

Contaminant Sources

The Delaware Bay and Estuary Basin contains a variety of known and potential **contaminant** sources such as active and abandoned industrial sites, gas stations, landfills and septic systems, as well as other **non-point sources** such as urban and agricultural stormwater runoff. A contaminant source is anything that has released, or has the potential to release, pollutants to air, soil, ground water, surface water or sediments. The contaminants can come from a variety of sources like industrial complexes and factories, or from urban and suburban residential areas and agricultural operations.

Fish consumption advisories have been issued in segments of several watersheds within the Basin: Red Lion Creek, Delaware River and Bay, C & D Canal, Appoquinimink River, St. Jones River. **PCBs** (polychlorinated biphenyls) are the primary contaminants of concern, while **dioxins**, chlorinated pesticides and mercury exist and present a concern. Potential industrial and municipal sources in the Delaware Bay basin are being monitored by the Delaware River Basin Commission to identify PCB origins. Many of the basin's streams and ponds are enriched with nitrogen and phosphorus. These excess nutrients can cause overgrowth of aquatic plants that deplete water oxygen levels important for fish survival, and result in deterioration of water quality in a process called **eutrophication**.

More information about fishing advisories and water quality issues can be found either in the Department's Fishing Guide or online at: <http://www.dnrec.state.de.us>



The Delaware Estuary contains the world's largest freshwater port



The Delaware Solid Waste Authority's Cherry Island Landfill; located along the Delaware River in New Castle County

Solid and Hazardous Waste

Hundreds of small and large businesses produce and manage **hazardous waste** within the basin. Hazardous wastes come from processes that supply goods and services we use routinely, from fuels and chemicals to dry cleaners and auto repair shops. Hazardous waste improperly managed can pollute the land, air and water and harm people, animals and plants. The Department works with businesses to manage their household hazardous waste to reduce the potential to cause harm and the amount produced.

Historic releases of hazardous substances occurred when industries spilled, mishandled, or disposed of hazardous materials. Modern-day laws and environmental oversight programs are now in place to remediate existing hazardous waste sites and ensure that everyone properly handles and disposes their hazardous waste. Many of the historic hazardous release sites are now located in and around urban areas due to growth. The Department's Site Investigation and Restoration Branch is responsible for the investigation and remediation

of Superfund sites within the basin.

Underground tanks that leak can pollute the ground water and soil. This basin has dozens of leaking underground storage tank sites with severe ground-water contamination, most of them located at gas stations. The Department's Underground Storage Tank Branch is remediating these sites with clean-ups tailored to specific conditions at each site.

Delaware residents and businesses together throw away over 1.2 billion pounds of trash each year, nearly all of it into landfills. The state has regulated landfills since the mid-1960s to reduce environmental risks. In modern landfills, the waste is covered to control insects and rodents, a bottom liner prevents leachate ("garbage juice") from contaminating ground or surface water, and gas collection systems control odors and collect **methane**. These protective measures are most efficient at large landfills and today, just one large, modern landfill operates in this basin.

Nutrients

Urbanization and agricultural activities are primary sources of nitrogen and phosphorus in the basin. Phosphorus enters waterways primarily on soil particles through soil erosion and runoff; nitrogen can enter through **point source discharges, atmospheric deposition, erosion, runoff, and ground-water discharge**. Nutrient sources include on-site septic systems and domestic sewage treatment plants, lawn and crop fertilizers, sediments from construction activities, exhaust emissions and open burning.

Septic system discharges may contribute the greatest suburban and rural loading of nutrients to waterways. More than 32,000 septic system permits have been issued in the basin, adding as much as 350,000 pounds of nitrogen and 15,000 pounds of phosphorus to the soils annually. Most of the nitrogen from septic tanks is converted to nitrate-nitrogen, which easily enters the ground water and eventually discharges into the waterways.

Agricultural settings contribute significant amounts of nitrogen and phosphorus via field applications of manure, litter, and chemical fertilizers. The nutrients are transported to surface waters when over-applied to the fields. Comprehensive nutrient management plans being implemented significantly reduce agricultural nutrient impacts. Many poultry operations now have manure storage facilities. State and federal cost-share funds and low-interest loans are available for installation of manure storage sheds and dead-bird composters. Research continues on methods to reduce phosphorus levels in manure through poultry feed modifications.

The drinking water standard for nitrate (as nitrogen) is 10 parts per million (ppm). Nitrate concentrations in ground water vary from less than 0.5 ppm in natural areas to greater than 100 ppm in areas with historically intensive poultry production.



Excessive amounts of poultry litter contribute to high nitrate levels in surface and ground water

Photo by DSWA