RHODE ISLAND EXECUTIVE CLIMATE CHANGE COUNCIL

A Resilient Rhode Island: Being Practical About Climate Change

Final Version | June 2014

Preliminary Report to

Governor Lincoln D. Chafee

Pursuant To Executive Order 14-01

RI EC^3

RHODE ISLAND
EXECUTIVE CLIMATE CHANGE COUNCIL

A RESILIENT RHODE ISLAND:
BEING PRACTICAL ABOUT CLIMATE CHANGE

PRELIMINARY REPORT
TO
GOVERNOR LINCOLN D. CHAFEE

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This report and related information is available in electronic format at the web site of the Executive Climate Change Council: www.planning.ri.gov/statewideplanning/climate.

INTRODUCTION

This report was prepared pursuant to **Executive Order 14-01**, issued on February 21, 2014.[1] The Order recognized that climate change is already occurring and will present increasing challenges to the State of Rhode Island, its communities, businesses and residents. It charged the Executive Climate Change Council (the "Council") with leading and coordinating state agencies in responding to these challenges in a timely and effective manner, focusing in particular on:

- assessing, integrating and coordinating efforts throughout state agencies to reduce greenhouse gas emissions, strengthen the resilience of communities, and prepare for the impacts of climate change;
- improving our understanding of the effects climate change will have in Rhode Island, for example, sea level rise, shoreline changes, frequency and intensity of severe weather events, flooding, wind, heat, and the impacts on our infrastructure, ecosystems, public health and economy;
- working in partnerships to identify, develop and implement strategies to be better prepared, reduce risk and losses, etc.

Council membership consists of the state directors of Administration, Coastal Resources Management, Commerce, Emergency Management, Energy Resources, Environmental Management, Health, Planning and Transportation. The membership reflects the multi-sector nature of both the challenges associated with climate change, and the approach that is required to address those challenges effectively.

The Governor instructed the Council to submit its first status update by May 1, 2014. The Council did so, with a draft report that was released for public comment on May 8, 2014. This final version takes the public comments into account, but remains in many ways incomplete. It is neither the first step the state has taken in response to climate change nor the definitive answer to the many questions that still need to be answered. Instead, it lays out **a preliminary action plan aimed at accelerating a shift by the State towards resiliency, a proactive, practical and positive approach to dealing with the realities and uncertainties of climate change**.

Context

It is important to recognize from the start that a significant amount of work related to climate change had preceded the executive order, and provided an important context and foundation, both for the executive order and for the work it tasked the Council with. Equally important is that this work, by both government and nongovernmental institutions and organizations, continues today. The findings and recommendations of this report build on this work and are informed by it.

[1] Appendix 1

The Council wants to recognize in particular the Climate Change Commission which the General Assembly created in 2010, as well as its three working groups. The 2012 Commission report[2] provides comprehensive information about the scope of projected climate change impacts in Rhode Island, programs that assess such impacts and/or develop adaptation responses[3], and next steps that should be taken, in particular to advance adaptation as a priority and a "mainstream" agenda for a broad range of agencies and non-governmental entities alike. The Commission successfully brought together a diverse group of government and nongovernment representatives, including also members of the academic community, who contributed a range of perspectives, expertise and backgrounds. Many of the agencies, institutions and organizations had previously done important work themselves to bring climate change to the attention of policy- and decision-makers and/or to develop better scientific and technical understanding of the challenges and options Rhode Island and its communities are facing.

The Council believes that the intent of the executive order was to strengthen the role state government, in particular state agencies, can play in this larger context, i.e. support and advance the collective effort, by state and local government, public and private sector, to act in a timely and efficient manner in the face of change that is already happening, and of impacts that our communities are already beginning to experience.

Scope and focus

The Executive Order did not ask the Council for further study to determine whether climate change is occurring. It acknowledged that this is the case and that bold and expeditious action is required in response. The Order did not ask the Council to first develop a comprehensive plan for all of Rhode Island that provides the entire state and each community, jurisdiction, sector and institution within it with a definitive document that explains exactly what to expect and what to do. Instead it instructed the Council to focus on **how state agencies can add the most value at this time, by coordinating their efforts and pooling their resources**, so as to (1) help improve our ***understanding of the likely impacts of climate change***, (2) help avoid or reduce the impacts to the greatest extent possible through ***mitigation***, (3) help develop effective ***adaptation*** strategies and solutions, and help our communities become more resilient; and (4) foster and utilize ***partnerships***, between agencies, with cities and towns, the federal government, the private sector and our academic institutions. Accordingly, this preliminary report is focused primarily on what state agencies can do, especially in the short term, to support, strengthen and accelerate the climate change resiliency program that has begun to take shape in Rhode Island over the last few years, and to ensure that this collective effort gains further momentum, continues well beyond the short term, and becomes part of how Rhode Island conducts its affairs.

[2] "Adapting to Climate Change in the Ocean State: a Starting Point." See www.planning.ri.gov/documents/comp/RI%20Climate%20Commission_Report2012.pdf

[3] Appendix A of the Commission report.

FINDINGS

- **Impacts from climate change are already being felt in Rhode Island, like elsewhere in New England. It requires action now, not just in the future.**

In its 2012 report, the Climate Change Commission concluded that "The impacts of climate change upon Rhode Island's built and natural environments are wide-ranging, discernible and documented, and, in many cases, growing in severity."[4] It was referring to both the more gradual changes that are taking place (for example, rising and warming waters in Narragansett Bay, changes in aquatic and terrestrial habitats), and the more dramatic increases in frequency and intensity of severe weather events. Severe flooding in the spring of 2010 had been linked to a changing climate. Since then, as several presentations to Executive Climate Change Council have pointed out, communities in Rhode Island have been hit by at least six major storms (qualifying as "100-year" or "500-year" events, but occurring more frequently than that terminology would suggest), which overwhelmed sewer and storm water systems, caused power outages, damaged roads and bridges, inundated neighborhoods and caused extensive property damage. Residential areas, business districts and key infrastructure are at risk under current conditions. Climatological projections indicate that conditions, and impacts, will worsen. Although these events are already creating serious budget and capacity challenges for cities and towns, public awareness varies greatly, even within towns that have been affected greatly.

- **Impacts are not limited to the coast but affect all of Rhode Island.**
  Coastal areas are already experiencing effects of higher sea levels, especially at high tide and during storms, but inland communities are also being impacted by more frequent storms , high wind speeds, extraordinary amounts of rainfall, riverine flooding, etc. Many of these communities are even less prepared or equipped to "handle" these events, for example, with storm water infrastructure that is not sized to handle the flow. Among other things, it is important to include these areas in the sophisticated modeling and mapping that is being done by state agencies and university programs to assess vulnerabilities; as well as in the scope of outreach and assistance programs. (Also a coordination issue; see below.)

[4] "Adapting to Climate Change in the Ocean State: a Starting Point," p. 4.

- **The range of potential impacts is extremely broad.**
  In addition to the often dramatic impacts along the shoreline, including beach erosion and loss of property, impacts of major concern include wind damage, heat, periods of drought, etc. Besides damage to public and private structures, all types of infrastructure are vulnerable, including drinking water, wastewater treatment and storm water management systems, other waste management systems, transportation, energy, communication infrastructure, as well as healthcare, education, housing and food supply facilities. In addition to natural resources, cultural and historic resources are at risk and have their own specific challenges. Public health impacts range from an increase in water- and vector-borne diseases to mold in flooded properties, heat stress, impacts on mental health, etc. Dealing effectively with the number and complexity of impacts requires not only proactive planning by many agencies, but effective coordination so as to avoid conflict or duplication of effort. In fact, it may require innovation in governance arrangements, and in particular in how we mobilize, allocate and use the resources required to develop and implement the necessary mitigation and adaptation strategies

- **Cities and Towns are on the front line, and need our help.**
  Coastal as well as inland communities are already struggling to deal with, in particular, more frequent and intense storms. They face significant challenges, both in responding to extreme events that have already been happening, and in planning for what lies ahead. Examples of the former include the storm water system in West Warwick, which gets routinely overwhelmed by discharges from neighboring Coventry, which has larger pipes; as well as by what amounts to sheet runoff from Scituate Reservoir that is being kept at maximum water levels, instead of lowered to accommodate forecasted rainfall. (Cranston experiences the same problem; both communities have asked for state assistance.) In coastal as well as inland communities, planners are having difficulty trying to determine what planning parameters to apply to, for example, future development, infrastructure investment, etc., and are asking the State for help; not to (only) refer them to various sources of scientific research, modeling and mapping, but to provide specific and consistent guidance as to what the scientific information means, which criteria, standards, map, or set of maps they can use for the time being, etc. This requires coordination among agencies, as well as with university programs and the planning community.

- **Climate change is not a just an environmental issue. It affects all aspects of our society and communities, including in particular our economy. We need to address it accordingly.**
  Although the public health, economic and other implications of climate change have been identified from the beginning, climate change programs have for a long time been associated with environmental (and energy) agencies, and with new regulatory requirements. As a result, there has been less support in certain sectors than is needed. Instead of considering the economic impact of climate change, for example, the economic sector has often focused on the cost to businesses of programs designed to mitigate those impacts. This has begun to change as mitigation programs have diversified, are designed to be cost-effective (if not

cost-savers), and demonstrate that partnerships between environmental, economic and energy agencies can produce results, innovation and new opportunities. Clearly, climate change mitigation and adaptation is an economic issue, as well.

www.riema.ri.gov

Another important dimension of climate change programs is emergency management, i.e. preparing for, responding to, and recovering from emergency events. The Rhode Island Emergency Management Agency (RIEMA) operates under both federal and state mandates that direct it to undertake and coordinate many of the programs and activities that make up climate change adaptation strategies; and it has access to federal resources to implement these mandates. Its programs go well beyond traditional emergency response operations; they include elements like proactive vulnerability assessments, mapping of vulnerable areas, working with communities to develop and update Hazard Mitigation Plans, and developing practical adaptation solutions that reduce risk and damages. As documented in the recently completed Rhode Island State Hazard Mitigation Plan[5], RIEMA has broad responsibilities as well as capabilities that are directly relevant to adaptation and improving resilience, suggesting it should have a leadership role in moving the State toward greater resiliency.

- **Mitigation and adaptation are both necessary. Success does not mean the end of climate change; it means resilience.** Initial responses to climate changes focused primarily on "mitigation," a term used for measures aimed at reducing emissions of greenhouse gases or at capturing and sequestrating their carbon content.[6] Even though significant reductions have been achieved in some sectors, it is now generally accepted that mitigation programs can no longer be expected to stop or reverse climate change trends such as global warming, increased precipitation as well as prolonged droughts, storms at greater frequency and intensity, etc. Nonetheless, it remains critically important to do the very best we can to reduce greenhouse gas emissions further, and step up our efforts, so as to avoid the most damaging scenarios and reduce risk, damage and loss. At the same time, it has become equally important to focus on "adaptation," i.e. changing our ways so we can live with climate change and the changing conditions and uncertainty it brings. That can mean protecting ourselves, our structures and infrastructure in place, or moving out of harm's way, depending on what the best available science and technology suggest our options are. Resilience is a positive goal in itself, because it refers to strengths we have and focuses on positive outcomes.[7]

[5] See www.riema.ri.gov/prevention/mitigation/RI%20HMP_2014_FINAL.pdf
[6] "Mitigation" has a different meaning in the context of emergency management, where "hazard mitigation" refers to a range of measures and strategies that eliminate or reduce risk, and/or make it possible to adapt to (live with) the risk.
[7] See below, pages 9-11, for more specific findings regarding adaptation and mitigation.

- **What we do in Rhode Island can make a difference, if we (1) focus on practical problem-solving, and (2) participate in regional and national initiatives where that is the most effective way to achieve results.**
  It is not uncommon to hear people question what difference we can make in a small state like Rhode Island. The answer is: you might be amazed. A first priority is to stop debating, and to start doing. If we experience an increase in flooding, it hurts what we care about, we can determine the cause, and there is a practical and affordable solution, the thing to do is to implement that solution. A good example is Bristol Town Beach, which used to get closed several times each summer because of problems with storm water affecting water quality. As the problem grew worse with increasing rain storms, the Town decided to implement a green infrastructure project that has eliminated the problem and at the same time helped to beautify the area adjacent to the beach. The same approach can be used to design energy efficiency and clean energy programs: determine the cause of (significant contribution to) greenhouse gas emissions, find a practical and cost-effective solution, and implement it. This approach is reflected in the State Energy Plan ("SEP"), for example, and can be implemented at the household/business, community or statewide level.

  As to emission reductions, however, the biggest impact Rhode Island has had is through its participation in regional initiatives, as is also reflected in the SEP. One example is the Climate Change Program created in 2000 by the New England Governors and Eastern Canadian Premiers, which in 2001 adopted regional reduction goals (to 1990 levels by 2010, by 10% below 1990 levels in 2020, and by 75-85% below 2001 levels in 2050). In 2007, Rhode Island joined the Regional Greenhouse Gas Initiative ("RGGI"), a market-based "cap-and-trade" program aimed at lowering carbon dioxide gas emissions from fossil-fueled electric power generating plants. In seven years, the program reduced emissions in participating states by more than 40%, from 162.5 million tons in 2005 to 92 million tons in 2012. The cap was lowered this year to 91 million tons, and will be lowered an additional 2.5% each year to 78 million tons in 2020; this will ensure that emissions will have been reduced by 50% below 2005 levels. Obviously, Rhode Island could never have this much of an impact on its own, even proportionally. The regional approach allows it to contribute to that impact, reap a significant benefit for the State in terms of actual emission reductions, and receive significant funding (more than $25 million to date) out of the proceeds from allowance auctions, to invest in energy efficiency and clean energy programs.

- **Resilience is good for business.**
  Once we move beyond the perception that climate change necessarily means more regulation or increase in the cost of doing business, it is possible to see the benefits of incorporating resilience into business planning and practices. Businesses incur significant damages during extreme weather, as insurance companies will testify, and have documented. Their data also show that companies that failed to take practical measures as suggested by their insurers, for example to secure roofs, incurred up to 28 times the amount of damages during one particular hurricane, compared to companies that took the advice. The negative impact, to companies and the economy at large, is significant, yet can be mitigated significantly through cost-effective measures. A proactive approach, such as incorporating particular materials or features in site and building design, can bring down costs further, but retrofits, too, have been shown to pay for themselves and are encouraged by the insurance industry.

Similarly, businesses have come to recognize the benefits of energy efficiency measures and of renewable energy that can reduce their energy cost and, in some instances, dependence on the grid. There is still concern that renewable energy programs contribute to the already high cost of energy and thereby hinder economic growth. The latter conclusion is not necessarily borne out in neighboring states, and there is growing recognition of the importance to develop a diverse, sustainable energy supply, as well as a resilient energy system, that can withstand climate change related disruptions. The draft update of the SEP seeks to strike a balance by applying the three criteria of security, cost-effectiveness and sustainability in the development and selection of energy strategies and programs. The Council endorses this approach.

Slide used by Lou Gritzo, FM Global, in presentation to the Council on 4/21/14

Finally, resilience, both mitigation and adaptation, presents business opportunity, as was made clear in several presentations to the Council and has also been recognized in recent reports by the Rhode Island Foundation and CommerceRI.[8] Certainly the renewable and clean energy sector offers opportunities for growth, especially if unnecessary barriers (for example, relating to licensing of installers) are removed and programmatic goals (for distributed generation) are increased or extended (renewable energy standard). Experience from multiple states indicates that investors, corporate decision-makers and consumers appreciate the certainty of statutory reduction goals. In addition, opportunities are increasing in fields such as architecture (including landscape architecture), engineering, design, manufacturing (building materials, equipment), etc.

- **State government should "Lead by Example" but should focus as much on providing effective guidance and assistance, and on working through partnerships.**
  Appendix 2 lists many state agency programs that are directly relevant to mitigating or adapting to the effects of climate change. The preliminary Action Plan at the end of this report also names many agencies and programs that have responsibility and expertise to take on certain aspects of mitigation and/or adaptation strategies. The State of Rhode Island has recognized for some time, however, that the responsibility extends to all agencies, and that all agencies should help the State "Lead by Example" when it comes to reducing environmental impacts or, in this case, reducing the risks and impacts associated with climate change. The actions proposed under Goal 1 in the Action plan build on existing programs that have been successful, but can achieve more, for

[8] "Economic Intersections of Rhode Island," (January 2014), http://www.rifoundation.org/Portals/0/Uploads/Documents/RI%20Economic%20Intersections%20-%20Executive%20Summary%20v.WEB.pdf; "Understanding the Economic Development Opportunity & Impact of Climate Variability," (April 2014), http://www.planning.ri.gov/documents/climate/CommerceRI_EDandClimate_1.pdf

example, through more consistent participation and compliance by all agencies, and by expanding programs to take advantage of newly available technologies.

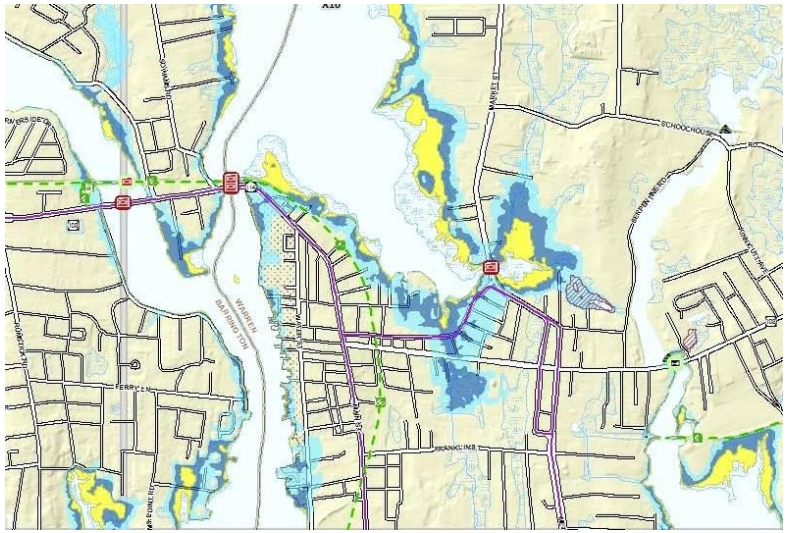
As important as it is to demonstrate the State's own commitment to, for example, energy efficiency and renewable energy; and to demonstrate the feasibility and cost-effectiveness of these programs, the State must also Lead by Example by incorporating its commitment to mitigation, adaptation and resilience at all levels of its operations, from its mission statements and strategic plans to capital planning, design standards, equipment specifications, to policy development, and rulemaking. Equally important is better coordination, between agencies, as well as between programs within agencies. We cannot afford to have agencies or programs send conflicting signals, for example, about rebuilding storm-damaged structures to the same, vulnerable, conditions; or to force installation of wastewater infrastructure without regard for projected inundation scenarios. The same emphasis on coordination and, as a result, more efficient and effective performance, also applies to coordination and collaboration with partners outside state government, including cities and towns as well as private sector entities. They not only need our assistance, we will need theirs to make our mitigation and adaptation programs work.

- **Rhode Island needs to prioritize, accelerate and coordinate adaptation**
  As noted in the Introduction, the Climate Change Commission recognized the urgency of shifting our focus to adaptation instead of only mitigation, as had the legislation that created the Commission. Long before that, the Coastal Resources Management Council (CRMC) had begun to make the same point, and to provide the science, documentation and visual presentations to support it. The agency has worked tirelessly to improve access to the best scientific and technical information, the most up-to-date modeling and projections about sea level rise, storm surge, shoreline changes, etc.; to use actual storm events to "ground-truth" the projections; and to develop practical applications that can help communities better plan for, respond to, and recover from such events as well as, most importantly, become more resilient and sustainable over time. More than any other agency, CRMC has brought a sense of urgency (changes are happening faster than once projected) to this area of government policy, as well as a practical approach to developing management strategies and tools, in close collaboration with programs at the University of Rhode Island (URI). Together with work already done by other agencies, and capacity available at other agencies, this provides a strong foundation to develop a more comprehensive, ongoing statewide adaptation program.

  - **First order of business: Vulnerability Assessments**
    Adaptation begins with assessing vulnerabilities. Assessments can vary significantly in scope, methodology and complexity, which may affect how useful they are in developing a comprehensive, coordinated strategy.[9] The Climate Change Commission's

[9] A general methodology has been developed, however, that can be helpful in this regard. It consists of four steps: (1) scoping, (2) gathering of data and expertise, (3) the actual assessment of vulnerability, and (4) applying the results to decision-making. The assessment itself has three components:

report included a good overview of the types of vulnerabilities we may, or likely will, have to address in Rhode Island. Only a few actual vulnerability assessments have been conducted to date, however. Perhaps the earliest one was the adoption by CRMC in 2007 of shoreline change maps that depict coastal zone erosion rates, which are used to establish set-back requirements for new development activities along the coast line. These maps will be updated as part of the Shoreline Change (or Beach) Special Area Management Plan (SAMP)[10] which CRMC is currently working on with the Coastal Resources Center at the University of Rhode Island. The BeachSAMP process also seeks to improve understanding of sea level rise and storm surge inundation scenarios, and to engage the public through communication and education. Both the process and the products will be key to Rhode Island's ability to develop an effective adaptation plan and strategy.



Potential impacts from 1", 3' and 5' SLR on Route 114 through Barrington into Warren

CRMC has also been working with URI and others to refine modeling and mapping of sea level rise scenarios, and undertaking pilot projects with coastal communities, for example, North Kingstown.[11] Coordination among agencies (including the Division of Planning and Department of Health), institutions (including several programs at URI and RI SeaGrant) and organizations (including The Nature Conservancy) has produced a standard methodology to depict 1', 3' and 5' sea level rise scenarios. This methodology was also used by the Division of Planning and Department of Transportation in an ongoing assessment of the vulnerability of transportation infrastructure in coastal areas.

In January 2012 the Rhode Island Department of Health, Office of Drinking Water Quality, launched *SafeWater RI: Ensuring Safe Water for Rhode Island's Future*. The objective of the project was to assess changing environmental conditions (including temperature, precipitation patterns, sea-level rise and storm surge) and their potential impacts on drinking water utilities in Rhode Island, develop strategies the utilities can use to address these changing conditions, and educate the public about the challenges, possible solutions, and associated costs. The project produced several reports that contain a wealth of data, including modeling and mapping, much of which is

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(1) exposure (nature and extent of the threat), (2) sensitivity (ability of the system, asset or population to manage the exposure), and (3) the effect of exposure on the system, asset or population, after factoring in its sensitivity.

[10] See www.beachsamp.org

[11] See maps at http://seagrant.gso.uri.edu/wp-content/uploads/2014/03/NK_maps.pdf

relevant beyond the subject of drinking water supplies.[12] A useful adaptation guidance document was developed that illustrates how utilities can plan for, and deal with, a very complex set of issues in an organized and practical manner.[13] More recently, the Department of Environmental Management issued a Request for Proposals to conduct a vulnerability assessment for wastewater treatment facilities (including their associated infrastructure).

The City of Cranston was also able to complete a vulnerability assessment[14], with assistance from the New England Climate Adaptation Project, a collaboration of the Massachusetts Institute of Technology and the National Estuarine Research Reserve System.[15] The reality, however, is that most cities and towns in Rhode Island are not prepared or otherwise able to undertake these assessments. Awareness and political will vary greatly, adequate resources are generally not available, and the ability to provide them with effective guidance and assistance, beyond pilot projects, has been limited. In addition, many assessments, especially with respect to infrastructure, are beyond the scope of individual municipalities.

The Council's recommendations focus, again, on coordination, in particular by the Emergency Management Agency, since it has the mandate, programmatic structure and capabilities to coordinate and implement a statewide vulnerability assessment program, with consistent methodology and sharing of expertise and resources across agencies, jurisdictions and sectors. This does not in any way diminish the importance of the role others have played and need to continue playing; to the contrary: a robust coordinating and support structure should enhance their effectiveness in those roles.

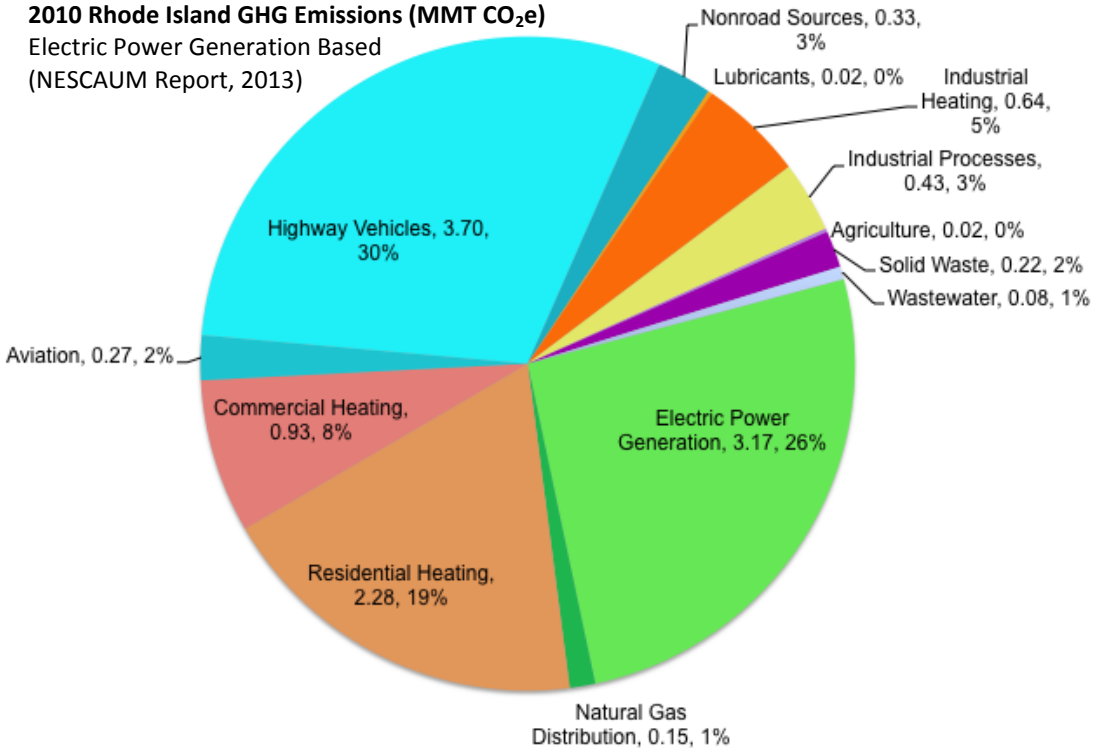
- **Work with public and private sector partners to develop solutions, including new financial strategies**
  Interagency coordination and collaboration will require a willingness on the part of agencies to look beyond their individual mission and "turf," and contribute their resources and strengths to a collective effort. The same is key to state government being able to develop and implement effective statewide strategies and solutions that will have the necessary public support and utilize the expertise and resources available at all levels, in all sectors. Cities and towns not only need our assistance, we need theirs to make our programs work. Universities already play a key role with respect to science, technology, education and outreach, and ongoing partnerships could expand the scope and impact of their contributions (for example, include their economics and business management programs, allow assistance to be made available to more cities and towns). Insurance and financial experts are going to be needed to develop new strategies to encourage investment in adaptation and, for example, pay for larger-scale infrastructure retrofits or reconstruction. The business sector needs to be a full partner in the State's resilience effort, not a target.

[12] See www.health.ri.gov/materialbyothers/SafeWaterRIReport.pdf
[13] Included in this report as Appendix 3
[14] http://necap.scripts.mit.edu/necap/wp-content/uploads/2014/03/Cranston_Summary-Risk-Assessment_Finalized_March-2014.pdf
[15] See http://necap.scripts.mit.edu/necap/cranston-ri/

- **Mitigation remains a high priority and needs increased effort**

  Prioritizing adaptation is important but cannot be used as an excuse to "go easy" on mitigation. It remains critically important to maximize greenhouse gas emission reductions so as to reduce the risk of worst case climate change scenarios. As described above (page 7), Rhode Island's mitigation programs go back many years and include participation in several regional initiatives. Almost all have focused on reducing greenhouse gas emissions[16], in particular the electric power generation, thermal and transportation sector.[17] In the electric power generation sector, the data indicate that emissions from generation have increased since 1990, but the increase has slowed down significantly; on a consumption basis, Rhode Island is already below 1990 levels and shown to be on a continuous reduction path. The closure of coal-powered plants and increase in number of natural gas plants, as well as the economic downturn, are part of the explanation, but so is the success of regional programs like RGGI and state energy efficiency, renewable energy and distributed generation programs (including the Rhode Island Public Energy Partnership, which has a goal of achieving 20% energy use reduction in state facilities and established a one million dollar revolving loan program to fund projects). The Office of Energy Resources (OER) has taken these programs to new levels and is proposing to take them further still, as part of a

2010 Rhode Island GHG Emissions (MMT CO_2e)
Electric Power Generation Based
(NESCAUM Report, 2013)



[16] Relatively little work has been done on carbon sequestration. Several commenters have pointed out that carbon sequestration, even on a relatively small scale, is important, and that opportunities are available to achieve co-benefits, for example in adaptation and habitat restoration, through agricultural, forestry and other natural resources management programs. The Council is aware that the Department of Environmental Management has been doing work in this area; it recommends partnering with universities and nonprofit organizations to supplement the limited agency resources.

[17] Commenters have noted that smaller categories may emit gases, such as methane and nitrous oxide with far greater global warming potential that should not be ignored, especially if cost-effective mitigation measures such as fixing leaks in natural gas pipelines and diverting food waste from landfills to digesters, are available. The Council agrees and has included those recommendations.

comprehensive, sustainable and cost-effective energy policy vision laid out in the new State Energy Plan. The Council endorses the vision and proposals developed by OER as a critical part of a broader climate change resilience strategy for Rhode Island, as well as an example of how to balance the need to provide affordable and dependable energy with the need to reduce greenhouse gas emissions, and the need to set aggressive goals and standards with appropriate outreach, assistance and partnership programs.

The SEP also proposed increased activity in the thermal and transportation sectors. The latter remains the largest contributor of greenhouse gas emissions. Over the years, fuel efficiency and greenhouse gas emission standards have been imposed by States and the Federal government and incentive programs have been developed to encourage use of low or zero emission vehicles, in addition to policies for government and corporate fleets. In Rhode Island, a policy is in place that new state vehicles have to meet clean fuel or zero emission standards unless conditions for a waiver can be met. Purchase and use of electric vehicles was encouraged by the installation of 50 charging stations around the State. In 2013, the Governor also signed a Memorandum of Understanding between eight States committing to put 3.3 million zero emission vehicles (ZEVs) on the roads by 2025. To coordinate the effort, the eight States released a Multi-State Action Plan to develop infrastructure, coordinate policies, codes and standards, and encourage a consumer market. A key concept is Vehicle Miles Traveled (VMT). Plans to reduce VMT (in single-occupancy vehicles) have been made for many years and are part of the State's Land Use and Transportation Plans. The challenge is implementation, especially with regard to the public transportation part. This has now become a critical challenge for climate change mitigation, not just in Rhode Island, but throughout the country. A high priority has to be to evaluate the pros and cons of various options (for example, shifting to electric, alternative fuel strategies, increasing public transportation, other VMT reduction techniques), taking into account lessons that can be learned from experiences in other States.

RECOMMENDATIONS: *KEY PRINCIPLES*

RI is committed to adopting a statewide climate change resiliency program that

1. defines its mission as **practical problem-solving**, not philosophical or even scientific debate
2. emphasizes **both mitigation and adaptation** as necessary elements on an ongoing basis, and optimizes strategies that produce benefits in both areas
3. improves **coordination and collaboration** between state government agencies, using existing authorities and programs to the extent possible, while avoiding increased bureaucracy
4. improves coordination and collaboration among local, state and federal government
5. improves services provided by state government agencies **without a net increase in regulatory process**
6. engages **both the public and private sectors** in developing and implementing strategies, and offers practical incentives and mechanisms for public-private partnerships to work
7. is (and asks participating entities to be) **entrepreneurial** in looking for the most effective, efficient and affordable ways to achieve its goals and objectives; dares to restructure and streamline authorities or programs when and where appropriate to produce better results more quickly
8. recognizes that all areas of the state are affected by climate change and extreme weather events, and is structured so as to **serve the whole state**
9. recognizes there are **populations** and geographic areas in the state **that are particularly vulnerable**, for various reasons, and makes it a priority to identify and address such vulnerabilities in a timely and equitable manner
10. makes effective communications a top priority and develops a **partnership-based communications program** that
    a. does not just focus on communicating "down" but enables civic conversation and debate by and among affected communities, groups and citizens, and ensures that they can communicate "up" into planning and decision-making processes
    b. coordinates "public messaging" (non-emergency) from state agencies around climate and resiliency
    c. makes up to date and reliable, scientific, technical and other information available to various user categories, in formats tailored to those categories
    d. assists in improving emergency response communications, especially among jurisdictions
    e. utilizes state-of-the-art, web-based and other programs and technologies to enhance quality, accessibility, level of engagement, as well as resilience.

RECOMMENDATIONS: *GOALS AND OBJECTIVES*

Goal 1: Lead by Example

1.1 ***Governance*** – facilitate prioritization, coordination, collaboration (resilience as decision-making principle for agencies, coordinating council, lead in governor's office, lead in each agency, interagency teams as needed; tracking by OMB/performance management, planning and coordination support by statewide planning)

1.2 Incorporate resiliency (mitigation and adaptation) into ***government operations*** at all levels; track and ***measure performance using resiliency metrics***

1.3 Coordinate, integrate and/or network data collection, analysis, modeling, mapping activities among state agencies (*see also Goal 7*)

Goal 2: Collaborate with Local Government, Federal Government, Private Sector and Higher Education

2.1 ***Cities and towns have easy access*** to reliable, scientific and technical information (*see also Goal 7*)

2.2 All cities and towns have up to date Hazard Mitigation Plans and Local Comprehensive Plans

2.3 Provide ***timely guidance and technical assistance***, with support from academic institutions

2.4 Public and private sector resources are combined to facilitate access to information, programs, assistance

2.5 Public and private sector expertise is combined to explore/develop ***new financial strategies*** to fund mitigation, adaptation and innovation

Goal 3: Pursue Economic Opportunities

3.1 Combine public and private sector leadership and expertise to identify and develop economic opportunities associated with developing greater resiliency (e.g., in fields like science and technology. engineering, architecture and design, green infrastructure, renewable energy)

Goal 4: Accelerate Vulnerability Assessment

4.1 Coordinate and expedite assessments for geographic areas and populations of particular concern, economic sectors, and key infrastructure (such as water, wastewater (including on-site wastewater treatment), storm water, waste management, transportation, energy, communication, healthcare, education, housing, food supply), to the extent not already assessed

4.2 Public and private sector leadership, expertise and resources are combined to assess vulnerabilities as well as means to mitigate them, agree on cost-effective strategies, and pursue opportunities to strengthen the RI economy through resiliency

4.3 Ongoing evaluation through monitoring, tracking and updating

RECOMMENDATIONS: *GOALS AND OBJECTIVES*

Goal 5: Increase Resilience through Mitigation - protect, reduce risk and create new opportunity

5.1 Adopt ***emission reduction targets***
5.2 Adopt clean energy strategies that meet security, cost-effectiveness and sustainability criteria
5.3 Optimize ***energy efficiency*** in electric, thermal and transportation sectors
5.4 Increase use of ***renewable energy and clean fuels***
5.5 Pursue ***clean energy industry growth*** opportunities
5.6 Address non-energy emissions from waste and agriculture
5.7 Promote smart land-use, biomass-retention, and other carbon-fixing measures

Goal 6: Increase Resilience through Adaptation - protect, reduce risk and create new opportunity

6.1 Improve emergency preparedness and incorporate adaptation into response and recovery where possible
6.2 Infrastructure: water, wastewater (including on-site wastewater treatment), storm water, waste management, transportation, energy, communication, healthcare, education, housing, food supply, etc.
6.3 Public Health
6.4 Economic Assets
6.5 Natural Resources

Goal 7: Coordinate Scientific and Technical Support

7.1 Integrate, coordinate and/or network data collection, analysis, modeling and mapping, combining expertise and resources from public and private sectors, including academic institutions for the purpose of supporting policy-development, planning, decision-making and projects
7.2 Ensure convenient and reliable access for state and local planners, decision-makers, researchers, students, stakeholders
7.3 Provide clear guidance and standards for use of scientific and technical information in planning, decision-making, applications
7.4 Establish forum(s) to facilitate information-sharing by policy- and decision-makers, planners, business leaders/owners, stakeholders and others, and to provide feedback loop

Goal 8: Communicate Effectively

8.1 Provide ***easy access to up-to-date, reliable information***
8.2 Develop a ***partnership-based, interactive communications program*** through which citizens, businesses, planners and decision-makers exchange information and ideas about the challenges and opportunities associated with climate change and resilience
8.3 Conduct and support ***outreach, public education and training*** in various sectors, at different levels

RECOMMENDATIONS: *LEGISLATIVE ACTION - 2014*

- Pass Climate Change Resilience legislation in the current session. Add consideration of climate change and resiliency to powers and duties of all state agencies, including quasi-public ones. Adopt greenhouse gas reduction targets for 2020, 2035 and 2050 of 10%, 45% and 80% below 1990 levels, respectively. Establish council to coordinate climate change and resiliency related programs and activities among state agencies; and to promote intergovernmental as well as public-private and cross-sector partnerships and collaborations, including partnerships with academic institutions. Call for coordination of scientific and technical research, analysis, modeling, mapping and similar programs in support of planning, policy-development and decision-making related to climate change resiliency.
  (Goals 1, 2, 3, 4, 5, 6, 7)

- Pass legislation this session (H7991A/S2439A) that will allow greater procurement by Rhode Island of regional renewable energy, including large scale hydro and wind energy, and improve the regional energy transmission infrastructure.
  (Goals 1, 3, 5, 6)

- Pass legislation (H8200A/S2692A) that will expand markets, create jobs for Rhode Islanders and accelerate generation and use of renewable energy by updating the licensing laws to remove barriers for local renewable energy installations by renewable energy businesses, electricians and general contractors.
  (Goals 2, 3, 5)

- Pass legislation (H7727A/S2690A) that will extend and expand the Rhode Island distributed generation growth program, which will increase local renewable energy development by 160 MW, spread out over 5 years, through a tariff-based program.
  (Goals 2, 3, 5)

- Approve budget article (H7133, Article 5, Section 1, Project 4) recommending a Clean Water, Open Space and Healthy Communities Bond providing new capital funding for green infrastructure projects to address storm water, dam repair and removal, protection and restoration of floodplains and natural shorelines, improving infrastructure to treat wastewater and abate water pollution, brownfield redevelopment, and other projects to increase community resilience.
  (Goals 2, 3, 6)

RECOMMENDATIONS: *EXECUTIVE ACTION - 2014*

- Designate senior level coordinator in Governor's Office; direct agencies to designate leads for internal and external coordination; direct Council and Office of Performance Management to develop guidance for agencies on incorporating climate change resiliency into exercise of powers and duties
- Integrate climate change into each functional element of State Guide Plan (Action 1.2.1)
- Include resiliency criteria in this year's capital budget planning process (Action 1.2.3)
- Include resiliency in Transportation Improvement Plan process (Action 1.2.7)
- As part of Resilient Economy Collaborative, create team with experts from financial sector and Treasurer's Office, to develop plan to attract private capital to provide long-term, sustainable financing for energy efficiency and renewable energy programs and projects, as well as non-energy mitigation and adaptation projects (Action 2.5.1)
- As part of Resilient Economy Collaborative, create team with experts from financial and utility sectors, as well as Treasurer's Office, to explore/develop new, sustainable financial strategies for public utilities, including drinking water, wastewater, storm water, etc., to cover costs associated with adaptation (Action 2.5.2)
- Finalize update of State Energy Plan (Action 5.2.1)

Glossary

ASMFC	Atlantic States Marine Fisheries Commission
ASRI	Audubon Society of Rhode Island
BCC	Building Code Commission
BRWCT	Bays, Rivers and Watersheds Coordination Team
CELS	College of Environmental Life Sciences @ URI
CI	Coastal Institute
CRB	Contractors Registration Board
CRC	Coasta Resources Center @ URI
CRMC	Coastal Resources Management Council
CRMP	Coastal Resources Management Plan (CRMC)
DEM	Dept. of Environmental Management
DBR	Dept. of Business Regulation
DG	Distributed Generation
DLT	Dept. of Labor and Training
DOA	Dept. of Adminstration
DOH	Dept. of Health
DOT	Dept. of Transportation
DPUC	Div. of Public Utilities & Carriers
EC3	Executive Climate Change Council
EDC	Environmental Data Center @ URI
EERMC	Energy Efficiency and Resource Management Council
EPA	Environmental Protection Agency
GHG	Greenhouse Gas(es)
GSRI	Grow Smart Rhode Island
HMP	Hazard Mitigation Plan
HPHC	Historic Preservation and Heritage Commission
LCP	Local Comprehensive Plan
NBC	Narragansett Bay Commission
NBEP	Narragansett Bay Estuary Program
NBNERR	Narragansett Bay National Estuarine Research Reserve
NESCAUM	Northeast States for Coordinated Air Use Management
NOAA	National Oceanic and Atmospheric Administration
OER	Office of Energy Resources
OHCD	Office of Housing and Community Development
OMB	Office of Management and Budget
RGGI	Regional Greenhouse Gas Initiative
RIBA	RI Builders Association
RIEMA	RI Emergency Management Agency
RIFACCT	RI Flood Awareness Climate Change Taskforce
RIGIS	Rhode Island Geographic Information System
RIPTA	Rhode Island Public Transit Authority
RIRRC	Rhode Island Resource Recovery Corporation
RISG	RI SeaGrant
RWU	Roger Williams University
SAMP	Special Area Management Plan
SLAMM	Sea Level Affecting Marshes Model
SLR	Sea Level Rise
SPC	Statewide Planning Council
STACC	Science and Technical Advisory and Coordinating Cte
STB	Save The Bay
SWOT	Strengths, Weaknesses, Opportunities and Threats
TIP	Transportation Improvement Plan
TNC	The Nature Conservancy
URI	University of Rhode Island
USFWS	United States Fish and Wildlife Service
VMT	Vehicle Miles Traveled
WRB	Water Resources Board

GOAL 1: LEAD BY EXAMPLE

Objective 1.1 ***Governance - facilitate prioritization, coordination and collaboration for the purpose of building resiliency***

Action 1.1.1: Legislation adding consideration of climate change and resiliency to powers and duties of state agencies; establishing council to coordinate climate change and resilience related programs and activities among state agencies and to encourage intergovernmental as well as cross-sector coordination and collaboration. Expand from EC3 membership by adding Lt. Governor as Chair of Emergency Management Advisory Council, Building Code Commission, DPUC, and/or allow flexibility for Governor to add limited number of members.

See also Action 5.1.1

Responsibility: General Assembly

When Current legislative session.

How Sub A.

Action 1.1.2 Establish climate change resiliency as a decision-making principle for all state agencies, including quasi-public agencies; direct the executive climate change council, or its successor if established by the General Assembly, to develop practical guidance in consultation with agency heads and their senior staff; and direct agencies to cooperate with the council to the greatest extent possible.

OPR Governor's Office/EC3

When Guidance by 9/30/2014. Responses by 10/31/2014 (so they can inform Strategic Plan due by end of year)

How Executive Order. (*See also Action 1.1.4, Objective 1.2)*

Action 1.1.3: Designate senior level position in Governor's office to help direct and facilitate interagency coordination on matters relating to climate change and resiliency, as well as facilitate intergovernmental and cross-sector coordination and collaboration

OPR Responsibility:	Governor's Office Governor	**OCR**	EC3 Div. of Planning
When	asap		

Action 1.1.4:

Designate senior staff level leads in each state agency to coordinate implementation of guidance across programs and projects, incorporation into strategic and work plans, tracking of performance, identification of challenges and opportunities, etc.

OPR Responsibility: Action Officer:	All agencies Cabinet members	**OCR**	OMB/Perform. Mgt Div. of Planning
When	7/1/2014 (note: could start with smaller group that works with RIEMA and OMB to develop guidance and formats for tracking, reducing paperwork burden)		
How	Executive order, memo from OMB		

Action 1.1.5: Create short- or longer-term interagency teams where that allows outcomes to be achieved more cost-effectively and/or quickly, for example, in areas like scientific and technical support, vulnerability assessments, public outreach and education, communications.

OPR Responsibility: Action Officer:	All agencies Cabinet members	**OCR**	EC3/Successor Council
When	7/1/2014 (note: could start with smaller group that works with RIEMA and OMB to develop guidance and formats for tracking, reducing paperwork burden)		
How	Executive order. Memorandum from DOA/OMB.		

Objective 1.2 ***Incorporate climate change resiliency into government operations at all levels, implement Lead by Example programs, measure and track performance***

Action 1.2.1: Integrate climate change into the functional elements of the State Guide Plan

See also Action 4.1.10

OPR	Div. of Planning	**OCR**	All SPC members
Responsibility:	Kevin Flynn		
Action Officer:			

When Ongoing, begin asap

How Is within enabling authority of SPC; add to its powers and duties.

Action 1.2.2: Develop a set of standard metrics agencies can use to track activities related to climate change

OPR	OMB/Perform. Mgt	**OCR**	RIEMA,
Responsibility:	Peter Marino		Div. of Planning
Action Officer:	Brian Daniels		

When 12/1/1214

How Memo from OMB Director outlining the criteria and distribute a semi-annual report on agency-specific activities

Action 1.2.3: Develop and incorporate a set of resiliency criteria for use in this year's capital planning process.

OPR	RIEMA/OMB	**OCR**	CRMC, Div. of Planning, OMB
Responsibility:	Jamia McDonald		
Action Officer:	Michelle Burnett		

When Criteria developed by 6/1/2014 and distributed to state agencies by 7/1/2014

How Memo from OMB Director outlining the policy behind the instructions and the criteria that will be used to weight capital project requests

Action 1.2.4: Evaluate state role in construction permitting process and identify opportunities to expedite permitting process post-disaster and for selected types of mitigation and adaptation actions

OPR	OMB/Office of Reg. Reform	**OCR**	BCC, CRB, CRMC, DEM, Div. of Planning, DLT, DOH, Fire Marshall
Responsibility:			RIEMA
Action Officer:			
When	11/1/2014		
How	Convene working group 5/2014		

Action 1.2.5: Develop long-term targets and a plan for net zero energy usage in state facilities through a combination of energy efficency upgrades, renewable energy and conservation effort; also mitigate transportation energy impacts by requiring reductions in Vehicle Miles Traveled (VMT) by state employees and expanding the use of alternative fuel and low emission vehicles in state fleets.

OPR	DOA	**OCR**	Div. of Planning, SPC, OER
Responsibility:	Ron Renaud		Green Building Advisory Committee
Action Officer:	Marion Gold		
When			
How	Finalize and implement State Energy Plan		

Action 1.2.6: Continue "Lead by Example" state energy efficiency program through RI Public Energy Partnership: benchmark energy use in state facilities and set goals for energy use reduction

OPR	DOA	**OCR**	All agencies
Responsibility:	Ron Renaud		
Action Officer:	Marion Gold		
When	Benchmarking completed by ? Reduction goals posted by?		

Action 1.2.7: Revise TIP selection process to include climate change resilience criteria

OPR	Div. of Planning	**OCR**	DOT, SPC
Responsibility:	Kevin Flynn		
Action Officer:			

When Criteria developed in 2014. TIP amended in FY16.

How Quadrennial TIP
See also Actions 4.1.2, 4.1.3, 4.1.4

Action 1.2.8: Create a "State Employees Lead by Example" program and encourage/support initiatives such as the State Employee Commuter Task Force to reduce Vehicle Miles Traveled (VMT, see Action 5.3.3) by state employees.

OPR	DOA	**OCR**	EC3 agencies
Responsibility	Director's Off., HR, Div. of Planning		
Action Officer	Deb Dawson		

When

How

Action 1.2.9: Conduct a review of laws and regulations to identify those that, in the context of climate change, create or add to risk, or interfere with the ability to reduce risk or to improve resilience

OPR	DOA/Office of Reg. Reform	**OCR**	EC3 agencies
Responsibility	Director Richard Licht		Municipalities
Action Officer			Stakeholders

When FY15

How Form interagency task force to work with Office of Regulatory Reform. Conduct, or ask university or college to conduct, best practices research. Include survey of key user groups, including muncipal planners.

Objective 1.3 ***Coordinate, integrate and/or network data collection, analysis, modeling and mapping of sea level rise, storm surge, riverine flooding and other climate change related impacts and scenarios, for example, involving heat, air quality, increases in water- and vector-borne diseases, invasive species, etc. (among state agencies)***

See also Goal 7

Action 1.3.1: Conduct inventory of current and planned activity by state agencies, including contracted work; conduct SWOT analysis, including gap analysis and evaluation of options to improve coordination, use of scarce resources, etc.

OPR Responsibility: Action Officer:	RIEMA	**OCR**	Div. of Planning/BRWCT, All agencies

When

How Create web site/page where agencies are asked to post basic information (per template) by ? Create small working group or use contractor analyze/evaluate. Invite feedback/input from academic institutions, perhaps other private sector parties?

Action 1.3.2: Establish or task an existing interagency advisory board or committee to make (1) policy recommendations, for example regarding research needs and priorities, and (2) recommendations regarding practical steps that can be taken to improve efficiencies, pool and leverage resources, etc.

OPR Responsibility: Action Officer:	Div. of Planning/BRWCT?	**OCR**	CRMC, DEM, DOH

When asap

How If possible, first identify/constitute the entity that can become the broader advisory/coordinating committee proposed in Action 7.1.1. Task 2 can then be undertaken by establishing an interagency subcommittee for that committee or the Executive Climate Change Council.

Action 1.3.3: Develop statewide planning criteria for the anticipated amount of SLR, level of riverine flooding, and the frequency and intensity of storms for which the State and its municipalities should plan, by time period.

OPR	Div. of Planning/CRMC	**OCR**	RIEMA, DEM, DOH, DOT
Responsibility:	Kevin Flynn/Grover Fugate		
Action Officer:	Jared Rhodes/		

When Interim maps, criteria, guidance in 2014. Finalize in 2015.

How By 8/1/2014, determine what maps, if any, planning criteria and guidance can be provided, if need be on interim basis, for SLR, riverine flooding, frequency and intensity of storms based on currently available data. By 10/1/2014, issue inundation maps, planning criteria and guidance for public comment and/or on an interim basis. By 11/1/2014, have plan and target date for development and adoption in 2015 of maps, criteria, standards and guidance by SPC, CRMC and RIEMA.

Note: CRMC has suggested that 500-yr floodplain (.02% storm) could serve as interim standard.

Action 1.3.4: Produce state inundation maps for 1', 3' and 5' SLR scenarios, with and without storm surge, consistent with state planning criteria for SLR and coastal flooding

OPR	CRMC	**OCR**	Div. of Planning
Responsibility:	Grover Fugate		RIEMA
Action Officer:			URI/EDC, Ocean Engineering; RISG

When Integrated mapping tool for use by state and local planners by 9/1/2014. Process for ongoing review (with user feedback) and updating by same date. Refined by 7/1/2015.

How Preliminary agreement on interagency/multi-party protocol for ongoing updating by 9/1/2014; scientific and further policy review completed by 12/1/2014. Adjustments, if any, made by 7/1/2015.

Note: *CRMC recommends expedited interim adoption of (1) Army Corps/NOAA SLR curves and time frame projections until supersed by more advanced information; (2) SLR ArcGIS Online viewer developed by URI/EDC as official state SLR map viewer; and (3) StormTools forecasting model, scaled to RI in collaboration with URI/Ocean Engineering. See also Goal 7.*

Action 1.3.5: Add standardized language to all state contracts for the conducting of climate change related activities to ensure that all data and maps produced are owned and accessible by the State of RI and are compatible with RIGIS formatting standards

OPR Responsibility: Action Officer:	Div. of Purchases	**OCR**	Div. Of Planning, DOT
When	9/30/2014		
How	Div. of Planning to provide Language to Division of Purchases		

Objective 1.4 ***Address legal issues raised by climate change, especially as it affects private property***

Action 1.4.1: Convene taskforce to identify, prioritize and evaluate issues, for example, effect of loss of land in context of zoning and other land use regulations, possible conflicts between public hazard mitigation/adaptation planning and private property interests (e.g. buy-out programs, projects to increase flood storage), public trust interest in access along shoreline and in use and conservation of marine waters and natural resources, requirements to provide notice at time of sale; develop guidance for cities and towns, real estate professionals, property owners under existing law and regulations; and develop proposals for changes in laws, policies and regulations as needed.

OPR Responsibility: Action Officer:	Off. of the Att. General	**OCR**	General Assembly DOA, RIEMA, CRMC RWU, Bar Association
When			
How	Begin with research of what other jurisdictions have done to date.		

Objective 1.5 ***Continuity***

Action 1.5.1: Develop Strategic Plan to guide state agency actions, coordination and collaborations for next 5 years

OPR Responsibility: Action Officer: EC3/Successor Council **OCR** Div. of Planning

When 11/1/14 draft, 1/1/15 final

How

Action 1.5.2: Semi-annual summits

OPR Responsibility: Action Officer: EC3/Successor Council **OCR** URI/Brown/RWU

When

Action 1.5.3: Annual Reports

OPR Responsibility: Action Officer: EC3/Successor Council **OCR**

GOAL 2: PARTNER WITH LOCAL GOVERNMENT & PRIVATE SECTOR

Objective 2.1 : ***Cities and towns have easy access to reliable scientific and technical information (see also Goal 7)***

Action 2.1.1 Establish a one-stop point-of-contact for inquiries, information resources, technical assistance, etc.

OPR	Div. of Planning	**OCR**	RIEMA
Responsibility:	Kevin Flynn		
Action Officer:			

When

How EC3 to assist with finding staffing/funding solution, including use of outside funding streams, collaboration with non-profit, academic institution

Action 2.1.2 Establish a Resilient RI clearinghouse website for municipal planners

OPR	Div. of Planning	**OCR**	URI
Responsibility:	Kevin Flynn		RIEMA, CRMC, DEM, DOT, OER
Action Officer:			

When

How First convene team to evaluate existing web sites, formats, audiences, gaps, need for new site vs using existing one(s)

Objective 2.2: ***All Cities and towns have up to date Hazard Mitigation Plans and Local Comprehensive Plans***

Action 2.2.1: Develop planning guidance for cities and towns to complete and/or update Hazard Mitigation Plans, including recommendations regarding coordination with neighboring towns

OPR	RIEMA (HMPs)	**OPR**	Div. of Planning	(LCPs. Also coordinate with RIEMA on outreach and
Responsibility:	Jamia McDonald	Resp.	Kevin Flynn	getting input from other agencies)

Action Officer: Michelle Burnett AO: Jared Rhodes

When

How Align and coordinate HMP and LCP processes to the extent possible, to save cost at local and state level

Action 2.2.2: Develop standards for addressing natural hazards and climate change in local comprehensive plans, and provide technical assistance to help cities and towns meet the standards and increase the number of state-approved plans

OPR Div. of Planning **OCR** RIEMA, CRMC, DEM
Responsibility: Kevin Flynn
Action Officer: Jared Rhodes

When ongoing, complete November 2014.

How Align and coordinate HMP and LCP processes to the extent possible, to save cost at local and state level

Action 2.2.3: Provide technical assistance to municipalities to incorporate climate change adaptation into comprehensive planning, hazard mitigation plans, capital improvement and transportation improvement programs

OPR URI/CRC **OCR** RISG, URI/EDC
Responsibility: Div. of Planning, RIEMA, CRMC, DOT
Action Officer: Pam Rubinof

When

How Continue current pilot projects but convene team (with OCRs, and private sector partners, see, e.g., Action 2.5.1) to address available funding and means to increase it so as to allow scaling up to ongoing municipal assistance program

Action 2.2.4: Develop mechanism to provide notice to cities and towns of funding opportunities to implement projects outlined in their Hazard Mitigation Plans

OPR	RIEMA (HMPs)	**OCR**	Div. of Planning
Responsibility:	Jamia McDonald		
Action Officer:	Michelle Burnett		

When asap; use if and when funding is available

How Develop comprehensive strategy and portal (see Action 2.1.2) to notify municipalities of opportunities as they arise. Information can include application timelines, requirements, eligibility criteria and application forms.

Note: consider expanding to joint program covering additional funding opportunities and projects in Local Comprehensive Plans, as well

Objective 2.3 : ***Provide timely guidance and technical assistance, with support from academic institutions to cities and towns***

Action 2.3.1: Provide standard maps, criteria and guidance relating to scenarios involving sea level rise, storm surge, riverine flooding, frequency and intensity of extreme weather events, heat, air quality, water- and vector-borne diseases, etc.

OPR	Div. of Planning/RIEMA	**OCR**	CRMC, DEM, DOT
Responsibility:	Kevin Flynn/Jamia McDonald		URI CI, CRC, RISG
Action Officer:	Jared Rhodes/		

When Interim maps, criteria, guidance in 2014. Finalize in 2015.

How *See Action 1.3.3*

Action 2.3.2: Provide guidance and technical resources to cities and towns to set and achieve clean energy goals, i.e. goals for reduced energy consumption, decreased carbon emissions, increased renewable energy, and environmentally-friendly transportation and land use systems; include guidance for updating and streamlining local permitting

OPR	OER	**OCR**	Div. of Planning
Responsibility:	Marion Gold		
Action Officers:	Rachel Sholly, Sue AnderBois, Danny Musher, Chris Kearns		

When Planning in 2014. Anticipated launch in 2015.

How Examples of technical assistance:

i. Assistance establishing a municipal energy use baseline and develop a plan to reduce energy use by XX% within X years

ii. Information and guidance for designating municipality as a Property Assessed Clean Energy (PACE) Municipality – thereby providing residents the option of financing clean energy upgrades to their homes through a property tax

iii. Assistance implementing a "stretch code" for new construction

iv. "As-of-right" siting model zoning ordinances for renewable energy

v. Expedited application and permitting processes for renewable energy

vi. Assistance and guidance for purchasing fuel efficient fleet vehicles

vii. Assistance adopting property tax and zoning policies that preserve open space and promote "smart growth"

Action 2.3.3 Develop strategies for properly managing storm debris without unnecessarily filling scarce landfill space, distinguishing between natural (vegetative) materials and non-natural materials (e.g., building parts, propane tanks, boat parts); provide specific guidance to cities and towns; and pursue innovative, environmentally as well as economically beneficial solutions

OPR	RI RRC	**OCR**	CRMC, DEM, Div. of Planning, DOT, RIEMA
Responsibility:	Kevin Flynn		CommerceRI
Action Officer:	Sarah Kite		Municipal Planners
			URI, RISLA

When

How Develop model management plans. Include considerations of local staging areas, sites for composting, pre-approvals, etc.

Action 2.3.4 Complete an assessment of lessons learned from the climate change planning process and economic vulnerability and opportunity assessment in North Kingstown, and produce a tool that can be used in other cities and towns

OPR	Div. of Planning	**OCR**	CRMC, DOT
Responsibility:	Kevin Flynn		URI/CRC; RISG
Action Officer:			

When *Depends on ability to find additional funding for URI team*

How

Note: to the extent possible, include review of experiences and lessons learned in Cranston, Newport and Matunuck.

Objective 2.4 ***Public and private sector resources are combined to facilitate access for businesses to information, programs, assistance***

Action 2.4.1: Create or use an existing public-private partnership to deliver a one-stop, consolidated concierge service to provide homeowners as well as small businesses with easy access to energy programs

OPR	OER	**OCR**	EERMC
Responsibility:	Marion Gold		CommerceRI
Action Officer:			National Grid

When OER has scheduled stakeholder meeting for May 2014

How

Action 2.4.2 Conduct outreach and training program with chambers, trade associations, insurance industry et al. to educate business owners about best practices in terms of mitigating risk, adaptation, preparedness, recovery, programs, etc.

OPR	CommerceRI	**OCR**	RIEMA
Responsibility:	Marcel Valois		Div. of Planning, DOT, OER
Action Officer:			

When

How

Objective 2.5 ***Public and private sector expertise is combined to explore/develop new financial strategies to fund mitigation, adaptation and innovation***

Action 2.5.1 As part of Resilient Economy Collaborative (see Action 3.1.1) , create team with experts from financial sector and Treasurer's Office, develop plan to attract private capital to provide long-term, sustainable financing for energy efficiency, renewable energy and alternative transportation programs and projects, as well as non-energy mitigation and adaptation projects

OPR	CommerceRI	**OCR**	Treasurer's Office
Responsibility:	Marcel Valois		OER, DOT
Action Officer:			CRMC, DEM
When			
How			

Action 2.5.2 As part of Resilient Economy Collaborative, create team with experts from financial and utility sectors, as well as Treasurer's Office, explore/develop new, sustainable financial strategies for public utilities, including drinking water, wastewater, stormwater, etc., to cover costs associated with adaptation

OPR	DPUC	**OCR**	CommerceRI
Responsibility:	Tom Ahern		Treasurer's Office
Action Officer:			DEM, DOH, OER, RIEMA
			NBRWCT, NBC
When			
How			

GOAL 3: PURSUE ECONOMIC OPPORTUNITIES

Objective 3.1 ***Combine public and private sector leadership and expertise to identify and develop economic opportunities associated with developing greater resiliency (e.g., in fields like science, technology. engineering, architecture and design, green infrastructure, renewable energy)***

Action 3.1.1: Convene a Resilient Economy Collaborative to follow up on findings and key recommendations of *Economic Intersections of Rhode Island* (Feb. 2014) and *Understanding the Opportunity and Impact of Climate Change* (Draft April 2014)

OPR	CommerceRI	**OCR**	Div. of Planning, DLT, OER, RIEMA
Responsibility:	Marcel Valois		
Action Officer:			

Action 3.1.2: Make test sites available to support piloting of resiliency-related innovation

OPR	CommerceRI	**OCR**	DOA
Responsibility:	Marcel Valois		
Action Officer:			
When			
How	Implementation of new Economic Development Plan		

Action 3.1.3: Develop a comprehensive workforce development strategy that maximizes the employment and training opportunities made available to diverse Rhode islanders in meeting the demands of the new economic opportunities resulting from the growing energy efficiency, renewable energy and resiliency industries.

OPR	DLT	**OCR**	CommerceRI
Responsibility:			
Action Officer:			
When			
How	Incorporate into Resilient Economy Collaborative's agenda?		

See also Actions 2.3.3, 2.5.1, 2.5.2, 4.2.1, 5.4.1, 5.4.2, 5.5.1, 6.2.6, 6.4.1.

GOAL 4: ACCELERATE VULNERABILITY ASSESSMENTS

Objective 4.1

Expedite proactive vulnerability assessments for geographic areas and populations of particular concern, economic sectors, and key infrastructure such as drinking water, wastewater (including on-site wastewater) treatment, stormwater, waste management, transportation, energy, healthcare, education, housing, food supply, etc., to the extent not already assessed

Action 4.1.1: Establish one or more core, interdisciplinary, rapid assessment teams, preferably with private sector participation. Prioritize and conduct proactive assessments on regular schedule.

OPR	RIEMA	**OCR**	BCC, CRMC, DEM, Div. of Planning, DOH, DOT, OER, URI
Responsibility:	Jamia McDonald		CommerceRI, DPUC
Action Officer:	John Washburn		

When Establish core team of experts by 11/1/2014. Begin assessments 1/1/2015.

How Prioritize key infrastructure assets based in 16 sectors of critical infrastructure and foreseen vulnerabilities in the state. Establish core team of experts to conduct assessments according to priorities. Develop joint fundraising strategy as necessary. Develop methodology for destop as well as field as field assessment. Develop application to collect real-time data in the field. Create schedule to rotate through all 16 sectors on bi-annual basis. Develop resilience checklist for communities and property owners. Develop and/or assist with self-assessment programs. Consider using Hazus model, already used by DOH and in Norht Kingstown pilot project.

Action 4.1.2:

Conduct risk assessment along state highway corridors for stormwater inundation, impacts of downed trees, utilities, etc.

OPR	DOT	**OCR**	RIEMA, CRMC, Div. of Planning, DEM, DPUC
Responsibility:	Mike Lewis		
Action Officer:	John Preiss		

When

How

Action 4.1.3: Conduct assessment of known stormwater impacts between state highways and municipal drainage systems, options to eliminate or mitigate such impacts

OPR	DOT	**OCR**	RIEMA, Div. of Planning, CRMC, DEM
Responsibility:	Mike Lewis		
Action Officer:			

When Determine whether federal flood hazard funding is available by ? Conduct survey of municipalities by ? Conduct assessments, either as part of rapid vulnerability assessments (Action 4.1.1) or separately.

How

Action 4.1.4: Conduct statewide assessment of highway drainage system

OPR	DOT	**OCR**	RIEMA, Div. of Planning, CRMC, DEM
Responsibility:	Mike Lewis		
Action Officer:			

When Consultant has been hired. Full assessment is currently expected to take 3-5 years.

How As part of developing a state Transportation Asset Management Plan pursuant to federal MAP-21 mandate (*see also Action 6.2.3*)

Action 4.1.5: Work with a science team to develop statewide heat island maps (coordinated with flood zones)

OPR	DOH	OCR	RIEMA
Responsibility:	Dr. Fine		Div. of Planning
Action Officer:	Julia Gold		URI, Brown?

When asap

How Statewide heat island maps that can be used for planning purposes, vulnerability assessments, etc

Note: Needs to be done with a GIS team and satellite data over the summer

Action 4.1.6 Review and update Energy Assurance Plan or conduct new vulnerability assessment for energy infrastructure

OPR	OER	**OCR**	DPUC
Responsibility:	Marion Gold		RIEMA
Action Officer:			

When Convene Working Group with DPUC to review Energy Assurance Plan and assess gaps, areas in need of update (for example, vulnerability at municipal and facility levels, especially for critical assets like hospitals, public safety facilities, water and wastewater facilties, senior centers and nursing homes, shelters, correctional facilities, fueling facilties, groceries stores, etc.)

How OER has applied for CDBG-DR funding to convene this working group.

Action 4.1.7: Complete RI Ports Assessment

OPR	Div. of Planning	**OCR**	CommerceRI
Responsibility:	Kevin Flynn		CRMC
Action Officer:			URI Transportation Ctr, CELS
			QDC, ProvPort
When	TBD		
How	Jointly pursue funding		

Action 4.1.8: Complete a housing vulnerability assessment for structures in coastal and riparian zones

OPR	Div. of Planning/OHCD	**OCR**	RIEMA, DOH, CRMC
Responsibility:	Kevin Flynn		
Action Officer:			
When	TBD		
How	TBD		

Action 4.1.9: Complete a vulnerability assessment of the State's historic and cultural resources

OPR Responsibility: Action Officer:	RI HPHC Ted Sanderson	OCR	RIEMA, CRMC, Div. of Planning, DEM, DOT Commerce
When	TBD		
How	TBD		

Action 4.1.10: Require all updates of elements of State Guide Plan to consider vulnerability of populations, natural or built environment, cultural and historic resources, infrastructure etc. to impacts associated with climate change or variability and, if necessary, to include, incorporate by reference, or be supplemented by a vulnerability assessment

OPR Responsibility: Action Officer:	Div. of Planning Kevin Flynn	**OCR**	All SPC members
When	immediately		
How	Already within legislative authority of Div. of Planning and SPC		

Action 4.1.11: In preparing vulnerability assessments, include an evaluation of the type of training required of the workforce to limit such vulnerabilities, the current and expected availability of such trained personnel, the educational and on-the-job training programs that could facilitate any needed expansion of that workforce, and the potential competition for that workforce from nearby states. Engage the trades, schools, and businesses.

OPR Responsibility: Action Officer:	DLT	**OCR**	CommerceRI, Div. of Planning, RIEMA
When			
How			

See also Objective 4.2

Objective 4.2 ***Public and private sector leadership, expertise and resources are combined to assess vulnerabilities as well as means to mitigate them, agree on cost-effective strategies, and identify opportunities to strengthen the RI economy through resiliency***

Action 4.2.1: Establish working groups that will conduct assessments for prioritized sectors of the economy, e.g., small business, ports and marine trades, agri- and aquaculture, manufacturing, tourism. Assessments should address vulnerabilities and economic impact, options to mitigate impact, options to improve preparedness, response and recovery, and economic opportunities associated with design, engineering, technological and other skills and capabilities that can improve resilience.

OPR	CommerceRI	**OCR**	RIEMA, CRMC, Div. of Planning, DOT/Multimodal, OER, DLT
Responsibility:	Marcel Valois		Chambers
Action Officer:			URI

When Start by ?

How *Seek support from RIF, academic institutions to help fund, facilitate, provide research, intern support, etc.*
To the extent possible, merge with Action 4.1.1.
Build on work being done by Div. of Planning with EPA grant to evaluate economic impact of climate change.
Use work done by pilot projects in North Kingstown and Newport (Newport Waterfront).
Prioritize sectors and issue sector reports on regular schedule, beginning 9/1/14
See also Action 6.4.3.

Objective 4.3 ***Ongoing evaluation through monitoring, tracking and updating***

Action 4.3.1: Incorporate post-assessment monitoring/tracking and mechanisms for reporting and updating in overall program and schedule. As part of each assessment, define specific conditions, parameters, etc. that need to be monitored/tracked.

OPR	RIEMA	**OCR**	BCC, CRMC, DEM, Div. of Planning, DOH, DOT, OER, URI
Responsibility:	Jamia McDonald		
Action Officer:	John Washburn?		

When

How

See also Objective 1.3 and Goal 7

GOAL 5: INCREASE RESILIENCE THROUGH MITIGATION - to protect, reduce risk and create new opportunity

Objective 5.1 *Adopt greenhouse gas emission reduction targets*

Action 5.1.1: Adopt state greenhouse gas emission reduction targets, consistent with regional goals and adding a new interim target: 10% by 2020, 45% by 2035, 80% by 2050 (from 1990 levels)

Responsibility: General Assembly

When This legislative session

How Pass Climate Change/Resiliency legislation containing targets

Action 5.1.2: Continue participation in the Regional Greenhouse Gas Initiative (RGGI), with the goal of reducing greenhouse gas emissions from the electric sector by 50% below 2005 levels by 2020.

OPR DEM/OER

When Ongoing

How Implement State Energy Plan (Action 5.2.1) and other emission reduction strategies and Actions below.

Note: Continued participation in this regional, market-based program is needed both to achieve greater GHG emission reductions and to increase economic benefits, i.e. reductions in cost of compliance and growth in the clean energy economy sector.

Action 5.1.3: Measure, repair and prevent leaks in natural gas distribution system; evaluate and adjust repair and replacement options to serve both mitigation and adaptation objectives

OPR	DPUC	**OCR**	OER, DEM
Responsibility:			National Grid
Action Officer:			

When Repairs ongoing. Measurements may be incomplete.

How Briefing, interagency planning meeting.

Objective 5.2 ***Adopt clean energy strategies that meet the 3 criteria of security, cost-effectiveness and sustainability***

Action 5.2.1: Finalize and adopt the update to the State Energy Plan

OPR OER **OCR** Div. of Planning
Responsibility: Marion Gold
Action Officer Danny Musher

When asap

How Approval by SPC, incorporation into State Guide Plan

Action 5.2.2: Reduce GHG emissions by increasing import of renewable energy, including large scale hydro and wind energy, and by improving the regional transmission and distribution infrastructure

Responsibility: General Assembly

When: This legislative session

How: Pass H7991/S2439

Objective 5.3 ***Optimize energy efficiency in electric, thermal and transportation sectors***

Action 5.3.1: Establish building energy labeling program, disclosing energy performance data to occupants, prospective buyers and/or public; together with training program for building inspectors, including third-party inspectors

OPR EERMC **OCR** OER, BCC
Responsibility:
Action Officer:

When

How

Action 5.3.2: Form Working Group to develop sustainable funding mechanism for energy efficiency programs for unregulated fuels

OPR	OER	**OCR**	EERMC
Responsibility:	Marion Gold		National Grid
Action Officer	Danny Musher		Fuel Dealers

When OER has formed working group. Recommendations later in 2014.

How

Action 5.3.3: Develop comprehensive strategy and action plan to reduce Vehicle Miles Traveled (VMT)

OPR	Div. of Planning	**OCR**	DOT, OER, RIPTA
Responsibility:	Kevin Flynn		Governor's Office, DEM
Action Officer:			

When Convene interagency policy group June 2014. Develop policy recommendations for reduction of GHG emissions in transportation sector by 9/1/2014. Include review of LRTP 2035 and recommend implementation as appropriate. Iinclude Lead by Example actions. Include items to be further developed in Strategic Plan by 12/2014. Align longer-term strategies with LRTP update in FY16.

How Examples of recommendations/action items

i. Implement policies from long-range transportation plan 2035
ii. Conduct a "Pay-as-you-drive" auto insurance pilot
iii. Investing in alternative transportation and mass transit
iv. Smart land use planning and incentive tools
v. Ridesharing, care-share, and flexible workplace programs
vi. Parking policies

Action 5.3.4: Develop RI implementation plan for 8-state ZEV policy and action plan

OPR	DEM/OER	**OCR**	DOA, DOT
Responsibility:	Janet Coit/Marion Gold		
Action Officer:	Frank Stevens/		

When Draft by end of 2014? Expedite early action items, such as new state purchase target?

How

Action 5.3.5: Prioritize congestion mitigation in project design and construction

OPR	DOT	**OCR**	
Responsibility:	Michael Lewis		
Action Officer:			

When

How For example, ensure that design and construction of Replacement of I-95 Providence Viaduct Bridge #578 Northbound project achieves greatest congestion mitigation benefits possible.

Objective 5.4 ***Increase use of renewable energy and clean fuels***

Action 5.4.1:

Reduce GHG emissions, increase use of renewable energy and improve resilience by expanding the Distributed Generation program

Responsibility: General Assembly

When This legislative session

How Pass H7727A/S2690A

Action 5.4.2: Increase renewable energy use while creating local jobs by updating licensing laws to remove barriers for renewable energy installations by local renewable energy businesses, electricians and general contractors

Responsibility: General Assembly

When This legislative session

How Pass H8200A/S2692A

Objective 5.5 ***Pursue clean energy industry growth opportunities***

Action 5.5.1: Develop comprehensive market development strategy for stimulating the adoption of renewable thermal fuels

OPR	OER	**OCR**	EERMC
Responsibility:	Marion Gold		National Grid
Action Officer:	Danny Musher		Fuel Dealers

When Report with recommendations by end of 2014

How OER is convening Working Group with key stakeholders

Objective 5.6 ***Modernize the grid***

Action 5.6.1: Convene a working group to develop recommendations for electric grid, rate, and regulatory modernization

OPR	OER	**OCR**	DPUC, PUC
Responsibility:	Marion Gold		National Grid
Action Officer:	Danny Musher		

When Start by July 2014

How OER has committed funds to support this effort

Objective 5.7 ***Address non-energy emissions from waste and agriculture***

Action 5.7.1: Pass legislation requiring certain food waste generated in certain quanities to be separated from solid waste stream to composting or methane digestion facilities

OPR General Assembly **OCR**

When 2014

Other Actions To be developed with DEM, RIRRC

Objective 5.8 ***Promote smart land use, biomass retention, and other carbon-fixing measures***

Action 5.8.1: Strengthen incentives for municipalities to obtain state approval for local comprehensive plans, thereby encouraging adoption and implementation of land use planning and practices that reduce risk and improve resilience.

OPR Div. of Planning **OCR** RIEMA, CRMC, DEM, DOH, DOT
Responsibility: Kevin Flynn
Action Officer:

When FY15

How Grant funding eligibility or ranking criteria, for example.

Action 5.8.2: Evaluate barriers municipalities are facing in implementing smart growth intiatives and develop recommendations for overcoming such barriers

OPR Div. of Planning **OCR** CRMC, DEM
Responsibility: Kevin Flynn GSRI
Action Officer:

When FY15

How

Other Actions To be developed with DEM (Forestry, Agriculture), Div. of Planning, URI et al.

Note: include reducing emissions associated with overuse of pesticides, and sequestration of carbon through natural resources management programs, including agriculture, forestry and habitat restoration/management.

GOAL 6: INCREASE RESILIENCE THROUGH ADAPTATION - to protect, reduce risk and create new opportunity

Objective 6.1 ***Improve emergency/disaster preparedness, and incorporate climate change adaptation into response and recovery when feasible***

Action 6.1.1: Establish a long-term recovery governance structure consistent with the National Recovery Framework, that would be activated after catastrophic events

OPR Responsibility: Action Officer:	Governor's Office	**OCR**	RIEMA, Div. of Planning, BCC, CRMC, DEM, DOH, DOT, et al.

When

How Adapt recommendations developed by FEMA Recovery Team post Sandy

Note: Build on post-Sandy coordination between CRMC, DEM, local building officials and others. See also Action 1.2.4.

Action 6.1.2: Incorporate state-of-the-art GIS technologies into emergency response to improve rescue efforts and reduce loss of life and property

OPR Responsibility: Action Officer:	RIEMA Jamia McDonald	**OCR**	URI/CI, EDC DOH

When

How

Action 6.1.3: Establish emergency permitting procedures to expedite issuance of state permits following severe storm events, and develop guidance (model procedures) for municipalities

OPR RIEMA **OCR** BCC, CRMC, DEM
Responsibility: DOA/OMB/ORR
Action Officer:

When 11/1/2014

Note: Build on post-Sandy coordination between CRMC, DEM, local building officials and others. See CRMP Section 180 - Emergency Permitting. See also Action 1.2.4.

Action 6.1.4: Deploy response teams post disaster to measure, monitor and catalog impacts to natural resources

OPR RIEMA **OCR** DEM, CRMC
Responsibility: URI/CI
Action Officer:

When

How Use existing MOU between DEM and URI regarding the development, training an deployment of the Sceintific Support for Environmental Emergency Response (SSEER) to provide scientific and training support to RIEMA

Action 6.1.5: When appropriate and consistent with federal regulations, incorporate the state's SLR and flood risk projections into evaluation criteria for public facilities and infrastructure projects funded through federal emergency and/or disaster allocations.

OPR RIEMA **OCR** Div. of Planning
Responsibility:
Action Officer:

When

How Adapt recommendations developed by FEMA Recovery Team post Sandy, if applicable

Action 6.1.6: Conduct assessment of traffic light power needs for evacuation routes and implement upgrades as needed

OPR	DOT	**OCR**	RIEMA, Div. of Planning
Responsibility:	Michael Lewis		
Action Officer:			
When			
How	RIEMA to work with DOT on funding?		

Objective 6.2 ***Prioritize, develop and implement adaptation strategies and action plans for critical infrastructure such as drinking water, wastewater (including on-site wastewater) treatment, stormwater, waste management, transportation, energy, healthcare, education, housing, food supply, etc.,***

Action 6.2.1: Ensure that public water utilities with infrastructure deemed to be highly or critically vulnerable evaluate adaptation options, including retrofitting, relocation or abandonment

OPR	WRB	**OCR**	DOH
Responsibility:			RIEMA
Action Officer:			
When			
How	*Note: $15 million for water supply improvements in proposed Environmental Bond*		

Action 6.2.2: Establish interagency working group with water utilities to develop and coordinate implementation of regional strategies to increase available water supply source

OPR	WRB	**OCR**	DOH, DEM, RIEMA
Responsibility:	TBD		
Action Officer:			
When	TBD		
How	TBD		

Action 6.2.3: Develop Transportation Asset Management Plan that includes adaptation strategies and measures to strengthen resilience of transportation system as identified through the study of impacts of SLR on transportation assets and the highway corridor risk assessments (Actions 4.1.2, 4.1.3 and 4.1.4).

OPR	DOT	**OCR**	Div. of Planning, CRMC, DEM, RIEMA
Responsibility:	Michael Lewis		CommerceRI/Dept. of Commerce, DPUC
Action Officer:	John Preiss		URI?

When 18-24 months

How Interagency, multi-sector team may be needed to supplement available resources at DOT

Note: *of critical importance to emergency management, utilities, muncipalities, businesses, etc.*

Action 6.2.4: Implement recommended strategies developed through the vulnerability assessment of the State's historic and cultural resources (Action 4.1.9).

OPR	HPHC?	**OCR**	Div. of Planning, RIEMA
Responsibility:			
Action Officer:			

When

How

Action 6.2.5: Conduct review of current natural gas infrastructure repair and replacement program from a GHG mitigation and adaptation perspective and develop recommendations

OPR	DPUC	**OCR**	OER
Responsibility:	Tom Ahern		National Grid
Action Officer:			

When

How

Action 6.2.6: Assess the opportunity, costs, and benefits of deploying resilient microgrids at critical infrastructure to maintain services during power outages or severe weather events

OPR	OER	**OCR**	DPUC
Responsibility:	Marion Gold		National Grid
Action Officer:	Danny Musher		

When OER has applied for CDBG-DR funding, funding award anticipated during summer, two years to complete work

How Will contract with a qualified vendor to do the analysis and work with key stakeholders

Objective 6.3 ***Develop and implement adaptation strategies to address priority public health impacts***

Action 6.3.1: Complete *Climate and Health Profile* , identifying priority health impacts from climate change and recommending adaptation strategies

OPR	DOH	**OCR**	DEM, DEA, DOT
Responsibility:	Dr. Fine		Brown U. School of Public Health
Action Officer:	Julia Gold		

When Sept. 2014

How

Action 6.3.2: Implement recommended strategies produced through the housing vulnerability assessment (Action 3.1.8)

OPR	Div. of Planning/OHCD	**OCR**	RIEMA, DOH, BCC, CRMC
Responsibility:			
Action Officer:			

When TBD

How TBD

Objective 6.4 ***Develop and implement adaptation strategies to reduce economic impacts, increase resilience and help create new opportunities***

Action 6.4.1: Adopt Insurance Institute for Business & Home Safety (IBHS) "Fortified for Safer Business" and "Fortified Homes" programs within State Building Code. (Insurance premium reductions for IHBS-certified structures provide incentives to create more resilient structures).

OPR BCC **OCR** CRMC, , Div. of Planning, RIEMA
Responsibility: CommerceRI
Action Officer: General Assembly

When TBD

How TBD

Action 6.4.2: Conduct public outreach and education, as part of larger resiliency education campaign at community level, about need to raise "freeboard" from 1' to 2' or 3'

OPR RIEMA/BCC **OCR** BCC, CRMC,
Responsibility: CommerceRI
Action Officer:

When
How

Action 6.4.3: Build capacity for waterfront business sectors, including marine trades, building and real estate sectors, to incorporate impacts of climate change in business strategies, and provide guidance for hazard mitigation and adaptation.

OPR	URI/CI	**OCR**	CRMC, BCC
Responsibility:			CommerceRI
Action Officer:			URI CRC, GSO, CELS, RIGS

When

How Build on current research and community engagement involving the marine trades, ports, BeachSAMP, etc.

Action 6.4.4: Develop public-private partnership to create buy-out program, targeting most vulnerable areas and leveraging funding from a variety of sources

OPR	RIEMA	**OCR**	CommerceRI
Responsibility:			BCC, CRMC, Div. of Planning
Action Officer:			

When

How

See also Action 2.5.1

Objective 6.5 ***Develop mechanisms by which municipalities can begin to adapt their land use patterns to better accommodate climate change impacts***

Action 6.5.1: Conduct feasibility assessment of the potential for a statewide transfer of development rights program that would target vulnerable areas as "sending zones."

OPR	Div. of Planning	**OCR**	CRMC, DEM, RIEMA
Responsibility:	Kevin Flynn		
Action Officer:			

When FY15

How Evaluate previous analysis; consider asking universities for assistance (Brown, RWU Law, URI)

Action 6.5.2: Develop a statewide coastal wetland monitoring, protection and restoration strategy to help lower the rate at which habitat, ecosystem resilience and shoreline protection are being lost, and to develop effective mitigation and adaptation strategies.

OPR	CRMC	**OCR**	DEM, Div. of Planning
Responsibility:	Grover Fugate		NBNERR, URI
Action Officer:			STB, TNC
When	FY15		
How			

Action 6.5.3: Adopt Sea Level Affecting Marshes Model (SLAMM) data and projections as planning and decision-making support tool in statewide coastal wetland monitoring, protection and restoration strategy

OPR	CRMC	**OCR**	DEM, NBNERR
Responsibility:	Grover Fugate		
Action Officer:			
When	FY15		
How	Rule-making		

Action 6.5.4: Convene short term working group to develop options for long term, sustainable funding of coastal wetlands protection and restoration, including, but not limited to legislation

OPR	Div. of Planning?	**OCR**	CRMC, DEM, RIEMA
Responsibility:			NBEP, NBNERR, URI
Action Officer:			Federal and state legislators?
			Private sector? *See Action 2.5.1*
When	FY15		
How			

Objective 6.6 ***Develop and implement adaptation strategies to reduce impacts to natural resources, protect and where possible improve ecosystem resilience, and adapt resource management policies and programs to changing trends and conditions***

Actions: To be developed with CRMC, DEM, DOH, URI et al.

Notes (based on public comments): address inland resources, as well, not just coastal ones; include protection/restoration of freshwater wetlands, stream flow, riparian buffers, etc.; incorporate strategies into local comprehensive plans, state wildlife action plan, bonds; include municipal and private land trusts and watershed organizations in implementation

GOAL 7: COORDINATE SCIENTIFIC AND TECHNICAL SUPPORT

See also Objective 1.3

Objective 7.1 ***Integrate, coordinate and/or network data collection, analysis, modeling and mapping, combining public and private sector expertise, including academic institutions, into one program that provides consistent, reliable support for policy development, decision-making and projects***

Action 7.1.1: Establish a Science and Technical Advisory and Coordinating Committee to:
(1) keep the Executive Climate Change Council or its successor coordinating council abreast of important developments in scientific and/or technical information relating to climate change and resiliency;
(2) explore and provide advice regarding opportunities to provide timely support for key policy and management decisions by aligning academic research around issues of resiliency;
(3) inventory the scientific and technical work being done by public and private sector entities and evaluate options to coordinate or integrate/consolidate such work in order to achieve greater efficiency, save resources, provide better services, etc.;

(4) assist the council, upon request, by providing scientific and technical information and advice pertaining to matters that come before the council;
(5) make recommendations and provide advice regarding priorities from its perspective, for example, regarding research needs, or planning thresholds.

OPR Responsibility: Action Officer:	Governor's Office/DOA	**OCR**	CRMC, DEM, Div. of Planning, DOH, DOT, OER CommerceRI, BRWCT, NBEP URI/CI, CRC, EDC; RISG; Brown U.; RWU Municipal, private sector partners, users?
When			
How	*Consider new role for Coordination Team, perhaps joining Div. of Planning?*		
Note:	*Include or consider role of State Climatologist*		

Objective 7.2 ***Ensure convenient and reliable access to the best available scientific and technical information for state and local planners, decision-makers, researchers, students, stakeholders***

Action: Same as 2.1.1 and 2.1.2

Objective 7.3 ***Provide clear guidance and standards for use of scientific and technical information in planning, decision-making, applications, etc.***

Action 7.3.1:

OPR	Div. of Planning	**OCR**	CRMC, DEM, RIEMA
Responsibility:			
Action Officer:			URI

When

How

Objective 7.4 ***Improve data collection, monitoring to enhance understanding of impacts of climate change on natural resources***

Action 7.4.1: Strengthen and expand existing collaborative monitoring program

OPR	DEM	**OCR**	BRWCT, NBEP,
Responsibility:	Janet Coit		URI, Brown U., RWU
Action Officer:	Sue Kiernan?/Ames Colt?		TNC, STB, ASRI

When

How Convene joint meeting of Science and Technical Advisory and Coordination Committee (STACC, Action 6.1.1) and Environmental Monitoring Collaborative (EMC) to develop new list of climate change related key indicators for which baseline monitoring needs to be conducted, and to evaluate capacity of EMC and its partners to conduct such monitoring.

Note, for example, existing monitoring, mapping and GIS capacity and programs at URI that could/should be used, leveraged and supported.

Note: include State Climatologist

Action 7.4.2: Coordinate data collection and analysis to improve understanding of the relationship between climate-related changes in the ecosystem and the abundance and distribution of priority fish species (such as lobster, winter flounder, summer flounder, squid, and black sea bass).

OPR	DEM/STACC	**OCR**	CRMC
Responsibility:	Janet Coit		URI/CELS, GSO
Action Officer:	Mark Gibson?		NOAA, USFWS, EPA
			ASMFC, other reg'l councils
When	TBD		
How	Coordinate through STACC?		

Action 7.4.3: Improve understanding of climate-related impacts on key habitats from coastal watersheds to open ocean, emphasizing those habits used by managed species as juvenile nursery or adult spawning areas

OPR	DEM/STACC	**OCR**	CRMC
Responsibility:	Janet Coit		URI
Action Officer:	Mark Gibson?		NOAA, USFWS, EPA
			ASMFC, other reg'l councils
When	TBD		
How	Coordinate through STACC?		

Action 7.4.4: Develop a series of key indicators that can be monitored annually with less resources than are needed for operational models to track current changes and provide managers with early warnings of future changes such as changes in the distribution and abundance of important marine resources

OPR	DEM/STACC	**OCR**	CRMC
Responsibility:	Janet Coit		URI
Action Officer:	Mark Gibson?		NOAA, USFWS, EPA
			ASMFC, other reg'l councils
When	TBD		
How	Coordinate through STACC? Combine with Action 7.3.1?		

GOAL 8: COMMUNICATE EFFECTIVELY

Objective 8.1 ***Provide easy access to up-to-date, reliable information about climate change, mitigation, adaptation, resilience, who is doing what, how to get involved, get assistance, etc.***

Action 8.1.1: Develop web site in partnership with nonprofit private sector that aggregates and/or links to best available information about climate change, mitigation, adaptation, resilience, best practices, etc.; and that provides forum for interactive communication (blogs, town meetings, etc.)

OPR		**OCR**	
Responsibility:			URI/CI, CRC; RISG
Action Officer:			

When

How *Combine with Actions above that propose development of a new web site, or adaptation of/networking with existing web sites*

Objective 8.2 ***Develop a partnership-based, interactive communications program through which citizens, businesses, planners and decision-makers exchange information and ideas about the challenges and opportunities associated with climate change and resilience***

Actions: *To be developed by EC3 subcommittee with working group by 8/1/2014*

Objective 8.3 ***Conduct and support outreach, public education and training programs in multiple sectors, at multiple levels***

Action 8.3.1: Develop program that can be delivered in modules, and tailored to different audiences, as part of state outreach initiative or in response to requests from communities, businesses, organizations

OPR	RIEMA	**OCR**	Div. of Planning, CRMC, DEM, OER
Responsibility:	Jamia McDonald		CommerceRI
Action Officer:	TBD		URI/CI, CRC; RISG; NBNERR
			GrowSmart RI

When MOA between key agencies conducting or planning outreach to muncipalities, businesses, etc. by ?
Interagency planning team established by ? Program modules, formats defined by ?
Partners, resources identified by ?

How Formal steering group of agencies, providers and user group reps. (Note possibility of building on work of NBNERR Coastal Training Program and its steering committee.) Strategic plan. Contract with institution or nonprofit?

APPENDIX 1

Executive Order 14-01

State of Rhode Island and Providence Plantations
State House, Room 224
Providence, Rhode Island 02903
401-222-2080

Lincoln D. Chafee
Governor

EXECUTIVE ORDER

14-01

February 21, 2014

RHODE ISLAND EXECUTIVE CLIMATE CHANGE COUNCIL

WHEREAS, there is strong evidence and scientific consensus that manmade greenhouse gases are causing an overall rise in global temperatures that is predicted to have profound effects on global climate, weather patterns and ocean conditions, including higher peak summer temperatures, rising sea levels, warmer and wetter winters, ocean acidification, increased periods of drought, increased coastal erosion, and increased frequency of severe precipitation events and flooding; and

WHEREAS, Rhode Island is already seeing the impacts of climate change—

- since 1930, sea level has risen nearly 10 inches at the Newport tide station and is projected to rise at least three feet by 2100
- since the 1960s, the surface temperature of Narragansett Bay has risen four degrees, and the number of days over 90 degrees has doubled
- inland areas that used to be flooded only on rare occasions are now regularly flooded during monthly high tides and extreme precipitation events
- coastal storm surges are now impacting more properties because rising sea levels allow flooding to reach farther inland, exposing residential and commercial properties and public infrastructure to more damage; and

WHEREAS, Rhode Island is engaged in international, federal, and regional efforts to reduce emissions, prepare for climate change, and facilitate international coordination in addressing climate change, including the President's Climate Action Plan, the New England Governors and Eastern Canadian Premiers Climate Change Action Plan, and the Regional Greenhouse Gas Initiative; and

WHEREAS, it is in the best interests of the state, its businesses, and its residents to lead by example with a comprehensive approach to reduce Rhode Island's greenhouse gas emissions and prepare for the impending impacts of climate change; and

WHEREAS, by acting boldly and acting now, Rhode Island will position itself as a national leader in climate adaptation to strengthen its resilience and support its long-term economic well-being.

NOW, THEREFORE, I, Lincoln D. Chafee, by the authority vested in me as the Governor of the State of Rhode Island and Providence Plantations, do hereby order as follows:

- There shall be established a Rhode Island Executive Climate Change Council (the "Council").

- The Council members shall include:
  - The Director of the Department of Environmental Management, who shall chair the Council;
  - The Executive Director of the Coastal Resources Management Council;
  - The Director of the Department of Administration;
  - The Director of the Department of Transportation;
  - The Director of the Department of Health;
  - The Executive Director of the Emergency Management Agency;
  - The Commissioner of the Office of Energy Resources;
  - The Director of the Division of Planning; and
  - The Executive Director of the Rhode Island Commerce Corporation.

- The Council shall be advisory to the Governor and shall have the following duties:
  - Assess, integrate, and coordinate climate change efforts throughout state agencies to reduce emissions, strengthen the resilience of communities, and prepare for the effects of climate change;
  - Advance the state's understanding of the effects of climate change including, but not limited to, sea level rise, coastal and shoreline changes, severe weather events, critical infrastructure vulnerability, and ecosystem, economic, and health impacts;
  - Identify strategies to prepare for these effects and communicate them to Rhode Islanders;
  - Work with municipalities to support the development of sustainable and resilient communities;
  - Identify and leverage federal, state, and private funding opportunities for emission reduction and climate change preparedness work in Rhode Island;

- Advise the Governor, the General Assembly, and the public on ways to ensure that Rhode Island continues to be a national leader in developing and implementing strategies that effectively address the challenges of climate change; and
- Work with other New England states to explore areas of mutual interest to achieve common goals.
-

- To support the Council's work, state agencies shall:
  - Assist in implementing this Order;
  - Develop short- and long-term greenhouse gas emission reduction strategies and track the progress of these strategies;
  - Purchase alternative fuel, hybrid, and electric vehicles that produce lower total emissions of greenhouse gases, and develop programs to encourage state employees to reduce their vehicle miles and use sustainable transportation alternatives (including public transit systems);
  - Implement programs to achieve energy savings in state and municipal buildings to reduce greenhouse gases, reduce expenditures on energy, and stimulate economic and job development;
  - Increase the deployment of in-state generation of renewable energy and energy efficiency;
  - Support efforts to expand Rhode Island's green economy and develop green infrastructure;
  - Assess the vulnerability of infrastructure (such as roads and bridges, dams, and wastewater and drinking water treatment facilities) to impacts of climate change and recommend strategies to protect these assets;
  - Work with relevant academic institutions and federal agencies to assess the threats of sea level rise, erosion and storm surge and communicate these assessments and threats, along with potential tools to address them, to state agencies and affected communities;
  - Develop plans, policies, and solutions based on the latest science to ensure the state continues to have a vibrant coastal economy, including protection of critical infrastructure;
  - Develop a climate and health profile report that documents the range of health impacts associated with climate change and identifies the most vulnerable; and
  - Encourage municipalities to incorporate climate change adaptation into local hazard mitigation plans and, when feasible, into hazard mitigation projects.

- The Council shall provide brief monthly reports to the Governor with a formal report including findings, recommendations, and a status update on achieving the objectives of this Order by May 1, 2014, with subsequent reports due by May 1 of each year thereafter.

This Order shall take effect immediately.

So ordered:

Lincoln D. Chafee

APPENDIX 2

Agency Programs

INVENTORY OF RI STATE AGENCY PROGRAMS & ACTIVITIES RELATING TO CLIMATE CHANGE
DRAFT 4/1/14

XXX = mitigation
XXX = adaptation

acronyms explained on last page

AGENCY	Related Mission/Goals	Planning	Science & Mapping	Regulatory	Assistance	Outreach/ Communications	Projects/ Leading by Example	Coordinates with	Funding Sources
COMMERCE	●identify and take advantage of opportunities to meet both clean energy and economic growth objectives ●program funds into projects that increase renewable energy on the grid and lower ratepayers' electric costs				●Renewable Energy Fund -grants -low interest loans	●(with OER) statewide communication and marketing plan for state energy programs		OER	●RGGI ●ARRA
CRMC	● manage and plan for the preservation, protection, development, and, where possible, restoration of the coastal resources of the state	● CRMP Section 145 Climate Change and Sea Level rise (Jan 2008) ●Ocean SAMP (2010) ●Shoreline Change (Beach) SAMP (projected 3-4 years) ● Coastal Wetland Restoration Strategy (2015) ● Coastal and Estuarine Land Conservation Plan (CELCP)	●CRMP, SAMPs-best available science on historic and projected rates of SLR, impacts on land and marine environments ●SLAMM simulate 1, 3 and 5 feet SLR scenarios; ID impact areas, develop mitigation and adaptation strategies with resource managers and mucipalities	● LID requirement for projects within Metro Bay SAMP started in 2006 ● LID requirement for all projects subject to stormwater management requirements - CRMP Section 300.6 (2010) ● Amendments to CRMP Section 145 (2013) ● Amendments to CRMP Section 210.3 - SLR findings and policy for coastal wetlands (2012)	● Coastal and Estuarine Land Conservation Program (CELCP) grants for conservation ● Funding and technical assistance for state and municipal shoreline adaptation projects ● Coastal and Estuarine Habitat Restoration Trust Fund for habitat restoration & adaptation projects ● Site consultations on shoreline management practices. With RI Sea Grant offer planning and engineering consultations for catagoris of businesses and muncipalites on climate change, surge and erosion. ● Local comprehensive plan review for hazard and climate change elements through SPP ● RI State Hazard Mitigation Plan (hazards and climate change elements)	● RI Flood Awareness Climate Change Taskforce ●RI StormSmart Coasts ● Beach SAMP public meetings ● Beach SAMP Coalition of Communitiy Leaders meetings ● Publication, "Building Capacity to Adapt to Climate Change Through Local Conservation Efforts" (2013) ● State agency SLR modeling coordination workgroup	● Sea Level Rise map viewer w/ URI EDC ● pilot projects to assess SLR impacts with N. Kingstown and Newport ● SLAMM project to assess SLR impacts statewide to coastal wetlands (21 communities) ● Shoreline adaptation projects: City Park in Warwick, Byway road in Barrington, Barrington Beach, Stillhouse Cove in Cranston, Pettee Ave. in North Kingstown, multiple "end-of-road" projects in Warwick (in progress) ● Ninigret salt marsh adaptation project (proposal for DOI Sandy Resiliency funding)	● DEM ● DOA Statewide Planning program ● State Building Commissioner ● RIDOT ● NBEP ● NBNERR ● URI CRC, EDC ● RI Sea Grant ● Save The Bay ● The Nature Conservancy ● US EPA, Army Corps ● NESCAUM ● NROC ● Coastal Community Advocates ● Fed Highwy Admin ● Fed Railroad Admin NEC Futures Initiative ● SNECWRP ● US Fish & Wildlife Service	● NOAA ● OSPAR ● ARRA (NOAA) ● State budget appropriations

DEM	●protect natural resources, public health, safety ●reduce greenhouse gas (GHG) emissions	●Comprehensive Wldlife Conservation Strategy ●State Forest Resource Assessment ●RFP for vulnerability assessments of wastewater treatment and major collection facilities (with BRWCT)	●Statewide and regional monitoring/data collection on CC impacts: - wildlife population trends - abundance/distribution of fisheries resources - physical, chemical and biological characteristics of freshwater streams ●estuarine resources, incl. saltmarshes (thru NBNERR) ●GHG Inventory	●revised design standards for stormwater transportation and retention system ●LID requirement in stormwater manual ●increased setbacks for on-site wastewater treatment systems ●consider increased bridge height in applications for repair projects ●RGGI-reducing GHG emissions from power plants ●GHG standard for motor vehicles 2009- ●participating in national Renewable Fuel Standard program ●ZEV production mandate	●production and promotion of locally grown/harvested food ●risk assessment for Cranston (thru NBNERR, NE Climate Change Adaptation Project) ●Climate Change Vulnerability Assessment Tool for Coastal Habitats (NBNERR) ●Coastal Training Program (NBNERR) ●America the Beautiful grants for urban tree planting ●grants for green storm water infrastructure, BMPs, fllood abatement, absorption and aquatic habitat restoration projects	●Comprehensive Wldlife Conservation Strategy ●outreach to design engineers and installers of onsite wastewater systems ●NBNERR Coastal Training Program	●wind turbines and solar systames installed at state parks ●new (re)development projects designed to LEED standards ●acquisition of vulnerable habitat	●Northeastern and Mid-Atlantic States (RGGI, TCI, NESCAUM, NROC) ●OER	●USEPA ●State budget appropriations ●RGGI

AGENCY	Related Mission/Goals	Planning	Science & Mapping	Regulatory	Assistance	Outreach/ Communications	Projects/ Leading by Example	Coordinates with	Funding Sources
DOA	*See also OER, OHCD and Statewide Planning*		-				●energy efficiency in state fleet: all new purchases either electric or hybrid (unless eligible for waiver) ●energy efficiency & renewable energy in state buildings: -Green Buildings Act -co-generation @ Pastore complex		
DOA Office of Energy Resources	●lead RI to a secure, cost-effective and sustainable energy future ●reduce GHG emissions by 45% by 2035 while producing net economic and increasing sector fuel diversity ●on track to reduce GHG emissions by 80% by 2050	●regional planning for energy supply and demand ●State Energy Plan (economy-wide energy goals and targets) ●Energy Assurance (fuel supply and power outages during storms) ●Least-Cost Procurement (energy efficiency plans) planning strategic ●Distributed Generation (local renewable energy plans)	●Scenario modeling for State Energy Plan ●Research and mapping related to on-shore renewable energy siting ●modeling for regional energy system (thru NESCOE)	●OER Commissioner on Booard of RGGI, co-manager of NESCOE, Executive Director of EERMC ●develop annual, 3-yr energy efficiency plans ●recommend standards for system reliability plans ●develop ceiling prices for DC generation contracts Distributed Generation Program ●intervene with PUC in support of state energy policies ●working with others towards - regulatory rate reform - improving building codes, standards - addressing gas leaks	●technical and funding assistance (RGGI $) to municipalities, state and other entities for energy efficiency and renewable energy planning and projects ●work with utility to ensure ratepayer funds for energy efficiency are deployed effectively to assist all RI energy users	●coordinating with EERMC, CommerceRI and National Grid on integrated marketing plan for clean energy offerings to RI energy users in all sectors ●exploring value of statewide branding campaign for energy efficiency and clean energy programs	●RI Public Energy Partnership/ State Better Building Challenge: reduce energy use by 20% in state and municipal buildings, water supplies and schools ●EV Everywhere: partnering with DOT to expand use of electric vehicles; OER installed 50 charging stations throughout RI ●working with DOA to transition state fleet and reduce VMT ●working with DEM on Zero Emission Vehicles (ZEV) ●Renewable Thermal Project to reduce emissions from the thermal sector ●SRP/DG Project with National grid to integrate renewable energy with energy efficiency and demand response to reduce need for expensive transmission upgrades	●US DOE State Energy Advisory Board ●New England States, NESCOE, RGGI Inc., TCI ●ISO New England ●Building Code Commission, CommerceRI, DEM, DG Board, DOT, DHS, DPUC, EERMC, PUC ●energy, power and fuel businesses; electirc and gas distribution companies; energy users and customers	●System Benefits Charge ●RGGI ●DOE SEP ●DOE competive funding
DOA Office of Housing and Community Development	Administer Community Development Block Grant, Disaster Recovery (CDBG-DR) Program	website, Hurricane Sandy Action Plan at http://www.planning.ri.gov/community/development/disaster/			disaster recovery grants	website, Hurricane Sandy Action Plan at http://www.planning.ri.gov/community/development/disaster/	All Hurricane Sandy public facilities and infrastructure projects subject to climate change "risk assessment" - key hazards are sea level rise and flooding	●DEM, CRMC, SPP, RIEMA, DOT, Commerce ● HUD, FEMA, EPA, FWS, USACE	HUD

AGENCY	Related Mission/Goals	Planning	Science & Mapping	Regulatory	Assistance	Outreach/ Communications	Projects/ Leading by Example	Coordinates with	Funding Sources
DOA Statewide Planning Program	●To prepare, adopt, and amend strategic plans for the physical, economic, and social development of the state and to recommend these to the governor, the general assembly, and all others concerned (RIGL 42-11-10).	●Currently working to integrate climate change considerations into the Rail, Economic Development, Housing, Energy, Solid Waste and Watershed elements of the State Guide Plan. ●Expecting to initiate the same with the freight and historic preservation elements in FY15.	●2012? Acquisition of Statewide Digital Elevation Data (complete USDOT - $200 K) ●2014 production of statewide sea level rise inundation mapping data and web server (nearly complete).	●2011 Revised municipal comprehensive plan requirements ●2012 Legislative proposal to provide exemption from zoning height limits for freeboard increases (failed).	●N Kingstown- Pilot SLR Vulnerability Asessment ●N Kings-town Com-prehenive Plan Climate Change Element Pilot (ongoing -$100,000) ●NK Economic Impacts Study (Ongoing, EPA -$60K) ●Transportation Asset Vulnerability Assessment (ongoing). ●Project vulnerabilty scoring matrix for disater relief funding proposals ●Preliminary Wind Energy Siting Guidelines ●Co-chair of Joint Legislative Climate Chnge Commission Infrastructure and Built Environment Group.	●Draft cguidance for integrating climate change considerations into municipal comprehensive plans (ongoing) ●Produced first generation of RI EC3 website	All	●BRWWCT, Building Code Commission, CRMC, DEM, DOT, EMA, OER, OHCD, RIPTA, WRB ●US EPA. DOT ● URI - EDC, CRC/RI Sea Grant, CRI ●RI APA, RIBA ●The Nature Conservancy (TNC)	●State General Revenues ●US FHWA, FTA, EPA, HUD ●TNC
DOH	●Protect public health & safety, prevent disease ●Respond to Climate Change challenges thru CC & Health Program: -heat - storms, flooding, SLR -vector-borne diseases - food, drinking water - amb. water quality -air quality	●hazard planning & training ●drinking water supply vulnerability project ●elderly emergency response	●hyperthermia surveillance ●literature review re CC impacts on mental health, best practices ●amb. water surveillance/ analysis of Watershed Watch data ●Climate & Health Profile Report (by 9/14): measurable impacts ●cyanobacteria surveillance ●pollen surveillance ●mapping vulnerable populations			●hyperthermia education for elderly ●hazard planning and training for long-term care facilities ●workshop for state agency workers (ACI, DEM, DOT) ●Lyme Communication Campaign ●vibrio education ●shellfish guidance and education ●rec facilities guidance ●"Faces of Climate	●green stormwater infrastructure projects (with others)	●hospitals, licensed care facilities, trade assocns ●DEA, DEM, EMA, OHCD ●City of Providence ●Brown, URI ●Providence Plan	●CDBG-DR

DOT	●help reduce GHG emissions from transportation sector (significant contributor) ●provide, maintain, protect, repair transportation infrastructure ●respond during and sfter storms	●State Rail Plan (with Statewide Planning) ●Transportation Vulnerability Assessment (N. and S. Kingstown) ●Identification of emergency evacuation routes (w/ RIEMA and RISP) ●Extreme weather event strike teams	●LIDAR mapping ●I-95 outfall mapping @ Pawtuxet River crossing ●1-295 catch basin cleaning and inspection (includes GPS location of all catch basins and outfalls within project limits) ●GIS mapping of high-priority traffic signal systems; to be overlaid with NGrid feeder systems to determine potential outage times and impact to travel and corridors ●Automated bridge scour warning system using USGS gauge readings	●Physical Alteration Permits	●Post disaster recovery assistance to municipalities ●state disaster debris plan with RI National Guard ●Availability of federal-aid system road classification on website (to assist municipalities in accessing federal funds)	●Commuter Resource (with RIPTA) ●Availability of federal-aid system road classification on website (to assist municipalities in accessing federal funds) ●Traffic management center/variable message signs	●expanding commuter rail service (S. County) ●improving pedestrian access to Prov.station ●electric vehicle charging stations ●bycicle path network (50+ miles),ash. bridge ●congestion relief projects ●highway lighting curfews ●LED lighting ●Complete Streets (bicycle & pedestrian accommodation) ●Diesel Retrofit/emission reduction study and resulting specifications ●RIPTA signal priority project ●Environmental Management System implementation	●Climate Change Comm. ●Statewide Planning, OER (State Energy Plan) ●CRMC (Shoreline SAMP) ●LIDAR mapping ●interstate (Transportation Climate Initiative, ICNET) ●national (AASHTO) ●National Grid, RISP, RIEMA and RING for storm strike teams (tree trimming, etc.) ●RIDOH (training employees about insect borne illnesses and sun protection)	FHWA FTA FRA State match fund

AGENCY	Related Mission/Goals	Planning	Science & Mapping	Regulatory	Assistance	Outreach/ Communications	Projects/ Leading by Example	Coordinates with	Funding Sources
EMA	●state & local emerg. preparedness, response & recovery ●administers National Flood Insurance Program (NFIP) and Hazard Mitigation Assistance Program on behalf of FEMA.	●State Hazard Mitigation Plan (April 2014 Update) ●including mitigation and adaptation in local plans	●floodplain (coastal and riverine) mapping	●local floodplain ordinances ●building code regs for floodplain development	●annual grants ●post-disaster grants ●incorporating mitigation into recovery projects ●NFIP Community Rating System (CRS) ●NFIP general technical assistance	●web site ●workshops ●design professionals: incorporate best practices and adaptation ●EMAC sub-groups: State Interagency Hazard Mitigation Committee/ Flood Mitigation Working Group ●CRS User Group	●works with DOA to ensure best practices and mitigation included in capital improvement projects and comprehensive planning ●integration into State and local hazard mitigation plans	●US ACE, EPA, FEMA, NRCS, USGS) ●CRMC, DEM, DOA/Planning, DOH, DOT, Building Code Comm. ●Municipalities ●URI/CRC, URI/EDC ●other universities ●national associations ●professionals ●NGOs	FEMA

APA	American Planning Association
BMPs	Best Management Practices (including stormwater)
CDBG	Community Development Block Grant
CC	Climate Change
CFS	Clean Fuel Standard
CRI	Coastal Resources Institute
CRC	Coasta Resources Center @ URI
CRS	Community Rating System (see EMA)
CRMC	Coastal Resources Management Council
CRMP	Coastal Resources Management Plan (CRMC)
DEM	Dept. of Environmental Management
DG	Distributed Generation
DOA	Dept. of Adminstration
DOT	Dept. of Transportation
EDC	Environmental Data Center @ URI
EERMC	Energy Efficiency and Resource Management Council
EMA	Emergency Management Agancy
EMAC	Emergency Management Advisory Council
GHG	Greenhouse Gas(es)
LID	Low-Impact Design
LIDAR	Remote sensing technology used in high-resolution mapping
NBNERR	Narragansett Bay National Estuarine Research Reserve
NESCAUM	Northeast States for Coordinated Air Use management
NESCOE	New England States Committee of Electricity
NFIP	National Flood Insurance Prtogram
NROC	Northeast Regional Ocean Council
OER	Office of Energy Resources
OHCD	Office of Housing and Community Development
RFS	Renewable Fuel Standard
RGGI	Regional Greenhouse Gas Initiative, northeast interstate, market-based
RIBA	RI Builders Association
RIFACCT	RI Flood Awareness Climate Change Taskforce
SAMP	Special Area Management Plan (CRMC)
SLAMM	Sea Level Affecting Marshes Model (CRMC, DEM, et al.)
SLR	Sea Level Rise
TCI	
VMT	Vehicle Miles Traveled

APPENDIX 3

Adaptation Options

Appendix 3
Adaptation Options for Drinking Water Utilities

The U.S. Environmental Protection Agency's *Adaptation Strategies Guide for Water Utilities* was identified in the literature review as the most comprehensive resource for drinking water utility adaptation strategies (2012). The Guide provides adaptation options for drinking water, wastewater, and stormwater utilities based on region and projected climate impacts. The three categories of adaptation options included are:

- **Planning strategies:** which include use of models, research, training, supply and demand planning, natural resource management, land use planning, and collaboration at watershed and community scales;
- **Operational strategies:** which include efficiency improvements, monitoring, inspections, conservation, demand management, flexible operations, and sustainable strategies; and
- **Capital / infrastructure strategies:** which include construction, water resource diversification, repairs and retrofits, upgrades, phased construction, new technology adoption, and green infrastructure.

Adaptation options are grouped according to impact (drought, water quality degradation, flooding, ecosystem changes, and service demand and use) and indicate relative costs are also provided for each option. The table below lists the key adaptation options identified in the Guide for each of the climate hazards.

Drought	
Planning Strategies	
Develop models to understand potential water quality changes (e.g., increased turbidity) and costs of resultant changes in treatment.	$
Use hydrologic models to project runoff and incorporate model results during water supply planning.	$
Conduct training for personnel in climate change impacts and adaptation strategies.	$
Participate in community planning and regional collaborations related to climate change adaptation.	$-$$
Operational Strategies	
Finance and facilitate systems to recycle water, including use of greywater in homes and businesses.	$$-$$$
Practice conjunctive use (i.e., optimal use of surface water and groundwater).	$$-$$$
Reduce agricultural and irrigation water demand by working with irrigators to install advanced equipment (e.g., drip or other micro-irrigation systems with weather-linked controls).	$$-$$$
Practice demand management through communication to public on water conservation actions.	$
Practice water conservation and demand management through water metering, rebates for water conserving appliances/toilets and/or rainwater harvesting tanks.	$-$$
Capital / Infrastructure Strategies	
Expand current resources by developing regional water connections to allow for water trading in times of service disruption or shortage.	$$-$$$
Increase water storage capacity, including silt removal to expand capacity at existing reservoirs and construction of new reservoirs and/or dams.	$$-$$$
Acquire and manage ecosystems, such as forested watersheds, vegetation strips, and wetlands, to regulate runoff.	$$$
Build infrastructure needed for aquifer storage and recovery, (either for seasonal storage or longer-term water banking), (e.g., recharge canals, recovery wells).	$$$
Diversify options to complement current water supply, including recycled water, desalination, conjunctive use, and stormwater capture.	$$$
Retrofit intakes to accommodate decreased flow in source waters.	$$-$$$
Build or expand infrastructure to support conjunctive use.	$$$

Water Quality Degradation	
Planning Strategies	
Develop models to understand potential changes (e.g., increased turbidity, sea level rise, saltwater intrusion) and costs of impacts.	**$**
Conduct training for personnel in climate change impacts and adaptation strategies.	**$**
Participate in community planning and regional collaborations related to climate change adaptation.	**$-$$**
Develop emergency response plans to deal with the relevant natural disasters and include stakeholder engagement and communication.	**$**
Operational Strategies	
Practice fire management plans in the watershed, such as mechanical thinning, weed control, selective harvesting, controlled burns and creation of fire breaks.	**$-$$**
Monitor vegetation changes in watersheds.	**$**
Monitor flood events and drivers that may impact flood and water quality models (e.g., precipitation, catchment runoff).	**$**
Manage reservoir water quality by investing in practices such as lake aeration to minimize algal blooms due to higher temperatures.	**$$**
Monitor current weather conditions, including precipitation and temperature.	**$**
Finance and facilitate systems to recycle water to decrease discharges to receiving waters.	**$$-$$$**
Monitor surface water conditions, including water quality in receiving bodies.	**$**
Finance and facilitate systems to recycle water, including use of greywater in homes and businesses.	**$$-$$$**
Reduce agricultural and irrigation water demand by working with irrigators to install advanced equipment (e.g., drip or other micro-irrigation systems with weather-linked controls).	**$$-$$$**
Practice water conservation and demand management through water metering, rebates for water conserving appliances/toilets and/or rainwater harvesting tanks.	**$-$$**
Capital / Infrastructure Strategies	
Diversify options to complement current water supply, including recycled water, desalination, conjunctive use, and stormwater capture.	**$$$**
Increase treatment capabilities and capacities to address decreased water quality due to saltwater	**$$$**
Implement barriers and aquifer recharge to limit effects of saltwater intrusion. Consider use of reclaimed water to create saltwater intrusion barriers.	**$$$**
Install low-head dams to separate saltwater wedge from intakes upstream in the freshwater pool.	**$$$**
Increase water storage capacity, including silt removal to expand capacity at existing reservoirs and construction of new reservoirs and/or dams.	**$$-$$$**
Expand current resources by developing regional water connections to allow for water trading in times of service disruption or shortage.	**$$-$$$**
Implement watershed management practices to limit pollutant runoff to reservoirs.$$	
Increase treatment capabilities to address water quality changes (e.g., increased turbidity).	**$$$**
Expand current resources by developing regional water connections to allow for water trading in times of service disruption or shortage.	**$$-$$$**
Implement or retrofit source control measures that address altered influent flow and quality at treatment plants.	**$$-$$$**

Flooding	
Planning Strategies	
Integrate flood management and modeling into land use planning.	$
Implement policies and procedures for post-flood repairs.	$
Participate in community planning and regional collaborations related to climate change adaptation.	$-$$
Integrate climate-related risks into capital improvement plans, including flood-proofing options to build facility resilience against current and potential future risks.	$
Identify and protect vulnerable facilities, including developing operational strategies that isolate these facilities and re-route flows.	$-$$
Establish mutual aid agreements with neighboring utilities.	$
Ensure that emergency response plans deal with flooding contingencies and include stakeholder engagement and communication.	$
Conduct training for personnel in climate change impacts and adaptation.	$
Adopt insurance mechanisms and other financial instruments, such as catastrophe bonds, to protect against financial losses associated with infrastructure losses.	$
Plan for alternative power supplies to support operations in case of loss of power.	$
Expand current resources by developing regional water connections to allow for water trading in times of service disruption or shortage.	$$-$$$
Develop models to understand potential water quality changes (e.g., increased turbidity) and costs of resultant changes in treatment.	$
Operational Strategies	
Monitor and inspect the integrity of existing infrastructure.	$-$$
Monitor surface water conditions, including streamflow and water quality.	$
Monitor flood events and drivers that may impact flood and water quality models (e.g., precipitation, catchment runoff).	$
Capital / Infrastructure Strategies	
Acquire and manage coastal ecosystems, such as coastal wetlands, to attenuate storm surge and reduce coastal flooding ("soft protection").	$$$
Increase treatment capabilities to address water quality changes (e.g., increased turbidity)	$$$
Relocate facilities (e.g., treatment plants) to higher ground.	$$$
Establish alternative power supplies, potentially through on-site generation, to support operations in case of loss of power.	$-$$
Expand current resources by developing regional water connections to allow for water trading in times of service disruption or shortage.	$$-$$$
Diversify options to complement current water supply, including recycled water, desalination, conjunctive use, and stormwater capture.	$$$
Build flood barriers, sea walls, levees, and related structures to protect infrastructure.	$$-$$$
Set aside land to support future flood-proofing needs (e.g., berms, dikes, and retractable gates).	$$$
Implement or retrofit source control measures that address altered influent flow and quality at treatment plants.	$$-$$$
Increase water storage capacity, including silt removal to expand capacity at existing reservoirs and construction of new reservoirs and/or dams.	$$-$$$

Ecosystem Changes	
Planning Strategies	
Study response of nearby wetlands to storm surge events.	$
Implement policies and procedures for post-flood and/or post-fire repairs.	$
Participate in community planning and regional collaborations related to climate change adaptation.	$-$$
Integrate climate-related risks into capital improvement plans, including options that provide resilience against current and potential future sea-level and storm surge risks.	$
Ensure that emergency response plans deal with flooding and wildfire and include stakeholder engagement and communication.	$
Develop coastal restoration plans, including consideration of barrier islands, coastal wetlands, and dune ecosystems.	$-$$
Conduct climate change impacts and adaptation training for personnel.	$
Adopt insurance mechanisms and other financial instruments, such as catastrophe bonds, to protect against financial losses associated with infrastructure losses.	$
Plan for alternative power supplies to support operations in case of loss of power.	$
Develop models to understand potential water quality changes (e.g., increased turbidity) and costs of resultant changes in treatment.	$
Conduct sea-level rise and storm surge modeling. Incorporate resulting inundation mapping and frequency estimates into land use and facility planning.	$
Update fire models and fire management plans to incorporate any changes in fire frequency, magnitude and extent due to projected future climate conditions.	$-$$
Operational Strategies	
Practice fire management plans in the watershed, such as mechanical thinning, weed control, selective harvesting, controlled burns and creation of fire breaks.	$-$$
Monitor vegetation changes in watersheds.	$
Monitor surface water conditions, including streamflow and water quality.	$
Monitor flood events and drivers that may impact flood and water quality models (e.g., precipitation, catchment runoff, storm intensity, sea level).	$
Monitor current weather conditions, including precipitation and temperature.	$
Monitor and inspect the integrity of existing infrastructure.	$-$$
Capital / Infrastructure Strategies	
Acquire and manage coastal ecosystems, such as coastal wetlands, to attenuate storm surge and reduce coastal flooding ("soft protection").	$$$
Increase treatment capabilities to address water quality changes (e.g., increased turbidity or salinity).	$$$
Implement barriers and aquifer recharge to limit effects of saltwater intrusion. Consider use of reclaimed water to create saltwater intrusion barriers.	$$$
Relocate facilities (e.g., treatment plants) to higher ground.	$$$
Establish alternative power supplies, potentially through on-site generation, to support operations in case of loss of power.	$-$$
Increase water storage capacity, including silt removal to expand capacity at existing reservoirs and construction of new reservoirs and/or dams.	$$-$$$
Expand current resources by developing regional water connections to allow for water trading in times of service disruption or shortage.	$$-$$$
Diversify options to complement current water supply, including recycled water, desalination, conjunctive use, and stormwater capture.	$$$
Build flood barriers, sea walls, levees, and related structures to protect infrastructure.	$$-$$$
Implement or retrofit source control measures that address altered influent flow and quality at treatment plants.	$$-$$$
Set aside land to support future flood-proofing needs (e.g., berms, dikes, and retractable gates).	$$$
Acquire and manage ecosystems, such as forested watersheds, vegetation strips, and wetlands, to buffer against floods and sediment and nutrient inflows into source waterways.	$$$

Service Demand and Use	
Planning Strategies	
Update drought contingency plans.	$
Model or understand existing models of regional electricity demand under future scenarios of climate change and regional growth.	$
Model agricultural water demand under future scenarios of climate change and projections of cropping types. Consider evaluating the use of recycled water for irrigation.	$-$$
Work with power companies to evaluate feasibility of using recycled water or alternative cooling	$
Establish a relationship with the local power utility and work jointly on strategies to reduce seasonal or peak water and energy demands (e.g., water reclamation for use in power generation).	$
Operational Strategies	
Monitor current weather conditions, including precipitation and temperature.	$
Practice water conservation and demand management through water metering, rebates for water conserving appliances/toilets and/or rainwater harvesting tanks.	$-$$
Practice demand management through communication to public on water conservation actions.	$
Reduce agricultural and irrigation water demand by working with irrigators to install advanced equipment (e.g., drip or other micro-irrigation systems with weather-linked controls).	$$-$$$
Practice conjunctive use (i.e., optimal use of surface and groundwater).	$$-$$$
Optimize operations by restricting some energy-intensive activities during the summer to times of reduced electricity demand (i.e., nighttime) and work with energy utility on off-peak pricing.	$$-$$$
Improve energy efficiency of operations (e.g., installing more energy efficient pumps).	$$-$$$
Finance and facilitate systems to recycle water, including use of greywater in homes and businesses.	$$-$$$
Monitor surface water conditions, including streamflow and water quality.	$
Monitor surface water conditions, including water quality in receiving bodies.	$
Capital / Infrastructure Strategies	
Acquire and manage ecosystems, such as forested watersheds, vegetation strips, and wetlands, to buffer against floods and sediment and nutrient inflows into source waterways.	$$$
Build systems to reclaim wastewater for energy, industrial, agricultural, or household use.	$$$
Build or expand infrastructure to support conjunctive use.	$$$
Retrofit intakes to accommodate decreased source water flows or reservior levels.	$$-$$$
Increase treatment capabilities to address water quality changes (e.g., increased turbidity).	$$$
Establish alternative power supply via on-site power sources.	$-$$
Increase water storage capacity, including silt removal to expand capacity at existing reservoirs and construction of new reservoirs and/or dams.	$$-$$$
Expand current resources by developing regional water connections to allow for water trading in times of service disruption or shortage.	$$-$$$
Diversify options to complement current water supply to include those that require less energy for treatment, conveyance, and distribution.	$$$
Build infrastructure needed for aquifer storage and recovery, (either for seasonal storage or longer-term water banking), (e.g., recharge canals, recovery wells).	$$$