STATE OF NEW MEXICO

SURFACE WATER QUALITY
10-YEAR MONITORING AND ASSESSMENT STRATEGY

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Disclaimer: As stated in the USEPA guidance document for this effort entitled *Elements of a State Water Monitoring and Assessment Program* (USEPA 2003), the intention of this document is to describe how the state's monitoring and assessment program will serve all water quality management needs and address all state surface waters over time. Although states are required to prepare a strategic program in a 10-year time frame (2010 – 2019), this document should be considered a "living document" to be periodically updated as New Mexico's monitoring and assessment program, associated funding and staff levels, and state priorities change or evolve over time. Please also note that several of the state references noted in this document are prepared annually or biannually, so it is important to check the website for the most recent version:

http://www.nmenv.state.nm.us/swqb/MAS/

1.0 MONITORING AND ASSESSMENT STRATEGY

1.1 Program Background

The New Mexico Water Quality Act (WQA) was developed to protect water quality in New Mexico in 1967. In 1978, the New Mexico Legislature revised the WQA, which became the basic authority for water quality management in New Mexico (Sections 74-6-1 *et seq*., NMSA 1978). This law expanded the duties and powers of the New Mexico Water Quality Control Commission (WQCC). These duties include adoption of water quality standards and the adoption of regulations "to prevent or abate water pollution in the State or in any specific geographic area or watershed of the state...or for any class of waters." Under this WQA, water is defined as "all water including water situated wholly or partly within, or bordering upon, the state, whether surface or subsurface, public or private, except private waters that do not combine with other surface or subsurface water." The WQCC is the State water pollution control agency for all purposes of the federal Clean Water Act (CWA) and may take all necessary actions to secure the benefits of the WQA.

Under the authority of the WQA, the WQCC has adopted a basic framework for water quality management in New Mexico. Major components of this framework include the State Water Quality Management Plan and Continuing Planning Process, the Nonpoint Source (NPS) Management Program, the State, surface water quality standards (WQS) (20.6.4 NMAC), regulations for discharge to surface waters, the regulation of disposal of refuse in watercourses, a spill-cleanup regulation and utility operators regulations. Since the WQCC has no technical staff, responsibilities for water quality management activities are delegated to constituent agencies, primarily the New Mexico Environment Department (NMED). Responsibilities for water quality management activities involving surface waters are delegated to NMED's Surface Water Quality Bureau (SWQB).

1.2 Program Goals

SWQB is responsible for the management of programs to protect and improve the quality of New Mexico's surface waters. Specifically, SWQB's mission is:

> *To preserve, protect and improve New Mexico's surface water quality for present and future generations through implementation of the New Mexico Water Quality Act, the federal Clean Water Act and their attendant rules and regulations* (NMED/SWQB 2009a).

The intent of SWQB's monitoring and assessment activities is to answer the following five questions, in order to meet federal (USEPA 2003) and state requirements:

1. *What is the overall quality of waters in the state?*
2. *To what extent is water quality changing over time?*
3. *What are the problem areas, and which areas need protection?*

4. *What level of protection is needed? and,*
5. *How effective are CWA projects and programs?*

The purpose of SWQB's monitoring and assessment program is to meet all surface water quality management needs to the extent possible given available resources, NMED priorities, and strategic goals. The primary waterbody types currently monitored by SWQB's ambient water quality monitoring program include streams, rivers, lakes, reservoirs, and wetlands. The NMED Ground Water Quality Bureau (GWQB) is charged with protecting ground water quality in New Mexico. The GWQB does not currently have an ambient monitoring program, but monitors groundwater in response to citizen complaints and during periodic sampling inspections at permitted facilities. To further meet the goals of the Clean Water Act, the SWQB is in the process of developing its monitoring and assessment program for wetlands through funding received from the USEPA. The SWQB recognizes that an essential task of a successful wetlands program is the development of an effective monitoring strategy. It is a goal of the SWQB to complete all elements required for a monitoring and assessment program for wetlands by 2016.

SWQB's statewide monitoring and assessment efforts provide for the evaluation of all watersheds in New Mexico on a rotational basis and attempt to prioritize data collection needs based on addressing the five questions noted above using available resources. This monitoring and assessment program is partially based on the USEPA/NMED Memorandum of Understanding that was developed to implement the consent decree between USEPA and Forest Guardians/Southwest Environmental Center (US District Court 1997). The consent decree sets forth a ten-year schedule for developing Total Maximum Daily Load (TMDL) planning documents for assessment units noted as Category 5A on the *State of New Mexico Integrated CWA §303(d)/305(b) List of Impaired Waters* (Integrated List). The most recent approved version of the list at the time of this revision (USEPA approved February 2009) is the 2008-2010 Integrated List (NMED/SWQB 2009b). Surface water quality data collected during these rotational water quality surveys are primarily used to implement the general framework for identifying and restoring impaired surface waters (**Figure 1.1**).

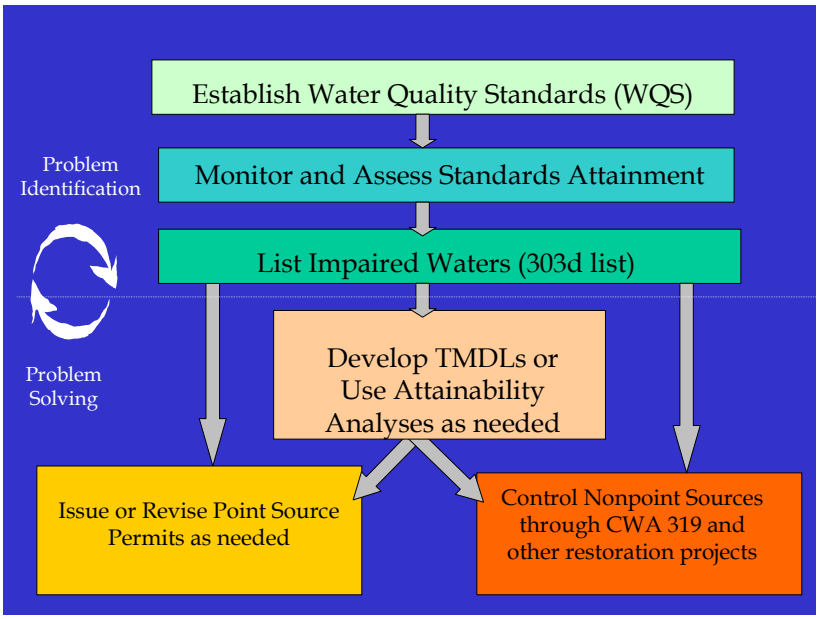

Figure 1.1 General framework for identifying and restoring polluted waters

1.3 Program Coordination

SWQB coordinates with several entities during development and implementation of water quality monitoring activities. During survey development, SWQB holds a pre-survey monitoring meeting in the watershed to solicit comment and concerns from public as well as local, state, or federal agency stakeholders working in the watershed. This information is used to finalize draft sampling plans that are developed in accordance with the SWQB quality assurance project plans that are prepared in accordance with U.S. Environmental Protection Agency (USEPA) guidelines prior to every field season. Standard operating procedures (SOPs) are followed during the survey to ensure consistent, quality collection and handling of samples (NMED/SWQB 2007). SWQB also coordinates with tribal environmental professionals throughout the state, and has provided technical assistance workshops related to monitoring when requested to assist tribes in the development of monitoring programs.

SWQB coordinates with the public at large via solicitations for comment on a variety of documents related to monitoring and assessment, including assessment protocols used to determine designated use impairment status for the Integrated List (NMED/SWQB 2009b). SWQB also solicits comments on general sampling procedures and specific assessment protocols related to narrative standards through groups such as the Regional Technical Assistance Group (RTAG) and counterparts at USEPA Region 6 in Dallas, TX. SWQB holds a yearly coordination meeting with the U.S. Forest Service (USFS) to discuss monitoring, restoration strategies, and TMDLs that cover USFS land management areas. SWQB is also an active participant in a number of multiagency working groups including the Middle Rio Grande Water Quality Workgroup, the Middle Rio Grande Endangered Species Act Collaborative Program, and the Rio Grande Salinity Coalition.

To coordinate the development of the monitoring strategy for wetlands, the SWQB has established a wetlands monitoring program planning team. This team is comprised of staff from several sections within the SWQB who have diverse areas of expertise that include water chemistry, macroinvertibrate biology, and data management and quality assurance. This team will also coordinate and receive assistance and input from other state and federal regulatory, resource and land management agencies throughout New Mexico.

1.4 Overall Program Future Direction

The future direction for each element of the entire program is discussed in the appropriate "Future Direction" section. To summarize, SWQB's overall strategic future directions are:

- Continue to refine the current monitoring methods and assessment protocols for wadeable streams,
- Develop monitoring methods and assessment protocols for non-wadeable rivers,
- Revise monitoring for lakes and reservoirs based on lessons learned from the National Lakes Survey,
- Clearly document assessment protocols for lakes and reservoirs, and
- Complete the development of monitoring methods and assessment protocols for wetlands by 2016.

2.0 MONITORING OBJECTIVES

Clear goals and objectives are required to implement an effective monitoring and assessment program. Therefore, the first step in developing this strategy is defining a clear set of water quality management needs. These goals and needs, which must be met to address the five questions identified in section 1.2, can be placed into the following broad monitoring categories:

1. Determination of designated use attainment,
2. Status and trend monitoring,
3. Monitoring for TMDL development,
4. Monitoring for standards refinement,
5. Effectiveness monitoring,
6. NPDES permit compliance evaluation and WQS compliance monitoring, and
7. Wetlands monitoring and assessment.

2.1 Determination of Designated Use Attainment

The primary monitoring function of MAS is to identify impaired waters that do not support the designated uses identified in NM's surface water quality standards (*Standards for Interstate and Intrastate Surface Waters* -- 20.6.4 NMAC[1]). Several SWQB-developed documents provide additional detail on this aspect of the monitoring program. Pursuant to CWA §106(e)(1), the SWQB has established appropriate monitoring methods (NMED/SWQB 2007), quality assurance/quality control (QA/QC) procedures (NMED/SWQB 2009a&c), and assessment methodologies (NMED/SWQB 2009d) in order to compile and assess the quality of the surface waters of New Mexico.

Similar to many other states, SWQB uses a rotating basin approach to target water quality monitoring. Using this approach, a select number of watersheds are monitored each year with an established return frequency of approximately every eight years. The proposed rotational schedule (described in section 3.1) was developed based on the date of the last survey, number of assessment units in each watershed, as well as the number of perennial stream miles, NPDES permits, and active 319 projects that are in each watershed. Revisions to the schedule may be occasionally necessary based on staff and monetary resources that fluctuate on an annual basis.

Data from this targeted sampling effort are assessed in accordance to SWQB's assessment protocols (NMED/SWQB 2009d). All summary assessment data, including probable causes and sources of impairment, are housed in the USEPA-developed Assessment Database version 2 (ADB v.2) (RTI 2002). Use attainment decisions are then summarized in Appendix A of the *State of New Mexico Integrated CWA §303(d)/305(b) Report* (Integrated Report) (NMED/SWQB 2009b). Starting with the 2004 submittal, SWQB switched from two separate submittals to one integrated report and list in accordance with USEPA guidance (USEPA 2002 and 2009). This report is prepared every even numbered calendar year as required by the CWA. Category 5 assessment units on this Integrated List constitute the *CWA §303(d) List of Impaired Waters* (NMED/SWQB 2009b).

[1] The water quality standards in effect for CWA purposes are identified on EPA's website: http://www.epa.gov/waterscience/standards/wqslibrary/nm/index.html.

2.2 Status and Trend Monitoring

The rotating basin monitoring effort is supplemented with other data collection efforts such as the funding of long-term U.S. Geological Survey (USGS) water quality gaging stations for long-term trend data. The SWQB, USGS, and other cooperators such as the Office of the State Engineer, U.S. Bureau of Reclamation, and City of Albuquerque fund approximately twenty ambient water quality monitoring stations that comprise the state's long-term water quality surveillance network. This is a reduced number of sites (it was over 30) as state budget cuts in FY10 reduced the available funds for this program from $123,400 to $80,000.

This monitoring program was designed with longer monitoring time frames (20+ years) and lower site densities per watershed than the rotating basin monitoring program (**Figure 2.1**). The stations are located on the major river and stream systems of New Mexico, as well as various perennial tributaries. The New Mexico Legislature provides annual funding for this cooperative monitoring effort and this funding is matched by the USGS. As long as funding is available, SWQB will continue to work with the USGS to determine long-term water quality trends on New Mexico's rivers and streams.

The stations included in the fixed-station network are reviewed annually to determine consistency with future water quality data needs. The types, number, and frequencies of sampling change every year in anticipation of upcoming data requirements. Data from the fixed USGS stations are also combined with data collected during SWQB's regular watershed surveys to characterize water quality of the major stream systems in a network of sampling sites across New Mexico, to provide data to determine long-term water quality trends, and to determine designated use support.

2.3 Total Maximum Daily Load Development

Water quality data requirements have increased due to the need to develop TMDL planning documents in compliance with schedules set forth in the TMDL consent decree and settlement agreement (U.S. District Court 1997). Unlike some other states, New Mexico does not develop and implement separate TMDL studies except in special circumstances when funding and staff resources allow. Instead, the data that are collected during a watershed survey form the basis of designated use attainment status as well as any subsequent TMDL development. Accordingly, this dataset is used to develop TMDL planning documents for impaired assessment units identified in the Integrated Report. Since TMDLs are written on an assessment unit (AU) basis, TMDL effectiveness monitoring occurs as SWQB rotates back to a particular watershed and assesses AUs within the watershed. As such, SWQB will still perform targeted monitoring of AUs with existing TMDLs.

2.4 Water Quality Standards Development and Refinement

SWQB provides technical support to the WQCC for the development and refinement of appropriate water quality standards designed to protect surface waters in New Mexico. Data collected during watershed surveys, as well as data from USGS gages and other reliable sources, are used to prepare for triennial reviews of state water quality standards, conduct use attainability analyses (UAAs), and develop and adopt revised designated uses and associated water quality

criteria. In the past, when funding was available, SWQB applied for and received research oriented grants to further the development of narrative nutrient criteria, biocriteria, and associated numeric translators and assessment protocols.

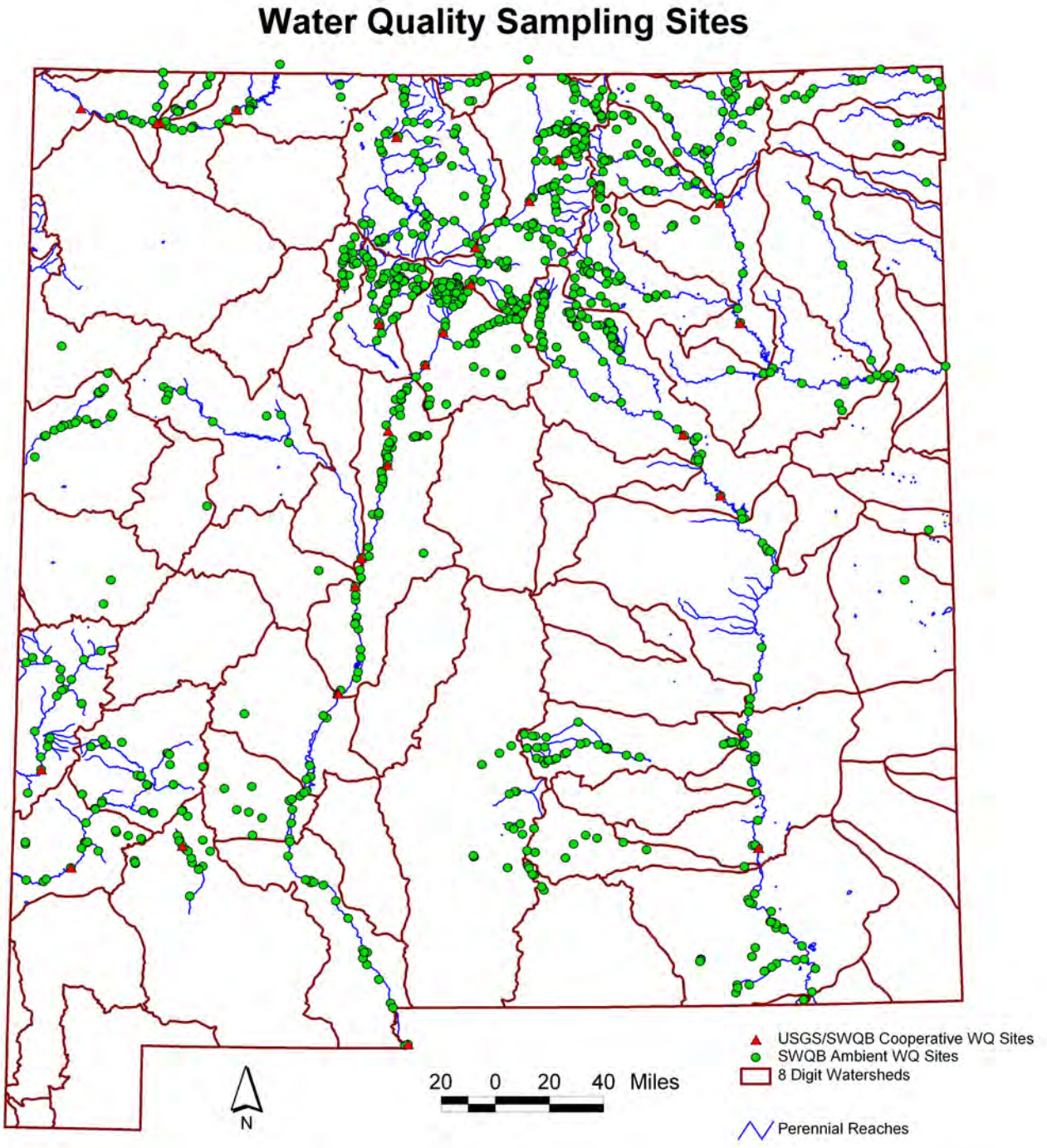

Figure 2.1 Water quality sampling sites in New Mexico

2.5 Effectiveness Monitoring

SWQB established an Effectiveness Monitoring Program in 2008 with the goal of documenting water quality changes resulting from projects implemented with incremental CWA §319 funds. An Effectiveness Monitoring coordinator was hired within the SWQB Watershed Protection Section (WPS) to implement the program.

The Effectiveness Monitoring Program is being conducted in accordance with each Project-Specific Quality Assurance Project Plan (PQAPP). Each project area is typically monitored for changes in water quality both upstream and downstream, and before and after implementation.

Effectiveness monitoring will be carried out within selected project areas every year for at least five years. In many cases a series of projects will result in a longer-term monitoring effort. When the Monitoring and Assessment Section (MAS) conducts a water quality survey in the area the survey will be tailored to supplement the effectiveness monitoring dataset, in compliance with the Quality Management Plan (NMED/SWQB 2009c).

2.6 NPDES Compliance Monitoring

A variety of mechanisms including state, federal and/or local components to protect New Mexico surface waters from point-source discharges from municipal and non-municipal (i.e., industrial, state, and federal) sources. The principal mechanism is the federal NPDES permit program. Under this program a permit specifies the total amounts and concentrations of contaminants that a permittee may discharge to a watercourse. While NPDES permits for discharges in New Mexico are currently issued and enforced by the USEPA Region 6 office in Dallas, Texas, New Mexico plays a role in this permit program. NMED is statutorily charged with responsibility for certification of NPDES permits and receives grant money from USEPA to assist with the administration of the NPDES permit program. As of January 2010, 116 individual NPDES permits are currently issued to dischargers in New Mexico (**Figure 2.2**). In addition, USEPA has issued four general NPDES permits in New Mexico.

The Point-Source Regulation Section (PSRS) of SWQB assists USEPA in administering the NPDES permit program by reviewing self-monitoring data submitted by many NPDES permittees, providing program information and training to the public and permittees, and conducting inspections of regulated facilities. According to USEPA policy, all active permitted facilities classified as major, whether municipal, non-municipal, or federal, should be inspected annually by either USEPA or the PSRS. Since neither USEPA nor the PSRS has resources to inspect every minor discharger each year, the PSRS uses a priority list to allocate inspection efforts among minor facilities. The priority list is based mainly on the date of last inspection — those facilities that have gone the longest without inspection receive a higher priority. Inspections at minor facilities are also prioritized based on a number of other factors. These include: citizen complaints, specific requests from USEPA, and proximity to the above major and traditional minor facility inspection locations

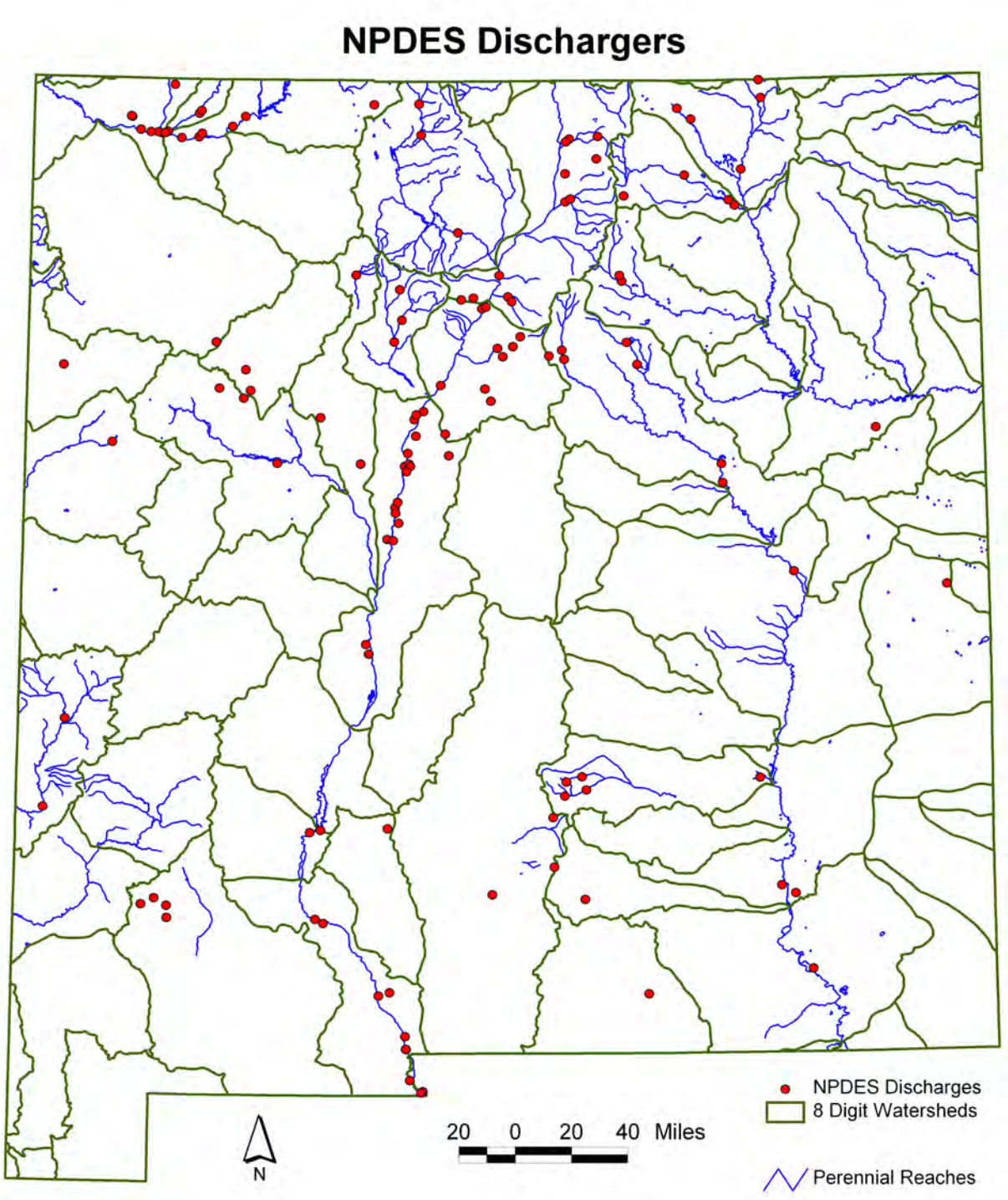

Figure 2.2 Active NPDES Permit Locations in New Mexico (January 2010)

2.7 Wetlands Monitoring and Assessment

The primary mission of the SWQB Wetlands Program is to protect existing wetlands, restore degraded wetlands, and expand wetland acreage in New Mexico. The goal of the monitoring and assessment program for wetlands is to provide the information necessary to: create a baseline inventory and condition of existing wetlands, facilitate wetland protection, develop water quality standards for wetlands, assess wetland mitigation activities and monitor wetland restoration activities for efficacy. To achieve these goals the SWQB has developed the following objectives:

- Develop a Rapid Assessment Methodology for New Mexico (NMRAM) for a range of environments and wetland types.
- Establish a baseline inventory map of wetland resources until all mapping in New Mexico is complete.
- Develop a ranking of the condition of existing wetlands.
- As resources permit, initiate wetlands monitoring to coincide with the current statewide water quality monitoring schedule.
- Coordinate with non-NMED agencies such as the NMDOT and the USACE on the implementation of the NMRAM as a standard monitoring tool to assess mitigation activities.
- Utilize NMRAM as part of a monitoring tool to assess wetland restoration activities.
- Utilize the information gathered from the monitoring effort to propose wetland specific state water quality standards to the NM WQCC by 2016.

Critical to achieving these objectives is the development of the NMRAM. The NMRAM will focus on Level 1 and Level 2 rapid assessment methods as outlined by the USEPA in the guidance document *Elements of a State Water Monitoring and Assessment Program for Wetlands* (USEPA 2006). The NMRAM is in the second phase of development with the collection, analysis, and validation of the method that is focused on the Upper Rio Grande region in New Mexico. This version of the manual is being developed with the intention of developing protocols and metrics for a relatively small range of environments and wetland types, testing and modifying those metrics and protocols as needed, and modifying and applying the same approaches and protocols to address other wetland classes and subclasses throughout New Mexico. In addition, the SWQB Wetlands Program continues to coordinate with the USFWS to complete baseline inventory mapping of all wetlands throughout New Mexico.

2.8 Future Direction for Monitoring Objectives

#	Future Objectives
1	Refine current monitoring and assessment methods for more reliable determination of use attainment in New Mexico's surface waters.
2	Establish a stormwater program to include sampling methodologies and assessment protocols specific to stormwater and/or intermittent and ephemeral streams.
3	Increase number of long-term USGS stations to historic levels in order to continue to examine long-term trend data across the state.
4	Expand lake monitoring and assessment to provide the data necessary for lake TMDL development.
5	Implement special studies to investigate aluminum, radionuclides, bacteria, and/or PCB (as well as other priority pollutants) levels across the state to develop or refine appropriate water quality standards designed to protect surface waters in New Mexico.
6	Increase NPDES permit compliance evaluations to assist USEPA in administering an effective permit program that protects surface waters of the state.
7	Monitor wetlands. Assessment of wetland conditions for the unconfined mid-elevation montane riverine subclass wetlands of the Upper Rio Grande watershed in 2011 using NMRAM. Level 1 assessment of wetlands in the Upper Canadian Watershed by 2013.

Specific tasks scheduled to enhance this element of the Monitoring Strategy are detailed in the timeline in **Appendix A**.

3.0 MONITORING DESIGN

New Mexico's monitoring program integrates targeted and fixed-station sampling designs to address the monitoring objectives and questions identified in sections 1.2 and 2.0. SWQB believes that this is the most efficient combination of monitoring designs, given current funding, to meet these objectives.

3.1 Targeted Approach

Similar to most states, SWQB utilizes a targeted, rotational watershed approach to ambient water quality monitoring. This approach best serves New Mexico's monitoring objectives given the current level of financial and staff resources. This integrative watershed approach enhances program efficiency by providing:

- A systematic review of water quality data and allows for more efficient use of human and budget resources;
- Information at a spatial scale where implementation of corrective actions is feasible; and
- An established order of rotation and predicted sampling year for each watershed, which allows easier coordination efforts with other programs and other entities interested in water quality.

Watershed surveys are developed through establishment of targeted sampling sites throughout a watershed of interest. Survey leads and co-leads strive to collect all necessary chemical, biological, and physical data during the survey year. Pre- and post-survey meetings are held with other SWQB personnel working in the watershed, including PSRS, WPS, and TMDL staff. In general, SWQB establishes at least one sampling station in an assessment unit (median reach length is 8.9 miles) and two stations for each lake/reservoir. Exact sample site location, sampling frequency, and type of data collected are determined so as to allow determination of compliance with or variance from New Mexico surface water quality standards. This information is detailed in the QAPP (NMED/SWQB 2009a). This is an adaptive, on-going management approach, meaning a watershed will not be ignored between survey years. The proposed 8-year rotational monitoring schedule is shown in **Figure 3.1** (see **Figure 2.1** for SWQB station locations).

Given the current level of financial and staff resources, SWQB considers the targeted approach the best approach to meet New Mexico's monitoring objectives primarily because New Mexico is a large state with relatively little perennial water. SWQB has fundamentally censused the perennial waters of the state during its targeted, rotational watershed surveys (**Tables 3.1 and 3.2**). Approximately 97% of perennial stream miles have been assessed and 81% of public lake acres have been assessed to date, including 99.6% of New Mexico's large, mainstem reservoirs. The targeted approach supplemented with fixed stations and SWQB long-term monitoring sites (e.g. ecoregional reference sites) has proven effective at making broad statements regarding the status of the State's waters and fulfills the monitoring objectives discussed in Section 2.

For these reasons, SWQB will continue to use the targeted approach when designing water quality surveys. At this time, SWQB plans to use probabilistic sampling on a limited basis for evaluating WQS, researching statewide conditions to assist with the development of new WQS, and evaluating proposed regional biocriteria, as needed. SWQB is committed to continuing to evaluate ways to incorporate probabilistic monitoring into the overall monitoring strategy given the adequate resources to do so.

Table 3.1 Percentage of perennial stream miles assessed in New Mexico

Reach Order	Stream Miles	Miles Assessed+	% Assessed
1	555	541	97.5%
2	1388	1352	97.4%
3+	4646	4523	97.4%
TOTAL	**6589**	**6416**	**97% of perennial stream miles assessed!**

+ For assessment, streams are divided into AUs which have a median length of 8.9 miles. Typically there is only one monitoring station per AU and each station is sampled 4 to 8 times during a watershed survey depending on the location and parameter.

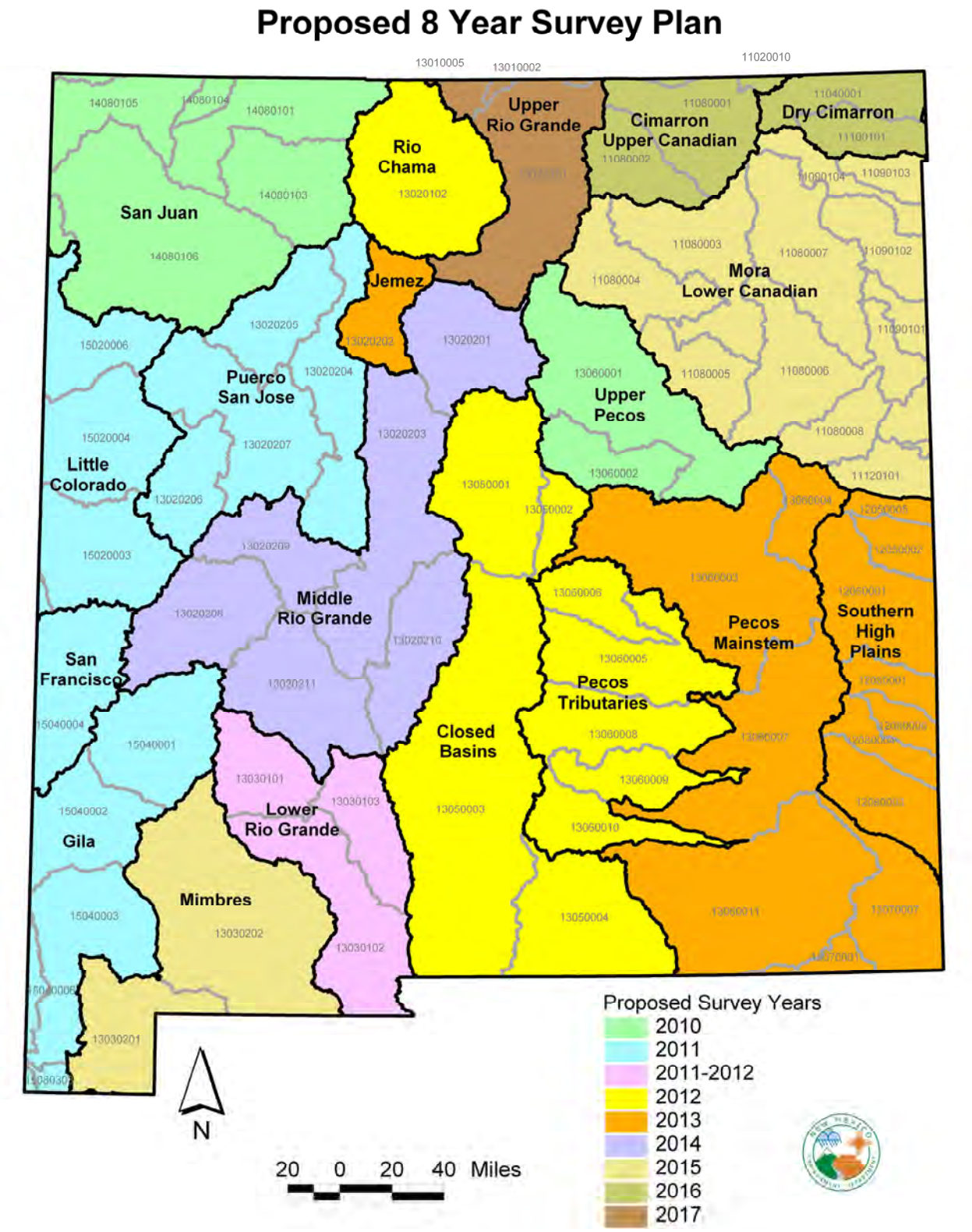

Figure 3.1 Proposed 8-year rotational schedule

Table 3.2 Percentage of perennial lake and reservoir acres assessed in New Mexico[+]

Lake Type	# of Lakes/Reservoirs	Lake Acreage	Acres Assessed[^]	% Assessed
Large Reservoirs (>100 acres)	31	81,926	81,636	**99.6%**
Small Reservoirs (<100 acres)	72	1,641	1,022	62.3%
Cirque Lakes[*]	45	171.4	6.0 (+ 28.9 acres visited)	3.5%
Sinkholes[*]	10	176.5	2.2 (+ 169.2 acres visited)	1.3%
TOTAL	**158**	**83,915**	**82,666**	**98.5% of lake acres assessed!**

+ Data were taken from the U.S. Geological Survey's (USGS) digital graph.
* Five cirque lakes and five sinkholes were studied in 2006 and 2007 for SWQB's nutrient criteria development program. Most of these lakes were visited once during the field season and were not assessed. However, data was collected and information was gained from those site visits.
^ For assessment each lake/reservoir typically has two sampling station samples which are sampled three times during a survey.

3.2 Fixed Station

As mentioned in Section 2.2, the USGS, SWQB, and other cooperators such as the Office of the State Engineer, U.S. Bureau of Reclamation, and City of Albuquerque fund approximately twenty ambient monitoring stations that comprise the state's long-term water quality surveillance network. These USGS stations are located on the major stream systems of New Mexico, and support a variety of projects across the state (see **Figure 2.1** for USGS WQ gage locations).

3.3 Probabilistic Design

USEPA has encouraged states to incorporate probabilistic sampling designs into their monitoring programs to enable states to generate statistically sound conclusions regarding the overall state of water quality. Although probabilistic-based monitoring can allow states to reach conclusions about surface water quality status as a whole, this type of monitoring cannot tell the state which specific water bodies are impaired or where to target CWA §319(h) watershed restoration funds, and does not provide the targeted data necessary for TMDL development. Some states have begun to incorporate probabilistic monitoring into their core monitoring strategies, however a number of states continue to rely primarily on targeted sampling to answer these specific questions.

SWQB has experimented with probabilistic design through involvement in Regional EMAP in the Gila River and Chama River watersheds. In 2004, USEPA and TetraTech utilized a

probabilistic design to sample several sites in New Mexico as part of the Wadeable Streams Assessment (WSA) project. However, successful sampling of random stations in the semiarid west is challenging due to the large percentage of private land, lack of hydrologic maps that accurately indicate perennial vs. non-perennial waters, and access logistics. Even South Carolina has challenges when trying to implement probabilistic monitoring. According to the South Carolina Department of Health and Environmental Control, some of the biggest challenges were access to GIS coverages with accurate hydrologic data, logistics of access to site locations, and acceptability of sites. About half of the randomly chosen sites for South Carolina's probabilistic study were inaccessible. It can only be concluded that New Mexico would encounter the same or more extensive challenges as South Carolina primarily due to the local environment (semi-arid versus mesic), stream network (poorly-defined vs. clearly-defined dendritic network), and land area (one of the largest states vs. one of the smallest states).

SWQB does recognize that intermittent and ephemeral water bodies (including playa lakes) are critical water resources as well. While sampling of these waters has occurred (**Table 3.3**), SWQB has only limited information about the quality of these waters due to a lack of practical sample collection methods (at current resource levels) and appropriate assessment methodologies. At present, funds are not available to support the undertaking of appropriate monitoring or the development of assessment methodologies specifically for intermittent and ephemeral waters. If such methodologies are developed and funds become available the use of a probabilistic sampling design, especially for the large number of ephemeral streams in New Mexico, would be considered.

Table 3.3 Percentage of non-perennial waterbodies assessed in New Mexico[+]

	Stream Miles/ Lake Acreage	Miles/Acres Assessed	% Assessed
Streams[*]	96,319	533	0.5%
Playa Lakes[^]	24,991	5,455	21.8%

\+ Data are from the National Hydrography Dataset (NHD-plus) and should be considered rough estimates.
* Streams include both intermittent and ephemeral streams because NHD-plus does not distinguish between the two.
^ These figures represent a SWQB study conducted on 38 playa lakes in the 1990's. Data are old. Only 9 of these playas are perennial in nature. There are many more playa lakes in the State, however there are no datasets or GIS coverages to represent them. Therefore, these numbers should be considered low approximations.

3.4 Wetlands Monitoring

Wetlands monitoring is directed toward inventorying, classifying and assessing the condition of New Mexico wetlands with the objective of developing narrative wetlands water quality standards. The SWQB Wetlands Program uses U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps as its overall inventory of wetlands in New Mexico. The Wetlands Program has partnered with NWI to complete mapping in targeted areas of New Mexico for special projects. For example, in 2008 NWI completed mapping of playas in three southeastern New Mexico counties to complement the Wetlands Action Plans being develop in the region. In 2009, NWI completed mapping of wetlands in USFS Wilderness Areas for potential designation as Outstanding National Resource Waters (ONRW). The SWQB Wetlands Program has initiated inventory and mapping of wetlands in the Canadian River Watershed in the

northeastern quadrant of the state. This effort will utilize the landscape position, landform, waterflow path, and waterbody type mapping descriptors developed by Tiner (2003).

The SWQB Wetlands Program classifies wetlands into regional wetland subclasses based on hydrogeomorphic (HGM) classification developed by Brinson (1993). The objective of classification is to identify groups of wetlands that are relatively homogeneous in terms of structure, process, and function. New Mexico wetland rapid assessment methods (NMRAM) have evolved to combine aspects of both bioassessments and HGM assessments. Rapid assessments are based upon three basic principals: 1) assessments are relative to existing conditions only, 2) the method is rapid such that two people can complete the field assessment and data analysis for the assessment in one day, and 3) the assessment is based primarily on observed field conditions.

To achieve the objectives outlined in Sections 1.2 and 2.7, wetlands monitoring will primarily utilize a targeted sampling design in conjunction with the NMRAM. The Wetlands Program will develop a Vegetation Index of Biotic Integrity to validate the results of NMRAM. This methodology will also use targeted sampling designs in order to assess a range of conditions. SWQB Wetlands Program staff will participate in pre- and post-survey meetings to integrate wetlands sampling sites with other water quality sampling sites so that resources, data and results can be shared. As funds become available, wetlands condition assessment (NMRAM) will follow the rotational watershed approach developed by SWQB.

3.5 Future Direction for Monitoring Design

#	Future Initiatives
1	Strive to incorporate probabilistic sampling design into yearly monitoring efforts.
2	Shorten the assessment return interval to a 5-year rotational cycle.
3	Increase lake and reservoir monitoring in order to prepare for subsequent TMDL development.
4	Pursue grant funding for special studies to research harmful algal blooms, pharmaceuticals, radionuclides, fish tissue contaminants, salinity, bacteria, and/or PCB levels on ecoregion and statewide levels.
5	Increase number of samples for the stream, river, and lake programs to improve confidence in data evaluation.
6	Implement special monitoring for unique resources such as Outstanding National Resource Waters (ONRWs) and intermittent/ephemeral waters.

Specific tasks scheduled to enhance this element of the Monitoring Strategy are detailed in the timeline in **Appendix A**.

4.0 CORE AND SUPPLEMENTAL WATER QUALITY INDICATORS

4.1 Core Water Quality Indicators

SWQB's ambient monitoring program utilizes a core set of essential water quality indicators (**Table 4.1**). This core set of indicators covers as many parameters with specific criteria as possible given available resources. Generally, MAS strives to collect samples for all parameters for which there are applicable standards while taking into consideration budgetary and laboratory constraints. Data from these analyses are housed at:
http://www.epa.gov/earth1r6/6wq/ecopro/watershd/monitrng/toxnet/nm.pdf.

Survey leads and watershed team members consider existing and designated uses assigned to each assessment unit, and current land use practices, when determining additional indicators for a particular study. SWQB has chosen the following core indicators for surface water. Each core indicator must be sampled at least two times, and are generally sampled 4 to 8 times, during a watershed survey to make a determination of use attainment. Generally, sampling efforts are scheduled once a month for eight months between March and October to capture seasonal variation and to ensure an adequate number of sampling events for assessment purposes.

Table 4.1 Core indicators for surface waters

Designated Use	Parameters
Aquatic Life[1]	- Dissolved oxygen, , pH, specific conductance and turbidity (5-8 day sonde deployment, generally in late summer and fall) - Temperature (minimum 30-day thermograph summer deployment) - Total nutrients[2], total metals[3], dissolved metals[4], hardness -Flow (if a stream) and depth (if a lake)
Primary or Secondary Contact	*Escherichia coli* and pH
Domestic Water Supply	Total nutrients[2], total metals[3], dissolved metals[4], radionuclides[5], and organics[6]
Irrigation	pH, dissolved metals[4], TDS/TSS, hardness, chloride, and sulfate
Livestock Watering	Total nutrients[2], total metals[3], dissolved metals[4], and radionuclides[5]
Wildlife Habitat	Total metals and cyanide
Human Health	Dissolved metals[4] and organics[6]

1 Parameters collected for aquatic life use are also used to assess narrative standards such as biological integrity, bottom deposits, plant nutrients, and turbidity.
2 Total Nutrients include nitrate + nitrite, ammonia, total Kjeldahl nitrogen, and total phosphorus.
3 Total metals include mercury and selenium at a minimum.
4 Dissolved metals include aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, uranium, vanadium, and zinc.
5 Radionuclides generally include gross alpha/beta and Ra-226 + Ra-228.
6 Organics include base/neutral acid extractables (Method 8270) and volatile organic compounds (Method 8260).

4.2 Core Biological Indicators

SWQB measures biological indicators of water quality at selected sites when core indicators indicate reasonable probability impairment or to support special studies. Core biological indicators may include:

- Benthic macroinvertebrate collection (during index period – August through November), identification, and enumeration
- Fish survey (during index period), identification, and enumeration
- Nutrient survey (during index period) to include chlorophyll *a*, ash free dry mass, and periphyton community composition
- EMAP habitat survey (during index period) to include physical habitat data such as substrate composition, geomorphology, and riparian health assessments
- Fish tissue samples for updates to fish consumption advisories

4.3 Supplemental Indicators

SWQB identifies additional supplemental indicators on a case-by-case basis when there is a reasonable probability that a specific pollutant may be present in a watershed. Supplemental indicators may include emerging contaminants and issues of public concern including pesticides, pharmaceuticals and surfactants.

4.4 NPDES Effluent Monitoring and Compliance Sampling Inspections

Either USEPA Region 6 or NMED SWQB PSRS may collect samples to determine compliance for enforcement purposes, particularly any of the priority pollutants that may have been detected or suspected in effluent discharges. If priority pollutants are detected by SWQB or shown in §308 priority pollutant scans provided by USEPA Region 6, the presence of these parameters can be specifically targeted in downstream ambient waters. During facility compliance sampling inspections, effluent samples are collected for selected parameters specified in the facility NPDES permit and related parameters or parameters of future concern. Table 2.2 in the SWQB QAPP provides a general summary of the parameters commonly sampled for compliance monitoring purposes. Sampling frequency is once per compliance sampling inspection event and the number of samples taken is one for all parameters except bacteria and polychlorinated biphenyls (PCBs), which have a 2 sample and 3 sample protocol, respectively. Any deviations from the generalized sampling plan set forth in Table 2.2 are documented during the NPDES permit compliance sampling inspection (NMED/SWQB 2009a).

4.5 Wetland Indicators

The NMRAM will employ a variety of core indicators (metrics) to assess New Mexico's wetlands (**Table 4.2**). These metrics are applicable across a wide range of wetland types, and can be measured using a combination of remote sensing/spatial analysis approaches (Level 1) and/or direct on-the-ground semi-quantitative measurements (Level 2). The draft NMRAM contains an

assessment protocol for each of the metrics associated with the four core indicators (landscape context, abiotic characteristics, biotic characteristics, and wetland size).

In addition, the NMRAM will use stressor checklist metrics to identify stressors that could affect wetland condition. A stressor is defined as an anthropogenic perturbation within a wetland or its environmental setting that is likely to negatively impact the condition and function of a wetland. The checklists identify the likely anthropogenic causes for poor wetland conditions (Faber-Langendoen 2008). The lists of potential stressors correspond to the main attributes of wetland condition. It is therefore possible to gain an understanding of why a wetland may deviate from the reference condition.

Table 4.2 Core indicators for wetlands

Core Indicator	Main Attribute	Metrics
Landscape Context	Landscape Structure	Landscape Connectivity Buffer Integrity Index
	Landscape Composition	Surrounding Land Use
Abiotic Attributes	Hydrology	Channel Stability Hydrologic Connectivity Macrotopographic Complexity Water Source
	Physical Structure	Topographic Cross Section Stream Bank Stability / Cover Soil Surface Condition
Biotic Attributes	Vegetation Structure	Vegetation Horizontal Patch Structure Vegetation Vertical Structure
	Community Composition	Relative Native Canopy Cover Native / Exotic Plant Richness Invasive-Exotic Plant Cover Tree Species Regeneration
Wetland size	Wetland Size	Absolute Patch Size

As NMRAM is developed and tested for various subclasses of wetlands throughout the state, supplemental indicators and metrics will be developed when class-specific indicators are warranted.

4.6 Future Direction for Water Quality Indicators

#	Future Initiatives
1	Update and enhance sample collection and analysis methods for core water quality and biological indicators (e.g. continuous data loggers, field probes, new bacteriological analysis methods etc.)
2	Develop various levels of habitat surveys depending on the objective (i.e., to determine potential sedimentation, to gather data for SSTEMP temperature model input, etc.) to increase efficiency and save resources.
3	Develop a set of core indicators for stormwater sampling of ephemeral and intermittent systems.
4	Monitor for emerging contaminants.
5	Add a second biological assemblage (e.g. periphyton or fish) for wadeable stream assessments.
6	Implement methylmercury and PCBs in fish tissue as core indicators.
7	Refine and expand numeric translators for nutrients, bottom deposits, turbidity, and biological integrity narrative standards.

Specific tasks scheduled to enhance this element of the Monitoring Strategy are detailed in the timeline in **Appendix A**.

5.0 QUALITY ASSURANCE

5.1 Quality Assurance Project Plan

The Quality Management Plan (QMP) and Quality Assurance Project Plan (QAPP) are developed, maintained, and annually reviewed and approved by the USEPA Region 6 office (NMED/SWQB 2009a&c). In 2004, SWQB separated out standard operating procedures into a companion Standard Operating Procedures (SOP) document and last updated the document in 2007 (NMED/SWQB 2007). Once reviewed and approved by USEPA, all documents are maintained on the SWQB website for access by staff as well as the general public. All monitoring activities are covered annually in the USEPA-approved QAPP. Generally, all chemical analyses of water and wastewater samples are performed by the State of New Mexico Department of Health - Scientific Laboratory Division (SLD). SWQB occasionally establishes contracts with outside laboratories if SLD cannot perform the needed analyses. All SWQB personnel involved with sampling are responsible for reading, understanding, and implementing procedures detailed in the QAPP and SOP. Survey leads and co-leads for stream and lake surveys are responsible for verifying that all data collected comply with the provisions of the QAPP prior to assessment and upload to EPA's national database.

In 2006, wetlands monitoring was incorporated into the Quality Management Plan and the Quality Assurance Project Plan for SWQB. For each wetlands restoration project undertaken as part of the SWQB Wetlands Program, a project-specific QAPP is produced and approved by USEPA Region 6 Wetlands technical staff to ensure scientific validity of monitoring activities. The SWQB Wetlands Program is in the process of employing hydrogeomorphic (HGM) assessment methods. Protocols for conducting data gathering will be selected based on their suitability for providing the information needed. As data gathering protocols are selected, they will undergo peer review and be incorporated into the SWQB SOP document.

5.2 Future Direction for Quality Assurance

SWQB undertook a major effort in 2004 to re-organize and expand the QAPP and associated QA data procedures in preparation for STORET uploads and to help identify potential data problems emanating from SLD reporting or SWQB's in-house database. SWQB strives to continue to design a QA process that provides confidence in the accuracy of the data without overburdening staff required to perform QA tasks. Some of the steps of the current QA process have been automated within the in-house WQ database.

#	Future Initiatives
1	Build additional automated QA tools into the in-house water quality database.
2	Continue open coordination and communication with SLD to address data problems.
3	Attempt to increase support for SLD in conjunction with the New Mexico Department of Health.

Specific tasks scheduled to enhance this element of the Monitoring Strategy are detailed in the timeline in **Appendix A**.

6.0 DATA MANAGEMENT

6.1 Ambient Water Chemistry Data

Beginning in 2000 SLD and SWQB began the electronic transfer of data. Samples are delivered to SLD along with a Request ID (RID). SLD sends results via email, along with appropriate metadata, to survey staff and the database manager. From 2000 through 2009 MAS staff used an in-house developed, MS Access-based WQ database to store chemical/physical data. Analytical data from SLD are uploaded to the current database using the RID to match data to the appropriate sample events. This database is specifically designed to receive SLD data, and includes flow data, photo links, QA tools, and mechanisms to track missing data (i.e., samples that were submitted to SLD but are pending results) to determine study completeness. This database also contains station and assessment unit rationales, is used to plan water quality surveys, estimates and tracks WTU usage at SLD, and generates Data Quality Objective reports for inclusion in the QAPP. Starting in 2010 MAS is switching to an Oracle-based database (NMEDAS) based on the EDAS2 database developed by TetraTech. This database maintains much of the functionality of the old database and handles biological datasets as well as chemical.

Once all data for the survey are received and all QA issues resolved, data are exported into MS Excel and prepared for upload to USEPA's national storage and retrieval system (STORET) or water quality exchange(WQX) databases (**Figure 6.1**). SWQB began uploading data to new STORET in 2003. Ambient toxicity monitoring data are housed by USEPA at: http://www.epa.gov/earth1r6/6wq/ecopro/watershd/monitrng/toxnet/nm.pdf.

6.2 Biological Data

Biological data, mainly benthic macroinvertebrate data, collected prior to 2010 was housed in the Ecological Data Application System (EDAS) developed by TetraTech and modified for New Mexico's specific needs. Use of EDAS enabled exploration of multiple years of benthic macroinvertebrate data during the beginning stages of biocriteria development and currently allows for the generation of metrics used as part of the current sedimentation and turbidity assessment processes. Starting in 2010, with the completion of the new oracle-based database, biological data, including fish, periphyton and macroinvertebrate, will be housed in NMEDAS enabling uploads to STORET/WQX.

6.3 Designated Use Impairment Summary Information

All summary assessment data are housed in the USEPA-developed Assessment Database version 2.1.4 (ADB). Use attainment decisions are then summarized in the Integrated Report (NMED/SWQB 2009b). This report is prepared every even numbered calendar year as required by the CWA. Category 5 assessment units on the Integrated List (see Section 4.0) constitute the *CWA §303(d) List of Impaired Waters*. The Integrated List (i.e., Appendix A of the Integrated Report) is opened for a minimum 30-day public comment period. A formal Response to

Comments is prepared by SWQB and submitted to the WQCC and USEPA Region 6 for review and approval. SWQB also submits the Record of Decision (ROD) document. The ROD is an additional, non-required document that SWQB provides to USEPA and the public. It explains why and when a particular assessment unit was noted as impaired and, if applicable, why and when it was de-listed (i.e. removed from Category 5 of the Integrated List).

6.4 Future Direction for Data Management

SWQB has many initiatives regarding data management and development of additional database tools. In 2004-2005, along with all other departments in New Mexico, NMED consolidated Information Technology (IT) services. SWQB is in the process of developing an Oracle-based database for its ambient water quality data, based on EDAS2 developed by TetraTech.

#	Future Initiatives
1	Expand capabilities of the in-house water quality database to incorporate outside data so database assessment tools can utilize all existing data.
2	Execute batch uploads of biological data to STORET.
3	Build additional automated QA tools to expedite QA of provisional data prior to STORET upload and prior to impairment determinations.
4	Build automated assessment tools and reports to electronically generate data for basin summaries in the Integrated Report.
5	Provide web-based tools to access the database such that satellite offices in Albuquerque, Las Vegas, Las Cruces, and Silver City as well as the general public can have real-time access to SWQB's data.

Specific tasks scheduled to enhance this element of the Monitoring Strategy are detailed in the timeline in **Appendix A**.

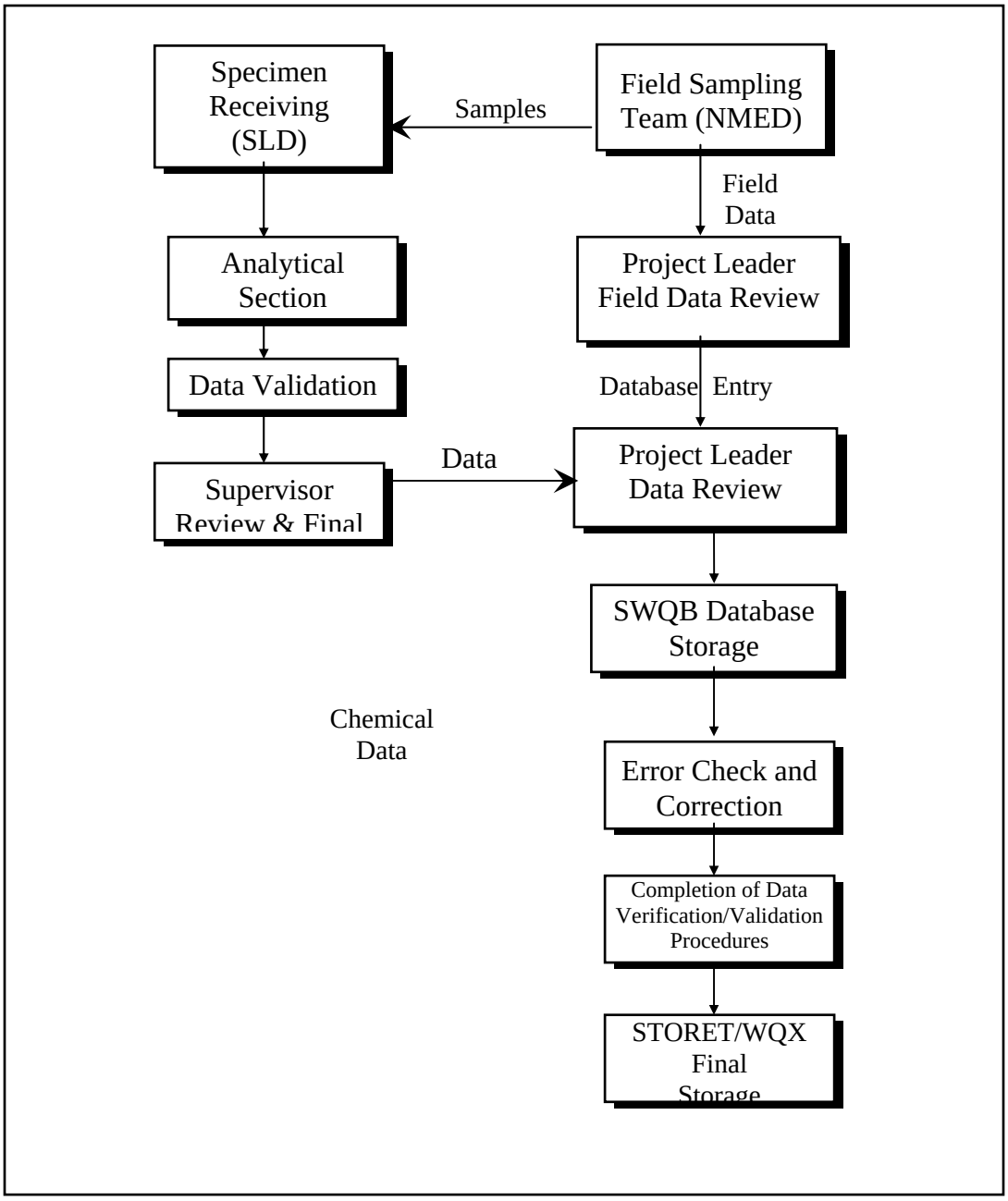

Figure 6.1 Data flow from SWQB field collection activities through the storage of validated data on the STORET/WQX system.

7.0 DATA ANALYSIS/ASSESSMENT

7.1 Ambient Surface Water Quality Data

All data collected during watershed surveys are assessed to determine designated use attainment status by utilizing various assessment protocols detailed in the most current version of the *State of New Mexico Procedures for Assessing Standards Attainment for the Integrated §303(d)/§305(b) Water Quality Monitoring and Assessment Report* (NMED/SWQB 2009d). The Assessment Protocol (AP) was modified in 2006 to include protocols to assess large data sets (temperature, pH, and dissolved oxygen) derived from *in situ* data loggers. The AP is internally reviewed every two years prior to development of the draft Integrated List. When there are significant revisions, or at least every other listing cycle, the AP is opened for public comment. The AP is developed and revised with input from the public, technical workgroups, and USEPA Region 6.

SWQB incorporated elements of various USEPA guidance documents during development and biennial refinement of these protocols, including elements of the Consolidated Assessment and Listing Methodology (CALM) guidance documents (USEPA 2002). Assessment metadata are housed in ADB. Assessment conclusions are reported to the public and USEPA every even numbered year in the Integrated Report and List (NMED/SWQB 2009b). All documentation is available on SWQB's web site.

7.2 Narrative Standards Impairment Determinations

Similar to other states, New Mexico has several narrative water quality standards. Impairment determinations for these standards require development of specific assessment protocols. SWQB has developed specific protocols for nutrients and sedimentation (stream bottom deposits) in perennial, wadeable streams (NMED/SWQB 2009d). SWQB strives to review and update these protocols on a regular basis, with input from USEPA and various workgroups.

7.3 NPDES Effluent Data

Analytical results from water quality samples collected from effluent discharges are compared to NPDES permit limits and waste load allocations, if applicable. Analytical results from water quality samples collected from ambient stream stations upstream and downstream from the effluent discharges are used to determine water quality standards attainment and the effects of the discharges on receiving waters.

7.4 Future Direction for Data Analysis and Assessment

#	Future Initiatives
1	Refine nutrient AP for wadeable, perennial streams.
2	Refine sedimentation/siltation and turbidity AP for wadeable, perennial streams.
3	Develop draft AP and numeric translators for narrative biological integrity standard, if adopted.
4	Research and incorporate a valid, scientifically-defensible turbidity AP for wadeable, perennial streams based on the current standard.
5	Develop draft nutrient APs for lakes/reservoirs and nonwadeable rivers.
6	Develop appropriate ways to incorporate stormwater data into impairment determinations.

Specific tasks scheduled to enhance this element of the Monitoring Strategy are detailed in the timeline in **Appendix A**.

8.0 REPORTING

8.1 Water Quality Reports and Lists

SWQB regularly produces timely and complete water quality reports and lists. As of the 2004 reporting cycle, New Mexico produces an Integrated CWA §303(d)/305(b) Report that includes the list of impaired waters per USEPA guidance. SWQB submits this information electronically for inclusion in the National Assessment Database through ADB.

Semiannual grant reports summarizing the status of all outstanding projects are prepared by SWQB program managers and MAS survey leads. These reports are provided to USEPA Region 6. Project summaries of water quality surveys conducted during the year are compiled and sent to USEPA.

8.2 Additional Reports Based On Monitoring Activities

Other reports and products resulting in part from water quality monitoring activities include use attainability analyses (UAAs), total maximum daily loads (TMDLs) planning documents, watershed-based plans (WBPs), Nonpoint Source Annual Reports, new or revised assessment protocols, water quality standards development documentation, and testimony for the triennial standards review. Monthly reports of the number of NPDES inspections are reported to USEPA Region 6. NPDES Compliance Inspection Reports and analytical results from samples collected during Compliance Sampling Inspections are provided to USEPA and to the permittee. Specific permittees are discussed during USEPA-SWQB enforcement meetings held in Santa Fe.

8.3 Future Direction for Reporting

#	Future Initiatives
1	Work with stakeholders and the WQCC to clear up the confusion regarding "probable sources" list and to better explain the need and importance of this information in the reporting and restoration planning process.
2	Improve and update the website to reflect current projects and milestones.
3	Allow or improve public access to data through the internet.

Specific tasks scheduled to enhance this element of the Monitoring Strategy are detailed in the timeline in **Appendix A**.

9.0 PROGRAMMATIC EVALUATION

New Mexico, in consultation with USEPA Region 6, conducts occasional reviews (dates to be determined by New Mexico and USEPA Region 6) of each aspect of its monitoring and assessment program and determines how well the program serves New Mexico's water quality decision needs for all of its waters. This involves evaluating the monitoring and assessment program to determine how well each of the elements is addressed and determining how needed changes and additions are incorporated into future monitoring and USEPA funding cycles.

In February 2007, the bioassessment program was evaluated by Chris Yoder, a consultant for USEPA, Robert Plotnikoff, and Anna Hamilton, both from Tetra Tech, Inc. The review team provided critical feedback to strengthen the SWQB's bioassessment program including adding a second biological assemblage, developing diagnostic capabilities, improving data management, and formalizing the review process.

9.1 Future Direction

SWQB's goal is to build the bureau's capacity to conduct periodic internal and external reviews of its water quality monitoring and assessment programs to determine if each element is meeting its stated goals. Specific tasks scheduled to enhance this element of the Monitoring Strategy are detailed in the timeline in **Appendix A**.

10.0 GENERAL SUPPORT AND INFRASTRUCTURE PLANNING

SWQB's current resources allow for an 8-year, single phase, targeted watershed survey rotation, as described in the previous sections. Additional resources would allow SWQB to:

- Incorporate probabilistic sampling designs into our monitoring program to statistically answer CWA §305(b) questions especially related to the quality of intermittent and ephemeral waters,
- Collect more data to update and maintain the fish consumption advisory program in New Mexico,
- Increase NPDES compliance evaluation activities in New Mexico,
- Expand the lakes and reservoir monitoring efforts which would enable SWQB to begin developing lake TMDLs,
- Increase the number of samples for the stream, river, and lake monitoring efforts to improve confidence in data evaluation,
- Refine and expand numeric translators for nutrients, stream bottom deposits, and benthic macroinvertebrate bioassessments,
- Refine monitoring methods and develop assessment protocols for nonwadeable rivers, and
- Shorten the assessment return interval to a 5-year rotational cycle.

10.1 Current and Future Monitoring and Assessment Resources

The successful implementation of a comprehensive monitoring and assessment strategy for the State of New Mexico is dependent upon adequate funding and personnel. SWQB's current staffing and funding sources are discussed below. An implementation timeline to reach the future directives outlined in Chapters 3 thru 10 is included in Appendix A. This appendix provides goals, target dates for completion, and a strategy for implementation along with resources needed.

The Monitoring and Assessment Section currently consists of 4 teams:

- Stream Studies Team (3 full time employees/ 2 dedicated to monitoring)
- Nutrient and Lakes Team (3.5 FTEs/ 3.25 dedicated to monitoring)
- Biological Studies Team (2 FTEs/ 2 dedicated to monitoring)
- Assessment Team (1.5 FTEs/ 0 dedicated to monitoring).

SWQB's current budget for fiscal year 2009 was approximately $4,500,000, the majority being funded by federal money (CWA §106 and §319(h) grant monies) with the remainder being funded through state funds (New Mexico General Funds and Corrective Action Fund). The Scientific Laboratory Division (SLD) provides the majority of SWQB's water quality analysis needs through the New Mexico General Fund appropriation, in past years SWQB had received 265,000 WTU (work time units - roughly equivalent to $1-2 each). In FY10 the overall allocation was greatly reduced and in future years SWQB anticipates receiving only 175,500 WTUs. Table 10.1 identifies current resource limitations to fully implement the monitoring strategy.

10.2 Training Needs

Training requests are determined on an as needed basis. Approximately $13,000 in funds are allocated in the 106 supplemental monitoring funds for training. In addition to required health and safety training, topics that employees have asked for additional training on include (but are not limited to):

- Current approaches to TMDL development
- Water Quality Standards Academy
- Development and incorporation of waste load allocations from stormwater permitted activities
- EMAP protocols
- Habitat survey techniques
- Lake/reservoir TMDL development
- Statistical approaches to monitoring design and assessments
- USEPA inspection workshops

Table 10.1 Monitoring resource assessment

Funding (Grant)	SWQB Funding Level/yr	Monitoring Staff	Monitoring Operations Resources	Monitoring Laboratory Resources	Additional Comments
106	$1,132,400 Fed $220,040 State	5.5 MAS	$0	$0	
106 Supplemental Monitoring	$174,000	1.25 MAS	$13,000 for training $20,000 for sondes + thermographs $5,500 Supplies	$25,000 in contract funds for periphyton and macroinvertebrate analysis	- increased by $4100 in FY10
604(b)	$101,000 ($194,300 ARRA fund FY10/11 only)	1 MAS (TMDL) + 1 MAS (ARRA)	$0	$0	- increased by $1000 in FY10
104(b)(3)†	$0	0	$0	$0	
319(h)	$2,150,000 $70,200 monitoring	1 Effectiveness monitoring			
New Mexico General Funds	$379,500**	1 MAS Program Manager	$80,000 for USGS contract***	SLD* provides the majority of our laboratory needs through New Mexico General Fund Appropriation – current total 175,500 WTUs (work time units)	- SLD WTU allocation cut by 40% in 2010 - State GF cuts in FY10 and planned for FY11 – mainly reduction of USGS contract by 30%
New Mexico - Corrective Action Fund (CAF)	$265,100	1 MAS (Fish consumption advisories)		$25,000 fish tissues analysis	
TOTALS	**$4,492,240** + $194,300 ARRA fund FY10/11 only	**10.75 Monitoring & Assessment 1 Effectiveness Monitoring**	**$80,000 for USGS $38,500 equipment + additional general fund**	**$50,000 + general funds for sample analysis**	

NOTES:
*SLD provides the majority of our laboratory needs through New Mexico General Fund Appropriation. Due to recent State budget cuts SWQB's allocation has been reduced by 1/3 and now total 175,500 WTUs. Future cuts are possible. These state funds are used as match on our grants.
** State budgets we cut by 6% in FY10; additional cuts anticipated in FY11
*** as part of state budget cuts funds for USGS sampling were reduced from 124,000 to 80,000; additional cuts possible
†104(b)(3) funding has been eliminated and no new funds under this program are anticipated

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APPENDIX A – IMPLEMENTATION SCHEDULE

The following table summarizes and prioritizes the future directions for improvement as outlined in Chapters 2-10 of the monitoring strategy. The time frame assumes that the identified resource needs have been met. Resources are categorized into three major groups: people, time and money. Timeframe for low priority items are not stated because resources are not available at this time and are not likely to be available in the next five years.

#	Goal	Implementation Plan	Priority	Resources Needed	Time Frame
Monitoring Objectives – Chapter 2					
1	Refine current monitoring and assessment methods for more reliable determination of use attainment in New Mexico's surface waters.	Evaluate and update riparian habitat and geomorphology (EMAP) data collection (see 4-1 below); assessment methods for turbidity and stream bottom deposition (see 7-2 and 7-4 below); Develop nutrient assessment protocols for non-wadeable rivers (see 7-5 below)	High	Time and money	2011
2	Establish a stormwater program to include sampling methodologies and assessment protocols specific to stormwater and/or intermittent and ephemeral streams.	See 4-2 and 7-6 below for details	Low	Time and money	
3	Increase number of long-term USGS stations to historic levels in order to continue to examine long-term trend data across the state.	Lobby the state senate for increased funding to support long-term monitoring efforts across the state.	Low	Time and money	
4	Expand lake monitoring and assessment to provide the data necessary for lake TMDL development.	Increase number of dedicated lake monitoring staff. (see 3-3 below)	Medium	People and money	2014

#	Goal	Implementation Plan	Priority	Resources Needed	Time Frame
5	Implement special studies to investigate aluminum, radionuclides, bacteria, and/or PCB (as well as other priority pollutants) levels across the state to develop or refine appropriate water quality standards designed to protect surface waters in New Mexico.	Determine and prioritize special study needs and objectives. (see 3-4 and 4-3 below)	Medium	People, time and money	As opportunities become available
6	Increase NPDES permit compliance evaluations to assist USEPA in administering an effective permit program that protects surface waters of the state.	Develop funding a support for New Mexico permit primacy; develop compliance monitoring strategy to support this effort.	Low	People, time and money	
7	Monitor wetlands. Assessment of wetland conditions in unconfined mid-elevation montane riverine subclass of wetlands using NMRAM.	Develop wetland monitoring protocols and QAPP. Identify wetlands and develop Geographic Information System wetland map. Develop appropriate monitoring design (NMRAM). Coordinate with other state and federal agencies.	High	People, time and money	Upper Rio Grande watershed – 2011 Upper Canadian Watershed – 2013
Monitoring Design – Chapter 3					
1	Strive to incorporate probabilistic sampling design into yearly monitoring efforts.	Incorporate a statewide probability-based design for ephemeral and intermittent waters that fulfills both 305(b) and 303(d) objectives.	Low	People, time and money	
2	Shorten the assessment return interval to a 5-year rotational cycle.	Increase number of dedicated monitoring staff. Monitor 70 to 80 assessment units per year (at increased staffing levels).	Low	People and money	
3	Increase lake and reservoir monitoring in order to prepare for subsequent TMDL development.	Increase number of dedicated lake monitoring staff.	Medium	People and money	2014

#	Goal	Implementation Plan	Priority	Resources Needed	Time Frame
4	Pursue grant funding for special studies to research harmful algal blooms, pharmaceuticals, radionuclides, fish tissue contaminants, salinity, bacteria, and/or PCB levels on ecoregion and statewide levels.	Determine and prioritize special study needs and objectives.	Medium	People, time and money	As opportunities become available
5	Increase number of samples for the stream, river, and lake programs to improve confidence in data evaluation.	Determine number of samples to optimize statistical confidence of assessment results with resources available.	Medium	People, time and money	2015
6	Implement special monitoring for unique resources such as Outstanding National Resource Waters (ONRWs) and intermittent/ephemeral waters.	Determine and prioritize special study needs and objectives. Add limited ONRW sampling to existing surveys as needed. Develop ephemeral sampling SOPs.	Medium to Low	Time and money	2011 for ONRW
Core and Supplemental Indicators – Chapter 4					
1	Update and enhance sample collection and analysis methods for core water quality and biological indicators (e.g. continuous data loggers, field probes, new bacteriological analysis methods etc.)	Evaluate current sampling equipment, investigate new/alternative methods and select/modify/adapt to meet New Mexico's monitoring needs	High	Money	On-going / as needed
2	Develop various levels of habitat surveys depending on the objective (i.e., to determine potential sedimentation, to gather data for SSTEMP temperature model input, etc.) to increase efficiency and save resources.	Investigate various habitat survey designs and modify/adapt to New Mexico's needs.	High	Time	2011
3	Develop a set of core indicators for stormwater sampling of ephemeral and intermittent systems.	Establish a stormwater program to include water quality standards development, sampling protocols, and assessment methodologies specific to stormwater. Coordinate with state and federal agencies.	Low	People and money	

#	Goal	Implementation Plan	Priority	Resources Needed	Time Frame
4	Monitor for emerging contaminants.	Hire a specialist in emerging contaminants preferably with a background in toxicology.	Low	People and money	
5	Add a second biological assemblage (e.g. periphyton or fish) for wadeable stream assessments.	Identify proper assemblage (fish, algae, etc.) and develop index of biological integrity based on reference conditions.	Medium	Time and money	2015
6	Implement methylmercury and PCBs in fish tissue as core indicators.	Evaluate and revise standards based on new information.	Medium	Time and money for analyses	2014
7	Refine and expand numeric translators for nutrients, bottom deposits, turbidity, and biological integrity narrative standards.	Evaluate and revise standards and/or numeric translators based on new information. (see 7-2 – 7.5 below)	Medium	Time	2012
Quality Assurance – Chapter 5					
1	Build additional automated QA tools into the in-house water quality database.	Coordinate with Department of Information Technology (DoIT) to complete and update the water quality database under development.	High	Time	2010
2	Continue open coordination and communication with SLD to address data problems.	Work with SLD to complete and update memorandum of understanding detailing data reporting requirements.	High	Time	2010
3	Attempt to increase support for SLD in conjunction with the New Mexico Department of Health.	Work with SLD and state legislature to request funding for this goal.	Low	Time	
Data Management – Chapter 6					
1	Expand capabilities of the in-house water quality database to incorporate outside data so database assessment tools can utilize all existing data.	Coordinate with DoIT to complete task.	Low	People, time and money	
2	Execute batch uploads of biological data to STORET.	Coordinate with Data Manager (vacant position) to complete task.	Medium	People and time	2012

#	Goal	Implementation Plan	Priority	Resources Needed	Time Frame
3	Build automated assessment tools and reports to electronically generate data for basin summaries in the Integrated Report.	Coordinate with DoIT to complete task.	Low	People, time and money	
4	Provide web-based tools to create real-time access to SWQB's data.	Coordinate with DoIT to complete task.	Low	People, time and money	
Data Analysis and Assessments – Chapter 7					
1	Refine nutrient AP for wadeable, perennial streams.	Evaluate and revise numeric translators based on new information.	Low	Time	
2	Refine sedimentation/siltation and turbidity AP for wadeable, perennial streams.	Propose numeric translators for New Mexico's narrative standard. Use weight-of-evidence approach including Relative Bed Stability (RBS) index to determine impairment. Incorporate biological component into assessments.	Medium	Time and money	2012
3	Develop draft AP and numeric translators for narrative biological integrity standard, if adopted.	Propose numeric translator(s) for narrative standard. Develop AP to assess for biological impairment.	Low	Time and money	
4	Research and incorporate a valid, scientifically-defensible turbidity AP for wadeable, perennial streams based on the current standard.	Evaluate and revise numeric translators based on new information.	Medium	Time	2012
5	Develop draft nutrient APs for lakes/reservoirs and nonwadeable rivers.	Propose numeric translators for New Mexico's narrative standard. Use weight-of-evidence approach to determine impairment. Incorporate biological component into assessments.	High	Time	2012
6	Develop appropriate ways to incorporate stormwater data into impairment determinations.	Evaluate effects of stormwater on water quality exceedences.	Low	People, time and money	

Reporting – Chapter 8					
1	Work with stakeholders and the WQCC to clear up the confusion regarding "probable sources" list and better explain the need and importance of this information in the reporting and restoration planning process.	Evaluate and improve NMED's approach to probable source identification. Specifically, evaluate the usefulness of public input, GIS datasets, and other approaches in the literature to help identify potential sources of pollutants.	High	Time	2011
2	Improve and update the website to reflect current projects and milestones.	Coordinate with webmaster to keep website current.	Low	Time	
3	Allow or improve public access to data through the internet.	Allocate funds for electronic viewing of data over the internet. Coordinate with webmaster, GIS specialist, and DoIT to develop website and data mine quality data from our existing oracle database.	Low	People, time and money	
Program Evaluation – Chapter 9					
1	Conduct periodic internal and external reviews of NMED's water quality monitoring programs to determine if each program is meeting its stated goals.	Conduct periodic reviews of the finalized strategy every 3-5 years. Communicate directly with USEPA regarding SWQB's strategy. Investigate evaluation criteria from other states to determine if they are appropriate for New Mexico.	Medium	Time	2014
General Support and Infrastructure – Chapter 10					
1	Provide training/professional growth opportunities and a supportive work environment to retain qualified staff.	Salary increases limited by state legislature. However, SWQB can strive to provide training/professional growth opportunities and a supportive work environment for program staff to support retention.	High	Time and money	2010