Raft River Subbasin Temperature Total Maximum Daily Load Implementation Plan for Agriculture

(HUC 17040210)

Photo taken from Raft River Subbasin Temperature TMDL (IDEQ, 2012)

Prepared by the Idaho Soil and Water Conservation Commission
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Original Plan: SWCC. July 2006. Raft River Watershed Total Maximum Daily Load Implementation Plan for Agriculture. Boise, ID.

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Introduction

The objective of this plan is to address the temperature total maximum daily load (TMDL) for Cassia Creek (Assessment unit ID17040210SK005_04) in the Raft River subbasin, (hydrologic unit code 17040210). Cassia Creek has had temperature exceedances of water quality standards and was included on Idaho's 2010 §303(d) list as an assessment unit impaired by temperature pollution. The temperature TMDL establishes effective shade targets for Cassia Creek based on the concept of maximum shading under potential natural vegetation (PNV) resulting in natural background temperatures (DEQ, 2012). There are several important contributors of heat to a stream, including ground water temperature, air temperature, and direct solar radiation. Of these, direct solar radiation is the source of heat that is most likely to be controlled. The parameters that affect the amount of solar radiation hitting a stream throughout its length are shade and stream morphology. Shade is provided by the surrounding vegetation and other physical features such as hillsides, canyon walls, terraces, and high banks. Stream morphology affects the density of riparian vegetation and water storage in the alluvial aquifer. Because streamside vegetation and channel morphology are the factors influencing shade which are most likely to have been influenced by anthropogenic activities, they are the factors most readily corrected and addressed by a TMDL implementation plan.

The Idaho Soil and Water Conservation Commission (ISWCC) is the designated agency responsible for preparing TMDL implementation plans for agriculture and grazing. While addressing the Raft River temperature TMDL, the 2006 *Raft River Watershed Total Maximum Daily Load Implementation Plan for Agriculture* outlines best management practices (BMPs) for riparian treatment units which will improve water quality by increasing shade (ISCC, 2006). Similar practices are also recommended for addressing the Cassia Creek temperature TMDL.

Project Setting

Cassia Creek emanates from the central Albion Mountains in Cassia County, Idaho and flows east to join the Raft River near the town of Malta as depicted in Figure 1. For more information about this watershed, see the *Raft River Subbasin Assessment and Total Maximum Daily Loads* (DEQ, 2004) and the *Raft River Subbasin Temperature Total Maximum Daily Load* (DEQ, 2012).

Land Use

Primary land uses and activities within the Raft River subbasin include livestock grazing, agriculture, timber management and dispersed recreation. The Cassia Creek subwatershed is comprised of 62,278 acres. For a detailed description of land use and land ownership, please see the *Raft River Subbasin Assessment and Total Maximum Daily Loads* (DEQ 2004).

Resource Concerns

Since the original *Raft River Subbasin Assessment and Total Maximum Daily Loads* was developed Cassia Creek has been identified as needing a TMDL for temperature. In agricultural and grazing lands a lack of riparian canopy cover contributes to temperature violations of water quality standards. Riparian vegetation can provide a substantial amount of shade that limits direct solar radiation to the creek (DEQ, 2013).

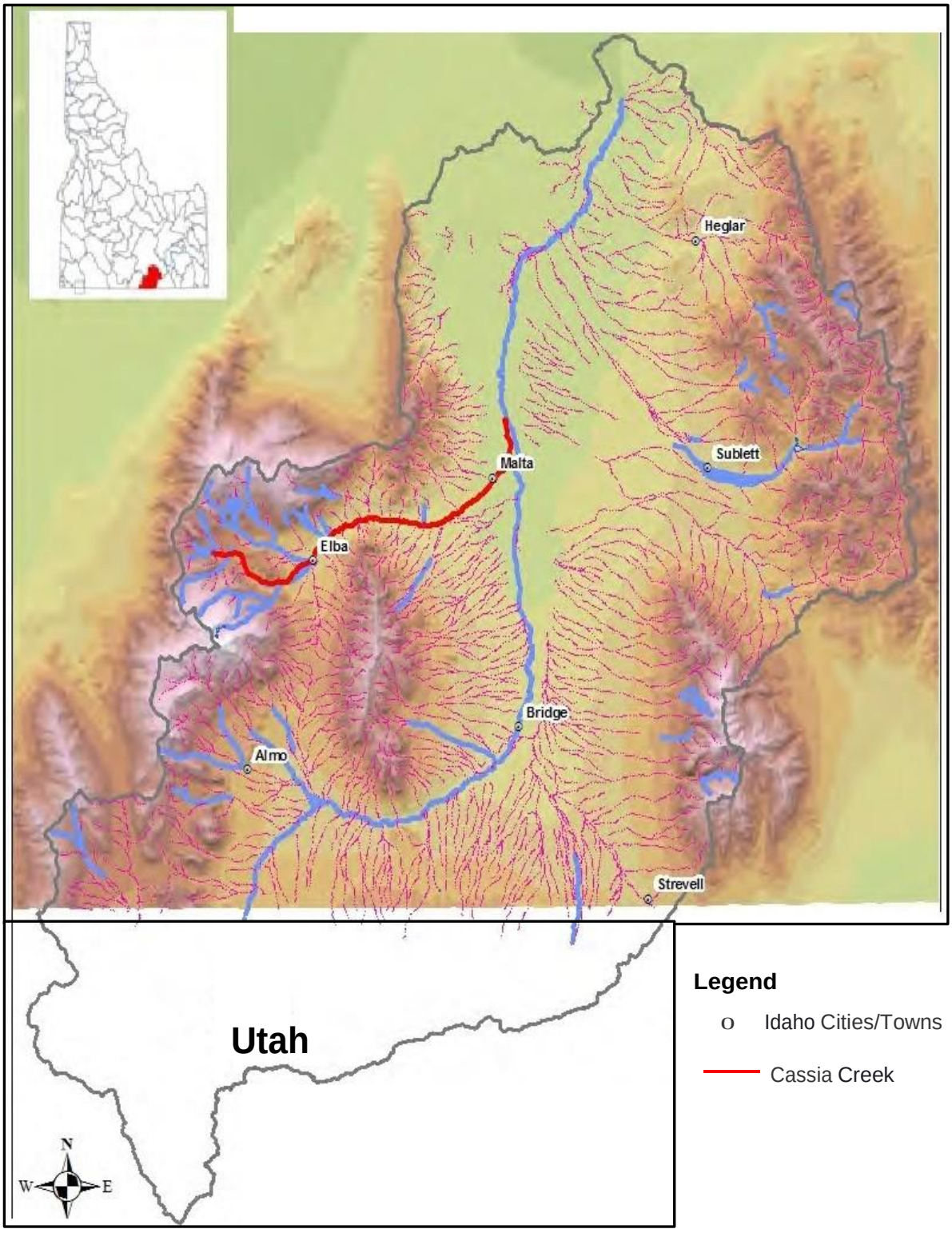

Figure 1. Cassia Creek location within Idaho and the Raft River subbasin (DEQ, 2012).

Table 1 shows the total existing, total target, and excess heat load (kWh/day), as well as the percent reduction needed to meet target loads and the average lack of shade experienced by Cassia Creek. Although this analysis focuses on total heat loads for Cassia Creek, it is important to note that differences between existing shade and target shade, expressed as a percentage lack of shade for individual stream segments as depicted in Figure 2, are the key to successfully restoring these waters to achieving water quality standards.

Table 1. Total existing, target, and excess solar loads; percent reductions; and average lack of shade for Cassia Creek.

Water Body	Total Existing Load (kWh/day)	Total Target Load (kWh/day)	Excess Load (kWh/day)	Reduction (%)	Average Lack of Shade (%)
Cassia Creek	2,000,000	1,800,000	270,000	14	-12

Note: Values are gross estimates—rounding errors occur.

Water Rights and Water Diversions

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

The Raft River Subbasin Temperature TMDL does not quantify what impact if any diversions are having on stream temperature. Water diversions are allowed for in state statue and it is possible for a water body to be 100% allocated. Therefore, although these water temperature affects may occur, ***nothing in this implementation plan supersedes any water appropriation in the affected watershed***.

This is in accordance with Idaho's Water Quality Standards, which includes this statement in Section IDAPA 58.01.02.050.01:

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

Diversions notwithstanding, reaching shade targets as discussed in the TMDL will protect what water remains in the channel and allow the stream to meet water quality standards for temperature. Thus, local land owners and holders of water rights are encouraged to voluntarily do whatever they can to help instream flow for the purpose of keeping channel water cooler for aquatic life.

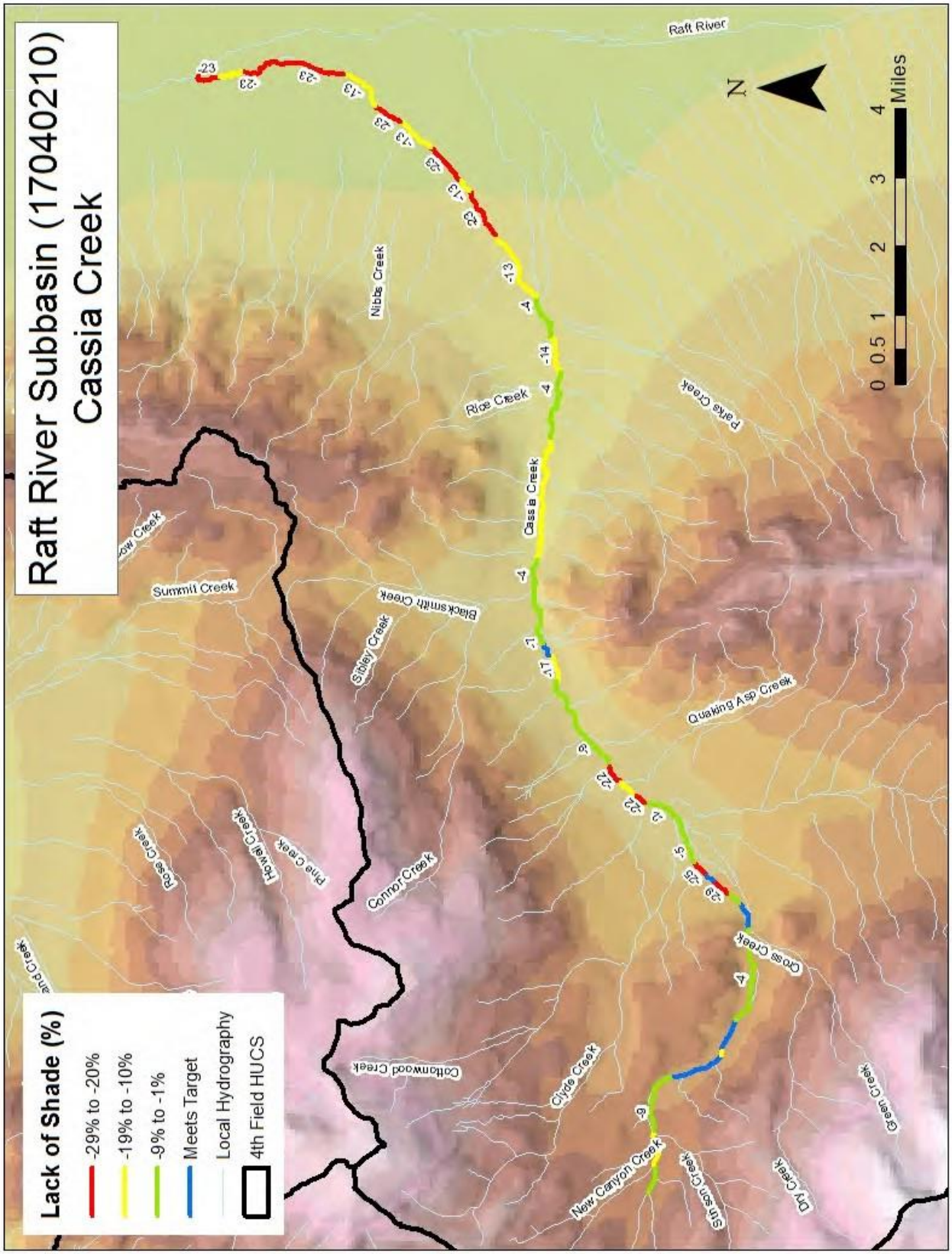

Figure 2. Lack of shade (%) for Cassia Creek in the Raft River subbasin. (DEQ, 2012)

Implementation Strategy

The Cassia Creek temperature TMDL (DEQ, 2012) was produced using PNV-based shade and solar loading. Implementation strategies should incorporate the load analysis table presented in Table 4 of the TMDL. Due to the inexact nature of the aerial photo interpretation technique, this table should not be viewed as complete until verified. Implementation strategies should include using the Solar Pathfinder at project sites both pre- and post-BMP implementation to verify the existing shade levels in the load analysis table and to mark progress towards achieving desired reductions in solar loads.

Target shade levels for individual reaches should be the goal managers strive for. Managers should focus on stream segments with the largest differences between existing and target shade as locations to prioritize implementation efforts. This difference is expressed as the lack of shade percentage. Thus, stream segments with the largest lack of shade percentages are in the worst condition with respect to shade.

Direct solar radiation is the source of heat that is most likely to be controlled. The parameters that affect the amount of solar radiation hitting a stream throughout its length are shade and stream morphology. Shade is provided by the surrounding vegetation and other physical features such as hillsides, canyon walls, terraces, and high banks. Stream morphology affects the density of riparian vegetation and water storage in the alluvial aquifer. Streamside vegetation and channel morphology are the factors influencing shade that are most likely to have been influenced by anthropogenic activities and can be most readily corrected and addressed by a TMDL.

Treatment

Critical areas were defined as those areas with more than 20% lack of shade. There are several high priority segments below Dry Creek, as well as in the lowest portion of the watershed where agricultural activity is predominant, that lack more than 20% shade (Figure 2). The upper portions of the watershed are in better condition with segments either meeting shade targets or lacking shade by less than 10%.

There may be a variety of reasons why individual reaches do not meet shade targets, including natural phenomena (e.g., beaver ponds, springs, wet meadows, past natural disturbances) and/or historic land-use activities (e.g., logging, grazing, mining). It is important that existing shade estimates be verified on specific reaches prior to BMP implementation in order to determine if shade differences are real and result from activities that are controllable

Site-specific conservation plans will need to be developed to guide the selection of appropriate BMPs along Cassia Creek. Typically, when a landowner approaches the local conservation district or NRCS for assistance the agency evaluates the current resource concerns at the proposed project location and works with the landowner to develop a conservation plan which identifies the most appropriate BMPs to install. The Idaho Agricultural Pollution Abatement Plan (SWCC, 2015) and the Idaho Agricultural Best Management Practices Field Guide (SWCC, 2013) contain guidance on the selection, implementation and monitoring of BMPs which have been shown to be effective at increasing riparian shade. Examples of BMPs which have been shown to be effective at increasing shade and reducing solar loads are shown

in Table 2.

Table 2. Best Management Practices for Increasing Stream Shade

Best Management Practice	Definition*
Access Control	The temporary or permanent exlusion of animals, people, vehicles, and/or equipment from an area.
Fence	A constructed barrier to animals or people.
Field Border	A strip of permanent vegetation established at the edge or around the perimeter of a field.
Filter Strip	A strip or area of herbaceous vegetation that removes contaminants from overland flow.
Riparian Herbaceous Cover	Grasses, grass-like plants and forbs that are tolerant of intermittent flooding or saturated soils and that are established or managed in the transitional zone between terrestrial and aquatic habitats.
Tree/Shrub Establishment	Establishing woody plants by planting seedlings or cuttings, direct seeding or natural regeneration.

*From the NRCS Idaho Conservation Practice Standards

Maintenance, Monitoring, Evaluation

DEQ will continue to monitor the watersheds as per Idaho Code 39-3611, at least on a 5-year interval using BURP protocol. Additional monitoring of BMP's and the maintenance of BMP's installed will be performed by the designated agency or the agency that funded the BMP for the expected life of each practice to ensure proper maintenance of the practices. Monitoring and evaluations will enable staff to ensure practices are maintained and to evaluate BMP effectiveness for future projects.

Funding

Financial and technical assistance for installation of BMPs may be needed to ensure success of this implementation plan. The East Cassia Soil and Water Conservation District can assist interested landowners in actively pursuing potential funding sources to implement water quality improvements on private agricultural and grazing lands. Many of the programs outlined below can be used in combination with each other to implement BMPs. Potential sources of financial assistance for BMP implementation include (but are not limited to):

Agricultural Conservation Easement Program (ACEP) – ACEP provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. http://www.nrcs.usda.gov/

Conservation Reserve Program (CRP) –The CRP is a land retirement program for blocks of land or strips of land that protect the soil and water resources, such as buffers and grassed waterways http://www.nrcs.usda.gov/

Conservation Stewardship Program (**CSP) –**CSP is a voluntary program that rewards the Nation's premier farm and ranch land conservationists who meet the highest standards of conservation

environmental management. http://www.nrcs.usda.gov

Conservation Technical Assistance (CTA) –The CTA provides free technical assistance to help farmers and ranchers identify and solve natural resource problems on their farms and ranches. This might come as advice and counsel, through the design and implementation of a practice or treatment, or as part of an active conservation plan. http://www.nrcs.usda.gov/

CWA 319 –These are Environmental Protection Agency funds allocated to Tribal entities and the State of Idaho. The Idaho Department of Environmental Quality (DEQ) administers the Clean Water Act §319 Non-point Source Management Program for areas outside the Tribal Reservations. Funds focus on projects to improve water quality and are usually related to the TMDL process. http://www.deq.idaho.gov/

Environmental Quality Incentives Program (EQIP): EQIP offers cost-share and incentive payments and technical help to assist eligible participants in installing or implementing structural and management practices on eligible agricultural land. http://www.nrcs.usda.gov/

Habitat Improvement Program (HIP) – This is an Idaho Department of Fish and Game program to provide technical and financial assistance to private landowners and public land managers who want to enhance upland game bird and waterfowl habitat. Funds are available for cost sharing on habitat projects in partnership with private landowners, non-profit organizations, and state and federal agencies. http://fishandgame.idaho.gov/

Partners for Fish and Wildlife Program in Idaho – This is a U.S. Fish and Wildlife program providing funds for the restoration of degraded riparian areas along streams, and shallow wetland restoration. http://www.fws.gov/

Resource Conservation and Rangeland Development Program (RCRDP) –The RCRDP is a loan program administered by the ISWCC for implementation of agricultural and rangeland best management practices or loans to purchase equipment to increase conservation. http://www.swc.idaho.gov/

State Revolving Loan Funds (**SRF) –**These funds are administered through the Idaho DEQ. http://www.deq.idaho.gov/

References

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