



BACKGROUND

In October 2018, county and local government elected officials from throughout the Tampa Bay Region voted to sign a memorandum of agreement creating the Tampa Bay Regional Resiliency Coalition. The MOU calls for the creation of a Regional Action Plan with strategies for coordinated regional preparation for and adaptation to a rapidly changing global environment. The MOU also calls for the plan to identify funding strategies at the local, state and federal levels for mitigation and adaptation actions to deal with those impacts.

CONTEXT FOR READING THE OBJECTIVES AND ACTIONS

The Regional Resiliency Action Plan is intended to serve as a guiding framework and provided a menu of best practices, which will be implemented locally and together as a region. TBRPC staff reviewed resiliency plans, recommendations and frameworks used around the country and state to identify promising practices that would work in our region. The TBRPC staff also received recommendations on best practices being implemented in region – so the plan builds on the priorities and work of member governments. The plan defines regional collaboration and actions that will enhance consistency in implementation across jurisdictions.

The actions reflect a compilation of best practices, are voluntary and should be viewed by local governments as recommendations.

Recognizing that Coalition members have different levels of resources and are at different stages in resilience planning, the plan is designed to support local governments from small to large. It includes a range of actions which will enable local governments to implement “low hanging fruit” and new innovative approaches.

LOCAL GOVERNMENT AND STAKEHOLDER INPUT ON THE DRAFT PLAN

Stakeholder feedback is essential to ensure the proposed actions match local and regional priorities. The ownership of the plan belongs to the member governments of the Resiliency Coalition. As such the top priority is ensuring that the plan aligns with the priorities of member governments and is supported by the Coalition Partners.

The TBRPC asks that member government staff conduct meetings for interdepartmental teams for review, forward to staff who have not been able to participate in the workshops and share the plan with relevant advisory boards.

Coalition Partners, community stakeholders, and subject matter experts are invited to provide comments. Your input will help to ensure the plan aligns with leading practices, is consistent with leading academic research, federal and state agency goals, and supports the priorities of organizations serving the communities in the region.



HOW TO PROVIDE FEEDBACK

Click on the links to download the [Regional Resiliency Action Plan Draft](#) in Word or PDF format. Please use the [comment](#) feature in Word or [add comments](#) in Adobe PDF.

When reviewing the goals, objectives and actions, **please include the number**. Feel free to provide specific copy edits to help enhance public understanding. You can also indicate actions that should be consolidated or removed. Or you may also propose new actions.

If necessary, the TBRPC will also hold a meeting with Coalition Members and Partners to review and discuss key topics. We also ask that you provide written comments to support the editing process.

DEADLINE FOR INPUT

Please submit your comments and feedback to cara@tbrpc.org by **May 28, 2021**. The TBRPC will combine comments in June and post the updated draft in July.

HAVE QUESTIONS?

Contact Cara Woods Serra (cara@tbrpc.org) or CJ Reynolds (cjreynolds@tbrpc.org).

CHAPTER 2

COMMUNITY VULNERABILITY

*Vulnerability assessments and
social demographics.*

Goal 2

Adaptation and resilience planning strategies are based on rigorous, consistent, scientifically defined vulnerability assessments.

Defining a community's existing socio-economic status, conditions and systems interdependencies are crucial to becoming more resilient. Household income, race, and educational attainment are key factors that influence personal resilience, and thus the greater community's resilience to disasters and hazards.

The Region is making progress on conducting risk and vulnerability assessments for critical infrastructure and public assets. In the next five years, the Region will undertake new efforts focused on understanding community vulnerability. The Region will work to quantify the risks, impacts and costs of disasters and slow-moving climate hazards to our infrastructure, neighborhoods, and homes. As we do this, we will have the opportunity to improve existing social factors – such as income and racial disparities – to increase broader community resilience. Understanding how these interconnected factors impact our economies and quality of life is necessary to become more resilient.

Chapter 2 defines core factors exacerbating resilience vulnerability. The goals, objectives and actions will support the development of local and regional assessments that are consistent, rigorous and science-based to guide our planning, policy and investments.

Assessing Community Vulnerability

Vulnerability assessments measure the impact of sea-level rise, heat and other hazards, and identify the people, infrastructure, ecosystems and land uses that may be affected. The vulnerability assessment draws from the Risk Assessment framework described in the Code of Federal Regulations (Title 44 CFR 201.6 (c)(2)), which measures the hazard exposures a community is likely to experience, and *the sensitivities* – e.g., populations and land uses – that may be exposed to the identified hazards. (Florida Department of Environmental Protection).

Through the REACH project, the TBRPC, Coalition members and Partners are developing a community vulnerability assessment methodology which integrate tools developed by the CDC SVI and FEMA RAPT. The REACH efforts will support

Vulnerability assessments are needed to measure the impact of sea-level rise, climate risks, and other hazards, and identify the people, infrastructure, habitats and other resources that may be affected.

local governments and partners in conducting community and housing vulnerability assessments and producing consistent data across the region.

Our Communities

The [2020 Regional Equity Report](#) produced by the Tampa Bay Partnership examines 21 indicators related to economic vitality, talent, infrastructure, civic quality, and outcomes. The report documents differences in performance by race and ethnicity across the eight-county Tampa Bay region. The differences and disparities are stark.

Because the tourism and hospitality sectors are the largest sectors, the region has a relatively low median hourly wage, compared to peers. Workers in low-wage service sector jobs may have several part-time jobs or work full time but still cannot make ends meet. The economic outcomes for people of color show that they are more likely to be part of the working poor, living in poverty, or unemployed.

The United Way defines households that earn above the Federal Poverty Level, but not enough to afford a bare-bones household budget as ALICE -- an acronym for Asset Limited, Income Constrained, Employed. Lower income households have less resources to make resilience improvements and are at increased risk to extreme weather events.

Innovative preparedness and resilience strategies are needed to increase resilience capacity within local governments and collaboration with community organizations that serve our vulnerable populations.

Housing Vulnerability

Housing is the foundation of our communities, yet the region, like other areas around the state, has a shortage of attainable and affordable housing. Additionally, while it is generally understood that many homes are at risk to storm

surge and future flood risks, the potential impacts need to be quantified to develop effective local plans.

Region-wide and local housing vulnerability assessments – that are consistent -- are necessary to quantify the number and type of properties and communities at risk, under different conditions and timeframes. This information will inform future land-use and zoning changes, and short-term mitigation investments and new construction goals. Property owners – from single family homes to large apartment and condo buildings – and prospective investors and buyers -- need open access to data, maps and tools to assess a buildings' risks and define actionable strategies.

Resilience and local assisted housing plans must be more closely coordinated to support effective HUD and SHIP investments, targeted mitigation policies, strategies, and incentives, especial for rental properties. Since Black and Hispanic people have the lowest rates of homeownership throughout the region, mitigation strategies for rental properties will also improve equity and overall community resilience.¹

Understanding Heat Hazards

Today, extreme heat events are responsible for more annual fatalities in the U.S. than any other form of extreme weather.² Overall, the frequency, duration, and intensity of heat waves have been on the rise since the 1960s, and extreme temperatures are projected to increase relative to average temperatures.³

To investigate the effects of heat and other climate hazards on the regional economy, the TBRPC produced the Taking Stock report in 2021⁴. Models project substantial warming in temperature extremes by the end of the 21st century, and Florida will likely experience a near tripling in the frequency, and greater than sixfold increase in the mean duration of heatwaves under a high emissions scenario.⁵ Increasing temperatures and heatwave events will precipitate human injuries and fatalities, in addition to other societal, physical, and ecological impacts.

Improving Community Spaces to Reduce Heat Impacts

Cities and highly developed suburban areas tend to have much higher temperatures than their rural landscapes, which are often referred to as "Urban Heat Islands" (UHI). High concentrations of roads, buildings, and other

¹ Tampa Bay Regional Equity Report, Tampa Bay Partnership, August 19,2020.

² Habeeb, D., Vargo, J., & Stone, B. (2015). Rising heat wave trends in large US cities. *Natural Hazards*, 76(3), 1651-1665.

³ Habeeb (2015).

⁴ <https://www.tbrpc.org/wp-content/uploads/2021/04/Taking-Stock-Economic-Impacts-of-Climate-Change-FINAL.pdf>

⁵ Raghavendra, A., Dai, A., Milrad, S. M., & Cloutier-Bisbee, S. R. (2018). Floridian heatwaves and extreme precipitation: future climate projections. *Climate Dynamics*, 52(1-2), 495-508.

infrastructure absorb and re-emit the sun's heat more than natural land cover, causing surface and ambient temperatures to rise in these urbanized pockets, particularly during the summer.

In the US, the UHI effect increases daytime temperatures between 0.9°– 7.2°F higher in urban areas, with larger temperature differences in humid regions, such as Florida, and in cities with larger and denser populations.⁶ It is highly likely that the UHI effect⁷ will worsen as the structure, spatial extent, and density of urban areas grow, unless specific cooling strategies for infrastructure, buildings and public spaces are implemented, in addition to climate mitigation strategies.

Heat, health and social vulnerability

While acclimatization, air conditioning and better building design are factors that are likely to moderate future heat mortalities, older adults, adults with chronic illnesses, and particularly minorities and households with low incomes are more vulnerable to heat-related illnesses and or dying.⁸ Sensitive populations, such as children, older adults, and those with existing health conditions, and socially vulnerable groups such as minorities and low-income people are particularly at risk to elevated urban heat in the Tampa Bay Area.

Heat islands compromise the health of urban populations by exacerbating the impacts of heat waves, including heat-related illnesses and deaths. Heat also amplifies the effects of air pollution and impacts people with asthma and other chronic respiratory conditions. Combined with the state's high humidity levels, “wet bulb” temperatures are likely to dramatically increase the number of deaths from heat stroke in the coming decades, especially among the very young and the elderly.⁹

Vulnerable Occupations and Workers

Heat stress also affects workforce health and productivity in occupations that are typically exposed to outdoor conditions for extended periods of time. Farm, utility, construction and landscaping workers are examples of this kind of

⁶ Hibbard, K.A., F.M. Hoffman, D. Huntzinger, and T.O. West, 2017: Changes in land cover and terrestrial biogeochemistry. In: *Climate Science Special Report: Fourth National Climate Assessment, Volume I* Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.]. U.S. Global Change Research Program, Washington, DC, USA, pp. 277-302, doi: 10.7930/J0416V6X.

⁷ Margolis, H. G. (2014). Heat waves and rising temperatures: human health impacts and the determinants of vulnerability. In *Global Climate Change and Public Health* (pp. 85-120). Humana Press, New York, NY.

⁸ *Climate Change Impacts in the United States: The Fourth National Climate Assessment, Summary Finding 6*. nca2018.globalchange.gov

⁹ Bruce Coffyn Mitchell & Jayajit Chakraborty (2014) Urban Heat and Climate Justice: A Landscape of Thermal Inequity in Pinellas County, Florida, *Geographical Review*, 104:4, 459-480, DOI: [10.1111/j.1931-0846.2014.12039.x](https://doi.org/10.1111/j.1931-0846.2014.12039.x)

occupations. Many logistics related jobs, such as those working in terminals or loading docks, will also face heightened exposure to heat and heat stress.

Other Priorities: Integrating Health and Food Systems into Resilience Planning

Extreme weather and climate change act as a threat multiplier to minority populations and low-income communities who are more vulnerable. Addressing health inequities when implementing climate mitigation and adaptation projects will improve health outcomes today, and in the future. The RRAP goals and actions will support the Health in All Policies (HiAP) principles. ([American Public Health Association.](#))

The COVID pandemic has exposed the precarious economic situation facing many residents. The Urban Institute's Well-Being and Basic Needs Survey (WBNS), a nationally representative survey, found that reported household use of food provided by charitable organizations grew almost 50 percent between December 2019 and December 2020, increasing from 13.2 percent of nonelderly adults to 19.7 percent, or almost in one in five adults.

The RRAP encourages alignment with short-term disaster preparedness goals defined in the FEMA Community Lifelines "Food, Water, Shelter." Extreme weather impacts and other hazards can affect food availability, access, utilization. Understanding potential impacts and vulnerabilities to the food system, including production, transportation, distribution, retail and storage will be crucial. The agricultural sector is highly adaptive but maybe impacted by land-use, unless resilience and economic development priorities are integrated.

The Path Forward

Conducting vulnerability assessments to flooding, sea level rise, extreme heat and other hazards will inform local government plans -- from housing to community services and infrastructures. Increasing equity in resilience requires a nuanced understanding of how impacts will exacerbate existing socio-economic conditions, vulnerabilities and underlying health conditions.

Using consistent assessment methods, local governments can collaborate to effectively develop targeted programs which address existing disparities and improve racial and social equity, and ensure communities are better able to "bounce forward" as healthy, resilient.

When planning for housing and development, the region and local governments will consider chronic stresses and climate change risks in tandem with the demand for specific categories of affordable housing, and future land-

use considerations. Local and regional planning initiatives will analyze the risks to housing and the community's most vulnerable people to inform local resilience and sustainability plans.

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Category	Indicator	Data Source	Application
Proposed Impact Indicators (Community Vulnerability)			
HEAT-RELATED ILLNESS	Age-adjusted rate of heat-related emergency department visits during summer months per 100,000	FDOH Florida Tracking	
	Age-adjusted rate of heat-related hospitalizations during summer months per 100,000		
	Age-adjusted rate of heat-related deaths during summer months per 100,000		
RESPIRATORY HEALTH (Affected by indoor and outdoor air quality. Potential climate change effects on air quality: mold due to storms or flooding, increased ground-level ozone due to higher temps, pollen changes, wildfires)	Asthma-related ER visits. FDOH Definition: Discharges from civilian hospital emergency departments located in Florida where asthma was the principal diagnosis.	FDOH [1], FL Health Charts	
	Asthma hospitalizations. FDOH Definition: Inpatient hospitalizations, discharged from civilian, non-federal acute care hospitals located in Florida, where asthma was <i>the principal diagnosis</i> . Note: FDOH also has an indicator "Hospitalizations from or With Asthma" that includes hospitalizations where asthma was any listed diagnosis.	FDOH, FL Health Charts	

VECTOR-BORNE ILLNESS	See FDOH's Mosquito-Borne Disease Surveillance page, which includes alerts / advisories, as well as Florida Arbovirus Surveillance weekly reports.	FDOH Mosquito-Borne Disease Surveillance page	
	FDOH monitors probable and confirmed cases of reportable diseases.	FDOH Reportable Diseases Frequency Report	
	Cases reported to CDC by county of residence; shows human disease cases and non-human infections (i.e. mosquito, bird, sentinel animal, veterinary)	CDC ArboNET	
HOUSING	Establish a housing risk baseline -- to hurricanes, extreme rain events and sea level rise floods		

HOW DO WE GET THERE?

OBJECTIVE 2.1	Conduct vulnerability assessments of critical infrastructure, publicly owned assets, Community Lifelines, and food systems.
OBJECTIVE 2.2	Integrate health and equity metrics into hazard analysis and resilience planning, and conduct community vulnerability assessments, including highly vulnerable populations.
OBJECTIVE 2.3	Conduct housing vulnerability assessments using new standardized, science-based methods to quantify and map risks.
OBJECTIVE 2.4	Conduct economic impact analysis for specific hazards, sectors and assets; and conduct cost-benefit analysis for resilience adaptation strategies

Objective 2.1

Conduct vulnerability assessments of critical infrastructure, services publicly owned assets, and food systems.

Actions	
The TBRPC will model scenarios and produce data and maps for extreme rain events and inland flooding to support vulnerability assessments.	<p>Lead Organization: TBRPC Partners: Universities, Comprehensive Plan Themes: Coastal, Conservation, Transportation Topic Tags: Community Vulnerability</p>
The TBRPC will coordinate the production of maps and integrate new high-resolution terrestrial LiDAR produced by the State and other agencies into resources to support local vulnerability analysis.	<p>Lead Organization: TBRPC Partners: Universities, Private Sector, Local Governments Comprehensive Plan Themes: Coastal, Conservation, Transportation Topic Tags: Community Vulnerability</p>
The TBRPC will coordinate a regional food systems vulnerability assessment to extreme weather and future climate hazards.	<p>Lead Organization: TBRPC Partners: Universities, Non-profits, Private Sector Comprehensive Plan Themes: Coastal, Conservation, Transportation Topic Tags: Community Vulnerability</p>
TBEP, and the TBRPC and regional scientific partners, will assess ecosystem and habitat vulnerability to identified climate hazards.	<p>Lead Organization: TBEP Partners: CSAP, TBRPC Comprehensive Plan Themes: Coastal, Conservation Topic Tags: Community Vulnerability</p>
Local governments will conduct comprehensive climate vulnerability assessment for the impacts of temperature, precipitation, hurricanes and sea level rise on critical infrastructure, operations, facilities, and services.	<p>Lead Organization: Local governments Partners: CSAP, TBRPC Comprehensive Plan Themes: Coastal, Conservation, Public Facilities Topic Tags: Community Vulnerability</p>
Local governments, using the recommendations for climate indicators in Chapter 1, will produce maps for the community visualizing risks and defining FEMA flood hazard areas, areas of low-service, high tide flooding and storm surge.	<p>Lead Organization: Local governments Partners: CSAP, TBRPC Comprehensive Plan Themes: Coastal, Conservation Topic Tags: Community Vulnerability</p>
Local governments will conduct community vulnerability assessments of the following: Low-	<p>Lead Organization: Local governments</p>

income populations, neighborhoods and small area plans and Community Redevelopment Areas.	Partners: Neighborhood organizations, TBRPC Comprehensive Plan Themes: Coastal, Conservation, Public Facilities Topic Tags: Community Vulnerability, LMS
Local governments will produce maps to visualize interconnected social vulnerability and resilience factors to inform stakeholders and community members.	Lead Organization: Local governments Partners: CSAP, TBRPC Comprehensive Plan Themes: Coastal, Conservation Topic Tags: Community Vulnerability
Local governments will designate Coastal High Hazard Areas and "Adaptation Action Areas" where appropriate.	Lead Organization: Local governments Partners: CSAP, TBRPC Comprehensive Plan Themes: Coastal, Conservation Topic Tags: Community Vulnerability
Local governments will develop a risk assessment to determine wellfields, groundwater and underground infrastructure at risk to saltwater intrusion.	Lead Organization: Local governments Partners: CSAP, TBRPC Comprehensive Plan Themes: Coastal, Conservation, Water Topic Tags: Community Vulnerability
Local governments will assess stormwater system facilities to vulnerabilities to future inundation and erosion including elevations of outfalls into surface water bodies.	Lead Organization: Local governments Partners: CSAP, TBRPC Comprehensive Plan Themes: Coastal, Conservation, Water Topic Tags: Community Vulnerability
TBRPC will conduct a vulnerability analysis for all vulnerable causeways and bridges identified in the Resilient Tampa Bay study using high resolution LIDAR data and create a priority list of improvements based on the results of this assessment.	Lead Organization: TBRPC Partners: CSAP, Local governments Comprehensive Plan Themes: Coastal, Conservation, Transportation Topic Tags: Community Vulnerability, roads
Local governments will assess risks to roads for future conditions and tidal flooding to define flooding thresholds for 2045 and 2070.	Lead Organization: Local governments Partners: CSAP, TBRPC Comprehensive Plan Themes: Coastal, Conservation, Transportation Topic Tags: Community Vulnerability

Objective 2.2

Integrate health and equity metrics into hazard analysis and resilience planning and support targeted vulnerability assessments for highly vulnerable populations.

Actions	
Local governments will identify and assess how climate change will impact public health within their jurisdiction using of Social Determinants of Health .	<p>Lead Organization: Local governments Partners: FDOH, TBRPC Comprehensive Plan Themes: Health, Coastal Topic Tags: Public Health, Equity</p>
Establish partnerships with public health, healthcare, and equity-focused organizations to assess health impacts and identify health and equity-promoting strategies. Assess the costs of public health impacts related to extreme weather and climate.	<p>Lead Organization: TBRPC Partners: FDOH, Local governments Comprehensive Plan Themes: Coastal, Health Topic Tags: Public Health, Equity</p>
TBRPC and regional partners will monitor the current list of health impact indicators and make them easily accessible through an online portal.	<p>Lead Organization: TBRPC Partners: FDOH, Local governments Comprehensive Plan Themes: Coastal, Health Topic Tags: Public Health, Equity</p>
TBRPC will establish and convene a public health and equity subcommittee of the Resilience Coalition to advise on best practices for using the health impact indicator data, improving accessibility, and identify needed updates to the list of health impact indicators.	<p>Lead Organization: TBRPC Partners: FDOH, Local governments Comprehensive Plan Themes: Coastal, Health Topic Tags: Public Health, Equity</p>
TBRPC, with grant funding, will conduct a region-wide study to quantify and visualize greenhouse gases emitted by source, identify areas with poor air quality that impact nearby by communities and enable decision making to reduce emissions.	<p>Lead Organization: TBRPC Partners: FDOH, Local governments Comprehensive Plan Themes: Coastal, Health Topic Tags: Public Health, Equity</p>

Objective 2.3

Conduct housing vulnerability assessments using standardized, science-based methods to quantify and map flood risks.

Actions

<p>TBRPC and regional partners will develop or identify a standardized housing risk assessment that can be used by member governments.</p>	<p>Lead Organization: TBRPC Partners: FHC, Local governments Comprehensive Plan Themes: Coastal, Housing Topic Tags: Housing</p>
<p>Local governments assess naturally occurring affordable housing (NOAH) vulnerability and create maps which define risks to sea level rise, storm surge, tidal flooding, and inland flooding.</p>	<p>Lead Organization: Local governments Partners: Florida Housing Coalition Comprehensive Plan Themes: Coastal, Housing Topic Tags: Housing</p>
<p>Local governments conduct affordable housing stock "windshield or walking tour" assessments to define energy and weather mitigation needs in LMI communities.</p>	<p>Lead Organization: Local governments Partners: Florida Housing Coalition Comprehensive Plan Themes: Coastal, Housing Topic Tags: Housing</p>

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Objective 2.4

Define economic impacts to specific hazards, sectors and assets; and conduct cost-benefit analysis for resilience adaptation strategies.

Actions	
The TBRPC will continue to assess the economic impacts of increased heat and flood risks. The Taking report will be updated as needed.	<p>Lead Organization: TBRPC Partners: Local governments Comprehensive Plan Themes: Coastal, Conservation Topic Tags: Community Vulnerability</p>
The TBRPC will work with regional partners to assess the economic impacts of insurance increases.	<p>Lead Organization: TBRPC Partners: CSAP, Local governments Comprehensive Plan Themes: Topic Tags: Community Vulnerability</p>
Local governments will conduct a cost-benefit analysis for new capital improvements and prepare for grant applications.	<p>Lead Organization: Local governments Partners: TBRPC Comprehensive Plan Themes: Topic Tags: Community Vulnerability</p>
Local governments will conduct a cost analysis for flood impacts to local roads and communities.	<p>Lead Organization: Local governments Partners: TBRPC Comprehensive Plan Themes: Topic Tags: Community Vulnerability</p>

Regional Targets

1. The TBRPC will model scenarios and produce data and maps for extreme rain events and inland flooding to support vulnerability assessments.
2. The TBRPC will coordinate the production of maps and integrate new high-resolution terrestrial LiDAR produced by the State and other agencies into resources to support local vulnerability analysis.
3. The TBRPC will coordinate a regional food systems vulnerability assessment to extreme weather and future climate hazards.
4. TBEP, and the TBRPC and regional scientific partners, will assess ecosystem and habitat vulnerability to identified climate hazards.

5. The TBRPC will conduct a vulnerability analysis for all vulnerable causeways and bridges identified in the Resilient Tampa Bay study using high resolution LIDAR data and create a priority list of improvements based on the results of this assessment.
6. Establish partnerships with public health, healthcare, and equity-focused organizations to assess health impacts and identify health and equity-promoting strategies. Assess the costs of public health impacts related to extreme weather and climate.
7. The TBRPC and regional partners will monitor the current list of health impact indicators and make them easily accessible through an online portal.
8. The TBRPC will establish and convene a public health and equity subcommittee of the Resilience Coalition to advise on best practices for using the health impact indicator data, improving accessibility, and identify needed updates to the list of health impact indicators.
9. The TBRPC, with grant funding, will conduct a region-wide study to quantify and visualize greenhouse gases emitted by source, identify areas with poor air quality that impact nearby by communities and enable decision making to reduce emissions.
10. The TBRPC and partners developed standardized housing and community vulnerability risk assessment.
11. The TBRPC continued to assess the economic impacts of increased heat and flood risks. The Taking report will be updated as needed.
12. The TBRPC worked with regional partners to assess the economic impacts of insurance increases.

Local Targets

1. Local government has conducted a comprehensive [climate vulnerability assessment](#) for the impacts of temperature, precipitation, hurricanes and sea level rise on critical infrastructure, operations, facilities, and services.
2. Local government has conducted one or more of the following vulnerability assessments: (1) assessment of publicly owned assets (2) assessment of private sector facilities and nonprofit community service providers supporting Community Lifelines (3) Saltwater-intrusion risk assessments (wellfields, groundwater and underground infrastructure) (4) assessment of stormwater system facilities to vulnerabilities to future inundation and (5) assessment of roads for future conditions and tidal flooding (6) assessment of low-income populations, neighborhoods

and/or (7) assessment of small area plans or Community Redevelopment Areas.

3. Local governments has conducted one or more of the following mapping actions : (1) produced maps for the community visualizing risks and defining FEMA flood hazard areas, areas of low-service, high tide flooding and storm surge (2) produced maps to visualize interconnected social vulnerability and resilience factors to inform stakeholders and community members (3) Formalized Coastal High Hazard Areas and Adaptation Action Areas.
4. Local government has identified and assessed how climate change will impact public health within their jurisdiction using of [Social Determinants of Health](#).
5. Local government has assessed housing vulnerability using one or more of the following strategies: (1) Assessed naturally occurring affordable housing (NOAH) vulnerability, and create maps which define risks to sea level rise, storm surge, tidal flooding, and inland flooding (2) conducted windshield or walking assessments in Low-Moderate Income neighborhoods to identify housing energy and weather mitigation needs.
6. Local government has conducted one or more of the following cost analyses: (1) cost-benefit analysis for new capital improvements and prepare for grant applications and/or (2) cost analysis for flood impacts to local roads and communities.