Palisades Subbasin
Total Maximum Daily Load
Agricultural Implementation Plan

Developed for the
Idaho Department of Environmental Quality

Prepared by
Steven Smith
Water Quality Resource Conservationist
Idaho Association of Soil Conservation Districts
Idaho Falls, Idaho

In Cooperation with the
East Side Soil and Water Conservation District
Idaho Soil Conservation Commission
USDA-Natural Resources Conservation Service

August 2002

Acknowledgements

The Idaho Association of Soil Conservation Districts would like to thank several people for contributing their time, effort and expertise. Specifically those include Troy Saffel with the Idaho Department of Environmental Quality, Dennis Hadley with the Natural Resources Conservation Service, Annette Brown and Kristen Clayton with the East Side Soil and Water Conservation District, Justin Krajewski with the Idaho Soil Conservation Commission, Christine Fischer and Elliot Traher with the Idaho Association of Soil Conservation Districts.

Table of Contents

Tables and Figures

Acronyms

ACP – Agriculture Conservation Program.

AFO - Animal Feeding Operation.

BMP - Best Management Practice.

BLM - Bureau of Land Management, USDI.

ESSWCD – East Side Soil and Water Conservation District.

C-CRP - Continuous Sign-Up, Conservation Reserve Program, FSA.

EPA - Environmental Protection Agency.

EQIP - Environmental Quality Incentives Program, USDA.

FSA - Farm Service Agency, USDA.

HIP - Habitat Improvement Program, IDFG.

HUC – Hydrologic Unit Catalog.

IASCD - Idaho Association of Soil Conservation Districts.

ICA - Idaho Cattle Association.

IDEQ - Idaho Department of Environmental Quality.

IDL - Idaho Department of Lands.

ISCC - Idaho Soil Conservation Commission.

ISDA - Idaho State Department of Agriculture.

LTA – Long Term Agreement.

NRCS - Natural Resources Conservation Service, USDA.

RMS - Resource Management System, NRCS.

RCRDP - Resource Conservation and Rangeland Development Program, ISCC.

TMDL - Total Maximum Daily Load.

TU - Treatment Unit.

UI-CES - University of Idaho-Cooperative Extension System.

USDA - United States Department of Agriculture.

USDI - United States Department of Interior.

USFS - Forest Service, USDA.

USGS - Geological Survey, USDI.

WQLS - Water Quality Limited Segment.

WQPA - Water Quality Program for Agriculture, ISCC.

Introduction

Goals and Objectives

This agricultural component of the Palisades Subbasin (HUC #17040104) TMDL Implementation Plan outlines an adaptive management approach for the implementation of BMPs and developing RMS plans to meet the requirements for the Palisades Subbasin TMDL. Implementation activities will be focused on 5,384 acres of private agricultural land along Antelope Creek in the Palisades Subbasin as shown in the appendix (Figure A.1).

The goal of this plan is to assist and/or compliment other subbasin efforts in restoring beneficial uses for §303(d) listed stream segments on private lands. These segments include Antelope Creek (WQLS 2006 Forest Service road culvert to private dam) and Bear Creek, which will not be addressed in this implementation plan because there is no private land along the listed reach. The objective of this plan will be to reduce the amount of sediment in Antelope Creek from private agricultural sources.

Beneficial Use Status

The State of Idaho has designated beneficial uses on rivers, creeks, lakes and reservoirs to meet the requirements of the Clean Water Act. Antelope Creek is designated for cold water biota, salmonid spawning, secondary contact recreation, agricultural water supply, wildlife habitat and aesthetics. Antelope Creek exhibits full support for salmonid spawning and falls into the waterbody assessment category of not full support for cold water biota beneficial uses (IDEQ 2001).

The pollutants of concern are sediment and flow alteration (IDEQ 2001). Flow alteration was not addressed in the TMDL. Therefore, this agricultural implementation plan only addresses sediment. The status of beneficial uses is shown in Table 1.

Table 1. Water Quality Limited Segments in the Palisades Subbasin.

Stream Segment	WQLS#	Pollutant	Status	Concerns
Antelope Creek	2006	Sediment	Not full Support	Bank erosion

Background

Antelope Creek originates on USFS property at an elevation of 7,600 feet and flows about four miles before entering private property. It then flows about another four miles to a private irrigation dam located in the se ¼ of the se ¼ of section 5 R42 E T 2 N at an elevation of 5,720 feet. Below this private dam Antelope Creek is dry for some of the summer months this is the stream segment that is listed for flow alteration. Private land is primarily used for recreation and dry land crop production, including grain, hay, pasture and rangeland, with some irrigated grain and potatoes below the private irrigation dam. There are approximately 1,088 acres of cropland above the dam of which 791 acres are enrolled in CRP. Historic impacts that may have affected the water quality in the subbasin are spraying riparian vegetation, stream channelization, irrigation dam, roads, trails, recreational vehicles, campsites and grazing (IDEQ 2001).

Accomplishments

The East Side Soil and Water Conservation District (ESSWCD) began in the late 70s to address the soil erosion on dry cropland in the Antelope Creek area with ACP & LTA contracts with individual landowners scattered through out the subbasin. Then in 1989 they expanded their scope to address water quality by watershed in the Palisades Subbasin with the Antelope–Pine Creek Watershed Plan, documenting the problems and then setting a priority strategy for how to

treat those areas. They then submitted a grant application to ISCC for financial and technical assistance to implement BMPs in the Antelope Creek watershed. The application was approved in 1990 and currently has four active contracts. The project has treated approximately 13,435 acres of the 17,975 critical acres with 25 different water quality contracts. In 1995 the ESSWCD submitted another grant application to ISCC for Granite Creek watershed and surrounding area. This project has a total of 16 contracts treating 11,600 acres of the 17,139 critical acres in the project area. There are 9 of the 16 contracts, which are still active. BMPs that were used to treat the crop land included crop residue use, no-till, chiseling/subsoiling, water and sediment basins, terraces, diversions, pasture and hay land planting, field strip cropping, grassed water ways, filter strips, critical area planting, reservoir tillage, stock water development, fencing, cross slope farming and conservation cropping system. There has also been a five acre riparian forest buffer and a five acre filter strip installed along Antelope Creek below the dam with the Continuous Conservation Reserve Program (C-CRP). Landowners started enrolling cropland into CRP in the mid 1980's. The CRP program converts cropland to wildlife cover for 10-years. This program has held new sign ups almost every year since. CRP has converted most of the extremely erodible cropland in the subbasin into grass, which has reduced the soil erosion in these areas to a manageable level.

Problem Statement

Pollutant of Concern

The Palisades Subbasin TMDL identified sediment as the pollutant of concern. Based on the stream bank erosion inventory conducted by IDEQ, stream banks were the primary source of sediment (IDEQ 2001). Fine sediment can reduce the quality of spawning and rearing habitat for resident trout species in Antelope Creek and its tributaries. In addition, fine sediment can also affect the amount and diversity of aquatic insects, which are an important food source for trout (IDEQ 2001). Riparian vegetation is very critical in controlling fine sediment inputs to a stream and also creates winter cover, hiding places, aquatic insect habitat and shading of the stream (Overton et al 1995).

Sediment

The sediment load and reduction allocations were defined in the Palisades Subbasin TMDL (IDEQ 2001) for Antelope Creek. This inventoried reach, sediment loads and percent reductions are listed in Table 2.

Table 2. Erosion Estimates for Antelope Creek (IDEQ 2001).

Stream	Inventory Site	Inventoried Length (feet)	Existing Erosion (tons/year)	Desired Erosion (tons/year)	Percent Reduction
Antelope Creek	Upper	701	82	14	82%

Critical Areas

Agricultural areas that contribute excessive pollutants to water bodies are defined as "Critical Areas". These critical areas are then prioritized for treatment based on their location to a water body of concern and the potential for pollutant transport and delivery to the receiving water body. The following is a list of critical areas within the subbasin:

- Unstable and erosive stream banks
- Over utilized pasture and rangelands
- Sheet & Rill erosion

Tiers

There are two tiers delineated within the subbasin. These tiers were determined by the proximity of the critical areas to the §303(d) listed stream segments. Critical areas and tier amounts are shown in Table 3.

Tier 1 **Unstable and erosive stream banks and riparian areas adjacent to the stream that have a direct and substantial negative influence on the stream.**

Tier 2 **Crop, pasture and range land with an indirect, yet substantial negative influence on the stream.**

Table 3. Critical Areas in the Palisades Subbasin.

TMDL Implementation Tier 1		TMDL Implementation Tier 2
Watershed	**Riparian**	**Crop, Pasture and Range Lands**
Antelope Creek	50 acres	5,334 acres

Animal Feed Operations

The Idaho Legislature passed the Beef Cattle Environmental Control Act in the spring of 2000. Governor Kempthorne then signed this Act in April 2000. ISDA then went into a rule making process and on September 18, 2000 the "Rules of the Department of Agriculture Governing Beef Cattle Animal Feeding Operations" (IDAPA 02.04.15) became effective. After the rules became effective, a Memorandum of Understanding (MOU) was written and signed by ISDA, IDEQ, ICA and EPA in January 2001. The MOU gave ISDA authority to regulate beef cattle feeding operations that fall under the definitions of IDAPA 02.04.15 not located on Indian Reservations (ISDA 2000). Currently there are no AFOs in the Antelope Creek Watershed.

Threatened and Endangered Species

The threatened and endangered species in Bonneville County include Gray wolf (*Canis lupus*), Bald eagle (*Haliaeetus leucocephalus*), Whooping crane (*Grus americana*) and Ute Ladies' tresses (*Spiranthes diluvialis*).

Treatment Units

Each agricultural critical area is divided into one or more TUs. These TUs describe critical areas with similar land uses, soils, productivity, resource concerns and treatment needs. These not only provide a method for delineating and describing resource areas but are also used to evaluate impacts to water quality and lead the formulation of alternatives for solving identified problems.

Treatment Unit #1 Stream Channels and Riparian Areas

Acres	Soils	Resource Problems
50	These soils are a silt loam to silty clay loam and are poorly drained with flooding frequent with a water table within 1 to 2 feet	Unstable and erosive stream banks Lack of riparian vegetation diversity and density

Treatment Unit #2 Crop, Hay and Pasture Lands

Acres	Soils	Resource Problems
1,088	These soils are very deep and well drained silt loams with a moderate to high runoff potential and moderate to high erosion potential	Sheet and rill erosion Pasture lands that are over utilized

Treatment Unit #3 Range Land

Acres	Soils	Resource Problems
4,196	These soils range from rock outcrop to a deep well drained extremely stony silt loam the runoff is rapid with a very high erosion potential	Range lands that are over utilized

Proposed Treatment

BMP Implementation

The proposed treatment for sediment reduction will be to implement BMPs through RMS plans with private landowners in the treatment units listed above. Following is Table 4 which lists the BMPs, estimated amounts and associated costs needed to reduce sediment in Antelope Creek from private agriculture sources.

Table 4. Total BMP Costs for the Palisades Subbasin.

Treatment Unit	Best Management Practice	Unit Type	Unit Cost	Cost Share Percent	Total Amount	Cost Share Funds	Operator Funds	Total Funds
TU1 Riparian	Channel Vegetation	foot	$6.00	75%	11,000	$49,500.00	$16,500.00	$66,000.00
	Conservation Cover	acre	$100.00	75%	800	$60,000.00	$20,000.00	$80,000.00
	Fence, 4-wire	foot	$1.65	75%	15,840	$19,602.00	$6,534.00	$26,136.00
	Fence, Electric 3 Wire	foot	$0.80	75%	2,000	$1,200.00	$400.00	$1,600.00
	Fence, Jack	foot	$4.50	75%	2,500	$8,437.50	$2,812.50	$11,250.00
	Heavy Use Area Protection	each	$2,000.00	75%	4	$6,000.00	$2,000.00	$8,000.00
	Irrigation System, Drip	tree	$1.50	75%	1,000	$1,125.00	$375.00	$1,500.00
	Prescribed Grazing	acre	$0.70	75%	50	$26.25	$8.75	$35.00
	Riparian Forest Buffer	acre	$23.00	75%	50	$862.50	$287.50	$1,150.00
	Stream Channel Stabilization	foot	$30.00	75%	500	$11,250.00	$3,750.00	$15,000.00
	Stream Bank Protection	foot	$45.00	75%	700	$23,625.00	$7,875.00	$31,500.00
	Use Exclusion	acre	$14.00	75%	30	$315.00	$105.00	$420.00
	Wetland Restoration	acre	$4,100.00	75%	1	$3,075.00	$1,025.00	$4,100.00
					Subtotal	$185,018.25	$61,672.75	$246,691.00
TU2 Crop, Hay and Pasture Lands	Critical Area Planting	acre	$160.00	75%	5	$600.00	$200.00	$800.00
	Conservation Crop Rotation	acre	$50.00	50%	1,088	$27,200.00	$27,200.00	$54,400.00
	Contour Farming	acre	$6.00	50%	1,088	$3,264.00	$3,264.00	$6,528.00
	Deep Tillage	acre	$13.00	50%	1,088	$7,072.00	$7,072.00	$14,144.00
	Direct Seed	acre	$40.00	50%	300	$6,000.00	$6,000.00	$12,000.00
	Fence, 4-wire	foot	$1.65	75%	2,000	$2,475.00	$825.00	$3,300.00
	Fence, Electric 3 Wire	foot	$0.80	75%	500	$300.00	$100.00	$400.00
	Fence, Jack	foot	$4.50	75%	600	$2,025.00	$675.00	$2,700.00
	Mulch Till	acre	$10.00	50%	600	$3,000.00	$3,000.00	$6,000.00
	Nutrient Management	acre	$5.00	75%	1,088	$4,080.00	$1,360.00	$5,440.00
	Nutrient Soil Testing	each	$55.00	75%	75	$3,093.75	$1,031.25	$4,125.00
	Pasture & Hayland Planting	acre	$65.00	75%	200	$9,750.00	$3,250.00	$13,000.00
	Pest Management	acre	$2.50	75%	1,088	$2,040.00	$680.00	$2,720.00
	Pipe, Polyethylene"	foot	$2.00	75%	5,000	$7,500.00	$2,500.00	$10,000.00
	Prescribed Grazing	acre	$0.70	75%	791	$415.28	$138.43	$553.70
	Spring Development	each	$2,500.00	75%	4	$7,500.00	$2,500.00	$10,000.00
	Terraces	foot	$1.10	75%	4,000	$3,300.00	$1,100.00	$4,400.00
	Water & Sediment Basins	each	$400.00	75%	65	$19,500.00	$6,500.00	$26,000.00
	Watering Facility	each	$800.00	75%	7	$4,200.00	$1,400.00	$5,600.00
	Well, Livestock Water	each	$3,500.00	75%	2	$5,250.00	$1,750.00	$7,000.00
					Subtotal	$118,565.03	$70,545.68	$189,110.70
TU3 Range Land	Fence, 4-wire	foot	$1.65	75%	26,400	$32,670.00	$10,890.00	$43,560.00
	Fence, Electric 3 Wire	foot	$0.80	75%	2,800	$1,680.00	$560.00	$2,240.00
	Fence, Jack	foot	$4.50	75%	2,000	$6,750.00	$2,250.00	$9,000.00
	Pipe, Polyethylene"	foot	$2.00	75%	900	$1,350.00	$450.00	$1,800.00
	Pond, Livestock Water	each	$3,200.00	75%	1	$2,400.00	$800.00	$3,200.00
	Prescribed Grazing	acre	$0.70	75%	4,295	$2,254.88	$751.63	$3,006.50
	Range Planting	acre	$55.00	75%	45	$1,856.25	$618.75	$2,475.00
	Spring Development	each	$2,500.00	75%	7	$13,125.00	$4,375.00	$17,500.00
	Watering Facility	each	$800.00	75%	10	$6,000.00	$2,000.00	$8,000.00
	Well, Livestock Water	each	$3,500.00	75%	1	$2,625.00	$875.00	$3,500.00
					Subtotal	$70,711.13	$23,570.38	$94,281.50
					Total	$374,294.40	$155,788.80	$530,083.20

Funding

Financial and technical assistance for installation of BMPs is needed to ensure success of this implementation plan. There are many sources of funding to make water quality improvements on private lands. These conservation programs could potentially be used in combination with each other to implement BMPs. These programs include WQPA, C-CRP, EQIP, §319, RCRDP and HIP.

Outreach

An intensive outreach program will be conducted through the ESSWCD and its partners, IASCD, ISCC and NRCS, to inform agriculture landowners and operators how conservation practices can benefit their farming or ranching operation. Newspaper articles, district newsletters, direct mailings, project tours, demonstration projects, landowner meetings and individual contacts will make up this intensive outreach program. Other outreach objectives are:

- Provide information about the TMDL process.
- Provide water quality monitoring results.
- Develop landowner support of conservation BMPs
- Provide TMDL implementation progress reports.
- Increase awareness of agriculture's contribution to conserve and enhance natural resources.
- Increase the public's awareness of agriculture's commitment to meeting the TMDL challenge.

Evaluation & Monitoring

Evaluation and monitoring will be an integral component of this implementation plan. At the field level, ISCC, IASCD and NRCS conduct annual status reviews in conservation programs. Evaluation protocols have been developed for several BMPs. However where an appropriate protocol is lacking, the ISCC will work with agencies such as NRCS, UI-CES, IDEQ, IASCD and ESSWCD to develop the needed protocol. The ISCC, IASCD and NRCS will also conduct annual project and program reviews. Reviews will be comprehensive from both a technical and administrative standpoint. These reviews will be very important for ensuring sound decision making involved with adaptation of implementation priorities and direction.

References

IDEQ, 2001. Palisades Subbasin Assessment and TMDL, Idaho Division of Environmental Quality, 95 pp.

IDWR, 2000. Idaho GIS Data website. http://www.idwr.state.id.us/gisdata/gis_data.htm. Boise, Idaho.

IDL, 2001. Idaho Department of Lands GIS website. http://gis.idl.state.id.us/. Boise, Idaho.

ISDA, 2000. The Idaho Beef Cattle Environmental Control Memorandum of Understanding, Idaho State Department of Agriculture, 7 pp., Boise, Idaho.

ISDA, 2000. Beef Cattle Animal Feeding Operation Program, Idaho State Department of Agriculture, 3 pp., Boise, Idaho.

Overton, C.K., McIntyre, J.D., Armstrong, R., Whitwell, S.L., and Duncan, K.A. 1995. User's guide to fish habitat: descriptions that represent natural conditions in the Salmon River Basin, Idaho. USFS Intermountain Research Service. General Technical Report INT-GTR-322. 142 p.

USGS. Data calculated from 24,000-scale stream hydrography and orthophoto quadrangles.

Glossary

Animal Feed Operation (AFO) - The term "animal feeding operation" or AFO is defined in EPA regulations as a "lot or facility" where animals "have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period and crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility."

beneficial use - A term used by the Idaho Department of Environmental Quality to identify uses which water quality supports in a given stream or lake.

Best Management Practice (BMP) - The Idaho Agricultural Pollution Abatement Plan definition as a component practice or combination of component practices determined to be the most effective, practical means of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality goals.

cold water biota - A beneficial use, designated by the Idaho Department of Environmental Quality, which indicates that water quality is high enough to support macroinvertebrates and fish.

critical area - those areas or sources of agricultural pollution identified as having the most significant impact on the quality of receiving waters in the project area.

full support – A category of water quality status. A water body whose status is "Full Support" is in compliance with those levels of water quality criteria listed in Idaho's *Water Quality Standards and Wastewater Treatment Requirements*, or with reference conditions approved by the Idaho Department of Environmental Quality Director in consultation with the appropriate Basin Advisory Group.

hydrology - The scientific study of the properties, distribution and effects of water on and below the earth surface. The effect of flowing water on the land or stream channel.

not full support – A category of water quality status. A water body whose status is "Not Full Support" is not in compliance with those levels of water quality criteria listed in Idaho's *Water Quality Standards and Wastewater Treatment Requirements*, or with reference conditions approved by the Idaho Department of Environmental Quality Director in consultation with the appropriate Basin Advisory Group.

primary contact recreation - A beneficial use, designated by the Idaho Department of Environmental Quality, which indicates that water quality is good enough for any activity in which full or partial, unprotected bodily contact occurs with water (ie. swimming or wading).

riparian - A vegetative community associated with surface or subsurface waters and watercourses within active watersheds. This community is rich in diversity of plants, as well as wildlife and aquatic organisms. The habitat includes not only lake and river ecosystems, but also wetland communities.

Resource Management System (RMS) - Natural Resource Conservation Service plan that is a combination of conservation practices and resource management for treatment of all identified resource concerns for soil, water, air, plants and animals that meets or exceeds the quality criteria in the Field Office Technical Guide (FOTG) for resource sustainability.

salmonid spawning - A beneficial use, designated by the Idaho Department of Environmental Quality, which indicates that water quality is good enough for salmonid fish to use for spawning with a high chance of egg survival.

secondary contact recreation - A beneficial use, designated by the Idaho Department of Environmental Quality, which indicates that water quality supports any activity in which partial or incidental, protected bodily contact occurs with water (eg. fishing).

subbasin - A collection of watersheds that forms a much larger area; such as the Palisades subbasin, which yet drains into another, larger system, such as the Upper Snake River Basin.

substrate - The stream bottom, composed of silt, sand, gravel, cobble, boulder or bedrock. The type of substrate and its looseness affects the ability of fish to spawn and the survivability of the eggs.

subwatershed - A collection of drainages that form a watershed; such as the Little Pine Subwatershed, which yet drains into larger area, such as the Antelope Watershed.

Total Maximum Daily Load (TMDL) - a tool used in the development and implementation of a watershed management plan. A TMDL determines the total amount of pollutants that can enter a water body before it can no longer fully support its beneficial uses. TMDLs are the sums of individual waste load allocations (WLAs) of point sources, load allocations (LAs) of nonpoint sources and a margin of safety.

tributary - A river or stream that flows into a larger river or stream.

water body – A homogeneous classification that can be assigned to rivers, lakes, esturaried, coastlines, streams or other water features.

water quality – A term used to describe the biological, chemical and physical characteristics of water with respect to its suitability for a beneficial use.

watershed - A collection of subwatersheds that form a subbasin; such as the Antelope Watershed, which drains into a larger area, such as the Palisades Subbasin.

Appendix A

Figure A-1. Upper Antelope Subwatershed Land Ownership and Streams