National Capital Region Network
Climate Change Brief

National Park Service
U.S. Department of the Interior

Inventory & Monitoring

Climate Change, Precipitation, and Stream Flow in NCR

With increase in overall temperatures due to climate change, changes in precipitation patterns are also expected. How would these changes in precipiation affect stream flows? Timing and amount of precipitation, both seasonally and by individual event, affects the volume of stream discharge (flow) and aquatic ecosystem processes.

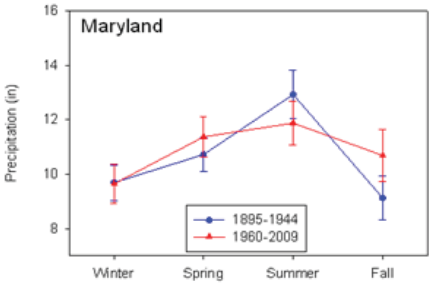
To understand how stream flows and precipitation are changing, the NCR's Inventory & Monitoring (I&M) network analyzed long-term, regional precipitation and stream-gauge data for streams in or near eight NCR parks.

USGS stream-gauge data shows that fall flow rates have risen in Antietam Creek at Antietam National Battlefield.

NPS, NCRN I&M

Amount and Seasonal Distribution of Precipitation are Changing

- Based on analysis of more than 100 years of precipitation data gathered by the National Oceanic and Atmospheric Administration, there is a historic, seasonal pattern to precipitation in the NCR.
- Precipitation is lowest in the fall, increases gradually through the winter and spring, and peaks in summer.
- This trend has been flattening out in recent decades as precipitation is decreasing in the summer months and increasing in the fall.



NPS, Schmit

This graph of seasonal precipitation rates in Maryland shows the trend toward homogenization--less precipitation in summer and more in fall. Trends are similar in Virginia and D.C.

Stream Flow Changes

- Analysis of long-term, U.S. Geological Survey stream-gauge data, shows that streams of the NCR have a seasonal flow pattern that is similar to the seasonal pattern of precipitation.
- Flows are lowest in fall, rise through the winter, peak in early spring and then fall during the late spring and summer.
- Flow patterns have been changing in recent decades: in less-urbanized watersheds the lowest flows (in fall) are getting higher but high flows are staying the same.
- In urbanized watersheds, low flows are getting lower and high flows becoming even higher throughout the year.

NPS, Nortrup

Impacts

Vernal pools and amphibians
Vernal pools are temporary pools of water, fed by precipitation and linked to streamflow via ground water, that are important amphibian breeding grounds. Changing precipitation and streamflow could affect vernal pools and the amphibians and other biota that are dependent on them. Changes in precipitation and streamflow could cause some vernal pools to flood and others to become year-round pools, which could negatively affect amphibian reproduction and survival.

Streambank erosion and channelization Higher streamflows and more intense storm events could increase stream bank erosion that undercuts streamside trees. It also could promote channelization and quicker flows that carry more sediment and have higher erosive potential.

Macroinvertebrates Erosion that may occur with higher streamflows could scour or disrupt the habitat of benthic macroinvertebrates. Fewer macroinvertebrates means less food for fish, amphibians, and other creatures.

Fish migration Changes in streamflow could also affect fish migration.

Land and vegetation changes
As streamflows increase, they may change the acreage of streamside land and affect specially adapted plant and animal communities.

Produced by the National Capital Region Inventory & Monitoring Network (NCRN I&M)