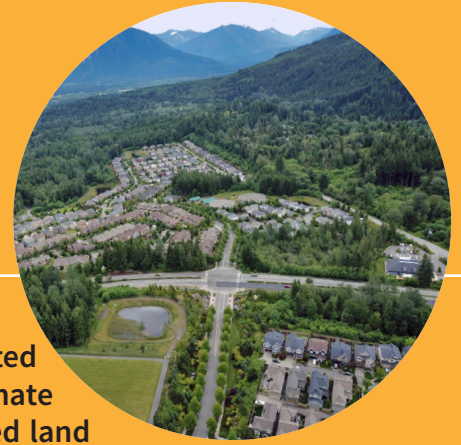


# CITY OF SNOQUALMIE

## FOREST BENEFITS FOR STORMWATER CASE STUDIES



The Snoqualmie Natural Infrastructure Assessment (June 2020) estimated the economic value of stormwater retention, water quality and climate stability in Snoqualmie's urban forest. Using geographically referenced land cover data and stormwater modeling, this assessment estimated the economic benefits delivered by the City's urban forest to the community at-large. Estimates show that over 70% of city-owned lands are forested and the quantified ecosystem service benefits generate a range of approximately \$5.8 to \$7.3 million in evaluated goods and services each year.

This stormwater benefit was calculated only for 2-year 24-hour events, not accounting for larger storms such as the January 2009 storm that resulted in a [presidential disaster declaration in King County](#) (King County, 2009). As a result, this analysis is an underestimate of the complete stormwater economic benefits produced by the City's forests.

Traditional methods of controlling stormwater flow and filtering water is achieved through the construction of infrastructure such as drainage basins, pipes, culverts, and other flow and storage systems, as well as filtration systems. Today, the City of Snoqualmie benefits from forests within developed areas and surrounding the City, especially during heavy storms, as the forests trap stormwater and hold it, slowly releasing water. This prevents the existing stormwater system from being overwhelmed and alleviates flooding in the surrounding community. Without this forest landscape, the City would face one of two scenarios: Either flooding increases, or capital investments are required to build larger multi-million-dollar stormwater structures.

The project team (The Keystone Concept, Equilibrium Economics and Ecosystem Sciences) has conducted a focused analysis of three separate city-owned forestland designations to demonstrate the stormwater and water quality benefits of retained forest land within the City. These forested lands include: within City owned right-of-way; within Snoqualmie Ridge; and adjacent to the Snoqualmie River and tributaries and are summarized in three separate case studies described below.

Ecosystem Service Valuation using the Benefit Transfer Method (BTM) is a well-accepted and commonly applied methodology in economics. ESV has been accepted by academics, private industry, federal, state and local governments. For example, in June of 2013, FEMA approved [Mitigation Policy FP-108-024-01](#) (FEMA, 2013), based on values developed using this methodology, for use in all hurricane and flood disaster mitigation across all 50 states. BTM has become the go-to approach for valuation, delivering for decision-makers a timely and cost-effective way to value ecosystem services and natural infrastructure (Wilson and Hoehn, 2006).

# +70%

OF CITY OWNED LANDS  
ARE FOREST

# \$5.8M

TO

# \$7.3M

ANNUAL DOLLAR  
VALUE (IN MILLIONS) OF  
EVALUATED GOODS AND  
SERVICES GENERATED BY  
PUBLIC FORESTS



# CASE STUDY #1: FOREST BENEFITS WITHIN CITY-OWNED RIGHT-OF-WAY

The Snoqualmie Ridge development was designed to include lawns and street trees along the edges of all streets and on larger streets in median islands as well. These trees were planted with the intention of providing stormwater and water quality benefits. The right-of-way in downtown Snoqualmie also contains many trees, which include some of the city's largest street trees. The City's right-of-way along streets encompasses approximately 37% tree cover. The total value of stormwater retained by right-of-way trees ranges from \$666,000 to \$819,000 each year; and the water quality benefit value ranges from \$6,600 - \$17,000 each year. Cumulatively, the total asset value of trees in the right of way ranges from \$18.2 million to \$22.6 million over 50 years.

## LAND COVER INFLUENCES STORMWATER RUN-OFF

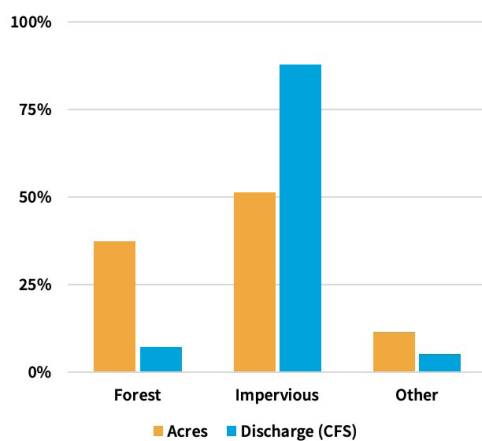
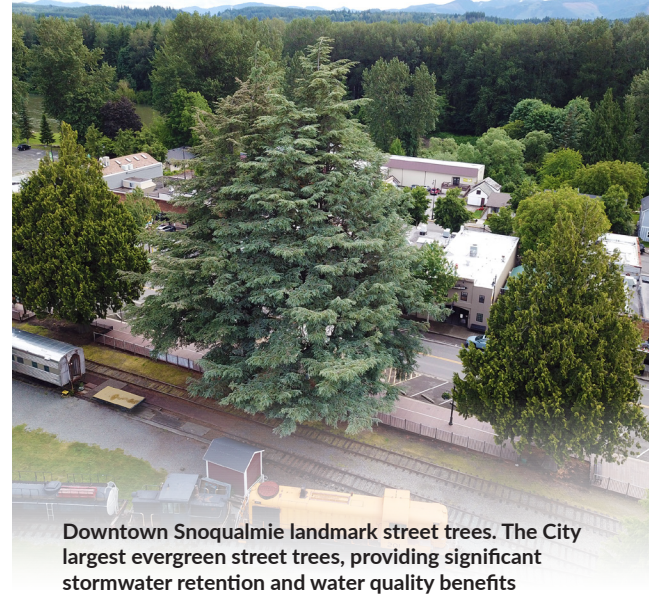


Chart: Percent of forested area and runoff compared to impervious and all other land cover types.

Forested areas generate less run-off per acre than non-forest land cover types, as canopy intercepts rainfall and soils allow for infiltration of water into the ground. Impervious land cover types do not allow for infiltration of rainfall and thus generates more runoff per acre compared to other land cover types.



Downtown Snoqualmie landmark street trees. The City largest evergreen street trees, providing significant stormwater retention and water quality benefits

The total value of stormwater retained by these forest lands ranges from \$666,000 to \$819,000 each year

The total water quality benefit value of forest land ranges from \$6,600 - \$17,000 each year

Cumulatively, the total asset value of intact forest land within City owned right-of-way ranges \$18.2 million to \$22.6 million over 50 years



Tree canopy closure in the street right-of-way helps to retain stormwater and provide water quality benefits





## CASE STUDY #2: FOREST BENEFITS WITHIN SNOQUALMIE RIDGE

The City of Snoqualmie intentionally designed the Snoqualmie Ridge development with intact forest land retained for stormwater and other environmental benefits, and an improved quality of life for citizens. These city-owned forest lands consist of nearly 87% forest cover and provide direct stormwater and water quality benefits to the citizens of Snoqualmie. The total value of stormwater retained by these forest lands ranges from \$1.2 million to \$1.5 million each year; and the water quality benefit value ranges from \$12,000 to \$31,000 each year. Cumulatively, the total asset value of intact forest land within Snoqualmie ridge ranges from \$32.9 million to \$40.8 million over 50 years.

Below: City-owned forest areas surrounding neighborhoods throughout Snoqualmie



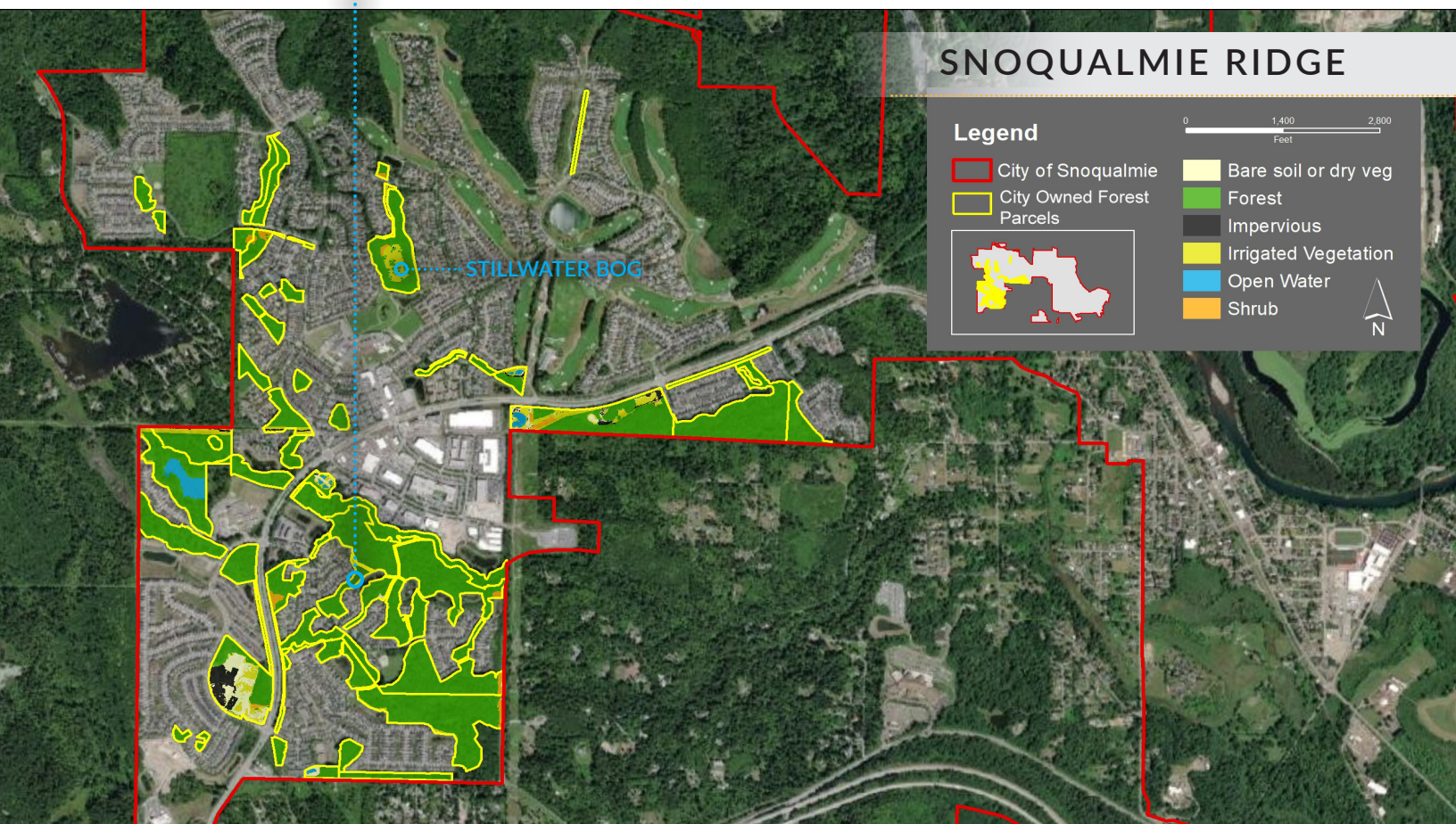
Above: Interior of Stillwater bog in Community Park, retained for stormwater benefits.



The total value of stormwater retained by these forest lands ranges from \$1.2 million to \$1.5 million each year

The total water quality benefit value of forest land ranges from \$12,000 to \$31,000 each year

Cumulatively, the total asset value of intact forest land within Snoqualmie Ridge ranges \$32.9 million to \$40.8 million over 50 years



### SNOQUALMIE RIDGE

#### Legend

- City of Snoqualmie
- City Owned Forest Parcels



0 1,400 2,800  
Feet

- Bare soil or dry veg
- Forest
- Impervious
- Irrigated Vegetation
- Open Water
- Shrub





# CASE STUDY #3: FOREST BENEFITS ADJACENT TO THE SNOQUALMIE RIVER AND TRIBUTARIES

The City of Snoqualmie owns several large parcels of intact forestland located within Snoqualmie valley. These lands consist of nearly 80% forest cover and provide direct stormwater and water quality benefits to the citizens of Snoqualmie. The total value of stormwater retained by these forest lands ranges from \$683,000 to \$840,000 each year; and the water quality benefit value ranges from \$6,800 to \$17,500 each year. Cumulatively, the total asset value of intact forest land within Snoqualmie Valley ranges from \$18.6 million to \$23.1 million over 50 years.

Below: Kimball Creek and surrounding City-owned forestland



Downtown Snoqualmie showing forest land adjacent to river

The total value of stormwater retained by these forest lands ranges from \$683,000 to \$840,000 each year

The total water quality benefit value of forest land ranges from \$6,800 to \$17,500 each year

Cumulatively, the total asset value of intact forest land within Snoqualmie valley ranges from \$18.6 million to \$23.1 million over 50 years.

