NEVADA'S TMDL PROGRAM

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ABSTRACT

Nevada's TMDL program is confronted with the challenge of revising and developing a larger number of TMDLs than previously identified. Many of the existing TMDLs are too simplistic and need to be updated. In some instances, impairment of waterbodies has been determined based upon water quality standards that are not appropriate. For most of the TMDLs, additional data are needed to properly understand the impairment and adequately characterize the sources. Without this information, TMDLs will provide little information useful for designing implementation plans.

INTRODUCTION

Nevada's 2002 303(d) Impaired Waters List has just been completed and represents a significant departure from the previous 1998 List. With changes made in the listing methodology, the number of river miles listed has increased from about 900 to over 1600 miles (NDEP, 2002). The most common parameters of concern include nutrients and metals. Some other concerns include sediment and temperature.

The State of Nevada is required by the Clean Water Act to develop Total Maximum Daily Loads (TMDLs) for those waterbodies on the 303(d) List. With the significant increase in listed waterbodies, Nevada's TMDL development obligation has been greatly expanded. The Bureau of Water Quality Planning (BWQP) within the Nevada Division of Environmental Protection (NDEP) is the primary agency responsible for developing this increased number of TMDLs. As discussed in this paper, BWQP is faced with significant issues constraining the success of the TMDL program.

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ISSUES FACING NEVADA'S TMDL PROGRAM

Existing TMDLs

The major streams in Nevada have had TMDLs established for several years, which has perhaps protected the State from TMDL litigation for the most part. However, only the Truckee River and Las Vegas Wash/Lake Mead TMDLs are based upon significant scientific analyses and modeling efforts funded by wastewater effluent dischargers in the basin. For some other streams, "bare bones" TMDLs are common. These have been dubbed as "bare bones" TMDLs due to the simplicity of the calculation (and their lack of usefulness):

"bare bones" TMDL, lbs/day = (Average Daily Flow, cfs) x (Water Quality Criteria, mg/l) x (Conversion Factor)

where:

lbs/day = pounds per day
cfs = cubic feet per second
mg/l = milligrams per liter

While these TMDLs seem to satisfy the requirements of the Clean Water Act, they have contributed little to any watershed/waterbody restoration plans. These types of TMDLs lead to no understanding of the cause of impairment and the location, quantity and timing of loads to the waterbody. Without adequate characterizations of the problems, appropriate solutions cannot be identified and implemented. Needless to say these TMDLs have to be updated, however the detailed information to adequately define the problems is not yet available.

Data Limitations

BWQP operates an ambient monitoring network of about 100 water quality sites on streams, lakes, reservoirs and wetlands throughout the state. For years this network has been operated for the main purpose of developing water quality standards and evaluating water quality standards compliance. With the need for TMDLs, BWQP needs to evaluate the monitoring program and gear it towards TMDL development. For example, the seasonal nature of the water quality throughout Nevada needs to be better understood through more intensive monitoring in some areas. With some waterbodies, additional data are needed to properly characterize diurnal dissolved oxygen (DO) and temperature levels. Most of the DO and temperature data that exist in Nevada are associated with instantaneous readings taken in conjunction with grab samples.

BWQP is realizing that it can no longer rely solely on water column chemistry data alone to assess stream health and develop plans for assuring that beneficial uses are supported. Starting in 2000, BWQP began performing biological

assessments on the major waterbodies in Nevada. Data and information are being collected concerning macroinvertebrate abundance and diversity, and physical habitat conditions. However as this program is in its infancy, none of this information is yet useful for assessments and TMDL development.

In addition to the water chemistry and biological information currently being collected, other types of information are needed which describe channel and streambed conditions, riparian vegetation conditions, fisheries conditions, and periphyton (attached algae) occurrences. These data will lead to a better understanding of the ways in which the waterbodies are impaired and will lead to more meaningful TMDLs.

Very little data exists to assist the State in properly characterizing sources of pollutants. Without a complete understanding of the location, quantity and timing of nonpoint source load, it may not be possible to develop TMDLs and implementation plans that are effective. For example, there are a number of streams that are listed as impaired for sediment, however it is not known if the source is watershed or streambank erosion.

Water Quality Standards

As required by the Clean Water Act, Nevada has set beneficial uses and water quality criteria for waterbodies throughout the state. While some waters have been listed based upon other evidence of use impairment, most of the waterbodies on the 303(d) List have been identified as impaired due to exceedances of these numeric criteria. Obviously water quality standards represent a significant input for the TMDL process. In many cases, these standards serve as the water quality target or goal for the TMDLs. However, some of these targets have shortcomings.

A primary example are the nutrient standards used for much of the state. The typical phosphorus standard is 0.1 mg/l and is based upon general recommendations in EPA's Gold Book as a "desired goal for the prevention of plant nuisances". Given the native soil conditions in the Great Basin and the topography that exists over much of Nevada, the suitability of the total phosphorus standard must be questioned. Additional investigations are needed to quantify natural phosphorus contributions. Without more detailed dissolved oxygen (DO) monitoring, it is unknown if the current phosphorus loads are even causing any problems. In fact research has shown that nitrogen rather than phosphorus is the limiting nutrient.

Before a large amount of resources are devoted to developing TMDLs and nutrient control strategies, it is advisable to evaluate the suitability of the existing water quality standards. Nevada is working with California, Arizona, Hawaii and EPA (Region 9) on the development of appropriate regional nutrient criteria.

Other standards that need to be reviewed include the DO and temperature criteria. Both of these parameters have numeric limits set but with no mention of duration (7-day mean, 7-day mean minimum, etc.). With dissolved oxygen and temperature levels fluctuating throughout the day, more robust standards are needed to properly define criteria required for beneficial use support. As stated above, additional data are needed to properly characterize diurnal DO and temperature levels for waters throughout the State. Any revision to the DO and temperature standards would be of little utility without efforts to collect more detailed DO and temperature data.

A large number of smaller streams are categorized as Class Waters and as such have been grouped into four classes, each having its own set of beneficial uses and water quality criteria. The Class Water criteria have not been reviewed since the 1970s and there are many questions about their suitability for many of the waters. Extensive work is still needed to review these standards and determine the appropriate criteria for each water in the class regulations.

Nonpoint Source Impairments

Originally, the focus of the Clean Water Act was to control and abate water pollution from point source. While great strides have been made in addressing these loads, the greatest challenge will be addressing nonpoint problems. As with most states, the majority of the impairments in Nevada are due to nonpoint source pollution (NDEP, 1999).

BWQP through its Nonpoint Source (NPS) program manages activities and implements projects that prevent and reduce nonpoint source loading in the surface and ground waters of Nevada. Nevada's NPS program is voluntary, relying on public education/outreach, agency collaboration, technology transfer, implementation of Best Management Practices (BMPs) and demonstration projects as mechanisms for reducing nonpoint sources loads. In addition to NDEP, other agencies, such as Natural Resources Conservation Service, are implementing projects to improvement water quality. As part of the NPS program, BWQP collaborates with these other agencies to the extent possible.

The success or failure of a voluntary nonpoint source control program depends upon the participation of a multitude of landowners, land management agencies, government agencies, decisionmakers and the public. Without buy in from the various entities, it becomes extremely difficult if not impossible to design and implement the necessary nonpoint source control projects.

Natural Levels of Pollutants

According to Nevada regulations, water quality standards are not considered to be violated if the cause is due solely to natural causes. In other words, a waterbody that is not supporting its beneficial use (or not meeting the water quality standards) due to natural causes does not qualify for inclusion on the 303(d) List and a TMDL is not required.

A variety of parameters appear on Nevada's 2002 303(d) List that may be naturally occurring. For example, given the native soil conditions in the Great Basin, it is possible that a significant portion of the phosphorus loads in Nevada's streams are due to natural conditions. Some may argue that higher sediment levels are the result of the river system attempting to naturally heal following some past change to its hydrology and geomorphology. It is obvious that more research and data collection are needed to define the natural levels of some pollutants prior to TMDL development.

Other Factors Causing and Related to Impairment

When people are first exposed to the TMDL concept, they tend to think in terms of loads when contemplating our water quality problems. However, there are other culprits that either cause impairment or at least contribute to the problem. For example, the water from the major streams in Nevada is utilized for a variety of consumptive uses, such as irrigation, drinking water, etc. These uses can lead to lower flows during certain times of the year thereby interfering with the river's ability to assimilate loads and support other beneficial uses. However, NDEP has no ability regulate flows for compliance with water quality standards. According to the Clean Water Act (Water Environment Federation, 1997),

> "[I]t is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this chapter. It is further the policy of Congress that nothing in this chapter shall be construed to supersede or abrogate rights to quantities of water which have been established by any State."

Nevada is the driest state in the nation. When beneficial uses were first recognized in the state regulations (1970s), some of these uses were based upon desired future conditions and not actual uses at the time. With much of the water diverted from the rivers for beneficial uses such as irrigation and drinking water, some of the other beneficial uses, such as propagation of aquatic life, can not be sustained during parts of the irrigation season.

Beginning in the mid-1800s, societal needs for space, food, water and ore resulted in changes to the major river systems in Nevada. Logging, mining, flood control,

land development and the diversion of water for agriculture and municipalities have all altered the form and function of the rivers impairing water quality and aquatic life. Channelization, removal of riparian vegetation and encroaching development have impaired the ability of Nevada streams to support beneficial uses. For these streams, the solution may be to restore the form and function of the streams to the extent possible recognizing the competing needs in the watershed. However, much of the major river corridor areas are on private land further complicating any stream restoration plan.

Experience has shown that river restoration projects can be extremely expensive and controversial. The regulatory agencies can only do so much to protect public health and improve the environment, but ultimately society is responsible for making the choices to preserve and or restore some of our river systems.

Funding Limitations

BWQP is responsible for three main programs: 1) ambient water quality monitoring, 2) water quality standards and TMDL development, and 3) nonpoint source pollution management. While some of BWQP's efforts are not directly related to TMDLs, most of our activities provide the foundation needed for TMDL development.

The lack of funding and staffing for TMDL development and implementation, and other support activities, such as monitoring, research, and nonpoint source assessment, is one of the largest obstacles facing Nevada. Some of the other issues previously discussed could be better addressed with higher levels of funding. It needs to be realized that the amount of money that has been spent on point source control is small compared to that needed for nonpoint source problems.

The most significant funding source available are CWA Section 319 funds. These funds assist Nevada in implementing its voluntary Nonpoint Source program. EPA has developed new guidelines which identify the process and criteria to be used in distributing 319 funds. In general, the new guidelines create a more concentrated focus on the development and implementation of TMDLs related to nonpoint source pollution.

On the federal level, the Natural Resources Conservation Service Environmental Quality Program (EQIP) is another source of funding available to private landowners for the implementation of water quality improvement projects. The U.S. Bureau of Reclamation and the Corps of Engineers also provide monies to local agencies to implement restoration and water quality control projects.

While the 319 and other funds will be very helpful in developing and implementing effective TMDLs, much more is needed to adequately address all of

the issues. Without additional funds, we are doomed to produce more "bare bones" TMDLs to satisfy the CWA requirements.

SUMMARY

With the completion of the 2002 303(d) List, Nevada's TMDL development needs have expanded but significant issues interfere with the success of the program. For many of the impaired waterbodies, we need to perform extensive evaluations of the water quality standards before appropriate TMDLs can be developed. Additional research and data collection are needed to adequately understand the impairment problems and to characterize the sources. Without this information, the TMDLs will provide little information useful for designing implementation plans.

TMDLs should be more than just calculated daily loads at a given point on a stream. The intent of a TMDL should be to provide the foundation for a comprehensive waterbody/watershed restoration plan. Unfortunately until more resources and data becomes available, our ability to develop effective TMDLs is limited.

REFERENCES

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