



**SPECIAL HOUSE COMMISSION TO STUDY
ECONOMIC RISK DUE TO FLOODING AND SEA LEVEL RISE**

Final Report

May 12, 2016

**Report Submitted to the
Rhode Island House of Representatives**

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I. Joint Commission Members

Chairwoman, Representative Lauren H. Carson (D-Dist. 75, Newport)

Representative Patricia Serpa (D-Dist. 27, West Warwick, Coventry, Warwick)

Representative Patricia Morgan (D-Dist. 26, West Warwick, Coventry, Warwick)

Myrna George, South County Tourism Council

Lisa Konicki, Ocean Community Chamber of Commerce

Mark Male, Independent Insurance Agents of RI

Dr. James Opaluch, University of Rhode Island

Ann Souder, Newport Maritime Alliance

Mark Stankiewicz, Town of Charlestown

Michael Walker, Commerce Corporation

Chris Waterson, ProvPort

II. Press Release

Commission forming to study economic impact of sea rise

September 23, 2015

STATE HOUSE – As a result of legislation sponsored by Rep. Lauren A. Carson (D-Dist. 75, Newport), a new legislative commission is organizing this week to study Rhode Island’s economic risk from flooding and sea rise.

The 11-member commission, which will hold an organizational meeting Thursday at 2 p.m. in Room 101 on the first floor of the State House, is tasked with assessing Rhode Island’s financial risk and economic exposure due to flooding and sea rise and reporting to the General Assembly. In particular, the commission is to perform case studies on the Providence Port, the Newport waterfront and the South County tourism and marine industry to determine what financial effects rising sea levels could have on them, and to provide information on how to prepare and respond to those risks.

“We need to think in concrete terms about what a higher sea level would mean to the specific businesses and properties along our coast that are drivers of our economy, and make some real plans for protecting them and our state’s economic interests. I’m looking forward to learning about the science and how it affects Rhode Island, and helping to set the stage for plans that prepare and protect our assets from the destruction of severe weather and rising sea levels,” said Representative Carson, who is expected to lead the commission.

Besides Representative Carson, the commission includes Rep. Patricia A. Serpa (D-Dist. 27, West Warwick, Coventry, Warwick), Rep. Patricia L. Morgan (R-Dist. 26, West Warwick, Coventry, Warwick), Dr. James Opaluch of the Kingston Coastal Institute at the University of Rhode Island, Charlestown Town Administrator Mark Stankiewicz, Greater Westerly-Pawcatuck Area Chamber of Commerce Executive Director Lisa Konicki, ProvPort Chief Operating Officer Bruce Waterson, South County Tourism Council President Myrna George, Independent Insurance Agents of Rhode Island Executive Vice President Mark Male, Rhode Island Commerce Corporation Senior Project Manager Michael Walker and Newport Maritime Alliance Vice President Ann Souder.

Under the establishing legislation ([2015-H 5478](#)), the commission is to provide information including economic risks to Rhode Island municipalities, businesses and the investment community so that they may factor sea rise and flooding into their short- and long- term decision making. It is also charged with making recommendations to the General Assembly about further steps to maintain the value of public and private property and revenue, to define adaptation strategies, to better understand the cost of inaction, and to propose new approaches to understand and address the business risks associated with sea rise and storm surge.

The commission is currently scheduled to meet monthly through February, and will hold three meetings that are each dedicated to one of the case studies: South County on Nov. 19, Providence on Dec. 17 and Newport on Jan. 21.

For more information, contact:
[Meredyth R. Whitty](#), Publicist
State House Room 20
Providence, RI 02903
(401) 222-2457

III. Letter from Chairwoman Carson

To the Members of the Rhode Island House of Representatives,

I reside among hundreds of businesses and other homeowners in Newport's waterfront district. In recent years, it has become common to walk out my front door during a storm and see several inches of water surging up the road. When I was elected to the House of Representatives I decided to study one of the challenges I knew best – the one at my front door. The House of Representatives followed suit and adopted House Resolution 5478, which established the Commission to Study Economic Risk Due to Flooding and Sea Rise.

Rhode Island possesses the research and intellectual capital to tackle the threat of sea level rise. However, I witnessed a communication divide between researchers studying the issue, stakeholders affected by the issue, and leaders capable of addressing the issue. Thus, we formed a diverse study commission composed of members with professional experience in residential and commercial real estate, hospitality and tourism, academia and scientific research, and, public policy.

The Commission studied the threat of sea level rise for six months. We adopted a case study methodology to narrow the scope of each meeting and focus on particular threats due to sea level rise. As you will read, sea level rise impacts coastal communities in many different ways. Whether it is a beachside restaurant in Westerly or marine shipping in Providence, many industries are susceptible to the threat of sea level rise.

Much work remains to ensure the Ocean State adequately adapts to sea level rise. Ultimately, there should be a statewide, philosophical approach to meeting adaptation goals that embraces the broader aim of protecting Rhode Island's economy from flooding and sea level rise. If we work diligently, Rhode Island, in light of its predisposition, has the opportunity to be a national model for preventing business interruption and loss of value due to flooding and sea rise level rise.

Sincerely,

Lauren Carson
Representative – District 75

IV. Executive Summary

The Rhode Island House of Representatives established the Commission to Study Economic Risk Due to Flooding and Sea Level Rise on June 17, 2015. The Commission's charge is set forth in [House Resolution - 5478](#) (2015). Composed of eleven individuals, the Commission first convened to elect Representative Lauren Carson as chairwoman on September 24, 2015.

The effects of flooding and sea level rise are real and measurable. In Rhode Island, these include: a sea level measured 10.6 inches higher since 1930 at the Newport Tide Gauge; storms that are thirty percent more intense; summers that are measurably warmer; and, coastal storms and sea surges that cause more and more damage.

Rhode Island has substantial public and private assets along its 400 miles of coastline. As of September 20, 2015, the Federal Emergency Management Agency had 15,380 active flood insurance policies covering over \$3.8 billion in property in Rhode Island. Additionally, twenty Rhode Island municipalities have acreage lying below the floodplain. Consequently, Rhode Island faces economic exposure due to flooding and sea level rise. This exposure carries significant economic consequences; such as, damage to publicly and privately owned coastal properties, business interruption, property devaluation, lost property tax revenue, and climate-driven changes on labor productivity and public health. No study has addressed Rhode Island's economic exposure to sea level rise and flooding until this report.

The Commission met six times and employed a case study methodology at each meeting. Meetings focused on sea level rise and flooding's consequences for particular municipality or region. Commission members received presentations from Westerly, Providence, and Newport leaders with hands on experience measuring and dealing with the effects of sea level rise. Witnesses included local planning and zoning officials, researchers from the Coastal Resources Center, scientists from the University of Rhode Island, officers from local tourism boards and chambers of commerce, port managers, municipal officials, small business owners, and an economist.

The Commission focused on risk assessment to identify vulnerabilities that would make business assets more susceptible to damage from flooding and sea level rise. These vulnerabilities included deficiencies in building construction, process systems, security, protection systems and loss prevention programs. The Commission remained mindful of their ultimate goal of proposing recommendations to the House for the broad purpose of understanding the scope of the risk in Rhode Island. Now that the risks have been identified, the Commission hopes that Rhode Island will take further steps to maintain the value of public and private property, protect public and private engines of economic growth, define effective adaptation strategies, better understand cost inaction, and propose new approaches to understand and address the business risks associated with sea rise and storm surge.

Westerly's rehabilitation in the wake of Hurricane Sandy

In 2012, Superstorm Sandy decimated the Misquamicut Beach shoreline in Westerly, Rhode Island. The storm dispersed 60,000 yards of sand and 5,300 cubic yards of construction debris along the coastline. The storm and ensuing damage also jeopardized twenty-eight million dollars in economic activity. Twenty-nine businesses in the district were damaged and thirteen were "red tagged." The Commission heard testimony on the community's recovery and rebuilding efforts.

The Port of Providence's susceptibility to sea level rise and storm surges

The Port of Providence lies along the estuary where the Providence River feeds into Narragansett Bay. Approximately thirty businesses use the port, which is among the fifty busiest ports in the United States. The Commission reviewed damage projections under Category 3-5 Hurricane scenarios before receiving testimony on local and state disaster preparedness plans as well as the effectiveness of the Providence Hurricane Barrier.

Newport's research on resiliency and adaptation

Hundreds of businesses and historic properties line Newport's waterfront. In order to preserve these assets, local officials have partnered with public and private entities to understand the threat of sea level rise. The Commission heard how Newport has identified assets in the coastal floodplain, researched flood regulations, and developed a strategy to protect their assets.

V. Commission Recommendations

Each witness called by the Commission offered recommendations. While these recommendations differed, they can be grouped into several categories:

- Updates to local comprehensive plans, zoning ordinances, and building codes;
- Additional support for academic and scientific research on sea level rise;
- Increased communication concerning the financial impact of natural disasters and flooding; and,
- The development of a statewide property preparedness program for property owners.

Recommendation 1: Business and homeowner flood audit program

The Commission believes the best way to prevent property damage due to sea level rise and flooding is to fortify vulnerable assets. One recommendation includes the creation of a flood audit program for property owners and businesses to incentivize property fortification and adaptation.

A flood audit program can be modeled after the RISE energy audit program for RI homeowners. We believe a companion flood audit program is necessary for homeowners and businesses to evaluate their property risk and consider necessary adaptation measures. Although the financial cost and funding model associated with the creation of this program is currently undetermined, the program could be funded through public or private investment.

The program could be overseen by a state agency or third-party contractor. First, a property management consultant would visit the property or business to perform a flood risk assessment of the land, assets, and structure. Then the auditor would provide the property or business owner with an evaluation detailing overall risk and flood preparedness along with specific resiliency measures available. The homeowner or business owner could be eligible for certain financing measures to reduce costs in exchange for implementing these resiliency measures.

Recommendation 2: Increase statewide awareness and resources for resiliency

The Commission realizes that many policy makers in municipal and state government are unaware of the threat of sea level rise. As such, several proposals should be developed to increase awareness: mandatory climate, flooding and sea level rise training for local planning commission, zoning boards, and realtors; a flood insurance incentive program for property owners in the floodplain; and, the dissemination of the Coastal Resources Center's adaptation catalogue to property owners in the flood plain.

Recommendation 3: Port of Providence and Fox Point Hurricane Barrier risk assessments

The Port of Providence includes commercial and industrial uses that are heavily integrated into the region's commerce stream. The Commission recommends continued support of state researchers in order to build stakeholder support for hurricane resiliency measures. Port stakeholders should continue to conceptualize and evaluate long-range resiliency options that protect the port from storm damage and ensure post-hurricane business continuity.

The Fox Point Hurricane Barrier was completed in 1966. Engineers proposed and developed the concept after two hurricanes devastated downtown Providence. The U.S. Army Corps of Engineers manages the station with operational support from the City of Providence. The barrier is designed to withstand a Category 5 Hurricane; however it has never been tested by a storm of that magnitude. Additionally, the station operates on the electric grid with a small generator providing back up power. In light of the barrier's age and scientific research projecting more hurricanes along the eastern seaboard, the Commission requests that municipal, state, and federal officials work with the Army Corps of Engineers and other federal agencies to review the Hurricane Barrier's structural sufficiency.

Recommendation 4: Increase support for business continuity following natural disasters

The Commission recommends a comprehensive review of state resources available to businesses following a natural disaster. Assisting business continuity is critical to maintaining the economic fabric of the affected community. As a result, state policy makers should assess a potential business continuity toolkit that could include sales tax deferments during rehabilitation and reconstruction, trauma and mental health counseling for affected business owners and employees, unemployment benefits for displaced workers, bridge loan programs for businesses waiting for flood insurance payments and FEMA financial support, and concentrated marketing programs to highlight restored communities.

Recommendation 5: Utilize risk assessment tools to understand statewide risk

The Commission believes it is clear that Rhode Island needs to more fully understand the economic implications of sea level rise. There should be a community by community analysis resulting in aggregate data that determines Rhode Island's total economic exposure due to sea level rise. State agencies should review all vulnerable assets and prioritize resiliency adaptation based upon the rate of return on their investment.

VI. Westerly Case Study

The Commission first examined the threat of sea level rise and flooding with a case study concerning Westerly's economic rehabilitation in the wake of Superstorm Sandy. In October, 2012, Sandy devastated the town's coastline along Misquamicut Beach. The storm displaced 60,000 yards of sand and left behind 5,300 cubic yards of debris. The community rallied to support the twenty-nine affected businesses and their employees. All but one of the businesses had resumed operation as of November, 2015.

The immediate recovery required emergency response measures in order to allow officials to survey and assess damage. Westerly suspended the issuance of building permits for two weeks so town officials could hold on-site meetings with the Rhode Island Department of Environmental Management and Coastal Resources Center to individually review damaged properties. Town officials also implemented several disaster recovery measures to allow qualifying businesses to rehabilitate without going through the typical "development plan and review process." This included the town council ratifying alternate permitting procedures to curtail the permitting process for qualifying businesses. Lastly, in anticipation of future storms, the town passed an ordinance discounting freeboard from the maximum allowable building height set forth in their zoning ordinance to encourage its use among rebuilding businesses.

Based upon their experiences, town officials and community stakeholders made the following recommendations to Commission members:

- Strengthen partnerships between towns, the Coastal Resources Center, and the Rhode Island Department of Environmental Management.
- Encourage the use of freeboard in local zoning ordinances by discounting it from a building's height.
- Allow the Rhode Island Infrastructure Bank to provide mitigation opportunities for municipalities.
- Increase coordination between the RI Building Official and individual municipal offices.
- Urge the Small Business Association to support seasonal businesses and employees.
- Review state laws concerning looting, trespassing, and insurance regulations to better protect small-businesses in the wake of natural disasters.
- Use Geographic Information Systems overlay mapping to establish vulnerable areas and evaluate projected sea level rise.

VII. Providence Case Study

The Port of Providence contains heavy industrial use as well as commercial and institutional uses below the floodplain. Sea level rise due to storm surges and climate change poses a substantial threat to these uses. On August 3, 2015, University of Rhode Island researchers met with Port of Providence stakeholders to understand the consequences of certain storm models. The workshop established a baseline of the Port of Providence's vulnerability to flooding and sea level rise. In response, the participants conceptualized long-range options for adaptation to protect the port.

Staff at the University of Rhode Island, Rhode Island Department of Transportation, and the U.S. Department of Transportation worked with the stakeholders to develop four scenarios for dealing with sea level rise: Protect, Relocate, Accommodate, and Do Nothing. Stakeholders listed the advantages and disadvantages of each scenario. As a whole, stakeholders agreed that more quantitative research was necessary for a proper cost-benefit analysis.

The Rhode Island Emergency Management Agency has a disaster plan in place for the Port of Providence due to the heavy industrial uses within the port. RIEMA coordinates with FEMA and state agencies through mobile command centers, an emergency operations center, and the RI Statewide Communication Network to provide emergency management in the wake of a natural disaster. Currently, the Federal Emergency Management Agency has 683 active NFIP policies representing \$177 million in flood coverage in Rhode Island.

While the Commission heard research testimony pertaining to land outside the Hurricane Barrier, the barrier's age was noted throughout the meeting. Consequently, the presenters made the following recommendations to Commission members:

- Urge state and federal officials to complete a comprehensive capital review and plan for the Fox Point Hurricane Barrier to ensure adequate protection of Providence during storm surges.
- Support the coordination of Port stakeholders and nurture their relationships with public officials and researchers so they may continuously assess scenario probability and resiliency adaptation.

VIII. Newport Case Study

Newport's coastline includes commercial use as well as residential use. In recent years, city and state officials have witnessed frequent storm surge along the pier area, such as a 2.7 meter storm surge along the Anne Street Pier during Tropical Storm Irene. Newport officials and state researchers at the Coast Resources Center have evaluated this rising threat in consideration of the town's heavy tourism industry and historical properties (968 properties worth an estimated \$560 million). Over fifty percent of the city's parcels lie within or touch the flood plain, which represents a total value of \$3.8 billion. Consequently, city and state stakeholders are working to address the issue through evidence based research and application in the hopes of marketing resiliency training and adaptation to similarly situated communities.

Even the above facts and figures would not have been available were it not for federal, state, and private investment. For example, Newport partnered with the Rhode Island Historical Preservation and Heritage Commission on a Certified Local Government Grant for Historic Preservation to evaluate at risk property. The working group identified historical assets in the coastal floodplain, worked with a consultant to understand applicable flood regulations, and laid the foundation for developing a strategy to protect these assets. The group also reviewed vulnerable historical assets in each Rhode Island municipality.

Similarly, the Coastal Resources Center partnered with the University of Rhode Island on a "Sea Grant" to produce the "Green and Resilient Infrastructure Planning" (GRIP)" project. GRIP surveyed several at-risk sites and then conceptualized engineering improvements to increase each site's resiliency. Proposed schematics account for storm water treatment, sedimentation, water quality issues, public access, and public safety. The Coastal Resources Center now has partnered with URI on a second Sea Grant focused on sea level rise and historic preservation. Throughout their research, the Coastal Resources Center catalogues adaptation techniques. These techniques include flood proofing buildings, raising utilities, increasing the elevation of entryways, and upgrading storm water infrastructure.

Extensive research on the threat of sea level rise to Newport's coastline led to the following recommendations:

- Provide low interest loans and other incentives to elevate structures above base flood elevation; such as, an incentive to increase freeboard above Building Code requirements.
- Support ongoing technical assistance for stakeholders and municipal decision makers so they may apply available tools to understand vulnerable and at risk properties.
- Identify strategies to disseminate adaptation and resilience techniques to Rhode Island businesses and community decision makers.
- Recognize the public sector's diminishing financial resources and understand that the private sector will play an increasing role in financing and developing projects with the public sector. Utilize that reality to unite stakeholders in developing an evidence-based approach to resiliency adaptation that can be marketed to similarly situated communities.

IX. Meeting Minutes

September 24, 2015 Meeting Minutes



House POLICY Office

MEETING BRIEF

RHODE ISLAND HOUSE COMMISSION ON ECONOMIC RISK DUE TO FLOODING AND SEA RISE” THURSDAY, SEPTEMBER 24, 2015

Not intended as official meeting minutes

**Representative Lauren Carson
Chairwoman**

Opening Remarks and Election of Chairman and Vice Chairman – John Conti, Deputy Chief of Staff to House Speaker Nicholas Mattiello, welcomed the commission members and called for a motion to elect a chairperson. John Conti confirmed that all of the members were at the meeting of their own accord and by their own choice. John Conti entertained a motion to nominate Lauren Carson as the Chairwoman. Representative Patricia Serpa made the motion. John Conti closed the nominations. Chairwoman Carson nominated Representative Serpa as the Vice Chair of the Commission.

Commission Members in Attendance:

- Honorable Chairwoman Representative Lauren Carson
- Honorable Vice Chair Representative Serpa
- Lisa Konicki, Ocean Community Chamber of Commerce
- Mark Stankiewicz, Town of Charlestown, League of Cities and Towns –
- Dr. James Opaluch, University of Rhode Island
- Mark Male, Executive VP for the Independent Insurance Agents of RI
- Ann Souder, Newport Maritime Alliance
- Chris Waterson, Prov Port
- Myrna George, South County Tourism Council
- Michael Walker, Rhode Island Commerce Corporation

Chairwoman Representative Lauren Carson provided an overview of the scope of the Rhode Island Commission on Economic Risk Due to Flooding and Sea Rise. Representative Carson explained why the issue at hand is very important. She thanked the House Policy staff as well as

all of the members for attending. She asked that all of the members of the commission identify themselves and what company or organization they are from.

Representative Carson thanked the members for identifying themselves. She then stated the goals of the commission. Representative Carson explained that she lives in Newport and oftentimes her neighbors' basements are flooded due to weather-related indicators.

Representative Carson explained that it is important to prepare homeowners and businesses for the risk of flooding. She explained that if Newport was impacted the way Westerly was, consequences would have been similar. She stated that it is important to bring new voices to the table that could help people understand the economic risks so the state could move forward and be aware of this issue. She said that it could be very disastrous if Rhode Island encountered another storm or microburst.

Representative Carson explained that there is a potential for business interruption, unemployment, and insurance issues when thinking about the effects on businesses. She mentioned that this could happen in the Providence Port area. She said the commission should think about what the risks are and how the state perceives those risks. She said clearly there is a wide variety of professions and interests that are affected by this.

Representative Carson explained that she is aware that looking at the economic impact on a state is a very large task. Representative Carson said that is why she chose to look at three specific areas in the state. The first area is Westerly and South County but Westerly specifically. The second is Newport (where there are historical properties, the marine industry, and the tourism industry). The third area is the Providence area, a metropolitan area, i.e. Providence Port.

Representative Carson explained that the commission will look at three case study presentations (Westerly, ProvPort, and Newport). She said that the commission will examine outcomes, not just the negative aspects of the issue. She really wants to focus on the positive. Representative Carson stated that presenters should be prepared to ask the commission one question: *What do they want policy makers to think about?* She would like them to explain what they want policy makers to do about this issue. The commission will be charged with bringing the public in and to give credence to the economic risk and additionally, the measures the state will go for the future to make businesses more resilient and to make the state of Rhode Island more resilient.

Representative Carson reiterated the schedule of the meetings and the overall slate of the upcoming agendas. She explained that the meetings will be scheduled for one hour in time on average. She said she is looking forward to moving forward with this issue.

Three members of the public made public remarks to the commission members:

- Abel Collins, from the South Kingstown Town Council and an Environmental Consultant as well as a Graduate Student at Brown encouraged Chairwoman Carson to work with the Science and Technical Advisory Board to advise the Executive Climate Change Coordinating Council. He also told her to look at the economic impact on a broad basis.
- Julian Drix, Asthma Program Manager at the Department of Health made comments related an expanded economic analysis to include health impacts in addition to storms,

flooding, etc. He specifically mentioned the Providence Port and the hospitals that are located near the Providence Port.

- Lastly, a member of the public, Sarah Lee from Cranston, a member of the flooding committee stated that a lot of studies are conducted primarily on the coastline. However, she explained that the commission should take a look at inland areas like Cranston that is located near many river ways.

Representative Carson said she will see what they can do to look at inland areas but she is not sure they will get to it since the topic of the commission is very broad and large. She encouraged the members to read the North Kingstown Business Resiliency Study (a piece of literature she provided the members).

Myrna George explained that she recommends looking at the inland areas and including this in the discussion and study, although not front and center.

Lisa Konicki said she will highlight the importance of the services that were not available to Westerly in a crisis like the one they were in. She also emphasized that mental health impacts should be at the forefront as well.

Representative Carson thanked everyone for attending the meeting.

Meeting Adjourned 2:45 pm

October 10, 2015



House POLICY Office

MEETING BRIEF

**RHODE ISLAND HOUSE COMMISSION ON ECONOMIC RISK DUE
TO FLOODING AND SEA RISE”
THURSDAY, OCTOBER 15, 2015**

Not intended as official meeting minutes

**Representative Lauren Carson
Chairwoman**

Commission Members in Attendance:

- Honorable Chairwoman Representative Lauren Carson
- Honorable Vice Chair Representative Serpa
- Lisa Konicki, Ocean Community Chamber of Commerce
- Mark Stankiewicz, Town of Charlestown
- Dr. James Opaluch, University of Rhode Island
- Ann Souder, Newport Maritime Alliance
- Chris Waterson, ProvPort
- Myrna George, South County Tourism Council
- Michael Walker, Rhode Island Commerce Corporation

Opening Remarks: Representative Carson opened the meeting with comments on how the *New York Times* published a story on the Bank of England’s concerns about climate issues and the impact on England’s economy. Representative Carson alluded to the experience and knowledge of the commission and the value each member will contribute to future meetings.

Chairwoman Carson cited a second *New York Times* article and referenced large companies such as Apple and Microsoft who are examining climate issues which could potentially affect their fiscal and economic positions. Chairwoman Carson explained that this particular session would provide background on what is known about flooding, sea rise, and climate in Rhode Island. She then explained that the next upcoming session will move into specific case studies.

Representative Carson stated that she is going to prepare a list of questions related to case studies that commission members will examine in subsequent meetings.

Finally, Chairwoman Carson explained that in this session, the commission members will receive presentations; one of which will involve a business resiliency plan pertaining to North Kingstown. Chairwoman Carson stated that North Kingstown was ahead of the curve in terms of taking an extensive look at the issue of flooding and sea rise and the effects on a community.

Moreover, Chairwoman Carson stated that it was a good idea to look at North Kingstown as a model for statewide policy or municipal guidance. Representative Carson encouraged speakers/presenters to inform the commission of any ideas they have for policy makers.

Presentation by Grover Fugate from Rhode Island Coastal Resources Management Council (CRMC) on flooding maps for targeted areas: City of Newport, Town of Westerly, City of Providence - Providence Port

Grover Fugate from the Rhode Island Coastal Resources Management Council (CRMC) began his presentation by explaining that there are generally two areas of risk: flooding (storm surge) and sea level rise. Mr. Fugate explained that it is important to remember that the most significant factor is relevant sea level rise – the sea level rise in the specific area that we are in. Mr. Fugate highlighted several variables to consider when discussing the effects of sea level rise. Mr. Fugate showed multiple images of specific areas of Rhode Island that have been affected by flooding, sea level rise, storm surge, and climate factors. Mr. Fugate explained that his company and others are working on StormTools, a set of resources that businesses and municipalities will be able to utilize that mitigate the impact of flooding and sea rise. StormTools is available to the public and utilized by new homebuyers. Mr. Fugate next highlighted sea level rise and how it would impact the three case studies: the Port of Providence, Newport, and the Town of Westerly. Moreover, Mr. Fugate highlighted the effects that sea level rise would have on Downtown Providence. Mr. Fugate showed multiple diagrams, images, data, and text that highlighted the various initiatives that CRMC is working on in terms of taking preventative measures as well steps for addressing the issue of sea rise and flooding. Mr. Fugate also passed out a “Property Guide” to the Commission members which included information for landowners and buyers. Finally, Mr. Fugate highlighted priorities of CRMC regarding the said issue. These priorities include:

- Monitoring, StormTools;
- statewide FEMA Flood map revision;
- Groundwater implications of SLR;
- Economic Modeling;
- “Engineered” Solutions, Fortified training;
- Outreach;
- Pilot projects;
- and, Training and Outreach.

At this time, Mr. Fugate entertained questions from the commission members. Mr. Fugate answered a question by Representative Serpa regarding whether there is a consortium of best practices of information for coastline states for problems involving flooding and sea rise so that Rhode Island is not “reinventing the wheel.” Mr Fugate explained that the National Oceanic and Atmospheric Administration (NOAA) and the Coastal States Organization are organizations that currently serve that purpose. Representative Serpa asked whether people are now required to purchase flood insurance. Mr. Fugate explained that if property owners that possess federally insured insurance are now required to buy flood insurance.

Dr. Opaluch asked how effective the hurricane barrier is and if there has been a careful look at the operating procedures of the hurricane barrier. Mr. Fugate answered that there are indeed sea

level rise and surge scenarios that can over top that hurricane barrier. Mr. Fugate alluded to a study that was done in New Bedford where it was revealed that there was a weakness in the wing walls of the hurricane barrier and there may be breaching on the wing walls. Mr. Fugate stated that similar issues to Rhode Island have not been determined at this time. However, they (who are they? Please elaborate) were both developed using the same type of technology and around the same time. He said overall, there are no solutions at this point.

Presentation by Caitlyn Greeley (Department Of Administration) and Teresa Crean (University of Rhode Island Coastal Resource Center): Economic Resilience Businesses Rising Ahead of Climate Change, North Kingstown.

Teresa Crean is a coastal community planner from The University of Rhode Island Coastal Resource Center. Ms. Crean explained that she would be highlighting a municipal pilot project focusing on North Kingstown, Rhode Island. Ms. Crean stated that there have been high water marks and high tide incidents in the North Kingstown area. Multiple images of these occurrences were illustrated, explaining that residential developments are in harms way of flooding and sea rise implications. Ms. Crean emphasized the drivers that plan for natural hazards and climate change including:

- Public health;
- Safety and welfare;
- Investment of public funds for infrastructure;
- State mandate;
- Impacts felt at the local level from multiple hazards.

Ms. Crean explained that public funds expended for infrastructure should be used in a smart way.

Ms. Crean noted that the study may be used to assist/ inform municipalities in making informed decisions regarding the issue of sea rise and flooding. Ms. Crean differentiated between Storm Flooding and Sea Level Rise Flooding. According to Ms. Crean:

- Storm Flooding is periodic and infrequent in nature and is considered coastal storm surge driven precipitation driven;
- Sea Level Rise Flooding occurs daily, twice per day at high tide.

The two should be differentiated, since both impacts have different planning implications. Ms. Crean explained that when drew parallels between the North Kingstown study and the 1938 hurricane. Highlighted, were the maps that Ms. Crean and others created for certain surrounding areas regarding flooding and sea rise. The map demonstrated areas of the town where funding and investments are critical. In addition to transportation, the report and map provides data related to property values as well.

The next presentation was given by Caitlin Greeley from the Rhode Island Statewide Planning Program (Department of Administration). Ms. Greeley explained that it became abundantly clear recently that there could be negative impacts from climate factors such as those being focused on in this commission. Ms. Greeley highlighted that North Kingstown (the area of her study), has more than 14,000 people that work in vulnerable areas. The report also contains information related to Wickford Village and Quonset Business Park, which houses 164 businesses and is the

state's largest employer. She explained that the Planning Framework is for users in Rhode Island and beyond to analyze potential climate impacts on economic activity and identify growth opportunities in adaptation. Ms. Greeley further explained that the report that she penned describes the results of the assessment tool in North Kingstown and strategies for economic resilience specific to North Kingstown businesses and the public sector. Ms. Greeley explained all of the steps of the framework in depth.

The steps are:

- Organize; Evaluate Projected Climate Change Impacts and Hazards;
- Identify Community Assets and Their Vulnerability;
- Analyze Overall Economic Implications for the Community;
- Explore Options to Enhance Resilience and Pursue Opportunities.

Finally, Ms. Greeley concluded by stating that she and her team are still working with the Town of North Kingstown to pilot the tool.

The town of North Kingstown is also working on their comprehensive plan. Ms. Greeley and Ms. Crean answered a few questions from the commission members at this time. These questions included how North Kingstown is receiving this information and whether they have the resources to use the studies by Ms. Crean and Ms. Greeley. Ms. Crean explained that North Kingstown is learning a lot and working with many local boards and commissions, while embracing the educational process. She explained that this has been an education process. North Kingstown is making progress retaining and implementing new measures and is aggressively pursuing new opportunities to address climate change. However, the town continues to face challenges from local stakeholders and officials as resources are scarce.

Another question was asked as to whether North Kingstown reached out to the local chamber of commerce for assistance in gathering data. Ms. Crean explained that the chamber of commerce engaged the town early on and has been of assisting in the process.

Ms. Crean provided three suggestions for policymakers at the request of Chairwoman Garson:

- 1) Municipalities need to have tools available to make decisions on how best to invest in adaptation strategies;
- 2) There is a need to understand municipal finances involving their ability to pay for infrastructures; and
- 3) Business continuity planning is very important.

Presentation by Liz Stone, Office of Strategic Planning

The final presentation was given by Elizabeth Stone from the Office of Strategic Planning and Policy in the Rhode Island Department of Environmental Management. Ms. Stone explained that climate change is her area of focus. Ms. Stone explained how EC4) was established by the Executive Order called "The Resilient Rhode Island Act of 2014." Ms. Stone highlighted the composition of members of the EC4)

Based on legislation, the assignment of EC4 is to:

1. Assess/integrate/coordinate climate change efforts across state agencies, with a focus on emission reduction, strengthening resilience of communities, and preparing for the effects of climate change (including vulnerability assessments).
2. Submit a GHG emission reduction plan by December 2016 to meet the following targets:
(i) Ten percent (10%) below 1990 levels by 2020; (ii) Forty-five percent (45%) below 1990 levels by 2035; (iii) Eighty percent (80%) below 1990 levels by 2050.
3. Advance Rhode Island's understanding of the effects of climate change (sea level rise, severe weather, infrastructure vulnerability, and ecosystem/economic/health impacts).

Ms. Stone concluded by giving suggestions to policy makers.

- Prioritizing assessment of Rhode Island's specific vulnerabilities is critical;
- Lead by example;
- Effective communication in messaging without instilling fear about climate issues;
- Think "outside of the box" with regards to finance.

Closing Remarks

In conclusion, Representative Carson reiterated her goal of this commission involving increased resiliency for the economy of the state with regards to flooding and sea rise. Chairwoman Carson stated that Rhode Island has a wealth of knowledge and people studying the issue in Rhode Island and is important to draw attention to the topic.

Representative Carson thanked everyone for attending the meeting.

Meeting Adjourned 3:31 pm

November 19, 2015



House Policy Office

Rhode Island House Commission on Economic Risk Due to Flooding and Sea Rise

Room 101
November 19, 2015

Commission Members in Attendance

- Chairwoman Lauren Carson - House of Representatives
- Vice-Chairwoman Pat Serpa - House of Representatives
- Dr. James Opaluch, University of Rhode Island
- Mr. Mark Stankiewicz, Town of Charleston
- Ms. Lisa Konicki, Ocean Community Chamber of Commerce
- Ms. Myrna George, South County Tourism Council
- Mr. Michael Walker, Rhode Island Commerce Corporation
- Mrs. Ann Souder, Newport Maritime Alliance

Meeting Notes

Chairwoman Carson called the meeting to order at 2:00 pm.

Chairwoman Carson convened the meeting by noting the resignation of David Salvatore, who clerked the first two meetings of the committee. She stated that Jake Bissaillon would be the new clerk for the committee. She then mentioned two news articles regarding climate change. The first described the relationship between climate change and the Syrian conflict. The second detailed the downturn of New England's Cod industry due to climate change. Those two articles can be found in this binder.

1) Presentation by Lisa Konicki, member of the Ocean Community Chamber of Commerce

Ms. Konicki presented on Misquamicut's response to Superstorm Sandy in 2012. As the president of the Ocean Community Chamber, she witnessed the devastation in one of Westerly's densest commercial districts. The storm displaced 60,000 yards of sand and 5,300 cubic yards of construction debris along the coastline. Twenty-nine businesses in the district were impacted, and thirteen were "red tagged" due to storm related damage.

Misquamicut's recovery mattered to the Chamber, because the storm had wreaked havoc on a critical cog in the local economy. 500 seasonal jobs were in jeopardy. The business community accounted for approximately in 9.3 million in sales. The Chamber recognized that ensuring a

swift recovery was important to the surrounding economy. They estimated that \$28 million in local economic impact was at risk. Within 24 hours the Chamber launched the “Bring Back the Beach Campaign.”

The Chamber raised \$438,000 to disburse to local businesses through their “Bring Back the Beach Campaign” and other fundraising efforts. Of the 29 businesses affected, 24 moved quickly to rebuild within the concept of their previous business model. In arriving at this decision, business owners consider the following:

- Can I be open by the start of next season (Memorial Day weekend)?
- The 50 percent rule. If their property was damaged more than 50 percent of the building’s value they would be forced to rebuild according to the new code
- What would the insurance payout be?
 - Businesses found that they did not have the coverage they expected
 - Businesses struggled to find the money for the rebuild in the meantime
- How much and how long would the rebuild take?
- What is the permitting process?
- Lastly, how long would the rebuild last? When would the next storm hit?
- Family legacy and tradition also played a large role in the decision making process, because many proprietors felt an obligation to the community

Best practices learned from case studies:

- Take time to consider all the options before acting
- Ask for everything (grants, extensions) - but expect nothing
- Flexibility is a must
- Prepare to face future storms

Policy recommendations from Ms. Konicki

- Establish a rapid response emergency grant program where a town endorsed 501©3 non-profit could apply for up to \$20,000 in seed money to develop a business recovery campaign and leverage funds to aid recovery, save/restore jobs and get business generating taxes again
 - Potential funding mechanisms:
 - Allocate money from the hotel/meal taxes at the regional Tourism Council level and the 7% PWCVB level.
 - Department of Labor and Training - Justifiable as a Jobs Restoration Program
 - Donations from Corporate sponsors secured by Commerce RI
- Strengthen laws against looting disaster sites
- Encourage municipalities to adapt an expedited emergency permitting process
- Reduce permitting fees for disaster recovery
- Offer tax incentives for homes and businesses to raise their height or move inland.

2) *Presentation by Andrea Thoman, President of the Ocean Community Chamber of Commerce and business manager of Paddy’s Beach Bar*

From the outset, Ms. Thoman noted that Paddy's Beach Bar employs 100 more individuals than it did in 2012 (currently 246 employees). Their sales also have increased 30% from the years prior to the storm.

Due to sand and debris, owners could not access their properties in the immediate aftermath of Sandy. However, this did not stop looters from entering the property. Owners faced pressure to make quick decisions to protect the seasonal jobs and their properties once the debris was cleared and access was granted.

The Ocean Community Chamber of Commerce organized meal programs, cleanup supplies, and volunteers to provide the ancillary needs for comprehensive cleanup. The Misquamicut business association also helped organize volunteers to make the recovery possible.

Recommendations from Ms. Thoman:

- Strengthen laws against looting and scrap metal stealing.
- Regulate "pop-up contractors" and "pop-up fundraising efforts."
- Release hotel and meals tax revenue generated by the disaster area to assist back into the region to fund recovery efforts.
- Regulate insurance contractors.
- Waive or reduce permitting fees for rebuilding from a disaster.
- Defer sales and use tax on purchases of new equipment.
- Grant automatic unemployment insurance to employees working to recover from a disaster.
- Provide free marketing and tourism support for the area once it has recovered.

3) Presentation by Amy Gryzbowski – Westerly Emergency Planner

Westerly has endured four federally declared disasters over the last four years. The March 2010 floods and Superstorm Sandy devastated the coastline town. The Winnapaug Pond and Misquamicut districts - which are particularly susceptible to damage during floods because of their location in the flood plane - have faced economic calamity.

March 2010 Flood impact:

- Approximately 150 – 200 homes affected.
- 25- 30 commercial structures were affected, and several businesses were forced into receivership.
- The groundwater table flooded 400 homes.
- Power loss for 3-6 days in most affected areas.
- Struck the manufacturing district and the most densely populated, low lying neighborhood.
- Surge was rapid and flooded National Grid Main Power Station.
- Extensive debris was washed into the Pawcatuck River.

Superstorm Sandy Impact:

- Storm surge impacted two city blocks (500 structures)

- Many structures were at ground level, which was approximately 5-7 feet below base flood elevation.
- 3-4 feet of sand on road for several miles
- Unsafe structures and debris throughout impacted area
- Primarily secondary homes and seasonal businesses

Westerly's Local Efforts to Ensure Long-Term Recovery Included:

- Immediately after the storm, the town suspended the issuance of building permits for two weeks.
- The town scheduled on-site meetings with the RIDEM and CRMC to discuss individual properties to review the specific impact to the property.
- The town implemented some disaster recovery relief measures that allowed for businesses to not have to go back to the "development plan and review process" if:
 - The use remained the same;
 - Building volume was not increased; and,
 - The wastewater flow as measured by RIDEM was not increased.
- The town also implemented an alternate permitting procedure to take months off the permitting process. The following conditions needed to be met in order to qualify:
 - The Town Planner reviewed the plan and provided recommendations for consideration by the Building Official and Zoning Official in the grant of permits;
 - The Town Assessor reviewed the proposed plan to verify pre-existing structure size; and,
 - The plan conformed to dimensional regulations.
- The town also passed an ordinance allowing for structures to exceed the height allowance in the town's zoning ordinance if 3 feet is "freeboard," which causes the building to be more storm-resilient.

Recommendations from Ms. Gryzbowski:

- Strengthen partnerships between towns, the CRMC, and RIDEM.
- Encourage the use of freeboard in local zoning ordinances.
- Allow the RI Infrastructure Bank to provide mitigation opportunities for municipalities
- Increase coordination between the RI Building Official and individual municipal offices.
- Urge the Small Business Association to support seasonal businesses and employees.

4) Presentation by Barbara Cardiff, member of the Executive Climate Coordinating Council

Ms. Cardiff is a resident of Westerly and member of the Executive Climate Coordinating Council Advisory Council. Her presentation covered the economic risks of rising sea levels by examining each region of Westerly and the respective land value below the flood plain.

Recommendations from Ms. Cardiff:

- Create vulnerable areas overlay map, using GIS mapping tools for sea level rise, storm surge, shoreline erosion, coastal wetlands migration, and inland flooding.
- Quantify revenue by property tax, meal tax, hotel tax, and sales tax and calculate the cumulative revenue.

- Update economic overlay map on a regular basis to consistently provide accurate information.
- Work with RIEMA, RI Statewide Planning, Commerce RI and Other State and Federal agencies to partner in shared objectives.
- Consider abolishing zoning variance requirement for structures located within Special Flood Hazard Areas provided the structures do not exceed the maximum height by more than 3 feet.
- Evaluate projected sea level rise and prepare for occurrence of extreme weather and undertake compliance with goals set by the Resilient RI Act and review implications per this study commission.

Chairwoman Carson adjourned the meeting at 3:00 pm.

December 17, 2015



House Policy Office

Rhode Island House Commission on Economic Risk Due to Flooding and Sea Rise

Room 135
December 17, 2015

Commission Members in Attendance

- Chairwoman Lauren Carson - House of Representatives
- Dr. James Opaluch, University of Rhode island
- Mr. Mark Stankiewicz, Town of Charlestown
- Mr. Chris Waterson, ProvPort
- Ms. Myrna George, South County Tourism Council
- Mr. Mark Male, Independent Insurance Agents of RI
- Mrs. Ann Souder, Newport Maritime Alliance

Meeting Notes ([Audio only](#))

Chairwoman Carson called the meeting to order at 2:10 pm.

Chairwoman Carson convened the meeting and noted the absence (with cause) of Representative Serpa. She then briefly recapped the previous meeting, which focused exclusively on Westerly's disaster preparedness in the wake of recent natural disasters. She proceeded to talk about the focus of this meeting (Providence and the Port of Providence), and then said that the next meeting would focus on Newport and the risks to the residential real estate market. Finally, she noted that she intends to host a final meeting for the purpose of soliciting public feedback.

1) Presentation by Austin Becker, professor at University of Rhode Island

Mr. Becker gave a general overview of the Port of Providence's geography as well as the impact of a potential "100-year storm." Mr. Becker defined a "100-year storm" as a worst case scenario, whereby a Category 4 hurricane directly hit Narragansett Bay and traveled up the port. Superstorm Sandy was a storm of equal strength but it traveled out to sea instead of directly hitting the bay.

The Port of Providence encompasses everything between the Hurricane Barrier and Field's Point. The port includes a deep water channel that is one of the deepest in New England with a depth of 40 feet. Approximately 30 businesses use the port, which is among the 50 busiest ports in the United States. The port is a critical energy import location for the region according to the

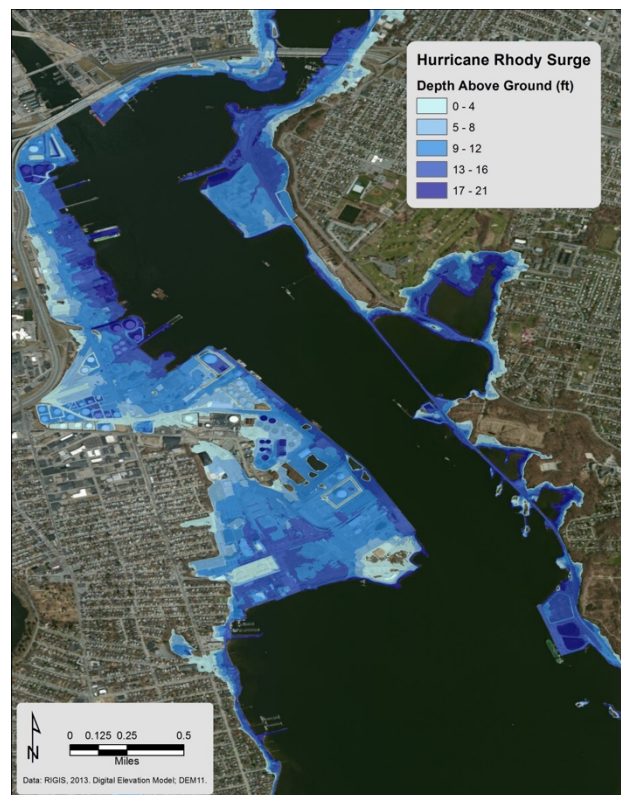
Bureau of Energy, and, while there is no LNG imported in Rhode Island, there are other critical energy imports such as petroleum, jet fuel, and all of Rhode Island's heating oil.

Hurricanes are a severe threat to the Port of Providence, Rhode Island, and New England. According to FEMA, "Narragansett Bay is the Achilles' heel of New England." Since 1851, 37 hurricanes have come within 50 miles of Rhode Island. That is approximately a "4 year return period." According to Dr. Becker, this return will be compounded by climate change. Recent studies project that the number of category 4 and 5 storms will double by the end of the century.

The compounding of increased frequency of stronger storms and higher sea levels poses a significant threat to the East Coast. For example, the 1 in 100 year storm scenario could become the 1 in 3 year storm scenario. This scenario envisions a Category 3 directly hitting the Port of Providence. For reference, the Hurricane of 38 and Superstorm Sandy were Category 3 storms.

Dr. Becker's analysis, pictured to the right, shows sea level rise due to a Category 3 hurricane. The analysis assumes the Hurricane Barrier holds and does not show sea level rise as a result of wave height. The scenario on the right carries the following consequences:

- Short term:
 - Loss of critical facilities affects business continuity
 - Energy supply compromised
 - Raw wastewater discharge
 - Debris cleanup
- Long term:
 - Damaged roads and rail disrupt local and regional commerce
 - Debris/sedimentation require surveying and restrict navigation
 - Bulkhead/pier damage result in permitting delays and repair
 - Erosion of riverbank leads to sediment loading of deep channel
 - Long-term environmental impacts to Narragansett Bay
 - Economic impacts, but little clarity over their nature
 - Risks to competitiveness of port if perceived as vulnerable to storms
 - Increase in insurance rates could force business to leave



This summer, Dr. Becker convened a workshop with Port of Providence stakeholders to discuss these findings and start a discussion on the Port's preparedness. The group included stakeholders from private industry, quasi-publics, and the City of Providence. The workshop's preliminary findings included:

- There is no long-term plan for major hurricane events.

- When there is no clear and present danger it is difficult to entice private business to participate in a process.
- There is no clear advocate to take the reins on long-term planning.
- Stakeholders find it difficult to engage because costs have not been identified.

The stakeholders developed several recommendations:

- Revise the workshop methodology, such as adding costs and feasibility to the storm scenarios.
- Create database of experts and best practices to include in resilience dialogues.
- Create an *ad hoc* stakeholder group to begin more formal dialogue around long-term resilience planning.
- Engage existing climate efforts in the state (e.g., the EC4, CRMC Beach SAMP).
- Create “post storm rebuilding goals and strategies.”
- Identify business-continuity opportunities before the storm hits (e.g., contingency contracts, debris destinations).
- Conduct an economic assessment of the consequences of a “port shutdown.”

2) *Presentation by Chris Waterson, executive director of ProvPort*

Mr. Waterson is the executive director of ProvPort. ProvPort was established in 1994 through a land lease from the City of Providence. Thus, the land ProvPort currently oversees is land formally owned by the City of Providence. Therefore, if the land reverts back to the City of Providence, the city reaps all of the benefits of the improvements.

Since the late 1990s, ProvPort has focused on growing their bulk cargo. This began with the establishment of Waterson Stevedoring and several capital investments in offloading equipment. By 2007 cargo volume had increase approximately 4-fold to 2.5 million tons annually. Waterson Terminal Services was formed at this point to manage ProvPort. ProvPort continues to partner with city and state agencies to increase capacity. In 2012, they received two mobile harbor cranes through a TIGER grant application sponsored by the EDC.



Most recently, they signed on to become the staging area for Deepwater Wind.

ProvPort primarily handles bulk and raw materials, such as coal, salt, and scrap. They average 100 vessel calls per year and handle approximately 2 million tons of cargo. ProvPort recognizes that it is uniquely positioned to take advantage of the 40 foot deep-water channel maintained by the Army Corps of Engineers. They store petroleum, calcium, salt, and bulk machinery products onsite. ProvPort handles approximately 100 vessel calls a year with a yearly tonnage through port of 2 million tons.

ProvPort's terminal services have resulted in economic output of approximately \$164 million for Providence and \$211 million for Rhode Island since 1994. The indirect impact of the port has generated approximately \$2.8 billion in economic output for the state since 1994, with \$1 billion of that occurring within the City of Providence. They have made \$24.7 million in capital improvements since 1994 at the port. According to ProvPort's projections, their capital investments at the port total over \$60 million dollars and have created 294 jobs. Their tenants also have invested approximately \$40 million in capital improvements since 1994 and expect to make another \$33-\$50 million in capital expenses over the next 5 years.

As far as the threat of sea level rise, Mr. Waterson said that they are beginning to review its effect on Provport and its capital investments. ProvPort's pier is 6 feet above mean high water height. Additionally, the highest point in ProvPort is 14 feet above sea level. As they review options (adapt, fortify, or relocate), they feel relocation is not an ideal option because they are boxed in by neighborhoods and the bay. ProvPort believes communication and coordination among local, state, and federal authorities needs to improve as they move forward with this discussion. Additionally, these agencies should be more inclusive when dealing with port stakeholders.

3) Presentation by Michelle Burnette, Rhode Island Emergency Management Agency

The Rhode Island Emergency Management Agency acts as a conduit across Rhode Island on behalf of the Federal Emergency Management to protect the loss of life and property in the event of a disaster. They are funded primarily through federal funds, but coordinate with local and state authorities in the event of disaster to manage and support the recovery effort. Since 2010, there have been 5 federally declared disasters in Rhode Island.

RIEMA's statewide comprehensive planning approach to emergency management includes a Base Plan, Emergency Support Functions (ESF) comprised of a lead agency and one or more support agencies/organizations, and reliance on over 200 stakeholders and relationships. This multi-tiered approach focused on the coordination and delivery of resources for response and recovery operations. RIEMA's efforts fall into four categories, which are overseen by various departments within the agency.

- Preparedness
 - Emergency Operations Plan/Emergency Support Functions
 - Preparedness programs
 - Training and exercises
 - State and local outreach
- Response
 - Coordination of agencies
- Recovery
 - Public assistance and individual assistance
- Prevention/Mitigation
 - Emergency operations plan
 - State Hazard Mitigation Plan/Local Hazard Mitigation Plans
 - Mitigation programs/grants

- National Flood Insurance Program (NFIP)/Community Rating System (CRS)
- State and local planning initiatives (EC⁴, Silver Jackets)

RIEMA is also responsible for overseeing the National Flood Insurance Program on behalf of the Federal Emergency Management Agency. The current flood insurance program does not take into account sea level rise and only relies on current mapping of flood zones. There are approximately 16,000 policies in Rhode Island. In Providence, there are around 700 policies in place insuring \$177 million worth of property. Ms. Burnette said RIEMA is working across local authorities to update state mapping models to account for sea level change and reduce duplication of effort.

4) Presentation by Barnaby Evans, WaterFire Providence

Barnaby Evan is the executive director of WaterFire Providence, which is an art installation along the Providence River. He testified to recent capital investments downtown, which are theoretically protected by the Hurricane Barrier, as well as changes to the river's topography in Downcity Providence. Due to sediment and tidal issues, Water Place Park at Capital Center in Providence routinely floods at high tide.

Mr. Evans spoke to the effectiveness of a hurricane barrier when it comes to protecting Downcity Providence. He said that the topography of the river and floodplain uniquely position Providence as a fortification site because, for all intents and purposes, there is only one entry way for water. While the Providence River runs through downtown, it can be blocked off with an operational hurricane barrier. Unlike Boston and New York, which are peninsulas jutting out into bays, Providence can be fortified. His main recommendation was to review the Hurricane Barrier's integration with the power grid and its structural integrity.

Dr. Becker said it was important to recognize that hurricane barriers are great at protecting storm surges but do very little to combat sea level rise. They agreed that another unique characteristic of the Providence River was the dearth of water that runs through the watershed and into the river.

January 21, 2016



House Policy Office

Rhode Island House Commission on Economic Risk Due to Flooding and Sea Rise

Room 101
January 21, 2016

Commission Members in Attendance

- Chairwoman Lauren Carson - House of Representatives
- Vice-Chairwoman Pat Serpa - House of Representatives
- Dr. James Opaluch, University of Rhode Island
- Mr. Mark Stankiewicz, Town of Charlestown
- Ms. Lisa Konicki, Ocean Community Chamber of Commerce
- Ms. Myrna George, South County Tourism Council
- Mr. Michael Walker, Rhode Island Commerce Corporation
- Mrs. Ann Souder, Newport Maritime Alliance
- Mr. Mark Male, Independent Insurance Agents

Meeting Notes

1) Presentation by Melissa Barker, City of Newport

Ms. Barker is a planner with the City of Newport. She has uploaded a vast amount of historic data to the City's GIS overlay to understand how the city's flood zones overlap with Newport's changing waterfront. Newport, like many older cities, was built out by filling in large portions of the bay. For example, the current location of the Marriott and the visitor's center was previously open water. Today, nearly \$5 million worth of properties is on that in-filled land and regularly experiences flooding issues. A similar situation exists in Newport's Spencer Park.

Fifty-three percent of all acreage in Newport touches the flood plain. Approximately half of those parcels are residential, while the remaining parcels are a mix of commercial (25.19%) and open space (20.96%). There are 11,787 structures in Newport and 16.8 percent of those structures are in the flood zone. These flood zone properties amount to \$3.8 billion.

Over 500 Newport businesses are in the flood zone. Most of these properties are retail (39.5%), food service (20.3%), professional service (10.8%), and hotel facilities (6.5%). Thirty-seven of Newport's 128 hotels are in the flood plain, which includes the Hyatt, Marriott, and Wyndham (55.4% of all total rooms). Approximately 50% of the entire hotel industry (based on room capacity and revenue) operates within the floodplain.

Newport has partnered with the Rhode Island Historical Preservation and Heritage Commission for a Certified Local Government Grant for Historic Preservation. The goal of this grant is to (1) identify Rhode Island's historical assets in the coastal flood plain, (2) work with a consultant to identify and understand all flood regulations applicable to historic assets, and (3) lay the groundwork for developing a strategy to protect Rhode Island's historic assets threatened by coastal flooding. Due to that grant, they have determined that 21 of 39 cities and towns have assets in the flood plane

2) Presentation by Teresa Crean, Coastal Resources Center

Ms. Crean works on several projects aimed at protecting Newport's historic assets from the dangers of sea level rise. She serves as the project coordinator for "Staying Afloat," which guides businesses through the adaptation process. Most recently, she obtained a federal grant entitled "Green and Resilient Infrastructure Project (GRIP)." Under the grant, she oversaw the Newport Marine Ave resiliency project, which analyzed current storm water, erosion, and flooding conditions before devising a plan to enhance the public space along the Cliff Walk.

Over the last several years, Newport has experienced disruption due to storms and sea level rise. During tropical storm Irene, the Anne Street Pier saw a storm sea level surge of 2.7 meters. Ms. Crean believes the water level experienced during Irene will become the norm in future years. The Army Corps of Engineers is the "state accepted data source" for sea level rise projections. The Coastal Resource Council is updating policies to reflect the Army Corps of Engineer's projections for planning purposes.

The work in Newport focuses on tidal vulnerability, flooding and storm inundation, and general sea level rise. Since Newport has a highly developed waterfront, which includes businesses, facilities and infrastructure, large areas of impervious surface compound the risks associated with sea level rise. This came to bear during Superstorm Sandy.

Ms. Crean and the CRC utilize employ a catalogue approach to bring about resiliency adaption. This structured approach allows her to present would-be adapters with tried and true weatherization techniques for improving storm resiliency. She incorporates a five-step process: 1) Understanding Exposure, 2) Facility Siting and Design, 3) Preparedness and Planning, 4) Preparing Your Employees, and 5) Additional resources. The goal of this process is to minimize damage during storms and flooding.

The CRC also is working with the RI Building Commissioner to bring the "FORTIFIED Program" to Rhode Island. FORTIFIED HOME "is a set of engineering and building standards designed to help strengthen new and existing homes through system-specific building upgrades to minimum building code requirements that will reduce damage from specific natural hazards."¹ This three step process focuses on reinforcing key structural components, such as windows, walls, and roof.

¹ FORTIFY HOME, February 5, 2016. <https://disastersafety.org/fortified/>

Moving forward, the CRC plans to interview different stakeholders throughout the community to identify common themes to increase awareness about resiliency preparedness in the historic preservation community. “[Keeping History Above Water](#),” which is a statewide conference being held in Newport this April entitled, is central to this process.

3) *Presentation by Paul Carroll, Director of Civic Investment for City of Newport*

Mr. Carroll chooses to focus on the economic opportunities presented by sea level rise. He hopes Newport’s experience of adopting resiliency can be exported to communities across the globe facing the same challenge. He refers to this export as integrated resiliency, which is a systems approach to the climate change challenge that looks for synergy between the built environment, economics, socio-political, and public health. Newport and Rhode Island can profit off their experience with this challenge by documenting it through evidence based research that can be replicated by other communities.

The City of Newport has embraced the idea of Newport being America’s first test case by organizing the Innovation Hub.² At the Hub, stakeholders convene to focus on oceanographic research, defense/cyber applications, environmental technology, alternative energy, emerging digital industries, and community resilience. It is backed by three major investors: InfraLinx Group, Louis Berger Group, and Gilbane Construction. He notes that all innovation will be evidenced based so that it can be replicated and exported. The response over the last three years has been largely positive and yielded 12 public-private partnerships.

Mr. Carroll made the following recommendations regarding the economic opportunities associated with seal level rise in Rhode Island:

- Recognize that public sector’s diminishing financial resources at the federal, state and local levels, in order to understand that the private sector will play an increasing role in financing and developing projects with the public sector.
- See resiliency adaptation as a systems approach for a new model for civic infrastructure system.
- Resiliency adaptation is too large a challenge and too great of an opportunity for one group (private, public, impact, foundations or community groups) to address alone, so the solution will come from an integrated combination of those stakeholders.
- Do not fall into the traditional US public-private partnership (P3) model where the public sector scopes out the projects, intends to maintain full control but expect the private sector to fund. Let’s look at it very early on as participation of all those groups to develop, fund and manage civic infrastructure

4) *Presentations by Deny Ingram and David Spencer, lobstermen*

Mr. Ingram has been a Rhode Island lobsterman for thirty years. Over the last 10 years he has seen “serious changes” to his industry. First, the lobster are leaving Narragansett Bay for deeper waters. Second, other species (such as crab) have filled in the habitats vacated by the lobster.

² City of Newport – Innovation Hub, February 5, 2016. <http://engagenewport.com/projects/newport-innovation-hub>

These species have grown exponentially. Lastly, all of the seasons are occurring later in the year. All of this results in the need for greater adaptation in regulating fishing. He asks that scientists, bureaucrats, and fishermen work together for a more adaptable system of regulations.

Mr. Spencer is an offshore lobster, which means he trolls areas near the Gulf Stream. He has witnessed many of the same changes; such as, later seasons, longer seasons, and physical changes to the shellfish (softer shells). He believes this situation does not necessarily have to yield a negative connotation. For example, the “explosion of the Blue Crab and Jonah Crab populations” in the Bay is something he has never seen. Currently, commercial fishing is prohibited for these species. He feels that in order for the industry to survive and mitigate the effects of climate change, the industry needs an “adaptable and flexible system.”

The industry is currently saddled with a management system that does not readily recognize over-harvesting/under-harvesting of species. This inability to adapt costs the industry millions annually. A good system requires good scientific advice on the quantity of the stocks, which requires state and federal surveys to collect and produce the data for these estimates. Most of these surveys were conducted when the environment and stocks were relatively static – today’s environment is anything but. Also, these surveys are limited to three miles offshore, but this will need to change since species are moving further offshore. More data is desperately needed that is collected year round basis on a greater spatial distribution. The obvious solution is to solicit industry members to assist state and federal agencies in collecting the data. Some of this exists today, but scientists and fishermen need to build a more trusting partnership to survive these challenging times.

February 25, 2016



House Policy Office

MEETING BRIEF

**RHODE ISLAND HOUSE COMMISSION ON ECONOMIC RISK DUE
TO FLOODING AND SEA RISE”
THURSDAY, FEBRUARY 25, 2016**

Not intended as official meeting minutes

**Representative Lauren Carson
Chairwoman**

Commission Members in Attendance:

- Honorable Chairwoman Representative Lauren Carson
- Lisa Konicki, Ocean Community Chamber of Commerce
- Mark Stankiewicz, Town of Charlestown
- Dr. James Opaluch, University of Rhode Island
- Mark Male, Executive VP for the Independent Insurance Agents of RI
- Ann Souder, Newport Maritime Alliance
- Michael Walker, Commerce RI

Opening Remarks – Chairwoman Carson thanked the commission members for their time and comments over the last six months. She briefly discussed a February 24, 2016, Providence Journal article entitled, “[20th Century sea rise is a game changer.](#)” She then introduced Jim Neumann, who she met at the 2014 Baird Symposium.

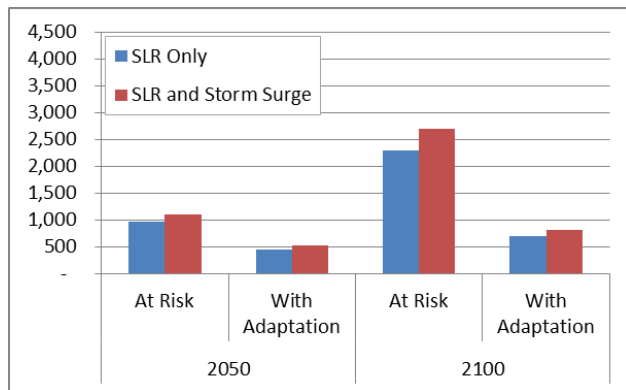
1) Presentation by Jim Neumann, principal of Industrial Economies, Inc.

Mr. Neumann testified that recent steps to mitigate greenhouse gas emissions will reduce the economic impact of sea-level rise and storm surge threats, but actors still need to adapt. New efforts to explore economic implications of adaptation to sea level rise provide useful lessons, which show that adaptation is cost-effective. Furthermore, the earlier one adapts the greater benefit. Needless to say, Rhode Island’s assets, such as ports, tourism, and fishing sites, are increasingly exposed to sea level rise and related hazards. Consequently, sea level rise and storm surge threaten to disrupt substantial economic activity within Rhode Island.

Mr. Neumann considers Rhode Island to be at the forefront of resiliency planning. He listed several Rhode Island regulatory and relational strengths. First, CRC regulations clearly outline expectations for homeowners. Second, Rhode Island, through URI and CRC, possess the necessary risk assessment tools and forge a strong science base within the state. Thirdly, stronger cooperation and information sharing exists between the real-estate sector and state regulators. Fourthly, municipalities are working to address resiliency in their own right, such as

amending their comprehensive plans. Lastly, Mr. Neumann has witnessed unparalleled coordination between Rhode Island’s government, academia, private sector, and landowners. Rhode Island’s economy and assets are vulnerable to sea level rise due to their coastal proximity. Property, infrastructure, and secondary/indirect effects (business interruption, power outages, electric grid failure, transport infrastructure, and coastal development employment) will be impacted by sea level rise as well as the region’s recreational and ecological resources. For example, Mr. Neumann showed Federal Department of Transportation projections for the Port of Providence’s economic output in the year 2020 to illustrate our regional and national export capacity.

Mr. Neumann and his firm have also studied how a 4 foot Sea Level Rise (SLR) affects Rhode Island’s coastline and assets. They proceeded to put affected parcels through a disaster mitigation model that includes building natural buffers and making structural changes to the



property. These properties were then evaluated under a cost-benefit analysis to determine whether it is financially feasible to adapt these properties. Mr. Neumann ran these models in each of Rhode Island’s five counties to determine properties ripe for adaptation investment. He spoke to the Newport County Model, which is to the left. As is the case in most adaptation scenarios, there are strong future returns but high upfront costs. Often it is difficult to finance these measures since the return is not immediate.

Business stakeholders hired Risk Management Solutions and Industrial Economies, Inc. to perform a national cost-benefit analysis of four adaptation scenarios. The four scenarios were: (1) No defensive investments (no adaptation), (2) Individual property owner action (e.g., elevation), (3) Property owner action plus beach nourishment, and (4) Property owner action, beach nourishment, and shoreline armoring. He reports two key findings. First, costs increase as the options available to adapt decrease (highest cost for scenario 1, lowest for scenario 4). Second, the no adaptation option is four to six times higher cost than the full adaptation option.

Mr. Neumann then spoke to recent studies of New York Harbor and ensuing proposals to fortify the harbor with a sea wall. This is similar to “walling off” Narragansett Bay. He said that these proposals are not cost effective in the current climate, but they become cost-effect under the average sea level rise scenario.

Recommendations from Mr. Neumann:

- *Develop an approach.* First and foremost, Rhode Island’s stakeholders should develop a philosophy of resilience. For example, is our goal to ensure every property is resilient or to ensure the Rhode Island economy as a whole is resilient?
- *Uncover vulnerabilities.* First, the state needs to understand the economic value at risk using statistic and probability based models for sea level rise. Once this is established, stakeholders can evaluate the direct and indirect effects to the state and regional

economies. Efforts to attract investment and financing are easier once these value points are established through evidenced based research.

- *Assess potential for adaption.* Once a philosophy for adaption is developed and vulnerable assets uncovered, it is necessary to look at each assets potential for adaption. There will be some assets that cannot be adapted while others will be cost prohibitive. The case for adaptation becomes more compelling to draw in Federal and private financing once this portfolio for adaption is established.
- *Insuring our assets.* Policymakers need to evaluate the tension between protecting homeowners and businesses from high rates versus using rate signal to incentivize resilience updates. The state could play a role in in the Coastal Resource Management Center's suggestion to amortize improvements over the entire life of structure. And, the state could also provide financing for municipal scale Community Rating System (CRS) improvements. Lastly, since business continuity/interruption is not covered by flood insurance, should the state seed a revolving fund to be used by affected business in order to get them operational again?

x. Enabling Legislation

R 392
2015 -- H 5478
Enacted 06/17/2015

HOUSE RESOLUTION CREATING THE RHODE ISLAND HOUSE COMMISSION ON ECONOMIC RISK DUE TO FLOODING AND SEA RISE

Introduced By: Representatives Carson, Almeida, Lally, Azzinaro, and Naughton

Date Introduced: February 12, 2015

WHEREAS, The State of Rhode Island has a long history of taking action to protect its shoreline, its coasts and its economy; and

WHEREAS, The Resilient RI legislation passed by the Rhode Island General Assembly in 2014, has signified that climate change will have an impact on the use and enjoyment of the public and private resources of the state and will require new types and levels of effort to secure their preservation, regeneration and restoration; and

WHEREAS, The effects of flooding and sea rise are real and measurable in Rhode Island and have been publicly recognized; these include a rising sea level measured 10.6 inches since 1930 at the Newport Tide Gauge; thirty percent more intense storms driving worsening floods; measurably longer and hotter summers and heat waves; and increasingly damaging coastal storms and sea surge; and

WHEREAS, The State of Rhode Island has valuable public and private assets that sit in the floodplain; and

WHEREAS, Rhode Island faces significant economic risks from flooding and sea rise because of its size and its coastal assets, exposure and its intricate web of inland rivers and streams and the effects of climate change that need to be seen in the context of other socio-economic drivers; and

WHEREAS, To date, there has been no comprehensive assessment of the economic risks to the Rhode Island economy from flooding and sea rise; and

WHEREAS, The clearest and most economically significant of these risks are damage to publicly and privately owned coastal properties, businesses and infrastructure from rising sea levels and increased storm surge, business interruption, property devaluation, lost tax revenue to the municipalities and the state and climate-driven changes on labor productivity and public health; and

WHEREAS, Flooding impacts are unusual in that future risks are directly tied to present decisions; and

WHEREAS, Marine industries, the real estate industry and tourism are three of Rhode Island's biggest economic drivers and are at risk from sea rise and flooding; and

WHEREAS, Rhode Island's business community and the public sector are partners in moving the economy forward and each play an active role in helping to determine how best to react to the risks and costs posed by sea rise and storm surge, and how to set the rules that move Rhode Island forward in a sustainable, affordable direction; now, therefore be it

RESOLVED, That the Rhode Island House Commission on Economic Risk Due to

Flooding and Sea Rise be and the same is hereby created consisting of eleven (11) members: three (3) of whom shall be members of the Rhode Island House of Representatives, not more than two (2) from the same political party, to be appointed by the Speaker of the House; one of whom shall be from a Rhode Island institution of higher learning with a specialization in economics and risk analysis, to be appointed by the Speaker of the House; one of whom shall be the President of the Rhode Island League of Cities and Towns, or designee; one of whom shall be a representative of the insurance industry, to be appointed by the Speaker of the House; one of whom shall be the Rhode Island Secretary of Commerce, or designee; one of whom shall be from a Rhode Island Chamber of Commerce, to be appointed by the Speaker of the House; one of whom shall be from the Newport Maritime Alliance, to be appointed by the Speaker of the House; one of whom shall be the Chief Operating Officer of Provport, or designee; and one of whom shall be the Chairman of the South County Tourism Council, or designee.

In lieu of any appointment of a member of the legislature to a permanent advisory commission, a legislative study commission, or any commission created by a General Assembly resolution, the appointing authority may appoint a member of the general public to serve in lieu of a legislator, provided that the majority leader or the minority leader of the political party which is entitled to the appointment consents to the appointment of the member of the general public.

The purpose of said commission shall be to make a comprehensive study to assess Rhode Island's financial risk and economic exposure due to flooding and sea rise and report to the General Assembly, including but not limited to:

(1) Conduct a study from three case study locations using the Providence Port, the Newport Waterfront and South County tourism and marine industries. Identify and highlight climate risks to the specific business sectors of the Rhode Island economy attributed to the case study locations, and provide actionable data at a geographically granular level for decision-makers;

(2) Provide data and information to Rhode Island municipalities, businesses and the investment community so that they may factor sea rise and flooding into their short- and long-term decision making;

(3) Forecast and document the economic risks of sea rise and climate change in order to provide information necessary for government, the business community, and the public to prepare to respond to these risks through climate preparedness and mitigation in the case studies;

(4) Forecast and document potential lost sales and income, unemployment, delayed sales and income, increased expenses, delay of business plans, potential loss of value and the costs of recovery strategies in the case studies;

(5) Conduct risk assessment, identifying vulnerabilities that would make business assets more susceptible to damage from flooding and sea rise. Vulnerabilities include deficiencies in building construction, process systems, security, protection systems and loss prevention programs in the case studies;

(6) Project Rhode Island as a leader in the region for taking steps to insure minimal business interruption and loss of value due to sea rise and sea surge; and

(7) Make recommendations to the General Assembly for the broad purpose of understanding the scope of the risk in order to take further steps to maintain the value of public and private property and state and private revenue in Rhode Island's economy, to define effective adaptation strategies, to better understand cost inaction; and to propose new approaches to understand and address the business risks associated with sea rise and storm surge.

Forthwith upon passage of this resolution, the members of the commission shall meet at

the call of the Speaker of the House and organize and shall select a chairperson.

Vacancies in said commission shall be filled in like manner as the original appointment.

The membership of said commission shall receive no compensation for their services.

All departments and agencies of the state, shall furnish such advice and information, documentary and otherwise, to said commission and its agents as is deemed necessary or desirable by the commission to facilitate the purposes of this resolution.

The Speaker of the House is hereby authorized and directed to provide suitable quarters for said commission; and be it further

RESOLVED, That the commission shall report its findings and recommendations to the House of Representatives no later than January 6, 2016, and said commission shall expire on February 6, 2016.

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