Parks, Trails, & Open Space

KEY PERFORMANCE MEASURES

- *Acres of Parks, Trails, & Open Space*
- *Community Forest Coverage*
- *Forest Health Index*

Aspen's unique blend of natural resources provides wide-ranging habitats, recreation opportunities and connected, accessible places. *A myriad of natural resources contribute to Aspen's singularity as a place. High levels of biodiversity, native ecosystems, extensive fish and wildlife habitat, and a diverse urban forest provide ecosystem functions that benefit the community (such as absorbing water runoff and filtering water for quality, for example), and provide for extensive active and passive recreational pursuits and personal renewal. Access to nearby parks and open spaces via walkable connections is an integral part of the City's appeal.*

The identity, well-being, and economy of Aspen are inextricably linked to the land and ecosystems that hold it. Development arrived in the Roaring Fork Valley during the mining age, and has ebbed and flowed ever since with tourism, residential, and commercial expansion. Consistently, Aspen's economy has relied on its natural surroundings and simultaneously posed a threat to that same lifeblood.

Today, Aspen is surrounded by the White River National Forest, the Maroon Bells-Snowmass Wilderness, Hunter-Frying Pan Wilderness, Collegiate Peaks Wilderness, and numerous networks of public lands and trails. Visitors and locals alike benefit from the many years of insight and hard work that led to the protection of these unique natural spaces. Undeveloped land in the Aspen area is both essential to the human experience, as well as to the vital ecosystems and ecosystem linkages for wildlife and vegetation.

Figure 1. The Marolt Open Space (left). [26] Trees lining Galena St in downtown Aspen (right).[27]

[26] *Williamson, City of Aspen Parks, Trails, and Open Space Department.*
[27] *Armstrong, Laura. 2016.*

In addition to the preservation of wilderness and forest in the areas surrounding Aspen, careful attention is dedicated to open spaces, parks, and trails. This elevates the health of the urban environment, its scenic character, and livability. These urban spaces also provide a level of accessibility and ease of access that is challenging to achieve in the wilderness areas and public lands that are further afield. The 2012 Aspen Area Community Plan (AACP) underscores that the natural environment is an essential component of the quality of life enjoyed in this mountain town.[28] The plan further asserts that: "scenic views of the natural environment, easy access to public lands and a range of recreational opportunities are among our greatest assets and the reasons many people choose to visit or make the Aspen Area their home."[29]

To understand Aspen's progress in striving toward greater sustainability, local experts and stakeholders convened and chose the three following metrics to represent the Sustainability Report's *Parks, Trails, & Open Space* section:

- *Acres of Parks, Trails, & Open Space*
- *Community Forest Coverage*
- *Forest Health Index*

Each of these individual key performance measures is introduced in further detail on the succeeding pages.

Acres of Parks, Trails, and Open Space

The community greatly benefits from parks, trails, and open space for their preservation of natural habitat and as areas for outdoor recreation. These spaces contribute to the quality of life offered to the visitors and residents of Aspen, ensuring accessibility to green space and trails both in the heart of the downtown and further afield. Concentrating recreation near population centers benefits wilderness and wildlife to the extent that habitat fragmentation is prevented.

There are 30 parks in Aspen. These parks contain playing fields and skate parks, water features and storm water filtration, picnic tables and restroom facilities, and natural settings to host events. A wide network of trails, both paved and unpaved, weave in and around town. Some of these trails are also maintained for cross country skiing in the winter. The City of Aspen owns a variety of open space parcels in and outside of City Limits and collaborates with Pitkin County in co-ownership and maintenance of other open spaces in the

Figure 2. Play structures in an Aspen park.[30]

[28] *Aspen Area Community Plan. City of Aspen and Pitkin County, 2012, p. 21.*
[29] *Ibid., p. 44.*
[30] *Williamson. City of Aspen Parks, Trails, and Open Space Department.*

Upper Roaring Fork Valley. These jurisdictions work together to manage these spaces with conservation, wildlife, and human well-being in mind. For example, seasonal closures protect migration corridors and elk calving habitat.[31]

Since 2000, the City of Aspen has entered into multi-jurisdictional partnerships with Pitkin County to acquire a 250-acre parcel on Smuggler Mountain, and the 845 acre Droste Property at Brush Creek, which combines with Cozy Point Ranch and Aspen Mass open spaces to form a monumental 2,500-acre Sky Mountain Park.[32]

Figure 3. Mountain biking in Sky Mountain Park.[33]

The City of Aspen Parks, Trails, and Open Space Department works hard to maintain existing holdings and carefully evaluates prospective parcels on a case-by-case basis. The 2012 AACP offers guidance on how these new parcels should be evaluated:

- Future acquisition... should focus on the intrinsic value of open space, wildlife habitat, protection of scenic resources, recreational uses, trail connectivity and accessibility.

- Future trail expansion should connect existing trails to improve and maintain easy access to public lands and provide opportunities for the use of trails by commuters in both summer and winter.[34]

The corresponding one-page dashboard describes the City of Aspen's current ownership of these spaces:

- *Acres of Parks, Trails, & Open Space*

Figure 4. Sky Mountain Park, a 2,500-acre multi-jurisdictional open space acquired by Pitkin County and the City of Aspen.[35]

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[31] *Ibid. For a list of the many other projects and accomplishments and initiatives that have come to fruition in regards to parks, recreation, open space, and trails since 2000, please visit p. 45 of the 2012 AACP.*
[32] *Ibid., p. 45. For a list of the many other projects and accomplishments and initiatives that have come to fruition in regards to parks, recreation, open space, and trails since 2000, please visit p. 45 of the 2012 AACP.*
[33] *Kuhn, Matt. City of Aspen Parks, Trails, and Open Space Department.*
[34] *Aspen Area Community Plan. City of Aspen and Pitkin County, 2012, p. 44.*
[35] *Kuhn, Matt. City of Aspen Parks, Trails, and Open Space Department.*

Community Forest Coverage

Aspen has been named as a "Tree City USA" and is also accredited by the Society of Municipal Arborists, a peer-reviewed program that demonstrates excellence in urban and community forest management.[36] Yet, this was not the case for Aspen in the relatively recent past. Historic photos reveal an Aspen with streets bare of cover or greenery.

Figure 5. Comparison panoramic views of Red and Smuggler Mountains.[37]

Now, the community canopy is an essential part of the resident and visitor experience in Aspen, and is also recognized for its healthy environmental impacts. Urban forests absorb water runoff and help filter water and air pollution. They provide shelter from elements, offer relief from heat, and stabilize soil erosion. Altogether, they enhance aesthetic value and support well-being.

As is the nature with a living forest, this task requires careful study, attention, and action. Within the implementation steps outlined in the Wildlife and Wildlife Habitat Section of the AACP is the objective to: "promote the diversity and vitality of the 'urban forest' that exists both within the City of Aspen and in the Wildland Urban Interface."[38]

In 2015, the City of Aspen commissioned an Urban Tree Canopy (UTC) Study, which documented the density of canopy coverage within Aspen's City Limits. This study used aerial photography as well as Light Detection and Ranging (LiDAR) technology to render precise imagery and information about the City's community forest, on a parcel-specific level.[39] Results of this study, as well as the important benefits of urban forest, are highlighted in the following one-page dashboard:

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[36] *Natural Resources and Forestry. City of Aspen Parks, Trails, Open Space, Web. <http://www.aspenpitkin.com/Departments/Parks-Trails-Open-Space/Natural-Resources-Forestry/>.*
[37] *Smuggler Mountain Open Space Management Plan. May, 2010. p. 5.*
[38] *Aspen Area Community Plan. 2012. City of Aspen and Pitkin County. Web. Appendix, p. 33.*
[39] *Aspen, Colorado Tree Canopy Facts. Rep. Arvada, CO: Plan-IT GEO LLC, 2015.*

- *Community Forest Coverage*

The two previously discussed measures – Acres of *Parks, Trails, Open Space,* and *Community Forest Coverage* – relate to populated areas in or near Aspen. The subsequent measure speaks to the environmental sustainability of the larger ecological communities that surround the urban spaces of the Roaring Fork Valley.

Forest Health Index

Aspen is a community surrounded by forests and wilderness. These areas are vibrant ecological communities, important natural buffers, and cherished for recreation and conservation benefits alike. Since 2013, the Aspen Center for Environmental Studies (ACES)[40] has generated an annual Forest Health Index (FHI). This web-based index assembles a variety of factors that influence the health and resiliency of Roaring Fork Valley forests. The index seeks to:

1. Provide clear communication about conditions of local forest ecosystems undergoing visible states of change.
2. Facilitate discussion and planning about forest management, restoration, and conservation at a landscape scale.
3. Fill gaps in baseline data and methodology for tracking change in forest conditions at ecosystem scales over time.
4. Present a model for other management communities to adopt as an additional resource and for comparative evaluation.[41]

The FHI's notion of forest health is based on the premise that a healthy forest is one that is resilient to change and able to provide for local ecology as well as human goals.

[40] *ACES partners with Aspen Global Change Institute on data analysis and to ensure the scientific accuracy of the database.*
[41] *Arnott, James C., Elise C. Osenga, Jamie L. Cundiff, and John W. Katzenberger. "Engaging Stakeholders on Forest Health: A Model for Integrating Climatic, Ecological, and Societal Indicators at the Watershed Scale." Journal of Forestry 113.5 (2015): 447-53.*

Accordingly, the Index is organized by four broadly accepted goals of forest health: ecological integrity, public and safety, ecosystem services, and sustainable use and management.[42] This complements the integrated importance of environmental, economic, and social sustainability within Aspen's Sustainability Report. Each one of these goal areas receives an individual score which is built from the cumulative scores of 6-15 specific indicators within it.

The FHI total score, as well as scores for the individual measures of which it is comprised, indicate how well aligned each item is to its own range of natural variability.[43] Scores are calculated by comparing the current state of each indicator to a historic, average, or target state. In this sense, the FHI measures forest change, and many indicators are closely tied to climate change.

FHI SCORE	FOREST SCORES
81-100	Within range of natural variability; exhibiting normal composition, structure, and function
61-80	Departing from natural ranges of variability; trends suggest irregular composition, structure, and function
1-60	Significant departure from natural range of variability or normal levels; trends suggest highly abnormal characteristics in composition, structure, and function

Figure 6. Forest Health Index scores and score explanations.[44]

Aspen's Sustainability Report sets a target that the overall FHI score will remain in the range of natural variability, between 81-100 points (see figure 6). In addition to highlighting the Index's total score, the accompanying dashboard tracks the progress of four specific measures, which are described on the following page.

These indicators were chosen as examples for Aspen's Sustainability Report because they speak to the dynamic range of matters that impact forest health and can also experience significant short-term and long-term changes, thereby exerting strong influence on the overall index score. Some of the indicators are drivers of forest health, such as High Elevation Snowpack. Others are highly dependent upon forest health, but do not have huge effect over that health, such as Elk Population Health. Finally, measures such as Fire Rotation and Insect and Disease Infestation are both influencers of and influenced by the condition of local forests.

[42] *Forest Health Index. Aspen Center for Environmental Studies, Web. <http://foresthealthindex.org/>.*
[43] *Ibid.*
[44] *Ibid.*

Elk Population Health *is a strong indicator of general ecological integrity. Elk habitat is fragmented by construction, road, and trail expansion and recreational activities. Human presence and climate change also reduce winter range.* ***Since about 2000, a significant decline in the observed elk calf-to-cow ratio has been identified, which may indicate a shrinking population due to larger scale degradation of forest habitat****.*

Fire Rotation *compares actual fires and the acres burned by them to the burning cycles that scientists estimate would occur under natural conditions. Fires are an intrinsic part of forest ecology and progression, and yet, when uncontrolled, are at odds with certain human activities and populations. Accordingly, much of the West has engaged in fire suppression, which limits natural cycles. White River National Forest data indicates that* ***fire rotation is close to the outer bounds of normal and suitable for ecological integrity****.*

Insect and Disease Infestation *occur naturally in forests, but can be detrimental when experienced at elevated levels or for unnaturally prolonged periods. Aerial surveys of the Roaring Fork Watershed, conducted between 1995-2013, measure aggregate total acres damaged from a range of agents.* ***In 2008, the percent of damaged forest acres peaked at ~12%, and has since gradually improved (with the exception of 2014).*** *This may be attributed to higher precipitation counts, which enable trees to better protect themselves from diseases and pests.*

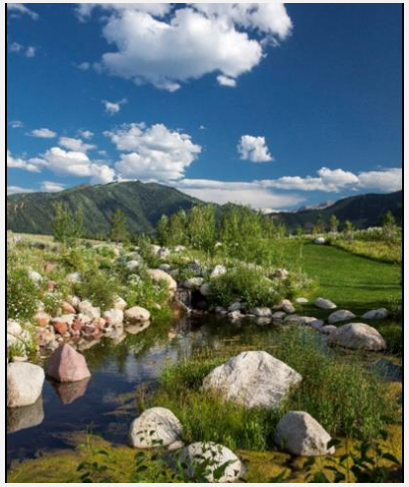
High Elevation Snowpack *is a critical water source for all inhabitants of the Roaring Fork Valley, impacting wildlife and plant populations, local economy, energy generation, and recreation. Considerable year to year variance in snowpack is detrimental to all. T****he most recent three-year average (2012-2014) of snow-water equivalent in the snowpack is slightly below the 1981-2011 base period average.***

Local communities can influence some of these markers of forest health. Regardless of their influence, all stakeholders should understand the impacts of a changing forest in order to plan for a resilient future.

Current & Proposed Actions

- The Smuggler Mountain Open Space 10-Year Management Plan outlines steps to restore tree age class diversity by mimicking natural disturbance events. This will concurrently improve wildlife habitat, reduce fire risk, and conserve the unique natural features of Smuggler Mountain.
- Sustainable expansion of parks, trails, and open space focuses on concentration and connectivity within existing systems or high-use areas, limiting habitat fragmentation.
- Sustainably built trails are durable, require minimal maintenance, drain properly, and are safe for a variety of users.
- Urban canopy cover can be promoted through new plantings, protection and maintenance of existing trees, and preventing tree loss during development.
- Collaboration with local, state, and national jurisdictions to manage local and regional forests in a way that promotes species and age class diversity and promotes healthy fire rotation will enhance forest health, and the health of the communities that surround them. The Hunter Creek prescribed burn in May of 2016 is a good example of such partnerships.
- Elk Population Health is addressed through reduction of habitat fragmentation, specifically by limiting the proliferation of roads, trails, and recreation that encroach or cut elk off from their summer, winter, and migratory areas. Another action that helps keep the Roaring Fork Valley's elk populations at targeted levels is management of hunting permits.
- High Elevation Snowpack is less easily addressed on a local level, but the observation and analysis of snowpack trends, and planning for future changes, is vital for the future health of Aspen's environment and economy.

Acres of Parks, Trails, and Open Space

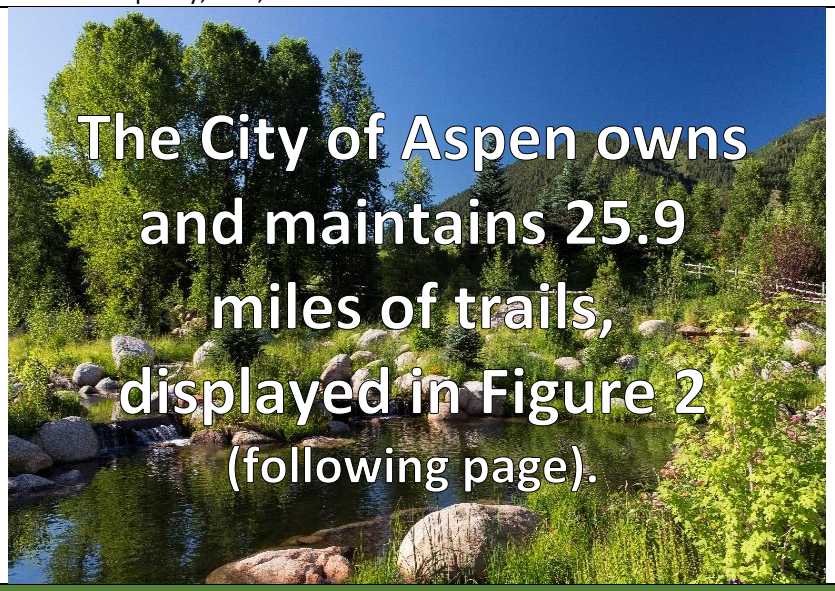


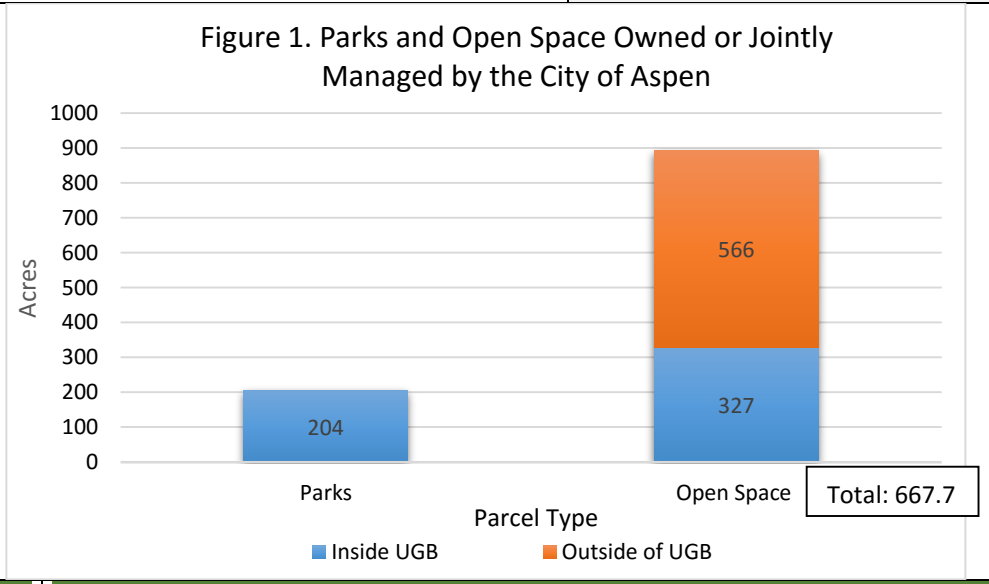
What is it? Why is it important?

This measure indicates the total acres of parks, trails, and open space acquired, developed and maintained by the City of Aspen to date. There are over 30 parks available for recreation within the City of Aspen. The City of Aspen is also involved in ownership and stewardship of a wide variety of open space parcels, both in and outside of the Urban Growth Boundary (UGB). Those outside the UGB include, but are not limited to, the Cozy Point and Mills Properties. Finally, the City maintains a wide variety of trails, both paved and dirt, some of which fall outside of the UGB. Parks, trails, and open space enable the public to access and enjoy time spent in Aspen's inspiring natural environment. This complex contributes to the Aspen Idea of well-being in mind, body, and spirit.

What does the data/trend say?

As is seen in Figure 1, in 2016, the City owns 204 acres of parks, all of which fall within the UGB. The City of Aspen owns 327 acres of open space in the UGB and partners with neighboring jurisdictions to own and jointly maintain 566 acres of open space in the greater area surrounding Aspen. In addition to open space and parks, the City of Aspen maintains over 25.9 miles of trails. Figure 2 (following page) shows a map of the parks, trails, and open space surrounding Aspen. The quantity of parks, trails, and open space that Aspen residents and visitors enjoy is extensive and diverse in nature. Future expansion will be considered on a parcel-specific basis, based on community benefit, maintenance capacity, cost, and habitat conservation.





Targets

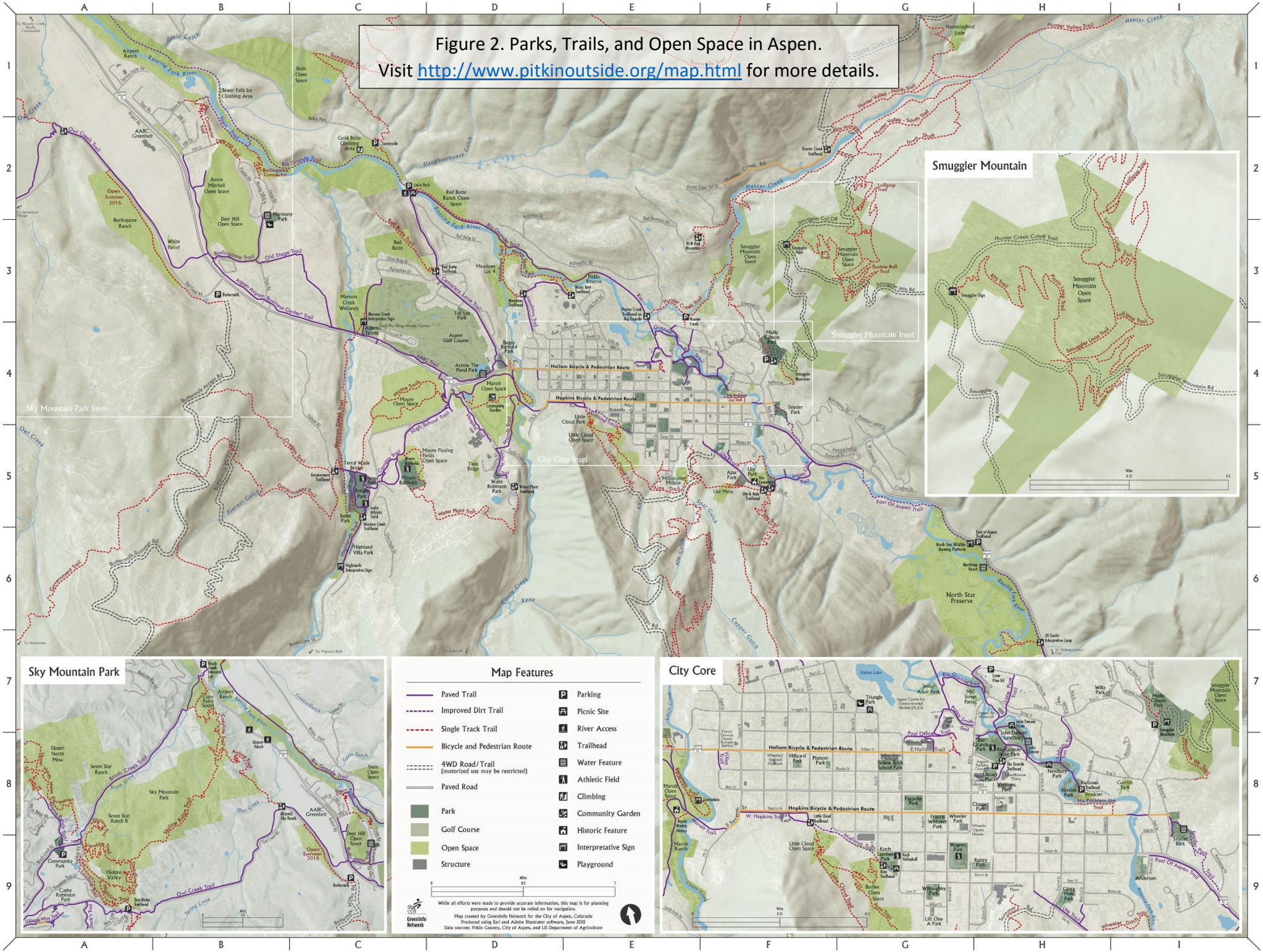
The City of Aspen will preserve the baseline acreage and linear distance of parks, open space, and trails in Aspen's Urban Growth Boundary, established in 2015. Instead of setting blanket goals for overall increase or decrease of parcels, the City of Aspen strategically considers each parcel that it might acquire or sell on an individual basis.

Data Sourcing & Complications

In Figure 1, the 327 acres of open space inside the UGB are all owned by the City of Aspen. The 566 acres outside of the UGB are either owned by the City of Aspen or co-owned with other jurisdictions (namely, Pitkin County).

Sources: [1][Figures] Kuhn, Matt. Trails Manager, City of Aspen Parks, Trails, and Open Space Department [Photos] Across the Pond Park, by Williamson, City of Aspen Parks, Trails, & Open Space Department.

Figure 2. Parks, Trails, and Open Space in Aspen.
Visit http://www.pitkinoutside.org/map.html for more details.



Community Forest Coverage

What is it? Why is it important?

This measure expresses the amount of forest coverage within Aspen's city limits. In 2015, the City of Aspen commissioned an Urban Tree Canopy (UTC) study, which used fly-over aerial imagery and LiDAR to analyze existing tree canopy and plantable spaces on a variety of scales, from citywide to individual parcel.[2] Plantable spaces are identified as areas with the potential to grow trees or vegetation, though it is important to note that in some cases, planting in these spaces is not desirable. For example, Wagner Park or the Marolt Open Space are areas that could potentially be planted with trees, but this would be in conflict with keeping those spaces open for recreation. There are many benefits to maintaining canopy cover in cities, such as reducing urban heat island effect and filtering air pollution and stormwater runoff, thereby improving water and air quality. Tree canopy provides wildlife habitat and shelter. In addition to environmental importance, tree cover offers aesthetic benefits, increased property values, economic prosperity in the downtown core, and augmented social and educational opportunities.[1]

What does the data/trend say?

In 2015, Aspen's tree canopy covered an impressive 31% of the city. As seen in figure 1, of that total canopy cover, 39% was found in residential areas, 36% in open space, and the remainder was located on rights of way (9%), multi-family residential (7%), commercial (5%), and lodging/recreation (4%). Of the plantable space identified in the UTC study, the bulk was found in open space (54%) and residential (24%).[3] This data enables the City staff to evaluate projects on a parcel-specific basis, to more strategically plan new plantings, and to understand the impact of development and land conversion on Aspen's canopy cover as a whole.

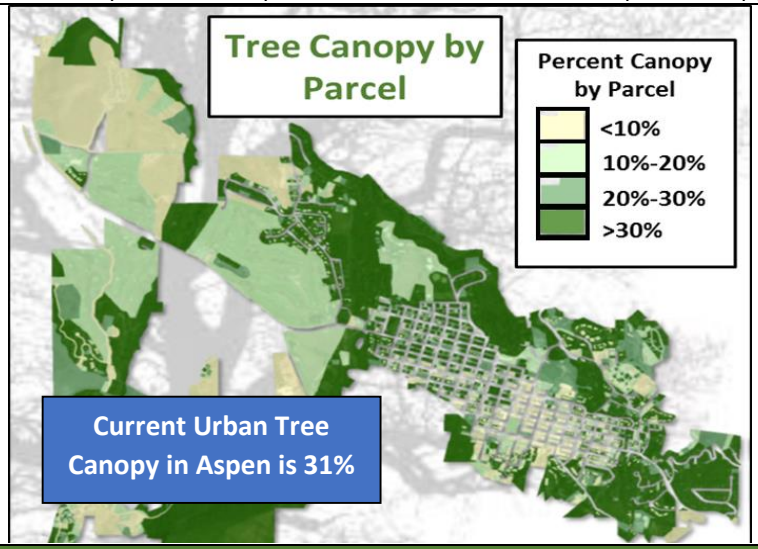
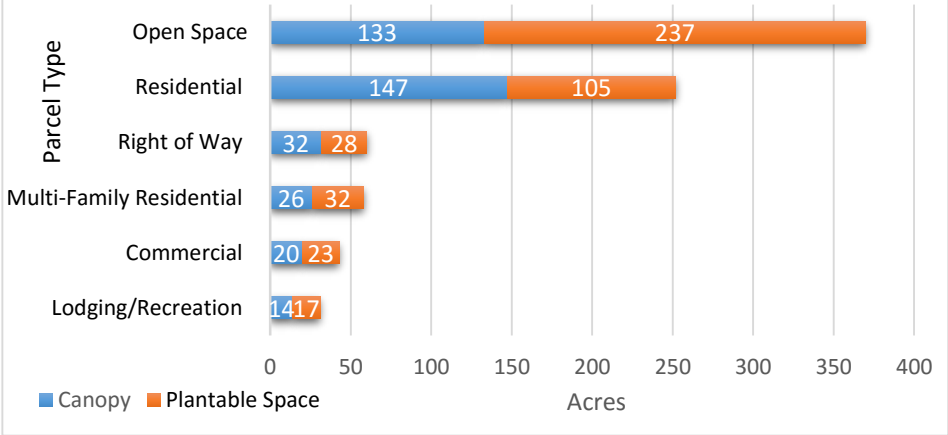


Figure 1. Acres Canopy Coverage and Plantable Space
(Total acres canopy = 372, Total acres plantable space= 442)



Targets

The City of Aspen aims to maintain the UTC 2015 baseline of 31% for the next 5 years.

Data Sourcing & Considerations

2015 is the first year in which Urban Tree Canopy data was collected in Aspen. Studies will be performed on a 5-year basis to monitor gains or losses in canopy.

Sources: [1] Ben Carlsen, City Forester, City of Aspen Parks, Trails, and Open Space, [2] "Urban Tree Canopy Assessment Projects." Plan-It Geo, Web. 14 Apr. 2016. <http://www.planitgeo.com/#!urban-forest-and-tree-canopy-projects/c2fr>. [3][4][5]Aspen, Colorado Tree Canopy Facts. Rep. Arvada, CO: Plan-IT GEO LLC, 2015. [Photo] Babbie, Sheila.

Forest Health Index

What is it? Why is it important?

ACES' Forest Health Index (FHI) is an online tool to help the community of the Roaring Fork Valley make sense of the wide range of interlinking environmental conditions that affect the health of our local forest. This forest is vital to Aspen's identity, economy, ecology, and quality of life. The Index provides discussion and data on over 20 unique climatic, ecological, and socioeconomic indicators, offering a glimpse into both the potential drivers of change and the effects of change in our local forest environment.

What does the data/trend say?

Scores for the FHI are on a 1-100 scale, with 100 being the best possible. Scores are calculated by comparing the current state of each indicator to a historic, average, or target state. **A score from 81-100 falls within the range of natural variability**, indicating normal levels of forest composition, structure, and function. As seen in Figure 1, Aspen's overall **FHI score in 2015 was 86**, which is the highest in the past three years that the Index has been collected. The 2014 score was 84, climbing from 78 in 2013. The sections below detail four individual measures and their scores from 2013-2015. These topics were highlighted because of their significant influence on the overall FHI score, both as causes and effects of forest health.

YEAR	SCORE
2013	78
2014	84
2015	86

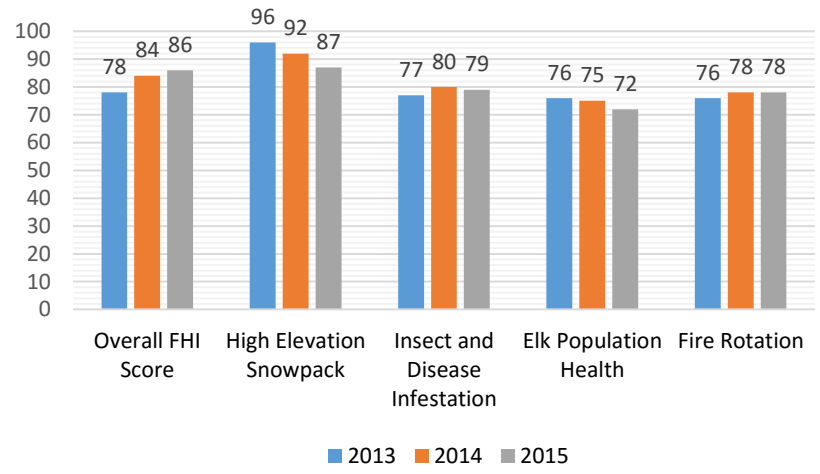
High Elevation Snowpack is a critical water source for vegetation, wildlife, and human activities, which can be dramatically impacted by abrupt year-to-year changes. The FHI tracks trends in maximum snow water equivalent from three local SNOTEL sites. As seen in Figure 1, this indicator's score has decreased from 96 to 87 over the course of three years. Compared to the base period of 1981-2011, the 2012-2014 three-year average was only slightly below normal, but if low snowpack years become a pattern, we may see significant short and long term changes in the forest.

Rates of **Insect and Disease Infestation** play a normal role in forest succession, but high levels of infestation, duration, and extent negatively impact ecological integrity. Aerial surveys of the Roaring Fork Watershed in the past decade indicate that following a significant increase in insect and disease affected area in 2008, there has been a steady recovery (with the exception of 2014), which is likely due to wetter conditions that help trees better defend themselves. This indicator's annual scores have consistently hovered just below the range of natural variability (Figure 1).

Elk Population Health serves as a bellwether of broader ecological integrity in the forest ecosystem and is negatively impacted by increased recreational activity, habitat fragmentation, and climate change. Since about 2000, a significant decline in the calf-to-cow ratio has been observed, which may indicate larger scale degradation of forest habitat. This drop is reflected in the indicator's scores (Figure 1), which are consistently below levels natural variability.

Fire Rotation compares the natural frequency of fire regimes with the actual acres burned. Fire plays an important role in forest ecology, though natural fire regimes vary by region and forest type. As seen in Figure 1, White River National Forest data since 1980 indicates that fire rotation is low and close to the outer bounds of what is normal and suitable for ecological integrity.

Figure 1. Forest Health Scores



More detailed descriptions of the FHI methodology and of each individual measure is available at www.foresthealthindex.org

Targets

Aspen's FHI score will remain at or above 81, the range of natural variability for forest health. In 2015, Aspen met and exceeded this target with a score of 86.

Data Sourcing & Issues

ACES determines scores and calculations for Individual indicators either by comparison to historical data or, where historical data is unavailable or unreliable, through consultation with an expert in the field to establish baseline numbers.

Sources: [1] [Figures] All data thanks to Jamie Werner, Forest Health Index. Aspen Center for Environmental Studies, Web. <http://foresthealthindex.org/>.