



HARC

CCMP Update

Stephanie Glenn

Erin Kinney

Jen Irving

HARCresearch.org

CCMP Update

Appendices:

- Introduction/ executive summary – describe the process + word cloud
- Minor changes and updates to the CCMP action plans, listed with page numbers
- Equity Strategy Spotlight and how to use with the CCMP
- Estuary Resilience Action Plan Spotlight and how to use with the CCMP
- Editable version of Finance Plan Addendum (created in 2022) – this will remain the same, no changes, remains as separated document in back

Timeline:

Today: feedback on how to use ES and ERAP with CCMP

Deadline: your feedback on today's presentations by December 18

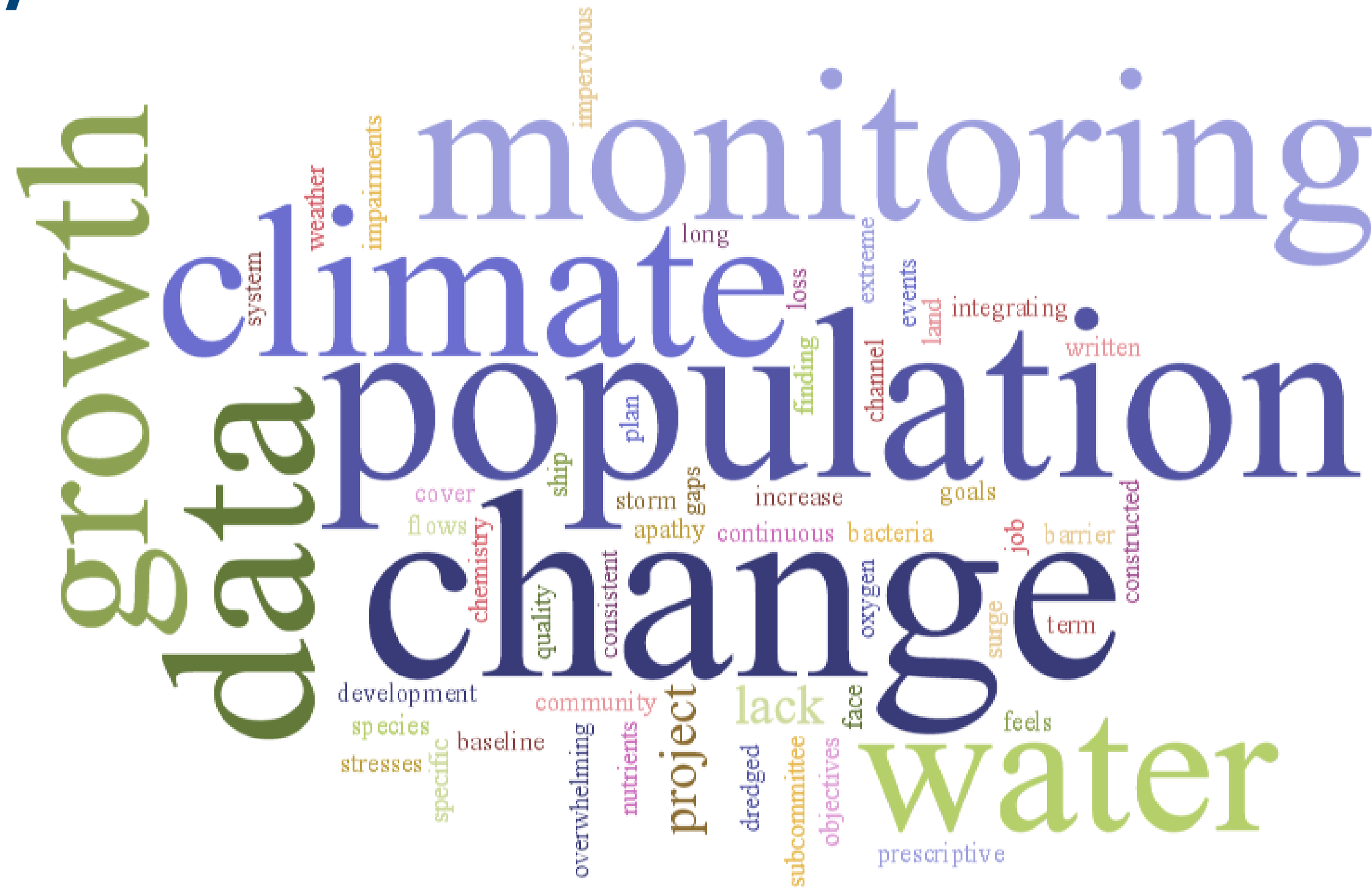
Spring: Draft Appendices

Summer: Subcommittee Review

Fall: Finalize Appendices

Completed: February 28, 2026

What is the biggest challenge facing Galveston Bay in the next ten years that this stakeholder group should address?



Feedback/ Comment Review Example


Plan Priority Two - Protect and Sustain Living Resources

	Complete?		Comments	Updates?		Comments	
	yes	no		yes	no		
Action Plan 1: Support Habitat Conservation (HC)		No	Conservation Work force programs targeting the Justice 40 communities				Specifically needs to be addressed in next revision
HC - 1: Land Acquisition		X	Im not sure sure where where we stand to date	X		Consider setting targets for specific habitat types within the broader 5,000 acre goal	Ongoing
HC - 2: Habitat Restoration		X	Im not sure sure where where we stand to date		X		Ongoing
HC - 3: Habitat Enhancement		X	Im not sure sure where where we stand to date		X		Ongoing
Action Plan 2: Support Species Conservation (SC)				X		"increasingly reported" in the Bay. This needs to be updated now that our research has shown that dolphins occur year-round in Galveston Bay (Mintzer and Fazioli, 2021) and there is a resident population (Mintzer et al., 2022)	Change effective as now
Action Plan 2: Support Species Conservation (SC)		No	Conservation Work force programs targeting the Justice 40 communities				Specifically needs to be addressed in next revision

ERAP “Highlight” for CCMP Update

202X CCMP Update

Estuary Resilience Action Plan



“Resilient systems are managed in ways that anticipate and plan for future disruptions, allowing the system to adapt and thrive.”

The Estuary Resilience Action Plan (ERAP) serves as a strategic guide for enhancing the resilience of the Galveston Bay estuary, focusing on collaborative approaches to tackle significant environmental challenges.

The ERAP was developed through a stakeholder-engaged process where expert workgroups identified 11 estuary stressors (Box 1). For each stressor, they assessed the risks to GBP goals, ranking them on a qualitative scale for consequence (impact) and probability (likelihood).

Box 1 – Estuary Stressors

1. Changes to Land Use and the Built Environment
2. Chronic Higher Tides/ Nuisance Flooding
3. Increase in Extreme Events
4. Increasing Drought
5. Increasing Inland Flooding
6. Ocean Acidification
7. Population Increase
8. Sea Level Rise and Subsidence
9. Warmer Summers
10. Water Waters
11. Warmer Winters

Box 2 – Adaptation & Mitigation

1. Stakeholder Outreach; Education
2. Stakeholder Outreach: Alerts
3. Monitoring
4. Implementation of Watershed-based Plans (WBPs)
5. Preservation, Conservation, & Restoration
6. Research
7. Promote Water Conservation & Reuse
8. Promote Native Habitat

Adaptation and mitigation strategies are actions designed to reduce risks, address vulnerabilities, and enhance the ability of systems to withstand and recover from disturbances. The workgroups identified adaptation and mitigation actions for the high-consequence and high-probability risks (Box 2).

To effectively use the ERAP, implementors need to understand the relationships between GBP goals, ERAP stressors, and which adaptation/ mitigation actions have the potential to reduce the risks associated with the stressors. To help users understand the interactions between GBP goals, stressors, and adaptation/ mitigation actions additional resources have been developed and included in the appendix.

2022 Estuary Blueprint

SPOTLIGHT



Photo: Karl Nielsen

RESILIENCE

The 2022 Estuary Blueprint recognizes that climate change is no longer a future abstraction, but a present reality already impacting the region.

In addition to preparing the region for more extreme weather events like prolonged drought and intense bursts of precipitation, scientists and planners are also confronted with the issue of looming sea level rise: a significant concern for both human and habitat investments around Estuary shores such as housing, regional infrastructure, and thousands of acres of restored wetlands.

To meet these extraordinary challenges, resilience has been incorporated as a throughline in the 2022 Estuary Blueprint. Steps to address and prepare for climate change begin with Blueprint Goal 2: Bolster the resilience of Estuary ecosystems, shorelines, and communities to climate change. Within this broad and overarching priority, numerous actions and objectives address more specific characteristics of resilience such as habitat and species diversity, buffer and transition zones, and connectivity and complexity in the design of natural and human infrastructure, among others. Each of the 25 actions in the Blueprint also examines climate resilience in their respective action backgrounds, using the Climate Change Considerations section to explain how each action will address or be impacted by climate change.

The 2022 Estuary Blueprint’s approach has also been updated to take a holistic approach to increasing resilience: one that is premised on the belief that the resilience of geophysical environments and human communities are not only interconnected, but interdependent. Action 2 (Equity) was created to acknowledge that increased resilience in the region will require a holistic approach to increasing resilience: one that is premised on the belief that the resilience of geophysical environments and human communities are not only interconnected, but interdependent. Action 2 (Equity) was created to acknowledge that increased resilience in the region will require a holistic approach to increasing resilience: one that is premised on the belief that the resilience of geophysical environments and human communities are not only interconnected, but interdependent.

Through the Estuary Blueprint, stakeholders visualize and build ecosystems and communities that are more resilient to climate change.

“Spotlight” pages from the 2022 San Francisco Bay CCMP

Example: how to use the ERAP with the CCMP

Example – Research

Research can be an effective risk adaptation/mitigation strategy according to the ERAP.

Example – Research

Table 6: Find which GBP Priorities/Goals have Research as an adaptation/mitigation strategy for the high risk/high consequence climate stressors.

Table 6: Adaptation/Mitigation Strategy Groupings vs. GBP Priorities/Goals

	GBP Priorities/Goals						
	Engage Communities	Ensure Safe Human and Aquatic Life Use: Increase public awareness of current public health risks/Reduce risk through WBPs	Ensure Safe Human and Aquatic Life Use: Reduce NPS and PS (including WWTFs and sanitary sewer system) pollution	Inform Science -Based Decision Making	Protect and Sustain Living Resources: Conserve, restore, and enhance vital habitats in the lower portion of the Galveston Bay watershed.	Protect and Sustain Living Resources: Ensure adequate quantities of freshwater reach Galveston Bay	Protect and Sustain Living Resources: Sustain and restore native species populations
Adaptation/Mitigation Grouping							
Stakeholder Outreach: Education	X	X	X		X		X
Stakeholder Outreach: Alerts/Risk		X			X		
Monitoring	X	X	X	X	X		X
Implementation of WBPs	X	X	X	X	X	X	
Preservation/Conservation/Restoration		X	X	X	X	X	X
Research			X	X	X		
Promote Water Conservation and Reuse				X	X	X	
Promote Native Habitat							X

Example – Research

Table 7: Narrow down to which Climate Stressors have Research as an adaptation/mitigation strategy for the high risk/high consequence climate stressors.

Table 7: Adaptation/Mitigation Strategy Groupings vs. Stressors

Stressors	Chronic higher tides/nuisance flooding	Increase in extreme events (coastal flooding/storm surge)	Sea Level Rise + subsidence	Warmer Summers	Warmer Waters	Increasing Drought	Increasing Inland Flooding (largely rain-based)	Population Increase	Changes in land use and the built environment (infrastructure)	Ocean Acidification
	Adaptation/Mitigation Grouping									
Stakeholder Outreach: Education	X	X	X	X	X			X		
Stakeholder Outreach: Alerts/Risk		X		X	X	X	X			
Monitoring	X	X	X	X	X		X			
Implementation of Watershed Based Plans	X	X	X	X		X	X	X	X	
Preservation/Conservation/Restoration		X	X	X			X	X		
Research		X		X	X	X	X			X
Promote Water Conservation and Reuse				X	X	X	X		X	
Promote Native Habitat				X			X		X	

Example – Research

Using the information from Tables 6 and 7, you can narrow down where to search in Table 5.

For example, research on evapotranspiration in the Galveston Bay watershed could lead to reduction in both risk and consequences of warmer summers and warmer waters leading to increased evapotranspiration – less freshwater inflow and compromised water quality.

Stressors and Associated Risks Selected for Adaptation/Mitigation	Potential Adaptation/Mitigation Action Strategies	Could the action reduce likelihood of the risk?	Could the action reduce consequence of the risk?	Selected Examples of Adaptation/Mitigation Actions
Warmer summers leading to increased evapotranspiration - less freshwater inflow, compromised water quality	Promote Water Conservation and Reuse	YES	YES	Initiate studies on evapotranspiration in the Galveston Bay watershed
Research		YES	YES	
Warmer waters leading to increased evapotranspiration - less freshwater inflow, compromised water quality	Promote Water Conservation and Reuse	YES	YES	Initiate studies on evapotranspiration in the Galveston Bay watershed; supply information to decision makers regarding inflow updates
Research		YES	YES	

Example – Research

Using the information from Tables 6 and 7, you can narrow down where to search in Table 5.

The same research could also potentially reduce the likelihood and consequences of the risk of increasing drought leading to increased evapotranspiration and/or decrease in freshwater inflows, which could increase salinity and decrease oyster reef habitat.

Stressors and Associated Risks Selected for Adaptation/Mitigation	Potential Adaptation/Mitigation Action Strategies	Could the action reduce likelihood of the risk?	Could the action reduce consequence of the risk?	Selected Examples of Adaptation/Mitigation Actions
Increasing drought leading to <i>increased evapotranspiration and/or decrease in freshwater inflows which will cause increased salinity impacts and decreases in oyster reef habitat</i>	Research	YES	YES	
	Promote Water Conservation and Reuse	YES	YES	Reef restoration in upper reaches of Galveston Bay; advocate for additional/ or base level inflow and preserve native habitat
	Preservation/Conservation/ Restoration	YES	YES	

Example: how to use the ERAP with the CCMP

Example – Research

So, this project, depending on the details of design and implementation, could have the potential to reduce both the risk and consequences of warmer summers, warmer waters, and increasing drought on water quality, freshwater inflows, and/or oyster reef habitats.

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CONTACT US

CCMPUpdate@harcresearch.org

Erin Kinney ekinney@harcresearch.org

Stephanie Glenn sglenn@harcresearch.org

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Backup Slides

CCMP Update

CCMP Updates versus Revisions

Minor changes to action plans or insertion of a few new actions would be considered an Update. Reformatting, streamlining or reorganizing core actions to reflect new ways of accomplishing original CCMP goals would also be considered an Update.

Revisions involve a significant change. Next revision “due” 2028

Update Requirements

- Ensure plan priorities are up to date
- Add Galveston Bay issues not currently covered in the CCMP
- Integrate the ERAP into CCMP
- Integrate the Equity Strategy into the CCMP



The Galveston Bay Plan, 2nd Edition

*The Comprehensive Conservation and Management
Plan for the Galveston Bay Ecosystem*

FINAL TCEQ APPROVED DRAFT

Review of Updated CCMPs

5 (out of 28) National Estuary Programs (NEP) have undergone recent updates or revisions that incorporate Climate Vulnerability Assessments (CVAs) or Estuary Resilience Action Plans (ERAPs):

- San Francisco Estuary Partnership
- Mobile Bay NEP
- Sarasota Bay NEP* (major updates)
- Coastal and Heartland NEP* (revision)
- Morro Bay

San Francisco Bay, Sarasota Bay, and Mobile Bay are good examples with different approaches.

Examples from other Estuary Programs

Common Elements in an Updated CCMP

Summary of Updates & Process

Varied across CCMPs. Included timelines, bulleted lists, and narrative or descriptive paragraphs.

Highlight or Spotlight Pages

New pages, often in the introduction section, help draw attention to changes in the updated CCMPs. Resilience and Equity were common themes for highlight pages.

Updated Actions/ Task Pages

San Francisco Bay NEP had the most extensive changes to individual pages, with clear changes for integration with the Climate Vulnerability Assessment. Sarasota Bay had new Objectives related to climate change and resilience.

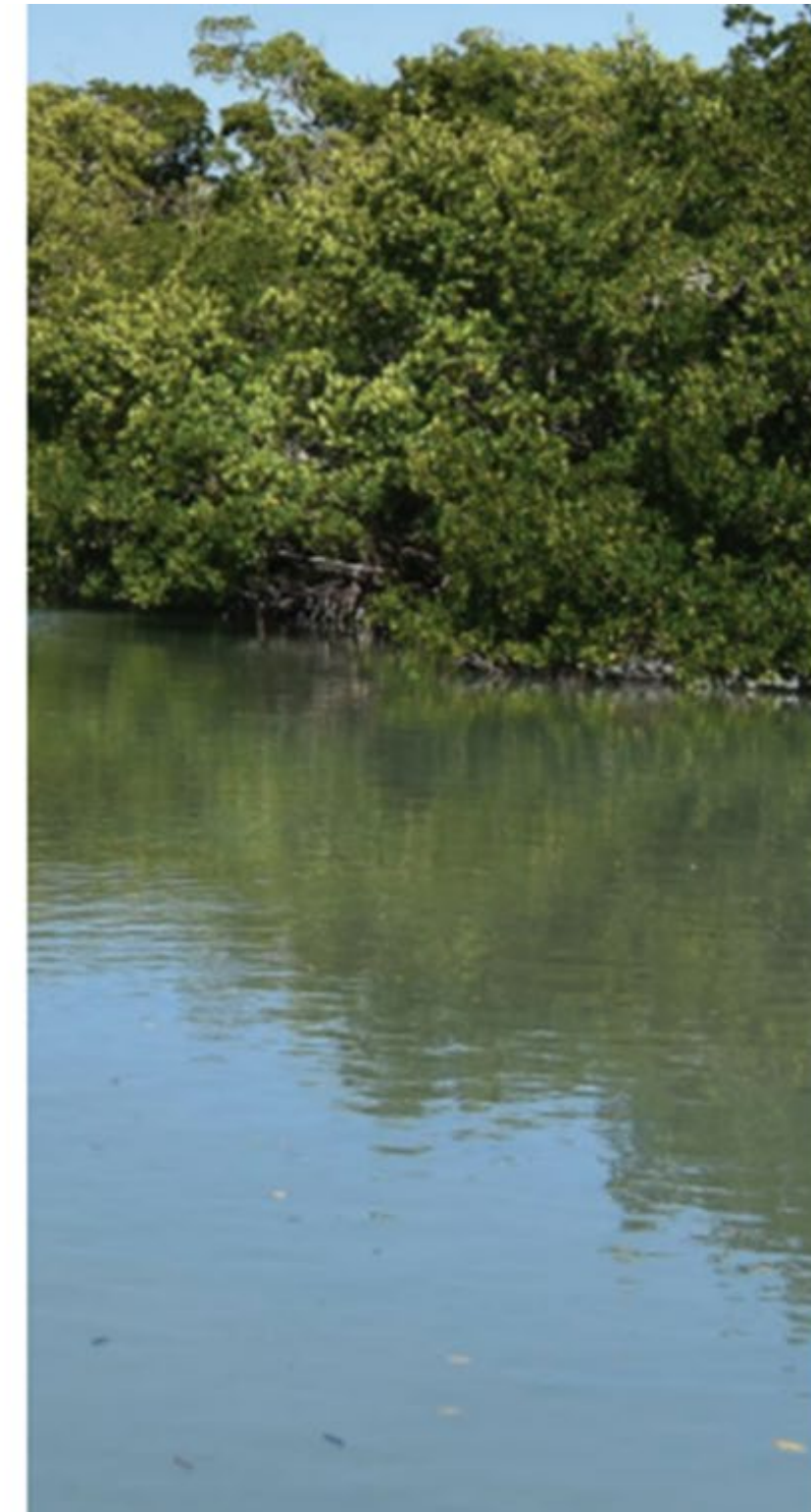
New Chapters or Appendices

Several updated CCMPs had a "Findings" section. Resilience was added as a new chapter for Mobile Bay.

Example “Updates” Pages

Notable changes in the 2022 CCMP Update include:

- Support for comprehensive and coordinated surface water and groundwater quality monitoring, assessment, and reporting was prioritized as a new objective (See WQQ-1).
- Improving and managing hydrology for a more natural pattern of timing, quantity, and distribution of surface water flows was prioritized as its own objective (See WQQ-3).
- Encouragement for regular inspection and maintenance of septic systems, including installation of supplemental and advanced septic system technologies was identified to be an important activity in coastal areas with impaired waters (WQ-5.2).
- Evaluation and management of the impacts of reclaimed wastewater storage, distribution, and use on nutrient loading and hydrology was prioritized as an activity, due to increased use of reclaimed water for irrigation (WQQ-6.2).
- Encouragement of proactive inspection, maintenance, fats, oils, and grease avoidance, and replacement of failing or underperforming sewer infrastructure to prevent inflow and infiltration, overflows, and spills was identified to be an important activity (WQQ-6.3).
- Improving understandings of pollutant loading from atmospheric deposition was introduced as a priority knowledge gap (WQQ-7).
- Improving understanding, monitoring, reporting, and response to recover from, mitigate, and reduce harmful algal blooms was prioritized as a new objective (WQQ-8).
- Protecting, enhancing, and restoring beaches and dunes for wildlife and resiliency was prioritized as a new objective (WH-6).
- Monitoring and protecting threatened, endangered, and vulnerable wildlife with an emphasis on birds, dolphins, manatees, and sea turtles was prioritized as a new objective (FW-3).
- Outreach to new groups, especially those that have traditionally been underserved or underrepresented in SBEP’s programming, has been prioritized to engage a broader, more diverse audience for protection, restoration, and education activities, and for expanding access and recreational opportunities to them (See Growing SBEP’s Reach to Underserved and Underrepresented Stakeholders).
- Threats due to climate change and the importance of mitigation and adaption were addressed in each Action Plan (See Climate Ready Estuary).



Example pages from the Sarasota Bay (right) CCMPs that describe the update process and major changes. Updates generally included more than just integrations with CVAs or ERAPs.

ERAP Integration

Estuary stressors identified in the ERAP:

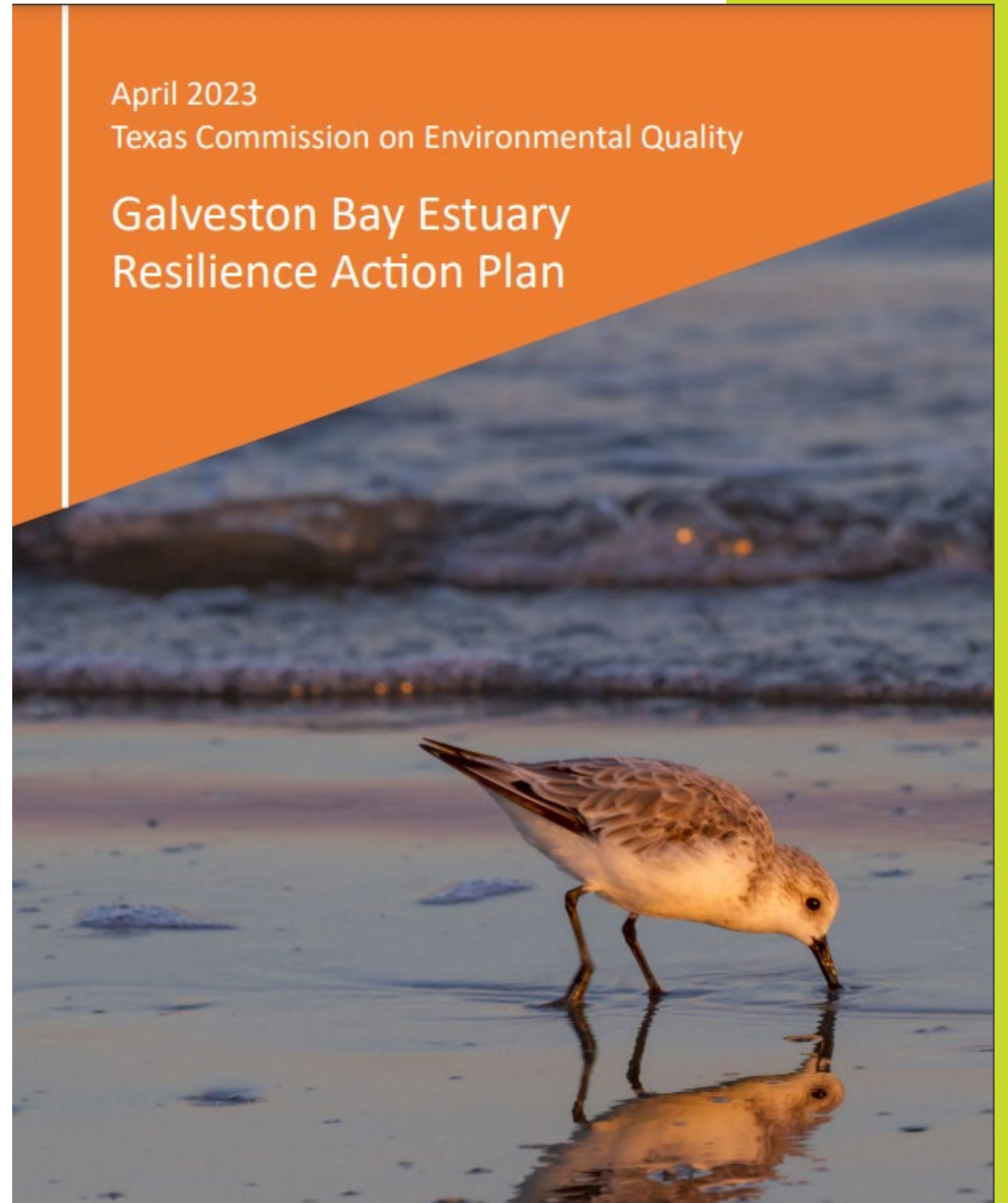
- Changes to land use and the built environment
- Chronic higher tides/ nuisance flooding
- Increase in extreme events (coastal flooding/ storm surge)
- Increasing drought
- Increasing inland flooding (largely rain-based)
- Ocean acidification
- Population increase
- Sea level rise and subsidence
- Warmer summers
- Warmer waters
- Warmer winters

How do you think the stressors should be integrated into the CCMP?

April 2023

Texas Commission on Environmental Quality

Galveston Bay Estuary
Resilience Action Plan



Questions about CCMP update asked during Dec 2023 Subcommittee meetings

- What is the biggest challenge facing Galveston Bay?
- Do you think there needs to be **greater integration of action plans/action items across plan priorities?**
- What **issues** do you think should be highlighted or pulled across multiple priorities?
- Should there be any constituents added specifically to **emerging contaminants?**
- Are any Action Plans/ Action Items complete? Need updating?
- What would ERAP and/or Equity Strategy integration look like?

Equity Strategy Integration

- I. Integration of Equity Strategy Key Activities
 - 1) Expanding Partnerships with Experts in equity issues facing Galveston Bay Communities
 - 2) Engaging Equitable Selection Practices
 - a) Consideration of barrier facing potential partner organizations who are smaller or excluded from funding sources
 - b) Establishing Ongoing Stakeholder Engagement
 - 3) Evaluating the Approach
- II. Tracking Benefits
- III. Equitable Stakeholder Engagement Plan

EQUITY STRATEGY THE GALVESTON BAY ESTUARY PROGRAM

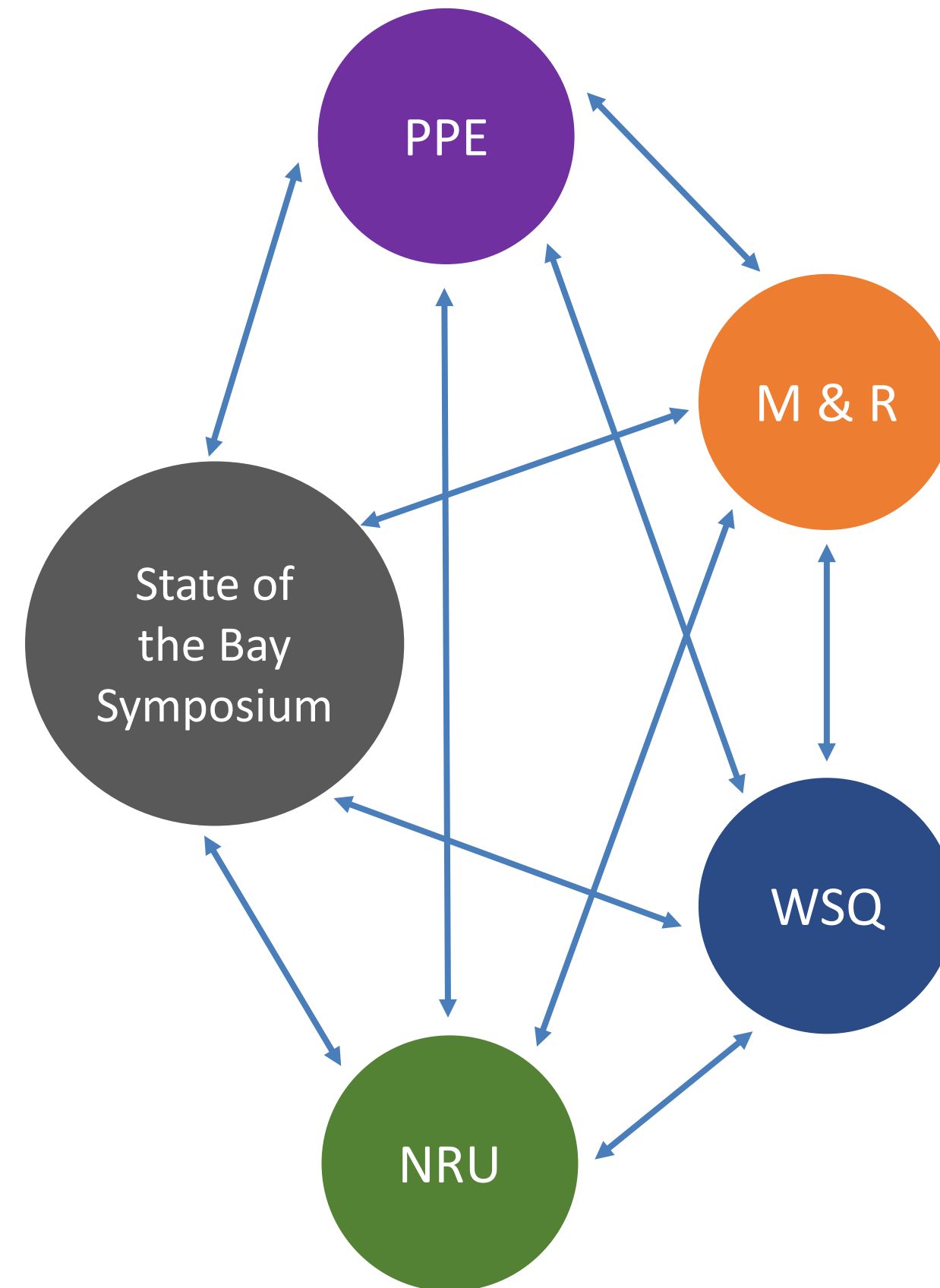


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August 24, 2023

Findings – Is there need for greater integration of action plans/action items across plan priorities (subcommittees)?

- Yes, greater integration is needed
- Integration of meetings was discussed to help integrate priorities
 - State of the Bay Symposium
 - Share summaries of meetings and funded projects with other subcommittees
 - Share schedules/agendas of upcoming subcommittee meetings with everyone
 - Invite subcommittee representatives to attend other subcommittee meetings



ERAP Integration

- Should a version of the table of the stressors and associated risks and potential adaptation and mitigation be added to the CCMP as part of the update?
- Idea: include column in ERAP Table 5 (at end of table) that refers the user to the page in the CCMP to the action item(s) that correspond with that adaptation/mitigation ERA action

Table 5: Evaluation of Potential Adaptation/Mitigation Actions and Strategies for Galveston Bay

Stressors appear in bold type, Risks appear in italics. Stressors and Associated Risks Selected for Adaptation/Mitigation are color coded by the CCMP goals they address: purple for Engage Communities, blue for Ensure Safe Human and Aquatic Life Use, orange for Inform Science-Based Decision Making, green for Protect and Sustain Living Resources. WBPs = Watershed-based Plans.

Stressors and Associated Risks Selected for Adaptation/Mitigation	Potential Adaptation/Mitigation Action Strategies	Could the action reduce likelihood of the risk?	Could the action reduce consequence of the risk?	Selected Examples of Adaptation/Mitigation Actions
Nuisance flooding, sea level rise and subsidence, and/or extreme event flooding leading to increased flooding of property and habitat	Stakeholder Outreach: Education	NO	YES	Development of resilience plans; networks to share data with stakeholders
	Monitoring	NO	YES	
Warmer summers and warmer waters leading to increased bacteria	Stakeholder Outreach: Education	YES	YES	Bacteria monitoring on beaches, streams, and lakes; informing stakeholders
	Monitoring	NO	YES	
	Implementation of WBPs	YES	YES	
Warmer waters leading to heat stress	Stakeholder Outreach: Education	NO	NO	Increased monitoring, informing stakeholders
	Monitoring	NO	YES	
Ocean acidification leading to loss of oyster reef habitat	Research	NO	YES	Research on current state of Galveston Bay acidification; share data with stakeholders
Extreme events and inland flooding leading to bacteria in flood waters	Stakeholder Outreach: Alerts/Risk	YES	YES	WBPs; water quality criteria; using genetic and traditional methods to track sources of bacteria and pathogens
	Monitoring	NO	YES	
	Implementation of WBPs	YES	YES	
Extreme events leading to exposure to pollutants in flood waters	Stakeholder Outreach: Alerts/Risk	YES	YES	Wet weather monitoring
Rising sea level and subsidence leading	Stakeholder Outreach: Education	YES	NO	Inform stakeholders of

Example “Highlight” Pages

2022 Estuary Blueprint
SPOTLIGHT



Photo: Karl Nielsen

RESILIENCE

The 2022 Estuary Blueprint recognizes that climate change is no longer a future abstraction, but a present reality already impacting the region. In addition to preparing the region for more extreme weather events like prolonged drought and intense bursts of precipitation, scientists and planners are also confronted with the issue of looming sea level rise: a significant concern for both human and habitat investments around Estuary shores such as housing, regional infrastructure, and thousands of acres of restored wetlands.

To meet these extraordinary challenges, resilience has been incorporated as a throughline in the 2022 Estuary Blueprint. Steps to address and prepare for climate change begin with Blueprint Goal 2: Bolster the resilience of Estuary ecosystems, shorelines, and communities to climate change. Within this broad and overarching priority, numerous actions and objectives address more specific characteristics of resilience such as habitat and species diversity, buffer and transition zones, and connectivity and complexity in the design of natural and human infrastructure, among others. Each of the 25 actions in the Blueprint also examines climate resilience in their respective action backgrounds, using the Climate Change Considerations section to explain how each action will address or be impacted by climate change.

The 2022 Estuary Blueprint’s approach has also been updated to take a holistic approach to increasing resilience: one that is premised on the belief that the resilience of geophysical environments and human communities are not only interconnected, but interdependent. Action 2 (Equity) was created to acknowledge that increased resilience in the region will not be possible without the buy-in of communities, especially those considered to be vulnerable, underserved, and frontline to the impacts of climate change.

Through the 2022 Estuary Blueprint, the San Francisco Estuary Partnership will continue to help partners and stakeholders visualize and build ecosystems and communities that are more resilient to climate change.

2022 Estuary Blueprint
SPOTLIGHT




Photo: Karl Nielsen

EQUITY

The 2022 Estuary Blueprint recognizes the connection between healthy, thriving communities and a healthy, resilient Estuary. It goes further than previous versions to elevate equity to a priority concern for the present and future.

The Estuary Blueprint update anticipates the disproportionate impacts of climate change on vulnerable, underserved, and marginalized communities, especially those that are non-White, non-native English speakers, elderly, poor, chronically ill, uninsured, and/or renters. Program leaders and partners acknowledge the subjugation, near decimation, and unjust theft of land from Indigenous peoples, the redlining and pollution of Black and other non-White communities, and the prolonged underinvestment and lack of accountability by government agencies and environmental groups. The 2022 Estuary Blueprint reflects upon and seeks to understand its place, and act towards ameliorating decades of mistrust, discrimination, and wrongdoing.

The Equity action in the 2022 Estuary Blueprint aims to promote environmental equity in the San Francisco Estuary region in concurrent, complementary ways. Equity is both integrated in actions throughout the Estuary Blueprint, and explicitly featured as its own action. This deliberate decision recognizes that if equity is not prioritized in our work, it will fall to the wayside and perpetuate an inequitable status quo. It also recognizes the need for broader stakeholder representation at the planning table in earlier phases of development. It seeks to prioritize the needs of those that have been marginalized from previous adaptation and other regional environmental planning processes and those that have historically lacked the ability to participate due to systemic and institutional barriers.

These Pages are usually at the front of the Plans to highlight the updates

“Spotlight” pages from the 2022 San Francisco Bay CCMP

Findings – What would ERAP and/or Equity Strategy integration look like to you?

- ERAP and Equity Strategy apply to almost everything in the plan
 - It would be better to address in one place rather than state that repetitively action item by action item
 - Idea of appendix with hyperlinked cross-references to tables/goals in the Plan
- Comments about tables
 - There are already a lot of tables in the Plan
 - Tables are more useful if you don't have to go to the rest of the document to figure it out

Next Steps

- Nov–Jan: Meeting with PPE, NRU, WSQ, M&R, B&P
-
- January: Meeting with Galveston Bay Council
 - November – **January 26th**: Feedback
 - What do you want to see added to the CCMP
 - How would it best be integrated into the CCMP
 - What do you use most in the CCMP
 - Should those tables, charts, pages be updated, or new tables, charts, pages be added?
 - June 2024: Collection of feedback submitted to GBEP for review, TCEQ & EPA review
 - September 2024: Present proposed updates to subcommittees and GBC

Feedback by January 26

CCMP Feedback_dueJanuary26

Search for tools, help, and more (Alt + Q)

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A23

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1	Plan Priority One - Ensure Safe Human and Aquatic Life Use									
2		Complete?		Comments	Updates?		Comments			
3		yes	no		yes	no				
4	Action Plan 1: Improve Water Quality Through Nonpoint Source Pollution Abatement (NPS)									
5	NPS - 1: Support Watershed-Based Plan Development and Implementation									
6	NPS - 2: Support Nonpoint Source Education and Outreach Campaigns									
7	NPS - 3: Implement NPS Best Management Practices									
8	NPS - 4: Host Nonpoint Source Workshops									
9	Action Plan 2: Improve Water Quality through Point Source Pollution Abatement (PS)									
10	PS - 1: Support Stormwater Education Programs									
11	PS - 2: Achieve Sanitary Sewer System Capacity and Integrity									
12	PS - 3: Increase Wastewater Treatment Facility Compliance									
13	Action Plan 3: Promote Public Health and Awareness (PHA)									
14	PHA - 1: Improve Seafood Advisory Awareness									
15	PHA - 2: Improve Regional Contact Recreation Risk Awareness									
16	PHA - 3: Improve Contact Recreation Safety Through Risk Awareness									
17	PHA - 4: Improve Shellfish Consumption Safety Through WBPs									
18	PHA - 5: Improve Finfish Consumption Safety Through WBPs									
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CommenterInfo Challenges Issues Contaminants Integration **Plan Priority 1** Plan Priority 2 Plan Priority 3 Plan Priority 4 ERAP_Equity_Integration +

Table 6: Adaptation/Mitigation Strategy Groupings vs. GBP Priorities/Goals

	GBP Priorities/Goals						
	Engage Communities	Ensure Safe Human and Aquatic Life Use: Increase public awareness of current public health risks/Reduce risk through WBPs	Ensure Safe Human and Aquatic Life Use: Reduce NPS and PS (including WWTFs and sanitary sewer system) pollution	Inform Science -Based Decision Making	Protect and Sustain Living Resources: Conserve, restore, and enhance vital habitats in the lower portion of the Galveston Bay watershed.	Protect and Sustain Living Resources: Ensure adequate quantities of freshwater reach Galveston Bay	Protect and Sustain Living Resources: Sustain and restore native species populations
Adaptation/Mitigation Grouping							
Stakeholder Outreach: Education	X	X	X		X		X
Stakeholder Outreach: Alerts/Risk		X			X		
Monitoring	X	X	X	X	X		X
Implementation of WBPs	X	X	X	X	X	X	
Preservation/Conservation/Restoration		X	X	X	X	X	X
Research			X	X	X		
Promote Water Conservation and Reuse				X	X	X	
Promote Native Habitat							X

**ERAP
Integration**

Table 7: Adaptation/Mitigation Strategy Groupings vs. Stressors

Stressors	Chronic higher tides/nuisance flooding	Increase in extreme events (coastal flooding/storm surge)	Sea Level Rise + subsidence	Warmer Summers	Warmer Waters	Increasing Drought	Increasing Inland Flooding (largely rain-based)	Population Increase	Changes in land use and the built environment (infrastructure)	Ocean Acidification
Adaptation/Mitigation Grouping										
Stakeholder Outreach: Education	X	X	X	X	X			X		
Stakeholder Outreach: Alerts/Risk		X		X	X	X	X			
Monitoring	X	X	X	X	X		X			
Implementation of Watershed Based Plans	X	X	X	X		X	X	X	X	
Preservation/Conservation/Restoration		X	X	X			X	X		
Research		X		X	X	X	X			X
Promote Water Conservation and Reuse				X	X	X	X		X	
Promote Native Habitat				X			X		X	

**ERAP
Integration**

Equity Strategy Integration

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EQUITY STRATEGY THE GALVESTON BAY ESTUARY PROGRAM



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August 24, 2023

ERAP and Equity Strategy Integration

FIGURE 8
PLAN PRIORITIES MATRIX

ACTION PLANS AND CORRESPONDING ACTIONS		PLAN PRIORITIES			
		Ensure Safe Human and Aquatic Life Use	Protect and Sustain Living Resources	Engage Communities	Inform Science-Based Decision Making
Action Plan: Improve Water Quality Through Nonpoint Source Pollution Abatement (NPS)					
NPS-1	Support Watershed-Based Plan Development and Implementation	x	x	x	x
NPS-2	Support Nonpoint Source Education and Outreach Campaigns	x	x	x	
NPS-3	Implement NPS Best Management Practices	x	x		x
NPS-4	Host Nonpoint Source Workshops	x		x	x
Action Plan: Improve Water Quality Through Point Source Pollution Abatement (PS)					
PS-1	Support Stormwater Education Programs	x		x	
PS-2	Achieve Sanitary Sewer System Capacity and Integrity	x		x	
PS-3	Increase Wastewater Treatment Facility Compliance	x		x	
Action Plan: Promote Public Health and Awareness (PHA)					
PHA-1	Improve Seafood Advisory Awareness	x		x	x
PHA-2	Improve Regional Contact Recreation Risk Awareness	x		x	
PHA-3	Improve Contact Recreation Safety Through Watershed-Based Plans (WBPs)	x			x
PHA-4	Improve Shellfish Consumption Safety Through WBPs	x		x	x
PHA-5	Improve Finfish Consumption Safety Through WBPs	x		x	x
Action Plan: Support Habitat Conservation (HC)					
HC-1	Land Acquisition	x	x		
HC-2	Habitat Restoration	x	x		
HC-3	Habitat Enhancement	x	x		
Action Plan: Support Species Conservation (SC)					
SC-1	Native Species Management		x	x	x
SC-2	Invasive Species Control		x	x	x
Action Plan: Sustain Freshwater Inflows (FWI)					
FWI-1	Regional Planning for Freshwater Inflows	x	x	x	
FWI-2	Freshwater Inflows Research and Management	x	x		x
FWI-3	Water Conservation and Education	x	x	x	

Should a version of the table of the ERAP adaptation/mitigation and Equity Strategy activities be added to the CCMP addendum as part of the update? Idea: include ERAP stressors to Figure 8 of the CCMP. Do we need to update other figures as well?

ERAP and Equity Strategy Integration

Table 8: Tracking Selected Adaptation/Mitigation Actions

Adaptation/ Mitigation	Risk(s) addressed	Responsible party(ies)	Next steps	Reporting frequency
1.				
2.				
3.				
n.				

Table 9: Example: Tracking Risk Reductions

Risk selected for adaptation/mitigation	Action(s) employed/completed
1.	
2.	
3.	
n.	

CCMP Update

Welcome to the Galveston Bay Estuary Program

Preserving Galveston Bay for generations to come

Our purpose is to provide comprehensive ecosystem management through collaborative partnerships and to ensure preservation of Galveston Bay's multiple uses.



Sylvan Rodriguez Park Habitat Restoration Project



The Sylvan Rodriguez Habitat Restoration Project focused on the restoration of a 23-acre section of forested and riparian buffer habitat within Sylvan Rodriguez Park. The restoration project included the removal of invasive woody species and the establishment of 1,407 native trees and

**EQUITY STRATEGY
THE GALVESTON BAY ESTUARY
PROGRAM**



GBEP Equity Strategy



The Galveston Bay Estuary Program (GBEP) is excited to announce that its Equity Strategy has been approved by the EPA. GBEP staff are looking forward to working with an Equity Consultant and our stakeholders to implement the



The Galveston Bay Plan, 2nd Edition

GBEP CCMP Update



The Galveston Bay Estuary Program (GBEP) is updating its Comprehensive Conservation and Management Plan (CCMP) ([the Galveston Bay Plan, 2nd Edition](#)). Input from stakeholders is critical to the success of the



- In one to three words, what is the biggest challenge facing Galveston Bay in the next ten years that this stakeholder group should address?

Update Ideas

- Do you think there needs to be **greater integration of action plans/action items across plan priorities** (subcommittees)? What would greater integration look like to you?
- What **issues** do you think should be highlighted or pulled across multiple priorities?
 - Examples: Air pollution, Freshwater inflows, Seafood safety, Species monitoring, Other issues
- Should there be any constituents added specifically to **emerging contaminants**?
 - Examples: Plastic pollution, Microplastics, PFAS, Other contaminants

Plan Priority Three (Engage Communities)

Action Plans :

1. Preserve Galveston Bay Through Stakeholder and Partner Outreach (SPO)
2. Support Public Education and Awareness Initiatives (PEA)

Do you feel that any of the action items listed below for these Action Plans need updating?

SPO-1: Stewardship Programs and Volunteer Opportunities

SPO-2: Workshops and Events

SPO-3: Support Regional Initiatives

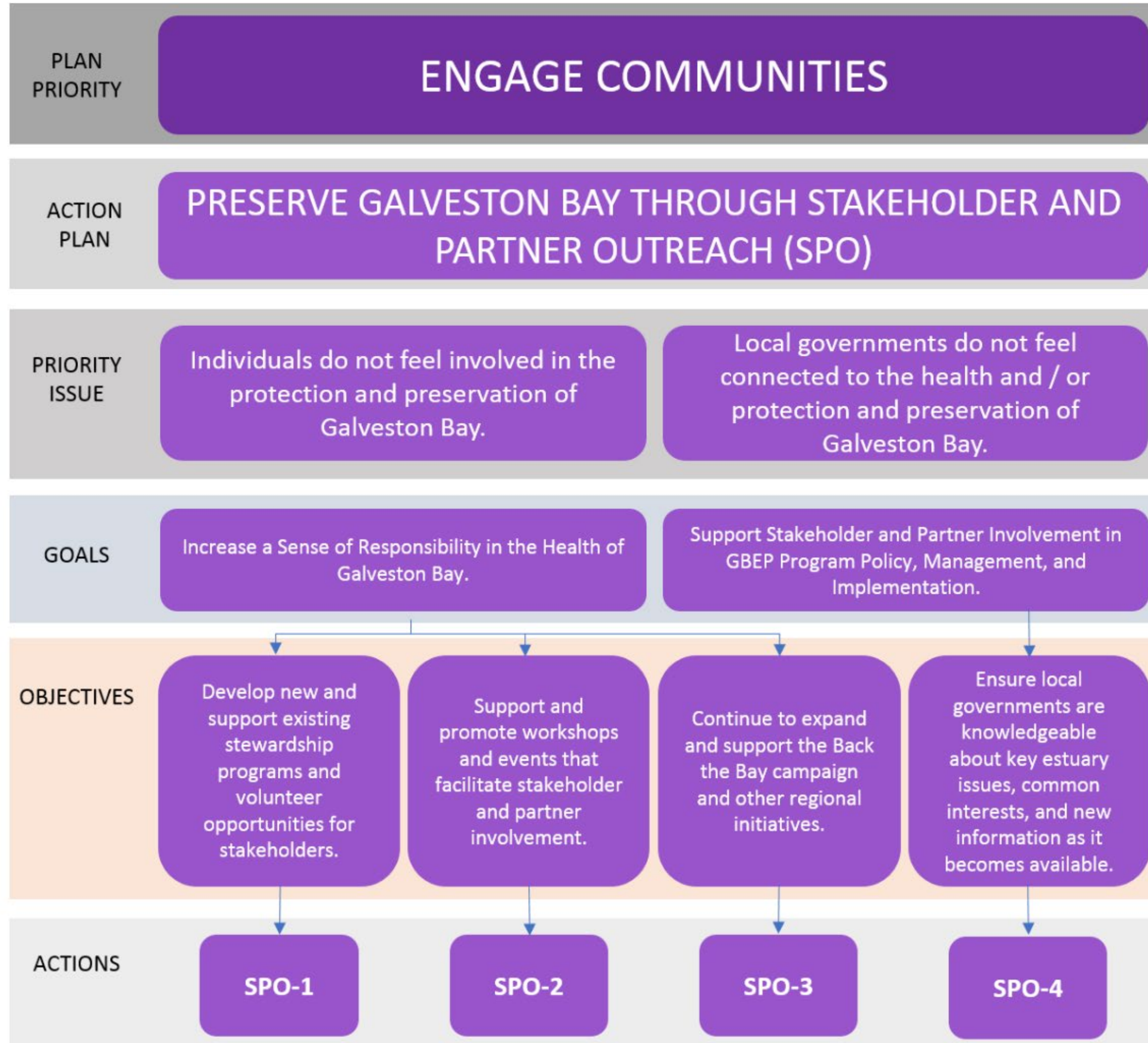
SPO-4: Local Government Outreach

PEA-1: Key Issue Engagement

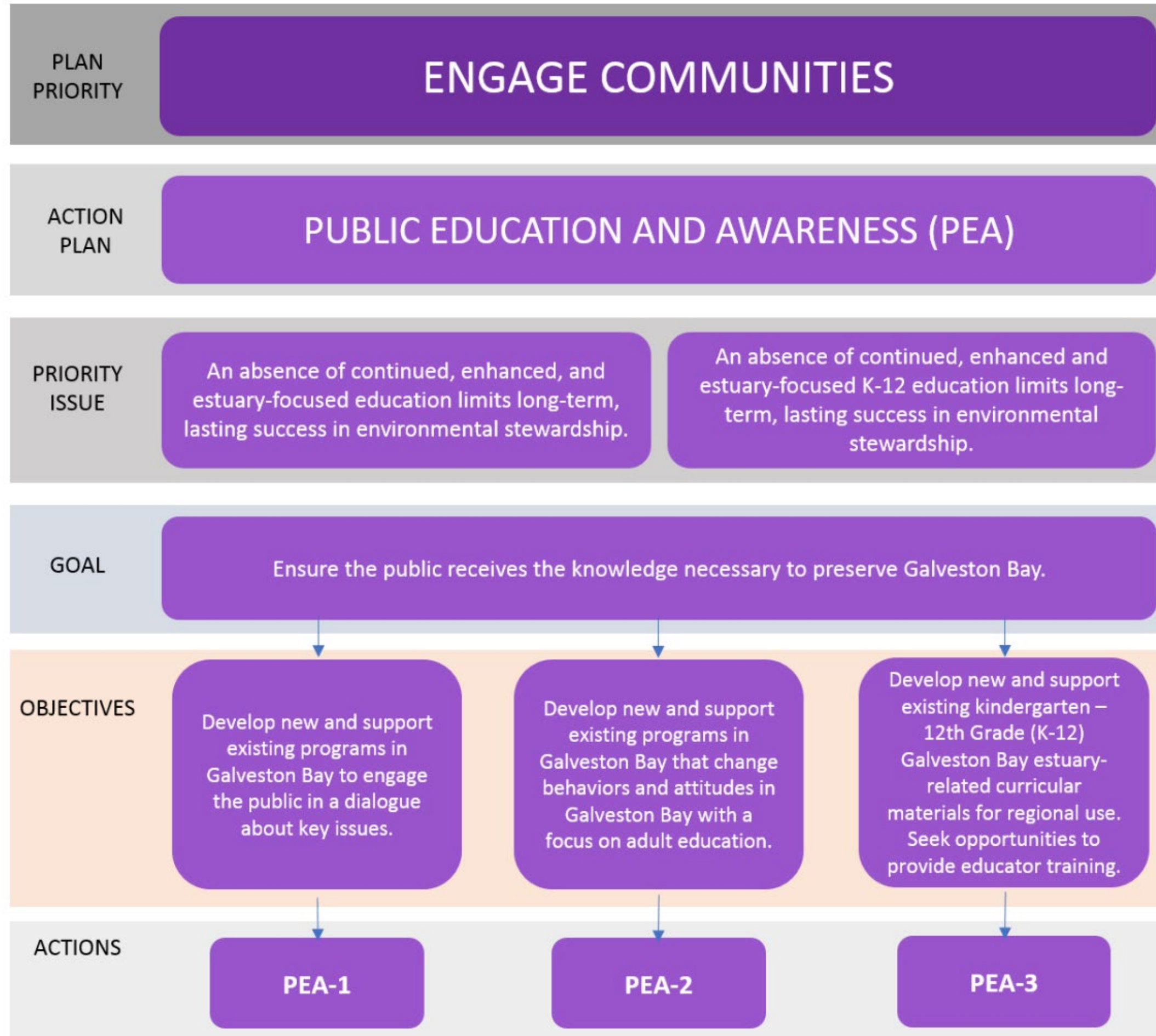
PEA-2: Adult Education

PEA-3: Kindergarten to 12th Grade (K-12) Education Efforts

**FIGURE 27
STAKEHOLDER AND PARTNER OUTREACH ACTION PLAN**



**FIGURE 29
PUBLIC EDUCATION AND AWARENESS ACTION PLAN**



Plan Priority Two (Protect and Sustain Living Resources)

Action Plans:

1. Support Habitat Conservation (HC)
2. Support Species Conservation (SC)
3. Sustain Freshwater Inflows (FWI)

Do you feel that any of the action items listed below for these Action Plans need updating?

HC-1: Land Acquisition

HC-2: Habitat Restoration

HC-3: Habitat Enhancement

SC-1: Native Species Management

SC-2: Invasive Species Control

FWI-1: Regional Planning for Freshwater Inflows

FWI-2: Freshwater Inflows Research and Management

FWI-3: Water Conservation and Education

FIGURE 21
HABITAT CONSERVATION ACTION PLAN

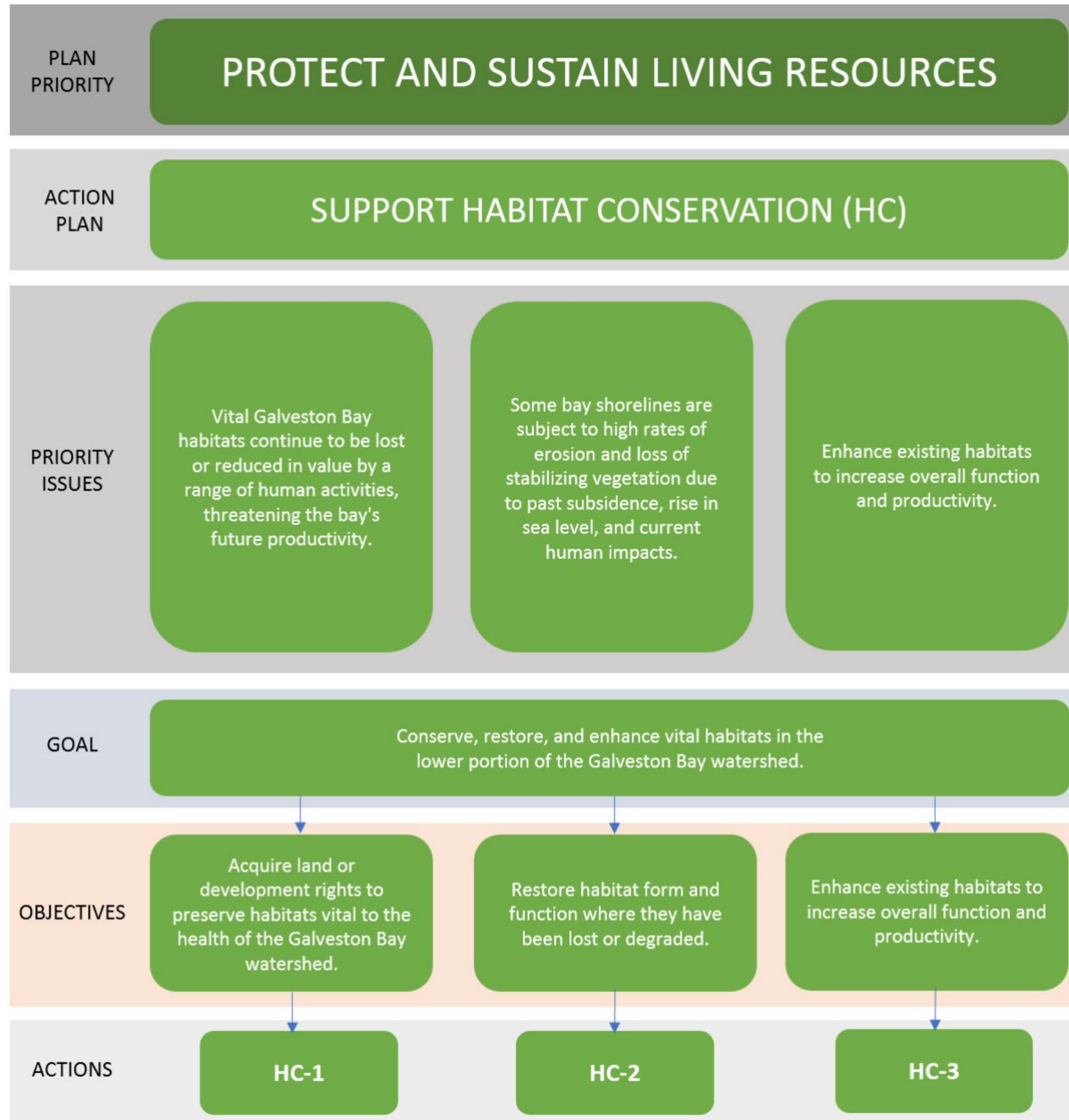


FIGURE 23
SPECIES CONSERVATION ACTION PLAN

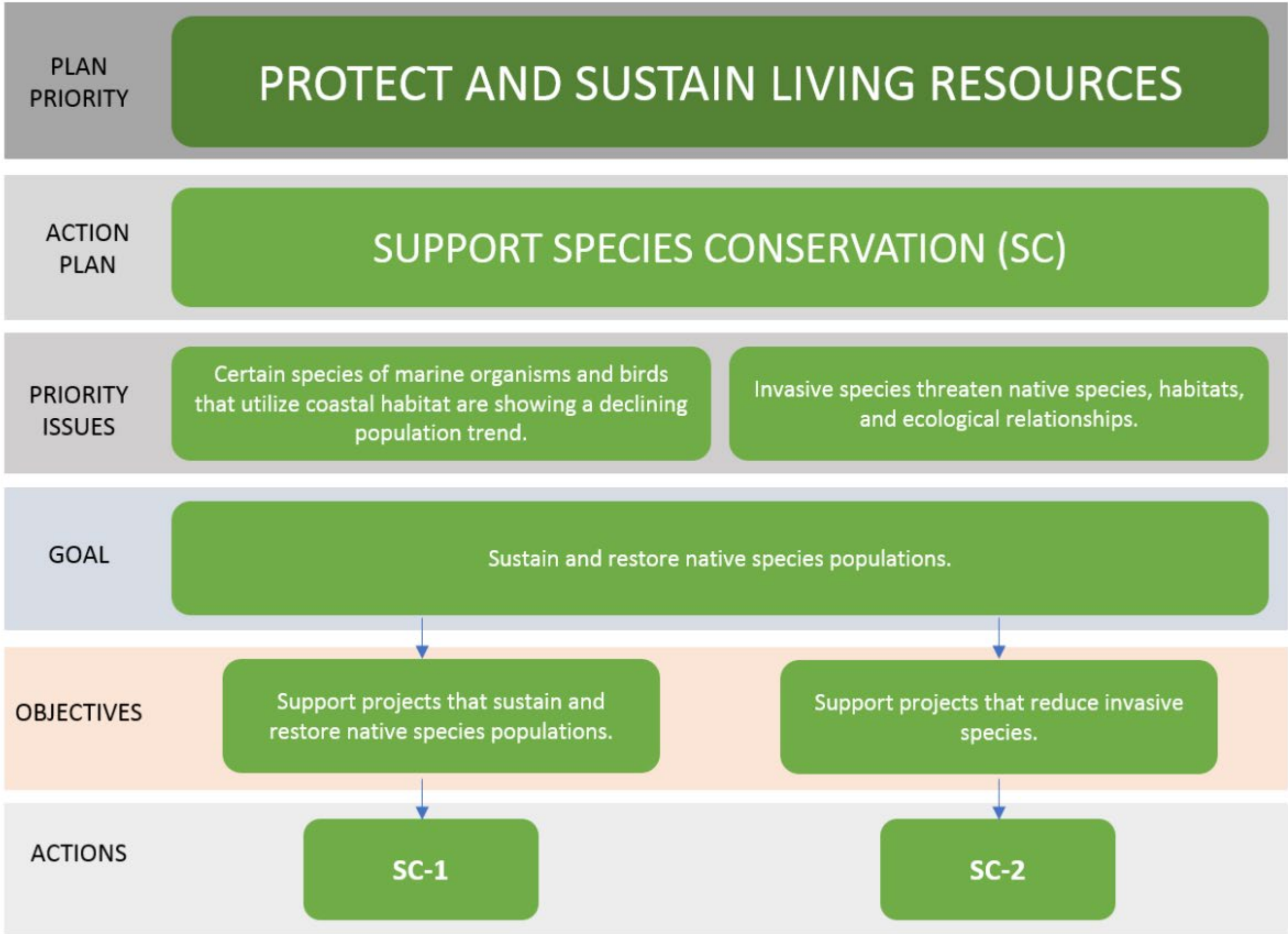
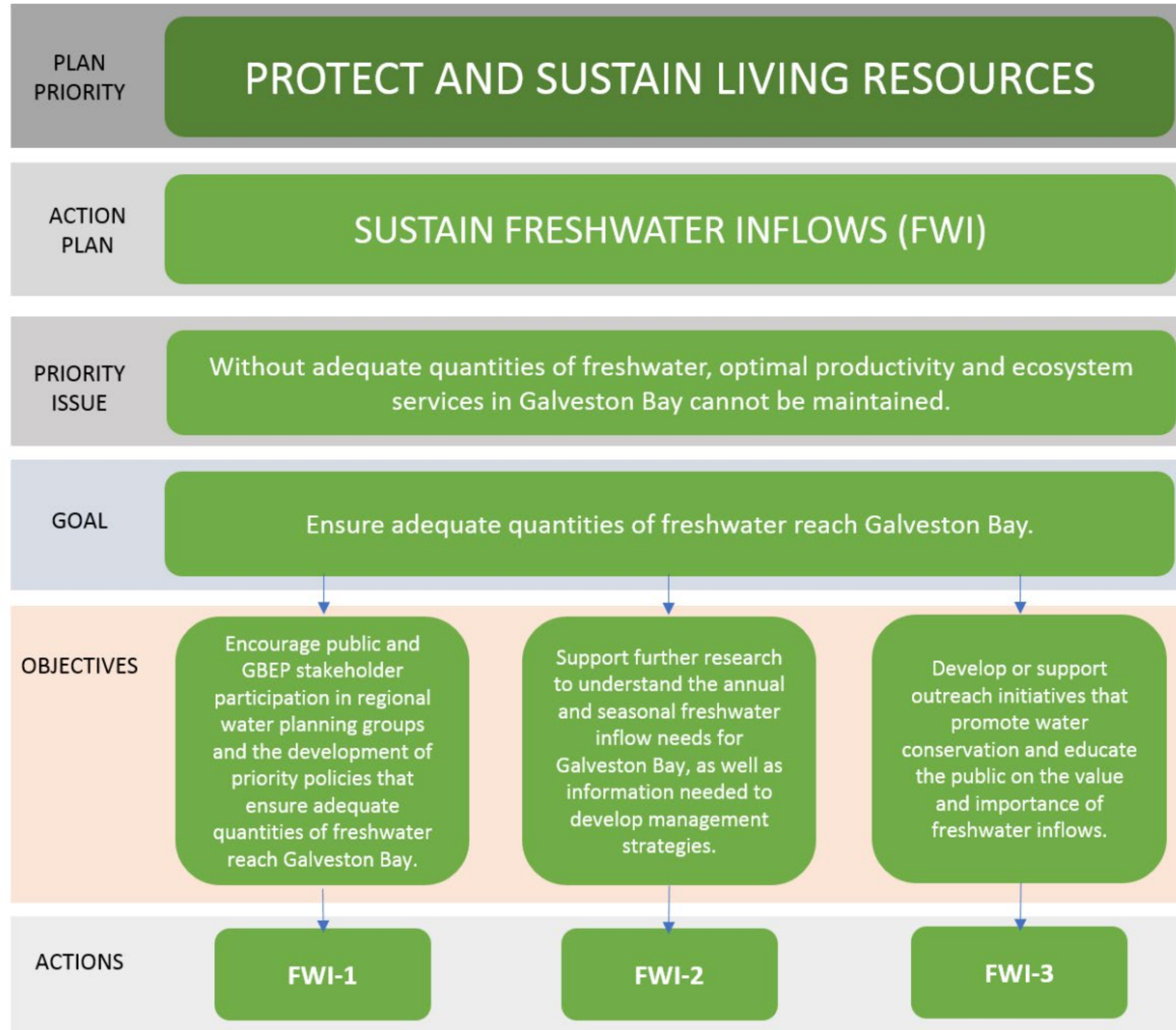


FIGURE 25
FRESHWATER INFLOWS ACTION PLAN



SC-2

Invasive Species Management*

Objective: Support projects that reduce invasive species.



Priority Issue: Invasive species threaten native species, habitats, and ecological relationships.

Description: To address this, the GBEP and its partners are seeking to support and fund projects that enhance coastal habitat(s) by reducing invasive species, leveraging the GBEP's monies for additional funds, when applicable.

Implementation location: Lower Galveston Bay watershed.

ACTIVITIES	TIMEFRAME AND OUTPUT(S)	IMPLEMENTATION COST
Support invasive species management on public and private lands.	Within 2-5 years, identify important coastal areas to target for enhancement of degraded coastal habitats.	\$0 - \$200,000
	Within 5-10 years, develop funding strategies for enhancement projects that can be adapted to multiple funding sources.	\$0 - \$200,000
	Within 10-plus years, enhance 5,000 acres of lost or degraded coastal habitats (please see HC-3).	\$1 Million - \$500 Million

POTENTIAL IMPLEMENTERS

Armand Bayou Nature Center
Ducks Unlimited
Galveston Bay Foundation
Houston Audubon
HARC
Houston Parks and Recreation Department
Houston Wilderness
NOAA Restoration

NRG Energy
Texas A&M AgriLife Extension Service
Texas Community Watershed Partners
Texas General Land Office
Texas Parks and Wildlife Department
The Nature Conservancy
U.S. Department of Agriculture Natural Resource Conservation Service
U.S. Fish and Wildlife Service

PERFORMANCE MEASURES

1. Habitat Conservation Blueprint (HC-2 and HC-3) updated.
2. Number of projects with invasive species managed, including the type and amount of invasives completed.

Plan Priority One (Ensure Safe Human and Aquatic Life Use)

Action Plans :

1. Improve Water Quality Through Nonpoint Source Pollution Abatement (NPS)
2. Improve Water Quality Through Point Source Pollution Abatement (PS)
3. Promote Public Health and Awareness (PHA)

Do you feel that any of the action items listed below for these Action Plans need updating?

NPS-1: Support Watershed-Based Plan Development and Implementation

NPS-2: Support Nonpoint Source Education and Outreach Campaigns

NPS-3: Implement NPS Best Management Practices

NPS-4: Host Nonpoint Source Workshops

PS-1: Support Stormwater Education Programs

PS-2: Achieve Sanitary Sewer System Capacity and Integrity

PS-3: Increase Wastewater Treatment Facility Compliance

PHA-1: Improve Seafood Advisory Awareness

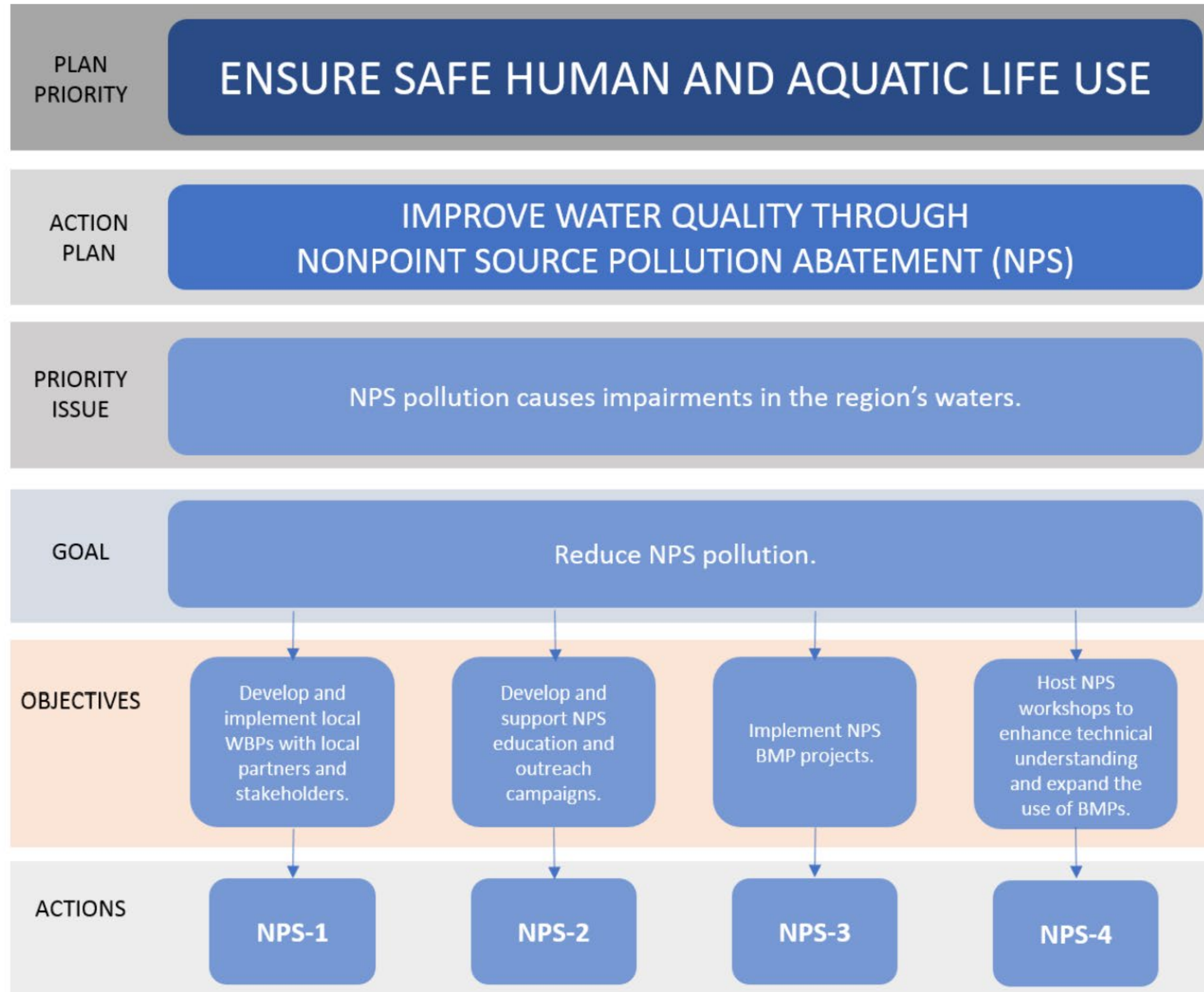
PHA-2: Improve Regional Contact Recreation Risk Awareness

PHA-3: Improve Contact Recreation Safety Through Watershed-Based Plans (WBPs)

PHA-4: Improve Shellfish Consumption Safety Through WBPs

PHA-5: Improve Finfish Consumption Safety Through WBPs

FIGURE 12
NONPOINT SOURCE ACTION PLAN



**FIGURE 15
POINT SOURCE ACTION PLAN**

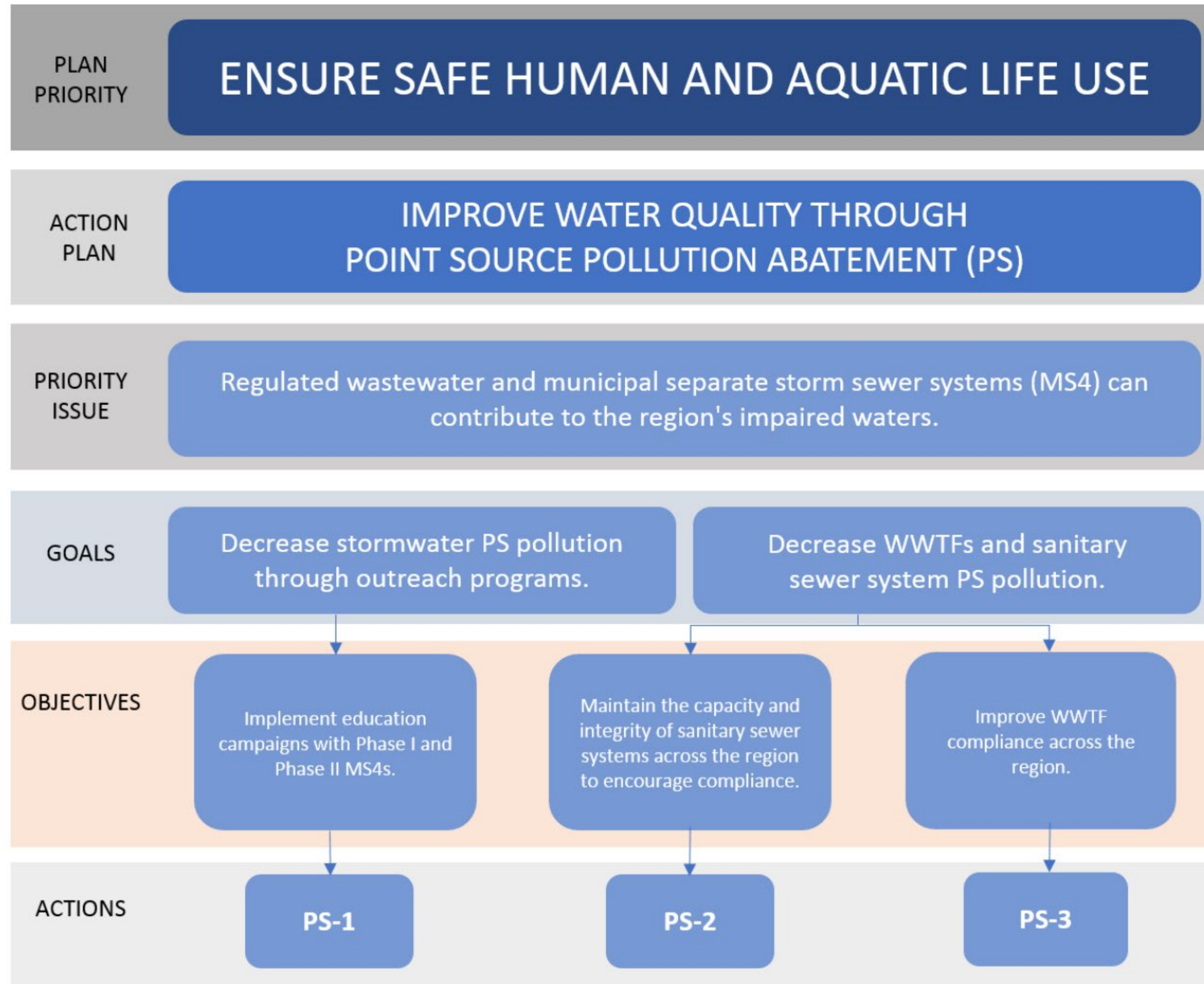
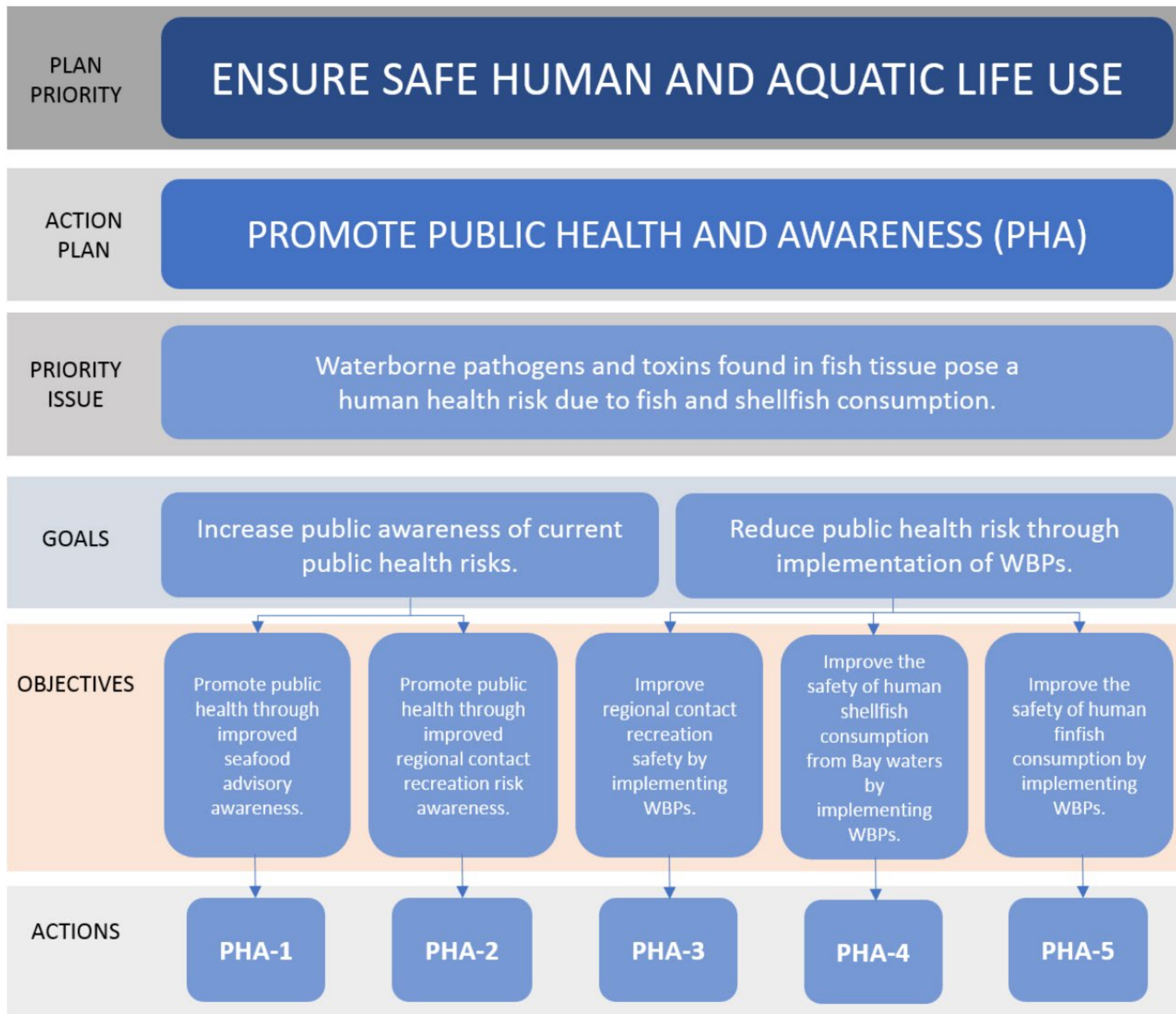


FIGURE 17
PUBLIC HEALTH AWARENESS ACTION PLAN



NPS-1

Support Watershed-Based Plan Development and Implementation

Objective: Develop and implement local WBPs with local partners and stakeholders.



Priority Issue: NPS pollution causes impairments to the region's waters.

Description: The GBEP and its partners are identifying target area(s) to schedule implementation of WBPs by developing prioritization measures, such as the relationship of water body to water quality standard impairment, local source of funding or match available, ongoing watershed planning effort, size of water body, access to monitoring data, etc.

Implementation location: Lower Galveston Bay watershed.

ACTIVITIES	TIMEFRAME AND OUTPUT(S)	IMPLEMENTATION COST
Identify target project areas and support development and implementation of 10 WBPs.	Within 2-5 years, support development and / or implementation of two WBPs (20% of goals met).	\$0 - \$200,000
	Within 5-10 years, support development and / or implementation of three additional (five total) WBPs (50% of goals met).	\$200,000 - \$1 Million
	Within 10-plus years, support development and / or implementation of five additional (10 total) WBPs (100% of goals met).	\$1 Million - \$50 Million

POTENTIAL IMPLEMENTERS

City of Houston
Future Watershed Partners
Galveston Bay Foundation
Galveston County Health District
HARC

H-GAC
Texas A&M AgriLife Extension Service
Texas Parks and Wildlife Department
Texas Sea Grant Program
Texas State Soil and Water Conservation Board

PERFORMANCE MEASURES

1. Number of WBPs developed and / or implemented.

Plan Priority Four (Inform Science-Based Decision Making)

Action Plans:

1. Collaborate with Research Institutions to Support Focus Area Applied Research and Monitoring (RES)
2. Increase Access to Galveston Bay Ecosystem Information (ACS)

Do you feel that any of the action items listed below for these Action Plans need updating?

RES-1: Conduct Biological Stressor Monitoring and Research

RES-2: Conduct Geochemical Stressor Monitoring and Research

RES-3: Conduct Physical Stressor Monitoring and Research

RES-4: Conduct Monitoring and Research to Address Limits to Contact Recreation

RES-5: Conduct Monitoring and Research to Address Limits to Seafood Consumption

RES-6: Evaluate Best Management Practice (BMP) Projects

RES-7: Conduct Research on Ecosystem Service and Economic Valuation of Bay Resources

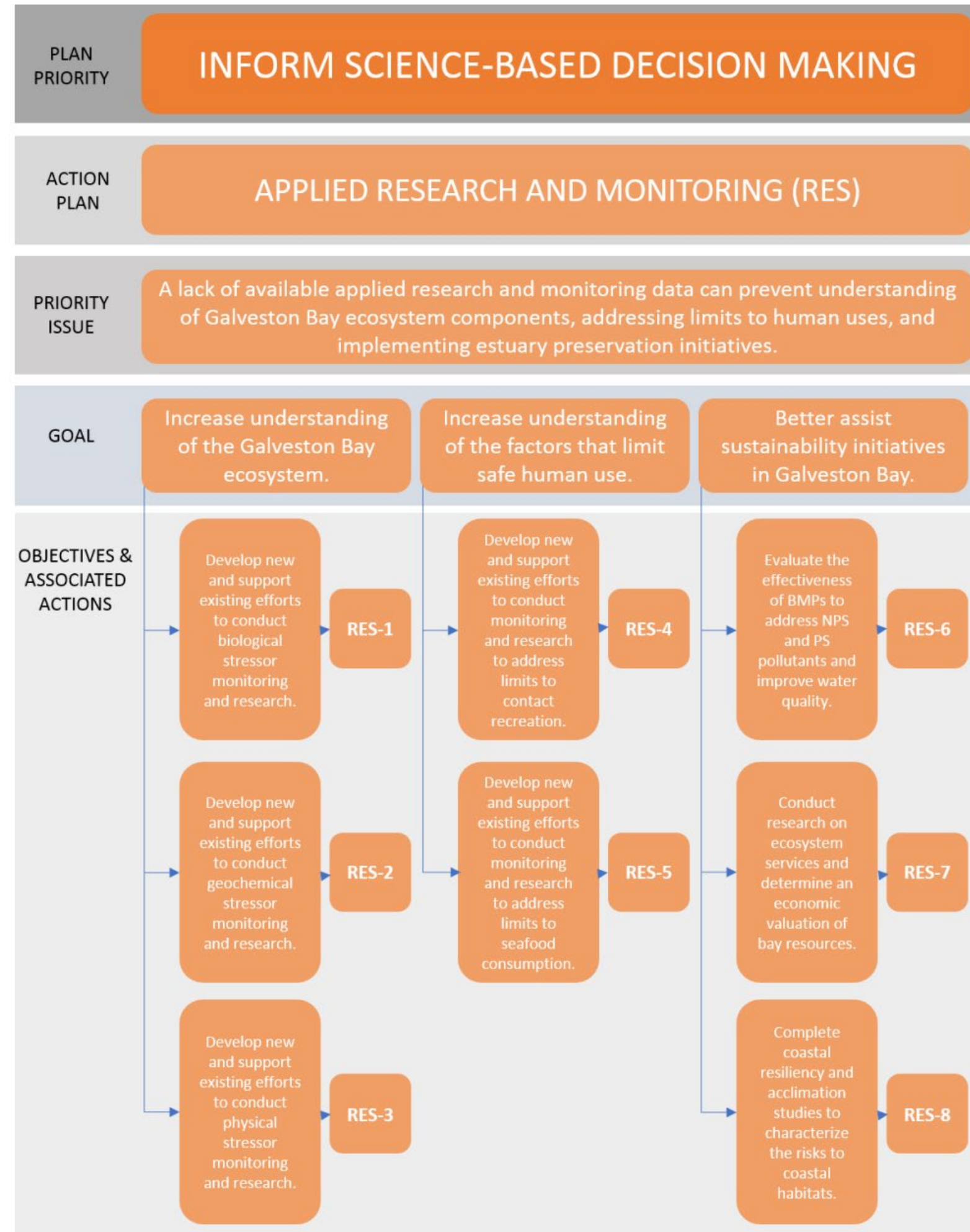
RES-8: Complete Coastal Resiliency and Acclimation Studies

ACS-1: Tracking Ecosystem Health Indicators

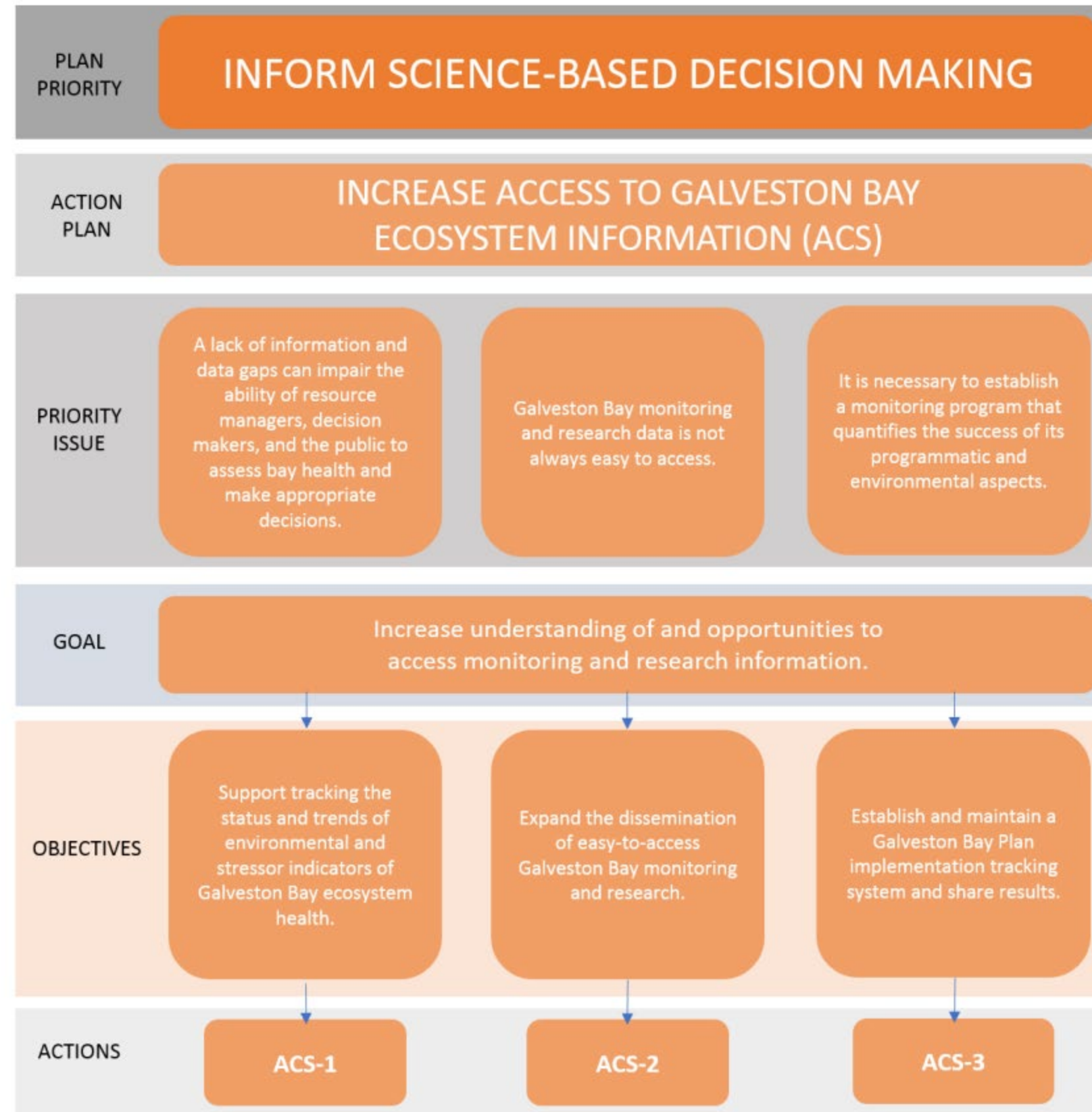
ACS-2: Access to Monitoring and Research Data

ACS-3: Track Galveston Bay Plan Implementation

**FIGURE 31
APPLIED RESEARCH AND MONITORING ACTION PLAN**



**FIGURE 33
INCREASE ACCESS ACTION PLAN**



RES-3

Conduct Physical Stressor Monitoring and Research

Objective: Develop new and support existing efforts to conduct physical stressor monitoring and research.



Priority Issue: A lack of available applied research and monitoring data can prevent understanding of Galveston Bay ecosystem components, addressing limits to human uses, and implementing estuary preservation initiatives.

Description: The GBEP and its partners are studying the influence of physical changes to the estuary (e.g., litter and illegal dumping, modified freshwater inflows, bay circulation, coastal erosion, shoreline hardening, land use changes, and loss or fragmentation of habitats) on aquatic, semi-aquatic, and terrestrial species populations found in the Galveston Bay watershed.

Implementation location: Lower Galveston Bay watershed.

ACTIVITIES	TIMEFRAME AND OUTPUT(S)	IMPLEMENTATION COST
Present physical stressor research results at the State of the Bay Symposia.	Within 2-5 years, host a State of the Bay Symposium.	\$0 - \$200,000
Collect physical stressor research data and share results and partner publications through GBEP website.	Within 2-5 years, collect data and share results through GBEP website.	\$200,000 - \$1 Million
Support the development and public delivery of physical stressor research.	Within 2-5 years, provide support on the development and public delivery of white papers, technical presentations, and workshops (number TBD).	\$0 - \$200,000
Incorporate physical stressor research results into the <i>State of the Bay Report</i> .	On a cycle of every 5-10 years, use research data to create the <i>State of the Bay Report</i> .	\$0 - \$200,000

POTENTIAL IMPLEMENTERS

Houston Wilderness
Texas Living Waters Project / National Wildlife Federation

Various Research Institutions, Agencies, and Nonprofit Organizations

PERFORMANCE MEASURES

1. Number of physical research stressor studies completed.
2. Number of geochemical stressor white papers, presentations, and workshops completed.
3. Number of GBEP website visits.

Questions for Stakeholders

- What is the biggest challenge facing Galveston Bay?
- Do you think there needs to be **greater integration of action plans/action items across plan priorities** (subcommittees)? What would greater integration look like to you?
- What **issues** do you think should be highlighted or pulled across multiple priorities?
 - Examples: Air pollution, Freshwater inflows, Seafood safety, Species monitoring

Questions for Stakeholders

- Should there be any constituents added specifically to **emerging contaminants**?
 - Examples: Plastic pollution, Microplastics, PFAS, Other contaminants
- Are any Action Plans/ Action Items complete? Need updating?
- What would ERAP and/or Equity Strategy integration look like to you?
- Are you seeing in B&P meetings any contradictions or omissions in the plan that make your job re: funding decisions more difficult?

Subcommittee Feedback – What is the Biggest Challenge Facing Galveston Bay?

Common Issues Across Priorities in the Plan

Population Growth, Land Use Change & Habitat Loss

Climate Change & Climate Resilience

Water Quality & Chemistry Changes

Priority/ Subcommittee Specific Issues

Priority 1/ WSQ

- Understanding stressors
- Bacteria impairments
- Lack of funding

Priority 2/ NRU

- Erosion
- Oyster productivity
- Politics
- Equity

Priority 3/ PPE

- Public apathy
- Lack of political buy-in
- Communication
- Equity

Priority 4/ M&R

- Need for consistent, long-term monitoring

Subcommittee Feedback – Are any Action Plans/Items complete? Need updating?

- **Plan Priority 1 – Ensure Safe Human and Aquatic Life Use (WSQ)**
 - *Species conservation action items could be updated to have their own targets/ numbers and reflect crosslinks with freshwater inflows*
 - Fish and shellfish safety
- **Plan Priority 2 – Protect and Sustain Living Resources (NRU)**
 - Updates related to monitoring for restoration projects and better integration for species monitoring
- **Plan Priority 3 – Engage Communities (PPE)**
 - Updates to broaden stakeholder groups and increase coordination and communication, especially with local government
- **Plan Priority 4 – Inform Science-Based Decision Making (M&R)**
 - The term “geochemical stressor” could be clarified
 - Add action items related to the ERAP stressors