Little Lost River Subbasin Assessment and Total Maximum Daily Load

2015 Temperature Addendum

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May 2015

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Abbreviations, Acronyms, and Symbols

§303(d)	refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section
AU	assessment unit
BLM	Bureau of Land Management
BMP	best management practice
BURP	Beneficial Use Reconnaissance Program
C	Celsius
CFR	Code of Federal Regulations
CGP	Construction General Permit
CW	cold water
CWA	Clean Water Act
DEQ	Department of Environmental Quality
DO	dissolved oxygen
E. coli	*Escherichia coli*
EPA	United States Environmental Protection Agency
GIS	geographic information systems
IDAPA	Refers to citations of Idaho administrative rules
IDL	Idaho Department of Lands
kWh	kilowatt-hour
LA	load allocation
LC	load capacity
m	meter
MOS	margin of safety
NAIP	National Agriculture Imagery Program
NB	natural background
NPDES	National Pollutant Discharge Elimination System
NREL	National Renewable Energy Laboratory
PCR	primary contact recreation
PNV	potential natural vegetation
SS	salmonid spawning
SCR	secondary contact recreation
SWPPP	Stormwater Pollution Prevention Plan
TMDL	total maximum daily load
TU	Trout Unlimited
US	United States
U.S.C.	United States Code
WAG	watershed advisory group
WLA	wasteload allocation

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Executive Summary

The federal Clean Water Act 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 Clean Water Act, 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 Clean Water Act 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. Currently, this list is published every 2 years as the list of Category 5 water bodies in Idaho's Integrated Report. 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. This document addresses 24 assessment units (AUs) in the Little Lost River subbasin that have either been placed in Category 5 of Idaho's most recent federally approved Integrated Report (DEQ 2014) for temperature impairments, previously had temperature TMDLs developed in 2000 that EPA took no action on, or were unlisted but found to be impaired for temperature violations..

This addendum describes the key physical and biological characteristics of the subbasin; water quality concerns and status; pollutant sources; and recent pollution control actions in the Little Lost River subbasin, located in east-central Idaho. For more detailed information about the subbasin and previous TMDLs, see the Little Lost River Subbasin TMDL (DEQ 2000).

The TMDL analysis establishes water quality targets and load capacities, estimates existing pollutant loads, and allocates responsibility for load reductions needed to return listed waters to a condition meeting water quality standards. It also identifies implementation strategies—including reasonable time frames, approach, responsible parties, and monitoring strategies—necessary to achieve load reductions and meet water quality standards.

Subbasin at a Glance

The Little Lost River subbasin is located in east-central Idaho northwest of the US Department of Energy's Idaho National Laboratory (Figure A). The Little Lost River is one of the "lost river" drainages that flow northwest to southeast between basin and range-type mountain-valley formations and ultimately discharges to playas on the Snake River plain. Historically, there was no connection to other surface water bodies but instead river water either evaporated or infiltrated to the Snake River aquifer. Today much of the Little Lost River is used for agricultural irrigation and often does not reach the playas.

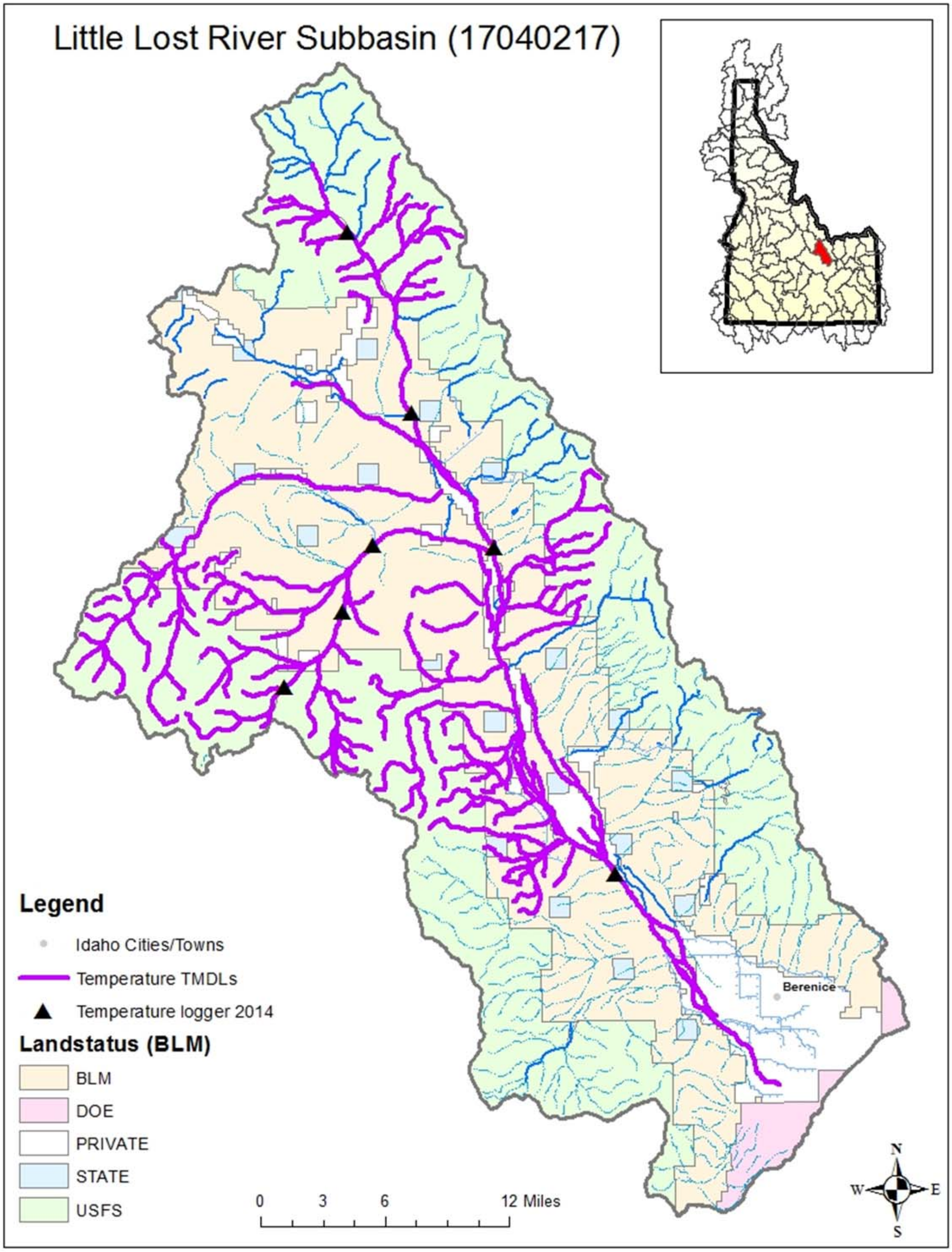

Figure A. Little Lost River subbasin.

Key Findings

The Little Lost River, Big Springs Creek, Sawmill Creek, Squaw Creek, Timber Creek, Moffett Creek, Summit Creek, Dry Creek, Deer Creek, Wet Creek, and many associated tributaries were placed on the 1998 §303(d) list of impaired waters, or subsequent lists, for reasons associated with temperature criteria violations, and the Idaho Department of Environmental Quality (DEQ) has developed temperature TMDLs for these waters (Table A). The Little Lost River, Sawmill Creek, and Wet Creek (5 AUs) had temperature TMDLs prepared in 2000 but EPA took no action. At one time they were erroneously placed in Category 4a of DEQ's current Integrated Report (DEQ 2014), which has now been corrected, as these TMDLs were never approved. Technically they are unlisted but impaired as their original listings were based on violations of temperature criteria. These five AUs as well as the 17 additional AUs currently listed in Category 5 for temperature are the subject of this addendum and temperature TMDLs for these AUs were developed using the Potential Natural Vegetation (PNV) methodology. Two AUs are unlisted but impaired for temperature are included because new data show they are temperature impaired. Temperature TMDLs were completed for these two AUs.

In this document, effective target shade levels were established for 24 AUs based on maximum shading under potential natural vegetation resulting in natural background temperature levels. Shade targets were derived from effective shade curves developed for similar vegetation types in Idaho. Existing shade was determined from aerial photo interpretation that was partially field verified with Solar Pathfinder data. Target and existing shade levels were compared to determine the amount of shade needed to bring water bodies into compliance with temperature criteria in Idaho's water quality standards (IDAPA 58.01.02). A summary of assessment outcomes, including recommended changes to listing status in the next Integrated Report, is presented in Tables B and C.

Most streams lack shade, although several AUs did not have any excess solar loads. Shade loss was affected primarily in the lower elevation deciduous tree-dominated riparian areas where losses of water, heat, and agricultural uses have diminished this vegetation. High elevation zones tend to be in better condition presumably because of higher moisture regimes and less land perturbation.

Target shade levels for individual stream segments should be the goal managers strive for with future implementation plans. Managers should focus on the largest differences between existing and target shade as locations to prioritize implementation efforts.

Table A. Water bodies and pollutants for which TMDLs were developed.

Water Body	Assessment Unit Number	Pollutant(s)
Little Lost River	ID17040217SK001_05 ID17040217SK002_05 ID17040217SK007_04 ID17040217SK009_04 ID17040217SK010_04	Temperature
Big Springs Creek	ID17040217SK003_02 ID17040217SK003_03 ID17040217SK003_04	Temperature
Little Lost River tributaries	ID17040217SK007_02 ID17040217SK009_02	Temperature
Sawmill Creek and tributaries	ID17040217SK012_04 ID17040217SK014_04 ID17040217SK014_02	Temperature
Squaw Creek	ID17040217SK015_02	Temperature
Timber Creek	ID17040217SK018_03	Temperature
Moffett Creek	ID17040217SK019_02a	Temperature
Summit Creek	ID17040217SK019_03	Temperature
Dry Creek and tributaries	ID17040217SK020_03 ID17040217SK021_02 ID17040217SK021_03	Temperature
Wet Creek	ID17040217SK022_03 ID17040217SK024_02 ID17040217SK024_03	Temperature
Deer Creek	ID17040217SK025_02	Temperature

Table B. Summary of assessment outcomes

Assessment Unit Name	Assessment Unit Number	Pollutant	TMDL(s) Completed	Recommended Changes to Next Integrated Report	Justification
Little Lost River	ID17040217SK001_05	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Little Lost River	ID17040217SK002_05 ID17040217SK007_04 ID17040217SK010_04	Temperature, combined biota/habitat bioassessments	Yes, revised	Move to Category 4a. Delist for combined biota/habitat bioassessments.	Temperature TMDL completed based on PNV.SK007_04 &SK010_04 are unlisted but impaired for temperature. No other pollutant sources or pathways identified. Temp is sole cause.
Big Springs Creek	ID17040217SK003_02 ID17040217SK003_03 ID17040217SK003_04	Temperature, unknown for SK003_03	Yes	Move to Category 4a. Delist SK003_03 for unknown pollutant.Placeholder for combined biota/habitat bioassessment	Temperature TMDL completed based on PNV. No other pollutant sources or pathways identified.Temp is sole cause.
Little Lost River tributaries	ID17040217SK007_02	Temperature, sediment, fishes bioassessment	Yes	Move to Category 4a. Delist sediment & fishes bioassessment	Temperature TMDL completed based on PNV. No other pollutant sources or pathways identified. Temp is sole cause.
Little Lost River tributaries	ID17040217SK009_02	Temperature, sediment	Yes	Move to Category 4a. Delist sediment	Excess solar load from a lack of existing shade. No other pollutant sources or pathways identified. Temperature is sole cause.
Sawmill Creek	ID17040217SK012_04	Temperature	Yes, revised	Move to Category 4a	Temperature TMDL completed based on PNV. Unlisted but impaired for temperature.
Sawmill Creek tributaries	ID17040217SK014_02 ID17040217SK014_04	Temperature, combined biota/habitat bioassessments SK014_02 only	Yes	Move to Category 4a. Delist SK014_02 for combined biota/habitat bioassessments	Temperature TMDL completed based on PNV. No other pollutant sources or pathways identified. Temperature is sole cause.
Squaw Creek	ID17040217SK015_02	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Timber Creek	ID17040217SK018_03	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Moffett Creek	ID17040217SK019_02a	Temperature, combined bioat/habitat bioassessments	Yes	Move to Category 4a. Delist combined biota/habitat bioassessments.	Temperature TMDL completed based on PNV. No other pollutant sources or pathways identified. Temperature is sole pollutant.

Summit Creek	ID17040217SK019_03	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Dry Creek and tributaries	ID17040217SK020_03 ID17040217SK021_02 ID17040217SK021_03	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Wet Creek	ID17040217SK022_03 ID17040217SK024_03	Temperature	Yes, revised	Move to Category 4a	Temperature TMDL completed based on PNV. Unlisted but impaired for temperature.
Deer Creek	ID17040217SK025_02	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV

Assessment Unit Name	Assessment Unit Number	Pollutant	TMDL(s) Completed	Recommended Changes to Next Integrated Report	Justification
Little Lost River	ID17040217SK009_04	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV. Unlisted but impaired.
Wet Creek	ID17040217SK024_02	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV. Unlisted but impaired.

Notes: total maximum daily load (TMDL); US Environmental Protection Agency (EPA); potential natural vegetation (PNV)

Public Participation

A formal WAG for the HUC does not exist. During the first iteration of the TMDL, DEQ worked with a local citizens group organized to support the ongoing Governor's Bull Trout working groups, established by Governor Phil Batt in 1996.

The current iteration of the 5 Year review was presented to the Upper Snake Basin Advisory Group in 2014.

Because DEQ does not have a formal WAG, the public comment draft will be delivered to the participants of the Bull Trout group, DMAs, federal land managers and local county officials

The general public will be able to comment on this draft document during the public comment period.

Introduction

This document addresses 24 assessment units (AUs) in the Little Lost River subbasin, several of which have been placed in Category 5 of Idaho's most recent federally approved Integrated Report (DEQ 2014). The purpose of this total maximum daily load (TMDL) addendum is to characterize and document pollutant loads within the Little Lost River subbasin. The first portion of this document presents key characteristics or updated information for the subbasin assessment, which is divided into four major sections: subbasin characterization (section 1), water quality concerns and status (section 2), pollutant source inventory (section 3), and a summary of past and present pollution control efforts (section 4). While the subbasin assessment is not a requirement of the TMDL, DEQ performs the assessment to ensure impairment listings are up-to-date and accurate.

The subbasin assessment is used to develop a TMDL for each pollutant of concern for the Little Lost River subbasin. The TMDL (section 5) is a plan to improve water quality by limiting pollutant loads. Specifically, a TMDL is an estimation of the maximum pollutant amount that can be present in a water body and still allow that water body to meet water quality standards (40 CFR 130). Consequently, a TMDL is water body- and pollutant-specific. The TMDL also allocates allowable discharges of individual pollutants among the various sources discharging the pollutant. Effective shade targets were established for 24 AUs based on the concept of maximum shading under potential natural vegetation (PNV) resulting in natural background temperatures.

Regulatory Requirements

This document was prepared in compliance with both federal and state regulatory requirements. The federal government, through the US Environmental Protection Agency (EPA), assumed the dominant role in defining and directing water pollution control programs across the country. The Idaho Department of Environmental Quality (DEQ) implements the Clean Water Act (CWA) in Idaho, while EPA oversees Idaho and certifies the fulfillment of CWA requirements and responsibilities.

Congress passed the Federal Water Pollution Control Act, more commonly called the Clean Water Act, in 1972. The goal of this act was to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (33 USC §1251). The act and the programs it has generated have changed over the years as experience and perceptions of water quality have changed. CWA has been amended 15 times, most significantly in 1977, 1981, and 1987. One of the goals of the 1977 amendment was protecting and managing waters to ensure "swimmable and fishable" conditions. These goals relate water quality to more than just chemistry.

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. DEQ must review those standards every 3 years, and EPA must approve Idaho's water quality standards. Idaho adopts water quality standards to protect public health and welfare, enhance water quality, and protect biological integrity. A water quality standard defines the goals of a water body by designating the use or uses for the water, setting criteria necessary to protect those uses, and preventing degradation of water quality through antidegradation provisions.

Section 303(d) of 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. Currently, this list is published every 2 years as the list of Category 5 waters in Idaho’s Integrated Report. For waters identified on this list, states and tribes must develop a TMDL for the pollutants, set at a level to achieve water quality standards.

DEQ monitors waters, and for those not meeting water quality standards, DEQ must establish a TMDL for each pollutant impairing the waters. However, some conditions that impair water quality do not require TMDLs. EPA considers certain unnatural conditions—such as flow alteration, human-caused lack of flow, or habitat alteration—that are not the result of discharging a specific pollutant as “pollution.” TMDLs are not required for water bodies impaired by pollution, rather than a specific pollutant. A TMDL is only required when a pollutant can be identified and in some way quantified.

1 Subbasin Assessment—Subbasin Characterization

The Little Lost River subbasin is located in eastern Idaho on the northern margin of the Snake River plain (Figure 1). The watershed is approximately 50 miles long and 20 miles wide (963 square miles). The valley floor averages 7 miles wide and is fairly consistent in width from the head of the valley to the mouth. Shaped like a long rectangle, it contains a high elevation valley flanked by the Lost River Range to the west and the Lemhi Range to the east.

The spine of the Lost River Range near the subbasin is predominately 10,000 feet in elevation, varying from 12,000 feet (Mount Breitenbach) in the north to 8,500 feet (Howe Peak) in the south. Most of the Lemhi Range is close to 11,000 feet in elevation with the ridge line ranging from 12,200 feet (Diamond Peak) to 10,800 feet (Saddle Mountain). The northwestern portion of the subbasin broadens a bit with several mountains and hills in the valley located between the Lost River Range and the Little Lost River.

Sawmill Creek elevation reaches 7,200 feet near Timber Creek at the head of Sawmill Canyon with surrounding mountains varying in elevation from 9,000 to 10,900 feet. Sawmill Creek joins Summit Creek at 6,200 feet in elevation. The valley bottom ranges in elevation from 6,600 feet near the source of Summit Creek in the north to 4,800 feet near the Little Lost River sinks, resulting in an approximate average valley gradient of 38 feet per mile (the gradient is steeper in the upper reaches of the valley).

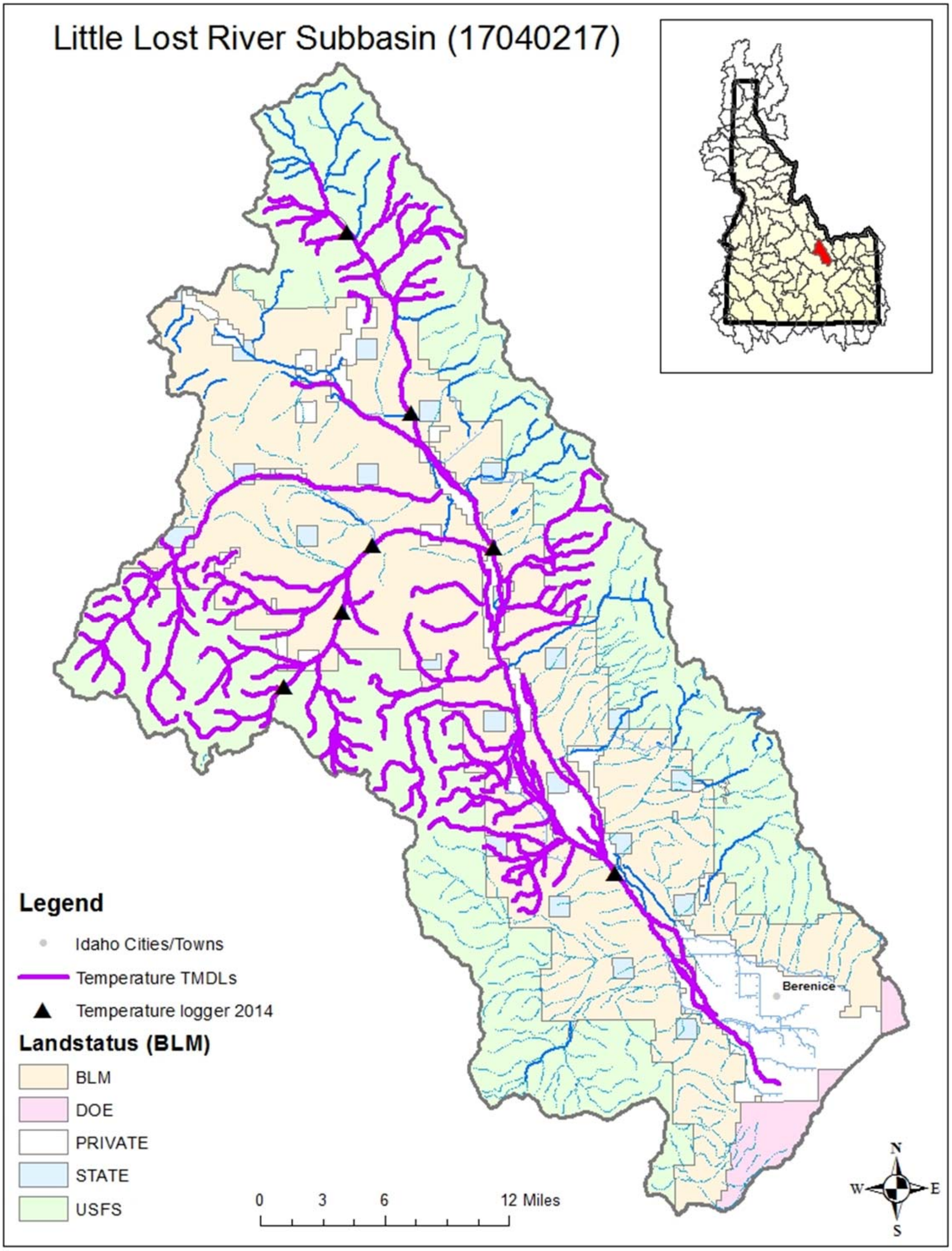

Figure 1. Little Lost River subbasin.

2 Subbasin Assessment—Water Quality Concerns and Status

2.1 Water Quality Limited Assessment Units Occurring in the Subbasin

Section 303(d) of the CWA states that waters that are unable to support their beneficial uses and do not meet water quality standards must be listed as water quality limited. Subsequently, these waters are required to have TMDLs developed to bring them into compliance with water quality standards.

2.1.1 Assessment Units

Assessment units (AUs) are groups of similar streams that have similar land use practices, ownership, or land management. However, stream order is the main basis for determining AUs—even if ownership and land use change significantly, the AU usually remains the same for the same stream order.

Using AUs to describe water bodies offers many benefits primarily that all waters of the state are defined consistently. AUs are a subset of water body identification numbers, which allows them to relate directly to the water quality standards.

2.1.2 Listed Waters

Table 1 shows the pollutants listed and the basis for listing for each currently §303(d)-listed AU in the subbasin (i.e., AUs in Category 5 of the Integrated Report). Table 1 does not show all the AUs that are within the present temperature TMDL, only those that are on the current §303(d) list. Two AUs are not listed but are temperature impaired (ID17040217SK009_04 and ID17040217SK024_02)

Table 1. Little Lost River subbasin current §303(d)-listed assessment units in the subbasin.

Assessment Unit Name	Assessment Unit Number	Listed Pollutants	Most RecentList
Little Lost River	ID17040217SK001_05 ID17040217SK002_05 ID17040217SK007_04 ID17040217SK010_04	Temperature for SK001_05 and SK002_05. Combined biota/ habitat bioassessments for SK002_05, SK007_04, and SK010_04.	2012 §303(d) list
Big Springs Creek	ID17040217SK003_02 ID17040217SK003_03 ID17040217SK003_04	Temperature. Also unknown for SK003_03.	2012 §303(d) list
Little Lost River tributaries	ID17040217SK007_02	Temperature, sediment, fishes bioassessment.	2012 §303(d) list
Little Lost River tributaries	ID17040217SK009_02	Temperature, sediment	2012 §303(d) list
Sawmill Creek and tributaries	ID17040217SK014_02 ID17040217SK014_04	Temperature. Also combined biota/ habitat bioassessments for SK014_02.	2012 §303(d) list
Squaw Creek	ID17040217SK015_02	Temperature	2012 §303(d) list
Timber Creek	ID17040217SK018_03	Temperature	2012 §303(d) list
Moffett Creek	ID17040217SK019_02a	Temperature, combined biota/ habitat bioassessments.	2012 §303(d) list
Summit Creek	ID17040217SK019_03	Temperature	2012 §303(d) list
Dry Creek and tributaries	ID17040217SK020_03 ID17040217SK021_02 ID17040217SK021_03	Temperature	2012 §303(d) list
Deer Creek	ID17040217SK025_02	Temperature	2012 §303(d) list

2.2 Applicable Water Quality Standards and Beneficial Uses

Idaho water quality standards (IDAPA 58.01.02) list beneficial uses and set water quality goals for waters of the state. 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 as described briefly in the following paragraphs. The *Water Body Assessment Guidance* (Grafe et al. 2002) provides a more detailed description of beneficial use identification for use assessment purposes.

Beneficial uses include the following:

- Aquatic life support—cold water, seasonal cold water, warm water, salmonid spawning, and modified
- Contact recreation—primary (swimming) or secondary (boating)
- Water supply—domestic, agricultural, and industrial
- Wildlife habitats
- Aesthetics

2.2.1 Existing Uses

Existing uses under CWA 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). The existing instream water uses and the level of water quality necessary to protect the uses shall be maintained and protected (IDAPA 58.01.02.051.01). Existing uses need to be protected, whether or not the level of water quality to fully support the uses currently exists. A practical application of this concept would be to apply the existing use of salmonid spawning to a water that supported salmonid spawning since November 28, 1975, but does not now due to other factors, such as blockage of migration, channelization, sedimentation, or excess heat.

2.2.2 Designated Uses

Designated uses under CWA are “those uses specified in water quality standards for each water body or segment, whether or not they are being attained” (40 CFR 131.3). Designated uses are simply uses officially recognized by the state. In Idaho, these include uses such as aquatic life support, recreation in and on the water, domestic water supply, and agricultural uses. Multiple uses often apply to the same water; in this case, water quality must be sufficiently maintained to meet the most sensitive use (designated or existing). Designated uses may be added or removed using specific procedures provided for in state law, but the effect must not be to preclude protection of an existing higher quality use such as cold water aquatic life or salmonid spawning. Designated uses are described in the Idaho water quality standards (IDAPA 58.01.02.100) and specifically listed by water body in sections 110–160.

2.2.3 Undesignated Surface Waters

In Idaho, due to a change in scale of cataloging waters in 2000, most water bodies listed in the tables of designated uses in the water quality standards do not yet have specific use designations. These undesignated surface waters ultimately need to be designated for appropriate uses. In the interim, and absent 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 criteria and primary or secondary contact recreation criteria to undesignated waters. If in addition to these *presumed uses*, an additional existing use (e.g., salmonid spawning) exists, then the additional numeric criteria for salmonid spawning would also apply (e.g., intergravel dissolved oxygen, temperature) because of the requirement to protect water quality for existing uses. However, if for example, cold water aquatic life is not found to be an existing use, a use designation (rulemaking) to that effect is needed before some other aquatic life criteria (such as seasonal cold water aquatic life) can be applied in lieu of cold water criteria (IDAPA 58.01.02.101.01).

2.2.4 Beneficial Uses in the Subbasin

In the Little Lost River subbasin, the Little Lost River itself is designated for cold water aquatic life, salmonid spawning, and primary contact recreation. All other streams in the subbasin are undesignated and are therefore presumed to support cold water aquatic life and at least secondary contact recreation. Many of these streams are known to contain viable populations of salmonids and will have salmonid spawning as an existing use.

Few fish have had access to the Little Lost River drainage due to ancient geological formations, which limit overland connections between these streams and adjacent drainages. Some species in the basin are plainly introduced while other species may be naturally established from when the Little Lost River drainage was linked to the Salmon River or the Snake River drainages. Eight species of salmonids have been reported to be native or have been introduced into the Little Lost River basin. These are Rainbow Trout (*Oncorhynchus mykiss*), Brook Trout (*Salvelinus fontinalis*), Bull Trout (*S. confluentus*), Cutthroat Trout (*O. clarki*), Brown Trout (*Salmo trutta*), Golden Trout (*O. aquabonita*), Mountain Whitefish (*Prosopium williamsoni*) and Arctic Grayling (*Thymallus arcticus*). The subbasin also contains Shorthead Sculpin (*Cottus confusus*), a native species.

The Little Lost River drainage upstream of the Big Springs Creek confluence is one of 59 key watersheds identified in Governor Batt’s State of Idaho Bull Trout Conservation Plan (Batt 1996). Bull Trout have been reported in the upper reaches of Badger and Big Creeks, lower reach of Camp Creek, Hawley Creek, Iron Creek, Jackson Creek, mid- and upper reaches of the mainstream (including Sawmill Creek), Mill Creek, Quigley Creek, Redrock Creek, Smithie Fork, Timber Creek, Squaw Creek (Sawmill Canyon), North Fork Squaw Creek, lower Slide Creek, upper reach of Warm Creek, Wet Creek (except the midsection), and Williams Creek. Bull Trout are thought to have been introduced to the watershed by an irrigation ditch that connected the upper Pahsimeroi River with upper Summit Creek.

Table 2 and Table 3 provide the beneficial uses for §303(d)-listed streams and unlisted but impaired streams.

Table 2. Little Lost River subbasin beneficial uses of §303(d)-listed streams.

Assessment Unit Name	Assessment Unit Number	Beneficial Uses[a]	Type of Use
Little Lost River	ID17040217SK001_05 ID17040217SK002_05 ID17040217SK007_04 ID17040217SK010_04	CW, SS, PCR	Designated
Big Springs Creek	ID17040217SK003_02 ID17040217SK003_03 ID17040217SK003_04	CW, SCR	Presumed
Little Lost River Tributaries	ID17040217SK007_02	CW, SCR	Presumed
Little Lost River Tributaries	ID17040217SK009_02	CW, SCR	Presumed
Sawmill Creek and tributaries	ID17040217SK014_04 ID17040217SK014_02	CW, SCR	Presumed
Squaw Creek	ID17040217SK015_02	CW, SCR	Presumed
Timber Creek	ID17040217SK018_03	CW, SCR	Presumed
Moffett Creek	ID17040217SK019_02a	CW, SCR	Presumed
Summit Creek	ID17040217SK019_03	CW, SCR	Presumed
Dry Creek and tributaries	ID17040217SK020_03 ID17040217SK021_02 ID17040217SK021_03	CW, SCR	Presumed
Deer Creek	ID17040217SK025_02	CW, SCR	Presumed

[a] Cold water (CW), salmonid spawning (SS), primary contact recreation (PCR), secondary contact recreation (SCR)

Table 3. Little Lost River subbasin beneficial uses of unlisted but impaired streams.

Assessment Unit Name	Assessment Unit Number	Beneficial Uses[a]	Type of Use
Little Lost River	ID17040217SK009_04	CW, SS, PCR	Designated
Wet Creek	ID17040217SK024_02	CW, SCR	Presumed

[a] Cold water (CW), salmonid spawning (SS), primary contact recreation (PCR), secondary contact recreation (SCR)

2.2.5 Water Quality Criteria to Support Beneficial Uses

Beneficial uses are protected by a set of water quality criteria, which include *numeric* criteria for pollutants such as bacteria, dissolved oxygen, pH, ammonia, temperature, and turbidity, and *narrative* criteria for pollutants such as sediment and nutrients (IDAPA 58.01.02.250–251) (Table 4). For more about temperature criteria and natural background provisions relevant to the PNV approach, see Appendix A.

Table 4. Selected numeric criteria supportive of designated beneficial uses in Idaho water quality standards.

Parameter	Primary Contact Recreation	Secondary Contact Recreation	Cold Water Aquatic Life	Salmonid Spawning[a]
Water Quality Standards: IDAPA 58.01.02.250–251				
Bacteria				
Geometric mean	<126 *E. coli*/100 mL[b]	<126 *E. coli*/100 mL	—	—
Single sample	≤406 *E. coli*/100 mL	≤576 *E. coli*/100 mL	—	—
pH	—	—	Between 6.5 and 9.0	Between 6.5 and 9.5
Dissolved oxygen (DO)	—	—	DO exceeds 6.0 milligrams/liter (mg/L)	**Water Column DO**: DO exceeds 6.0 mg/L in water column or 90% saturation, whichever is greater **Intergravel DO**: DO exceeds 5.0 mg/L for a 1-day minimum and exceeds 6.0 mg/L for a 7-day average
Temperature[c]	—	—	22 °C or less daily maximum; 19 °C or less daily average **Seasonal Cold Water**: Between summer solstice and autumn equinox: 26 °C or less daily maximum; 23 °C or less daily average	13 °C or less daily maximum; 9 °C or less daily average **Bull Trout**: Not to exceed 13 °C maximum weekly maximum temperature over warmest 7-day period, June–August; not to exceed 9 °C daily average in September and October
Turbidity	—	—	Turbidity shall not exceed background by more than 50 nephelometric turbidity units (NTU) instantaneously or more than 25 NTU for more than 10 consecutive days.	—
Ammonia	—	—	Ammonia not to exceed calculated concentration based on pH and temperature.	—
EPA Bull Trout Temperature Criteria: Water Quality Standards for Idaho, 40 CFR Part 131				
Temperature	—	—	—	7-day moving average of 10 °C or less maximum daily temperature for June–September

[a] During spawning and incubation periods for inhabiting species
[b] *Escherichia coli* per 100 milliliters
[c] Temperature exemption: Exceeding the temperature criteria will not be considered a water quality standard violation when the air temperature exceeds the ninetieth percentile of the 7-day average daily maximum air temperature calculated in yearly series over the historic record measured at the nearest weather reporting station.

DEQ’s procedure to determine whether a water body fully supports designated and existing beneficial uses is outlined in IDAPA 58.01.02.050.02. The procedure relies heavily upon biological parameters and is presented in detail in the *Water Body Assessment Guidance* (Grafe et al. 2002). This guidance requires DEQ to use the most complete data available to make beneficial use support status determinations (Figure 2).

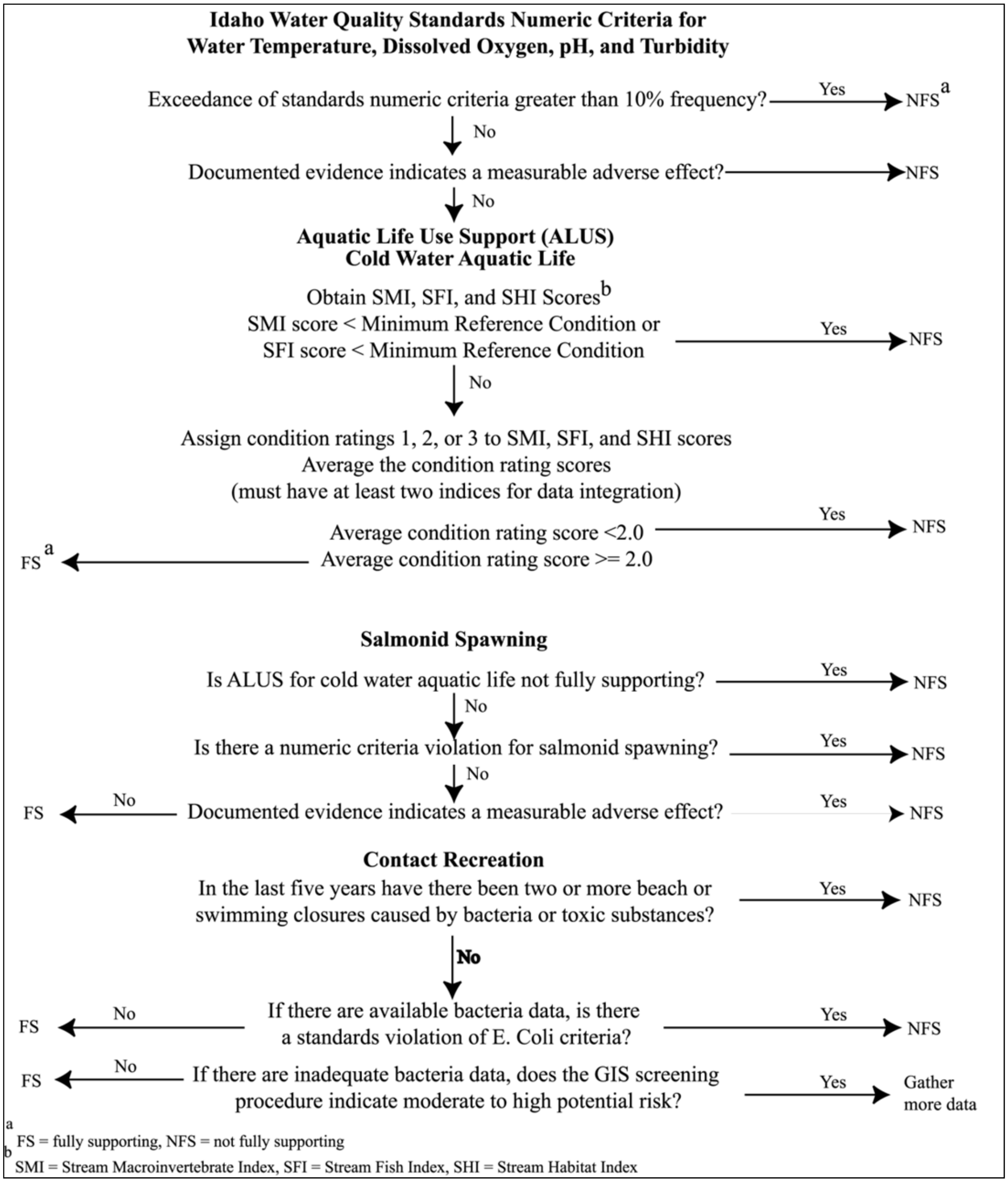

Figure 2. Determination steps and criteria for determining support status of beneficial uses in wadeable streams (Grafe et al. 2002).

2.3 Summary and Analysis of Existing Water Quality Data

Seven continuously recording temperature loggers were placed in three streams within the Little Lost River subbasin (Figure 1). Stream temperature data were recorded for a period from May 20, 2014, to July 29, 2014 (Appendix B, Figures B-4 to B-10). Streams represented by logger data include those waters in the previous temperature TMDL (DEQ 2000) with the exception of one logger in upper Wet Creek (ID17040217SK024_02), an unlisted AU. All seven logger sites showed criteria exceedances to varying degrees (section 2.3.2).

2.3.1 Status of Beneficial Uses

Salmonid spawning use, either as designated in the Little Lost River or as potentially existing in Sawmill and Wet Creeks, is impacted by criteria exceedances. Cold water aquatic life use was affected by criteria exceedances only in the Little Lost River but not in Sawmill or Wet Creeks.

2.3.2 Assessment Unit Summary

A summary of the data analysis, literature review, and field investigations and a list of conclusions for AUs with temperature TMDLs developed in this addendum follows. This section includes changes that will be documented in the next Integrated Report once the TMDLs in this document have been approved by EPA.

ID17040217SK001_05, Little Lost River from canal (T06N, R28E) to playas.

- Listed for temperature.
- AU was not sampled through the Beneficial Use Reconnaissance Program (BURP) because it was dry and inaccessible. This region of the river is likely completely diverted during the irrigation season. The remnant riparian vegetation lacks a considerable amount of shade (-49%) compared to its target cottonwood community.
- A temperature TMDL was completed for this AU although it may prove difficult to achieve shade targets because of dewatering. This AU should also be listed in Category 4c for low flow alterations or other flow regime alterations due to irrigation diversions.

ID17040217SK002_05, Little Lost River, Big Spring Creek to canal (T06N, R28E).

- Listed for temperature and combined habitat/biota bioassessments.
- Approved sediment TMDL (Category 4a) (DEQ 2000). The sediment TMDL is discussed in a separate 5-year review document.
- This AU was included in the previous approved TMDL (DEQ 2000) for temperature and sediment. EPA took no action on the submitted temperature TMDL. This addendum revises the temperature TMDL using the PNV method. Temperature data collected in 2014 (Figure B-5) show 45% exceedance of cold water aquatic life daily maximum temperatures and 96%–100% exceedance of spring salmonid spawning criteria.
- It is recommended that the AU be delisted for combined habitat/biota bioassessment because the listing results from sediment and temperature issues already addressed in TMDLs. No other pollutants were discovered.

ID17040217SK007_04, Little Lost River, Badger Creek to Big Spring Creek.

- Listed for combined habitat/biota assessment.
- Approved sediment TMDL (Category 4a) (DEQ 2000). The sediment TMDL is discussed in a separate 5-year review document.
- This AU was included in the previous approved TMDL (DEQ 2000) for temperature and sediment. EPA took no action on the submitted temperature TMDL. This addendum revises the temperature TMDL using the PNV method.

- It is recommended that the AU be delisted for combined habitat/biota bioassessment because the listing results from sediment and temperature issues already addressed in TMDLs. No other pollutants were discovered.

ID17040217SK010_04, **Little Lost River, confluence of Summit and Sawmill Creeks to Wet Creek.**

- Listed for combined habitat/biota bioassessment.
- This AU was included in the previous approved TMDL (DEQ 2000) for temperature and sediment. EPA took no action on the submitted temperature TMDL. This addendum revises the temperature TMDL using the PNV method. Temperature data collected in 2014 (Figure B-4) show 11% exceedance of cold water aquatic life daily maximum temperatures and 91%–96% exceedance of spring salmonid spawning criteria.
- It is recommended that the AU be delisted for combined biota/habitat bioassessments because the listing results from sediment and temperature issues are fully addressed in TMDLs. No other pollutants were discovered.

ID17040217SK009_04, **Little Lost River, Wet Creek to Badger Creek.**

- Unlisted but impaired for temperature. Upstream reaches are also impaired for temperature
- Approved sediment TMDL (Category 4a) (DEQ 2000). The sediment TMDL is discussed in a separate 5-year review document.
- This addendum develops a new temperature TMDL using the PNV method. It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature.

ID17040217SK003_02, **Big Springs Creek, source to unnamed tributary at 44.029, -113.206, and three small tributaries near the mouth of Big Springs Creek.**

- Listed for temperature.
- This AU was not assessed through BURP but lacks shade (-15%) compared to its target riparian communities. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature.

ID17040217SK003_03, **Big Springs Creek, unnamed tributary at 44.029, -113.206 to Uncle Ike Creek.**

- Listed for temperature and cause unknown.
- This AU had low BURP scores in 2001 and lacks shade (-19%) compared to its target riparian community. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature. It is recommended that the AU be delisted for cause unknown. The stream results from a high volume, low gradient spring on the valley floor. No other sources or pathways for pollutants identified. Temperature is sole cause of impairment

ID17040217SK003_04, Big Springs Creek, Uncle Ike Creek to mouth.

- Listed for temperature.
- This AU was not assessed through BURP but lacks shade (-38%) compared to its target riparian communities. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature.

ID17040217SK007_02, Little Lost River Tributaries, Badger Creek to Big Spring Creek.

- Listed for temperature, sediment, and fishes bioassessment.
- This AU was not sampled through BURP because it was dry but lacks shade (-5%) compared to its target riparian communities. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature.
- Delist sediment and fishes bioassessment as temperature is the sole source of impairment when water is flowing.

ID17040217SK009_02, Little Lost River Tributaries, Wet Creek to Badger Creek.

- Listed for temperature and sediment.
- This AU had low BURP scores in 2001 and lacks shade (-6%) compared to its target riparian community. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature. Temperature is the sole pollutant and cause of impairment. Delist for sediment.

ID17040217SK012_04, Sawmill Creek, Warm Creek to mouth.

- This AU was included in the previous approved TMDL (DEQ 2000) for temperature and sediment. EPA to no action on the submitted temperature TMDL. This addendum revises the temperature TMDL using the PNV method. The sediment TMDL will be discussed in a separate five-year review document. Temperature data collected in 2014 (Figure B-6) show no exceedance of cold water aquatic life criteria and 68%–70% exceedance of spring salmonid spawning criteria.
- It is recommended that the AU be moved to Category 4a for temperature.

ID17040217SK014_02, Sawmill Creek Tributaries.

- Listed for temperature and combined biota/habitat bioassessment.
- All tributaries had passing assessment scores except Garfield Creek (1996 data). The AU was listed for temperature due to Bull Trout concerns. The AU lacks shade (-8%) compared to its target riparian community. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature. It is recommended the AU be delisted for combined biota/habitat bioassessments because the listing results from temperature issues already addressed in the TMDL. No other pollutant sources or pathways were discovered.

ID17040217SK014_04, **Sawmill Creek, source to Warm Creek.**

- Listed for temperature.
- Approved sediment TMDL (Category 4a) (DEQ 2000). The sediment TMDL is discussed in a separate 5-year review document.
- This addendum develops a new temperature TMDL using the PNV method. Temperature data collected in 2014 (Figure B-7) show no exceedance of cold water aquatic life criteria and 34%–36% exceedance of spring salmonid spawning criteria.
- It is recommended that the AU move to Category 4a for temperature and remain in Category 4a for sediment.

ID17040217SK015_02, **Squaw Creek, source to mouth.**

- Listed for temperature.
- Five BURP sites had passing scores (1996–2007). The AU was listed for temperature due to Bull Trout concerns. The AU lacks shade (-11%) compared to its target riparian community. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature.

ID17040217SK018_03, **Timber Creek, Redrock Creek to mouth.**

- Listed for temperature.
- Two BURP sites had passing scores (1997–2011). The AU was listed for temperature due to Bull Trout concerns. The AU lacks shade (-14%) compared to its target riparian community. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature.

ID17040217SK019_02a, **Moffett Creek.**

- Listed for temperature and combined biota/habitatbioassessments.
- This AU had low BURP scores in 1994–1997. This addendum develops a new temperature TMDL using the PNV method. The AU does not appear to have an excess solar load compared to its target riparian community.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature. The AU should be delistedfor combined biota/habitat bioassessments as no other potential pollutants were identified.

ID17040217SK019_03, **Summit Creek.**

- Listed for temperature.
- This AU had passing BURP scores in 2011 but lacks shade (-21%) compared to its target riparian community. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU moved to Category 4a for temperature.

ID17040217SK020_03, **Dry Creek, Dry Creek Canal to mouth.**

- Listed for temperature.
- The AU had low BURP scores in 1995 and was dry from 2001 to 2008. The AU lacks shade (-4%) compared to its target riparian community. This addendum develops a new temperature TMDL using the PNV method. The AU is likely compromised by flow alteration and will not likely attain riparian shade targets. It is recommended the AU be added to Category 4c for low flow alterations.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature.

ID17040217SK021_02, **Dry Creek, source to Long Lost Creek.**

- Listed for temperature.
- The AU had low BURP scores in 1995 and lacks shade (-4% to -9%) compared to its target riparian community. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature.

ID17040217SK021_03, **Dry Creek, Long Lost Creek to Dry Creek Canal.**

- Listed for temperature.
- The AU had passing BURP scores in 1994 and 2007 and failing scores in 1995. The AU lacks shade (-11%) compared to its target riparian community. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU added to Category 4a for temperature.

ID17040217SK022_03, **Wet Creek, Squaw Creek to mouth.**

- This AU was included in the previous approved TMDL (DEQ 2000) for temperature. However, EPA took no action on the submitted temperature TMDL. This addendum revises the temperature TMDL using the PNV method. Temperature data collected in 2014 (Figure B-8) show no exceedance of cold water aquatic life criteria and 95%–96% exceedance of spring salmonid spawning criteria.
- It is recommended that the AU be moved to Category 4a for temperature and remain in Category 4c for flow alteration.

ID17040217SK024_02, **Wet Creek, source to Big Creek.**

- Unlisted but impaired for temperature.
- Approved sediment TMDL (Category 4a) (DEQ 2000). The sediment TMDL is discussed in a separate 5-year review document.
- This addendum develops a new temperature TMDL due to new temperature data. Temperature data collected in 2014 (Figure B-10) show no exceedance of cold water aquatic life criteria and 51%–82% exceedance of spring salmonid spawning criteria.
- It is recommended that the AU be moved to Category 4a for temperature.

ID17040217SK024_03, **Wet Creek, Big Creek to Squaw Creek.**

- This AU was included in the previous approved TMDL (DEQ 2000) for temperature and sediment. EPA took no action on the submitted temperature TMDL of 2000. This addendum revises the temperature TMDL using the PNV method. The sediment TMDL will be discussed in a separate five-year review document. Temperature data collected in 2014 (Figure B-9) show no exceedance of cold water aquatic life criteria and 93%–95% exceedance of spring salmonid spawning criteria.
- It is recommended that the AU be move to Category 4a for temperature and remain in Category 4a for sediment.

ID17040217SK025_02, **Deer Creek, source to mouth.**

- Listed for temperature.
- The AU has a mixture of failing and passing BURP scores from 1996 to 2001. The AU lacks shade (-7%) compared to its target riparian community. This addendum develops a new temperature TMDL using the PNV method.
- It is recommended that the new temperature TMDL be approved and the AU moved to Category 4a for temperature.

3 Subbasin Assessment—Pollutant Source Inventory

Pollution within the Little Lost River subbasin is primarily from temperature and sediment. Load allocations were established in the *Little Lost River Subbasin TMDL* approved by EPA in 2000 (DEQ 2000). Current knowledge regarding sediment pollution within the subbasin will be discussed in a separate 5-year review document. The temperature TMDL portion is being revised here in this document (section 5).

3.1 Point Sources

No known National Pollutant Discharge Elimination System (NPDES)-permitted point sources exist within the Little Lost River subbasin; however, numerous old mining claims were prospects, occurrences, or past producers of primarily lead, copper, gold, and silver. The majority of these entities occur along the west side of the Lemhi Mountain Range from Diamond Peak to Saddle Mountain on the east side of the subbasin.

3.2 Nonpoint Sources

The majority of the nonpoint source pollution results from rangeland livestock grazing, flow alteration, and a minor amount of crop agriculture along the valley floor. Although roads are common in the low elevation valleys, the higher elevation watersheds are largely inaccessible. Few timber resources exist within the subbasin; a small amount in the Sawmill Creek drainage has been largely affected by fire.

3.3 Pollutant Transport

Pollutant transport refers to the pathway by which pollutants move from the pollutant source to cause a problem or water quality violation in the receiving water body. Temperature pollution is not greatly affected by transport. It is primarily affected by shade removal through vegetation removal or manipulation.

4 Subbasin Assessment—Summary of Past and Present Pollution Control Efforts

Since 2003, a number of projects implemented by Trout Unlimited (TU) and cooperating landowners and agencies have provided fish passage at various barriers. TU worked with landowners to provide fish passage on three mainstem Little Lost River irrigation diversions upstream of Badger Creek. TU also worked on connecting Badger Creek to the Little Lost River in 2006. TU requested funding from DEQ in 2006 to finish the Waymire Diversion–Wet Creek Project, an irrigation diversion fish barrier on Wet Creek. Additionally, the Bureau of Land Management (BLM) has built exclosures on Wet Creek to protect the streambank. Additional information can be found in the Little Lost River TMDL Five Year Review, May 2015.

4.1 Water Quality Monitoring

As stated in section 2.3, seven continuously recording temperature loggers were placed in three streams within the Little Lost River subbasin (Figure 1). Stream temperature data were recorded for a period from May 20, 2014, to July 29, 2014 (Appendix B, Figures B-4 to B-10). Streams represented by logger data include those waters in the previous temperature TMDL (DEQ 2000) with the exception of one logger in upper Wet Creek (ID17040217SK024_02), which is a unlisted AU. All seven logger sites showed criteria exceedances to varying degrees (section 2.3.2).

5 Total Maximum Daily Loads

A TMDL prescribes an upper limit (i.e., load capacity) on discharge of a pollutant from all sources to ensure water quality standards are met. It further allocates this load capacity among the various sources of the pollutant. Pollutant source fall into two broad classes: point sources, each of which receives a wasteload allocation, and nonpoint sources, each of which receives a load allocation. Natural background contributions, when present, are considered part of the load allocation but are often treated separately because they represent a part of the load not subject to control. Because of uncertainties about quantifying loads and the relation of specific loads to attaining water quality standards, the rules regarding TMDLs (40 CFR 130) require a margin of safety be included in the TMDL. Practically, the margin of safety and natural background are both reductions in the load capacity available for allocation to pollutant sources.

Load capacity can be summarized by the following equation:

$$LC = MOS + NB + LA + WLA = TMDL$$

Where:

LC = load capacity
MOS = margin of safety
NB = natural background
LA = load allocation
WLA = wasteload allocation

The equation is written in this order because it represents the logical order in which a load analysis is conducted. First, the load capacity is determined. Then the load capacity is broken down into its components. After the necessary margin of safety and natural background, if relevant, are quantified, the remainder is allocated among pollutant sources (i.e., the load allocation and wasteload allocation). When the breakdown and allocation are complete, the result is a TMDL, which must equal the load capacity.

The load capacity must be based on critical conditions—the conditions when water quality standards are most likely to be violated. If protective under critical conditions, a TMDL will be more than protective under other conditions. Because both load capacity and pollutant source loads vary, and not necessarily in concert, determining critical conditions can be more complicated than it may initially appear.

Another step in a load analysis is quantifying current pollutant loads by source. This step allows for the specification of load reductions as percentages from current conditions, considers equities in load reduction responsibility, and is necessary for pollutant trading to occur. A load is fundamentally a quantity of pollutant discharged over some period of time and is the product of concentration and flow. Due to the diverse nature of various pollutants, and the difficulty of strictly dealing with loads, the federal rules allow for “other appropriate measures” to be used when necessary (40 CFR 130.2). These other measures must still be quantifiable and relate to water quality standards, but they allow flexibility to deal with pollutant load in more practical and tangible ways. The rules also recognize the particular difficulty of quantifying nonpoint loads and allow “gross allotment” as a load allocation where available data or appropriate predictive techniques limit more accurate estimates. For certain pollutants whose effects are long term, such as temperature, EPA allows for seasonal or annual loads.

5.1 Instream Water Quality Targets

For the Little Lost River subbasin temperature TMDLs, we utilized a PNV approach. The Idaho water quality standards include a provision (IDAPA 58.01.02.200.09) that if natural conditions exceed numeric water quality criteria, exceedance of the criteria is not considered a violation of water quality standards. In these situations, natural conditions essentially become the water quality standard, and for temperature TMDLs, the natural level of shade and channel width become the TMDL target. The instream temperature that results from attaining these conditions is consistent with the water quality standards, even if it exceeds numeric temperature criteria. Appendix A provides further discussion of water quality standards and natural background provisions.

The PNV approach is described briefly below. The procedures and methodologies to develop PNV target shade levels and to estimate existing shade levels are described in detail in *The*

Potential Natural Vegetation (PNV) Temperature Total Maximum Daily Load (TMDL) Procedures Manual (Shumar and De Varona 2009). The manual also provides a more complete discussion of shade and its effects on stream water temperature.

5.1.1 Factors Controlling Water Temperature in Streams

Several important factors contribute heat to a stream, including ground water temperature, air temperature, and direct solar radiation (Poole and Berman 2001). Of these, direct solar radiation is the source of heat that is most controllable. The parameters that affect the amount of solar radiation hitting a stream throughout its length are shade and stream morphology. Shade is provided by the surrounding vegetation and other physical features such as hillsides, canyon walls, terraces, and high banks. Stream morphology (i.e., structure) affects riparian vegetation density and water storage in the alluvial aquifer. Riparian vegetation and channel morphology are the factors influencing shade that are most likely to have been influenced by anthropogenic activities and can be most readily corrected and addressed by a TMDL.

Riparian vegetation provides a substantial amount of shade on a stream by virtue of its proximity. However, depending on how much vertical elevation surrounds the stream, vegetation further away from the riparian corridor can also provide shade. We can measure the amount of shade that a stream receives in a number of ways. Effective shade (i.e., that shade provided by all objects that intercept the sun as it makes its way across the sky) can be measured in a given location with a Solar Pathfinder or with other optical equipment similar to a fish-eye lens on a camera. Effective shade can also be modeled using detailed information about riparian plants and their communities, topography, and stream aspect.

In addition to shade, canopy cover is a similar parameter that affects solar radiation. Canopy cover is the vegetation that hangs directly over the stream and can be measured using a densiometer or estimated visually either on-site or using aerial photography. All of these methods provide information about how much of the stream is covered and how much is exposed to direct solar radiation.

5.1.2 Potential Natural Vegetation for Temperature TMDLs

PNV along a stream is that riparian plant community that could grow to an overall mature state, although some level of natural disturbance is usually included in the development and use of shade targets. Vegetation can be removed by disturbance either naturally (e.g., wildfire, disease/old age, wind damage, wildlife grazing) or anthropogenically (e.g., domestic livestock grazing, vegetation removal, erosion). The idea behind PNV as targets for temperature TMDLs is that PNV provides a natural level of solar load to the stream without any anthropogenic removal of shade-producing vegetation. Vegetation levels less than PNV (with the exception of natural levels of disturbance and age distribution) result in the stream heating up from anthropogenically created additional solar inputs.

We can estimate PNV (and therefore target shade) from models of plant community structure (shade curves for specific riparian plant communities), and we can measure or estimate existing canopy cover or shade. Comparing the two (target and existing shade) tells us how much excess solar load the stream is receiving and what potential exists to decrease solar gain. Streams disturbed by wildfire, flood, or some other natural disturbance will be at less than PNV and require time to recover. Streams that have been disturbed by human activity may require additional restoration above and beyond natural recovery.

Existing and PNV shade was converted to solar loads from data collected on flat-plate collectors at the nearest National Renewable Energy Laboratory (NREL) weather stations collecting these data. In this case, we used the Pocatello, ID station. The difference between existing and target solar loads, assuming existing load is higher, is the load reduction necessary to bring the stream back into compliance with water quality standards (Appendix A).

PNV shade and the associated solar loads are assumed to be the natural condition; thus, stream temperatures under PNV conditions are assumed to be natural (so long as no point sources or other anthropogenic sources of heat exist in the watershed) and are considered to be consistent with the Idaho water quality standards, even if they exceed numeric criteria by more than 0.3 °C.

5.1.2.1 Existing Shade Estimates

Existing shade was estimated for 24 AUs from visual interpretation of aerial photos. Estimates of existing shade based on plant type and density were marked out as stream segments on a 1:100,000 or 1:250,000 hydrography taking into account natural breaks in vegetation density. Stream segment length for each estimate of existing shade varies depending on the land use or landscape that has affected that shade level. Each segment was assigned a single value representing the bottom of a 10% shade class (adapted from the cumulative watershed effects process, IDL 2000). For example, if shade for a particular stream segment was estimated somewhere between 50% and 59%, we assigned a 50% shade class to that segment. The estimate is based on a general intuitive observation about the kind of vegetation present, its density, and stream width. Streams where the banks and water are clearly visible are usually in low shade classes (10%, 20%, or 30%). Streams with dense forest or heavy brush where no portion of the stream is visible are usually in high shade classes (70%, 80%, or 90%). More open canopies where portions of the stream may be visible usually fall into moderate shade classes (40%, 50%, or 60%).

Visual estimates made from aerial photos are strongly influenced by canopy cover and do not always take into account topography or any shading that may occur from physical features other than vegetation. It is not always possible to visualize or anticipate shade characteristics resulting from topography and landform. However, research has shown that shade and canopy cover measurements are remarkably similar (OWEB 2001), reinforcing the idea that riparian vegetation and objects proximal to the stream provide the most shade. The visual estimates of shade in this TMDL were partially field verified with a Solar Pathfinder, which measures effective shade and takes into consideration other physical features that block the sun from hitting the stream surface (e.g., hillsides, canyon walls, terraces, and man-made structures).

Solar Pathfinder Field Verification

The accuracy of the aerial photo interpretations was field verified with a Solar Pathfinder at 26 sites. The Solar Pathfinder is a device that allows one to trace the outline of shade-producing objects on monthly solar path charts. The percentage of the sun’s path covered by these objects is the effective shade on the stream at the location where the tracing is made. To adequately characterize the effective shade on a stream segment, ten traces are taken at systematic or random intervals along the length of the stream in question.

At each sampling location, the Solar Pathfinder was placed in the middle of the stream at about the bank-full water level. Ten traces were taken following the manufacturer's instructions (i.e., orient to south and level). Systematic sampling was used because it is easiest to accomplish without biasing the sampling location. For each sampled segment, the sampler started at a unique location, such as 50 to 100 meters from a bridge or fence line, and proceeded upstream or downstream taking additional traces at fixed intervals (e.g., every 50 meters, 50 paces, etc.). Alternatively, one can randomly locate points of measurement by generating random numbers to be used as interval distances.

When possible, the sampler also measured bank-full widths, took notes, and photographed the landscape of the stream at several unique locations while taking traces. Special attention was given to changes in riparian plant communities and what kinds of plant species (the large, dominant, shade-producing ones) were present. One can also take densiometer readings at the same location as Solar Pathfinder traces. These readings provide the potential to develop relationships between canopy cover and effective shade for a given stream.

The original aerial interpretation of existing shade was conducted using 2009 National Agriculture Imagery Program (NAIP) imagery and was field verified at 26 sites across the subbasin (Table 5). The results showed that on average the original interpretation was off by 4% ± 9.97 (average ± 95% C.I.). At 12 sites the aerial interpretation overestimated shade by four 10%-shade classes (yellow cells). Most of these sites were in regions where shade was naturally high (> 50%). At 11 sites the aerial interpretation underestimated shade (orange cells); and these locations tended to be low shade sites (< 50%). At three sites shade was accurately predicted. The results of the field verification were used to first correct shade interpretations at the site locations, and then secondly used to "calibrate the eye" for a second round of aerial photo interpretations using 2011 and 2013 NAIP imagery for all other stream reaches in the analysis. The 2009 imagery was of much lower resolution than latter imagery, presumably causing much of the error discovered in the field verification.

Table 5. Solar pathfinder field verification results.

aerial class	pathfinder actual	pathfinder class	delta	Site Name
50	32.5	30	20	squaw1
80	42.4	40	40	timber1
90	55.2	50	40	timber1
90	68.9	60	30	timber2
20	30.3	30	-10	sawmill1
40	6.7	0	40	summit1
40	18.4	10	30	sawmill2
30	51.4	50	-20	sawmill3
50	27	20	30	wet1
60	30.8	30	30	wet2
30	15.5	10	20	wet3
40	17.1	10	30	wet4
20	39.1	30	-10	wet5
30	24.7	20	10	wet6
20	18.5	10	10	wet7
30	36.5	30	0	deer1
40	50.5	50	-10	deer2
60	74.2	70	-10	deer3
0	47	40	-40	williams1
30	60.7	60	-30	williams1
10	67	60	-50	big springs1
10	23.5	20	-10	littlelost1
10	48.7	40	-30	littlelost2
20	25.4	20	0	littlelost3
20	32.4	30	-10	littlelost4
30	30.2	30	0	littlelost5
			4	average
			25.93	std dev
			9.97	95%CI

5.1.2.2 Target Shade Determination

PNV targets were determined from an analysis of probable vegetation at the streams and comparing that to shade curves developed for similar vegetation communities in Idaho (Shumar and De Varona 2009). A shade curve shows the relationship between effective shade and stream width. As a stream gets wider, shade decreases as vegetation has less ability to shade the center of wide streams. As the vegetation gets taller, the more shade the plant community is able to provide at any given channel width.

Natural Bank-Full Widths

Stream width must be known to calculate target shade since the width of a stream affects the amount of shade the stream receives. Bank-full width is used because it best approximates the width between the points on either side of the stream where riparian vegetation starts. Measures of current bank-full width may not reflect widths present under PNV (i.e., natural widths). As impacts to streams and riparian areas occur, width-to-depth ratios tend to increase such that streams become wider and shallower. Shade produced by vegetation covers a lower percentage of the water surface in wider streams, and widened streams can also have less vegetative cover if shoreline vegetation has eroded away.

Since, natural bank-full width may not be known or interpreted from aerial photography and may not reflect existing bank-full widths, this parameter must be estimated from available information. We used regional curves for the major basins in Idaho—developed from data compiled by Diane Hopster of the Idaho Department of Lands (IDL)—to estimate natural bank-full width (Figure 3).

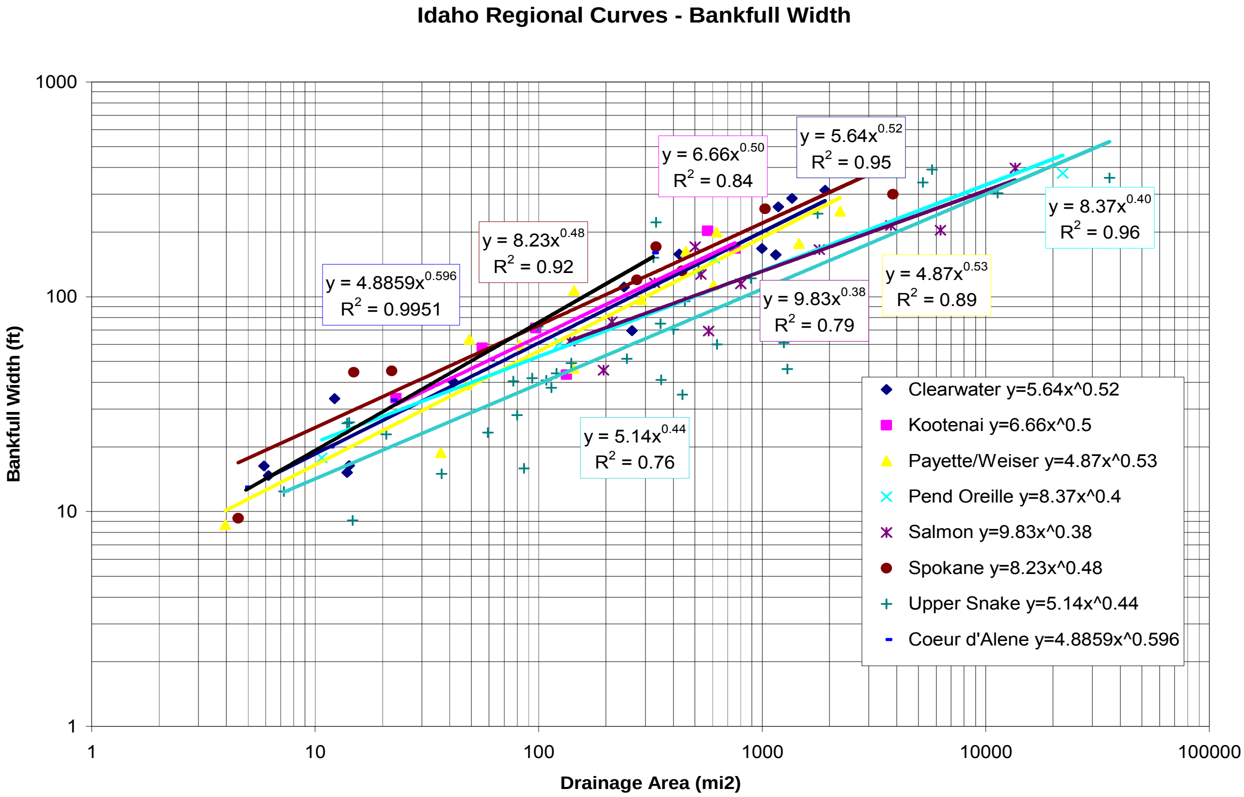

Figure 3. Bank-full width as a function of drainage area.

For each stream evaluated in the load analysis, natural bank-full width was estimated based on the drainage area of the Upper Snake and Salmon basin curves from Figure 3. Although estimates from other curves were examined (i.e., Payette/Weiser), the Upper Snake and Salmon curves were ultimately chosen because of their proximity to the Little Lost River watershed and similarities in climate and geology. Existing width data should also be evaluated and compared to these curve estimates if such data are available. However, for the Little Lost River watershed, only a few BURP sites exist, and bank-full width data from those sites represent only spot data (e.g., only three measured widths in a reach just several hundred meters long) that are not always representative of the stream as a whole.

In general, we found BURP bank-full width data to show that widths were somewhere between the two curve estimates. Thus, we chose to make natural bank-full width estimates a hybrid between the Upper Snake and Salmon basin curves. Natural bank-full width estimates for each stream in this analysis are presented in Table B-2 in Appendix B. The load analysis tables contain a natural bank-full width and an existing bank-full width for every stream segment in the analysis based on the bank-full width results presented in Table B-2. Existing widths and natural widths are the same in load tables when the data do not support making them differ.

Design Conditions

The Little Lost River subbasin lies within the Middle Rockies Level 3 Ecoregion of McGrath et al. (2001), which is further divided into (from low to high elevation) the Dry Intermontane Sagebrush Valleys, the Dry Gneissic-Schistose-Volcanic Hills, the Barren Mountains, and the High Elevation Rockland Alpine Zone Level 4 sub-ecoregions (McGrath et al., 2001). In the highest elevations of this area, alpine tundra and grassland, subirrigated meadows and wetlands are found above the timberline. In the Barren Mountains sub-ecoregion, elevations range from 6,800 to 10,000 feet and open forests, shrublands, and grassland are dominant vegetation types. Dry Douglas fir (*Psuedotsuga menziesii*) without ponderosa pine is the dominant forest type, although limber pine (*Pinus flexilis*) and lodgepole pine (*P. contorta*) types also occur. Moist subalpine fir (*Abies lasiocarpa*) is occasionally used as a riparian corridor forest. Barren or rocky areas are also common in these ecoregions. In contrast, the lower elevation Dry Gneissic-Schistose-Volcanic Hills sub-ecoregion is dominated by sagebrush-grassland vegetation. The Dry Intermontane Sagebrush Valleys sub-ecoregion at the valley floor is characterized by low precipitation and mountain runoff with alluvial fans, floodplains, and deep gravels that prevent water from remaining on the surface. Vegetation in this area consists mainly of sagebrush grasslands. Nonforest riparian areas are typically dominated by shrubs, aspen (*Populus tremuloides*), thinleaf (mountain) alder (*Alnus incana*), and willows (*Salix* sp.) at higher elevations or water birch (*Betula occidentalis*), mountain mahogany (*Cercocarpus ledifolius*), juniper (*Juniperus* sp.), and willows at lower elevations.

The Little Lost River valley exists between two mountain ranges of Basin and Range-like topography, the Lost River Mountain Range to the west and the Lemhi Mountain Range to the east. The Little Lost River is one of the “lost” river systems in Idaho that drain southeast and are lost to the desert of the upper Snake River plain. The Little Lost River along with the Big Lost River to the west and Birch Creek to the east do not connect with other river systems but deposit their water onto playas where water is evaporated or percolates into the vast Snake River aquifer. The Little Lost River drainage originally drained north to the Salmon River and was a part of the Pahsimeroi River system. Fault block movement in this basin and range-like province raised the valley floor in its middle splitting the original river into two, the Pahsimeroi River draining north and the Little Lost River draining south.

Streams in the Little Lost River subbasin are exposed to a variety of habitats. The Sawmill Creek drainage, which includes Timber Creek, Smithie Fork, Main Fork, Iron Creek, Squaw Creek, and Mill Creek, is nestled between Bear Mountain (10,744 feet) and Sheep Mountain (10,865 feet) of the Lemhi Range on the north end of the Little Lost River drainage. These streams originate at high elevations in primarily mixed conifer forest of Douglas fir, lodgepole, and limber pine. Stream riparian zones may include subalpine fir, aspen, and willows. Recent fire has affected the upper reaches of Sawmill drainage especially Smithie Fork and Main Fork. Most streams in this region emerge from conifer-dominated riparian areas to high elevation (< 7,000 feet) shrub-dominated riparian areas. Sawmill Creek itself extends below this high elevation shrub zone into the mid-elevation (5,000–7,000 feet) shrub type.

Across the valley from Sawmill Creek to the southwest are the Dry Creek and Wet Creek drainages. These streams originate from some of the highest mountains in Idaho in the Lost River Range between Leatherman Peak (12,228 feet) and Invisible Mountain (11,343 feet). Again, Dry and Wet Creeks as well as tributaries (Long Lost and Squaw Creeks) begin in conifer vegetation types and may progress through a variety of types including aspen and high elevation shrub before traversing broad alluvial fans to the Lost River Valley. BLM (2000) describes Wet Creek riparian as Booth's willow (*S. boothii*) in upper reaches with Geyer willow (*S. geyeriana*)/beaked sedge (*Carex rostrata*), water birch, and sandbar willow (*S. exigua*) types dominating lower reaches. Squaw Creek, a tributary to Wet Creek, is almost entirely within the mid-elevation shrub vegetation type before it loses surface water to become a dry wash. The lower half of Dry Creek is also a dry, ephemeral wash with no riparian vegetation as the bulk of Dry Creek is retained behind a dam and pumped over to the Wet Creek drainage.

The Little Lost River is formed by the convergence of the Sawmill Creek channel and Summit Creek. Summit Creek originates from springs near the divide with the Pahsimeroi River drainage. BLM (2000) classifies Summit Creek as a sandbar willow type with significant amounts of Booth's willow and Nebraska sedge (*C. nebrascensis*) types. The Little Lost River begins in sandbar willow type riparian vegetation (BLM 2000), which eventually graduates to the deciduous tree/shrub vegetation type (water birch or cottonwoods) below Big Springs Creek. Big Springs Creek is characterized as a water birch community type with beaked sedge, wild rose, and sandbar willow types as well (BLM 2000).

Several tributaries to the Little Lost River below Wet Creek are predominantly in aspen or alder riparian vegetation at higher elevations transitioning to water birch, mahogany, and juniper on alluvial fans. Williams Creek originates in conifers in the Lemhi Range then quickly emerges into the water birch and juniper on a broad alluvial fan. Deer Creek proper, across the valley on the Lost River Range side, also transitions from mountain mahogany and alder to water birch. Many of the smaller west-side and east-side drainages are essentially dry washes with sagebrush/grasslands as their dominant channel-side vegetation type. On alluvial fans at low elevations, this sagebrush community is dominated by low growing species (*Artemisia arbuscula* and *A. nova*) that are rarely more than a foot tall.

Shade Curve Selection

To determine PNV shade targets for the Little Lost River subbasin, effective shade curves from the Salmon-Challis National Forest Vegetation (PVT) Types and the Southern Idaho Non-forest Vegetation Types were examined (Table 6) (Shumar and De Varona 2009). These curves were produced using vegetation community modeling of Idaho plant communities. Effective shade curves include percent shade on the vertical axis and stream width on the horizontal axis. For the Little Lost River subbasin, curves for the most similar vegetation type were selected for shade target determinations. Most forested locations on tributary streams were within the dry Douglas fir without ponderosa pine type with occasional deep ravines in subalpine fir-moist type or other subalpine fir types. Tributaries to upper Dry Creek tended to have more limber pine types. Nonforested willow vegetation types tended to follow a pattern with descending elevation of Drummond willow, Geyer willow, and sandbar willow. Water birch was common in spring fed drainages; whereas, mountain mahogany was found in drier west-side drainages. The driest regions where most streams are intermittent the stream-side vegetation is primarily upland vegetation of sagebrush. Black cottonwood occurred primarily on the lowest reaches of the Little Lost River and juniper, alder, and aspen were sporadic throughout the subbasin.

Table 6. Shade target vegetation types in the Little Lost River subbasin.

Salmon-Challis National Forest Vegetation (PVT) Types	Southern Idaho Nonforest Vegetation Types
Dry Douglas fir without ponderosa pine	Sage/grass
Subalpine fir – moist	Low sage/grass[a]
Subalpine fir with Douglas fir	Grass
Subalpine fir – dry/gentle	Juniper
Douglas fir with limber pine	Black cottonwood (western ID)[a]
Limber pine	Water birch
	Mountain mahogany[a]
	Sandbar willow
	Geyer willow/sedge
	Drummond willow/sedge
	Aspen
	Thinleaf alder

a. Shade curves developed since the last revision of Shumar and De Varona (2009). See Appendix B.

5.2 Load Capacity

The load capacity for a stream under PNV is essentially the solar load allowed under the shade targets specified for the segments within that stream. These loads are determined by multiplying the solar load measured by a flat-plate collector (under full sun) for a given period of time by the fraction of the solar radiation that is not blocked by shade (i.e., the percent open or 100% minus percent shade). In other words, if a shade target is 60% (or 0.6), the solar load hitting the stream under that target is 40% of the load hitting the flat-plate collector under full sun.

We obtained solar load data from flat-plate collectors at the NREL weather station in Pocatello, ID. The solar load data used in this TMDL analysis are spring/summer averages (i.e., an average load for the 6-month period from April through September). As such, load capacity calculations are also based on this 6-month period, which coincides with the time of year when stream temperatures are increasing, deciduous vegetation is in leaf, and spawning is occurring. During this period, temperatures may affect beneficial uses; spring and fall salmonid spawning and cold water aquatic life criteria may be exceeded during summer months. Late July and early August typically represent the period of highest stream temperatures. However, solar gains can begin early in the spring and affect not only the highest temperatures reached later in the summer but also salmonid spawning temperatures in spring and fall.

Tables B-3 to B-29 and Figure 4 show the PNV shade targets. The tables also show corresponding target summer loads (in kilowatt-hours per square meter per day [kWh/m^2/day] and kWh/day) that serve as the load capacities for the streams. Existing and target loads in kWh/day can be summed for the entire stream or portion of stream examined in a single load analysis table. These total loads are shown at the bottom of their respective columns in each table. Because load calculations involve stream segment area calculations, the segments channel width, which typically only has one or two significant figures, dictates the level of significance of the corresponding loads. One significant figure in the resulting load can create rounding errors when existing and target loads are subtracted. The totals row of each load table represents total loads with two significant figures in an attempt to reduce apparent rounding errors.

The AU with the largest target load (i.e., load capacity) was Dry Creek (ID17040217SK020_03) with 1.75 million kWh/day (Table B-7). The smallest target load was in the Moffett Creek AU (ID17040217Sk019_02a) with 18,000 kWh/day (Table B-20).

5.3 Estimates of Existing Pollutant Loads

Regulations allow that loads "...may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading" (Water Quality Planning and Management, 40 CFR 130.2(I)). An estimate must be made for each point source. Nonpoint sources are typically estimated based on the type of sources (land use) and area (such as a subwatershed) but may be aggregated by type of source or area. To the extent possible, background loads should be distinguished from human-caused increases in nonpoint loads.

Existing loads in this temperature TMDL come from estimates of existing shade as determined from the field-verified aerial photo interpretations. Currently, no permitted point sources exist in the affected AUs. Like target shade, existing shade was converted to a solar load by multiplying the fraction of open stream by the solar radiation measured on a flat-plate collector at the NREL weather station. Existing shade data are presented in Tables B-3 to B-29 and Figure 5. Like load capacities (target loads), existing loads in Tables B-3 to B-29 are presented on an area basis (kWh/m^2/day) and as a total load (kWh/day). Existing loads in kWh/day are also summed for the entire stream or portion of stream examined in a single load analysis table. The difference between target and existing load is also summed for the entire table. Should existing load exceed target load, this difference becomes the excess load (i.e., shade deficit) to be discussed next in the load allocation section and as depicted in the shade deficit figure (Figure 6).

The AU with the largest existing load was Dry Creek (ID17040217SK020_03) with 1.82 million kWh/day (Table B-7). The smallest existing load was in the Moffett Creek AU (ID17040217SK019_02a) with 18,000 kWh/day (Table B-20).

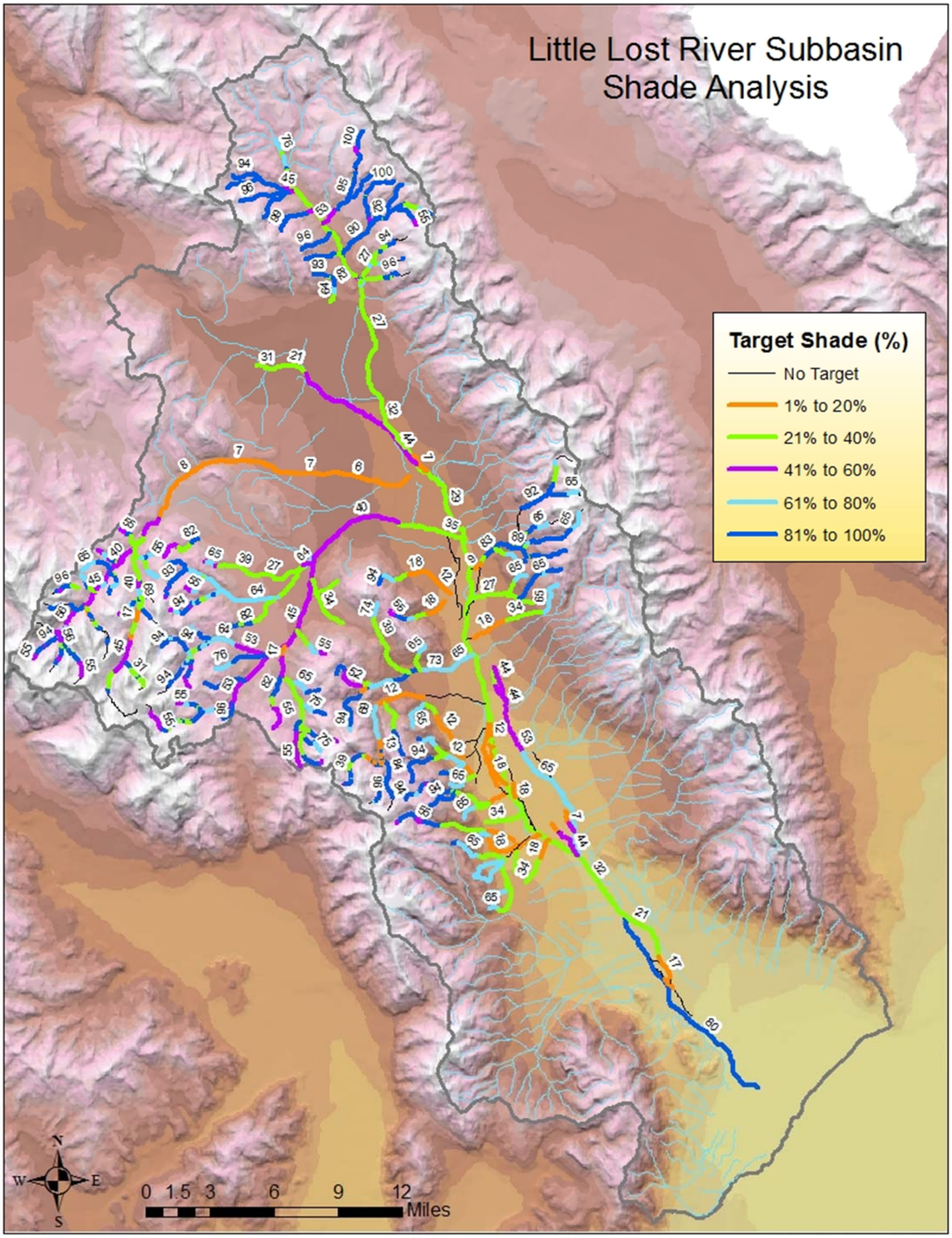

Figure 4. Target shade for the Little Lost River subbasin.

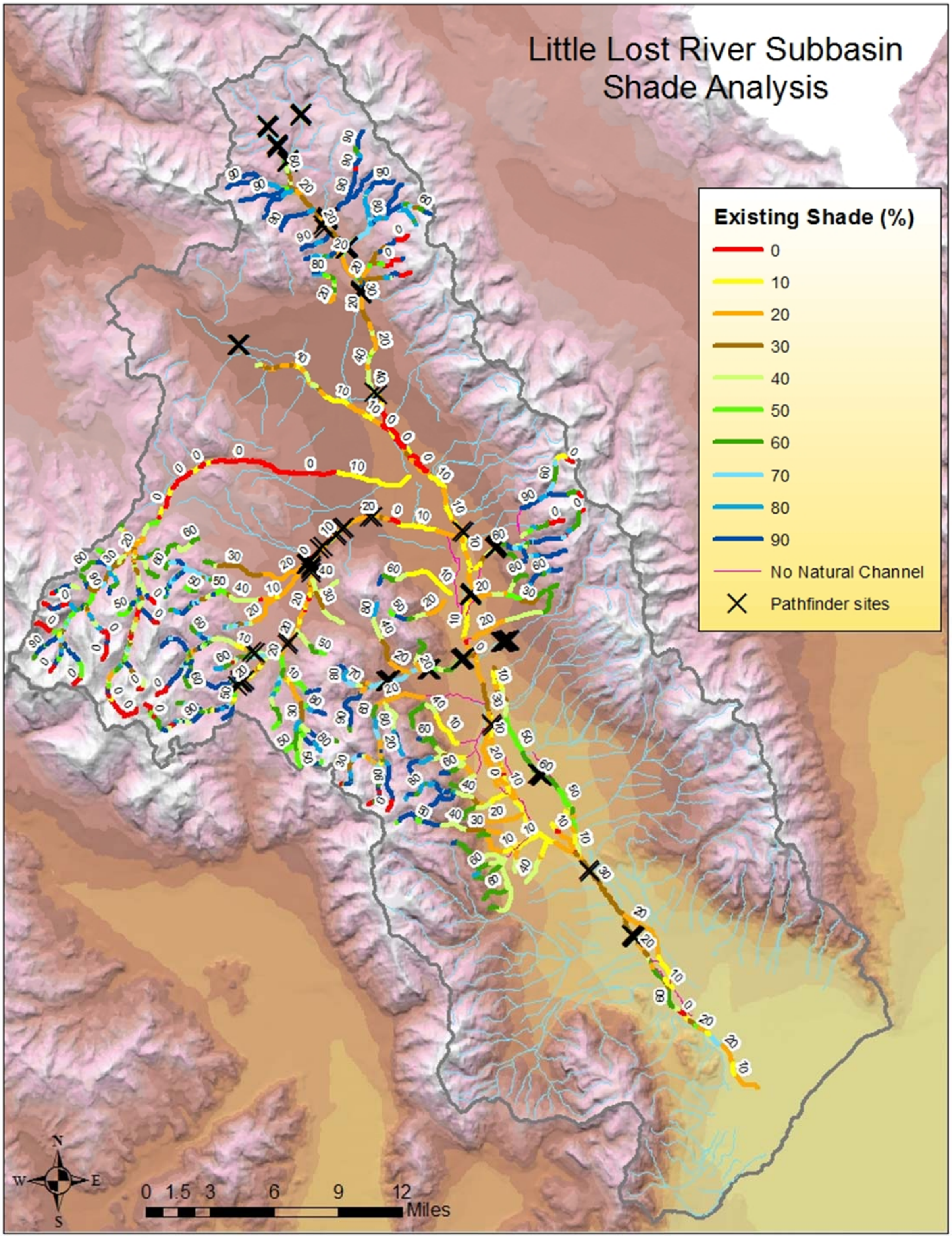

Figure 5. Existing shade estimated for the Little Lost River subbasin by aerial photo interpretation.

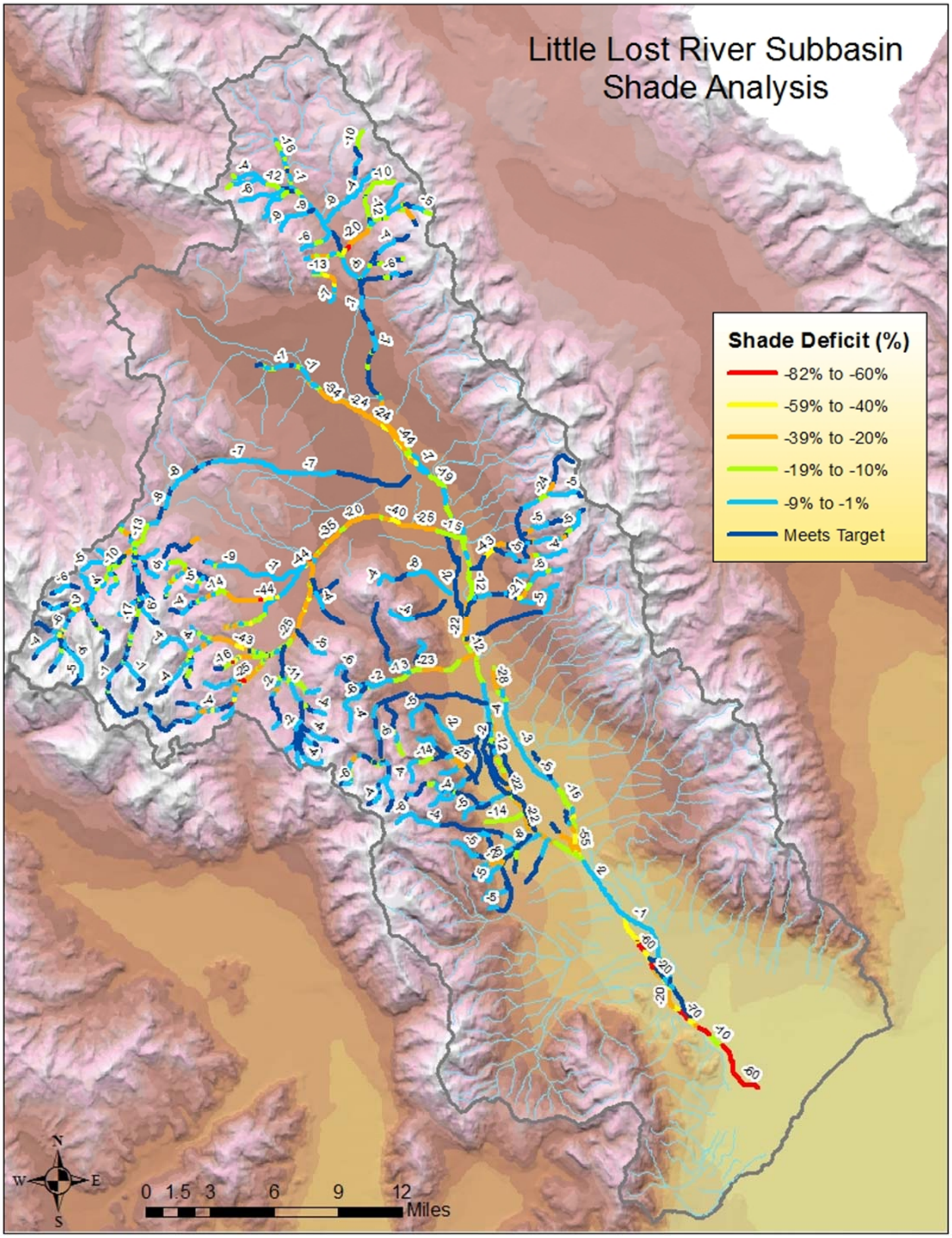

Figure 6. Shade deficit (difference between existing and target) for the Little Lost River subbasin.

5.4 Load and Wasteload Allocation

Because this TMDL is based on PNV, which is equivalent to background load, the load allocation is essentially the desire to achieve background conditions. However, to reach that objective, load allocations are assigned to nonpoint source activities that have affected or may affect riparian vegetation and shade as a whole. Therefore, load allocations are stream segment specific and dependent upon the target loads for a given segment. Tables B-3 to B-29 (Appendix B) show the target shade and corresponding target summer load. This target load (i.e., load capacity) is necessary to achieve background conditions. There is no opportunity to further remove shade from the stream by any activity without exceeding its load capacity. Additionally, because this TMDL is dependent upon background conditions for achieving water quality standards, all tributaries to the waters examined here need to be in natural conditions to prevent excess heat loads to the system.

Table 7 shows the total existing, target, and excess loads and the average lack of shade for each water body examined. The size of a stream influences the size of the excess load. Large streams have higher existing and target loads by virtue of their larger channel widths. Table 7 lists the AUs in order of their excess loads, from highest to lowest. Therefore, large AUs tend to be listed first and small AUs last.

Although this TMDL analysis focuses on total solar loads, it is important to note that differences between existing and target shade, as depicted in the shade deficit figure (Figure 6), are the key to successfully restoring these waters to achieving water quality standards. Target shade levels for individual reaches should be the goal managers strive for with future implementation plans. Managers should focus on the largest differences between existing and target shade as locations to prioritize implementation efforts. Each load analysis table contains a column that lists the lack of shade on the stream segment. This value is derived from subtracting target shade from existing shade for each segment. Thus, stream segments with the largest lack of shade are in the worst shape. The average lack of shade derived from the last column in each load analysis table is listed in Table 7 and provides a general level of comparison among streams.

Table 7. Total solar loads and average lack of shade for all waters.

Water Body/ Assessment Unit	Total Existing Load	Total Target Load	Excess Load (% Reduction)	Average Lack of Shade (%)
	(kWh/day)			
Little Lost River (ID17040217SK001_05)	550,000	150,000	380,000 (69%)	-49
Little Lost River (ID17040217SK007_04)	960,000	760,000	200,000 (21%)	-17
Little Lost River (ID17040217SK009_04)	540,000	370,000	170,000 (31%)	-18
Wet Creek (ID17040217SK024_02)	930,000	810,000	120,000 (13%)	-12
Summit Creek (ID17040217SK019_03)	360,000	250,000	110,000 (31%)	-21
Little Lost River (ID17040217SK010_04)	620,000	510,000	110,000 (18%)	-16
Big Springs Creek (ID17040217SK003_02)	600,000	490,000	110,000 (18%)	-15
Wet Creek (ID17040217SK022_03)	410,000	310,000	100,000 (24%)	-27
Sawmill Creek (ID17040217SK012_04)	600,000	520,000	75,000 (13%)	-7
Little Lost River (ID17040217SK002_05)	430,000	360,000	75,000 (17%)	-26
Dry Creek (ID17040217SK020_03)	1,820,000	1,750,000	66,000 (4%)	-4
Sawmill Creek (ID17040217SK014_04)	510,000	460,000	47,000 (9%)	-9
Big Springs Creek (ID17040217SK003_04)	90,000	42,000	44,000 (49%)	-38
Wet Creek (ID17040217SK024_03)	200,000	160,000	43,000 (22%)	-26
Squaw Creek (ID17040217SK015_02)	83,000	37,000	41,000 (49%)	-11
Big Springs Creek (ID17040217SK003_03)	260,000	220,000	36,000 (14%)	-19
Sawmill Creek tributaries (ID17040217SK014_02)	550,000	520,000	35,000 (6%)	-8
Dry Creek (ID17040217SK021_02)	170,000	140,000	30,000 (18%)	-9
Williams Creek (ID17040217SK009_02)	100,000	79,000	27,000 (27%)	-8
Dry Creek (ID17040217SK021_03)	140,000	110,000	24,000 (17%)	-11

Water Body/ Assessment Unit	Total Existing Load	Total Target Load	Excess Load (% Reduction)	Average Lack of Shade (%)
	(kWh/day)			
Deer Creek (ID17040217SK025_02)	240,000	210,000	23,000 (10%)	-7
Dry Creek tributaries (ID17040217SK021_02)	160,000	150,000	7,500 (5%)	-6
Little Lost River tributaries (ID17040217SK009_02)	250,000	250,000	2,200 (1%)	-6
Little Lost River tributaries (ID17040217SK007_02)	760,000	790,000	0 (0%)	-5
Long Lost Creek (ID17040217SK021_02)	270,000	320,000	0 (0%)	-4
Moffett Creek (ID17040217SK019_02a)	18,000	18,000	0 (0%)	-4

Note: Load data are rounded to two significant figures, which may present rounding errors.

Most AUs lacked shade, although the exceptions were Moffett Creek (ID17040217SK019_02a), some of the tributaries to the Little Lost River (ID17040217SK007_02) and Long Lost Creek (Dry Creek tributary, ID17040217SK021_02) that had no excess load. The Little Lost River itself tended to have the largest excess loads, not surprising considering it is the largest water body in the analysis. Summit Creek also had a large excess load. This creek at the top of the drainage is a transition area from graminoid-dominated spring meadows (Moffett Creek) to sandbar willow-dominated Little Lost River. We have placed Summit Creek into a sandbar willow vegetation type, which may be a higher target than can be achieved in this transition area.

AUs that require the largest percent reductions in solar load include the lowest AU of the Little Lost River (ID17040217SK001_05), a cottonwood vegetation type that carries high shade targets, Big Springs Creek (ID17040217SK003_04), and Squaw Creek (ID17040217SK015_02). All of these AUs have portions in tree-dominated vegetation types that tend to carry higher shade targets. Tree vegetation types often occur at the lower end of drainages where valleys open up and provide more space for such vegetation. These areas are more subject to vegetation loss because water from streams is diverted for agricultural use, agricultural disturbance occurs, and in general, the areas suffer from the effects of a drying environment. Most of the AUs with relatively low percent reductions (i.e., Dry Creek, ID17040217SK020_03; Sawmill Creek, ID17040217SK014_04 and tributaries, ID17040217SK014_02; Dry Creek and tributaries, ID17040217SK021_02; Wet Creek and tributaries, ID17040217SK024_02; and Little Lost River tributaries, ID17040217SK009_02) are found higher in the watershed where water is still available.

A certain amount of excess load is potentially created by the existing shade/target shade difference inherent in the load analysis. Because existing shade is reported as a 10% shade class and target shade a unique integer between 0 and 100%, there is usually a difference between the two. For example, say a particular stream segment has a target shade of 86% based on its vegetation type and natural bank-full width. If existing shade on that segment were at target level, it would be recorded as 80% in the load analysis because it falls into the 80% existing shade class. An automatic difference of 6% could be attributed to the margin of safety.

5.4.1 Water Diversion

Stream temperature may be affected by diversions of water for water rights purposes. Diversion of flow reduces the amount of water exposed to a given level of solar radiation in the stream channel, which can result in increased water temperature in that channel. Loss of flow in the channel also affects the ability of the near-stream environment to support shade-producing vegetation, resulting in an increase in solar load to the channel.

Although these water temperature effects may occur, nothing in this TMDL supersedes any water appropriation in the affected watershed. Section 101(g), the Wallop Amendment, was added to the CWA as part of the 1977 amendments to address water rights. It reads as follows:

> It is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this chapter. It is the further policy of Congress that nothing in this chapter shall be construed to supersede or abrogate rights to quantities of water which have been established by any State. Federal agencies shall co-operate with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources.

Additionally, Idaho water quality standards indicate the following:

> The adoption of water quality standards and the enforcement of such standards is not intended to…interfere with the rights of Idaho appropriators, either now or in the future, in the utilization of the water appropriations which have been granted to them under the statutory procedure… (IDAPA 58.01.02.050.01)

In this TMDL, we have not quantified what impact, if any, diversions are having on stream temperature. Water diversions are allowed for in state statute, and it is possible for a water body to be 100% allocated. Diversions notwithstanding, reaching shade targets as discussed in the TMDL will protect what water remains in the channel and allow the stream to meet water quality standards for temperature. This TMDL will lead to cooler water by achieving shade that would be expected under natural conditions and water temperatures resulting from that shade. DEQ encourages local landowners and holders of water rights to voluntarily do whatever they can to help instream flow for the purpose of keeping channel water cooler for aquatic life.

5.4.2 Margin of Safety

The margin of safety in this TMDL is considered implicit in the design. Because the target is essentially background conditions, loads (shade levels) are allocated to lands adjacent to these streams at natural background levels. Because shade levels are established at natural background or system potential levels, it is unrealistic to set shade targets at higher, or more conservative, levels. Additionally, existing shade levels are reduced to the next lower 10% shade class, which likely underestimates actual shade in the load analysis. Although the load analysis used in this TMDL involves gross estimations that are likely to have large variances, load allocations are applied to the stream and its riparian vegetation rather than specific nonpoint source activities and can be adjusted as more information is gathered from the stream environment.

5.4.3 Seasonal Variation

This TMDL is based on average summer loads. All loads have been calculated to be inclusive of the 6-month period from April through September. This time period is when the combination of increasing air and water temperatures coincide with increasing solar inputs and vegetative shade. The critical time periods are April through June when spring salmonid spawning occurs, July and August when maximum temperatures may exceed cold water aquatic life criteria, and September when fall salmonid spawning is most likely to be affected by higher temperatures. Water temperature is not likely to be a problem for beneficial uses outside of this time period because of cooler weather and lower sun angle.

5.4.4 Reasonable Assurance

All load allocations within this document are directed at nonpoint source activities. The completion of on-the-ground actions designed to reduce pollutant loads will be completed through designated management agency (DMA) and citizen participation. DEQ's continued interaction with these groups will help ensure progress is made towards pollutant reductions. DEQ will inform these groups on the current water quality data, updated best management practices (BMPs), and potential funding sources.

5.4.5 Construction Stormwater and TMDL Wasteload Allocation

There are no known NPDES-permitted point sources in the affected watersheds and thus no wasteload allocations. If a point source is proposed that would have thermal consequences or cause streambank erosion sediments upon these waters, background provisions in Idaho water quality standards addressing such discharges (IDAPA 58.01.02.200.09; IDAPA 58.01.02.401.01) should be involved (Appendix A).

Stormwater runoff is water from rain or snowmelt that does not immediately infiltrate into the ground and flows over or through natural or man-made storage or conveyance systems. When undeveloped areas are converted to land uses with impervious surfaces—such as buildings, parking lots, and roads—the natural hydrology of the land is altered and can result in increased surface runoff rates, volumes, and pollutant loads. Certain types of stormwater runoff are considered point source discharges for CWA purposes, including stormwater that is associated with municipal separate storm sewer systems (MS4s), industrial stormwater covered under the Multi-Sector General Permit (MSGP), and construction stormwater covered under the Construction General Permit (CGP).

5.4.5.1 Municipal Separate Storm Sewer Systems

Polluted stormwater runoff is commonly transported through MS4s, from which it is often discharged untreated into local water bodies. An MS4, according to (40 CFR 122.26(b)(8)), is a conveyance or system of conveyances that meets the following criteria:

- Owned by a state, city, town, village, or other public entity that discharges to waters of the United States
- Designed or used to collect or convey stormwater (including storm drains, pipes, and ditches)
- Not a combined sewer

- Not part of a publicly owned treatment works (sewage treatment plant)

To prevent harmful pollutants from being washed or dumped into an MS4, operators must obtain an NPDES permit from EPA, implement a comprehensive municipal stormwater management program (SWMP), and use BMPs to control pollutants in stormwater discharges to the maximum extent practicable.

There are no MS4s in the Little Lost Subbasin.

5.4.5.2 Industrial Stormwater Requirements

Stormwater runoff picks up industrial pollutants and typically discharges them into nearby water bodies directly or indirectly via storm sewer systems. When facility practices allow exposure of industrial materials to stormwater, runoff from industrial areas can contain toxic pollutants (e.g., heavy metals and organic chemicals) and other pollutants such as trash, debris, and oil and grease. This increased flow and pollutant load can impair water bodies, degrade biological habitats, pollute drinking water sources, and cause flooding and hydrologic changes, such as channel erosion, to the receiving water body.

Multi-Sector General Permit and Stormwater Pollution Prevention Plans

In Idaho, if an industrial facility discharges industrial stormwater into waters of the United States, the facility must be permitted under EPA’s most recent MSGP. To obtain an MSGP, the facility must prepare a stormwater pollution prevention plan (SWPPP) before submitting a notice of intent for permit coverage. The SWPPP must document the site description, design, and installation of control measures; describe monitoring procedures; and summarize potential pollutant sources. A copy of the SWPPP must be kept on site in a format that is accessible to workers and inspectors and be updated to reflect changes in site conditions, personnel, and stormwater infrastructure.

Industrial Facilities Discharging to Impaired Water Bodies

Any facility that discharges to an impaired water body must monitor all pollutants for which the water body is impaired and for which a standard analytical method exists (40 CFR 136).

Also, because different industrial activities have sector-specific types of material that may be exposed to stormwater, EPA grouped the different regulated industries into 29 sectors, based on their typical activities. Part 8 of EPA’s MSGP details the stormwater management practices and monitoring that are required for the different industrial sectors.

TMDL Industrial Stormwater Requirements

When a stream is on Idaho’s §303(d) list and has a TMDL developed, DEQ may incorporate a wasteload allocation for industrial stormwater activities under the MSGP. However, most load analyses developed in the past have not identified sector-specific numeric wasteload allocations for industrial stormwater activities. Industrial stormwater activities are considered in compliance with provisions of the TMDL if operators obtain an MSGP under the NPDES program and implement the appropriate BMPs. Typically, operators must also follow specific requirements to be consistent with any local pollutant allocations. Construction Stormwater

The CWA requires operators of construction sites to obtain permit coverage to discharge stormwater to a water body or municipal storm sewer. In Idaho, EPA has issued a general permit for stormwater discharges from construction sites.

Construction General Permit and Stormwater Pollution Prevention Plans

If a construction project disturbs more than 1 acre of land (or is part of a larger common development that will disturb more than 1 acre), the operator is required to apply for a CGP from EPA after developing a site-specific SWPPP. The SWPPP must provide for the erosion, sediment, and pollution controls they intend to use; inspection of the controls periodically; and maintenance of BMPs throughout the life of the project. Operators are required to keep a current copy of their SWPPP on site or at an easily accessible location.

TMDL Construction Stormwater Requirements

When a stream is on Idaho's §303(d) list and has a TMDL developed, DEQ may incorporate a gross wasteload allocation for anticipated construction stormwater activities. Most loads developed in the past did not have a numeric wasteload allocation for construction stormwater activities. Construction stormwater activities are considered in compliance with provisions of the TMDL if operators obtain a CGP under the NPDES program and implement the appropriate BMPs. Typically, operators must also follow specific requirements to be consistent with any local pollutant allocations. The CGP has monitoring requirements that must be followed.

Postconstruction Stormwater Management

Many communities throughout Idaho are currently developing rules for postconstruction stormwater management. Sediment is usually the main pollutant of concern in construction site stormwater. DEQ's *Catalog of Stormwater Best Management Practices for Idaho Cities and Counties* (DEQ 2005) should be used to select the proper suite of BMPs for the specific site, soils, climate, and project phasing in order to sufficiently meet the standards and requirements of the CGP to protect water quality. Where local ordinances have more stringent and site-specific standards, those are applicable.

5.4.6 Reserve for Growth

No reserve for growth has been provided since all sources of thermal loading of temperature are non-point source.

5.5 Implementation Strategies

Implementation strategies for TMDLs produced using PNV-based shade and solar loads should incorporate the load analysis tables presented in this TMDL (Tables B-3 to B-29). These tables need to be updated, first to field verify the remaining existing shade levels and second to monitor progress toward achieving reductions and TMDL goals. Using the Solar Pathfinder to measure existing shade levels in the field is important to achieving both objectives. It is likely that further field verification will find discrepancies with reported existing shade levels in the load analysis tables. Due to the inexact nature of the aerial photo interpretation technique, these tables should not be viewed as complete until verified. Implementation strategies should include Solar

Pathfinder monitoring to simultaneously field verify the TMDL and mark progress toward achieving desired load reductions.

DEQ recognizes that implementation strategies for TMDLs may need to be modified if monitoring shows that TMDL goals are not being met or significant progress is not being made toward achieving the goals. Reasonable assurance (addressed in section 5.4.4) for the TMDL to meet water quality standards is based on the implementation strategy. There may be a variety of reasons that individual stream segments do not meet shade targets, including natural phenomena (e.g., beaver ponds, springs, wet meadows, and past natural disturbances) and/or historic land-use activities (e.g., logging, grazing, and mining). It is important that existing shade for each stream segment be field verified to determine if shade differences are real and result from activities that are controllable. Information within this TMDL (maps and load analysis tables) should be used to guide and prioritize implementation investigations. The information in this TMDL may need further adjustment to reflect new information and conditions in the future.

5.5.1 Time Frame

Implementation of this TMDL relies on riparian area management practices that will provide a mature canopy cover to shade the stream and prevent excess solar load. Because implementation is dependent on mature riparian communities to substantially improve stream temperatures, DEQ believes 10–20 years may be a reasonable amount time for achieving water quality standards. Shade targets will not be achieved all at once. Given their smaller bank-full widths, targets for smaller streams may be reached sooner than those for larger streams.

DEQ and the designated watershed advisory group (WAG) will continue to re-evaluate TMDLs on a 5-year cycle. During the 5-year review, implementation actions completed, in progress, and planned will be reviewed, and pollutant load allocations will be reassessed accordingly.

5.5.2 Approach

TMDLs will be implemented through the continuation of ongoing pollution control activities in the watershed. The designated WAG, DMAs, local organizations, and other appropriate public process participants are expected to do the following:

- Develop BMPs to achieve load allocations.
- Give reasonable assurance that management actions will meet load allocations through both quantitative and qualitative analysis of management measures.
- Adhere to measurable milestones for progress.
- Develop a timeline for implementation, including cost and funding.
- Develop a monitoring plan to determine if BMPs are being implemented, if individual BMPs are effective, and if load allocations are being met.

5.5.3 Responsible Parties

In addition to the DMAs, the public—through the WAG and other equivalent organizations or processes—will have opportunities to be involved in developing the implementation plan to the maximum extent practical. The following Idaho DMAs are responsible for management activities:

- Idaho Department of Lands for timber harvest activities, oil and gas exploration and development, and mining activities
- Idaho Soil and Water Conservation Commission for grazing and agricultural activities
- Idaho Transportation Department for public road construction
- Idaho State Department of Agriculture for aquaculture
- DEQ for all other activities

Although not an Idaho DMA, the US Forest Service and Bureau of Land Management are responsible for implementing TMDL activities on land it manages.

5.5.4 Implementation Monitoring Strategy

Effective shade monitoring can take place on any segment throughout the Little Lost River subbasin and be compared to existing shade estimates seen in Figure 5 and described in Tables B-3 to B-29. Those areas with the largest disparity between existing and target shade should be monitored with Solar Pathfinders to verify existing shade levels and determine progress toward meeting shade targets. Since many existing shade estimates have not been field verified, they may require adjustment during the implementation process. Stream segment length for each estimate of existing shade varies depending on the land use or landscape that has affected that shade level. It is appropriate to monitor within a given existing shade segment to see if that segment has increased its existing shade toward target levels. Ten equally spaced Solar Pathfinder measurements averaged together within that segment should suffice to determine new shade levels in the future.

6 Conclusions

Effective shade targets were established for 24 AUs based on the concept of maximum shading under PNV resulting in natural background temperature levels. Shade targets were derived from effective shade curves developed for similar vegetation types in Idaho. Existing shade was determined from aerial photo interpretation and partially field verified with Solar Pathfinder data. Target and existing shade levels were compared to determine the amount of shade needed to bring water bodies into compliance with temperature criteria in Idaho's water quality standards (IDAPA 58.01.02). A summary of assessment outcomes, including recommended changes to listing status in the next Integrated Report, is presented in Table 8 and Table 9.

Most streams lack shade, although there were several AUs that did not have any excess solar loads. Shade loss was affected primarily in the lower elevation deciduous tree-dominated riparian areas where losses of water, heat, and agricultural uses have diminished this vegetation. High elevation zones tend to be in better condition presumably because of higher moisture regimes.

Target shade levels for individual stream segments should be the goal managers strive for with future implementation plans. Managers should focus on the largest differences between existing and target shade as locations to prioritize implementation efforts.

Table 8. Summary of assessment outcomes.

Assessment Unit Name	Assessment Unit Number	Pollutant	TMDL(s) Completed	Recommended Changes to Next Integrated Report	Justification
Little Lost River	ID17040217SK001_05	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Little Lost River	ID17040217SK002_05 ID17040217SK007_04 ID17040217SK010_04	Temperature, habitat/biota	Yes, revised	Move to Category 4a. Delist for combined habitat/biota.	Temperature TMDL completed based on PNV
Big Springs Creek	ID17040217SK003_02 ID17040217SK003_03 ID17040217SK003_04	Temperature, unknown for 003_03	Yes	Move to Category 4a. Delist 003_03 for unknown pollutant.	Temperature TMDL completed based on PNV. No other pollutants identified.
Little Lost River tributaries[a]	ID17040217SK007_02	Temperature, sediment, fishes bioassessment	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Little Lost River tributaries[a]	ID17040217SK009_02	Temperature, sediment	Yes	Move to Category 4a	Excess solar load from a lack of existing shade
Sawmill Creek	ID17040217SK012_04	Temperature	Yes, revised	Move to Category 4a	Temperature TMDL completed based on PNV
Sawmill Creek tributaries	ID17040217SK014_02 ID17040217SK014_04	Temperature, habitat/biota	Yes	Move to Category 4a. Delist 014_02 for combined habitat/biota.	Temperature TMDL completed based on PNV. No other pollutants identified.
Squaw Creek	ID17040217SK015_02	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Timber Creek	ID17040217SK018_03	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Moffett Creek	ID17040217SK019_02a	Temperature, habitat/biota	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Summit Creek	ID17040217SK019_03	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Dry Creek and tributaries	ID17040217SK020_03 ID17040217SK021_02 ID17040217SK021_03	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV
Wet Creek	ID17040217SK022_03 ID17040217SK024_03	Temperature	Yes, revised	Move to Category 4a	Temperature TMDL completed based on PNV
Deer Creek	ID17040217SK025_02	Temperature	Yes	Move to Category 4a	Temperature TMDL completed based on PNV

a. Sediment TMDLs are not developed in this document.

Table 9. Summary of assessment outcomes for unlisted but impaired assessment units.

Assessment Unit Name	Assessment Unit Number	Pollutant	TMDL(s) Completed	Recommended Changes to Next Integrated Report	Justification
Little Lost River	ID17040217SK009_04	Temperature	Yes	Add temperature to Category 4a	Temperature TMDL completed based on PNV
Wet Creek	ID17040217SK024_02	Temperature	Yes	Add temperature to Category 4a	Temperature TMDL completed based on PNV

Notes: total maximum daily load (TMDL); US Environmental Protection Agency (EPA); potential natural vegetation (PNV)

This document was prepared with input from the public, as described in Appendix C. Following the public comment period, comments and DEQ responses will also be included in this appendix, and a distribution list will be included in Appendix D.

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GIS Coverages

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USDA–FSA Aerial Photography Field Office, 2013 National Agricultural Imagery Program (NAIP), 0.5m imagery

USDA–FSA Aerial Photography Field Office, 2011 National Agricultural Imagery Program (NAIP), 1.0m imagery

Glossary

§303(d)

Refers to section 303 subsection "d" of the Clean Water Act. Section 303(d) requires states to develop a list of water bodies that do not meet water quality standards. This section also requires total maximum daily loads (TMDLs) be prepared for listed waters. Both the list and the TMDLs are subject to US Environmental Protection Agency approval.

Ambient

General conditions in the environment (Armantrout 1998). In the context of water quality, ambient waters are those representative of general conditions, not associated with episodic perturbations or specific disturbances such as a wastewater outfall (EPA 1996).

Anthropogenic

Relating to, or resulting from, the influence of human beings on nature.

Assessment Unit (AU)

A segment of a water body that is treated as a homogenous unit, meaning that any designated uses, the rating of these uses, and any associated causes and sources must be applied to the entirety of the unit.

Beneficial Use

Any of the various uses of water, including, but not limited to, aquatic life, recreation, water supply, wildlife habitat, and aesthetics, that are recognized in water quality standards.

Beneficial Use Reconnaissance Program (BURP)

A program for conducting systematic biological and physical habitat surveys of water bodies in Idaho. BURP protocols address lakes, reservoirs, wadeable streams, and rivers.

Exceedance

A violation (according to DEQ policy) of the pollutant levels permitted by water quality criteria.

Fully Supporting

In compliance with water quality standards and within the range of biological reference conditions for all designated and exiting beneficial uses as determined through the *Water Body Assessment Guidance* (Grafe et al. 2002).

Load Allocation (LA)

A portion of a water body's load capacity for a given pollutant that is allocated to a particular nonpoint source (by class, type, or geographic area).

Load(ing)
The quantity of a substance entering a receiving stream, usually expressed in pounds or kilograms per day or tons per year. Loading is the product of flow (discharge) and concentration.

Load Capacity (LC)
How much pollutant a water body can receive over a given period without causing violations of state water quality standards. Upon allocation to various sources, a margin of safety, and natural background contributions, it becomes a total maximum daily load.

Margin of Safety (MOS)
An implicit or explicit portion of a water body's load capacity set aside to allow for uncertainty about the relationship between the pollutant loads and the quality of the receiving water body. This is a required component of a total maximum daily load (TMDL) and is often incorporated into conservative assumptions used to develop the TMDL (generally within the calculations and/or models). The MOS is not allocated to any sources of pollution.

Natural Condition
The condition that exists with little or no anthropogenic influence.

Nonpoint Source
A dispersed source of pollutants generated from a geographical area when pollutants are dissolved or suspended in runoff and then delivered into waters of the state. Nonpoint sources are without a discernable point of origin. They include, but are not limited to, irrigated and nonirrigated lands used for grazing, crop production, and silviculture; rural roads; construction and mining sites; log storage or rafting; and recreation sites.

Not Assessed (NA)
A concept and an assessment category describing water bodies that have been studied but are missing critical information needed to complete a use support assessment.

Not Fully Supporting
Not in compliance with water quality standards or not within the range of biological reference conditions for any beneficial use as determined through the *Water Body Assessment Guidance* (Grafe et al. 2002).

Point Source
A source of pollutants characterized by having a discrete conveyance, such as a pipe, ditch, or other identifiable "point" of discharge into a receiving water. Common point sources of pollution are industrial and municipal wastewater.

Pollutant

Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.

Pollution

A very broad concept that encompasses human-caused changes in the environment that alter the functioning of natural processes and produce undesirable environmental and health effects. These changes include human-induced alterations of the physical, biological, chemical, and radiological integrity of water and other media.

Potential Natural Vegetation (PNV)

A.U. Küchler (1964) defined potential natural vegetation as vegetation that would exist without human interference and if the resulting plant succession were projected to its climax condition while allowing for natural disturbance processes such as fire. Our use of the term reflects Küchler's definition in that riparian vegetation at PNV would produce a system potential level of shade on streams and includes recognition of some level of natural disturbance.

Riparian

Associated with aquatic (stream, river, lake) habitats. Living or located on the bank of a water body.

Stream Order

Hierarchical ordering of streams based on the degree of branching. A 1st-order stream is an unforked or unbranched stream. Under Strahler's (1957) system, higher-order streams result from the joining of two streams of the same order.

Total Maximum Daily Load (TMDL)

A TMDL is a water body's load capacity after it has been allocated among pollutant sources. It can be expressed on a time basis other than daily if appropriate. Sediment loads, for example, are often calculated on an annual basis. A TMDL is equal to the load capacity, such that load capacity = margin of safety + natural background + load allocation + wasteload allocation = TMDL. In common usage, a TMDL also refers to the written document that contains the statement of loads and supporting analyses, often incorporating TMDLs for several water bodies and/or pollutants within a given watershed.

Wasteload Allocation (WLA)

The portion of receiving water's load capacity that is allocated to one of its existing or future point sources of pollution. Wasteload allocations specify how much pollutant each point source may release to a water body.

Water Body

A stream, river, lake, estuary, coastline, or other water feature, or portion thereof.

Water Quality Criteria

Levels of water quality expected to render a water body suitable for its designated uses. Criteria are based on specific levels of pollutants that would make the water harmful if used for drinking, swimming, farming, or industrial processes.

Water Quality Standards

State-adopted and US Environmental Protection Agency-approved ambient standards for water bodies. The standards prescribe the use of the water body and establish the water quality criteria that must be met to protect designated uses.

Appendix A. State and Site-Specific Water Quality Standards and Criteria

Water Quality Standards Applicable to Salmonid Spawning Temperature

Water quality standards for temperature are specific numeric values not to be exceeded during the salmonid spawning and egg incubation period, which varies by species. For spring-spawning salmonids, the default spawning and incubation period recognized by the Idaho Department of Environmental Quality (DEQ) is generally March 15 to July 15 (Grafe et al. 2002). Fall spawning can occur as early as September 1 and continue with incubation into the following spring up to June 1. As per IDAPA 58.01.02.250.02.f.ii., the following water quality criteria need to be met during that time period:

- 13 °C as a daily maximum water temperature
- 9 °C as a daily average water temperature

For the purposes of a temperature TMDL, the highest recorded water temperature in a recorded data set (excluding any high water temperatures that may occur on days when air temperatures exceed the 90th percentile of the highest annual maximum weekly maximum air temperatures) is compared to the daily maximum criterion of 13 °C. The difference between the two water temperatures represents the temperature reduction necessary to achieve compliance with temperature standards.

Natural Background Provisions

For potential natural vegetation temperature TMDLs, it is assumed that natural temperatures may exceed these criteria during certain time periods. If potential natural vegetation targets are achieved yet stream temperatures are warmer than these criteria, it is assumed that the stream's temperature is natural (provided there are no point sources or human-induced ground water sources of heat) and natural background provisions of Idaho water quality standards apply:

> When natural background conditions exceed any applicable water quality criteria set forth in Sections 210, 250, 251, 252, or 253, the applicable water quality criteria shall not apply; instead, there shall be no lowering of water quality from natural background conditions. Provided, however, that temperature may be increased above natural background conditions when allowed under Section 401. (IDAPA 58.01.02.200.09)

Section 401 relates to point source wastewater treatment requirements. In this case, if temperature criteria for any aquatic life use are exceeded due to natural conditions, then a point source discharge cannot raise the water temperature by more than 0.3 °C (IDAPA 58.01.02.401.01.c).

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Appendix B. Data Sources and Channel Width, Load Tables, Shade Curves, and Temperature Data

Table B-1. Data sources for Little Lost River subbasin assessment.

Water Body	Data Source	Type of Data	Collection Date
Little Lost River subbasin	DEQ Idaho Falls Regional Office	Solar Pathfinder effective shade and stream width	Summer 2014
Little Lost River subbasin	DEQ State Technical Services Office	Aerial photo interpretation of existing shade and stream width estimation	2012–2014
Little Lost River subbasin	DEQ Idaho Falls Regional Office	Temperature	2014

Table B-2. Bank-full channel widths estimated by regional hydrology curves for streams in the analysis.

Location	area (sq mi)	Upper Snake (m)	Salmon (m)	Payette/Weiser (m)	measurement (m)
Little Lost River above sinks	816	30	38	52	9
Little Lost River above Deer	481	24	31	39	
Little Lost River above Wet	324	20	27	32	12
Little Lost River @ Sawmill/Summit	216	17	23	26	
Main Fork Sawmill above Smithie	5.99	3	6	4	4
Main Fork Sawmill @ mouth	17.5	6	9	7	8.3
Sawmill above Iron	28.5	7	11	9	8.4
Sawmill Creek @ mouth	216	17	23	26	6.4 (@ditch)
Sawmill Creek above Squaw	54.9	9	14	12	
Sawmill Creek below Squaw	66.5	10	15	14	11
Smithie Creek @ mouth	6.44	4	6	4	5
Timber Creek @ mouth	10.2	4	7	5	7.8
Iron Creek @ mouth	7.02	4	6	4	3.9
Iron Creek ab 1st tributary	1.9	2	4	2	
1st tributary to Iron	1.12	2	3	2	
Jackson Creek @ mouth	1.87	2	4		3.5
Hawley Creek @ mouth	0.74	1	3		3.9
Bull Creek @ mouth	2.5	2	4		2.7
1st tributary to Bull	0.72	1	3		
Horse Lake Creek @ mouth	0.58	1	2		
Aspen Creek @ mouth	0.87	1	3		
Cub Canyon @ mouth	1.79	2	4		
1st tributary to Cub Canyon	0.16	1	1		
1st tributary to Mill Creek	1.96	2	4		
Mill @ mouth	7.14	4	6	4	4
Squaw Creek (Sawmill) @ mouth	10.6	4	7	5	7
1st tributary to Squaw	3.38	3	5		
1st tributary to Squaw bl forks	2.45	2	4		
1st tributary to Squaw upper fork	1.58	2	4		
1st tributary to Squaw lower fork	0.86	1	3		
NF Squaw Creek @ mouth	2.59	2	4		
Garfield Creek @ mouth	5.05	3	6		
Garfield Creek ab 1st tributary	0.67	1	3		
1st tributary to Garfield	2.67	2	4		
Un-named bl Garfield	0.7	1	3		
Summit Creek @ mouth	187	16	22	24	6
Summit Creek below Moffet	65.3	10	15	14	
Summit Creek above Moffet	57.3	9	14	13	
Summit Creek below Iron Springs	18.7	6	9	7	
Moffett Creek @ mouth	16.36	5	9	7	
Moffett Creek @ 019_02a	7.28	4	6	4	2.4
Barney Creek @ hotsprings	6.17	3	6	4	6.4
Summerhouse Canyon @ mouth	7.66	4	6	4	4.1
Dry Creek @ mouth	74.8	10	15	15	
Dry Creek @ diversion	61.4	10	14	13	8
Dry Creek below Long Lost Creek	41.3	8	12	11	6.9
Dry Creek above Long Lost Creek	23.4	6	10	8	
1st tributary to Dry Creek	2.36	2	4	2	
2nd tributary to Dry Creek	0.51	1	2	1	
3rd tributary to Dry Creek	2.63	2	4	2	
4th tributary to Dry Creek	1.43	2	3	2	
5th tributary to Dry Creek	3.18	3	5	3	
un-connected trib ab 6th trib	0.85	1	3	1	
6th tributary to Dry Creek	0.3	1	2	1	
7th tributary to Dry Creek	0.68	1	3	1	
8th tributary to Dry Creek	1.2	2	3	2	
9th tributary to Dry Creek	0.59	1	2	1	
10th tributary to Dry Creek	0.9	1	3	1	
Long Lost Creek @ mouth	16.58	5	9	7	~7
Long Lost Creek ab 03 AU	15.14	5	8	6	7
Long Lost Creek ab 1st tributary	10.94	4	7	5	6
Long Lost Creek ab Hell Canyon	5.55	3	6	4	5
Hell Canyon @ mouth	1.75	2	4	2	
1st tributary to Long Lost	0.62	1	2	1	
2nd tributary to Long Lost	0.56	1	2	1	
3rd tributary to Long Lost	0.74	1	3	1	
4th tributary to Long Lost	1.34	2	3	2	

Table B-2 (cont.). Bank-full channel widths estimated by regional hydrology curves for streams in the analysis.

Location	area (sq mi)	Upper Snake (m)	Salmon (m)	Payette/Weiser (m)	measurement (m)
Wet Creek @ mouth	102	12	17	17	7
Wet Creek above Squaw Creek	55.9	9	14	13	3.9
Wet Creek above Big Creek	14.2	5	8	6	5
Wet Creek above Coal Creek	9.32	4	7	5	3
Basin Creek @ mouth	14.9	5	8	6	1.9
Big Creek @ mouth	13.5	5	8	6	4.6
Coal Creek @ mouth	1.39	2	3	2	2
Squaw Creek (Wet) @ mouth	28.1	7	11	9	3
Squaw Creek ab Massacre Creek	3.47	3	5	3	
Squaw Creek (Wet) ab Spring Cr	1.22	2	3	2	2.2 (ab Massacre)
Spring Creek @ mouth	0.62	1	2	1	
2nd tributary to Squaw Creek	0.47	1	2	1	
Massacre Creek @ mouth	3.4	3	5	3	2.4
Chicken Creek @ mouth	2.44	2	4	2	2.2 (midpt)
Camp Springs Creek @ mouth	11.18	5	7	5	
Buck Springs Area	1.61	2	4	2	
Wet Creek ab Hilts Creek	8.84	4	7	5	
Sands Creek ab Big Creek	2.35	2	4	2	
Pine Creek @ mouth	2.65	2	4	2	
Basin Creek bl Blacktail Canyon	4.2	3	5	3	
Williams Creek @ mouth	8.18	4	7	5	2
Williams Creek ab 1st tributary	4.3	3	5	3	
1st tributary to Williams	1.58	2	4	2	
2nd tributary to Williams	1.27	2	3	2	
Cedar Run Canyon @ mouth	4.88	3	5	3	
Cedar Run Canyon ab 1st tributary	2.22	2	4	2	
Mud Springs	0.47	1	2	1	
1st tributary to Cedar Run	1.6	2	4	2	
between Cedar Run & Williams	0.91	2	3	1	
Horse Creek @ mouth	4.47	3	5	3	
Horse Creek ab 2nd tributary	1.76	2	4	2	
2nd tributary to Horse Creek	0.44	1	2	1	
3rd tributary to Horse Creek	0.7	1	3	1	
between Horse & Badger	1.48	2	3	2	
un-named opposite Horse	1.3	2	3	2	
Hawley Canyon	2.54	2	4	2	
Badger Creek @ mouth	19.1	6	9	7	3
Deer Creek @ mouth	17.9	6	9	7	2
Deer Creek bl forks	5.66	3	6	4	
SF Deer Creek @ mouth	3.67	3	5	3	4
NF Deer Creek @ mouth	1.99	2	4	2	3
1st tributary to Deer Creek	6.62	4	6	4	4
2nd tributary to Deer Creek	0.91	2	3	1	3
Van Dorn Creek @ mouth	12.7	5	8	6	
Van Dorn Creek bl forks	3.05	3	5	3	
Van Dorn Creek (right fork)	1.2	2	3	2	
Van Dorn Creek (left fork)	1.85	2	4	2	
1st tributary to Van Dorn	3.46	3	5	3	
2nd tributary to Van Dorn	1.94	2	4	2	
Bird Canyon @ end	4.56	3	5	3	
Bird Canyon ab 2nd tributary	2.59	2	4	2	
1st trib in Bird Canyon Complex	3.05	3	5	3	
2nd trib in Bird Canyon Cpmplex	1.86	2	4	2	
3rd trib in Bird Canyon Complex	1.36	2	3	2	
4th trib in Bird Canyon Complex	0.41	1	2	1	
5th trib in Bird Canyon Complex	0.44	1	2	1	
Buck Canyon @ end	5.09	3	6	4	
1st to Buck Canyon	0.61	1	2	1	
2nd to Buck Canyon	1.14	2	3	2	
between Buck & Sands Canyons	0.38	1	2	1	
Sands Canyon @ end	5.66	3	6	4	
Sands Canyon @ 6310ft	3.8	3	5	3	
1st trib (Sands/Cedarville)	1.56	2	4	2	
2nd trib (Sands/Cedarville)	1.61	2	4	2	
3rd trib (Sands/Cedarville)	0.83	1	3	1	
4th trib (Sands/Cedarville)	0.58	1	2	1	
5th trib (Sands/Cedarville)	1.2	2	3	2	
6th trib (Sands/Cedarville)	2.41	2	4	2	
7th trib (Sands/Cedarville)	0.96	2	3	1	
8th trib (Sands/Cedarville)	0.9	1	3	1	
Big Springs Creek @ mouth	79.2	11	16	15	6

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Load Analysis Tables

Note: All assessment unit (AU) numbers start with ID17040217SK in all load tables (Tables B-3–B-29). Significant figures are controlled by the lowest level in the calculation, typically that of the channel width. Some rounding errors may result.

Table B-3. Existing and target solar loads for Big Springs Creek (ID17040217SK003_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
003_02	1st trib to Big Sp	1	380	water birch	44%	3.44	10	3,800	13,000	30%	4.31	10	3,800	16,000	3,000	-14%
003_02	1st trib to Big Sp	2	550	water birch	44%	3.44	10	5,500	19,000	10%	5.54	10	5,500	30,000	11,000	-34%
003_02	1st trib to Big Sp	3	100	pond	0%	6.15	17	1,700	10,000	0%	6.15	17	1,700	10,000	0	0%
003_02	1st trib to Big Sp	4	220	water birch	44%	3.44	10	2,200	7,600	50%	3.08	10	2,200	6,800	(800)	0%
003_02	1st trib to Big Sp	5	460	water birch	44%	3.44	10	4,600	16,000	10%	5.54	10	4,600	25,000	9,000	-34%
003_02	1st trib to Big Sp	6	710	water birch	44%	3.44	10	7,100	24,000	40%	3.69	10	7,100	26,000	2,000	-4%
003_02	2nd trib to Big Sp	1	1130	grass	7%	5.72	10	11,000	63,000	10%	5.54	10	11,000	61,000	(2,000)	0%
003_02	2nd trib to Big Sp	2	110	water birch	44%	3.44	10	1,100	3,800	40%	3.69	10	1,100	4,100	300	-4%
003_02	2nd trib to Big Sp	3	680	water birch	44%	3.44	10	6,800	23,000	20%	4.92	10	6,800	33,000	10,000	-24%
003_02	3rd trib to Big Sp	1	700	grass	7%	5.72	10	7,000	40,000	10%	5.54	10	7,000	39,000	(1,000)	0%
003_02	3rd trib to Big Sp	2	210	pond	0%	6.15	47	9,900	61,000	0%	6.15	47	9,900	61,000	0	0%
003_02	3rd trib to Big Sp	3	2500	water birch	44%	3.44	10	25,000	86,000	20%	4.92	10	25,000	120,000	34,000	-24%
003_02	3rd trib to Big Sp	4	110	water birch	44%	3.44	10	1,100	3,800	0%	6.15	10	1,100	6,800	3,000	-44%
003_02	3rd trib to Big Sp	5	240	water birch	44%	3.44	10	2,400	8,300	30%	4.31	10	2,400	10,000	1,700	-14%
003_02	Big Springs Cr	1	920	water birch	38%	3.81	12	11,000	42,000	10%	5.54	12	11,000	61,000	19,000	-28%
003_02	Big Springs Cr	2	530	water birch	44%	3.44	10	5,300	18,000	20%	4.92	10	5,300	26,000	8,000	-24%
003_02	Big Springs Cr	3	1500	water birch	44%	3.44	10	15,000	52,000	30%	4.31	10	15,000	65,000	13,000	-14%
								Totals	490,000					600,000	110,000	

Table B-4. Existing and target solar loads for Big Springs Creek (ID17040217SK003_03).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
003_03	Big Springs Cr	1	1010	water birch	44%	3.44	10	10,000	34,000	40%	3.69	10	10,000	37,000	3,000	-4%
003_03	Big Springs Cr	2	3220	water birch	53%	2.89	8	30,000	90,000	50%	3.08	8	30,000	90,000	0	-3%
003_03	Big Springs Cr	3	4170	water birch	65%	2.15	6	30,000	60,000	60%	2.46	6	30,000	70,000	10,000	-5%
003_03	Big Springs Cr	4	1720	water birch	65%	2.15	6	10,000	20,000	50%	3.08	6	10,000	30,000	10,000	-15%
003_03	Big Springs Cr	5	300	water birch	65%	2.15	6	2,000	4,000	10%	5.54	6	2,000	10,000	6,000	-55%
003_03	Big Springs Cr	6	600	water birch	65%	2.15	6	4,000	9,000	60%	2.46	6	4,000	10,000	1,000	-5%
003_03	Big Springs Cr	7	370	water birch	65%	2.15	6	2,000	4,000	20%	4.92	6	2,000	10,000	6,000	-45%
							Totals		220,000					260,000	36,000	

Table B-5. Existing and target solar loads for Big Springs Creek (ID17040217SK003_04).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
003_04	Big Springs Cr	1	950	water birch	65%	2.15	6	6,000	10,000	50%	3.08	6	6,000	20,000	10,000	-15%
003_04	Big Springs Cr	2	1400	water birch	65%	2.15	6	8,000	20,000	10%	5.54	6	8,000	40,000	20,000	-55%
003_04	Big Springs Cr	3	460	water birch	65%	2.15	6	3,000	6,000	40%	3.69	6	3,000	10,000	4,000	-25%
003_04	Big Springs Cr	4	510	water birch	65%	2.15	6	3,000	6,000	10%	5.54	6	3,000	20,000	10,000	-55%
							Totals		42,000					90,000	44,000	

Table B-6. Existing and target solar loads for Deer Creek (ID17040217SK025_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
025_02	SF Deer Creek	1	500	sage/grass	65%	2.15	1	500	1,000	60%	2.46	1	500	1,000	0	-5%
025_02	SF Deer Creek	2	870	dry DF w/o Ppine	94%	0.37	1	900	300	90%	0.62	1	900	600	300	-4%
025_02	SF Deer Creek	3	1490	dry DF w/o Ppine	94%	0.37	2	3,000	1,000	90%	0.62	2	3,000	2,000	1,000	-4%
025_02	SF Deer Creek	4	430	dry DF w/o Ppine	92%	0.49	3	1,000	500	90%	0.62	3	1,000	600	100	-2%
025_02	SF Deer Creek	5	790	DF/limber pine	96%	0.25	3	2,000	500	90%	0.62	3	2,000	1,000	500	-6%
025_02	SF Deer Creek	6	450	grass	16%	5.17	4	2,000	10,000	20%	4.92	4	2,000	10,000	0	0%
025_02	SF Deer Creek	7	430	black cottonwood	92%	0.49	4	2,000	1,000	80%	1.23	4	2,000	2,000	1,000	-12%
025_02	NF Deer Creek	1	1300	DF/limber pine	96%	0.25	1	1,000	200	90%	0.62	1	1,000	600	400	-6%
025_02	NF Deer Creek	2	800	mt mahogany	52%	2.95	2	2,000	6,000	80%	1.23	2	2,000	2,000	(4,000)	0%
025_02	NF Deer Creek	3	1100	mt mahogany	52%	2.95	2	2,000	6,000	70%	1.85	2	2,000	4,000	(2,000)	0%
025_02	NF Deer Creek	4	250	mt mahogany	41%	3.63	3	800	3,000	40%	3.69	3	800	3,000	0	-1%
025_02	NF Deer Creek	5	530	sage/grass	27%	4.49	3	2,000	9,000	30%	4.31	3	2,000	9,000	0	0%
025_02	NF Deer Creek	6	360	grass	21%	4.86	3	1,000	5,000	20%	4.92	3	1,000	5,000	0	-1%
025_02	NF Deer Creek	7	110	thinleaf alder	72%	1.72	3	300	500	70%	1.85	3	300	600	100	-2%
025_02	1st trib to Deer Cr	1	1200	mt mahogany	74%	1.60	1	1,000	2,000	80%	1.23	1	1,000	1,000	(1,000)	0%
025_02	1st trib to Deer Cr	2	1900	sage/grass	39%	3.75	2	4,000	20,000	40%	3.69	2	4,000	10,000	(10,000)	0%
025_02	1st trib to Deer Cr	3	1700	sage/grass	27%	4.49	3	5,000	20,000	30%	4.31	3	5,000	20,000	0	0%
025_02	1st trib to Deer Cr	4	1900	sage/grass	21%	4.86	4	8,000	40,000	20%	4.92	4	8,000	40,000	0	-1%
025_02	2nd trib to Deer Cr	1	1400	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
025_02	2nd trib to Deer Cr	2	890	sage/grass	39%	3.75	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
025_02	2nd trib to Deer Cr	3	610	sage/grass	39%	3.75	2	1,000	4,000	20%	4.92	2	1,000	5,000	1,000	-19%
025_02	Deer Creek	1	1600	thinleaf alder	72%	1.72	3	5,000	9,000	70%	1.85	3	5,000	9,000	0	-2%
025_02	Deer Creek	2	2420	water birch	83%	1.05	4	10,000	10,000	70%	1.85	4	10,000	20,000	10,000	-13%
025_02	Deer Creek	3	1200	water birch	73%	1.66	5	6,000	10,000	50%	3.08	5	6,000	20,000	10,000	-23%
025_02	Deer Creek	4	710	water birch	73%	1.66	5	4,000	7,000	40%	3.69	5	4,000	10,000	3,000	-33%
025_02	Deer Creek	5	750	water birch	73%	1.66	5	4,000	7,000	60%	2.46	5	4,000	10,000	3,000	-13%
025_02	Deer Creek	6	700	water birch	65%	2.15	6	4,000	9,000	50%	3.08	6	4,000	10,000	1,000	-15%
025_02	Deer Creek	7	1200	water birch	65%	2.15	6	7,000	20,000	30%	4.31	6	7,000	30,000	10,000	-35%
							Totals		210,000					240,000	23,000	

Table B-7. Existing and target solar loads for Dry Creek (ID17040217SK020_03).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
020_03	Dry Creek	1	250	pond	0%	6.15	30	7,500	46,000	0%	6.15	30	7,500	46,000	0	0%
020_03	Dry Creek	2	760	sage/grass	8%	5.66	11	8,400	48,000	10%	5.54	11	8,400	46,000	(2,000)	0%
020_03	Dry Creek	2	1100	sage/grass	8%	5.66	11	12,000	68,000	0%	6.15	11	12,000	74,000	6,000	-8%
020_03	Dry Creek	2	440	sage/grass	8%	5.66	11	4,800	27,000	10%	5.54	11	4,800	27,000	0	0%
020_03	Dry Creek	2	2000	sage/grass	8%	5.66	11	22,000	120,000	0%	6.15	11	22,000	140,000	20,000	-8%
020_03	Dry Creek	2	790	sage/grass	8%	5.66	11	8,700	49,000	10%	5.54	11	8,700	48,000	(1,000)	0%
020_03	Dry Creek	2	510	sage/grass	8%	5.66	11	5,600	32,000	0%	6.15	11	5,600	34,000	2,000	-8%
020_03	Dry Creek	2	780	sage/grass	8%	5.66	11	8,600	49,000	10%	5.54	11	8,600	48,000	(1,000)	0%
020_03	Dry Creek	2	390	sage/grass	8%	5.66	11	4,300	24,000	0%	6.15	11	4,300	26,000	2,000	-8%
020_03	Dry Creek	3	10170	sage/grass	7%	5.72	13	130,000	740,000	0%	6.15	13	130,000	800,000	60,000	-7%
020_03	Dry Creek	4	6400	sage/grass	6%	5.78	15	96,000	550,000	10%	5.54	15	96,000	530,000	(20,000)	0%
							Totals		1,750,000					1,820,000	66,000	

Table B-8. Existing and target solar loads for Dry Creek (ID17040217SK021_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
021_02	Dry Creek	1	540	grass	55%	2.77	1	500	1,000	60%	2.46	1	500	1,000	0	0%
021_02	Dry Creek	2	850	conifer/meadow	94%	0.37	1	900	300	90%	0.62	1	900	600	300	-4%
021_02	Dry Creek	3	70	grass	55%	2.77	1	70	200	50%	3.08	1	70	200	0	-5%
021_02	Dry Creek	4	490	dry DF w/o Ppine	94%	0.37	1	500	200	90%	0.62	1	500	300	100	-4%
021_02	Dry Creek	5	640	dry DF w/o Ppine	94%	0.37	2	1,000	400	90%	0.62	2	1,000	600	200	-4%
021_02	Dry Creek	6	200	Drummond/sedge	76%	1.48	2	400	600	70%	1.85	2	400	700	100	-6%
021_02	Dry Creek	7	410	Drummond/sedge	76%	1.48	2	800	1,000	50%	3.08	2	800	2,000	1,000	-26%
021_02	Dry Creek	8	250	Drummond/sedge	76%	1.48	2	500	700	30%	4.31	2	500	2,000	1,000	-46%
021_02	Dry Creek	9	170	Drummond/sedge	76%	1.48	2	300	400	70%	1.85	2	300	600	200	-6%
021_02	Dry Creek	10	550	Drummond/sedge	56%	2.71	3	2,000	5,000	50%	3.08	3	2,000	6,000	1,000	-6%
021_02	Dry Creek	11	280	Drummond/sedge	56%	2.71	3	800	2,000	70%	1.85	3	800	1,000	(1,000)	0%
021_02	Dry Creek	12	740	Drummond/sedge	56%	2.71	3	2,000	5,000	50%	3.08	3	2,000	6,000	1,000	-6%
021_02	Dry Creek	13	240	dry DF w/o Ppine	84%	0.98	4	1,000	1,000	80%	1.23	4	1,000	1,000	0	-4%
021_02	Dry Creek	14	90	dry DF w/o Ppine	84%	0.98	4	400	400	60%	2.46	4	400	1,000	600	-24%
021_02	Dry Creek	15	550	subalpine fir-moist	93%	0.43	4	2,000	900	90%	0.62	4	2,000	1,000	100	-3%
021_02	Dry Creek	16	170	Geyers/sedge	53%	2.89	4	700	2,000	60%	2.46	4	700	2,000	0	0%
021_02	Dry Creek	17	1400	Geyers/sedge	53%	2.89	4	6,000	20,000	50%	3.08	4	6,000	20,000	0	-3%
021_02	Dry Creek	18	190	Geyers/sedge	53%	2.89	4	800	2,000	60%	2.46	4	800	2,000	0	0%
021_02	Dry Creek	19	290	Geyers/sedge	45%	3.38	5	1,000	3,000	30%	4.31	5	1,000	4,000	1,000	-15%
021_02	Dry Creek	20	400	Geyers/sedge	45%	3.38	5	2,000	7,000	40%	3.69	5	2,000	7,000	0	-5%
021_02	Dry Creek	21	270	dry DF w/o Ppine	76%	1.48	5	1,000	1,000	70%	1.85	5	1,000	2,000	1,000	-6%
021_02	Dry Creek	22	3070	Geyers/sedge	40%	3.69	6	20,000	70,000	30%	4.31	6	20,000	90,000	20,000	-10%
021_02	Dry Creek	23	320	Geyers/sedge	40%	3.69	6	2,000	7,000	20%	4.92	6	2,000	10,000	3,000	-20%
021_02	Dry Creek	24	450	Geyers/sedge	40%	3.69	6	3,000	10,000	30%	4.31	6	3,000	10,000	0	-10%
							Totals		140,000					170,000	30,000	

Table B-9. Existing and target solar loads for Dry Creek (ID17040217SK021_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
021_02	1st trib to Dry Cr	1	850	rock/barren	0%	6.15	1	900	6,000	0%	6.15	1	900	6,000	0	0%
021_02	1st trib to Dry Cr	2	340	fir dry-gentle	96%	0.25	1	300	70	90%	0.62	1	300	200	100	-6%
021_02	1st trib to Dry Cr	3	380	grass	55%	2.77	1	400	1,000	50%	3.08	1	400	1,000	0	-5%
021_02	1st trib to Dry Cr	4	280	dry DF w/o Ppine	94%	0.37	2	600	200	90%	0.62	2	600	400	200	-4%
021_02	1st trib to Dry Cr	5	370	dry DF w/o Ppine	94%	0.37	2	700	300	80%	1.23	2	700	900	600	-14%
021_02	1st trib to Dry Cr	6	490	grass	21%	4.86	3	1,000	5,000	30%	4.31	3	1,000	4,000	(1,000)	0%
021_02	1st trib to Dry Cr	7	220	Drummond/sedge	56%	2.71	3	700	2,000	70%	1.85	3	700	1,000	(1,000)	0%
021_02	1st trib to Dry Cr	8	190	Drummond/sedge	56%	2.71	3	600	2,000	50%	3.08	3	600	2,000	0	-6%
021_02	1st trib to Dry Cr	9	130	Drummond/sedge	56%	2.71	3	400	1,000	10%	5.54	3	400	2,000	1,000	-46%
021_02	2nd trib to Dry Cr	1	1500	rock/barren	0%	6.15	1	2,000	10,000	0%	6.15	1	2,000	10,000	0	0%
021_02	2nd trib to Dry Cr	2	540	grass	55%	2.77	1	500	1,000	50%	3.08	1	500	2,000	1,000	-5%
021_02	3rd trib to Dry Cr	1	1140	rock/barren	0%	6.15	1	1,000	6,000	0%	6.15	1	1,000	6,000	0	0%
021_02	3rd trib to Dry Cr	2	1400	grass	55%	2.77	1	1,000	3,000	50%	3.08	1	1,000	3,000	0	-5%
021_02	3rd trib to Dry Cr	3	530	DF/limber pine	96%	0.25	2	1,000	200	90%	0.62	2	1,000	600	400	-6%
021_02	3rd trib to Dry Cr	4	170	grass	31%	4.24	2	300	1,000	40%	3.69	2	300	1,000	0	0%
021_02	3rd trib to Dry Cr	5	70	DF/limber pine	96%	0.25	2	100	20	90%	0.62	2	100	60	40	-6%
021_02	3rd trib to Dry Cr	6	180	grass	21%	4.86	3	500	2,000	40%	3.69	3	500	2,000	0	0%
021_02	3rd trib to Dry Cr	7	100	DF/limber pine	96%	0.25	3	300	70	90%	0.62	3	300	200	100	-6%
021_02	3rd trib to Dry Cr	8	290	grass	21%	4.86	3	900	4,000	40%	3.69	3	900	3,000	(1,000)	0%
021_02	3rd trib to Dry Cr	9	310	dry DF w/o Ppine	92%	0.49	3	900	400	90%	0.62	3	900	600	200	-2%
021_02	3rd trib to Dry Cr	10	500	grass	21%	4.86	3	2,000	10,000	20%	4.92	3	2,000	10,000	0	-1%
021_02	3rd trib to Dry Cr	11	120	dry DF w/o Ppine	92%	0.49	3	400	200	70%	1.85	3	400	700	500	-22%
021_02	3rd trib to Dry Cr	12	280	rock/barren	0%	6.15	3	800	5,000	0%	6.15	3	800	5,000	0	0%
021_02	4th trib to Dry Cr	1	650	rock/barren	0%	6.15	1	700	4,000	0%	6.15	1	700	4,000	0	0%
021_02	4th trib to Dry Cr	2	250	dry DF w/o Ppine	94%	0.37	1	300	100	90%	0.62	1	300	200	100	-4%
021_02	4th trib to Dry Cr	3	130	rock/barren	0%	6.15	1	100	600	0%	6.15	1	100	600	0	0%
021_02	4th trib to Dry Cr	4	610	dry DF w/o Ppine	94%	0.37	1	600	200	90%	0.62	1	600	400	200	-4%
021_02	4th trib to Dry Cr	5	680	rock/barren	0%	6.15	2	1,000	6,000	0%	6.15	2	1,000	6,000	0	0%
021_02	4th trib to Dry Cr	6	280	dry DF w/o Ppine	94%	0.37	2	600	200	80%	1.23	2	600	700	500	-14%

Table B-9 (cont.). Existing and target solar loads for Dry Creek tributaries (ID17040217SK021_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
021_02	4th trib to Dry Cr	7	400	limber pine	99%	0.06	2	800	50	80%	1.23	2	800	1,000	1,000	-19%
021_02	5th trib to Dry Cr	1	1300	rock/barren	0%	6.15	1	1,000	6,000	0%	6.15	1	1,000	6,000	0	0%
021_02	5th trib to Dry Cr	2	370	dry DF w/o Ppine	94%	0.37	2	700	300	90%	0.62	2	700	400	100	-4%
021_02	5th trib to Dry Cr	3	1100	rock/barren	0%	6.15	2	2,000	10,000	0%	6.15	2	2,000	10,000	0	0%
021_02	5th trib to Dry Cr	4	510	dry DF w/o Ppine	92%	0.49	3	2,000	1,000	80%	1.23	3	2,000	2,000	1,000	-12%
021_02	5th trib to Dry Cr	5	490	grass	21%	4.86	3	1,000	5,000	40%	3.69	3	1,000	4,000	(1,000)	0%
021_02	5th trib to Dry Cr	6	120	dry DF w/o Ppine	92%	0.49	3	400	200	80%	1.23	3	400	500	300	-12%
021_02	5th trib to Dry Cr	7	140	grass	16%	5.17	4	600	3,000	30%	4.31	4	600	3,000	0	0%
021_02	5th trib to Dry Cr	8	260	dry DF w/o Ppine	84%	0.98	4	1,000	1,000	80%	1.23	4	1,000	1,000	0	-4%
021_02	5th trib to Dry Cr	9	430	grass	16%	5.17	4	2,000	10,000	20%	4.92	4	2,000	10,000	0	0%
021_02	5th trib to Dry Cr	10	120	sage/grass	21%	4.86	4	500	2,000	30%	4.31	4	500	2,000	0	0%
021_02	5th trib to Dry Cr	11	110	grass	16%	5.17	4	400	2,000	10%	5.54	4	400	2,000	0	-6%
021_02	5th trib to Dry Cr	12	160	Geyers/sedge	53%	2.89	4	600	2,000	60%	2.46	4	600	1,000	(1,000)	0%
021_02	not connectted	1	360	rock/barren	0%	6.15	1	400	2,000	0%	6.15	1	400	2,000	0	0%
021_02	not connectted	2	310	DF/limber pine	96%	0.25	1	300	70	90%	0.62	1	300	200	100	-6%
021_02	not connectted	3	90	grass	55%	2.77	1	90	200	50%	3.08	1	90	300	100	-5%
021_02	not connectted	4	930	DF/limber pine	96%	0.25	2	2,000	500	90%	0.62	2	2,000	1,000	500	-6%
021_02	not connectted	5	560	sage/grass	39%	3.75	2	1,000	4,000	40%	3.69	2	1,000	4,000	0	0%
021_02	6th trib to Dry Cr	1	640	sage/grass	65%	2.15	1	600	1,000	60%	2.46	1	600	1,000	0	-5%
021_02	6th trib to Dry Cr	2	650	dry DF w/o Ppine	94%	0.37	1	700	300	90%	0.62	1	700	400	100	-4%
021_02	6th trib to Dry Cr	3	480	sage/grass	39%	3.75	2	1,000	4,000	30%	4.31	2	1,000	4,000	0	-9%
021_02	7th trib to Dr Cr	1	560	dry DF w/o Ppine	94%	0.37	1	600	200	90%	0.62	1	600	400	200	-4%
021_02	7th trib to Dr Cr	2	780	sage/grass	65%	2.15	1	800	2,000	60%	2.46	1	800	2,000	0	-5%
021_02	7th trib to Dr Cr	3	370	dry DF w/o Ppine	94%	0.37	2	700	300	80%	1.23	2	700	900	600	-14%
021_02	7th trib to Dr Cr	4	300	sage/grass	39%	3.75	2	600	2,000	40%	3.69	2	600	2,000	0	0%
021_02	7th trib to Dr Cr	5	280	Geyers/sedge	82%	1.11	2	600	700	80%	1.23	2	600	700	0	-2%
021_02	8th trib to Dry Cr	1	1300	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
021_02	8th trib to Dry Cr	2	570	dry DF w/o Ppine	94%	0.37	2	1,000	400	90%	0.62	2	1,000	600	200	-4%
021_02	8th trib to Dry Cr	3	470	aspen/conifer	99%	0.06	2	900	60	90%	0.62	2	900	600	500	-9%
021_02	8th trib to Dry Cr	4	130	Geyers/sedge	82%	1.11	2	300	300	70%	1.85	2	300	600	300	-12%
021_02	8th trib to Dry Cr	5	120	Geyers/sedge	82%	1.11	2	200	200	80%	1.23	2	200	200	0	-2%
021_02	9th trib to Dry Cr	1	520	grass	55%	2.77	1	500	1,000	50%	3.08	1	500	2,000	1,000	-5%
021_02	9th trib to Dry Cr	2	550	sage/grass	65%	2.15	1	600	1,000	60%	2.46	1	600	1,000	0	-5%
021_02	9th trib to Dry Cr	3	180	grass	55%	2.77	1	200	600	50%	3.08	1	200	600	0	-5%
021_02	9th trib to Dry Cr	4	500	Geyers/sedge	82%	1.11	2	1,000	1,000	90%	0.62	2	1,000	600	(400)	0%
021_02	9th trib to Dry Cr	5	280	sage/grass	39%	3.75	2	600	2,000	30%	4.31	2	600	3,000	1,000	-9%
021_02	10th trib to Dry Cr	1	370	sage/grass	65%	2.15	1	400	900	60%	2.46	1	400	1,000	100	-5%
021_02	10th trib to Dry Cr	2	420	grass	55%	2.77	1	400	1,000	40%	3.69	1	400	1,000	0	-15%
021_02	10th trib to Dry Cr	3	210	grass	55%	2.77	1	200	600	20%	4.92	1	200	1,000	400	-35%
021_02	10th trib to Dry Cr	4	380	Geyers/sedge	93%	0.43	1	400	200	70%	1.85	1	400	700	500	-23%
021_02	10th trib to Dry Cr	5	160	sage/grass	39%	3.75	2	300	1,000	40%	3.69	2	300	1,000	0	0%
021_02	10th trib to Dry Cr	6	210	grass	31%	4.24	2	400	2,000	30%	4.31	2	400	2,000	0	-1%
021_02	10th trib to Dry Cr	7	350	sage/grass	39%	3.75	2	700	3,000	30%	4.31	2	700	3,000	0	-9%
021_02	10th trib to Dry Cr	8	330	grass	31%	4.24	2	700	3,000	20%	4.92	2	700	3,000	0	-11%
							Totals		150,000					160,000	7,500	

Table B-10. Existing and target solar loads for Long Lost Creek (Dry Creek tributary) (ID17040217SK021_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
021_02	Hell Canyon Creek	1	230	rock/barren	0%	6.15	1	200	1,000	0%	6.15	1	200	1,000	0	0%
021_02	Hell Canyon Creek	2	960	grass	31%	4.24	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	9%
021_02	Hell Canyon Creek	4	230	subalpine fir moist	96%	0.25	2	500	100	90%	0.62	2	500	300	200	-6%
021_02	Hell Canyon Creek	5	630	grass	31%	4.24	2	1,000	4,000	30%	4.31	2	1,000	4,000	0	-1%
021_02	Hell Canyon Creek	7	850	dry DF w/o Ppine	92%	0.49	3	3,000	1,000	90%	0.62	3	3,000	2,000	1,000	-2%
021_02	1st trib to Long Lost	1	690	rock/barren	0%	6.15	1	700	4,000	0%	6.15	1	700	4,000	0	0%
021_02	1st trib to Long Lost	2	430	dry DF w/o Ppine	94%	0.37	1	400	100	90%	0.62	1	400	200	100	-4%
021_02	1st trib to Long Lost	3	400	dry DF w/o Ppine	94%	0.37	2	800	300	90%	0.62	2	800	500	200	-4%
021_02	1st trib to Long Lost	4	710	sage/grass	39%	3.75	2	1,000	4,000	30%	4.31	2	1,000	4,000	0	-9%
021_02	2nd trib to Long Lost	1	1000	grass	55%	2.77	1	1,000	3,000	50%	3.08	1	1,000	3,000	0	-5%
021_02	2nd trib to Long Lost	2	510	sage/grass	65%	2.15	1	500	1,000	60%	2.46	1	500	1,000	0	-5%
021_02	2nd trib to Long Lost	3	360	dry DF w/o Ppine	94%	0.37	2	700	300	90%	0.62	2	700	400	100	-4%
021_02	2nd trib to Long Lost	4	350	sage/grass	39%	3.75	2	700	3,000	50%	3.08	2	700	2,000	(1,000)	0%
021_02	2nd trib to Long Lost	5	180	dry DF w/o Ppine	94%	0.37	2	400	100	80%	1.23	2	400	500	400	-14%
021_02	2nd trib to Long Lost	6	40	Drummond/sedge	76%	1.48	2	80	100	60%	2.46	2	80	200	100	-16%
021_02	3rd trib to Long Lost	1	750	rock/barren	0%	6.15	1	800	5,000	0%	6.15	1	800	5,000	0	0%
021_02	3rd trib to Long Lost	2	140	dry DF w/o Ppine	94%	0.37	1	100	40	90%	0.62	1	100	60	20	-4%
021_02	3rd trib to Long Lost	3	1200	sage/grass	39%	3.75	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
021_02	3rd trib to Long Lost	4	100	Geyers/sedge	82%	1.11	2	200	200	70%	1.85	2	200	400	200	-12%
021_02	4th trib to Long Lost	1	1300	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
021_02	4th trib to Long Lost	2	860	grass	31%	4.24	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
021_02	4th trib to Long Lost	3	1100	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
021_02	4th trib to Long Lost	4	310	Geyers/sedge	82%	1.11	2	600	700	80%	1.23	2	600	700	0	-2%
021_02	4th trib to Long Lost	5	230	Geyers/sedge	64%	2.21	3	700	2,000	60%	2.46	3	700	2,000	0	-4%
021_02	4th trib to Long Lost	6	450	sage/grass	27%	4.49	3	1,000	4,000	30%	4.31	3	1,000	4,000	0	0%
021_02	Long Lost Creek	1	3000	rock/barren	0%	6.15	1	3,000	20,000	0%	6.15	1	3,000	20,000	0	0%
021_02	Long Lost Creek	2	310	rock/barren	0%	6.15	2	600	4,000	10%	5.54	2	600	3,000	(1,000)	0%
021_02	Long Lost Creek	3	390	rock/barren	0%	6.15	2	800	5,000	0%	6.15	2	800	5,000	0	0%
021_02	Long Lost Creek	4	170	subalpine fir/DF	100%	0.00	2	300	0	90%	0.62	2	300	200	200	-10%
021_02	Long Lost Creek	5	120	subalpine fir moist	96%	0.25	2	200	50	90%	0.62	2	200	100	50	-6%
021_02	Long Lost Creek	6	80	rock/barren	0%	6.15	2	200	1,000	0%	6.15	2	200	1,000	0	0%
021_02	Long Lost Creek	7	210	sage/grass	39%	3.75	2	400	2,000	50%	3.08	2	400	1,000	(1,000)	0%

Table B-10 (cont.). Existing and target solar loads for Long Lost Creek (ID17040217SK021_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
021_02	Long Lost Creek	8	110	sage/grass	39%	3.75	2	200	800	20%	4.92	2	200	1,000	200	-19%
021_02	Long Lost Creek	9	210	sage/grass	27%	4.49	3	600	3,000	40%	3.69	3	600	2,000	(1,000)	0%
021_02	Long Lost Creek	10	840	grass	21%	4.86	3	3,000	10,000	20%	4.92	3	3,000	10,000	0	-1%
021_02	Long Lost Creek	11	150	Drummond/sedge	56%	2.71	3	500	1,000	50%	3.08	3	500	2,000	1,000	-6%
021_02	Long Lost Creek	12	250	Drummond/sedge	56%	2.71	3	800	2,000	60%	2.46	3	800	2,000	0	0%
021_02	Long Lost Creek	13	490	Drummond/sedge	56%	2.71	3	1,000	3,000	80%	1.23	3	1,000	1,000	(2,000)	0%
021_02	Long Lost Creek	14	200	Drummond/sedge	56%	2.71	3	600	2,000	50%	3.08	3	600	2,000	0	-6%
021_02	Long Lost Creek	15	70	Drummond/sedge	45%	3.38	4	300	1,000	30%	4.31	4	300	1,000	0	-15%
021_02	Long Lost Creek	16	550	Drummond/sedge	45%	3.38	4	2,000	7,000	50%	3.08	4	2,000	6,000	(1,000)	0%
021_02	Long Lost Creek	17	320	Drummond/sedge	45%	3.38	4	1,000	3,000	40%	3.69	4	1,000	4,000	1,000	-5%
021_02	Long Lost Creek	18	270	Drummond/sedge	45%	3.38	4	1,000	3,000	70%	1.85	4	1,000	2,000	(1,000)	0%
021_02	Long Lost Creek	19	210	Drummond/sedge	45%	3.38	4	800	3,000	50%	3.08	4	800	2,000	(1,000)	0%
021_02	Long Lost Creek	20	80	Drummond/sedge	45%	3.38	4	300	1,000	30%	4.31	4	300	1,000	0	-15%
021_02	Long Lost Creek	21	170	Drummond/sedge	45%	3.38	4	700	2,000	60%	2.46	4	700	2,000	0	0%
021_02	Long Lost Creek	22	230	Drummond/sedge	45%	3.38	4	900	3,000	40%	3.69	4	900	3,000	0	-5%
021_02	Long Lost Creek	23	470	grass	16%	5.17	4	2,000	10,000	0%	6.15	4	2,000	10,000	0	-16%
021_02	Long Lost Creek	24	250	Drummond/sedge	38%	3.81	5	1,000	4,000	30%	4.31	5	1,000	4,000	0	-8%
021_02	Long Lost Creek	25	720	Drummond/sedge	38%	3.81	5	4,000	20,000	40%	3.69	5	4,000	10,000	(10,000)	0%
021_02	Long Lost Creek	26	230	sage/grass	17%	5.10	5	1,000	5,000	20%	4.92	5	1,000	5,000	0	0%
021_02	Long Lost Creek	27	910	sage/grass	17%	5.10	5	5,000	30,000	0%	6.15	5	5,000	30,000	0	-17%
021_02	Long Lost Creek	28	80	Drummond/sedge	38%	3.81	5	400	2,000	20%	4.92	5	400	2,000	0	-18%
021_02	Long Lost Creek	29	250	Drummond/sedge	38%	3.81	5	1,000	4,000	40%	3.69	5	1,000	4,000	0	0%
021_02	Long Lost Creek	30	430	Drummond/sedge	33%	4.12	6	3,000	10,000	40%	3.69	6	3,000	10,000	0	0%
021_02	Long Lost Creek	31	180	Drummond/sedge	33%	4.12	6	1,000	4,000	30%	4.31	6	1,000	4,000	0	-3%
021_02	Long Lost Creek	32	820	dry DF w/o Ppine	69%	1.91	6	5,000	10,000	90%	0.62	6	5,000	3,000	(7,000)	0%
021_02	Long Lost Creek	33	130	Geyers/sedge	40%	3.69	6	800	3,000	60%	2.46	6	800	2,000	(1,000)	0%
021_02	Long Lost Creek	34	470	Geyers/sedge	40%	3.69	6	3,000	10,000	40%	3.69	6	3,000	10,000	0	0%
021_02	Long Lost Creek	35	500	Geyers/sedge	35%	4.00	7	4,000	20,000	40%	3.69	7	4,000	10,000	(10,000)	5%
021_02	Long Lost Creek	36	390	Geyers/sedge	35%	4.00	7	3,000	10,000	30%	4.31	7	3,000	10,000	0	-5%
021_02	Long Lost Creek	37	640	Geyers/sedge	35%	4.00	7	4,000	20,000	40%	3.69	7	4,000	10,000	(10,000)	0%
021_02	Long Lost Creek	38	160	Geyers/sedge	35%	4.00	7	1,000	4,000	30%	4.31	7	1,000	4,000	0	-5%
021_02	Long Lost Creek	39	130	Geyers/sedge	35%	4.00	7	900	4,000	20%	4.92	7	900	4,000	0	-15%
021_02	Long Lost Creek	40	100	Geyers/sedge	35%	4.00	7	700	3,000	30%	4.31	7	700	3,000	0	-5%
021_02	Long Lost Creek	41	160	Geyers/sedge	35%	4.00	7	1,000	4,000	40%	3.69	7	1,000	4,000	0	0%
							Totals		320,000					270,000	-45,000	

Table B-11. Existing and target solar loads for Dry Creek (ID17040217SK021_03).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
021_03	Dry Creek	1	620	Geyers/sedge	35%	4.00	7	4,000	20,000	20%	4.92	12	7,000	30,000	10,000	-15%
021_03	Dry Creek	2	280	Geyers/sedge	32%	4.18	8	2,000	8,000	10%	5.54	8	2,000	10,000	2,000	-22%
021_03	Dry Creek	3	670	Geyers/sedge	32%	4.18	8	5,000	20,000	20%	4.92	8	5,000	20,000	0	-12%
021_03	Dry Creek	4	870	water birch	53%	2.89	8	7,000	20,000	40%	3.69	8	7,000	30,000	10,000	-13%
021_03	Dry Creek	5	1200	water birch	53%	2.89	8	10,000	30,000	50%	3.08	8	10,000	30,000	0	-3%
021_03	Long Lost Cr	1	150	Geyers/sedge	35%	4.00	7	1,000	4,000	40%	3.69	7	1,000	4,000	0	0%
021_03	Long Lost Cr	2	160	Geyers/sedge	35%	4.00	7	1,000	4,000	20%	4.92	7	1,000	5,000	1,000	-15%
021_03	Long Lost Cr	3	220	Geyers/sedge	35%	4.00	7	2,000	8,000	30%	4.31	7	2,000	9,000	1,000	-5%
							Totals		110,000					140,000	24,000	

Table B-12. Existing and target solar loads for Little Lost River (ID17040217SK001_05).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
001_05	Little Lost River	1	60	black cottonwood	80%	1.23	9	500	600	0%	6.15	9	500	3,000	2,000	-80%
001_05	Little Lost River	2	480	black cottonwood	80%	1.23	9	4,000	5,000	30%	4.31	9	4,000	20,000	20,000	-50%
001_05	Little Lost River	3	680	black cottonwood	80%	1.23	9	6,000	7,000	20%	4.92	9	6,000	30,000	20,000	-60%
001_05	Little Lost River	4	590	black cottonwood	80%	1.23	9	5,000	6,000	30%	4.31	9	5,000	20,000	10,000	-50%
001_05	Little Lost River	5	460	black cottonwood	80%	1.23	9	4,000	5,000	40%	3.69	9	4,000	10,000	5,000	-40%
001_05	Little Lost River	6	190	black cottonwood	80%	1.23	9	2,000	2,000	60%	2.46	9	2,000	5,000	3,000	-20%
001_05	Little Lost River	7	310	black cottonwood	80%	1.23	9	3,000	4,000	20%	4.92	9	3,000	10,000	6,000	-60%
001_05	Little Lost River	8	1320	black cottonwood	80%	1.23	9	10,000	10,000	60%	2.46	9	10,000	20,000	10,000	-20%
001_05	Little Lost River	9	210	black cottonwood	80%	1.23	9	2,000	2,000	30%	4.31	9	2,000	9,000	7,000	-50%
001_05	Little Lost River	10	400	black cottonwood	80%	1.23	9	4,000	5,000	50%	3.08	9	4,000	10,000	5,000	-30%
001_05	Little Lost River	11	230	black cottonwood	80%	1.23	9	2,000	2,000	30%	4.31	9	2,000	9,000	7,000	-50%
001_05	Little Lost River	12	1600	black cottonwood	80%	1.23	9	10,000	10,000	60%	2.46	9	10,000	20,000	10,000	-20%
001_05	Little Lost River	13	520	black cottonwood	80%	1.23	9	5,000	6,000	40%	3.69	9	5,000	20,000	10,000	-40%
001_05	Little Lost River	14	650	black cottonwood	80%	1.23	9	6,000	7,000	0%	6.15	9	6,000	40,000	30,000	-80%
001_05	Little Lost River	15	680	black cottonwood	80%	1.23	9	6,000	7,000	10%	5.54	9	6,000	30,000	20,000	-70%
001_05	Little Lost River	16	580	black cottonwood	80%	1.23	9	5,000	6,000	30%	4.31	9	5,000	20,000	10,000	-50%
001_05	Little Lost River	17	330	black cottonwood	80%	1.23	9	3,000	4,000	50%	3.08	9	3,000	9,000	5,000	-30%
001_05	Little Lost River	18	620	black cottonwood	80%	1.23	9	6,000	7,000	20%	4.92	9	6,000	30,000	20,000	-60%
001_05	Little Lost River	19	330	black cottonwood	80%	1.23	9	3,000	4,000	10%	5.54	9	3,000	20,000	20,000	-70%
001_05	Little Lost River	20	1470	black cottonwood	80%	1.23	9	10,000	10,000	70%	1.85	9	10,000	20,000	10,000	-10%
001_05	Little Lost River	21	1630	black cottonwood	80%	1.23	9	10,000	10,000	20%	4.92	9	10,000	50,000	40,000	-60%
001_05	Little Lost River	22	920	black cottonwood	80%	1.23	9	8,000	10,000	10%	5.54	9	8,000	40,000	30,000	-70%
001_05	Little Lost River	23	2200	black cottonwood	80%	1.23	9	20,000	20,000	20%	4.92	9	20,000	100,000	80,000	-60%
							Totals		150,000					550,000	380,000	

Table B-13. Existing and target solar loads for Little Lost River (ID17040217SK002_05).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
002_05	Little Lost River	1	660	sandbar willow	32%	4.18	9	6,000	30,000	20%	4.92	9	6,000	30,000	0	-12%
002_05	Little Lost River	2	6230	sandbar willow	32%	4.18	9	60,000	300,000	30%	4.31	9	60,000	300,000	0	-2%
002_05	Little Lost River	3	1860	black cottonwood	80%	1.23	9	20,000	20,000	30%	4.31	9	20,000	90,000	70,000	-50%
002_05	Little Lost River	4	460	black cottonwood	80%	1.23	9	4,000	5,000	40%	3.69	9	4,000	10,000	5,000	-40%
							Totals		360,000					430,000	75,000	

Table B-14. Existing and target solar loads for Little Lost River (ID17040217SK007_04).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
007_04	Little Lost River	1	2020	sandbar willow	32%	4.18	9	20,000	80,000	20%	4.92	9	20,000	100,000	20,000	-12%
007_04	Little Lost River	2	2700	sandbar willow	32%	4.18	9	20,000	80,000	30%	4.31	9	20,000	90,000	10,000	-2%
007_04	Little Lost River	3	270	sandbar willow	32%	4.18	9	2,000	8,000	10%	5.54	9	2,000	10,000	2,000	-22%
007_04	Little Lost River	4	390	sandbar willow	32%	4.18	9	4,000	20,000	20%	4.92	9	4,000	20,000	0	-12%
007_04	Little Lost River	5	440	sandbar willow	32%	4.18	9	4,000	20,000	10%	5.54	9	4,000	20,000	0	-22%
007_04	Little Lost River	6	1850	sandbar willow	32%	4.18	9	20,000	80,000	20%	4.92	9	20,000	100,000	20,000	-12%
007_04	Little Lost River	7	500	sandbar willow	32%	4.18	9	5,000	20,000	10%	5.54	9	5,000	30,000	10,000	-22%
007_04	Little Lost River	8	450	sandbar willow	32%	4.18	9	4,000	20,000	20%	4.92	9	4,000	20,000	0	-12%
007_04	Little Lost River	9	410	sandbar willow	32%	4.18	9	4,000	20,000	10%	5.54	9	4,000	20,000	0	-22%
007_04	Little Lost River	10	280	sandbar willow	32%	4.18	9	3,000	10,000	20%	4.92	9	3,000	10,000	0	-12%
007_04	Little Lost River	11	400	sandbar willow	32%	4.18	9	4,000	20,000	0%	6.15	9	4,000	20,000	0	-32%
007_04	Little Lost River	12	1800	sandbar willow	32%	4.18	9	20,000	80,000	10%	5.54	9	20,000	100,000	20,000	-22%
007_04	Little Lost River	13	400	sandbar willow	32%	4.18	9	4,000	20,000	20%	4.92	9	4,000	20,000	0	-12%
007_04	Little Lost River	14	5700	sandbar willow	32%	4.18	9	50,000	200,000	10%	5.54	9	50,000	300,000	100,000	-22%
007_04	Little Lost River	15	2270	sandbar willow	32%	4.18	9	20,000	80,000	20%	4.92	9	20,000	100,000	20,000	-12%
							Totals		760,000					960,000	200,000	

Table B-15. Existing and target solar loads for Little Lost River (ID17040217SK009_04).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
009_04	Little Lost River	1	950	sandbar willow	29%	4.37	10	9,500	41,000	10%	5.54	10	9,500	53,000	12,000	-19%
009_04	Little Lost River	2	510	sandbar willow	29%	4.37	10	5,100	22,000	20%	4.92	10	5,100	25,000	3,000	-9%
009_04	Little Lost River	3	1300	sandbar willow	29%	4.37	10	13,000	57,000	10%	5.54	10	13,000	72,000	15,000	-19%
009_04	Little Lost River	4	2750	sandbar willow	32%	4.18	9	20,000	80,000	20%	4.92	9	20,000	100,000	20,000	-12%
009_04	Little Lost River	5	3200	sandbar willow	32%	4.18	9	30,000	100,000	10%	5.54	9	30,000	200,000	100,000	-22%
009_04	Little Lost River	6	330	sandbar willow	32%	4.18	9	3,000	10,000	20%	4.92	9	3,000	10,000	0	-12%
009_04	Little Lost River	7	110	sandbar willow	32%	4.18	9	1,000	4,000	0%	6.15	9	1,000	6,000	2,000	-32%
009_04	Little Lost River	8	1020	sandbar willow	32%	4.18	9	9,000	40,000	20%	4.92	9	9,000	40,000	0	-12%
009_04	Little Lost River	9	350	sandbar willow	32%	4.18	9	3,000	10,000	0%	6.15	9	3,000	20,000	10,000	-32%
009_04	Little Lost River	10	160	sandbar willow	32%	4.18	9	1,000	4,000	20%	4.92	9	1,000	5,000	1,000	-12%
009_04	Little Lost River	11	150	sandbar willow	32%	4.18	9	1,000	4,000	10%	5.54	9	1,000	6,000	2,000	-22%
							Totals		370,000					540,000	170,000	

Table B-16. Existing and target solar loads for Little Lost River (ID17040217SK010_04).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
010_04	Little Lost River	1	1430	sandbar willow	29%	4.37	10	14,000	61,000	10%	5.54	10	14,000	77,000	16,000	-19%
010_04	Little Lost River	2	1570	sandbar willow	29%	4.37	10	16,000	70,000	20%	4.92	10	16,000	79,000	9,000	-9%
010_04	Little Lost River	3	240	sandbar willow	29%	4.37	10	2,400	10,000	0%	6.15	10	2,400	15,000	5,000	-29%
010_04	Little Lost River	4	2300	sandbar willow	29%	4.37	10	23,000	100,000	10%	5.54	10	23,000	130,000	30,000	-19%
010_04	Little Lost River	5	1260	sandbar willow	29%	4.37	10	13,000	57,000	20%	4.92	10	13,000	64,000	7,000	-9%
010_04	Little Lost River	6	1560	sandbar willow	29%	4.37	10	16,000	70,000	10%	5.54	10	16,000	89,000	19,000	-19%
010_04	Little Lost River	7	660	sandbar willow	29%	4.37	10	6,600	29,000	20%	4.92	10	6,600	32,000	3,000	-9%
010_04	Little Lost River	8	220	sandbar willow	29%	4.37	10	2,200	9,600	10%	5.54	10	2,200	12,000	2,400	-19%
010_04	Little Lost River	9	1290	sandbar willow	29%	4.37	10	13,000	57,000	20%	4.92	10	13,000	64,000	7,000	-9%
010_04	Little Lost River	10	990	sandbar willow	29%	4.37	10	9,900	43,000	10%	5.54	10	9,900	55,000	12,000	-19%
							Totals		510,000					620,000	110,000	

Table B-17. Existing and target solar loads for Little Lost River tributaries (ID17040217SK007_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
007_02	Van Dorn Creek	1	1100	rock/barren	0%	6.15	1	1,000	6,000	0%	6.15	1	1,000	6,000	0	0%
007_02	(right fork)	2	810	dry DF w/o Ppine	94%	0.37	2	2,000	700	90%	0.62	2	2,000	1,000	300	-4%
007_02	(right fork)	3	1000	subalpine fir moist	96%	0.25	2	2,000	500	90%	0.62	2	2,000	1,000	500	-6%
007_02	(left fork)	1	450	rock/barren	0%	6.15	1	500	3,000	0%	6.15	1	500	3,000	0	0%
007_02	(left fork)	2	210	sage/grass	65%	2.15	1	200	400	60%	2.46	1	200	500	100	-5%
007_02	(left fork)	3	700	dry DF w/o Ppine	94%	0.37	2	1,000	400	90%	0.62	2	1,000	600	200	-4%
007_02	(left fork)	4	320	rock/barren	0%	6.15	2	600	4,000	0%	6.15	2	600	4,000	0	0%
007_02	(left fork)	5	220	subalpine fir moist	96%	0.25	2	400	100	90%	0.62	2	400	200	100	-6%
007_02	(left fork)	6	120	sage/grass	27%	4.49	3	400	2,000	60%	2.46	3	400	1,000	(1,000)	0%
007_02	(left fork)	7	990	subalpine fir moist	95%	0.31	3	3,000	900	90%	0.62	3	3,000	2,000	1,000	-5%
007_02	(below forks)	1	960	dry DF w/o Ppine	84%	0.98	4	4,000	4,000	90%	0.62	4	4,000	2,000	(2,000)	0%
007_02	(below forks)	2	460	dry DF w/o Ppine	84%	0.98	4	2,000	2,000	80%	1.23	4	2,000	2,000	0	-4%
007_02	(below forks)	3	30	grass	16%	5.17	4	100	500	40%	3.69	4	100	400	(100)	0%
007_02	(below forks)	4	200	grass	16%	5.17	4	800	4,000	30%	4.31	4	800	3,000	(1,000)	0%
007_02	(below forks)	5	130	dry DF w/o Ppine	84%	0.98	4	500	500	60%	2.46	4	500	1,000	500	-24%
007_02	(below forks)	6	400	grass	16%	5.17	4	2,000	10,000	20%	4.92	4	2,000	10,000	0	0%
007_02	(below forks)	7	50	dry DF w/o Ppine	84%	0.98	4	200	200	90%	0.62	4	200	100	(100)	0%
007_02	(below forks)	8	1000	grass	13%	5.35	5	5,000	30,000	20%	4.92	5	5,000	20,000	(10,000)	0%
007_02	(below forks)	9	850	dry DF w/o Ppine	76%	1.48	5	4,000	6,000	70%	1.85	5	4,000	7,000	1,000	-6%
007_02	(below forks)	10	840	dry DF w/o Ppine	76%	1.48	5	4,000	6,000	80%	1.23	5	4,000	5,000	(1,000)	0%
007_02	(below forks)	11	810	dry DF w/o Ppine	69%	1.91	6	5,000	10,000	60%	2.46	6	5,000	10,000	0	-9%
007_02	(below forks)	12	950	sage/grass	14%	5.29	6	6,000	30,000	20%	4.92	6	6,000	30,000	0	0%
007_02	(below forks)	13	3000	sage/grass	12%	5.41	7	20,000	100,000	20%	4.92	7	20,000	100,000	0	0%
007_02	1st trib to Van Dorn	1	280	rock/barren	0%	6.15	1	300	2,000	0%	6.15	1	300	2,000	0	0%
007_02	1st trib to Van Dorn	2	70	grass	55%	2.77	1	70	200	50%	3.08	1	70	200	0	-5%
007_02	1st trib to Van Dorn	3	590	subalpine fir moist	96%	0.25	1	600	100	90%	0.62	1	600	400	300	-6%
007_02	1st trib to Van Dorn	4	110	dry DF w/o Ppine	94%	0.37	1	100	40	80%	1.23	1	100	100	60	-14%
007_02	1st trib to Van Dorn	5	180	dry DF w/o Ppine	94%	0.37	1	200	70	90%	0.62	1	200	100	30	-4%
007_02	1st trib to Van Dorn	6	110	sage/grass	65%	2.15	1	100	200	60%	2.46	1	100	200	0	-5%
007_02	1st trib to Van Dorn	7	160	dry DF w/o Ppine	94%	0.37	2	300	100	80%	1.23	2	300	400	300	-14%
007_02	1st trib to Van Dorn	8	190	sage/grass	39%	3.75	2	400	2,000	30%	4.31	2	400	2,000	0	-9%
007_02	1st trib to Van Dorn	9	200	dry DF w/o Ppine	94%	0.37	2	400	100	80%	1.23	2	400	500	400	-14%
007_02	1st trib to Van Dorn	10	700	sage/grass	39%	3.75	2	1,000	4,000	30%	4.31	2	1,000	4,000	0	-9%
007_02	1st trib to Van Dorn	11	540	dry DF w/o Ppine	92%	0.49	3	2,000	1,000	70%	1.85	3	2,000	4,000	3,000	-22%
007_02	1st trib to Van Dorn	12	340	dry DF w/o Ppine	92%	0.49	3	1,000	500	90%	0.62	3	1,000	600	100	-2%
007_02	1st trib to Van Dorn	13	340	grass	21%	4.86	3	1,000	5,000	40%	3.69	3	1,000	4,000	(1,000)	0%
007_02	1st trib to Van Dorn	14	530	grass	16%	5.17	4	2,000	10,000	20%	4.92	4	2,000	10,000	0	0%
007_02	1st trib to Van Dorn	15	90	dry DF w/o Ppine	84%	0.98	4	400	400	70%	1.85	4	400	700	300	-14%
007_02	1st trib to Van Dorn	16	110	grass	16%	5.17	4	400	2,000	20%	4.92	4	400	2,000	0	0%
007_02	1st trib to Van Dorn	17	550	dry DF w/o Ppine	84%	0.98	4	2,000	2,000	70%	1.85	4	2,000	4,000	2,000	-14%
007_02	1st trib to Van Dorn	18	350	grass	16%	5.17	4	1,000	5,000	10%	5.54	4	1,000	6,000	1,000	-6%

Table B-17 (cont.). Existing and target solar loads for Little Lost River tributaries (ID17040217SK007_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
007_02	2nd trib to Van Dorn	1	1200	dry DF w/o Ppine	94%	0.37	1	1,000	400	80%	1.23	1	1,000	1,000	600	-14%
007_02	2nd trib to Van Dorn	2	730	dry DF w/o Ppine	94%	0.37	2	1,000	400	90%	0.62	2	1,000	600	200	-4%
007_02	2nd trib to Van Dorn	3	110	dry DF w/o Ppine	94%	0.37	2	200	70	80%	1.23	2	200	200	100	-14%
007_02	2nd trib to Van Dorn	4	2800	sage/grass	27%	4.49	3	8,000	40,000	40%	3.69	3	8,000	30,000	(10,000)	0%
007_02	Bird Canyon	1	2400	dry DF w/o Ppine	94%	0.37	1	2,000	700	90%	0.62	1	2,000	1,000	300	-4%
007_02	Bird Canyon	2	1000	dry DF w/o Ppine	94%	0.37	2	2,000	700	80%	1.23	2	2,000	2,000	1,000	-14%
007_02	Bird Canyon	3	1100	sage/grass	39%	3.75	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
007_02	Bird Canyon	4	350	sage/grass	27%	4.49	3	1,000	4,000	30%	4.31	3	1,000	4,000	0	0%
007_02	Bird Canyon	5	1400	low sage/grass	12%	5.41	3	4,000	20,000	10%	5.54	3	4,000	20,000	0	-2%
007_02	1st trib to Bird	1	2500	sage/grass	65%	2.15	1	3,000	6,000	60%	2.46	1	3,000	7,000	1,000	-5%
007_02	1st trib to Bird	2	1200	sage/grass	39%	3.75	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
007_02	1st trib to Bird	3	2800	low sage/grass	12%	5.41	3	8,000	40,000	10%	5.54	3	8,000	40,000	0	-2%
007_02	2nd trib to Bird	1	100	dry DF w/o Ppine	94%	0.37	1	100	40	90%	0.62	1	100	60	20	-4%
007_02	2nd trib to Bird	2	1800	dry DF w/o Ppine	65%	2.15	1	2,000	4,000	60%	2.46	1	2,000	5,000	1,000	-5%
007_02	2nd trib to Bird	3	1100	dry DF w/o Ppine	39%	3.75	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
007_02	3rd trib to Bird	1	480	dry DF w/o Ppine	65%	2.15	1	500	1,000	60%	2.46	1	500	1,000	0	-5%
007_02	3rd trib to Bird	2	1000	dry DF w/o Ppine	65%	2.15	1	1,000	2,000	40%	3.69	1	1,000	4,000	2,000	-25%
007_02	3rd trib to Bird	3	1200	low sage/grass	18%	5.04	2	2,000	10,000	20%	4.92	2	2,000	10,000	0	0%
007_02	4th trib to Bird	1	590	dry DF w/o Ppine	94%	0.37	1	600	200	90%	0.62	1	600	400	200	-4%
007_02	4th trib to Bird	2	1000	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
007_02	4th trib to Bird	3	380	sage/grass	65%	2.15	1	400	900	40%	3.69	1	400	1,000	100	-25%
007_02	5th trib to Bird	4	1800	sage/grass	65%	2.15	1	2,000	4,000	60%	2.46	1	2,000	5,000	1,000	-5%
007_02	5th trib to Bird	5	580	low sage/grass	34%	4.06	1	600	2,000	40%	3.69	1	600	2,000	0	0%
007_02	Buck Canyon	1	340	conifer meadow	80%	1.23	1	300	400	80%	1.23	1	300	400	0	0%
007_02	Buck Canyon	2	590	dry DF w/o Ppine	94%	0.37	1	600	200	90%	0.62	1	600	400	200	-4%
007_02	Buck Canyon	3	480	conifer meadow	60%	2.46	1	500	1,000	60%	2.46	1	500	1,000	0	0%
007_02	Buck Canyon	4	810	conifer meadow	80%	1.23	1	800	1,000	80%	1.23	1	800	1,000	0	0%
007_02	Buck Canyon	5	50	grass	55%	2.77	1	50	100	60%	2.46	1	50	100	0	0%
007_02	Buck Canyon	6	90	dry DF w/o Ppine	94%	0.37	1	90	30	80%	1.23	1	90	100	70	-14%
007_02	Buck Canyon	7	50	grass	55%	2.77	1	50	100	60%	2.46	1	50	100	0	0%
007_02	Buck Canyon	8	400	dry DF w/o Ppine	94%	0.37	1	400	100	80%	1.23	1	400	500	400	-14%
007_02	Buck Canyon	9	1200	dry DF w/o Ppine	94%	0.37	2	2,000	700	90%	0.62	2	2,000	1,000	300	-4%
007_02	Buck Canyon	10	130	conifer meadow	70%	1.85	2	300	600	70%	1.85	2	300	600	0	0%
007_02	Buck Canyon	11	550	dry DF w/o Ppine	94%	0.37	2	1,000	400	90%	0.62	2	1,000	600	200	-4%
007_02	Buck Canyon	12	230	sage/grass	39%	3.75	2	500	2,000	60%	2.46	2	500	1,000	(1,000)	0%
007_02	Buck Canyon	13	140	sage/grass	94%	0.37	2	300	100	80%	1.23	2	300	400	300	-14%

Table B-17 (cont.). Existing and target solar loads for Little Lost River tributaries (ID17040217SK007_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m^2/day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
007_02	Buck Canyon	14	1300	sage/grass	39%	3.75	2	3,000	10,000	40%	3.69	2	3,000	10,000	0	0%
007_02	Buck Canyon	15	870	sage/grass	27%	4.49	3	3,000	10,000	30%	4.31	3	3,000	10,000	0	0%
007_02	Buck Canyon	16	650	sage/grass	27%	4.49	3	2,000	9,000	20%	4.92	3	2,000	10,000	1,000	-7%
007_02	Buck Canyon	17	1540	low sage/grass	12%	5.41	3	5,000	30,000	10%	5.54	3	5,000	30,000	0	-2%
007_02	1st trib to Buck	1	2750	dry DF w/o Ppine	94%	0.37	1	3,000	1,000	90%	0.62	1	3,000	2,000	1,000	-4%
007_02	2nd trib to Buck	1	1400	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
007_02	2nd trib to Buck	2	1100	sage/grass	39%	3.75	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
007_02	not named	1	2900	low sage/grass	34%	4.06	1	3,000	10,000	20%	4.92	1	3,000	10,000	0	-14%
007_02	Sands Canyon	1	330	grass	55%	2.77	1	300	800	50%	3.08	1	300	900	100	-5%
007_02	Sands Canyon	2	1200	subalpine fir moist	96%	0.25	1	1,000	200	90%	0.62	1	1,000	600	400	-6%
007_02	Sands Canyon	3	440	dry DF w/o Ppine	94%	0.37	1	400	100	90%	0.62	1	400	200	100	-4%
007_02	Sands Canyon	4	600	grass	55%	2.77	1	600	2,000	50%	3.08	1	600	2,000	0	-5%
007_02	Sands Canyon	5	1500	dry DF w/o Ppine	94%	0.37	2	3,000	1,000	90%	0.62	2	3,000	2,000	1,000	-4%
007_02	Sands Canyon	6	750	grass	31%	4.24	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
007_02	Sands Canyon	7	1400	sage/grass	39%	3.75	2	3,000	10,000	60%	2.46	2	3,000	7,000	(3,000)	0%
007_02	Sands Canyon	8	1300	sage/grass	27%	4.49	3	4,000	20,000	40%	3.69	3	4,000	10,000	(10,000)	0%
007_02	Sands Canyon	9	1700	low sage/grass	12%	5.41	3	5,000	30,000	20%	4.92	3	5,000	20,000	(10,000)	0%
007_02	Sands Canyon	10	860	low sage/grass	12%	5.41	3	3,000	20,000	10%	5.54	3	3,000	20,000	0	-2%
007_02	1st tributary	1	890	sage/grass	65%	2.15	1	900	2,000	60%	2.46	1	900	2,000	0	-5%
007_02	1st tributary	2	2100	low sage/grass	18%	5.04	2	4,000	20,000	20%	4.92	2	4,000	20,000	0	0%
007_02	1st tributary	3	1300	low sage/grass	18%	5.04	2	3,000	20,000	10%	5.54	2	3,000	20,000	0	-8%
007_02	2nd tributary	1	460	dry DF w/o Ppine	94%	0.37	1	500	200	90%	0.62	1	500	300	100	-4%
007_02	2nd tributary	2	2000	sage/grass	65%	2.15	1	2,000	4,000	60%	2.46	1	2,000	5,000	1,000	-5%
007_02	2nd tributary	3	2300	sage/grass	39%	3.75	2	5,000	20,000	40%	3.69	2	5,000	20,000	0	0%
007_02	3rd tributary	1	430	mt mahogany	74%	1.60	1	400	600	80%	1.23	1	400	500	(100)	0%
007_02	3rd tributary	2	1300	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
007_02	3rd tributary	3	1100	sage/grass	65%	2.15	1	1,000	2,000	40%	3.69	1	1,000	4,000	2,000	-25%
007_02	4th tributary	1	3000	sage/grass	65%	2.15	1	3,000	6,000	60%	2.46	1	3,000	7,000	1,000	-5%
007_02	4th tributary	2	190	sage/grass	65%	2.15	1	200	400	40%	3.69	1	200	700	300	-25%
007_02	5th tributary	1	2300	sage/grass	65%	2.15	1	2,000	4,000	60%	2.46	1	2,000	5,000	1,000	-5%
007_02	5th tributary	2	560	sage/grass	39%	3.75	2	1,000	4,000	40%	3.69	2	1,000	4,000	0	0%
007_02	6th tributary	1	600	sage/grass	65%	2.15	1	600	1,000	60%	2.46	1	600	1,000	0	-5%
007_02	6th tributary	2	5000	sage/grass	39%	3.75	2	10,000	40,000	40%	3.69	2	10,000	40,000	0	0%
007_02	7th tributary	1	1100	low sage/grass	34%	4.06	1	1,000	4,000	40%	3.69	1	1,000	4,000	0	0%
007_02	7th tributary	2	530	low sage/grass	34%	4.06	1	500	2,000	20%	4.92	1	500	2,000	0	-14%
007_02	7th tributary	3	2300	low sage/grass	18%	5.04	2	5,000	30,000	10%	5.54	2	5,000	30,000	0	-8%
007_02	8th tributary	1	2300	low sage/grass	34%	4.06	1	2,000	8,000	40%	3.69	1	2,000	7,000	(1,000)	0%
007_02	8th tributary	2	260	low sage/grass	18%	5.04	2	500	3,000	20%	4.92	2	500	2,000	(1,000)	0%
007_02	8th tributary	3	1300	low sage/grass	18%	5.04	2	3,000	20,000	10%	5.54	2	3,000	20,000	0	-8%
							Totals		790,000					760,000	-28,000	

Table B-18. Existing and target solar loads for Little Lost River tributaries (ID17040217SK009_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m^2/ day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m^2/ day)	Segment Width (m)	Segment Area (m^2)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
009_02	1st trib to Cedar Run	1	390	rock/barren	0%	6.15	1	400	2,000	0%	6.15	1	400	2,000	0	0%
009_02	1st trib to Cedar Run	2	840	sage/grass	65%	2.15	1	800	2,000	60%	2.46	1	800	2,000	0	-5%
009_02	1st trib to Cedar Run	3	1580	dry DF w/o Ppine	94%	0.37	2	3,000	1,000	90%	0.62	2	3,000	2,000	1,000	-4%
009_02	Mud Springs	1	250	black cottonwood	98%	0.12	1	300	40	90%	0.62	1	300	200	200	-8%
009_02	Cedar Run Canyon	1	690	rock/barren	0%	6.15	1	700	4,000	0%	6.15	1	700	4,000	0	0%
009_02	Cedar Run Canyon	2	930	rock/barren	0%	6.15	1	900	6,000	10%	5.54	1	900	5,000	(1,000)	0%
009_02	Cedar Run Canyon	3	340	sage/grass	65%	2.15	1	300	600	70%	1.85	1	300	600	0	0%
009_02	Cedar Run Canyon	4	1400	sage/grass	39%	3.75	2	3,000	10,000	60%	2.46	2	3,000	7,000	(3,000)	0%
009_02	Cedar Run Canyon	5	920	dry DF w/o Ppine	94%	0.37	2	2,000	700	70%	1.85	2	2,000	4,000	3,000	-24%
009_02	Cedar Run Canyon	6	1100	dry DF w/o Ppine	92%	0.49	3	3,000	1,000	80%	1.23	3	3,000	4,000	3,000	-12%
009_02	Cedar Run Canyon	7	1000	dry DF w/o Ppine	92%	0.49	3	3,000	1,000	90%	0.62	3	3,000	2,000	1,000	-2%
009_02	Cedar Run Canyon	8	380	black cottonwood	96%	0.25	3	1,000	200	90%	0.62	3	1,000	600	400	-6%
009_02	not named #1	1	1400	rock/barren	0%	6.15	1	1,000	6,000	0%	6.15	1	1,000	6,000	0	0%
009_02	not named #1	2	1100	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
009_02	not named #1	3	430	juniper	89%	0.68	2	900	600	80%	1.23	2	900	1,000	400	-9%
009_02	not named #1	4	490	juniper	89%	0.68	2	1,000	700	50%	3.08	2	1,000	3,000	2,000	-39%
009_02	not named #1	5	430	sage/grass	39%	3.75	2	900	3,000	40%	3.69	2	900	3,000	0	0%
009_02	1st trib to Horse Cr	1	200	water birch	93%	0.43	1	200	90	90%	0.62	1	200	100	10	-3%
009_02	2nd trib to Horse Cr	1	670	sage/grass	65%	2.15	1	700	2,000	60%	2.46	1	700	2,000	0	-5%
009_02	2nd trib to Horse Cr	2	1900	low sage/grass	34%	4.06	1	2,000	8,000	30%	4.31	1	2,000	9,000	1,000	-4%
009_02	3rd trib to Horse Cr	1	1100	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
009_02	3rd trib to Horse Cr	2	1300	low sage/grass	34%	4.06	1	1,000	4,000	40%	3.69	1	1,000	4,000	0	0%
009_02	Horse Creek	1	1100	dry DF w/o Ppine	94%	0.37	1	1,000	400	90%	0.62	1	1,000	600	200	-4%
009_02	Horse Creek	2	180	dry DF w/o Ppine	94%	0.37	1	200	70	80%	1.23	1	200	200	100	-14%
009_02	Horse Creek	3	650	sage/grass	65%	2.15	1	700	2,000	60%	2.46	1	700	2,000	0	-5%
009_02	Horse Creek	4	460	water birch	93%	0.43	1	500	200	90%	0.62	1	500	300	100	-3%
009_02	Horse Creek	5	720	water birch	91%	0.55	2	1,000	600	90%	0.62	2	1,000	600	0	-1%
009_02	Horse Creek	6	490	water birch	91%	0.55	2	1,000	600	80%	1.23	2	1,000	1,000	400	-11%
009_02	Horse Creek	7	810	water birch	91%	0.55	2	2,000	1,000	70%	1.85	2	2,000	4,000	3,000	-21%
009_02	Horse Creek	8	130	water birch	91%	0.55	2	300	200	50%	3.08	2	300	900	700	-41%
009_02	Horse Creek	9	1100	sage/grass	27%	4.49	3	3,000	10,000	50%	3.08	3	3,000	9,000	(1,000)	0%
009_02	Horse Creek	10	320	sage/grass	27%	4.49	3	1,000	4,000	20%	4.92	3	1,000	5,000	1,000	-7%
009_02	Horse Creek	11	880	sage/grass	27%	4.49	3	3,000	10,000	40%	3.69	3	3,000	10,000	0	0%
009_02	Horse Creek	12	1100	sage/grass	27%	4.49	3	3,000	10,000	20%	4.92	3	3,000	10,000	0	-7%
009_02	Horse Creek	13	70	sage/grass	27%	4.49	3	200	900	30%	4.31	3	200	900	0	0%
009_02	Horse Creek	14	80	sage/grass	27%	4.49	3	200	900	20%	4.92	3	200	1,000	100	-7%
009_02	not named #2	1	3100	sage/grass	65%	2.15	1	3,000	6,000	60%	2.46	1	3,000	7,000	1,000	-5%
009_02	not named #2	2	2700	low sage/grass	34%	4.06	1	3,000	10,000	40%	3.69	1	3,000	10,000	0	0%
009_02	not named #2	3	3000	low sage/grass	18%	5.04	2	6,000	30,000	20%	4.92	2	6,000	30,000	0	0%
009_02	not named #3	1	750	dry DF w/o Ppine	94%	0.37	1	800	300	90%	0.62	1	800	500	200	-4%
009_02	not named #3	2	1000	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
009_02	not named #3	3	1030	sage/grass	39%	3.75	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
009_02	not named #3	4	1500	low sage/grass	18%	5.04	2	3,000	20,000	10%	5.54	2	3,000	20,000	0	-8%
009_02	not named #3	5	2500	low sage/grass	12%	5.41	3	8,000	40,000	10%	5.54	3	8,000	40,000	0	-2%
009_02	Hawley Canyon	1	720	grass	55%	2.77	1	700	2,000	50%	3.08	1	700	2,000	0	-5%
009_02	Hawley Canyon	2	910	dry DF w/o Ppine	94%	0.37	1	900	300	90%	0.62	1	900	600	300	-4%
009_02	Hawley Canyon	3	440	sage/grass	65%	2.15	1	400	900	60%	2.46	1	400	1,000	100	-5%
009_02	Hawley Canyon	4	1150	sage/grass	39%	3.75	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
009_02	Hawley Canyon	5	1730	low sage/grass	18%	5.04	2	3,000	20,000	20%	4.92	2	3,000	10,000	(10,000)	0%
							Totals		250,000					250,000	2,200	

Table B-19. Existing and target solar loads for Williams Creek (Little Lost River tributary) (ID17040217SK009_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
009_02	1st trib to Williams	1	2300	dry DF w/o Ppine	94%	0.37	1	2,000	700	90%	0.62	1	2,000	1,000	300	-4%
009_02	1st trib to Williams	2	480	water birch	91%	0.55	2	1,000	600	80%	1.23	2	1,000	1,000	400	-11%
009_02	1st trib to Williams	3	270	water birch	91%	0.55	2	500	300	70%	1.85	2	500	900	600	-21%
009_02	1st trib to Williams	4	180	sage/grass	39%	3.75	2	400	2,000	40%	3.69	2	400	1,000	(1,000)	0%
009_02	1st trib to Williams	5	670	water birch	89%	0.68	3	2,000	1,000	90%	0.62	3	2,000	1,000	0	0%
009_02	1st trib to Williams	6	490	water birch	89%	0.68	3	1,000	700	80%	1.23	3	1,000	1,000	300	-9%
009_02	1st trib to Williams	7	230	water birch	89%	0.68	3	700	500	70%	1.85	3	700	1,000	500	-19%
009_02	1st trib to Williams	8	250	sage/grass	65%	2.15	1	300	600	60%	2.46	1	300	700	100	-5%
009_02	1st trib to Williams	9	190	sage/grass	39%	3.75	2	400	2,000	40%	3.69	2	400	1,000	(1,000)	0%
009_02	1st trib to Williams	10	210	low sage/grass	18%	5.04	2	400	2,000	10%	5.54	2	400	2,000	0	-8%
009_02	2nd trib to Williams	1	410	water birch	93%	0.43	1	400	200	90%	0.62	1	400	200	0	-3%
009_02	2nd trib to Williams	2	300	sage/grass	65%	2.15	1	300	600	70%	1.85	1	300	600	0	0%
009_02	2nd trib to Williams	3	1000	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
009_02	2nd trib to Williams	4	1000	sage/grass	39%	3.75	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
009_02	Williams Creek	1	410	rock/barren	0%	6.15	1	400	2,000	0%	6.15	1	400	2,000	0	0%
009_02	Williams Creek	2	1590	sage/grass	65%	2.15	1	2,000	4,000	60%	2.46	1	2,000	5,000	1,000	-5%
009_02	Williams Creek	3	570	dry DF w/o Ppine	94%	0.37	1	600	200	80%	1.23	1	600	700	500	-14%
009_02	Williams Creek	4	130	rock/barren	0%	6.15	1	100	600	0%	6.15	1	100	600	0	0%
009_02	Williams Creek	5	250	dry DF w/o Ppine	94%	0.37	2	500	200	70%	1.85	2	500	900	700	-24%
009_02	Williams Creek	6	2180	dry DF w/o Ppine	94%	0.37	2	4,000	1,000	90%	0.62	2	4,000	2,000	1,000	-4%
009_02	Williams Creek	7	370	water birch	91%	0.55	2	700	400	70%	1.85	2	700	1,000	600	-21%
009_02	Williams Creek	8	240	water birch	89%	0.68	3	700	500	90%	0.62	3	700	400	(100)	0%
009_02	Williams Creek	9	500	water birch	89%	0.68	3	2,000	1,000	70%	1.85	3	2,000	4,000	3,000	-19%
009_02	Williams Creek	10	590	sage/grass	27%	4.49	3	2,000	9,000	40%	3.69	3	2,000	7,000	(2,000)	0%
009_02	Williams Creek	11	770	sage/grass	89%	0.68	3	2,000	1,000	90%	0.62	3	2,000	1,000	0	0%
009_02	Williams Creek	12	690	sage/grass	83%	1.05	4	3,000	3,000	60%	2.46	4	3,000	7,000	4,000	-23%
009_02	Williams Creek	13	1210	sage/grass	83%	1.05	4	5,000	5,000	40%	3.69	4	5,000	20,000	20,000	-43%
009_02	Williams Creek	14	530	sage/grass	21%	4.86	4	2,000	10,000	30%	4.31	4	2,000	9,000	(1,000)	0%
009_02	Williams Creek	15	770	low sage/grass	9%	5.60	4	3,000	20,000	10%	5.54	4	3,000	20,000	0	0%
							Totals		79,000					100,000	27,000	

Table B-20. Existing and target solar loads for Moffett Creek (ID17040217SK019_02a).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
019_02a	Moffett Creek	1	440	grass	31%	4.24	2	900	4,000	40%	3.69	2	900	3,000	(1,000)	0%
019_02a	Moffett Creek	2	150	grass	31%	4.24	2	300	1,000	30%	4.31	2	300	1,000	0	-1%
019_02a	Moffett Creek	3	290	grass	31%	4.24	2	600	3,000	20%	4.92	2	600	3,000	0	-11%
019_02a	Moffett Creek	4	240	grass	31%	4.24	2	500	2,000	30%	4.31	2	500	2,000	0	-1%
019_02a	Moffett Creek	5	500	grass	31%	4.24	2	1,000	4,000	20%	4.92	2	1,000	5,000	1,000	-11%
019_02a	Moffett Creek	6	490	grass	31%	4.24	2	1,000	4,000	30%	4.31	2	1,000	4,000	0	-1%
							Totals		18,000					18,000	0	

Table B-21. Existing and target solar loads for Sawmill Creek (ID17040217SK012_04).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
012_04	Sawmill Creek	1	840	sandbar willow	27%	4.49	11	9,200	41,000	20%	4.92	11	9,200	45,000	4,000	-7%
012_04	Sawmill Creek	2	1200	sandbar willow	27%	4.49	11	13,000	58,000	30%	4.31	11	13,000	56,000	(2,000)	0%
012_04	Sawmill Creek	3	540	sandbar willow	27%	4.49	11	5,900	26,000	20%	4.92	11	5,900	29,000	3,000	-7%
012_04	Sawmill Creek	4	330	sandbar willow	27%	4.49	11	3,600	16,000	40%	3.69	11	3,600	13,000	(3,000)	0%
012_04	Sawmill Creek	5	1300	sandbar willow	27%	4.49	11	14,000	63,000	20%	4.92	11	14,000	69,000	6,000	-7%
012_04	Sawmill Creek	6	250	sandbar willow	27%	4.49	11	2,800	13,000	40%	3.69	11	2,800	10,000	(3,000)	0%
012_04	Sawmill Creek	7	140	sandbar willow	27%	4.49	11	1,500	6,700	10%	5.54	11	1,500	8,300	1,600	-17%
012_04	Sawmill Creek	8	200	sandbar willow	32%	4.18	9	2,000	8,000	50%	3.08	9	2,000	6,000	(2,000)	0%
012_04	Sawmill Creek	9	630	sandbar willow	32%	4.18	9	6,000	30,000	40%	3.69	9	6,000	20,000	(10,000)	0%
012_04	Sawmill Creek	10	410	sandbar willow	32%	4.18	9	4,000	20,000	20%	4.92	9	4,000	20,000	0	-12%
012_04	Sawmill Creek	11	1800	sandbar willow	32%	4.18	9	20,000	80,000	40%	3.69	9	20,000	70,000	(10,000)	0%
012_04	Sawmill Creek	12	470	sandbar willow	32%	4.18	9	4,000	20,000	50%	3.08	9	4,000	10,000	(10,000)	0%
012_04	Sawmill Creek	13	320	sandbar willow	32%	4.18	9	3,000	10,000	20%	4.92	9	3,000	10,000	0	-12%
012_04	Sawmill Creek	14	380	sandbar willow	32%	4.18	9	3,000	10,000	30%	4.31	9	3,000	10,000	0	-2%
012_04	Sawmill Creek	15	490	sandbar willow	32%	4.18	9	4,000	20,000	10%	5.54	9	4,000	20,000	0	-22%
012_04	Sawmill Creek	16	3770	sandbar willow	32%	4.18	9	30,000	100,000	0%	6.15	9	30,000	200,000	100,000	-32%
							Totals		520,000					600,000	75,000	

Table B-22. Existing and target solar loads for Sawmill Creek (ID17040217SK014_04).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
014_04	Sawmill Creek	1	190	aspen/conifer	85%	0.92	7	1,000	900	40%	3.69	8	2,000	7,000	6,000	-45%
014_04	Sawmill Creek	2	90	Drummonds/sedge	29%	4.37	7	600	3,000	40%	3.69	8	700	3,000	0	0%
014_04	Sawmill Creek	3	250	DF/lodgepole-steep	92%	0.49	7	2,000	1,000	60%	2.46	8	2,000	5,000	4,000	-32%
014_04	Sawmill Creek	4	480	Geyers/sedge	31%	4.24	8	4,000	20,000	30%	4.31	9	4,000	20,000	0	-1%
014_04	Sawmill Creek	5	230	dry DF w/o Ppine	59%	2.52	8	2,000	5,000	40%	3.69	9	2,000	7,000	2,000	-19%
014_04	Sawmill Creek	6	820	Geyers/sedge	31%	4.24	8	7,000	30,000	30%	4.31	9	7,000	30,000	0	-1%
014_04	Sawmill Creek	7	530	Geyers/sedge	31%	4.24	8	4,000	20,000	20%	4.92	9	5,000	20,000	0	-11%
014_04	Sawmill Creek	8	2240	Geyers/sedge	31%	4.24	8	20,000	80,000	30%	4.31	9	20,000	90,000	10,000	-1%
014_04	Sawmill Creek	9	1470	Geyers/sedge	29%	4.37	9	10,000	40,000	20%	4.92	10	10,000	50,000	10,000	-9%
014_04	Sawmill Creek	10	2100	Geyers/sedge	29%	4.37	9	20,000	90,000	30%	4.31	10	20,000	90,000	0	0%
014_04	Sawmill Creek	11	1990	Geyers/sedge	26%	4.55	10	20,000	91,000	20%	4.92	11	22,000	110,000	19,000	-6%
014_04	Sawmill Creek	12	390	black cottonwood	54%	2.83	11	4,300	12,000	50%	3.08	11	4,300	13,000	1,000	-4%
014_04	Sawmill Creek	13	250	sandbar willow	27%	4.49	11	2,800	13,000	30%	4.31	11	2,800	12,000	(1,000)	0%
014_04	Sawmill Creek	14	180	sandbar willow	27%	4.49	11	2,000	9,000	40%	3.69	11	2,000	7,400	(1,600)	0%
014_04	Sawmill Creek	15	990	sandbar willow	27%	4.49	11	11,000	49,000	30%	4.31	11	11,000	47,000	(2,000)	0%
							Totals		460,000					510,000	47,000	

Table B-23 Existing and target solar loads for Sawmill Creek tributaries (ID17040217SK014_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
014_02	Trib to Iron Cr	1	290	DF/lodgepole-gentle	100%	0.00	1	300	0	90%	0.62	1	300	200	200	-10%
014_02	Trib to Iron Cr	2	2200	dry DF w/o Ppine	94%	0.37	1	2,000	700	90%	0.62	1	2,000	1,000	300	-4%
014_02	Jackson Cr	1	3100	subalpine fir moist	96%	0.25	2	6,000	1,000	90%	0.62	2	6,000	4,000	3,000	-6%
014_02	Jackson Cr	2	490	DF/lodgepole-gentle	99%	0.06	4	2,000	100	90%	0.62	4	2,000	1,000	900	-9%
014_02	Hawley Creek	1	450	subalpine fir moist	96%	0.25	1	500	100	90%	0.62	1	500	300	200	-6%
014_02	Hawley Creek	2	430	DF/lodgepole-steep	98%	0.12	1	400	50	90%	0.62	1	400	200	200	-8%
014_02	Hawley Creek	3	190	subalpine fir moist	96%	0.25	1	200	50	90%	0.62	1	200	100	50	-6%
014_02	Hawley Creek	4	380	DF/lodgepole-steep	98%	0.12	2	800	100	90%	0.62	2	800	500	400	-8%
014_02	Hawley Creek	5	980	subalpine fir moist	96%	0.25	2	2,000	500	90%	0.62	2	2,000	1,000	500	-6%
014_02	Hawley Creek	6	440	dry DF w/o Ppine	92%	0.49	3	1,000	500	80%	1.23	3	1,000	1,000	500	-12%
014_02	Hawley Creek	7	290	subalpine fir moist	95%	0.31	3	900	300	80%	1.23	3	900	1,000	700	-15%
014_02	Hawley Creek	8	140	Drummond/sedge	56%	2.71	3	400	1,000	80%	1.23	3	400	500	(500)	24%
014_02	Iron Creek	1	480	DF/lodgepole-gentle	100%	0.00	1	500	0	90%	0.62	1	500	300	300	-10%
014_02	Iron Creek	2	1500	dry DF w/o Ppine	94%	0.37	1	2,000	700	90%	0.62	1	2,000	1,000	300	-4%
014_02	Iron Creek	3	750	subalpine fir moist	96%	0.25	2	2,000	500	90%	0.62	2	2,000	1,000	500	-6%
014_02	Iron Creek	4	750	dry DF w/o Ppine	92%	0.49	3	2,000	1,000	90%	0.62	3	2,000	1,000	0	-2%
014_02	Iron Creek	5	640	dry DF w/o Ppine	92%	0.49	3	2,000	1,000	80%	1.23	3	2,000	2,000	1,000	-12%
014_02	Iron Creek	6	340	DF/lodgepole-gentle	99%	0.06	3	1,000	60	80%	1.23	3	1,000	1,000	900	-19%
014_02	Iron Creek	7	1310	Drummond/sedge	45%	3.38	4	5,000	20,000	50%	3.08	4	5,000	20,000	0	5%
014_02	Bull Creek	1	210	subalpine fir moist	96%	0.25	1	200	50	90%	0.62	1	200	100	50	-6%
014_02	Bull Creek	2	220	rock/barren	0%	6.15	1	200	1,000	0%	6.15	1	200	1,000	0	0%
014_02	Bull Creek	3	1300	DF/lodgepole-gentle	99%	0.06	2	3,000	200	90%	0.62	2	3,000	2,000	2,000	-9%
014_02	Bull Creek	4	580	subalpine fir moist	95%	0.31	3	2,000	600	90%	0.62	3	2,000	1,000	400	-5%
014_02	Bull Creek	5	820	DF/lodgepole-gentle	99%	0.06	3	2,000	100	90%	0.62	3	2,000	1,000	900	-9%
014_02	Bull Creek	6	380	Drummond/sedge	56%	2.71	3	1,000	3,000	80%	1.23	3	1,000	1,000	(2,000)	24%
014_02	1st to Bull Cr	1	1300	DF/lodgepole-gentle	99%	0.06	1	1,000	60	90%	0.62	1	1,000	600	500	-9%
014_02	Horse Lake Cr	1	1200	subalpine fir moist	96%	0.25	1	1,000	200	90%	0.62	1	1,000	600	400	-6%
014_02	Horse Lake Cr	2	530	aspen	99%	0.06	2	1,000	60	80%	1.23	2	1,000	1,000	900	-19%
014_02	Horse Lake Cr	3	970	subalpine fir moist	96%	0.25	2	2,000	500	90%	0.62	2	2,000	1,000	500	-6%
014_02	Aspen Creek	1	520	subalpine fir moist	96%	0.25	1	500	100	90%	0.62	1	500	300	200	-6%
014_02	Aspen Creek	2	140	aspen	100%	0.00	1	100	0	70%	1.85	1	100	200	200	-30%
014_02	Aspen Creek	3	220	aspen	100%	0.00	1	200	0	80%	1.23	1	200	200	200	-20%
014_02	Aspen Creek	4	210	Geyers willow/sedge	93%	0.43	1	200	90	80%	1.23	1	200	200	100	-13%
014_02	Aspen Creek	5	60	grass	55%	2.77	1	60	200	30%	4.31	1	60	300	100	-25%
014_02	Aspen Creek	6	320	Geyers willow/sedge	93%	0.43	1	300	100	70%	1.85	1	300	600	500	-23%
014_02	Aspen Creek	8	350	Geyers willow/sedge	82%	1.11	2	700	800	60%	2.46	2	700	2,000	1,000	-22%
014_02	Aspen Creek	9	220	aspen	99%	0.06	2	400	20	80%	1.23	2	400	500	500	-19%
014_02	Aspen Creek	10	80	Geyers willow/sedge	82%	1.11	2	200	200	60%	2.46	2	200	500	300	-22%
014_02	Aspen Creek	11	280	aspen	99%	0.06	2	600	40	90%	0.62	2	600	400	400	-9%
014_02	Aspen Creek	12	600	sage/grass	39%	3.75	2	1,000	4,000	20%	4.92	2	1,000	5,000	1,000	-19%

Table B-23 (cont.). Existing and target solar loads for Sawmill Creek tributaries (ID17040217SK014_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
014_02	Cub Canyon	1	290	Geyers willow/sedge	93%	0.43	1	300	100	90%	0.62	1	300	200	100	-3%
014_02	Cub Canyon	2	140	Geyers willow/sedge	93%	0.43	1	100	40	80%	1.23	1	100	100	60	-13%
014_02	Cub Canyon	3	410	Geyers willow/sedge	93%	0.43	1	400	200	60%	2.46	1	400	1,000	800	-33%
014_02	Cub Canyon	4	260	Geyers willow/sedge	93%	0.43	1	300	100	50%	3.08	1	300	900	800	-43%
014_02	Cub Canyon	5	170	sage/grass	39%	3.75	2	300	1,000	10%	5.54	2	300	2,000	1,000	-29%
014_02	Cub Canyon	6	370	Geyers willow/sedge	82%	1.11	2	700	800	60%	2.46	2	700	2,000	1,000	-22%
014_02	Cub Canyon	7	240	Geyers willow/sedge	82%	1.11	2	500	600	50%	3.08	2	500	2,000	1,000	-32%
014_02	Cub Canyon	8	290	Geyers willow/sedge	82%	1.11	2	600	700	40%	3.69	2	600	2,000	1,000	-42%
014_02	Cub Canyon	9	490	Geyers willow/sedge	64%	2.21	3	1,000	2,000	60%	2.46	3	1,000	2,000	0	-4%
014_02	Cub Canyon	10	100	Geyers willow/sedge	64%	2.21	3	300	700	40%	3.69	3	300	1,000	300	-24%
014_02	Cub Canyon	11	790	sage/grass	27%	4.49	3	2,000	9,000	20%	4.92	3	2,000	10,000	1,000	-7%
014_02	1st to Cub	1	800	Geyers willow/sedge	93%	0.43	1	800	300	80%	1.23	1	800	1,000	700	-13%
014_02	un-named trib	1	1000	rock/barren	0%	6.15	1	1,000	6,000	0%	6.15	1	1,000	6,000	0	0%
014_02	un-named trib	2	770	DF/limber	96%	0.25	2	2,000	500	90%	0.62	2	2,000	1,000	500	-6%
014_02	un-named trib	3	210	sage/grass	39%	3.75	2	400	2,000	40%	3.69	2	400	1,000	(1,000)	1%
014_02	un-named trib	4	300	dry DF w/o Ppine	94%	0.37	2	600	200	80%	1.23	2	600	700	500	-14%
014_02	un-named trib	5	1800	sage/grass	27%	4.49	3	5,000	20,000	30%	4.31	3	5,000	20,000	0	3%
014_02	un-named trib	6	250	sandbar willow	70%	1.85	3	800	1,000	90%	0.62	3	800	500	(500)	20%
014_02	Trib to Mill Cr	1	140	grass	55%	2.77	1	100	300	60%	2.46	1	100	200	(100)	5%
014_02	Trib to Mill Cr	2	1500	DF/lodgepole-steep	98%	0.12	1	2,000	200	90%	0.62	1	2,000	1,000	800	-8%
014_02	Trib to Mill Cr	3	910	dry DF w/o Ppine	94%	0.37	2	2,000	700	90%	0.62	2	2,000	1,000	300	-4%
014_02	Trib to Mill Cr	4	840	DF/lodgepole-gentle	99%	0.06	3	3,000	200	90%	0.62	3	3,000	2,000	2,000	-9%
014_02	Mill Creek	1	1530	limber pine	100%	0.00	1	2,000	0	90%	0.62	1	2,000	1,000	1,000	-10%
014_02	Mill Creek	2	300	grass	55%	2.77	1	300	800	60%	2.46	1	300	700	(100)	5%
014_02	Mill Creek	4	570	subalpine fir-grass	80%	1.23	2	1,000	1,000	80%	1.23	2	1,000	1,000	0	0%
014_02	Mill Creek	6	320	dry DF w/o Ppine	94%	0.37	2	600	200	90%	0.62	2	600	400	200	-4%
014_02	Mill Creek	7	430	subalpine fir-moist	96%	0.25	2	900	200	90%	0.62	2	900	600	400	-6%
014_02	Mill Creek	9	310	lake	0%	6.15	170	52,700	324,000	0%	6.15	170	52,700	324,000	0	0%
014_02	Mill Creek	10	180	under ground	100%	0.00	2	400	0	100%	0.00	2	400	0	0	0%
014_02	Mill Creek	11	110	grass	31%	4.24	2	200	800	30%	4.31	2	200	900	100	-1%
014_02	Mill Creek	12	380	dry DF w/o Ppine	92%	0.49	3	1,000	500	90%	0.62	3	1,000	600	100	-2%
014_02	Mill Creek	13	1300	subalpine fir-moist	95%	0.31	3	4,000	1,000	90%	0.62	3	4,000	2,000	1,000	-5%
014_02	Mill Creek	14	430	dry DF w/o Ppine	92%	0.49	3	1,000	500	90%	0.62	3	1,000	600	100	-2%
014_02	Mill Creek	15	1100	DF/lodgepole-gentle	99%	0.06	3	3,000	200	90%	0.62	3	3,000	2,000	2,000	-9%
014_02	Mill Creek	16	1500	Geyers willow/sedge	53%	2.89	4	6,000	20,000	50%	3.08	4	6,000	20,000	0	-3%
014_02	Trib to Garfield	1	1200	rock/barren	0%	6.15	1	1,000	6,000	0%	6.15	1	1,000	6,000	0	0%
014_02	Trib to Garfield	2	840	dry DF w/o Ppine	94%	0.37	2	2,000	700	90%	0.62	2	2,000	1,000	300	-4%
014_02	Trib to Garfield	3	530	sage/grass	39%	3.75	2	1,000	4,000	30%	4.31	2	1,000	4,000	0	-9%
014_02	Trib to Garfield	4	150	dry DF w/o Ppine	92%	0.49	3	500	200	90%	0.62	3	500	300	100	-2%
014_02	Trib to Garfield	5	1270	sage/grass	27%	4.49	3	4,000	20,000	30%	4.31	3	4,000	20,000	0	3%
014_02	Garfield Creek	1	120	limber pine	100%	0.00	1	100	0	90%	0.62	1	100	60	60	-10%
014_02	Garfield Creek	2	1700	rock/barren	0%	6.15	2	3,000	20,000	0%	6.15	2	3,000	20,000	0	0%
014_02	Garfield Creek	3	370	Geyers willow/sedge	64%	2.21	3	1,000	2,000	50%	3.08	3	1,000	3,000	1,000	-14%
014_02	Garfield Creek	4	440	sage/grass	27%	4.49	3	1,000	4,000	30%	4.31	3	1,000	4,000	0	3%
014_02	Garfield Creek	5	100	Geyers willow/sedge	64%	2.21	3	300	700	60%	2.46	3	300	700	0	-4%
014_02	Garfield Creek	6	60	sage/grass	27%	4.49	3	200	900	30%	4.31	3	200	900	0	3%
014_02	Garfield Creek	7	120	Geyers willow/sedge	64%	2.21	3	400	900	60%	2.46	3	400	1,000	100	-4%
014_02	Garfield Creek	8	140	Geyers willow/sedge	64%	2.21	3	400	900	50%	3.08	3	400	1,000	100	-14%
014_02	Garfield Creek	9	1100	sage/grass	21%	4.86	4	4,000	20,000	20%	4.92	4	4,000	20,000	0	-1%
014_02	Garfield Creek	10	100	black cottonwood	92%	0.49	4	400	200	80%	1.23	4	400	500	300	-12%
							Totals		520,000					550,000	35,000	

Table B-24. Existing and target solar loads for Squaw Creek (ID17040217SK015_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
015_02	Trib to Squaw Cr	1	460	limber pine	100%	0.00	1	500	0	90%	0.62	1	500	300	300	-10%
015_02	Trib to Squaw Cr	2	530	sage/grass	65%	2.15	1	500	1,000	60%	2.46	1	500	1,000	0	-5%
015_02	Trib to Squaw Cr	3	350	sage/grass	39%	3.75	2	700	3,000	30%	4.31	2	700	3,000	0	-9%
015_02	Trib to Squaw Cr	4	390	sage/grass	39%	3.75	2	800	3,000	70%	1.85	2	800	1,000	(2,000)	0%
015_02	Trib to Squaw Cr	5	320	sage/grass	39%	3.75	2	600	2,000	60%	2.46	2	600	1,000	(1,000)	0%
015_02	Trib to Squaw Cr	6	180	dry DF w/o Ppine	92%	0.49	3	500	200	80%	1.23	3	500	600	400	-12%
015_02	Trib to Squaw Cr	7	560	dry DF w/o Ppine	92%	0.49	3	2,000	1,000	90%	0.62	3	2,000	1,000	0	-2%
015_02	Trib to Squaw Cr	8	140	grass	55%	2.77	1	100	300	80%	1.23	1	100	100	(200)	0%
015_02	Trib to Squaw Cr	9	450	grass	55%	2.77	1	500	1,000	60%	2.46	1	500	1,000	0	0%
015_02	Trib to Squaw Cr	10	1030	subalpine fir/DF	100%	0.00	2	2,000	0	80%	1.23	2	2,000	2,000	2,000	-20%
015_02	Trib to Squaw Cr	11	290	dry DF w/o Ppine	94%	0.37	2	600	200	80%	1.23	2	600	700	500	-14%
015_02	Trib to Squaw Cr	12	100	dry DF w/o Ppine	94%	0.37	2	200	70	70%	1.85	2	200	400	300	-24%
015_02	Trib to Squaw Cr	13	120	dry DF w/o Ppine	94%	0.37	2	200	70	90%	0.62	2	200	100	30	-4%
015_02	Trib to Squaw Cr	14	830	dry DF w/o Ppine	92%	0.49	3	2,000	1,000	90%	0.62	3	2,000	1,000	0	-2%
015_02	Trib to Squaw Cr	15	470	dry DF w/o Ppine	92%	0.49	3	1,000	500	80%	1.23	3	1,000	1,000	500	-12%
015_02	Trib to Squaw Cr	16	60	sage/grass	21%	4.86	4	200	1,000	30%	4.31	4	200	900	(100)	0%
015_02	Trib to Squaw Cr	17	730	aspen	96%	0.25	4	3,000	700	80%	1.23	4	3,000	4,000	3,000	-16%
015_02	NF Squaw Creek	1	350	limber pine	100%	0.00	1	400	0	90%	0.62	1	400	200	200	-10%
015_02	NF Squaw Creek	2	2000	subalpine fir/DF	100%	0.00	2	4,000	0	90%	0.62	2	4,000	2,000	2,000	-10%
015_02	NF Squaw Creek	3	530	dry DF w/o Ppine	92%	0.49	3	2,000	1,000	80%	1.23	3	2,000	2,000	1,000	-12%
015_02	NF Squaw Creek	4	100	grass	21%	4.86	3	300	1,000	40%	3.69	3	300	1,000	0	0%
015_02	NF Squaw Creek	5	1700	dry DF w/o Ppine	92%	0.49	3	5,000	2,000	80%	1.23	3	5,000	6,000	4,000	-12%
015_02	NF Squaw Creek	6	230	Geyers willow/sedge	53%	2.89	4	900	3,000	70%	1.85	4	900	2,000	(1,000)	0%
015_02	NF Squaw Creek	7	200	dry DF w/o Ppine	84%	0.98	4	800	800	80%	1.23	4	800	1,000	200	-4%
015_02	Squaw Creek	1	310	subalpine fir-moist	96%	0.25	2	600	100	90%	0.62	2	600	400	300	-6%
015_02	Squaw Creek	2	960	DF/limber pine	96%	0.25	2	2,000	500	90%	0.62	2	2,000	1,000	500	-6%
015_02	Squaw Creek	3	1300	dry DF w/o Ppine	96%	0.25	2	3,000	700	90%	0.62	2	3,000	2,000	1,000	-6%
015_02	Squaw Creek	4	170	subalpine fir-moist	96%	0.25	2	300	70	90%	0.62	2	300	200	100	-6%
015_02	Squaw Creek	5	530	dry DF w/o Ppine	92%	0.49	3	2,000	1,000	80%	1.23	3	2,000	2,000	1,000	-12%
015_02	Squaw Creek	6	390	subalpine fir-moist	95%	0.31	3	1,000	300	90%	0.62	3	1,000	600	300	-5%
015_02	Squaw Creek	7	150	dry DF w/o Ppine	84%	0.98	4	600	600	70%	1.85	4	600	1,000	400	-14%
015_02	Squaw Creek	8	450	subalpine fir-moist	93%	0.43	4	2,000	900	90%	0.62	4	2,000	1,000	100	-3%
015_02	Squaw Creek	9	330	dry DF w/o Ppine	84%	0.98	4	1,000	1,000	70%	1.85	4	1,000	2,000	1,000	-14%
015_02	Squaw Creek	10	2000	aspen/conifer	90%	0.62	6	10,000	6,000	70%	1.85	6	10,000	20,000	10,000	-20%
015_02	Squaw Creek	11	340	aspen/conifer	90%	0.62	6	2,000	1,000	30%	4.31	6	2,000	9,000	8,000	-60%
015_02	Squaw Creek	12	340	aspen/conifer	90%	0.62	6	2,000	1,000	50%	3.08	6	2,000	6,000	5,000	-40%
015_02	Squaw Creek	13	220	black cottonwood	89%	0.68	7	2,000	1,000	70%	1.85	7	2,000	4,000	3,000	-19%
							Totals		37,000					83,000	41,000	

Table B-25. Existing and target solar loads for Summit Creek (ID17040217SK019_03).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
019_03	Moffett Creek	1	720	grass	21%	4.86	3	2,000	10,000	20%	4.92	3	2,000	10,000	0	-1%
019_03	Moffett Creek	2	140	grass	21%	4.86	3	400	2,000	30%	4.31	3	400	2,000	0	0%
019_03	Moffett Creek	3	180	grass	21%	4.86	3	500	2,000	20%	4.92	3	500	2,000	0	-1%
019_03	Moffett Creek	4	580	grass	21%	4.86	3	2,000	10,000	10%	5.54	3	2,000	10,000	0	-11%
019_03	Moffett Creek	5	520	grass	21%	4.86	3	2,000	10,000	20%	4.92	3	2,000	10,000	0	-1%
019_03	Summit Creek	6	580	sandbar willow	44%	3.44	6	3,000	10,000	40%	3.69	6	3,000	10,000	0	-4%
019_03	Summit Creek	7	410	sandbar willow	44%	3.44	6	2,000	7,000	20%	4.92	6	2,000	10,000	3,000	-24%
019_03	Summit Creek	8	480	sandbar willow	44%	3.44	6	3,000	10,000	40%	3.69	6	3,000	10,000	0	-4%
019_03	Summit Creek	9	500	sandbar willow	44%	3.44	6	3,000	10,000	30%	4.31	6	3,000	10,000	0	-14%
019_03	Summit Creek	10	310	sandbar willow	44%	3.44	6	2,000	7,000	20%	4.92	6	2,000	10,000	3,000	-24%
019_03	Summit Creek	11	2490	sandbar willow	44%	3.44	6	10,000	30,000	10%	5.54	6	10,000	60,000	30,000	-34%
019_03	Summit Creek	12	1200	sandbar willow	44%	3.44	6	7,000	20,000	20%	4.92	6	7,000	30,000	10,000	-24%
019_03	Summit Creek	13	1220	sandbar willow	44%	3.44	6	7,000	20,000	10%	5.54	6	7,000	40,000	20,000	-34%
019_03	Summit Creek	14	760	sandbar willow	44%	3.44	6	5,000	20,000	20%	4.92	6	5,000	20,000	0	-24%
019_03	Summit Creek	15	770	sandbar willow	44%	3.44	6	5,000	20,000	0%	6.15	6	5,000	30,000	10,000	-44%
019_03	Summit Creek	16	610	sandbar willow	44%	3.44	6	4,000	10,000	10%	5.54	6	4,000	20,000	10,000	-34%
019_03	Summit Creek	17	1190	sandbar willow	44%	3.44	6	7,000	20,000	0%	6.15	6	7,000	40,000	20,000	-44%
019_03	Summit Creek	18	380	sandbar willow	44%	3.44	6	2,000	7,000	20%	4.92	6	2,000	10,000	3,000	-24%
019_03	Summit Creek	19	420	sandbar willow	44%	3.44	6	3,000	10,000	30%	4.31	6	3,000	10,000	0	-14%
019_03	Summit Creek	20	220	sandbar willow	44%	3.44	6	1,000	3,000	0%	6.15	6	1,000	6,000	3,000	-44%
019_03	Summit Creek	21	460	sandbar willow	44%	3.44	6	3,000	10,000	20%	4.92	6	3,000	10,000	0	-24%
019_03	Summit Creek	22	120	sandbar willow	44%	3.44	6	700	2,000	0%	6.15	6	700	4,000	2,000	-44%
							Totals		250,000					360,000	110,000	

Table B-26. Existing and target solar loads for Timber Creek (ID17040217SK018_03).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
018_03	Timber Creek	1	300	dry DF w/o Ppine	76%	1.48	5	2,000	3,000	70%	1.85	5	2,000	4,000	1,000	-6%
018_03	Timber Creek	2	810	dry DF w/o Ppine	76%	1.48	5	4,000	6,000	60%	2.46	5	4,000	10,000	4,000	-16%
018_03	Timber Creek	3	290	Drummond/sedge	33%	4.12	6	2,000	8,000	30%	4.31	6	2,000	9,000	1,000	-3%
018_03	Timber Creek	4	210	Subalpine fir-moist	79%	1.29	7	1,000	1,000	70%	1.85	7	1,000	2,000	1,000	-9%
018_03	Timber Creek	5	80	Subalpine fir-moist	79%	1.29	7	600	800	60%	2.46	7	600	1,000	200	-19%
018_03	Timber Creek	6	630	dry DF w/o Ppine	64%	2.21	7	4,000	9,000	60%	2.46	7	4,000	10,000	1,000	-4%
018_03	Timber Creek	7	50	Subalpine fir-moist	79%	1.29	7	400	500	40%	3.69	8	400	1,000	500	-39%
							Totals		28,000					37,000	8,700	

Table B-27. Existing and target solar loads for Wet Creek (ID17040217SK022_03).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
022_03	Wet Creek	1	70	Geyer/sedge	45%	3.38	5	400	1,000	10%	5.54	5	400	2,000	1,000	-35%
022_03	Wet Creek	2	40	Geyer/sedge	45%	3.38	5	200	700	0%	6.15	5	200	1,000	300	-45%
022_03	Wet Creek	3	110	Geyer/sedge	45%	3.38	5	600	2,000	20%	4.92	5	600	3,000	1,000	-25%
022_03	Wet Creek	4	400	Geyer/sedge	45%	3.38	5	2,000	7,000	30%	4.31	5	2,000	9,000	2,000	-15%
022_03	Wet Creek	5	340	Geyer/sedge	45%	3.38	5	2,000	7,000	20%	4.92	5	2,000	10,000	3,000	-25%
022_03	Wet Creek	6	40	Geyer/sedge	45%	3.38	5	200	700	0%	6.15	5	200	1,000	300	-45%
022_03	Wet Creek	7	260	Geyer/sedge	45%	3.38	5	1,000	3,000	20%	4.92	5	1,000	5,000	2,000	-25%
022_03	Wet Creek	8	190	Geyer/sedge	45%	3.38	5	1,000	3,000	30%	4.31	5	1,000	4,000	1,000	-15%
022_03	Wet Creek	9	1400	Geyer/sedge	45%	3.38	5	7,000	20,000	10%	5.54	5	7,000	40,000	20,000	-35%
022_03	Wet Creek	10	530	Geyer/sedge	45%	3.38	5	3,000	10,000	30%	4.31	5	3,000	10,000	0	-15%
022_03	Wet Creek	11	290	Geyer/sedge	45%	3.38	5	1,000	3,000	20%	4.92	5	1,000	5,000	2,000	-25%
022_03	Wet Creek	12	40	Geyer/sedge	45%	3.38	5	200	700	0%	6.15	5	200	1,000	300	-45%
022_03	Wet Creek	13	1440	Geyer/sedge	40%	3.69	6	9,000	30,000	20%	4.92	6	9,000	40,000	10,000	-20%
022_03	Wet Creek	14	30	Geyer/sedge	40%	3.69	6	200	700	0%	6.15	6	200	1,000	300	-40%
022_03	Wet Creek	15	800	Geyer/sedge	40%	3.69	6	5,000	20,000	20%	4.92	6	5,000	20,000	0	-20%
022_03	Wet Creek	16	30	Geyer/sedge	40%	3.69	6	200	700	0%	6.15	6	200	1,000	300	-40%
022_03	Wet Creek	17	390	Geyer/sedge	40%	3.69	6	2,000	7,000	20%	4.92	6	2,000	10,000	3,000	-20%
022_03	Wet Creek	18	260	Geyer/sedge	40%	3.69	6	2,000	7,000	30%	4.31	6	2,000	9,000	2,000	-10%
022_03	Wet Creek	19	340	Geyer/sedge	40%	3.69	6	2,000	7,000	20%	4.92	6	2,000	10,000	3,000	-20%
022_03	Wet Creek	20	880	Geyer/sedge	40%	3.69	6	5,000	20,000	0%	6.15	6	5,000	30,000	10,000	-40%
022_03	Wet Creek	21	3400	Geyer/sedge	35%	4.00	7	20,000	80,000	10%	5.54	7	20,000	100,000	20,000	-25%
022_03	Wet Creek	22	2260	Geyer/sedge	35%	4.00	7	20,000	80,000	20%	4.92	7	20,000	100,000	20,000	-15%
							Totals		310,000					410,000	100,000	

Table B-28. Existing and target solar loads for Wet Creek (ID17040217SK024_03).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
024_03	Wet Creek	1	560	Geyer/sedge	45%	3.38	5	3,000	10,000	30%	4.31	5	3,000	10,000	0	-15%
024_03	Wet Creek	2	280	Geyer/sedge	45%	3.38	5	1,000	3,000	40%	3.69	5	1,000	4,000	1,000	-5%
024_03	Wet Creek	3	1360	Geyer/sedge	45%	3.38	5	7,000	20,000	30%	4.31	5	7,000	30,000	10,000	-15%
024_03	Wet Creek	4	1500	Geyer/sedge	45%	3.38	5	8,000	30,000	20%	4.92	5	8,000	40,000	10,000	-25%
024_03	Wet Creek	5	490	Geyer/sedge	45%	3.38	5	2,000	7,000	10%	5.54	5	2,000	10,000	3,000	-35%
024_03	Wet Creek	6	690	Geyer/sedge	45%	3.38	5	3,000	10,000	20%	4.92	5	3,000	10,000	0	-25%
024_03	Wet Creek	7	130	Geyer/sedge	45%	3.38	5	700	2,000	0%	6.15	5	700	4,000	2,000	-45%
024_03	Wet Creek	8	160	Geyer/sedge	45%	3.38	5	800	3,000	10%	5.54	5	800	4,000	1,000	-35%
024_03	Wet Creek	9	540	Geyer/sedge	45%	3.38	5	3,000	10,000	20%	4.92	5	3,000	10,000	0	-25%
024_03	Wet Creek	10	330	Geyer/sedge	45%	3.38	5	2,000	7,000	0%	6.15	5	2,000	10,000	3,000	-45%
024_03	Wet Creek	11	180	Geyer/sedge	45%	3.38	5	900	3,000	10%	5.54	5	900	5,000	2,000	-35%
024_03	Wet Creek	12	650	Geyer/sedge	45%	3.38	5	3,000	10,000	20%	4.92	5	3,000	10,000	0	-25%
024_03	Wet Creek	13	220	Geyer/sedge	45%	3.38	5	1,000	3,000	30%	4.31	5	1,000	4,000	1,000	-15%
024_03	Wet Creek	14	580	Geyer/sedge	45%	3.38	5	3,000	10,000	20%	4.92	5	3,000	10,000	0	-25%
024_03	Wet Creek	15	1200	Geyer/sedge	45%	3.38	5	6,000	20,000	10%	5.54	5	6,000	30,000	10,000	-35%
024_03	Wet Creek	16	410	Geyer/sedge	45%	3.38	5	2,000	7,000	40%	3.69	5	2,000	7,000	0	-5%
							Totals		160,000					200,000	43,000	

Table B-29. Existing and target solar loads for Wet Creek (ID17040217SK024_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
024_02	Wet Creek	1	890	rock/barren	0%	6.15	1	900	6,000	0%	6.15	1	900	6,000	0	0%
024_02	Wet Creek	2	340	grass	55%	2.77	1	300	800	50%	3.08	1	300	900	100	-5%
024_02	Wet Creek	3	110	lake	0%	6.15	70	7,700	47,000	0%	6.15	70	7,700	47,000	0	0%
024_02	Wet Creek	4	1200	grass	55%	2.77	1	1,000	3,000	60%	2.46	1	1,000	2,000	(1,000)	0%
024_02	Wet Creek	5	330	sage/conifer	90%	0.62	2	700	400	90%	0.62	2	700	400	0	0%
024_02	Wet Creek	6	360	grass	31%	4.24	2	700	3,000	40%	3.69	2	700	3,000	0	0%
024_02	Wet Creek	7	330	rock/barren	0%	6.15	2	700	4,000	0%	6.15	2	700	4,000	0	0%
024_02	Wet Creek	8	110	fir dry/steep	99%	0.06	2	200	10	90%	0.62	2	200	100	90	-9%
024_02	Wet Creek	9	260	drummond willow	76%	1.48	2	500	700	80%	1.23	2	500	600	(100)	0%
024_02	Wet Creek	10	270	grass	31%	4.24	2	500	2,000	40%	3.69	2	500	2,000	0	0%
024_02	Wet Creek	11	210	DF/limber pine	96%	0.25	2	400	100	90%	0.62	2	400	200	100	-6%
024_02	Wet Creek	12	530	grass	31%	4.24	2	1,000	4,000	40%	3.69	2	1,000	4,000	0	0%
024_02	Wet Creek	13	1300	dry DF w/o Ppine	92%	0.49	3	4,000	2,000	90%	0.62	3	4,000	2,000	0	-2%
024_02	Wet Creek	14	160	Geyer willow	64%	2.21	3	500	1,000	40%	3.69	3	500	2,000	1,000	-24%
024_02	Wet Creek	15	540	Geyer willow	64%	2.21	3	2,000	4,000	60%	2.46	3	2,000	5,000	1,000	-4%
024_02	Wet Creek	16	50	Geyer willow	64%	2.21	3	200	400	10%	5.54	3	200	1,000	600	-54%
024_02	Wet Creek	17	480	dry DF w/o Ppine	92%	0.49	3	1,000	500	90%	0.62	3	1,000	600	100	-2%
024_02	Wet Creek	18	320	Geyer willow	64%	2.21	3	1,000	2,000	80%	1.23	3	1,000	1,000	(1,000)	0%
024_02	Wet Creek	19	100	Geyer willow	53%	2.89	4	400	1,000	40%	3.69	4	400	1,000	0	-13%
024_02	Wet Creek	20	230	dry DF w/o Ppine	84%	0.98	4	900	900	90%	0.62	4	900	600	(300)	0%
024_02	Wet Creek	21	490	Geyer willow	53%	2.89	4	2,000	6,000	70%	1.85	4	2,000	4,000	(2,000)	0%
024_02	Wet Creek	22	370	Geyer willow	53%	2.89	4	1,000	3,000	50%	3.08	4	1,000	3,000	0	-3%
024_02	Wet Creek	23	80	Geyer willow	53%	2.89	4	300	900	10%	5.54	4	300	2,000	1,000	-43%
024_02	Wet Creek	24	640	Geyer willow	53%	2.89	4	3,000	9,000	50%	3.08	4	3,000	9,000	0	-3%
024_02	Wet Creek	25	330	Geyer willow	53%	2.89	4	1,000	3,000	20%	4.92	4	1,000	5,000	2,000	-33%
024_02	Wet Creek	26	230	Geyer willow	53%	2.89	4	900	3,000	50%	3.08	4	900	3,000	0	-3%
024_02	Wet Creek	27	310	Geyer willow	53%	2.89	4	1,000	3,000	10%	5.54	4	1,000	6,000	3,000	-43%
024_02	Wet Creek	28	110	Geyer willow	53%	2.89	4	400	1,000	20%	4.92	4	400	2,000	1,000	-33%
024_02	Wet Creek	29	640	Geyer willow	45%	3.38	5	3,000	10,000	20%	4.92	5	3,000	10,000	0	-25%
024_02	Wet Creek	30	450	Geyer willow	45%	3.38	5	2,000	7,000	10%	5.54	5	2,000	10,000	3,000	-35%
024_02	Wet Creek	31	260	Geyer willow	45%	3.38	5	1,000	3,000	20%	4.92	5	1,000	5,000	2,000	-25%
024_02	Wet Creek	32	130	Geyer willow	45%	3.38	5	700	2,000	30%	4.31	5	700	3,000	1,000	-15%
024_02	Wet Creek	33	410	Geyer willow	45%	3.38	5	2,000	7,000	10%	5.54	5	2,000	10,000	3,000	-35%
024_02	Wet Creek	34	340	Geyer willow	45%	3.38	5	2,000	7,000	30%	4.31	5	2,000	9,000	2,000	-15%
024_02	Wet Creek	35	180	Geyer willow	45%	3.38	5	900	3,000	40%	3.69	5	900	3,000	0	-5%
024_02	Wet Creek	36	70	Geyer willow	45%	3.38	5	400	1,000	10%	5.54	5	400	2,000	1,000	-35%
024_02	Wet Creek	37	210	Geyer willow	45%	3.38	5	1,000	3,000	50%	3.08	5	1,000	3,000	0	0%
024_02	1st trib to Wet	1	610	grass	55%	2.77	1	600	2,000	60%	2.46	1	600	1,000	(1,000)	0%
024_02	1st trib to Wet	2	260	conifer/grass	70%	1.85	1	300	600	70%	1.85	1	300	600	0	0%
024_02	1st trib to Wet	3	910	dry DF w/o Ppine	94%	0.37	1	900	300	90%	0.62	1	900	600	300	-4%
024_02	1st trib to Wet	4	110	grass	31%	4.24	2	200	800	40%	3.69	2	200	700	(100)	0%
024_02	1st trib to Wet	5	290	dry DF w/o Ppine	94%	0.37	2	600	200	90%	0.62	2	600	400	200	-4%
024_02	1st trib to Wet	6	170	Geyer willow	82%	1.11	2	300	300	60%	2.46	2	300	700	400	-22%
024_02	2nd trib to Wet	1	1600	subalpine fir moist	96%	0.25	1	2,000	500	90%	0.62	1	2,000	1,000	500	-6%
024_02	2nd trib to Wet	2	40	Geyer willow	93%	0.43	1	40	20	20%	4.92	1	40	200	200	-73%
024_02	Coal Creek	1	2300	subalpine fir moist	96%	0.25	1	2,000	500	90%	0.62	1	2,000	1,000	500	-6%
024_02	Coal Creek	2	100	grass	31%	4.24	2	200	800	50%	3.08	2	200	600	(200)	0%
024_02	Coal Creek	3	360	subalpine fir moist	96%	0.25	2	700	200	90%	0.62	2	700	400	200	-6%
024_02	Coal Creek	4	380	Geyer willow	82%	1.11	2	800	900	50%	3.08	2	800	2,000	1,000	-32%
024_02	Coal Creek	5	360	Geyer willow	82%	1.11	2	700	800	20%	4.92	2	700	3,000	2,000	-62%

Table B-29 (cont.). Existing and target solar loads for Wet Creek (ID17040217SK024_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/ day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
024_02	Big Creek	1	410	rock/barren	0%	6.15	1	400	2,000	0%	6.15	1	400	2,000	0	0%
024_02	Big Creek	2	150	lake	0%	6.15	90	14,000	86,000	0%	6.15	90	14,000	86,000	0	0%
024_02	Big Creek	3	500	rock/barren	0%	6.15	1	500	3,000	0%	6.15	1	500	3,000	0	0%
024_02	Big Creek	4	1000	dry DF w/o Ppine	94%	0.37	1	1,000	400	90%	0.62	1	1,000	600	200	-4%
024_02	Big Creek	5	400	subalpine fir moist	96%	0.25	1	400	100	90%	0.62	1	400	200	100	-6%
024_02	Big Creek	6	420	dry DF w/o Ppine	94%	0.37	1	400	100	90%	0.62	1	400	200	100	-4%
024_02	Big Creek	7	240	grass	55%	2.77	1	200	600	10%	5.54	1	200	1,000	400	-45%
024_02	Big Creek	8	220	conifer/grass	75%	1.54	1	200	300	70%	1.85	1	200	400	100	-5%
024_02	Big Creek	9	300	subalpine fir moist	96%	0.25	2	600	100	90%	0.62	2	600	400	300	-6%
024_02	Big Creek	10	170	conifer/grass	62%	2.34	2	300	700	50%	3.08	2	300	900	200	-12%
024_02	Big Creek	11	220	grass	31%	4.24	2	400	2,000	20%	4.92	2	400	2,000	0	-11%
024_02	Big Creek	12	110	drummond willow	76%	1.48	2	200	300	30%	4.31	2	200	900	600	-46%
024_02	Big Creek	13	250	drummond willow	76%	1.48	2	500	700	50%	3.08	2	500	2,000	1,000	-26%
024_02	Big Creek	14	170	drummond willow	76%	1.48	2	300	400	60%	2.46	2	300	700	300	-16%
024_02	Big Creek	15	270	grass	31%	4.24	2	500	2,000	20%	4.92	2	500	2,000	0	-11%
024_02	Big Creek	16	350	grass	31%	4.24	2	700	3,000	30%	4.31	2	700	3,000	0	-1%
024_02	Big Creek	17	270	dry DF w/o Ppine	94%	0.37	2	500	200	90%	0.62	2	500	300	100	-4%
024_02	Big Creek	18	110	drummond willow	76%	1.48	2	200	300	40%	3.69	2	200	700	400	-36%
024_02	Big Creek	19	230	drummond willow	76%	1.48	2	500	700	50%	3.08	2	500	2,000	1,000	-26%
024_02	Big Creek	20	340	dry DF w/o Ppine	92%	0.49	3	1,000	500	90%	0.62	3	1,000	600	100	-2%
024_02	Big Creek	21	340	Geyer willow	64%	2.21	3	1,000	2,000	60%	2.46	3	1,000	2,000	0	-4%
024_02	Big Creek	22	2000	Geyer willow	64%	2.21	3	6,000	10,000	40%	3.69	3	6,000	20,000	10,000	-24%
024_02	Big Creek	23	780	Geyer willow	53%	2.89	4	3,000	9,000	10%	5.54	4	3,000	20,000	10,000	-43%
024_02	Big Creek	24	260	Geyer willow	53%	2.89	4	1,000	3,000	20%	4.92	4	1,000	5,000	2,000	-33%
024_02	Big Creek	25	300	Geyer willow	53%	2.89	4	1,000	3,000	60%	2.46	4	1,000	2,000	(1,000)	0%
024_02	Big Creek	26	370	Geyer willow	53%	2.89	4	1,000	3,000	40%	3.69	4	1,000	4,000	1,000	-13%
024_02	Big Creek	27	180	Geyer willow	53%	2.89	4	700	2,000	50%	3.08	4	700	2,000	0	-3%
024_02	Big Creek	28	260	Geyer willow	53%	2.89	4	1,000	3,000	40%	3.69	4	1,000	4,000	1,000	-13%
024_02	Big Creek	29	320	Geyer willow	53%	2.89	4	1,000	3,000	60%	2.46	4	1,000	2,000	(1,000)	0%
024_02	Big Creek	30	90	Geyer willow	45%	3.38	5	500	2,000	60%	2.46	5	500	1,000	(1,000)	0%
024_02	1st trib to Big	1	1000	grass	55%	2.77	1	1,000	3,000	60%	2.46	1	1,000	2,000	(1,000)	0%
024_02	1st trib to Big	2	540	DF/lodgepole gentle	100%	0.00	1	500	0	90%	0.62	1	500	300	300	-10%
024_02	1st trib to Big	3	310	grass	55%	2.77	1	300	800	60%	2.46	1	300	700	(100)	5%
024_02	1st trib to Big	4	470	dry DF w/o Ppine	94%	0.37	2	900	300	90%	0.62	2	900	600	300	-4%
024_02	1st trib to Big	5	380	grass	31%	4.24	2	800	3,000	50%	3.08	2	800	2,000	(1,000)	0%
024_02	2nd trib to Big	1	930	dry DF w/o Ppine	94%	0.37	1	900	300	90%	0.62	1	900	600	300	-4%
024_02	2nd trib to Big	2	120	conifer/grass	75%	1.54	1	100	200	70%	1.85	1	100	200	0	-5%
024_02	2nd trib to Big	3	1900	dry DF w/o Ppine	94%	0.37	1	2,000	700	90%	0.62	1	2,000	1,000	300	-4%
024_02	3rd trib to Big	1	810	sage/grass	65%	2.15	1	800	2,000	60%	2.46	1	800	2,000	0	-5%
024_02	3rd trib to Big	2	390	Geyer willow	93%	0.43	1	400	200	80%	1.23	1	400	500	300	-13%
024_02	3rd trib to Big	3	310	dry DF w/o Ppine	94%	0.37	1	300	100	90%	0.62	1	300	200	100	-4%
024_02	3rd trib to Big	4	370	Geyer willow	82%	1.11	2	700	800	70%	1.85	2	700	1,000	200	-12%
024_02	3rd trib to Big	5	210	sage/grass	39%	3.75	2	400	2,000	30%	4.31	2	400	2,000	0	-9%
024_02	Sands Creek	1	590	conifer/grass	76%	1.48	1	600	900	80%	1.23	1	600	700	(200)	0%
024_02	Sands Creek	2	870	conifer/grass	76%	1.48	1	900	1,000	60%	2.46	1	900	2,000	1,000	-16%
024_02	Sands Creek	3	90	Geyer willow	82%	1.11	2	200	200	0%	6.15	2	200	1,000	800	-82%
024_02	Sands Creek	4	260	Geyer willow	82%	1.11	2	500	600	40%	3.69	2	500	2,000	1,000	-42%
024_02	Sands Creek	5	170	alder	86%	0.86	2	300	300	80%	1.23	2	300	400	100	-6%
024_02	Sands Creek	6	190	Geyer willow	82%	1.11	2	400	400	30%	4.31	2	400	2,000	2,000	-52%
024_02	Sands Creek	7	870	Geyer willow	82%	1.11	2	2,000	2,000	60%	2.46	2	2,000	5,000	3,000	-22%
024_02	Sands Creek	8	1300	Geyer willow	82%	1.11	2	3,000	3,000	70%	1.85	2	3,000	6,000	3,000	-12%

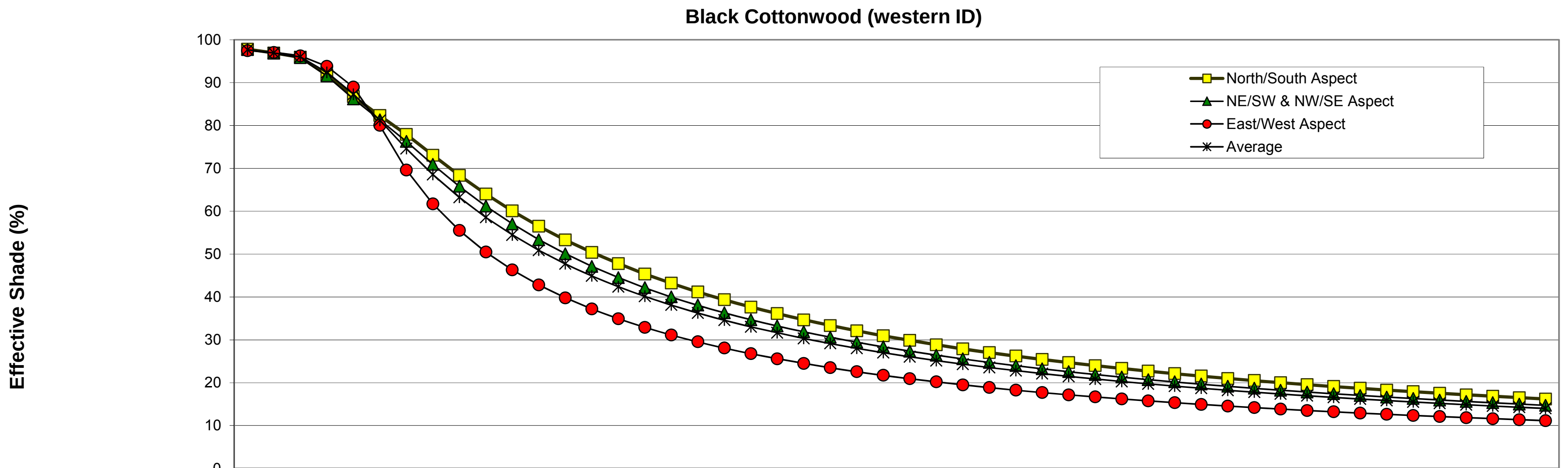
Table B-29 (cont.). Existing and target solar loads for Wet Creek (ID17040217SK024_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
024_02	Basin creek	1	1100	grass	55%	2.77	1	1,000	3,000	50%	3.08	1	1,000	3,000	0	-5%
024_02	Basin creek	2	1600	grass	55%	2.77	1	2,000	6,000	60%	2.46	1	2,000	5,000	(1,000)	0%
024_02	Basin creek	3	530	sage/grass	39%	3.75	2	1,000	4,000	50%	3.08	2	1,000	3,000	(1,000)	0%
024_02	Basin creek	4	370	sage/grass	39%	3.75	2	700	3,000	40%	3.69	2	700	3,000	0	0%
024_02	Basin creek	5	1200	grass	21%	4.86	3	4,000	20,000	30%	4.31	3	4,000	20,000	0	0%
024_02	Basin creek	6	290	sage/grass	27%	4.49	3	900	4,000	30%	4.31	3	900	4,000	0	0%
024_02	Basin creek	7	1600	sage/grass	27%	4.49	3	5,000	20,000	20%	4.92	3	5,000	20,000	0	-7%
024_02	Basin creek	8	720	sage/grass	21%	4.86	4	3,000	10,000	10%	5.54	4	3,000	20,000	10,000	-11%
024_02	Basin creek	9	270	sage/grass	21%	4.86	4	1,000	5,000	20%	4.92	4	1,000	5,000	0	-1%
024_02	Basin creek	10	570	Geyer willow	45%	3.38	5	3,000	10,000	60%	2.46	5	3,000	7,000	(3,000)	0%
024_02	Basin creek	11	900	Geyer willow	45%	3.38	5	5,000	20,000	50%	3.08	5	5,000	20,000	0	0%
024_02	Basin creek	12	910	sage/grass	17%	5.10	5	5,000	30,000	20%	4.92	5	5,000	20,000	(10,000)	0%
024_02	1st trib to Basin	1	190	grass	55%	2.77	1	200	600	50%	3.08	1	200	600	0	-5%
024_02	1st trib to Basin	2	1700	dry DF w/o Ppine	94%	0.37	1	2,000	700	90%	0.62	1	2,000	1,000	300	-4%
024_02	1st trib to Basin	3	1500	sage/grass	39%	3.75	2	3,000	10,000	40%	3.69	2	3,000	10,000	0	0%
024_02	1st trib to Basin	4	150	sage/grass	27%	4.49	3	500	2,000	30%	4.31	3	500	2,000	0	0%
024_02	trib to 1st Basin	1	800	conifer/grass	75%	1.54	1	800	1,000	80%	1.23	1	800	1,000	0	0%
024_02	trib to 1st Basin	2	1100	DF/limber pine	96%	0.25	1	1,000	200	90%	0.62	1	1,000	600	400	-6%
024_02	trib to 1st Basin	3	200	sage/grass	39%	3.75	2	400	2,000	50%	3.08	2	400	1,000	(1,000)	0%
024_02	2nd trib to Basin	1	290	grass	55%	2.77	1	300	800	60%	2.46	1	300	700	(100)	0%
024_02	2nd trib to Basin	2	480	DF/limber pine	96%	0.25	1	500	100	90%	0.62	1	500	300	200	-6%
024_02	2nd trib to Basin	3	120	grass	55%	2.77	1	100	300	50%	3.08	1	100	300	0	-5%
024_02	2nd trib to Basin	4	1500	dry DF w/o Ppine	94%	0.37	1	2,000	700	90%	0.62	1	2,000	1,000	300	-4%
024_02	2nd trib to Basin	5	630	sage/grass	39%	3.75	2	1,000	4,000	40%	3.69	2	1,000	4,000	0	0%
024_02	3rd trib to Basin	1	580	grass	55%	2.77	1	600	2,000	50%	3.08	1	600	2,000	0	-5%
024_02	3rd trib to Basin	2	1400	grass	55%	2.77	1	1,000	3,000	60%	2.46	1	1,000	2,000	(1,000)	0%
024_02	3rd trib to Basin	3	730	Geyer willow	82%	1.11	2	1,000	1,000	80%	1.23	2	1,000	1,000	0	-2%
024_02	3rd trib to Basin	4	110	grass	31%	4.24	2	200	800	30%	4.31	2	200	900	100	-1%
024_02	4th trib to Basin	1	830	dry DF w/o Ppine	94%	0.37	1	800	300	90%	0.62	1	800	500	200	-4%
024_02	4th trib to Basin	2	880	conifer/grass	75%	1.54	1	900	1,000	80%	1.23	1	900	1,000	0	0%
024_02	4th trib to Basin	3	350	sage/grass	65%	2.15	1	400	900	50%	3.08	1	400	1,000	100	-15%
024_02	5th trib to Basin	1	1100	dry DF w/o Ppine	94%	0.37	1	1,000	400	90%	0.62	1	1,000	600	200	-4%
024_02	5th trib to Basin	2	1800	sage/grass	65%	2.15	1	2,000	4,000	50%	3.08	1	2,000	6,000	2,000	-15%
024_02	Pine Creek	1	680	grass	55%	2.77	1	700	2,000	50%	3.08	1	700	2,000	0	-5%
024_02	Pine Creek	2	1500	grass	55%	2.77	1	2,000	6,000	60%	2.46	1	2,000	5,000	(1,000)	0%
024_02	Pine Creek	3	350	sage/grass	39%	3.75	2	700	3,000	40%	3.69	2	700	3,000	0	0%
024_02	Pine Creek	4	220	grass	31%	4.24	2	400	2,000	40%	3.69	2	400	1,000	(1,000)	0%
024_02	Pine Creek	5	360	Geyer willow	82%	1.11	2	700	800	80%	1.23	2	700	900	100	-2%
024_02	Pine Creek	6	470	Geyer willow	82%	1.11	2	900	1,000	50%	3.08	2	900	3,000	2,000	-32%
024_02	Pine Creek	7	510	Geyer willow	82%	1.11	2	1,000	1,000	80%	1.23	2	1,000	1,000	0	-2%
024_02	Pine Creek	8	550	Geyer willow	82%	1.11	2	1,000	1,000	70%	1.85	2	1,000	2,000	1,000	-12%
024_02	3rd trib to Wet	1	590	grass	55%	2.77	1	600	2,000	50%	3.08	1	600	2,000	0	-5%
024_02	3rd trib to Wet	2	1000	sage/grass	65%	2.15	1	1,000	2,000	60%	2.46	1	1,000	2,000	0	-5%
024_02	3rd trib to Wet	3	1600	low sage/grass	34%	4.06	1	2,000	8,000	40%	3.69	1	2,000	7,000	(1,000)	0%
024_02	4th trib to Wet	1	2100	low sage/grass	34%	4.06	1	2,000	8,000	40%	3.69	1	2,000	7,000	(1,000)	0%
024_02	4th trib to Wet	2	1300	low sage/grass	34%	4.06	1	1,000	4,000	30%	4.31	1	1,000	4,000	0	-4%
024_02	4th trib to Wet	3	1100	sage/grass	39%	3.75	2	2,000	8,000	40%	3.69	2	2,000	7,000	(1,000)	0%
024_02	trib to 4th trib	1	2100	low sage/grass	34%	4.06	1	2,000	8,000	40%	3.69	1	2,000	7,000	(1,000)	0%
024_02	Squaw Creek	1	200	grass	55%	2.77	1	200	600	60%	2.46	1	200	500	(100)	0%
024_02	Squaw Creek	2	250	dry DF w/o Ppine	94%	0.37	1	300	100	80%	1.23	1	300	400	300	-14%
024_02	Squaw Creek	3	450	dry DF w/o Ppine	94%	0.37	1	500	200	90%	0.62	1	500	300	100	-4%
024_02	Squaw Creek	4	110	grass	55%	2.77	1	100	300	50%	3.08	1	100	300	0	-5%
024_02	Squaw Creek	5	210	dry DF w/o Ppine	94%	0.37	1	200	70	90%	0.62	1	200	100	30	-4%
024_02	Squaw Creek	6	120	Geyer willow	93%	0.43	1	100	40	80%	1.23	1	100	100	60	-13%
024_02	Squaw Creek	7	90	grass	55%	2.77	1	90	200	60%	2.46	1	90	200	0	0%
024_02	Squaw Creek	8	210	Geyer willow	93%	0.43	1	200	90	70%	1.85	1	200	400	300	-23%
024_02	Squaw Creek	9	320	Geyer willow	93%	0.43	1	300	100	80%	1.23	1	300	400	300	-13%

Table B-29 (cont.). Existing and target solar loads for Wet Creek (ID17040217SK024_02).

Segment Details					Target					Existing					Summary	
AU	Stream Name	Number (top to bottom)	Length (m)	Vegetation Type	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Shade	Solar Radiation (kWh/m²/day)	Segment Width (m)	Segment Area (m²)	Solar Load (kWh/day)	Excess Load (kWh/day)	Lack of Shade
024_02	Squaw Creek	10	320	aspen	99%	0.06	2	600	40	90%	0.62	2	600	400	400	-9%
024_02	Squaw Creek	11	110	Geyer willow	82%	1.11	2	200	200	60%	2.46	2	200	500	300	-22%
024_02	Squaw Creek	12	180	aspen	99%	0.06	2	400	20	90%	0.62	2	400	200	200	-9%
024_02	Squaw Creek	13	250	aspen	99%	0.06	2	500	30	80%	1.23	2	500	600	600	-19%
024_02	Squaw Creek	14	70	aspen	99%	0.06	2	100	6	70%	1.85	2	100	200	200	-29%
024_02	Squaw Creek	15	2000	Geyer willow	64%	2.21	3	6,000	10,000	70%	1.85	3	6,000	10,000	0	0%
024_02	Squaw Creek	16	920	Geyer willow	64%	2.21	3	3,000	7,000	60%	2.46	3	3,000	7,000	0	-4%
024_02	Squaw Creek	17	890	Geyer willow	64%	2.21	3	3,000	7,000	50%	3.08	3	3,000	9,000	2,000	-14%
024_02	Squaw Creek	18	250	Geyer willow	64%	2.21	3	800	2,000	30%	4.31	3	800	3,000	1,000	-34%
024_02	Squaw Creek	19	2400	Geyer willow	64%	2.21	3	7,000	20,000	40%	3.69	3	7,000	30,000	10,000	-24%
024_02	Squaw Creek	20	150	Geyer willow	64%	2.21	3	500	1,000	0%	6.15	3	500	3,000	2,000	-64%
024_02	Squaw Creek	21	790	Geyer willow	64%	2.21	3	2,000	4,000	20%	4.92	3	2,000	10,000	6,000	-44%
024_02	Squaw Creek	22	550	Geyer willow	64%	2.21	3	2,000	4,000	10%	5.54	3	2,000	10,000	6,000	-54%
024_02	Squaw Creek	23	3160	sage/grass	27%	4.49	3	9,000	40,000	20%	4.92	3	9,000	40,000	0	-7%
024_02	Squaw Creek	24	630	Geyer willow	64%	2.21	3	2,000	4,000	20%	4.92	3	2,000	10,000	6,000	-44%
024_02	Squaw Creek	25	610	Geyer willow	64%	2.21	3	2,000	4,000	0%	6.15	3	2,000	10,000	6,000	-64%
024_02	Spring Creek	1	680	sage/grass	65%	2.15	1	700	2,000	60%	2.46	1	700	2,000	0	-5%
024_02	Spring Creek	2	340	drummond willow	87%	0.80	1	300	200	70%	1.85	1	300	600	400	-17%
024_02	Spring Creek	3	670	aspen	100%	0.00	1	700	0	90%	0.62	1	700	400	400	-10%
024_02	Spring Creek	4	600	Geyer willow	82%	1.11	2	1,000	1,000	70%	1.85	2	1,000	2,000	1,000	-12%
024_02	2nd trib to Squaw	1	630	grass	55%	2.77	1	600	2,000	50%	3.08	1	600	2,000	0	-5%
024_02	2nd trib to Squaw	2	720	sage/grass	65%	2.15	1	700	2,000	60%	2.46	1	700	2,000	0	-5%
024_02	2nd trib to Squaw	3	510	Geyer willow	93%	0.43	1	500	200	80%	1.23	1	500	600	400	-13%
024_02	2nd trib to Squaw	4	260	sage/grass	39%	3.75	2	500	2,000	30%	4.31	2	500	2,000	0	-9%
024_02	Massacre Creek	1	400	grass	55%	2.77	1	400	1,000	60%	2.46	1	400	1,000	0	0%
024_02	Massacre Creek	2	280	conifer/grass	75%	1.54	1	300	500	80%	1.23	1	300	400	(100)	0%
024_02	Massacre Creek	3	1200	dry DF w/o Ppine	94%	0.37	1	1,000	400	90%	0.62	1	1,000	600	200	-4%
024_02	Massacre Creek	4	180	grass	55%	2.77	1	200	600	60%	2.46	1	200	500	(100)	0%
024_02	Massacre Creek	5	250	dry DF w/o Ppine	94%	0.37	2	500	200	90%	0.62	2	500	300	100	-4%
024_02	Massacre Creek	6	290	conifer/grass	63%	2.28	2	600	1,000	70%	1.85	2	600	1,000	0	0%
024_02	Massacre Creek	7	110	dry DF w/o Ppine	94%	0.37	2	200	70	90%	0.62	2	200	100	30	-4%
024_02	Massacre Creek	8	260	Geyer willow	82%	1.11	2	500	600	70%	1.85	2	500	900	300	-12%
024_02	Massacre Creek	9	460	grass	31%	4.24	2	900	4,000	30%	4.31	2	900	4,000	0	-1%
024_02	Massacre Creek	10	540	Geyer willow	64%	2.21	3	2,000	4,000	40%	3.69	3	2,000	7,000	3,000	-24%
024_02	Massacre Creek	11	120	dry DF w/o Ppine	92%	0.49	3	400	200	90%	0.62	3	400	200	0	-2%
024_02	Massacre Creek	12	740	Geyer willow	64%	2.21	3	2,000	4,000	50%	3.08	3	2,000	6,000	2,000	-14%
024_02	Chicken Creek	1	250	aspen	100%	0.00	1	300	0	80%	1.23	1	300	400	400	-20%
024_02	Chicken Creek	2	90	grass	55%	2.77	1	90	200	40%	3.69	1	90	300	100	-15%
024_02	Chicken Creek	3	190	aspen	100%	0.00	1	200	0	70%	1.85	1	200	400	400	-30%
024_02	Chicken Creek	4	130	grass	55%	2.77	1	100	300	50%	3.08	1	100	300	0	-5%
024_02	Chicken Creek	5	250	aspen	100%	0.00	1	300	0	70%	1.85	1	300	600	600	-30%
024_02	Chicken Creek	6	340	aspen	100%	0.00	1	300	0	90%	0.62	1	300	200	200	-10%
024_02	Chicken Creek	7	150	grass	31%	4.24	2	300	1,000	30%	4.31	2	300	1,000	0	-1%
024_02	Chicken Creek	8	640	Geyer willow	82%	1.11	2	1,000	1,000	70%	1.85	2	1,000	2,000	1,000	-12%
024_02	Chicken Creek	9	30	Geyer willow	82%	1.11	2	60	70	0%	6.15	2	60	400	300	-82%
024_02	Chicken Creek	10	320	Geyer willow	82%	1.11	2	600	700	40%	3.69	2	600	2,000	1,000	-42%
024_02	Chicken Creek	11	1000	grass	31%	4.24	2	2,000	8,000	20%	4.92	2	2,000	10,000	2,000	-11%
024_02	Chicken Creek	12	1700	sage/grass	27%	4.49	3	5,000	20,000	20%	4.92	3	5,000	20,000	0	-7%
024_02	5th trib to Squaw	1	230	grass	55%	2.77	1	200	600	60%	2.46	1	200	500	(100)	0%
024_02	5th trib to Squaw	2	650	sage/grass	65%	2.15	1	700	2,000	60%	2.46	1	700	2,000	0	-5%
024_02	5th trib to Squaw	3	320	grass	55%	2.77	1	300	800	40%	3.69	1	300	1,000	200	-15%
024_02	5th trib to Squaw	4	3500	sage/grass	39%	3.75	2	7,000	30,000	30%	4.31	2	7,000	30,000	0	-9%
024_02	5th trib to Squaw	5	3500	sage/grass	27%	4.49	3	10,000	40,000	20%	4.92	3	10,000	50,000	10,000	-7%
024_02	5th trib to Squaw	6	220	sage/grass	21%	4.86	4	900	4,000	20%	4.92	4	900	4,000	0	-1%
024_02	5th trib to Squaw	7	180	Geyer willow	45%	3.38	5	900	3,000	40%	3.69	5	900	3,000	0	-5%
024_02	5th trib to Squaw	8	340	Geyer willow	45%	3.38	5	2,000	7,000	20%	4.92	5	2,000	10,000	3,000	-25%
							Totals		810,000					930,000	120,000	

Shade Curves Not Found in Shumar and De Varona (2009)

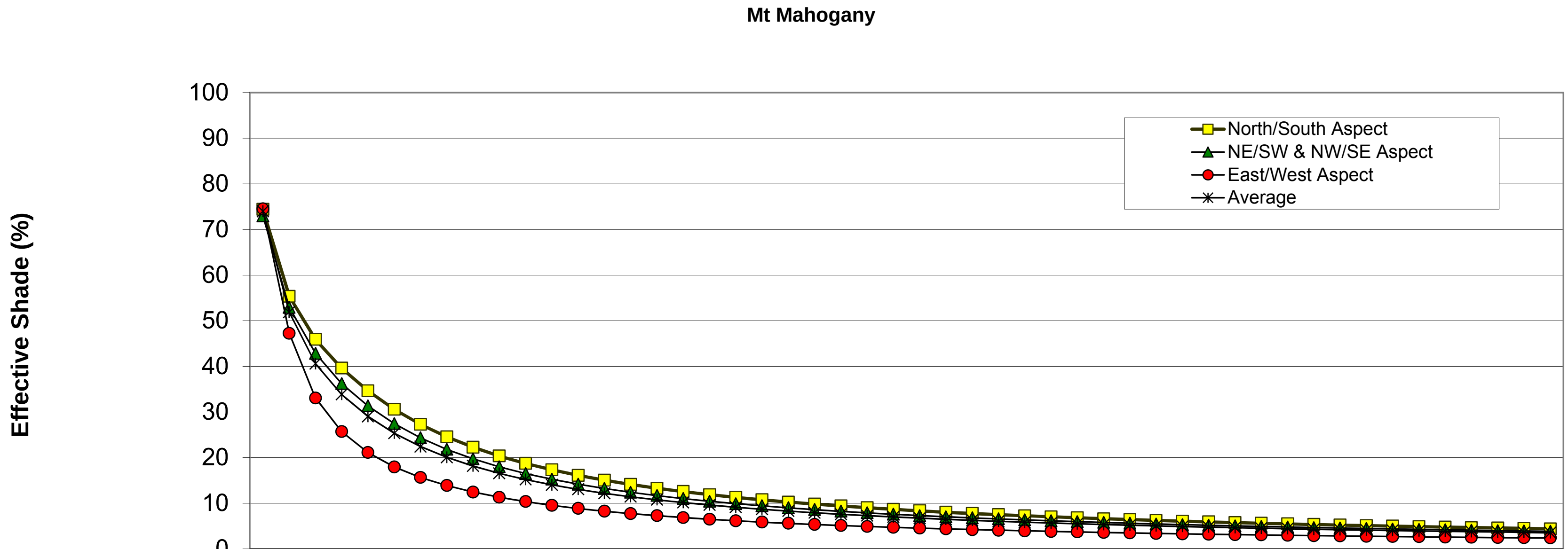


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
North/South Aspect	98	97	96	92	87	82	78	73	68	64	60	56	53	50	48	45	43	41	39	38	36	35	33	32	31
NE/SW & NW/SE Aspect	98	97	96	92	86	81	76	71	66	61	57	53	50	47	45	42	40	38	36	35	33	32	31	29	28
East/West Aspect	97	97	96	94	89	80	70	62	56	50	46	43	40	37	35	33	31	30	28	27	26	24	23	23	22
Average	98	97	96	92	87	81	75	69	63	59	54	51	48	45	42	40	38	36	35	33	32	30	29	28	27

	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
North/South Aspect	30	29	28	27	26	25	25	24	23	23	22	22	21	20	20	20	19	19	18	18	18	17	17	16	16
NE/SW & NW/SE Aspect	27	26	26	25	24	23	23	22	21	21	20	20	19	19	18	18	17	17	17	16	16	16	15	15	15
East/West Aspect	21	20	20	19	18	18	17	17	16	16	15	15	15	14	14	14	13	13	13	12	12	12	12	11	11
Average	26	25	24	24	23	22	21	21	20	20	19	19	18	18	17	17	17	16	16	16	15	15	15	14	14

"Vegetation" Channel Width (meters)

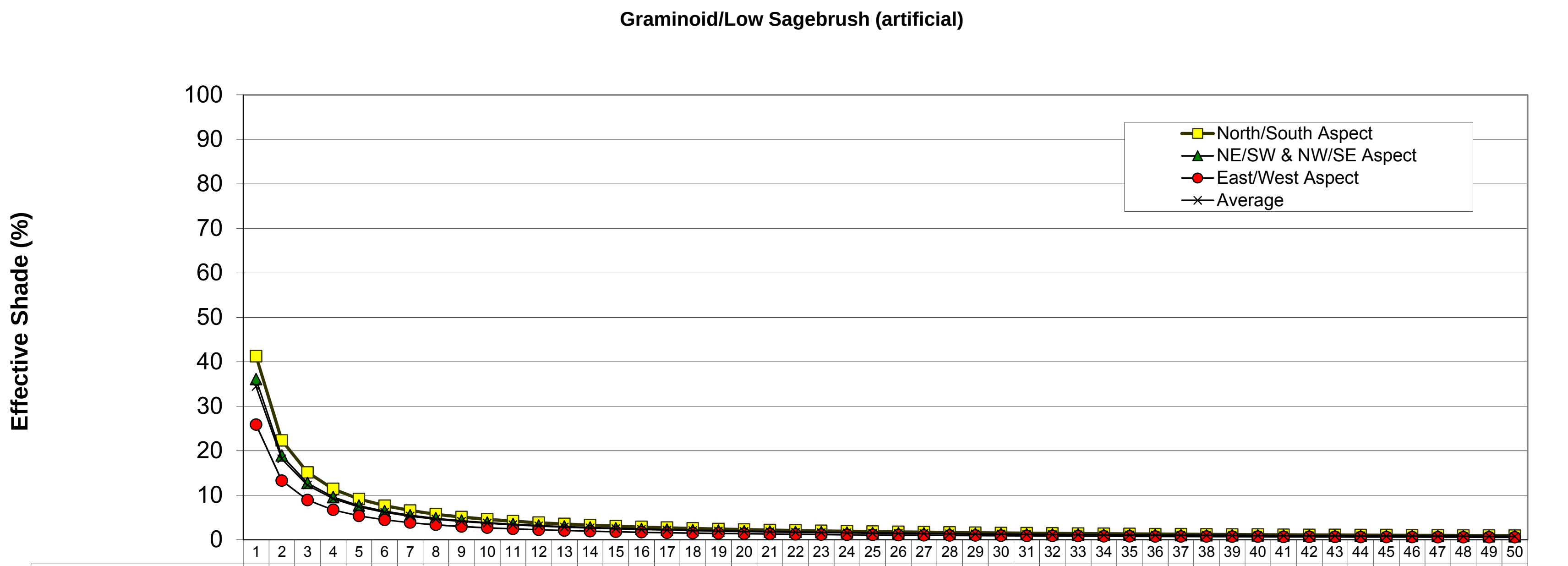
Figure B-1. Target shade curve for the western Idaho black cottonwood vegetation type.



"Vegetation" Channel Width (meters)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
North/South Aspect	74	55	46	40	35	31	27	25	22	20	19	17	16	15	14	13	13	12	11	11	10	10	9	9	9
NE/SW & NW/SE Aspect	73	53	43	36	31	27	24	22	20	18	17	15	14	13	12	12	11	10	10	9	9	9	8	8	8
East/West Aspect	75	47	33	26	21	18	16	14	12	11	10	10	9	8	8	7	7	6	6	6	6	5	5	5	5
Average	74	52	41	34	29	25	22	20	18	17	15	14	13	12	11	11	10	10	9	9	8	8	8	7	7

"Vegetation" Channel Width (meters)	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
North/South Aspect	8	8	8	8	7	7	7	7	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	4	4
NE/SW & NW/SE Aspect	7	7	7	7	6	6	6	6	6	5	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4
East/West Aspect	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2
Average	7	6	6	6	6	6	5	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4

Figure B-2. Target shade curve for the mountain mahogany vegetation type.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
North/South Aspect	41	22	15	11	9	8	7	6	5	5	4	4	4	3	3	3	3	3	2	2	2	2	2	2	2
NE/SW & NW/SE Aspect	36	19	13	10	8	6	6	5	4	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2
East/West Aspect	26	13	9	7	5	4	4	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
Average	34	18	12	9	7	6	5	5	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	1

	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
North/South Aspect	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NE/SW & NW/SE Aspect	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
East/West Aspect	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Average	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

"Vegetation" Channel Width (meters)

Figure B-3. Target shade curve for the low sagebrush/grass vegetation type.

Temperature Data Collected in 2014

DEQ Summary of Temperature Data

Data Source: Idaho Falls DEQ
Water Body: Little Lost River
Data Collection Site: Upper Little Lost
Data Period: 5/20/2014 - 7/29/2014

MDMT = 22.4, 07 Jul
MWMT = 21.5, 11 Jul
MDAT = 19.1, 08 Jul
MWAT = 18.4, 13 Jul

HUC4 Number: 17040217
HUC4 Name: Little Lost

Waterbody ID Number: SK10_04

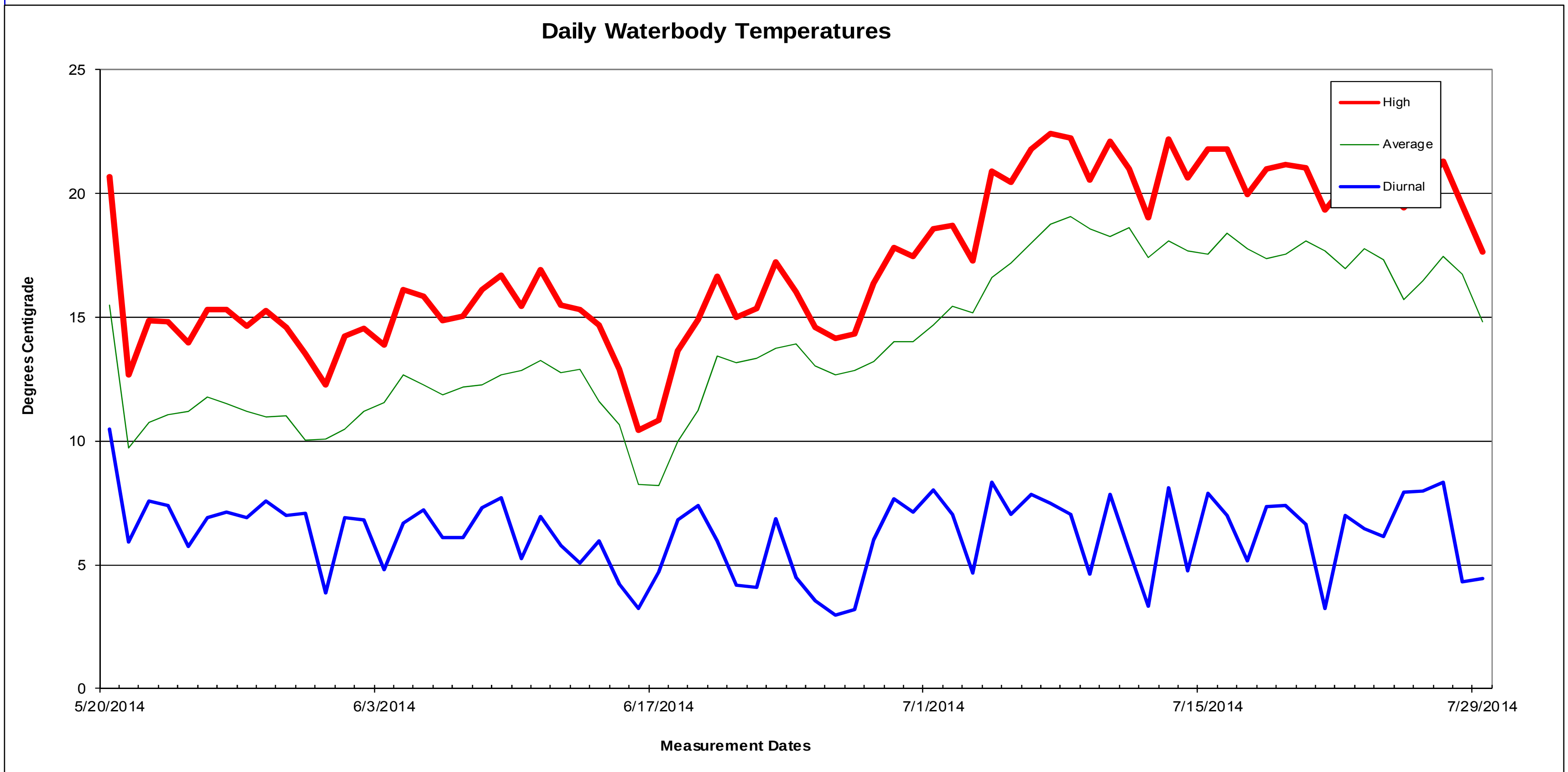


Figure B-4. Continuous temperature data collected at Little Lost River (ID17040217SK010_04).

DEQ Summary of Temperature Data

Data Source: Idaho Falls DEQ
Water Body: Little Lost River
Data Collection Site: Lower Little Lost
Data Period: 5/20/2014 - 7/29/2014

MDMT = 24.1, 07 Jul
MWMT = 23.0, 11 Jul
MDAT = 19.3, 14 Jul
MWAT = 18.8, 14 Jul

HUC4 Number: 17040217
HUC4 Name: Little Lost

Waterbody ID Number: SK02_05

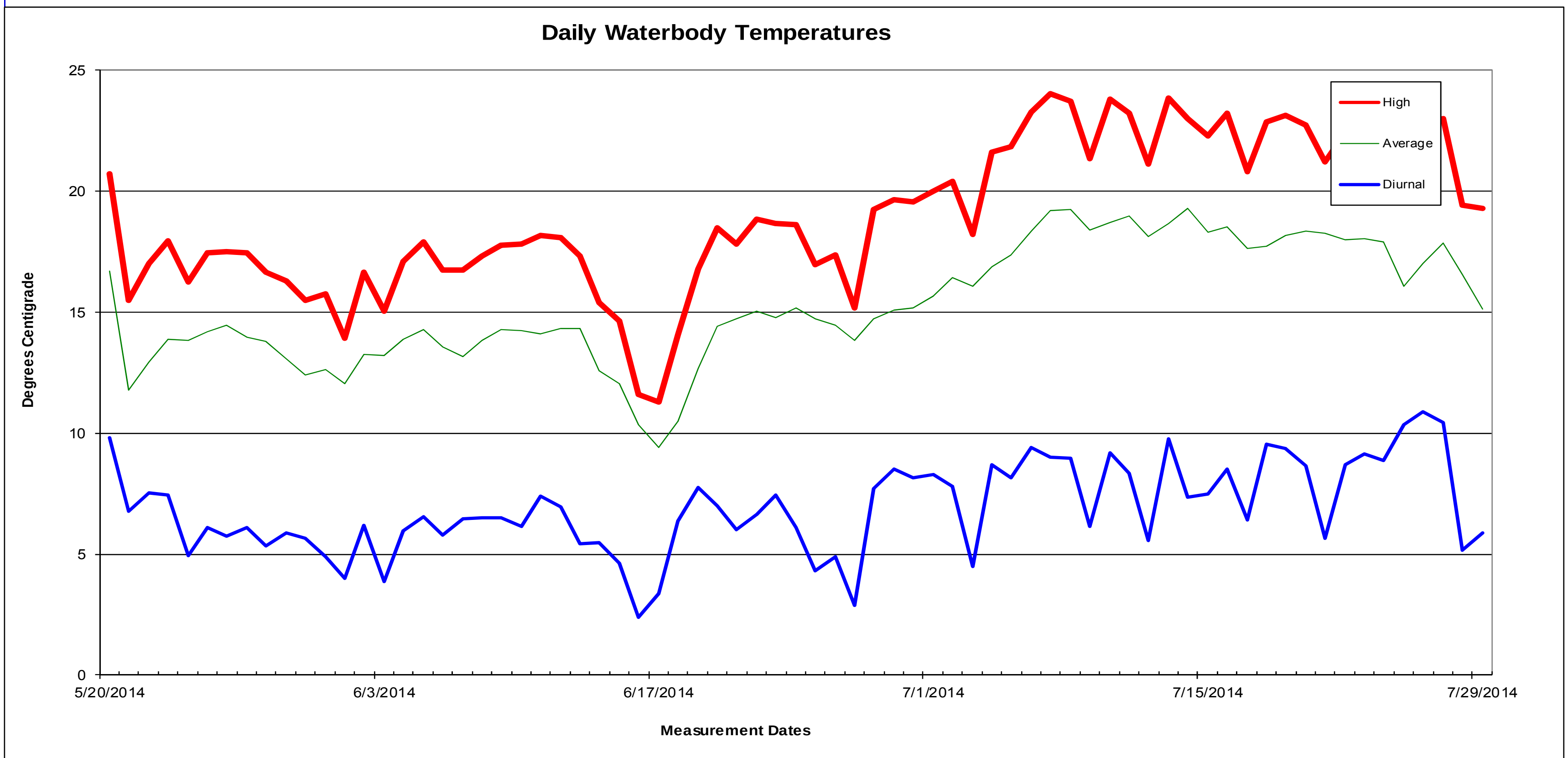


Figure B-5. Continuous temperature data collected at Little Lost River (ID17040217SK002_05).

DEQ Summary of Temperature Data

Data Source: Idaho Falls
Water Body: Sawmill Creek
Data Collection Site: Lower Sawmill Creek
Data Period: 5/20/2014 - 7/29/2014

MDMT = 21.7, 10 Jul
MWMT = 20.5, 19 Jul
MDAT = 17.2, 08 Jul
MWAT = 16.8, 13 Jul

HUC4 Number: 17040217
HUC4 Name: Little Lost

Waterbody ID Number: [redacted]

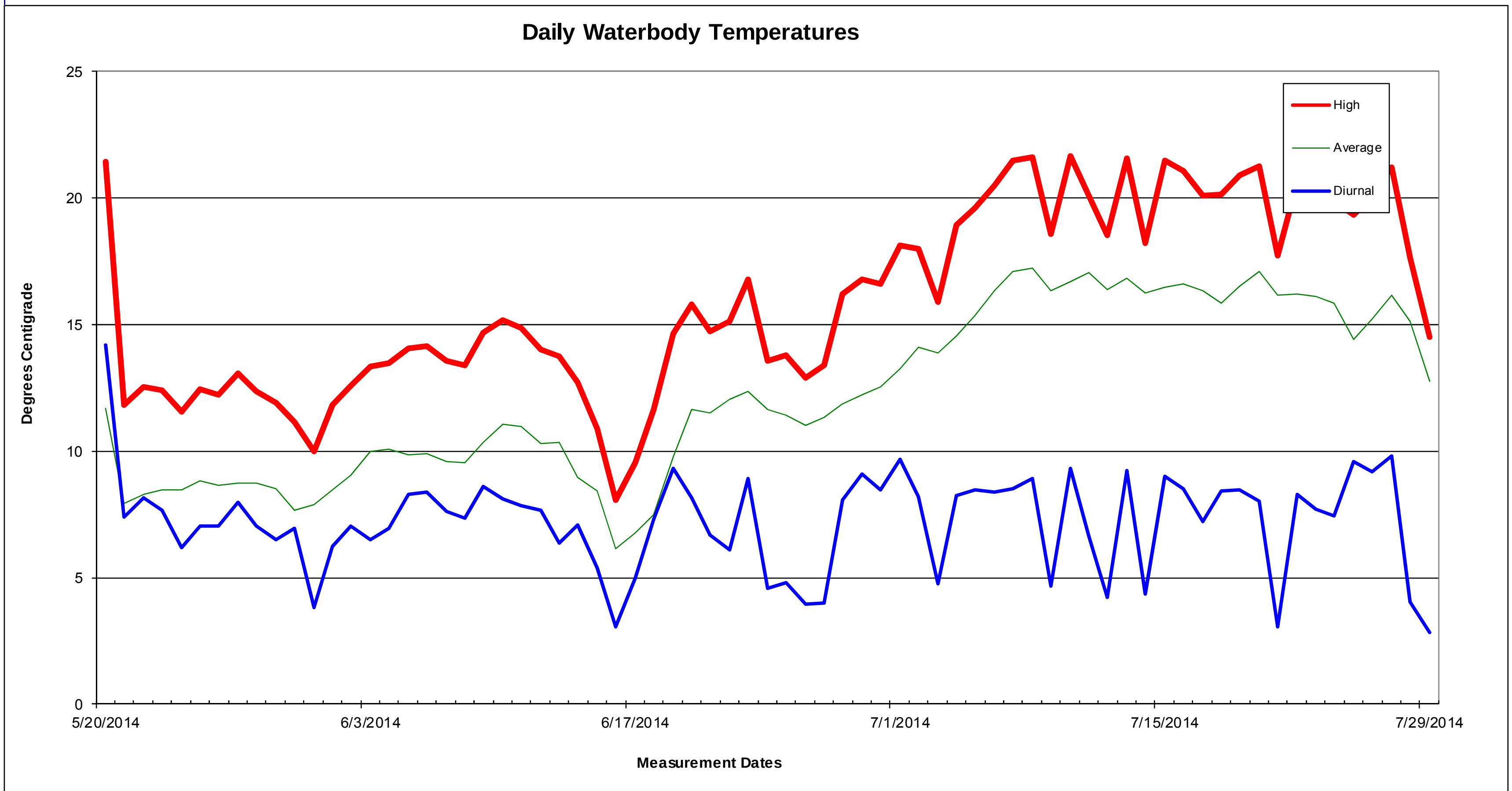


Figure B-6. Continuous temperature data collected at lower Sawmill Creek (ID17040217SK012_04).

DEQ Summary of Temperature Data

Data Source: Insert
Water Body: Sawmill Creek
Data Collection Site: Upper Sawmill Creek
Data Period: 5/21/2014 - 7/28/2014

MDMT = 18.4, 19 Jul
MWMT = 17.3, 24 Jul
MDAT = 13.5, 20 Jul
MWAT = 13.1, 21 Jul

HUC4 Number: 17040217
HUC4 Name: Little Lost

Waterbody ID Number: SK14_04

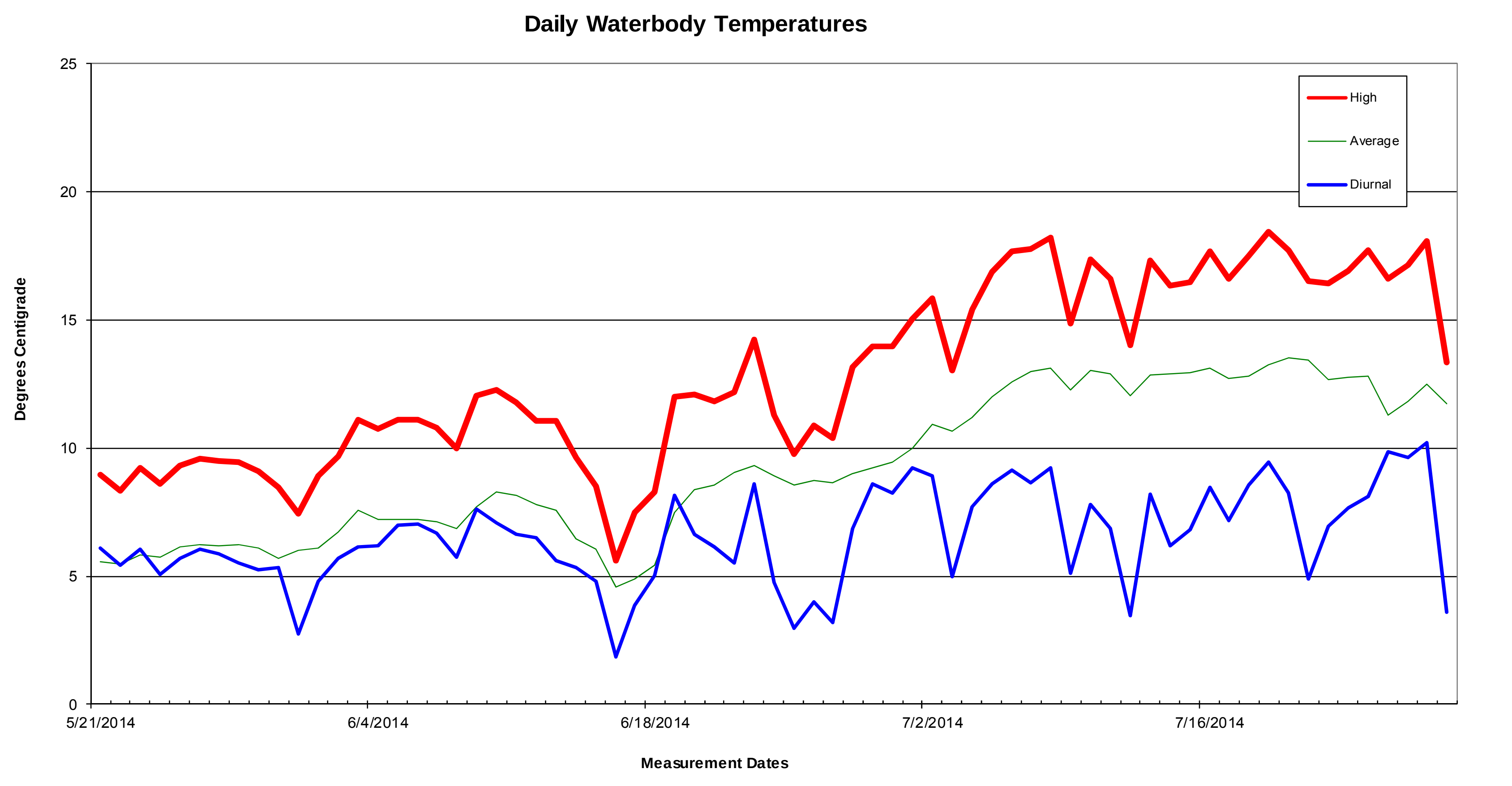


Figure B-7. Continuous temperature data collected at upper Sawmill Creek (ID17040217SK014_04).

DEQ Summary of Temperature Data

Data Source: Idaho Falls DEQ
Water Body: Wet Creek
Data Collection Site: Lower Wet Creek
Data Period: 5/20/2014 - 7/29/2014

MDMT = 23.1, 08 Jul
MWMT = 21.3, 10 Jul
MDAT = 17.6, 08 Jul
MWAT = 16.5, 11 Jul

HUC4 Number: 17040217
HUC4 Name: Little Lost

Waterbody ID Number: [redacted]

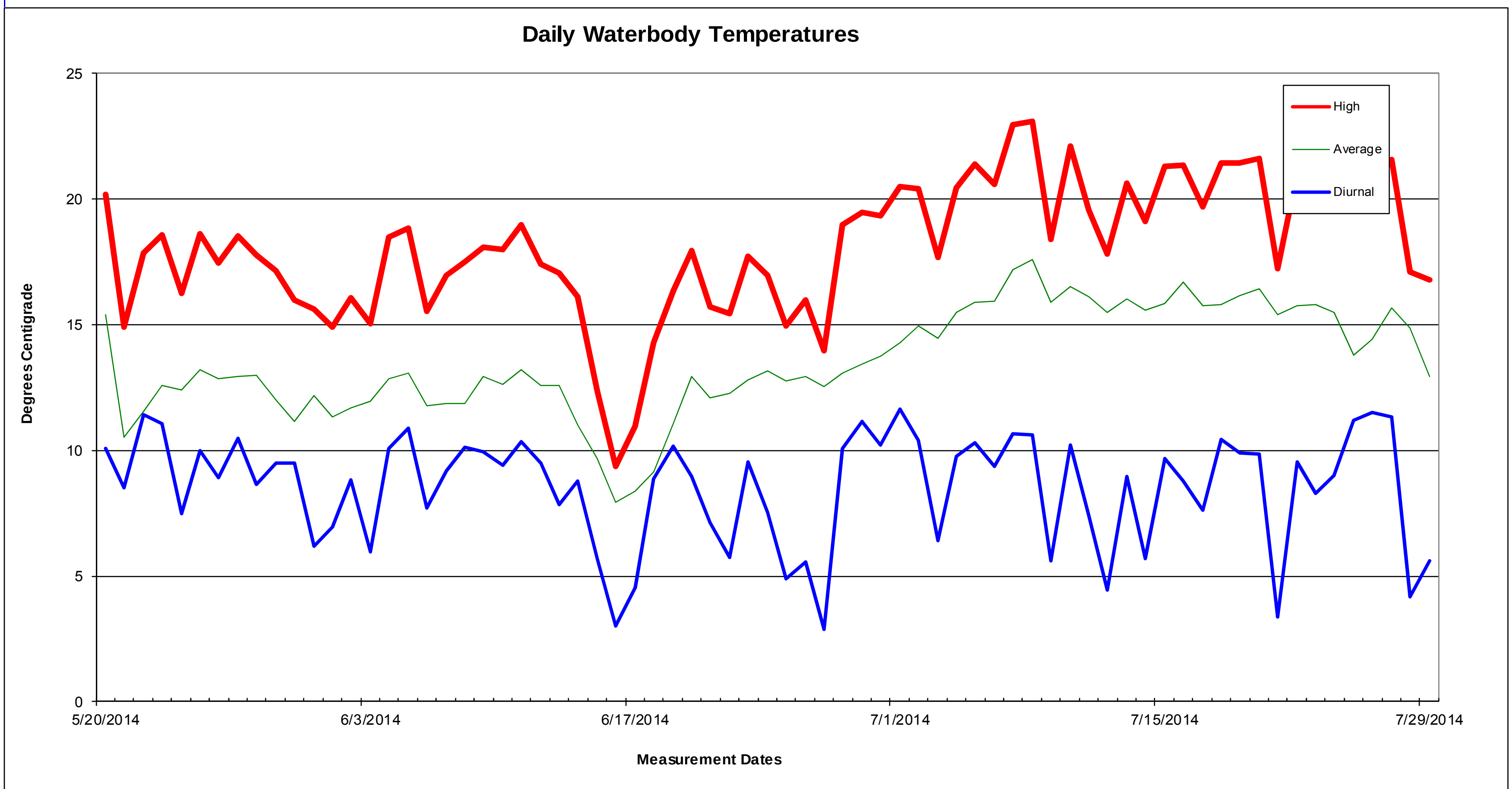


Figure B-8. Continuous temperature data collected at lower Wet Creek (ID17040217SK022_03).

DEQ Summary of Temperature Data

Data Source: DEQ Idaho Falls Office
Water Body: Wet Creek
Data Collection Site: Middle Wet Creek
Data Period: 5/20/2014 - 7/29/2014

MDMT = 21.9, 07 Jul
MWMT = 20.2, 10 Jul
MDAT = 16.6, 08 Jul
MWAT = 15.6, 11 Jul

HUC4 Number: 17040217
HUC4 Name: Little Lost

Waterbody ID Number: SK024_03

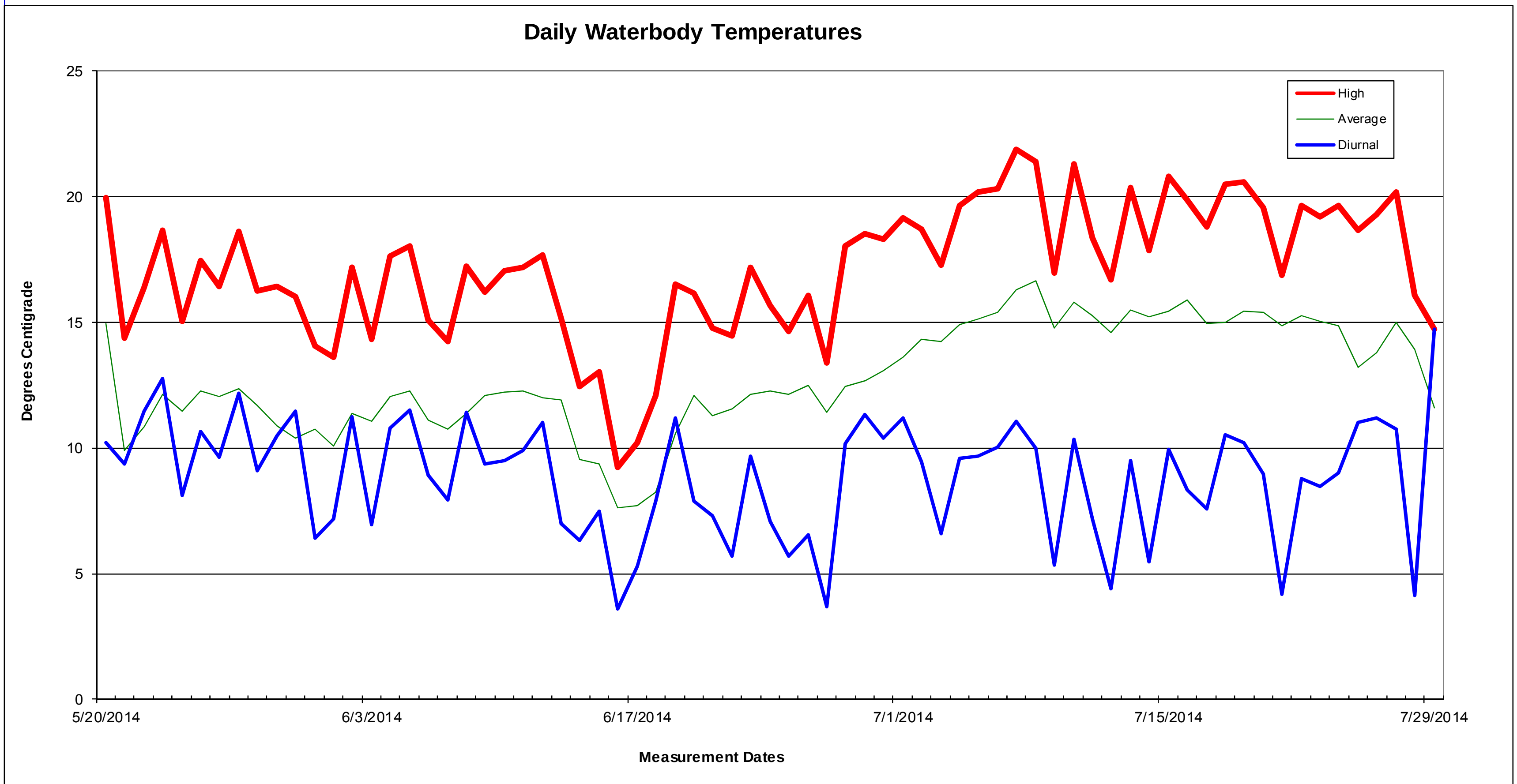


Figure B-9. Continuous temperature data collected at middle Wet Creek (ID17040217SK024_03).

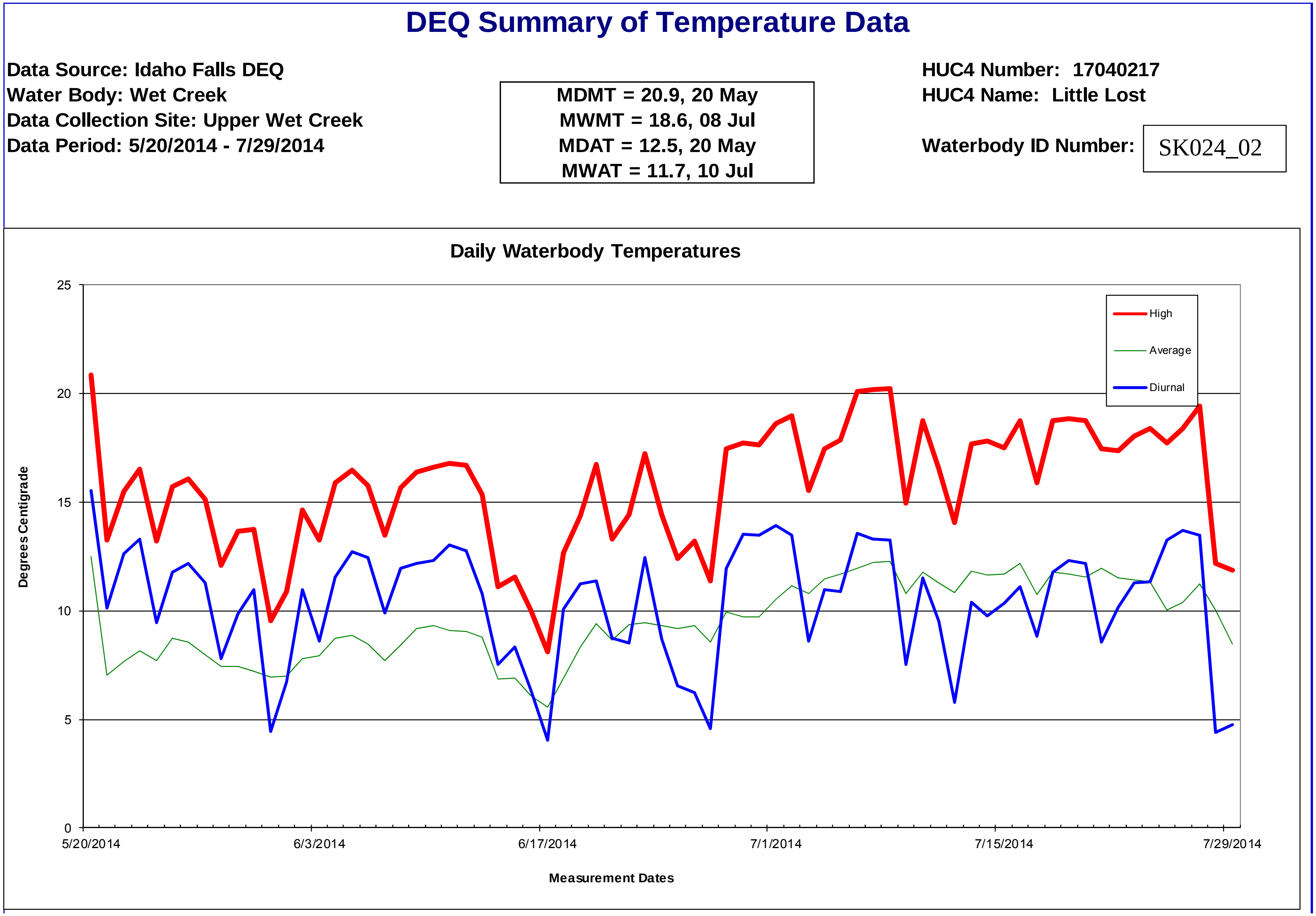


Figure B-10. Continuous temperature data collected at upper Wet Creek (ID17040217SK024_02.

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Appendix C. Public Participation and Public Comments

This TMDL addendum was developed with participation from identify the WAG/BAG and include dates of public meetings, public comment, etc.

[Public comments and DEQ responses to be inserted following public comment period.]

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Appendix D. Distribution List

[To be added following the public comment period.]

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