

# Evaluation of Water Shortage Risks from Permit Exemptions: A Comparison with Climate Change and Demand Growth

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November 23, 2022

## Abstract

Many states in US follow strict regulations on water discharge into the streams to enforce water quality standards, however water withdrawal restrictions from the streams are limited and inadequate in water management at the time of low flows. In states such as Virginia (VA), Virginia Department of Environmental Quality (VDEQ) requires a Virginia Water Protection (VWP) permit for all water withdrawals made from Virginia's surface waters. However, under certain provisions of VWP regulations, users are exempted from having a permit (e.g., water withdrawal in existence before 1989) allowing unrestricted access for water withdrawals. Such permit exemptions are in existence in many states and present a severe challenge to the management of water supplies. Still, little research exists that quantifies the impact they could have on water availability. This study was conducted to compare the impact of permit exemptions on surface water availability and drought flows and compares these impacts to the relatively well-studied risks presented by climate change and demand growth in Virginia (VA). This study makes use of VaHydro, a comprehensive, modular flow model to examine the impacts of exempt users' withdrawals, demand growth, climate change and compare with the base scenario representing current precipitation and temperature conditions and current withdrawals. While the reduction in flows was widespread in climate change scenario, the impacts were more localized in exempt users and demand growth scenarios. It was observed that permit exemptions existed in 90% of the counties in VA and impacts on flows exceeded than climate change scenario in certain regions and at the low flows. Higher reduction in flows was observed during winter months in climate change scenarios while reductions were observed higher in summer months in demand and exempt user scenarios.

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### Evaluation of Water Shortage Risks from Permit Exemptions: A Comparison with Climate Change and Demand Growth

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#### Abstract Text:

Many states in US follow strict regulations on water discharge into the streams to enforce water quality standards, however water withdrawal restrictions from the streams are limited and inadequate in water management at the time of low flows. In states such as Virginia (VA), Virginia Department of Environmental Quality (VDEQ) requires a Virginia Water Protection (VWP) permit for all water withdrawals made from Virginia's surface waters. However, under certain provisions of VWP regulations, users are exempted from having a permit (e.g., water withdrawal in existence before 1989) allowing unrestricted access for water withdrawals. Such permit exemptions are in existence in many states and present a severe challenge to the management of water supplies. Still, little research exists that quantifies the impact they could have on water availability. This study was conducted to compare the impact of permit exemptions on surface water availability and drought flows and compares these impacts to the relatively well-studied risks presented by climate change and demand growth in Virginia (VA). This study makes use of VaHydro, a comprehensive, modular flow model to examine the impacts of exempt users' withdrawals, demand growth, climate change and compare with the base scenario representing current precipitation and temperature conditions and current withdrawals. While the reduction in flows was widespread in climate change scenario, the impacts were more localized in exempt users and demand growth scenarios. It was observed that permit exemptions existed in 90% of the counties in VA and impacts on flows exceeded than climate change scenario in certain regions and at the low flows. Higher reduction in flows was observed during winter months in climate change scenarios while reductions were observed higher in summer months in demand and exempt user scenarios.

#### Session Selection:

H120. Water and Society: Water Resources Management and Policy in a Changing World

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**Requested Presentation Type:**

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**Previously Published?:**

Yes

**Previously Published Material:**

Results were reported in an oral presentation at EWRI Virtual Congress 2021

**Abstract Payment:**

Paid (agu-fm21-866551-1164-4162-1817-3717)

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