King Hill - C.J. Strike Reservoir Subbasin Assessment and TMDL

Implementation Plan for Agriculture
December 2007

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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 (33 USC § 1251.101). 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 waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). States and tribes must periodically publish (currently every two years) a priority list of impaired waters known as a 303(d) list. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for specified pollutants, set at levels to achieve water quality standards. This document addresses the water bodies in the C.J. Strike – King Hill Subbasin that have been placed on the "§303(d) list."

The C.J. Strike – King Hill Subbasin TMDL Implementation Plan for Agriculture was drafted by the land management agencies tasked with improving water quality in the subbasin. The Idaho Soil Conservation Commission is the designated agency for the development of TMDL Implementation plans and BMP applications on privately owned agricultural lands that raise crops or graze livestock. The Bureau of Land Management (BLM) is the largest landowner in the subbasin, and the Idaho Department of Lands (IDL) manages State-owned land. The Idaho Department of Environmental Quality (DEQ) will track the land management agencies' accomplishments toward meeting water quality standards identified in the TMDL on an annual basis. The C.J. Strike – King Hill Watershed Advisory Group (WAG) and the designated agencies listed above played a significant role in the TMDL development process. The WAG and the designated agencies were involved in developing the allocation processes and their continued participation will be critical while implementing the TMDL.

PURPOSE

The purpose of this TMDL Implementation Plan for Agriculture is to provide a prioritization strategy for implementing conservation improvements on privately owned lands. The intent is to help restore designated beneficial uses on the 303(d) listed streams within the C.J. Strike – King Hill Subbasin by reducing pollutant contributions from privately owned parcels of land. The costs to install Best Management Practices (BMPs) on private agricultural lands are estimated in this plan to provide the local community, government agencies, and watershed stakeholders some perspective on the economic demands of meeting specific TMDL goals. Availability of cost-share funds to agricultural producers within the C.J. Strike – King Hill Subbasin will likely be necessary to meet the TMDL requirements within each stream segment that received a load reduction target.

GOALS

The goal of this plan is to assist and/or compliment other watershed efforts to restore beneficial uses for the 303(d) listed stream segments within the C.J. Strike – King Hill Subbasin. These segments are: (1) the Snake River from Glenns Ferry to Indian Cove, (2) The lower 4.0 miles of Cold Springs Creek, and (3) the lower 5.82 miles of Little Canyon Creek. The agricultural component of the C.J. Strike – King Hill Subbasin TMDL Implementation Plan includes an adaptive management approach for the implementation of Resource Management Systems (RMSs) and Best Management Practices (BMPs) to meet the requirements for the C.J. Strike – King Hill SubbasinTMDL. This agricultural implementation plan will address agricultural concerns on Cold Springs and Little Canyon Creeks as they are the only segments that have potential impact from agricultural activities.

OBJECTIVES

The primary objectives of this plan are to reduce the amount of sediment entering streams in the C.J. Strike – King Hill Subbasin and, where feasible, to decrease stream temperatures by increasing shading along stream corridors. Agricultural RMSs and BMPs on privately owned land will be developed and implemented on site with individual agricultural operators as per the 2003 Idaho Agricultural Pollution Abatement Plan (APAP).

The State of Idaho has adopted a non-regulatory approach to control agricultural non-point sources. However, regulatory authority can be found in the Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA 58.01.02.350.01 through 58.01.02.350.03), which provides direction to the agricultural community and includes a list of approved BMPs. A portion of the APAP outlines responsible agencies or elected groups designated to address non-point source pollution problems. For agricultural activities on private land, the Elmore Soil Conservation District and the Bruneau River Soil Conservation District (BRSCD) in cooperation with the Idaho Soil Conservation Commission (ISCC), the Idaho Association of Soil Conservation Districts (IASCD), and the Natural Resource Conservation Service (NRCS) can assist landowners in developing and implementing conservation plans that incorporate BMPs that will help meet TMDL allocation targets.

Background

PROJECT SETTING

The King Hill-C.J. Strike subbasin (HUC 17050101) lies mainly in plains and low hills of the western Snake River plain. Figure 1 shows the location of the subbasin within Idaho. The climate is very arid. The Snake River is the primary drainage with most tributaries intermittent or dry. Irrigation is highly developed in this area. Geology is mainly sedimentary and volcanic rocks. The potential natural vegetation is sagebrush (*Artemisia*) steppe with some saltbush (*Atriplex*) communities where fine, high-mineral soils occur. The Snake River on the map below divides the two Soil Conservation Districts within the subbasin. Elmore Soil Conservation District is located north of the Snake River, while the Bruneau River Soil Conservation District is located south of the Snake River.

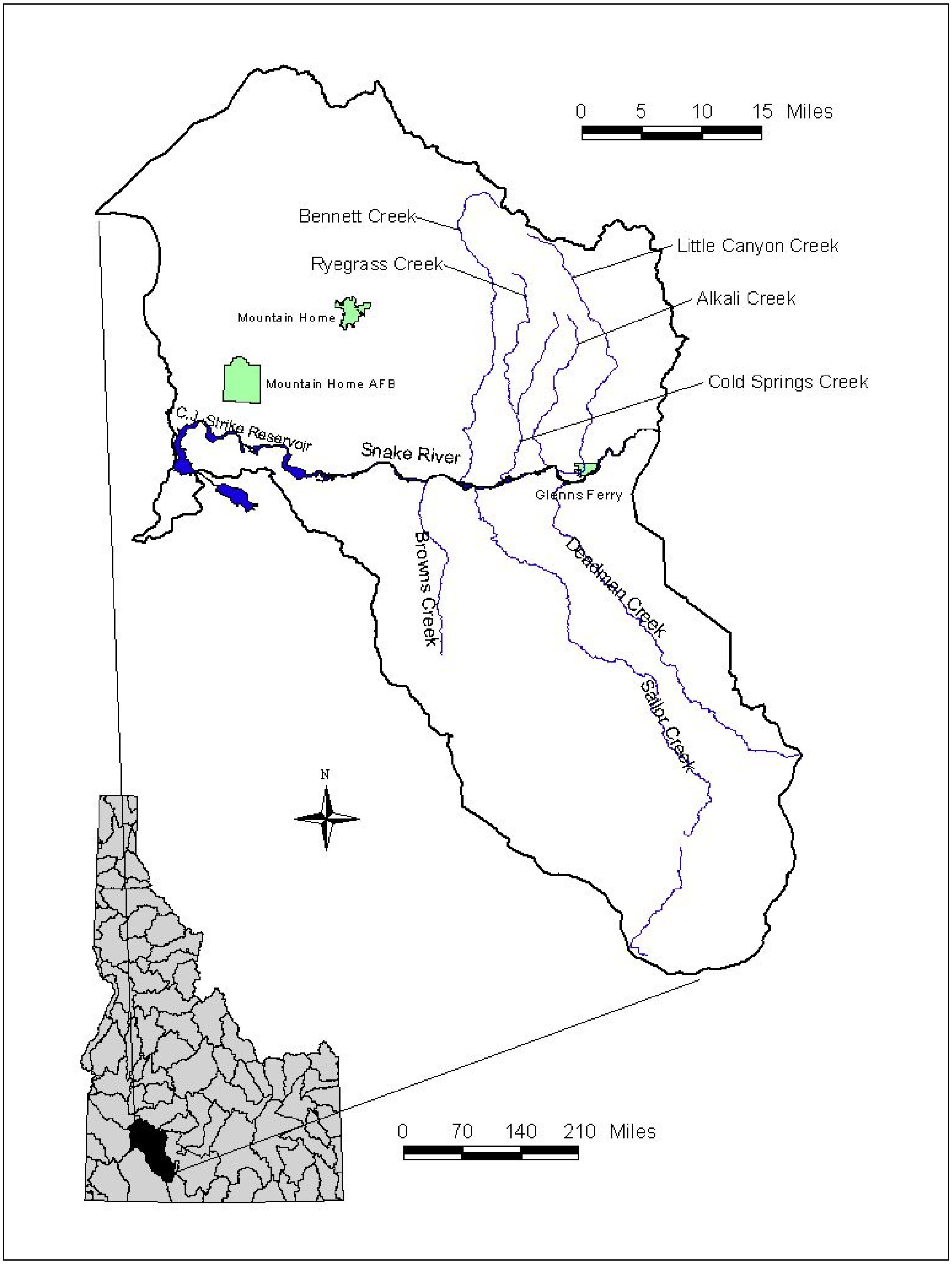

Figure 1. Location of King Hill-C.J. Strike Subbasin within Idaho

Snake River Stream Characteristics

The Snake River originates at 9,500 feet, along the continental divide in Wyoming, and flows 1,038 miles to the confluence with the Columbia River in Pasco, Washington. The King Hill-C.J. Strike reach begins at river mile 547 at King Hill and ends at river mile 494 at the C.J. Strike Dam for a total length of 53 river miles. The Snake River is a large volume river that is one of the most important water resources in the state. The King Hill-C.J. Strike reach is an important agricultural, recreational, and wildlife resource as well as a hydroelectric power source. In this reach, the river flows through basalt canyons, rangeland, and agricultural land. The channel shape varies from being confined in the canyons to wide single channel areas with extensive floodplains and meandering channels with island complexes.

Climate

The climate of the King Hill-C.J. Strike Subbasin is dry and temperate. Precipitation values over the Snake River plain as a whole are low (Table 1) because the region is in a large structural depression between two mountain ranges. To the west, the Cascade Mountains capture much of the moisture from oceanic air masses moving east. To the east, the Rocky Mountains shield the Snake River plain from continental cold air masses that sweep from Canada to the Gulf of Mexico (IDWR 1985, Abramovich et al. 1998). Overall, climate differences result more from changes in elevation and aspect rather than latitude.

Cloud cover varies throughout the year, but there are an overall high proportion of sunny days in this subbasin. Solar radiation values are highest during July and clear, sunny skies are common throughout the summer. Cloud cover varies throughout the year, but there are an overall high proportion of sunny days in this subbasin. Winter is only moderately sunny, with cloudiest conditions in December and January(IDWR 1985).

The primary weather stations (Table 1) in the King Hill-C.J. Strike Subbasin are located at Glenns Ferry and Mountain Home. On average between the two weather stations, monthly mean maximum temperatures climb to the mid 90s(ºF) during the summer months with the highest maximum temperatures occurring in July and August while mean minimum temperatures can drop as low as 20 ºF in the winter. The annual average maximum temperature is 66 ºF for the region. Total mean annual precipitation averages less than 10 inches for the region (Western Regional Climate Center 2004).

Table 1. Summary of monthly climate data from 1948 through 2003 for the Glenns Ferry and Mountain Home weather stations.

Month	Glenns Ferry			Mountain Home		
	Temperature °F		Precipitation	Temperature °F		Precipitation
	Mean Maximum	Mean Minimum	Mean Total (in.)	Mean Maximum	Mean Minimum	Mean Total (in.)
Jan.	39.2	20.3	1.47	38.2	20.4	1.34
Feb.	47.9	24.9	0.98	45.1	24.2	0.86
March	56.8	29.1	0.87	53.7	28.8	1.06
April	66.8	34.9	0.68	63.1	34.4	0.84
May	76.4	42.7	0.82	72.8	42.2	0.87
June	85.5	50.0	0.68	83.0	49.9	0.73
July	95.9	55.4	0.20	93.0	56.4	0.27
August	93.4	52.5	0.26	91.5	54.2	0.28
Sept.	82.6	43.5	0.42	80.9	45.1	0.51
Oct.	69.4	33.4	0.55	67.3	35.1	0.63
Nov.	52.6	27.2	1.24	50.0	27.3	1.19
Dec.	41.2	21.7	1.26	39.3	21.3	1.29
Annual	67.3	36.3	9.43	64.8	36.6	9.87

SUBWATERSHEDS AND WATER QUALITY IMPAIRED STREAMS

The three 303(d) listed subwatersheds/water bodies and impaired stream segments in the King Hill-C.J.Strike Subbasin are listed below in Table 2. The location of these streams within the watershed can be found in Figure 2.

Table 2. 303(d) Listed Stream Segments in the King Hill-C.J. Strike Subbasin

Subwatershed/Water Body	Listed Segments	Listed Pollutant
Cold Springs Creek	From the mouth continuing 4.0 miles upstream	sediment
Little Canyon Creek	From the mouth continuing 5.82 miles upstream	sediment
Snake River	Glenns Ferry down stream to Indian Cove	sediment

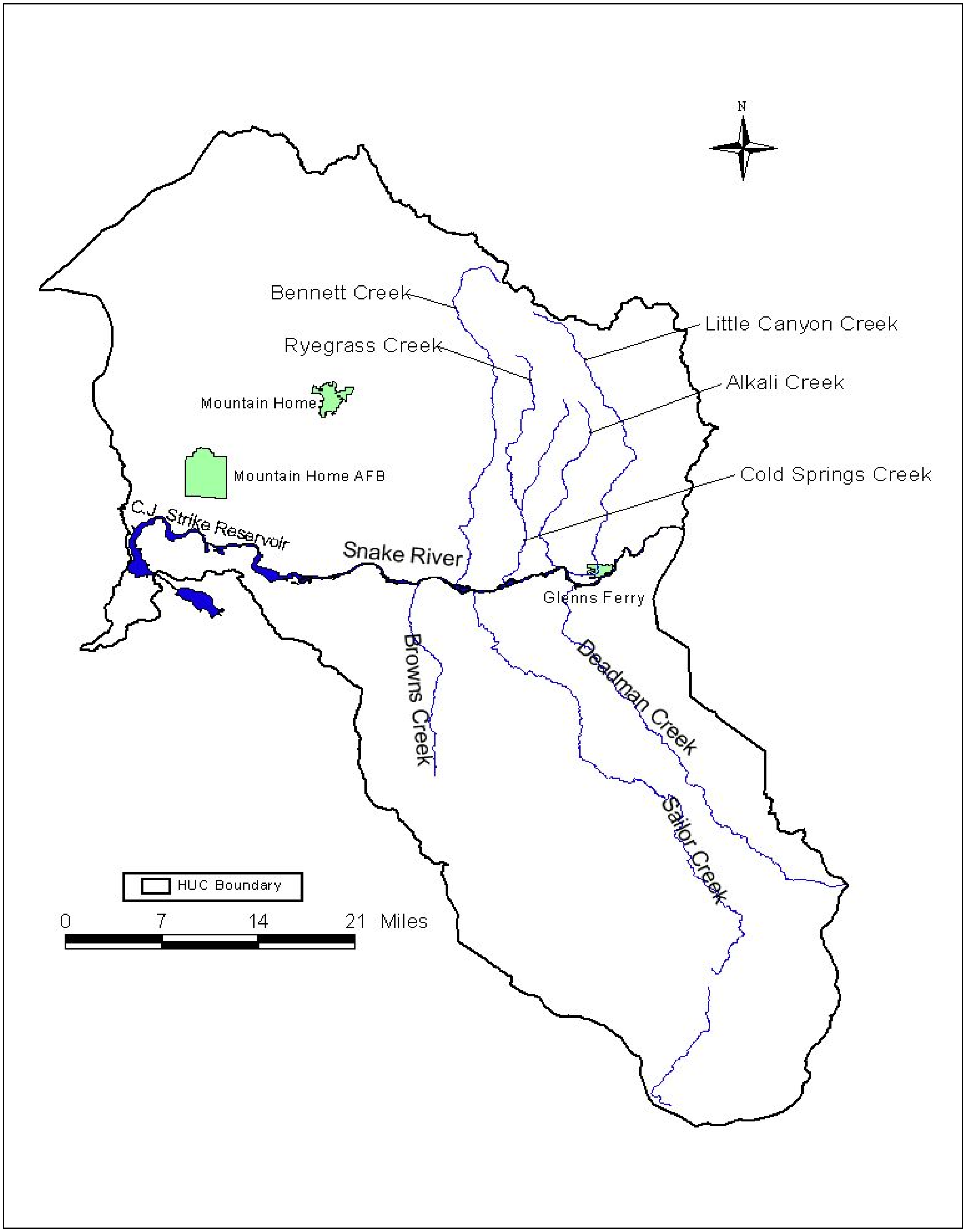

Figure 2. Water Bodies in the King Hill – C.J. Strike Reservoir Subbasin

LAND USE

Today, land use in the C.J. Strike – King Hill Subbasin is primarily cattle grazing on the uplands, and alfalfa hay, corn & grain production on the irrigated lowlands. Today, irrigated cropland makes up only a small percentage of the overall land use, and this has probably changed little since the late 1800s. The water diversions, along with increased water storage capacity, have greatly increased farmable lands in the lower end of the watershed. Table 3 and Figure 3 below show current land use in the C.J. Strike – King Hill Subbasin.

Table 3. Land Use in the King Hill-C.J. Strike Subbasin

<table>
<tr><th colspan="2">Land Use</th><th colspan="2">Area (square miles)</th><th>Area (percentage)</th></tr>
<tr><td colspan="2">Rangeland</td><td colspan="2">1,835.72</td><td>86%</td></tr>
<tr><td>Irrigated – Sprinkler
Irrigated - Gravity</td><td>Total Irrigated</td><td>163.47
34.19</td><td>197.66</td><td>9%</td></tr>
<tr><td colspan="2">Riparian</td><td colspan="2">38.78</td><td>2%</td></tr>
<tr><td colspan="2">Dryland Agriculture</td><td colspan="2">35.35</td><td>2%</td></tr>
<tr><td colspan="2">Open Water</td><td colspan="2">8.52</td><td><1%</td></tr>
<tr><td colspan="2">Township</td><td colspan="2">7.36</td><td><1%</td></tr>
<tr><td colspan="2">Bare Rock</td><td colspan="2">5.35</td><td><1%</td></tr>
<tr><td colspan="2">Forest</td><td colspan="2">4.04</td><td><1%</td></tr>
<tr><td colspan="2">Total Land Area</td><td colspan="2">2,132.79</td><td>--</td></tr>
</table>

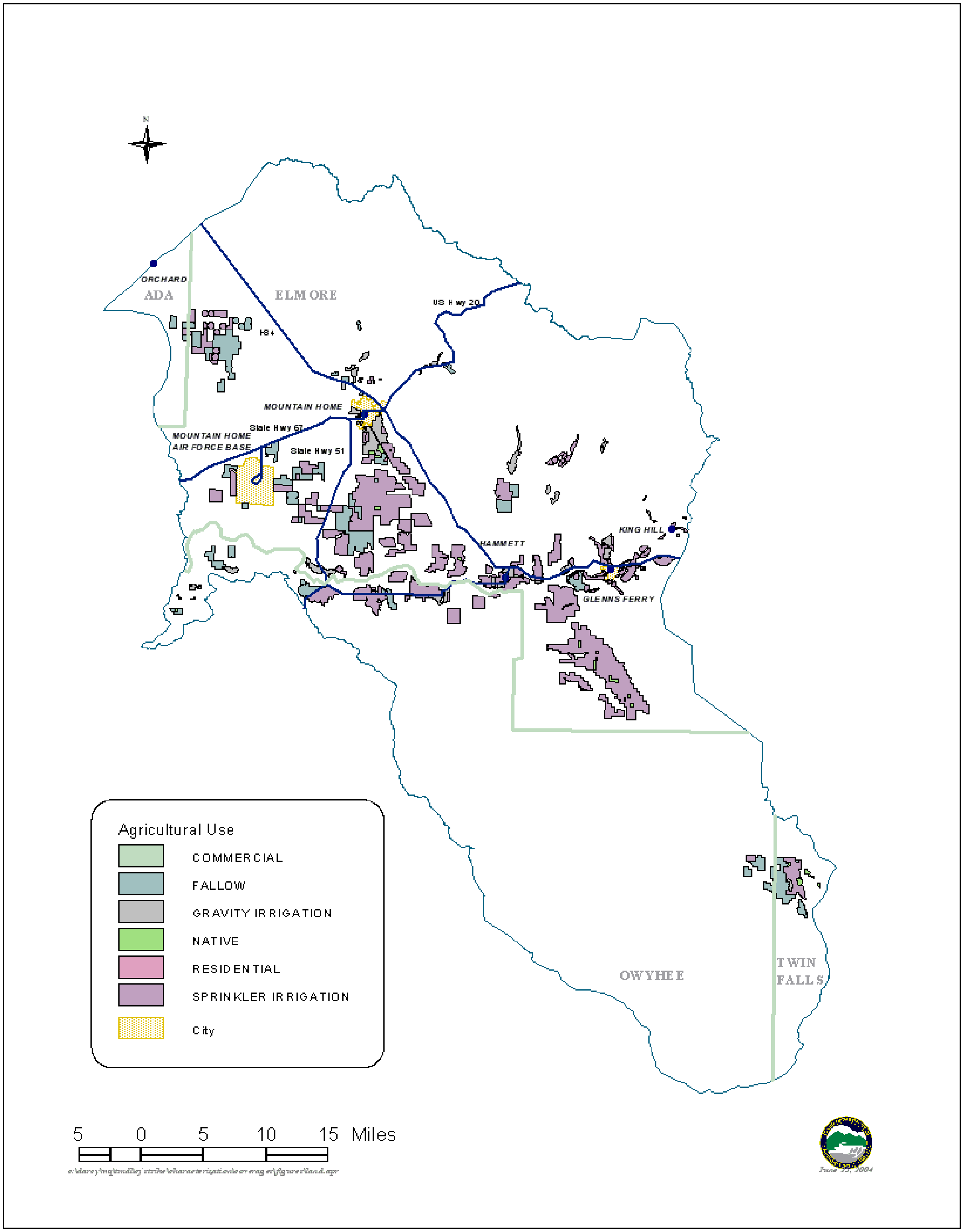

Figure 3. Agricultural Land Use in the King Hill-C.J. Strike Subbasin

LAND OWNERSHIP

Most of the land in the King Hill-C.J. Strike Subbasin is managed by BLM (Table 4 and Figure 4), with 64% of the total land area and 86% of the total rangeland. Privately-owned land is 22% of the land area, with smaller percentages managed by the State of Idaho and Department of Defense (USGS 2002).

Table 4. Land Ownership in the King Hill-C.J. Strike Subbasin

Land Owner	Area (square miles)	Area (percentage)
BLM	1,366.94	64
Private	462.88	22
State of Idaho	152.85	7
Department of Defense	132.42	6
Open Water	14.74	< 1
U.S. Forest Service	2.96	< 1
Total Land Area	2,132.79	--

The Department of Defense owns land used for the Mountain Home Air Force Base (MHAFB) and the Saylor Creek Range. The MHAFB provides the most significant employment in the area, with 4,666 people from Mountain Home working for national defense (Idaho Department of Commerce 2004). First built as the Mountain Home Army Air Field in 1943, the MHAFB is now home to the 366th Fighter Wing. The Saylor Creek Range is the existing training range for the 366th Wing.

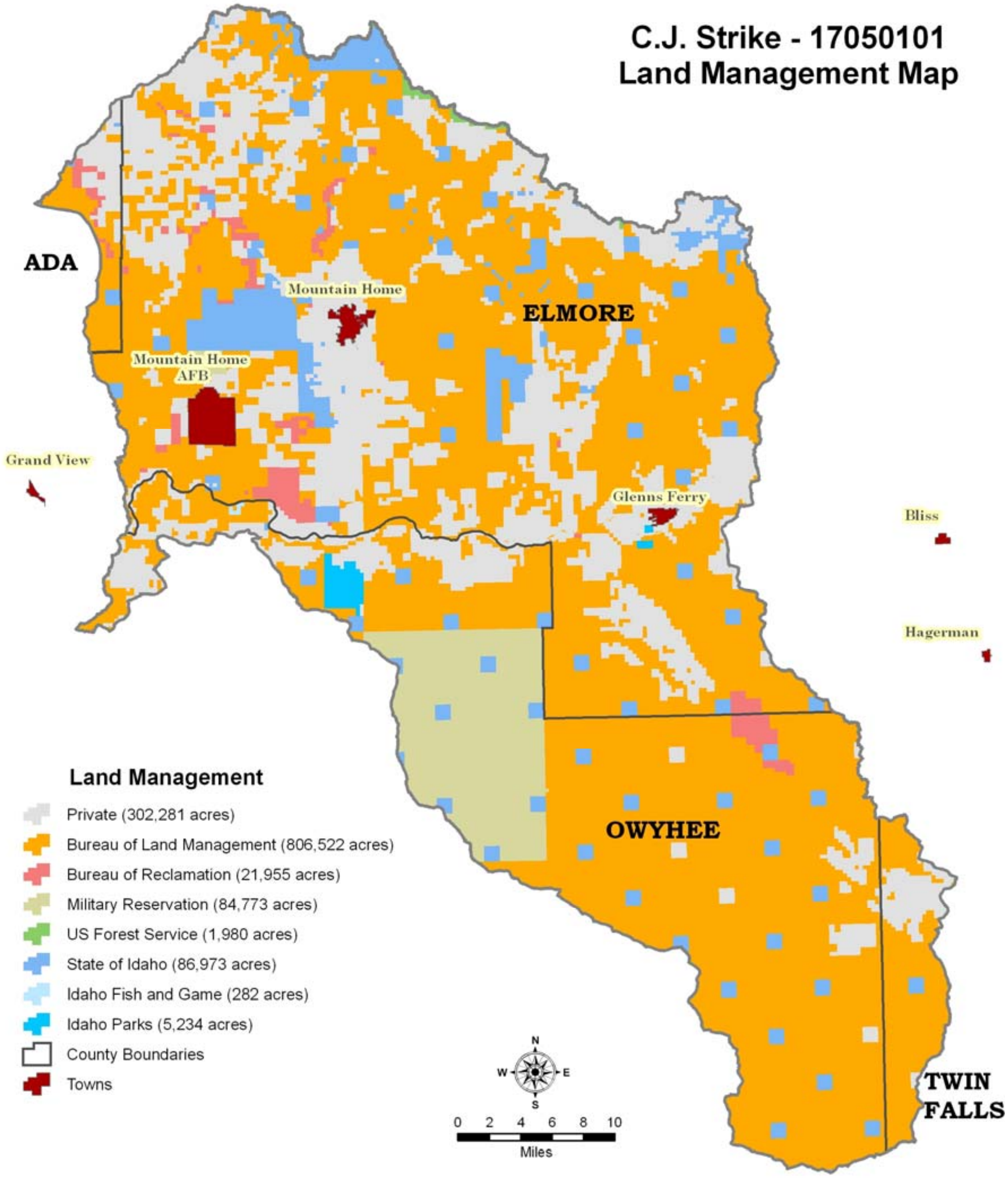

Figure 4. Land Ownership in the King Hill –C.J. Strike Subbasin.

ACCOMPLISHMENTS

Over the years since the early 1990s, many landowners and agricultural operators in the King Hill – C.J. Strike Subbasin have proactively installed many Best Management Practices (BMPs) on their own and in cooperation with the Bruneau River Soil Conservation District, Elmore Soil & Water Conservation District, DEQ and the NRCS. BMPs include conversion from Surface Irrigation to Sprinkler Irrigation, Riparian Fencing, Offsite Watering, Irrigation Water Management, Nutrient Management and Prescribed Grazing. Based on field observations by ISCC and IASCD staff, the BMPs that have already been installed and BMPs that are presently being installed have greatly improved water quality within the watershed. The BMP's that have been installed include conversion from surface irrigation to sprinkler irrigation, riparian fencing, offsite watering, prescribed grazing, nutrient management and irrigation water management. With the producers, the Soil Conservation Districts, and State and Federal agencies working together, water quality standards can be met within the King Hill – C.J. Strike Subbasin. A summary of BMPs installed to date on private agricultural land in the Cold Springs Creek and Little Canyon Creek subwatersheds follows.

Cold Springs Creek

1604 Acres in the Cold Springs Creek subwatershed has been converted to sprinkler irrigation (pivots, wheel lines and hand lines) since the King Hill –C.J. Strike Reservoir Subbasin Assessment and TMDL was written in 2004. In addition, approximately 75% of the riparian area along the creek has been fenced to exclude or manage livestock use. The irrigated cropland is used for hay and grain production. The rotation is alfalfa hay for five years followed by one to two years of grain and then back to alfalfa hay. Cattle are wintered on the land from the middle of December until the 15th of April. Bank stability is over 80% along the length of the private lands (the estimated natural condition is based on visual assessment and ISCC Riparian Assessment results for King Hill-C.J. Strike Subbasin, David Ferguson 9/2003), and no further BMPs need to be installed in this subwatershed at this time.

Little Canyon Creek

The listed portion of Little Canyon Creek subwatershed is a combination of privately owned agriculture properties, urban properties (homes within Glenns Ferry) and property owned by the city of Glenns Ferry. Of the agricultural properties, over 90% of the irrigated acreage is now under sprinkler irrigation (pivot, wheel lines and hand lines). Hay, grain and pasture are the primary crops grown on the irrigated cropland along with a few acres of grapes and fruit trees. Less than 20 acres of the irrigated cropland along Little Canyon Creek is grazed.

Table 5 summarizes the installed BMPs on both Cold Springs Creek and Little Canyon Creek to date.

Table 5. Installed BMPs on Cold Springs Creek and Little Canyon Creek

Producer/Program	Practice	Units	Total
Producer	Riparian Fencing	Feet	12672 feet
Producer	Sprinkler Irrigation	Acres	1604.64cres
Producer	Prescribed Grazing	Acres	904.78 acres

Water Quality Concerns (Problems)

BENEFICIAL USE STATUS

Idaho water quality standards require that beneficial uses of all water bodies be protected. Beneficial uses can include existing uses, designated uses, and presumed existing uses. Designated uses are uses officially recognized by the state. In cases where designated uses have not been established by the state for a given water body, DEQ has established the presumed existing uses of supporting cold water aquatic life and either primary or secondary contact recreation. Beneficial uses for water bodies on the 303(d) list in the C.J. Strike Subbasin are listed below in Table 6.

Table 6. Beneficial Uses for 303(d) Listed Stream Segments in the King Hill – C.J. Strike Subbasin.

Water Body	Boundaries	Beneficial Uses
Snake River	King Hill to Highway 51 Bridge; see Figure 2	primary contact recreation, cold water, domestic water supply, special resource water
Cold Springs Creek	See Figure 5 (segment 1)	salmonid spawning, cold water, secondary contact recreation
Little Canyon Creek	See Figure 5 (segment 1 & 2)	salmonid spawning, cold water, secondary contact recreation

POLLUTANTS

Subbasin Assessment Summary

Any pollutant that impairs the water quality of a given stream must be addressed by installing BMPs to reduce pollutants in order that the designated beneficial uses of a stream can be attained and maintained. The first step in this process is the Subbasin Assessment (SBA). A SBA entails analyzing and integrating multiple types of water body data, such as biological, physical/chemical, and landscape data to address several objectives: (1) determine the degree of designated beneficial use support of the water body (i.e., attaining or not attaining water quality standards); (2) determine the degree of achievement of biological integrity; (3) compile descriptive information about the water body, particularly the identity and location of pollutant sources; and (4) determine the causes and extent of the impairment when water bodies are not attaining water quality standards.

Describing physical and biological parameters of the subbasin aids assessing characteristics relevant to pollutants impairing beneficial uses. To begin evaluating the

King Hill-C.J. Strike Subbasin for sensitivity to activities that may impair beneficial uses of its waterbodies, the climate, hydrology, geology, soils, vegetation, and assemblages of aquatic life are identified and described.

Total Maximum Daily Loads were developed for four water body segments (nine assessment units) in the King Hill-C.J. Strike Subbasin. Table 7summarizes the stream segments addressed in this assessment and the actions that will be taken as a result of the assessment.

Table 7. Summary of King Hill-C.J Strike Reservoir Subbasin Assessment Conclusions

Water Body	§303(d) Boundary [1]	Listed Pollutants	Proposed Action
Snake River	King Hill to Highway 51 Bridge (Loveridge Bridge)	Sediment	TMDLs for sediment and nutrients
C.J. Strike Reservoir	Entire Reservoir	Pesticides, Nutrients	TMDL for nutrients with no in-reservoir reduction requirements. Additional management to meet the dissolved oxygen criteria De-list pesticides Do not list TDG
Alkali Creek	Headwaters to Snake River	Sediment	De-list sediment
Bennett Creek	Headwaters to Snake River	Unknown	De-list for unknown
Browns Creek	Headwaters to Snake River	Sediment	De-list sediment
Cold Springs Creek	Ryegrass Creek to Snake River	Unknown	TMDL for sediment
Deadman Creek	Headwaters to Snake River	Sediment	De-list sediment
Little Canyon Creek	Headwaters to Snake River	Sediment, Flow Alteration	TMDL for sediment, no action for flow alteration
Ryegrass Creek	Headwaters to Cold Springs Creek	Sediment	De-list sediment
Sailor Creek	Headwaters to Snake River	Sediment	De-list sediment

[1] The §303(d) boundaries are not always the same as the boundaries for which TMDLs were developed. In many cases impairment does not exist throughout the entire segment, or, the segment is split for other reasons.

Margin of Safety

The margin of safety (MOS) factored into the Snake River sediment TMDL is 5.0% of the load capacity. That is, 5.0% of the load in the river when the 50 mg/L target is met is removed from being available. This 5.0% MOS accounts for uncertainty in the data used to develop the loads and adds a level of conservativeness to the TMDL.

The MOS for the Cold Springs Creek and Little Canyon Creek TMDLs includes the following assumptions: The desired bank erosion rates are representative of background conditions. The water quality target for percent fines is consistent with values measured and as set by local land management agencies based on established literature values (DEQ 2004).

Seasonal Variation

TMDLs must be established with consideration of seasonal variation. In the Snake River and its tributaries, there are seasonal influences on nearly every pollutant addressed. The summer growing season is typically when concentrations of sediment and nutrients are the highest. Seasonal variation as it relates to development of these TMDLs is addressed simply by ensuring that the loads are reduced during the *critical period* (when beneficial uses are impaired and loads are controllable). Thus, the effects of seasonal variation are built into the load allocations.

Background Load

The sediment allocations for the Snake River, Cold Springs Creek, and Little Canyon Creek are not explicitly adjusted to account for background conditions. Since the Snake River at King Hill and Indian Cove is already below the 50 mg/L suspended sediment concentration (SSC) target (18 and 25 mg/L, respectively) no additional reductions will be required by the TMDL (see allocations below). As a result, it is not necessary to include the any potential background load in the allocations.

Additionally, the Cold Springs Creek and Little Canyon Creek TMDLs already include an accommodation for background sediment by way of the 80% bank stability target. That is, the 80% bank stability target allows for 20% of the banks to be less than stable, which is to be expected in a stream's naturally functioning state. Thus, background is considered, but no adjustments are made to the allocations (IDEQ, 2004).

Reserve for Growth

The sediment allocation for the Snake River includes a 10% reserve for growth. That is, 10% of the load in the river when the 50 mg/L target is met is removed and is made available for any future sources of sediment, which are typically point sources. While an abundance of growth is not expected in the near future, the 10% reserve helps accommodate any growth that may occur while still ensuring that the river will meet the TMDL.

The Cold Springs Creek and Little Canyon Creek TMDLs do not include a reserve for growth. While growth may occur, the expectation is that no additional bank sediment will be discharged to the systems as a result of the growth. This can be achieved via the use of Best Management Practices.

Sediment Load and Wasteload Allocations

This section describes the sediment load and wasteload allocations for the Snake River and Cold Springs Creek and Little Canyon Creek TMDLs. The SSC water column target in the Snake River between King Hill and Indian Cove, on which the TMDL is based, is

50 mg/L. While the target is durational in nature (based on a geometric mean over 60 consecutive days), the TMDL is not based on duration. The 50 mg/L target for the Snake River is intended to provide protection for the mix of aquatic life species that inhabit the river.

Table 8 shows the sediment load allocation for the Snake River at King Hill and wasteload allocations for the Glenns Ferry Waste Water Treatment Plant (WWTP). Table 8 also includes a generalized no-net-increase allocation for the tributaries to the river. DEQ recommends collecting additional data during the implementation phase of the TMDL to further clarify the tributary allocations.

The Glenns Ferry WWTP wasteload allocation is based on the plants current NPDES permit limit for total suspended solids. The relative mass of sediment contributed by the WWTP is quite small. The plant already removes much of the influent suspended solids as part of the treatment process; further treatment at this time would result in high costs with little tangible benefit to the river. However, the plant must continue to meet the minimum percent removal requirement in its permit. Fixed load allocation targets were selected because the management practices that affect sediment loading to the river is not expected to change on a day-to-day basis.

Table 8. Sediment Load and Wasteload Allocations for Snake River at King Hill and the Glenns Ferry WWTP

Name	Typical Existing Load	Load Capacity	Margin of Safety	Reserve for Growth	Allocation Type / Allocation	Percent Reduction from Existing Load
Snake River at King Hill	544 tons/day SSC	1,540 tons/day SSC	77 tons/day SSC	154 tons/day SSC	Load / 1,309 tons/day SSC	0% Typical existing is below LA
Unmonitored[1] Snake River tributaries	Not Defined	N/A	N/A	N/A	No increase beyond current loads	0%
Glenns Ferry WWTP[2]					Wasteload /	
Average Monthly	125 lb/day TSS	N/A	N/A	N/A	125 lb/day TSS	0%
Average Weekly	188 lb/day TSS	N/A	N/A	N/A	188 lb/day TSS	0%

[1] SSC loading data are not available for the tributaries to the Snake River. DEQ recommends initiating a monitoring regime as part of the TMDL implementation plan.
[2]Based on current NPDES permit limits for TSS

Little Canyon Creek and Cold Springs Creek are receiving sediment allocations due to DEQ monitoring that showed excess stream bank erosion (see appendix D). Table 9 shows the load allocations and percent decrease identified for the representative segment. Since reference reaches were established above and below road crossings on both creeks, the erosion rate established in the TMDL does not represent the actual rate of erosion in the listed portion of these streams.

Table 9. Streambank Erosion Load Allocations for Little Canyon Creek and Cold Springs Creek.

Water Body	Current Erosion Rate (tons/mile/ year)	Target Erosion Rate (tons/mile/ year)	Current Total Erosion (tons/year)	Target Total Erosion (tons/year) Load	% Decrease
Little Canyon Creek, Segment 1	315.97	236.98	183.26	137.45	25
Little Canyon Creek, Segment 2	345.58	218.26	1,814.31	1,145.88	36.84
Cold Springs Creek	113.36	82.44	457.97	333.07	29.41

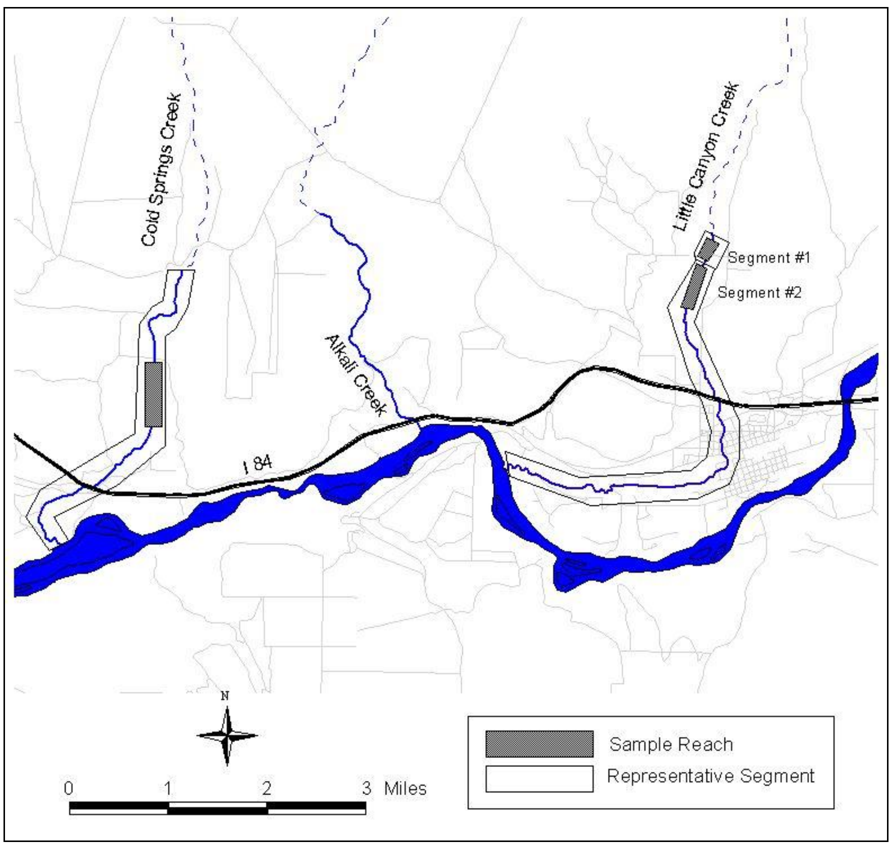

Figure 5. Segments of Little Canyon Creek and Cold Springs Creek receiving sediment load allocations.

Recommended Reduction Summary

Table 10 below lists the 303 (d) listed stream segments and the required reductions to meet the TMDL load allocations (LA). As mentioned above, current streambank erosion data was collected above and below road crossings on both creeks. Therefore the erosion rate established in the TMDL does not represent the actual rate of erosion in the listed portion of these streams. Also when cut banks occurred on one side of the stream in the TMDL, the length was doubled for the other side of the stream. Only the cut banks that exist should have been added to the total. Table 10 also includes a summary of agricultural concerns for each listed segments based on ISCC and IASCD staff field observations.

Table 10. 2002 303(d) Listed Stream Segments: Identified Pollutants, Required Reductions and Agricultural Concerns

Water Body	303(d) Listed Pollutants	Required Reduction to meet TMDL	Agricultural Concerns
Snake River	Sediment	Typical existing sediment is below Load Allocation (LA)	There are no agriculture activities that effect sediment deposition along this portion of the Snake River.
Cold Springs Creek	Sediment	Typical existing sediment is below Load Allocation (LA)	Irrigated agriculture and livestock grazing could contribute to sediment
Little Canyon Creek	Sediment	Typical existing sediment is below Load Allocation (LA)	Irrigated agriculture and livestock grazing could contribute to sediment

WATER QUALITY MONITORING

There has been very limited monitoring by DEQ on the 303 (d) listed sections of Cold Springs and Little Canyon Creeks prior to the TMDL and no monitoring by DEQ on record since the TMDL. Idaho Power has and continues to monitor the 303 (d) listed section of the Snake River.

Riparian assessment and water quality data collected by DEQ and the U.S. Geological Survey used in the King Hill - C.J. Strike Reservoir Subbasin Assessment are summarized in Appendix D.

AGRICULTURAL WATER QUALITY INVENTORY AND EVALUATION

Riparian

An ISCC Riparian team spent two days (9/11 – 9/12 2003) evaluating the stream condition with an initial field inventory of all 303(d) listed streams in the King Hill – C.J. Strike Reservoir Subbasin. The results of riparian field inventory and corresponding field visit indicated that most of the 303(d) listed streams should be de-listed, as 95%of the stream segments were either intermittent, diverted for agriculture, or at proper functioning condition. These results were presented at the first WAG meeting held in Glenns Ferry and accepted as a good representation of the streams on the 303(d) list in the King Hill – C.J. Strike Subbasin by the WAG.

On April 9, 2007, DEQ Implementation Coordinator and IASCD Water Quality Resource Conservationist went and evaluated the remaining 303(d) listed streams on the King Hill – C..J. Strike Subbasin. The team found that the sites chosen to evaluate the erosion rates for the TMDL on both Cold Springs Creek and Little Canyon Creek were located either above or below a road crossing. Since, the culvert restricts flows above road crossings and then concentrated channel flow below the culvert, it causes accelerated bank erosion. Using these sites to determine actual bank erosion for the total length of both streams does not give a true picture of bank erosion. After the evaluation of the four stream segments, it was agreed upon that there are no agricultural activities contributing to excessive sediment loading in Cold Springs Creek, Little Canyon Creek or the Snake River.

Irrigated Cropland

Cropland is conventionally tilled and planted predominantly to row crops, depending on water availability. Typical crops grown include beans, potatoes, sugar beets, mint, peas, silage corn, grain corn, sweet corn, small grains, and alfalfa. Crop rotations generally contain less than 50 percent high residue crops. Wind erosion typically occurs in the spring following potatoes and other low residue crops and causes visibility concerns. Typical tillage includes plow, heavy offset disc or deep ripping with seasonal residue management. Commercial fertilizers and pesticides are applied in most cases as needed. Typical soils are loamy fine sand to course sand with slopes from zero to four percent. Growing season is approximately 100 – 160 days. Precipitation is eight to twelve inches per year. The irrigation water source is groundwater and surface water from stream flow in the spring and early summer. (NRCS Website, 2007).

Rangeland

Rangeland vegetation consists of perennial grass and forbs. There are both cool and warm season grasses. Annual precipitation ranges from 12-16 inches, while the growing season ranges from 80-120 days. Topography varies from steep slopes to flat rims and benches. Soils vary from clay loams to gravelly loams with slopes ranging from 10 to 60 percent. Temperatures are mild in the winter and very hot in the summer. Fencing is generally an existing condition. The typical planning unit is 640 acres. Riparian grazing units do not exhibit negative impacts to riparian vegetation. Riparian vegetation consists of grasses, sedges, rushes and a variety of woody species. Streams are primarily low gradient and depend on vegetation for stability. (NRCS Website, 2007).

Pasture

Surface irrigated pastureland. Annual precipitation is eight to eighteen inches, and the growing season is 100 to 160 days. Soils vary from silt loams to gravelly sands, with sloped from one to five percent. Irrigation water is distributed by earthen ditches. Tail water from fields may be reused and eventually returns to streams, or drain system (NRCS Website, 2007)

Animal Feeding Operations and Dairies

There are no confined animal feeding operations (CAFOs), animal feeding operations (AFOs) or Dairies on or near any 303 (d) listed streams within the King Hill – C. J. Strike Reservoir watershed.

THREATENED AND ENDANGERED SPECIES

In the tributaries of the King Hill-C.J. Strike subbasin, the only salmonid generally present is redband trout. Redband trout are a variety of rainbow trout that are adapted to the warmer waters of desert watersheds. Although water temperatures often exceed the salmonid spawning criteria of Idaho's water quality standards, red band trout are successfully propagating in warmer waters within the watershed. Figure 6 shows the tributaries where healthy populations of red band trout occur. Red Band trout populations are strong in the upper reaches of the subwatersheds

Improvements in water quality, achieved from BMPs installed on agricultural lands, are not expected to adversely affect these T&E or sensitive specie, and should, with confidence, improve or enhance habitat environments for the listed species. Any agricultural conservation planning will be coordinated with other species recovery and protection efforts to improve listed species' habitats and address any potential impacts.

Section 7 of the Endangered Species Act of 1973, "mandates all Federal agencies to determine how to use their existing authorities to further the purpose of the Act to aid in recovering listed species and address existing and potential conservation issues". Section 7 (a)(2) states that "agencies shall consult with either the U.S. Fish and Wildlife Service (USFWS) or NOAA Fisheries, to insure that any action they authorize, fund or carry out is not likely to jeopardize the continues existence of a listed species or result in the destruction or adverse modification of designated critical habitat." The Natural Resource Conservation Service (NRCS) is required to follow the above mandate for all project implementation and TMDL implementation within this plan will also follow this process.

If it is determined that a proposed action is within close proximity to habitat used by a listed Threatened or Endangered species (T&E) or the known location of a T&E species, consultation is initiated with the appropriate regulatory agency. Consultation involves describing the project, assessing the potential project impacts, describing the mitigation effort for the project and determining the effect of the project on the species of concern. The consultation process results in the development of reasonable alternatives for implementation and helps to minimize the impacts of conservation practices to critical habitat. Generally, good communication between consulting agencies ensures the development of sound decisions being made.

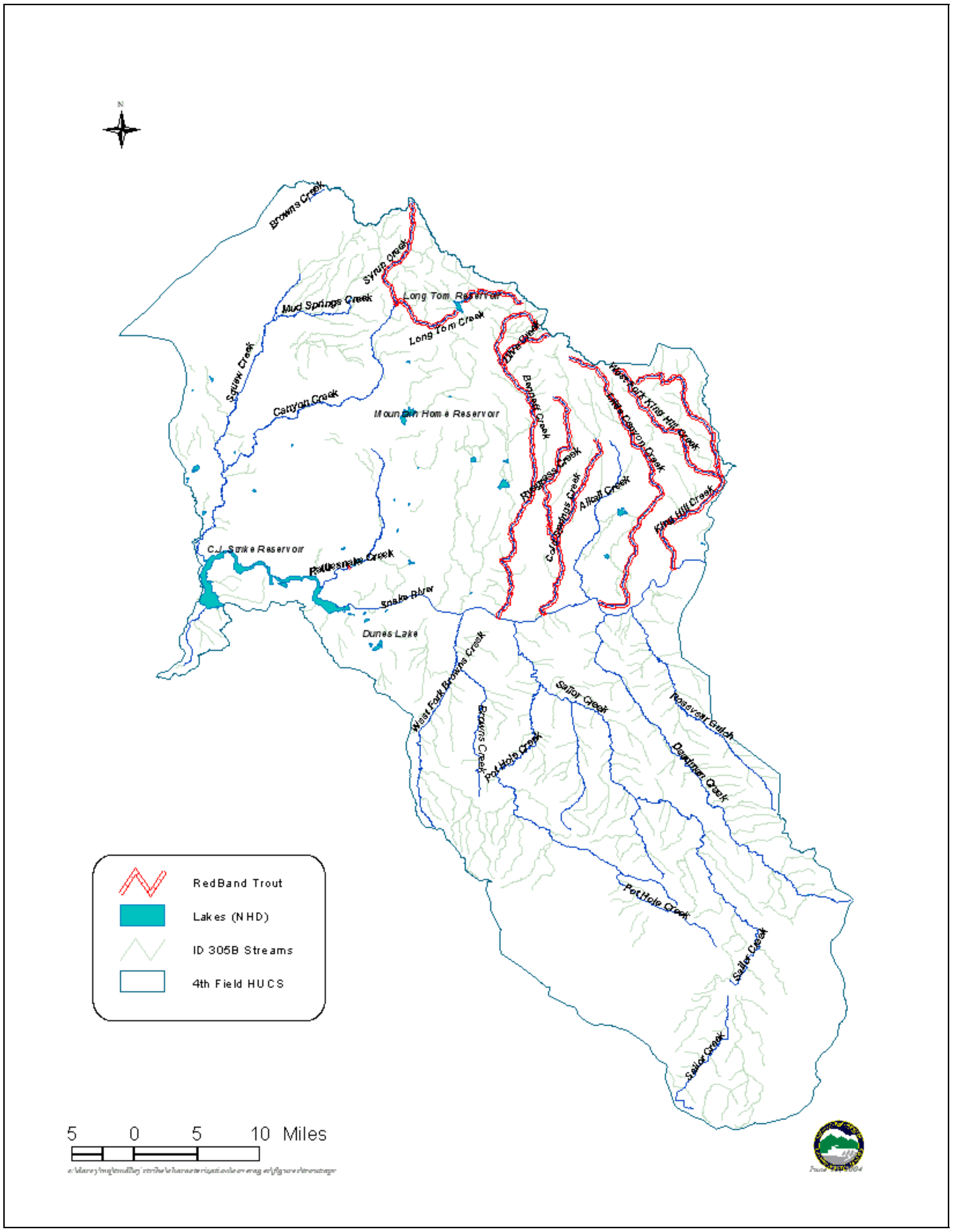

Figure 6. Redband Trout Distribution.

Implementation Plan Priorities

The purpose of this TMDL implementation plan is to access the impacts to water quality in the King Hill – C.J. Strike Reservoir subbasin from agricultural lands on 303(d) listed streams and recommend a priority for installing agricultural BMPs to meet the water quality objectives stated in the King Hill – C.J.Strike TMDL. This implementation priority process includes evaluating the water quality monitoring data and field inventory and evaluations and working with the local SCD to identify critical agricultural areas affecting water quality and set priorities for treatment. Impacts to water quality from non-agricultural lands in the subbasin are beyond the scope of this planning process.

CRITICAL AREAS

Areas of agricultural lands that contribute excessive pollutants to water bodies are defined as critical areas for BMP implementation. Critical areas are prioritized for treatment based on their location to a water body of concern and the potential for pollutant transport and delivery to the receiving water body. Critical areas are those areas in which treatment is considered necessary to address resource concerns affecting water quality. Agricultural critical areas within the King Hill-C.J. Strike Subbasin are included in the five treatment units described below.

RECOMMENDED PRIORITIES FOR BMP IMPLEMENTATION

The Little Canyon Creek subwatershed is the primary subwatershed where agricultural BMPs to improve water quality could be installed; therefore, this subwatershed is the highest priority for BMP implementation. As noted in the accomplishment section, the Cold Springs Creek subwatershed already has all recommended BMPs installed on agricultural lands; therefore, this subwatershed is a second priority area for any additional BMP implementation. Since the Snake River segment is not impacted from agricultural activities, BMPs for this segment are not considered in this plan.

Treatment

TREATMENT UNITS

The following Treatment Units (TUs) describe critical areas in the King Hill-C.J. Strike Subbasin with similar land uses, soils, productivity, resource concerns, and treatment needs. These TUs not only provide a method for delineating and describing land use, but are also used to evaluate land use impacts to water quality and in the formulation of alternatives for solving water quality problems. BMPs to improve water quality are suggested for each treatment unit.

There are five treatment units (TUs) that need to be addressed for the 303(d) listed segments of Cold Springs Creek and Little Canyon Creek: Riparian, Pasture, Sprinkler Irrigated Cropland, Surface Irrigated Cropland, and Rangeland.

Riparian Treatment Unit

Total Acres (Critical Acres)	Soils: loams, sandy loams & sandy clay loams (126, 137,138,149)	Resource Problems	Recommended BMPs
20.23 (2.1critical acres)	include 1-2% slopes	Water gaps too large	Riparian Fencing/Prescribed Grazing
Although the majority of the riparian treatment unit acres are in good condition without resource problems, a small percentage (approximately x critical acres) would benefit from implementation of the above recommended BMPs. A large portion of the riparian area along Cold Springs Creek and Little Canyon Creek is already fenced off in areas used by livestock and most of the remaining riparian acreage is not grazed at all.			

Pasture Treatment Unit

Total Acres	Soils: sandy & silt loam soils (137)	Resource Problems	Recommended BMPs
904.78 (22 critical acres)	Includes 1-3% slopes	Loafing area concentration	Prescribed Grazing
Although the majority of the pasture treatment unit acres are in good condition without resource problems, a small percentage (approximately 22 critical acres) would benefit from implementation of the above recommended BMPs. Part of the cropland areas along the listed sections of Cold Springs Creek and Little Canyon Creek are grazed in the fall after hay and small grain crops are harvested. The crop residue is a great source of feed in the fall and winter. Some of the feed in these fields could be better utilized if cross fencing in the form of electric fences could be installed. This would concentrate the animals in a given area so that they would utilize even the less desirable feed more completely			

Sprinkler Irrigated Cropland Treatment Unit

Total Acres	Soils: loams, sandy loams & sandy clay loams (126,137,138,149)	Resource Problems	Recommended BMPs
1604.64 (264 critical acres)	Includes 1-3% slopes	Water loss through leakage	Replace seals and sprinkler packages as recommended
Sprinkler irrigation is a BMP that greatly reduces water induced erosion, as well as saving water used to produce a crop. While the vast majority of the sprinkler irrigation systems are in good condition about 264 acres of sprinkler systems need to replace sprinkler packages and seals to reduce water loss and increase sprinkler system efficiency. There are also several other BMPs that can be used in sprinkler irrigated cropland which will help to effectively reduce, or eliminate irrigation-induced erosion, thus reducing sediment loading to nearby streams. These practices include, Conservation Crop Rotation, , Nutrient Management, Pest Management and Residue Management. Your local NRCS, Soil Conservation District, ISCC and IASCD are your best sources of information about which BMPs will work best in a given situation on irrigated cropland.			

Surface Irrigated Cropland Treatment Unit

Total Acres	Soils: sandy and coarse sandy loams (126)	Resource Problems	Recommended BMPs
29.36 (29.36 critical acres)	Includes 2-3% slope	Excessive Erosion	Sprinkler Irrigation
The surface irrigated field below the road crossing could be converted to sprinkler irrigation to help the bank stability as this field drains directly into Little Canyon Creek. Bank stability BMPs installed above, below and at the road crossing could also help to improve the bank stability issue. PAM, Conservation Crop Rotation, Deep Tillage, Surge or Sprinkler Irrigation Systems, Irrigation Water Management, Nutrient Management, Pest Management and Residue Management are all possible BMPs that could be installed.			

Rangeland Treatment Unit

Total Acres (Critical Acres)	Soils: loam, sandy loam, sandy clay loams	Resource Problems	Recommended BMPs
399.53 (35 critical acres)	Includes 2-6% slope	loafing areas	Prescribed Grazing
Prescribed grazing should be maintained on the rangeland to insure that erosion on the steeper slopes does not occur. The present prescribed grazing plans are working well to hold the soils in place within the 303 (d) listed portions of the sub-watersheds (Cold Springs Creek and Little Canyon Creek).			

IMPLEMENTATION ALTERNATIVES AND COSTS

The cost list to install BMPs on private agricultural land is available from the Bruneau River Soil Conservation District office in Bruneau and the Elmore Soil and Water Conservation District office in Mountain Home. These costs have been developed through actual tracking of average BMP installation costs and are used county-wide to determine allowed contracted costs through the USDA Environmental Quality Incentives Program (EQIP) developed by the Natural Resource Conservation Service (NRCS). When there is a large distance between material suppliers and the location of installation, there is a greater overall cost for the BMP as a result of the cost for delivery. Where shallow soils exist, fence building materials (as well as installation costs) may differ greatly from typical costs. Since actual costs to install a BMP may not be known until during (or after) installation, a more accurate watershed-wide budget will be developed during the on-site planning and implementation process. Table 11 provides the estimated costs for the applicable BMP components for Little Canyon Creek and Table 12 provides the estimated costs for applicable BMP components for Cold Springs Creek. Labor and equipment costs are not included in this table due to the variation from one site to another. BMP alternatives and costs will be developed and finalized during the on farm individual planning and implementation phase.

Table 11. Average Costs of Component Practices Applicable to Little Canyon Creek

Component Practice	Unit of Measure	Cost/Unit
Fence, 4 wire	Feet	$2.00
Fence, 5 wire	Feet	$2.30
Filter Strip	Acre	$100.00
Prescribed Grazing, Irrigated pasture	Acre	$5.00
Irrigation Systems, Sprinkler (Wheel Line)	Acre	$1125.00
Spring Development	Each	$2,350.00
Streambank & Shoreline Protection	Each	Job Estimate
Stream Channel Stabilization	Each	Job Estimate
Watering Facility, Nose pump	Each	$550.00
Watering Facility, Trough or Tank	Each	$850.00

Costs may increase with greater travel distances and accessibility
**Source: NRCS 2007 EQIP Cost List – Average Costs, For Estimates Only!

Table 12. Average Costs of Component Practices Applicable to Cold Springs Creek

Component Practice	Unit of Measure	Cost/Unit
Fence, 4 wire	Feet	$2.00
Fence, 5 wire	Feet	$2.30
Filter Strip	Acre	$100.00
Prescribed Grazing, Rangeland	Acre	$2.00
Streambank & Shoreline Protection	Each	Job Estimate
Watering Facility, Trough or Tank	Each	$850.00

Costs may increase with greater travel distances and accessibility
**Source: NRCS 2007 EQIP Cost List – Average Costs, For Estimates Only!

INSTALLATION AND FINANCING

Landowners can enter into voluntary water quality contracts with the local Soil Conservation District (SCD) to reduce out of pocket expenses to implement BMPs. The USDA Natural Resources Conservation Service (NRCS), Idaho Soil Conservation Commission (ISCC), and Idaho Association of Soil Conservation Districts (IASCD) are technical agencies that can assist landowners in conservation plan development, BMP design, and identification of funding sources. Each landowner participating in an SCD sponsored program is responsible for installing the BMPs scheduled within their water quality contract (plan of operations). Each participant is also required to make their own arrangements for financing their share of installation costs. Available funding sources for BMP installation are listed in Appendix A.

OPERATION, MAINTENANCE AND REPLACEMENT

Participants of SCD sponsored programs are required to maintain the BMPs throughout its expected life span. The program contract outlines the landowner’s responsibilities regarding operation and maintenance (O&M) for each BMP.

Inspections of installed BMPs are made annually by available technicians within the local SCD, NRCS, IASCD, or ISCC during the contracted period of the water quality/conservation plan. It is intended that the contracted BMPs will become a part of the participant's farming or ranching operation and will continue to be maintained after the water quality contract expires.

Monitoring and Evaluation

Component practice BMP evaluation is done in conjunction with conservation plan and program contract implementation. The objective of an individual conservation plan evaluation is to verify that BMPs are properly installed, maintained, and working as designed. An October 2003 publication by ISCC and IDEQ entitled *Idaho Agricultural Best Management Practices: " A Field Guide for Evaluating BMP Effectiveness"* provides the specifications and protocol for BMP evaluation to be used by field staff. Monitoring for pollutant reductions from individual projects consists of spot checks, annual reviews, and evaluation of advancement toward reduction goals. The results of these evaluations are used to recommend any necessary adjustments to continue meeting resource objectives. Annual status reviews are typically done within program contracts to ensure compliance with contract rules.

Where conservation plans are developed in cooperation with a local Soil Conservation District (SCD), progress is tracked during the life of a program contract. Local tracking is assisted by NRCS and ISCC agency program specialists, where cost-share programs/projects are active. Where cost-share programs are not used, tracking is up to the local SCD or NRCS field offices.

FIELD LEVEL

At the field level, annual status reviews will be conducted to insure that the contract is on schedule, and that BMPs are being installed according to standards and specifications. BMP effectiveness monitoring will be conducted on installed projects to determine installation adequacy, operation consistency and maintenance, and the relative effectiveness of implemented BMPs in reducing water quality impacts. This monitoring will also measure the effectiveness of BMPs in controlling agricultural nonpoint-source pollution. These BMP effectiveness evaluations will be conducted according to the protocols outlined in the *Agriculture Pollution Abatement Plan* and the *ISCC Field Guide for Evaluating BMP Effectiveness*.

The *Revised Universal Soil Loss Equation (RUSLE)* and *Surface Irrigation Soil Loss (SISL)* Equation are used to predict sheet and rill erosion on non-irrigated and irrigated lands. The Alutin Method, Imhoff Cones, and direct-volume measurements are used to determine sheet and rill irrigation-induced and gully erosion. *Stream Visual Assessment Protocol (SVAP)* and *Streambank Erosion Condition Inventory (SECI)* are used to assess aquatic habitat, stream bank erosion, and lateral recession rates. The Idaho OnePlan's *CAFO/AFO Assessment Worksheet* is used to evaluate livestock waste, feeding, storage, and application areas. The *Water Quality Indicators Guide* is utilized to assess nitrogen, phosphorus, sediment, and bacteria contamination from agricultural land.

WATERSHED LEVEL

At the watershed level, there are many governmental and private groups involved with water quality monitoring. The Idaho Department of Environmental Quality uses the *Beneficial Use Reconnaissance Protocol (BURP)* to collect and measure key water quality variables that aid in determining the beneficial use support status of Idaho's water bodies. The determination will tell if a water body is in compliance with water quality standards and criteria. In addition, IDEQ will be conducting five-year TMDL reviews.

Annual reviews for funded projects will be conducted to insure the project is kept on schedule. With many projects being implemented across the state, ISCC developed a software program to track the costs and other details of each BMP installed. This program can show what has been installed by project, by watershed level, by sub-basin level, and by state level. These project and program reviews will insure that TMDL implementation remains on schedule and on target. Monitoring BMPs and projects will be the key to a successful application of the adaptive watershed planning and implementation process.

Outreach

Conservation partners working in the King Hill-C.J. Strike Subbasin will use their combined resources to provide information on BMP installation to agricultural landowners and operators within the subbasin. A local outreach plan may be developed by the conservation partnership. Newspaper articles, district newsletters, watershed and project tours, landowner meetings and one-on-one personal contact may be used as outreach tools. Outreach efforts will:

Provide information about the TMDL process
Supply water quality monitoring results
Accelerate the development of conservation plans and program participation
Increase public understanding of agriculture's contribution to conserve and enhance natural resources
Improve public appreciation of agriculture's commitment to meeting the TMDL challenge
Organize an informational tour bringing together irrigation districts' Board of Directors and Soil Conservation Districts' Board of Supervisors

Appendices

APPENDIX A: FUNDING FOURCES

Financial and technical assistance for installation of BMPs is needed to ensure success of this implementation plan. Conservation partners will actively pursue multiple potential funding sources to implement water quality improvements on private agricultural lands. These sources include (but are not limited to):

CWA 319 projects refer to section 319 of the *Clean Water Act*. These are Environmental Protection Agency funds that are allocated to the Nez Perce Tribe and to Idaho State. The Idaho Department of Environmental Quality has primacy to administer the Clean Water Act §319 Non-point Source Management Program for areas outside the Nez Perce Reservation. Funds focus on projects to improve water quality, and are usually related to the TMDL process. The Nez Perce tribe has CWA 319 funds available for projects on Tribal lands on a competitive basis.
Source: Idaho Department of Environmental Quality

WQPA The Water Quality Program for Agriculture administered by the Idaho Soil Conservation Commission. This program is also coordinated with the TMDL process. Source: Idaho Soil Conservation Commission.
http://www.scc.state.id.us/programs.htm

The RCRDP program is the Resource Conservation and Rangeland Development Program administered by the Idaho Soil Conservation Commission. This is a grant/loan program for implementation of agricultural and rangeland best management practices or loans to purchase equipment to increase conservation. Source: Idaho Soil Conservation Commission. **http://www.scc.state.id.us/programs.htm**

Conservation Improvement Grants are administered by the Idaho Soil Conservation Commission. **http://www.scc.state.id.us/programs.htm**

PL-566 The small watershed program administered by the USDA Natural Resources Conservation Service (NRCS).

Agricultural Management Assistance (AMA): AMA provides cost-share assistance to agricultural producers for constructing or improving water management structures or irrigation structures; planting trees for windbreaks or to improve water quality; and mitigating risk through production diversification or resource conservation practices, including soil erosion control, integrated pest management, or transition to organic farming. **http://www.nrcs.usda.gov/programs/ama/**

Conservation Reserve Program (CRP): 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/programs/crp/**

Conservation Technical Assistance (CTA): 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. This is provided through your local Conservation District and NRCS. **http://www.nrcs.usda.gov/programs/cta/**

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/programs/eqip/**

Wetlands Reserve Program (WRP): WRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. Easements and restoration payments are offered as part of the program- **http://www.nrcs.usda.gov/programs/wrp/**

Wildlife Habitat Incentives Program (WHIP): WHIP is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Cost-share payments for construction or re-establishment of wetlands may be included. **http://www.nrcs.usda.gov/programs/whip/**

SRF State Revolving Loan Funds are administered through the Idaho Soil Conservation commission. **http://www.scc.state.id.us/programs.htm**

Grassland Reserve Program (GRP) is a voluntary program offering landowners the opportunity to protect, restore, and enhance grasslands on their property. Administered by the NRCS. **http://www.nrcs.usda.gov/programs/GRP/**

CSP Conservation Security Program is a voluntary program that rewards the Nation's premier farm and ranch land conservationists who meet the highest standards of conservation environmental management. More details can be found at **http://www.nrcs.usda.gov**

GLCI Grazing Land Conservation Initiative mission is to provide high quality technical assistance on privately owned grazing lands on a voluntary basis and to increase the awareness of the importance of grazing land resources. **http://www.glci.org/**

Many of these programs can be used in combination with each other to implement BMPs.

APPENDIX B: GLOSSARY OF TERMS AND ACRONYMS

Aquifer - A water-bearing bed or stratum of permeable rock, sand, or gravel capable of yielding considerable quantities of water to wells or springs.

Antidegradation - A Federal regulation requiring the States to protect high quality waters. Water Quality Standards may be lowered to allow important social or economic development only after adequate public participation. In all instances, the existing beneficial uses must be maintained.

Aquatic - Growing, living, or frequenting water.

Assimilative Capacity - An estimate of the amount of pollutants that can be discharged to a water body and still meet the state water quality standards. It is the equivalent of the Loading Capacity, which is the equivalent of the TMDL for the water body.

Bedload - Sand, silt, gravel, or soil and rock detritus carried by a stream on or immediately above (3") its bed.

Beneficial Use - Any of the various uses which may be made of the water of an area, including, but not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife habitat, and aesthetics.

Best Management Practice (BMP) - A measure determined to be the most effective, practical means of preventing or reducing pollution inputs from point or nonpoint sources in order to achieve water quality goals.

Biomass - The weight of biological matter. Standing crop is the amount of biomass (e.g., fish or algae) in a body of water at a given time. Often measured in terms of grams per square meter of surface.

Biota - All plant and animal species occurring in a specified area.

Coliform bacteria - A group of bacteria predominantly inhabiting the intestines of man and animal but also found in soil. While harmless themselves, coliform bacteria are commonly used as indicators of the possible presence of pathogenic organisms.

Critical Areas - Areas identified by the commission based on recommendations from local entities producing significant nonpoint source pollution impacts or areas deemed necessary for protection or improvement for the attainment or support of beneficial uses.

Designated Beneficial Use or Designated Use - Those beneficial uses assigned to identified waters in Idaho Department of Health and Welfare Rules, Title 1, Chapter 2, "Water Quality Standards and Wastewater Treatment Requirements”:, Sections 110. through 160. and 299., whether or not the uses are being attained.

Erosion - The wearing away of areas of the earth's surface by water, wind, ice, and other forces.

Existing Beneficial Use or Existing Use - Those beneficial uses actually attained in waters on or after November 28, 1975, whether or not they are designated for those waters in Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA 58).

Exotic Species - Non-native or introduced species.

Feedback Loop - A component of a watershed management plan strategy that provides for accountability on targeted watershed goals.

Flow - The water that passes a given point in some time increment.

Groundwater - Water found beneath the soil's surface; saturates the stratum at which it is located; often connected to surface water.

Habitat - A specific type of place that is occupied by an organism, a population or a community.

Headwater - The origin or beginning of a stream.

Hydrologic basin - The area of land drained by a river system, a reach of a river and its tributaries in that reach, a closed basin, or a group of streams forming a drainage area. There are six basins described in the Nutrient Management Act (NMA) for Idaho -- Panhandle, Clearwater, Salmon, Southwest, Upper Snake, and the Bear Basins.

Hydrologic cycle - The circular flow or cycling of water from the atmosphere to the earth (precipitation) and back to the atmosphere (evaporation and plant transpiration). Runoff, surface water, groundwater, and water infiltrated in soils are all part of the hydrologic cycle.

Intermittent Waters – A stream, reach, or waterbody which has a period of zero (0) flow for at least one (1) week during most years. Where flow records are available, a stream with a 7Q2 hydrologically-based flow of less than one-tenth (0.1) cfs is considered intermittent. Streams with natural perennial pools containing significant aquatic life uses are not intermittent.

Irrigation Water Management (IWM) - IWM involves providing the correct amount of water at the right times to optimize crop yields, while at the same time protecting the environment from excess surface runoff. Irrigation water management includes techniques to manage irrigation system hardware for peak uniformity and efficiency as well as irrigation scheduling and soil moisture-monitoring methods.

LA - Load Allocation for nonpoint sources.

Limiting - A chemical or physical condition that determines the growth potential of an organism, can result in less than maximum or complete inhibition of growth, typically results in less than maximum growth rates.

Load Allocation - The amount of pollutant that nonpoint sources can release to a water body.

Loading - The quantity of a substance entering a receiving stream, usually expressed in pounds (kilograms) per day or tons per month. Loading is calculated from flow (discharge) and concentration.

Loading Capacity - A mechanism for determining how much pollutant a water body can safely assimilate without violating state water quality standards. It is also the equivalent of a TMDL.

Macro invertebrates - Aquatic insects, worms, clams, snails, and other animals visible without aid of a microscope, that may be associated with or live on substrates such as sediments and macrophytes. They supply a major portion of fish diets and consume detritus and algae.

Macrophytes - Rooted and floating aquatic plants, commonly referred to as water weeds. These plants may flower and bear seed. Some forms, such as duckweed and coontail (*Ceratophyllum*), are free-floating forms without roots in the sediment.

Margin of safety (MOS) - An implicit or explicit component of water quality modeling that accounts for the uncertainty about the relationship between the pollutant loads and the quality of the receiving water body. This accounts for any lack of knowledge concerning the relationship between pollutant loads and the water quality of the receiving water body. It is a required component of a TMDL and is normally incorporated into the conservative assumptions used to develop the TMDL (generally within the calculations or models) and is approved by the EPA either individually or in State/EPA agreements. Thus, the TMDL = LC = WLA + LA + MOS.

National Pollution Discharge Elimination System (NPDES) - A national program from the Clean Water Act for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcement permits, and imposing and enforcing pretreatment requirements.

Nonpoint Source - A geographical area on which pollutants are deposited or dissolved or suspended in water applied to or incident on that area, the resultant mixture being discharged into the waters of the state. Nonpoint source activities include, but are not limited to irrigated and nonirrigated lands used for grazing, crop production and silviculture; log storage or rafting; construction sites; recreation sites; and septic tank disposal fields.

Participant - Individual agricultural owner, operator, partnership, private corporation, conservation district, irrigation district, canal company, or other agricultural or grazing interest approved by the commission for cost-sharing in an eligible project area; or an individual agriculture owner or operator, partnership, or private corporation approved by a project sponsor in an eligible project area.

Project Sponsor - A conservation district, irrigation district, canal company or other agriculture or grazing interest as determined appropriate by the commission that enters into a water quality project agreement with the commission.

Reach - A continuous unbroken stretch of river.

Riparian vegetation - Vegetation that is associated with aquatic (streams, rivers, lakes) habitats.

Runoff - The portion of rainfall, melted snow, or irrigation water that flows across the surface or through underground zones and eventually runs into streams.

Sediment - Bottom material in a body of water that has been deposited after the formation of the basin. It originates from remains of aquatic organism, chemical precipitation of dissolved minerals, and erosion of surrounding lands.

Sub-watershed - Smaller geographic management areas within a watershed delineated for purposes of addressing site specific situations.

Threatened species - A species, determined by the U.S. Fish and Wildlife Service, which are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

TMDL - Total Maximum Daily Load. TMDL = LA + WLA + MOS. A TMDL is the equivalent of the Loading Capacity which is the equivalent of the assimilative capacity of a water body.

Total Suspended Solids (TSS) - The material retained on a 45 micron filter after filtration

Tributary - A stream feeding into a larger stream or lake.

Waste Load Allocation - The portion of receiving water's loading capacity that is allocated to one of its existing or further point sources of pollution. It specifies how much pollutant each point source can release to a water body.

Water Pollution - Any alteration of the physical, thermal, chemical, biological, or radioactive properties of any waters of the state, or the discharge of any pollutant into the waters of the state, which will or is likely to create a nuisance or to render such waters harmful, detrimental or injurious to public health, safety or welfare, or to fish and wildlife, or to domestic, commercial, industrial, recreational, aesthetic, or other beneficial uses.

Water Quality Contract - The legal document executed by the commission or the project sponsor identifying terms and conditions between the commission or the project sponsor and an individual cost-share participant.

Water Quality Management Plan - A state- or area-wide waste treatment plan developed and updated in accordance with the provisions of the Clean Water Act.

Water Quality Limited Segment (WQLS) - Any segment where it is known that water quality does not meet applicable water quality standards and/or is not expected to meet applicable water quality standards.

Water Quality Plan - The plan developed cooperatively by the participant, technical agency and the commission or project sponsor which identifies the critical areas and nonpoint sources of water pollution on the participant's operation and sets forth BMPs that may reduce water quality pollution from these critical areas and sources.

Water table - The upper surface of groundwater; below this point, the soil is saturated with water.

Watershed - A drainage area or basin in which all land and water areas drain or flow toward a central collector such as a stream, river, or lake at a lower elevation. The whole geographic region contributing to a water body.

APPENDIX C: REFERENCES

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APPENDIX D: RIPARIAN INVENTORY AND WATER QUALITY

Cold Springs Creek

BURP Habitat Assessment

DEQ uses the Beneficial Use Reconnaissance Program (BURP) to determine the quality of Idaho's waters. BURP is a monitoring program which combines biological monitoring and habitat assessment to determine the water quality, existing uses, and the beneficial support status for each subbasin assessment (http://www.deq.state.id.us/water/data_reports/surface_water/monitoring/overview.cfm#beneficial). Results from DEQ's BURP monitoring on Cold Springs Creek are summarized below in table D1 (DEQ 2004).

Table D1. BURP Habitat Assessment Data for Cold Springs Creek

Stream Name	BURP ID	Date	Flow	% Fines	SMI	SHI	SFI	Support Status	Segment
Cold Springs Creek	1995SBOIA002	05/30/95	5.05	70	12.82	37	none	NFS	
Cold Springs Creek (upper)	1997SBOIC023	09/11/97	Dry	**	**	**	**	**	
Cold Springs Creek (lower)	1997SBOIC024	09/11/97	Dry	**	**	**	**	**	
Cold Springs Creek	2003SBOIA015	07/22/03	Dry	**	**	**	**	**	
Cold Springs Creek	2003SBOIA016	07/22/03	2.1	20	NA	NA	NA	**	

NWIS Water Quality Data

The U.S. Geological Survey's (USGS) National Water Information System (NWIS) supports the acquisition, processing, and long-term storage of water data. The USGS collects and analyzes chemical, physical, and biological properties of water to include in the NWIS database. At selected surface-water and ground-water sites, the USGS maintains instruments that continuously record physical and chemical characteristics of the water including pH, specific conductance, temperature, dissolved oxygen, and percent dissolved-oxygen saturation. Supporting data such as air temperature and barometric pressure are also available at some sites (http://waterdata.usgs.gov/nwis/qw). Water Quality data from the USGS NWIS for Cold Springs Creek are summarized below in table D2 (DEQ 2004).

Table D2. NWIS Water Quality Data for Cold Springs Creek

Date	Water Temp °C	Water Temp °F	Air Temp °C	Air Temp° F	Flow (cfs)	Conductivity
04/17/85	10	50	18	64.4	21	152
05/22/85	19.5	67.1	23	73.4	2	500
06/12/85	21.5	70.7	32	89.6	2.5	516
07/09/85	19	66.2	20	68	3.1	598
08/14/85	19.5	67.1	19.5	67.1	2	771
09/09/85	15	59	15.5	59.9		729
10/07/85	11.5	52.7	9	48.2	1.7	717
12/16/85	0	32	-5.5	22.1	1.4	918
01/14/86	0.5	32.9	-5	23	1.1	922
02/12/86	0.5	32.9	-0.1	31.82	14	271
04/18/86	8.5	47.3	11.5	52.7	42	142
05/16/86	15.5	59.9	15.5	59.9	21	243
06/12/86	16	60.8	19.5	67.1	14	310
07/22/86	25	77	24	75.2	1.2	532
08/27/86	17.5	63.5	17.5	63.5	4.1	519
09/25/86	12	53.6	12	53.6	4.8	620
10/20/86	13	55.4	14	57.2	1.5	708
11/20/86	5	41		32	1.5	734
12/18/86	2	35.6	-3.5	25.7	1.7	671
01/13/87	1	33.8		32	1.6	494
02/13/87	7	44.6	10	50	1.8	698
03/13/87	10.5	50.9		32	2	585
04/13/87	10.5	50.9	9.5	49.1	2	585
04/14/87	10.5	50.9	11.5	52.7	1.8	571
05/05/87	23	73.4	21.5	70.7	1.2	553
07/15/87	20	68			1.3	661
				Mean Flow	6.092	

Streambank Erosion Inventory

DEQ's current (actual) streambank erosion data and estimated target streambank erosion rates (estimated natural conditions) used to develop the sediment load allocation and required reductions for Cold Spring Creek are summarized in table D3 and D4 below (DEQ 2004).

Table D3. Cold Springs Creek Streambank Erosion– Current Conditions

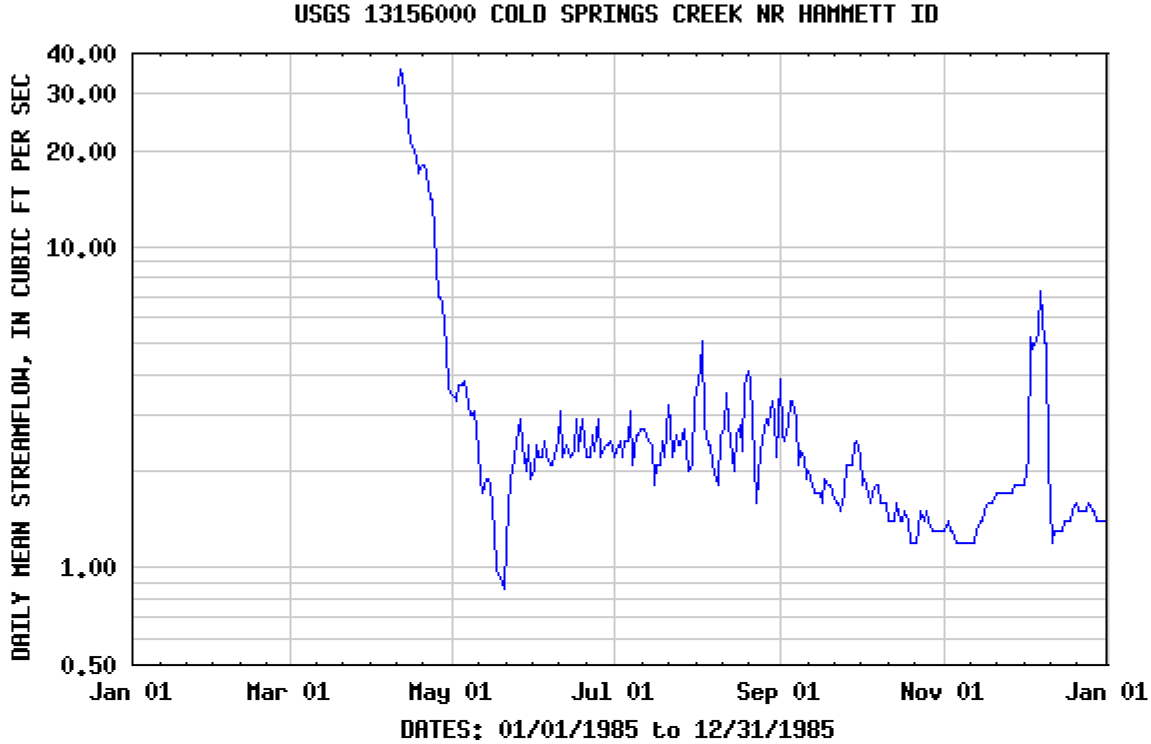
T5S, R9E, Sec 20, SW 1/4 to Snake River, Baseline Conditions					
			Segment Length	4.04 miles	
Segment #	Ave Slope HT (ft)	Bank Length (ft)	A_E (ft^2)	R_{LR}	D_B
1	2.63	63	165.9	0.165	110
2	3.73	72	268.8		
3	2.85	144	410.4		
4	3.97	105	416.5		
5	3.15	90	283.5		
6	2.82	138	388.7		
7	3.20	69	220.8		
8	1.42	90	127.7		
9	0.48	243	116.6		
10			0.0		
		1014	2398.9 Total Area		
$E = [A_E*R_{LR}*D_B]/2000$		21.8	tons/year	Bank erosion rate at sampled reach	
		113.36	tons/mile/year	Bank erosion rate per mile	
		457.97	tons/year	Total erosion from segment per year	

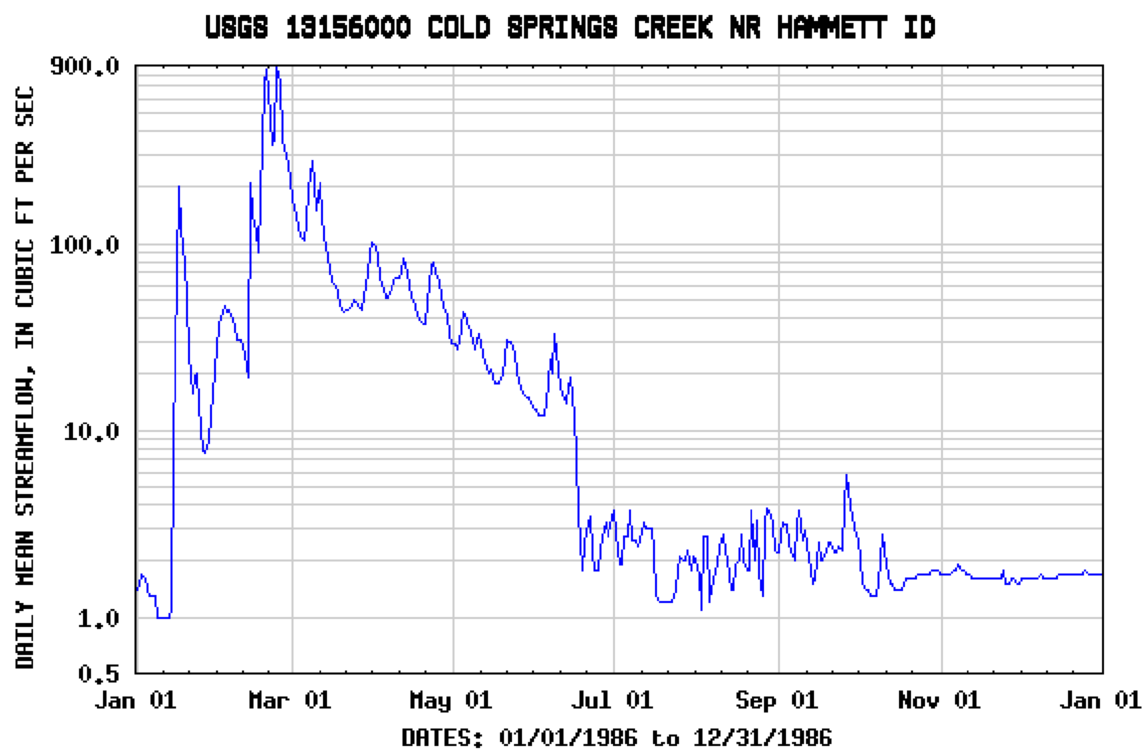
Table D4. Cold Springs Creek Streambank Erosion—Allocations

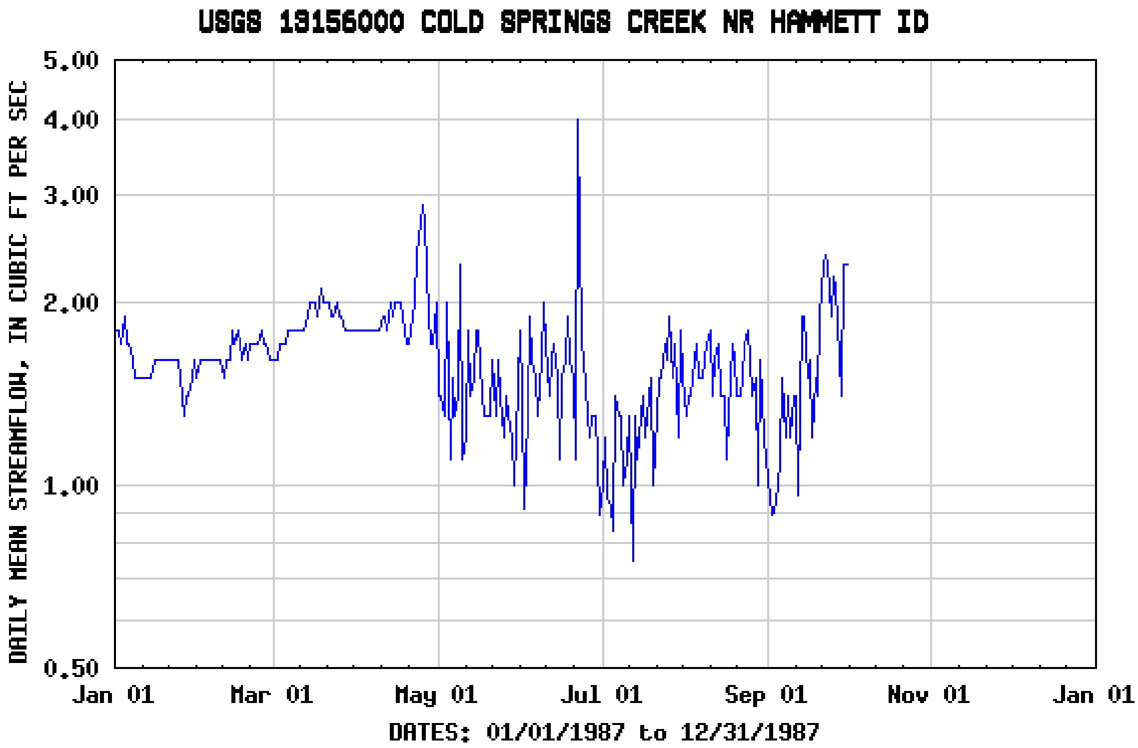
T5S, R9E, Sec 20, SW 1/4 to Snake River, TMDL Conditions						
			Segment Length	4.04 miles		
Segment #	Ave Slope HT (ft)	Bank Length (ft)	A_E (ft^2)	R_{LR}	D_B	Target R_{LR}
1	2.63	63	165.9	0.165	110	0.12 Rosgen C4
2	3.73	72	268.8			
3	2.85	144	410.4			
4	3.97	105	416.5			
5	3.15	90	283.5			
6	2.82	138	388.7			
7	3.20	69	220.8			
8	1.42	90	127.7			
9	0.48	243	116.6			
10			0.0			
		1014	2398.9 Total Area			
$E = [A_E*R_{LR}*D_B]/2000$		21.8	tons/year	Bank erosion rate at sampled reach		
		113.36	tons/mile/year	Bank erosion rate per mile		
		457.97	tons/year	Total erosion from segment per year		
		15.8	tons/year	Target erosion rate at sampled reach		
		82.44	tons/mile/year	Target bank erosion rate per mile		
		333.07	tons/year	Target total erosion from segment per year		
		30.92	tons/mile/year	Load Reduction achieved if restored to functioning C4		
		27.27	Percent Reduction			

Hydrography

Annual streamflow for Cold Springs Creek near Hammet, ID is shown below for 1985, 1986, and 1987.


USGS 13156000 COLD SPRINGS CREEK NR HAMMETT ID
DAILY MEAN STREAMFLOW, IN CUBIC FT PER SEC
40.00
30.00
20.00
10.00
1.00
0.50
Jan 01
Mar 01
May 01
Jul 01
Sep 01
Nov 01
Jan 01
DATES: 01/01/1985 to 12/31/1985


USGS 13156000 COLD SPRINGS CREEK NR HAMMETT ID
DAILY MEAN STREAMFLOW, IN CUBIC FT PER SEC
900.0
100.0
10.0
1.0
0.5
Jan 01
Mar 01
May 01
Jul 01
Sep 01
Nov 01
Jan 01
DATES: 01/01/1986 to 12/31/1986



Little Canyon Creek

BURP Habitat Assessment

Results from DEQ's BURP monitoring on Little Canyon Creek are summarized below in table D5 (DEQ 2004).

Table D5. BURP Habitat Assessment Data for Little Canyon Creek

Stream Name	BURP ID	Date	Flow (cfs)	% Fines	SMI	SHI	SFI	Support Status	Segment
Little Canyon Creek (upper site)	1993SBOIA044	07/16/93	3.09	No Calc.	<thresh	26	none	NFS	Upper Perennial
Little Canyon Creek (lower site)	1993SBOIA045	07/16/93	2.59	No Calc.	18.17	15	none	NFS	
Little Canyon Creek (upper)	1997SBOIC017	09/08/97	1.3	32	79.99	67.3	none	FS	Upper Perennial
Little Canyon Creek (lower)	1997SBOIC018	09/08/97	0.04	25	6.26	38	none	NFS	
Little Canyon Creek	2003SBOIA034	08/20/03	3.3	97	NA	NA	NA	**	Lower Perennial
Little Canyon Creek	2003SBOIA002	07/02/03	1.3	30	NA	NA	NA	**	

NWIS Water Quality Data

Water Quality data from the USGS NWIS for Little Canyon Creek are summarized below in table D6 (DEQ 2004).

Table D6. NWIS Water Quality Data for Little Canyon Creek

Date	Water Temp °C	Water Temp °F	Air Temp °C	Air Temp °F	Flow (cfs)	Conductivity
03/19/73	5	41	3	37.4	11	46
04/06/73	7.5	45.5	11.5	52.7	38	45
04/09/73	5.5	41.9	15	59	16	46
09/22/73	11.5	52.7	19.5	67.1	0.58	68
04/06/74	7.5	45.5	11.5	52.7	39	45
05/19/75	7	44.6	16	60.8	76	153
10/07/75	9.5	49.1	10	50	1.2	76
03/28/76	4.5	40.1	5.5	41.9	13	41
05/08/76	11	51.8	14	57.2	36	38
09/14/76	9.5	49.1	14	57.2	1.8	534
03/07/77	3.5	38.3	7.5	45.5	1.1	56
06/06/77	16.5	61.7	29.5	85.1	0.35	78
03/18/78	9.5	49.1	8	46.4	39	70
04/23/78	10	50	15	59	31	70
05/24/78	8.5	47.3	9.5	49.1	32	50
09/18/78	5	41	0	32	1.3	64
03/11/79	2.5	36.5	1.5	34.7	13	90
07/03/79	16	60.8	25.5	77.9	1.9	
10/05/79	10	50	22.5	72.5	0.24	82
01/18/80	4.5	40.1	-0.5	31.1	10	55
05/23/80	9	48.2	12	53.6	16	38
				Mean Flow	18.022381	

Streambank Erosion Inventory

DEQ's current (actual) streambank erosion data and estimated target streambank erosion rates (estimated natural conditions) used to develop the sediment load allocation and required reductions for Little Canyon Creek are summarized in table D7 and D8 below (DEQ 2004).

Table D7. Little Canyon Creek Streambank Erosion– Current Conditions

Little Canyon Creek (1)
T5S, R10E, Sec 8, SW 1/4 to T5S, R10E, Sec 18, SE 1/4, Baseline Conditions

Segment #	Ave Slope HT (ft)	Bank Length (ft)	A_E (ft^2)	R_{LR}	D_B
			Segment Length →	0.58 miles	
1	7.90	123	971.7	0.16	110
2	6.22	69	429.0	↓	↓
3	7.58	228	1729.0		
4	5.10	168	856.8		
5	6.50	114	741.0		
6	8.93	225	2010.0		
7	4.63	66	305.8		
8	7.17	105	752.5		
9	5.65	189	1067.9		
10	6.63	660	4376.8		
		1947	13240.4 Total Area		
$E = [A_E*R_{LR}*D_B]/2000$		116.5	tons/year	Bank erosion rate at sampled reach	
		315.97	tons/mile/year	Bank erosion rate per mile	
		183.26	tons/year	Total erosion from segment per year	

Little Canyon Creek (2)
T5S, R10E, Sec 18, SE 1/4 to Snake River, Baseline Conditions

Segment #	Ave Slope HT (ft)	Bank Length (ft)	A_E (ft^2)	R_{LR}	D_B
			Segment Length →	5.25 miles	
1	4.13	285	1178.0	0.19	110
2	4.97	237	1177.1	↓	↓
3	3.95	321	1268.0		
4	9.38	207	1942.4		
5	8.68	255	2214.3		
6	7.37	357	2629.9		
7			0.0		
8			0.0		
9			0.0		
10			0.0		
		1662	10409.6 Total Area		
$E = [A_E*R_{LR}*D_B]/2000$		108.8	tons/year	Bank erosion rate at sampled reach	
		345.58	tons/mile/year	Bank erosion rate per mile	
		1814.31	tons/year	Total erosion from segment per year	

Table D8. Cold Springs Creek Streambank Erosion– Allocations

Little Canyon Creek (1)
T5S, R10E, Sec 8, SW 1/4 to T5S, R10E, Sec 18, SE 1/4, Current Conditions

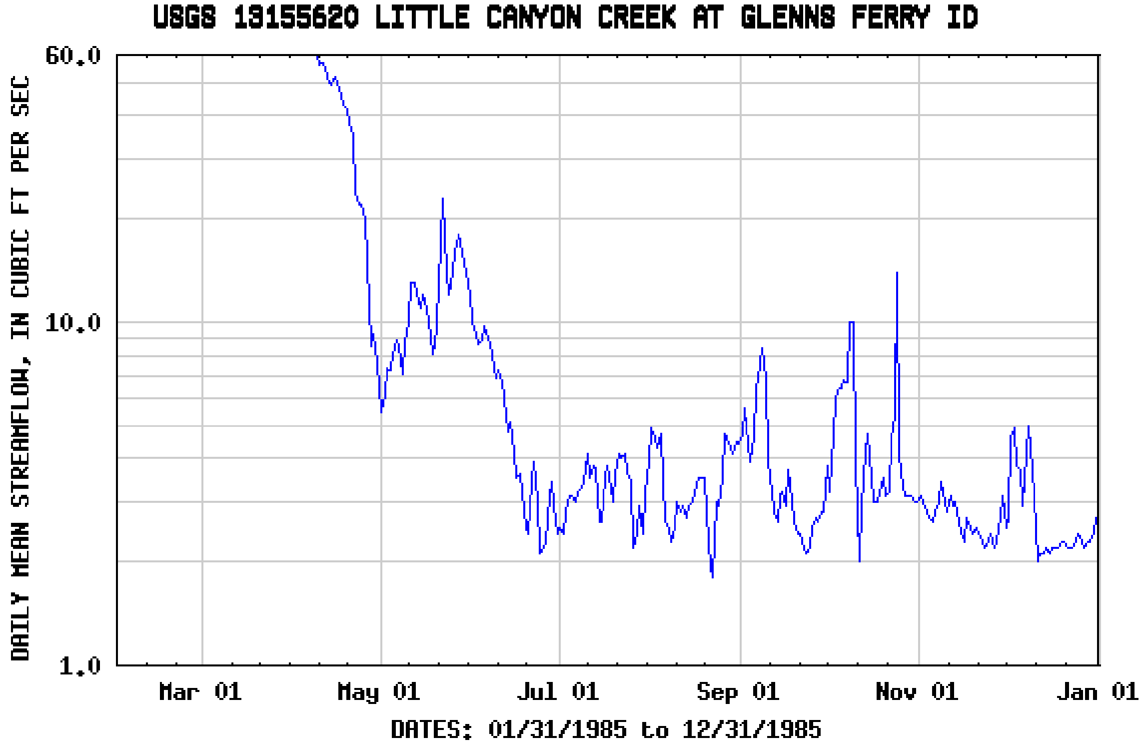
			Segment Length	0.58	miles	
Segment #	Ave Slope HT (ft)	Bank Length (ft)	A_E (ft^2)	R_{LR}	D_B	Target R_{LR}
1	7.90	123	971.7	0.16	110	0.12 Rosgen C4
2	6.22	69	429.0			
3	7.58	228	1729.0			
4	5.10	168	856.8			
5	6.50	114	741.0			
6	8.93	225	2010.0			
7	4.63	66	305.8			
8	7.17	105	752.5			
9	5.65	189	1067.9			
10	6.63	660	4376.8			
		1947	13240.4 Total Area			
$E = [A_E*R_{LR}*D_B]/2000$		116.5	tons/year	Bank erosion rate at sampled reach		
		315.97	tons/mile/year	Bank erosion rate per mile		
		183.26	tons/year	Total erosion from segment per year		
		87.4	tons/year	Target erosion rate at sampled reach		
		236.98	tons/mile/year	Target bank erosion rate per mile		
		137.45	tons/year	Target total erosion from segment per year		
		78.99	tons/mile/year		Load Reduction achieved if restored to functioning C4	
		25.00	Percent Reduction			

Little Canyon Creek (2)
T5S, R10E, Sec 18, SE 1/4 to Interstate 84, TMDL Conditions

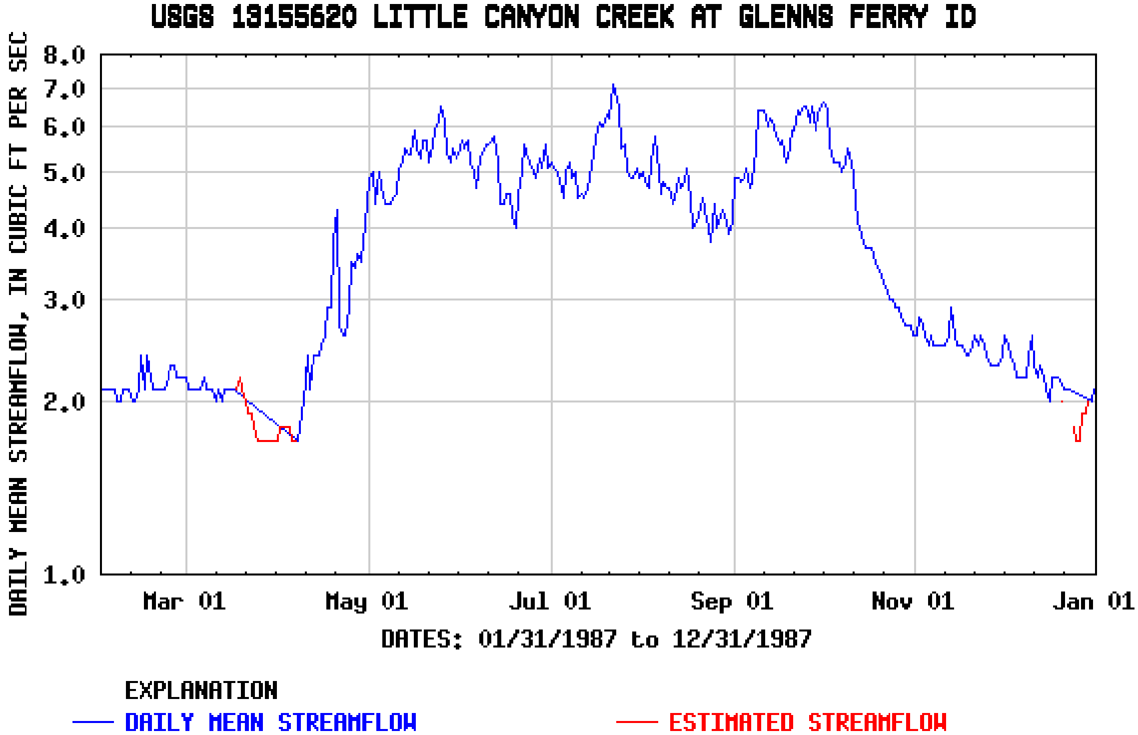
			Segment Length	5.25	miles	
Segment #	Ave Slope HT (ft)	Bank Length (ft)	A_E (ft^2)	R_{LR}	D_B	Target R_{LR}
1	4.13	285	1178.0	0.19	110	0.12 Rosgen C4
2	4.97	237	1177.1			
3	3.95	321	1268.0			
4	9.38	207	1942.4			
5	8.68	255	2214.3			
6	7.37	357	2629.9			
7			0.0			
8			0.0			
9			0.0			
10			0.0			
		1662	10409.6 Total Area			
$E = [A_E*R_{LR}*D_B]/2000$		108.8	tons/year	Bank erosion rate at sampled reach		
		345.58	tons/mile/year	Bank erosion rate per mile		
		1814.31	tons/year	Total erosion from segment per year		
		68.7	tons/year	Target erosion rate at sampled reach		
		218.26	tons/mile/year	Target bank erosion rate per mile		
		1145.88	tons/year	Target total erosion from segment per year		
		127.32	tons/mile/year	Load Reduction achieved if restored to functioning C4		
		36.84	Percent Reduction			

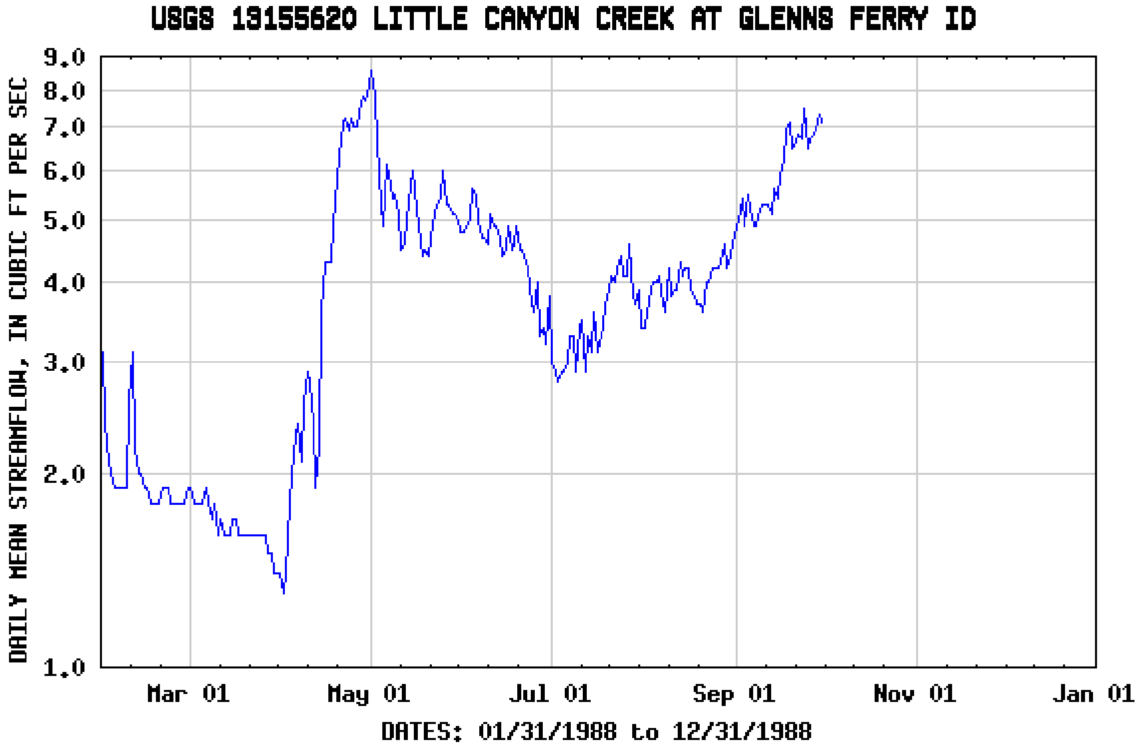
Hydrography

Annual streamflow for Little Canyon Creek at Glenns Ferry, ID is shown below for 1985, 1986,1987, and 1988.


USGS 13155620 LITTLE CANYON CREEK AT GLENNS FERRY ID
DAILY MEAN STREAMFLOW, IN CUBIC FT PER SEC
60.0
10.0
1.0
Mar 01
May 01
Jul 01
Sep 01
Nov 01
Jan 01
DATES: 01/31/1985 to 12/31/1985


USGS 13155620 LITTLE CANYON CREEK AT GLENNS FERRY ID
DAILY MEAN STREAMFLOW, IN CUBIC FT PER SEC
700.0
100.0
10.0
1.0
Mar 01
May 01
Jul 01
Sep 01
Nov 01
Jan 01
DATES: 01/31/1986 to 12/31/1986
EXPLANATION
DAILY MEAN STREAMFLOW
ESTIMATED STREAMFLOW


USGS 13155620 LITTLE CANYON CREEK AT GLENNS FERRY ID
DAILY MEAN STREAMFLOW, IN CUBIC FT PER SEC
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Mar 01
May 01
Jul 01
Sep 01
Nov 01
Jan 01
DATES: 01/31/1987 to 12/31/1987
EXPLANATION
DAILY MEAN STREAMFLOW
ESTIMATED STREAMFLOW


USGS 13155620 LITTLE CANYON CREEK AT GLENNS FERRY ID
DAILY MEAN STREAMFLOW, IN CUBIC FT PER SEC
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Mar 01
May 01
Jul 01
Sep 01
Nov 01
Jan 01
DATES: 01/31/1988 to 12/31/1988

ADPENDIX E: ISCC RIPARIAN INVENTORY

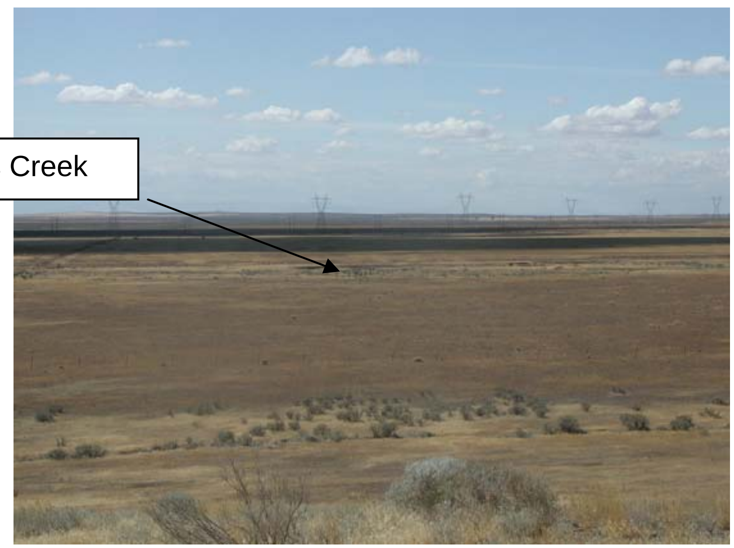
The following photographs summarize the ISCC riparian assessment results from September 2003 on Cold Springs Creek and Little Canyon Creek in the King Hill – C.J.Strike Subbasin.

Cold Springs Creek

Cold Springs Creek above the 303(d) listed segment.

Overview of agricultural fields along Cold Springs Creek.

Overview of agricultural fields along Cold Springs Creek.



Agricultural fields along Cold Springs Creek.

Cold Springs Creek at road crossing.

Cold Springs Creek below road crossing.

Cold Springs Creek through non-irrigated portion.

Cold Springs Creek below agricultural field.

Cold Springs Creek along agricultural fields

Cold Springs Creek below agricultural fields.

Little Canyon Creek

Little Canyon Creek above the 303(d) listed segment.

Overview of agricultural fields along Little Canyon Creek.

Overview of agricultural fields along Little Canyon Creek.

Agricultural fields along Little Canyon Creek.

Alfalfa field along Little Canyon Creek.

Little Canyon Creek below road crossing.

Little Canyon Creek at a road crossing.

Little Canyon Creek along an agricultural field.