U.S. Department of Transportation
Federal Highway Administration

Integrating Resilience into Transportation Planning

National Transportation in Indian Country Conference

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Virtual

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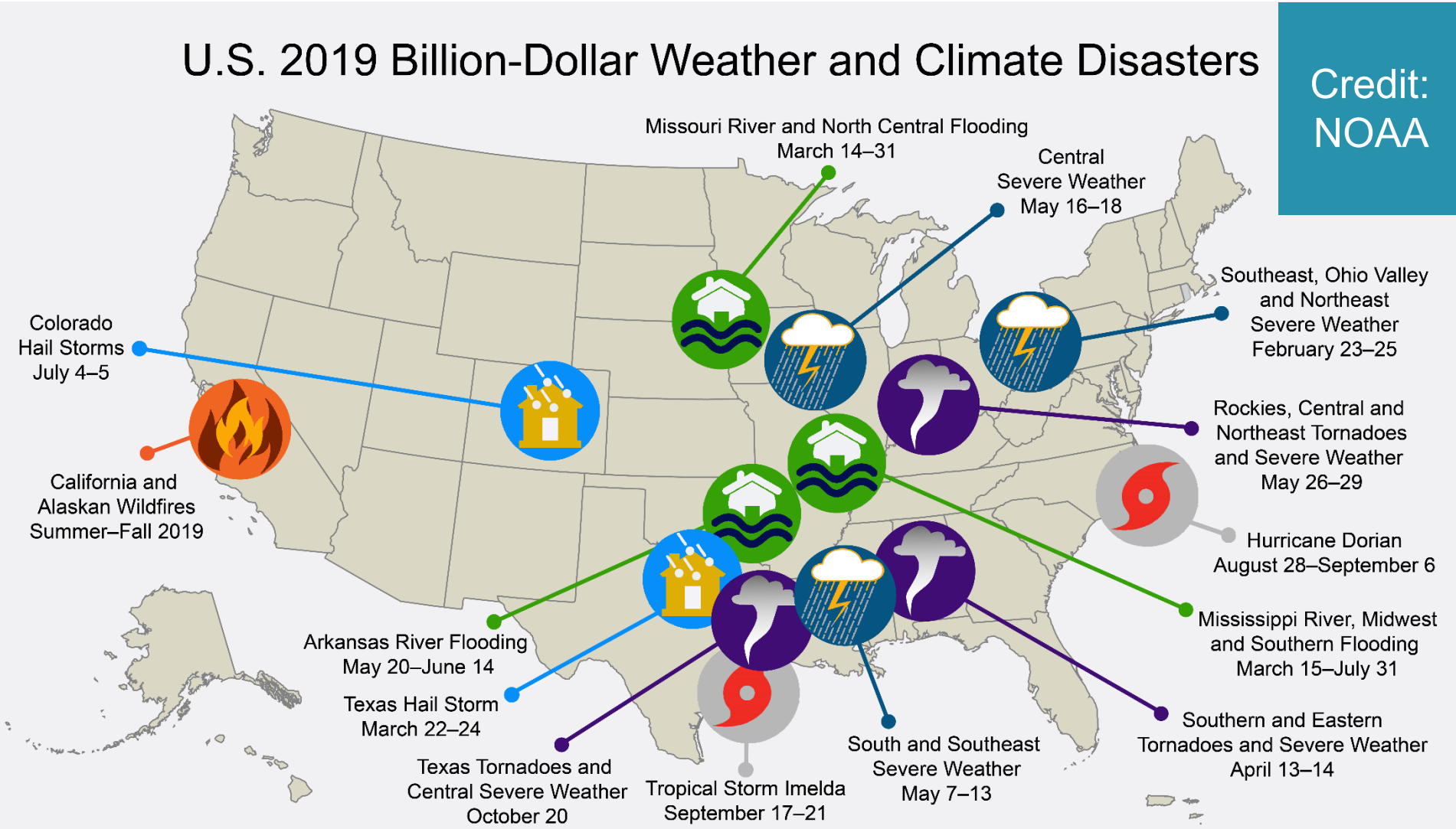
What is *Resilience*?

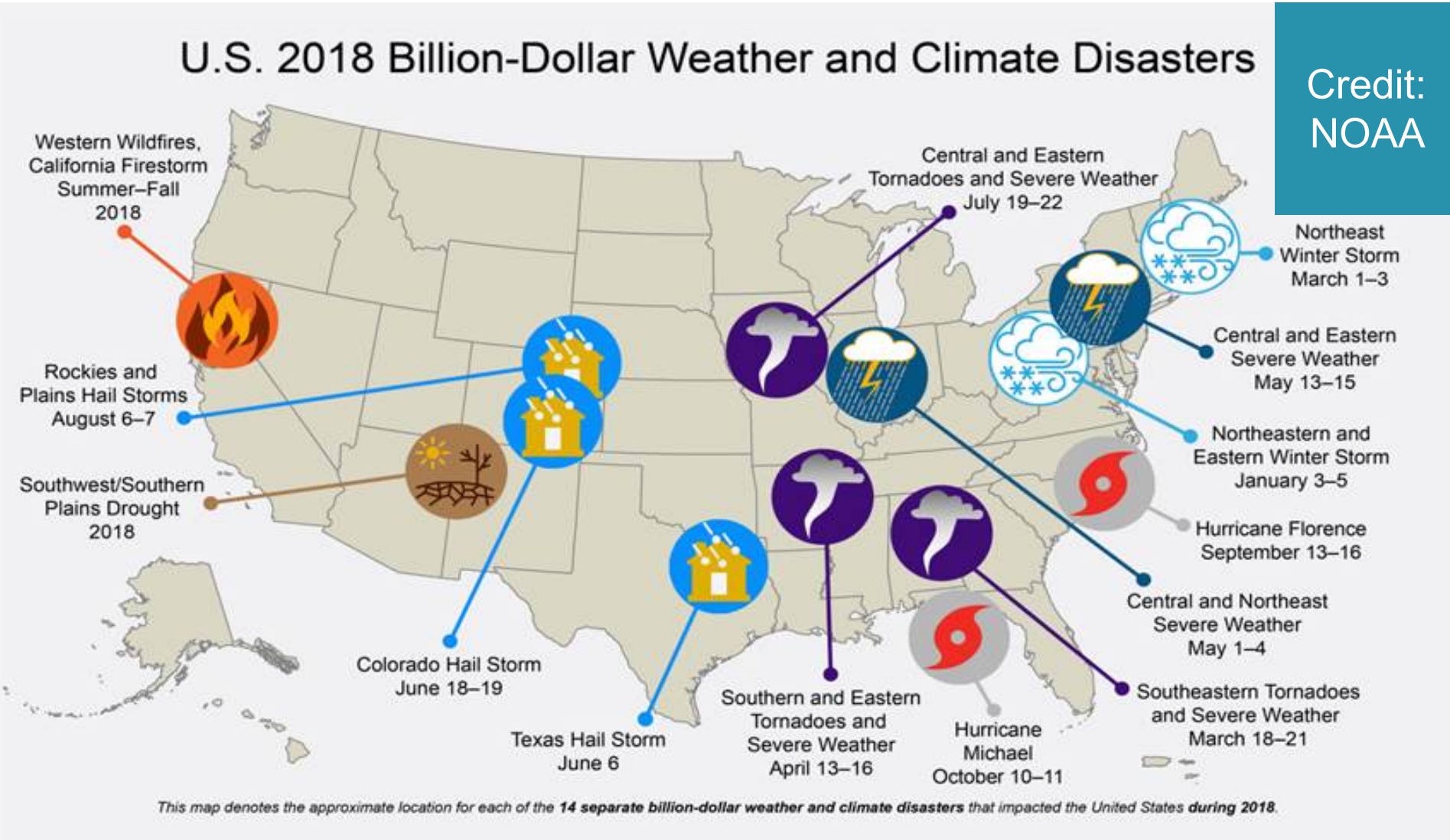
Resilience: the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.

Fourteen Separate Billion Dollar Disasters in 2019



*This map denotes the approximate location for each of the **14 separate billion-dollar weather and climate disasters** that impacted the United States **during 2019**.*

Fourteen Separate Billion-Dollar Disasters in 2018



Credit: NOAA

Transportation System Impacts

USDOT FY 2018-22 Strategic Plan: "DOT will increase its effectiveness in ensuring that infrastructure is resilient enough to withstand extreme weather"


Photo credit: CalTrans


Photo credit: CO DOT


Photo credit: Iowa State Patrol

Photo credit: NYCDOT

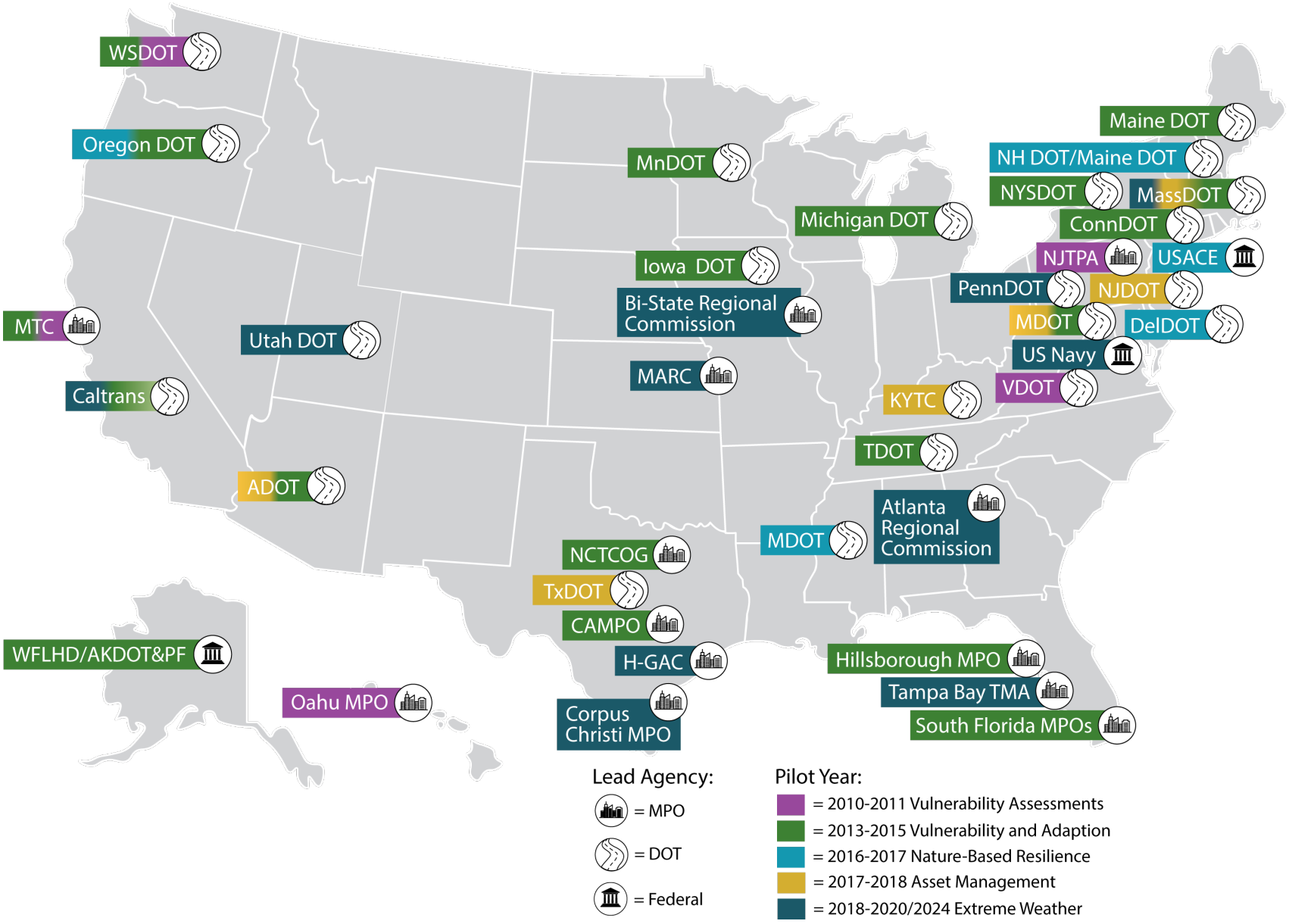
FHWA and Resilience

- Adaptation activities eligible for FHWA funding
- FHWA requires resilience to be considered in:
  - Asset management plans (23 CFR 515)
  - Transportation plans (23 USC 134, 23 CFR 450)
  - Emergency relief (23 CFR 667)
  - FHWA programs and policies (Order 5520)
- Extensive FHWA research and technical assistance available.
- FHWA Resilience Website: https://www.fhwa.dot.gov/environment/sustainability/resilience/

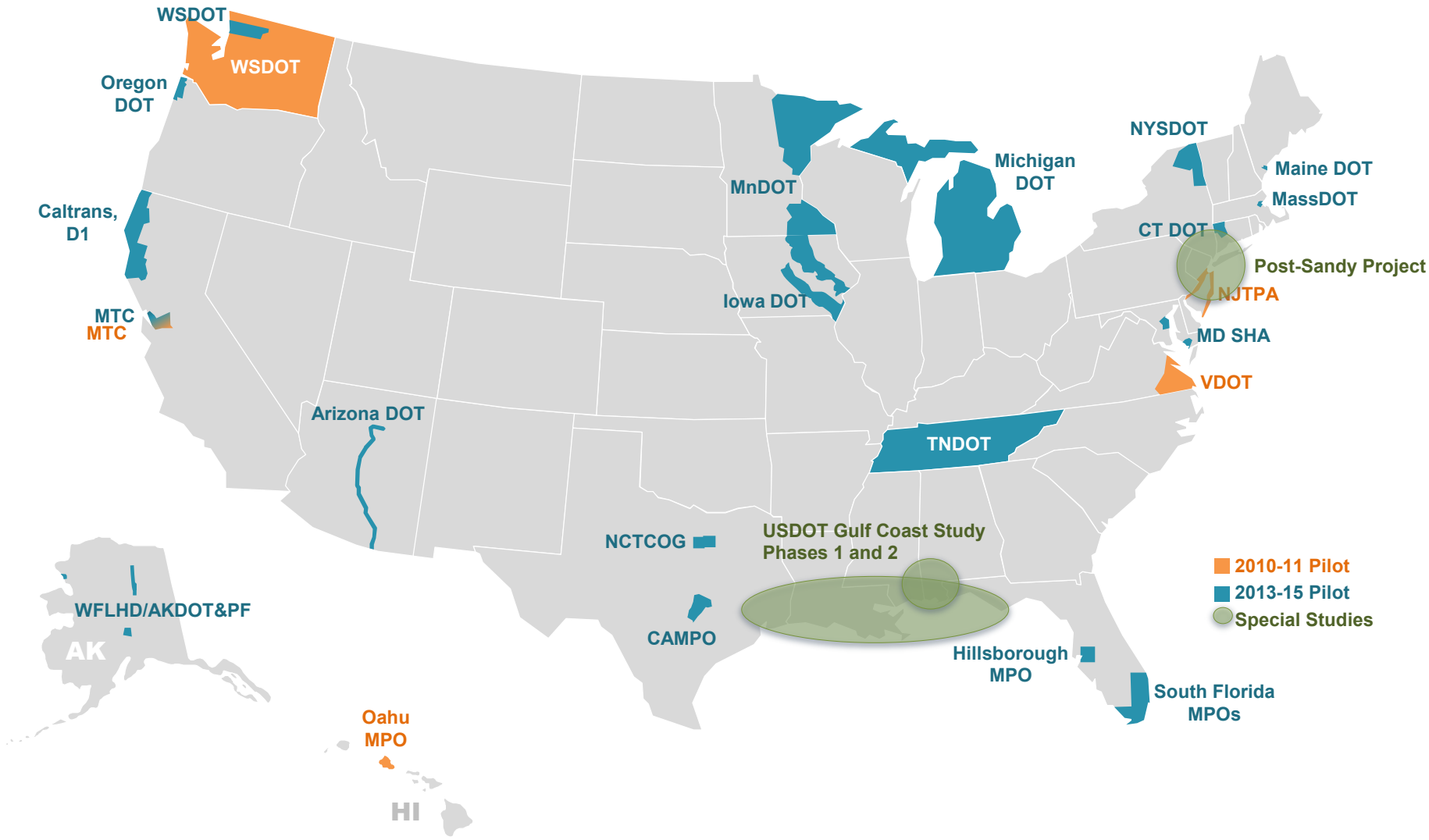
Flooding from Hurricane Harvey, Credit: TTI

April 2017 flooding in Washington State, Credit: WSDOT

Working with Partners Across the Country

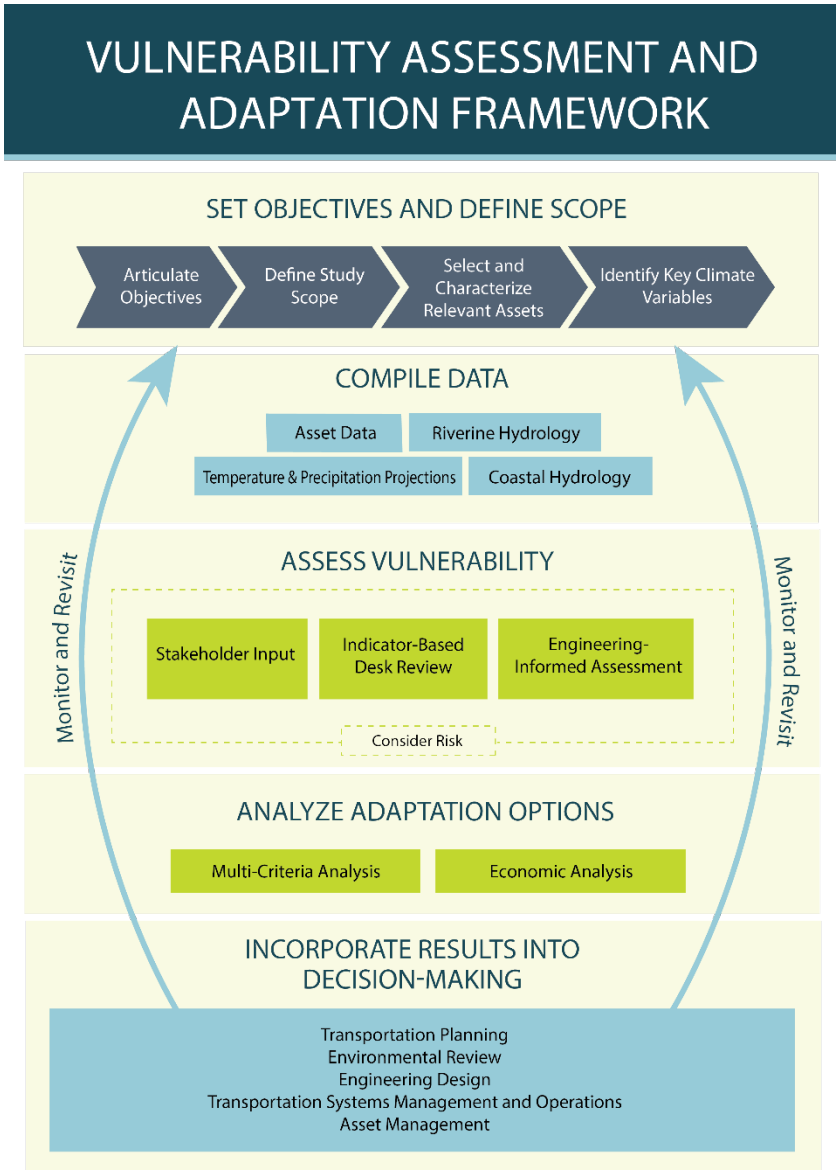


Vulnerability Assessment Studies

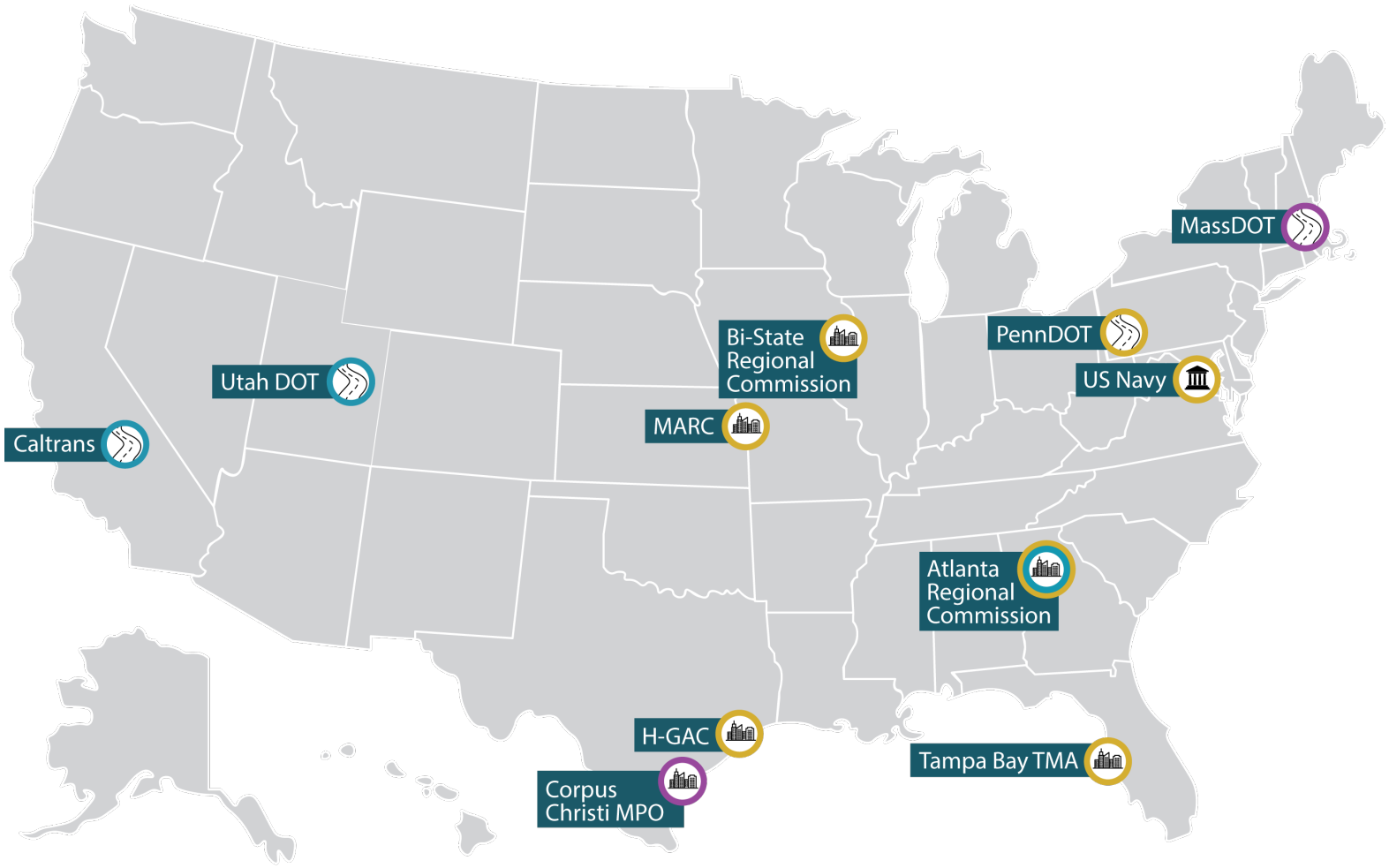


Vulnerability Assessment and Adaptation Framework, 3rd Edition

- Provides an in-depth and structured **process** for conducting a vulnerability assessment.
- Features **examples** from assessments conducted nationwide.
- Incorporates information from recent FHWA and other Federal **partner projects**.
- Includes links and references to related **resources and tools**.



2018-2020 Resilience and Durability Pilots



Lead Agency:

= MPO

= DOT

= Federal

Type of Project:

= Integrating resilience and durability into agency practices.

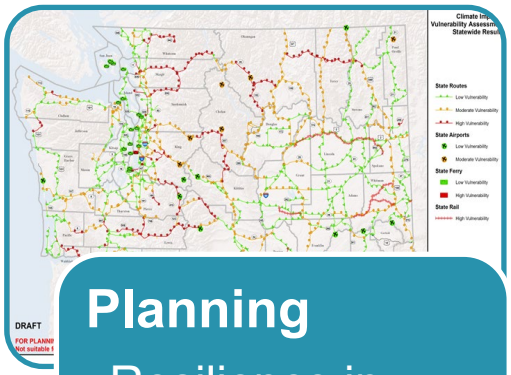
= Using available tools and resources to assess the vulnerability and risk of transportation projects or systems.

= Deploying a resilience solution and monitoring performance.

Ongoing FHWA Resilience Projects

Goal: Integrate consideration of resilience in transportation decision making

- In support of 23 U.S.C. § 503(b)(3)(B)(viii), which directs the U.S. Department of Transportation "to carry out research and development activities … to study vulnerabilities of the transportation system to … extreme events and methods to reduce those vulnerabilities."



Planning

- Resilience in Asset Management
- Resilience in Transportation Planning

Project Level

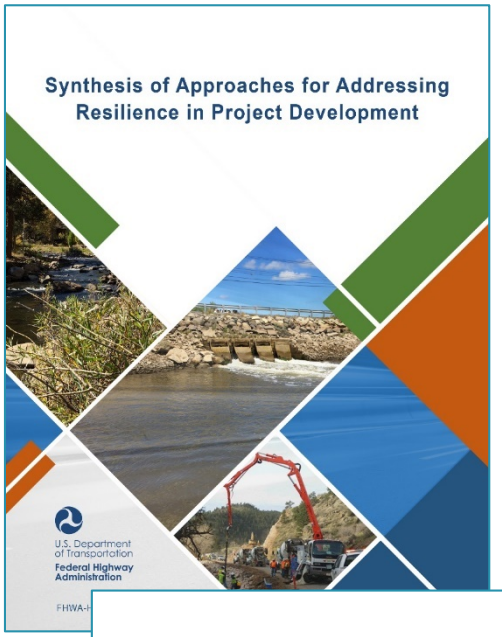
- Coastal and Riverine Hydrology Manuals
- Nature Based Resilience for Coastal Highways

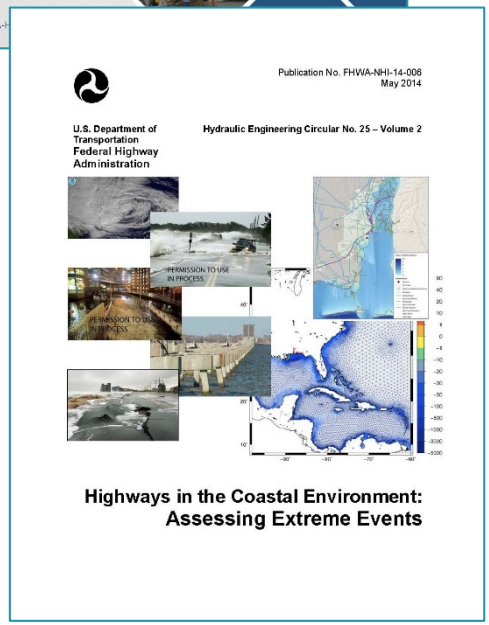
Operations and Maintenance

- Emergency Response
- Resilient Recovery

Integrating Resilience at a Project Level

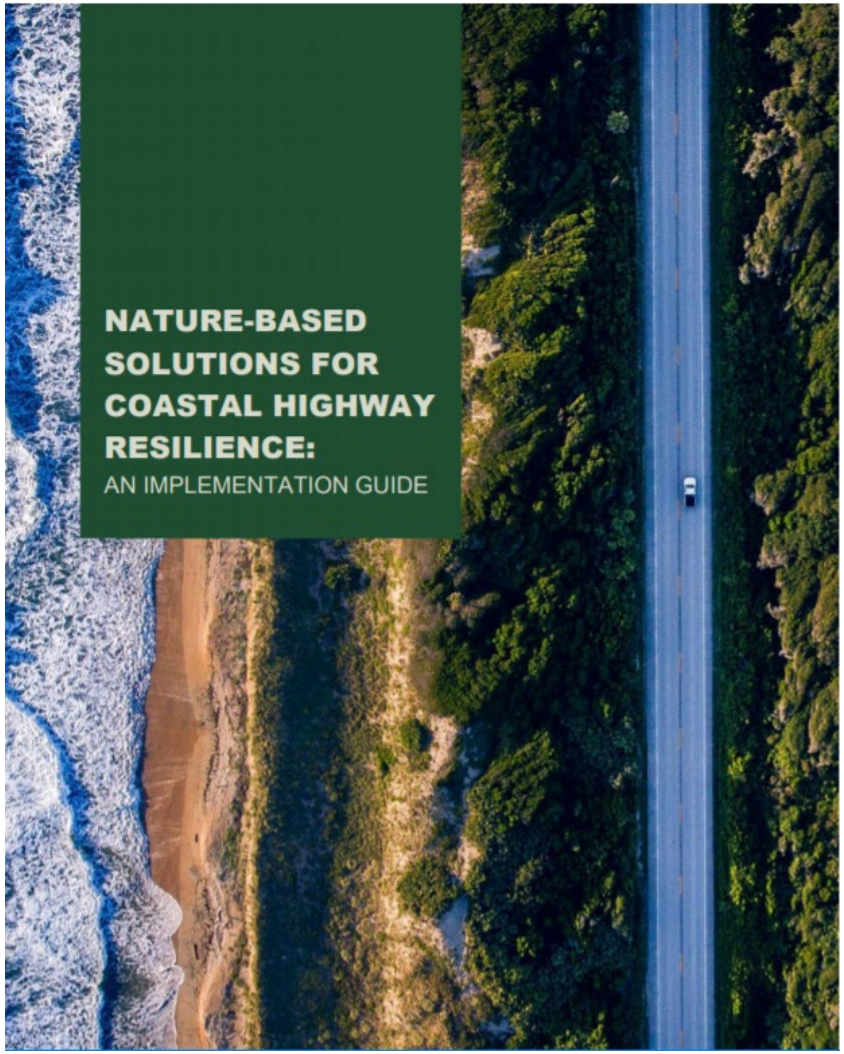
- Transportation Engineering Approaches to Climate Resiliency (TEACR)
  - Overall lessons learned for engineering
  - Coastal Hydraulics
  - Riverine Flooding
  - Pavements and Soils
  - Mechanical and Electrical Systems
- HEC 25: Highways in the Coastal Environment, V2
  - How to incorporate extreme events in coastal design
  - Sea level rise, storm surge, wave action
  - 3 approaches (low, medium, high level of effort)
- HEC 17: Highways in the River Environment
  - Strategies ranging from sensitivity analysis with higher discharges to integrating climate model rainfall projections into local hydrologic models





Nature-based Resilience Solutions

- **FHWA Goal**: Provide research and technical assistance to transportation agencies on how they can use nature-based solutions (such as wetlands, dunes, beaches, and reefs) to reduce coastal flood and erosion risks to highways.
- **FHWA Products**:
  - 5 pilot projects, 2018
  - Regional peer exchanges, 2018
  - Implementation Guide, 2019
- **Funding Opportunity**: FHWA is collaborating with NOAA on Effects of Sea Level Rise research grant program. 2021 call will include focus on how nature-based solutions can improve transportation resilience.



Rapid Resilience Assessments

A small team of FHWA, State DOT, and contractor subject matter experts conduct “Rapid Resilience Assessments” of affected locations 6-8 weeks after an event and report on their observations:

- *What appeared to happen?*
- *What were the impacts?*
- *What seemed to demonstrate resilience?*
- *What are some options to improve the resilience of repaired or reconstructed facilities?*

Resilience in Asset Management

- State DOTs required to develop **asset management** plans that identify and address risks to the National Highway System (NHS) pavements, bridges, and performance (23 USC 119(e))

  > *"including risks associated with current and future environmental conditions, such as extreme weather events, climate change, seismic activity, and risks related to recurring damage and costs as identified through the evaluation of facilities repeated damaged by emergency events carried out under part 667 of this title." (23 CFR 515)*

- 6 Resilience in Asset Management Pilots (2017-19): Arizona, Texas, Kentucky, Maryland, Massachusetts, New Jersey
- Forthcoming handbook (expected in 2020):
  - Developing asset inventory informed by natural hazard/vulnerability assessments
  - Identifying and managing risks
  - Conducting life cycle planning
  - Creating resilient investment strategies and financial plans

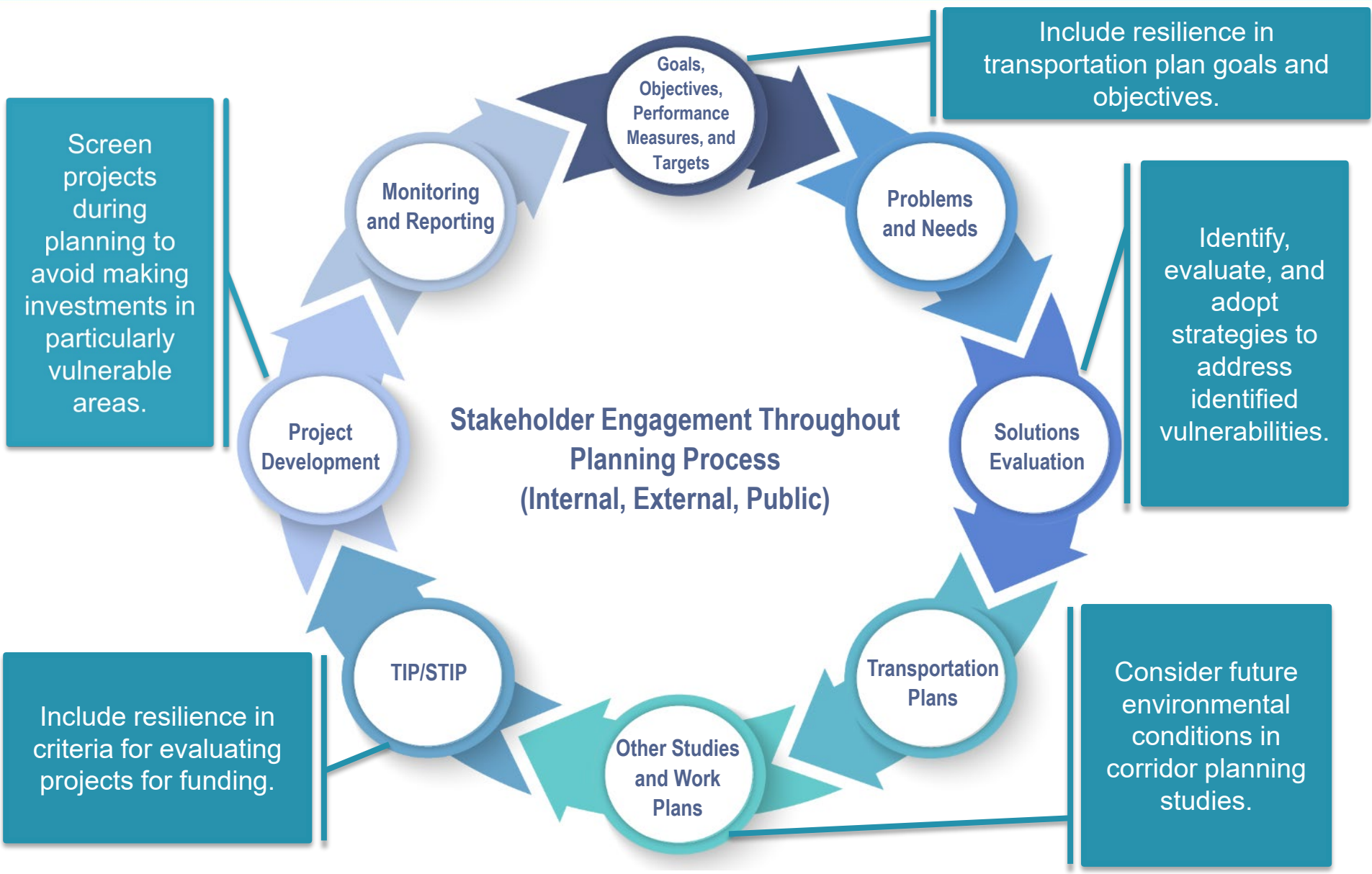
www.fhwa.dot.gov/asset/pilot

Resilience in Transportation Planning

- State and metro **transportation planning** include resilience as a planning factor (23 USC 134, 23 CFR 450)
- **Metropolitan transportation plans** shall include an assessment of capital investment and other strategies to… reduce the vulnerability of the existing transportation infrastructure to natural disasters (23 CFR 450.324(f)(7))
- **Project: Integrating Resilience into the Transportation Planning Process**
  - Workshops and Peer Exchanges
  - Fact Sheet (January 2017)
  - White Paper (May 2018)
  - Handbook (Coming 2020)

https://www.fhwa.dot.gov/environment/sustainability/resilience/ongoing_and_current_research/planning/

Consider Resilience in the "Typical" Transportation Planning Process

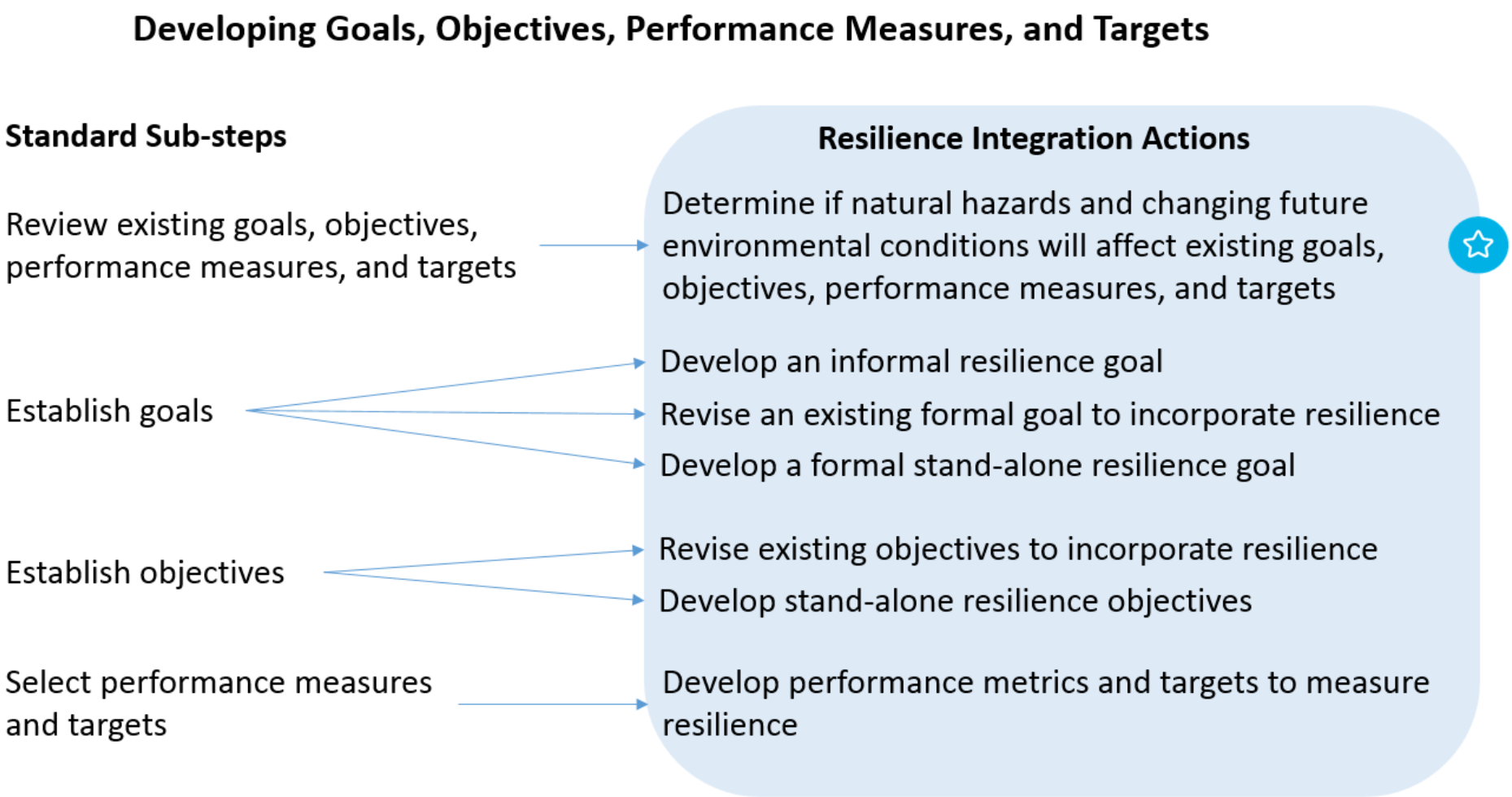


Stakeholder Engagement

- Raise Awareness
- Build Support
- Expand Your Network
- Find Resources
- Become a Resource

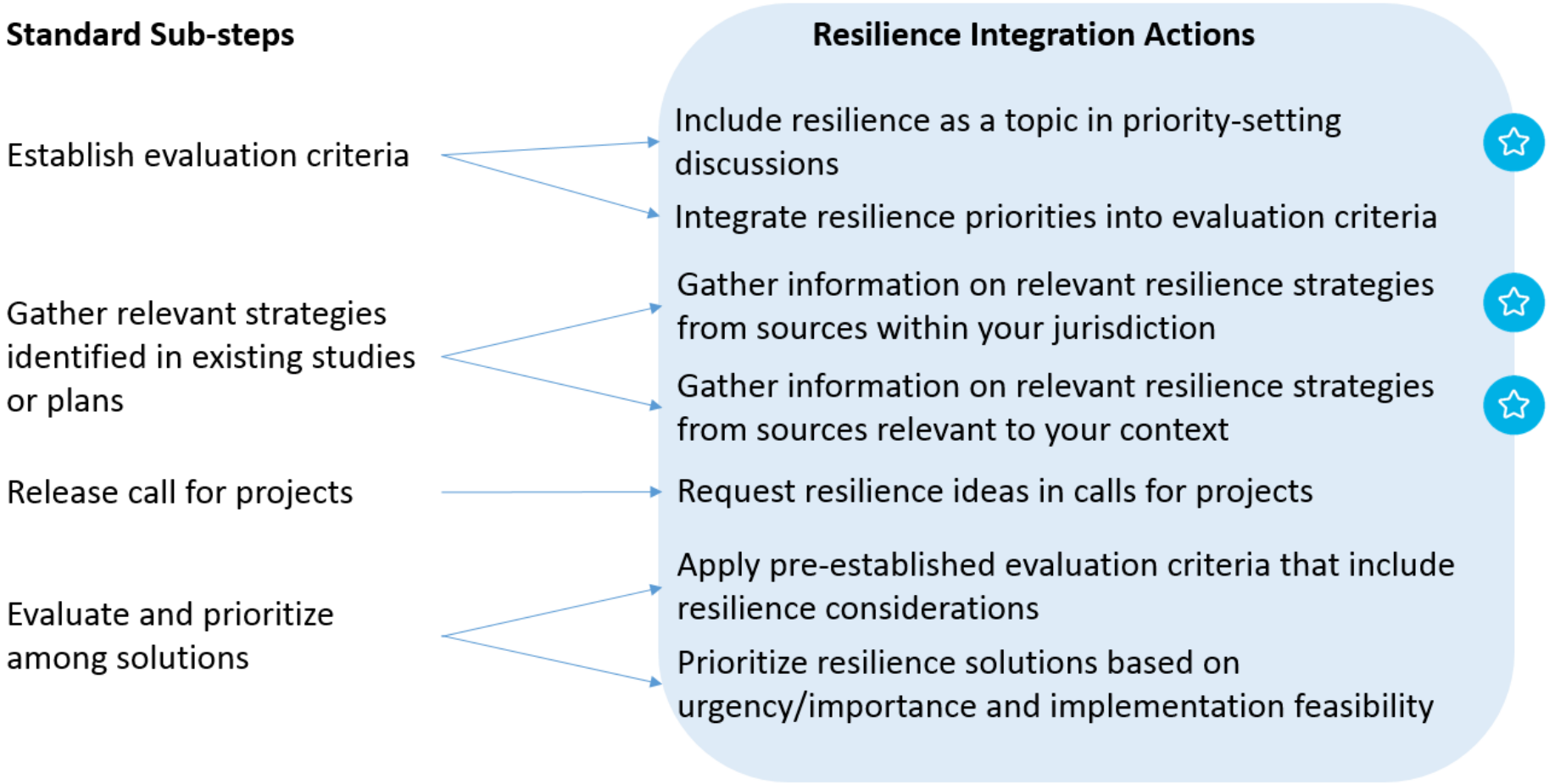
Integration Action	Potential Approaches
Build a culture of resilience	▪ Identify a champion(s) ▪ Garner support from leadership
Enhance internal communication and build support across departments	▪ Delegate tasks according to expertise ▪ Establish resilience goals, objectives, performance measures, and targets ▪ Plan for and schedule collaboration efforts ▪ Set up committees
Coordinate with and solicit information from external partners, agencies, or institutions	▪ Formal avenues of coordination (e.g. interagency workgroups) ▪ Ad hoc avenues of coordination ▪ Serve as a resource to external stakeholders
Communicate effectively with the public	▪ Reach out to vulnerable communities ▪ Use avenues already in place in your agency ▪ Pursue creative engagement strategies

Consider Resilience When Developing Goals, Objectives, Performance Measures, and Targets

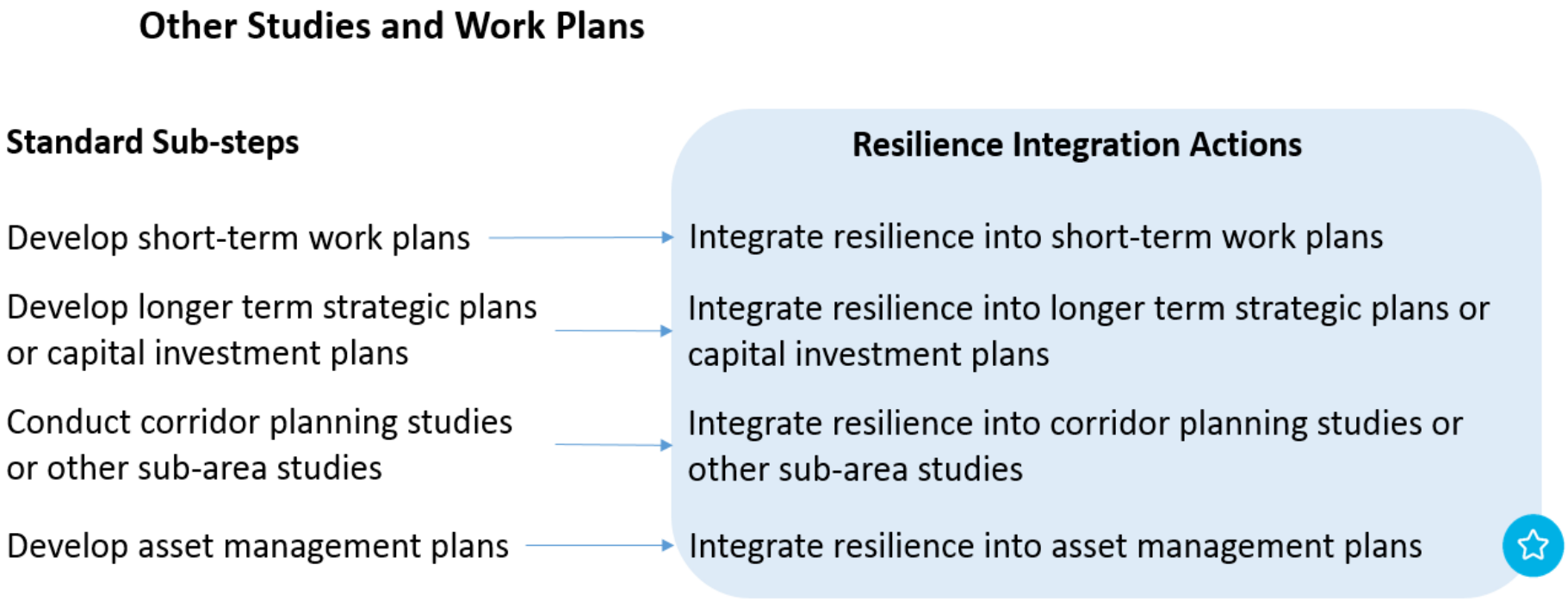


Consider Resilience When Evaluating Solutions

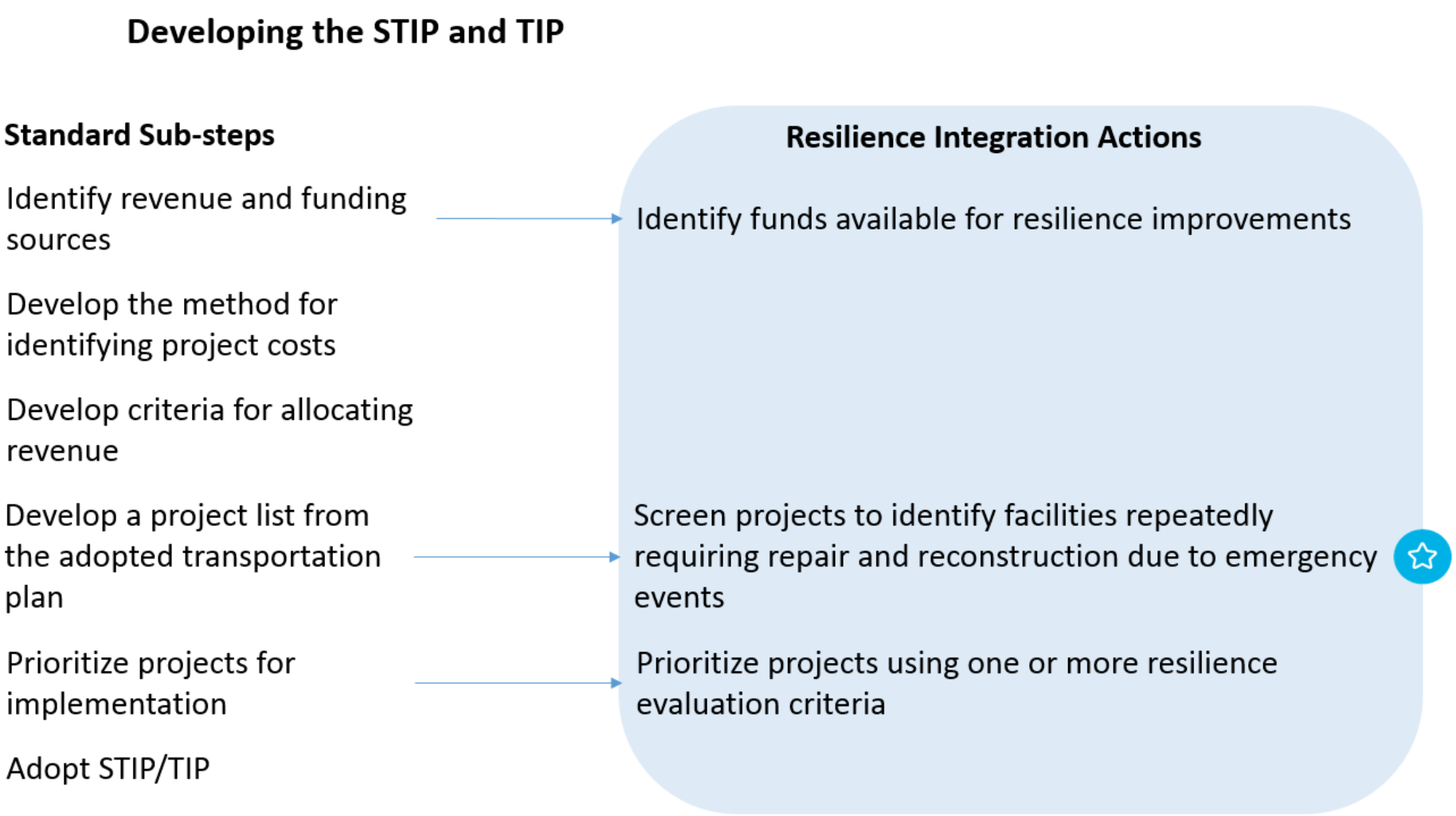
Evaluating Solutions



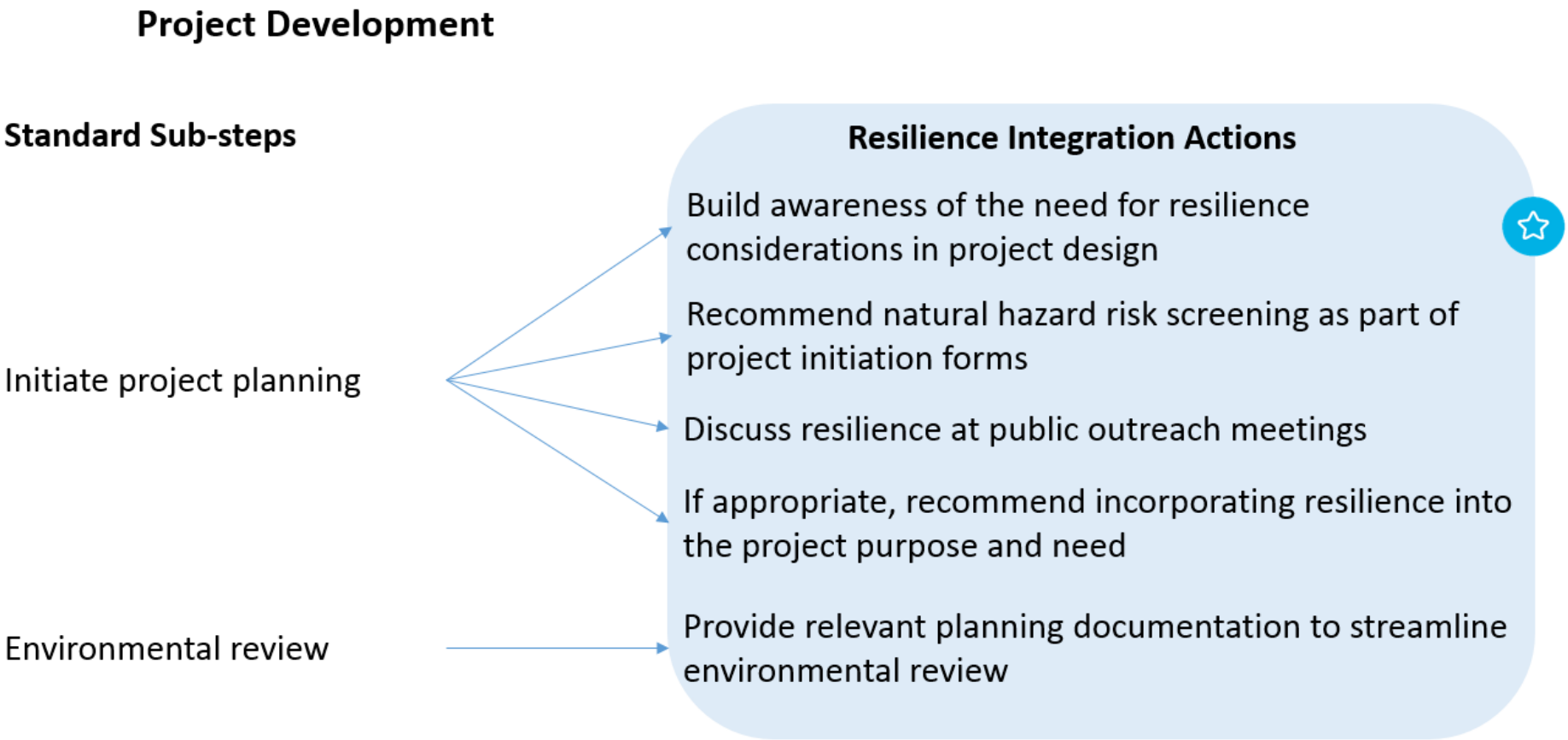
Consider Resilience in Other Studies and Work Plans



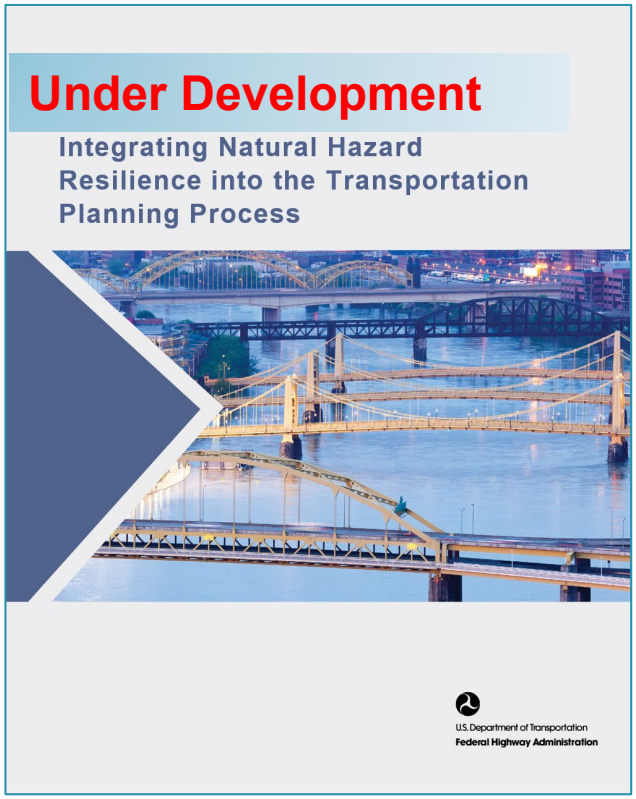
Consider Resilience When Developing the STIP and TIP



Consider Resilience in Project Development



What is the Handbook?

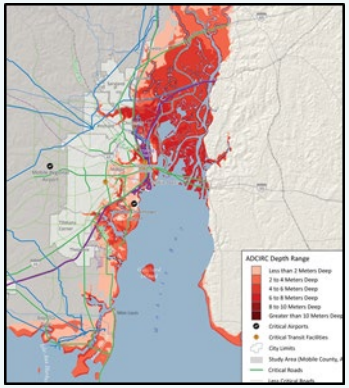


Resources include:

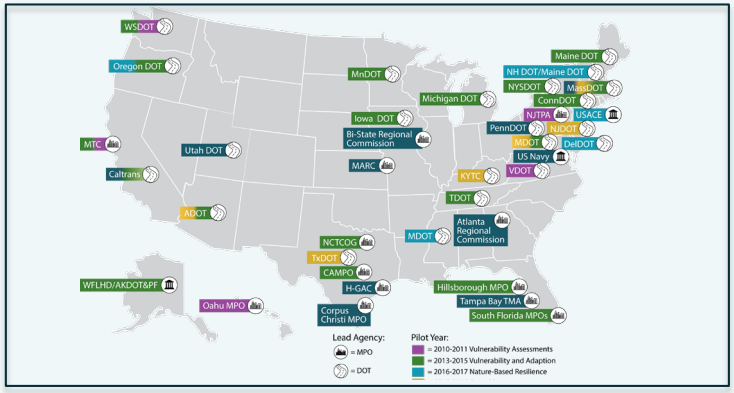
- A range of options for considering resilience throughout the transportation planning process.
- Information for every step in the planning process, including key resources.
- Real-world examples of how agencies are integrating resilience into transportation planning.

FHWA Resilience Resources

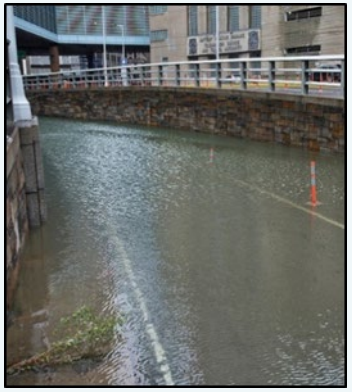
Gulf Coast 2 Study



Resilience Pilots with State DOTS & MPOs



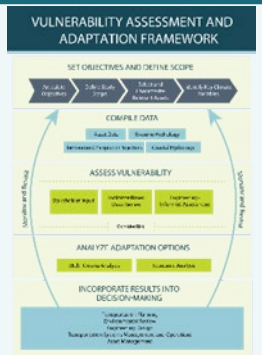
Hurricane Sandy Project



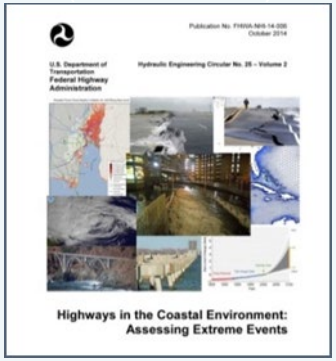
Engineering Assessments Study

https://www.fhwa.dot.gov/environment/sustainability/resilience/

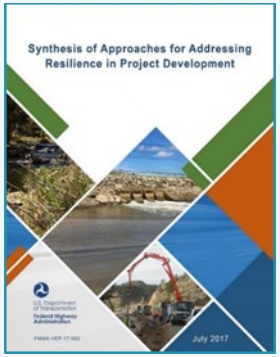
Vulnerability & Adaptation Framework



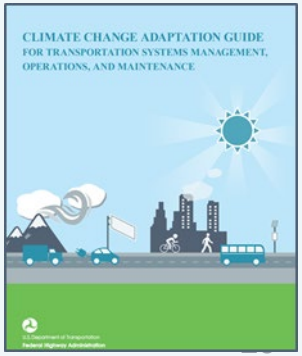
Engineering Guidance (HEC-25 & 17)



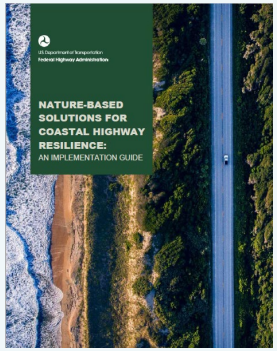
Project Development



Operations & Maintenance



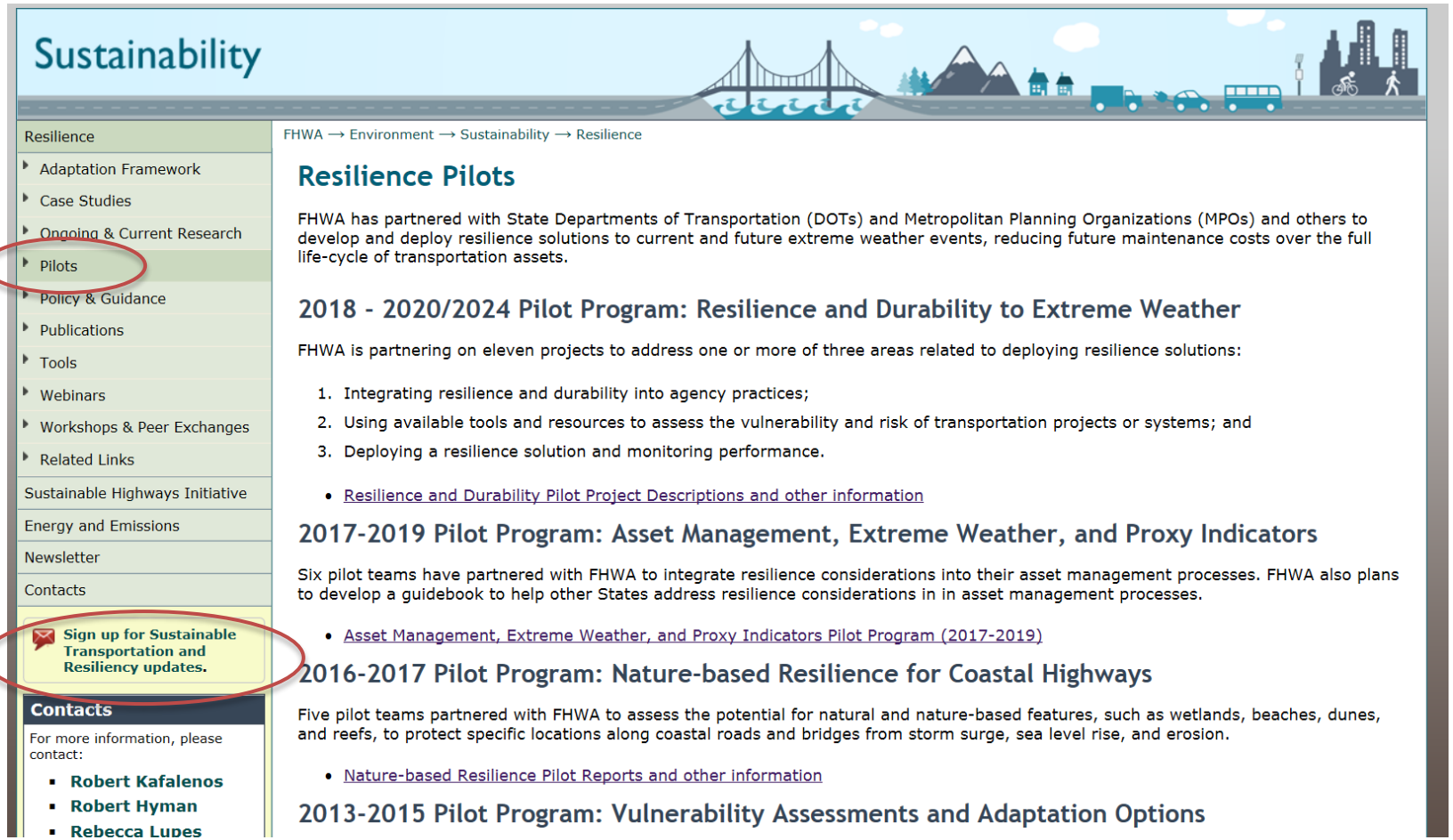
Nature-Based Solutions



Website, Contact Info, Thank you!

Pilots

Sign up for emails



https://www.fhwa.dot.gov/environment/sustainability/resilience/

THANK YOU!

Contact Information: Heather.Holsinger@dot.gov

Website: https://www.fhwa.dot.gov/environment/sustainability/resilience/

Funding for Transportation Climate Resilience

Types of Funding Sources

Eligible for Planning/Research Activities

- Conducting Vulnerability (Risk) Assessments
- Identifying at-risk assets
  - Roads, trails, bridges, culverts, transit facilities, docks/boat ramps
- Identifying threats and climate projections
  - Sea-level rise, extreme storm events, wildfires, increased heat, drought, erosion, permafrost melt

Eligible for Project Activities

- Construction or other projects to adapt to climate effects

TTP Funding Sources

- TTP Formula allocation (planning and projects)
  - Formula based
- TTP 2% Planning Funds (planning*)
  - Formula based
- TTP Bridge Program (projects)
  - Funded based on sufficiency rating for the bridge
  - The lower the rating, the higher likelihood of being funded
- TTP Safety Program (projects)
  - Competitive program

Other Federal Transportation Sources

- Better Utilizing Investments to Leverage Development - BUILD (projects and planning)
  - Competitive program
  - Minimum award $1 million (rural) $5 million (urban), no minimum for planning grants
- Infrastructure for Rebuilding America - INFRA (projects)
  - Competitive program
  - Minimum award $5 million (small projects), $25 million (large projects)
- Nationally Significant Federal Lands and Tribal Projects Program - NSFLTP (projects)
  - Competitive program
  - Minimum $25 million, with priority consideration for projects over $50 million
  - TTP funds cannot be used as the non-federal share

Other Federal Transportation Sources, cont.

- Emergency Relief for Federally Owned Roads - ERFO (projects)
  - Funding for repair or replacement after damage by natural disaster or catastrophic failure from external cause
  - Tribal transportation facilities are funded at 100%
  - Essentially replaces what was there before, but betterments may be eligible if determined cost effective. Betterments may also be funded with supplemental sources.
  - Coordination with BIA Region
- FHWA Federal-Aid funding (projects and planning)
  - Coordination with State DOT
  - Local Public Agencies Program

Federal Non-Transportation Sources

- Bureau of Indian Affairs Resilience Program (Planning)
- Environmental Protection Agency - EPA
  - Smart Growth Grant (Planning and Projects)
- National Oceanic and Atmospheric Administration - NOAA
  - Supporting Resilient Coastal Communities in a Changing Climate (Planning and Projects)
- US Fish and Wildlife Service - USFWS
  - National Fish Passage Program (Projects)
- Federal Emergency Management Agency - FEMA
  - Hazard Mitigation Grant Program (Planning and Projects)
  - Hazard Mitigation Grant Program Post Fire (Projects)
  - Building Resilient Infrastructure and Communities (Projects)
  - Flood Mitigation Assistance Grant (Projects)

State/Local Sources

- California
  - Department of Transportation (CalTrans) SB1 Adaptation Planning Grant (Planning)
  - Resilience Challenge 2020 Grant (Planning)
- Minnesota Department of Transportation Flood Mitigation Program (Projects)
- Massachusetts Coastal Resilience Grant Program (Planning and Projects)
- Washington Climate Change Planning Grants (Planning)
- New York State Department of Environmental Conservation Climate Smart Communities Grant Program (Projects)
- Research climate funding opportunities in your State

Private Sources

- The Kresge Foundation Environment Program
- Wildlife Conservation Society Climate Adaptation Fund
- Robert Wood Johnson Foundation
- National Fish and Wildlife Foundation
- Various Economic Development Organizations
- Adaptation Clearinghouse
  - The Georgetown Climate Center
- Tribal Climate Change Guide
  - University of Oregon

Questions and Comments

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