

# Engaging Communities to Design Nature-based Solutions to Mitigate Climate-related Hazards in Refugio County, Texas

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## Purpose and Objective

National Wildlife Federation, through partnerships with Harte Research Institute (HRI) at Texas A&M University-Corpus Christi and the Refugio County Leadership, is co-designing a Nature-based Project in the Coastal Bend region. The potential nature-based project in the county can help balance extreme event vulnerabilities, strengthen natural features to withstand these impacts, and support long-term development goals of the community. The project is supported by the National Academies of Science, Gulf Research Program and Harte Research Institute (HRI) held a subcontract from the National Wildlife Federation (NWF).

The main goal of HRI in this project was to support the project partners with engagement and in capturing community input. The project extended from October 2022-May 2023.

### **Summary of Major Tasks in Years 1**

1. Participate in check-in calls with local stakeholders.
2. Assist in identifying stakeholders for the advisory group.
3. Assist in workshop planning.
4. Co-facilitate workshops 1&2.
5. Assist in community survey design.
6. Review and comment on outreach materials.

## Task 1 Activities and Outcomes: Participate in check-in calls with local stakeholders

For Task 1, HRI participated in bi-monthly Team calls with the project Team, including NWF, County of Refugio representative, Santos McBain Consulting and representative from the Refugio County Community Development Foundation. The project team used these calls to discussion project development, brainstorm engagement and partners, discuss survey development and results, and to discuss development and outcomes of the project workshops. Chris Hale and Diana Del Angel attended these calls regularly.

### **Project Calls**

- 10/6/2022- Team Call
- 11/8/2022-Team Call
- 11/16/2022- HRI/NWF Survey Chat
- 11/22/2022-Team Call
- 12/20/2022- Team Call
- 1/17/2023 Team Call
- 1/25/2023- NWF-HRI Call
- 1/27/2023 Workshop 1
- 1/31/2023 Team Call
- 2/2/2023- Survey Chat
- 2/14/2023 Team Call
- 2/28/2023 Team Call
- 3/14/2023 Team Call
- 3/28/2023 Team Call
- 4/10/2023 Survey Chat
- 4/11/2023 Team Call
- 4/14/2323 Workshop 2
- 4/25/2023 Team Call

## Task 2 Activities and Outcomes: Assist in identifying stakeholders for the advisory group

Between November 1-December 1<sup>st</sup>, 2022 the project team developed a list of potential members of the project's Advisory Group. The Advisory Group helped guide the project team toward selection of a nature-based solution/green infrastructure project relevant to the needs and interests of communities in Refugio. The project team developed a list of 30 individuals representative of local non-profits, federal agencies, state agencies, faith-based organizations, community representatives, public health, education, and local organized groups.

## Task 3 and Task 4 Activities and Outcomes: Assist in workshop planning and Co-facilitate workshops 1&2

HRI assisted in workshop planning and facilitation. The project team held two workshops: one January 27, 2023 and April 14, 2023.

### **Workshop 1- 1/27/23**

Workshop 1 was held at the Refugio County Development Foundation Building. For workshop 1 HRI prepared a map packet to facilitate the discussion on nature-based solutions that would be locally relevant (see [Appendix 1](#)). In addition, HRI supplied large print maps of the region showing flood hazards and other supplies such as name tags, easels, and flipcharts. During workshop 1 the Advisory Group developed a list of potential nature-based projects to enhance resilience in Refugio County. Lastly, the advisory group was directed to the project survey, and they served as the pilot for survey design. See Workshop 1 summary report in [Appendix 2](#)).

Post Workshop 1 HRI helped review the workshop summary and developed maps for the top 3 potential projects selected (see [Appendix 3](#)).

### **Workshop 2- 4/14/23**

Workshop 2 was held at the Refugio County Development Foundation Building. For workshop 2 HRI presented the results from the community survey, helped facilitate the meeting, and recorded meeting minutes. Diana Del Angel of HRI presented some key takeaways from the community survey (see [Appendix 4](#)). Further, team notes helped develop the Workshop 2 summary also, HRI provided feedback and comments on the Workshop 2 Summary Report (See [Appendix 5](#)).

## Task 5 Activities and Outcomes: Assist in community survey design

Task 5 involved the design, creation, and administration of the project's community surveys. The project produced 2 surveys: Community Values Related to Natural Areas Survey and a Blackpoint Project Community Input Survey.

### **Community Values Survey**

The Community Values survey was designed by Chris Hale and Diana Del Angel during the months of December and Early January. The survey questions were designed to capture which natural areas are most important to the Refugio County community, what they value about natural spaces, and what

concerns they may have. These topics were generated based on literature review and were reviewed by the NWF Team. Further, HRI provided a Spanish version of the survey with the expertise of HRI staff (Olga Gil Barrientos).

The pilot survey was completed by the Advisory Group after Workshop 1. Workshop 1 participants provided their feedback and the updated and final version of the survey went live in March 6, 2023.

HRI and NWF promoted the survey in-person during the Refugio County Fair, Friday March 26 and Saturday March 27; these dates coincide with the majority of the collected responses (Figure 1). The survey was also distributed in the project page and through HRI and the Regional Resilience Partnership social media pages, as well as the local newspaper printed in March 24.

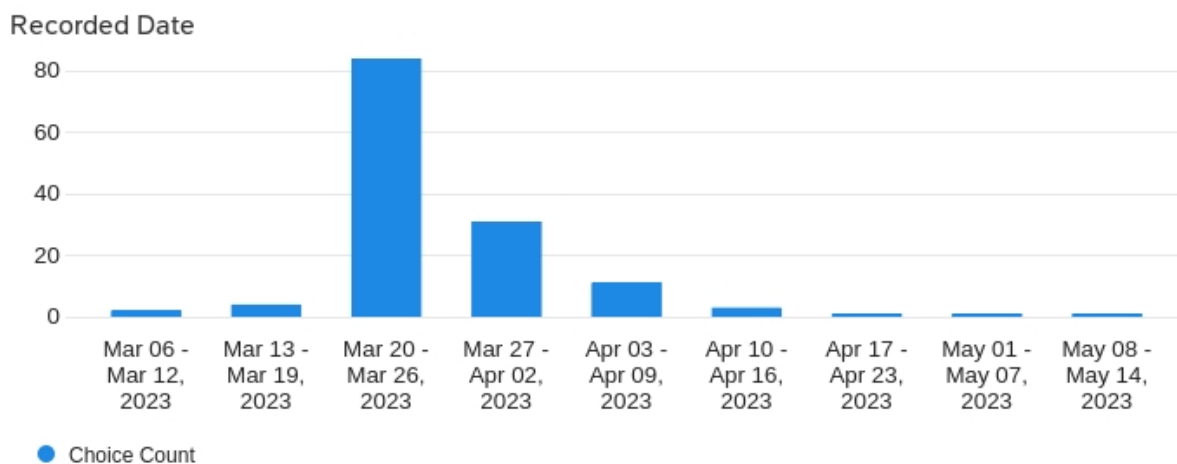


Figure 1. Survey response by date

The survey resulted in 131 responses, responses have been summarized in [Appendix 4](#) and [Appendix 6](#).

### Black Point Project Survey

The second survey was developed after workshop 2 and it was designed to collect broader community input on the selected nature-based project. Survey is live and of late April and will remain open through the summer: [https://tamucc.co1.qualtrics.com/jfe/form/SV\\_ONTAbPo4DSFcShw](https://tamucc.co1.qualtrics.com/jfe/form/SV_ONTAbPo4DSFcShw). See [Appendix 6](#) for a copy of the survey.

### Task 6 Activities and Outcomes: Review and comment on outreach materials

Lastly, HRI provided broad support related to communication and outreach of this project. Activities and outcomes related to this task include a project page, maps and graphics, and social media communication.

The project page is hosted through the HRI website at <https://www.hartheresearch.org/project/designing-nature-based-project-refugio-county>. The project

page holds the summary of the project, documents related to the workshops, and the project survey links.

Further, HRI developed maps and graphics for workshops, project document, surveys and social media posts (i.e. [Appendix 1](#) and [Appendix 3](#)).

Lastly, social media was used to promote the project and the project survey. Social media was conducted under the Regional Resilience Partnership page, which is a partnership between HRI and the Coastal Bend Council of Governments. The active platforms of engagement include LinkedIn, Facebook and Instagram (Figure 2).

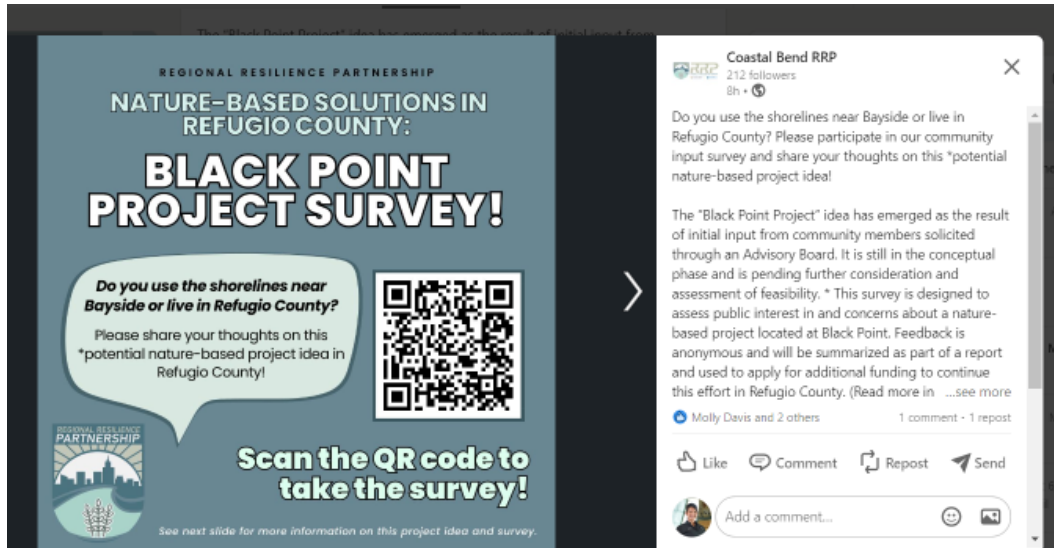
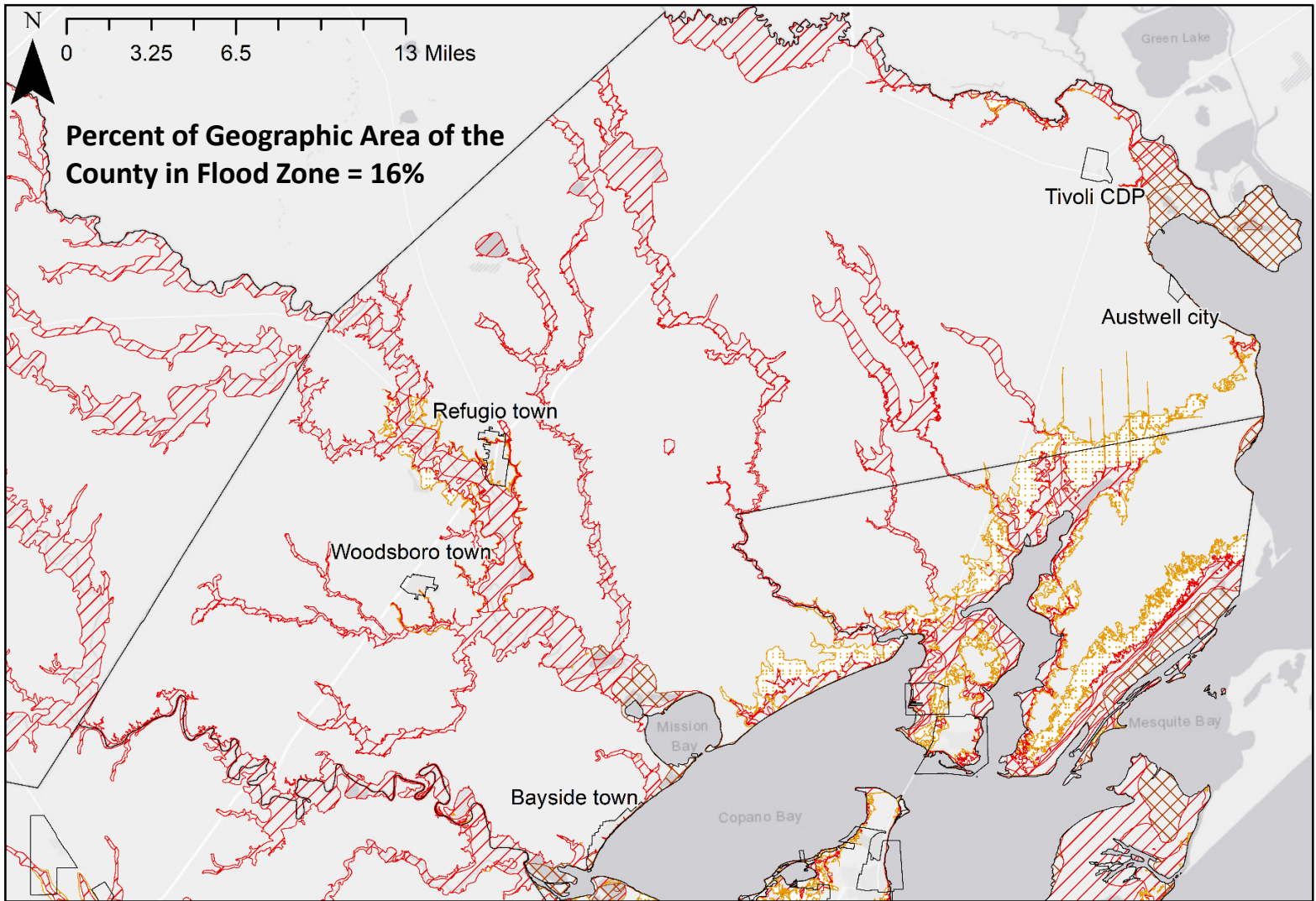


Figure 2. Sample social media post

# Appendix 1

Workshop 1 Resources




# Percent of Area in Flood Hazard Zone



## Legend

### Texas 2021 Flood Quilt

#### Flood Zone

-  1% Annual Chance- A Zones
-  1% annual Chance - V zones
-  0.2% Annual Chance - X Zones

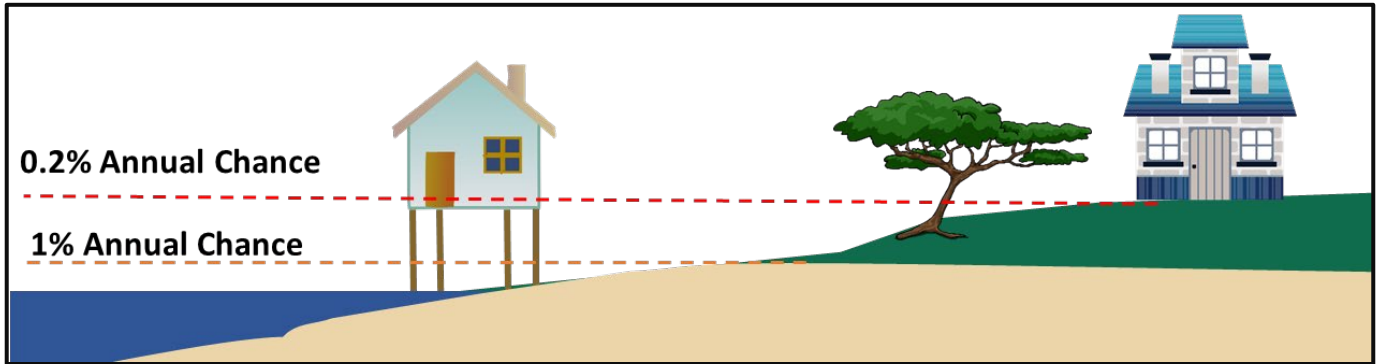
### Percent of Geographic Area in Flood Zone

Place Name	Percent
Austwell city	0.0%
Bayside town	22.3%
Tivoli CDP	0.0%
Woodsboro town	1.5%
Refugio town	17.4%

The floodplain quilt was developed by the Texas water Development Board and consists of multiple layers from various sources. These layers are 'quilt' together to a single flood hazard dataset. This dataset includes FEMA flood zones as well as other preliminary and local data.

Source: <https://twdb-flood-planning-resources-twdb.hub.arcgis.com/pages/flood-hazard-quilt>

# Floodplain and Flood Hazard Areas



- A **floodplain** is any area susceptible to flooding from any source. Potential sources include coastal storms like hurricanes with storm surge, rainfall, downstream runoff, and elevated high tides.
- Flood hazard areas are typically determined by FEMA for the development of Flood Insurance Rate Maps. These flood zones represent a flood's statistical return period or how likely it is to occur in a given period of time. The two most highly used flood return period are the 1% annual chance flood and the 0.2% annual chance flood.
- **The 1% annual chance flood**
  - Also known as the base flood or 100-year flood, it is a type of flood that has a one-in-100 or 1% chance of occurring in any given year. This means that over 30 years there is a 26% chance a 1% annual chance flood will occur.
  - These zones may appear labeled as : Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30.
  - V-zones are coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves
- **The 0.2% annual-chance flood**
  - Also known as a one-in-500 or 0.2% chance of occurring in any given year. This means that over 30 years there is a 5.8% chance a 0.2% annual chance flood will occur. A 0.2% annual chance flood is also known as a 500-year flood. These type of floods are considered a moderate flood hazard.
  - These zones may appear labeled as: Zone B or Zone X

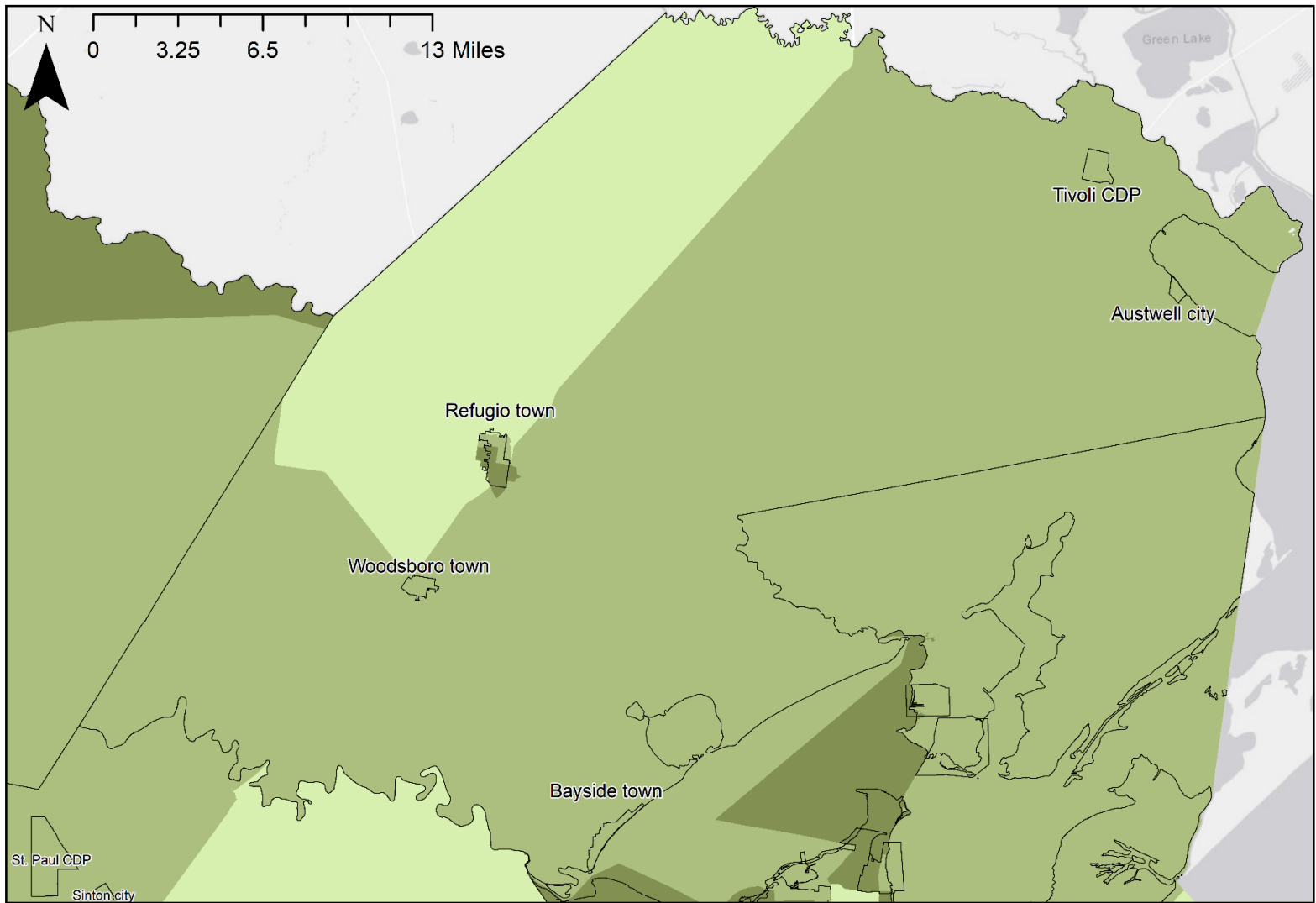
Resources:

<https://www.fema.gov/glossary/flood-zones>

<https://www.fema.gov/glossary/special-flood-hazard-area-sfha>



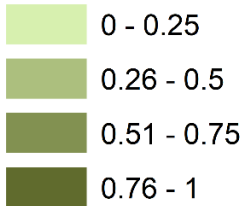
# Population and Low & Moderate Income



## Legend

### Low & Moderate Income Individuals

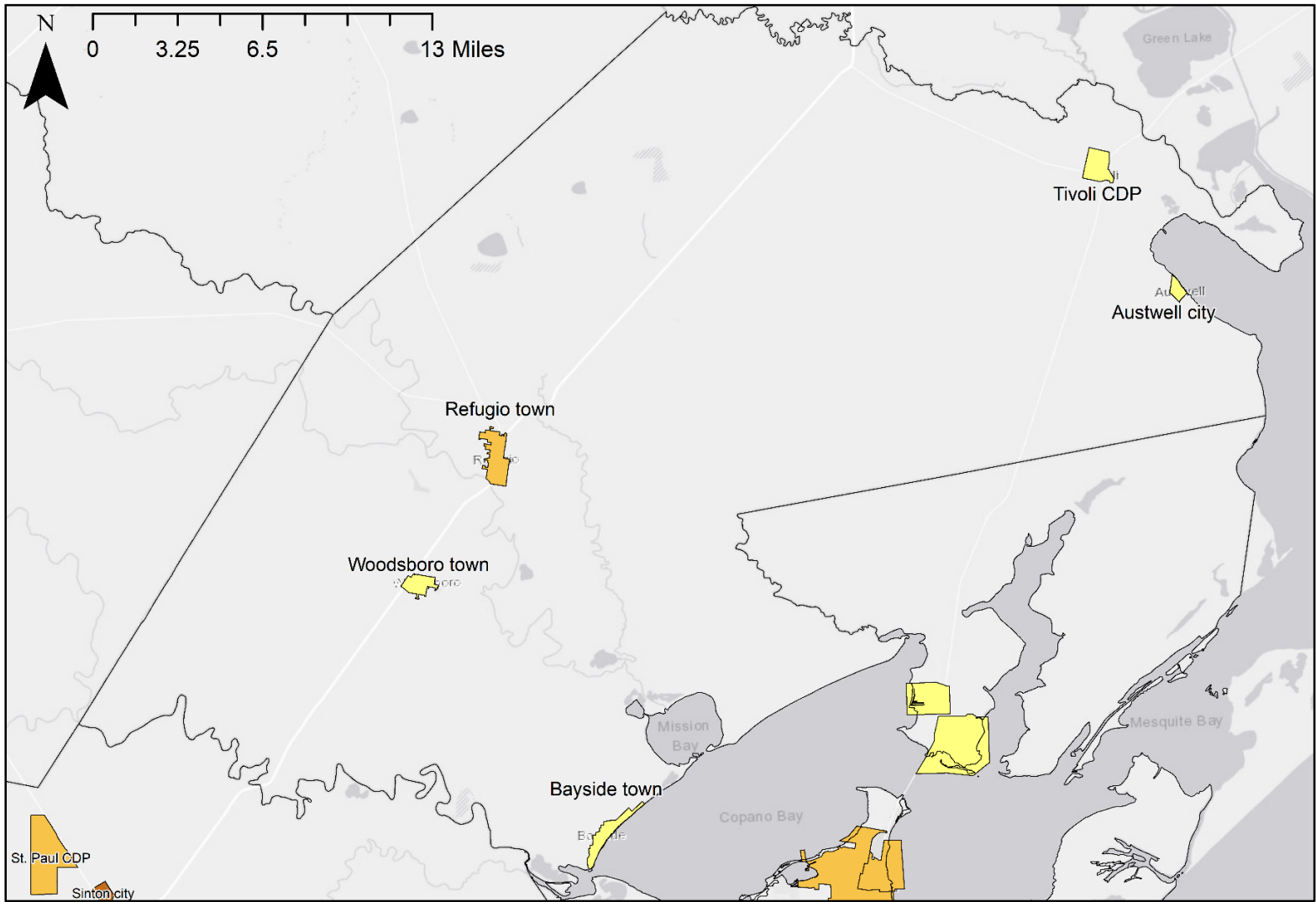
#### LMI percent



Place Name	Population (2019 ACS)	Population (2020 ACS)	Percent Change (2019-2020)	Percent LMI
Refugio town	2806	2748	-2.1%	46.8%
Woodsboro town	1344	1441	7.2%	31.0%
Tivoli CDP	527	550	4.4%	52.9%
Bayside town	333	428	28.5%	41.0%
Austwell city	133	118	-11.3%	32.0%

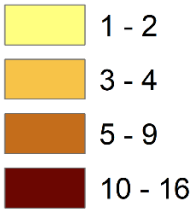
**Low and Moderate Income (LMI):** The percentage of Low- and Moderate-income persons within a geography. It's a designation by the U.S. Department of Housing and Urban Development (HUD) for Community Development Block Grants for Disaster Recovery (CDBG-DR).

# FEMA Declared Disasters



## Legend

### FEMA Individual Assistance Declared disasters (2002-2019)



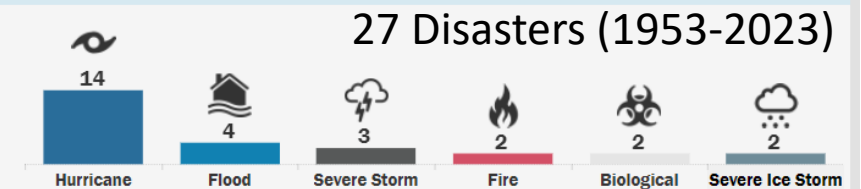
## FEMA Individual Assistance Program\*

Place Name	Declared Disasters	No of Applicants	Properties Destroyed
Refugio town	3	1261	8
Woodsboro town	2	671	3
Tivoli CDP	2	237	9
Bayside town	1	213	9
Austwell city	2	106	0

\*The number of declared disasters summarized by Census Place was obtained from the FEMA's Individuals and Households Program and include the Count of declared disasters (2002-2019) per geography.

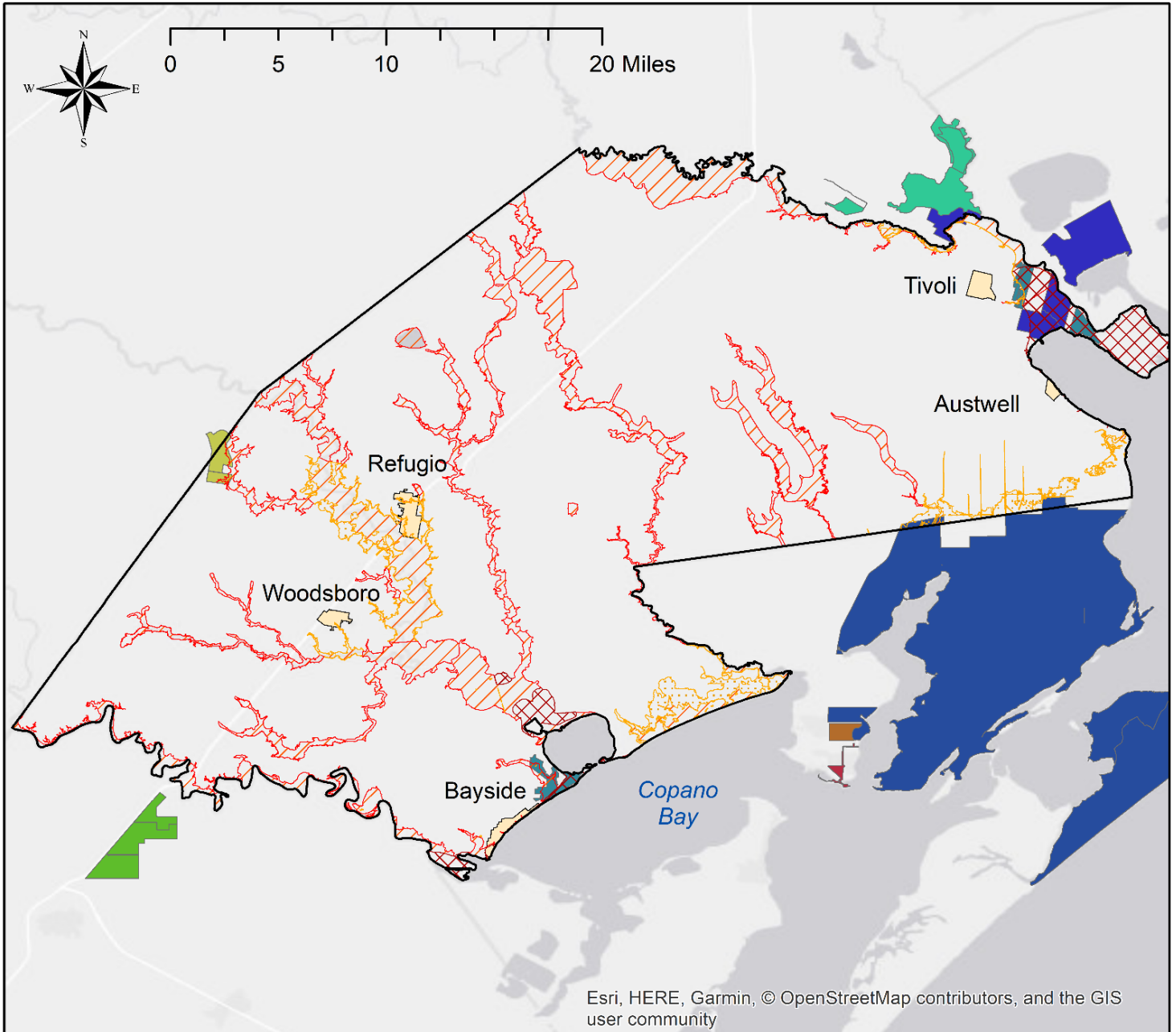
### Disaster(s) by Incident Category

\*Includes Subcategories



<https://www.fema.gov/about/reports-and-data/data-visualizations>

# Protected and Managed Areas



## Legend

### Protected and Managed Areas

#### Unit Name

- Aransas Complex Easement
- Aransas National Wildlife Refuge
- Goose Island State Park
- Grassland Reserve Program (GRP), San Patricio, TX
- Grasslands Reserve Program (GRP)
- Guadalupe Delta Wildlife Management Area
- Us-Tx-142-12
- Wetlands Reserve Program (WRP), Refugio, TX
- Wetlands Reserve Program (WRP), Victoria, TX










### Texas Flood Quilt

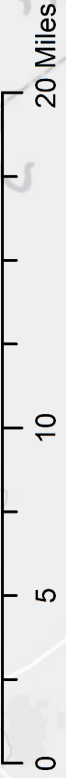
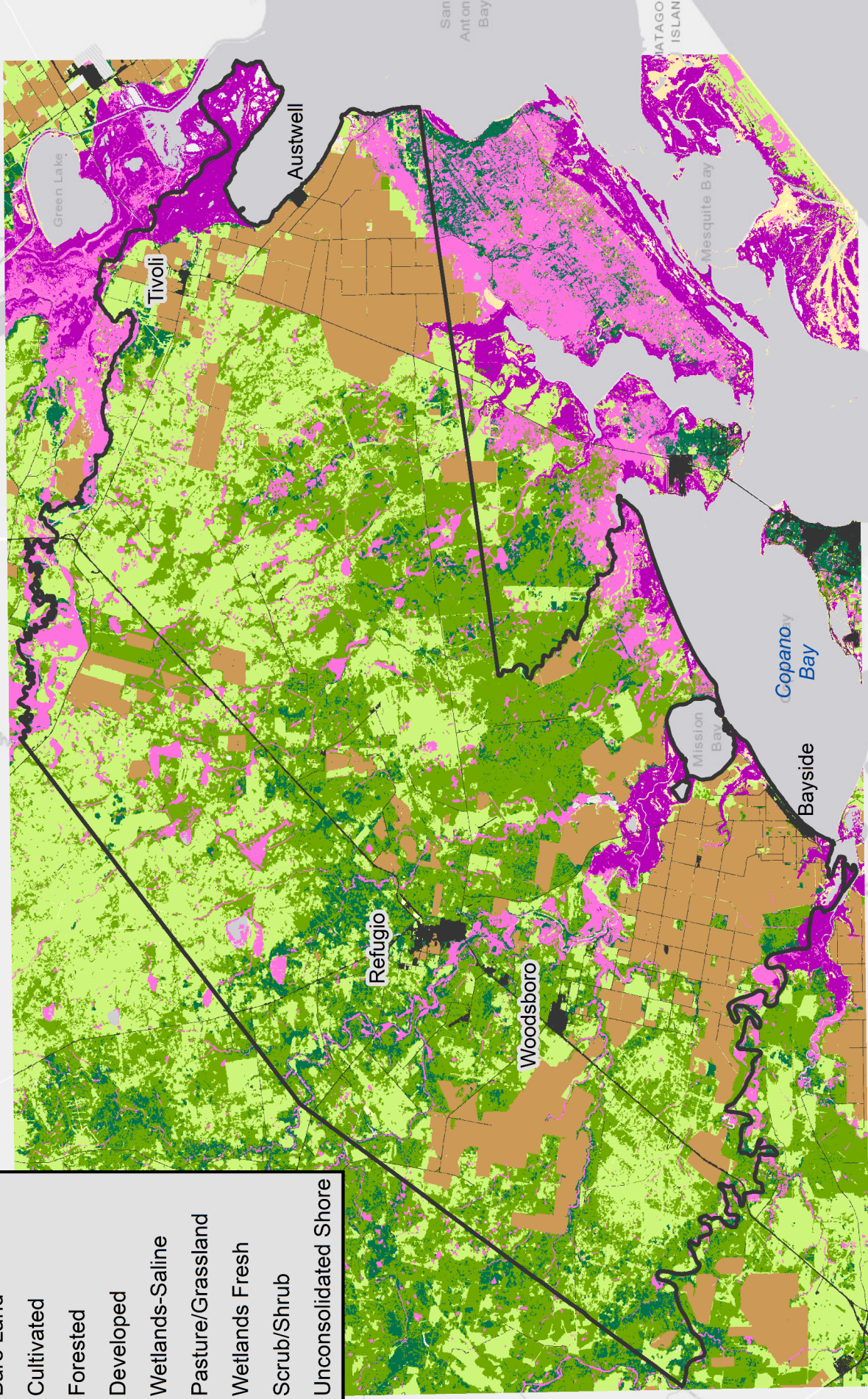
#### Flood Zones

- 1% Annual Chance- A zones
- 1% Annual Chance- V zones
- 0.2% Annual Chnace-X zones
- Census Places

# Refugio County Landcover



Legend	
Land Classification	
	Bare Land
	Cultivated
	Forested
	Developed
	Wetlands-Saline
	Pasture/Grassland
	Wetlands Fresh
	Scrub/Shrub
	Unconsolidated Shore



# Appendix 2

Workshop 1 Summary

# Co-developing Nature-based Solutions in Refugio County, Texas

## Workshop Summary

Friday, January 27, 9 to noon



## Workshop Participants

### Advisory Group

Libby Myers	WISD School Board; Texas Parks and Wildlife Department
Kathryn Tunnell	Coastal Bend Bays and Estuary Program
Amy Ancira	Austwell Town Council
Kaylee Vega	Woodsboro High School Student
Hayden Smith	Anchor QEA
Geron Gowdy	Natural Resources Conservation Service
Mary Afuso	Regional Resilience Partnership of the South Texas Coastal Bend
Ryan Martinez	Regional Resilience Partnership of the South Texas Coastal Bend
Katie Swanson	Mission-Aransas National Estuarine Research Reserve
Joan Garland	Mission-Aransas National Estuarine Research Reserve
April Conkey	Texas Children in Nature
Molly Rooke	Environmental and Community Advocate
Ann Fierova	Community Development Foundation

### Core Team Members

Robert Blaschke	County Judge <i>Ret.</i>
Amanda Fuller	National Wildlife Federation
Arsum Pathak	National Wildlife Federation
Christine (Chris) Hale	Harte Research Institute
Diana Del Angel	Harte Research Institute
Raynaldo De Los Santos	Santos McBain
Hailey Satterwhite Morrow	Santos McBain

### Others

Jennifer Walker	National Wildlife Federation
Dijani Laplace	Harte Research Institute

## Agenda

- 9:00 **Welcome and project overview** (National Wildlife Federation)
- 9:10 **Introductions** (full group)
- 9:20 **Vulnerability assessment** (presentation)
- 9:40 **Introduction to Nature-based Solutions** (presentation)
- 10:00 **Break**
- 10:10 **Identify and prioritize Nature-based Solutions** (small groups)
- 11:30 **Closing and next steps** (National Wildlife Federation & Harte Research Institute)
- 11:35 **Questions** (full group)
- 11:45 **Refreshments**



## Workshop Summary

National Wildlife Federation, partnering with Harte Research Institute, Santos McBain, and Refugio County leadership, convened a 3-hour workshop on nature-based solutions at the Refugio Community Development Foundation. This summary provides an overview of the presentations and participant discussions that took place at the workshop. The format of the workshop included a mix of presentations, large group discussions, and small group discussion.

The purpose of the workshop was to engage community experts to facilitate conversations on nature-based solutions and identify a preferred project for the county. This workshop is funded through the *Engaging Communities to Design Nature-based Solutions to Mitigate Climate-related Hazards* grant provided by the National Academies of Sciences and Medicine (NASEM) Gulf Research Program.



### Outcomes

- An understanding of present and future vulnerabilities in Refugio County and compounding socio-economic and environmental concerns.
- An understanding of nature-based solutions, types, case studies and funding opportunities.
- An identification of nature-based projects preferred by the advisory team.
- An identification of priority projects based on the project review in large group discussions.

### Presentation Highlights

#### Vulnerability Assessment

Arsum Pathak, National Wildlife Federation, presented the county-specific findings from the *Vulnerability and Adaptation to Climate Change: An Assessment for the Texas Mid-Coast*. Sea level rise along this region has increased at the rate of 6 mm/year (3 inches/decade) since 1940 and end-of-century projections show a further increase between 3-9 ft depending on the global greenhouse gas estimates. The increase in sea level rise will lead to potential inundation, coastal flooding, increase in storm surge and erosion of wetlands along the county's coastline. Diana Del Angel, Harte Research Institute, shared *maps to demonstrate the area's susceptibility to storm surge and shoreline erosion*.

## Nature-based Solutions

Amanda Fuller, National Wildlife Federation, presented an overview of nature-based solutions. *Nature-based Solutions* are actions to protect, sustainably manage and restore natural and modified ecosystems in ways that address societal challenges effectively and adaptively, to provide both human well-being and biodiversity benefits. Some examples include wetland restoration, living shorelines, riparian buffers, conservation easements, etc. These solutions provide a range of environmental (water quality, wildlife habitat) and socio-cultural and economic (public health, food security, jobs) benefits. The presentation also included a need to center equity in the design and implementation of these approaches and shared best practices and funding opportunities including National Wildlife Federation's *Nature-based Solutions Funding Database* to do so.

## Small Group Discussion Highlights

Following the presentations, participants broke out into small groups to discuss nature-based solutions available for their county. Core team members from the project team were assigned as facilitators to each group. The worksheets developed as part of National Wildlife Federation's *Incorporating Nature-based Solutions into Community Climate Adaptation Planning* were provided to each group member to help facilitate the discussion. The worksheets were based on the Steps to Resilience framework developed through U.S Climate Resilience Toolkit and focused on three steps of the framework:

- *Step 3.* Investigate Options to identify a range of potential nature-based solutions and strategies available to a community.
- *Step 4.* Prioritize and Plan to determine which potential actions are the most appropriate to take, and when those actions should be implemented.
- *Step 5.* Take action to craft specific actions that will be necessary in order to successfully implement the NbS option selected for a specific site within the community.

Each small group completed a summary sheet to share notes and reflections with the entire advisory group. The summary questions included:

- List potential nature-based projects and their locations.
- Evaluate the possible NbS option through guiding questions and describe the appropriateness of preferred project(s).
- Identify 2-3 action steps for implementation and opportunities for advisory group engagement for each action.
- List the specific desired outcomes for this NbS project.

### **Group 1: Amy Ancira, Mary Afuso, Ann Fierova, Hayden Smith**

*Facilitator: Raynaldo De Los Santos*

This group identified three projects: Black Point Bayside Living Shoreline, Mission River Living Shoreline, and Hynes Bay Restoration. With their small group, the group discussed:

- Need for intense planning and project definition before taking action

- Continuing getting community feedback and respecting the culture with community buy-in

**Group 2: Robert Blaschke, Ryan Martinez, Libby Myers, Kathryn Tunnell**

*Facilitator: Arsum Pathak*

This group identified two projects: N. Woodsboro Green Infrastructure and E. Refugio Stormwater Management. With their small group, the group discussed:

- Need to address flood concerns in NE Refugio through a retention pond project
- Lions/Shelley Park re-designed with educational stormwater features to enhance nature-based components, mitigate flooding
- Inland flooding in Woodsboro can be mitigated using the football field as retention pond/public park and improving water quality through education/outreach, highlighted that this is a private property
- NbS can attenuate overflows of municipalities sewage plant

**Group 3: Molly Rooke, Katie Swanson, Kaylee Vega**

*Facilitator: Chris Hale*

This group identified two projects: Coastal Prairie Restoration at Fennessey Ranch and Black Point Boat Ramp. With their small group, the group discussed:

- Need to reduce risk to communities through fire management, prescribed burning, and other land management techniques to preserve the coastal prairie habitat
- Conducting community outreach through NERR educational opportunities, understanding long-term community, and school groups engagement, and environmental benefits and monitoring for them, to build community buy-in
- Boat ramp project to restore habitats (oyster, salt marshes) and increase recreational access and use, decrease storm impact risk to communities and increase public use access

**Group 4: April Conkey, Joan Garland, Geron Gowdy**

*Facilitator: Diana Del Angel*

The group identified two projects: Bayside Green Infrastructure and E. Bayside Flood Mitigation. With their small group, the group discussed:

- Need to emphasize the Bayside area as potential for development and population growth, recreation etc. increases
- Part of Bayside good for nature park and restoration through acquisition to provide buffer as the communities grow
- Concerns on landownership and the potential to do the project under a million dollars
- Other things to consider include projects near roads as TXDOT property

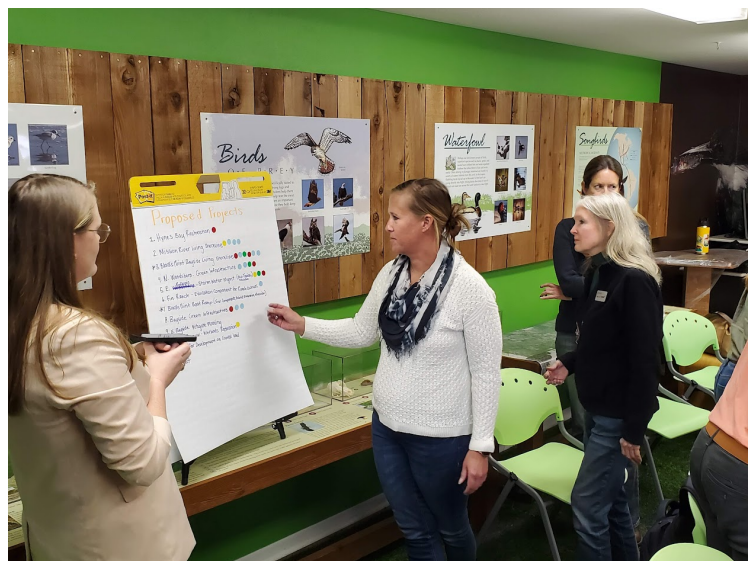
Two additional projects - Levee Removal at the confluence of San Antonio and Guadalupe rivers and Policies for Development on Coastal Land - were also suggested as one of the group members.

Project	Number of Votes	Group
Hynes Bay Restoration	2	1
Mission River Living Shoreline	5	1
Black Point Bayside Living Shoreline	10	1
N. Woodsboro Drainage Green Infrastructure	7	2
E. Refugio Stormwater Management	5	2
Fennessey Ranch Education Component for Ranch Owners	4	3
Black Point Boat Ramp	-	3
Bayside Green Infrastructure	4	4
E. Bayside Flood Mitigation	-	4
Levee Removal (confluence of San Antonio and Guadalupe Rivers)	1	4
Policies for Development on Coastal Land	-	4

## Large Group Discussion and Dot Polling Highlights

Each group shared reflections on their identified projects with the entire group followed by a dot-polling activity to vote on their top three preferred projects. Some common themes that emerged during the report-outs include:

- All four groups expressed an interest in the Bayside area through different project ideas to mitigate flood concerns and increase recreational opportunities.
- Group members were interested in enhancing education and eco-tourism opportunities through any nature-based project.
- Several projects will require private landowners' willingness and support and members highlighted the need to include them at the table.



Group members were asked to select their preferred projects and 11 group members participated in a dot polling activity to select their top three projects. The projects with highest votes were: Black Point Bayside Living Shoreline (10 votes), N. Woodsboro Drainage Green Infrastructure (7 votes), Mission River Living Shoreline (5 votes), and E. Refugio Stormwater Management (5 votes).

## Next Steps

Following the workshop, the core team met virtually on 1/31 to review the workshop findings and project ideas. The core team talked through each of the top four projects and decided to focus on top three projects: Black Point Bayside Living Shoreline, Mission River Living Shoreline, and E. Refugio Stormwater Management. The team strategically decided to skip N. Woodsboro Drainage Green Infrastructure Project because of previous experience with landowner unwillingness that might be difficult to influence during this project's duration. The core team decided to continue refining the top three projects and develop them in a way that aligns with advisory team selection and is appropriate for the funding scope and timeline. Some next steps include:

- Select project through continued community buy-in and vetting
- Conduct community outreach through surveys (Harte Research Institute)
- Prepare proposal (Santos McBain)
- Review and finalize proposal in Workshop #2 (Core Team and Advisory Group)

# Appendix 3

Nature-Based Project List

## Black Point Bayside Living Shoreline Project

**Project Description:** The project proposes the installation of a living shoreline to protect shoreline erosion and enhance wetland habitats. The area of shoreline near Black Point has eroded due to hurricanes, storm surge, wave energy and increasing water levels. The site is further at-risk of inundation due to future increase in sea level rise. This project can include multiple components which are considered as separate phases. The first phase will construct living shoreline features and connect the in-tact old roadway piles to provide shoreline protection. This phase will also include installations of community amenities such as trails, boardwalk, etc. preferred by the community members (identified through a supplementary project survey). The future phase of the project will focus on habitat creation, expansion of recreational opportunities (trails, boardwalk, etc.), and minimizing the sediment build-up on the Black Point edge of the site (close to the existing boat ramp) by dredging and beneficially using the sediment to the nearby marsh habitat. The efforts of this project will be complementary to the “Bayside Water Quality, Access, and Habitat Creation” project identified as a priority project in the 2023 Texas Coastal Resiliency Master Plan.

**Hazard Risk Reduction Benefits:** This project is proposed along the stretch of Bayside at risk of intermediate-low sea level rise (3 feet) and coastal storms.

**Ecological Benefits:** The project will help reduce wetland erosion and protect the productive wetlands. that are already accreting.

**Community Benefits:** The site is publicly accessible to fishermen, bird watchers, tourists, and will provide community-preferred recreational opportunities. The location of the project is in a highly visible location for the public and will help drive future funding opportunities.

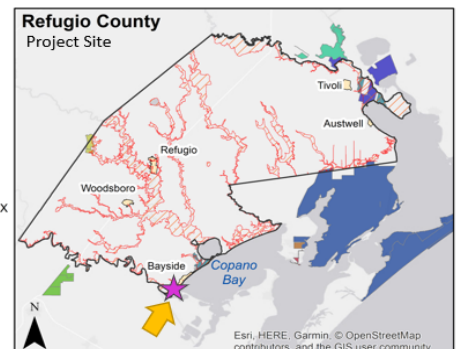
**Land Ownership/Jurisdiction:**  
Refugio County

Black Point Bayside Living Shoreline Project



### Legend

- Cities and townships
  - Flood Zones
  - Protected and Managed Areas**
  - Unit Name**
  - Aransas Complex Easement
  - Aransas National Wildlife Refuge
  - Goose Island State Park
  - Grassland Reserve Program (GRP), San Patricio, TX
  - Grasslands Reserve Program (GRP)
  - Guadalupe Delta Wildlife Management Area
  - Us-Tx-142-12
  - Wetlands Reserve Program (WRP), Refugio, TX
  - Wetlands Reserve Program (WRP), Victoria, TX
- Imagery and Data sources: ESRI, Google, USGS, USCENSUS



## Mission River Living Shoreline Restoration

**Project Description:** The project will help restore riparian function and shoreline stabilization along the Mission River by installing living shoreline features. The river is experiencing stream bank erosion and habitat degradation impacting the overall water quality of the river as well as the Copano Bay. During the heavy rainfall events of July 2021, the Mission River at Refugio rose above major flood and crested at 31.24 feet putting the residents living around the river at risk. The project will include evaluation of the riparian areas along Mission River from Refugio to Mission Bay to identify riparian restoration opportunities and conducting outreach to landowners, as needed, to design living shoreline features along the river. This would involve contacting landowners to discuss the natural and cultural significance of the river, develop educational materials to be used in that discussion and seek landowners' participation and provide funding where appropriate and of interest to the landowner to identify opportunities for living shoreline and habitat restoration. The permitting and construction of the living shoreline features will take place in the next phase of the project.

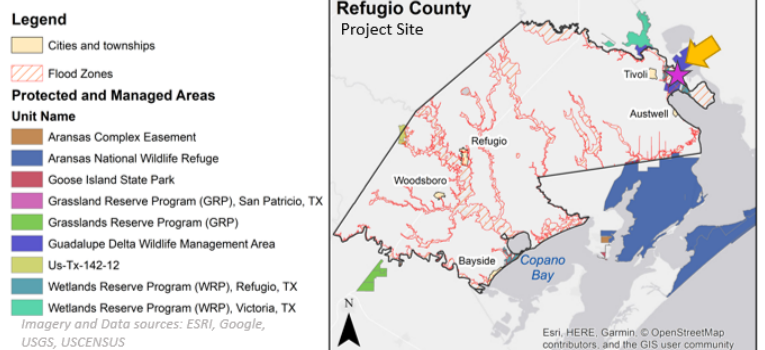
**Hazard Risk Reduction Benefits:** This project is proposed along the Mission River experiencing flood risks and water quality challenges due to extreme rainfall and coastal storms.

**Ecological Benefits:** The project will help protect the riverine habitat and wetlands and create positive ecological cascades for Mission Bay and Copano Bay.

**Community Benefits:** The project will provide water quality improvement benefits and is a critical first step towards improving public access to the river and recreational opportunities for community members.

**Land Ownership/Jurisdiction:** Refugio County, Private landowners

Mission River Living Shoreline Restoration





## East Refugio Nature-based Stormwater Management

**Project Description:** The project will include development and implementation of nature-based stormwater management measures to alleviate stormwater runoff, flooding and nonpoint source pollution at the eastern side of the town of Refugio. The first phase of the project would focus on delivering education programs within the town that increase awareness regarding the impacts of stormwater on riparian areas and water quality. This can include installation of demonstration sites (constructed wetlands, green infrastructure practices, etc.) at Lions/Shelley Park, training for city/county district officials and community members through developing flyers, and other outreach materials. The second phase will involve working with local jurisdiction and community members and potentially develop an incentive program for landowners to install green infrastructure on their properties. Potential measures include, but are not limited to, rain gardens, rain barrels/cisterns, green roofs, permeable pavement, bioretention, constructed wetlands, and bioswales.

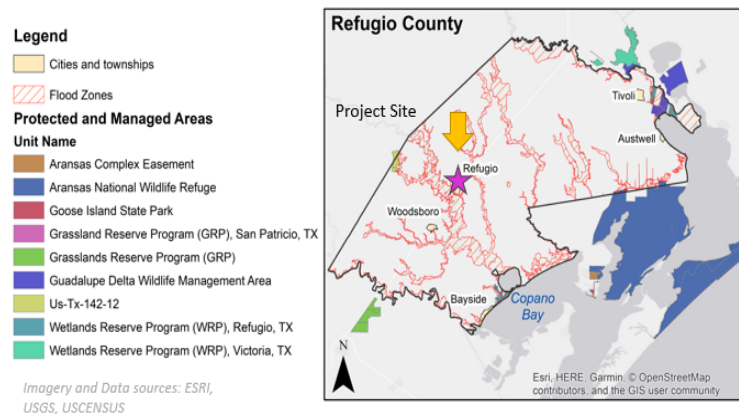
**Hazard Risk Reduction Benefits:** This project is proposed in the eastern side of Refugio, experiencing flooding due to stormwater runoff and rainfall events.

**Ecological Benefits:** The project will help protect the water quality of the Mission River that feeds into Mission Bay and Copano Bay by reducing stormwater runoff.

**Community Benefits:** The project will provide education and learning opportunities for community members. The incentive program developed through the project would also serve as a convincing example for community members to work together on shared flood mitigation goals.

**Land Ownership/Jurisdiction:** Refugio County, Town of Refugio, Private landowners

East Refugio Nature-based Stormwater Management



## Projects identified by the Advisory Team in Workshop #1

<b>Project</b>	<b>Number of Votes</b>	<b>Group</b>
Hynes Bay Restoration	2	1
Mission River Living Shoreline	5	1
Black Point Bayside Living Shoreline	10	1
N. Woodsboro Drainage Green Infrastructure	7	2
E. Refugio Stormwater Management	5	2
Fennessey Ranch Education Component for Ranch Owners	4	3
Black Point Boat Ramp	-	3
Bayside Green Infrastructure	4	4
E. Bayside Flood Mitigation	-	4
Levee Removal (confluence of San Antonio and Guadalupe Rivers)	1	4
Policies for Development on Coastal Land	-	4

# Appendix 4

Workshop 2 HRI Presentation



# Nature Based Solutions for Refugio County: Community Survey

April 14<sup>th</sup>, 2023

Christine Hale - Diana Del Angel



# Purpose and Survey Design

- To capture Refugio County community's values, concerns, and preferences regarding use of natural and public areas

12:29

English

**Are you a resident of Refugio County?**

Yes

No

Other. Please explain.

← →

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# Survey Distribution

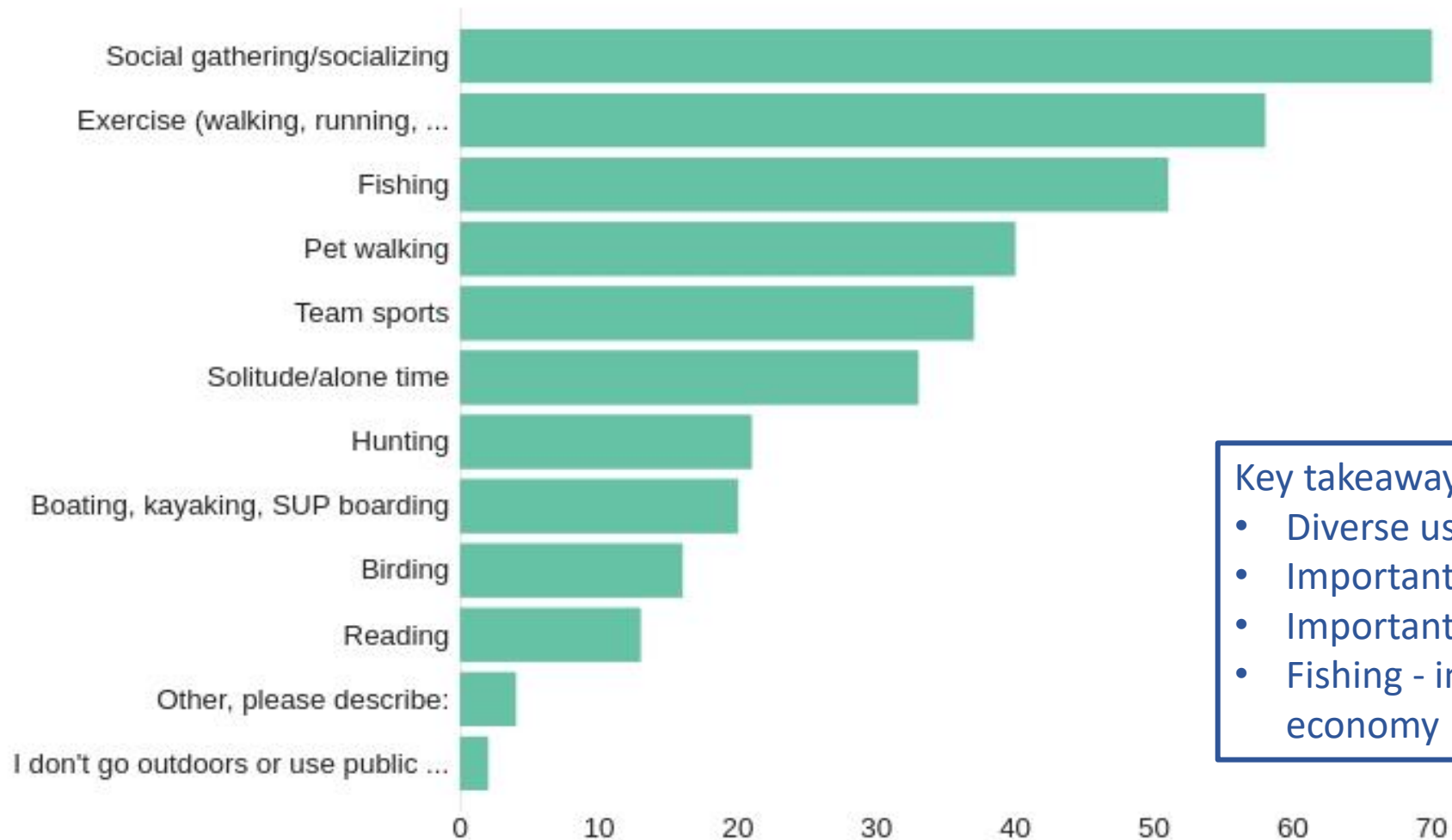
- Shared online: March 20<sup>th</sup>
- Distributed at the Refugio County Fair March 24<sup>th</sup>
- Published in local paper March 30<sup>th</sup>
- Total Responses= 131



# Survey Results

Q2 - How do you use outdoor, public spaces in Refugio County? Please select all that apply. -

Selected Choice



## Key takeaways:

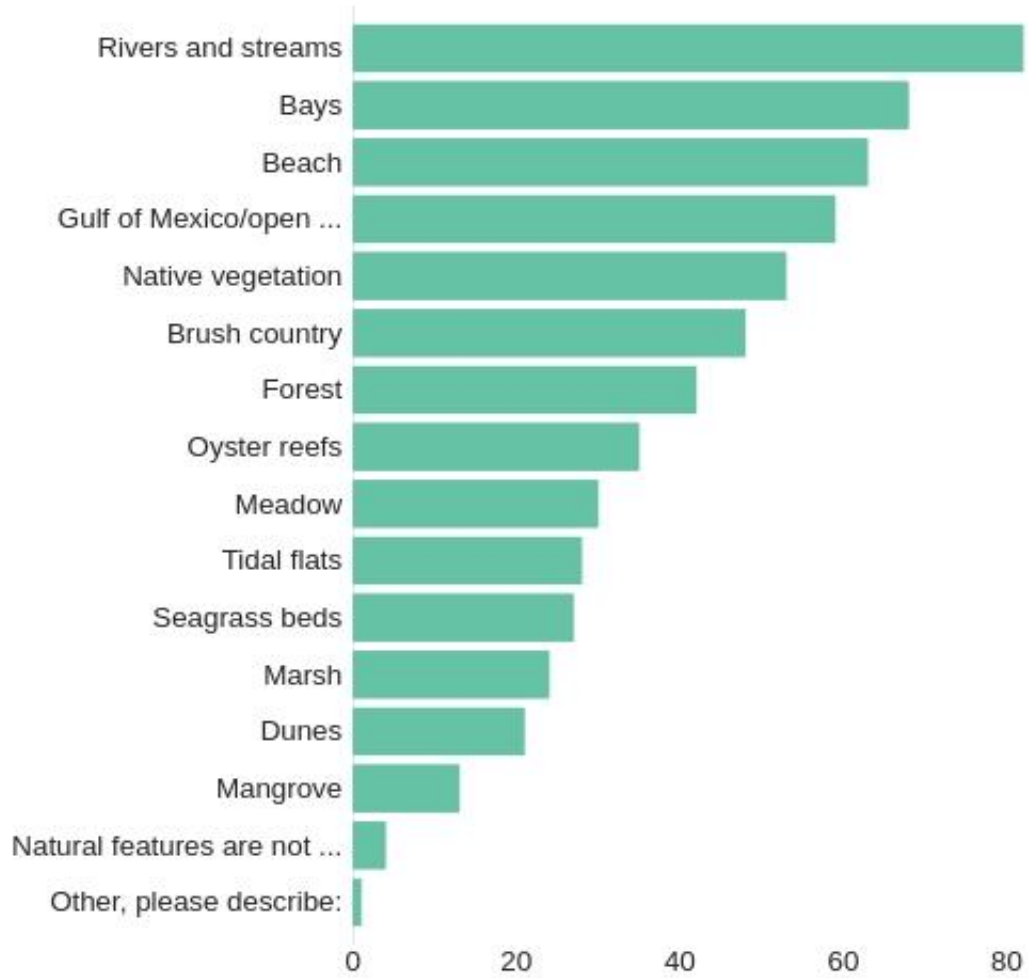
- Diverse use
- Important to social-cultural structure
- Important to health & well-being
- Fishing - implications for water quality, economy

● Choice Count





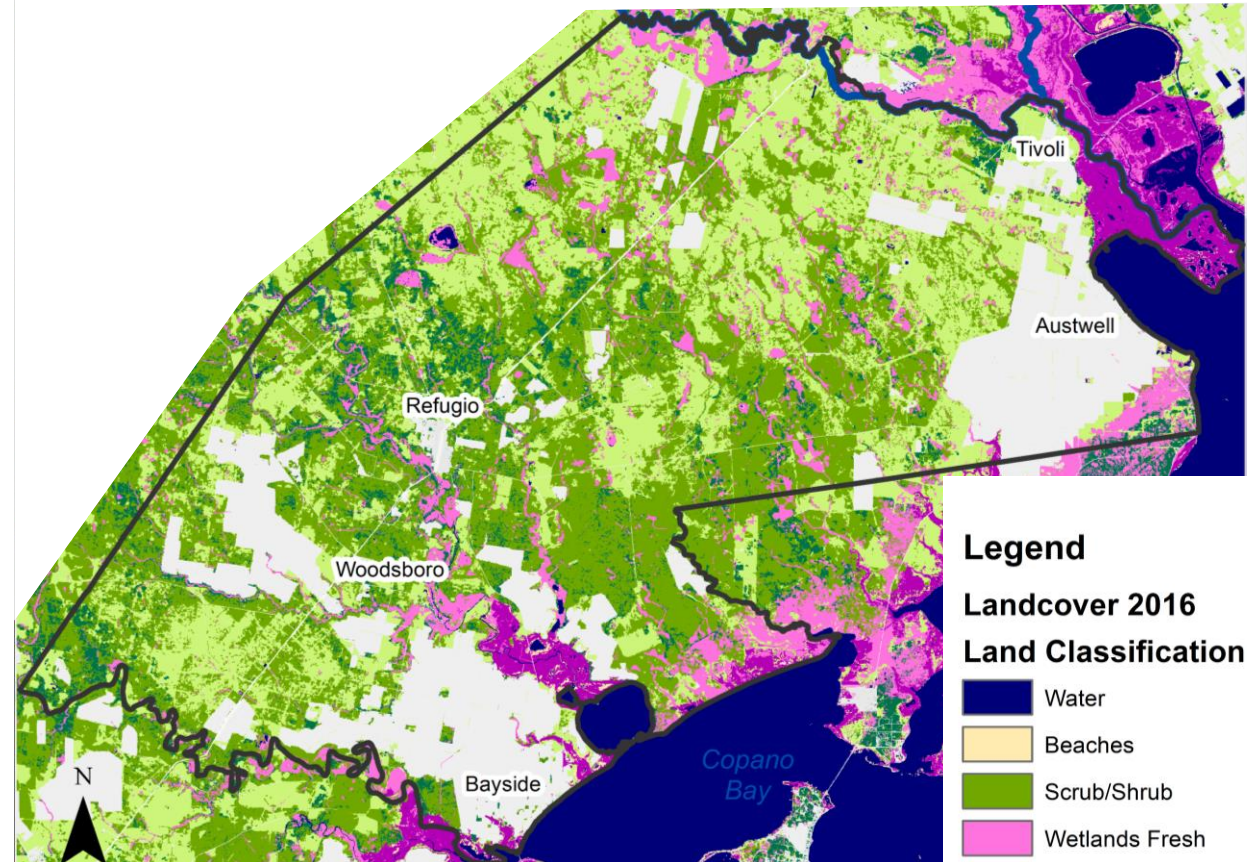
Q4 - In general, which of the following natural features are important to you? Please select all that apply. - Selected Choice



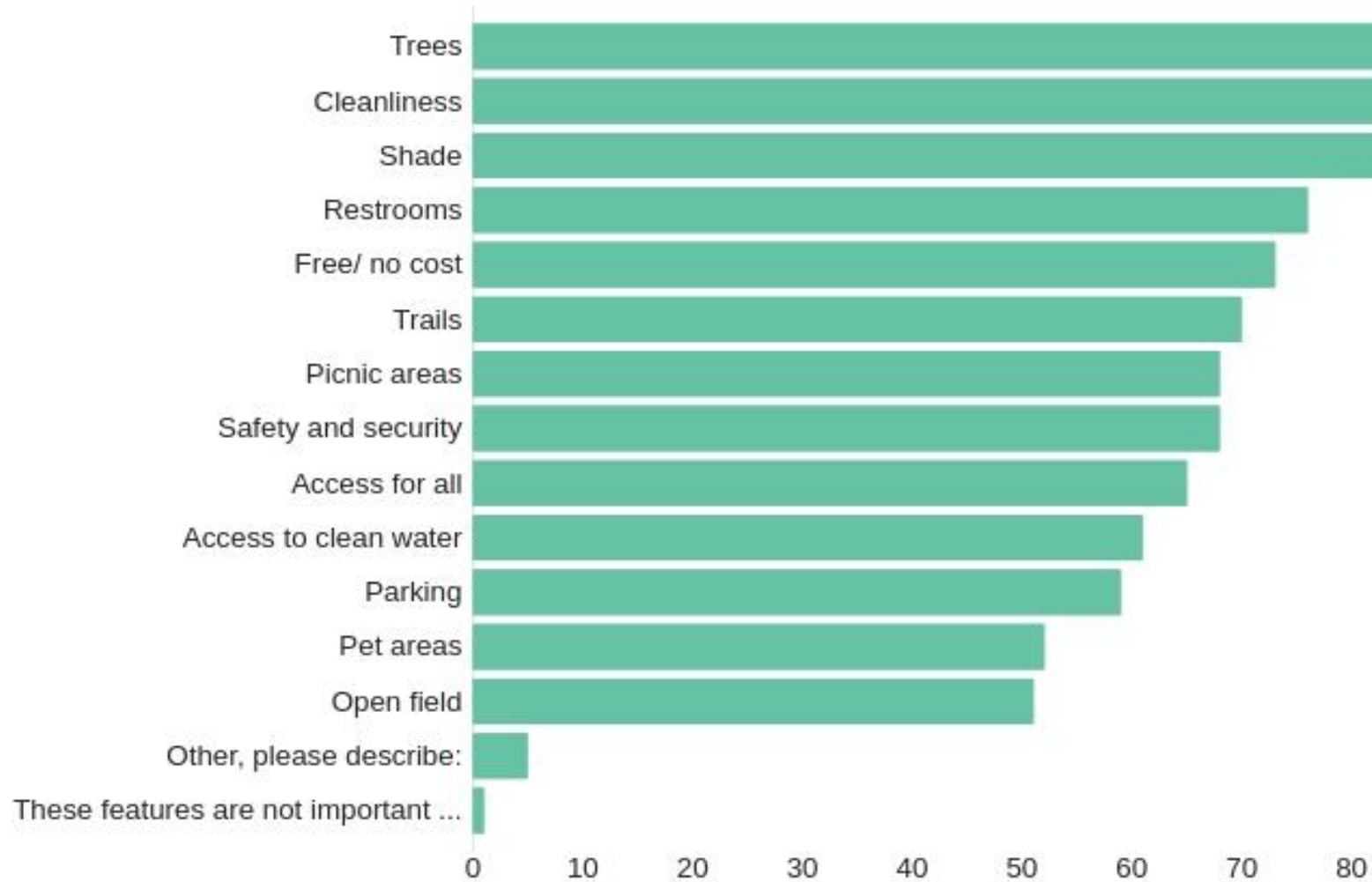
● Choice Count

Key takeaways:

- Water features & vegetation are highly valued



Q5 - What aspects of outdoor public areas are important to you? Please select all that apply and add your own ideas in the "Other" box. - Selected Choice



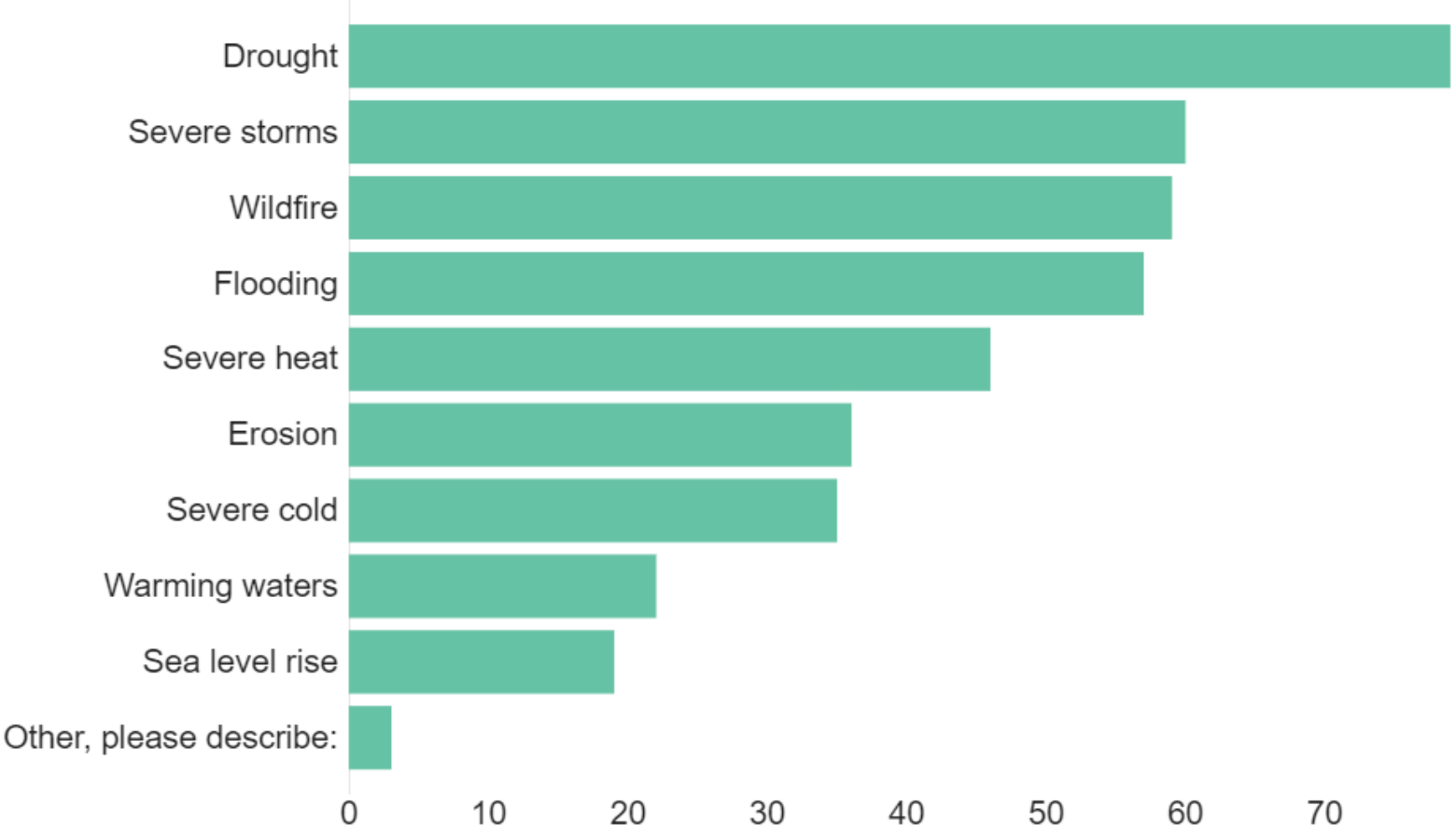
● Choice Count



Key takeaways:

- All > 50; all are important for project to consider incorporating
- Note "Free" is in top 5 aspects

Q6 - Which of the following environmental challenges are you concerned about? Please select all that apply. - Selected Choice



- Key takeaways:
- Potential connection between concerns re: drought and the value placed on natural vegetation, water
  - Sea level rise is not as concerning



Q8 - Do you have ideas or opinions about how to reduce risks or hazards associated with environmental challenges in your community? Please share your thoughts.



- 70 Responses
- Flood control
- More oversight, policy and enforcement
- Education
- Safety
- More dumpsters
- Signage
- Safety
- Updating ramps

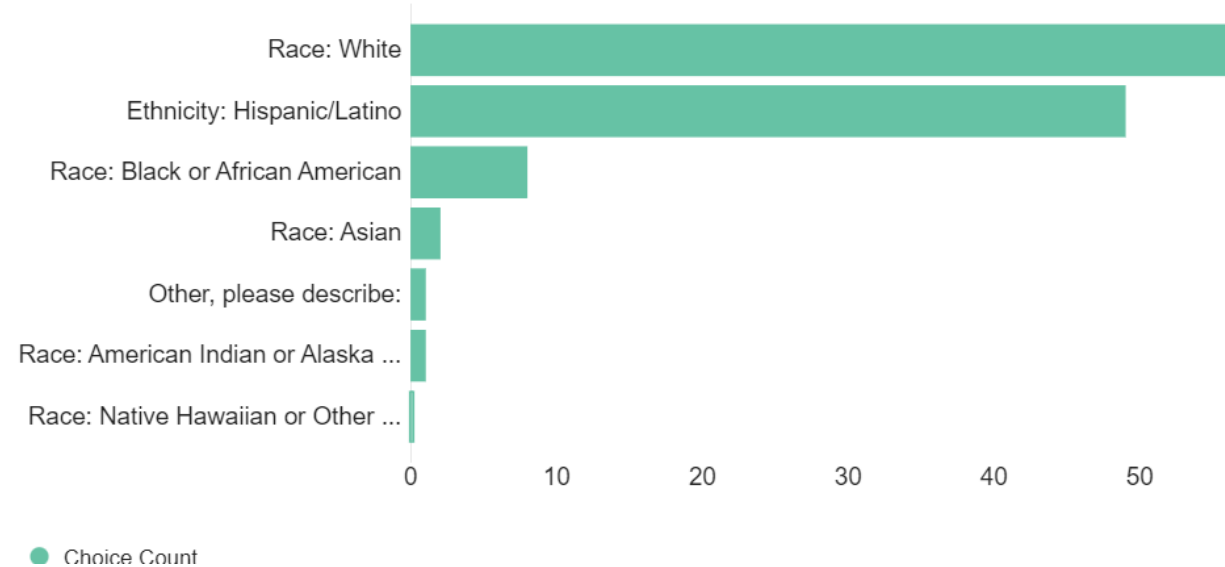


# Survey vs County Demographics

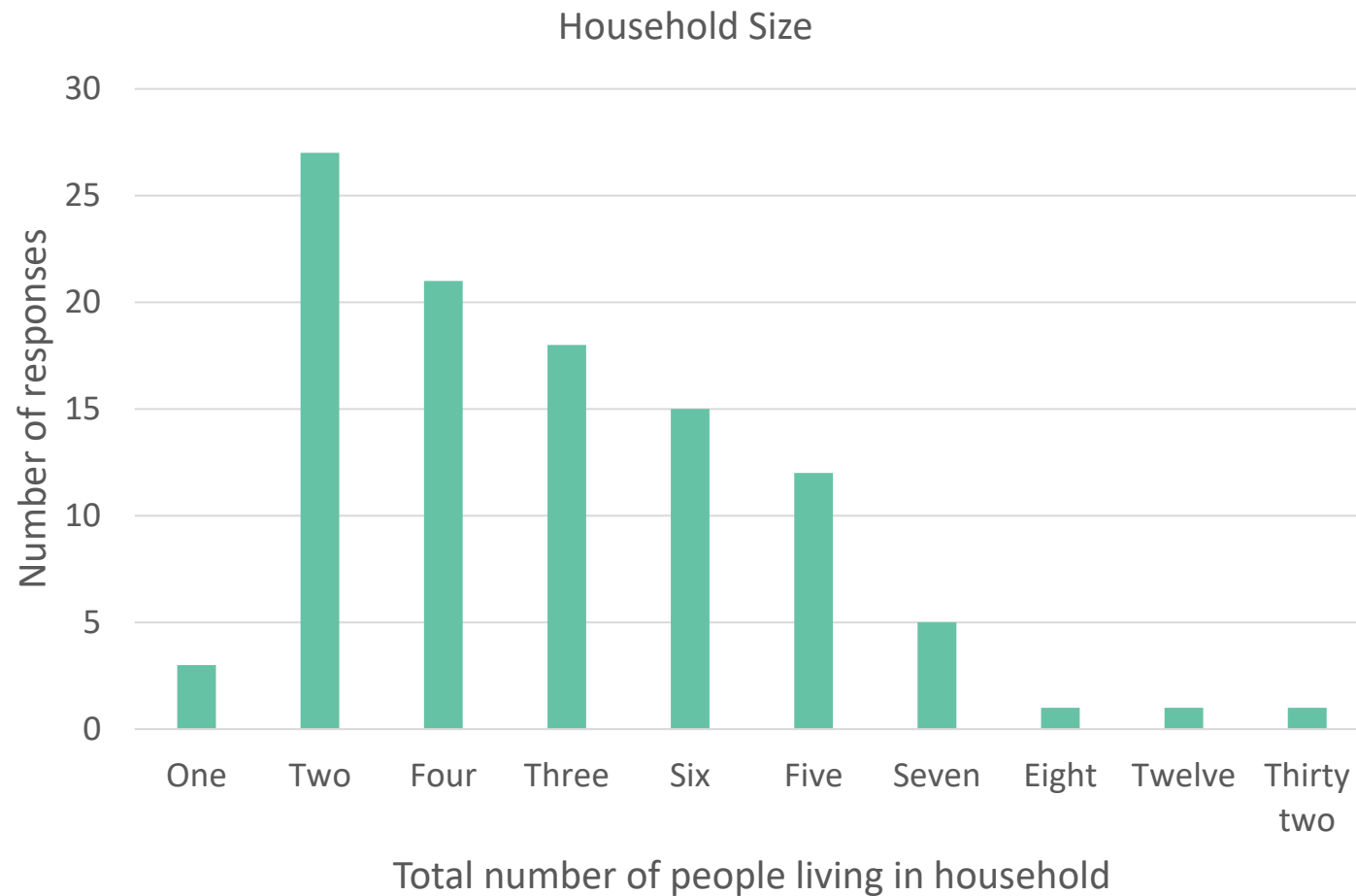
- Census 2020  
Refugio County
- Total Population:  
6,741
- Percent White  
alone or in  
combination: 81%
- Percent Hispanic or  
Latino: 49%

5

Q9 - What is your Race/Ethnicity? Please select all that apply. - Selected Choice



# Q10 - Including yourself, how many total people live in your home with you?



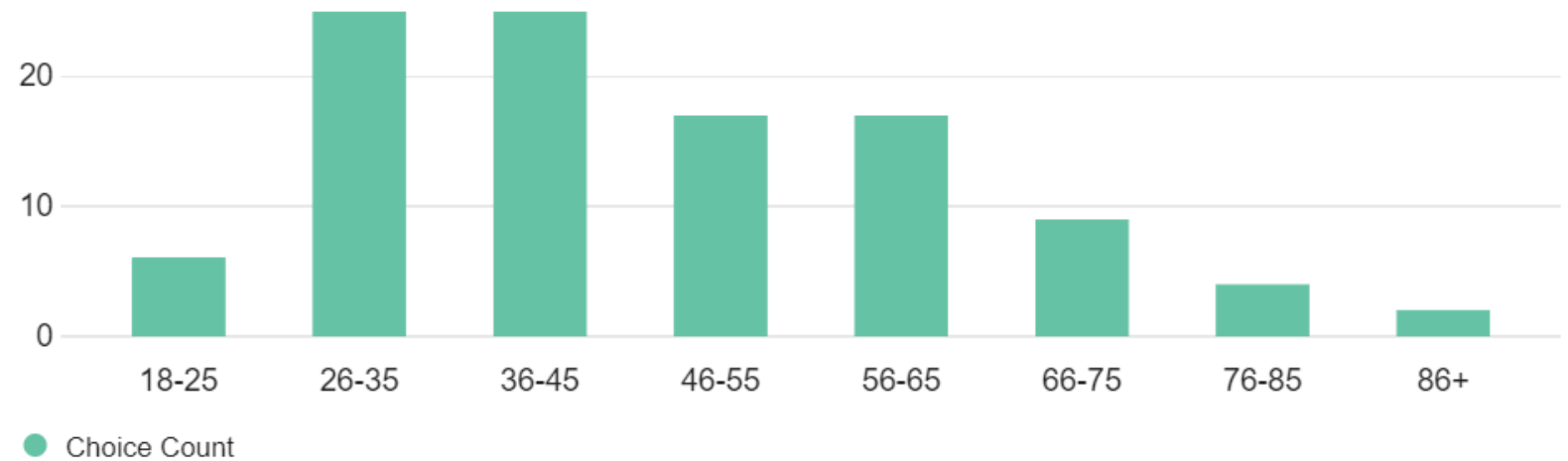
- Person per household (2017-2021: 3.05\*)

\*census quickfacts



# Survey vs County Demographics

Q11 - What is your age range?



Age

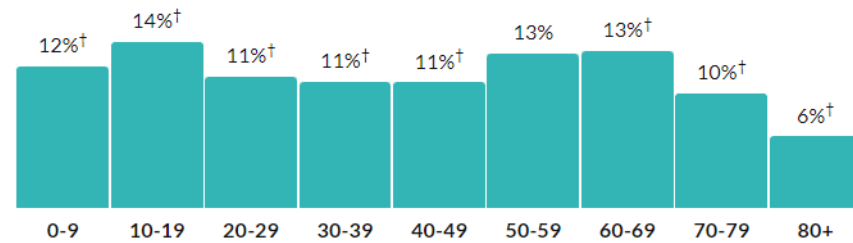
**42.3**

Median age

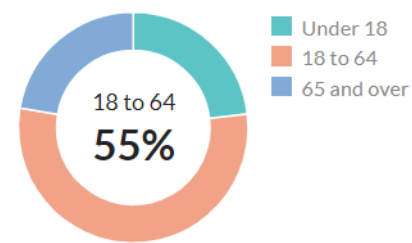
about 20 percent higher than the figure in Texas: 35

about 10 percent higher than the figure in United States: 38.4

Population by age range



Population by age category



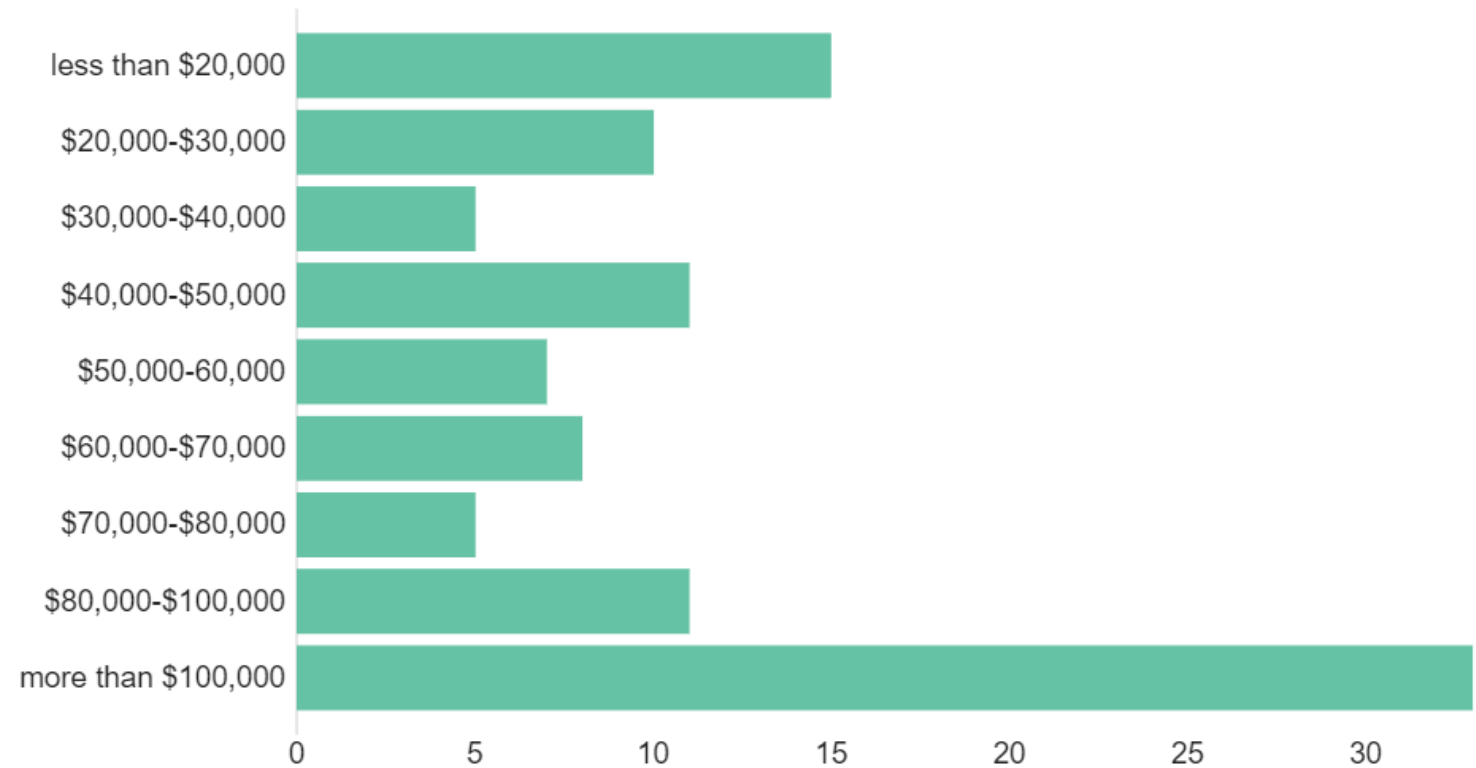
- <https://censusreporter.org/profiles/05000US48391-refugio-county-tx/>

Show data / Embed

# Survey vs County Demographics

- The median household income: \$51,152

Q12 - What is your household income range (within the last 12 months)?



# Discussion?

- How will the Black Point project address the community's key primary environmental concerns (drought, storms, wildfire, flooding)?
- Can the Black Point project include space for activities that the community is most interested in (socializing, exercising, fishing, pets) ?
- Which natural features are included in the Black Point project that the community values (rivers, streams, bays)?
- Are the community's preferred aspects included in the Black Point project (trees, shade, clean, restrooms, free)?

# Appendix 5

Workshop 2 Summary (Draft)

# Co-developing Nature-based Solutions in Refugio County, Texas

## Workshop Summary

Friday, April 14, 9 to noon



TEXAS A&M  
UNIVERSITY  
CORPUS  
CHRISTI

**HARTE**  
RESEARCH INSTITUTE  
FOR GULF OF MEXICO STUDIES



**SANTOS | MCBAIN**

## Workshop Participants

### Advisory Group

Libby Myers	WISD School Board; Texas Parks and Wildlife Department
Kiersten Stanzel	Coastal Bend Bays and Estuary Program
Amy Ancira	Austwell Town Council
Dan Opdyke	Anchor QEA
Geron Gowdy	Natural Resources Conservation Service
Mary Afuso	Regional Resilience Partnership of the South Texas Coastal Bend
Joan Garland	Mission-Aransas National Estuarine Research Reserve
April Conkey	Texas Children in Nature
Molly Rooke	Environmental and Community Advocate
Ann Fierova	Community Development Foundation

### Core Team Members

Robert Blaschke	County Judge <i>Ret.</i>
Arsum Pathak	National Wildlife Federation
Christine (Chris) Hale	Harte Research Institute
Diana Del Angel	Harte Research Institute
Hailey Satterwhite Morrow	Santos McBain

## **Agenda**

- 9:00 **Project overview** (National Wildlife Federation)
- 9:05 **Introductions** (full group)
- 9:15 **Project updates** (National Wildlife Federation)
- 9:30 **Black Point Bayside Living Shoreline Project** (Santos McBain)
- 9:50 **Community survey** (Harte Research Institute)
- 10:10 **Break**
- 10:20 **Group discussion to gather feedback/refine project design, identify engagement and outreach opportunities** (full group)
- 11:20 **Questions** (full group)
- 11:35 **Closing and next steps** (National Wildlife Federation)
- 11:45 **Refreshments**

## Workshop Summary

National Wildlife Federation, partnering with Harte Research Institute, Santos McBain, and Refugio County leadership, convened a 3-hour workshop on nature-based solutions at the Refugio Community Development Foundation. This summary provides an overview of the presentations and participant discussions that took place at the workshop. The format of the workshop included a mix of presentations and large group discussions.

The goal of the second workshop was to engage community experts to share the Bayside Living shoreline project identified during the first workshop, gather feedback on the project proposal and explore avenues for continued engagement and outreach. This workshop is funded through the *Engaging Communities to Design Nature-based Solutions to Mitigate Climate-related Hazards* grant provided by the National Academies of Sciences and Medicine (NASM) Gulf Research Program.

### Outcomes

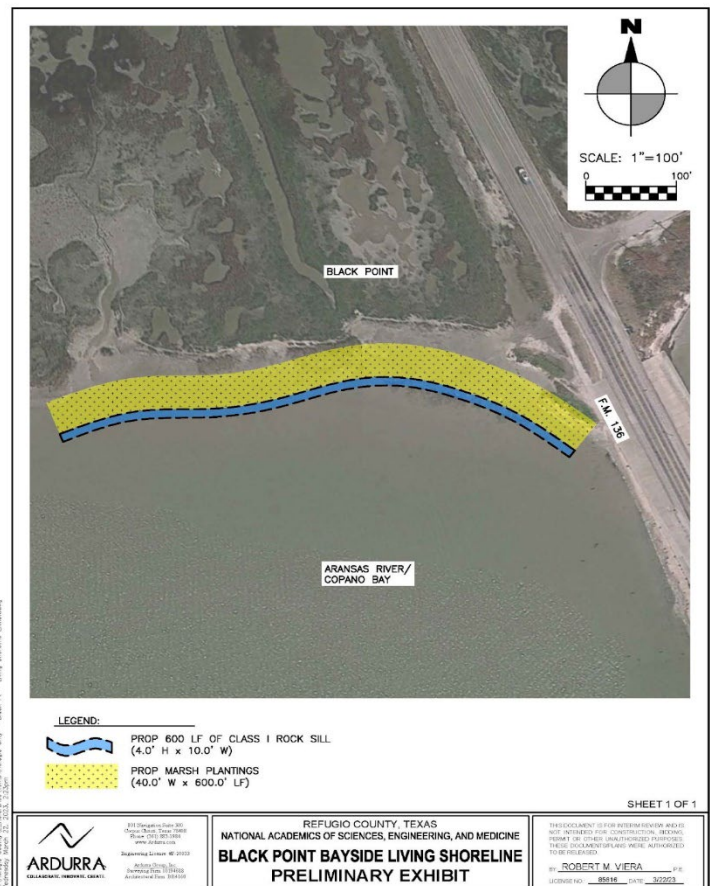
- A detailed understanding of the pros and cons related to the Black Point Bayside Living Shoreline project.
- An understanding of community needs, goals and priorities in the county.
- An understanding of the continued project sustainability and engagement by the advisory board.

### Presentation Highlights

#### Project Summary and Workshop 1 Outcomes

Arsum Pathak provided a short project overview. The purpose of this project was to engage the community, facilitate a conversation nature-based solutions for the county and organize community to support Refugio County's resilience efforts. In addition, a summary of Workshop 1 was presented. The outcome of Workshop 1 were three potential projects of interest, of which *Black Point Living Shoreline Project* had the most votes. The other two projects also considered were the *Mission River Living Shoreline Restoration* and the *East Refugio Nature-based Stormwater Management*.

#### Black Point Bayside Living Shoreline Project





Hailey Satterwhite Morrow, Santos McBain, presented a preliminary design of the Black Point Bayside Living shoreline project. The preliminary scope of work included a living shoreline design that includes a 600 linear feet of rock silt (4' by 10') along with marsh plantings (40' by 60') in the area east of F.M. 136 on Aransas River and Copano Bay in Bayside, Texas. A proposal for continuous planning and feasibility studies will be submitted to the National Academies of Sciences Gulf Research Program.



### **Community Survey**

Diana Del Angel, Harte Research Institute, shared findings from the community survey that captured Refugio County community's values, concerns, and preferences regarding use of natural and public areas. The survey collected anonymous feedback from participants and went live on March 20, 2023. The survey is available on the project's website, was distributed at the Refugio County Fair March 24<sup>th</sup>-25<sup>th</sup> and advertised in the local paper on March 30<sup>th</sup>. HRI received a total of 131 responses as of April 14, and will continue collecting responses through the end of the month.

Survey responses suggest that:

- Residents of Refugio County use natural and public areas in diverse ways and are important to the socio-cultural structure of the county and for health and well-being. Primary uses include social gathering and socializing, exercise, and fishing.
- Some of the most widely used public areas in the county are parks and sports fields. Survey responses also pointed to high interest in areas adjacent to water such as rivers and bays. This was further supported by residents' choices in features of importance, where rivers and streams, bays, and beaches were top of the list.
- There are several amenities and characteristics of a place that are considered and appreciated for example trees, shade, cleanliness, restrooms, and free access.
- Regarding environmental concerns drought is the main concern followed by severe storms, wildfires, and flooding.
- Open ended questions find comments that point to a lack of or degraded facilities, need for trails, concerns for closed parks, trash, water quality, and safety concerns.

### **Large Group Discussion Highlights**

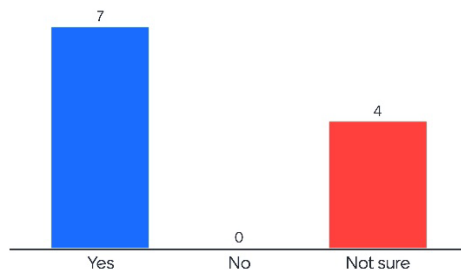
Following the presentations, participants had an open-ended discussion on the project description and community surveys. Detailed notes for this discussion are available at the end of this document. Some common themes that emerged during the discussion include:

- A majority of participants (7) still prefer Black Point project as the potential NbS proposed for NASEM Phase 2 application.
- Participants expressed the need to align community values with the project design, particularly focusing on education, public access, recreational and community amenities such as parking at the location.
- All participants in the advisory board expressed interest for continued engagement with the majority being interested in stakeholder engagement and outreach (11), followed by monitoring and evaluation (3), and engineering

Each participant completed a mentimeter poll and answered the following questions:

# Based on the project description and community survey, do you still support Black Point Bayside Project for NASEM Phase 2?

Mentimeter



11

## How should we align the survey findings with the preliminary project design?

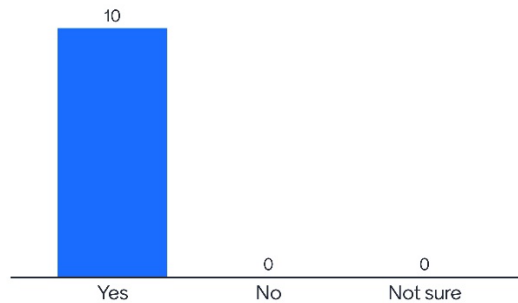
9 Answers


Mentimeter

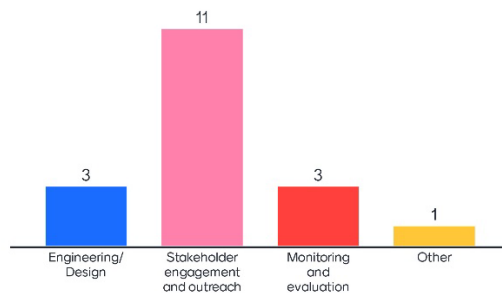
- Focus on storm surge, flooding, mitigation and recreational opportunities
- Incorporate public access and educational signage
- Community values the nature around them. Showing the importance of proactively mitigating the loss of shoreline, waterways, etc.
- Boardwalk for bird watching, Parking/trash issues, Be mindful of kayak access point, Recreational fishing access
- Enhance educational experiences for the broader region and access to these unique coastal areas.
- Continue public access for kayaking, fishing, waterfowl hunting. Include educational signage on living shorelines.
- Expand into school/education opportunities as part of a broader county-wide project. Potentially include utilizing Eagle Creek sewer leakage in Woodsboro.
- Survey findings can help shape preliminary project design to expressed interests & concerns, while keeping in mind that we need to focus on effective nature based climate adaptation & mitigation.
- Add some supporting components like upstream storm water projects, potential long term plans for parking, traffic congestion in the location

9

Would you like to continue participating in these workshops for NASEM Phase 2? 



How will you/your organization like to participate in the NASEM Phase 2 project opportunity? 



## Next Steps

The core team decided to continue moving forward with the Black Point project with continued feedback on multiple partners and stakeholders identified during the workshop. Some next steps include:

- Conduct community outreach through another survey to gather feedback on the Black Point project.

- Reach out to key players (landowners, TX DOT, and Texas GLO), and identify additional stakeholders and partners required for project design and implementation.
- Draft and finalize proposal for NASEM Phase 2 application.

## Detailed Discussion Notes

- The survey responses may be a mismatch for the project- there will be a second and specific survey about the project.
- Could the wastewater project be used to support the need for parks in the areas?
- In support: from a regional perspective, this project would be visible to the whole community [as opposed to a local park]
- Further issues related to the implementation of the project (private property) will be issues that all projects face including the wastewater and mission river projects.
- A project survey would be needed. Participant suggested there are many outdoorsmen that use the area. The second survey can be circulated with groups such as CCA, ACA, DU- also a sign at the project sit with a survey link may be helpful for targeting people who use this area.
- Note that these projects [coastal restoration] can take 5-6 years from conception, planning, to implementation.
- An idea would be to have a stormwater demonstration project- maybe next to a school for visibility- Look at Clean Coast Texas. It's a struggle to find places for educational purposes.
  - Example flour Bluff ocean program
- An example of successfully completed project: Bayside wastewater treatment facility
- Eagle Creek runs through school in Woodsboro- there is water quality concerns and a opportunity for a project
- Other flooding issues in North Woodsboro communities
- Participant supports the Bayside project- The project on the right side of the road took years to get traction, work is needed Work with TxDOT to turn this into a destination- add features like a breakwater walk maybe to connect both projects. It will be important to engage the private company A&E to get their support/buy in- to overall stop erosion of the shoreline and would increase the size of the property – may contribute to the success of the ongoing bayside restoration projects
- This can be a site for school field trips- design an educational activity that can be used for regional county schools
- Monitoring is important (perception, education, fishing, economy)
- Important to craft language carefully around climate and SLR- this triggers people to think that others are trying to get into their pockets- Blackpoint is a unique educational

opportunity- we can signal “this is where the shoreline used to be” and can point to the restored/vs erosion sections of wetlands.

- What is missing is input from the youth in the area would this project be of benefit to them?
- Will need to go into the school; create a discussion guide; project lead has contacted school superintendent
- What about scouts? Student council? You have to target groups that operate outside the regular day- would have to be after school
- Matagorda Bay Foundation has a 2 week summer camp with youth- educational components can be added to the phase 2 proposal
- Its work to move forward several ideas- since the implementation process takes so long as you’re pushing one project forward the next has to be on the way.

# Appendix 6

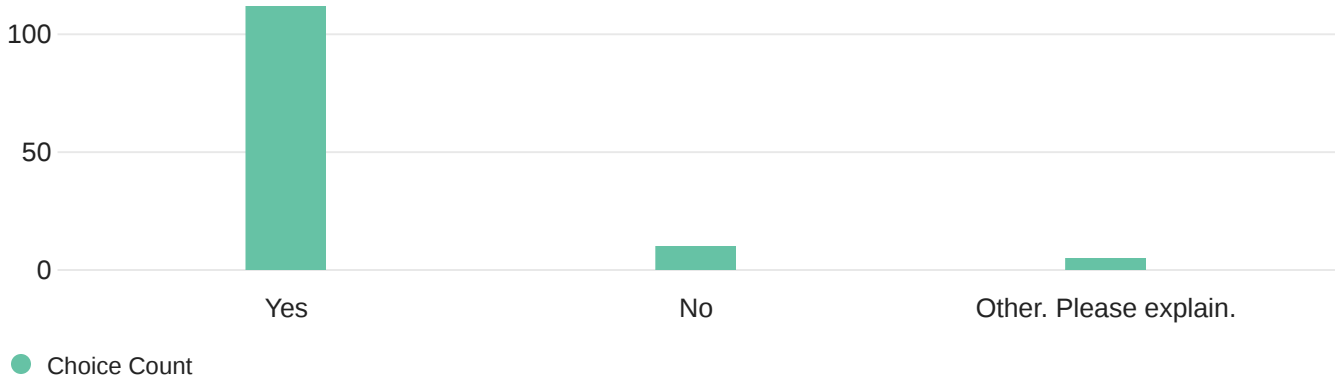
Community Values Survey Preliminary Results



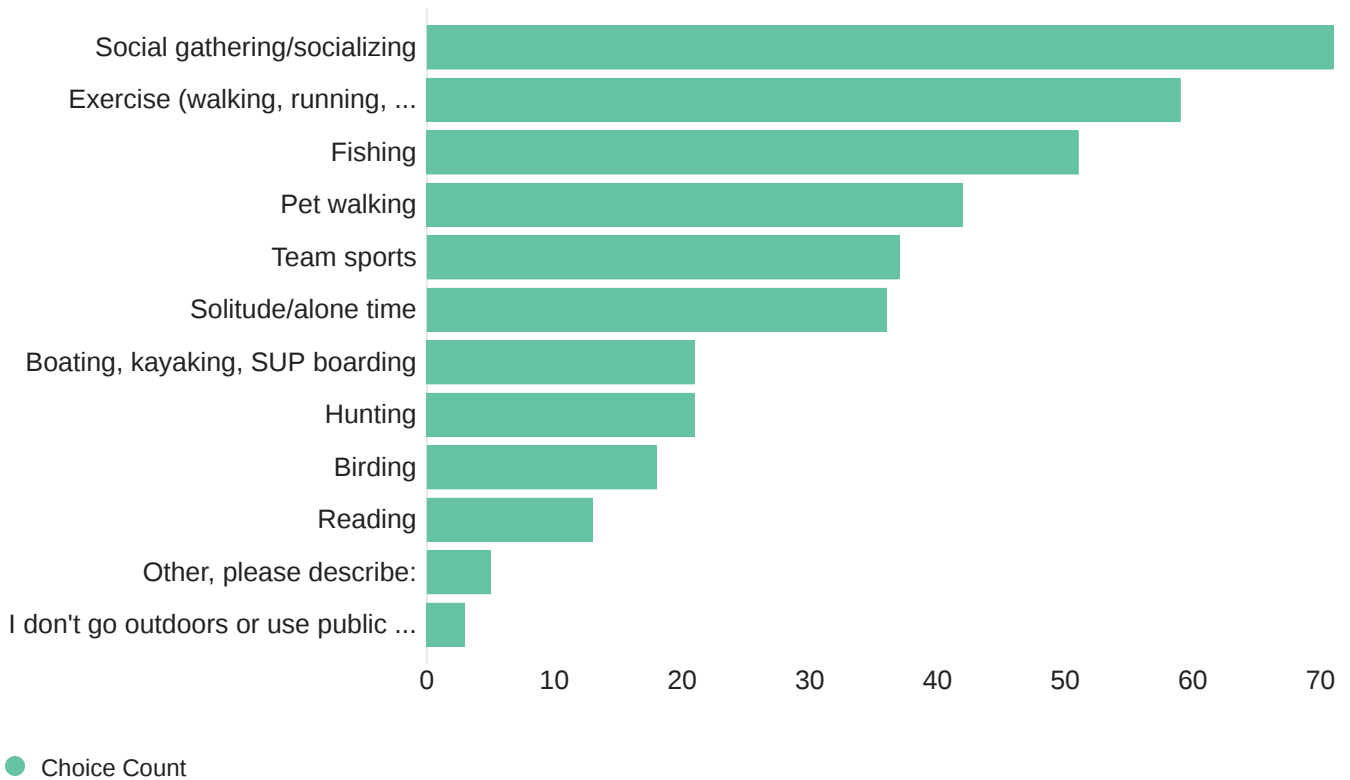
# Results for the Nature-Based Solutions Community values Survey August 2023

Total responses: 139

## Q1 - Are you a resident of Refugio County? - Selected Choice



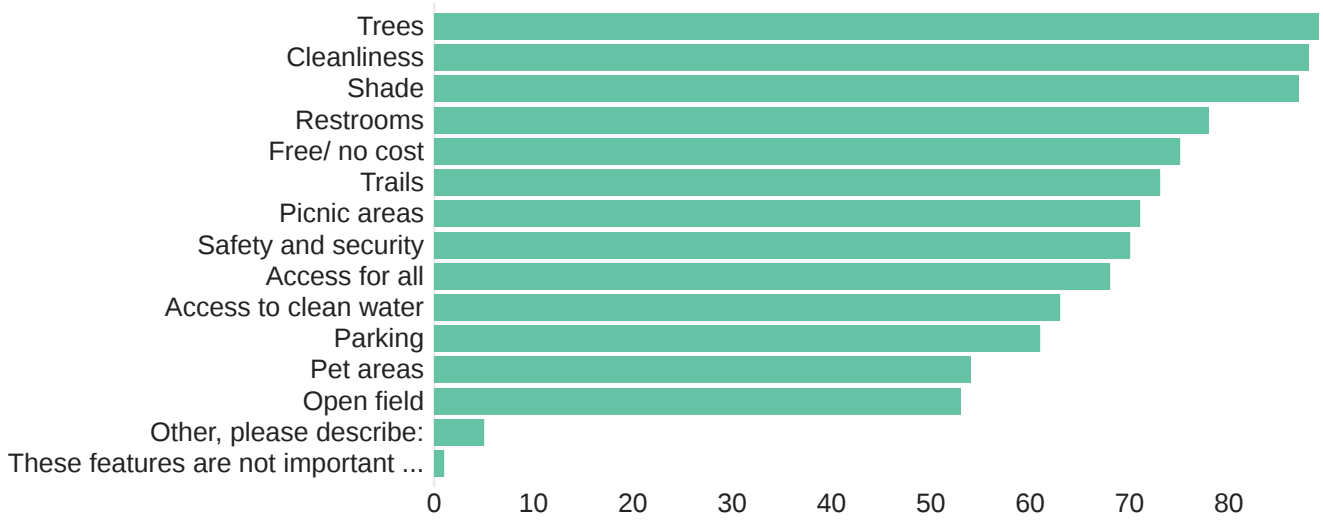
## Q2 - How do you use outdoor, public spaces in Refugio County? Please select all that apply. - Selected Choice





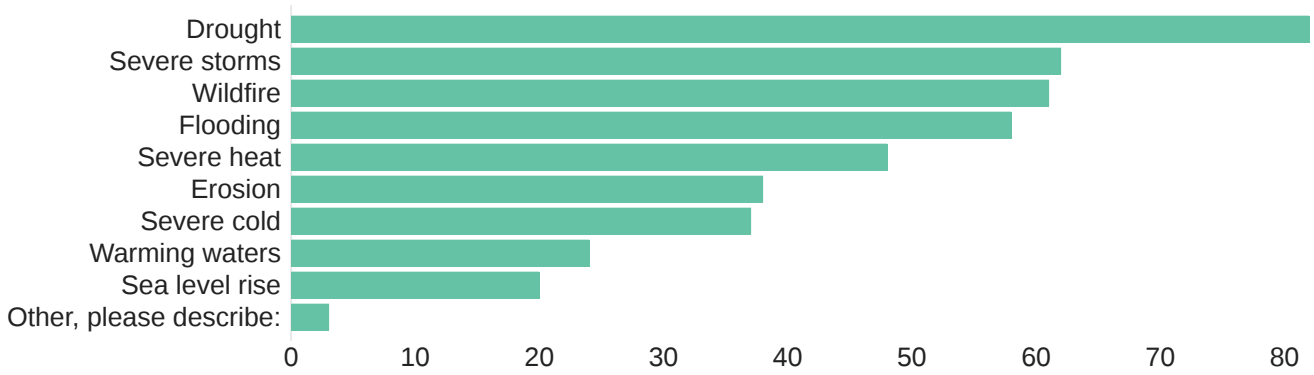
Q5 - What aspects of outdoor public areas are important to you? Please select all that apply and add your own ideas in the "Other" box. -

Selected Choice



● Choice Count

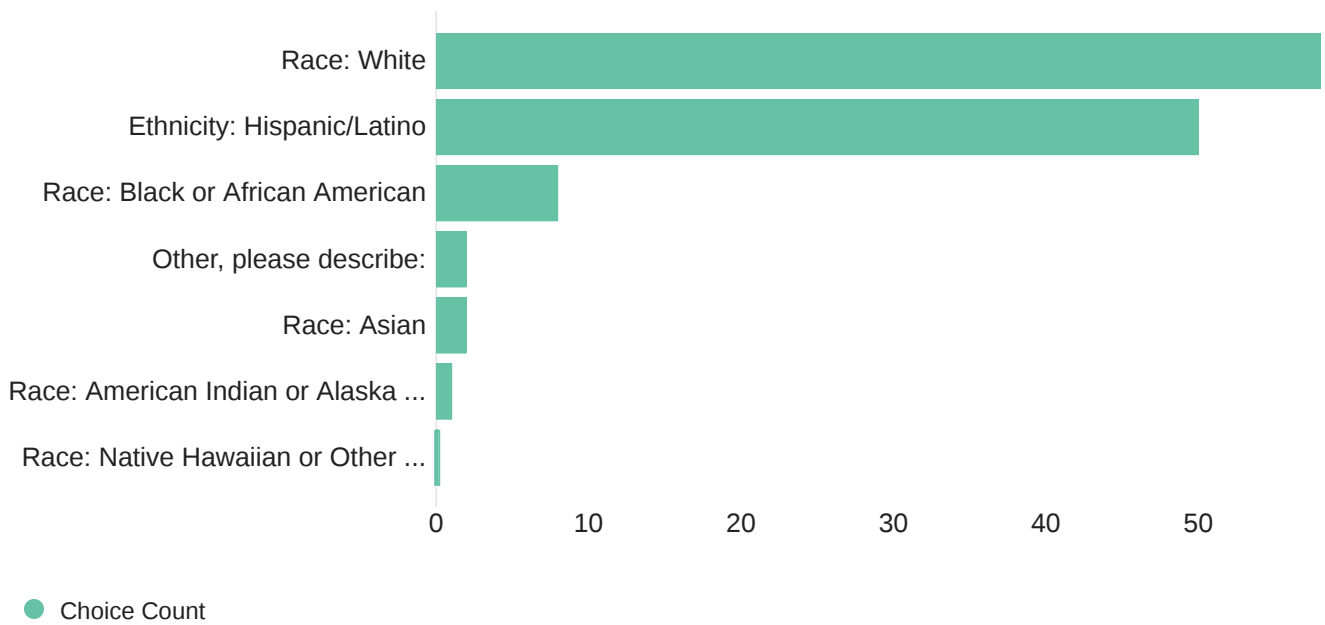
Q6 - Which of the following environmental challenges are you concerned about? Please select all that apply. - Selected Choice



● Choice Count



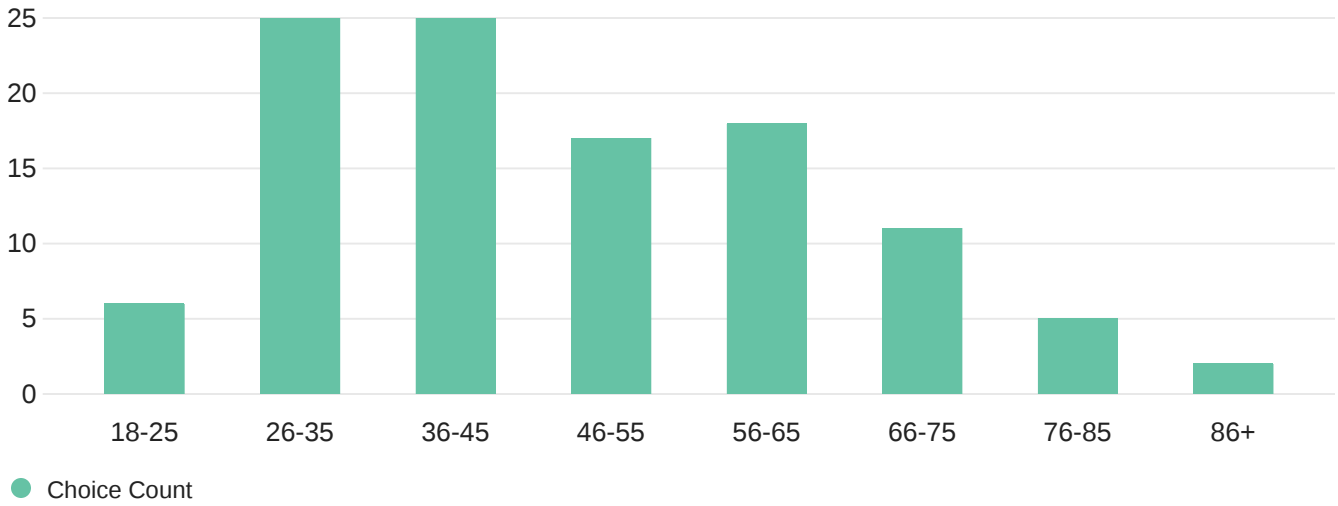
### Q9 - What is your Race/Ethnicity? Please select all that apply. - Selected Choice



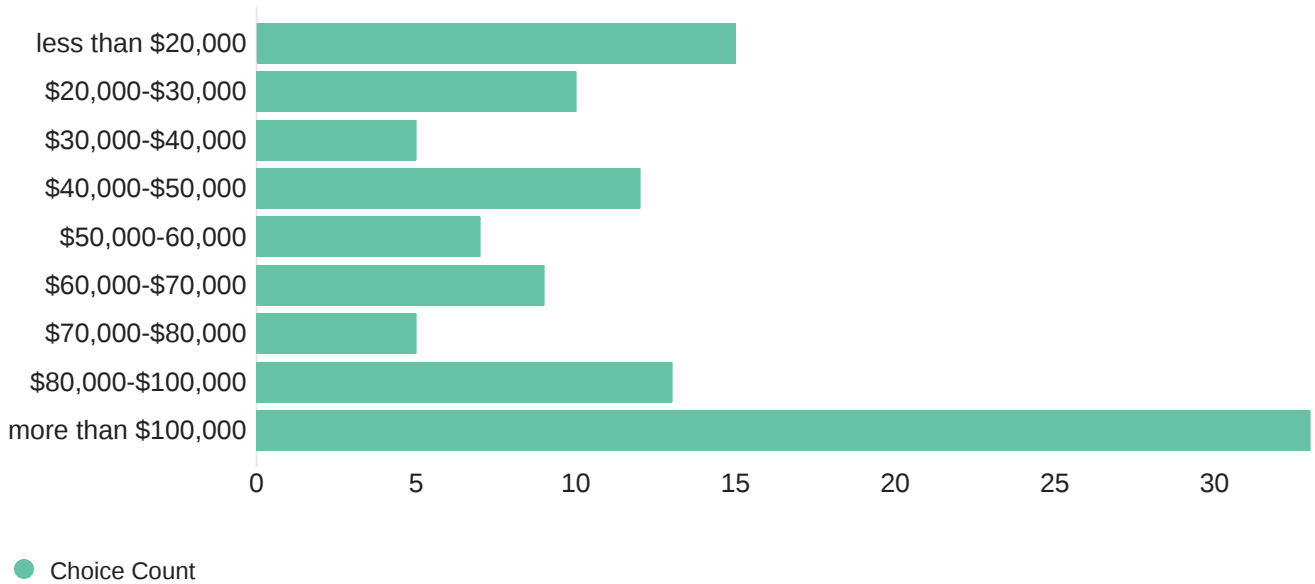
### Q10 - Including yourself, how many total people live in your home with you?



### Q11 - What is your age range?



### Q12 - What is your household income range (within the last 12 months)?





# Appendices

Text responses



### Q3 - Where are the outdoor areas that you use or are important to you, within Refugio County? Please describe the location.

Where are the outdoor areas that you use or are important to you, within Refugio County? Please describe the location.

ASR

Trails in Woodsboro

Lyons park

I used to enjoy Lion's Club Park. I like to hike trails on public and our private property. I remember the days there was a beach in Bayside, and I spent many hours sailing there with my father and the family. I also would boat in the Aransas River, and my brother would water ski even with alligators. I also would enjoy trying to identify birds at Fennessey Ranch Reserve and our ranch. The parks in Refugio County are nice to visit.

Non currently

Wildlife refuge, Hynes bay, Guadalupe river

test

Lion's Shelley Park for bird watching.

I like walking and exercising. There are currently no trails to walk. I would love a trail to walk.

1. I like going fishing to driscoll rooke covenant park fishing pier
2. I've also visited lions park but is always closed and not sure why.

there is not much to do in refugio county that I know of. For this reason, I visit the outdoors in other areas outside of refugio county.

My property. I don't know of well kept public areas in Refugio county.

Bonnie View Park, all boat ramps (Aransas & Mission River, Bayside), all athletic facilities.

Mission River, Lions Park, Copano Bay

Parks

The local park, county fair and back roads for taking miles long walks

Woodsboro square

The back roads are most important too me and the location is the cemetery cause it's nice a quiet just great too take a walk

Parks

Heritage Park where veterans memorial statues are at, baseball fields and pavillion.

Bayside

## Q7 - Do you have additional concerns about changes in the outdoor public areas in your neighborhood, community, or County? Please be specific.

Do you have additional concerns about changes in the outdoor public areas in your neighborhood, community, or County? Please be specific.

asd

No we just need more open to public

I am concerned about lack of funding to maintain the parks and other improvements around the county. Wild hogs also do major damage to our ranch and farm land and can damage and root up the parks. The alligator population is large and warnings about snakes and alligators would be advisable and helpful.

None

Unkept areas, clearing of natural areas, erosion of historical areas

test

Outdoor public areas seem to be of NO concern to our city officials in Refugio.

being an outdoors person, I'm aware of wildlife in parks, etc. But, not everyone is aware of possible dangers. Every park that has encountered wildlife such as alligators, venemous snakes, foxes, or even a wildcat, a sign should be posted as warning.

Stop pushing "the green new deal" agenda. The community just enjoys a safe clean community that isn't littered with homeless and illegals. We enjoy our farms/ranches and wildlife.

The lack of nicer outdoor facilities for gathering.

Refugio County needs access to the waters that run thru it. Bring back swimming, kayaking and fishing for the children to have something to do.

Kids saefty

Closed parks or rest stops that

No

Just with there waters around refugio County

No

Concern that Lion's park has not been opened. That would be a good area to refurbish the nature trail like Goliad and Kenedy/Karnes City has.

Would be nice to have a place with trails for walking or biking, picnic area with shade, a place for kids & fishing.

I'm concerned that the City chose to shut down our best park, Lions/Shelly, instead of looking at ways to remedy any problems it has. I don't like that they took out the swimming pool without adding something that would give the kids activities in the summer. Putting in the covered area in Heritage Park was just copying a facility we already had in Lions/Shelly. Putting the RV park in Heritage Park just congested an area that was already crowded.

There should be more management of the area, and people shouldn't be driving through the grassy areas, but remain in the designated parking spots. Employees of Mission Ridge park in the parking area, but choose to do so in the grass, instead of staying on the pavement. They should increase their own parking area if there's not room.

The ramp at the kayak park is completely unsuitable for getting a kayak to the water or launching a kayak. Launching should be done on flat ground with a gentle push required to scoot into the water. It also need to have a gentle slope from the parking area to the launch point, so kayaks can be hauled back to the vehicle easily. A ramp with switchbacks is completely unnavigable with a 14.5' kayak and accessories.

The Mission River needs to have water quality testing done on a regular basis. Down from the kayak park, where the city wastewater discharge is, is nasty. During droughts, there is a really nasty scum on the water surface. Since Mission River is the only river in Texas that begins and ends in the same county, we should step up and assure that the water quality is good throughout the flow. I'm sure it would be discovered that some housing on the river discharges waste into the river as well. Redfish are caught within the parks and ingested.

No

## Q8 - Do you have ideas or opinions about how to reduce risks or hazards associated with environmental challenges in your community? Please share your thoughts.

Do you have ideas or opinions about how to reduce risks or hazards associated with environmental challenges in your community? Please share your thoughts.

sdfg

Community education and/or public notices

Mitigating impacts with nature based solutions and reducing future impacts by community education about behavior and personal choices.

Oversee areas, protect historical areas, chemicals used in area

test

No

i'm new in Refugio, but I've been told that mission river floods and it affects where i live which is a few minutes from the refugio catholic church. Perhaps creating a huge flood drainage ditches ecosystem that has lots of trees to suck up the water.

Better trash cans at gas stations and stores so trash isn't blowing out and all over the ground. Public restrooms with running water to flush toilets and wash hands. Nature preserves with walking/hiking trails to take our dogs on leashes walks, safe places to explore with our children.

Education Education Education

Clean up the rivers from the hurricane debris to let them flow freely.

More fences

Have more options available to the community for cleanliness, recreation and family orientated events

No

No I don't but there could be alot of things so it's hard too say

No

None

Educate them young. Perhaps a group/club for adults & children to get involved in keeping areas free of trash & hazards that is not just a “clean up group” but has fun activities, crafts, picnics, hand on education with area wildlife. Kinda like a scouts type of thing

There is absolutely no policies or enforcement of anything in the community except for the compliance officers, who focus on citizens lawn overgrowth and brush piles, and whatever they can fine the citizens for. It's simply a way for the City to generate funds. There should be more focus on testing and keeping the natural waters clean. There are no building codes in the county, or permits and inspections for building or electrical, except for septic tank management. There needs to be more oversight to prevent accidents in the future.

Na

No

### Q13 - Do you have any more thoughts or ideas on these topics that you'd like to share?

Do you have any more thoughts or ideas on these topics that you'd like to share?

Our chamber of commerce does absolutely nothing to bring in people to our community. They need to clean house.

Refugio county lacks parks and outdoor activities. We need to create more outdoor areas for our families.

Provide more seminars for educational information for county residents. For example Hurricane Preparedness

My thoughts are to have the park's beautified, the rivers cleaned of debris to allow for swimming, kayaking and fishing. A walking trail for people with pets and for residents to utilize for exercise instead of the streets.

I come for a more urban community and personally wish the city would re open a park or open a larger park that's away from a main street

Not really

No

The county could use walking paths, the baseball fields improved to include better parking. More smaller pavilions placed around the open spaces in the park with sidewalks leading to them do more people can picnic there and enjoy the beauty of the park.

I'd like to see more environmental education for our children. Without giving them a background and developing feelings of ownership with the outdoors, we cannot expect them to nurture and protect it. We need to develop programs that bring naturalists and scientists to the schools for short courses. Summer camps that immerse kids in various outdoor activities that will impart greater knowledge of their local environment to them.

No

No

No

Just need more patrolling and need more activity for kids

No

Nope. Thanks for the good food! :)

No

No

No

No

None

# Appendix 7

Black Point Project Survey

## **Survey: Black Point Shoreline Restoration Project**

### **About the survey:**

This survey is part of a series of engagement activities associated with Designing a Nature-based Project in Refugio County planning grant. This effort is sponsored by the National Academies of Sciences – Gulf Research Program to encourage partnerships and community engagement in designing a nature-based project that can help reduce coastal hazards such as flooding in Refugio County. It is led by the National Wildlife Federation in partnership with Refugio County, Santos-McBain, and Harte Research Institute at Texas A&M University-Corpus Christi. <https://www.harterresearch.org/project/designing-nature-based-project-refugio-county>

The “Black Point Project” presented below emerged as the result of initial input from community members solicited through an Advisory Board. It is still in the conceptual phase and is pending further consideration and assessment of feasibility. This survey is designed to assess the public’s interest in and concerns about a nature-based project located at Black Point. Your feedback is anonymous and will be summarized as part of a report and used to apply for additional funding to continue this effort in Refugio County. If you have any questions you can contact the Project Director, Dr. Arsum Pathak: PathakA@nwf.org

Please read the following project description and then answer the brief questions at the end. Make sure you complete the survey so that you can sign up to receive incentive in the form of a gift card. Thank you.



### Black Point project description:

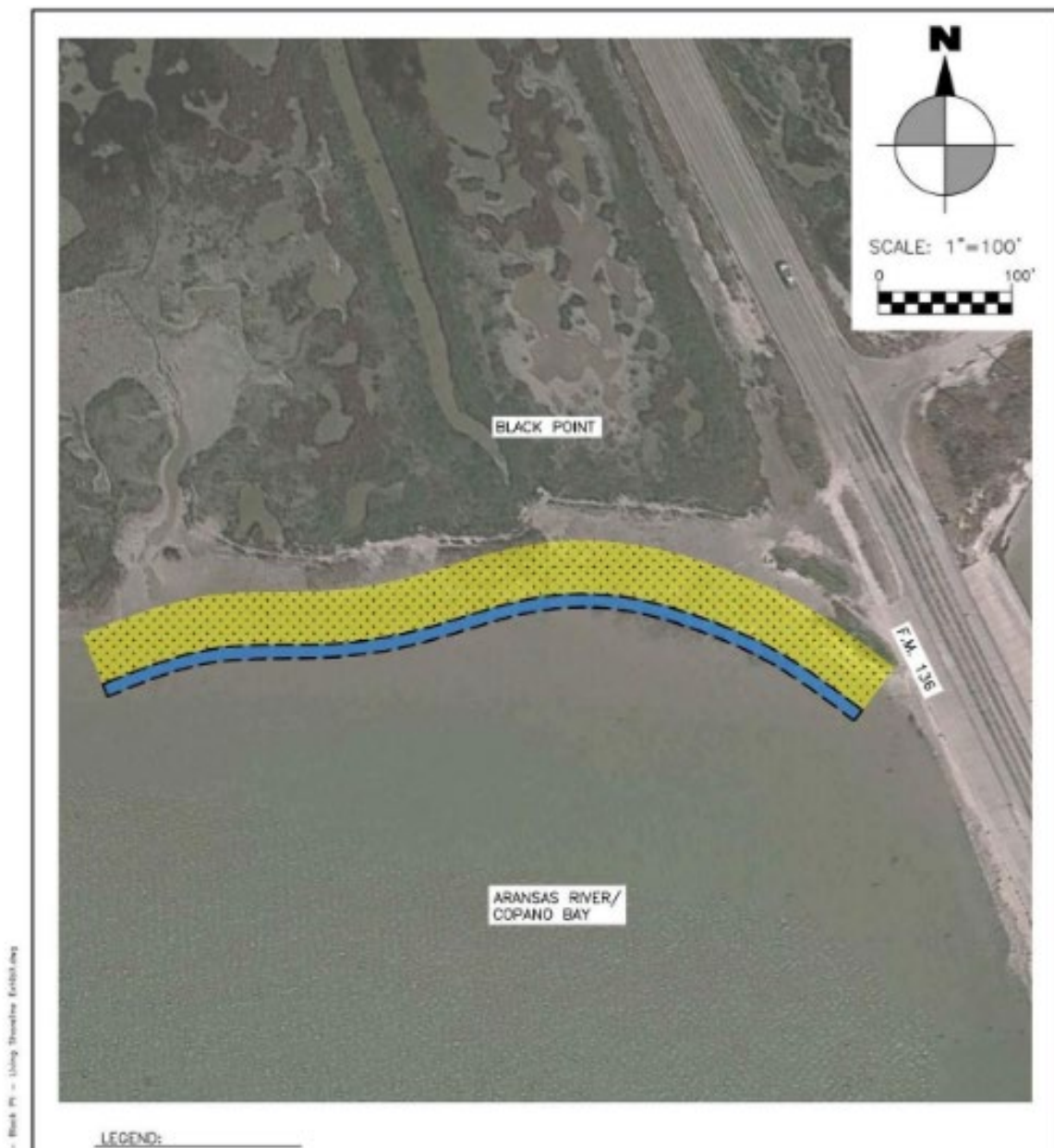
This project proposes the installation of a living shoreline to protect shoreline erosion and enhance wetland habitats at Black Point, in the area east of F.M. 136 on Aransas River and Copano Bay in Bayside, Texas. The area of shoreline near Black Point has eroded due to hurricanes, storm surge, wave energy and increasing water levels. The site is further at-risk of continued erosion and inundation from steadily increasing water levels, as has been observed in the last decades (see <https://tidesandcurrents.noaa.gov/sltrends/>). The County's coastal infrastructure protects the inland neighborhoods, protects endangered species, supports local fishing industries and tourism, and increases quality of life for at-risk communities.

Figure 1. Historical shorelines and shorelines change analysis by the Texas Bureau of Economic Geology. At this location shorelines have receded at a rate of 2-4ft per year. Webmap available online at [https://coastal.beg.utexas.edu/shorelinechange\\_bays/](https://coastal.beg.utexas.edu/shorelinechange_bays/)



This project can potentially include multiple components which are considered as separate phases. The first phase will construct living shoreline features. The proposed Black Point Bayside Living Shoreline includes the construction of a living shoreline with a 4-foot-high and 10-foot-wide Class I Rock Sill with 40-foot-wide and 60-foot-long marsh plantings. The project will construct a nature-based solution to protect shoreline erosion, enhance wetland habitats, and increase community resilience (see figure 2). Additionally, the living shoreline buffers floods (reducing storm damage), purifies water, and attracts wildlife. The future phase of this project will focus on expansion of recreational opportunities (trails, boardwalk, etc.), and minimizing the sediment build-up on the Black Point edge of the site (close to the existing boat ramp) by dredging and beneficially using the sediment to the nearby marsh habitat.

Figure 2. Draft shoreline design by Ardurra



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**Project funding:**

A proposal for continuous planning and feasibility studies will be submitted to the National Academies of Sciences Gulf Research Program. The project team will further pursue additional funding through federal and state grants for project construction and implementation. Project website: <https://www.hartheresearch.org/project/designing-nature-based-project-refugio-county>

Do you have concerns about this project?

No

Yes

If yes, please explain:

Do you see any benefits from implementing this project?

No

Yes

Please explain your response to the previous question (why do you, or do you not, see any benefits from this project?)

Do you have ideas on how this project can continue to be funded? Please share:

Would you like to engage in the project design?

No

Yes

Do you have any other comments or thoughts to share about this effort? Please share:

Thank you for your time and consideration of this project! If you would like to be engaged in future news and updates regarding this effort you can sign up using your email. Follow this link to sign up:

[https://docs.google.com/forms/d/e/1FAIpQLSeviyXWdpy\\_noPXW7qJyPPgGAJLAS0uXzFuR-mSZ5vfcpr2MQ/viewform](https://docs.google.com/forms/d/e/1FAIpQLSeviyXWdpy_noPXW7qJyPPgGAJLAS0uXzFuR-mSZ5vfcpr2MQ/viewform)

Note that this link is external, and your survey responses will not be associated with your email address. Your responses remain anonymous. Also, when you click on that link you will receive a participation incentive in the form of a gift card.

This is your survey receipt number to claim your gift card:256

