07 Contaminants

Target Statement

By 2050, identify and reduce contaminants entering the Hudson River, and remove or remediate river sediments contaminated by long-term pollutants, so that food webs of the river are supported, people can safely eat Hudson River fish, and harbors are free of the contaminants that constrain their operation. These efforts decrease direct and indirect toxic risks to human communities and improve ecosystem health and resilience. By 2030, priority contaminants of greatest concern are identified, the respective transport mechanisms and fluxes are well understood, and their sources and distribution are mapped and monitored, while at least 10 priority source sites are being prepared for remediation in direct consultation with affected communities.

Summary

The presence of a variety of chemical contaminants has been a primary driver in the use and management of the Hudson River estuary for decades. Although contaminants are present at elevated levels in all environmental attributes of the Hudson River estuary (sediments, soil, water, air and biota), their highest concentrations are generally in the organic sediments. Chemical contamination of the estuary from persistent legacy pollutants such as polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), dioxins, pesticides and metals is a long-standing problem and is now combined with an ever-increasing suite of contaminants of emerging concern. These contaminants are known to enter the system through industrial point sources,

wastewater treatment facilities, and non-point sources including atmospheric deposition, municipal runoff, agricultural runoff, combined sewer overflows and septic systems. Their presence has, and continues, to impair ecosystem function, threaten human health, and limit managers' options for use of the system's valuable resources, particularly its fish community and recreational opportunities. Furthermore, the Hudson River corridor is known to contain many brownfields, therefore former industrial properties targeted for redevelopment or reuse may be constrained by the presence of contaminants.

There are 120 contaminated sites within 400 meters of the Hudson River estuary according to the New York State Registry of Inactive Hazardous Waste Sites. An additional 25 sites have been issued Certificates of Completion of Cleanup. In fact, 200 miles of the Hudson River, including the tidal estuary is classified as a Superfund Site by USEPA under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The chemical contaminants of greatest concern are PCBs, a class of man-made synthetic compounds manufactured for a variety of 20th century industrial uses and now banned in many countries worldwide. Beyond their exceptionally slow rate of decomposition, perhaps the most disturbing properties of PCBs are their ability to accumulate in the tissues of macroinvertebrates, fish and other wildlife and their adverse health effects to humans which limit consumption.

Although the flow of legacy contaminants to the estuary, PCBs in particular, may have been somewhat curtailed by recent efforts above Troy, there continues to be little assessment effort spent evaluating the ramifications of their continued presence in the estuary. The continued input, distribution and movement of PCBs in the estuary ecosystem remains a significant void of understanding which requires further monitoring and research. Understanding the results of remediation efforts would likely inform, if not compel, remedial actions in both the tidal and non-tidal reaches of the Hudson.

Metals, including mercury (Hg), cadmium (Cd), chromium (Cr) and lead (Pb) have been of concern in the estuary but are not as widely recognized as PCB's. Knowledge of the distribution of metals in the estuary sediments is incomplete; focusing initial efforts to more fully understand the implications of primary heavy metal sources and associated source control actions is recommended.

Contaminants of emerging concern include pharmaceuticals, personal care products, pesticides, industrial chemicals and microplastics. These contaminants are problematic because of their ability to produce profound biophysical changes and alter natural processes (e.g., photosynthesis) even at very low concentrations. Microplastics are also alarming because they attract organic toxicants (e.g. PCBs and dioxins) and there is not a definitive characterization of the full ramifications when they are consumed by fish or other organisms; although behavioral changes and/or death have been identified.

The contaminants of emerging concern are also entering the system with poorly understood ramifications. Generally, we know little about the levels and toxicities of some metals and many contaminants of emerging concern making remediation prioritization difficult. The absence of actionable information on the source, distribution and movement of contaminants in tidal estuary limits our ability to evaluate impacts of past remedial efforts and prioritize those that should be implemented in the future. Extensive research into the toxicities and ecological implications of contaminants of emerging concern and microplastics is needed to not only gain a better understanding of their implications, but to also develop, evaluate and implement effective treatment options where and when possible.