



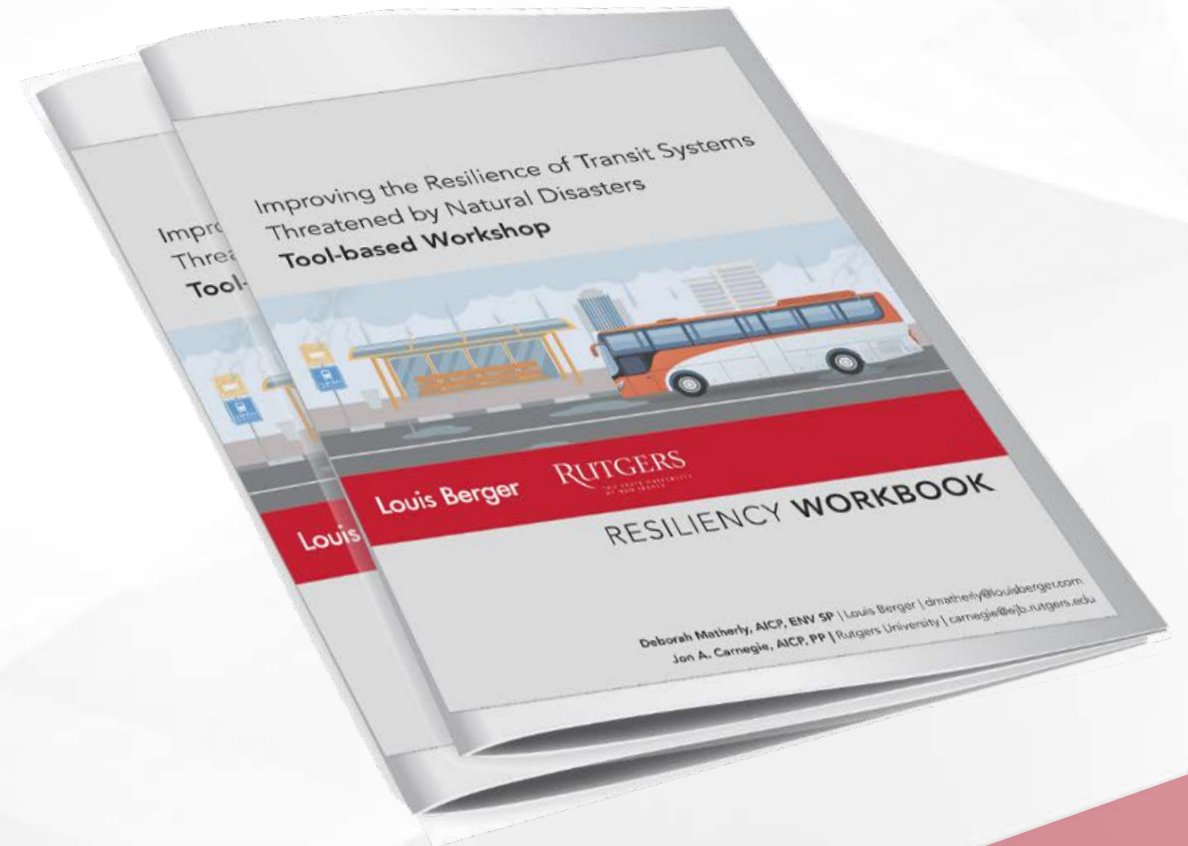
**Transit Cooperative Research Program
Web-Only Document 70:
Improving the Resilience of Transit Systems Threatened by Natural
Disasters (briefing and tool-based mini-workshop)**

APTA 2018 Sustainability and Multimodal Conference

**July 30, 2:00-3:30, Session “Driving the Value of Climate Action Plans
and Resiliency Frameworks for Public Transit Agencies”**

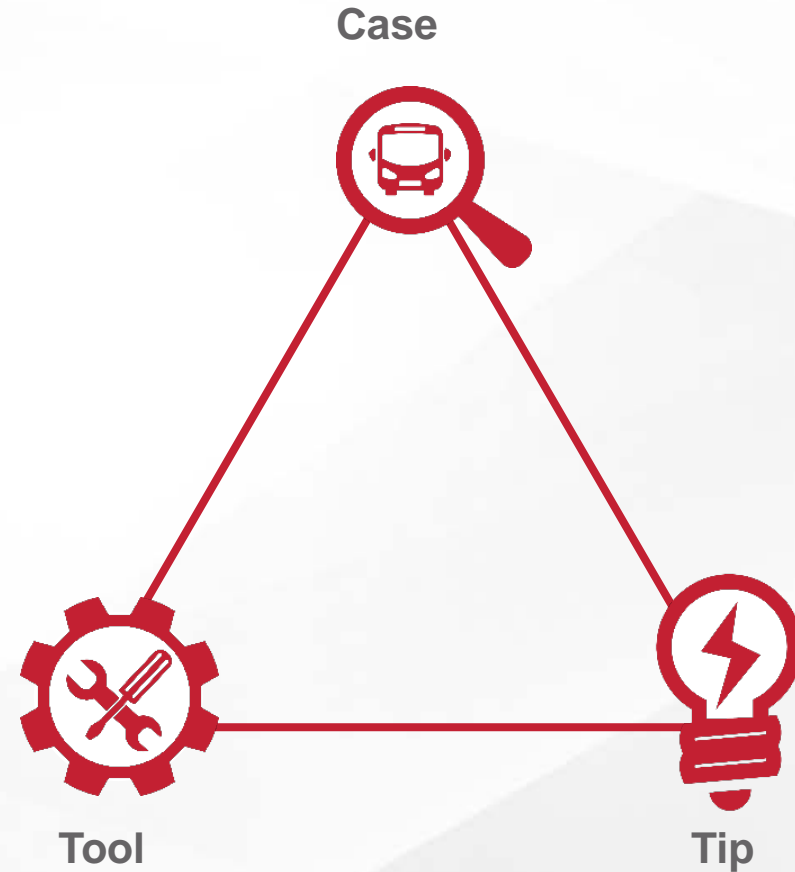
What We Will Cover Today

- Transit Resilience- Guidebook and Example Tools in the Workbook- 15 minutes
 - Transit agency case studies/ paths to resilience
 - Learn basic steps and use some example tools to start to chart your course to resilience
 - Introduce our database of tools and resources



Guidebook

- Aimed at any agency personnel, but especially middle managers who often lead resilience planning efforts
- Presents an actionable, step-wise approach to help transit agencies meet the challenges created by climate change and the impacts of extreme weather
- Designed for easy printing and binding as agency workbook
- Includes case study examples, tools, and tips to try



Case Studies



- Hillsborough Area Regional Transit Authority (HART), FL
- Honolulu Department of Transportation Services (DTS), HI
- Valley Regional Transit (VRT), ID
- Kansas City Area Transit Authority (KCATA)- KS & MO
- Los Angeles County Metropolitan Transportation Authority (LA Metro), CA
- Maryland Transit Administration (MTA), MD
- Massachusetts Bay Transportation Agency (MBTA), MA
- Metropolitan Atlanta Rapid Transit Authority (MARTA), GA
- Nashville Metropolitan Transit Authority (MTA), TN

- New Jersey Transit Corporation (NJ TRANSIT), NJ
- New Orleans Regional Transit Authority (NORTA/ RTA), LA
- San Francisco Bay Area Rapid Transit (BART), CA
- San Francisco Municipal Transportation Agency (MUNI), CA
- Southeastern Pennsylvania Transportation Authority (SEPTA), PA
- Utah Transit Agency (UTA), UT
- Swedish Transportation Agency (STA), Sweden
- Transport for London (TfL), England

Many Paths to Resilience



01

Defining Resilience

*“...the ability to **prepare and plan** for, **absorb, respond, recover** from, and more successfully **adapt** to adverse events.”*

-The National Academies of Sciences, Engineering and Medicine

What Definition is Right for You?

“The ability to provide core functions in the face of threats, and recover quickly from major shocks or changing conditions.” —LA Metro

Being able to “...bounce back from shocks during natural disasters or weather-related events.” — KCATA

“Being better prepared to withstand and recover from an extreme weather event or threat.” — NJ TRANSIT

“How fast can a service be safely restored? ...Resilience is the new reality.” (Engineering motto) — SEPTA

One definition need not fit all. It is up to you to figure out what resilience means for your agency. Refer to Activity I on page 2 in the Workbook.

02

Charting Your Agency's Path to Resilience

Four Basic Steps

Getting Started

Taking Stock

Moving Forward

Monitoring Progress

Adjust course as needed

Step 1: Getting Started

- **Understanding** agency context
- **Engaging** to plan and implement
 - Who should be involved?
- **Identifying** opportunities and barriers to greater resilience

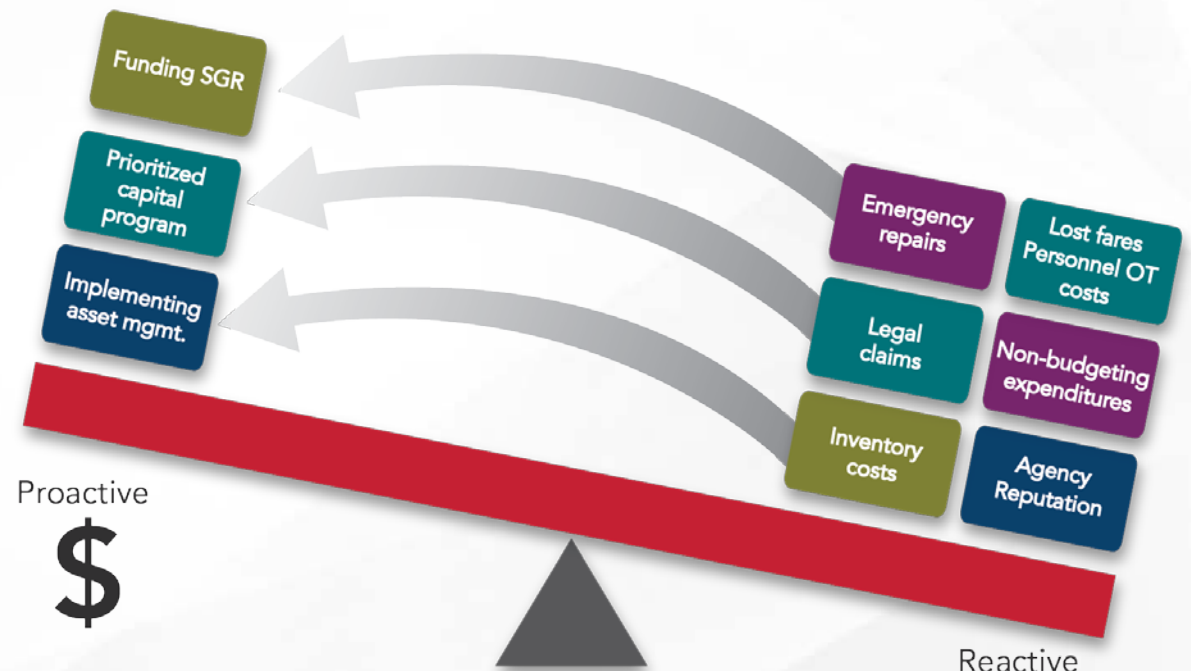
Understanding Agency Context



The Business Case for Resilience

Enhanced resilience allows better anticipation of disasters and better planning to reduce disaster losses, rather than waiting for an event to occur and paying for it afterward.

— National Academies of Sciences, Engineering and Medicine



2017 NIBS report documents 6::1 payoff for past mitigation investments



See Activity II on page 3.

Step 2: Taking Stock

- **Assessing** Vulnerabilities and Risk
- **Domains** of Resilience Adoption
- **Processes** That Support Adoption
- **Assessing** the Current Status of Resilience Activity
 - What else can/should you be doing?

“Domains” of Adoption



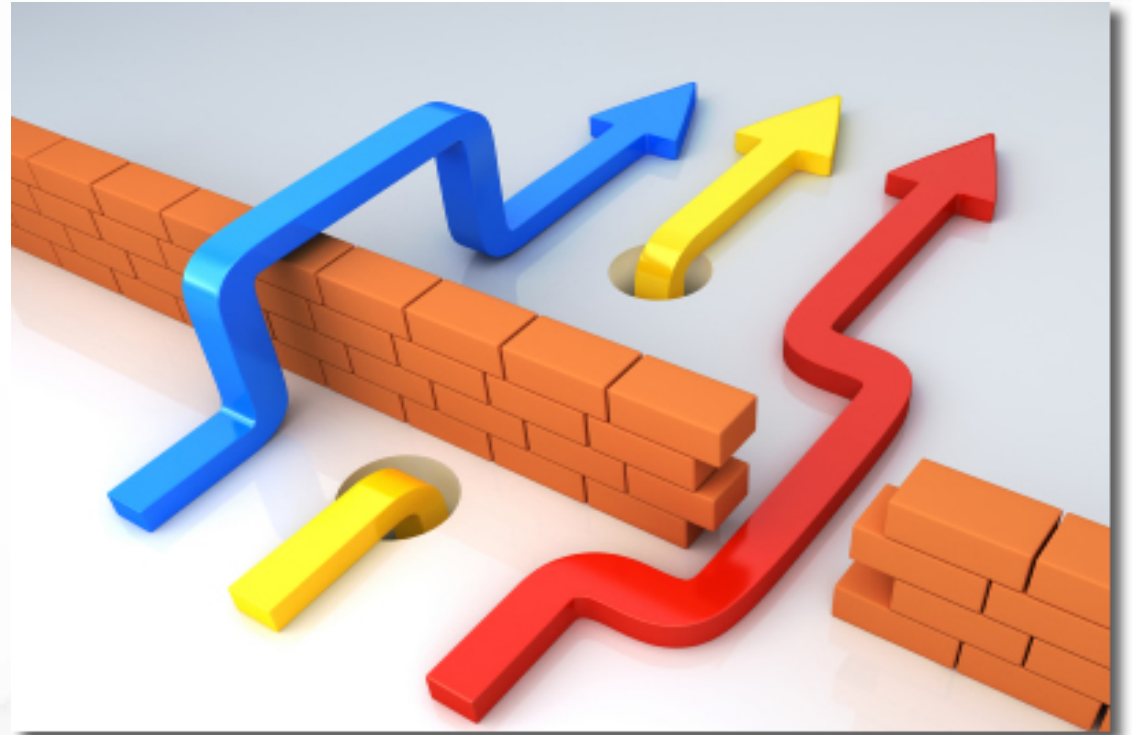
The concept of improving transit systems resilience is framed around the idea of building resilience across all “domains” of transit agency business.



See Activity III on page 4.

Identifying Opportunities & Barriers

- **Where** are there opportunities to support change?
- **What do** barriers to resilience look like?
- **What can** an agency do to get past them?
- **See Activity IV** on page 5.



Step 3: Moving Forward

- **Creating** a shared sense of need
- **Articulating** a resilience vision, goals and desired outcomes
- **Selecting and prioritizing** implementation strategies
- **Developing** detailed action plans
- **Mobilizing** commitment
- **Making** change last

Selecting and Prioritizing Strategies



Adaptation



Resilient Design



Mitigation

See Activity V
on page 6.

Step 4: Monitoring Progress

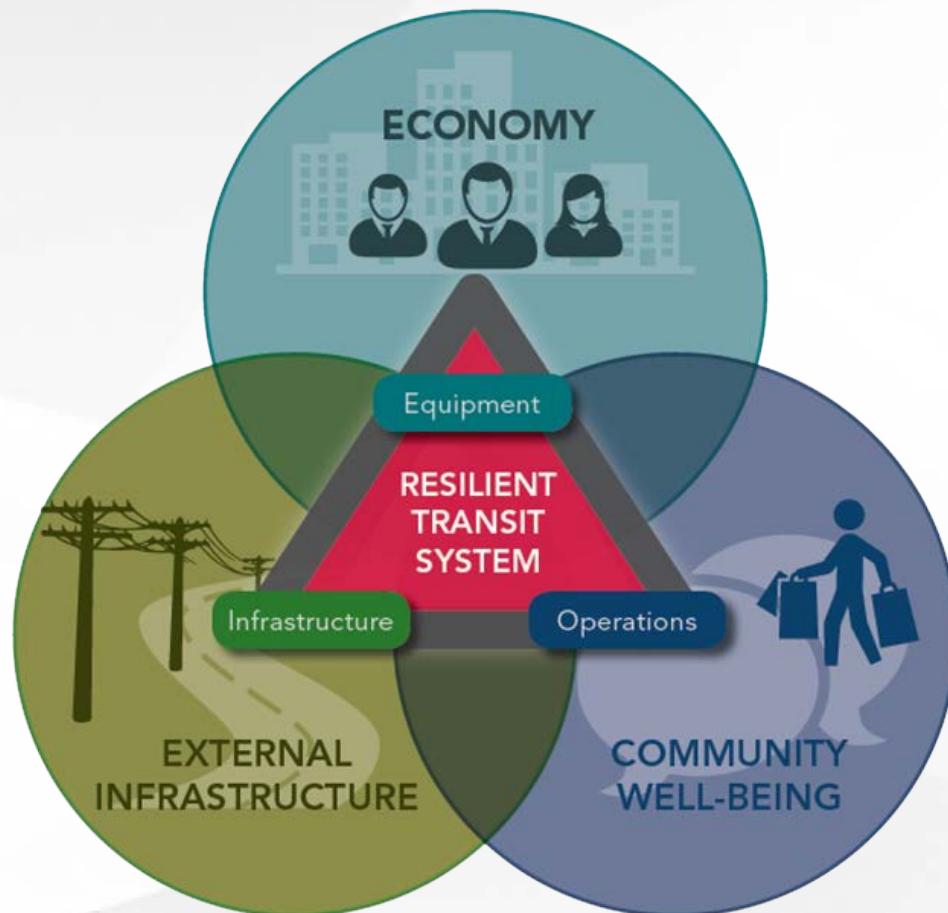
- **Choosing** performance measures and metrics
 - What makes a good metric?
- **Collecting** and tracking data
- **Evaluating** success and adjusting course as needed

03

Reinforce Regional Interdependencies

Thinking Beyond Your Agency...

...No agency is an island



- Who do you depend on?
- Who depends on you?
- See Activity VI on page 7.

04

Resilience Adoption Tools & Resources

Transit Resilience Database

- Browse the Library
- Search by:
 - Resource type
 - Hazard type
 - Adoption domain
 - Transit mode
 - Keyword
 - Tags
- Print summary of selected resources
- Follow links to full documents or web references

Resilient Transit Search Page
Resilient Transit Tools and Resources

[Print](#)

Resilient Transit Tools and Resources

Showing 1-100 of 110 [add filters](#) [export](#) 100 per page Page 1 of 2

| Resource/Tool Name | Type of Resource/Tool | Description | View Resource Details |
|--|-----------------------|---|-----------------------|
| Adaptation of Transport to Climate Change in Europe | Report (General) | As an initial step towards the necessary widespread mainstreaming of climate change adaptation into transport planning and decision-making, this report aims to shed light on initial adaptation practices in the transport sector across Europe while providing a perspective on the emerging challenges and opportunities. The purpose of the report is to stimulate discussion. The factual information collected is based on data available in the Climate-ADAPT (1) information platform, a literature review, case studies provided by many stakeholders, and a questionnaire on transport and adaptation addressed to EEA member countries in 2013. A total of 23 country representatives answered this questionnaire and provided information on the variety of national approaches to adaptation in transport. | view |
| Adapting to Climate Change Through Asset Management Planning | Other | This presentation examines the relationship between potential climate change factors and transit assets and operations, with particular focus on how a transit agency's asset management system can be used in support of strategic adaptation investment decision making. It offers a framework for integrating climate adaptation in transit asset management. | view |
| Adapting to Climate Change: Another Challenge for the Transportation Community | Article | The paper outlines a series of issues surrounding the incorporation of climate change into transportation planning processes. Accepting climate change is occurring, the paper outlines a series of impacts to various regions of the United States while outlining the uncertainty the data provides. Diving into the concerns, it identifies approaches to risk management and the need for long term planning as necessary but also maintains awareness of potential data uncertainty. | view |
| Adapting to Climate Change: Practical Strategies at the Port Authority | Policy, Other | The presentation outlines the efforts the PANYNJ has been undertaking to address climate change. These efforts include policy. | view |

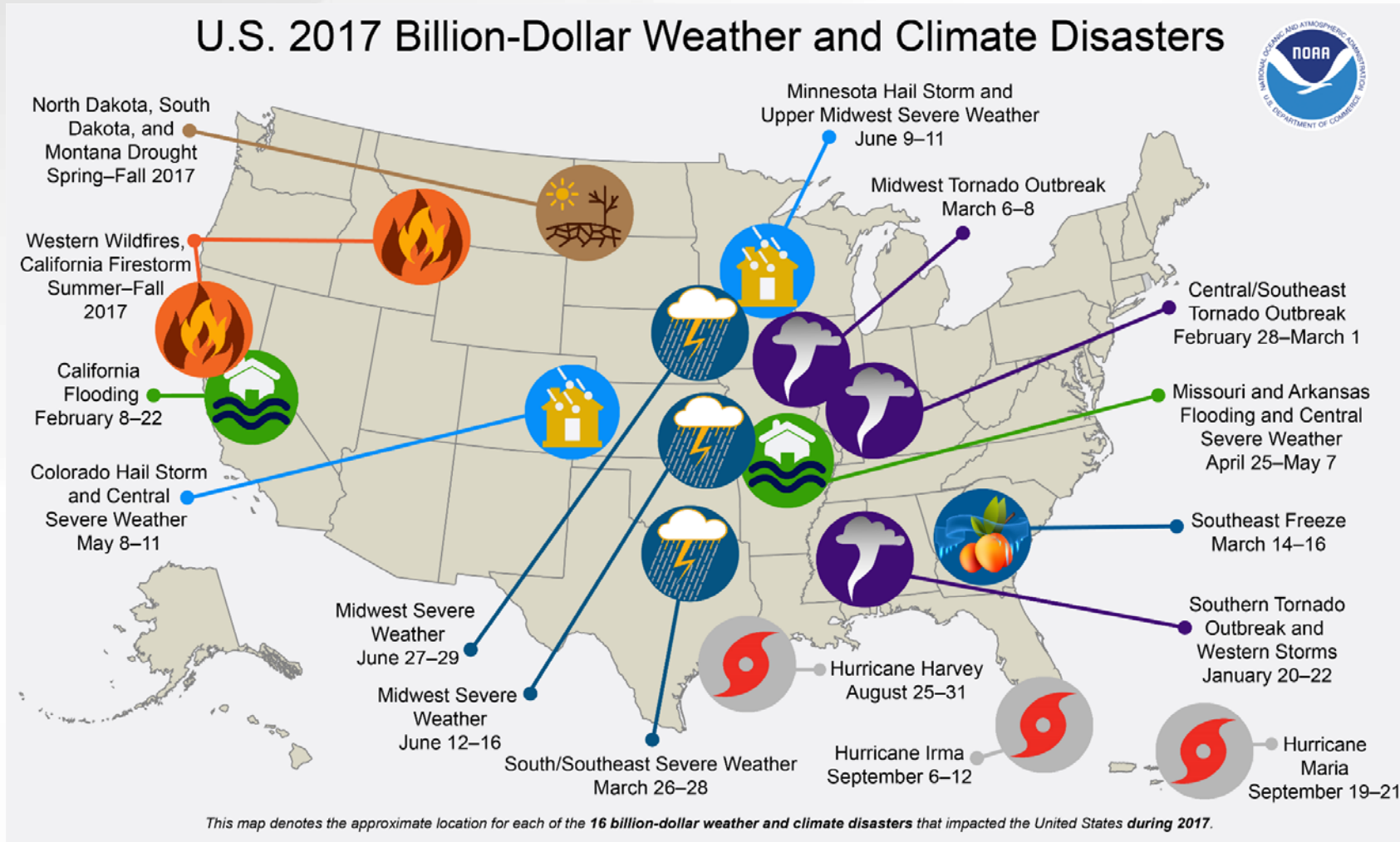


For Further Information

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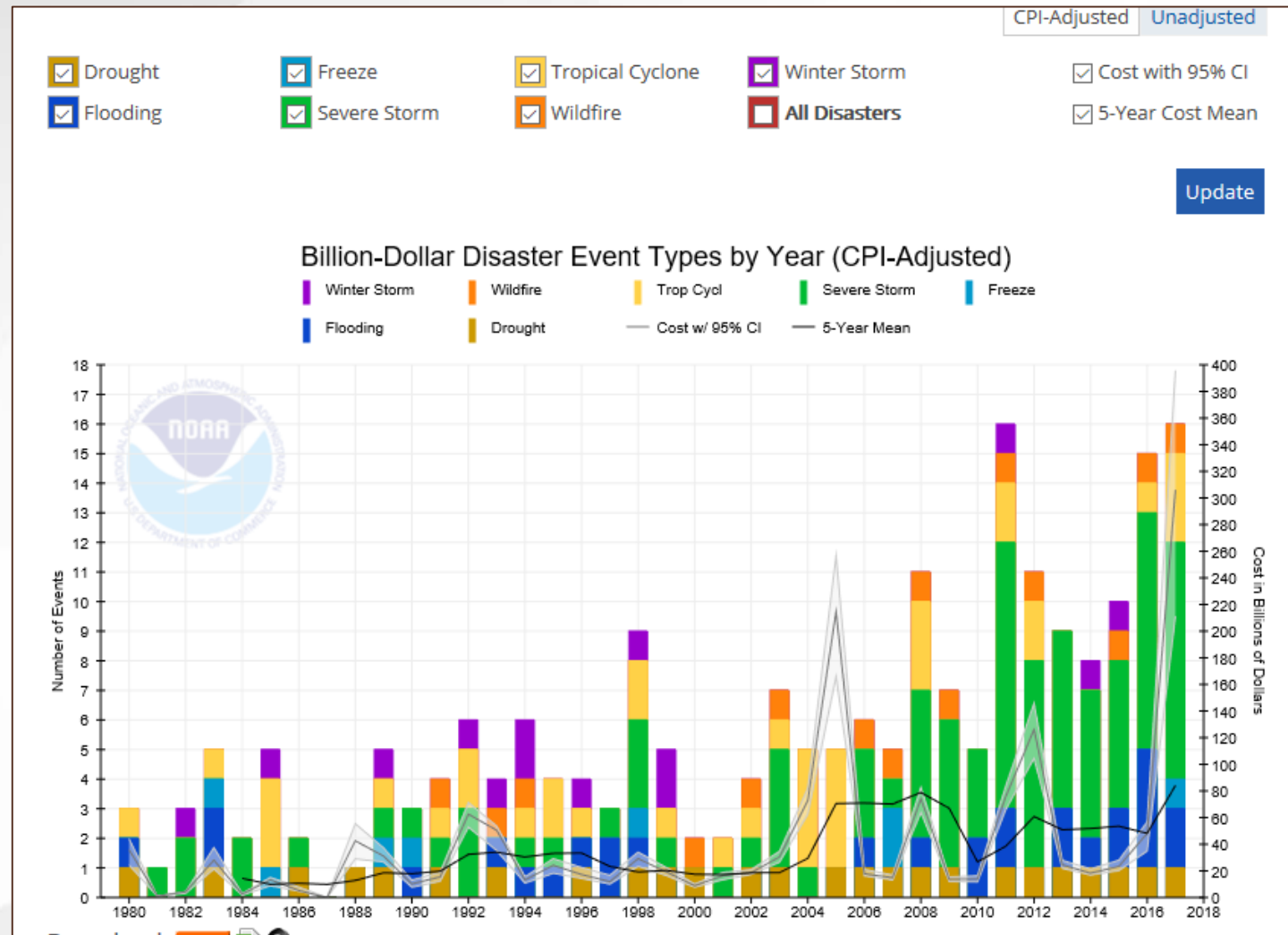
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Why Resilience Matters



Source: NOAA website – Billion dollar disasters

Why Resilience Matters- continued



Source: NOAA website – Billion dollar disasters