New Jersey Department of Environmental Protection
Division of Water Monitoring and Standards
Bureau of Environmental Analysis, Restoration and Standards

2014 New Jersey Integrated Water Quality Assessment Report
Executive Summary
May 2017

The 2014 Integrated Report launches a comprehensive, regional approach to water quality assessment that supports identification of specific causes and sources, and the development of management measures, tailored to the unique circumstances of one of New Jersey's five Water Regions each assessment cycle. This approach is needed to identify and manage all the sources contributing to water quality impairment (including point and nonpoint sources of pollution), land use planning, and other resource management tools. Public participation and local commitment to a common goal of water quality restoration is needed to achieve fully supported uses in all waters of the State. The Barnegat Bay Initiative served as a pilot for this approach, which has been expanded to the entire Atlantic Coastal Region (ACR) for this Integrated Report. Subsequent Integrated Reports will focus on different Water Regions, resulting in a comprehensive assessment of the entire state every 10 years.

Use assessment results for the ACR's 293 assessment units (AUs) showed that water quality is generally better in the ACR than water quality statewide. Both statewide and ACR assessment results showed that public water supply and recreation uses had the highest percentage of use support; moreover, the relative percentage of all AUs fully supporting applicable designated uses was generally higher in the ACR.

General Aquatic LIfe

Trout Aquatic Life

Water Supply

Recreation

Shellfish Harvest for Consumption

Fish Consumption

This report provides the information about New Jersey's water resources, current water quality conditions, and causes and sources of water quality impairment, needed to inform and guide water quality monitoring, restoration and protection efforts conducted at the state, regional, watershed and local levels. The information provided in this report is also used by Congress, the U.S. Environmental Protection Agency (USEPA), and the State of New Jersey to establish program priorities and funding for restoring, maintaining, enhancing and protecting waters of the State and the uses and benefits (public health, environmental, and economic) they provide.

The comprehensive regional assessment also allowed for consideration of results from nearby sampling stations and historical data to confirm current water quality conditions. Restoration activities that were associated with improved water quality were identified. Natural conditions were thoroughly investigated, such as low pH conditions in waters surrounding the Pinelands

Reserve and pH-influenced low dissolved oxygen levels within the Pinelands. Potential pollutant sources were also identified, specifically in impaired waters that had minimal development or point sources, such as within the Pinelands and other less developed watersheds. The final result of the comprehensive assessment of the ACR was an increase in the number of thorough, validated, high confidence assessment decisions regarding ambient water quality conditions, identification of data gaps to guide future water quality sampling, the identification sources of impairment on which to focus restoration activities, and the identification of new water quality issues for future investigation.

The Integrated Report summarizes results of both short-term and long-term water quality analysis. The bulk of the water quality data assessed for this report was generated during a five-year period, from January 1, 2008 through December 31, 2012. Such data provides a "snapshot" of water quality conditions over a relatively short period of time and also provides an overview of water quality conditions on a statewide basis; however, results vary every two years to meet the federally-required reporting cycle. Long-term monitoring data, including certain ambient chemical data, macroinvertebrate data, and fish population studies, provide a better indication of changes in water quality over time.

Figure ES-1: AUs Fully Supporting One or More Uses
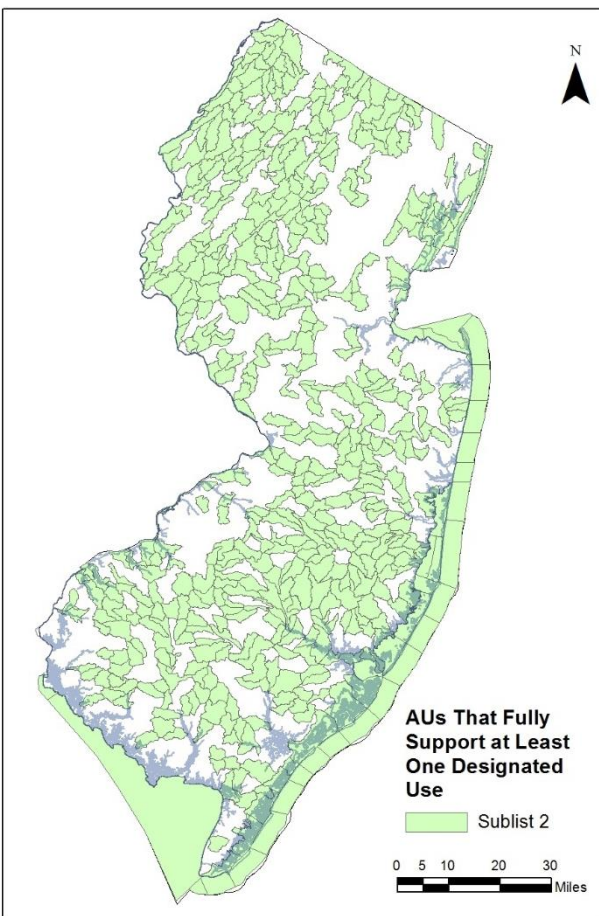
Current water quality assessment results show that 55% of New Jersey's 958 AUs fully support at least one designated use (Figure ES-1). A summary of statewide use assessment results is provided in Figure ES-2. The spatial extent and cause of use impairment varies across the State; however, both short and long-term data show correlations between use impairment, particularly aquatic life uses (Figure ES-2), and density of development. The Atlantic Coastal Region has the highest amount of fully supported designated uses of the New Jersey's five Water Regions, followed by the Lower Delaware and Northwest Regions. Raritan and Northeast Water Regions have the lowest amount of fully supported uses (Figure ES-3).

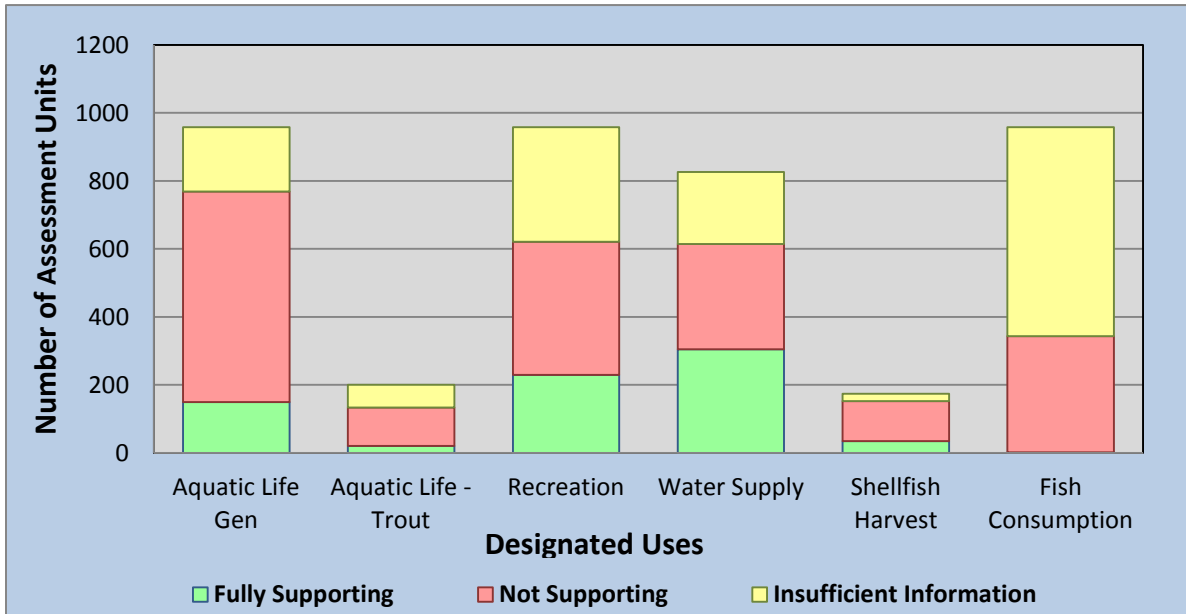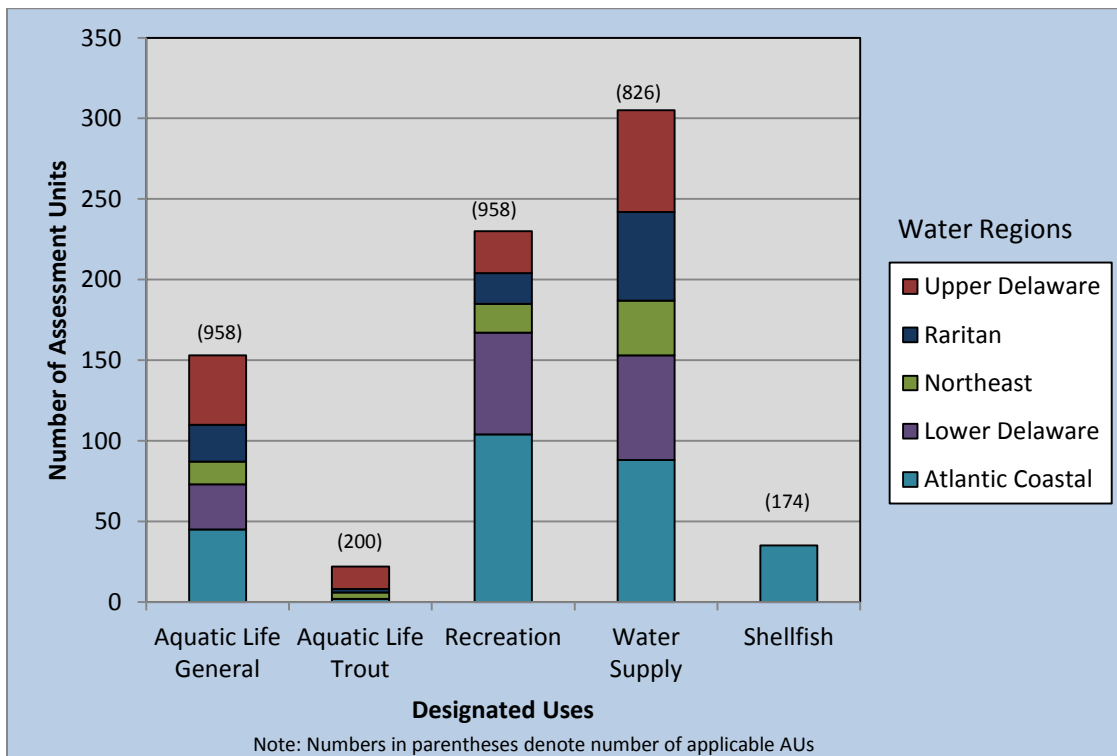**Figure ES-2: Statewide Designated Use Assessment Results, 2014**

Figure ES-3: Number of AUs Fully Supporting Designated Uses, by Water Region

Note: Numbers in parentheses denote number of applicable AUs

Water Supply: Thirty-seven percent of waters designated for the drinking water supply use fully support the use, 37% do not support the use and 26% have insufficient information to assess the use. All New Jersey freshwater streams and lakes are designated for potential use as drinking water supply; however, most of the waters that do not support this use are not used for drinking water purposes. Arsenic is the predominant cause of water supply use impairment; however, many of these impairments are due to naturally-occurring concentrations of arsenic.

Recreation: All waters of the State are designated for recreational use (e.g., swimming, boating). Most recreation occurs in ocean bathing beaches. All of New Jersey's ocean bathing beaches are fully swimmable. Twenty-four percent of all New Jersey waters, including lakes, ponds, rivers, and streams, fully support the recreational use, 41 percent do not support the use, and 35 percent have insufficient information. The Department has addressed pathogens (fecal coliform, *E. coli, Enterococcus*) through development of total maximum daily loads (TMDLs), as a regulatory response for most of these impairments.

Aquatic Life: All waters of the State are designated for general aquatic life use and 80 percent have been assessed for this use. Sixteen percent of State waters fully support the general aquatic life use, 64 percent do not support the use, and 20 percent have insufficient information to assess the use. Ten percent of waters designated for the trout aquatic life use fully support this use, 57 percent do not support this use, and 33 percent have insufficient information. Nutrient-related parameters, particularly total phosphorus (TP), are the primary cause of general aquatic life use impairment. Over 100 TP TMDLs have been established to date. Temperature is the primary cause of trout use impairment.

Shellfish Harvest for Consumption: Almost ninety percent of shellfish waters are classified as harvestable. Harvestable waters include: approved with no restrictions, seasonal harvest, and special restrictions. Only shellfish waters approved with no restrictions are considered to be fully supporting the designated use. Twenty percent of New Jersey's shellfish waters fully support this use; 67 percent do not support this use, and 13 percent have insufficient information. Total coliform is the cause of shellfish use impairment but TMDLs have been developed for most of the impaired shellfish waters.
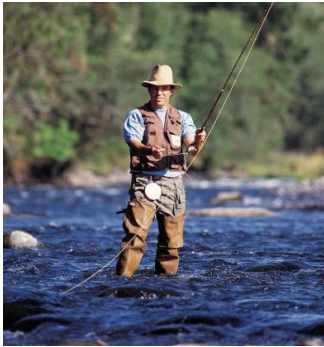
Fish Consumption: All New Jersey waters are designated for fish consumption. A very small percentage (<0.5 percent) of waters fully support the fish consumption use, 36 percent do not support the use, and sixty-four percent have insufficient information. The Department issues both statewide and waterbody-specific fish consumption advisories for impaired waters. Specific consumption levels are recommended for the general population and for high-risk groups including infants, children, pregnant or nursing mothers, and women of childbearing age. Bioaccumulative toxic pollutants are the cause of use impairment; however, many of these pollutants are no longer being manufactured and are considered to be "legacy" pollutants, such as DDT and its metabolites.

Trends: Water quality trend analyses conducted using data collected as far back as 1975 indicate that overall water quality has generally improved since the mid 1970's, particularly with respect to total phosphorus and total nitrogen (nutrients). This improvement is most likely due to the upgrade and regionalization of wastewater treatment plants that occurred throughout the State in the late 1980's through the early 1990's, as well as improved treatment for nutrients in New Jersey Pollution Discharge Elimination System (NJPDES) permits, implementation of Section 319(h) nonpoint source pollution control projects, and stewardship activities at the local level aimed at reducing nonpoint source of pollution.
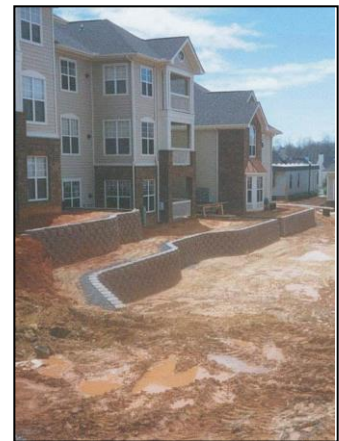
*Photo courtesy of the USDA NRCS*

Declining water quality trends for nitrate, total dissolved solids (TDS) and chlorides were also observed. Ammonia reduction measures implemented at waste treatment plants oxidize ammonia to form nitrate, resulting in increased nitrate concentrations over time. Runoff from urban and agricultural areas, including runoff of salt used to control ice on roadways, are the likely cause of increased TDS and chloride concentrations over time.

Biological trends analysis shows a correlation between biological impairment and anthropogenic factors such as land use, total urban land, total upstream wastewater flow, increase in impervious surface, and decrease in forests and wetlands in a stream's drainage basin. Biological data for fish communities also showed a correlation between impairment and human activity, such as increased impervious cover, siltation, and increased run-off from stormwater outfalls.

The 303(d) List identifies pollutant causes of water quality impairment that require TMDL development. The 2014 303(d) List identifies 40 different causes of impairment for a total of 1,958 assessment unit (AU)/pollutant combinations (some AUs are impaired by multiple causes). Causes already covered by an approved TMDL are identified on Sublist 4 of the Integrated List. Of all causes of water quality impairment, five of the top ten are associated with the aquatic life use, including total phosphorus (TP). TMDLs have been established for 74% of the pathogens, 56% of the mercury, and 35% of the TP causing use impairment.

Figure ES-4: 2014 Top Ten Causes of Use Impairment[1]
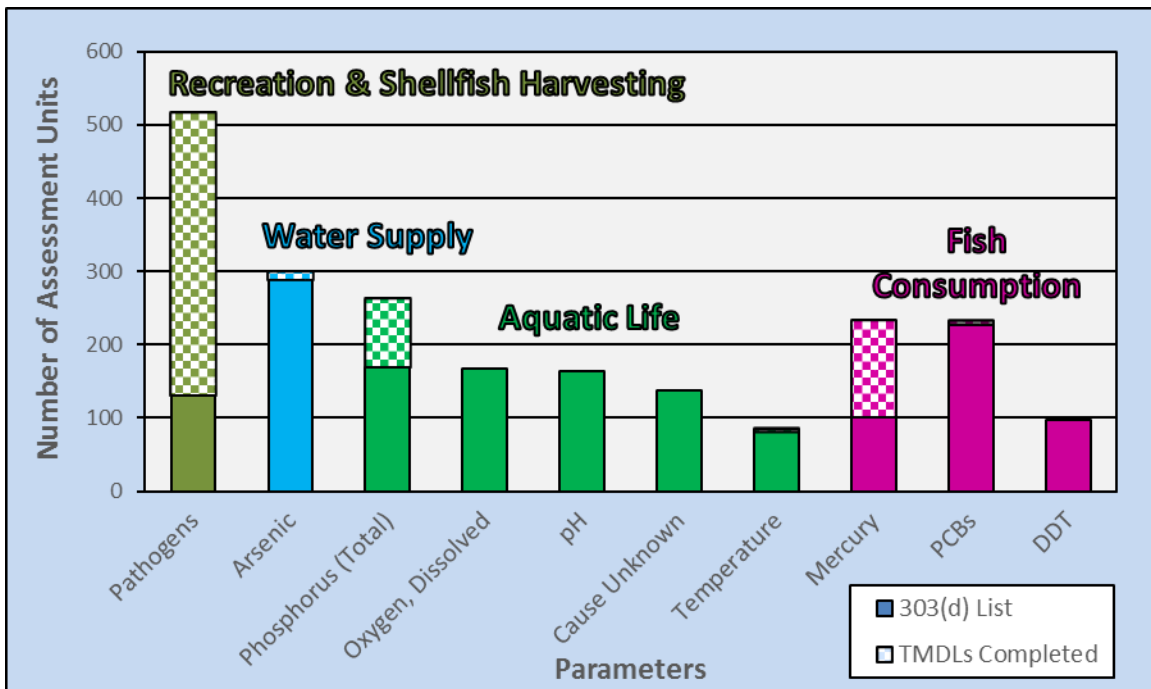
Over 120 AU/pollutant combinations were delisted from the 2014 303(d) List for various reasons (see Section 2.2). Forty-five percent of these delistings were due to water quality improvement. Another 44 AU/pollutant combinations previously covered by a TMDL are meeting water quality criteria.

Controlling TP and other nutrient-related parameters is one of New Jersey's top priorities. Studies show that the impact of nutrients on water quality is strongly influenced by other environmental factors such as sunlight availability, stream velocity and water clarity. The Department has developed a Nutrient Criteria Enhancement Plan (NCEP) that explains the Department's approach to developing and enhancing the existing nutrient

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[1] Aquatic life use impairment is attributed to "cause unknown" when biological data shows impairment but chemical data is either unavailable or does not exceed applicable water quality standards; therefore, the pollutant cause of aquatic life use impairment is unknown (see 2014 Methods Document, available on the Department's Web site at http://www.state.nj.us/dep/wms/bears/2014_integrated_report.htm).

criteria and policies to protect designated uses of all New Jersey's surface waters. The Barnegat Bay, which is the subject of the Governor's 10-Point Action Plan, is identified as a priority for estuarine criteria development in the NCEP, in order to meet Item 7 of the Action Plan: "Adopt more rigorous water quality standards" for nutrients in the Barnegat Bay.

Photo courtesy of the USDA Natural Resources Conservation Service

The Department has also approved seventeen Watershed Restoration and Protection Plans, also referred to as Watershed Based Plans (WBPs), developed under the Department's Section 319(h) NPS control grant program. WBPs identify causes and sources of pollution, estimate pollutant loading and the expected load reductions, develop management measures that will achieve load reductions, identify resources and authority needed to implement the management measures, and monitor and track implementation and water quality improvement.

The Department administers numerous programs to restore, maintain, and enhance water quality (Chapter 4). These programs include regulatory and non-regulatory water pollution control programs along with pollution prevention through education, outreach and stewardship programs for volunteer and community groups. These community-based programs have removed 1,930 tons of debris from waterways, beaches, greenways and roads. Watershed cleanup efforts in Barnegat Bay, Raritan River, Great Falls, and Brigantine involved almost 20,000 volunteers who collected over 11,000 bags of litter and 34 tons of recyclables across 131 miles in 2014 alone, along with collection of over 8,000 tires illegally disposed on public property. The Department's Clean Shores Program uses inmates from state correctional facilities to remove wood and garbage from tidal shorelines. Cleaning up these wastes helps prevents marine debris from washing up on recreational ocean bathing beaches. This program has removed over 125 million pounds of debris from New Jersey beaches since its inception in 1989.

The success of the Department's water quality management programs is supported by the results of the water quality trends analysis, which shows improving and stabilizing conditions over time (Chapter 3). These improvements are the result of significant financial investment, including millions of dollars in grants awarded for water quality planning, restoration, land acquisition, and wastewater facility infrastructure improvements, operations, and maintenance (Chapter 6). Over the past 25 years, more than $6 billion dollars has been financed through the NJ Environmental Infrastructure Financing Program to upgrade wastewater treatment facilities, reduce infiltration/inflow, control discharges from Combined Sewer Overflows (CSOs), construct sludge handling facilities, improve stormwater runoff, and close landfills. Public entities continue to collectively spend well over $1 billion per year to provide clean water for public and ecological health - money that is generated through local taxes and user fees. These investments have generated tangible results - increased beach days, trout waters, and shellfish harvests – that yield economic benefits for the entire State.

New Jersey is the fifth smallest and most densely populated state in the Nation. It is also one of the most geologically and hydrogeologically diverse states, with over 18,000 miles of rivers and

streams; over 50,000 acres of lakes, ponds, and reservoirs; 950,000 acres of wetlands; 260 square miles of estuaries; 127 miles of coastline; and over 450 square miles of ocean under its jurisdiction. The combination of population density, diversity of natural resources, and a wide range of industries and land uses presents unique challenges to protecting New Jersey's water resources and these uses.

New Jersey's surface waters provide much of the water used for public drinking water, as well for recreation, fish consumption and shellfish harvesting for consumption; yet most of the State's streams, lakes, ponds, bays, ground waters and ocean waters are impacted to some degree by both point and nonpoint sources of pollution. Protecting and restoring our water resources from such impacts has a direct and positive impact on the State's economy, particularly dollars generated by tourism, including recreational boating, swimming, and fishing, as well as from commercial fisheries, including shellfish, and the seafood industry. The Department estimates that the economic value of New Jersey's aquatic ecosystems at more than 19 billion dollars[2].

The full 2014 Integrated Report is available on the Department's website at http://www.state.nj.us/dep/wms/bears/assessment.htm along with other related documents and information.

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[2] NJDEP. Valuing New Jersey's Natural Capital: An Assessment of the Economic Value of the State's Natural Resources. April 2007. http://www.nj.gov/dep/dsr/naturalcap. Table 7.1 is based on data from Table 4 of Part II this report. Dollar amounts were converted from 2004 to 2009 dollars using the change in the Consumer Price Index for All Urban Consumers published by the U.S. Department of Labor's Bureau of Labor Statistics at http://www.bls.gov/cpi/.