# Jordan Creek Subbasin
# 17050108



# TMDL Implementation Plan for Agriculture

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# Introduction

The Idaho Department of Environmental Quality (IDEQ) must develop a Total Maximum Daily Load (TMDL) for pollutants for impaired waters as described in Section 303(d) of the Clean Water Act. A final errata of the *Jordan Creek Subbasin Assessment (SBA) and Total Maximum Daily Load (TMDL)* was prepared by the IDEQ on November 2010 and partially approved by the Environmental Protection Agency (EPA) on April 2011 (IDEQ 2009). As the designated agency for agriculture and grazing, the Idaho State Soil & Water Conservation Commission (SWC) is responsible for preparing the implementation plan for agriculture.

The Jordan 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.

The Idaho Department of Environmental Quality (DEQ) will re-evaluate the SBA-TMDL and implementation plan during their 5 year review process. At that time the land management agencies' accomplishments toward meeting water quality standards are identified in the 5 year review.

## Purpose

The purpose of this TMDL Implementation Plan for Agriculture is to provide a prioritization strategy for the implementation of conservation projects on privately owned lands. The intent is to help restore designated beneficial uses on the 303(d) listed streams within the Jordan Creek subbasin by reducing pollutant contributions from privately owned parcels of land.

## Goals and Objectives

The goal of this plan is to assist and/or compliment other efforts to restore beneficial uses for the 303(d) listed stream segments within the Jordan Creek subbasin. The agricultural component of the Jordan Creek Subbasin TMDL Implementation Plan includes an adaptive management approach for the implementation of Resource Management Systems (RMS) and Best Management Practices (BMPs) to meet the requirements for the Jordan Creek TMDL.

The primary objectives of this plan are to reduce pollutants, such as temperature and sediment, from entering streams in the Jordan Creek subbasin and, where feasible, to decrease stream temperatures by increasing shading along stream corridors. Agricultural RMS and BMPs on privately owned land will be developed and implemented on site with individual agricultural operators following the 2003 Idaho Agricultural Pollution Abatement Plan (APAP) (Resource Planning Unlimited, Inc. 2003).

# BACKGROUND

## Project Setting

The Jordan Creek subbasin is located in the Owyhee Mountains of southwestern Idaho and continues into southeastern Oregon (Figure 1). The subbasin lies within Owyhee County which is the second largest county in Idaho. The county is made up of almost 7,700 square miles. The county stretches from Oregon border to 45 miles east of the Bruneau River, and the Nevada border to the mouth of the Owyhee River. This rural county consists of about 11,500 people, which equates to 1.4 persons per square mile according to the 2010 census.

The Jordan Creek subbasin is approximately 834,911 acres. The subbasin overlaps across the states of Idaho and Oregon. Less than half of the acres are in Idaho. Only the portion of the Jordan Creek subbasin that falls within the State of Idaho will only be addressed for the purposes of this implementation plan (NRCS 2007).

## Climate

The subbasin is characterized by its semi-arid climate, hot summer temperatures, rugged terrain, and remoteness. Average precipitation ranges from high elevations (8000 ft.), receiving a little over 21 inches, to the lower elevations (3500 ft.), receiving a little over 11 inches annually. This diverse watershed also has 373 different soil types recorded in the Soil Survey of Owyhee County (Harkness 2003).

For more information regarding the climate, hydrology, soils, vegetation, and other watershed characteristics; please consult Jordan Creek SBA-TMDLs (IDEQ 2009).

## Common Resource Area Descriptions

There are three Common Resource Areas (CRAs) for the Jordan Creek subbasin. CRAs are geographical areas with similar resource concerns and treatment needs. These CRAs fall under a larger Major Land Resource Area (MLRA) known as the Owyhee High Plateau-Western Range and Irrigated Region. General characteristics for these CRAs were taken from the Jordan Creek Rapid Watershed Assessment (NRCS 2007).

> 25.11 Owyhee High Plateau - Partly Forested Mountains- The Partly Forested Mountains ecoregion occupies the elevational belt above the Semiarid Uplands. Elevations exceed 6,500 feet. Annual precipitation is sufficient to support Douglas-fir, ponderosa pine, mountain big sagebrush, and mountain brush.
>
> 25.2 Owyhee High Plateau - Dissected High Lava Plateau- This unit has alluvial fans, rolling plains, and shear-walled canyons that are cut into extrusive rocks. Sagebrush grassland is common and scattered woodland grows on rocky uplands. This region has more cool season grasses than the valleys to the south and lacks saltbush–greasewood.

Frigid and mesic Aridisols and Mollisols occur. Grazing is the primary land use. Cropland is less common than in the Snake River Plain. High water quality and native fish assemblages occur in isolated canyons.

25.3 Owyhee High Plateau - Owyhee Uplands and Canyons- The Owyhee Uplands and Canyons ecoregion contains deep, precipitous river canyons, barren lava fields, badlands, and tuffaceous outcrops that are riddled by caves. Sagebrush grassland occurs.

25.6 Owyhee High Plateau - Semiarid Uplands- The disjunct Semiarid Uplands ecoregion includes mid-elevation zones in the Owyhee and Jarbidge mountains and hills, volcanic cones, buttes, and rocky outcrops that rise out of neighboring, drier lava plains. Mountain sagebrush, western juniper, mountain brush, and grasses grow in the ecoregion. In the Jarbidge Mountains, juniper woodland can be of limited extent. Elsewhere, density and extent of juniper woodland varies with long term climate changes, grazing pressure, and fire suppression.

## Land Use

Land use consists of rangeland grazing, irrigated grass/hay meadows, and one mining operation (Delamar). Rangeland is the predominant land use in the subbasin. Much smaller areas of grassland, pasture, and hayland are found in close proximity to streams throughout the subbasin. Forest lands are located in the middle northern and middle southern regions of the subbasin (Figure 2 and Table 1). Dirt roads crisscross the subbasin. Delamar, Silver City, and Triangle are the only towns found in the subbasin. These are very small community areas. Land use data for Table 1 was taken from the National Land Cover Database developed and led by the United States Geological Survey (http://seamless.usgs.gov).

**Table 1. Land Use, Total Acres and Percent of Total Acres in the Idaho Portion of the Jordan Creek Subbasin.**

| Land Use Description | Acres | Percent of Total |
|---|---|---|
| Open Water | 294.7 | 0.08 |
| Developed, Open Space | 195.0 | 0.05 |
| Barren Land | 440.1 | 0.11 |
| Evergreen Forest | 67,559.7 | 17.51 |
| Shrub/Scrub | 310,084.0 | 80.39 |
| Grassland/Herbaceous | 1,641.2 | 0.43 |
| Pasture/Hay | 1,353.4 | 0.35 |
| Cultivated Crops | 28.2 | 0.1 |
| Wood Wetlands | 431.7 | 0.11 |
| Emergent Herbaceous Wetlands | 3,713.6 | 0.96 |
| **Total** | **385,741.7** | **100** |

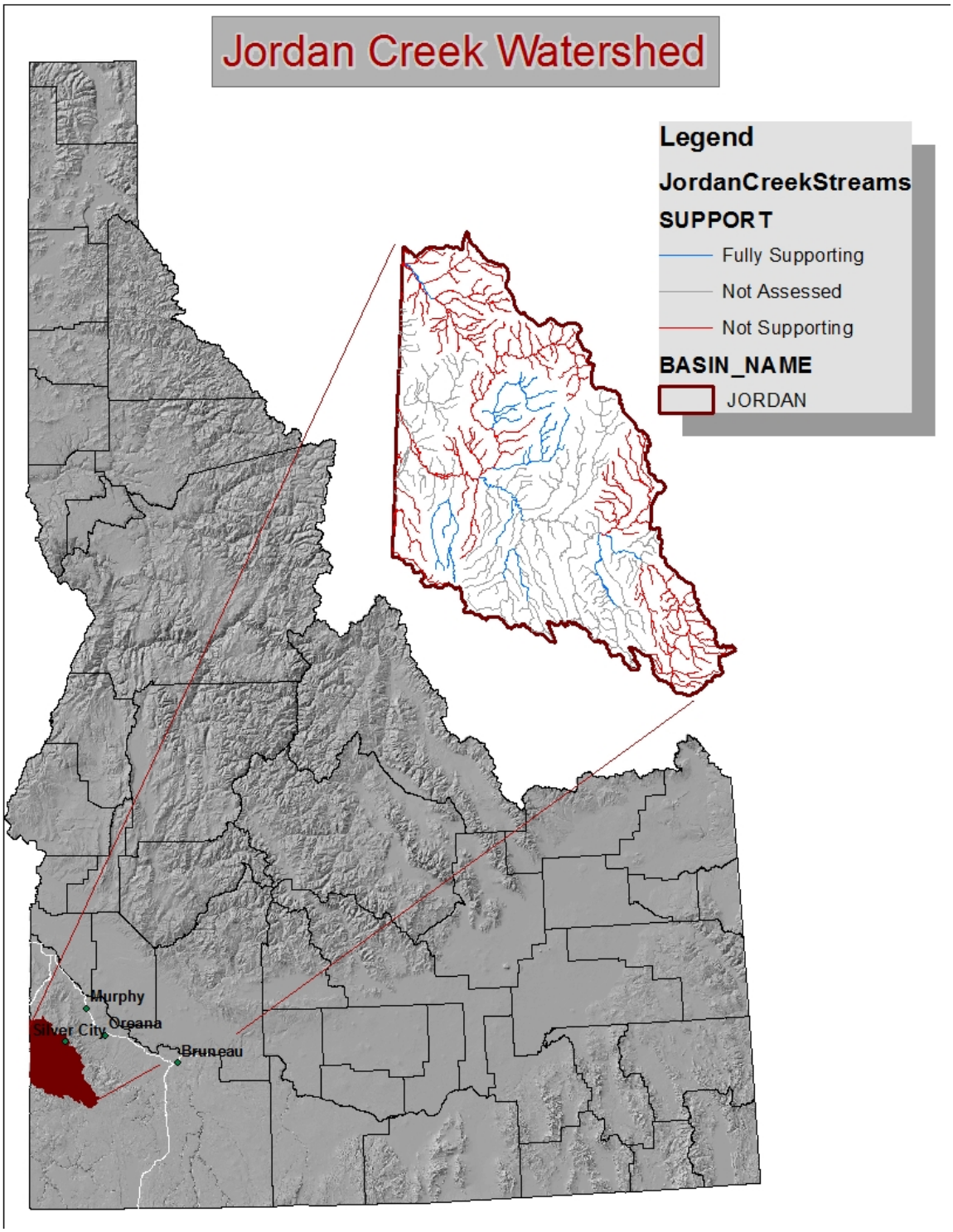



**Figure 1. Project Setting Map**

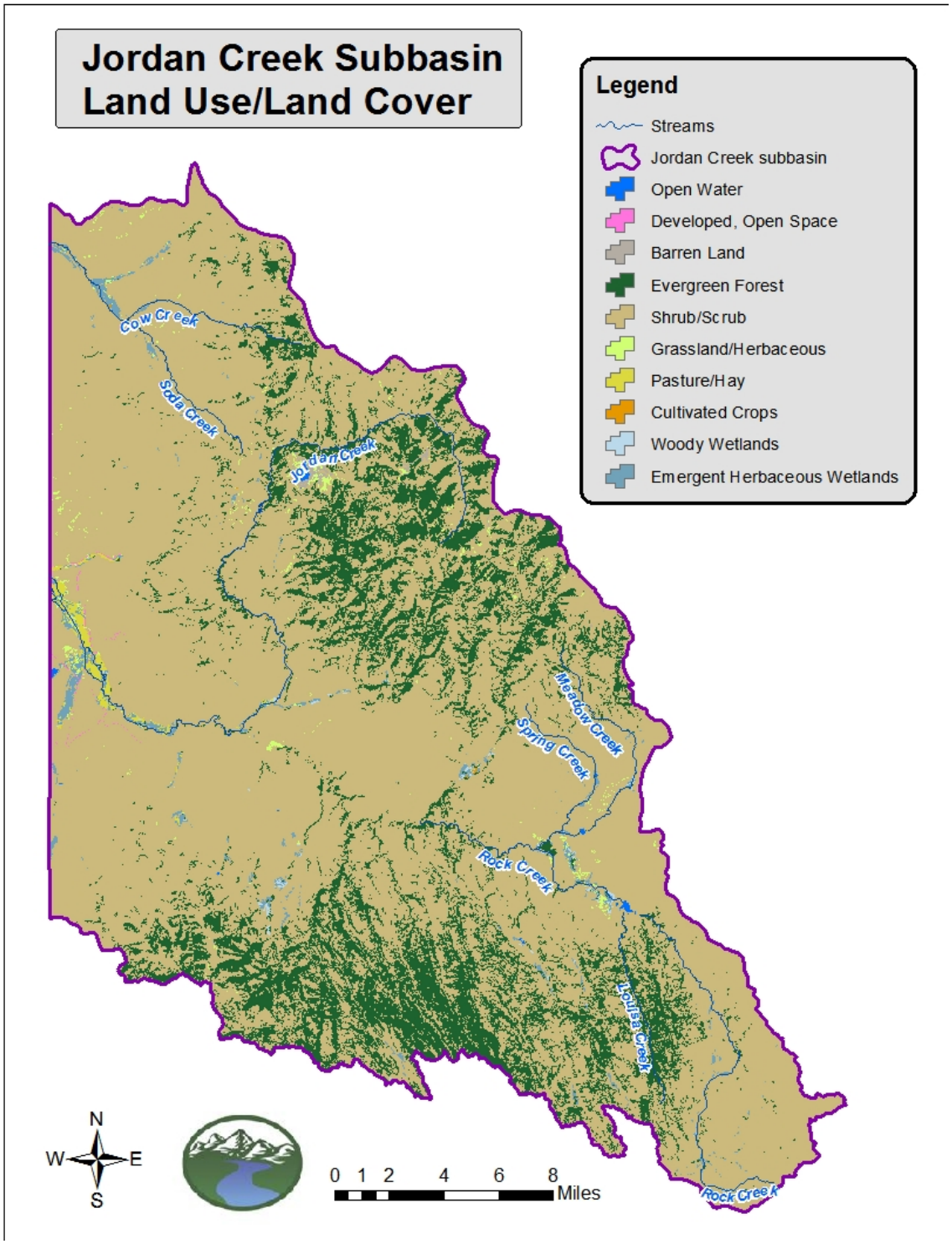



**Figure 2. Land Use/ Land Cover in the Jordan Creek Subbasin**

## Land Ownership/Management

There are only three land owners/managers in the subbasin (Table 2 and Figure 3). About fifty percent of the lands in the Jordan Creek subbasin are managed by the Bureau of Land Management (BLM). Most of this land is devoted to rangeland (grazing) use. State of Idaho lands are also used for grazing and they equal 17.5%. Private lands comprise thirty percent of the subbasin and are mostly found along riparian areas. The privately held property (base operation) is usually too limited to support a viable cattle operation and must rely on state and/or federally managed grazing allotments. In many instances, these allotments are "financially tied" to the base operation even though they are not seen as real property. If a base operation is sold, the grazing rights to a given allotment are considered a part of the overall "package." Table 2 shows the breakdown of land ownership.

**Table 2. Land Ownership/ Management in the Jordan Creek Subbasin**

| Land Owner / Manager | Acres | Percent of Total |
|---|---|---|
| BLM | 202,400 | 52.5 % |
| Private | 115,932 | 30.0 % |
| State of Idaho | 67,427 | 17.5% |
| Total | 385,760 | 100.00% |

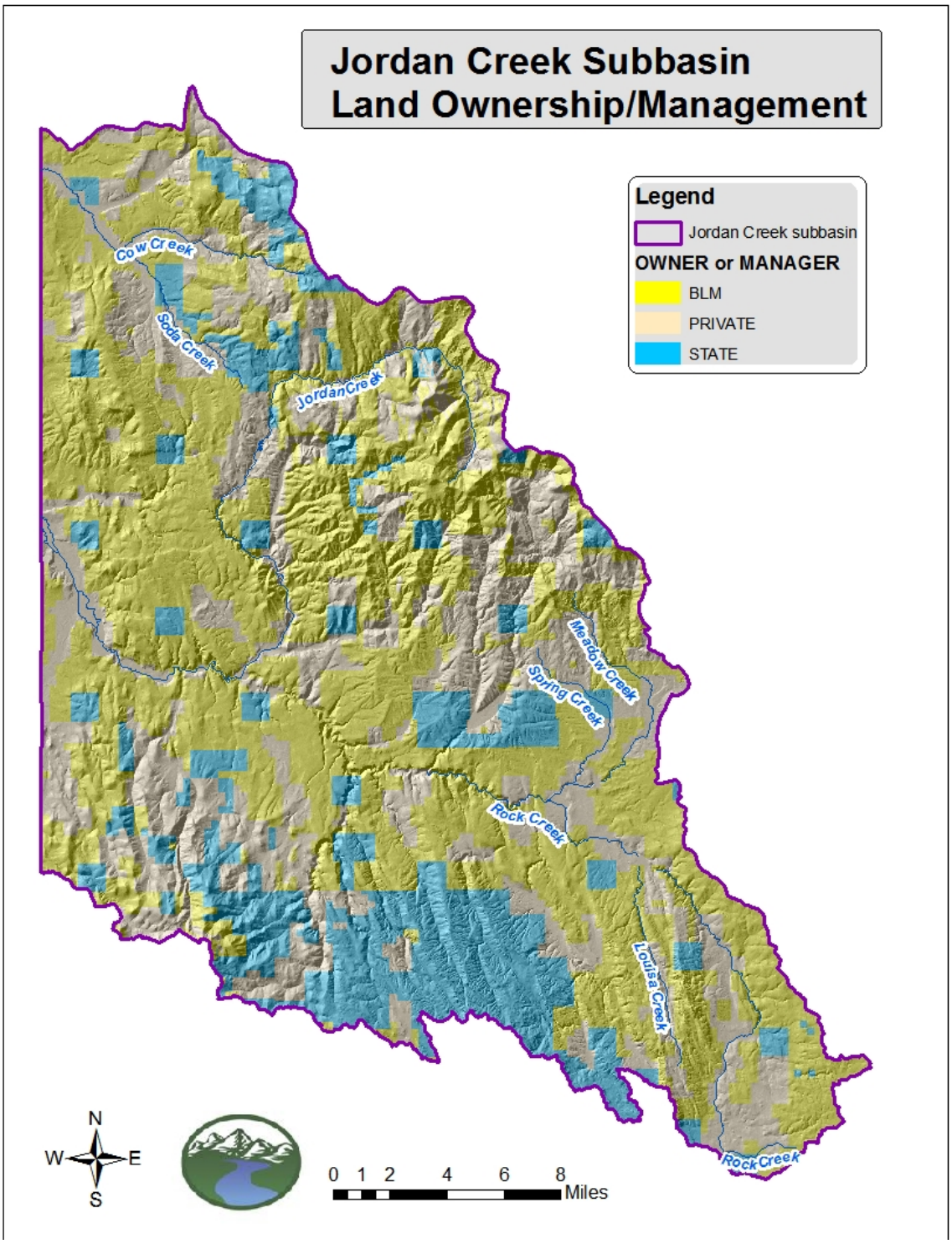



**Figure 3. Land Ownership/ Management in the Jordan Creek Subbasin**

# Conservation Accomplishments 2008-2012

Table 3 describes the Best Management Practices (BMP'S) applied from 2008-2012. The majority of the projects include cross fencing for better livestock distribution and fencing off riparian areas. As part of these fencing practices, off site watering facilities were provided for livestock. (EQIP) Environmental Quality Incentives Program, is a Natural Resource Conservation Service program that provides funding for a large share of these projects. Under the Resource Concern tab in Table 3, Declining Species or Species of Concern refers to Sage Grouse and the Sage Grouse Initiative EQIP program.

**Table 3. Accomplishments in the Jordan Creek Subbasin from 2008-2012**

| Hydrologic Unit Code | Practice | Program | Applied Date | Resource Concern | Applied Amount |
|---|---|---|---|---|---|
| 17050108 | Fence | EQIP | 2009/2010/2011 | T&E Species: Declining Species, Species of Concern/ Productivity, health and vigor/Organics in surface water | 40164.6 Feet |
| 17050108 | Pest Management | GENRL | 2008 | Irrigated Land/ Organics in surface water | 1604.9 Acres |
| 17050108 | Spring Development | EQIP | 2008 | Productivity, health and vigor | 3 |
| 17050108 | Pipeline | EQIP | 2008 | Productivity, health and vigor | 48.8 Feet |
| 17050108 | Prescribed Grazing | CTA-GLC | 2008/2011 | Productivity, health and vigor/ Declining species, species of concern | 4060.4 Acres |
| 17050108 | Watering Facility | EQIP | 2008 | Productivity, health and vigor | 6 |
| 17050108 | Pond | EQIP | 2008/2010/2011 | Productivity, health and vigor/ Declining species, species of concern | 5 |
| 17050108 | Upland Wildlife Management | CTA-GENRL | 2011 | Declining species, species of concern | 1349.6 Acres |
| 17050108 | Brush Management | EQIP | 2011 | Declining species, species of concern | 492 Acres |

# Conservation Accomplishments Pre-2008

Accomplishments prior to 2008 are noted below. Many of these projects include stream restoration, riparian fencing, and off site watering facilities.

## Cow Creek

**Willow Plantings** – 11,088 feet of willow plantings along Cow Creek over the last two years.

**Riparian Fencing** – 22,440 feet of riparian fencing installed to exclude cattle from the Cow Creek's riparian area.

**Off Site Watering Facilities** – 3 water troughs installed away from Cow Creek to reduce the effects of grazing on the riparian area.

## Jordan Creek

**Headwater to Williams Creek** – Prescribed grazing practices have been implemented changing from spring grazing to summer/fall grazing (1815 ac.).

**Williams Creek to the Oregon Line** – Prescribed grazing has changed from summer to fall grazing (500+ ac.), and 7,920 feet of bank stabilization measures have been completed on Jordan Creek.

## Meadow Creek

**Permanent Diversion** installed to replace two temporary earthen diversions that had to be installed and taken out annually.

## Rock Creek

**Offsite Watering** consisting of two water troughs – each water trough has a new well with a solar pump

**Riparian and Cross Fencing** – 32,736 feet of fencing has been installed to keep the cattle from overusing riparian areas.

The BMP's applied before and after 2008 are very similar. For example, fencing and off-site watering facilities were most common. Because of new programs like EQIP's Sage Grouse Initiative, 2008 to 2012 has had more funding for these types of projects and has included a new practice of brush management. Juniper tree removal has become popular amongst landowners, and is currently the largest practice being applied.

# Water Quality Concerns

## Beneficial Use Status

Idaho water quality standards require that beneficial uses of all water bodies be protected (IDAPA 58.01.02.051.02). Beneficial uses can include existing uses, designated uses, and presumed existing uses. Designated uses are uses officially recognized by the state. Agricultural water supply, industrial water supply, wildlife habitat, and aesthetics are designated uses for all waterbodies within the state of Idaho. In cases where designated uses have not been established by the state for a given water body, DEQ has established the presumed existing uses of supporting cold water aquatic life and either primary or secondary contact recreation (IDEQ 2009). Designated beneficial uses for waterbodies in the Jordan Creek subbasin are listed below in Table 4 (IDEQ 2009). In order for beneficial uses to be supported, water quality criteria must not be exceeded. Some of these criteria are:

Cold water aquatic life (CWAL)

- Temperature is 22 °C or less daily maximum; 19 °C or less daily average.

Primary Contact Recreation (PCR)

- Bacteria counts are less than 126 *E. coli*/100 ml (geometric mean) of 5 samples over 30 days or less than 406 *E. coli*/100 ml (instantaneous).
- Waters shall be free from visible slime growths or other nuisance aquatic growths.

**Table 4. Beneficial uses and support status for stream segments in the Jordan Creek Subbasin (IDEQ 2009).**

| Waterbody | Boundaries | Assessment Unit | Designated Beneficial Uses | Support Status |
|---|---|---|---|---|
| Cow Creek | Headwaters to Oregon Line | ID1705108SW021_02<br>ID1705108SW021_03 | No designated uses; presumed existing use: CWAL | Not fully supporting CWAL |
| Jordan Creek (Lower) | Williams Creek to Idaho/Oregon Stateline | ID1705108SW001_02 | CWAL, SS, PCR, SRW | Not fully supporting CWAL; Not fully supporting PCR |
| Jordan Creek – (Upper) | Source to Williams Creek | ID1705108SW004_02<br>ID1705108SW004_03<br>ID1705108SW004_05 | CWAL, SS, PCR, SRW | Not fully supporting CWAL; Not fully supporting PCR |
| Louisa Creek | Headwaters to Triangle Reservoir | ID1705108SW014_02 | No designated uses; presumed existing use: CWAL | Not fully supporting CWAL |
| Rock Creek | Headwaters to Triangle Reservoir | ID1705108SW013_02 | No designated uses; presumed existing use: CWAL | Not fully supporting CWAL |
| Soda Creek | Headwaters to Cow Creek | ID1705108SW022_02<br>ID1705108SW022_03 | No designated uses; presumed existing use: CWAL | Not fully supporting CWAL |
| Spring Creek and Meadow Creek | Headwaters to Mouth | ID1705108SW015_02<br>ID1705108SW015_03 | No designated uses; presumed existing use: CWAL | Not fully supporting CWAL |
| **Designated & Presumed Uses Key**: CWAL = cold water aquatic life; SS = salmonid spawning; PCR = primary contact recreation; SCR = secondary contact recreation; SRW = special resource | | | | |

## Pollutants

The main sources of pollutants in the Jordan Creek subbasin include past mining activities, roads, and agricultural activities. Pollutants of concern in the subbasin include mercury, sediment, and temperature. Flow alteration and habitat alteration are also impacting streams in the subbasin but they are not considered pollutants. Bacteria, oil and grease, pesticides, and sediment were identified in the 2002 Integrated Report as pollutants for Jordan Creek. Louse Creek was listed as having metals and pH as a pollutants in the 2002 Integrated Report. Louse Creek was subsequently delisted by DEQ based on additional water quality data as reported in the 2008 Integrated Report (IDEQ 2008). The Jordan Creek SBA-TMDL recommended removing oil and grease, sediment, bacteria, and pesticides as pollutants of concern for Jordan Creek (IDEQ 2009). Sediment and temperature TMDLs were generated for streams in the Jordan Creek subbasin. Table 5 lists the waterbody and its corresponding pollutant and TMDL.

Mercury will not be addressed in this implementation plan. A TMDL for mercury was completed; however, high mercury levels in the subbasin are the result of historic placer mining, dredging, and tailing piles in Upper Jordan Creek and are not associated with agricultural activities.

The Jordan Creek SBA-TMDL identifies target maximum daily loads for listed streams. Tables 6 and 7 summarize allocated pollutant loads and required reductions for sediment and temperature in the Jordan Creek subbasin. The TMDL for Soda Creek was based on suspended sediment targets. The TMDL for the streams listed for temperature was based on a Potential Natural Vegetation method (IDEQ 2009). This method compares existing shade versus target shade for the purposes of determining the amount of solar loading to a stream.

There are a few factors that should be considered in regard to the temperature TMDL. The Jordan Creek subbasin has low precipitation zones with less than 12 inches of precipitation annually (NRCS 2007) and high temperatures, on average 77 °F to 88 °F during the summer months (http://www.wrcc.dri.edu/climate-summaries/). Irrigation may be required to re-establish vegetation along streams because of the climate of the area. Second, redband trout are found in streams in the Jordan Creek subbasin (IDEQ 2009). Redband trout have been documented to feed, survive, and reproduce i.e. function better in warmer waters than other species of trout (Zoellick 1999, Rodnick 2004). Third, because external factors such as topographic shade can affect stream temperatures; it is likely that the steep, rocky, mountainous terrain found in the Jordan Creek subbasin impacts stream temperatures (Poole 2001). Riparian vegetation and canyon topography are sources of shading which can influence water temperature. There are areas throughout the subbasin where riparian vegetation is naturally limited due to geology of the subbasin therefore the potential for riparian shade is also limited (Poole 2001).

**Table 5. Listed Stream Segments in the Jordan Creek Subbasin with Identified Pollutants and TMDL (IDEQ 2009).**

| Waterbody | Boundaries | Assessment Unit | Pollutant(s) | TMDL |
|---|---|---|---|---|
| Cow Creek | Headwaters to Oregon Line | ID17050108SW021_02<br>ID17050108SW021_03 | Sediment and temperature | Temperature |
| Jordan Creek (Lower) | 1st and 2nd Order tributaries (Williams Creek to Oregon Line) | ID17050108SW001_02 | Fecal coliform, mercury, oil/grease, unknown, (pesticides) sediment, | Temperature and Mercury |
| Jordan Creek (Upper) | Source to Williams Creek | ID17050108SW004_02<br>ID17050108SW004_03<br>ID17050108SW004_05 | Fecal coliform, mercury, oil/grease, unknown (pesticides), sediment | Temperature and Mercury |
| Louisa Creek | Headwaters to Triangle Reservoir | ID17050108SW014_02 | Sediment and temperature | Temperature |
| Rock Creek | Headwaters to Triangle Reservoir | ID17050108SW013_02 | Sediment and temperature | Temperature |
| Soda Creek | Headwaters to Cow Creek | ID17050108SW022_02<br>ID17050108SW022_03 | Sediment and temperature | Sediment and Temperature |
| Spring Creek and Meadow Creek | Headwaters to mouth | ID17050108SW015_02<br>ID17050108SW015_03 | Temperature | Temperature |

**Table 6. Sediment Loads, Targets, and Reductions in the Jordan Creek Subbasin (IDEQ 2009).**

| Waterbody | TSS or SS not to be exceeded | | Target Load | | Current Load | Required Reduction |
|---|---|---|---|---|---|---|
| | 30 day | 14 day | 30 day | 14 day | | |
| Soda Creek (at the confluence with Cow Creek) | 50 mg/l | 80 mg/l | 123.6 kg/day | 197.7 kg/day | not determined | n/a |

**Table 7. Solar Loads, Targets, and Reductions in the Jordan Creek Subbasin (IDEQ 2009).**

| Waterbody | Existing Load (kWh/day) | Target Load (kWh/day) | Excess Load (kWh/day) | Average Lack of Shade (%) |
|---|---|---|---|---|
| Cow Creek | 521,884 | 499,264 | 22,620 | -18 |
| Jordan Creek | 7,273,168 | 4,307,893 | 2,965,275 | -10 |
| Louisa Creek | 69,389 | 58,783 | 10,605 | -13 |
| Rock Creek | 1,499,549 | 1,341,371 | 158,177 | -23 |
| Soda Creek | 115,912 | 86,344 | 29,568 | -20 |
| Spring Creek | 195,362 | 141.478 | 53,884 | -27 |
| Meadow Creek | 397,334 | 345,044 | 52,290 | -18 |

## Water Quality Monitoring

Surface water quality monitoring was conducted by IDEQ and other agencies before and during the TMDL process. This data is described in Appendix D of the Jordan Creek Subbasin SBA-TMDL (IDEQ 2009). IDEQ has conducted surface water quality monitoring since the completion of the TMDL in 2010 (http://mapcase.deq.idaho.gov/wq2010/).

There are no known groundwater monitoring sites in the Jordan Creek subbasin (http://waterdata.usgs.gov/id/nwis/rt). This subbasin does not contain nitrate priority areas or groundwater concern areas (http://www.deq.state.id.us/water/data_reports/ground_water/reports.cfm).

## Agricultural Water Quality Inventory and Evaluation

Methods used by SWC/IASCD to evaluate water quality, streambank stability, and riparian habitat are listed below followed by a summary of SWC/IASCD staff field inventories completed on private agricultural lands to assess agricultural impacts to water quality on 303 (d) listed stream segments.

**Proper Functioning Condition**
Proper functioning condition (PFC) is a qualitative method of assessing the condition of riparian wetland areas. The PFC assessment refers to a consistent approach for considering hydrology, vegetation and erosion/deposition (soils) attributes and processes to assess the condition of riparian wetland areas. The on-the-ground condition termed PFC refers to how well the physical processes are functioning.

**Stream Visual Assessment Protocol**
SVAP is a qualitative assessment of the stream's health based on a score from 1 to 10, with 1 being the most impaired. SVAP is used to assess channel condition, hydrologic alteration,

riparian zone, bank stability, water appearance, nutrient enrichment, barriers to fish movement, instream fish cover, pools, invertebrate habitat, canopy cover, manure presence and macroinvertebrates.

**Solar Pathfinder Inventory**
A solar pathfinder is used to determine the amount of shade received at a particular point based on canopy cover, topography, and aspect.

**Riparian Vegetation Inventory**
It is very important to identify the riparian vegetation and the health and abundance of riparian vegetation. This information is very important in order to determine the health of the riparian zone along a given stream.

**Stream Erosion Condition Inventory**
SECI is a qualitative assessment of the potential for streambank erosion and deposition into a stream. A higher rating equals greater potential for erosion. SECI is often combined with quantitative measurements of eroding bank length and depth in order to determine the extent of sedimentation in a given stream. The best method of determining bank stability is by inventorying the extent of bank erosion along a given stream reach.

**Riparian Photo Inventory**
Riparian photo inventory is very valuable as the pictures can be used to document field observations and also to maintain a record of condition to be compared to in future years.

## Riparian Evaluation

From 2004 through 2007, there was a riparian assessment conducted by the SWC/IASCD in the Jordan Creek subbasin. Proper Functioning Condition (PFC) Inventory, Stream Visual Assessment Protocol (SVAP), Solar Pathfinder, Riparian Vegetation Inventory, Stream Erosion Condition Inventory (SECI), as well as a Riparian Photo Inventory were used to assess private property. Descriptions of these methods are found above.

In 2012, there was another riparian assessment conducted by SWC personnel in the Jordan Creek subbasin. Cow, Spring, Meadow, Rock, and Jordan Creeks were assessed. Protocols used during the 2012 assessment were the same as the previous described above with the addition of the Wolman Pebble Count.

### 2004-2007 Riparian Assessment Summary

Tables 8-12 summarize the results of riparian assessments conducted by the SWC and the IASCD on 303 (d) listed streams in the Jordan Creek subbasin from 2004 through 2007.

**Table 8. Cow Creek – Riparian Assessment (SWC & IASCD 2005)**

| Stream Reach | PFC Rating | PFC Trend | SVAP Rating |
|---|---|---|---|
| Reach l | Functioning at risk | Moderate upward trend | High Fair/Good |
| Reach 2 | Functioning at risk | Moderately upward trend | Good |
| Reach 3 | Proper functioning condition | Moderate upward trend | Excellent |
| Reach 4 | Functioning at risk | Strong upward trend | Good |
| Reach 5 | Proper functioning condition | Moderate upward trend | Excellent |
| Reach 6 | Functioning at risk | Moderate upward trend | High Fair |
| Reach 7 | Functioning at risk | Very strong upward trend | High Good |

**Table 9. Jordan Creek (Lower) - Riparian Assessment (2004-2005 SWC & IASCD)**

| Stream Reach | PFC Rating | PFC Trend |
|---|---|---|
| Reach 1 | Proper functioning condition | Not Available |
| Reach 2 | Functioning at risk | Moderate upward trend |
| Reach 3 | Functioning at risk | Moderate upward trend |
| Reach 4 | Functioning at risk | Strong upward trend |
| Reach 5 | Proper functioning condition | Not Available |
| Reach 6 | Functioning at risk | Low moderate upward trend |
| Reach 7 | Functioning at risk | Moderate upward trend |

**Table 10. Jordan Creek (Upper) – Riparian Assessment (2005-2006 ISCC & IASCD)**

| Stream Reach | PFC Rating | PFC Trend | SVAP Rating |
|---|---|---|---|
| Reach 1 | Proper functioning condition | Not Available | Excellent |
| Reach 2 | Functioning at risk | Strong upward trend | Good |
| Reach 3 | Proper functioning condition | Not Available | Excellent |
| Reach 4 | Functioning at risk | Strong upward trend | Very good |
| Reach 5 | Proper functioning condition | Not Available | Excellent |
| Reach 6 | Proper functioning condition | Not Available | Excellent |
| Reach 7 | Proper functioning condition | Not Available | Excellent |
| Reach 8 | Functioning at risk | Strong upward trend | Good |

**Table 11. Louisa Creek – Riparian Assessment**

| Stream Reach | PFC Rating | PFC Trend |
|---|---|---|
| Reach 1 | Functioning at risk | Low upward trend |

**Table 12. Rock Creek – Riparian Assessment (2004 David Ferguson – SWC)**

| Stream Reach | PFC Rating | PFC Trend |
|---|---|---|
| Reach 1 | Functioning at risk | Strong upward trend |
| Reach 2 | Functioning at risk | Strong upward trend |
| Reach 3 | Functioning at risk | Moderate upward trend |
| Reach 4 | Functioning at risk | Strong upward trend |
| Reach 5 | Functioning at risk | Strong upward trend |
| Reach 6 | Proper Functioning condition | Not Available |
| Reach 7 | Functioning at risk | Strong upward trend |
| Reach 8 | Functioning at risk | Low upward trend |
| Reach 9 | Functioning at risk | Strong upward trend |
| Reach 10 | Functioning at risk | Very strong upward trend |

## 2012 Riparian Assessment Summary

### Tributaries Summary

Stream Visual Assessment Protocol (SVAP)

Two of the four creeks rated fair and two creeks, Rock Creek and Spring Creek, rated good according to SVAP (Table 13 and Figures 4 and 5). Lower SVAP scores for the creeks that rated fair were due to steep banks, bank failures, bank erosion, cloudy or greenish water, and lack of canopy (vegetative) cover.

Stream Erosion Condition Inventory (SECI)/ Eroding Bank Measurements

SECI ranked stream erosion potential slight or minimal for three of the four creeks. One creek, Cow Creek, had severe potential for streambank erosion. A large portion of this creek was eroding with bare and unprotected streambanks. The other creeks had much smaller eroding areas and the potential for erosion was much less (Table 13).

**Table 13. SVAP and SECI results for Jordan Creek tributaries**

| Stream | SVAP Rating | SECI Rating |
|---|---|---|
| Cow Creek | Fair | Severe |
| Spring Creek | Good | Slight |
| Meadow Creek | Fair | Slight |
| Rock Creek | Good | Slight |

Solar Pathfinder

Solar pathfinder data showed that three of the creeks assessed met potential natural vegetation (PNV) conditions. This is indicated by a positive value in the lack of shade column which means that these reaches met or exceeded shade conditions based on the target shade (Table14). Rock Creek does not meet target shade conditions. Reaches with numbers less than -20 have the greatest need for shade and are targeted for implementation of riparian BMPs

**Table 14. Solar Pathfinder Results for tributaries to Jordan Creek**

| Stream Name | Original Lack of Shade | TARGET SHADE (percent) | EXISTING SHADE (percent) | Current Lack of Shade |
|---|---|---|---|---|
| Cow Creek | 3 | 7 | 8.4 | 1.4 |
| Spring Creek | -29 | 39 | 47.3 | 8.3 |
| Meadow Creek | 0 | 10 | 15 | 5 |
| Rock Creek | -17 | 19 | 8.3 | **-8.7** |

Wolman Pebble Count

Wolman pebble counts were conducted on Cow and Rock Creeks. These two streams (Cow Creek in particular) had the largest percent of eroding banks of the four streams assessed. Cow Creek is predominantly a Tucker-Zola silt loam. Rock Creek is mainly a Paynecreek-Northcastle soil (gravelly sandy loam). Particle sizes ranged from silt to boulder, however, fine materials made of silt, sand, and clay and cobbles were most common for both streams.

Vegetation was a mixture of willows, rushes, sedges, golden currant, wild rose, speedwell, and grass species. Noxious or introduced plants, such as Canada thistle were also present, but in minimal amounts.

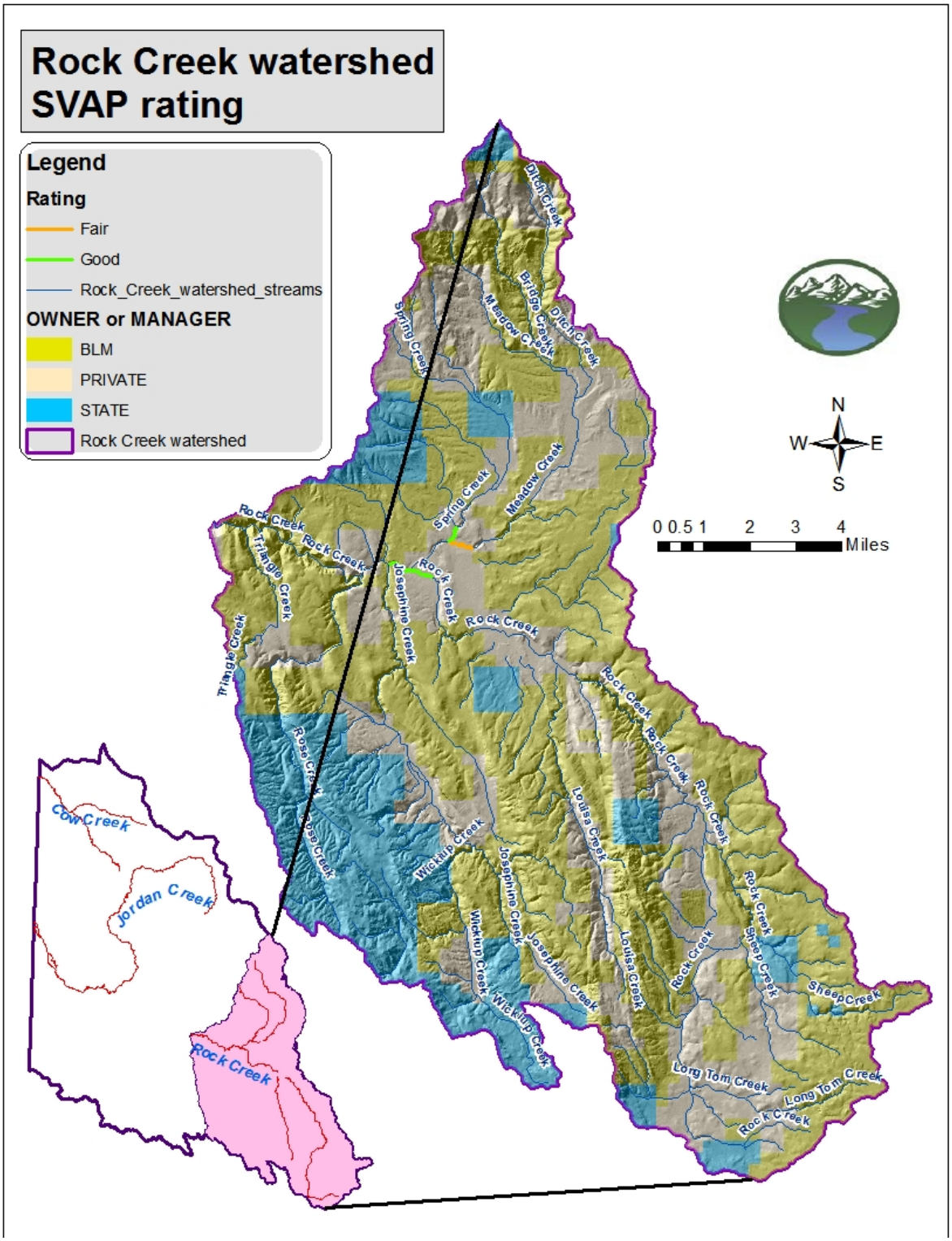



**Figure 4. SVAP results for the Rock Creek watershed (Meadow, Spring, & Rock Creeks)**

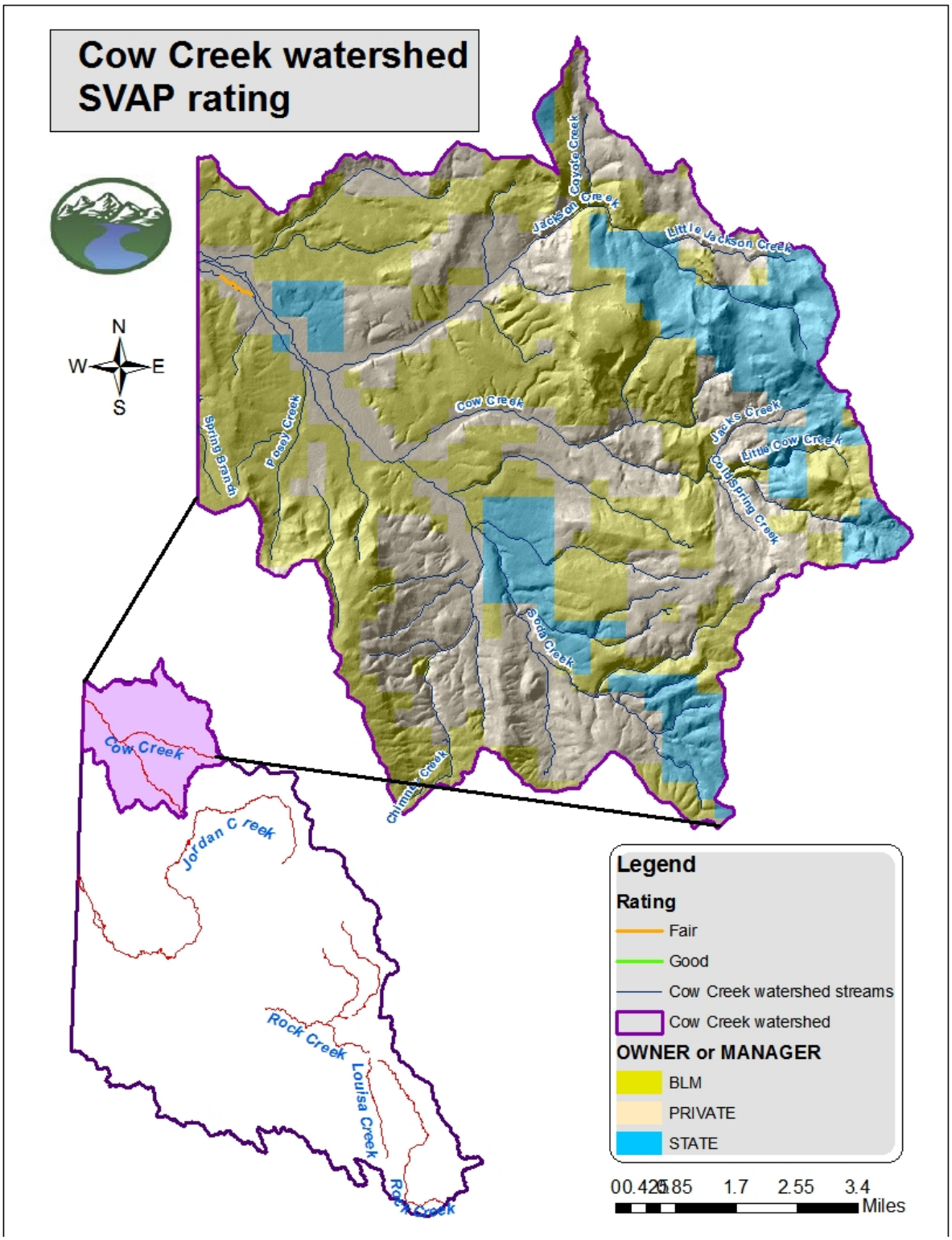



**Figure 5. SVAP results for the Cow Creek watershed**

## Mainstem Summary

### Stream Visual Assessment Protocol (SVAP)

Results from the SVAP are shown below in Table 15 and Figure 6. Six of the nine reaches on Jordan Creek rated good, and the remaining three rated fair. Lower SVAP scores for those reaches that rated fair were due to steep banks, bank failures, bank erosion, cloudy or greenish water, channel modification, manure presence, and lack of canopy (vegetative) cover.

### Stream Erosion Condition Inventory (SECI)/ Eroding Bank Measurements

Stream erosion potential was slight or minimal for six of the nine reaches. A few reaches; four, five, and seven, had greater potential for streambank erosion. Jordan Creek reaches 1, 4, 5, and 7 had the largest amounts of measured eroding banks. Eroding areas had incised, bare, and unprotected land with moderate to severe potential to deliver sediment into the creek. Often encroaching farther into hay meadows where there was little to no protection of banks. The other reaches had much smaller eroding areas and the potential erosion rate was much less (Table 15).

**Table 15. Jordan Creek SVAP and SECI ratings**

| Stream (by reach) | SVAP Rating | SECI Rating |
|---|---|---|
| Reach 1 | Fair | Slight |
| Reach 2 | Good | Slight |
| Reach 3 | Good | Slight |
| Reach 4 | Good | Moderate |
| Reach 5 | Fair | Moderate |
| Reach 6 | Good | Slight |
| Reach 7 | Fair | Moderate |
| Reach 8 | Good | Slight |
| Reach 9 | Good | Slight |

### Solar Pathfinder

Most of the reaches assessed met potential natural vegetation (PNV) conditions. This is indicated by a positive value in the lack of shade which means that these reaches met or exceeded shade conditions based on the target shade. Reaches 2, 4, 7, and 9 do not meet target shade conditions. Reach 2 is identified in this plan as the most in need of treatment. Reaches with numbers less than -20 have the greatest need for shade and are targeted for implementation of riparian BMPs.

**Table 16. Solar Pathfinder Results for Jordan Creek**

| Stream Reach | Original Lack of Shade | TARGET SHADE (percent) | Current SHADE (percent) | Current Lack of Shade |
|---|---|---|---|---|
| **Reach 1** | -9 | 9 | 9.7 | 0.7 |
| **Reach 2** | -23 | 23 | 6.8 | **-16.1** |
| **Reach 3** | -18 | 18 | 18 | 0 |
| **Reach 4** | -19 | 19 | 12.3 | **-6.6** |
| **Reach 5** | -19 | 19 | 22.9 | 3.9 |
| **Reach 6** | 19 | 19 | 19.3 | 0.3 |
| **Reach 7** | -22 | 22 | 19.3 | **-2.6** |
| **Reach 8** | -13 | 43 | 50 | 7 |
| **Reach 9** | -13 | 43 | 36.8 | **-6.2** |

Wolman Pebble Count

Wolman pebble counts were conducted on all nine reaches. The most common substrate material found was predominately small to large cobbles (128-256 mm). Particle sizes ranged from silt to boulder, however, fine materials made of silt, sand, and clay and cobbles were most common for reaches 5 and 7. Reaches 5 and 7 had relatively similar bank erosion and SVAP/SECI ratings, which related to having a higher amount of sands and silts (1-2.5 mm).

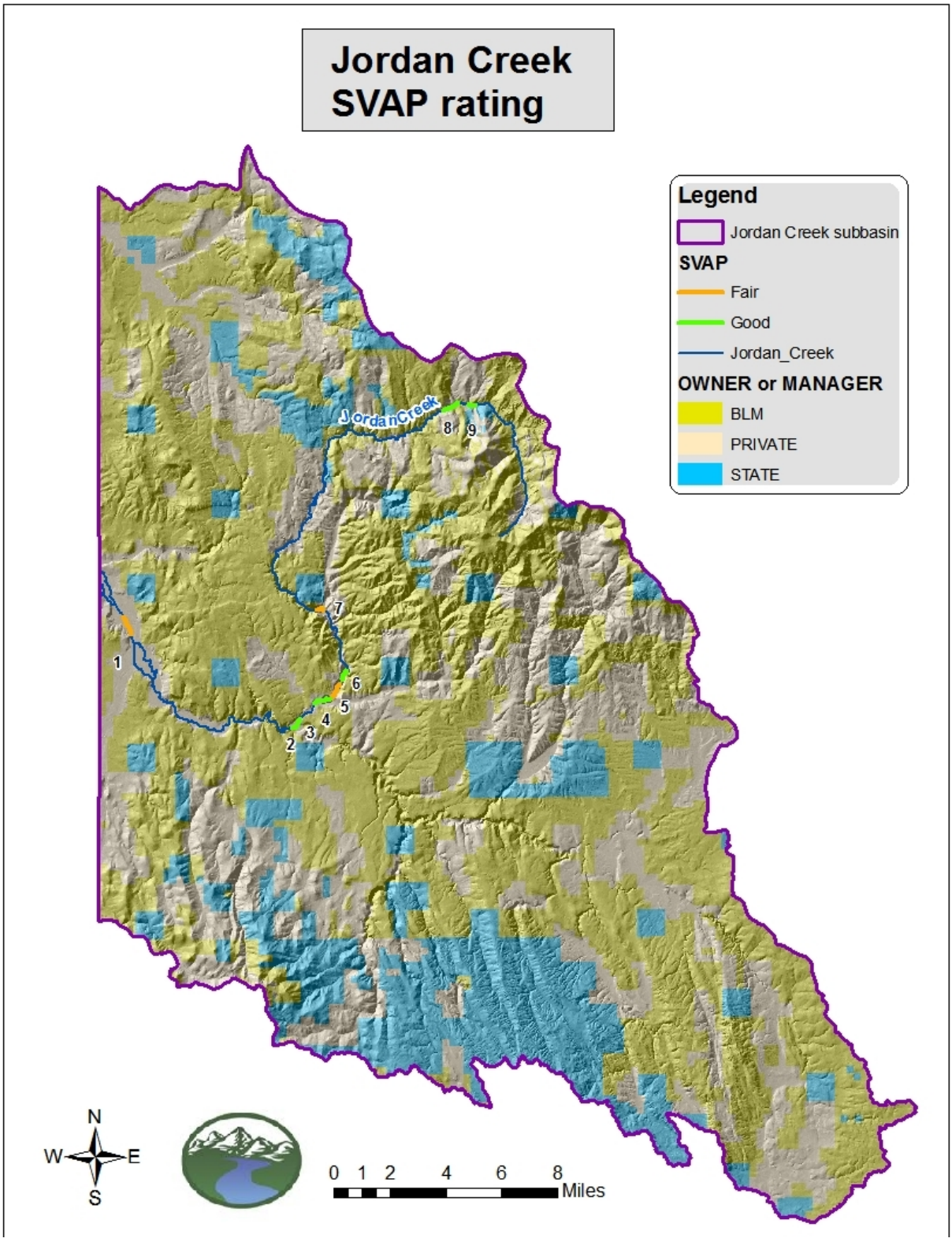



**Figure 6. Jordan Creek SVAP Rating**

## Rangeland/ Grass/ Pastureland/ Hayland Evaluation

NRCS and SWC personnel used NRCS's Range Health Evaluation Form to rate the uplands adjacent to a few reaches assessed on Jordan Creek. The uplands in the Jordan Creek area are mostly rangelands with mixed meadows throughout. Commonly, these areas are "home places" or "base operations" for livestock producers. The reaches that were evaluated are typically irrigated from the perennial streams to take one cutting of grass hay in the summer, and then grazed later in the fall when the livestock return.

The chosen reaches and their ratings can be seen in Table 17. Each upland area was rated under three categories; Soil, Hydrologic, and Biotic. The ratings ranged from "Extreme to Total" to "none to slight". Thus meaning the range sites that closely match the Ecological Site Description (ESD) would rate none to slight, whereas the more the site differs from the ESD, the site would rank closer towards Extreme to Total. ESD's are reports that provide detailed ecological information and data about a particular kind of land (www.nrcs.usda.gov). ESD information is presented in four major categories:

- Site Characteristics - physiographic, climate, soil, and water features
- Plant Communities – vegetation states, species composition, and ecological dynamics
- Site Interpretations – best management of the site and its related resources
- Supporting Information – information and data sources, relationship to other ecological site.

Jordan Creek reach 1 for example, closely represented what the ESD described should be at a loamy bottom 12-16" site. Table 17 below shows the ratings of this reach. Reach 1 received a "none to slight" rating in all three areas of the form. This site was what a person should expect to see when comparing to this particular ESD. In the hydrologic categories of the evaluation, this site's ability to capture, store, and safely release water from rainfall and snowmelt were very similar to the EDS indicators. Also, the biotic characteristics and its ability to support proper functioning structural groups of grasses, forbs, and shrubs were also correct. For the soil portion of this evaluation, the limited redistribution and loss of soil by wind and water appeared to best match the "none to slight" ranking.

Jordan Creek reach 5 was evaluated and received a slight to moderate ranking. This ranking was due to the difference in the ESD indicators and the site. Reach 5 was also a loamy bottom 12-16" precipitation site, but ranked differently from reach 1 for a few reasons. Slight forming of pedestals and terracettes were apparent in the uplands. In the meadows, soil loss and degradation was beginning from irrigation activity. Lastly, a lack of plant mortality and decadence was evident, proving most plants were not reaching this stage before becoming consumed.

**Table 17. Range Health Evaluation Rating**

| Stream/Reach | Soil | Hydrologic | Biotic |
|---|---|---|---|
| Jordan Creek Reach 1 | None to Slight | None to Slight | None to Slight |
| Jordan Creek Reach 4 | None to Slight | None to Slight | Slight to Moderate |
| Jordan Creek Reach 5 | Slight to Moderate | Slight to Moderate | Slight to Moderate |
| Jordan Creek Reach 6 | None to Slight | None to Slight | Slight to Moderate |
| Jordan Creek Reach 7 | None to Slight | None to Slight | Slight to Moderate |
| Cow Creek Reach 1 | None to Slight | None to Slight | None to Slight |
| Soda Creek Reach 1 | None to Slight | None to Slight | None to Slight |

## Animal Feeding Operations and Dairies

There are no AFOs or dairies in the Jordan Creek subbasin at the present time, thus there is no action needed in this regard.

Furthermore, in 2000, the Idaho Legislature passed Idaho law, I.C. §22-4906, Title 22, Chapter 49, Beef Cattle Environmental Control Act. Beef cattle AFOs are required to submit a nutrient management plan to the Idaho State Department of Agriculture (ISDA) for approval no later than January 1, 2005 (http://www.agri.state.id.us/Categories/Animals/cattleFeedlots/indexcattlefeedlots.php.)

All licensed dairies are required to have a nutrient management plan according to Idaho law, *I.C. §37-401, Title 37, Chapter 4, Sanitary Inspections of Dairy Products* (http://www.agri.state.id.us/Categories/Animals/Dairy).

## Candidate Species

There are three candidate species in the Jordan Creek subbasin. The Columbia spotted frog (*Rana luteiventris*) is found in springs above the headwaters of Rock Creek and in the headwaters of Long Tom Creek which flows into Rock Creek. The yellow-billed cuckoo (*Coccyzus americanus*) and the Greater sage grouse (*Centrocercus urophasianus*) are listed as candidate species for Owyhee County and are recorded to exist in the Jordan Creek subbasin (http://www.natureserve.org, http://www.fws.gov/endangered/). Redband trout, which are a species of concern, are found in streams in the subbasin.

Brown bullhead and white crappie were the only nonindigenous aquatic species collected in the subbasin (http://nas.er.usgs.gov/queries/huc6nw.asp). They are found in Cow Lake in Oregon.

**Table 18. Species Listings in the Jordan Creek Subbasin.**

| Species | Status | Habitat |
|---|---|---|
| Yellow-billed cuckoo (*Coccyzus americanus*) | Candidate | Wetland, Riparian, Forest |
| Columbia spotted frog (*Rana luteiventris*) | Candidate—Great Basin population | Aquatic |
| Greater sage grouse (*Centrocercus urophasianus*) | Candidate | Foothills, Plains, Mountains |
| Redband trout (*Oncorhynchus mykiss gairdeneri)* | Species of Concern | Aquatic |

Agricultural conservation planning will be coordinated with other species recovery and protection efforts to improve listed species' habitats and address any potential impacts

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

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

# Treatment

## Treatment Units

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

treatment units (TUs) that need to be addressed for the 303(d) listed segments in the subbasin: (1) Riparian, (2) Grass/Pasture/Hayland, and (3) Rangeland.

## Riparian Treatment Unit

| Total Acres | Soils: | Resource Problems | Recommended BMPs |
|---|---|---|---|
| 153 Critical Acres | loams, sandy loams & sandy clay loams, 1-2% slopes | Streambank erosion, livestock crossings, irrigated lands adjacent to the stream | Offsite Watering, Fencing, Prescribed Grazing |
| Although the majority of the riparian treatment unit acres are in good condition without resource problems, a small percentage (approximately 153 acres) would benefit from implementation of the above recommended BMPs. | | | |

## Grass/Pasture/Hayland Treatment Unit

| Total Acres | Soils: | Resource Problems | Recommended BMPs |
|---|---|---|---|
| 556 Critical Acres | sandy and coarse sandy loam soils, 2-3% slope | Nutrient and sediment concerns, surface irrigated erosion, inefficient water use | Sprinkler Irrigation, surge or gated pipe |
| | | | |
| The crop residue is a source of feed in the fall and winter. Some of the feed in these fields could be better utilized if cross fencing in the form of electric fences could be installed. This would concentrate the animals in a given area so that they would utilize even the less desirable feed more completely. | | | |

## Rangeland Treamtment Unit

| Total Acres | Soils | Resource Problems | Recommended BMPs |
|---|---|---|---|
| 1,213 Critical Acres | loam, sandy loam, sandy clay loams, 30% and less slope | Livestock populations are too concentrated in certain areas – over utilization | Prescribed grazing, distribute salt & watering locations away from areas of concentration. |
| Prescribed grazing should be maintained on the rangeland to insure that erosion on the steeper slopes does not occur. The present prescribed grazing plans are working well to hold the soils in place within the 303 (d) listed portions of the subbasin. | | | |

## Critical Areas

Areas of agricultural lands that contribute excessive pollutants to waterbodies are defined as "critical areas" for BMP implementation. Critical areas are prioritized for treatment based on their location to a waterbody of concern and the potential for pollutant transport and delivery to the receiving waterbody. Critical areas are those areas in which treatment is considered necessary to address resource concerns affecting water quality. Agricultural critical areas within the Jordan Creek Subbasin include:

- Grass/Pasture/Hayland next to waterways
- Surface irrigated cropland and pastureland
- Unstable and erosive streambanks
- Areas where livestock are grazed
- Areas where livestock have access to streams and riparian areas

## Recommended BMPs by Treatment Unit

The costs to install Best Management Practices (BMPs) on private agricultural lands are most accurately made on a case by case basis during development of contracts with individual landowners. Each operation and location is unique and individual farm planning is needed to optimize BMP implementation and load reductions. Availability of cost-share funds as financial assistance for agricultural producers within the Jordan Creek subbasin will likely be necessary to meet the TMDL requirements.

### Riparian Treatment Unit

Some of the voluntary best management practices (BMPs) that may be implemented along these creeks include fence, pipeline for troughs, spring development, prescribed grazing, use exclusion, watering facility, riparian herbaceous cover, tree and shrub establishment, and pest management to control noxious weeds. Stream crossing may also be needed in certain areas to allow livestock and vehicles to cross the stream.

Fencing off portions of these creeks and allowing time for recovery can lead to improved bank stability and vegetation re-growth. Riparian plantings can stabilize streambanks and prevent further soil erosion. Water developments, cross fencing, and livestock management may be necessary for the success of riparian plantings. Also, pest management to control noxious weeds is recommended.

### Grass/Pasture/Hayland Treatment Unit

Irrigation water management and irrigation system upgrades may be considered for pastureland adjacent to these streams. Earth diversions can be upgraded to permanent type structures made from concrete or steel to prevent washouts during high flows. Flood irrigation could be changed to more efficient irrigation equipment like gated pipe or sprinkler, which can greatly save water

and reduce sediment loading from tailwater. Nutrient and pest management is recommended for grass/pasture/hayland.

### Rangeland Treamtment Unit

Brush management has been used to clear juniper. Prescribed grazing and upland wildlife habitat may be considered in addition to the BMPs recommended under the riparian treatment unit.

## Implementation Priority

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

## Recommended Priorities for BMP Implementation

Jordan Creek is the Owyhee Conservation District's first priority, followed by Cow Creek and Rock Creek. Lower Jordan Creek below the bridge to the Oregon state line is of greatest concern. Rock Creek is of less concern as it is an intermittent stream and only flows for a short distance above and below the road crossing. Most sediment is due to road base added to the road crossing and to traffic that uses the crossing (Table 19).

**Table 19. Priority Ranking for BMP Implementation.**

| PRIORITY RANKING | STREAM | RATIONALE |
|---|---|---|
| 1 | **Jordan Creek** | -Several reaches scoring FAIR on SVAP<br>-Several reaches scoring MODERATE on SECI<br>-Lack of shade according to Solar Pathfinder<br>-Range Health Evaluation score of a Slight to Moderate |
| 2 | **Cow Creek** | -Scored FAIR on SVAP<br>-Scored SEVERE on SECI, numerous eroding banks, sediment input is a major concern, trend downward |
| 3 | **Rock Creek** | -Does not meet PNV targets for shade, temperature is a concern |

## Treatment Alternatives

The Owyhee Conservation District with the help of the NRCS will update its priorities annually as needed for the Jordan Creek subbasin upon completion of the Jordan Creek TMDL Implementation Plan. This process will include continuing to work with SCD and NRCS to evaluate alternatives and implement based on available funding. All recommended BMP's should be implemented in order of importance, starting with Jordan Creek and followed next by Cow Creek, and lastly by Rock Creek.

# Funding

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

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

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

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

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

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

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

**Conservation Technical Assistance (CTA)**: CTA provides free technical assistance to help farmers and ranchers identify and solve natural resource problems on their farms and ranches.

This might come as advice and counsel, through the design and implementation of a practice or treatment, or as part of an active conservation plan. This is provided through your local Conservation District and NRCS. http://www.nrcs.usda.gov/programs/cta/

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

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

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

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

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

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

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

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

# Outreach

The conservation partnership (the Owyhee Conservation District, SWC, USDA/NRCS, FSA, U of I, ISDA, Extension Service, and County Officials will use their combined resources to provide information to agricultural landowners and operators within the Jordan Creek subbasin. A local outreach plan can be developed by the conservation partnership. Newspaper articles, district newsletters, subbasin and project tours, landowner meetings and one-on-one personal contact would be used as outreach tools. Outreach efforts will:

- Provide information about the TMDL process
- Supply water quality monitoring results
- Accelerate the development of conservation plans and program participation
- Distribute progress reports
- Enhance technology transfer related to BMP implementation
- Increase public understanding of agriculture's contribution to conserve and enhance natural resources
- Improve public appreciation of agriculture's commitment to meeting the TMDL challenge
- Organize an informational tour bringing together irrigation districts' Board of Directors, a Soil Conservation Districts' Board of Supervisors, interested government agencies and the public to observe BMP's on the ground and their benefits to everyone.
  Identify and encourage the use of BMPs for recreation activities on the sub-basin

# Monitoring and Evaluation

## Field Level

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

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

## Watershed Level

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

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

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