

# **Holiday Coastal Update 2021**

## **By Jim Blackburn**

Hello all. Welcome once again to my holiday coastal update on things that I consider to be of importance and interest along the Texas coast. As you may know, I have spent much of my career as an environmental lawyer, planner, researcher, and teacher focused on this wonderful coast in one way or another. This newsletter started in the mid-1990s after several contested case hearings and lawsuits filed by me against Formosa Plastics Corporation, U.S.A. (Formosa Plastics) on behalf of Diane Wilson and others. These legal actions led to three settlement agreements that I helped negotiate and implement – settlements that made great progress in reducing the threat of toxics to the bay and to the residents at that point in time. The work under this settlement was completed around 1999. Since then, I have provided this newsletter as an update on happenings along the coast during the past year as well as to provide occasional updates on Formosa.

I have lived long enough and been involved on the Texas Coast long enough to begin to see fundamental changes begin to occur that will transform the coast in the future. Many of these changes are encouraging to me and offer hope for the future of the coast as does the possibility of all of us becoming more spiritually attuned to the Earth and the coast, which is, I think, perhaps the biggest unrealized challenge yet. On the other hand, there is the reality that the coast will be more heavily impacted by climate change than will the rest of the State. So, this year's coastal update reflects the yin of change by human institutions and the yang of climate change, each influencing the other, each defining the future.

### **1. The Challenge of Climate Change**

In Texas, we have lost at least two decades of planning and thinking about climate change because we denied that it was occurring. This denial was based upon fear – fear of admitting that the climate was changing and the effect that such an admission would have on the oil and gas industry. There is also the reality that climate change did not fit the belief structure of many of us. But as Dr. Katharine Hayhoe of Texas Tech would say, climate change is fact, not belief. And

the fact is that our climate has been changing, is changing and will continue to change.

In January 2020, BlackRock – the trillion dollar-plus investment firm – made several changes in their policies regarding climate change. They announced that they were (1) beginning to divest from coal, (2) that they were planning to vote their share interests for management platforms supporting climate change in the oil and gas industry and (3) that they were starting several ESG (sustainability) funds. At about the same time, Bobby Tudor, the then-President of the Houston Partnership, announced that Houston needed to address climate change by becoming the center of carbon capture and storage knowledge and expertise to balance our reliance on the hydrocarbon economy. These two policy statements have altered the conversation in Houston and arguably in Texas about climate change.

Although these developments are very important in terms of the oil and gas industry beginning to take steps to respond to their carbon dioxide emissions and impacts, these changes do not address the issue of adaptation to climate change. On that score, Texas and the coast are way behind. Climate change will affect virtually all aspects of our built environment, and no area is more susceptible to climate change than is the Texas coast.

There has not been a lot of attention to the longer-term issue of sea level rise along the Texas coast. One excellent analysis of sea level rise and its impacts on our Texas coastal development was prepared by Anne Stoner and Katharine Hayhoe for the City of Houston. Here is their summary of sea level rise:

“Sea level will continue to rise and is likely to continue to accelerate. Over the coming century, global mean sea level is likely to rise 0.3–0.6 feet (9–18 cm) by 2030, 0.5–1.2 feet (15–38 cm) by 2050, and 1.0–4.3 feet (30–130 cm) by 2100 (Sweet et al. 2017). Due to the uncertainty in predicting the rate at which Antarctica and Greenland are melting, Sweet et al. (2017) also warn that . . . sea level rise exceeding 8 feet (2.4 m) by 2100 is ‘physically possible, although the probability of such an extreme outcome cannot currently be assessed.’”

Anne Stoner and Katharine Hayhoe, “Climate Impact Assessment for the City of Houston”, August 2020. [Climate-Impact-Assessment-2020-August.pdf \(houstontx.gov\)](#)

The result of their analysis is shown below in Figure 1 for the west shoreline of Galveston Bay. This figure shows the impacts from two scenarios – a business as usual projected future leading to a 4-degree Centigrade temperature rise and a pro-active, reduced emission future leading to a 2-degree Centigrade increase. Both of these futures will lead to substantial inundation, with the 4-degree future overwhelming much of developed Galveston County and the NASA area and the Houston Ship Channel. Results such as these are seldom publicly discussed here on the coast and clearly indicate the importance of the Paris Accord and the attempt to limit global climate change to 1.5 degrees Centigrade.

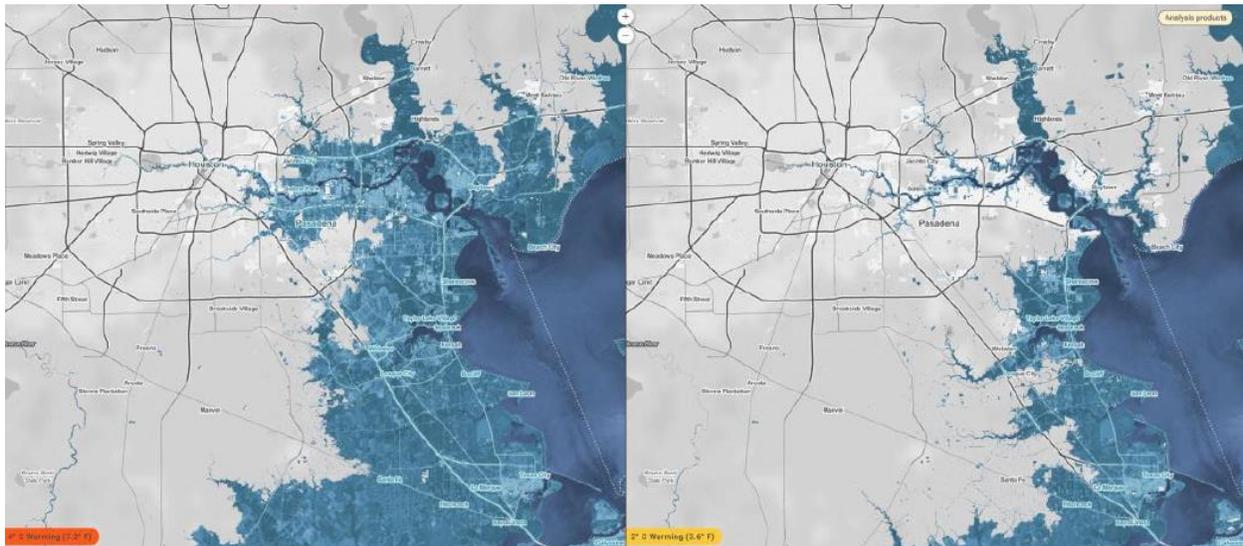


Figure 1. Future sea level rise for the western shoreline of Galveston Bay based upon two future climate scenarios, one depicting impacts from a 4-degree C rise on the left and another predicting the impacts from a 2-degree centigrade increase in the year 2100. From Figure 8 in Stoner and Hayhoe, “Climate Impact Assessment for the City of Houston”, August 2020. [Climate-Impact-Assessment-2020-August.pdf \(houstontx.gov\)](#)

Another example of the impact of sea level rise can be seen in the graph below prepared by the National Ocean and Atmospheric Administration (NOAA) that shows sea level rise at Port Isabel over time. This graph shows the extent of daily tidal inundation that could flood infrastructure if not homes in the Port Isabel area. Note that the graph levels off at 365 days by 2060 meaning that high tide will cause flooding and inundate infrastructure every day of the year. 2040 is less than 20 years away and the projection for then is for high tide to be a flood problem about 50% of the time.

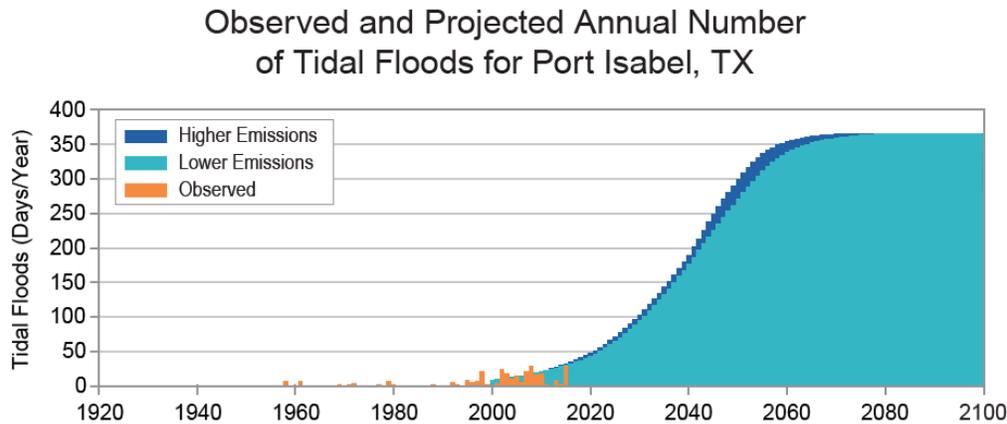


Figure 2. Observed and projected annual number of tidal floods for Port Isabel, Texas. Note how the projection increases dramatically around 2030 to 2050 time-period. Image from National Oceanic and Atmospheric Administration (NOAA).

Currently, we are building a significant amount of infrastructure along the coast. Are we building our roads, our sewer plants, our new structures high enough? Will new construction be obsolete after 20 to 30 years rather than the 50 to 75 years that should be lifetime of new infrastructure? Can we afford to build and then rebuild? I think not.

It is time for us to face this coming crisis honestly and directly. We need the full resources of the State of Texas focused on the future of the coast. Our wetlands are threatened. Do we have a plan for their long-term survival against the rising sea level? Our industry is vulnerable. Do we have a plan? We are past the time when we needed to take adaptation to climate change seriously. Almost every discussion below has one or more references to climate change and represents either a response to the need to reduce carbon dioxide emissions or adaptation to climate change.

This issue will only accelerate in the future. We delay at our own risk.

## 2. BCarbon and Nature-Based Carbon Sequestration

I have written much about nature-based carbon sequestration in this coastal report as well as in many other places. I believe that nature-based carbon capture and storage will be one of the transformative economic strategies emerging from the climate crisis. The agricultural economy of the coast and of

Texas as well as the U.S. and the world could be transformed by the creation of a market around nature and the removal of carbon dioxide from the atmosphere.

As you know, photosynthesis in plants removes carbon dioxide from the atmosphere and turns it into cellulose that becomes woody plant material and roots and the sugars that feed the microbes in the soil. This phenomenon occurs in forests, prairies, coastal marshes, and seagrass. In a different way, carbon storage also occurs within an oyster reef. Each of these ecosystems provide the service of carbon removal and storage. In the economy of the future, landowners, states, or perhaps even countries will be paid for providing this service to all of us.

Throughout our lives, we have all been given a free ride relative to carbon dioxide. All of us have contributed to the build-up of carbon dioxide in our atmosphere but have never paid a cent to discharge this pollutant. Carbon dioxide has been and is being emitted by our daily existence – our cars, our homes, our businesses. And we all must and will change our ways, although much slower than needed. Part of that change will establish an economic system that is more in line with our natural system and its carbon cycle. Carbon dioxide is naturally recycled in nature, but there currently is no money to be made from this “product” with the result that many if not most landowners do not optimize for it. That will change in the future.

For optimization of carbon removal to occur, we need a vibrant market to emerge – one that pays our farmers and ranchers for management practices that remove carbon dioxide from the atmosphere. We should not discriminate between who was doing what in the past. If someone today can prove that they are removing and storing carbon dioxide in their forest, prairie, marsh, or oyster reef, then they should be paid for that service. Period. It is just like growing onions or carrots – if you grow it, you can sell it. It is a property right.

At the Baker Institute at Rice, we took this concept to a group of stakeholders that now number over 200 companies and individuals and asked them if they agreed with these propositions? They did, and we have now created 11 principles for carbon dioxide storage transactions, and we have created a 501(c)(3) non-profit called BCarbon. BCarbon’s responsibility is to certify carbon credits for various tracts of land that are enrolled in the BCarbon methodology for evaluation and assignment of carbon credits. Credits issued by BCarbon can be

bought and sold by commercial entities and used to reduce the impact of carbon dioxide emissions by removing and storing those emissions in the land or forests.

It is fascinating to watch this carbon market come alive. BCarbon has already processed about 34,000 tons of credits from six Texas ranches and has applications coming from all over the United States and the world. At the time of this writing, there are 12 applications for credits either pending or noticed, including projects in Texas, New Mexico, North Dakota, Montana, West Virginia, and Florida as well as from Yorkshire in the United Kingdom, western Australia, Israel, Estonia, Paraguay, Guatemala, and Germany.

There is no doubt that this concept could become transformative. In the past, I have written about the need to keep our low-lying areas along the coast undeveloped, particularly the area subject to storm surge inundation. This represents about six million acres from the Rio Grande to the Sabine that are shown in Figure 3 below. Although much of the low-lying Texas coastal prairie and marsh has been purchased and set aside as wildlife refuges, there is not enough money to purchase all of this remaining land for wildlife refuges, and Texas will not regulate to prevent development. What we can do, however, is pay these landowners for dedicating these lands to carbon removal and storage. By turning natural carbon capture and storage into a commodity, we can protect and restore not only our low-lying coastal fringe but hundreds of millions of acres across the United States in the greatest land conservation program in U.S. history.

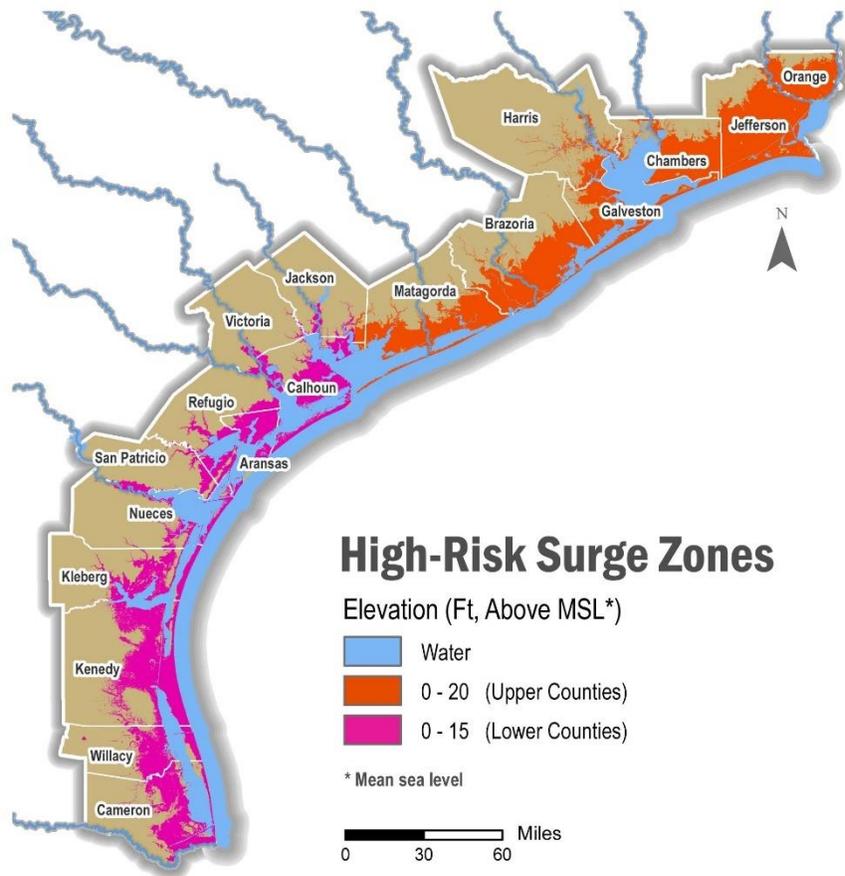


Figure 3. Coastal areas subject to surge flooding. The area of concern extends to 20’ in the upper coast and only to 15’ elevation in the lower coast due to the narrower continental shelf in the lower coast that reduces the storm surge potential. Image by Christina Walsh from *A Texan Plan for the Texas Coast*.

Now you might ask “Has he lost his mind?” but I don’t think so. I believe we are in the process of one of the largest economic reformations in modern history, similar in scale to the industrial revolution. Industry today is in the process of shifting to an economy that works with the Earth, not against it. Carbon capture and storage is a huge step in this transition. However, to achieve this goal of a reformed economic system, we are going to have to zero out existing carbon dioxide and other greenhouse gas emissions and then continue to remove carbon dioxide from the atmosphere as we strive to become carbon negative. Nature is the only way to achieve this result unless a giant vacuum cleaner for the atmosphere becomes affordable, and that is a long way off if it ever occurs. The

comparative view of the future of carbon dioxide removal from the atmosphere is shown on Figure 4.

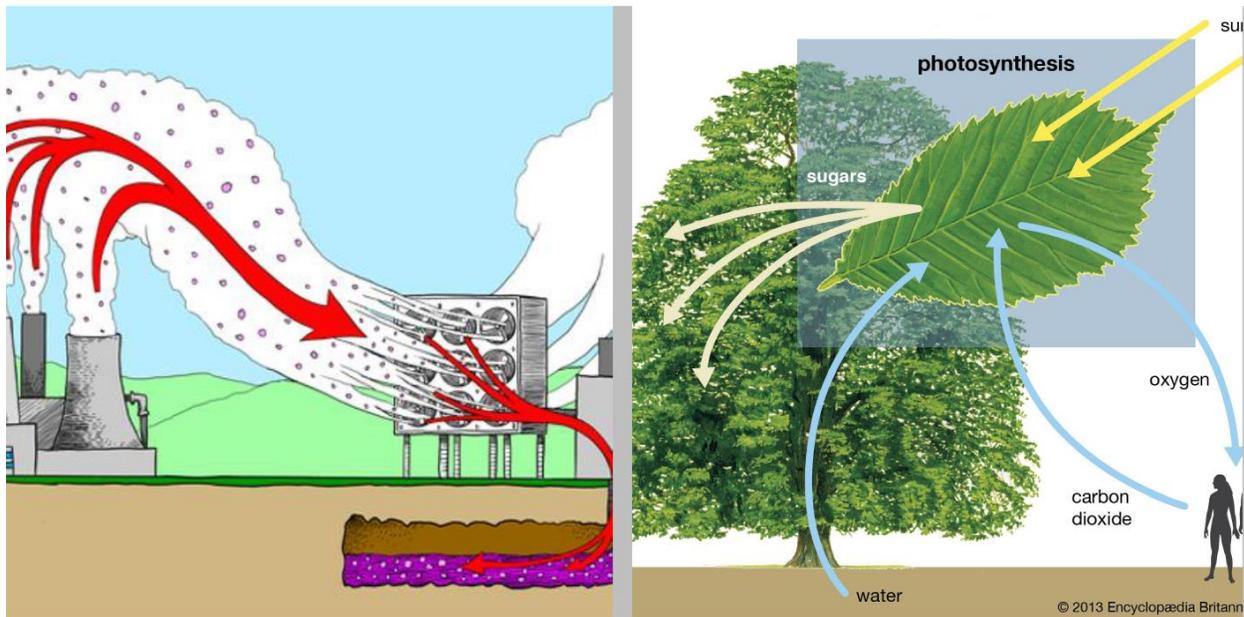


Figure 4. Two key concepts for carbon dioxide and the future - technological removal and photosynthetic removal of carbon dioxide from the air. Images from BCarbon and Encyclopedia Britannica.

The oil and gas industry is under intensive pressure to act on carbon dioxide emissions. The ecosystems of the Earth have not been a traditional ally of the industry, and it is hard for many oil and gas professionals to view nature as a solution, yet it is. Nature-based capture and storage is real and inexpensive compared to technological fixes to our carbon dilemma. In my opinion, the oil and gas industry must become much more aggressive in charting their path into the future, and a key for their longer-term future is to embrace nature. For a group generally considered as decisive, they are collectively failing to act decisively. And as inconceivable as it might seem, nature is a major piece of their solution.

When industry does decide to act, it will forever change the Texas coast. Currently, landowners have no incentive to allow marshes to migrate inland because they make no money from marshland. As sea level rises, we could lose the existing coastal marsh and their sequestered carbon. But if we create oyster reefs and living shorelines to protect our wetlands and create a market for oyster reef and wetland carbon storage, landowners will be willing to allow the marsh to

expand into their adjacent prairie because they may be paid for it. This is discussed further in the next section of this report.

Similarly, marginal cropland – rice that is barely profitable due to the cost of water or availability of water – sorghum and corn grown for animal feed – overgrazed grasslands - will be converted back to native prairies with their deep root systems that pump carbon into the soil. Forests will be preserved and expanded, and sustainably harvested and replanted even as architects design more buildings using wood, a carbon sink rather than using bricks or concrete with a large carbon footprint. This is a future I want to live long enough to enjoy. And I truly believe it lies before us if we can only open the doors and create the market that will bring us along.

I must admit that it has been quite a journey for me to become an advocate for markets after a professional lifetime as a regulatory environmental lawyer. Regulation, however, is a bit like a band aid. It stops the bleeding. It patches the tear. But regulation does not build a healthy economy whereas I believe a market with the right pricing can bring about massive, positive change at scale in a fairly short time frame. That is what lies ahead for the Texas coast, for Texas and for the nation. I now believe we must rely upon money to achieve what ethics and spirituality and science and regulation have not.

### **3. Making The Marsh Work As A Carbon Transaction**

It is well-known that marshes take a lot of carbon dioxide out of the atmosphere and put it into the marsh soil system where it would stay indefinitely in the past. However, in this era of climate change, a concern has emerged that the carbon stored in our marshes has the potential of being released through the impact of sea-level rise because the rising water level can suffocate the vegetation and wave erosion could possibly cause the soil to sluff off and disperse, releasing stored carbon.

One of the important issues in the future of the coast will be to expand our marshes inland with rising water levels while also attempting to protect the marsh from sluffing. There are many potential solutions to these problems, but they all revolve around putting money into marsh protection and expansion. And much of my research these days focuses on aspects of this issue.

In this context, the concept of the living shoreline is important. A living shoreline is protected by either rip rap or oysters as shown in Figure 5 below. By providing a wave break, the hard structure protects the edge of the marsh from severe erosion. Over time, sediment will be deposited from waters that rise and enter the marsh, hopefully adding to the thickness of the soil layer that also benefits from the calmer conditions behind the breakwater that allow sediment to settle. Fish and shellfish can move both within the reef and beyond it into the marsh, making this a living protected shoreline that is compatible with maintenance of the marsh system.



Figure 5. Image of a living shoreline in North Carolina. Source: <https://coastalreview.org/2016/12/18165/>.

I am fascinated that oyster reefs sequester carbon dioxide. Although the oyster shell itself is built of carbon (calcium carbonate), researchers have assured

me that this process does not store and remove carbon in an overall sense. However, carbon dioxide is removed and fixed by phytoplankton which are filtered from the water column and consumed by oysters that then pass the remains into the reef itself. This is the step by which carbon dioxide removed by photosynthesis is stored in the oyster reef. Preliminary initial estimates indicate an oyster reef may be able to add a ton or more carbon dioxide per acre per year.

The importance of the living shoreline relative to carbon sequestration is magnified significantly when considered in the context of protecting the marsh from erosion and sea level rise. Depending upon the extent of the living shoreline, substantial marsh acreage behind the reef potentially can be protected and allowed to continue putting carbon in the marsh soil as sluffing is avoided. Such a result would justify issuance of carbon sequestration credit to the reef itself as well as to the functioning marsh behind the reef. In this manner, marsh expansion would also become profitable to the adjacent landowner who may be reluctant to allow the marsh to expand into adjacent prairie under current conditions where the marsh generates no significant income to the landowner.

At this time, BCarbon has not agreed to issue credits for wetlands although other entities do. We may take this issue up next year as we begin to diversify the types of credits that we will offer. With the addition of a living shoreline and marsh protection, marsh loss can be avoided for a significant amount of time. The result is a win for oysters, a win for the marsh and a win for the landowner owning coastal marshland.

To determine the feasibility of this approach, BCarbon is preparing one or more grant applications to evaluate the feasibility of oyster reef credits and shoreline protection using the living shoreline. Coastal industry should be interested in investing in oysters and coastal marsh credits protected by living shorelines, but we need grant monies to prove up the viability of this approach and to develop an implementation plan.

I see a future for the Texas coast with 1000 miles of living shoreline made up of oyster reefs that protect the coastal wetlands behind them. Fish would thrive, marshes would be protected, and industry would have an excellent source of nature-based carbon credits. Let's make it happen.

#### **4. Inland Rainfall Flooding**

Another reality of the Texas coast of the future is the fact that we are going to be experiencing much more rainfall in a shorter time-period than we have in the past. This increased rainfall has been identified in report after report, and all of us living in the Houston area remember Imelda in 2019, Harvey in 2017, Tax Day in 2015 and Allison in 2001, to name four major flooding events in a twenty-year time period. Houston residents smile when someone mentions the 100-year flood. The current published 100-year flood plain map is obsolete. The City of Houston and Harris County are now using the 500-year flood plain for land development regulatory purposes.

There is no doubt that our rainfall intensity is increasing. In the chart shown in Figure 6, the old 100-year rainfall amounts are shown in the yellow area and our “new” 100-year rainfall amounts from a document prepared by the National Oceanic and Atmospheric Administration (NOAA) called Atlas 14 are set out in green. But then compare those “new” 100-year flood levels with those shown for several big storms, including Harvey and Imelda. The rainfall amounts set out in the red box all exceed the “new” 100-year flood levels and two exceed the “new” 500-year level.

Duration	100 Year Rain Event	500 Year Rain Event	NOAA Atlas 14 100 Year	NOAA Atlas 14 500 Year	Imelda Sept. 2019	Harvey Aug. 2017	Tax Day April 2016	Allison June 2001	October 1994
1-hr	4.3	5.5	4.8	6.4	6.4	6.8	4.7	5.7	3.7
2-hr	5.7	7.6	7.0	9.7	9.2	11.9	7.3	9.9	4.7
3-hr	6.7	9.2	8.6	12.4	10.9	14.8	8.3	13.5	5.3
6-hr	8.9	12.8	11.4	17.0	14.3	18.9	13.9	21.2	7.2
12-hr	10.8	15.5	14.1	21.2	17.9	20.9	16.7	28.3	12.0
24-hr	13.2	18.9	17.0	25.4	21.1	25.6	17.4	28.4	20.9
2 days	14.5	20.0	20.5	29.6	29.1	35.2	17.5	28.5	23.1
4 days	15.9	21.1	23.1	32.5	29.7	47.7	N/A	38.5	28.9

Figure 6. Graph comparing the “current” 100-year and 500-year rainfall level, the NOAA Atlas 14 rainfall level and the rainfall levels from several storms as reported by Jeff Lindner of Harris County Flood Control District.

Dr. Phil Bedient at Rice’s SSPEED center has recently re-evaluated the recurrence frequency of Hurricane/Tropical Storm Harvey and has determined

that Harvey was a 35 to 70-year storm rather than the 10,000+ year recurrence storm as was discussed when Harvey hit. Now stop and think about that for a minute. That should catch everyone's attention. And by 2100, Dr. Kerry Emanuel of MIT estimates that Harvey might be a 20-year storm if we do not get climate change under control. <https://arstechnica.com/science/2017/11/harvey-scale-rains-could-hit-texas-18x-more-often-by-the-end-of-the-century/>.

It is important that we residents of the coast pay attention to these new rainfall realities. Although Harris County is redoing its 100-year flood plain mapping to incorporate NOAA Atlas 14 rainfall, most Texas flood plain maps will remain the same, using out of date rainfall amounts. Whereas the City of Houston and Harris County are now using the "existing" 500-year flood plain for regulatory purposes, important state agencies such as the Texas Commission on Environmental Quality (TCEQ) are not. TCEQ has responsibility for regulating hazardous waste storage and treatment, landfills, and other industrial facility design. Internal stormwater systems for various industrial facilities are being under-designed for the rains of the future and represent a potential hazard.

We need to approach the future with our eyes open. The Texas coast has always been a hard place to live. Climate change will make it harder. Our developed communities will need to make room for water. New development should stay out of the flood plain as we buy out those homes that we cannot protect within the existing flood plain. If we use our intelligence, we will be able to thrive on the coast, but we must be smart. This is not the time for denial. This is the time for acceptance and action.

## **5. Galveston Bay Park Plan and Infrastructure Planning of the Future**

Coastal surge flooding represents a very real threat to the Houston Ship Channel and Bayport industrial complexes as well as the residential and commercial development on the west shore of Galveston Bay and Galveston Island. To address this problem, the Corps has proposed building the "Coastal Spine", a series of dunes with a major gate complex at Bolivar Roads (where the ferry runs) and a backside levee around Galveston. This proposed solution is shown in figure 7.

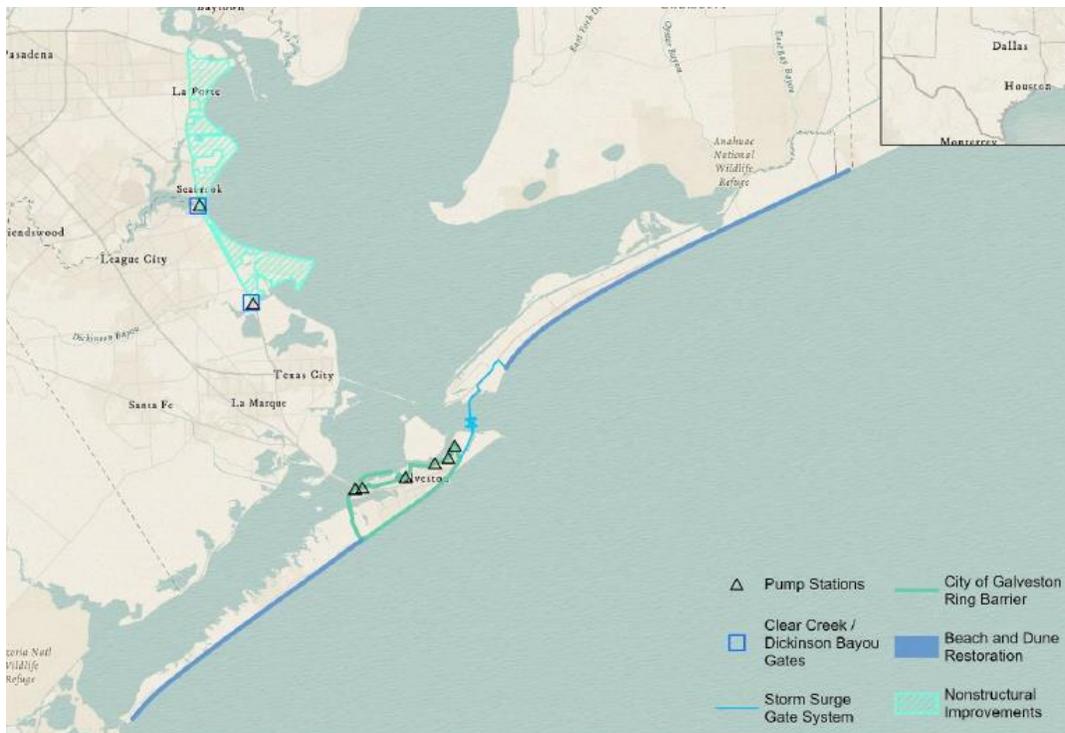


Figure 7. Corps of Engineers graphic showing the coastal spine, with beach and dune restoration in dark blue, the storm surge gate in brighter blue, the backside Galveston levee in green and the non-structural, exposed shoreline turquoise. Graphic from the Corps of Engineers.

Although this spine will offer significant protection for Galveston Island and some inland coastal development, it has only been designed to contain a Category 2 storm. It therefore offers little protection to the Houston Ship Channel and Bayport complexes which remain extremely vulnerable to higher intensity category 3, 4 and 5 storms that are becoming more frequent with our changing climate.

To better understand this vulnerability, the SSPEED Center at Rice University commissioned Clint Dawson of the University of Texas to evaluate a category 5 storm striking just south of Galveston Island with the coastal spine in place. The result of that analysis is shown in Figure 8. The extent of inundation is significant, reaching upwards of 8 feet depth in key industrial areas. In this storm event, over \$100 billion in damages are projected to occur from the inundation of over 13,000 homes, 1200 commercial structures and 160 industrial facilities, including over 2900 storage tanks for oil or hazardous substances. It is also worth noting that the incoming surge will take these released chemicals into residential

neighborhoods in Baytown, Galena Park, and the eastside of Houston with significant minority and lower income residential occupancy.

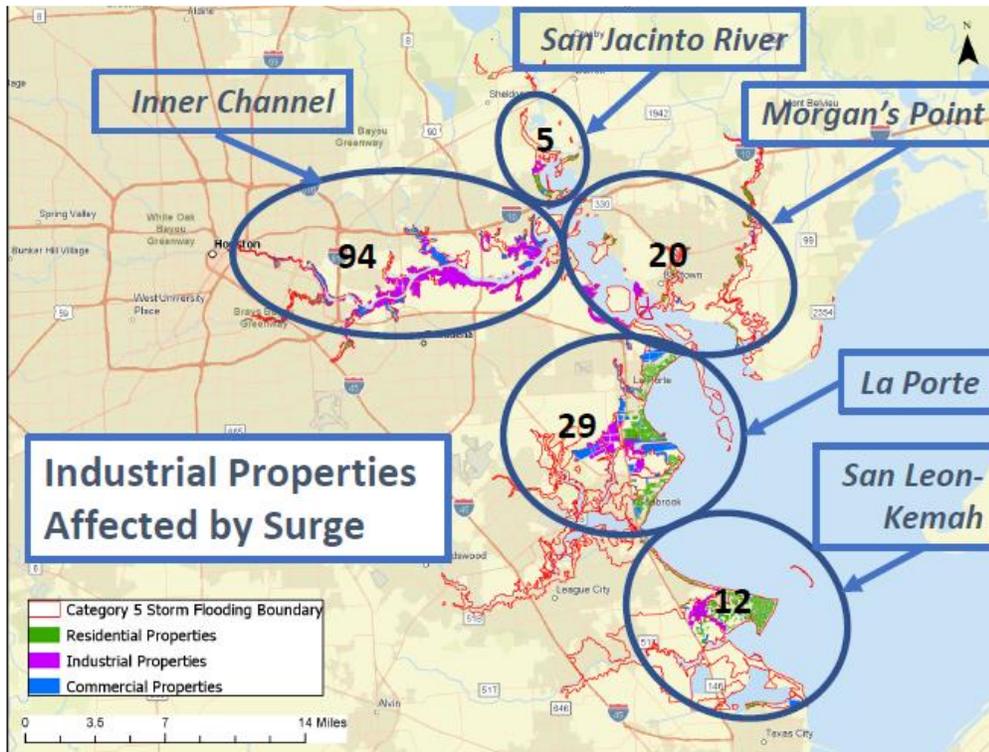


Figure 8. Graphic depiction of computer modeling of the impact of a Category 5 storm coming ashore south of Galveston with the coastal spine in place. Areas outlined in red along Clear Creek and Dickinson Bayou would have been inundated but for the presence of flood gates also proposed as part of the coastal spine project. Graphic by Christina Walsh, analysis by Blake Eskew based on computer modeling by Dr. Clint Dawson of UT Austin.

To contain this threat, the SSPEED Center proposed the construction of the Galveston Bay Park Plan (see figure 9 below) which will offer significant protection to the Houston Ship Channel, Bayport and the developed western shoreline of Galveston Bay. This system is proposed as complementary to the coastal spine and has been determined to be compatible with the coastal spine by both the Corps of Engineers and the General Land Office of the State of Texas.

However, the important point is not the Galveston Bay Park Plan itself but the story behind the development of the plan. Essentially, the Corps of Engineers was unable to protect the Houston Ship Channel, the Bayport Industrial complex, and the commercial and residential areas of the west shoreline because of the

way that their methodologies treat the risk of the occurrence of category 3, 4 or 5 storms. By their methodology, the benefits cannot be considered for storms with a recurrence frequency greater than once every one-hundred years, thereby eliminating these larger storms from consideration because the old statistics do not reveal the increase in storm intensity caused by climate change.

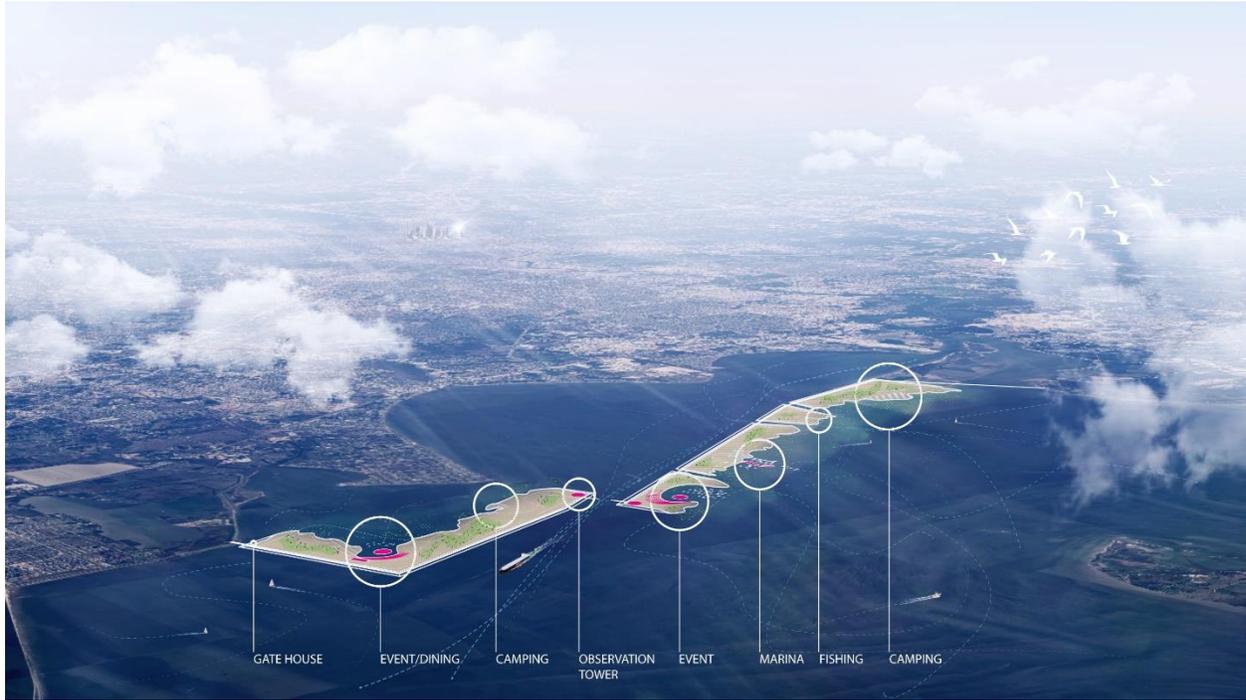


Figure 9. Galveston Bay Park Plan that will provide in bay protection that is complimentary to the Coastal Spine while providing protection against Category 3, 4 and 5 storms that remain a threat to upper Galveston Bay and the ship channel. Image by Rogers Partners.

The point here is that these methodologies are out of date – obsolete. The evidence is clear that although climate change will not cause more storms in the future, it will increase the size of the storms of the future, meaning that we will have more category 3, 4 and 5 storms than historic records indicate. However, the Corp’s methodology is based on a statistical analysis of storm occurrence going back to the early 1900s that does not “tease out” the increase in storm intensity that has occurred and will occur to a greater degree in the future like Dr. Bedient did in his revised analysis of the Harvey rainfall discussed in the previous section.

This is an important implication of our failure to act upon climate change at an earlier time. No serious review of engineering methods has occurred at the

Corps of Engineers because past administrations and Congress have failed to take effective action to update our methods for analyzing storm frequency taking climate change into account. Our failure to agree and act upon climate change will hurt us for years to come until we get these methods out of obsolescence and into the current era.

The unfortunate result of this is that communities seeking a higher level of protection will be left to their own devices. The Galveston Bay Park Plan was not developed by federal, state, or local governments but instead by a grant to SSPEED Center by the Houston Endowment, a private foundation. More recently, the City of Houston, Harris County, the Port of Houston and Joe Swinbank, a private entrepreneur, have taken steps to fund the next phase of research on the Galveston Bay Park Plan.

Think about that for a moment. The federal government cannot be depended upon to protect us from the large storms of the future, representing an abdication of their traditional role in the provision of coastal infrastructure. To achieve protection for the larger storms of the future, local governments and/or the private sector must take action involving processes that will be very different from their norm. And this will be true of every coastal city in the United States facing an increased risk of storm surge due to climate change, at least until Congress or the administration decides to revise the Corps of Engineer's Principles and Standards for designing infrastructure projects.

There is no doubt about the risk of surge in the Galveston Bay region. A big storm coming into Galveston Bay would cause the worst environmental disaster in United States history. That risk becomes magnified each year that the climate situation worsens with the temperature rising and the Atlantic, Caribbean and the Gulf getting hotter. To build the infrastructure needed for the future will require adaptive action by local governments and by the private sector. Otherwise, it likely will not happen, at least in the near-term. In the Houston area, we seem to have found the will to go beyond the federal project and evaluate further action, and for that I am grateful.

## **6. Lessons From Formosa Plastics**

I have known Formosa Plastics for decades. I litigated against them in the late 1980s and early 1990s on behalf of Diane Wilson and other coastal stewards.

I helped forge three settlement agreements that I worked on for several years. These agreements helped to clean up the plant at that point in time with the help of Ken Mounger who became the plant manager for the Point Comfort complex and moved his family into the town adjacent to the plant, an act that indicated his commitment and attitude toward addressing these problems.

As time moved forward into the 2000s, those agreements lapsed, Ken moved on, progress slowed, and commitment waned. Over time, a problem became apparent regarding plastic pellets in the bay, and Diane Wilson sued Formosa in 2017 for violation of their Clean Water Act permit. Wilson won that lawsuit in which she was very well represented by Texas Rural Legal Aid and Amy Johnson, leading to a court-ordered plastic pellet treatment and removal requirement with the Formosa plant and the establishment of a \$50 million fund for Matagorda Bay. At the same time, Formosa promoted Ken Mounger to Executive Vice President over U.S. operations.

Today, the situation at Formosa is changing in major ways. Litigation was a key element in transforming this company, but it is also important to understand that individuals can and do make a difference. Diane's constant vigilance and willingness to fight was a key as was the decision to put Ken Mounger in charge of U.S. operations. Ken is a problem-solver, and the problem he is trying to solve goes beyond the performance of the plant at Point Comfort. Today, he and every key manager in the plastics industry are facing critical issues about the future of the industry at a time when globally, the land, rivers and oceans are being overwhelmed with plastic pollution.

Ken and I agreed that Formosa would support general research on the trends in the plastic industry that allowed me to hire several undergraduate students at Rice to prepare a report about the plastics industry and its future. This report was shared with Ken and helped generate interest in these issues which were then taken up by Formosa's management team in Taiwan, leading to the recent adoption of a most interesting set of policies for the future. Of course, these policies are no good if they are not implemented, but they do form a basis for hope for positive change within Formosa Plastics going forward.

One area of change is carbon footprinting. Formosa recently committed to reducing the carbon content of their operations including Scope 3 emissions –

emissions from the supply chain and product use – as well as Scope 1 (direct emissions) and Scope 2 (electricity use emissions). Plans are being developed for both solar and wind electrical generation at Point Comfort along with a potential carbon capture and storage system using deep injection either immediately offshore (See Figure 10) or in deep wells at the plant site. As part of its Scope 3 reduction, Formosa in early 2022 will begin to invest a portion of its 401(k) and its retirement fund in ESG funds focused on sustainability. From my personal experience, I can attest that many ESG funds are performing better than the market. Taking responsibility for carbon emissions from an investment portfolio is a big step, one that few industries or corporations on the Gulf Coast or in the United States have taken. It is a step that Rice University has not taken.

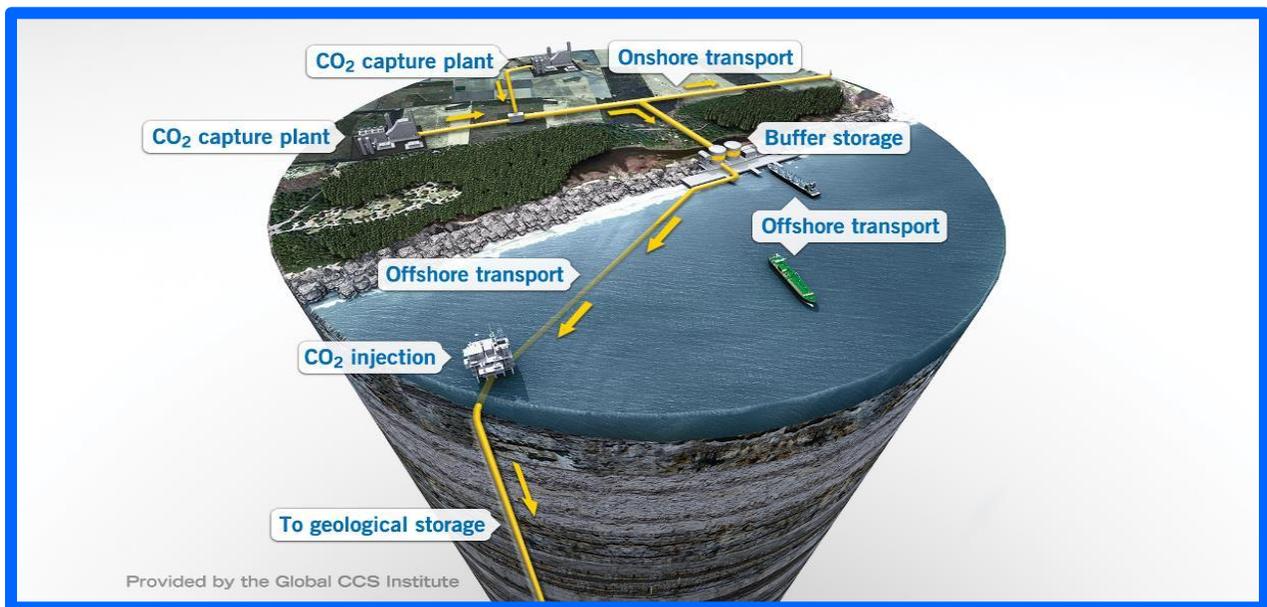


Figure 10. Carbon capture and storage as proposed for the Formosa Point Comfort facility. Graphic from CCS Institute website.

On the plastic recycling side, Formosa has committed to the circular economy to increase recycled plastics content in its product line. There are several ways to achieve this. Formosa is pursuing this challenge by proposing to take recycled plastics and re-manufacture a feedstock such as naphtha and use it as raw material for the processing. This is again important from a market standpoint. Formosa and others will emerge as buyers for recycled plastics, a market that had collapsed after China ceased being the global recycling center in 2017. In a similar vein, another alternative is to buy recycled plastic pellets from

independent companies that are springing up in response to the global demand for recycled content in plastics. This is one of the most interesting new economies to emerge from the current plastic industry transformation.

In addition to those changes, the lawsuit has altered the Point Comfort operation. Much of the federal permit violation case involved stormwater collection and discharge. To address this, major stormwater recycling basins have been constructed, and now stormwater is in the process of being re-directed into these interconnected basins for treatment as shown in Figure 11. Back in the 1990s, under the settlement agreements, we researched achieving zero discharge from the Point Comfort operations. All of this attention to plastic content in wastewater discharge has led to those old plans being revisited and re-evaluated. Zero discharge would be a great solution if it could be achieved.



Figure 11. Layout of interconnected stormwater collection ponds under construction by Formosa Plastics. Cox's Creek lies east of the plant site and these stormwater ponds are along the length of the creek. Image provided by Formosa Plastics.

Finally, the Matagorda Bay Trust established by the settlement of this lawsuit has yielded unexpected benefits. Rather than being spiteful about losing this litigation, Formosa has embraced this Trust created by a settlement agreement ending the litigation. Among other things, the trust has created a point of pride and stewardship about the bay that was previously missing from Formosa. This fund (which is discussed later in this report in section 8) was recently used to support research by Dr. Paul Montagna and Dr. Jim Gibeaut of the Harte Research Institute in their evaluation of recent changes proposed by the Calhoun Port Authority to the planned expansion of the Point Comfort Deepwater channel. This research study identified problems with this new plan that had not been previously documented and may be instrumental in helping the

Corps determine that these proposed changes need to be evaluated further before proceeding, a major victory for environmental protection if it occurs.

The bottom line is that litigation can be constructive. Diane and her lawyers did everyone a favor, and Formosa has responded with the type of attitude all of us should have when challenged to change their ways. From my perspective, they have taken their penalty and are moving forward resolved to not continue in the same way. Rather than carrying lingering animosity, they appear to be embracing the court's decision and turning it into a direction for the future. This could be the most important decision ever made by Formosa and could be instructive to all industry on the Texas coast.

## **7. Whoopers and the GBRA Mega-HCP**

Back in 2010, The Aransas Project (TAP) filed a suit against the Commissioners of the Texas Commission on Environmental Quality (TCEQ) and others over the deaths of 23 whooping cranes on their wintering grounds on or adjacent to the Aransas National Wildlife Refuge. The goal of that litigation was to compel a Habitat Conservation Plan (HCP) to protect the whooping cranes. TAP won in district court before Judge Janis Jack and then lost at the 5<sup>th</sup> Circuit Court of Appeals. After that, the U.S. Supreme Court refused to hear the case. We had lost and it hurt.

And then Molly Cagle (GBRA's excellent attorney), Bill West (then general manager of GBRA) and I met in Seguin and signed an agreement between TAP and GBRA for joint study of several issues important to the future of the whooping cranes. After Bill retired, a similar agreement was negotiated with Kevin Patteson, the new general manager of GBRA. That agreement led to a grant for further study from the Mitchell Foundation, and then GBRA brought in Nathan Pence to work with us and to forge a path forward that allowed the GBRA to continue its function of providing water supply to the Guadalupe River basin as well as taking care of its stewardship responsibilities to the whooping cranes as well as other federal endangered species within the watershed.

Today as I write this, I remember sitting in the audience at the GBRA headquarters in Seguin on April 17, 2019, with Ann Hamilton, a TAP board member. At that time, we were listening to Nathan make a presentation to the GBRA board about preparing an HCP that covered the entire river, and then we

listened as the board voted to move forward with this HCP plan. What a nice moment.

Fast forward to today where the GBRA is now moving forward with the development of a river-wide HCP. GBRA has signed a contract with Blanton & Associates to prepare this HCP with work scheduled to be underway by early 2022. According to GBRA General Manager Kevin Patteson,

“This HCP will be a critical component of our conservation and sustainability efforts for decades to come. The completed plan will serve as a roadmap for how we can work collaboratively with our partners and communities to better develop water resource management and protect our environment.” <https://www.gbra.org/news/2021/07/gbra-to-develop-habitat-conservation-plan-for-the-guadalupe-river/>

It is often hard to gauge the importance of events when they are occurring, but I think this effort is very important in the evolution of thinking in Texas and is another piece of evidence that things are changing for the better on the Texas coast. Species protection can be compatible with achieving economic goals, but those issues must both be considered. One cannot simply dominate over the other. Domination of nature is the system that I was born into. This is the thinking I have been fighting my whole career. Domination-thinking is what has gotten us into this mess with climate and with declining species.

I do not mean to suggest that we will not have problems in the future. We will, and we continue to have them in Port Aransas as well as other places. But this new direction of the GBRA should be a beacon to every river authority and every corporation. Embracing and accepting change is hard, but business does it better than any of us because they follow the money. With individuals, it is much harder to change because the need to act does not always translate into making money. And governments may be the most difficult group to accept change, yet here is a governmental entity of the State of Texas leading the way to a different view of river authorities and their role. And that is good.

All of us interested in the coast should watch this GBRA HCP process unfold and participate if time and interest allow. This process must have stakeholder involvement and ultimately acceptance. From TAP’s continuing work with GBRA, I know that the commitment is sincere, but the task of addressing both species and

development with potentially diminishing water supplies is both difficult and serious. So join with me in wishing GBRA well while keeping one eye clearly focused on this process.

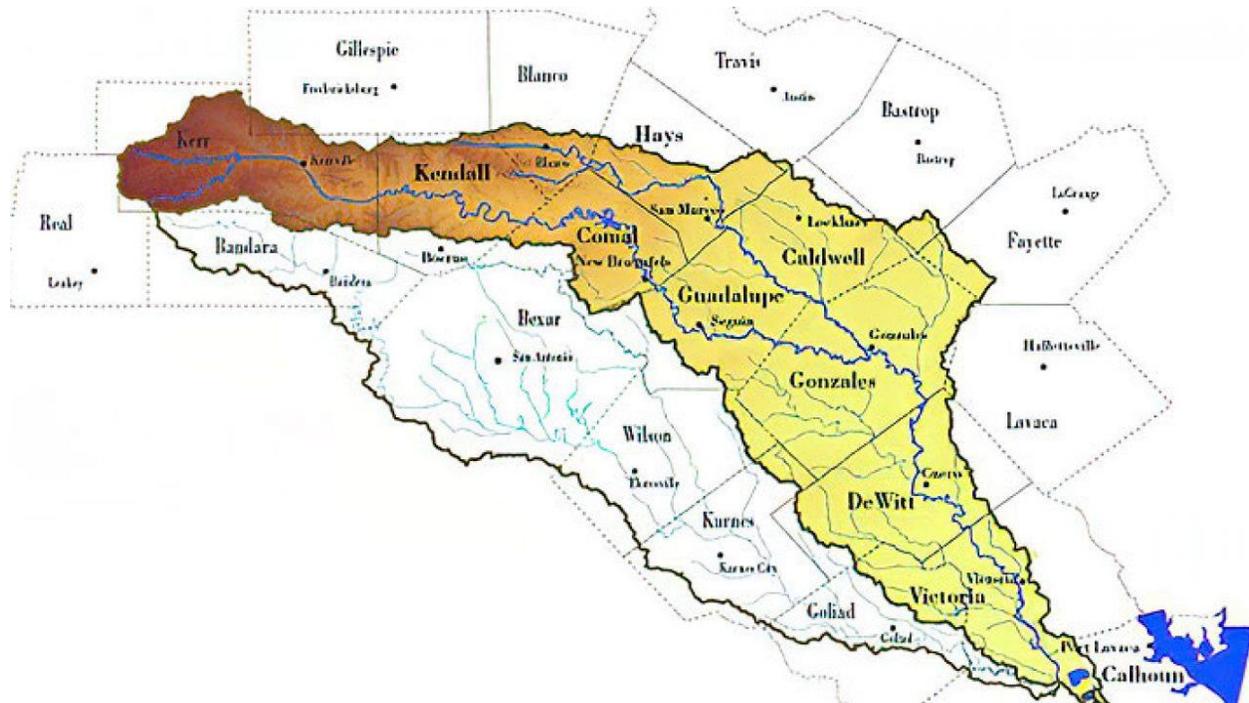


Figure 12. Guadalupe River watershed. Image from <https://mycanyonlake.com/clean-rivers-program-on-gbras-agenda-for-guadalupe-river-basin-meeting/>. The Guadalupe River empties into San Antonio Bay at the bottom right of this figure.

## 8. Matagorda Bay

There is more good news from Matagorda Bay where Bill Balboa continues to do a marvelous job as the Executive Director of the Matagorda Bay Foundation. Matagorda Bay is in many ways the forgotten bay of the Texas coast. It is large, covering 422 square miles, and extending from Sargent at the top of East Matagorda Bay down to Port O'Connor and Port Lavaca, a distance of almost 80 miles as the crow flies. It is bisected by the Colorado River delta that was formed when a log jam upriver was blown up in the 1930s, and debris flowed downstream to connect the community of Matagorda with the barrier island.

For over three years, Bill has been leading the Matagorda Bay Foundation and has developed project after project to benefit the bay. To date, Bill has obtained funding to purchase Dog Island, a wonderful wetland and upland area just west of Matagorda and the Colorado delta. Bill is also working on several oyster reef and wetland restoration and living shoreline projects around the bay. A recent meeting with the Lower Colorado River Authority (LCRA) and MBF board members Mark Rose and Jim Blackburn has led to an agreement to work together on several different issues to benefit Matagorda Bay with the hope of creating a long-term working relationship. This promises to change what has been an adversarial relationship into one of working together on matters of mutual benefit to the bay.

However, an adversarial relationship may be developing with the Calhoun Port Authority which has initiated a study with the U.S. Army Corps of Engineers (USACE) to acquire a permit for improving the Matagorda Ship Channel (MSC), Port Lavaca, Texas. This channel is 26 miles long and extends from offshore in the Gulf of Mexico through Matagorda Bay and Lavaca Bay to the Port in Point Comfort, across the bay from Port Lavaca. The current alternative plan A is to deepen the channel to 47 feet MLLW from the current 38 feet and widen it to 350 feet in the bay from 200 feet wide.

Bill Balboa and others expressed concern about the potential impacts of this permit application and identified numerous impacts that might occur from the channel widening and particularly from a change in the disposal plan that would lead to the placement of dredged material much closer to the shoreline. As can be seen from Figure 13, there are numerous oyster reefs and wetland areas that might be impacted along with Powderhorn Lake which now provides wintering habitat for whooping cranes among other species. MBF has requested that a Supplemental Environmental Impact Statement be prepared by the Corps to address the impacts that will occur from this permit proposal which deviates from a previously approved disposal plan with lesser impacts.

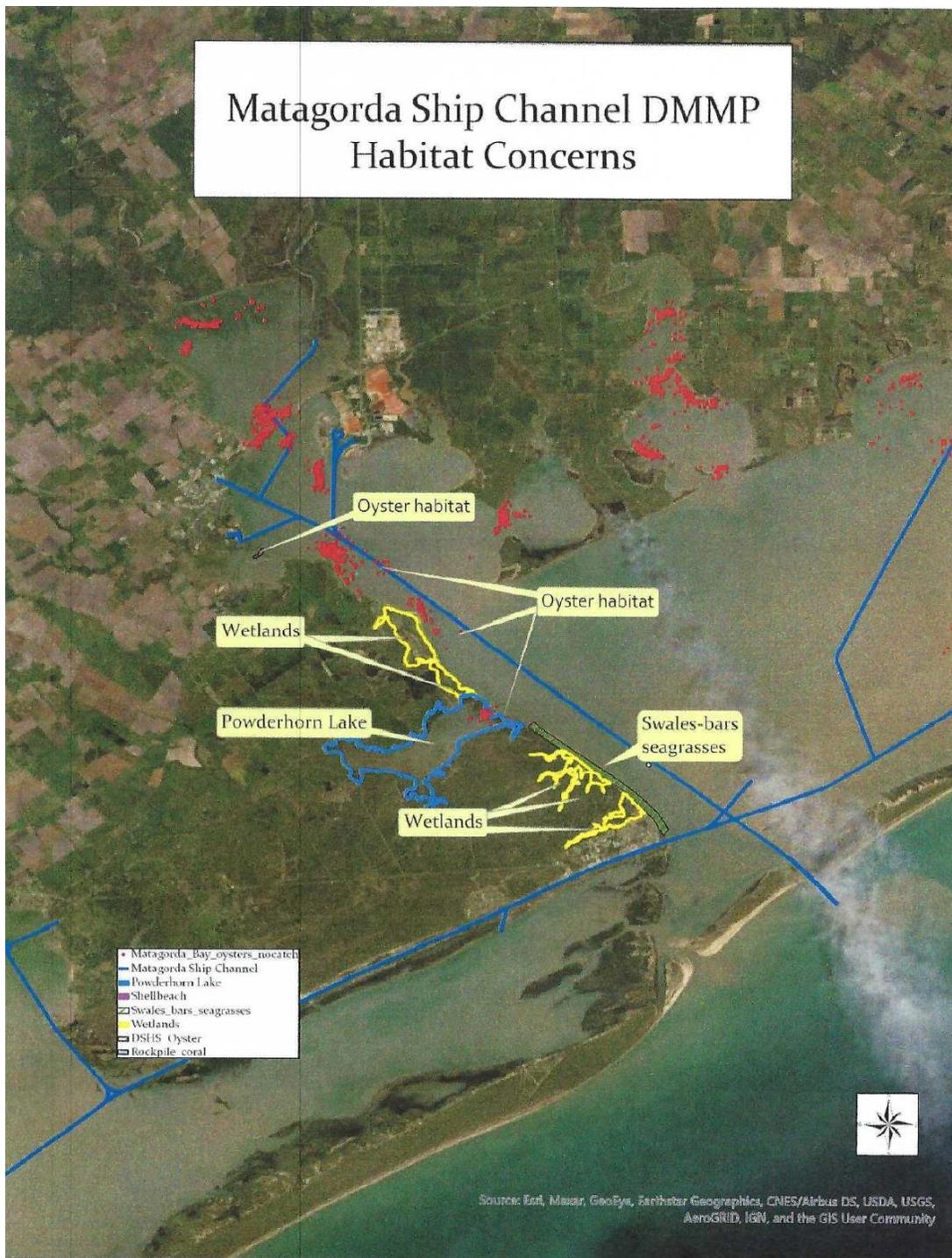


Figure 13. Concerns identified by Matagorda Bay Foundation regarding the changed dredge spoil disposal plan by the U.S. Army Corps of Engineers. Existing oyster reefs are shown in red and various navigation channels are shown in blue (except for the outline of Powderhorn Lake). The concern is about the dredging of

the deepwater channel which comes in from the Gulf and goes northward into Point Comfort. Graphic courtesy of Bill Balboa, Matagorda Bay Foundation.

Here is where this story gets interesting. As mentioned earlier, the Formosa litigation led to a settlement that created the \$50 million Matagorda Bay Mitigation Trust to be spent for research and projects benefitting Matagorda Bay. Due to the concern about the potential impacts from this permit application, the Trust issued a grant to Dr. Paul Montagna and Dr. Jim Gibeaut of Texas A&M Corpus Christi to study these impacts and issue a report on their findings. Their final report was issued on September 30 2021 and set out their findings about potential impacts. Among other things, their report determined that numerous negative effects could occur, including resuspension of mercury that had been discharged into Lavaca and Matagorda Bay by Alcoa in the past – discharge that led to the identification of a Lavaca Bay Superfund site. In short, the report confirmed concerns and set out a set of studies that should be conducted to fully understand the impacts of this dredging plan. To read a summary of the report, please go to <https://www.harte.org/project/evaluation-proposal-widening-and-deepening-matagorda-ship-channel>.

The point here is that an independent trust set up to benefit Matagorda Bay actually achieved the goal it was set out to achieve – it generated useful information that might lead to the protection of Matagorda Bay. Every bay on the coast needs a bay trust fund dedicated to protection of the bay. Thanks go to both Diane and her lawyers and Formosa and their lawyers for setting up this trust that can benefit us all.

## **9. Chiltipin Creek**

Another situation that has worked out well so far involves the dispute over the discharge of treated wastewater from the Steel Dynamics facility near Sinton, Texas. As you might remember, The Aransas Project (TAP) opposed the original discharge permit and persuaded the company to work with us to design a “polishing” system for the wastewater. This agreement was brought back to the Texas Commission on Environmental Quality (TCEQ) and after a bit of delay the permit has now been issued allowing the commencement of the construction of a wetland system through which the wastewater will be circulated prior to discharge.

At this time, construction has begun on this wetland system that is being designed for Steel Dynamics by Civil and Environmental Consultants, Inc (CEC) and BioWest. This design is being reviewed and evaluated by Dr. Jack Matson on behalf of TAP. The diagram below indicates the general layout of the wetland system with the yellow and red area being about 6.9 acres of deeper emergent and submerged zones, the light and dark blue being about 14 acres of Shallow Emergent Zone and the pink area being about 9.5 acres of Saturated Soil Zone and Islands. This site is currently under construction as can be seen in Figure 14 with the constructed wetland to be filled and formal planting to begin in the spring.

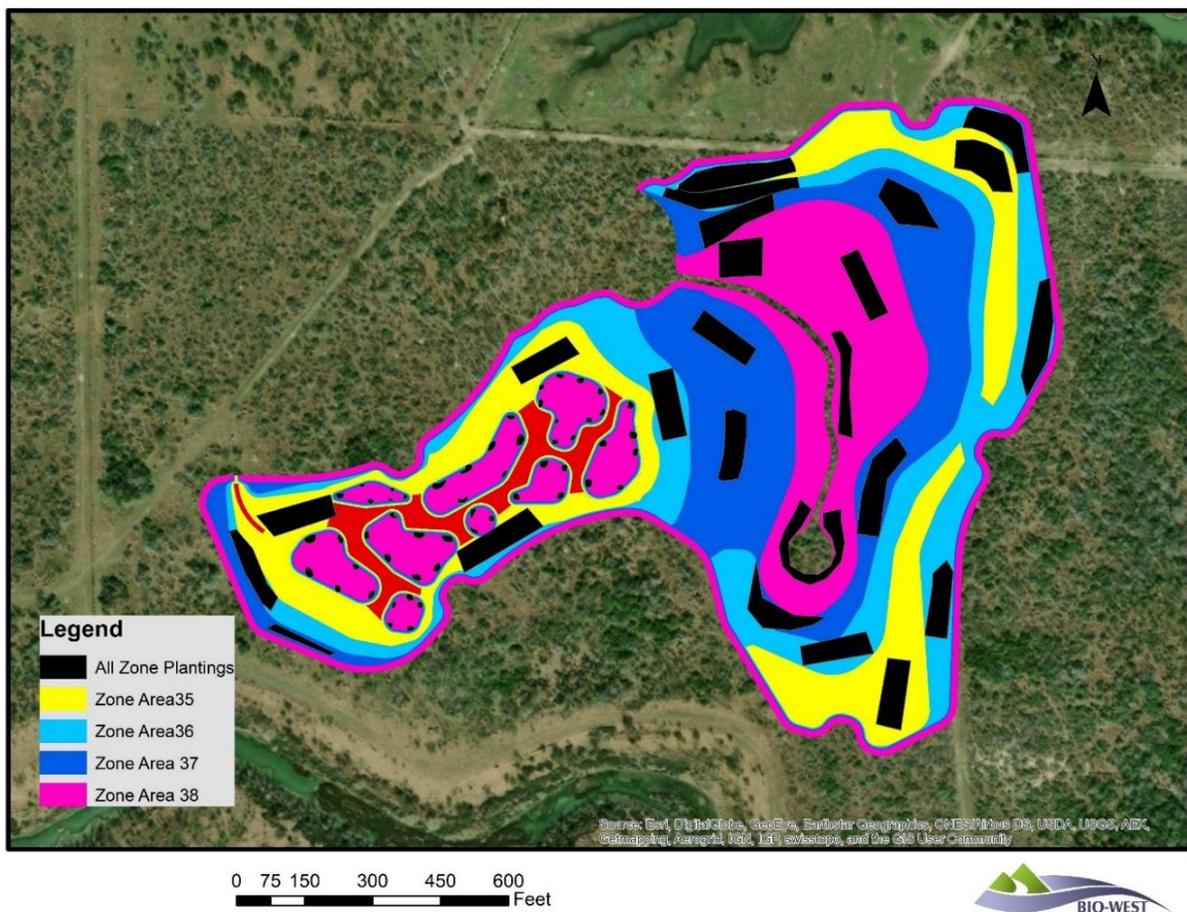


Figure 14. Proposed Steel Dynamics wetland system developed in response to settlement agreement with TAP. The red and yellow areas are the deepest planted zones, with the light and dark blue being shallower and the pink zones being the shallowest part of the wetland. Chiltipin Creek can be seen in the bottom left side of the image. Graphic from Bio-West and used courtesy of Steel Dynamics.



Figure 15. Photograph of ongoing construction of wetland facility at Steel Dynamics. Photo courtesy of Steel Dynamics.

### **10. Port Aransas and the Port of Corpus Christi**

Perhaps the worst situation on the Texas coast continues to unfold at Port Aransas where the Port of Corpus Christi is attempting to undertake two major projects. One project is a permit application to the Texas Commission on Environmental Quality (TCEQ) to obtain a discharge permit for reject water from a desalination plant that would go into the pass between Port Aransas and St. Joseph's Island. The second project seeks a permit from the Corps of Engineers to deepen the Corpus Christi Ship Channel from offshore past Port Aransas and past the ferry landing and into Harbor Island behind Port Aransas.

I have written in the past about these two projects and about the harm that they would bring. At a hearing conducted this past year, two administrative law judges from TCEQ heard evidence about the discharge of this reject water and

wrote a Proposal for Decision that was released on February 5, 2021. In that decision, the judges recommended denial of the permit. However, when faced with this difficult decision, the TCEQ commissioners sent it back to the judges with instructions for them to collect more evidence. Essentially the Port of Corpus Christi got to “redo” their permit hearing with perhaps a better chance of getting it right the second time around. At this point in time, new depositions are being taken in anticipation of another several-day trial with a new proposal for decision to be forthcoming perhaps by late spring or early summer.

The situation with the Corps of Engineers permit request for the deepening of the Ship Channel into Harbor Island is that a draft environmental impact statement (DEIS) is currently being prepared and will likely be issued sometime this coming year. At that time, comments will be solicited on the DEIS, and all those concerned about this channel enlargement and the development of Harbor Island will have a chance to submit comments. After receiving those comments, the Corps will prepare a final environmental impact statement (FEIS) and issue a Record of Decision (ROD), and at that point a lawsuit will likely be filed. The strife over these two actions will continue for at least a few more years, and the implications of this strife are extremely important for the future of the lower coast.

The Port of Corpus Christi is uniquely set up to make two major changes that could elevate it to the top of port leadership on the Texas coast. The desalination problem can be solved by sending the wastewater offshore where it can be dissipated with minimal effects. Why the port has refused this easy solution is simply beyond my understanding. Climate change will affect the availability of water supplies in Texas and the western United States. We need desal now and in the future, but we must address this wastewater issue correctly. The precedent here is critical for all bays on the Texas coast. We do not need to be discharging concentrated brine in a fish pass or in our bays. It belongs offshore. That is where it should go, and the Port should do the right thing and go offshore.

The issue with the deep-water channel into Harbor Island is perhaps more difficult although it seems another easy answer exists. At this time, an offshore monobuoy project called Bluewater Texas (BWTX) has been proposed to export oil from the Corpus Christi/Port Aransas area. This offshore port has none of the

problems that arise with the dredging of the onshore port and development of Harbor Island. This is a joint venture between Phillips 66 and Trafigura and could service the needs for oil export without generating negative environmental impacts. Again, I call upon the Port of Corpus Christi and anyone with influence or regulatory authority over this issue to make the right choice for the future of the Texas coast. We do not need an onshore deepwater port.

The Port of Corpus Christi has announced its intention to be the carbon sequestration leader of Texas and the United States. That is an excellent image. That is an excellent direction. We need to put aside the pursuit of bragging rights for the deepest onshore port and work for the common good of the coast and support BWTX. I might add that while I was a part of the project team for a Trafigura offshore port further south, I am not involved with the BWTX proposal. It just makes sense as the least damaging alternative approach to exporting oil.

### **11. *Earth Church*, the book**

I want to take a little time here to tell you about *Earth Church*, a new book recently published by Isabelle Scurry Chapman and me. The book is a collection of paintings, poems and narrative about Earth-based spirituality focused on the Texas coast. This book came out of the 365-day virus vigil that Isabelle and I maintained during the first year of the COVID pandemic. As you all know, the world and the U.S. are now well into the second year of COVID with a new variety just identified in South Africa and moving into Europe. This is a time to stay connected, which is what the virus vigil was all about, and the Earth provides the best connection for all of us.

Without the Earth, we would not be. That statement is true, beyond doubt, yet we fail to correctly value the Earth either economically or spiritually. Without a livable Earth, we are not. Our species will fail, but it does not have to be that way. However, we must change our thinking, particularly our spiritual thinking, hence the book *Earth Church*.

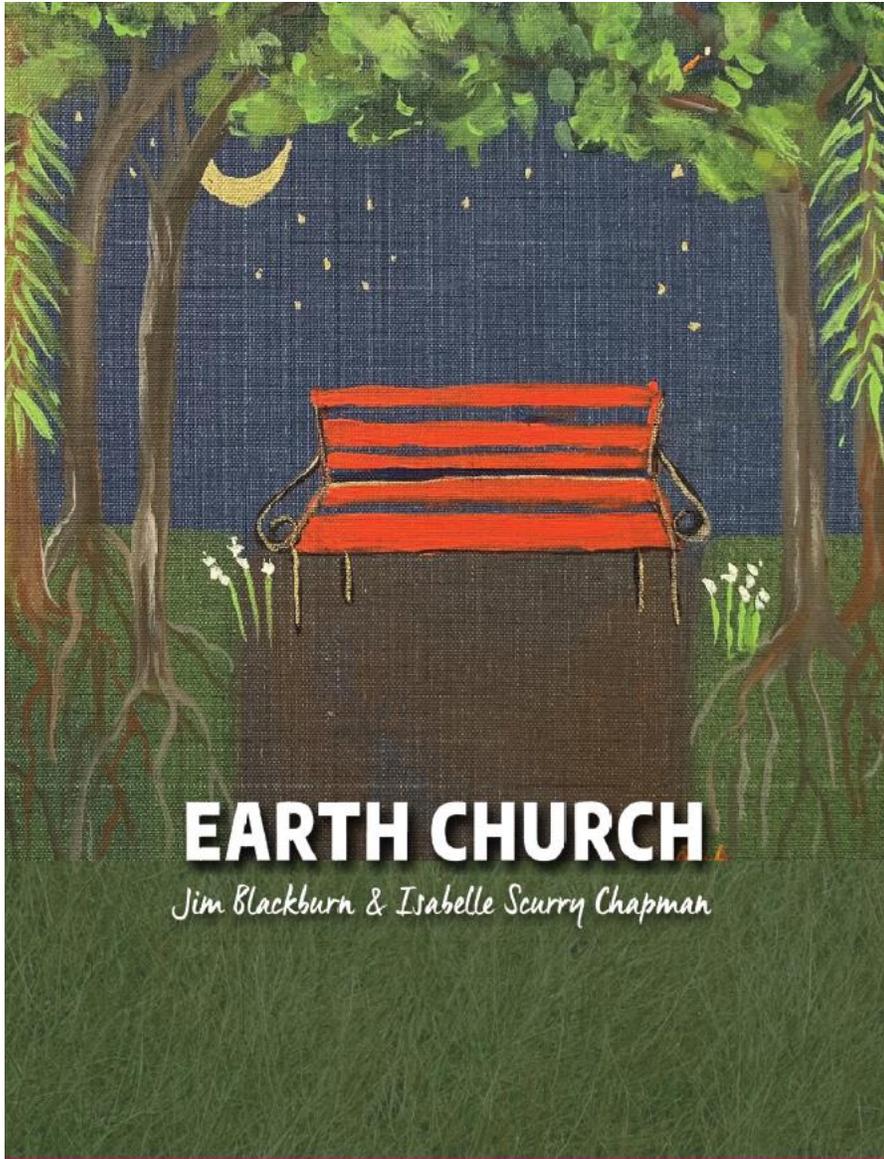


Figure 16. Cover of *Earth Church*. Image by Isabelle Scurry Chapman.

So what is *Earth Church* the book about? Consider this review posted on Amazon:

The Earth Church invites me to sit on the red anime pew with Jim and Isabelle. Birds in the choir are singing songs of nature. Small creatures are co-inhabiting our space. The tree roots stabilize my feet, and its leaves shade me from the sun. I am motivated to explore the hymnal to further experience the earth spirit life. I am Earth Church! Nothing is more beautiful as raindrops softly dance on my skin. Thank you, Jim and Isabelle, for this eternal lesson.

And here are some raindrops from *Earth Church*.

### *the* EARTH

*The Earth is beautiful seen from space,  
It is my home, it is my place,  
I think I am, therefore, I am,  
And because of Earth, therefore, I am.*

*The Earth is my church, and here I pray,  
It is my anchor – don't take it away,  
It is mine by right of inheritance,  
I must protect it from happenstance.*

*Buckminster Fuller said Earth is a spaceship,  
We must keep it going - we're on a long trip,  
We must learn to keep all systems working,  
We all have a duty – there'll be no shirking.*

*Earth-keeping's a calling of this religion,  
But such a call could result in a collision,  
Between making jobs in the name of economy,  
And fighting for life in the name of ecology.*

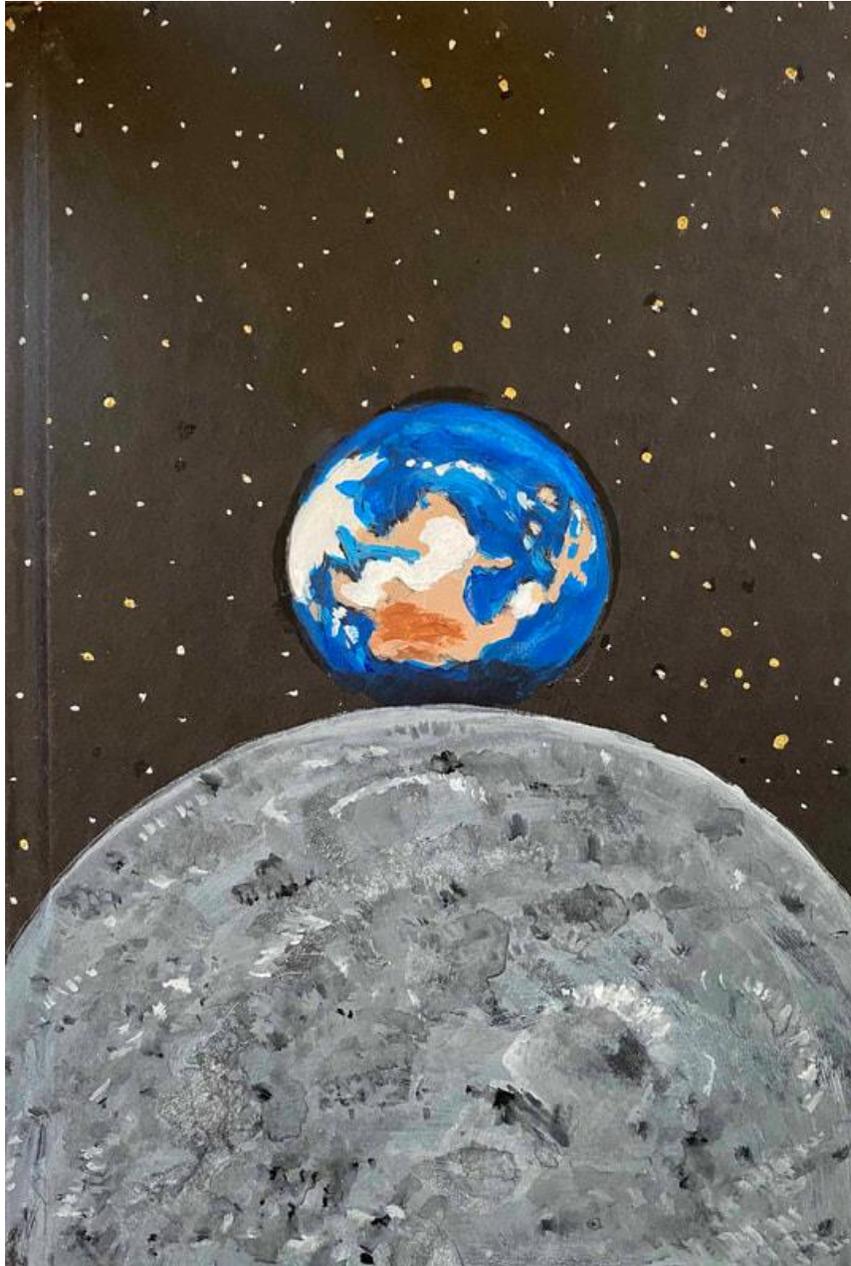


Figure 17. Earth rising from behind the moon. Image from *Earth Church* by Isabelle Scurry Chapman.

*That conflict is false, I hereby proclaim,  
Economy and ecology should be one and the same,  
But we must rethink and recalibrate,  
We must act swiftly and not hesitate.*

*This rhyme is a call to Earth devotees,  
Who amongst you is willing to change their ways?  
Will you act to implement this new thinking?  
Will you send a message without blinking?*

*Implementing this thinking requires force of will,  
We all have a duty that we must fulfill,  
Our practices must change from a century ago,  
It's gonna be hard, but old ways have to go.*

*The Earth is our voyager, our spacecraft, our home,  
And we can't make this trip by ourselves, alone,  
We must bring the whole of the Earth along,  
We must live and think in practice and song.*

*So, rise past the moon my beautiful Earth,  
And thanks for hosting me in this universe,  
Earth Church is here to celebrate your existence,  
And to pledge allegiance to your blue brilliance.*

*And welcome to Earth Church,  
Pull yourself up a pew,  
Here we honor our spaceship,  
And protect it for you.*

### *the* GREEN HERON 3

*The green heron wades beside the waterway  
That's the chemical industry's passageway,  
And sits on timbers that are often smashed  
By the chemical barges trying to pass.*

*The coat of the heron has many colors,  
Its obvious beauty admired by the others,  
A fabric of yellow and maroon and green,  
This smallest heron has the brightest sheen.*

*It makes its living off of nature's cycles,  
The proven pathway to survival,  
Just think if our economy followed this path,  
We might avoid the coming bloodbath.*

*An economy like nature makes common sense,  
Where waste is a product, a place to commence,  
We will make and use, recycle and reuse,  
Such a system a wise man would not refuse.*

*We're all tired of seeing plastics on the beach,  
It's a popular subject with the students I teach,  
We can all see the consequences of the old way,  
Let the dawn reveal a new circular day.*

*So, toss plastic waste to the recycle bin,  
It's the beginning step for a societal win,  
But the bin must be part of a reuse plan  
Connecting to the plants across the land.*

*This system is now only beginning to occur,  
The pieces are forming but are still a blur,  
But have no doubt that the pieces will fit,  
And we'll build this system bit by bit.*

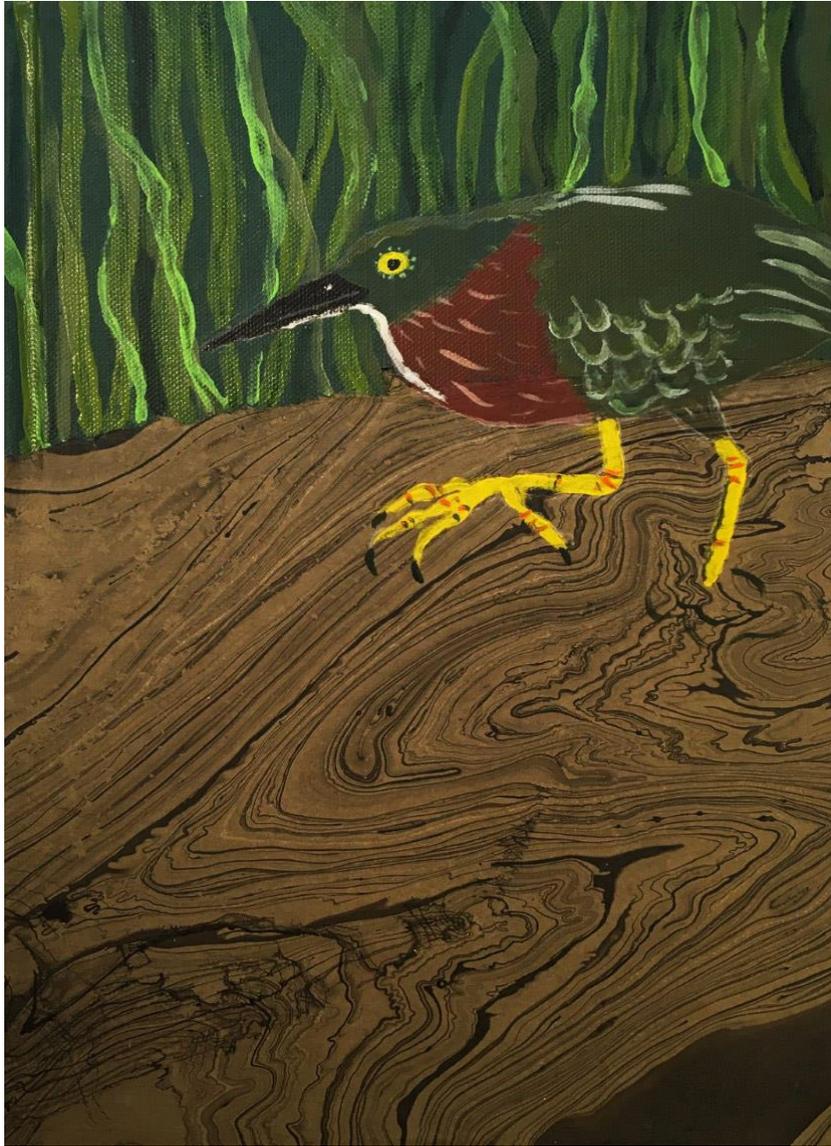


Figure 18. Green Heron from *Earth Church* by Isabelle Scurry Chapman.

*The green heron slashes its bill in the murk,  
And pulls up a silver fish with a jerk,  
And I smile on the circular point of view,  
It's good for me and it's good for you.*

*So welcome to Earth Church  
Pull yourself up a pew  
Here we're pushing for plastics  
To be recycled to you.*

The book *Earth Church* is available through Amazon or the Old Mill Store in Wimberley, Texas, or through me directly, and I hope to have it in other bookstores soon.

## **12. A Few Concluding Thoughts**

At the end of the year, many of you consider giving to various organizations. I have two to suggest. First, you might consider removing your carbon footprint from the atmosphere and storing it on the Texas coast. The Texas Coastal Exchange (TCX) pays landowners to capture carbon dioxide and store it on their land. Each of us produce, on average, about 10 tons of carbon dioxide a year. For a donation of \$20 per ton, or about \$200 for most of us, TCX will make a grant to one or more landowners along the coast to store your carbon in their soil. You can donate to TCX by going to [https://donate.texascoastalexchange.org/?gclid=EAIaIQobChMI5-7gx6jS9AIVFxfUAR16PAmVEAAYASAAEgJ3N\\_D\\_BwE](https://donate.texascoastalexchange.org/?gclid=EAIaIQobChMI5-7gx6jS9AIVFxfUAR16PAmVEAAYASAAEgJ3N_D_BwE). Your money will help to create a market for carbon storage that is badly needed by coastal landowners.

Second, you might consider donating to the Matagorda Bay Foundation. Unlike Galveston Bay, Matagorda Bay does not have a large population living nearby and needs support from those that do not live near this bay. Matagorda Bay is a jewel and Executive Director Bill Balboa is doing an excellent job, so please consider donating to <https://matbay.org/donate-page/>. You will be donating to a first-class organization that is doing good for all Texans.

Once again, I wish you well and hope you will take some action either of appreciation or protection for the Texas coast. It is worth the time and effort.  
Blackburn