3.0 Surface Water Quality Concerns

In the sections that follow, New Jersey's Surface Water Quality Standards are described, including applicable stream classifications for WMA 02. Statewide monitoring programs for water and sediment chemistry, sanitary quality, biological health, lake trophic status and fish tissue contamination are described. In addition, a study of water quality trends between 1985 and 1995 conducted by USGS under contract to NJDEP was used to summarize trends. In addition, the Impaired Waterbodies List (303d Program) is described.

Only readily available data were used to prepare this assessment. Additional datasets collected by the NJDEP, other agencies and watershed partners are needed to improve this initial assessment. Further, additional data collection efforts are underway or being planned by the Department to develop TMDLs and address data gaps. Integration of these datasets will provide the scientific and technical basis for the Watershed Management Plan for WMA 02.

3.1 Surface Water Quality Standards

Water quality is evaluated with respect to Surface Water Quality Standards (SWQS) and water quality issues or concerns occur when SWQS are not met or are threatened. New Jersey s Surface Water Quality Standards (N.J.A.C.7:9B) establish the water quality goals and policies underlying the management of the state s water quality. These standards designate the use or uses of the water and establish policies and narrative and numerical criteria necessary to protect the uses. A draft map of the SWQS is provided on Figure 3.1-1. SWQS are explained below.

Water Quality Goals: National water quality goals were established in the Federal Clean Water Act. These goals state that surface waters should be fishable, swimmable and potable (after reasonable treatment). The national goals are reflected in the designated uses of waters established in New Jersey s Surface Water Quality Standards (SWQS) and the water goal statement developed under the National Environmental Performance Partnership Agreement (NEPPS).

Designated uses: The designated water uses in WMA 02 are primary and secondary contact recreation (i.e., swimmable); maintenance, migration and propagation of the natural and established biota (i.e., fishable) and public potable water supply, after such treatment as required by law or regulation (i.e., potable). These uses were established based on physical, chemical, biological, and hydrological characteristics of the waters and the economic considerations related to attaining various uses. Designated uses that apply to streams and rivers within WMA 02 are listed in the SWQS and are evaluated periodically.

Water Classifications: Waters in WMA 02 are grouped into classifications as follows:

FW1: Fresh surface waters that are to be maintained in their natural state and not subjected to man-made wastewater discharges or increases from runoff from anthropogenic activities.

FW2: General fresh surface water classification applied to fresh waters that are not FW1 or Pinelands Waters.

TP: Trout Production waters are designated for trout spawning/nursery during their first year.

TM: Trout Maintenance waters are designated for the support of trout throughout the year.

NT: Non Trout: fresh surface waters that have not been designated TM or TP. These waters are generally unsuitable for trout because of their physical, chemical, or biological species, but are suitable for a wide variety of other fish species.

ND: Nondegradation waters are waters set aside for posterity because of their clarity, color, scenic setting, other characteristic of aesthetic value, unique ecological significance, or exceptional water supply significance. These include all waters designated as FW1 in this report.

C1: Category 1 waters are designated for implementation of antidegradation policies for protection from any measurable change in water quality. C1 may be applied to any surface water classification except those designated as FW1 or PL. Note: the Department is currently proposing a clarification of C1 antidegradation policies

C2: Category 2 waters are waters that are not designated as Outstanding Natural Resource Water (i.e., FW1 or PL) or C1 for implementation of antidegradation policies.

Water Quality Policies: Anti-degradation policies apply to all surface waters of the State. Existing uses must be either maintained or protected, and no irreversible changes to water quality are allowed that would impair or preclude attainment of designated uses. Waters classified as nondegradation waters (i.e., FW1) must be maintained in their natural state, and are not to be subject to any manmade wastewater discharges. Narrative criteria that prohibit changes in natural water quality apply to high quality waters. Water quality characteristics that do not meet criteria must be improved to meet criteria.

Water Quality Criteria: States are required to adopt water quality criteria that will protect both the existing and designated uses of a waterbody with an adequate degree of safety. Numerical criteria are often established for chemical pollutants, sanitary quality, and physical characteristics of the water such as temperature and dissolved oxygen. Narrative criteria that prohibit toxicity in surface waters are established to protect against the effects of multiple pollutants. A summary of SWQS criteria that apply to FW2-NT waters is provided in Table A3.1-1 in the Appendix**.**

Table 3.1-1: SWQS Stream Classification and Stream Miles

SWQ Classification	Trout Classification	Antidegredation Policy	Length (mi.)
FW1	NA	ND	13.34
FW1	TP	ND	6.05
FW1	TM	ND	1.77
FW2	TP	C1	22.56
FW2	TM	C1	2.37
FW2	TM	C2	90.25
FW2	NT	C1	21.42
FW2	NT	C2	36.39
FW2	NT	NS	198.74
		Total	**392.89**

3.2 Surface Water Quality Monitoring Programs

Monitoring data are used to evaluate current conditions and trends with respect to Surface Water Quality Standards, identify emerging issues and evaluate effectiveness of management measures. The NJDEP's primary surface water quality monitoring unit is the Water Monitoring Management (WMM), although other units also perform some monitoring functions and some monitoring is conducted cooperatively with other entities, especially the United States Geological Survey (USGS). Monitoring stations in WMA 02 that are routinely sampled by NJDEP and / or USGS are shown on Figure 3.2-1 and Table A3.2-1 in the Appendix. The monitoring networks are explained below.

Ambient Stream Monitoring Network (ASMN): The NJDEP and the United States Geological Survey (USGS) have cooperatively operated the Ambient Stream Monitoring Network (ASMN) in New Jersey since the 1970s. The data from this network were used to assess the physical, chemical, and sanitary quality of freshwater streams and sediments. Long term water chemistry and sanitary quality data are available for the following stations in WMA 02:

Table 3.2-1 Water Quality Monitoring Stations in WMA 02

Station #	Location	SWQS Classification	Drainage Area (sq. mi.)	Years Sampled
01367770	Wallkill near Sussex (above the Papakating confluence)	FW2-NT	60.8	1976-current
01368000	Wallkill near Unionville NY	FW2-NT	140	1963-78; 1991-97
01367910	Papakating Creek at Sussex	FW2-NT	59.4	1976-97
01368950	Black Creek near Vernon	FW2-NT	17.3	1976-97

Routine water column parameters and observations collected at each monitoring station on a quarterly schedule are shown on Table 3.2-2.

Table 3.2-2: Routine Water Quality Parameters

Date/ Time	Calcium	Nitrite
Instantaneous discharge	Magnesium	Nitrate + Nitrite
Specific conductivity	Sodium	Ammonia - total
PH	Potassium	Ammonia - dissolved
Water temperature	ANC Unfiltered?	Ammonia + organic N -total
Barometric pressure	Sulfate	Ammonia + organic N - dis
Dissolved oxygen	Chloride	Total Nitrogen
DO % saturation (calculated)	Fluoride	Dissolved Nitrogen
BOD (5 day)	Silica	Total Phosphorus
Fecal Coliform	Solids (residue)	Dissolved Phosphorus
Enterococcus	Solids (calculated)	Dissolved Organic Carbon
Hardness	Residue at 105 C	Suspended Organic Carbon

Supplemental water column parameters are collected 2 times per year at 1/3 of the stations on a rotating schedule. Thus, all stations are sampled over 3 years. Parameters include:

Table 3.2-3: Supplemental Water Quality Parameters

Chemical oxygen demand	Arsenic	Beryllium
Boron	Cadmium	Chromium
Copper	Iron	Lead
Manganese	Mercury	Nickel
Selenium	Zinc	

Supplemental sediment parameters include metals, organic pesticides, herbicides and PCBs.

Under contract to NJDEP, USGS conducted a project to characterize water quality status and trends in NJ between 1986 and 1995. (USGS, 1999). The results were used in the characterizations that follow to summarize trends.

Redesigned Ambient Stream Monitoring Network: Although the Ambient Stream Monitoring Network was sufficient to assess general status and trends, changes were needed to provide data for water quality indicators and watershed management. Therefore, a NJDEP/USGS interagency committee redesigned the network. The Redesigned Ambient Stream Monitoring Network has been operating since the fall of 1997. Thus, data from 1990-1997 collected in the previous network are used to provide an overview of long-term water quality conditions for this assessment. In the future, water quality assessments can be updated using data from the redesigned network. An overview of the redesigned network is provided in Appendix 3.

NJDEP Ambient Biomonitoring Network (AMNET): Ambient chemical monitoring is now extensively supplemented by biological assessments of in-stream benthic macroinvertebrate communities (See Figure 3.2-1). These bottom- dwelling communities of larval insects and crustacea (See Appendix A3.2-3) were examined using USEPA's Rapid Bioassessment Protocols - Level II. (USEPA, 1989). Using this protocol, communities are examined for pollution tolerant

and intolerant forms and the results are used to compute the New Jersey Impairment Score (NJIS).

Monitoring at over 800 locations statewide is conducted on a 5-year rotating schedule. Round 1 sampling was completed in the mid-1990's and Round 2 sampling is ongoing now. In Round 2, the assessments were improved by sampling various types of stream habitat at each monitoring location and by conducting a visual habitat assessment. Various components of the habitat are examined and results are used to compute a Habitat Assessment Score.

Benthic macroinvertebrate communities integrate the effects of multiple stressors including habitat quality (e.g., temperature, flow, erosion, sedimentation); chemical quality (e.g., contaminants in water and / or sediment) and natural shifts in population. Further, benthic macroinvertebrate communities may reveal the impacts of chronic stressors which may be overlooked by the short-term "snapshot" view provided by ambient chemical sampling. Thus, benthic data provide a useful indicator to screen the overall health of aquatic communities. Other components of EPA's Rapid Bioassessment Protocol are being added to provide a more comprehensive picture of the health of aquatic ecosystems. Indicators that are being explored include fish and algal communities and presence of rare and threatened species.

Clean Lakes Program: In WMA02, two lakes were included in the Clean Lakes Program: Clove Lake and Lake Waywayanda. The Clean Lakes Program evaluates public lakes possessing water quality problems, which in turn impair the lake's recreational value. These assessments began in the late 1970's and continued into the mid-1990's. Natural and constructed lakes are assessed. Typically under the Clean Lakes Program, lakes that require management due to use impairments are identified by citizens or other groups. Phase I Diagnostic Studies are conducted to evaluate water quality and document use impairments. The diagnostic study results are used to develop appropriate management proposals (typically dredging) for funding. If funding is secured, the management project is conducted in Phase II. Lakes are monitored again after the management project is completed.

Many lakes in WMA 02 are private and as such are not monitored by state and federal lake management programs (See Figures 2.1-2 and 2.1-4). Examples of such lakes in WMA 02 are Lakes Mohawk and Grinnell, Highland, Barry, Wallkill, Beaver and Upper Greenwood Lakes. Many of these lakes may experience use impairments; however, the Department is not always made aware of this by the communities overseeing these lakes.

Toxics in Biota Program: To evaluate contaminants in fish in terms of risks for human consumption, levels of PCBs, dioxins, chlordane and mercury have been carried out I various water of the state (i.e., edible tissue of fish and shellfish). PCBs, dioxin and chlordane are contaminants typically associated with point sources (e.g., hazardous waste sites) in the coastal and estuarine areas of the state. In contrast, most freshwater fish contamination in New Jersey is typically associated with mercury (i.e., ostensibly due to non-point source atmospheric deposition pollution). A DEP guide to health advisories for eating fish and shellfish caught in New Jersey waters is updated and published annually in the Department’s Fish & Wildlife Digest (DEP 2000). Affecting WMA 02 is a Statewide consumption advisory for largemouth bass and chain pickerel (i.e., for all freshwater bodies in New Jersey). The advisory directs the general population not eat more than one meal a week and that high-risk individuals (i.e., pregnant and breast feeding women) not eat more than one meal a month. Certain other lakes and reservoirs in New Jersey are posted for the more restrictive advisory but none of them are in WMA 02. It

should be noted that although data may show elevated levels of mercury in fish, it does not affect the quality of the waters used for drinking and bathing.

3.3 Surface Water Quality in the Wallkill River Watershed

3.3.1 Chemical and Sanitary Water Quality in the Wallkill River Watershed

Through 1997, the Wallkill River was monitored near Sussex (01367770), just below the confluence with Papakating Creek and near Unionville, NY (01368000). Both of these stations are located in FW2-NT waters. See Figure 3.3-1 for a summary of water quality trends.

Dissolved Oxygen: Levels are significantly above the SWQS criteria for FW2-NT waters and no exceedences were identified between 1990 and 1997. Between 1986 and 1995, a slightly decreasing downward trend in DO (-0.13 mg/l per year) was found in the Wallkill at Unionville. This trend may have been affected by changes in flow. No trends were found at Sussex. (USGS, 1999). These data indicate very good water quality with respect to DO.

Temperature: No exceedences of the upper criterion for FW2-NT waters or trends were identified. These data indicate very good water quality with respect to temperature.

Nutrients: Phosphorus levels met SWQS criterion of 0.1 mg/l between 1995 and 1997. Although no trends were identified between 1986 and 1995 (USGS, 1999), levels were historically slightly elevated. These data indicate very good water quality with respect to total phosphorus. As shown on Figure 3.3-3, total phosphorus in bottom sediments was 430 mg/kg in the Wallkill River at Sussex and dropped to 42 mg/kg in the Wallkill River near Unionville between 1990 and 1994. This drop may be due to the large wetland area acting as a phosphorus sink.

Levels of nitrate are very low at both monitoring locations (about 1 ppm), but were rising slightly between 1986 and 1995 in the Wallkill near Unionville (+0.039 mg/l per year). (USGS, 1999). These data indicate very good water quality with respect to nitrate.

Bacteria: Fecal coliform levels were elevated at both monitoring locations, and no statistically significant trends were found. These data indicate poor water quality with respect to fecal coliform bacteria.

Heavy Metals: Levels of metals were very low between 1990 and 1997. Insufficient data were available to analyze trends. Additional metals data are being collected through the 303d Evaluation Monitoring Program described elsewhere.

Summary: Water quality in the Wallkill River is overall very good. Similar to many areas in the state, elevated fecal coliform impairs swimmable use. See Figure 3.3-1 and Table A3.3-1 in the Appendix for additional information on Water Quality Status and Trends in WMA02.

3.3.2 Biological Evaluation of the Wallkill River Watershed

The Wallkill River Watershed is monitored at 5 mainstem locations and 1 tributary (Beaver Run). Data were collected primarily in 1990 and 1998. Based on these two sample events, benthic communities that were not impaired in 1990 declined to moderate impairment by 1998 or remained moderately impaired over this time period. (NJDEP, 1999). See Figure 3.3-2 and Table A3.3-2: Benthic Macroinvertebrate Status and Trends in WMA02 in the Appendix for additional information.

As noted from the water quality discussion above, chemical water quality as measured by the Wallkill at Sussex location is very good. Habitat quality was evaluated in the 1998 sample event. All locations exhibited optimal or sub-optimal habitat scores; none were marginal or poor. Thus additional investigations are needed to evaluate potential cause(s) of this apparent decline in biological health. Potential causes include changes in flow (e.g., storms, drought, etc.), natural conditions (e.g., recent hatch). Also, it is possible that one or more contributing factors were not identified in the habitat assessment or water quality monitoring.

3.3.3 Lake Trophic Status in the Wallkill River Watershed

As shown on Figure 3.3-3, none of the Wallkill River Watershed lakes were monitored in the Clean Lakes Program.

3.4 Water Quality in the Papakating Creek Watershed

3.4.1 Chemical and Sanitary Water Quality in the Papakating Creek Watershed

The Papakating Creek is a major tributary to the Wallkill River and the Papakating Creek at Sussex water quality monitoring station (01367910) is located in FW2-Non Trout waters. See Figure 3.3-1 for a summary of water quality trends.

Dissolved Oxygen: Levels are significantly above the SWQS criteria for FW2-NT waters and no exceedences were identified between 1990 and 1997. An increasing (improving) trend was identified between 1985 and 1996 (USGS, 1999). These data indicate very good water quality with respect to dissolved oxygen.

Temperature: No violations of the upper criterion for non-trout waters. These data indicate very good water quality with respect to temperature.

Nutrients: Between 1990 and 1994, the Papakating Creek at Sussex showed elevated phosphorus, with 31% of samples exceeding the criterion for total phosphorus. However, a statistically significant downward trend (-0.006 mg/l per year) was identified between 1986 and 1995 (USGS, 1999). Between 1995 and 1997, 21% of the samples exceeded the SWQS criterion for total phosphorus. These data indicate marginal water quality with respect to total phosphorus. As shown on Figure 3.3-3, total phosphorus in bottom sediments was 520 mg/kg in the Papakating Creek at Sussex between 1990 and 1994.

Nitrate levels are well below the SWQS criterion and no statistically significant trends were identified (USGS, 1999). These data indicate very good water quality with respect to nitrate.

Bacteria: The Papakating Creek exhibited elevated bacterial levels and no statistically significant trends were identified (USGS, 1999). These data indicate poor water quality with respect to fecal coliform bacteria.

Heavy Metals: Between 1995 and 1997, metals levels were very low. Only one sample exhibited elevated lead in 1990. This sample was collected prior to implementation of improved sample collection and analysis techniques, and may be the result of sample contamination. Additional metals data are being collected through the 303d Evaluation Monitoring Program, described elsewhere in this report.

Summary: Water quality in the Wallkill River is very good for most parameters. However, elevated bacterial and phosphorus levels require additional attention. See Figure 3.3-1 and Table A3.3-1 in the Appendix for additional information on Water Quality Status and Trends in WMA02.

3.4.2 Biological Evaluation of Stream Water Quality in Papakating Creek Watershed

The Papakating Creek Watershed is monitored at 3 locations on the mainstem, 2 locations on the West Branch, and 3 locations on Clove Run. Data were collected primarily in 1990 and 1998. See Figure 3.3-2 and Table A3.3-2: Benthic Macroinvertebrate Status and Trends in WMA02 in the Appendix for additional information.

Based on these two sample events, benthic communities on the Papakating Creek mainstem remained not impaired in the headwaters, moderately impaired at Pellettown and declined from not impaired to moderately impaired at the basin outlet. Benthic communities on the West Branch of the Papakating Creek also remained not impaired in the headwaters and declined from not impaired to moderately impaired at the downstream end. One Clove Run station declined from not impaired to moderately impaired, while the other, sampled only in 1998, was not impaired. The downstream end of Clove Run remained moderately impaired. (NJDEP, 1999).

As noted from the water quality discussion above, chemical water quality as measured by the Papakating Creek at Sussex location is good, although the effect of elevated total phosphorus on benthic health is unclear. Habitat quality was evaluated in the 1998 sample event. All locations that were not impaired exhibited optimal habitat scores; moderately impaired locations exhibited optimal, sub-optimal and marginal habitat scores. Additional investigations are needed to evaluate potential cause(s) of moderate impairment and apparent decline in biological health. Potential causes include habitat alterations (e.g., siltation, erosion, etc.) changes in flow (e.g., storms, drought, etc.), natural conditions (e.g., recent hatch) and water quality (e.g., elevated total phosphorus or other factors).

3.4.3 Evaluation of Water Quality in Lakes: Trophic Status

As shown on Figure 3.3-3, Clove Lake was monitored in the Clean Lakes Program in 1983 and was classified as eutrophic due to elevated total phosphorus and chlorophyll a. This lake has a surface area of 35 acres and is used for recreation and swimming.

3.5 Surface Water Quality in the Black Creek (Pochuck) Watershed

3.5.1 Chemical and Sanitary Water Quality in the Black Creek Watershed

The Black Creek is monitored near Vernon, NJ (01368950), just below the NY border. This station is located in FW2-NT waters. See Figure 3.3-1 for a summary of water quality trends.

Dissolved Oxygen: Although median concentrations were 7.9 mg/l between 1995 and 1997, one sample exceeded the SWQS for DO (i.e., fell below 4 mg/l DO). No statistically significant trends were identified between 1986 and 1995 (USGS, 1999). Additional evaluation of diurnal DO is needed at this location. These data indicate marginal water quality with respect to dissolved oxygen.

Temperature: No violations of the upper criterion for non-trout waters and no statistically significant trends were identified between 1986 and 1995 (USGS, 1999). These data indicate very good water quality with respect to temperature.

Nutrients: Average levels of total phosphorus were low (0.04 mg/l TP) between 1995 and 1997. Additionally, decreasing trends (-0.003 mg/l per year) were identified between 1986 and 1995 (USGS, 1999). However, one sample collected between 1995 and 1997 exceeded SWQS criterion. These data indicate marginal water quality with respect to total phosphorus. As shown on Figure 3.3-3, total phosphorus in bottom sediments was 720 mg/kg in the Black Creek at Vernon between 1990 and 1994.

Levels of nitrate were significantly below the SWQS criterion and no statistically significant trends were identified between 1986 and 1995 (USGS, 1999). These data indicate very good water quality with respect to nitrate.

Bacteria: Exhibited elevated bacterial levels and no statistically significant trends were identified between 1986 and 1995 (USGS, 1999). These data indicate poor water quality with respect to fecal coliform bacteria.

Heavy Metals: Levels are at acceptable levels when compared to human health SWQS criteria. Additional metals data are being collected through the 303d Evaluation Monitoring Program, described elsewhere in this report.

Summary: The Black Creek near Vernon showed elevated bacteria and total phosphorus levels. In addition, levels of DO dropped below the minimum standard for protection of aquatic life in one sample event. These data indicate marginal water quality in the Black Creek near Vernon.

See Figure 3.3-1 and Table A3.3-1 in the Appendix for additional information on Water Quality Status and Trends in WMA02.

3.5.2 Biological Evaluation of the Black Creek Watershed

The Black Creek Watershed is monitored at 3 locations: on the mainstem, on Lake Lookout Brook and Waywayanda Brook. Data were collected at Waywayanda Brook primarily in 1990 and 1998; the other locations were sampled only in 1998. See Figure 3.3-2 and Table A3.3-2: Benthic Macroinvertebrate Status and Trends in WMA02 in the Appendix for additional information.

Black Creek and Waywayanda Brook both exhibited moderate impairment and sub-optimal habitat scores. Lake Lookout Brook exhibited a decline from not impaired in 1990 to moderate impairment in 1998, despite optimal habitat.

Water quality and habitat degradation may contribute to impairment in the Black Creek. Other potential contributing factors include flow alterations and natural factors. Additional investigations are needed to identify potential contributing factors to biological impairment at these locations in the Black Creek Watershed.

3.5.3 Lakes Trophic Status in the Black Creek Watershed

As shown on Figure 3.3-3, Lake Waywayanda was monitored in the Clean Lakes Program in 1991 and found to be eutrophic due to macrophyte growth. This 240 acre lake is located in Waywayanda State Park, and is used for recreation and swimming.

3.6 Impaired Waterbodies List

Section 303(d) of the Federal Clean Water Act requires states to identify waters that are not attaining surface water quality standards, despite the implementation of technology based effluent limits. Impaired waterbodies are ranked by considering the type, severity and spatial extent of the impairment, among other factors. Based on the ranking, high priority waterbodies are identified for TMDL development in the next two years. The 303d List is proposed and adopted in a public process (See Table A3.6-1 in the Appendix).

Impaired waterbodies have been identified using data sources identified above (i.e., chemical and sanitary water quality, benthic macroinvertebrate monitoring, Clean Lakes Program data and fish tissue studies). In addition, county data have also been used. The latest NJ Impaired Waterbodies List (303d List) was published in 1998. This list was based on 303d Lists published in 1992, 1994 and 1996 as well as a list of waterbodies suspected to be impaired by toxics developed in 1989 (i.e., the 304(l) List) and data collected through 1996.

Impaired waterbodies remain on the 303d List until new data show that the SWQS are currently being met or the basis for the listing is no longer applicable (e.g., change in SWQS criterion). Strategies to attain SWQS include development of TMDLs for chemical/ sanitary exceedences of SWQS, implementation of nonpoint source and stormwater management measures, land preservation, etc.

Federal implementing regulations for Section 303d are found at 40 CFR 130.7; NJ implementing regulations are found at N.J.A.C. 7:15-6. USEPA published proposed revisions to 40 CFR 130.7 in 1999, and these are expected to be adopted in 2000. USEPA proposed and

adopted an amendment to 40 CFR 130.7 that eliminates the requirement for states to submit a 2000 Impaired Waterbodies List. The intent was to encourage states to collect new data to evaluate listed waters and allow time for TMDL development. NJ is planning to propose revisions to state regulations in the Watershed Management Planning Rules in 2000. In addition, NJDEP and USEPA are establishing an Interagency 303d Technical Workgroup to jointly develop detailed 303d Listing and De-Listing procedures. Procedures will be available for public review and comment. These procedures will be used to evaluate data collected through 2001 to develop the 2002 Impaired Waterbodies List.

3.6.1 New Jersey's 1998 Impaired Waterbodies List

The 1998 303(d) List has been divided into three distinct parts: 1.) Waterways with Known Impairments; and 2.) Candidate Waters (Sub-Lists A and B). Waterways with Known Impairments (Sub-List 1) includes waterbodies with known current or historical exceedences of SWQS numerical criteria or use impairments. TMDLs are likely to be needed in these waterbodies.

There is some evidence of impairment but additional data are needed to evaluate Candidate Waters (Sub-List II). The results of additional evaluation will be used to identify appropriate management measures, including TMDL development as needed or to remove waters that are shown to be not impaired. This sub-list is further divided into two parts (A and B) based on the strength of evidence for water quality impairment.

Sub-List I: Waterways with Known Water Quality Impairment includes:

- Conventional pollutants and fecal coliform
- Lakes with confirmed water quality problems and Clean Lakes Program Phase 1 studies
- Waters with fish consumption advisories
- Other data collected using current QA/QC procedures

Sub-List IIA: Candidate TMDL Waters- Known Water Quality Impairment

- Severely impaired benthic macroinvertebrate locations

Sub-List IIB: Candidate TMDL Waters - Suspected Water Quality Impairment

- Metals and ammonia data (data age and data quality issues)
- Lakes with suspected water quality problems based on limited data
- Moderately impaired benthic macroinvertebrate locations

3.6.2 Impaired Waterbodies in WMA 02

Impaired waterbodies in included on the 1998 Impaired Waterbodies List for WMA 02 is provided in Table A3.6-1 in the Appendix. Chemical impairments are summarized on Table 3.6-1 below.

Table 3.6-1: 1998 Impaired Waterbodies List for WMA02 (chemical/ sanitary only)

Reach	Pollutants
Papakating Creek at Sussex	fecal coliform, total phosphorus
Black Creek near Vernon	fecal coliform, total phosphorus

Wallkill River at Franklin	temperature, fecal coliform, total phosphorus, arsenic, beryllium, cadmium, chromium, lead, mercury *
Wallkill River near Sussex	fecal coliform, total phosphorus, lead *
Wallkill River near Unionville	fecal coliform, total phosphorus, lead *
Note: metals are from 304(l) list and the stream reach, not specific monitoring location, is listed on 303d	

NJDEP is evaluating these impaired waterbodies to ensure that the TMDL project for WMA 02 addresses current water quality impairments. A review of the most recent 5 years of data was conducted to develop preliminary recommendations for TMDL planning. Results are provided in Appendix A3.6-2: Preliminary TMDL Parameter Recommendations for WMA02. These recommendations will be re-evaluated and finalized based on the results of 303d Evaluation Monitoring, which is described below.

3.6.3 303d Evaluation Monitoring

In order to focus TMDL development on waterbodies with current impairments, 303d Evaluation Monitoring is being conducted by NJDEP. This monitoring effort is currently focused on metals and conventional constituents in freshwater streams. In New Jersey and nationally, concerns regarding the quality of historical metals data have been raised. In addition, total recoverable metals data were compared to dissolved criteria for protection of aquatic life, potentially overestimating of exceedences of metals criteria. Therefore, clean sampling and analysis techniques are being implemented and total recoverable and dissolved metals data are being collected from waterbodies on the 1998 303d List. Results will be used to propose delisting, additional monitoring or TMDL development as appropriate. 303d Evaluation Monitoring for conventional constituents (nutrients, dissolved oxygen) is being used to define the spatial extent and severity of the problem to plan TMDL development. Flow data are also being collected to facilitate interpretation of results. The monitoring plan for WMA 02 is provided as Appendix Table A3.6-3.

Data from the 303d Evaluation Monitoring will be used to finalize the TMDL scope of work for stream water quality constituents and will be integrated into this Surface Water Quality Characterization and Assessment. Remaining impairments will be addressed through other venues.

3.7 Public Community Water Supply in WMA 02

In contrast to the large number of groundwater withdrawals for Public Community Supply Wells (PCSWs) in WMA 02 (Figure 3.7-1) there are only three permitted surface water intakes (i.e., Colesville, Morris Lake (2)) and three potable reservoirs (i.e., Rutherford Lake, Franklin Pond and Morris Lake.