

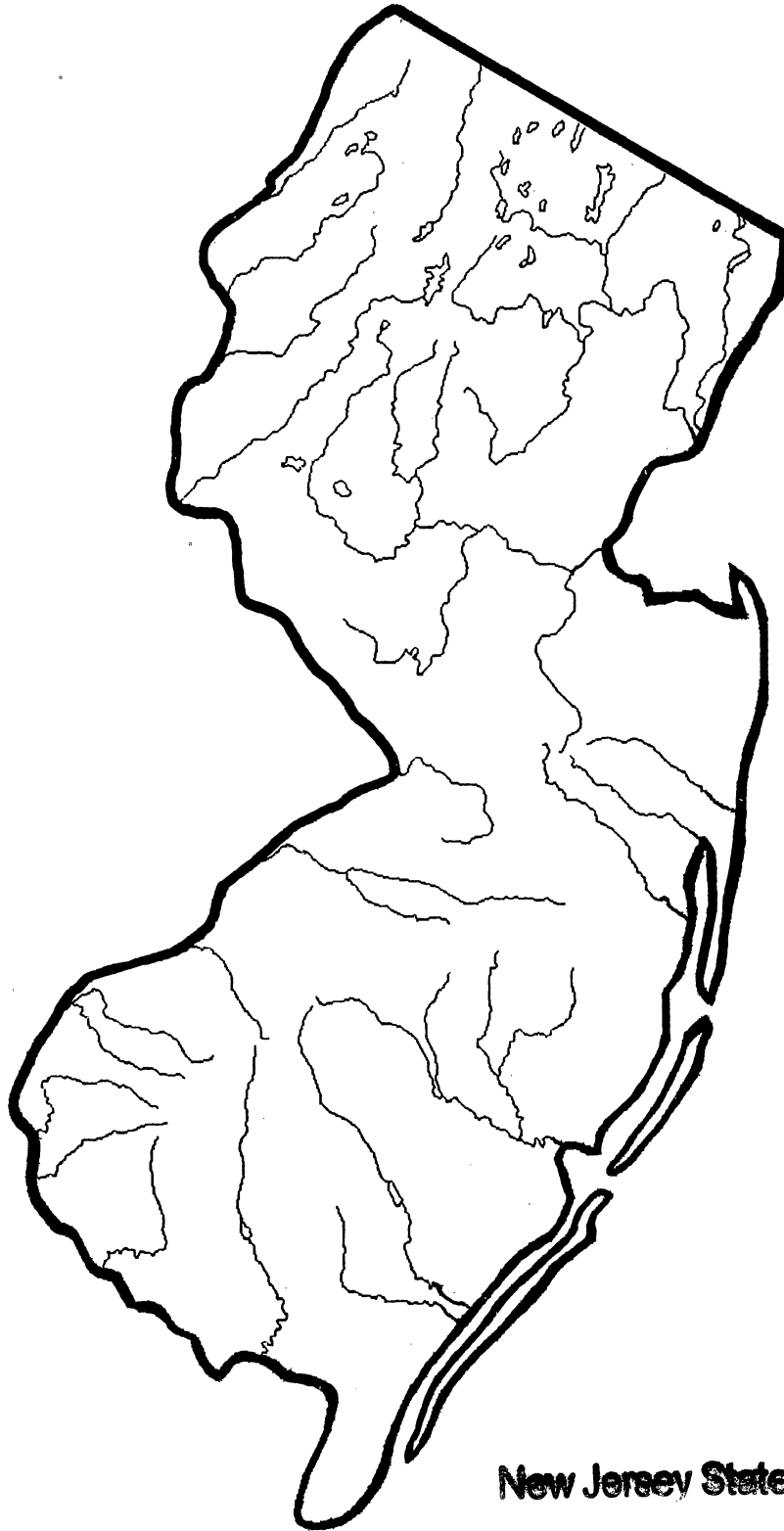
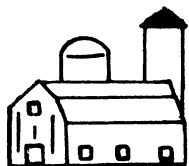
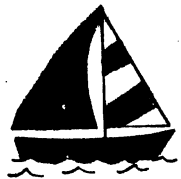
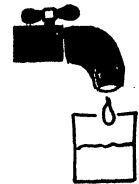
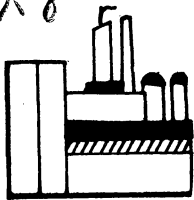


New Jersey 1982 State Water Quality Inventory Report

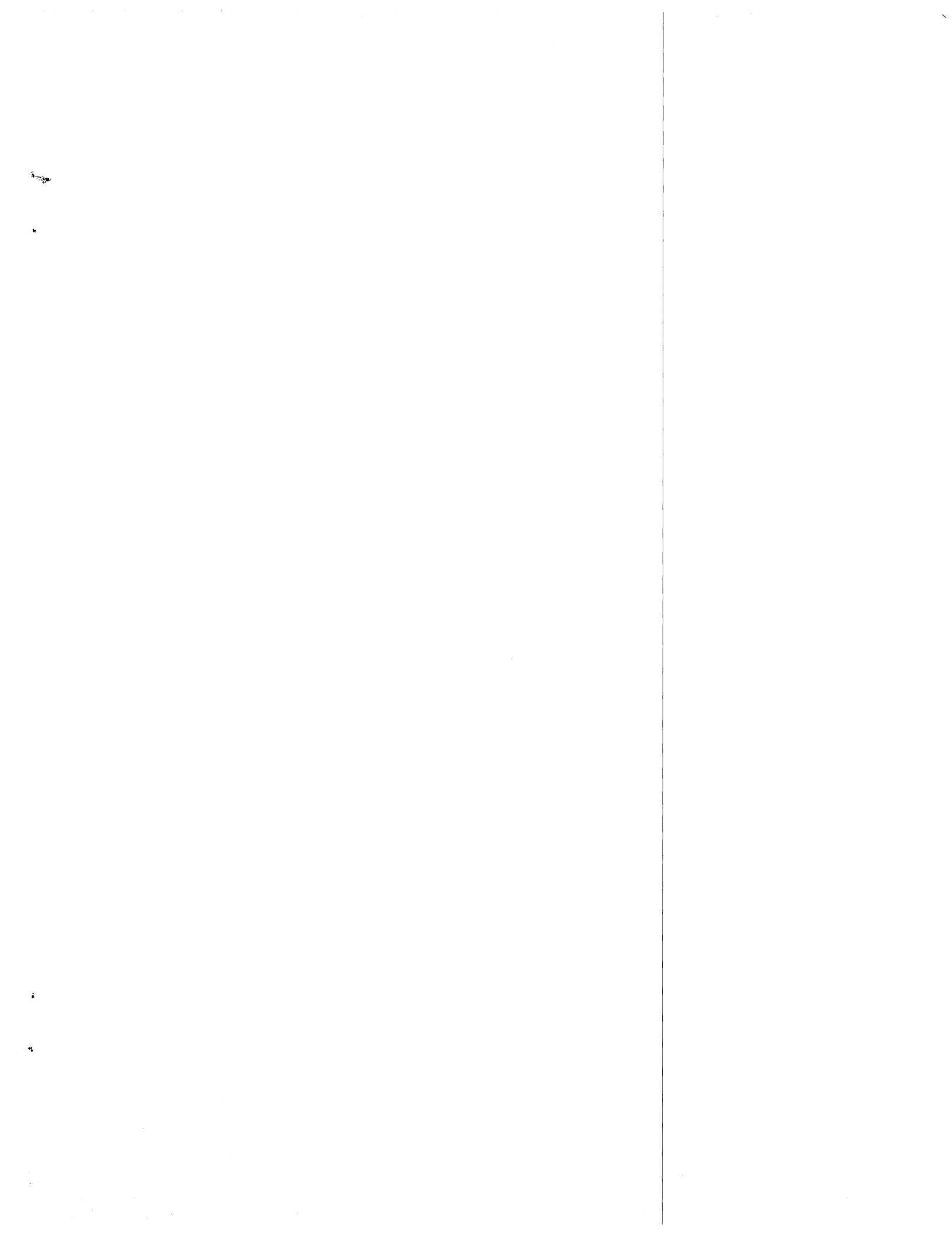
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Executive Summary



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NEW JERSEY 1982 STATE WATER QUALITY INVENTORY REPORT

EXECUTIVE SUMMARY

A REPORT ON THE STATUS OF WATER QUALITY IN NEW JERSEY
PURSUANT TO THE NEW JERSEY WATER POLLUTION CONTROL
ACT AND SECTION 305(b) OF THE FEDERAL CLEAN WATER ACT

WATER RESOURCES REPORT 39-A

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June, 1983

ACKNOWLEDGMENTS AND CONTRIBUTIONS

This report was prepared under the direction of George Horzepa, Chief, Bureau of Planning and Standards, and the supervision of Barry Chalofsky, Supervising Planner.

Robert Scro, Patricia Garces, Barry Miller and Edward Frankel of the Bureau of Planning and Standards all assisted in or completed various sections of this report. Significant contributions were made to this report by the following persons and groups within the Division of Water Resources: Robert Hirst (conventional parameters section of the water quality assessments, Appendix 1) and the Data Management Unit (water quality data graphs in Appendix 1) of the Bureau of Monitoring and Data Management; Gail Carter, New Jersey Geological Survey, for Chapter IV - Ground Waters of New Jersey; Tom Vernam, Bureau of Shellfish Control for the Shellfish Harvesting section of Chapter III; Surya Shah, Bureau of Industrial Waste Management, for the discharge inventories in Appendix 1; the Division Drafting Unit; and the Word Processing Center. Acknowledgment is also given to the Office of Cancer and Toxic Substances Research, NJDEP, for producing the toxics parameters section in the water quality assessments of Appendix 1; and to the Interstate Sanitation Commission and Delaware River Basin Commission for their water quality status reports (presented in Appendix 1) on their jurisdictional waters.

Information useful in the preparation of this report was also supplied by the following offices and agencies: Enforcement Element, Construction Grants Administration, and Water Supply and Watershed Management Administration of the Division of Water Resources; Division of Fish, Game and Wildlife; Division of Waste Management (formerly Hazard Management); designated Water Quality Management agencies; and the many local, regional and county health agencies and officials.

The Office of Cancer and Toxic Substances Research is now named the Office of Science and Research. This name change is not reflected throughout the report, but is being noted here.

INTRODUCTION

The New Jersey 1982 State Water Quality Inventory Report was prepared pursuant to Section 305(b) of the Federal Clean Water Act, and represents the fifth in a series of State Water Quality Inventory Reports that began in 1975. This report is the first complete revision of a State Water Quality Inventory (305(b)) Report since 1977. To prepare the 305(b) Report, information was gathered from throughout the Department of Environmental Protection, and numerous local, county and regional agencies and organizations.

The 305(b) Report reviews surface water quality in the State from 1977 to 1981, using ambient monitoring data collected at 78 fixed stations. Included in these analyses are the results of the first five years of monitoring toxic and carcinogenic substances in the State's surface waters. The 305(b) Report also discusses: the ability of the State's waters to meet the swimmable and fishable goals of the Clean Water Act; the quality of waters used for potable supplies; trends in shellfish harvesting areas classifications; and recommendations for improving surface water quality. In order to facilitate management decisions for improving waterways, a rating system was developed which assigns an index to individual or grouped watersheds on the basis of water quality and water use. In addition, the 305(b) Report also contains a review of ground water quality and quantity, and their associated problems in New Jersey.

CONCLUSIONS

SURFACE WATERS

Results of the water quality data evaluated in the 305(b) Report are summarized in "Table 1 - New Jersey Surface Water Quality Trends 1977 to 1981." This table shows that surface water quality throughout the State has been relatively stable over the last 4 to 5 years. However, it should be noted that the coastal bays and estuaries improved significantly during this period, particularly with regard to bacterial quality. This has been evidenced by the upgrading of over 7000 acres of shellfish harvesting areas from restrictive categories to less restrictive or open categories. The elimination, regionalization and upgrading of antiquated or improperly operating municipal sewerage facilities in the 1970's appears to be the principal reason for this water quality improvement. Conversely, water quality degradation did occur in the Passaic, Raritan and Hackensack River basins during the mid-1980 to early 1981 drought. This drought resulted in significantly lower stream flows and consequently reduced pollutant assimilation capacity. This caused lower dissolved oxygen and elevated levels of nutrients, biochemical oxygen demand and un-ionized ammonia.

Stress to aquatic life in streams within these basins was evident.

Comparison of water quality data generated at the 78 fixed stations with State Water Quality Standards indicates that nutrient enrichment is a major problem in the State's waterways. Forty-five percent of all total phosphorus values exceeded criteria, accounting for the large number of lakes in the State that are considered eutrophic. For other water quality indices, 4% of the dissolved oxygen values fell below standards, while 3 and 2% of the un-ionized ammonia and total dissolved solids values, respectively, exceeded their standards. In addition, the majority of fecal coliform samples gathered during the period of review were greater than the 200 MPN/100 ml criterion.

The causes of water quality degradation are quite varied throughout the State. Each watershed has a different set of pollution sources affecting water quality which are often difficult to identify and to quantify their impacts. New Jersey has approximately 1600 permitted point source wastewater discharges (one-third are municipal/institutional and the remaining two-thirds are industrial), and many possible non-point sources of pollution. Even with the implementation of discharge permits and their resultant discharge limitations, there are facilities throughout the State that are not in compliance with their permit requirements or are providing inadequate treatment. As a result, the major cause of nutrients in surface waters generally appears to be point sources, while non-point sources are the likely contributor of the frequently high fecal coliform counts found.

The majority of New Jersey's inland surface waters do not meet minimum standards for swimming and are not expected to meet the national swimmable goal in the foreseeable future. Although there are some localized acceptable stream bathing beaches as confirmed by regular monitoring, only the Flat Brook, Paulins Kill, and Mullica River are considered entirely acceptable for swimming. New Jersey as a whole has approximately 700 bathing beaches, most of which are found along the Atlantic Coast, within the Pinelands region, and in the ridge and valley lakes and streams of the State's northwest. Achievement of the Clean Water Act's fish propagation and maintenance goal will occur throughout much of New Jersey. Occasional stress to fish life is likely a result of periodic low dissolved oxygen, high un-ionized ammonia, excessive metals, and other toxic or hazardous substances. Waters that are not expected to meet the 1983 fishable goal are those in the urbanized and industrialized regions of the State, including tributaries to the Delaware River in Mercer, Burlington and Camden Counties, portions of the Passaic and Hackensack basins, and the New Jersey-New York interstate waters.

Because of fish tissue contamination by toxic or hazardous substances certain waters in the State have been closed to fishing, or advisories issued recommending the intake of specific

fish be limited. Cooper River, portions of Pennsauken Creek and Steward Lake are closed to all fishing because of chlordane contamination. New Jersey - New York interstate waters are contained in fishing advisories issued by both New Jersey and New York due to the presence of elevated PCB levels in striped bass, American eel, bluefish, white perch and white catfish (striped bass and American eels caught from these waters are prohibited from being sold).

A review of coastal bay and estuary studies by the NJ Division of Fish, Game and Wildlife in the mid to late 1970s has shown that many of the State's bays and estuaries experience low summertime dissolved oxygen concentrations, often under 4.0 mg/l. While these levels partially reflect background conditions, they also point to the limited ability these waters have for assimilating oxygen-demanding pollutants from point and non-point sources.

Toxics including volatile organics, pesticides, PCBs and heavy metals were analyzed for their presence in the water column, sediment and fish tissue. These substances seem to be fairly widespread at very low concentrations (depending on the substance and the medium sampled) throughout the State. Volatile organics were found in highest concentrations in waters adjacent to, or flowing through, industrialized urban and suburban centers. Metals, PCBs and pesticides were also found throughout the State in fish tissue in low levels, but appeared highest in catadromous and anadromous species. Most concentrations of these substances in fish tissue are not thought to be dangerous to the fish or to people consuming fish taken from State waters, with the exception of waters currently closed to all fishing or where advisories have been issued.

The stability of State water quality for the last five years should not be viewed in a pessimistic manner. Water quality degradation has been for the most part halted, largely due to higher treatment levels at municipal and industrial wastewater treatment facilities. However, if water quality in New Jersey is to improve beyond current "status quo" conditions, then water quality management agencies have to look beyond point source management to more technically complicated issues such as developing a more thorough understanding of the physical, chemical and biological nature of the State's water bodies; determining the specific pollution sources in a watershed and their affect on stream quality and biota; and identifying which control activities will be most effective from an environmental, technical and economical perspective.

WATER QUALITY AND WATER USE RATING SYSTEM

The water quality and water use rating system represents, quantitatively, an objective summation of: 1) the degree of water quality impairment; and 2) the value of the water uses in a watershed. It is anticipated that the rating system will assist management in the decision-making process with regard to

directing available public resources for water quality management activities. Indexes are allocated to 29 segments (individual or grouped watersheds as evaluated in the 305(b) Report) in the State on the basis of certain water quality parameters which violate standards and on the occurrence of water uses identified within the segment. The water quality index considers dissolved oxygen, total phosphorus, total dissolved solids, un-ionized ammonia and toxics. The water use index incorporates information on surface diversions for potable supplies; fisheries resources, including stocking of trout and anadromous fish spawning runs; the number of bathing beaches; shellfish harvesting, including percentage of waters approved for harvesting and shellfisheries production; and agricultural use.

A summary of the water quality/water use rating system is found in Table 2. Segments are listed by major river basin and not by ratings assigned to it. This is to emphasize that the rating system is not designed to prioritize one watershed over another, but rather to guide water quality management activities in an informed and efficient manner.

GROUND WATERS

Ground water plays an important role in New Jersey for supplying potable, agricultural and industrial waters; and for contributing base flows to streams in the State. The 305(b) Report discusses the availability of ground water for these uses in three major physiographic provinces (Coastal Plain, Triassic Lowlands and Highlands), major quantity and quality problems in each province, and current and suggested management practices.

Natural ground water quality is generally very good throughout the State and most ground waters can be used for potable purposes without treatment. Common natural quality problems which do require treatment in some areas include high iron, dissolved solids, manganese; hardness; and variations in pH. The development of ground water resources is not usually limited by natural quality, but rather by contamination of the resource through man's activities. The two common methods of contamination include over pumpage and pollutant introduction.

Over pumpage has led to the intrusion of saltwater into formally fresh water formations along the coast, rendering the water unsuitable for use. Over pumpage has resulted in the lowering of ground water levels in many water-bearing formations throughout the State, although it is most severe in the Coastal Plain. Currently, an estimated 500 million gallons per day (mgd) are being pumped from Coastal Plain Aquifers, causing lowering water levels in areas of Middlesex, Monmouth, Burlington, Camden, Ocean, Atlantic, Cape May, Gloucester and Salem Counties. In addition, this problem may be affecting streams dependent upon ground water inflows.

Many of the above noted problems in the Coastal Plain are also occurring in the Triassic Lowlands and Highlands provinces of northern New Jersey where resource development has exceeded the recovery capacity of certain ground water systems. Basic information gathering activities (mapping, exploration, consumption and recharge rates, and impacts on water levels) are in the planning process, but lacking in many regions of central and northern New Jersey.

Ground water pollution is a serious and immediate problem when municipal or residential supplies are contaminated. The Department has closed 74 public supply wells since 1971. Ninety percent were closed because of contamination by organic and industrial chemicals. Many of these contamination events were due directly to point sources. Well closings are not primarily limited to a particular region of the State, but have occurred throughout. A monitoring study by the NJDEP Office of Science and Research found approximately 30 wells (out of 670) to be contaminated with more than one chemical group at levels above drinking water standards. Chemical groups included halogenated volatile organics, chlorinated pesticides and related compounds, and metals.

Many causes of ground water pollution exist. Three-hundred registered landfills are found in the State, along with 134 known abandoned landfills and illegal dump sites. Of these 434 sites, 134 are or are suspected of contaminating ground water based on information from the Hazardous Site Mitigation Administration. Roughly 7 billion gallons of landfill leachate is generated in New Jersey each year, much of which will enter ground water systems. Three-hundred and fifty-six waste disposal surface impoundments have been identified in the State, 65 percent being unlined. This may be leading to 6 billion gallons of leachate liquid entering ground waters each year. Accidental spills (2,512 petroleum and chemical spills in 1981 alone), leaking underground storage tanks and pipelines, on-site wastewater disposal systems, and other sources are contaminating ground water resources to a varying extent. Over the next several decades it is expected that of the 750 million gallons a day of ground water used for potable purposes, 40 to 50 million gallons a day will be lost because of pollution. Major investments in the 1980s will be required for additional water treatment, ground water resource development and protection, and aquifer restoration in New Jersey.

RECOMMENDATIONS FOR IMPROVING WATER QUALITY IN NEW JERSEY

SURFACE WATERS

New Jersey's surface waters, on the basis of ambient monitoring results, have generally not shown significant improvement in the last five years. Even with the successful efforts to prevent

further water quality degradation in the face of increased industrial, residential and transportation corridor development; the State's waters are for the most part just as close to meeting the Clean Water Act's goals of swimmable and fishable as they were in 1977. The recommendations presented below are designed to facilitate thought and discussion concerning surface water quality improvement throughout the State.

Revamp water quality monitoring activities so they are designed for detecting specific water pollution sources. Water quality monitoring in New Jersey has historically and primarily been designed for long-term trend analysis. To maximize the effectiveness of pollution control activities, pollution sources and their impacts on water quality and biota must be identified.

It is recommended that the current long-term, fixed-station monitoring programs used by the DWR be operated on a minimal basis, and that intensive surveys be emphasized as the primary tool for monitoring water quality. The purpose of such monitoring would be to indentify specific pollution sources so that control activities can be targeted. Intensive or special monitoring surveys have recently begun to play a greater role in DWR monitoring programs. This trend should be extended to all waters of the State.

Greater identification and control of non-point sources.

Non-point pollution contributes more of certain pollutants than point sources in many of New Jersey's watersheds. The frequently excessive fecal coliform counts indicates that this parameter continues to be a serious water quality problem in the State, despite advances in sewage treatment. Non-point sources, ranging from feedlot runoff to antiquated and leaking sewer lines, are prevalent in New Jersey and probably the sources of bacteria being detected. These sources must be effectively controlled if water quality is to be improved to where national clean water goals can be realized. Intensive monitoring will identify non-point sources and therefore, will enable the appropriate application of control measures.

One example of how intensive surveys have proved effective in indentifying non-point sources is the Bureau of Planning and Standards project in the Navesink River watershed. High fecal coliform counts in the upper Navesink estuary have resulted in the closure of shellfish growing areas. Intensive monitoring by the DWR found the predominant sources of bacteria to be upstream livestock (horse) farms along a major tributary, and suburban runoff. The DWR, the Soil Conservation Service, and the local conservation district, are currently exploring the feasibility of a watershed project designed to correct the agricultural runoff problem. The local health agencies are focusing on managing bacterial pollution from the suburban sector.

Achieving necessary effluent quality from point sources. Due to the large number of point sources in many of New Jersey's watersheds, wastewaters can often have profound impacts on stream water quality. This was exemplified in the Passaic River during the recent drought when as much as 75 percent of the river's flow at Little Falls was thought to be upstream point source effluent. In addition, streams in the State consistently having poor water quality, have the average, the greatest number of wastewater treatment plants that are not meeting their effluent requirements. If clean water goals are to be met in New Jersey, it is imperative that all point sources be in compliance with their discharge permit limitations. Poor discharge quality is often due to inadequate, antiquated or underdesigned treatment systems and poor or delinquent operation of facilities. Primary treatment plants are still found in the State, and many secondary treatment plants are discharging unsatisfactory treated wastewaters because of system overload or improper operation. These deficiencies need to be corrected at all municipal/domestic, industrial and other wastewater facilities.

Coordinated watershed management activities. Coordination of activities dealing with water pollution control and water resource management in a watershed should be improved so that duplication of effort is eliminated and greater efficiency results. This coordination should involve local, county, regional, state and federal agencies; with special consideration given to local and county health offices or departments. The County Environmental Health Act is currently serving as a tool for such coordination to take place. Cooperative monitoring agreements with many counties are now in progress, or are being developed.

Water pollution control efforts should also be coordinated so that specific water use goals are targeted. The public can best identify water quality improvement with restoration of water uses (such as bathing, greater fisheries and shellfisheries) which are available in the past, but are now not possible because of water quality degradation. Identification of water use goals will also assist in determining what control resources should be allocated and where.

GROUND WATERS

The increasing number of pollution incidents affecting New Jersey's ground waters each year has resulted in a greater frequency of public and private supply well closures. This, in addition to hydrologic problems such as lowering of aquifer water levels, increasing occurrences of saltwater intrusion into formally fresh water formations, and the loss of surface water flows due to the reversal of ground water inflows, clearly demonstrates that increased research and management is necessary to protect the State's ground water resources. The following recommendations outline activities which can be pursued to achieve such ground water goals.

Protection of ground water levels and availability. To prevent existing or future aquifer degradation and depletion in the Coastal Plain Region, the following are suggested: eliminate the practice of aquifer overdevelopment; uniformly distribute future well development; institute projects designed to reverse water level declines in problem areas; promote recharge of aquifers in outcrop areas; develop new supplies in problem localities; and supplement ground water supplies with surface water supplies (conjunctive use). In the Triassic Lowlands and Highlands Regions of the State the following are recommended: conduct hydrogeologic exploration and delineation of the available ground water resources; establish monitoring programs to gather vital ground water statistics; and institute management of the ground water resources of northern New Jersey on a regional basis.

Protection of ground water quality. Managing abandoned or technologically outdated landfill sites, and monitoring and regulating operating landfill sites is essential if unnecessary pollution of the State's ground waters is to be reduced. Proper landfill closure when necessary must include a relatively impervious cap, as well as leachate collection and treatment. New Jersey Pollutant Discharge Elimination System (NJPDDES) permits should be issued for all existing and potential point sources contributing to ground water pollution. However, adequate ambient monitoring is needed so as to properly assign NJPDDES permit limitations to ground water discharges.

Table 1- New Jersey Surface Water Quality Trends - 1977 to 1981

Stream	DO	Total P	NH ₃	TDS	BOD	DO Sat.	Fecal Coli.	NO ₃ /NO ₂	NH ₃ /NH ₄ ⁺	pH	1982 Overall Water Quality***
<u>DELAWARE BASIN</u>											
Wallkill River	D	S	S	S	S	D	S	S	S	S	Fair
Flat Brook	S	S	S	S	S	S	S	S	S	S	Excellent
Paulins Kill	S	S	S	S	S	I	S	S	S	S	Good
Pequest River	S	S	S	S	S	S	S	S	S	S	Good
Musconetcong River	S	S*	S	S	I	S	S	S	S	S	Good
Pohatcong Creek	S	D*	S	S	S	S	D	D	S	S	Good
Lopatcong Creek	S	D	S	S	S	S	D	D	S	S	Good
Delaware River Tribs.- Hunterdon County	D	S	S	D	S	S	S	S	S	S	Good
Assunpink Creek	I	I*	S	S	S	S	S	S	S	D	Fair
Crosswicks Creek	I	S*	S	S	I	S	S	S	S	S	Fair
Assiscunk Creek	I	S	S	S	I	S	S	S	S	S	Fair
Rancocas Creek - North Branch	S	I	S	S	I	I	S	S	S	S	Fair
Rancocas Creek - South Branch	S	I*	S	S	I	I	S	S	S	S	Fair
Pennsauken Creek	S	S*	S	S	S	S	S	S	S	S	Poor
Big Timber Creek	S	S*	S	S	S	S	S	S	S	S	Poor
Cooper River	S	S*	S	S	S	S	S	S	S	S	Poor
Mantau Creek	S	S*	S	S	S	S	D	S	S	S	Fair
Raccoon Creek	S	S*	S	S	S	S	S	S	S	S	Fair
Oldmans Creek	I	S	S	S	S	S	S	S	S	S	Fair
Salem River	S	S*	S	S	S	S	S	S	S	S	Poor
Cohansey River	S	D	S	S	S	S	D	S	S	S	Poor
Maurice River	I	I	S	S	S	S	S	S	S	S	Fair/Good

Legend

I = Improving

D = Declining

S = Stable/Unchanged

- = Insufficient data to determine trend

* = Exceeded State Water Quality Standard 50% or more of the time

** = Derived from 208 Areawide Quality Management Plans

*** = Classification may be based on water quality parameters other than the ten presented here.

Table 1- New Jersey Surface Water Quality Trends - 1977 to 1981

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ATLANTIC COASTAL BASIN											
Tuckahoe River	S	S	D	S	S	S	S	S	D	D	Good
Great Egg Harbor	S	S	S	S	S	S	S	S	S	S	Fair
Mullica River	S	S	S	S	S	D	S	S	S	S	Excellent
Metedeconk River	I	I	S	S	S	S	S	S	S	S	Fair
Toms River	S	S	S	S	D	S	S	S	S	S	Fair
Manasquan River	S	S*	S	S	S	S	S	S	S	S	Fair
N. Atlantic Coastal- (Willow, Yellow, Jumping Br's)	S	S	S	S	S	S	S	S	S	S	Good
RARITAN BASIN											
North Branch Raritan River	S	S*	D	S	D	S	D	S	S	S	Good
South Branch Raritan River	S	S	D	S	S	S	S	S	S	S	Good
Millstone River	I	I*	S	S	I	S	S	S	S	S	Fair/Good
Lawrence Brook	S	D	S	S	S	S	I	S	S	S	Good
South River	S	S	S	S	S	S	S	S	S	S	Fair
Raritan River	I	D*	I	S	S	S	S	S	I	S	Poor/Fair
Elizabeth River	S	S	D	-	I	S	D	-	D	-	Poor
Rahway River	S	S	S	-	D	S	D	-	S	-	Poor/Fair

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<u>PASSAIC/HACKENSACK BASIN</u>											
Upper Passaic River	S	S*	S	S	S	S	I	S	S	S	Poor/Fair
Mid-Passaic River	S	S*	S	S	S	S	S	S	S	S	Poor
Mid-Passaic Tributaries											
Rockaway River	S	S*	S	S	S	S	I	S	S	S	Poor
Whippany River	S	S*	S	S	S	S	D	S	S	S	Poor/Fair
Ramapo River	S	S*	S	S	S	S	S	S	S	S	Fair
Pompton River	S	S*	S	-	D	-	D	S	S	-	Fair
Lower Passaic River	S	S*	S	S	S	S	S	S	S	S	Poor
Hackensack River	S	S	S	S	S	S	S	S	S	S	Poor

Legend

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- = Insufficient data to determine trend

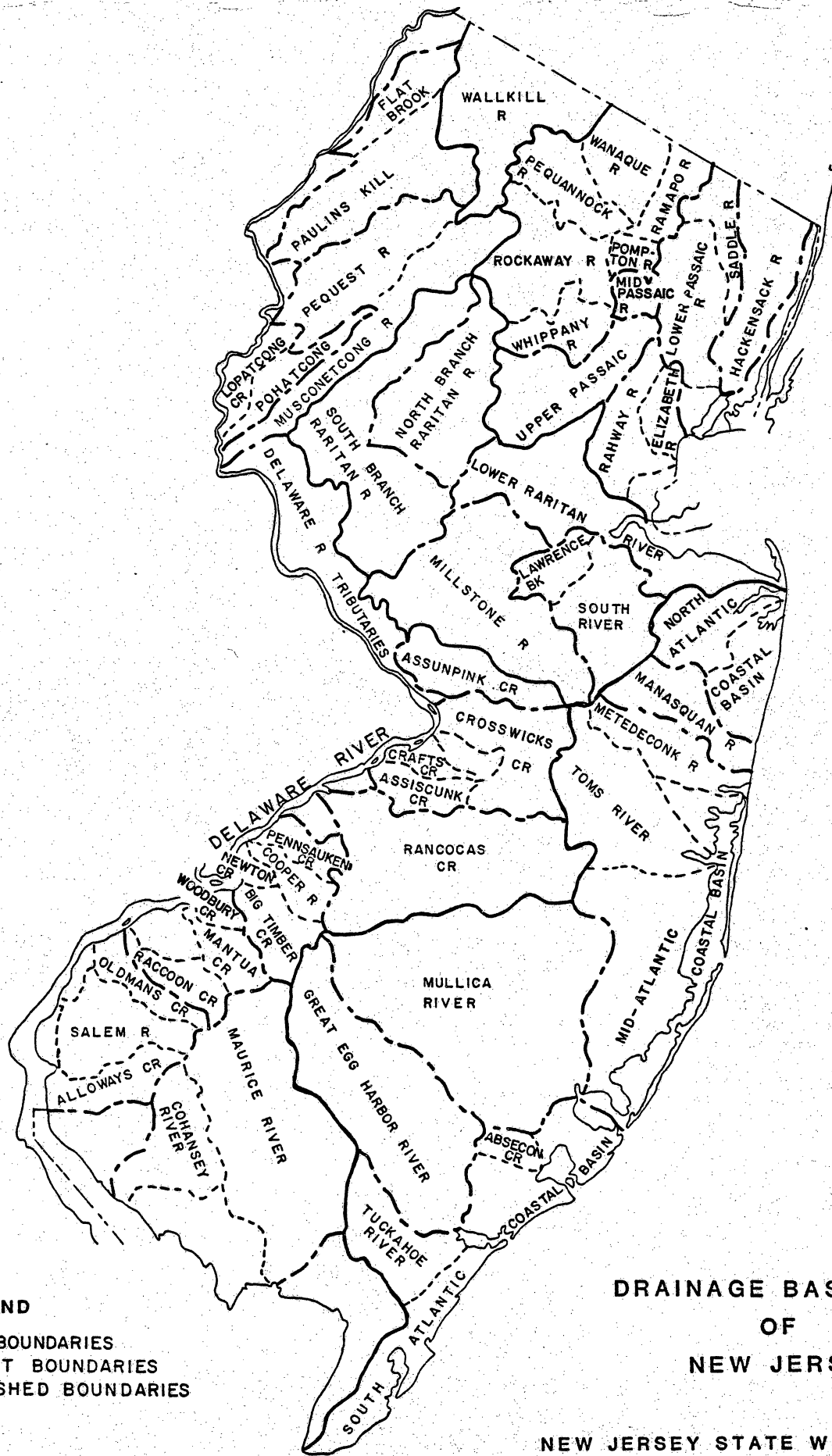
* = Exceeded State Water Quality Standard 50% or more of the time

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Table 2 Results of the Water Quality/Water Use Rating System

<u>Segment</u>	<u>Water Quality Index</u>	<u>Water Use Index</u>
Wallkill River	47	59
<u>Delaware River Basin</u>		
Flat Brook and Paulins Kill	20	34
Pequest and Musconetcong Rivers	66	124
Pohatcong and Lopatcong Creeks	39	8
Delaware River Tributaries Hunterdon/Mercer Counties	26	28
Assunpink Creek	74	30
Crosswick and Assiscunk Creeks	90	68
Rancocas Creek	70	69
Pennsauken Creek, Big Timber Creek, Cooper River	119	8
Woodbury, Mantua and Raccoon Creeks	84	51
Oldmans Creek, Salem River and Alloway Creek	94	36
Cohansey and Maurice Rivers	33	76
<u>Atlantic Coastal Basin</u>		
Southern Atlantic Coastal Basin	12	138
Great Egg Harbor River	73	27
Mullica River	39	86
Mid-Atlantic Coastal Basin	50	245
Manasquan River	134	15
North Atlantic Coastal Basin	47	106
<u>Raritan River Basin</u>		
North Branch Raritan River	69	16
South Branch Raritan River	85	101
Millstone River	58	88
Lawrence Brook and South River	63	21
Raritan River and Raritan Bay Drainage	103	85
<u>Passaic River Basin/Northeast</u>		
Elizabeth and Rahway Rivers	66	4
Upper Passaic River	40	10
Mid-Passaic River	146	20
Mid-Passaic River Tributaries (Whippany, Rockaway, Pequannock, Wanaque, Ramapo and Pompton Rivers)	98	137
Lower Passaic River	163	12
Hackensack River	64	45



LEGEND

- BASIN BOUNDARIES
- - - SEGMENT BOUNDARIES
- - - - WATERSHED BOUNDARIES

**DRAINAGE BASIN MAP
OF
NEW JERSEY**

**NEW JERSEY STATE WATER QUALITY
INVENTORY REPORT**

1982

