

Thurston Climate Adaptation Plan

Action Table

Drought & Water Use (Education & Outreach)

Action 15

Expand septic system operation and maintenance education and outreach programs.

Source: Modified Action 3 from Deschutes Watershed project

- 55** Warmer water increases the growth and reach of pathogens (e.g., cyanobacteria and algal blooms) harmful to humans, fish and other water users.
- 61** Intensifying precipitation contaminates water (nutrients) from septic systems due to high groundwater flooding.
- 60** Population change increases pollution related to development (e.g., more septic systems and impervious surfaces).

Action 93

Identify a local non-regulatory entity to provide technical assistance to private well owners regarding conserving water and detecting leaks and pollution.

Source: Modified ST Action E-3.3

- 1** Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 52** Increasing drought reduces groundwater recharge (drinking water and in-stream flows).
- 114** Sea-level rise makes coastal groundwater more vulnerable to saltwater intrusion and inundation.
- 117** Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 80** Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.
- 116** Increasing drought raises pollutant concentrations in shallow wells and surface waters.
- 129** Increasing drought necessitates moving water farther distances, which consumes more energy and may increase greenhouse gas emissions (depending on the energy fuel source).

Drought & Water Use (Emergency Management)

Action 12

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

Source: Andrew Kinney

- 1 Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 8 Increasing drought degrades critical habitat (lakes, rivers, streams and watersheds) due to changes in water volume and temperature.
- 10 Increasing drought stresses sensitive plants and habitat, which could reduce long-term viability of preserved and restored areas.
- 29 Increasing drought reduces summer hydropower production, a comparatively clean and inexpensive electricity source for commercial and residential customers.
- 52 Increasing drought reduces groundwater recharge (drinking water and in-stream flows).
- 117 Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 80 Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.
- 105 Increasing drought raises the risk of lower crop yield or failure.
- 5 Increasing drought stresses sensitive urban landscaping, which could leave them vulnerable to extreme heat, pests or pathogens.
- 96 Increasing drought parches farm fields and other open spaces, which could erode and release windblown dust (e.g., PM10) that degrades air quality.
- 125 Increasing drought lowers reservoir levels, which exposes organic materials and causes them to decay and emit greenhouse gases.
- 129 Increasing drought necessitates moving water farther distances, which consumes more energy and may increase greenhouse gas emissions (depending on the energy fuel source).
- 135 Increasing drought parches farm fields and other open spaces, which could erode and release windblown dust (e.g., PM10) that degrades air quality.

Action 120

Consider constructing new water-storage systems (e.g., large cisterns, water towers and reservoirs) to serve as a hedge against droughts.

Source: Modified action from NFS/NPS Climate Adaptation Library

- 1 Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).

Drought & Water Use (Incentives)

Action 13

Increase incentives for water conservation during dry months.

- 1 Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 8 Increasing drought degrades critical habitat (lakes, rivers, streams and watersheds) due to changes in water volume and temperature.
- 52 Increasing drought reduces groundwater recharge (drinking water and in-stream flows).
- 117 Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 80 Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.
- 105 Increasing drought raises the risk of lower crop yield or failure.
- 5 Increasing drought stresses sensitive urban landscaping, which could leave them vulnerable to extreme heat, pests or pathogens.
- 96 Increasing drought parches farm fields and other open spaces, which could erode and release windblown dust (e.g., PM10) that degrades air quality.
- 125 Increasing drought lowers reservoir levels, which exposes organic materials and causes them to decay and emit greenhouse gases.
- 129 Increasing drought necessitates moving water farther distances, which consumes more energy and may increase greenhouse gas emissions (depending on the energy fuel source).
- 135 Increasing drought parches farm fields and other open spaces, which could erode and release windblown dust (e.g., PM10) that degrades air quality.

Action 28

Incentivize new commercial construction to include on-site rainwater harvesting facilities.

This action would help ensure there is adequate water for all users -- housing, industry, energy, agriculture, and the environment.

Source: *Smart Growth Fixes for Climate Adaptation and Resilience*, pg. vi, 69

- 1 Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 30 Intensifying precipitation increases the volume of urban runoff and flooding, which could render inadequate some stormwater/flood-control facilities.
- 63 Intensifying precipitation contaminates water (bacteria, pathogens) due to a greater incidence of combined stormwater/sewer system overflows.
- 117 Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 138 Intensifying precipitation necessitates retrofitting stormwater and wastewater infrastructure to mitigate flooding and backups that threaten water quality and human health and welfare.
- 80 Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.
- 5 Increasing drought stresses sensitive urban landscaping, which could leave them vulnerable to extreme heat, pests or pathogens.
- 119 Intensifying precipitation increases volume of urban runoff and flooding, which decrease groundwater recharge.

Drought & Water Use (Infrastructure Management)

Action 24

Increase the energy efficiency of the region's water infrastructure.

This action includes replacing pumps and other drinking water, wastewater, and stormwater systems that consume large amounts of energy.

Source: Modified version of ST EN-3.7

- 65 Population change increases transportation-related energy consumption, CO2 emissions, and other pollutants related to buildings and transportation.
- 87 Intensifying precipitation puts more strain on services (social, emergency, etc.).
- 90 Population change increases strain on social and emergency services.
- 126 Sea-level rise increases energy consumed to pump wastewater and stormwater.
- 129 Increasing drought necessitates moving water farther distances, which consumes more energy and may increase greenhouse gas emissions (depending on the energy fuel source).

Drought & Water Use (Planning & Data)

Action 90

Identify and secure a consistent funding source to support long-term monitoring of ground and surface water quality and quantity.

As part of this comprehensive program, incentivize water metering for all wells, and assess near-shore wells' vulnerability to saltwater intrusion and inundation.

Source: Modified ST Action E-4.12

- 7 Intensifying precipitation increases the frequency and intensity of the heaviest 24-hour rain events and the overall volume of winter streamflow, which could degrade sensitive riparian areas.
- 8 Increasing drought degrades critical habitat (lakes, rivers, streams and watersheds) due to changes in water volume and temperature.
- 11 Warmer winters degrade critical habitat (rivers and streams) due to greater winter runoff.
- 30 Intensifying precipitation increases the volume of urban runoff and flooding, which could render inadequate some stormwater/flood-control facilities.
- 55 Warmer water increases the growth and reach of pathogens (e.g., cyanobacteria and algal blooms) harmful to humans, fish and other water users.
- 56 Increasing drought increases the concentration of pollutants in first-flush runoff.
- 57 Intensifying precipitation contaminates water (turbidity and sedimentation) due to landslides.
- 58 Sea-level rise increases coastal flooding of downtown Olympia and LOTT wastewater treatment plant assets, which could threaten the ability to treat and discharge water.
- 59 Ocean acidification decreases marine pH, and such changes -- coupled with increases in ocean temperature and land-borne pollution -- threaten marine water quality.
- 61 Intensifying precipitation contaminates water (nutrients) from septic systems due to high groundwater flooding.
- 62 Sea-level rise inundates former industrial sites, which could mobilize pollutants in the soil and degrade water quality.
- 63 Intensifying precipitation contaminates water (bacteria, pathogens) due to a greater incidence of combined stormwater/sewer system overflows.
- 78 Warmer summers introduce or exacerbate disease vectors (carriers), which could harm human health (warmer, wetter winters also exacerbate exposure to pathogens and other health threats).
- 102 Warmer water threatens the survival of salmon, which support cultural and economic practices and ecosystem services.
- 114 Sea-level rise makes coastal groundwater more vulnerable to saltwater intrusion and inundation.
- 64 Warmer water increases periods of low dissolved oxygen and hypoxic conditions in both freshwater and marine areas.
- 45 Warmer water increases the risk of marine water stratification and hypoxia, which could alter the timing of spring plankton blooms that support the marine food web (including salmon and other economically important fish).
- 66 Increasing drought contaminates water (turbidity and sedimentation) due to wildfires.
- 67 Warmer summers increase recreational activity in waterbodies and risk of boat fuel spills.

Action 92

Assess drinking water wells' vulnerability to sea-level rise inundation and saltwater intrusion, and develop adaptation measures (e.g., relocating wells).

- 114 Sea-level rise makes coastal groundwater more vulnerable to saltwater intrusion and inundation.

Drought & Water Use (Planning & Data)

Action 125

Enhance the ability to predict drought and flood conditions by improving tools that track soil moisture, streamflow, precipitation, groundwater levels, tide levels, well levels, reservoir levels, and weather forecasts.

The Water Resources Dashboard -- an online tool created by NOAA and other partners -- has maps and data that can help local resource managers monitor for the potential for extreme precipitation and drought:

<https://toolkit.climate.gov/topics/water-resources/water-resources-dashboard>.

Source: Modified action from draft Thurston County drought plan

- 1** Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 25** Intensifying precipitation raises the risk of floods and landslides, which could damage private property and result in economic losses.
- 26** Sea-level rise raises the risk of coastal inundation and erosion, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 27** Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 52** Increasing drought reduces groundwater recharge (drinking water and in-stream flows).
- 87** Intensifying precipitation puts more strain on services (social, emergency, etc.).
- 33** Increasing drought raises the risk of wildfires which could damage forests that are important to the region's economy.
- 80** Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.
- 105** Increasing drought raises the risk of lower crop yield or failure.
- 109** Sea-level rise pushes saltwater farther into estuaries, which may inundate near-coastal farms and ranches.
- 133** Increasing drought raises the risk of wildfires and elevated levels of PM10 from smoke.
- 5** Increasing drought stresses sensitive urban landscaping, which could leave them vulnerable to extreme heat, pests or pathogens.
- 94** Increasing drought raises the risk of wildfires, which could damage utility infrastructure.
- 95** Increasing drought raises the risk of wildfires, which could close roads and cut off access to vital goods and services.
- 96** Increasing drought parches farm fields and other open spaces, which could erode and release windblown dust (e.g., PM10) that degrades air quality.
- 99** Increasing drought raises the risk of wildfires, which could result in personal injury or death.
- 110** Warmer summers increase the heat stress risk for dairy cows and other large livestock.
- 135** Increasing drought parches farm fields and other open spaces, which could erode and release windblown dust (e.g., PM10) that degrades air quality.

Drought & Water Use (Regulations)

Action 26

Implement a water impact fee that reflects each property's water consumption.

This action would encourage conservation and help ensure there is adequate water for all users -- housing, industry, energy, agriculture, and the environment.

Source: *Smart Growth Fixes for Climate Adaptation and Resilience*, pg. v, 66

- 1 Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 52 Increasing drought reduces groundwater recharge (drinking water and in-stream flows).
- 117 Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 80 Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.

Action 94

Develop a regulatory structure to allocate water for all users (rural and urban homes, commercial businesses, etc.).

Source: *Modified ST Action E-3.5*

- 1 Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 8 Increasing drought degrades critical habitat (lakes, rivers, streams and watersheds) due to changes in water volume and temperature.
- 52 Increasing drought reduces groundwater recharge (drinking water and in-stream flows).
- 114 Sea-level rise makes coastal groundwater more vulnerable to saltwater intrusion and inundation.
- 117 Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 116 Increasing drought raises pollutant concentrations in shallow wells and surface waters.
- 129 Increasing drought necessitates moving water farther distances, which consumes more energy and may increase greenhouse gas emissions (depending on the energy fuel source).

Drought & Water Use (Restoration & Conservation)

Action 14

Increase treatment and reuse of greywater (i.e., gently used water from bathroom sinks, showers, tubs, and washing machines) for irrigating plants, supplementing low streamflows, and other purposes.

- 1** Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 10** Increasing drought stresses sensitive plants and habitat, which could reduce long-term viability of preserved and restored areas.
- 117** Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 129** Increasing drought necessitates moving water farther distances, which consumes more energy and may increase greenhouse gas emissions (depending on the energy fuel source).

Action 29

Increase the use of water-efficient plumbing fixtures in various building types (residential, industrial, commercial, institutional).

This action would encourage conservation and help ensure there is adequate water for all users -- housing, industry, agriculture, and the environment.

Source: Modified action from Smart Growth Fixes for Climate Adaptation and Resilience, pg. v, 66, 68

- 1** Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 8** Increasing drought degrades critical habitat (lakes, rivers, streams and watersheds) due to changes in water volume and temperature.
- 52** Increasing drought reduces groundwater recharge (drinking water and in-stream flows).
- 117** Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 80** Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.
- 129** Increasing drought necessitates moving water farther distances, which consumes more energy and may increase greenhouse gas emissions (depending on the energy fuel source).

Action 30

Establish water usage goals/benchmarks for various building types (residential, industrial, commercial, institutional).

This action would encourage conservation and help ensure there is adequate water for all users -- housing, industry, agriculture, and the environment.

Source: Smart Growth Fixes for Climate Adaptation and Resilience, pg. v, 68

- 1** Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 8** Increasing drought degrades critical habitat (lakes, rivers, streams and watersheds) due to changes in water volume and temperature.
- 52** Increasing drought reduces groundwater recharge (drinking water and in-stream flows).
- 117** Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 80** Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.

Drought & Water Use (Restoration & Conservation)

Action 45

Purchase and retire water rights and/or transfer them to a water bank.

Water banking would allow people to conserve water during a drought without losing their water rights.

Source: Action 20 from Deschutes River Watershed project

- 1** Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 52** Increasing drought reduces groundwater recharge (drinking water and in-stream flows).
- 80** Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.

Action 95

Facilitate new residential water connections to municipal sources, where feasible.

Source: Modified ST Action E-3.6

- 1** Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 52** Increasing drought reduces groundwater recharge (drinking water and in-stream flows).
- 117** Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).

Flooding & Erosion (Education & Outreach)

Action 19

Increase education and enforcement efforts to ensure that commercial and residential building owners properly maintain low-impact development (LID) facilities that treat stormwater runoff on site.

Washington's municipal stormwater permit directs recipients to make LID the "preferred and commonly used approach to site development," where feasible. Such facilities reduce stormwater runoff, flooding, and water pollution.

- 25** Intensifying precipitation raises the risk of floods and landslides, which could damage private property and result in economic losses.
- 30** Intensifying precipitation increases the volume of urban runoff and flooding, which could render inadequate some stormwater/flood-control facilities.
- 56** Increasing drought increases the concentration of pollutants in first-flush runoff.
- 63** Intensifying precipitation contaminates water (bacteria, pathogens) due to a greater incidence of combined stormwater/sewer system overflows.
- 60** Population change increases pollution related to development (e.g., more septic systems and impervious surfaces).
- 50** Intensifying precipitation raises the cost of development (flooding and runoff mitigation measures).
- 119** Intensifying precipitation increases volume of urban runoff and flooding, which decrease groundwater recharge.

Flooding & Erosion (Emergency Management)

Action 16

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.

- 27** Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 95** Increasing drought raises the risk of wildfires, which could close roads and cut off access to vital goods and services.

Plants & Animals (Education & Outreach)

Action 78

Educate waterfront property owners about the benefits of voluntary oyster seeding and other shellfish production, and encourage such practices.

Such practices could help improve water quality and sustain the region's shellfishery, which are threatened by ocean acidification and land-borne pollution.

Source: *Modified ST Action F-2.10*

- 20 Sea-level rise increases wave-action effects, which could degrade coastal habitat.
- 26 Sea-level rise raises the risk of coastal inundation and erosion, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 59 Ocean acidification decreases marine pH, and such changes -- coupled with increases in ocean temperature and land-borne pollution -- threaten marine water quality.
- 83 Ocean acidification makes it harder for calcifying organisms to form shells, and ultimately harms commercial and recreational shellfisheries.
- 85 Warmer winters shift the life cycle of fish and wildlife, which could reduce populations that support subsistence and recreational hunting.
- 103 Ocean acidification makes it harder for calcifying organisms to form shells, and it ultimately harms commercial and recreational fisheries.
- 104 Ocean acidification reduces the food available for and survival of salmon and other marine life.
- 41 Ocean acidification reduces food available for and survival of salmon and other marine life.
- 109 Sea-level rise pushes saltwater farther into estuaries, which may inundate near-coastal farms and ranches.
- 45 Warmer water increases the risk of marine water stratification and hypoxia, which could alter the timing of spring plankton blooms that support the marine food web (including salmon and other economically important fish).

Action 122

Increase education efforts about efficient crop irrigation and soil water-retention techniques.

Source: *Modified action from NFS/NPS Climate Adaptation Library*

- 1 Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 117 Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 38 Warmer summers raise the risk of low crop yields or failure due to warmer temperature, reduced summer precipitation, and increased pest prevalence.
- 80 Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.
- 96 Increasing drought parches farm fields and other open spaces, which could erode and release windblown dust (e.g., PM10) that degrades air quality.

Action 131

Expand education and outreach to youth and adults about how forests, prairies and streams support ecosystem services and climate resiliency (providing habitat for fish and wildlife, mitigating erosion, etc.) so as to encourage sustainable land-use practices by residents.

Source: *Modified action from Alliance for a Healthy Sound's draft (2016) South Sound Strategy*

- 11 Warmer winters degrade critical habitat (rivers and streams) due to greater winter runoff.
- 85 Warmer winters shift the life cycle of fish and wildlife, which could reduce populations that support subsistence and recreational hunting.
- 39 Warmer water thermally stresses salmonids, which support economically important fisheries.
- 113 Population change increases pressure to develop rural areas, which could reduce, fragment and/or degrade farms, forests, and prairies.

Plants & Animals (Incentives)

Action 106

Increase funding, education, and incentives for private landowners so that they may practice land management in a way that enhances ecological and economic resilience (e.g., protecting and restoring forests, prairies, and shoreline/riparian areas). Incentives could include providing landowners payments for the ecosystem services that the conserved/restored lands provide, as well as expanding Thurston County's Transfer of Development Rights (TDR) program.

Source: Hybrid of Action 1.1a from NRF adaptation plan and Action 5 from Deschutes River Watershed project

- 22 Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 85 Warmer winters shift the life cycle of fish and wildlife, which could reduce populations that support subsistence and recreational hunting.
- 15 Warmer summers decrease climatic suitability of areas that currently support Garry oak and prairie habitat.
- 139 Warmer summers decrease climatic suitability of areas that currently support Douglas fir.
- 112 Sea-level rise turns coastal marshes and forests into mudflats that alter nesting habitat.
- 113 Population change increases pressure to develop rural areas, which could reduce, fragment and/or degrade farms, forests, and prairies.

Plants & Animals (Infrastructure Management)

Action 121

Improve coordination of efforts to identify stream crossings that impede fish movements, as well as share data and prioritize culvert replacement.

Source: Modified action from NFS/NPS Climate Adaptation Library

- 8 Increasing drought degrades critical habitat (lakes, rivers, streams and watersheds) due to changes in water volume and temperature.

Plants & Animals (Planning & Data)

Action 116

Expand efforts to monitor the cause and extent of changes in native and invasive plant distribution.

Source: Modified action from NFS/NPS Climate Adaptation Library

- 13 Warmer summers stress sensitive plants and habitat, which could leave them vulnerable to extreme heat, pests or pathogens.
- 16 Warmer winters increase the range and survival of invasive species, pests and diseases that threaten native flora and fauna.
- 5 Increasing drought stresses sensitive urban landscaping, which could leave them vulnerable to extreme heat, pests or pathogens.

Plants & Animals (Restoration & Conservation)

Action 5

Implement early detection of invasive species on land and in water, and expand biological control and manual removal of such plants and insects.

Source: Modified action from NFS/NPS Climate Adaptation Library

- 10 Increasing drought stresses sensitive plants and habitat, which could reduce long-term viability of preserved and restored areas.
- 16 Warmer winters increase the range and survival of invasive species, pests and diseases that threaten native flora and fauna.
- 106 Warmer winters increase the range and survival of pests and diseases that affect crops.

Action 62

Set basin goals for resource and habitat protection, such as no net loss of farmland, forest cover, and prairie habitat.

Source: Modified ST Action C-4.1

- 1 Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 8 Increasing drought degrades critical habitat (lakes, rivers, streams and watersheds) due to changes in water volume and temperature.
- 10 Increasing drought stresses sensitive plants and habitat, which could reduce long-term viability of preserved and restored areas.
- 11 Warmer winters degrade critical habitat (rivers and streams) due to greater winter runoff.
- 13 Warmer summers stress sensitive plants and habitat, which could leave them vulnerable to extreme heat, pests or pathogens.
- 14 Warmer winters cause salmon to remain active during winter and deplete their store of energy/health.
- 16 Warmer winters increase the range and survival of invasive species, pests and diseases that threaten native flora and fauna.
- 22 Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 83 Ocean acidification makes it harder for calcifying organisms to form shells, and ultimately harms commercial and recreational shellfisheries.
- 102 Warmer water threatens the survival of salmon, which support cultural and economic practices and ecosystem services.
- 103 Ocean acidification makes it harder for calcifying organisms to form shells, and it ultimately harms commercial and recreational fisheries.
- 117 Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 15 Warmer summers decrease climatic suitability of areas that currently support Garry oak and prairie habitat.
- 38 Warmer summers raise the risk of low crop yields or failure due to warmer temperature, reduced summer precipitation, and increased pest prevalence.
- 39 Warmer water thermally stresses salmonids, which support economically important fisheries.
- 42 Warmer winters reduce snowpack and alter stream volume and temperature, impacting long-term productivity of anadromous fish populations and fisheries.
- 105 Increasing drought raises the risk of lower crop yield or failure.
- 106 Warmer winters increase the range and survival of pests and diseases that affect crops.
- 109 Sea-level rise pushes saltwater farther into estuaries, which may inundate near-coastal farms and ranches.
- 139 Warmer summers decrease climatic suitability of areas that currently support Douglas fir.
- 5 Increasing drought stresses sensitive urban landscaping, which could leave them vulnerable to extreme heat, pests or pathogens.
- 96 Increasing drought parches farm fields and other open spaces, which could erode and release windblown dust (e.g., PM10) that degrades air quality.
- 110 Warmer summers increase the heat stress risk for dairy cows and other large livestock.
- 113 Population change increases pressure to develop rural areas, which could reduce, fragment and/or degrade farms, forests, and prairies.

Plants & Animals (Restoration & Conservation)

Action 75

Increase opportunities for urban agriculture and less land-intensive farming models such as aquaponics and vertical gardening.

Such agricultural practices would provide a hedge against climate-exacerbated risks including water scarcity and pests.

Source: Modified ST Action ST F-1.5

- 1** Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 13** Warmer summers stress sensitive plants and habitat, which could leave them vulnerable to extreme heat, pests or pathogens.
- 27** Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 117** Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 38** Warmer summers raise the risk of low crop yields or failure due to warmer temperature, reduced summer precipitation, and increased pest prevalence.
- 80** Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.
- 105** Increasing drought raises the risk of lower crop yield or failure.
- 106** Warmer winters increase the range and survival of pests and diseases that affect crops.
- 107** Warmer summers accelerate the risk of food spoilage before it reaches market.
- 4** Warmer summers cause urban heat islands, which could affect livability/health in heavily developed centers and corridors.
- 113** Population change increases pressure to develop rural areas, which could reduce, fragment and/or degrade farms, forests, and prairies.

Action 99

Protect and enhance marine vegetation, such as eelgrass, so as to help clean water, sequester carbon dioxide, and improve fish habitat and survival.

Note: The Alliance for a Healthy South Sound's draft South Sound Strategy does not propose a local target for eelgrass beds; the Nisqually Estuary has Thurston County's only significant eelgrass beds.

- 20** Sea-level rise increases wave-action effects, which could degrade coastal habitat.
- 59** Ocean acidification decreases marine pH, and such changes -- coupled with increases in ocean temperature and land-borne pollution -- threaten marine water quality.
- 83** Ocean acidification makes it harder for calcifying organisms to form shells, and ultimately harms commercial and recreational shellfisheries.
- 103** Ocean acidification makes it harder for calcifying organisms to form shells, and it ultimately harms commercial and recreational fisheries.
- 104** Ocean acidification reduces the food available for and survival of salmon and other marine life.
- 41** Ocean acidification reduces food available for and survival of salmon and other marine life.
- 47** Sea-level rise increases the rate of erosion of unprotected coastal bluffs, which could threaten the property and safety of nearby residents.

Action 114

Consider additional assisted migration of vulnerable plant and animal species to suitable habitat.

Source: Modified action from NFS/NPS Climate Adaptation Library

- 8** Increasing drought degrades critical habitat (lakes, rivers, streams and watersheds) due to changes in water volume and temperature.
- 10** Increasing drought stresses sensitive plants and habitat, which could reduce long-term viability of preserved and restored areas.
- 13** Warmer summers stress sensitive plants and habitat, which could leave them vulnerable to extreme heat, pests or pathogens.
- 22** Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 15** Warmer summers decrease climatic suitability of areas that currently support Garry oak and prairie habitat.
- 139** Warmer summers decrease climatic suitability of areas that currently support Douglas fir.

Plants & Animals (Restoration & Conservation)

Action 123

Plant vegetation to increase shading of wetlands and riparian areas, where appropriate.

Source: Action from NFS/NPS Climate Adaptation Library

- 8 Increasing drought degrades critical habitat (lakes, rivers, streams and watersheds) due to changes in water volume and temperature.
- 13 Warmer summers stress sensitive plants and habitat, which could leave them vulnerable to extreme heat, pests or pathogens.

Action 145

Build logjams with large woody debris to improve river channel conditions and cool water temperatures. Such structures vary the river by digging out pools for fish to rest and creating sediment-free riffles for fish to spawn.

Source: Squaxin Island Tribe: <http://www.squaxin-nr.org/page/24/>

- 7 Intensifying precipitation increases the frequency and intensity of the heaviest 24-hour rain events and the overall volume of winter streamflow, which could degrade sensitive riparian areas.
- 8 Increasing drought degrades critical habitat (lakes, rivers, streams and watersheds) due to changes in water volume and temperature.
- 10 Increasing drought stresses sensitive plants and habitat, which could reduce long-term viability of preserved and restored areas.

Transportation & Energy (Education & Outreach)

Action 54

Expand outreach and education to commercial and residential power customers about the benefits of clean and efficient energy technologies and practices.

Source: Modified ST Action EN-3.4

- 29 Increasing drought reduces summer hydropower production, a comparatively clean and inexpensive electricity source for commercial and residential customers.
- 120 Warmer summers increase summer peak energy demand for cooling residential and commercial buildings, which — depending on the energy source — may increase carbon emissions.
- 91 Warmer summers increase summer peak energy demand for cooling residential and commercial buildings, which could place more demand on the grid and reduce energy security.

Action 135

Develop the technical expertise and skills of municipal staff in preparing for and responding to climate change impacts.

Source: Modified action from King County Strategic Climate Action Plan

- 3 Sea-level rise increases the frequency, depth, and duration of inundation of low coastal areas (e.g., downtown Olympia and tribal lands), which could damage or disrupt use of infrastructure and result in loss of cultural resources (e.g., homes, roads, etc.).
- 7 Intensifying precipitation increases the frequency and intensity of the heaviest 24-hour rain events and the overall volume of winter streamflow, which could degrade sensitive riparian areas.
- 52 Increasing drought reduces groundwater recharge (drinking water and in-stream flows).
- 87 Intensifying precipitation puts more strain on services (social, emergency, etc.).
- 95 Increasing drought raises the risk of wildfires, which could close roads and cut off access to vital goods and services.

Wildfire & Extreme Heat (Education & Outreach)

Action 9

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.

Source: Modified action from NFS/NPS Climate Adaptation Library

- 22 Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 82 Increasing drought raises the risk of wildfires and elevated levels of PM10 (coarse particulate matter) from smoke.
- 33 Increasing drought raises the risk of wildfires which could damage forests that are important to the region's economy.
- 122 Increasing drought raises the risk of wildfires, which could destroy forests that serve as a net carbon sink.
- 133 Increasing drought raises the risk of wildfires and elevated levels of PM10 from smoke.
- 66 Increasing drought contaminates water (turbidity and sedimentation) due to wildfires.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 94 Increasing drought raises the risk of wildfires, which could damage utility infrastructure.
- 95 Increasing drought raises the risk of wildfires, which could close roads and cut off access to vital goods and services.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.

Action 11

Enhance training and financial support for wildfire response.

- 82 Increasing drought raises the risk of wildfires and elevated levels of PM10 (coarse particulate matter) from smoke.
- 33 Increasing drought raises the risk of wildfires which could damage forests that are important to the region's economy.
- 122 Increasing drought raises the risk of wildfires, which could destroy forests that serve as a net carbon sink.
- 133 Increasing drought raises the risk of wildfires and elevated levels of PM10 from smoke.
- 66 Increasing drought contaminates water (turbidity and sedimentation) due to wildfires.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 94 Increasing drought raises the risk of wildfires, which could damage utility infrastructure.
- 95 Increasing drought raises the risk of wildfires, which could close roads and cut off access to vital goods and services.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.

Wildfire & Extreme Heat (Education & Outreach)

Action 44

Develop and maintain a countywide hazards mitigation public outreach strategy.

Source: Modified CW-MH6 Countywide Hazard Mitigation Initiative

- 26 Sea-level rise raises the risk of coastal inundation and erosion, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 55 Warmer water increases the growth and reach of pathogens (e.g., cyanobacteria and algal blooms) harmful to humans, fish and other water users.
- 63 Intensifying precipitation contaminates water (bacteria, pathogens) due to a greater incidence of combined stormwater/sewer system overflows.
- 78 Warmer summers introduce or exacerbate disease vectors (carriers), which could harm human health (warmer, wetter winters also exacerbate exposure to pathogens and other health threats).
- 82 Increasing drought raises the risk of wildfires and elevated levels of PM10 (coarse particulate matter) from smoke.
- 92 Warmer summers increase extreme temperatures, which could cause hyperthermia -- a major risk for elderly, homeless and other especially vulnerable populations.
- 114 Sea-level rise makes coastal groundwater more vulnerable to saltwater intrusion and inundation.
- 132 Warmer summers increase production of surface ozone (VOCs interacting with NOx) and accumulation of fine particulate matter (PM2.5).
- 133 Increasing drought raises the risk of wildfires and elevated levels of PM10 from smoke.
- 4 Warmer summers cause urban heat islands, which could affect livability/health in heavily developed centers and corridors.
- 96 Increasing drought parches farm fields and other open spaces, which could erode and release windblown dust (e.g., PM10) that degrades air quality.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.

Action 124

Create a health impacts of climate change website, hosted by Thurston County Health & Social Services, and update the site with information that helps the community prepare for and respond to drought, poor air quality, extreme heat, disease vectors, and other threats.

Source: Modified action from draft Thurston County drought planning effort

- 55 Warmer water increases the growth and reach of pathogens (e.g., cyanobacteria and algal blooms) harmful to humans, fish and other water users.
- 78 Warmer summers introduce or exacerbate disease vectors (carriers), which could harm human health (warmer, wetter winters also exacerbate exposure to pathogens and other health threats).
- 82 Increasing drought raises the risk of wildfires and elevated levels of PM10 (coarse particulate matter) from smoke.
- 92 Warmer summers increase extreme temperatures, which could cause hyperthermia -- a major risk for elderly, homeless and other especially vulnerable populations.
- 116 Increasing drought raises pollutant concentrations in shallow wells and surface waters.
- 4 Warmer summers cause urban heat islands, which could affect livability/health in heavily developed centers and corridors.
- 46 Warmer summers increase the risk for heat injuries due to rising temperatures, which will increase demand/cost for emergency medical services and hospitalizations.

Wildfire & Extreme Heat (Education & Outreach)

Action 146

Increase the number of residents who receive Community Emergency Response Team (CERT) training to improve local hazard preparedness, response, and recovery efforts. Ensure efforts are ongoing.

[Lead for this action could be a tribe, neighborhood association and/or other community group]

Source: *PDX community disaster preparedness plan*

- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 92 Warmer summers increase extreme temperatures, which could cause hyperthermia -- a major risk for elderly, homeless and other especially vulnerable populations.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 94 Increasing drought raises the risk of wildfires, which could damage utility infrastructure.

Action 147

Encourage neighborhoods to become familiar with residents who have skills and tools to assist others with special needs (e.g., elderly or disabled), should residents need to provide emergency response in the event that police and fire cannot provide immediate assistance.

Programs such as "Map Your Neighborhood" are effective ways to develop maps and inventories/directories of neighborhood assets. [Thurston County Emergency Management Map Your Neighborhood:

<http://www.co.thurston.wa.us/em/MYN/MYN.htm>]

[Lead for this action could be a tribe, neighborhood association and/or other community group]

Source: *PDX community disaster preparedness plan*

- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 92 Warmer summers increase extreme temperatures, which could cause hyperthermia -- a major risk for elderly, homeless and other especially vulnerable populations.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 94 Increasing drought raises the risk of wildfires, which could damage utility infrastructure.

Action 148

Identify a neighborhood hub (e.g., a school or other location that's safe, accessible and well-known) to serve as a temporary coordination site for local hazard response and recovery efforts, and publicize the hub's location widely.

[Lead for this action could be a tribe, neighborhood association and/or other community group]

Source: *PDX community disaster preparedness plan*

- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 92 Warmer summers increase extreme temperatures, which could cause hyperthermia -- a major risk for elderly, homeless and other especially vulnerable populations.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 94 Increasing drought raises the risk of wildfires, which could damage utility infrastructure.

Wildfire & Extreme Heat (Emergency Management)

Action 50

Encourage public health, law enforcement, fire, emergency medical services, and other first-responders to consider climate change impacts into planning of operations and coordination of disaster response and recovery activities.

Action examples include:

Updating emergency services communications equipment;

Enhancing training of emergency personnel and other responders;

Taking regular inventory of emergency facility needs (e.g., cooling centers and temporary shelters);

Assessing and improving the adaptive capacity of people who are most vulnerable to climate change-exacerbated hazards (e.g., people who are homeless, elderly, socially isolated, and/or live in high-risk areas).

Source: CW-MH8 Countywide Hazard Mitigation Initiative

- 3 Sea-level rise increases the frequency, depth, and duration of inundation of low coastal areas (e.g., downtown Olympia and tribal lands), which could damage or disrupt use of infrastructure and result in loss of cultural resources (e.g., homes, roads, etc.).
- 26 Sea-level rise raises the risk of coastal inundation and erosion, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 87 Intensifying precipitation puts more strain on services (social, emergency, etc.).
- 92 Warmer summers increase extreme temperatures, which could cause hyperthermia -- a major risk for elderly, homeless and other especially vulnerable populations.
- 4 Warmer summers cause urban heat islands, which could affect livability/health in heavily developed centers and corridors.
- 47 Sea-level rise increases the rate of erosion of unprotected coastal bluffs, which could threaten the property and safety of nearby residents.
- 95 Increasing drought raises the risk of wildfires, which could close roads and cut off access to vital goods and services.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.

Action 69

Encourage residents to organize or participate in regular emergency preparedness, response, and recovery planning and training events.

Events could include neighborhood potlucks with mock disaster drills, skills sharing, and speakers from local police and fire agencies.

Source: ST Action PS-2.6

- 26 Sea-level rise raises the risk of coastal inundation and erosion, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 87 Intensifying precipitation puts more strain on services (social, emergency, etc.).
- 90 Population change increases strain on social and emergency services.
- 92 Warmer summers increase extreme temperatures, which could cause hyperthermia -- a major risk for elderly, homeless and other especially vulnerable populations.
- 46 Warmer summers increase the risk for heat injuries due to rising temperatures, which will increase demand/cost for emergency medical services and hospitalizations.

Wildfire & Extreme Heat (Emergency Management)

Action 81

Create disaster-recovery plans and prioritize the restoration of vital public safety facilities and other essential community assets.

Source: Modified ST Action PS-2.7

- 3 Sea-level rise increases the frequency, depth, and duration of inundation of low coastal areas (e.g., downtown Olympia and tribal lands), which could damage or disrupt use of infrastructure and result in loss of cultural resources (e.g., homes, roads, etc.).
- 25 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and result in economic losses.
- 26 Sea-level rise raises the risk of coastal inundation and erosion, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 58 Sea-level rise increases coastal flooding of downtown Olympia and LOTT wastewater treatment plant assets, which could threaten the ability to treat and discharge water.
- 78 Warmer summers introduce or exacerbate disease vectors (carriers), which could harm human health (warmer, wetter winters also exacerbate exposure to pathogens and other health threats).
- 87 Intensifying precipitation puts more strain on services (social, emergency, etc.).
- 92 Warmer summers increase extreme temperatures, which could cause hyperthermia -- a major risk for elderly, homeless and other especially vulnerable populations.
- 109 Sea-level rise pushes saltwater farther into estuaries, which may inundate near-coastal farms and ranches.
- 47 Sea-level rise increases the rate of erosion of unprotected coastal bluffs, which could threaten the property and safety of nearby residents.
- 68 Sea-level rise raises the risk of coastal inundation, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 95 Increasing drought raises the risk of wildfires, which could close roads and cut off access to vital goods and services.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.
- 110 Warmer summers increase the heat stress risk for dairy cows and other large livestock.

Action 119

Limit activities in parks and other outdoor recreation areas when natural hazards pose risks to public safety.

Source: Modified action from NFS/NPS Climate Adaptation Library

- 3 Sea-level rise increases the frequency, depth, and duration of inundation of low coastal areas (e.g., downtown Olympia and tribal lands), which could damage or disrupt use of infrastructure and result in loss of cultural resources (e.g., homes, roads, etc.).
- 22 Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 55 Warmer water increases the growth and reach of pathogens (e.g., cyanobacteria and algal blooms) harmful to humans, fish and other water users.

Wildfire & Extreme Heat (Infrastructure Management)

Action 18

Increase the urban canopy with drought-tolerant and pest-resistant vegetation.

Such grasses, shrubs and trees could help conserve water, provide cooling shade, improve air and water quality, and support flood storage/infiltration.

Source: Columbia Basin Trust Adaptation Resource Kit

- 1** Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 27** Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 30** Intensifying precipitation increases the volume of urban runoff and flooding, which could render inadequate some stormwater/flood-control facilities.
- 54** Warmer summers increase water temperatures.
- 87** Intensifying precipitation puts more strain on services (social, emergency, etc.).
- 90** Population change increases strain on social and emergency services.
- 92** Warmer summers increase extreme temperatures, which could cause hyperthermia -- a major risk for elderly, homeless and other especially vulnerable populations.
- 117** Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 23** Population change increases pressure on existing parks and open space.
- 80** Increasing drought reduces aquifer recharge and could spur more groundwater pumping when surface water is scarce, which could lower well levels and raise the cost of pumping water from greater depths.
- 132** Warmer summers increase production of surface ozone (VOCs interacting with NOx) and accumulation of fine particulate matter (PM2.5).
- 4** Warmer summers cause urban heat islands, which could affect livability/health in heavily developed centers and corridors.
- 5** Increasing drought stresses sensitive urban landscaping, which could leave them vulnerable to extreme heat, pests or pathogens.
- 46** Warmer summers increase the risk for heat injuries due to rising temperatures, which will increase demand/cost for emergency medical services and hospitalizations.
- 50** Intensifying precipitation raises the cost of development (flooding and runoff mitigation measures).
- 111** Warmer summers increase atmospheric CO₂, which decreases the nutritional quality of forage and pasture lands for livestock and wild animals.

Wildfire & Extreme Heat (Infrastructure Management)

Action 87

Advocate for expanding the eligibility of federal disaster-assistance funding to allow for the replacement or relocation of aging or vulnerable infrastructure before it fails.

This includes facilities such as water infrastructure, fire stations, transportation infrastructure, emergency coordination shelters, and buildings used as emergency shelters that are better suited to serve communities in the future.

Source: *Modified ST Action PS-2.17*

- 3 Sea-level rise increases the frequency, depth, and duration of inundation of low coastal areas (e.g., downtown Olympia and tribal lands), which could damage or disrupt use of infrastructure and result in loss of cultural resources (e.g., homes, roads, etc.).
- 26 Sea-level rise raises the risk of coastal inundation and erosion, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 30 Intensifying precipitation increases the volume of urban runoff and flooding, which could render inadequate some stormwater/flood-control facilities.
- 58 Sea-level rise increases coastal flooding of downtown Olympia and LOTT wastewater treatment plant assets, which could threaten the ability to treat and discharge water.
- 92 Warmer summers increase extreme temperatures, which could cause hyperthermia -- a major risk for elderly, homeless and other especially vulnerable populations.
- 114 Sea-level rise makes coastal groundwater more vulnerable to saltwater intrusion and inundation.
- 68 Sea-level rise raises the risk of coastal inundation, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.

Action 111

Account for the inclusion of defensible spaces into future developments (e.g., designing roads, pathways, sidewalks, and landscaping to create firebreaks) in areas where there is high wildfire risk.

Source: *Modified Action 2.3 from Columbia Basin Trust adaptation toolkit*

- 22 Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 82 Increasing drought raises the risk of wildfires and elevated levels of PM10 (coarse particulate matter) from smoke.
- 33 Increasing drought raises the risk of wildfires which could damage forests that are important to the region's economy.
- 122 Increasing drought raises the risk of wildfires, which could destroy forests that serve as a net carbon sink.
- 133 Increasing drought raises the risk of wildfires and elevated levels of PM10 from smoke.
- 66 Increasing drought contaminates water (turbidity and sedimentation) due to wildfires.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 94 Increasing drought raises the risk of wildfires, which could damage utility infrastructure.
- 95 Increasing drought raises the risk of wildfires, which could close roads and cut off access to vital goods and services.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.

Wildfire & Extreme Heat (Planning & Data)

Action 46

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

Source: *Modified CW-WH1 Countywide Hazard Mitigation Initiative*

- 22 Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 82 Increasing drought raises the risk of wildfires and elevated levels of PM10 (coarse particulate matter) from smoke.
- 122 Increasing drought raises the risk of wildfires, which could destroy forests that serve as a net carbon sink.
- 133 Increasing drought raises the risk of wildfires and elevated levels of PM10 from smoke.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.

Action 85

Adopt a hazard-mitigation plan and actively pursue funding opportunities to implement the highest-priority actions.

Source: *ST Action PS-2.15*

- 3 Sea-level rise increases the frequency, depth, and duration of inundation of low coastal areas (e.g., downtown Olympia and tribal lands), which could damage or disrupt use of infrastructure and result in loss of cultural resources (e.g., homes, roads, etc.).
- 25 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and result in economic losses.
- 26 Sea-level rise raises the risk of coastal inundation and erosion, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 58 Sea-level rise increases coastal flooding of downtown Olympia and LOTT wastewater treatment plant assets, which could threaten the ability to treat and discharge water.
- 78 Warmer summers introduce or exacerbate disease vectors (carriers), which could harm human health (warmer, wetter winters also exacerbate exposure to pathogens and other health threats).
- 87 Intensifying precipitation puts more strain on services (social, emergency, etc.).
- 92 Warmer summers increase extreme temperatures, which could cause hyperthermia -- a major risk for elderly, homeless and other especially vulnerable populations.
- 47 Sea-level rise increases the rate of erosion of unprotected coastal bluffs, which could threaten the property and safety of nearby residents.
- 68 Sea-level rise raises the risk of coastal inundation, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 95 Increasing drought raises the risk of wildfires, which could close roads and cut off access to vital goods and services.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.

Wildfire & Extreme Heat (Planning & Data)

Action 88

Develop a countywide disaster debris management plan with actions to efficiently dispose of or recycle materials (organic and artificial).

Source: Modified ST Action SW-1.9

- 13 Warmer summers stress sensitive plants and habitat, which could leave them vulnerable to extreme heat, pests or pathogens.
- 22 Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 5 Increasing drought stresses sensitive urban landscaping, which could leave them vulnerable to extreme heat, pests or pathogens.
- 68 Sea-level rise raises the risk of coastal inundation, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 71 Population change increases solid waste generation.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.

Action 100

Assess climate change-induced migration within and to the Thurston Region, and evaluate response strategies. This action could entail assessing which of the region's residents are most vulnerable to temporary or permanent displacement (e.g., low-income or socially isolated residents who may be forced to move because of climate-exacerbated hazards) and what resources they might need. This action also could entail assessing who is most likely to move to the region and how to accommodate them in ways consistent with community values. For example, this could be done by studying "chain migration," the tendency of migrants to follow those of similar ethnicity, language or job skillset, as well as by evaluating migrants' needs and where/how much growth should occur so that it's consistent with local comprehensive plans.

- 1 Increasing drought makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 65 Population change increases transportation-related energy consumption, CO2 emissions, and other pollutants related to buildings and transportation.
- 90 Population change increases strain on social and emergency services.
- 117 Population change makes it harder to balance competing demands for water (for housing, industry, energy, agriculture, and the environment).
- 23 Population change increases pressure on existing parks and open space.
- 36 Population change puts more strain on transportation (roads, transit, etc.).
- 60 Population change increases pollution related to development (e.g., more septic systems and impervious surfaces).
- 89 Population change puts more strain on schools (e.g., unplanned influx or loss of students).
- 71 Population change increases solid waste generation.
- 113 Population change increases pressure to develop rural areas, which could reduce, fragment and/or degrade farms, forests, and prairies.

Wildfire & Extreme Heat (Regulations)

Action 7

Extend and enforce the rural burn ban season during droughts.

- 22 Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 82 Increasing drought raises the risk of wildfires and elevated levels of PM10 (coarse particulate matter) from smoke.
- 33 Increasing drought raises the risk of wildfires which could damage forests that are important to the region's economy.
- 122 Increasing drought raises the risk of wildfires, which could destroy forests that serve as a net carbon sink.
- 133 Increasing drought raises the risk of wildfires and elevated levels of PM10 from smoke.
- 66 Increasing drought contaminates water (turbidity and sedimentation) due to wildfires.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 94 Increasing drought raises the risk of wildfires, which could damage utility infrastructure.
- 95 Increasing drought raises the risk of wildfires, which could close roads and cut off access to vital goods and services.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.

Action 8

Downzone areas with highest risk of wildfire.

- 22 Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 82 Increasing drought raises the risk of wildfires and elevated levels of PM10 (coarse particulate matter) from smoke.
- 33 Increasing drought raises the risk of wildfires which could damage forests that are important to the region's economy.
- 122 Increasing drought raises the risk of wildfires, which could destroy forests that serve as a net carbon sink.
- 133 Increasing drought raises the risk of wildfires and elevated levels of PM10 from smoke.
- 66 Increasing drought contaminates water (turbidity and sedimentation) due to wildfires.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 94 Increasing drought raises the risk of wildfires, which could damage utility infrastructure.
- 95 Increasing drought raises the risk of wildfires, which could close roads and cut off access to vital goods and services.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.
- 113 Population change increases pressure to develop rural areas, which could reduce, fragment and/or degrade farms, forests, and prairies.

Action 60

Modify building codes, where necessary, to address emergency service radio communications, fire sprinkler systems in all new residential and commercial construction, and access and egress issues to emergency response and equipment.

Source: ST Action PS-1.5

- 3 Sea-level rise increases the frequency, depth, and duration of inundation of low coastal areas (e.g., downtown Olympia and tribal lands), which could damage or disrupt use of infrastructure and result in loss of cultural resources (e.g., homes, roads, etc.).
- 27 Intensifying precipitation raises the risk of floods and landslides, which could damage private property and public infrastructure, endanger lives, and cut off access to goods and services (affects agriculture, buildings, roads, bridges, and other assets).
- 87 Intensifying precipitation puts more strain on services (social, emergency, etc.).
- 90 Population change increases strain on social and emergency services.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.

Wildfire & Extreme Heat (Regulations)

Action 139

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

Source: Action from Smart Growth Fixes for Climate Adaptation & Resilience

- 22 Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 82 Increasing drought raises the risk of wildfires and elevated levels of PM10 (coarse particulate matter) from smoke.
- 33 Increasing drought raises the risk of wildfires which could damage forests that are important to the region's economy.
- 122 Increasing drought raises the risk of wildfires, which could destroy forests that serve as a net carbon sink.
- 133 Increasing drought raises the risk of wildfires and elevated levels of PM10 from smoke.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 94 Increasing drought raises the risk of wildfires, which could damage utility infrastructure.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.

Action 140

Adopt wildfire hazard overlay districts with development regulations (for new structures) based on factors such as slope, structure, and fuel hazards.

Source: Modified Action from Smart Growth Fixes for Climate Adaptation & Resilience

- 22 Increasing drought raises the risk of wildfires, which could damage forests and other sensitive lands that provide habitat.
- 82 Increasing drought raises the risk of wildfires and elevated levels of PM10 (coarse particulate matter) from smoke.
- 33 Increasing drought raises the risk of wildfires which could damage forests that are important to the region's economy.
- 122 Increasing drought raises the risk of wildfires, which could destroy forests that serve as a net carbon sink.
- 133 Increasing drought raises the risk of wildfires and elevated levels of PM10 from smoke.
- 74 Increasing drought raises the risk of wildfires, which could damage public- and private-sector infrastructure (homes, businesses, roads, etc.) and create waste that cannot be reused or recycled.
- 94 Increasing drought raises the risk of wildfires, which could damage utility infrastructure.
- 99 Increasing drought raises the risk of wildfires, which could result in personal injury or death.