Nevada's 2002 303(d) Impaired Waters List

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October 2002

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Introduction

Section 303(d) of the Clean Water Act requires that States develop a list of waterbodies needing additional work beyond existing controls to achieve or maintain water quality standards. This list, referred to as the Section 303(d) List, provides a comprehensive inventory of water bodies impaired by all sources, including point sources, nonpoint sources, or a combination of both. The 303(d) List is the basis for targeting water bodies for watershed-based solutions, and the Total Maximum Daily Load (TMDL) process provides an organized framework to develop these solutions.

Subpart C of 40 CFR (Code of Federal Regulations) Part 130 requires that states develop descriptions of the criteria and process used in generating their 303(d) lists. Following is a summary of the methodology utilized by the Nevada Division of Environmental Protection (NDEP) in developing the 2002 303(d) List and the listed waterbodies.

On July 11, 2000, past EPA Administrator Carol Browner signed new TMDL rules which represent significant changes to the current regulations and to content and format requirements of the 303(d) List. However at this time, the new TMDL regulations are not in effect and the exact future of these regulations is unknown. Because of the controversy, Congress prevented the implementation of the rule through passage of an appropriations bill which prohibits the obligation or expenditure of Fiscal Years 2000 and 2001 funds for the new TMDL rules or for any related technical assistance or guidance. This action moved the effective date of the rules to October 1, 2001. On July 16, 2001, EPA announced its plan to propose an 18-month extension of the effective date of the rule to provide time to review and possibly revise the rule. On October 18, 2001, the TMDL rule delay was made official. As a result of this action by EPA, the 2002 303(d) List is due to EPA on October 1, 2002 and the new TMDL rules have been delayed until April 30, 2003. Therefore, the 2002 303(d) List was developed in accordance with the current regulations.

Background on Water Quality Standards

Nevada's water quality standards, contained in the Nevada Administrative Code (NAC) 445A.119 – 445A.225, define the water quality goals for a waterbody, or a portion of a waterbody, by: 1) designating beneficial uses of the water; and 2) setting criteria necessary to protect the beneficial uses. Beneficial uses include, but are not limited to, irrigation, recreation, aquatic life, fisheries, and drinking water. In many instances, NAC defines two or more reaches for a river system, with each reach possibly having different beneficial uses and water quality standards.

Both narrative and numeric criteria are included in Nevada's water quality standards. The narrative standards are applicable to all surface waters of the state and consist mostly of statements requiring waters to be "free from" various pollutants including those that are toxic.

The numeric standards for conventional pollutants are broken down into two types: class and waterbody specific. For the class waters, criteria for various pollutants are designed to protect the beneficial uses of classes of water, from A to D; with class A being the highest quality. The waterbodies belonging to these classes are named in the regulations.

For major waterbodies in Nevada, site-specific numeric standards have been developed. These waterbodies are often referred to as "designated" waters. The standards for designated waters include both criteria designed to protect the beneficial uses and antidegradation requirements. The antidegradation is addressed through the establishment of "requirements to maintain existing higher quality" or RMHQs. RMHQs are set when existing water quality (as evidenced by the monitoring data) for individual parameters is higher than the criteria necessary to protect the beneficial uses. This system of directly linking antidegradation to water quality standards provides a manageable means for implementing antidegradation through permits and other programs.

General Listing Criteria

The criteria for listing were developed to identify only those waterbody segments for which there is adequate documentation that beneficial uses are not being supported and water quality standards are not being met. In evaluating a given waterbody, NDEP considered "all existing and readily available water quality related data and information" such as chemical/physical properties of water column, sediment and fish tissue; biological information; toxicity testing results; narrative and qualitative information.

In general, a waterbody was included on the 2002 303(d) List when there is adequate documentation that beneficial uses were not being supported and/or beneficial use standards (NAC 445A.119 through 445A.225, including narrative and numeric standards) were not being met during the five-year period 1997 through 2001. Also, a waterbody was included on the 303(d) List if:

- A fishing, drinking, or swimming advisory had been in effect for the waterbody during the listing period.
- The waterbody was listed on a prior 303(d) List and insufficient information exists to delist the waterbody.

In developing the List, NDEP considered both beneficial use standards (BUs) and RMHQs. However, separate lists were developed for waterbodies exceeding BUs versus RMHQs. BUs were evaluated in developing the 2002 303(d) List. Waterbodies not meeting RMHQs are identified in a separate table for which TMDLs are not required.

Evaluating Numeric Standards and Data

For most waterbodies, the most comprehensive readily available water quality related data/information were physical and chemical water column monitoring data, and widely distributed scientifically defensible special studies (including chemical and biological information). Other types of data (sediment, fish tissue, narrative information, etc.) are generally

not as common for Nevada waterbodies. While NDEP examined all types of readily available data, a majority of the listing decisions were based upon numeric data primarily because these types of data are most common.

In general, a waterbody was included on the 2002 303(d) List if any of its numeric beneficial use standards were exceeded more than 10 percent[1] of the time during the five-year listing period (January 1, 1997 to December 2001). There are some exceptions to this general rule as discussed in subsequent sections of this report.

Data Sources and Requirements

Data and Information Sources

As required by Section 303(d) of the Clean Water Act and Section 130.7(B)(5) of CFR, NDEP will compile and consider "all existing and readily available water quality related data and information" in identifying listed waters. Existing and readily available data and information includes, but is not limited to, the following:

- Most recent 303(d) List;
- Most recent 305(b) Report;
- Clean Water Act 319 nonpoint source assessments;
- Drinking water source water assessment under Section 1453 of the Safe Drinking Water Act;
- Dilution calculations, trend analyses, or predictive models for determining the physical, chemical or biological integrity of streams, rivers, lakes and estuaries; and
- Data, information, and water quality problems reported from local, State, Territorial, or Federal agencies (especially the USGS National Water Quality Assessment (NAWQA) and National Stream Quality Accounting Network (NASQAN)), Tribal governments, the public, and academic institutions.

All waters listed on the 1998 303(d) List were also included on the 2002 303(d) List, unless delisting was justified if available data indicates no impairment. Refer to the "Delisting" section for more information.

While NDEP is required to ***consider*** waterbodies identified in the 305(b) as "not fully supporting", NDEP is not required to include all such waterbodies in the 303(d) List. In fact, the

[1] It must be noted that previous 303(d) lists used an exceedance threshold of 25 percent since NDEP did not have the resources needed to develop TMDLs associated with a list developed using the 10 percent threshold. Also, past lists only used two years worth of data resulting in a majority of the datasets consisting of less than 10 samples. It was felt that it would not be statistically appropriate to apply a 10 percent threshold to such small sample sizes.

While NDEP's resources have not increased significantly, it was felt important to provide a more comprehensive 303(d) List. The 10% threshold was chosen so as to be consistent with Nevada's 305(b) Report to Congress on our water quality with uses the 10% threshold. The existence of both the 303(d) and the 305(b) has led to a lot of confusion throughout the country and efforts are underway to integrate these lists. Therefore, it was important to use similar methodologies.

two reports are developed using data for different time periods and using different methodologies. As a result, waterbodies identified as impaired on the 305(b) lists may not meet the 303(d) listing criteria. It must be noted that the 303(d) List and the 305(b) Report are setforth in the Clean Water Act to meet different needs. While the 303(d) List identifies waterbodies in need of additional actions, the 305(b) Report has been intended to serve as a summary report to Congress on states water quality conditions. States and EPA are recognizing the confusion these two reports create for the public and the agencies. Nevada and other states are moving toward an integrated 303(d)/305(b) report in the future. Because of the significant differences in the the 303(d) and the 305(b) methodologies, the most recent 305(b) Report was used as a guide in identifying gaps in the 303(d) analysis.

The State of Nevada operates a monitoring program which encompasses the States 110,000 square miles, regularly monitoring over 100 sampling points in the 14 hydrographic regions found in the state (Appendix E). In addition to these fixed monitoring stations, several water quality intensive field studies are conducted on the major water systems of Nevada. These studies included Truckee River, Carson River, Walker River and the Humboldt River. In addition a number of lakes and reservoirs have been added to the monitoring program. As part of the monitoring, samples are collected from each major river basin in the state, and then analyzed for physical and chemical quality. In addition to this numeric information, NDEP also collects information pertinent to Nevada's narrative water quality standards.

Additional data was solicited from other entities prior to the completion of the 2002 303(d) List. Also, the public notice and comment period provided the opportunity for additional individuals and groups to present additional monitoring data, ongoing research or other publications for consideration. However, it is important that the decision to list a water body be based upon credible evidence.

It is relatively straightforward to define methods for evaluating numeric data for numeric standard compliance. However, it is much more challenging to define how other types of data and information will be used in the listing process. Other types of data and information that are available include:

- Fish tissue data
- Contaminated sediment data
- Toxicity testing data
- Bioassessment data and information
- Qualitative information or other studies

In general, NDEP examined these types of available information in order to identify evidence that any of the beneficial uses were impaired during the period 1997-2001. The data sources and decisions supporting each listing decision are documented in the appendices. Appendix F provides a summary of the major data compiled by NDEP and submitted to NDEP for possible use in the listing analyses.

Minimum Data Requirements and Listing

With a few exceptions, most of the listings in the 2002 303(d) Impaired Waters List were based upon data meeting the following minimum requirements:

- For the waterbodies in question, at least 10 water quality sample analyses were available for the five-year period January 1, 1997 and December 31, 2001.
- There were a sufficient number of samples to represent conditions in the waterbody reach during the five-year period. Best professional judgment was utilized to make this determination. Basically, the available samples were considered representative if collected during a variety of flow regimes and seasons throughout the five-year listing period and not biased toward extreme or unusual conditions. As discussed in the "Accounting for Extreme Events" section, data associated with samples collected during extreme high or low flows were not considered in the listing analysis.
- There was adequate documentation on data development and sampling location.

Waterbodies were included on the 303(d) List if any of its numeric beneficial use standards were exceeded more than 10 percent of the time during the five-year listing period (January 1, 1997 to December 2001). The decision to set a minimum number of samples for consideration was driven by our need to provide a clear definition of the criteria with results that are reproducible by others to the extent possible, and to provide a level of statistical reliability to our decisions.

In general, the goal for the 303(d) List was to identify those waters that are exceeding water quality standards over 10% of the time. However, the true exceedance percentage for most waterbodies and water quality criteria is unknown due to the limited data resulting from monthly or less frequent sampling. The State of Florida[2] has investigated the issue of minimum sample size for listing decisions from a statistical perspective. One basic conclusion was that greater sample sizes result in more reliable estimates of the true standards exceedances in a waterbody. The investigators recommended that a minimum of 10 samples be required for assessing impairment. NDEP deemed this to be an appropriate minimum threshold for data used in the listing decisions.

It must be noted that a few waterbodies were listed with sample sizes less than 10. For those waterbodies, other information such as severity and frequency of the exceedances warranted listing. A number of waterbodies had 8 to 9 samples but had numerous exceedances (4 or more). This was deemed to be a good indication that the water quality standards were consistently exceeded and these waterbodies were listed. The data sources and decisions supporting each listing decision are documented in the appendices.

NDEP thought it important to identify those waterbodies with minimal water samples but had the potential for water quality problems. With this in mind, a "List of Waterbodies Warranting Further Investigation" was included. In general, a waterbody were included on this list if there was not sufficient evidence to place the waterbody on the 303(d) List, but there was evidence

[2] "A Nonparametric Procedure for Listing and Delisting Impaired Waters Based on Criterion Exceedances", Pi-Erh Lin, Duane Meeter, Xu-Feng Niu, Department of Statistics, Florida State University, Technical Report Submitted to the Florida Department of Environmental Protection, October 2000.

from available data and information that a problem may exist. This list is intended to serve as a planning tool for future NDEP assessment activities. TMDLs are NOT required for these waterbodies

As stated earlier, there were a few exceptions to the above 303(d) listing criteria. A few waterbodies, which did not meet the above listing criteria, were placed on the 2002 303(d) List because:

- A fishing, drinking, or swimming advisory had been in effect for the waterbody during the listing period indicating an impairment of a beneficial use for over 10% of the 5-year listing period.
- The waterbody was listed on a prior 303(d) List and insufficient information exists to delist the waterbody.
- Other information existed indicating impairment of beneficial use(s).

The data and information used in placing a waterbody on the List are documented in the appendices.

Detection Limits

Frequently, toxics concentrations in Nevada rivers are less than the detection limit[3] of the applicable laboratory procedure. According to Footnote (3) in NAC 445A.144, if the water quality standard:

> "…is less than the detection limit of a method that is acceptable to the division, laboratory results which show that the substance was not detected [below detection limit] will be deemed to show compliance with the standard unless other information indicates that the substance may be present."

Therefore for purposes of developing the 303(d) List, samples with toxic concentrations reported "as less than the detection limit" were assumed to comply with the water quality standards, but only if:

- the certified laboratory method is acceptable to NDEP; and
- no other information indicates that the substance in question exists in levels detrimental to the beneficial uses.

Toxics

NAC 445A.144 defines water quality standards for various toxic materials that are applicable to the water specified in NAC 445A.119 through 445A.225. For some of these constituents, the standards set 1-hour average (acute) and 96-hour average (chronic) maximum acceptable concentrations, with the 96-hour criteria being the most restrictive. Based upon EPA criteria recommendations, NAC 445A.144 states that "one-hour average and 96-hour average

[3] Detection limit is the minimum concentration of a constituent that can be detected using a particular laboratory procedure.

concentration limits may be exceeded only once every 3 years." For the 2002 303(d) List, waters were listed as "impaired" if:

- 10 samples were available; and
- 2 or more exceedances of the 1-hour criteria occurred during any 3 year period with the listing cycle (1997-2001).

It must be noted that most of the data analyzed for this report were derived from monthly (or less frequent) grab samples and that grab samples may not be representative of conditions over a 4 day period depending upon the waterbody and constituent. For that reason, waterbodies exceeding the 96-hour criteria (with 10 samples, 2 or more exceedances during any 3 year period) but not the 1-hour criteria were placed on the "List of Waterbodies Warranting Further Investigation", unless 303(d) listing was warranted based upon other information such as biological data indicating impairment, or severity of exceedances.
It must be noted that a few waterbodies were listed with sample sizes less than 10. For those waterbodies, other information such as severity, frequency and magnitude of the exceedances, and sediment, fish tissue, biological conditions warranted listing. The data sources and decisions supporting each listing decision are documented in the appendices.

Accounting for Extreme Events

Drought and flood period are a part of the natural process, and data that shows impairment as a result of a major drought or flood event should not serve as the listing basis. Nevada Administrative Code 445A.121(8) states, "The specified standards are not considered violated when the natural conditions of the receiving water are outside the established limits, including periods of extreme high or low flow ...." Therefore, water chemistry data associated with samples collected during extreme high and low flows[4] were not considered in the listing analysis.

Field and Laboratory Data

In the case of pH, many of the available datasets include both field and laboratory values. Since pH can change over time before the sample arrives at the laboratory, the field pH is felt to be the more accurate measure. Therefore, field pH was the primary value evaluated for standards compliance. However, laboratory pH was utilized in some instances where field pH was not available.

Biological Assessments

Starting in 2000, NDEP has been performing biological assessments on the major waterbodies in Nevada. Data and information are being collected concerning macroinvertebrate abundance and diversity, and physical habitat conditions. As this program is in its infancy, none of NDEP's biological assessment or bioassay information were used in the 303(d) listing analysis. Laboratory identification and quantification of macroinvertebrate samples have yet to be

[4] $7Q10_{high}$ and $7Q10_{low}$ values as developed by USGS were used to establish the extreme flow conditions. The 7Q10 flows were developed from historic streamflow data and are defined as a predicted high or low flow for a consecutive seven day period with an expected recurrence interval of ten years.

received by NDEP. Reference sites and biological assessment protocols will be developed as NDEP collects additional data.

Some macroinvertebrate data were submitted to NDEP for consideration, but without any evaluation protocols, reference conditions and criteria specific to Nevada, BWQP was not able to incorporate these data into our listing decisions. As the biological assessment program develops, BWQP will be better suited to evaluate biological data for determinations of beneficial use support.

Continuous Monitoring Data

Past 303(d) Lists have been developed based primarily upon grab sample data, which represent quality conditions for a specific point in time. Data collected on a more continuous basis, e.g. hourly or other frequencies, needs to be considered during the 303(d) List development. In recent years, NDEP and other groups have undertaken continuous monitoring of some parameters (such as dissolved oxygen, temperature, pH and specific conductance) for selected waterbodies. In most cases, the available continuous monitoring data did not have a complete record set for the five-year listing period (January 1, 1997 to December 31, 2001). These data were evaluated as follows for inclusion on the List:

- Each day of available data was examined to determine the number of violations. If the standards were violated for any length of time for a given day, it was considered as one violation.
- A reach was listed if standard violations occurred for more than 10% of the 1,826 days in the five-year period.

Additional Considerations during the Listing Assessments

Standards, Control Points and the Tributary Rule

For the major waterbodies, NAC sets water quality standards for specific control points (see NAC 445A.145). On a given stream, the standards apply to that control point and for the remainder of the river upstream, all surface waters upstream (in Nevada) or to the next control point upstream, if any. If there are no control points downstream from a particular control point, the standards for that control point apply for the remainder of the stream downstream, all surface waters downstream (in Nevada) or to the next waterbody downstream named in NAC. As a result, NAC has effectively divided many of the streams into reaches with varying standards.

As stated earlier, NDEP operates an extensive water quality monitoring network throughout Nevada. In many cases, the associated sampling locations are at control points. Data collected at these control points are evaluated as part of the listing process. If the standards are violated (in accordance to the criteria described herein) at the control point, the entire reach associated with that control point was listed unless there is available information to divide the reach into subreaches. In fact, there are some instances where two or more monitoring stations are located on a reach. These data were examined to determine whether or not to list the entire reach or only subreaches.

NAC 445A.145 is commonly referred to as the "tributary rule." In general, the tributary rule provides additional water quality criteria for those surface waters (in Nevada only) that are not defined as a class water (NAC 445A.123 through 127) nor as a designated water (NAC 445A.146 through 225). For those waters that are unclassified and undesignated, the water quality criteria for the nearest control point or classified water (upstream or downstream) may be applied to these water bodies in the listing analysis under certain conditions. According to NDEP's Continuing Planning Process document, the tributary rule is to be applied to an unclassified and undesignated water in the listing analysis if:

- there was a hydrologic connection during the listing period not just in response to storm events; and
- the hydrologic connection was for a long enough period such that a commingling of water and an exchange of beneficial uses, in particular aquatic life, was possible.

For purposes of the 2002 303(d), the tributary rule was applied to a given waterbody if USGS topographical maps showed a connection between the waterbody in question and a designated or class water. Tributary application decisions are denoted in the appendices.

Designated and Class Waters

The water quality of both the designated and the class waters will be evaluated for potential inclusion on the 2002 303(d) List. In general, only designated waters were included in past 303(d) Lists.

Single Value and Annual Average/Median Standards

For some reaches, the water quality standard for a parameter is defined in terms of a maximum annual average or annual median concentrations. The reach was listed if the annual average or median values exceeded the beneficial use standard at least once during the five-year listing period.

Some reaches have both single value standards and annual average standards for certain parameters. If either the single value standard were exceeded more than 10% of the time (assuming a minimum of ten samples) or the annual average standard was exceeded at least once, the reach was listed for that particular parameter.

Antidegradation Considerations

Nevada Revised Statutes (NRS) 445A.565 contain the State's antidegradation requirements. NRS 445A.565 states:

> "Any surface waters of the state whose quality is higher than the applicable standards of water quality as of the date when those standards became effective must be maintained in their higher quality. No discharges of waste may be made which will result in lowering the quality of these waters unless it has been demonstrated to the commission that the lower quality is justifiable because of economic or social considerations. This subsection

does not apply to normal agricultural rotation, improvement or farming practices"

NRS 445A.565 is implemented through the establishment of requirements to maintain existing higher quality (RMHQs). An RMHQ is established when the monitoring data show that existing water quality for individual parameters is significantly better than the standard necessary to protect the beneficial uses. If adequate monitoring data exist, RMHQs are established at levels which reflect existing conditions. This system of directly linking antidegradation to numeric objectives provides a manageable means for implementing antidegradation through permits and other programs. In general, past Nevada 303(d) Lists have been developed based upon violations of the beneficial use standards and not the RMHQs. However in the case of the Truckee River, TDS was placed on the 1992 303(d) List due to violations of the TDS RMHQ. For this report, waterbodies violating RMHQs (in general, more than 10% of the time for sample sizes of 10 or greater) were placed in a separate table entitled "Waterbodies not meeting RMHQs (Requirements to Maintain Higher Water Quality)." TMDLs are NOT required for these waterbodies.

Tribal Water Quality Standards

Tribes have independent authority for setting water quality standards and implementing regulations for waters on reservation land under the 1987 Amendments to the Clean Water Act (CWA). At this time, the State of Nevada regulations include water quality standards for waterbodies on tribal lands throughout Nevada. However the State of Nevada has no authority to set standards on tribal lands, therefore the 2002 303(d) List does not included any impaired waterbodies that exist on tribal lands.

Natural Condition-Based Water Quality Standards

There are several instances in the regulations where the water quality criteria are defined as a certain level above or below the "natural conditions[5]" (Table 1). Application of these standards to the 303(d) listing process is difficult due to problems in quantifying natural conditions. In order to quantify natural conditions, data representing pre-human development conditions are needed. However, most of the available water quality data are based upon samples collected after upstream human impacts have occurred.

Violations of the natural condition-based standards were not evaluated for impairment status on the 2002 303(d) List, except for fecal coliform and TDS as follows:

> **Fecal coliform:** Criteria 1 and 3 in Table 1 are not natural condition-based standards and will be used in the listing analysis.
>
> **TDS:** The natural conditions portion of the standard will not be used, however the maximum TDS level of 500 mg/l in Table 1 will be used in the listing analysis.

[5] "Natural conditions" are considered to be the water quality characteristics that would exist in a waterbody without the impacts of modern human development. The Nevada Administrative Code does not define "natural conditions", but does provide the following definition of "natural waters" – "…waters which have not been degraded or enhanced by actions attributable to man."

Table 1. Summary of Natural Condition-Based Water Quality Standards

Parameter	Applicable Water Class	Standard
Alkalinity	various designated waters	"less than 25% change from ***natural conditions***"
Color	various designated waters	"Increase in color must not be more than 10 PCU above ***natural conditions***."
Fecal coliform	Class C only	The more stringent of the following apply: "1. The fecal coliform concentration must not exceed a geometric mean of 1000 per 100 milliliters nor may more than 20 percent of total samples exceed 2400 per 100 milliters." "2. The annual geometric mean of fecal coliform concentration must not exceed that characteristic of ***natural conditions*** by more than 200 per 100 milliliter nor may the number of fecal coliform in a single sample exceed that characteristic of ***natural conditions*** by more than 400 per 100 milliliter." (italics added) "3. The fecal coliform concentration, based on a minimum of 5 samples during any 30-day period, must not exceed a geometric mean of 200 per 100 milliliters, nor may more than 10 percent of total samples during any 30-day period exceed 400 per 100 milliliters. This is applicable only to those waters used for primary contact recreation."
Total Dissolved Solids	Class A, B and C waters	"must not exceed 500 mg/l or one-third above that characteristic of ***natural conditions*** (whichever is less)."
Turbidity	various designated waters	"Increase in turbidity must not be more than 10 NTU above ***natural conditions***."

NDEP is in the process of revising these natural condition-based standards to numeric criteria that are measurable and defensible.

Natural Background Considerations

In instances where a water quality standard is exceeded due solely to naturally occurring conditions, the exceedance is not considered a violation of the water quality standard. Refer to the following NAC references:

> NAC 445A.120(2) states:
>
> "…Natural water conditions may, on occasion, be outside the limits established by standards. The standards adopted in NAC 445A.120 to 445A.213, inclusive, relate to the condition of waters as affected by discharges relating to the activities of man."

NAC 445A.121(8) states:

> "The specified standards are not considered violated when the natural conditions of the receiving water are outside the established limits, including periods of extreme high or low flow…"

In determining whether or not a waterbody is impaired due solely to natural causes, NDEP examined available information and applied best professional judgment. The type of information needed for a waterbody to be considered as naturally impaired include (but not limited to):

- Human activities (e.g. urbanization, grazing, mining) within the affected waterbody shown not to be significant source of pollutant in question.
- The pollutant in question is known to occur naturally in the form found in the reach.
- A probable natural source (i.e. hot springs, mineralized outcropping) is located within the watershed.

During the development of the 2002 List, no waterbodies were found at this time to qualify as "impaired by natural causes." Additional studies are needed for some waterbodies to determine whether or not impairments are due to natural causes.

Narrative Standards

Narrative standards appear in two locations in the regulations:

> NAC 445A.121 contains narrative criteria that are applicable to all surface waters of the state and consist mostly of statements requiring waters to be "free from" various pollutants in sufficient levels so as to not: 1) be unsightly; 2) interfere with any beneficial uses; 3) create a public nuisance; 4) be toxic to human, animal, plan or aquatic life; etc.
>
> NAC 445A.203 – 445A.208 (Humboldt River) includes criteria which states that color is to not have "adverse effects" on the beneficial use (with municipal and domestic supply being the most restrictive use).

One example of available qualitative information includes information collected by NDEP. When grab samples are collected as part of NDEP's monitoring network operations, staff also notes whether or not the water contains substances attributable to domestic or industrial waste or other controllable sources including:

- Settleable solids that form bottom or sludge deposits;
- Floating debris;
- Oil, grease, scum and other floating materials;
- Odor; and
- Color, turbidity or other conditions.

These qualitative observations did not lead to any new listings but were used as a check on some listings that were based upon water column chemistry.

Some data submitted to NDEP for consideration were for waterbodies that have no specific numeric criteria and are not tributary to waterbodies with criteria. In these instances, only NAC 445A.121 provides narrative criteria. For these waterbodies, there were insufficient data to list as impaired. However, some of these waterbodies were included on the "List of Waterbodies Warranting Further Investigation".

Special Considerations for Lakes

NDEP collects samples at a number of lakes throughout Nevada, however in some instances the sampling points are limited to one point that is easily accessible to the monitoring crew. The same may be true for other entities and their sampling programs. Depending upon the parameter in question, the resulting water quality data may or may not be representative of conditions in the lake. For instance, the samples may have been collected near shore at high use areas with water quality representative of only a limited portion of the lake. Other samples collected further out in the lake may indicate different water quality conditions. Lakes were included on the 2002 303(d) List if the data were deemed (based upon our experience with lakes and best professional judgment) to be representative of mid-lake conditions and sufficient standards exceedances were identified. Otherwise, waterbodies were placed on the "List of Waterbodies Warranting Further Investigation". Future monitoring is needed for these waterbodies to determine actual mid-lake conditions and relations with near shore conditions.

Delisting

As a general rule of thumb, it should take similar data to delist as to list. In other words, if the procedures described above are found to indicate a waterbody is not impaired, the waterbody will be delisted. Other reasons to delist include:

- The standard is no longer exceeded because of a change in the surface water quality standards.
- Faulty data or information, or errors in the analysis resulted in a listing error.

The above list is not intended to be inclusive of the only criteria considered for de-listing. NDEP reserves the right to use data or information that goes beyond the above criteria, and can include other types of information and best professional judgment. The lack of data was never justification for delisting a waterbody. For the 2002 303(d) List, waterbodies were delisted for the following reasons:

- the available 10 or more samples indicated exceedances at less than 10 percent;
- the waterbody was erroneously included on the 1998 303(d) List; and
- the waterbody is on tribal land.

TMDL Prioritization Schedule

40 CFR Part 130 requires that TMDLs be developed for those waterbodies on the 303(d) List, and that the 303(d) List contain a prioritized schedule for establishing TMDLs for these waters. Prioritizing water bodies enables the state to make efficient use of available resources to meet the objectives of the Clean Water Act. Priority ranking takes into account the severity of the pollution and the uses to be made of such waters.

Targeting high priority waters for TMDL development reflects an evaluation of the relative value and benefit of water bodies within the state. The priority ranking was developed taking into consideration the following (not in order of priority):

- Risk to human and aquatic life
- Degree of public interest and support
- Recreational, economic, and aesthetic importance of a particular waterbody
- Vulnerability or fragility of a particular waterbody as an aquatic habitat
- Immediate programmatic needs such as:
    - waste load allocations
    - permits to be issued
    - new or expanding discharges
    - load allocations for needed Best Management Practices (BMPs)
- Severity of the impairment and the designated water uses
- Data availability
- Potential changes to water quality standards
- Appropriateness of standard
- TMDL complexity
- Staffing and other resources

The 2002 303(d) List (Appendix A) presents the TMDL development priorities for the various listed waterbodies as determined by the Bureau of Water Quality Planning based upon existing resources. In general, the following schedule applies for the different priority levels:

- (1) High priority: 0 to 2 years
- (2) Medium priority: 2 to 5 years
- (3) Low priority: beyond 5 years

NDEP did not go through any formal priority ranking process to develop the TMDL priorities. With our limited resources, it was clear that NDEP could only complete one to two TMDLs per year. Keeping this in mind along with our knowledge of the watersheds and other ongoing assessment efforts, staff used its judgment in prioritizing TMDLs into these three categories.

Summary of Methodology and Findings

Section 303(d) of the Clean Water Act requires that States develop a list of waterbodies needing additional work beyond existing controls to achieve or maintain water quality standards. This

list, referred to as the Section 303(d) List, provides a comprehensive inventory of water bodies impaired by all sources, including point sources, nonpoint sources, or a combination of both. The 303(d) List is the basis for targeting water bodies for watershed-based solutions, and the Total Maximum Daily Load (TMDL) process provides an organized framework to develop these solutions.

Subpart C of 40 CFR (Code of Federal Regulations) Part 130 requires that states develop descriptions of the criteria and process used in generating their 303(d) lists. This report summarizes the basic methodology NDEP used in developing the 2002 303(d) List. The 2002 303(d) List is included in Appendix A. In addition to impaired waters, this report also identified waterbodies in need of additional review:

- **List of Waterbodies with Exceedances of RMHQs:** Represents violations of Requirements to Maintain Higher Water Quality, TMDLs are not required (Appendix B). Additional investigations are needed to determine whether or not water quality is worsening. Available resources limit NDEP's ability to investigate these waterbodies.
- **List of Waterbodies Warranting Further Investigations:** Represents waterbodies with possible water quality problems, TMDLs are not required. (Appendix C). Additional investigations are needed to determine whether or not standards are being exceeded and the uses are being impaired. Available resources limit NDEP's ability to investigate these waterbodies.
- **Delisted Waters:** Waterbodies that were on the 1998 303(d) List but no longer qualify for inclusion as impaired on the 2002 303(d) List (Appendix D)

As stated above, the 303(d) Impaired Waters List begins to define those waterbodies in need of TMDLs as part of the solutions for a given waterbody. The next 2 tables included in this report (Waterbodies with Exceedances of RMHQs, and Waterbodies Warranting Further Investigation) identify waterbodies in need of additional review which could include additional monitoring, standards review and revision, or inclusion on future 303(d) List. Appendix D includes waters removed from the 303(d) List.

There are approximately 14,988 miles of perennial rivers and streams, 126,257 miles of intermittent/ephemeral streams and channels, 1,782 miles of ditches/canals and 551 border miles of shared rivers. Nevada has approximately 1,070 lakes, reservoirs or ponds with a approximate total acreage of 533,239 (these river and lake sizes are according to EPA's "Total Waters Report") and approximately 136,650 acres of wetlands. The 2002 303(d) Impaired Waters List identifies approximately 1,474 river miles as impaired, an increase of about 600 miles from the 1998 303(d) List. The most common causes of impairment for all listed streams is nutrient, metals, sediment, temperature, totals dissolved solids, pH and other parameters (Table 2). Impaired lake and reservoir acreages have increased from 36,812 acres in 1998 to 76,928 acres in the 2002 303(d) List. Impaired wetland acreages have remained essentially constant at 19,511 acres. The number of listed river miles and acreages have increased from the 1998 303(d) List due to changes in the listing methodology and the implementation of new standards, not from degradation of the water quality.

Table 2. Summary of Impaired Waterbodies and Associated Parameters

Parameter	Impaired Rivers, miles	Impaired Lakes/Reservoirs, acres	Impaired Wetlands, acres
TOTAL	1,474	76,928	19,511
Nutrients	1,070	2,830	185
Metals	1,066	0	19,326
Sediment	672	0	0
Temperature	535	0	0
Total Dissolved Solids	251	35,500	185
pH	41	4,616	185
Other	19	36,812	0

Current Status of TMDL Development

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.

It must be recognized that there are significant constraints to the future development of comprehensive TMDLs which adequately define the problems and lead to effective implementation plans. As discussed in the "Statewide Observations" section, factors such as limited data, and inappropriateness of some standards are impediments to more effective TMDLs. For this reason, a majority of Nevada's future TMDLs will be "phased", whereby the available data are used to the extent possible recognizing that revisions will be made as additional information and data become available.

Established TMDLs

Table 3 summarizes the TMDLs that have been established by NDEP and approved by EPA. The following discussion provides information on the status of these TMDLs and any efforts to modify.

Table 3. Summary of Established TMDLs

Basin	Parameters	Reference
Carson River	BOD, nitrate, orthophosphates, TDS	208 Plan for the Carson River Basin (NDEP, 1982)
Humboldt River	TDS, TP, TSS	208 Plan for Non-Designated Areas (NDEP, 1993)
Las Vegas Wash/Bay	TP, total ammonia	Rationale and Calculations for TMDLs and WLAs for Las Vegas Bay (NDEP, 1988)
Truckee River	TDS, TN, TP	Truckee River Final TMDLs and WLAs (NDEP, 1994)
Walker River	TSS	208 Plan for Non-Designated Areas (NDEP, 1993)

BOD = biochemical oxygen demand
TDS = total dissolved solids
TN = total nitrogen
TP = total phosphorus
TSS = total suspended solids

Carson River: *Water Quality Management (208) Plan for the Carson River Basin, Nevada* (1982) contains maximum allowable daily loads for dissolved oxygen, biochemical oxygen demand, orthophosphates, nitrates and total dissolved solids, which were developed utilizing a detailed water quality modeling study. However, this TMDL is confusing, and needs to be updated to reflect current water quality standards and conditions on the river. NDEP is in the process of updating the Carson River TMDL. It is anticipated that some updates will be developed by 2003.

Humboldt River: The existing TMDLs for total suspended solids (TSS) and total phosphorus (TP) are included in Nevada's Nondesignated Areas 208 Plan (NDEP 1993). However, the existing TMDLs oversimplify a complex situation and do little to characterize sources to the level needed for a meaningful implementation plan. Additional work is needed to better identify sources in terms of their contributions and locations.

The water quality standards for the Humboldt River were revised in November 1995. As a result of revisions to the water quality standards for TP and TSS, the existing TMDLs need to be reevaluated. NDEP plans to revised the current TMDL in the future, however, it must be noted that significant additional assessments are needed before a more meaningful TMDL can be realized. The existing TMDL does not define any wasteload allocations for point source discharges:

"Section 303(d)(1)(C) requires that TMDLs shall be established at a level necessary to implement the applicable water quality standards. Any discharge which improves the existing water quality, and has permitted discharge limits as strict or stricter than the water quality standards will be considered in compliance with the TMDLs."

Las Vegas Bay/Wash: In 1987, NDEP established total phosphorus and total ammonia WLAs in the Las Vegas Wash at Northshore Road as needed to meet the Las Vegas Bay water quality standards. The WLAs set are applicable for only April through September and were based upon target concentrations (0.64 mg/l – total phosphorus, 1.43 mg/l total ammonia) developed by French (*Concentration Estimates at Northshore Road to Meet Water Quality Standards in Las Vegas Bay*, 1988), and average streamflows. In 1994, Dr. French (*Concentration Estimates at Northshore Road to Meet Water Quality Standards in Las Vegas Bay*, May 1994), re-examined these target concentrations. Of particular interest was the possible impact of increasing the un-ionized ammonia standard for the Las Vegas Bay would have on the target concentrations and ultimately the TMDL/WLAs and permit limits. The study suggested that the target concentrations could be lowered considerably (0.32 mg/l – total phosphorus, 0.57 mg/l – total ammonia), representing a significant change in the TMDL. However the study also made it clear that additional work is needed to understand the dynamics of the Wash and Bay. Following completion of the 1994 study, NDEP decided that a revision of the TMDL/WLAs was not appropriate because of the uncertainties revealed by the study.

NDEP is in the process of reviewing the existing TMDL/WLAs to assess compliance and to determine if revisions are required. In 2002, UNLV completed a study entitled "Microbiological and Limnological Evaluations in the Las Vegas Wash/Bay System" to address some of the issues raised by the 1994 French report. NDEP's review will include an examination of the findings of the UNLV report. Another component of the TMDL review will include an evaluation of changes in flow conditions. During the years since the TMDL was developed, the average annual streamflow in the Las Vegas Wash has increased significantly while loading during the TMDL season (April through September) has not increased as required by the TMDL.

Truckee River: NDEP established TMDLs for TN, TP and TDS for the Truckee River in 1994. These TMDLs have been incorporated into the NPDES permit for the Truckee Meadows Water Reclamation Facility (TMWRF). During the mid-1990s, TMWRF was not able to consistently meet the waste load allocation (WLA) for total nitrogen due to a snail infestation of the nitrification towers. When the snails consume the bacterial populations down to low levels, the ammonia conversion to nitrates is severely diminished and nitrogen concentrations in the final effluent increases. Subsequent improvements have eliminated the problem and the plant has been able to meet its WLA requirements.

TMWRF is currently studying options for updating the TMDL. One possible revision could involve modifying the TN WLA to account for only the bioavailable portion of TN. The current TMDL assumes that all of the nitrogen in the TMWRF effluent is readily available for biological uptake. The goal of the study is to determine the degree to which

the DON (dissolved organic nitrogen) in the TMWRF effluent is bioavailable. TMWRF is also studying the feasibility of reworking the TMDL/WLA so that higher winter TN loads would be acceptable during the winter months when less algal activity generally occurs.

Walker River: The existing TMDLs for total suspended solids (TSS) are included in Nevada's Nondesignated Areas 208 Plan (NDEP 1993). As with the Humboldt TMDLs, the existing Walker River TMDLs oversimplify a complex situation and do little to characterize sources to the level needed for a meaningful implementation plan. Additional work is needed to better identify sources in terms of their contributions and locations, and to better characterize beneficial use impairment (particularly aquatic life).

Other TMDL Activities

Bryant Creek: NDEP will be finalizing the Bryant Creek TMDL for metals in 2003.

East Fork Owyhee River: NDEP will be finalizing the East Fork Owyhee River TMDL for total phosphorus, total suspended solids, and iron in 2003

Lake Tahoe: NDEP is working inconjunction with the State of California (Lahontan Regional Water Quality Control Board) for the development of a Lake Tahoe TMDL to address clarity concerns caused by nutrient loading and fine sediments. It is anticipated that a technical TMDL will be completed in 2005, with subsequent implementation plan development by 2007.

Virgin River: NDEP will be finalizing the Virgin River TMDL for boron in 2003.

Statewide Observations

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 relatively large number of waterbodies have been identified as impaired for total phosphorus (TP) throughout the state on both past and present 303(d) Lists. For many reaches, TP is the main or only parameter causing the waterbody to be listed as impaired. The standard of 0.1 mg/l (single value or annual average) applies across much of the state. This standard is based on recommendations made in EPA's "Quality Criteria for Water 1986" or commonly referred to as the Gold Book. These recommendations are not strongly supported in the Gold Book and are not identified as criteria, but rather 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 TP water quality standard must be questioned. It is clear that additional research is needed on the role of TP in eutrophication. 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 for some of our rivers.

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.

Another problem relates to the nitrogen standards set for various waterbodies in the state. In most cases, the nitrate standards are based upon drinking water standards rather than eutrophication control needs. As a result, current nitrate standards are likely higher than needed for controlling algae growth.

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.

pH

The pH standards for a number of waterbodies are outdated and in need of revision. In EPA's most recent criteria guidance (Gold Book: Quality Criteria for Water, 1986), a pH range of 6.5 to 9.0 is recommended for the protection of aquatic life. NDEP is in the process of updating the pH standards, as needed, in the Nevada Administrative Code. Unless the regulations indicated otherwise, a pH range of 6.5 to 9.0 was used in the developing the 2002 303(d) List.

Naturally Occurring Pollutants

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, arsenic, selenium and iron 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.

Metals and Detection Limits

As discussed earlier, toxics concentrations in Nevada rivers are frequently less than the detection limits associated with the methods currently used by the State Health Laboratory for the NDEP monitoring program. This poses a problem when the detection limit is greater than the water quality criteria for the particular constituent. In those instances where the laboratory reports levels are "less than detection limit", it was not possible to determine whether or not a water quality standard is being met. For purposes of the 2002 303(d) List, it was generally assumed that a standard was being met if the data were reported as "less than the detection limit".

At this time, NDEP is working with the State Health Laboratory in lowering the detection limits thereby improving our ability to assess standards compliance. The constituents of particular concerns are summarized in Table 4 with the associated detection limits and water quality criteria for waters with a hardness of 30 mg/l as $CaCO_3$. In general, the lowest hardness levels

found in Nevada's surface waters are around 30 mg/l. For those constituents with hardness-dependent criteria, the criteria become more restrictive with lower hardness values. It is at these lower hardness levels that the detection limits become a concern.

Table 4. Summary of Method Detection Limits and Criteria for Various Toxics

Parameter	Method Detection Limit, µg/l	1-hr Criteria, µg/l (for Hardness = 30 mg/l as $CaCO_3$)	96-hr Criteria, µg/l (for Hardness = 30 mg/l as $CaCO_3$)
Cadmium	1	0.9	0.4
Copper	20	4.9	3.6
Lead	2	8.8	0.2
Mercury	0.5	2	.012
Zinc	50	35.9	32.5

Note: Criteria are for dissolved concentrations, with the exception of mercury which is given as a total recoverable concentration. The mercury criteria are not hardness dependent.

Zinc

Exceedances of the dissolved zinc criteria were identified on a number of waterbodies. However upon close examination of the data, the dissolved zinc concentrations were found to be significantly greater than the total recoverable concentrations in many cases. This situation suggests that sample contamination may be occurring as it is not possible for dissolved concentrations to exceed total concentrations. Because of concerns about the accuracy of these data, no zinc listings were made using NDEP data.

Currently, NDEP is working with the State Health Laboratory to address this problem. It must be noted that this condition was found only with the zinc data and not other metals.

Truckee River Metals Monitoring

For several years, DRI (Desert Research Institute) has been monitoring water quality on the Truckee River. Due to funding constraints, metals analyses were dropped from the Truckee monitoring program in 1999. As a result, only 2 years of metals data were available for the Truckee River monitoring sites for the period 1997-2001. Also, data were restricted to total recoverable concentrations with no dissolved concentration data.

Total Recoverable vs. Dissolved Concentrations (Metals)

Nevada's water quality standards for metals includes criteria for both total recoverable and dissolved concentrations. Until recently, NDEP monitoring data were available only for total recoverable levels. Beginning in 1998 and 1999 (depending on the waterbody), NDEP began collecting filtered samples. As a result, for many waterbodies less than 5 years of filtered data were available for comparison to the dissolved water quality criteria.

Arsenic

Nevada's current water quality standards for arsenic is 50 µg/l for municipal and domestic supply beneficial uses (NAC 445A.144). On January 22, 2001 EPA adopted a new MCL (maximum contaminant level) standard for arsenic in drinking water at 10 µg/l, replacing the old standard of 50 µg/l. The rule became effective on February 22, 2002 and drinking water supply systems have until January 23, 2006 to comply with the MCL. For the 2002 303(d) List, the Nevada's current water quality standard of 50 µg/l was utilized in the analyses. NDEP is in the process of reviewing and updating its toxics standards (including arsenic). It must be noted that the regulations state that surface water quality in support of the municipal/domestic supply beneficial use is to be of appropriate quality so that the water can be treated by conventional methods in order to comply with Nevada's drinking water standards. In other words, a waterbody with municipal/domestic supply as a beneficial use is not expected to meet the drinking water MCLs **without treatment**; and when setting water quality standards, NDEP may set numeric criteria less restrictive than the MCLs. In some instances, NDEP and the State Environmental Commission has set surface water quality standards at levels equivalent to drinking water standards even though the constituents could be treated by conventional means. These numeric water quality standards apply in these cases.

Fecal Coliform

For many waterbodies, the fecal coliform criteria reads as follows:

> " Based on a minimum of not less than 5 samples taken over a 30-day period, the fecal coliform bacterial level may not exceed a geometric mean of 200 per 100 ml nor may more than 10 percent of the total samples taken during any 30-day period exceed 400 per 100 ml."

There were no instances where the available data were of adequate frequency (at least 5 samples per month) to appropriately evaluate compliance with this standard. For instance, NDEP samples for bacteria 3 to 6 times per year depending upon the waterbody.

While the available fecal coliform data could not be used for assessing standards compliance and placing waters on the Impaired Waters List, the fecal coliform data were evaluated for possible inclusions on the "List of Waterbodies Warranting Further Investigation". For this analyses, the 200/100 ml standard was evaluated as an annual geometric mean standard, and the 400/100 ml standard was evaluated as a single value standard.

The existing fecal coliform criteria in the regulations were set for the prevention of illness resulting from water contact recreation. However, *E. Coli* bacteria has been found to be a better indicator of public health threats for water contact uses. Following U.S. EPA recommendations, NDEP is in the process of incorporating *E. Coli* criteria into the 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.

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.

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,

> "[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.

Glossary

Best Management Practices (BMPs). Methods, measures, or practices determined to be reasonable and cost-effective means for a landowner to meet certain pollution (generally nonpoint source) control needs.

Geometric Mean. The value obtained by taking the "nth" root of the product of "n" numbers. Example: For the dataset (10, 15, 12, 11), the geometric mean = $(10 \times 15 \times 12 \times 11)^{1/4}$

Impaired waterbody. A water that does not attain/maintain the water quality standards throughout the waterbody due to individual or multiple pollutants or other causes of pollution.

Load allocations. The portion of a TMDL's pollutant load allocated to nonpoint sources (NPS) or background sources.

Median. For a given set of numbers, the median is the value which has an equal number of values greater and less than it.

Narrative standards. Nonquantitative guidelines that describe the desired water quality goals.

Nonpoint sources. Pollution that is discharged over a wide land area and not from one specific location.

Point sources. Pollutant loads discharge at a specific location from pipes, outfalls, and conveyance channels from either municipal wastewater treatment plants or industrial waste treatment facilities. This term does not include return flows from irrigated agriculture or agriculture storm water runoff.

Total Maximum Daily Load (TMDL). A TMDL is a written, quantitative plan and analysis for attaining and maintaining water quality standards in all seasons for a specific waterbody and pollutant. Total maximum daily loads or TMDLs are an assessment of the maximum amount of pollutant a waterbody can receive without violating water quality standards. TMDLs take into account pollution from all sources, including discharges from sewage treatment facilities and industry; runoff from farms, forests and urban areas; and natural sources. TMDLs provide a way to integrate the management of both point and nonpoint sources of pollution through the establishment of wasteload allocations (WLA) for point source discharges and load allocations (LA) for nonpoint sources of pollution. The TMDL Program is designed to help bring waterbodies into compliance with the water quality standards as needed to support their designated uses such as irrigation, aquatic life, municipal or domestic supply, and water contact recreation.

Waste load allocations. The portion of a TMDL's pollutant load allocated to point sources subject to NPDES permits.

Appendix A

Nevada's 2002 303(d) List

Table A-1. Nevada's 2002 303(d) List of Impaired Waterbodies

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Existing TMDLs	Pollutant or Stressor of Concern	Data Sources	TMDL Priority	New Listing?	Notes
Snake River Basin											
NV03-SR-02	445A.216	Salmon Falls Creek	Above stateline	37.2	miles	None	Iron (total)	NDEP	3	X	
							Temperature		3		
							Total phosphorus		3	X	1
							Total suspended solids		3	X	
							Turbidity		3	X	
NV03-SR-03	445A.217	Shoshone Creek	Above stateline	11.51	miles	None	Iron (total)	NDEP	3	X	
							Temperature		3		
							Total phosphorus		3	X	1
							Total suspended solids		3	X	
							Turbidity		3	X	
NV03-JR-12	445A.218	East Fork Jarbidge River	Above stateline	18.6	miles	None	Temperature	NDEP	3	X	
NV03-JR-13	445A.219	Jarbidge River	Source to Town of Jarbidge	7.44	miles	None	Total phosphorus	NDEP	3	X	1
NV03-JR-14	445A.220	Jarbidge River	Town of Jarbidge to stateline	8.98	miles	None	Temperature	NDEP	3	X	
NV03-OW-18	445A.222	East Fork Owyhee River	Wildhorse Reservoir to Mill Creek	13.75	miles	Draft TMDL Iron, Total phosphorus, TSS, turbidity	Iron (total)	NDEP	1		
							Temperature		1	X	
							Total phosphorus		1		1
							Total suspended solids		1		
							Turbidity		1		
NV03-OW-19	445A.223	East Fork Owyhee River	Mill Creek to Duck Valley Indian Reservation	7.71	miles	Draft TMDL Iron, Total phosphorus, TSS, turbidity	Total phosphorus	NDEP	1		1,2
							Total suspended solids		1		1,2
							Turbidity		1		1,2
NV03-OW-25-B	445A.125	Wildhorse Reservoir	Entire Reservoir	2,830	Acres	None	pH	NDEP	3	X	3
							Total phosphorus		3	X	1
NV03-OW-27	445A.225	South Fork Owyhee River	Above Stateline	75	miles	None	Temperature	BLM - Elko District	3	X	
NV03-OW-100	Tributary to SF Owyhee River - 445A.225	Snow Creek	Below Jerritt Canyon Project	6	miles	None	Total dissolved solids	AngloGold-Meridian Jerritt Canyon Joint Venture	3	X	
NV03-OW-101	Tributary to SF Owyhee River - 445A.225	Jerritt Canyon Creek	Below Jerritt Canyon Project	6	miles	None	Total dissolved solids	AngloGold-Meridian Jerritt Canyon Joint Venture	3	X	
NV03-OW-102	Tributary to SF Owyhee River - 445A.225	Mill Creek	Below Jerritt Canyon Project	1	miles	None	Total dissolved solids	AngloGold-Meridian Jerritt Canyon Joint Venture	3	X	

Table A-1. Nevada's 2002 303(d) List of Impaired Waterbodies (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Existing TMDLs	Pollutant or Stressor of Concern	Data Sources	TMDL Priority	New Listing?	Notes
Snake River Basin											
NV03-OW-34-C	Tributary to EF Owyhee River - 445A.223	Mill Creek	Above East Fork Owyhee River	1.44	miles	Draft TMDL Iron, Total phosphorus, TDS, TSS	Cadmium (total)	NDEP	1	X	
							Copper (dissolved)		1	X	4
							Copper (total)		1	X	
							Dissolved oxygen		1	X	
							Iron (total)		1	X	
							pH		1	X	
							Temperature		1	X	
							Total dissolved solids		1	X	
							Total phosphorus		1	X	1
							Total suspended solids		1	X	
							Turbidity		1	X	
Humbolt River Basin											
NV04-HR-01	445A.203	Humboldt River	Origin to Osino	66.12	miles	none	Iron (total)	NDEP	2	X	5
							Total phosphorus		2	X	1
NV04-HR-02	445A.204	Humboldt River	Osino to Palisade	64.39	miles	Total phosphorus, TSS	Iron (total)	NDEP	2		
							Total phosphorus		2		1
							Turbidity		2		
NV04-HR-03	445A.205	Humboldt River	Palisade to Battle Mtn	76.5	miles	Total phosphorus, TSS	Iron (total)	NDEP	3		2
							Total phosphorus		3		1
							Total suspended solids		3	X	
							Turbidity		3		
NV04-HR-04	445A.206	Humboldt River	Battle Mtn to Comus	81.36	miles	Total phosphorus, TDS, TSS	Boron (total)	NDEP	3	X	
							Iron (total)		3		
							Total dissolved solids		3	X	
							Total phosphorus		3		1
							Total suspended solids		3	X	
							Turbidity		3		
NV04-HR-05	445A.207	Humboldt River	Comus to Imlay	114.09	miles	Total phosphorus, TDS, TSS	Iron (total)	NDEP	3		2
							Molybdenum	USGS	3	X	
							Total dissolved solids	NDEP	3	X	
							Total phosphorus		3		1
							Total suspended solids		3	X	
							Turbidity		3		
NV04-HR-06	445A.208	Humboldt River	Imlay to Woolsey	44.42	miles	None	Molybdenum	USGS	3	X	

Table A-1. Nevada's 2002 303(d) List of Impaired Waterbodies (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Existing TMDLs	Pollutant or Stressor of Concern	Data Sources	TMDL Priority	New Listing?	Notes
Humbolt River Basin											
NV04-HR-07-C	445A.126	Humboldt River	Woolsey to Rodgers Dam	13.22	miles	None	Total dissolved solids	NDEP	3	X	5
NV04-HR-08-D	445A.127	Humboldt River	Rodgers Dam to Humboldt Sink	22.77	miles	None	Boron (total)	NDEP, USGS	3		
							Iron (total)	NDEP	3		
							Molybdenum	USGS	3	X	
NV04-MR-10-B	445A.125	Mary's River	East line of T41N, R59E to Humboldt River	53.2	miles	None	Total phosphorus	NDEP	3	X	1
NV04-NF-16-A	445A.124	North Fork Humboldt River and its tributaries in the Independence Mountain Range (specifically Dry Creek, Sammy Creek, Water Canyon Creek	NF Humboldt - Confluence with Sammy Creek to National Forest Boundary	3.5	miles	None	Total dissolved solids	AngloGold Corporation	3	X	
			Dry Creek - waste rock to confluence with NF Humboldt	0.1	miles	None	Selenium (total)		3	X	4
							Total dissolved solids		3	X	
			Sammy Creek - above waste rock (upstream of Big Springs Mine)	0.6	miles	None	Arsenic (total)		3	X	
							Selenium (total)		3	X	4
			Sammy Creek - waste rock to confluence with NF Humboldt	0.6	miles	None	Total dissolved solids		3	X	
			Water Canyon Creek - waste rock to confluence with NF Humboldt	0.3	miles	None	Selenium (total)		3	X	4
							Total dissolved solids		3	X	
NV04-NF-17-B	445A.125	North Fork Humboldt River	National Forest Boundary to Humboldt River	84.67	miles	None	Iron (total)	NDEP	3	X	5
							Temperature		3	X	
							Total phosphorus		3	X	1
NV04-SF-19-B-01	445A.125	South Fork Humboldt River	Lee to Humboldt River	32.75	miles	None	Iron (total)	NDEP	3	X	
							Total phosphorus		3	X	1
NV04-SF-19-B-02	445A.125	South Fork Humboldt Reservoir	Entire Reservoir	1,650	acres	None	pH	NDEP	3	X	3
NV04-HR-26-B	445A.125	Maggie Creek	Where it is formed by tributaries to confluence with Jack Creek	28.07	miles	None	Total phosphorus	NDEP	3	X	1, 5

Table A-1. Nevada's 2002 303(d) List of Impaired Waterbodies (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Existing TMDLs	Pollutant or Stressor of Concern	Data Sources	TMDL Priority	New Listing?	Notes
Humbolt River Basin											
NV04-LH-47-C	445A.126	Little Humboldt River	Entire Length	53.52	miles	None	Total phosphorus	NDEP	3	X	1, 5
NV04-HR-56-C	Tributary to Humboldt River - 445A.205	Pine Creek	Upstream of Palisade	15.92	miles	None	Iron (total)	NDEP	3	X	5
							Total dissolved solids		3	X	
							Total phosphorus		3	X	1
							Total suspended solids		3	X	
							Turbidity		3	X	
NV04-HR-100-C	Tributary to Maggie Creek - 445A.126	Simon Creek	Above confluence with Maggie Creek	1	miles	None	Total dissolved solids	Newmont Mining Corporation	3	X	
NV04-HR-101	Tributary to Pine Creek & Humboldt River - 445A.205	Willow Creek	Below Buckhorn Mine	5	miles	None	Mercury (dissolved)	Cominco American Inc.	3	X	
NV-04-HR-102-B	Tributary to North Fork Humboldt River - 445A.125	Sheep Creek	Below Jerritt Canyon Project	6	miles	None	Total dissolved solids	AngloGold-Meridian Jerritt Canyon Joint Venture	3	X	
Lake Tahoe Basin											
NV06-TB-08	445A.191	Lake Tahoe	Mid-Lake and Index Station	36,812 (Nevada portion only)	acres	TMDL underdevelopment	Clarity	Tahoe Research Group	1	X	
NV06-TB-10-01	445A.1915	2nd Creek	2nd Creek Drive to Lake Tahoe	0.45	miles	None	Total phosphorus	NDEP	3	X	
							Turbidity		3	X	
NV06-TB-10-02	445A.1915	2nd Creek	Origin to 2nd Creek Drive	2	miles	None	Total phosphorus	NDEP	3	X	
									3		

Table 1. Nevada's 2002 303(d) List of Impaired Waterbodies (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Existing TMDLs	Pollutant or Stressor of Concern	Data Sources	TMDL Priority	New Listing?	Notes
Lake Tahoe Basin											
NV06-TB-12	445A.1915	3rd Creek	Lake Tahoe to EF 3rd Creek at Highway 431 and to WF 3rd Creek Origin	0.31	miles	None	Total phosphorus	NDEP	3	X	
NV06-TB-15	445A.1915	EF Incline Creek	Ski resort to Origin	4.66	miles	None	Total phosphorus	NDEP	3	X	
NV06-TB-16	445A.1915	Incline Creek	Lake Tahoe to EF Incline Creek at ski resort and to WF Incline Creek at Highway 431	0.19	miles	None	Iron (total)	NDEP	3	X	
NV06-TB-26	445A.1915	Glenbrook Creek	Above Lake Tahoe	3.83	miles	None	Iron (total)	USGS	3	X	
							Total phosphorus		3	X	
NV06-TB-33	445A.1915	Edgewood Creek	Above Lake Tahoe	5.37	miles	None	Iron (total)	USGS	3	X	
Truckee River Basin											
NV06-TR-03	445A.186	Truckee River	Idlewild to East McCarran	6.25	miles	None	Temperature	TMWRF	3	X	
NV06-TR-04	445A.187	Truckee River	East McCarran to Lockwood	5.85	miles	Total nitrogen, total phosphorus, TDS	Total phosphorus	DRI/TMWRF	3		1
NV06-TR-05	445A.188	Truckee River	Lockwood to Derby Dam	15.15	miles	Total nitrogen, total phosphorus, TDS	Total phosphorus	DRI/TMWRF	3		1
							Turbidity		3		
NV06-TR-06	445A.189	Truckee River	Derby Dam to Pyramid Lake Reservation	11.22	miles		Temperature	DRI/TMWRF	3	X	
							Total phosphorus		3		1
							Turbidity		3		
NV06-SC-41-C	445A.126	Steamboat Creek	Washoe Lakes to Sec 33, T18N, R20E	5.41	miles	None	Iron (total)	NDEP	3	X	
							Mercury (total)	NDEP, UNR	3	X	6
							Total phosphorus	NDEP	3	X	1
NV06-SC-42-D	445A.127	Steamboat Creek	Sec 33, T18N, R20E to Truckee River	13.71	miles	None	Arsenic (total)	NDEP	3	X	7
							Boron (total)		3	X	7
							Iron (total)		3	X	
							Mercury (total)	NDEP, UNR	3	X	6
NV06-SC-45-B	445A.125	Franktown Creek	First irrigation diversion to Washoe Lake	9.07	miles	None	Dissolved oxygen	NDEP	3	X	

Table A-1. Nevada's 2002 303(d) List of Impaired Waterbodies (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Existing TMDLs	Pollutant or Stressor of Concern	Data Sources	TMDL Priority	New Listing?	Notes
Carson River Basin											
NV08-CR-02	445A.148	Bryant Creek	Near Stateline	0	miles	Draft TMDL Copper, Iron, Nickel	Arsenic (total)	NDEP	3	X	
							Copper	Leviathan Mine Database	1		2, 8
							Iron (total)	NDEP	1		
							Nickel	Leviathan Mine Database	1		2, 8
							Temperature	NDEP	3	X	
							Total suspended solids		3	X	
							Turbidity		3	X	
NV08-CR-04	445A.150	EF Carson River	Stateline to Highway 395	10.48	miles	BOD, Nitrate, Phosphates, TDS	Iron (total)	NDEP	3	X	
							Turbidity		2		
NV08-CR-05-01	445A.151	EF Carson River	Highway 395 to Highway 88	8.53	miles	BOD, Nitrate, Phosphates, TDS	Temperature	NDEP	3	X	
							Turbidity		2		
NV08-CR-05-02			Highway 88 to Muller Lane	2	miles	BOD, Nitrate, Phosphates, TDS	Iron (total)	NDEP	3	X	
							Temperature		3	X	
							Total phosphorus		2	X	1
							Turbidity		2		
NV08-CR-06-01	445A.152	WF Carson River	Stateline to Muller Lane	11.23	miles	BOD, Nitrate, Phosphates, TDS	Iron (total)	NDEP	3	X	
							Temperature		3	X	
							Total phosphorus		2		1
							Turbidity		2		
NV08-CR-06-02		EF/WF Carson River	Genoa Lane to EF Carson River at Muller Lane and to WF Carson River at Muller Lane	4.59	miles	BOD, Nitrate, Phosphates, TDS	Iron (total)	NDEP	3	X	
							Temperature		3	X	
							Total phosphorus		2		1
							Total suspended solids		2	X	
							Turbidity		2		

Table A-1. Nevada's 2002 303(d) List of Impaired Waterbodies (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Existing TMDLs	Pollutant or Stressor of Concern	Data Sources	TMDL Priority	New Listing?	Notes
Carson River Basin											
NV08-CR-07	445A.153	Carson River	Genoa Lane to Cradlebaugh Bridge	5.88	miles	BOD, Nitrate, Phosphates, TDS	Iron (total)	NDEP	3	X	
							Temperature		3	X	
							Total phosphorus		2		1
							Total suspended solids		2	X	
							Turbidity		2		
NV08-CR-08	445A.154	Carson River	Cradlebaugh Bridge to Mexican Ditch Gage	6.34	miles	BOD, Nitrate, Phosphates, TDS	Iron (total)	NDEP	3	X	
							Temperature		3	X	
							Total phosphorus		2		1
							Total suspended solids		2	X	
							Turbidity		2		
NV08-CR-09	445A.155	Carson River	Mexican Ditch Gage to New Empire	7.82	miles	BOD, Nitrate, Phosphates, TDS	Iron (total)	NDEP	3	X	
							Temperature		3	X	
							Total phosphorus		2		1
							Turbidity		2		
NV08-CR-10	445A.156	Carson River	New Empire to Dayton Bridge	16.82	miles	BOD, Nitrate, Phosphates, TDS	Iron (total)	NDEP	3	X	
							Mercury (total)		3		6, 9, 10
							Total phosphorus		1		1
							Total suspended solids		1	X	
NV08-CR-11	445A.157	Carson River	Dayton Bridge to Weeks	25.5	miles	BOD, Nitrate, Phosphates, TDS	Iron (total)	NDEP	3	X	
							Mercury (total)		3		6, 9, 10
							Total phosphorus		1		1
							Total suspended solids		1	X	
							Turbidity		1	X	
NV08-CR-12	445A.158	Carson River	Weeks to Lahontan Dam	29.17	miles	BOD, Nitrate, Phosphates, TDS	Iron (total)	NDEP	3		2
							Mercury (total)		3		6, 9, 10
							Total phosphorus		3		1
							Total suspended solids		3		
							Turbidity		3	X	
NV08-CR-13-C	445A.126	Carson River	Lahontan Reservoir to Carson Sink	40.46	miles	None	Mercury	NDEP	3	X	9, 10

Table A-1. Nevada's 2002 303(d) List of Impaired Waterbodies (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Existing TMDLs	Pollutant or Stressor of Concern	Data Sources	TMDL Priority	New Listing?	Notes
Carson River Basin											
NV08-CR-27-C	445A.126	Stillwater Marsh	Area of Stillwater Marsh east of Westside Road and north of the community of Stillwater	19,326 (Class C and Class D waters)	acres	None	Arsenic	NDEP	3		2
							Boron		3		2
							Mercury		3		10
NV08-CR-100	Tributary to Carson River - 445A.153	Brockliss Slough	Above Carson River	5	miles	None	Iron (total)	NDEP	3	X	11
							Temperature		3	X	11
							Total phosphorus		3	X	1, 11
							Turbidity		3	X	11
NV08-CR-101	Tributary to Carson River - 445A.151	Indian Creek	At Stateline	0	miles	None	Total phosphorus	South Tahoe Public Utilities District	3	X	1
Various	Not applicable	All waters below Lahontan Dam in Lahontan Valley	n/a	n/a	n/a	None	Mercury	NDEP, NDOW, Nevada Health Division	3	X	10
Walker River Basin											
NV09-WR-01	445A.160	West Walker River	At Stateline	0	miles	None	Iron (total)	NDEP	3	X	
							Total phosphorus		3	X	1
NV09-WR-03	445A.162	West Walker River	Stateline to Wellington	16.9	miles	None	Boron (total)	NDEP	3	X	
							Iron (total)		3	X	
							pH		3		
							Total phosphorus		3		1
NV09-WR-04	445A.163	West Walker River	Wellington to Confluence with East Walker River	25.69	miles	None	Iron (total)	NDEP	3	X	
							Total phosphorus		3		1
NV09-WR-05	445A.164	Sweetwater Creek	Stateline to Confluence with East Walker River	8.07	miles	None	E Coli	NDEP	3	X	
							Total phosphorus		3		1
NV09-WR-06	445A.165	East Walker River	At Stateline	0	miles	None	Nitrite	NDEP	3	X	
							pH		3		
							Temperature		3	X	
							Total phosphorus		3		1
NV09-WR-07	445A.166	East Walker River	Stateline to Bridge B-1475	22.7	miles	Total suspended solids	pH	NDEP	3	X	
							Total phosphorus		3	X	1

Table A-1. Nevada's 2002 303(d) List of Impaired Waterbodies (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Existing TMDLs	Pollutant or Stressor of Concern	Data Sources	TMDL Priority	New Listing?	Notes
Walker River Basin											
NV09-WR-08	445A.166	East Walker River	East Walker River from Bridge B-1475 to the confluence with the W. Walker	41.7	miles	Total suspended solids	Iron (total)	NDEP	3		2
							Temperature		3	X	
							Total phosphorus		3	X	1
							Total suspended solids		3		
NV09-WR-09	445A.167	Walker River	Confluence of East and West Walker Rivers to Walker River Indian Reservation Boundary	41.15	miles	Total suspended solids	Iron (total)	NDEP	3		
							Total suspended solids		3		
NV09-WR-11	To be assigned	Walker Lake	Entire Reservoir	35,500	acres	None	Total dissolved solids	NDEP, NDOW, USFWS, UC Berkeley, others	1	X	12
NV09-WR-12	445A.169	Desert Creek	Stateline to Confluence with West Walker River	23.39	miles	None	Temperature	NDEP	3	X	
NV-09-WR-13-C	445A.126	Mason Valley Wildlife Management Area (North Pond only)	North Pond	100	acres	None	pH	NDEP	3	X	3
							Total dissolved solids		3	X	
							Total phosphorus		3	X	1
Central Region											
NV10-CE-33-C	445A.126	Comins Lake	Entire Lake	136	acres	None	pH	NDEP	3	X	3
Colorado River Basin											
NV13-CL-06	445A.201	Las Vegas Wash	Telephone Line Road to Lake Mead	5.12	miles	Total ammonia, total phosphorus	Iron (total)	NDEP	3	X	13
							Total suspended solids	NDEP, Wash Discharger Monitoring Network	3	X	14
NV13-CL-07	445A.175	Virgin River	Stateline to Mesquite	4.5	miles	Draft TMDL Boron	Boron (total)	NDEP	1		
							Iron (total)		3	X	
							Temperature		3	X	
							Total phosphorus		3		1

Table A-1. Nevada's 2002 303(d) List of Impaired Waterbodies (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Existing TMDLs	Pollutant or Stressor of Concern	Data Sources	TMDL Priority	New Listing?	Notes
Colorado River Basin											
NV13-CL-09	445A.177	Virgin River	Mesquite to Lake Mead	25.75	miles	Draft TMDL Boron	Boron (total)	NDEP	1		
							Iron (total)		3	X	
							Temperature		3	X	
							Total phosphorus		3		1
NV13-CL-11	445A.210	Muddy River	Source to Glendale	13.63	miles	None	Iron (total)	NDEP	3		
							Temperature		3	X	
							Total phosphorus		3		1
NV13-CL-12	445A.211	Muddy River	Glendale to Lake Mead	25.07	miles	None	Boron (total)	NDEP	3		
							Iron (total)		3	X	
							Temperature		3	X	

Footnotes:

1. The phosphorus standard may not be appropriate for eutrophication control.

2. Less than 10 samples were available at the control point for this parameter, however this parameter was on the 1998 303(d) List and the available data does not justify delisting.

3. Current pH standard is outdated and needs to be revised to 6.5 to 9.0 based upon current EPA recommendations. However, the available data show that the new pH criteria have not been met.

4. Both the 1-hour and 96-hour criteria were exceeded in over 10% of the samples.

5. 8 to 9 samples were available at the control point for this parameter, however there were significant exceedances (4 or more) in the available samples.

6. The 1-hour criteria were not exceeded, but the 96-hour criteria were exceeded in over 10% of the samples. Though grab samples may not representative of conditions (depending upon the situation) over a 96-hour period, the fact that the grab sample data consistently exceeded the 96-hour criteria by a factor of 50 to 100 times the standard is deemed to be a good indication that the 96-hour conditions are in fact in exceedance of the 96-hour standard.

7. Pollutant may be naturally occurring. Additional data should be collected prior to development of TMDLs

8. Leviathan Mine is listed on the National Priorities List (Superfund) because of acid mine drainage into adjoining creeks. Copper, iron and nickel have been found to be present in amounts that are harmful to public health, the environment and aquatic life.

9. Carson River from New Empire down to Carson Sink is listed on the National Priorities List (Superfund) due to mercury contamination from historic mining activities.

10. Nevada State Health Division has issued a fish consumption advisory for the Carson River from Dayton to Lahontan Dam and all waters in the Lahontan Valley.

11. While the Brockliss Slough has no specific numeric criteria, the tributary rule was applied thereby utilizing the numeric criteria for the Carson River: Genoa to Cradlebaugh Bridge Reach (NAC 445A.153). It needs to be recognized that at the junction of Brockliss Slough and the West Fork Carson River most of the West Fork Carson River flow enters the Brockliss Slough, with little flow continuing down the West Fork channel at this point.

12. In 2002, EPA approved the beneficial uses and criteria promulgated by the State of Nevada for Walker Lake. The propagation of aquatic life was included as one of the beneficial uses. While the standards do not include numeric criteria for TDS, the Nevada Division of Wildlife has shown that TDS levels have impaired the aquatic life beneficial use. NDOW found that hatchery LCT experienced high death rates upon release into the high TDS waters of Walker Lake. In the mid-1990s, NDOW began acclimating the hatchery trout in high TDS water prior to releasing into Walker Lake. While this acclimation process has improved initial fish survival, the health and lifespan of the LCT and its food sources are impaired due to the elevated TDS levels. Increasing TDS concentrations have caused significant biological changes in Walker Lake, including a reduction in biological diversity and the extinction of at least one zooplankton species. The declining water quality is also directly related to the loss of native species of fish (Tahoe sucker, Lahontan redside shiner, Lahontan speckled dace). Additionally, the 2002 305(b) Report identified Walker Lake as "Not Supporting". Sources include: "Walker Lake Limnological Report, 1995-1996", Horne & Beutel, UC Berkeley, 1997; Communications with M. Sevon, Nevada Division of Wildlife, various years; Written communications with Robert Williams, U.S. Fish and Wildlife Service, October 29, 2001.

13. Data indicates that a majority of the iron is in particulate form associated with sediment.

14. TSS levels have improved following the construction of erosion control structures and wetlands, with minimal exceedances of the TSS standard in 2001. Additional monitoring is needed to confirm standards compliance.

Appendix B

List of Waterbodies with Exceedances of RMHQs (Requirements to Maintain Higher Quality Water)

Table B-1. List of Waterbodies with Exceedances of RMHQs (Requirements to Maintain Higher Quality Water)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Pollutant or Stressor of Concern	Notes
Snake River Basin							
NV03-SR-02	445A.216	Salmon Falls Creek	Above stateline	37.2	miles	Fecal coliform	
NV03-JR-12	445A.218	East Fork Jarbidge River	Above stateline	18.6	miles	Fecal coliform	
NV03-JR-13	445A.219	Jarbidge River	Source to Town of Jarbidge	7.44	miles	Total phosphorus	
Humbolt River Basin							
NV04-HR-01	445A.203	Humboldt River	Origin to Osino	66.12	miles	pH	
NV04-HR-02	445A.204	Humboldt River	Osino to Palisade	64.39	miles	Chlorides	
						pH	
NV04-HR-03	445A.205	Humboldt River	Palisade to Battle Mtn	76.5	miles	pH	
NV04-HR-04	445A.206	Humboldt River	Battle Mtn to Comus	81.36	miles	Chlorides	
						pH	
						Total dissolved solids	
NV04-HR-05	445A.207	Humboldt River	Comus to Imlay	114.09	miles	Chlorides	
						pH	
NV04-HR-06	445A.208	Humboldt River	Imlay to Woosley	44.42	miles	Total dissolved solids	
Lake Tahoe Basin							
NV06-TB-09-00	445A.1917	1st Creek	Origin to Lake Tahoe	1.8	miles	pH	
						Total nitrogen	
NV06-TB-10-01	445A.1917	2nd Creek	2nd Creek Drive to Lake Tahoe	0.45	miles	pH	
						Total nitrogen	
NV06-TB-10-02	445A.1917	2nd Creek	Origin to 2nd Creek Drive	2	miles	pH	
						Total nitrogen	
NV06-TB-12	445A.1917	3rd Creek	Lake Tahoe to EF 3rd Creek at Highway 431 and to WF 3rd Creek Origin	0.31	miles	Chlorides	
						Total dissolved solids	

Table B-1. List of Waterbodies with Exceedances of RMHQs (Requirements to Maintain Higher Quality Water) (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Pollutant or Stressor of Concern	Notes
Lake Tahoe Basin							
NV06-TB-14	445A.1917	WF Incline Creek	Origin to Highway 431	3.11	miles	Chlorides	
						pH	
						Total dissolved solids	
						Total nitrogen	
						Turbidity	
NV06-TB-15	445A.1917	EF Incline Creek	Ski resort to Origin	4.66	miles	pH	
						Total nitrogen	
NV06-TB-16	445A.1917	Incline Creek	Lake Tahoe to EF Incline Creek at ski resort and to WF Incline Creek at Highway 431	0.19	miles	Chlorides	
						pH	
						Total nitrogen	
Truckee River Basin							
NV06-TR-02	445A.185	Truckee River	Stateline to Idlewild	15.7	miles	Total nitrogen	
NV06-TR-03	445A.186	Truckee River	Idlewild to East McCarran	6.25	miles	Total nitrogen	
NV06-TR-05	445A.188	Truckee River	Lockwood to Derby Dam	15.15	miles	Turbidity	
Carson River Basin							
NV08-CR-01	445A.147	WF Carson River	At Stateline	0	miles	pH	
						Total nitrogen	
						Total phosphorus	
NV08-CR-02	445A.148	Bryant Creek	Near Stateline	0	miles	Total nitrogen	
						Total phosphorus	
NV08-CR-04	445A.150	EF Carson River	Stateline to Highway 395	10.48	miles	pH	
						Total dissolved solids	
						Total nitrogen	

Table B-1. List of Waterbodies with Exceedances of RMHQs (Requirements to Maintain Higher Quality Water) (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Pollutant or Stressor of Concern	Notes
Carson River Basin							
NV08-CR-05	445A.151	EF Carson River	Highway 395 to Muller Lane	10.53	miles	pH	
						Total nitrogen	
NV08-CR-06	445A.152	EF/WF Carson River	Genoa Lane to EF Carson River at Muller Lane and to WF Carson River at Stateline	15.82	miles	pH	
						Total dissolved solids	
NV08-CR-07	445A.153	Carson River	Genoa Lane to Cradlebaugh Bridge	5.88	miles	Chlorides	
						pH	
						Total dissolved solids	
NV08-CR-08	445A.154	Carson River	Cradlebaugh Bridge to Mexican Ditch Gage	6.34	miles	Sulfate	
NV08-CR-09	445A.155	Carson River	Mexican Ditch Gage to New Empire	7.82	miles	pH	
NV08-CR-10	445A.156	Carson River	New Empire to Dayton Bridge	16.82	miles	Chlorides	
						pH	
						Turbidity	
NV08-CR-11	445A.157	Carson River	Dayton Bridge to Weeks	25.5	miles	Chlorides	
						Fecal coliform	
						pH	
						Turbidity	
NV08-CR-12	445A.158	Carson River	Weeks to Lahontan Dam	29.17	miles	Chlorides	
						Total dissolved solids	
						Turbidity	
Walker River Basin							
NV09-WR-01	445A.160	West Walker River	At Stateline	0	miles	Total suspended solids	
NV09-WR-02	445A.161	Topaz Lake	Topaz Lake (Nevada portion)	988	acres	Total nitrogen	
						Total suspended solids	
						Turbidity	

Table B-1. List of Waterbodies with Exceedances of RMHQs (Requirements to Maintain Higher Quality Water) (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Pollutant or Stressor of Concern	Notes
Walker River Basin							
NV09-WR-03	445A.162	West Walker River	Stateline to Wellington	16.9	miles	Chlorides	
						Total dissolved solids	
						Total nitrogen	
						Total phosphorus	
NV09-WR-04	445A.163	West Walker River	Wellington to Confluence with East Walker River	25.7	miles	Chlorides	
						Total phosphorus	
NV09-WR-05	445A.164	Sweetwater Creek	Stateline to Confluence with East Walker River	8.07	miles	Total nitrates	
NV09-WR-06	445A.165	East Walker River	At Stateline	0	miles	Total nitrogen	
NV09-WR-08	445A.166	East Walker River	East Walker River from Bridge B-1475 to the confluence with the W. Walker	41.7	miles	Sulfate	
Colorado River Basin							
NV13-CL-04	445A.195	Lake Mead/Las Vegas Bay	Las Vegas Bay	3,840	acres	chlorophyll a	1
NV13-CL-07	445A.175	Virgin River	Stateline to Mesquite	4.5	miles	Total nitrogen	

Notes:

Except as noted in the following, all data for identifying RMHQ exceedances were taken from NDEP ambient monitoring program. including Truckee River monitoring performed by Desert Research Institute and Truckee Meadows Wastewater Reclamation Facility.

1. Chlorophyll a exceeded more than 10% of samples at Stations LM4 (LVB2.7) and LM5 (LVB3.5). Based upon data collected by Las Vegas Wash Discharger Monitoring Network.

Appendix C

List of Waterbodies Warranting Further Investigation

Table C-1. List of Waterbodies Warranting Further Investigation

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Pollutant or Stressor of Concern	Data Sources	Notes
Black Rock Desert Region						
NV02-BL-09-B	445A.125	Bilk Creek Reservoir	Entire Reservoir	Dissolved oxygen	NDEP	1
				pH		2
				Total phosphorus		3
NV02-BL-100	445A.121	Charleston Gulch	Below National Mine site	Metals	NDEP	
				pH		
NV02-BL-101	445A.121	National Gulch	Below National Mine site	Metals	NDEP, USGS Open File Report 00-459	
				pH		
Snake River Basin						
NV03-OW-19	445A.223	East Fork Owyhee River	Mill Creek to Duck Valley Indian Reservation	Copper (dissolved)	NDEP	
				Iron (total)		
NV03-OW-25-B	445A.125	Wildhorse Reservoir	Entire Reservoir	Temperature	NDEP	1
Humbolt River Basin						
NV04-HR-07-C	445A.126	Humboldt River	Woolsey to Rodgers Dam	Iron (total)	NDEP	
NV04-NF-16-A	445A.124	North Fork Humboldt River and its tributaries in the Independence Mountain Range (specifically Dry Creek, Sammy Creek, Water Canyon Creek)	NF Humboldt - Confluence with Sammy Creek to National Forest Boundary	Selenium (total)	AngloGold Corporation	4, 5
			Sammy Creek - waste rock to confluence with NF Humboldt	Selenium (total)	AngloGold Corporation	4, 5
NV04-SF-19-B-02	445A.125	South Fork Humboldt Reservoir	Entire Reservoir	Temperature	NDEP	1
NV04-HR-26-B	445A.125	Maggie Creek	Where it is formed by tributaries to confluence with Jack Creek	Temperature	NDEP	
NV04-HR-27-C	445A.126	Maggie Creek	Confluence with Jack Creek to Humboldt River	pH	NDEP, Newmont Mining Corporation	6
NV04-RR-38-B	445A.125	Reese River	Confluence with Indian Creek to old Highway 50	Total dissolved solids	NDEP	
NV04-RR-39-C	445A.126	Reese River	North of old Highway 50	Total dissolved solids	NDEP	
				Total phosphorus		3
NV04-LH-45-A	445A.124	North Fork Little Humboldt River	Below Buckskin Mine site to forest boundary	Metals	NDEP, USFS	
				pH		
NV04-LH-47-C	445A.126	Little Humboldt River	Entire length	Dissolved oxygen	NDEP	
				Iron (total)		
				Temperature		

Table C-1. List of Waterbodies Warranting Further Investigation (continued)

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Pollutant or Stressor of Concern	Data Sources	Notes
Humbolt River Basin						
NV04-LH-49-B	445A.125	South Fork Little Humboldt River	Elko/Humboldt County Line to confluence with North Fork Little Humboldt River	Iron (total)	NDEP	
				Total phosphorus		3
NV04-HR-55-B	Tributary to Humboldt River -445A.205	Pine Creek	Above Tomera Ranch	E coli	NDEP	
				Iron (total)		
				Total dissolved solids		
				Total phosphorus		3
				Total suspended solids		
				Turbidity		
NV04-HR-101	Tributary to Pine Creek and Humboldt River - 445A.205	Willow Creek	Below Buckhorn Mine	Cyanide	Cominco American, Inc.	4
NV04-HR-103-A	Tributary to Maggie Creek - 445A.124	Coon Creek	Below Rip Van Winkle Mine	Acid mine drainage	Interagency AML Environmental Task Force, USGS Open File Report 00-459	
NV04-HR-104-A	Tributary to South Fork Humboldt River - 445A.124	Long Canyon Creek (near Lamoille)	Below American Beauty Mine	Metals	EPA-REMAP	
NV04-HR-105	445A.121	Long Canyon Creek (near Battle Mtn.)	Below historic mine site	Metals	USGS Open File Report 00-459; BLM Battle Mountain District	
NV04-HR-106	445A.121	Licking Creek (near Battle Mtn.)	Below historic mine site	Metals	USGS Open File Report 00-459; BLM Battle Mountain District	
NV04-HR-107	445.121	Butte Canyon (near Battle Mtn.)	Below historic mine site	Metals	USGS Open File Report 00-459; BLM Battle Mountain District	
NV04-HR-108	445.121	Galena Canyon (near Battle Mtn.)	Below historic mine site	Metals	USGS Open File Report 00-459; BLM Battle Mountain District	
NV04-HR-109	445.121	Rochester Canyon Creek (near Lovelock)	Below historic mine site	Metals	USGS Open File Report 00-459	
NV04-HR-110	445A.121	East Fork and West Fork Rock Creeks (near Battle Mtn.)	Below historic mine site	Metals	USGS Open File Report 00-459	

Table C-1. List of Waterbodies Warranting Further Investigation (continued)

Humboldt River Basin						
NV04-HR-111	Tributary to Pine Creek/Humboldt River - 445A.205	Trout Creek	Above Pine Creek	Total phosphorus	BLM - Elko District	
NV04-HR-112	445A.121	Little Cottonwood Creek (near Battle Mtn.)	Below historic mine site	Metals	BLM - Battle Mountain District	
NV04-HR-113	445A.121	Iron Canyon (near Battle Mtn.)	Below historic mine site	Metals	BLM - Battle Mountain District	
Lake Tahoe Basin						
NV06-TB-08	445A.191	Lake Tahoe	At Cave Rock Monitoring Site and Sand Harbor Monitoring Site	DO - % of saturation	NDEP	1
				Temperature		1
				Specific electrical conductance		1
				Total nitrogen		1
Truckee River Basin						
NV06-SC-40-C	445A.126	Little Washoe Lake	Little Washoe Lake	Iron (total)	NDEP	
				Mercury (total)		
NV06-TR-100	445A.121	Perry Canyon/Mullen Creek	Below mine site	Metals	Nevada Bureau of Mines and Geology	
				pH		
Carson River Basin						
NV08-CR-13-C	445A.126	Carson River	Lahontan Reservoir to Carson Sink	Iron (total)	NDEP	
NV08-CR-100	Tributary to Carson River - 445A.153	Brockliss Slough	Above Carson River	Fecal coliform	NDEP	7
NV08-CR-101	Tributary to Carson River - 445A.151	Indian Creek	At Stateline	Fecal coliform	South Tahoe Public Utilities District	
Walker River Basin						
NV09-WR-02	445A.161	Topaz Lake	Topaz Lake (Nevada portion)	Temperature	NDEP	1
NV09-WR-08	445A.166	East Walker River	East Walker River from Bridge B-1475 to the confluence with the W. Walker	Iron (total)	NDEP	
NV09-WR-12	445A.169	Desert Creek	Stateline to Confluence with West Walker River	Iron (total)	NDEP	
NV-09-WR-13-C	445A.126	Mason Valley Wildlife Management Area (North Pond only)	North Pond	Arsenic (total)	NDEP	
				Boron (total)		
				Dissolved oxygen		1
NV09-WR-18-A	445A.124	Corey Creek	Origin to point of diversion of the town of Hawthorne	Total dissolved solids	NDEP	
				Total phosphorus		3

Table C-1. List of Waterbodies Warranting Further Investigation (continued)

Central Region						
NV10-CE-14-A	445A.124	Birch Creek	Origin to National Forest Boundary	Iron (total)	Meridian Gold	8
NV10-CE-25-B	445A.125	Illipah Reservoir	Entire Reservoir	pH	NDEP	2
NV10-CE-33-C	445A.126	Comins Lake	Entire Lake	Temperature	NDEP	1
NV10-CE-100	445A.121	Tybo Creek	Below mine site	Acid mine drainage	BLM, NDOW	
Colorado River Basin						
NV13-CL-01	445A.192	Colorado River	Lake Mohave Inlet to CA stateline	Temperature	NDEP	1
NV13-CL-02	445A.193	Colorado River	Hoover Dam to Lake Mohave inlet	Temperature	NDEP	1
NV13-CL-06	445A.201	Las Vegas Wash	Telephone Line Road to Lake Mead	Selenium (total)	NDEP	4
NV13-CL-07	445A.175	Virgin River	Stateline to Mesquite	Selenium (total)	NDEP	4
NV13-CL-09	445A.177	Virgin River	Mesquite to Lake Mead	Selenium (total)	NDEP	4
NV13-CL-16-B	445A.125	White River	National Forest boundary to confluence with Ellison Creek	Temperature	NDEP	
NV13-CL-25-C	445A.126	Echo Canyon Reservoir	Entire reservoir	Iron (total) Temperature	NDEP	 1
NV13-CL-100	445A.121	Caselton Wash	Below Caselton Tailings	Acid mine drainage	Interagency AML Environmental Task Force	

Footnotes

1. Sampling point may not be representative of conditions for this parameter.

2. Current pH standard is outdated and needs to be revised to 6.5 to 9.0 based upon current EPA recommendations. However, the available data show that the new pH criteria have not been met.

3. The phosphorus standard may not be appropriate for eutrophication control.

4. The 96-hour criteria was exceeded, but the 1-hour criteria was not exceeded.

5. A variety of biological information has been developed by US Fish and Wildlife Service, EPA and AngloGold Corporation as part of assessment activities below Big Springs Mine. However, the results of these studies are in conflict with respect to biological impairment from metals.

6. NDEP data shows exceedances of standard, while Newmont Mining data shows compliance with standard.

7. The fecal coliform criteria reads as follows: " Based on a minimum of not less than 5 samples taken over a 30-day period, the fecal coliform bacterial level may not exceed a geometric mean of 200 per 100 ml nor may more than 10 percent of the total samples taken during any 30-day period exceed 400 per 100 ml." NDEP collects 6 samples a year on the Brockliss Slough which is not frequent enough to evaluate the fecal coliform standard as written. For the Potential Problems list, NDEP dropped the 30-day time period solely for identifying possible problems needing further investigation.

8. Data indicates that the iron originates in the watershed upstream of the Austin Gold Venture Mine and not from the mine site.

Appendix D

List of Delisted Waterbodies

Table D-1. Delisted Waterbodies

Waterbody ID	NAC Reference	Waterbody Name	Reach Description	Size	Units	Pollutant or Stressor of Concern	Data Sources	Notes
Snake River Basin								
NV03-OW-20	445A.224	East Fork Owyhee River	Within Duck Valley Indian Reservation	6.31	miles	Iron Total phosphorus Total suspended solids Turbidity	not applicable	1
Humbolt River Basin								
NV04-HR-04	445A.206	Humboldt River	Battle Mtn to Comus	81.36	miles	Lead	NDEP	2
Truckee River Basin								
NV06-TR-04	445A.187	Truckee River	East McCarran to Lockwood	5.85	miles	Total nitrogen	DRI/TMWRF	2
NV06-TR-05	445A.188	Truckee River	Lockwood to Derby Dam	15.15	miles	Total nitrogen	DRI/TMWRF	2
NV06-TR-06	445A.189	Truckee River	Derby Dam to Wadsworth	11.22	miles	Total nitrogen	DRI/TMWRF	2
NV06-TR-07	445A.190	Truckee River	Wadsworth to Pyramid Lake	28.07	miles	Total nitrogen Total phosphorus Turbidity	not applicable	1
Carson River Basin								
NV08-CR-04	445A.150	EF Carson River	Stateline to Highway 395	10.48	miles	Total suspended solids	NDEP	2
NV08-CR-05-01	445A.151	EF Carson River	Highway 395 to Highway 88	8.53	miles	Total suspended solids	NDEP	2
NV08-CR-05-02	445A.151	EF Carson River	Highway 88 to Muller Lane	2	miles	Total suspended solids	NDEP	2
Walker River Basin								
NV09-WR-02	445A.161	Topaz Lake	Topaz Lake (Nevada portion)	988	acres	Total phosphorus Total suspended solids	NDEP	2 2
NV09-WR-04	445A.163	West Walker River	Wellington to Confluence with East Walker River	25.69	miles	pH	NDEP	2
NV09-WR-07	445A.166	East Walker River	Stateline to Bridge B-1475	22.7	miles	Iron (total)	NDEP	2
NV09-WR-10	445A.168	Walker River	Within Walker River Indian Reservation	11	miles	pH	not applicable	1
Colorado River Basin								
NV13-CL-12	445A.211	Muddy River	Glendale to Lake Mead	25.07	miles	Arsenic	NDEP	3

Footnotes:

1, State water quality standards not applicable within tribal lands

2. Standard exceeded less in less than 10% of the samples

3. This reach was listed in error. Waterbody reach does not have drinking water supply identified as a beneficial use, therefore there is no arsenic standard applicable for this reach

Appendix E

Summary of NDEP Monitoring Program

Summary of NDEP Monitoring Program

Introduction

State Requirements:

The State must conduct a water quality monitoring program in order to evaluate the quality of the waters of the State. This evaluation is necessary in order to determine if the quality of the waters of the State are suitable for the beneficial uses associated with them. This monitoring strategy has been developed in order to describe the manner in which the State intends to comply with EPA's monitoring requirements.

Federal Requirements:

A monitoring program is needed so the EPA can assess the State's progress towards the goals of P.L. 92-500.

State Authority:

The State authority for conducting a monitoring program is contained in Nevada Revised Statute (NRS) 445.214 and 445.216.

Federal Authority:

In order for the State to receive a Federal Grant for a water pollution control program, it must operate an appropriate monitoring program on the quality of the navigable bodies of water in the State (PL 92-500; Section 106(e)).

Monitoring Program

The Nevada Division of Environmental Protection (NDEP) surface water monitoring network is described in Tables E-1 and E-2. Table E-1 lists the parameters analyzed in the monitoring program. The monitoring network started with the one contained in the State's plan of implementation which was adopted in 1967. Modifications were made and are continuing to be made to reflect review of the data base, recognize resource constraints and to coordinate and utilize other government agencies monitoring activities. The selection of the stations in the monitoring network are based on land use, water quality, hydro modifications and topography. The monitoring network is used to assess compliance with water quality standards, conduct trend analysis, validate water quality models and set total maximum daily loads (TMDL's). The data are also used to conduct nonpoint source assessments, compile the 303(d) List, 208 Plan Amendments, and compile the 305(b) report.

Table E-2 lists the sampling sites, frequency and STORET number of the routine monitoring network. The Bureau of Water Quality Planning samples other waters as needed for evaluating standards, developing nonpoint source assessment, and other special projects.

Table E-1

List of parameters analyzed in NDEP's routine monitoring network

Conventional Pollutants
Total Dissolved Solids
Total Suspended Solids
Electrical Conductivity
Turbidity
Color
pH - field
pH - lab
Temperature
Alkalinity ($CaCO_3$)
Bicarbonate ($CaCO_3$)
Carbonate (CO_3)
Carbonate ($CaCO_3$)
Kjeldahl-N

Metals (total and filtered)
Cadmium
Zinc
Chromium
Arsenic
Copper
Boron
Iron
Selenium
Mercury
Lead

Conventional Pollutants
Nitrate-NO_3
Nitrate-N
Nitrite-N
Ammonia-N
Total Nitrogen
Ortho - Phosphorus-P
Total Phosphorus-P
Chloride
COD
BOD
Sulfate
Calcium
Magnesium
Sodium
Hardness ($CaCO_3$)
Sodium Absorption Ratio

Bacteriology
Fecal Coliform
Fecal Streptococcus
E. Coliform

Table E-2
List of NDEP's Routine Monitoring Network

RIVER SYSTEM	Frequency Time/Year Agency	NDEP Station Number	STORET Number
WALKER RIVER SYSTEM			
Walker River at Wabuska	6 NDEP	W4	310030
Walker River at Schurz Bridge	6 NDEP	WSB	310127
Walker River at Mason Gage	6 NDEP	W9	310117
E.Walker River at Nordyke Road	6 NDEP	W3	310029
W.Walker River at Nordyke Road	6 NDEP	W4	310026
E.Walker River at the Elbow	6 NDEP	EFE	310109
E.Walker River at Ivy Ranch	6 NDEP	EF5	310112
W.Walker River at Hudson Gage	6 NDEP	W7	310118
E.Walker River at Stateline	6 NDEP	EFS	310028
W.Walker River at Topaz Lane	6 NDEP	W5	310023
W.Walker at Wellington	6 NDEP	W10	310025
Topaz Lake	6 NDEP	TOP	310024
Desert Creek	6 NDEP	DC	310033
Sweetwater Creek	6 NDEP	SWC	310027
Walker Lake at Sportsmans Beach	6 NDEP	WL	310652
HUMBOLDT RIVER SYSTEM			
Mary's River	6 NDEP	HS1	310087
N.F. Humboldt River at I-80	6 NDEP	HS2B	310188
N.F. Humboldt River at N.F. Ranch	6 NDEP	HS15	310585
N.F. Humboldt River at Taco Tunnel	6 NDEP	HS16	310584
Humboldt River at Osino Cutoff	6 NDEP	HS4	310080
S.F. Humboldt River below Dixie Cr	6 NDEP	HS3A	310089
Humboldt River near Carlin Bridge	6 NDEP	HS5	310081
Humboldt River near Palisade	6 NDEP	HS6	310082
Humboldt River at Battle Mountain	6 NDEP	HS7	310083
Humboldt River at Comus	6 NDEP	HS8	310084
Humboldt River near Imlay	6 NDEP	HS9	310085
Toulon Drain	6 NDEP	HS10	310091
Humboldt River near Humboldt Sink	6 NDEP	HS12	310086
Pine Creek	6 NDEP	HS13	310582
Maggie Creek	6 NDEP	HS14	310583
South Fork Reservoir	6 NDEP	SFR	310587
Below Rye Patch Reservoir	6 NDEP	H6	310079

Table E-2
List of NDEP's Routine Monitoring Network

RIVER SYSTEM	Frequency Time/Year Agency	NDEP Station Number	STORET Number
COLORADO RIVER SYSTEM			
Colorado River at Willow Beach	4 NDEP	CL2	310054
Colorado River at Laughlin	4 NDEP	CL1	310055
Las Vegas Wash above Lake Las Vegas	4 NDEP	CL3	310070
Virgin River at Riverside Bridge	4 NDEP	CL6A	310032
Virgin River at Mesquite	4 NDEP	CL6	310037
Muddy River at Glendale	4 NDEP	CL4	310071
Muddy River near Overton	4 NDEP	CL11	310095
Muddy River above Reid Gardner	4 NDEP	MARG	
LAKE TAHOE TRIBUTARIES			
First Creek at Dale & Knotty Pine	6 NDEP	1A	310056
First Creek at Lakeshore Drive	6 NDEP	1B	310057
Second Creek at Second Creek Dr.	6 NDEP	2A	310058
Second Creek at Lakeshore Drive	6 NDEP	2B	310059
Wood Creek at Lakeshore Drive	6 NDEP	WO	310061
E.F. Third Creek at Hwy 27	6 NDEP	EF3A	310063
Third Creek at Lakeshore Drive	6 NDEP	3B	310064
W.F. Incline Creek at Hwy 27	6 NDEP	WFINCA	310065
Incline Creek at Lakeshore Drive	6 NDEP	INCL	310067
Lake Tahoe at Sand Harbor	6 NDEP	SH	310128
E.F. Incline Creek below Diamond Peak	6 NDEP	EFINCA	310066
Lake Tahoe at Cave Rock	6 NDEP	CR	310588
SNAKE RIVER SYSTEM			
E.F. Owyhee River below Slaughterhouse Creek	4 NDEP	E16	
E.F. Owyhee River below Mill Creek	4 NDEP	E15	
Mill Creek near Patsville	4 NDEP	E14	310591
E.F. Owyhee River above Mill Creek	4 NDEP	E4	310047
W.F. Bruneau River at Mind Ranch	4 NDEP	E5	310046
W.F. Jarbidge River below Jarbidge	4 NDEP	E6	310045
W.F. Jarbidge River above Jarbidge	4 NDEP	E7	310044
E.F. Jarbidge River above Murphys	4 NDEP	E11	310043
Salmon Falls Creek at Hwy 93	4 NDEP	E8	310041
Shoshone Creek	4 NDEP	E9	310042
Wildhorse Reservoir at Pier	4 NDEP	E13	310589
Below Wildhorse Reservoir	4 NDEP	E12	310586

Table E-2 (Continued)
List of NDEP's Routine Monitoring Network

RIVER SYSTEM	Frequency Time/Year Agency	NDEP Station Number	STORET Number
TRUCKEE RIVER SYSTEM			
Truckee River at Farad	12 DRI	T1	310000
Truckee River at Circle C Ranch	12 DRI	T7	310092
Truckee River at Idlewild	12 DRI	T2	310001
Truckee River at McCarran Bridge	12 DRI	T3	310002
Truckee River at Vista Gage	12 DRI	T4A	310006
Truckee River at Tracy	12 DRI	T5	310004
Truckee River at Wadsworth	12 DRI	T6	310005
Truckee River at Nixon	12 DRI	T10	310514
North Truckee Drain	12 DRI	T9	310513
Steamboat Creek above WWTP	12 DRI	T8	310502
(above are sampled by DRI and Truckee MeadowsWastewater Reclamation Facility)			
CARSON RIVER SYSTEM			
W.F. Carson near Paynesville	6 NDEP	C8	310008
E.F. Carson at Riverview	6 NDEP	C9	310011
E.F. Carson at Hwy 88	6 NDEP	C16	310152
E.F. Carson at Muller	6 NDEP	C15	310093
Brockliss Slough at Muller Lane	6 NDEP	C5	310060
W.F. Carson at Muller Lane	6 NDEP	C14	310165
Carson at Genoa Lane	6 NDEP	C3	310013
Carson at Cradlebaugh Bridge	6 NDEP	C2	310014
Carson at Mexican Gage	6 NDEP	C13	310167
Carson at New Empire Bridge	6 NDEP	C1	310015
Carson at Dayton Bridge	6 NDEP	C11	310022
Carson at Weeks Bridge	6 NDEP	C10	310016
Truckee Canal at Hwy 50	6 NDEP	C22	310510
Carson below Lahontan Dam	6 NDEP	C18	310106
Bryant Creek at Doud Springs	6 NDEP	BCU	310592
Daggett Creek at Foothill Roak	6 NDEP	C23	310007

Table E-2 (Continued)
List of NDEP's Routine Monitoring Network

RIVER SYSTEM	Frequency Time/Year Agency	NDEP Station Number	STORET Number
STEAMBOAT CREEK SYSTEM			
Little Washoe Outfall	6 NDEP-WCCP*	SB1	310200
Steamboat Creek at Pleasant Valley	6 NDEP-WCCP	SB3	310201
Galena Creek	6 NDEP-WCCP	SB4	310202
Steamboat Creek at Rhodes Road	6 NDEP-WCCP	SB5	310203
Steamboat Ditch	6 NDEP-WCCP	SB6	310204
Steamboat Creek at Geiger Grade	6 NDEP-WCCP	SB7	310205
Whites Creek	6 NDEP-WCCP	SB8	310206
Thomas Creek	6 NDEP-WCCP	SB10	310207
Steamboat Creek at Short Lane	6 NDEP-WCCP	SB11	310208
Alexander Ditch	6 NDEP-WCCP	SB12	310209
Rio Poco Drain	6 NDEP-WCCP	SB14	310210
Boynton Slough	6 NDEP-WCCP	SB16	310211
Steamboat Creek near Pembroke Lane	6 NDEP-WCCP	SB17	310212
Yori Drain	6 NDEP-WCCP	SB18	310213
Steamboat Creek at Clean Water Way	6 NDEP-WCCP	SB19	310214
*Washoe County Comprehensive Planning			

Appendix E

Summary of Data and Information Evaluated for the 2002 303(d) List

Summary of Data and Information Evaluated for the 2002 303(d) List

As presented in Appendix F, the NDEP monitoring network was a major data source for the listing analyses. In addition to NDEP monitoring data, the primary water chemistry data sources that were either compiled by NDEP or submitted to NDEP, and were used to evaluated for inclusion on the 303(d) List were:

- **U.S. Geological Survey**

  The main U.S. Geological Survey data used in the listing analysis included water quality data for the Humboldt River, and Lake Tahoe tributaries. Data sets for these areas covered a number of years throughout the 1997-2001 period and met the minimum data requirements.

- **Desert Research Institute**

  DRI collects Truckee River water quality data inconjunction with NDEP's monitoring network..

- **University of Nevada, Reno**

  UNR has studied mercury levels in Steamboat and confirms mercury impairment identified with NDEP data.

- **Tahoe Research Group – U.C. Davis**

  Tahoe Research Group collects data for a variety of parameters – clarity, nutrients, sediment. The light extinction data were used to list Lake Tahoe for clarity.

- **Truckee Meadows Water Reclamation Facility**

  TMWRF collects extensive Truckee River water quality data with grab samples and physical characteristics with Hydrolabs. All these data were evaluated in the listing analyses.

- **City of Las Vegas, Clark County Sanitation District and City of Henderson**

  These three entities operate wastewater treatment facilities which discharge into the Las Vegas Wash. Extensive data collected by these entities were evaluated.

- **U.S. Bureau of Land Management**

  BLM – Elko District submitted continuous temperature data on the South Fork Owyhee River

- **South Tahoe Public Utilities District**

  Nutrient data collected by STPUD on the lower reaches of Indian Creek were evaluated.

- **Leviathan Mine Database (multiple sources)**

  Superfund contractors are developing a comprehensive database of water quality data associated with the Leviathan Mine site and area. These data were evaluated in the listing process.

- **Nevada Bureau of Mining Regulation and Reclamation**

The Bureau of Mining maintains files of discharge monitoring reports (DMRs) submitted by various mining operations in accordance with permit requirements. These data were evaluated for listing purposes.

Other information used in listing waterbodies included:

- **Health Advisory**

The State Health Division has issued a health advisory based upon studies performed by NDEP and the Division of Wildlife that a public health problem exists from eating fish from the Carson River from Dayton to the Lahontan Dam and all waters in the Lahontan Valley. Elevated levels of mercury have been identified in gamefish and carp from these waters. This advisory was used as the basis for listing these waters.

- **Carson River Mercury Superfund Site**

A portion of the Carson River is designated as a superfund site due to elevated mercury levels. The Carson River Mercury Site consists of: 1) sediments in an approximately 50-mile stretch of the Carson River in Lyon and Churchill Counties, beginning between Carson City and Dayton, Nevada, and extending downstream through the Lahontan Reservoir to Stillwater National Wildlife Refuge; and 2) tailing piles associated with the river. This designation was used as the basis for listing these waters.

- **Walker Lake**

In 2002, EPA approved the beneficial uses and criteria promulgated by the State of Nevada for Walker Lake. The propagation of aquatic life was included as one of the beneficial uses. While the standards do not include numeric criteria for TDS, the Nevada Division of Wildlife has shown that TDS levels have impaired the aquatic life beneficial use. NDOW found that hatchery Lahontan Cutthroat Trout experienced high death rates upon release into the high TDS waters of Walker Lake. In the mid-1990s, the Nevada Division of Wildlife began acclimating the hatchery trout in high TDS water prior to releasing into Walker Lake. While this acclimation process has improved initial fish survival, the health and lifespan of the LCT and its food sources are impaired due to the elevated TDS levels. Increasing TDS concentrations have caused significant biological changes in Walker Lake, including a reduction in biological diversity and the extinction of at least one zooplankton species. The declining water quality is also directly related to the loss of native species of fish (Tahoe sucker, Lahontan redside shiner, Lahontan speckled dace). Additionally, the 2002 305(b) Report identified Walker Lake as "Not Supporting". Sources include: "Walker Lake Limnological Report, 1995-1996", Horne & Beutel, UC Berkeley, 1997; Communications with M. Sevon, Nevada Division of Wildlife, various years; Written communications with Robert Williams, U.S. Fish and Wildlife Service, October 29, 2001.

Following is a description of other data and information that were used to place waterbodies on the “List of Waterbodies Warranting Further Investigation”:

- **NDEP Monitoring Data**

In addition to the ambient monitoring networks, NDEP has been monitoring Class Waters as part of its review of the Class Water regulations. In some instances, the data did not meet the minimum data size requirements but suggested that additional investigation was warranted.

- **"Hydrogeochemical Data for Historic Mining Areas, Humboldt Watershed and Adjacent Areas, Northern Nevada", J. Thomas Nash, U.S. Geological Survey, Open File Report 00-459, 2000.**

  The document contains water quality information for a variety of parameters for 131 sites in Northern Nevada. NDEP has reviewed these data and there is a significant problem associated with using these data for listing decisions. In general, each site was sampled only once during the 1996-2000 period with no sample dates provided in the datasets. Under the 303(d) Methodology, more than one sample is generally needed to make listing decisions, unless other information supports listings. For this report, data from OFR 00-459 was used to identify potential problems in need of additional monitoring.

- **"Water Quality at Inactive and Abandoned Mines in Nevada", Nevada Bureau of Mines and Geology Open File Report 95-4, 1995.**

  This reports presents their water quality findings for a number of inactive and abandoned mines throughout Nevada. While the Crown Prince adit has been identified as one of worst adit discharges in the state with high metals and low pH levels, no water quality data for Perry Canyon itself could be located in NDEP/BMRR's files. As part of a 1995 report, Nevada Bureau of Mines and Geology provides water quality for one sample taken from the Crown Prince adit discharge. No samples were available for Perry Canyon Creek or Mullen Creek. Therefore, Perry Canyon Creek was placed on the "List of Waterbodies Warranting Further Investigation".

- **Nevada Abandoned Mine Lands Report, Interagency Abandoned Mine Land Environmental Task Force, September 1999**

  This report provided qualitative information on abandoned mines that were in need of remediation and was used to identify waterbodies warranting further investigations.

- **"Phoenix Project, Final Environmental Impact Statement", U.S. Bureau of Land Management, 2002**

  Surface water data collected for the EIS were for the years 1995 and 1996, therefore the data were outside the 1997-2001 period considered for the List. Also, there were typically only 3 or fewer samples collected at one site. Data from the EIS show some exceedances of metal standards but because of the limited data and data age, creeks in this area were placed on the draft Potential Problems list.

- **North Fork Humboldt River and Tributaries**

  A variety of studies have generated data and information regarding the health of the North Fork Humboldt River and tributaries in the Big Springs Mine area:

  > "Preliminary Assessment of Potential Impacts of Drainage Associated with the Big Springs Mine to Aquatic Organisms in the North Fork Humboldt River, Elko County, Nevada", U.S. Fish and Wildlife Service, 1998.
  >
  > "Fish Population Survey of the North Fork Humboldt River, Elko County, Nevada, 1999", Chadwick Ecological Consultants, Inc., 2000.
  >
  > "Benthic Macroinvertebrate Monitoring of the North Fork Humboldt River, Elko County, Nevada, 1999", Chadwick Ecological Consultants, Inc., 2000.

Upon examination of these reports, no clear cut finding of impairment for selenium can be found for certain reaches of the North Fork Humboldt River (Sammy Creek to forest boundary) and Sammy Creek (below the wasterock). Based upon "Guidelines for Interpretation of the Biological Effects of Selected Constituents in Biota, Water and Sediment", National Irrigation Water Quality Program Information Report No. 3, US Dept. of the Interior, November 1998, examination of selenium levels in the water, sediment and fish tissues shows both exceedances and compliances with the toxicity thresholds, and suggests that further investigations are needed. Therefore, both of these reaches were placed on the "List of Waterbodies Warranting Further Investigation."

- **EPA's Regional Environmental Monitoring and Assessment Program (REMAP)**

EPA submitted data associated with the Nevada REMAP project including water and sediment chemistry, fish tissue and macroinvertebrate data. However, the datasets were generally restricted to 1 sample per site during the 1997-2001 period. While suitable for regional analysis, NDEP requires more than 1 sample to determine impairment at the local level regardless of the type of sample (water, sediment, tissue, macroinvertebrate). However these data were evaluated to identify waterbodies warranting further investigation by comparing REMAP data the threshold values provided in "Guidelines for Interpretation of the Biological Effects of Selected Constituents in Biota, Water and Sediment", National Irrigation Water Quality Program Information Report No. 3, US Dept. of the Interior, November 1998. As described above, the REMAP data were evaluated inconjunction with other data on the North Fork Humboldt River.

- **Other Data**

Miscellaneous water quality data (collected by NDEP, U.S. Forest Service, BLM) were submitted or compiled for some sites throughout the state. As the datasets were limited to 1 sample, they were used for identifying waterbodies warranted further investigations.