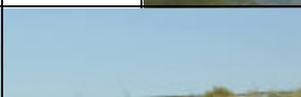


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# Lower Boise River Nutrient & Tributary Subbasin Assessments

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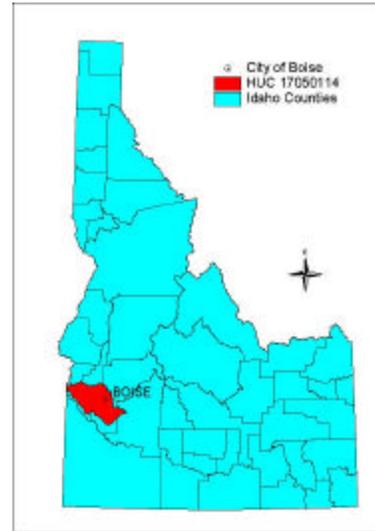
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## Introduction

The lower Boise River watershed, Hydrologic Unit Code (HUC) 17050114, is located in southwest Idaho. The watershed drains 1290 square miles of rangeland, forests, agricultural lands, and urban areas. The lower Boise River itself is a 64-mile stretch that flows in a northwesterly direction through Ada and Canyon counties and the cities of Boise and Caldwell, Idaho. The lower Boise River originates at Lucky Peak Dam and flows into the Snake River near Parma, Idaho. Two segments of the lower Boise River (Star to Notus, Notus to Snake) are listed for nutrients on Idaho's 1998 303(d) list. In addition, eight tributaries to the river are listed for multiple pollutants (Table1).



The 303(d) listed tributaries include Blacks Creek, Fivemile Creek, Tenmile Creek, Mason Creek, Indian Creek and Sand Hollow Creek (Figure1). These water bodies, including the river, are scheduled for assessment and possible TMDL development in 2001. Three additional tributaries were added to the 1998 303(d) in January 2001. Dixie Drain and Willow Creek were added for temperature and Cottonwood Creek was added for unknown pollutants. The TMDL's for Dixie Drain, Willow Creek and Cottonwood Creek are anticipated in 2006.

This document describes the water quality conditions and beneficial use support status for the lower Boise River as it pertains to nutrients and Blacks Creek, Fivemile Creek, Tenmile Creek, Mason Creek, Indian Creek and Sand Hollow Creek as they pertain to their respective 303(d) listed pollutant (as described in Table 1). Cottonwood Creek, Willow Creek and Dixie Drain are not addressed in this document.

Due to the hydrologic complexity and the vast range of jurisdictional authority in managing the river and of each of the tributaries to the river, the assessment of each water body is addressed in separate, stand-alone documents. This method of assessment enables the data and the interpretation of data for each water body to be readily available for the reader. While some redundancy occurs between the assessments, the redundancy is necessary so that each assessment is a stand-alone document. The documents appear in the following order:

1. Lower Boise River
2. Fivemile and Tenmile Creek
3. Indian Creek
4. Mason Creek
5. Sand Hollow Creek
6. Blacks Creek

The technical appendices to the tributary assessments are available at the end of this package. The document that accompanies each appendix is clearly marked.

Table 1. 303(d) listed tributaries to the lower Boise River

Stream Name	Boundaries	Listed Pollutant(s)
Black Creek	Headwaters to Black Creek Reservoir	DO, Sediment, Nutrients
Fivemile Creek	Headwaters to Miller Canal	DO, Sediment, Nutrients
Tenmile Creek	Headwaters to Miller Canal	DO, Sediment, Nutrients
Mason Creek	Headwaters to Boise River	DO, Sediment, Nutrients
Indian Creek	Headwaters to New York Canal	DO, Sediment, Nutrients, Temperature
Indian Creek	New York Canal to Boise River	DO, Sediment, Nutrients, Oil/Grease, Temperature
Sand Hollow Creek	Headwaters to Snake River	DO, Sediment, Nutrients
Cottonwood Creek	Headwaters to Freestone Creek	Unknown
Dixie Drain	Headwaters to Boise River	Temperature
Willow Creek	Headwaters to Freestone Creek	Temperature

## Assessment Summaries

### Lower Boise River

For purposes of designating beneficial uses, the *Idaho Water Quality Standards and Wastewater Treatment Requirements* (IDAPA 58.01.02) delineate the lower Boise River by segments. The river is designated for cold water biota, primary contact recreation and domestic water supply from Lucky Peak Dam to the Barber Diversion. From Barber Diversion to River Mile 50 (Veteran's Parkway) the river is designated for cold water biota, salmonid spawning, primary contact recreation and domestic water supply. Above River Mile 50, the river is also designated as a special resource water. From River Mile 50 to Indian Creek, the river is designated for cold water biota, salmonid spawning and primary contact recreation. From Indian Creek to its mouth, the river is designated for cold water biota and primary contact recreation. The river is 303(d) listed for nutrients from Star (about River Mile 35) to the Snake River.

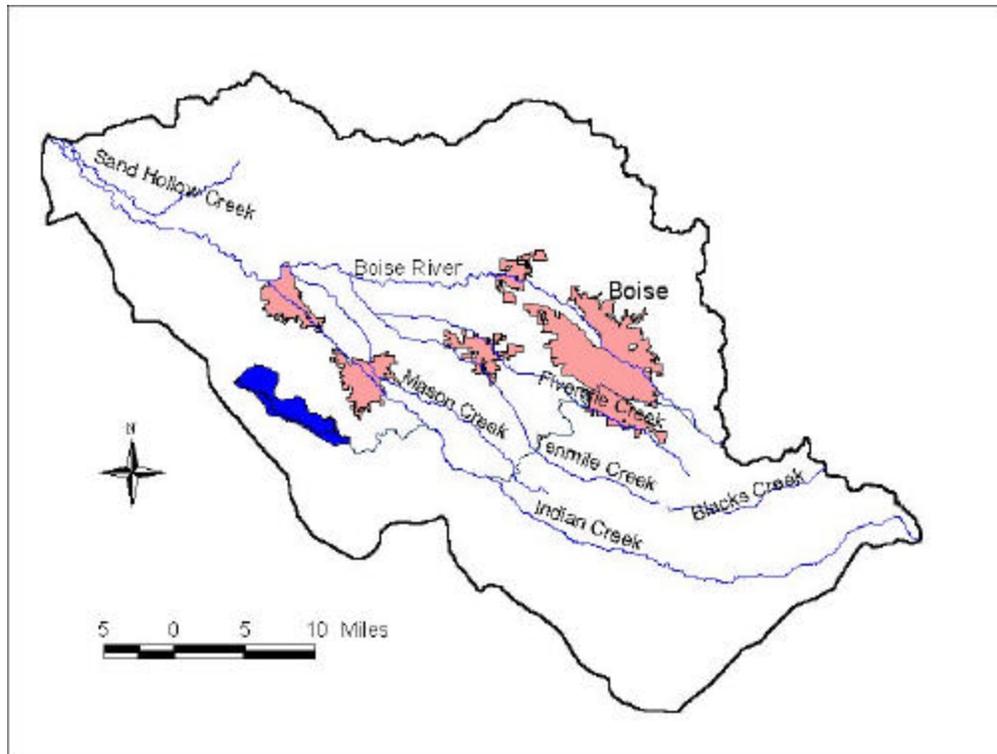


Figure 1. Waters included in the lower Boise River assessment

The *Idaho Water Quality Standards and Wastewater Treatment Requirements* (IDAPA 58.01.02) are designed to provide protection for designated and existing beneficial uses. If the numeric water quality criteria are not met, the associated beneficial uses are typically not fully supported. The state of Idaho does not have a numeric water quality criterion for nutrients. Rather, the standard is narrative. The standard says: “*Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses (IDAPA 58.01.02.200.06).*” The narrative standard is interpreted as indicating that if the designated and existing beneficial uses are not impaired by the *effects* of excessive nutrients in the water body, nutrients are not exceeding the narrative water quality standard.

In determining the support status of beneficial uses in the lower Boise River as they relate to nutrients, suspended and benthic chlorophyll-a levels are used as a surrogate to algal biomass, and hence excessive nutrients. The volume of macrophytes and other bulky aquatic species in the river are also investigated. The effects of excessive algal biomass on water chemistry (DO, pH) are evaluated to determine the direct effects on aquatic life. Historical and recent complaint data and anecdotal recreational information are reviewed to determine the public perception and aesthetic quality of the river.

The analysis indicates that nutrients are not impairing aquatic life or recreational beneficial uses in the lower Boise River. Thus, nutrients will be proposed for 303(d) de-listing. However, nutrients that originate in the lower Boise River watershed are contributing to the impairment of beneficial uses in the Snake River and Brownlee Reservoir. 40 CFR 131.10(b) says that the State shall take into consideration the water quality and standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of water quality standards of downstream waters. For this reason, nutrient allocations driven by the Snake River - Hells Canyon TMDL may be necessary.

## Fivemile and Tenmile Creek

The Fivemile and Tenmile Creek subwatersheds drain 83 and 74 square miles of rangeland, agricultural land and urban areas, respectively. Both streams are located in the southeast portion of the lower Boise River watershed, which is located in southwest Idaho. Fivemile and Tenmile Creek flow in a northwesterly direction through Ada and Canyon Counties before they join together to form Fifteenmile Creek, which discharges to the lower Boise River four miles upstream of the town of Middleton.

The section 303(d) listed pollutants in Fivemile and Tenmile Creek are sediment, nutrients and dissolved oxygen. The streams are designated in the *Idaho Water Quality Standards and Wastewater Treatment Requirements* for cold water biota and secondary contact recreation. Recognizing that cold water biota and secondary contact recreation may not be appropriate beneficial uses for highly regulated and irrigation driven systems, Nampa-Meridian and Pioneer Irrigation Districts performed a beneficial use evaluation for Fivemile and Tenmile Creek to characterize the appropriate beneficial uses, and submitted it to DEQ. The analysis shows that a modified aquatic life use accurately defines the best attainable conditions in both streams. The modified aquatic life use describes streams that are limited in aquatic life diversity due to factors such as ephemeral or intermittent flow, naturally occurring pollutant levels or long-standing hydrologic modification. The use evaluation also recommends removing all contact recreation designations. However, secondary contact recreation use will not be removed.

Modified aquatic life and secondary contact recreation are fully supported in Fivemile and Tenmile Creek. Using dissolved oxygen, pH, suspended sediment and algal biomass concentrations as indicators and surrogates of sustainable water quality conditions, the data do not indicate impairment by nutrients, sediment or dissolved oxygen. Surrogates provide an expression of water quality condition in instances where numeric water quality criteria do not exist, as with nutrients and sediment. Dissolved oxygen concentrations and pH levels are also within the criteria ranges, further indicating that aquatic life beneficial uses are not impaired. Due to the lack of beneficial use impairment, TMDLs for sediment, nutrients and dissolved oxygen are not required for Fivemile and Tenmile Creek and DEQ will recommend de-listing during the 2002 303(d) listing cycle.

Bacteria are not listed as a pollutant of concern in Fivemile or Tenmile Creek. However, the data show that E. Coli are exceeding the state standard at all locations in the stream. DEQ recommends listing Fivemile and Tenmile Creek for bacteria on the 2002 303(d) list and establishing a TMDL schedule.

Table 2 outlines the beneficial use support status in Fivemile and Tenmile Creek.

Table 2. Beneficial Use Support Status in Fivemile and Tenmile Creek.

<b>Segment</b>	<b>Designated Use</b>	<b>Existing Use</b>	<b>Impaired Use</b>	<b>Pollutant(s) Causing Impairment</b>
Headwaters to Fifteenmile Creek	CWB, SCR	MOD, SCR	SCR	Bacteria
Headwaters to Fifteenmile Creek	CWB, SCR	MOD, SCR	SCR	Bacteria

## Indian Creek

The Indian Creek subwatershed drains 295 square miles of rangeland, agricultural land and urban areas. Indian Creek is 55.68 mile long and is located in the southern portion of the lower Boise River watershed, which is located in southwest Idaho. The headwaters of Indian Creek are in Elmore County, but most of the stream flows through Ada and Canyon Counties. The stream flows in a southwesterly direction from its origin to where it intersects Interstate 84. From Interstate 84 to its confluence with the lower Boise River it flows in a northwesterly direction.

The section 303(d) listed pollutants in Indian Creek are sediment, nutrients, dissolved oxygen, temperature and oil/grease. Temperature is not addressed in this document because the state is currently developing a temperature assessment protocol and the TMDL is not due until 2006. Indian Creek is designated for cold water biota, salmonid spawning and primary contact recreation from the headwaters to Sugar Avenue (Nampa), and for cold water biota and secondary contact recreation from Sugar Avenue to the mouth. Recognizing that these designations were not appropriate for the stream segments above the New York Canal, the Lower Boise River Water Quality Plan, which acts as the watershed advisory group, performed a detailed beneficial use evaluation to characterize the appropriate beneficial uses. The analysis showed that from the headwaters to Indian Creek Reservoir the appropriate uses are seasonal cold water biota and secondary contact recreation. From the reservoir to the Callopy Gates (New York Canal-Indian Creek split) the appropriate uses are modified aquatic life and secondary contact recreation. The modified aquatic life use describes streams that are limited in aquatic life diversity due to factors such as ephemeral or intermittent flow, naturally occurring pollutant levels or long-standing hydrologic modification. Water quality criteria for dissolved oxygen, pH and temperature were developed to accompany the modified aquatic life use. From the Callopy Gates to the mouth the beneficial uses remain the same as those designated in the standards.

Using literature-based algal biomass levels as a surrogate to beneficial use support status, the data show that nutrients (phosphorus) are not assimilated by algae to the extent necessary to impair beneficial uses. Surrogates provide an expression of water quality condition in instances where numeric water quality criteria do not exist, as with nutrients and sediment. Dissolved oxygen (DO) concentrations and pH levels were also evaluated to determine nutrient impairment. pH levels were within the criteria range at all locations in the stream. Dissolved oxygen concentrations above the City of Nampa sagged below the standard during the summer months of 1996-1998, but were well above the standard in the remainder of the stream. The cause of the sag above Nampa has not been determined, but potential sources may include natural biological oxygen demand (BOD) caused by submergent macrophytes or sediment oxygen demand (SOD). DEQ does not recommend a DO TMDL because conditions have remained above the criteria for the past three years. Rather, DEQ recommends continuing to monitor DO concentrations to track the current conditions.

Total suspended sediment concentrations and the percentage of substrate surface fines (< 6 mm in diameter) relative to the remaining substrate material were used as sediment surrogates. While the data show that total suspended sediment concentrations are within the range necessary to support salmonid spawning and cold water biota, the percentage of surface fines below the Callopy Gates are in excess (62%) and are contributing to the impairment of aquatic life, particularly salmonid spawning. However, a closer review of the Rosgen stream channel classification shows that the expected level of surface fines in Indian Creek is 66%, which is within 3% of current conditions. This is substantiated by a 2001 United States Geologic Survey (USGS) report indicating that based on the geological framework of the valley, the bulk of the material transported by the lower Boise

river tributaries is sand and silt. Furthermore, a sediment source survey revealed relatively few sources of sediment above the City of Nampa, where salmonid spawning is a designated use. Based on these data, DEQ is not recommending sediment TMDL, but rather, recommends implementing the 37% sediment reductions stipulated in the lower Boise River TMDL (DEQ 2000) and assessing sediment conditions according to the schedule to be developed in the implementation plan.

Nutrients and oil & grease are not impairing beneficial uses in Indian Creek. Therefore, DEQ does not recommend TMDLs and recommends delisting nutrients and oil & grease as pollutants of concern from the 2002 303(d) list. Surface sediment (substrate) fine material is in excess below the New York Canal, but DEQ does not recommend a TMDL for sediment at this time. Further investigation into the sediment sources revealed that much of the surface fines are due to the natural functioning conditions of the stream. While no TMDL is required for sediment, DEQ does not recommend de-listing sediment from Indian Creek until the 37% suspended sediment reductions stipulated in the lower Boise River TMDL are implemented. The cause of the low dissolved oxygen conditions above the city of Nampa in the years of 1996-1998 is undetermined. While the sags did not occur in 1999-2001, DEQ does not recommend de-listing dissolved oxygen until sufficient data exists to show that the sags no longer exist.

Bacteria are not listed as a pollutant of concern in Indian Creek. However, the data show that E. Coli are exceeding the state standard at all locations below the New York Canal. DEQ recommends listing Indian Creek for bacteria on the 2002 303(d) list and establishing a TMDL schedule.

Table 3 outlines the beneficial use support status in Indian Creek.

Table 3. Beneficial Use Support Status in Indian Creek.

Segment		Designated Use	Recommended Use	Impaired Use	Pollutant(s) Causing Impairment
Headwaters to Indian Creek Res.		SS, CWB, PCR	SCWB, SCR	None	None
Indian Creek Res. to Callopy Gates	Aquatic Live	SS, CWB	MOD	None	None
	Contact Recreation	PCR	SCR	None	None
Callopy Gates to Con-Agra Beef	Aquatic Live	SS, CWB	SS, CWB	SS, CWB, SCR	Sediment, Dissolved Oxygen
	Contact Recreation	PCR	SCR	SCR	Bacteria
Con-Agra Beef to Sugar Ave.		SS, CWB, SCR	SS, CWB, SCR	CWB, SCR	Bacteria, Sediment
Sugar Ave. to mouth		CWB, PCR	CWB, SCR	CWB, SCR	Bacteria, Sediment

## Mason Creek

The Mason Creek subwatershed drains 62 square miles of rangeland, agricultural land and urban areas. Mason Creek is located in the southern portion of the lower Boise River watershed, which is located in southwest Idaho. Mason Creek largely flows through Canyon County, but the headwaters are located in Ada County. The stream flows in a northwesterly direction from its origin at the New York Canal to its confluence with the lower Boise River in the city of Caldwell.

The section 303(d) listed pollutants in Mason Creek are sediment, nutrients and dissolved oxygen. Mason Creek is not designated for beneficial uses in the water quality standards. For undesignated waters, the presumed uses are cold water biota and secondary contact recreation, unless analysis shows other uses are more appropriate. Using CH2M Hill as a contractor, the Lower Boise River Water Quality Plan performed a detailed beneficial use evaluation for Mason Creek in order to characterize the appropriate beneficial uses for a highly regulated, irrigation driven system. The analysis shows that modified aquatic life and secondary contact recreation represent the best attainable beneficial uses in Mason Creek. The modified aquatic life use describes streams that are limited in aquatic life diversity due to factors such as ephemeral or intermittent flow, naturally occurring pollutant levels or long-standing hydrologic modification. Water quality criteria for dissolved oxygen, pH and temperature were developed to accompany the modified aquatic life use.

Using literature-based algal biomass levels and total suspended sediment concentrations as surrogates to beneficial use support status, the data show that nutrients (total phosphorous) and sediment (total suspended sediment) are not impairing modified aquatic life or secondary contact recreation. Surrogates provide an expression of water quality condition in instances where numeric water quality criteria do not exist, as with nutrients and sediment. Dissolved oxygen concentrations and pH levels are also within the criteria ranges, further indicating that aquatic life beneficial uses are not impaired. Due to the lack of beneficial use impairment, TMDLs for sediment, nutrients and dissolved oxygen are not required for Mason Creek and DEQ will recommend de-listing during the 2002 303(d) listing cycle.

Bacteria are not listed as a pollutant of concern in Mason Creek. However, the data show that E. Coli are exceeding the state standard at all locations in the stream. DEQ recommends listing Mason Creek for bacteria on the 2002 303(d) list and establishing a TMDL schedule.

Table 3 outlines the beneficial use support status in Mason Creek.

Table 3. Beneficial Use Support Status in Mason Creek.

<b>Segment</b>	<b>Designated Use</b>	<b>Existing Use</b>	<b>Impaired Use</b>	<b>Pollutant(s) Causing Impairment</b>
Headwaters to Boise River	Undesignated	MOD, SCR	SCR	Bacteria

## Sand Hollow Creek

The Sand Hollow Creek subwatershed drains 93 square miles of rangeland, agricultural land and mixed rural farmstead. Sand Hollow Creek is located in the northwest portion of the lower Boise River watershed (although it drains to the Snake River), which is located in southwest Idaho. Sand Hollow Creek largely flows through Canyon County, but the headwaters are located in Gem and Payette Counties. The stream flows in a southwesterly direction from its

origin to Interstate 84, then in a northwesterly direction from the interstate to its confluence with the Snake River below Parma, Idaho.

The section 303(d) listed pollutants in Sand Hollow Creek are sediment, nutrients and dissolved oxygen. Sand Hollow Creek is not designated for beneficial uses in the water quality standards. For undesignated waters, the presumed uses are cold water biota and secondary contact recreation, unless analysis shows other uses are more appropriate. Using CH2M Hill as a contractor, the Lower Boise River Water Quality Plan performed a detailed beneficial use evaluation for Sand Hollow Creek to characterize the appropriate beneficial uses for a highly regulated, irrigation driven system. The analysis shows that modified aquatic life and secondary contact recreation are appropriate beneficial uses. The modified aquatic life use describes streams that are limited in aquatic life diversity due to factors such as ephemeral or intermittent flow, naturally occurring pollutant levels or long-standing hydrologic modification. Water quality criteria for dissolved oxygen, pH and temperature were developed to accompany the modified aquatic life use.

Using literature-based algal biomass levels and total suspended sediment concentrations as surrogates to beneficial use support status, the data show that nutrients (total phosphorous) is not impairing modified aquatic life or secondary contact recreation. Dissolved oxygen concentrations and pH levels are also within the criteria ranges, further indicating that aquatic life beneficial uses are not impaired by nutrients. TMDLs for nutrients and dissolved oxygen are not recommended for Sand Hollow Creek and DEQ will recommend de-listing during the 2002 303(d) listing cycle. When the data are compared to the total suspended sediment (TSS) surrogate they indicate that TSS is in excess above Parma and further reductions need to be made. However, DEQ does not recommend a sediment TMDL. Rather, an adaptive management approach is recommended by dovetailing with an ongoing management plan being implemented by the Canyon Soil Conservation Commission. Until the surrogate target is met, DEQ does not recommend removing sediment from the 303(d) list.

Bacteria are not listed as a pollutant of concern in Sand Hollow Creek. However, the data show that E. Coli are exceeding the state standard at all locations in the stream. DEQ recommends listing Sand Hollow Creek for bacteria on the 2002 303(d) list and establishing a TMDL schedule.

Table 4 outlines the beneficial use support status in Sand Hollow Creek.

Table 4. Beneficial Use Support Status in Sand Hollow Creek.

<b>Segment</b>	<b>Designated Use</b>	<b>Existing Use</b>	<b>Impaired Use</b>	<b>Listed Pollutant(s) Causing Impairment</b>
Headwaters to Snake River	Undesignated	MOD, SCR	MOD, SCR	Sediment, Bacteria

### Blacks Creek

Blacks Creek is a small stream in Southwestern Idaho originating in the Danskin Mountains, flowing out into the Boise valley and ending in Blacks Creek Reservoir. All creeks in the watershed, including Blacks Creek, are intermittent or ephemeral. The watershed drains 25,000 acres of rangeland. The 303(d) listed segment is 13.22 miles in length and extends from the headwaters of Blacks Creek to the reservoir. Blacks Creek is 303(d) listed for sediment, dissolved oxygen and nutrients. No beneficial uses are designated for the water body. Sources of sediment are from both natural conditions and

anthropogenic sources, including roads, grazing, borrow pits and off road recreation use. Nutrients primarily enter the stream through natural sources and grazing.

Blacks Creek was listed on the 303(d) list using anecdotal observations: no habitat or water quality data were provided in support of the listing. Data gathered since the listing shows that while sources of sediment and nutrients exist, the stream is able to naturally attenuate these inputs during the times when there is water flowing in the creek. No beneficial uses are designated in the water quality standards for Blacks Creek. However, the presumed uses are secondary contact recreation and cold water biota.

The water quality data show that while the temperature and dissolved oxygen levels are adequate to support cold water biota, the seasonality or lack of water prevents a cold water community from becoming fully established. There are no coldwater indicators in the macroinvertebrate data and no evidence of cold water fish. The aquatic life community in Blacks Creek is limited by the stream's intermittent nature and lack of perennial pools. This limitation is not the result of excess pollutants introduced through human caused activities but rather, the lack of water due to natural conditions. The cold water organisms cannot re-establish their community structure in the short period of time that water is available to them.

The receiving water, Blacks Creek Reservoir, is a warm water fishery and is stocked accordingly. The majority of the year, there is no direct drainage of Blacks Creek into the reservoir. The stream is either dry or submerged in the gravel substrate south of Interstate 84. It is presumed that the reservoir fills primarily by ground water infiltration. While this report addresses the reservoir, the reservoir itself is not part of the 303(d) listed water body and is not subject to a TMDL.

Coldwater aquatic life in Blacks Creek is limited by natural conditions and not by pollutant loading, hence, the DEQ finds that a TMDL is not necessary for Blacks Creek. Instead, DEQ will propose changing the aquatic life use designation to modified aquatic life use to better describe the limitations on the biotic community due to the seasonality of water. The modified aquatic life use describes streams, such as Blacks Creek, that are limited in aquatic life diversity due to factors such as ephemeral or intermittent flow, naturally occurring pollutant levels or long-standing hydrologic modification. The modified use criteria and subsequent rule change will be completed during the next rule making cycle.

Table 5 outlines the beneficial use support status in Blacks Creek.

Table 5. Beneficial Use Support Status in Blacks Creek.

<b>Segment</b>	<b>Designated Use</b>	<b>Presumed Use</b>	<b>Impaired Use</b>	<b>Listed Pollutant(s) Causing Impairment</b>
Headwaters to Blacks Creek Res.	Undesignated	CWB, SCR	None	None

### Implications of the Snake River – Hells Canyon TMDL

The Snake River-Hells Canyon TMDL is scheduled to be completed in 2001. Nutrients and sediment are listed as pollutants of concern in the TMDL and will be addressed by assigning load allocations to the major tributaries to the Snake River, including the lower

Boise River. When the Snake River-Hells Canyon TMDL allocates a nutrient load to the lower Boise River, load reductions from the tributaries to the lower Boise River will be necessary to meet the Snake River-Hells Canyon load allocation. Load reductions will also be necessary from the point sources. The schedule for assigning loads to the nonpoint sources and wasteloads to the point sources in the lower Boise River basin has not been determined. The Snake River-Hells Canyon TMDL must be approved before loads can be assigned.

## Implementation Plan Development

An implementation plan is currently being developed by the Lower Boise River Watershed Advisory Group and its supporting agencies to specify the activities needed to meet the sediment and bacteria load allocations identified in the 2000 sediment and bacteria TMDLs for the river. The implementation plan will contain placeholders to address nutrient reductions when they become necessary.