Mid Snake River / Succor Creek Subbasin

Five-Year Review of 2003 and 2007 Total Maximum Daily Loads

Department of Environmental Quality
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Idaho Power Company provided water quality data for the Snake River and several of its tributaries.

The Bureau of Land Management provided water quality data for Jump, Sinker, and Succor Creeks.

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Cover photograph is the Snake River at Marsing (Stone, 2011).

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Executive Summary

This document presents a 5-year review of the *Mid Snake River/Succor Creek Subbasin Assessment and Total Maximum Daily Load* (DEQ 2003) and the 2007 temperature and bacteria TMDL addendum (DEQ 2007). In the original analysis, many streams were found not to be meeting their beneficial uses. Temperature, sediment, nutrients (i.e., phosphorus), and bacteria were identified as the primary pollutants. The total maximum daily load (TMDL) established the maximum ability of the streams to absorb pollution and still meet water quality standards, and then allocated that level of pollution to sources within the watershed.

This review has been developed to comply with Idaho Statute 39-3611(7) and addresses the streams of the Mid Snake River/Succor Creek subbasin that are in category 4a of Idaho's Integrated Water Quality Monitoring and Assessment Report (Integrated Report). This review describes current water quality status, pollutant sources, and recent pollution control efforts in the subbasin. It also examines the assumptions, targets, and methods used in developing the TMDLs.

The assessment units subject to 5-year review are shown in Table A. Generally, water quality seems to be declining, despite an implementation plan that covers all the streams with TMDLs, with the exception of the Snake River assessment units. Sediment, temperature, bacteria, and phosphorus are still the main sources of pollution.

During the course of this review, the assumptions and methods of the sediment TMDLs were found to generally be sound, and the nutrient and bacteria load allocations should remain unchanged. For the temperature-impaired assessment units of Sinker Creek, the SSTEMP model was used to calculate shade targets. This model was considered the best method available at the time the TMDL was developed. However, the Idaho Department of Environmental Quality's (DEQ's) current potential natural vegetation method is more realistic because it relies on shade curves developed for specific landscapes. The 2007 TMDL addendum used potential natural vegetation analysis to determine shade targets for upper Succor Creek and Castle Creek. DEQ intends to revise the Sinker Creek temperature TMDL using the potential natural vegetation method.

Table A. Existing total maximum daily loads and general water quality status

Stream	Assessment Unit[a]	Pollutant(s)	TMDL Approval Year	Implementation Activities	Water Quality Trend[b]
Snake River—Swan Falls to Marsing (river mile 425)	006_07b	Phosphorus	2004	None known	Stable
Snake River—Marsing (river mile 425) to Oregon state line	001_07	Phosphorus	2004	None known	Unknown
Snake River—Oregon state line to Boise River	000_07	Phosphorus	2004	None known	Unknown
Upper Succor Creek—1st- and 2nd-order tributaries	003_02	Sediment Temperature	2004 2007	Some	Unknown
Upper Succor Creek—3rd order (Granite Creek to state line)	003_03	Sediment Temperature	2004 2007	Some	Unknown
Sage Creek—3rd order	002_03	Sediment Bacteria	2004	None	Declining
Succor Creek—4th order (below state line)	002_04	Sediment Bacteria	2004	Many	Declining
Jump Creek—1st and 2nd order	005_02	Sediment	2004	None	Unknown
Jump Creek—3rd order	005_03	Sediment	2004	Some	Declining
Sinker Creek—4th order	012_04	Sediment Temperature	2004	Some	Unknown
Castle Creek—1st- and 2nd-order rangeland tributaries	014_02	Temperature	2007	Some	Unknown
Castle Creek—1st- and 2nd-order forested tributaries	014_02a	Temperature	2007	Some	Unknown
Castle Creek—3rd-order tributaries (parts of Pixley, Alder, and North Fork Castle Creeks)	014_03	Temperature	2007	Some	Unknown
Castle Creek—lower 4th order (irrigated section)	014_04	Sediment Temperature	2004 2007	Some	Unknown
Castle Creek—upper 4th order (canyon section)	014_04a	Temperature	2007	Some	Unknown
Castle Creek—5th order (Catherine Creek to Snake River)	014_05	Sediment Temperature	2004 2007	Some	Unknown
South Fork Castle Creek and tributaries—1st and 2nd order	020_02	Temperature	2007	Some	Unknown
South Fork Castle Creek—3rd order (Clover Creek to North Fork Castle Creek)	020_03	Temperature	2007	Some	Unknown

[a] All assessment units begin with ID17050103SW
[b] As determined by the monitoring activities detailed in section 3 of this document

All of the above assessment units, with the exception of the three Snake River segments (006_07b, 001_07, and 000_07), are covered by the *Mid Snake River/Succor Creek Watershed TMDL Implementation Plan for Agriculture* (ISCC and IASCD 2005). The Snake River segments do not have an implementation plan.

Watershed at a Glance

The watershed, at a glance, is shown in Table B.

Table B. Watershed at a glance

<table>
<tr><th>Approved TMDLs</th><th>Pollutants Within Watershed</th><th>Assessment Units Moving From Category 4a to 2* since TMDL Approval</th></tr>
<tr><td>Phosphorus (3 assessment units)
Temperature (11 assessment units)
Sediment (9 assessment units)
Bacteria (2 assessment units)</td><td>Phosphorus
Temperature
Sediment
Bacteria</td><td>None</td></tr>
<tr><th>Implementation Plans</th><th>Implementation Actions</th><th>Assessment Units Moving from Category 3 to 5* since TMDL Approval</th></tr>
<tr><td rowspan="3">Mid-Snake River/Succor Creek Watershed TMDL Implementation Plan for Agriculture (2005)</td><td rowspan="3">Conservation plans
Grazing management plans
Sprinkler irrigation and pipelines
Public education</td><td>Reynolds Creek ID17050103SW009_03
Reynolds Creek ID17050103SW009_04
Vinson Wash ID17050103SW023_03</td></tr>
<tr><th>Estimated Percent of Watershed in Category 4a or 5*</th></tr>
<tr><td>73%</td></tr>
</table>

* Refers to categories in Idaho's Integrated Report on water quality

Please see section 2 for a map of the subbasin.

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Section 1: Introduction—Legal Authority

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and tribes, pursuant to Section 303 of the CWA, are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the nation's waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). States and tribes must periodically publish a priority list (a "§303(d) list") of impaired waters. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards.

Idaho Statute 39-3611(7) requires a 5-year cyclic review process for Idaho TMDLs:

> The director shall review and reevaluate each TMDL, supporting subbasin assessment, implementation plan, and all available data periodically at intervals of no greater than five (5) years. Such reviews shall include the assessments required by section 39-3607, Idaho Code, and an evaluation of the water quality criteria, instream targets, pollutant allocations, assumptions and analyses upon which the TMDL and subbasin assessment were based. If the members of the watershed advisory group, with the concurrence of the basin advisory group, advise the director that the water quality standards, the subbasin assessment, or the implementation plan(s) are not attainable or are inappropriate based upon supporting data, the director shall initiate the process or processes to determine whether to make recommended modifications. The director shall report to the legislature annually the results of such reviews. (Idaho Code § 39.3611)

This report is intended to meet the intent and purpose of Idaho Statute 39-3611(7). The report documents the review of an approved Idaho TMDL and addendum (DEQ 2003, 2007) and implementation plan (ISCC and IASCD 2005) and provides consideration of the most current and applicable information in conformance with Idaho Statute 39-3607, evaluation of the appropriateness of the TMDL to current watershed conditions, evaluation of the implementation plan, and consultation with the watershed advisory group (WAG). Final decisions for TMDL modifications are decided by the Idaho Department of Environmental Quality (DEQ) director. Approval of TMDL modifications is decided by the U.S. Environmental Protection Agency (EPA), with consultation by DEQ.

About Assessment Units—An Accounting Change

Prior to 2002, impaired waters were defined as stream segments with geographical descriptive boundaries (e.g., "Blue Creek—headwaters to mouth"). These stream segments tended to be non-uniform and to miss many headwater streams, and so in 2002, DEQ started identifying stream segments by assessment unit (AU) instead.

AUs are groups of similar streams, with the same stream order, that have similar land-use practices, ownership, or land management. AUs define all the waters of the state of Idaho and are referenced by an alphanumeric code and a written description. For example, "ID17050103SW003_02, Upper Succor Creek—all 1st- and 2nd-order tributaries," is a typical AU. All AUs begin with ID, followed by the 8-digit 4th-field hydrologic unit code (HUC) and the two letter basin identifier. Because all of the AUs discussed in this document are in the subbasin identified by HUC 17050103 in the Southwest basin, this document refers to AUs by only the numerical suffix that identifies the particular AU. For example, the AU ID17050103SW003_02 is abbreviated as 003_02.

This review focuses on the AU listings, rather than the older stream segments. Although these are broadly the same, the result of AU designations has been that many unnamed tributaries to impaired waters have themselves become listed as impaired.

Section 2: TMDL Review and Status

The Mid Snake River/Succor Creek subbasin, HUC 17050103, encompasses a large area of southwestern Idaho (Figure 1). The major river is the Snake River, which enters the subbasin from the east, at C.J. Strike dam, and flows northwest to the Oregon state line. Swan Falls hydroelectric dam is located in the middle of the Snake River segment. Both dams are operated by Idaho Power Company.

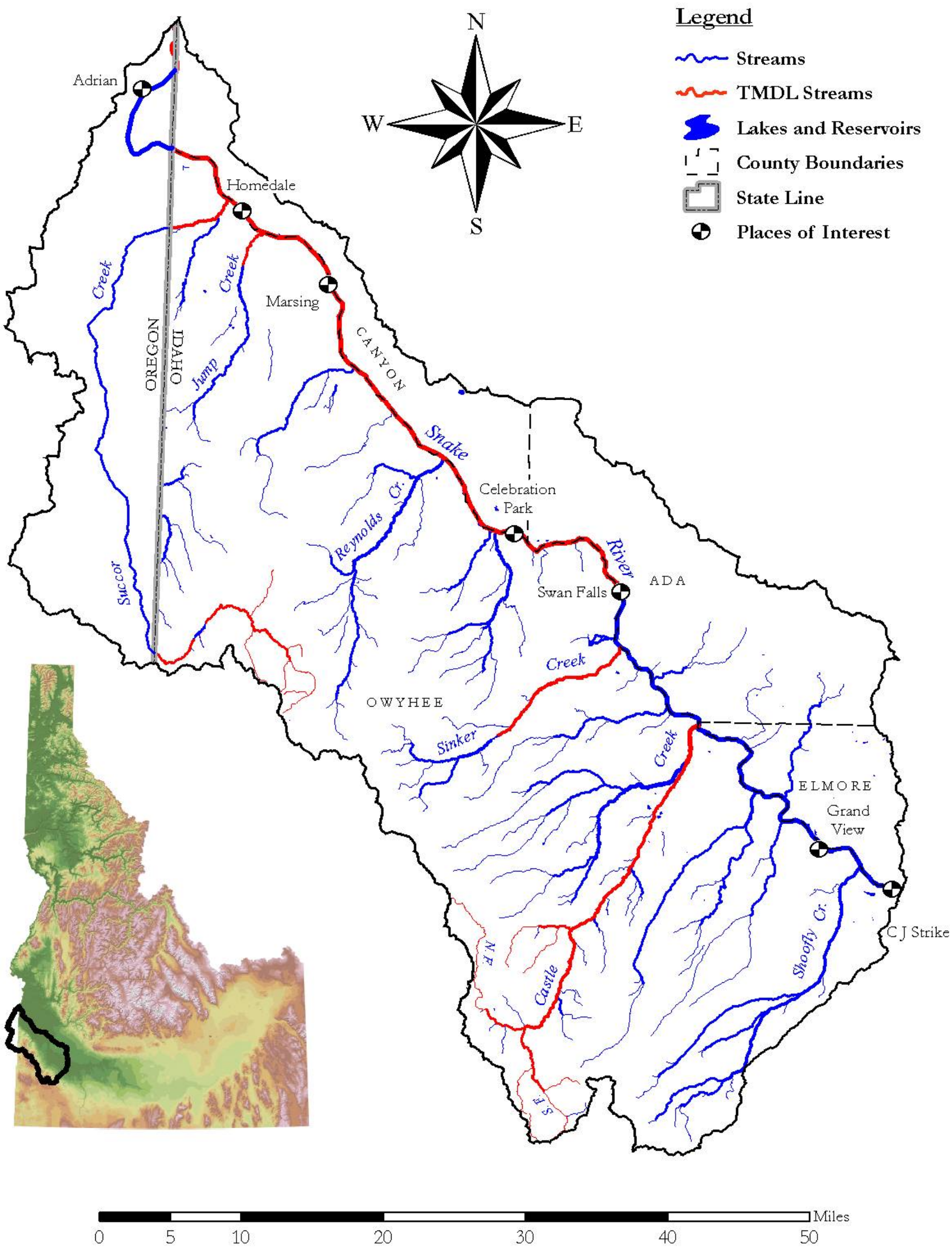

Figure 1. Location of subbasin

The tributaries all have their headwaters in the Owyhee Mountains. The highest point in the watershed is Hayden Peak at 8,403 feet. The Snake River crosses the Oregon state line at only 2,200 feet. The Snake River itself is polluted by nutrients and temperature, while many of the upland streams suffer from sediment and temperature impairments.

There are 11 AUs in this subbasin on the §303(d) list that do not meet their beneficial uses but have not yet had a TMDL developed. However, this document is narrowly focused and only reviews the existing TMDLs (Table 1). As such, these impaired streams will be addressed separately and not in this review.

The goal of a TMDL is to achieve Idaho water quality standards and to restore and maintain a healthy and balanced biological community for the full support of cold water aquatic life and salmonid spawning. In the Mid Snake River/Succor Creek subbasin, the load allocations in the original TMDL and addendum consisted of heat, sediment, bacteria, and phosphorus reductions. Surrogate measures of total shade and substrate and turbidity targets were presented to assist in achieving the load allocations (DEQ 2003, 2007).

Nutrient (i.e., total phosphorus [TP]) TMDLs for the Snake River between Swan Falls dam and the Boise River (3 AUs) were approved by EPA in January 2004.

Temperature TMDLs for Sinker and Succor Creeks (4 AUs) were approved by EPA in January 2004 (DEQ 2003). The Succor Creek TMDL was later converted to a potential natural vegetation (PNV) model, and Castle Creek (8 AUs) was added. The addendum to the TMDL was approved by EPA in December 2007 (DEQ 2007).

Sediment TMDLs for Succor, lower Castle, Jump, Sage, and Sinker Creeks (9 AUs) were also approved in January 2004. Instead of a water column target (i.e., an explicit numerical criterion), upper Succor, Castle, and Sinker Creeks used a surrogate measure of bank stability.

A bacteria TMDL for lower Succor Creek (1 AU) was approved by EPA in January 2004. Sage Creek, a major tributary, was also assigned a bacteria load.

The TMDL and addendum are available on DEQ's website at http://www.deq.idaho.gov. Hard copies are available from DEQ's Boise Regional Office.

Table 1. Overview of applicable total maximum daily loads

Assessment Unit and Stream[a]	Pollutant	Target	Critical Period	TMDL Approval Date
006_07b Snake River—Swan Falls to Marsing (river mile 425)	Total Phosphorus	70 µg/L[b]	May–Sept	2004
001_07 Snake River—Marsing (river mile 425) to state line	Total Phosphorus	70 µg/L	May–Sept	2004
000_07 Snake River—state line to Boise River	Total Phosphorus	70 µg/L	May–Sept	2004
002_03 Sage Creek—3rd order	Sediment	22 mg/L[c]	May–Sept	2004
	E. coli	126 cfu/100 mL[d]	n/a	2004
002_04 Succor Creek—4th order (below state line)	Sediment	22 mg/L	May–Sept	2004
	E. coli	126 cfu/100 mL	n/a	2004
003_02 Upper Succor Creek—1st and 2nd order	Sediment	80% bank stability	n/a	2004
	Temperature	Natural background level of shading	n/a	2007
003_03 Upper Succor Creek (Granite Creek to Chipmunk Meadows)	Temperature	Natural background level of shading	n/a	2007
	Sediment	80% bank stability	n/a	2004
005_02 Jump Creek—1st and 2nd order	Sediment	65 mg/L	May–Sept	2004
005_03 Jump Creek—3rd order	Sediment	65 mg/L	May–Sept	2004
012_04 Sinker Creek—4th order	Temperature	70% shade	July	2004
	Sediment	80% bank stability	n/a	2004
014_02 Castle Creek—1st and 2nd order rangeland	Temperature	Natural background level of shading	n/a	2007
014_02a Castle Creek—1st- and 2nd-order forested	Temperature	Natural background level of shading	n/a	2007
014_03 Castle Creek and tributaries—3rd-order sections	Temperature	Natural background level of shading	n/a	2007
014_04 Castle Creek—lower 4th order (irrigated section)	Sediment	80% bank stability	n/a	2004
	Temperature	Natural background level of shading	n/a	2007
014_04a Castle Creek—upper 4th order (canyon section)	Temperature	Natural background level of shading	n/a	2007
014_05 Castle Creek—5th order	Sediment	80% bank stability	n/a	2004
	Temperature	Natural background level of shading	n/a	2007
020_02 South Fork Castle Creek—1st and 2nd order	Temperature	Natural background level of shading	n/a	2007
020_03 South Fork Castle Creek—3rd order	Temperature	Natural background level of shading	n/a	2007

[a] All assessment units begin with ID17050103SW
[b] µg/L = micrograms per liter (70 µg = 0.07 mg)
[c] mg/L = milligrams per liter
[d] cfu/100 mL = colony forming units per 100 milliliters

For more information on specific load allocations, please see section five of the 2003 and 2007 TMDLs available on DEQ's website.

Pollutant Targets—Phosphorus

The target for TP was chosen to be 70 micrograms per liter (µg/L) because that is also the target for the Brownlee/Hells Canyon section of the Snake River, into which the Mid Snake River/Succor Creek section directly flows. At the point where the two sections meet, the Mid Snake River must meet the 70 µg/L target.

Pollutant Targets—Temperature

There are two types of temperature TMDL in the subbasin, each of which calls upon a different part of the water quality standards and uses different methods.

Sinker Creek

The target for Sinker Creek in July (the critical period) is the percentage of stream shade that results in compliance with state temperature criteria for cold water aquatic life:

> Water temperatures of twenty-two (22) degrees C or less with a maximum daily average of no greater than nineteen (19) degrees C. (IDAPA 58.01.02.250.02b)

This is probably an unattainable target. The hot, dry summers and low water levels of many Owyhee County streams mean that it is likely that even a reference-condition stream would violate these criteria. For example, DEQ uses Little Jacks Creek as a desert reference site for its Beneficial Use Reconnaissance Program (BURP) monitoring, and yet temperatures there frequently exceed the above criterion during the summer (IDFG 2001). That stream has a robust population of young trout, even though the salmonid spawning temperature criteria is routinely exceeded. Of course, if the target *were* to be met, beneficial uses would certainly be supported.

Succor and Castle Creeks

Rather than being measured against a (perhaps unattainable) water quality criterion, Succor and Castle Creeks are compared to their own potential riparian shading, which becomes the TMDL target. These TMDL targets do not have a critical period. This method, called PNV analysis, calls upon the "natural background" clause of the water quality standards:

> When natural background conditions exceed any applicable water quality criteria … the applicable water quality criteria shall not apply; instead, there shall be no lowering of water quality from natural background conditions… (IDAPA 58.01.02.200.09)

For these particular streams, the canopy shade targets were set at natural background levels of shading derived from the Alvord Lake TMDL (Oregon Department of Environmental Quality 2003). This comparison was chosen because the Alvord Lake riparian vegetation features a mixed deciduous shrub plant community of average height and density, similar to what is found in the Succor and Castle Creeks riparian areas.

Specifically, the following two shade curves were used:

- Willow mix community for the East Steens low elevation ecological province: elevation = 4,260–4,100 feet; average canopy height = 20 feet; average canopy density = 50%
- Co-dominant willow-alder community of the Trout Creek Mountains mid-elevation ecological province: elevation = 6,562–4,500 feet; average canopy height = 24 feet; average canopy density = 75%

When the shade targets are met, the streams are presumed to be at their natural background temperatures.

Pollutant Targets—Sediment

There are 3 different sediment targets in the TMDL, each chosen to address the particular cause of the sediment impairment.

Upper Succor Creek, Castle, and Sinker Creeks

The target for upper Succor, Castle, and Sinker Creeks is 80% bank stability. In-stream bank erosion was identified as the primary source of sediment loading in these streams. The value of 80% was chosen because it has been found to produce 28% fines in the stream sediment, which is protective of cold water aquatic life. (Previous TMDLs have established this connection [DEQ 2001a and b].) Back stability targets have no critical time period.

Lower Succor Creek

The total suspended sediment (TSS) target for lower Succor Creek (i.e., the section between the Oregon state line and the Snake River) is 22 milligrams per liter (mg/L). The TMDL analysis found that the biggest sediment contributor to lower Succor Creek was Sage Creek, which functions as an agricultural return drain. TSS concentrations averaged 83 mg/L below the confluence with Sage Creek and 22 mg/L above. Furthermore, the TSS concentration above Sage Creek was independent of irrigation season, implying that it is the background sediment level. This 22 mg/L sediment concentration was believed to be supportive of salmonid spawning because a nominally similar target (15 mg/L) supports the beneficial use in the lower Boise River above Middleton. The critical period is the irrigation season (May–September), because almost the entire sediment loading occurs during this time.

The critical period makes sense, as does the selection of a target, but only if 22 mg/L would truly support salmonid spawning (a designated use). Ideally, a full beneficial use survey should be conducted above Sage Creek to confirm this. Alternatively, pebble counts could confirm that the streambed has less than 28% fines, thereby supporting salmonid spawning (DEQ 2001a and b). If so, the target is appropriate. If fines exceed 28%, then the target may need to be reduced. This monitoring should be conducted in the next 5 years and the target reevaluated in the next review cycle.

Jump Creek

The TSS target for Jump Creek is 65 mg/L. Although not originally on the §303(d) list, Jump Creek was found to be impaired by turbidity. In order to present a load allocation in kilograms per day, monitoring data were used to establish an equivalency between turbidity and TSS. Specifically, the water quality standard for (chronic) turbidity of 25 nephelometric turbidity units (NTU) was found to lead to a TSS of 65 mg/L.

The critical period is the irrigation season (May–September), because almost the entire sediment loading occurs in this time. It is unclear whether this target supports the cold water aquatic life beneficial use.

The target only applies below Mule Creek (i.e., most of AU ID17050103SW005_03). The headwaters of Jump Creek (ID17050103SW005_02) are intermittent and were erroneously included in the original 2003 TMDL.

Pollutant Targets—Bacteria

The bacteria target is the state water quality standard: 5 samples must be collected 3 to 7 days apart over a 30-day period, and the geometric mean of their *E. coli* concentration must not exceed 126 colony forming units per 100 milliliters (cfu/100 mL). Below this level, primary contact recreation is fully supported.

Recreation can occur year round, and so the target applies at all times.

Control and Monitoring Points

The Snake River TP target must be met at the Oregon state line in order to comply with the Snake River-Hells Canyon TMDL. The control point is nearby at Homedale, Idaho. Allocations for all drains and tributaries were combined, with no specific control point. The TMDL states that between Swan Falls dam and the Oregon state line, “all sources must discharge at a concentration of 70 µg/L TP or less where they enter the river.” The Snake River must meet a target of 70 µg/L TP at the C.J. Strike discharge.

Temperature TMDLs do not have specific control points.

Sediment TMDLs with numeric loads apply throughout the entire stream. Succor Creek’s control point is Homedale, and Jump Creek’s is at the railroad trestle. The Jump and Succor Creek drains (Sage Creek, Mule Creek, Field Scale, B-Line Canal, Kora Canal, B-4 Lateral, and Hortsman Drain) have control points at their mouths.

Sediment TMDLs based upon bank stability do not have specific control points.

Bacteria TMDLs apply throughout the entire stream, so there are no specific control points. Monitoring at the mouths of tributary drains (i.e., Coates, Murphy, Sage Creeks) will help ensure the bacteria contribution to Succor Creek can be accurately quantified.

The TMDL recommended future stream and river monitoring as well as best management practices (BMP)-effectiveness monitoring. It did not spell out any specific locations or parameters for monitoring.

Load Capacity—Phosphorus

The method used to estimate the load capacity for TP in the Snake River was to set the target to match the Snake River-Hells Canyon TMDL of 70 µg/L, located immediately downstream. At average flow, this translates to a total load capacity of 1,667 kilograms per day (kg/day) during the critical period. The average flows used in the calculation were from 1995 and 2000 as provided by the U.S. Geological Survey (USGS) and Idaho Power Company from several gaging sites in the Mid Snake River/Succor Creek subbasin.

The critical period for phosphorus loading coincides with the irrigation season of May 1 to September 30. This period is appropriate because it is when most transport and deposition of phosphorus occurs in the river.

The method used to estimate load capacity in the Snake River tributaries was the same. The target was set to 70 µg/L TP, and the average flows of the drains were used to arrive at a total load capacity of 84 kg TP/day. There is no more recent data available for the average flow from the drains.

Load Capacity—Temperature

Sinker Creek

The original TMDL (2003) used a computer model, called SSTEMP, to calculate how to reach the temperature target in Sinker Creek. Through a complex modeling process, a 12% increase in shade was prescribed. The SSTEMP model had many variables (Table 2).

Table 2. SSTEMP assumptions

Variable	Value
Segment Inflow (cubic feet per second)	4
Inflow Temperature (°C)	17.65 *
Segment Outflow (cubic feet per second)	4 *
Accretion Temp. (°F)	51.3
Latitude (degrees)	42 *
Segment Length (miles)	7.7 *
Upstream Elevation (meters)	1,000 *
Downstream Elevation (meters)	750 *
Width's A-term (seconds per square foot)	10.39
Manning's n	0.035
Air Temperature (°F)	78
Relative Humidity (%)	37
Wind Speed (miles per hour)	8.4
Ground Temperature (°F)	51.3
Thermal gradient (joules per square meter per second per degree Celcius)	1.65 *
Possible Sun (%)	87
Dust Coefficient	6
Ground Reflectivity (%)	15
Solar Radiation (Langleys/day)	647.966 *
Total Shade (%)	70.2
Segment Azimuth (degrees)	0 *

Note: The asterisked assumptions are approximately correct, and the rest seem, in general, sensitively chosen. However, the sheer number of variables makes this a very difficult analysis to evaluate. Furthermore, the Idaho Department of Environmental Quality no longer uses the SSTEMP model, and so experimentation to determine the effect of these variables is not possible.

The final output of the model was the shade level (percent) that would meet the state standards. Sinker Creek was found to only violate state temperature standards during the month of July, so July was chosen as the critical period. However, because the remedy is long-lived riparian shade, there is no practical critical period.

The load capacity for Sinker Creek in July is 3.49 joules per square meter per second ($J/m^2/s$). This is a measure of how much solar radiation can fall on the stream before it violates the temperature standards. To attain this load capacity value, the shade must be increased by 12% to 70.4%. This load only applies to the listed section, downstream of the confluence with East Fork Sinker Creek.

Succor and Castle Creeks

Succor Creek was also originally modeled using SSTEMP, but in 2007, DEQ replaced the analysis with a new method called PNV. This approach compares a stream to its own potential vegetation (and thereby shading capacity), rather than a statewide standard. Castle Creek was also analyzed in this way in the 2007 TMDL addendum. It is unknown why Sinker Creek was not updated at the same time.

The PNV method also has some assumptions built into it:

- Aerial photographs are used to estimate the current level of canopy shading on a stream. This interpretation is field verified at certain locations using a Solar Pathfinder device to measure effective shade and reduce estimation error.
- The natural level of canopy shading is estimated using a regionally appropriate shade curve. The shade curve provides an estimate of the shading provided by a given vegetation type for different stream widths. Clearly, the vegetation type is a very important factor in the level of canopy shading, and it must be chosen carefully.
- Topographic features, such as canyon walls, can provide extra shading and should be accounted for but are hard to estimate using visual interpretation of aerial photographs.
- The analyses typically do not account for small impoundments, such as beaver ponds and simple diversion dams.

PNV is currently the most reliable method to determine the natural background shading of each stream. The final product of the PNV method is a map and table that shows the increase in shading needed throughout the stream in order to reach natural background levels of shade. PNV is calculated for the time period from April through September. This period is protective of salmonid spawning and coincides with the summer season of warm air, fierce sun, and growing vegetation.

The load capacity for the upper Succor Creek watershed is 862 megawatt hours per day (MWh/day). The load capacity for Castle Creek is 1,536 MWh/day. These figures are the sum of the load capacities for each main creek and all its perennial tributaries. It is the amount of solar radiation that will fall on the stream when the shade is at its potential.

The original temperature TMDLs on Succor and Castle Creeks were replaced by PNV TMDLs because PNV is a better method (DEQ 2007). PNV delineates the most severely impacted locations, which provides an invaluable guide to improving water quality. For these reasons, it is recommended that the Sinker Creek analysis be replaced with a PNV analysis.

Load Capacity—Sediment

The methods used to estimate the load capacity for sediment were threefold.

Upper Succor, Castle, and Sinker Creeks

The load capacity for these creeks is the amount of sediment that would be generated if all the banks met the 80% stability target. Bank geometry and lateral recession rates were measured at reference reaches and the erosion rate calculated. The erosion rate was then extrapolated to the entire stream to produce the following sediment load capacities:

- 322 tons/year for Sinker Creek, downstream of East Fork
- 108 tons/year for upper Succor Creek between Granite Creek and Chipmunk Meadows
- 175 tons/year for upper Succor Creek between the reservoir and the Oregon state line
- 543 tons/year for the lowlands of Castle Creek (ID17050103SW014_04 and _05)

These load capacity calculations include the following assumptions:

- 80% bank stability leads to <28% fines. Previous DEQ TMDLs (DEQ 2001a, b) have established this linkage.
- Unsampled reaches resemble sampled ones. This is a genuine concern, but not one that can be overcome. The watershed advisory group can encourage more landowners to participate in implementation and monitoring activities.
- The Natural Resources Conservation Service (NRCS) method accurately measures lateral recession rate. Instead of using bank pins, or other physical measurements, this field method employed a 6-part rating scale to assign an erosion severity. This rating was then correlated with a lateral recession rate. Although such a method relies on many simplifications and averages, it is part of a standard NRCS method (NRCS 1983) and has been used in many other TMDLs. As funding allows, actual bank pin surveys could replace the rating scale.

There are no critical periods, because the targets apply year-round.

Lower Succor Creek

The target was set to match the background level of TSS in the water (22 mg/L). The load capacity is the amount of sediment in the water when the target is met. This load capacity is 3.03 tons/day, measured at Homedale at a flow of 51 cubic feet per second (cfs) during the critical period of May 1–September 30.

This load capacity assumes that the major tributary, Sage Creek, was measured at a representative time. There is no reason to doubt this, but further monitoring could help confirm it.

The critical period is the irrigation season, which is reasonable because this time period is when nearly all the sediment loading to the stream occurs.

Jump Creek

The target was set to meet the state water quality criterion for turbidity (25 NTU) throughout the length of Jump Creek. Monitoring data were used to develop a regression relationship that showed this turbidity value was equivalent to 65 mg/L TSS in the water. The load capacity is the amount of sediment present in the stream when the target is met. The TMDL established that the average irrigation-season discharge was 68.75 cfs (measured at the railroad trestle), and at this flow, a sediment concentration of 65 mg/L would translate to 12.06 tons/day. This target applies during the critical period of May 1–September 30.

This analysis assumes that the relationship between turbidity and TSS remains constant. The two variables were extremely well correlated (R^2 of 0.93), and the factors upon which the relationship depends, such as soil particle size, are unlikely to change.

The critical period is the irrigation season, which is reasonable because this time period is when nearly all the sediment loading to the stream occurs.

Since the TMDL was approved in 2004, more flow data have become available (Table 3). However, the best target is still the TSS concentration (65 mg/L), which would not be affected by these new discharge data.

Table 3. Jump Creek discharge data

Year	Number of Measurements	Average May–September Discharge (cubic feet per second)
1992	9	54.18
1993	10	108.32
2001	11	96.31
2009	15	108.86
2010	10	111.21
		Average 95.78

Load Capacity—Bacteria

The method used to estimate the bacteria load capacity was simply to equate it to the water quality standard. Bacteria are not amenable to a mass load approach, and so a simple concentration is used. The TMDL defines the water quality standard as follows:

1. May not exceed 406 organisms/100 mL at any time[1]
2. May not exceed a geometric mean of 126 organisms/100 mL, based on a minimum of 5 samples taken every 3 to 7 days over a 30-day period

However, after the TMDL was approved, the water quality standards changed slightly, and part 1 above has been removed. A single sample can no longer result in noncompliance with the water quality standards.

Primary contact recreation may occur year round, so there is no critical period.

Load Allocations—Phosphorus

The following table presents the load and wasteload allocations for the Snake River between Swan Falls dam and the Oregon state line from May through September (Table 4).

[1] The water quality standards (IDAPA 58.01.02.251) use organisms per 100 mL as the unit of measure for *E. coli* concentrations. However, water samples analyzed for the presence of *E. coli* are reported in colony forming units (cfu). A cfu is a measure of viable cells which can grow into a colony or cluster of bacterium. In this report, organisms and cfu are used interchangeably, and lab analyses reported in cfu are compared to the water quality criterion measured in organisms.

Table 4. Total phosphorus load and wasteload allocations

Location	Allocation	National Pollutant Discharge Elimination System Permit
Marsing Wastewater Treatment Plant (point source)	4 kg/day	ID0021202
Homedale Wastewater Treatment Plant (point source)	5 kg/day	ID0020427
Background load at Homedale	453 kg/day	N/A
Snake River at Homedale	1,205 kg/day	N/A
Drains and tributaries	84 kg/day (below Swan Falls dam only)	N/A

The Marsing and Homedale Wastewater Treatment Plants were monitored during 2006. The actual load ranged from 2.4 to 4.6 kg/day at Homedale and from 1.1 to 2.1 kg/day at Marsing.

River and tributary loads were based on the “equal concentration” standard of 70 µg/L TP adopted in the TMDL.

Idaho Power Company has provided phosphorus data for C.J. Strike bridge and Celebration Park bridge, but no data are available for the control point at Homedale bridge, nor for the tributaries below Swan Falls dam.

Load Allocations—Temperature

Since there are no thermal discharge point sources and the margin of safety (MOS) is implicit, the solar load allocations are the same as the load capacities:

- Sinker Creek: 3.49 $J/m^2/s$ (for the section downstream of East Fork Sinker Creek)
- Upper Succor Creek: 862 MWh/day (includes Succor, Crane, Granite, Crows Nest, Little Succor, and Cottonwood Creeks; Succor Creek Reservoir; and the tributaries from Johnston Lakes)
- Castle Creek: 1,536 MWh/day (includes Alder, North Fork Castle, South Fork Castle, Clover, and Juniper Creeks)

The Castle and Succor Creek temperature TMDLs (DEQ 2007) were approved fairly recently, so there are no new pathfinder data. More pathfinder data could be easily gathered in preparation for the next review cycle of this TMDL if funding and resources allow.

Load Allocations—Sediment

Upper Succor, Castle, and Sinker Creeks

Since there are no sediment discharge point sources and the MOS is implicit, the sediment load allocations are the same as the load capacities:

- Sinker Creek (downstream of East Fork): 322 tons/year
- Upper Succor Creek (Granite Creek to Chipmunk Meadows): 108 tons/year
- Upper Succor Creek (reservoir to Oregon state line): 175 tons/year

- Castle Creek (lowland section, ID17050103SW014_04 and _05): 543 tons/year

All the loading is from bank erosion, fields, and agricultural return drains. There are no recent data that address these load allocations.

Lower Succor Creek

The load allocations for Succor and Sage Creeks are as follows:

- Succor Creek above Sage Creek: 1.19 tons/day
- Sage Creek: 1.84 tons/day

These load allocations assume that the average flow at the mouth remains at 51 cfs. This assumption is challenged by 2009 monitoring data that recorded an average irrigation season flow of 80 cfs, but more measurements are needed to establish whether these data represent a new average flow. As such, the loading allocations should remain unchanged for now. The allocations also assume that the relative tributary flows remain similar, and no data are available to assess this assumption.

Jump Creek

For a given sediment concentration of 65 mg/L, the load allocations are shown in Table 5.

Table 5. Jump Creek load allocations

Location	Flow (cubic feet per second)	Load Allocation (tons/day of total suspended sediment)
Jump Creek above Mule Creek	16.30	0
Mule Creek	12.11	2.13
Field Scale near B-Line	0.50	0.09
B-Line Canal	5.00	0.88
Town Canal Withdrawal	15.00	n/a
Kora Canal	2.00	0.35
B-4 Lateral	1.00	0.18
Hortsman Drain	46.84	8.22
Jump Creek at Railroad Trestle	68.75	11.84

These load allocations assume that the relative flows from each tributary remain constant. There are no monitoring data to evaluate this assumption.

Load Allocations—Bacteria

The load allocation for bacteria is 126 cfu/100 mL (geometric mean) at the following points:

- Coates Drain at the mouth
- Murphy Drain at the mouth
- Sage Creek at the mouth
- Succor Creek at the Oregon state line

There are no point sources of bacterial pollution, and there are no recent bacteria data to address these load allocations.

Margins of Safety

Phosphorus

An explicit MOS of 13% was used. This MOS originates from the uncertainties in sampling, analysis, system uptake, and assimilative capacity. The value and the rationale were taken directly from the Snake River-Hells Canyon TMDL:

> …. recommended associated error included over/underestimation of overall concentration by grab sampling (10% to 25%), and analytical error (3% to 5%). Error ranges were recommended by Dr. Paul Woods of the USGS (sample error) and certified federal and state analytical laboratories (analytical error)… As all sample collection and analytical work for these data were performed under rigorous, well defined protocols, conservative error estimates were used for all sources. This resulted in an overall MOS of 13 percent… (DEQ and Oregon Department of Environmental Quality 2004)

The MOS is accounted for in the target concentration of 70 µg/L.

Temperature

The SSTEMP shade targets are based upon attaining the optimum level of canopy shading in July, the hottest month. As such, the targets will be more than protective during the rest of the year. This would also be true for the PNV model, which calculates shade for the period from April through September.

There is an implied MOS in the PNV shade targets, because target shade is reported as an integer (e.g., 37%), while existing shade is rounded down to a 10% class level (e.g., existing shade of 37% would be reported as 30%). This difference means that even in this example, where the stream is at its target, it would be reported as lacking 7% shade. This difference, which could vary from 0% to 9%, could be ascribed to a MOS.

Sediment

Upper Succor, Castle, and Sinker Creeks

The sediment target of 28% fines is based upon a bank stability target of 80%. The reference sites used in the analysis actually had bank stabilities of 85%, so when the target bank conditions are attained, the overall percent fines will be less than 28%. This difference results in an implicit MOS.

Lower Succor Creek

Recall that the target for Lower Succor Creek was established by comparing it to a nominally similar stream, the Boise River above Middleton. The MOS derives from the relative particle size in each stream.

The two streams have nominally similar sediment targets (22 mg/L versus 15 mg/L), but the Boise River is polluted by larger particles, which are particularly hazardous to fish. Succor Creek is polluted by small sediment particles, which fish find more tolerable. Therefore, at a similar sediment concentration, the aquatic life in Succor Creek is more protected than their northern friends.

Jump Creek

The Jump Creek sediment target was established by correlating it to the chronic water quality standard for turbidity (25 NTU for 10 consecutive days). An implicit MOS applies because this is a more stringent standard than the instantaneous criterion of 50 NTU.

Bacteria

There is an implicit MOS built into the bacteria load allocation. The TMDL ignores any inflowing water to Succor Creek in the section between the Oregon state line and the Snake River. Any such water would swell the creek, and hence dilute any pollutants.

There are several inflows to this stream segment (Coates and Murphy Drains, for example) and probably also groundwater contributions. If any of these sources were below the load allocation of 126 cfu/100 mL, then each would provide an extra opportunity to reduce the bacterial concentration in Succor Creek.

Reserves for Growth

The wasteload allocations for existing phosphorus point sources (i.e., Homedale and Marsing Wastewater Treatment Plants) are based upon their operation at design capacity. This design capacity is almost double their current output, so there is room to expand to that design capacity. Above that level, there is no future growth allowance, and they would have to use phosphorus removal strategies. Any future point sources of phosphorus or sediment would receive a wasteload allocation of zero, and any new temperature point sources would be evaluated on a mass-balance approach.

For the nonpoint sources, an allowance for future growth was not recommended until “such time as reductions indicate that beneficial uses or water quality standards have been restored” (DEQ 2003, p. 178). Growth was allowed to occur under pollutant trading, as long as there was a) no net increase above in-stream target parameters and b) no discharges when land application was a viable alternative.

The TMDL states that there is no reserve for growth for bacteria: “Any additional point sources discharging to Succor [Creek] would receive a wasteload allocation of zero” (DEQ 2003, p. 174).

This does not seem correct. The load allocation is expressed as a concentration (i.e., “all sources to Succor Creek must be able to meet a geometric mean of 126/100mL” [DEQ 2003, p. 174]). As such, a point source discharging at less than 126 cfu/100 mL would actually reduce the bacteria concentration in the stream. It seems that there is, in fact, a reserve for growth, only with the caveat that the point source discharges below 126 cfu/100 mL, which is the water quality standard.

Section 3: Beneficial Use Status

Idaho water quality standards require that surface waters of the state be protected for beneficial uses, wherever attainable (IDAPA 58.01.02.050.02). These beneficial uses are interpreted as existing uses, designated uses, and presumed uses. The *Water Body Assessment Guidance, Second Edition* (Grafe et al. 2002) gives a detailed description of beneficial use identification for use assessment purposes.

Existing uses under the Clean Water Act are "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards" (40 CFR § 131.3(e)). Designated uses are specifically listed for water bodies in Idaho in tables in the Idaho water quality standards (see IDAPA 58.01.02.140.03 and 02.109–160 in addition to citations for existing and presumed uses). For the AUs addressed in this revision, designated uses include cold water aquatic life, salmonid spawning, and primary and secondary contact recreation (Table 6).

Without information on existing uses, DEQ presumes that most waters in the state will support cold water aquatic life and either primary or secondary contact recreation (IDAPA 58.01.02.101.01). To protect these so-called "presumed uses," DEQ applies the numeric cold water aquatic life criteria and primary or secondary contact recreation criteria to undesignated waters. The following table lists the beneficial uses of the water bodies included in the TMDL. All information was taken from EPA's Assessment Database in January 2011.

Table 6. Beneficial uses of water bodies addressed in total maximum daily loads as presently listed in the U.S. Environmental Protection Agency's Assessment Database

Stream Name and Assessment Unit (All assessment units begin ID17050103SW)			Beneficial Uses[a]	Use Type	Use Support
Snake River	C.J. Strike Dam to Castle Creek	006_07	CWAL PCR	Designated Designated	Not fully supporting Fully supporting
	Castle Creek to Swan Falls	006_07a	CWAL PCR	Designated Designated	Fully supporting Fully supporting
	Swan Falls to Marsing (river mile 425)	006_07b	CWAL PCR	Designated Designated	Not fully supporting Fully supporting
	Marsing (river mile 425) to state line	001_07	CWAL PCR	Designated Designated	Not fully supporting Fully supporting
	State line to Boise River	000_07	CWAL	—[b]	Not fully supporting
Sage Creek—3rd order		002_03	CWAL SS PCR	Designated Designated Designated	Not fully supporting Not fully supporting Not fully supporting
Lower Succor Creek (state line to mouth)		002_04	CWAL SS PCR	Designated Designated Designated	Not fully supporting Not fully supporting Not fully supporting
Upper Succor Creek	1st- and 2nd-order tributaries	003_02	CWAL	Designated	Not fully supporting
	3rd order (Granite Creek to state line)	003_03	CWAL	Designated	Not fully supporting
Jump Creek	1st and 2nd order	005_02	CWAL	Designated	Not fully supporting
	3rd order	005_03	CWAL PCR	Designated Designated	Not fully supporting Fully supporting
Sinker Creek—4th order		012_04	CWAL SS PCR	Designated Presumed Presumed	Not fully supporting Not fully supporting Fully supporting
Castle Creek	1st- and 2nd-order rangeland tributaries	014_02	CWAL SCR	Designated Presumed	Not fully supporting Fully supporting
	1st- and 2nd-order forested tributaries	014_02a	CWAL SS PCR	Presumed Presumed Presumed	Not fully supporting Not fully supporting Fully supporting
	3rd-order tributaries (parts of Pixley, Alder, and North Fork Castle Creeks)	014_03	CWAL SS PCR	Designated Designated Designated	Not fully supporting Not fully supporting Fully supporting
	Lower 4th order (irrigated)	014_04	CWAL	Designated	Not fully supporting
	Upper 4th order (canyon)	014_04a	CWAL	Designated	Not fully supporting
	5th order (Catherine Creek to Snake River)	014_05	CWAL	Designated	Not fully supporting
	South Fork—3rd order (Clover Creek to North Fork Castle Creek)	020_03	CWAL PCR	Presumed Presumed	Not fully supporting Fully supporting
	South Fork and tributaries—1st and 2nd order	020_02	CWAL PCR	Presumed Presumed	Not fully supporting Fully supporting

Source: All information was taken from the U.S. Environmental Protection Agency's Assessment Database in January 2011 (EPA 2010).
[a] CWAL = cold water aquatic life, PCR = primary contact recreation, SS = salmonid spawning, SCR = secondary contact recreation
[b] Use type is missing from the U.S. Environmental Protection Agency's Assessment Database.

Errors in Beneficial Uses

The following corrections should be made to the information in EPA's Assessment Database:

- For AU 000_07, specify that the cold water aquatic life use is presumed.
- For AUs 003_02 and _03, salmonid spawning and primary contact recreation are designated uses. The former is not fully supported, and the latter is unknown.
- AU 005_02 (Jump Creek headwaters) was erroneously included in the sediment TMDL, which properly only applies between Mule Creek and the Snake River (i.e., AU 005_03). The headwaters of the creek, which are intermittent, have never been assessed and should ideally be returned to category 3 of the integrated report. EPA has indicated that 'mere intermittency' is not sufficient to delist a water body, so this AU will remain in category 4a until DEQ develops a method to assess intermittent streams.
- For AU 014_02, the recreation use should be changed from secondary to primary to properly match the water quality standards (58.01.02.140.03, SW14). The AU is designated and fully supporting this use. Salmonid spawning should also be added to the database as a designated use, although it is not fully supporting (because cold water aquatic life is not supporting, salmonid spawning, which is more protective, cannot either).
- For AUs 014_04 and 04a, primary contact recreation is a designated use in the water quality standards. It is fully supported in these AUs. Salmonid spawning is also designated, although it is not fully supported (see the rationale for 014_02 directly above).

Beneficial Use Assessment

Beneficial use protection is evaluated with a set of criteria, which include narrative criteria for pollutants such as sediment and nutrients and numeric criteria for pollutants such as bacteria, dissolved oxygen (DO), pH, ammonia, temperature, and turbidity (IDAPA 58.01.02.250). Figure 2 provides an outline of the stream assessment process for determining support status of the beneficial uses of cold water aquatic life, salmonid spawning, and contact recreation.

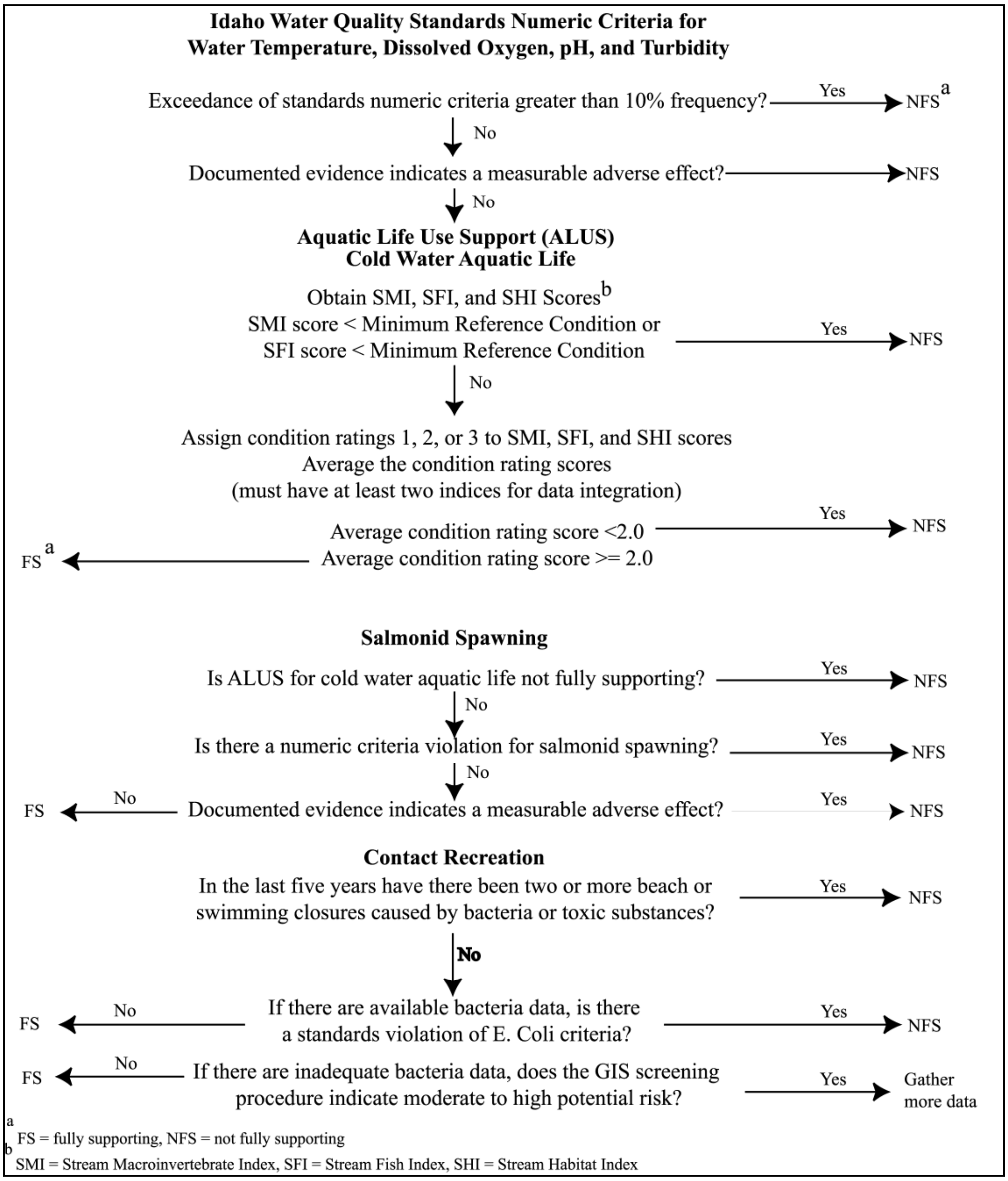

Figure 2. Steps for determining support status of beneficial uses in wadeable streams
Source: Grafe et al. 2002

Appropriateness of Beneficial Uses

Primary contact or secondary contact recreation uses apply to most of the AUs. Although many of them are remote, most streams are used for water-based recreation (e.g., camping, hiking, wading, and fishing).

DEQ believes that most streams could support, and should be protected for, cold water aquatic life use. This is the default use all the streams in this TMDL review should attain.

The upper portions of Succor, Sinker, and Castle Creeks could all support salmonid spawning, and so their designation in the water quality standards is appropriate.

Domestic water supply (DWS) is a designated beneficial use on Snake River AUs 006_07, and _07a between C.J. Strike Reservoir and Marsing. There are currently no known domestic water intakes in this section of the river, and so the support status should remain as “not assessed.”

Changes to Subbasin Characteristics

A recent re-analysis of mollusk samples collected in the late 1990s identified the endangered *Physa natricina*. Very recent sampling was not able to collect the species, but it is likely rare and is assumed to be present (Hoelscher 2011).

The WAG did not identify any other major changes to the subbasin, as indicated by any of the following events:

- Major land-use or ownership changes
- New industries or NPDES-permitted facilities
- Pollutant load controls
- Climate changes
- Hydrology, flooding, wildfires, or landslides
- Changes in water resource activities, dams, diversions, or withdrawals

Summary and Analysis of Current Water Quality Data

DEQ has monitored 6 intermittent streams and conducted 14 BURP surveys in the watershed. Data collection efforts on Jump and Succor Creeks have been led by the Idaho State Department of Agriculture (ISDA) and on the Snake River by Idaho Power Company. The Bureau of Land Management (BLM) has collected data on the upper watersheds of Succor and Jump Creeks. Idaho Power Company has collected data on Castle Creek and the Snake River. The Homedale and Marsing Wastewater Treatment Plants monitoring their phosphorus output in 2006.

DEQ Surveys

Intermittent Stream Monitoring

The original TMDL contained a recommendation to delist Pickett, Birch, Brown, Hardtrigger, McBride, Rabbit, and Corder Creeks for sediment and temperature, with the rationale that these were all intermittent streams. This recommendation was formalized in DEQ’s 2008 Integrated Report. EPA rejected the rationale for delisting, and so these streams remain on the §303(d) list.

In spring 2010, DEQ staff conducted bank surveys on several of these intermittent streams, with the goal of determining the extent of sediment impairment, if any. As a result, evidence was collected to support the delisting of the 2nd-order sections of Pickett and Birch Creeks and the entire Brown Creek system. Hardtrigger Creek, McBride Creek, and the lower reaches of Birch Creek were found to be probably impaired by sediment, and more intensive monitoring was suggested. The final report for this monitoring project (DEQ 2010) is available on DEQ’s website.

DEQ plans to analyze Rabbit and Corder Creeks and the upper reaches of Jump Creek in summer 2011 using the same method.

Beneficial Use Reconnaissance Program Sampling

BURP crews have visited 14 sites on 9 streams in this watershed since 2001. The results are summarized below (Table 7) and are already reflected in the DEQ's most recent Integrated Report.

Table 7. Beneficial Use Reconnaissance Program sites sampled in the watershed since 2001

Stream and Assessment Unit	Location	Site ID	Results[a]	Interpretation[b]
Succor Creek 002_04	Downstream from Sage Creek	2001SBOIA043	SMI = 0 SHI = 1	Poor condition Not fully supporting CWAL
Sage Creek 002_03	Just upstream of Succor Creek	2001SBOIA044	SMI = 0 SHI = 3	Poor condition Not fully supporting CWAL
Succor Creek 003_03	Just above reservoir	2002SBOIF001	SFI = 1	Poor fish condition
Succor Creek 003_02	Just above Berg Mine	2002SBOIF002	SFI = 1	Poor fish condition
Reynolds Creek 009_04	Lower section, in canyon	2008SBOIA021	SMI = 1 SHI = 1 *E. coli* = 115.3 cfu/100 mL (single sample)	Poor condition Not fully supporting CWAL
Reynolds Creek 009_03	Middle section, near Reynolds	2008SBOIA022	SMI = 3 SHI = 2 *E. coli* = 146.6 cfu/100 mL (mean)	Good condition, but impaired by *E. coli* Not fully supporting PCR
East Fork Reynolds Creek 009_02	At confluence with West Fork	2008SBOIA011	SMI = 3 SHI = 3	Excellent condition
West Fork Reynolds Creek 009_02	At confluence with East Fork	2008SBOIA012	SMI = 3 SHI = 3	Excellent condition
Sinker Creek 012_04	Near mouth	2004SBOIA050	SMI = 1 SFI = 0 SHI = 1 *E. coli* = 220 cfu/100 mL (single sample)	Poor condition Not fully supporting CWAL
Castle Creek 014_05	2 miles upstream from mouth	2002SBOIF003	SFI = 0	Poor fish condition
Castle Creek 014_04a	Above Alder Creek	2008SBOIA190	SMI = 3 SHI = 3 *E. coli* = 113.7 cfu/100 mL (single sample)	Excellent condition
Alder Creek 014_03	Just upstream of Castle Creek	2001SBOIA018	SMI = 3 SFI = 0 SHI = 3	Poor condition Not fully supporting CWAL
North Fork Castle Creek 014_02a	Near Buckaroo Spring	2001SBOIA017	SMI = 2 SFI = 0 SHI = 1	Poor condition Not fully supporting CWAL
Vinson Wash 023_03	Near the mouth	2001SBOIA026	SMI = 0 SHI = 3	Poor condition Not fully supporting CWAL

Stream and Assessment Unit	Location	Site ID	Results[a]	Interpretation[b]

[a] S(M/H/F)I = Stream (Macroinvertebrate/Habitat/Fish) Index. These indices are used to evaluate support of cold water aquatic life. For an explanation of scoring methods and determining supporting status, see the *Water Body Assessment Guidance, Second Edition* (Grafe et al. 2002). Scores range from 0 to 3, with 0 being the poorest condition and 3 being the best.
[b] CWAL = cold water aquatic life, PCR = primary contact recreation

Idaho State Department of Agriculture Monitoring

Jump Creek

The most comprehensive monitoring of Jump Creek has been done by Kirk Campbell of ISDA. In 2009, flow, phosphorus, and suspended sediment samples were collected bimonthly from a site near the mouth of Jump Creek (ISDA 2009). In 2010, the survey was expanded to include 4 other sites on Jump Creek and its tributaries (ISDA 2010a).

The data clearly show that sediment loads are increasing and moving farther away from the TMDL targets (Figure 3). The discharge was similar between years, and so the extra sediment will lead to higher turbidity.

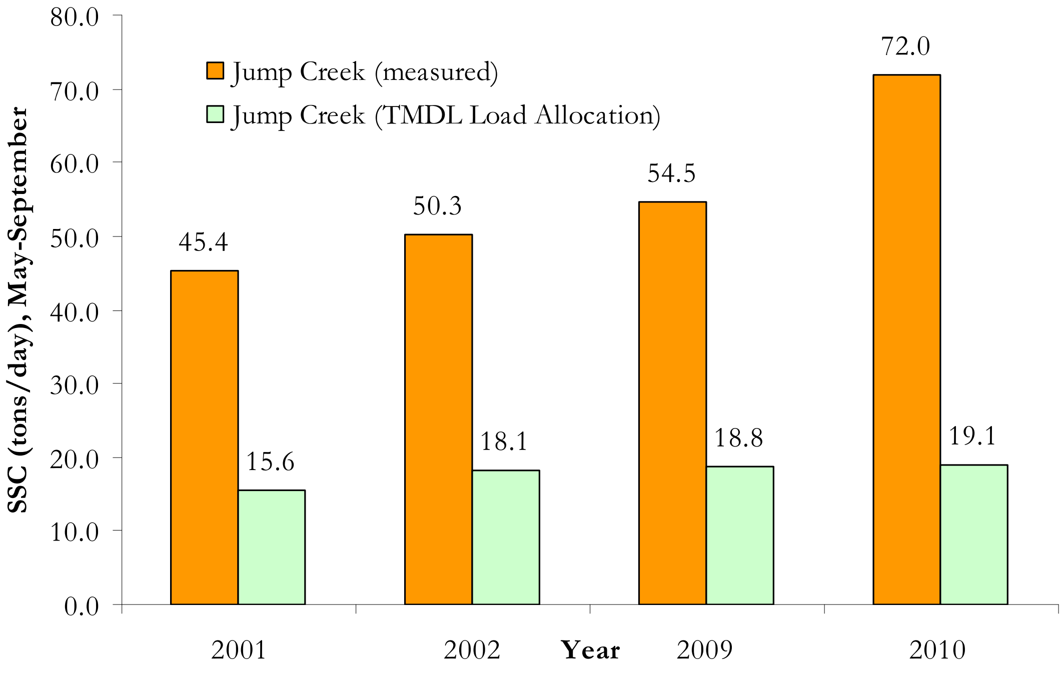

Figure 3. Average suspended sediment concentrations (May–September) in Jump Creek
Note: SSC = suspended sediment concentration

In addition to having its own TMDL, Jump Creek is a tributary to the Snake River between Swan Falls dam and Homedale and so has a TP load allocation of 70 µg/L. The ISDA measured TP in 2001, 2009, and 2010 (Figure 4).

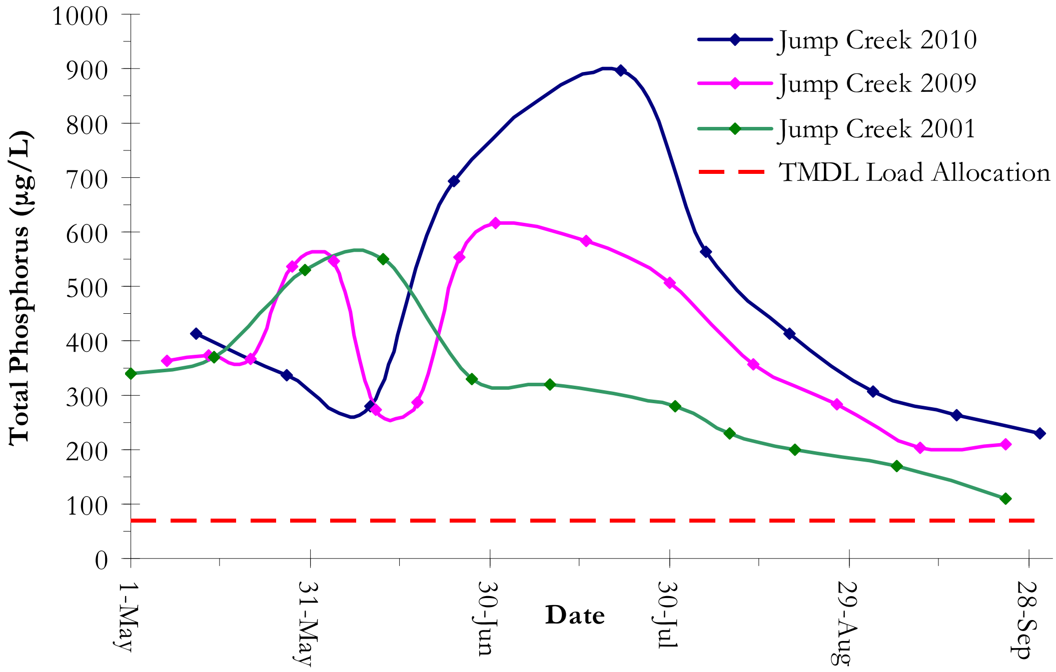

Figure 4. Total phosphorus concentrations at the mouth of Jump Creek

Figure 4 makes it clear that Jump Creek contributes phosphorus to the Snake River at levels significantly above its TMDL load allocation and that the problem appears to be getting worse.

The average daily irrigation season phosphorus load from Jump Creek was 70 kg/day in 2001, 110 kg/day in 2009, and 112 kg/day in 2010.

The BLM collected some bank condition and *E. coli* samples, but these samples were taken much further up in the watershed, out of the TMDL-affected reach.

Lower Succor Creek

Like Jump Creek, lower Succor Creek was the subject of an ISDA survey in 2009 (ISDA 2010b). The survey found a massive increase in suspended sediment in the major tributary, Sage Creek, compared with the data collected in 2002 (Figure 5).

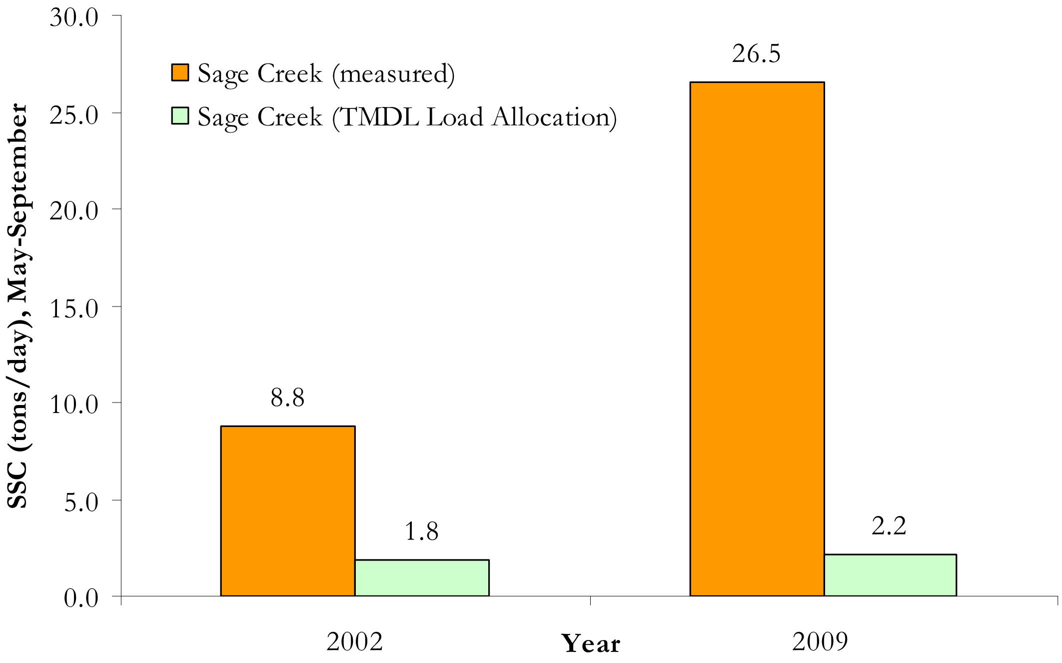

Figure 5. Average suspended sediment concentrations (May–September) in Sage Creek
Note: SSC = suspended sediment concentration

During the ISDA monitoring, a huge sediment plume was observed in the mainstem of Succor Creek. It was determined that this originated from a drain cleaning operation: "the heavy drain deposits of sediment into Succor Creek left the bottom of Succor Creek covered with approximately one to one and a half feet of fine sediment" (ISDA 2010b).

In addition to having its own TMDL, Succor Creek is a tributary to the Snake River between Swan Falls dam and Homedale and so has a phosphorus load allocation of 70 µg/L. The ISDA measured TP in 2000 and 2009 (Figure 6).

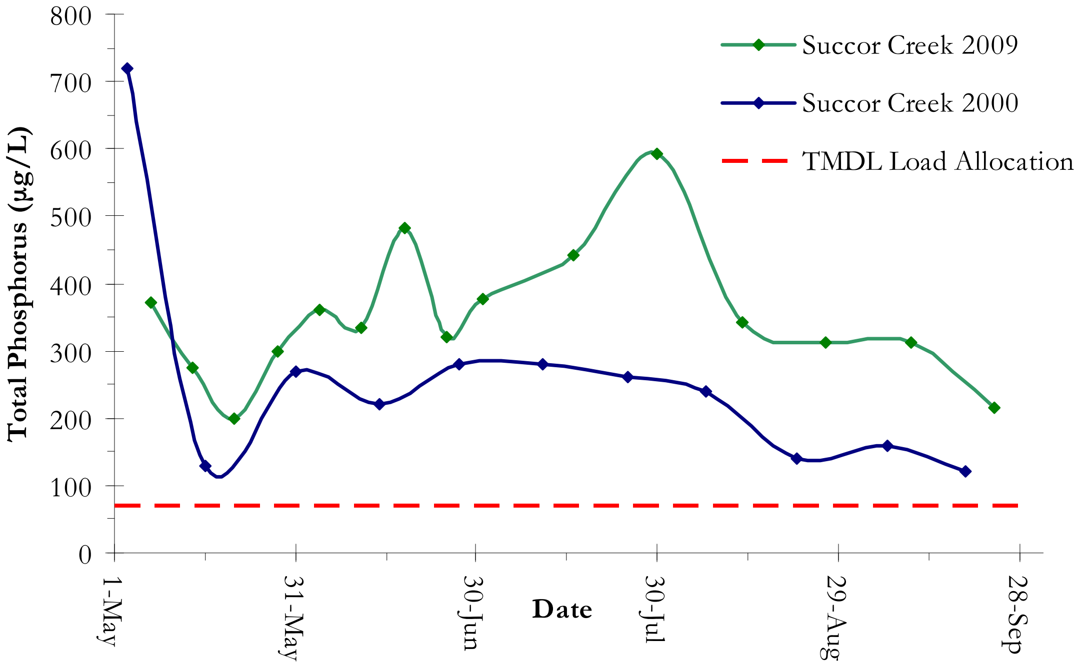

Figure 6. Total phosphorus concentrations at the mouth of Succor Creek

Figure 6 makes it clear that Succor Creek contributes phosphorus to the Snake River at levels significantly above its TMDL load allocation and that the problem appears to be getting worse.

The average daily irrigation season phosphorus load from Succor Creek was 35 kg/day in 2000 and 70 kg/day in 2009. The large increase is accounted for by increases in both average phosphorus concentration and a 50% increase in average discharge.

Bureau of Land Management Surveys

Upper Succor Creek

The BLM collected some bank condition measurements just upstream of Succor Creek Reservoir (in the upper part of the watershed). Their survey of 110 meters of stream found the bank was 32% altered, which is a potential sediment source. In the same section of stream, the banks were found to be only 53% stable.

A mile of stream was evaluated using the BLM's "proper functioning condition" method and was found to be "Functioning at Risk."

Idaho Power Company Studies

Castle Creek

Idaho Power Company monitored the mouth of Castle Creek as part of its study of tributaries to the Snake River (Knight and Naymik 2009). The data show that Castle Creek is indeed impaired by high water temperatures. The data also show high concentrations of phosphorus (Table 8).

Table 8. Castle Creek discharge and phosphorus data

Date	Discharge (cubic feet per second)	Total Phosphorus (micrograms per liter)
5/14/07	1.3	125
6/19/07	1.7	118
7/31/07	0.4	190
8/29/07	0.2	52
10/8/07	1.3	66

Although DEQ has assigned TP targets during the development of TMDLs, the State of Idaho does not have a numeric criterion for phosphorus, using instead a narrative criterion that focuses on the effects of phosphorus:

> 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)

There is no documentation of slime growths on Castle Creek, so it will not be listed as impaired by phosphorus at this time.

Snake River, C.J. Strike Dam to Swan Falls

Idaho Power Company has collected a large number of water quality measurements from the Snake River in this subbasin.

Swan Falls Study

In 2008, Idaho Power Company found that the Swan Falls outflow temperature regularly violated the water quality criterion (Naymik and Hoovestol 2008). This finding is not surprising; the original TMDL detailed several fish kills resulting from water temperatures exceeding 26 °C below Swan Falls dam.

The study included several instantaneous temperature measurements above Swan Falls dam (AU 006_07a) but not enough to determine whether the temperature exceeds water quality criteria.

The study also found that the reservoir changed the dynamics of phosphorus flow: “outflow particulate P was higher than inflow, while outflow ortho-P was lower than inflow … The time period of export supports the concept of retention of TP during low flows and export during higher flows” (Naymik and Hoovestol 2008).

The study found that the average TP concentration at the Swan Falls inflow from May through September for 2003–2006 was 77 µg/L.

Total Phosphorus Sampling

Idaho Power Company has collected TP samples from the C.J. Strike and Celebration Park bridges throughout the summer for the last decade (Figure 7). These data show that between 1999 and 2010, the Snake River averaged 70 µg/L TP (the TMDL target) at C.J. Strike bridge and 76 µg/L downstream at Celebration Park (Idaho Power Company 1999–2010). Celebration Park is several miles downriver from Swan Falls dam. These data show that the Snake River at Celebration Park routinely exceeds the TMDL TP target of 70 µg/L.

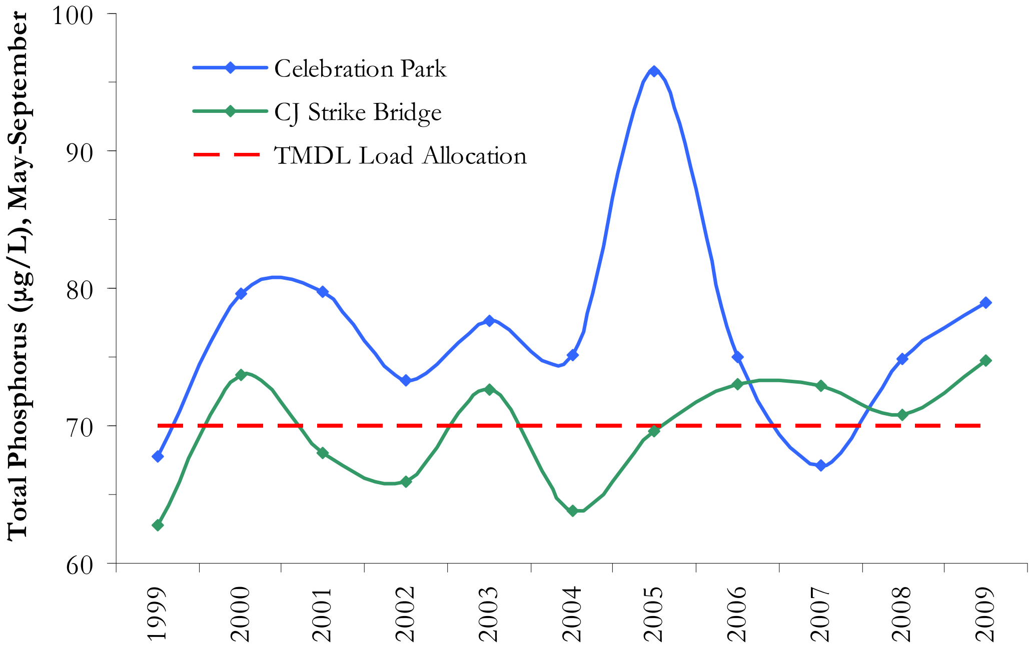

Figure 7. Total phosphorus concentrations (May–September averages) at C.J. Strike bridge

Tributary Study

This study, conducted from May through October 2007, measured the water quality of all tributaries and agricultural drains entering the Snake River between C.J. Strike and Swan Falls dams. Study parameters included flow, temperature, DO, TP, suspended solids, and Kjeldahl nitrogen (Knight and Naymik 2009). The study also included data from the Snake River at three locations: C.J. Strike outflow (river mile [RM] 493.6) and Swan Falls inflow and outflow (RM 474.8 and 457.7, respectively). Table 9 shows the data from the Snake River sites.

Table 9. Idaho Power Company Snake River water chemistry

				Nitrogen			Organic Carbon		Phosphorus		Suspended Solids	
Measure Date	River Mile	River Position	Flow[b] (cfs)	Ammonia[c]	Nitrate	Kjeldahl	Total	Dissolved	Ortho	Total	Total	Volatile
5/14/2007	457.7	RB	5712	0.01	0.7	0.52	3.22	2.03	0.005	0.051	16	9
6/19/2007	457.7	RB	5466	0.005	0.32	0.5	4.01	3.06	0.005	0.039	17	9
7/31/2007	457.7	RB	6097	0.09	0.6	0.81	4.27	3.59	0.024	0.068	7	4
8/29/2007	457.7	RB	5754	0.05	0.92	0.24	2.69	2.12	0.038	0.06	2	2
10/8/2007	457.7	RB	7230	0.02	1.23	0.44	2.59	2.23	0.025	0.079	10	6
Mean			6052	0.04	0.75	0.50	3.36	2.61	0.02	0.06	10.4	6
Maximum			7230	0.09	1.23	0.81	4.27	3.59	0.038	0.079	17	9
Minimum			5466	0.005	0.32	0.24	2.59	2.03	0.005	0.039	2	2
SD			696	0.04	0.34	0.20	0.76	0.69	0.01	0.02	6.27	3.08

				Nitrogen			Organic Carbon		Phosphorus		Suspended Solids	
Measure Date	River Mile	River Position	Flow[a](cfs)	Ammonia[c]	Nitrate	Kjeldahl	Total	Dissolved	Ortho	Total	Total	Volatile
5/14/2007	474.8	MC	5913	0.02	0.72	0.63	3.17	2.07	0.006	0.055	12	6
6/19/2007	474.8	MC	5184	0.09	0.51	0.85	5.68	5.14	0.005	0.066	20	7
7/31/2007	474.8	MC	6017	0.08	0.65	0.45	3	2.39	0.021	0.091	8	4
8/29/2007	474.8	MC	5595	0.01	0.84	0.35	3	1.52	0.029	0.056	5	4
10/8/2007	474.8	MC	7416	0.07	1.3	0.42	2.87	2.29	0.022	0.062	7	4
Mean			6025	0.05	0.80	0.54	3.54	2.68	0.02	0.07	10.4	5
Maximum			7416	0.09	1.3	0.85	5.68	5.14	0.029	0.091	20	7
Minimum			5184	0.01	0.51	0.35	2.87	1.52	0.005	0.055	5	4
SD			843	0.04	0.30	0.20	1.20	1.41	0.01	0.01	5.94	1.41

				Nitrogen			Organic Carbon		Phosphorus		Suspended Solids	
Measure Date	River Mile	River Position	Flow[a](cfs)	Ammonia[c]	Nitrate	Kjeldahl	Total	Dissolved	Ortho[d]	Total	Total	Volatile
5/17/2007	493.6	LB	5809	0.04	0.55	0.5	3.54	2.87	0.038	0.04	9	5
6/20/2007	493.6	LB	4970	0.15	0.44	0.71	5.01	2.88	0.0025	0.071	18	13
8/1/2007	493.6	LB	6164	0.13	0.56	0.8	3.43	2.42	0.022	0.083	7	4
8/1/2007	493.6	MC	6164	0.18	0.49	0.83	3.29	2.24	0.029	0.082	6	4
8/30/2007	493.6	MC	5619	0.06	0.67	0.54	3.13	1.79	0.011	0.042	9	5
10/9/2007	493.6	MC	7791	0.16	1.2	0.73	2.77	2.41	0.03	0.065	7	2
Mean			6086	0.12	0.65	0.69	3.53	2.44	0.02	0.06	9.33	5.5
Maximum			7791	0.18	1.2	0.83	5.01	2.88	0.038	0.083	18	13
Minimum			4970	0.04	0.44	0.5	2.77	1.79	0.0025	0.04	6	2
SD			944	0.06	0.28	0.14	0.77	0.41	0.01	0.02	4.41	3.83

[a] Daily mean flow at C.J. Strike gauge
[b] Daily mean flow at Murphy gauge
[c] Represents a detection limit correction of 1/2 the detection limit value for Ammonia for all values equal to .005
[d] Represents a detection limit correction of 1/2 the detection limit value for Orthophosphate for all values equal to .0025

(Source: Knight and Naymik 2009)

From May through September alone, the mean TP concentrations for individual Snake River sites were as follow:

- RM 457.7 (Swan Falls reservoir outflow) 54 µg/L
- RM 474.8 (Swan Falls reservoir inflow) 67 µg/L
- RM 493.6 (C.J. Strike dam outflow) 59µg/L

(Note that the latter two sites each exceeded 70 µg/L at least once. The TP values in the table above are reported in milligrams per liter, rather than micrograms per liter.)

Summary of Idaho Power Company Phosphorus Measurements

Celebration Park (RM 447.6)

- 76 µg/L, averaged over 103 samples from May through September, 1999–2010

Swan Falls Reservoir outflow (RM 457.7)

- 54 µg/L, averaged over 4 samples from May through September 2007
- 82 µg/L, averaged from May through September, 2003–2006 (sampled every 2 weeks)

Swan Falls Reservoir inflow (RM 474.8)

- 67 µg/L, averaged over 4 samples from May through September 2007
- 77 µg/L, averaged from May through September, 2003–2006 (sampled every 2 weeks)

C. J. Strike Dam outflow (RM 493.6)

- 59 µg/L, averaged over 4 samples from May through September 2007
- 70 µg/L, averaged over 143 samples from May through September, 1999–2010

Summary of Idaho Power Company Snake River Studies

The results of these Snake River studies lead to the following conclusions:

1. The outflow from C.J. Strike Reservoir is generally below 70 µg/L, although it usually exceeds this number several times each summer.
2. Although the evidence is not entirely clear, the section of river between C.J. Strike and Swan Falls dams probably exceeds 70 µg/L in most years.
3. The source of the extra phosphorus in this section of river is mainly the tributaries and drains, and it is strongly correlated with sediment loads.
4. Although, again, the evidence is mixed, the outflow from Swan Falls Reservoir appears to still exceed 70 µg/L from May through September and averages 76 µg/L at Celebration Park, a few miles downstream.
5. Temperature still impairs the water below Swan Falls dam. Upstream of Swan Falls dam, there is not enough evidence to support listing.

Currently, the TMDL phosphorus loading allocations only apply between Swan Falls dam and the Oregon state line. According to the original TMDL document, “An allocation for the sections of the river from CJ Strike Reservoir to … Swan Falls Dam may be necessary in the future” (DEQ 2007, p. 175).

Assessment decisions about nutrients are based upon nuisance aquatic growths—not numeric phosphorus numbers—as explained in the Idaho water quality standards (IDAPA 58.01.02.200.06). There is no firm evidence of nuisance aquatic growths, and so the Snake River between C.J. Strike and Swan Falls dams should remain unlisted for nutrients. If this portion of the river is listed in the future, the Idaho Power Company tributary study mentioned above would be a useful tool to assign loadings (Knight and Naymik 2009).

Wastewater Treatment Plants

In 2006, both the Homedale and Marsing Wastewater Treatment Plants measured average phosphorus output. Homedale’s average load was 3.4 kg/day (recall that its wasteload allocation is 5 kg/day). Marsing’s average load was 1.7 kg/day (wasteload allocation of 4 kg/day).

Assuming that average phosphorus concentrations have remained constant, then the current phosphorus load can be estimated using the most recently reported discharges. As such, Homedale is estimated to have produced 3.5 kg/day between July 2009 and June 2010. For the same period, Marsing is estimated to have produced 2.8 kg/day.

Both of these wasteloads are within their respective allocations.

Summary of Current Water Quality Data

Water quality in Lower Succor, Sage, and Jump Creeks is declining and moving away from the TMDL goals. Phosphorus levels in the Snake River have increased slightly, but the trend is less clear.

There are no recommended changes to EPA's Assessment Database based upon this data, because the data have already been considered in DEQ's 2010 Integrated Report.

Section 4: Review of Implementation Plan and Activities

The implementation plan was created by the Idaho Soil Conservation Commission (ISCC), Idaho Association of Soil Conservation Districts (IASCD), BLM, and the Idaho Department of Lands (IDL) (ISCC and IASCD 2005).

Planned Activities

DEQ was supposed to track annually the accomplishments that land management agencies have had towards achieving water quality standards.

DEQ, BLM, IDL, and IASCD were supposed to meet each year to document any projects that occurred over the previous field season.

On private lands, IASCD, ISCC, and the NRCS (with help from BLM and IDL) were responsible for the following tasks:

1. Developing conservation plans with private agricultural landowners
2. Assisting private agricultural landowners to implement conservation plan components
3. Monitoring conservation implementation progress and evaluating effects on vegetation, channel shape, and riparian area
4. Installing “reference reach” transects on Castle and Succor Creeks to define potential and capability of shading of stream channels.

On federal lands, BLM was responsible for the following tasks:

1. Completing 16 allotment assessments for grazing allotments
2. Preparing water quality restoration plans for §303(d)-listed streams on all grazing allotments within the Mid Snake River/Succor Creek subbasin by December 2009
3. Issuing new grazing permits that include BMPs identified to improve/restore the water quality of streams within BLM grazing allotments by December 2009
4. At least biannually, at the end of the grazing season, monitoring livestock use levels of riparian herbaceous vegetation and woody shrubs on §303(d)-listed streams on BLM grazing allotments
5. Every 5 years, monitoring effectiveness of BMPs implemented to improve/restore water quality of §303(d)-listed streams on BLM grazing allotments
6. Every 5 years, evaluating compliance with State of Idaho water quality criteria in streams on BLM grazing allotments (with support from Idaho DEQ)

On State of Idaho lands, IDL was responsible for the following tasks:

1. Every 4–10 years, preparing or revising grazing management plans on State allotments so that water quality standards will be met within a reasonable length of time
2. Implementing grazing management plans on State grazing allotments
3. Monitoring and reviewing state grazing leases
4. Developing and implementing short- and long-term monitoring in State grazing allotments

The Marsing and Homedale Wastewater Treatment Plants were supposed to write a nutrient reduction plan (DEQ 2007, p. 176).

Accomplished Activities

The following §319 grant projects have been completed (Table 10). Section 319 of the Clean Water Act established a grant program under which states, territories, and tribes may receive funds to support a wide variety of nonpoint source pollution management activities, including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects. There are no directly comparable data to evaluate the results with repect to the TMDL targets.

Table 10. Completed §319 projects

Project Number and Description	Sediment Reduction (tons/year)	Phosphorus Reduction (pounds/year)
05-04 Babbington/Reynolds Creek Riparian Rehabilitation	138	276
05-05 Succor Creek Field Pipeline Project	1,422	1,209
05-17 Shenk Animal Waste Containment Project Phase I	32	136
05-18 Hart Creek Diversion Ditch Project	3	6
05-20 Reynolds Creek Water Quality Improvement Project	15	30
05-21 Thomas Diversion Project	3	6
05-23 Upper Pivot Project	1,070	2,140
07-05 Shenk Animal Waste Containment Project Phase II	32	136
07-06 North Juniper Ridge Project (off-site watering)	232	464
07-09 Jump Creek Sediment Reduction Project (irrigation efficiency)	360	416
07-11 Jump Creek Spill Water Quality (sediment reduction)	475	885
07-12 D-Lateral Water Quality Project (sediment reduction)	166	310
07-17 A-Lateral Irrigation Efficiency/Sediment Reduction	1,425	3,880
07-18 Juniper Removal on Reynolds Creek	n/a	n/a
07-15 Pickett Creek Pipeline	225	600

Sources: Owyhee Watershed Council 2008, 2009, and no date.

The Owyhee Conservation District has completed the following projects as part of the Northwest Owyhee Water Quality Program for Agriculture:

1. Public awareness campaign (100% completed)
2. Nutrient management planning (100% completed)
3. 3,900 acres under nutrient management by 2008 (100% completed)
4. Additional 3,900 acres under nutrient management by 2009 (100% completed)
5. Additional 3,900 acres under nutrient management by 2010 (50% completed)
6. Irrigation water management evaluations (100% completed)
7. BMP effectiveness evaluation program (90% completed)
8. Semiannual status reviews and report (67% completed)
9. Inventory the surface water drainage system for Jump and Succor Creeks (100% completed)

The IASCD provided the following tables detailing its accomplished activities (Table 11 and Table 12).

Table 11. Best management practices applied with Idaho Soil and Water Conservation Commission (SWC) and Owyhee Conservation District programs' assistance (2005–2011)

BMPs Applied With Idaho SWC and Owyhee Conservation District Programs Assistance, 2005-2011			
BMP Title	**NRCS Practice Std. #**	**Units Treated**	
Channel Bank Vegetation	322	164	ft.
Fence	382	22,906	ft.
Filter Strip	393	1	ac.
Heavy Use Area Protection	561	3	each
Irrigation Land Leveling	464	21	ac.
Sprinkler Irrigation System	442	687	ac.
Nutrient Management	590	1,476	ac.
Livestock Water Pipeline	516	580	ft.
Pasture & Hayland Planting	512	22	ac.
Wildlife Pond	378	2	each
Sediment Basin	350	4	each
Streambank and Shoreline Protection	580	164	ft.
Subsurface Drain	606	4,960	ft.
Riparian Zone Livestock Use Exclusion	472	28	ac.
Waste Storage Facility	313	2	each
Livestock Watering Facility	614	5	each

Source: Delwyne Trefz, Idaho Soil and Water Conservation Commission

Table 12. Best management practices applied with the Natural Resources Conservation Service program's assistance, 2005–2011

BMPs Applied With USDA-NRCS Programs Assistance, 2005-2011		
BMP Title	NRCS Practice Std. #	Units Treated
Anionic Polyacrylamide (PAM) Application	450	375 ac.
MicroIrrigation System	411	1 ac.
Surface Irrigation System	443	610 ac.
Tail Water Recovery System	447	1 each
Sprinkler Irrigation System	442	6,309 ac.
Irrigation Water Management	449	12,093 ac.
Nutrient Management Planning	590	6,854 ac.
Channel and Streambank Stabilization	584	290 ft.
Streambank and Shoreline Protection	580	525 ft.
Irrigation Regulating Reservoir	552	5 each
Sediment Basin	350	8 each
Conservation Crop Rotation	328	6,842 ac.
Cover Crop	340	541 ac.
Residue Management--Mulch-Till	345	2,076 ac.
Residue Management--No-Till/Strip-Till	329A	778 ac.
Seasonal Residue Management	344	1,750 ac.
Surface Roughening	609	3,447 ac.
Deep Tillage	324	42 ac.

Source: Delwyne Trefz, Idaho Soil and Water Conservation Commission

Responsible Parties

Table 13 explains which entities are responsible for implementing the TMDL.

Table 13. Parties responsible for total maximum daily load implementation

Designated Management Agency	Resource Responsibility	Type of Involvement (regulatory, funding, assistance etc.)
Bureau of Land Management	Federal Lands	Regulatory
Idaho Department of Lands	State Lands	Regulatory
Idaho Association of Soil Conservation Districts/ Idaho Soil Conservation Commission	Private Lands	Assistance
Idaho Department of Environmental Quality	Streams	Funding

Future Strategy

The WAG recommends further monitoring of temperature-impaired streams, with the intention of refining the target shade maps in the PNV TMDLs.

Planned Time Frame

With the data showing that pollutant loads are increasing, it is difficult to provide a time frame by which water quality standards and beneficial uses could be met. However, these existing pollutant loads would probably have been worse if the projects listed above had not been in place.

Projects that reduce sediment and phosphorus in Jump and Succor Creeks should receive special attention.

Section 5: Summary of Five-Year Review

Review Process

Data were requested from the WAG in November 2009 and January 2010 and collated by DEQ's technical services office. The bulk of the data were received from Idaho Power Company, the BLM, and ISDA. Any data that pertained to a TMDL stream were considered and used in this analysis.

Changes in Subbasin

There have been no reported changes to the land use or climate in the subbasin. And endangered mollusk, *Physa natricina*, has been identified in the Snake River. Large increases in pollutant loads have been observed.

TMDL Analysis

In general, the original assumptions, analyses, and loading allocations of the TMDL are valid. These could be simplified somewhat by replacing the SSTEMP analysis of Sinker Creek with the new PNV method.

Review of Beneficial Uses

The beneficial uses in the subbasin are generally appropriate. Several small changes are recommended to EPA's Assessment Database to properly match the information in the water quality standards. Assessments of monitoring data (especially BURP data) have already been completed.

The status of beneficial uses in the subbasin is mixed. The lower portions of Reynolds Creek and Vinson Wash were found to be impaired, but upper Reynolds Creek and part of Castle Creek are in excellent condition.

Beneficial uses in streams that have a TMDL are generally not met.

Water Quality Criteria

The *E. coli* criterion has changed slightly since the TMDL was approved. The change prevents a single sample from being used to show a stream is impaired and does not affect the streams in this TMDL.

DEQ now relies more heavily on the natural background clause of its water quality standards, which is used in lieu of the numeric temperature criteria in PNV analyses.

Watershed Advisory Group Consultation

Members of the original WAG were contacted (where possible) and offered an opportunity to continue their service. DEQ is grateful for the assistance of the following individuals who agreed to serve:

Mr. Burl Ackerman, J. R. Simplot Company

Ms. Connie Brandau, Reynolds Creek water master

Mr. Brian Collett, landowner and rancher

Mr. Jerry Hoagland, Seven High Ranch Inc.

Mr. Brian Hoelscher, Idaho Power Company

Mr. Rich Jackson, Bureau of Land Management

Mr. Dean Johnson, Idaho Department of Lands

Mr. Delwyne Trefz, Idaho Soil and Water Conservation Commission

In addition to providing data in December 2010, the members of the WAG reviewed this document in March 2011. At a meeting in April 2011, the WAG suggested some changes. A final draft was sent to the WAG in July 2011.

Recommendations for Further Action

- Implementation projects on Succor and Jump Creeks should be given priority.
- An addendum to the TMDL should be prepared that changes the Sinker Creek temperature TMDL from an SSTEMP analysis to a PNV analysis.
- If macrophyte and slime levels are found to be objectionable in the Snake River between C.J. Strike and Swan Falls dams, the segment could be listed for a nutrient impairment. Loads could then be allocated to the tributaries.
- As recommended in the original TMDL, a Snake River thermal site analysis still needs to be done.
- The intermittent headwaters of Jump Creek should be monitored to demonstrate that there is no sediment impairment.
- A BURP site should be sampled, or at least pebble counts performed, in Succor Creek upstream of Sage Creek to establish whether the TSS target of 22 mg/L does indeed protect beneficial uses.

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