St. Maries River and Tributaries Agricultural TMDL Implementation Plan

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Introduction

The agricultural component of the St. Maries River Total Maximum Daily Load (TMDL) Implementation Plan outlines an adaptive management approach for implementation of Resource Management Systems (RMS) and Best Management Practices (BMPs) to meet the requirements of the St. Maries River TMDL. Implementation activities will be phased in on a sub-watershed basis due to the size and complexity of the St. Maries River watershed, which encompasses 307,840 acres.

The goal of this plan is to assist and/or complement other watershed efforts in restoring and protecting beneficial uses for 303(d) listed stream segments. These segments are identified in Table 1:

Table 1: Stream Segments

	Water Quality Limited Segment Number	Water Body	1998 303 (d) Boundaries	Pollutant(s)
	3579	St. Maries River	Mashburn (town) to St. Joe River	Sediment, Temp.
	3580	St. Maries River	Clarkia to Mashburn	Sediment, Temp.
	3581	West Fork St. Maries River	Headwaters to St. Maries River	Sediment, Temp.
**	3582	Thorn Creek	Headwaters to St. Maries River	Sediment
***	3583	Alder Creek	Headwaters to St. Maries River	Sediment
*	3584	John Creek	Unnamed tributary 7.5 km upstream to St. Maries River	Sediment
	3585	Santa Creek	Headwaters to St. Maries River	Sediment, Temp.
**	3587	Charlie Creek	Headwaters to Santa Creek	Sediment
**	3588	Renfro Creek	Headwaters to Davis Creek	Sediment
**	3589	Tyson Creek	N. Fork Tyson Creek to St. Maries River	Sediment
*	3590	Crystal Creek	Headwaters to St. Maries River	Sediment
	3591	Carpenter Creek	Headwaters to St. Maries River	Temperature
	3593	Emerald Creek	E. Fork Headwaters to St. Maries River	Temperature
	3594	Middle Fork St. Maries River	Headwaters to St. Maries River	Sediment, Temp.
*	3596	Gold Center Creek	Windy Creek to M. Fork St. Maries River	Temperature
*	7596	Flewsie Creek	Headwaters to M. Fork St. Maries River	Temperature
**	7598	Gramp Creek	Headwaters to Gold Center Creek	Temperature

*No Private Agriculture Land ** Sub-basin wide sediment TMDL *** TMDL Implementation Plan will be completed by the Coeur d'Alene Tribe in 2006.

The major objective of this plan will be to reduce the amount of sediment entering these water bodies from agricultural sources and lower water temperatures where feasible. Agricultural pollutant reductions will be achieved through the application of Resource Management Systems (RMS) and Best Management Practices (BMPs) developed and implemented on site with individual agricultural operators.

Another objective of this plan will be to provide BMP effectiveness evaluation and monitoring in terms of reducing pollutant loading and impacts on designated beneficial uses of the above listed stream segments. Emphasis will also be placed on implementation of a water quality outreach program to encourage landowner participation in water quality implementation efforts within the watershed.

Background

The St. Maries River watershed is located within four counties - Benewah, Shoshone, Clearwater and Latah – although the majority of the St. Maries River watershed lies within Benewah County. See Figure 1, St. Maries River Watershed/Sub-watershed Map.

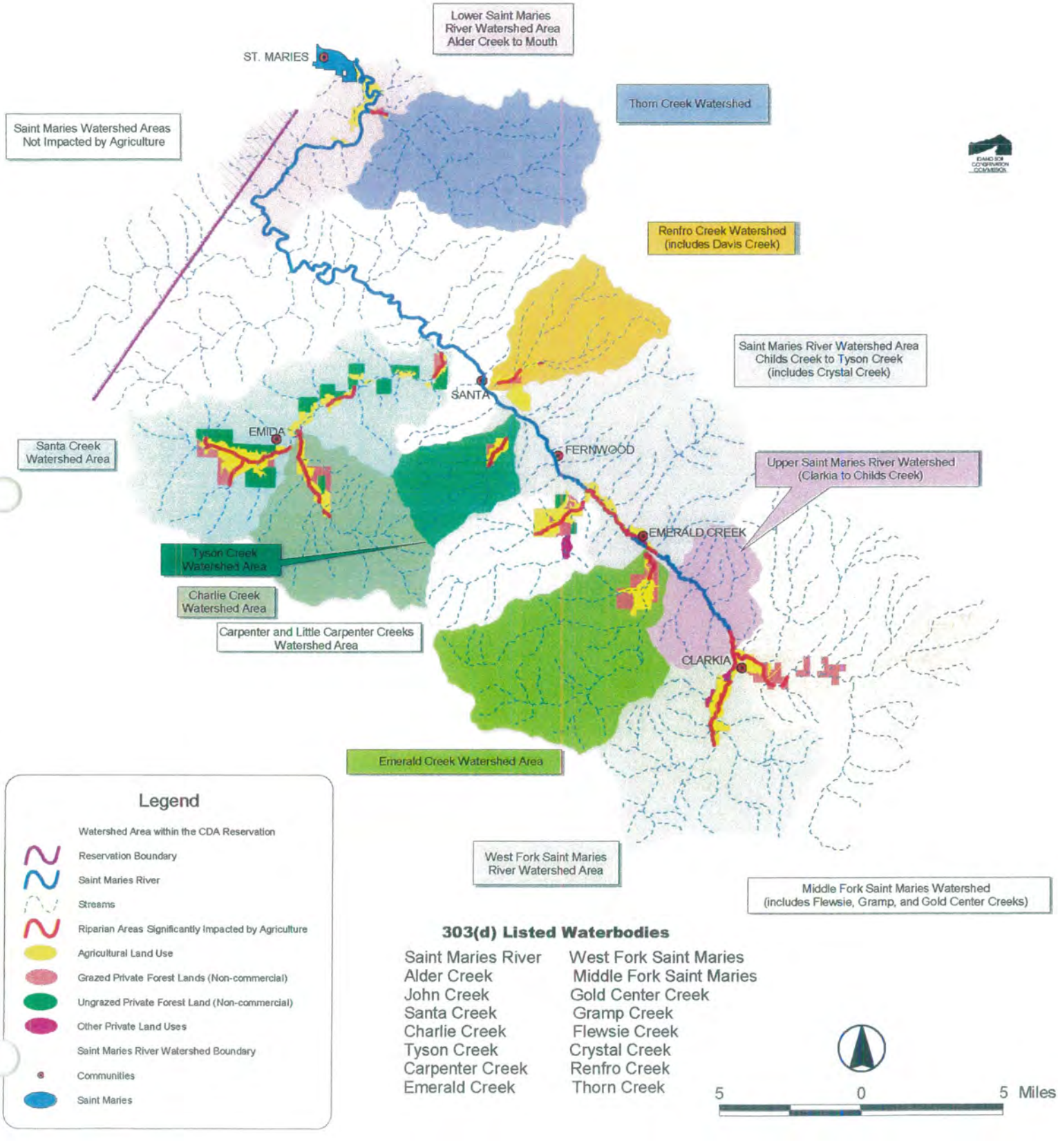
Land ownership or management within the St. Maries River Watershed consists of federal, state, tribal, and private land. A large majority of the private land consists of commercial forestry. See Figure 2, St. Maries River Watershed Land Management Map.

The Benewah Soil and Water Conservation District (BSWCD) has been active in soil and water conservation and water quality issues since 1946. The District has proactively developed individual conservation plans and pursued the application of several funding programs such as the Agricultural Conservation Program, Environmental Quality Incentive Program, Sustainable Agriculture Research and Education Grants, 319 Program and the Emerald Creek Coordinated Resource Management Project. See Table 2, NRCS Field Office Accomplishments.

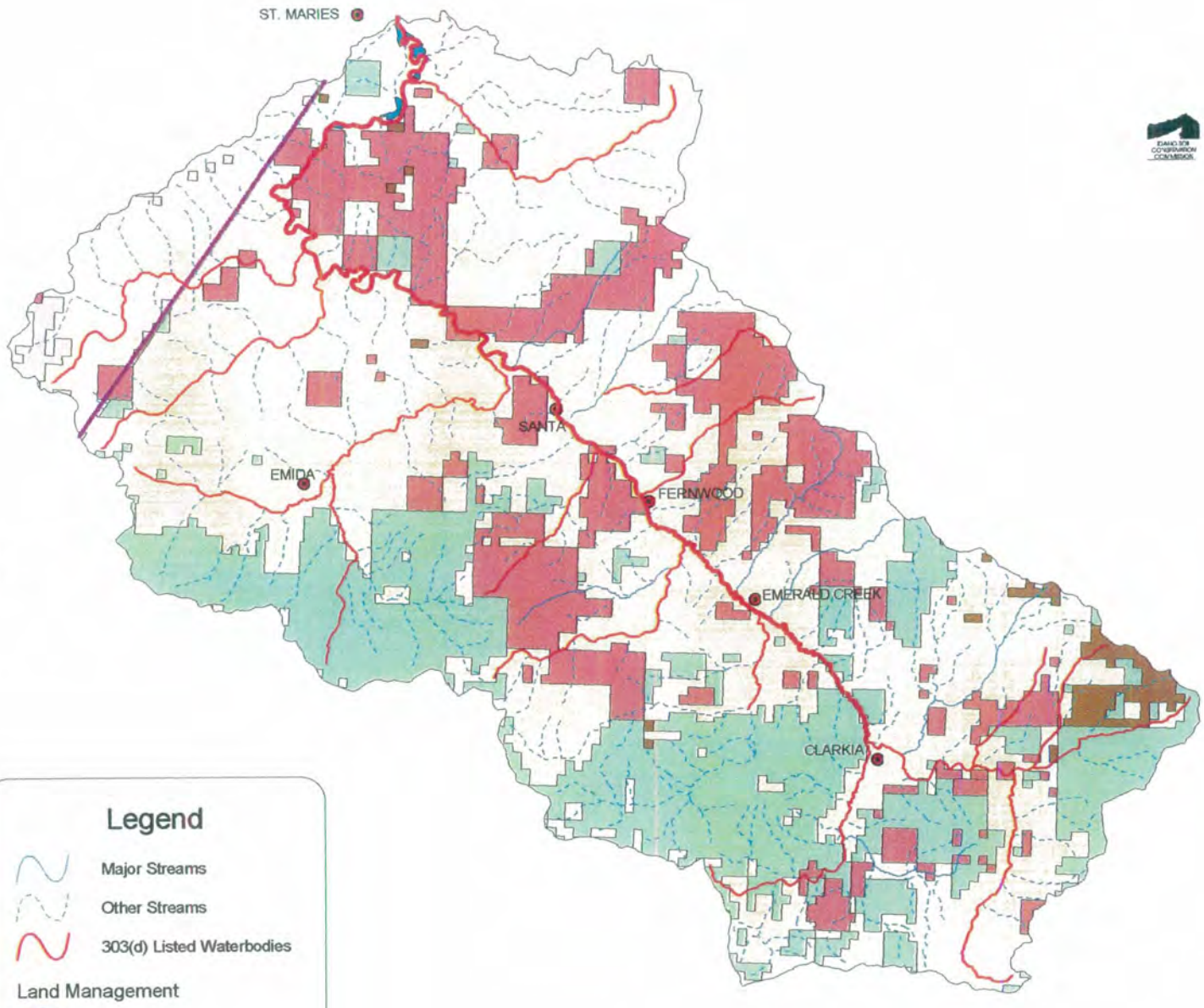
Table 2: NRCS Field Office Accomplishments

FIELD OFFICE & DATES	STREAM	PROJECT/ PROGRAM	BENEFITS
Plummer 1990 -	Emerald Creek Carpenter Creek	Emerald Creek Coordinated Resource Management Plan	State and federal land management agencies, along with major private landowners in the basin, cooperatively manage logging, mining, and grazing operations within the 42,363 acres of the CRMP. Grazing on approximately 8,000 acres of meadows and cutover timber land is monitored yearly to assure proper utilization averaging 50% of the available forage. Mining and timber operations reclaim utilized areas with new tree plantings, road closures, and stream restoration projects. As new resource concerns are identified the group acts to address them.
Plummer 1983 – 1992	Merry Creek	Merry Creek Coordinated Resource Management Plan	Proper Grazing Use was achieved on 1,145 acres of rangeland and 41,490 acres of woodland. 600 feet of fencing and stream bank vegetation was installed as a demonstration of stream bank restoration.
Plummer 2001	St. Maries River	Technical Assistance	Reclaimed 536 acres of pasture that was severely infested with hawkweed.
Plummer 2002	Santa Creek	Technical Assistance	Assisted the Benewah Soil and Water Conservation District in implementing an EPA 319 grant to achieve stream bank protection/restoration along 1 mile of Santa Creek. 2 miles of fencing was constructed for livestock exclusion and a 25 foot buffer on each side of the creek was planted to conifer and broad-leafed trees. Additional stretches of Santa Creek will be treated in 2003.

Saint Maries River Drainage Map Showing 303(d) Listed Watershed Areas Inventoried for Agricultural LandUses and Impacts



Saint Maries River Watershed Map Showing Land Management And 303(d) Listed Waterbodies



Legend

- Major Streams
- Other Streams
- 303(d) Listed Waterbodies

Land Management

- B.L.M.
- Bureau of Indian Affairs
- Open water
- Private
- State of Idaho
- U.S. Forest Service
- Reservation Boundary
- Communities

303(d) Listed Waterbodies

Saint Maries River	West Fork Saint Maries
Alder Creek	Middle Fork Saint Maries
John Creek	Gold Center Creek
Santa Creek	Gramp Creek
Charlie Creek	Flewsie Creek
Tyson Creek	Crystal Creek
Carpenter Creek	Renfro Creek
Emerald Creek	Thorn Creek

5 0 5 Miles

Over the years the Benewah Soil and Water Conservation District has pioneered work in stream bank stabilization and is currently working with the Idaho Department of Environmental Quality in supporting a multi-watershed stream inventory effort.

Problem Statement:

The St. Maries subbasin is dominated by forestry in upland areas and agriculture in valley floors. Tributaries flow through steep V-shaped valleys that turn into low-gradient meandering courses as they reach the valley floor. In-stream erosion is problematic in streams where canopy and riparian buffer have been removed and streams have been straightened. Cattle grazing in riparian zones has led to further sediment contributions, temperature increases, nuisance algae, and lack of in-stream vegetation. The TMDL for the St. Maries subbasin has identified sediment and temperature as parameters of concern.

According to the Idaho Department of Environmental Quality, sediment modeling and monitoring data (as developed by the USGS) indicates that stream bank erosion is the single largest factor causing sediment yield to exceed acceptable levels. Sediment model results also indicate that streams supporting their fishery uses are in a range of 10 to 40 percent above background sediment yield. A stream bank erosion inventory identified key critical areas. Santa and Carpenter Creek, the West and Middle Forks and the St. Maries River exceed the sediment threshold and are sediment impaired. Emerald, Tyson and Merry Creeks may exceed the threshold as well. Since the St. Maries River segments are impaired by sediment, a sediment TMDL that addresses sediment in the entire St. Maries River Subbasin will be required.

The temperature TMDL addresses the Middle Fork St. Maries River and its tributaries (Gold Center, Gramp and Flewsie), the West Fork and its tributaries (Catspur Creek), Emerald Creek, Santa Creek, Charlie Creek and the St. Maries River. The TMDL calls for 100% potential shade where practicable. Beneficial uses are displayed in Table 3.

Table 3: St. Maries Subbasin Designated Beneficial Uses.

Unit	Water Body	Designated Uses[1]			§303(d) List[2]
		Aquatic Life	Recreation	Other	
P-15	St. Maries River	CW	PCR	DWS, SRW	x
P-12	St. Maries River	CW	PCR		x
P-7	St. Maries River	CW	PCR		x
P-8	Alder Creek	CW, SS	SCR		x
P-9	John Creek	CW, SS	SCR		x
P-10	Santa Creek	CW, SS	PCR		x
P-11	Charlie Creek	CW, SS	SCR		x
P-13	Tyson Creek	CW, SS	SCR		x
P-14	Carpenter Creek	CW, SS	SCR		x
P-16	Emerald Creek	CW, SS	SCR		x
P-17	West Fork St. Maries River	CW, SS	PCR		x
P-18	Middle Fork St. Maries River	CW, SS	PCR		x
P-19	Gold Center Creek	CW, SS	SCR		x
	Flewsie Creek	CW, SS	SCR		x
	Gramp Creek	CW, SS	SCR		x
P-23	Crystal Creek	CW, SS	SCR		x
P-24	Renfro Creek	CW, SS	SCR		x
P-26	Thorn Creek	CW, SS	SCR		x

[1]CW – Cold Water, SS – Salmonid Spawning, PCR – Primary Contact Recreation, SCR – Secondary Contract Recreation
DWS – Domestic Water Supply, SRW – Special Resource Water
[2]Refers to a list created in 1998 of water bodies in Idaho that did not fully support at least one beneficial use. This list is required under section 303 subsection 'd' of the Clean Water Act.

Threatened and Endangered Species

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

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

The official Federal list of T&E "*listed and candidate species*" for Benewah and Shoshone Counties are as follows:

Mammals
Gray wolf (*Canis lupus*)
Idaho Ground Squirrel (*Spermophilus brunneus brunneus*)
Canada lynx (*Lynx canadensis*)

Birds
Bald eagle (*Haliaeetus leucocephalus*)

Fish
Bull trout (*Salvelinus confluentus*)

Plants
Ute ladies'-tress (*Spiranthes diluvialis*)

Species of Concern in Benewah and Shoshone Counties include:
Wolverine (*Gulo gulo luscus*)
Harlequin duck (*Histrionicus histrionicus*)
Northern goshawk (*Accipiter gentilis*)
Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)
Clustered lady's slipper (*Cypripedium fasciculatum* Kellogg ex S. Wats.)
Howell's gumweed (*Grindelia howellii*)

Another tool available in the planning process is the Idaho Department of Fish and Game Conservation Data Center, 2002 Threatened and Endangered Species GIS database. The database contains documented locations for terrestrial species (plants and animals only!). This can help identify known locations of T&E species and identify critical habitat types that may harbor threatened or endangered species. Planners can reference habitat requirements to help landowners determine the potential benefits of their project implementation. These discussions remain confidential between the landowner and the planners. The St. Maries River watershed contains numerous rare plants and species of concern. Impacts to these species will be taken into account in any TMDL project implementation.

Confined Animal Feeding Operations (CAFOs)

The following general criteria are used to determine a CAFO maintained for 45 days or more per year; vegetation or residue is not sustained in normal growing season over any portion of the lot or facility; and runoff discharges into waters of the state or U.S.

Cattle grazing in the St. Maries River watershed is mainly seasonal, beginning in the spring and ending in the fall. Cow/calf and feeder cattle predominate. No dairy operations or year round animal feeding operations were observed. Some horses were observed to be confined near creeks.

St. Maries River Watershed Agricultural Critical Areas

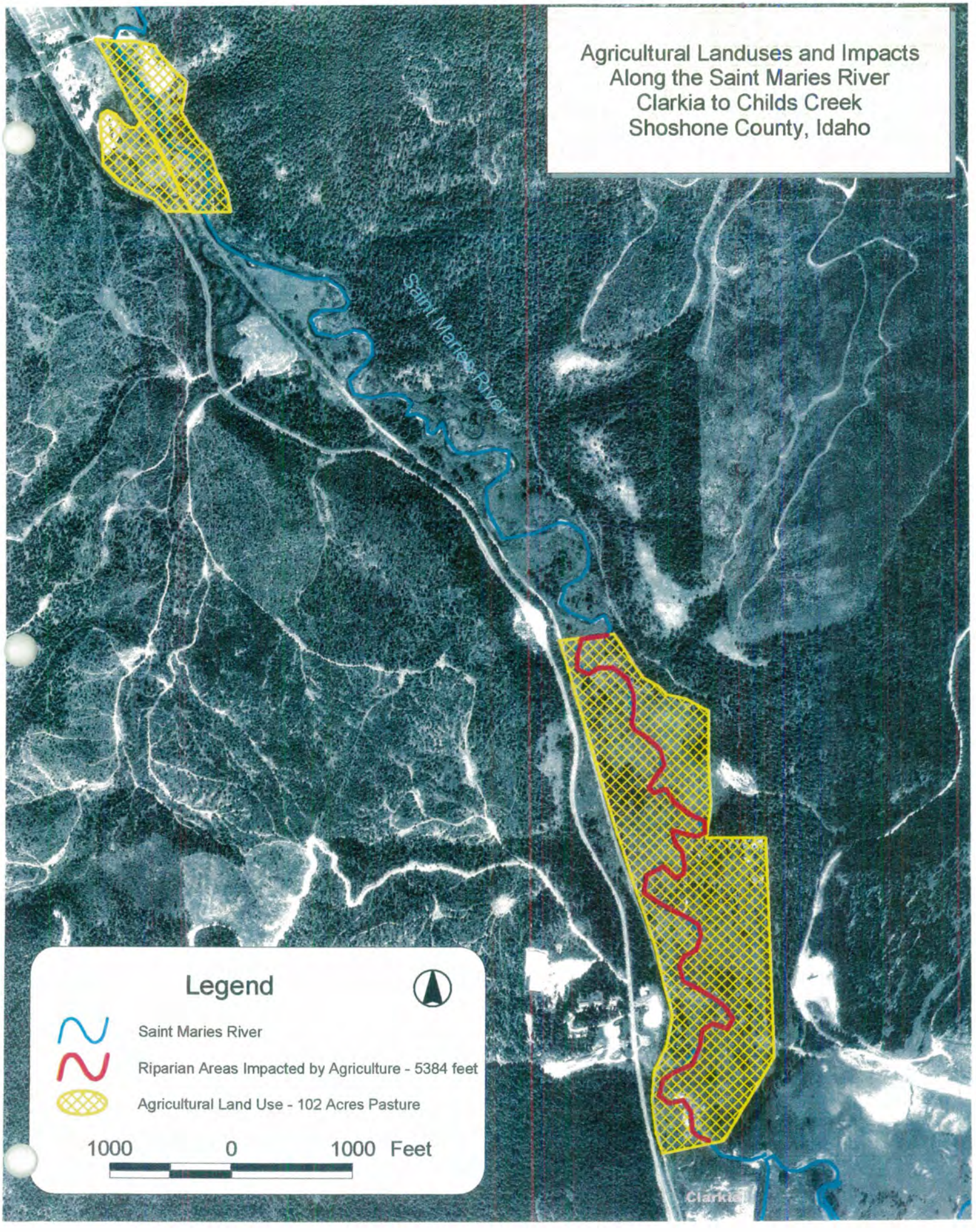
Agricultural areas that contribute excessive pollutants to water bodies are defined as "Critical Areas". These critical areas are then prioritized for treatment based on their location to a stream segment of concern and the potential for pollutant transport and delivery to the receiving water body. The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

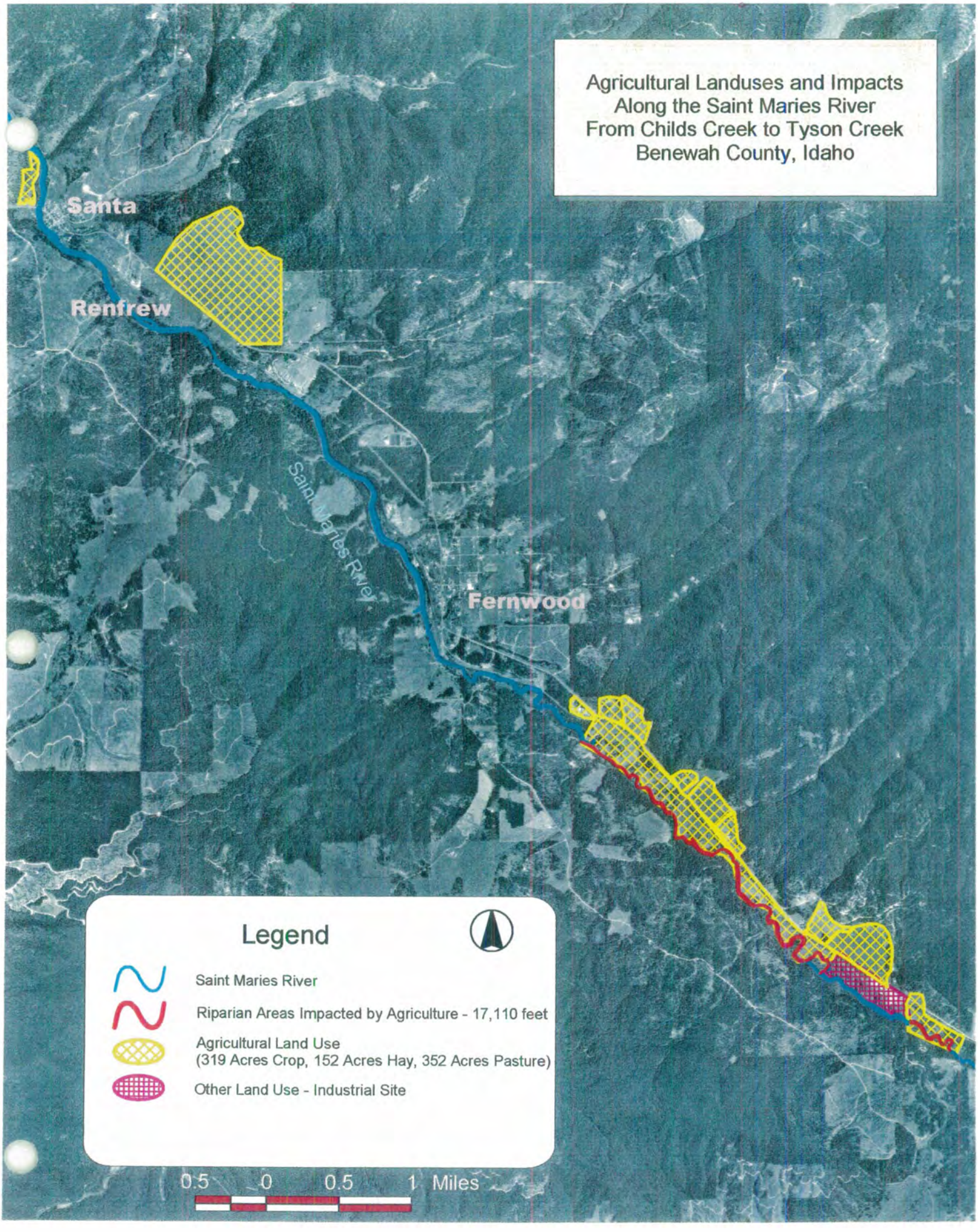
- Unstable and eroding stream banks
- Over-utilized pasture and hay lands adjacent to stream corridors

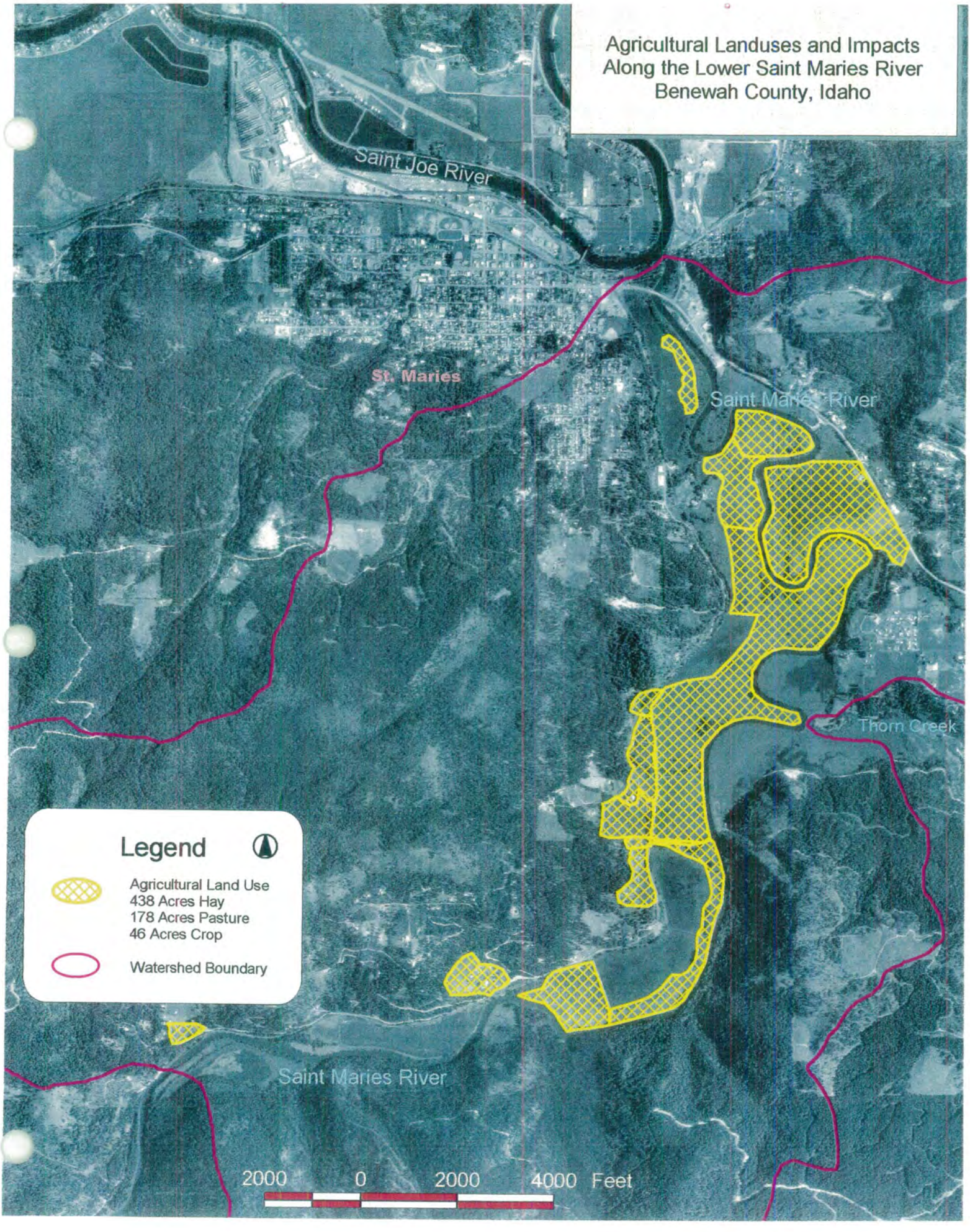
A private land agricultural use inventory was conducted during July-August of 2002, for all 303(d) listed streams within the St. Maries Watershed. Agricultural land use areas identified were: pastureland, hayland, and grazed forest. Sub-watersheds with agricultural impacts were mapped and have been illustrated by GIS coverage. See Figures 3-14.

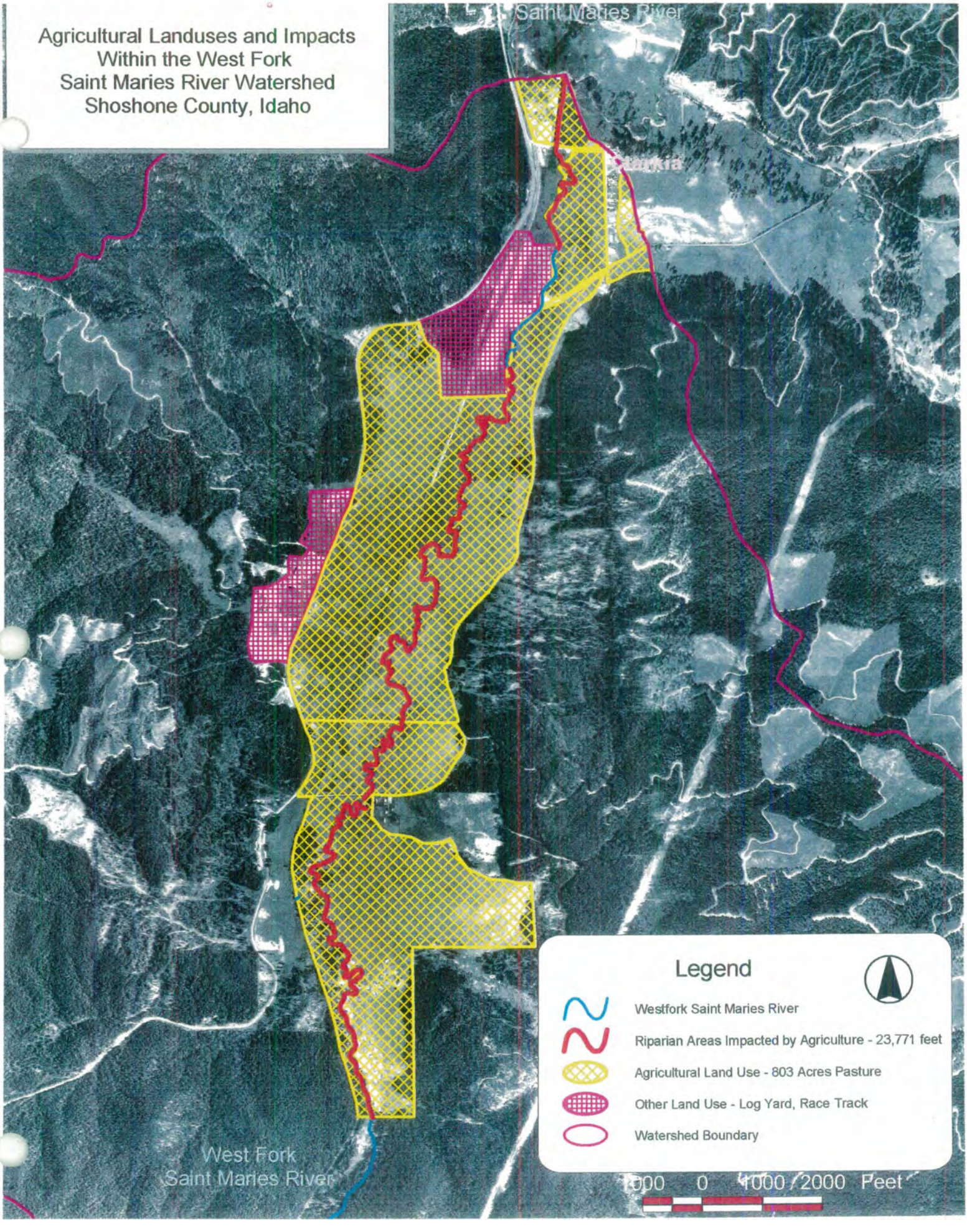
Table 4: Summary of Agricultural Critical Areas by Sub-watershed

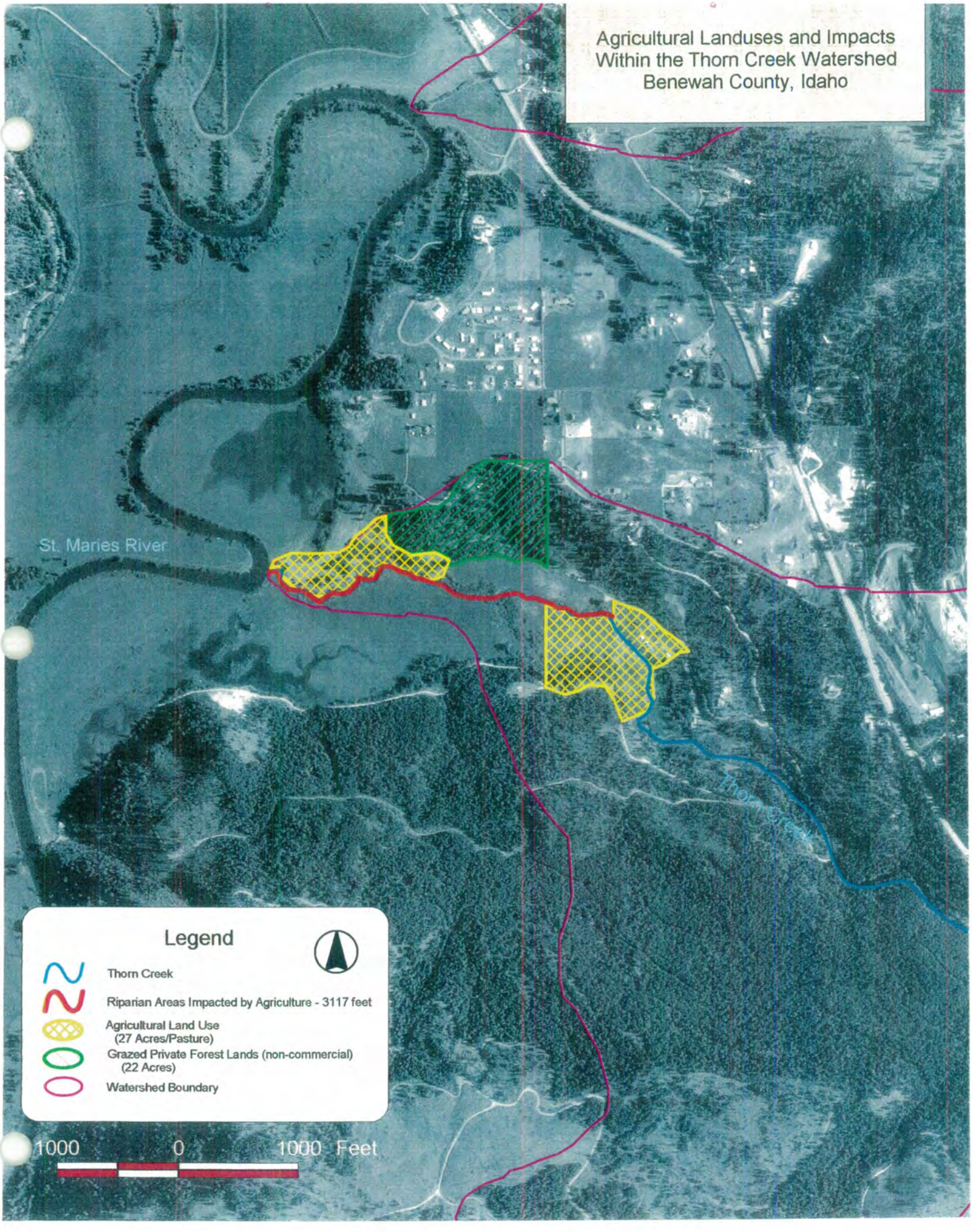
St. Maries River Watershed, 303-d Streams	Hayland (Acres)	Pasture (Acres)	Private Forest * (non-commercial, Acres)		Riparian Area Impacted by Agriculture (Feet)
			Grazed	Ungrazed	
St. Maries River:					
Clarkia –Childs	0	102	0	0	5,384
Childs-Tyson	471	352	0	0	17,110
Tyson-Beaver	0	0	0	0	0
Beaver-Alder	0	0	0	0	0
Alder-Mouth	484	178	0	0	0
Other Streams					
West Fork St. Maries River	0	803	0	0	23,771
Thorn Creek	0	27	22	0	3,117
Alder Creek	(Coeur	d'Alene	Tribe	2006)	
John Creek	0	0	0	0	0
Santa Creek	439	1,361	506	1,737	25,412
Charlie Creek	0	651	349	68	19,063
Renfro Creek	54	132	45	0	5,079
Tyson Creek	0	264	52	0	6,788
Crystal Creek	0	0	0	0	0
Carpenter Creek	0	901	216	108	11,952
Emerald Creek	0	607	646	0	6,336
Middle Fork St. Maries River	0	382	876	0	14,650
Gold Center Creek	0	0	0	0	0
Flewsie Creek	0	0	0	0	0
Gramp Creek	0	0	0	0	0
Overall Totals:	**1,448 Acres**	**5,760 Acres**	**2,712 Acres**	**1,913 Acres**	**138,662 feet or 26.3 miles.**

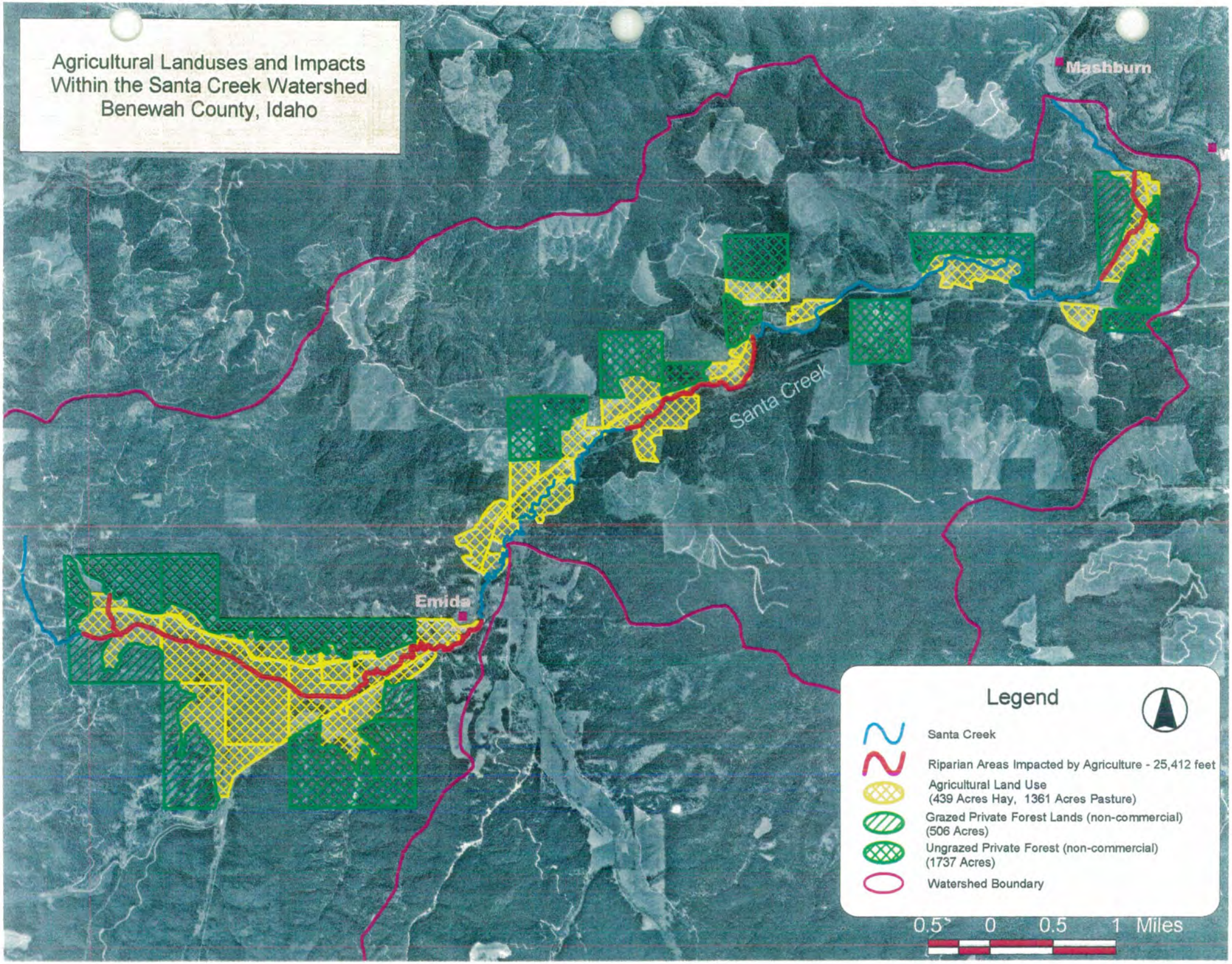

Agricultural Landuses and Impacts
Along the Saint Maries River
Clarkia to Childs Creek
Shoshone County, Idaho
Saint Maries River
Legend
Saint Maries River
Riparian Areas Impacted by Agriculture - 5384 feet
Agricultural Land Use - 102 Acres Pasture
1000 0 1000 Feet
Clarkia

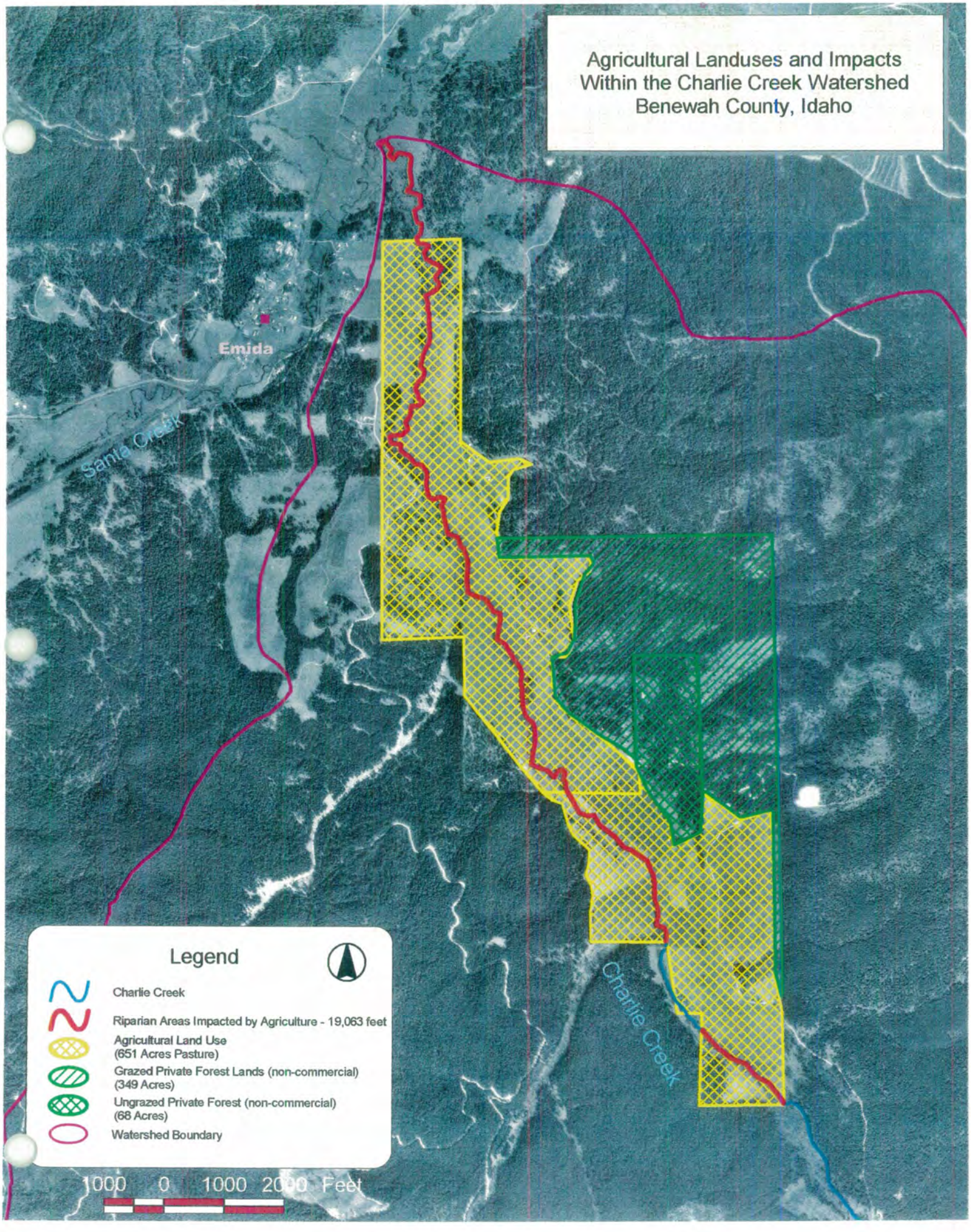

Agricultural Landuses and Impacts
Along the Saint Maries River
From Childs Creek to Tyson Creek
Benewah County, Idaho
Santa
Renfrew
Saint Maries River
Fernwood
Legend
Saint Maries River
Riparian Areas Impacted by Agriculture - 17,110 feet
Agricultural Land Use
(319 Acres Crop, 152 Acres Hay, 352 Acres Pasture)
Other Land Use - Industrial Site
0.5 0 0.5 1 Miles

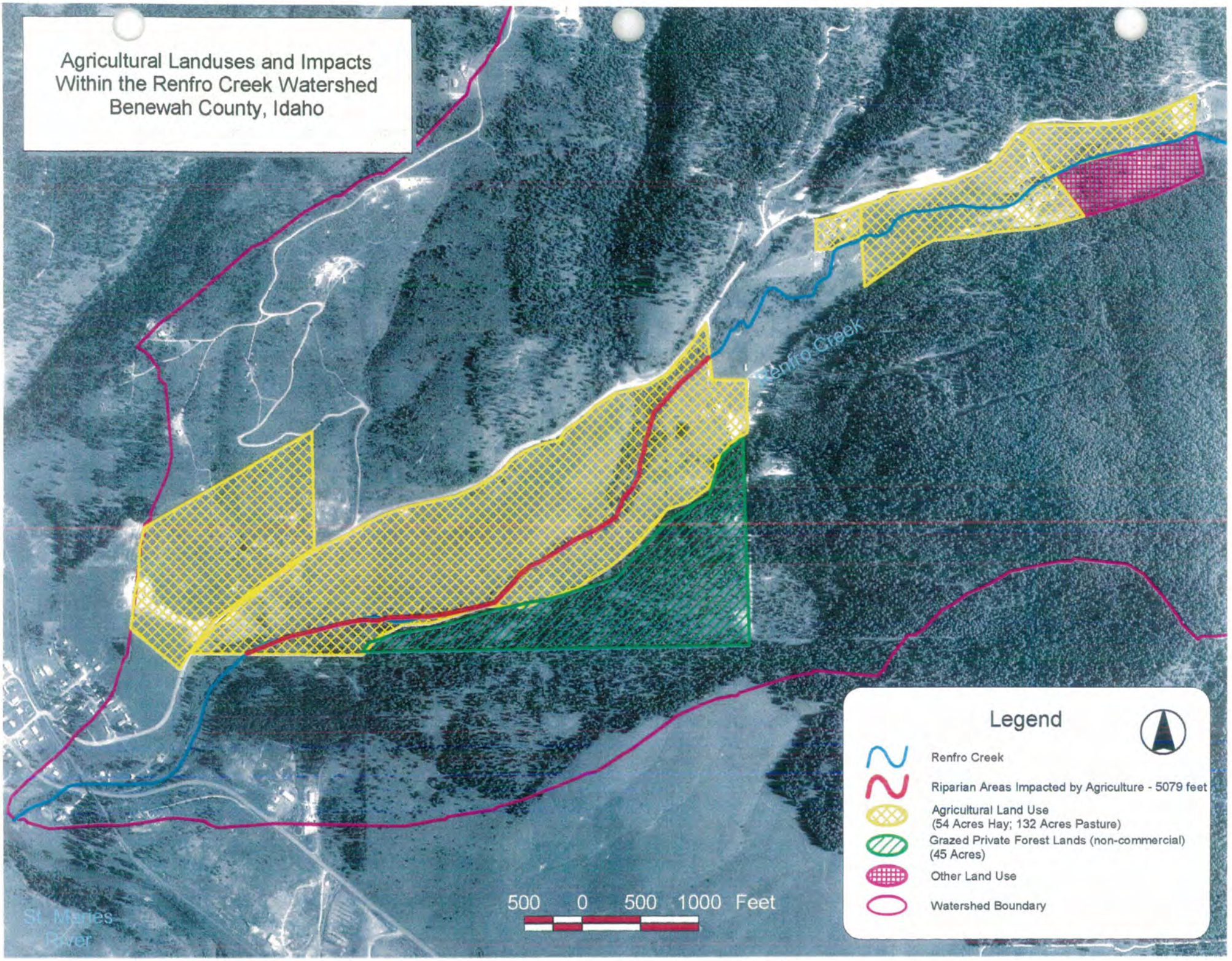

Agricultural Landuses and Impacts
Along the Lower Saint Maries River
Benewah County, Idaho
Saint Joe River
St. Maries
Saint Maries River
Thorn Creek
Saint Maries River
Legend
Agricultural Land Use
438 Acres Hay
178 Acres Pasture
46 Acres Crop
Watershed Boundary
2000 0 2000 4000 Feet

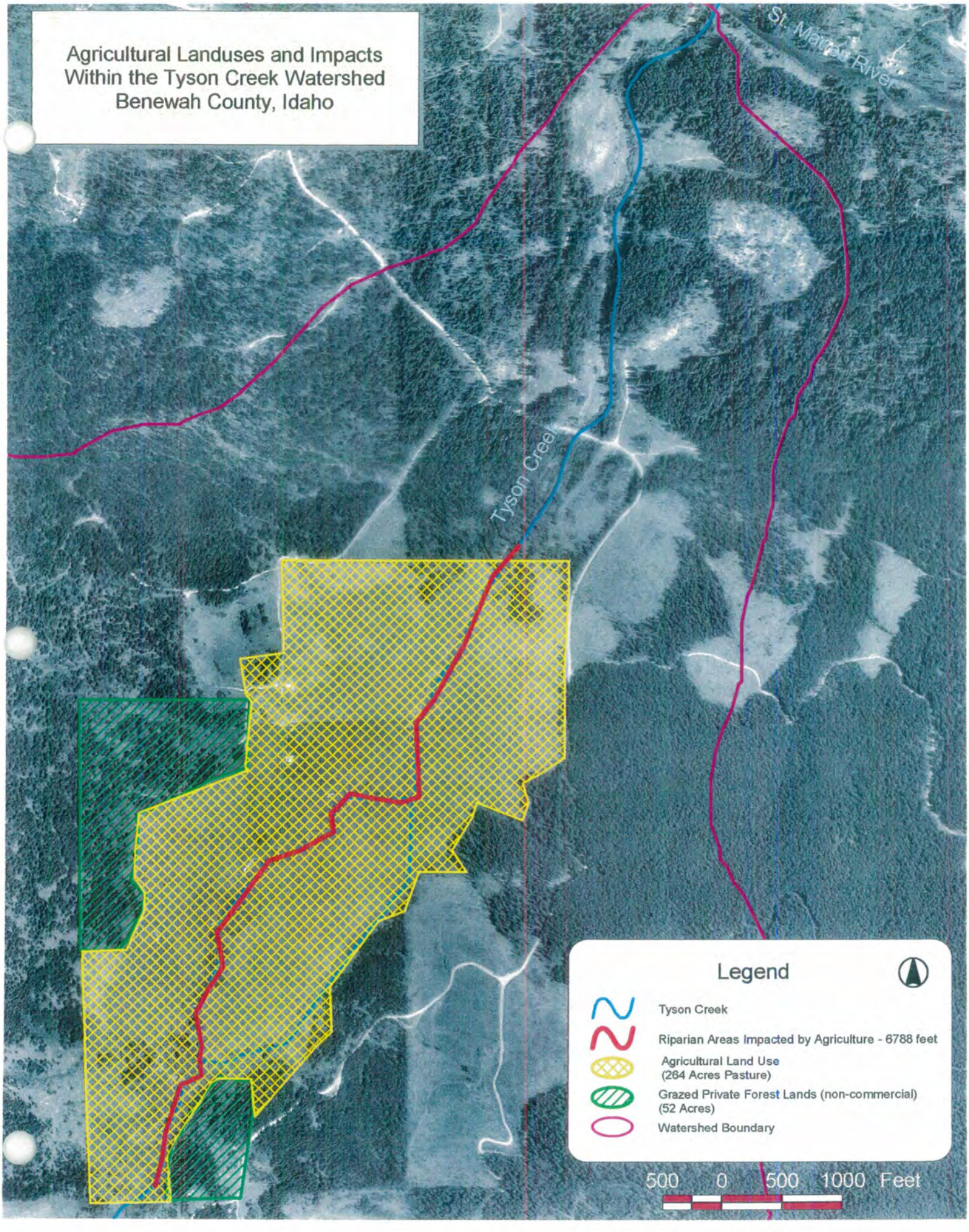

Agricultural Landuses and Impacts
Within the West Fork
Saint Maries River Watershed
Shoshone County, Idaho
Saint Maries River
Clarkia
West Fork
Saint Maries River
Legend
Westfork Saint Maries River
Riparian Areas Impacted by Agriculture - 23,771 feet
Agricultural Land Use - 803 Acres Pasture
Other Land Use - Log Yard, Race Track
Watershed Boundary
1000 0 1000 2000 Feet

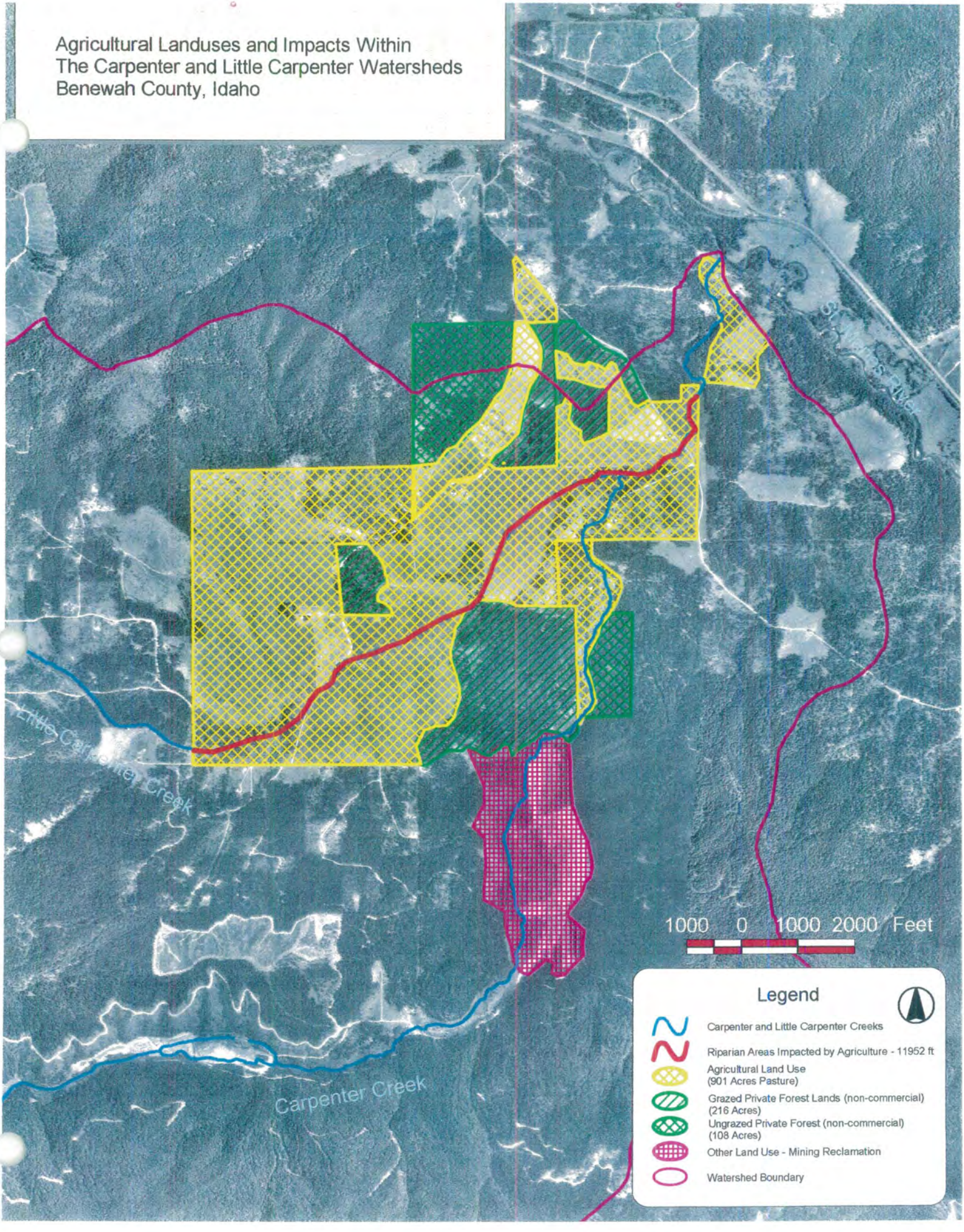

Agricultural Landuses and Impacts
Within the Thorn Creek Watershed
Benewah County, Idaho
St. Maries River
Thorn Creek
Legend
Thorn Creek
Riparian Areas Impacted by Agriculture - 3117 feet
Agricultural Land Use
(27 Acres/Pasture)
Grazed Private Forest Lands (non-commercial)
(22 Acres)
Watershed Boundary
1000 0 1000 Feet

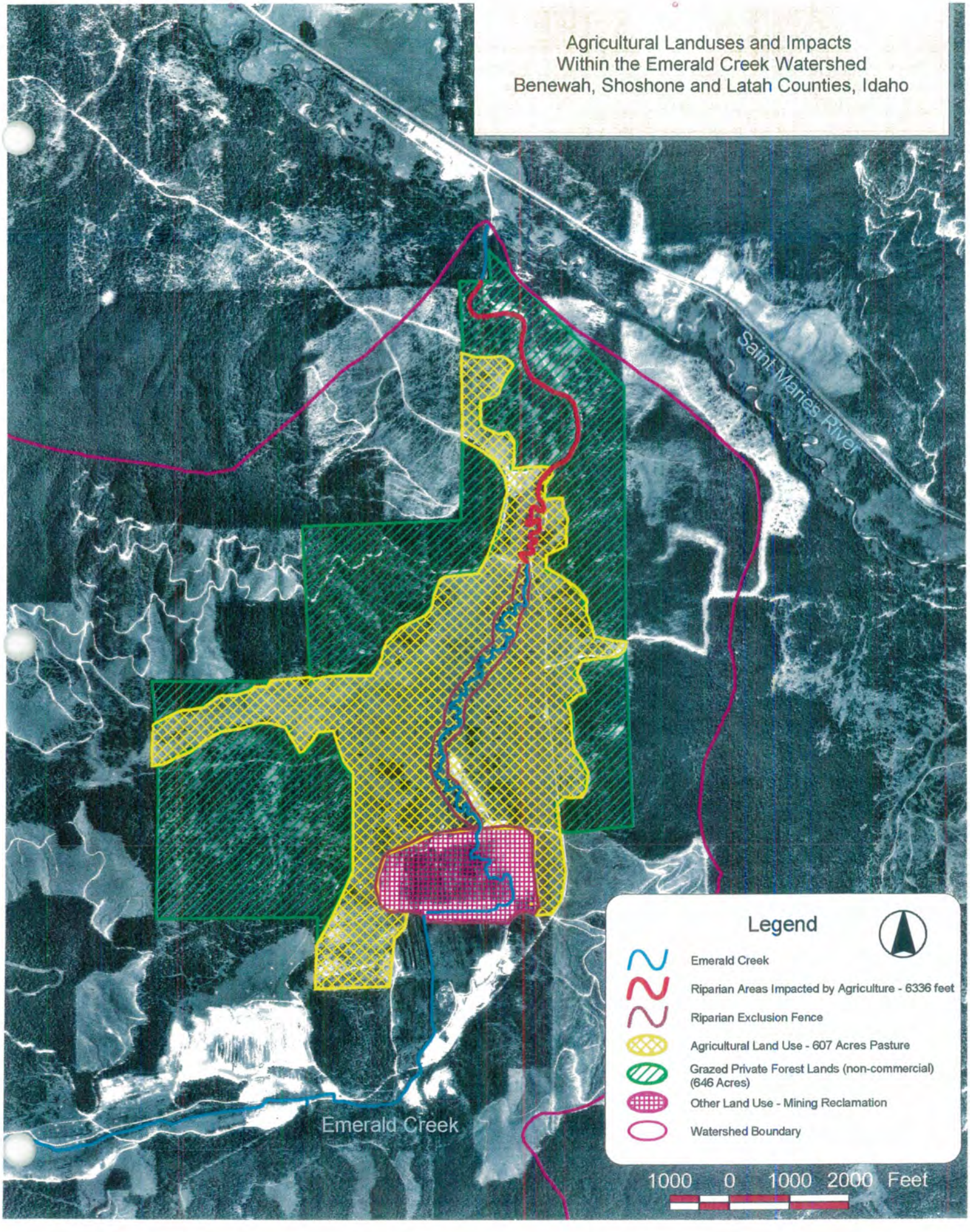

Agricultural Landuses and Impacts
Within the Santa Creek Watershed
Benewah County, Idaho
Mashburn
Santa Creek
Emida
Legend
Santa Creek
Riparian Areas Impacted by Agriculture - 25,412 feet
Agricultural Land Use
(439 Acres Hay, 1361 Acres Pasture)
Grazed Private Forest Lands (non-commercial)
(506 Acres)
Ungrazed Private Forest (non-commercial)
(1737 Acres)
Watershed Boundary
0.5 0 0.5 1 Miles

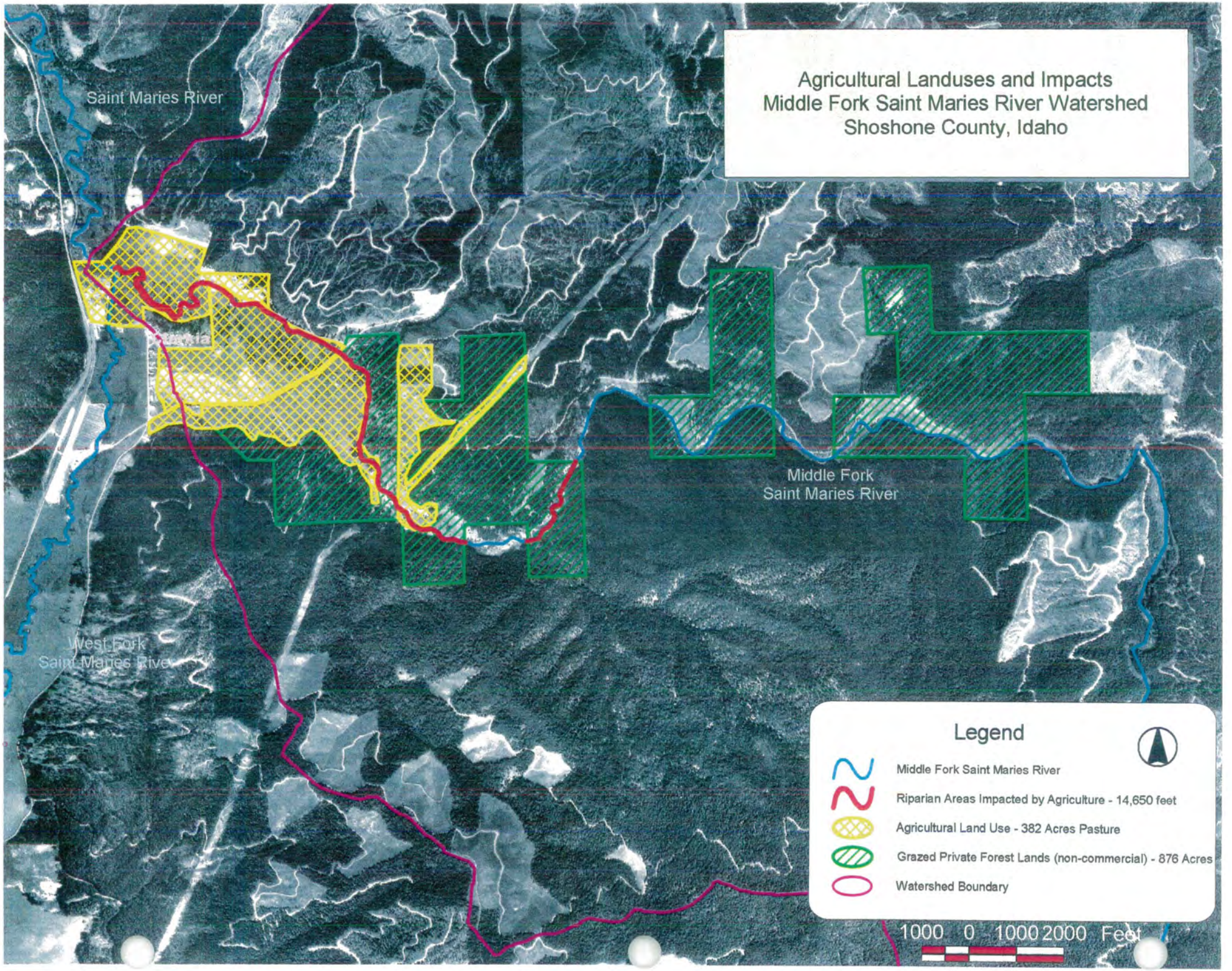

Agricultural Landuses and Impacts
Within the Charlie Creek Watershed
Benewah County, Idaho
Emida
Santa Creek
Charlie Creek
Legend
Charlie Creek
Riparian Areas Impacted by Agriculture - 19,063 feet
Agricultural Land Use
(651 Acres Pasture)
Grazed Private Forest Lands (non-commercial)
(349 Acres)
Ungrazed Private Forest (non-commercial)
(68 Acres)
Watershed Boundary
1000 0 1000 2000 Feet


Agricultural Landuses and Impacts
Within the Renfro Creek Watershed
Benewah County, Idaho
Renfro Creek
St. Maries
River
500 0 500 1000 Feet
Legend
Renfro Creek
Riparian Areas Impacted by Agriculture - 5079 feet
Agricultural Land Use
(54 Acres Hay; 132 Acres Pasture)
Grazed Private Forest Lands (non-commercial)
(45 Acres)
Other Land Use
Watershed Boundary


Agricultural Landuses and Impacts
Within the Tyson Creek Watershed
Benewah County, Idaho
St. Maries River
Tyson Creek
Legend
Tyson Creek
Riparian Areas Impacted by Agriculture - 6788 feet
Agricultural Land Use
(264 Acres Pasture)
Grazed Private Forest Lands (non-commercial)
(52 Acres)
Watershed Boundary
500 0 500 1000 Feet


Agricultural Landuses and Impacts Within
The Carpenter and Little Carpenter Watersheds
Benewah County, Idaho
Little Carpenter Creek
Carpenter Creek
1000 0 1000 2000 Feet
Legend
Carpenter and Little Carpenter Creeks
Riparian Areas Impacted by Agriculture - 11952 ft
Agricultural Land Use
(901 Acres Pasture)
Grazed Private Forest Lands (non-commercial)
(216 Acres)
Ungrazed Private Forest (non-commercial)
(108 Acres)
Other Land Use - Mining Reclamation
Watershed Boundary


Agricultural Landuses and Impacts
Within the Emerald Creek Watershed
Benewah, Shoshone and Latah Counties, Idaho
Saint Maries River
Emerald Creek
Legend
Emerald Creek
Riparian Areas Impacted by Agriculture - 6336 feet
Riparian Exclusion Fence
Agricultural Land Use - 607 Acres Pasture
Grazed Private Forest Lands (non-commercial) (646 Acres)
Other Land Use - Mining Reclamation
Watershed Boundary
1000 0 1000 2000 Feet


Agricultural Landuses and Impacts
Middle Fork Saint Maries River Watershed
Shoshone County, Idaho
Saint Maries River
Middle Fork
Saint Maries River
West Fork
Saint Maries River
Legend
Middle Fork Saint Maries River
Riparian Areas Impacted by Agriculture - 14,650 feet
Agricultural Land Use - 382 Acres Pasture
Grazed Private Forest Lands (non-commercial) - 876 Acres
Watershed Boundary
1000 0 1000 2000 Feet

Implementation Priority

The following sub-watersheds all contain riparian areas impacted by agriculture:

Santa Creek
Charlie Creek
West Fork of the St. Maries River
Middle Fork of the St. Maries River
St. Maries River-Clarkia to Santa
Carpenter Creek
Emerald Creek
Renfro Creek
Tyson Creek
Thorn Creek

Riparian zone BMP implementation on any of these sub-watersheds should result in TMDL reductions. The local Conservation District will determine landowner participation interest levels prior to implementation project application.

While landowner participation interest is critical to achieving any level of success, the most severely eroding streambanks were identified in the streambank erosion surveys conducted in 2000-2002. Erosion was calculated to determine estimated annual sediment delivery, and then normalized to determine erosion in terms of feet per mile of stream in a given reach and erosion in estimated tons delivered per mile annually. The following table shows the results:

Table 5. Erosion Analysis

Stream Segment	Reach Length (Miles)	Eroded Length (Feet)	Erosion Ft/Mi	Erosion Tons/Mi/Yr
Thorn Creek Middle Reach	0.1	600	4286	200
W Fork St. Maries Upper Reach	0.9	2552	2819	174
Santa Creek Upper Reach	2.9	3640	2892	123
Charlie Creek	2.7	4235	1588	107
Main St. Maries (Clarkia-Fernwood)	9.5	21860	2301	100
Santa Creek Lower Reach	1.5	3234	2156	91
Santa Creek Middle Reach	1.6	2491	1557	80
Renfro Creek Middle Reach	0.8	2411	3095	74
W Fork St. Maries Lower Reach	0.2	203	1230	67
W Fork St. Maries (total reach)	4.4	4077	937	55
Santa Creek (total reach)	13.2	11952	906	54
Tyson Creek Upper Reach	0.8	815	1087	46
Thorn Creek (total reach)	0.8	669	892	40
Main St. Maries (total reach)	32.3	27060	839	35
Renfro Creek	2.7	2919	1083	25
W Fork St. Maries Middle Reach	2.5	1172	469	25
Tyson Creek (total reach)	1.8	1014	563	22
Middle Fork (total reach)	3.7	8650	2317	18

Critical areas along stream banks and adjacent to the streams are often considered highest priority for the treatment due to increased potential to directly impact surface water quality. The accuracy in determining exactly where particular pollutants originate is greatly compromised as distance from the affected water body increases. Therefore, the following is a general rule that applies to the prioritization of critical acres within priority sub-watersheds:

Tier 1: Stream banks and adjacent fields having a direct and substantial influence on a stream. 200 foot stream corridor width.

Tier 2: Includes fields with an indirect yet substantial influence on a stream. Nearly flat fields outside Tier 1.

Tier 3: Upland fields in a sub-watershed that indirectly influence a stream.

In terms of BMP implementation, Tier 1 designates highest priority, and has been selected for treatment of TMDL pollutants.

Treatment and Costs

Agricultural portions of the St. Maries watershed have been divided into two or more Treatment Units (TUs). For each 303(d) listed stream, the pollutant of concern is either sediment or temperature, or both. The critical TU to solve both pollutants of concern will be TU #1- Riparian Areas, Buffer Zones, and Stream Channels. Additional TUs will address Best Management Practices (BMPs) for Resource Management System (RMS) conservation planning. These additional TUs will not be needed for full TMDL implementation, but will act as supporting practices to TMDL implementation. The TUs describe critical areas with similar land use areas, soils, productivity, resource concerns and treatment needs. TUs not only provide a method for delineating and describing resource areas, but are also used to evaluate impacts to water quality and lead to the formulation of alternatives for solving identified problems.

A practical and attainable goal of 75% implementation has been set for the BMPs needed to address the resource concerns of TU #1. This goal is reflected in the implementation treatment BMPs for TU #1(Tables 5-14). The Conservation District feels confident that the goals set will attain the desired TMDL background pollutants.

Treatment Unit #1 Description- Riparian Areas, Buffer Zones, and Stream Channels

There are approximately 620 acres within this treatment unit. This area consists of 75 foot buffers on each side of agricultural impacted channels, plus a 45 foot average bankfull width. This area is located in and adjacent to perennial and intermittent stream courses within the St. Maries River watershed on all land use types. The riparian resources within the St. Maries River watershed vary from pasture and hayland on the upper banks of the waterways, to narrow, shrub-dominated riparian areas, to broad, tree-dominated riparian zones in the flatter U-shaped valley. The upper portion is primarily a narrow, rocky canyon with a corresponding narrow riparian area. Tributaries are short and steep; however, several contain areas with wide meadows. Vegetation in the riparian areas consists of trees and shrubs in the forest and grazed woodland units and varies in the pasture units from trees and shrubs, alder, and hawthorn, or

no woody vegetation. Some of the tributaries have been mined for garnet. Most of these areas have been reclaimed, but lack trees and shrubs. The lower half of St. Maries River is dominated by trees and shrubs except for the wider floodplain influenced by backwaters of Lake Coeur d'Alene. The riverbanks in this area have been undermined by boat wake erosion during the summer water levels of the lake, which causes bank failure and elimination of woody vegetation.

Resource Problems

Some of the riparian zones are unstable from lack of protective woody and perennial grass vegetative cover. Results are bare, exposed soil as well as unstable stream banks. Direct sedimentation from stream banks adversely affects stream temperature, turbidity, water velocity, and habitat for fish and other aquatic species.

Causes of Resource Problems

The degradation of riparian areas is caused by stream channelization, improper road construction and maintenance, invasion of Reed's canarygrass, livestock overgrazing, garnet mining operations, boat wake erosion, and the direct removal of vegetation to facilitate farming and ranching operations. Past logging impacts of riparian areas has changed the stream channel stability causing increased erosion rates and has also eliminated some of the tree canopy cover of the streams. Floodplain encroachment is also becoming a widespread problem. Tables 5- 14 below estimate BMPs and cost by subwatershed for TU #1.

Table 6: Santa Creek (TU#1)

Best Management Practices	Amount	Estimated Cost
Fence (exclusion)	38,100 feet	$95,250
Channel Vegetation	66 acres	$66,000
Water Facility	9 each	$22,500
Heavy Use Area Protection	10 each	$27,000
Stream Stabilization	5,850 feet	$438,750
Total		**$649,500**

Table 7: Charlie Creek (TU#1)

Best Management Practices	Amount	Estimated Cost
Fence (exclusion)	28,600 feet	$71,500
Channel Vegetation	49 acres	$49,000
Water Facility	7 each	$17,500
Heavy Use Area Protection	7 each	$18,900
Stream Stabilization	3,175 feet	$238,125
Total		**$395,025**

Table 8: West Fork of St. Maries River (TU #1)

Best Management Practices	Amount	Estimated Cost
Fence (exclusion)	35,660 feet	$89,150
Channel Vegetation	61 acres	$61,000
Water Facility	9 each	$22,500
Heavy Use Area Protection	9 each	$24,300
Stream Stabilization	2,025 feet	$151,875
Total		**$348,825**

Table 9: Middle Fork of St .Maries River (TU #1)

Best Management Practices	Amount	Estimated Cost
Fence (exclusion)	21,975 feet	$54,940
Channel Vegetation	38 acres	$38,000
Water Facility	5 each	$12,500
Heavy Use Area Protection	6 each	$16,200
Stream Stabilization	2,960 feet	$222,000
Total		**$343,640**

Table 10: St. Maries River - Clarkia to Santa (TU #1)

Best Management Practices	Amount	Estimated Cost
Fence (exclusion)	33,741 feet	$84,350
Channel Vegetation	58 acres	$58,000
Water Facility	8 each	$20,000
Heavy Use Area Protection	9 each	$24,300
Stream Stabilization	16,400 feet	$1,230,000
Total		**$1,416,650**

Table 11: Carpenter Creek (TU #1)

Best Management Practices	Amount	Estimated Cost
Fence (exclusion)	17,930 feet	$44,825
Channel Vegetation	31 acres	$31,000
Water Facility	4 each	$10,000
Heavy Use Area Protection	5 each	$13,500
Stream Stabilization	3,250 feet	$243,750
Total		**$343,075**

Table 12: Emerald Creek (TU#1)

Best Management Practices	Amount	Estimated Cost
Fence (exclusion)	9,500 feet	$23,750
Channel Vegetation	16 acres	$16,000
Water Facility	2 each	$5,000
Heavy Use Area Protection	3 each	$8,100
Stream Stabilization	1,260 feet	$94,500
Total		**$147,350**

Table 13: Renfro Creek (TU #1)

Best Management Practices	Amount	Estimated Cost
Fence (exclusion)	7,620 feet	$19,050
Channel Vegetation	13 acres	$13,000
Water Facility	2 each	$5,000
Heavy Use Area Protection	2 each	$5,400
Stream Stabilization	1,215 feet	$91,125
Total		**$133,575**

Table 14: Tyson Creek (TU #1)

Best Management Practices	Amount	Estimated Cost
Fence (exclusion)	10,180 feet	$25,450
Channel Vegetation	18 acres	$18,000
Water Facility	2 each	$5,000
Heavy Use Area Protection	3 each	$8,100
Stream Stabilization	480 feet	$36,000
Total		**$92,550**

Table 15: Thorn Creek (TU #1)

Best Management Practices	Amount	Estimated Cost
Fence (exclusion)	4,675 feet	$11,690
Channel Vegetation	8 acres	$8,000
Water Facility	1 each	$2,500
Heavy Use Area Protection	1 each	$2,700
Stream Stabilization	161 feet	$12,075
Total		**$36,965**

The estimated costs for BMPs displayed in the above tables reflect a 75% landowner participation level. Since agricultural non-point source pollution is non-regulatory, BMP implementation relies solely on voluntary efforts of project landowner. Landowner trust and excellent working relationships need to be established in order to ensure project success.

In addition, these estimated BMP costs do not include technical assistance, administration, and an aggressive information and education program.

Treatment Unit #2 Description-Pasture and Hayland

There are approximately 7100 acres of pasture and hayland within the 303(d)-listed streams of the St. Maries Watershed. Slopes and aspects are quite variable. Some of the better soils were probably farmed at some point in the past, but they are now utilized as pasture and hayland. Where the pasture and hayland is adjacent to riparian areas with no buffer strips, streambanks have little stability, thereby contributing to streambank erosion. These lands also do not provide canopy cover to the streams which contributes to elevated water temperatures.

Resource Problems

With the large variability in soils and sites comes a big difference in production and species makeup. Native pastures are located on the flood plains of the St. Maries River and some other tributaries in deep poorly drained soils. These sites are generally in fair to good condition with annual and perennial grasses along with camas making up a large portion of the production. Drier upland sites are in fair to good condition containing perennial forage species such as orchardgrass, Kentucky bluegrass, timothy, brome, fescue, and clovers. In many cases both sites will be contained within a grazing unit.

Pasture and hayland encroachment to channel edges eliminates buffer zones that allow sediments to enter waterways more readily and decrease shading benefits of streams from overhanging vegetation.

Best Management Practices applicable to Treatment Unit #2:

Contour Farming
Exclusion Fence
Grassed Waterway
Nutrient Management
Pasture and Hayland Planting
Pest Management
Pipeline
Pond
Prescribed Grazing
Spring Development
Watering Facility

Treatment Unit #3 Description-Grazable Woodland

This treatment unit contains approximately 2,700 acres located on nearly level to moderately steep slopes (5-40%) generally located adjacent to pasture and hayland ground or in recently harvested forestland. The land is owned and operated by non-industrial private forest (NIPF) landowners. Common forest habitat types range from Douglas fir/snowberry to grand fir/pachistima. In well-managed timber stands, production can range from 18,500 to 34,600 board feet (Scribner rule).

Suitable forage is generally found in the Hemlock, Larch and Douglas fir habitat types. In the higher and wetter habitats livestock forage is often not adequate unless the tree canopy coverage is open (less than about 60 percent) or if the stand is young.

Resource Problems

The greatest single cause of erosion and sedimentation is from logging activities (forested roads and skid trails and, to a lesser degree, log landings). Newly constructed roads are a greater risk than older roads, which have had an opportunity to stabilize and re-vegetate.

The Idaho Forest Practices Act (FPA) is in place to address non-point source pollution from forest activities. It is administered by the Idaho Department of Lands (IDL). FPA generally

protects the forest resource adequately; however, IDL jurisdiction of FPA ends after timber harvest activities cease. Roads that continue to be used for non-harvest purposes usually represent an ongoing source of erosion, sedimentation, and water quality degradation.

Noxious weeds, specifically hawkweed, are a major problem in areas that have been harvested, which can deplete the soil of nitrogen, inhibiting desirable plant production. When a mono-culture of hawkweed exists, sheet and rill erosion can accelerate beyond tolerable limits.

Best Management Practices applicable to Treatment Unit #3:

Exclusion Fence
Forest Harvest Trails and Landings
Forest Site Preparation
Forest Stand Improvement
Grassed Waterway
Nutrient Management
Pest Management
Pipeline
Pond
Prescribed Grazing
Spring Development
Tree and Shrub Establishment
Watering Facility

Treatment Unit #4 Description-Forestland (Ungrazed)
This treatment unit contains approximately 1900 acres located on moderately steep to very steep slopes (10-75%). The land is owned and operated by non-industrial private forest (NIPF) landowners. Common forest habitat types range from Douglas fir/snowberry to grand fir/pachistima. In well-managed timber stands, production can range from 18,500 to 34,600 board feet (Scribner rule).

Resource Problems
Timber harvest activities are concentrated in times of high market values or in periods when landowners have more acute financial needs. This leads to the potential for unplanned and multiple-stand harvest entries within the common stand rotation age of a well-managed forest. NIPF timber harvest operations are rarely coordinated across ownership boundaries.

High-grading and poor regeneration provisions are common results of logging activities on NIPF lands. Logging can be accomplished by ground-based skidding systems on this less-steep treatment unit. Unplanned skid trails have resulted in concentrated water flow and increased erosion in past harvest operations. Poorly planned skid trails also result in a higher amount of soil surface disturbance
Noxious weeds, specifically hawkweed, are a major problem in areas that have been harvested. When a mono-culture of hawkweed exists soils are depleted of nitrogen, desirable

plant production is inhibited and accelerated sheet and rill erosion can exceed tolerable limits of soils capabilities.

Best Management Practices applicable to Treatment Unit #4:

Forest Harvest Trails and Landings
Forest Site Preparation
Forest Stand Improvement
Nutrient Management
Pest Management
Tree and Shrub Establishment

Funding

Financial and technical assistance for installation of BMPS is needed to ensure success of this implementation plan. There are many potential sources of funding that will be actively pursued by the BSWCD to implement water quality improvements on private agricultural lands. These sources of funding include the following programs:
Water Quality Programs for Agriculture – WQPA
Continuous Conservation Reserve Program – CCRP
Environmental Quality Incentive Program – EQIP
319 Program
Rangelands Conservation and Rural Development Program – RCRDP
NCRS Small Watersheds Program – PL-566
State Revolving Loan Fund – SRF
Combinations of these programs could be used to implement BMPs.

Outreach

An intensive outreach program will be conducted through the BSWCD and its partners, the Idaho Association Soil Conservation Districts, Idaho Soil Conservation Commission, and the Natural Resources Conservation Service. The purpose of these various outreach programs is to inform agricultural landowners and operators how water-quality BMPs can benefit their farm or ranch.

Newspaper articles, district newsletters, direct mail, project tours, demonstration projects, landowner meetings, and personal contacts will be conducted as part of this outreach effort. Other outreach objectives include:

Provision of information about the TMDL process
Accelerated technology transfer
Dissemination of water quality monitoring results
Increased landowner support for water quality BMPs
Distribution of TMDL implementation progress reports
Greater awareness of agriculture's involvement in the protection and enhancement of natural resources
Increased public awareness of agriculture's commitment to meeting the TMDL challenge

Evaluation and Monitoring

Evaluation, monitoring, and data collection will all be integral components of this implementation plan. At the field level the ISCC and the USDA-NRCS will complete annual status reviews in cost share programs such as EQIP, CRP, WQPA, RCRDP, and 319. In addition, the ISCC will complete in-field BMP effectiveness evaluations throughout the implementation phase. The ISCC BMP evaluation format and process will be implemented in conjunction with the annual status reviews. These reviews will be important from a technical and an administrative perspective to ensure sound decision-making and adaptation of implementation priorities and direction. The ISCC will be responsible for tracking and reporting implementation progress for all cost-share programs.

The Conservation District continues to monitor streambank erosion at selected sites throughout the watershed. Steel bankpins have been placed at various points along certain streams to set a baseline level of erosion. These points are measured after each spring runoff to see exactly how much lateral bank recession has occurred. This lateral recession is then used to calculate more precisely the sediment load contributed through bank erosion, and conversely, how much sediment is being prevented through implementation of BMPs.

At the sub-basin level, ISDA and IASCD will provide water quality monitoring. Monitoring will be conducted to ensure that non-point BMPs are operating effectively and to give some quantitative indication of the reduction efficiency of these BMPs. All water quality monitoring activities will be coordinated with the Coeur d'Alene tribe, IDEQ, and the BSWCD. Very little pre-implementation water quality data exists currently. The strategy of ISDA and IASCD will be to provide baseline information on 303 (d) listed tributaries above their confluences with the St. Maries River. On the prioritized sub-watersheds with the greatest agricultural impact, monitoring will be performed at the agriculture forest boundary and near the mouth to determine agriculture's impact to water quality. This pre-implementation data will be collected for one year. After actual implementation has occurred IASCD will return after five years and perform water quality monitoring on the prioritized watersheds. This information will be correlated with ISCC in-field data, as well as available precipitation and discharge data to look for improvements in water quality in the St. Maries Subbasin. A proposed monitoring plan is attached as Appendix A.

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St. Maries River
Monitoring Program 2002-2003

A Water Quality Sampling Project for the St. Maries River and 303(d)-listed tributaries

December 12, 2002

Developed for: Benewah Soil and Water Conservation District (BSWCD)
Idaho Soil Conservation Commission (SCC)
Idaho State Department of Agriculture (ISDA)

Prepared by: Ken Clark, Idaho Association of Soil Conservation Districts

Approved by: _____
Benewah Soil and Water Conservation District Chairperson

Approved by: _____
Idaho Soil Conservation Commission Representative

Approved by: _____
Idaho State Department of Agriculture Representative

Introduction:

The St. Maries River and 17 tributaries have been identified under the Clean Water Act section 303(d) list of water quality impaired streams. The St. Maries watershed drains approximately 307,649 acres. Tributaries flow through steep V-shaped valleys that turn into low gradient meandering courses as they reach the valley floor. Forestry dominates in upland and agriculture occurs along lower reaches of tributaries and valley bottoms. The U. S. Geological Survey (USGS) has operated a gauging station on the St. Maries River near Santa from 1965 to present. This monitoring program is designed to collect samples at agriculturally prioritized segments every two weeks for a one-year period. The data will be used by BSWCD, ISDA, and the SCC to quantitatively set load allocations for best management practice (BMP) implementation as well as provide a baseline to measure future BMP effectiveness.

Monitoring Program:

This water quality monitoring program is intended to provide baseline data on the St. Maries River and it's 303 (d)-listed tributaries. This monitoring plan was originally designed in coordination with the Benewah Soil and Water Conservation District (BSWCD), and Soil Conservation Commission (SCC) and the Idaho Association of Soil Conservation Districts (IASCD) to fill data gaps that exist in the watershed. Monitoring near the agriculture-forest boundary and near the mouth will enable managers to determine where loads are entering the stream to allow prioritization for the implementation of BMPs.

Specific parameters to be tested are total phosphorus (TP), bacteria (*Escherichia coli* and total coliform), nitrate+nitrite (NO_3+NO_2-N), ammonia (NH_3), turbidity, total suspended solids (TSS), instantaneous temperature, continuous temperature, dissolved oxygen (DO), and percent (%) saturation. With the exception of continuous temperature monitoring, parameters will be monitored on an instantaneous basis with sampling occurring every two weeks. Funding will determine the duration of monitoring, but at least a full year would be recommended.

The University of Idaho Analytical Science Laboratory (ASL) will conduct all analytical parameter testing. Bacteria analysis will be performed by the State of Idaho Health and Welfare Laboratory in Coeur d' Alene. All other measurements will be performed by IASCD, or other personnel under supervision or training. Continuous temperature dataloggers will be installed at representative sites May 2003 and retrieved late October 2003.

This project is a cooperative effort between IASCD, ISDA, and SCC. ISDA and IASCD will provide the personnel, sampling equipment, and technical expertise. IASCD personnel will conduct the monitoring, perform data entry, and provide a summary report after the data has been gathered.

PROGRAM OBJECTIVES:

IASCD will cooperate with ISDA, BSWCD and local landowners in an attempt to complete the following goals:

1. Evaluate the water quality and discharge rates of the St Maries River and impacted tributaries in order to provide a baseline for BMP implementation as well as for future effectiveness monitoring.

2. Attempt to determine which areas contribute to water quality exceedances or degradation.

3. Prioritize loading areas that may require BMP implementation or other possible management strategies.

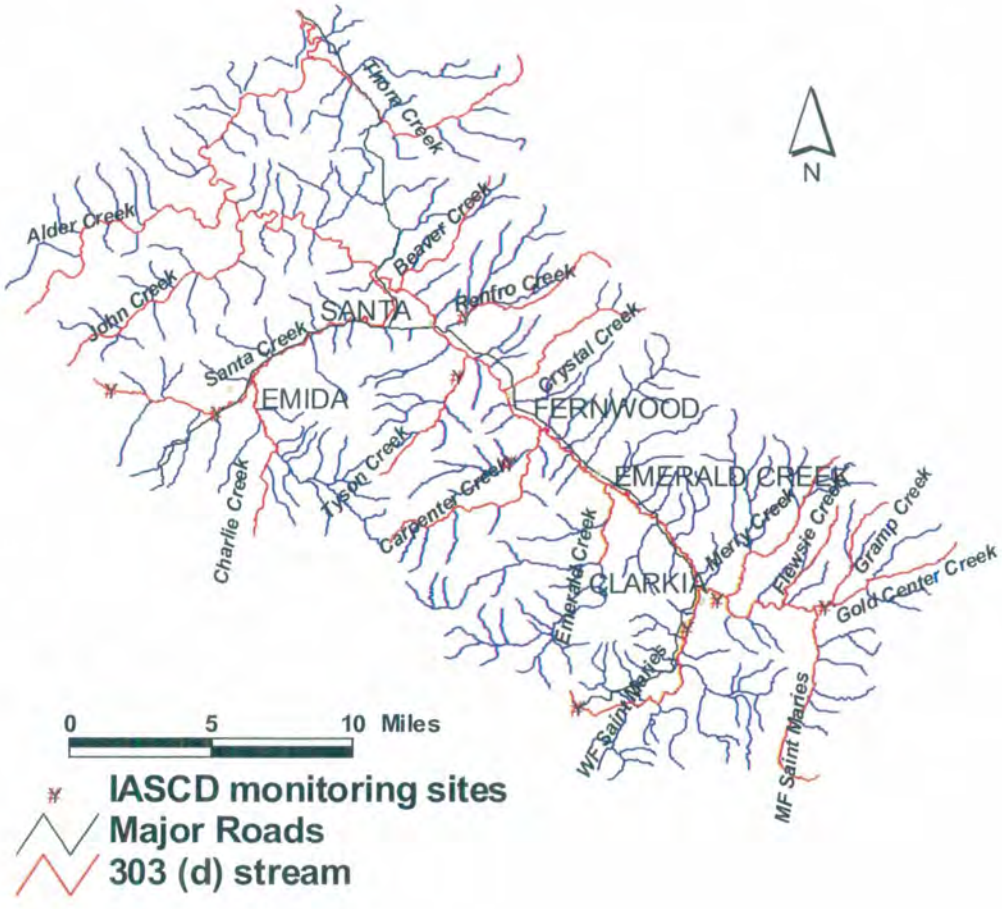
4. Make data available to the public.

Site Description:

Little or no agriculture was observed at Gold Center, Gramp. Flewise, Merry, Crystal, and Beaver Creeks. These streams were characterized by forestry activities. Emerald and Carpenter Creeks are impacted by agriculture, but extensive mining operations in downstream reaches, which were observed to contribute sediment to the streambed should be prioritized as mining impacted streams. The mining companies have collected baseline data and will continue to monitor these streams (Osburn, 2002 personal communication). This monitoring program will focus on priority streams St, Maries River (from Clarkia to town of St. Maries, West and Middle Forks of St Maries, Santa Creek, Renfro, and Tyson Creek. All IASCD monitoring stations are shown in Figure 1.

SM-1	MF St. Maries River (upstream of agricultural influence).
SM-2	MF St. Maries River (near confluence with WF).
SM-3	WF St. Maries River (near confluence with MF).
SM-4	WF St. Maries River (near mouth).
SM-5	Little Carpenter Creek (near mouth).
SM-6	Tyson Creek near mouth.
SM-7	Renfro Creek near mouth
SM-8	Santa Creek below agriculture.
SM-9	Santa Creek upstream of agricultural influence
SM-10	Charlie Creek (Charlie Creek road crossing)

St Maries Watershed



Sampling Methods

Water Quality

At each monitoring station a DH81 (depth integrated sampler) will be used to collect a width and depth integrated sample, which will be composited into a 2.5-gallon polyethylene churn sample splitter. The resultant composite sample will then be thoroughly homogenized and poured off into properly prepared sample containers. Nutrient water samples that require preservation will be obtained in preserved (H_2SO_4 pH <2) 500 mL. sample containers. The polyethylene churn splitter will be thoroughly rinsed with ambient water at each location prior to sample collection. Bacteriological samples will be collected directly from mid-stream flow into properly prepared sterile sample bottles. Refer to Table 1 for a list of parameters, analytical methods, preservation, and holding times.

All sample containers will be equipped with sample labels that will be filled out using water proof markers with the following information: station location, sample identification, date of collection, and time of collection. Clear packing tape will be wrapped around each sample bottle and its label to insure that moisture from the coolers does not cause the loss of sample labels. All resultant samples will be placed in a cooler, on ice, to await shipment to the laboratory. Chain-of-Custody forms will accompany each sample shipment. All samples, with the exception of bacteria, will be shipped to the ASL in Moscow, Idaho for analyses. Bacteria samples will be sent to the State of Idaho Health and Welfare Laboratory in Couer d' Alene for analysis. Samples will be shipped either the same day or early the next morning to meet 30-hour holding time.

Table 1. Water Quality Parameters

Parameters	Sample Size	Preservation	Holding Time	Method
Non Filterable Residue (TSS)	1L	Cool 4°C	7 Days	EPA 160.2
Nitrogen(NO_3+NO_2) Ammonia (NH_3)	60 mL	Cool 4°C, H_2SO_4 pH < 2	28 Days	EPA 353.2
Total Phosphorus (TP)	100 mL	Cool 4°C, H_2SO_4 pH < 2	28 Days	EPA 365.4
Escherichia coli (E. coli)	100 mL	Cool 4°C	30 Hours	MPN

Field Measurements

At each location, field parameters of dissolved oxygen, specific conductance, pH, temperature and total dissolved solids will be measured. These measurements will be taken, when possible, from a well-mixed section, near mid-stream at approximately mid-depth. Calibration of all field equipment will be in accordance with the manufacturer's specifications. Refer to Table 2 for a listing of field measurements, equipment and calibration techniques.

Table 2 Field Measurements

Parameters	Instrument	Calibration
Dissolved Oxygen	YSI Model 55	Ambient air calibration
Temperature	YSI Model 55 StowAway temperature logger Model XTI 02	Centigrade thermometer Centigrade thermometer
Conductance & TDS	Orion Model 115	Specific Conductance (25°C)
pH	Orion Model 210A	Standard buffer (7,10) bracketing for linearity
Turbidity	Hach Model 2100P	Formazin Primary Standard

All field measurements will be recorded in a bound log book along with any pertinent observations about the site, including weather conditions, flow rates, personnel on site or any potential problems observed that may affect the quality of data.

Flow Measurements

Flow measurements will be collected by wading and using a Marsh McBirney Flow Mate Model 2000 flow meter. The six-tenth-depth method (0.6 of the total depth below water surface) will be used when the depth of water is less than or equal to three feet. For depths greater than three feet the two-point method (0.2 and 0.8 of the total depth below the water surface) will be employed. At each gauging station, a transect line will be established across the width of the drain/creek at an angle perpendicular to the flow. The mid-section method for computing cross-sectional area along with the velocity-area method will be used for discharge determination. The discharge is computed by summation of the products of the partial areas (partial sections) of the flow cross-sections and the average velocities for each of those sections. This method will be used to calculate cubic feet per second at each of the monitoring stations.

Staff gauges will be used on selected segments to determine stream and river discharge during high water levels. Each staff gauge will be securely attached to a bridge or other permanent secure structure so that not movement will occur. A stream cross-sectional profile at the staff gauge will be permanently established with metal stakes and shot in and recorded with laser level. Mannings n roughness coefficient will be estimated. Stream discharge will be taken as many events as deemed possible with rising water levels. This data as well as USGS continuous discharge data from St. Maries River near Santa will be used to develop a predictive model to use staff measurement to extrapolate stream discharge.

Quality Assurance and Quality Control (QA/QC)

The ASL utilizes methods approved and validated by EPA. A method validation process, including precision and accuracy performance evaluations and method detection limit studies, are required of all of ASL Standard Methods. Method performance evaluations include quality control samples, analyzed with a batch to ensure sample data integrity. Internal laboratory spikes and duplicates are all part of ASL's quality assurance program. Laboratory QA/QC results generated from this project can be provided upon request.

QA/QC procedures from the field-sampling portion of this project will consist of duplicates (at 10% of the sample load) along with blank samples (one set per sampling day). The field blanks will consist of laboratory-grade deionized water, transported to the field and poured off into a prepared sample container. The blank sample is used to determine the integrity of the field teams handling of samples, the condition of the sample containers supplied by the laboratory and the accuracy of the laboratory methods. Duplicates consist of two sets of sample containers filled with the same composite water from the same sampling site. The duplicates are used to determine both field and laboratory precision. The duplicate and blank samples will not be identified as such and will enter the laboratories blindly for analyses. Both the duplicates and blank samples will be stored and handled with the normal sample load for shipment to the laboratory.

Bacteria water samples will be shipped from the Idaho Department of Health and Welfare building in Moscow to the laboratory in Couer d' Alene where the samples will be ran within the 30 hour holding time. Their procedures use MPN (most probable number) by Quantitray test to determine *E. coli* and total coliform concentrations. The laboratory in Couer d' Alene is certified by the State of Idaho to conduct laboratory analysis of bacteria.

Data Handling

All of the field data and analytical data generated from each survey will be submitted to ISDA for review. Each batch of data from a survey will be reviewed to insure that all necessary observations, measurements, and analytical results have been properly recorded. The analytical results will be reviewed for completeness and quality control results. Any suspected errors will be investigated and resolved, if possible. The data will then be stored electronically and made available to any interested entity.

Data use

The data generated from this monitoring program will be used by IASCD, SCC, and the BSWCD to determine loads within the stream, identify areas where BMP's would have the greatest benefit, provide baseline data prior to TMDL development, and identify changes as BMP's are implemented. Data will also be available to other agencies and the general public.

References

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