# Mid Snake River/Succor Creek Watershed

## TMDL Implementation Plan for Agriculture

**June 2005**

IDAHO SOIL CONSERVATION COMMISSION

IASCD

CONSERVATION DEVELOPMENT SELF GOVERNMENT

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## Preface

The Mid Snake Succor Creek Watershed TMDL Implementation Plan was drafted by land management agencies that affect water quality in this area. The Idaho Association of Soil Conservation Districts (IASCD) represents private landowners and wrote the majority of the plan. The Bureau of Land Management (BLM) is the largest landowner in the area. The Department of Lands (IDL) manages State-owned land.

Tracking Accomplishments
The Department of Environmental Quality will track annually the accomplishments that Land Management Agencies have had to achieve Water Quality Standards. The DEQ, BLM, IDL, and IASCD agree to meet each year to document what projects occurred over the previous field season. Projects will be compared with the Tasks and Milestones that are outlined in respective portions of the implementation plan.

# 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 a priority list of impaired waters, currently every two years. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards. This document addresses the water bodies in the Mid Snake River/Succor Creek Subbasin that have been placed on what is known as the "§303(d) list."

The Mid Snake River/Succor Creek Watershed Advisory Group (WAG) and the designated agencies 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 Mid Snake River/Succor Creek Watershed 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 Mid Snake River/Succor Creek Watershed will likely be necessary to meet the TMDL requirements within each stream segment that received a load reduction target.

## Goals and Objectives

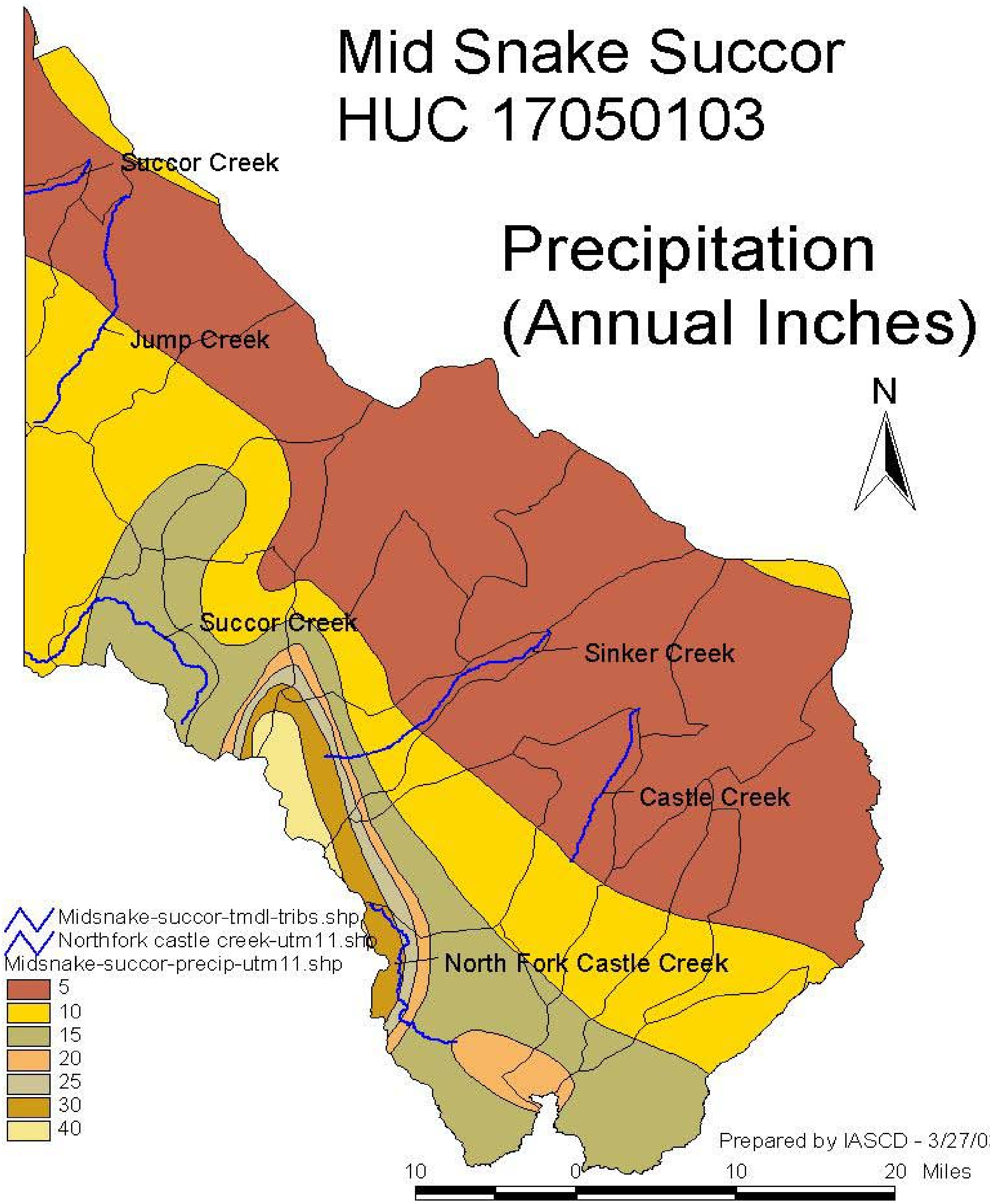
The goal of this plan is to assist and/or compliment other watershed efforts to restore beneficial uses for the 303(d) listed stream segments within the Mid Snake River/Succor Creek Watershed. The agricultural component of the Mid Snake River/Succor Creek Watershed TMDL Implementation Plan includes an adaptive management approach for the implementation of Resource Management Systems (RMSs) and Best Management Practices (BMPs) to meet the requirements for the Mid Snake River/Succor Creek TMDL. The primary objectives of this plan are to reduce the amount of nutrients entering the Mid Snake River system 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 Owyhee 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 Mid Snake River/Succor Creek watershed is a semi- arid watershed characterized by hot summer temperatures. There are a total of 373 different soil types identified and recorded in the NRCS Soil Survey of Owyhee County. This survey took the NRCS over 25 years to complete due to the rugged terrain and remoteness of the region. Tributaries in this watershed are generally low volume rangeland streams that have a combination of high ambient temperatures, rocky geography, poor shading, low flow volume, flow alteration, and naturally warm springs, which often lead to exceeding of the water temperature standards. Even with maximum potential shade, some of the streams in the watershed cannot meet the cold water temperature standard. These streams were evaluated to determine the best achievable temperature based on the maximum potential shade.



## The Owyhee's "A Land of Change"

Dramatic climatic changes have occurred in the Owyhee Mountains in the last one hundred to one hundred and fifty years. The exact date of this climatic transition varies slightly depending on the source, but scientists generally agree that it occurred around the 1860's (Great Basin Riparian Ecosystems 2004). The area began to slowly change over time from a high precipitation tall grass area to a low precipitation desert plant community. When the first settlers began to move into the Owyhee Mountains in the 1860's and 1870's, they recorded grasses to their horse's shoulders. Other settlers' journals recorded looking over a sea of tall grass as far as the eye could see, taller than their wagon wheels.

As you review settlers' accounts around 1900, they began telling of drier and drier conditions occurring in the Owyhee Mountains and surrounding area. Heavy snow years did not happen every year, but only one year out of five. The annual precipitation was diminishing and the tall grasses had all but disappeared. The early settlers used the Owyhees to raise horses and sheep. They sold replacement horses to the Army and raised small bands of sheep for wool and meat. Sheep and horses were the primary livestock raised in the Owyhees until the early 1940's.

According to the Black's family journal and Paul Black born in 1908, the Indian bands would use the Antelope Trail and the Desert Trail out of the high country of the Owyhee Mountains and the Lonesome Trail between Shoo Fly Creek and Little Jacks Creek in late spring and early summer each year to make their way to the annual encampment at the mouth of the Bruneau River. They would go to the Bruneau encampment to catch and dry their winter supply of salmon. The Indian Trails were used so heavily for so many years that they were beat deep into the earth and can still be seen to this day. There was an abundance of trout in the streams in the Upper Owyhee country during the late 1800's.

According to the Black family and other early settlers, the earthquake in October of 1915 changed the Upper Owyhee country forever. For months after the earthquake, the springs and streams ran murky water and the stream and spring flows dropped off sharply. Many springs dried up, and water had to be hauled in for livestock in areas that always had water previously. As stream and spring flows continued to decrease in the 1920s, many homesteads had to be abandoned. Meadows in Camas Creek, Battle Creek, Big Springs, and Rock Creek no longer produced enough hay for the winter feeding of horses and the settlers were forced to move. Where there were large trout populations, they disappeared. Paul Black remembered how they would catch gunny sacks of trout in Battle Creek; and attributes that to the loss of water flow after the 1915 earthquake. Today, there are only limited populations of trout caught in short sections of streams that have enough water year around in the Owyhee Subbasin. There were lawsuits filed over water rights after the earthquake as the

water supply dwindled. One of the latest lawsuits was Burkhardt vs. Black (1981) involving water rights on Shoo Fly Creek.
Figure 1.1 shows the §303(d) listed water bodies within the basin and the Mid Snake River/Succor Creek watershed boundaries.

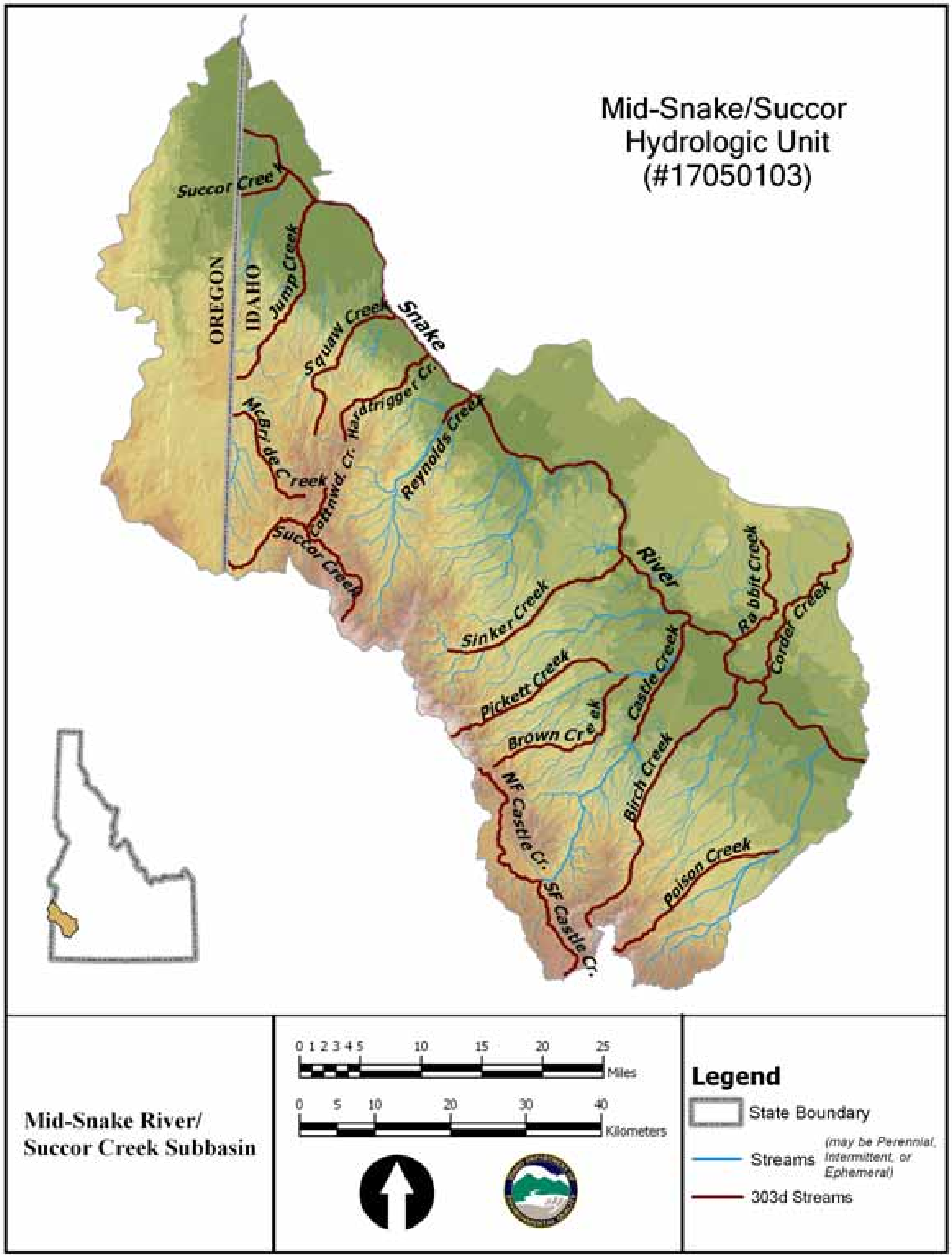



**Figure 1.1 Mid-Snake River/Succor Creek Subbasin**

# WATERSHED CONCERNS

## Pollutants: Load Allocations and Reductions

Nutrient loading to the Snake River comes from the upstream segment of the Snake River, drains, tributaries, and point sources. The primary nutrient impairing beneficial uses is phosphorus. A total phosphorus target of 0.07 mg/L has been set for the Mid Snake River, based upon the work done in the draft Snake River Hells Canyon (SR-HC) TMDL (DEQ 2001). The critical period for target application is May-September.

Instream channel erosion is the primary source of sediment loading in Castle Creek, Sinker Creek, and Succor Creek. Land management practices contribute to unstable banks and this resultant instability leads to sediment delivery to the stream channel. Eighty-percent bank stability was selected as a surrogate target to achieve 28% depth fines in the creek.

Table 1 below is the summary of specific stream segments for which TMDLs were set.

**Table 1. Streams and pollutants for which TMDLs[1] were developed.**

| Stream | Pollutants |
|---|---|
| Snake River<br>(Swan Falls to Oregon Line) | Nutrients, Dissolved Oxygen (as part of nutrient TMDL) |
| Castle Creek | Sediment |
| Jump Creek<br>(Mule Creek to Snake River) | Sediment |
| Sinker Creek | Sediment, Temperature |
| Succor Creek<br>(Headwaters to Oregon line) | Sediment, Temperature |
| Succor Creek<br>(Oregon line to Snake River) | Sediment, Bacteria |

[1]Total Maximum Daily Loads

## Land Ownership & Land Use

The majority of the land within the Mid Snake River/Succor Creek Watershed consists of public lands that are owned and managed by the Bureau of Land Management (BLM) and Idaho Department of Lands (IDL).  The primary use on these public lands is livestock grazing.  The privately owned lands within the watershed are used primarily for livestock grazing in the mountain areas and farming along lower elevations of the tributary streams and the Snake River. Table 2 below shows the land ownership in the Mid Snake/ Succor Creek Watershed.  Farming production is quite diversified in the lower elevations along the Snake River and its' tributaries.  Crops commonly raised in these areas are alfalfa hay, silage corn, corn, grains (mostly wheat, oats and barley), mint, sugar beets, potatoes (bakers & processing), beans, peas, seed crops (alfalfa, clover, lettuce, radish, sweet corn, seed beans, popcorn, carrot, onion, sugar beet, a large variety of flower seeds, etc.), onions (yellow globe, whites, reds), irrigated pastures, and a variety of specialty crops.  Irrigation systems vary as much as the different crops.  Surface irrigation is used on about half of the acreage, while sprinkler accounts for the other half.  There is also a limited amount of drip irrigation used on a few fields of onions in the area.

The different types of surface irrigation include mostly siphon tubes, gated pipe and check blocks.  The different types of sprinkler irrigation include mostly pivots, wheel lines and solid sets.  Drip tape is the most common type of drip irrigation used for onion production.

Table 2 : Land Ownership

| Owner | Acres | Percent |
|---|---|---|
| B.L.M. | 696,744 | 71.9% |
| Open water | 3,264 | 0 .3% |
| Private | 217,229 | 22.4% |
| State of Idaho | 51,586 | 5.4% |
| Total | 968,823 | 100.0% |

Figure 1.2 that follows shows the actual distribution of the land ownership in the Mid Snake River / Succor Creek Watershed.

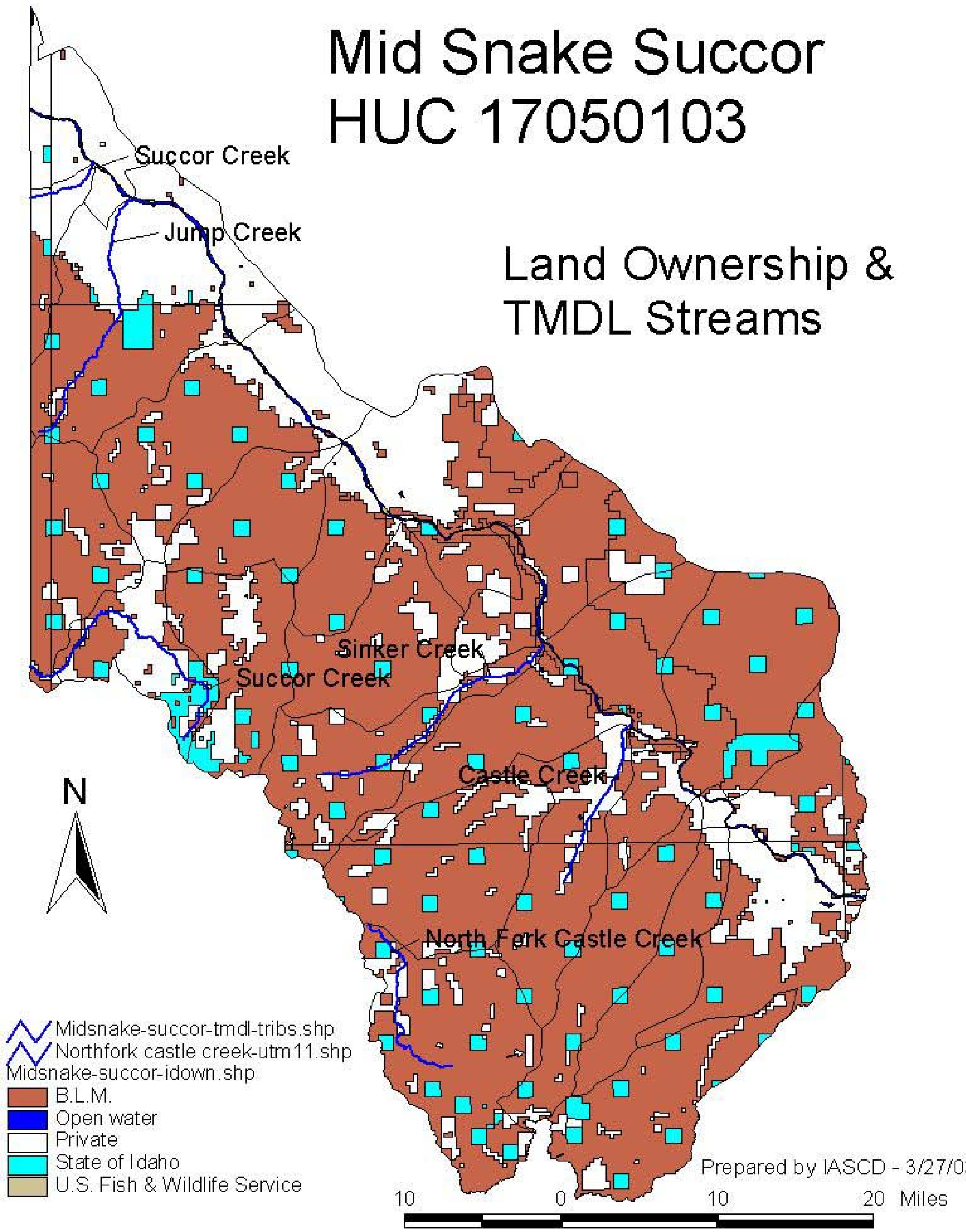



**Figure 1.2 Land Ownership in the Mid Snake River/Succor Creek Watershed**

# ACCOMPLISHMENTS

Over the years since the early 1990's, many landowners and operators in the Mid Snake/Succor Creek Watershed have proactively installed many Best Management Practices (BMPs) on their own and in cooperation with the Bruneau River and Owyhee Soil Conservation Districts, as well as IDEQ and the NRCS. 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. With the producers, the Soil Conservation Districts, State and Federal agencies working together, we will be able to meet water quality standards within the Mid Snake/Succor Creek Watershed.

## Castle Creek Subwatershed Accomplishments

**Table 3. Installed BMPs on Castle Creek**

| Producer/Project/Program | Practice | Units | Total |
|---|---|---|---|
| Producers | Riparian Fencing | 26,400 Ft. | 5 Miles |
| Producers | Off Site Watering | 6 Watering troughs | 6 Watering troughs |
| Producers | Filter Strips – bottom of irrigated fields | 12,000 Ft. | 10.7 Acres |
| Producers | Sprinkler Irrigation | 22 Fields | 300 Acres |
| Producers | Proper Grazing Mgmt. – Riparian | 11 Producers | 1200 Acres |

Table 3 above outlines the BMPs that have been installed on Castle Creek to date. In addition 2.5 miles of Castle Creek including adjacent land totaling over 400 acres has been developed into a wildlife area by one landowner. Livestock grazing has been excluded from this area for over four years. Five other producers along Castle Creek have changed their grazing management practices in order to enhance the riparian plant community along most of the 13 miles of Castle Creek that is 303 (d) listed. Refer to Castle Creek Subwatershed Appendix 1 for more implementation information.

## Jump Creek Subwatershed Accomplishments

**Table 4. Installed BMPs on Jump Creek**

| Producer/Project/Program | Practice | Units | Total |
|---|---|---|---|
| Producers | Livestock Nutrient Management Plans | Dairy – 3<br>Livestock -5 | 8 Plans approved to date |
| Producers/EQIP(NRCS) | | | |
| Producers | Surface to Sprinkler Irrigation | 156 Fields | 4,296.2 Acres |

Table 4 above outlines the BMPs that have been installed on Jump Creek to date. Irrigation return flow was cited as the reason for sediment loading in Jump Creek according to the 1994 report. The bacteria problem was attributed to livestock operations. With this information the Owyhee Soil Conservation with the aid of the NRCS, ISCC and the IASCD were able to start working on the water quality problems to try to bring Jump Creek within water quality standards. In 1994, the primary source of irrigation was surface (flood) irrigation. Through education and financial programs, much of this surface irrigated farm ground has been converted to sprinkler irrigation. The feedlots and irrigated pastures are now managed to keep bacteria counts in Jump Creek within water quality standards. The Owyhee Soil Conservation District was one of the first districts in the state to test and recommend PAM to be used to reduce soil erosion on surface irrigated row crop land. Due to BMPs installed in the Jump Creek Watershed between 1994 and 2003, bacteria is no longer a water quality issue. Also, as more and more fields are being converted to sprinkler irrigation each year along with several other BMPs being used on an ever increasing level, the sediment loading in Jump Creek has decreased significantly.

## Sinker Creek Subwatershed Accomplishments

**Table 5. Installed BMPs on Sinker Creek**

| Producer/Project/Program | Practice | Units | Total |
|---|---|---|---|
| Producers | Converting from flood to sprinkler irrigation | 14 Fields | 132.7 Acres |
| Producers/EQIP(NRCS) | Converting from Flood to sprinkler irrigation | 4 Fields | 236 Acres |
| Producers | Grazing Management System | 3 Producers | 3 Producers |

Table 5 above outlines the BMPs that have been installed on Sinker Creek to date. The Edwards Ranch cropland in the past has been flood irrigated, but they are in the process of converting their fields to wheel line sprinkler irrigation and pivot irrigation with an EQIP contract in 2004 and 2005. The Edwards ranch also plans to install riparian fencing and hardened livestock crossings along their portion of Sinker Creek. There was quite an erosion problem in the past under the flood irrigation system due to soil type and slope. With the conversion from flood to sprinkler irrigation and the other improvements that are being installed next spring, the sediment problem in Sinker Creek will be greatly decreased.

## Upper Succor Creek Subwatershed Accomplishments

**Table 6. Installed BMPs on Upper Succor Creek**

| Producer/Project/Program | Practice | Units | Total |
|---|---|---|---|
| Producers | Using Proper Riparian Grazing Management | 5 | 5 Producers |
| Producers | Watering Troughs | 2 | 2 Watering Troughs |

Table 6 outlines the BMPs that have been installed on Upper Succor Creek to date. Although only three of the Upper Succor Creek reaches are at Proper Functioning Condition, the majority of the reaches are improving riparian condition showing an upward trend. This indicates that the present grazing management practices are having a positive effect on riparian condition. These practices should be maintained in order to improve overall riparian health, while improving water quality.

## Lower Succor Creek Subwatershed Accomplishments

**Table 7. Installed BMPs on Lower Succor Creek**

| Producer/Project/Program | Practice | Units | Total |
|---|---|---|---|
| Producers/IDEQ – 319 Grant | Succor Creek Wetlands Project | One | 1 Wetland Project |
| Producers/NRCS – EQIP Program | Converting from Surface to Sprinkler Irrigation | 33 Fields | 33 Fields 519.9 Acres |
| Producers | Surface Irrigated Pastures | 52 Fields | 424.6 Acres |

Table 7 above outlines the BMPs that have been installed on Lower Succor Creek to date. The Owyhee Soil Conservation District in conjunction with NRCS, IASCD, ISCC and IDEQ has been very much aware of water quality problems along Lower Succor Creek. Lower Succor Creek is 303 (d) listed for sediment and bacteria in the Mid Snake/Succor Creek TMDL. The Homedale School District received a 319 Grant to develop a wetland area on their property along Succor Creek in 2002. The 319 Grant was extended to December 31st 2003 in order to allow the school district time to finish the Succor Creek Wetlands project. The wetlands project is functioning as intended and has nearly eliminated the sedimentation problem in one of the agricultural drains that drains into Lower Succor Creek. There have also been some grazing management changes along Lower Succor creek that are having a positive impact on water quality. Most of the cropland in this sub-watershed is still surface irrigated, due to the small size of the fields. Other BMPs to slow down soil erosion are being installed by the farmers along Lower Succor Creek with the help of the five agencies mentioned above.

# TMDL ALLOCATIONS

## Sediment Allocations

Tables 8 and 9 shows the sediment load allocations for Succor Creek and each tributary that is a major source of sediment in Jump Creek. The sources were identified at a 1:24,000 scale. The allocations are designed to meet the Total Suspended Solid goals of 22 mg/L (lower Succor Creek) and 65 mg/L (Jump Creek) in the full length of the streams, with checkpoints near end of each stream. Fixed load targets were selected because the management practices that affect sediment loading to the streams are not expected to change on a day-to-day basis. Thus, the management practices should be developed to meet the load goals, which meet the target even when very low flow conditions occur in the stream. No point sources discharge to Succor or Jump Creeks. Additionally, there is no reserve for growth built into the allocations. Any additional point sources discharging to Succor or Jump Creek would receive a wasteload allocation of zero.

As described in section 5.2 of the Mid Snake/Succor TMDL, the loading capacity for lower Succor Creek and Jump Creeks is based on maintaining the instream target at all locations in the stream. As such, the actual mass load capacity changes at any given location in the stream as flows increase (or decrease with diversions). In addition to the load allocations, Tables 4 and 5 show the load capacity for each stream at the final downstream compliance point. As shown in the tables, if the load allocations are met, the loading capacity will be met.

**Table 8. Total suspended solids load allocations for Succor Creek.**

| Name | Typical Existing Load: 2001-2002 (tons/day) | Load Allocation (tons/day) | Percent Reduction from Existing Load |
|---|---|---|---|
| Succor Creek above Sage Creek | 1.19 | 1.19 | 0% |
| Sage Creek | 8.79 | 1.84 | 79% |
| ***Succor Creek at Homedale*** | Load Capacity: 3.03 | Load achieved with reductions: 3.03 | -- |

**Table 9. Total suspended solids load allocations for Jump Creek.**

| Name | Typical Existing Load: 2001-2002 (tons/day) | Load Allocation (tons/day) | Percent Reduction from Existing Load |
|---|---|---|---|
| Mule Creek | 10.67 | 2.13 | 80% |
| Field Scale near B-Line Canal | 3.38 | 0.09 | 97% |
| B-Line Canal | 1.19 | 0.88 | 26% |
| Kora Canal | 5.08 | 0.35 | 93% |
| B-4 Lateral | 0.41 | 0.18 | 57% |
| Hortsman Drain | 15.83 | 8.22 | 48% |
| ***Jump Creek at Railroad Trestle*** | Load Capacity: 12.06 | Load achieved with reductions: 11.25 | -- |

The analysis of sediment inputs into lower Succor and Jump Creeks focuses on a critical condition from May through September, the standard irrigation season. It is within that season that the most significant loads of sediment are generated.

The analysis for lower Succor Creek shows that the irrigation season TSS load in Sage Creek must be reduced by 79% in order to maintain 22 mg/L throughout the stream. The mass balance analysis for Jump Creek shows that the irrigation season tributary TSS loads must be reduced anywhere between 26% and 97% in order to maintain 65 mg/L throughout the stream. 1993 data shows the mixed concentration of Sage Creek and lower Succor Creek with a 79% reduction in TSS load from Sage Creek. Table 9 show the mass balance for Jump Creek, which is based on an equal concentration allocation scenario for the 1993 data. Working with DEQ, the WAG concluded that an equal concentration allocation scenario is the most equitable for all sources in Jump Creek. One of the primary drivers for this decision is the fact that an equal concentration allocation scenario does not penalize those sources that have already implemented best management practices.

Tables 10 and 11 show that based on the LAs, the target concentrations, and hence the load capacities, are never exceeded in the stream. Since these years represent typical flow conditions in the basin, the LAs will be applied to all years. The loads are not particularly conservative, but are likely to occur relatively frequently in comparison to the most extreme conditions, and thus are a better basis for establishing load targets than the most extreme condition on record. Tables 4 and 5 display the current and typical existing loads (based on the years described above), and the LAs that represent reductions. The loads derived from this process ensure that the targets for suspended solids are met throughout the streams. Note that the mixed concentrations in Tables 10 and 11 do not exceed the respective targets for each stream.

**Table 10. Mixed Concentration of Total Suspended Solids in lower Succor Creek, Based on Sage Creek Load Reduction**

| | Flow | TSS (mg/L) | Mixed Flow in Succor Creek | Mixed Conc. in Succor Creek | Load Allocation (tons/day) | Current Load | % Reduction |
|---|---|---|---|---|---|---|---|
| Succor Creek above Sage | 20.00 | 22.00 | | | 1.19 | 1.19 | 0 |
| Sage Creek | 31.00 | 22.00 | 51.00 | 22.00 | 1.84 | 8.79 | 79 |
| Succor near Homedale | | | 51.00 | 22.00 | | | |

**Table 11. Total Suspended Solids Mass Balance for Jump Creek, Based on Equal Concentration Allocations**

| | Flow | TSS (mg/L) | Mixed Flow in Jump Creek | Mixed Conc. in Jump Creek | Load Allocation (tons/day) | Current Load | % Reduction |
|---|---|---|---|---|---|---|---|
| Jump above Mule Creek | 16.30 | 32.12 | | | | | |
| Mule Creek | 12.11 | 65 | 28.41 | 46.14 | 2.13 | 10.67 | 80 |
| Field Scale near B-Line | 0.50 | 65 | 28.91 | 46.46 | 0.09 | 3.38 | 97 |
| B-Line Canal | 5.00 | 65 | 33.91 | 49.20 | 0.88 | 1.19 | 26 |
| Town Canal Withdrawal | -15.00 | 49 | 18.91 | 49.20 | | | |
| Kora Canal | 2.00 | 65 | 20.91 | 50.71 | 0.35 | 5.08 | 93 |
| B-4 Lateral | 1.00 | 65 | 21.91 | 51.36 | 0.18 | 0.41 | 57 |
| Hortsman Drain | 46.84 | 65 | 68.75 | 60.65 | 8.22 | 15.83 | 48 |
| Jump at RR Trestle | | | 68.75 | 60.65 | | | |

The remaining stream segments in the Mid Snake River/Succor Creek basin that are receiving sediment allocations are receiving them due to excess stream bank erosion. Table 12 shows the load allocations for these segments. The worksheets used to derive these load allocations are located in Appendix H of the TMDL. The current erosion rate is based on the bank geometry and lateral recession rate at each measured reach. The target erosion rate is based on the bank geometry of the measured reach and the lateral recession rate at the reference reach. The reference reach is an area that contains greater than 80% bank stability and less than 28% fine substrate material. The loading capacity is the total load that is present when banks are at least 80% stable. As such, the loading capacity and the load allocations are the same. Note that these are the overall decreases necessary in the stream, but only apply to areas where banks are less than 80% stable. The determination of the reference reach was based solely on the water quality surrogates (e.g. bank stability, percent fines) at the reference site. The determination did not evaluate the land management activities that are contributing to the water quality.

**Table 12. Stream bank erosion load allocations for Sinker Creek, UpperSuccor Creek, and Castle 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 Allocations Loading Capacity | % Decrease |
|---|---|---|---|---|---|
| Sinker Creek | 35.26 | 32.20 | 352.57 | 322 | 8.64 |
| Succor Creek (Granite Creek to Chipmunk Meadows) | 214.80 | 36.52 | 637.96 | 108.45 | 83.07 |
| Succor Creek (Directly below reservoir to Oregon line) | 173.87 | 39.67 | 768.49 | 175.36 | 77.18 |
| Castle Creek | 56.35 | 43.41 | 704.35 | 542.63 | 21 |

Shaded cells represent existing loads

## Bacteria Allocations

Lower Succor Creek is the only stream in Mid Snake River/Succor Creek hydrologic unit that requires a bacteria TMDL. The target for bacteria in lower Succor Creek is based upon the state criteria for primary contact recreation, for which the stream is designated. The entire reach below the Oregon line will accommodate primary contact recreation, therefore the compliance points for bacteria loading are any given location in the stream. The primary contact recreation beneficial use has associated numeric criteria in *Idaho's Water Quality Standards and Wastewater Treatment Requirements* (IDAPA 58.01.02.251.)

Table 13 shows the primary contact recreation geometric mean LAs for the tributaries to Succor Creek. The state of Oregon's allocation is consistent with Idaho's and Oregon's criteria for primary contact recreation. Assuming the stream enters Idaho at 126/100 mL, there will be no dilution available to downstream sources. The short length of the segment means that new dilution does not become available along the length of the stream. Thus, the tributaries to Succor Creek must be able to meet a geometric mean of 126/100 mL where they enter the stream. When dilution becomes available in the stream, tributaries may be able to discharge at slightly higher than the criteria. However, until data are collected to determine this, all sources to Succor Creek must be able to meet a geometric mean of 126/100 mL where they enter the stream. There are no point sources discharging to lower Succor Creek. Additionally, there is no reserve for growth built into the allocations.  Any additional point sources discharging to Succor would receive a wasteload allocation of zero.

**Table 13.  Bacteria load allocations for Succor Creek.**

| Name | Existing Condition (#/100mL geometric mean) | Primary Contact Recreation Load Allocations (#/100mL geometric mean) Loading Capacity | Percent Reduction from Existing Load |
|---|---|---|---|
| Succor Creek at Oregon Line | Unknown | 126 | Unknown |
| Coates Drain | Unknown | 126 | Unknown |
| Murphy Drain | Unknown | 126 | Unknown |
| Sage Creek | 266 | 126 | 53% |

The bacteria load allocations are intended to target the geometric mean criteria for *E. Coli.*  Compliance with those criteria must be judged using an appropriate number of samples.  Tributaries should discharge bacteria in quantities that do not exceed state criteria for bacteria assuming little likelihood for dilution and minimal die-off.

## Nutrient Allocations

The allocation strategy used for the nutrient TMDL is “equal concentration,” meaning that all sources must discharge at a concentration of 0.07 mg/L TP or less where they enter the river. This allocation applies to the Snake River from Swan Falls Dam to the Oregon line. Seasonal variation and critical conditions were accounted for in this allocation and the target applies from May-September. The instream seasonal concentration at River Mile 449.3 (Murphy) is 0.071 mg/L. An allocation for the sections of the river from CJ Strike Reservoir to Castle Creek and from Castle Creek to Swan Falls Dam may be necessary in the future. However, at this time a further delineation of tributary sources and instream concentrations above Swan Falls is necessary to determine where these allocations might need to occur.  In addition, the Snake River where it exits CJ Strike Dam must meet the 0.07 mg/L target.   Using 1999 and 2000 data, the Snake River, below CJ Strike Dam, discharges at 0.07 mg/L, meeting the target.

**Table 14. Instream Total Phosphorus Average Concentrations**

| Location | May-September Average Concentration (mg/L) |
|---|---|
| Snake River below CJ Strike Dam | 0.07 |
| Snake River at river mile 449.3 | 0.071 |
| Snake River at Marsing (river mile 425) | 0.082 |
| Snake River at Homedale (river mile 417) | 0.087 |

The Mid Snake River/Succor Creek WAG felt that equal concentration was the most equitable allocation scenario because this method does not require any sources to discharge below the 0.07 mg/L target and it does not penalize those sources that have already implemented best management practices.

**Table 15. Loads from nonpoint sources to the Snake River in the Mid Snake River/Succor Creek Subbasin.**

| Wasteload Type | Location | Load | Estimation Method |
|---|---|---|---|
| Total Phosphorus | Drain and Tributaries | 381 kg/day | Direct Load Average |

**Table 16. Waste loads from point sources to the Snake River in the Mid Snake River/Succor Creek Subbasin.**

| Wasteload Type | Location | Current Load (kg/day) | Load Allocation (kg/day) | NPDES Permit Number |
|---|---|---|---|---|
| Total Phosphorus | Marsing WWTP | 2 kg/day | 4 kg/day | Permit # ID0021202 |
| Total Phosphorus | Homedale WWTP | 3 kg/day | 5 kg/day | Permit # ID0020427 |

**Table 17. State of Idaho water temperature criteria.**

| Temperature Criteria | Cold Water Aquatic Life (June 22-Sept 21) | Salmonid Spawning (March 1-June 15) |
|---|---|---|
| Instantaneous Maximum | 22 °C., 71.6 °F. | 13 °C., 55.4 °F. |
| Maximum Daily Average | 19 °C., 66.2 °F. | 9 °C., 48.2 °F. |

*Water temperature criteria is applicable only to trout.

## Table 18. Load allocations for streams requiring temperature TMDLs.

| Stream Segment / Month | Existing shade as determined by SSTEMP (Riparian %) | Estimated system potential shade (Riparian %) | Shade to meet numeric temperature standards (Riparian %) | Temperature criteria -or- best achievable temperature (°C) | Decrease in current mean temperature (°C) to meet standard -or- best achievable temperature | Current solar load as per SSTEMP (j/m2/s) | Solar loading capacity (LC) based on shade to meet standard or best achievable temperature (j/m2/sec) | Solar load decrease (j/m2/s) to meet capacity (Load Allocation) | Required increase in shade (%) |
|---|---|---|---|---|---|---|---|---|---|
| North Fork Castle Creek | Insufficient Data to Develop TMDL | | | | | | | | |
| Sinker Creek (July) | 58.2 | 70.4* | 70.4 | 19** | 0.85 | 4.30 | 3.49 | 0.81 | 12[a] |
| Succor Creek – Headwaters to Berg Mine<br>May<br>June | 16<br>14 | 55<br>55 | 55[b]<br>55[b] | 9.52<br>10.67 | 0.90<br>1.22 | 109.88<br>183.80 | 50.61<br>115.26 | 59.27<br>68.54 | 39<br>41 |
| Succor Creek – Berg Mine to Chipmunk Meadows<br>May<br>June | 14<br>13 | 55<br>55 | 55[b]<br>55[b] | 10.10<br>11.46 | 0.52<br>0.71 | 135.87<br>205.86 | 63.94<br>120.81 | 71.93<br>85.05 | 41<br>42 |
| Chipmunk Meadows to Succor Creek Reservoir | Insufficient Data To Develop TMDL | | | | | | | | |
| Succor Creek - Reservoir to the Oregon Line<br>May<br>June<br>July<br>August | 14<br>13<br>13<br>14 | 55<br>55<br>55<br>55 | 55[b]<br>55[b]<br>24<br>53 | 9.63<br>10.76<br>22<br>22 | 0.66<br>0.87<br>0.20<br>1.61 | 124.57<br>202.35<br>208.78<br>87.59 | 57.37<br>122.03<br>184.88<br>43.34 | 67.20<br>80.32<br>23.90<br>44.25 | 41<br>42<br>11<br>39 |

Shaded Columns Represent Existing Conditions

# IMPLEMENTATION PLAN PRIORITIES

Lower Succor Creek and Jump Creek subwatersheds would be the top priority for water quality improvement for several reasons. Although both these streams are 303 (d) listed for sediment, Lower Succor Creek is also listed for bacteria. The listed portions of both subwatersheds are primarily privately owned irrigated agricultural lands. The largest contributing factor to the sediment load in both Jump and Lower Succor creek is irrigation-induced erosion. There are many BMPs that have been and could be installed to reduce this irrigation induced erosion. There are also several BMPs that can be initiated along Lower Succor Creek that will address the bacteria problem.

Although Castle Creek is also listed for sediment, it would be a lower priority than both Lower Succor and Jump Creek as the sedimentation problem is not nearly as severe. Castle Creek is basically a lowland riparian area with a few agricultural fields on the uplands that drain into the creek. The primary emphasis is BMPs for the riparian area, although we also wanting to focus on installing BMPs on the agricultural fields that drain into the creek.

Sinker Creek would be next in priority. Although this stream is listed for both sediment and temperature, it is a mix of very limited irrigated agricultural lands, uplands and riparian. The last of the irrigated lands will have BMPs installed this year. These BMPs should greatly reduce any sediment loading from those agricultural fields. Sinker Creek is primarily used for livestock grazing with a reservoir above the Joyce Ranch and a reservoir near the bottom of the creek. Livestock grazing practices (BMPs) are being changed to reduce the impact that livestock have on the riparian area which should positively impact both sediment and temperature issues.

Upper Succor Creek is listed for both sediment and temperature. Except for one small irrigated pasture, Upper Succor Creek is primarily used for livestock grazing. Much of the riparian area is improving as many riparian BMPs have been initiated, but there are still several areas that need grazing BMPs installed in the future.

**** For a more detailed description of each subwatershed and their implementation plans, please see Appendix #1 for Castle Creek, Appendix #2 for Jump Creek, Appendix #3 for Sinker Creek and Appendix #4 for Upper and Lower Succor Creek.**

# RECOMMENDED CONSERVATION PLAN ELEMENTS

Conservation plans will be developed by ISCC & IASCD in conjunction with NRCS and the local Soil Conservation Districts (Bruneau River Soil Conservation District and/or Owyhee Soil Conservation District).

The nine step NRCS planning criteria will be used to ensure quality design and installation of applicable BMPs. All Endangered Species Act (ESA), Cultural Resources, permit & easement issues will be addressed during the conservation planning process. Conservation plans will be developed with landowners to establish BMPs that will improve and maintain healthy riparian conditions. High priority areas for conservation planning are determined by the stream’s current “state of transition” and how effectively a BMP will improve conditions. What works well on one specific stream reach may not work at all in another.

The first three elements that follow are focused on improving and maintaining multiple resources within the riparian areas on privately owned parcels. If properly implemented, these efforts by individual landowners will increase channel stability and shading within the stream segments with TMDL allocation targets. Although there are well-shaded and stable stream reaches with narrow channel widths, good soil, and adequate water supply within the watershed, they are considered rare exceptions. Regardless of TMDL shade targets, riparian stability and species diversity need to be improved by adjusting grazing management strategies on private lands.

The fourth element on the list deals directly with BMPs on irrigated cropland. Intensive farming can accelerate sediment problems in nearby streams, causing water quality problems. Irrigation BMPs can be installed to reduce and even eliminate irrigation- induced erosion that cause sediment problems in water quality impaired streams.

## Element #1 - Grazing management components should be included in every Conservation Plan if applicable.

Properly implemented grazing plans are intended to improve and maintain upland and riparian plant vigor while meeting many of the local resource needs. For riparian plants, increasing bank stability through an increased quantity of stabilizing plants is a high priority. With the exception of bedrock and boulder channel types, channel shape conversion from “dish” to “trapezoid” and “inverse trapezoid” will follow with an increase of bank stability. Where woody vegetative species (primarily shrubs) are capable of reproducing along riparian areas, shading will also increase naturally. Where stream floodplains are wide, stream gradient very low, and silt/clay soils are dominant, shrub species will be limited. Channel shape and over hanging banks will provide the best conditions for maintaining water temperatures in these types of conditions. Temperatures in east/west stream channels will likely differ from north/south flowing streams because of shading effectiveness.

**Element #2 - New or additional watering sources for livestock and wildlife use may be needed to reduce grazing intensity on riparian vegetation.**

By developing watering sources away from streams, grazing intensity on the riparian area is reduced. Riparian fencing may not be necessary or feasible in many of the remote areas of Owyhee County. If riparian fencing is installed along stream channels, water gaps can be installed for livestock watering with minimal impact to water quality and riparian function.

**Element #3 - Existing large pastures may need to be divided into smaller pastures to create an effective grazing rotational system that controls both duration and timing of livestock use.**

While fencing of specific riparian areas may be recommended, early season grazing of riparian areas can occur if duration is short and ample time is allowed for regrowth. This type of management will ensure healthy root growth of riparian species for the entire season. Fall grazing can occur if livestock do not overly desire protein during this period of time. Protein availability in grasses late in the growing season is very low, while shrub protein is high. Livestock supplements such as protein blocks may overcome excessive utilization of shrubs (willows, dogwood, etc.) in the summer and fall months.

**Element #4 – Irrigated Cropland should use Nutrient, Pest, Residue and Irrigation Management along with other BMPs in their operation to reduce irrigation-induced erosion.**

There are several Best Management Practices that can be used in irrigated cropland which will effectively reduce, or eliminate irrigation-induced erosion, thus reducing sediment loading to nearby streams. These practices include Sediment Basins, Filter Strips, Surge Irrigation, PAM, Conservation Crop Rotation, Deep Tillage, Irrigation Land Leveling, Irrigation System, Irrigation Water Management, 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. The Implementation Tiers evaluation listed below will be used to rate irrigated cropland priorities.

## IMPLEMENTATION TIERS

In order to achieve the goals set forth in the TMDL Subbasin Assessment, land treatment through BMP installation will be pursued in a three tier format. Agricultural land that drains directly into a 303 (d) listed stream is included in **Tier 1**. Tier 1 fields have the most immediate impact on water quality due to their proximity, or influence to a 303 (d) listed stream segment. Unlike Tier 1 fields,

**Tier 2** fields are not directly adjacent to a 303 (d) listed stream segment, and the wastewater from Tier 2 acreage has the potential to be reused by Tier 1 acreage before entering a 303 (d) listed stream segment. **Tier 3** fields are located in the uplands where wastewater has the potential to be used multiple times by Tier 2 and Tier 1 acreage before entering a stream segment of concern.

**In terms of BMP implementation Tier 1 Fields are high priority, Tier 2 Fields are medium priority, and Tier 3 Fields are low priority in terms of water quality.**

These tiers only apply to surface irrigated cropland fields and do not include sprinkler irrigated agricultural land, pastureland, or CAFO/AFO units within the Jump Creek and Lower Succor Creek Sub-watersheds.

The Jump Creek and Lower Succor Creek Sub-watersheds consist of a total of 32,296.0 acres, but only 25,681.9 acres (79.5%) actually produce agricultural crops. Table l below shows the total farmable acres in each of their respective categories.

**Table 19. Jump Creek and Lower Succor Creek Sub-watersheds**

| **Treatment Unit** | **Acres** | **Percentage of total ag. acres** |
|---|---|---|
| Tier 1: surface irrigated cropland | 963.4 | 3.8% |
| Tier 2: surface irrigated cropland | 7401.8 | 28.8% |
| Tier 3: surface irrigated cropland | 8117.5 | 31.6% |
| Irrigated Pasture | 1815.9 | 7.1% |
| Sprinkler irrigated cropland | 7083.7 | 27.6% |
| CAFO/AFO | 299.6 | 1.1% |
| | | |
| **Total** | 25681.9 | 100% |

Please refer to figure 1.3 for tier field locations within Jump Creek and Lower Succor Creek Sub-watersheds.

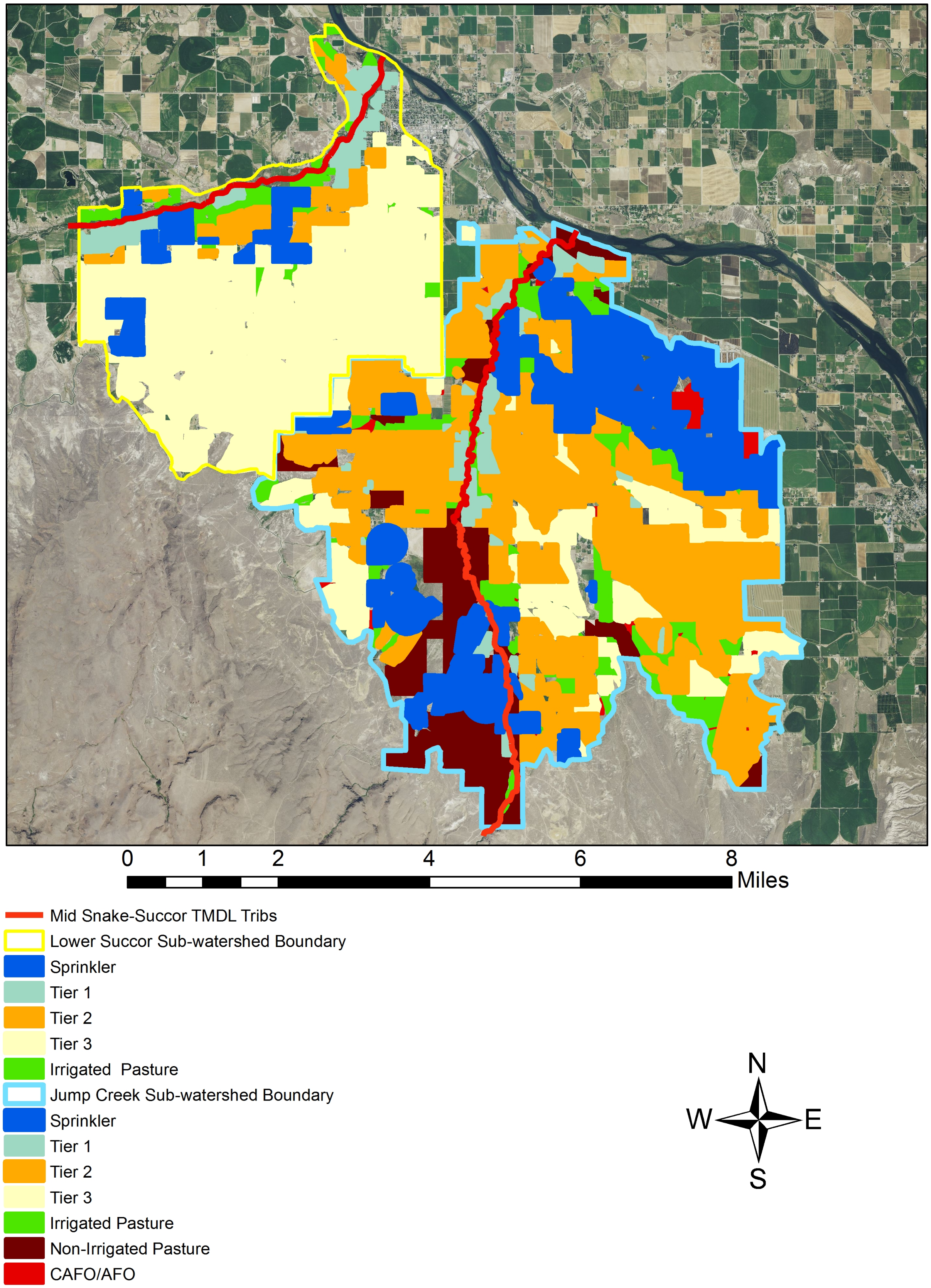



**Figure 1.3 Tier Map - Jump Creek and Lower Succor Creek Sub-watersheds**

## BMP IMPLEMENTATION ALTERNATIVES AND COSTS

The cost list to install BMPs on private agricultural land is available from the Owyhee Soil Conservation District office in Marsing and the Bruneau River Soil Conservation District office in Bruneau. 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). 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 21 on the following page, provides the typical costs for many of the applicable BMP components for southern Idaho. Labor and equipment costs are not included in this table due to the variation from one site to another.

**Table 20. Average Costs of Component Practices Applicable to Owyhee County**

| Component Practice | Unit of Measure | Cost/Unit |
|---|---|---|
| Fence, 4 wire | Feet | $ 1.40 |
| Fence, 5 wire | Feet | $ 1.75 |
| Fence, wood, panel & pole | Feet | $ 2.50 |
| Filter Strip | Acre | $ 200.00 |
| Prescribed Grazing, Irrigated pasture | Acre | $ 1.10 |
| Irrigation Systems, Sprinkler (Center Pivot) | Acre | $ 1320.00 |
| Irrigation Systems, Sprinkler (Wheel Line) | Acre | $ 1125.00 |
| Prescribed Grazing, Rangelane | Acre | $ 0.11 |
| Prescribed Grazing, Woodland | Acre | $ 0.11 |
| Grazing Land Mechanical Treatment | Acre | $ 28.00 |
| Range Planting | Acre | $ 132.00 |
| Spring Development | Each | $2,000.00 |
| Trough or Tank | Each | $ 990.00 |
| Streambank & Shoreline Protection | Each | Job Estimate |
| Stream Channel Stabilization | Each | Job Estimate |
| Watering Facility, Large Storage Tank | Each | Job Estimate |
| Watering Facility, Nose pump | Each | $ 550.00 |
| Watering Facility, Trough or Tank | Each | $ 990.00 |

**Costs may increase with greater travel distances and accessibility**
****Source: NRCS 2005 EQIP Cost List – Average Costs, For Estimates Only**

**Example Description of Alternatives for Surface Irrigated Cropland** (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

| **SITE SPECIFIC BMP Alternative #1a ($1520/acre)** | **SITE SPECIFIC BMP Alternative #2 (575/acre)** | **SITE SPECIFIC BMP Alternative #3 $300/acre)** |
|---|---|---|
| Irrigation Water Mgmt. | Irrigation Water Mgmt. | Irrigation Water Mgmt. |
| Drip Irrigation System | Land Leveling | Concrete Ditch |
| Nutrient Mgmt. | Surface Irrigated System | Filter Strip |
| Conservation Crop Rotation | Gated Pipe | PAM |
| **Alternative #1b** | Tail Water Recovery System | Sediment Basin |
| **($920/acre)** | Nutrient Mgmt. | Nutrient Mgmt. |
| Sprinkler Irrigation | Conservation Crop Rotation | Conservation Crop Rotation |
| Nutrient Mgmt. | Conservation Tillage | Conservation Tillage |
| Conservation Crop Rotation | | |
| Irrigation Water Mgmt. | | |

**Example Description of Alternatives for Surface Irrigated Pasture** (Prices based on the NRCS 2005 Cost List plus, 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

| **SITE SPECIFIC BMP Alternative #1 ($520/acre)** | **SITE SPECIFIC BMP Alternative #2 ($400/acre)** | **SITE SPECIFIC BMP Alternative #3 ($290/acre)** |
|---|---|---|
| Fencing | Fencing | Fencing |
| Planned Grazing System | Planned Grazing System | Pasture & Hayland Mgmt. |
| Pasture & Hayland Mgmt. | Pasture & Hayland Mgmt. | Nutrient Mgmt. |
| Nutrient Mgmt. | Nutrient Mgmt. | Livestock Watering Fac. |
| Heavy Use Protection | Irrigation Water Mgmt. | Irrigation Water Mgmt. |
| Livestock Watering Fac. | Livestock Watering Fac. | Field Border Irr. System |
| Irrigation Water Mgmt | Field Border Irr. System | |
| Field Border Irr. System | | |
| Gated Pipe | | |

# 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 5.

**Table 21. Estimated BMP Cost Summary of Treatment Alternatives for Jump & Lower Succor Creek Sub-watersheds, Tier 1 Fields.**

| ALTERNATIVE | | ACRES | Total Costs |
|---|---|---|---|
| Alternative 1a | $1520 / AC | 963.4 | $1,464,400 |
| Alternative 1b | $ 920 / AC | 963.4 | $ 886,300 |
| Alternative 2 | $ 575 / AC | 963.4 | $ 554,000 |
| Alternative 3 | $ 300 / AC | 963.4 | $ 289,000 |

**Table 22. Estimated BMP Cost Summary of Treatment Alternatives for Jump & Lower Succor Creek Sub-watersheds, Tier 1 & Tier 2 Fields.**

| ALTERNATIVE | | ACRES | Total Costs |
|---|---|---|---|
| Alternative 1a | $1520 / AC | 8365 | $ 12,714,800 |
| Alternative 1b | $ 920 / AC | 8365 | $ 7,695,800 |
| Alternative 2 | $ 575 / AC | 8365 | $ 4,809,900 |
| Alternative 3 | $ 300 / AC | 8365 | $ 2,509,500 |

# 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.

Additionally, "reference reach" transects will be established on multiple stream segments within the watershed to determine potential and capability for shading of stream channels. Once BMPs are established on other stream reaches, tracking of progress toward "reference reach" status will be monitored and evaluated. Adjustments to implementation strategies will be adjusted as necessary to maximize effectiveness of implemented BMPs.

# 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.

**WLA** - Wasteload Allocation for point sources.

Useful Conversion Factors

1 meter = 3.821 feet    1 hectare = 0.4047 acre    $^{o}C = (^{o}F - 32)/1.8$

# APPENDICES

## APPENDIX #1

### Castle Creek Subwatershed

Castle Creek is a perennial stream that drains approximately 129,542 acres and generally flows in a northeasterly direction. The fourth order creek begins at close to 6,700 feet near Toy Mountain pass. Catherine, Browns, Bates, Hart and Pickett Creeks all flow into Castle Creek. After the creek exits the Owyhee front it flows through rangeland and pastures before emptying into the Snake River around 2,400 feet.

The 13-mile listed portion is a Rosgen C channel, a sediment depositing reach characterized by a U-shaped, sandy channel bottom. In swifter parts of the stream, the substrate is made up of partially embedded cobbles. This creek exhibits entrenchment and unstable banks in portions of the lower watershed. A large portion of the stream channel entrenchment is due to flash flood rain events, or rain on snow flood events. A small portion of the entrenchment problem can also be attributable to stream channel straightening. Where the riparian area has not been disturbed or the channel is not deeply entrenched, the riparian area is thick with a variety of willows, sedges and rushes.

There are geothermal sources of water in the Castle Creek sub-watershed. Some of the warm water enters the creek due to the presence of flowing wells, while the common use of warm water for irrigation purposes, accounts for much of the warm water returning to the creek. Before the hot water wells were drilled and used for irrigation, a hot water spring at the mouth of the canyon fed Castle Creek throughout the year. The Castle Creek watershed has been settled for over 100 years and irrigation development can be traced back to the 1880s, although the greatest amount of irrigation development occurred in the 1950s and 1960s. Mining also occurred historically in the watershed.

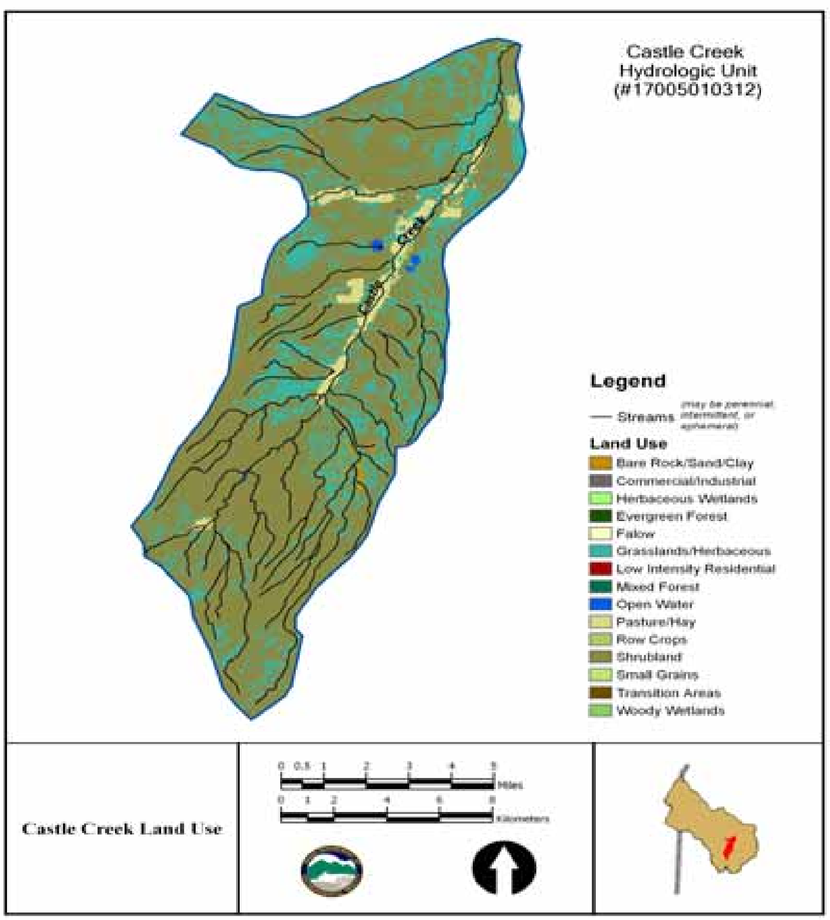
### Land Ownership and Land Use

The upper part of the Castle Creek watershed is primarily rangeland, while the lower reaches below the canyon are a mix of irrigated agriculture and rangeland. Deposits of bentonite are also actively mined within the watershed. Also, parts of the watershed are considered to have high mineral potential and sedimentary rock alongside the creek which is being mined for industrial minerals (BLM 1999). Figure 1 shows the land use patterns within the watershed. While private lands exist in the upper part of the watershed, land is primarily BLM owned. The private lands along Castle Creek below the mouth of the canyon are a mix of rangeland and irrigated cropland. The crops farmed on the irrigated cropland along Castle Creek consists primarily of alfalfa hay, corn, grain and permanent pasture. The agricultural fields are surface (flood) irrigated as well as sprinkler irrigated throughout the growing season (see Table 1). The farmers use irrigation water from the creek in the spring and early summer when sufficient runoff is available. When the runoff water subsides, water is pumped from deep hot water wells to finish the growing season. The hot water wells water temperatures ranges from 140 degrees to over 180 degrees F. The water has to be pumped into open ponds and cooled before it can be used for irrigation, due to these high temperatures. The excess irrigation water applied to the agricultural fields along the creek flows back into the creek itself. This agricultural return water is what determines the stream flow throughout most of the growing season in Castle Creek, except during the spring snow melt. The hay, grain and corn raised along Castle Creek are used primarily as winter feed by the local cattle ranchers for their livestock.

**Table 1 - Irrigated cropland – Castle Creek**

| Type of Irrigation | Acres | Percent |
|---|---|---|
| Surface irrigation | 1546.9 Acres | 49.7% |
| Sprinkler irrigation | 1564.6 Acres | 50.3% |

**Figure 1. Castle Creek Land Use**



## Private Land Riparian Resource Concerns

There was no evidence of “excessive” stream bank erosion or deposition caused by poor upland conditions. This determination does not imply absence of problems in the uplands, but that there is no evidence that upland problems are directly impacting stream function. Regarding the TMDL objectives for the streams assessed in 2003, the primary focus for BMP implementation will be on the riparian areas themselves and the management of irrigation diversions.

### Riparian/wetland vegetation

Most of the reaches assessed on Castle Creek were found without adequate stabilizing vegetative species. Regeneration of riparian species is limited throughout most of the stream reaches assessed, due to a lack of water and/or grazing impacts. Water seems to be adequate within the shallow aquifer for maintenance of riparian vegetation. Most reaches did, however, contain stabilizing species, such as black willow, common three square, and bulrush near the Snake River. It is also noted that alkali soils are found through much of the riparian and adjacent lands. This alkali may limit vegetation to what is tolerant to salts. Salt cedar was also found in the reaches near the mouth.

Depending on the characteristic of a storm event, stream bank erosion may occur even with adequate vegetation, as demonstrated by the summer cloud burst in 2003. Stabilizing vegetation is very influential on channel shape. Vegetation can decrease channel bankfull widths, creating trapezoid-shaped channels, and ultimately increasing floodplains inwardly. Narrowing channel width (bankfull width) may help reduce fine material when higher flows occur.

Most of these stream reaches are capable and do support woody species (trees and shrubs), but at different quantities. Riparian woody species are restricted by water availability, elevation to surface, soil type, and availability of parent stock.

### Lateral Stream Bank Erosion – Floodplain Development

No reaches along Castle Creek were found to have active and excessive lateral stream bank erosion with an outward development of its floodplain. Limited annual flow and infrequent storm events have resulted in little stream bank erosion and outward development of needed floodplain. There was a very short section in CC19 that had some bank erosion, but it did not represent the condition of the reach, which had a wide floodplain and fairly stable stream banks.

There is adequate floodplain (outward development) on most of the reaches. Inward floodplain development is still needed on all reaches, where channels are dish-shaped and over widened. The inward floodplain development would decrease the appearance of ‘dish-shaped’ channels and increase trapezoid-shaped channels.  If channel widths are decreased, average bank full depths should increase accordingly.

**Excessive Deposition – Channel Substrate Conditions**

Although no examples of excessive stream bank erosion was present along Castle Creek, there was a fairly high amount of fine materials within many of its reaches.  Flow alterations, nominal bank erosion, and some sedimentation from irrigation return flows are likely the “active’ source of the fine materials.  The low gradient portions of the stream downstream of the active diversions are likely to have the greatest quantity of fine materials.  Infrequent storm events also cause the accumulation of fines as stream flows are not adequate to scour the channel. A lack of moderate to high flows may be the greatest limitation to “cleaner” substrates within the riparian zone along Castle Creek.

Bank erosion is assumed by DEQ (2003) to be the source or cause of excessive fines. DEQ (appendix H) rated lateral recession rates no higher than moderate (0.11), which is derived from the NRCS Stream Bank Erosion Inventory.  The moderate erosion category ranges from 0.06 to 0.15. The TMDL calls for a 34.2% reduction in annual bank erosion to reduce the percentage of fine materials in the channel.  Higher stream banks along Castle Creek also increases the estimated quantity of erosion per mile.  Though rated only slight to moderate in bank erosion, high banks produced a greater portion of fines within the channel.  **Based on this 2003 riparian assessment, active bank erosion does not seem to be the primary cause of the fine material within the Channel.  Limited flows, channel shape, and low stream gradients seem to be the primary cause of excessive fines in Castle Creek.**  The average gradient is about 0.7% (range 0.2 to 1.8%).  In general, lower gradient streams usually consist of smaller sized materials within the channel.

**Channel Down-cutting**

No active head cuts were found within any of the reaches assessed in Castle Creek. Even though there are a few beaver dams in the upper part of the stream that are not being maintained, due to their very low profile, they have little effect on stream flow.   In contrast, those beaver dams found in the lower portion of the channel, near the Snake River, were active and stable (Table 2).

| Table 2. Various Riparian Attributes | | | | | | |
|---|---|---|---|---|---|---|
| Stream Reach | Beaver Dams? | Beaver Dams Stable? | Excessive Bank Erosion | Excessive Deposition? | Unstable Head Cuts | Floodplain developing outward? |
| Castle CreekCC1 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC2 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC3 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC4 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC5 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC6 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC7 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC8 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC9 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC10 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC11 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC12 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC13 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC14 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC15 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC16 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC17 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC18 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC19 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC20 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC21 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC22 | YES | NO | NO | NO | NO | NO |
| Castle CreekCC23 | YES | NO | NO | NO | NO | NO |
| Castle CreekCC24 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC25 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC26 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC27 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC28 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC29 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC30 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC31 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC32 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC33 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC34 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC35 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC36 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC37 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC38 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC39 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC40 | YES | YES | NO | NO | NO | NO |
| Castle CreekCC41 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC42 | NO | NO | NO | NO | NO | NO |
| Castle CreekCC43 | YES | NO | NO | NO | NO | NO |

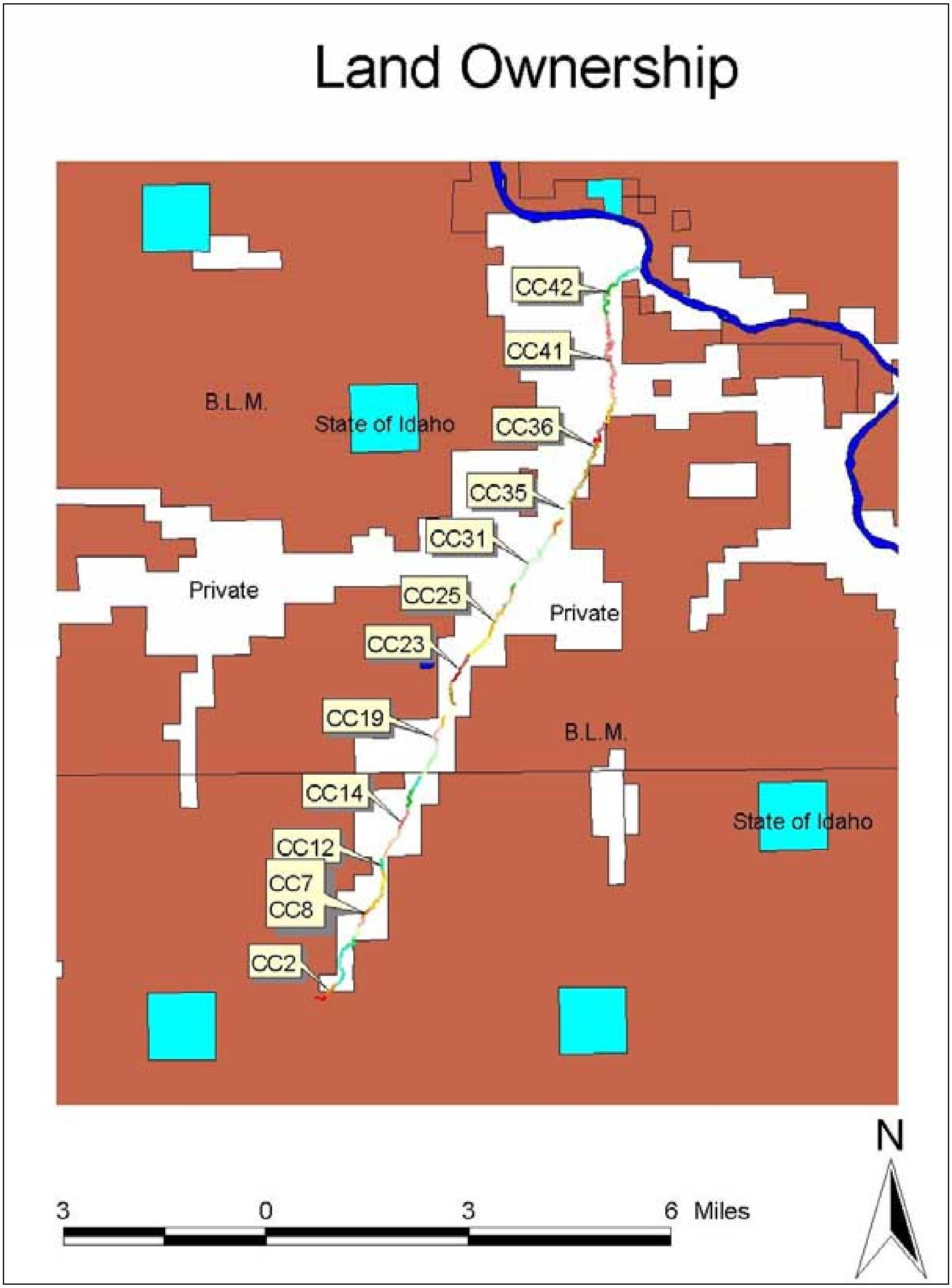



**Figure 2 Castle Creek Ownership**

**Private Land Riparian Improvement Recommendations**

The result of the 2003 stream inventory conducted by ISCC & IASCD, along with the interpretation of the data collected indicates that there are areas of Castle Creek in need of improvement (primarily riparian vegetation). Conservation plans should be developed with landowners to improve and maintain riparian conditions. The stream's current "state of succession or transition" will dictate how effective a BMP will be to improve given conditions (see Figure 3, Winward, 2000). A recently down-cut stream will generally respond slowly to grazing management adjustments while still increasing its' floodplain in an outwardly direction. In comparison, a stream with a well-developed floodplain may respond very well to a given change in grazing practices. Each stream reach, in many cases, each pasture, needs to be evaluated on its own merits. What works well in one area may not work at all in another.

There are two actions that could be implemented to improve riparian conditions: offsite water facilities and a reduction in grazing duration. These two actions are certain to provide some level of improvement and protection of the existing riparian areas. However, with limited annual flows throughout most of the stream channel, success of riparian improvements and channel conditions (substrate) may be limited.

The riparian areas in need of grazing management adjustments could be accomplished with or without the use of structural components such as fencing. Additional water developments and pasture fencing could make it easier to control livestock distribution and grazing intensity along the stream.

To further improve stability and shading, the duration of grazing should be reduced. Watering facilities are needed and fencing may be needed to increase the number of pastures to increase rotation and decrease duration. The primary reason to reduce duration and adjust timing is to increase and protect riparian vegetation. Allowing new vegetation growth each year will create multiple age classes, which increases both the quantity and quality of stabilizers along the stream bank in order to ensure long-term bank stability.

## Prioritization of Improvement Areas

Based on the assessments and the data collected, the author has prioritized which stream reaches that should be addressed and first. The typical criteria for the prioritization are as follows:

1) Reaches that have full outwardly developed floodplains, or where no excessive lateral streambank erosion is indicating active outward floodplain development,
2) Floodplains exist and are inundated with relatively frequent flood events (every 1-2 years),
3) A diverse community of riparian-wetland vegetative species exists,
4) Adequate soil moisture for riparian-wetland species to exist.

**Table 5. Stream Reach Condition Summary**

| Stream Name | Adequate stabilizing vegetative species present | Excessive lateral streambank erosion | Active & unstable headcuts present | Floodplain development occurring | Rated at or near Proper Functioning Condition (PFC) | High potential for successful treatment | Low potential for successful treatment |
|---|---|---|---|---|---|---|---|
| | Stream Reaches | | | | | | |
| Castle Creek | N/A | N/A | N/A | CC3-10<br>CC16-19<br>CC35-40 | CC1-2<br>CC12,14,15<br>CC26,33<br>CC41,42 | CC3-10<br>CC-13<br>CC16-19<br>CC-22,25<br>CC29-31<br>CC-35-40<br>CC43 | CC11,21<br>CC27,28<br>CC32,34 |

## Conclusions of Riparian Assessment

Based on the 16 mile stream assessment in 2003, active excessive stream bank erosion does not seem to be occurring. Some high banks exist with some sloughing occurring, but overall, these few areas of erosion do not represent the condition of the reach in which it was found.

Fine sediment material that covers the channel bottom seems to be the result of flow alterations, over-widened channels (also dish-shaped), low stream gradients, and infrequent storm events. Even with large cloud-bursts, such as the one recorded in the summer of 2003, stream bank erosion or channel scouring does not always occur.

Riparian vegetation is in need of improvement, regardless of existing channel conditions. Alkali soils may limit riparian areas to fewer species. Water availability does not seem to be a limiting factor for maintaining riparian species. Managing vegetation should help reduce the quantity of fine material in the channels, but success may be limited by low annual flow volume.

**Example Description of Alternatives for Surface Irrigated Cropland** (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

| SITE SPECIFIC BMP Alternative #1 ($575/acre) | SITE SPECIFIC BMP Alternative #2 ($300/acre) |
|---|---|
| Irrigation Water Mgmt. | Irrigation Water Mgmt. |
| Land Leveling | Concrete Ditch |
| Irrigated System | Filter Strip |
| Gated Pipe | PAM |
| Tail Water Recovery System | Sediment Basin |
| Nutrient Mgmt. | Nutrient Mgmt. |
| Conservation Crop Rotation | Conservation Crop Rotation |
| Conservation Tillage | Conservation Tillage |

**Example Description of Alternatives for Surface Irrigated Pasture** (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

| SITE SPECIFIC BMP Alternative #3 ($520/acre) | SITE SPECIFIC BMP Alternative #4 ($400/acre) | SITE SPECIFIC BMP Alternative # ($290/acre) |
|---|---|---|
| Fencing | Fencing | Fencing |
| Planned Grazing System | Planned Grazing System | Pasture & Hayland Mgmt. |
| Pasture & Hayland Mgmt. | Pasture & Hayland Mgmt. | Nutrient Mgmt. |
| Nutrient Mgmt. | Nutrient Mgmt. | Livestock Watering Fac. |
| Heavy Use Protection | Irrigation Water Mgmt. | Irrigation Water Mgmt. |
| Livestock Watering Fac. | Livestock Watering Fac. | Field Border Irr. System |
| Irrigation Water Mgmt | Field Border Irr. System | |
| Field Border Irr. System | | |
| Gated Pipe | | |

**Table 6. Estimated BMP Cost Summary of Treatment Alternatives for the Castle Creek Sub-watershed.**

| ALTERNATIVE | | ACRES | Total Costs |
|---|---|---|---|
| Alternative 1 | $ 575 / AC | 1,050.8 | $ 604,210 |
| Alternative 2 | $ 300 / AC | 1,050.8 | $ 315,240 |
| Alternative 3 | $ 520 / AC | 495.2 | $ 275,504 |
| Alternative 4 | $ 400 / AC | 495.2 | $ 198,080 |

**Final cost estimates and selected implementation alternatives will be determined during the on farm, site specific planning with each individual landowner or operator.**

**Tasks for Privately Owned Parcels**

**Task 1**: Develop conservation plans with private agricultural landowners.
Responsible Agency: IASCD, ISCC & NRCS (support from IDL, and BLM)
Timeline: Immediately

**Task 2**: Assist private agricultural landowners to implement conservation plan components.
Responsible Agency: IASCD, ISCC & NRCS (support from IDL, and BLM)
Timeline: Ongoing

**Task 3**: Monitor conservation implementation progress and evaluate effect on vegetation and channel shape.
Responsible Agency: IASCD & ISCC (support from NRCS IDL, and BLM)
Timeline: Ongoing

**Task 4**: Install “reference reach” transects to define potential and capability of shading of stream channels.
Responsible Agency: ISCC (support from IASCD, NRCS, IDL, and BLM)
Timeline: Summer of 2006

# APPENDIX #2

## Jump Creek Subwatershed

Jump Creek is a 25.6-mile long stream that drains a 170 square mile watershed. The elevation change in the watershed is 2,040 feet, with the elevation of the headwaters at 4,240 feet and mouth at 2,200 feet. The headwaters of Jump Creek are located just above the Sands Basin in the Owyhee Mountain Range. After flowing in a northeasterly direction through the Sands Basin, Jump Creek passes through a narrow canyon. The canyon reaches depths of 600 feet and is often less than a quarter mile across. The cliffs and natural arches that bind Jump Creek as it flows through the canyon are primarily of Miocene volcanic origin. After exiting the canyon, Jump Creek opens up into the low gradient Snake River Plain where it flows in a northerly direction to the Snake River.

The Sands Basin portion of Jump Creek does not have year round flow although perennial pools occur in some years. Flow occurs as a direct result of spring snowmelt or flash flooding from cloudbursts. The flashiness of the stream discourages the growth of a shrub community. Instead, the riparian community consists mostly of tall forbs and grasses. About 2 miles down the canyon, a series of springs originate along a one-quarter mile stretch of the creek, marking the beginning of the perennial section. Below the springs, the quantity of water gradually increases as the stream mixes with other springs and small intermittent tributaries. Near the end of the canyon the 60-foot Jump Creek Falls occur (Figure 1.10). These falls effectively isolate the upper segment of stream from the lower segment. As the stream enters the Snake River Plain it begins to mix with a series of agricultural drains and small tributaries until it enters the Snake River.

### Land Ownership and Land Use

The primary land use within the publicly held portion is livestock grazing. Within the privately held portion the land uses are primarily agricultural related activities such as rangeland grazing and sprinkler and flood irrigated cropland. The land uses in this agricultural segment are being addressed for sediment (although it is not §303(d) listed for sediment). The agricultural practices being addressed in this Implementation Plan are irrigated grazing and irrigated cropland. Figure 1 shows the land use patterns within the Jump Creek watershed (DEQ 2002a). The irrigated crops raised along Jump creek consist of alfalfa hay, beans, corn, grains, sugar beets, onions, alfalfa seed, and various other seed crops (onion seed, carrot seed, sweet corn seed, clover seed, lettuce seed, radish seed and bean seed). The intensively row cropped area along Jump Creek is from Highway 95 downstream to the Snake River near Marsing, Idaho.

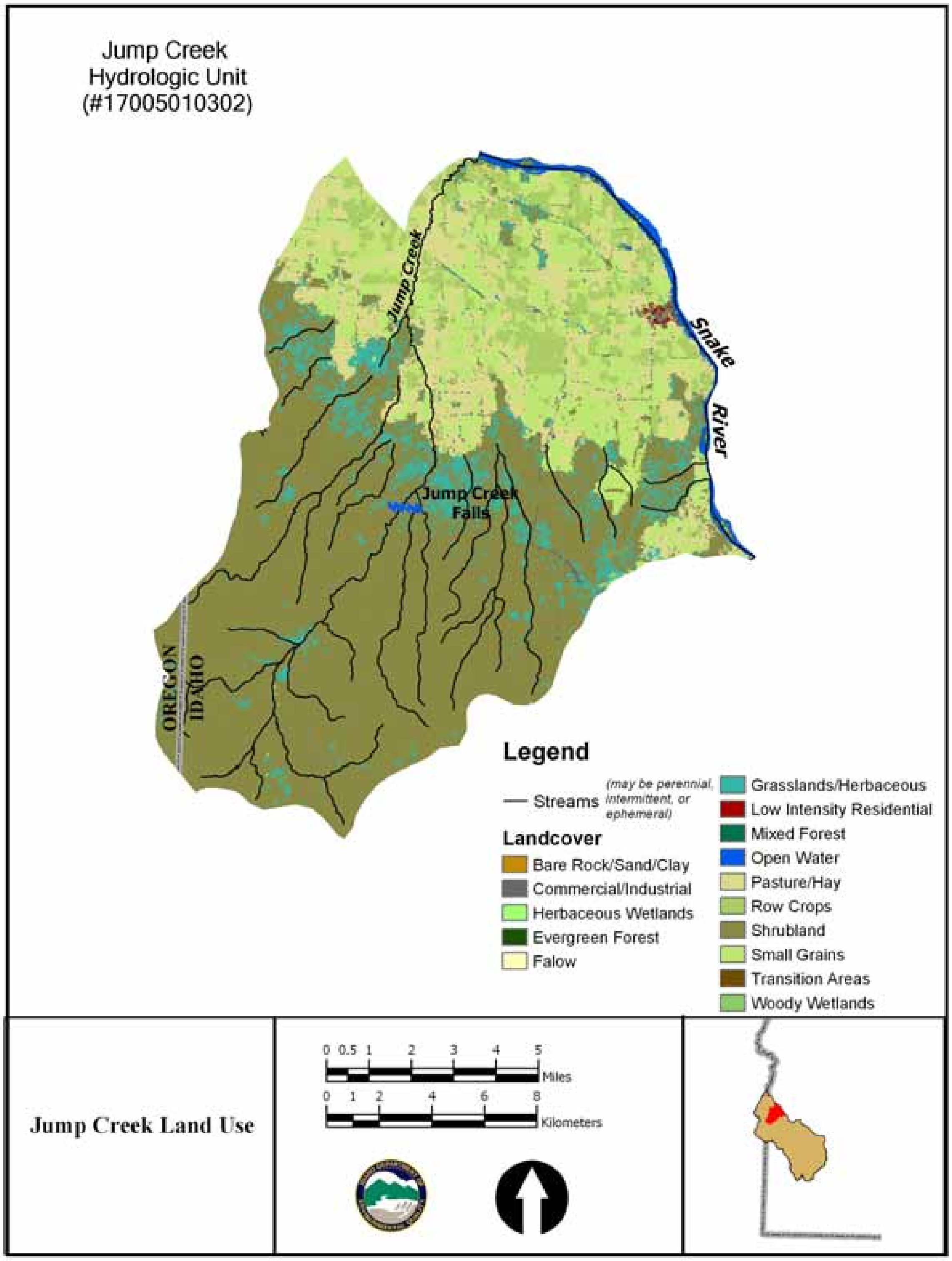



**Figure 1. Jump Creek Land Use**

**Water Quality Issue**

The water quality issue we are going to address in the segment of Jump Creek from the Mule Creek Drain to the Snake River is sediment. This segment of stream is primarily privately owned agricultural lands. There are two primary sources that are responsible for the sediment problem in Jump Creek. The first is soil erosion from fields that border the stream and the second is sediment being added to the creek by agricultural drains and tributaries. Both sources originate from soil erosion off agricultural fields.

**Implementation Tiers**

In order to achieve the goals set forth in the TMDL Subbasin Assessment, land treatment through BMP installation will be pursued in a three tier format. Agricultural land that drains directly into Jump Creek, or drain directly into agricultural drains that drain directly into Jump Creek is included in **Tier 1**. Tier 1 fields have the most immediate impact on water quality due to their proximity, or influence to a 303 (d) listed stream segment. Unlike Tier 1 fields, **Tier 2** fields are not directly adjacent to a 303 (d) listed stream segment, and the wastewater from Tier 2 acreage has the potential to be reused by Tier 1 acreage before entering a 303 (d) listed stream segment. **Tier 3** fields are located in the uplands where wastewater has the potential to be used multiple times by Tier 2 and Tier 1 acreage before entering a stream segment of concern.

The Jump Creek Sub-watershed consists of a total of 21,790.9 acres, but only 17,790.3 acres (81.6%) actually produces agricultural crops. Table l below shows the total farmable acres in each of their respective categories.

**Table 1. Jump Creek Sub-watershed**

| **Treatment Unit** | **Acres** | **Percentage of Total Ag. Acres** |
|---|---|---|
| Tier 1: surface irrigated cropland | 524.6 | 2.9% |
| Tier 2: surface irrigated cropland | 6836.5 | 38.5% |
| Tier 3: surface irrigated cropland | 2295.2 | 12.9% |
| Irrigated Pasture | 1409.2 | 7.9% |
| Sprinkler irrigated cropland | 6425.2 | 36.1% |
| CAFO/AFO | 299.6 | 1.7% |
| | | |
| **Total** | 17790.3 | 100% |

# Jump Creek

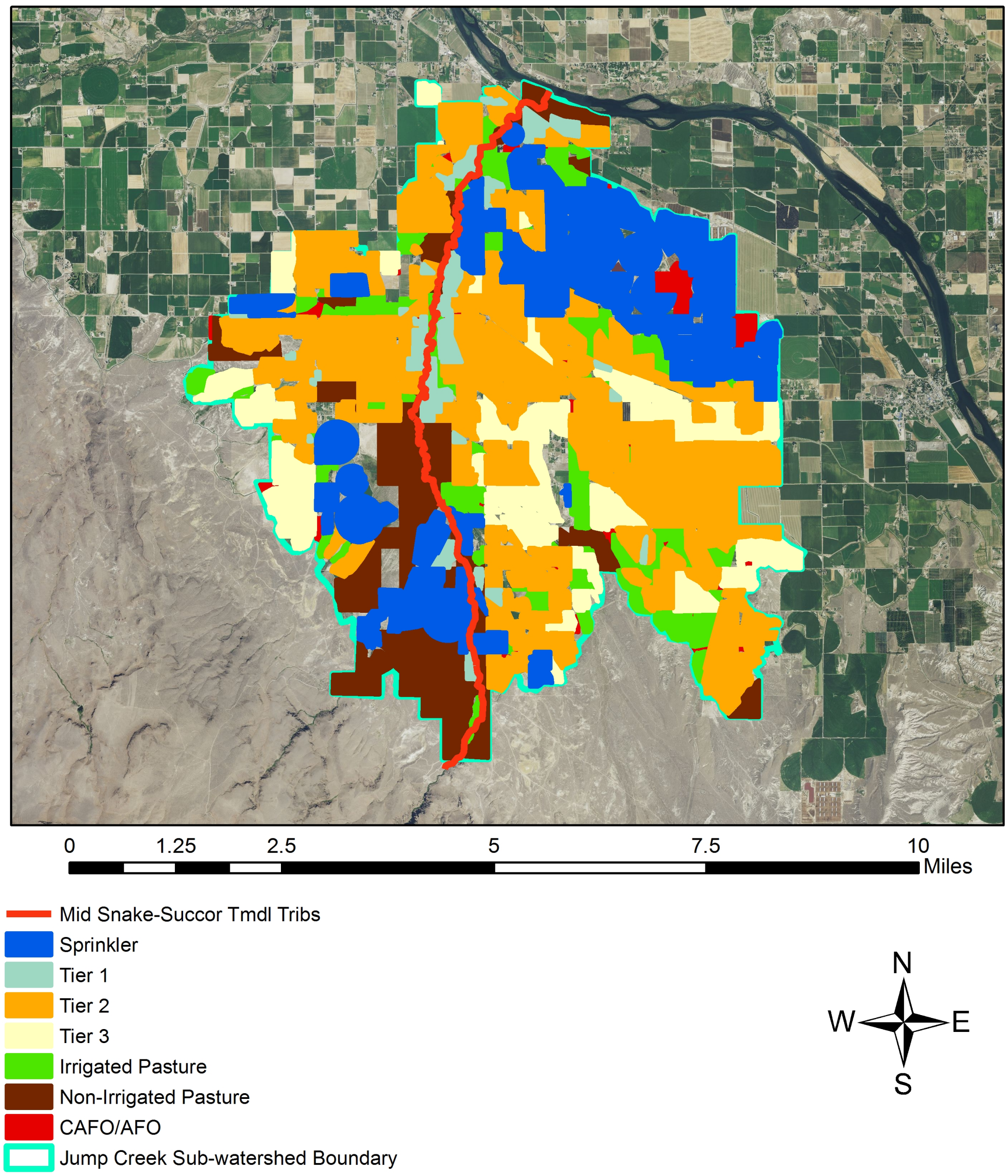



**Figure 2. Jump Creek Tier Map**

**In terms of BMP implementation Tier 1 Fields are high priority, Tier 2 Fields are medium priority, and Tier 3 Fields are low priority in terms of water quality.**

## Implementation Plan BMPs

Agricultural conservation and soil erosion practices are typically referred to as Best Management Practices (BMPs).  These practices are nationally derived systems to control, reduce, or prevent soil erosion and sedimentation on agricultural land uses (APAP, 2003).  BMPs are selected to reduce irrigation-induced and streambank erosion, contain and filter sediment, nutrients, and bacteria from irrigation wastewater, contain and properly dispose of animal wastes,and reduce leaching of nutrients and pesticides. Proper implementation of BMPs on agricultural fields within the Jump Creek Sub-watershed will improve the quality of surface water in the project area and reduce pollutant loading to the Snake River from Jump Creek.

## BMP Implementation Costs

The cost list to install BMPs on private agricultural land is available from the Owyhee Soil Conservation District office in Marsing and the Bruneau River Soil Conservation District office in Bruneau.  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).  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,  or after installation, a more accurate watershed-wide budget will be developed during the on-site planning and implementation process.  Table 3 provides the typical costs for many of the applicable BMP components for southern Idaho. Labor and equipment costs are not included in this table due to the variation from one site to another.

**Table 3. Avg. Costs of Component Practices Applicable to Owyhee County**

| Component | Unit of Measure | Cost/Unit |
|---|---|---|
| Anionic Polyacrylamide (PAM) | Acre | $ 12.50 |
| Cover Crop | Acre | $ 30.00 |
| Deep Tillage | Acre | $ 12.00 |
| Fence, 4 wire | Feet | $ 1.40 |
| Filter Strip | Acre | $ 200.00 |
| Irrigation (surge irrigation) | Acre | $ 750.00 |
| Irrigation (pivot) | Acre | $1320.00 |
| Irrigation (wheel line system) | Acre | $1125.00 |
| Prescribed Grazing, Irrigated Pasture | Acre | $ 1.10 |
| Prescribed Grazing, Rangeland | Acre | $ 0.11 |
| Pest Management (Noxious Weeds) | Acre | $ 40.00 |
| Nutrient Management | Acre | $ 0.00 |
| Spring Development | Each | $2,000.00 |
| Trough or Tank | Each | $ 990.00 |
| Streambank & Shoreline Protection | Each | Job Estimate |
| Stream Channel Stabilization | Each | Job Estimate |
| Wildlife Watering Facility | Each | $ 500.00 |
| Watering Facility, Nose pump | Each | $ 550.00 |

**Costs may increase with greater travel distances and accessibility**
****Source: NRCS 2005 EQIP Cost List – Average Costs, For Estimates Only**

**Example Description of Alternatives for Surface Irrigated Cropland** (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

**SITE SPECIFIC BMP Alternative #1a ($1520/acre)**

Irrigation Water Mgmt.
Drip Irrigation System
Nutrient Mgmt.Surface
Conservation Crop Rotation

**Alternative #1b ($920/acre)**

Sprinkler Irrigation
Nutrient Mgmt.
Conservation Crop Rotation
Irrigation Water Mgmt.

**SITE SPECIFIC BMP Alternative #2 ($575/acre)**

Irrigation Water Mgmt.
Land Leveling
Irrigated System
Gated Pipe
Tail Water Recovery System
Nutrient Mgmt.
Conservation Crop Rotation
Conservation Tillage

**SITE SPECIFIC BMP Alternative #3 ($300/acre)**

Irrigation Water Mgmt.
Concrete Ditch
Filter Strip
PAM
Sediment Basin
Nutrient Mgmt.
Conservation Crop Rotation
Conservation Tillage

**Example Description of Alternatives for Surface Irrigated Pasture** (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

**SITE SPECIFIC BMP Alternative #1 ($520/acre)**

Fencing
Planned Grazing System
Pasture & Hayland Mgmt.
Nutrient Mgmt.
Heavy Use Protection
Livestock Watering Fac.
Irrigation Water Mgmt
Field Border Irr. System
Gated Pipe

**SITE SPECIFIC BMP Alternative #2 ($400/acre)**

Fencing
Planned Grazing System
Pasture & Hayland Mgmt.
Nutrient Mgmt.
Irrigation Water Mgmt.
Livestock Watering Fac.
Field Border Irr. System

**SITE SPECIFIC BMP Alternative #3 ($290/acre)**

Fencing
Pasture & Hayland Mgmt.
Nutrient Mgmt.
Livestock Watering Fac.
Irrigation Water Mgmt.
Field Border Irr. System

**Table 4. Estimated BMP Cost Summary of Treatment Alternatives for the Jump Creek Sub-watershed, Tier 1 Fields.**

| ALTERNATIVE | | ACRES | Total Costs |
|---|---|---|---|
| Alternative 1a | $1520 / AC | 524.6 | $ 797,992 |
| Alternative 1b | $ 920 / AC | 524.6 | $ 482,632 |
| Alternative 2 | $ 575 / AC | 524.6 | $ 301,645 |
| Alternative 3 | $ 300 / AC | 524.6 | $ 157,380 |

**Table 5. Estimated BMP Cost Summary of Treatment for the Jump Creek Sub-watershed, Tier 1 & Tier 2 Fields.**

| ALTERNATIVE | | ACRES | Total Costs |
|---|---|---|---|
| Alternative 1a | $1520 / AC | 7361 | $ 11,188,720 |
| Alternative 1b | $ 920 / AC | 7361 | $ 6,772,120 |
| Alternative 2 | $ 575 / AC | 7361 | $ 4,232,575 |
| Alternative 3 | $ 300 / AC | 7361 | $ 2,208,300 |

**Final cost estimates and selected implementation alternatives will be determined during the on farm, site specific planning with each individual landowner or operator.**

## Tasks for Privately Owned Parcels

**<u>Task 1</u>**: Develop conservation plans with private agricultural landowners.
Responsible
Agencies: IASCD, ISCC & NRCS (support from IDL and BLM)
Timeline: Ongoing

**<u>Task 2</u>**: Assist private agricultural landowners to implement conservation plan components.
Responsible
Agencies: IASCD, ISCC & NRCS (support from IDL and BLM)
Timeline: Ongoing

**<u>Task 3</u>**: Monitor conservation implementation progress on cropland and evaluate effect on riparian area along Jump Creek.
Responsible
Agencies: IASCD & ISCC (support from NRCS, IDL and BLM)
Timetable: Ongoing

# APPENDIX #3

## Sinker Creek Subwatershed

As shown in Figure 1.13, Sinker Creek drains approximately 51,671 acres of primarily rangeland. A fourth order, low to moderately sinuous stream, Sinker Creek originates at over 8,000 feet in the Silver City Range of the Owyhee Mountains and flows in a northerly direction into the Snake River at 2,400 feet. Hulet Reservoir is located 12.9 miles upstream from the mouth of Sinker Creek.

Sinker Creek is perennial except in extreme drought years. However, the stream goes dry near the mouth due to flow diversions. Additionally, the nearby Nahas Reservoir is filled with water from Sinker Creek. Sinker Creek cuts through steep V-shaped basalt canyon in places and in others opens up into small low gradient valleys. In the canyon areas, the channel shape is trapezoid , and more dish shaped in the cropland areas.

**Land Ownership and Land Use**

The primary land use within the publicly held portion is rangeland grazing. Both irrigated agriculture and rangeland grazing occur in the privately owned portion. Table1shows stream length by ownership and Figure 1 shows land use. Irrigated agriculture is limited to two areas along Sinker Creek. The first area is very small irrigated permanent pastures along the creek above Highway 78 on the Joyce Ranch and the second is flood irrigated croplands down stream about 2 miles on the John Edwards Ranch.

**Table 1. Stream Length by Ownership**

| NAME | Length (Miles) | Percent |
|---|---|---|
| B.L.M. | 5.8 | 29% |
| Private | 13.3 | 66% |
| State of Idaho | 1.1 | 5% |
| Total Miles within 5th Field HUC | 20.2 | |

## Private Land Riparian Resource Concerns

### Riparian/wetland vegetation

All of the reaches assessed by the Idaho Soil Conservation Commission Riparian Team in 2003 on Sinker Creek were found without adequate stabilizing vegetative species (SC 1-18). Vigor was found to be poor in all but 2 reaches (SC11 & 12). Regeneration of riparian species is limited throughout most of the stream reaches (except for SC12). Water was found to be adequate (within shallow aquifer) for maintaining riparian vegetation, except in SC1, just downstream of the reservoir. However, cottonwood trees regenerate on new gravel deposits formed by adequate storm flows. Because of the reservoir, storm flows are no longer creating gravel deposits downstream.

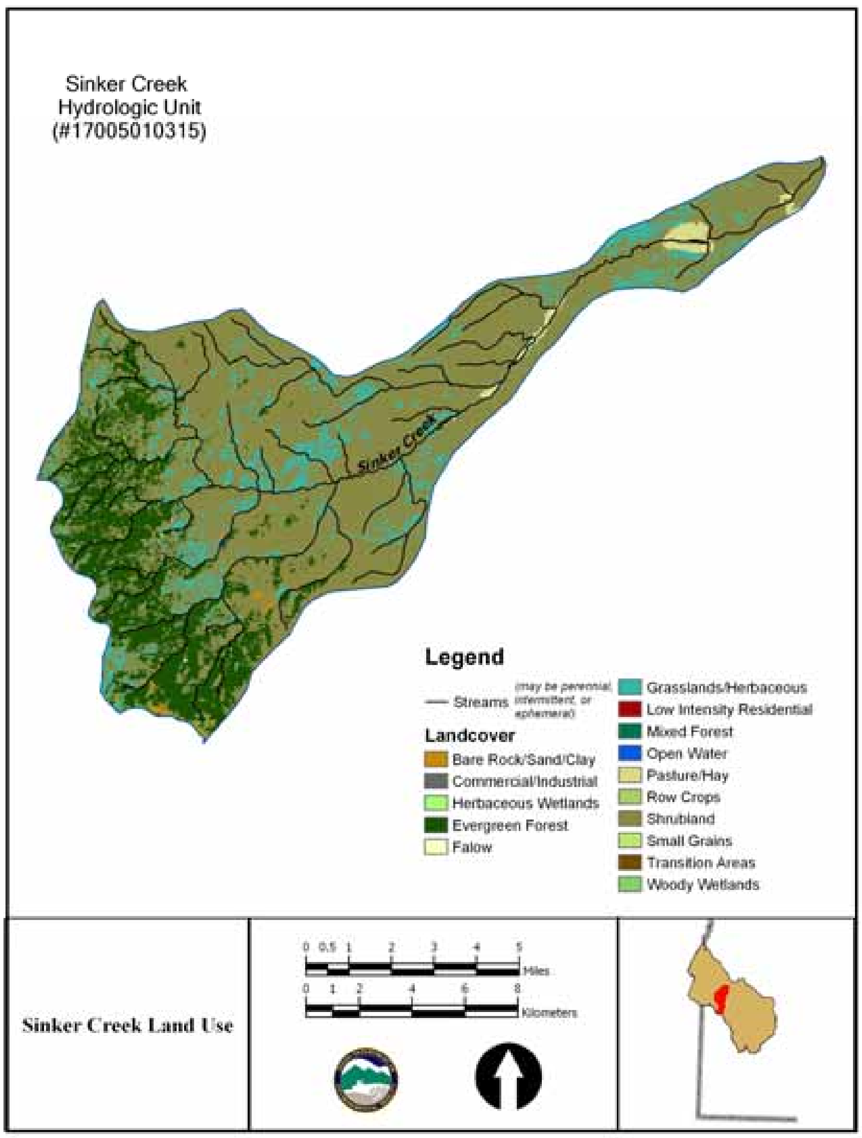



**Figure 1. Sinker Creek Land Use**

### Lateral Stream Bank Erosion – Floodplain Development

No reaches were found to have excessive lateral stream bank erosion with an outward development of its floodplain. This is mainly due to the reservoir's buffering effect on storm flows and the cobble dominated channel.

### Channel Down-cutting

No active head cuts were found within any of the eighteen reaches assessed in Sinker Creek.

### Various Riparian Attributes

See table 2 below.

**Table 2. Various Attributes**

| Stream Reach | Beaver Dams? | Beaver Dams Stable? | Excessive Bank Erosion | Excessive Deposition? | Unstable Head Cuts | Floodplain developing outward? |
|---|---|---|---|---|---|---|
| Sinker CreekSC1 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC2 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC3 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC4 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC5 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC6 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC7 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC8 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC9 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC10 | YES | NO | NO | NO | NO | NO |
| Sinker CreekSC11 | YES | YES | NO | NO | NO | NO |
| Sinker CreekSC12 | YES | YES | NO | NO | NO | NO |
| Sinker CreekSC13 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC14 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC15 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC16 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC17 | NO | NO | NO | NO | NO | NO |
| Sinker CreekSC18 | NO | NO | NO | NO | NO | NO |

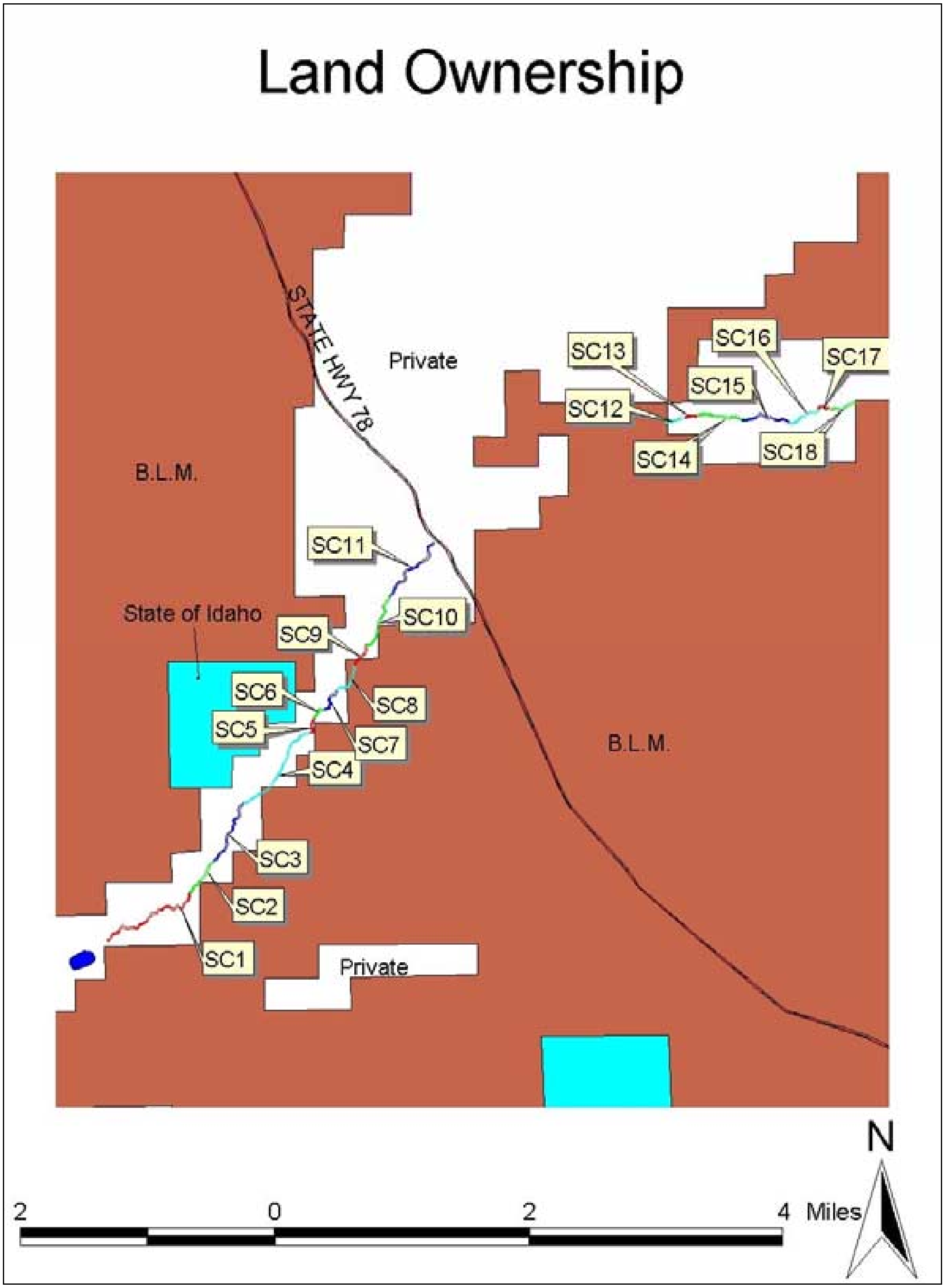



**Figure 2. Sinker Creek Land Ownership**

**Private Land Riparian Improvement Recommendations**

The result of the 2003 stream inventory and the interpretation of the data indicate that there are areas in need of improvement. Conservation plans should be developed with landowners to establish Best Management Practices to improve and maintain healthy riparian conditions. The author has identified areas of greater priority for improvements. High priority areas are determined by the stream's current "state of transition" and how effective a BMP will improve conditions. A recently down-cut stream may respond slowly to grazing management adjustments while it's floodplain is still increasing in an outwardly direction. In comparison, a stream with a well-developed floodplain may respond very well to a given change in grazing practices. Each stream reach, in many cases, each pasture, needs to be evaluated on its own merits. What works well in one area may not work at all in another. There are two actions that should be implemented soon: offsite water facilities and a reduction in grazing duration. These two actions are certain to provide some level of improvement and protection of existing riparian areas.

All of the reaches assessed in 2003 need some level of management change. Many reaches were found to be lacking in riparian vegetation, possibly in a downward vegetative trend, but stability does not seem to be such a problem because of the reservoir.

**Private Land Priority Treatment Areas**

The riparian areas in need of grazing management adjustments could be accomplished with or without the use of structural components such as fencing. However, additional water developments and pasture fencing could make it easier to control livestock distribution and grazing intensity.

Some stream reaches will improve more quickly than others due to their current condition and available water. It seems, due to the affect of the reservoir on storm flows, the reaches may not need such a wide floodplain. There does not seem to be excessive erosion as annual flows and large storm flows are being buffered out by the reservoir. Today, however, riparian vegetation regeneration is more important than protection from stream bank erosion. Channel diversity (pools, riffles, etc.) will develop slowly, due to altered flows and the cobble dominated channel that makes up Sinker Creek.

The author has determined that the riparian conditions are the result of "in-stream" activities and not upland related. There was no evidence that excessive stream bank erosion or deposition is caused from poor upland conditions. This determination does not imply absence of problems in the uplands, but that there is no evidence that upland problems are directly impacting stream function. Regarding the TMDL objectives for the streams assessed in 2003, the primary focus should be on the riparian areas themselves.

There seems to be adequate floodplain (outward development) on most all of the reaches. There are no indicators present that indicate the stream is seeking additional outward floodplain. Inward floodplain development is still needed on all reaches, as most reaches are dish shaped, with over widened channels. Reaches SC11 & 12 are excluded from this observation, however, because of the beaver dams. This inward floodplain development would decrease the appearance of ‘dish-shaped’ channels and increase trapezoid-shaped channels. Since this stream is mostly dominated with cobble and gravel, it is not as likely to create a true ‘trapezoid’-shape channel. Stream reach SC6 seems to contain a trapezoid shaped channel, created mostly by the cottonwood trees.

Stabilizing vegetation is very influential on channel shape. Vegetation can decrease channel bank full widths, creating trapezoid-shaped channels, and ultimately increasing floodplains inwardly. As dish-shaped channels are converted to trapezoid shaped channels, it is likely that the excess fine material trapped within channel will be scoured out, thus reducing stream embeddedness. In reaches SC1 to SC10, cottonwood and black willow trees dominate the riparian area greatly restricting material fines in the stream. Downstream in reaches SC12 – SC18, sedges seem to have a greater role in channel shape development where the channel holds a greater amount of fine material within the system.

The average gradient is about 1.1% (range 0.5 to 1.8%). In general, lower gradient streams usually consist of smaller sized parent materials, however, this was a depositional area with cottonwood as the dominant vegetative species. Gravel and cobble sized material are dominant here until the lower reaches (SC12 - SC18). The lower reaches are low gradient and consist of a larger portion of sand, silt and clay material.

If channel widths are decreased, average bank full depths will increase. This will increase more trapezoid-shaped channels and increase floodplain inwardly. In low gradient streams, riparian vegetation actually creates and maintains floodplain development. Riparian vegetation usually starts within newly developed floodplains by first establishing colonizing riparian plant species. These colonizers are later replaced by stabilizing riparian species as natural succession continues. In the later stages of a developing riparian area, woody vegetation such as whiplash willow, cottonwood, and alder will become established and create a greater shading potential in and around the wetland areas. Shrubs, by nature, can provide a greater amount of shading on narrow streams due to their density, compared to larger trees. The greater the stream channel width, the less potential shading is available to the water, due to the vegetation crown width limits. Where the TMDL is calling for a 12 percent increase in shade, from 0.5 miles south of highway 78 to nearly the mouth, improvements could be made from SC13 to SC18 on private land. The improvements in channel shape may provide for lower stream temperatures before an increase in shading could, given the soil types and water availability.

Most of these stream reaches are capable and do support woody species (trees and shrubs), but at different quantity levels.  Riparian woody species are restricted by water availability, elevation to surface, soil type, and availability of parent stock.

Based on assessments, there are “reference” stream reaches within the Sinker Creek that represent better riparian conditions within the sub-watershed.  The right bank (looking downstream) of SC6 seems to represent the possible channel shape (see picture to right).  This reach closely represents the initial potential for riparian stability, vegetation cover, and diversity within the stream. The left bank, as shown in the picture to the right, of course, does not show the trapezoid shape. This is just upstream of a stream crossing.  It is not unusual to find a patchwork of vegetation and channel shape along many of the riparian areas, interrupting a continuous line of vegetation.

Due to soil variability, rocky terrain, vegetative diversity, and soil moisture, a continual line of shading does not occur.  Stream channel meandering both shades and exposes water surfaces to direct sunlight.  Valley aspect (i.e. south vs. west flowing channels) also influences the shading and the greater the sinuosity the more diverse the shading characteristics.  Sinker Creek flows basically flows from southwest to northwest (from the reservoir to mouth), somewhat perpendicular to the sun’s daily summer path.

If width-depth ratios are decreased, primarily by decreasing channel width, average depth will increase which will increase water velocities.  This of course, could increase fishery habitat (deeper pools and riffles in $\leq$ 2 percent gradients) while increasing soil to water contact.  The greater the soil-to-water contact, the greater the cooling affect of the ground water and soils have on overall stream temperature.  Narrowing the channel should also get at reducing fine material in the channel, addressing the TMDL sediment objectives (8.64% reduction in stream bank erosion).

To further improve stability and shading, the duration of grazing should be reduced. Watering facilities are needed and fencing may be needed to increase the number of pastures to increase rotation and decrease duration.  The primary reason to reduce duration and adjust timing is to increase and protect the riparian vegetation.  Allowing new vegetation growth each year will create multiple age classes, which increases both the quantity and quality of stabilizers along the stream bank in order to ensure long-term bank stability.  There is a concern however with cottonwood regeneration.  Future cottonwood growth will likely be limited to a narrow band along the stream channel, while there is little storm flow disturbance to create gravel bars.  A natural transition to other riparian species may be occurring.  Russian olive trees are more dominant near Highway 78.

A Proper Function Condition (PFC) Assessment was completed for the reaches. Based on the assessments and the data collected, the author has prioritized which stream reaches should be addressed. The typical criteria for the prioritization are as follows:

1. Reaches that have full outwardly developed floodplains, whereas no excessive lateral stream bank erosion is indicating active outward floodplain development,
2. Floodplains exist and are inundated with relatively frequent flood events (every 1-2 years),
3. A diverse community of riparian-wetland vegetative species exists,
4. Adequate soil moisture for riparian-wetland species to exist.

**Table 3. Stream Reach Condition Summary**

| Stream Name | Adequate stabilizing vegetative species present | Excessive lateral streambank erosion | Active & unstable headcuts present | Flow Alterations-Shallow ground water | Rated at Proper Functioning Condition (PFC) | High potential for successful treatment | Low potential for successful treatment |
|---|---|---|---|---|---|---|---|
| | Stream Reach (es) | | | | | | |
| Sinker Creek | N/A | N/A | N/A | SC1,4 | SC11,12 | SC2,3, SC5-10 SC13-18 | SC1,4 |

**Reaches with high potential for improvement**

These stream segments will improve rapidly with the implementation of certain BMPs.

**Reaches with low potential for improvement**

Flow alteration and shallow ground water supply seems to be the most limiting factor in these two reaches.

**Reaches nearly at PFC, but in need of some additional improvement**

SC 11 & 12 – There exist active beaver dams within these two reaches. Some utilization of riparian species is higher than desired. The upstream portion of SC12 is in good condition, but the lower portion could use some improvement. The inevitable loss of food supply for beaver can compromise the integrity of the dams. By allowing existing riparian vegetation to stabilize the dams, it should reduce the risk of failure if the beaver leave the area.

**Final cost estimates and selected implementation alternatives will be determined during the on farm, site specific planning with each individual landowner or operator.**

**Tasks for Privately Owned Parcels**

**<u>Task 1</u>**: Develop conservation plans with private agricultural landowners.
Responsible Agencies: IASCD, ISCC & NRCS (support from IDL, and BLM)
Timeline: Ongoing

**<u>Task 2</u>**: Assist private agricultural landowners to implement conservation plan components.
Responsible Agencies: IASCD, ISCC & NRCS (support from IDL, and BLM)
Timeline: Ongoing

**<u>Task 3</u>**: Monitor conservation implementation progress and evaluate effect on vegetation and channel shape.
Responsible Agency: IASCD & ISCC (support from NRCS, IDL, and BLM)
Timeline: Ongoing

# APPENDIX #4

## Succor Creek Subwatershed (Upper & Lower)

Succor Creek is a 67.3-mile long stream located in the states of Idaho and Oregon. The elevation change in the watershed is 4,400 feet, with the elevation of the headwaters at 6,600 feet and mouth at 2,200 feet. The headwaters of Succor Creek are located approximately 6 miles north of DeLamar, near Johnson Lakes in Owyhee County, Idaho. After flowing in a northeasterly direction to near Rooster Comb Peak, Succor Creek turns to the northwest for approximately 5 miles. The stream then turns to the southwest and enters Succor Creek Reservoir. The reservoir was constructed in 1979 for agricultural storage. After exiting the reservoir, Succor Creek continues to flow in a southwesterly direction for another mile. It then turns to the northwest until it enters Oregon. This entire segment of Succor Creek will be referred to as Upper Succor Creek in this TMDL Implementation Plan. In Oregon, Succor Creek travels primarily directly north. The stream flows through agricultural land, rangeland and Succor Creek State Park. Succor Creek exits Oregon 5.4 miles above Homedale, Idaho, and travels in a northeasterly direction to its confluence with the Snake River. This segment of Succor Creek (in Idaho) will be referred to as Lower Succor Creek in this TMDL Implementation Plan. Only the portions of Succor Creek that are in Idaho are addressed in this Implementation Plan.

During most years, the entirety of upper Succor Creek is classified as a perennial stream, due to the presence of scattered naturally perennial pools that support aquatic life. However, in most years there is no evident flow of water between the pools. Above the reservoir, flow occurs as a direct result of spring snowmelt and the subsequent bank storage. Below the reservoir to the Oregon Line, flow is largely affected by the discharge from Succor Creek Reservoir and the stream rarely is without water. In the lower segment (lower Succor Creek) near Homedale (Oregon Line to Snake River), the stream is a perennial flowing stream, due to natural springs flowing into Succor Creek and agricultural return water.

### Land Ownership and Land Use

The primary land use within the publicly and privately held portion of the Upper Succor Creek watershed is livestock grazing. Within the privately held portion of Lower Succor Creek, the land uses are primarily agricultural related activities such as intensive row crop farming and livestock grazing on irrigated pastures. Most of the cropland within the Lower Succor Creek sub-watershed is flood irrigated, with only a small percentage of sprinkler irrigation at the present time. Figure 1 shows the land use patterns within the Idaho portions of the Succor Creek watershed (DEQ 2002a). Note: The headwaters drainage of Succor Creek (Upper Succor Creek) is depicted on the bottom of the map and the mouth of Succor Creek (Lower Succor Creek) is depicted on the top of the map.

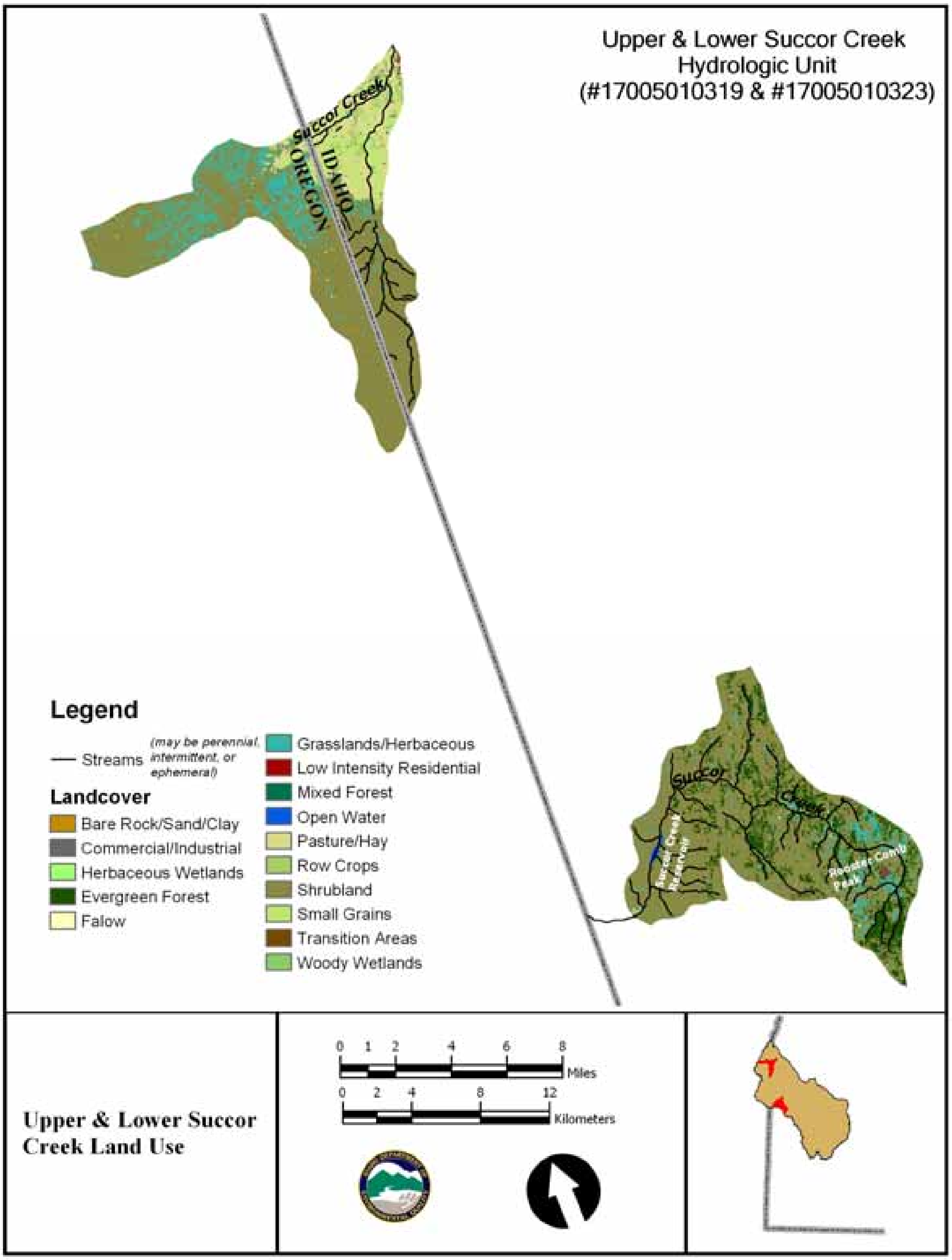



**Figure 1. Upper and Lower Succor Creek Land Use**

## Upper Succor Creek Subwatershed

### Private Land Riparian Resource Assessment

The purpose of this section is to provide a brief description of the riparian areas assessed in 2003.

### Priority Riparian Areas

Grazing related impacts on private lands within Upper Succor Creek are of primary concern. The land use surrounding this water body is primarily livestock grazing. Livestock grazing is currently having varying degrees of impact on riparian health and stream function.

### Private land ownership

Table 1 summarizes the land ownership in the Upper Succor Creek 5$^{th}$ field subwatershed. The subwatershed boundary for this report ends at the Idaho/Oregon State Line, even though the actual subwatershed overlaps into Oregon. The total acres will be slightly less than the actual for the Upper Succor subwatershed. There are just over 35 thousand acres within this subwatershed. Table 2 on the following page shows stream ownership in miles. Again, this only represents the Upper Succor Creek area. According to IDEQ 2003, there are approximately 67 total stream miles (headwaters to mouth on Snake River). Notice that an analysis by land area shows that 52% is comprised of private land. Table 2 shows ownership by stream miles, 66% is on private lands.

### Upper Succor Creek

| Table 1. Land Ownership | | |
|---|---|---|
| NAME | Acres | Percent |
| B.L.M. | 10881 | 31% |
| Open water | 181 | <1% |
| Private | 18423 | 52% |
| State of Idaho | 5715 | 16% |
| Total of Acres within HUC | 35199 | |

The stream miles in Table 2 have been derived from ArcView shape files called idown and hydro100k, found on the state ftp GIS site (http://www.idwr.state.id.us/ftp/gisdata/). There exists a high degree of error in hydro100 stream lengths due to the method used to digitize the stream segments. All of the segment's lengths are shorter than actual. For the purposes of comparison in Table 2, however, the lengths used here are adequate.

## Upper Succor Creek

| Table 2. Stream Length by Ownership | | |
|---|---|---|
| NAME | Length (Miles) | Percent |
| B.L.M. | 3.0 | 15% |
| Open water | 1.5 | 8% |
| Private | 13.2 | 66% |
| State of Idaho | 2.2 | 11% |
| Total Miles within 5th Field HUC | 19.9 | |

### Private land use/management

Based on the 2003 assessments within most of the water listed in Table 2, most all have been found to still have active riparian livestock grazing. There are public land allotments associated with these private land areas. These allotments consist of BLM and State managed lands. Multiple resources are managed and grazing duration and locations are adjusted according to BLM policy regarding these various resources. Private lands are often used as holding areas before and after public land grazing periods. Most private land areas consist of wider valleys with lower stream gradients. These areas private land areas were found more suitable to new comers for homesteading.

### Allotments/pastures:

These allotments include state, Bureau of Land Management (BLM), and privately owned lands. Public land management agencies manage the public lands for multiple resources and purposes. Cattle grazing is the primary land use within the Upper Succor Creek Sub-Watershed. Wildlife use is diverse and periodically heavy in the Owyhee area.

### Annual Precipitation (snow & rain)

According to the Western Regional Climate Center (http://www.wrcc.dri.edu/), climate summaries for Silver City and Reynolds Creek Idaho, precipitation ranges from 10 to 21 annual inches of snow and rain. Monthly averages range from 0.5 to 3.0 inches.

### Air temperature

According to the Western Regional Climate Center (http://www.wrcc.dri.edu/), climate summaries, temperature data for Silver City and Reynolds Creek Idaho, air temperatures range from 20 to 86 $^{o}$F.

**Private Land Riparian Resource Problems**
**Riparian/wetland vegetation**

Those reaches found without adequate stabilizing vegetative species are:

USC 1-10, 12-23, 25, & 28

**Lateral Stream Bank Erosion – Floodplain Development**

Stream reaches found to have excessive lateral stream bank erosion with an outward development of its floodplain:

USC 5, 6, 10, 12, 13, 15, 20, 22, 23, 25, 27, & 28

**Channel Down-cutting**

Only two stream reaches have been found to contain active, unstable head cuts:

USC 3 & 12

**Various Riparian Attributes**

See table 3 below.

| Table 3. Various Attributes | | | | | | |
|---|---|---|---|---|---|---|
| Stream Name | Beaver Dams? | Beaver Dams Stable? | Excessive Bank Erosion | Excessive Deposition? | Unstable Head Cuts | Floodplain developing outward? |
| Succor CreekUSC1 | NO | NO | NO | NO | NO | NO |
| Succor CreekUSC2 | NO | NO | NO | NO | NO | NO |
| Succor CreekUSC3 | NO | NO | NO | NO | YES | NO |
| Succor CreekUSC4 | NO | NO | NO | NO | NO | NO |
| Succor CreekUSC5 | NO | NO | YES | YES | NO | YES |
| Succor CreekUSC6 | NO | NO | YES | NO | NO | YES |
| Succor CreekUSC7 | NO | NO | NO | NO | NO | NO |
| Succor CreekUSC8 | NO | NO | YES | NO | NO | NO |
| Succor CreekUSC9 | NO | NO | YES | NO | NO | NO |
| Succor CreekUSC10 | YES | YES | YES | NO | NO | YES |
| Succor CreekUSC11 | YES | YES | NO | NO | NO | NO |
| Succor CreekUSC12 | NO | NO | YES | NO | YES | YES |
| Succor CreekUSC13 | NO | NO | YES | NO | NO | YES |
| Succor CreekUSC14 | NO | NO | YES | NO | NO | NO |
| Succor CreekUSC15 | NO | NO | YES | NO | NO | YES |
| Succor CreekUSC16 | NO | NO | YES | NO | NO | YES |
| Succor CreekUSC17 | NO | NO | NO | NO | NO | NO |
| Succor CreekUSC18 | NO | NO | NO | NO | NO | NO |
| Succor CreekUSC19 | NO | NO | NO | NO | NO | NO |
| Succor CreekUSC20 | NO | NO | YES | NO | NO | YES |
| Succor CreekUSC21 | NO | NO | NO | NO | NO | NO |
| Succor CreekUSC22 | NO | NO | YES | NO | NO | YES |
| Succor CreekUSC23 | NO | NO | YES | NO | NO | YES |
| Succor CreekUSC24 | NO | NO | NO | NO | NO | NO |
| Succor CreekUSC25 | NO | NO | YES | NO | NO | YES |
| Succor CreekUSC26 | NO | NO | NO | NO | NO | NO |
| Succor CreekUSC27 | NO | NO | YES | NO | NO | YES |
| Succor CreekUSC28 | YES | YES | YES | NO | NO | YES |

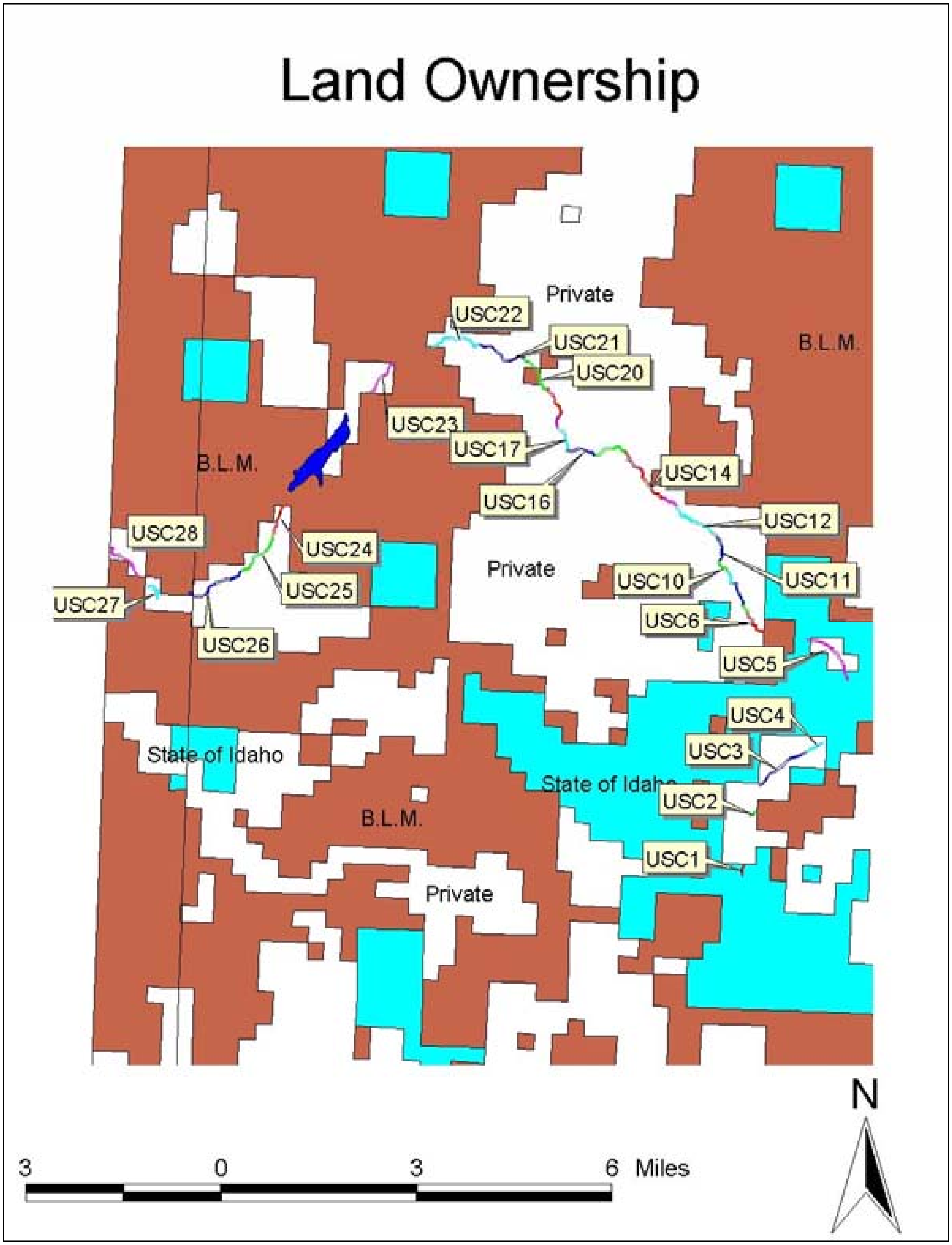



**Figure 2. Upper Succor Creek Land Ownership**

## Private Land Riparian Improvement Recommendations

The result of the 2003 stream inventory and the interpretation of the data indicate that there are areas in need of improvement. Conservation plans should be developed with landowners to establish Best Management Practices to improve and maintain healthy riparian conditions. The author has identified areas of greater priority for improvements. High priority areas are determined by the stream's current "state of transition" and how effective a BMP will improve conditions. A recently down-cut stream may not respond well to any grazing management adjustments while it is still increasing floodplain capacity. In comparison, a stream with a well-developed floodplain may respond very well to a given change in grazing practices. Each stream reach, in many cases, each pasture, needs to be evaluated on its own merits. What works well in one area may not work at all in another. There are two certain actions that should be implemented soon: offsite water facilities and head cut stabilization. These two actions are certain to provide some level of improvement and protection of existing riparian areas.

Not all of the reaches assessed in 2003 will require management changes. Most reaches were found in to be in an upward vegetative trend, but still in need of channel shape and stability improvements (see priorities below). It is important to note however that those stream channels and riparian areas found in good condition need to be maintained. Also, further improvement in channel complexity, such as those characteristics desired by aquatic species, should continue to improve with time under current management.

## Private Land Priority Treatment Areas

Some of the riparian areas that are in need of grazing management adjustments could be accomplished with or without the use of structural components such as fencing. However, additional water developments and pasture fencing could make it easier to control livestock distribution and grazing intensity.

Some stream reaches will improve more quickly than others due to their current condition and stage of stream development. Streams with well-developed flood plains should respond more quickly to grazing management adjustments. These stream reaches should be of higher priority for conservation plan development.

The author has determined that the riparian conditions are the result of "in-stream" activities and not upland related. There was no evidence that excessive stream bank erosion or deposition is caused from poor upland conditions. This determination does not imply absence of problems in the uplands, but that there is no evidence that upland problems are directly impacting stream function. Regarding the TMDL objectives for the streams assessed in 2003, the primary focus should be on the riparian areas themselves.

There seems to be adequate floodplain (outward development) on about 47% of the stream reaches assessed. The remaining 53% of the reaches require additional outward floodplain development. Inward floodplain development is still needed on about 89% of the stream segments assessed. This inward development will decrease the appearance of 'dish-shaped' channels and increase trapezoid-shaped channels in gravel, sand and silt/clay-dominated streams. This stream is mostly dominated with gravel and cobble, which are not as likely to create a true 'trapezoid' shaped channel, due to the decreased ability of grass-like vegetation to dominate within this substrate. The average gradient is about 1.6% (range 0.8 to 7.5%). In general, lower gradient streams usually consist of smaller sized material, while this stream, due to its high gradient and geology, consists mostly of gravel and cobbles.

Stabilizing vegetation is very influential on channel shape. Vegetation can decrease channel bankfull widths, creating trapezoid-shaped channels, and ultimately increasing floodplains inwardly. As dish-shaped channels are converted to trapezoid shaped channels, it is likely that the excess fine material trapped within channel will be scoured out to some extent, thus reducing stream embeddedness.

If channel widths are decreased, average bankfull depths will increase. This will increase more trapezoid-shaped channel and increase floodplain inwardly. In low gradient streams, riparian vegetation actually creates and maintains floodplain development. Riparian vegetation starts in a newly developed floodplain by first establishing colonizing riparian plant species. These colonizers are later replaced by stabilizing riparian species as natural succession continues. In the later stages of a developing riparian area, woody vegetation such as whiplash willow, cottonwood, and alder will become established and create a greater shading potential in and around the wetland areas. Shrubs, by nature, can provide a greater amount of shading on narrow streams due to their density, compared to larger trees. The greater the stream channel width, the less potential shading is available to the water, due to the vegetation crown width limits.

Most of these stream reaches are capable and do support woody species (trees and shrubs), but at different rates and quantities. Riparian woody species are restricted by water availability, elevation to surface, soil type, and availability of parent stock.

Based on assessments, there are "reference" stream reaches within the watershed that do in fact represent better riparian conditions within the watershed. These are USC11, 24, and 26. USC 11 a beaver complex, however, should not be used to characterize resource targets elsewhere. These reaches closely represent the potential for riparian stability, vegetation health, and diversity within the stream. Channel diversity, however, is still improving in these reaches. It is not unusual to find a patchwork of vegetation along many of the riparian areas, interrupting a continuous line of vegetation.

In steeper gradient and narrow channel streams with cobble substrate, a continual line of alder or various species of willows may occur. On lower gradient streams, where channel material is diverse and different types of deposition are found at various locations across the valley bottom, riparian vegetation responds accordingly. Due to soil variability, rocky terrain and vegetative diversity, a continual line of shading does not occur. Stream channel meandering both shades and exposes water surfaces to direct sunlight. Valley aspect (i.e. south vs. west flowing channels) also influences the shading and the greater the sinuosity the more diverse the shading characteristics.

If width-depth ratios are decreased, primarily by decreasing channel width, average depth will increase which will increase water velocities. This of course, increases fishery habitat (deeper pools and riffles in $\leq$ 2 percent gradients) while increasing soil to water contact. The greater the soil-to-water contact, the greater the cooling affect ground water and soils have on stream temperature.

To improve stability and shading, the duration of grazing should be reduced. Watering facilities are needed and fencing may be needed to increase the number of pastures to increase rotation and decrease duration. According to some ranchers in the area, there has already been a change in duration, and that is evident on some reaches. The primary reason to reduce duration and adjust timing is to increase and protect riparian vegetation. Allowing new vegetation growth each year will create multiple age classes, which increases both the quantity and quality of stabilizers along the streambank in order to ensure long-term bank stability.

Proper Function Condition (PFC) Assessments, along with other data collection, were completed in the watershed. Based on the assessments and the data collected, the author has prioritized which stream reaches that should be addressed and first. The criteria for the prioritization are as follows:

Reaches that have full outwardly developed floodplains, whereas no excessive lateral streambank erosion is indicating active outward floodplain development,

1. Floodplains exist and are inundated with relatively frequent flood events (every 1-2 years),
2. A diverse community of riparian-wetland vegetative species exists,
3. Adequate soil moisture for riparian-wetland species to exist.

**Table 4. Stream Reach Condition Summary**

| Stream Name | Adequate stabilizing vegetative species present | Excessive lateral streambank erosion | Active & unstable headcuts present | Floodplain development occurring | Rated at Proper Functioning Condition (PFC) | High potential for successful treatment | Low potential for successful treatment |
|---|---|---|---|---|---|---|---|
| | Stream Reach (es) | | | | | | |
| Upper Succor Creek | N/A | N/A | N/A | USC3,12 | USC11,24<br>USC26 | USC1-4<br>USC7-9<br>USC14,17<br>USC18,19<br>USC21 | USC5,6<br>USC10,12<br>USC13,15<br>USC16,20U<br>SC22,23<br>USC25,27<br>USC28 |

Note: Even though the criteria used here to categorize these reaches as having lower potential for improvement (i.e. channel shape, width/depth ratio, floodplain development, etc.) there are upward trends in vegetation in some areas. The author predicts that adequate floodplain and diverse channel characteristics will be slower to develop here than other reaches.

Also, those reaches downstream of the reservoir (USC 24 - 28) are not as likely to build and maintain diverse channel characteristics due to regulated flows. While flows are regulated under normal climate conditions (where adequate water is stored), flows are held at an artificial bankfull flow level for longer periods of time, which seems to have created a uniform channel. Storm events are buffered by the reservoir, which reduces channel and floodplain diversity.

**Reaches rated at PFC**

USC 11, 24, & 26

**Tasks for Privately Owned Parcels**

**Task 1**: Develop conservation plans with private agricultural landowners.
Responsible Agency: IASCD, ISCC & NRCS (support from IDL, and BLM)
Timeline: Ongoing

**Task 2**: Assist private agricultural landowners to implement conservation plan components.
Responsible Agency: IASCD, ISCC & NRCS (support from IDL, and BLM)
Timeline: Ongoing

**Task 3**: Monitor conservation implementation progress and evaluate effect on vegetation and channel shape.
Responsible Agency: IASCD & ISCC (support from NRCS, IDL, and BLM)
Timeline: Ongoing

**Task 4**: Install “reference reach” transects to define potential and capability of shading of stream channels.
Responsible Agency: ISCC (support from IASCD, NRCS, IDL, and BLM)
Timeline: Summer of 2006

## Lower Succor Creek

### Water Quality Issue

Lower Succor Creek is that portion of Succor Creek that flows from Oregon at Idaho's west border to the Snake River below Homedale. The water quality issues we are going to address in Lower Succor Creek are sediment and bacteria. There are two sources of sediment being added to Lower Succor Creek. The first is soil erosion from fields that border the creek and the second is sediment being added to the creek through agricultural drains and tributaries. All sediment originates from soil erosion off agricultural fields. The bacteria problem on Lower Succor Creek originates from irrigated pastures that drain directly and indirectly into the creek.

The overall objective of the TMDL is to achieve water quality that will support appropriate designated uses for Lower Succor Creek as well as the Mid Snake River. The TMDL recognizes that the targets and load reductions may be revised as additional data is collected, as understanding of water quality in the Mid Snake/Succor Watershed improves, and as state water quality standards adapt to reflect new developments.

Agricultural sources of sediment, bacteria and nutrients include erosion from surface irrigated cropland and pastures, runoff from animal feedlots, livestock grazing on or near waterways, and erosion in drainage ditches resulting from continual maintenance**.** BMPs can be implemented to address the following:

- Irrigation induced erosion
- Irrigation tailwater delivery to receiving water bodies
- Lack of adequate vegetation adjacent to waterways necessary for reducing nutrients and pathogens from runoff.
- Livestock grazing in and adjacent to waterways delivering excess sediment, nutrients, and bacteria.

### Implementation Tiers

In order to achieve the goals set forth in the TMDL Subbasin Assessment, land treatment through BMP installation will be pursued in a three tier format. Agricultural land that drains directly into Lower Succor Creek, or drain directly into agricultural drains that drain directly into Lower Succor Creek is included in **Tier 1**.fields have the most immediate impact on water quality due to their proximity, or influence to a 303 (d) listed stream segment. Unlike Tier 1 fields, **Tier 2** fields are not directly adjacent to a 303 (d) listed stream segment, and the wastewater from Tier 2 acreage has the potential to be reused by Tier 1 acreage before entering a 303 (d) listed stream segment.

**Tier 3** fields are located in the uplands where wastewater has the potential to be used multiple times by Tier 2 and Tier 1 acreage before entering a stream segment of concern.

Figure 3, Lower Succor Creek Tier Map shows the agricultural fields that fall into each category.

**In terms of BMP implementation Tier 1 Fields are high priority, Tier 2 Fields are medium priority, and Tier 3 Fields are low priority in terms of water quality.**

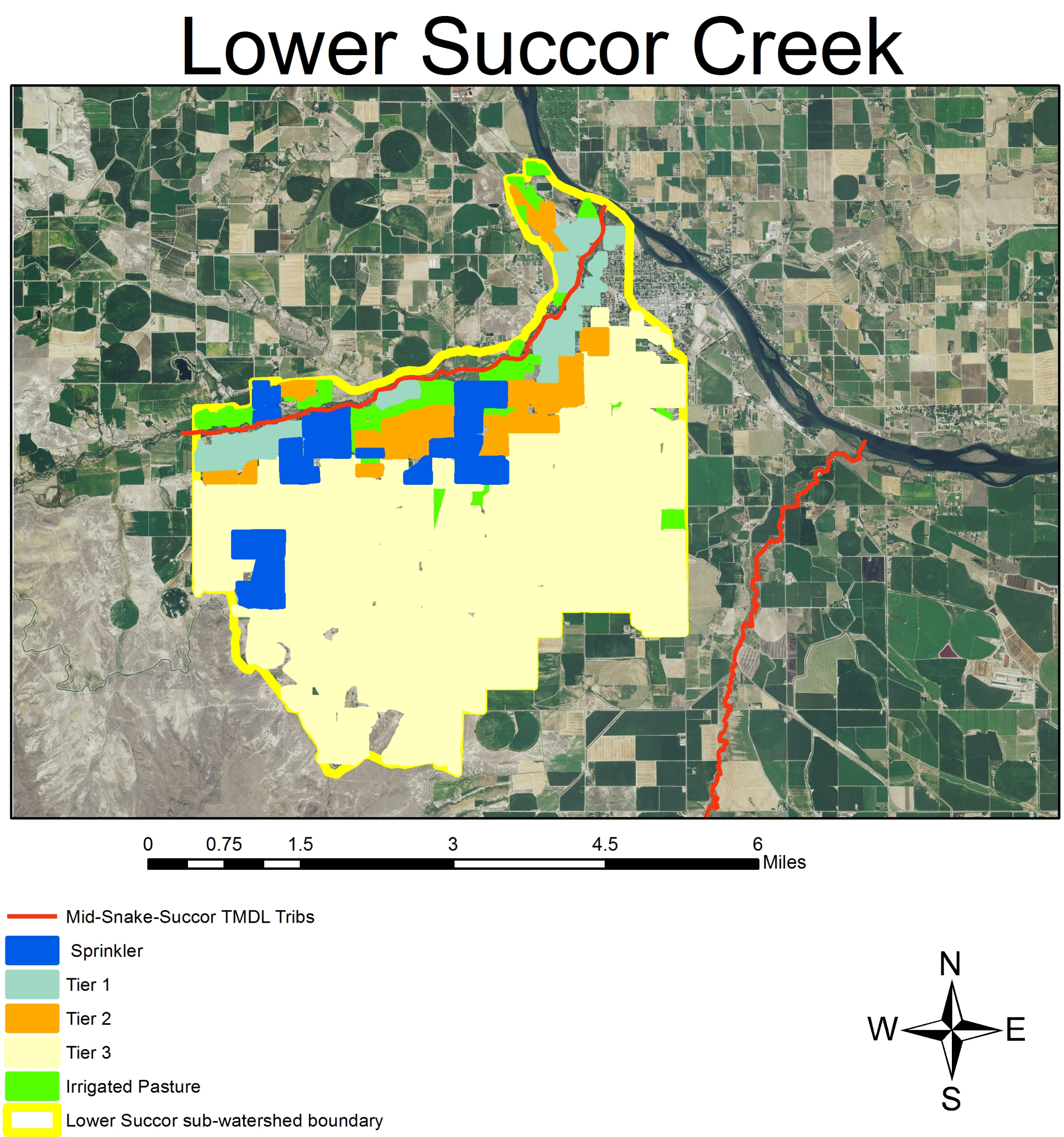



**Figure 3. Lower Succor Creek Tier Map**

***Tiers 1-3 only apply to surface irrigated cropland fields and do not include sprinkler irrigated agricultural land, pastureland, or CAFO/AFO units within The Lower Succor Creek Sub-watershed.***

The Lower Succor Creek Sub-watershed consists of a total of 10,505.1 acres, but only 7,891.6 acres (75.1%) actually produces agricultural crops. Table 6 below shows the total farmable acres in each of their respective categories.

**Table 5. Lower Succor Creek Sub-watersheds**

| **Treatment Unit** | **Acres** | **Percentage of total ag. Acres** |
|---|---|---|
| Tier 1: surface irrigated cropland | 438.8 | 5.6% |
| Tier 2: surface irrigated cropland | 565.3 | 7.2% |
| Tier 3: surface irrigated cropland | 5822.3 | 73.8% |
| Irrigated Pasture | 406.7 | 5.1% |
| Sprinkler irrigated cropland | 658.5 | 8.3% |
| CAFO/AFO | N/A | 0.0% |
| | | |
| **Total** | 7891.6 | 100% |

**Implementation Plan BMPs**

Agricultural conservation and soil erosion practices are typically referred to as Best Management Practices (BMPs). These practices are nationally derived systems to control, reduce, or prevent soil erosion and sedimentation on agricultural land uses (APAP, 2003). BMPs are selected to reduce irrigation-induced and streambank erosion, contain and filter sediment, nutrients, and bacteria from irrigation wastewater, contain and properly dispose of animal wastes,and reduce leaching of nutrients and pesticides. Proper implementation of BMPs on agricultural fields within the Lower Succor Creek Sub-watershed will improve the quality of surface water in the project area and reduce pollutant loading to the Snake River from Lower Succor Creek.

**BMP Implementation Costs**

The cost list to install BMPs on private agricultural land is available from the Owyhee Soil Conservation District office in Marsing and the Bruneau River Soil Conservation District office in Bruneau. 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). 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 6 provides the typical costs for many of the applicable BMP components for southern Idaho. Labor and equipment costs are not included in this table due to the variation from one site to another.

**Table 6.** Average Costs of Component Practices Applicable to Owyhee County

| Component Practice | Unit of Measure | Cost/Unit |
|---|---|---|
| Anionic Polyacrylamide (PAM) | Acre | $ 12.50 |
| Cover Crop | Acre | $ 30.00 |
| Deep Tillage | Acre | $ 12.00 |
| Fence, 4 wire | Feet | $ 1.40 |
| Filter Strip | Acre | $ 200.00 |
| Irrigation (surge irrigation) | Acre | $ 750.00 |
| Irrigation (pivot) | Acre | $1320.00 |
| Irrigation (wheel line system) | Acre | $1125.00 |
| Prescribed Grazing, Irrigated Pasture | Acre | $ 1.10 |
| Prescribed Grazing, Rangeland | Acre | $ 0.11 |
| Pest Management (Noxious Weeds) | Acre | $ 40.00 |
| Nutrient Management | Acre | $ 0.00 |
| Spring Development | Each | $2,000.00 |
| Trough or Tank | Each | $ 990.00 |
| Streambank & Shoreline Protection | Each | Job Estimate |
| Stream Channel Stabilization | Each | Job Estimate |
| Wildlife Watering Facility | Each | $ 500.00 |
| Watering Facility, Nose pump | Each | $ 550.00 |

**Costs may increase with greater travel distances and accessibility**
****Source: NRCS 2005 EQIP Cost List – Average Costs, For Estimates Only**

**Example Description of Alternatives for Surface Irrigated Cropland (**Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

**SITE SPECIFIC BMP**
**Alternative #1a**
**($1520/acre)**

Irrigation Water Mgmt.
Drip Irrigation System
Nutrient Mgmt.Surface
Conservation Crop Rotation

**Alternative #1b**
**($920/acre)**

Sprinkler Irrigation
Nutrient Mgmt.
Conservation Crop Rotation
Irrigation Water Mgmt.

**SITE SPECIFIC BMP**
**Alternative #2**
**($575/acre)**

Irrigation Water Mgmt.
Land Leveling
Irrigated System
Gated Pipe
Tail Water Recovery System
Nutrient Mgmt.
Conservation Crop Rotation
Conservation Tillage

**SITE SPECIFIC BMP**
**Alternative #3**
**($300/acre)**

Irrigation Water Mgmt.
Concrete Ditch
Filter Strip
PAM
Sediment Basin
Nutrient Mgmt.
Conservation Crop Rotation
Conservation Tillage

**Example Description of Alternatives for Surface Irrigated Pasture** (Prices based on the NRCS 2005 Cost List, plus 15% for increased cost of materials)

Procedure: Conduct Resource Inventory and Site Assessment, Evaluate Data to Develop Site Specific BMP Alternatives.

**SITE SPECIFIC BMP**
**Alternative #1**
**($520/acre)**

Fencing
Planned Grazing System
Pasture & Hayland Mgmt.
Nutrient Mgmt.
Heavy Use Protection
Livestock Watering Fac.
Irrigation Water Mgmt
Field Border Irr. System
Gated Pipe

**SITE SPECIFIC BMP**
**Alternative #2**
**($400/acre)**

Fencing
Planned Grazing System
Pasture & Hayland Mgmt.
Nutrient Mgmt.
Irrigation Water Mgmt.
Livestock Watering Fac.
Field Border Irr. System

**SITE SPECIFIC BMP**
**Alternative #3**
**($290/acre)**

Fencing
Pasture & Hayland Mgmt.
Nutrient Mgmt.
Livestock Watering Fac.
Irrigation Water Mgmt.
Field Border Irr. System

**Table 7. Estimated BMP Cost Summary of Treatment Alternatives for Lower Succor Creek Sub-Watershed, Tier 1 Fields.**

| ALTERNATIVE | | ACRES | Total Costs |
|---|---|---|---|
| Alternative 1a | $1520 / AC | 439 | $ 667,280 |
| Alternative 1b | $ 920 / AC | 439 | $ 403,880 |
| Alternative 2 | $ 575 / AC | 439 | $ 252,425 |
| Alternative 3 | $ 300 / AC | 439 | $ 131,700 |

**Table 8. Estimated BMP Cost Summary of Treatment Alternatives for Lower Succor Creek Sub-Watershed, Tier 1 & Tier 2 Fields.**

| ALTERNATIVE | | ACRES | Total Costs |
|---|---|---|---|
| Alternative 1a | $1520 / AC | 1004 | $ 1,526,080 |
| Alternative 1b | $ 920 / AC | 1004 | $ 923,680 |
| Alternative 2 | $ 575 / AC | 1004 | $ 557,300 |
| Alternative 3 | $ 300 / AC | 1004 | $ 301,200 |

**Final cost estimates and selected implementation alternatives will be determined during the on farm, site specific planning with each individual landowner or operator.**

**Tasks for Privately Owned Parcels**

**Task 1**: Develop conservation plans with private agricultural landowners.
Responsible
Agencies: IASCD, ISCC & NRCS (support from IDL and BLM)
Timeline: Ongoing

**Task 2**: Assist private agricultural landowners to implement conservation plan components.
Responsible
Agencies: IASCD, ISCC & NRCS (support from IDL and BLM)
Timeline: Ongoing

**Task 3**: Monitor conservation implementation progress and evaluate effect on vegetation and channel shape.
Responsible
Agencies: IASCD & ISCC (support from NRCS, IDL and BLM)
Timetable: Ongoing

# APPENDIX #5

## Funding Sources

Funding of Best Management Practices - *Search for Many Funding Sources Using Boise State University Environmental Finance Center*: http://ssrc.boisestate.edu

Costs estimates relative to each of the designated agency responsibilities need to be estimated as individual water quality plans for private agricultural lands, grazing management plans for state lands, or water quality restoration plans for federal land. As always, funding issues and the availability of funding to implement best management practices is of concern. Much of the available funds that can be used to implement this plan are available annually on a first-come first-serve basis or through a competitive review and ranking process. The Boise State University Environmental Finance Center is a valuable resource for anyone interested in obtaining funding for projects. Chapter Four of the Idaho Nonpoint Source Management Plan (IDEQ, 1999a) also contains a fairly substantial listing of potentially available funding sources and cooperating agencies for use in the implementation of best management practices and includes several of the programs which could possibly be used as potential implementation funding sources:

*§104(b)(3)...Tribal and State Wetland Protection Grant*, *EPA*
http://yosemite.epa.gov/R10/HOMEPAGE.NSF/webpage/Grants
This program provides financial assistance to state, tribal, and local government agencies to develop new wetland protection programs or refine and improve existing programs. All projects must clearly demonstrate a direct link to improving an applicant's ability to protect, restore or manage its wetland resources.

*§319 (h)...Nonpoint Source Grants, EPA/IDEQ*
http://www.deq.state.id.us/water/water1.htm#ww_nonpoint
This program provides financial assistance for the implementation of best management practices to abate nonpoint source pollution. The IDEQ manages the NPS program. All projects must demonstrate the applicant's ability to abate NPS pollution through the implementation of BMPs.

*Aquatic Ecosystem Restoration, CoE*
http://www.nab.usace.army.mil/whatwedo/civwks/CAP/206.pdf
Section 206 of the Water Resources Development Act of 1996, provides financial assistance for aquatic and associated riparian and wetland ecosystem restoration and protection projects that will improve the quality of the environment. There is no requirement for an aquatic ecosystem project to be linked to a Corp of Engineers project. The program does require that a non-federal interest provide 35% of construction costs, including all lands, easements, right-of-ways and necessary relocations. The program also requires that 100% of the operation, maintenance, replacement, and rehabilitation be

borne by the non-federal interest. The program limits the amount of federal assistance to $5 million for any single project.

*Challenge Cost-share Program, BLM*
http://www.dfw.state.or.us/ODFWhtml/VolunteerProg/STEP.html
This program provides 50% cost-share monies on fish, wildlife, and riparian enhancement projects to non-federal entities.

*Conservation Operations Program (CO-01), NRCS*
http://www.id.nrcs.usda.gov/programs/financial.html
The CO-01 program provides technical assistance to individuals and groups of landowners for the purpose of establishing a link between water quality and the implementation of conservation practices. The NRCS technical assistance provides farmers and ranchers with information and detailed plans necessary to conserve their natural resources and improve water quality.

*Conservation Research and Education*, *NRCS*
http://www.id.nrcs.usda.gov/programs/financial.html
The Conservation Research and Education program was created through the 1996 Farm Bill and is administered by the National Natural Resources Conservation Foundation. The purpose of the program is to fund research and educational activities related to conservation on private lands through public-private partnerships.

*Conservation Reserve Program (CRP)*, *NRCS*
http://www.id.nrcs.usda.gov/programs/financial.html
The CRP program provides a financial incentive to landowners for the protection of highly erodible and environmentally sensitive lands with grass, trees, and other long-term cover. This program is designed to remove those lands from agricultural tillage and return them to a more stable cover. This program holds promise for nonpoint source control since its aim is highly erodible lands.

*Conservation Technical Assistance (CTA)*, *NRCS*
http://www.id.nrcs.usda.gov/programs/financial.html
Technical assistance for the application of BMPs is provided to cooperators of soil conservation districts by the NRCS. Preparation and application of conservation plans is the main form of technical assistance. Assistance can include the interpretation of soil, plant, water, and other physical conditions needed to determine the proper BMPs. The CTA program also provides financial assistance in implementing BMPs described in the conservation plan.

*Environmental Quality Incentives Program (EQIP), NRCS*
http://www.id.nrcs.usda.gov/programs/financial.html
EQIP is a program based on the 1996 Farm Bill legislation and combines the functions of the Agricultural Conservation Program, Water Quality Incentives Programs, Great Plains Conservation Program, and the Colorado River Basin Salinity Control Program. EQIP offers technical assistance, and cost share monies to landowners for the establishment of a five to ten year conservation

agreement activities such as manure management, pest management, and erosion control. This program gives special consideration to contracts in those areas where agricultural improvements will help meet water quality objectives.

*Environmental Restoration*, *CoE* http://www.usace.army.mil
Section 1135 of the Water Resources Development Act of 1986 provides for modifying the structure, operation, or connected influences or impacts from a Corp of Engineer project to restore fish and wildlife habitat. The project must result in the implementation or change from existing conditions, and the project benefits must be associated primarily with restoring historic fish and wildlife resources. Though recreation cannot be the primary reason for the modification, an increase in recreation may be one measure of value in the improvement to fish and wildlife resources. The program requires a non-federal sponsor which can include public agencies, private interest groups, and large national nonprofit organizations such as Ducks Unlimited or the Nature Conservancy. Operation and maintenance associated with the project modifications are the responsibility of the non-federal sponsor. Planning studies, detailed design, and construction are cost shared at a 75% federal and 25% non-federal rate. No more than $5 million in federal funds may be spent at a single location.

*Farm Services Agency Direct Loan Program, FSA*
http://www.fsa.usda.gov/pas/default.asp
This program provides loans to farmers and ranchers who are unable to obtain financing from commercial credit sources. Loans from this program can be used to purchase or improve pollution abatement structures.

*Hydrologic Unit Areas* (HUAs), *NRCS*
http://www.id.nrcs.usda.gov/programs/financial.html
The NRCS is responsible for the HUA water quality projects. The purpose of these projects is to accelerate technical and cost-share assistance to farmers and ranchers in addressing agricultural nonpoint source pollution.

*Idaho Water Resources Board Financial Programs, IDWR*
http://www.idwr.state.id.us/waterboard/financial.htm
The Idaho Water Resources Board Financial Program assists local governments, water and homeowner associations, non-profit water companies, and canal and irrigation companies with funding for water system infrastructure projects. The various types of projects that can be funded include: public drinking water systems, irrigation systems, drainage or flood control, ground water recharge, and water project engineering, planning and design. Funds are made available through loans, grants, bonds, and a revolving development account.

*National Conservation Buffer Initiative*, *NRCS*
http://www.id.nrcs.usda.gov/programs/financial.html
The National Conservation Buffer Initiative program provides cost-share funds in an effort to use grasses and trees as conservation buffers to protect and enhance riparian resources on farms. This program will be an integral part of

TMDL/WRAS implementation planning to ensure land management practices are moved away from streams and riparian areas.

*Planning Assistance*, *CoE* http://www.usace.army.mil
Section 22 of the Water Resources Development Act of 1974 authorizes the Corp of Engineers to assist local governments and agencies, including Indian Tribes, in preparing comprehensive plans for the development, utilization and conservation of water and related resources. Total costs for projects cannot exceed $1 million in a single year and are cost-shared at a 50% federal and 50% non-federal rate.
*Range Improvement Fund - 8100, BLM* http://www.id.blm.gov
This program focuses on improving rangeland management conditions, including the implementation of best management practices. A portion of the money to operate the program comes from the grazing fees paid by permittees.

*Small Watersheds* (PL-566), *NRCS*
http://www.id.nrcs.usda.gov/programs/financial.html
The Small Watersheds program authorizes the NRCS to cooperate in planning and implementing efforts to improve soil and water conservation. The program provides for technical and financial assistance for water quality improvement projects, upstream flood control projects, and water conservation projects.

*Partners for Wildlife (Partners), USFWS* http://partners.fws.gov
The Partners for Wildlife program is implemented by the U.S. Fish and Wildlife Service and designed to restore and enhance fish and wildlife habitat on private lands through public/private partnerships. Emphasis is on restoration of riparian areas, wetlands, and native plant communities.

*Pheasants Forever* http://www.pheasantsforever.org
Pheasants Forever can provide up to 100 percent cost-share for pheasant and other upland game projects which establish, maintain, or enhance wildlife habitat.

*Resource Conservation and Development (RC&D)*, *NRCS*
http://www.id.nrcs.usda.gov/programs/financial.html
Through locally sponsored areas, the RC&D program assists communities with economic opportunities through the wise use and development of natural resources by providing technical and financial assistance. Program assistance is available to address problems including water management for conservation, utilization and quality, and water quality through the control of nonpoint source pollution.

*Resource Conservation and Rangeland Development Program (RCRDP)*, *SCC*
http://www.scc.state.id.us/loans.htm
The RCRDP program provides grants for the improvement of rangeland and riparian areas, and loans for the development and implementation of conservation improvements.

*State Revolving Fund (SRF), IDEQ*
http://www.deq.state.id.us/water/water1.htm#funding
The IDEQ Grant and Loan Program administers the State Revolving Fund. http://www.deq.state.id.us/water/water1.htm#fundingThe purpose of the program is to provide a perpetually revolving source of low interest loans to municipalities for design and construction of sewage collection and treatment facilities to correct public health hazards or abate pollution. State Revolving Loan funds are also used to support the Source Water Assessment Program and Nonpoint Sources…. The Grant and Loan Program uses a priority rating form to rank all projects primarily on the basis of public health, compliance, and affordability. Additional points are awarded to projects that have completed a source water assessment and are maintaining a protection area around their source.

*Stewardship Incentives Program (SIP), IDL*
http://www2.state.id.us/lands/Forest%20Legacy/Assessment%20of%20Need%20Breakout%20Files/8-Existing%20Conservation%20Efforts.pdf
SIP provides technical and financial assistance to encourage non-industrial private landowners to keep their lands and natural resources productive and healthy. Qualifying land includes rural lands with existing tree cover or land suitable for growing trees. Eligible landowners must have an approved Forest Stewardship Plan and own less than 1,000 acres.

*Water Quality Program for Agriculture (WQPA), ISCC*
http://www.scc.state.id.us/docs/wqpafs.doc
Provides financial incentives to owners and operators of agricultural lands to apply conservation practices to protect and enhance water quality and fish and wildlife habitat.

*Wetlands Reserve Program (WRP)*, *NRCS*
http://www.id.nrcs.usda.gov/programs/financial.html
WRP was established to help landowners work toward the goal of "no net loss" of wetlands. This program provides landowners the opportunity to establish 30-year or permanent conservation easements, and cost-share agreements for landowners willing to provide wetlands restoration.

*Wildlife Habitat Incentive Program (WHIP)*, *NRCS*
http://www.id.nrcs.usda.gov/programs/financial.html
WHIP was established to help landowners improve habitat on private lands by providing cost-share monies for upland wildlife, wetland wildlife, endangered species, fisheries, and other wildlife. Additionally, cost share agreements developed under WHIP require a minimum 10-year contract.

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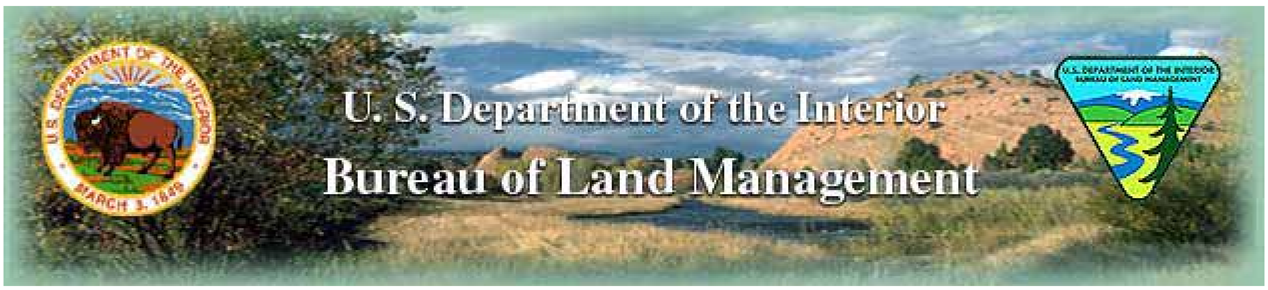
# Middle Snake River / Succor Creek Implementation Plan for Public Lands




IDAHO DEPARTMENT OF LANDS

## Goals and Objectives for Federal Lands

To comply with the Clean Water Act and protect and enhance the quality of the surface and ground water in the Middle Snake River/Succor Creek Subbasin, BLM is responsible for developing range management plans that authorize livestock grazing on Federal lands, while meeting State Water Quality Standards criteria in the subbasin.

Federal grazing regulations require that the BLM determine if grazing related management practices are achieving Idaho Standards for Rangeland Health and Guidelines for Livestock Grazing (USDI 1997) or are making significant progress toward their achievement, and conform with the Guidelines for Livestock Grazing Management (Code of Federal Regulations, Section 4180). Standards for Rangeland Health for Idaho include a standard for Water Quality (Standard 7), which states surface and ground water on public lands comply with the State of Idaho Water Quality Standards and Wastewater Treatment Requirements. BLM policy states that assessments for standards of rangeland health (Assessments) will be completed for all grazing allotments on Federal lands during the next 4 years.

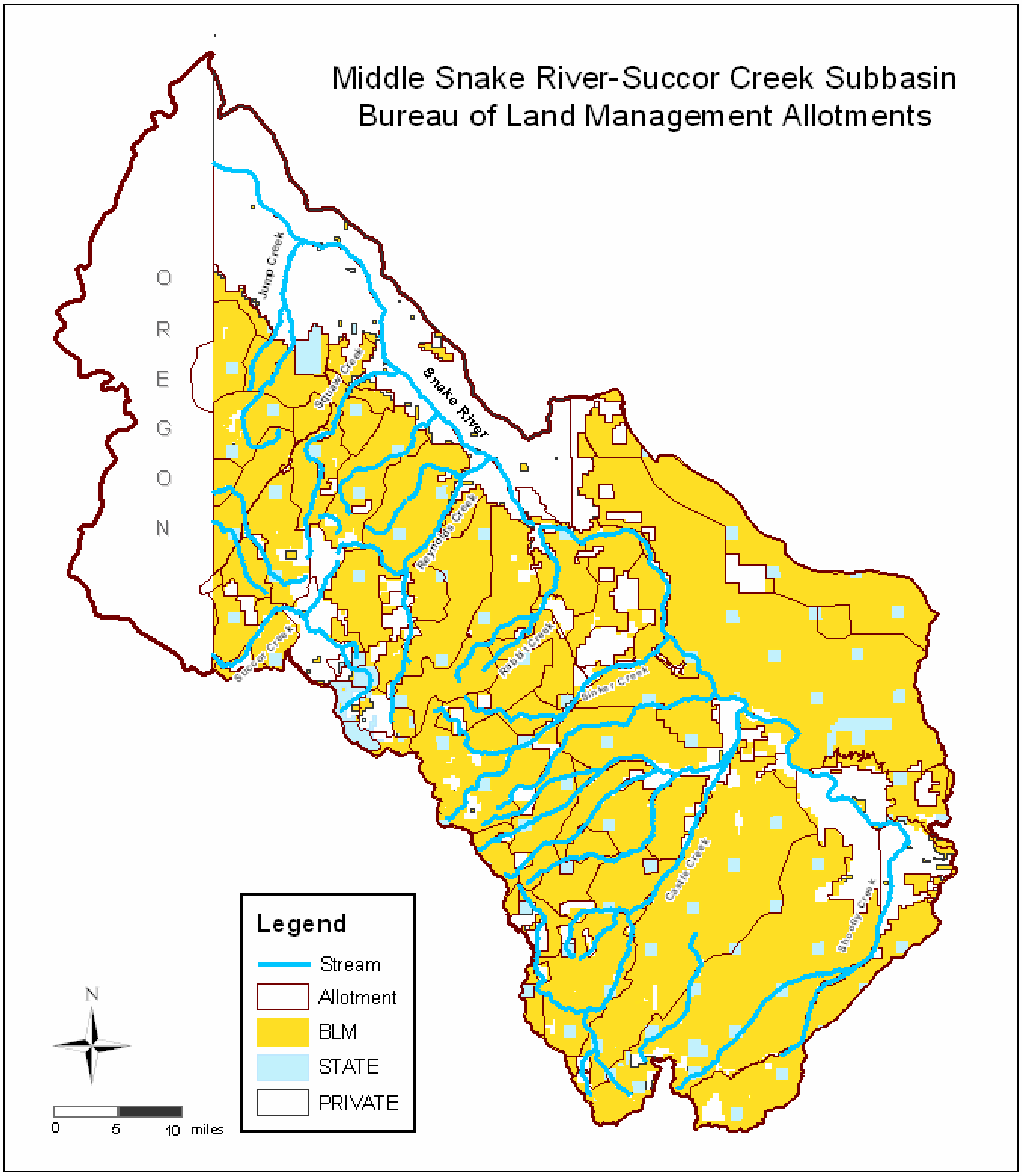



Figure 1. Locations of grazing allotments in the Middle Snake River/Succor Creek Subbasin where the BLM authorizes livestock grazing. Reference Table 1 for allotment names and numbers.

BLM authorizes livestock grazing on federal lands encompassing 76 grazing allotments that comprise nearly 70% of the Middle Snake River/Succor Creek Subbasin. Federal lands within 42 grazing allotments that contain 303(d) listed streams include 53% of the land within the subbasin (Figure 1). BLM authorized livestock grazing of federal lands may potentially be impacting these water-quality impaired stream segments, especially those allotments that are not meeting BLM standards and guidelines.

Assessments for Standards of Rangeland Health are scheduled to be completed by 2009 for all Federal-grazing allotments within the Middle Snake River/Succor Creek Subbasin.

The Assessments will include evaluations of current water quality conditions and compliance with State of Idaho water quality criteria. Grazing on BLM allotments will be revised based on the findings of the Rangeland Health Assessments. Environmental Assessments (EAs) are then prepared that analyze alternatives to modifying the grazing permits. These EAs will include Water Quality Restoration Plans (WQRP) that outline Best Management Practices used to address nonpoint source pollution. The WQRPs also specify monitoring that will be conducted to evaluate the effectiveness of prescribed BMPs in improving water quality. Any changes to range management on allotments in the subbasin (ie. implementation of BMPs) will be formalized through the issuance of proposed and final decisions that modify the existing permits authorizing livestock grazing on Federal lands.

BMPs and/or component practices that typically have been applied to address impacts to water quality resulting from BLM authorized livestock grazing include, but are not limited to:

- Development of offsite water;
- Limiting of livestock utilization of streamside and floodplain vegetation;
- Fencing to modify or exclude livestock use of riparian and aquatic habitats;
- Development of detailed range management plans that change seasons of use, or
- Prescribed rest or deferment for pastures that contain riparian/aquatic habitat, where necessary to meet in-stream, riparian and floodplain objectives (ISCC and IDEQ 2003).

In general, emphasis is placed on range management plans that modify grazing practices to conform to Guidelines for Livestock Grazing Management, while not requiring large expenditures on projects such as fencing, and/or water developments. The extensive amount of stream mileage and rugged terrain where these allotments are located may make certain projects cost prohibitive.

**Table 1. Grazing allotments with 303(d) streams in the Middle Snake River/Succor Creek Subbasin where BLM authorizes livestock grazing and scheduled date for completion of Assessment for Standards of Rangeland Health.**

| Allotment Number | Allotment Name | Federal Land Acreage[1] | 303(d) Stream | Year Assessed or Scheduled for Assessment |
|---|---|---|---|---|
| 00514 | Alkali-Wildcat | 6380 | Jump Creek | 2005 |
| 00607 | Baltzor FFR | 367 | Succor Creek | 2004 |
| 00515 | Blackstock Springs | 12794 | McBride Creek [2] | 2005 |
| 00589 | Boone Peak | 18349 | North Fork Castle Creek, Pickett Creek [2] | 2003 |

| Allotment Number | Allotment Name | Federal Land Acreage[1] | 303(d) Stream | Year Assessed or Scheduled for Assessment |
|---|---|---|---|---|
| 00534 | Box T | 4393 | North Fork Castle Creek | 2005 |
| 00590 | Bridge Creek | 1063 | North Fork Castle Creek | 2004 |
| 00585 | Browns Creek | 3865 | Browns Creek [2] | 2005 |
| 00638 | Burgess FFR | 78 | Succor Creek | 2005 |
| 00476 | Bush Ranch FFR | 275 | McBride Creek [2] | 2005 |
| 00801 | Castle Creek | 82142 | South Fork Castle Creek, Birch Creek | 1999 |
| 00523 | Chipmunk Field FFR | 544 | Succor Creek | 2005 |
| 00571 | Con Shea | 12548 | Sinker Creek | 2004 |
| 00893 | East Castle Creek | 87991 | South Fork Castle, Birch* Creeks | 2007 |
| 00513 | Elephant Butte | 8252 | Squaw Creek [2] | 2003 |
| 00619 | Evans FFR | 726 | Succor Creek | 2004 |
| 00535 | Fossil Butte | 20355 | Sinker Creek | 2005 |
| 00516 | Hardtrigger | 21593 | Hardtrigger Creek [2] | 2003 |
| 00624 | Jaca FFR | 631 | Succor Creek | 2003 |
| 00506 | Jackson Creek | 1191 | Succor Creek | 2005 |
| 00487 | Joyce FFR | 5643 | Sinker Creek | 2004 |
| 00601 | Louisa Creek | 2109 | North Fork Castle Creek | 2005 |
| 00654 | Montini FFR | 2220 | Sinker Creek | 2005 |
| 00603 | Poison Creek | 3172 | Jump Creek | 2004 |
| 00806 | Pole Creek Individual | 3029 | Castle Creek | 2009 |
| 00522 | Rats Nest | 4891 | Squaw Creek [2] | 2004 |
| 00588 | Red Mountain | 14484 | Browns Creek [2], Pickett Creek [2] | 2004 |
| 00508 | Reynolds Creek | 44336 | Hardtrigger Creek [2] | 2004 |

| Allotment Number | Allotment Name | Federal Land Acreage[1] | 303(d) Stream | Year Assessed or Scheduled for Assessment |
|---|---|---|---|---|
| 00565 | Rockville | 13218 | McBride Creek [2] | 2004 |
| 00521 | Sands Basin | 10862 | Jump Creek | 2004 |
| 00556 | Shares Basin | 11103 | Squaw Creek [2] | 2004 |
| 00569 | Silver City | 40017 | Sinker Creek | 2003 |
| 00578 | Sinker Butte | 7079 | Sinker Creek | 2005 |
| 00511 | Succor Creek | 11431 | Succor Creek | 2004 |
| 00616 | Tyson FFR | 423 | Succor Creek | 2004 |
| 00604 | Walker FFR | 238 | Squaw Creek [2] | 2004 |
| 00648 | West Castle | 9823 | Browns Creek [2] | 2007 |
| 00541 | Whitehorse/Antelope | 36608 | North Fork Castle, South Fork Castle, Browns [2] Creeks | 2005 |

[1]Portion of the allotment located within the Middle Snake River/Succor Creek Subbasin.
[2] = These intermittent streams were de-listed in the TMDL. Some of these streams contain perennial reaches. BLM considers all of these streams to contain important riparian resources and will manage these streams to achieve proper functioning condition.
Note: Allotments that include only the Snake River are not included in this table because livestock grazing has not been identified as a pollutant source affecting this reach of the river.

Recent examples of grazing management plans written by BLM to address water quality concerns in the upper Middle Snake River/Succor Creek Subbasin include the issuance of the Boone Peak Allotment Grazing Permit (Environmental Assessment [EA] No. ID-096-2003-066) and the Silver City Allotment Grazing Permit (EA No. ID-096-2004-006). Both of these Environmental Assessments include Water Quality Restoration Plans (USDI 2003, 2004) for addressing non-point source pollution impacts resulting from BLM authorized livestock grazing.

As part of grazing allotment assessments, BLM also inventories riparian areas, streams and watersheds for activities other than livestock grazing that may be impacting water quality such as poorly located or constructed roads, and unauthorized off-road vehicle use. These impacts are minimally identified in the assessment, and BLM implements restoration actions to address these impacts where possible. For example, BLM implemented several stream channel restoration projects in the upper Battle Creek watershed that were identified as needed during the Battle Creek Allotment grazing Assessment (USDI 1999a). Some of the impacts from off-road vehicle use are difficult to address with current funding and staffing levels, but BLM anticipates additional resources will become available as part of Access Management Plans that are being developed as part of the implementation of the Owyhee Resource Area Management Plan (USDI 1999b) and of the Bruneau Resource Area Management Plan (currently in preparation).

**Funding Opportunities**

Monitoring and restoration actions taken to improve water quality on federal lands managed by BLM are conducted with funding appropriated by congress to the BLM to manage public lands in accordance with the Federal Land Policy and Management Act of 1976. BLM can apply for additional funding such as that from Clean Water Grants. However, opportunities to obtain additional funding in the form of grants for the restoration or improvement of water quality on federal lands are limited because BLM must have a non-federal partner to qualify for the grants.

## Monitoring Plan

Water Quality Restoration Plans prepared as part of the issuance of each grazing permit include monitoring plans for evaluating the success of management actions in improving water quality of listed §303(d) streams. As part of the best management practices feedback-loop process, stream temperatures will be monitored at 5-year intervals, or as deemed necessary, to evaluate changes in water temperature with improved stream shading and channel morphology.

The BLM will also conduct greenline plant community composition studies to evaluate the change in the plant community composition along the greenline of the stream. The greenline is the first continuous band of perennial vegetation located up from the stable low water level of the stream (Cowley 1992). Greenline plant community composition and cover will be monitored every 5 years to evaluate the trend in streamside vegetation. Trend photographs will also be taken periodically at greenline monitoring sites. Bacteria levels (*E. coli* concentrations) will be monitored periodically to evaluate changes in bacteria levels with improved streambank and channel conditions (resulting in reduced sediment and bacteria inputs).

Those interested in examining monitoring data collected on streams listed in BLM Water Quality Restoration Plans can contact the BLM Owyhee Field Office to review or obtain copies of the monitoring information (http://www.id.blm.gov/offices/owhyee/index.htm). Increases in the density and cover of riparian vegetation on streambanks are the first indicators that revised grazing practices are resulting in progress towards water quality goals. An example of this are photos of Big Jacks Creek (Figures 2a and 2b) taken July 25, 1996 and August 26, 2003 that show increased riparian shrub cover as the result of grazing practices implemented as part of the Northwest Allotment grazing decision and associated WQRP (USDI 2000). Season of grazing use was changed from summer-long use to spring grazing on this segment of Big Jacks Creek to improve quality of water delivered to Jacks Creek, which is a 303(d) listed stream. These photos also show the potential of many perennial streams in the Middle Snake River/Succor Creek Subbasin to support dense willow-dominated riparian plant communities and meet objectives for stream shade identified in the Middle Snake River/Succor Creek TMDL (DEQ 2004).


Figure 2. Increase in riparian shrub cover and stream shade from 1996 (a) to 2003 (b) on Big Jacks Creek in the Northwest Allotment. Livestock grazing was changed from summer grazing to spring (June) grazing in 1997. Note the distinctive rock cliff notch (A), lichen-covered cliff wall (B), and cliff breaks (C) in the background of the photographs (the angle of the photos differ slightly because shrub growth on the right side of the stream completely obscured the original view by 2003).

If it is found through monitoring that water quality standards cannot be or are not met on certain stream segments, then site-specific water quality standards may need to be developed as set forth in the Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA 58.01.02.275.01).

**Federal Land Management - Tasks**

Task 1: Complete Allotment Assessments for grazing allotments located in the Middle Snake River/Succor Creek Subbasin on or before the schedule developed to comply with the BLM policy and regulations (see Table 15).
Milestones: 1999-2001 – completed 1 Assessment
2002-2004 – completed 20 Assessments
December 2005 – complete 13 additional Assessments
December 2007 – complete 2 additional Assessments
December 2009 – complete remaining 1 Assessment

Responsible Agency: U.S.D.I. Bureau of Land Management

Task 2: Prepare Water Quality Restoration Plans for §303(d) listed streams on all grazing allotments within the Middle Snake River/Succor Creek Subbasin
Milestones: Same type date and targets as above
Responsible Agency: U.S.D.I. Bureau of Land Management

Task 3. Issue new grazing permits that include Best Management Practices (BMPs) identified to improve/restore water quality of streams within grazing allotments where BLM authorizes livestock grazing on public lands
Milestones: Same as above
Responsible Agency: U.S.D.I. Bureau of Land Management

Task 4. Monitor livestock use levels of riparian herbaceous vegetation and woody shrubs on §303(d) listed streams on public lands where BLM authorizes livestock grazing
Milestones: Annually to biannually, generally at the end of the grazing or growing season
Responsible Agency: U.S.D.I. Bureau of Land Management

Task 5. Monitor effectiveness of Best Management Practices (BMPs) implemented to improve/restore water quality of §303(d) listed streams on public lands managed by BLM.
Milestones: Every 5 years following the issuance of new grazing permits that include BMPs examine trend in streamside plant community composition, and plant density and vigor
Responsible Agency: U.S.D.I. Bureau of Land Management

Task 6. Evaluate compliance with State of Idaho Water Quality Criteria in streams on public lands where BLM authorizes livestock grazing
Milestones: Minimally, every 5 years, or more often as deemed necessary
Responsible Agency: U.S.D.I. Bureau of Land Management, Idaho Department of Environmental Quality

## Figure Legends:

Figure 1. Locations of grazing allotments in the Middle Snake River/Succor Creek Subbasin where the U.S. Bureau of Land Management authorizes livestock grazing. Reference Table 1 for allotment names and numbers.

Figure 2. Increase in riparian shrub cover and stream shade from 1996 (a) (photo dated 7.25.96) to 2003 (b) (photo dated 8.26.03) on Big Jacks Creek in the Northwest Allotment. Livestock grazing was changed from summer grazing to spring (June) grazing in 1997. Note the distinctive rock cliff notch (A), lichen-covered cliff wall (B), and cliff breaks (C) in the background of the photographs (the angle of the photos differ slightly because shrub growth on the right side of the stream completely obscured the original view by 2003).

# GOALS AND OBJECTIVES FOR STATE ENDOWMENT LANDS

To protect and enhance both the quality of the surface and ground water in the Mid Snake Succor Creek watersheds by developing detailed grazing management plans to meet State Water Quality Standards. State Endowment Lands are administered to maximize revenues overtime to the State Endowment Fund. This is done through consistent sound long term management practices to maintain or improve the resource. The Idaho Department of Lands (IDL) is responsible for developing detailed grazing management plans that address water quality issues on State Endowment Lands which will provide for the protection and restoration of beneficial uses and meet State Water Quality Standards.

**State Land Tasks**

| | |
|---|---|
| Task 1: | Prepare or revise grazing management plans on State Allotments so that water quality standards will be met within a reasonable length of time. |
| Milestones: | Every 4-10 years when the lease comes up for renewal. |
| Responsible Agency: | Idaho Department of Lands |
| Task 2: | Implement grazing management plans on State grazing allotments |
| Milestones: | Annually on blocks of State land. |
| Responsible Agency: | Idaho Department of Lands |
| Task 3: | Monitor and review of state grazing leases |
| Milestones: | Annually on blocks or when lease comes up for renewal. |
| Responsible Agency: | Idaho Department of Lands |
| Task 4: | Develop and implement short term and long term monitoring in State grazing allotments |
| Milestones: | Already in place, or looked at when the lease comes up for renewal. |
| Responsible Agency: | Idaho Department of Lands |