson, Charlotte Harbor National Estuary Program</i>
10:00 – 11:00am	Lee County Hydrology Model <i>Mike Campbell, Lee County Natural Resources</i>
11:00 – 11:15am	Break
11:15 – 12:15pm	Water Quality, Fish & Wildlife Habitat, and Watershed <i>Melynda Brown, Charlotte Harbor Aquatic Preserves</i> <i>Harry Phillips, City of Cape Coral, Environmental Resources Div.</i> <i>Stephanie Burkhardt, Florida Fish & Wildlife Research Institute</i> <i>Steve Sentes, South Florida Water Management District</i>
12:15 – 12:45pm	Lunch
12:45 – 1:15pm	Build Out Projections and Sea Level Rise <i>Doug Kidd, Northwest Cape Coral Neighborhood Association, Inc.</i> <i>Heidi Stiller, NOAA Office for Coastal Management</i>
1:15 – 1:45pm	Group Brainstorm: Goals for the Future of the Northwest Cape Coral Estuary <i>Heidi Stiller, NOAA Office for Coastal Management</i>
1:45 – 2:30pm	Tidal Creek Restoration Potential <i>Dr. William Mitsch, Everglades Wetland Research Park / Florida Gulf Coast University</i>
2:30 – 2:45pm	Break
2:45 – 3:15pm	Panel of Speakers: Questions from the Audience
3:15 – 4:00pm	Roving Flipchart Activity: Strategies for Restoring and Preserving Ecosystem Health While Achieving Economic and Quality of Life Goals <ul style="list-style-type: none">• <i>What are some immediate strategies or steps for moving toward the goals identified earlier today? Who would need to be involved in each of these strategies and where might we get the necessary resources?</i>• <i>What are some longer-term strategies for achieving the goals identified earlier today? Who would need to be involved in each of these strategies and where might we get the necessary resources?</i>• <i>How might we keep the communication started at this workshop going? How can the community work together toward the goals identified?</i>
4:00 – 4:30pm	Report Out from Roving Flipchart Activity
4:30 – 4:45pm	Next Steps and Wrap-Up

Welcome and Review of Agenda

- Heidi Stiller, NOAA, provided an overview and welcome, with recognition of participants from various entities, including special recognition of Rick Williams, Cape Coral City Councilman. A full list of participants is provided at the end of this summary.
- Pascha Donaldson, CHNEP CAC member, provided a brief overview of the CHNEP. The CHNEP is a partnership organization that welcomes the participation of citizens on its Citizens Advisory Committee (CAC). The Charlotte Harbor area is one of twenty-eight estuaries in the United States designated as an estuary of national significance. The CHNEP has a Comprehensive Conservation Management Plan (CCMP) that guides the work of the organization. The original CCMP was drafted 20 years ago and identified priorities and actions to address problems in the area. The CCMP is updated every 5 years with CAC input. The CHNEP CAC is always looking for people to get involved, and is grateful to interest shown by the Nwana.
- Doug Kidd, Nwana and Northwest Cape Coral Foundation, set the stage for the meeting by reviewing the general history and geography of the Northwest Cape Coral neighborhood, touching on some of the concerns. Key points are outlined below, and a pdf of the PowerPoint presentation is available.
 - Three-legged stool – neighborhood viability, estuary sustainment, economic development
 - Overview of where the NW Cape is located, size (4,200 acres), saltwater community, estuary ~ 5,000 acres
 - Issue of pre-platted communities – what does the future hold
 - Historic tidal creeks cut off in the 1970's – comparison of 2016 map to 1950 aerial – provided a visual depiction of the development over 40 years
 - The North Spreader Canal, the canals east and west of Burnt Store Road and the Key Ditch resulted in the cut off of 16 tidal creeks.
 - There is concern of rising sea levels and effects on the community
 - Development risk and estuary sustainment
 - To what degree are various factors stressing certain elements of the ecosystem?
 - Opportunity to determine if converging economic forces and ecosystem challenges are mutually exclusive or can there be a synergy.
 - Desirable outcome is to align quality of life, economic and watercraft safety interests of NW Cape Coral with ecosystem preservation and sustainment of our protected wetlands westward in the Preserve.

Setting the Stage: Issues and Opportunities for the Northwest Cape Coral Estuary

- Mike Campbell, the Marine Project Manager for Lee County Natural Resources, and the project manager of the Northwest Cape Coral/Lee County Watershed Initiative, presented on the Lee County Hydrology Model. Mike is originally from Louisiana, but has been a local of Lee County for seven years. Prior to starting his presentation Mike discussed that as a process, science is not always able to provide definitive answers; when in the testing phase, scientists try to find the most/best information to inform decisions in the future. Key points from Mike's presentation are outlined below, and a pdf of the PowerPoint presentation is available.

- Northwest Cape Coral/Lee County Watershed Initiative – Lee County Hydrologic Model
 - Overview of hydrodynamics
 - Remember models are not 100% accurate
 - Phase 1 – needed to figure out what is happening, where is the water flowing and how much water is going in each direction
 - Phase 2 – evaluate potential management actions etc.
 - In the process of developing scenarios using the Phase 1 model to evaluate the results, biological indicators being used are seagrass and oysters.
 - One of the scenarios being evaluated includes a barrier
 - Lee County is open to suggestions for scenarios
 - Data collection at some of the historic breaches included: water levels, flows and salinity. A quick overview of examples of data collected was provided.
 - Discussed connection from the Key Ditch to Matlacha Pass, connectivity is where water moves from Key Ditch to the pass.
 - The model includes movement of water and bathymetry, and shows a lot of small but frequent areas of water movement in the northern area.
 - USGS data collection occurred in all of the areas that had measurable flows going through them, breaches without measurable flows, where not monitored. Some of these may come on and off line but the water movement in those areas is small.
 - Comparison of model data vs. measured data is done to evaluate validity of the model. Mike showed graphs to demonstrate closeness of model vs. data. One example was the USGS 0 & 1 flow comparison in cubic feet per second (cfs), at the site of the previous barrier 1000 cfs compared to a breach to the north with 100 cfs. Data and model shows that about 80% of water goes through the southern end where the barrier used to be. The model and data match, and included consideration of very wet and very dry period, so able to test for both highs and lows which is good for calibrating the model. The period of record was a full year in the 2013/2014 time period. Examples of data from further north shows less flow moving in and out, #7 the northern most breach at end of Kismet parkway, has a little more water moving out than other middle breaches.
 - Salinity data is also well correlated between model and real data.
 - Questions from the audience about why and how the model was developed. Mike stated that the goal was to create a tool for decision making; the tool can be used to evaluate the result of various management decisions, but does not take into effect sea level rise because more assumptions make it more complicated. The model is based off of the EFDC model, which is supported and used by EPA, FDEP and Water Management Districts, and was developed by John Hammerick at BMI.
 - Question from the audience about the relationship of the water going in and out of the system in relation to the tide. Mike stated that during certain time periods the water going in and out are similar, but not always the case, water going out in the south end is not always equal to the water going in.
 - Question from the audience about the elevations included in the model, the audience member referenced that the average elevation (of mangrove wetlands) is 1.41 feet and stated that overtopping is not being considered in the model and needs to be, other critiques of the model were provided.

- Oyster data collection was conducted under a contract with FGCU, samples were taken at four different areas, one in the spreader canal (site 1), one at the bar before Matlacha Pass (site 2), and two in the northern area of the pass (sites 3&4). Salinity data was also collected from June 2014-2015. Oyster metrics included numbers of living oysters per square meter, oyster length, and mean number of surviving oysters. Sites 3 & 4 (in the north) had total oyster mortality, 1 & 2 did not, higher growth rate at 1 & 2, Perkinsus (on oyster disease) was lower in 1 & 2. The drop in salinity at sites 1&2 likely kept the prevalence and intensity of Perkinsus down, while total mortality at sites 3&4 was likely due to Perkinsus & salt water predators.
- Question from the audience about why the Key Ditch is where it is? Another audience member answered, stating that a consent order stopped development of home sites west of the spreader, and the Key Ditch represents what was going to be the western extent of Cape Coral development. Doug Kidd stated that the historical plats from 1968 show that there were 4 EW passes out to Matlacha Pass from the Key Ditch.
- Question from the audience regarding the interpretation of oyster data and death of oysters in areas without freshwater. Mike's answer was that the data does not necessarily indicate bad/good, but different conditions, the report provides reference to how this data fits into the big picture of the estuary. Seagrass metrics are better north, while oyster metrics are better in the south.
- The intention of the project was to provide a tool, not to say what should be done or what is right or wrong, but to allow for evaluation of scenarios. It was suggested that participants think about scenarios that would be helpful to evaluate.
- The goal of the project was to collect the best data, by independent non-biased contractors (out of town firm), with a promise to do it right with the resources that were available.
- The scenarios to be run have not all been identified, but do include a regular scenario run (no change), barrier in model run, and opening Gator Slough run.
- This tool can be used to explore tidal creek restoration and other options.
- Question from the audience: Can Lee County get this information out to the masses? Reports are available online including a full report, a medium report, and one-page report.
- Question from the audience, is the model flexible enough to make some changes in the outfalls in the tidal creek with seasonal variations? Absolutely, inputs are easy to play with various scenarios, more assumptions lead to lower accuracy, right now focus is on changing topography.
- A request was made to talk more about Gator Slough model scenario? Not finished yet, but will look at taking the bulk head out and widening the area, modeling the scenario does not mean that it is something that will get permitted.
- Information changes, use the best data to make decisions, sometimes it has been no data, at some point decisions need to be made, without any certainty.
- The scheduled release of Phase 2 is hopefully by the end of the year.
- Concern from an audience member was made about water quality if the slough is opened up that more pollutants could make it out into Matlacha Pass.
- Question from the audience, is there any way to look back and estimate historic conditions of water flow/salinity of tidal creeks? Hard to look back, but can look at current conditions and evaluate potential harm/benefit.

- The amount of water going into this area is dramatically increased from historical – waters of US cannot be used for treatment, treatment has to be upstream.
- The realm of possibilities for scenarios was discussed and includes changes of water flow, stormwater flow, restoration – does not look at nutrients.
- There is no funding for a Phase 3 at this time. There was a comment from the audience about needing to get Citizens to drive funding, examples to be learned from Lemon Bay Conservancy (Jim Cooper).
- Comment was made that consideration of sea level rise, retreat, accommodation is necessary.
- In closing, Mike emphasized that the data and model is a public product and if anyone wants to take it and do anything different it is available for running scenarios, including more survey data to evaluate sea level rise etc., all are encouraged to utilize the tool.

Water Quality, Fish & Wildlife Habitat, and Watershed

- Melynda Brown, Manager of the Charlotte Harbor Aquatic Preserves, presented on the Charlotte Harbor Aquatic Preserves Water Quality Monitoring. Key points from Mindy's presentation are outlined below, and a pdf of the PowerPoint presentation is available.
 - There many divisions of the Florida Department of Environmental Protection, the Aquatic Preserves in a non-regulatory section.
 - CHAP manages five aquatic preserves, 180,000 acres managed, including Matlacha Pass Aquatic Preserve
 - Aquatic Preserves are areas with special protections, as defined by state statutes.
 - Aquatic Preserve staff monitor the health of the estuaries using a continuous datasonde program in Matlacha Pass, volunteer water quality program throughout the CHAP, seagrass monitoring (which includes water clarity, species, health, abundance, and relates back to water quality), colonial wading and diving bird monitoring, and invasives, and also conduct educational outreach, and site inspections to inform the regulatory division of FDEP.
 - Focus on Matlacha Pass Aquatic Preserve – map of seagrass and water quality stations was shown indicating continuous water quality monitoring in the north, middle and south of Matlacha Pass and volunteer water quality monitoring sites
 - Volunteer program – collect water quality at the surface using a set protocol
 - 46 sites, over 100 volunteers, used for status and trends, regulatory, and available to public via Water Atlas
 - DO, pH, Salinity, weather and water conditions, water clarity, depth, chlorophyll, turbidity, color, fecal coliform and nutrients.
 - Water Atlas link www.chnep.wateratlas.usf.edu/chevwqmn/
 - Continuous Datasonde – collect water quality every 15 minutes
 - 3 stations (by bridge set up in 2009, others in 2005)
 - DO, pH, depth, turbidity, salinity, temperature + monthly grab samples
 - Not available via web, but available by request
 - Example shown of looking at data by average monthly salinity from 2005 – 2016, and also examples of how the data can be used to examine relationships

between nitrogen and chlorophyll. Nitrogen data show current decreasing trends, these trends can also be evaluated in relation to seagrass data.

- Benefits of seagrass – nursery habitat, water quality improvements, nutrient uptake etc., benefits are equal to \$20,000 – \$93,000/acre.
- Help improve WQ in your own backyard
 - Limit the amount of fertilizers to lawns, especially during the rainy season
 - Do not throw grass/plant clippings or animal waste into waterbodies
 - Minimize the total amount of paved (impervious) surfaces
 - Plant native plants
- Harry Phillips, with the Cape Coral Environmental Resources Division, presented on the work it takes to keep a waterfront wonderland amidst urbanization. Key points from Harry's presentation are outlined below, and a pdf of the PowerPoint presentation is available.
 - Issues in water quality in Matlacha Pass are directly as a result of urbanization.
 - History – Cape Coral was touted as a waterfront wonderland. The city was developed through dredge & fill to bring home owners to the area. A mosaic of historic photos show lakes/sloughs, this was a huge project that completely altered the landscape. Now water quality managers are tasked with fixing water quality from the urban setting before it enters into the estuary.
 - Canal system part of waterfront property, but is also used for recreation, habitat for wildlife, flood protection (not for sea level rise or storm surge, but good for draining land), stormwater treatment, water for irrigation from freshwater canals (freshwater canals in interior – weirs were put in for treatment)
 - Numbers – canals are a visible MS4 (municipal stormwater sewer system – typically this is underground not visible), Cape Coral is 115 square miles and has 400 linear miles of canal – 300 miles of freshwater canals – reuse water sold back for irrigation (dual water system) – north/south spreader waterway original intent was to hold back and then slowly push over mangrove fringes – however breaches do occur and system has been tested over the last 60 years – south system barrier (in the Caloosahatchee River area) might also be removed.
 - Problems with canal – no way of buffering run off, especially when fertilizer is used, excess nutrients stay in the system, low or no oxygen, accumulation of decaying matter, algae blooms, and fish kills.
 - Natural system – tree shading, gradual slope, runoff buffered by natural plants, more fetch and wind driven circulation all result in better conditions than in canals.
 - Issues with too many nutrients – phytoplankton, macroalgae, duckweed (small flowering plant that floats on the surface)
 - Cape Coral does street sweeping, picks up macrotrash, has swales and catch basins to stop as much as possible from going into the water. Cape Coral promotes public awareness so people know water leads into natural systems, the need to clean up after pets, a fertilizer ordinance has been in place since 2010 including a black out period between June – October when no fertilizing is supposed to be done.
 - Better landscape management – planting native plants/xeriscape, fertilizer ordinance, water restrictions, Florida yards and neighborhoods program, rain barrel program, bioswales

- Canalwatch Volunteer Program – ambassadors in the field, dialogue begins with neighbors
 - With programs hopefully the urban setting can more so mimic the historic natural system.
- Stephanie Burkhart, a biological scientist with the Florida Fish and Wildlife Conservation Commission’s Aquatic Habitat Conservation & Restoration Section, presented on the importance of aquatic habitats. Key points from Stephanie’s presentation are outlined below, and a pdf of the PowerPoint presentation is available.
 - Mission - Our Section is responsible for restoring, enhancing, and managing aquatic habitat in Florida for the long-term well-being of fish and aquatic wildlife and the benefit of the people of Florida.
 - Map of habitats within the area was shown, including seagrass, saltmarsh, mangroves, and oysters
 - Seagrass beds – habitat (e.g. listed species that use these areas, Florida manatee, green sea turtle), stabilization of sediments, water quality, support our local economies – Florida is fishing capital of the world, fish use seagrass beds – nursery (70% of Florida fisheries species, e.g. red drum, spotted sea trout), also important for foraging (e.g. manatee, foraging for 8 hours, eats 40-90 pounds of seagrass and aquatic vegetation), refuge where animals can hide out from currents and major predators.
 - Saltmarsh – habitat (wading birds), protection (buffers from storms and erosion), filter runoff and aid water quality, local economy, foraging animals (wood stork like 10-12 inches of water), nesting (tri-colored heron, build in saltmarsh), refuge (shallow and highly vegetated protects smaller animals).
 - Mangroves – habitat, protection and water quality, buffers help protect shoreline and water quality, trap suspended sediments, local economy
 - Oyster reefs – habitat, protection (dissipate high wave energy), water quality (filter water), support local economy.
 - A lot of similarities between habitats – all habitats are very sensitive – a lot of pressures that lead to a decrease in habitat – examples climate, sea level rise, pollution, invasive species, population growth, degradation, anthropogenic factors – a lot of opportunities, we have the opportunity to restore, enhance and manage, advocate, educate, change, and create positive anthropogenic factors.
 - Question from the audience about decline in saltmarshes & transitions. Yes, there have been declines and there is a focus on restoring. Follow up question about where do salt marshes go if we are built up to the edge – need adaptive management, new restoration techniques.
- Steve Sentes, from the Everglades Policy and Coordination Division of the South Florida Water Management District (SFWMD), presented on the Charlotte Harbor Flatwoods Initiative. Key points from Steve’s presentation are outlined below, and a pdf of the PowerPoint presentation is available.
 - There is long list of partners involved, that have been so important to the project, overtime the partners have come together to work on the same goals.
 - Multi-phased regional initiative, working over 11 years, picking off projects as funding is available to work towards the larger completed project.
 - Charlotte Harbor Flatwoods summary:

- Multi-phased regional hydrologic restoration effort
- Focuses on restoration of tidal creeks within the watershed that flow into Charlotte Harbor
- Involves the development of regional water storage and treatment facilities, establishment of conveyance systems and restoration of habitat to restore sheetflow across five watersheds
- Establishes linkages between Cecil Webb Wildlife Management Area and Yucca Pens Unit
- Benefits include flood control, habitat enhancement, recreation opportunities, water quality improvement and water recharge.
- Historical flow was from northeast to southwest
- Partnership with FDOT to work on outside the box thinking about I-75
- Impediments changed sheetflow – some water flowing into North Fort Myers to Caloosahatchee – some to Alligator Creek – problem with flow into Gator Slough
- 2010 Yucca Pens Hydrologic Restoration Plan – built off of previous plans/studies
- Monitoring network – MikeShe/Mike11 model used to look at scenarios
- FDOT – acquirement of Bond Farm for treatment – currently in the conceptual plan stage
- Continue to collect data and add into the model
- Get timing and quantity right so by the time water gets to Gator Slough/tidal creek restoration it is at the appropriate levels
- Want to improve hydroperiods in Yucca Pens – currently too dry
- Looking at tidal creeks – looking at what properties are needed to protect and restore – prioritized properties – as Burnt Store Road is widened, the Counties are looking to assist with restoration to meet their needs.
- Question from audience about treatment. Shallow marshes will help to settle out sediments, and vegetation will assimilate nutrients.
- Question about initiative on tidal creek sub-committee. The information about fish habitat is needed and a scope of work was put together by FWC to describe the work needed to answer the questions.

Build Out Projections and Sea Level Rise

- Doug Kidd, from the NRNA, presented on buildout scenarios. Key points from Doug's presentation are outlined below, and a pdf of the PowerPoint presentation is available.
 - Why does it matter
 - Manatee mortality – 93% of water craft collisions with manatees happen in the south end of the canal system, with buildout it is only going to get worse
 - Currently around 24% buildout - full build out means a 330% increase in boater density – additional 2,746 homes in coming decades.
 - Unknown – future land use changes could go to seven-fold increase in boater activity (ex. Seven islands marina with 140-280 slips – this is one of numerous concepts, other concepts have a higher number of slips)
 - Utility expansion – Northwest Cape Coral is mostly on septic, but utilities are coming – showed plans based on Cape Coral website.
 - Partial build-out thresholds plays a part in septic – when will sewer come on board? – at about a 25% buildout planning becomes more

- serious for switch to sewer – 35% buildout results in design and construction (referenced City staff)
- Percent buildout of neighborhoods from south to north – 52%, 34%, 28%, 27%, 22%, 19%, 17%, 9% - looking at the whole area 24% homes/76% vacant lots – 35% in 17 years – numbers are strictly based on Doug’s analysis of recent 2.9% growth rate – waterfront lots have a higher growth rate (5.2%) vs. dry lot growth of 0.8% - this plays into switch to public sewer by neighborhood.
- Heidi Stiller, NOAA Office for Coastal Management, presented on the Climate Context: Sea Level Rise Projections. Key points from Heidi’s presentation are outlined below, and a pdf of the PowerPoint presentation is available.
- Climate predictions for the Southeast United States
 - National Climate Assessment (NCA) points to warmer temperatures, sea level rise, and extreme rain events; more water/less water is an area of uncertainty
 - NCA 2014 – considered the report from 2012 on sea level rise which includes the “NOAA sea level rise curves”
 - The causes of sea level rise include both thermal expansion (water expanding with increased temperatures) and ice melt.
 - Tampa Bay Climate Science Advisory Panel Recommended Projection of SLR (2015)– localized projections for Tampa Bay Region using local tide gauge data, local data is needed to consider subsidence and rise of land – in southwest Florida there is no major subsidence, whereas in Louisiana subsidence is a big player.
 - Four global SLR scenarios
 - NOAA Low (0.93 ft by 2100 – only based on current trends)
 - NOAA Intermediate Low (1.97ft by 2100)
 - NOAA Intermediate High (4.26 ft – includes ice sheet loss)
 - NOAA High (6.89 ft – worst-case scenario)
 - Using Fort Myers tide gauge data and the USACE calculator the current trend and projected sea level rise indicates a range of sea level rise from 0.82-6.78 ft by 2100.
 - The Sea Level Rise viewer was used to show the Northwest Cape with 0, 1ft, 2ft, 3ft and 6ft of sea level rise. The viewer is available at: (<https://coast.noaa.gov/digitalcoast/tools/slr.html>)
 - Observations are matching what is predicted – warmest year on record, highest global sea level on record, Arctic’s lowest maximum ice sheet
 - Comment from the audience that data is gauged data, Key West gauge includes a lot of old data, this is non-interpretive data – sea level rise is a measurable phenomenon – cap on seawall is really at 3.9 ft on current datum – sea level rise is geologic event visible in a lifespan.
 - NOAA Tides and currents website can be used to look at trends of sea level rise using data.
 - Predicted tides are based on the most recent 19-year epoch – if looking at recorded vs. predicted, now tide predictions are always running 0.4+ feet above predicted – past data no longer good for predicting future.

Group Brainstorm: Goals for the Future of the Northwest Cape Coral Estuary

- Everyone was asked to write down three goals for the area and the following were shared during the brainstorming session.
 - Restore hydrology through Cape Coral and mangrove fringe closer to natural condition
 - Lower nutrients in stormwater
 - Creation of a land trust for the purpose of creating conservation easements, so full buildout is not reached
 - Creating more filter marshes throughout the area
 - Accommodation for sea level rise, allowing movement of ecosystems with SLR.
 - Creating a better flow of boats coming through the area while protecting manatees
 - Plan to deal with the water rise in the future
 - Create series of stormwater parks in the system for water quality treatment and recreation
 - Creating more paddle craft access points
 - Improve the fisheries to 1950s levels, and all that includes
 - Continue the City of Cape Corals total water management areas – capture, irrigation, minimum flows
 - Better and more convenient access for boaters and kayakers into Matlacha Pass
 - Education program that is very intentional, like a campaign, to educate the residents of Cape Coral
 - At least one additional navigable waterway from north spreader into Matlacha Pass
 - Accelerate the Charlotte Flatwoods project funding for connecting the tidal creeks sooner rather than later.
 - Get fertilizers off of the shelf for some public education at the point of sale.
 - Elimination of vertical seawalls, accommodate for sea level rise, move towards living shoreline (natural vegetation) concept
 - Enjoyment for all tax payers – ease of access
 - Reduce nutrients to the estuary through using a creative combination of tools, such as storm water parks, changes in fertilizers, watch nutrients in reuse water.
 - Native plant ordinance
 - Extend central sewer to direct growth, not just respond to it.
 - Heightened enforcement of power boat speeds in speed zones.
 - Local growth management plans being more prescriptive rather than descriptive.
- All goals were handed in on notecards, and are included below.
 - Accommodation of sea level rise, allowing for biota migration with rising water.
 - Paying for sea level rise accommodation or resiliency infrastructure – reduced property values due to a frightened public.
 - Land Conservation
 - Conservation Easements
 - Land Trusts
 - Restore freshwater sheet flow to tidal creeks west of the spreader canal system.
 - To restore the hydrology of the area for the restoration and enhancement of the surrounding aquatic habitats.

- Improve flows to historic creeks to historical rates, locations, configurations and volumes to restore habitats
- Decrease nutrients from Cape Coral canals to Matlacha Pass to maintain and improve seagrasses.
- Clearly define build out scenario, considering sea level rise, for Cape Coral that protects mangrove fringe, water quality, tidal creeks, and fish; could be accomplished by designating some upland lots for preservation, storm water retention and public use; should clearly define which lots have boat access so the maximum number of boats is clearly understood.
- Protect and enhance coastal ecosystems.
- Diversify urban landscape with water/wetland parks.
- Decrease manatee mortality at south end of spreader canal.
- Increase boater access to Matlacha Pass other than through the manatee “kill zone”.
- Keep water quality high and habitat safe as urban development increases.
- At least one additional navigable outlet from the northwest spreader to Charlotte Harbor, serving several purposes: 1) additional water flow throughout the canal system/spreader, increasing water quality, 2) reduce boat traffic at the south end of the spreader, resulting in reduced manatee kills.
- Critical land acquisition
- Restore tidal creeks
- Water storage/improve water quality
- Sustainable growth that allows the natural systems/estuary and its resources (seagrass, oysters, mangroves, etc.) to thrive, be protected and improve.
- Restore the natural flow (with proper quality, quantity and timing) to Matlacha Pass with least impacts to mangroves and seagrasses.
- Increase the number of City-owned properties to increase the amount of green space within the community.
- Begin the change in code regulations to promote the building of piling homes or homes with sacrificial floors in consideration of sea level rise.
- Lower nutrients in stormwater
- Increase wildlife and wildlife habitat
- Increased community awareness of water quality and environmental issues.
- Creating filter marshes to offset runoff
- Preserving coastal lands and restoring land to historical or near historical habitat
- Native planting ordinance
- Improving water flow/quality for sea life and people.
- Having a manatee habitat area – no motor/wind-powered boats/boat traffic.
- Improving the appearance and education for natural/native habitat
- Control build out
- Putting in at least two new outlets from the north spreader to Charlotte Harbor
- Control sea level rise
- Improve water quality and minimize negative impacts to the environment.
- Restore more natural water flow over land and through tidal creeks and mangrove and marsh habitat.
- Restore a natural hydrologic regime

- Decrease nutrient/pollutant inputs
- Wetland parks
- Living shorelines
- Better and more productive bio-retention areas/practices
- Create development vs. nature interface. How do we incorporate nature into construction?
- Create continuous improvement water quality goals as public policy.
- Improve fisheries to 1950 levels.
- Preservation of sensitive environment surrounding the Charlotte Harbor estuary.
- Working in concert with governmental, neighborhood and concerned entities to common goal of mangrove restoration and maintenance.
- Consideration of future build out alternatives with regard to coastal habitat adaptation in the face of climate change/sea level rise.
- Restore tidal creek habitat, including the adjacent tidal ponds.
- Restore natural hydrology, as best as possible; restored hydrology will positively impact the natural flora and fauna.
- Preservation of natural habitat
- Education of area residents on importance of water quality and how to manage their own property.
- Relieving boater traffic at Ceitus Pass and finding another waterway out to Matlacha Pass safe for fish and wildlife and boaters.
- Education of Northwest Cape Coral residents on all issues that impact estuaries and our future (ex. Simple videos we can all understand, campaigns).
- Improve water quality of freshwater runoff into salt water estuary.
- Reduce amount of septic tank leaching into salt water canals.
- Improve tidal creek flow toward natural rates (hydrology).
- Preserve and protect all natural fish habitat in mangrove swamps.
- Avoid further or new “cuts” into Charlotte Harbor or Matlacha Pass
- Minimize any dock or marina areas to protect smalltooth sawfish
- Restore hydrology to natural systems and habitats.
- Engage school science teachers to offer STEM water sampling and monitoring for middle and high school students and perhaps earn college credits or community service hours.
- Relieve tidal pressure on the south spreader (NW spreader)
- Build more filter marshes/reservoirs
- Create added access to Matlacha Pass to accommodate increase in boaters
- Create educational programs and an education center to help school kids learn about what was talked about here today.
- Hire Dr. Mitsch to oversee study (or grant to a graduate student) of northwest cape/spreader system and develop best practices so nature and development can co-exist
- Require trees to be planted along all roads and canals, also in private lots – reduces heat signature, increase carbon dioxide uptake and more attractive community.
- Severely limit extent of grassy lawns and resulting fertilizers, etc. Require more native vegetation, ground cover etc.

- Restore tidal creeks
- Relieve pressure on south end of the NW spreader
- Open up a mid or north tidal creek for boats to access Charlotte Harbor and to enter Cape Coral from other areas (think of what the boat footprint would be if you had half the distance to get out); hire Dr. Mitsch to make this happen.
- Places that please people.

Tidal Creek Restoration Potential

- Dr. William Mitsch, Eminent Scholar and Director of the Everglades Wetland Research Park at Florida Gulf Coast University, presented on the potential of mangrove restoration in Cape Coral to provide ecosystem services. Key points from Dr. Mitsch's presentation are outlined below, and a pdf of the PowerPoint presentation is available.
 - Focus on mangrove ecosystems - put into context of the world.
 - Florida has 5,000 sqkm of mangroves. Mangroves are found in tropical/sub-tropical, salt marshes are generally transitional wetlands.
 - Mangroves are now shifting their distribution further north. Louisiana starting to get a lot of black mangroves.
 - The textbook zoning of mangroves shows red mangroves along coast, black/white further up, then buttonwoods, and uplands.
 - Hydrogeomorphic classification of mangroves e.g. fringe, riverine, basin, dwarf, shrub/scrub.
 - Odum's energy diagram of mangrove swamp shows these are very complicated ecosystems, not linear, lots of intertwined systems.
 - Ecosystem services – buzz term of the decade, used to be called “values”, basically what is nature doing for you and what is nature doing for humanity – examples are water purification, flood regulation/storm protection, biodiversity island and corridors, climate regulation, locations for human relaxation and nature observation/education
 - Research in Southwest Florida – draft manuscript on nutrient concentrations in tidal creeks (Naples) – looking to see if tidal creeks are sources or sinks of nutrients, not determined – every tidal creek was different, higher concentrations in the wet season indicate pollution from runoff.
 - Flood regulation/storm protection – priceless reason to save the mangroves – published paper shows coastal protection from tsunamis and cyclones from a review of data collected around the world – graphics showing effects on attenuating storm waves – Katrina damage inevitable due to messed up delta system – Tsunami analysis showed where mangroves remained intact, least amount of damage.
 - Climate regulation – carbon storage in mangroves, relatively high levels compared to other forests – flux of carbon is different dependent on different types of mangroves – carbon sequestration study in Naples Bay determined a rate of carbon going into the mangroves of 130-160 gC/m²/yr in natural system, 30% less in disturbed system – no methane emissions out of estuarine systems in comparison to freshwater systems this is an added benefit - the Florida mangrove carbon sequestration is equal to the emissions of 110,000 cars/year.
 - Valuation of coastal mangroves – farmed shrimp almost guaranteed to come from places where mangrove forests have been replaced with shrimp farms – values of

- mangroves in place are much much higher than the values economically from raising shrimp – Values of ecosystems on the planet are 3x the GDP of the world – estimate of tidal marsh/mangrove increased greatly from estimate in 1997 to 2011 (Costanza), invaluable price on mangroves – 2011 \$193,843/ha/yr
- Tidal Creeks are the arteries of the coastal wetlands – saltmarshes are the temperate analog of mangroves – let mother nature take over after making small changes (example of poke hole in levee) and systems will restore themselves
 - A model of a restoration of a tidal creek in Naples Bay was shown
 - Poleward expansion of mangroves 1980s to 2011 – climate change and mangroves is not a simple thing, other climate change factors may affect mangroves (e.g. temperature rise)
 - Dr. Mitsch’s Lab could identify and quantify ecosystem services of Cape Coral mangroves to local economy – identify opportunities for tidal creek improvement/restoration, estimate the health of the mangrove ecosystem, explore the opportunities for ecologically engineering wetland parks and other semi-natural systems in the developed watershed, work with Lee county modeling effort, incorporate northwest Cape Coral ecosystems into the management plan for the Ramsar wetland of international importance application that the Nature Conservancy submitted.
 - What is a wetland park? Every major city in China has wetland parks – they are parks that improve water quality through the use of wetlands
 - Question from audience, do the various forms of mangroves have the same functions? Overall yes, but the level of functions may vary based on size and growth rates
 - Question from audience, what type of restoration is needed for those creeks moving out from spreader canal? Most likely they have adapted and are “at peace” with the spreader canal – tidal creek restoration east of the spreader canal is a whole different question.
 - Question from audience, why do the hydrologically disturbed creeks result in less carbon sequestration? Not sure, but suspect it is a sign of “illness”.
 - Question from audience, is there an easy recommendation to make the spreader canal better? Bill was amazed at what a nice mangrove system it is, no immediate recommendation except save what is there and value what is there.

Panel of Speakers

Panelists included, Mindy Brown, Steve Sentes, Bill Mitsch, Stephanie Burkhardt, Harry Phillips, Doug Kidd, Heidi Stiller

- Q. Suggestion to Harry that ordinance be amended to educate consumers at point of sale, not necessarily remove fertilizers from the shelves – Harry spoke a bit more about ordinance ins and outs, social change has increased desire for green lawns in Florida, used to be only in gated communities where there were stormwater systems and pretreatment – hard to keep all contractors educated and “policed”
- Q. Live on canal, told they had to have so much grass between seawall and house – example of no grass by seawall – A. within landscape ordinance certain percentage has to be permeable, plant beds, groundcover etc. – possible slight berm by seawall to slow movement of water

- Q. Fertilizer ordinances – need to get outreach out to box stores etc. – need to go back to council to raise the bar
- Q. Future of mangroves with sea level rise? Mangroves can create earth and keep up with modest sea level rise. Coastal squeeze, stops movement of habitats uphill
- Q. What is the optimal size of mangrove wetlands? All are valuable
- Mindy – all mangroves along Matlacha Pass are managed by preserve state park
- Q. Has there been a change in culture with more people xeriscaping, buffering etc. – Harry - yes with each year more champions demonstrating in their own lawns
- Q. How effective is treatment behind weirs? Quantification is difficult due to non-point source pollution
- Q. Do homeowners know how polluted waters are? Long-term data 1/mo for 20 years, water quality has been relatively static despite growth, ordinances etc. probably offset – what each person does adds up, but they don't realize it
- Q. Public/private non-profit partnerships – is there anything that non-profits can help agencies to do their job better? Non-profits could help as volunteers, potentially to do additional restoration on private lands, grant opportunities – non-profits could write a grant, get money, then give money to agency/City to do the work
- Q. Do the water releases from Lake O get into the freshwater Cape canal system? Generally no because of the weirs, unless the water is really high and canals get overtopped.
- Meeting for Charlotte Soil and Water on Dec. 7 (agenda and time not out yet) – will be talking about water farming, BMPs, NRCS – tremendous impact on the Caloosahatchee River – Charlotte Soil and Water can work between districts etc. Can do innovative storm water programs, good grass roots approach looking for low tech projects.
- General statement from audience member – title is sustainability – we need a change in culture in our neck of the woods, in 1993 Sarasota realized need to do something at the government level to look at zoning and planning in relation to sea level rise – Pine Island 35 years ago created a land trust and started buying land – land west of Burnt Store is very environmentally sensitive – need to change culture through education – need to look at vertical seawall ordinance – think about letting to develop in a sustainable way
- Steve Sentes talking about land acquisition, count on non-profit entities, need to include citizens in process, at meetings etc.
- Mindy, need to have a change in perspective about living shorelines
- Cape Coral encourages planting of red mangroves, but there is a stigma about limitations with mangroves (regulatory) – plant propagules into PVC tubes, allow to grow up on outside of seawall
- Stephanie, living shoreline Nationwide Permit will help with permitting, hybrid seawalls are another option
- Mangroves can be maintained between 6-10 feet by homeowners and can be trimmed laterally for navigation – Mindy clarified DEP guidance and options

Roving Flipchart Activity: Audience Input on Future Strategies

- Question 1: What are some immediate strategies or steps for moving toward the goals identified earlier today? Who would need to be involved in each of these strategies and where might we get the necessary resources? (Resources might be funding, in-kind support from agencies, volunteer time, private sector donations, etc. Think broadly!)

- Highlights shared during the meeting – continue to work on public education opportunities, stay engaged with local government, explore more options and ideas for living shorelines within individual home sites, continue working on boating speed enforcement, work with other communities, support for sector 7 plan land swaps
- Flipchart comments (as recorded)
 - Boating speed enforcement – volunteers & Cape Coral Marine Police
 - Add more signs along waterways
 - Engage partnerships – network with other foundations (e.g. SWFL Community Foundation)
 - State more clearly a goal statement
 - Letters of support (re: Bear Creek) – send a NWNA representative to meetings about Charlotte Flatwoods Initiative
 - Consider land swaps – trust for public land (see Section 7 plan & Greg Stuart proposal)
 - Develop an education facility/museum – need to obtain funding – networking, grant procurement
 - Public education
 - Events (i.e. Taste of Pine Island, Burrowing Owl and other festivals, farmers markets)
 - NWNA and Lee county clean up days
 - “on the move” articles
 - Bulletin boards
 - Dr. Mitsch’s team to be involved with the NWNA Estuary Initiative
 - Stay engaged with City government
 - Stay engaged with CHNEP
 - Explore options for “living” seawalls and eco-friendly shorelines at home sites.
- Question 2: What are some longer-term strategies for achieving the goals identified earlier today? Who would need to be involved in each of these strategies and where might we get the necessary resources? (Resources might be funding, in-kind support from agencies, volunteer time, private sector donations, etc. Think broadly!)
 - Highlights shared during the meeting – common themes, partnering, collective strength, focus, education – get to the same level of education on initiatives, elect official that are eco-minded, reconfigure Key Ditch to restore natural flow and engage Dr. Mitsch.
 - Flipchart comments (as recorded)
 - Frequent stakeholder group meetings to define priorities and goals
 - Who - City of Cape Coral residents, regulatory, businesses, real estate agents, agencies
 - Education
 - Who – Residents, subject matter experts (e.g. best practices), extension offices
 - Partner with DOT, county and state
 - Who – DOT, agencies, residents, concerned citizens
 - Focus on one goal (rifle vs. shotgun) – visioning process
 - Who – NWNA, City, etc.

- Interface, breakdown silos
 - Who – CHNEP
 - Public/private non-profit partnerships
 - Who – non-profit groups, NW Cape Coral Foundation, Community Groups, Business Leaders
 - Hosting Special Events (on the water)
 - Who – local outfitter, community groups, media
 - Develop the northwest vision
 - Who – City of Cape Coral, NWNA, Landowners, developers, economic development (city)
 - Resources – Lee County Tourism & Development money
 - Elect political leaders who are “eco” focused
 - Who – Everyone
 - Tie into similar international themes (sustainability)
 - Who – advocacy groups, sustainability groups, academia
 - Reconfigure the Key Ditch and some tidal creeks to restore natural flow and a “semi-natural system”
 - Who – state, Dr. Mitsch (FGCU)
- Question 3: How might we keep the communication started at this workshop going? How can the community work together toward the goals identified?
 - Highlights – What – NWNA subcommittee, coordinate with other facilities – How – annual reports from NWNA to City Council, work with other organizations instead of trying to reinvent the wheel – Content – I don’t know what I don’t know – communicate at the 10,000 foot view, dumb it down, become part of the watershed initiatives
 - Flipchart comments (as recorded)
 - Annual report by NWNA to City Council stating priorities
 - Email updates of progress to members and council
 - Area on NWNA website for updates
 - Be patient to gain consensus – K.I.S.S. (keep it simple stupid), 10,000 foot view, dumb it up
 - Identify subjects to be discussed in advance and focus
 - Become part of watershed initiative, start listening and learning
 - Get speakers to help us understand what the issues are
 - Work with other groups (businesses, communities, rotary, other associations) – NWNA needs a subcommittee for this purpose – coordinate with “next door” both “whats” and “hows”
 - Diversify subcommittee by neighborhoods