WINCHESTER LAKE
&
UPPER LAPWAI CREEK

IMPLEMENTATION PLAN

GOAL:

" To Restore and Maintain Beneficial Uses in Upper Lapwai Creek and Winchester Lake Watersheds"

First Revision
May 2000

Winchester Lake
Total Maximum Daily Load Implementation Plan

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MAPS

1.0 INTRODUCTION

The Winchester Lake Watershed Advisory Group is implementing agriculture, riparian, stream bank stabilization, road and culvert improvements, camp ground site stabilization, and public outreach projects to meet the required reduction of pollutants for the Winchester Lake watershed Total Maximum Daily Load. The Winchester Lake and Upper Lapwai Creek Implementation Plan has a scheduled completion date of April 2000.

1.1 Background

Winchester Lake

Winchester Lake is a manmade reservoir, created by the damming of Lapwai Creek in 1910. The Lake was formed to serve as a mill pond, but by 1963 most of the marketable large-diameter timber in the area was harvested and the lake ceased to be used as a mill pond. The Idaho Department of Fish and Game purchased the lake from Potlatch Corporation in 1966. The Lake is the focal point of 318 ac. Winchester Lake State Park. The lake has a surface area of 100 acres, drains a watershed of 7,800 acres, and acts as a settling basin for the watershed. The watershed includes approximately 3,419 acres of forest and range land, 3,295 acres of non-irrigated cropland, and 697 acres of pasture. Land uses in the Winchester Lake watershed consist of dryland farming, grazing, timber harvest and recreation.

The Winchester Lake TMDL Implementation Plan utilizes a phased watershed approach to implement in-lake, agricultural, forest, and rural roads BMP's to meet the required reduction for pollutants to Winchester Lake. The Lake hosts populations of rainbow trout, largemouth bass, black crappie, and black bullhead, yellow perch and tiger muskie.

Upper Lapwai Creek

Upper Lapwai Creek is the largest tributary to the lake, contributing about 70% of the average flow. The creek drains an area of 5,950 acres and has a stream length, including all tributaries, of approximately 27 miles. Fish species in the drainage include native redband and planted trout, sculpin. Largemouth bass, and black bullhead.

1.2 Winchester Lake Watershed Advisory Group (WLWAG)

The Winchester Lake Watershed Advisory Group (WLWAG) was nominated by the Clearwater Basin Advisory Group and appointed by the Administrator of the Idaho Division of Environmental Quality (IDEQ) under Idaho Code 39-3615 in early 1996. The WLWAG is comprised of key stakeholders in the watershed, and is charged with providing advice on the specific actions needed to control nonpoint and point source pollution that affects the quality of water in Winchester Lake. The group is clerically supported by the Lewis Soil Conservation District with meeting facilities located at the Craig Mountain Senior Citizen Center in Winchester, Idaho. Interested parties include; Landowners & operators, Idaho Department of Fish and Game, Idaho State Parks and Recreation, Lewis County, City of Winchester, Nez Perce Tribe, and the Idaho Department of Lands.

The WAG began meeting on February 4, 1998 and provided input and advice throughout the development of the TMDL. The WAG meets on a monthly basis and is committed to completing a sound TMDL Implementation Project.

1.3 Beneficial Uses

Winchester Lake

Designated beneficial uses for Winchester Lake include drinking and domestic water, agricultural water supply, cold water biota, primary and secondary contact recreation.

Upper Lapwai Creek

Designated beneficial uses for Upper Lapwai Creek include salmonid spawning, drinking water, agricultural water supply, cold water biota, primary and secondary contact recreation.

1.4 Pollutants

Winchester Lake

Pollutants allocations and reductions are required for nutrients, sediment, and dissolved oxygen.

Upper Lapwai

Pollutants allocations and reductions are required for are sediment, nutrients, thermal modification, pathogens.

2.0 WINCHESTER LAKE TMDL

Total Maximum Daily Loads (TMDLs) are water quality management plans required under the Section 303(d) of the Clean Water Act for waters determined to not meet state water quality standards. The goal of a TMDL is to restore beneficial uses and achieve state water quality standards. Winchester Lake and Lapwai Creek were identified on Idaho’s 1994 and 1996 303(d) lists as not meeting state water quality standards, and requiring TMDLs.

As additional information becomes available during implementation of the TMDL, the TMDL targets, loading capacity, and allocations may need to be changed. In the event that data show that changes are warranted, TMDL revisions will be made with the assistance of the Winchester Lake Advisory Group. Although specific targets and allocations are identified in the TMDL, the ultimate success of the TMDL is not whether these targets and allocations are met, but whether beneficial uses and state water quality standards are achieved and maintained. The following discussion explains how all the listed parameters were addressed by the TMDL, and the attached table summarizes pollutant loading and allocations.

2.1 Phosphorus

Past water quality studies of Winchester Lake have indicated that excessive levels of nutrient compounds in lake waters and lake bottom sediment cause nuisance algae growth that causes depleted oxygen in the lake's deeper waters during the summertime/early fall. This TMDL estimates reductions in phosphorus loading to Winchester Lake needed to ensure that increased dissolved oxygen levels meet dissolved oxygen criteria, and that a sufficient volume of the lake meets both the dissolved oxygen and temperature criteria to fully support a cold water fishery.

The TMDL phosphorus target for Winchester Lake is 739 lbs/yr. This target requires a reduction of 1187 lbs/yr from the current 1926 lbs/yr. The TMDL allocates 741 lbs/yr reduction comes from Upper Lapwai Creek. The remaining 446 lbs/yr reduction will occur in the lake. The TMDL requires a 570 lbs/yr reduction in Upper Lapwai Creek for beneficial use support in Upper Lapwai Creek. This is less than the 741 lbs/yr reduction in Lapwai Creek for Winchester Lake. Thus, the reduction needed to meet the lake target is expected to restore Upper Lapwai Creek.

2.2 Sediment

Overall, about a 90% reduction of the existing sediment load is needed to improve the fishery. Sediment entering Winchester Lake also needs to be reduced in order to reduce the amount of nutrients that they carry. Reducing erosion and sediment delivery through implementation of Best Management Practices will help improve water quality in Winchester Lake and Upper Lapwai Creek. The major sources of sediment are surface and stream bank erosion. Agricultural lands are likely the largest contributor of sediment, and both surface and bank erosion occur on these lands. The second major source of sediment is stream bank erosion on pasture lands.

2.3 Temperature

Winchester Lake

During the summer, water cool enough for coldwater species only occurs at a depth greater than 1.5 meters within the lake. Water below 2.5 meters has inadequate dissolved oxygen levels. Only a narrow 1 meter layer of water exists during the summer which has adequate temperature and dissolved oxygen.

The temperature analysis has concluded that temperature in the lake is elevated primarily because of the shallow nature, large surface area, and relatively low flow through the lake. Little can be done to change these conditions, or reduce the surface temperature of the lake. Therefore, the goal of the temperature TMDL is to increase dissolved oxygen in the deeper water by decreasing nutrient input, thereby allowing trout and other species to utilize the cooler water which meets the temperature criteria year-round.

Upper Lapwai Creek

A temperature TMDL for Upper Lapwai Creek was established to address impaired salmonid spawning and rearing uses in the watershed. Solar radiation currently raises water temperatures in Lapwai Creek above the prescribed state water quality standards for salmonid and coldwater biota.

Model results indicate that a 38% - 87% increase in shade is necessary in order to attain and maintain state water quality standards. In addition to stream shade, other factors such as narrowing and deepening of the channel, colder water temperature from improved segments upstream, or increases in flow, may also help to decrease temperatures.

2.4 Bacteria

Sampling in 1988 and 1993 indicates that fecal coliform levels exceeded state water quality standards at several locations within the Lapwai Creek drainage. Since Lapwai Creek is the greatest contributor to the lake, and since it appears that Winchester Lake meets bacteria standards, it was concluded that a bacteria TMDL for Upper Lapwai Creek would be protective of both the creek and lake.

The sources of bacteria in Lapwai Creek are unknown. Cattle grazing in the watershed are suspected to be a significant source. Improperly operating septic systems and other methods of sewage disposal may also be contributing at times.

Although data are extremely limited, it appears that a 90% reduction in bacteria concentrations at the mouth of Lapwai Creek would be needed to ensure that state water quality standards are met at all times.

Due to the age and limited nature of the bacteria data, a sampling effort was planned by EPA and the for 1999 to reassess bacteria concentrations in Lapwai Creek and Winchester Lake. These data will be used to revise the bacteria load allocations set for Upper Lapwai Creek.

Winchester Lake and Upper Lapwai Creek Loading and Allocation Summary

Pollutant	Waterbody	Target (s)	Subwatershed	Load	Load allocation	Reduction needed
Nutrients/DO	Winchester L.	37 ug/l total phosphorus		1926 lb/yr	739 lb/yr	62%
	Lapwai Cr.	50 ug/l total phosphorus (May thru Oct.)		42 lbs/month	18 lbs/month	57%
Sediment	Winchester L.	total reductions in sediment to Winchester Lake are the same as cumulative reduction in Upper Lapwai tributaries (LP6)		571 tons/yr	43 ton/yr	93%
	Lapwai Cr.	Improving trend in average annual sediment load with natural background as interim target and full support of salmonid spawning and cold water biota uses as the ultimate measure of success.	LP-1	322 tons/yr	21 tons/yr	93%
			LP-2	122 tons/yr	13 tons/yr	89%
			LP-3	234 tons/yr	18 tons/yr	92%
			LP-4	526 tons/yr	36 tons/yr	93%
			LP-5	555 tons/yr	40 tons/yr	93%
			LP-6	571 tons/yr	43 tons/yr	93%
Pathogens	Winchester L.	TMDL determined to be unnecessary				
	Lapwai Cr.	< 500 cfu/100 ml - at all times > 200 cfu/100 ml - <10% of samples over 30 days < 50 cfu/100 ml - geo. mean in 5 samples over 30 days		1.9E10 cfu/day @ 0.37 cfs	1.8E09 cfu/day @ 0.37 cfs	90%
Temperature	Winchester L.	Phosphorus/dissolved oxygen TMDL established as a surrogate for the temperature TMDL				
	Lapwai Cr.			**(j/m2/sec)**	**(j/m2/sec)**	**Shade increase needed**
		78% shade	LP-1	225.6	68.9	50%
		92% shade	LP-2	297.6	25.1	87%
		79% shade	LP-3	3.3.9	65.8	76%
		78% shade	LP-4	283.1	68.9	54%
		79% shade	LP-5	244.4	65.8	57%
		95% shade	LP-6	134.7	15.7	38%
Pesticides	Winchester L.	TMDL determined to be unnecessary				
Flow	Winchester L.	TMDL not developed until it is determined that TMDL's are required for impairments due to flow alteration				
	Lapwai Cr.	" "				
Habitat	Winchester L.	TMDL not developed until it is determined that TMDL's are required for impairments due to habitat alteration				
	Lapwai Cr.	" "				

3.0 WINCHESTER LAKE TMDL IMPLEMENTATION

3.1 Past and Present Pollution Control Efforts

3.1.1. Clean Lakes Program Phase I

Winchester Lake has been involved in the EPA Clean Lakes Program since 1988. The Phase I Diagnostic and Feasibility Study was completed by Entranco Engineers in February 1990. The Phase I study also developed a lake restoration plan (Entranco, 1992) to address water quality problems. The restoration plan identified specific management activities to implement in the watershed with the goal of reducing sediment and nutrient loading to the lake. These management activities include agricultural, riparian, and forestry best management practices (BMPs) and direct runoff controls. If the water quality did not improve as a result of watershed loading reductions, the restoration plan suggested an aluminum sulfate treatment to reduce the contribution of phosphorus from lake bottom sediments.

3.1.2 Clean Lakes Program Phase II

The Winchester Lake Phase II Implementation and Restoration Project began in June 1990. The goals of this project were to; implement the BMPs outlined in the lake restoration plan; develop an information and education program and continue water quality monitoring to evaluate the effectiveness of BMPs.

3.2 Implementation and Restoration Activities

3.2.1.Forestry BMPs

Timber harvest activities by private landowners occurred on approximately 850 acres in the watershed between January 1990 and June 1995. An estimated 8 miles of road were built. Forestry BMPs were implemented under the Idaho Forest Practices Act and included proper road design and maintenance, stream protection zones, and replanting.

3.2.2. Direct Runoff BMPs

The large number of people fishing at Winchester Lake created exposed shoreline areas requiring erosion controls. The Winchester Lake State Park implemented the shoreline erosion controls. The park reseeded areas that were the least damaged by Park users and areas that were severely damaged, the park constructed rock-filled baskets for fishing platforms and additional docks for public access. Twenty rock-filled fishing platforms totaling 1100 linear ft were installed in the most damaged areas. Five docks were constructed into a T-shape design providing 32 linear ft of fishing area for every 8 ft of shoreline used. been very positive.

3.2.3 Agricultural BMPs

The Lewis Soil Conservation District installed nutrient and sediment control structures within the Winchester Lake watershed. Since 1990, 11 contracts treating 2880 cropland and pastureland critical acres have been initiated. Conservation tillage is the most common treatment practice. As of January 1998, 7 sediment basins, 20 gully plugs, and 7 grade stabilizations had been constructed. A complete list of BMPs installed is shown in Table 4. Locations are shown in Figure 9.

3.2.4 Riparian BMPs

The Lewis Soil Conservation District has installed a riparian demonstration area. The demonstration area is located in the upper portion of the watershed above Mud Springs Reservoir and is used to educate landowners in the watershed about riparian BMPs. Seven log drop structures were constructed in 900 feet of the stream. These structures are designed to raise the water table near the stream so that vegetation can be reestablished. Additionally, 2800 ft of fencing and a livestock access ramp were installed so that the cattle could only cross the creek in one location. In the spring of 1995, the District and the Nez Perce Tribe planted several hundred willow cuttings along the creek in an effort to restore the riparian area. Four thousand feet of fence have been built and a rotational grazing plan has been implemented on a landowner's property along Lapwai Creek between Winchester Lake and Mud Springs reservoir. Two log drop structures and 4 spring developments are planned for implementation on the same property.

3.2.5 Nez Perce Tribe Restoration Projects

The Nez Perce Tribe has worked to restore Lapwai Creek above and below Mud Springs Reservoir within the Nez Perce Reservation. The upper stream was fenced off, willows were planted, and transects were established to evaluate aggradation and degradation. The reservoir was deepened by the Nez Perce Tribe in the fall of 1998 and will be restocked with trout and bass.

<table>
<tr><td colspan="4">WICHESTER LAKE CLEAN LAKES PROJECT
SUMMARY OF BMP’S INSTALLED (as of 1/26/98)</td></tr>
<tr><td>NUMBER INSTALLED</td><td>BMP</td><td>AMOUNT SPENT</td><td>COST PER UNIT</td></tr>
<tr><td>7 ea</td><td>Sediment basins</td><td>$3,598.50</td><td>$514.07/unit</td></tr>
<tr><td>20 ea</td><td>Gully plugs</td><td>$7,674.00</td><td>$383.70/unit</td></tr>
<tr><td>7 ea</td><td>Grade stabilization structures</td><td>$4,048.00</td><td>$578.29/unit</td></tr>
<tr><td>36 ea</td><td>Standpipes</td><td>$3,361.00</td><td>$93.36/unit</td></tr>
<tr><td>18,012 ft</td><td>4” underground outlet</td><td>$14,221.00</td><td>$0.79/ft</td></tr>
<tr><td>12,593 ft</td><td>6” underground outlet</td><td>$19,128.00</td><td>$1.52/ft</td></tr>
<tr><td>6 ea</td><td>Log drop stabilization structure</td><td>$2,339.00</td><td>$389.83/unit</td></tr>
<tr><td>1 ea</td><td>Livestock access ramp</td><td>$390.00</td><td>$390.00/unit</td></tr>
<tr><td>419 rods or
6915 ft</td><td>Fence</td><td>$5,825.00</td><td>$13.90/rod
$0.84/ft</td></tr>
<tr><td colspan="4">TOTAL AMOUNT SPENT FOR BMP’S = $60,584.50</td></tr>
<tr><td colspan="4">PRACTICES INSTALLED ON PRIVATELY OWNED PROPERTY THROUGH OTHER PROGRAMS</td></tr>
<tr><td colspan="2">Lapwai State Ag Water Quality Project</td><td colspan="2">11 contracts providing financial incentives installing ag-related BMP’s on 2880 privately-owned critical acres.</td></tr>
<tr><td colspan="2">Public Law 566</td><td colspan="2">3 basins
Contract signed with Nez Perce Tribe on Mud Springs</td></tr>
<tr><td colspan="2">Annual Conservation Practices</td><td colspan="2">Spring developments</td></tr>
<tr><td colspan="2">Idaho Department of Lands</td><td colspan="2">Timber management/ thinning/ reforestation</td></tr>
<tr><td colspan="2">Privately-installed</td><td colspan="2">2 additional log drop structures</td></tr>
<tr><td colspan="4">1996 PHASE II REPORT LISTS 5 JURISDICTIONAL ENTITIES ABOVE THE LAKE</td></tr>
<tr><td colspan="4">IDFG IDPR Lewis County City of Winchester Nez Perce Tribe</td></tr>
</table>

Table 4. Summary of BMP’s (Lewis Soil Conservation District).

3.3 Winchester Lake Community Education and Outreach

The information and education component of the Clean Lakes Phase II project consisted of several different activities designed to increase awareness of the lake's condition and the efforts needed to restore the lake's water quality. In the summer of 1994, approximately 300 people at Winchester Lake State Park participated in a survey that determined the demography of the park and lake users, the activities they participated in while at the park, their preferred fishing locations, their views on water quality, and their knowledge of BMPs. After the survey the participants were given information regarding the lake project and the BMPs in the watershed. Two brochures were developed for the project and distributed to the public. The first brochure described the Clean Lakes Project, water quality in the lake, watershed sources of pollution, and the lake management plan. The second brochure was targeted at landowners in the watershed and explained various types of recommended BMPs. Informational display boards were constructed. The displays contained 3 informational panels about the lake project. These panels were displayed at several locations within the park and placed at the Lewis Soil Conservation District Office. A traveling display was developed and used for an exhibit at the Lewis County Fair and other locations.

3.4 Point Source Pollution Control Activities

There are no point sources of pollution identified in the TMDL which require implementation of pollution controls.

3.5 Nonpoint Source Pollution Control Activities

3.5.1 Agriculture

Agricultural land comprises 3,992 acres of the Winchester Lake watershed. Agricultural activities in the watershed contribute approximately 87% of the current sediment loading into Winchester Lake. Agricultural BMPs will be applied to reduce sediment and associated nutrient delivered to the streams. BMP's will include agronomic, structural, and riparian practices. The USDA Continuous Conservation Reserve Program and regular Conservation Reserve Program (CRP) are viewed as the programs most attractive to landowners for installation of filter strips, grassed waterways and riparian forest buffers.

Seven more sediment basins will be installed in sub watersheds LP-3, LP-4, LP-5, LP-6 and five water and sediment control structures will be installed in LP-3, LP-4, LP-5, LP-6, which will be implemented in critical areas will reduce sediment and nutrient loading.

Establishment of Continuous Direct Seeding High Residue Systems as a desirable agronomic practice within the Winchester Lake watershed will greatly reduce sheet and rill erosion on non-irrigated cropland, and enhance water retention in the watershed. Nutrient Management plans will be initiated on non-irrigated cropland. Sod crops such as; hay or grass for seed production will reduce sediment-loading and increase water retention. Continuous CRP, and regular CRP, PL-566, SAWQ, Clean Lakes Projects will also be integrated & utilized to reduce soil erosion on agricultural lands.

Critical areas on agricultural lands in LP-1, LP-3, LP-4, LP-5, LP-6 adjacent to county and tribal roads will be seeded to grass to stabilize rights of way and subsequently reduce sediment delivery into Lapwai Creek and Winchester Lake.

Continuous CRP will be sought for cropland areas adjacent to main drainage ways. Vegetation planting in these key locations will not only stabilize & minimize gullies, but will also consume nutrients that have been trapped from runoff events. Incentives offered through the program enable landowners to enroll cropland for 10 years of re occurring rental payments very similar to the Regular CRP program. BMP components may range from a straight grass seeding & land shaping to establishing woody vegetation & fence exclusions. It is estimated that 84 acres could be involved if all areas were enrolled at the maximum 100 ft/side of drainage. Grassed Waterways will provide much the same benefits, but more engineering for proper capacities are needed than that required for the filter strips. It is estimated that 11 acres or 20,000 lineal feet at 24 ft. ave width could be installed in higher drainage areas. Sediment Basins & Water/Sediment Control Basins will be placed in strategic areas where gully erosion is a problem in Ag areas. Hay or grass seeding will be encouraged for producers in place of conventional cropping practices. Continuous Direct Seeding practices will be introduced & encouraged to provide optimal coverage over the whole cropland area. Producers are trying to fit this new use of technology to their operations, but this has not been a completely proven practice at this time. Fields that are continuous direct seeded will depend less on structural type bmps as the soil & water is retained at its original location. Nutrient Management will be a component to the Continuous Direct Seeding for enhanced management of the nutrients added for cropland production. Field Borders, Critical Area Plantings will be installed on annually cropland areas adjacent to county roads. The local Road District will shape the areas & clean ditches first, then the participant will prepare the seedbed & plant the area to grass. It is intended to allow for the operator to go up & back. The width will vary according to the individuals haying equipment. After 2 years, the stand of grass should be established so that weeds can be sprayed along with the crop, & then the stand will be hayed in June or July. The ground will be more stable for rainfall events, winter runoffs. Road ditches will stay cleaner longer, & provide a cleaner conduit for ag runoff to the live streams.

3.5.2 Riparian Vegetation and Streambank Stabilization

Unstable streambanks will be stabilized through conservation buffers reducing load allocation requirements. Revegetation with trees, grasses, forbes and shrubs will enhance the filtering and streambank stabilization effects of the riparian buffer zone along Upper Lapwai Creek and tributaries. These vegetative plantings and stabilization activities will be installed to work towards the required reductions of pollutants of the TMDL (TMDL pg.98, table 23). In addition, conservation buffers and re-vegetation of riparian zones in the watershed and will provide long term shading of the streams. Revegetation will help maintain lower stream temperatures for cold water biota. Eroding banks will be stabilized with revetments as needed. Riparian vegetation plants will increase habitat diversity and corridor connectivity.

Approximately 60 acres of non-agricultural land with existing shade conditions below 50% will be treated with willow, native shrubs, and conifer plants. The project is designed to achieve the long term goals of a minimum of 80% shade, as targeted in the TMDL to meet solar loading.

Landowners will have an opportunity to specify vegetation areas and types within the project. In addition, funds are requested for ten brush mattresses and five brush revetments to assist with bank stabilization. Off-site watering will be encouraged within these areas. Mud Springs Campground improvements mitigate nutrient and sediment loading to Upper Lapwai Creek. In order to eliminate the possibility of the Mud Springs Campsite area as a bacteria source, a single unit vault toilet with a 2000 gallon will be installed. This unimproved site is located within 150 feet of the stream corridor and a sensitive wet meadow/riparian zone prone to erosion from disturbance. This plan includes hardening the site and spur road with gravel, and placing 2 parking barriers on concrete posts to prevent vehicle access to sensitive areas. Two fire rings are proposed as well, in order to contain fires and ashes, preventing nutrient runoff into the stream.

Livestock fence exclusion will be used in riparian areas where livestock grazing pressures are problem. It will also be used on property where tree/shrub plantings need “rest” from the Willow Tree & Shrub Plantings will be installed along riparian areas for stability of streambanks and increase shade for water temperature reduction

3.5.3 Roads

The Evergreen Highway District maintains the county roads in the Winchester Lake watershed. These roads contribute sediment loading into Winchester Lake. Unimproved private, Idaho State Park, and Tribal forest roads provide access to timber stands, fields, homes and recreation areas. The Upper Lapwai Creek watershed contains 35.4 miles of roads. Sediment delivery to Upper Lapwai Creek varies by subwatershed from 2 to 79 tons per year. Delivery from the smaller subwatersheds immediately surrounding Winchester Lake is approximately 26 tons per year.

Road projects include stabilizing road cuts and fills, replacing undersized culverts, restoring fish passage, and hardening road surfaces to reduce erosion, sediment, and phosphorus delivery. Areas with greatest sediment delivery will be prioritized. Required reductions will be accomplished through grass seeding cuts, rocking roads, installation of gates, tree and brush plantings and culvert installations.

The Evergreen Highway District will implement road BMP’s focusing on high-priority problem areas,which by. Stabilization of road banks, removal of undersized, short and damaged culverts to allow for water and fish passage. 11 culverts will be installed. Field borders, buffers and dust abatement of high traffic areas, will be completed. These treatments will greatly reduce the input of sediment and pollutants to the receiving waters as required of the TMDL.

Nez Perce Tribal projects include replacing two culverts with engineered rocked fords in intermittent drainages to Upper Lapwai Creek. These projects will take place in subwatershed LP-2, which currently contributes 15 tons per year from road erosion. Additional work includes rocking 3 miles of unimproved road and installing one metal gate in subwatershed LP-5. This watershed currently contributes 18 tons per year to Upper Lapwai Creek. The gate would be placed to restrict vehicle access to a sensitive wetland meadow immediately adjacent to the creek, approximately one-third mile upstream of the lake.

3.5.4 In-Lake Dissolved Oxygen Management

Winchester Lake is categorized as containing to many nutrients. Low dissolved oxygen levels are caused by plants dying, decomposing and using up the oxygen in deeper water can pose a significant problem for trout in Winchester Lake. Idaho Fish and Game, Winchester Lake State Park and the Nez Perce Tribe show three preferential methods to deal with the dissolved oxygen problem: aluminum sulfate treatments, hypolimnetic withdrawal and hypolimnetic aeration.

Other options considered include phosphorus inactivation through chemical treatment of surface in-flows, dredging, and full lake aeration. As part of this phased TMDL, the necessity of in-lake management techniques can be evaluated once the effectiveness of external source reductions has been determined.

Hypolimnetic Aeration

During stratification, decomposition uses up oxygen in the hypolimnion. Decreased oxygen and anoxic conditions promote the release of soluble orthophosphate from lake sediments into the waters of the hypolimnion. During lake turnover the orthophosphate becomes available and re-enters the cycle. Aeration would preclude the hypolimnion from reaching anoxic conditions thus limiting the conditions that allow orthophosphate from becoming soluble. Hypolimnetic aeration systems "lift" cold water from deep parts of a lake to the surface from contact with the atmosphere and return the water to the hypolimnion without significant warming. This method protects benefits of the cooler water temperatures in a thermally stratified lake.

Aluminum Sulfate Treatment

Alum is a chemical that is used to bind sediment phosphorus and inhibit internal phosphorus cycling from the sediment. Literature review shows demonstrated phosphorus reductions of 55 to 90 percent. Winchester Lake Phase I (Entranco 1990) report optimistically assumed an 80% reduction, benefits can last from 5 to 10 years. Alum is typically applied as a liquid solution that is gravity fed into the lake using barge-mounted equipment. The chemical would be delivered to the lake via tanker truck. Dosage is typically determined using titration or jar testing techniques. Dosage is typically twice the alkalinity of the lake. Entranco, Phase I report, estimated the dosage of 140 mg/l of alum or the equivalent of 274 dry tons for Winchester Lake.

Hypolimnetic withdrawal

During lake stratification decomposition of organic matter uses up oxygen in the hypolimnion. Decreased oxygen and anoxic conditions release orthophosphate from lake sediments. Data sets from Winchester Lake (Mohler, 1985) show total phosphorus and orthophosphorus levels in the hypolimnion up to 10 times higher than surface waters during September. Average concentrations from three sampling stations were 0.72 mg/l total phosphorus. Removing water from the hypolimnion during this time could also remove phosphorus and reduce the amount recycled during the next lake turnover.

In lake reduction needed: 446 lbs. = 203kg = 203,000g = 203,000,000mg/0.72mg/l = 282,000,000 l = 282,000m 3/1234m 3/acft= 228.5 ac ft, Volume of Winchester Lake =1,960 acre feet, Volume of hypolimnion = 980 acre feet 228.5 acre feet = 12% of lake volume or 24 % of hypolimnion = a 2.5' pool reduction.

3.5.5 Public Outreach

Public outreach will be accomplished with collaborative input from participating agencies. Information on best management practices will be provided for watershed landowners and visitors to Winchester Lake State Park. Information will be conveyed via interpretive signs, pamphlets, flyers, displays and newsletters.The Nez Perce Tribe Water Resources Division will develop a pamphlet using a computer software program.

Two or three interpretive signs will be developed by Winchester Lake State Park personnel, the Nez Perce Tribe, other collaborating agencies. The Rural Roads/Residential/ Forestry Committee of the Winchester Watershed Advisory Group will develop a pamphlet/leaflet for watershed residents describing best management practices for private lands with the following components: livestock watering, fencing, and grazing practices; fire hazard identification and control; proper use of pesticides and fertilizers, appropriate land clearing; maintenance of riparian buffer zones; BMP's for lake and lakeshore; and recommendations for wood lot management (shade for streams, brush clearing, firewood gathering, road construction and drainage); project progress status reports (including monitoring).

4.0 WINCHESTER LAKE AND UPPER LAPWAI CREEK TMDL IMPLEMENTATION MONITORING PLAN

Water Quality monitoring for the watershed and lake is conducted collaboratively by 3 agencies. The Nez Perce Tribe conducts monitoring at 3 sites along Upper Lapwai Creek, and at 3 sites in Winchester Lake. Idaho Department of Agriculture (IDA), through the Idaho Association of Soil Conservation Districts (IASCD), the Lewis Soil Conservation District, the Idaho Soil Conservation Commission, (ISCC), and the Natural Resources Conservation Service (NRCS) will monitor results of implementation actions on agricultural lands in the Winchester Lake watershed. Idaho DEQ conducts beneficial use support monitoring in the watershed.

4.1 IASCD Best Management Practices Implementation Monitoring

This monitoring program is intended to verify previous findings of agricultural input to Upper Lapwai Creek in its upland areas before the stream enters Winchester Lake. Determining where loads are entering the stream will allow prioritization for the implementation of Best Management Practices (BMPs) on a subwatershed scale.

Involved with this monitoring plan is the Nez Perce Tribe (NPT) and agencies such as the Idaho Department of Agriculture (ISDA), Idaho Soil Conservation Commission (SCC), the Idaho Association of Soil Conservation Districts (IASCD), and the Lewis Conservation District (LCD). Monitoring will be done by IASCD employees with additional support coming from staff of SCC, Natural Resources Conservation Service (NRCS), NPT and ISDA employees. The Lewis Soil and Water Conservation District (LSWCD) and SCC provide guidance and support with local landowners in the Lapwai Creek watershed. IASCD will supply the technical support, equipment, and funds for analytical testing. If additional help is needed to conduct physical monitoring, SCC, NPT, ISDA personnel, or other temporary employees, will provide technical and field expertise and time.

Monitoring of Lapwai Creek in accordance with this plan, will be conducted in agricultural and forested settings. Parameters being monitored will provide information related to implementation to determine the priority portions of the watershed with regards to sources of sedimentation, nutrient loading, temperature loading, dissolved oxygen, and pathogens. Specific parameters are: total phosphorus (TP), ortho-phosphorus (OP), bacteria (fecal coliform and e-coli) nitrogen (nitrate, nitrite), turbidity, total suspended solids (TSS), instantaneous temperature, dissolved oxygen (DO), and percent (%) of DO saturation.

Analysis of nitrogen, TP, OP, and TSS will be conducted by University of Idaho=s lab. Bacteria analysis will be performed by Anatek Labs in Moscow. All other analysis would be performed by IDA personnel with the Idaho Association of Soil Conservation Districts (IASCD), or other personnel. Sampling will occur every two weeks for one year. Eight sites have been chosen along Lapwai Creek to capture the best >picture= of the watershed.

4.2 Program Objectives

IASCD will cooperate with the above-mentioned agencies and organizations in an attempt to complete the following goals:

1. Evaluate the water quality and discharge rates at various locations within this creek and its tributaries.
2. Attempt to determine which areas contribute the greatest level of water quality exceedances.
3. Collect data for use in future monitoring to analyze trends.
4. Prioritize loading areas that may require BMP implementation or other possible management strategies.
5. Clarify background nutrient levels.
6. Determine correlation between turbidity and total suspended solids.
7. Make data available to the public.

4.3 Site Description:

1. Site located downstream of Winchester Lake
2. Site located along the main stem of Lapwai Creek immediately upstream of Lake.
3. Site located along the main stem of Lapwai Creek immediately below the confluence with LP4 subwatershed.
4. Site located on LP4 tributary above culvert.
5. Site located along the main stem of Lapwai Creek approximately 400 feet upstream of culvert.
6. Site located along Lapwai Creek main stem above LP3 tributary.
7. Site located on LP3 tributary.
8. Site located Above Mud Springs Reservoir.

4.4 Sampling Methods

4.4.1 Water Quality

Samples for water quality analyses will be collected by depth-integrated sampling directly from the water source. The actual sampling sites within the waterway will be located away from culverts, roads, and other unnatural influences along the creek. For very incised, shallow sections of Lapwai Creek, six one-liter grab samples will be collected from a well-mixed section near mid-stream, at approximately mid-depth. For larger sections, multiple grab samples will be collected at equal intervals across the stream's cross-section to provide a representative sample. For shallow water sites (<1 foot deep) grab samples will be collected by hand using a clean one-liter stainless steel container. At sites where the water depth is greater than 1 foot, a DH-81 integrated sampler will be used for water collection. Whichever method is used, individual samples will be collected at equal intervals across the entire width of the creek. Each discrete sample will in turn be composited as described in the following paragraph. The actual location, number of grabs, and sample collection technique will be determined after observing the conditions at each sampling location.

With the exception of bacteriological samples, each grab sample 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. For samples requiring filtration (ortho-phosphorous), a portion of the sample water will be transferred into the filtration unit and pressure filtered through a 0.45 µm. GN-6 Gelman Metricel Filter. The resultant filtrate will be transferred directly into a properly prepared sample bottle. The filtration unit will be thoroughly rinsed with deionized water and equipped with a new 0.45 µm. filter at each sampling location. Water samples for nutrients that require preservation, will be transferred into preserved (H_2SO_4 pH <2) 500 ml. sample containers. The polyethylene churn splitter will be thoroughly rinsed with source water at each location prior to sample collection. Bacteriological samples will be collected directly from the mid-stream discharge into properly prepared sterile sample bottles

In addition to monitoring fecal coliform, analysis for escherichia-coli (e-coli) bacteria will also be conducted on Lapwai Creek. Idaho is revising water quality bacteria standards to e-coli bacteria instead of the present parameter, fecal coliform. Collecting e-coli data at this time will provide information to comform to this new parameter when it becomes the new standard. The samples will be shipped to Anatek Labs with the fecal coliform samples. 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 within a cooler, on ice, to await shipment to the laboratory. Chain-of-Custody forms will accompany each sample shipment. All samples, except bacteria, will be shipped to the University of Idaho Analytical Sciences Laboratory Moscow, Idaho for analyses. Bacteria samples will be sent to Anatek Labs in Spokane 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)	200 ml	Cool 4°C	7 Days	EPA 160.2
Nitrogen-nitrate/nitrite	50 ml	Cool 4 °C, H2SO4 pH < 2	28 Days	EPA 353.2
Total Phosphorus	100 ml	Cool 4 °C, H2SO4 pH < 2	28 Days	EPA 365.4
Ortho Phosphorus	100 ml	Filtered , Cool 4°C	24 Hours	EPA 365.2
Fecal Coliform	250 ml	Cool 4 °C	30 Hours	SM9221
Escherichia Coli	250ml	Cool 4 °C	30 Hours	MPN

4.4.2 Field Measurements

At each location, field parameters for 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	Centigrade thermometer
Conductance & TDS	Orion Model 115	Conductance standards
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 problems observed that may affect the quality of data.

4.4.3 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 waterway 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.

4.4.4 Quality Assurance and Quality Control (QA/QC)

The University of Idaho Analytical Service Laboratory (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 event). The field blanks will consist of laboratory-grade deionized water, transported to the field and poured off into a prepared sample container. The dissolved phosphorous blank will be collected by filtering deionized water through the filtration unit and transferring the resultant filtrate into an appropriate 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.

Water samples for bacteria will be shipped to Anatek Labs. Their procedures use MPN (most probable number) by multiple tube fermentation to determine fecal coliform levels in the water sample. Anatek Labs is certified by the state of Washington to conduct laboratory analysis including bacteria.

4.4.5 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.

4.4.6 Data Use

The data generated from this monitoring program will be used by IASCD, SCC, NPT and the LSWCD 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.

4.4.7 Nez Perce Tribe Trend Monitoring

The Nez Perce Tribe is monitoring 3 sites along Upper Lapwai Creek, and 3 sites in Winchester lake at 6 week intervals.

Upper Lapwai Sites include:

∃ Lapwai @ ISCO Site at inlet to Winchester lake
∃ Lapwai Creek downstream of Mud Springs in LP-2
∃ Lapwai Creek @ LP-4 below Woodside Road

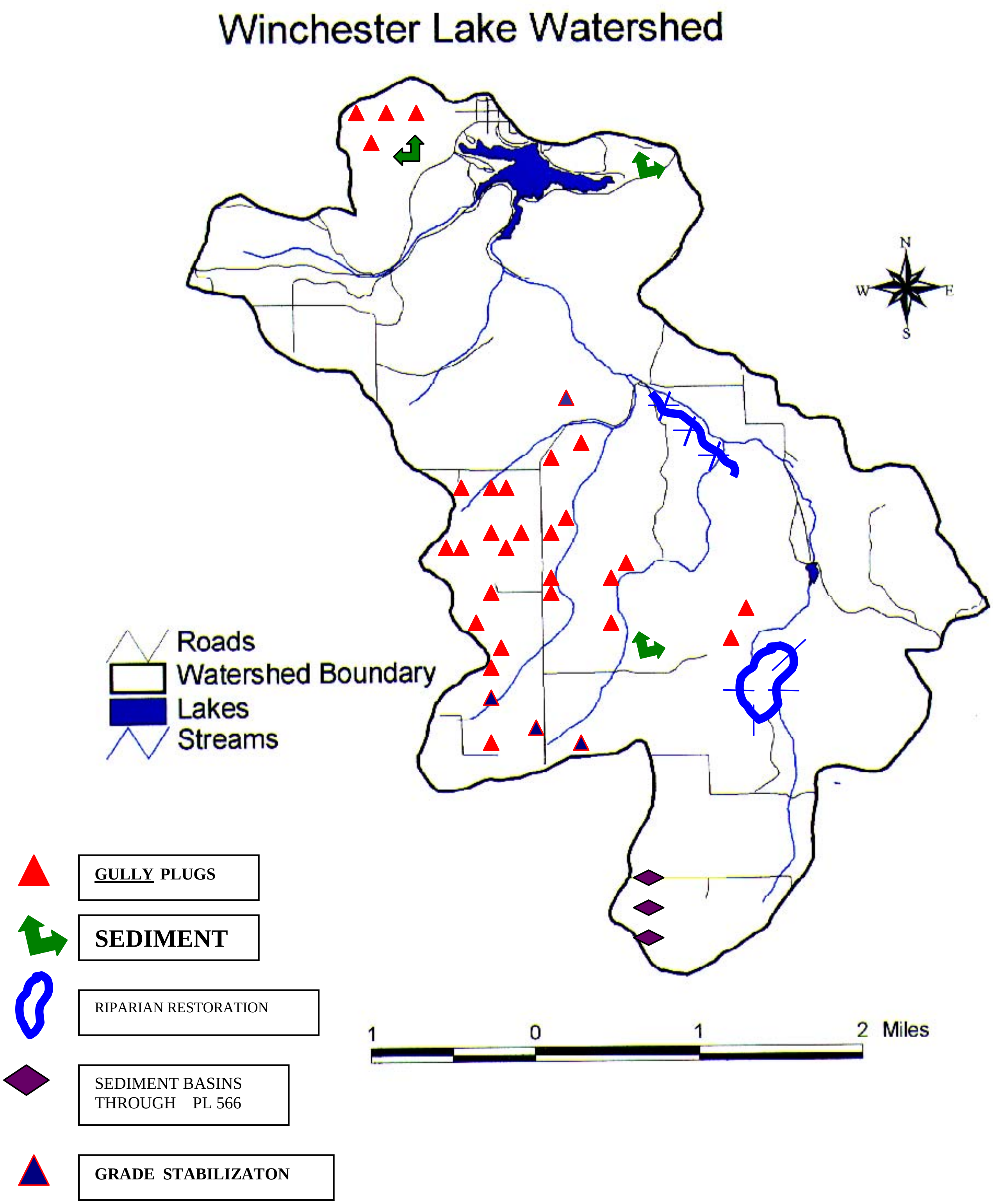
Parameters sampled include bacteria, flow, TSS, bedload, and nutrients (TP, NH4-N, TKN, NO3-NO2, orthophosphate), and ammonia. Hydrolab readings are taken for temperature, dissolved oxygen, pH, turbidity, and specific conductivity. A hydrologic site assessment is completed once a year for the inlet site including a cross-section survey, and a longitudinal profile. The Tribe will also be conducting R1/R4 stream habitat inventories for habitat complexity and residual pool volume for 3 reaches on Upper Lapwai Creek. Thermographs for temperature monitoring are located at the following 3 sites:

∃ Lapwai @ ISCO Site at inlet to Winchester lake,
∃ Lapwai Creek headwaters upstream from Mud Springs, and
∃ LP-4 tributary upstream confluence with Lapwai Creek.

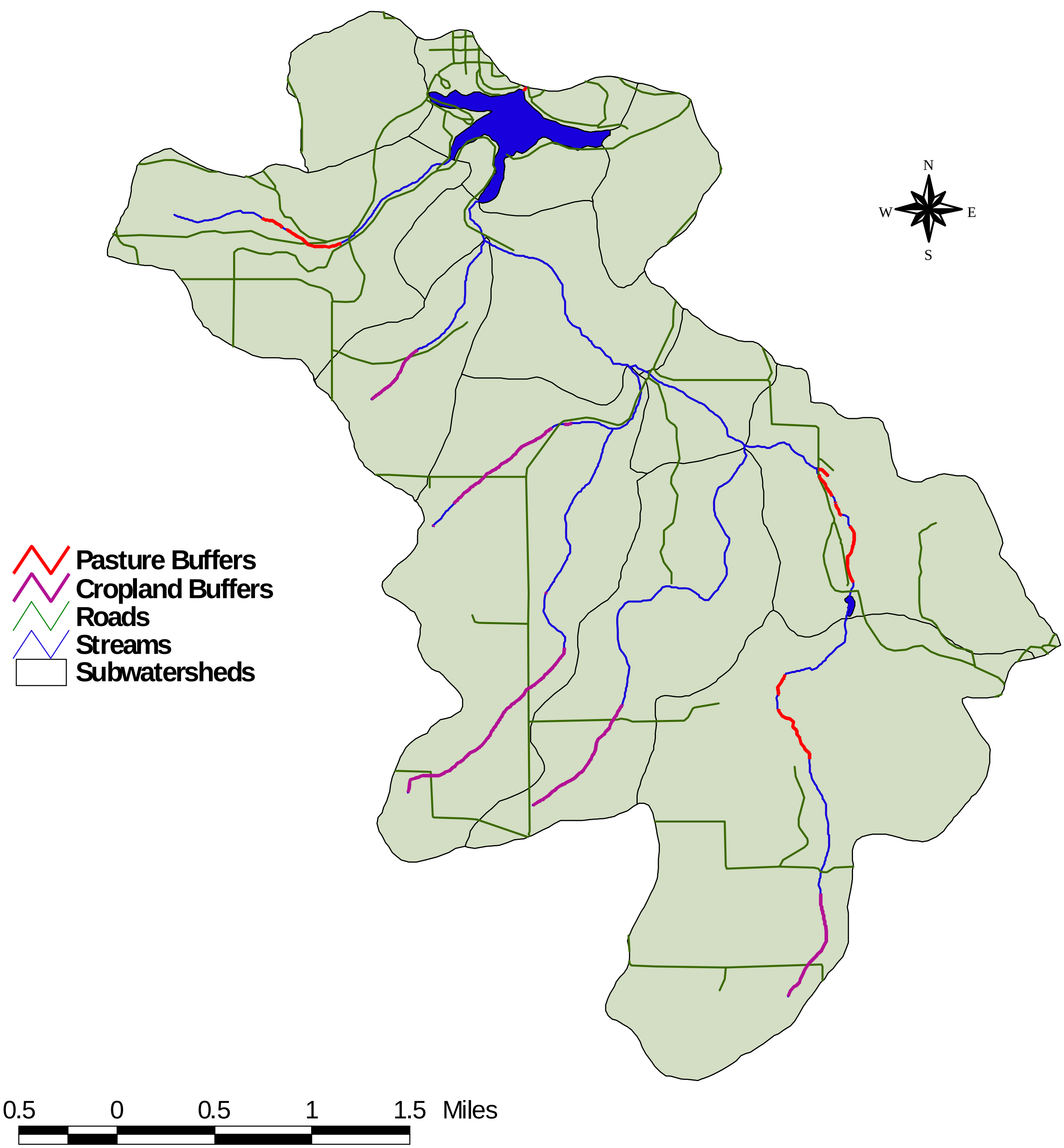
Winchester Lake Sites include:

∃ Deepest zone near discharge outlet
∃ Johnson Creek Inlet
∃ Upper Lapwai Creek Inlet

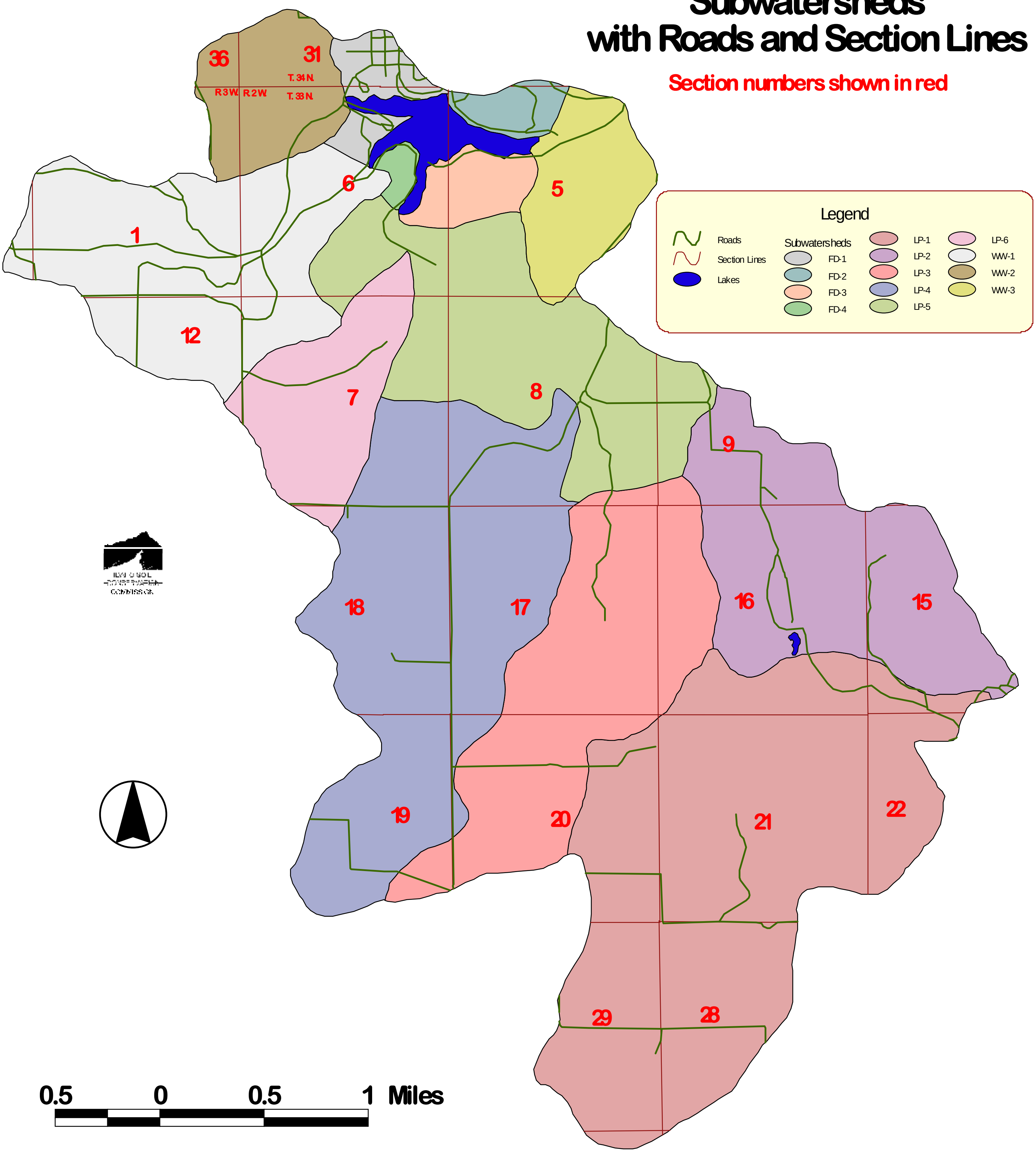
Parameters sampled include bacteria, chlorophyll a, and nutrients (TP, NH4-N, TKN, NO3-NO2, orthophosphate), and ammonia. Hydrolab readings are taken for temperature, dissolved oxygen, pH, turbidity, and specific conductivity from the surface to bottom substrate at 1 meter intervals. Secchi disk readings are also taken.


Winchester Lake Watershed
N
W
E
S
Roads
Watershed Boundary
Lakes
Streams
GULLY PLUGS
SEDIMENT
RIPARIAN RESTORATION
SEDIMENT BASINS
THROUGH PL 566
GRADE STABILIZATON
1
0
1
2 Miles

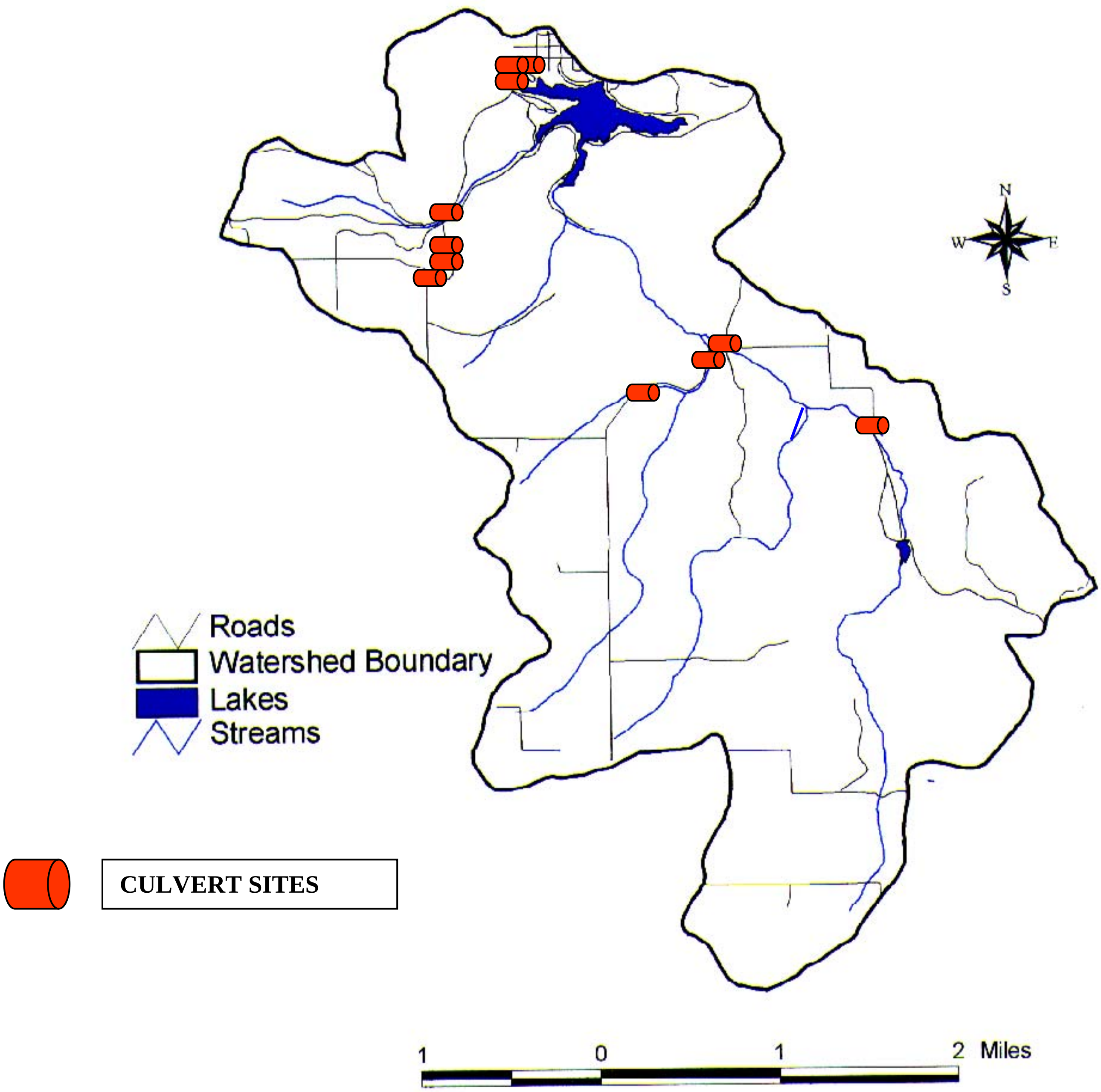
Buffer Potential for Winchester Lake Watershed Agricultural Lands



Winchester Lake Watershed Subwatersheds with Roads and Section Lines



319 Grant
11 Proposed Culvert Sites



Lewis Soil Conservation District