



# URBAN FOREST AND WATERSHEDS

## Urban Forest and Watersheds

Forests and watersheds provide benefits to residents and visitors of Anchorage, as well as important habitat for Alaska's fish and wildlife. Anchorage is comprised of multiple diverse watersheds that span the land-use gradient from urban to natural. This shared habitat supports a vibrant community that is proud to co-exist with abundant wildlife and fish.

Eklutna Lake and its watershed provides drinking water and hydroelectric power for Anchorage. Anchorage watersheds support year-round recreation including: running, walking, biking, cross country skiing, wildlife viewing, and fishing. Many of Anchorage's 250 miles of trails run through these watersheds, connecting neighborhoods, parks, and open spaces. Several Anchorage watersheds support urban salmon runs, a unique feature that benefits residents and attracts visitors.

Trees in yards, parks, and shared right of ways make up the urban forest. These trees provide clean air, shade, protection from the elements, habitat, food, and peace of mind. In addition to these tangible benefits, recent studies have demonstrated a link between human health and the presence of trees. For example, the invasive Emerald Ash Borer beetle killed 100 million trees in 15 US states, as a result there were increased deaths of residents due to an increase in cardiovascular and respiratory illnesses.<sup>66</sup> Urban forests and contact with nature also have documented benefits to human social connections and mental health and well-being.

Anchorage's forestlands, waterways, wetlands, and soils are some of the most important tools for mitigating the impacts of climate change. These natural assets, along with increased implementation of green infrastructure and low impact development practices, sequester carbon, improve air quality, provide clean water, and regulate temperatures. Based on field data from ten US cities, urban forests currently store 700 million tons of carbon.<sup>67</sup>



***Bioswales and rain gardens included in building and infrastructure designed to catch runoff from rainfall. Bioswales and rain gardens can be used along sidewalks, roofs, and other hard surfaces to capture rainwater and filter out contaminants from runoff that can end up in our waterways. The Municipality of Anchorage currently supports a rain garden program, including free literature, advice, and site visits to residents interested in a Low Impact Development (LID) or rain garden project.<sup>68,69</sup>***

<sup>66</sup> Donovan, G. H., Butry, D. T., Michael, Y. L., Prestemon, J. P., Liebhold, A. M., Gatzolis, D., & Mao, M. Y. (2013). The relationship between trees and human health: Evidence from the spread of the emerald ash borer. *American Journal of Preventive Medicine*, 44(2), 139.

<sup>67</sup> Nowak DJ, Crane DE. 2002. Carbon storage and sequestration by urban trees in the USA. *Environmental Pollution*. 116: 381-389.

<sup>68</sup> <https://alaskamastergardener.community.uaf.edu/2015/08/04/rain-garden-resources-for-alaskans/>

<sup>69</sup> <https://www.muni.org/Departments/SWS/recycle/Documents/5.1%20Water%20Quality%20and%20Rain%20Gardens.pdf>

## Climate impacts on urban forests and watersheds

Many changes to the urban forests and watersheds have already been observed in Anchorage. These changes often have ripple effects throughout the ecosystem with consequences for many species. For example, an overall increase in air temperature can raise stream temperatures and increase evapotranspiration, which impacts habitat suitability for fish and aquatic plants. Similarly, changes in the timing and volume of runoff during spring as a result of melting snowpack can affect nutrient cycling and habitat quality for aquatic species. As the treeline in Anchorage moves up in elevation, it will begin to replace alpine tundra. As this happens, less light is reflected from snow cover and more heat is absorbed, creating a feedback that facilitates rapid snowmelt and exacerbates issues associated with changing runoff.<sup>70,71</sup> Higher temperatures can also contribute to increased wildfire risk and can exacerbate epidemic occurrences of forest pests and pathogens.

Major hydrologic changes have already been observed in Anchorage and are expected to continue causing degradation of salmon habitat, potential reductions in wildlife abundance, and loss of winter snow sport opportunities.<sup>72</sup> Monitoring and predicting hydrologic changes and the run-off rate for Eklutna Lake and its watershed are especially important, as they provide over 85% of the water for Anchorage's residential and commercial use, manufacturing, industrial cooling, and hydropower uses. Mid-winter freeze-thaw events require more sand, gravel, and salt to keep roads safe for Anchorage residents. This leads to increased sedimentation and turbidity in our water sources and degraded aquatic habitat, more frequent and severe flood events, and more stormwater infrastructure maintenance.

**Eklutna Lake.** Over 85% of the 8.3 trillion gallons of water supplied for Anchorage Water & Wastewater Utility (AWWU) comes from Eklutna Lake, but the life expectancy for the glacier providing this water is estimated to come to an end within the next 100 years. The Eklutna Glacier has seen an increase of the loss of glacial mass over the years with an average of 7% annually between 2010 and 2015 and an even higher average of 13% in the hotter years of 2013 and 2015.<sup>73</sup> (Photo available under creative commons licensing, credit: Enrico Blasutto)



Finally, invasive species have the potential to disrupt ecosystem processes, compete with and displace native species, and destroy habitat for wildlife and fish. Changes in climate may make forests and waterways more hospitable to invasive species. Elodea (*Elodea spp.*), which degrades freshwater habitat, has recently been detected in Anchorage lakes.<sup>74</sup> Invasive trees such as European Bird

<sup>70</sup> Foley JA, Kutzback JE, Coe MT, Levis S.1994. Feedbacks between climate and boreal forests during the Holocene epoch. *Nature* 271:52–54.

<sup>71</sup> Chapin III FS, McGuire AD, Randerson JT, Pielke R, Baldocchi, DD, Hobbie SE, Roulet N, Eugster W, Kasischke ES, Rastetter EB, Zimov SA, Running S.2000. Arctic and boreal ecosystems of western North America as components of the climate system. *Global Change Biology* 6 (suppl.):211–223.

<sup>72</sup> Hayward, G. D., Colt, S., McTeague, M. L., Hollingsworth, T. N., & Pacific Northwest Research Station (Portland, Or.). (2017). Climate change vulnerability assessment for the chugach national forest and the Kenai Peninsula. (No. 950.;GTR-950;). Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

<sup>73</sup> <https://www.awwu.biz/water-quality/water-quality-and-the-customer/current-usgs-eklutna-lake-level>

<sup>74</sup> Alaska Department of Natural Resources. 2018. Invasive plants and agricultural pest management. Alaska Department of Natural Resources, Division of Agriculture. <http://plants.alaska.gov/invasives/elodea.htm> Accessed on October 20, 2018.

Cherry (*Prunus padus*) can displace native species, alter forest succession and composition, and create visual barriers causing safety concerns in parks and along trails.

### **Protecting our greenspaces and watersheds**

Overall, 35% of the Anchorage Bowl is covered with tree canopy.<sup>75</sup> Several large tracts of forest, including Chugach State Park, Chugach National Forest, and the many city parks and greenspaces make up a significant portion of this canopy. In these areas, tree canopy coverage is closer to 75%, so protection and preservation of these forests is critical for many reasons.

As Anchorage's population continues to grow and development expands, forests and watersheds will see increased pressure and stress that is compounded by climate change. It is imperative that policies are established to stop further canopy loss, protect greenspace and watersheds, and incorporate more green infrastructure into future development in a strategic and equitable way. Forests and watersheds within the Anchorage area have already been influenced by climate change and will continue to be affected in the future. An adequately funded and supported urban forestry program is vital for preserving and managing forests and green spaces. Healthy urban forests and watersheds are important for maintaining ecosystem functions and providing habitat for wildlife, fish, and birds. These elements provide for our community's well-being and connection to the environment.

#### **Case Study: UAA is a Tree Campus USA**

UAA is Tree Campus USA for the ninth consecutive year, recognized for its conservation capabilities in promoting and enhancing our urban forests. The five core requirements to become a Tree Campus USA include: (1) having an established tree advisory committee, (2) a campus tree care plan, (3) campus commitment to annual spending on tree programs, (4) recognition of Arbor Day, and (5) promotion of student participation in service-learning projects.

Encouraging a bounty of trees on UAA's campus not only improves air quality and protection from the elements but is also benefiting the overall quality of life for students and faculty. Green spaces on campus give students more room to de-stress and take a mental break. Additionally, a well-designed tree campus can have energy efficiency benefits by cutting heating and cooling costs.

UAA aims to preserve large areas of mature vegetation and trees during construction projects in order to preserve and rehabilitate animal habitat. UAA's landscaping team successfully restored habitat around Chester Creek behind student housing. They revegetated 1,450 feet of stream bank by planting 1,000 cottonwood, alder, and willow trees to improve areas that had been damaged by erosion. After revegetation, fish and beavers began to occupy the stream. Beavers no longer live in the area, most likely due to increase in human activity, but the process demonstrated how landscape management is a valuable asset for urban forest sustainability.

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<sup>75</sup> [http://forestry.alaska.gov/Assets/pdfs/community/organizations/AnchorageFAMP-final\\_draft.pdf](http://forestry.alaska.gov/Assets/pdfs/community/organizations/AnchorageFAMP-final_draft.pdf)

# Climate Action Plan sectors

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The Anchorage Climate Action Plan puts Anchorage on a path to reduce greenhouse gas emissions 80 percent from 2008 levels by 2050, with an interim goal of 40 percent by 2030. This document details objectives and actions to achieve these emissions goals and to support resilience and preparedness for climate impacts.

## Key

The objectives and associated actions are grouped into the following sectors:

- Buildings and Energy
- Land Use and Transportation
- Consumption and Solid Waste
- Health and Emergency Preparedness
- Food Systems
- Urban Forest and Watersheds
- Outreach and Education

## TERMINOLOGY

**“Vision”** = A broad statement that describes our desired position by 2050 within each sector.

**“Objectives”** = Steps towards achieving mitigation targets and adaptation goals by 2030.

**“Actions”** = Detailed policies, projects and activities to achieve our objectives.

**CO-BENEFITS** refer to the intended or unintended benefits for the local environment and community as a result of mitigation and adaptation actions that are directed at addressing climate change. The co-benefits column indicates the actions that have the potential for significant, direct co-benefits. For example, actions to reduce the number of cars on the road have environmental quality and health co-benefits because these actions will improve air quality in Anchorage. The co-benefits assessed in this plan include:

- High potential to support jobs and prosperity
- High potential to advance equity
- High potential to improve local environmental quality
- High potential to improve health

## PRIMARY MUNICIPAL LIAISON & POTENTIAL PARTNERS

To assist with implementation and accountability, primary municipal liaisons and potential partners are identified. For Municipality lead actions, the Primary Municipal Liaison is the primary entity responsible for initiating the implementation of the action and reporting on progress. For partner (university and other) lead actions, the Primary Municipal Liaison will be the main point of contact for the Municipality. Successful implementation will often require collaboration and coordination with other departments as well as public and private sector partners.

The full list of municipal departments included in the plan is included in the Appendix.

## IMPLEMENTATION TIMEFRAME

- **Near-term** = Plan adoption to June 2020
- **Mid-term** = 2020 to 2025
- **Long-term** = 2026 and beyond
- **Existing and/or ongoing** = currently underway
- **Uncertain** = depends on funding or other factors

## Urban Forests and Watersheds

**2050 Vision:** Anchorage strives for forests and watersheds that provide all residents and visitors with access to a resilient ecosystem that yields recreational opportunities, clean air and water, peace of mind, and habitat for fish and wildlife.

**Objective 21. Maintain or improve resilience of urban forest and watersheds in Anchorage to promote ecosystem services and buffer against extreme weather events.**

No.	Actions	Co-benefits	Primary Municipal Liaison	Potential Partners	Timeline
21A	Sustain a full time, year-round urban forester through the Anchorage Fire Department (AFD) to 1) update the Community Wildfire Protection Plan, 2) implement the plan with active forest management, and 3) facilitate communication and collaboration among agencies, including Parks and Recreation.	environment, health, equity	AFD	Parks and Recreation (P&R), Planning Department, Alaska Department of Natural Resources (AK DNR) Division of Forestry and Community Forestry Program, UAF Cooperative Extension	Mid-term
21B	Develop an urban forest management plan to establish objectives and best management practices for MOA's urban forest and to identify appropriate canopy cover and diversity goals for Anchorage.	environment, health	P&R, AFD	Planning Department, AK DNR Division of Forestry and Community Forestry Program, UAF Cooperative Extension	Mid-term
21C	Preserve existing forested areas through practices that re-purpose already developed areas, such as establishing codes that retain minimum canopy cover on new development (See Land Use and Transportation Action 5D).	environment, health, equity	Planning Department, P&R	Anchorage Assembly, AFD, Project Management & Engineering (PM&E), AK DNR Division of Forestry and Community Forestry Program, AK Department of Fish and Game (AK DF&G), Joint Base Elmendorf-Richardson (JBER)	Uncertain
21D	Support efforts to protect and restore extended riparian corridors to maintain wildlife and fish habitat, including efforts to reestablish historical surface channels and connectivity.	environment, health	PM&E (Watershed Management)	P&R, Planning Department, AK DF&G, Anchorage Waterways Council, JBER, U.S. Forest Service, U.S. Fish and Wildlife Service (USFWS)	Long-term
21E	Increase GIS capacity in the MOA Planning Department in order to analyze environmental data in relation to long range and current planning issues that may be impacted by climate change.		Planning Department	UAA Center for Conservation Science, AK DF&G, AK DNR Division of Forestry	Uncertain
21F	Promote and expand weed pulls, tree plantings, spruce beetle identification and management, wildfire mitigation, scoop poop events, and other educational activities that promote stewardship among the public, businesses, and homeowners.	environment, equity	P&R	AK DNR, UAA, APU, ASD	Near-term

**Objective 22. Reduce run-off to mitigate peak flows and flooding and promote better water quality.**

No.	Actions	Co-benefits	Primary Municipal Liaison	Potential Partners	Timeline
22A	Protect and facilitate expansion of wetlands, monitor water quality, and preserve the ecosystem function of wetlands and creeks through strengthening current municipal zoning regulations and codes and exploring incentives for developers.	environment, equity, health	Planning Department, Real Estate Department	PM&E, Heritage Land Bank (HLB), Alaska Department of Environmental Conservation (AK DEC), Great Land Trust	Long-term
22B	Incentivize and prioritize the development of "green infrastructure" such as parks, wetlands, riparian and wildlife corridors, and natural drainageways, and low-impact development. Research green infrastructure implementation and long-term viability in a sub-Arctic environment.	environment, equity, Jobs and prosperity	PM&E (Watershed Management), Maintenance and Operations (M&O)	UAA Small Business Development Center, Planning Department	Mid-term
22C	Strengthen municipal requirements for stormwater retention (keeping all of the water) and detention (retain amount for a certain amount of time) for new development.	environment, health, Jobs and prosperity	PM&E (Watershed Management), Development Services	AK DEC	Mid-term
22D	Expand public education about the value of watersheds, storm water run-off, and rain gardens.	environment, equity, health	PM&E (Watershed Management), Development Services	P&R, UAA, ASD, Anchorage Park Foundation, Campbell Creek Science Center, FCC	Near-term
22E	Continue to support Alaska Pacific University (APU) efforts to monitor Eklutna Watershed (e.g. glacial volume change over time, inflow of water to lake, recharge) and help make data available to the Anchorage Water and Wastewater Utility (AWWU) and ML&P (See Health and Emergency Preparedness Action 17D).		AWWU	APU, United States Geological Survey (USGS), Eklutna, Inc., AK DEC, ADF&G, USFWS	Uncertain
22F	Continue to monitor chemical snow and ice management treatments and update regulations as needed to respond to changing ice, freeze/thaw, and rain events in a way that supports a healthy watershed.	environment, health	PM&E, M&O (Street Maintenance)	Alaska Department of Transportation & Public Facilities (AK DOT&PF)	Mid-term

**Objective 23. Reduce establishment and spread of invasive species (plants, insects, aquatics, wildlife) to make our urban forest more resilient to environmental change.**

No.	Actions	Co-benefits	Primary Municipal Liaison	Potential Partners	Timeline
23A	Develop a watch list of potential invasive species that could establish residency in Anchorage due to climate change and distinguish this from species that might naturally expand their range into Anchorage.		P&R	UAA Center for Conservation Science	Near-term

23B	Document and monitor spread of invasive species (See Health and Emergency Preparedness Action 17B).	environment	P&R	JBER, UAA	Long-term
23C	Establish agency management practices that reduce the spread of invasive terrestrial (e.g. plants, fungus, etc.) and aquatic species (e.g. establish a source of weed free top soil or seed mix in Anchorage).	environment, Jobs and prosperity	Planning Department, P&R	AK DOT&PF	Uncertain
23D	Increase the management capacity to rapidly and effectively respond to invasive species outbreaks.	environment, equity	P&R	AK DNR Plant Materials Center, AK DOT&PF, UAF Cooperative Extension	Mid-term

**Objective 24. Increase interagency cooperation to improve ecosystem management.**

No.	Actions	Co-benefits	Primary Municipal Liaison	Potential Partners	Timeline
24A	Improve stormwater management by creating a stormwater utility and encourage inter-agency cooperation to increase capacity to handle climate-related events.	environment, health, equity	Office of the Mayor, PM&E (Watershed Management), AWWU	M&O Street Maintenance, AK DEC, AK DOT&PF	Mid-term
24B	Share information across agencies about illegal use and waste disposal within parks and forests to reduce destruction of forests and negative impacts on water quality.	environment, health	Anchorage Health Department (AHD), P&R, Anchorage Police Department (APD)	P&R, AK DNR Community Forestry Program	Near-term
24C	Enhance inter-agency communication for wildfire mitigation and emergency response.	health	Office of Emergency Management (OEM), AFD	AK DNR, AK DOT&PF, JBER, National Guard	Mid-term