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Ready or Not: An Evaluation of State Climate and Water Preparedness Planning

AUTHOR

Ben Chou
*Natural Resources
Defense Council*

PROJECT DESIGN AND DEVELOPMENT

Steve Fleischli
*Natural Resources
Defense Council*

CONTRIBUTING AUTHOR

Jenna Schroeder



Across the United States, climate change is affecting water resources in many ways, including putting water supplies at risk, increasing flooding and erosion, and threatening fish and aquatic species. As global warming pollution continues to affect our environment, these risks to water resources will only increase, posing grave challenges to our nation's cities, towns, and neighborhoods. Some states are leading the way in preparing for water-related impacts with integrated and comprehensive preparedness plans that address all relevant water sectors and state agencies. Unfortunately, other states are lagging when it comes to consideration of potential climate change impacts-or have yet to formally address climate change preparedness at all.

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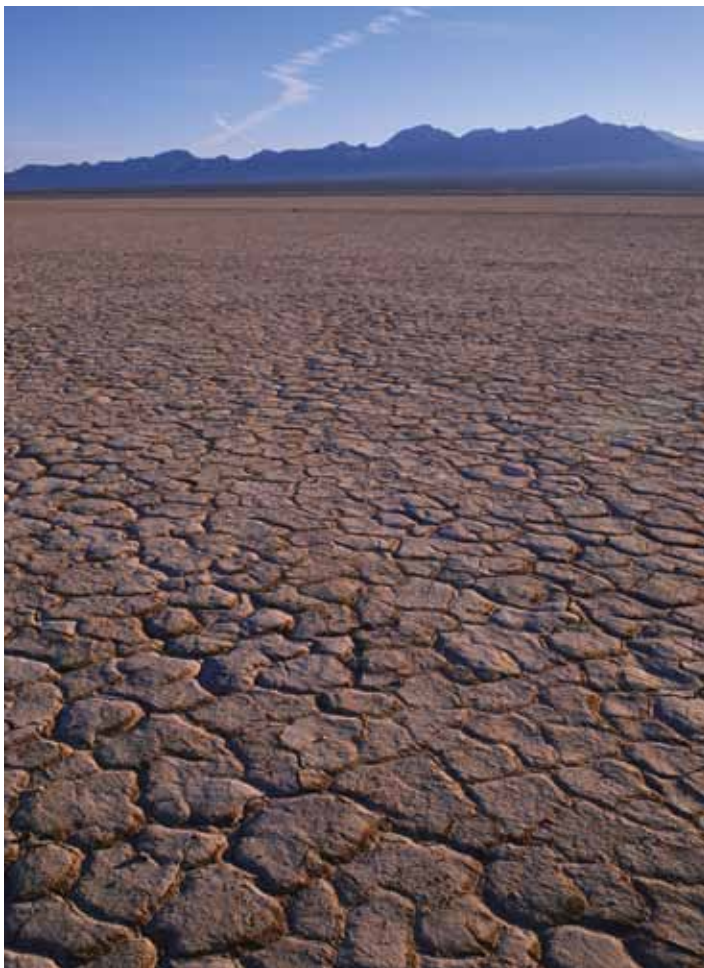
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EXECUTIVE SUMMARY

Every region of the United States is potentially vulnerable to adverse water-related impacts from climate change. Some states are taking action by reducing the greenhouse gas pollution that contributes to climate change and by planning for projected climate change-related impacts. However, many states are not. Nonetheless, the effects of climate change on the nation's water resources already are being observed. According to the U.S. Global Change Research Program (USGCRP), warmer temperatures are causing changes to the water cycle that include:

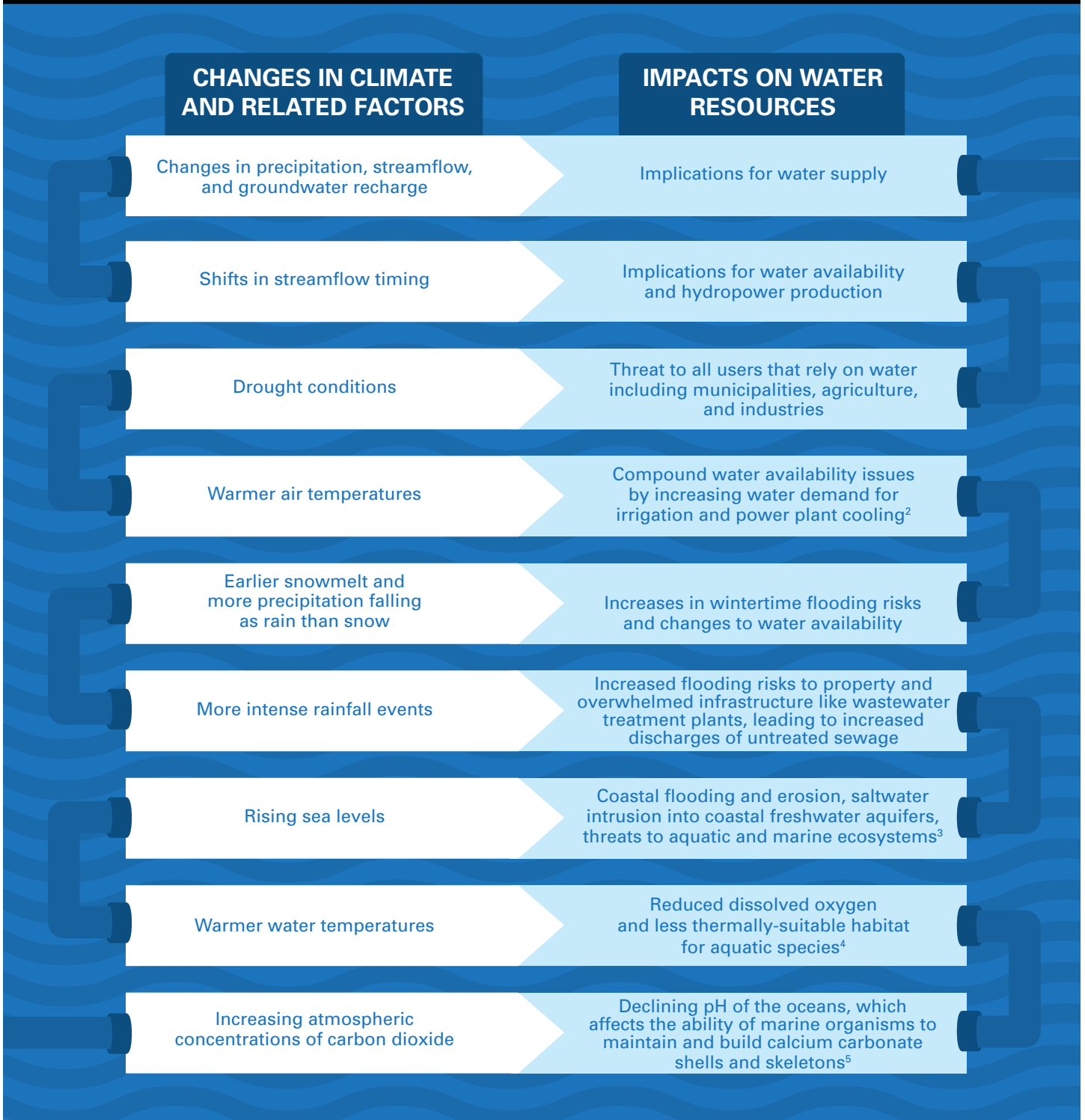


- Changes in precipitation patterns and intensity
- Increases in evaporation
- Changes in runoff and soil moisture
- Changes in the occurrence of drought
- Widespread melting of snow and ice
- Loss of lake and river ice
- Rising water temperatures¹

These changes and their effects on water resources will have wide-ranging impacts on our nation's cities, towns, and neighborhoods, as well as on our natural resources, and will only intensify as atmospheric greenhouse gas levels grow and temperatures rise further (see Figure ES-1). For a more detailed summary of potential water-related impacts of climate change for each state, see Table ES-1.

To address climate change threats, many states have developed greenhouse gas pollution reduction plans and/or adopted greenhouse gas pollution reduction targets. In fact, 36 states have developed climate action plans that identify measures to reduce greenhouse gas pollution. Meanwhile, 22 states have formally adopted or established greenhouse gas pollution reduction targets or goals. A summary of state actions on climate change pollution reduction and preparedness can be found in Table ES-2.

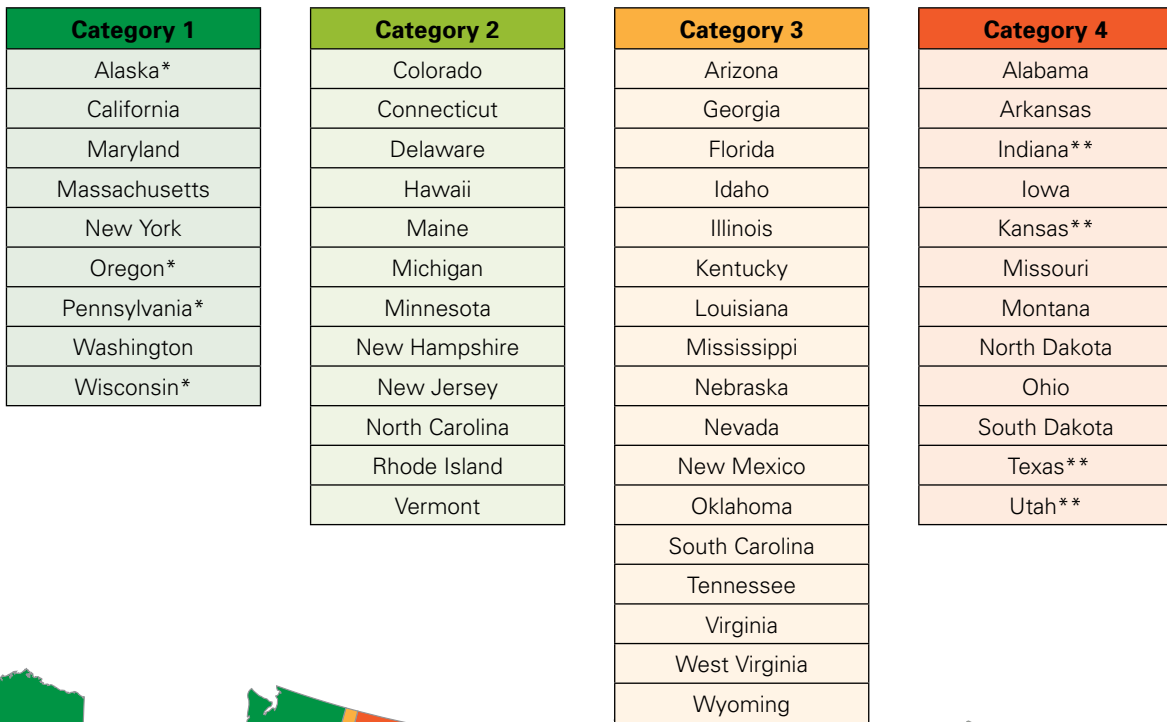
Figure ES-1: Water-related impacts of climate change



The full analysis for this brief provides a state-by-state assessment that specifically focuses on how state governments are planning and preparing for the water-related impacts of climate change. Based on the preparedness actions of state government entities, all 50 states have been categorized into one of four categories, developed to differentiate the best prepared and most engaged states on climate change preparedness issues (i.e., Category 1 and 2)

from those that are largely unprepared and lagging behind (i.e., Category 3 and 4). Although many states have yet to formally address climate change preparedness within state government (and therefore fall within Category 4), a number of these states have existing water policies or programs, such as water conservation or efficiency policies, that if recognized within the context of climate change, could prove beneficial.

Figure ES-2: Ranking of states according to climate preparedness planning



*Denotes a state where climate preparedness activities at the state government level, although once more robust, appear to have slowed or stalled in some planning areas.
 **Denotes a state that has some existing water programs and policies (e.g., water conservation) that, if recognized as climate change adaptation tools, could prove beneficial for climate preparedness.

Unfortunately, within roughly the last two years, climate action at the federal legislative and state government levels has noticeably diminished as economic conditions have deteriorated and political interests have shifted. This trend has affected some of the states that have seemingly made the most progress on climate change preparedness planning. Many of the state agency personnel that were contacted for this report indicated that without a top-down directive from the executive level, there is unlikely to be sufficient action by all necessary government agencies within a state on climate change issues. There are clear limits to how far climate preparedness planning can proceed based on a strictly voluntary approach and without executive level support or leadership.

Despite these obstacles, states can implement *no regret* and *multiple benefit* strategies, such as green infrastructure, water conservation, and efficiency measures that address existing water quality and quantity challenges, while also building resilience to climate change impacts.

Governors across the United States must do what is in the best interest of their states and local communities and prioritize and support climate change preparedness planning. To prepare for the impacts of climate change, all states can and should:

Set greenhouse gas pollution reduction targets or goals and develop a plan for meeting these reduction levels

Greenhouse gas pollution reduction and climate change preparedness are related. Globally, the level of greenhouse gas emissions plays a role in determining the severity of climate change impacts. States should formally establish greenhouse gas pollution reduction targets and implement measures to reduce emissions.

Develop a stakeholder group to organize and coordinate state-level adaptation planning and implementation

The states that are the most effective at integrating climate change adaptation into state agency operations, planning, and programs have a central coordinating group to organize adaptation efforts among agencies and organizations within the state. Personnel from state agencies with jurisdiction over water quality, water quantity, hazard response, transportation, public health, aquatic species, and coastal management (where relevant) can help form a comprehensive preparedness team.

Foster partnerships to stay current on climate science and sector-specific developments

Because knowledge around climate modeling and adaptation tools is rapidly evolving, states can benefit from fostering partnerships with the research community to bolster their expertise and remain current on these issues.

Conduct a statewide vulnerability assessment to determine potential climate change impacts

These assessments should include an evaluation of water-related impacts, including precipitation changes, water supply availability, drought, flooding, hydrologic changes, water quality, and, where applicable, sea level rise. The evaluation of a comprehensive set of climate change impacts enables states to better understand their vulnerabilities and develop strategies to reduce them.

Develop a comprehensive adaptation plan to address climate risks in all relevant sectors and integrate climate change preparedness into existing planning processes

Actions and strategies to address vulnerabilities and risks identified during the assessment process should be developed. Framing climate change vulnerability and preparedness planning in terms of emergency or risk management can be useful as many state and municipal officials are readily familiar with this type of approach. Moreover, comprehensive planning should include input from a wide variety of stakeholders—including those outside of state government—and prioritize non-structural and *no regrets* strategies like green infrastructure and water conservation and efficiency. States also should use caution when making investments in *hard* or *gray* infrastructure that is costly and inflexible in the face of changing hydrologic conditions, and may inhibit effective adaptation in the long run. Furthermore, climate change factors should be integrated into existing planning frameworks and policies. This process may benefit from regional partnerships or collaborative efforts to pool resources and share information.

Prioritize and support implementation of the adaptation plan

Goals and tracking metrics to measure the progress of plan implementation are vital, and specific tasks and implementation mechanisms needed to achieve these goals should be developed. Minimum staffing and funding levels also must be made available to support effective implementation of the adaptation plan.

Measure progress regularly and update the adaptation plan as needed

Climate change preparedness should be an iterative and informed process. As climatic conditions change and new information is made available, reevaluation of adaptation options is appropriate. States also should measure progress towards achieving established adaptation goals and make modifications as necessary.

Federal action also is critical

In addition to direct state action, there is clearly a role for the federal government in cutting carbon pollution and supporting climate change preparedness activities in the states. While state efforts to cut carbon pollution are important, federal limits are essential. The Environmental Protection Agency (EPA) is developing standards to limit carbon pollution from new and existing power plants, which will save lives, create jobs, and protect our environment.

Power plants are our nation's biggest carbon polluters. The public health threats to our children, seniors and communities from climate change—fueled by rising levels of dangerous carbon pollution and the resulting temperature increases—include more heat deaths; respiratory complications (such as asthma attacks); more infectious diseases; and severe dangers to life, limb, and property during storms, floods, and other extreme weather events. In addition to finding their own ways to lower carbon pollution, states should be supporting the EPA's efforts to set national standards for power plants.

The federal government, via agencies like the White House Council on Environmental Quality (CEQ), National Oceanic and Atmospheric Administration (NOAA), U.S. Geological Survey (USGS), U.S. Department of Agriculture (USDA), and Environmental Protection Agency (EPA), can help states by providing technical information on the projected scope and impacts of climate change. Many states and local

governments currently lack the capacity and expertise to conduct some of this research on their own.

Despite the numerous benefits that would result from adaptation planning and action, many states will not act until they are prompted to do so by the federal government. These states must do significantly more to prepare for the water-related impacts of climate change. The federal government can lead by example by requiring climate change impacts to be considered as part of federal agencies' analyses under the National Environmental Policy Act (NEPA).

There also are numerous pathways of funding between the federal government and state governments—Coastal Zone Management Administration Awards, Clean Water and Drinking Water State Revolving Funds, disaster mitigation funding—that should be utilized to advance climate change preparedness planning at the state and local level. The federal government has a key opportunity to ensure effective adaptation by requiring states to consider the implications of climate change in their use of federal funds.

Finally, the actions necessary to prepare and respond to climate change impacts ultimately must be implemented at a local level. While many municipalities are outpacing their respective state governments in addressing climate change,⁶ various issues concerning water resources cross political and jurisdictional boundaries and require coordination at a much larger scale. Some municipalities also lack sufficient resources and the capacity to comprehensively prepare for climate impacts. By working together, local, state, and federal governments can ensure that all communities across the United States are better prepared for the water resource challenges inherent in a changing climate. To tackle these challenges, some states are leading the way. It is time for the others to follow.

Table ES-1: Summary of potential climate change impacts within each state.⁷

| | Increased Annual Precipitation | Decreased Annual Precipitation | Water Supply Challenges | More Frequent and Intense Storm Events | Increased Flooding | Sea Level Rise | Increased Erosion | Saltwater Intrusion | Aquatic/Marine Species Impacts |
|----------------|--------------------------------|--------------------------------|-------------------------|--|--------------------|----------------|-------------------|---------------------|--------------------------------|
| Alabama | | | | | | | | | |
| Alaska | | | | | | | | | |
| Arizona | | | | | | | | | |
| Arkansas | | | | | | | | | |
| California | | | | | | | | | |
| Colorado | | | | | | | | | |
| Connecticut | | | | | | | | | |
| Delaware | | | | | | | | | |
| Florida | | | | | | | | | |
| Georgia | | | | | | | | | |
| Hawaii | | | | | | | | | |
| Idaho | | | | | | | | | |
| Illinois | | | | | | | | | |
| Indiana | | | | | | | | | |
| Iowa | | | | | | | | | |
| Kansas | | | | | | | | | |
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| Massachusetts | | | | | | | | | |
| Michigan | | | | | | | | | |
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| Montana | | | | | | | | | |
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| Nevada | | | | | | | | | |
| New Hampshire | | | | | | | | | |
| New Jersey | | | | | | | | | |
| New Mexico | | | | | | | | | |
| New York | | | | | | | | | |
| North Carolina | | | | | | | | | |
| North Dakota | | | | | | | | | |
| Ohio | | | | | | | | | |
| Oklahoma | | | | | | | | | |
| Oregon | | | | | | | | | |

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|----------------|--------------------------------|--------------------------------|-------------------------|--|--------------------|----------------|-------------------|---------------------|--------------------------------|
| Pennsylvania | | | | | | | | | |
| Rhode Island | | | | | | | | | |
| South Carolina | | | | | | | | | |
| South Dakota | | | | | | | | | |
| Tennessee | | | | | | | | | |
| Texas | | | | | | | | | |
| Utah | | | | | | | | | |
| Vermont | | | | | | | | | |
| Virginia | | | | | | | | | |
| Washington | | | | | | | | | |
| West Virginia | | | | | | | | | |
| Wisconsin | | | | | | | | | |
| Wyoming | | | | | | | | | |

Table ES-2: Summary of climate change actions by each state.

| | POLLUTION REDUCTION | | ADAPTATION/PREPAREDNESS | | | |
|---------------|---------------------------|------------------------------|-------------------------------|----------------------------------|-------------------------------|------------------------|
| | GHG Reduction Target/Goal | GHG Pollution Reduction Plan | CATEGORY 1 | CATEGORY 2 | CATEGORY 3 | CATEGORY 4 |
| | | | Comprehensive Adaptation Plan | Fragmented Adaptation Activities | Limited Adaptation Activities | No Adaptation Planning |
| Alabama | | | | | | |
| Alaska | | | | | | |
| Arizona | | | | | | |
| Arkansas | | | | | | |
| California | | | | | | |
| Colorado | | | | | | |
| Connecticut | | | | | | |
| Delaware | | | | | | |
| Florida | | | | | | |
| Georgia | | | | | | |
| Hawaii | | | | | | |
| Idaho | | | | | | |
| Illinois | | | | | | |
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| Iowa | | | | | | |
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| Kentucky | | | | | | |
| Louisiana | | | | | | |
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| Maryland | | | | | | |
| Massachusetts | | | | | | |

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| | GHG Reduction Target/Goal | GHG Pollution Reduction Plan | CATEGORY 1 | CATEGORY 2 | CATEGORY 3 | CATEGORY 4 |
| | | | Comprehensive Adaptation Plan | Fragmented Adaptation Activities | Limited Adaptation Activities | No Adaptation Planning |
| Michigan | ✓ | ✓ | | ✓ | | |
| Minnesota | ✓ | ✓ | | ✓ | | |
| Mississippi | | | | | ✓ | |
| Missouri | | ✓ | | | | ✗ |
| Montana | | ✓ | | | | ✗ |
| Nebraska | | | | | ✓ | |
| Nevada | | ✓ | | | ✓ | |
| New Hampshire | ✓ | ✓ | | ✓ | | |
| New Jersey | ✓ | ✓ | | ✓ | | |
| New Mexico | ✓ | ✓ | | | ✓ | |
| New York | ✓ | ✓ | ✓ | | | |
| North Carolina | | ✓ | | ✓ | | |
| North Dakota | | | | | | ✗ |
| Ohio | | | | | | ✗ |
| Oklahoma | | | | | ✓ | |
| Oregon | ✓ | ✓ | ✓ | | | |
| Pennsylvania | | ✓ | ✓ | | | |
| Rhode Island | ✓ | ✓ | | ✓ | | |
| South Carolina | | ✓ | | | ✓ | |
| South Dakota | | | | | | ✗ |
| Tennessee | | ✓ | | | ✓ | |
| Texas | | ✓ | | | | ✗ |
| Utah | ✓ | ✓ | | | | ✗ |
| Vermont | ✓ | ✓ | | ✓ | | |
| Virginia | ✓ | ✓ | | | ✓ | |
| Washington | ✓ | ✓ | ✓ | | | |
| West Virginia | | | | | ✓ | |
| Wisconsin | | ✓ | ✓ | | | |
| Wyoming | | | | | ✓ | |

Endnotes

- 1 U.S. Global Change Research Program, "Water Resources," *Global Climate Change Impacts in the United States* (2009), 41, <http://www.globalchange.gov/images/cir/pdf/water.pdf>.
- 2 Ibid., 49.
- 3 Ibid., 47.
- 4 Ibid., 46.
- 5 U.S. Global Change Research Program, "Regional Impacts: Coasts," *Global Climate Change Impacts in the United States* (2009), 151, <http://www.globalchange.gov/images/cir/pdf/coasts.pdf>.
- 6 See Mark Dorfman, Michelle Mehta, Ben Chou, Steve Fleischli and Kirsten Sinclair Rosselot, *Thirsty for Answers: Preparing for the Water-related Impacts of Climate Change in American Cities* (August 2011), 9, NRDC, <http://www.nrdc.org/water/files/thirstyforanswers.pdf>.
- 7 If a state is not identified as likely to experience a specific climate change-related impact, this does not necessarily mean that the state is not vulnerable to that impact—only that the literature reviewed contained insufficient information to make a determination. Because the underlying methodologies used to determine projected climate change impacts in the studies considered may differ, climate impacts from different studies should not be directly compared.