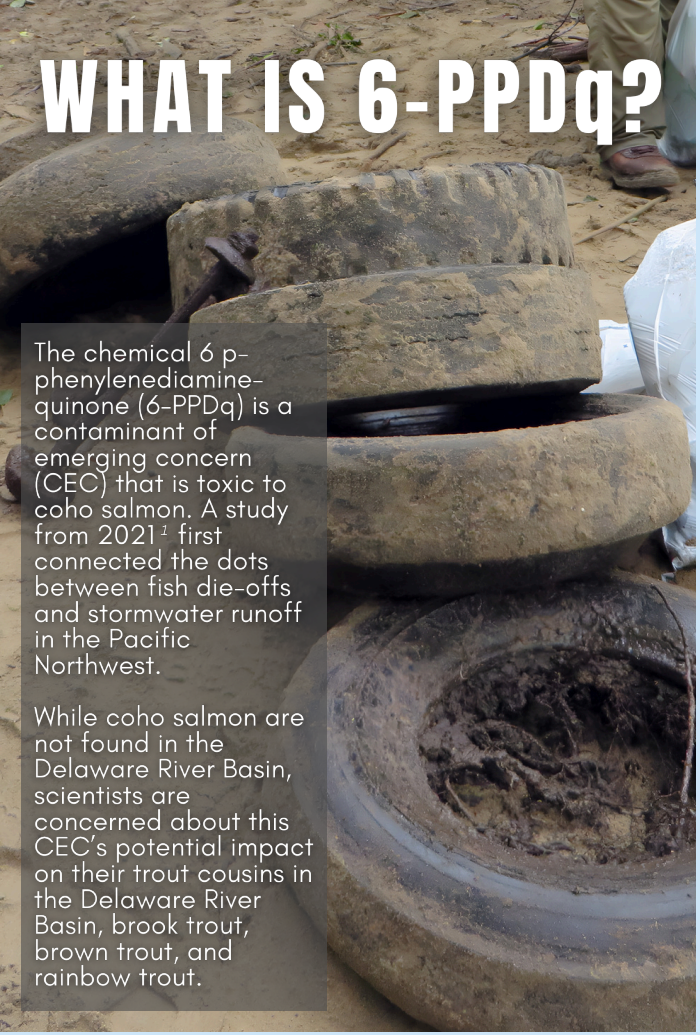
WHAT IS 6-PPDq?



The chemical 6 p-phenylenediamine-quinone (6-PPDq) is a contaminant of emerging concern (CEC) that is toxic to coho salmon. A study from 2021[1] first connected the dots between fish die-offs and stormwater runoff in the Pacific Northwest.

While coho salmon are not found in the Delaware River Basin, scientists are concerned about this CEC's potential impact on their trout cousins in the Delaware River Basin, brook trout, brown trout, and rainbow trout.

WHERE DOES 6-PPDq COME FROM?

6-PPD is a chemical added to tires to prevent cracking, which extends their life. When water interacts with tires or the tiny bits of tire rubber they shed onto surfaces when driving, 6-PPD is converted to 6-PPDq. This chemical then enters surface waters in runoff or slowly leaches from tires and tire particles submerged in water bodies.

With new information emerging on the widespread impact of 6-PPDq on aquatic species, scientists at the DRBC are studying the contaminant's presence in the waters of the Delaware River Basin.

What we don't know is the concentration of 6-PPDq in surface water of the Delaware River Basin under normal and stormwater flows. This study will be one of, if not the first, to get to the bottom of these questions by examining 6-PPDq in the Delaware River Basin.

1 - Zhenyu Tian et al., A ubiquitous tire rubber–derived chemical induces acute mortality in coho salmon. *Science* **371**, 185-189(2021). DOI: 10.1126/science.abd6951

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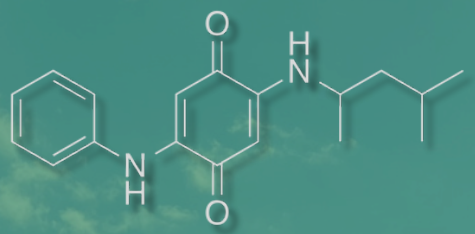
(Hagerty, Ryan/USFWS)



6-PPDq AND THE DELAWARE RIVER:

Investigating a Contaminant of Emerging Concern

WHAT WE'RE INVESTIGATING

The DRBC committed, in 2023, to perform this first-of-its-kind study in the Delaware River Basin to determine the presence of this contaminant in Basin waters.

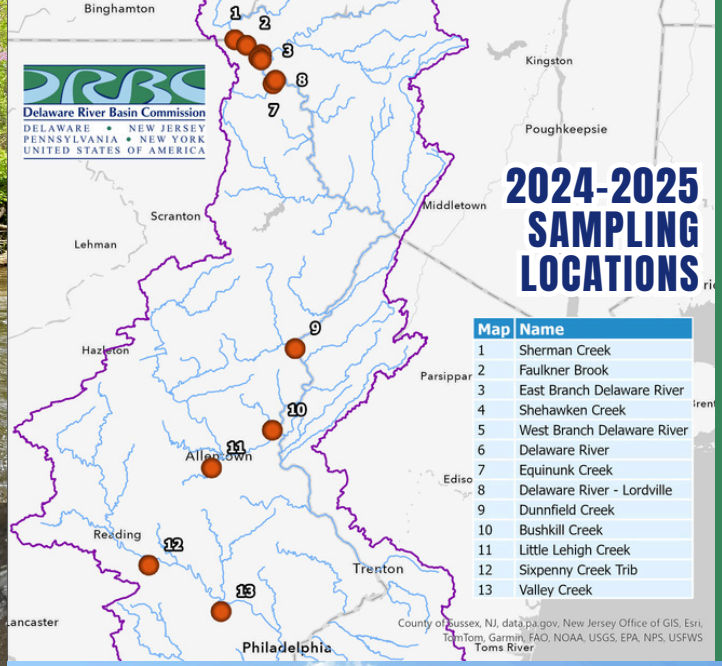
In Spring 2024, researchers began collecting samples to develop baseline concentrations of 6-PPDq in trout streams during normal flow and after significant rain events. This will allow scientists to look at how storms affect concentrations. Initial monitoring focused on the high-quality trout streams in the upper Delaware River region, as well as a few middle Basin trout streams.

As this work continues, it will contribute to the development of comprehensive strategies that identify, characterize, and evaluate 6-PPDq presence in the DRB.

WHAT WE'VE LEARNED SO FAR

The behavior and properties of this contaminant are not well known, and continued investigation is needed to better understand its presence in the DRB.

6-PPDq was consistently found in the mainstem of the Delaware River from Trenton to Paulsboro, with concentrations just above quantitation limits, which are well below known toxicity thresholds. It was also detected in ~65% of tributary samples, but most concentrations are at or just above detection limits. The highest concentrations are associated with runoff events. However, with the exception of one sample in a stormwater drainage channel from the PA Turnpike, all samples were below known toxicity thresholds for species in the basin.

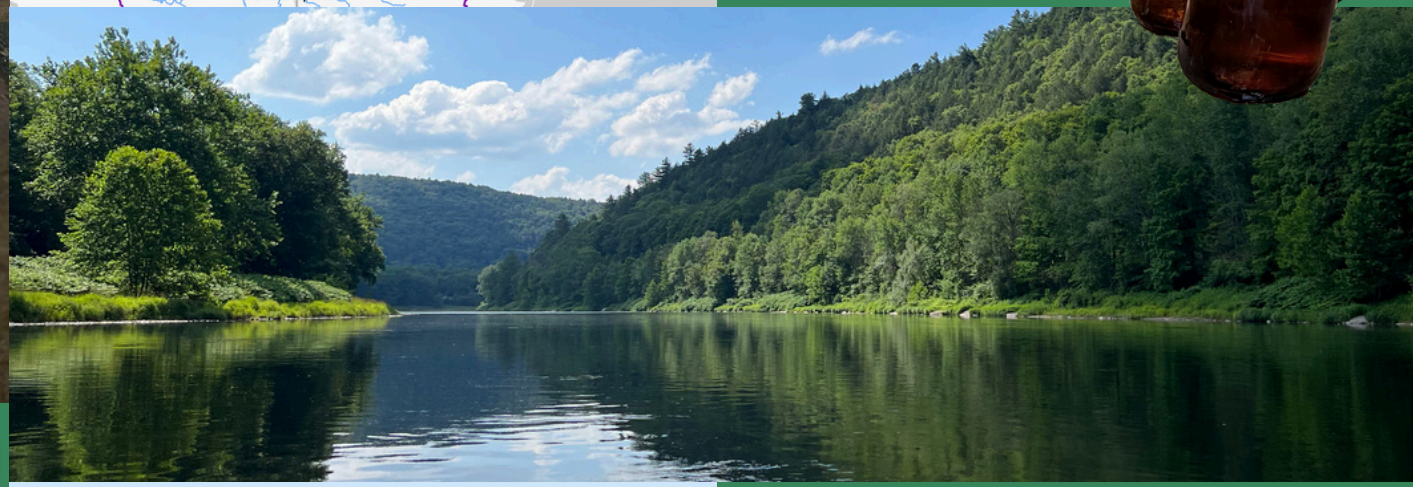


Map	Name
1	Sherman Creek
2	Faulkner Brook
3	East Branch Delaware River
4	Shehawken Creek
5	West Branch Delaware River
6	Delaware River
7	Equinunk Creek
8	Delaware River - Lordville
9	Dunnfield Creek
10	Bushkill Creek
11	Little Lehigh Creek
12	Sixpenny Creek Trib
13	Valley Creek

LOCATING 6-PPDq HOTSPOTS

Data from DRBC's 2024 and early 2025 sampling in the Upper Delaware consistently found 6-PPDq at levels indicating limited effects, if any on salmonid species.

Downbasin, elevated levels of 6-PPDq have been found at the Valley Creek site. Normal flow concentrations were at or near detection limits but spiked during rain events, particularly after an extended dry period in June. This site directly receives runoff from the PA Turnpike and is therefore subject to 6-PPDq in runoff as well as a buildup of tire particles that could be slowly leaching the pollutant.



Dry condition sampling is being conducted over 12 months; samples are also collected around runoff events (wet weather) when conditions allow.

Water samples collected by DRBC staff assess parameters such as dissolved oxygen, conductivity, and pH.

6-PPDq sampling analysis is performed at Temple University's Water and Environmental Technology Center.

LOOKING AHEAD TO NEXT STEPS

The current grant, awarded by NFWF, initiated the first round of 6-PPDq sampling (sites identified on the map to the left). This project is scheduled to end in April 2025. With this data, researchers may investigate hotspots to determine where the contaminant may be originating and how it is affecting nearby trout populations.

Under another grant awarded by the US EPA, DRBC scientists will sample additional trout streams for 6-PPDq in 2025.