Utah's 2006 Integrated Report
Volume II - 303(d) List of Impaired Waters

Little Deer Creek, Wasatch County

Department of Environmental Quality
Division of Water Quality

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I. INTRODUCTION

Pursuant to Section 303(d) of the Clean Water Act as amended, each State is required to identify those assessment units (AUs) for which existing pollution controls are not stringent enough to implement state water quality standards. Thus, those waters or assessment units (i.e., lakes, reservoirs, rivers, and streams) that are not currently achieving or are not expected to achieve those standards are identified as water quality limited. An assessment unit is considered water quality limited when it is known that its water quality does not meet applicable water quality standards or is not expected to meet applicable water quality standards. Assessment units can be water quality limited due to point sources of pollutants, non point sources of pollutants or both. Examples of pollutants that can cause beneficial use impairment include chemicals for which there are numeric standards (e.g., ammonia, chlorine, organic compounds and trace elements), and pathogens.

Once an AU is identified as water quality limited, the State is to determine the source(s)of the water quality problem and to allocate the responsibility for controlling the pollution. This analysis which the State does to determine the reduction in pollutant loading necessary for that AU to meet water quality standards and support its beneficial uses is called a Total Maximum Daily Load analysis or "TMDL". The result of this process determines (1) the amount of a specific pollutant that an assessment unit can receive with out exceeding a water quality standard or impair a beneficial use, (2) the apportionment of the load to point and nonpoint sources, and (3) a margin of safety. While the term TMDL implies that loading capacity is determined on a daily time scale, TMDLs can range from meeting an instantaneous concentration (e.g., an acute standard) to computing an acceptable annual phosphorus load for a lake or reservoir.

When the State prepares its 303(d) list, it is required to prioritize its assessment units for TMDL development and to identify those AUs that will be targeted for TMDL development within the next two years.

For the 2006 Integrated Report, Utah is using the five-part integrated list for reporting the status of the State's waters (EPA, 2006). One major change from the 2004 Integrated Report report includes the reporting of all completed TMDLs in Category 4A, TMDLs completed and approved by EPA. Other TMDLs in the same AU not completed will be listed on the 2006 303(d) list. Therefore, an AU can be assessed as a Category 4A and 5A water. Waters found to be impaired by "pollutants" are required to have TMDLs developed. Water quality impairments caused by pollution, i.e. habitat alteration, flow alteration, will be listed in Category 4A, impaired, but a TMDL is not required for this type of impairment. The State will continue to add and delete AUs from the 303(d) list by moving them to the correct category according to the procedures outlined in this document. An overview of the five categories and a decision flow diagram are provided later in this report.

The 303(d) list is a dynamic list in which AUs can be added (i.e. new permits are issued, new assessments are made) or removed (i.e. water quality standards are now being met). Information supporting Utah's TMDL list is provided in the subsequent sections of this document. At a minimum, a state's supporting information should include: (1) a description of the methodology used to develop the list; (2) a description of the data and information used to develop the list; (3) the rationale for any decision to not use any information or the rationale for removing AUs previously listed as water quality limited; and (4) a summary of comments received on the list during the state's public comment period. Following an opportunity for public review and comment the State must submit its list to the EPA Regional Administrator by April 1, 2006.The EPA Regional Administrator then has 30 days to approve, conditionally approve, or disapprove a state's listing. If the EPA Regional Administrator disapproves a state's submittal. EPA then has 30 days to develop a list for the state.

II. ASSESSMENT UNIT DELINEATION AND IDENTIFICATION

To assess waters of the State, the Division of Water Quality (DWQ) has delineated lakes, reservoirs, streams, and rivers into discrete units called assessment units (AUs). Lakes and reservoirs have been delineated as individual AUs and the size is reported in acres. Rivers and streams have been delineated by specific river, river or stream reach, or several stream reaches in sub-watersheds. When using sub-watersheds to delineate stream AUs, the new U.S.G.S. 5th (10 digit) and 6th (12 digit) level watershed units for Utah were used to delineate the AUs. These watershed units allow for the aggregation of stream reaches into individual AUs that are hydrologically defined. The watershed units were developed by a group of individuals representing state and federal agencies, and have been certified by the Natural Resource Conservation Service. In delineating river and stream AUs, DWQ followed the guidelines listed below with the first two guideline statements being fixed rules.

1. Each AU is within an eight-digit USGS hydrologic unit (HUC).

2. Each river and stream AU is comprised of stream reaches having the same water quality standards classifications (2B, 1C, 3A,and 4 or 2B, 3B, and 4).

3. Large rivers such as the Green River, Colorado River and portions of other large rivers (Bear River, Weber River, etc), were delineated into "linear" or "ribbon" AUs. Where a major tributary entered these rivers or hydrological features such as dams exist, the river is further delineated into two or more AUs.

4. Tributary rivers and streams were delineated primarily using the 5th and 6th level hydrologic units to define the AUs.

5. Additional AUs were defined by combining or splitting 5th or 6th level watersheds using tributary streams, stream size, and ecological changes such as geology, vegetation, or land use.

6. Small tributary streams to larger streams that could not be incorporated into a watershed unit were combined into separate unique AUs.

These AUs units have been geo-referenced (indexed) to the National Hydrologic Database using a reach-indexing tool that provides the capability of using GIS techniques to display information and data for each AU. Beneficial use classifications and assessments for individual AUs can be mapped or displayed to provide visual representation of assessment results. Individual stream AUs were assigned a unique identification code for indexing which includes the 8-digit hydrological unit (HUC) number with the prefix UT and a 3-digit code to identify each unique AU in a HUC. Lake and reservoir AUs were identified by adding the prefix UT-L- to the 8-digit HUC number and adding a 3-digit code.

Figure 1 illustrates the results of using the above guidelines to delineate and identify AUs. The Weber River was delineated as a linear AU from its confluence with Chalk Creek upstream to the Wanship Dam (UT16020101-017). One AU, UT16020101-011, in the Chalk Creek watershed was delineated by combining two 5th level watershed units located in the South Fork Chalk Creek sub-basin. The first AU, (UT16020101-010), in the Chalk Creek watershed was delineated using the confluence of the South Fork as the upstream point. This necessitated splitting the 5th level watershed unit into two segments. An example of small tributary streams that could not be combined into a hydrological based AU is illustrated by theAU,UT16020101-019. These are very small tributaries and the Weber River is not reflective of their stream order or the habitat that they flow through. Rockport Reservoir (UT-L-16020101-002) and Echo Reservoir (UT16020101-001) are examples of lake and reservoir Aus.

III. Category Definitions for Listing Assessment Units.

For this reporting cycle, assessment units (AUs) will be placed in one of five attainment categories with sub-categories as needed (USEPA, 2006). The methodology for determining whether or not an AU is meeting water quality standards or fully supporting its designated beneficial uses is discussed in Section II. For those AUs for which there are no reliable data, either monitored or evaluated, for a specific designated beneficial use, a designation of **Not Assessed** for that specific beneficial use shall be assigned. For those AUs for which there are no reliable data, either monitored or evaluated, for all criteria for all applicable designated uses, a designation of **Not Assessed** will be assigned to all the designated beneficial uses for that AU.

The determination of use support using methods described in section II and other specified protocols will be combined to determine the overall water quality attainment category for each AU. The unique assessment categories are described as follows:

Category 1. All designated uses are attained. AUs are listed in this category if there are data and information that meet all requirements of the assessment and listing methodology and support a determination of full support for all of an AU's designated beneficial uses.

Category 2. Some of the designated uses are attained, but here is insufficient data to determine beneficial use support for the remaining designated uses. AUs are listed in this category if there are data and information that meet requirements of the assessment and listing methodology to support a determination that some, but not all, uses are attained. Attainment status of the remaining uses is unknown because there is insufficient or no data to assess beneficial use support.

Category 3. Insufficient or no data and information to determine if any designated use is attained. AUs are listed in this category where data or information is not sufficient or does not exist to determine whether any beneficial use is attained following the requirements of the assessment and listing methodology.

Category 4. Impaired for one or more designated uses, but does not require development of a TMDL.

A. TMDL has been completed for any pollutant. AUs are listed in this sub-category when any TMDL(s) has been developed and approved by EPA, that when implemented, are expected to result in full support of the water quality standards or support the designated beneficial uses. Where more than one pollutant is associated with the impairment of an AU, the AU and the parameter(s) that has an approved TMDL will be placed in this category. For those pollutants that still need a TMDL, they will be placed in Category 5.

B. Other pollution control requirements are reasonably expected to result in attainment of the water quality standard in the near future. Consistent with the regulation under 40 CFR, 130.7(b)(I), (ii), and (iii), AUs are listed in this subcategory where other pollution control requirements (e.g., best management practices)required by local, state, or federal authority are stringent enough to meet any water quality standard or support any beneficial use applicable to such waters.

C. The impairment is not caused by a pollutant. Assessment units are listed in this subcategory if the impairment is not caused by a pollutant (e.g., habitat alteration).

Category 5. The water quality standard is not attained and is caused by a pollutant. The AU is found not supporting one or more of its designated beneficial uses as determined by current water quality standards and assessment methodologies. This category constitutes the Section 303(d) list of waters. Category 5 is further delineated into the following sub-categories.

A. A TMDL is underway or scheduled [303(d) list]. AUs are listed in this category if the AU is impaired for one or more designated uses by a pollutant.

B. A request is made to remove one or more pollutants from the 303(d) list. AUs are listed in this category for the following reasons: If the most recent water quality assessment indicates that water quality standards are being met, the AU is listed in this

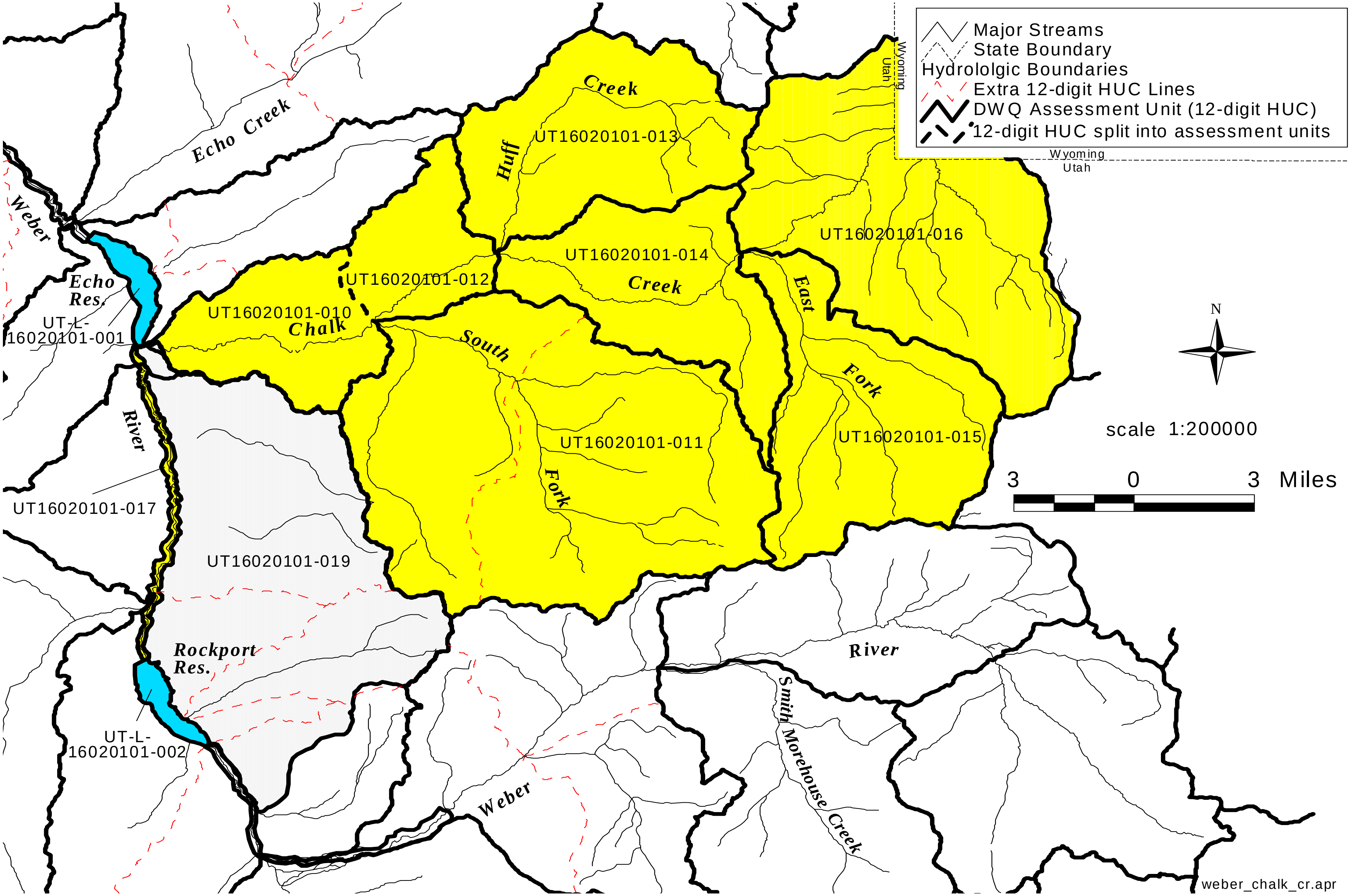


Figure 1. Delineation of assessment units following established guidelines.

sub-category. If errors in previous assessments or a new delineation of an assessment unit is the cause for meeting water quality standards, the AU is included in this sub-category. If a change in the water quality standards was made and it results in the AU meeting the standard, the AU is listed in this category. UPDES permit renewals for which a letter of approval has not been received were placed in this category. A more detailed list of reasons for removal is provided later in the report.

C. A Utah Pollutant Discharge Elimination System permit renewal TMDL is scheduled to determine discharge limitations that will meet water quality standards or protect designated beneficial uses. Parameters listed with UPDES Permit Renewal TMDLs are effluent limited and the receiving water is not impaired and does not violate water quality standards. Water quality standards may be violated and water quantity impaired if the permitted effluent limits are not met. Assessment units are listed in this category if there is a discharge permit renewal scheduled between April 1, 2006 and March 31, 2008 inclusive.

D. A Lake or Reservoir has been assessed as not meeting standards for one monitoring cycle. The assessment has identified impairment during one of the even or odd year monitoring cycles. If the AU is assessed as impaired during the next assessment period, it will be listed in Category 5A, TMDL required.

The five categories of reporting were developed by EPA to provide a clearer summary of a state's water quality status and to assist in developing management actions to protect and restore waters of the state to meet water quality standards and support beneficial uses. The decision criteria for determining where an AU is assigned is illustrated in Figure 2. Figure 3 illustrations further decision criteria applied to Category 5 sub-categories.

II. METHODOLOGY FOR DEVELOPING THE 303(d) LIST

The purpose of this section is to describe the methods and decision-making process used to identify and list water quality limited assessment units needing TMDLs, as well as the criteria used to de-list assessment units previously identified in any of the State's previous TMDL lists.

A. Division of Water Quality Programs Involved In Identifying Impaired Waters.

1. Utah Pollutant Discharge Elimination System Program (UPDES)- Any receiving AU (lake, reservoir, river, stream) on which a facility is located that requires a Utah Pollutant Discharge Elimination System discharge permit renewal between April 1, 2006 and March 31, 2008 for pollutants that are not controlled through technology-based requirements or end-of-pipe requirements was listed. The assessment units identified and associated with the UPDES permit dischargers are water quality limited, which means a TMDL is needed to determine proper water quality-based limits to assure water quality standards are maintained or attained. Listing of permittees and pollutants doesn't imply that the receiving water is currently

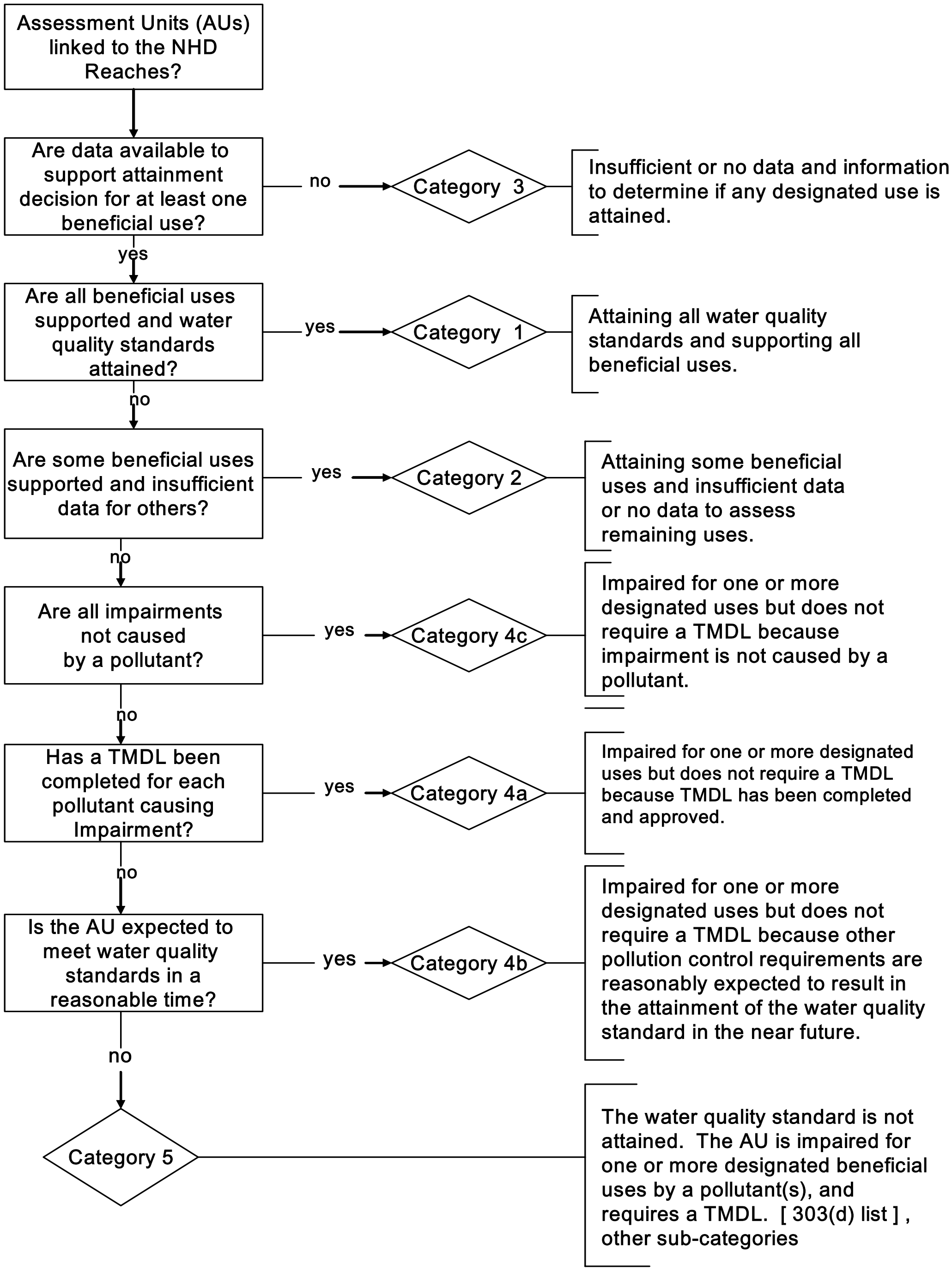


Figure 2. Decision criteria for attainment categories. Category 5 is further divided into categories 5A [303(d) list], 5B, 5C [UPDES permit renewal TMDLs] and 5D.

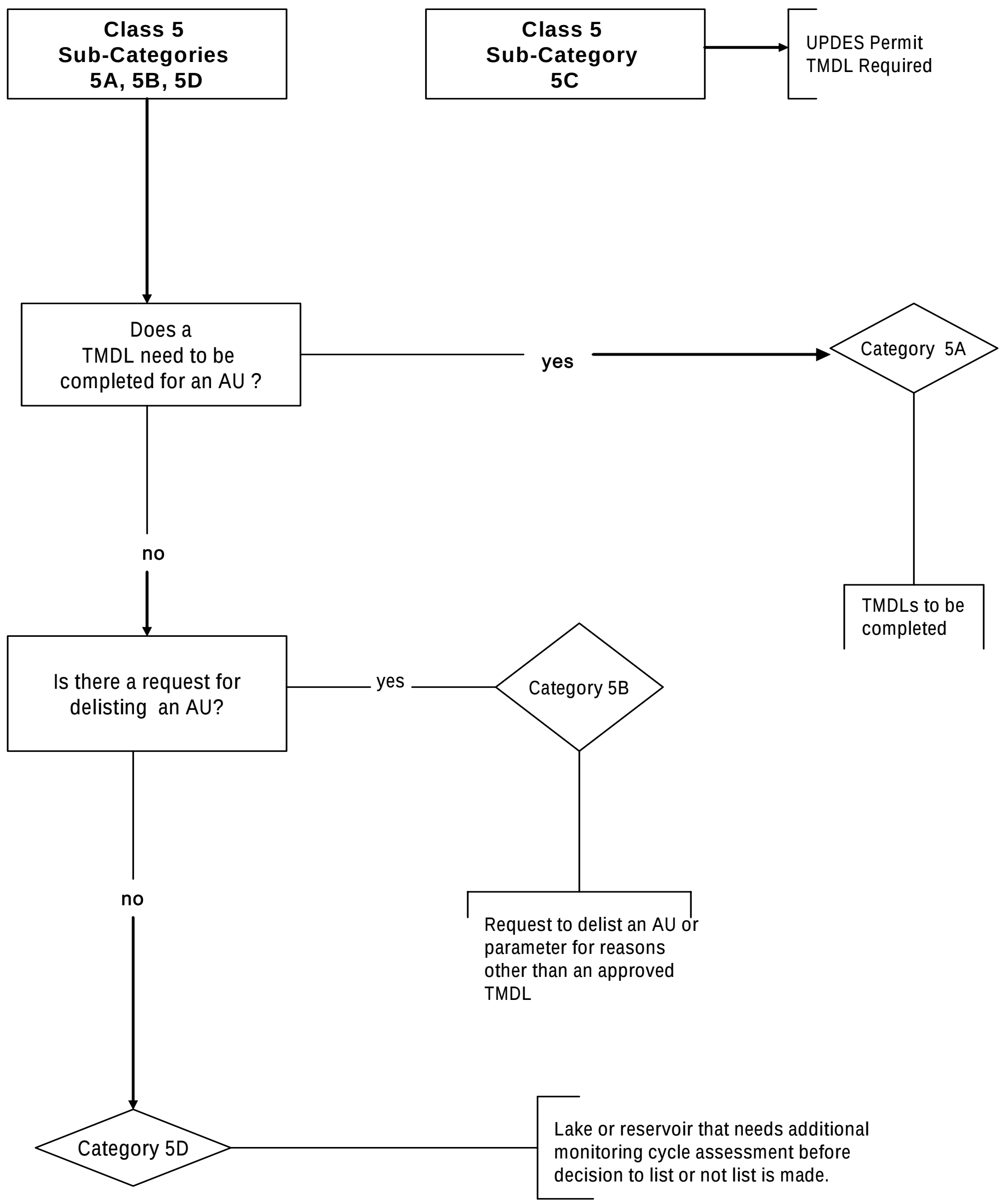


Figure 3. Flow diagram for Category 5 sub-categories.

violating any of the State's water quality standards. Total Maximum Daily Load Analyses are calculated to determine the degree of treatment that must be performed before the effluent can bed is charged to assure the receiving water quality and its beneficial use designations are maintained.

2. Lake Water Quality Assessment and Clean Lakes Programs (314) - Any lake or reservoir identified as partially supporting or not supporting one or more of its beneficial uses through either one of these programs was evaluated for listing.

3. Stream Water Quality Assessment and Nonpoint Source Programs (319) - Any stream or stream segment identified as partially supporting or not supporting one or more of its beneficial uses through either one of these programs was evaluated for listing.

4. Cooperative Monitoring Program - The Division of Water Quality has Memorandums of Agreement with the U.S. Forest Service and U.S. Bureau of Land Management to cooperate in the monitoring of the waters of the State. Agreements have also been made with other entities to monitor and collect data to be used in assessing waters for preparation of the 303(d) list. Any AU identified using data from the cooperative monitoring program as not meeting its beneficial uses was evaluated for listing.

B. Criteria for Listing Assessment units on 303(d) List.

As stated above, assessment units with permit renewals between April 1, 2006 and March 31, 2006 were listed for pollutants that are not controlled through technology-based requirements or end-of-pipe requirements.

Beneficial use support was determined by comparing data against the standards and indicators for the designated beneficial uses listed in Table 1. Narrative standards were also used to determine beneficial use support. Tables 2 through 6 are the listing criteria used to compare data against standards and pollution indicators found in Standards of Quality for Waters of the State, R317-2, Utah Administrative Code (DEQ, 2005) to determine beneficial use support of assessment units that are not listed because of a UPDES discharge permit renewal. For lakes and reservoirs, the same criteria are used with the exception of the tables for conventional parameters; pH, dissolved oxygen and temperature for 3A (cold water game fish), 3B (warm water game fish) and 3C (warm water non-game fish). Additional criteria for determining beneficial use support for lakes and reservoirs are explained in the last part of this section. The total phosphorus method for identifying waters as needing further study is not applied to lakes and reservoirs or large rivers such as the Green River and Colorado River.

The State of Utah exercises discretion in using data or information that goes beyond the criteria listed in the following tables and/or narrative for listing assessment units and can include other types of information and best professional judgment. *This listing methodology for chronic levels of toxicants when less that 10 samples are used for assessment was developed following EPA's overwhelming evidence guidance. Note: If more than 3 years of data are available, EPA guidelines allow for one additional exceedance when determining beneficial use support.

Table 1. Designated Beneficial Uses for River Streams, Lakes, and Reservoirs,	
Class	**Definition**
1	Protected for use as a raw water source for domestic water systems.
1C	Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
2	Protected for recreational use and aesthetics.
2A	Protected for primary contact recreation such as swimming.
2B	Protected for secondary contact recreation such as boating, wading, or similar uses.
3	Protected for use by aquatic wildlife.
3A	Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.
3B	Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
3C	Protected for nongame fish and other aquatic life, including he necessary aquatic organisms in their food chain.
3D	Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.
3	Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.
4	Protected for agricultural uses including irrigation of crops and stock watering.
5	The Great Salt Lake. Protected for primary and secondary contact recreation, aquatic wildlife, and mineral extraction.

Table 2. Criteria for Assessing Water as a Source of Drinking Water - Class 1C		
Degree of Use Support	**Field Monitoring (Toxicants)**	**Restrictions**
Full	For any one pollutant, no more than two violation of criterion.	No source water closures or advisories
Partial	For any one pollutant, two or more violations the criterion, but violations occurred in ≤ 10% of the samples.	One or more drinking water source advisories lasting less than 30 days per year.
Non	For any one pollutant, two or more violations of the criterion occurred in more than 10% of the samples	One or more drinking water source advisories lasting greater than 30 days.

Table 3. Criteria for Assessing Primary and Secondary Contact Beneficial Use - Class 2A and 2B

Degree of Use Support	Restrictions	*E. coli*
Full	No bathing area closures or restrictions in effect during reporting period.	Criterion 1 and 2 met.
Partial	On average, one bathing area closure per year of less than one week's duration.	Geometric mean met; single-sample criterion exceeded during the recreational season
Non	On average, one bathing area closure per year of greater than one week's duration, or more than one bathing areas closure per year.	Geometric mean not met.
Bacterial Criterion		
Criterion 1 = For Class 2A, single sample maximum should not exceed 576 per 100 mL; and for Class 2B, the single sample maritimum should not exceed 940 per 100/mL		
Criterion 2 = For Class 2A, the geometric mean should not exceed 126 per 100 mL for any 30-day period. For Class 2B, the geometric mean should not exceed 206 per 100 mL for any 30-day period. At least 5 samples should be collected in any 30-day period. Samples should be evenly spaced over the 30-day period		

Table 4. Criteria for Assessing Aquatic Life Beneficial Use Support – Classes 3A, 3B, 3C, 3D	
Degree of Use Support	**Conventional Parameters [1] (pH, DO, Temperature)**
Full	For any one pollutant, criterion was exceed only once or was not exceeded in < 10% of the samples if the criterion was exceeded at least two times.
Partial	For any one pollutant, criterion was exceeded two times, and criterion was exceeded in more than 10% but not more than 25% of the samples.
Non	For any one pollutant, criterion was exceeded two times, and criterion was exceeded in more than 25% of the samples.
1 - During the recent drought, areas of the state ranged from moderate to extreme drought conditions. For conventional parameters, especially temperature, a determination was made as to whether or not the violations of the state standards were caused by the drought conditions. Data were compared against historical data at monitoring sites to assist in making the decision; flow data and observations by field crews were also used in making the determination whether to list conventional parameters for an AU or not.	

Table 5. Toxic Parameters (priority pollutants, chlorine, and ammonia			
Criteria	**Number of Samples**	**Degree of Support**	
Acute	4 or more	Full	For any one pollutant, no more than one violation of acute criteria within a 3-year period.
		Partial	For any one pollutant, two or more violations of the acute criterion, but violations occurred in ≤ 10% of the samples 3-year period.
		Non	For any one pollutant, two or more violations of the acute criterion, and violations occurred in more than 10% of the samples within a 3-year period
Chronic	10 or more	Full	For any one pollutant, less than two exceedances of criterion within a 3-year period.
	Less than 10	Partial	Standard is multiplied by 1.75 to determine the listing value. For any one pollutant, more than 3 exceedances in a 3-year period.*
	10 or more	Non	For any one pollutant, 3 or more violations of the chronic criterion within a 3-year period.

* The listing methodology for chronic levels of toxicants when less than 10 samples are used for assessment was developed following EPA's overwhelming evidence guidance.

Note: If more than 3 years of data are available, EPA guidelines allow for one additional exceedance when determining beneficial use support.

Fish and Wildlife Consumption Advisories: In previous 305(b) assessments, Utah has listed AUs on the 303(d) list if a health advisory for consumption of fish and/or waterfowl had been issued. For this cycle, AUs were not listed based on health advisories. Several issues that need to be studied before AUs are listed for consumption advisories include but are not limited to: (1) What is the current fishing rate on a stream or lake and (2) how many species of fish are included in the advisory, and (3) what is the spatial distribution of the population of fish that are not meeting the limits of the consumption advisory. The same issues need to be addressed for waterfowl advisories especially if they are migratory birds. One of the major issues involved in migratory fowl listings is determining where the source of the contaminant is located. They could have been contaminated from a source within the state or outside of the state. The DWQ will review the methods used by other states and work towards having a procedure in place for the 2008 listing cycle. Some states uses age class and creel census as part of there procedure for listing AUs based upon mercury contamination and others use different levels of contamination of mercury to determine if an AU needs to be listed. The application of any listing method based upon health advisories should be evaluated for other metals also.

For now, Utah will leave the two AUs that are on the list based upon fish and/or waterfowl consumption advisories. These waters include the lower portion of Ashley Creek, Stewart Lake, Uintah County, and Silver Creek in Summit County. Without the fish and wildlife advisories the lower portion of Ashley Creek and Stewart Lake would have been listed for selenium based on violations of the water quality standard. Silver Creek is being listed this cycle because of violations of the drinking water standard for arsenic. It is currently listed for arsenic based upon a health advisory for fish consumption.

C. Additional Criteria for Listing Lakes and Reservoirs.

The criteria for listing lakes and reservoirs under Class 1C (source of drinking water), 2A (recreation), and Class 4 (agricultural use) are the same as listed in Tables 2, 3, and 6. Several factors were considered in the assessment for beneficial use support. The monitoring program for lakes and reservoirs is designed to determine a basic water quality characterization and evaluate the productivity during the summer period. Additional winter monitoring is conducted to evaluate dissolved oxygen deficiencies as indicated by the summer monitoring. Water quality standards are evaluated to assess impairment for waters classified in Classes 2 (recreation), 3 (aquatic life), and 4 (agriculture).

1. The following procedure was used to evaluate Class 3 (aquatic life) beneficial use:

Three basic parameters that are compared to standards in addition to other specific parameters include dissolved oxygen, pH, and temperature. These basic parameters are obtained in the field as part of the overall monitoring program for Utah's lakes and reservoirs. The data for these three parameters are analyzed for the entire water column and evaluated according to current 305(b) guidelines. A comparison of water column values with State standards is determined as follows: For any one pollutant or stressor, the criterion was exceeded in less than or equal to10 percent of the measurements, a designation of 'fully supporting' was assigned. For any one pollutant or stressor, if the criterion was exceeded in greater than 10 percent but less than or equal to 25 percent of measurements, a designation of 'partially supporting' was assigned. For any one any one pollutant or stressor a 'not supporting' designation was assigned if more than 25 percent of measurements exceeded the criterion. An exception to these guidelines has been provided for dissolved oxygen

Table 6. Criteria for assessing Agricultural Beneficial Use Support - Class 4		
Degree of Use Support	**Conventional Parameter (Total Dissolved Solids)**	**Toxic Parameters**
Full	Criterion exceeded in less than two samples or was exceeded in ≤ 10% of the samples when the criterion was exceeded at least twice.	For any one pollutant, no more than one violation of criterion.
Partial	Criterion was exceeded at least two times, and criterion was exceeded in more than 10% but not more than 25% of the samples.	For any one pollutant, two or more violations of the criterion, but violations occurred in ≤10% of the samples.
Non	Criterion was exceeded at least two times, and criterion was exceeded in more than 25% of the samples.	For any one pollutant, two or more violations of the criterion, and violations occurred in more than 10% of the samples.

The dissolved oxygen criterion has been defined using the 1-day minimum dissolved oxygen concentration of 4.0 mg/l. State standards account for the fact that anoxic or low dissolved oxygen conditions may exist in the bottom of deep reservoirs and therefore, the dissolved oxygen standard is applied as follows. When the concentration is above 4.0 mg/l for greater than 50% of the water column depth, a fully supporting status is assigned. When 25-50% of the water column is above 4.0 mg/l, it is designated as partial supporting and when less than 25% of the water column exceeds the 4.0 mg/l criteria, it is designated as not supporting its defined beneficial use. Having determined support status for individual pollutants or stressors, an overall use support designation was determined based on a combination of the individual pollutant or stressor support designations. A 'not supporting' status was assigned to a body of water when at least two of the basic criteria (dissolved oxygen, pH or temperature) were found to be not supportive. A 'fully supporting' status was assigned when all of the criteria were found to be fully supporting. All other assessment units were assigned a 'partially supporting' status for criteria found in the various remaining combinations. The initial support status may be modified through an evaluation of the trophic state index (TSI), winter dissolved oxygen conditions with reported fish kills, and the presence of significant blue green algal populations in the phytoplankton community. This evaluation, although based to an extent on professional judgment, could shift initial support status ranking downward if two of the three criteria indicate there is was impairment in the water quality.

2. Evaluation of Class 3A Reservoirs that Exhibit Temperature Impairment.

There are 12 reservoirs that are currently classified as 3A (cold water fishery support) but that have consistently been found to exceed the associated temperature standard. These include: Otter Creek, Brough, Piute, Porcupine, Red Fleet, Wide Hollow, Mantua, Baker Dam, Matt Warner and Steinaker reservoirs and Palisade and China Lakes. Careful investigation of the sources of these exceedances has been performed. This included calculation of the heat budget for each reservoir (Horne and Goldman 1994). During this exercise, we considered summer tributary volume and temperature and the quality and ability of riparian vegetation to provide stream shading. Although some improvement to stream riparian condition is possible, the low summer flows would remain ineffective in overcoming the heat gained by solar radiation. Because of this natural source of heating, concurrent with natural low summer tributary flow we have determined that the impairment can not be remediated and will exclude temperature in the 305(b)/303(d) assessment and reporting process for these waterbodies.

A final determination to list the AU is made through an evaluation of assessment trends since 1989. It is necessary to incorporate such an evaluation to incorporate the hydrology and seasonality associated with lakes and reservoirs. In general, if an AU exhibits a consistent status of 'partial supporting' or 'not supporting', it should be listed on the303(d) list. However, some assessment units appear to be borderline and there is a mixture of partially and fully supporting conditions over the period of study. Therefore, two consecutive evaluation cycles in any particular support status are required for addition to or removal from the303(d) list.

D. Biological and Habitat Data

Biological and habitat data were used on a limited basis to supplement water chemistry data in determining beneficial use support. Phytoplankton data were used to assess lake and reservoir water quality.

E. Criteria for Removing Assessment Units from the Category 5A (303(d) List).

1. An AU was placed on list due to error in assessment or because an AU was listed incorrectly in place of another AU or any other error not based on water quality assessment.

2. The most recent data assessment indicates that the AU is supporting all of its designated beneficial uses.

3. A total maximum daily load analysis has been completed and approved by EPA.

4. An existing AU delineation has changed. a. An AU has been changed by dividing it into several assessment units. b. The AU boundaries have been changed and it is now a part of a different AU or portions of the AU are included in newly defined assessment units.

5. A change in the method(s) of determining beneficial use support. The methodology change would cause the assessment to indicate that all beneficial uses assessed are fully supported.

6. A change in State water quality standards or pollution indicator values would change assessment to fully supporting all beneficial uses that have sufficient data to be assessed.

7. A determination that insufficient amounts of data were collected to place the AU on the list originally, e.g.,too few

samples collected to make a reliable determination of beneficial use support.

8. Utah exercises discretion in using data or information that goes beyond the criteria listed above in determining whether to de-list an AU and can include other types of information and best professional judgment.

III. DATA AND INFORMATION USED TO PREPARE 303(d) LIST

The state of Utah relied upon the following sources of data and information to prepare its 303(d) list.

A. Water Quality Assessments

Water quality assessments conducted as part of the Section 305(b) report form the basis for the State's TMDL list. As part of this assessment, the State uses a five-year rotating monitoring program to collect data and to assess the beneficial use support of its rivers and streams. The State has been divided into ten watershed management units (Figure 2) that have been aggregated into five monitoring regions (Table 7) for water quality monitoring purposes. Each region is monitored on an intensive basis once every five years.

The primary areas of assessment since the 2004 305(b) assessment were the Bear River and Weber River Watershed Management Units.

Data collected on a yearly basis by the Division of Water Quality and other agencies were also used to assess water quality statewide. Because some of the standards for metals were changed, data from previous watershed assessments were compared against the new standards to determine beneficial use support.

Assessments completed on previous watershed management units which included the Jordan/Utah Lake Uinta, Sevier River, Cedar/Beaver, Colorado River West, Colorado River Southeast, and the Lower Colorado Watershed Management Unit were combined with the above assessments to compile a statewide beneficial use support assessment.

Letters and e-mails were sent to entities involved in collecting water quality data to solicit data to be used in assessing waters of the state. Other entities were contacted by telephone to solicit data.

The Division of Water Quality issued a public notice of request for submission of data to be used in assessing waters of the state for the 2006 305(b) report and the303(d) list of impaired waters. It was published in the Salt Lake Tribune and the Deseret News on May 21, 22, 2005. Included in the notice was a deadline, June 20, 2005, for submission of data to ensure that it would be used during the preparation of the2006 305(b) report and 303(d) list.

Beneficial use support designations were arrived at using chemical, physical, biological data and other information collected by the DWQ, Cooperating Agencies, and other entities involved in collecting data related to water quality. Federal and other public agencies involved with cooperative monitoring agreements or providing information used during this cycle to assess beneficial use support are listed below:

1. United States Forest Service

2. United States Bureau of Land Management

3. Salt Lake City

4. United States National Park Service

6. Central Utah Water Conservancy District.

7. United States Geological Survey

8. Salt Lake County

9. Kanab Water

Bacteriological data collected by Salt Lake City were used to assess some streams in the Jordan River watershed. Bacteriological data provided by Salt Lake County were used to assess the Jordan River. Physical and water chemistry data collected by the U. S. Geological Survey (U.S.G.S.) as part of the Great Salt Lake River Basins NAWQUA study and from other monitoring sites throughout the state were used to assess beneficial use support.

B. Dilution Equations

Dilution equations were used to develop waste load allocations for the UPDES discharge permit TMDLs to determine acceptable effluent discharge limits that would attain water quality standards and protect the receiving water from having its beneficial uses impaired.

As previously mentioned, cooperative monitoring programs with other governmental agencies were used to enhance the assessment capabilities of the State. In addition, technical advisory committees have been established in several watersheds and they assisted in the assessment and reviewed reports that were prepared by the Division of Water Quality. These advisory committees include representatives from federal, state, county, and private groups.

C. Nonpoint Sources Assessments

Nonpoint source assessments that have identified impaired waters were used to list waters. These assessments were done by various agencies including the Division of Water Quality and the U.S. National Resource Conservation Service. Nonpoint Source Project Implementation Plans were reviewed to identify problems and list impacts.

IV. PUBLIC PARTICIPATION

Public participation in developing the list was primarily in the form of technical advisory and steering committees that consisted of other State agencies, Federal agencies, and individuals or groups from the private sector. Some committees actively participated in preparing the list while presentations of the assessments were given to others. Comments by the groups were then reviewed to assist in preparing the list.

A. Public Notices

The Division of Water Quality issued two public notices soliciting public participation. One was a request for submission of data to be used in assessing waters of the state for the 2006 305(b) report and the303(d) list of

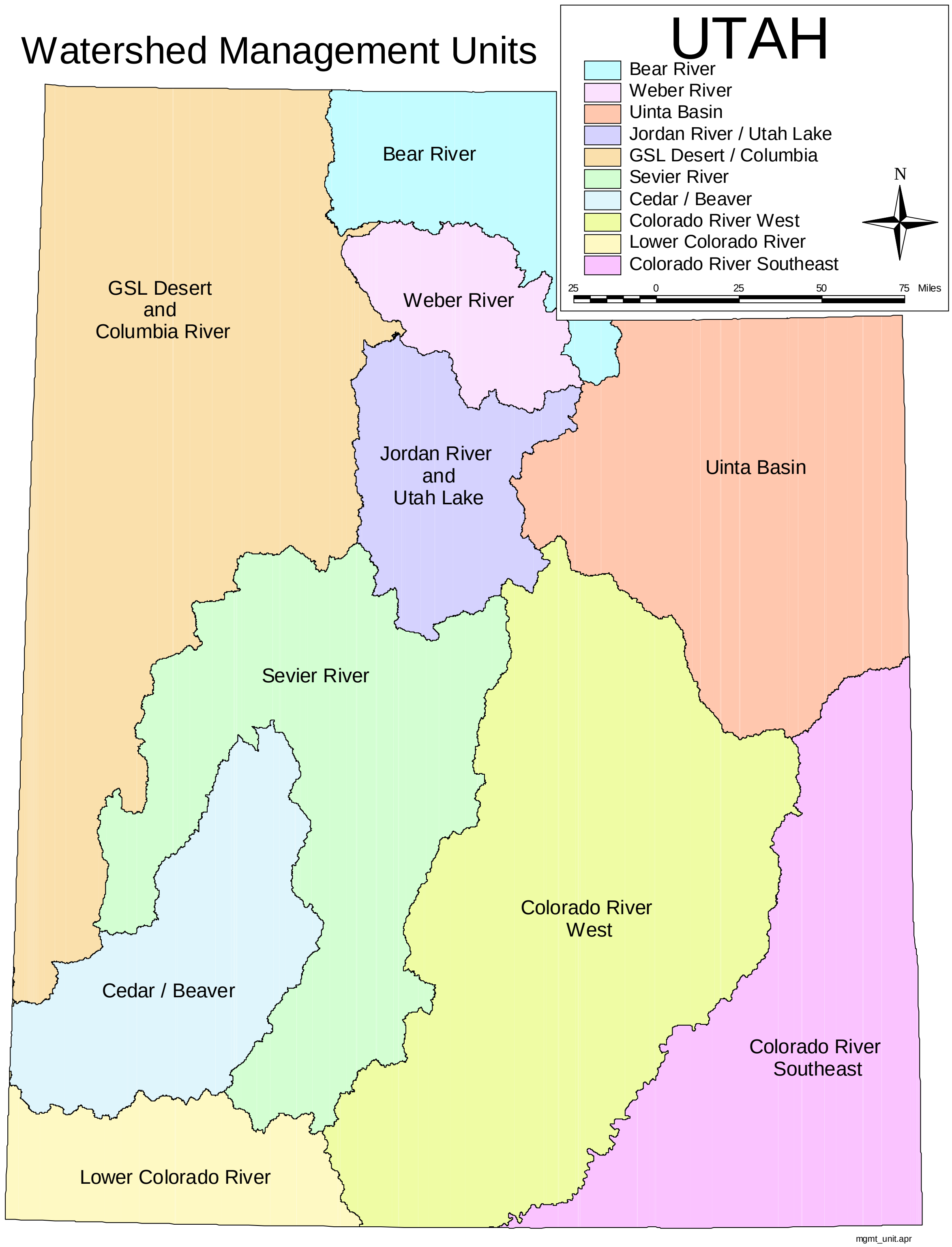


Figure 4. Utah's Watershed Management Units.

Table 7. Water Quality Monitoring Regions	
Region	**Management Unit**
1	Bear River, Weber River, Great Salt Lake Desert / Columbia (northern portion of GSL Desert
2	Jordan River, Great Salt Lake Desert (southern portion of GSL Desert)
3	Uinta
4	Sevier River, Cedar / Beaver, Lower Colorado
5	Colorado River West, Colorado River Southeast

impaired waters

A public notice for reviewing and commenting on the proposed 2006 303(d) list was published in the Salt Lake Tribune and the Deseret News on January 18, 2006. In addition, the draft 303(d) list was placed on the DWQ's website for access by the public. The comments and DWQ's response to these were were submitted with the list (Appendix II-A).

B. Steering, Technical Advisory, and Watershed Committees

1. Bear River Watershed

a. Bear River Basin Water Quality Task Force

b. Cub River Steering and Technical Advisory Committees

2. Jordan River Watershed Management Unit

a. Jordanelle Technical Advisory Committee

b. Little Cottonwood Creek Watershed Group
c. Spanish Fork River Steering and Technical Advisory Committees

3. Cedar/Beaver Watershed Management Unit

Beaver River Technical Advisory Committee

4. Lower Colorado Watershed Management Unit

Virgin River Watershed Advisory Committee

5. Sevier River Watershed Management Unit

a. Sevier River Steering and Technical Advisory Committees

b. Upper Sevier River Technical Advisory Committee

c. San Pitch RiverWatershed Stewardship Group

6. Uinta Watershed Management Unit

a. Ashley Creek Advisory Committee
b. Duchesne-Strawberry Advisory Committee

c. Uinta Water Advisory Committee

7. Weber River Watershed Management Unit

a. East Canyon Water Quality Advisory Committee

b. Lower East Canyon Watershed Committee

c. Chalk Creek Watershed Committee

d. Echo Creek Watershed Committee

e. Upper Silver Creek Watershed Stakeholder Group

f. Ogden Valley Watershed Committee

8. Colorado River West Watershed Management Unit

a. Price-San Rafael Steering and Technical Advisory Committees

b. Fremont River Steering and Technical Advisory Committees

V. PRIORITIZATION OF TMDL ASSESSMENT UNITS

The following criteria were used to prioritize TMDL Waters:

A. Severity of pollution and beneficial uses of waters (includes waste load allocations under (UPDES program).

UPDES permit renewal TMDLs received a high priority because many of the industrial permits required effluent limits on parameters that could be toxic to aquatic life as well as a danger to human health. In addition, the volume of the effluent discharged by the permittee can be a major component of the flow after the point of discharge. Severity of pollution is also used in determining the priority of nonpoint source TMDLs.

B. Programmatic needs regarding UPDES permitting

Utah's UPDES program is based upon a five-year permit renewal cycle. Permit renewals have been set up so that the number of permit renewals each year during the five-year cycle are approximately equal. Because of this, the UPDES permit TMDLs are given a high priority so that the TMDL can be completed in time for the permit to be renewed because of the statutory requirements for permits to be issued .

C. Basin Planning Cycles.

The Division of Water Quality has divided the state into ten watershed management units. These units were combined to create five monitoring regions or units that are sampled intensively once every five years. This schedule allows the state to monitor a majority of the perennial streams state-wide to identify those waters that are not meeting beneficial uses. A key component of the Division's water quality management process is to complete priority TMDLs in each of these watersheds during the five-year cycle. This process allows the Division to revise and update its water quality assessment, report completed TMDLs for impaired waters and document improvement in water quality as TMDLs are implemented.

D. On-going Activities Within the Watershed.

The Division uses water quality related projects and activities that are on going in a watershed to prioritize its TMDL assessment units. The Division has cooperated with various entities to implement TMDL work and water quality management plans throughout the state and will continue to do so. This cooperation provides additional funding and staff for water quality related assessments and improvements. The Division has and will continue to work with the Division of Water Resources to coordinate work when that Division produces its state water plans for each basin.

E. Economic and Social Impact on Communities, Businesses, and Citizens

Economic and social impact on different sectors of the public are used to help prioritize TMDLs. The need to develop a TMDL to allocate discharges of water quality parameters to prevent the closure of industries or create undo burdens on communities and individuals is used in developing TMDL priorities.

F. Degree of Public Interest, Support, and Resource Importance.

This information is also used to assist in prioritizing TMDL assessment units. Public interest has played a significant role in developing TMDLs in various watersheds. Some examples of completed and new TMDL development where public interest as well as other parties was used as a ranking criteria to list assessment units high on the list for TMDL completion were Uinta River (Duchesne County), East Canyon Creek (Summit County),Fremont River (Wayne County)and Spring Creek (Cache County).

VI. PROPOSED SCHEDULE FOR COMPLETION OF TMDLs

A TMDL is basically defined as the amount of a pollutant that must be removed from an AU in order that water quality standards may be achieved in those areas where the standards are exceeded or beneficial uses are impaired. Impairments caused by "pollution", i.e. habitat alteration, flow alteration, were listed in Category 4C, but TMDLs are not required.

Pollutants requiring a TMDL were listed in Category 5A.

A.Components of a TMDL.

1. A description of the water quality standards applicable for the area in question. This includes beneficial uses, narrative standards, numeric criteria and the anti-degradation policy and procedure;

2. A quantifiable endpoint that an AU needs to achieve, e.g., total permitted lbs. per day of a certain parameter, or other appropriate endpoints such as temperature, etc.;

3. A quantified pollution reduction target. e.g., the total lbs. per day that needsto be reduced, or other appropriate indicators such as percent removal of pollutant;

4. All significant sources of the "stressor" must be identified or accounted for in some manner;

5. There must be an appropriate level of technical analysis;

6. The Clean Water Act requires a margin of safety;

7. An apportion of responsibility for taking actions, e.g., who is causing what and how many lbs. per day of a pollutant is this land owner or entity responsible for, and lastly;

8. There must be some level of public involvement or review.

B. Number of TMDLs scheduled to be completed during the 2006-2008 cycle.

TMDLs scheduled for completion from April 1, 2006 to March 31, 2008 are listed in Tables 8, 9, and 13. They are identified by the scheduled date of completion.

VII. TMDL LIST FOR 2006

A. Background

As previously stated, the areas assessed since the 2004 report were the Bear River and Weber River Watershed Management Units.

The tables include the Category 5A listings for rivers and streams, lakes and reservoirs, and Category 5C listings for UPDES permit renewals.

B. Utah's 2006 303(d) List of Waters

1. Category 5A - TMDL Required, River and Stream Segments (Table 9),Lakes and Reservoirs (Table 10).

2. Category 5B: Request for removal of waters from the 303(d) list. Water quality standards are now being met, new delineation of AU, changes in beneficial use classification, change in listing methods, awaiting approval letter from EPA, or change in water quality standards: Streams (Tables 12, 15.);

3. Category 5C - UPDES permit renewal TMDLs for 2006-2006 cycle (Table 1).

4. Category 5D - Lakes not fully supporting beneficial uses for 2006 that will not be listed as Category 5A(requiring a TMDL)until two consecutive assessment cycles demonstrate impairment (Table 13).

Stream AUs requiring TMDLs are displayed for each watershed management units in Figures 4-11. Lakes and reservoirs are presented in Figure 12. UPDES permit renewal TMDLs are displayed in Figure13.

C. Number of TMDLs identified for the 2006 303(d) List.

The number of TMDLs identified as needing TMDLs are listed below in Table 8.

D. Status of Total Maximum Daily Loads Scheduled for the 2002-2006 Cycle

Table 14 is a list of the status for rivers, stream, lakes and reservoir TMDLs that were targeted for completion and submission by April 1, 2006. Assessment Units that were not targeted, but TMDLs were completed are also listed in this table. Assessment Units in the Colorado River West Watershed Management Unit for which site specific total dissolved standards were developed based upon a TMDL developed were left in Category 5A because there was not enough current data to assess them. They could have been placed in

Category 4A, approved TMDLs. The UPDES permit TMDLs that were targeted for completion by April 1, 2008 are listed in Table 15.

Table 8. Summary of 2006 Assessment Units Requiring Total Maximum Daily Load Analyses		
Assessment Unit Type TMDL	**Number of Assessment Units**	**Constituents or Pollutants Needing TMDLs**
Streams / River	56	76
Lakes / Reservoirs	28	42
UPDES Permit	29	102

Table 9. Category 5A - Stream Assessment Units Needing TMDLS								
Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Stream Miles	Beneficial Use Support	Pollutant	TMDL Target Date
Bear River	UT16010101-006	Bear River-4	Bear River from Sage Creek Junction upstsream to Woodruff Creek confluence	3A	55.67	PS	Dissolved Oxygen	4/1/2006
Bear River	UT16010101-007	Big Creek	Big Creek and tributaries from Bear River to headwaters	2B	26.84	NS	pH	
Bear River	UT16010101-007	Big Creek	Big Creek and tributaries from Bear River to headwaters	3A	26.84	NS	pH	
Bear River	UT16010101-007	Big Creek	Big Creek and tributaries from Bear River to headwaters	4	26.84	NS	pH	
Bear River	UT16010101-016	Saleratus Creek	Saleratus Creek and tributaries from confluence with Woodruff Creek to headwaters	3A	29.05	NS	Dissolved Oxygen	4/1/2006
Bear River	UT16010203-008	Spring Creek	Spring Creek and tributaries from confluence w/ Little Bear River to headwaters	4	7.36	NS	Total Dissolved Solids	
Colorado River Southeast	UT14010005-001	Colorado River-6	Colorado River from HUC 14010005/14030001 boundary to Colorado State Line	3B	3.84	NS	Selenium	
Colorado River Southeast	UT14030001-005	Colorado River-5	Colorado River from Dolores River confluence to HUC 14010005 boundary	3B	33.90	NS	Selenium	
Colorado River Southeast	UT14030005-009	Castle Creek	Castle Creek and tributareis from confluence with Colorado River to headwaters	3B	18.19	PS	Total Dissolved Solids	
Colorado River Southeast	UT14030005-003	Colorado River-3	Colorado River from Green River confluence to Moab	3B	62.69	NS	Selenium	
Colorado River Southeast	UT14030005-004	Colorado River-4	Colorado River from Moab to HUE unit (14030005)boundary	3B	35.77	NS	Selenium	
Colorado River West	UT14060007-007	Price River-3	Price River and tributaries from Coal Creek confluence to Carbon Canal Diversion	4	16.65	PS	Total Dissolved Solids	
Colorado River West	UT14060007-014	Price River-4	Price River and tributaries from near Woodside to Soldier Creek confluence	4	67.83	NS	Total Dissolved Solids	
Colorado River West	UT14060007-015	Price River-5	Price River and tributaries from confluence w/Green River to near Woodside	4	24.52	NS	Total Dissolved Solids	

Table 9. Category 5A - Stream Assessment Units Needing TMDLS								
Watershed Management Unit	**Assessment Unit ID**	**Assessment Unit Name**	**Assessment Unit Description**	**Beneficial Use Class**	**Stream Miles**	**Beneficial Use Support**	**Pollutant**	**TMDL Target Date**
Colorado River West	UT14060009-004	Huntington Creek-2	Huntington Creek and tributariesfrom Highway 10 crossing to USFS boundary	4	19.24	NS	Total Dissolved Solids	
Colorado River West	UT14060009-010	Huntington Creek-1	Huntington Creek from confluence with San Rafael River to Highway 10	4	25.79	NS	Total Dissolved Solids	
Colorado River West	UT14060009-011	Lower Cottonwood Creek	Cottonwood Creek from confluence w/Huntington Creek to Highway 57	4	17.76	NS	Total Dissolved Solids	
Colorado River West	UT14060009-013	Upper San Rafael	San Rafael River from Buckhorn Crossing to confluence Huntington and Cottonwood Creeks	4	23.25	NS	Total Dissolved Solids	
Colorado River West	UT14060009-014	Lower San Rafael	San Rafael from confluence w/ Green River to Buckhorn Crossing	4	82.84	NS	Total Dissolved Solids	
Colorado River West	UT14070002-006	Middle Muddy	Muddy Creek and tributaries from Quitchipah Creek confluence to U-10 xing	4	20.06	NS	Total Dissolved Solids	
Colorado River West	UT14070002-007	Lower Quitchipah Creek	Quitchipah Creek from confluence of Ivie Cr. to U-10 xing	4	9.95	NS	Total Dissolved Solids	
Colorado River West	UT14070002-008	Lower Ivie Creek	Ivie Creek and tributariesfrom confluence w/Muddy River to U-10 highway	4	14.01	NS	Total Dissolved Solids	
Colorado River West	UT14070002-009	Lower Muddy Creek	Muddy Creek from confluence w/Freemont River to Ivie Creek confluence	3C	84.79	PS	Selenium	
Colorado River West	UT14070005-012	Upper Escalante	Escalante River and some tributaries from Boulder Creek confluence to Birch Creek confluence	3A	26.78	PS	Temperatures	4/1/2006
Colorado River West	UT14070007-001	Paria River-1	Paria River from start of Paria River Gorge to headwaters	4	16.77	NS	Total Dissolved Solids	4/1/2006
Colorado River West	UT14070007-005	Paria River-3	Paria River and tributaries from Arizona-Utah state line to Cottonwood Creek confluence	4	9.23	NS	Total Dissolved Solids	4/1/2006
Jordan River/ Utah Lake	UT16020201-003	Currant Creek	Current Creek from mouth of Goshen Canyon to Mona Reservoir	2B	3.44	PS	pH	
Jordan River/ Utah Lake	UT16020201-003	Currant Creek	Current Creek from mouth of Goshen Canyon to Mona Reservoir	3A	3.44	PS	pH	

Table 9. Category 5A - Stream Assessment Units Needing TMDLS								
Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Stream Miles	Beneficial Use Support	Pollutant	TMDL Target Date
Jordan River/ Utah Lake	UT16020201-003	Currant Creek	Current Creek from mouth of Goshen Canyon to Mona Reservoir	3A	3.44	PS	Temperature	
Jordan River/ Utah Lake	UT16020201-003	Currant Creek	Current Creek from mouth of Goshen Canyon to Mona Reservoir	4	3.44	PS	pH	
Jordan River/ Utah Lake	UT16020202-012	Soldier Creek-1	Soldier Creek from confluence with Thistle Creek to confluence of Starvation Creek	3A	18.46	PS	Sediment	4/1/2006
Jordan River/ Utah Lake	UT16020202-012	Soldier Creek-1	Soldier Creek from confluence with Thistle Creek to confluence of Starvation Creek	3A	18.46	PS	Total Phosphorus	4/1/2006
Jordan River/ Utah Lake	UT16020203-014	Snake Creek-1	Snake Creek from confluence w/ Provo River to WMSP Golf Course	1C	4.08	NS	Arsenic	
Jordan River/ Utah Lake	UT16020204-001	Jordan River-1	Jordan River from Farmington Bay upstream contiguous with the Davis County line.	3C	7.60	PS	Dissolved Oxygen	
Jordan River/ Utah Lake	UT16020204-001	Jordan River-1	Jordan River from Farmington Bay upstream contiguous with the Davis County line.	3D	7.60	PS	Dissolved Oxygen	
Jordan River/ Utah Lake	UT16020204-001	Jordan River-1	Jordan River from Farmington Bay upstream contiguous with the Davis County line.	4	7.60	PS	Total Dissolved Solids	
Jordan River/ Utah Lake	UT16020204-002	Jordan River-2	Jordan River from Davis County line upstream to North Temple Street.	2B	4.46	NS	E. coli	
Jordan River/ Utah Lake	UT16020204-002	Jordan River-2	Jordan River from Davis County line upstream to North Temple Street.	3B	4.46	PS	Dissolved Oxygen	
Jordan River/ Utah Lake	UT16020204-003	Jordan River-3	Jordan River from North Temple to 2100 S	2B	4.20	NS	E. coli	
Jordan River/ Utah Lake	UT16020204-005	Jordan River-5	Jordan River from 6400 S to 7800 S	2B	1.63	PS	E. coli	
Jordan River/ Utah Lake	UT16020204-005	Jordan River-5	Jordan River from 6400 S to 7800 S	3A	1.63	PS	Temperature	
Jordan River/ Utah Lake	UT16020204-005	Jordan River-5	Jordan River from 6400 S to 7800 S	4	1.63	NS	Total Dissolved Solids	

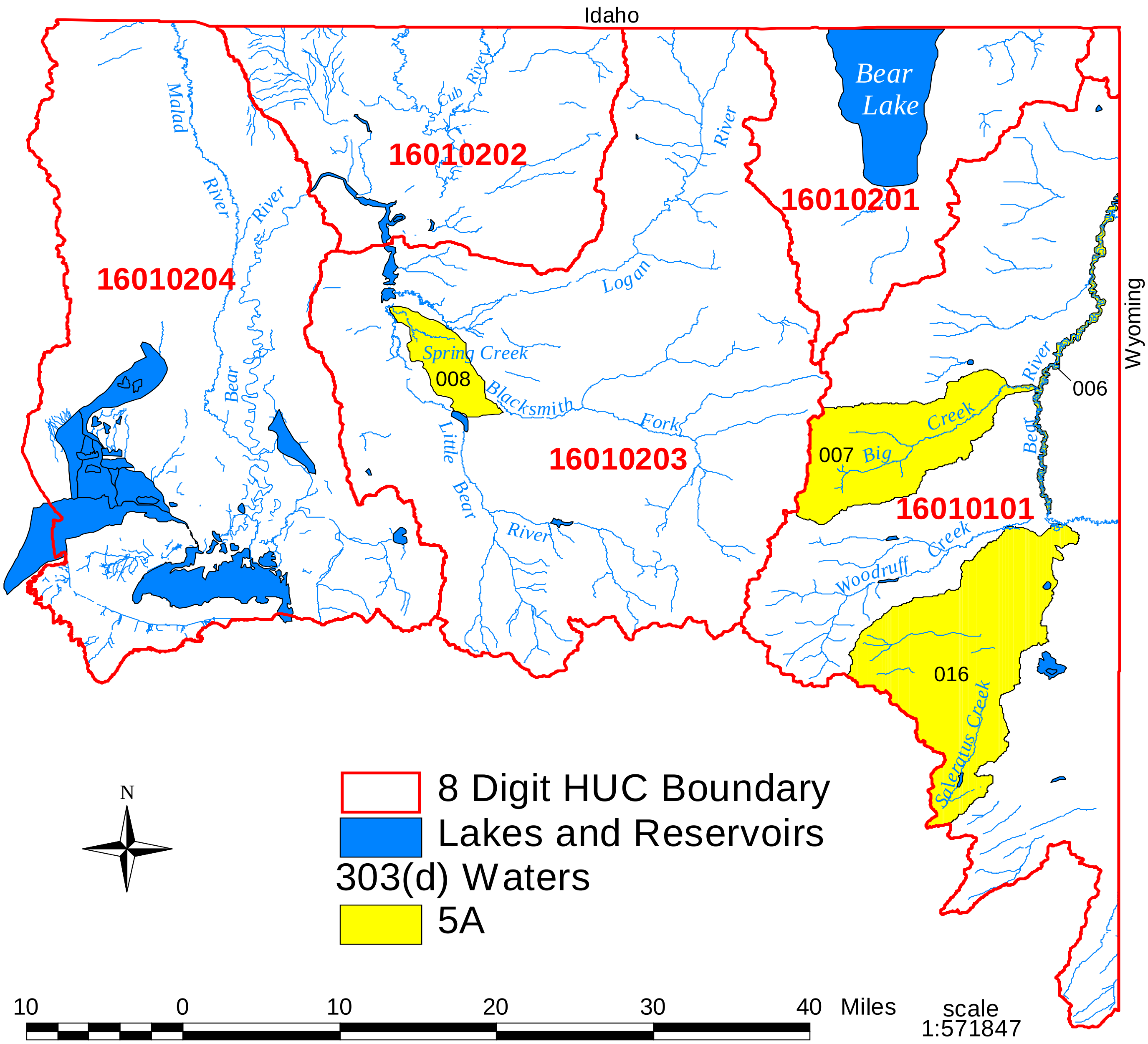
Table 9. Category 5A - Stream Assessment Units Needing TMDLS								
Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Stream Miles	Beneficial Use Support	Pollutant	TMDL Target Date
Jordan River/ Utah Lake	UT16020204-006	Jordan River-6	Jordan River from 7800 S to Bluffdale	3A	10.29	PS	Temperature	
Jordan River/ Utah Lake	UT16020204-006	Jordan River-6	Jordan River from 7800 S to Bluffdale	4	10.29	NS	Total Dissolved Solids	
Jordan River/ Utah Lake	UT16020204-007	Jordan River-7	Jordan River from Bluffdale to Narrows	3A	4.18	PS	Temperature	
Jordan River/ Utah Lake	UT16020204-007	Jordan River-7	Jordan River from Bluffdale to Narrows	4	4.18	NS	Total Dissolved Solids	
Jordan River/ Utah Lake	UT16020201-001	Jordan River-8	Jordan River from Narrows to Utah Lake	4	14.15	NS	Total Dissolved Solids	
Jordan River/ Utah Lake	UT16020204-019	Big Cottonwood Creek-1	Big Cottonwood Creek and tributaries from Jordan River to Big Cottonwood WTP	3A	9.52	PS	Temperature	
Jordan River/ Utah Lake	UT16020204-021	Little Cottonwood Creek-1	Little Cottonwood Creek and tributaries from confluence Jordan River to Metropolitan WTP	3A	8.73	PS	Temperature	
Jordan River/ Utah Lake	UT16020204-021	Little Cottonwood Creek-1	Little Cottonwood Creek and tributaries from confluence Jordan River to Metropolitan WTP	4	8.73	PS	TDS	
Lower Colorado	UT15010010-001	Virgin River-1	Virgin River from state line to Santa Clara Confluence	4	15.24	PS	Temperature	
Sevier River	UT16030002-005	East Fork Sevier-4	East Fork Sevier River and tributaries from confluence with Sevier River upstream to Antimony Creek confluence excluding Otter Creek and tributaries	3A	25.74	PS	Total Phosphorus	4/1/2006
Sevier River	UT16030002-005	East Fork Sevier-4	East Fork Sevier River and tributaries from confluence with Sevier River upstream to Antimony Creek confluence excluding Otter Creek and tributaries	3A	25.74	PS	Temperature	
Sevier River	UT16030002-005	East Fork Sevier-4	East Fork Sevier River and tributaries from confluence with Sevier River upstream to Antimony Creek confluence excluding Otter Creek and tributaries	3A	25.74	PS	Total Phosphorus	

Table 9. Category 5A - Stream Assessment Units Needing TMDLS								
Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Stream Miles	Beneficial Use Support	Pollutant	TMDL Target Date
Sevier River	UT16030003-027	Peterson Creek	Peterson Creek and tributaries from confluence with Sevier River to USFS boundary	4	8.70	NS	Total Dissolved Solids	
Sevier River	UT16030003-017	Sevier River-6	Sevier River from Clear Creek confluence to HUC unit boundary	3A	28.02	PS	Temperature	
Sevier River	UT16030003-005	Lost Creek-1	Lost Creek and tributaries from confluence w/Sevier River upstream ~ 6 miles	4	4.11	NS	Total Dissolved Solids	
Sevier River	UT16030004-009	San Pitch-5	San Pitch River and tributaries from beneficial U132 to Pleasant Creek confluence excluding Cedar Creek Oak Creek Pleasant Cree and Cottowood Creek.	3A	65.67	PS	Temperature	
Sevier River	UT16030005-022	Chicken Creek-2	Chicken Creek and tributaries from confluence w/Sevier River to Levan	4	24.51	NS	Total Dissolved Solids	4/1/2006
Sevier River	UT16030005-027	Sevier River-24	Sevier River from Gunnison bend Reservoir to DMAD Reservoir	4	17.45	NS	Total Dissolved Solids	
Sevier River	UT16030005-028	Sevier River-25	Sevier River from Crear Lake to Gunnison Bend Reservoir	4	18.66	NS	Total Dissolved Solids	
Uinta	UT14060002-001	Lower Ashley Creek	Ashley Creek and tributaries from confluence Green River Vernal Sewage Lagoons.	3B	8.10	NS	Selenium	
Uinta	UT14060002-001	Lower Ashley Creek	Ashley Creek and tributaries from confluence Green River Vernal Sewage Lagoons.	4	8.10	NS	Total Dissolved Solids	
Uinta	UT14060002-003	Brush Creek	Brush Creek and tributaries from confluence w/Green River to Red Fleet Dam not including Little Brush Creek.	3B	22.74	PS	Selenium	
Uinta	UT14060003-001	Duchesne River-1	Duchesne River and tributaries from confluence Green River to Randlett.	4	19.49	PS	Total Dissolved Solids	
Uinta	UT14060003-002	Duchesne River-2	Duchesne River from Randlett to Myton.	4	31.59	PS	Total Dissolved Solids	
Uinta	UT14060003-005	Antelope Creek	Antelope Creek and tributaries confluence Duchesne River to headwaters.	4	31.57	NS	Total Dissolved Solids	
Uinta	UT14060003-008	Lake Fork-1	Lake Fork River and tributaries confluence Duchesne River to Pigeon Water Creek confluence.	3A	19.64	PS	Sediment	

Table 9. Category 5A - Stream Assessment Units Needing TMDLS								
Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Stream Miles	Beneficial Use Support	Pollutant	TMDL Target Date
Uinta	UT14060003-008	Lake Fork-1	Lake Fork River and tributaries confluence Duchesne River to Pigeon Water Creek confluence.	4	19.64	PS	Total Dissolved Solids	
Uinta	UT14060004-002	Indian Canyon Creek	Indian Canyon Creek and tributaries confluence Strawberry River to headwaters.	4	44.01	NS	Total Dissolved Solids	
Uinta	UT14060005-002	Pariette Draw Creek	Pariette Draw Creek and tributaries confluence Green River to headwaters.	3A	54.10	NS	Selenium	
Uinta	UT14060005-002	Pariette Draw Creek	Pariette Draw Creek and tributaries confluence Green River to headwaters.	4	54.10	NS	Boron	
Uinta	UT14060005-002	Pariette Draw Creek	Pariette Draw Creek and tributaries confluence Green River to headwaters.	4	54.10	NS	Total Dissolved Solids	
Uinta	UT14060005-003	Ninemile Creek	Ninemile Creek and tributaris from confluence Green River to headwaters.	3A	119.08	NS	Temperature	
Uinta	UT14060006-001	Willow Creek	Willow Creek and tributaries confluence Green River to Meadow Creek confluence (excluding Hill Creek).	4	57.18	PS	Total Dissolved Solids	
Weber	UT16020101-007	Echo Creek	Echo Creek and tributaries from confluence w/ Weber River to headwaters	3A	44.15	PS	Sediment	4/1/2006

Bear River Management Unit

2006 Category 5A Waters



Assessment Unit	Name	Assessment Unit Description
UT16010101-006	Bear River-4	Bear River from Woodruff Creek north to Sage Creek Junction bear2006au.apr
UT16010101-007	Big Creek	Big Creek and tributaries from Bear River to headwaters
UT16010101-016	Saleratus Creek	Saleratus Creek and tributaries from confluence with Woodruff Creek to headwaters
UT16010203-008	Spring Creek	Spring Creek and tributaries from confluence w/ Little Bear River to headwaters

Figure 5. Bear River Watershed Management Category 5A assessment units

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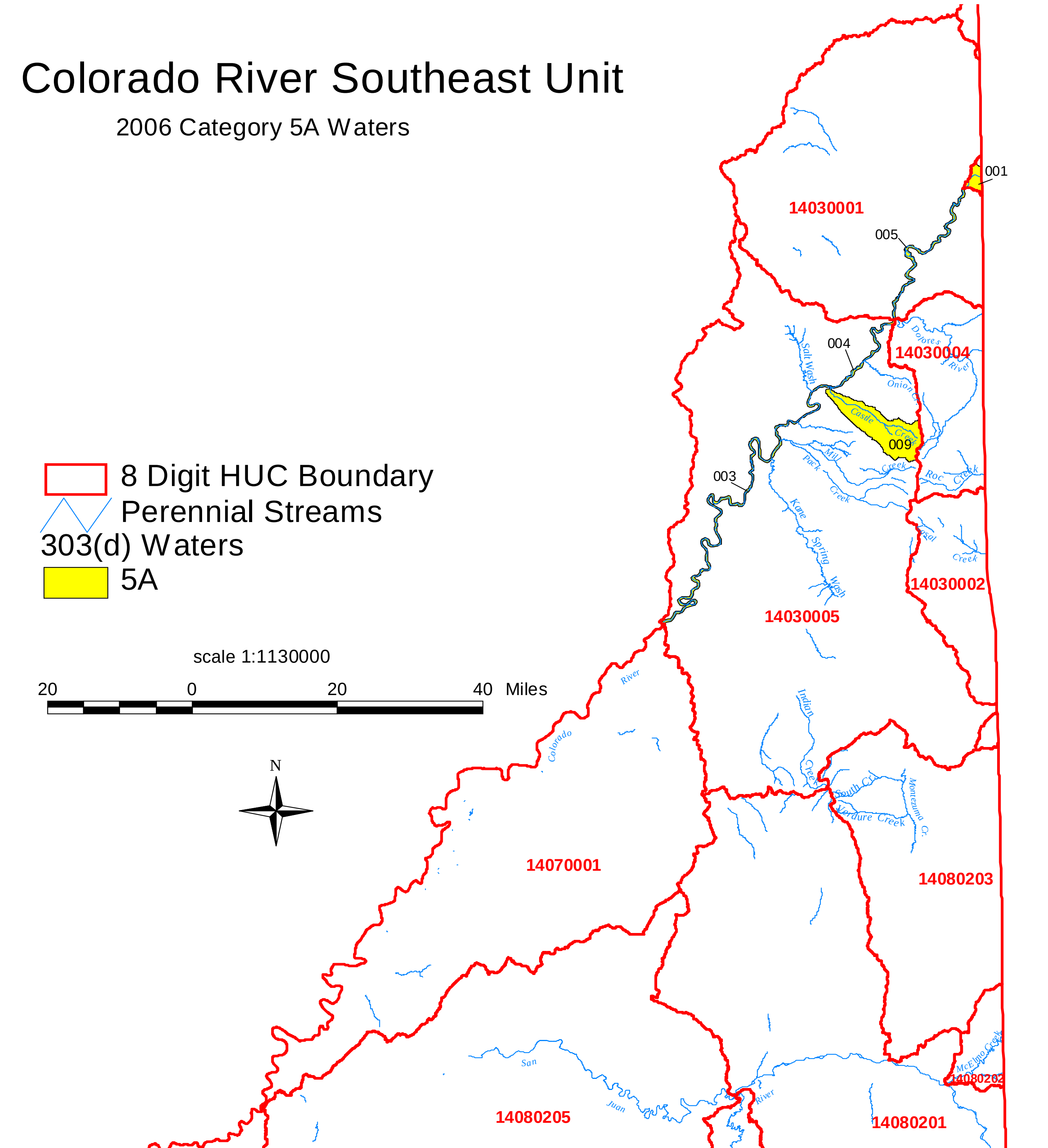
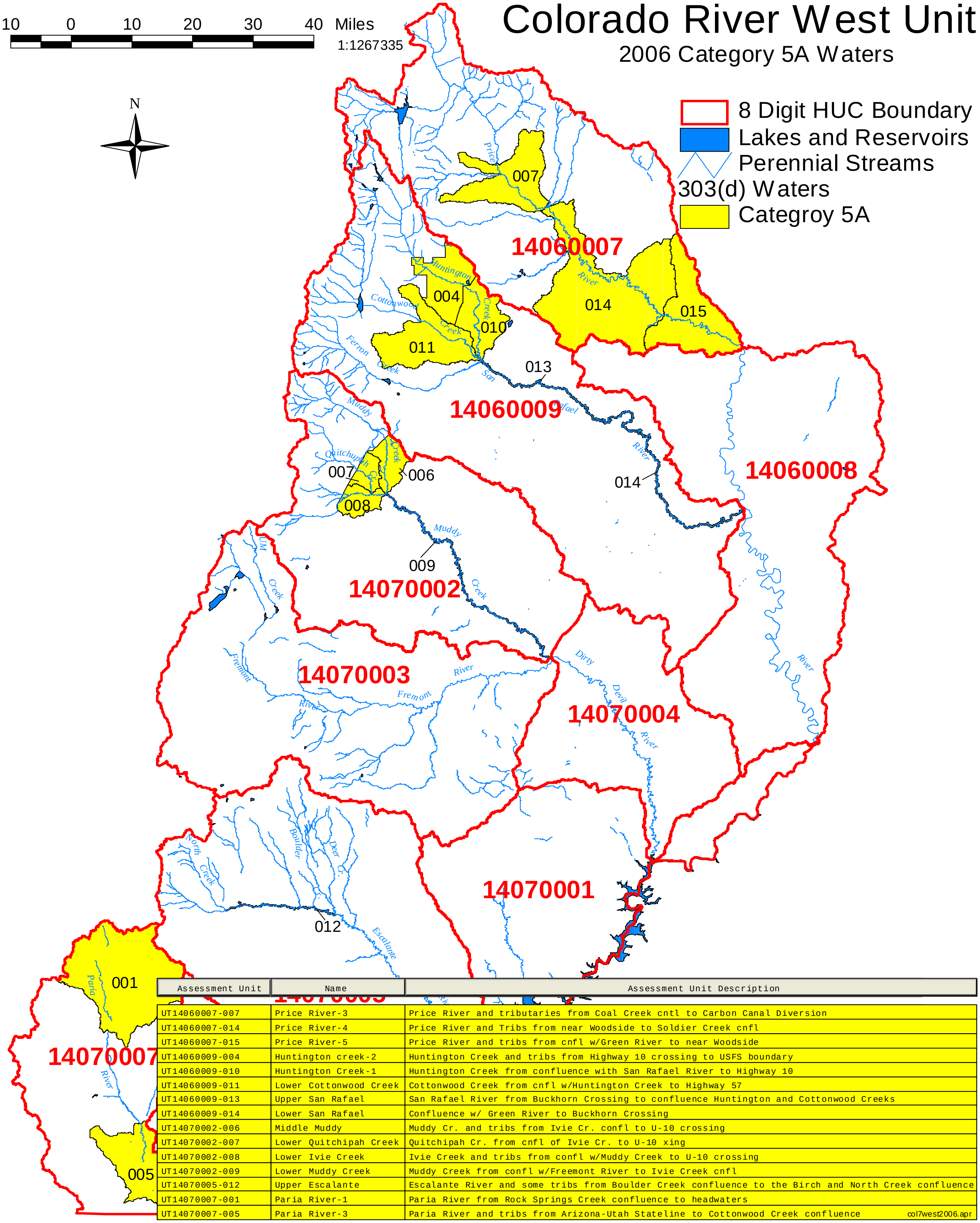


Assessment Unit	Name	Assessment Unit Description
UT14010005-001	Colorado River-6	Colorado River from HUC (14010005) boundary to Colorado State Line
UT14030001-005	Colorado River-5	Colorado River from Dolores River confluence to HUC 14010005 boundary
UT14030005-003	Colorado River-3	Colorado River from Green River confluence to Moab at Mill Creek confluence
UT14030005-004	Colorado River-4	Colorado River from Moab (Mill Creek confluence) to Dolores River confluence
UT14030005-009	Castle Creek	Castle Creek & tribs from confluence with Colorado River to headwaters

Figure 6.Colorado River Southeast Category 5A assessment units



Assessment Unit	Name	Assessment Unit Description
UT14060007-007	Price River-3	Price River and tributaries from Coal Creek cntl to Carbon Canal Diversion
UT14060007-014	Price River-4	Price River and Tribs from near Woodside to Soldier Creek cnfl
UT14060007-015	Price River-5	Price River and tribs from cnfl w/Green River to near Woodside
UT14060009-004	Huntington creek-2	Huntington Creek and tribs from Highway 10 crossing to USFS boundary
UT14060009-010	Huntington Creek-1	Huntington Creek from confluence with San Rafael River to Highway 10
UT14060009-011	Lower Cottonwood Creek	Cottonwood Creek from cnfl w/Huntington Creek to Highway 57
UT14060009-013	Upper San Rafael	San Rafael River from Buckhorn Crossing to confluence Huntington and Cottonwood Creeks
UT14060009-014	Lower San Rafael	Confluence w/ Green River to Buckhorn Crossing
UT14070002-006	Middle Muddy	Muddy Cr. and tribs from Ivie Cr. confl to U-10 crossing
UT14070002-007	Lower Quitchipah Creek	Quitchipah Cr. from cnfl of Ivie Cr. to U-10 xing
UT14070002-008	Lower Ivie Creek	Ivie Creek and tribs from confl w/Muddy Creek to U-10 crossing
UT14070002-009	Lower Muddy Creek	Muddy Creek from confl w/Freemont River to Ivie Creek cnfl
UT14070005-012	Upper Escalante	Escalante River and some tribs from Boulder Creek confluence to the Birch and North Creek confluence
UT14070007-001	Paria River-1	Paria River from Rock Springs Creek confluence to headwaters
UT14070007-005	Paria River-3	Paria River and tribs from Arizona-Utah Stateline to Cottonwood Creek confluence

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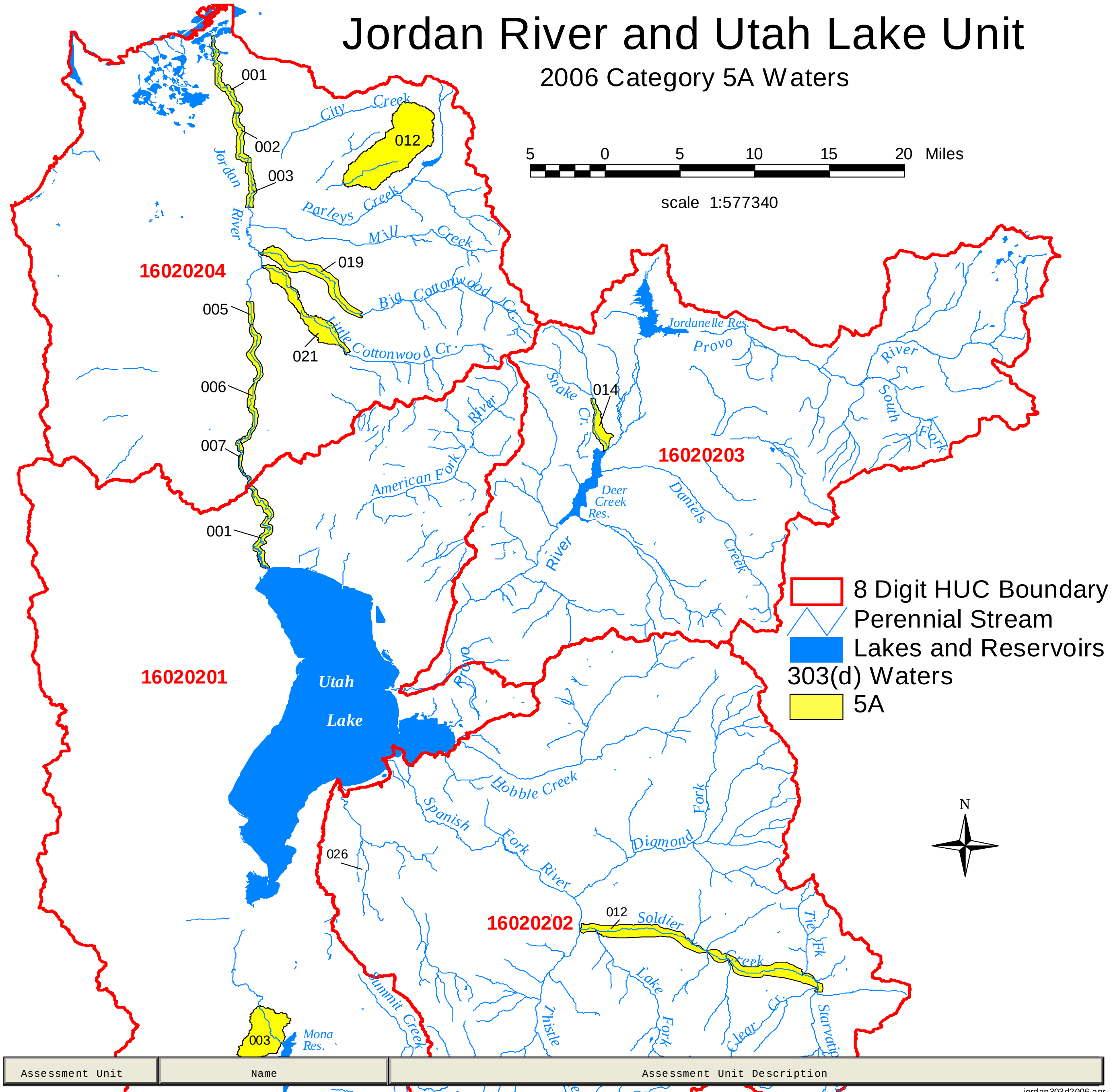
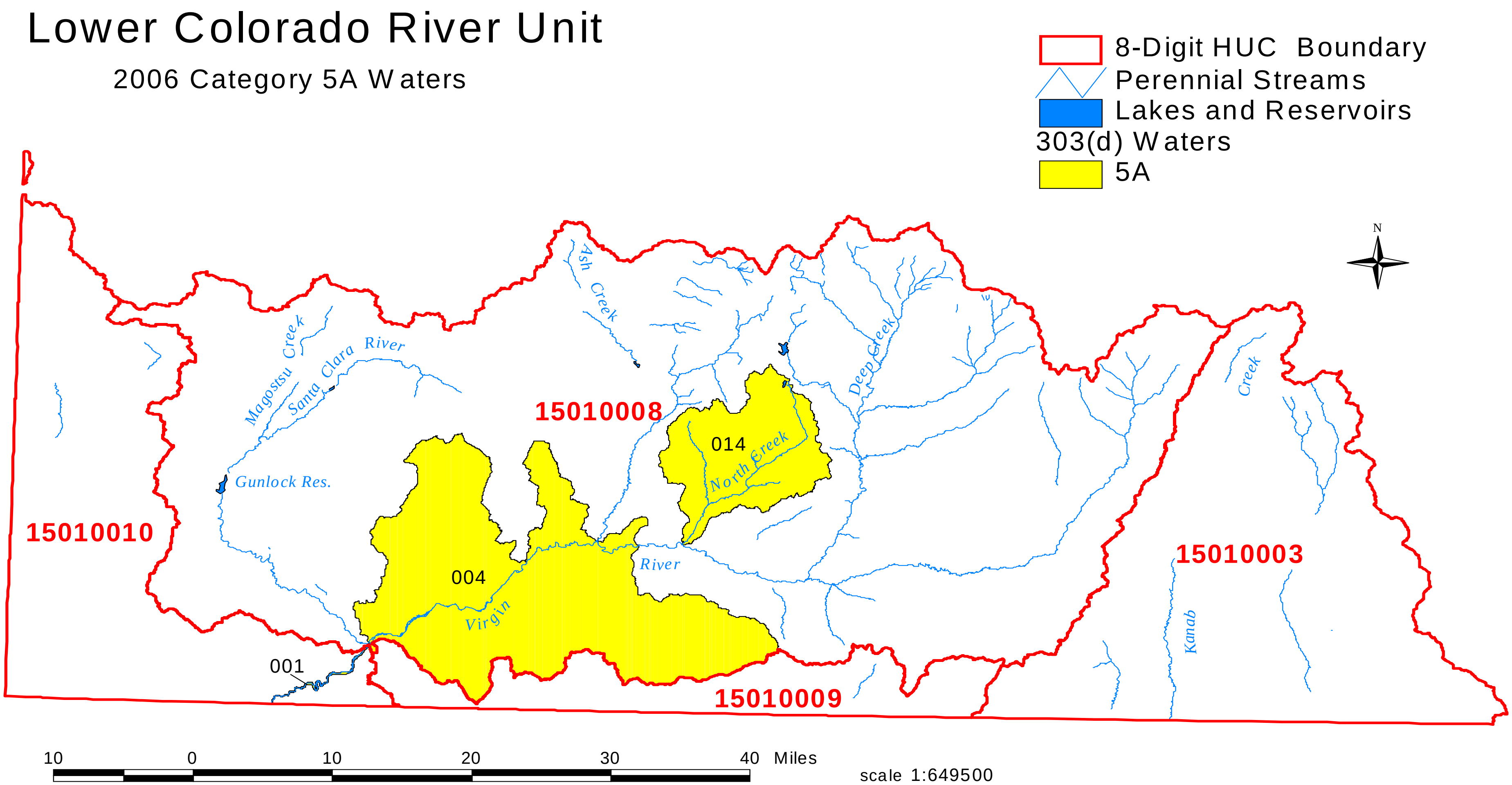
Figure 7.Colorado River West Category 5A assessment units



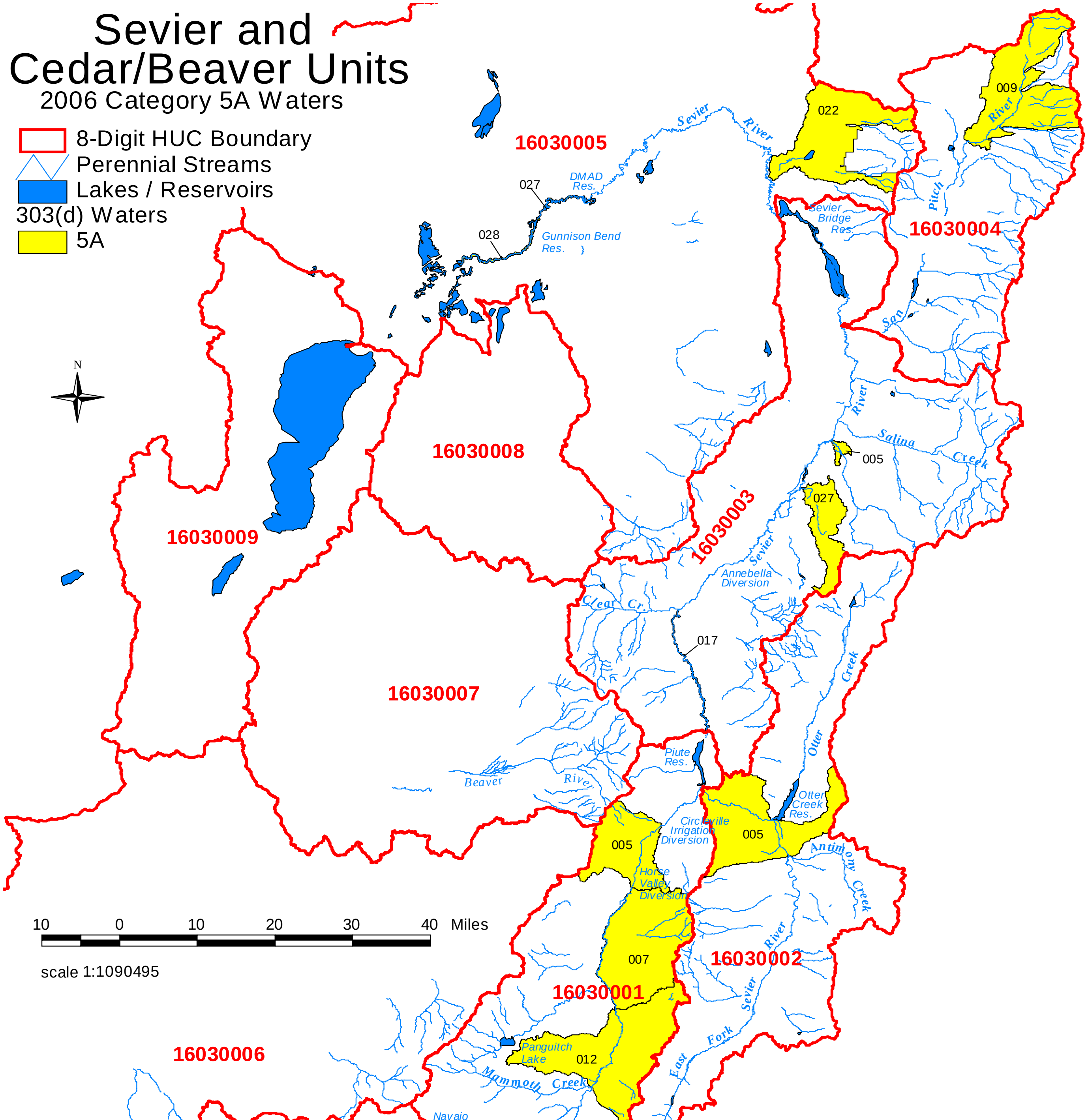
Assessment Unit	Name	Assessment Unit Description
UT16020201-001	Jordan River-8	Jordan River from Narrows to Utah Lake
UT16020201-003	Currant Creek	Current Creek from mouth of Goshen Canyon to Mona Reservoir
UT16020202-012	Soldier Creek-1	Soldier Creek from confluence with Thistle Creek to confluence of Starvation Creek
UT16020203-014	Snake Creek-1	Snake Creek from confluence w/ Provo River to WMSP Golf Course
UT16020204-001	Jordan River-1	Jordan River from Farmington Bay upstream contiguous with the Davis County line.
UT16020204-002	Jordan River-2	Jordan River from Davis County line upstream to North Temple Street.
UT16020204-003	Jordan River-3	Jordan River from North Temple to 2100 S
UT16020204-005	Jordan River-5	Jordan River from 6400 S to 7800 S
UT16020204-006	Jordan River-6	Jordan River from 7800 S to Bluffdale
UT16020204-007	Jordan River-7	Jordan River from Bluffdale to Narrows
UT16020204-012	Emigration Creek	Emigration Creek and tributaries from Foothill BLVD to headwaters
UT16020204-019	Big Cottonwood Creek-1	Big Cottonwood Creek and tributaries from Jordan River to Big Cottonwood WTP
UT16020204-021	Little Cottonwood Creek-1	Little Cottonwood Creek and tributaries from confluence Jordan River to Metropolitan WTP

Figure 8.Jordan River / Utah Lake Category 5 Assessment units



Assessment Unit	Name	Assessment Unit Description
UT15010008-004	Virgin River-2	Virgin River and tributaries from Santa Clara River confluence to Quail Creek diversion (excludes Quail and Leeds Creek)
UT15010008-014	North Creek	North Creek and tributaries from confluence with Virgin River to headwaters
UT15010010-001	Virgin River-1	Virgin River from state line to Santa Clara Confluence low8colo2006.apr

Figure 9. Lower Colorado Watershed Management Unit Category 5A



Assessment Unit	Name	Assessment Unit Description
UT16030005-022	Chicken Creek-2	Chicken Creek and tributaries from confluence w/Sevier River to Levan
UT16030001-012	Sevier River-1	Sevier River and tributaries from Long Canal to Mammouth Creek confluence
UT16030002-005	East Fork Sevier River-4	E Fk Sevier River and tributaries from Sevier River to Antimony Creek confluence, excluding Otter Creek and tributaries.
UT16030004-009	San Pitch-5	San Pitch River and tributaries from U132 to headwaters excluding Cedar Creek, Oak Creek, Pleasant Creek and Cottowood Creek.
UT16030005-028	Sevier River-25	Sevier River from Crear Lake to Gunnison Bend Reservoir
UT16030005-027	Sevier River-24	Sevier River from Gunnison bend Reservoir to DMAD Reservoir
UT16030003-017	Sevier River-6	Sevier River from Clear Creek confluence to HUC unit boundary
UT16030003-027	Peterson Creek	Petersen Creek and tributaries from confluence with Sevier River to USFS boundary.
UT16030001-005	Sevier River-3	Sevier River and tributaries from Circleville Irrigation Diversion to Horse Valley Diversion
UT16030001-007	Sevier River-2	Sevier River and east side tributaries from Horse Valley Bridge Diversion upstream to Long Canal.
UT16030003-005	Lost Creek-1	Lost Creek and tributaries from confluence w/Sevier River upstream ~ 6 miles

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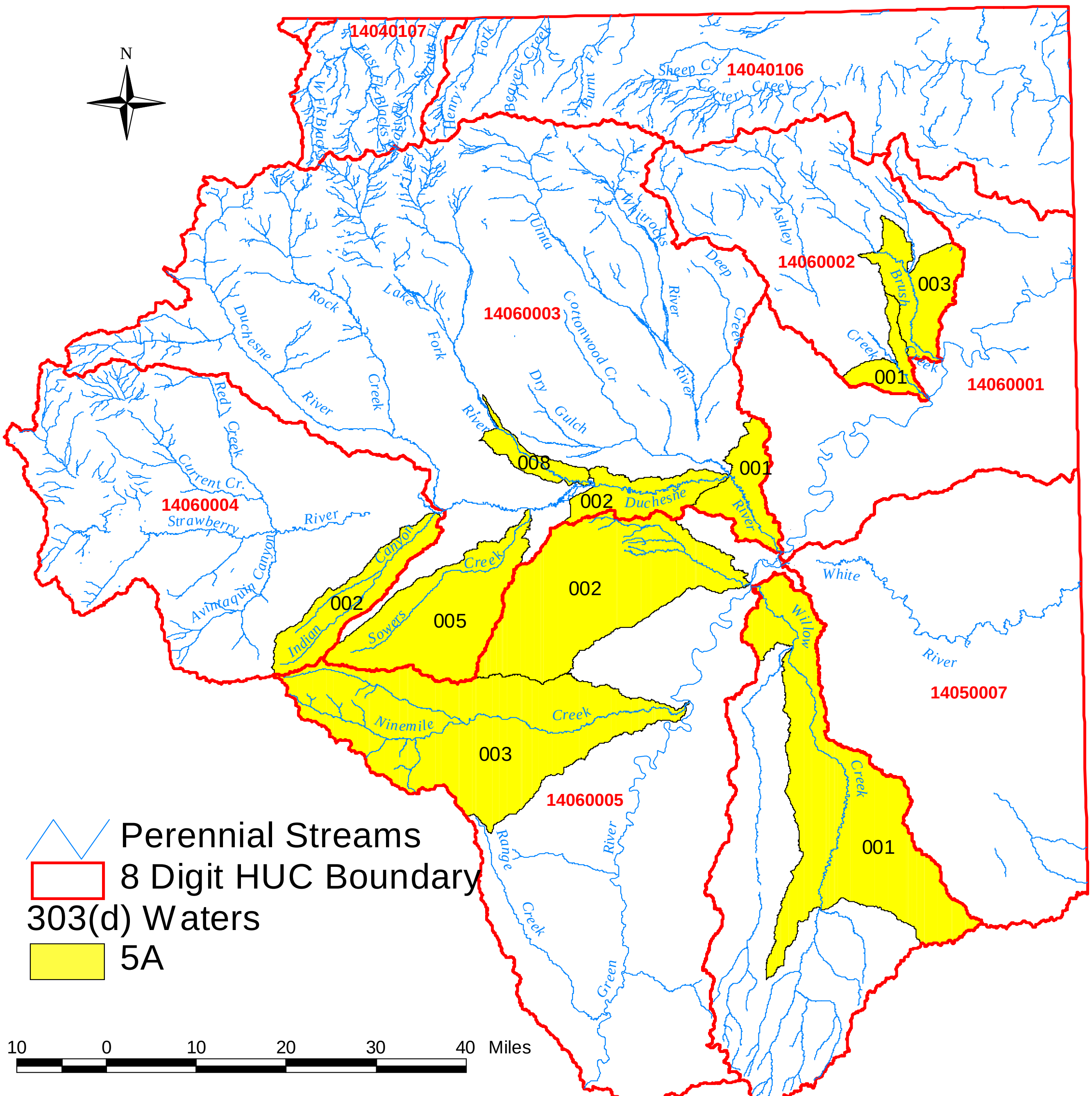
Figure 10.Sevier; Cedar / Beaver Watershed Management Unit Category 5A assessment units

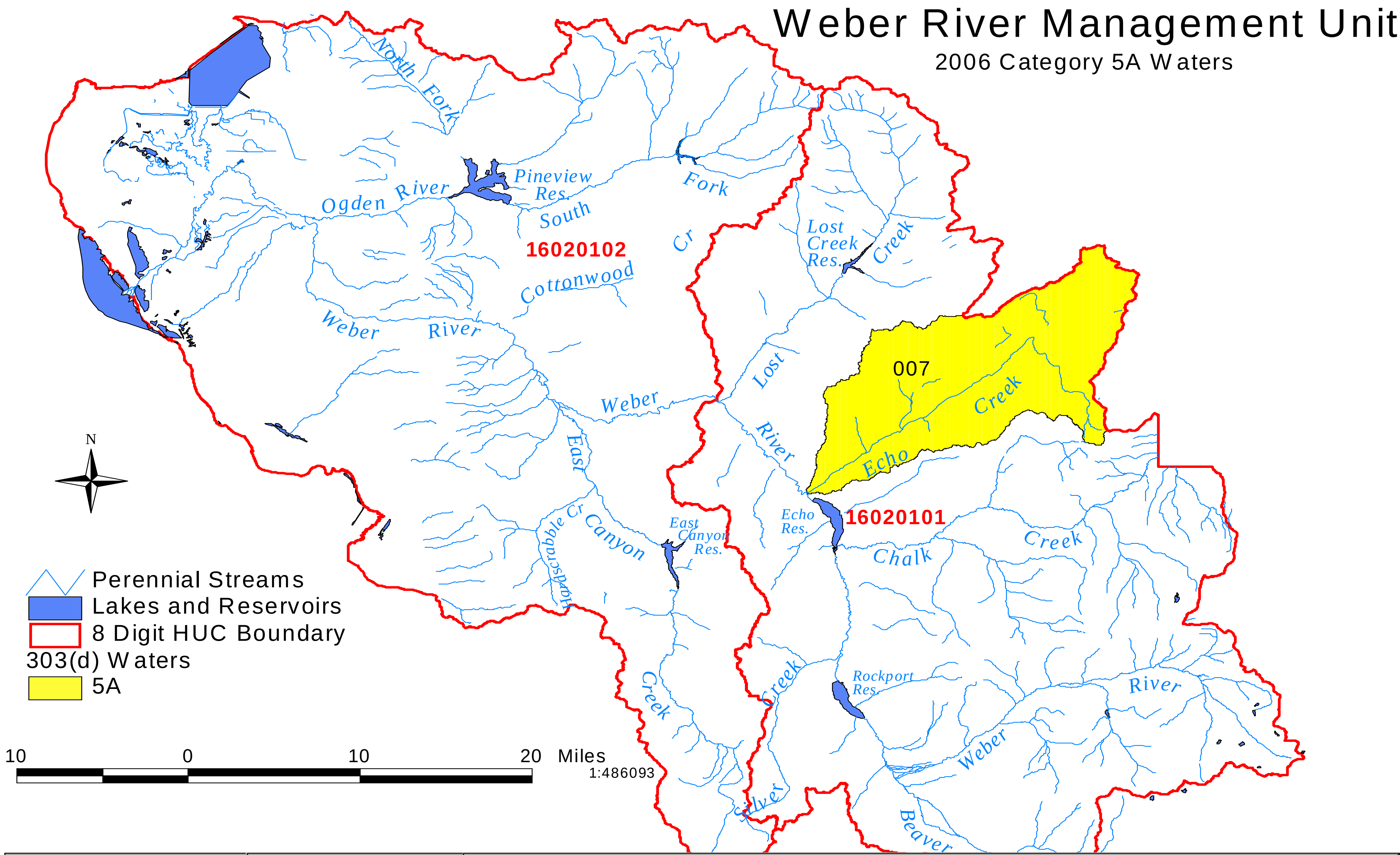
Uinta Basin Unit

2006 Category 5A Waters



Assessment Unit	Name	Assessment Unit Description
UT14060002-001	Lower Ashley Creek	Ashley Creek-tribs: from confluece Green River Vernal Sewage Lagoons.
UT14060002-003	Brush Creek	Brush Creek-tribs: confluence Green River to Red Fleet Dam: not including Little Brush Creek.
UT14060003-001	Duchesne River-1	Duchesne River-tribs: confluence Green River to Randlett.
UT14060003-002	Duchesne River-2	Duchesne River: Randlett to Myton.
UT14060003-005	Antelope Creek	Antelope Creek-tribs: confluence Duchesne River to headwaters.
UT14060003-008	Lake Fork-1	Lake Fork River-tribs: confluence Duchesne River to Pigeon Water Creek confluence.
UT14060004-002	Indian Canyon Creek	Indian Canyon Creek-tribs: confluence Strawberry River to headwaters.
UT14060005-002	Pariette Draw Creek	Pariette Draw Creek-tribs: confluence Green River to headwaters.
UT14060005-003	Nine Mile	Nine Mile Creek-tribs: confluence Green River to headwaters.
UT14060006-001	Willow Creek	Willow Creek-tribs: confluence Green River to Meadow Creek confluence (excluding Hill Creek). uinta303d2006.apr

Figure 11.Uinta Watershed Management Unit Category 5A assessment units



Assessment Unit	Name	Assessment Unit Description
UT16020101-007	Echo Creek	Echo Creek and tributaries from confluence w/ Weber River to headwaters

weber2006.apr

Figure 12. Weber River Watershed Management Unit Category 5A assessment unitII-47

Table 10. Category 5A - Lakes and Reservoirs Needing Total Maximum Daily Load Analyses.								
Map ID	Watershed Management Unit	Assessment Unit ID	Assessment Unit Description	Beneficial Use Class	Assessment Unit Acreage	Beneficial Use Support	Pollutant	TMDL Target Date
1	Bear River	UT-L-16010203-012	Tony Grove Lake	3A	25	PS	TP,DO,pH	4/1/06
2	Bear River	UT-L-16010202-002	Cutler Reservoir	3B	7,184	PS	TP,DO	
3	Weber River	UT-L-16020101-001	Echo Reservoir	3A	1,394	PS	TP,DO	4/1/06
4	Uinta Basin	UT-L-14040107-005	Lyman Lake	3A	27	PS	DO	4/1/06
5	Uinta Basin	UT-L-14040107-004	Bridger Lake	3A	288	PS	DO	4/1/06
6	Uinta Basin	UT-L-14040107-003	Marsh Lake	3A	38	PS	DO	4/1/06
7	Uinta Basin	UT-L-14040107-006	China Lake	3A	47	PS	DO	4/1/06
8	Uinta Basin	UT-L-14040106-033	Matt Warner Reservoir	3A	433	PS	DO, TP	4/1/06
9	Uinta Basin	UT-L-14040106-034	Calder Reservoir	3A	99	NS	TP,DO	4/1/06
10	Uinta Basin	UT-L-14060002-006	Red Fleet Reservoir	3A	520	PS	DO	
11	Uinta Basin	UT-L-14060001-002	Brough Reservoir	3A	128	PS	DO	
12	Uinta Basin	UT-L-14060001-001	Pelican Lake	3B	1,680	NS	pH	
13	Jordan River / Utah Lake	UT-L-16020203-004	Mill Hollow Reservoir	3A	15	PS	TP,pH	
14	Jordan River / Utah Lake	UT-L-16020201-004	Utah Lake	3B	96,900	PS	TP,TDS	4/1/08
15	Uinta Basin	UT-L-14060004-001	Strawberry Reservoir	3A	17,160	PS	TP, DO	4/1/06
16	Jordan River / Utah Lake	UT-L-16020202-002	Big East Lake	3A	23	PS	DO	
17	Colorado River West	UT-L-14060007-004	Lower Gooseberry Reservoir	3A	57	PS	DO,pH	4/1/08
18	Sevier River	UT-L-16030004-001	Ninemile Reservoir	3A	197	NS	TP,DO	
19	Sevier River	UT-L-16030002-011	Koosharem Reservoir	3A	310	PS	TP	4/1/06
20	Sevier River	UT-L-16030003-006	Manning Meadow Reservoir	3A	59	PS	TP,DO	
21	Sevier River	UT-L-16030002-005	Lower Box Creek Reservoir	3A	50	PS	TP,DO	4/1/06
22	Sevier River	UT-L-16030001-011	Piute Reservoir	3A	2,508	PS	TP	
23	Sevier River	UT-L-16030002-004	Otter Creek Reservoir	3A	2,520	PS	TP	4/1/06
24	Colorado River West	UT-L-14070003-044	Lower Bowns Reservoir	3A	90	NS	pH	
25	Cedar / Beaver River	UT-L-16030006-019	Red Creek Reservoir (Iron Co)	3A	39	NS	DO	
26	Cedar / Beaver River	UT-L-16030006-017	Yankee Meadow Reservoir	3A	53	PS	DO,pH	
27	Colorado River Southeast	UT-L-14080201-007	Recapture Reservoir	3A	17	PS	DO	
28	Cedar / Beaver River	UT-L-16030006-008	Newcastle Reservoir	3A	163	PS	TP,DO	
29	Sevier River	UT-L-16030001-001	Navajo Lake	3A	714	PS	DO	4/1/06

Utah's Lake and Reservoir 303(d) Waters for 2006

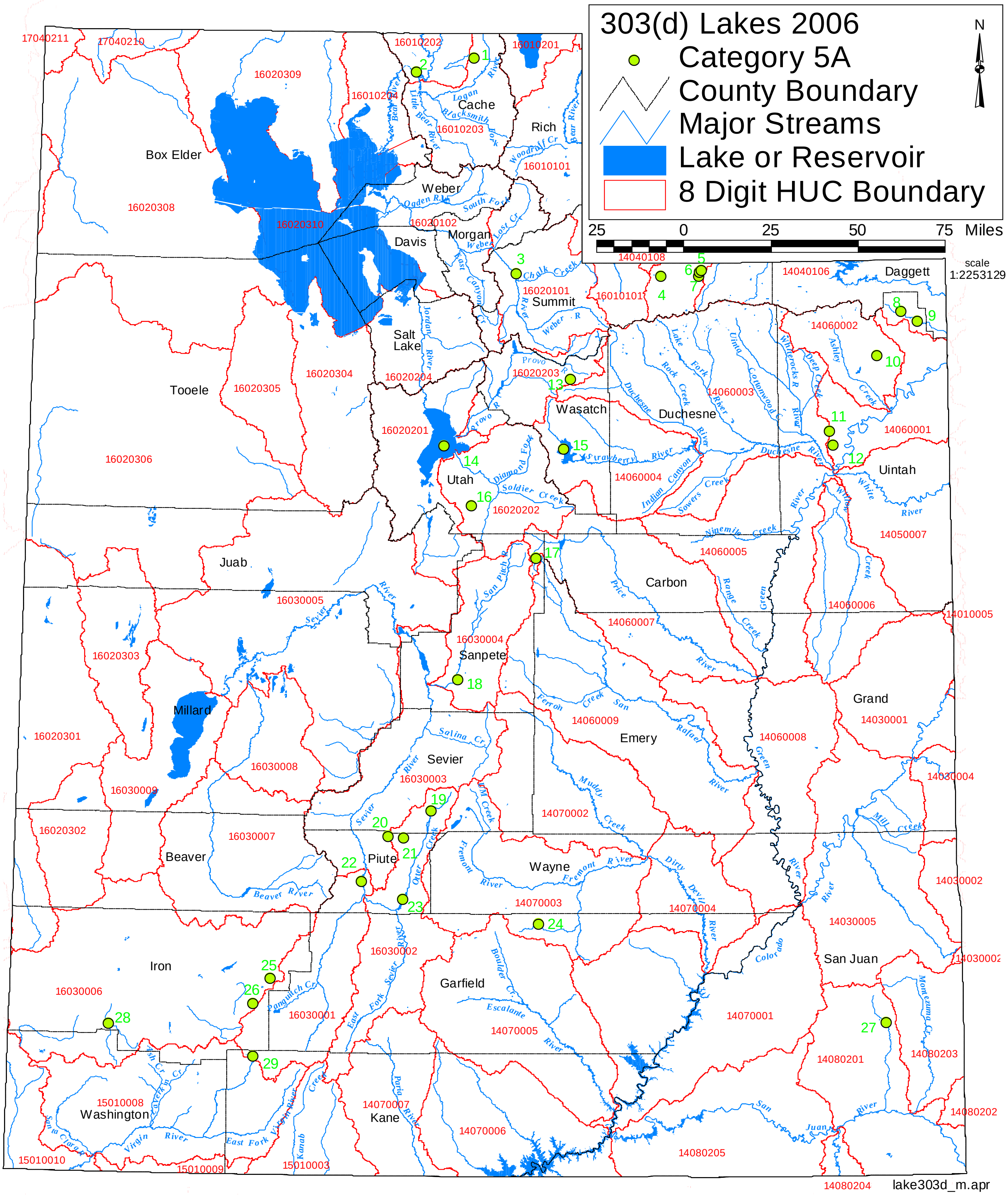


Figure 13.Category 5A Lakes and Reservoirs

Table 11. Category 5C - 2006 UPDES Permit Renewal TMDLs						
Watershed Management Unit	Receiving Water	Assessment Uint ID	Permit Number	Facility	Parameter	Renewal Date
Uinta Basin	Duchesne River	UT14060003-006	UT0020095	Duchesne City Corp	Total chlorine residual	
Weber River	Marsh to Silver Creek	UT16020101-020	UT0024414	Snyderville Bsid-silver Creek	Dissolved oxygen	
Weber River	Marsh to Silver Creek	UT16020101-020	UT0024414	Snyderville Bsid-silver Creek	Total ammonia	09/01/07
Weber River	Marsh to Silver Creek	UT16020101-020	UT0024414	Snyderville Bsid-silver Creek	Dissolved oxygen	09/01/07
Weber River	Marsh to Silver Creek	UT16020101-020	UT0024414	Snyderville Bsid-silver Creek	Total ammonia	09/01/07
Jordan River	Jordan River, I-80 Culvert to GSL, Gsl, Pine Canyon Creek (Tooele County), Butterfield Creek, Ritter_utah Sl Canal, 'C-7 Ditch	undefined	UT0000051	Kennecott Copper co	Total Cadmium	05/01/06
Jordan River	Jordan River, I-80 Culvert to Gsl, Gsl, Pine Canyon Creek (Tooele County), Butterfield Creek, Ritter_Utah Sl Canal, 'C-7 Ditch	undefined	UT0000051	Kennecott Copper co	Arsenic	05/01/06
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total molybdenum	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total zinc	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total silver	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total selenium	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total chlorine residual	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total nickel	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total Ammonia	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total mercury	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total lead	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total cyanide	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total chromium	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Dissolved oxygen	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total Cadmium	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Arsenic	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total Dissolved Solids	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	Total copper	01/01/07
Jordan River	Kersey Creek	undefined	UT0021440	Magna Water & Sewer Dist	TRC	01/01/07
Jordan River	Jordanelle Reservoir	undefined	UT0022403	Jordanelle Special Service Dis	Zinc total Recover	07/01/07
Jordan River	Jordanelle Reservoir	undefined	UT0022403	Jordanelle Special Service Dis	Mercury total Reco	07/01/07
Jordan River	Jordanelle Reservoir	undefined	UT0022403	Jordanelle Special Service Dis	Lead total Recover	07/01/07
Jordan River	Jordanelle Reservoir	undefined	UT0022403	Jordanelle Special Service Dis	Aluminum	07/01/07
Jordan River	Jordanelle Reservoir	undefined	UT0022403	Jordanelle Special Service Dis	Copper total Recov	07/01/07
Jordan River	Spring Creek	undefined	UT0025429	Holliday Water co	Total chlorine residual	12/01/06
Jordan River	Hobble Creek	UT16020202-003	UT0025283	Ensign-bickforf-hobble Creek	RDX	01/01/08

Table 11. Category 5C - 2006 UPDES Permit Renewal TMDLs						
Watershed Management Unit	**Receiving Water**	**Assessment Uint ID**	**Permit Number**	**Facility**	**Parameter**	**Renewal Date**
Jordan River	Hobble Creek	UT16020202-003	UT0025283	Ensign-Bickford-Hobble Creek	Nitrates	01/01/08
Lower Colorado River	Virgin River	UT15010008-004	UT0024686	St George City Corporation	Dissolved oxygen	08/01/06
Lower Colorado River	Virgin River	UT15010008-004	UT0024686	St George City Corporation	Total silver	08/01/06
Lower Colorado River	Virgin River	UT15010008-004	UT0024686	St George City Corporation	Total dissolved solids	08/01/06
Lower Colorado River	Virgin River	UT15010008-004	UT0024686	St George City Corporation	Total ammonia	08/01/06
Colorado River West	Quitchipah Creek	UT14070002-002	UT0022918	Canyon Fuel Co., Llc - Sufco	Total Iron	05/01/06
Colorado River West	Quitchipah Creek	UT14070002-002	UT0022918	Canyon Fuel Co., Llc - Sufco	Total Dissolved Solids	05/01/06
Colorado River West	Sevier River	undefined	UT0025291	Salina City Sanitary Sewer Lgn **	Total ammonia	08/01/07
Colorado River West	Sevier River	undefined	UT0025291	Salina City Sanitary Sewer Lgn **	Total chlorine residual	08/01/07
Colorado River West	Icelander Creek & Grassy Trail Creek	UT14060007-012	UT0024759	Sunnyside Cogeneration Assoc.	Total chromium	08/01/07
Colorado River West	Icelander Creek & Grassy Trail Creek	UT14060007-012	UT0024759	Sunnyside Cogeneration Assoc.	Total zinc	08/01/07
Colorado River West	Icelander Creek & Grassy Trail Creek	UT14060007-012	UT0024759	Sunnyside Cogeneration Assoc.	Dissolved oxygen	08/01/07
Colorado River West	Price River	UT14060007-007	UT0021814	Price R Water Imp Dist	Total chlorine residual	01/01/07
Colorado River West	Price River	UT14060007-007	UT0021814	Price R Water Imp Dist	Total ammonia	01/01/07
Colorado River West	Price River	UT14060007-007	UT0021814	Price R Water Imp Dist	Dissolved oxygen	01/01/07
Colorado River West	Price River	UT14060007-007	UT0021814	Price R Water Imp Dist	Total chlorine residual	01/01/07
Colorado River West	Price River	UT14060007-007	UT0021814	Price R Water Imp Dist	Total ammonia	01/01/07
Colorado River West	Price River	UT14060007-007	UT0021814	Price R Water Imp Dist	Dissolved oxygen	01/01/07

Table 11. Category 5C - 2006 UPDES Permit Renewal TMDLs						
Watershed Management Unit	Receiving Water	Assessment Uint ID	Permit Number	Facility	Parameter	Renewal Date
Colorado River West	Deer Creek	UT14060009-003	UT0023604	Pacific Corp - Deer Creek Coal	Total Dissolved Solids	12/01/07
Colorado River West	Deer Creek	UT14060009-003	UT0023604	Pacific Corp - Deer Creek Coal	Total Iron	12/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total chromium	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total mercury	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total silver	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total selenium	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total nickel	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total molybdenum	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total zinc	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total lead	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total copper	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total Cadmium	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Arsenic	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total aluminum	09/01/07
Cedar / Beaver	Bulldog Irrigation Ditch	undefined	UT0024970	Cedar City Corporation	Total cyanide	09/01/07
Bear River	Ditch to Spring Creek	UT16010203-008	UT0000281	Miller-e a Inc	Total dissolved solids	05/01/06
Bear River	Ditch to Spring Creek	UT16010203-008	UT0000281	Miller-e a Inc	Total ammonia	??
Bear River	Ditch to Spring Creek	UT16010203-008	UT0000281	Miller-e a Inc	Total phosphorus	05/01/06
Bear River	Ditch to Spring Creek	UT16010203-008	UT0000281	Miller-e a Inc	Total dissolved solids	05/01/06
Bear River	Ditch to Spring Creek	UT16010203-008	UT0000281	Miller-e a Inc	Total ammonia	05/01/06
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total mercury	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total copper	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total zinc	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total silver	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total selenium	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total nickel	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total molybdenum	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total cyanide	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Arsenic	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total chromium	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total chlorine residual	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total Cadmium	04/01/08
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	BOD	04/01/08

Table 11. Category 5C - 2006 UPDES Permit Renewal TMDLs						
Watershed Management Unit	Receiving Water	Assessment Uint ID	Permit Number	Facility	Parameter	Renewal Date
Bear River	Malad River	UT16010204-006	UT0020303	Tremonton City Corps	Total lead	04/01/08
Bear River	Little Bear River	UT16010203-009	UT0020371	Wellsville City Corporation	Dissolved oxygen	01/01/07
Bear River	Little Bear River	UT16010203-009	UT0020371	Wellsville City Corporation	Total ammonia	01/01/07
Bear River	Irrigation Ditch to Cutler re	UT16010203-007	UT0021920	Logan City Corporation	Total lead	07/01/07
Bear River	Irrigation Ditch to Cutler re	UT16010203-007	UT0021920	Logan City Corporation	Dissolved oxygen	07/01/07
Bear River	Irrigation Ditch to Cutler re	UT16010203-007	UT0021920	Logan City Corporation	Total ammonia	07/01/07
Bear River	Irrigation Ditch to Cutler re	UT16010203-007	UT0021920	Logan City Corporation	Total chlorine residual	07/01/07
Bear River	Irrigation Ditch to Cutler re	UT16010203-007	UT0021920	Logan City Corporation	Total copper	07/01/07
Bear River	Cub River	UT16010202-010	UT0020214	Lewiston City le	Dissolved oxygen	08/01/07
Bear River	Cub River	UT16010202-010	UT0020214	Lewiston City le	Total chlorine residual	08/01/07
Bear River	Cub River	UT16010202-010	UT0020214	Lewiston City le	Total recoverable phosphorus	08/01/07
Jordan River	Ironton Canal	undefined	UT0000612	Pacific States Cast Iron Pipe	Temperature	07/01/06
Jordan River	Beer Creek	UT16020202-027	UT0020249	Salem City Corp	Total ammonia	12/01/07
Jordan River	Beer Creek	UT16020202-027	UT0020249	Salem City Corp	Total chlorine residual	12/01/07
Jordan River	Oil Drain Canal	undefined	UT0000175	Chevron U.s.a. Inc	Chemical oxygen demand	01/01/08
Jordan River	Oil Drain Canal	undefined	UT0000175	Chevron U.s.a. Inc	Hexavalent chromium	01/01/08
Jordan River	Oil Drain Canal	undefined	UT0000175	Chevron U.s.a. Inc	Total chromium	01/01/08
Jordan River	Oil Drain Canal	undefined	UT0000175	Chevron U.s.a. Inc	Total ammonia	01/01/08
Jordan River	Oil Drain Canal	undefined	UT0000175	Chevron U.s.a. Inc	Total pheolics	01/01/08
Jordan River	Oil Drain Canal	undefined	UT0000175	Chevron U.s.a. Inc	Total sulfide	01/01/08

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Utah 2006 UPDES Permits

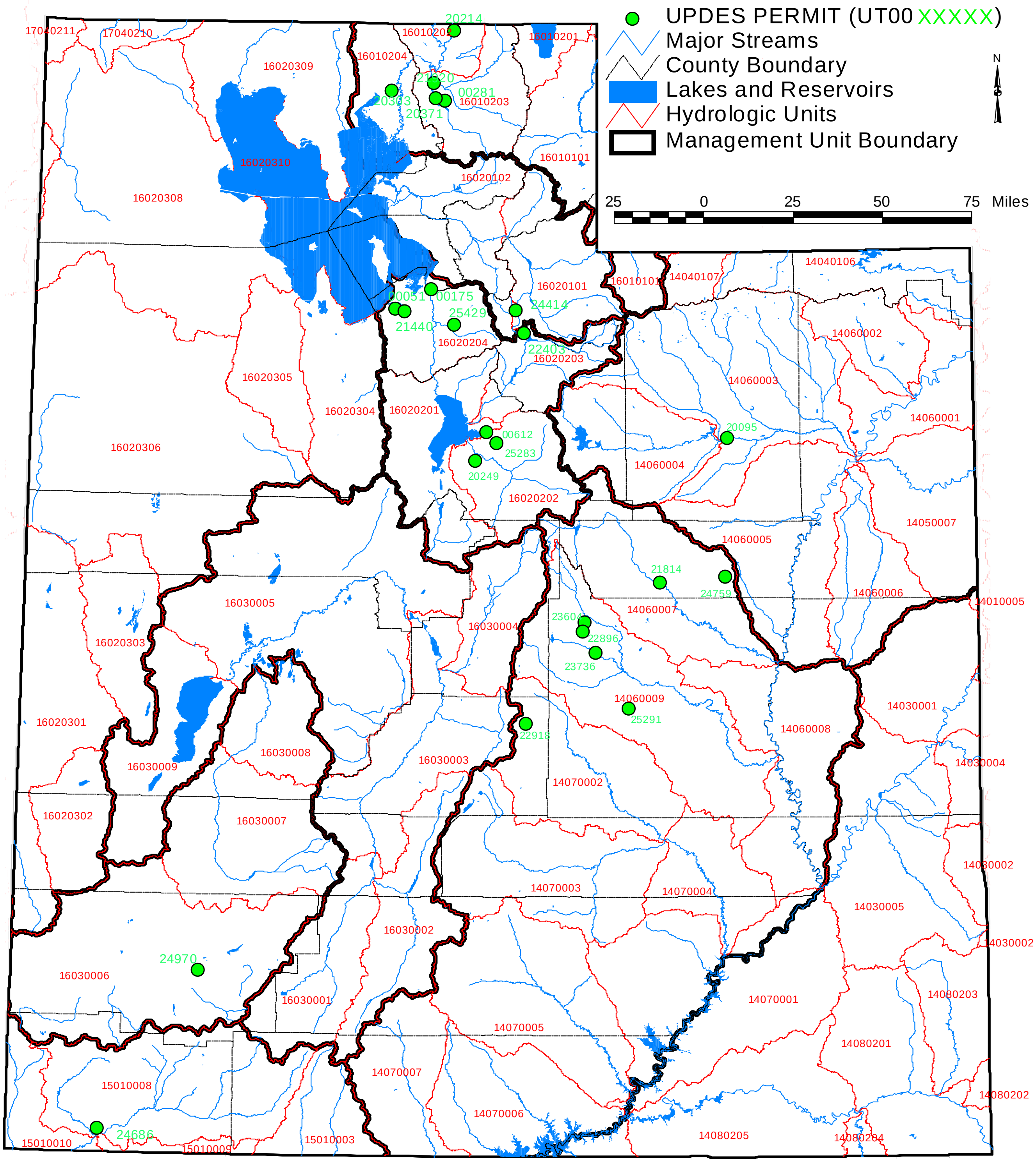


Figure 14. Utah UPDES permit TMDLs targeted for completion by April 1, 2004

Table 12. Category 5B - Request for Removal From The 303(d) List of Impaired Waters.								
Watershed Management Unit	Assessment Unit Identification	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Use Support	Stream Miles	Parameter Removed	Reason For Delisting
Jordan River / Utah Lake	UT16020201-001	American Fork River-1	American Fork River and tributaries from Diversion at mouth of Canyon to Tibble Fork Res	2B,3B,4	FS	14.15	pH	2004-2005 Intensive Survey, pH standard was met.
Jordan River / Utah Lake	UT16020202-026	Spring Creek	Spring Creek and tributariesfromconfluence w/ Beer Creek to headwaters	3A	FS	18.76	Temparature	2004-2005 Intensive Survey, pH standard was met.
Jordan River / Utah Lake	UT16020204-012	Emigration Creek	Emigration Creek and tributaries from Foothill BLVD to headwaters.	2B	FS	4.29	Pathogens	This is a technical removal. Originally listed when Fecal Coliforms were the standard. E. coli is now the standard. The TMDL is proceeding and E. coli data have been and will continue to be collected for the TMDL.
Bear River	UT16010101-009	Bear River-5	Bear River from Utah-Wyoming border to Woodruff Creek confluence	3A	FS	55.666	Dissolved Oxygen	2004-2005 Intensive Survey, Dissolved Oxygen standard was met.
Bear River	UT16010203-008	Spring Creek	Spring Creek and tributaries from confluence w/ Little Bear River to headwaters	2B	PS	7.361	Fecal Coliforms	Bacteriological standard was changed to E. coli, June 1, 2005. The original listing was not based on EPA's recommended method, therefore the assessment is not considered valid.
	UT-L-14040106-033	Matt Warner Reservoir	Matt Warner Reservoir	3A	FS	433	Temperature	See Foot Note
	UT-L-16030002-004	Otter Creek Reservoir	Otter Creek Reservoir	3A	FS	2,520	Temperature	See Foot Note
	UT-L-14060001-002	Brough Reservoir	Brough Reservoir	3A	FS	128	Temperature	See Foot Note
	UT-L-14040107-006	China Lake	China Lake	3A	FS	47	Temperature	See Foot Note
	UT-L-16030004-005	Palisade Lake	Palisade Lake	3A	FS	66	Temperature	See Foot Note
	UT-L-16030001-011	Piute Reservoir	Piute Reservoir	3A	FS	2,508	Temperature	See Foot Note
	UT-L-16010203-009	Porcupine Reservoir	Porcupine Reservoir	3A	FS	190	Temperature	See Foot Note
	UT-L-14060002-006	Red Fleet Reservoir	Red Fleet Reservoir	3A	FS	520	Temperature	See Foot Note
	UT-L-14060002-004	Steinaker Reservoir	Steinaker Reservoir	3A	FS	829	Temperature	See Foot Note
	UT-L-15010008-008	Baker Dam Reservoir	Baker Dam Reservoir	3A	FS	63	Temperature	See Foot Note
	UT-L-16010204-033	Mantua Reservoir	Mantua Reservoir	3A	FS	554	Temperature	See Foot Note
	UT-L-14070005-011	Wide Hollow Reservoir	Wide Hollow Reservoir	3A	FS	145	Temperature	See Foot Note

Table 12. Category 5B - Request for Removal From The 303(d) List of Impaired Waters.								
Watershed Management Unit	Assessment Unit Identification	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Use Support	Stream Miles	Parameter Removed	Reason For Delisting

Foot Note: New method of temperature assessment now includes calculation of heat budget (see text) - Assessment resulted in full support

Table 13. Category 5D - Lakes not fully supporting beneficial uses for 2004 but will not be listed until two consecutive assessment cycles demonstrate impairment.						
Watershed Management Unit	Watershed Management ID	Assessment Unit Name	Beneficial Use Class	Lake Acreage	Beneficial Use Support	Pollutant
Jordan / Utah Lake	UT-L-16020203-005	Washington Lake	3A	94	PS	DO
Colorado River West	UT-L-14070005-011	Wide Hollow Reservoir	3A	145	NS	pH
Colorado River West	UT-L-14060009-001	Ferron Reservoir	3A	55	PS	pH
Colorado River Southeast	UT-L-14080203-002	Monticello Lake	3A	3	PS	pH
Uinta	UT-L-14060004-006	Starvation Reservoir	3A	2,760	PS	DO
Weber River	UT-L-16020101-002	Rockport Reservoir	3A	1189	PS	DO
Cedar / Beaver	UT-L-16030007-025	Three Creeks Reservoir	3A	57	PS	DO

Table 14. Status of Total Maximum Daily Loads Identified for Completion in the 2004 Cycle and Others Completed.									
Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Stream Miles	Beneficial Use Support	Pollutant	Site Specific Standard Developed	Date TMDL Approved
Colorado River Southeast	UT14030005-009	Castle Creek	Castle Creek and tributareis from confluence with Colorado River to headwaters	4	18.19	PS	Total Dissolved Solids	Yes	08/04/04
Colorado River West	UT14060007-007	Price River-3	Price River and tributaries from Coal Creek confluence to Carbon Canal Diversion	4	16.65	PS	Total Dissolved Solids	Yes	08/04/04
Colorado River West	UT14060007-014	Price River-4	Price River and tributaries from near Woodside to Soldier Creek confluence	4	67.83	NS	Total Dissolved Solids	Yes	08/04/04
Colorado River West	UT14060007-015	Price River-5	Price River and tributaries from confluence w/Green River to near Woodside	4	24.52	NS	Total Dissolved Solids	Yes	08/04/04
Colorado River West	UT14060009-004	Huntington Creek-2	Huntington Creek and tributariesfrom Highway 10 crossing to USFS boundary	4	19.24	NS	Total Dissolved Solids	Yes	08/04/04
Colorado River West	UT14060009-010	Huntington Creek-1	Huntington Creek from confluence with San Rafael River to Highway 10	4	25.79	NS	Total Dissolved Solids	Yes	08/04/04
Colorado River West	UT14060009-011	Lower Cottonwood Creek	Cottonwood Creek from confluencew/Huntington Creek to Highway 57	4	17.76	NS	Total Dissolved Solids	Yes	08/04/04
Colorado River West	UT14060009-013	Upper San Rafael	San Rafael River from Buckhorn Crossing to confluence Huntington and Cottonwood Creeks	4	23.25	NS	Total Dissolved Solids	Yes	08/04/04
Colorado River West	UT14060009-014	Lower San Rafael	San Rafael from confluence w/ Green River to Buckhorn Crossing	4	82.84	NS	Total Dissolved Solids	Yes	08/04/04
Colorado River West	UT14070002-006	Middle Muddy	Muddy Creek and tributaries from Quitchipah Creek confluence to U-10 xing	4	20.06	NS	Total Dissolved Solids	Yes	08/04/04
Colorado River West	UT14070002-007	Lower Quitchipah Creek	Quitchipah Creekfrom confluence ofIvie Cr. to U-10 xing	4	9.95	NS	Total Dissolved Solids	Yes	08/04/04

Table 14. Status of Total Maximum Daily Loads Identified for Completion in the 2004 Cycle and Others Completed.									
Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Stream Miles	Beneficial Use Support	Pollutant	Site Specific Standard Developed	Date TMDL Approved
Colorado River West	UT14070005-012	Upper Escalante	Escalante River and some tributaries from Boulder Creek confluence to Birch Creek confluence	3A	26.78	PS	Temperatures	Rolled Over	Scheduled 04/01/06
Colorado River West	UT14070007-001	Paria River-1	Paria River from start of Paria River Gorge to headwaters	4	16.77	NS	Total Dissolved Solids	Rolled Over	Scheduled 04/01/06
Colorado River West	UT14070007-005	Paria River-3	Paria River and tributaryiesfrom Arizona-Utah state line to Cottonwood Creek confluence	4	9.23	NS	Total Dissolved Solids	Rolled Over	Scheduled 04/01/06
Colorado River West	UT16010101-006	Bear River-4	Bear River from Sage Creek Junction upstsream to Woodruff Creek confluence	3A	55.67	PS	Dissolved Oxygen	Rolled Over	Scheduled 04/01/06
Jordan River/ Utah Lake	UT16020202-012	Soldier Creek-1	Soldier Creek from confluence with Thistle Creek to confluence of Starvation Creek	3A	18.46	PS	Sediment	Rolled Over	Scheduled 04/01/06
Lower Colorado	UT15010008-001	Santa Clara-1	Santa Clara River: from confluence w/Virgin River to Gunlock Reservoir	4	23.67	NS	Total Dissolved Solids		10:22 am
Lower Colorado	UT15010008-001	Santa Clara-1	Santa Clara River: from confluence w/Virgin River to Gunlock Reservoir	3B	23.67	PS	Selenium		10:22 am
Lower Colorado	UT15010008-004	Virgin River-2	Virgin River and tributaries from Santa Clara River confluence to Quail Creek diversion (excludes Quail Creek and LeadsCreek)	4	41.11	NS	Total Dissolved Solids	Yes	09/20/04
Lower Colorado	UT15010010-001	Virgin River-1	Virgin River from state line to Santa Clara Confluence	4	15.24	NS	Total Dissolved Solids	Yes	09/20/04
Sevier River	UT16030002-005	East Fork Sevier-4	East Fork Sevier River and tributaries from confluence with Sevier River upstream to Antimony Creek confluence excluding Otter Creek and tributaries	3A	25.74	PS	Total Phosphorus	Rolled Over	Scheduled 04/01/06
Sevier River	UT16030001-005	Sevier River-3	Sevier River and tributaries from Circleville Irrigation Diversion to Horse Valley Diversion	3A	20.40	PS	Total Phosphorus		08/24/04
Sevier River	UT16030001-005	Sevier River-3	Sevier River and tributaries from Circleville Irrigation Diversion to Horse Valley Diversion	3A	20.40	PS	Sediment		08/24/04
Sevier River	UT16030001-007	Sevier River-2	Sevier River and tributaries from Horse Valley Bridge Diversion upstream to Long Canal excluding Panquitch Creek, Bear River Creek and their tributaries.	3A	20.40	PS	Total Phosphorus		08/24/04
Sevier River	UT16030001-007	Sevier River-2	Sevier River and tributaries from Horse Valley Bridge Diversion upstream to Long Canal excluding Panquitch Creek, Bear River Creek and their tributaries.	3A	20.40	PS	Sediment		08/24/04
Sevier River	UT16030001-007	Sevier River-1	Sevier River and tributaries from Lng Canal to Mammouth Creek confluence	3A	27.10	PS	Total Phosphorus		08/24/04
Sevier River	UT16030001-012	Sevier River-1	Sevier River and tributaries from Lng Canal to Mammouth Creek confluence	3A	27.10	PS	Sediment		08/24/04
Sevier River	UT16030003-005	Lost Creek-1	Lost Creek and tributaries from confluence w/Sevier River upstream ~ 6 miles	4	4.11	NS	Total Dissolved Solids	Yes	08/17/04
Sevier River	UT16030003-012	Sevier River-17	Sevier River from Yuba Dam upstream to confluence with Salina Creek	4	45.24	NS	Salinity/TDS/chl orides		10:22 am

Table 14. Status of Total Maximum Daily Loads Identified for Completion in the 2004 Cycle and Others Completed.									
Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Stream Miles	Beneficial Use Support	Pollutant	Site Specific Standard Developed	Date TMDL Approved
Sevier River	UT16030003-012	Sevier River-17	Sevier River from Yuba Dam upstream to confluence with Salina Creek	3B	45.24	PS	Total Phosphorus		10:22 am
Sevier River	UT16030003-027	Peterson Creek	Petersen Creek and tributaries from confluence with Sevier River to USFS boundary	4	8.70	NS	Total Dissolved Solids	Yes	08/17/04
Sevier River	UT16030005-025	Sevier River-20	Sevier River from U-132 at ther northern most point of the Sevier River (near Dog Valley Wash confluence) upstream to Yuba Dam.	3B	34.43	PS	Sediment		10:22 am
Sevier River	UT16030005-025	Sevier River-20	Sevier River from U-132 at ther northern most point of the Sevier River (near Dog Valley Wash confluence) upstream to Yuba Dam.	3B	34.43	PS	Total Phosphorus		10:22 am
Sevier River	UT16030005-026	Sevier River-22	Sevier River from DMAD Reservoir upstram to U-132 crossing at the northern most point of the Sevier River (near Dog Valley Wash)	4	42.26	PS	Total Dissolved Solids		10:22 am
Sevier River	UT16030005-026	Sevier River-22	Sevier River from DMAD Reservoir upstram to U-132 crossing at the northern most point of the Sevier River (near Dog Valley Wash)	4	42.26	PS	Total Dissolved Solids		10:22 am
Sevier River	UT16030005-026	Sevier River-22	Sevier River from DMAD Reservoir upstram to U-132 crossing at the northern most point of the Sevier River (near Dog Valley Wash)	3B	42.26	PS	Sediment		10:22 am
Sevier River	UT16030005-026	Sevier River-22	Sevier River from DMAD Reservoir upstram to U-132 crossing at the northern most point of the Sevier River (near Dog Valley Wash)	3B	42.26	PS	Total Dissolved Solids		10:22 am
Sevier River	UT16030005-027	Sevier River-24	Sevier River from Gunnison bend Reservoir to DMAD Reservoir	4	17.45	NS	Salinity/TDS/chlorides		
Sevier River	UT16030005-027	Sevier River-24	Sevier River from Gunnison bend Reservoir to DMAD Reservoir	3B	17.45	PS	Sediment		10:22 am
Sevier River	UT16030005-027	Sevier River-24	Sevier River from Gunnison bend Reservoir to DMAD Reservoir	3B	17.45	PS	Total Phosphorus		10:22 am
Sevier River	UT16030005-028	Sevier River-25	Sevier River from Crear Lake to Gunnison Bend Reservoir	4	18.66	NS	Total Dissolved Solids	Yes	08/17/04
Uinta	UT14060006-001	Willow Creek	Willow Creek and tributaries confluence Green River to Meadow Creek confluence (excluding Hill Creek).	4	57.18	PS	Total Dissolved Solids	Yes	08/04/04
Weber	UT16020101-020	Silver Creek	Silver Creek and tributaries from confluence w/Weber River to headwaters	1C	21.37	NS	Arsenic		10:22 am
Weber	UT16020101-020	Silver Creek	Silver Creek and tributaries from confluence w/Weber River to headwaters	3A	21.37	NS	Cadmium		10:22 am
Weber	UT16020101-020	Silver Creek	Silver Creek and tributaries from confluence w/Weber River to headwaters	3A	21.37	NS	Zinc		10:22 am

Table 15. Status of 2004, 2002, and 2000 303(d) List UPDES Permit TMDLs

Watershed Management Unit	Receiving Water	Receiving Water Assessment Unit ID	Permit Number	Facility Name	Renewal Date	Pollutants	Status
Uinta	Gully to Ashley Creek	UT14060002-001	UT0000035	EQUITY OIL CO	04/30/04	TDS	Completed
Uinta	Gully to Ashley Creek	UT14060002-001	UT0000124	EQUITY OIL COMPANY	04/30/04	Bod	Completed
Uinta	Gully to Ashley Creek	UT14060002-001	UT0000124	EQUITY OIL COMPANY	04/30/04	TDS	Completed
Uinta	Gully to Ashley Creek	UT14060002-001	UT0000124	EQUITY OIL COMPANY	04/30/04	TSS	Completed
Jordan River / Utah Lake	Utah Lake	UT-L-16020201-004	UT0000361	GENEVA STEEL	05/31/05	Ammonia	Completed
Jordan River / Utah Lake	Utah Lake	UT-L-16020201-004	UT0000361	GENEVA STEEL	05/31/05	BOD	Completed
Jordan River / Utah Lake	Utah Lake	UT-L-16020201-004	UT0000361	GENEVA STEEL	05/31/05	TDS	Completed
Jordan River / Utah Lake	Utah Lake	UT-L-16020201-004	UT0000361	GENEVA STEEL	05/31/05	Total Cyanide	Completed
Jordan River / Utah Lake	Utah Lake	UT-L-16020201-004	UT0000361	GENEVA STEEL	05/31/05	Total Lead	Completed
Jordan River / Utah Lake	Utah Lake	UT-L-16020201-004	UT0000361	GENEVA STEEL	05/31/05	Total Zinc	Completed
Colorado River West	Ferron Creek	UT14060009-012	UT0020052	FERRON- CITY OF	05/31/04	Residual Chlorine	Completed
Colorado River West	Ferron Creek	UT14060009-012	UT0020052	FERRON- CITY OF	05/31/04	Total Ammonia	Completed
Sevier	San Pitch River	UT16030004-005	UT0020222	MORONI FEED/WASTEWATER	10/31/05	Total Ammonia	Completed
Sevier	San Pitch River	UT16030004-005	UT0020222	MORONI FEED/WASTEWATER	10/31/05	Total Residual Chlorine	Completed
Bear	Malad River	UT16010204-006	UT0020311	BEAR RIVER- TOWN OF	09/30/04	Total Residual Chlorine	Completed
Weber	Weber River	UT16020102-022	UT0020893	MORGAN CITY CORP	04/30/05	Total Chlorine Residual	Completed
Weber	Ditch to Beaver Creek	UT16020101-029	UT0020966	KAMAS CITY WASTEWATER	10/31/05	Dissolved Oxygen	Completed
Weber	Ditch to Beaver Creek	UT16020101-029	UT0020966	KAMAS CITY WASTEWATER	10/31/05	Oxygen	Completed
Weber	Ditch to Beaver Creek	UT16020101-029	UT0020966	KAMAS CITY WASTEWATER	10/31/05	Total Ammonia	Completed
Weber	Ditch to Beaver Creek	UT16020101-029	UT0020966	KAMAS CITY WASTEWATER	10/31/05	TSS	Completed
Weber	Baer Creek	UT16020102-053	UT0020974	CENTRAL DAVIS CO SEWER	02/28/05	BOD	Completed
Weber	Baer Creek	UT16020102-053	UT0020974	CENTRAL DAVIS CO SEWER	02/28/05	TSS	Completed
Weber	Chalk Creek	UT16020101-010	UT0021288	COALVILLE CITY CORP	07/31/04	Total Ammonia	Completed
Colorado River West	Huntington Creek	UT14060009-010	UT0021296	CASTLE VALLEY SSD-(HUNTINGTON)	11/30/04	Ammonia	Completed

Table 15. Status of 2004, 2002, and 2000 303(d) List UPDES Permit TMDLs							
		Receiving Water					
Watershed		Assessment					
Management	Receiving	Unit	Permit	Facility	Renewal		
Unit	Water	ID	Number	Name	Date	Pollutants	Status
Colorado River West	Huntington Creek	UT14060009-010	UT0021296	CASTLE VALLEY SSD-(HUNTINGTON)	11/30/04	Nitrogen	Completed
Colorado River West	Huntington Creek	UT14060009-010	UT0021296	CASTLE VALLEY SSD-(HUNTINGTON)	11/30/04	Total Residual Clhlorine	Completed
Jordan River / Utah Lake	Kersey Creek	not defined	UT0021440	MAGNA WATER & SEWER DIST	09/30/04	Ammonia	Completed
Jordan River / Utah Lake	Kersey Creek	not defined	UT0021440	MAGNA WATER & SEWER DIST	09/30/04	BOD	Completed
Jordan River / Utah Lake	Kersey Creek	not defined	UT0021440	MAGNA WATER & SEWER DIST	09/30/04	Total Residual Chlorine	Completed
Uinta	Gully to Ashley Creek	UT14060002-001	UT0021792	HOLLANDSWORTH & TRAVIS	04/30/04	BOD	Completed
Uinta	Gully to Ashley Creek	UT14060002-001	UT0021792	HOLLANDSWORTH & TRAVIS	04/30/04	TDS	Completed
Uinta	Gully to Ashley Creek	UT14060002-001	UT0021792	HOLLANDSWORTH & TRAVIS	04/30/04	TSS	Completed
Weber	Warren Canal & Weber River	not defined	UT0021911	CENTRAL WEBER SEWER IMPRO DIST	04/30/04	Ammonia	Completed
Weber	Warren Canal & Weber River	not defined	UT0021911	CENTRAL WEBER SEWER IMPRO DIST	04/30/04	Copper	Completed
Weber	Warren Canal & Weber River	not defined	UT0021911	CENTRAL WEBER SEWER IMPRO DIST	04/30/04	Mercury	Completed
Weber	Warren Canal & Weber River	not defined	UT0021911	CENTRAL WEBER SEWER IMPRO DIST	04/30/04	Total Chlorine Residual	Completed
Bear	Box Elder Creek	UT16010204-001	UT0022365	BRIGHAM CITY CORP	06/30/05	Ammonia	Completed
Bear	Box Elder Creek	UT16010204-001	UT0022365	BRIGHAM CITY CORP	06/30/05	Total Chlorine Residual	Completed
Colorado River West	Quitchupah Creek	UT14070002-007	UT0022616	CONSOL. COAL CO-UNDERGROUND	06/30/04	Iron	Completed
Colorado River West	Quitchupah Creek	UT14070002-007	UT0022616	CONSOL. COAL CO-UNDERGROUND	06/30/04	Trichloroethene	Completed
Colorado River West	Cedar & Miller Creek	UT14060007-010	UT0023094	HIAWATHA COAL COMPANY	09/30/04	Iron	Completed
Colorado River West	Cedar & Miller Creek	UT14060007-010	UT0023094	HIAWATHA COAL COMPANY	09/30/04	TDS	Completed
Colorado River West	Eccles Creek	UT14060007-002	UT0023540	CANYON FUEL CO., LLC - SKYLINE	09/30/04	Iron	Completed
Colorado River West	Eccles Creek	UT14060007-002	UT0023540	CANYON FUEL CO., LLC - SKYLINE	09/30/04	TDS	Completed
Colorado River West	Eccles Creek	UT14060007-002	UT0023540	CANYON FUEL CO., LLC - SKYLINE	09/30/04	Total	Completed
Jordan River / Utah Lake	Utah Lake	UT-L-16020201-004	UT0023639	TIMPANOGOS SPECIAL SERVICE DIS	10/31/04	Total Residual Chlorine	Completed
Jordan River / Utah Lake	Cottonwood Creek	UT14060009-011	UT0023663	CASTLE VALLEY SPECIAL SERVICE	07/31/05	Ammonia	Completed
Jordan River / Utah Lake	Cottonwood Creek	UT14060009-011	UT0023663	CASTLE VALLEY SPECIAL SERVICE	07/31/05	Total Chlorine Residual	Completed

Table 15. Status of 2004, 2002, and 2000 303(d) List UPDES Permit TMDLs

Watershed Management Unit	Receiving Water	Receiving Water Assessment Unit ID	Permit Number	Facility Name	Renewal Date	Pollutants	Status
Weber	Mill Creek	not defined	UT0023752	FRESENIUS MEDICAL CARE	12/31/05	TDS	Completed
Jordan River / Utah Lake	Ditch to Jordan River	UT16020204-008	UT0024082	UTAH STATE PRISON	10/31/05	TDS	Completed
Colorado River West	Huntington	UT14060009-003	UT0024368	GENWAL RESOURCES, INC.	08/31/05	Total Iron	Completed
Jordan River / Utah Lake	Jordan River	UT16020204-005	UT0024384	SOUTH VALLEY WATER RECLAM FAC	08/31/05	Chemical BOD	Completed
Jordan River / Utah Lake	Jordan River	UT16020204-005	UT0024384	SOUTH VALLEY WATER RECLAM FAC	08/31/05	Total Residual Chlorine	Completed
Jordan River / Utah Lake	Mill Creek to Jordan River	UT16020204-026	UT0024392	CENTRAL VALLEY WTR RFB-CENTRAL	07/31/04	Dissolved Oxygen	Completed
Jordan River / Utah Lake	Mill Creek to Jordan River	UT16020204-026	UT0024392	CENTRAL VALLEY WTR RFB-CENTRAL	07/31/04	Total Ammonia	Completed
Jordan River / Utah Lake	Mill Creek to Jordan River	UT16020204-026	UT0024392	CENTRAL VALLEY WTR RFB-CENTRAL	07/31/04	Total Residual Chlorine	Completed
Colorado River Southeast	Montezuma Creek	UT14080203-003	UT0024503	MONTICELLO, CITY STP	08/31/04	Residual Chlorine	Completed
Colorado River Southeast	Montezuma Creek	UT14080203-003	UT0024503	MONTICELLO, CITY STP	08/31/04	Total Nitrogen Ammonia	Completed
Colorado River Southeast	Montezuma Creek	UT14080203-003	UT0024503	MONTICELLO, CITY STP	08/31/04	Trc	Completed
Weber	Weber River	UT16020102-002	UT0024732	MOUNTAIN GREEN SEWER IMPROVEME	04/30/05	Total Chlorine Residual	Completed
GSL / Columbia	Blue Creek	not defined	UT0024805	THIOKOL CORPORATION	06/30/04	1-1 Dichlorethylene	Completed
GSL / Columbia	Blue Creek	not defined	UT0024805	THIOKOL CORPORATION	06/30/04	1-1-1 Trichloroethane	Completed
GSL / Columbia	Blue Creek	not defined	UT0024805	THIOKOL CORPORATION	06/30/04	Aluminum	Completed
GSL / Columbia	Blue Creek	not defined	UT0024805	THIOKOL CORPORATION	06/30/04	Carbon Tetrachloride	Completed
GSL / Columbia	Blue Creek	not defined	UT0024805	THIOKOL CORPORATION	06/30/04	Isopropanal	Completed
GSL / Columbia	Blue Creek	not defined	UT0024805	THIOKOL CORPORATION	06/30/04	Ozone	Completed
GSL / Columbia	Blue Creek	not defined	UT0024805	THIOKOL CORPORATION	06/30/04	Perchlorate	Completed
GSL / Columbia	Blue Creek	not defined	UT0024805	THIOKOL CORPORATION	06/30/04	Total Ammonia	Completed
GSL / Columbia	Blue Creek	not defined	UT0024805	THIOKOL CORPORATION	06/30/04	Total Recoverable Silver	Completed
GSL / Columbia	Blue Creek	not defined	UT0024805	THIOKOL CORPORATION	06/30/04	TSS	Completed
GSL / Columbia	Blue Creek	not defined	UT0024805	THIOKOL CORPORATION	06/30/04	Volatile Organics	Completed
Jordan River / Utah Lake	700 West Ditch	UT16020204-003	UT0025119	WASATCH CHEMICAL SITE	12/31/04	Total Toxic Organics	Completed

Table 15. Status of 2004, 2002, and 2000 303(d) List UPDES Permit TMDLs

Watershed Management Unit	Receiving Water	Receiving Water Assessment Unit ID	Permit Number	Facility Name	Renewal Date	Pollutants	Status
Lower Colorado	Virgin River	UT15010008-012	UT0025224	SPRINGDALE, TOWN OF	12/31/05	TDS	Completed
Jordan River / Utah Lake	Spanish Fork River	UT16020202-001	UT0025275	ENSIGN-BICKFORD - SPANISH FORK	05/31/04	Nitrate	Completed
Jordan River / Utah Lake	Spanish Fork River	UT16020202-001	UT0025275	ENSIGN-BICKFORD - SPANISH FORK	05/31/04	Oxygen	Completed
Jordan River / Utah Lake	Spanish Fork River	UT16020202-001	UT0025275	ENSIGN-BICKFORD - SPANISH FORK	05/31/04	Total Nitrogen	Completed
Jordan River / Utah Lake	Spanish Fork River	UT16020202-001	UT0025275	ENSIGN-BICKFORD - SPANISH FORK	05/31/04	Total Rdx	Completed
Cedar / Beaver	Shoal Creek	UT16030006-004	UT0025330	ENTERPRISE CITY WWTF	05/31/04	Total Residual Chlorine	Completed
Jordan River / Utah Lake	Jordan River	UT16020204-001	UTL021636	S DAVIS CO SEWER - NORTH	09/30/04	Total Residual Chlorine	Completed
Uinta	Gully to Ashley Creek	UT14060002-001	UT0021768	CIMA PETROLEUM.	01/31/06	TDS	On Schedule
Weber	Warren Canal & Weber River	UT16020102-003	UT0021911	CENTRAL WEBER SEWER IMPROVEMEN	01/31/06	Dissolved Oxygen	On Schedule
Weber	Warren Canal & Weber River	UT16020102-003	UT0021911	CENTRAL WEBER SEWER IMPROVEMEN	01/31/06	Total Ammonia	On Schedule
Jordan River / Utah Lake	Soldier Creek	UT14060007-009	UT0023680	CANYON FUEL CO., LLC - SOLDIER	03/31/06	TDS	On Schedule
Jordan River / Utah Lake	Soldier Creek	UT14060007-009	UT0023680	CANYON FUEL CO., LLC - SOLDIER	03/31/06	Total Iron	On Schedule
Bear	Gully to Malad River	UT16010204-006	UT0023850	NUCOR STEEL-DIV OF NUCOR CORP	03/31/06	TDS	On Schedule
Bear	Gully to Malad River	UT16010204-006	UT0023850	NUCOR STEEL-DIV OF NUCOR CORP	03/31/06	Total Residual Chlorine	On Schedule
Colorado River West	Green River	UT14060008-001	UT0025232	GREEN RIVER WTF	01/31/06	Total Residual Chlorine	On Schedule
Uinta	To Ditch Then to Ashley Creek	UT14060002-002	UT0025348	WHITE MESA WASTEWATER LAGOONS	01/31/06	TDS	On Schedule
Uinta	To Ditch Then to Ashley Creek	UT14060002-002	UT0025348	WHITE MESA WASTEWATER LAGOONS	01/31/06	Total Ammonia	On Schedule
Uinta	To Ditch Then to Ashley Creek	UT14060002-002	UT0025348	WHITE MESA WASTEWATER LAGOONS	01/31/06	Total Selenium	On Schedule
2002 303(d) List of Updes Tmdls							
Bear River	Malad River	UT16010204-006	UT0020303	TREMONTON CITY CORP	03/31/03	Oxygen Dissolved	Completed
Bear River	Malad River	UT16010204-006	UT0020303	TREMONTON CITY CORP	03/31/03	Chlorine Total Residual	Completed
Bear River	Ditch to Cub River	UT16010202-007	UT0020907	RICHMOND- CITY	09/30/03	Oxygen Dissolved	Completed
Bear River	Ditch to Cub River	UT16010202-007	UT0020907	RICHMOND- CITY	09/30/03	Chlorine Total Residual	Completed

Table 15. Status of 2004, 2002, and 2000 303(d) List UPDES Permit TMDLs							
		Receiving Water					
Watershed		Assessment					
Management	Receiving	Unit	Permit	Facility	Renewal		
Unit	Water	ID	Number	Name	Date	Pollutants	Status
Bear River	Bear River Bay-gsl	UT16010204-002	UT0021148	PERRY CITY	12/31/03	Chlorine Total Residual	Completed
Bear River	Bear River Bay-gsl	UT16010204-002	UT0021148	PERRY CITY	12/31/03	Ammonia Nitrogen (N)	Completed
Cedar / Beaver River	Unnamed Dry Wash	Undefined	UT0025062	AMERICAN AZIDE CORPORATION	11/30/02	Milligrams per Liter	Completed
GSL Desert / Columbia	Blue Lakes to Great Salt Lake	Undefined	UT0021130	GRANTSVILLE CITY	01/31/04	Ammonia Nitrogen (N)	Completed
GSL Desert / Columbia	Mercur and Manning Creeks	Undefined	UT0023884	BARRICK MERCUR GOLD MINES INC	12/31/02	Cadium Total	Completed
GSL Desert / Columbia	Mercur and Manning Creeks	Undefined	UT0023884	BARRICK MERCUR GOLD MINES INC	12/31/02	Copper Total	Completed
GSL Desert / Columbia	Mercur and Manning Creeks	Undefined	UT0023884	BARRICK MERCUR GOLD MINES INC	12/31/02	Lead Total	Completed
GSL Desert / Columbia	Mercur and Manning Creeks	Undefined	UT0023884	BARRICK MERCUR GOLD MINES INC	12/31/02	Zinc Total	Completed
GSL Desert / Columbia	Mercur and Manning Creeks	Undefined	UT0023884	BARRICK MERCUR GOLD MINES INC	12/31/02	Nitrogen	Completed
GSL Desert / Columbia	Mercur and Manning Creeks	Undefined	UT0023884	BARRICK MERCUR GOLD MINES INC	12/31/02	Solids Total Dissolved	Completed
GSL Desert / Columbia	Mercur and Manning Creeks	Undefined	UT0023884	BARRICK MERCUR GOLD MINES INC	12/31/02	Mercury Total Recoverable	Completed
GSL Desert / Columbia	Mercur and Manning Creeks	Undefined	UT0023884	BARRICK MERCUR GOLD MINES INC	12/31/02	Cyanide Total (as CN)	Completed
GSL Desert / Columbia	Mercur and Manning Creeks	Undefined	UT0023884	BARRICK MERCUR GOLD MINES INC	12/31/02	Sulfate Total	Completed
Jordan River / Utah Lake	Oil Drain Canal	Undefined	UT0000175	CHEVRON U.S.A. INC	12/31/02	Hexavalent Chromium	Completed
Jordan River / Utah Lake	Oil Drain Canal	Undefined	UT0000175	CHEVRON U.S.A. INC	12/31/02	Total Chromium	Completed
Jordan River / Utah Lake	Oil Drain Canal	Undefined	UT0000175	CHEVRON U.S.A. INC	12/31/02	Total Recoverable Phenolics	Completed
Jordan River / Utah Lake	Oil Drain Canal	Undefined	UT0000175	CHEVRON U.S.A. INC	12/31/02	Ammonia Nitrogen (N)	Completed
Jordan River / Utah Lake	Oil Drain Canal	Undefined	UT0000175	CHEVRON U.S.A. INC	12/31/02	Total Sulfide	Completed
Jordan River / Utah Lake	Unnamed Ditch to C-7 Ditch	Undefined	UT0000701	VARIAN X-RAY TUBE PRODUCTS	03/31/03	Zinc Total Recoverable	Completed
Jordan River / Utah Lake	Unnamed Ditch to C-7 Ditch	Undefined	UT0000701	VARIAN X-RAY TUBE PRODUCTS	03/31/03	Copper Total Recoverable	Completed
Jordan River / Utah Lake	Dry Creek	UT16020202-035	UT0020109	SPANISH FORK CITY CORP	07/31/02	Oxygen Dissolved	Completed
Jordan River / Utah Lake	Dry Creek	UT16020202-035	UT0020109	SPANISH FORK CITY CORP	07/31/02	Chlorine Total Residual	Completed
Jordan River / Utah Lake	Dry Creek	UT16020202-035	UT0020109	SPANISH FORK CITY CORP	07/31/02	Ammonia Nitrogen (N)	Completed
Jordan River / Utah Lake	Beer Creek	UT16020202-027	UT0020249	SALEM CITY CORP	11/30/02	Oxygen Dissolved	Completed

Table 15. Status of 2004, 2002, and 2000 303(d) List UPDES Permit TMDLs							
		Receiving Water					
Watershed		Assessment					
Management	Receiving	Unit	Permit	Facility	Renewal		
Unit	Water	ID	Number	Name	Date	Pollutants	Status
Jordan River / Utah Lake	Beer Creek	UT16020202-027	UT0020249	SALEM CITY CORP	11/30/02	Chlorine Total Residual	Completed
Jordan River / Utah Lake	Beer Creek	UT16020202-027	UT0020249	SALEM CITY CORP	11/30/02	Ammonia Nitrogen (N)	Completed
Jordan River / Utah Lake	Beer Creek	UT16020202-027	UT0020427	PAYSON CITY	10/01/02	Arsenic Total	Completed
Jordan River / Utah Lake	Beer Creek	UT16020202-027	UT0020427	PAYSON CITY	10/01/02	Oxygen Dissolved	Completed
Jordan River / Utah Lake	Beer Creek	UT16020202-027	UT0020427	PAYSON CITY	10/01/02	Chlorine Total Residual	Completed
Jordan River / Utah Lake	Beer Creek	UT16020202-027	UT0020427	PAYSON CITY	10/01/02	Ammonia Nitrogen (N)	Completed
Jordan River / Utah Lake	Spring Creek	UT16020202-003	UT0020834	SPRINGVILLE- CITY OF	06/30/02	Oxygen Dissolved	Completed
Jordan River / Utah Lake	Spring Creek	UT16020202-003	UT0020834	SPRINGVILLE- CITY OF	06/30/02	Chlorine Total Residual	Completed
Jordan River / Utah Lake	Spring Creek	UT16020202-003	UT0020834	SPRINGVILLE- CITY OF	06/30/02	Ammonia Nitrogen (N)	Completed
Jordan River / Utah Lake	Powell Slough	Undefined	UT0020915	OREM CITY CORP	03/31/04	Oxygen Dissolved	On Schedule
Jordan River / Utah Lake	Powell Slough	Undefined	UT0020915	OREM CITY CORP	03/31/04	Chlorine Total Residual	On Schedule
Jordan River / Utah Lake	State Canal to Farmington Bir	UT16020102-050	UT0021636	S DAVIS CO SEWER - NORTH	07/31/03	Oxygen Dissolved	Completed
Jordan River / Utah Lake	State Canal to Farmington Bir	UT16020102-050	UT0021636	S DAVIS CO SEWER - NORTH	07/31/03	Chlorine Total Residual	Completed
Jordan River / Utah Lake	State Canal to Farmington Bir	UT16020102-050	UT0021636	S DAVIS CO SEWER - NORTH	07/31/03	Nitrogen	Completed
Jordan River / Utah Lake	Millrace Creek	UT16020203-029	UT0021717	PROVO CITY CORP	12/31/03	Oxygen Dissolved	Completed
Jordan River / Utah Lake	Millrace Creek	UT16020203-029	UT0021717	PROVO CITY CORP	12/31/03	Chlorine Total Residual	Completed
Jordan River / Utah Lake	Millrace Creek	UT16020203-029	UT0021717	PROVO CITY CORP	12/31/03	Nitrogen	Completed
Jordan River / Utah Lake	Oil Drain Canal	Undefined	UT0021725	SALT LAKE CITY CORP-WASTE WATER	09/30/03	Chlorine Total Residual	Completed
Jordan River / Utah Lake	Jordanelle Reservoir	UT16020203-026	UT0022403	UNITED PARK CITY MINES	06/30/02	Zinc Total Recoverable	Completed
Jordan River / Utah Lake	Jordanelle Reservoir	UT16020203-026	UT0022403	UNITED PARK CITY MINES	06/30/02	Aluminum Total recoverable	Completed
Jordan River / Utah Lake	Jordanelle Reservoir	UT16020203-026	UT0022403	UNITED PARK CITY MINES	06/30/02	Lead Total recoverable	Completed
Jordan River / Utah Lake	Jordanelle Reservoir	UT16020203-026	UT0022403	UNITED PARK CITY MINES	06/30/02	Copper Total Recoverable	Completed
Jordan River / Utah Lake	Jordanelle Reservoir	UT16020203-026	UT0022403	UNITED PARK CITY MINES	06/30/02	Mercury Total Recoverable	Completed
Jordan River / Utah Lake	Coon Creek	Undefined	UT0024546	ALLIANT TECHSYSTEMS	08/31/02	Copper Total	Completed

Table 15. Status of 2004, 2002, and 2000 303(d) List UPDES Permit TMDLs							
		Receiving Water					
Watershed		Assessment					
Management	Receiving	Unit	Permit	Facility	Renewal		
Unit	Water	ID	Number	Name	Date	Pollutants	Status
Jordan River / Utah Lake	Coon Creek	Undefined	UT0024546	ALLIANT TECHSYSTEMS	08/31/02	Lead Total	Completed
Jordan River / Utah Lake	Coon Creek	Undefined	UT0024546	ALLIANT TECHSYSTEMS	08/31/02	Zinc Total	Completed
Jordan River / Utah Lake	Coon Creek	Undefined	UT0024546	ALLIANT TECHSYSTEMS	08/31/02	Aluminum Total	Completed
Jordan River / Utah Lake	Coon Creek	Undefined	UT0024546	ALLIANT TECHSYSTEMS	08/31/02	Benzene	Completed
Jordan River / Utah Lake	Coon Creek	Undefined	UT0024546	ALLIANT TECHSYSTEMS	08/31/02	Nitrogen	Completed
Jordan River / Utah Lake	Coon Creek	Undefined	UT0024546	ALLIANT TECHSYSTEMS	08/31/02	Phosphorus Total	Completed
Jordan River / Utah Lake	Storm Drain to Mill Creek	Undefined	UT0024767	RUBBER ENGINEERING	02/24/04	Copper Total	On Schedule
Jordan River / Utah Lake	Storm Drain to Mill Creek	Undefined	UT0024767	RUBBER ENGINEERING	02/24/04	Lead Total	On Schedule
Jordan River / Utah Lake	Hobble Creek	UT16020202-001	UT0025283	ENSIGN-BICKFORD - HOBBLE CREEK	01/31/03	Oxygen Dissolved	Completed
Jordan River / Utah Lake	Hobble Creek	UT16020202-001	UT0025283	ENSIGN-BICKFORD - HOBBLE CREEK	01/31/03	Nitrogen	Completed
Jordan River / Utah Lake	Hobble Creek	UT16020202-001	UT0025283	ENSIGN-BICKFORD - HOBBLE CREEK	01/31/03	RDX Total	Completed
Jordan River / Utah Lake	Utah Lake	Undefined	UT0025321	SARATOGA SPRINGS	03/31/04	Chlorine Total Residual	On Schedule
Sevier River	Sevier River	UT16030003-012	UT0025291	SALINA CITY SANITARY SEWER LGN	07/31/02	Oxygen Dissolved	Completed
Sevier River	Sevier River	UT16030003-012	UT0025291	SALINA CITY SANITARY SEWER LGN	07/31/02	Chlorine Total Residual	Completed
Sevier River	Sevier River	UT16030003-012	UT0025291	SALINA CITY SANITARY SEWER LGN	07/31/02	Ammonia Nitrogen (N)	Completed
Uinta Basin	Duchesne River	UT14060003-006	UT0020095	DUCHESNE CITY CORP	06/30/02	Chlorine Total Residual	Completed
Uinta Basin	Duchesne River	UT14060003-006	UT0020095	DUCHESNE CITY CORP	06/30/02	Total Dissolved Solids	Completed
Weber River	Drain to Great Salt Lake	Undefined	UT0021326	PLAIN CITY CORPORATION	12/31/03	Chlorine Total Residual	Completed
Weber River	Ditch to Farmington Bay	Undefined	UT0021741	N DAVIS CO SEWER DIST	01/31/03	Chlorine Total Residual	Completed
Weber River	Ditch to Farmington Bay	Undefined	UT0021741	N DAVIS CO SEWER DIST	01/31/03	Ammonia Nitrogen (N)	Completed
Weber River	Ditch to Farmington Bay	Undefined	UT0021741	N DAVIS CO SEWER DIST	01/31/03	Mercury Total	Completed
Weber River	Stone Creek to State Canal	UT16020102-46	UT0024210	AIR PRODUCTS & CHEMICAL INC	09/30/03	Chlorine Total Residual	Completed
Weber River	Stone Creek to State Canal	UT16020102-46	UT0024210	AIR PRODUCTS & CHEMICAL INC	09/30/03	Solids Total Dissolved	Completed
Weber River	Marsh to Silver Creek	UT16020101-020	UT0024414	SNYDERVILLE BSID-SILVER CREEK	08/31/02	Oxygen Dissolved	Completed

Table 15. Status of 2004, 2002, and 2000 303(d) List UPDES Permit TMDLs							
		Receiving Water					
Watershed		Assessment					
Management	Receiving	Unit	Permit	Facility	Renewal		
Unit	**Water**	**ID**	**Number**	**Name**	**Date**	**Pollutants**	**Status**
Weber River	Marsh to Silver Creek	UT16020101-020	UT0024414	SNYDERVILLE BSID-SILVER CREEK	08/31/02	Ammonia Nitrogen (N)	Completed
Weber River	Salt Lake Canal	Undefined	UT0025305	HEXCEL CORP. - SL OPERATIONS	08/31/02	Arsenic Total	Completed
Weber River	Salt Lake Canal	Undefined	UT0025305	HEXCEL CORP. - SL OPERATIONS	08/31/02	Boron Total	Completed
Weber River	Salt Lake Canal	Undefined	UT0025305	HEXCEL CORP. - SL OPERATIONS	08/31/02	Cadium Total	Completed
Weber River	Salt Lake Canal	Undefined	UT0025305	HEXCEL CORP. - SL OPERATIONS	08/31/02	Chromium	Completed
Weber River	Salt Lake Canal	Undefined	UT0025305	HEXCEL CORP. - SL OPERATIONS	08/31/02	Copper Total	Completed
Weber River	Salt Lake Canal	Undefined	UT0025305	HEXCEL CORP. - SL OPERATIONS	08/31/02	Lead Total	Completed
Weber River	Salt Lake Canal	Undefined	UT0025305	HEXCEL CORP. - SL OPERATIONS	08/31/02	Selenium Total	Completed
West Colorado River	Grimes Wash	UT14060009-007	UT0022896	PACIFICORP WILBERG	10/31/02	Total Iron	Completed
West Colorado River	Grimes Wash	UT14060009-007	UT0022896	PACIFICORP WILBERG	10/31/02	Solids Total Dissolved	Completed
West Colorado River	Grassy Trail Creek Rest-1	UT14060007-012	UT0024759	SUNNYSIDE COGENERATION ASSOC.	07/31/02	Chromium Total	Completed
West Colorado River	Grassy Trail Creek Rest-1	UT14060007-012	UT0024759	SUNNYSIDE COGENERATION ASSOC.	07/31/02	Zinc Total	Completed
West Colorado River	Grassy Trail Creek Rest-1	UT14060007-012	UT0024759	SUNNYSIDE COGENERATION ASSOC.	07/31/02	Oxygen Dissolved	Completed
West Colorado River	Grassy Trail Creek Rest-1	UT14060007-012	UT0024759	SUNNYSIDE COGENERATION ASSOC.	07/31/02	Chlorine Total Residual	Completed
West Colorado River	Grassy Trail Creek Rest-1	UT14060007-012	UT0024759	SUNNYSIDE COGENERATION ASSOC.	07/31/02	Solids Total Dissolved	Completed
West Colorado River	Cottonwood Creek	UT14060009-007	UTG040003	PACIFICORP - TRAIL MTN. MINE	04/30/03	Total Iron	Completed
West Colorado River	Cottonwood Creek	UT14060009-007	UTG040003	PACIFICORP - TRAIL MTN. MINE	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Gordon Creek	UT14060007-006	UTG040004	MOUNTAIN COAL COMPANY	04/30/03	Total Iron	Completed
West Colorado River	Gordon Creek	UT14060007-006	UTG040004	MOUNTAIN COAL COMPANY	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Gordon Creek	UT14060007-006	UTG040005	SAVAGE INDUSTRIES	04/30/03	Total Iron	Completed
West Colorado River	Gordon Creek	UT14060007-006	UTG040005	SAVAGE INDUSTRIES	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Huntington and Bear Creeks	UT14060009-003	UTG040006	CO-OP MINING--BEAR/TRAIL	04/30/03	Total Iron	Completed
West Colorado River	Huntington and Bear Creeks	UT14060009-003	UTG040006	CO-OP MINING--BEAR/TRAIL	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Gordon Creek Wildcat	UT14060007-005	UTG040007	ANDALEX RESOURCES-CENTENNIAL	04/30/03	Total Iron	Completed

Table 15. Status of 2004, 2002, and 2000 303(d) List UPDES Permit TMDLs							
		Receiving Water					
Watershed		Assessment					
Management	Receiving	Unit	Permit	Facility	Renewal		
Unit	Water	ID	Number	Name	Date	Pollutants	Status
West Colorado River	Gordon Creek Wildcat	UT14060007-005	UTG040007	ANDALEX RESOURCES-CENTENNIAL	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Deadman Creek	UT14060007-007	UTG040008	ANDALEX RESOURCES-CENTENNIAL	04/30/03	Total Iron	Completed
West Colorado River	Deadman Creek	UT14060007-007	UTG040008	ANDALEX RESOURCES-CENTENNIAL	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Cottonwood Creek	UT14060009-011	UTG040009	INTERWEST COAL MINING-HUNTER	04/30/03	Total Iron	Completed
West Colorado River	Cottonwood Creek	UT14060009-011	UTG040009	INTERWEST COAL MINING-HUNTER	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Price River	UT14060007-014	UTG040010	NEICO (CASTLE VAL RESOURCES)	04/30/03	Total Iron	Completed
West Colorado River	Price River	UT14060007-014	UTG040010	NEICO (CASTLE VAL RESOURCES)	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Grassy Trail Creek	UT14060007-012	UTG040011	CANYON FUEL CO. LCC - BANNING	04/30/03	Total Iron	Completed
West Colorado River	Grassy Trail Creek	UT14060007-012	UTG040011	CANYON FUEL CO. LCC - BANNING	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Sowbelly Hardscrabble Price	UT14060007-005	UTG040012	PLATEAU MINING CORP-WILLOW CK	04/30/03	Total Iron	Completed
West Colorado River	Sowbelly Hardscrabble Price	UT14060007-005	UTG040012	PLATEAU MINING CORP-WILLOW CK	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Horse Canyon	UT14060007-012	UTG040013	(IPA) HORSE CANYON MINE	04/30/03	Total Iron	Completed
West Colorado River	Horse Canyon	UT14060007-012	UTG040013	(IPA) HORSE CANYON MINE	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Mud Creek/whiskey Creek	UT14060007-002	UTG040019	LODESTAR ENERGY INC.	04/30/03	Total Iron	Completed
West Colorado River	Mud Creek/whiskey Creek	UT14060007-002	UTG040019	LODESTAR ENERGY INC.	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Dugout Creek	UT14060007-012	UTG040020	CANYON FUEL CO. LCC - DUGOUT	04/30/03	Total Iron	Completed
West Colorado River	Dugout Creek	UT14060007-012	UTG040020	CANYON FUEL CO. LCC - DUGOUT	04/30/03	Total Dissolved Solids	Completed
West Colorado River	North Fork Gordon Creek	UT14060007-006	UTG040021	LODESTAR ENERGY INC.	04/30/03	Total Iron	Completed
West Colorado River	North Fork Gordon Creek	UT14060007-006	UTG040021	LODESTAR ENERGY INC.	04/30/03	Total Dissolved Solids	Completed
West Colorado River	Grimes Wash	UT14060009-010	UTG040022	INTERWEST MINING CO	04/30/03	Total Iron	Completed
West Colorado River	Grimes Wash	UT14060009-010	UTG040022	INTERWEST MINING CO	04/30/03	Total Dissolved Solids	Completed
2000 303(d) List of Updes Permit Tmdls							

Table 15. Status of 2004, 2002, and 2000 303(d) List UPDES Permit TMDLs							
		Receiving Water					
Watershed		Assessment					
Management	Receiving	Unit	Permit	Facility	Renewal		
Unit	Water	ID	Number	Name	Date	Pollutants	Status
Bear River	Hansen Spring		UT0024872	Magic Valley Milk	05/30/00	Ammonia	being reviewed by EPA
Bear River	Hansen Spring		UT0024872	Magic Valley Milk	05/30/00	Dissolved Oxygen	being reviewed by EPA
Bear River	Hansen Spring		UT0024872	Magic Valley Milk	05/30/00	Temperature	being reviewed by EPA
Bear River	Box Elder Creek		UT0022365	Brigham City Corp	06/30/00	Dissolved Oxygen	being reviewed by EPA
Colorado River West	Quitchupah Creek		UT0022918	Canyon Fuel Co. Llc - Sufco	04/30/01	Iron	being reviewed by EPA
Colorado River West	Quitchupah Creek		UT0022918	Canyon Fuel Co. Llc - Sufco	04/30/01	Total Dissolved Solids	being reviewed by EPA
Lower Colorado	Virgin River		UT0024686	St George City Corporation	07/31/01	Ammonia	
Lower Colorado	Virgin River		UT0024686	St George City Corporation	07/31/01	Dissolved Oxygen	
Lower Colorado	Virgin River		UT0024686	St George City Corporation	07/31/01	Silver	
Lower Colorado	Virgin River		UT0024686	St George City Corporation	07/31/01	Total Dissolved Solids	being reviewed by EPA
Bear River	Great Salt Lake		UT0021148	Perry City	02/28/99	Chlorine Residual	being reviewed by EPA
Bear River	Cutler Reservoir		UT0021920	Logan City Corporation	10/31/98	Dissolved Oxygen	being reviewed by EPA
GSL/Columbia	Blue Creek		UT0024805	Thiokol Corporation	02/28/99	Aluminum	being reviewed by EPA
GSL/Columbia	Blue Creek		UT0024805	Thiokol Corporation	02/28/99	Ammonia	being reviewed by EPA
Jordan River / Utah Lake	Utah Lake		UT0020915	Orem City Corp	03/31/99	Ammonia	being reviewed (2004)

Table 15. Status of 2004, 2002, and 2000 303(d) List UPDES Permit TMDLs							
		Receiving Water					
Watershed		**Assessment**					
Management	**Receiving**	**Unit**	**Permit**	**Facility**	**Renewal**		
Unit	**Water**	**ID**	**Number**	**Name**	**Date**	**Pollutants**	**Status**
Weber River	East Canyon			Snyderville Basin Sewer Imp. District	12/31/98	Ammonia	being reviewed by EPA

REFERENCES

DWQ. 2005. Standards of quality for waters of the State, R317-2, Utah Administrative Code, Utah Department of Environmental Quality, Utah Division of Water Quality. 62 pp.

Horne, Alexander, and Charles Goldman. 1994. Limnology. 2nd ed. McGraw-Hill. New York

USEPA. 2006. Guidance for 2006 assessment, listing and reporting requirements pursuant to Sections 303(d) and 305(b) of the Clean Water Act. United States Environmental Protection Agency.

USEPA. 2004. Guidance for 2004 assessment, listing and reporting requirements pursuant to Sections 303(d) and 305(b) of the Clean Water Act. United States Environmental Protection Agency.

USEPA. 1997. Guidelines for preparation of the comprehensive state water quality assessments 305(b) reports and electronic updates: supplement. EPA-841-B-97-002B

Appendix VII-A

Responsiveness Summary

Responsiveness Summary for Utah 2006 303(d) List of Impaired Waters

Comment Letters Received:

1. Central Davis Sewer District

2. Great Salt Lake Alliance

3. Great Salt Lakekeeper

4. Salt Lake County
    a. Central Valley Water Reclamation
    b. South Valley Sewer District
    c. South Valley Water Reclamation Facility
    d. South Davis Sewer Improvement District
    e. Kearns Improvement District

5. The Nature Conservancy of Utah

6. Western Resource Advocates

7. US Department of Interior—Fish and Wildlife Service

Copies of letters received are listed prior to DWQ comments on issues raised.

DWQ has not responded to the comment letter received from Central Davis Sewer District submitted with rationale in support of not listing Farmington Bay. DWQ concurs with the observations and data submitted by Leland Meyers, P.E., District Manager contained in their letter.

CENTRAL DAVIS SEWER DISTRICT

RECEIVED
FEB 17 2006
DIVISION OF
WATER QUALITY

February 16, 2006

Walter Baker, Director, Division of Water Quality
Thomas W. Toole, 303(d) List Coordinator
Utah Department of Environmental Quality
Division of Water Quality
P.O. Box 144870
Salt Lake City, Utah 84114-4870

RE: Utah 2006 Section 303(d) List of Impaired Waters

Dear Mr. Baker/Mr. Toone:

It has come to my attention that some interested parties have decided to request Farmington Bay be listed as an impaired water body. This letter is being written to address this issue and justify why Farmington Bay should not be listed in 2006. As you are well aware, the GSL Steering Committee and the Farmington Bay Technical Advisory Committee are actively investigating the water quality status of Farmington Bay and the associated wetlands. These investigations have been ongoing for several years and are still currently in process. The results of these studies indicate that Farmington Bay is eutrophic and given the right conditions support extensive algal blooms and cyanobacteria. If this were a prime fishery or drinking water supply these would probably be sufficient to require listing. However, Farmington Bay has unique and different water quality beneficial uses than these classes of water. The studies, thus far, have highlighted and quantified these physical differences, but have not yet addressed whether these physical differences impact on the intended beneficial uses. Let me cite some examples of what we do and don't know.

Phosphorus Issues:

Currently, Farmington Bay receives phosphorus inputs from multiple sources. A current estimate completed by Central Davis Sewer District demonstrates that the wastewater treatment discharges amount to a maximum of 43% of these P inputs. The Bay is thought to be highly eutrophic due to high P concentrations, thus allowing, at low salinity, significant cyanobacteria growth to occur. While this is true, there is no current science to indicate that this cyanobacteria growth impacts the designated beneficial uses. There is no current scientific studies showing that this condition impacts either shore birds or waterfowl or the food web supporting them. At low or high salinity there appears to be sufficient food. While the food source may change due to salinity, no current evidence indicates that eutrophication causes a deficiency in the food web and thus the beneficial uses. Studies done by USGS have indicated that the cyanobacteria may play an important part in the food chain for brine shrimp in the open water. If this is the case, a reduction of cyanobacteria may actually reduce the brine shrimp harvest. Many ongoing and future studies are needed to confirm compliance with designated uses or to identify and define impacts to beneficial uses. Central Davis Sewer District is fully supportive of the need for studies to continue, but listing Farmington Bay as impaired to help generate funds for these studies is inappropriate.

Dissolved Oxygen Issues:

Recent studies funded by the District through loan proceeds, have demonstrated significant diurnal swings in Farmington Bay dissolved oxygen. These large variations are, again, the result of cyanobacteria activity with super-saturation during the day and DO depletion at night. Since fish are not present in the bay, periods of low DO may have little or no impact on aquatic organisms present. The has been some who suggest that the low DO impacts brine shrimp population in the Bay. This may be true, but the low brine shrimp populations may also be a result of low salinity concentrations. It is possible that at low salinity, conditions favorable to cyanobacteria are present and brine shrimp respond poorly. At higher salinity concentrations, conditions favorable to brine shrimp occur, and cyanobacteria growth is inhibited. Again, ongoing and future studies are needed to confirm that low DO is not an impairment or to identify what is being impaired.

Mercury or Selenium Toxicity:

Recent investigations have found high levels of mercury in some waterfowl on the Great Salt Lake and in Farmington Bay. A small subset of the waterfowl has been affected based on a limited sampling of birds. While the elevated levels of mercury are cause for concern, there still remains the lack of evidence indicating where the mercury was acquired by the waterfowl. Further studies are needed to determine the source of the mercury before listing should occur. This is in keeping with the guidance given in the 2006 Integrated Report.

Recreational Contact Issues:

Arguments have been presented which indicate that Farmington Bay is impaired due to (1) toxicity issues related to cyanobacteria, (2) due to objectionable algae and cyanobacteria growth on the surface or in the water, or (3) odors being released from the water (H_2S from the brine layer) or from the exposed sediment. Toxicity issues relating to Farmington Bay cyanobacteria are still not based on scientific studies, but on isolated antidotal evidence. We agree that studies are needed to determine if toxicity issues are real, but disagree with this being an impairment. Current contact beneficial use is classified based on presence of E. coli in a sample and closing of bathing areas. This is shown on Table 3 of the Integrated Report. Should toxic substances be identified in Farmington Bay (a point still not known), a revised definition of beneficial use would be needed. The presence of algal or cyanobacteria biomass similarly are not specified as impairments. Further rule making may be needed for this to be included as an impairment. Concerning odor, again studies just don't exist which quantify scientifically the source and effect of such annoying smells. They may be bad to a sensitive nose, but early explorers to the area also complained about this problem. Like all the other possible issues raised about Farmington Bay being impaired and needing to be listed, further studies are needed before this conclusion should be jumped at.

Based on available research we can probably conclude that some beneficial uses of Farmington Bay are being met. A large shore bird and waterfowl population is being supported, however many questions remain to be answered. Based on Figure 2 of the Integrated Report, this would mean that Farmington Bay is in an attainment Category 2. If we back off the belief that even some of the beneficial uses are being met, the attainment category would change to 3. We just do not have sufficient scientific research and findings to jump to the conclusion that water quality criteria are not being met and Farmington bay is a category 5.

The research should continue. We must be sure that this valuable resource is being protected. Future generations deserve to know that we acted responsibly and insured the preservation of a quality environment. Jumping to conclusions now is putting the "cart before the horse" and may have adverse impacts on this continuing research effort.

Should you have any questions, or require further information, please contact me.

Sincerely,

Leland Myers

Leland Myers, P. E.
District Manager

GREAT SALT LAKE ALL ANCE

Feb. 20, 2006

Thomas W. Toole
Utah State Department of Environmental Quality
P.O. Box 144870
288 North 1460 West
SLC, UT 84114-4870

Dear Mr. Toole:

RE: Request that Farmington Bay be included on 2006 303(d) list as an impaired water body for phosphorus and Great Salt Lake be listed for mercury.

It has come to our attention from Utah's 2006 Integrated Report Volume II: Utah's 303(d) List, that Farmington Bay and Great Salt Lake are not listed as impaired waters. We believe there is credible evidence that would support our conviction that Farmington Bay is impaired for nutrients (phosphorus) and Great Salt Lake for mercury. These impaired water bodies should therefore be listed as impaired and receive the added investigation and support that other impaired water bodies are afforded.

There are numerous reasons to be concerned about water quality degradation on the wetlands surrounding Great Salt Lake and the open waters of the Lake. Details are described in Appendices A, B, and C.

The fresh water systems surrounding the major bays of Great Salt Lake have numeric water quality standards that they must meet. Many wetlands, including Farmington Bay WMA, are classified as 3D, and are therefore "[p]rotected for waterfowl, shorebirds and other water oriented wildlife not included in classes 3A, 3B or 3C, including the necessary aquatic organisms in their food chain." Utah Admin. Code R317-2-6.3. These waters are subject to numeric criteria. The open waters of Great Salt Lake have been designated as class 5 and are thereby "protected for primary and secondary contact recreation, waterfowl, shore birds and other water-oriented wildlife including their necessary aquatic organisms in their food chain, and mineral extraction." Utah Admin. Code R317-2-6.5.

While there are currently no numeric standards for the open waters of Great Salt Lake, they are safeguarded by the narrative standard, which specifies "[i]t shall be unlawful .

GREAT SALT LAKE ALLIANCE

to cause conditions which produce undesirable aquatic life or . . . produce undesirable physiological responses in desirable resident fish, or other desirable aquatic life, or undesirable human health effects . . . ." Utah Admin. Code R317-2-7.2. Moreover, the regulations implementing the Clean Water Act require, as a minimum, that state water quality standards include "[w]ater quality criteria sufficient to protect the designated uses." 40 C.F.R. § 131.6(c). Under these provisions, even without a showing of a violation of numeric standards, a waterbody must be listed on the 303(d) list if it is not meeting its beneficial uses. See, 33 U.S.C § 1313(d)(1)(A) ("Each state shall identify those waters within its boundaries for which effluent limitations . . . are not stringent enough to implement any water quality standard applicable to such waters").

Relative to the designation of impaired waters, Clean Water Act regulations also require "states to evaluate all existing and readily available water quality-related data and information in developing 303(d) lists." 40 CFR § 130.7(b)(5). The Clean Water Act also requires listing water bodies thought to be threatened leading to impairment by the time the next 303(d) list is due. The information acquired already by DWQ and submitted herewith demonstrates that the quality of the waters of Great Salt Lake and Farmington Bay are harmful for and impairing recreational use, aquatic wildlife and aquatic organisms. As a result, these waters should be included on the 303(d) list. In addition, given the significance of the existing threat to these waters and their international importance, Great Salt Lake and Farmington Bay must be given top priority on the list. See, 33 U.S.C § 1313(d)(1)(A).

Excess nutrients have been a concern in Farmington Bay for over 30 years. The history of Great Salt Lake Alliance involvement in this issue and evidence supporting our comment is detailed in Appendix D. Details of available scientific investigations are included. After two years of study, Dr. Wayne Wurtsbaugh of Utah State University has concluded that "Farmington Bay has the worst eutrophication problem of any water body in the state."[3] Impacts of these eutrophication on waterfowl, shorebirds and aquatic organisms in their food chains indicate a violation of numeric criteria, as applied to the Waterfowl Management Area, as well as a violation of the narrative standard for the open waters. Yet, lower nutrient loads have been established for other water bodies in Utah. It is time to begin the process of limiting excess nutrient loads (currently estimated at 2,724,000 lbs/yr P) by listing the Bay as impaired.

On September 29, 2005, The Utah Department of Health issued a Consumption Advisory for Northern Shoveler and Common Goldeneye from Great Salt Lake due to very high mercury levels.[8] The Utah Division of Wildlife Resources put out WARNINGS saying, "Avoid Shooting or eating Shoveler or Goldeneye from the Great Salt Lake."[10] Water samples taken in 2003 from GSL by USGS showed exceedingly high levels of methyl mercury (>25ng/L).[9] Samples collected by the USFWS for brine shrimp and eared

GREAT SALT LAKE ALL ANCE

grebes showed bioaccumulation of mercury to high levels in eared grebes. The USGS and USFWS data has been provided to UDWQ and presented elsewhere. Elevated levels of mercury in Great Salt Lake waters and waterbirds and a consumption advisory based on contaminants in a food source shows that the Great Salt Lake should be included on 303(d) list for mercury. Waterfowl hunting, a recreational beneficial use, has been impacted. Clearly the mercury issue needs to be fully explored and various entities are working in that effort. The degree of contamination of water, sediment, and biota must be investigated as well as impacts to beneficial use.

Please find attached specific information supporting our conviction that Farmington Bay and Great Salt Lake should be placed on the 303(d) list (Appendices A-E). We hope that you will amend the list accordingly.

We appreciate the efforts of the Utah Division of Water Quality and others to address these concerns and the opportunity for us to comment during this public comment period. We hope these comments will be perceived as a positive act to encourage management of the natural resources of Great Salt Lake in a sustainable way. We also would be happy to entertain any future dialog on these issues.

Thank you for considering the inclusion of Farmington Bay on the 303(d) list for phosphorus, and the entire Great Salt Lake for mercury.

Sincerely,

Maunsel B. Pearce
Chairman, Great Salt Lake Alliance

List of References
Appendices A-E with documents

cc. Walter Baker, Director Utah Division of Water Quality
Dianne Nielson, Director Utah Division of Environmental Quality

Reference List

Great Salt Lake Avian Resources

Great Salt Lake Waterbird Survey, Utah DWR, Great Salt Lake Ecosystem Project 1998-2003

2. Avian Ecology of Great Salt Lake; Great Salt Lake: An Overview of Change, 2002; Tom Aldridge and Don Paul

Nutrients in Farmington Bay

Note: (only summaries of papers from Wurtsbaugh et al are included here since the original full reports were made to the Division of Water Quality)

3. Eutrophication in Farmington Bay; Wayne Wurtsbaugh, Utah State University, November 2005, article for Deseret News
4. Comparative Analysis of Pollution in Farmington Bay and the Great Salt Lake, Utah; Aquatic Ecology Laboratory Class Project 2001, Utah State University, Wurtsbaugh and Amy Marcarelli
5. Ecological analyses of nutrients, plankton and benthic communities in Farmington Bay and the Great Salt Lake, Utah; Aquatic Ecology Practicum Class Project 2004, Utah State University, Marcarelli and Wurtsbaugh
6. Great Salt Lake – Farmington Bay Evaluation of Phosphorus Loading; Leland Meyers, Central Davis Sewer District 2005
7. Photo of algae scum; Farmington Bay, Utah, May 15, 2005, Wayne Wurtsbaugh, PhD

Mercury in Great Salt Lake

8. An Evaluation of Mercury Concentrations in Waterfowl from the Great Salt Lake, Utah for 2004 and 2005; Utah Department of Health, Office of Epidemiology, September 29, 2005
9. Mercury in water and biota from Great Salt Lake, Utah: Reconnaissance-phase results; David Naftz, USGS, Bruce Waddell, USFWS, David Krabbenhoft, USGS
10. Warning to Waterfowl Hunters on Great Salt Lake Wetlands, Utah Division of Wildlife Resources, October 1, 2005

Appendix A

Information on the Great Salt Lake Alliance and Organizations supporting these comments;

The Great Salt Lake Alliance is composed of leaders of ten Conservation Organizations with a major focus on Great Salt Lake and began in 1998. We are represented on the GSL Selenium Water Quality Standard Steering Committee, the Farmington Bay Water Quality Working Group, and the Great Salt Lake Technical Advisory Group (Utah Div. Of Forestry Fire and State Lands) .We believe that issues of water quality and quantity of the waters entering Great Salt Lake pose serious threats to it's present and future health. We have been supportive of efforts to answer the questions of impairment of beneficial uses in Farmington Bay since 2002 and we believe we are qualified to submit these comments. Not all groups represented in the Alliance are included in this letter. The following organizations wish to be included in our comments and conclusions:

The Nature Conservancy of Utah, National Audubon (IBA program and Gillmor Sanctuary), Great Salt Lake Audubon, Utah Wetlands Foundation, FRIENDS of Great Salt Lake, Utah Rivers Council, Utah Waterfowl Association, League of Women Voters, Western Resource Advocates, and the Sierra Club of Utah.

Appendix B. Uses of Great Salt Lake, including bird use at Farmington Bay.

The Great Salt Lake provides tremendous human and economic value to the state. The Great Salt Lake is a major tourist attraction for visitors throughout the world. Literally tons of brine shrimp cysts are harvested from the lake and are used at shrimp farms across the world. There are major salt companies on the lake, including salt companies that harvest the salt for human consumption. Great Salt Lake is famous for the ability to float like a cork, which attracts tourists and locals. There are major hunting and birdwatching activities that occur on the wetlands adjacent to the lake and on the lake itself. The Great Salt Lake is a major contributor to the "Greatest Snow on Earth." And finally the Great Salt Lake is almost literally the backyard for well over a million people in one of the most heavily concentrated metropolitan areas in the country. Additional details on these uses including the economic value are available. More details and better wording would be great.

The Great Salt Lake Alliance is greatly interested in the human uses of the Great Salt Lake, but for now would like to provide some more detailed information on bird use. Great Salt Lake is a Western Hemispheric Shorebird Site of Hemispheric Importance. It is a major part of the pacific and central flyway for waterfowl. The five major bays of Great Salt Lake (Farmington, Ogden, Bear River, Gunnison and Gilbert) have been nominated as Globally Important Bird Areas as part of the BirdLife International program, which National Audubon Society sponsors in the United States. These nominations demonstrate that 20 bird species have on a regular basis over 1% of their North American population at the Great Salt Lake, and that each bay is of global importance.

Additional details for each bay are attached. Please note: The birds that are included in the above and the attached use all major components of the Great Salt Lake including fresh water wetlands, saline mudflats, playas, uplands and the open water of the Great Salt Lake.

For Farmington Bay, including the wetlands and the open water, there are twelve species on the attached that had survey counts of over 1% of the estimated North American population for a specific species. Counts of over 3% include: 81,000+ American Avocets, 18.2%; 47,000+ Black-necked Stilts, 31.4%; 108,000+ Wilson's Phalaropes 7.2%; 19,000+ California Gulls, 3.2%; 8,000+ Cinnamon Teal, 3.5% and 7,000+ White-faced Ibis, <4.9%.

The open water of Farmington Bay also has extensive use as documented by the Great Salt Lake Waterbird surveys.[1] For example, high counts of over 1,000 by species on the open water of Farmington Bay during the waterbird surveys from 1998-2001 are: Franklin Gull – 30,230, Northern Pintail – 2,178, American Avocet – 51,606, Black-necked Stilt – 4,023, California Gull – 37,620, Wilson's Phalarope – 10,481, Eared Grebe – 16,476. (This data is not yet published but is included in the Important Bird Area nomination for Farmington Bay and is available from the Utah Division of Wildlife Resources.) Highest single day numbers on Farmington Bay in 2005 are: American Avocet- >65,000, phalaropes (Wilson's and Red necked) >670,000, Western Sandpiper->41,000, waterfowl->34,000. (Data are from unofficial records by Maunsel and Ann Pearce who are part of the survey team for this area.)

We understand that nutrient loading in Farmington Bay is responsible for invertebrate density that provides food for waterbirds. It is the current and future EXCESS nutrients flowing into the Bay that concern us.

By listing these water bodies as impaired we hope that some other questions might be addressed. Specifically;

1. What is the cumulative affect of all wastewater treatment plants on the wetlands and waters of Great Salt Lake? What is the quantity and diversity of elements (nutrients, endocrine disruptors, human drugs, cleansing compounds, heavy metals, etc.) entering Great Salt Lake? How do these elements affect and/or interact with each other, the wetlands, the organisms in and on the lake, and the humans living nearby?
2. What is the cumulative affect of storm water entering the lake?
3. What is the cumulative affect of those rivers and streams entering the lake that have pesticides and fertilizers from agriculture and urban/suburban uses?
4. What is the cumulative affect of items 1 though 3? Has it changed over time? Can we estimate the affects to Farmington Bay and Great Salt Lake of the significant projected increase in human population for the Greater Wasatch Front (*ergo* increase in waste water and decreased river flows)?

Appendix C

Problems on other lakes such as the Salton Sea. There are numerous saline water bodies that are in trouble. For example, The Salton Sea Restoration Website talks about the Salton Sea being California's Everglades and includes information titled "A Countdown to Disaster." http://www.saltonsea.ca.gov/ltnav/why_countdown.html. (See attached.) This countdown provides the number of days until "the disaster" will occur unless action is taken. While the "Countdown to Disaster" primarily refers to loss of water, one of the major threats is nutrient run-off from agriculture. To the knowledge of participants in the GSL Alliance no one has yet put together a timeframe on a "Countdown to Disaster" for the Great Salt Lake. Ideally, all of the actions that have occurred and further actions that should occur will prevent this type of countdown for Great Salt Lake.

Appendix D. Excess Nutrients in Farmington Bay

In 1972 Coburn and Eckhoff wrote "disregard for Farmington Bay water quality may lead to a tremendously large wastewater lagoon".Nutrient loading in Farmington Bay has been a concern of the Great Salt Lake Alliance since 2002 when we learned of a presentation by Wayne Wurtsbaugh PhD (see attached report to Utah DWQ entitled "Comparative Analysis of Pollution in Farmington Bay and Great Salt Lake, Utah") [4].

Questions were raised at that time about impacts to aquatic life of excessive nutrient loads resulting in anoxia and high hydrogen sulfide levels in the water column. We assisted Don Ostler in creating a Farmington Bay Working Group in September 2002 to recommend studies of nutrient problems in Farmington Bay. Funding by EPA was obtained for the wetland portion of the study. Central Davis Sewer District has provided funding for the open areas of Farmington Bay during 2004 and 2005. Dr Wurtsbaugh has directed this work. The results after 2 years of study "indicate that Farmington Bay has the worst eutrophication problem of any water body in the state". (see attached "Eutrophication in Farmington Bay" by Wurtsbaugh November 2005) [#3]. In spite of this comment, it appears that funding will run out before proof of impairment of a beneficial use can be agreed upon. See below for details.

Nutrient loading into Farmington Bay has been addressed by Utah State University students and Dr. Wurtsbaugh[4] and by Leland Meyers at North Davis POTW [6]. The annual phosphorus (P) load from POTWs to Farmington Bay is 1,376,000 lbs/year, about 50% of the total nutrient load (calculated to be 2,724,000 lbs./year P).

Algae blooms occur in Farmington Bay in response to nutrient loading but also vary with salinity and water temperature. Algae can use up all available O_2, resulting in water column anoxia. These anoxic periods occur routinely at night but have been observed to last as long as 48 hours. Marcarelli and Wurtsbaugh in their 2004 Report to the Utah Division of Water Quality[5] found 100%mortality in all zooplankton and brine shrimp nauplii exposed to Farmington Bay water at 0.8 m. However high mortality was also found in brine shrimp from Gilbert Bay raising question about the methods used. The relationship of brine shrimp numbers to salinity is not well understood in Farmington Bay and some have argued that low numbers are related to low salinity.

Very large thick algae scums occupying up to 10% (9.7 sq miles) of Farmington Bay were noted in May of 2005. These were located near the entrance sites of a major sewer treatment plant discharge and the Salt Lake Sewer Canal (see attached photo). [7] This photo implies that the prediction by Coburn and Echoff of "a Farmington Bay wastewater lagoon" may have come true. Scums were composed of essentially pure cultures of nodularia (a cyanobacteria) and were observed repeatedly through the summer months. The toxic effect of these organisms is unknown in Farmington Bay, but elsewhere has produced toxins responsible for bird mortality. Obviously the impaired mixing of Farmington Bay waters with the South Arm of GSL by the Antelope Island Causeway compounds these problems.

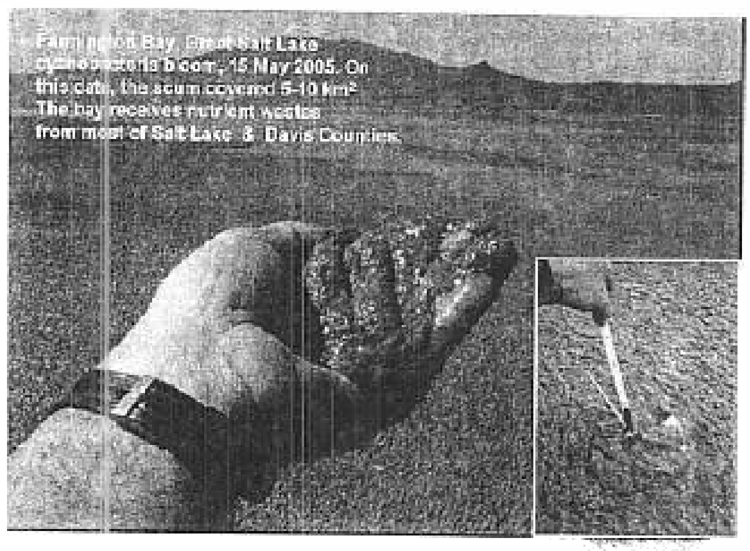
In 2005, chlorophyl levels in Farmington Bay averaged 260 micrograms/L during summer months. Lakes with >55 micrograms/L are usually considered hypereutropic and polluted by nutrients[3] We do not understand why Farmington Bay is not listed in the 303(d) list when other water bodies with lesser Eutrophication are listed. Since phosphorus levels are used as the nutrient indicator for the Bay with a calculated load of 2,724,000 lbs/year, we suggest using P as the nutrient for listing.

#3

Eutrophication in Farmington Bay

Wayne Wurtsbaugh, Utah State University, November 2005

We don't yet have definitive answers to most of the questions about water pollution in Farmington Bay. The results we have do indicate that Farmington Bay has the worst eutrophication problem of any water body in the State. This is driven by the excessive nutrients (N, P, essentially fertilizers) that come into it. The main river draining in, the Jordan, is already polluted before it reaches metropolitan Salt Lake City, and then it picks up a great deal of additional nutrients from industry and particularly sewage treatment plants. The nutrients coming down the Jordan, however, are partially filtered out in the wetlands at the south end of the bay. Another huge source of nutrients is the Sewage Canal that collects effluents from wastewater treatment plants in the city and dumps them directly into Farmington Bay. Three treatment plants in Davis County also discharge to Farmington Bay, but some of these nutrients are also removed in wetlands that have developed along the flow paths to the bay.



All of the nutrients cause excessive amounts of algae to grow (Figure 1). We measure the amount of algae by calculating how much chlorophyll they have. In the spring and summer of 2005 Farmington Bay averaged 260 micrograms per liter of chlorophyll, whereas in the open lake (Gilbert Bay), there were only 20 micrograms per liter. In Bear Lake, which receives very few nutrients, chlorophyll levels are less than 1 microgram per liter. Water management agencies consider lakes with more than 55 micrograms per liter to be "hypereutrophic," or exceedingly- polluted with nutrients.

In freshwater lakes hypereutrophic conditions usually cause severe problems by killing fish and other organisms, and by causing taste and odor problems if it is used as a drinking water supply. However, Farmington Bay is often too salty for fish and certainly for use as drinking water, so those particular problems aren't relevant. Rather, the State designates that water quality in the bay and the rest of the Great Salt Lake must support contact recreation, salt extraction, and support aquatic wildlife (birds and the organisms in the water they feed on). Our work funded by the Central Davis Sewer Improvement District is addressing if the conditions in the bay do these uses. Two principal organisms of interest are brine shrimp and brine flies. These are fed on extensively by the hundreds of thousands of birds that utilize the Great Salt Lake during their seasonal migrations, and the brine shrimp cysts are harvested commercially. These organisms are also tolerant of harsh conditions that occur in salt lakes, so we cannot use existing water quality criteria developed for other organisms like trout and freshwater insects, to apply to those in the bay.

Another complicating factor for determining the impact of eutrophication in Farmington Bay is salinity. Since our studies began in 2002, salinities in the Farmington Bay have varied from 1% to 9%, whereas those in Gilbert Bay have ranged from about 14% to 16%. For reference, seawater is about 3.5%. The reason for the lower salinity in Farmington Bay is twofold. First, the Jordan River and sewage treatment plants discharge a lot of fresh water into the shallow bay, but this would ordinarily decrease the salinity only slightly under normal circumstances. However, the construction of the automobile causeway to Antelope Island greatly restricts mixing between Farmington and the main lake, so that fresh waters are retained, and salinities are consequently considerably lower than in the main lake. The high range in salinity in Farmington Bay is caused by seasonal changes in runoff (e.g., snowmelt vs. summer dry period), and drought cycles. Farmington Bay would be quite fresh if salt water did not enter from Gilbert Bay via the breach on the west side of the causeway.

Why does salinity complicate understanding the impact of eutrophication? It is because salinity exerts a huge impact on what organisms can survive in a water body. Even marine fish, for example, cannot usually tolerate salinities above 4%. Other organisms have different tolerance levels. Some species of insects prefer intermediate salinities. Brine shrimp and brine flies usually occur only when salinities are high. In Farmington Bay, densities of brine shrimp are normally very low in Farmington Bay, but occasionally we find high densities, even when salinities are relatively low. A good deal of our research is focused on determining whether the brine shrimp (and brine flies) are excluded due to the poor water quality, or simply to the low salinities in the bay.

An interesting fact about eutrophication and the brine shrimp, is that the feeding activities of the shrimp can clear up the water. Brine shrimp are terrific grazers. When densities are high, as they are in Gilbert Bay, the shrimp can graze nearly all of the algae out of the water column once a day. Algae reproduce very rapidly, so they are never completely removed, but the shrimp do clear things up. The grazing activity in the main lake has a huge influence on the algae there. In winter, when shrimp disappear and "hibernate" as resting cysts (eggs), the chlorophyll levels in Gilbert Bay go up to more than 40 micrograms per liter. In midsummer when brine shrimp are abundant and high temperatures promote rapid grazing, they can drive chlorophyll levels down to less than 1 microgram/L. The jargon term for this in limnology (study of inland waters) is "top-down" control, as opposed to "bottom-up" stimulation of algal growth by nutrients. Consequently, the extremely high concentration of algae in Farmington Bay is a consequence of both extreme amounts of nutrients coming into it (bottom-up stimulation), but also, limited top-down control by grazing brine shrimp.

Salinities also help determine what algae can survive in a water body. At salinities less than about 5% and with high nutrients, blue-green algae, (more appropriately called cyanobacteria), can proliferate. The low salinities and high nutrients in Farmington Bay promote blooms of a taxa called *Nodularia* (those in the picture). These form dense blooms and sometimes the scums that are shown in the photograph. Under some circumstances cyanobacteria produce toxins that can affect humans and aquatic organisms. Cattle and dogs can die by drinking highly eutrophic water with cyanobacteria in it. A teenager died in Wisconsin several years back by swimming in a hypereutrophic pond. Fortunately, Farmington Bay water is not used for culinary use! The high densities of cyanobacteria in the bay do raise questions as to whether it is a safe place to swim (let alone a desirable place to swim), and others have speculated about a link between these toxins and bird deaths and botulism. I should emphasize that the cyanobacteria in Farmington Bay have not yet been tested to determine if they produce the neuro- and hepatotoxins that can affect humans. Research on this public health issue is needed.

The interaction of salinity and nutrients in controlling what species exist in the bay opens an interesting possibility. By modifying the causeway with a raised roadway, or by greatly increasing the number of breaches, salinities in the bay would increase and brine shrimp would likely increase in abundance, and algae would decrease. However, this approach would allow more nutrients to go directly into Gilbert Bay, and we are not certain what impact this would have on the organisms there. Clearly, there is a lot to be studies that need to be done before we understand the pollution problems of the Great Salt Lake.

One other issue relevant to eutrophication is odor. Odors can result when large amounts of algae die and decompose. This decomposition takes oxygen out of the water, and without oxygen, biochemical reactions occur that produce hydrogen sulfide (rotten-egg smell), and other noxious compounds. Odors are sometimes severe around Farmington Bay. "Lake stink" may be largely driven by the bay. Several years ago we did an odor survey and found that people driving across the automobile causeway frequently noted extreme odors, particularly near the mud-flats on the eastern side. In contrast, the few people that live on Antelope Island never reported lake stink unless the winds were blowing from Farmington Bay. "Odor" is highly subjective and people have very different sensitivities, so studying this problem is difficult. "Lake stink" clearly influences people close to the bay and sometimes the entire populace of Salt Lake City, as well as affecting people's perception of the Great Salt Lake as a recreational resource. Consequently, the importance of Farmington Bay and eutrophication in contributing to this air-quality problem needs to be examined further.

Our work has focused on the nutrients entering Farmington Bay and the resulting eutrophication. The bay also receives high levels of other pollutants such as heavy metals and hydrocarbons. Our group has not examined these pollutants so I should not comment on them. However, sediments from the bottom of the bay analyzed by the US Geological Survey have shown that those pollutants have increased markedly since the valley was settled.

One important fact about all of the work going on in the Great Salt Lake is that it will be relevant to many other lakes in the world. Although we think of the Great Salt Lake as an anomaly, in fact, nearly 50% of the water in lakes worldwide is salty. Mono Lake and the Salton Sea in California, and the Aral Sea in central Asia are prominent examples.

#4

A Report to the Utah Division of Water Quality

Comparative Analysis of Pollution in Farmington Bay and the Great Salt Lake, Utah

Aquatic Ecology Laboratory Class Project 2001
College of Natural Resources
Utah State University

Wayne A. Wurtsbaugh, Instructor[1]
Amy Marcarelli, Teaching Assistant

Students

Cameron Christison - Phytoplankton
Joel Moore - Brine Shrimp growth and survival
Donovan Gross - Farmington bay nutrient budget
Sophia Bates & Sara Kircher - Oxygen and hydrogen sulfide

February 25, 2002

Reference:
Wurtsbaugh, W.A., A. Marcarelli, D. Gross, J. Moore C. Christison, S. Kircher and S. Bates. 2002. Comparative analysis of pollution in Farmington Bay and the Great Salt Lake, Utah. Aquatic Ecology Laboratory Class Project 2001. College of Natural Resources, Utah State University. 21 p.

[1]Author for correspondence: Dept. Fisheries and Wildlife, Utah State University, Logan, Utah 84322-5210. 435 797-2584, wurts@cc.usu.edu

Summary

Farmington Bay covers 94 mi^2 (260 km^2) in the SW corner of the Great Salt Lake, and is essentially a separate lake because it is enclosed by Antelope Island and a causeway leading to the island from the mainland. The bay has received wastes from the adjoining Salt Lake City metropolitan area for decades. Because of water quality concerns for Farmington Bay, the Aquatic Ecology Laboratory class at Utah State University studied the bay and a nearby control site (Bridger Bay) in the Great Salt Lake during the fall of 2001. Field sampling and laboratory experiments, as well as other data sources, demonstrated the bay is severely eutrophic and is one of the most polluted water bodies in the state of Utah. A preliminary nutrient loading estimate for the bay indicates that total phosphorus coming into the system is 8-times higher than necessary for the bay to be classed as eutrophic. Sewage treatment plants discharging directly to the bay contribute approximately 50% of the nutrients. Metrics of eutrophication (chlorophyll, Secchi depth and total phosphorus) all indicated that the bay was hypereutrophic and the combined Trophic State Index was 91, higher than any other lake or reservoir in the state. Oxygen was supersaturated in the surface waters of Farmington Bay during the day, but the bottom water was anoxic. During the night, nearly the entire water column became anoxic due to respiratory demand of the biota. The anoxic conditions allowed high concentrations of foul-smelling hydrogen sulfide to be produced. Brine shrimp were not abundant in Farmington Bay and the community was dominated by rotifers. In contrast, water quality in Bridger Bay located on the main lake, was good and brine shrimp were abundant there. Our results, although restricted in scope, corroborate existing monitoring data from this bay.

Water quality characteristics in Farmington Bay do not meet those mandated for the protection of aquatic life. Odor problems from the bay likely impact more people than are affected by any other polluted water body in the state. The impact of eutrophication and anoxia on the biota in Farmington Bay may also be substantial, although inadequate data exists to determine these impacts. There are substantial technical challenges to be overcome if water quality in the bay is to be improved to meet its designated use. However, before these technical issues can be solved, the responsible agencies will need to address the problem, and begin studies that may eventually lead to a solution to this serious water quality issue.

Introduction

The Great Salt Lake of Utah lies next to greater metropolitan Salt Lake City with a population of over one million people. The lake is a tremendous recreational asset, supports a diverse and abundant bird community, and produces commercially important brine shrimp cysts for the world's aquaculture industry. The lake also receives a large portion of wastes from the adjoining community. Much of the city's wastes flow into Farmington Bay at the SE corner of the lake. This "bay" is more like a lake, as Antelope Island to the west, and a causeway joining the island to the mainland greatly restrict mixing of its waters with the much larger Great Salt Lake. The heavy waste load flowing into the bay has been a concern for decades. In 1972 Coburn and Eckhoff (1972) wrote "disregard for the...water quality of Farmington Bay might lead to...a tremendously large mismanaged waste lagoon, upwind from metropolitan Salt Lake City." They also commented that if anaerobic conditions developed in Farmington Bay, the potential for odor problems was at hand.

The objective of our class project was to compare water quality conditions in Farmington Bay with those of a nearby site in the Great Salt Lake. On October 4th and 5th we sampled limnological conditions at these two sites. Additionally, students conducted individual or group projects of their own design. Donovan Gross analyzed nutrient concentrations at the two sites and in tributaries and used data of the USGS, Utah Division of Water Quality and EPA to construct the first nutrient budget for Farmington Bay. Sara Kircher and Sophia Bates measured diel changes in oxygen at the two sites, and experimentally related these results to the production of odor-causing hydrogen sulfide gas. Cameron Christison and Joel Moore conducted an experiment to test how mixing the nutrient-laden Farmington Bay water with Great Salt Lake water would influence phytoplankton growth and species composition, and how this, in turn, would effect the growth, survival and egg production of brine shrimp. The results of the sampling and experiments, albeit limited to a short-term class project, indicate that Farmington Bay is indeed severely eutrophic, causing the production of noxious hydrogen sulfide gas and likely limiting the production of brine shrimp. In contrast, the site in the Great Salt Lake had good water quality and abundant populations of brine shrimp.

Figure 1. Map of the southern section of the Great Salt Lake showing the sampling sites in Farmington Bay (FB) and Bridger Bay (BB). Triangles show the locations of sewage treatment plants and the Jordan River sampling sites.

Methods

Field Sampling--We sampled at two sites: Farmington Bay, and Bridger Bay in the Great Salt Lake. Both bays are located near the Antelope Island Marina (Fig. 1). The Farmington Bay site was located approximately 1 km SE of the causeway bridge at the NE end of the island (12T 0396982, UTM 4546797). The Bridger Bay site was located off the NW tip of the island (12T 0393509, UTM 4544598) and was also approximately 1 km from shore. Both stations were in located where the depth was ca 2 m. Weather prior to, and on the first day of sampling (Oct. 4) was warm and there were no winds. Strong winds began at 2000 hr and blew through much of the night and the following morning.

At each station we measured vertical profiles of temperature and dissolved oxygen with a Yellow Springs Instrument (YSI) probe that was calibrated for zero oxygen with saturated sulfite solution, and

Discussion

Our data indicate that Farmington Bay is one of the most polluted water bodies in the State of Utah. We base this conclusion by comparing our results with trophic state indices of 127 lakes and reservoirs greater than 50 acres that are on the priority list of impaired water bodies in Utah (Judd 1997). Using the data collected during our study, the mean Trophic State Index (TSI) derived from chlorophyll, total phosphorus and Secchi depth for Farmington Bay was 91 (Table 3), compared to the most eutrophic reservoir on the list with a TSI of 74 (Lower Box Reservoir). The water quality in Bridger Bay, in contrast, was relatively good with a mean TSI of 62. Our preliminary nutrient loading estimate suggests that the wetland and bay complex received 8 times the phosphorus load that is acceptable to maintain good water quality, although the portion of nutrients that pass through the wetlands into the bay is unknown. Data collected during a class project in 2000 (Marcarelli et al. 2001) also indicated that Farmington Bay was hypereutrophic. Our data may not be characteristic of the entire summer period, as we collected during a warm fall at the end of a 3-year drought. However, data collected by the Utah Division of Water Quality also indicates that Farmington Bay has severe water quality problems. Using their Secchi depth and total phosphorus data for 2000 yields a mean TSI of 76, still the highest value of any system in the state. Despite its extremely poor water quality, Farmington Bay is not on the state's priority list of impacted water bodies.

Oxygen levels also indicate the severity of the eutrophication in the bay. The huge swings of oxygen from supersaturation of surface waters in the late afternoon, to anoxia of the water column by early morning indicate that the bay is hypereutrophic. The large diel changes in oxygen are caused by photosynthesis during the day, followed at night by bacterial decomposition of the large amount of organic matter produced by the phytoplankton growing in a nutrient-rich soup. The respiration of the bacteria and other organisms depletes the oxygen in the water column and sediments.

Thus the warning of Coburn and Eckoff (1972) made 30 years ago has come to pass: the degradation of water quality in Farmington Bay has produced anoxia and an odor-producing lagoon upwind from metropolitan Salt Lake City. The severe euthrophication and anoxia in Farmington Bay allows the abundant sulfates in the water to be reduced to hydrogen sulfide gas that can influence metropolitan Salt Lake City. Noxious hydrogen sulfide was present in the water and particularly in the sediments of the bay, and more was produced under simulated anoxic conditions in the laboratory. The production of odor-causing hydrogen sulfide in the bay is not new: Carter et al. (1971) and Israelsen et al. (1985) noted that it was present in the sediments and water. Production of hydrogen sulfide and other odors is not limited to Farmington Bay, as smaller amounts are produced in marshes bordering the lake and were even noted by early explorers visiting the Great Salt Lake (Lazar, in press). The main south basin of the lake seldom, if ever, produces objectionable odors (W. Wurtsbaugh, personal observation). Bear River Bay does not produce the intense, objectionable odors characteristic of Farmington Bay, even though the two bays have similar morphometric and hydrological characteristics (Personal communications S. Manes, Harold Crane Wildlife Refuge and J. Dolling, Farmington Bay waterfowl Management area). Quantitative analyses of the odor problems in Farmington Bay and elsewhere in the lake are badly needed, but unfortunately, there is no agency directly responsible for this problem (Personal communication, J. Pitkin, Utah DWQ). Despite the lack of quantitative data, the preliminary observations suggest that the odor problems influencing lakeside communities are due to severe water pollution in Farmington Bay, and not to the innate characteristics of the Great Salt Lake.

In addition to odor problems, the hypereutrophic condition of Farmington Bay may deplete invertebrates upon which bird populations depend. Our sampling in October indicated that there were considerably less brine shrimp in Farmington Bay than in the main lake, and that overall zooplankton biomass was lower in the bay. The microcosm experiments indicated that brine shrimp survival after 15 days was similar in water from the two sites, suggesting that salinity or algal food composition in Farmington Bay may be sufficient for brine shrimp. However, oxygen levels in the microcosms were relatively high, even at night, whereas the anoxia in the bay may preclude brine shrimp from thriving. Instead, the zooplankton population in Farmington Bay was dominated by rotifers, and also by air-breathing corixids. This was also noted in field sampling during the previous year's class project on Farmington Bay (Marcarelli et al. 2001). The corixids, however, may be an important food source for birds (J. Caudell, Utah State University, personal communication), and bird populations in the bay are high (C. Perschon, UDWR, personal communication). Our zooplankton data, however, must be interpreted cautiously. Our sampling site was near the causeway, and salt wedges from the main lake intrude into Farmington Bay. It is possible that the brine shrimp we did encounter in the bay were brought in via this intruding water mass. Additionally, zooplankton populations are highly dynamic, and sampling on a single date can provide biased results. Our laboratory experiment was also compromised, as variability between replicates was high, and we encountered unexplained differences between the constant salinity and variable salinity treatments that could possibly have been due to contaminated containers. Because of its large size, the potential production of brine shrimp and other invertebrates in the bay is very important, both for the commercial brine shrimp industry, and for the birds that depend on the invertebrate prey base. Brine shrimp survival will be influenced not only by eutrophication, but also by the salinity (Hayes, 1971; Wurtsbaugh 1992), which is now influenced by the Antelope Island causeway that impedes mixing between the lake and bay. The relative impact of salinity changes and euthrophication on the invertebrate populations is not understood. Clearly, more research is needed on the zooplankton and benthic community in Farmington Bay to understand how these anthropogenic factors have modified the biotic community of the bay.

Are there solutions to the eutrophication problem in Farmington Bay? Human and industrial wastes have been dumped into Farmington Bay for a century with little regard for the impact on the system. Currently the nutrients and other wastes from more than 500,000 people in the metropolitan area enter the bay. The effluents from 10 of the12 sewage treatment plants in the Salt Lake Valley reach the bay, creating a tremendous nutrient load. The construction of the Syracuse-Antelope Island causeway exacerbates the problem by restricting the exchange of water between the bay and the main lake. Furthermore, Farmington Bay is very shallow so that the nutrients are concentrated in a relatively small volume of water, thus providing optimal conditions for algal growth. Thus the buildup of nutrients and their containment in a restricted area presents real challenges for reducing euthrophication. The peculiar chemical characteristics and the biota in the bay provide additional challenges for investigators.

The greatest challenge for improving the water quality in the bay, however, will be overcoming the neglect it has suffered. Only recently has a monitoring program been initiated by the State and Davis County and by the federal NAQWA program (Giddings and Stephens 1999). The lack of studies is surprising give that the odor problems from Farmington Bay likely impact more people in the state than are affected by any other polluted water body. The impact of euthrophication and anoxia on the biota in the bay may also be substantial, although adequate data to determine these impacts are wanting. Because of the severity of the problem for both human and wildlife welfare, Farmington Bay needs to be added to Utah's list of impacted water bodies following the provisions of the Clean Water Act (303d listing). Before progress can be made in restoring Farmington Bay to a condition closer to the relatively good water quality like that in Bridger Bay on the main lake, considerable efforts will need to be focused by the state and non-governmental groups dedicated to maintaining healthy aquatic ecosystems.

#5

A Report to the Utah Division of Water Quality

Ecological analyses of nutrients, plankton and benthic communities in Farmington Bay and the Great Salt Lake, Utah (2004)

Aquatic Ecology Practicum Class Project 2004
Department of Aquatic, Watershed and Earth Resources
Utah State University

Amy Marcarelli, Teaching Assistant
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February 14, 2005

Reference:
Marcarelli, A.M., W.A. Wurtsbaugh, J. Horrocks, R.S. Jensen, K.B. Markland, J.N. Parker, J. Robinson and E. VanDyke. 2005. Ecological analyses of nutrients, plankton and benthic communities in Farmington Bay and the Great Salt Lake, Utah (2004). Aquatic Ecology Practicum (AWER 4510) Class Project. College of Natural Resources, Utah State University. 71 p.

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sediments of Gilbert Bay. This fall, Kathleen Markland collected sediment cores from Gilbert Bay to determine the presence and viability of cysts in this egg bank (Ch. 4). She successfully hatched cysts from as deep as 25-26 cm, which were estimated to be 360 years old, pre-dating Anglo settlement of the Great Salt Lake valley. These brine shrimp are being maintained in our laboratory and can be used in future experiments to determine whether brine shrimp have evolved resistance mechanisms to pollutants in the lake.

Pelagic Ecology of Farmington and Gilbert Bays

Industry and agencies have recently focused on the effects of selenium (Se) on organisms in the Great Salt Lake, as work progresses towards a numeric standard for Se specific to the Lake. A bioassay estimated the 48-hour LC_{50} for newly hatched brine shrimp nauplii to be 27 mg Se L^{-1} (Markland, Ch. 4), which was considerably less than a site specific toxicity level previously estimated for the Great Salt Lake (Brix et al. 2004). These results suggest that more work is needed to determine the toxicity level of selenium for brine shrimp.

Smaller populations of brine shrimp are found in Farmington than in Gilbert Bay during most of the year (Wurtsbaugh et al. 2002, Wurtsbaugh and Marcarelli 2004b), and the factors driving this difference remain unclear. Erin VanDyke (Ch. 5) conducted in situ cage and laboratory experiments to assess the importance of water quality for brine shrimp survival in the two bays. Despite problems with the cage construction, field results showed that conditions at 0.8-m in Farmington Bay lead to mortality of all zooplankton. A laboratory assay confirmed this result, with no survival of brine shrimp nauplii in either deep Farmington Bay or surface Gilbert Bay water. In Gilbert Bay, it was likely that food in the surface water was too low to support brine shrimp. In Farmington Bay, high hydrogen sulfide concentrations (20 mg L^{-1}) and anoxia at 0.8-m were likely responsible for zooplankton mortality, as has been suggested previously (Wurtsbaugh and Marcarelli 2004c).

Another potential control of brine shrimp in Farmington Bay is predation by the water boatman, *Trichocorixa verticalis* (Marcarelli et al. 2003, Marcarelli and Wurtsbaugh 2004). Previous experiments have shown that corixids can feed more effectively on juvenile brine shrimp than on adults or nauplii, leading to the question of whether corixids are visual or tactile predators. To answer this question, Jessica Horrocks (Ch. 6) conducted laboratory predation experiments with light and dark treatments to determine how corixids locate their prey. In dark treatments, corixids had moderately lower predation rates on nauplii compared to predation rates on larger brine shrimp, suggesting that the increased movements of the adult shrimp might facilitate tactile predation. In the light treatments corixids preyed more heavily on nauplii than adults, suggesting that under high light conditions corixids can use visual cues to locate prey. These results, however, were not conclusive and additional laboratory and field experiments are needed to determine if corixids are truly tactile and visual predators.

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#6

Great Salt Lake - Farmington Bay
Evaluation of Phosphorus Loading

Introduction

There has been concern expressed that Farmington Bay is highly eutrophic and impaired due to this condition. The concern over eutrophication focuses on the abundant supply of phosphorus that reaches the Bay which allows the growth of cyanobacteria. There has been a desire to control such bacteria growth through the control of phosphorus discharges to the lake. The primary method of implementing phosphorus control would be to implement stringent restrictions on point source discharges. However, it has not been determined that such action would sufficiently reduce the phosphorus loading to make it effective at controlling cyanobacteria blooms. This study was conducted to determine the contribution of point sources in relationship to total phosphorus entering the Bay.

Evaluation Methodology

Previous studies attempting to quantify the sources of phosphorus entering the Bay have focused on water quality sampling available through the STORET database. This data base contains State and other sampling sources evaluating waters which ultimately enter Farmington Bay. While this is one methodology which is sometimes effective at evaluating phosphorus sources there are various short comings to it. First, routine sampling often fails to quantify the amount of phosphorus which arrives at the Bay from slug loading. An example would be agricultural and other sources of phosphorus runoff associated with storm water discharges. Such discharges could carry significant runoff of phosphorus as a result of possible buildup of phosphorus in surface soils. It has long been known that agricultural buildup of phosphorus occurs in the surface when over fertilization takes place. In addition, sampling from all inflow sources to the Bay is not always done and is not always representative of all water sources. Either a comprehensive sampling program needs to be developed to quantify all sources, including storm water surges, or a different method needs to be developed.

Total Annual Loading 3,178,000 lbs/year

Loading from POTW point source discharges are as follows:

Central Davis Sewer Dist.	49,000	lbs/year
So. Davis North & South	63,000	lbs/year
North Davis Sewer Dist.	224,000	lbs/year
So. Valley WRF	259,000	lbs/year
Salt Lake City WRF	292,000	lbs/year
Central Valley WRF	489,000	lbs/year

As can be determined, the total annual phosphorus as P loading from POTW's is about 1,376,000 lbs/year.

Finally, given the above information, the total phosphorus as P received from POTW's is 43%. This amount is the amount which could be removed if all phosphorus were eliminated from point sources.

Conclusion

A previous study conducted by students at USU reported an approximate point source loading to Farmington Bay of about 50%. While this report failed to account for all POTW sources, it probably also failed to account for all phosphorus reaching the Bay. This current study, using a different approach to assessing the Bay loading, concluded that phosphorus from POTW's amounts to about 43% of the total phosphorus load. There are two options to further refine Farmington Bay phosphorus loading. The first is to increase the data base used in this study. Differing values for sediment deposition or long term outflows may significantly alter the percentage from POTW's. The second approach is to identify and measure all flow sources to the bay, including all flow surges, and measure each source concentration. Without further data, the conclusion is that POTW's contribute about 50% of all phosphorus reaching Farmington Bay.

Phosphorus Analysis
Great Salt Lake Farmington Bay
Loading Analysis

WWTP Loading

CDSD	48,855	lbs/yr
SDN	47,032	lbs/yr
SDS	15,668	lbs/yr
NDS	224,264	lbs/yr
CVSRF	489,497	lbs/yr
SLC	291,874	lbs/yr
SVWRF	259,029	lbs/yr
Annual Loading	1,376,220	lbs/year

GSL Farmington Bay P Discharge at Dike

0.56 mg/L
(Storet Average 3 Sites)

USGS Acoustic Gage Average 10/3 to 9/4
412 CFS

P In Farminton Bay Discharge at Causeway

Flow	412	CFS
Concentration	0.56	mg/L
Mass P Annual	453,899	lbs/year

Sediment Loading

Sediment Area	2,620,569,600	Sq. Ft.		94 Sq Mi.
Depth of Deposition	0.4	cm/yr.	Inches/cm	0.3937
Assumed density	100	lbs/cf		
Average Conc. P	792	ppm		
Sediment P	2,723,736	lbs/year		

P Accumulated in Sediment	2,723,736	lbs/year
P Released to GSL Thru Causeway	453,899	lbs/year
Total P into Farmington Bay	3,177,635	lbs/year

Percent of P from Wastewater Treatment Plants 43%

2/9/2006 1:22 PM
C:\Data Files\Great Salt Lake Info\Farmington Bay P Model\Storet Results - 2000 to 2005 Mass Loading

#7

MAUNSEL B PEARCE

From: "Wayne Wurtsbaugh" <wurts@cc usu.edu>
To: "amym" <amym@cc.usu.edu>; "Phil Brown" <phildbrown@cc.usu.edu>; "Ashley Nielson" <ashleyn@cc.usu.edu>; "Dave Naftz" <dlnaftz@usgs.gov>; "Andrew E Johnson" <aej25@email.byu.edu>; "Shane R Bradt" <srbradt@cisunix.unh.edu>; "Chris Luecke" <luecke@cc.usu.edu>; "Lynn de Freitas" <ldefreitas@earthlink.net>; "Maunsel Pearce" <maunsel3616@msn.com>; <wurts@cc.usu.edu>; "amym" <amym@cc.usu.edu>; "Justin Robinson" <jcr@cc.usu.edu>; "Erin VanDyke" <eevandyke@cc.usu.edu>; "Kathlene Markland" <kbmarkland@cc.usu.edu>; "Robert Jensen" <slrp1@cc.usu.edu>; "Jessie Horrocks" <jdhorrocks@cc.usu.edu>; "Jonas Parker" <jnparker@cc.usu.edu>; "Nancy Mesner" <nancym@ext.usu.edu>
Sent: Monday, May 16, 2005 8:34 AM
Subject: I have found the algae and they are us!

Limnologos;

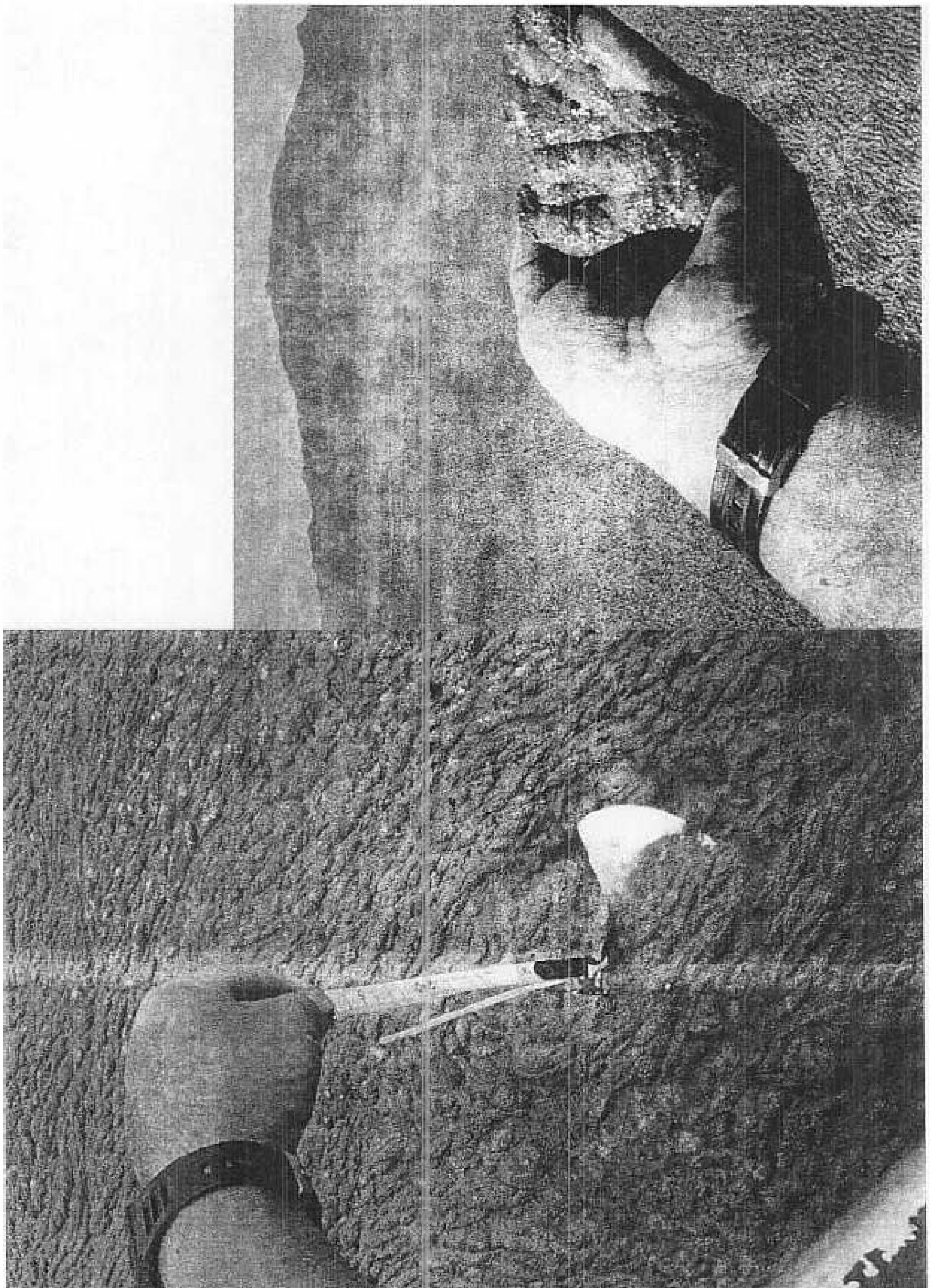
I sampled Farmington Bay yesterday, and there is one massive bloom of the nitrogen-fixing cyanobacteria, Nodularia. Perhaps 10% of the bay was covered with a thick scum (see pictures) and elsewhere the Secchi depth varied from 6 cm to 27 cm. Salinities are lower this year than when we've sampled in the past, and this is allowing the cyanobacteria to thrive and fix their limiting nutrient from atmospheric nitrogen. We're sampling at 2-week intervals, so we'll be able to determine if this bloom will get even larger. No wonder the bay smells!

I've also attached an interesting image from the MODIS satellite that was taken this past Friday, and sent to us by a Univ. New Hampshire student, Shane Bradt. The USGS and our group are hoping to work with Shane to do more remote sensing of the lake.

Wayne

--
Wayne Wurtsbaugh, Professor
Dept. of Aquatic, Watershed & Earth Resources/Ecology Center, Utah State Univ., Loga
435 797-2584; 435 797-1871 (FAX); http://cc.usu.edu/~wurts/index.html

"Discovery is seeing what everybody else has seen, and thinking what nobody else has



2/1 /2006

#8

HEALTH CONSULTATION

An Evaluation of Mercury Concentrations in Waterfowl from the Great Salt Lake, Utah for 2004 and 2005

September 29, 2005

Prepared by

Utah Department of Health
Office of Epidemiology
Environmental Epidemiology Program

Background and Statement of Issues

The Utah Division of Wildlife Resources (UDWR) began a preliminary study during the summer of 2005 to determine if ducks around Great Salt Lake contained mercury. This concern was based upon research findings from the United States Geological Survey (USGS) and United States Fish & Wildlife Service (USF&WS) that demonstrated the lake had elevated levels of methyl mercury. Archived tissue samples from three waterfowl species were taken from ducks collected in 2004 in an unrelated study being conducted by The Great Salt Lake Ecosystem Project at UDWR and Utah State University (USU). Results of that analysis promulgated a more expansive collection of seven waterfowl species for further testing. All of these data were provided to the Environmental Epidemiology Program (EEP) for review . This health consultation is an evaluation of mercury in waterfowl from areas near the Great Salt Lake covering the period 2004 and 2005.

Results

Waterfowl Analysis for 2004

All contaminant concentrations are reported as a wet weight concentration in milligrams of contaminant per kilogram waterfowl muscle tissue (mg/kg). Waterfowl muscle tissue was analyzed as samples from individuals of each species.

Three different waterfowl species were collected from four locations within the South Arm of the Great Salt Lake during November-December 2004. Muscle samples from the breast muscle of each bird were submitted for toxicological analysis. Ten Common Goldeneye were collected. Mercury levels ranged from 0.213 mg/kg to 4.721 mg/kg with an average mercury concentration of 2.012 mg/kg (Appendix A, Table 1). Ten Northern Shoveler were collected with mercury levels ranging from 0.262 mg/kg to 1.408 mg/kg with an average mercury concentration of 0.759 mg/kg (Appendix A, Table 2). Ten Green Wing Teal were collected with mercury levels ranging from 0.146 mg/kg to 0.329 mg/kg with an average mercury concentration of 0.232 mg/kg (Appendix A, Table 3).

Waterfowl Analysis for 2005

Seven different waterfowl species were collected in 2005 and muscle samples from individual birds of each species were analyzed for mercury. Ten Mallards were collected with mercury levels ranging from 0.039 mg/kg to 0.662 mg/kg with an average mercury concentration of 0.282 mg/kg (Appendix A, Table 4). Ten Northern Shovelers were collected with mercury levels ranging from 0.645 mg/kg to 11.708 mg/kg with an average mercury concentration of 3.220 mg/kg (Appendix A, Table 5). Three Northern Pintail were collected with mercury levels ranging from 0.007 mg/kg to 0.095 mg/kg with an average mercury concentration of 0.064 mg/kg (Appendix A, Table 6). Two Cinnamon Teal were collected with mercury levels of 0.228 mg/kg and 0.605 mg/kg with an average mercury concentration of 0.417 mg/kg (Appendix A, Table 7). One Redhead duck sample was collected and analyzed for mercury; the mercury concentration was 0.089 mg/kg (Appendix A, Table 8). Ten Green Wing Teal were collected with mercury levels ranging from 0.064 mg/kg to 0.390 mg/kg with an average mercury concentration of 0.180 mg/kg (Appendix A, Table 9). Eleven Gadwall were collected with mercury levels ranging from 0.019 mg/kg to 0.205 mg/kg with an average mercury concentration of 0.057 mg/kg (Appendix A, Table 10).

Discussion

Screening values (SVs) were developed by the U.S. Environmental Protection Agency (EPA) and are used as standards by which levels of contamination can be compared. Screening values are defined as the concentrations of target analytes that can trigger further investigation and/or consideration of consumption advisories for the species where such concentrations occur [EPA 2000b].

In waterfowl tissue, the majority of mercury is methylmercury. Methylmercury is rapidly absorbed from the gastrointestinal tract. The body absorbs about 90 to 100 percent of ingested methylmercury. Methylmercury can be changed by your body to inorganic mercury. When this happens in the brain, the mercury can remain there for a long time. When methylmercury does leave your body after you have been exposed, it leaves slowly over a period of several months, mostly as inorganic mercury in the feces. The biological half-life of methylmercury in humans is roughly 50 to 65 days. The half-life is a measure of rate for the time required to eliminate one half of a quantity of a chemical from the body. As with inorganic mercury, some of the methylmercury in a nursing woman's body will pass into her breast milk [ATSDR 1999].

Results of the 2004 and 2005 mercury concentrations in waterfowl were compared to the SV. The SV for mercury is 0.3 milligrams mercury per kilogram fresh muscle tissue weight (mg/kg) [EPA 2000a].

The average concentration of mercury exceeded the SV for mercury of 0.3 mg/kg for Common Goldeneye and Northern Shoveler from 2004 and for Northern Shoveler and Cinnamon Teal collected in 2005. However, only two samples of Cinnamon Teal were collected and one sample was above the SV of 0.3 mg/kg.

Toxicological Evaluation

The nervous system is very sensitive to all forms of mercury. In poisoning incidents that occurred in other countries, some people who ate fish contaminated with large amounts of methylmercury or seed grains treated with methylmercury or other organic mercury compounds developed permanent damage to the brain and kidneys. Animals exposed orally to long-term, high levels of methylmercury or phenylmercury in laboratory studies experienced damage to the kidneys, stomach, and large intestine; changes in blood pressure and heart rate; adverse effects on the developing fetus, sperm, and male reproductive organs; and increases in abortions and stillbirths [ATSDR 1999].

Consumption Limits

When SVs are exceeded, consumption limits can be estimated to determine how many meals of waterfowl can be safely consumed each month [EPA 2000b]. Calculations are based on an adult body weight of 70 kg with a meal size of 227 g waterfowl and a child body weight of 16 kg with a meal size of 113 g of waterfowl (Appendix B).

Based on an average mercury concentration of 3.220 mg/kg in Northern Shoveler collected in 2005 and an average mercury concentration is 2.012 mg/kg in Common Goldeneye, people should refrain from eating Northern Shoveler and Common Goldeneye from the Great Salt Lake marshes. The average mercury concentration in Cinnamon Teal from 2005 exceeded the SV for mercury, however, with a sample size of only two waterfowl, there is not currently enough data on this species to warrant a consumption advisory.

Green Wing Teal were collected in 2004 and 2005. Only three Green Wing Teal of a total of twenty exceeded the mercury screening value. Three of ten Mallards from 2005 exceeded the SV. None of the samples from Northern Pintail, Gadwall, or Redhead ducks exceeded the screening value for mercury. Since the mean mercury levels for Green Wing Teal, Mallards, Northern Pintail, Gadwall, and Redhead ducks did not exceed the SV for mercury, consumption limits were not calculated for these species.

Children's Health Considerations

Infants and children have unique vulnerabilities to environmental contaminants. Children are less developed and may have developmental harm from exposure that would not be experienced by a completely developed adult. The developing body systems of children may sustain permanent damage if toxic exposures occur during critical growth stages. Children's health was considered as a part of this health consultation.

Very young children may be more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and may accumulate there. It can also pass to a nursing infant through breast milk. However, the benefits of breast-feeding may be greater than the possible adverse effects of mercury in breast milk. Mercury's harmful effects that may be passed from the mother to the fetus include brain damage, mental retardation, incoordination, blindness, seizures, and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage [ATSDR 1999]. Due to the possible health effects from chemical contaminants on the fetus, pregnant women should follow the consumption limits assigned to children.

Conclusions

Northern Shoveler and Common Goldeneye from the Great Salt Lake have levels of mercury that may result in a risk of adverse health effects. Northern Shoveler and Common Goldeneye from the Great Salt Lake marshes should not be consumed.

The average mercury level in Mallard was just below the screening value. Additional sampling of this species is needed to further characterize the mercury levels in Mallards to determine if a consumption advisory is warranted.

Although the average mercury level in Cinnamon Teal exceeded the screening value, only two ducks were analyzed. The small sample size was insufficient to support a consumption advisory for this species. Additional sampling of the Cinnamon Teal is needed to further characterize the mercury levels in this species to determine if a consumption advisory is warranted.

The average mercury concentrations in Green Wing Teal, Northern Pintail, Gadwall, and Redhead ducks were well below the screening value for mercury.

Recommendations

The Environmental Epidemiology Program recommends a consumption advisory for waterfowl harvested from the Great Salt Lake marshes because of elevated levels of mercury detected in Common Goldeneye and Northern Shoveler. People should not consume meat from Common Goldeneye and Northern Shoveler harvested from this region.

The EEP recommends that concentrations of mercury and other chemicals continue to be monitored in waterfowl from the Great Salt Lake marshes.

Public Health Action Plan

The Environmental Epidemiology Program of the Utah Department of Health will continue to work with the Utah Department of Environmental Quality, the Utah Division of Wildlife Resources and local health departments on the development of waterfowl sampling and monitoring plans for Utah. A copy of this Health Consultation and waterfowl consumption advisories will be posted on the EEP web site.

The EEP will continue to work with all applicable agencies to perform additional research on mercury and other chemical contaminants in waterfowl in Utah. The EEP will adjust recommendations as new information becomes available.

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Salt Lake City, Utah 84152
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DIVISION OF WATER QUALITY

February 20, 2006

Tom Toole
Utah Division of Water Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, Utah 84114-4870

Re: Public comments in response to Utah's Draft 303(d) List of Impaired Waters

Mr. Toole:

Great Salt Lakekeeper is writing in response to the state of Utah's Draft 303(d) List of Impaired Waters and offers the following public comments. Great Salt Lakekeeper is a nonprofit conservation organization dedicated to the protection of water quality and health of the waterways making up the Great Salt Lake watershed basin. This includes those sub-basin watershed regions that flow into the Great Salt Lake, namely, the Bear River, the Weber/Ogden Rivers, and the Utah Lake/Jordan River systems.

Clean Water Act
According to the Federal Pollution Control Act of 1972, also known as the Federal Clean Water Act, the federal government and the state of Utah are obligated to protect the waters of the state from modifications or impairments that would interfere with the attainment or maintenance of that water quality which shall assure protection of public water supplies, and the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities, in and on the water and such modification that would result in the discharge of pollutants in quantities which may reasonably be anticipated to pose an unacceptable risk to human health or the environment because of bioaccumulation, persistency in the environment, acute toxicity, chronic toxicity (including carcinogenicity, mutagenicity or teratogenicity), or synergistic propensities.

In accordance with federal regulations and guidelines, the state of Utah has implemented a water quality program that establishes water quality standards and assigns beneficial uses to the waters of the state. This water quality standard framework is the basis for determining whether a waterway is in compliance of water quality standards for the assigned beneficial uses for that waterway. The state's water quality program has been updated periodically as outlined in the draft 303(d) List of Impaired Waters report for 2006.

Among the many beneficial uses identified in the State's water quality standard program, recreational uses are clearly and well identified as protected beneficial uses. Accordingly, recreational beneficial uses are those activities that can be divided into the following categories of primary contact recreational use and secondary contact recreational use. Recreational beneficial uses can be supported by numeric standards, narrative standards, quantitative measures, and qualitative measures. Qualitative measures in turn can include such parameters as unnatural or undesirable smells, aesthetic considerations or descriptive complaints.

In addition to those regulations found in the Federal Water Pollution Control Act, water quality can be regulated by the terms outlined in the Rivers and Harbors Act, which prohibits the blockage of navigable waters of the United States by pollution and the interference of navigational uses of navigable waterways.

Jordan River Watershed Management Unit

Great Salt Lakekeeper has examined the proposed listing of Assessment Units within the Jordan River Watershed Management Unit and disagrees with the UDWQ's listing of many of the Jordan River Assessment Units for the following reasons:

1) ***The proposed listings do not reflect recreational impacts caused by visible, floating trash, garbage and solid waste (debris, junk, objects).*** Great Salt Lakekeeper provides recreational boating and educational programs along the Jordan River, and is probably the most frequent user of the river for recreational boating. Our organization is constantly plagued by floating and visible trash, garbage and debris in the river, which makes recreational boating very undesirable. In some sections of the Jordan River, floating garbage accumulates and renders the river impassable or unsafe. Accumulated garbage also poses a threat to aquatic wildlife such as fish, birds and mammals that inhabit the river system. Great Salt Lakekeeper has removed tons of garbage and 272 shopping carts from the Jordan River since 2000. Each year, the floating and visible garbage persists, despite our annual cleanup efforts, and has become a chronic pollution problem along the Jordan River. Great Salt Lakekeeper has brought this situation to the attention of UDWQ staff, but nothing has been done to control or prevent garbage and solid waste from entering and accumulating in the river. Great Salt Lakekeeper requests that the Jordan River be listed for floating and visible trash and garbage, as a negative impact to 2B recreational beneficial uses, and 3B, 3C and 3D aquatic wildlife beneficial uses. We request this listing be applied to the Jordan River Watershed Management Unit in Jordan River segments 1, 2, and 3, and also include the Surplus Canal and State Canal, which are part of the Jordan River system. Segments 1, 2, and 3 should be listed as NS. Floating garbage should also be listed along the Jordan River segments 3 –8 as PS

for 2B, 3B, 3C, and 3D beneficial uses. Finally, we recommend that floating trash and garbage be included in the upcoming TMDL for the Jordan River.

2) ***The proposed listings do not reflect the recreational impacts caused by undesirable smells of the Jordan River resulting from the discharges at wastewater treatment facilities.*** The Jordan River has developed a signature background smell that is unnatural and creates a negative impact to 2B recreational uses of the river. Great Salt Lakekeeper has traced the origins of the unnatural or "perfumy" smell back to the regional wastewater treatment facilities located in Salt Lake County. Great Salt Lakekeeper recommends that the Jordan River be listed for negative impacts to 2B recreational uses for Jordan River segments 1-5, and be listed as PS for this impact. This unnatural smell discourages people from using the river for secondary contact recreation. If the unnatural smell is the result of excess chlorination, then we further recommend that the Surplus Canal and State Canal portions of the Jordan River be listed for this smell problem, and that 3B, 3C, and 3D be added to the list of impacts to beneficial uses because of the harm that excess chlorination can cause to aquatic wildlife.

3) ***The proposed listings do not include impairments found in the Surplus Canal and State Canal segments of the lower Jordan River system.*** The proposed listings in the draft 303(d) list of impaired waters does not include the Surplus Canal and State Canal that convey Jordan River water to the south end of Great Salt Lake and Farmington Bay respectively. The impairments listed in the draft 303(d) list do not consider that the lower Jordan River is comprised of three segments that convey water to support aquatic wildlife.

4) ***The proposed listings do not include habitat loss and modification impairments.*** Many segments of the Jordan River have been dramatically altered in terms of instream and riparian habitat, which has resulted in soil erosion, increases in water temperature, lower dissolved oxygen, and reductions in wildlife populations. Great Salt Lakekeeper recommends that the entire Jordan River, segments 1-8 and the Surplus Canal and State Canal be listed for habitat loss and degradation.

5) ***The proposed listing for E. coli is not complete.*** The proposed listing of the Jordan River in the draft 303(d) listing of impaired waters indicates E. coli pollution (NS) for Jordan River segments 1-3, and E. coli pollution (PS) for Jordan River segment 5, but fails to list E. coli at all for the Surplus Canal, State Canal, or for Jordan River segment 4. While dilution of the Jordan River from flows entering at Little Cottonwood Creek, Big Cottonwood Creek and Mill Creek may dilute the E. coli, Great Salt Lakekeeper believes that segment 4 should be included in the listing since E. coli must be present in that segment if it is found in upstream and downstream samples.

6) ***Dissolved Oxygen listings are not consistent.*** The draft 303(d) listing of impaired waters lists the Jordan River for dissolved oxygen impairments for 3C and 3D beneficial uses in Jordan River segment 1, but only 3B in Jordan River segment 2. Great Salt Lakekeeper recommends that all three categories 3B, 3C, and 3D be

listed for dissolved oxygen impairment for both Jordan River segments 1 and 2 and for the State Canal.

7) ***TDS listings are not consistent.*** The draft 303(d) listing of impaired waters lists the Jordan River for TDS impairments of category 4 beneficial uses in Jordan River segments 1, 5-8. Great Salt Lakekeeper recommends that the State Canal be added to the listing of TDS impairments along with Jordan River segment 1, and that TDS listing for category 4 beneficial uses be added for Jordan River segments 2-4, and the Surplus Canal.

In summary, Great Salt Lakekeeper believes that the proposed listings for the Jordan River Watershed Management units are incomplete, and inconsistent to protect 2B recreational uses; 3B, 3C, and 3D aquatic wildlife beneficial uses; and category 4 irrigational beneficial uses. We highly recommend that the Jordan River be listed to include visible and floating trash as a impact to 2B recreational uses, and that unnatural smells stemming from wastewater treatment also be added to protect 2B uses. Furthermore, we recommend that E. coli, dissolved oxygen and TDS impairments be changed to protect 2B recreational uses, aquatic wildlife uses in category 3 and irrigational uses respectively. Finally, we recommend that habitat loss and degradation be added to the listings for all segments of the Jordan River 1-8, and that the Surplus Canal and State Canal segments be added to existing listings.

Thank you,

Jeff Salt

Jeff Salt

Executive Director and Lakekeeper

SALT LAKE
COUNTY

PETER M. CORROON
Salt Lake County Mayor

Linda Hamilton
Public Works Department
Director

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DIVISION OF
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February 19, 2006

State of Utah Dept. of Environmental Quality
Division of Water Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, Utah 84114-4870

Attn: Mr. Tom Toole, Environmental Scientist
Subject: Jordan River 303(d) Listing and TMDL Process

Dear Mr. Toole:

The Jordan River Watershed Council, Publicly Owned Treatment Works (POTW) Advisory Group has reviewed Utah's 2006 Integrated Report Volume II: Utah's 303(d) List, prepared by the Utah Division of Water Quality (DWQ), and offers the following comments and/or questions:

1. Table 9 shows no TMDL target date for the Jordan River. Table 10 shows a 4/1/08 TMDL target date for Utah Lake. A recent meeting between Mr. Steve Jensen, of Salt Lake County, and Mssrs .Carl Adams and Dave Wham, of your office, revealed their assessment that the Jordan River TMDL process is currently ahead of the Utah Lake TMDL and that the Lake staff consultant has left the organization– further retarding progress on the Utah Lake TMDL.

   The proposed 303(d) list for the Jordan River includes TDS, temperature and E. Coli as pollutants which are impairing designated beneficial uses for the River. These constituents may be directly impacted by releases from Utah Lake. This suggests that the Utah Lake TMDL should precede the Jordan River TMDL so that released pollutant "source" loadings from Utah Lake are accounted for. Does DWQ concur with this suggestion?

2. Recent meetings with your Jordan River TMDL consultant, and discussions with other parties, reveal total phosphorus as a potentially listed 303(d) pollutant. The rationale for this listing lies in its impact on aquatic vegetative growth and resultant dissolved oxygen depletion in the river.

   To date, an indicator value of 0.05 mg/l total P has been applied for comparative water quality assessment along the Jordan River. Data showing diurnal DO fluctuations on the Jordan River appears limited. Can the State clarify its approach to establishing the "cause-effect" relationship between phosphorus concentration and impairment of the Jordan River beneficial uses? For example, even though limited data shows relatively low total phosphorus concentrations at the Jordan River narrows– Utah Lake is considered eutrophic, seasonally releasing algal growth to the Jordan River.

Can dissolved phosphorus be considered in lieu of total phosphorus in development of an appropriate water quality standard?

3. The POTW Advisory Group would also like to offer laboratory services to assist in expanding the current water quality data base on the Jordan River. We would welcome inclusion of our facilities and personnel, in a coordinated fashion as monitored by the State's TMDL consultant, to sample and test the River for water quality parameters for which data is most lacking.

We look forward to working with the State of Utah Division of Water Quality and Salt Lake County throughout the TMDL process.

Sincerely,

Reed N. Fisher, P.E., General Manager
Central Valley Water Reclamation Facility
Spokesperson Jordan River Watershed Council POTW Advisory Group

Craig White, General Manager
South Valley Sewer District

John Newman, General Manager
South Valley Water Reclamation Facility

Dal Wayment, General Manager
South Davis County Sewer Improvement District

Carl Eriksson, ~~General~~ Manager
Kearns Improvement District

Cc: John Whitehead, Division of Water Quality, Branch Manager
Mr. James Harris, Division of Water Quality, Environmental Scientist
Mr. Dave Wham, Division of Water Quality, Environmental Scientist

The Nature Conservancy
SAVING THE LAST GREAT PLACES ON EARTH

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nature.org

Feb. 21, 2006

Thomas W. Toole
Utah State Department of Environmental Quality
P.O. Box 144870
288 North 1460 West
SLC, UT 84114-4870

Dear Mr. Toole:

The Nature Conservancy of Utah supports the listing of Farmington Bay (for nutrients) and the Great Salt Lake (for mercury) as impaired water bodies under Utah's 303(d) List. As a conservation organization and a major landowner of shoreline properties in Davis County, we are concerned about the long-term sustainability of the natural systems of the Great Salt Lake (including water quality) that support a globally-recognized system of wetlands and uplands for millions of South, Central and North American migratory birds of hundreds of species.

We approach this listing as a positive step that will allow the appropriate state agencies and private partners to work together to secure funding, conduct additional scientific research, and eventually set discharge standards that will protect both the natural lake ecosystem and the human health of millions of residents who live and work next to the lake.

The Nature Conservancy purchased its first parcel of wetland property in Davis County in 1983. Since then, the Conservancy and partners has acquired 4,104 total acres (approx. 12 shoreline miles) in 40 transactions costing $16,952,000. Our investment in these productive wetlands and the visitors facilities open to the public depend on a Great Salt Lake system that is functioning in a healthy, sustainable way. Deteriorating water quality in Farmington Bay and in the greater lake body itself could not only impair the beneficial uses of wildlife habitat, recreation and industry, but conceivably affect public health in a negative way.

The Nature Conservancy encourages you to list Farmington Bay and the Great Salt Lake as a first step in a larger public/private effort to understand what information and actions are required to ensure that these invaluable resources are not irreparably damaged by human actions today, but continue to function for the dual purposes of wildlife conservation and human use for generations to come. With another million people on their way to the Wasatch Front, the time to get a handle on this issue is now.

Thank ~~you for your~~ consideration,

Dave Livermore
Director
The Nature Conservancy of Utah

WESTERN RESOURCE
ADVOCATES
Advancing Solutions for the Western Environment

February 20, 2006

Thomas W. Toole
Division of Water Quality
P.O. Box 144870
288 North 1460 West
Salt Lake City, Utah 84114-4870
VIA: email (ttoole@utah.gov)
and US Mail

Re: Comments on Utah's Draft 2006 § 303(d) List of Waters

Dear Tom,

Utah Rivers Council and Western Resource Advocates submit these comments on Utah's draft 2006 303(d) List of Waters, prepared by the Utah Division of Water Quality (DWQ) pursuant to section 303(d) of the Clean Water Act. Thank you for this opportunity to comment. Plainly, the DWQ has put considerable time and work into creating this list and into monitoring the quality of Utah's waters. We appreciate these efforts and others taken to protect and restore water quality in this state.

However, we have some significant concerns and questions regarding the content and inclusiveness of the 2006 List.

I. Impairment of Farmington Bay and Great Salt Lake

Initially, we hereby incorporate and reference the request made by the Great Salt Lake Alliance to have Farmington Bay listed on the 2006 303(d) list for phosphorous and Great Salt Lake for mercury. In each case, significant data and studies, submitted to

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www.westernresourceadvocates.org

DWQ by the Alliance or otherwise in the possession of the agency, indicate that the relevant pollutants are significantly impairing the beneficial uses of these waters. Whether based on the narrative standard applicable to the open waters of Great Salt Lake or on the numeric criteria applicable to Farmington Bay Waterfowl Management Area, this information shows that these waters are not meeting state water quality standards and therefore should be listed as impaired.

II. Lack of 305(b) Data

Public review of the draft list was handicapped by the fact that the data upon which draft listing decisions were based was not yet available through Volume I of the Integrated Report. Particularly in the case of proposed delisting based on 2004-2005 surveys and the 2006 305(b) assessment (American Fork River-1, Spring Creek, Bear River 4, Bear River 5, and Jordan River 1), we were unable to review the data on which the delisting claims are based. Attempts at using STORET to review the data were not successful. As you know, STORET is virtually impossible for citizens to use.

Although we do not directly challenge the proposed delistings referenced above, we reserve the right to object to them once the supporting data is available for review. In addition, we request that DWQ coordinate the joint release of these volumes in the future in order to allow for meaningful public input.

III. 5B Delistings

Bacteriological delisting of Spring Creek

Spring Creek is proposed for delisting on the draft list. You state the reason for delisting as: "Bateriological standard was changed to E. coli, June 1, 2005. The original listing was not based on EPA's recommended method, therefore the assessment is not considered valid." Delisting without evidence that the waterbody actually meets standards is inappropriate. The recommended method should be applied, and a listing decision made as appropriate.

Temperature delistings for numerous reservoirs and lakes

The draft list proposes to delist the following 3A lakes and reservoirs for temperature impairments due to the use of a new method of temperature assessment:

> Matt Warner Reservoir, Otter Creek Reservoir, Brough Reservoir, China Lake, Palisade Lake, Piute Reservoir, Porcupine Reservoir, Red Fleet Reservoir, Steinaker Reservoir, Baker Dam Reservoir, Mantua Reservoir, and Wide Hollow Reservoir

The new assessment methodology referenced in the delisting table is described on page II-15:

> Careful investigation of the sources of these exceedances has been performed. This included calculation of the heat budget for each reservoir (Horne and Goldman 1994). During this exercise, we considered summer tributary volume and temperature and the quality and ability of riparian vegetation to provide stream shading. Although some improvement to stream riparian condition is possible, the low summer flows would remain ineffective in overcoming the heat gained by solar radiation. Because of this natural source heating, concurrent with natural low summer tributary flow we have determined that the impairment can not be remediated and will exclude temperature in the 305(b)/303(d) assessment and reporting process for these waterbodies.

Draft List at II-15. The assessment described is not appropriate for 303(d) decision making. The assessment finds that the criteria is not achievable, and hence excludes the water bodies from listing. Initially, you determine, but then dismiss without adequate basis, that habitat improvement will not alleviate temperature exceedences. Second, you deem source heating and low flows as "natural". However, if these factors are indeed "natural", there must be an additional non-natural factor that accounts for the failure of the waters to meet their beneficial uses. Third, issues of habitat improvement and flows are exactly the types of factors relevant to TMDL analysis. As a result, DWQ's decision to delist is not adequately supported and not in keeping with the Clean Water Act. The Act requires the listing of waters that are not meeting state water quality standards and mandates attainment and protection of beneficial uses. See, 33 U.S.C. § 1313(d)(1)(A). As Utah has water quality standards for temperature, the failure to achieve this standard cannot be ignored.

Finally, if the impairment is truly not fixable, the decision to change the designated uses and associated criteria must be reviewed under a formal Use Attainability Analysis for each water body. In any case, these water bodies must remain on the 303(d) list until they achieve the temperature standard.

IV. 5D Lakes and Reservoirs

In the draft list, DWQ defines 5D waters as "[l]akes not fully supporting beneficial uses for 2006 that will not be listed as Category 5A (requiring a TMDL) until two consecutive assessment cycles demonstrate impairment."

The draft list places the following waters in Category 5D: Washington Lake, Wide Hollow Reservoir, Ferron Reservoir, Monticello Lake, Starvation Reservoir, Rockport Reservoir, and Three Creeks Reservoir. All of these waterbodies are classified as 3A waters.

As you know and as the U.S. Environmental Protection Agency (EPA) has emphasized, the federal Clean Water Act (CWA) section 303, requires each state to "identify those waters within its boundaries for which the [technology-based or other existing] effluent limitations are not stringent enough to implement any water quality standard [WQS] applicable to such waters." 33 U.S.C. § 1313(d)(1)(A). EPA regulations and policy clarify that states must identify all segments of water bodies which do not or may not within the next two years meet numeric water quality criteria, narrative criteria, water body designated or existing uses or antidegradation requirements. 40 C.F.R. § 130.7(b)(3)

Nothing in the statute or regulations allows the state to require water quality standards to be violated for extended periods of time (four years in the case of the two listing cycles) before listing the relevant water. These waterbodies must be placed in category 5A.

V. Category 4A

DWQ seems to make contradictory statements regarding Category 4A. For example, the agency states that "[o]ne major change . . . includes the reporting of all completed TMDLs in Category 4A, TMDLs completed and approved by EPA." Draft List at II-1. However, DWQ goes on to state that "[w]ater quality impairments caused by pollution, i.e. habitat alteration, flow alternation, will be listed in Category 4A, impaired, but a TMDL is not required for this type of impairment." Id. These statements are contradictory. To the extent that DWQ will list segments and water bodies for which TMDLs have been prepared, but which are not meeting beneficial uses, we support this effort and hope that this very important information will be released to the public in a user-friendly fashion. If Category 4A will not include such a list, we urge that one be created. It is critical that this information be available to the public.

VI. Category 4C

Later, DWQ defines Category 4C as including impaired waters for which TMDLs are not required because the "impairment is not caused by a pollutant." Draft List at II-7. For the reasons explained above relative to 5B delistings, this category is not in keeping with the Clean Water Act, which requires the attainment of beneficial uses and the listing of all water bodies that are not attaining these uses. See, 33 U.S.C. § 1313(d)(1)(A). For example, because there is a water quality standard for temperature and maintaining proper temperature is essentially to maintaining beneficial uses, it is inappropriate to delist waters when temperature standards are not being met. Clearly, a water not meeting the standard for temperature is a water for which other "effluent limitations . . . are not stringent enough" to achieve state water quality standards. Id. Therefore, listing of such a water is required under the act whether or not the violation of the standard is caused by a pollutant.

VII. Category 3

It is unclear whether Category 3 will include AUs for which little or no water quality monitoring data exists. We have long been concerned about waters that are not listed on the 303(d), because little or no water quality monitoring data exists. In these situations, DWQ does not know whether the water is meeting its beneficial uses. However, the fact that a water is not on the list is used by entities such as federal land managers to suggest that the water is meeting its beneficial uses. Yet, where there is little or no water quality monitoring data for the water, no such conclusion can be drawn. Therefore we welcome a list of waters for which there is insufficient information to determine whether beneficial uses are being met. To the extent that Category 3 does not include such a list, we urge that one be created. Moreover, we urge that DWQ gather the information necessary to determine if the waters are meeting state water quality standards.

Thank you again for this opportunity to comment on Utah's Draft 303(d) List. We hope that this comments are helpful to you and that you will incorporate our concerns into your final list. Please feel free to contact me with any questions.

JORO WALKER, Esq.
Director, Utah Office

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In Reply Refer To
FWS/R6
ES/UT

February 21, 2006

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DIVISION OF
WATER QUALITY

Walt Baker
Department of Environmental Quality
Division of Water Quality
288 North 1460 West
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RE: Utah's Draft 2006 303(d) List of Impaired Waters

Dear Mr. Baker:

The U.S. Fish and Wildlife Service (Service) has reviewed the draft 2006 303(d) list of impaired waters, and is providing the following comments for your consideration.

Huntington Creek

In our comment letter for the 2004 303(d) list, subsequent conversations with the Division of Water Quality (UDWQ), and consultation with EPA, we expressed concern that selenium concentrations in Huntington Creek exceeded the State's water quality criteria on a regular basis. In 2004 we believed there was enough evidence to list the stream as impaired for selenium; however, the State believed there was insufficient data to make a proper assessment. To address our concerns, the State agreed to collect additional data and re-evaluate the assessment units in 2006.

In reviewing the data available in STORET since January 1, 2004, eight samples were collected on Huntington Creek at the Highway 10 crossing (Station 4930524). Only one of these samples exceeded the state standard of 4.6 µg Se/L. These data suggest Huntington Creek above the Highway 10 crossing is not impaired for selenium as per criteria from Table 4 in "Utah's 2006 Integrated Report Volume II – 303(d) list of Impaired Waters." However, for the reach below the Highway 10 crossing, only four data points exist since January 1, 2004: two at each above and below the Huntington wastewater lagoons (stations 4930520 and 4930500, respectively). At each location, the water quality criterion for selenium was exceeded in half of the samples and the other half were not far below the criterion.

Of note is the increase of selenium concentrations observed between the Highway 10 crossing and the station above the lagoons: during this short distance selenium concentrations on November 18, 2004 increased from 3.49 to 6.34 µg/L. These data—while few—once again suggest that selenium concentrations in Huntington Creek below the Highway 10 crossing are at or above the water quality standard. The paucity of samples below the Highway 10 crossing makes it difficult to adequately assess Huntington Creek. Once again, we encourage the Division of Water Quality to collect additional data for Huntington Creek below the Highway 10 crossing. We also recommend that studies to address salinity (whether ongoing or planned) in Huntington Creek, nearby irrigation systems, and at Desert Lake WMA also investigate selenium.

Mercury and Fish and Wildlife Consumption Advisories

In previous assessments, the State has listed waterbodies on the 303(d) list if there was a fish or waterfowl consumption advisory. In the current cycle, the State did not list additional waterbodies because of health advisories [for mercury]. Reasons for this omission included the following: the fish catch rate is unknown, the number of species with elevated mercury concentrations is unknown, and extent of spatial contamination is unknown. We believe the State should re-evaluate this decision.

The State's detection limits for mercury in water samples almost always exceeded the water quality standard; therefore, it has been unclear whether waterbodies historically met water quality criteria for mercury or if they have been impaired. It is much easier to measure mercury in fish and invertebrate tissues and we applaud the State for the recent round of biological sampling, especially since this biological sampling is a relevant endpoint for both human health and aquatic life support, though the primary emphasis has thus far been placed on human health. Samples to date have shown most waters in Utah (at least of those sampled) are not of concern for mercury. There were, however, a limited number of waterbodies where mercury concentrations in fish warranted consumption advisories.

The fact that consumption advisories have been issued indicates mercury is of concern for these waterbodies. Angling pressure (e.g., how often an area gets fished and how many fish are harvested) is a concern from a human health standpoint, but regardless of angling pressures, elevated mercury in fish tissues suggests mercury is also elevated in the food chain and perhaps in the water as well. This alone should be reason to list. The number of species with elevated mercury concentrations may be important for human health and for issuing consumption advisories, but elevated concentrations of mercury in at least one fish species suggests mercury is elevated in the system. It seems likely that data from other states with mercury advisories would elucidate the relationship between mercury concentrations and a species' trophic level and that an evaluation on the number of species could be made without the need for further collections. And finally, the spatial distribution of fish with elevated mercury concentrations is of interest but should not limit interpretation, since the State similarly uses water samples from a point location to represent an entire reach of a river or lake. Once again, we recommend the State re-evaluate its decision to not list waterbodies with mercury consumption advisories.

Similarly, the Great Salt Lake has two waterfowl consumption advisories for mercury, which suggests this waterbody could be listed for mercury; however, since waterfowl are migratory the State suggests that the source of contamination may not be the Great Salt Lake. We agree that additional study is needed but we believe much is already known: USGS measured elevated concentrations of methyl mercury in Great Salt Lake waters; and data collected by the Service showed mercury concentrations in brine shrimp were higher in fall than in spring, that eared grebes accumulated mercury while staging on the lake during the fall, and that most of the wetlands around the lake are low in mercury. The preponderance of evidence to date suggests mercury is an element of concern for the open waters of the Great Salt Lake.

Colorado River and Selenium

In our comment letter for the 2004 303(d) list we recommended that the assessment units of the Colorado River from the boundary with the state of Colorado down to the confluence with the Green River be listed for selenium. At that time STORET data for years 1999 through 2003 showed selenium concentrations exceeded the aquatic life chronic criteria of 4.6 µg Se/L on numerous occasions at all stations on the Colorado River between the state line and the confluence with the Green River.

Since January 1, 2004 the trend has continued despite an increase in precipitation and flows. For instance, selenium concentrations in three of twelve samples exceeded the chronic criteria of 4.6 µg/L at station 495629 (Colorado River at Potash boat ramp) and in four of thirteen samples at the station directly above the confluence with the Green River (495240). We once again recommend these assessment units of the Colorado River between the state line and the confluence with the Green River be listed for selenium.

We acknowledge that limited data are available and that most exceedances have occurred during low flow periods. We also acknowledge that the primary sources of selenium appear to come from areas in Colorado which are beyond the borders and jurisdiction of Utah. However, listing an extensive portion of the Colorado River would illustrate the scope and pervasiveness of selenium contamination in the Colorado River from upstream sources. Such awareness could bring additional resources and leverage to bear on the selenium issues in Colorado.

If further assistance is needed or you have any questions, please contact Nathan Darnall, at (801) 975-3330 extension 137.

Sincerely,

for Henry R. Maddux
Utah Field Supervisor

cc: Thomas Toole, Utah Department of Environmental Quality, Box 144870, Salt Lake City, Utah 84114-4870
Kathryn Hernandez, U.S. Environmental Protection Agency, Water Quality Unit, 999 18th Street, Suite 300, Denver, CO 80202-2466

Response to comments received from Great Salt Lake Alliance
Letter dated February 20, 2006

Comment:

The commenter addressed the pertinent information with regard to the Clean Water Act by citing the section of the United State Code and 40 C.F.R. and has proposed that Farmington Bay and the Great Salt Lake should be placed on the 303(d) list for a number of reasons (See Comment).

Response:

Although the commenter raised several issues related to nutrients, eutrophication and health advisories based on the consumption of two species of waterfowl as justification for listing the above waters, the Division of Water Quality has determined that it would be presumptive to list either Farmington Bay or the Great Salt Lake on the 2006 303(d) list.

The major rationale for not listing is the lack of water quality standards developed for either of the waters. The Division of Water Quality has been working with various groups and has been working with a variety of stakeholders this past year to collect data and information on Farmington Bay and the Great Salt Lake. Two committees, the Great Salt Lake Steering Committee and the Great Salt Lake Science Panel, were formed to assist in collecting and reviewing data from the current project(s) and to provide input into the development of water quality standards for both waterbodies. The issues related to these waters are many and complex and need to be thoroughly evaluated before standards are established. The Division of Water Quality strongly supports the process where all interested parties are involved in developing standards based on sound data and judgment that are both protective of the resource and address potential issues related to municipal and industrial development and public interest.

DWQ is not required to list either water body on the 303(d) list due to the concerns raised in your comments related to eutrophication and health advisories. In addition, other questions such as the cumulative effect of wastewater treatment plants, the effect of cumulative storm water entering the lake, cumulative effects of streams, issues related to population growth can be addressed through the committees and stakeholders that are contributing both time, resources, and money to learn more about the complex ecosystems that exist and what will be needed to be implemented beyond just standards to protect and enhance them.

The fact that the DWQ has chosen not to list either waterbody does not mean that we are not cognizant of the issues raised to protect the lake and its environs nor does it mean that steps will not be taken to ensure the current beneficial uses are defined and protected. However, the DWQ firmly believes that the best approach to the issues is to finish the current studies and assess them as a step towards developing standards. This will ensure that the standards are established based up enough data and on good science.

The following section addresses specific issues raised by the commenter:

1. **Farmington Bay and the Great Salt Lake should be listed because of health consumption advisories based on levels of mercury that have been identified in two species of waterfowl.**

The DWQ has never established a defined a methodology for listing waters based upon fish and waterfowl advisories. Health advisories have been used in conjunction with water quality data to support listings. DWQ staff have reviewed several states listing criteria for fish and wildlife consumption advisories and discovered variation applying the information in conjunction with such things as levels of contamination, creel counts, age classes, fishing pressure, and other things to determine whether to list a specific waterbody where health advisories exist.

DWQ is considering that listing methods should also incorporate some function related to migratory habits of fish and waterfowl too. Due to lack of a formalized process involving the examples cited, DWQ has decided not to list any additional waters based solely upon advisories until it has developed a formalized listing methodology that will include issuance of health advisories. It is DWQ's intent to develop such a methodology as quickly as possible soliciting input from those groups and other interested parties as we move forth in gathering additional data and information essential for the methodology foundation. This, in no way, lessens the concerns the DWQ has about the potential impacts of mercury or other toxics in the state. The Division is currently involved with a variety of stakeholders in assessing and determining the potential impacts of mercury throughout the State and will continue to support this work and the development of appropriate methodology associated with listings based on health related issues.

Comment:

The commenter requests that Farmington Bay and its wetlands be included on the 303(d) list because it is not meeting beneficial uses of recreation, aquatic wildlife and aquatic life.

Response:

Open water area:

The Division has been actively engaged in studies that characterize the pelagic (open water) and wetland ecosystems of Farmington Bay since 2003. As the reports by Dr. Wurtsbaugh and others have indicated, the pelagic ecosystem is extremely complex. The primary driver is salinity, with characteristic of large seasonal and annual fluctuations. Briefly, significant ecological responses to this fluctuation include: 1) The ability of air breathing predatory corixids (*Trichocorixa verticalis*) to flourish in the lower salinities of the bay whereas it is virtually absent in Gilbert Bay (south arm of Great Salt Lake). Laboratory studies have indicated that corixid predation on brine shrimp is significant enough to cause the observed low populations in Farmington Bay. Predatory harpactacoid copepods are also able to flourish in Farmington Bay. 2) The salinity in Farmington Bay is occasionally low enough to allow the nitrogen-fixing Cyanobacterium *Nodularia sp.* to flourish whereas it is otherwise precluded by the high salinity of Gilbert Bay; 3) Lower salinity, by itself, has often been identified as the causative factor in reduced brine shrimp populations relative to Gilbert Bay. Therefore, although it is true that Farmington Bay is hypereutrophic, it has not yet been possible to identify impairment of beneficial uses that can be attributed to nutrients. Indeed, the brine shrimp are very tolerant to low dissolved oxygen and to high hydrogen sulfide concentrations, but we don't yet know what acute and chronic values are appropriate for brine shrimp. And we don't know the relative importance of water quality and predation by corixids or copepods in reducing shrimp populations. Perhaps most importantly, most of the waterfowl and shorebirds found foraging in Farmington Bay are in the shallow "sheet-flow" areas which constitute the transition between freshwater inflows and the hypersaline pelagic waters. These zones are richly populated with corixids, midge larvae, amphipods and large cladocerans (Class Crustacea). Documents attached by the commenter report phenomenal numbers of many important waterbird species foraging in these productive habitats. Indeed nesting American avocets and black neck stilts and their fledglings have been found to successfully forage on primarily corixids and midge larvae in these transition zones.

Wetland areas:

Our ongoing intensive wetland studies are focused on potential impairment of functional attributes by nutrients. Our studies are including, sediment, water column and plant tissue nutrient concentrations, above-ground biomass, stem height, macrophyte species composition, periphyton and phytoplankton species composition, macroinvertebrate species composition and shorebird nesting and foraging success. Our macroinvertebrate and algal surveys are also including known sensitivity ranges of water quality parameters that occur in these wetland communities.

We maintain that is one of the most comprehensive wetland studies ever conducted and particularly in reference to potential impairment by nutrients.

As seen from the above and often conflicting information, it is premature to list Farmington Bay or its wetlands on the

303(d) list. We have not been able to identify any impairment thus far. However, additional and specific studies which we would like to perform are: 1) the palatability of *Nodularia sp.* to brine shrimp and cladocerans; and 2) the potential for *Nodularia sp.* to produce hepato- and neurotoxins and their subsequent potential impact on aquatic life and aquatic wildlife that utilize Farmington Bay. We are continuing to find resources to answer questions on the characterization of these waterbodies and as numeric criteria are defined and assessment methodology developed evaluations of these waterbodies will occur and if impairments exist they will be listed.

Response to Great Salt Lakekeeper

Jordan River Watershed Management Unit

Comment:

1) The proposed listings do not reflect recreational impacts caused by visible, floating, trash, garbage and solid waste (debris, junk, objects).

Response:

The Division of Water Quality has not established methodology for listing an assessment unit on the 303(d) list based upon the impacts to recreation by the visible, trash, garbage, and solid waste. In addition, the descriptions provided by the commenter are of a general nature and do not provide sufficient information or data for the DWQ to use in a listing procedure. Although the DWQ has decided not to list the segments of the Jordan River, the State Canal or the Surplus Canal based upon comments and information submitted. We recognize that in order to control such nuisance a collaborative effort would need to be established with Salt Lake County and the cities within the valley to improve their enforcement of illegal dumping.

Comment:

2) The proposed listings do not reflect the recreational impacts caused by undesirable smells of the Jordan River resulting from the discharges at wastewater treatment facilities.

Response:

The commenter states that the Jordan River has developed a signature background smell that is unnatural and creates a negative impact to the 2B recreational uses of the river. He further states that he has traced the origin back to the regional wastewater treatment facilities located in Salt Lake County. Malodor issues, which may contribute to a nuisance condition, are outside the purview of Utah's Water Quality Standards.

Comment:

3) The proposed listings do not include impairments found in the Surplus Canal and State Canal segments of the lower Jordan River System.

Response:

The State Canal does not have any beneficial use standards and the DWQ will address this issue in the triennial review. Therefore, it will not be listed during this cycle. The Surplus Canal will be listed for total dissolved solids.

Comment:

4) The proposed listings do not include habitat loss and modification impairments.

Response:

The commenter has referenced the impacts of habitat and stream modifications and their affect on elevated waterbody temperature, lower dissolved oxygen, and reduction in wildlife populations, and has requested that the entire Jordan River and the Surplus Canal be listed but has not provided any information or data that document that these effects. Where the DWQ has listed segments of the Jordan River for dissolved oxygen and temperature impairments, all possible effects including habitat and stream modifications will be evaluated in the TMDL process. The DWQ will not list the entire Jordan River or the Surplus Canal for habitat loss and modification impairments without sufficient data and information to assess the impacts. Habitat modifications such as riparian habitat loss can be listed as causes of impairment but TMDLs are not required to address these causes under the federal Clean Water Act.

Comment:

5) The proposed listing for E. coli is not complete.

Response:

The DWQ has listed all segments for *E. coli* where data had been collected and the assessment was based upon the U. S. Environmental Agency's recommended sampling protocol and analysis for impairment. Only those segments that met the criteria for listing are listed. As for Segment-4 of the Jordan River, it will be included in the TMDL evaluation of *E. coli* even though it is not listed because it can be a source of *E. coli* that is contributing to the downstream impairment.

Comment:

6) Dissolved oxygen listings are not consistent.

Response:

Upon review of the 303(d) list, the DWQ discovered that there were two errors in the listing of the Jordan River segment 1. The first error was that the segment is not classified as 3C and the second error was the omission of the Class 3D. The 303(d) list has been edited to correct these errors. As stated before, the State Canal does not have any standards and the DWQ or others may address this issue in the triennial review.

Comment:

6) TDS listings are not consistent.

Response: After reviewing the data it was determined that segment-4 of the Jordan River be added to the list as being impaired by TDS. Segments 2 and 3 did not meet the requirements for listing, but will be evaluated during the TMDL process because downstream segments are impaired by TDS. The DWQ will add the Surplus Canal to the list because of TDS violations.

Response to comments received from Jordan River Watershed Council POTW Advisory Group (South Valley Sewer District, South Valley Water Reclamation Facility, South Davis County Sewer Improvement District, Kearns Improvement District).
In Letter dated February 19, 2006

Response:

After reviewing the comments provided by the above entities, it was apparent that the issues they are addressing apply to the Total Maximum Daily Load Analysis (TMDL) program for the Jordan River. Questions and information included in the letter do not directly address issues related to the 303(d) listing process. The information was passed on to the TMDL section for their review and incorporation into development of the Jordan River TMDL. In addition it was suggested that they include these issues in dialogue with the entities submitting the comments. DWQ recognizes their desire to participate in the development of the TMDL and recommends that they pursue active participation in the TMDL process to assure the points that were raised are addressed and included to the extent feasible within the TMDL process.

Under current regulations, dissolved phosphorus cannot be considered in the listing process without linkage to a specific water quality standard. Total phosphorus is an indicator of pollution utilized in determining impairment. Segments are not placed on the 303(d) list unless there is other data that confirms that total phosphorus is a contributing factor to the impairment of a stream or lake.

Response to comments received from The Nature Conservancy of Utah
In Letter dated February 21, 2006

Comment:

The Nature Conservancy encouraged DWQ to list Farmington Bay and the Great Salt Lake as a first step in a larger public/private effort to understand what information and actions are required to ensure that these invaluable resources are not irreparable damaged by human actions today, but continue to function for the dual purposes of wildlife conservation and human use for generations to come.

Response:

As previously discussed to other commenters, DWQ supports the effort to acquire background data, establish or modify water quality standards and then evaluations of mentioned waters in an effort to assess potential impairment. At the appropriate time action will then be undertaken to list or not list based upon scientific rationale and Utah Water Quality Standards.

Response to Comments Received from Western Resource Advocates
In letter dated February 20, 2006

Comment:

I. Impairment of Farmington Bay and Great Salt Lake

Reaffirmation and support of the petition by the Great Salt Lake Alliance to request the listing of Farmington Bay and the Great Salt Lake

Response:

See response documented in response to comments received from the Great Salt Lake Alliance

Comment:

II. Lack of 305(b) Data

The commenter states that the draft list was handicapped by the fact that the data used to draft the listing were not based on available data from Volume I of the Integrated Report. In addition, they requested that DWQ coordinate the joint release of these volumes in the future in order to allow meaningful public input.

Response:

Volume II of the Integrated Report, which is commonly referred to as the 303(d) list, does not contain the data that the assessments for the report and the list were based on. It describes the areas that were assessed and the results of the Division of Water Quality's assessment. The results are presented in tabular and graphical form. It includes information on the number of stream miles fully supporting or not supporting their beneficial uses. Included in the report are maps of delineating stream beneficial use designations and the assessment categories that stream segments were assigned to after the assessment. The raw data used for assessments are available to the public through STORET as the commenter noted or can be requested from the DWQ. DWQ concludes that the data were available to the public for review but appreciates the concern and hopes this information will clarify our process.

DWQ is committed to submission of an Integrated Report during the next cycle (2008). Both the 305(b) report section of the Integrated Report and the 303(d) list will be available at the same time for the 2008 listing cycle.

Comment:

III. 5B Delistings

Bacteriological delisting of Spring Creek.

The commenter suggests that the delisting was incorrect because it was not based on evidence of the standards being met.

Response:

DWQ made an error in requesting the delisting of Spring Creek for bacteria. A Total Maximum Daily Load analysis has been completed and approved for Spring Creek with one of the parameters of concern as bacteria. Therefore, the DWQ will place it in Category 4A, indicating that the impaired segment has a completed and approved TMDL. Current data indicates the stream is still impaired, but efforts are underway to reduce, abate or eliminate sources of defined pollutants. In future evaluations of Spring Creek, the new E. coli standard will be used in assessing the stream with the adoption of associated E. coli criteria.

Temperature delisting for numerous reservoirs and lakes

Comment:

Inadequate support presented for delisting.

Response:

DWQ maintains that calculation of the reservoir-specific heat budget is the most scientific approach to determining the potential for a reservoir to maintain or restore adequate temperature to support a 3A (cold water) fishery. This new information has been vital in our assessment of the efficacy and appropriateness in performing a TMDL for temperature. In each case, there is a net addition of several billion calories of heat per month by solar radiation. Hence, the substantial heat loss from evaporative cooling or blending with tributary water is easily overwhelmed. Also notable, tributaries are concurrently at seasonal low (summer) flows. In addition, in most cases, these reservoirs are or have become shallow with summer withdrawal and not strongly stratified. Hence, radiant heating occurs over broad littoral zones or even the entire sediment surface. In one noted exception, Porcupine Reservoir, the dam is managed for a hypolimnetic withdrawal. This type of withdrawal allows the cool tributary water to under-flow the warm epilimnion (rather that mixing with it or discharging it), in order to maintain the desired 3A fishery downstream. The commenter should also keep in mind that all of these waterbodies are "unnatural" storage reservoirs built on small streams that experience only seasonal (spring) high flows. Hence, the purpose of these reservoirs was not to create a coldwater fishery, but rather to store water for irrigation and culinary use. In turn, during severe summer drawdown, reducing or eliminating a cool hypolimnetic refuge is "normal".

In addition the CWA does not require the development of TMDLs for flow or habitat alteration related impairments. Part of the evaluation of temperature regimes within a reservoir would also include inflow water temperatures and potential for reduction of those temperatures through habitat improvements.

Comment:

IV. 5D Lakes and Reservoirs

The commenter contends that lakes and reservoirs cannot be placed in Category 5D but should be included in Category 5A, 303(d) list. The commenter contends that the assessment method used is not appropriate for 303(d) decision making.

Response:

The DWQ places lakes and reservoirs that fluctuate between meeting state standards and not, from year to year, into this category. The lakes or reservoirs in this category are not being ignored by following this procedure. Rather, this procedure recognizes the annual variability in the response indicators (assessment criteria) that are measured. Together with long-term trend data, our assessment is aimed at responsibly identifying true impairment rather than falling into the trap of cycling on and off of the 303(d) 5A list. This would only add further confusion and perhaps unnecessary time and expense of performing a TMDL. For further clarification, we are equally stringent in requiring a reservoir to meet water quality standards for two consecutive reporting cycles before it would be removed from the category 4A list.

Comment:

VI. Category 4A

DWQ seems to make a contradictory statements regarding Category 4A. “For example, because there is a water quality standard for temperature is essentially to maintaining proper temperature is essentially to maintaining beneficial uses, it is inappropriate to delist waters that when temperature standards are not met.”

Response:

The DWQ agrees that the paragraph was contradictory and confusing due to grammatical errors. The statement has been changed to read, “Water quality impairments caused by pollution, i.e., habitat alterations, flow alteration, will be listed in Category 4C, impaired, but a TMDL is not required for this type of impairment. (Page II-1, paragraph 5).

In addition the commenter then went on to imply that this category could not be used for temperature impaired waters.

Response:

This is correct and the DWQ does not contend in this paragraph that temperature impaired waters could be placed in this category. Elevated temperature is considered a pollutant and requires a TMDL when violation of the water quality standards results. However, it should be noted DWQ has always placed impairments based on pollutants in Category 5A.

Comment:

VII. Category 3

The commenter states “It is unclear whether Category 3 will include AUs for which little or no water quality monitoring data exists………..However, the fact that a water is not on the list is used by entities such as federal land mangers to suggest that the water is meeting its beneficial uses.” Later in their comment they urge DWQ to develop a list within Category 3 indicating waters that qualify for this category that presumably would be somewhere in the Integrated Report.

Response:

The reasons for placing Assessment Units in Category 3 are clearly defined in the text of the 303(d) list (Page II-4) under Category 3. Assessment Units (AUs) for which there are no data or insufficient data to make a determination of use support for all of its assigned beneficial uses are placed in this category and a list is included in the 305(b) report.

As to the latter portion of this commenter’s concern suggesting federal agencies interpret and use the fact that since these waters are not listed as impaired waters they suggest that a water is not impaired and use this concept in their analysis is beyond the scope of our listing process. When waters qualify as Category 3 waters, the DWQ does not assume nor should anyone else assume that a water is either meeting or not supporting its beneficial uses. DWQ considers the recommendation of establishing a formal Category 3 list a good idea and will look to incorporate such a list in the 2008 Integrated Report to the extent these waters have been defined.

Response to comments received from U. S. Fish and Wildlife Service
Letter dated February 21, 2006

Huntington Creek

Comment:
Once again, we encourage the Division of Water Quality to collect additional data for Huntington Creek below the Highway 10 crossing .We also recommend that studies to address salinity (whether ongoing or planned) in Huntington creek, nearby irrigation systems, and at Desert Lake WMA also investigate selenium.

Response:
After further review of the data, we concur with your comments and will include Huntington Creek below U-10 on the list of impaired waters for Selenium. Many of the listings for selenium are indicative of concentrations relatively low compared to the water quality standard. As with all current listings for selenium DWQ will undertake a process to obtain additional water quality data using better techniques for sampling and analysis to provide justification for the current listing or for delisting based on this additional data.

Mercury and Fish and Wildlife Consumption Advisories

Comment:
Once again, we recommend the State re-evaluate its decision to not list waterbodies with mercury consumption advisories.

Response:
The DWQ has never established a defined a methodology for listing waters based upon fish and waterfowl advisories. Health advisories have been used in conjunction with water quality data to support listings. DWQ staff have reviewed several states listing criteria for fish and wildlife consumption advisories and discovered variation applying the information in conjunction with such things as levels of contamination, creel counts, age classes, fishing pressure, and other things to determine whether to list a specific waterbody where health advisories exist.

DWQ is considering that listing methods shall also incorporate some function related to migratory habits of fish and waterfowl. Due to a lack of a formalized process involving examples cited, DWQ has decided not to list any additional waters based solely upon advisories until it has developed a formalized listing methodology that will include issuance of health advisories. It is DWQ's intent to develop such a methodology as quickly as possible soliciting input from those groups and other interested parties as we move forth in gathering additional data and information essential for the methodology foundation. This, in no way, lessens the concerns the DWQ has about the potential impacts of mercury or other toxics in the state. The Division is currently involved with a variety of stakeholders in assessing and determining the potential impacts of mercury throughout the State and will continue to support this work and the development of appropriate methodology associated with listings based on health related issues.

Comment:
The preponderance of evidence to date suggests mercury is an element of concern for the open waters of the Great Salt Lake.

Response:
We understand your concern describing mercury as an element of concern within the Great Salt Lake. In summary, as previously described, DWQ in conjunction with other stakeholders, including your office, is currently gathering additional data and studying the environs associated with the Great Salt Lake. The presence of elevated mercury levels is one of the factors behind these investigations. At the appropriate time, DWQ will conduct assessments based on water quality standards and defined methodology to evaluate use support.

Colorado River and Selenium

Comment:
We once again recommend these assessment units of the Colorado River between the state line and the confluence with the Green River be listed for selenium.

Response:
After further review of the data we concur with your comments and will proceed to include the Colorado River from the confluence of the Green River upstream on the list of impaired waters for selenium.

Response to comments received from U. S. Fish and Wildlife Service
Letter dated February 21, 2006

The Division thanks you for your review and comments on the 2006 303(d) List of Impaired Waters sent in your letter of February 15, 2006. As you are aware from subsequent discussions relative to Farmington Bay and the Great Salt Lake, the Division agrees with the opinions and rationale presented in your letter regarding the addition of Farmington Bay and the Great Salt Lake to the current 303(d) List for 2006.

In light of the intensive investigations currently underway on both the Great Salt Lake and Farmington Bay to both determine selected water quality standards (Selenium) and ascertain the beneficial use support of Farmington Bay, the Division agrees it would not be prudent at this time to list the Bay for nutrients or the GSL for mercury. There are vital questions that need more complete answers. We agree that the research must continue and the efforts underway lead by the Great Salt Lake Steering Committee must continue to assure that these valuable resources are fully understood and protected.