Weiser River Total Maximum Daily Loads Five-Year Review

Hydrologic Unit Code 17050124

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April 2014

Prepared by
Idaho Department of Environmental Quality
Boise Regional Office
1445 N. Orchard Street
Boise, Idaho 83706
and
Idaho Department of Environmental Quality
State Technical Services Office
1410 N. Hilton
Boise, Idaho 83706

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Cover photo of Weiser River at Little Weiser River confluence.

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Executive Summary

This document presents a five-year review of the *Weiser River Subbasin Assessment and Total Maximum Daily Loads* (SBA/TMDL) (DEQ 2006a). This review addresses the water bodies in the Weiser River subbasin that are in Idaho's current and most recent draft Section 4(a) of the Integrated Report. This five-year review has been developed to comply with Idaho Code §39-3611 (7). The review describes current water quality status, pollutant sources, and recent pollution control efforts in the Weiser River subbasin, located in southwestern Idaho.

TMDLs subject to five-year review are shown in Table A. Table A includes the water body name, corresponding assessment unit, and pollutants with approved TMDLs. It also contains a general description of any implementation on a water body scale and if known, the current water quality trend.

Table A. Existing 2006 TMDLs.

Stream Name	Assessment Unit	Pollutant	Meeting TMDL
Weiser River	ID17050124SW001_05	Sediment	Yes
		Temperature	Unknown
Weiser River	ID17050124SW001_06	Sediment	Yes
		Temperature	Unknown
Weiser River	ID17050124SW001_06a	Bacteria (*E. coli)*	Yes - DELIST
		Sediment	Yes
		Temperature	Unknown
Crane Creek	ID17050124SW003_05	Bacteria *(E. coli)*	No
		Sediment	Yes
		Temperature	Unknown
North Crane Creek	ID17050124SW004_04	Temperature	Unknown
South Crane and Tennison Creeks	ID17050124SW005_02	Temperature	Unknown
South Crane Creek	ID17050124SW005_03	Temperature	Unknown
South Crane Creek	ID17050124SW005_04	Temperature	Unknown
North Crane Creek	ID17050124SW006_02	Temperature	Unknown
North Crane Creek	ID17050124SW006_03	Temperature	Unknown
North Crane Creek	ID17050124SW006_04	Temperature	Unknown
Weiser River	ID17050124SW007_05	Temperature	Unknown
Weiser River	ID17050124SW007_05a	Sediment	Yes
		Temperature	Unknown
Little Weiser River	ID17050124SW008_03	Bacteria (*E. coli)*	Unknown
Little Weiser River	ID17050124SW008_04	Bacteria *(E. coli)*	No
		Sediment	Yes
		Temperature	Unknown

Subbasin At A Glance

The Weiser River subbasin (hydrologic unit code 17050124) is located in southwestern Idaho near the border with Oregon. It is a rural subbasin dominated by agricultural land, rangeland and forest. The Weiser River subbasin has approved TMDLs for bacteria, sediment, and temperature. Table B summarizes the pollutants, approved TMDLs, and associated implementation plans.

In the approved 2006 temperature TMDL, the Idaho Department of Environmental Quality (DEQ) presented loading analyses for the five temperature-listed segments, as well as for the Weiser River as a whole and 10 of its major tributaries (Figure A and Figure B). Because water temperature in a segment of flowing water can be strongly influenced by the waters flowing into and mixing with it, it was important to gain perspective on heat loading throughout the entire watershed.

For this five-year review, DEQ revisited the 2006 temperature TMDL and revised it according to current procedures and new knowledge based on potential natural vegetation (PNV) temperature TMDLs. Newer (2009–2011) aerial photographs were evaluated, and new existing shade levels were identified along with the prescription of new target shade levels based on Idaho vegetation types. New solar loads were developed and compared to those results obtained in 2006. Finally, DEQ is developing a new technology to estimate shade on medium and large rivers based on modeling rather than aerial photo interpretation. The shade levels on the lower portion of the Weiser River, below the confluence with the Little Weiser River, were modeled using the *shadelator* portion of the heat source temperature model. The results of these newer procedures changed the way the Weiser River subbasin was evaluated for riparian shade and solar load. This information and analysis may be used to updated and refine the temperature TMDLs when any new TMDLs are scheduled for development in the future.

Table B. Subbasin at a glance.

Approved TMDLs	**Pollutants Within Subbasin**
Bacteria Sediment Temperature, water	Bacteria Sediment Temperature, water Nutrients
Implementation Plans	**Implementation Actions**
Weiser River Subbasin Total Maximum Daily Load Implementation Plan for Agriculture	Approved best management practices, sedimentation basins (see pages 36–39 in the Implementation Plan) *www.deq.idaho.gov/media/449901-weiser_river_subbasin_agriculture_implementation_plan_revised_0513.pdf*

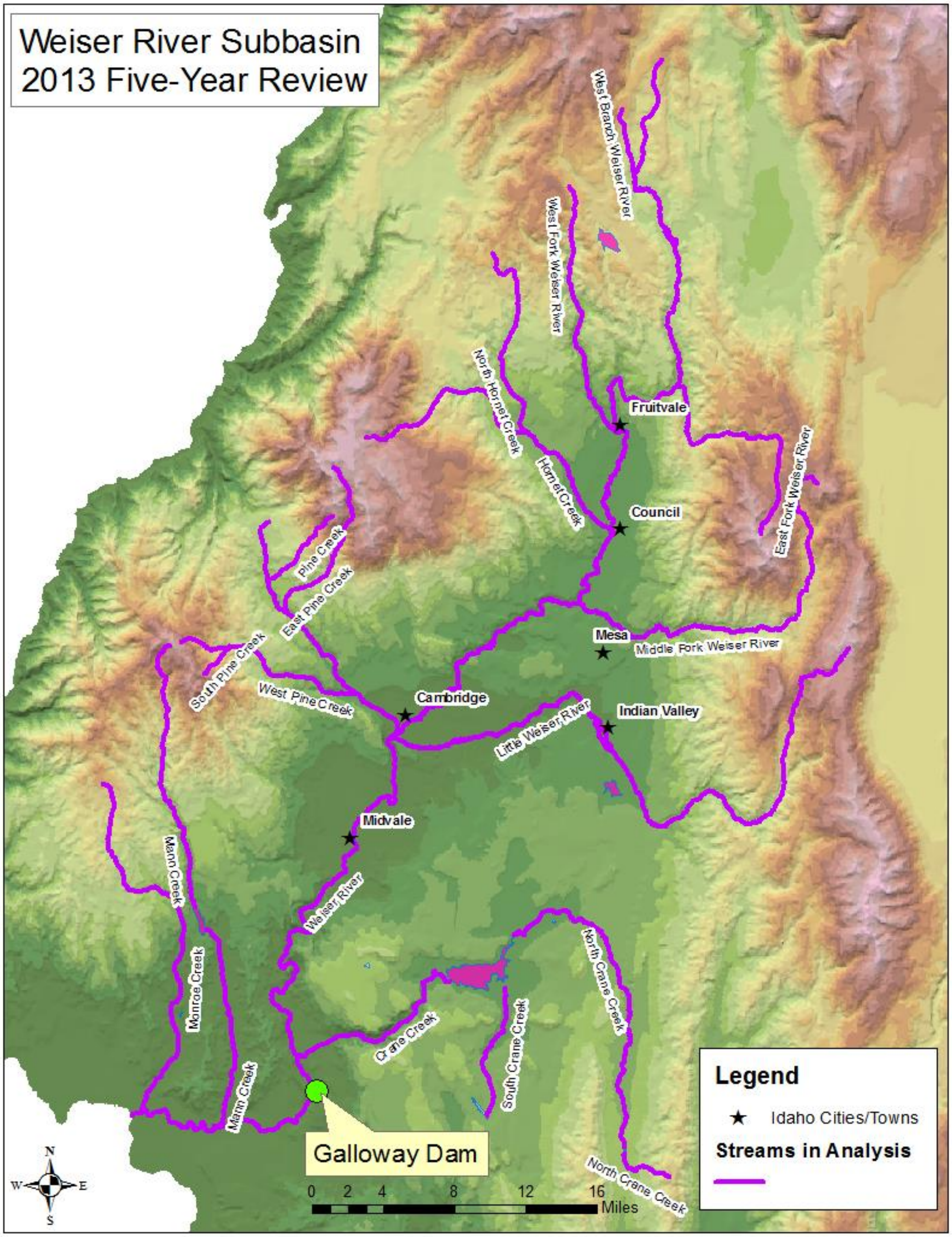

Figure A. Streams analyzed for shade and solar loading in the Weiser River subbasin.

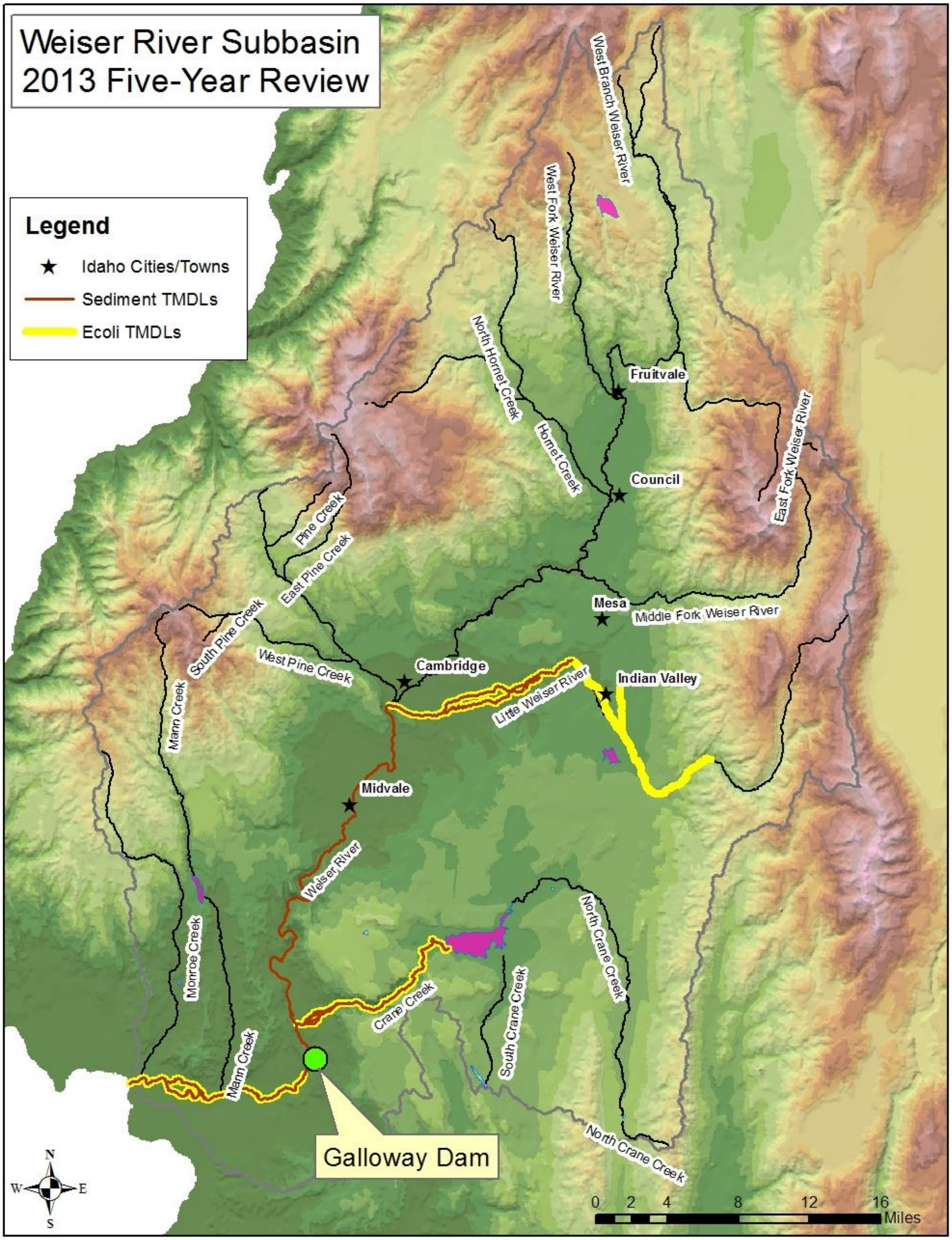

Figure B. *E. coli* and sediment TMDL stream segments.

Key Findings

The Weiser River and Little Weiser River have *Escherichia coli* (*E. coli*), sediment, and PNV temperature TMDLs. DEQ conducted 2 years of monitoring, which suggests the TMDL targets are largely being met. However, beneficial use data are lacking. Additional monitoring by the Idaho Soil and Water Conservation Commission and both Weiser and Adams Soil Conservation Districts suggest that Rush Creek and the Middle Fork Weiser River should be scheduled for beneficial use monitoring for possible future delisting of temperature.

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) under natural conditions. Results of the present analysis are compared to previous (2006) results based upon new information.

Analysis of new data, new aerial photo interpretations, new shade modeling, and new shade targets has resulted in a better understanding of shade conditions in the Weiser River subbasin. Seven streams show improved conditions over 2006 levels including three streams (East Pine Creek, West Pine Creek and upper Weiser River) that do not have excess solar loads. Nine stream systems (including the lower Weiser River) have conditions roughly the same as they had in 2006. One stream (North Crane Creek) showed worse conditions. Percent solar load reductions necessary to meet target loads varied from 0% in the three streams mentioned above to 34% in Hornet Creek. Average required reduction was about 14%.

All waters (Crane Creek, North Crane Creek, Little Weiser River, and lower Weiser River) that were listed as impaired for temperature in the Integrated Report for Water Quality (§303(d) list) have been identified as lacking shade. Major tributary contributors to the Weiser River (West Fork, Middle Fork, and East Fork Weiser River, Hornet Creek, Monroe Creek, and Mann Creek) also lack shade and have excess solar loads.

1 Introduction

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and tribes, pursuant to Section 303 of the CWA, are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the nation's waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited. States and tribes must periodically publish a priority list (§303(d) list) of impaired waters. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards.

Idaho Code §39-3611(7) requires a five-year cyclic review process for Idaho TMDLs:

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

This report is intended to meet the intent and purpose of Idaho Code §39-3611(7). The report documents the review of an approved Idaho TMDL and implementation plan and provides consideration of the most current and applicable information in conformance with Idaho Code §39-3607, evaluation of the appropriateness of the TMDL to current watershed conditions, implementation plan evaluation, and consultation with the watershed advisory group (WAG). An evaluation of the recommendations presented is provided. Final decisions for TMDL modifications are decided by the Idaho Department of Environmental Quality (DEQ) Director. Approval of TMDL modifications is decided by the United States Environmental Protection Agency (EPA), with consultation by DEQ.

About Assessment Units

Prior to 2002, impaired waters were defined as stream segments with geographical descriptive boundaries. In 2002, DEQ modified the structure and format of Idaho's § 303(d) list by combining it with the §305(b) report, required by the CWA to inform Congress of the state of Idaho's waters. This modification included identifying stream segments by assessment units (AUs) instead of non-uniform stream segments and defining the use support of stream AUs by five categories, published as Sections, in the Integrated Report. AUs now define all the waters of the state of Idaho. These units and the methods used to describe them can be found in the water body assessment guidance (Grafe et al. 2002). AUs are groups of similar streams that have similar land use practices, ownership, or land management. Stream order, however, is the main basis for determining AUs—even if ownership and land use change significantly, an AU remains the same. Because AUs are an extension of water body identification numbers, there is now a direct tie to the "Water Quality Standard" (IDAPA 58.01.02) for each AU, so that beneficial uses defined in IDAPA 58.01.02 are clearly tied to streams on the landscape.

2 TMDL Review and Status

The Weiser River TMDLs are comprised of three separate documents: the original SBA, a potential natural vegetation (PNV) temperature TMDL addendum, and draft phosphorus TMDLs that resulted from the Snake River-Hells Canyon TMDL (Figure 1). The original *Weiser River Watershed Subbasin Assessment and Total Maximum Daily Loads* (DEQ 2006a) contain *Escherichia coli* (*E. coli*) and sediment TMDLs for the Weiser River subbasin. This TMDL was completed in 2006 and is located at *www.deq.idaho.gov/media/449892-weiser_river_entire.pdf*. The temperature TMDLs for the subbasin were completed concurrently and are contained in the *Weiser River Subbasin Temperature Total Maximum Daily Loads: Addendum to the Weiser River Subbasin Assessment and TMDL* (DEQ 2006b), located at *www.deq.idaho.gov/media/450157-weiser_river_addendum_entire.pdf*. Draft total phosphorus allocations for the Weiser River have been developed in an addendum to the Snake River-Hells Canyon TMDL (DEQ 2007), located at *www.deq.idaho.gov/media/450151-weiser_river_phosphorus_addendum.pdf*. The draft phosphorus addendum was not submitted to EPA for approval, however.

The Idaho Association of Soil Conservation Districts (IASCD), Idaho Soil and Water Conservation Commission (SWCC), Weiser River Soil Conservation District, and Weiser River WAG developed an implementation plan in 2008. The *Weiser River Subbasin Total Maximum Daily Load Implementation Plan for Agriculture* (SWCC 2008) was revised in 2013 and is located at *www.deq.idaho.gov/media/449901-weiser_river_subbasin_agriculture_implementation_plan_revised_0513.pdf*.

This five-year review primarily focuses on the *E. coli* and sediment TMDLS contained in the original SBA and a review of the PNV TMDL. No review of the phosphorus loads will be included as they relate to the Snake River-Hells Canyon TMDL. Any review of phosphorus reductions and associated implementation will not be performed until the Snake River-Hells Canyon TMDL has been fully implemented.

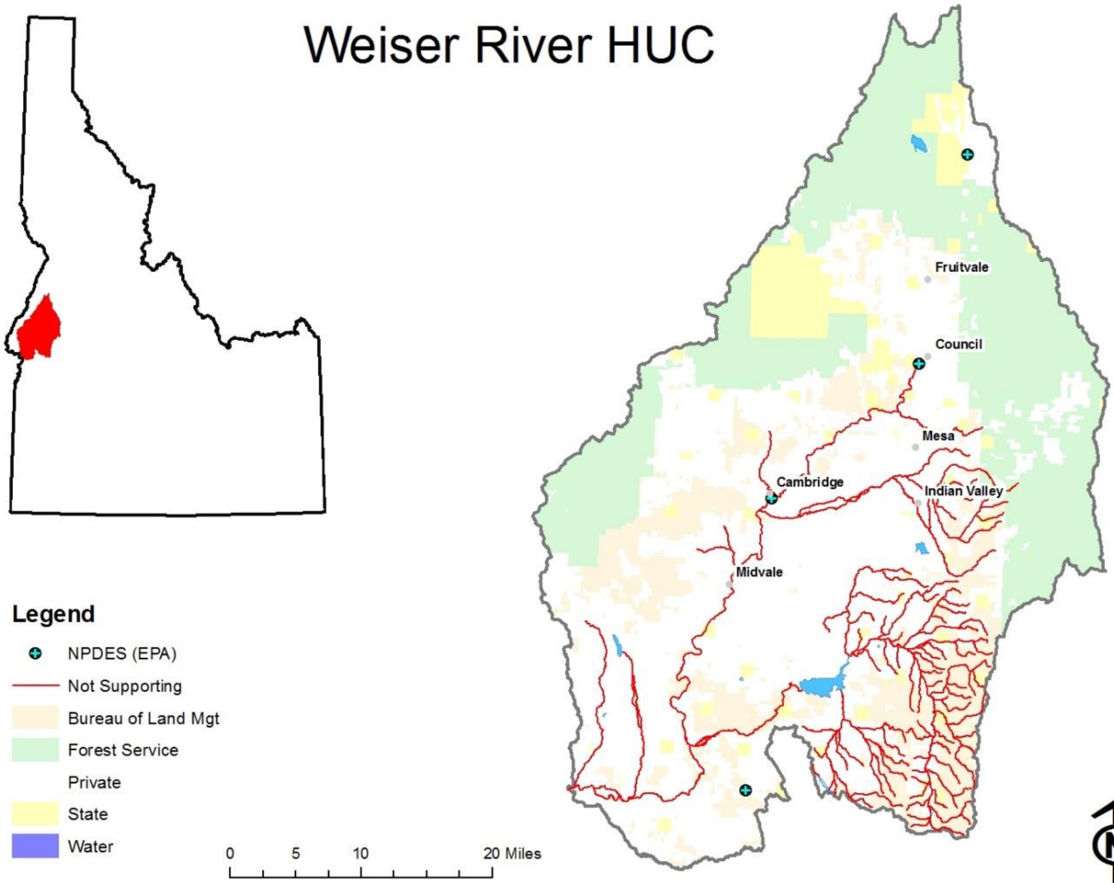

Figure 1. Weiser River subbasin location, land ownership, and impaired water bodies.

Table 1 contains the TMDLs developed for the Weiser River subbasin for *E. coli*, sediment, and PNV temperature. The *E. coli* TMDL reflects Idaho Code for contact recreation. The sediment target consists of both a total suspended solids (TSS) target and a substrate percent fines target. The TSS target is based on Newcombe and Jensen (1996). The percent fines target is based on literature values and existing TMDLs that suggest salmonid spawning is supported when depth fines are below 30%. The depth-fines target also provides protection for a healthy macroinvertebrate community that is supportive of cold water aquatic life. The temperature targets are based on shade curves using PNV as a surrogate for temperature. The TMDLS are as follows:

E. coli Target

The *E. coli* target is based on a geometric mean criterion as defined in Idaho's Water Quality Standards, IDAPA 58.01.02. Waters designated for primary or secondary contact recreation are not to contain *E. coli* bacteria in concentrations exceeding a geometric mean of 126 *E. coli* organisms per 100 milliliters (mL) based on a minimum of five samples taken every 3 to 7 days over a 30-day period.

Sediment Target

Less than or equal to 50 milligrams per liter (mg/L) TSS for no more than 30 days, and less than or equal to 80 mg/L TSS for no more than 14 days; both calculated as a geometric mean over the exposure duration. Percent fines in gravel substrate are not to exceed 30% fines (6 millimeters [mm] or smaller).

PNV Temperature Target

The PNV temperature targets have been updated as part of this five-year review and have resulted in new shade targets.

Table 1 summarizes the targets set out in the TMDLs for each assessment unit/pollutant combination. The TMDL identifies March–May as a critical period for the sediment target and July as the critical period for *E. coli*. The critical period for temperature is April–September. Individual temperature criteria for specific AUs are not listed as they vary with existing and potential shade.

Table 1. Assessment unit level TMDL targets and associated documents.

Stream Name	Assessment Unit	Relevant TMDL Document	Pollutant	Criteria/Target	Critical Period
Weiser River	ID17050124SW001_05	a, b	Sediment	50 mg/L TSS/30 days ≥ 30% depth fines	March–May
			Temperature	See updated shade tables	April–Sept
Weiser River	ID17050124SW001_06	a, b	Sediment	50 mg/L TSS/30 days ≥ 30% depth fines	March–May
			Temperature	See updated shade tables	April–Sept
Weiser River	ID17050124SW001_06a	a, b	*E. coli*	126 cfu/100 mL	July
			Sediment	50 mg/L TSS/30 days ≥ 30% depth fines	March–May
			Temperature	See updated shade tables	April–Sept
Crane Creek	ID17050124SW003_05	a, b	*E.coli*	126 cfu/100 mL	July
			Sediment	50 mg/L TSS/30 days ≥ 30% depth fines	March–May
			Temperature	See updated shade tables	April–Sept

Stream Name	Assessment Unit	Relevant TMDL Document	Pollutant	Criteria/Target	Critical Period
North Crane Creek	ID17050124SW004_04	b	Temperature	See updated shade tables	April–Sept
South Crane and Tennison Creeks	ID17050124SW005_02	b	Temperature	See updated shade tables	April–Sept
South Crane Creek	ID17050124SW005_03	b	Temperature	See updated shade tables	April–Sept
South Crane Creek	ID17050124SW005_04	b	Temperature	See updated shade tables	April–Sept
North Crane Creek	ID17050124SW006_02	b	Temperature	See updated shade tables	April–Sept
North Crane Creek	ID17050124SW006_03	b	Temperature	See updated shade tables	April–Sept
North Crane Creek	ID17050124SW006_04	b	Temperature	See updated shade tables	April–Sept
Weiser River	ID17050124SW007_05	b	Temperature	See updated shade tables	April–Sept
Weiser River	ID17050124SW007_05a	a, b	Sediment	50 mg/L TSS/30 days ≥ 30% depth fines	March–May (high discharge)
			Temperature	See updated shade tables	April–Sept
Little Weiser River	ID17050124SW008_03	a	*E. coli*	126 cfu/100 mL	July
Little Weiser River	ID17050124SW008_04	a, b	*E. coli*	126 cfu/100 mL	July
			Sediment	50 mg/L TSS/30 days ≥ 30% depth fines	March–May (high discharge)
			Temperature	See updated shade tables	April–Sept

Notes: milligram per liter (mg/L); total suspended solid (TSS); colony forming unit (cfu); *Escherichia coli* (E. coli). Updated shade tables are provided in Appendix A.

2.1 Pollutant Targets

The pollutant targets developed in the original Weiser River TMDL are summarized in Table 2. The targets for *E. coli* and sediment are correct although they need modified to accommodate the shift from water body descriptions to AUs.

The PNV TMDL shade targets have been updated to reflect DEQs most current methodology.

The *E. coli* bacteria target is aimed at protecting contact recreation and is based on the numeric criteria for primary and secondary contact recreation. The targets are applied during critical periods of the year; it is assumed that if a water body is meeting the target for these periods that they would be supportive throughout the remainder of the year as well. The critical period for the *E. coli* target is July, when conditions are likely to be exceeded.

The PNV target is a surrogate for temperature and is intended to protect salmonid spawning and/or cold water aquatic life. While PNV targets change along the length of the channel, they are applied only during the critical period of April–September when many species are present and likely to spawn. These are also the months during the year when surface water temperatures are likely to exceed and vegetation is present.

The sediment target was developed under the assumption that 50/80 mg/L target would be protective of salmonid spawning and cold water aquatic life. This sediment target is currently under revision in other TMDLs within Idaho as the sediment target of 50/80 mg/L has generally been found to not be adequately protective of either cold water aquatic life or salmonid spawning. Additionally, both the Weiser River and the Little Weiser River have a substrate target that is not supposed to exceed 30% (< 6.0 mm) fines. The TMDL identified March–May as the critical period for the TSS. This time period was chosen for TSS because it is the period when the river is experiencing high flows due to spring runoff, while the depth fines target applies year-round.

The Weiser River is designated for cold water aquatic life and the Little Weiser River is designated for salmonid spawning. A depth-fines target is meant to limit the amount of surface and/or subsurface fines, which can alter the suitability of spawning habitat, more so than cold water aquatic life. The depth-fines target is designed to protect both the eggs and developing larvae by minimizing the amount of sediment that is available to fill-in spawning gravels, while it also offers protection to cold water aquatic life and provides insight into sediment loading to the river that may be overlooked from TSS sampling alone.

Within the listed AUs of the Weiser River below the Little Weiser River, there is little to no accessible habitat to collect meaningful substrate data. Much of the riverbed below Crane Creek is hardpan clay deposits, while upstream much of the river rests on bedrock. While there are locations within the river that contain large volumes of sediment and larger gravel bars, they are not suitable for McNeil core sampling. DEQ should work with the WAG and landowners to select appropriate McNeil monitoring locations for long-term monitoring.

If beneficial use monitoring indicates that either cold water aquatic life or salmonid spawning is not being supported or approaching support, all or part of the sediment target may require revision. Support of cold water aquatic life is inextricability linked to a healthy macroinvertebrate population, which can be severely limited by excess levels of sediment. Because the survival of macroinvertebrates is related to turbidity and TSS, more so than depth fines, an attainable and protective sediment target for the main stem Weiser River could potentially include a lower TSS target and no depth-fines target. Additionally, 50 mg/L has been found to not be protective of cold water aquatic life, and a depth-fines target is not needed to protect cold water aquatic life. If beneficial use support is not attained in the near future, the current sediment TMDL will need to be revised in conjunction with additional implementation of sediment reducing best management practices (BMPs).

Table 2 describes the specific bacteria, sediment, and temperature targets defined in the original TMDLs for the lower and middle Weiser River, Little Weiser River and Crane Creek from Crane Creek Reservoir to the Weiser River. These are targets that are applied to geographical reaches and do not address individual AUs, although the targets are applied identically to AUs within each reach. Table 2 also combines geographical stream reaches with individual AUs.

Table 2. Water quality targets for specific water bodies in the Weiser River subbasin.

Stream Name	Assessment Unit	Parameter	Selected Targets
Weiser River (Lower, Galloway Dam to Snake River)	ID17050124SW001_06 ID17050124SW001_06a	Bacteria	Less than 126 *E. coli* cfu or mpn/100 mL as a 30-day log mean with a minimum of 5 samples and no sample greater than 406 *E. coli* cfu or mpn/100 mL
		Sediment	Less than or equal to 50 mg/L TSS for no more than 30 days, less than or equal to 80 mg/L TSS for no more than 14 days, both calculated as a geometric mean over the exposure duration, and a substrate target of percent fines (< 6.0 mm) not to exceed 30%
		Temperature	See updated shade analysis and shade tables in section 2 and Appendix A
Weiser River (Middle, Little Weiser River to Galloway Dam)	ID17050124SW001_05 ID17050124SW001_05a	Sediment	Less than or equal to 50 mg/L TSS for no more than 30 days, less than or equal to 80 mg/L TSS for no more than 14 days, both calculated as a geometric mean over the exposure duration and a substrate target of percent fines (< 6.0 mm) not to exceed 30%
		Temperature	See updated shade analysis and shade tables in section 2 and Appendix A
Crane Creek (Crane Creek Reservoir to Weiser River)	ID17050124SW003_05	Sediment	Less than or equal to 50 mg/L TSS for no more than 30 days, less than or equal to 80 mg/L TSS for no more than 14 days, both calculated as a geometric mean over the exposure duration and a substrate target of percent fines (< 6.0 mm) not to exceed 30%
		Bacteria	Less than 126 *E. coli* cfu or mpn/100 mL as a 30-day log mean with a minimum of 5 samples and no single sample greater than 406 *E. coli* cfu or mpn/100 mL
		Temperature	See updated shade analysis and shade tables in section 2 and Appendix A
Little Weiser River (Forest Service Boundary to Weiser River)	ID17050124SW008_03 ID17050124SW008_04	Bacteria	Less than 126 *E. coli* cfu or mpn/100 mL as a 30-day log mean with a minimum of 5 samples and no single sample greater than 406 *E. coli* cfu or mpn/100 mL
		Sediment	Less than or equal to 50 mg/L TSS for no more than 30 days, less than or equal to 80 mg/L TSS for no more than 14 days, both calculated as a geometric mean over the exposure duration, and a substrate target of percent fines (< 6.0 mm) not to exceed 30%
		Temperature	See updated shade analysis and shade tables in section 2 and Appendix A

Notes: colony forming unit (cfu); most probable number (mpn) per 100 milliliters (mL); milligrams per liter (mg/L); total suspended solid (TSS); millimeters (mm); *Escherichia coli* (*E. coli)*

2.2 Control and Monitoring Points

The monitoring points assigned in the original Weiser River TMDL were based on geographical location rather than AUs. When the TMDL was originally developed Idaho was transitioning to the AU approach, consequently some of the monitoring locations contain more than one AU, while some AUs are not captured at all. The five original monitoring locations are Weiser River at confluence with the Snake River, Weiser River at United States Geological Survey (USGS) Gage 13266000, Crane Creek near the confluence with the Weiser River, Weiser River at Midvale, and Little Weiser River near Cambridge.

All future monitoring should be done at each of the seven listed AUs on the main stem Weiser and Little Weiser River. In an effort to accommodate all AUs, two additional monitoring sites should be added; one on the Weiser River (ID17050124SW001_05a) at Shoepeg Road Bridge and one on the Little Weiser River (ID17050124SW008_03) at Monday Gulch Road Bridge (Table 3). The existing monitoring locations should be maintained to preserve existing data sets for long-term trend monitoring.

Table 3. Changes to monitoring points.

Stream Name	Assessment Unit	AU Description	Current Monitoring Point	Recommended Monitoring Point	Lat/Long[b]
Weiser River	ID17050124SW001_06	Weiser River: Crane Creek to Galloway Dam	Weiser River at USGS Gage 1326600	No change	44.26754 -116.76794
Weiser River	ID17050124SW001_06a	Weiser River: Galloway Dam to Snake River	Weiser River confluence with the Snake River	No change	44.24163 -116.94385
Weiser River	ID17050124SW001_05	Weiser River: Keithly Creek to Crane Creek	Weiser River at Midvale	No change	44.292254 -116.788224
Weiser River	ID17050124SW001_05a	Weiser River: Little Weiser River to Keithly Creek	None	Weiser River at Shoepeg Road	44.53233 -116.68633
Crane Creek near confluence with the Weiser River[a]	ID17050124SW003_05	Crane Creek: Crane Creek Reservoir Dam to mouth	Crane Creek near the confluence with the Weiser River	No change	44.29062 -116.78053
Little Weiser River	ID17050124SW008_03	Little Weiser River: lower 3rd order	None	Little Weiser River at Monday Gulch Road	44.557007 -116.452240
Little Weiser River	ID17050124SW008_04	Little Weiser River: Grays Creek to mouth	Little Weiser Near Cambridge	No change	44.54557 -116.65565

a. Crane Creek at this location is a split channel. Samples should be composited from both channels, or if accessible, sampled downstream where Crane Creek is a single channel.
b. Latitude/longitude reported in decimal degrees, NAD 83.

The monitoring points shown in Table 3 are either bridge locations or locations accessible by foot on public land that should be used for *E. coli*, sediment and TSS monitoring. They are located in the most practical, accessible lower portion of the AU and should yield the most information about each AU. Depth-fines monitoring does not necessarily need to be done at these locations especially since the riverbed and substrate near manmade structures may be highly altered and not representative of the AU. Ideal spawning habitat may be found throughout the AU, and therefore, McNeil cores/depth-fines sampling should be performed in multiple locations throughout the AU, particularly in available habitat and spawning redds in salmonid.

Both the TSS and *E. coli* data collected for the Weiser River TMDL review were collected at the original monitoring points and only give a general overview of TSS and *E.coli* concentrations in the Weiser River, Little Weiser River and Crane Creek because when the original TMDL was developed it was not designed for AU reaches.

The original Weiser River PNV temperature TMDL indicates that temperature PNV monitoring may be conducted at any point along the AU; this recommendation remains unchanged for the Little Weiser River, Weiser River and relevant tributaries. Any future data collection should involve flow data for load calculation.

2.3 Load Capacity

The loading capacity for bacteria, sediment, and temperature for the Weiser River, Crane Creek, and Little Weiser River was calculated in the original Weiser River TMDL and is summarized in Table 4–Table 7. At this time the assumptions that were used in calculating the loading capacity are presumed to be valid, however, after future beneficial use monitoring occurs, the load capacity should be revaluated. If future beneficial use monitoring indicates that the water bodies are fully supporting or nearing support, the load capacity will be assumed correct. In the case that future beneficial uses monitoring indicates that beneficial uses are not being met, despite improving water quality, both the TMDL target and the load capacity will need to be considered for revision.

Table 4. Load capacity, lower Weiser River (Weiser River from Galloway Dam to Snake River ID17050124SW001_06, ID17050124SW001_06a).

Critical Period	Pollutant	Load Capacity
July	Bacteria (*E. coli*)	280,000 colony forming units
March	Sediment (total suspended solids)	301.0 tons/day
April		309.0 tons/day
May		301.0 tons/day
Year-round	Sediment (% fines)	30%
June–September	Thermal	See updated shade tables

Table 5. Load capacity, middle Weiser River (Weiser River from the Little Weiser River to Galloway Dam ID17050124SW001_05, ID17050124SW001_05a).

Critical Period	Pollutant	Load Capacity
February	Sediment (total suspended solids)	188.0 tons/day
March		295.0 tons/day
April		304.0 tons/day
May		307.0 tons/day
June		190.0 tons/day
Year-round	Sediment (% fines)	30%

Table 6. Load capacity, Crane Creek (Crane Creek Reservoir to Weiser River ID17050124SW003_05).

Critical Period	Pollutant	Load Capacity
July	Bacteria (*E. coli)*	3,530,000 colony forming units
Year-round	Sediment (% fines)	30%

Table 7. Load capacity, Little Weiser River (ID17050124SW008_03, ID17050124SW008_04).

Critical Period	Pollutant	Load Capacity
July	Bacteria (*E. coli)*	1,240,000 colony forming units
Year-round	Sediment (% fines)	30%

2.4 Load Allocations

The Weiser River TMDL was reviewed for data collected in 2003. The data indicated that the Cambridge and Council wastewater treatment plants were having negligible effects on water quality and did not assign any wasteload allocations, but it was suggested that wasteload allocations should be established at the current National Pollutant Discharge Elimination System permit level. The wasteloads were allocated to heat loads and not discussed in the TMDL.

Nonpoint load allocations are summarized below directly from the original Weiser River TMDL. At this time, there are no recommendations for changes in the load allocations, margin of safety (MOS), natural background, or the load allotted to nonpoint sources. At this time DEQ does not have sufficient additional data to recommend changes to the existing load allocations. However, it is possible that the loads may be further refined if/when additional data indicate impacts to water quality or impaired beneficial uses (Table 8–Table 11).

Table 8. Lower Weiser River load allocations (ID17050124SW001_06, ID17050124SW001_06a).

Critical Period	Allocation for Segment	Margin of Safety	Natural Background	Upstream Source Allocation	Nonpoint Source	Total Load Allocation
Pollutant—Bacteria (*E. coli*) (colony forming units)						
July	189,000	30,996	37,800	460,000	120,204	649,000
Pollutant—Sediment (total suspended solids) (tons/day)						
March	11.0	42.1	60.2	290.0	-91.3	301.0
April	19.0	43.3	61.8	290.0	-86.1	309.0
May	11.0	42.1	60.2	290.0	-91.3	301.0
Pollutant—Sediment (% fines)						
Year-round	30.0	4.9	8.6	0.0	16.5	30.0

Table 9. Middle Weiser River load allocations (ID17050124SW001_05, ID17050124SW001_05a).

Critical Period	Allocation for Segment	Margin of Safety	Natural Background	Upstream Source Allocation	Nonpoint Source	Total Load Allocation
Pollutant—Sediment (total suspended solids) (tons/day)						
February	144.7	13.4	28.9	43.3	102.3	188.0
March	196.6	18.3	39.3	98.4	139.0	295.0
April	127.0	11.8	25.4	177.0	89.8	304.0
May	131.9	12.3	26.4	175.0	93.3	307.0
June	125.5	11.7	25.1	64.5	88.7	190.0
Pollutant—Sediment (% fines)						
Year-round	30.0	4.9	8.6	0.0	16.5	30.0

Table 10. Crane Creek load allocations (Crane Creek Reservoir to Weiser River ID17050124SW003_05).

Critical Period	Allocation for Segment	Margin of Safety	Natural Background	Upstream Source Allocation	Nonpoint Source	Total Load Allocation
Pollutant—Bacteria (*E. coli*) (colony forming units)						
July	2,075,380	543,620	706,000	205,000	2,075,380	3,530,000
Sediment (% fines)						
Year-round	30.0	4.9	8.6	0.0	16.5	30.0

Table 11. Little Weiser River load capacity (ID17050124SW008_03, ID17050124SW008_04).

Critical Period	Allocation for Segment	Margin of Safety	Natural Background	Upstream Source Allocation	Nonpoint Source	Total Load Allocation
Pollutant—Bacteria (*E. coli*) (colony forming units)						
July	613,400	173,600	248,000	205,000	613,400	1,240,000
Pollutant—Sediment (% fines)						
Year-round	30.0	4.9	8.6	0.0	16.5	30.0

2.5 Margin of Safety

TMDLs commonly incorporate a MOS to account for uncertainty. A MOS may be expressed as either an implicit or explicit portion of a water body's loading capacity that is reserved to allow for uncertainty about the relationship between the pollutant loads and the quality of the receiving water body. The MOS is not allocated to any source of a pollutant. Commonly DEQ adds an explicit MOS (10%) to the required load reduction to ensure beneficial uses are supported.

The original TMDL addressed multiple areas of uncertainty and calculated specific margins of safety for each pollutant at various points in the river. Consequently, the MOS varies by pollutant. Some MOS parameters are based on the statistical analysis of existing data and are compared to water quality modeling results. Table 12 includes the MOS applied in the original Weiser River TMDL, along with a description of how they were developed. The MOS applied to pollutants in the Weiser River TMDL are similar to those applied in other TMDLs within Idaho and are presumed to be protective. At this time, the original MOS applied in the bacteria and sediment TMDLs appear to be adequate and in the range of other MOSs applied in TMDLS by DEQ throughout Idaho.

Table 12. Margin of safety and rationale for selected water bodies in the Weiser River subbasin.

Water Body	Pollutant	Margin of Safety	Rationale
Lower Weiser River	Bacteria	12.6% of load capacity	Based on relative range of duplicate samples
	Sediment (water column)	10.8% of load capacity	Square root error of modeling results
	Sediment (% fines substrate)	14.0% of load capacity	10% allowance for sampling error 4% allowance for analytical error
Middle Weiser River	Sediment (water column)	9.3% of load capacity	Square root error of modeling results
	Sediment (% fines substrate)	14.0% of load capacity	10% allowance for sampling error 4% allowance for analytical error
Crane Creek	Bacteria	15.4% of load capacity	Based on relative range of duplicate samples
	Sediment	10.4% of load capacity	Square root error of modeling results
	Sediment (% fines substrate)	14.0% of load capacity	10% allowance for sampling error 4% allowance for analytical error
Little Weiser River	Bacteria	14.0% of load capacity	10% allowance for sampling error 4% allowance for analytical error
	Sediment	12.2% of load capacity	Square root error of modeling results

2.6 Critical Periods

The Weiser River sediment TMDL focuses on seasonal variation, realizing that the watershed is heavily influenced by upper basin runoff, which varies dramatically on a year-to-year basis. The most significant sediment loads are delivered during these high flow events. The sediment TMDL is designed to account for these pulses of sediment that are associated with high flows by using a geometric mean that reduces the influences on the mean used in target evaluation.

The remaining sediment load left after accounting for high flow sediment loads is the load that is to be managed and reduced to meet the sediment target.

Bacteria loads were set using the critical summer months when contact recreation is most likely to occur, and surface water temperatures are higher and water levels are lower resulting in the highest levels of bacteria. The assumption is made that if the TMDL is protective during the most critical time period of the year, when water quality conditions are most affected, then the target will be protective throughout the year.

2.7 Reserve

There is no additional reserve for growth. Both pre- and post-TMDL data collection indicate that the Weiser and Little Weiser River and tributaries are at or below the sediment target for most of the year. Any additional sources will have to meet this target. There are multiple opportunities for reducing sediment loading within the watershed to allow for additional sources. For this reason the "no future reserve for growth" is reasonable.

2.8 PNV TMDL Review

For the Weiser River temperature TMDLs, we used a PNV approach. IDAPA 58.01.02.200.09 provides 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. Further discussion of water quality standards and natural background provisions is provided at *www.deq.idaho.gov/media/450667-natural_background_paper.pdf.*

The PNV approach is described briefly below. The procedures and methodologies used 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). This manual also provides a more complete discussion of shade and its effects on stream water temperature.

Existing Shade Estimates

Existing shade was estimated for 40 AUs (14 TMDLs and 26 sources) from visual interpretation of aerial photos or from modeling. 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).

Heat Source, a model created by Oregon DEQ, was used to model shade on the lower portion of Weiser River below the confluence of Little Weiser River. The *shadelator* portion of Heat Source was used to estimate existing shade based on topography and riparian vegetation found along the river. The model results replace our aerial interpretation of shade for that portion of the river only.

Solar Pathfinder Field Verification

The accuracy of the Heat Source model was field verified with a Solar Pathfinder at one site near the confluence with Little Weiser River. 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, 10 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 bankfull 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). Alternatively, one can randomly locate points of measurement by generating random numbers to be used as interval distances.

When possible, the sampler also measured bankfull 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.

No new pathfinder data have been collected since the completion of the original temperature TMDL (DEQ 2006b). However, one previous pathfinder site from that 2006 work was located in the Heat Source modeled reach just below where Little Weiser River empties into the Weiser River. Measured shade at this site was used to calibrate the *shadelator* model as best as possible given the limited amount of field data. An examination of current aerial photos suggests that shade has not changed substantially in that sampled reach. Figure 2 shows the relationship between those pathfinder data and the calibrated model.

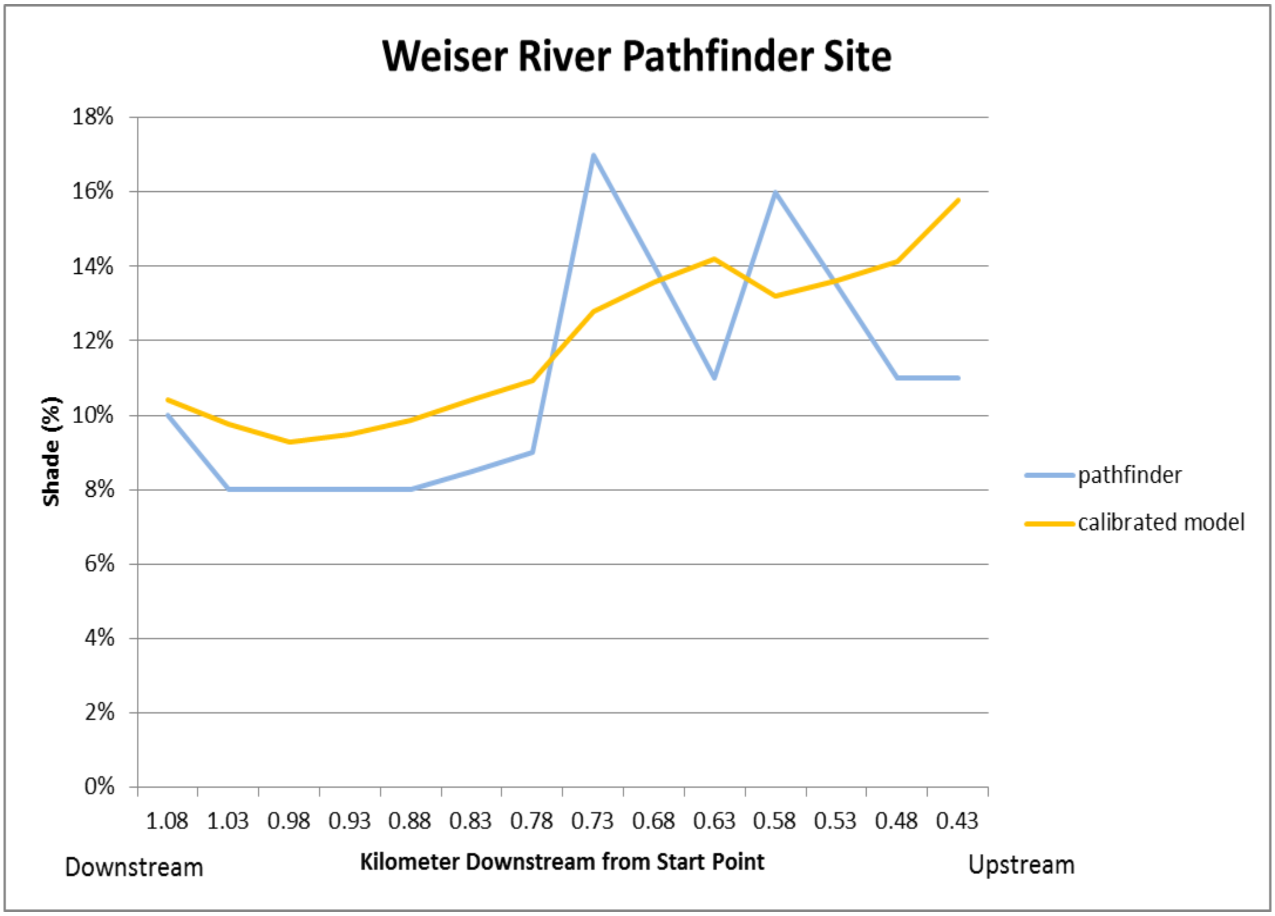

Figure 2. Weiser River pathfinder site used to calibrate model.

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 Bankfull Widths

Stream width must be known to calculate target shade since the width of a stream affects the amount of shade the stream receives. Bankfull 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 bankfull 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 so 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.

For each stream evaluated in the load analysis, natural bankfull width was retained from the previous TMDL analysis (DEQ 2006b). Channel widths for the lower Weiser River modeled reach were estimated every 50 meters from 10-meter digital elevation models (DEMs) using Oregon DEQ’s TTools ArcGIS extension. Those results are presented in Figure 3 and are used for channel widths in the lower Weiser River load analysis.

Design Conditions

In the previous Weiser subbasin temperature TMDL, riparian vegetation types were described as broad growth form categories such as conifer, conifer/meadow and cottonwood/shrub. Shade targets from shade curves to match these broad categories were selected from TMDLs found in other states (Oregon and Washington). The appropriate shade targets were selected from shade curves produced specifically for Idaho vegetation types (Shumar and De Varona 2009). Forest types were based on Payette National Forest Potential Vegetation Groups (PVGs), and non-forest types were selected by us based on likely distributions of willows, alder and black cottonwood.

The lower elevation portions of most tributaries and the Weiser River itself are dominated by black cottonwood communities. Some exceptions include (1) the canyon reaches of the Weiser River where basalt geology prevents the growth of cottonwood gallery forest and instead sagebrush hills are the dominant vegetation type; and (2) the Crane Creek watershed where yellow willow and sandbar willow largely dominate the riparian landscape.

Higher in the subbasin tributaries, some coniferous forest types appear such as hydric subalpine fir (PVG 9), moist grand fir (PVG 6), or dry grand fir (PVG 5) and progress through warm/dry Douglas fir (PVG 2), forest/shrub meadows and/or alders before entering into lower elevation types such as willows and cottonwood.

Shade Curve Selection

For this five-year review, conifer vegetation types were selected based on PVGs from the southwest Idaho Ecogroup of National Forests (Shumar and De Varona 2009). Non-coniferous forest and shrub vegetation types were selected from the southern Idaho Non-forest Group (Shumar and De Varona 2009). The southwestern Idaho black cottonwood community shade curve has been produced after that publication from field data collected in the Weiser, Payette and Boise Rivers subbasins. 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 Weiser River subbasin, curves for the most similar vegetation type were selected for shade target determinations. In some cases, specific shade curves were hybridized to produce shade targets for low gradient meadow systems where alder shrubs or grasses tended to dominate the near stream environment and forests were set back from the stream about 10 meters. These vegetation types are identified in load tables by the appropriate forest type followed by the words “shrub” or “meadow” (e.g., PVG9/shrub).

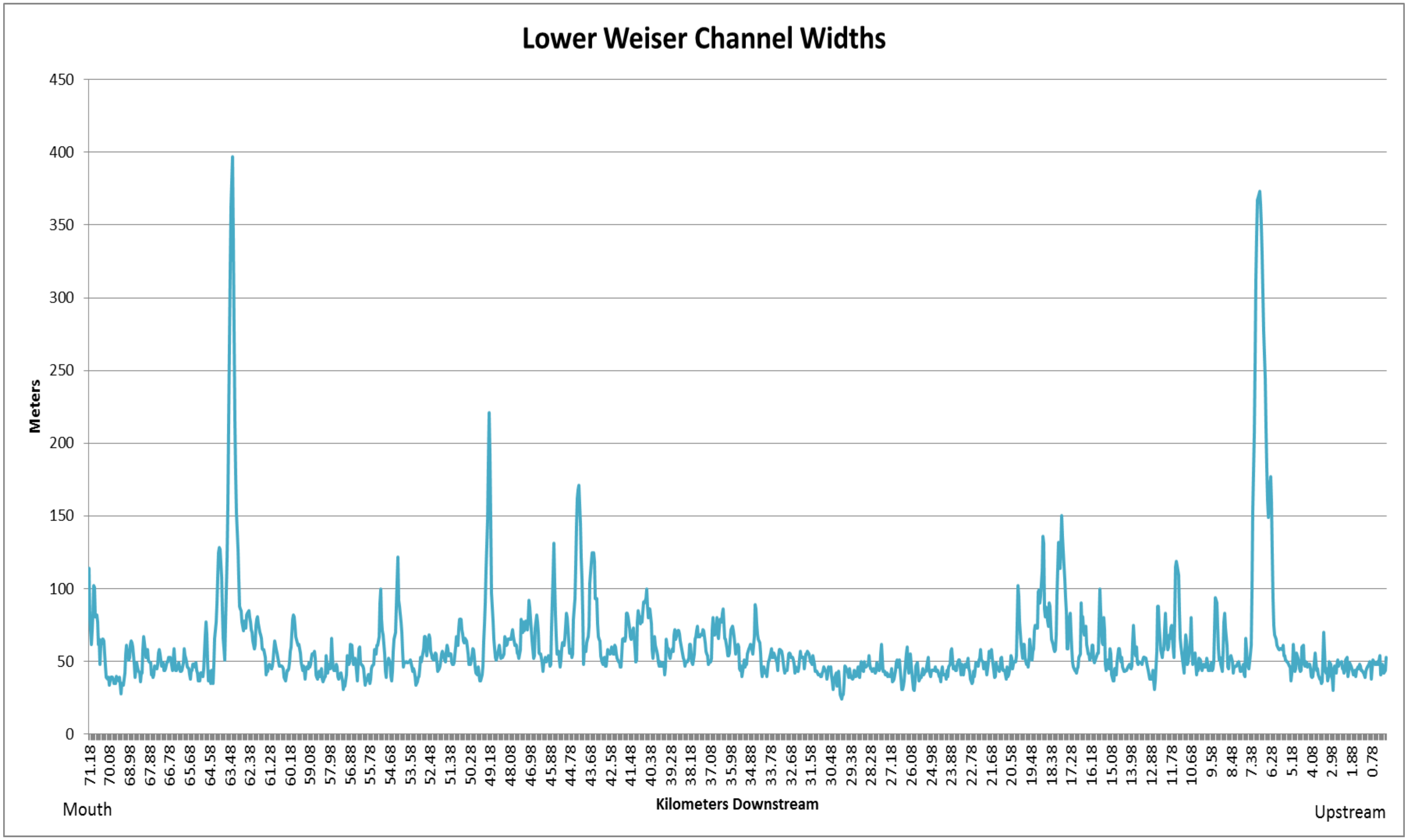

Figure 3. Channel widths measured every 50 meters for the lower Weiser River modeled reach (Little Weiser River confluence on right side of figure to mouth on left side of figure).

2.9 Load Capacity

The load capacity for a stream under PNV is essentially the solar loading 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 National Renewable Energy Laboratory (NREL) weather station in Boise, Idaho. 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 fall spawning is occurring. During this period, temperatures may affect beneficial uses such as 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.

It is important to note that the load analysis is about all the tributary streams originally examined in the 2006 Weiser River Subbasin Assessment and TMDL, not just the temperature impaired reaches listed in the Integrated Report. Therefore, information below relates to both TMDLs for impaired waters (Little Weiser River, Crane Creek, North Crane Creek, and lower Weiser River) and source loading information about all other waters examined. Tables A1 through A17 and Figure 4 show the new 2013 PNV shade targets for all streams except the lower modeled reach of Weiser River. 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 stream, not including the modeled reach, with the largest target load (i.e., load capacity) was Mann Creek (ID 17050124SW030_02 and ID 17050124SW030_03) with 5.4 million kWh/day (Table A-6). The smallest target load was in the West Branch Weiser River AU (ID 17050124SW007_02) with 33,000 kWh/day (Table A-13). The target load for the modeled reach of Weiser River, which included AUs ID17050124SW001_05, ID17050124SW007_05a, ID17050124SW001_06, and ID17050124SW001_06a, was 26 million kWh/day (data are not presented but are available from DEQ).

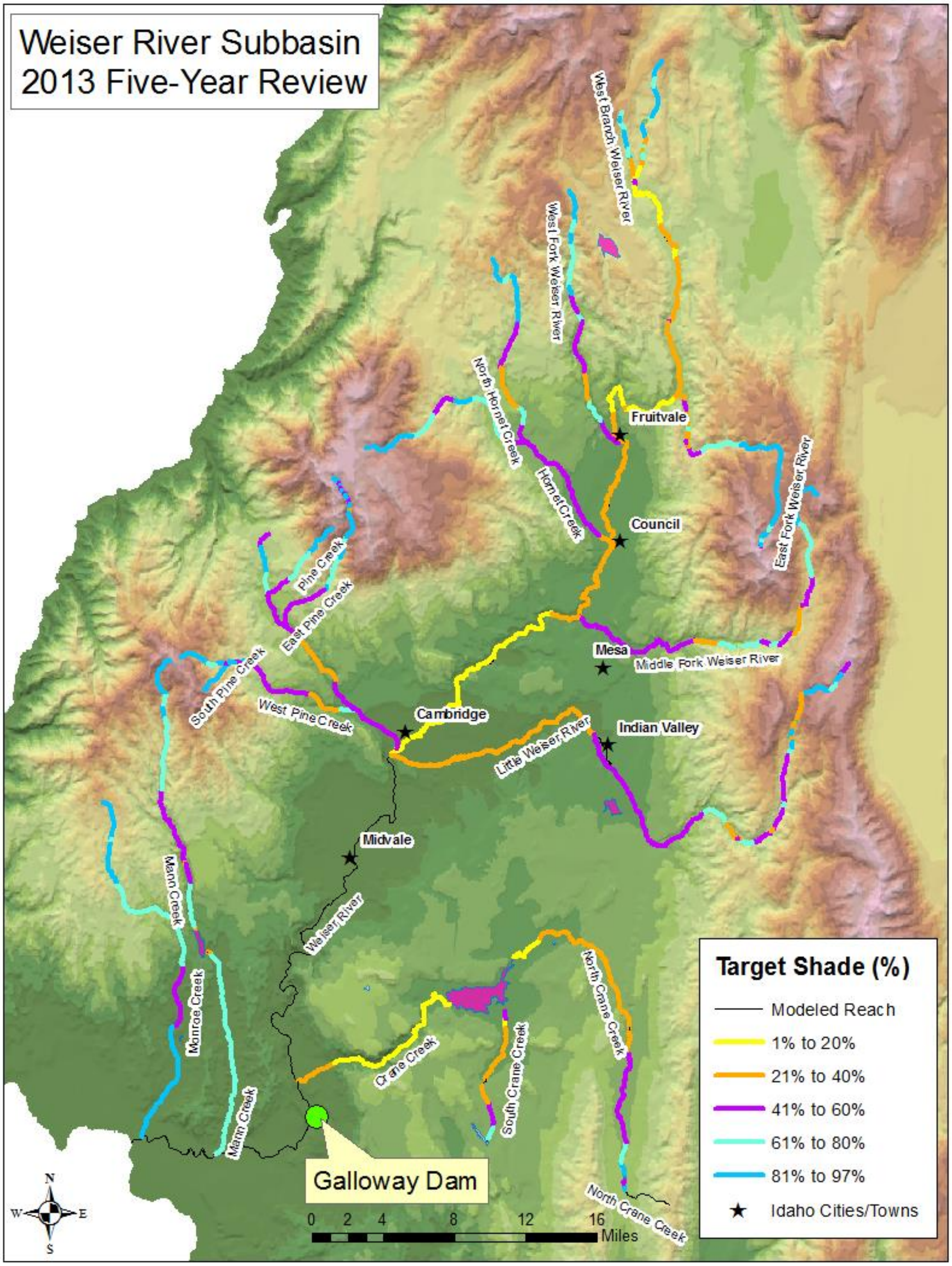

Figure 4. Target shade (2012) for Weiser subbasin.

2.10 Estimates of Existing Pollutant Loads

Existing loads in this 2013 temperature TMDL come from estimates of existing shade as determined from aerial photo interpretations in 2012 (Figure 5). Currently, there are no permitted point sources addressed 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 A1 through A17. Like load capacities (target loads), existing loads in Tables A1 to A17 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., lack of shade) discussed in section 2.11 and depicted in the lack-of-shade figure (Figure 6).

The stream, not including the modeled reach, with the largest existing load was Mann Creek (ID 17050124SW030_02 and ID 17050124SW030_03) with 5.8 million kWh/day (Table A-6). The smallest existing load was in the West Branch Weiser River AU (AU ID 17050124SW007_02) with 34,000 kWh/day (Table A-13). The existing load for the modeled reach of Weiser River, which included AUs ID17050124SW007_05a, ID17050124SW001_05, ID17050124SW001_06, and ID17050124SW001_06a, was 26.4 million kWh/day (data not presented but is available from DEQ).

Figure 7 presents the shade deficits that were determined in the previous 2006 temperature TMDL. Deficits have changed since 2006, primarily because of changes in shade targets resulting from switching to Idaho shade curves. Differences may also result from changes in shade as a result of new aerial photo interpretations and on the ground vegetation changes. Figure 8 displays a comparison between the 2006 deficits and 2012 deficits. Brown, yellow and red colors indicate that the conditions in 2012 are worse than depicted in 2006. Light blue to dark blue colors reflect improved conditions since 2006. Most of the headwater reaches and the upper portion of the Weiser River have improved in the new analysis. We believe this is the result of using better shade targets that are more applicable to existing riparian plant communities. Lower reaches of tributaries, those primarily in the cottonwood zone did not improve. Shade targets used in the 2006 TMDL for black cottonwood communities were likely insufficient targets.

Existing and Target shade levels for the modeled reach of the Weiser River are presented in Figure 9. Existing shade as calculated by the model were compared to target shade levels from either the western Idaho black cottonwood shade curve described above or the sagebrush/grass shade curve (Shumar and De Varona 2009). Shade deficits (difference between target and existing shade) for the lower Weiser River modeled reach are presented in Figure 10.

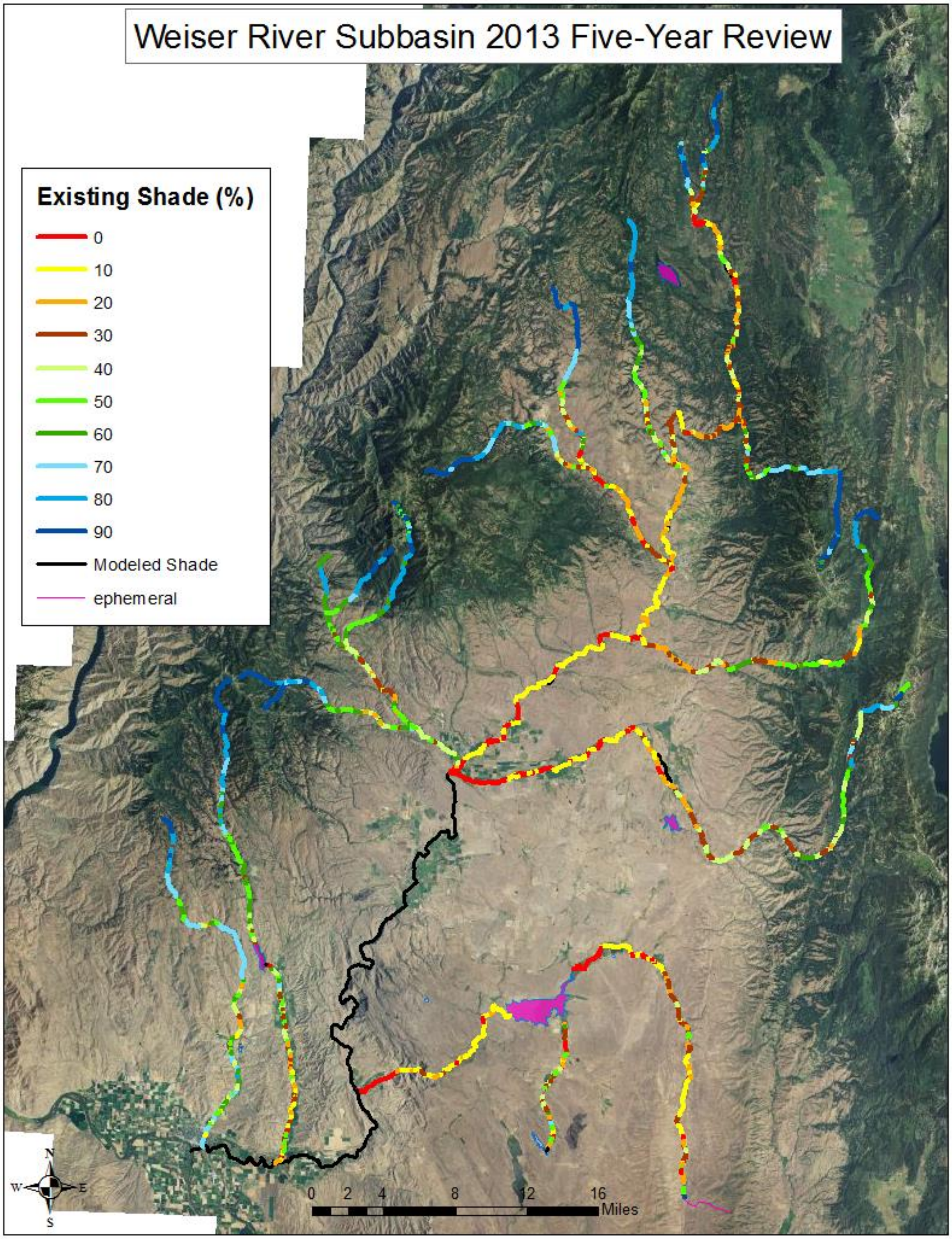

Figure 5. Existing shade estimated for Weiser River subbasin by aerial photo interpretation in 2012.

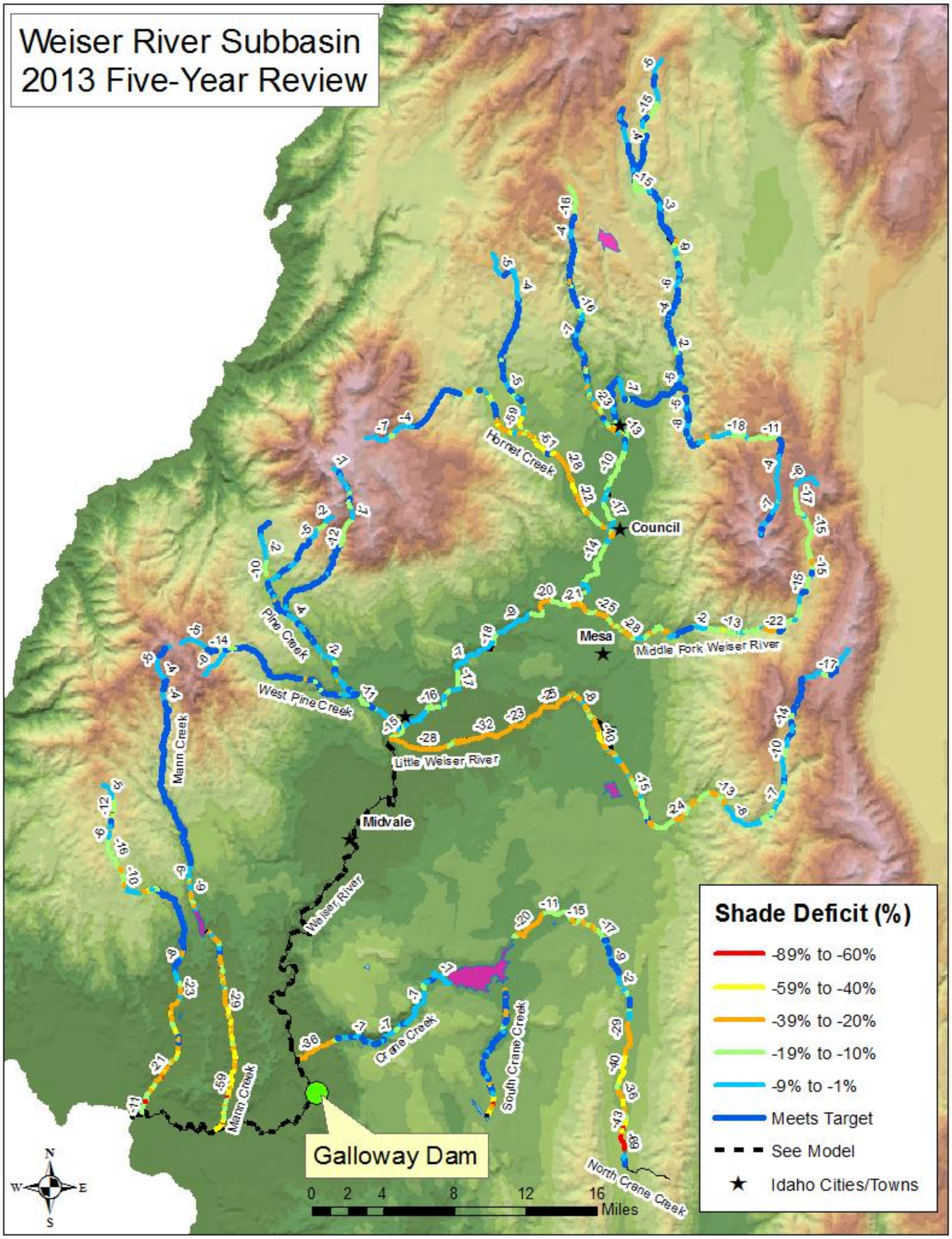

Figure 6. Shade deficits (difference between existing and target) for Weiser River subbasin in 2012.

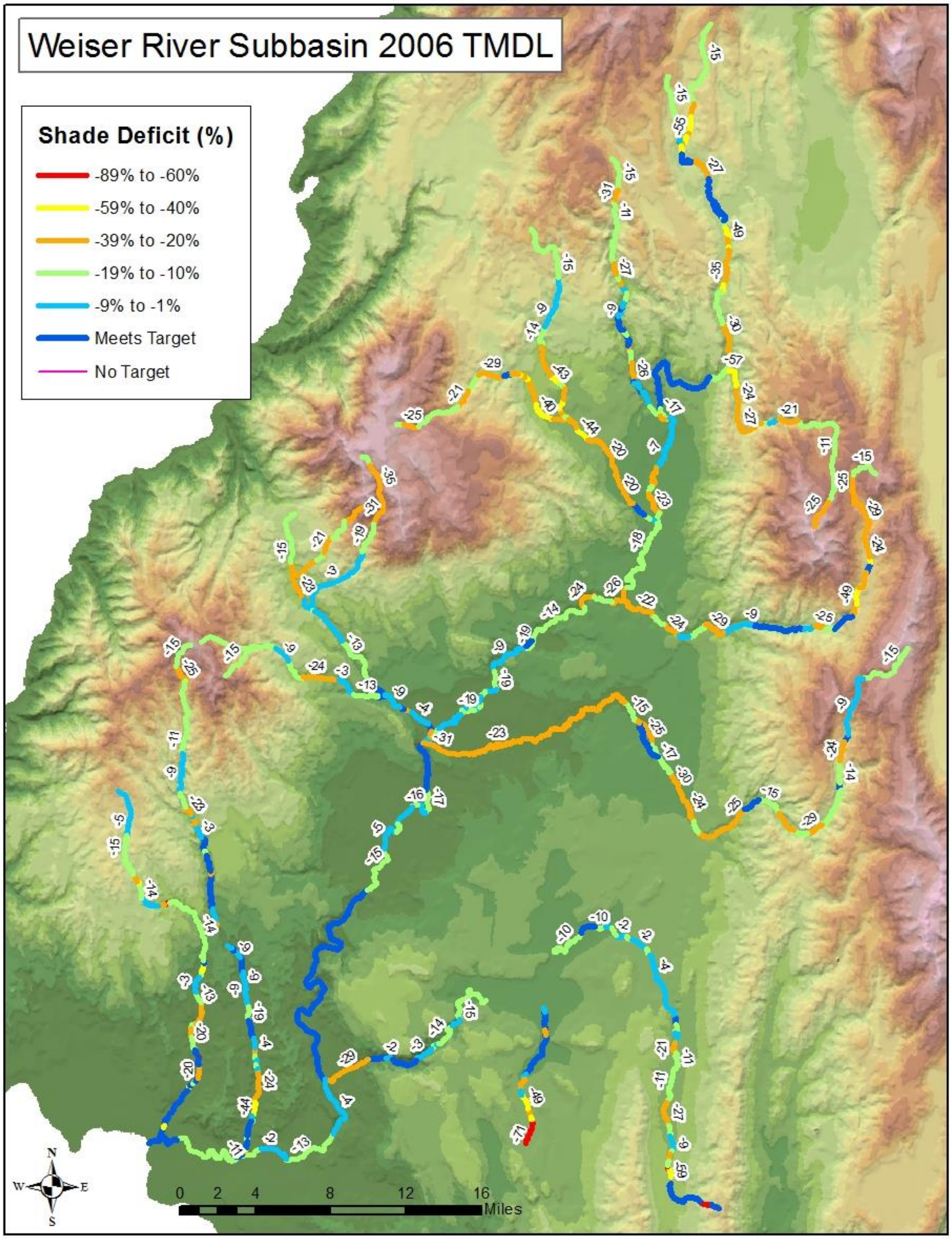

Figure 7. Shade deficits for the Weiser River subbasin in 2006 (DEQ 2006b).

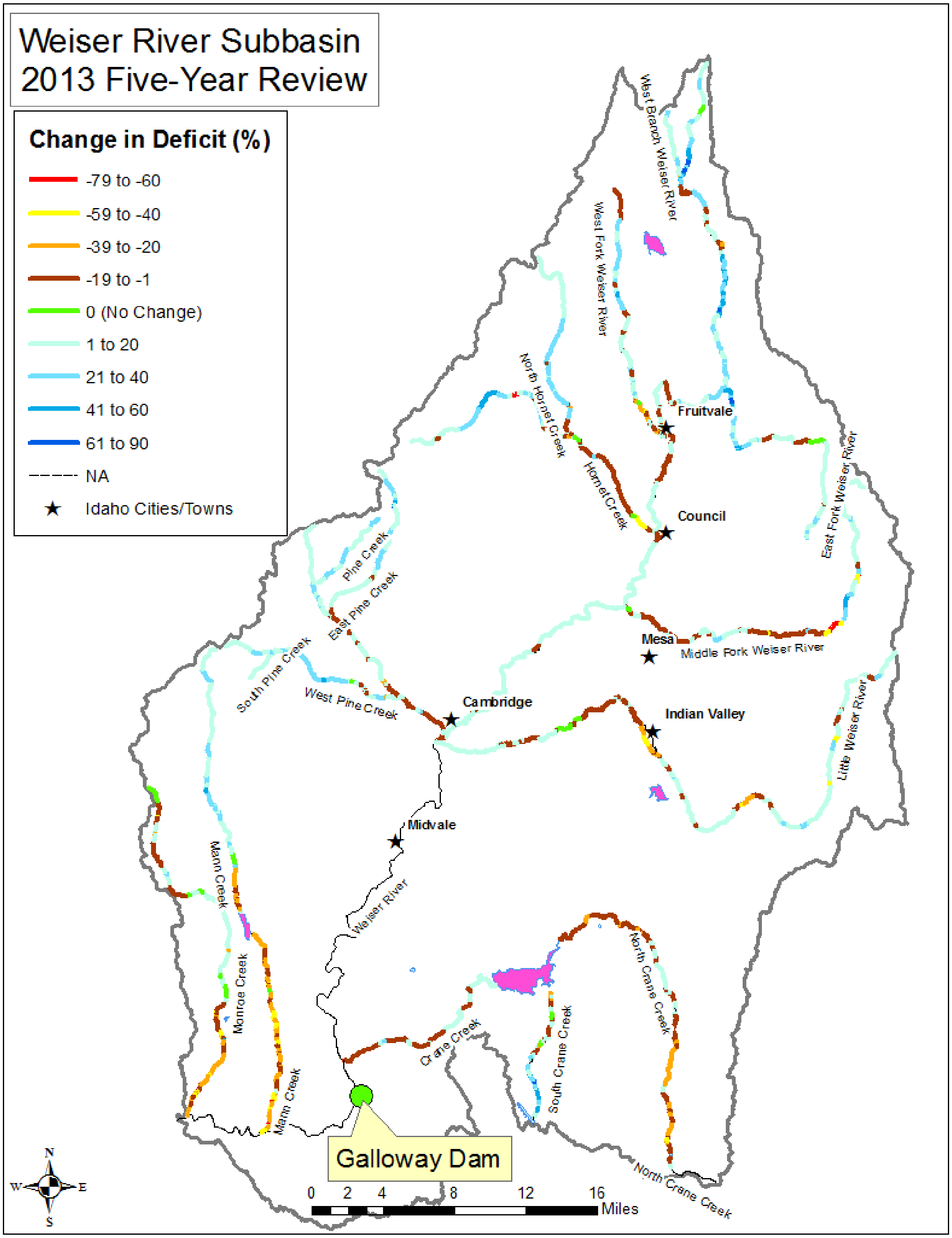

Figure 8. Changes in shade deficits from 2006 to 2012.

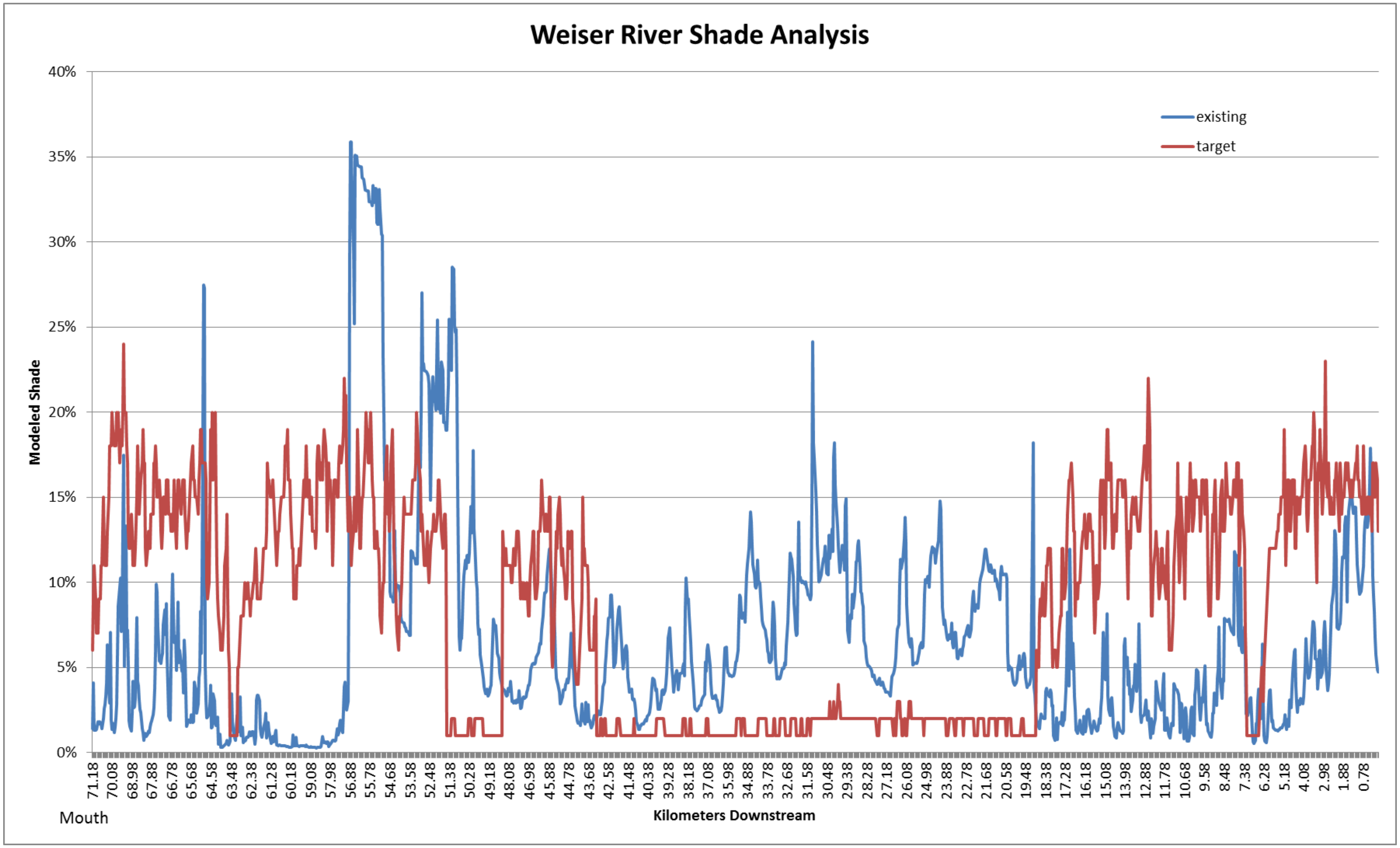

Figure 9. Existing and target shade as modeled every 50 meters for the lower Weiser River (Little Weiser River to mouth).

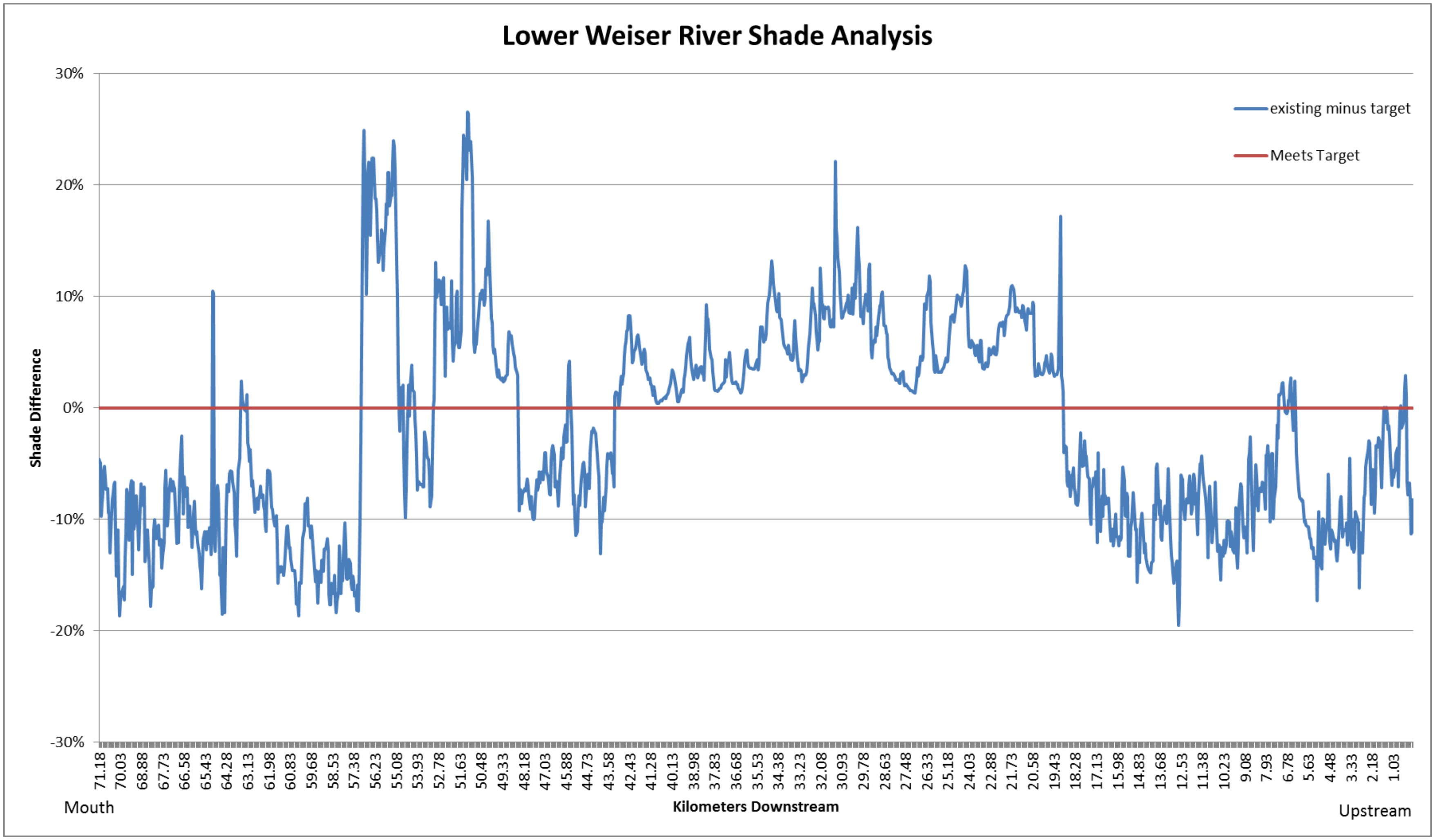

Figure 10. Shade deficit analysis as modeled every 50 meters for the lower Weiser River (Little Weiser River to mouth).

2.11 Load and Wasteload Allocation

Because this TMDL is based on PNV, which is equivalent to background loading, 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 load for a given segment. Tables A1 to A17 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.

It is important to note that the load analysis is about all tributary streams originally examined in the 2006 Weiser River Subbasin Assessment and TMDL, not just the temperature impaired reaches listed in the Integrated Report. Therefore, the information below relates to both TMDLs for impaired waters (Little Weiser River, Crane Creek, North Crane Creek, and lower Weiser River) and source loading information for all other waters examined. Table 13 shows the total existing, target, and excess loads and the percent reduction needed 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 13 compares loads generated for the 2006 TMDL document to loads generated in the present analysis. Streams are tallied as whole streams and may include several AUs. Therefore, it is not possible to compare AU to AU or stream to stream within a given year.

Although this 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 13 and provides a general level of comparison among streams.

Table 13. Comparison of solar loads and percent reductions between 2006 and 2012 for all waters.

Stream Name	2006				2012			
	Target Load	Existing Load	Excess Load	Reduction	Target Load	Existing Load	Excess Load	Reduction
Crane Creek†	2,635,565	3,019,998	384,433	13	1,900,000	2,200,000	290,000	13
East Pine Creek	130,918	186,819	55,902	30	160,000	160,000	640	0
EF Weiser River	101,501	278,053	176,552	63	350,000	290,000	57,000	16
Hornet Creek	926,662	1,405,763	479,100	34	830,000	1,200,000	410,000	34
Little Weiser River†	3,864,157	5,362,773	1,498,616	28	3,500,000	5,000,000	1,400,000	28
Mann Creek	1,319,965	1,554,385	234,420	15	5,400,000	5,800,000	340,000	6
MF Weiser River	1,131,670	1,569,799	438,129	28	1,000,000	1,400,000	320,000	23
Monroe Creek	481,196	594,552	113,356	19	320,000	460,000	140,000	30
North Crane Creek†	2,039,241	2,240,898	201,657	9	1,300,000	1,700,000	370,000	22
North Hornet Creek	208,031	353,337	145,306	41	280,000	340,000	62,000	18
Pine Creek	685,461	779,751	94,290	12	710,000	760,000	50,000	7
South Crane Creek	317,425	339,741	22,317	7	350,000	380,000	27,000	7
West Branch Weiser	16,702	28,149	11,447	41	33,000	34,000	1,500	4
West Pine Creek	124,513	191,323	66,810	35	280,000	250,000	0	0
WF Weiser River	347,516	478,717	131,201	27	380,000	480,000	100,000	21
Weiser River (upper)	1,482,364	1,814,013	331,649	18	2,200,000	2,100,000	0	0
Weiser River (lower)†	33,726,281	36,960,839	3,234,559	9	34,800,000	36,400,000	1,750,000	5

*†*Integrated Report listed as impaired for temperature (DEQ 2010).
Note: Load data are in kilowatt hours per day (kWh/day), and 2012 data are rounded to two significant figures, which may present rounding errors.

The comparison between loads in the 2006 TMDL to those generated in this five-year review (2012) shows that most streams' load conditions improved or stayed the same. Percent reductions in existing loads needed to meet target loads increased in only two streams, Monroe Creek and North Crane Creek. Percent reductions stayed the same in Crane Creek, Hornet Creek, Little Weiser River, and South Crane Creek; and decreased in all the other streams. Only Crane Creek, North Crane Creek, lower Weiser River, and Little Weiser River are temperature impaired waters according to the Integrated Report. Data in Table 13 suggest that other water bodies may have temperature issues as well and should be examined more thoroughly.

The total target, existing, and excess loads for the modeled reach of the lower Weiser River were 26 million, 26.4 million, and 450,000 kWh/day, respectively; a necessary reduction of only 2% (not previously displayed). Figure 10 shows shade deficit results from the model that are similar to the results obtained in the 2006 TMDL. The modeled reach of the Weiser River tends to lack shade in the cottonwood areas and enjoys shade greater than targets in the canyon reaches due to the abundance of topographic shade. The canyon reaches tend to compensate for the lack of shade in the more open cottonwood areas resulting in low deficits overall. To make a comparison in Table 13 between 2006 and 2012 for the lower Weiser River, a portion of the non-modeled reach had to be included with the modeled reach. Thus, target and existing loads were on the order of 34 to 36 million kWh/day with a 5% reduction needed.

Table 13 also shows that several streams are essentially at target load levels and are not in need of reductions. They are East Pine Creek, West Pine Creek, and the upper portion of the Weiser River. These streams were erroneously assumed to be in worse condition in 2006; and now through the application of more appropriate and refined shade targets are considered in good condition.

All waters (Crane Creek, North Crane Creek, Little Weiser River, lower Weiser River) that were listed as impaired for temperature in the Integrated Report (§303(d) list) have been identified as lacking shade. Major tributary contributors to the Weiser River (West Fork, Middle Fork, and East Fork Weiser River, Hornet Creek, Monroe Creek, and Mann Creek) also lack shade and have excess solar loads. Although water temperature data do not exist to confirm or deny if these major contributors exceed temperature criteria, these are a data gap that DEQ hopes to fill at some time in the future.

A certain amount of excess load is potentially created by the existing shade/target shade difference inherent in the loading analysis. Because existing shade is reported as a 10% shade class and target shade is 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 bankfull width. If existing shade on that segment were at target level, it would be recorded as 80% in the loading analysis because it falls into the 80% existing shade class. There is an automatic difference of 6%, which could be attributed to the MOS.

2.11.1 Margin of Safety

The MOS 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 loading analysis. Although the loading 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.

2.11.2 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.

3 Beneficial Use Status

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

Existing uses under the 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." Designated uses are specifically listed for Idaho water bodies in IDAPA 58.01.02.003.27 and .02.109.02.160 (in addition to citations for existing and presumed uses).

Undesignated uses are to be designated. 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 will apply the numeric cold water aquatic life criteria and primary or secondary contact recreation criteria to undesignated waters.

Beneficial uses in the Weiser River subbasin vary by water body from presumed to designated and include cold water aquatic life, salmonid spawning, primary contact recreation, secondary contact recreation, and drinking water. Table 14 includes the beneficial uses for all listed water bodies in the subbasin

Table 14. Beneficial uses of TMDL water bodies.

Water Body Description	Assessment Unit	Beneficial Uses[a]	Type of Use (designated, existing, presumed)
Weiser River—Keithly Creek to Crane Creek	ID17050124SW001_05	COLD, PCR, DWS	Designated
Weiser River—Crane Creek to Galloway Dam	ID17050124SW001_06	COLD PCR, DWS	Designated
Weiser River—Galloway Dam to Snake River	ID17050124SW001_06a	COLD, PCR, DWS	Designated
Crane Creek—Crane Creek Reservoir Dam to mouth	ID17050124SW003_05	COLD, PCR	Designated
North Crane Creek—500-meter segment above reservoir	ID17050124SW004_04	COLD, PCR	Designated
South Crane and Tennison Creeks	ID17050124SW005_02	COLD, SCR	Presumed
South Crane Creek—3rd order	ID17050124SW005_03	COLD, SCR	Presumed
South Crane Creek	ID17050124SW005_04	COLD, SCR	Presumed
North Crane Creek	ID17050124SW006_02	COLD, SCR	Presumed
North Crane Creek	ID17050124SW006_03	COLD, SCR	Presumed
North Crane Creek—Middle Creek to Reservoir	ID17050124SW006_04	COLD, SCR	Presumed
Weiser River—Hornet Creek to Little Weiser River	ID17050124SW007_05	COLD, SCR	Presumed
Weiser River—Little Weiser River to Keithly Creek	ID17050124SW007_05a	COLD, SCR	Presumed
Little Weiser River—3rd order	ID17050124SW008_03	COLD, SS, PCR, DWS	Designated
Little Weiser River—Grays Creek to mouth	ID17050124SW008_04	COLD, SS, PCR, DWS	Designated

a. Cold water aquatic life (CW), salmonid spawning (SS), primary contact recreation (PCR), secondary contact recreation (SCR), domestic water supply (DWS)

Beneficial uses are protected by a set of criteria, which include *narrative* criteria for pollutants such as sediment and nutrients and *numeric* criteria for pollutants such as bacteria, dissolved oxygen, pH, ammonia, temperature, and turbidity (IDAPA 58.01.02.250). Table 15 includes the most common numeric criteria used in TMDLs; Figure 11 provides an outline of the stream assessment process for determining support status of the beneficial uses of cold water aquatic life, salmonid spawning, and contact recreation.

Table 15. Common numeric criteria supportive of designated beneficial uses in Idaho water quality standards.

Water Quality Parameter	Designated and Existing Beneficial Uses			
	Primary Contact Recreation	**Secondary Contact Recreation**	**Cold WaterAquatic Life**	**Salmonid Spawning**[a]
Water Quality Standards (IDAPA 58.01.02.250)				
Bacteria, pH, and dissolved oxygen	Less than 126 *E. coli*/100 mL[b] as a geometric mean of five samples over 30 days; no sample greater than 406 *E. coli* organisms/100 mL	Less than 126 *E. coli*/100 mL as a geometric mean of five samples over 30 days; no sample greater than 576 *E. coli*/100 mL	pH between 6.5 and 9.0 DO[c] exceeds 6.0 mg/L[d]	pH between 6.5 and 9.5 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[e]			22 °C or less daily maximum; 19 °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
			Seasonal cold water: between summer solstice and autumn equinox: 26 °C or less daily maximum; 23 °C or less daily average	
Turbidity			Turbidity shall not exceed background by more than 50 NTU[f] instantaneously or more than 25 NTU for more than 10 consecutive days	
Ammonia			Ammonia not to exceed calculated concentration based on pH and temperature	

Water Quality Parameter	Designated and Existing Beneficial Uses			
	Primary Contact Recreation	**Secondary Contact Recreation**	**Cold WaterAquatic Life**	**Salmonid Spawning[a]**
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. Dissolved oxygen
d. Milligrams per liter
e. Temperature exemption—exceeding the temperature criteria will not be considered a water quality standard violation when the air temperature exceeds the 90th 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.
f. Nephelometric turbidity units

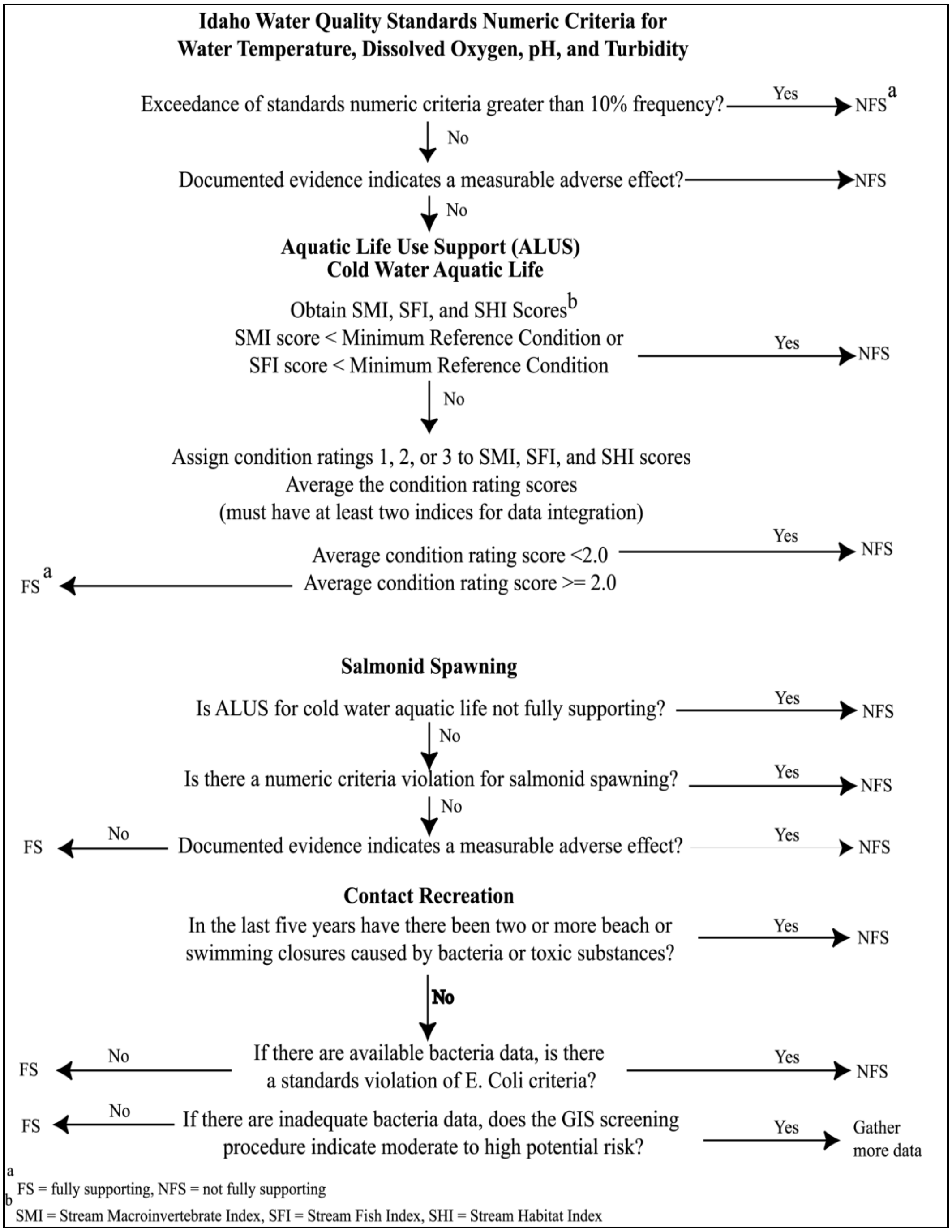

Figure 11. Determination steps and criteria for determining support status of beneficial uses in wadeable streams (Grafe et al. 2002).

3.1 Changes to Subbasin Characteristics

While agriculture is the dominate land use across the Weiser River subbasin, it includes forested areas in the upper elevations, rangelands, and some urban areas. Figure 12 shows the land use in the subbasin. Table 16 shows the acreage and percent of total land use in the Weiser River subbasin.

The Weiser River subbasin is split between Washington and Adams County and includes the cities of Weiser, Midvale, Cambridge, and Council. Land ownership in both counties is a mixture of private, state, county, city, and federally managed lands. Federal and state lands are generally associated with the rangeland and forest. State lands, which are managed for the public school endowment fund, are used primarily for animal grazing or forest products. The Idaho Department of Lands is the primary land manager for state endowment lands. The United States Forest Service and Bureau of Land Management are responsible for managing much of the federal lands within the subbasin.

Gravity irrigated agriculture can be found throughout the subbasin. Most of the surface irrigated areas are adjacent or near rivers and streams. Near the confluence of the Weiser River with the Snake River and the town of Weiser, much of the irrigated areas are on benches (e.g., Sunny Slope) or in the Weiser Flats area. In Indian Valley, irrigation water is either diverted from the river, delivered from storage water from the Ben Ross Reservoir, or pumped to the desired location. Near Midvale, irrigation water is diverted from the Weiser River and delivered via irrigation canals. Some dry land agriculture exists as well, but the acreage is small due to the lack of precipitation events during summer months.

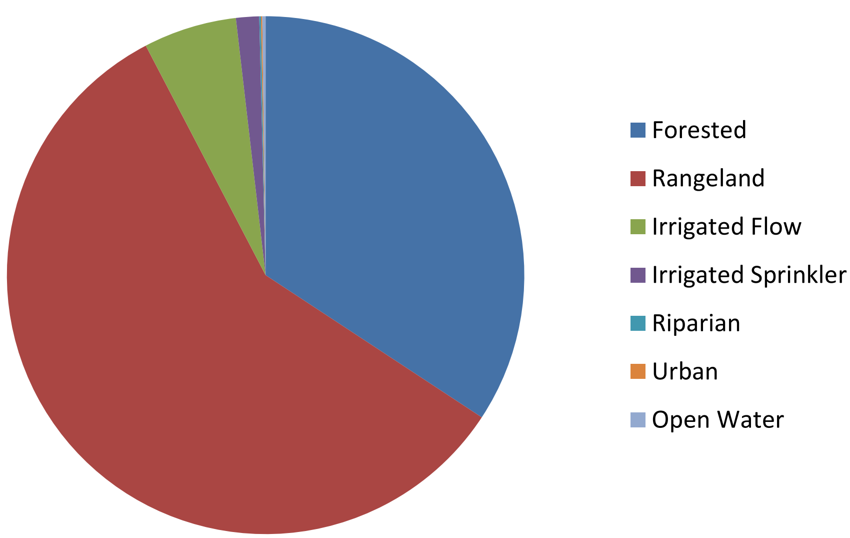

Figure 12. Land uses in Weiser River subbasin.

Table 16. Land ownership in Weiser River subbasin.

Landowner	Acreage	Percent of Total
Private	541,854	50.20%
Public		
State of Idaho	61,134	5.70%
Open Water	3,490	0.30%
US Forest Service	308,406	28.60%
Bureau of Land Management	164,259	15.20%
Total	1,079,143	100.00%

According to the Weiser River WAG, land use across the subbasin has remained relatively stable with only minor development related to housing with negligible land conversion. This trend is expected to remain the same for the foreseeable future.

The biggest proposed change in land use and water resources is the proposed Galloway Dam, which if approved, will inundate several miles of river upstream of the current Galloway Dam. This will have significant impacts on local economies such as farming and ranching. It may provide flood control, but no new water rights are anticipated by its construction. There is a possibility that it will flood or nearly flood the old mercury mine in the region. If constructed it would likely become a sediment "sink" as the Weiser River system produces large seasonal sediment loads. This has the potential to exacerbate nutrient problems, impact cold water fisheries and created unintended consequences for water quality. Temperatures in the river would increase due to the large surface area exposed and the reduction of streamflow moving through the system naturally. Historically the Weiser River was a migration corridor for A-run Steelhead that spawned in the Little Weiser River. With the completion of the Hells Canyon Dam complex and the failure of its fish ladders to provide fish passage, the A-run Steelhead cannot make their way currently. There has been discussions through the Idaho Power Relicensing efforts to remedy this problem and possibly repatriate A-run Steelhead. If the dam proposal bears fruit this would also diminish the viability of restoring A-run Steelhead. Dependent upon future decisions a Use Attainability Analysis may need to be conducted and dependent upon the results, the water quality standards and designated uses revised.

Water quality data collection on the Weiser River, Little Weiser River, and tributaries has been sparse since the approval of the TMDL. While the original data set is rich, consisting of multi-year monthly data, post-TMDL data collection focused on the targets set within the TMDL, a 30-day geometric mean. It is difficult to compare the two data sets on a before and after basis, or discern real trends in water quality improvement. The data can, however, be used to determine if the target is being achieved at any given time. In addition to monitoring compliance with TMDL targets, future data collection should also identify long-term trends in water quality. Future data collection should include 30-day geometric mean data for TMDL target evaluation in addition to monthly samples from approximately February through July. These monthly samples will allow a comparison to pre-TMDL data and identify long-term trends and overall BMP effectiveness. DEQ should also perform occasional synoptic monitoring during the irrigation season to ensure the target is being met during this period too.

A formal request for data was made to the WAG and other agencies in August 2013. Water column sediment data received and analyzed for the five-year review consisted of DEQ and Bureau of Reclamation data. No surface or subsurface fine data were available at the time of this review, although this should be a priority of future monitoring. *E. coli* data were limited to that which DEQ collected in accordance with IDAPA, and while much of it fell within the 30-day sampling criteria, a few samples were 1 day outside the geometric mean criteria.

Idaho Fish and Game has not collected any recent fish data for the Weiser River, Little Weiser River, and selected tributaries. Fish data are critical in assessing beneficial use status since no Beneficial Use Reconnaissance Program (BURP) sites were located on the Weiser River, Little Weiser River, or Crane Creek. DEQ should assess these reaches using BURP and large river BURP protocols in the future. A large rivers BURP site near Council failed fish metrics due to presence of Smallmouth Bass and no salmonids during electrofishing attempts. However, the macroinvertebrates were healthy.

The Weiser River has minimal effective storage capacity and is subject to highly variable flows, which are wholly dependent upon snow pack and rainfall. It is subject to low water during drought years and extreme high flows during wet years. The samples were taken during typical spring high flow events.

The USGS Gage (1326600) on the Weiser River is located 10 miles east of Weiser, Idaho, and 2 miles downstream of Crane Creek. This gage would likely be inundated by the construction of the proposed Galloway Dam. Figure 13 illustrates the high natural variability in discharge that the river experiences. Spring flows regularly exceed 5,000 cubic feet per second (cfs). The majority of the sediment load in the system is transported during these high flow events. Figure 13 illustrates that variability in flow on the Weiser River from 1952 to 2012, while Figure 14 and Figure 15 show the flows for 2011 and 2012 during the sampling periods at USGS Gage 13266000, which is located near Weiser, Idaho.

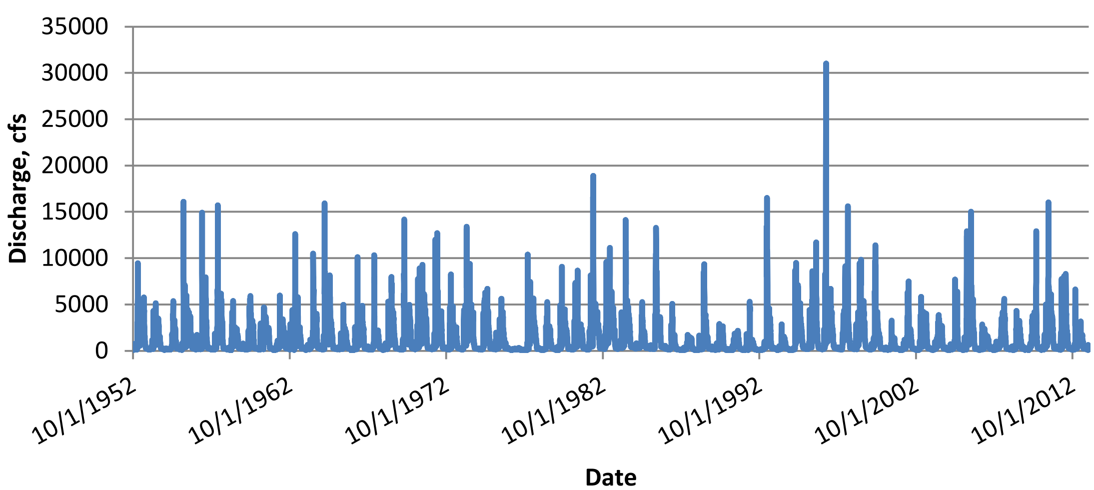

Figure 13. Historic flow (1952–present) for Weiser River at USGS Gage 1326600 near Weiser, Idaho.

Sediment data consisted of either DEQ or Bureau of Reclamation TSS monitoring data. DEQ collected weekly TSS data from March to May in both 2011 and 2012 at the TMDL compliance points. The Bureau of Reclamation collected monthly TSS data on the Weiser River at Weiser from 2001 to 2008. DEQ samples in accordance with the protocol outlined in the TMDL during high flow spring runoff. Figure 14 illustrates the discharge at the USGS Gage 1326600 near Weiser, Idaho. The flows are representative of what occurs in other water years. Unfortunately, this USGS gage is the only site on the Weiser River that provides discharge data. For this reason no other flow data are available. It is often not possible to collect flow data at many of these sites due to the high flow of the river. However, all future data collection should make a good faith effort to quantify flow. The lack of flow data limit DEQ's ability to calculate daily loads at each monitoring location because the Weiser River is a modified system with multiple irrigation withdrawals and returns. To calculate TMDLs at each monitoring and control point, DEQ or other monitoring entities would likely have to employ the use of acoustic Doppler profiling equipment or other flow measuring devices during high flow events.

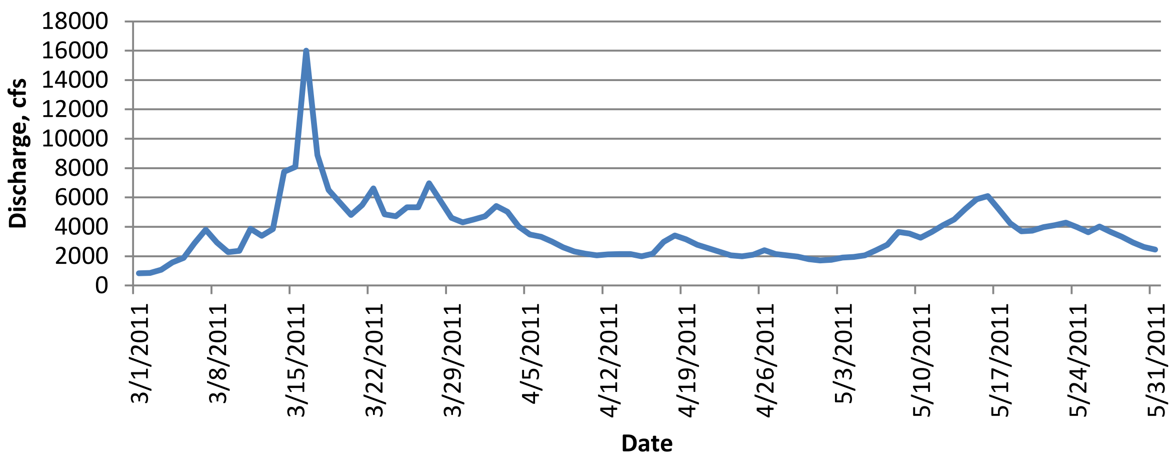

Figure 14. Discharge for the Weiser River at USGS Gage 1326600 near Weiser, Idaho, March 1, 2011 to May 31, 2011.

DEQ performed additional monitoring at multiple sites on the Weiser and Little Weiser Rivers in 2012 between March and May. Only the site near Galloway Dam has any associated flow data. Figure 15 indicates that total discharge during spring runoff and the sampling events was similar to the high flow spring runoff event in 2011 and the historical data set.

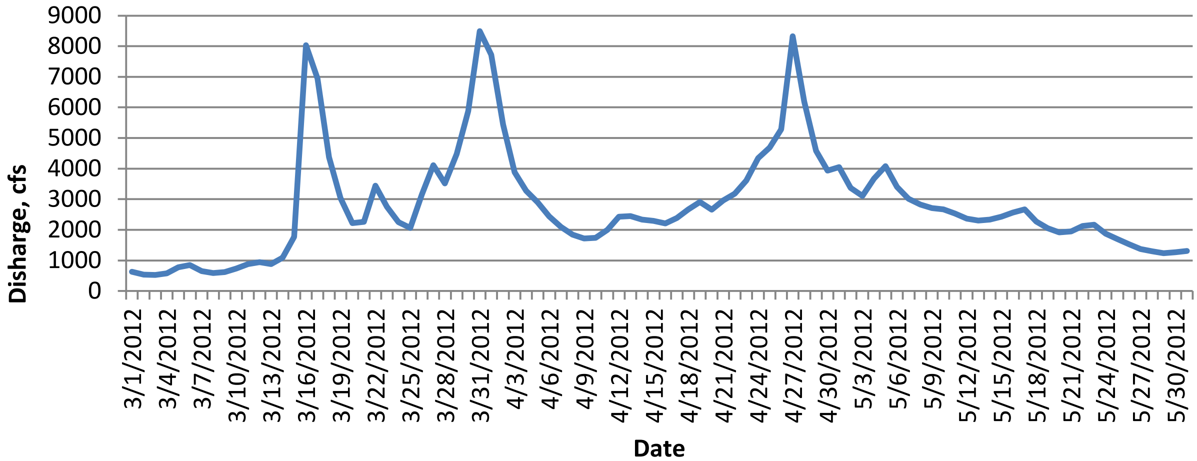

Figure 15. Discharge for the Weiser River at USGS Gage 1326600 near Weiser, Idaho, March 1, 2012 to May 31, 2012.

DEQ collected TSS data at each of the control and monitoring points set out in the TMDL, which are as follows: Weiser, Idaho, Galloway Dam, Crane Creek, Midvale, Idaho, and the Little Weiser River near Cambridge, Idaho.

Figure 16 illustrates the individual results of DEQ's TSS monitoring for the Weiser River at Weiser, Idaho, in both 2011 and 2012. Table 17 lists the resultant 14- and 30-day geometric means for both 2011 and 2012. The same data are used to calculate 14- and 30-day averages; several averages are calculated during each monitoring year and are listed in Table 17. While Figure 16 shows that some individual samples clearly exceed the 50 mg/L for TSS, Table 17 shows that both the 14- and 30-day targets (80 mg/L and 50 mg/L, respectively) are being met. The geometric mean target accounts for high flow sediment loads.

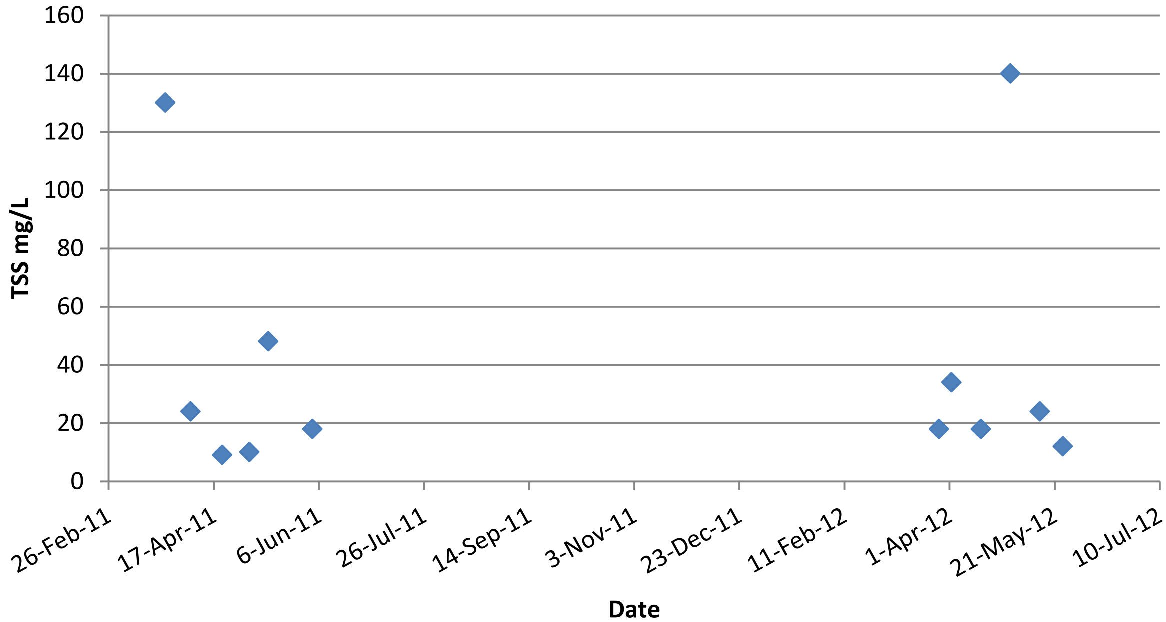

Figure 16. Total suspended solids at Weiser River at Weiser, Idaho, 2011–2012.

Table 17. TSS geometric mean results for 2011 and 2012 for Weiser River at Weiser, Idaho.

Weiser River at Weiser, Idaho			
2011		2012	
TSS (mg/L) 30-day geometric mean	TSS (mg/L) 14-day geometric mean	TSS (mg/L) 30-day geometric mean	TSS (mg/L) 14-day geometric mean
30	56	22	25
13	15	44	25
16	9	39	50
21	22	34	58
—	29	—	17

Notes: total suspended solid (TSS); milligram per liter (mg/L)

Figure 17 illustrates the individual results of DEQ’s TSS monitoring in both 2011 and 2012 for the Weiser River at the Galloway Dam, while Table 18 shows the resultant 14- and 30-day geometric means for both 2011 and 2012. While Figure 17 shows that some individual samples clearly exceed the 50 mg/L for TSS, Table 18 shows that both the 14- and 30-day targets (80 mg/L and 50 mg/L, respectively) are being met.

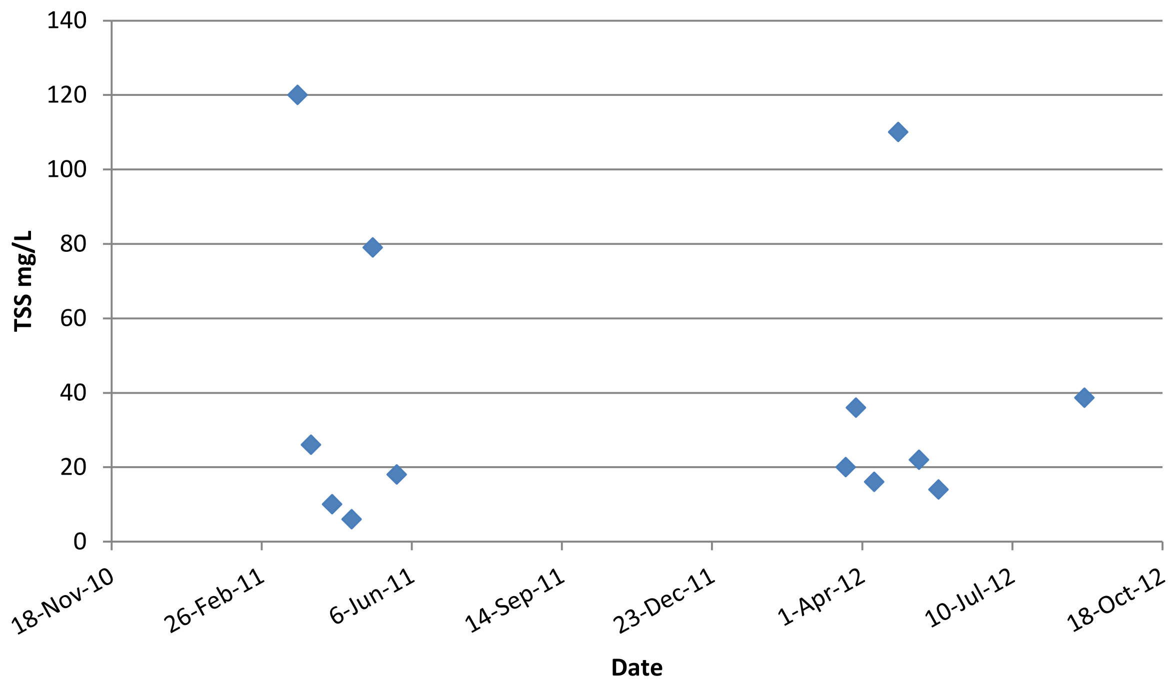

Figure 17. Total suspended solids at Galloway Dam, Weiser River for 2011–2012.

Table 18. TSS geometric mean results for 2011 and 2012 for Weiser River at Galloway Dam.

Weiser River at Galloway Dam			
2011		2012	
TSS (mg/L) 30-day geometric mean	TSS (mg/L) 14-day geometric mean	TSS (mg/L) 30-day geometric mean	TSS (mg/L) 14-day geometric mean
31	56	23	27
12	16	40	24
17	8	34	42
20	22	32	49
—	38	—	18

Notes: total suspended solid (TSS); milligram per liter (mg/L)

Figure 18 illustrates the individual results of DEQ's TSS monitoring in both 2011 and 2012 at Crane Creek above the confluence with the Weiser River. Table 19 shows the resultant 14- and 30-day geometric means for both 2011 and 2012. While the data are somewhat limited for this location, Figure 18 shows that some individual samples clearly exceed the 50 mg/L for TSS, and Table 19 shows that both the 14- and 30-day targets (80 mg/L and 50 mg/L, respectively) are being met.

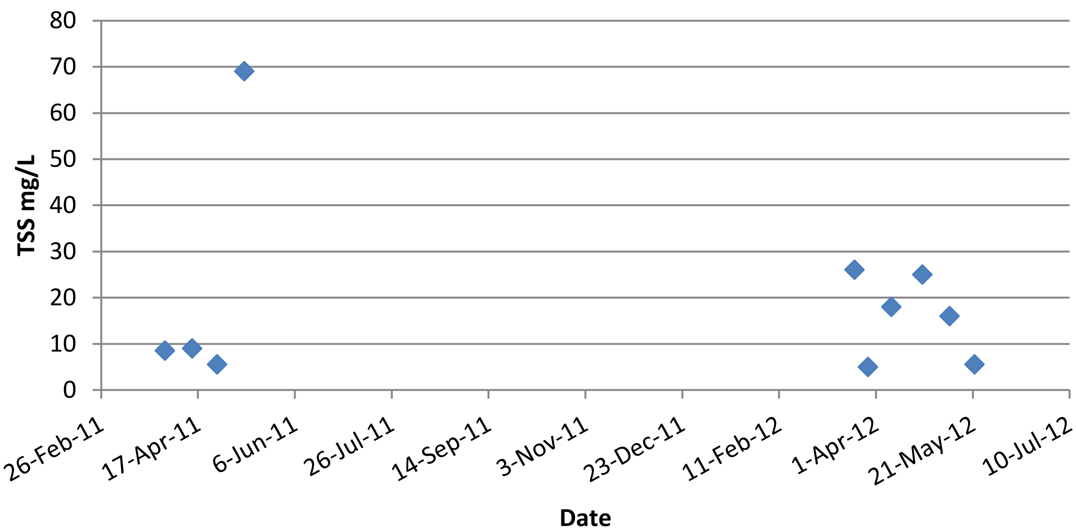

Figure 18. Total suspended solids in Crane Creek near confluence with Weiser River, 2011–2012.

Table 19. TSS geometric mean results for 2011 and 2012 for Crane Creek River near confluence with Weiser River.

Crane Creek			
2011		2012	
TSS (mg/L) 30-day geometric mean	TSS (mg/L) 14-day geometric mean	TSS (mg/L) 30-day geometric mean	TSS (mg/L) 14-day geometric mean
7	9	13	11
15	7	13	9
—	19	19	21
—	—	13	20
—	—	—	9

Notes: total suspended solid (TSS); milligram per liter (mg/L)

Figure 19 illustrates the individual results of DEQ's TSS monitoring in both 2011 and 2012 for the Weiser River at Midvale, Idaho, while Table 20 provides the resultant 14- and 30-day geometric means for both 2011 and 2012. Figure 19 shows that some individual samples clearly exceed the 50 mg/L for TSS, and Table 20 shows that both the 14- and 30-day targets (80 mg/L and 50 mg/L, respectively) are being met.

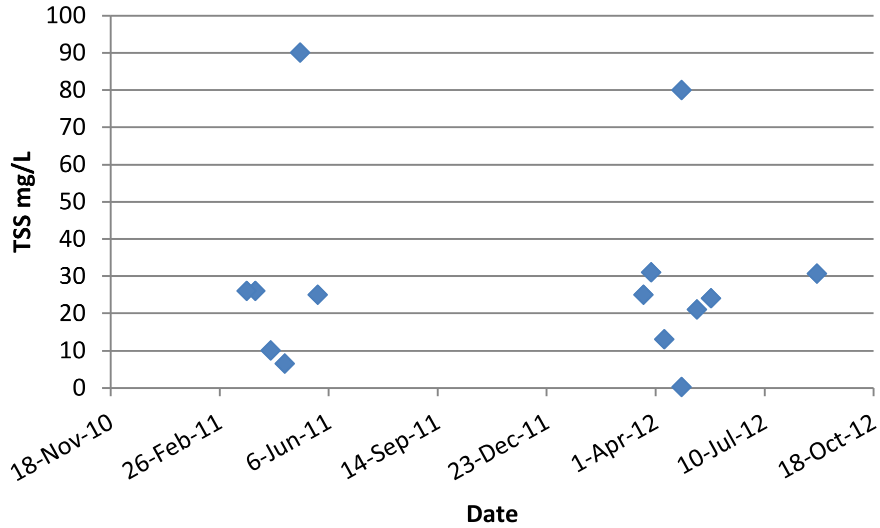

Figure 19. Total suspended solids for Weiser River at Midvale, Idaho, 2011–2012.

Table 20. TSS geometric mean results for 2011 and 2012 for Weiser River at Midvale, Idaho.

Weiser River at Midvale, Idaho			
2011		2012	
TSS (mg/L) 30-day geometric mean	TSS (mg/L) 14-day geometric mean	TSS (mg/L) 30-day geometric mean	TSS (mg/L) 14-day geometric mean
19	26	22	28
12	16	32	20
18	8	28	32
24	24	34	41
—	47	—	22

Notes: total suspended solid (TSS); milligram per liter (mg/L)

Figure 20 illustrates the individual results of DEQ's TSS monitoring in both 2011 and 2012 for the Little Weiser River near Cambridge, Idaho, while Table 21 provides the resultant 14- and 30-day geometric means for both 2011 and 2012. Figure 20 shows that some individual samples clearly exceed the 50 mg/L for TSS, and Table 21 shows that both the 14- and 30-day targets (80 mg/L and 50 mg/L, respectively) are being met.

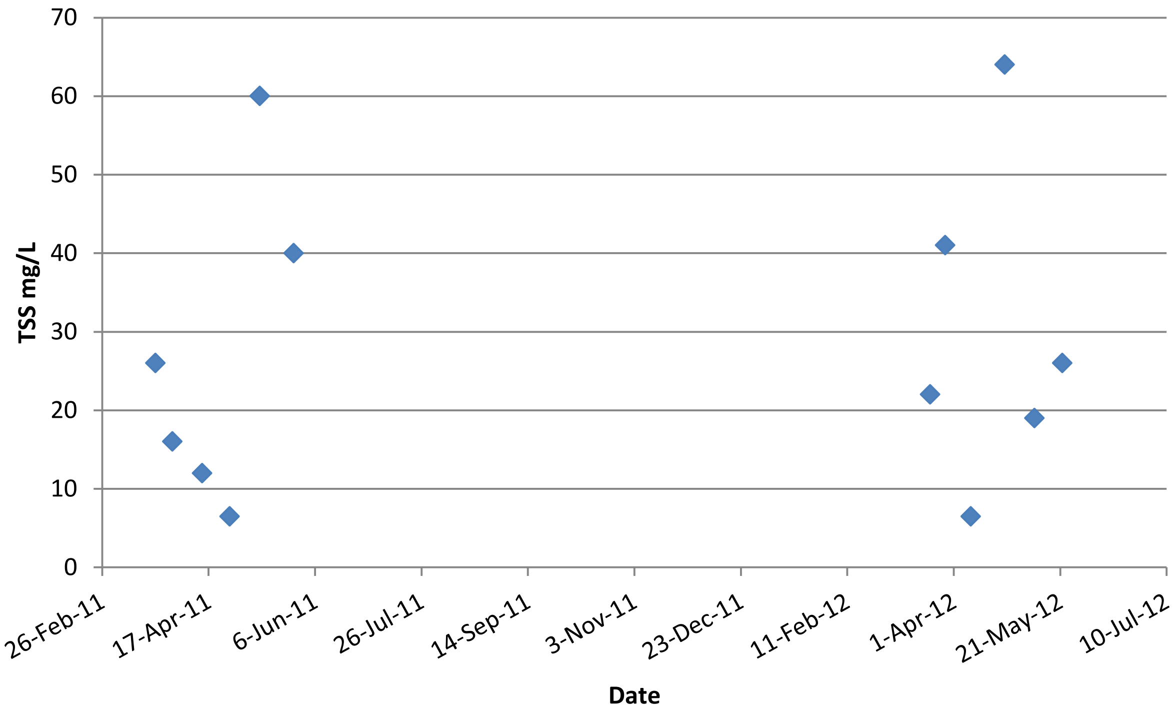

Figure 20. Total suspended solids for the Little Weiser River, 2011–2012.

Table 21. TSS geometric mean results for 2011 and 2012 for Little Weiser River near Cambridge, Idaho.

Little Weiser River near Cambridge, Idaho			
2011		2012	
TSS (mg/L) 30-day geometric mean	TSS (mg/L) 14-day geometric mean	TSS (mg/L) 30-day geometric mean	TSS (mg/L) 14-day geometric mean
17	20	18	30
11	14	26	16
17	9	20	20
25	20	32	35
—	49	—	22

Notes: total suspended solid (TSS); milligram per liter (mg/L)

The individual sampling results for TSS at all locations from 2011 (Table 22) and 2012 (Table 23) are shown below. The individual samples are used to calculate the geometric mean used in the TMDL. Figure 21 illustrates TSS levels over time as monitored by the Bureau of Reclamation at Weiser, Idaho, from 2001–2007. Much of these data were presented in the original Weiser River TMDL, but it helps to visualize TSS in the Weiser River, with much of the concentrations being below the sediment target set out in the original TMDL.

Table 22. DEQ 2011 total suspended solids monitoring results.

Site	3/22/11	3/23/11	3/31/11	4/14/11	4/27/11	5/11/11	5/27/11
Weiser River at Weiser, Idaho	130	—	24	9	10	48	18
Weiser River at Galloway Dam	120	—	26	10	6	79	18
Crane Creek	—	—	8.5	9	5.5	69	—
Weiser River at Midvale, Idaho	—	26	26	10	6.5	90	25
Little Weiser River	—	26	16	12	6.5	60	40

Table 23. DEQ 2012 total suspended solids monitoring results.

Site	3/21/12	3/28/12	4/9/12	4/25/12	5/9/12	5/22/12	8/27/12
Weiser River at Weiser, Idaho	18	34	18	140	24	12	—
Weiser River at Galloway Dam	20	36	16	110	22	14	38.6
Crane Creek	26	5	18	25	16	5.5	—
Weiser River at Midvale, Idaho	25	31	13	80	21	24	—
Little Weiser River	22	41	6.5	64	19	26	—

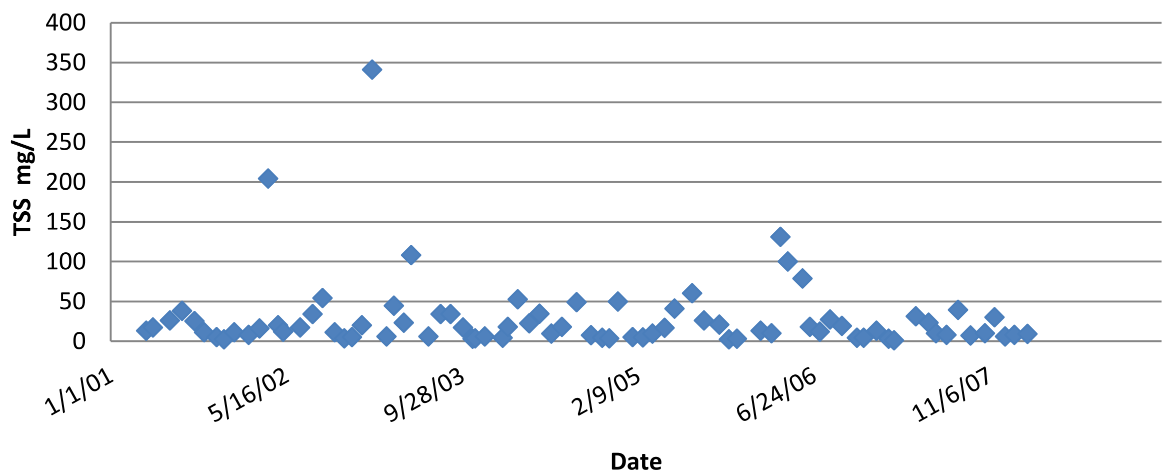

Figure 21. Bureau of Reclamation total suspended solids data on the Weiser River at Weiser, Idaho, 2001–2008.

Table 24 shows the daily sediment load in the Weiser River at the Galloway Dam location, near the USGS gage. The daily load was calculated by first converting discharge from cubic feet per second to liters per day, and TSS from milligrams per liter into pounds per liter. Discharge (L/day) was then multiplied by TSS (lb/L) to yield the sediment load in the river in lb/day.

Table 24. Total daily sediment load at Galloway Dam, 2011-2012.

Date	Discharge (cfs)	TSS (mg/L)	Daily Load (lb/day)
March 11	4,772	73	1,878,992
April 11	2,747	8	118,548
May 11	3,561	48.5	931,627
March 12	2,483	28	374,953
April 12	2,747	63	933,566
May 12	3,561	18	345,758

Notes: cubic feet per second (cfs); milligram per liter (mg/L); pounds per day (lb/day)

In 2011, DEQ collected *E. coli* data for all listed and some unlisted water bodies in the subbasin. Table 25 contains the results from the individual sampling events and the associated 30-day geometric mean, however, some of the sites did not follow DEQ's *E. coli* sampling protocol. Some sample sites data collection fell slightly outside of the 30-day window. The data still provide insight into current water quality conditions and the status of contact recreation. The lower Weiser River (Galloway Dam to Snake River, ID17050124SW001_06a) showed improvement and is meeting beneficial uses. DEQ is recommending this AU for delisting. Mann Creek is the only additional water body that showed probable impairment although the data do not fit DEQ's monitoring protocol for contact recreation. DEQ will perform monitoring to determine that status of this water body.

Table 25. *E. coli* data for Weiser River and Little Weiser River monitoring points.

Site	7/8/11	7/5/11	7/13/11	7/18/11	7/27/11	8/4/11	8/13/11	Geometric Mean	Status
Crane at River Road	435.2	613.1	172.2	290.9	152.9	—	—	289.8	Impaired
Weiser at Galloway Dam	104.6	64.4	44.1	238.2	27.5	—	—	72.1	Not Impaired
Weiser at US95	175	60.5	108.6	218.7	78.9	—	—	114.7	Not Impaired
Weiser at Midvale	—	—	28.8	72.3	74.9	55.7	67.7	56.7	Not Impaired
Lower. Weiser at Burton	—	—	206.4	166.4	387.3	727	678.2	365.9	Impaired
Mann Creek at River Road	988.1	702.7	694.5	461.1	141.4	—	—	500.6	Impaired[a]

a. This geometric mean was 2 days outside of the 30-day window. DEQ will perform follow-up sampling to confirm impairment and list accordingly.

The Idaho Fish and Game (IDFG) provided fish data for the Weiser River, Crane Creek, and Little Weiser River and associated tributaries. These data provide invaluable insight into the status of beneficial use, including the validity of the cold water aquatic life and salmonid spawning use designation.

IDFG was not able to provide any new additional data collected after the original TMDL was authored. However, in 1999 IDFG surveyed a major portion of the Weiser River from Cambridge to the confluence with the Snake River. In total IDFG surveyed 40 kilometers of the Weiser River and captured 1,306 fish (IDFG 2001). A wide variety of fish were captured including Smallmouth Bass, wild Rainbow Trout, hatchery Rainbow Trout, Channel Catfish, Mountain Whitefish, Northern Pikeminnow, Largescale Sucker, Bridgelip Sucker, Mountain Sucker, Speckled Dace, Longnose Dace, Sculpin, Chiselmouth, Common Carp, and Redside Shiner. The presence of wild Rainbow Trout and Mountain Whitefish support the designation of the cold water aquatic life for the Weiser River.

SWCC and the Weiser River Soil Conservation District conducted assessments of Rush Creek in three separate locations. The results of the stream visual assessment protocol (SVAP), stream erosion control inventory (SECI), and Solar Pathfinder are illustrated in Table 26. The individual reports are included in Appendix B.

Table 26. Rush Creek assessment results.

Stream Reach	SVAP Rating	SECI Rating	Average % Unshaded	Average % Shaded
Rush Creek, Reach1	9.3 = Excellent	3 = Slight erosion	39.71	60.29
Rush Creek, Reach 2	8.6 = Good	5.5 = Moderate erosion	27.18	72.82
Rush Creek, Reach 3	8.25 = Good	2.5 = Slight	27.33	72.67

Notes: Stream visual assessment protocol (SVAP); stream erosion control inventory (SECI)

SWCC and the Adams Soil and Water Conservation District also performed assessments of four reaches on the Middle Fork Weiser River. The result are summarized in Table 27, and the individual reports are included in Appendix B. The surveys included SVAP and Solar Pathfinder data collection to quantify the instream sediment and shading to the stream channel.

Table 27. Middle Fork Weiser assessment results.

Stream Reach	SVAP Rating	Average % Unshaded	Average % Shaded	Target Shade	Existing Shade %	Current Lack of Shade
Middle Fork Weiser River, Reach 1	7.8	72.5	27.5	42.0	27.5	-14.5
Middle Fork Weiser River, Reach 2	6.8	91.6	8.3	42.0	8.3	-33.7
Middle Fork Weiser River, Reach 3	9.0	54.7	45.3	—	—	—
Middle Fork Weiser River, Reach 4	9.3	53.9	46.1	—	—	—

Notes: Stream visual assessment protocol (SVAP)

3.2 Beneficial Uses

Within the Weiser River, Crane Creek, and Little Weiser River watersheds, namely the AUs not supporting beneficial uses, which have approved TMDLS, only the Little Weiser River has salmonid spawning as a beneficial use. The Weiser River has cold water aquatic life and Crane Creek has cold water aquatic life and secondary contact recreation beneficial uses. Both the Weiser River and Little Weiser River are designated primary contact recreation.

The beneficial uses seem to be appropriate and appear to be supporting or near support in some reaches of the river. A review of IDFG fish survey data indicate that there are native populations of Redband Trout in the Little Weiser system along with endangered Bull Trout and other trout species (Appendix C). While the lower portions of the Little Weiser River undoubtedly run dry in a certain number of years without flow augmentation from C. Ben Ross Reservoir, the upper portions of the Little Weiser River and tributaries provide important spawning habitat for native salmonids. Historically the Little Weiser supported a thriving population of A-run Steelhead that was diminished by the failure of fish passage ladders when the Hells Canyon Dam complex was built to generate power. All salmonid species in the system likely migrate into the main stem Weiser River and Snake River systems where they mature.

A review of the limited water quality data that have been collected since the approval of the original TMDL, indicates that water quality is achieving the target in a number of AUs. A more in-depth analysis, which includes a review of macroinvertebrates and subsurface sediments, along with fish surveys and additional water column data, will provide a more clear picture of the status of these beneficial uses and whether they are being met, or whether a use attainability analysis is warranted as the WAG suggests (Table 28).

It is the opinion of the Weiser River WAG that many if not all of these beneficial use determinations are unreasonable, have never been supported, and can never be attained. The Weiser River WAG would like to explore a change in beneficial uses through a use attainability analysis.

Table 28. Beneficial use summary for bacteria and sediment TMDL-associated assessment units.

Water Body/ Assessment Unit	Prescribed Control Point	Pollutant/ Impairment	Water Quality Trend	Meeting TMDL	Supporting Beneficial Uses
Weiser River ID17050124SW001_05	Midvale (Top of AU) *May need adjusted	Sediment	Unknown	Yes	Unknown
		Temperature	Unknown	Unknown	Unknown
Weiser River ID17050124SW001_06	Weiser River at Galloway Dam	Sediment	Unknown	Yes	Unknown
		Temperature	Unknown	Unknown	Unknown
Weiser River ID17050124SW001_06a	Weiser River at Weiser, Idaho	*E. coli* bacteria	Improving	Yes	Yes
		Sediment	Unknown	Yes	Unknown
		Temperature	Unknown	Unknown	Unknown
Crane Creek ID17050124SW003_05	Crane Creek near confluence with Weiser River	*E. coli* bacteria	Unknown	No	No
		Sediment	Unknown	Yes	Unknown
		Temperature	Unknown	Unknown	Unknown
Weiser River ID17050124SW007_05a	None *Adopt Shoepeg Road	Sediment	Unknown	*Yes (Shoepeg)	Unknown
		Temperature	Unknown	Unknown	Unknown
Little Weiser River ID17050124SW008_03	None *Adopt Monday Gulch Road	*E. coli* bacteria	Unknown	Unknown	Unknown
Little Weiser River ID17050124SW008_04	Burton Road	*E. coli* bacteria	Unknown	No	No
		Sediment	Unknown	Yes	Unknown
		Temperature	Unknown	Unknown	Unknown

4 Review of Implementation Plan and Activities

The *Weiser River Subbasin Total Maximum Daily Load Implementation Plan for Agriculture* (SWCC 2008) (*http://www.deq.idaho.gov/media/449901-*

weiser_river_subbasin_agriculture_implementation_plan_revised_0513.pdf) was developed for DEQ by IASCD in cooperation with SWCC, Weiser River Soil Conservation District, and Weiser River WAG. The implementation plan provides guidance for the both the Weiser and Adams Soil Conservation Districts.

The implementation plan divides the watershed into four sections for implementation.

1. Weiser River (Galloway Dam to Snake River)
2. Weiser River (Little Weiser River to Galloway Dam)
3. Little Weiser River (Indian Valley to Weiser River)
4. Crane Creek (Crane Creek Reservoir to Weiser River)

It also prioritizes critical areas within each of these sections for BMP implementation. Prioritization is based on tiering. Tier 1 lands are of immediate concern and have the highest impact on water quality due to their proximity to surface water. Tier 2 land are not directly adjacent to surface water, while Tier 3 lands are generally upland with no surface water connection and are low priority. The implementation plan loosely sets goals for these tiered lands in each watershed section. DEQ recommends that the implementation plan be updated to include AUs.

Weiser River (Galloway Dam to Snake River)

In the implementation plan, this section is subdivided into 8 sections for implementation: Galloway Canal, Mann Creek, Mill Ditch, Monroe Creek, No Drainage, Slough to Weiser River, Sunnyside Ditch, and the Weiser River. The implementation plan did not identify any specific goals or targets for these sections, but suggested beginning with “willing agricultural producers” on Tier 1 fields. It suggested not focusing exclusively on individual farm fields, but that the end of drain wetlands would be very effective at removing pollutants of concerns and indicated that the mouths of both Monroe and Mann Creeks should be considered. Additionally the Payette Ditch and Cove Creek were identified for consideration of end of mouth BMPs.

Weiser River (Little Weiser River to Galloway Dam)

Implementation in this reach should focus near Midvale on Tier 1 fields.

Little Weiser River (Indian Valley to Weiser River)

Implementation in this section is to initially focus along the Little Weiser River corridor and include all portions from Indian Valley at Mundy Gulch Road to the mouth. While BMPs will be appropriately site specific, initial efforts should focus on identifying willing land owners and on Tier 1 fields.

Crane Creek (Crane Creek Reservoir to Weiser River)

BMP implementation in this section should focus on the Crane Creek corridor (and channel braids) in the lower valley area. BMPs will be site specific and efforts should focus on identifying willing landowners and Tier 1 fields.

4.1 Accomplished Activities

Since the development of the original Weiser River TMDL, there have been a number of improvements in the watershed; both DEQ §319-funded projects, and other National Resources Conservation Service (NRCS)-approved projects with water quality related benefits. Both irrigation districts and individual irrigators have made improvements in irrigations infrastructure and installed several BMPs, which have water quality improvement benefits.

DEQ has provided §319 funding for a number of projects resulting in water quality improvements. DEQ has also provided funding for ground water improvement projects with ancillary surface water benefits that have reduced sediment and nutrients. These projects are also included as they have a net reduction on these pollutants reaching surface water.

Scott and Mann Creeks Implementation (2001–2006)

The project area has been degraded by nutrients, potentially coliform bacteria and surface runoff of agricultural byproducts, stormwater runoff, and septic systems that leach chemicals such as nitrogen into the ground water. The goal of this project was to reduce levels of nitrate in the ground water with ancillary benefits to surface water. While this project was primarily a ground water improvement project, the following activities are likely to improve local surface water quality.

- New septic systems in the nitrate priority area will be permitted only in the top 2 feet of soil for maximum nitrate uptake (where applicable, replacement septic systems will also permitted so drainfields are kept in the top 2 feet of soil).
- The Weiser River Soil Conservation District was awarded a §319 grant to implement BMPs to reduce nitrogen loads to the ground water.

Cove Creek Wetland

Cove Creek is located east of Weiser and is confluent with the Weiser River. This part of the Weiser River is located in the Weiser Cove area. The Weiser River subbasin encompasses a large area in southwestern Idaho. The headwaters for the Weiser River originate in the southern end of the Seven Devil Mountain Range and the west central mountains of Idaho. The watershed size is 1,076,348 acres solely within the state of Idaho. The land in the Weiser Cove area of the Weiser River subbasin is primarily irrigated agriculture, rangeland and riparian. Overall there are 12 water quality limited segments within the Weiser River subbasin that were placed on the Idaho 1998 §303(d) list. One segment is Crane Creek Reservoir. Three segments of the Weiser River were listed on the Idaho 1998 §303(d) list. The remaining water bodies are tributaries to the Weiser River or to Crane Creek Reservoir with Cove Creek being a tributary to the Weiser River.

A wetland will be placed on Cove Creek prior to the confluence with the Weiser River. Water will filter through three ponds. The first pond will be the deepest and act as a settling pond, subsequent ponds will reduce the amount of phosphorus that would go into the Weiser River. As already stated, Cove Creek is a contributor of phosphorus to the Weiser River (ISDA 2006). A fence will be built around the ponds and along both sides of Cove Creek from the road below the diversion to where it empties into the Weiser River.

The goal of the project would be to reduce sediment and phosphorus that discharge into the Weiser River subbasin and meet the reduction of sediment and phosphorus goals set in the Weiser River SBA TMDL and Snake River-Hells Canyon SBA TMDL (IDEQ/ODEQ 2004) *www.deq.idaho.gov/media/454498-snake_river_hells_canyon_entire.pdf*. This wetland project would clean up the water from thousands of acres including 1,600 dryland acres, 130 gravity irrigated acres, and 17,117 rangeland acres.

Table 29. Cove Creek Project.

Project Name, Location, and Parameters	Calculation/Estimation Method	Load Reduction
Cove Creek N 44.13583 W 116.48115	Load calculated from monitoring data	Sediment = 165 tons Nitrogen = 136 pounds Phosphorus = 150 pounds

The Weiser River Soil Conservation District has been actively involved with the local WAG. The WAG provided advice and input to DEQ into the Weiser River TMDL. The WAG has also been active in commenting and supporting the *Weiser River Subbasin Totally Maximum Daily Load Implementation Plan for Agriculture* (SWCC 2008). WAGs were established in watersheds to assist DEQ and other state agencies in formulating specific actions needed to control point and nonpoint sources of pollution affecting water quality limited segments. The Weiser River WAG is in support of the Cove Creek Wetland Project.

Little Weiser River Streambank Stabilization and Restoration

The goal of this project was to stabilize the streambanks by resloping, planting trees, and adding root wads, barbs, and other treatments aimed at streambank protection. The Weiser River subbasin experienced a heavy spring runoff in 2012, and although some of the vegetation was destroyed, most of it survived. All of the hardscape, including barbs and riprap, have held up well.

Phase II of this project is planned, pending funding and will encompass an additional 15 miles of the Little Weiser River. It will stabilize streambanks through the use of riparian vegetation, and channel stabilization methods.

Additional BMPs

In addition to §319 projects, the SWCC and local landowners have been installing NRCS BMPs. The SWCC provided detailed data on BMPs that were installed in the subbasin from 2008–2013 (Table 30–Table 37).

Table 30. Best management practices for federal fiscal year 2013.

Best Management Practices for Federal Fiscal Year 2013		**WATERSHED**								
PRACTICE NAME	**UNIT**	Crane Creek	Keithly Creek	Mann Creek	Monroe Creek	Pine Creek	Rush Creek	Upper Weiser River	Little Weiser	**Grand Totals**
Access Road	ft						681.0			**681.0**
Critical Area Planting	ac	3.0								**3.0**
Fence	ft	10566.5	6500.0				4941.0		1527.0	**23534.5**
Forage and Biomass Planting	ac	50.0							14.8	**64.8**
Above Ground, multi-outlet pipe	ft						1200.0			**1200.0**
Irrigation Pipeline	ft				1007.0	732.0				**1739.0**
Irrigation Land Leveling	ac					24.9	41.7			**66.6**
Irrigation Water Conveyance	ft					80.0	30.0			**110.0**
Irrigation Water Management	ac				43.6					**43.6**
Intergrated Pest Management	ac							10.0		**10.0**
Nutrient Management	no						1.0			**1.0**
Nutrient Management	ac			0.1						**0.1**
Obstruction Removal	ac									**0.0**
Pipeline - Livestock	ft				1273.0		565.0			**1838.0**
Prescribed Grazing	ac									**0.0**
Pumping Plant	no				1.0	1.0				**2.0**
Subsurface drain	ft						145.0			**145.0**
Structure for Water Control	no					1.0				**1.0**
Spring Development	no				1.0					**1.0**
Sprinkler System	ac				42.5	21.3				**63.8**
Upland Wildlife Habitat Management	ac	3593.6	3363.2		2857.6				3942.6	**13757.0**
Waste Storage Facility	no						1.0			**1.0**
Watering Facility	no				4.0		4.0			**8.0**

Table 31. Best management practices for federal fiscal year 2012.

Best Management Practices for Federal Fiscal Year 2012		**WATERSHED**								
PRACTICE NAME	**UNIT**	Crane Creek	Hornet Creek	Keithly Creek	Mann Creek	Monroe Creek	Pine Creek	Rush Creek	Upper Weiser River	**Grand Total**
Fence	ft	12,672.2				8,195.0		3,638.0	150.0	**24,655.2**
Conservation Cover	ac	68.4		140.6						**209.0**
Forage and Biomass Planting	ac		40.6							**40.6**
Above Ground, multi-outlet pipe	ft					4,320.0	1,650.0	1,470.0		**7,440.0**
Herbaceous Weed Control	ac					5.0				**5.0**
Irrigation Pipeline	ft					4,155.0	4,525.0			**8,680.0**
Irrigation System, Subsurface	ac					75.5				**75.5**
Intergrated Pest Management	ac	68.4				2,857.6				**2,926.0**
Nutrient Management	ac					18.8				**18.8**
Obstruction Removal	ac			5.0		2.0				**7.0**
Pipeline	ft					9,711.0	50.0		200.0	**9,961.0**
Prescribed Grazing	ac		600.0						724.6	**1,324.6**
Pumping Plant	no					2.0			1.0	**3.0**
Range Planting	ac					52.8				**52.8**
Restoration and Management of Rare Habitat	ac	22.0								**22.0**
Seasonal High Tunnel for Crops	sqft					2,880.0				**2,880.0**
Structure for Water Control	no					2.0	2.0			**4.0**
Upland Wildlife Habitat Management	ac	2,593.6		3,978.0	897.5	1,760.0				**9,229.1**
Watering Facility	no					7.0	1.0			**8.0**

Table 32. Best management practices for federal fiscal year 2011.

Best Management Practices for Federal Fiscal Year 2011		WATERSHED								
PRACTICE NAME	**UNIT**	Crane Creek	Hornet Creek	Keithly Creek	Little WeiserRiver	Middle Fork Weiser River	Monroe Creek	Rush Creek	Upper Weiser River	**Grand Total**
Access Control	ac				115.1					**115.1**
Conservation Cover	ac			134.0	868.2					**1002.2**
Critical Area Planting	ac					4.2				**4.2**
Fence	ft			2274.5				2020.0	190.0	**4484.5**
Forage and Biomass Planting	ac	56.5						63.4		**119.9**
Fuel Break	ac		25.0							**25.0**
Integrated Pest Management	ac				115.1					**115.1**
Irrigation Pipeline	ft						2740.0			**2740.0**
Irrigation System, Sprinkler	ac		39.0				18.8			**57.8**
Irrigation Water Conveyance, Corrugated Metal Pipeline	ft						202.0			**202.0**
Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic	ft		1960.0				920.0			**2880.0**
Irrigation Water Conveyance, Pipeline, Low-Pressure, Underground, Plastic	ft				150.0					**150.0**
Irrigation Water Management	ac				124.3			158.2		**282.5**
Nutrient Management	ac						43.6			**43.6**
Pipeline	ft								275.0	**275.0**
Pumping Plant	no		2.0				2.0			**4.0**
Range Planting	ac			15.0						**15.0**
Sediment Basin	no						1.0			**1.0**
Structure for Water Control	no				2.0		1.0			**3.0**
Upland Wildlife Habitat Management	ac			3363.2	495.1	68.8				**3927.1**
Water Well	no								1.0	**1.0**
Watering Facility	no				1.0				4.0	**5.0**

Table 33. Best management practices for federal fiscal year 2010.

Best Management Practices for Federal Fiscal Year 2010		WATERSHED									
PRACTICE NAME	**UNIT**	Crane Creek	Hornet Creek	Keithly Creek	Little Weiser River	Mann Creek	Middle Fork Weiser River	Monroe Creek	Rush Creek	Upper Weiser River	**Grand Total**
Access Control	ac	103.7		201.5	235.7						**540.9**
Access Road	ft	550.0									**550.0**
Conservation Cover	ac			57.0	370.3						**427.3**
Fence	ft	1625.0	18868.0		3216.0	2720.0		2243.0			**28672.0**
Forest Stand Improvement	ac		90.0								**90.0**
Heavy Use Area Protection	ac		2.0								**2.0**
Integrated Pest Management	ac			201.5	235.7						**437.2**
Irrigation System, Microirrigation	ac							47.0			**47.0**
Irrigation System, Sprinkler	ac					96.4			246.3		**342.7**
Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic	ft					2377.0			3975.0		**6352.0**
Irrigation Water Management	ac							39.4	36.2		**75.6**
Nutrient Management	ac								36.2		**36.2**
Pipeline	ft	1000.0	255.4		593.0						**1848.4**
Prescribed Grazing	ac			200.7	931.6			39.4			**1171.7**
Pumping Plant	no					2.0		1.0	2.0	2.0	**7.0**
Spring Development	no		1.0								**1.0**
Structure for Water Control	no								2.0		**2.0**
Tree/Shrub Establishment	ac		0.5				71.4				**71.9**
Tree/Shrub Site Preparation	ac						71.4				**71.4**
Upland Wildlife Habitat Management	ac	103.7		201.5	1167.3						**1472.5**
Water Well	no									1.0	**1.0**
Watering Facility	no	3.0	2.0		2.0						**7.0**

Table 34. Best management practices for federal fiscal year 2009.

Best Management Practices for Federal Fiscal Year 2009		**WATERSHED**									
PRACTICE NAME	**UNIT**	Crane Creek	Hornet Creek	Keithly Creek	Little Weiser River	Middle Fork Weiser River	Monroe Creek	Pine Creek	Rush Creek	Upper Weiser River	**Grand Total**
Above Ground, Multi-Outlet Pipeline	ft								1,350		**1,350**
Access Control	ac	24		732							**756**
Brush Management	ac				97						**97**
Conservation Cover	ac	24		738							**761**
Fence	ft		4,200		900			216	9,002	3,700	**18,018**
Forest Slash Treatment	ac		12								**12**
Forest Stand Improvement	ac		50								**50**
Grade Stabilization Structure	no	7									**7**
Irrigation Land Leveling	ac								36		**36**
Irrigation System, Microirrigation	ac						62				**62**
Irrigation System, Surface and Subsurface	ac						44		36		**80**
Irrigation Water Conveyance, Pipeline, Low-Pressure, Underground, Plastic	ft						2,450		4,965		**7,415**
Irrigation Water Conveyance, Pipeline, Steel	ft								20		**20**
Irrigation Water Management	ac						62				**62**
Nutrient Management	ac						62				**62**
Pasture and Hay Planting	ac	40									**40**
Pest Management	ac	24		732							**756**
Pipeline	ft				650				1,660		**2,310**
Prescribed Grazing	ac	894			1,096	688			1,613		**4,292**
Pumping Plant	no								1		**1**
Range Planting	ac				97						**97**
Spring Development	no				1						**1**
Structure for Water Control	no						1		7		**8**
Upland Wildlife Habitat Management	ac	24		732							**756**
Waste Storage Facility	no	1						1	1		**3**
Watering Facility	no								3		**3**

Table 35. Best management practices for federal fiscal year 2008.

Best Management Practices for Federal Fiscal Year 2008		WATERSHED										
PRACTICE NAME	**UNIT**	Crane Creek	Hornet Creek	Keithly Creek	Little Weiser River	Mann Creek	Middle Fork Weiser	Monroe Creek	Pine Creek	Rush Creek	Upper Weiser River	**Grand Total**
Conservation Completion Incentive First Year								2.0				**2.0**
Conservation Cover	ac			23.2				671.2				**694.4**
Conservation Crop Rotation	ac							28.9				**28.9**
Diversion	ft			2930.0								**2930.0**
Fence	ft	10800.0		2084.0	4550.0					2600.0		**20034.0**
Forage Harvest Management	ac			77.3								**77.3**
Forest Stand Improvement	ac		25.0									**25.0**
Irrigation System, Sprinkler	ac					30.0						**30.0**
Irrigation System, Surface and Subsurface	ac									2.0		**2.0**
Irrigation Water Conveyance, Corrugated Metal Pipeline	ft	60.0	139.0									**199.0**
Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic	ft		272.0		1931.0	2525.0		1220.0				**5948.0**
Irrigation Water Conveyance, Pipeline, Steel	ft									86.0		**86.0**
Irrigation Water Conveyance, Gated Pipe	ft				1860.0							**1860.0**
Irrigation Water Management	ac			68.0				49.6				**117.6**
Land Smoothing	ac										20.0	**20.0**
Nutrient Management	ac			77.3				20.7				**98.0**
Pest Management	ac			97.3								**97.3**
Pipeline	ft	560.0	506.0		147.0		450.0	1800.0		590.0		**4053.0**
Prescribed Grazing	ac			77.3	1000.0			1397.0	2790.4			**5264.7**
Pumping Plant	no			1.0		1.0						**2.0**
Range Planting	ac		15.0									**15.0**
Spring Development	no						1.0	1.0		2.0		**4.0**
Structure for Water Control	no		2.0		1.0	1.0		2.0				**6.0**
Upland Wildlife Habitat Management	ac			11.6								**11.6**
Waste Storage Facility	no	2.0			1.0							**3.0**
Water Well	no		1.0									**1.0**
Watering Facility	no	3.0	2.0				1.0	2.0		2.0		**10.0**

Table 36. Best management practices for federal fiscal year 2007.

Best Management Practices for Federal Fiscal Year 2007		WATERSHED								
PRACTICE NAME	**UNIT**	Beaver Creek	Crane Creek	Hornet Creek	Keithly Creek	Little Weiser River	Mann Creek	Monroe Creek	Rush Creek	**Grand Total**
Fence	ft	192.0	2755.0		2300.0					**5247.0**
Forage Harvest Management	ac			76.9						**76.9**
Integrated Pest Management	ac				20.0			36.3		**56.3**
Irrigation System, Surface and Subsurface	ac			76.9				28.9		**105.8**
Irrigation Water Conveyance, Gated Pipe	ft					1950.0			2160.0	**4110.0**
Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic	ft			1518.0				767.0		**2285.0**
Irrigation Land Leveling	ac				37.6					**37.6**
Pipeline - Livestock	ft				1300.0					**1300.0**
Pond	no		4.0	1.0	2.0					**7.0**
Prescribed Grazing	ac		1910.8				1541.6			**3452.4**
Pumping Plant	no							1.0		**1.0**
Residue Management, Mulch Till	ac			76.9						**76.9**
Structure for Water Control	no					1.0		2.0		**3.0**
Upland Wildlife Habitat Management	ac		1910.8				1541.6			**3452.4**
Water Well	no				1.0					**1.0**
Watering Facility	no				2.0					**2.0**

Table 37. Best management practices for federal fiscal year 2006.

Best Management Practices for Federal Fiscal Year 2006		**WATERSHED**							
PRACTICE NAME	**UNIT**	Crane Creek	Hornet Creek	Keithly Creek	Little Weiser River	Mann Creek	Monroe Creek	Rush Creek	**Grand Total**
Fence	ft	7685.0	5280.0						**12965.0**
Forage Harvest Management	ac			54.9					**54.9**
Forage and Biomass Planting	ac								**0.0**
Forest Stand Improvement	ac		30.0						**30.0**
Irrigation System, Sprinkler	ac			109.7	124.9				**234.6**
Irrigation System, Surface and Subsurface	ac							2.0	**2.0**
Irrigation Water Conveyance, Gated Pipe	ft						2610.0		**2610.0**
Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic	ft			3390.0					**3390.0**
Irrigation Water Conveyance, Pipeline, Low-Pressure, Underground, Plastic	ft						1365.0	2360.0	**3725.0**
Irrigation Water Conveyance, Pipeline, Steel	ft						103.0		**103.0**
Irrigation Water Conveyance, Concrete Ditch	ft			757.0					**757.0**
Irrigation Water Management	ac				311.3		87.1	145.6	**544.0**
Irrigation Land Leveling	ac						70.7	18.3	**89.0**
Pasture and Hayland Planting	ac						125.7		**125.7**
Pest Management	ac			54.9					**54.9**
Pipeline - Livestock	ft	155.0							**155.0**
Prescribed Grazing	ac				357.0			13.2	**370.2**
Pumping Plant	no			1.0					**1.0**
Residue Management, Mulch Till	ac					203.9	320.6		**524.5**
Spring Development	no				1.0				**1.0**
Structure for Water Control	no			2.0			2.0		**4.0**
Waste Storage Facility	no	1.0							**1.0**
Watering Facility	no	2.0							**2.0**

4.2 Future Strategy

The current water quality monitoring has provided insight into the status of water quality in relation to the TMDL targets. However, at this time DEQ is unable to determine long-term trends in water quality for either TSS or *E. coli*. Future TSS monitoring should include additional monthly sampling and new sampling on both the Weiser River at Shoepeg Road and Little Weiser River at Monday Gulch Road. Monitoring sites need to be carefully selected to perform depth-fines monitoring on both the Little Weiser River and Weiser River.

Perhaps the biggest gap lies in the lack of beneficial use monitoring. Beneficial use monitoring is critical if DEQ is to evaluate the successes and shortcomings of the current TMDL. Without beneficial use monitoring, DEQ will not be able show if water quality has improved sufficiently to support beneficial uses and meet water quality standards. It is critical that DEQ works with the WAG to find landowners who are willing to allow access for this monitoring over the next few years.

4.3 Planned Time Frame

Water quality data suggest that water quality conditions are improving in the Weiser River and the impacts of recent projects are likely to start having a detectable reduction in pollutant delivery to the Weiser River and the Little Weiser River over the next several years. It is expected that the Weiser River and the Little Weiser River should be meeting the TMDL within 5 years and supporting beneficial within a reasonable period after the TMDL is met. If this is not the case, the TMDL targets may have to be revised.

5 Summary of Five-Year Review

5.1 Review Process

The Weiser River WAG has been extremely proactive in improving water quality within the Weiser River subbasin. The WAG was formerly consulted and invited to provide significant input for the entire document on August 6, 2013, and was given a 3-month period to provide additional input and information (Appendix D).

The primary data sources were the BOR, USGS, IDFG, and DEQ. The WAG provided data on load reductions related to implementation projects, and NRCS and SWCC provided information on installed BMPs. The WAG also provided valuable insight into the status of the TMDL, on-going water quality issues, and areas of improvement. An overview of the data and the five-year review was presented to them in November 2013, and the final review was discussed in spring 2014.

5.2 Changes in Subbasin

No major changes in land use, land conversion, or new industry, point sources, or nonpoint sources have occurred in the subbasin, and according to the Weiser River WAG, land use in regards to these activities remains relatively stable. The only potential change in land use is the proposed Galloway Dam, which is in a feasibility study phase at this point.

5.3 TMDL Analysis

The original sediment TMDL target may need to be considered for revision if future data analysis suggests beneficial uses are not being supported. Before this occurs, there needs to be a targeted effort to assess the status of beneficial uses in all of the listed AUs to which the TMDL applies. At this point, the data are too sparse when assessing cold water aquatic life. There needs to be significant data collection defining the status of fish populations, including species and size classes in the Weiser River and Little Weiser River. Ideally, either BURP or river BURP sites could be established within each AU, however at minimum, both fish and macroinvertebrate data should be collected at multiple locations in each AU.

The *E. coli* TMDL was written to attain full support of contact recreation and meet based Idaho's "Water Quality Standards" (IDAPA 58.01.02). There are no anticipated changes to this TMDL.

5.4 Review of Beneficial Uses

Beneficial uses in the Weiser River, Little Weiser, and Crane Creek are a point of contention with landowners and the WAG. The WAG would like to see a use attainability analysis for all beneficial uses in listed waters to which the TMDL applies. It is their opinion that these water bodies have never achieved these beneficial uses and will not likely be able to attain them in the future.

A thorough review of beneficial use support is difficult because the data are lacking to support such an analysis and future data collection should be targeted to assess beneficial uses in conjunction with the TMDL.

Historic IDFG fish data used in the original Weiser River TMDL suggest the cold water aquatic life use designation on the Weiser River. Additionally, these IDFG data indicate that the salmonid spawning use designation on the Little Weiser River is a valid and appropriate beneficial use designation. No effort to change designated uses is recommended.

5.5 Water Quality Criteria

Water quality criteria related to the sediment and *E. coli* TMDLs have remained unchanged. While the TMDL has been implemented, there has been some improvement in water quality. Although it is widely static, it appears to be meeting the sediment targets set out in the original TMDL. This is expected to further improve as large-scale water quality improvement projects are planned, but this is contingent upon receiving §319 funding.

5.6 Recommendations for Further Action

Future monitoring needs to address the following three questions:

1. Are the TMDL targets being met? This is done by performing a monthly geometric mean for sediment and conducting a 5 samples 3 to 7 days apart within 30 days during July geometric mean for *E. coli* on all impaired AUs for the respective listed pollutants.
2. What is the long-term trend in water quality? This is done by collecting data that are compatible with long-term data sets (i.e., monthly samples from approximately February to July).
3. What is the status of beneficial uses in the river? Each AU needs to be monitored for beneficial uses or at a minimum, surveyed for aquatic life (macroinvertebrates and depth fines where salmonid spawning is designated or is an existing use.)

It is recommended that follow-up monitoring be performed on Mann Creek to assess contact recreation because the data suggest impairment, as samples were taken outside of the critical time frame of summer.

Two additional monitoring locations need to be established to encompasses all listed AUs: one on the Weiser River at Shoepeg Road (ID17050124SW007_05a) for sediment and *E. coli* and one on the Little Weiser River at Monday Gulch Road for *E. coli* (ID17050124SW008_03).

It is further recommended that DEQ move to delist the Weiser River (ID17050124SW007_05a) for *E. coli* contact recreation impairment based on DEQ's *E. coli* sampling results.

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Appendix A. Load Analysis Tables

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Table A1. Existing and target solar loads for Crane Creek.

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_05	Crane Creek	1	2600	sandbar willow	17%	5.30	18	47,000	250,000	10%	5.74	18	47,000	270,000	20,000	-7%
003_05	Crane Creek	3	760	sandbar willow	17%	5.30	18	14,000	74,000	20%	5.10	18	14,000	71,000	(3,000)	0%
003_05	Crane Creek	4	570	sandbar willow	17%	5.30	18	10,000	53,000	10%	5.74	18	10,000	57,000	4,000	-7%
003_05	Crane Creek	6	400	sandbar willow	17%	5.30	18	7,200	38,000	0%	6.38	25	10,000	64,000	26,000	-17%
003_05	Crane Creek	7	4600	sandbar willow	17%	5.30	18	83,000	440,000	10%	5.74	18	83,000	480,000	40,000	-7%
003_05	Crane Creek	10	230	sandbar willow	17%	5.30	18	4,100	22,000	20%	5.10	18	4,100	21,000	(1,000)	0%
003_05	Crane Creek	11	670	sandbar willow	17%	5.30	18	12,000	64,000	10%	5.74	18	12,000	69,000	5,000	-7%
003_05	Crane Creek	12	250	sandbar willow	17%	5.30	18	4,500	24,000	0%	6.38	12	3,000	19,000	(5,000)	-17%
003_05	Crane Creek	13	1500	sandbar willow	17%	5.30	18	27,000	140,000	10%	5.74	18	27,000	160,000	20,000	-7%
003_05	Crane Creek	14	210	sandbar willow	17%	5.30	18	3,800	20,000	30%	4.47	18	3,800	17,000	(3,000)	0%
003_05	Crane Creek	15	370	sandbar willow	17%	5.30	18	6,700	35,000	10%	5.74	18	6,700	38,000	3,000	-7%
003_05	Crane Creek	16	420	sandbar willow	17%	5.30	18	7,600	40,000	20%	5.10	18	7,600	39,000	(1,000)	0%
003_05	Crane Creek	18	910	sandbar willow	17%	5.30	18	16,000	85,000	10%	5.74	18	16,000	92,000	7,000	-7%
003_05	Crane Creek	19	440	sandbar willow	17%	5.30	18	7,900	42,000	30%	4.47	18	7,900	35,000	(7,000)	0%
003_05	Crane Creek	20	660	sandbar willow	17%	5.30	18	12,000	64,000	10%	5.74	18	12,000	69,000	5,000	-7%
003_05	Crane Creek	21	360	sandbar willow	17%	5.30	18	6,500	34,000	20%	5.10	18	6,500	33,000	(1,000)	0%
003_05	Crane Creek	22	1100	sandbar willow	17%	5.30	18	20,000	110,000	10%	5.74	18	20,000	110,000	0	-7%
003_05	Crane Creek	24	130	sandbar willow	17%	5.30	18	2,300	12,000	20%	5.10	18	2,300	12,000	0	0%
003_05	Crane Creek	25	390	sandbar willow	17%	5.30	18	7,000	37,000	0%	6.38	18	7,000	45,000	8,000	-17%
003_05	Crane Creek	29	4000	black cottonwood	36%	4.08	18	72,000	290,000	0%	6.38	18	72,000	460,000	170,000	-36%
							Totals		1,900,000					2,200,000	290,000	

Note: All assessment unit (AU) numbers start with ID17050124SW in all load tables (Tables B-1–B-17). Significant figures are controlled by the lowest level in the calculation, typically that of the channel width. Some rounding errors may result.

Table A2. Existing and target solar loads for East Pine Creek.

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
027_02	E. Pine Creek	1	630	PVG 9	97%	0.19	1	600	100	90%	0.64	1	600	400	300	-7%
027_02	E. Pine Creek	2	280	meadow	55%	2.87	1	300	900	60%	2.55	1	300	800	(100)	0%
027_02	E. Pine Creek	3	230	PVG 9	97%	0.19	1	200	40	90%	0.64	1	200	100	60	-7%
027_02	E. Pine Creek	4	220	meadow	55%	2.87	1	200	600	50%	3.19	1	200	600	0	-5%
027_02	E. Pine Creek	5	400	PVG 9 shrub	92%	0.51	1	400	200	90%	0.64	1	400	300	100	-2%
027_02	E. Pine Creek	6	110	meadow	55%	2.87	1	100	300	50%	3.19	1	100	300	0	-5%
027_02	E. Pine Creek	7	400	PVG 9	97%	0.19	1	400	80	90%	0.64	1	400	300	200	-7%
027_02	E. Pine Creek	8	210	meadow	55%	2.87	1	200	600	60%	2.55	1	200	500	(100)	0%
027_02	E. Pine Creek	9	170	PVG 9	97%	0.19	1	200	40	80%	1.28	1	200	300	300	-17%
027_02	E. Pine Creek	10	300	meadow	55%	2.87	1	300	900	50%	3.19	1	300	1,000	100	-5%
027_02	E. Pine Creek	11	400	PVG 9 shrub	87%	0.83	2	800	700	70%	1.91	2	800	2,000	1,000	-17%
027_02	E. Pine Creek	12	240	PVG 9	97%	0.19	2	500	100	90%	0.64	2	500	300	200	-7%
027_02	E. Pine Creek	13	220	meadow	31%	4.40	2	400	2,000	50%	3.19	2	400	1,000	(1,000)	0%
027_02	E. Pine Creek	14	130	PVG 9	97%	0.19	2	300	60	80%	1.28	2	300	400	300	-17%
027_02	E. Pine Creek	15	220	meadow	31%	4.40	2	400	2,000	60%	2.55	2	400	1,000	(1,000)	0%
027_02	E. Pine Creek	16	190	PVG 9	97%	0.19	2	400	80	80%	1.28	2	400	500	400	-17%
027_02	E. Pine Creek	17	1100	PVG 9	97%	0.19	2	2,000	400	90%	0.64	2	2,000	1,000	600	-7%
027_02	E. Pine Creek	18	920	PVG 5	92%	0.51	3	3,000	2,000	80%	1.28	3	3,000	4,000	2,000	-12%
027_02	E. Pine Creek	19	700	PVG 4 shrub	74%	1.66	3	2,000	3,000	60%	2.55	3	2,000	5,000	2,000	-14%
027_02	E. Pine Creek	20	1300	PVG 5	92%	0.51	3	4,000	2,000	80%	1.28	3	4,000	5,000	3,000	-12%
027_02	E. Pine Creek	21	2100	PVG 2	61%	2.49	4	8,000	20,000	80%	1.28	4	8,000	10,000	(10,000)	0%
027_02	E. Pine Creek	22	930	PVG 2	61%	2.49	4	4,000	10,000	60%	2.55	4	4,000	10,000	0	-1%
027_02	E. Pine Creek	23	430	PVG 6	84%	1.02	5	2,000	2,000	80%	1.28	5	2,000	3,000	1,000	-4%
027_02	E. Pine Creek	24	910	PVG2 shrub	53%	3.00	5	5,000	10,000	60%	2.55	5	5,000	10,000	0	0%
027_02	E. Pine Creek	25	1500	alder	50%	3.19	5	8,000	30,000	50%	3.19	5	8,000	30,000	0	0%
027_02	E. Pine Creek	26	1300	alder	43%	3.64	6	8,000	30,000	50%	3.19	6	8,000	30,000	0	0%
027_02	E. Pine Creek	27	990	sandbar willow	44%	3.57	6	6,000	20,000	60%	2.55	6	6,000	20,000	0	0%
027_02	E. Pine Creek	28	790	sandbar willow	44%	3.57	6	5,000	20,000	40%	3.83	6	5,000	20,000	0	-4%
							Totals		160,000					160,000	0	

Table A3. Existing and target solar loads for East Fork Weiser River.

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
016_02	EF Weiser River	1	100	meadow	55%	2.87	1	100	300	60%	2.55	1	100	300	0	0%
016_02	EF Weiser River	2	380	PVG 7	96%	0.26	1	400	100	90%	0.64	1	400	300	200	-6%
016_02	EF Weiser River	3	57	PVG 6 meadow	61%	2.49	1	60	100	60%	2.55	1	60	200	100	-1%
016_02	EF Weiser River	4	1200	PVG 9	97%	0.19	1	1,000	200	90%	0.64	1	1,000	600	400	-7%
016_02	EF Weiser River	5	570	PVG 6 meadow	61%	2.49	1	600	1,000	70%	1.91	1	600	1,000	0	0%
016_02	EF Weiser River	6	250	PVG 9	97%	0.19	1	300	60	90%	0.64	1	300	200	100	-7%
016_02	EF Weiser River	7	1100	PVG 9	97%	0.19	2	2,000	400	90%	0.64	2	2,000	1,000	600	-7%
016_02	EF Weiser River	8	170	PVG 9	97%	0.19	2	300	60	80%	1.28	2	300	400	300	-17%
016_02	EF Weiser River	9	1500	PVG 9	97%	0.19	2	3,000	600	90%	0.64	2	3,000	2,000	1,000	-7%
016_02	EF Weiser River	11	2600	PVG 6	94%	0.38	3	8,000	3,000	90%	0.64	3	8,000	5,000	2,000	-4%
016_02	EF Weiser River	12	1000	PVG 6	91%	0.57	4	4,000	2,000	90%	0.64	4	4,000	3,000	1,000	-1%
016_02	EF Weiser River	13	530	PVG 5	84%	1.02	4	2,000	2,000	90%	0.64	4	2,000	1,000	(1,000)	0%
016_02	EF Weiser River	14	1500	PVG 6	91%	0.57	4	6,000	3,000	80%	1.28	4	6,000	8,000	5,000	-11%
016_02	EF Weiser River	15	1500	PVG 6	84%	1.02	5	8,000	8,000	70%	1.91	5	8,000	20,000	10,000	-14%
016_02	EF Weiser River	16	620	PVG 6	84%	1.02	5	3,000	3,000	80%	1.28	5	3,000	4,000	1,000	-4%
016_02	EF Weiser River	17	410	PVG 6	84%	1.02	5	2,000	2,000	70%	1.91	5	2,000	4,000	2,000	-14%
016_02	EF Weiser River	18	1000	PVG 6	78%	1.40	6	6,000	8,000	60%	2.55	6	6,000	20,000	10,000	-18%
016_02	EF Weiser River	20	1800	PVG 6	78%	1.40	6	10,000	10,000	70%	1.91	6	10,000	20,000	10,000	-8%
016_02	EF Weiser River	24	76	PVG 6	72%	1.79	7	500	900	70%	1.91	7	500	1,000	100	-2%
016_02	EF Weiser River	25	730	PVG 6	72%	1.79	7	5,000	9,000	50%	3.19	7	5,000	20,000	10,000	-22%
016_02	EF Weiser River	26	340	PVG 6	72%	1.79	7	2,000	4,000	70%	1.91	7	2,000	4,000	0	-2%
016_02	EF Weiser River	27	180	PVG 2	46%	3.45	7	1,000	3,000	40%	3.83	7	1,000	4,000	1,000	-6%
016_02	EF Weiser River	28	660	PVG 2	46%	3.45	7	5,000	20,000	60%	2.55	7	5,000	10,000	(10,000)	0%
016_02	EF Weiser River	30	110	PVG 2	46%	3.45	7	800	3,000	40%	3.83	7	800	3,000	0	-6%
016_02	EF Weiser River	31	280	PVG 2	46%	3.45	7	2,000	7,000	60%	2.55	7	2,000	5,000	(2,000)	0%
016_02	EF Weiser River	32	380	PVG 2	46%	3.45	7	3,000	10,000	50%	3.19	7	3,000	10,000	0	0%
016_02	EF Weiser River	33	360	PVG 2 shrub	38%	3.96	8	3,000	10,000	30%	4.47	8	3,000	10,000	0	-8%
016_02	EF Weiser River	34	210	PVG 2	43%	3.64	8	2,000	7,000	50%	3.19	8	2,000	6,000	(1,000)	0%
016_02	EF Weiser River	35	1100	PVG 2 shrub	38%	3.96	8	9,000	40,000	30%	4.47	8	9,000	40,000	0	-8%
016_02	EF Weiser River	37	190	PVG 6	68%	2.04	8	2,000	4,000	70%	1.91	8	2,000	4,000	0	0%
016_03	EF Weiser River	38	250	PVG 6	68%	2.04	8	2,000	4,000	70%	1.91	8	2,000	4,000	0	0%
016_03	EF Weiser River	39	210	PVG 2 shrub	38%	3.96	8	2,000	8,000	50%	3.19	8	2,000	6,000	(2,000)	0%
016_03	EF Weiser River	40	500	PVG 2 shrub	38%	3.96	8	4,000	20,000	40%	3.83	8	4,000	20,000	0	0%
016_03	EF Weiser River	41	620	PVG 2 shrub	35%	4.15	9	6,000	20,000	30%	4.47	9	6,000	30,000	10,000	-5%
016_03	EF Weiser River	44	130	PVG 2 shrub	35%	4.15	9	1,000	4,000	40%	3.83	9	1,000	4,000	0	0%
016_03	EF Weiser River	45	210	PVG 2	40%	3.83	9	2,000	8,000	40%	3.83	9	2,000	8,000	0	0%
016_03	EF Weiser River	47	190	PVG 2	40%	3.83	9	2,000	8,000	60%	2.55	9	2,000	5,000	(3,000)	0%
016_03	EF Weiser River	48	610	PVG 2	40%	3.83	9	5,000	20,000	20%	5.10	9	5,000	30,000	10,000	-20%
016_03	EF Weiser River	50	69	alder	31%	4.40	9	600	3,000	30%	4.47	9	600	3,000	0	-1%
016_03	EF Weiser River	51	350	alder	31%	4.40	9	3,000	10,000	30%	4.47	9	3,000	10,000	0	-1%
016_03	EF Weiser River	52	180	alder	31%	4.40	9	2,000	9,000	20%	5.10	9	2,000	10,000	1,000	-11%
016_03	EF Weiser River	53	71	alder	31%	4.40	9	600	3,000	30%	4.47	9	600	3,000	0	-1%
016_03	EF Weiser River	54	280	alder	31%	4.40	9	3,000	10,000	40%	3.83	9	3,000	10,000	0	0%
							Totals		290,000					350,000	57,000	

Table A4. Existing and target solar loads for Hornet Creek.

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	Hornet Creek	1	290	PVG 9	97%	0.19	1	300	60	90%	0.64	1	300	200	100	-7%
021_02	Hornet Creek	2	430	PVG 10	96%	0.26	1	400	100	90%	0.64	1	400	300	200	-6%
021_02	Hornet Creek	3	1000	PVG 9	97%	0.19	1	1,000	200	90%	0.64	1	1,000	600	400	-7%
021_02	Hornet Creek	4	560	PVG 9	97%	0.19	2	1,000	200	90%	0.64	2	1,000	600	400	-7%
021_02	Hornet Creek	5	290	PVG 6 shrub	87%	0.83	2	600	500	70%	1.91	2	600	1,000	500	-17%
021_02	Hornet Creek	6	2200	PVG 6	94%	0.38	3	7,000	3,000	90%	0.64	3	7,000	4,000	1,000	-4%
021_02	Hornet Creek	7	1100	PVG 2	70%	1.91	3	3,000	6,000	80%	1.28	3	3,000	4,000	(2,000)	0%
021_02	Hornet Creek	8	1800	PVG 2	61%	2.49	4	7,000	20,000	70%	1.91	4	7,000	10,000	(10,000)	0%
021_02	Hornet Creek	10	1700	PVG 2	55%	2.87	5	9,000	30,000	80%	1.28	5	9,000	10,000	(20,000)	0%
021_02	Hornet Creek	12	720	PVG 2 shrub	53%	3.00	5	4,000	10,000	70%	1.91	5	4,000	8,000	(2,000)	0%
021_02	Hornet Creek	13	220	PVG 2 shrub	53%	3.00	5	1,000	3,000	60%	2.55	5	1,000	3,000	0	0%
021_02	Hornet Creek	14	450	black cottonwood	81%	1.21	6	3,000	4,000	80%	1.28	6	3,000	4,000	0	0%
021_02	Hornet Creek	15	660	black cottonwood	81%	1.21	6	4,000	5,000	70%	1.91	6	4,000	8,000	3,000	-11%
021_03	Hornet Creek	16	250	black cottonwood	81%	1.21	6	2,000	2,000	50%	3.19	6	2,000	6,000	4,000	-31%
021_03	Hornet Creek	17	400	black cottonwood	81%	1.21	6	2,000	2,000	60%	2.55	6	2,000	5,000	3,000	-21%
021_03	Hornet Creek	18	470	black cottonwood	75%	1.60	7	3,000	5,000	60%	2.55	7	3,000	8,000	3,000	-15%
021_03	Hornet Creek	19	160	black cottonwood	75%	1.60	7	1,000	2,000	80%	1.28	7	1,000	1,000	(1,000)	0%
021_03	Hornet Creek	20	250	black cottonwood	75%	1.60	7	2,000	3,000	40%	3.83	7	2,000	8,000	5,000	-35%
021_03	Hornet Creek	21	430	black cottonwood	75%	1.60	7	3,000	5,000	70%	1.91	7	3,000	6,000	1,000	-5%
021_03	Hornet Creek	22	300	black cottonwood	75%	1.60	7	2,000	3,000	20%	5.10	7	2,000	10,000	7,000	-55%
021_03	Hornet Creek	23	860	black cottonwood	69%	1.98	8	7,000	10,000	50%	3.19	8	7,000	20,000	10,000	-19%
021_03	Hornet Creek	24	170	black cottonwood	69%	1.98	8	1,000	2,000	70%	1.91	8	1,000	2,000	0	0%
021_03	Hornet Creek	25	1300	black cottonwood	69%	1.98	8	10,000	20,000	70%	1.91	8	10,000	20,000	0	0%
021_03	Hornet Creek	26	230	black cottonwood	63%	2.36	9	2,000	5,000	40%	3.83	9	2,000	8,000	3,000	-23%
021_03	Hornet Creek	27	540	black cottonwood	63%	2.36	9	5,000	10,000	20%	5.10	9	5,000	30,000	20,000	-43%
021_03	Hornet Creek	28	440	black cottonwood	63%	2.36	9	4,000	9,000	40%	3.83	9	4,000	20,000	10,000	-23%
021_03	Hornet Creek	29	190	black cottonwood	63%	2.36	9	2,000	5,000	30%	4.47	9	2,000	9,000	4,000	-33%
021_03	Hornet Creek	30	710	black cottonwood	63%	2.36	9	6,000	10,000	20%	5.10	9	6,000	30,000	20,000	-43%
021_03	Hornet Creek	31	470	black cottonwood	59%	2.62	10	4,700	12,000	50%	3.19	10	4,700	15,000	3,000	-9%
021_03	Hornet Creek	32	390	black cottonwood	59%	2.62	10	3,900	10,000	30%	4.47	10	3,900	17,000	7,000	-29%
021_03	Hornet Creek	33	110	black cottonwood	59%	2.62	10	1,100	2,900	10%	5.74	10	1,100	6,300	3,400	-49%
021_03	Hornet Creek	34	410	black cottonwood	59%	2.62	10	4,100	11,000	40%	3.83	10	4,100	16,000	5,000	-19%
021_04	Hornet Creek	35	190	black cottonwood	54%	2.93	11	2,100	6,200	30%	4.47	11	2,100	9,400	3,200	-24%
021_04	Hornet Creek	36	210	black cottonwood	54%	2.93	11	2,300	6,800	40%	3.83	11	2,300	8,800	2,000	-14%
021_04	Hornet Creek	37	180	black cottonwood	54%	2.93	11	2,000	5,900	20%	5.10	11	2,000	10,000	4,100	-34%
021_04	Hornet Creek	38	320	black cottonwood	54%	2.93	11	3,500	10,000	10%	5.74	11	3,500	20,000	10,000	-44%
021_04	Hornet Creek	39	160	black cottonwood	54%	2.93	11	1,800	5,300	30%	4.47	11	1,800	8,000	2,700	-24%
021_04	Hornet Creek	40	1300	black cottonwood	51%	3.13	12	16,000	50,000	0%	6.38	12	16,000	100,000	50,000	-51%
021_04	Hornet Creek	41	210	black cottonwood	51%	3.13	12	2,500	7,800	0%	6.38	12	2,500	16,000	8,200	-51%
021_04	Hornet Creek	42	140	black cottonwood	51%	3.13	12	1,700	5,300	20%	5.10	12	1,700	8,700	3,400	-31%
021_04	Hornet Creek	43	150	black cottonwood	51%	3.13	12	1,800	5,600	50%	3.19	12	1,800	5,700	100	0%
021_04	Hornet Creek	44	170	black cottonwood	51%	3.13	12	2,000	6,300	0%	6.38	12	2,000	13,000	6,700	-51%
021_04	Hornet Creek	45	360	black cottonwood	51%	3.13	12	4,300	13,000	10%	5.74	12	4,300	25,000	12,000	-41%
021_04	Hornet Creek	46	110	black cottonwood	51%	3.13	12	1,300	4,100	20%	5.10	12	1,300	6,600	2,500	-31%
021_04	Hornet Creek	47	340	black cottonwood	48%	3.32	13	4,400	15,000	20%	5.10	13	4,400	22,000	7,000	-28%
021_04	Hornet Creek	48	310	black cottonwood	48%	3.32	13	4,000	13,000	10%	5.74	13	4,000	23,000	10,000	-38%
021_04	Hornet Creek	49	1600	black cottonwood	48%	3.32	13	21,000	70,000	20%	5.10	13	21,000	110,000	40,000	-28%
021_04	Hornet Creek	50	1100	black cottonwood	45%	3.51	14	15,000	53,000	10%	5.74	14	15,000	86,000	33,000	-35%
021_04	Hornet Creek	51	630	black cottonwood	45%	3.51	14	8,800	31,000	0%	6.38	14	8,800	56,000	25,000	-45%
021_04	Hornet Creek	52	1500	black cottonwood	42%	3.70	15	23,000	85,000	20%	5.10	15	23,000	120,000	35,000	-22%
021_04	Hornet Creek	53	730	black cottonwood	42%	3.70	15	11,000	41,000	0%	6.38	15	11,000	70,000	29,000	-42%
021_04	Hornet Creek	54	210	black cottonwood	40%	3.83	16	3,400	13,000	10%	5.74	16	3,400	20,000	7,000	-30%
021_04	Hornet Creek	55	1400	black cottonwood	40%	3.83	16	22,000	84,000	30%	4.47	16	22,000	98,000	14,000	-10%
021_04	Hornet Creek	56	580	black cottonwood	38%	3.96	17	9,900	39,000	10%	5.74	17	9,900	57,000	18,000	-28%
021_04	Hornet Creek	57	630	black cottonwood	38%	3.96	17	11,000	44,000	30%	4.47	17	11,000	49,000	5,000	-8%
021_04	Hornet Creek	58	120	black cottonwood	38%	3.96	17	2,000	7,900	10%	5.74	17	2,000	11,000	3,100	-28%
							Totals		830,000					1,200,000	410,000	

Table A5. Existing and target solar loads for Little Weiser River.

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
008_02	Little Weiser R.	1	1200	meadow	55%	2.87	1	1,000	3,000	50%	3.19	1	1,000	3,000	0	-5%
008_02	Little Weiser R.	2	1100	PVG 9	97%	0.19	1	1,000	200	90%	0.64	1	1,000	600	400	-7%
008_02	Little Weiser R.	3	470	PVG 7 meadow	60%	2.55	1	500	1,000	60%	2.55	1	500	1,000	0	0%
008_02	Little Weiser R.	4	330	PVG 9 meadow	62%	2.42	1	300	700	70%	1.91	1	300	600	(100)	0%
008_02	Little Weiser R.	5	820	PVG 9 shrub	87%	0.83	2	2,000	2,000	70%	1.91	2	2,000	4,000	2,000	-17%
008_02	Little Weiser R.	6	2100	PVG 9 shrub	87%	0.83	2	4,000	3,000	80%	1.28	2	4,000	5,000	2,000	-7%
008_02	Little Weiser R.	7	2800	PVG 6 meadow	34%	4.21	3	8,000	30,000	40%	3.83	3	8,000	30,000	0	0%
008_02	Little Weiser R.	8	150	PVG 5	92%	0.51	3	500	300	80%	1.28	3	500	600	300	-12%
008_02	Little Weiser R.	9	350	PVG 5 meadow	28%	4.59	4	1,000	5,000	30%	4.47	4	1,000	4,000	(1,000)	0%
008_02	Little Weiser R.	10	130	PVG 5 meadow	28%	4.59	4	500	2,000	40%	3.83	4	500	2,000	0	0%
008_02	Little Weiser R.	11	200	PVG 5 meadow	28%	4.59	4	800	4,000	30%	4.47	4	800	4,000	0	0%
008_02	Little Weiser R.	12	810	PVG 5	84%	1.02	4	3,000	3,000	70%	1.91	4	3,000	6,000	3,000	-14%
008_02	Little Weiser R.	13	320	PVG 6 meadow	29%	4.53	4	1,000	5,000	30%	4.47	4	1,000	4,000	(1,000)	0%
008_02	Little Weiser R.	14	520	PVG 5	84%	1.02	4	2,000	2,000	80%	1.28	4	2,000	3,000	1,000	-4%
008_02	Little Weiser R.	15	760	PVG 2	61%	2.49	4	3,000	7,000	60%	2.55	4	3,000	8,000	1,000	-1%
008_02	Little Weiser R.	16	660	PVG 2 shrub	53%	3.00	5	3,000	9,000	50%	3.19	5	3,000	10,000	1,000	-3%
008_02	Little Weiser R.	17	930	alder	50%	3.19	5	5,000	20,000	40%	3.83	8	7,000	30,000	10,000	-10%
008_02	Little Weiser R.	18	2000	PVG 2 shrub	53%	3.00	5	10,000	30,000	50%	3.19	8	20,000	60,000	30,000	-3%
008_02	Little Weiser R.	19	530	PVG 2 shrub	47%	3.38	6	3,000	10,000	50%	3.19	8	4,000	10,000	0	0%
008_03a	Little Weiser R.	1	280	PVG 2 shrub	47%	3.38	6	2,000	7,000	40%	3.83	8	2,000	8,000	1,000	-7%
008_03a	Little Weiser R.	2	680	PVG 6	78%	1.40	6	4,000	6,000	60%	2.55	8	5,000	10,000	4,000	-18%
008_03a	Little Weiser R.	3	1200	PVG 2 shrub	47%	3.38	6	7,000	20,000	40%	3.83	8	10,000	40,000	20,000	-7%
008_03a	Little Weiser R.	4	110	PVG 2 shrub	47%	3.38	6	700	2,000	30%	4.47	8	900	4,000	2,000	-17%
008_03a	Little Weiser R.	5	680	PVG 2 shrub	42%	3.70	7	5,000	20,000	40%	3.83	8	5,000	20,000	0	-2%
008_03a	Little Weiser R.	6	280	alder	38%	3.96	7	2,000	8,000	20%	5.10	10	3,000	20,000	10,000	-18%
008_03a	Little Weiser R.	7	500	PVG 2 shrub	42%	3.70	7	4,000	10,000	40%	3.83	10	5,000	20,000	10,000	-2%
008_03a	Little Weiser R.	8	600	PVG 2 shrub	42%	3.70	7	4,000	10,000	30%	4.47	10	6,000	30,000	20,000	-12%
008_03a	Little Weiser R.	9	1100	PVG 2 shrub	42%	3.70	7	8,000	30,000	40%	3.83	8	9,000	30,000	0	-2%
008_03a	Little Weiser R.	10	1300	PVG 6	68%	2.04	8	10,000	20,000	60%	2.55	8	10,000	30,000	10,000	-8%
008_03a	Little Weiser R.	11	170	PVG 2 shrub	38%	3.96	8	1,000	4,000	30%	4.47	10	2,000	9,000	5,000	-8%
008_03a	Little Weiser R.	12	200	PVG 2	43%	3.64	8	2,000	7,000	40%	3.83	10	2,000	8,000	1,000	-3%
008_03a	Little Weiser R.	13	1600	PVG 2 shrub	38%	3.96	8	10,000	40,000	30%	4.47	10	20,000	90,000	50,000	-8%
008_03a	Little Weiser R.	14	610	black cottonwood	63%	2.36	9	5,000	10,000	40%	3.83	9	5,000	20,000	10,000	-23%
008_03a	Little Weiser R.	15	860	black cottonwood	63%	2.36	9	8,000	20,000	50%	3.19	9	8,000	30,000	10,000	-13%
008_03a	Little Weiser R.	16	390	black cottonwood	63%	2.36	9	4,000	9,000	30%	4.47	9	4,000	20,000	10,000	-33%
008_03	Little Weiser R.	1	490	black cottonwood	63%	2.36	9	4,000	9,000	40%	3.83	9	4,000	20,000	10,000	-23%
008_03	Little Weiser R.	2	680	black cottonwood	63%	2.36	9	6,000	10,000	50%	3.19	9	6,000	20,000	10,000	-13%
008_03	Little Weiser R.	3	370	black cottonwood	59%	2.62	10	3,700	9,700	40%	3.83	10	3,700	14,000	4,300	-19%
008_03	Little Weiser R.	4	1200	black cottonwood	59%	2.62	10	12,000	31,000	30%	4.47	10	12,000	54,000	23,000	-29%
008_03	Little Weiser R.	5	660	black cottonwood	59%	2.62	10	6,600	17,000	40%	3.83	10	6,600	25,000	8,000	-19%
008_03	Little Weiser R.	6	1300	black cottonwood	54%	2.93	11	14,000	41,000	30%	4.47	11	14,000	63,000	22,000	-24%
008_03	Little Weiser R.	7	1200	black cottonwood	54%	2.93	11	13,000	38,000	40%	3.83	11	13,000	50,000	12,000	-14%
008_03	Little Weiser R.	8	1300	black cottonwood	51%	3.13	12	16,000	50,000	40%	3.83	12	16,000	61,000	11,000	-11%
008_03	Little Weiser R.	9	510	black cottonwood	51%	3.13	12	6,100	19,000	30%	4.47	12	6,100	27,000	8,000	-21%
008_03	Little Weiser R.	10	470	black cottonwood	51%	3.13	12	5,600	18,000	50%	3.19	12	5,600	18,000	0	0%
008_03	Little Weiser R.	11	440	black cottonwood	51%	3.13	12	5,300	17,000	40%	3.83	12	5,300	20,000	3,000	-11%
008_03	Little Weiser R.	12	1900	black cottonwood	48%	3.32	13	25,000	83,000	30%	4.47	13	25,000	110,000	27,000	-18%

Table A5 (cont.). Existing and target solar loads for Little Weiser River.

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
008_03	Little Weiser R.	13	380	black cottonwood	48%	3.32	13	4,900	16,000	40%	3.83	13	4,900	19,000	3,000	-8%
008_03	Little Weiser R.	14	180	black cottonwood	48%	3.32	13	2,300	7,600	20%	5.10	13	2,300	12,000	4,400	-28%
008_03	Little Weiser R.	15	1200	black cottonwood	45%	3.51	14	17,000	60,000	30%	4.47	14	17,000	76,000	16,000	-15%
008_03	Little Weiser R.	16	640	black cottonwood	45%	3.51	14	9,000	32,000	20%	5.10	14	9,000	46,000	14,000	-25%
008_03	Little Weiser R.	17	190	black cottonwood	45%	3.51	14	2,700	9,500	40%	3.83	14	2,700	10,000	500	-5%
008_03	Little Weiser R.	18	1200	black cottonwood	45%	3.51	14	17,000	60,000	20%	5.10	14	17,000	87,000	27,000	-25%
008_03	Little Weiser R.	19	500	black cottonwood	42%	3.70	15	7,500	28,000	40%	3.83	15	7,500	29,000	1,000	0%
008_03	Little Weiser R.	20	480	black cottonwood	42%	3.70	15	7,200	27,000	30%	4.47	15	7,200	32,000	5,000	-12%
008_03	Little Weiser R.	21	840	black cottonwood	42%	3.70	15	13,000	48,000	20%	5.10	15	13,000	66,000	18,000	-22%
008_03	Little Weiser R.	22	140	black cottonwood	42%	3.70	15	2,100	7,800	40%	3.83	15	2,100	8,000	200	0%
008_03	Little Weiser R.	23	950	black cottonwood	42%	3.70	15	14,000	52,000	20%	5.10	15	14,000	71,000	19,000	-22%
008_03	Little Weiser R.	24	170	black cottonwood	42%	3.70	15	2,600	9,600	0%	6.38	15	2,600	17,000	7,400	-42%
008_03	Little Weiser R.	25	96	black cottonwood	40%	3.83	16	1,500	5,700	10%	5.74	16	1,500	8,600	2,900	-30%
008_03	Little Weiser R.	26	1100	black cottonwood	40%	3.83	16	18,000	69,000	0%	6.38	16	18,000	110,000	41,000	-40%
008_03	Little Weiser R.	27	940	black cottonwood	40%	3.83	16	15,000	57,000	20%	5.10	16	15,000	77,000	20,000	-20%
008_03	Little Weiser R.	28	670	black cottonwood	40%	3.83	16	11,000	42,000	10%	5.74	16	11,000	63,000	21,000	-30%
008_03	Little Weiser R.	29	1000	black cottonwood	38%	3.96	17	17,000	67,000	20%	5.10	17	17,000	87,000	20,000	-18%
008_03	Little Weiser R.	30	310	black cottonwood	38%	3.96	17	5,300	21,000	10%	5.74	17	5,300	30,000	9,000	-28%
008_03	Little Weiser R.	31	110	black cottonwood	38%	3.96	17	1,900	7,500	20%	5.10	17	1,900	9,700	2,200	-18%
008_03	Little Weiser R.	32	430	black cottonwood	38%	3.96	17	7,300	29,000	10%	5.74	17	7,300	42,000	13,000	-28%
008_03	Little Weiser R.	33	650	black cottonwood	38%	3.96	17	11,000	44,000	30%	4.47	17	11,000	49,000	5,000	-8%
008_03	Little Weiser R.	34	470	black cottonwood	38%	3.96	17	8,000	32,000	10%	5.74	17	8,000	46,000	14,000	-28%
008_03	Little Weiser R.	35	610	black cottonwood	36%	4.08	18	11,000	45,000	20%	5.10	18	11,000	56,000	11,000	-16%
008_04	Little Weiser R.	1	470	black cottonwood	36%	4.08	18	8,500	35,000	0%	6.38	18	8,500	54,000	19,000	-36%
008_04	Little Weiser R.	2	200	black cottonwood	36%	4.08	18	3,600	15,000	20%	5.10	18	3,600	18,000	3,000	-16%
008_04	Little Weiser R.	3	510	black cottonwood	36%	4.08	18	9,200	38,000	0%	6.38	18	9,200	59,000	21,000	-36%
008_04	Little Weiser R.	4	450	black cottonwood	36%	4.08	18	8,100	33,000	10%	5.74	18	8,100	47,000	14,000	-26%
008_04	Little Weiser R.	5	1900	black cottonwood	35%	4.15	19	36,000	150,000	10%	5.74	19	36,000	210,000	60,000	-25%
008_04	Little Weiser R.	6	1100	black cottonwood	35%	4.15	19	21,000	87,000	0%	6.38	19	21,000	130,000	43,000	-35%
008_04	Little Weiser R.	7	410	black cottonwood	33%	4.27	20	8,200	35,000	0%	6.38	20	8,200	52,000	17,000	-33%
008_04	Little Weiser R.	8	740	black cottonwood	33%	4.27	20	15,000	64,000	10%	5.74	20	15,000	86,000	22,000	-23%
008_04	Little Weiser R.	9	670	black cottonwood	33%	4.27	20	13,000	56,000	0%	6.38	20	13,000	83,000	27,000	-33%
008_04	Little Weiser R.	10	1900	black cottonwood	33%	4.27	20	38,000	160,000	10%	5.74	20	38,000	220,000	60,000	-23%
008_04	Little Weiser R.	11	200	black cottonwood	32%	4.34	21	4,200	18,000	0%	6.38	21	4,200	27,000	9,000	-32%
008_04	Little Weiser R.	12	2000	black cottonwood	32%	4.34	21	42,000	180,000	10%	5.74	21	42,000	240,000	60,000	-22%
008_04	Little Weiser R.	13	1700	black cottonwood	32%	4.34	21	36,000	160,000	0%	6.38	21	36,000	230,000	70,000	-32%
008_04	Little Weiser R.	14	370	black cottonwood	30%	4.47	22	8,100	36,000	10%	5.74	22	8,100	47,000	11,000	-20%
008_04	Little Weiser R.	15	250	black cottonwood	30%	4.47	22	5,500	25,000	0%	6.38	22	5,500	35,000	10,000	-30%
008_04	Little Weiser R.	16	320	black cottonwood	30%	4.47	22	7,000	31,000	10%	5.74	22	7,000	40,000	9,000	-20%
008_04	Little Weiser R.	17	1700	black cottonwood	30%	4.47	22	37,000	170,000	0%	6.38	22	37,000	240,000	70,000	-30%
008_04	Little Weiser R.	18	240	black cottonwood	30%	4.47	22	5,300	24,000	10%	5.74	22	5,300	30,000	6,000	-20%
008_04	Little Weiser R.	19	230	black cottonwood	29%	4.53	23	5,300	24,000	0%	6.38	23	5,300	34,000	10,000	-29%
008_04	Little Weiser R.	20	760	black cottonwood	29%	4.53	23	17,000	77,000	10%	5.74	23	17,000	98,000	21,000	-19%
008_04	Little Weiser R.	21	460	black cottonwood	29%	4.53	23	11,000	50,000	0%	6.38	23	11,000	70,000	20,000	-29%
008_04	Little Weiser R.	22	5300	black cottonwood	28%	4.59	24	130,000	600,000	0%	6.38	24	130,000	830,000	230,000	-28%
								Totals	3,500,000					5,000,000	1,400,000	

Table A6. Existing and target solar loads for Mann Creek.

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
032_02	Mann Creek	1	560	PVG 4 shrub	92%	0.51	1	600	300	90%	0.64	1	600	400	100	-2%
032_02	Mann Creek	2	890	alder	91%	0.57	1	900	500	90%	0.64	1	900	600	100	-1%
032_02	Mann Creek	3	1000	PVG 5	95%	0.32	1	1,000	300	90%	0.64	1	1,000	600	300	-5%
032_02	Mann Creek	4	1700	PVG 5	94%	0.38	2	3,000	1,000	90%	0.64	2	3,000	2,000	1,000	-4%
032_02	Mann Creek	5	930	PVG 2	78%	1.40	2	2,000	3,000	80%	1.28	2	2,000	3,000	0	0%
032_02	Mann Creek	6	1200	PVG 5	94%	0.38	2	2,000	800	90%	0.64	2	2,000	1,000	200	-4%
032_02	Mann Creek	7	890	PVG 5 shrub	74%	1.66	3	3,000	5,000	80%	1.28	3	3,000	4,000	(1,000)	0%
032_02	Mann Creek	8	1500	PVG 2 shrub	74%	1.66	3	5,000	8,000	80%	1.28	3	5,000	6,000	(2,000)	0%
032_02	Mann Creek	9	1500	PVG 2 shrub	61%	2.49	4	6,000	10,000	70%	1.91	4	6,000	10,000	0	0%
032_02	Mann Creek	10	1100	PVG 2	61%	2.49	4	4,000	10,000	80%	1.28	4	4,000	5,000	(5,000)	0%
032_02	Mann Creek	11	720	PVG 2 shrub	61%	2.49	4	3,000	7,000	70%	1.91	4	3,000	6,000	(1,000)	0%
032_03	Mann Creek	1	330	PVG 2 shrub	61%	2.49	4	1,000	2,000	60%	2.55	4	1,000	3,000	1,000	-1%
032_03	Mann Creek	2	500	PVG 2 shrub	61%	2.49	4	2,000	5,000	70%	1.91	4	2,000	4,000	(1,000)	0%
032_03	Mann Creek	3	370	PVG 2 shrub	61%	2.49	4	1,000	2,000	60%	2.55	4	1,000	3,000	1,000	-1%
032_03	Mann Creek	4	830	PVG 2	55%	2.87	5	4,000	10,000	80%	1.28	5	4,000	5,000	(5,000)	0%
032_03	Mann Creek	5	500	PVG 2 shrub	53%	3.00	5	3,000	9,000	60%	2.55	5	3,000	8,000	(1,000)	0%
032_03	Mann Creek	6	190	PVG 2 shrub	53%	3.00	5	1,000	3,000	80%	1.28	5	1,000	1,000	(2,000)	0%
032_03	Mann Creek	7	260	alder	50%	3.19	5	1,000	3,000	60%	2.55	5	1,000	3,000	0	0%
032_03	Mann Creek	8	150	PVG 2 shrub	53%	3.00	5	800	2,000	60%	2.55	5	800	2,000	0	0%
032_03	Mann Creek	9	210	PVG 2 shrub	53%	3.00	5	1,000	3,000	70%	1.91	5	1,000	2,000	(1,000)	0%
032_03	Mann Creek	10	290	PVG 2 shrub	53%	3.00	5	1,000	3,000	60%	2.55	5	1,000	3,000	0	0%
032_03	Mann Creek	11	190	PVG 2 shrub	53%	3.00	5	1,000	3,000	70%	1.91	5	1,000	2,000	(1,000)	0%
032_03	Mann Creek	12	600	alder	50%	3.19	5	3,000	10,000	50%	3.19	5	3,000	10,000	0	0%
032_03	Mann Creek	13	81	alder	50%	3.19	5	400	1,000	30%	4.47	5	400	2,000	1,000	-20%
032_03	Mann Creek	14	270	alder	50%	3.19	5	1,000	3,000	50%	3.19	5	1,000	3,000	0	0%
032_03	Mann Creek	15	330	PVG 2 shrub	53%	3.00	5	2,000	6,000	60%	2.55	5	2,000	5,000	(1,000)	0%
032_03	Mann Creek	16	2000	alder	43%	3.64	6	10,000	40,000	50%	3.19	6	10,000	30,000	(10,000)	0%
032_03	Mann Creek	17	1700	alder	43%	3.64	6	10,000	40,000	60%	2.55	6	10,000	30,000	(10,000)	0%
032_03	Mann Creek	18	190	alder	38%	3.96	7	1,000	4,000	30%	4.47	7	1,000	4,000	0	-8%
032_03	Mann Creek	19	430	water birch	43%	3.64	7	3,000	10,000	60%	2.55	7	3,000	8,000	(2,000)	17%
032_03	Mann Creek	20	1300	water birch	43%	3.64	7	9,000	30,000	50%	3.19	7	9,000	30,000	0	7%
032_03	Mann Creek	21	1600	black cottonwood	69%	1.98	8	10,000	20,000	60%	2.55	8	10,000	30,000	10,000	-9%
032_03	Mann Creek	22	180	black cottonwood	69%	1.98	8	1,000	2,000	50%	3.19	8	1,000	3,000	1,000	-19%
032_03	Mann Creek	23	92	black cottonwood	69%	1.98	8	700	1,000	40%	3.83	8	700	3,000	2,000	-29%
032_03	Mann Creek	24	900	black cottonwood	69%	1.98	8	7,000	10,000	60%	2.55	8	7,000	20,000	10,000	-9%
032_03	Mann Creek	25	270	black cottonwood	69%	1.98	8	2,000	4,000	40%	3.83	8	2,000	8,000	4,000	-29%
032_03	Mann Creek	26	200	black cottonwood	69%	1.98	9	2,000	4,000	50%	3.19	8	2,000	6,000	2,000	-19%
031_03	Mann Creek	1	78	black cottonwood	69%	1.98	8	600	1,000	50%	3.19	8	600	2,000	1,000	-19%
031_03	Mann Creek	2	63	black cottonwood	69%	1.98	8	500	1,000	30%	4.47	8	500	2,000	1,000	-39%
031_03	Mann Creek	3	730	black cottonwood	69%	1.98	8	6,000	10,000	50%	3.19	8	6,000	20,000	10,000	-19%
031_03	Mann Creek	4	120	black cottonwood	69%	1.98	8	1,000	2,000	40%	3.83	8	1,000	4,000	2,000	-29%
031_03	Mann Creek	5	310	sandbar willow	35%	4.15	8	2,000	8,000	30%	4.47	8	2,000	9,000	1,000	-5%
031L_0L	Reservoir	1	2100	water	0%	6.38	360	756,000	4,820,000	0%	6.38	360	756,000	4,820,000	0	0%
030_03	Mann Creek	1	260	sandbar willow	29%	4.53	8	2,000	9,000	0%	6.38	8	2,000	10,000	1,000	-29%
030_03	Mann Creek	2	360	black cottonwood	69%	1.98	8	3,000	6,000	60%	2.55	8	3,000	8,000	2,000	0%
030_03	Mann Creek	3	770	black cottonwood	69%	1.98	8	6,000	10,000	40%	3.83	8	6,000	20,000	10,000	-29%
030_03	Mann Creek	4	400	black cottonwood	69%	1.98	8	3,000	6,000	50%	3.19	8	3,000	10,000	4,000	-19%
030_03	Mann Creek	5	310	black cottonwood	69%	1.98	8	2,000	4,000	60%	2.55	8	2,000	5,000	1,000	0%
030_03	Mann Creek	6	690	black cottonwood	69%	1.98	8	6,000	10,000	70%	1.91	8	6,000	10,000	0	0%
030_03	Mann Creek	7	160	black cottonwood	69%	1.98	8	1,000	2,000	40%	3.83	8	1,000	4,000	2,000	-29%
030_03	Mann Creek	8	230	black cottonwood	69%	1.98	8	2,000	4,000	50%	3.19	8	2,000	6,000	2,000	-19%
030_03	Mann Creek	9	370	black cottonwood	69%	1.98	8	3,000	6,000	30%	4.47	8	3,000	10,000	4,000	-39%
030_03	Mann Creek	10	230	black cottonwood	69%	1.98	8	2,000	4,000	50%	3.19	8	2,000	6,000	2,000	-19%
030_03	Mann Creek	11	260	black cottonwood	69%	1.98	8	2,000	4,000	0%	6.38	8	2,000	10,000	6,000	-69%

Table A6 (cont.). Existing and target solar loads for Mann Creek.

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
030_03	Mann Creek	12	300	black cottonwood	69%	1.98	8	2,000	4,000	50%	3.19	8	2,000	6,000	2,000	-19%
030_03	Mann Creek	13	400	black cottonwood	69%	1.98	8	3,000	6,000	40%	3.83	8	3,000	10,000	4,000	-29%
030_03	Mann Creek	14	88	black cottonwood	69%	1.98	8	700	1,000	30%	4.47	8	700	3,000	2,000	-39%
030_03	Mann Creek	15	170	black cottonwood	69%	1.98	8	1,000	2,000	50%	3.19	8	1,000	3,000	1,000	-19%
030_03	Mann Creek	16	240	black cottonwood	69%	1.98	8	2,000	4,000	40%	3.83	8	2,000	8,000	4,000	-29%
030_03	Mann Creek	17	78	black cottonwood	69%	1.98	8	600	1,000	10%	5.74	8	600	3,000	2,000	-59%
030_03	Mann Creek	18	130	black cottonwood	69%	1.98	8	1,000	2,000	50%	3.19	8	1,000	3,000	1,000	-19%
030_03	Mann Creek	19	180	black cottonwood	69%	1.98	8	1,000	2,000	30%	4.47	8	1,000	4,000	2,000	-39%
030_03	Mann Creek	20	370	black cottonwood	69%	1.98	8	3,000	6,000	60%	2.55	8	3,000	8,000	2,000	0%
030_03	Mann Creek	21	290	black cottonwood	69%	1.98	8	2,000	4,000	50%	3.19	8	2,000	6,000	2,000	-19%
030_03	Mann Creek	22	190	black cottonwood	69%	1.98	8	2,000	4,000	30%	4.47	8	2,000	9,000	5,000	-39%
030_03	Mann Creek	23	1400	black cottonwood	69%	1.98	8	10,000	20,000	40%	3.83	8	10,000	40,000	20,000	-29%
030_03	Mann Creek	24	210	black cottonwood	69%	1.98	8	2,000	4,000	50%	3.19	8	2,000	6,000	2,000	0%
030_03	Mann Creek	25	280	black cottonwood	69%	1.98	8	2,000	4,000	20%	5.10	8	2,000	10,000	6,000	-49%
030_03	Mann Creek	26	430	black cottonwood	69%	1.98	8	3,000	6,000	30%	4.47	8	3,000	10,000	4,000	-39%
030_03	Mann Creek	27	130	black cottonwood	69%	1.98	8	1,000	2,000	50%	3.19	8	1,000	3,000	1,000	0%
030_03	Mann Creek	28	280	black cottonwood	69%	1.98	8	2,000	4,000	40%	3.83	8	2,000	8,000	4,000	-29%
030_03	Mann Creek	29	250	black cottonwood	69%	1.98	8	2,000	4,000	20%	5.10	8	2,000	10,000	6,000	-49%
030_03	Mann Creek	30	340	black cottonwood	69%	1.98	8	3,000	6,000	30%	4.47	8	3,000	10,000	4,000	-39%
030_03	Mann Creek	31	520	black cottonwood	69%	1.98	8	4,000	8,000	20%	5.10	8	4,000	20,000	10,000	-49%
030_03	Mann Creek	32	250	black cottonwood	69%	1.98	8	2,000	4,000	30%	4.47	8	2,000	9,000	5,000	-39%
030_03	Mann Creek	33	120	black cottonwood	69%	1.98	8	1,000	2,000	20%	5.10	8	1,000	5,000	3,000	-49%
030_03	Mann Creek	34	210	black cottonwood	69%	1.98	8	2,000	4,000	40%	3.83	8	2,000	8,000	4,000	-29%
030_03	Mann Creek	35	190	black cottonwood	69%	1.98	8	2,000	4,000	10%	5.74	8	2,000	10,000	6,000	-59%
030_03	Mann Creek	36	310	black cottonwood	69%	1.98	8	2,000	4,000	50%	3.19	8	2,000	6,000	2,000	0%
030_03	Mann Creek	37	390	black cottonwood	69%	1.98	8	3,000	6,000	20%	5.10	8	3,000	20,000	10,000	-49%
030_03	Mann Creek	38	400	black cottonwood	69%	1.98	8	3,000	6,000	40%	3.83	8	3,000	10,000	4,000	-29%
030_03	Mann Creek	39	520	black cottonwood	69%	1.98	8	4,000	8,000	20%	5.10	8	4,000	20,000	10,000	-49%
030_03	Mann Creek	40	130	black cottonwood	69%	1.98	8	1,000	2,000	10%	5.74	8	1,000	6,000	4,000	-59%
030_03	Mann Creek	41	570	black cottonwood	69%	1.98	8	5,000	10,000	30%	4.47	8	5,000	20,000	10,000	-39%
030_03	Mann Creek	42	130	black cottonwood	69%	1.98	8	1,000	2,000	10%	5.74	8	1,000	6,000	4,000	-59%
030_03	Mann Creek	43	180	black cottonwood	69%	1.98	8	1,000	2,000	30%	4.47	8	1,000	4,000	2,000	-39%
030_03	Mann Creek	44	310	black cottonwood	69%	1.98	8	2,000	4,000	0%	6.38	8	2,000	10,000	6,000	-69%
030_03	Mann Creek	45	84	black cottonwood	69%	1.98	8	700	1,000	30%	4.47	8	700	3,000	2,000	-39%
030_03	Mann Creek	46	170	black cottonwood	69%	1.98	8	1,000	2,000	10%	5.74	8	1,000	6,000	4,000	-59%
030_03	Mann Creek	47	400	black cottonwood	69%	1.98	8	3,000	6,000	20%	5.10	8	3,000	20,000	10,000	-49%
030_03	Mann Creek	48	280	black cottonwood	69%	1.98	8	2,000	4,000	10%	5.74	8	2,000	10,000	6,000	-59%
030_03	Mann Creek	49	99	black cottonwood	69%	1.98	8	800	2,000	20%	5.10	8	800	4,000	2,000	-49%
030_03	Mann Creek	50	840	black cottonwood	69%	1.98	8	7,000	10,000	10%	5.74	8	7,000	40,000	30,000	-59%
030_03	Mann Creek	51	410	black cottonwood	69%	1.98	8	3,000	6,000	30%	4.47	8	3,000	10,000	4,000	-39%
030_03	Mann Creek	52	470	black cottonwood	69%	1.98	8	4,000	8,000	10%	5.74	8	4,000	20,000	10,000	-59%
030_03	Mann Creek	53	170	black cottonwood	69%	1.98	8	1,000	2,000	30%	4.47	8	1,000	4,000	2,000	-39%
030_03	Mann Creek	54	210	black cottonwood	69%	1.98	8	2,000	4,000	0%	6.38	8	2,000	10,000	6,000	-69%
030_03	Mann Creek	55	270	black cottonwood	69%	1.98	8	2,000	4,000	50%	3.19	8	2,000	6,000	2,000	0%
030_03	Mann Creek	56	550	black cottonwood	69%	1.98	8	4,000	8,000	30%	4.47	8	4,000	20,000	10,000	-39%
030_03	Mann Creek	57	260	black cottonwood	69%	1.98	8	2,000	4,000	50%	3.19	8	2,000	6,000	2,000	0%
030_03	Mann Creek	58	520	black cottonwood	69%	1.98	8	4,000	8,000	20%	5.10	8	4,000	20,000	10,000	-49%
030_03	Mann Creek	59	220	black cottonwood	69%	1.98	8	2,000	4,000	50%	3.19	8	2,000	6,000	2,000	0%
030_03	Mann Creek	60	320	black cottonwood	69%	1.98	8	3,000	6,000	10%	5.74	8	3,000	20,000	10,000	-59%
030_03	Mann Creek	61	200	black cottonwood	69%	1.98	8	2,000	4,000	0%	6.38	8	2,000	10,000	6,000	-69%
030_03	Mann Creek	62	330	black cottonwood	69%	1.98	8	3,000	6,000	20%	5.10	8	3,000	20,000	10,000	-49%
030_03	Mann Creek	63	160	black cottonwood	69%	1.98	8	1,000	2,000	10%	5.74	8	1,000	6,000	4,000	-59%
030_03	Mann Creek	64	440	black cottonwood	69%	1.98	8	4,000	8,000	20%	5.10	8	4,000	20,000	10,000	-49%
							Totals		5,400,000					5,800,000	340,000	

Table A7. Existing and target solar loads for Middle Fork Weiser River.

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	MF Weiser R.	1	1200	PVG 9	97%	0.19	1	1,000	200	90%	0.64	1	1,000	600	400	-7%
014_02	MF Weiser R.	2	1400	PVG 6	96%	0.26	1	1,000	300	90%	0.64	1	1,000	600	300	-6%
014_02	MF Weiser R.	3	2100	PVG 9	97%	0.19	2	4,000	800	80%	1.28	2	4,000	5,000	4,000	-17%
014_02	MF Weiser R.	4	590	PVG 6	95%	0.32	2	1,000	300	80%	1.28	2	1,000	1,000	700	-15%
014_03a	MF Weiser R.	1	360	PVG 9 shrub	75%	1.60	3	1,000	2,000	60%	2.55	3	1,000	3,000	1,000	-15%
014_03a	MF Weiser R.	2	330	PVG 9 shrub	75%	1.60	3	1,000	2,000	70%	1.91	3	1,000	2,000	0	-5%
014_03a	MF Weiser R.	3	2200	PVG 9 shrub	75%	1.60	3	7,000	10,000	60%	2.55	3	7,000	20,000	10,000	-15%
014_03a	MF Weiser R.	4	490	PVG 9 shrub	63%	2.36	4	2,000	5,000	50%	3.19	4	2,000	6,000	1,000	-13%
014_03a	MF Weiser R.	5	1700	PVG 6 shrub	62%	2.42	4	7,000	20,000	50%	3.19	4	7,000	20,000	0	-12%
014_03a	MF Weiser R.	6	290	PVG 6 shrub	62%	2.42	4	1,000	2,000	30%	4.47	4	1,000	4,000	2,000	-32%
014_03a	MF Weiser R.	7	830	PVG 6 shrub	55%	2.87	5	4,000	10,000	40%	3.83	5	4,000	20,000	10,000	-15%
014_03a	MF Weiser R.	8	140	PVG 6 shrub	55%	2.87	5	700	2,000	60%	2.55	5	700	2,000	0	0%
014_03a	MF Weiser R.	9	550	PVG 6 shrub	55%	2.87	5	3,000	9,000	50%	3.19	5	3,000	10,000	1,000	-5%
014_03a	MF Weiser R.	10	1300	PVG 6 shrub	55%	2.87	5	7,000	20,000	40%	3.83	5	7,000	30,000	10,000	-15%
014_03a	MF Weiser R.	11	300	PVG 6 shrub	49%	3.25	6	2,000	7,000	50%	3.19	6	2,000	6,000	(1,000)	0%
014_03a	MF Weiser R.	12	1400	PVG 6 meadow	24%	4.85	6	8,000	40,000	20%	5.10	6	8,000	40,000	0	-4%
014_03a	MF Weiser R.	13	1100	PVG 6 meadow	24%	4.85	6	7,000	30,000	10%	5.74	6	7,000	40,000	10,000	-14%
014_03a	MF Weiser R.	14	200	PVG 6 meadow	23%	4.91	7	1,000	5,000	10%	5.74	7	1,000	6,000	1,000	-13%
014_03a	MF Weiser R.	15	200	PVG 6 meadow	23%	4.91	7	1,000	5,000	20%	5.10	7	1,000	5,000	0	-3%
014_03a	MF Weiser R.	16	1400	PVG 2	46%	3.45	7	10,000	30,000	30%	4.47	7	10,000	40,000	10,000	-16%
014_03a	MF Weiser R.	17	500	PVG 2	46%	3.45	7	4,000	10,000	50%	3.19	7	4,000	10,000	0	0%
014_03a	MF Weiser R.	18	850	PVG 6	72%	1.79	7	6,000	10,000	50%	3.19	7	6,000	20,000	10,000	-22%
014_03a	MF Weiser R.	19	770	PVG 2	43%	3.64	8	6,000	20,000	10%	5.74	8	6,000	30,000	10,000	-33%
014_03a	MF Weiser R.	20	300	PVG 2	43%	3.64	8	2,000	7,000	40%	3.83	8	2,000	8,000	1,000	-3%
014_03a	MF Weiser R.	21	1200	PVG 6	68%	2.04	8	10,000	20,000	50%	3.19	8	10,000	30,000	10,000	-18%
014_03a	MF Weiser R.	22	360	PVG 6	68%	2.04	8	3,000	6,000	60%	2.55	8	3,000	8,000	2,000	-8%
014_03a	MF Weiser R.	23	190	PVG 6	63%	2.36	9	2,000	5,000	50%	3.19	9	2,000	6,000	1,000	-13%
014_03a	MF Weiser R.	24	340	PVG 6	63%	2.36	9	3,000	7,000	60%	2.55	9	3,000	8,000	1,000	-3%
014_03a	MF Weiser R.	25	330	PVG 6 shrub	37%	4.02	9	3,000	10,000	30%	4.47	9	3,000	10,000	0	-7%
014_03a	MF Weiser R.	26	190	PVG 6	63%	2.36	9	2,000	5,000	50%	3.19	9	2,000	6,000	1,000	-13%
014_03a	MF Weiser R.	27	130	PVG 6 shrub	37%	4.02	9	1,000	4,000	30%	4.47	9	1,000	4,000	0	-7%
014_03a	MF Weiser R.	28	1200	PVG 6	63%	2.36	9	10,000	20,000	50%	3.19	9	10,000	30,000	10,000	-13%
014_03a	MF Weiser R.	29	260	PVG 6	63%	2.36	9	2,000	5,000	20%	5.10	9	2,000	10,000	5,000	-43%
014_03a	MF Weiser R.	30	170	PVG 6	63%	2.36	9	2,000	5,000	50%	3.19	9	2,000	6,000	1,000	-13%
014_03a	MF Weiser R.	31	1200	PVG 6 shrub	35%	4.15	10	12,000	50,000	20%	5.10	10	12,000	61,000	11,000	-15%
014_03a	MF Weiser R.	32	1200	PVG 2 shrub	32%	4.34	10	12,000	52,000	30%	4.47	10	12,000	54,000	2,000	-2%
014_03	MF Weiser R.	1	340	black cottonwood	59%	2.62	10	3,400	8,900	40%	3.83	10	3,400	13,000	4,100	-19%
014_03	MF Weiser R.	2	1800	black cottonwood	54%	2.93	11	20,000	59,000	60%	2.55	11	20,000	51,000	(8,000)	0%
014_03	MF Weiser R.	3	580	black cottonwood	54%	2.93	11	6,400	19,000	50%	3.19	11	6,400	20,000	1,000	-4%
014_03	MF Weiser R.	4	790	black cottonwood	54%	2.93	11	8,700	26,000	30%	4.47	11	8,700	39,000	13,000	-24%
014_03	MF Weiser R.	5	270	black cottonwood	51%	3.13	12	3,200	10,000	20%	5.10	12	3,200	16,000	6,000	-31%
014_03	MF Weiser R.	6	1300	black cottonwood	51%	3.13	12	16,000	50,000	40%	3.83	12	16,000	61,000	11,000	-11%
014_03	MF Weiser R.	7	830	black cottonwood	51%	3.13	12	10,000	31,000	30%	4.47	12	10,000	45,000	14,000	-21%
014_03	MF Weiser R.	8	620	black cottonwood	51%	3.13	12	7,400	23,000	40%	3.83	12	7,400	28,000	5,000	-11%
014_03	MF Weiser R.	9	390	black cottonwood	48%	3.32	13	5,100	17,000	40%	3.83	13	5,100	20,000	3,000	-8%
014_03	MF Weiser R.	10	470	black cottonwood	48%	3.32	13	6,100	20,000	30%	4.47	13	6,100	27,000	7,000	-18%
014_03	MF Weiser R.	11	1300	black cottonwood	48%	3.32	13	17,000	56,000	20%	5.10	13	17,000	87,000	31,000	-28%
014_03	MF Weiser R.	12	260	black cottonwood	48%	3.32	13	3,400	11,000	30%	4.47	13	3,400	15,000	4,000	-18%
014_03	MF Weiser R.	13	290	black cottonwood	48%	3.32	13	3,800	13,000	20%	5.10	13	3,800	19,000	6,000	-28%
014_03	MF Weiser R.	14	140	black cottonwood	45%	3.51	14	2,000	7,000	30%	4.47	14	2,000	8,900	1,900	-15%
014_03	MF Weiser R.	15	640	black cottonwood	45%	3.51	14	9,000	32,000	20%	5.10	14	9,000	46,000	14,000	-25%
014_03	MF Weiser R.	16	360	black cottonwood	45%	3.51	14	5,000	18,000	30%	4.47	14	5,000	22,000	4,000	-15%
014_03	MF Weiser R.	17	1700	black cottonwood	45%	3.51	14	24,000	84,000	20%	5.10	14	24,000	120,000	36,000	-25%
014_03	MF Weiser R.	18	840	black cottonwood	42%	3.70	15	13,000	48,000	30%	4.47	15	13,000	58,000	10,000	-12%
014_03	MF Weiser R.	19	270	black cottonwood	42%	3.70	15	4,100	15,000	10%	5.74	15	4,100	24,000	9,000	-32%
014_03	MF Weiser R.	20	190	black cottonwood	42%	3.70	15	2,900	11,000	20%	5.10	15	2,900	15,000	4,000	-22%
014_03	MF Weiser R.	21	280	black cottonwood	42%	3.70	15	4,200	16,000	10%	5.74	15	4,200	24,000	8,000	-32%
014_03	MF Weiser R.	22	310	black cottonwood	42%	3.70	15	4,700	17,000	0%	6.38	15	4,700	30,000	13,000	-42%
							Totals		1,000,000					1,400,000	320,000	

Table A8. Existing and target solar loads for Monroe Creek.

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
033_02	Monroe Creek	1	1600	PVG 5	95%	0.32	1	2,000	600	90%	0.64	1	2,000	1,000	400	-5%
033_02	Monroe Creek	2	1500	PVG 2 shrub	92%	0.51	1	2,000	1,000	80%	1.28	1	2,000	3,000	2,000	-12%
033_02	Monroe Creek	3	150	PVG 2 shrub	92%	0.51	1	200	100	30%	4.47	1	200	900	800	-62%
033_02	Monroe Creek	4	260	PVG 2 shrub	92%	0.51	1	300	200	80%	1.28	1	300	400	200	-12%
033_02	Monroe Creek	5	320	alder	91%	0.57	1	300	200	80%	1.28	1	300	400	200	-11%
033_02	Monroe Creek	6	460	PVG 2	79%	1.34	1	500	700	90%	0.64	1	500	300	(400)	0%
033_02	Monroe Creek	7	410	PVG 2 shrub	86%	0.89	1	400	400	80%	1.28	1	400	500	100	-6%
033_02	Monroe Creek	8	99	PVG 2 shrub	86%	0.89	2	200	200	50%	3.19	2	200	600	400	-36%
033_02	Monroe Creek	9	640	PVG 2 shrub	86%	0.89	2	1,000	900	80%	1.28	2	1,000	1,000	100	-6%
033_02	Monroe Creek	10	2600	alder	86%	0.89	2	5,000	4,000	70%	1.91	2	5,000	10,000	6,000	-16%
033_02	Monroe Creek	11	460	sandbar willow	70%	1.91	3	1,000	2,000	60%	2.55	3	1,000	3,000	1,000	-10%
033_02	Monroe Creek	12	450	sandbar willow	70%	1.91	3	1,000	2,000	50%	3.19	3	1,000	3,000	1,000	-20%
033_02	Monroe Creek	14	1200	sandbar willow	70%	1.91	3	4,000	8,000	60%	2.55	3	4,000	10,000	2,000	-10%
033_02	Monroe Creek	15	230	sandbar willow	70%	1.91	3	700	1,000	50%	3.19	3	700	2,000	1,000	-20%
033_02	Monroe Creek	16	1700	water birch	77%	1.47	3	5,000	7,000	70%	1.91	3	5,000	10,000	3,000	-7%
033_02	Monroe Creek	17	550	water birch	64%	2.30	4	2,000	5,000	40%	3.83	4	2,000	8,000	3,000	-24%
033_02	Monroe Creek	18	490	water birch	64%	2.30	4	2,000	5,000	20%	5.10	4	2,000	10,000	5,000	-44%
033_02	Monroe Creek	20	230	water birch	64%	2.30	4	900	2,000	60%	2.55	4	900	2,000	0	-4%
033_02	Monroe Creek	21	240	water birch	64%	2.30	4	1,000	2,000	50%	3.19	4	1,000	3,000	1,000	-14%
033_03	Monroe Creek	1	220	water birch	64%	2.30	4	900	2,000	50%	3.19	4	900	3,000	1,000	-14%
033_03	Monroe Creek	2	6500	water birch	64%	2.30	4	30,000	70,000	70%	1.91	4	30,000	60,000	(10,000)	0%
033_03	Monroe Creek	3	260	water birch	48%	3.32	6	2,000	7,000	60%	2.55	6	2,000	5,000	(2,000)	0%
033_03	Monroe Creek	4	400	water birch	48%	3.32	6	2,000	7,000	50%	3.19	6	2,000	6,000	(1,000)	0%
033_03	Monroe Creek	5	290	water birch	48%	3.32	6	2,000	7,000	20%	5.10	6	2,000	10,000	3,000	-28%
033_03	Monroe Creek	6	640	water birch	48%	3.32	6	4,000	10,000	40%	3.83	6	4,000	20,000	10,000	-8%
033_03	Monroe Creek	7	220	water birch	48%	3.32	6	1,000	3,000	50%	3.19	6	1,000	3,000	0	0%
033_03	Monroe Creek	8	410	water birch	48%	3.32	6	2,000	7,000	60%	2.55	6	2,000	5,000	(2,000)	0%
033_03	Monroe Creek	9	510	water birch	48%	3.32	6	3,000	10,000	50%	3.19	6	3,000	10,000	0	0%
033_03	Monroe Creek	10	1100	water birch	43%	3.64	6	7,000	30,000	50%	3.19	6	7,000	20,000	(10,000)	0%
033_03	Monroe Creek	11	230	water birch	43%	3.64	6	1,000	4,000	30%	4.47	6	1,000	4,000	0	-13%
033_03	Monroe Creek	12	880	water birch	43%	3.64	6	5,000	20,000	20%	5.10	6	5,000	30,000	10,000	-23%
033_03	Monroe Creek	13	670	water birch	43%	3.64	6	4,000	10,000	40%	3.83	6	4,000	20,000	10,000	-3%
033_03	Monroe Creek	14	370	water birch	43%	3.64	6	2,000	7,000	10%	5.74	6	2,000	10,000	3,000	-33%
033_03	Monroe Creek	15	580	black cottonwood	81%	1.21	6	3,000	4,000	60%	2.55	6	3,000	8,000	4,000	-21%
033_03	Monroe Creek	16	150	black cottonwood	81%	1.21	6	900	1,000	0%	6.38	6	900	6,000	5,000	-81%
033_03	Monroe Creek	17	180	black cottonwood	81%	1.21	6	1,000	1,000	50%	3.19	6	1,000	3,000	2,000	-31%
033_03	Monroe Creek	18	450	black cottonwood	81%	1.21	6	3,000	4,000	30%	4.47	6	3,000	10,000	6,000	-51%
033_03	Monroe Creek	19	200	black cottonwood	81%	1.21	6	1,000	1,000	50%	3.19	6	1,000	3,000	2,000	-31%
033_03	Monroe Creek	20	280	black cottonwood	81%	1.21	6	2,000	2,000	60%	2.55	6	2,000	5,000	3,000	-21%
033_03	Monroe Creek	21	670	black cottonwood	81%	1.21	6	4,000	5,000	70%	1.91	6	4,000	8,000	3,000	-11%
033_03	Monroe Creek	22	520	black cottonwood	81%	1.21	6	3,000	4,000	40%	3.83	6	3,000	10,000	6,000	-41%
033_03	Monroe Creek	23	210	black cottonwood	81%	1.21	6	1,000	1,000	60%	2.55	6	1,000	3,000	2,000	-21%
033_03	Monroe Creek	24	190	black cottonwood	81%	1.21	6	1,000	1,000	70%	1.91	6	1,000	2,000	1,000	-11%
033_03	Monroe Creek	25	100	black cottonwood	81%	1.21	6	600	700	30%	4.47	6	600	3,000	2,000	-51%
033_03	Monroe Creek	26	130	black cottonwood	81%	1.21	6	800	1,000	80%	1.28	6	800	1,000	0	-1%
033_03	Monroe Creek	27	230	black cottonwood	81%	1.21	6	1,000	1,000	60%	2.55	6	1,000	3,000	2,000	-21%
033_03	Monroe Creek	28	290	black cottonwood	81%	1.21	6	2,000	2,000	80%	1.28	6	2,000	3,000	1,000	0%
033_03	Monroe Creek	29	800	black cottonwood	81%	1.21	6	5,000	6,000	60%	2.55	6	5,000	10,000	4,000	-21%
033_03	Monroe Creek	30	330	black cottonwood	81%	1.21	6	2,000	2,000	40%	3.83	6	2,000	8,000	6,000	-41%
033_03	Monroe Creek	31	390	black cottonwood	81%	1.21	6	2,000	2,000	70%	1.91	6	2,000	4,000	2,000	-11%
033_03	Monroe Creek	32	280	black cottonwood	81%	1.21	6	2,000	2,000	50%	3.19	6	2,000	6,000	4,000	-31%
033_03	Monroe Creek	33	340	black cottonwood	81%	1.21	6	2,000	2,000	70%	1.91	6	2,000	4,000	2,000	-11%
033_03	Monroe Creek	34	270	black cottonwood	81%	1.21	6	2,000	2,000	10%	5.74	6	2,000	10,000	8,000	-71%
033_03	Monroe Creek	35	790	black cottonwood	81%	1.21	6	5,000	6,000	60%	2.55	6	5,000	10,000	4,000	-21%
033_03	Monroe Creek	36	140	black cottonwood	81%	1.21	6	800	1,000	40%	3.83	6	800	3,000	2,000	-41%
033_03	Monroe Creek	37	430	black cottonwood	81%	1.21	6	3,000	4,000	60%	2.55	6	3,000	8,000	4,000	-21%
033_03	Monroe Creek	38	110	black cottonwood	81%	1.21	6	700	800	10%	5.74	6	700	4,000	3,000	-71%
033_03	Monroe Creek	39	510	black cottonwood	81%	1.21	6	3,000	4,000	50%	3.19	6	3,000	10,000	6,000	-31%
033_03	Monroe Creek	40	750	black cottonwood	81%	1.21	6	5,000	6,000	70%	1.91	6	5,000	10,000	4,000	-11%
033_03	Monroe Creek	41	220	black cottonwood	81%	1.21	6	1,000	1,000	40%	3.83	6	1,000	4,000	3,000	-41%
033_03	Monroe Creek	42	220	black cottonwood	81%	1.21	6	1,000	1,000	50%	3.19	6	1,000	3,000	2,000	-31%
033_03	Monroe Creek	43	900	black cottonwood	81%	1.21	6	5,000	6,000	70%	1.91	6	5,000	10,000	4,000	-11%
033_03	Monroe Creek	44	200	black cottonwood	81%	1.21	6	1,000	1,000	10%	5.74	6	1,000	6,000	5,000	-71%
033_03	Monroe Creek	45	1100	black cottonwood	81%	1.21	6	7,000	8,000	70%	1.91	6	7,000	10,000	2,000	-11%
								Totals	320,000					460,000	140,000	

Table A9. Existing and target solar loads for North Crane Creek.

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
006_02	N. Crane Creek	1	530	yellow willow	89%	0.70	1	500	400	90%	0.64	1	500	300	(100)	0%
006_02	N. Crane Creek	2	400	meadow	55%	2.87	1	400	1,000	50%	3.19	1	400	1,000	0	-5%
006_02	N. Crane Creek	3	850	yellow willow	89%	0.70	1	900	600	20%	5.10	1	900	5,000	4,000	-69%
006_02	N. Crane Creek	4	290	yellow willow	89%	0.70	1	300	200	0%	6.38	2	600	4,000	4,000	-89%
006_02	N. Crane Creek	6	180	yellow willow	73%	1.72	2	400	700	0%	6.38	2	400	3,000	2,000	-73%
006_02	N. Crane Creek	7	200	yellow willow	73%	1.72	2	400	700	50%	3.19	2	400	1,000	300	-23%
006_02	N. Crane Creek	8	410	yellow willow	73%	1.72	2	800	1,000	20%	5.10	2	800	4,000	3,000	-53%
006_02	N. Crane Creek	9	130	yellow willow	73%	1.72	2	300	500	10%	5.74	6	800	5,000	5,000	-63%
006_02	N. Crane Creek	10	130	yellow willow	73%	1.72	2	300	500	0%	6.38	6	800	5,000	5,000	-73%
006_02	N. Crane Creek	11	970	yellow willow	73%	1.72	2	2,000	3,000	30%	4.47	2	2,000	9,000	6,000	-43%
006_02	N. Crane Creek	13	260	yellow willow	56%	2.81	3	800	2,000	40%	3.83	3	800	3,000	1,000	-16%
006_02	N. Crane Creek	14	300	yellow willow	56%	2.81	3	900	3,000	30%	4.47	3	900	4,000	1,000	-26%
006_02	N. Crane Creek	15	500	yellow willow	56%	2.81	3	2,000	6,000	20%	5.10	3	2,000	10,000	4,000	-36%
006_02	N. Crane Creek	17	170	yellow willow	56%	2.81	3	500	1,000	0%	6.38	3	500	3,000	2,000	-56%
006_02	N. Crane Creek	18	170	yellow willow	56%	2.81	3	500	1,000	10%	5.74	3	500	3,000	2,000	-46%
006_03	N. Crane Creek	1	110	yellow willow	56%	2.81	3	300	800	0%	6.38	6	700	4,000	3,000	-56%
006_03	N. Crane Creek	2	190	yellow willow	56%	2.81	3	600	2,000	10%	5.74	3	600	3,000	1,000	-46%
006_03	N. Crane Creek	3	1200	yellow willow	46%	3.45	4	5,000	20,000	10%	5.74	4	5,000	30,000	10,000	-36%
006_03	N. Crane Creek	4	840	yellow willow	46%	3.45	4	3,000	10,000	30%	4.47	4	3,000	10,000	0	-16%
006_03	N. Crane Creek	5	360	sandbar willow	58%	2.68	4	1,000	3,000	10%	5.74	4	1,000	6,000	3,000	-48%
006_03	N. Crane Creek	6	2500	sandbar willow	50%	3.19	5	10,000	30,000	10%	5.74	5	10,000	60,000	30,000	-40%
006_03	N. Crane Creek	7	890	sandbar willow	44%	3.57	6	5,000	20,000	10%	5.74	6	5,000	30,000	10,000	-34%
006_03	N. Crane Creek	8	250	sandbar willow	44%	3.57	6	2,000	7,000	0%	6.38	6	2,000	10,000	3,000	-44%
006_03	N. Crane Creek	9	150	sandbar willow	44%	3.57	6	900	3,000	20%	5.10	6	900	5,000	2,000	-24%
006_03	N. Crane Creek	10	400	sandbar willow	44%	3.57	6	2,000	7,000	10%	5.74	6	2,000	10,000	3,000	-34%
006_03	N. Crane Creek	11	760	sandbar willow	44%	3.57	6	5,000	20,000	20%	5.10	6	5,000	30,000	10,000	-24%
006_03	N. Crane Creek	12	1100	sandbar willow	39%	3.89	7	8,000	30,000	10%	5.74	7	8,000	50,000	20,000	-29%
006_03	N. Crane Creek	13	1000	sandbar willow	39%	3.89	7	7,000	30,000	30%	4.47	7	7,000	30,000	0	-9%
006_03	N. Crane Creek	14	320	sandbar willow	35%	4.15	8	3,000	10,000	20%	5.10	8	3,000	20,000	10,000	-15%
006_03	N. Crane Creek	15	580	sandbar willow	35%	4.15	8	5,000	20,000	50%	3.19	8	5,000	20,000	0	0%
006_03	N. Crane Creek	16	440	sandbar willow	35%	4.15	8	4,000	20,000	30%	4.47	8	4,000	20,000	0	-5%
006_03	N. Crane Creek	17	230	sandbar willow	35%	4.15	8	2,000	8,000	20%	5.10	8	2,000	10,000	2,000	-15%
006_03	N. Crane Creek	18	410	sandbar willow	35%	4.15	8	3,000	10,000	30%	4.47	8	3,000	10,000	0	-5%
006_03	N. Crane Creek	19	410	sandbar willow	32%	4.34	9	4,000	20,000	30%	4.47	9	4,000	20,000	0	-2%
006_03	N. Crane Creek	20	210	sandbar willow	32%	4.34	9	2,000	9,000	10%	5.74	9	2,000	10,000	1,000	-22%
006_03	N. Crane Creek	21	1100	sandbar willow	32%	4.34	9	10,000	40,000	30%	4.47	9	10,000	40,000	0	-2%
006_03	N. Crane Creek	22	320	sandbar willow	32%	4.34	9	3,000	10,000	40%	3.83	9	3,000	10,000	0	0%
006_03	N. Crane Creek	23	1000	sandbar willow	29%	4.53	10	10,000	45,000	30%	4.47	10	10,000	45,000	0	0%
006_03	N. Crane Creek	24	720	sandbar willow	29%	4.53	10	7,200	33,000	20%	5.10	10	7,200	37,000	4,000	-9%
006_03	N. Crane Creek	25	630	sandbar willow	29%	4.53	10	6,300	29,000	30%	4.47	10	6,300	28,000	(1,000)	0%
006_03	N. Crane Creek	26	610	sandbar willow	27%	4.66	11	6,700	31,000	20%	5.10	11	6,700	34,000	3,000	-7%
006_03	N. Crane Creek	27	170	sandbar willow	27%	4.66	11	1,900	8,800	30%	4.47	11	1,900	8,500	(300)	0%
006_03	N. Crane Creek	28	1500	sandbar willow	27%	4.66	11	17,000	79,000	10%	5.74	11	17,000	98,000	19,000	-17%
006_03	N. Crane Creek	29	190	sandbar willow	25%	4.79	12	2,300	11,000	0%	6.38	12	2,300	15,000	4,000	-25%
006_03	N. Crane Creek	30	140	sandbar willow	25%	4.79	12	1,700	8,100	10%	5.74	12	1,700	9,800	1,700	-15%
006_04	N. Crane Creek	1	130	sandbar willow	25%	4.79	12	1,600	7,700	0%	6.38	12	1,600	10,000	2,300	-25%
006_04	N. Crane Creek	2	370	sandbar willow	25%	4.79	12	4,400	21,000	10%	5.74	12	4,400	25,000	4,000	-15%
006_04	N. Crane Creek	3	570	sandbar willow	25%	4.79	12	6,800	33,000	0%	6.38	12	6,800	43,000	10,000	-25%
006_04	N. Crane Creek	4	940	sandbar willow	25%	4.79	12	11,000	53,000	10%	5.74	12	11,000	63,000	10,000	-15%
006_04	N. Crane Creek	5	280	sandbar willow	23%	4.91	13	3,600	18,000	0%	6.38	13	3,600	23,000	5,000	-23%
006_04	N. Crane Creek	6	1500	sandbar willow	23%	4.91	13	20,000	98,000	10%	5.74	13	20,000	110,000	12,000	-13%
006_04	N. Crane Creek	7	1800	sandbar willow	21%	5.04	14	25,000	130,000	10%	5.74	14	25,000	140,000	10,000	-11%
006_04	N. Crane Creek	8	430	sandbar willow	21%	5.04	14	6,000	30,000	0%	6.38	14	6,000	38,000	8,000	-21%
006_04	N. Crane Creek	9	3300	sandbar willow	20%	5.10	15	50,000	260,000	0%	6.38	15	50,000	320,000	60,000	-20%
004_04	N. Crane Creek	1	710	sandbar willow	19%	5.17	16	11,000	57,000	0%	6.38	30	21,000	130,000	73,000	-19%
							Totals		1,300,000					1,700,000	370,000	

Table A10. Existing and target solar loads for North Hornet Creek.

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	N. Hornet Creek	1	2500	PVG 5	95%	0.32	1	3,000	1,000	90%	0.64	1	3,000	2,000	1,000	-5%
021_02	N. Hornet Creek	2	780	PVG 2	78%	1.40	2	2,000	3,000	80%	1.28	2	2,000	3,000	0	0%
021_02	N. Hornet Creek	3	500	PVG 6	95%	0.32	2	1,000	300	90%	0.64	2	1,000	600	300	-5%
021_02	N. Hornet Creek	4	2400	PVG 6	94%	0.38	3	7,000	3,000	90%	0.64	3	7,000	4,000	1,000	-4%
021_02	N. Hornet Creek	5	1600	PVG 6	91%	0.57	4	6,000	3,000	90%	0.64	4	6,000	4,000	1,000	-1%
021_02	N. Hornet Creek	6	2900	PVG 2 shrub	53%	3.00	5	10,000	30,000	70%	1.91	5	10,000	20,000	(10,000)	0%
021_02	N. Hornet Creek	7	1400	Geyer willow	40%	3.83	6	8,000	30,000	50%	3.19	6	8,000	30,000	0	0%
021_03	N. Hornet Creek	1	90	Geyer willow	35%	4.15	7	600	2,000	20%	5.10	7	600	3,000	1,000	-15%
021_03	N. Hornet Creek	2	140	Geyer willow	35%	4.15	7	1,000	4,000	50%	3.19	7	1,000	3,000	(1,000)	0%
021_03	N. Hornet Creek	3	630	alder	38%	3.96	7	4,000	20,000	50%	3.19	7	4,000	10,000	(10,000)	0%
021_03	N. Hornet Creek	4	390	alder	38%	3.96	7	3,000	10,000	40%	3.83	7	3,000	10,000	0	0%
021_03	N. Hornet Creek	5	450	sandbar willow	39%	3.89	7	3,000	10,000	30%	4.47	7	3,000	10,000	0	-9%
021_03	N. Hornet Creek	6	370	sandbar willow	39%	3.89	7	3,000	10,000	40%	3.83	7	3,000	10,000	0	0%
021_03	N. Hornet Creek	7	880	sandbar willow	35%	4.15	8	7,000	30,000	30%	4.47	8	7,000	30,000	0	-5%
021_03	N. Hornet Creek	8	180	sandbar willow	35%	4.15	8	1,000	4,000	10%	5.74	8	1,000	6,000	2,000	-25%
021_03	N. Hornet Creek	9	180	sandbar willow	35%	4.15	8	1,000	4,000	40%	3.83	8	1,000	4,000	0	0%
021_03	N. Hornet Creek	10	700	sandbar willow	35%	4.15	8	6,000	20,000	20%	5.10	8	6,000	30,000	10,000	-15%
021_03	N. Hornet Creek	11	95	sandbar willow	35%	4.15	8	800	3,000	30%	4.47	8	800	4,000	1,000	-5%
021_03	N. Hornet Creek	12	520	black cottonwood	63%	2.36	9	5,000	10,000	80%	1.28	9	5,000	6,000	(4,000)	0%
021_03	N. Hornet Creek	13	130	black cottonwood	63%	2.36	9	1,000	2,000	0%	6.38	9	1,000	6,000	4,000	-63%
021_03	N. Hornet Creek	14	170	black cottonwood	63%	2.36	9	2,000	5,000	60%	2.55	9	2,000	5,000	0	0%
021_03	N. Hornet Creek	15	200	black cottonwood	63%	2.36	9	2,000	5,000	40%	3.83	9	2,000	8,000	3,000	-23%
021_03	N. Hornet Creek	16	120	black cottonwood	63%	2.36	9	1,000	2,000	10%	5.74	9	1,000	6,000	4,000	-53%
021_03	N. Hornet Creek	17	240	black cottonwood	63%	2.36	9	2,000	5,000	60%	2.55	9	2,000	5,000	0	0%
021_03	N. Hornet Creek	18	380	black cottonwood	63%	2.36	9	3,000	7,000	40%	3.83	9	3,000	10,000	3,000	-23%
021_03	N. Hornet Creek	19	130	black cottonwood	63%	2.36	9	1,000	2,000	60%	2.55	9	1,000	3,000	1,000	0%
021_03	N. Hornet Creek	20	850	black cottonwood	59%	2.62	10	8,500	22,000	0%	6.38	10	8,500	54,000	32,000	-59%
021_03	N. Hornet Creek	21	420	black cottonwood	59%	2.62	10	4,200	11,000	10%	5.74	10	4,200	24,000	13,000	-49%
021_03	N. Hornet Creek	22	210	black cottonwood	59%	2.62	10	2,100	5,500	50%	3.19	10	2,100	6,700	1,200	-9%
021_03	N. Hornet Creek	23	220	black cottonwood	59%	2.62	10	2,200	5,800	40%	3.83	10	2,200	8,400	2,600	-19%
021_03	N. Hornet Creek	24	78	black cottonwood	59%	2.62	10	780	2,000	20%	5.10	10	780	4,000	2,000	-39%
021_03	N. Hornet Creek	25	370	black cottonwood	59%	2.62	10	3,700	9,700	40%	3.83	10	3,700	14,000	4,300	-19%
							Totals		280,000					340,000	62,000	

Table A11. Existing and target solar loads for Little Pine Creek and Pine Creek.

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
027_02	Little Pine Creek	1	870	PVG 6 shrub	92%	0.51	1	900	500	90%	0.64	1	900	600	100	-2%
027_02	Little Pine Creek	2	1200	PVG 5	95%	0.32	1	1,000	300	80%	1.28	1	1,000	1,000	700	-15%
027_02	Little Pine Creek	3	540	PVG 5	94%	0.38	2	1,000	400	90%	0.64	2	1,000	600	200	-4%
027_02	Little Pine Creek	4	880	PVG 6	95%	0.32	2	2,000	600	90%	0.64	2	2,000	1,000	400	-5%
027_02	Little Pine Creek	5	690	PVG 2	78%	1.40	2	1,000	1,000	80%	1.28	2	1,000	1,000	0	0%
027_02	Little Pine Creek	6	1500	PVG 2 shrub	74%	1.66	3	5,000	8,000	80%	1.28	3	5,000	6,000	(2,000)	0%
027_02	Little Pine Creek	7	960	alder	72%	1.79	3	3,000	5,000	70%	1.91	3	3,000	6,000	1,000	-2%
027_02	Little Pine Creek	8	1400	alder	59%	2.62	4	6,000	20,000	60%	2.55	4	6,000	20,000	0	0%
027_02	Little Pine Creek	9	1100	alder	59%	2.62	4	4,000	10,000	50%	3.19	4	4,000	10,000	0	-9%
027_02	Pine Creek	1	1600	meadow	55%	2.87	1	2,000	6,000	60%	2.55	1	2,000	5,000	(1,000)	0%
027_02	Pine Creek	2	2600	Geyer willow	82%	1.15	2	5,000	6,000	80%	1.28	2	5,000	6,000	0	-2%
027_02	Pine Creek	3	1200	sandbar willow	70%	1.91	3	4,000	8,000	60%	2.55	3	4,000	10,000	2,000	-10%
027_02	Pine Creek	4	360	sandbar willow	70%	1.91	3	1,000	2,000	50%	3.19	3	1,000	3,000	1,000	-20%
027_02	Pine Creek	5	190	alder	72%	1.79	3	600	1,000	70%	1.91	3	600	1,000	0	-2%
027_03	Pine Creek	1	960	sandbar willow	58%	2.68	4	4,000	10,000	60%	2.55	4	4,000	10,000	0	0%
027_03	Pine Creek	2	410	sandbar willow	58%	2.68	4	2,000	5,000	50%	3.19	4	2,000	6,000	1,000	-8%
027_03	Pine Creek	3	270	sandbar willow	58%	2.68	4	1,000	3,000	60%	2.55	4	1,000	3,000	0	0%
027_03	Pine Creek	4	320	sandbar willow	58%	2.68	4	1,000	3,000	50%	3.19	4	1,000	3,000	0	-8%
027_03	Pine Creek	5	150	sandbar willow	50%	3.19	5	800	3,000	30%	4.47	5	800	4,000	1,000	-20%
027_03	Pine Creek	6	630	sandbar willow	50%	3.19	5	3,000	10,000	50%	3.19	5	3,000	10,000	0	0%
027_03	Pine Creek	7	700	sandbar willow	50%	3.19	5	4,000	10,000	60%	2.55	5	4,000	10,000	0	0%
027_03	Pine Creek	8	350	sandbar willow	50%	3.19	5	2,000	6,000	30%	4.47	5	2,000	9,000	3,000	-20%
027_03	Pine Creek	9	140	sandbar willow	50%	3.19	5	700	2,000	50%	3.19	5	700	2,000	0	0%
027_03	Pine Creek	10	1300	sandbar willow	44%	3.57	6	8,000	30,000	40%	3.83	6	8,000	30,000	0	-4%
027_03	Pine Creek	11	280	sandbar willow	44%	3.57	6	2,000	7,000	50%	3.19	6	2,000	6,000	(1,000)	0%
027_03	Pine Creek	12	550	sandbar willow	39%	3.89	7	4,000	20,000	30%	4.47	7	4,000	20,000	0	-9%
027_03	Pine Creek	13	1100	sandbar willow	39%	3.89	7	8,000	30,000	40%	3.83	7	8,000	30,000	0	0%
027_03	Pine Creek	14	190	sandbar willow	39%	3.89	7	1,000	4,000	20%	5.10	7	1,000	5,000	1,000	-19%
027_03	Pine Creek	15	110	sandbar willow	35%	4.15	8	900	4,000	40%	3.83	8	900	3,000	(1,000)	0%
027_03	Pine Creek	16	1500	sandbar willow	35%	4.15	8	10,000	40,000	30%	4.47	8	10,000	40,000	0	-5%
027_03	Pine Creek	17	120	sandbar willow	35%	4.15	8	1,000	4,000	10%	5.74	8	1,000	6,000	2,000	-25%
027_03	Pine Creek	18	46	sandbar willow	35%	4.15	8	400	2,000	30%	4.47	8	400	2,000	0	-5%
027_03	Pine Creek	19	1900	sandbar willow	32%	4.34	9	20,000	90,000	30%	4.47	9	20,000	90,000	0	-2%
027_03	Pine Creek	20	400	black cottonwood	59%	2.62	10	4,000	10,000	60%	2.55	10	4,000	10,000	0	0%
027_03	Pine Creek	21	310	black cottonwood	59%	2.62	10	3,100	8,100	50%	3.19	10	3,100	9,900	1,800	-9%
027_03	Pine Creek	22	500	black cottonwood	59%	2.62	10	5,000	13,000	20%	5.10	10	5,000	26,000	13,000	-39%
027_03	Pine Creek	23	85	black cottonwood	59%	2.62	10	850	2,200	50%	3.19	10	850	2,700	500	-9%
027_03	Pine Creek	24	1200	black cottonwood	54%	2.93	11	13,000	38,000	50%	3.19	11	13,000	41,000	3,000	-4%
027_03	Pine Creek	25	380	black cottonwood	54%	2.93	11	4,200	12,000	60%	2.55	11	4,200	11,000	(1,000)	0%
027_03	Pine Creek	26	280	black cottonwood	54%	2.93	11	3,100	9,100	50%	3.19	11	3,100	9,900	800	-4%
027_04	Pine Creek	1	260	black cottonwood	51%	3.13	12	3,100	9,700	50%	3.19	12	3,100	9,900	200	0%
027_04	Pine Creek	2	1600	black cottonwood	51%	3.13	12	19,000	59,000	40%	3.83	12	19,000	73,000	14,000	-11%
027_04	Pine Creek	3	470	black cottonwood	48%	3.32	13	6,100	20,000	50%	3.19	13	6,100	19,000	(1,000)	0%
027_04	Pine Creek	4	250	black cottonwood	48%	3.32	13	3,300	11,000	30%	4.47	13	3,300	15,000	4,000	-18%
027_04	Pine Creek	5	750	black cottonwood	48%	3.32	13	9,800	33,000	40%	3.83	13	9,800	38,000	5,000	-8%
027_04	Pine Creek	6	1500	black cottonwood	45%	3.51	14	21,000	74,000	40%	3.83	14	21,000	80,000	6,000	-5%
027_04	Pine Creek	7	780	black cottonwood	45%	3.51	14	11,000	39,000	60%	2.55	14	11,000	28,000	(11,000)	0%
027_04	Pine Creek	8	190	black cottonwood	45%	3.51	14	2,700	9,500	40%	3.83	14	2,700	10,000	500	-5%
027_04	Pine Creek	9	280	black cottonwood	45%	3.51	14	3,900	14,000	20%	5.10	14	3,900	20,000	6,000	-25%
							Totals		710,000					760,000	50,000	

Table A12. Existing and target solar loads for South Crane Creek.

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
005_02	S. Crane Creek	1	690	yellow willow	73%	1.72	2	1,000	2,000	20%	5.10	6	4,000	20,000	20,000	-53%
005_02	S. Crane Creek	2	280	yellow willow	73%	1.72	2	600	1,000	50%	3.19	6	2,000	6,000	5,000	-23%
005_02	S. Crane Creek	3	250	yellow willow	73%	1.72	2	500	900	0%	6.38	6	2,000	10,000	9,000	-73%
005_02	S. Crane Creek	4	510	yellow willow	56%	2.81	3	2,000	6,000	10%	5.74	3	2,000	10,000	4,000	-46%
005_02	S. Crane Creek	5	260	yellow willow	56%	2.81	3	800	2,000	20%	5.10	3	800	4,000	2,000	-36%
005_02	S. Crane Creek	6	190	yellow willow	56%	2.81	3	600	2,000	50%	3.19	3	600	2,000	0	-6%
005_03	S. Crane Creek	1	780	yellow willow	46%	3.45	4	3,000	10,000	70%	1.91	5	4,000	8,000	(2,000)	0%
005_03	S. Crane Creek	2	84	yellow willow	46%	3.45	4	300	1,000	30%	4.47	5	400	2,000	1,000	-16%
005_03	S. Crane Creek	3	470	yellow willow	46%	3.45	4	2,000	7,000	20%	5.10	6	3,000	20,000	10,000	-26%
005_03	S. Crane Creek	4	240	yellow willow	39%	3.89	5	1,000	4,000	60%	2.55	6	1,000	3,000	(1,000)	0%
005_03	S. Crane Creek	5	290	yellow willow	39%	3.89	5	1,000	4,000	30%	4.47	8	2,000	9,000	5,000	-9%
005_03	S. Crane Creek	6	520	yellow willow	39%	3.89	5	3,000	10,000	40%	3.83	6	3,000	10,000	0	0%
005_03	S. Crane Creek	7	170	yellow willow	34%	4.21	6	1,000	4,000	30%	4.47	6	1,000	4,000	0	-4%
005_03	S. Crane Creek	8	480	yellow willow	34%	4.21	6	3,000	10,000	40%	3.83	6	3,000	10,000	0	0%
005_03	S. Crane Creek	9	230	yellow willow	34%	4.21	6	1,000	4,000	50%	3.19	6	1,000	3,000	(1,000)	0%
005_03	S. Crane Creek	10	390	yellow willow	34%	4.21	6	2,000	8,000	30%	4.47	6	2,000	9,000	1,000	-4%
005_03	S. Crane Creek	11	470	yellow willow	30%	4.47	7	3,000	10,000	40%	3.83	6	3,000	10,000	0	0%
005_03	S. Crane Creek	12	160	yellow willow	30%	4.47	7	1,000	4,000	30%	4.47	6	1,000	4,000	0	0%
005_03	S. Crane Creek	13	460	yellow willow	30%	4.47	7	3,000	10,000	60%	2.55	6	3,000	8,000	(2,000)	0%
005_03	S. Crane Creek	14	160	yellow willow	27%	4.66	8	1,000	5,000	30%	4.47	6	1,000	4,000	(1,000)	0%
005_03	S. Crane Creek	15	470	yellow willow	27%	4.66	8	4,000	20,000	50%	3.19	6	3,000	10,000	(10,000)	0%
005_03	S. Crane Creek	16	280	yellow willow	27%	4.66	8	2,000	9,000	20%	5.10	6	2,000	10,000	1,000	-7%
005_03	S. Crane Creek	17	150	yellow willow	27%	4.66	8	1,000	5,000	40%	3.83	6	900	3,000	(2,000)	0%
005_03	S. Crane Creek	18	350	yellow willow	24%	4.85	9	3,000	10,000	30%	4.47	6	2,000	9,000	(1,000)	0%
005_03	S. Crane Creek	19	160	yellow willow	24%	4.85	9	1,000	5,000	20%	5.10	6	1,000	5,000	0	-4%
005_03	S. Crane Creek	20	520	yellow willow	24%	4.85	9	5,000	20,000	10%	5.74	8	4,000	20,000	0	-14%
005_03	S. Crane Creek	21	270	yellow willow	22%	4.98	10	2,700	13,000	20%	5.10	9	2,400	12,000	(1,000)	-2%
005_04	S. Crane Creek	1	250	yellow willow	22%	4.98	10	2,500	12,000	50%	3.19	10	2,500	8,000	(4,000)	0%
005_04	S. Crane Creek	2	450	yellow willow	22%	4.98	10	4,500	22,000	30%	4.47	10	4,500	20,000	(2,000)	0%
005_04	S. Crane Creek	3	520	yellow willow	21%	5.04	11	5,700	29,000	0%	6.38	12	6,200	40,000	11,000	-21%
005_04	S. Crane Creek	4	480	yellow willow	21%	5.04	11	5,300	27,000	30%	4.47	10	4,800	21,000	(6,000)	0%
005_04	S. Crane Creek	5	820	yellow willow	19%	5.17	12	9,800	51,000	30%	4.47	10	8,200	37,000	(14,000)	0%
005_04	S. Crane Creek	6	100	black cottonwood	51%	3.13	12	1,200	3,800	50%	3.19	10	1,000	3,200	(600)	0%
005_04	S. Crane Creek	7	190	black cottonwood	51%	3.13	12	2,300	7,200	30%	4.47	10	1,900	8,500	1,300	-21%
005_04	S. Crane Creek	8	74	black cottonwood	51%	3.13	12	890	2,800	60%	2.55	10	740	1,900	(900)	0%
005_04	S. Crane Creek	9	360	black cottonwood	51%	3.13	12	4,300	13,000	20%	5.10	10	3,600	18,000	5,000	-31%
							Totals		350,000					380,000	27,000	

Table A13. Existing and target solar loads for West Branch Weiser River.

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	West Branch	1	400	PVG 5 meadow	60%	2.55	1	400	1,000	70%	1.91	1	400	800	(200)	0%
007_02	West Branch	2	110	PVG 5 meadow	60%	2.55	1	100	300	60%	2.55	1	100	300	0	0%
007_02	West Branch	3	390	PVG 5	95%	0.32	1	400	100	90%	0.64	1	400	300	200	-5%
007_02	West Branch	4	1000	PVG 2	79%	1.34	1	1,000	1,000	80%	1.28	1	1,000	1,000	0	0%
007_02	West Branch	5	1600	PVG 5	94%	0.38	2	3,000	1,000	90%	0.64	2	3,000	2,000	1,000	-4%
007_02	West Branch	6	630	PVG 2	70%	1.91	3	2,000	4,000	70%	1.91	3	2,000	4,000	0	0%
007_02	West Branch	7	400	PVG 5	92%	0.51	3	1,000	500	80%	1.28	3	1,000	1,000	500	-12%
007_02	West Branch	8	170	PVG 2 meadow	29%	4.53	3	500	2,000	40%	3.83	3	500	2,000	0	0%
007_02	West Branch	9	120	PVG 2 meadow	25%	4.79	4	500	2,000	30%	4.47	4	500	2,000	0	0%
007_02	West Branch	10	150	PVG 2 meadow	25%	4.79	4	600	3,000	40%	3.83	4	600	2,000	(1,000)	0%
007_02	West Branch	11	800	wolf willow	22%	4.98	4	3,000	10,000	30%	4.47	4	3,000	10,000	0	0%
007_02	West Branch	12	110	wolf willow	22%	4.98	4	400	2,000	20%	5.10	4	400	2,000	0	-2%
007_02	West Branch	13	82	wolf willow	22%	4.98	4	300	1,000	20%	5.10	4	300	2,000	1,000	-2%
007_02	West Branch	14	250	wolf willow	22%	4.98	4	1,000	5,000	20%	5.10	4	1,000	5,000	0	-2%
							Totals		33,000					34,000	1,500	

Table A14. Existing and target solar loads for West Pine Creek.

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
027_02	W. Pine Creek	1	3600	PVG 6	96%	0.26	1	4,000	1,000	90%	0.64	1	4,000	3,000	2,000	-6%
027_02	W. Pine Creek	2	2900	PVG 6	95%	0.32	2	6,000	2,000	90%	0.64	2	6,000	4,000	2,000	-5%
027_02	W. Pine Creek	3	760	PVG 2	70%	1.91	3	2,000	4,000	90%	0.64	3	2,000	1,000	(3,000)	0%
027_02	W. Pine Creek	4	960	PVG 6	94%	0.38	3	3,000	1,000	80%	1.28	3	3,000	4,000	3,000	-14%
027_02	W. Pine Creek	5	330	alder	59%	2.62	4	1,000	3,000	70%	1.91	4	1,000	2,000	(1,000)	0%
027_02	W. Pine Creek	6	610	PVG 6	94%	0.38	4	2,000	800	80%	1.28	4	2,000	3,000	2,000	-14%
027_02	W. Pine Creek	7	450	alder	59%	2.62	4	2,000	5,000	70%	1.91	4	2,000	4,000	(1,000)	0%
027_02	W. Pine Creek	8	1100	PVG 6	91%	0.57	4	4,000	2,000	90%	0.64	4	4,000	3,000	1,000	-1%
027_02	W. Pine Creek	9	840	PVG 2	55%	2.87	5	4,000	10,000	80%	1.28	5	4,000	5,000	(5,000)	0%
027_02	W. Pine Creek	10	310	PVG 2 shrub	53%	3.00	5	2,000	6,000	70%	1.91	5	2,000	4,000	(2,000)	0%
027_02	W. Pine Creek	11	380	PVG 2	55%	2.87	5	2,000	6,000	80%	1.28	5	2,000	3,000	(3,000)	0%
027_02	W. Pine Creek	12	460	alder	50%	3.19	5	2,000	6,000	70%	1.91	5	2,000	4,000	(2,000)	0%
027_03	W. Pine Creek	1	200	alder	50%	3.19	5	1,000	3,000	70%	1.91	5	1,000	2,000	(1,000)	0%
027_03	W. Pine Creek	2	390	alder	50%	3.19	5	2,000	6,000	60%	2.55	5	2,000	5,000	(1,000)	0%
027_03	W. Pine Creek	3	1100	alder	43%	3.64	6	7,000	30,000	50%	3.19	6	7,000	20,000	(10,000)	0%
027_03	W. Pine Creek	4	160	alder	43%	3.64	6	1,000	4,000	60%	2.55	6	1,000	3,000	(1,000)	0%
027_03	W. Pine Creek	5	1500	sandbar willow	44%	3.57	6	9,000	30,000	50%	3.19	6	9,000	30,000	0	0%
027_03	W. Pine Creek	6	550	water birch	48%	3.32	6	3,000	10,000	60%	2.55	6	3,000	8,000	(2,000)	0%
027_03	W. Pine Creek	7	370	water birch	43%	3.64	7	3,000	10,000	40%	3.83	7	3,000	10,000	0	-3%
027_03	W. Pine Creek	8	240	water birch	43%	3.64	7	2,000	7,000	20%	5.10	7	2,000	10,000	3,000	-23%
027_03	W. Pine Creek	9	280	water birch	43%	3.64	7	2,000	7,000	50%	3.19	7	2,000	6,000	(1,000)	0%
027_03	W. Pine Creek	10	420	sandbar willow	39%	3.89	7	3,000	10,000	40%	3.83	7	3,000	10,000	0	0%
027_03	W. Pine Creek	11	170	sandbar willow	39%	3.89	7	1,000	4,000	20%	5.10	7	1,000	5,000	1,000	-19%
027_03	W. Pine Creek	12	540	sandbar willow	39%	3.89	7	4,000	20,000	40%	3.83	7	4,000	20,000	0	0%
027_03	W. Pine Creek	13	98	sandbar willow	39%	3.89	7	700	3,000	30%	4.47	7	700	3,000	0	-9%
027_03	W. Pine Creek	14	200	sandbar willow	39%	3.89	7	1,000	4,000	50%	3.19	7	1,000	3,000	(1,000)	0%
027_03	W. Pine Creek	15	98	sandbar willow	39%	3.89	7	700	3,000	20%	5.10	7	700	4,000	1,000	-19%
027_03	W. Pine Creek	16	420	sandbar willow	39%	3.89	7	3,000	10,000	40%	3.83	7	3,000	10,000	0	0%
027_03	W. Pine Creek	17	310	sandbar willow	35%	4.15	8	2,000	8,000	40%	3.83	8	2,000	8,000	0	0%
027_03	W. Pine Creek	18	1100	sandbar willow	35%	4.15	8	9,000	40,000	50%	3.19	8	9,000	30,000	(10,000)	0%
027_03	W. Pine Creek	19	140	black cottonwood	69%	1.98	8	1,000	2,000	30%	4.47	8	1,000	4,000	2,000	-39%
027_03	W. Pine Creek	20	630	black cottonwood	69%	1.98	8	5,000	10,000	60%	2.55	8	5,000	10,000	0	-9%
027_03	W. Pine Creek	21	630	black cottonwood	69%	1.98	8	5,000	10,000	70%	1.91	8	5,000	10,000	0	0%
							Totals		280,000					250,000	0	

Table A15. Existing and target solar loads for West Fork Weiser River.

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
017_02	WF Weiser R.	1	3000	PVG 6	96%	0.26	1	3,000	800	80%	1.28	1	3,000	4,000	3,000	-16%
017_02	WF Weiser R.	2	910	PVG 2	78%	1.40	2	2,000	3,000	80%	1.28	2	2,000	3,000	0	0%
017_02	WF Weiser R.	3	1100	PVG 5	94%	0.38	2	2,000	800	90%	0.64	2	2,000	1,000	200	-4%
017_03	WF Weiser R.	4	2700	PVG 2	70%	1.91	3	8,000	20,000	80%	1.28	3	8,000	10,000	(10,000)	0%
017_03	WF Weiser R.	5	1500	PVG 2	61%	2.49	4	6,000	10,000	70%	1.91	4	6,000	10,000	0	0%
017_03	WF Weiser R.	6	200	PVG 6	91%	0.57	4	800	500	70%	1.91	4	800	2,000	2,000	-21%
017_03	WF Weiser R.	7	350	PVG 6	91%	0.57	4	1,000	600	90%	0.64	4	1,000	600	0	-1%
017_03	WF Weiser R.	8	130	PVG 6	91%	0.57	4	500	300	80%	1.28	4	500	600	300	-11%
017_03	WF Weiser R.	9	260	alder	59%	2.62	4	1,000	3,000	60%	2.55	4	1,000	3,000	0	0%
017_03	WF Weiser R.	10	220	PVG 2	55%	2.87	5	1,000	3,000	70%	1.91	5	1,000	2,000	(1,000)	0%
017_03	WF Weiser R.	11	330	PVG 2	55%	2.87	5	2,000	6,000	60%	2.55	5	2,000	5,000	(1,000)	0%
017_03	WF Weiser R.	12	470	PVG 2	55%	2.87	5	2,000	6,000	70%	1.91	5	2,000	4,000	(2,000)	0%
017_03	WF Weiser R.	13	530	PVG 2 shrub	53%	3.00	5	3,000	9,000	60%	2.55	5	3,000	8,000	(1,000)	0%
017_03	WF Weiser R.	14	840	PVG 5	76%	1.53	5	4,000	6,000	60%	2.55	5	4,000	10,000	4,000	-16%
017_03	WF Weiser R.	15	210	PVG 2 shrub	53%	3.00	5	1,000	3,000	50%	3.19	5	1,000	3,000	0	-3%
017_03	WF Weiser R.	16	230	PVG 2 shrub	47%	3.38	6	1,000	3,000	30%	4.47	6	1,000	4,000	1,000	-17%
017_03	WF Weiser R.	17	120	PVG 2 shrub	47%	3.38	6	700	2,000	40%	3.83	6	700	3,000	1,000	-7%
017_03	WF Weiser R.	18	420	PVG 2	50%	3.19	6	3,000	10,000	50%	3.19	6	3,000	10,000	0	0%
017_03	WF Weiser R.	19	600	PVG 2	50%	3.19	6	4,000	10,000	60%	2.55	6	4,000	10,000	0	0%
017_03	WF Weiser R.	20	630	PVG 2 shrub	47%	3.38	6	4,000	10,000	40%	3.83	6	4,000	20,000	10,000	-7%
017_03	WF Weiser R.	21	970	PVG 2	46%	3.45	7	7,000	20,000	50%	3.19	7	7,000	20,000	0	0%
017_03	WF Weiser R.	22	280	PVG 6	72%	1.79	7	2,000	4,000	70%	1.91	7	2,000	4,000	0	-2%
017_03	WF Weiser R.	23	140	PVG 2 shrub	42%	3.70	7	1,000	4,000	50%	3.19	7	1,000	3,000	(1,000)	0%
017_03	WF Weiser R.	24	520	PVG2 shrub	42%	3.70	7	4,000	10,000	40%	3.83	7	4,000	20,000	10,000	-2%
017_03	WF Weiser R.	25	950	PVG 2	46%	3.45	7	7,000	20,000	50%	3.19	7	7,000	20,000	0	0%
017_03	WF Weiser R.	26	440	PVG 2 shrub	38%	3.96	8	4,000	20,000	40%	3.83	8	4,000	20,000	0	0%
017_03	WF Weiser R.	27	120	PVG 2 shrub	38%	3.96	8	1,000	4,000	10%	5.74	8	1,000	6,000	2,000	-28%
017_03	WF Weiser R.	28	240	PVG 2 shrub	38%	3.96	8	2,000	8,000	20%	5.10	8	2,000	10,000	2,000	-18%
017_03	WF Weiser R.	29	800	PVG 2 shrub	38%	3.96	8	6,000	20,000	40%	3.83	8	6,000	20,000	0	0%
017_03	WF Weiser R.	30	480	PVG 2 shrub	38%	3.96	8	4,000	20,000	30%	4.47	8	4,000	20,000	0	-8%
017_03	WF Weiser R.	31	410	alder	34%	4.21	8	3,000	10,000	10%	5.74	8	3,000	20,000	10,000	-24%
017_03	WF Weiser R.	32	160	alder	34%	4.21	8	1,000	4,000	30%	4.47	8	1,000	4,000	0	-4%
017_03	WF Weiser R.	33	210	alder	31%	4.40	9	2,000	9,000	10%	5.74	9	2,000	10,000	1,000	-21%
017_03	WF Weiser R.	34	340	black cottonwood	63%	2.36	9	3,000	7,000	50%	3.19	9	3,000	10,000	3,000	-13%
017_03	WF Weiser R.	35	200	black cottonwood	63%	2.36	9	2,000	5,000	60%	2.55	9	2,000	5,000	0	0%
017_03	WF Weiser R.	36	200	black cottonwood	63%	2.36	9	2,000	5,000	30%	4.47	9	2,000	9,000	4,000	-33%
017_03	WF Weiser R.	37	120	black cottonwood	63%	2.36	9	1,000	2,000	60%	2.55	9	1,000	3,000	1,000	0%
017_03	WF Weiser R.	38	1100	black cottonwood	63%	2.36	9	10,000	20,000	40%	3.83	9	10,000	40,000	20,000	-23%
017_03	WF Weiser R.	39	130	black cottonwood	63%	2.36	9	1,000	2,000	20%	5.10	9	1,000	5,000	3,000	-43%
017_03	WF Weiser R.	40	240	black cottonwood	63%	2.36	9	2,000	5,000	50%	3.19	9	2,000	6,000	1,000	-13%
017_03	WF Weiser R.	41	540	black cottonwood	59%	2.62	10	5,400	14,000	30%	4.47	10	5,400	24,000	10,000	-29%
017_03	WF Weiser R.	42	72	black cottonwood	59%	2.62	10	720	1,900	70%	1.91	10	720	1,400	(500)	11%
017_03	WF Weiser R.	43	590	black cottonwood	59%	2.62	10	5,900	15,000	50%	3.19	10	5,900	19,000	4,000	-9%
017_03	WF Weiser R.	44	310	black cottonwood	59%	2.62	10	3,100	8,100	40%	3.83	10	3,100	12,000	3,900	-19%
017_03	WF Weiser R.	45	610	black cottonwood	59%	2.62	10	6,100	16,000	20%	5.10	10	6,100	31,000	15,000	-39%
017_03	WF Weiser R.	46	210	black cottonwood	59%	2.62	10	2,100	5,500	30%	4.47	10	2,100	9,400	3,900	-29%
017_03	WF Weiser R.	47	290	black cottonwood	59%	2.62	10	2,900	7,600	50%	3.19	10	2,900	9,300	1,700	-9%
017_03	WF Weiser R.	48	110	black cottonwood	59%	2.62	10	1,100	2,900	20%	5.10	10	1,100	5,600	2,700	-39%
							Totals		380,000					480,000	100,000	

Table A16. Existing and target solar loads for Upper Weiser River (2nd order).

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	Weiser River	1	1700	PVG 5	95%	0.32	1	2,000	600	90%	0.64	1	2,000	1,000	400	-5%
007_02	Weiser River	2	780	PVG 5 meadow	60%	2.55	1	800	2,000	80%	1.28	1	800	1,000	(1,000)	0%
007_02	Weiser River	3	1800	PVG 5	94%	0.38	2	4,000	2,000	90%	0.64	2	4,000	3,000	1,000	-4%
007_02	Weiser River	4	1030	PVG 7	95%	0.32	2	2,000	600	80%	1.28	2	2,000	3,000	2,000	-15%
007_02	Weiser River	5	130	PVG 7	94%	0.38	3	400	200	80%	1.28	3	400	500	300	-14%
007_02	Weiser River	6	470	PVG 5 shrub	74%	1.66	3	1,000	2,000	60%	2.55	3	1,000	3,000	1,000	-14%
007_02	Weiser River	7	180	PVG 5 shrub	74%	1.66	3	500	800	70%	1.91	3	500	1,000	200	-4%
007_02	Weiser River	8	130	PVG 5 meadow	33%	4.27	3	400	2,000	40%	3.83	3	400	2,000	0	0%
007_02	Weiser River	9	120	PVG 6	94%	0.38	3	400	200	90%	0.64	3	400	300	100	-4%
007_02	Weiser River	10	180	PVG 5 meadow	33%	4.27	3	500	2,000	40%	3.83	3	500	2,000	0	0%
007_02	Weiser River	11	580	PVG 5	92%	0.51	3	2,000	1,000	90%	0.64	3	2,000	1,000	0	-2%
007_02	Weiser River	12	840	PVG 5	92%	0.51	3	3,000	2,000	80%	1.28	3	3,000	4,000	2,000	-12%
007_02	Weiser River	13	290	PVG 5 meadow	28%	4.59	4	1,000	5,000	40%	3.83	4	1,000	4,000	(1,000)	0%
007_02	Weiser River	14	110	PVG 6 meadow	29%	4.53	4	400	2,000	30%	4.47	4	400	2,000	0	0%
007_02	Weiser River	15	260	PVG 6 meadow	29%	4.53	4	1,000	5,000	40%	3.83	4	1,000	4,000	(1,000)	0%
007_02	Weiser River	16	220	PVG 6 shrub	62%	2.42	4	900	2,000	60%	2.55	4	900	2,000	0	-2%
007_02	Weiser River	17	140	PVG 2 shrub	61%	2.49	4	600	1,000	60%	2.55	4	600	2,000	1,000	-1%
007_02	Weiser River	18	310	PVG 2 meadow	25%	4.79	4	1,000	5,000	30%	4.47	4	1,000	4,000	(1,000)	0%
007_02	Weiser River	19	140	PVG 2 shrub	61%	2.49	4	600	1,000	70%	1.91	4	600	1,000	0	0%
007_02	Weiser River	20	430	PVG 2 shrub	61%	2.49	4	2,000	5,000	60%	2.55	4	2,000	5,000	0	-1%
007_02	Weiser River	21	740	wolf willow	22%	4.98	4	3,000	10,000	30%	4.47	4	3,000	10,000	0	0%
007_02	Weiser River	22	570	wolf willow	18%	5.23	5	3,000	20,000	30%	4.47	5	3,000	10,000	(10,000)	0%
007_02	Weiser River	23	640	wolf willow	18%	5.23	5	3,000	20,000	10%	5.74	5	3,000	20,000	0	-8%

Table A16 (cont.). Existing and target solar loads for Upper Weiser River (3rd order).

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_03	Weiser River	1	200	wolf willow	18%	5.23	5	1,000	5,000	10%	5.74	5	1,000	6,000	1,000	-8%
007_03	Weiser River	2	96	wolf willow	18%	5.23	5	500	3,000	20%	5.10	5	500	3,000	0	0%
007_03	Weiser River	3	110	wolf willow	18%	5.23	5	600	3,000	10%	5.74	5	600	3,000	0	-8%
007_03	Weiser River	4	360	PVG 2 shrub	53%	3.00	5	2,000	6,000	40%	3.83	5	2,000	8,000	2,000	-13%
007_03	Weiser River	5	330	wolf willow	18%	5.23	5	2,000	10,000	20%	5.10	5	2,000	10,000	0	0%
007_03	Weiser River	6	71	wolf willow	18%	5.23	5	400	2,000	0%	6.38	5	400	3,000	1,000	-18%
007_03	Weiser River	7	2400	wolf willow	15%	5.42	6	10,000	50,000	0%	6.38	6	10,000	60,000	10,000	-15%
007_03	Weiser River	8	460	wolf willow	15%	5.42	6	3,000	20,000	10%	5.74	6	3,000	20,000	0	-5%
007_03	Weiser River	9	330	wolf willow	13%	5.55	7	2,000	10,000	10%	5.74	7	2,000	10,000	0	-3%
007_03	Weiser River	10	1500	PVG 2 meadow	18%	5.23	7	10,000	50,000	20%	5.10	7	10,000	50,000	0	0%
007_03	Weiser River	11	630	wolf willow	13%	5.55	7	4,000	20,000	10%	5.74	7	4,000	20,000	0	-3%
007_03	Weiser River	12	1100	wolf willow	11%	5.68	8	9,000	50,000	20%	5.10	8	9,000	50,000	0	0%
007_03	Weiser River	13	350	alder	34%	4.21	8	3,000	10,000	40%	3.83	8	3,000	10,000	0	0%
007_03	Weiser River	14	940	alder	34%	4.21	8	8,000	30,000	50%	3.19	8	8,000	30,000	0	0%
007_03	Weiser River	15	1000	alder	31%	4.40	9	9,000	40,000	40%	3.83	9	9,000	30,000	(10,000)	0%
007_03	Weiser River	16	610	alder	31%	4.40	9	5,000	20,000	30%	4.47	9	5,000	20,000	0	-1%
007_03	Weiser River	17	250	alder	31%	4.40	9	2,000	9,000	10%	5.74	9	2,000	10,000	1,000	-21%
007_03	Weiser River	18	670	wolf willow	10%	5.74	9	6,000	30,000	0%	6.38	9	6,000	40,000	10,000	-10%
007_03	Weiser River	19	610	wolf willow	9%	5.81	10	6,100	35,000	0%	6.38	10	6,100	39,000	4,000	-9%
007_03	Weiser River	20	480	alder	28%	4.59	10	4,800	22,000	20%	5.10	10	4,800	24,000	2,000	-8%
007_03	Weiser River	21	390	alder	28%	4.59	10	3,900	18,000	10%	5.74	10	3,900	22,000	4,000	-18%
007_03	Weiser River	22	230	alder	28%	4.59	10	2,300	11,000	20%	5.10	10	2,300	12,000	1,000	-8%
007_03	Weiser River	23	620	alder	28%	4.59	10	6,200	28,000	30%	4.47	10	6,200	28,000	0	0%
007_03	Weiser River	24	360	alder	28%	4.59	10	3,600	17,000	20%	5.10	10	3,600	18,000	1,000	-8%
007_03	Weiser River	25	630	alder	26%	4.72	11	6,900	33,000	40%	3.83	11	6,900	26,000	(7,000)	0%
007_03	Weiser River	26	910	alder	26%	4.72	11	10,000	47,000	20%	5.10	11	10,000	51,000	4,000	-6%
007_03	Weiser River	27	330	PVG 2 shrub	30%	4.47	11	3,600	16,000	40%	3.83	11	3,600	14,000	(2,000)	0%
007_03	Weiser River	28	410	alder	26%	4.72	11	4,500	21,000	30%	4.47	11	4,500	20,000	(1,000)	0%
007_03	Weiser River	29	320	PVG 2 shrub	30%	4.47	11	3,500	16,000	40%	3.83	11	3,500	13,000	(3,000)	0%
007_03	Weiser River	30	500	PVG 2 shrub	28%	4.59	12	6,000	28,000	30%	4.47	12	6,000	27,000	(1,000)	0%
007_03	Weiser River	31	160	PVG 2 shrub	28%	4.59	12	1,900	8,700	50%	3.19	12	1,900	6,100	(2,600)	0%
007_03	Weiser River	32	650	alder	24%	4.85	12	7,800	38,000	20%	5.10	12	7,800	40,000	2,000	-4%
007_03	Weiser River	33	170	PVG 2 shrub	28%	4.59	12	2,000	9,200	30%	4.47	12	2,000	8,900	(300)	0%
007_03	Weiser River	34	110	PVG 2 shrub	28%	4.59	12	1,300	6,000	20%	5.10	12	1,300	6,600	600	-8%
007_03	Weiser River	35	93	PVG 6	52%	3.06	12	1,100	3,400	60%	2.55	12	1,100	2,800	(600)	0%
007_03	Weiser River	36	180	PVG 2 shrub	28%	4.59	12	2,200	10,000	30%	4.47	12	2,200	9,800	(200)	0%
007_03	Weiser River	37	230	PVG 2 shrub	28%	4.59	12	2,800	13,000	20%	5.10	12	2,800	14,000	1,000	-8%
007_03	Weiser River	38	140	PVG 2 shrub	28%	4.59	12	1,700	7,800	30%	4.47	12	1,700	7,600	(200)	0%
007_03	Weiser River	39	160	PVG 2 shrub	28%	4.59	12	1,900	8,700	20%	5.10	12	1,900	9,700	1,000	-8%
007_03	Weiser River	40	790	PVG 2 shrub	28%	4.59	12	9,500	44,000	40%	3.83	12	9,500	36,000	(8,000)	0%
007_03	Weiser River	41	220	PVG 2 shrub	26%	4.72	13	2,900	14,000	20%	5.10	13	2,900	15,000	1,000	-6%
007_03	Weiser River	42	260	PVG 2 shrub	26%	4.72	13	3,400	16,000	30%	4.47	13	3,400	15,000	(1,000)	0%
007_03	Weiser River	43	460	PVG 2	31%	4.40	13	6,000	26,000	40%	3.83	13	6,000	23,000	(3,000)	0%
007_03	Weiser River	44	320	PVG 2 shrub	26%	4.72	13	4,200	20,000	40%	3.83	13	4,200	16,000	(4,000)	0%
007_03	Weiser River	45	630	alder	22%	4.98	13	8,200	41,000	20%	5.10	13	8,200	42,000	1,000	-2%
007_03	Weiser River	46	350	alder	22%	4.98	13	4,600	23,000	10%	5.74	13	4,600	26,000	3,000	-12%
007_03	Weiser River	47	240	PVG 2 shrub	26%	4.72	13	3,100	15,000	20%	5.10	13	3,100	16,000	1,000	-6%
007_03	Weiser River	48	370	PVG 2 shrub	26%	4.72	13	4,800	23,000	30%	4.47	13	4,800	21,000	(2,000)	0%
007_03	Weiser River	49	260	PVG 2 shrub	25%	4.79	14	3,600	17,000	30%	4.47	14	3,600	16,000	(1,000)	0%
007_03	Weiser River	50	170	alder	21%	5.04	14	2,400	12,000	20%	5.10	14	2,400	12,000	0	-1%
007_03	Weiser River	51	150	PVG 2 shrub	25%	4.79	14	2,100	10,000	40%	3.83	14	2,100	8,000	(2,000)	0%
007_03	Weiser River	52	120	PVG 2 shrub	25%	4.79	14	1,700	8,100	30%	4.47	14	1,700	7,600	(500)	0%
007_03	Weiser River	53	140	PVG 2 shrub	25%	4.79	14	2,000	9,600	40%	3.83	14	2,000	7,700	(1,900)	0%
007_03	Weiser River	54	910	PVG 2 shrub	25%	4.79	14	13,000	62,000	30%	4.47	14	13,000	58,000	(4,000)	0%
007_03	Weiser River	55	840	PVG 2 shrub	25%	4.79	14	12,000	57,000	20%	5.10	14	12,000	61,000	4,000	-5%
007_03	Weiser River	56	430	PVG 2 shrub	25%	4.79	14	6,000	29,000	30%	4.47	14	6,000	27,000	(2,000)	0%
							Totals		1,300,000					1,300,000	0	

Table A17. Existing and target solar loads for Upper Weiser River (4th and 5th order).

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	Weiser River	1	380	PVG 2 shrub	23%	4.91	15	5,700	28,000	30%	4.47	15	5,700	25,000	(3,000)	0%
007_04	Weiser River	2	1400	alder	19%	5.17	15	21,000	110,000	20%	5.10	15	21,000	110,000	0	0%
007_04	Weiser River	3	800	alder	19%	5.17	15	12,000	62,000	30%	4.47	15	12,000	54,000	(8,000)	0%
007_04	Weiser River	4	260	alder	18%	5.23	16	4,200	22,000	20%	5.10	16	4,200	21,000	(1,000)	0%
007_04	Weiser River	5	340	alder	18%	5.23	16	5,400	28,000	30%	4.47	16	5,400	24,000	(4,000)	0%
007_04	Weiser River	6	240	alder	18%	5.23	16	3,800	20,000	20%	5.10	16	3,800	19,000	(1,000)	0%
007_04	Weiser River	7	520	alder	18%	5.23	16	8,300	43,000	30%	4.47	16	8,300	37,000	(6,000)	0%
007_04	Weiser River	8	1000	alder	18%	5.23	16	16,000	84,000	20%	5.10	16	16,000	82,000	(2,000)	0%
007_04	Weiser River	9	250	alder	18%	5.23	16	4,000	21,000	40%	3.83	16	4,000	15,000	(6,000)	0%
007_04	Weiser River	10	260	alder	17%	5.30	17	4,400	23,000	20%	5.10	17	4,400	22,000	(1,000)	0%
007_04	Weiser River	11	320	alder	17%	5.30	17	5,400	29,000	0%	6.38	17	5,400	34,000	5,000	-17%
007_04	Weiser River	12	190	PVG 2	25%	4.79	17	3,200	15,000	30%	4.47	17	3,200	14,000	(1,000)	0%
007_04	Weiser River	13	1900	alder	17%	5.30	17	32,000	170,000	10%	5.74	17	32,000	180,000	10,000	-7%
007_04	Weiser River	14	1100	PVG 2 shrub	20%	5.10	18	20,000	100,000	30%	4.47	18	20,000	89,000	(11,000)	0%
007_04	Weiser River	15	1600	alder	16%	5.36	18	29,000	160,000	30%	4.47	18	29,000	130,000	(30,000)	0%
007_04	Weiser River	16	160	alder	16%	5.36	18	2,900	16,000	10%	5.74	18	2,900	17,000	1,000	-6%
007_04	Weiser River	17	280	black cottonwood	36%	4.08	18	5,000	20,000	40%	3.83	18	5,000	19,000	(1,000)	0%
007_04	Weiser River	18	450	black cottonwood	36%	4.08	18	8,100	33,000	30%	4.47	18	8,100	36,000	3,000	-6%
007_04	Weiser River	19	940	black cottonwood	36%	4.08	18	17,000	69,000	40%	3.83	18	17,000	65,000	(4,000)	0%
007_04	Weiser River	20	110	black cottonwood	36%	4.08	18	2,000	8,200	20%	5.10	18	2,000	10,000	1,800	-16%
007_04	Weiser River	21	200	black cottonwood	35%	4.15	19	3,800	16,000	20%	5.10	19	3,800	19,000	3,000	-15%
007_04	Weiser River	22	560	black cottonwood	35%	4.15	19	11,000	46,000	0%	6.38	19	11,000	70,000	24,000	-35%
007_04	Weiser River	23	280	black cottonwood	35%	4.15	19	5,300	22,000	10%	5.74	19	5,300	30,000	8,000	-25%
007_04a	Weiser River	1	1400	black cottonwood	33%	4.27	20	28,000	120,000	20%	5.10	20	28,000	140,000	20,000	-13%
007_04a	Weiser River	2	340	black cottonwood	33%	4.27	20	6,800	29,000	40%	3.83	20	6,800	26,000	(3,000)	0%
007_04a	Weiser River	3	520	black cottonwood	33%	4.27	20	10,000	43,000	30%	4.47	20	10,000	45,000	2,000	-3%
007_04a	Weiser River	4	680	black cottonwood	32%	4.34	21	14,000	61,000	20%	5.10	21	14,000	71,000	10,000	-12%
007_04a	Weiser River	5	3000	black cottonwood	30%	4.47	22	66,000	290,000	20%	5.10	22	66,000	340,000	50,000	-10%
007_04a	Weiser River	6	1200	black cottonwood	29%	4.53	23	28,000	130,000	10%	5.74	23	28,000	160,000	30,000	-19%
007_04a	Weiser River	7	680	black cottonwood	29%	4.53	23	16,000	72,000	20%	5.10	23	16,000	82,000	10,000	-9%
007_04a	Weiser River	8	120	black cottonwood	28%	4.59	24	2,900	13,000	10%	5.74	24	2,900	17,000	4,000	-18%
007_04a	Weiser River	9	890	black cottonwood	28%	4.59	24	21,000	96,000	20%	5.10	24	21,000	110,000	14,000	-8%
007_04a	Weiser River	10	2300	black cottonwood	27%	4.66	25	58,000	270,000	10%	5.74	25	58,000	330,000	60,000	-17%
007_04a	Weiser River	11	1000	black cottonwood	26%	4.72	26	26,000	120,000	20%	5.10	26	26,000	130,000	10,000	-6%
007_05	Weiser River	1	250	black cottonwood	26%	4.72	26	6,500	31,000	10%	5.74	26	6,500	37,000	6,000	-16%
007_05	Weiser River	2	590	black cottonwood	25%	4.79	27	16,000	77,000	0%	6.38	27	16,000	100,000	23,000	-25%
007_05	Weiser River	3	650	black cottonwood	25%	4.79	27	18,000	86,000	20%	5.10	27	18,000	92,000	6,000	-5%
007_05	Weiser River	4	3800	black cottonwood	24%	4.85	28	110,000	530,000	10%	5.74	28	110,000	630,000	100,000	-14%
007_05	Weiser River	5	1900	black cottonwood	24%	4.85	29	55,000	270,000	10%	5.74	29	55,000	320,000	50,000	-14%
007_05	Weiser River	6	1500	black cottonwood	23%	4.91	30	45,000	220,000	20%	5.10	30	45,000	230,000	10,000	-3%
007_05	Weiser River	7	160	black cottonwood	23%	4.91	30	4,800	24,000	10%	5.74	30	4,800	28,000	4,000	-13%
007_05	Weiser River	8	1200	black cottonwood	22%	4.98	31	37,000	180,000	10%	5.74	31	37,000	210,000	30,000	-12%
007_05	Weiser River	9	1100	black cottonwood	21%	5.04	32	35,000	180,000	0%	6.38	32	35,000	220,000	40,000	-21%
007_05	Weiser River	10	1800	black cottonwood	21%	5.04	33	59,000	300,000	10%	5.74	33	59,000	340,000	40,000	-11%
007_05	Weiser River	11	1900	black cottonwood	20%	5.10	34	65,000	330,000	0%	6.38	34	65,000	410,000	80,000	-20%
007_05	Weiser River	12	1500	black cottonwood	20%	5.10	35	53,000	270,000	10%	5.74	35	53,000	300,000	30,000	-10%
007_05	Weiser River	13	2300	black cottonwood	19%	5.17	36	83,000	430,000	10%	5.74	36	83,000	480,000	50,000	-9%
007_05	Weiser River	14	1600	black cottonwood	19%	5.17	37	59,000	300,000	10%	5.74	37	59,000	340,000	40,000	-9%
007_05	Weiser River	15	1100	black cottonwood	18%	5.23	38	42,000	220,000	0%	6.38	38	42,000	270,000	50,000	-18%
007_05	Weiser River	16	720	black cottonwood	18%	5.23	38	27,000	140,000	10%	5.74	38	27,000	160,000	20,000	-8%
007_05	Weiser River	17	1300	black cottonwood	18%	5.23	39	51,000	270,000	10%	5.74	39	51,000	290,000	20,000	-8%
007_05	Weiser River	18	2900	black cottonwood	17%	5.30	40	120,000	640,000	10%	5.74	40	120,000	690,000	50,000	-7%
007_05	Weiser River	19	1600	black cottonwood	17%	5.30	41	66,000	350,000	0%	6.38	41	66,000	420,000	70,000	-17%
007_05	Weiser River	20	1100	black cottonwood	17%	5.30	42	46,000	240,000	10%	5.74	42	46,000	260,000	20,000	-7%
007_05	Weiser River	21	600	black cottonwood	16%	5.36	43	26,000	140,000	0%	6.38	43	26,000	170,000	30,000	-16%
007_05	Weiser River	22	470	black cottonwood	16%	5.36	43	20,000	110,000	10%	5.74	43	20,000	110,000	0	-6%
007_05	Weiser River	23	550	black cottonwood	16%	5.36	43	24,000	130,000	0%	6.38	43	24,000	150,000	20,000	-16%
007_05	Weiser River	24	520	black cottonwood	16%	5.36	44	23,000	120,000	10%	5.74	44	23,000	130,000	10,000	-6%
007_05	Weiser River	25	1200	black cottonwood	16%	5.36	44	53,000	280,000	0%	6.38	44	53,000	340,000	60,000	-16%
007_05	Weiser River	26	840	black cottonwood	16%	5.36	45	38,000	200,000	0%	6.38	45	38,000	240,000	40,000	-16%
007_05	Weiser River	27	1100	black cottonwood	16%	5.36	45	50,000	270,000	10%	5.74	45	50,000	290,000	20,000	-6%
007_05	Weiser River	28	1200	black cottonwood	15%	5.42	46	55,000	300,000	10%	5.74	46	55,000	320,000	20,000	-5%
007_05	Weiser River	29	470	black cottonwood	15%	5.42	47	22,000	120,000	10%	5.74	47	22,000	130,000	10,000	-5%
007_05	Weiser River	30	980	black cottonwood	15%	5.42	47	46,000	250,000	0%	6.38	47	46,000	290,000	40,000	-15%
007_05	Weiser River	31	1400	black cottonwood	15%	5.42	48	67,000	360,000	0%	6.38	48	67,000	430,000	70,000	-15%
							Totals		9,800,000					11,000,000	1,200,000	

Appendix B. Designated Management Agency Report of Implementation Activities and Effectiveness

Rush Creek—2012 Stream Assessment Summary

Introduction

Three reaches on Rush Creek were assessed by Idaho Department of Environmental Quality (DEQ) and Idaho Soil and Water Conservation Commission (ISWCC) staff during June 2012. The purpose of an assessment is to identify resource concerns, recommend solutions to improve stream condition, and to develop agricultural implementation plans if warranted.

Methods Used for Assessment

Stream Visual Assessment Protocol (SVAP)	Descriptive ranking of stream health based on categories such as channel condition, riparian zone, bank stability, and water appearance
Stream Erosion Condition Inventory (SECI)	Descriptive ranking of the potential for soil erosion based on evidence of bank erosion, bank stability condition, bank cover, channel stability, and in-channel deposition
Bank Erosion Assessment	Measurement of height and width of eroding banks to determine whether an excessive amount of eroding bank exists, causing streams to widen unnaturally or have too much sediment on the stream bottom in fish spawning areas. Locations of severely eroding bank where riparian plantings or stabilization measures could help a landowner from losing too much valuable ground are pinpointed in this process.
Solar Pathfinder	Measure of percent shade received by canopy cover and other features
Wolman Pebble Count	Measure of size of sediment in stream

Stream Visual Assessment Protocol (SVAP) Terms and Definitions

Each assessment element is rated with a value from 1 to 10 with the exception of manure presence (rated from 1 to 5). The maximum, best, score possible is the highest number possible. For example, if the rating is from 1 to 10, then 10 is the maximum score possible.

- **Channel condition—**Evidence of channel alteration and structural changes, such as dikes and levees
- **Hydrologic alteration—**Flood frequency and high/low flow patterns
- **Riparian zone**—The extent or width of natural riparian vegetation along streambanks
- **Bank stability—**The presence of vegetation supporting the banks, the evidence of soil erosion from banks

- **Water appearance**—The clarity and visibility of the water, the presence of algae and other aquatic plants, odor
- **Nutrient enrichment—-**Presence and abundance of aquatic plants that indicate high inputs of nutrients into the stream
- **Barriers to fish movement**—Presence of culverts, dams, and diversions; seasonal water withdraws that may affect fish movement
- **Instream fish cover—**Number of types of cover, such as woody debris, pools, overhanging vegetation, macrophyte beds, cobbles, riffles, etc. available to fish
- **Pools—**Presence and abundance of deep pools, pockets of water
- **Invertebrate habitat**—The amount of habitat (cover types) available, such as fine woody debris, submerged logs, leaf packs, undercut banks, cobble, boulders, etc.
- **Canopy cover**—The percentage of the stream that is shaded by vegetation

2012 Stream Assessment Results

Stream Visual Assessment Protocol (SVAP)

SVAP is a qualitative assessment of the stream's health based on a score from 1 to 10, with 1 being the most impaired. The reaches rated from "good" to "excellent." Each reach had deep pools present, the water was clear and cold, the stream bottom consisted mainly of cobble, and the stream was well shaded. Each reach also had a vigorous riparian area, natural channel conditions, excellent stream habitat, and good land stewardship practices already in place. Results from SVAP are shown below in Table B1.

Stream Erosion Condition Inventory (SECI)

SECI is a qualitative assessment of the potential for streambank erosion and sediment deposition into the stream. While areas of erosion were present due to high flows, overall the streambanks were stable. The SECI results are shown below in Table B1.

Table B1. SVAP and SECI results for Rush Creek.

Stream Reach	SVAP Rating	SECI Rating
Rush Creek 1	9.3 (Excellent)	3 = slight erosion
Rush Creek 2	8.6 (Good)	5.5 = moderate erosion
Rush Creek 3	8.25 (Good)	2.5 = slight erosion

Solar Pathfinder/Riparian Vegetation

A Solar Pathfinder is used to determine the percentage of the sun's path that is covered by shade-producing objects, characterizing the effective shade on the stream reach. Solar Pathfinder photos for tracing are taken at systematic intervals along the length of the stream assessed. The average existing shade for the reaches based on Solar Pathfinder data collected during the assessment was 60%–70%, which reflects that the stream is well shaded (Table B2).

Table B2. Solar Pathfinder results for Rush Creek.

Stream Reach	Average % Unshaded	Average % Shaded
Rush Creek 1	39.71	60.29
Rush Creek 2	27.18	72.82
Rusk Creek 3	27.33	72.67

The assessed reaches had streamside vegetation consisting of a mature cottonwood community with a stable trend.

Summary of Results and Recommendations

Voluntary best management practices that may be implemented on some portions of the assessed reaches of Rush Creek include riparian plantings, pest management, water gaps with heavy use area protection or offsite watering facilities, and managed grazing along the creek.

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Appendix C. Weiser River HUC Fish Presence and Potential Presence, Distribution, and Stream Survey Compilation

Using ArcGIS 10.1 DEQ exported metadata provided by Idaho Department of Fish and Game that is held in data layers available through *www.streamnet.org*.

- There is extensive metadata, so we reviewed abstracts of what the different data sets are and have presented some of the key data in this appendix.
- There is presence survey data and extrapolated generalized fish distribution.
- There are data from 1954-2013, so some of that data is more of "what was", but much of it still includes the current state of fisheries.
- The Fish Presence data layers are more historic and came from IDFG's older database, which is being phased out.
- The Standard Stream Survey (SSS) and Lake and Reservoir Survey (LRS) are more current (e.g. 1977-2013).
- The information is presented to give an overall view of what cold water salmonid fisheries exist or existed in the Weiser River HUC.

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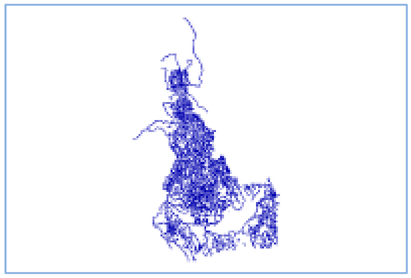
FishPresenceStreams

File Geodatabase Feature Class



Tags

anadromous, 1954-2003, present, fish distribution, density, Idaho, stream survey, use, resident, abundance, current, rivers, streams, creeks, canals, ditches, fish presence

Summary

Use this presence data to get a snapshot of fish distribution for a given time, place, and methodology which can be extrapolated to similar water bodies.

Description

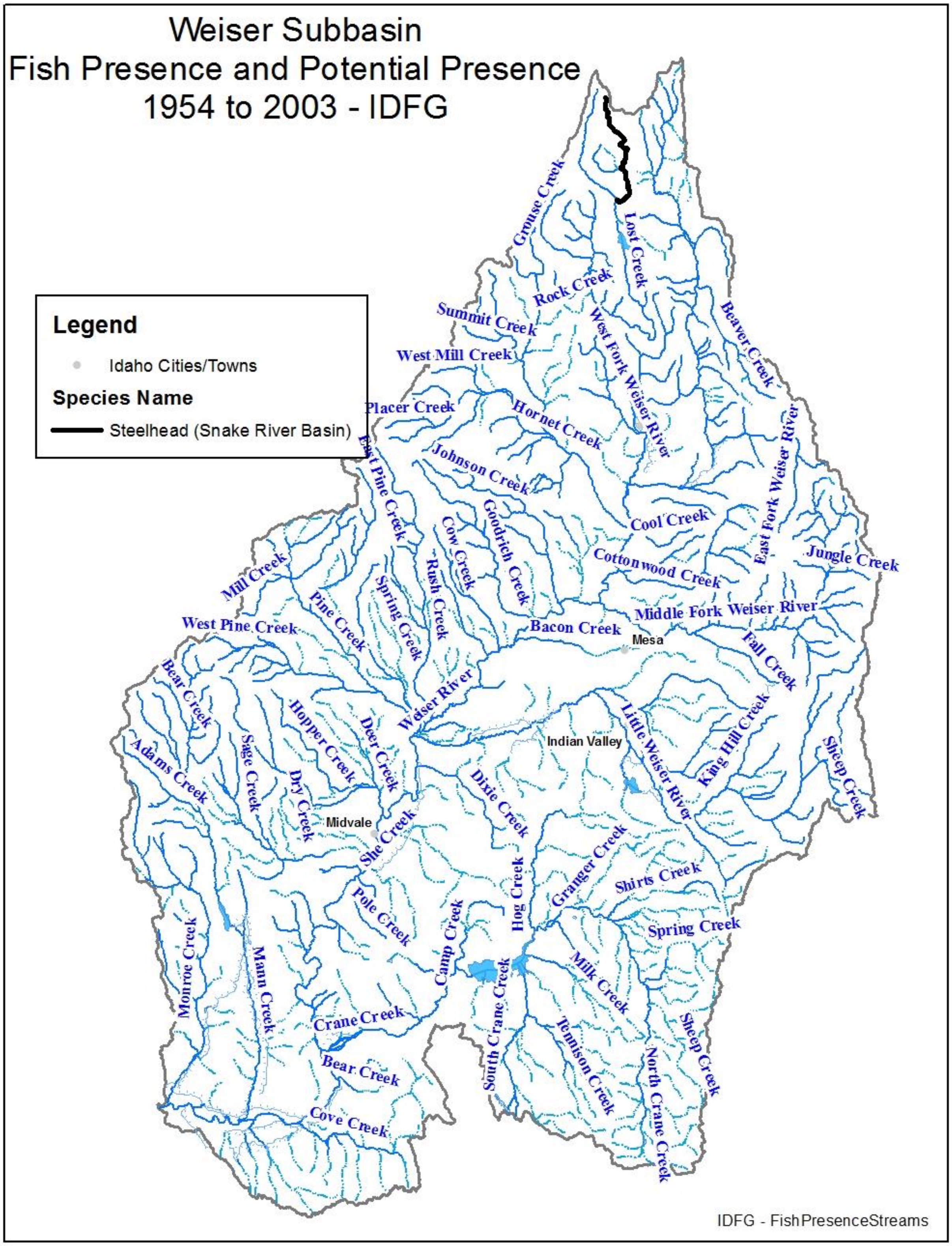
Presence and potential presence of fish in streams. Potential Presence or Distribution data extrapolates from presence data to describe what species would probably be found in similar habitat for which there might not be any data. It is not necessary to sample every waterbody to determine which species occur where. The purpose is to have a value for every stream (or stream segment) and thereby show the full extent of a specie's distribution. An example would be the data from the presence-absence database in FisRef: It has a value for every 1:100k EPA River Reach number in Idaho. The value is based upon the expert opinion of fisheries biologists and their knowledge of fish habitat and use. Presence data describes what species were found by sampling (sometimes not found) for a given place, time, and method. The purpose is to document the presence for a given fraction of a specie's range based upon actual observations. Often, only a target species and a few incidental species were enumerated. Therefore, one cannot say that a species absolutely does not occur for a given waterbody. Fish move and waterbodies change. The probability that a species is or is not detected increases with the number of suveys. Therefore, one would not query for one record of presence for a waterbody in order to answer the question "what fish are in this stream or lake". It would be better to query for all records of presence (or absence). The data from the FIS Ref and GIS are mostly from published documents (reviewed by peers) and expert opinion. That data is more reliable than some of the raw, FishData survey data. The source documents are archived at IDFG and/or CRITFC libraries. The expert opinion used to generate the distribution updates is an extrapolation of the survey observations and published reports. Every water body cannot be surveyed. Therefore, findings from surveyed segments of water bodies are also applied to similar water bodies that are not surveyed. There are usually multiple surveys for a species per stream segment. The GIS distribution data should overlap most of the other data because it is, by definition, the estimated extent of distribution for a species at a given time. The other data are smaller segments that provide a detailed snapshot (or index) of the bigger GIS data. The FishData references are mostly surveys by IDFG regional personnel. They were stored in a wide variety of database formats (Dbase, Word documents, Excel workbooks, Lotus spreadsheets, Paradox databases, Access datases, etc.). The FisColp references are from the IDFG Collectors Permit files (IDFGHQ). They are the reports sent to IDFG by people given collectors permits. They were historically quite incomplete: Sometimes a stream name and a common name of game fish only were reported. A specific section of stream and scientific name was not supplied. The process has been refined and the quality of the data is much improved. GPS coordinates and scientific names of both game and non-game species of fish and amphibians, reptiles are often included. Shapefiles have been included to aid in analysis of the data. Hydrologic Unit Codes

(HUC) are provided at the 4th and 6th code levels. The massive amounts of data can be selected for an area of interest and "whittled down to size" using the HUCs. Do's and Don'ts: Do use this presence data to get a snapshot of fish distribution for a given time, place, and methodology which can be extrapolated to similar water bodies. Do not use this presence data to say that there absolutely are not fish in this stream forever (check dates, methods, etc.). Do use the distribution data to get an estimate of the extent of a specie's range.

Credits

There are no credits for this item.

Use limitations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Fish Presence and Potential Presence
1954 to 2003 - IDFG
Legend
Idaho Cities/Towns
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Rock Creek
Summit Creek
West Mill Creek
West Fork Weiser River
Beaver Creek
Placer Creek
Hornet Creek
East Fork Weiser River
Johnson Creek
East Pine Creek
Cow Creek
Goodrich Creek
Cool Creek
Cottonwood Creek
Jungle Creek
Mill Creek
Spring Creek
Rush Creek
Pine Creek
Middle Fork Weiser River
West Pine Creek
Bacon Creek
Mesa
Fall Creek
Bear Creek
Weiser River
Hopper Creek
Deer Creek
Little Weiser River
King Hill Creek
Sheep Creek
Indian Valley
Adams Creek
Sage Creek
Dry Creek
Dixie Creek
Midvale
She Creek
Granger Creek
Shirts Creek
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Pole Creek
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Camp Creek
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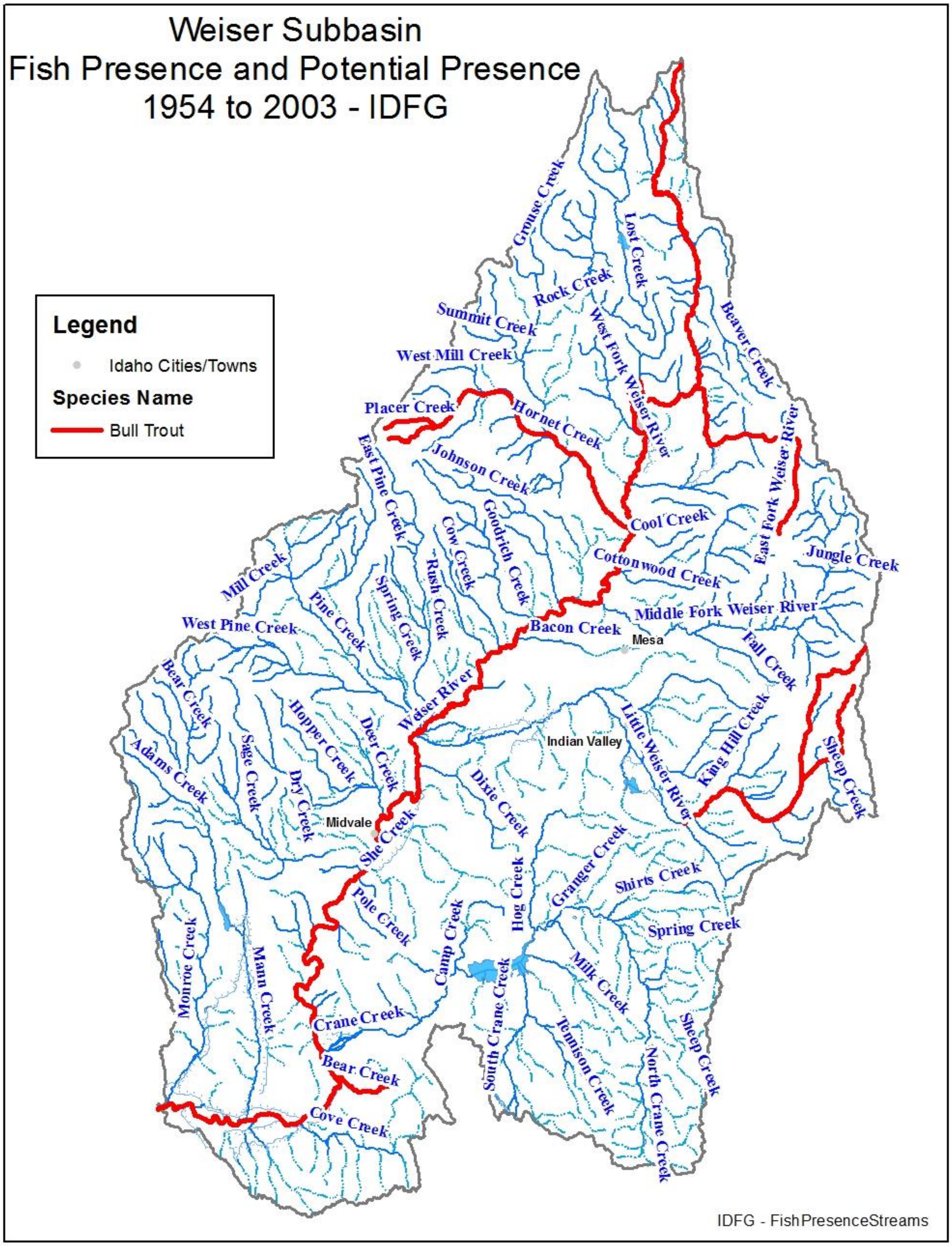
IDFG - FishPresenceStreams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Cow Creek
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Cottonwood Creek
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Rush Creek
Pine Creek
Middle Fork Weiser River
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Bacon Creek
Mesa
Fall Creek
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Weiser River
Hopper Creek
Deer Creek
Little Weiser River
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King Hill Creek
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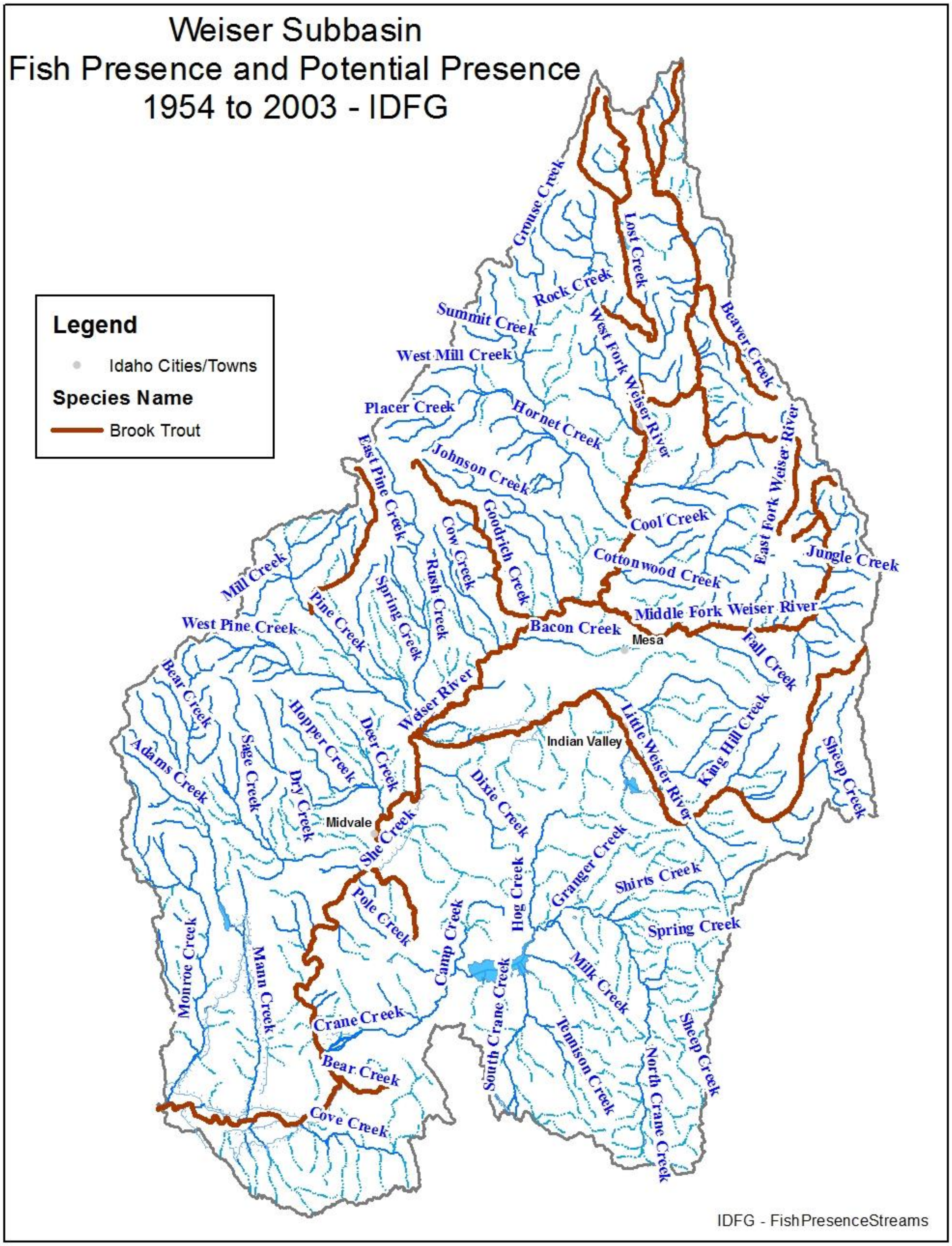
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Mesa
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King Hill Creek
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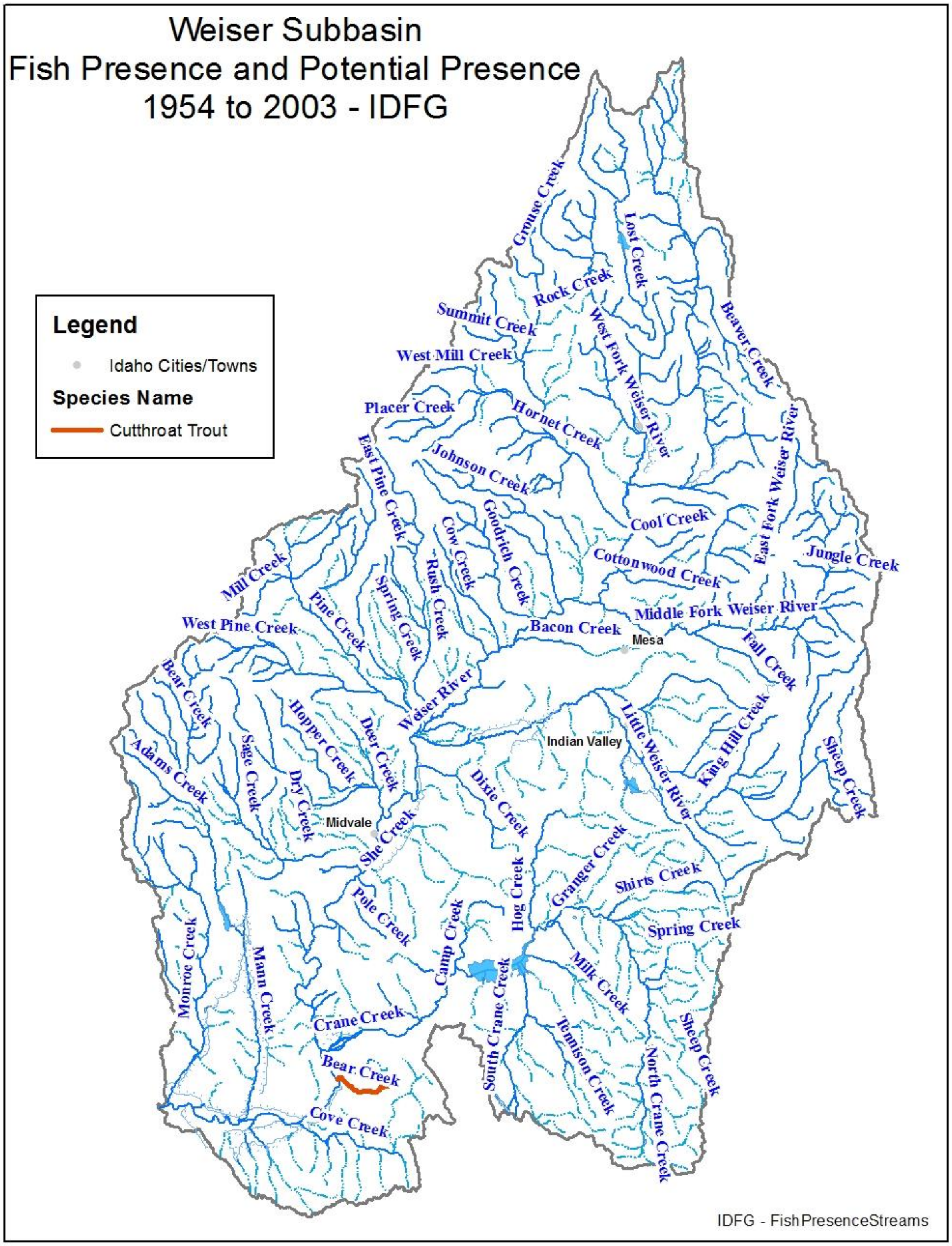
IDFG - FishPresenceStreams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Hopper Creek
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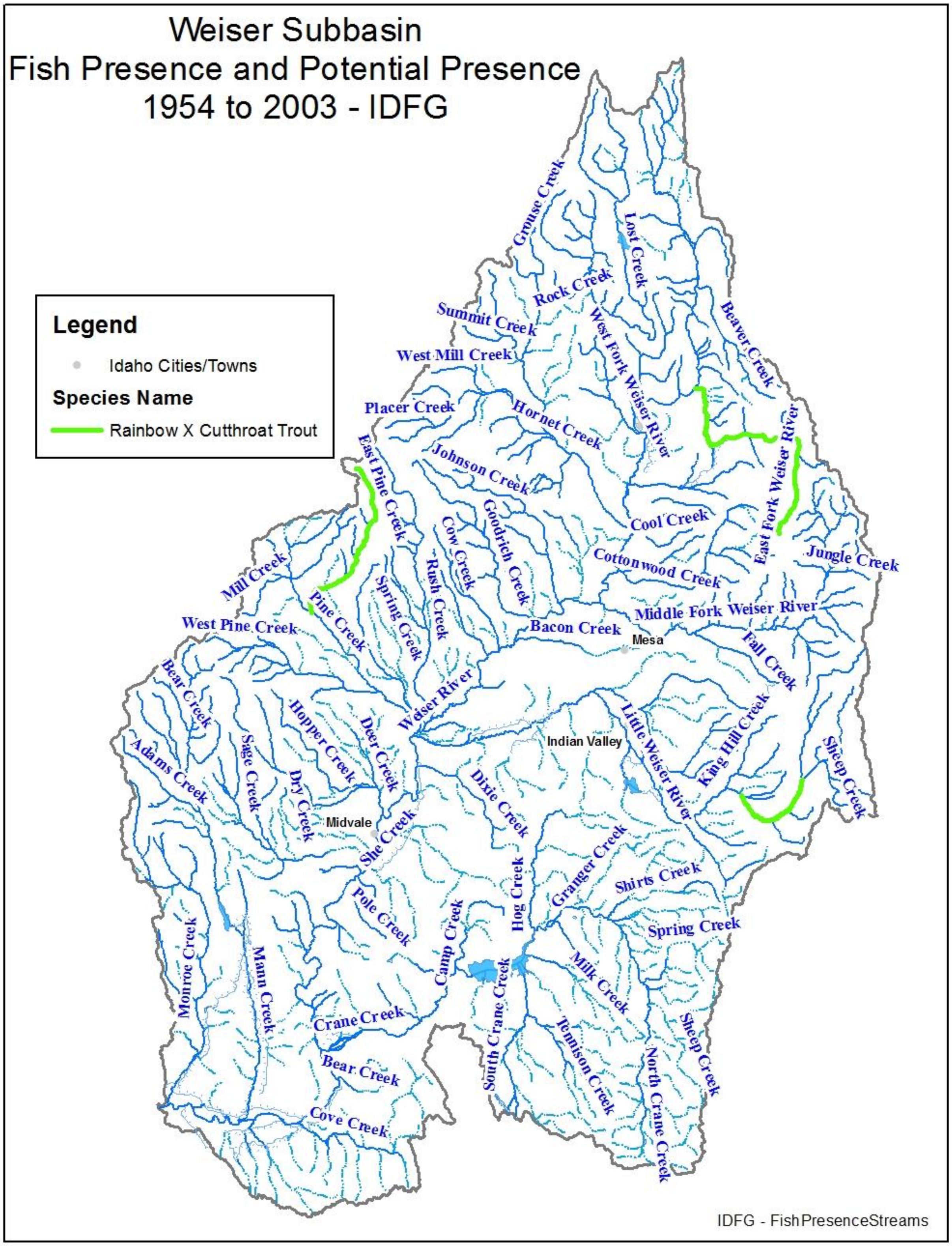
IDFG - FishPresenceStreams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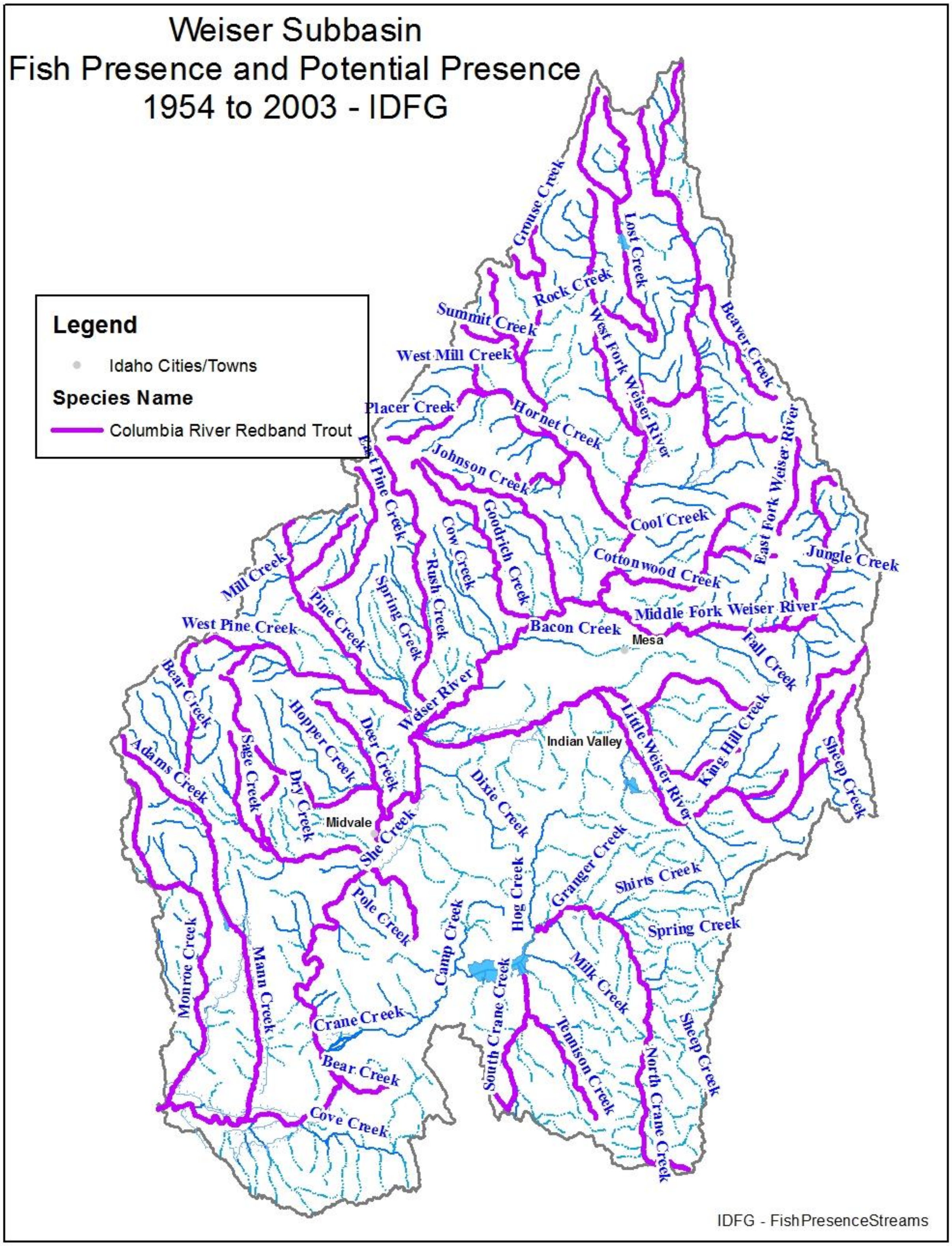
IDFG - FishPresenceStreams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Cool Creek
Cow Creek
Goodrich Creek
East Fork Weiser River
Jungle Creek
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Cottonwood Creek
Pine Creek
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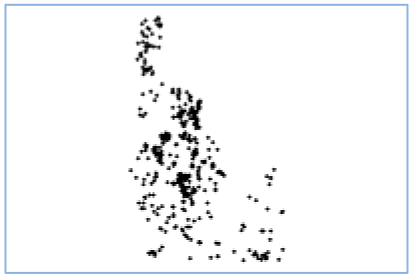
IDFG - FishPresenceStreams

FishPresenceLakes

File Geodatabase Feature Class



Tags

anadromous, 1954-2002, present, fish distribution, density, Idaho, stream survey, use, resident, lakes, reservoirs, ponds, abundance, current, fish presence

Summary

Use this presence data to get a snapshot of fish distribution for a given time, place, and methodology which can be extrapolated to similar water bodies.

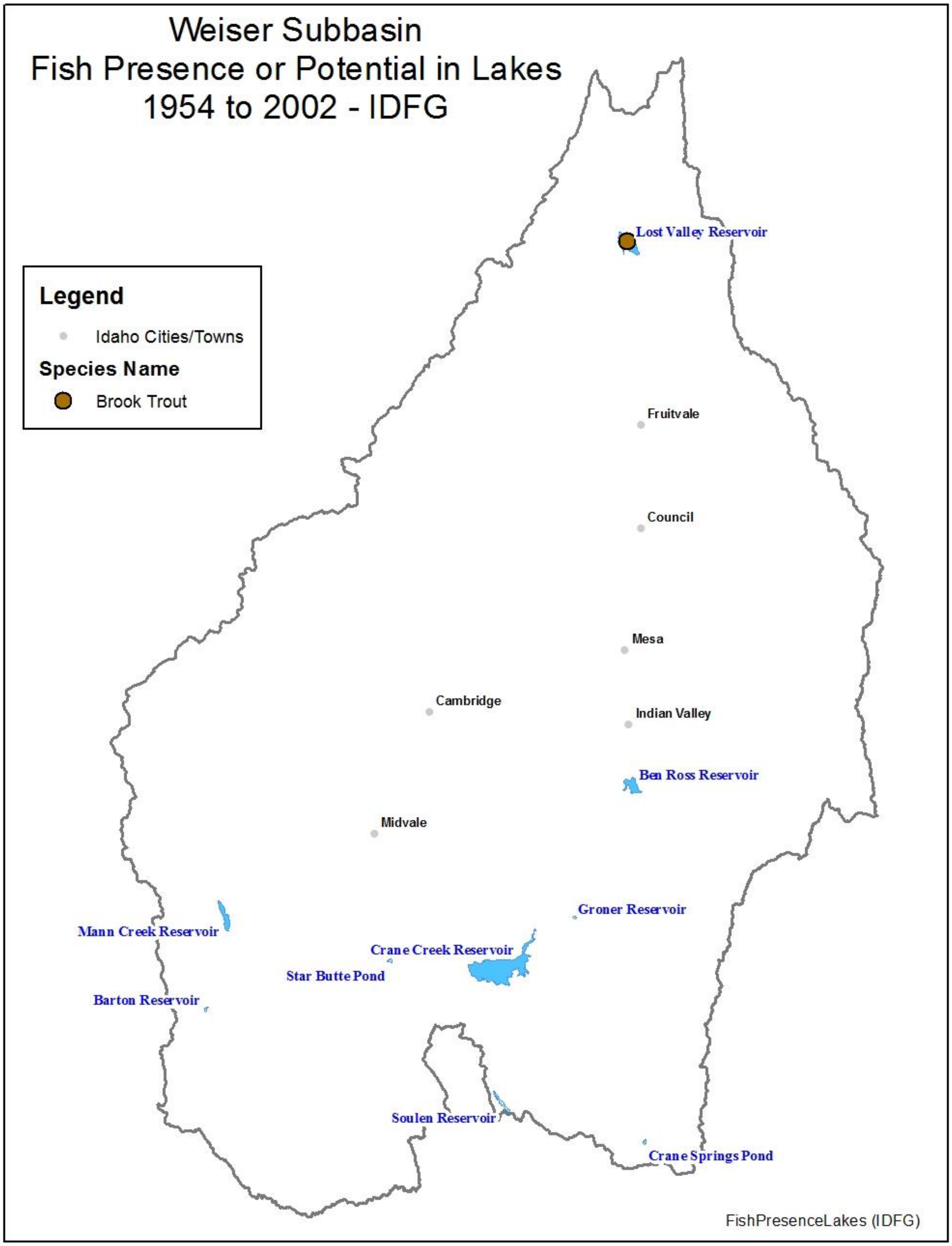
Description

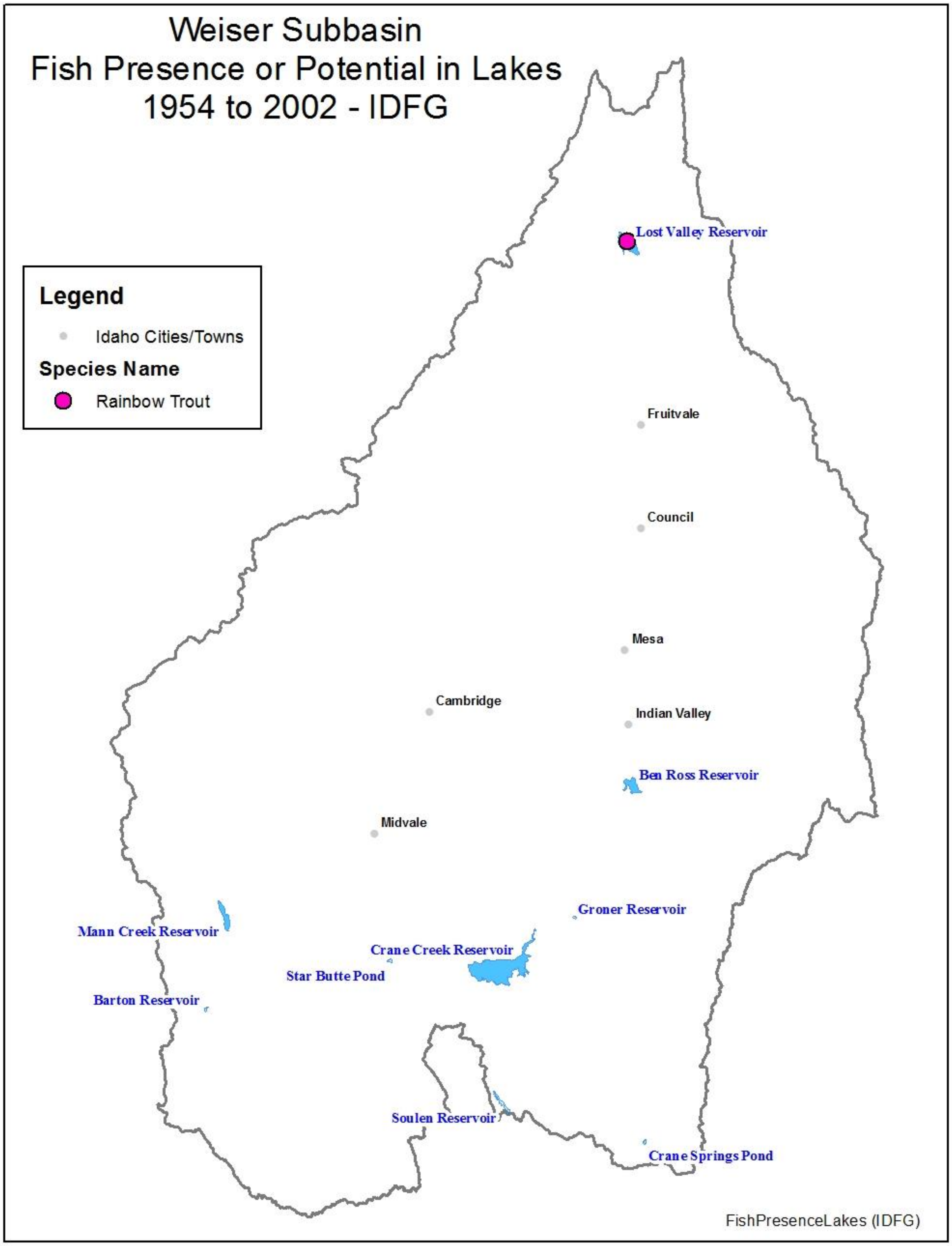
Presence and potential presence of fish in lakes. Potential Presence or Distribution data extrapolates from presence data to describe what species would probably be found in similar habitat for which there might not be any data. It is not necessary to sample every waterbody to determine which species occur where. The purpose is to have a value for every stream (or stream segment) and thereby show the full extent of a specie's distribution. An example would be the data from the presence-absence database in FisRef: It has a value for every 1:100k EPA River Reach number in Idaho. The value is based upon the expert opinion of fisheries biologists and their knowledge of fish habitat and use. Presence data describes what species were found by sampling (sometimes not found) for a given place, time, and method. The purpose is to document the presence for a given fraction of a specie's range based upon actual observations. Often, only a target species and a few incidental species were enumerated. Therefore, one cannot say that a species absolutely does not occur for a given waterbody. Fish move and waterbodies change. The probability that a species is or is not detected increases with the number of suveys. Therefore, one would not query for one record of presence for a waterbody in order to answer the question "what fish are in this stream or lake". It would be better to query for all records of presence (or absence). The data from the FIS Ref and GIS are mostly from published documents (reviewed by peers) and expert opinion. That data is more reliable than some of the raw, FishData survey data. The source documents are archived at IDFG and/or CRITFC libraries. The expert opinion used to generate the distribution updates is an extrapolation of the survey observations and published reports. Every water body cannot be surveyed. Therefore, findings from surveyed segments of water bodies are also applied to similar water bodies that are not surveyed. There are usually multiple surveys for a species per stream segment. The GIS distribution data should overlap most of the other data because it is, by definition, the estimated extent of distribution for a species at a given time. The other data are smaller segments that provide a detailed snapshot (or index) of the bigger GIS data. The FishData references are mostly surveys by IDFG regional personnel. They were stored in a wide variety of database formats (Dbase, Word documents, Excel workbooks, Lotus spreadsheets, Paradox databases, Access datases, etc.). The FisColp references are from the IDFG Collectors Permit files (IDFGHQ). They are the reports sent to IDFG by people given collectors permits. They were historically quite incomplete: Sometimes a stream name and a common name of game fish only were reported. A specific section of stream and scientific name was not supplied. The process has been refined and the quality of the data is much improved. GPS coordinates and scientific names of both game and non-game species of fish and amphibians, reptiles are often included. Shapefiles have been included to aid in analysis of the data. Hydrologic Unit Codes

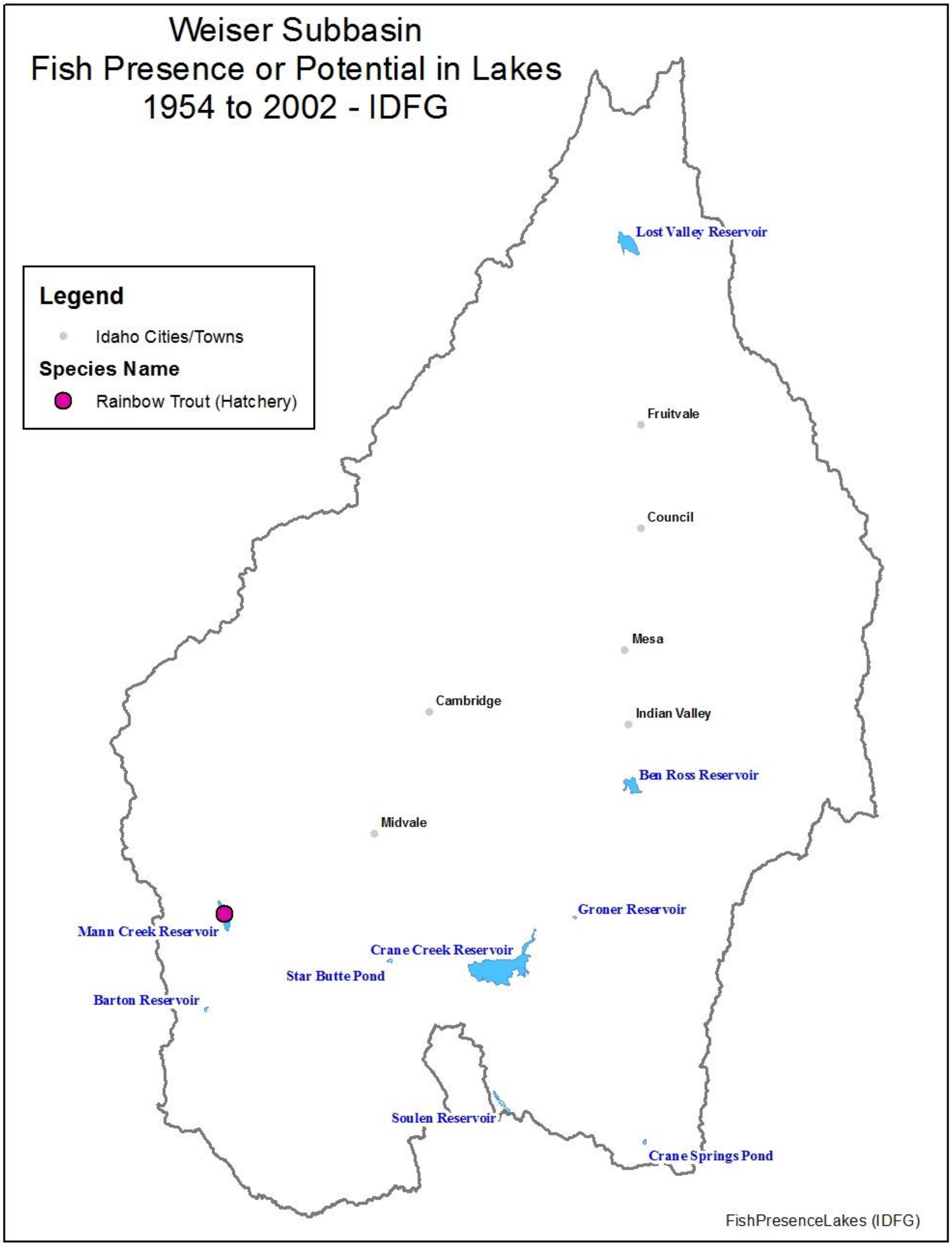
(HUC) are provided at the 4th and 6th code levels. The massive amounts of data can be selected for an area of interest and "whittled down to size" using the HUCs. Do's and Don'ts: Do use this presence data to get a snapshot of fish distribution for a given time, place, and methodology which can be extrapolated to similar water bodies. Do not use this presence data to say that there absolutely are not fish in this stream forever (check dates, methods, etc.). Do use the distribution data to get an estimate of the extent of a specie's range.

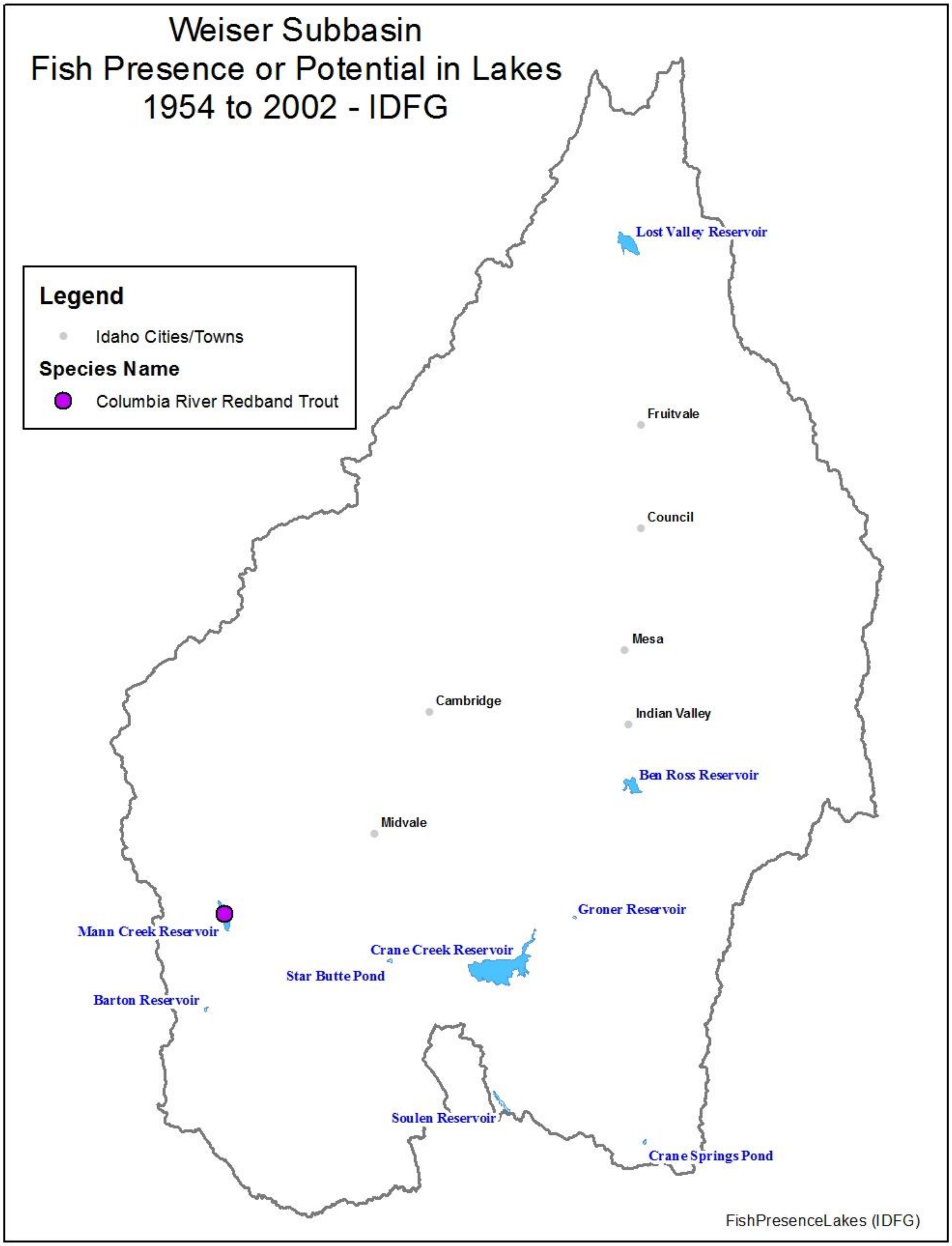
Credits
There are no credits for this item.

Use limitations
Data from RefDB=fiscolp and fishdata are DRAFT


Weiser Subbasin
Fish Presence or Potential in Lakes
1954 to 2002 - IDFG
Legend
Idaho Cities/Towns
Species Name
Brook Trout
Lost Valley Reservoir
Fruitvale
Council
Mesa
Cambridge
Indian Valley
Ben Ross Reservoir
Midvale
Groner Reservoir
Mann Creek Reservoir
Crane Creek Reservoir
Star Butte Pond
Barton Reservoir
Soulen Reservoir
Crane Springs Pond
FishPresenceLakes (IDFG)

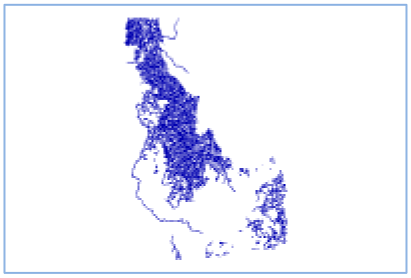

Weiser Subbasin
Fish Presence or Potential in Lakes
1954 to 2002 - IDFG
Legend
Idaho Cities/Towns
Species Name
Rainbow Trout
Lost Valley Reservoir
Fruitvale
Council
Mesa
Cambridge
Indian Valley
Ben Ross Reservoir
Midvale
Groner Reservoir
Mann Creek Reservoir
Crane Creek Reservoir
Star Butte Pond
Barton Reservoir
Soulen Reservoir
Crane Springs Pond
FishPresenceLakes (IDFG)


Weiser Subbasin
Fish Presence or Potential in Lakes
1954 to 2002 - IDFG
Legend
Idaho Cities/Towns
Species Name
Rainbow Trout (Hatchery)
Lost Valley Reservoir
Fruitvale
Council
Mesa
Cambridge
Indian Valley
Ben Ross Reservoir
Midvale
Groner Reservoir
Mann Creek Reservoir
Crane Creek Reservoir
Star Butte Pond
Barton Reservoir
Soulen Reservoir
Crane Springs Pond
FishPresenceLakes (IDFG)


Weiser Subbasin
Fish Presence or Potential in Lakes
1954 to 2002 - IDFG
Legend
Idaho Cities/Towns
Species Name
Columbia River Redband Trout
Lost Valley Reservoir
Fruitvale
Council
Mesa
Cambridge
Indian Valley
Ben Ross Reservoir
Midvale
Groner Reservoir
Mann Creek Reservoir
Crane Creek Reservoir
Star Butte Pond
Barton Reservoir
Soulen Reservoir
Crane Springs Pond
FishPresenceLakes (IDFG)

GenFishDist

File Geodatabase Feature Class



Tags

chinook salmon, sockeye salmon, steelhead trout, coho salmon, bull trout, westslope cutthroat trout, bonneville cutthroat trout, yellowstone cutthroat trout, white sturgeon, pacific lamprey

Summary

Current presence and use type by species, run, subrun, and stream section. Presence and suspected presence data showing where fish have been found given a certain time, place, and method, and where they are likely to be found given the above and adjacent, accessible, and suitable habitat.

Description

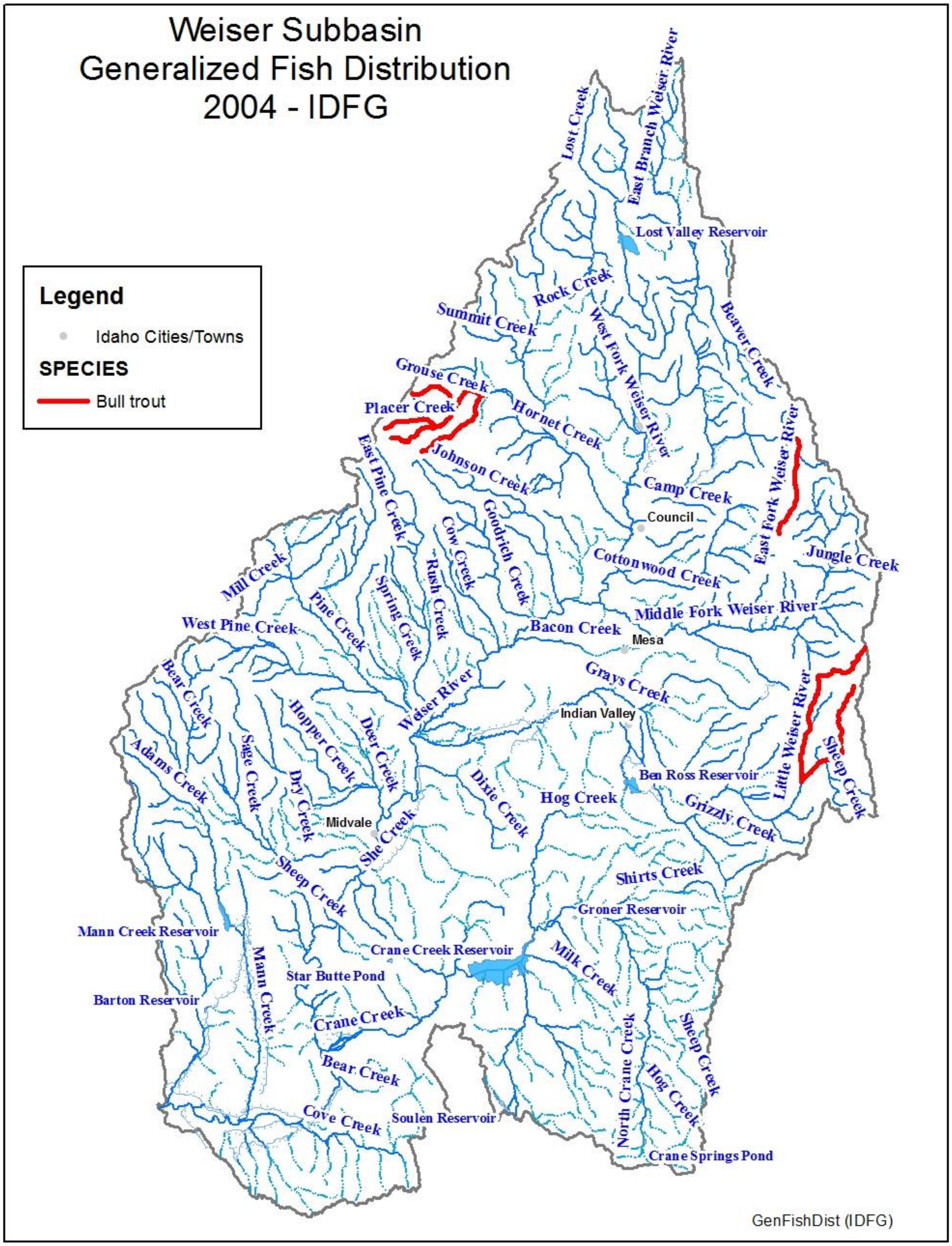
Generalized Fish Distribution intersecting Idaho in StreamNet DEF for Snake River spring, summer, fall chinook salmon, Snake River sockeye salmon, coho salmon, Snake River summer steelhead trout, pacific lamprey, white sturgeon, bull trout, westslope cutthroat trout, bonneville cutthroat trout, and yellowstone cutthroat trout.

Credits

StreamNet, IDFG, USFS, USBLM, USFWS, Nez Perce Tribe, Shoshone-Bannock Tribe, Coeur d'Alene Tribe, Kootenai Tribe, Potlatch Corp., Idaho State University.

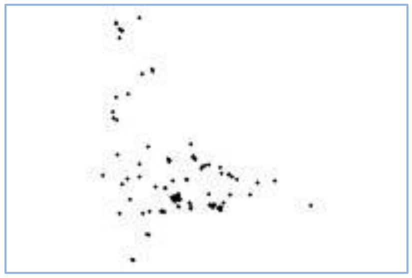
Use limitations

None


Weiser Subbasin
Generalized Fish Distribution
2004 - IDFG
Legend
Idaho Cities/Towns
SPECIES
Bull trout
Lost Creek
East Branch Weiser River
Lost Valley Reservoir
Rock Creek
Summit Creek
West Fork Weiser River
Beaver Creek
Grouse Creek
Placer Creek
Hornet Creek
East Fork Weiser River
Johnson Creek
East Pine Creek
Camp Creek
Council
Goodrich Creek
Cow Creek
Jungle Creek
Cottonwood Creek
Mill Creek
Spring Creek
Rush Creek
Middle Fork Weiser River
Pine Creek
West Pine Creek
Bacon Creek
Mesa
Grays Creek
Weiser River
Bear Creek
Hopper Creek
Deer Creek
Indian Valley
Little Weiser River
Sheep Creek
Adams Creek
Sage Creek
Dry Creek
Dixie Creek
Ben Ross Reservoir
Hog Creek
Grizzly Creek
Midvale
She Creek
Shirts Creek
Sheep Creek
Groner Reservoir
Mann Creek Reservoir
Crane Creek Reservoir
Milk Creek
Mann Creek
Star Butte Pond
Barton Reservoir
Crane Creek
Sheep Creek
North Crane Creek
Bear Creek
Hog Creek
Cove Creek
Soulen Reservoir
Crane Springs Pond
GenFishDist (IDFG)

LRS_LakeSurveys

File Geodatabase Feature Class



Tags

lake survey, reservoir survey, fish distribution, Idaho

Summary

Spatially display lake and reservoir survey data in Idaho.

Description

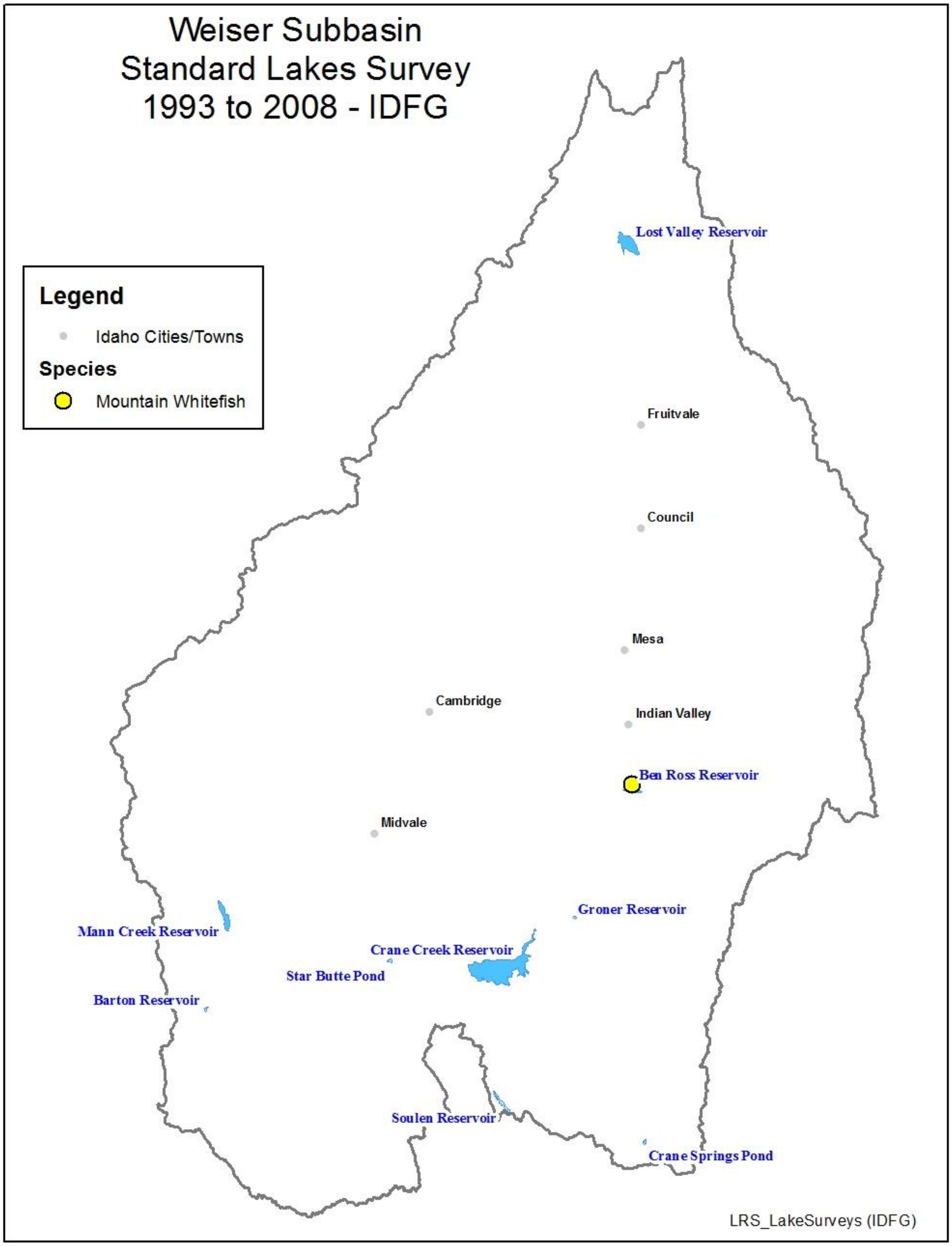
Survey data from lakes and reservoirs in Idaho by IDFG and collaborators.

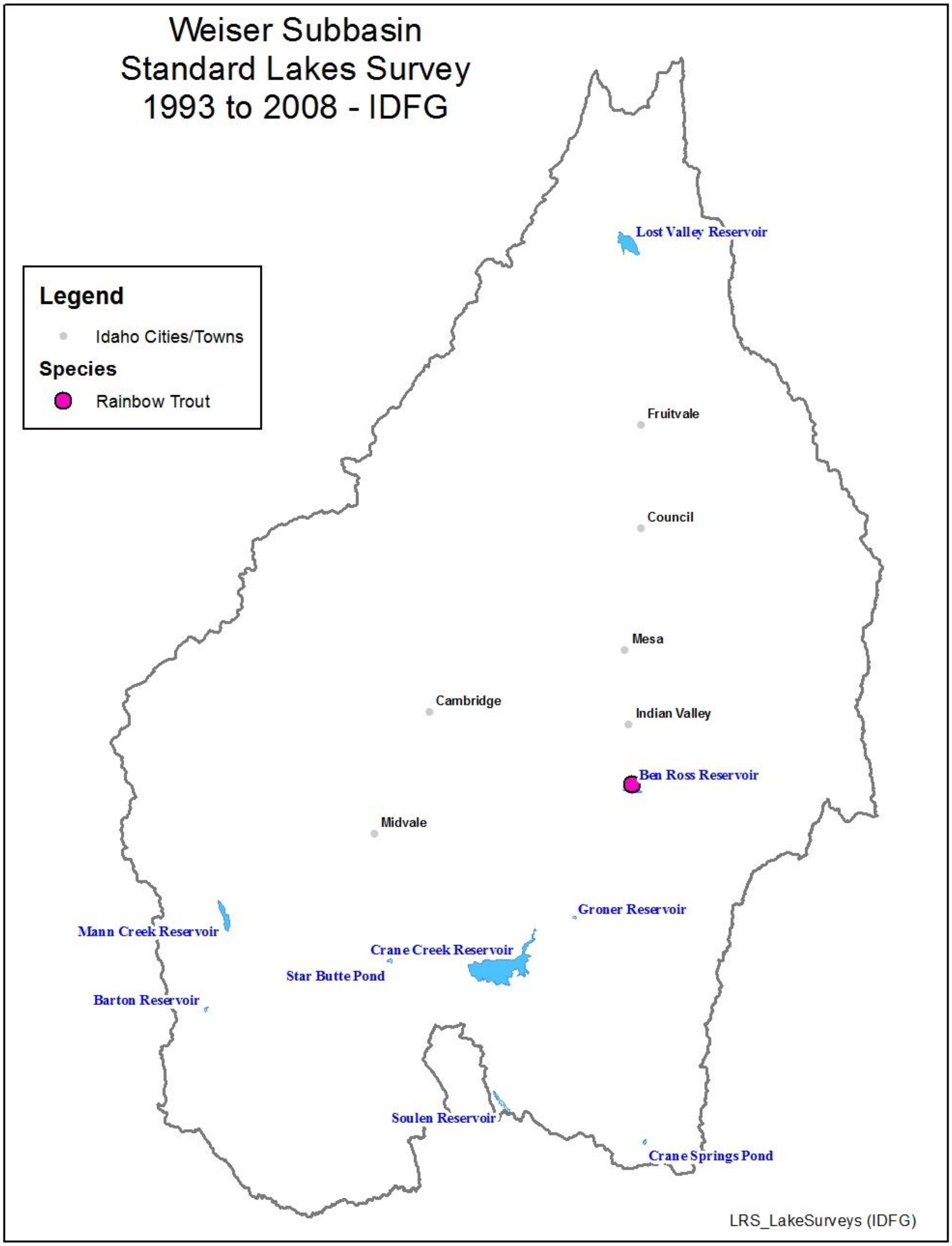
Credits

IDFG, StreamNet

Use limitations

Data are for research and management purposes only.


Weiser Subbasin
Standard Lakes Survey
1993 to 2008 - IDFG
Legend
Idaho Cities/Towns
Species
Mountain Whitefish
Lost Valley Reservoir
Fruitvale
Council
Mesa
Cambridge
Indian Valley
Ben Ross Reservoir
Midvale
Groner Reservoir
Mann Creek Reservoir
Crane Creek Reservoir
Star Butte Pond
Barton Reservoir
Soulen Reservoir
Crane Springs Pond
LRS_LakeSurveys (IDFG)


Weiser Subbasin
Standard Lakes Survey
1993 to 2008 - IDFG
Legend
Idaho Cities/Towns
Species
Rainbow Trout
Lost Valley Reservoir
Fruitvale
Council
Mesa
Cambridge
Indian Valley
Ben Ross Reservoir
Midvale
Groner Reservoir
Mann Creek Reservoir
Crane Creek Reservoir
Star Butte Pond
Barton Reservoir
Soulen Reservoir
Crane Springs Pond
LRS_LakeSurveys (IDFG)

SSS_StreamSurveys

File Geodatabase Feature Class

Tags

fish surveys in streams, General parr monitoring, salmon, trout, parr, anadromous fishes, resident fishes, fish densities, snorkel surveys, electrofishing surveys

Summary

Compile statewide, standardized, fish density data for juvenile anadromous and all resident species.

Description

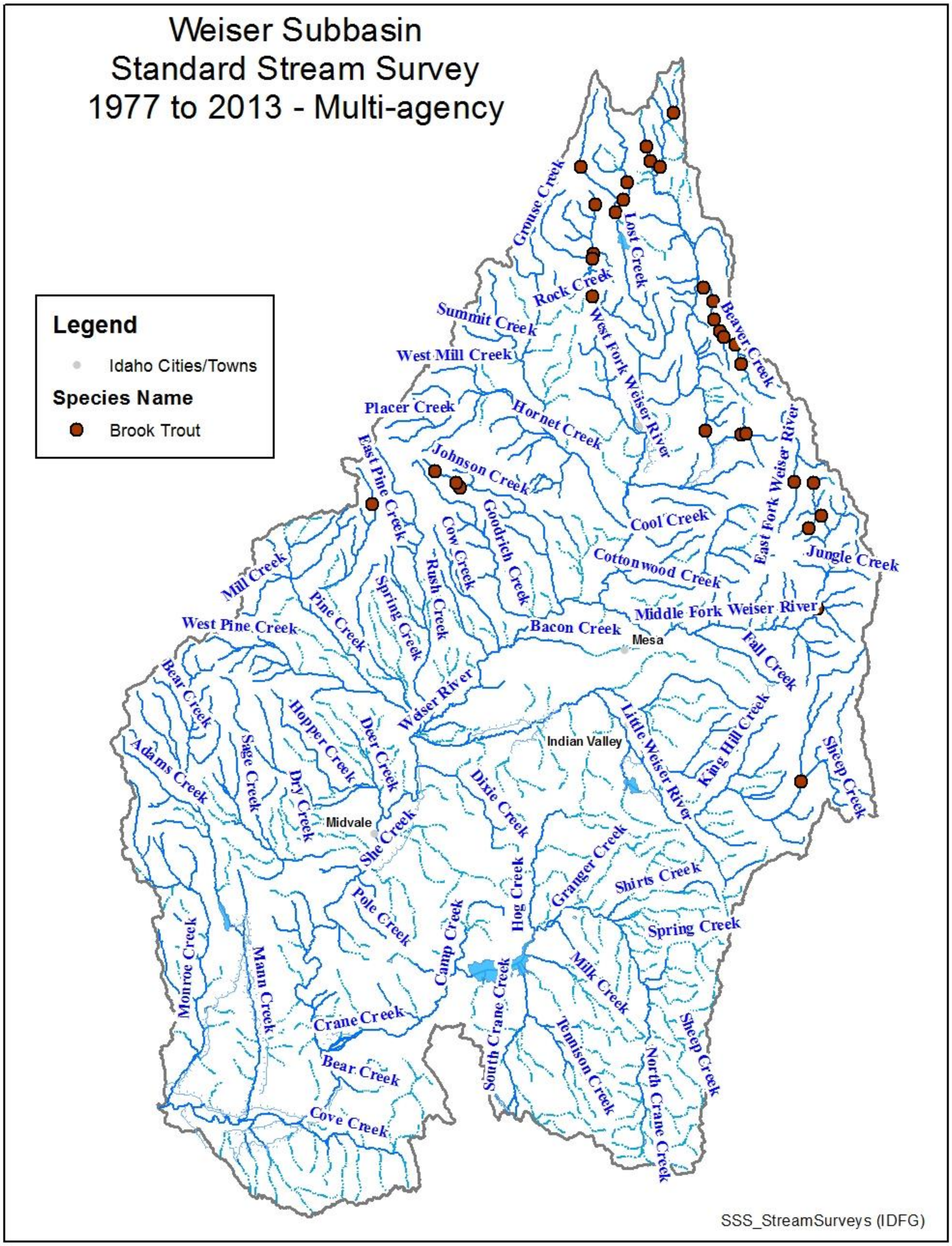
Standard Stream Survey (SSS) sites and non-standard stream surveys in Idaho and surrounding states, 1977 to 2013. Fish densities from observation and collection surveys of juvenile anadromous, and juvenile and adult resident species. Many sources of data and many different methodologies were used statewide. General Parr Monitoring (GPM), Intensive Smolt Monitoring (ISM), Idaho Supplementation Studies Evaluation (CSUP, EVAL), and IDFG Regional stream survey sites are included.

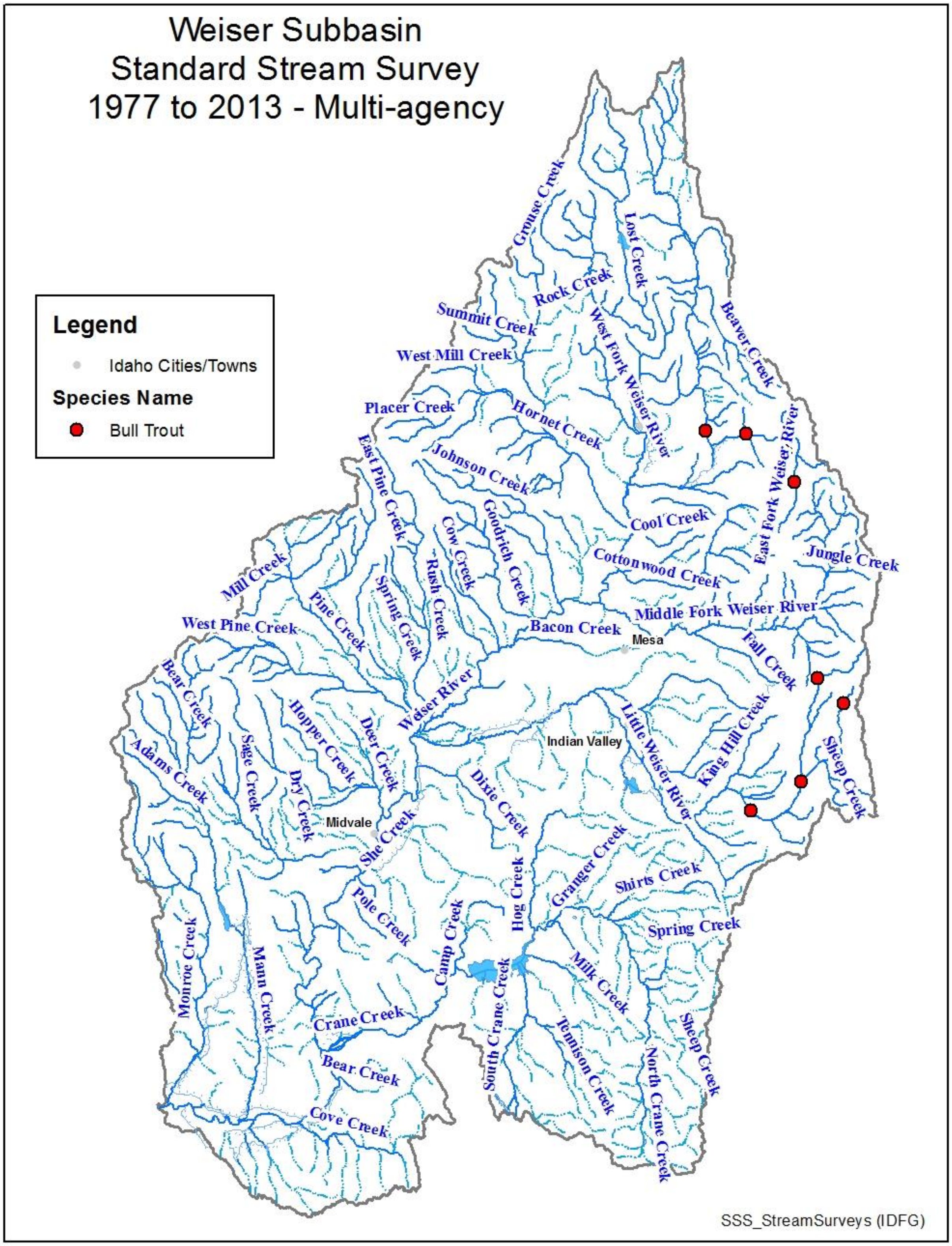
Credits

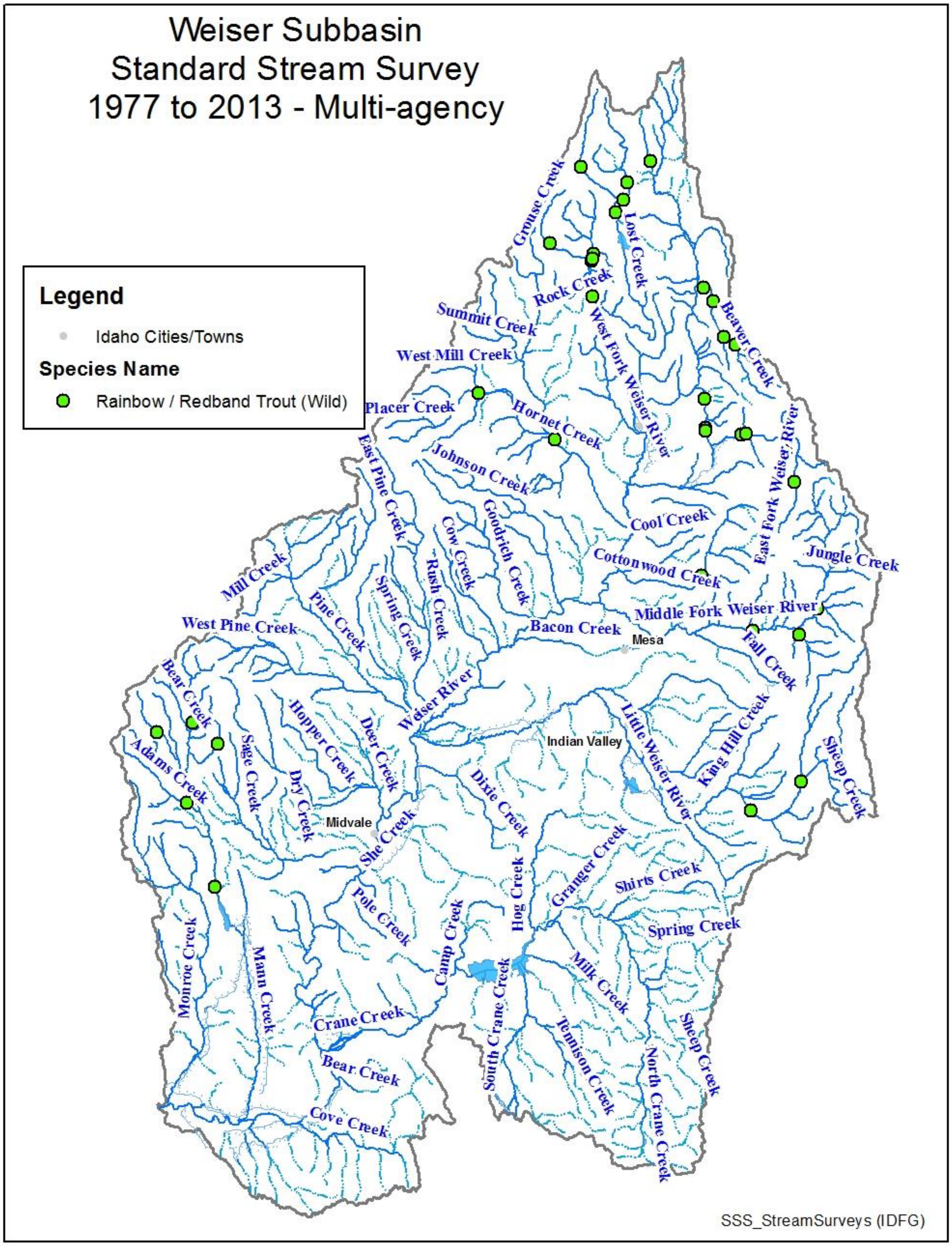
IDFG, USFS, USFWS, NPT, SBT, USBLM, IDEQ, StreamNet

Use limitations

There are no access and use limitations for this item.


Weiser Subbasin
Standard Stream Survey
1977 to 2013 - Multi-agency
Legend
Idaho Cities/Towns
Species Name
Brook Trout
Grouse Creek
Lost Creek
Rock Creek
Summit Creek
West Mill Creek
West Fork Weiser River
Beaver Creek
Placer Creek
Hornet Creek
East Pine Creek
Johnson Creek
East Fork Weiser River
Cool Creek
Goodrich Creek
Cow Creek
Jungle Creek
Cottonwood Creek
Mill Creek
Spring Creek
Rush Creek
Pine Creek
Middle Fork Weiser River
West Pine Creek
Bacon Creek
Mesa
Fall Creek
Bear Creek
Weiser River
Hopper Creek
Deer Creek
Little Weiser River
King Hill Creek
Indian Valley
Sheep Creek
Adams Creek
Sage Creek
Dry Creek
Dixie Creek
Midvale
She Creek
Granger Creek
Shirts Creek
Hog Creek
Pole Creek
Camp Creek
Spring Creek
Monroe Creek
Mann Creek
Milk Creek
South Crane Creek
Crane Creek
Tennison Creek
Sheep Creek
Bear Creek
North Crane Creek
Cove Creek
SSS_StreamSurveys (IDFG)


Weiser Subbasin
Standard Stream Survey
1977 to 2013 - Multi-agency
Legend
Idaho Cities/Towns
Species Name
Bull Trout
Grouse Creek
Lost Creek
Rock Creek
Summit Creek
West Mill Creek
West Fork Weiser River
Beaver Creek
Placer Creek
Hornet Creek
East Fork Weiser River
East Pine Creek
Johnson Creek
Cool Creek
Goodrich Creek
Cow Creek
Cottonwood Creek
Jungle Creek
Mill Creek
Spring Creek
Rush Creek
Pine Creek
Middle Fork Weiser River
West Pine Creek
Bacon Creek
Mesa
Fall Creek
Bear Creek
Weiser River
Hopper Creek
Deer Creek
Little Weiser River
King Hill Creek
Indian Valley
Adams Creek
Sage Creek
Dry Creek
Sheep Creek
Dixie Creek
Midvale
She Creek
Granger Creek
Shirts Creek
Hog Creek
Pole Creek
Camp Creek
Spring Creek
Monroe Creek
Mann Creek
Milk Creek
South Crane Creek
Crane Creek
Tennison Creek
Sheep Creek
Bear Creek
North Crane Creek
Cove Creek
SSS_StreamSurveys (IDFG)


Weiser Subbasin
Standard Stream Survey
1977 to 2013 - Multi-agency
Legend
Idaho Cities/Towns
Species Name
Rainbow / Redband Trout (Wild)
Grouse Creek
Lost Creek
Rock Creek
Summit Creek
West Fork Weiser River
Beaver Creek
West Mill Creek
Placer Creek
Hornet Creek
East Fork Weiser River
East Pine Creek
Johnson Creek
Goodrich Creek
Cow Creek
Cool Creek
Jungle Creek
Cottonwood Creek
Mill Creek
Spring Creek
Rush Creek
Pine Creek
Middle Fork Weiser River
West Pine Creek
Bacon Creek
Mesa
Fall Creek
Bear Creek
Weiser River
Hopper Creek
Deer Creek
Little Weiser River
King Hill Creek
Sheep Creek
Indian Valley
Adams Creek
Sage Creek
Dry Creek
Dixie Creek
Midvale
She Creek
Granger Creek
Shirts Creek
Hog Creek
Pole Creek
Spring Creek
Camp Creek
Monroe Creek
Mann Creek
Milk Creek
South Crane Creek
Crane Creek
Tennison Creek
Sheep Creek
North Crane Creek
Bear Creek
Cove Creek
SSS_StreamSurveys (IDFG)

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Appendix D. Public Participation

This five-year review was developed with participation from the Weiser River WAG, Payette, and Adams County SWCC.

Weiser River WAG Meeting: August 6, 2013

Weiser River Monitoring Site tour/selection with Vern Lolly: August 21, 2013

Little Weiser River Monitoring Site tour/selection with Adams County SWCD, August 28, 2013

Weiser River WAG Meeting: November 10, 2013

Weiser River WAG Meeting: