THURSTON CLIMATE ADAPTATION PLAN

Plan Overview

thurston regional planning council

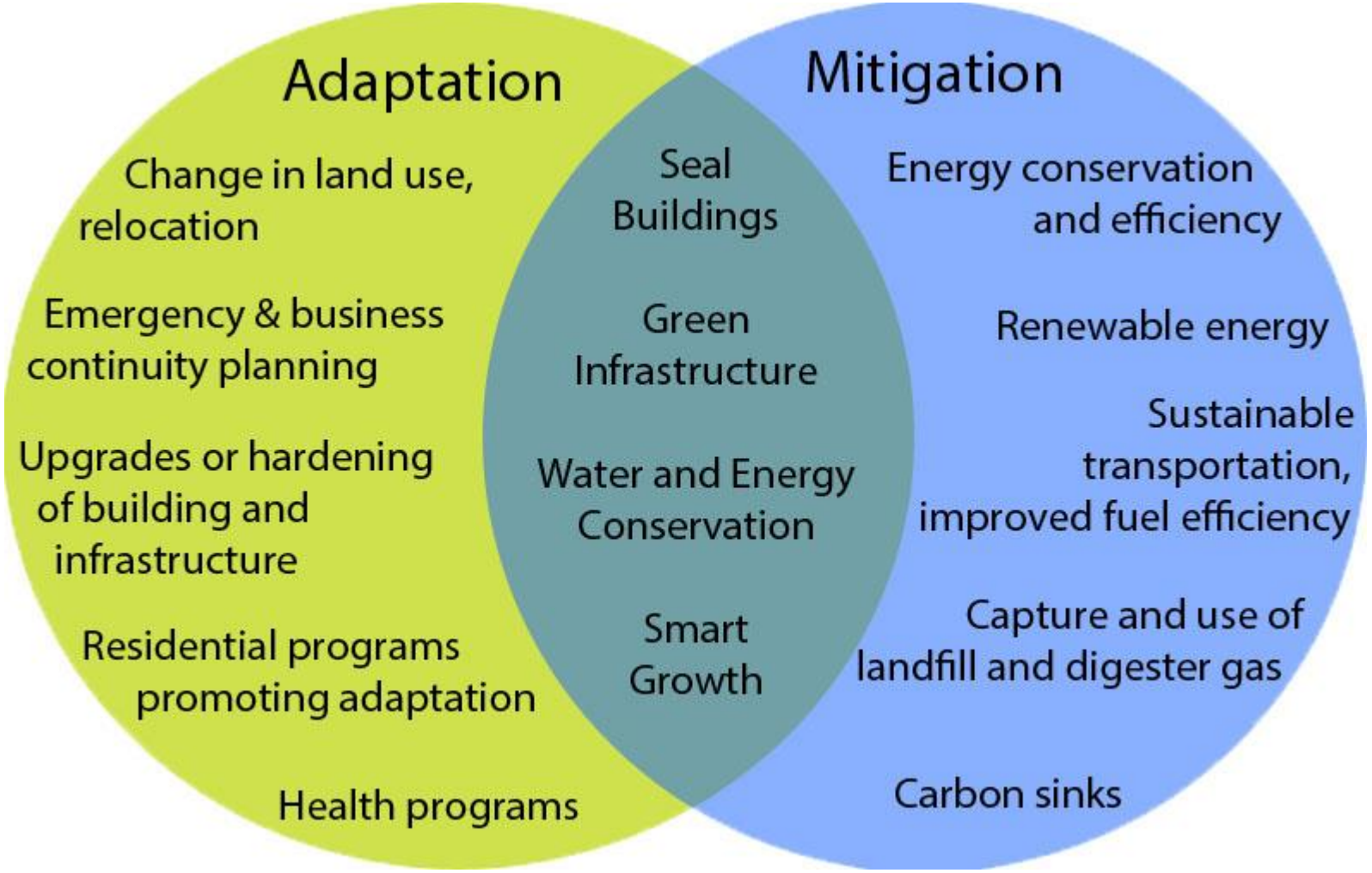
Adaptation and Mitigation

Climate adaptation refers to the ability to take advantage of opportunities, or to cope with the consequences.

Climate mitigation is any action to reduce the emission/sources of greenhouse gases

Why Adaptation?

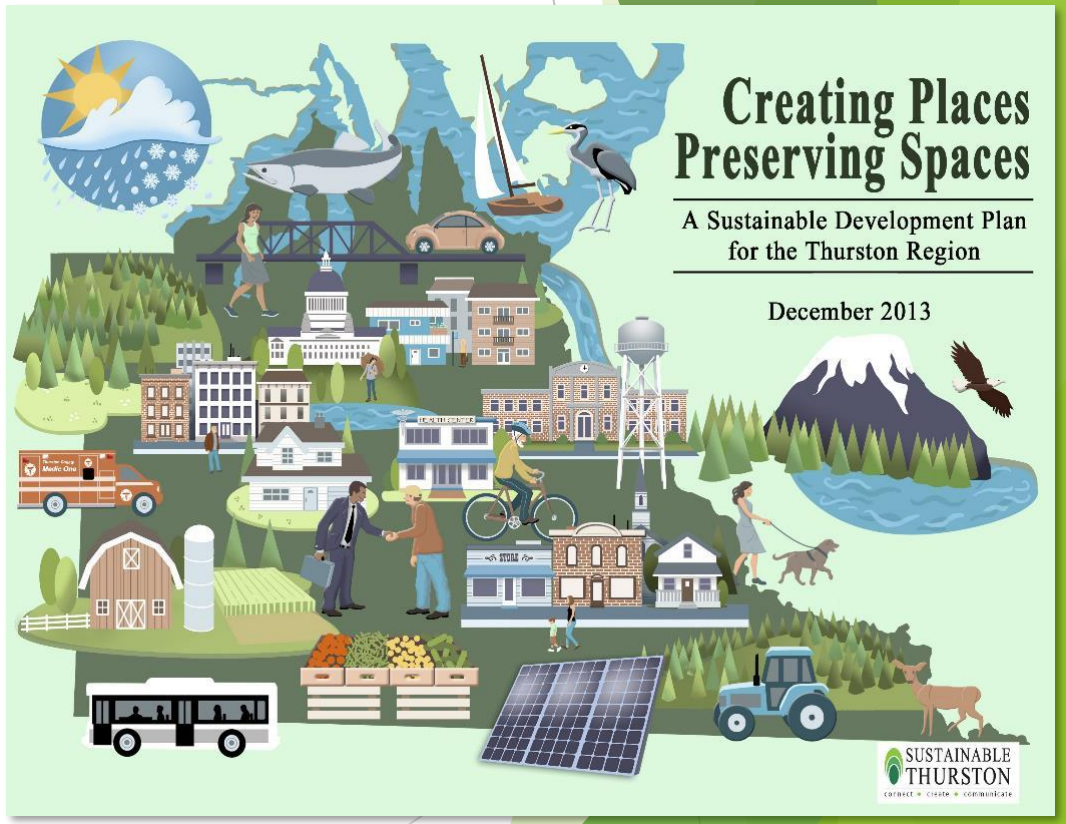
- It's necessary – even if we reduce our greenhouse gas emissions (mitigation)
- It's resiliency – the ability to withstand large disturbances
- It's socially and fiscally responsible –potentially saves lives and dollars



Sustainable Thurston

TRPC adopted the **Sustainable Thurston** plan in late 2013.

1. Create vibrant centers, corridors, and neighborhoods while accommodating growth
2. Preserve environmentally sensitive lands, farmlands, forest lands, prairies, and rural lands and develop 40 comped urban areas
3. Create a robust economy through sustainable practices
4. Protect and improve water quality, including groundwater, rivers, streams, lakes, and the Puget Sound
5. Plan and act toward zero waste in the region
6. Ensure that residents have the resources to meet their daily needs
7. Support local food systems to increase community resilience, health, and economic prosperity
8. Ensure that the regions water supply sustains people in perpetuity while protecting the environment
9. Move toward a carbon-neutral community
10. Maintain air quality standards
11. Provide opportunities for everyone in the Thurston Region to learn about and practice sustainability
12. Make strategic decisions and investments to advance sustainability regionally



Sustainable Thurston Climate Call to Action

Identifies strategies to enhance economic, social and environmental sustainability

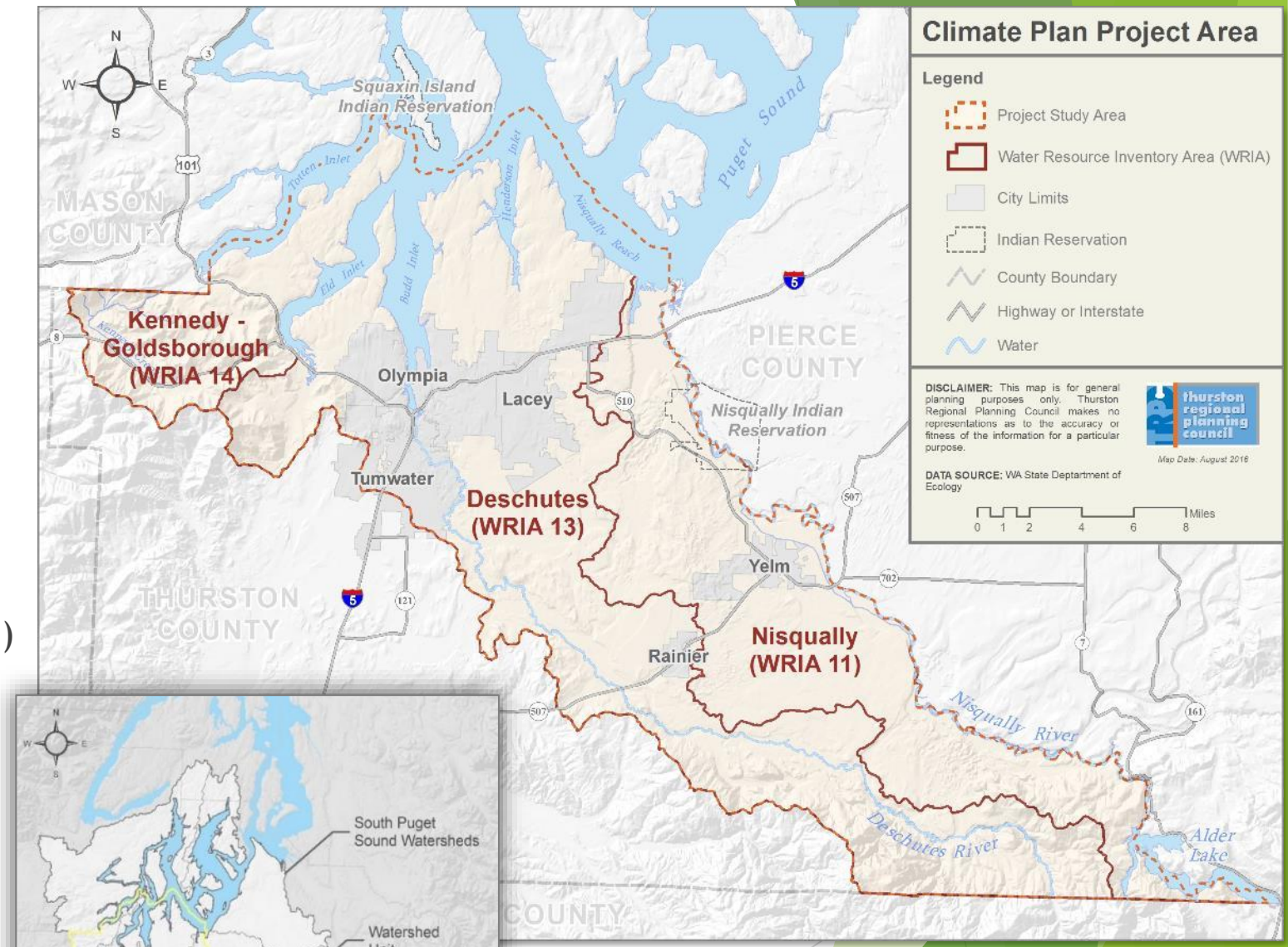
- First Action Step for Goal 9, Move toward a carbon-neutral community:

Find Resources to create a Thurston Region climate adaptation plan.

Project Snapshot

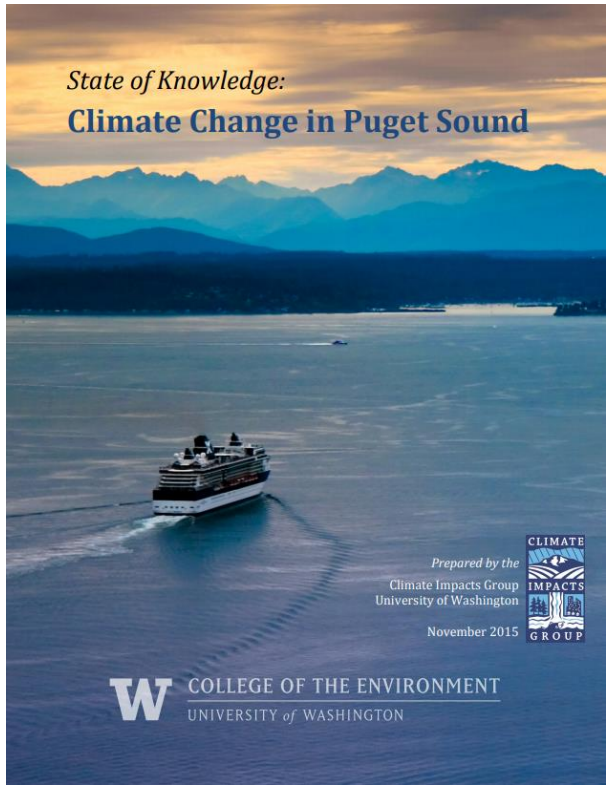
THURSTON CLIMATE ADAPTATION PLAN

- **Funding:**
  - U.S. EPA grant (National Estuary Program)
- **Project Area:**
  - South Puget Sound watersheds
- **Actions:**
  - Menu of actions for local municipalities, tribes, businesses, neighborhoods, households, etc.
  - Actions could be taken within entire county, Puget Sound region, elsewhere.



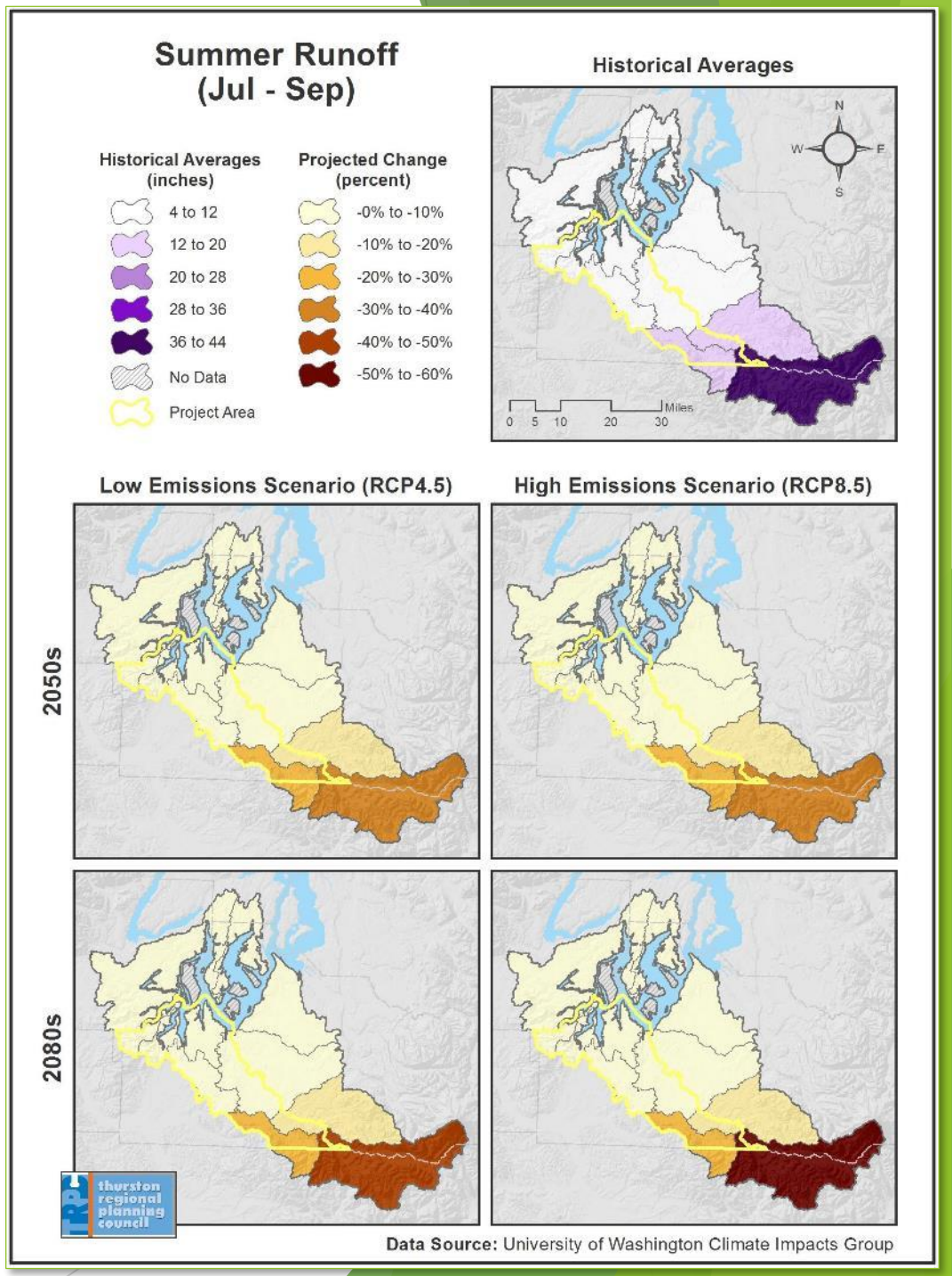
Science Summary

- **What:**
  - Describes observed and projected climate impacts at global, national, regional scales
  - Incorporates research and analysis from the UW Climate Impacts Group and other sources



Vulnerability Assessment

- Uses empirical data to show historical averages in region's climate over late 20th century (*right*)
  - **Study Area:** South Puget Sound (Mount Rainier to the marine shoreline)
- Uses emissions scenarios and climate models to show projected changes over 21st century
  - **Indicators:** temperature, precipitation, runoff, snowpack, streamflow, sea level, etc.
- Assesses impacts on the region's human and natural systems
  - **Assets Affected:** roads, estuaries, wells, crops, fisheries, forests, homes, health, etc.



Climate Impacts

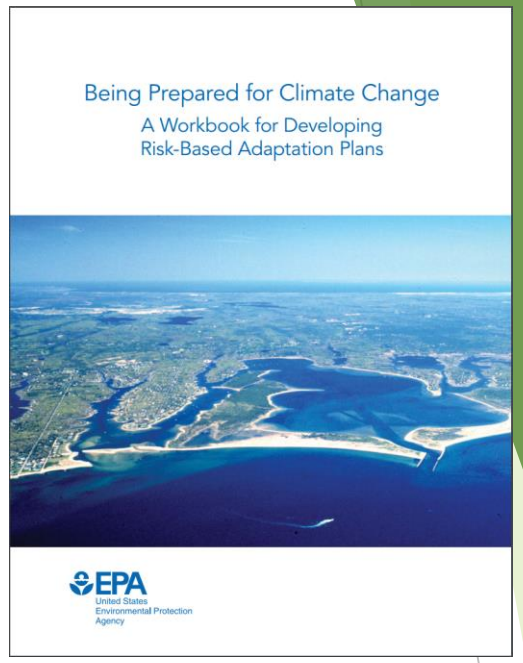
- **Outlook:**
  - Region's average annual air temperate continues to rise over 21st century
    - Continued natural variability (e.g., the El Nino and La Nina cycles)
    - Generally, **warmer, wetter winters** and **hotter, drier summers**
  - Changes anticipated to worsen existing hazards (floods, landslides, wildfires) and introduce threats (invasive plants and insects, infectious diseases).

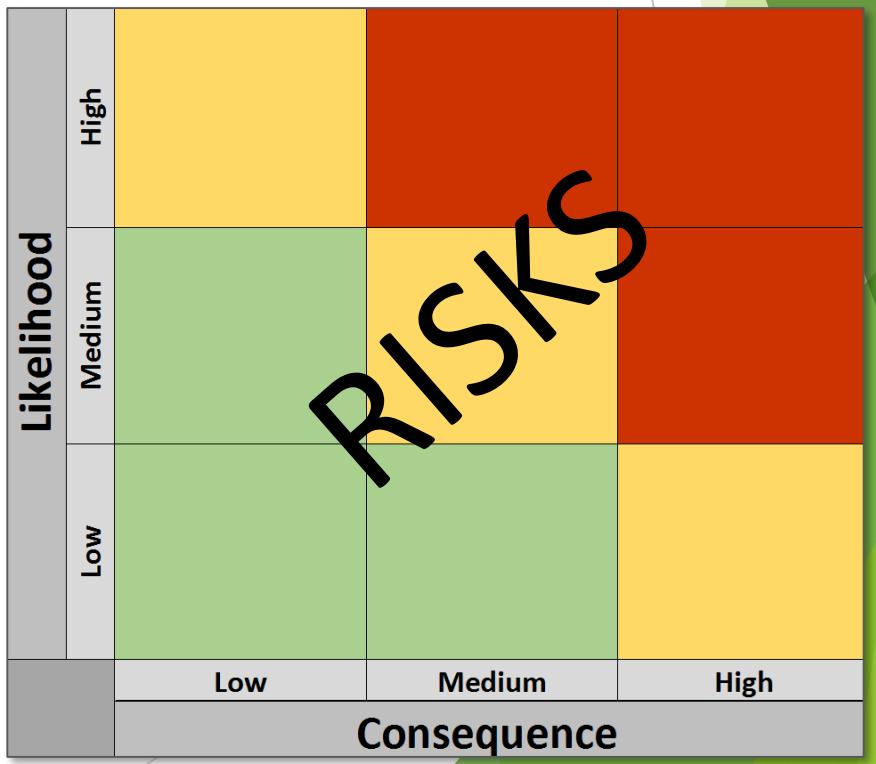
- **Risks & Impacts:**
  - Shrinking snowpack **=** Changes runoff timing and streamflow volume
  - Changing oceans **=** Threatens local fisheries (acidification and temp.)
  - Rising sea levels **=** Exacerbates coastal flooding and erosion
  - Warmer waters **=** Threatens water quality for humans, salmon, etc.
  - Bigger storms **=** Damages infrastructure, endangers people
  - Deeper droughts **=** Spurs water shortages, wildfires, crop losses

Risk Assessment

- **Analyzed Risks:**
  - Put 85 risks into a Consequence/Likelihood Matrix
  - Assessed impact of each risk (*High, Med., or Low*)
    - **Likelihood** – probability of impacts
    - **Consequence** – severity of impacts

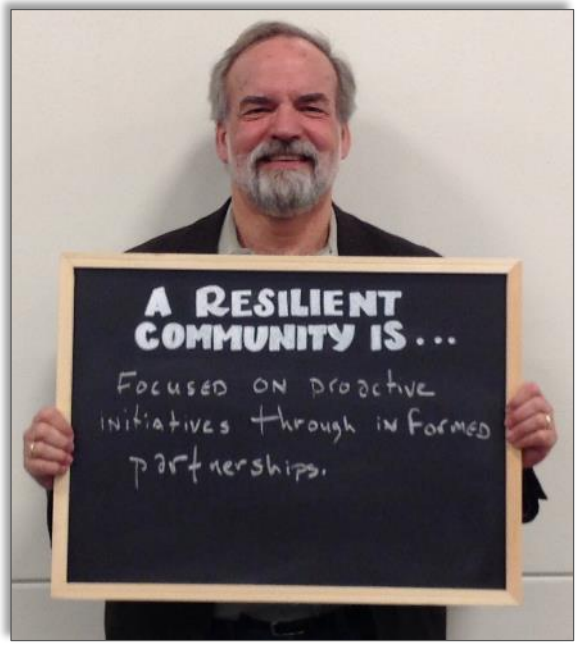
- **Selected Strategies:**
  - Either Accept Risk or Take Action …
  - Accept Risk means:
    - Monitoring the risk
    - Considering actions if impacts begin to occur
  - Take Action means:
    - Continuing or enhancing effective actions
    - Recommending new actions
    - Helping responsible partners (state and feds) adapt

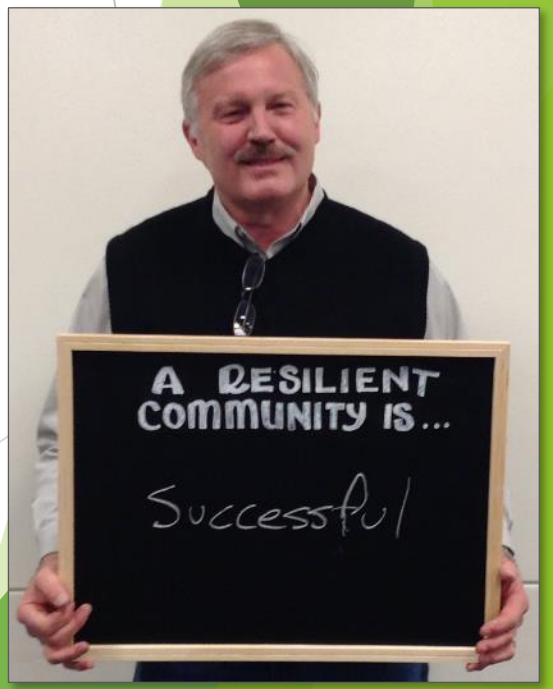




Public Engagement

- **Multimedia Strategy**
  - Meetings, messages, games ... Oh, my!



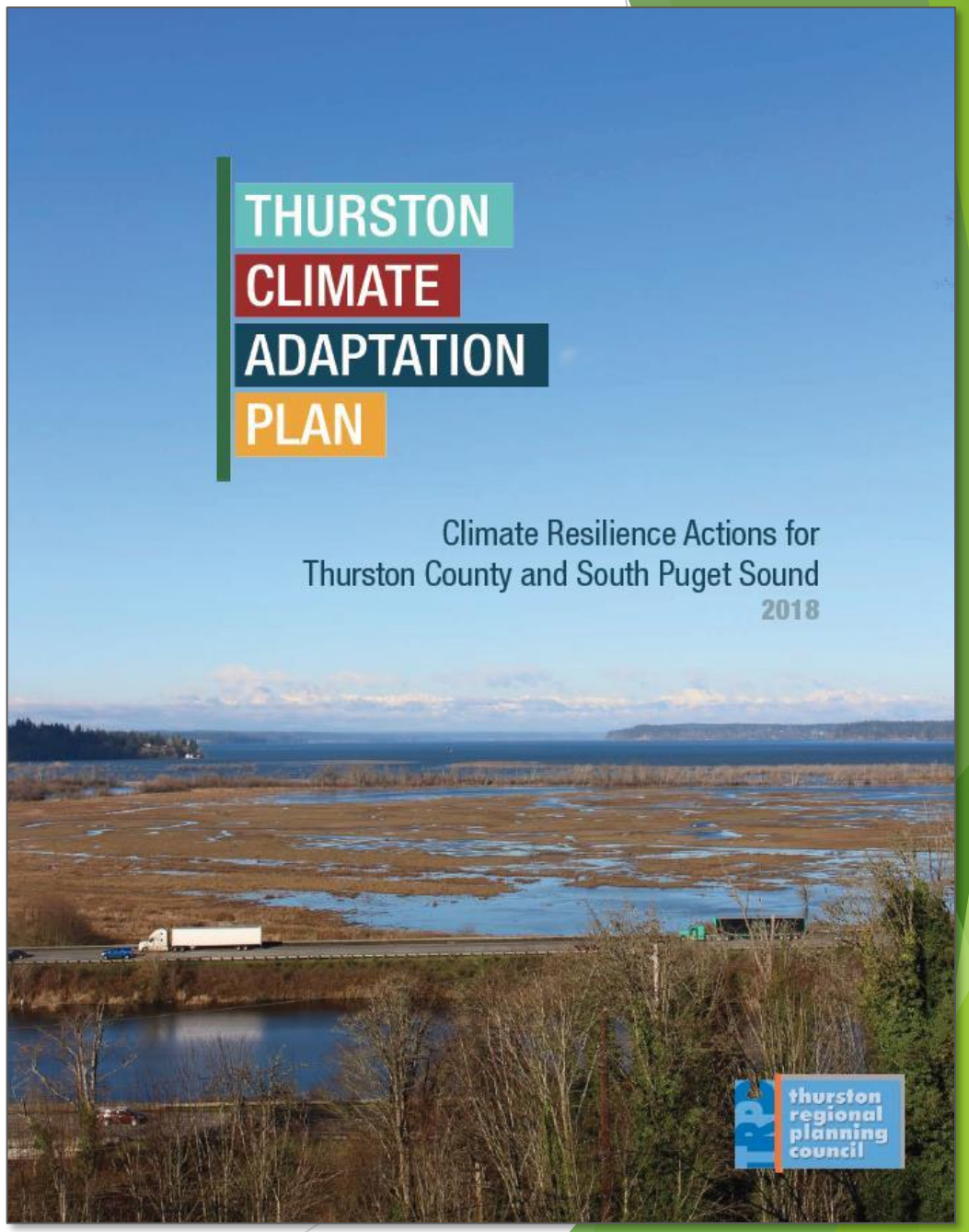


Adopted Plan

- www.trpc.org/climate

- Explores how observed and projected climate impacts affect our region's:
  - Built and natural assets
  - Human health and welfare

- Recommends "adaptation" actions to prepare for and respond to impacts:
  - **9 Guiding Principles**
  - **91** actions; **25** are priorities

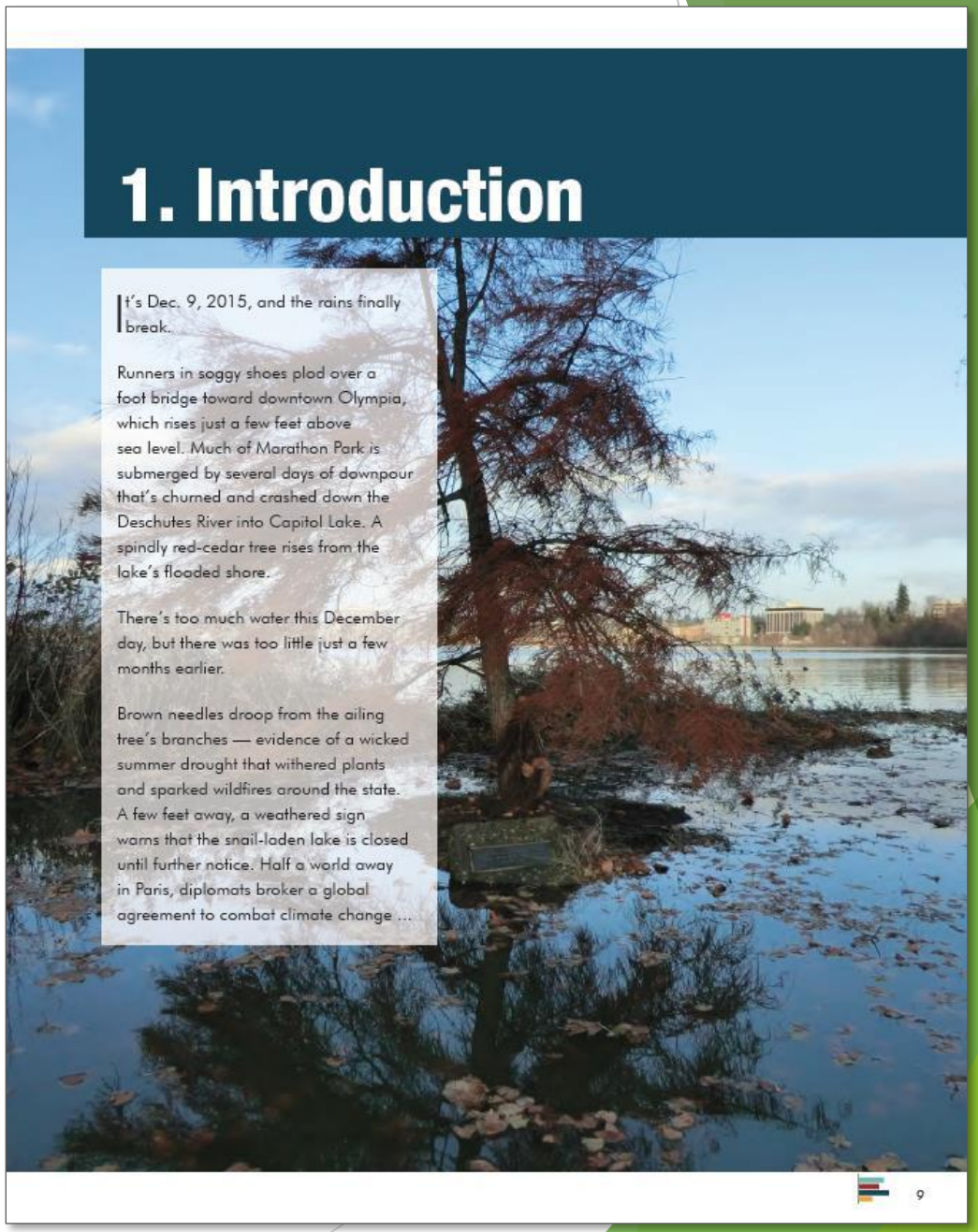


Guiding Principles

1. Think in terms of multiple generations and connected built and natural systems, as well as view local and regional decisions through the lens of social, economic, and environmental sustainability
2. **Increase resiliency through achievable, flexible — and, where possible, measurable and replicable — adaptation strategies and actions that will help the region prepare for and cope with climate change impacts**
3. Be responsive to immediate and long-term climate impacts — both emergencies and opportunities
4. Identify and leverage climate change adaptation strategies and actions with mitigation co-benefits, such as reducing, capturing, and storing greenhouse gas emissions
5. Utilize sound scientific research, scenarios modeling, economic analysis, and other tools to analyze regional and local climate change vulnerabilities, risks, and solutions
6. **Incorporate and complement work produced by others, including the Natural Hazards Mitigation Plan for the Thurston Region, Sustainable Thurston, Thurston Thrives, and Olympia sea-level rise analyses**
7. Consider the impacts of climate change adaptation recommendations on the region's economy, environment, and society; this includes all urban and rural communities — especially vulnerable residents — and the ecosystem benefits provided by natural systems
8. Recognize and strive to protect local indigenous tribes' community health and well-being, including natural resources security and self-determination
9. Seek broad community input, as well as educate residents about climate change and inspire them to take action.

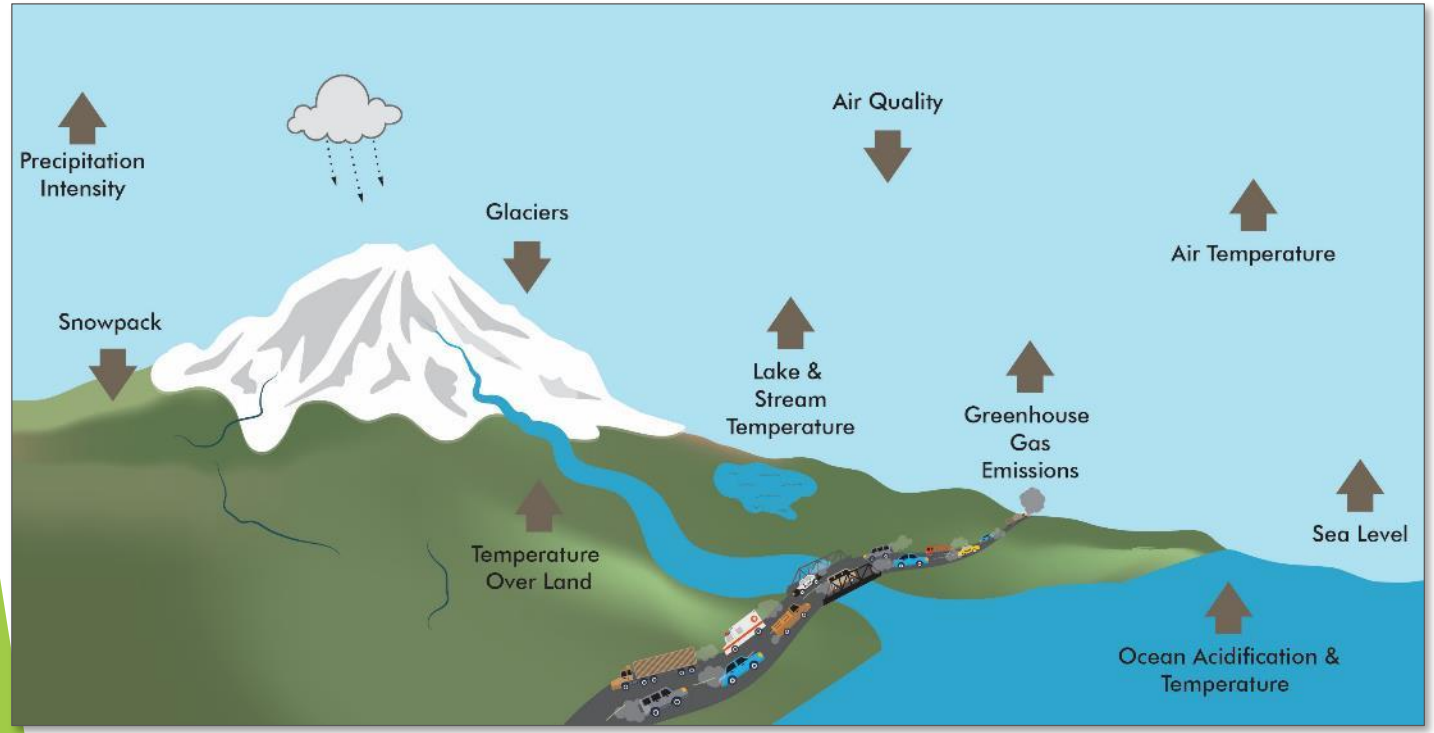
Plan Organization

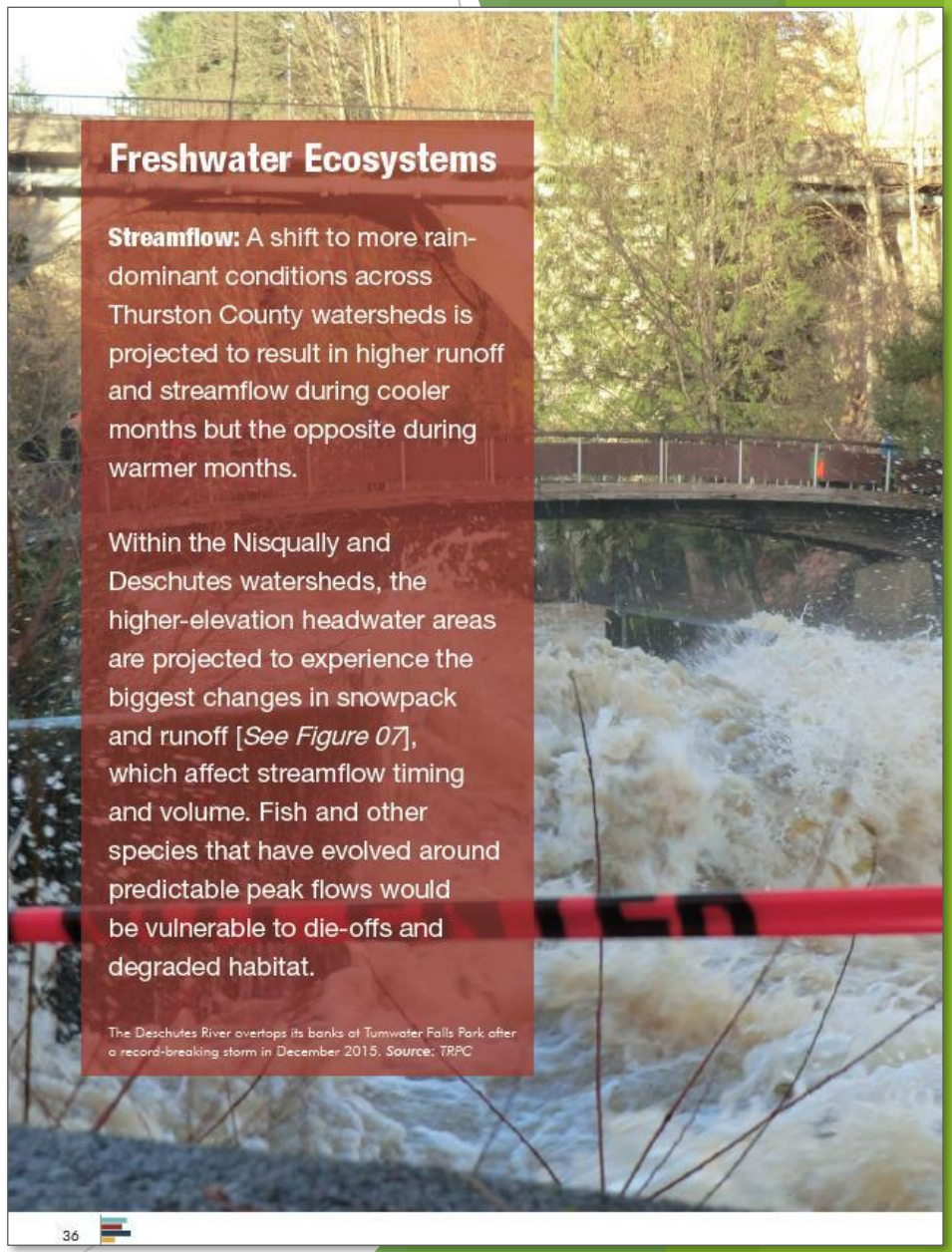
- **Integrates stakeholder input:**
  - Project vision, goals & guiding principles
- **Summarizes deliverables:**
  - Science Summary
  - Vulnerability Assessment
  - Risk Assessment
  - Action Evaluation & Prioritization
- **Includes 91 actions within 6 themes:**
  - General
  - Drought & Water Quality
  - Flood & Erosion
  - Plants & Animals
  - Transportation & Energy
  - Wildfire & Extreme Heat



Plan Design

- Enhances text with maps, photos, and graphics
- Explains complex information simply
- Connects science to policy clearly
- Includes technical information in appendices

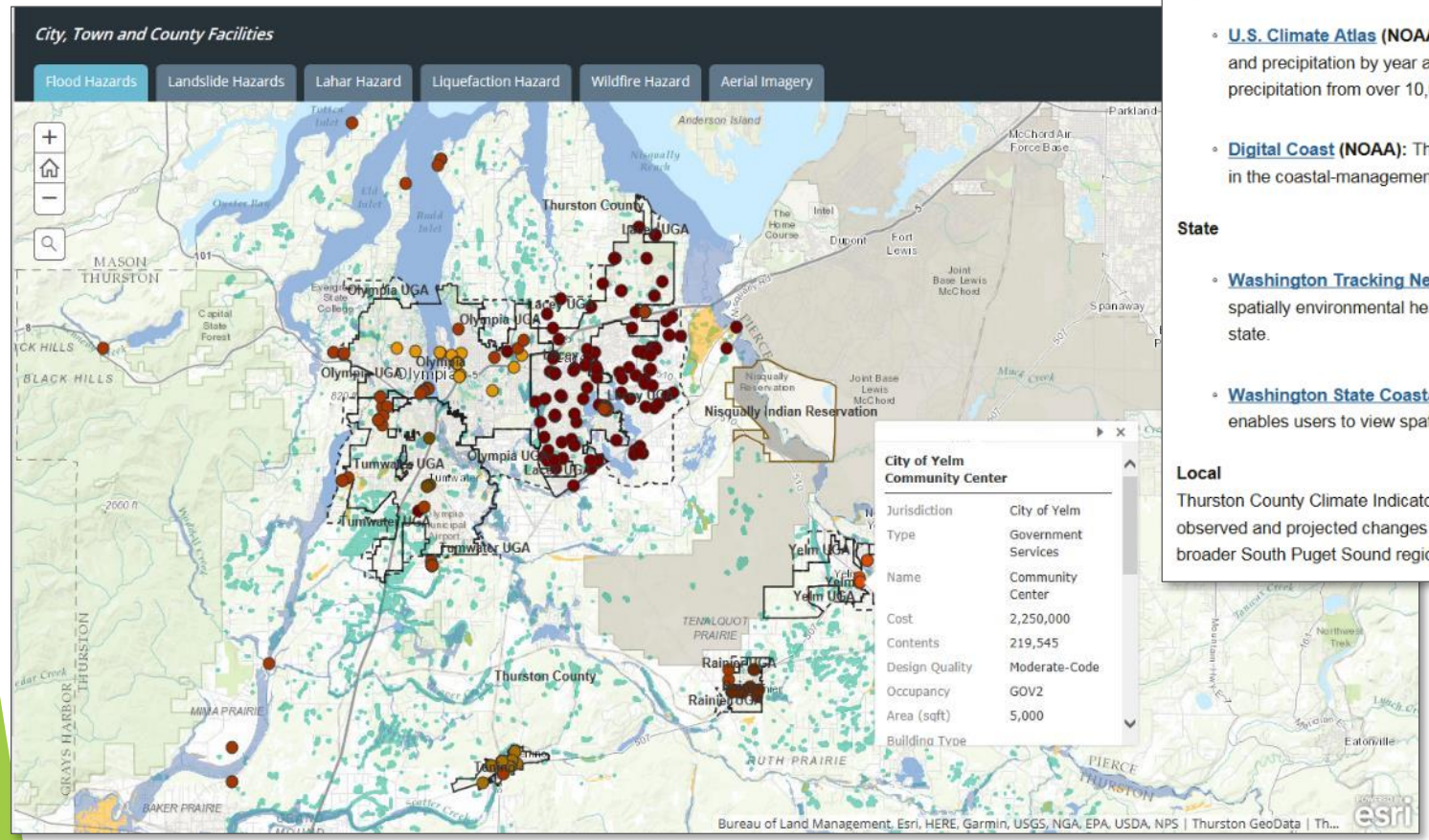


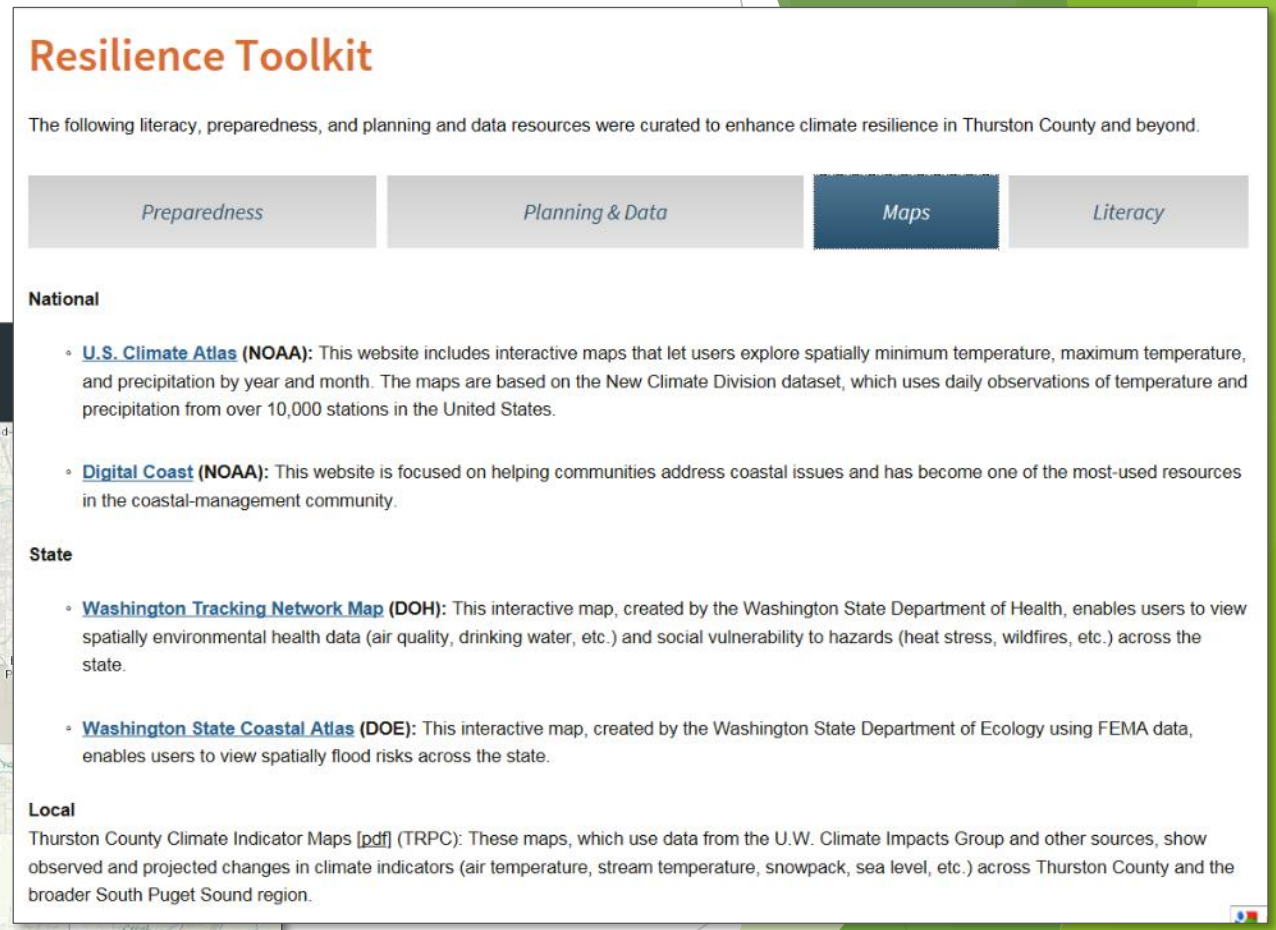


Plan Resources

Created **Resilience Toolkit** with links to TRPC's Hazards Vulnerability map, climate data, preparedness resources:

- https://www.trpc.org/586/Resilience-Toolkit





Resilience Toolkit

The following literacy, preparedness, and planning and data resources were curated to enhance climate resilience in Thurston County and beyond.

Preparedness | *Planning & Data* | *Maps* | *Literacy*

National

- U.S. Climate Atlas **(NOAA):** This website includes interactive maps that let users explore spatially minimum temperature, maximum temperature, and precipitation by year and month. The maps are based on the New Climate Division dataset, which uses daily observations of temperature and precipitation from over 10,000 stations in the United States.
- Digital Coast **(NOAA):** This website is focused on helping communities address coastal issues and has become one of the most-used resources in the coastal-management community.

State

- Washington Tracking Network Map **(DOH):** This interactive map, created by the Washington State Department of Health, enables users to view spatially environmental health data (air quality, drinking water, etc.) and social vulnerability to hazards (heat stress, wildfires, etc.) across the state.
- Washington State Coastal Atlas **(DOE):** This interactive map, created by the Washington State Department of Ecology using FEMA data, enables users to view spatially flood risks across the state.

Local

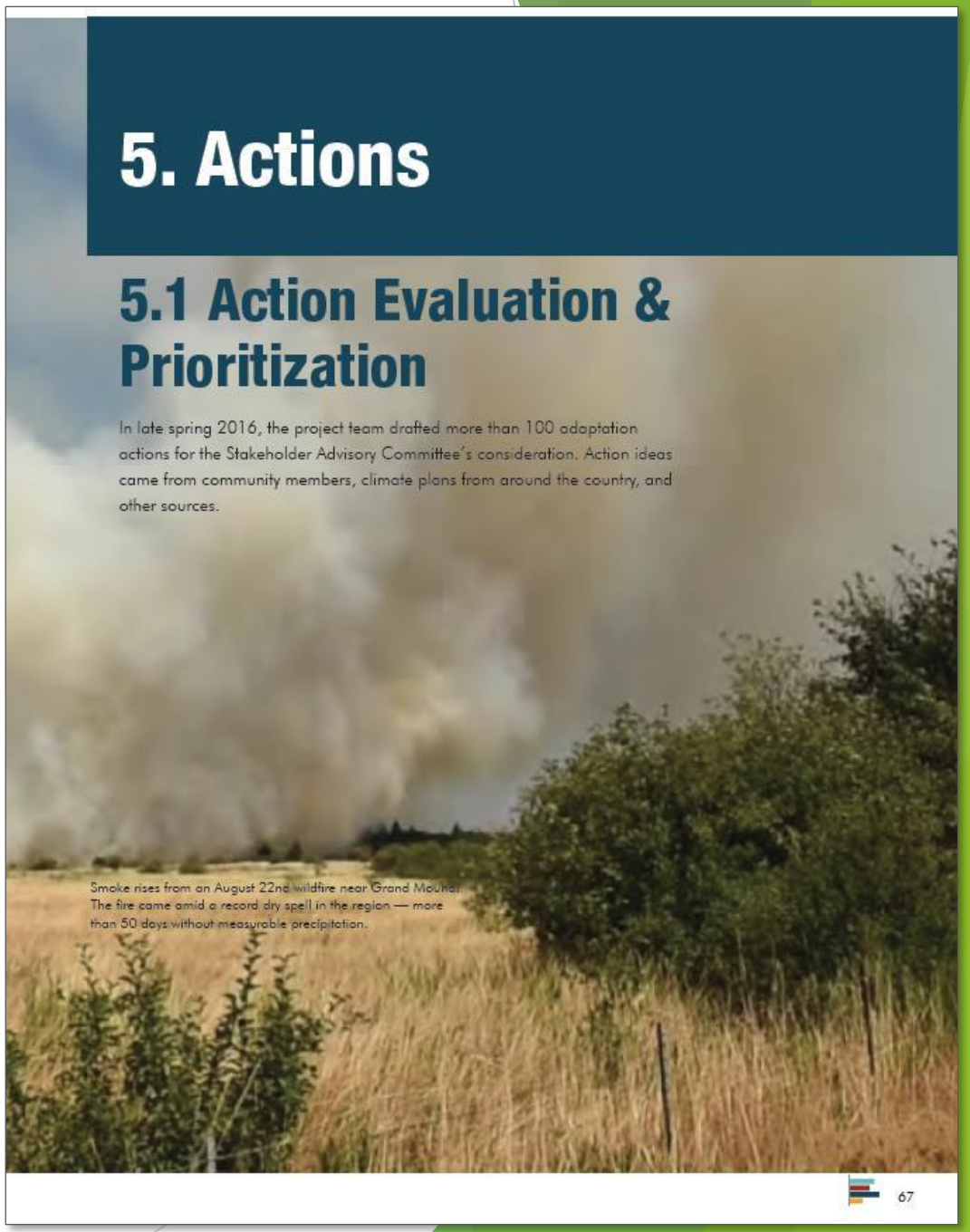
Thurston County Climate Indicator Maps [pdf] (TRPC): These maps, which use data from the U.W. Climate Impacts Group and other sources, show observed and projected changes in climate indicators (air temperature, stream temperature, snowpack, sea level, etc.) across Thurston County and the broader South Puget Sound region.

General Actions

- **18** General Actions; **4** priorities, including:

- **Action G-01:** Direct government staff members to develop their technical expertise and skills to prepare for and respond to climate change impacts.

- **Action G-04:** Factor climate impacts into the planning of operations and the coordination of disaster response and recovery activities among first-responders.

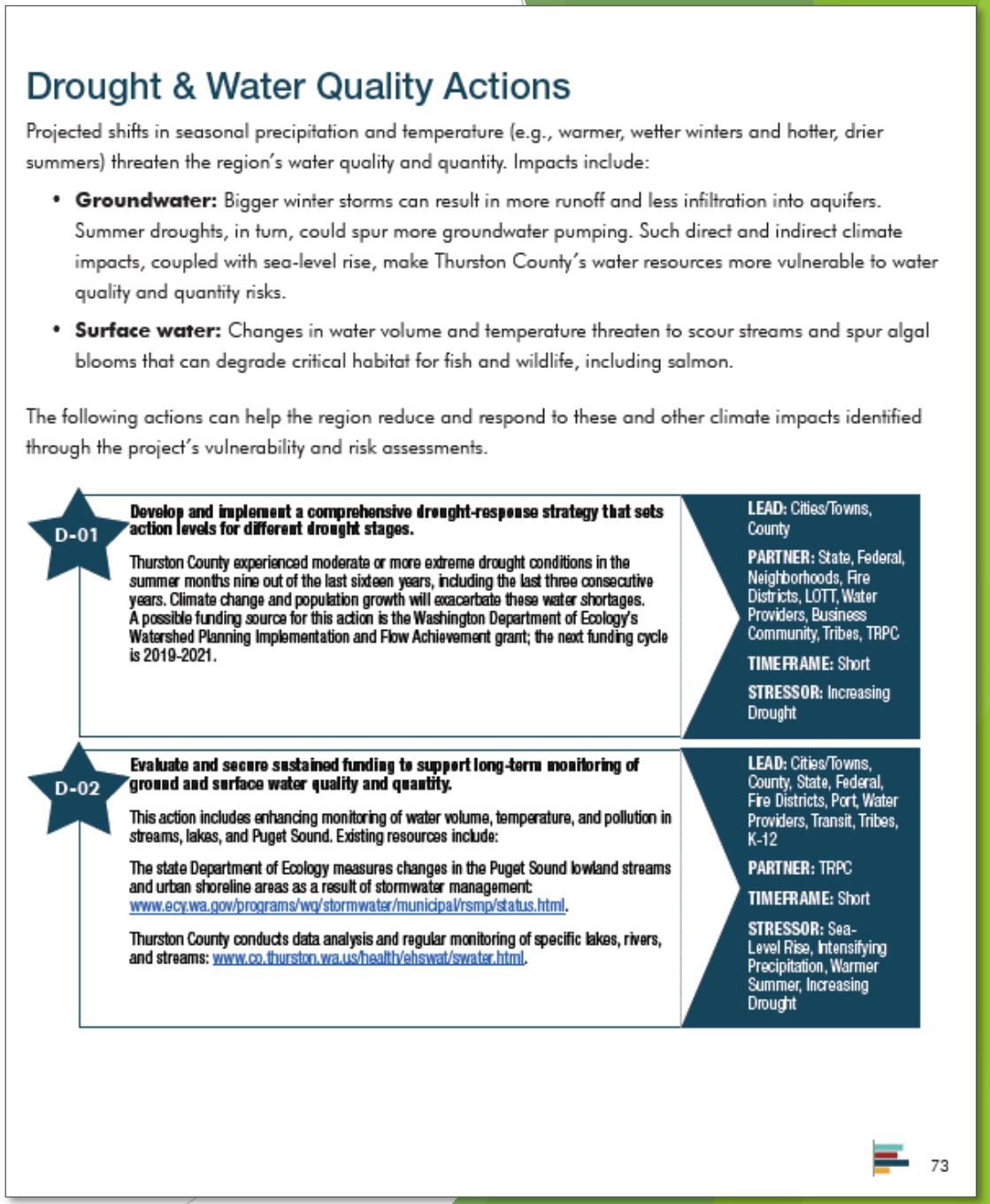


Drought & Water Quality

- **17** actions; **4** priorities, including:

- **Action D-01:** Develop and implement a comprehensive drought-response strategy that sets action levels for different drought stages.

- **Action D-02:** Evaluate and secure sustained funding to support long-term monitoring of ground and surface water quality and quantity.



Drought & Water Quality Actions

Projected shifts in seasonal precipitation and temperature (e.g., warmer, wetter winters and hotter, drier summers) threaten the region's water quality and quantity. Impacts include:

- **Groundwater:** Bigger winter storms can result in more runoff and less infiltration into aquifers. Summer droughts, in turn, could spur more groundwater pumping. Such direct and indirect climate impacts, coupled with sea-level rise, make Thurston County's water resources more vulnerable to water quality and quantity risks.
- **Surface water:** Changes in water volume and temperature threaten to scour streams and spur algal blooms that can degrade critical habitat for fish and wildlife, including salmon.

The following actions can help the region reduce and respond to these and other climate impacts identified through the project's vulnerability and risk assessments.

D-01

Develop and implement a comprehensive drought-response strategy that sets action levels for different drought stages.

Thurston County experienced moderate or more extreme drought conditions in the summer months nine out of the last sixteen years, including the last three consecutive years. Climate change and population growth will exacerbate these water shortages. A possible funding source for this action is the Washington Department of Ecology's Watershed Planning Implementation and Flow Achievement grant; the next funding cycle is 2019-2021.

LEAD: Cities/Towns, County

PARTNER: State, Federal, Neighborhoods, Fire Districts, LOTT, Water Providers, Business Community, Tribes, TRPC

TIMEFRAME: Short

STRESSOR: Increasing Drought

D-02

Evaluate and secure sustained funding to support long-term monitoring of ground and surface water quality and quantity.

This action includes enhancing monitoring of water volume, temperature, and pollution in streams, lakes, and Puget Sound. Existing resources include:

The state Department of Ecology measures changes in the Puget Sound lowland streams and urban shoreline areas as a result of stormwater management: www.ecy.wa.gov/programs/wq/stormwater/municipal/rsmp/status.html.

Thurston County conducts data analysis and regular monitoring of specific lakes, rivers, and streams: www.co.thurston.wa.us/health/ehswat/swater.html.

LEAD: Cities/Towns, County, State, Federal, Fire Districts, Port, Water Providers, Transit, Tribes, K-12

PARTNER: TRPC

TIMEFRAME: Short

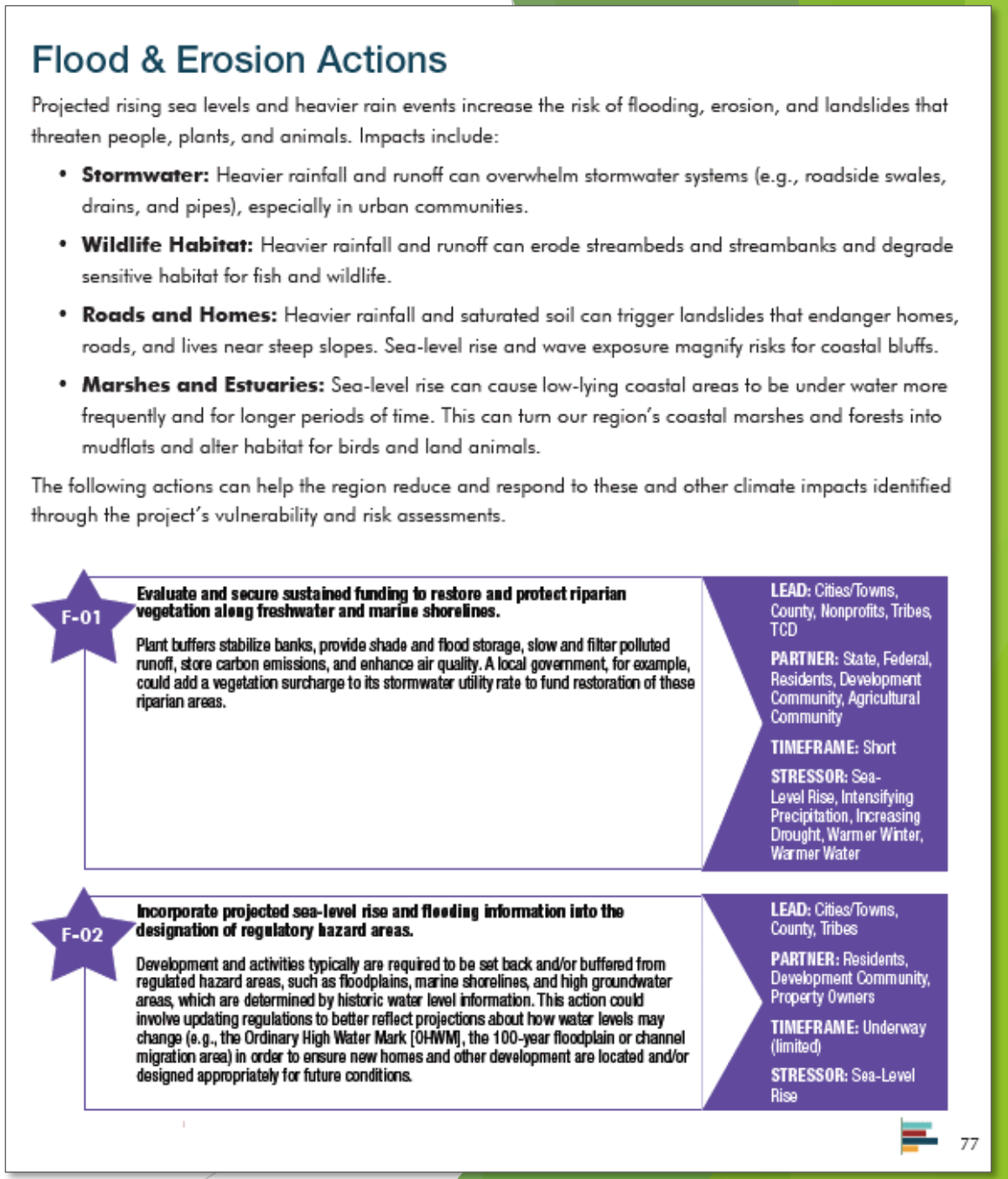
STRESSOR: Sea-Level Rise, Intensifying Precipitation, Warmer Summer, Increasing Drought

Flood & Erosion

- **17** actions; **6** priorities, including:

- **Action F-02:** Incorporate projected sea-level rise and flooding information into the designation of regulatory hazard areas.

- **Action F-03:** Design new and replacement stream culverts and other drainage infrastructure to accommodate projected higher peak flows associated with more frequent and intense heavy precipitation events.



Flood & Erosion Actions

Projected rising sea levels and heavier rain events increase the risk of flooding, erosion, and landslides that threaten people, plants, and animals. Impacts include:

- **Stormwater:** Heavier rainfall and runoff can overwhelm stormwater systems (e.g., roadside swales, drains, and pipes), especially in urban communities.
- **Wildlife Habitat:** Heavier rainfall and runoff can erode streambeds and streambanks and degrade sensitive habitat for fish and wildlife.
- **Roads and Homes:** Heavier rainfall and saturated soil can trigger landslides that endanger homes, roads, and lives near steep slopes. Sea-level rise and wave exposure magnify risks for coastal bluffs.
- **Marshes and Estuaries:** Sea-level rise can cause low-lying coastal areas to be under water more frequently and for longer periods of time. This can turn our region's coastal marshes and forests into mudflats and alter habitat for birds and land animals.

The following actions can help the region reduce and respond to these and other climate impacts identified through the project's vulnerability and risk assessments.

F-01

Evaluate and secure sustained funding to restore and protect riparian vegetation along freshwater and marine shorelines.

Plant buffers stabilize banks, provide shade and flood storage, slow and filter polluted runoff, store carbon emissions, and enhance air quality. A local government, for example, could add a vegetation surcharge to its stormwater utility rate to fund restoration of these riparian areas.

LEAD: Cities/Towns, County, Nonprofits, Tribes, TCD

PARTNER: State, Federal, Residents, Development Community, Agricultural Community

TIMEFRAME: Short

STRESSOR: Sea-Level Rise, Intensifying Precipitation, Increasing Drought, Warmer Winter, Warmer Water

F-02

Incorporate projected sea-level rise and flooding information into the designation of regulatory hazard areas.

Development and activities typically are required to be set back and/or buffered from regulated hazard areas, such as floodplains, marine shorelines, and high groundwater areas, which are determined by historic water level information. This action could involve updating regulations to better reflect projections about how water levels may change (e.g., the Ordinary High Water Mark [OHWM], the 100-year floodplain or channel migration area) in order to ensure new homes and other development are located and/or designed appropriately for future conditions.

LEAD: Cities/Towns, County, Tribes

PARTNER: Residents, Development Community, Property Owners

TIMEFRAME: Underway (limited)

STRESSOR: Sea-Level Rise

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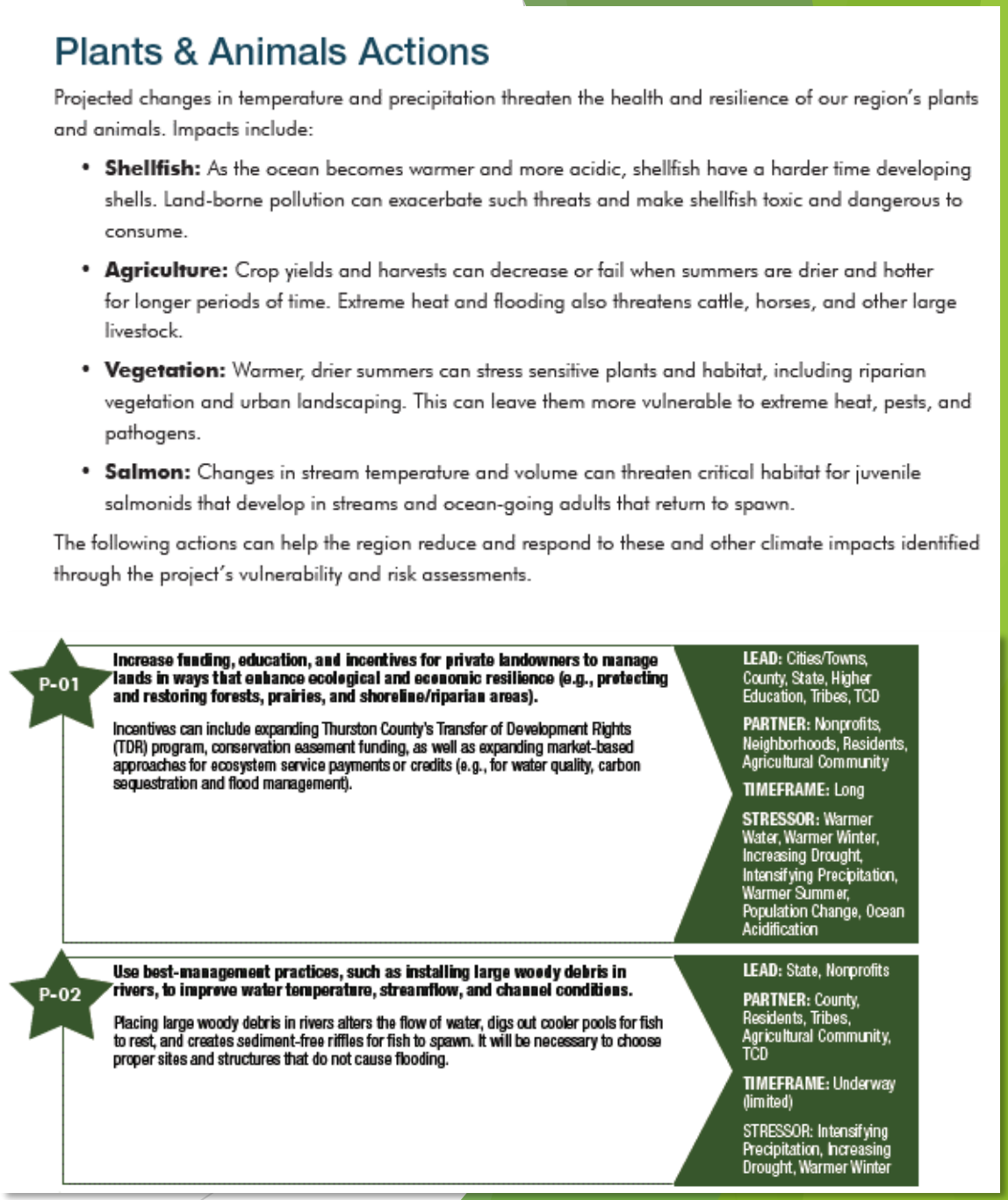
Plants & Animals

- **12** actions; **3** priorities, including:

- **Action P-01:** Increase funding, education and incentives for private landowners to manage lands in ways that enhance ecological and economic resilience (e.g., protecting and restoring forests, prairies, and shoreline/riparian areas).

- **Action P-02:** Use best-management practices, such as installing large woody debris in rivers, to improve water temperature, streamflow, and channel conditions.



Plants & Animals Actions

Projected changes in temperature and precipitation threaten the health and resilience of our region's plants and animals. Impacts include:

- **Shellfish:** As the ocean becomes warmer and more acidic, shellfish have a harder time developing shells. Land-borne pollution can exacerbate such threats and make shellfish toxic and dangerous to consume.
- **Agriculture:** Crop yields and harvests can decrease or fail when summers are drier and hotter for longer periods of time. Extreme heat and flooding also threatens cattle, horses, and other large livestock.
- **Vegetation:** Warmer, drier summers can stress sensitive plants and habitat, including riparian vegetation and urban landscaping. This can leave them more vulnerable to extreme heat, pests, and pathogens.
- **Salmon:** Changes in stream temperature and volume can threaten critical habitat for juvenile salmonids that develop in streams and ocean-going adults that return to spawn.

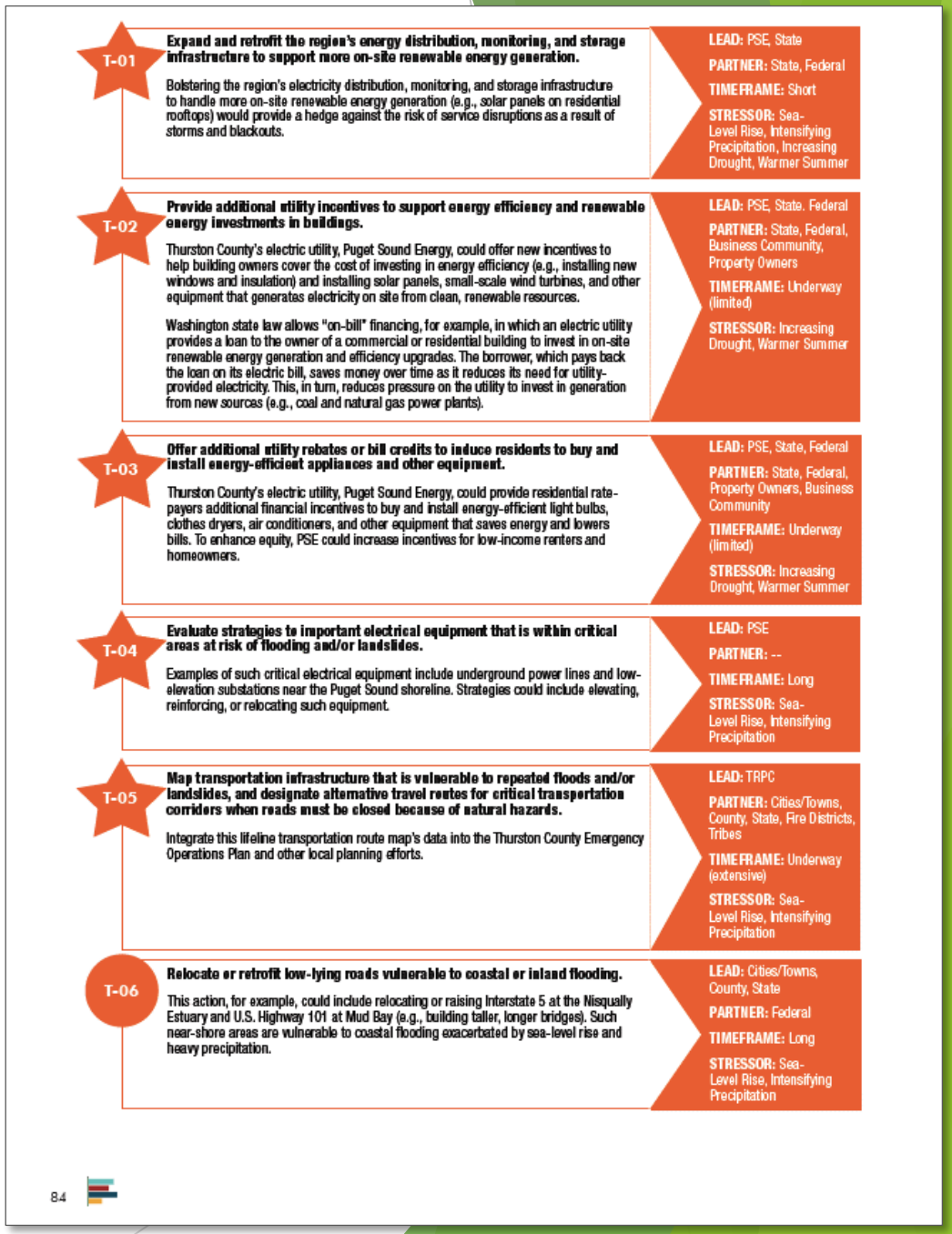
The following actions can help the region reduce and respond to these and other climate impacts identified through the project's vulnerability and risk assessments.

Transportation & Energy

- **14** actions; **5** priorities, including:

- **Action T-01:** Expand and retrofit the region's energy distribution, monitoring, and storage infrastructure to support more on-site renewable energy generation.

- **Action T-05:** Map transportation infrastructure that is vulnerable to repeated floods and/or landslides, and designate alternative travel routes for critical transportation corridors when roads must be closed because of natural hazards.



T-01

Expand and retrofit the region's energy distribution, monitoring, and storage infrastructure to support more on-site renewable energy generation.

Bolstering the region's electricity distribution, monitoring, and storage infrastructure to handle more on-site renewable energy generation (e.g., solar panels on residential rooftops) would provide a hedge against the risk of service disruptions as a result of storms and blackouts.

LEAD: PSE, State
PARTNER: State, Federal
TIMEFRAME: Short
STRESSOR: Sea-Level Rise, Intensifying Precipitation, Increasing Drought, Warmer Summer

T-02

Provide additional utility incentives to support energy efficiency and renewable energy investments in buildings.

Thurston County's electric utility, Puget Sound Energy, could offer new incentives to help building owners cover the cost of investing in energy efficiency (e.g., installing new windows and insulation) and installing solar panels, small-scale wind turbines, and other equipment that generates electricity on site from clean, renewable resources.

Washington state law allows "on-bill" financing, for example, in which an electric utility provides a loan to the owner of a commercial or residential building to invest in on-site renewable energy generation and efficiency upgrades. The borrower, which pays back the loan on its electric bill, saves money over time as it reduces its need for utility-provided electricity. This, in turn, reduces pressure on the utility to invest in generation from new sources (e.g., coal and natural gas power plants).

LEAD: PSE, State, Federal
PARTNER: State, Federal, Business Community, Property Owners
TIMEFRAME: Underway (limited)
STRESSOR: Increasing Drought, Warmer Summer

T-03

Offer additional utility rebates or bill credits to induce residents to buy and install energy-efficient appliances and other equipment.

Thurston County's electric utility, Puget Sound Energy, could provide residential rate-payers additional financial incentives to buy and install energy-efficient light bulbs, clothes dryers, air conditioners, and other equipment that saves energy and lowers bills. To enhance equity, PSE could increase incentives for low-income renters and homeowners.

LEAD: PSE, State, Federal
PARTNER: State, Federal, Property Owners, Business Community
TIMEFRAME: Underway (limited)
STRESSOR: Increasing Drought, Warmer Summer

T-04

Evaluate strategies to important electrical equipment that is within critical areas at risk of flooding and/or landslides.

Examples of such critical electrical equipment include underground power lines and low-elevation substations near the Puget Sound shoreline. Strategies could include elevating, reinforcing, or relocating such equipment.

LEAD: PSE
PARTNER: --
TIMEFRAME: Long
STRESSOR: Sea-Level Rise, Intensifying Precipitation

T-05

Map transportation infrastructure that is vulnerable to repeated floods and/or landslides, and designate alternative travel routes for critical transportation corridors when roads must be closed because of natural hazards.

Integrate this lifeline transportation route map's data into the Thurston County Emergency Operations Plan and other local planning efforts.

LEAD: TRPC
PARTNER: Cities/Towns, County, State, Fire Districts, Tribes
TIMEFRAME: Underway (extensive)
STRESSOR: Sea-Level Rise, Intensifying Precipitation

T-06

Relocate or retrofit low-lying roads vulnerable to coastal or inland flooding.

This action, for example, could include relocating or raising Interstate 5 at the Nisqually Estuary and U.S. Highway 101 at Mud Bay (e.g., building taller, longer bridges). Such near-shore areas are vulnerable to coastal flooding exacerbated by sea-level rise and heavy precipitation.

LEAD: Cities/Towns, County, State
PARTNER: Federal
TIMEFRAME: Long
STRESSOR: Sea-Level Rise, Intensifying Precipitation

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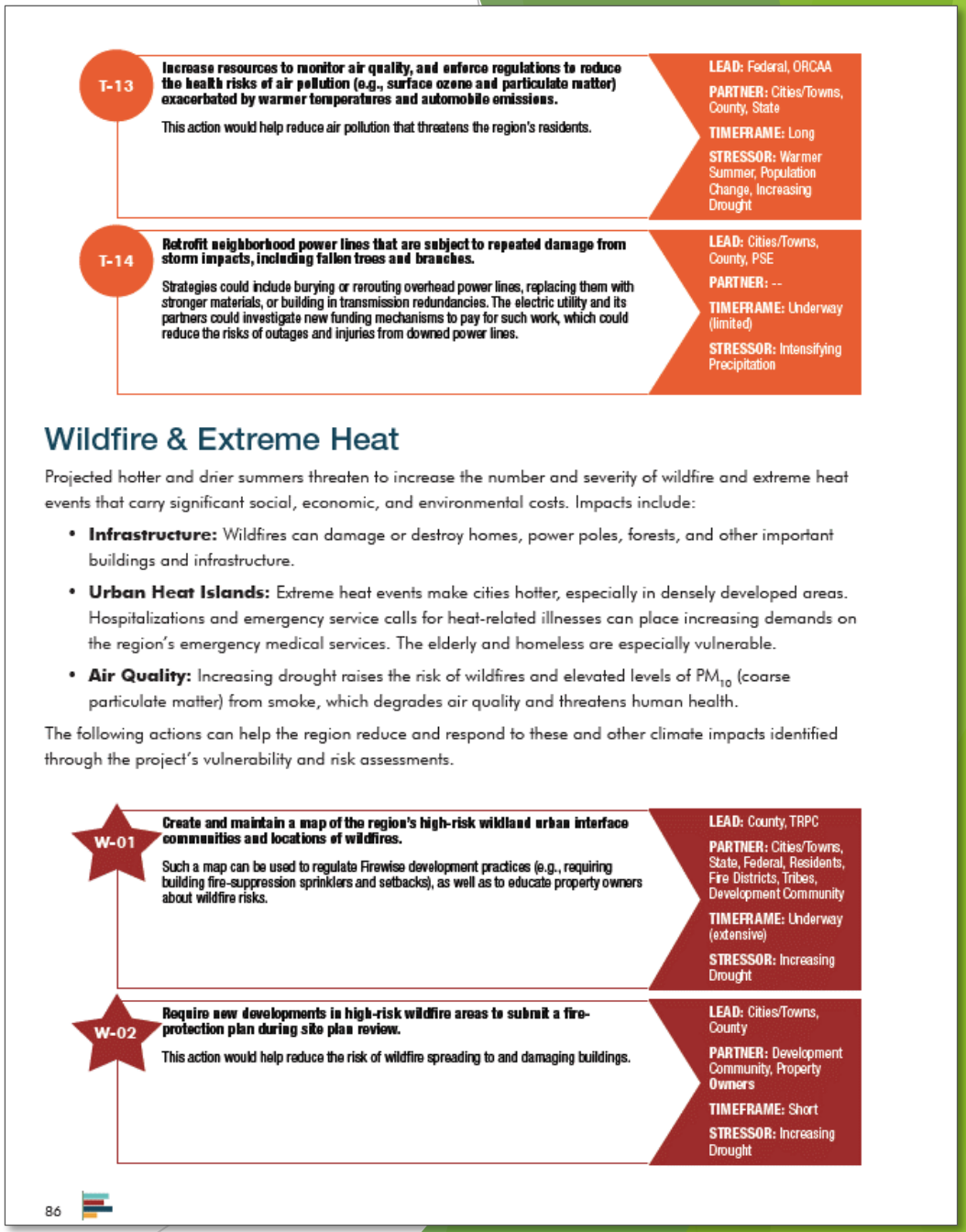
Wildfire & Extreme Heat

- **12** actions; **3** priorities, including:

- **Action W-02:** Require new developments in high-risk wildfire areas to submit a fire-protection plan during site plan review.

- **Action W-03:** Provide private forestland owners and residents living in Wildland-Urban Interface (WUI) areas information about fire prevention/Firewise practices, and encourage application of such practices.



T-13

Increase resources to monitor air quality, and enforce regulations to reduce the health risks of air pollution (e.g., surface ozone and particulate matter) exacerbated by warmer temperatures and automobile emissions.

This action would help reduce air pollution that threatens the region's residents.

LEAD: Federal, ORCAA
PARTNER: Cities/Towns, County, State
TIMEFRAME: Long
STRESSOR: Warmer Summer, Population Change, Increasing Drought

T-14

Retrofit neighborhood power lines that are subject to repeated damage from storm impacts, including fallen trees and branches.

Strategies could include burying or rerouting overhead power lines, replacing them with stronger materials, or building in transmission redundancies. The electric utility and its partners could investigate new funding mechanisms to pay for such work, which could reduce the risks of outages and injuries from downed power lines.

LEAD: Cities/Towns, County, PSE
PARTNER: --
TIMEFRAME: Underway (limited)
STRESSOR: Intensifying Precipitation

Wildfire & Extreme Heat

Projected hotter and drier summers threaten to increase the number and severity of wildfire and extreme heat events that carry significant social, economic, and environmental costs. Impacts include:

- **Infrastructure:** Wildfires can damage or destroy homes, power poles, forests, and other important buildings and infrastructure.
- **Urban Heat Islands:** Extreme heat events make cities hotter, especially in densely developed areas. Hospitalizations and emergency service calls for heat-related illnesses can place increasing demands on the region's emergency medical services. The elderly and homeless are especially vulnerable.
- **Air Quality:** Increasing drought raises the risk of wildfires and elevated levels of PM_{10} (coarse particulate matter) from smoke, which degrades air quality and threatens human health.

The following actions can help the region reduce and respond to these and other climate impacts identified through the project's vulnerability and risk assessments.

W-01

Create and maintain a map of the region's high-risk wildland urban interface communities and locations of wildfires.

Such a map can be used to regulate Firewise development practices (e.g., requiring building fire-suppression sprinklers and setbacks), as well as to educate property owners about wildfire risks.

LEAD: County, TRPC
PARTNER: Cities/Towns, State, Federal, Residents, Fire Districts, Tribes, Development Community
TIMEFRAME: Underway (extensive)
STRESSOR: Increasing Drought

W-02

Require new developments in high-risk wildfire areas to submit a fire-protection plan during site plan review.

This action would help reduce the risk of wildfire spreading to and damaging buildings.

LEAD: Cities/Towns, County
PARTNER: Development Community, Property Owners
TIMEFRAME: Short
STRESSOR: Increasing Drought

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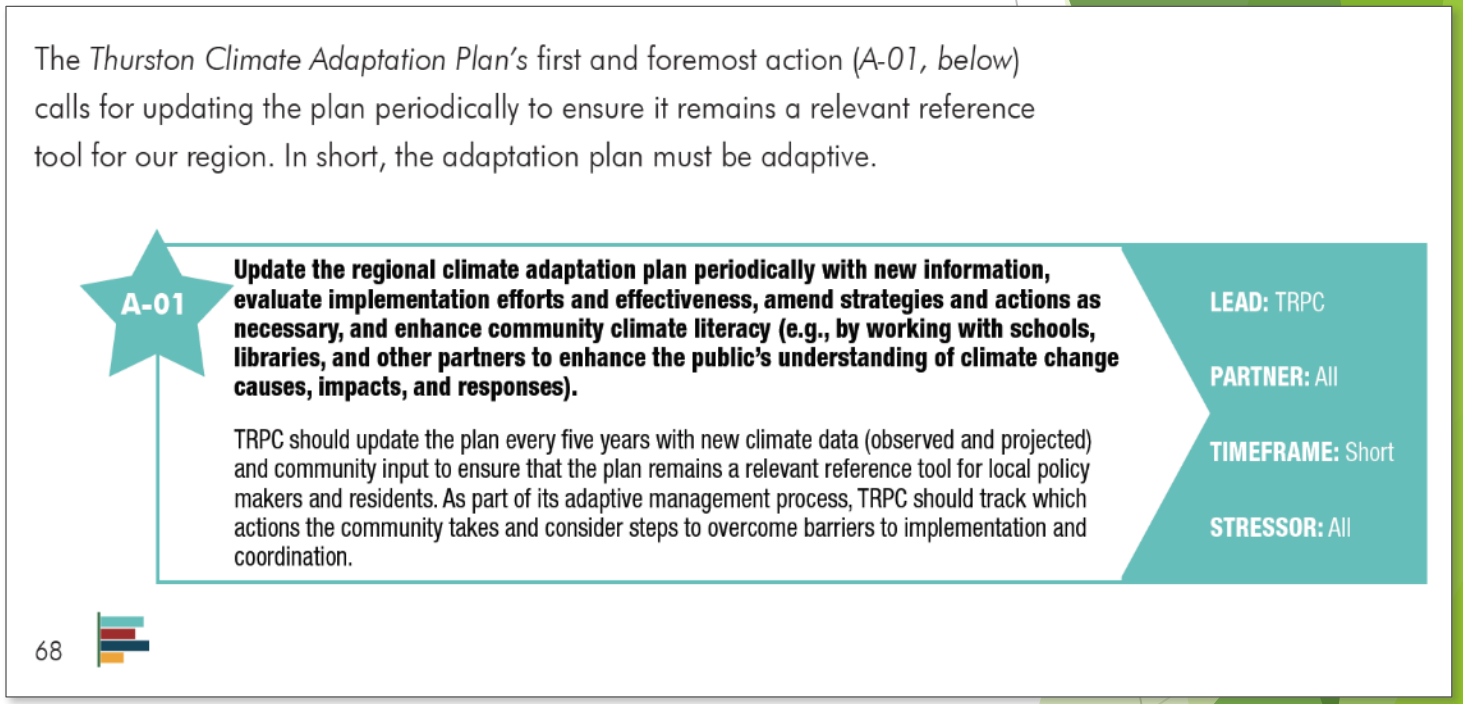
Next Steps

- Implement actions
- Monitor climate impacts
- Assess progress
- Update plan periodically
- Continue public engagement
- Work on climate mitigation



The *Thurston Climate Adaptation Plan's* first and foremost action (*A-01, below*) calls for updating the plan periodically to ensure it remains a relevant reference tool for our region. In short, the adaptation plan must be adaptive.

A-01

Update the regional climate adaptation plan periodically with new information, evaluate implementation efforts and effectiveness, amend strategies and actions as necessary, and enhance community climate literacy (e.g., by working with schools, libraries, and other partners to enhance the public's understanding of climate change causes, impacts, and responses).

TRPC should update the plan every five years with new climate data (observed and projected) and community input to ensure that the plan remains a relevant reference tool for local policy makers and residents. As part of its adaptive management process, TRPC should track which actions the community takes and consider steps to overcome barriers to implementation and coordination.

LEAD: TRPC

PARTNER: All

TIMEFRAME: Short

STRESSOR: All

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Questions?

Mike Burnham, Senior Planner
burnhamm@trpc.org

Paul Brewster, Senior Planner

brewstp@trpc.org

Karen Parkhurst, Programs & Policy Director

parkhuk@trpc.org

www.trpc.org/climate