The Big Wood River Watershed Management Plan

December 31, 2001 – Submission to IDEQ-State Office
January 25, 2002 – Submission to USEPA
February 2, 2002 – Finalization of USEPA Comments
March 11, 2002 – Re-submission to IDEQ-State Office & USEPA
May 15, 2002 – Approval by USEPA of TMDL

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Acknowledgments

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Cover photo by IDEQ-TFRO. Rob Sharpnack, IDEQ-TFRO, generated GIS maps.

Table of Contents

List of Tables

List of Figures

List of Appendices

Abbreviations, Acronyms, and Symbols

303(d) Refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section

µ Micro, one-one thousandth

§ Section (usually a section of federal or state rules or statutes)

AWS Agricultural water supply

BAG Basin Advisory Group

BLM United States Department of the Interior, Bureau of Land Management

BMP Best management practice

BOD or BOD5 Biochemical oxygen demand or BOD 5-day

BOR United States Bureau of Reclamation

Btu British thermal unit

BURP Beneficial Use Reconnaissance Program

C Celsius or Centigrade

CFR Code of Federal Regulations (refers to citations in the federal administrative rules)

cfs Cubic feet per second

cm Centimeters

CW **C**old water

CWA Clean Water Act

CWE Cumulative watershed effects

DO Dissolved oxygen

DWS Domestic water supply

EMAP Environmental Monitoring and Assessment Program

ESA Endangered Species Act

F Fahrenheit

FPA Idaho Forest Practices Act

FWS U.S. Fish and Wildlife Service

GIS Geographical Information Systems

HUC Hydrologic Unit Code

I.C. Idaho Code

ICBEMP Interior Columbia Basin Ecosystem Management Project

IDAPA Refers to citations of Idaho administrative rules

IDEQ Idaho Department of Environmental Quality

IDFG Idaho Department of Fish and Game

IDL Idaho Department of Lands

IDWR Idaho Department of Water Resources

INFISH The federal Inland Native Fish Strategy

IRIS Integrated Risk Information System

km kilometer

km^2 square kilometer

LA load allocation

LC load capacity = TMDL

m meter

m^3 cubic meter

mi mile

mi^2 square miles

MBI macroinvertebrate index

MGD million gallons per day

mg/L milligrams per liter

mm millimeter

MOS margin of safety

MWMT maximum weekly maximum temperature

n.a. not applicable

NA not assessed

NB natural background

nd no data (data not available)

NFS not fully supporting

NPDES National Pollutant Discharge Elimination System

NRCS Natural Resources Conservation Service

NTU nephlometric turbidity unit

ORV off-road vehicle

ORW Outstanding Resource Water

PACFISH The federal Pacific Anadromous Fish Strategy

PCR Primary contact recreation

PFC proper functioning condition

ppm part(s) per million

QA quality assurance

QC quality control

RBP rapid bioassessment protocol

RDI IDEQ's river diatom index

RFI IDEQ's river fish index

RHCA riparian habitat conservation area

RMI IDEQ's river macroinvertebrate index

RPI IDEQ's river physiochemical index

SBA subbasin assessment

SCR secondary contact recreation

SFI IDEQ's stream fish index

SHI IDEQ’s stream habitat index

SMI IDEQ’s stream macroinvertebrate index

SRP soluble reactive phosphorus

SS salmonid spawning

STATSGO State Soil Geographic Database

Sub Substrate sediments as % Fines

TDG total dissolved gas

TDS total dissolved solids

T&E threatened and/or endangered species

TIN total inorganic nitrogen

TKN total Kjeldahl nitrogen

TMDL total maximum daily load = LC = LA + WLA + MOS

TP total phosphorus

TS total solids

TSS total suspended solids

t/y tons per year

U.S. United States

USC United States Code

USDA United States Department of Agriculture

USDA ARS USDA Agricultural Research Service as described in USDA documents

USDA FS USDA Forest Service as described in USFS documents

USDA NRCS USDA Natural Resource Conservation Service as described in USDA documents

USDI United States Department of the Interior

USEPA United States Environmental Protection Agency

USFS United States Forest Service

USGS United States Geological Survey

WAG Watershed Advisory Group

WBAG *Water Body Assessment Guidance*

WBID waterbody identification number

WET whole effluence toxicity

WLA wasteload allocation

WQLS water quality limited segment

WQMP water quality management plan

WQRP water quality restoration plan

WQS water quality standard

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Executive Summary

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters (33 USC § 1251.101). States and tribes, pursuant to section 303 of the CWA are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). States and tribes must periodically publish a priority list of impaired waters, currently every two years. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards. This document addresses the water bodies in the Big Wood River Subbasin that have been placed on what is known as the "303(d) list."

This subbasin assessment and TMDL analysis has been developed to comply with Idaho's TMDL schedule. This assessment describes the physical, biological, and cultural setting; water quality status; pollutant sources; and recent pollution control actions in the Big Wood River Subbasin located in the southcentral portion of Idaho. The first part of this document, the subbasin assessment, is an important first step in leading to the TMDL. The starting point for this assessment was Idaho's current 303(d) list of water quality limited water bodies. Twenty (20) segments of the Big Wood River Subbasin were listed on this list. The subbasin assessment portion of this document examines the current status of 303(d) listed waters, and defines the extent of impairment and causes of water quality limitation throughout the subbasin. The loading analysis quantifies pollutant sources and allocates responsibility for load reductions needed to return listed waters to a condition of meeting water quality standards.

Subbasin at a Glance

The following description provides a short and concise review of the Big Wood River subbasin.

Subbasin	Big Wood River, HUC 17040212
303(d) Streams	Big Wood River – 5 segments
Tributaries – 15 segments	
Key Resource:	
Above Magic Reservoir – Special resource water and domestic water supply	
Below Magic Reservoir – Agricultural water supply	
Beneficial uses affected:	Cold water aquatic life, salmonid spawning, primary and Secondary contact recreation
Pollutants-of-concern	Suspended sediments, substrate sediments, total phosphorus, and pathogens (*Escherichia coli*)
Sources considered	Point sources – 3 Sewage Treatment Plant facilities Nonpoint sources – Agriculture, grazing, and forestry

The Big Wood River Subbasin and the extent of the Big Wood River Watershed Management Plan is best described by the following three figures. Figure A describes the subbasin in relation to the Idaho counties. Figure B illustrates the 1998 303(d) listed streams in the Big Wood River Subbasin. And Figure C illustrates the various segments of the Big Wood River mainstem.

Figure A describes the subbasin in relation to the Idaho counties.

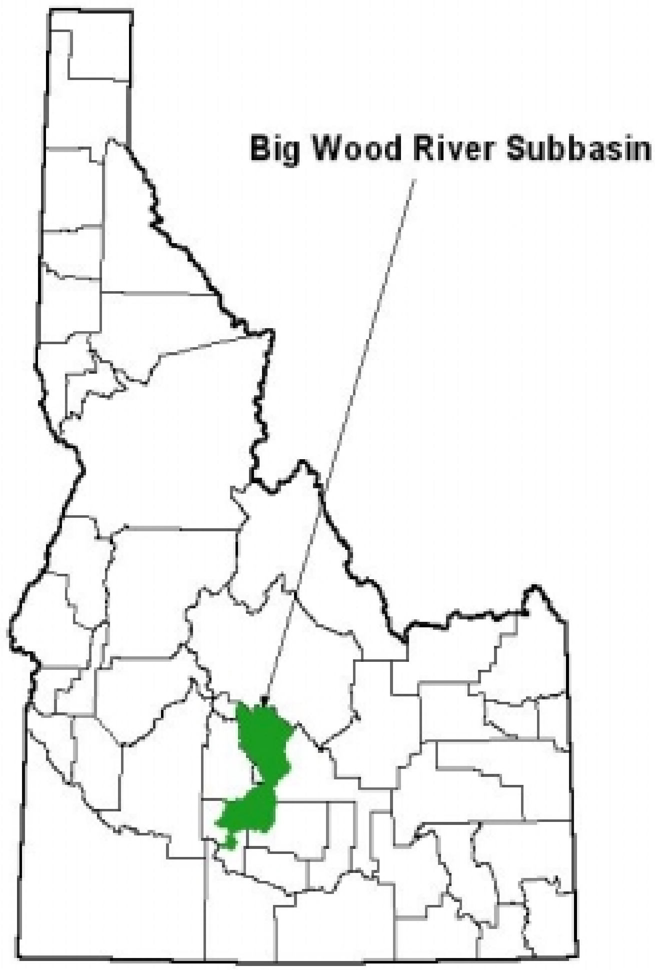


Figure A. The Big Wood River Subbasin

Figure B illustrates the 1998 303(d) listed streams in the Big Wood River Subbasin.

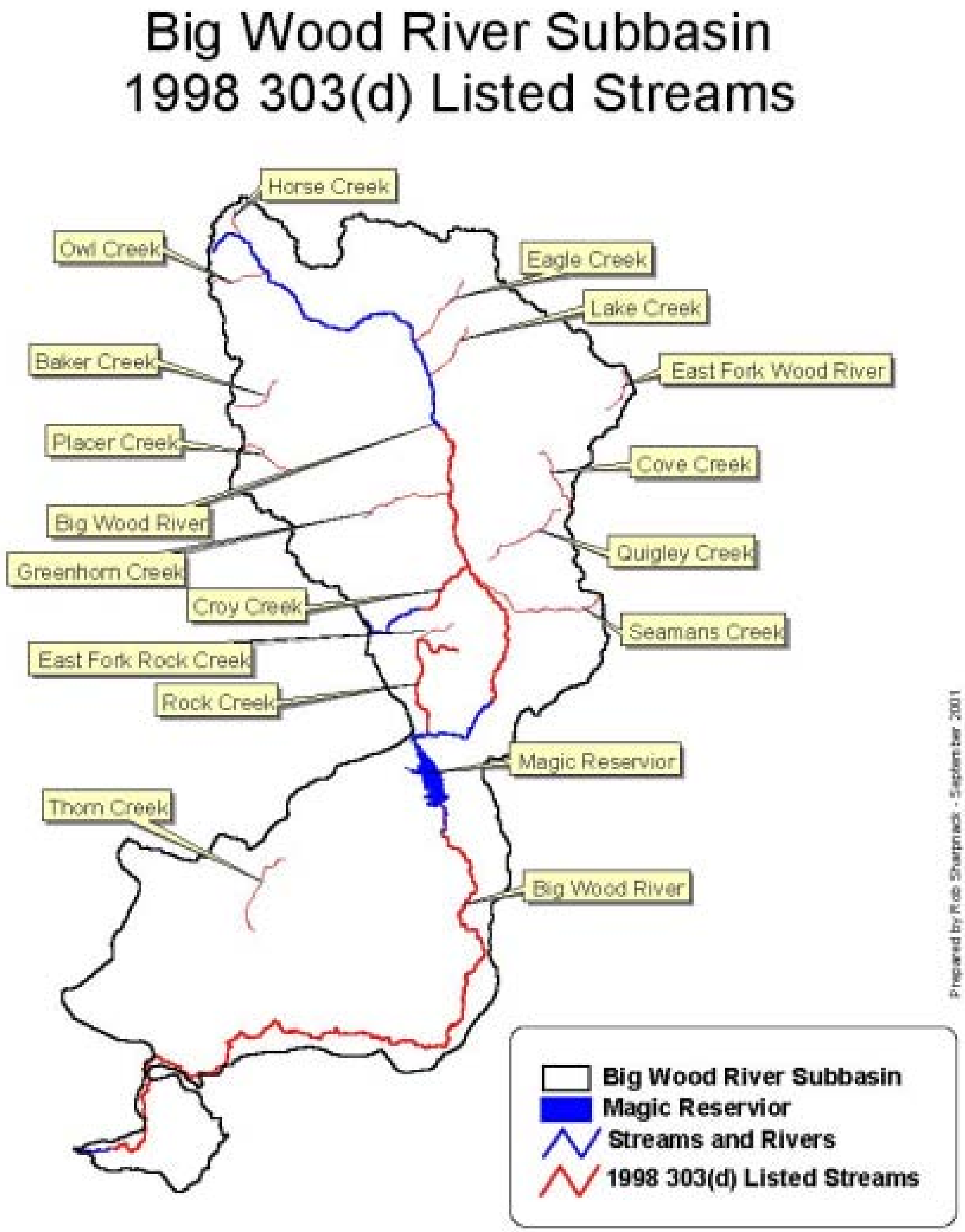


Figure B. 1998 303(d) stream segments of the Big Wood River Subbasin

Figure C illustrates the various segments of the Big Wood River mainstem.

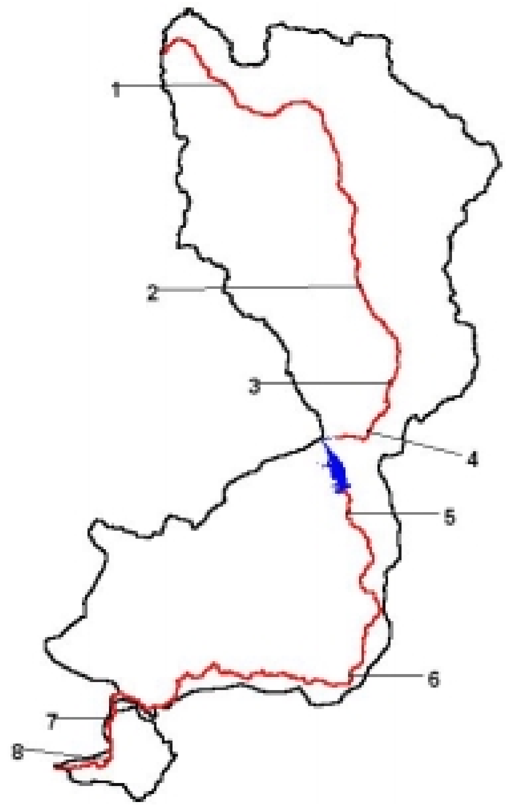


Figure C. Mainstem Big Wood River segments

BWR-1: Segment 1: Headwaters to Trail Creek
BWR-2: Segment 2: Trail Creek to Glendale Diversion
BWR-3: Segment 3: Glendale Diversion to Base Line
BWR-4: Segment 4: Base Line to Magic Reservoir
BWR-5: Segment 5: Magic Reservoir to Highway 75
BWR-6: Segment 6: Highway 75 to Little Wood River confluence
BWR-7: Segment 7: Little Wood River confluence to Interstate 84
BWR-8: Segment 8: Interstate 84 to Middle Snake River

The following tables summarize various characteristics of the 303(d) process for the Big Wood River Subbasin. Table A summarizes the streams that are listed on the 1998 303(d) list, their pollutants-of-concern, and the beneficial uses affected for the Big Wood River Subbasin. Point source impacts occur only in Segment 2, from Trail Creek to the Glendale Diversion. Table B summarizes the key indicators of impairment, the pollutant sources considered, the known pollutant sources, and the load reductions needed.

Table A summarizes the streams that are listed on the 1998 303(d) list, their pollutants-of-concern, and the beneficial uses affected for the Big Wood River Subbasin. The entire Big Wood River is being assessed and evaluated in the Big Wood River Watershed Management Plan for two important reasons. First, USEPA and IDEQ-TFRO agreed that doing a complete assessment of the Big Wood River was necessary and opportune for purposes of the TMDL process at this time. Second, the decisions units (or segment numbers of the Big Wood River) may be used in the event that pollution trading becomes a viable option in the subbasin.

Table A. 1998 303(d) list of streams, pollutants, and beneficial uses

Stream Name	WQLS No.	Pollutants								Beneficial Uses					
		S	N	A	DO	TM	B	F	U	CW	SS	PC	SC	SR	DW
Big Wood River Mainstem Segments															
BWR-1: Hwt to Trail Ck	NOL								X	X	X	X		X	X
BWR-2: Trail Ck to Glen Div	2483							X		X	X	X		X	X
BWR-3: Glen Div to BaseLine	2482							X		X	X	X		x	x
BWR-4: BaseLIne to Mag Res	NOL								X	X	X	X		X	X
BWR-5: Mag Res to Hwy 75	2478	X	X					X		X	X	X			
BWR-6: Hwy 75 to LWR	2477	X	X	X	X		X	X		X	X	X			
BWR-7: LWR to Int 84	2476	x	x	x	x		x	x		X	X	X			
BWR-8: Int 84 to Snake River	NOL								X	X	X	X			
Tributaries or Tributary Segments															
Horse Ck – Hwt to BWR	7613								X	X	X		X		
Owl Ck – Hwt to BWR	5290								X	X	X		X		
Baker Ck – Hwt to Norton Ck	5292								X	X	X	X			
Baker Ck – NortonCk to BWR	NOL								X	X	X	X			
Eagle Ck – Hwt to BWR	5291								X	X	X		X		
Lake Ck – Hwt to BWR	7614								X	X	X		X		
Placer Ck – Hwt to WSCk	5293								X	X	X		X		
Cove Ck – Hwt to EFWR	5296								X	X	X		X		
EFWR – Hwt to Blind Can	5295								X	X	X		X		
Greenhorn Gul –Hwt to BWR	5294								X	X	X		X		
Quigley Ck – Hwt to mouth	5297								X	X	X		X		
Croy Ck – Elk Ck to BWR	2491	x	x					X		X	X		X		
Seamans Ck – Hwt to mouth	5298								X	X			X		
Rock Ck – Hwt to Magic Res	2487	x				x	x	x		X	X		X		
EFRC – Hwt to Rock Ck	5299								X		X	X	X		
ThornCk–Hwt to Schooler Ck	5300								x		X		X		

Prepared by IDEQ-TFRO. WQLS No. = Water quality limited stream identification number as it appears in the 1998 303(d) list. S = Sediment. N = Nutrients. A = Ammonia. DO = Dissolved oxygen. TM = Temperature or temperature modification. B = Bacteria. F = Flow alteration. U = Unknown. CW = Cold water aquatic life. SS = Salmonid spawning. PC = Primary contact recreation. SC = Secondary contact recreation. SR = Special resource water. DW = Drinking water supply. All streams are also protected for agricultural water supply, industrial water supply, wildlife habitats, and aesthetics. NOL = Not on 303(d) list but being included in the overall assessment. Ck = Creek. Glen Div = Glendale Diversion. Hwy = Highway. LWR = Little Wood River. Hwt = Headwaters. BWR = Big Wood River. WSCk = Warm Springs Creek. EFWR = East Fork Wood River. Can = Canyon. Gul = Gulch. Mag Res = Magic Reservoir. EFRC = East Fork Rock Creek. Int = Interstate.

Baker Creek is listed from its headwaters to Norton Creek. From Norton Creek to the Big Wood River the creek is meeting its beneficial uses and therefore is not listed on the 303(d) list. USEPA and IDEQ-TFRO did a site assessment of the stream and agreed that IDEQ-TFRO would assess the entire stream from its headwaters to the Big Wood River as part of The Big Wood River Watershed Management Plan. A similar site assessment was also done on East Fork Wood River. However, it was decided that the landuse and ownership diversity of the East Fork Wood River was multi-cultural and thus would necessitate keeping the segments "as is" in terms of TMDL assessment. The term "multi-cultural" implies that that is more than two cultural practices that affect the water quality of the stream.

Table B summarizes the key indicators of impairment, the pollutant sources considered, the known pollutant sources, and the load reductions needed. Point source impacts occur only in Segment 2, from Trail Creek to the Glendale Diversion. The Big Wood River is divided into the decision units (or segments) as defined in Table A.

Table B. Key indicators of impairment and load reductions

Stream & WQLS No.	Pollutant Sources, landuse %				% Reduction			
	Forest	Range	Irrigated	Riparian	TSS	Sub	TP	*E. coli*
Big Wood River Mainstem Segments								
BWR – 1	34.8	49.2	0.3	15.7	0.0	0.0	0.0	0.0
BWR – 2	0.0	34.9	35.2	30.0	0.0	24.4	0.0	69.9
BWR – 3	0.0	2.5	77.0	20.5	0.0	34.6	20.6	0.0
BWR – 4	0.0	45.8	44.8	9.3	0.0	40.3	24.2	22.2
BWR – 5	0.0	91.5	1.5	7.0	0.0	0.0	0.0	0.0
BWR – 6	0.0	56.8	43.1	0.0	0.0	9.5	23.7	0.0
BWR – 7	0.0	38.3	61.7	0.0	0.0	27.1	13.8	0.0
BWR – 8	0.0	24.0	75.1	0.9	0.0	24.4	0.0	0.0
Tributaries or Tributary Segments								
Horse Ck – 7613	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Owl Ck – 5290	78.4	10.2	0.0	11.4	0.0	0.0	0.0	0.0
Baker Ck – Entire	72.6	27.4	0.0	0.0	0.0	0.0	0.0	0.0
Eagle Ck – 5291	18.6	81.4	0.0	0.0	0.0	0.0	0.0	0.0
Lake Ck – 7614	2.1	96.4	0.0	1.5	0.0	0.0	0.0	0.0
Placer Ck – 5293	88.1	11.9	0.0	0.0	0.0	0.0	0.0	0.0
Cove Ck – 5296	0.0	100.0	0.0	0.0	0.0	32.3	41.9	0.0
EFWR – 5295	24.7	75.3	0.0	0.0	0.0	0.0	0.0	0.0
Greenhorn – 5294	0.0	74.2	6.9	19.0	0.0	3.0	63.8	0.0
Quigley Ck– 5297	0.0	87.1	12.9	0.0	0.0	44.3	0.0	0.0
Croy Ck – 2491	0.0	82.0	13.3	4.7	0.0	49.2	0.0	0.0
Seamans – 5298	0.0	70.7	23.0	6.2	0.0	21.7	0.0	8.0
Rock Ck – 2487	0.0	88.0	11.5	0.4	0.0	35.8	0.0	25.9
EFRC – 5299	0.0	100.0	0.0	0.0	0.0	58.1	37.5	0.0
Thorn Ck - 5300	0.0	100.0	0.0	0.0	0.0	52.7	24.8	0.0

Prepared by IDEQ-TFRO. BWR = Big Wood River. Ck = Creek. EFWR = East Fork Wood River. EFRC = East Fork Rock Creek. TSS = Total suspended solids. Sub = Substrate sediments. TP = Total phosphorus. *E. coli* = Escherichia coli. Entire = the entire creek.

Additional to the major nonpoint sources listed in Table B, other nonpoint sources (non-major) of pollution were considered. These included construction, roads, stream crossings, mining, urban runoff, rural runoff, diversions, and septic tanks. At the present time there is no clear scientific evidence that these additional nonpoint sources contribute in the major categories as forestland, rangeland, irrigated land, and riparian lands. The Wood River Watershed Advisory Group and the Wood River Technical Advisory Committee supported this finding and agreed to consider these additional minor nonpoint sources during the implementation period.

Key Findings

The following defines the key findings on each of the 303(d) streams, what actions will be taken by IDEQ-TFRO as a consequence of these findings, and relevant issues pertaining to numeric targets, loading capacity, wasteload allocations, and load allocations.

- Problem Statement
  Table C summarizes a problem statement for the indicated stream segments. The problem statement stipulates that problem variables have associated pollutants.

Table C. Problem statement for 303(d) streams

Stream and WQLS No.	Problem Variables	Associated Pollutants
Big Wood River Mainstem Segments		
BWR – 1	Meeting beneficial uses.	-
BWR – 2	Q, HI	Q
BWR – 3	Tem, Ex nut, excess sed, Q, HI	Tem, NOX, TP, Sed, Q
BWR – 4	Tem, Ex nut, excess sed, Q, HI	Tem, NOX, TP, Sed, Q
BWR – 5	Tem, Ex nut, Q, HI	Tem, NOX, TP, Q
BWR – 6	Tem, Ex nut, excess sed, DO, Q, HI	Tem, DO, NTU, Sed, NOX, TP, Q
BWR – 7	Tem, Ex nut, excess sed, Q, HI	Tem, Sed, NOX, TP, Q
BWR – 8	Ex nut, excess sed, Q, HI	NOX, TP, Sed, Q
Tributaries or Tributary Segments		
Horse Ck – 7613	Delist + Antidegradation Policy	-
Owl Ck – 5290	Delist + Antidegradation Policy	-
Baker Ck – 5292	Delist + Antidegradation Policy	-
Eagle Ck – 5291	Tem, Ex nut, excess sed, MBI	Tem, TP, Sed, Q
Lake Ck – 7614	Ex nut, MBI	NOX, TP, Q
Placer Ck – 5293	Ex nut, MBI	NOX, TP
Cove Ck – 5296	Ex nut, excess sed, HI, MBI	NTU, TP, Sed, Q
EFWR – 5295	Delist + Antidegradation Policy	-
Greenhorn – 5294	Tem, Ex nut, excess sed, MBI	Tem, Sed, TP, Q
Quigley Ck– 5297	Tem, Ex nut, excess sed, DO, HI, MBI	Tem, DO, NOX, TP, Sed, Q
Croy Ck – 2491	Ex nut, excess sed, HI, MBI	TP, Sed, Q
Seamans – 5298	Tem, Ex nut, excess sed, HI, MBI	Tem, NOX, TP, Sed, Q
Rock Ck – 2487	Tem, Ex nut, excess sed, E Coli, HI, MBI	Tem, NOX, TP, Sed, E Coli, Q
EFRC – 5299	Tem, Ex nut, excess sed, HI, MBI	Tem, NOX, TP, Sed
Thorn Ck - 5300	Tem, Ex nut, excess sed, DO, HI, MBI	Tem, DO, NTU, NOX, TP, Sed, Q

Prepared by IDEQ-TFRO. Q = Flow alteration. Tem = Temperature. Ex nut = Excess nutrients. NOX = nitrite + nitrate. TP = Total phosphorus. Sed = Excess sediments. HI = Habitat Index not meeting beneficial uses. Delist = This stream will be delisted from the 303(d) list. MBI = MBI does not meet beneficial uses. NTU = Turbidity. Antidegradation Policy = This policy will be applied on all streams that will be delisted from the 303(d) list.

- Numeric Water Quality Instream Targets
  Four (4) numeric water quality instream targets have been established in the Big Wood River Watershed Management Plan. These targets are considered preliminary targets and may become more stringent after Year 10 of the plan. At present, the Big Wood River WAG and the Big Wood River TAC support these preliminary numeric water quality instream targets. Where streams are currently flowing below the instream targets, the antidegradation policy (IDAPA §58.01.02.051) will be enforced such that existing water quality and beneficial uses will be protected and maintained. Table D summarizes the numeric water quality instream targets.

Table D. Numeric water quality instream targets

Numeric Instream Targets	Average Monthly	Daily Maximum
Above Magic Reservoir		
Total suspended solids (TSS)	< 25 mg/L	< 40 mg/L
Substrate sediments (Sub)	< 35 % Fines	-
Total phosphorus (TP)	< 0.050 mg/L	< 0.080 mg/L
E. coli, geometric mean	< 126 cfu/100 mL	< 200 cfu/100 mL
Below Magic Reservoir		
Total suspended solids (TSS)	< 50 mg/L	< 80 mg/L
Substrate sediments (Sub)	< 40 % Fines	-
Total phosphorus (TP)	< 0.100 mg/L	< 0.160 mg/L
E. coli, geometric mean	< 126 cfu/100 mL	< 200 cfu/100 mL
Prepared by IDEQ-TFRO. The targets are dependent on whether the streams discharge above or below the Magic Reservoir. Where water bodies are canalways, compliance will be at the point where the canal discharges to a natural waterbody.		

- Loading Capacity Analysis
  A loading capacity (L.C.) analysis includes the wasteload allocations (WLA), the load allocations (LA), natural background, and the margin of safety (MOS). Seasonal variation was considered in the development of the TMDL but insufficient water quality data was obtained to allow for seasonal variation calculations. However, as more information is collected over the next 3-5 years, seasonal targets may be developed and adjustments made, if necessary.

  Tables E, F, G, and H summarize the L.C. calculations for the entire mainstem of the Big Wood River for TSS, substrate sediments, TP, and *E. coli*. Magic Reservoir was excluded since it is not listed on the 303(d) list. The mainstem of the Big Wood River was divided into decision-making units, which correspond to the designations of the river according to the 303(d) listing.

Unit 2 has the wasteload allocations for the three- (3) point sources that discharge directly to the Big Wood River.

Table E. Mainstem Big Wood River TSS L.C. calculations

Unit	Stream and WQLS No.	L.C. t/yr	WLAs t/yr	LAs t/yr	10% Natural Background t/yr	10% MOS t/yr
1	BWR – 1	2,156.7	0.0	1,725.3	215.7	215.7
2	BWR – 2 - NPS	6,670.9	0.0	5,330.7	670.1	670.1
	BWR-2-Hailey	3.3	3.3	0.0	0.0	0.0
	BWR-2-Ketchum	26.5	26.5	0.0	0.0	0.0
	BWR-2-Meadows	0.6	0.6	0.0	0.0	0.0
	BWR-2-TOTAL	6,701.3	30.4	5,330.7	670.1	670.1
3	BWR – 3	10,931.1	0.0	8,744.9	1,093.1	1,093.1
4	BWR – 4	11,452.4	0.0	9,162.0	1,145.2	1,145.2
5	BWR – 5	16,978.2	0.0	13,582.6	1,697.8	1,697.8
6	BWR – 6	1,800.1	0.0	1,440.1	180.0	180.0
7	BWR – 7	24,626.3	0.0	19,701.1	2,462.6	2,462.6
8	BWR – 8	25,826.4	0.0	20,661.2	2,582.6	2,582.6

Prepared by IDEQ-TFRO. TSS = Total suspended solids. WQLS = Water quality limited stream. L.C. = Load Capacity = TMDL = WLA + LA + Natural Background + MOS. WLAs = Wasteload allocations for point sources. LAs = Load allocations for nonpoint sources. MOS = Margin of safety. Hwt = Headwaters. Ck = Creek. t/yr = tons/year. The WLAs of 30.4 t/yr in Unit 2 represents three (3) point source wastewater treatment facilities – The Meadows, City of Hailey, and City of Ketchum. NPS = Nonpoint source.

Table F. Mainstem Big Wood River substrate sediments L.C. calculations

Unit	Stream and WQLS No.	L.C. % Fines	WLAs % Fines	LAs % Fines	10% Natural Background % Fines	20% MOS % Fines
1	BWR – 1	35.0	0.0	24.5	3.5	7.0
2	BWR – 2 - NPS	35.0	0.0	24.5	3.5	7.0
	BWR-2-Hailey	0.0	0.0	0.0	0.0	0.0
	BWR-2-Ketchum	0.0	0.0	0.0	0.0	0.0
	BWR-2-Meadows	0.0	0.0	0.0	0.0	0.0
	BWR-2-TOTAL	35.0	0.0	24.5	3.5	7.0
3	BWR – 3	35.0	0.0	24.5	3.5	7.0
4	BWR – 4	35.0	0.0	24.5	3.5	7.0
5	BWR – 5	40.0	0.0	28.0	4.0	8.0
6	BWR – 6	40.0	0.0	28.0	4.0	8.0
7	BWR – 7	40.0	0.0	28.0	4.0	8.0
8	BWR – 8	40.0	0.0	28.0	4.0	8.0

Prepared by IDEQ-TFRO. WQLS = Water quality limited stream. L.C. = Load Capacity = TMDL = WLA + LA + Natural Background + MOS. WLAs = Wasteload allocations for point sources. LAs = Load allocations for nonpoint sources. MOS = Margin of safety. Hwt = Headwaters. Ck = Creek. t/yr = tons/year.

Unit 2 of Table G has three (3) point sources. The point sources represent the City of Hailey, the City of Ketchum, and The Meadows wastewater treatment plants. Because of the special resource water designation, more water quality monitoring data is needed in order to more fully understand the relationship between the point sources and the nonpoint sources in this stretch of the Big Wood River. Therefore, a monitoring plan will be developed by IDEQ-TFRO in conjunction with the three- (3) point sources to specifically look at describing fully the TP impacts from nonpoint and point sources. The monitoring plan will be developed and finalized during the implementation phase and monitoring will be finalized by year 2003.

Table G. Mainstem Big Wood River TP LC calculations

Unit	Stream and WQLS No.	L.C. lb/day	WLAs lb/day	LAs lb/day	10% Natural Background lb/day	10% MOS lb/day
1	BWR – 1	23.6	0.0	18.9	2.4	2.4
2	BWR – 2 – NPS	56.0	0.0	41.4	7.3	7.3
	BWR-2-Hailey	5.2	5.2	0.0	0.0	0.0
	BWR-2-Ketchum	9.9	9.9	0.0	0.0	0.0
	BWR-2-Meadows	2.3	2.3	0.0	0.0	0.0
	BWR-2-TOTAL	73.4	17.4	41.4	7.3	7.3
3	BWR – 3	119.8	0.0	95.8	12.0	12.0
4	BWR – 4	125.5	0.0	100.4	12.6	12.6
5	BWR – 5	186.1	0.0	148.9	18.6	18.6
6	BWR – 6	19.7	0.0	15.8	2.0	2.0
7	BWR – 7	269.9	0.0	215.9	27.0	27.0
8	BWR – 8	283.0	0.0	226.4	28.3	28.3

Prepared by IDEQ-TFRO. TP = Total phosphorus. WQLS = Water quality limited stream. L.C. = Load Capacity = TMDL = WLA + LA + Natural Background + MOS. WLAs = Wasteload allocations for point sources. LAs = Load allocations for nonpoint sources. MOS = Margin of safety. Hwt = Headwaters. Ck = Creek. t/yr = tons/year. NPS = Nonpoint source.

The WLAs of 17.4 lb/day in Unit 2 represents three (3) point source wastewater treatment facilities – the Meadows, City of Hailey, and City of Ketchum.

Table H. Mainstem Big Wood River *E. coli* L.C. calculations

Unit	Stream and WQLS No.	LC cfu^9	WLAs Cfu^9	LAs cfu^9	10% Natural Background cfu^9	10% MOS cfu^9
1	BWR – 1	270.2	0.0	216.1	27.0	27.0
2	BWR-2-NPS	346.4	0.0	276.6	34.9	34.9
	BWR-2-Hailey	0.2	0.2	0.0	0.0	0.0
	BWR-2-Ketchum	2.7	2.7	0.0	0.0	0.0
	BWR-2-Meadows	0.1	0.1	0.0	0.0	0.0
	BWR – 2 - TOTAL	349.4	3.0	276.6	34.9	34.9
3	BWR – 3	1,369.4	0.0	1,095.5	136.9	136.9
4	BWR – 4	1,434.7	0.0	1,147.7	143.5	143.5
5	BWR – 5	1,063.5	0.0	850.8	106.3	106.3
6	BWR – 6	112.8	0.0	90.2	11.3	11.3

7	BWR – 7	1,542.5	0.0	1,234.0	154.3	154.3
8	BWR – 8	1,617.7	0.0	1,294.1	161.8	161.8

Prepared by IDEQ-TFRO. TP = Total phosphorus. WQLS = Water quality limited stream. L.C. = Load Capacity = TMDL = WLA + LA + Natural Background + MOS. WLAs = Wasteload allocations for point sources. LAs = Load allocations for nonpoint sources. MOS = Margin of safety. Hwt = Headwaters. Ck = Creek. t/yr = tons/year. The WLAs of 3.0 cfu[9] in Unit 2 represents three (3) point source wastewater treatment facilities – The Meadows, City of Hailey, and City of Ketchum. NPS = Nonpoint source.

Tables I, J, K, and L summarize the LC calculations for the 303(d) listed tributaries for TSS, substrate sediments, TP, and *E. coli*. These are grouped according to their decision Unit number as defined in Tables S, T, U, and V.

Table I. Tributary TSS L.C. calculations

Unit	Stream and WQLS No.	LC t/yr	WLAs t/yr	LAs t/yr	6% Natural Background t/yr	10% MOS t/yr
1	Horse Ck – 7613	41.8	0.0	35.1	2.5	4.2
	Owl Ck – 5290	71.3	0.0	59.9	4.3	7.1
	Baker Ck – 5292	290.2	0.0	243.8	17.4	29.0
	Eagle Ck – 5291	68.9	0.0	57.8	4.1	6.9
	Lake Ck – 7614	54.1	0.0	45.4	3.2	5.4
2	Placer Ck – 5293	54.1	0.0	45.4	3.2	5.4
	Cove Ck – 5296	34.4	0.0	28.9	2.1	3.4
	EFWR – 5295	113.1	0.0	95.0	6.8	11.3
	Greenhorn – 5294	14.8	0.0	12.4	0.9	1.5
	Quigley Ck– 5297	243.5	0.0	204.5	14.6	24.3
	Croy Ck – 2491	54.1	0.0	45.4	3.2	5.4
	Seamans – 5298	14.8	0.0	12.4	0.9	1.5
3	No 303(d) Streams	-	-	-	-	-
4	Rock Ck – 2487	44.3	0.0	37.2	2.7	4.4
	EFRC – 5299	27.1	0.0	22.7	1.6	2.7
5	No 303(d) Streams	-	-	-	-	-
6	Thorn Ck - 5300	186.9	0.0	157.0	11.2	18.7
7	No 303(d) Streams	-	-	-	-	-
8	No 303(d) Streams	-	-	-	-	-

Prepared by IDEQ-TFRO. TSS = Total suspended solids. WQLS = Water quality limited stream. L.C. = Load Capacity = TMDL = WLA + LA + Natural Background + MOS. WLAs = Wasteload allocations for point sources. LAs = Load allocations for nonpoint sources. MOS = Margin of safety. Hwt = Headwaters. Ck = Creek. t/yr = tons/year.

Table J. Tributary substrate sediments LC calculations

Unit	Stream and WQLS No.	L.C. % Fines	WLAs % Fines	LAs % Fines	6% Natural Background % Fines	20% MOS % Fines
1	Horse Ck – 7613	35.0	0.0	25.9	2.1	7.0
	Owl Ck – 5290	35.0	0.0	25.9	2.1	7.0
	Baker Ck – 5292	35.0	0.0	25.9	2.1	7.0
	Eagle Ck – 5291	35.0	0.0	25.9	2.1	7.0
	Lake Ck – 7614	35.0	0.0	25.9	2.1	7.0
2	Placer Ck – 5293	35.0	0.0	25.9	2.1	7.0
	Cove Ck – 5296	35.0	0.0	25.9	2.1	7.0
	EFWR – 5295	35.0	0.0	25.9	2.1	7.0
	Greenhorn – 5294	35.0	0.0	25.9	2.1	7.0
	Quigley Ck– 5297	35.0	0.0	25.9	2.1	7.0
	Croy Ck – 2491	35.0	0.0	25.9	2.1	7.0
	Seamans – 5298	35.0	0.0	25.9	2.1	7.0
3	No 303(d) Streams	-	-	-	-	-
4	Rock Ck – 2487	35.0	0.0	25.9	2.1	7.0
	EFRC – 5299	35.0	0.0	25.9	2.1	7.0
5	No 303(d) Streams	-	-	-	-	-
6	Thorn Ck - 5300	40.0	0.0	29.6	2.4	8.0
7	No 303(d) Streams	-	-	-	-	-
8	No 303(d) Streams	-	-	-	-	-

Prepared by IDEQ-TFRO. WQLS = Water quality limited stream. L.C. = Load Capacity = TMDL = WLA + LA + Natural Background + MOS. WLAs = Wasteload allocations for point sources. LAs = Load allocations for nonpoint sources. MOS = Margin of safety. Hwt = Headwaters. Ck = Creek. % Fines = Percent fines as determined by Wolman pebble counts.

Table K. Tributary TP LC calculations

Unit	Stream and WQLS No.	L.C. lb/day	WLAs lb/day	LAs lb/day	6% Natural Background lb/day	10% MOS lb/day
1	Horse Ck – 7613	0.5	0.0	0.38	0.03	0.05
	Owl Ck – 5290	0.8	0.0	0.66	0.05	0.08
	Baker Ck – 5292	3.2	0.0	2.67	0.19	0.32
	Eagle Ck – 5291	0.8	0.0	0.63	0.05	0.08
	Lake Ck – 7614	0.6	0.0	0.50	0.04	0.06
2	Placer Ck – 5293	0.6	0.0	0.50	0.04	0.06
	Cove Ck – 5296	0.4	0.0	0.32	0.02	0.04
	EFWR – 5295	1.2	0.0	1.04	0.07	0.12
	Greenhorn – 5294	0.2	0.0	0.14	0.01	0.02
	Quigley Ck– 5297	2.7	0.0	2.24	0.16	0.27
	Croy Ck – 2491	0.6	0.0	0.50	0.04	0.06
	Seamans – 5298	0.2	0.0	0.14	0.01	0.02
3	No 303(d) Streams	-	-	-	-	-
4	Rock Ck – 2487	0.5	0.0	0.41	0.03	0.05
	EFRC – 5299	0.3	0.0	0.25	0.02	0.03
5	No 303(d) Streams	-	-	-	-	-
6	Thorn Ck - 5300	2.0	0.0	1.72	0.12	0.20

7	No 303(d) Streams	-	-	-	-	-
8	No 303(d) Streams	-	-	-	-	-

Prepared by IDEQ-TFRO. TP = Total phosphorus. WQLS = Water quality limited stream. L.C. = Load Capacity = TMDL = WLA + LA + Natural Background + MOS. WLAs = Wasteload allocations for point sources. LAs = Load allocations for nonpoint sources. MOS = Margin of safety. Hwt = Headwaters. Ck = Creek. lb/day = Pounds/day.

Table L. Tributary *E. coli* LC calculations

Unit	Stream and WQLS No.	LC cfu^9	WLAs cfu^9	LAs cfu^9	6% Natural Background cfu^9	10% MOS cfu^9
1	Horse Ck – 7613	5.2	0.0	4.4	0.3	0.5
	Owl Ck – 5290	8.9	0.0	7.5	0.5	0.9
	Baker Ck – 5292	36.4	0.0	30.5	2.2	3.6
	Eagle Ck – 5291	8.6	0.0	7.2	0.5	0.9
	Lake Ck – 7614	6.8	0.0	5.7	0.4	0.7
2	Placer Ck – 5293	6.8	0.0	5.7	0.4	0.7
	Cove Ck – 5296	4.3	0.0	3.6	0.3	0.4
	EFWR – 5295	14.2	0.0	11.9	0.9	1.4
	Greenhorn – 5294	1.8	0.0	1.6	0.1	0.2
	Quigley Ck– 5297	30.5	0.0	25.6	1.8	3.0
	Croy Ck – 2491	6.8	0.0	5.7	0.4	0.7
	Seamans – 5298	1.8	0.0	1.6	0.1	0.2
3	No 303(d) Streams	-	-	-	-	-
4	Rock Ck – 2487	5.5	0.0	4.7	0.3	0.6
	EFRC – 5299	3.4	0.0	2.8	0.2	0.3
5	No 303(d) Streams	-	-	-	-	-
6	Thorn Ck - 5300	11.7	0.0	9.8	0.7	1.2
7	No 303(d) Streams	-	-	-	-	-
8	No 303(d) Streams	-	-	-	-	-

Prepared by IDEQ-TFRO. *E. coli* = *Escherichia coli*. WQLS = Water quality limited stream. L.C. = Load Capacity = TMDL = WLA + LA + Natural Background + MOS. WLAs = Wasteload allocations for point sources. LAs = Load allocations for nonpoint sources. MOS = Margin of safety. Hwt = Headwaters. Ck = Creek. cfu^9 = A billion coliform forming units.

- <u>Streams for 303(d) Delisting</u>
  Table C lists four (4) streams that will be delisted from the 1998 303(d) list. They are Horse Creek, Owl Creek, Baker Creek, and East Fork Wood River. IDEQ-TFRO arrived at a conclusion that these streams are meeting their beneficial uses and/or state water quality standards based on seventeen (17) components that link to beneficial uses and/or state water quality standards. This weight-of-evidence approach was utilized since each component weighs in equally as other components. An overall grade score ≥ 90.0% indicated full support. In the case of these streams their grade score was each 100.0%.

- <u>Streams Proposed for Next 303(d) List</u>
  Table C lists two streams or segments that are proposed for listing on the next 303(d) list. The first is in the Big Wood River mainstem from Base Line to Magic Reservoir. The second is in the Big Wood River mainstem from Interstate 84 to

the Snake River (or the Malad River). The problem variables and the associated pollutants are also listed in Table C.

- Public Input/Meetings
  The greatest public participation and comments came from the Wood River TAC, the Wood River Executive Board, and the Wood River WAG. Comments were incorporated into the document after all meetings beginning in 2000. Various drafts of the subbasin assessment were developed to solicit input from the TAC and WAG members. Although no formal public comment was required for the subbasin assessment, IDEQ-TFRO elected to have a 60-day public comment period from June 12 to August 12, 2001 for the subbasin assessment. Public hearings were held on June 12 in Gooding, Idaho and on June 19 in Hailey, Idaho. Comments were incorporated into the final subbasin assessment document. In addition, public presentations were done on August 7, 2001 in Gooding, Idaho (Executive Board) and August 28, 2001 in Gooding, Idaho (Wood River WAG) of the full watershed management plan. The official public comment period ran from September 24 to October 24, 2001 for the full Big Wood River Watershed Management Plan (which consisted of the subbasin assessment and the TMDL). It is the comments of the official public comment period (September 24 to October 24, 2001) that are summarized in Appendix E.

- Time Schedule for Meeting Water Quality Standards
  Assuming the Big Wood River TMDL is approved by USEPA in 2002, attainment of beneficial uses is preliminarily set for Year 5 (or 2006), with an additional five- (5) years (through Year 10 or 2011) of holding to water quality instream target levels. Point source and nonpoint source industries have prescribed short-term and long-term goals in the management plan based on the pollutant-of-concern.

- Streams and Pollutants for which TMDLs were Developed
  Table C summarizes the streams and pollutants in the Big Wood River Subbasin for which TMDLs will be developed as a consequence of the Big Wood River Watershed Management Plan. In the case of total suspended solids and substrate sediments (both interpreted as Ex Sed), total phosphorus (interpreted as Ex Nut), and *E. coli*, full TMDLs will be established immediately. In the case of flow (Q), it will be added to USEPA's pollution list to be further evaluated. In the case of nitrite + nitrate (interpreted as NOX), no TMDL is being pursued at this time. In the case of temperature and dissolved oxygen, TMDLs will be deferred until year 2003 pending collection of more information. In the case of turbidity, no TMDL is being pursued since TMDL reductions in Ex Sed will create reductions in turbidity. Moreover, in the case of total ammonia, the pollutant will be delisted from the 303(d) list.

- Changes to the 303(d) List
  Changes to the 303(d) list are summarized in Table M. This table is a complex table and has appropriate comments in the footnote section.

Table M. Summary of assessment outcomes

Waterbody Segment	Pollutant	TMDL(s) Completed	Recommended Changes to 303(d) List	Justify the Change
Big Wood River Mainstem Segments				
BWR – 1	None	None	Do not add to 303(d) list.	Meets BU
BWR – 2	Q	No	Put on Pollution List.	New Regs
BWR – 3	Q	No	Put on Pollution List.	New Regs
	Tem	No	Add on Pollutant List to do TMDL by 2003.	Data Gap
	Ex Nut	Yes	Add on Pollutant List and formalize TMDL.	TMDL
	Ex Sed	Yes	Add on Pollutant List and formalize TMDL.	TMDL
BWR – 4	Q	No	Put on Pollution List.	New Regs
	Tem	No	Add on Pollutant List to do TMDL by 2003	Data Gap
	Ex Nut	Yes	Add on Pollutant List and formalize TMDL.	TMDL
	Ex Sed	Yes	Add on Pollutant List and formalize TMDL.	TMDL
BWR – 5	Q	No	Put on Pollution List.	New Regs
	Tem	No	Add on Pollutant List to do TMDL by 2003	Data Gap
	Ex Nut	Yes	Add on Pollutant List and formalize TMDL.	TMDL
BWR – 6	Q	No	Put on Pollution List.	New Regs
	Tem	No	Add on Pollutant List to do TMDL by 2003.	Data Gap
	Ex Nut	Yes	Add on Pollutant List and formalize TMDL.	TMDL
	Ex Sed	Yes	Add on Pollutant List and formalize TMDL.	TMDL
	DO	No	Add on Pollutant List to do TMDL by 2003.	Data Gap
	NH3	No	Delist NH3 from Pollutant List.	Meets BU
BWR – 7	Q	No	Put on Pollution List.	New Regs
	Tem	No	Add on Pollutant List to do TMDL by 2003.	Data Gap
	Ex Nut	Yes	Add on Pollutant List and formalize TMDL.	TMDL
	Ex Sed	Yes	Add on Pollutant List and formalize TMDL.	TMDL
	NH3	No	Delist NH3 from Pollutant List.	Meets BU
BWR – 8	Q	No	Put on Pollution List.	New Regs
	Ex Nut	Yes	Add on Pollutant List and formalize TMDL.	TMDL
	Ex Sed	Yes	Add on Pollutant List and formalize TMDL.	TMDL
Tributaries or Tributary Segments				
Horse Ck – 7613	Unknown	No	IDEQ intends to delist.	Meets BU
Owl Ck – 5290	Unknown	No	IDEQ intends to delist.	Meets BU
Baker Ck – Entire	Unknown	No	IDEQ intends to delist.	Meets BU
Eagle Ck – 5291	Q	No	Put on Pollution List.	New Regs
	Tem	No	Add on Pollutant List to do TMDL by 2003.	Data Gap
	Ex Nut	Yes	Add on Pollutant List and formalize TMDL.	TMDL
	Ex Sed	Yes	Add on Pollutant List and formalize TMDL.	TMDL
Lake Ck – 7614	Q	No	Put on Pollution List.	New Regs
	Ex Nut	Yes	Add on Pollutant List and formalize TMDL.	TMDL
Placer Ck – 5293	Ex Nut	Yes	Add on Pollutant List and formalize TMDL.	TMDL
Cove Ck – 5296	Q	No	Put on Pollution List.	New Regs
	Ex Nut	Yes	Add on Pollutant List and formalize TMDL.	TMDL
	Ex Sed	Yes	Add on Pollutant List and formalize TMDL.	TMDL
EFWR – 5295	Unknown	No	IDEQ intends to delist.	Meets BU

Greenhorn – 5294	Q Tem Ex Nut Ex Sed	No No Yes Yes	Put on Pollution List. Add on Pollutant List to do TMDL by 2003. Add on Pollutant List and formalize TMDL. Add on Pollutant List and formalize TMDL.	New Regs Data Gap TMDL TMDL
Quigley Ck– 5297	Q Tem Ex Nut Ex Sed DO	No No Yes Yes No	Put on Pollution List. Add on Pollutant List to do TMDL by 2003. Add on Pollutant List and formalize TMDL. Add on Pollutant List and formalize TMDL. Add on Pollutant List to do TMDL by 2003.	New Regs Data Gap TMDL TMDL Data Gap
Croy Ck – 2491	Q Ex Nut Ex Sed	No Yes Yes	Put on Pollution List. Add on Pollutant List and formalize TMDL. Add on Pollutant List and formalize TMDL.	New Regs TMDL TMDL
Seamans – 5298	Q Tem Ex Nut Ex Sed	No No Yes Yes	Put on Pollution List. Add on Pollutant List to do TMDL by 2003. Add on Pollutant List and formalize TMDL. Add on Pollutant List and formalize TMDL.	New Regs Data Gap TMDL TMDL
Rock Ck – 2487	Q Tem Ex Nut Ex Sed *E. coli*	No No Yes Yes Yes	Put on Pollution List. Add on Pollutant List to do TMDL by 2003. Add on Pollutant List and formalize TMDL. Add on Pollutant List and formalize TMDL. Add on Pollutant List and formalize TMDL.	New Regs Data Gap TMDL TMDL TMDL
EFRC – 5299	Tem Ex Nut Ex Sed	No Yes Yes	Add on Pollutant List to do TMDL by 2003. Add on Pollutant List and formalize TMDL. Add on Pollutant List and formalize TMDL.	Data Gap TMDL TMDL
Thorn Ck – 5300	Q Tem Ex Nut Ex Sed DO	No No Yes Yes No	Put on Pollution List. Add on Pollutant List to do TMDL by 2003. Add on Pollutant List and formalize TMDL. Add on Pollutant List and formalize TMDL. Add on Pollutant List to do TMDL by 2003.	New Regs Data Gap TMDL TMDL Data Gap

Prepared by IDEQ-TFRO. TMDL = Total maximum daily load. BWR = Big Wood River. BL to MR (LIST) = Base Line to Magic Reservoir (To be listed on the 303(d) list). Q = Flow alteration or flow diversion. Tem = Temperature or thermal modification. Ex Nut = Excess nutrients (NOX and/or TP). Ex Sed = Excess sediments (Total suspended solids and/or substrate sediments). DO = Dissolved oxygen. NH3 = Total ammonia. Malad River (LIST) = Interstate 84 to the Snake River (To be listed on the 303(d) list). Ck = Creek. EFWR = East Fork Wood River. EFRC = East Fork Rock Creek. Unknown = Unknown pollutants. Entire = the entire creek.

Justify the Change: <u>New Regs</u> = Transfer the flow modification or flow alteration over to the pollution (not pollutant) list based on the new TMDL regulations in 2002-2003. <u>Data Gap</u> = Tem or DO information is lacking and requires addition information to complete a TMDL. <u>TMDL</u> = A TMDL will be formalized for Ex Nut, Ex Sed, and *E. coli*. as part of the TMDL process. <u>Meets BU</u> = IDEQ-TFRO has determined that this pollutant or stream meet beneficial uses and/or state water quality standards, and thus will invoke a delisting of the pollutant or stream from the 303(d) list.

1. Subbasin Assessment – Watershed Characterization

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters (33 USC § 1251.101). States and tribes, pursuant to section 303 of the CWA are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). States and tribes must periodically publish a priority list of impaired waters, currently every two years. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards. This document addresses the water bodies in the Big Wood River Subbasin that have been placed on what is known as the "303(d) list."

The overall purpose of this subbasin assessment and TMDL is to characterize and document pollutant loads within the Big Wood River Subbasin. The first portion of this document, the subbasin assessment, is partitioned into four major sections: watershed characterization, water quality concerns and status, pollutant source inventory, and a summary of past and present pollution control efforts (Chapters 1 – 4). This information will then be used to develop a TMDL for each pollutant of concern for the Big Wood River Subbasin (Chapter 5).

1.1 Introduction

In 1972, Congress passed public law 92-500, the Federal Water Pollution Control Act, more commonly called the Clean Water Act. The goal of this act was to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Water Pollution Control Federation 1987). The act and the programs it has generated have changed over the years as experience and perceptions of water quality have changed. The CWA has been amended 15 times, most significantly in 1977, 1981, and 1987. One of the goals of the 1977 amendment was protecting and managing waters to insure "swimmable and fishable" conditions. This goal, along with a 1972 goal to restore and maintain chemical, physical, and biological integrity, relates water quality with more than just chemistry.

Background

The federal government, through the U.S. Environmental Protection Agency (USEPA), assumed the dominant role in defining and directing water pollution control programs across the county. The Idaho Department of Environmental Quality (IDEQ) implements the CWA in Idaho, while the USEPA oversees Idaho and certifies the fulfillment of CWA requirements and responsibilities.

Section 303 of the CWA requires IDEQ to adopt, with USEPA approval, water quality standards and to review those standards every three years. Additionally, IDEQ must monitor waters to identify those not meeting water quality standards. For those waters not meeting standards, IDEQ must establish TMDLs for each pollutant impairing the waters. Further, the agency must set appropriate controls to restore water quality and allow the water bodies to meet their designated uses. These requirements result in a list of impaired waters called the "303(d) list." This list describes water bodies not meeting water quality standards. Waters identified on this list require further analysis. A subbasin assessment and TMDL provide a summary of the water quality status and allowable TMDL for water bodies on the 303(d) list. *The Big Wood River Watershed Management Plan* provides this summary for the currently listed waters in the Big Wood River Subbasin.

The subbasin assessment section of this report (Chapters 1 – 4) includes an evaluation and summary of the current water quality status, pollutant sources, and control actions in the Big Wood River Subbasin to date. While this assessment is not a requirement of the TMDL, IDEQ performs the assessment to ensure impairment listings are up to date and accurate. The TMDL (Chapter 5) is a plan to improve water quality by limiting pollutant loads. Specifically, a TMDL is an estimation of the maximum pollutant amount that can be present in a waterbody and still allow that waterbody to meet water quality standards (40 CFR § 130). Consequently, a TMDL is waterbody- and pollutant-specific. The TMDL also includes individual pollutant allocations among various sources discharging the pollutant.

The USEPA considers certain unnatural conditions, such as flow alteration, a lack of flow, or habitat alteration, that are not the result of the discharge of a specific pollutant as "pollution." TMDLs are not required for water bodies impaired by pollution, but not specific pollutants (Federal Register, Vol 65, No. 135, p. 43592, July 13, 2001). In common usage, a TMDL also refers to the written document that contains the statement of loads and supporting analyses, often incorporating TMDLs for several water bodies and/or pollutants within a given watershed. In addition, degraded aquatic habitat is evidence of impairment, which may be caused solely by channelization of a stream's bottom. In this case the waterbody would be considered impaired by pollution that is not a result of the introduction of or presence of a pollutant.

Idaho's Role

Idaho adopts water quality standards to protect public health and welfare, enhance the quality of water, and protect biological integrity. A water quality standard defines the goals of a waterbody by designating the use or uses for the water, setting criteria necessary to protect those uses, and preventing degradation of water quality through antidegradation provisions.

The state may assign or designate beneficial uses for particular Idaho water bodies to support. These beneficial uses are identified in the Idaho water quality standards and include:

- Aquatic life – cold water, seasonal cold water, warm water, salmonid spawning, modified
- Contact recreation – primary (swimming), secondary (boating)
- Water supply – domestic, agricultural, industrial
- Wildlife habitats, aesthetics

The Idaho legislature designates uses for water bodies. Industrial water supply, wildlife habitat, and aesthetics are designated beneficial uses for all water bodies in the state. If a waterbody is unclassified, then cold water and primary contact recreation are used as additional default designated uses when water bodies are assessed.

A subbasin assessment entails analyzing and integrating multiple types of waterbody data, such as biological, physical/chemical, and landscape data to address several objectives:

- Determine the degree of designated beneficial use support of the waterbody (i.e., attaining or not attaining water quality standards).

- Determine the degree of achievement of biological integrity.

- Compile descriptive information about the waterbody, particularly the identity and location of pollutant sources.

- When waterbodies are not attaining water quality standards, determine the causes and extent of the impairment.

1.2 Physical and Biological Characteristics

See Figure A in the Executive Summary. The Big Wood River subbasin general characterization indicates that it is made up of three elevation-ecological areas that reside in the counties of Blaine, Gooding, Lincoln, and Camas in southcentral Idaho. These areas include the Sawtooth National Forest (> 5,800 feet higher elevation), the Wood River Valley (4,000-5,800 feet middle elevation), and the agricultural area (< 4,000 feet lower elevation). The Wood River Valley has atypical ecological characteristics of the lower elevation area. All physical and biological characteristics of the Big Wood River subbasin are related to the elevation-ecological areas.

Climate

The Big Wood River subbasin meteorology has climate characteristics that correlate to its elevation-ecological areas. These characteristics include precipitation, temperature and available sunlight, cloudiness, snowfall and snow depth, and wind erosion.

- Precipitation
  The annual average precipitation of the Big Wood River subbasin decreases from the higher elevation (20.4”) through the middle elevation (13.4”) through the lower elevation (10.2”) areas. The greatest precipitation occurs in the months of November through March and represents 58.4% of the total annual average precipitation. Annual average precipitation < 10” is found in the agricultural area, the Wood River Valley, and the lower valley of the higher elevation area. This accounts for 74.3% of the subbasin. See IASS 1993; IASS 1995; IASS 1997; and, IDWR 1972 [pp 5, 7].

- Temperature and Available Sunlight

The annual air temperature range is from –6.17 to 12.11°C in the higher elevation, from -1.44 to 14.50°C in the middle elevation, and from 2.00 to 17.83°C in the lower elevation, based on a 1931-1998 average. See IASS 1993; IASS 1995; IASS 1997; and, Robbins 2000 [p 7].

- <u>Cloudiness</u>
  Average available sunlight is 9.4 hours in winter, 13.3 hours in spring, 14.8 hours in summer, and 11.1 hours in fall. See IASS 1993; IASS 1995; IASS 1997; and, Robbins 2000 [p 7].

- <u>Snowfall and Snow Depth</u>
  The average annual snowfall for the Big Wood River subbasin is 139.6” in the higher elevation, 52.4” in the middle elevation, and 20.1” in the lower elevation. The greatest amount of snowfall occurs from November through March. The average annual snow depth for the Big Wood River subbasin is 128.7” in the higher elevation, 37.0” in the middle elevation, and 6.7” in the lower elevation. The greatest snow depth occurs from November through March. See IASS 1993; IASS 1995; and, IASS 1997.

- <u>Wind Erosion</u>
  Wind erosion occurs primarily during the spring months when wind velocities are highest in the Snake River Plain, particularly in Gooding and Lincoln counties in the lower elevation areas. It is uncertain to what extent erosion seasonally affects water quality on 303(d) streams in the Big Wood River subbasin. But based on regional estimates of uncovered single-grain textured soils, the soil texture, and the wind velocities, it is estimated that <1% of the water quality is affected on an annual average basis. Therefore, although wind erosion may be a significant localized problem, its affect on water quality is not significant beyond 1% of the suspended sediment. See USDA NRCS 1998.

<u>Subbasin Characteristics</u>

The Big Wood River Subbasin has overall subbasin characteristics that correlate to its elevation-ecological areas. These characteristics include hydrography, geology and/or soils, topography, vegetation, and fisheries. In the Big Wood River Subbasin there exist two ecoregions: the Snake River Basin/High Desert (51% of the subbasin) and the Northern Rockies (49% of the subbasin). These ecoregions represent the agricultural area of the Wood River Valley and the higher elevation area, respectively. See USDA FS 1980; USDA FS 1994; USGS Landuse Coverage 1996; and, USFWS 2000c. There also exists a transitional zone between these two ecoregions at the middle-to-higher elevations.

- <u>Subbasin Geologic Characteristics or Attributes</u>
  This section deals with the subwatershed characteristics or attributes. As described in §1.2 of the subbasin assessment under Subbasin Characteristics, the Big Wood River Subbasin is hydrologically divided into seventeen (17) watersheds of the 5th field HUC category. Taking into account the overall

subbasin, the following subbasin attributes are descriptive of the Big Wood River Subbasin:

Maximum elevation = 3,313.2 m
Minimum elevation = 249.9 m
Maximum difference in elevation (H_d) =
Max elevation – Min elevation = 3,063.3 m
Watershed area (A_w) = 1460 m^2
Mean elevation (H_m) = 1781.6 m (mid-range)
Major axis = 107,987 m
Relief ratio (R_h) = H_d/Major axis = 0.028

- Hydrography

The Big Wood River subbasin hydrology has the Big Wood River as its principal waterbody running through the central portion of the subbasin. In general, all tributaries and canals discharge to the Big Wood River directly or indirectly. The Big Wood River subbasin is hydrologically divided into seventeen (17) watersheds of the 5th field HUC category. Of the total number of waterbodies in this subbasin, approximately 49% are perennial and 51% are intermittant. Of those waterbodies, 89% are streams and 10% are canalways (USGS Landuse Coverage 1996; ArcView GIS 1996). Of the fifteen (15) 303(d) tributaries, eight (8) are found in the higher elevation area, seven (7) are found in the middle elevation area, and one (1) is found in the lower elevation area.

The Big Wood River is predominantly a perennial stream that is fed during periods of high runoff by numerous ephemeral, intermittent, and perennial streams. However, certain reaches are intermittent due to irrigation diversion. Approximately 10% (or more) of the Big Wood River (from the Glendale Diversion to Magic Reservoir) is intermittent due to flow diversions for irrigation purposes. The remainder (headwaters to Glendale Diversion and Magic Reservoir to Snake River) is perennial. See IDFG 2000L; IDWR 1972 [pp 5, 11]; and, Robbins 2000 [p 4]. However, from the Richfield Diversion (which is below the Magic Reservoir) to T5S, R18E, Section 8 (or about 1 mile north of Ruiz Lake) the Big Wood River could potentially be intermittent during dry years due to irrigation diversions.

The Big Wood River subbasin has many manmade reservoirs that are a part of the more complex network of natural and manmade waterbodies of the Big Wood River system. The Magic Reservoir is the largest and more famous of all the reservoirs. It fulfills its purpose in providing irrigation and power generation. Approximately 60% of the storage in Magic Reservoir is used within the Middle Little Wood River area, with the remainder being used on cropland in the Big Wood River subbasin. See IDFG 2000J; ISCC 1993 [pp 6-8]; and, USGS 1998.

The Big Wood River Company (Shoshone, Idaho) operates the manmade canal system of the Big Wood River Subbasin. It is a single management unit that has storage space in American Falls Reservoir and behind Magic Dam, as well as natural flow rights on the Wood River system. The Wood River system includes the Big Wood River and the Little Wood River and irrigates approximately 98,000 acres. Other management units that service the subbasin are the North Side Canal Company (160,000 acres) and the Milner-Gooding Canal (62,400 acres) as well as a number of smaller canal companies that are privately owned and are operated above the Magic Reservoir. See Clinton 1994 [pp B-8, B-9] and IASCD 1973 [p 9].

- Geology and/or soils

  The Northern Rockies ecoregion is predominantly tertiary Challis volcanic rocks in the higher elevations. The Snake River Plain/High Desert ecoregion is Miocene and Pliocene and sedimentary rocks interbedded with older basalt flows in the lower elevation and valley regions. As a consequence, rocks within the Big Wood River valley are grouped into two general categories: (1) consolidated igneous and sedimentary rocks which make up the mountains that surround the valley floor; and, (2) unconsolidated fluvioglacial and alluvial material that make up the valley fill. See Link and Hackett 1988 [p 110]; Luttrell and Brockway 1982 [p 6], 1984 [p 13]; and, USDA FS 1994.

  In general, the “cool to cold soils” lend themselves to sheet and rill erosion in the higher elevations of Blaine and Camas counties. The clayey soils lend themselves to furrow erosion in the middle and lower elevation agricultural areas of Lincoln and Gooding counties. See also USDA FS 1994 and USDA NRCS 1998. The primary soil orders described in Table N provide a general description of the type of soil that may contribute erosional sediment to waterbodies based on the extent of their disturbed condition and their surface slope.

Table N. Soil orders of the Big Wood River subbasin

Soil Orders	Soil Genesis	Potential Natural Vegetation	Erosion Potential
Aridisols (Lower Elevation)	Arid soil (clayey soils)	Rangeland vegetation with some woodlands.	< 15% slope. High potential. Furrow erosion.
Entisols (Lower Elevation)	Recent soil (clayey soils)	Rangeland vegetation with forestland or cropland.	< 20% slope. Steeper slopes; erodible. Furrow erosion.
Mollisols (Middle Elevation)	Soft soil (clayey soils)	Grassland environments for croplands and ag soil.	< 20% slope. Low to moderate potential. Furrow erosion.
Inceptisols (Middle Elevation)	Beginning soil (clayey soils)	Agricultural lands developed from grasslands and rangelands.	< 25% slope. Very high potential. Furrow erosion.
Alfisols (Higher Elevation)	Nonsense soil (cool to cold soils)	Forest vegetation; tall grasses; some agricultural soils.	< 10% slope. Low to moderate potential. Sheet and rill erosion.
Prepared by IDEQ-TFRO. Reviewed by the Idaho Geological Survey; USFS – Twin Falls; and, BLM – Shoshone.			

- Topography

  The subbasin physical boundaries may be categorized into high, middle, and lower elevation areas. The higher elevation area is comprised of three mountain ranges (Smokey on the west, Boulder on the north, and Pioneer Mountains on the east) with an average peak elevation of 10,870 feet. The middle elevation area is comprised of two hill areas (Mount Bennett on the southwest and Timmerman Hills on the east), Camas Prairie on the west, and Magic Reservoir on the west. The lower elevation area is comprised of the Dry Creek drainage on the west, and lava fields on the east and south. As a consequence of these physical boundaries, the Big Wood River Subbasin is made up of three elevation-ecological areas. These elevation-ecological areas include the Sawtooth National Forest (> 5,800 feet elevation), the Wood River Valley (4,000-5,800 feet elevation), and the agricultural area (< 4,000 feet.

  Generally speaking for the entire subbasin, 50% of the slope elevation is in the 0-5% range, 23% in the 16-25% range, 15% in the 6-15% range, 11% in the 26-35% range, and < 1% in the 36-65% range.

  Some of the well-known peaks of the higher elevation area have mountain peaks that have an attitude that is trending from southwest to northeast and from northeast to southwest. In the middle elevation area the mountain peaks have an attitude that is trending from southwest to northeast. In the lower elevation area the mountain peaks have an attitude that is trending from northeast to the south.

- Vegetation

  In general, the valley area in the higher elevation consists of sagebrush and grasses in the hills; and willows, cottonwoods, marsh, and other grasses on the lowland areas. Public land vegetation for the most part may be categorized into two general categories: vegetation at the lower-to-middle elevation areas, and vegetation at the middle-to-higher elevation areas. Vegetation at the lower-to-middle elevation areas includes sagebrush, riparian, and grassland (IDFG 1997 [p 15]). Vegetation at middle-to-higher elevation areas includes forested vegetation, scrub-shrub vegetation, and emergent (herbaceous) vegetation (IDFG 1997 [pp 14-16]).

  The Big Wood River has only 26.7 square miles (17,071.8 acres) of riparian area found in the upper half of the subbasin. This makes up 1.8% of the entire watershed land area as Palustrine emergent, Palustrine scrub-shrub, and Lacustrine limnetic type wetlands. Other riparian areas or wetlands exist on tributaries to the Big Wood River. Their contribution to the overall wetland/ riparian area amounts to 0.2% of the entire watershed land area. See IDFG 1997 [pp 5, 7, 9, 14-15].

- Fisheries

General fisheries productivity is relatively low with the principal fishes in the upper basin being wild rainbow trout, mountain whitefish, Wood River sculpin, and the mottled sculpin. Introduced brook trout and cutthroat trout are occasionally sampled as they move out of mountain lakes feeding the Big Wood River watershed. Wild trout populations are supplemented with catchable rainbow trout stockings in several heavily fished stream reaches. Brown trout, originally stocked by IDFG, appear from Hailey to the Glendale Diversion, downstream of Bellevue. At Magic Reservoir, anglers commonly target rainbow trout, brown trout, and yellow perch. Trophy rainbow trout are produced in Magic Reservoir and entrained into the Richfield Canal and the Big Hole directly below the Magic Dam. See IDFG 2000F, 2000K, 2000L.

The Big Wood River Subbasin does not have the bull trout species present.

The threatened and endangered (T & E) species that have linkage to water quality are the bald eagle (that relies on the fish in the streams), the Ute ladies' tresses (that rely on water quantity), and several mollusk species (Utah valvata snail and Banbury Springs lanx that rely on water quality). The mollusc species are found in the Malad River springs area. The Wood River sculpin is listed as a sensitive non-salmonid species in Idaho and is similarly protected under all federal agencies. See ICDC 2000; IDFG 2000B, 2000G, 2000H, 2000I; USFWS 2000b; and, USDI BLM 2000 [p 8]. To the extent practical, the T & E and sensitive species will not be adversely affected by improvements in water quality. Improvements reductions in TSS, substrate sediments, TP, and E. coli will not adversely affect the T & E or sensitive species.

Subwatershed Stream Characteristics

This section deals with the subwatershed stream characteristics or attributes. Table O identifies the 5th field HUC that links to the 303(d) stream. Stream attributes with a potential sediment risk include landform, dominant slope, width/depth ratio, and Rosgen channel type.

Table O. 5th Field HUC characteristics of 303(d) streams

Stream Name	5th Field HUC	Mean Elevation feet	Land Form	Dom Slope %	W/D Ratio	Overall Rosgen Channel Type	Sediment Risk
Mainstem Big Wood River							
BWR – 1	LA, UBWR, BNFBW	7590	Transitional	14.2	11.0	Aa^+	VL, T
BWR – 2	CE, QC, MBWR	5610	Transitional	11.7	9.0	Aa^+	L, T
BWR – 3	MBWR	5280	Transitional	3.9	45.2	D	H, D
BWR – 4	MBWR, MR	5280	Transitional	4.0	48.1	D	H, D
BWR – 5	LBC	4950	SRP/HD	3.7	14.8	B	H, D
BWR – 6	LBC, TC	4290	SRP/HD	3.0	22.2	B	H, D
BWR – 7	LBWR	3630	SRP/HD	3.0	15.9	B	H, D
BWR - 8	LBWR	3300	SRP/HD	3.4	17.2	B	H, D
Tributaries or Tributary Segments							
Horse Ck	Upper BWR	7900	NR	8.0	5.0	A	L, T
Owl Ck	Upper BWR	8450	NR	11.0	4.7	A	L, T
Baker Ck	Baker - NFBW	7930	NR	9.0	6.4	A	L, T
Eagle Ck	Lake – Adams	7740	Transitional	10.0	4.0	A	L, T
Lake Ck	Lake – Adams	6320	Transitional	3.0	13.9	B	H, D
Placer Ck	Warm Sp Ck	7810	Transitional	10.0	7.9	A	L, T
Cove Ck	Middle BWR	6728	Transitional	2.0	37.4	B	H, D
EFWR	East Fork WR	7710	NR	4.0	16.9	B	H, D
Greenhorn	Greenhorn Ck	6565	Transitional	5.0	11.4	A	M, D
Quigley	Quigley Ck	6180	Transitional	4.0	7.6	A	H, D
Croy Ck	Quigley Ck	5810	Transitional	2.0	24.8	C	H, D
Seamans	Middle BWR	5600	Transitional	2.0	15.5	B	H, D
Rock Ck	Rock Ck	5004	SRP/HD	<1.0	23.3	C	H, D
EFRC	Rock Ck	5904	SRP/HD	9.0	7.2	A	L, T
Thorn Ck	Thorn Ck	4923	SRP/HD	2.0	33.8	C	H, D

Prepared by IDEQ-TFRO. Dom Slope = Dominant slope. Ck = Creek. BWR = Big Wood River. NFBW = North Fork Big Wood. Sp = Springs. WR = Wood River. LA = Lake-Adams. UBWR = Upper BWR. CE = Cold – Elkhorn. QC = Quigley Creek. MBWR = Middle BWR. MR = Magic Reservoir. LBC = Lincoln Bypass Canal. TC = Thorn Creek. Land Form: SRP/HD = Snake River Plain/High Desert ecoregion = Tablelands with moderate to high relief-plains with hills or low mountains. Land Form: NR = Northern Rockies ecoregion = High mountains, usually sharp-crested with steep slopes. Land Form: Transitional = a combination of SRP/HD and NR. Sediment Risk: VL = Very low, L = Low, M = Moderate, H = High, T = Transport, D = Deposition.

Table P describes the current mass wasting potential in the Big Wood River Subbasin per 303(d)-stream segment and the potential mass wasting based on the geomorphology of the stream, the type of vegetative coverage of the riparian zone, and the K factor.

Table P. Mass wasting potential

Stream Name	Geomorphology	Vegetation, %					K Factor	Mass Wasting, t/yr	
		F	G	S	A	O		Overall	Bkgd
Mainstem Big Wood River									
BWR – 1	Alpine-glacial	46	1	39	2	12	0.323	17,816.9	436.1
BWR – 2	F and A-G	9	3	52	11	25	0.193	13,625.6	479.9
BWR – 3	Fluvial and plateau	0	4	35	51	10	0.193	3,048.3	46.7
BWR – 4	Plateau	0	16	40	24	20	0.227	3,084.5	118.0
BWR – 5	Plateau	0	27	61	1	11	0.337	2,499.6	52.9
BWR – 6	Plateau	0	5	44	44	7	0.249	18,909.1	2.8
BWR – 7	Plateau	0	17	22	60	1	0.120	980.4	1.1
BWR - 8	Plateau	0	10	12	76	2	0.188	4,180.5	4.0
Tributaries or Tributary Segments									
Horse Ck	Alpine-glacial	76	0	18	0	6	0.218	1,137.7	25.0
Owl Ck	Alpine-glacial	75	0	17	0	8	0.218	2,463.6	71.5
Baker Ck	Alpine-glacial	71	1	21	0	7	0.253	2,471.8	64.6
Eagle Ck	Alpine-glacial	56	1	36	1	6	0.218	3,953.7	77.6
Lake Ck	Alpine-glacial	40	1	54	3	2	0.249	3,089.7	22.5
Placer Ck	Alpine-glacial	64	1	32	0	3	0.205	1,905.7	18.2
Cove Ck	Alpine-glacial	27	2	65	5	1	0.263	2,461.7	9.8
EFWR	Alpine-glacial	51	1	17	0	31	0.188	2,087.2	267.4
Greenhorn	Fluvial	34	1	58	2	5	0.186	3,600.0	41.8
Quigley	F and A-G	19	1	72	3	5	0.221	3,855.6	7.1
Croy Ck	Fluvial	3	1	87	2	7	0.277	3,353.3	14.0
Seamans	Alpine-glacial	10	2	64	8	16	0.221	4,684.7	78.1
Rock Ck	Plateau	0	4	93	0	3	0.188	2,640.6	10.1
EFRC	Plateau	1	1	98	0	0	0.179	1,308.3	1.4
Thorn Ck	Plateau	0	21	75	3	1	0.254	1,546.1	4.5

Prepared by IDEQ-TFRO. F = Forested. G = Grassland. S = Shrubland. A = Agriculture. O = Other. Bkgd = Background. BWR = Big Wood River. Ck = Creek. EFWR = East Fork Wood River. EFRC = East Fork Rock Creek. F and A-G = Fluvial and alpine-glacial.

Table Q deals with the general streambed sediment character based on percent fines (Wolman pebble counts) and sedimentation embeddedness.

Table Q. General streambed sediment characteristics

Stream Name	Overall % Fines	% Fines by Segment			Sedimentation Embeddedness, %
		Upper	Middle	Lower	
Mainstem Big Wood River					
BWR – 1	32.2	-	-	-	18.5
BWR – 2	46.3	-	-	-	32.0
BWR – 3	53.5	-	-	-	42.5
BWR – 4	58.6	-	-	-	52.0
BWR – 5	31.3	-	-	-	60.0
BWR – 6	44.2	-	-	-	56.0
BWR – 7	54.9	-	-	-	65.5
BWR - 8	52.9	-	-	-	39.5
Tributaries or Tributary Segments					
Horse Ck	30.8	26.0	33.8	32.6	17.5
Owl Ck	19.9	5.2	14.8	33.2	17.5
Baker Ck	24.7	17.3	23.2	22.2	17.5
Eagle Ck	27.2	16.0	16.6	46.0	17.5
Lake Ck	21.4	18.4	-	24.4	20.0
Placer Ck	31.6	35.5	-	29.1	27.5
Cove Ck	51.7	90.3	15.8	29.7	47.5
EFWR	15.4	15.4	-	-	12.5
Greenhorn	29.2	45.6	30.3	28.7	35.0
Quigley	62.8	67.2	47.4	70.1	57.5
Croy Ck	68.9	-	-	68.9	57.5
Seamans	44.7	30.9	59.3	44.1	45.0
Rock Ck	54.5	57.6	-	52.0	72.5
EFRC	83.5	90.3	82.8	77.2	77.5
Thorn Ck	84.5	34.5	-	-	70.0

Prepared by IDEQ-TFRO. BWR = Big Wood River. Ck = Creek. EFWR = East Fork Wood River. EFRC = East Fork Rock Creek. Whereas little correlation (r^2 = 0.0853) between fines and embeddedness is found in the mainstem of the Big Wood River, a stronger correlation (r^2 = 0.8815) is found in the tributaries.

1.3 Cultural Characteristics

The growing population, landuse and land ownership, agriculture, forestry, rangeland, mining, recreation, roads, urban and rural development, and economic growth can characterize various human perturbations and/or management practices in the Big Wood River subbasin that may potentially affect water quality. Some of these cultural practices affect water quality more directly than others.

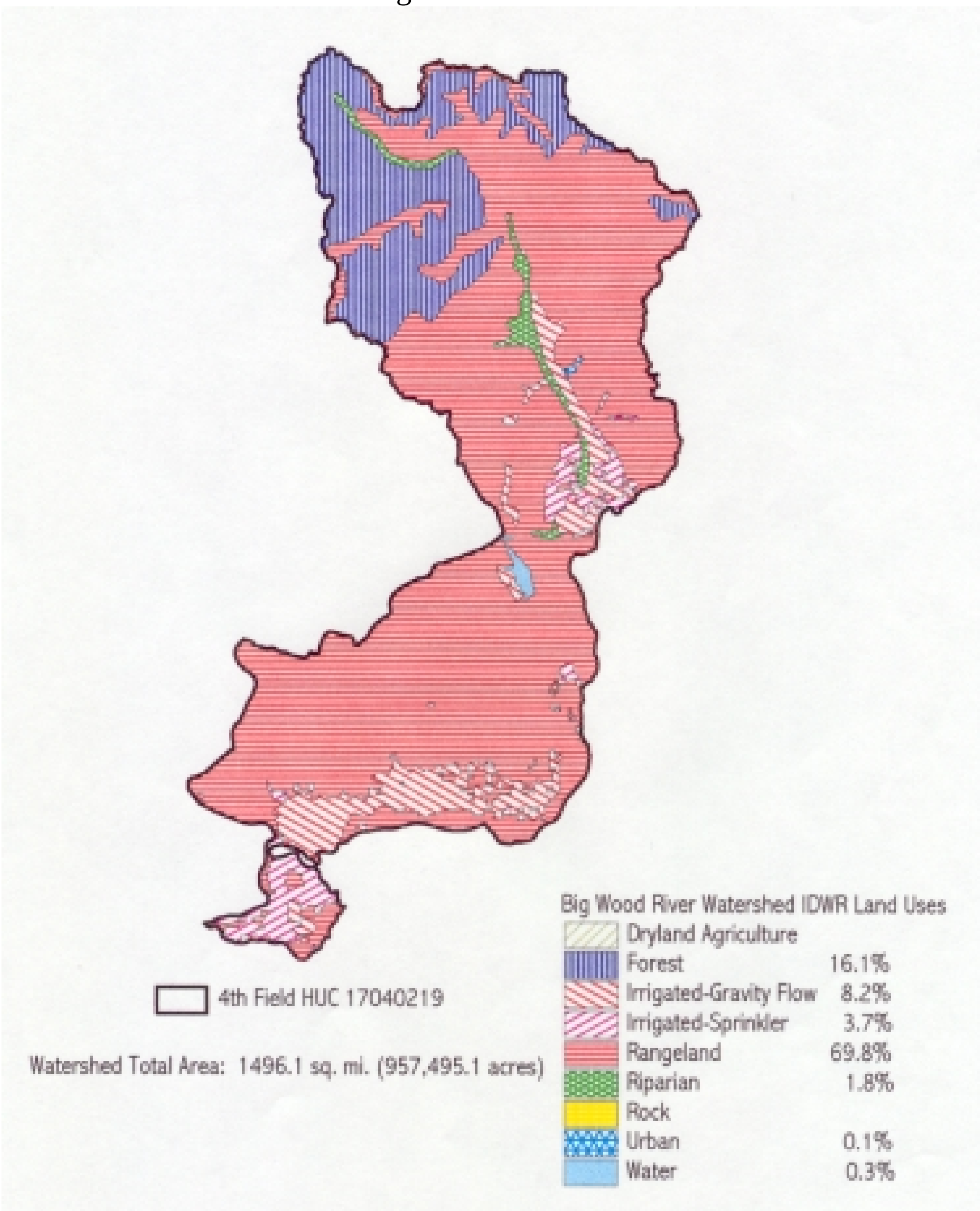
Land Use

Land use in the Big Wood River Subbasin is categorized according to agricultural lands, forestlands, and rangelands. These are the major land uses for the subbasin.

- Landuse

In general, the Big Wood River subbasin has USGS/IDWR land uses categorized as 10-12% agricultural land (both irrigated and dryland), 16-24% forestland, and 63-70% rangeland (USGS 1996 [Land Use Coverage]; IDWR 1996 [Land Use Coverage]). Figure D illustrates the major land uses of the subbasin.

Figure D. Land use.



- <u>Trends in Land Use</u>
  The trends in land use in the Big Wood River Subbasin indicate that agricultural lands are quickly being changed into development areas for the larger cities. Encroachment of forestlands and rangelands is also being noticed as the population in the subbasin increases.

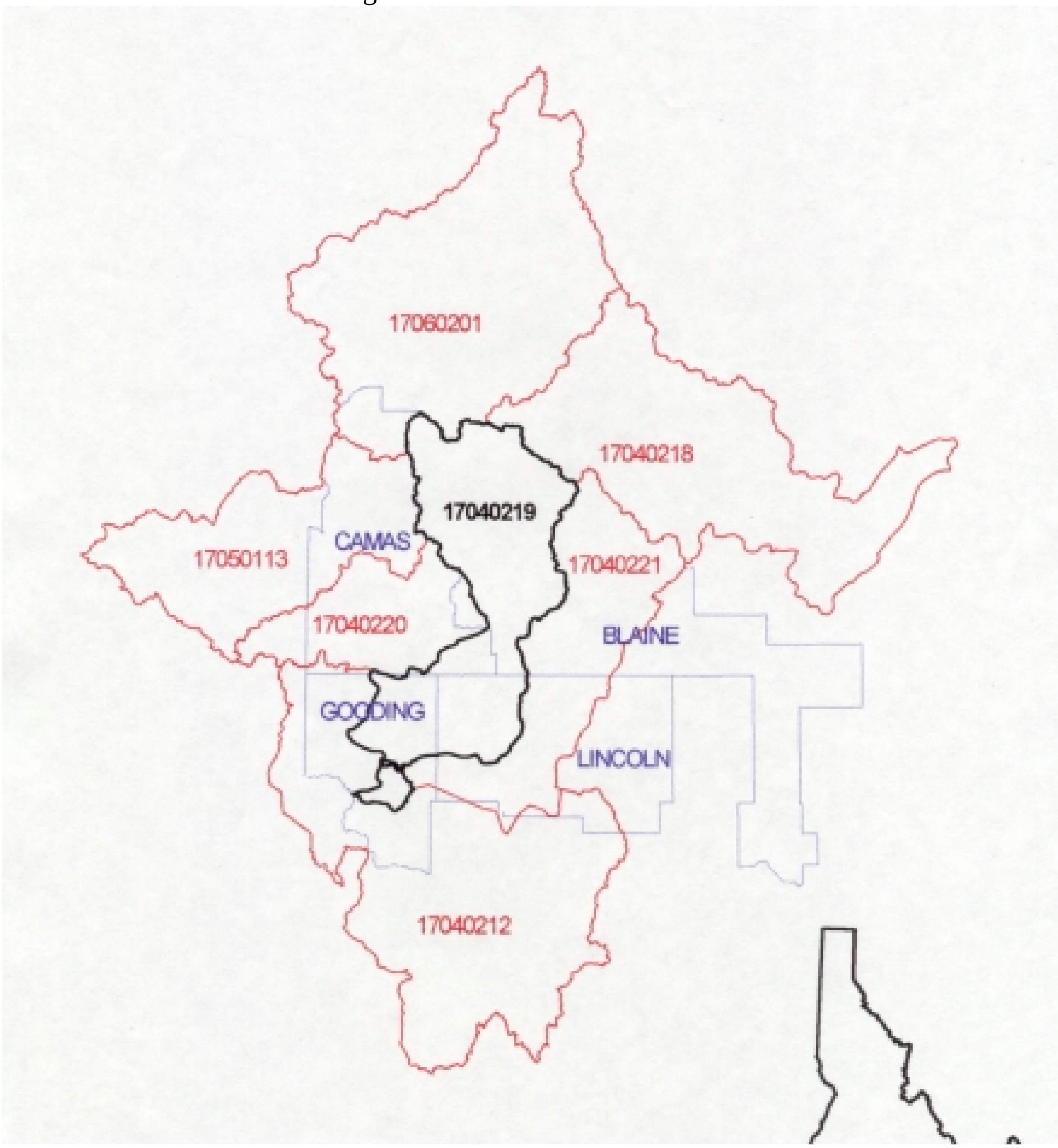
- Types of Roads and Stream Crossings
  In the Big Wood River Subbasin there exist three (3) general categories of roads. The first are developed roads (like Highway 20 and Interstate 84) which are paved by asphalt. These roads may parallel streams (like the Big Wood River) but account for small-to-none levels of sediment impacts. The second are developed secondary roads surfaced with oil. These predominate in rural areas of which the majority do not influence or parallel streams. The third are undeveloped roads in the rural areas of which the majority are little traveled by vehicles. Stream crossings are included in the third category. These third category roads contribute to sediment loads only in those areas where stream crossings are possible and only during those times of the year when the stream has water. It is estimated that roads contribute very little to the sediment load in the Big Wood River Subbasin. There is no historical indication on any of the 303(d) streams that roads have aided in mass failures of cut and fill slopes and channelized surface erosion. Since precipitation is not excessive in most of the road areas, both paved and unpaved roads do not necessarily result in more rapid routing of water to the stream channel.

Land Ownership, Cultural Features, and Population

The following short sections describe the subbasin's county boundaries, its land ownership, its cultural features, and overall demographics.

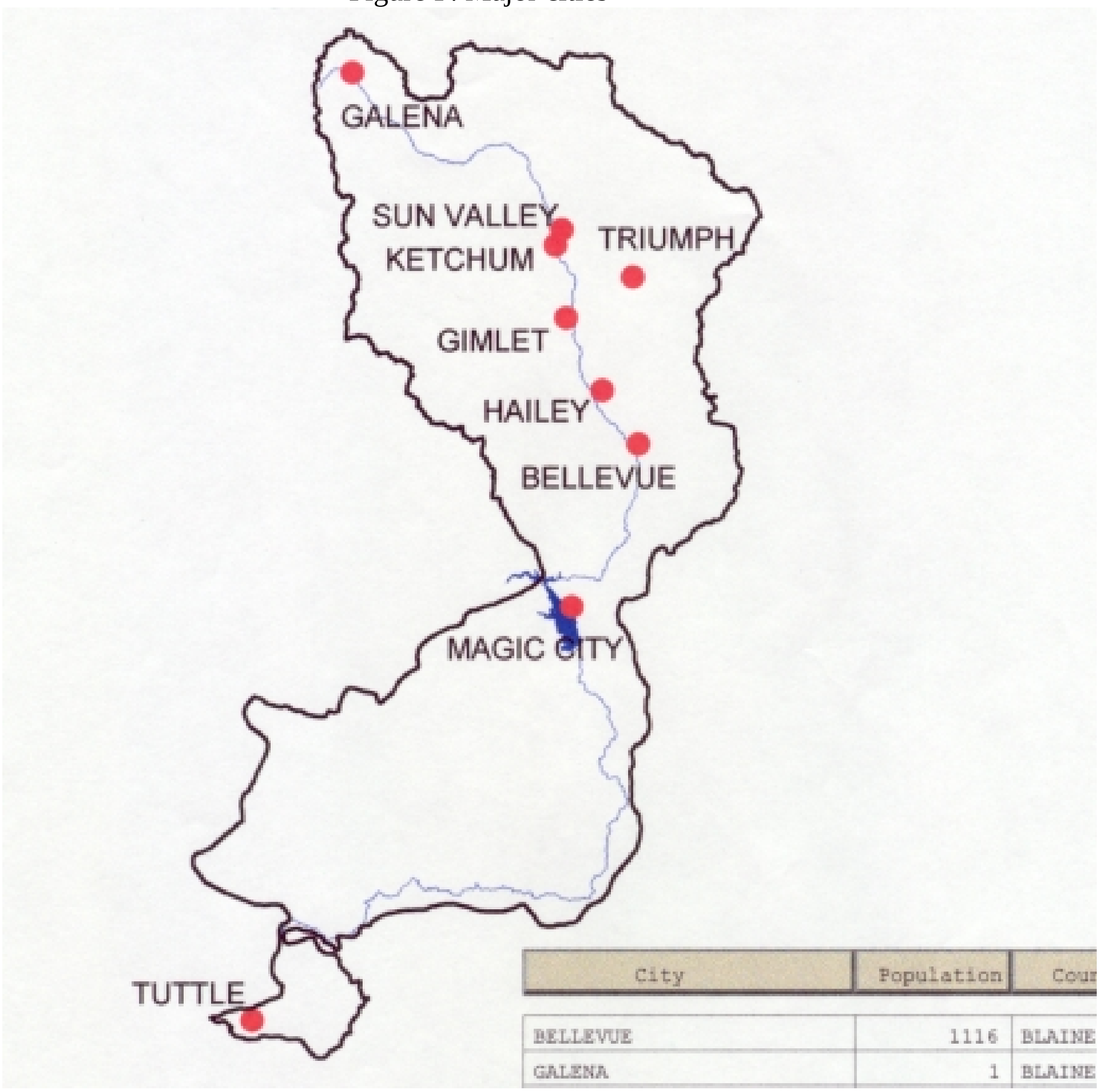
- County Boundaries
  There are four counties that include the Big Wood River subbasin. They are Blaine, Camas, Gooding, and Lincoln counties. In general, approximately 61% of the subbasin resides in Blaine County (906.7 square miles), 18% in Gooding County (263.6 square miles), 17% in Lincoln County (246.5 square miles), and 5% in Camas County (78.5 square miles). Total subbasin area is 957,495 acres or 1,496.1 square miles. The total vertical relief in the subbasin is 8,713 feet, from an elevation of 3,000 feet at the Malad River confluence to the Middle Snake River to 11,713 feet at Ryan Peak in the Boulder Mountains. Figure E illustrates HUC 17040219 against other HUCs and adjacent county boundaries.

Figure E. HUC 17040219



- <u>Locations of Cities</u>
  The major cities in the Big Wood River Subbasin are illustrated in Figure F.

Figure F. Major cities



- <u>Major Land Ownership</u>
  Land ownership in the Big Wood River subbasin is defined according to county boundaries. Table R describes the land ownership by county for federal and nonfederal lands and the major land uses of nonfederal rural lands.

Table R. Major Land Ownership in the Big Wood River Subbasin

County	Non-federal Land Private	Non-federal Land State	Non-federal Land Other	Federal	Other	Total
Acres in 1000s						
Blaine	324.6	59.4	15.0	1300.5	0.0	1699.5
Camas	219.4	24.4	5.2	440.2	0.0	689.2
Gooding	192.8	10.0	6.3	260.2	0.0	469.3
Lincoln	149.0	46.9	0.3	576.6	0.0	772.8
Total	885.8	140.7	26.8	2577.5	0.0	3630.8
% of Total	24%	4%	<1%	71%	0%	100%

Prepared by IDEQ-TFRO. From USDA NRCS 1998.

- Cultural Features
  Cultural features in the Big Wood River Subbasin include the location of major dams/reservoirs (see Figure B), cities (see Figure F), and major streams (see Figures B and C). Point sources are located only in Segment 2 (Trail Creek to Glendale Diversion) of Figure C at Gimlet, Hailey, and Ketchum/Sun Valley.

- Demographics
  Overall, population growth in the subbasin increased 1.95 times from 1970 to 1998. Human congestion (persons per square mile) is estimated at 6.5 for Blaine County, 0.8 for Camas County, 18.6 for Gooding County, and 3.1 for Lincoln County (Robbins 2000 [Appendix 1 Population]).

  In analyzing 10-year population increments, population growth in the subbasin increased 1.43 times from 1970 to 1980, 1.14 times from 1980 to 1990, and 1.20 times from 1990 to 1998. The greatest growth has been in Blaine County due to the towns of Ketchum, Hailey, and Bellevue, which have experienced the most growth. Gooding County, Lincoln County, and then Camas County follow this same net growth.

History and Economics

The economic growth of the Big Wood River Subbasin has changed from a rush on gold and silver mining and timbering during the 1800s through the 1950s to a dependence on agriculture and cattle raising in the 1950s through1970s. A more diverse economy has since developed where tourism and recreation have taken on a significant role in the 1980s through 1990s. Other natural resources historically contributing to the economy of the area, include mining and timber, no longer provide the economic stability they once possessed in the early 1900s. The economy has since developed into a dependence on tourism and recreation, resulting in a large transient population and a resident population that is employed largely in service-oriented occupations such as merchandising and construction. See Hazen 2000; IDWR 1972 [p 7]; Luttrell and Brockway 1982 [pp 5-6], 1984 [p 4]; and, Robbins 2000 [p 8].

- Principal Economic Activities
  The principal economic activities which provide the backbone to the economic viability of the subbasin include irrigated agriculture (crop and animal production), rangeland ranching (private, BLM, and USFS), mining (about 10 active mines), and recreation (year-round on private and public lands). Recreation is by far the most important economic activity now. As far as crop production, prior to 1980, wheat was the primary cash crop, with hay, alfalfa, and other grains being used for cattle feed. During the 1970s it was estimated that 60-65% of the irrigated acreage consisted of alfalfa and pasture, with the remainder consisting of grain crops. In the 1990s the major agricultural crop commodities are wheat, barley, oats, alfalfa-hay, and potatoes (Robbins 2000 [p 7]). As far as recreation, before the mid-1960s the economy of the Big Wood River valley depended primarily on agriculture and ranching. The economy has since developed into a dependence on tourism and recreation, resulting in a large transient population. The resident population is employed largely in service-oriented occupations such as merchandising and construction (Luttrell and Brockway 1982 [pp 5-6], 1984 [p 4]).

- Main Industries
  The main industries which have linkage to the economic viability of the subbasin include agriculture (both irrigated and dryland), animal ranching (sheep and cattle), and recreation. The growth index ratio indicates that although the number of farms decreased from 1987 through 1997 in all counties, Lincoln and Gooding counties showed animal increases (over a 9-year period) in all cattle and calves. In the case of cows that have calved, beef cows decreased substantially as dairy cows increased in Gooding County. The four-county area for sheep and lambs showed animal increases (with the exception of Camas County over a 9-year period). Rangeland grazing is found in 100% of the 17 watersheds, or the equivalent of 69.8% of the total landuse. It is estimated that 71% of the land is owned and managed by the federal land management agencies. The remainder of the land is owned by the State or privately. See FGTC 1991; NCBA 1996; USDA FS 2000; and, USDA NRCS 1988. The recreation industry in the Big Wood River subbasin is diversified and growing rapidly due to increasing density of populations and increased competition for resource development. Recreation and its associated values are big business in the Big Wood River subbasin and are now receiving management attention from various state and federal land management agencies.

- Dates of Major Water Resource Activities
  The dates of the major water resource activities in comparison to major historical events are listed as follows:

Water Resource Activity	Date of Activity
Alexander Ross	1824 first fur trading expedition
Homesteaders	1836 first homesteaders
Spring Creek irrigation	1877 first irrigation commenced
Union Pacific Railroad	1880 established in Shoshone and Gooding
Magic Reservoir	1907-1909; raised 5’ in 1917

North Side Canal Company	1908 brought irrigation to Wendell area
Milner-Gooding Canal	1925 70-mile construction
Sun Valley Resort	1936 ski resort built by railroad
Magic Dam + Power	1988 powerhouse built

- Existing Local Groups Working on Water Quality
  A number of local groups in the Big Wood River Subbasin have been working on water quality issues for a number of years. These groups include the Wood River Watershed Advisory Group (which has interests in the Big Wood, Little Wood, and Camas Creek subbasins), the Blaine Soil Conservation District (SCD), the Camas SCD, the Gooding SCD, and the Wood River Soil and Water Conservation District (SWCD). In addition, the following groups have also participated in water quality projects/issues: Big Wood Canal Company, North Side Canal Company, and U.S. Bureau of Reclamation (BOR).

2. Subbasin Assessment – Water Quality Concerns and Status

This section links §1, Watershed Characterization, to water quality concerns and status of the subbasin 303(d) streams. In this section the identification and boundaries of the water quality limited segments (from the 1998 §303(d) list) will be described along with their listed pollutants and affected beneficial uses. Where data gaps exist these will be identified for future updating.

2.1 Water Quality Limited Segments Occurring in the Subbasin

Water quality limited segments are streams (or segments of streams) "where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-based effluent limitations required by sections 301(b) and 306 of the Clean Water Act" (40 CFR §130.2(j) and 40 CFR §131.3(h)). IDAPA §16.01.02.003.117 supports this definition. The process to designate water quality limited segments is established by 40 CFR §180.7(b)(1) by USEPA. Under this process, such waters require a TMDL when certain specified pollution reduction requirements (identified in 40 CFR §130.7(b)(1)(i), (ii), and (iii)) are not stringent enough to implement water quality standards. Idaho Code §39-3602(27) defines the TMDL process "for a waterbody not fully supporting designated beneficial uses."

Table A in the Executive Summary provides a description of the 303(d) streams from the 1998 303(d) list for the Big Wood River Subbasin. Table S summarizes the same 303(d) streams but in a more directed manner. The listing basis for all streams in the Big Wood River Subbasin was the Beneficial Use Reconnaissance Program (BURP) of the IDEQ.

Table S. 303(d) Segments in the Big Wood River Subbasin.

Waterbody Name	Segment ID Number	1998 303(d)[1] Boundaries	Pollutants
Mainstem Big Wood River			
Big Wood River, BWR - 1	Not 303(d)	Hwt to Trail Ck	U
Big Wood River, BWR – 2	2483	Trail Ck to Glen Div	Q
Big Wood River, BWR – 3	2482	Glen Div to BaseLine	Q
Big Wood River, BWR – 4	Not 303(d)	BaseLIne to Mag Res	Q
Big Wood River, BWR – 5	2478	Mag Res to Hwy 75	Ex Sed, Ex N, Q
Big Wood River, BWR – 6	2477	Hwy 75 to LWR	Ex Sed, Ex N, NH3, DO, E. coli, Q
Big Wood River, BWR – 7	2476	LWR to Int 84	Ex Sed, Ex N, NH3, DO, E. coli, Q
Big Wood River, BWR – 8	Not 303(d)	Int 84 to Snake River	U
Tributaries or Tributary Segments			

Horse Creek	7613	Hwt to BWR	U
Owl Creek	5290	Hwt to BWR	U
Baker Creek	5292	Hwt to Norton Ck	U
Baker Creek	Not 303(d)	NortonCk to BWR	U
Eagle Creek	5291	Hwt to BWR	U
Lake Creek	7614	Hwt to BWR	U
Placer Creek	5293	Hwt to WSCk	U
Cove Creek	5296	Hwt to EFWR	U
East Fork Wood River	5295	Hwt to Blind Can	U
Greenhorn Gulch	5294	Hwt to BWR	U
Quigley Creek	5297	Hwt to mouth	U
Croy Creek	2491	Elk Ck to BWR	Ex Sed, Ex N, Q
Seamans Creek	5298	Hwt to mouth	U
Rock Creek	2487	Hwt to Magic Res	Ex Sed, Tem, E. coli, Q
East Fork Rock Creek	5299	Hwt to Rock Ck	U
Thorn Creek	5300	Hwt to Schooler Ck	U
Prepared by IDEQ-TFRO. [1]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 (d) of the Clean Water Act. Q = Flow alteration or diversions. Ex Sed = Excess sediments. Ex N = Excess nutrients. NH3 = Total ammonia. DO = Dissolved oxygen. E. coli = Escherichia coli. Tem = Temperature, thermal modification. U = Unknown pollutants.			

2.2 Applicable Water Quality Standards

Applicable water quality standards and/or beneficial uses are listed in Table T according to the waterbody. Designated beneficial uses have been assigned already on the mainstem Big Wood River (See IDAPA 58.01.02.150.21). Existing beneficial uses are described for the tributaries.

According to IDAPA 58.01.02.050.02.a, “wherever attainable, surface waters of the state shall be protected for beneficial uses which for surface waters includes all recreational use in and on the water surface and the preservation and propagation of desirable species of aquatic life.” As defined in 40 CFR §131.3(f), “designated uses are those uses specified in water quality standards for each waterbody or segment whether or not they are being attained.” Surface water use designations are defined in IDAPA 58.01.02.100 and are to be protected wherever attainable. These designations include aquatic life (cold water biota, salmonid spawning, seasonal cold water, warm water, and modified), recreation (primary contact recreation and secondary contact recreation), water supply (domestic, agricultural, and industrial), wildlife habitats, and aesthetics. “The beneficial use is dependent upon actual use, the ability of the water to support a non-existing use either now or in the future, and its likelihood of being used in a given manner” (IDAPA 58.01.02.003.04).

Table T. Big Wood River Subbasin beneficial uses.

Waterbody	Beneficial Uses[1]						1998 §303(d) List[2]
	CW	SS	PCR	SCR	SRW	DWS	
Mainstem Big Wood River – Designated Uses							
Big Wood River, BWR - 1	X	X	X		X	X	No

Big Wood River, BWR – 2	X	X	X		X	X	Yes
Big Wood River, BWR – 3	X	X	X		X	X	Yes
Big Wood River, BWR – 4	X	X	X		X	X	No
Big Wood River, BWR – 5	X	X	X				Yes
Big Wood River, BWR – 6	X	X	X				Yes
Big Wood River, BWR – 7	X	X	X				Yes
Big Wood River, BWR – 8	X	X	X				No
Tributaries or Tributary Segments – Existing Uses							
Horse Creek	X	X		X			Yes
Owl Creek	X	X		X			Yes
Baker Creek – Hwt to NC	X	X		X			Yes
Baker Creek - Entire	X	X	X				No
Eagle Creek	X	X		X			Yes
Lake Creek	X	X		X			Yes
Placer Creek	X	X		X			Yes
Cove Creek	X	X		X			Yes
East Fork Wood River	X	X		X			Yes
Greenhorn Gulch	X	X		X			Yes
Quigley Creek	X	X		X			Yes
Croy Creek	X	X		X			Yes
Seamans Creek	X			X			Yes
Rock Creek	X	X		X			Yes
East Fork Rock Creek	X	X		X			Yes
Thorn Creek	X			X			Yes

Prepared by IDEQ-TFRO. [1]CW – Cold Water, SS – Salmonid Spawning, PCR – Primary Contact Recreation, SCR – Secondary Contact Recreation, AWS – Agricultural Water Supply, 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(d) of the Clean Water Act. BWR = Big Wood River. Hwt = Headwaters. NC = Norton Creek. Entire = the entire creek.

2.3 Summary and Analysis of Existing Water Quality Data

Past and existing water quality data was provided from the following agencies and/or organizations for the development of the Big Wood River Watershed Management Plan. Table U describes the nature of the data provided and the agency source.

Table U. Data sources of the Big Wood River Watershed Management Plan

Source	Water Quality	BURP Type	Flow Data	Water Rights	Surface Water	Ground Water	Habitat Data
IDEQ-TFRO	X	X	X		X	X	X
USFS-Twin Falls	X	X	X		X	X	X
IDFG-Jerome	X	X	X		X		X
USGS-Boise	X		X	X	X	X	
Idaho Power Company	X		X		X		
Municipality Industry	X		X		X		
USEPA	X	X	X		X	X	X
BLM-Shoshone	X	X	X		X		X
IDWR-Twin Falls			X	X	X	X	
IASCDs	X	X	X		X	X	X
Utah State University	X		X		X	X	
IWRRI-Kimberly	X		X		X	X	

Prepared by IDEQ-TFRO. USFS = U.S. Forest Service, Twin Falls office. IDFG = Idaho Department of Fish and Game, Jerome office. USGS = U.S. Geological Survey, Boise office. USEPA = U.S. Environmental Protection Agency. BLM = Bureau of Land Management, Shoshone office. IDWR = Idaho Department of Water Resources, Twin Falls office. IASCDs = Idaho Association of Soil Conservation Districts. IWRRI = Idaho Water Resources Research Institute, Kimberly office.

Flow Characteristics

USGS flow stations in the Big Wood River Subbasin are confined to the mainstem Big Wood River. They include nine (9) active stations and nine (9) discontinued stations. These are summarized in Table V according to location, drainage area, and period of record (POR).

Table V. USGS stream gauge information on the mainstem Big Wood River

USGS Gauge No.	Station Name	Latitude	Longitude	Drainage Area miles^2	POR
Active USGS Stream Gauging Stations					
13139500	At Hailey	N43°31’05”	W114°19’10”	640	1915-1999
13140800	At Stanton Crossing	N43°19’50”	W114°19’06”	820	1996-1999
13141000	Near Bellevue	N43°19’40”	W114°20’25”	824	1942-1996
13142000	Magic Reservoir nr Richfield	-	-	1,600	1909-1999
13142500	Below Magic nr Richfield	N43°14’53”	W114°21’20”	1,600	1911-1999
13152500	Malad River near Gooding	N42°53’12”	W114°43’08”	2,990	1937-1999
13152940	Malad Power Flume nr Bliss	N42°51’54”	W114°53’11”	3,000[1]	1985-1999
13153500	Malad River near Bliss	N42°51’48”	W115°54’04”	3,000[2]	1984-1999
13153501	Comb Malad River & Flume	N42°51’00”	W114°54’00”	3,000[1]	1985-1999
Discontinued USGS Stream Gauging Stations					
13135500	Near Ketchum	N43°47’11”	W114°25’27”	137	1948-1971
13136000	At Ketchum	N43°48’00”	W114°26’00”	240	1920-1921
13138500	At Gimlet	N43°36’00”	W114°21’00”	438	1920-1921
13140500	At Glendale Bridge	N43°26’00”	W114°15’00”	665	1920-1921
13144000	Above Gooding Canal	N43°06’00”	W114°18’00”	1,770	1921-1938

13144500	Below Gooding Canal	N43°04'00"	W114°18'00"	1,780	1911-1938
13145000	Near Shoshone	N43°00'00"	W114°28'00"	1,860	1908-1913
13145500	Above Thorn Creek	N43°00'00"	W114°35'50"	1,940	1926-1927
13146500	At Gooding	N42°57'00"	W114°43'00"	2,190	1921-1948

Prepared by IDEQ-TFRO. [1]Estimate based on USGS WY s 1985-1999. [2]Based on USGS WY 1987, p 255. nr = near. Comb = Combination. Magic = Magic Dam. Malad = Malad River.

A number of streamflow variables were utilized to describe the hydrologic attributes of the Big Wood River. These streamflow variables were statistically assessed for the period of record for each active USGS gauging station. Streamflow variables included the overall mean flow, minimum flow, maximum flow, median flow, days to baseline, overall mean baseflow, and peak flow month percentages. The days to baseline was determined using the overall drainage area. These are described in Tables W and X for the active USGS stations. The data indicates that minimum flows can reach zero at the Magic Reservoir (USGS Gauge 13142000) through the Malad River power flume near Bliss (USGS Gauge 13152940).

Table W. Basic flow analysis for the period of record (POR)

Active USGS Gauge	Mean Flow cfs	Minimum Flow cfs	Maximum Flow cfs	Median Flow cfs	Days to Baseline	Mean Baseflow cfs
13139500	407	13	1,842	357	3.6	1,700
13140800	559	27	4,670	138	3.8	2,238
13141000	302	10	5,120	105	3.8	1,399
13142000	95,867 ac ft	0 ac ft	195,400 ac ft	100,390 ac ft	4.4	-
13142500	489	0	9,800	70	4.4	667
13152500	316	1	6,400	125	5.0	1,398
13152940	1,190	0	1,500	1,210	5.0	1,225
13153500	309	66	5,390	115	5.0	644
13153501	1,499	1,000	6,400	1,330	5.0	935

Prepared by IDEQ-TFRO. Days to Baseline = Number of days it takes within the drainage to get to baseline flow from a peak flow event. ac ft = acre feet of water.

Table X describes the analysis of peak flow events and includes the top four months in which the highest flows occurred and their probability of occurrence. The top four months in which the highest flows (peak flows) occurred were April, May, June, and July. Non-peak flow months are represented by other months of the year (August through March). Peak flows occurred 100.0% of the time from Hailey (USGS Gauge 13139500) through below the Magic Dam (USGS Gauge 13142500). By the time the Big Wood River combines with the Little Wood River to form the Malad River (which is considered a part of the Big Wood River) peak flows range from 53.4-63.6% of the time. The main reason for this drop in probability occurrence is due to the increased density of the canal system that exists below the Magic Reservoir through the Malad River.

Table X. Analysis of peak flow events

Active USGS Gauge	Peak Flow Months Occurrence Probability				Total for Peak Flow Months	Total for Non-peak Flow Months
	April	May	June	July		
13139500	2.4%	44.0%	52.4%	1.2%	100.0%	0.0%
13140800	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%
13141000	5.5%	38.2%	54.5%	1.8%	100.0%	0.0%
13142000	-	-	-	-	-	-
13142500	18.2%	37.5%	31.8%	12.5%	100.0%	0.0%
13152500	41.3%	17.5%	4.8%	0.0%	63.6%	36.4%
13152940	46.7%	0.0%	0.0%	6.7%	53.4%	46.6%
13153500	25.0%	25.0%	6.3%	0.0%	56.3%	43.7%
13153501	35.9%	12.5%	3.2%	3.4%	56.0%	44.0%
Prepared by IDEQ-TFRO. Total for Peak Flow Months = the total occurrence probabilities for the months of April, May, June, and July. Total for Non-peak Flow Months = 100.0% - Total for Peak Flow Months.						

Table Y more specifically describes the flows of the streams being considered in the Big Wood River Watershed Management Plan and categorizes the flows into flushing spring flows, mean flows, and low summer flows. Critical time periods of concern are also listed. The impact on the support status of beneficial uses is also considered based on the effects of flow alteration or flow diversion. This support status is best professional and scientific judgment based on data compiled from IDEQ-TFRO, IDFG, USGS, BLM, and USFS. Flow alteration and/or flow diversion has the potential to affect riparian areas, habitat, instream temperature, suspended sediment, substrate sediment, turbidity, and other biological components of a stream's ecology. Flow alteration and/or flow diversion by itself does not necessarily detract from a stream's beneficial uses without additional appropriate parameters being implicated in the detraction.

Table Y. Flow characteristics and critical time periods

Stream Name	Critical Time Periods		Estimated Flows, cfs			FA and Div on BU
	Spring	Spawning	Spring	Mean	Summer	
Mainstem Big Wood River						
BWR-1	Apr to May	Oct 01 – Jul 15	1,023	88	23	Support
BWR-2	Apr to May	Oct 01 – Aug 01	3,232	273	30	Not Support
BWR-3	Apr to May	Oct 01 – July 15	1,015	445	189	Not Support
BWR-4	Apr to May	Oct 01 – Aug 01	3,058	465	146	Not Support
BWR-5	May to Jun	Oct 01 – Jul 15	1,466	345	92	Not Support
BWR-6	May to Jun	Oct 01 – July 15	206	37	10	Not Support
BWR-7	May to Jun	Oct 01 – Jul 15	2,716	561	134	Not Support
BWR-8	May to Jun	Jan 15 – July 15	1,801	525	203	Not Support

Tributaries or Tributary Segments						
Horse Creek	Apr to May	Oct 01 – Aug 01	5.9	1.7	0.6	Support
Owl Creek	Apr to May	Oct 01 – Aug 01	7.2	2.9	0.9	Support
Baker Creek	Apr to May	Oct 01 – Aug 01	34.4	11.8	3.4	Support
Eagle Creek	Apr to May	Oct 01 – Jul 15	6.6	2.8	0.9	Not Support
Lake Creek	Apr to May	Oct 01 – Jul 15	4.9	2.2	0.6	Not Support
Placer Creek	Apr to May	Oct 01 – Jul 15	3.9	2.2	1.0	Support
Cove Creek	Apr to Jun	Oct 01 – Jun 01	3.5	1.4	0.4	Not Support
EFWR	Apr to May	Oct 01 – Aug 01	8.0	4.6	2.6	Support
Greenhorn Gulch	Apr to May	Oct 01 – Jul 15	2.2	0.6	0.2	Not Support
Quigley Creek	Apr to Jun	Oct 01 – Jul 15	25.0	9.9	2.7	Not Support
Croy Creek	Apr to Jun	Oct 01 – Jul 15	10.6	2.2	0.6	Not Support
Seamans Creek	Apr to Jun	Oct 01 – Jul 15	1.5	0.6	0.3	Not Support
Rock Creek	Apr to Jun	Oct 01 – Jul 15	7.1	1.8	0.5	Not Support
EFRC	Apr to Jun	Oct 01 – Jul 15	1.8	1.1	0.6	Support
Thorn Creek	Apr to Jun	Oct 01 – Jul 15	23.2	3.8	1.0	Not Support
Prepared by IDEQ-TFRO. BWR = Big Wood River. EFWR = East Fork Wood River. EFRC = East Fork Rock Creek. Spring = Spring flushing flows. Spawning = Salmonid spawning period. Summer = Low summer flows. FA = Flow alteration. Div = Flow diversion. BU = Beneficial uses.						

Water Column Data

Water column data is summarized in the Table Z as to exceedances, beneficial support status, and trend analysis. Parameters summarized include temperature (Tem), dissolved oxygen (DO), pH, turbidity (NTU), total suspended solids (TSS), total ammonia (NH3), total nitrite + nitrate (NOX), total phosphorus (TP), *Escherichia coli* (*E. coli*), substrate (Sub) sediments, total nitrogen to total phosphorus (TN: TP) ratio, and the water quality index (WQI). Although most of the parameters summarized are singular attributes of the water column chemistry, the TN: TP ratio and the WQI are both multi-parameter components. While the TN: TP ratio includes total Kjeldahl nitrogen (TKN), NOX, and TP, the WQI includes Tem, DO, pH, fecal coliform bacteria, total solids (TSS and total dissolved solids), total nitrogen (NH3 + NOX), TP, and biological oxygen demand 5-day (BOD5).

Table Z. Water column data of the Big Wood River Subbasin

Name	Tem	DO	pH	NTU	TSS	NH3	NOX	TP	*E. coli*	Sub	TN:TP	WQI
Mainstem Big Wood River												
BWR-1	<10 Sup Neg	≥ 6 Sup Neg	War Sup Stat	War Sup Neg	<25 Sup Neg	<0.02 Sup Neg	<0.3 Sup Neg	Exc Sup Neg	<126 Sup Stat	32.2 Sup -	N & P Sup -	Excel Sup Pos
BWR-2	Exc NS Pos	≥ 6 Sup Stat	War Sup Stat	War Sup Neg	<25 Sup Pos	<0.02 Sup Stat	<0.3 Sup Stat	Exc NS Stat	<126 Sup Stat	46.3 NS -	N Sup -	Poor NS Neg
BWR-3	Exc NS Neg	≥ 6 Sup Stat	War Sup Stat	War Sup Stat	<25 Sup Stat	<0.02 Sup Neg	Exc NS Neg	Exc NS Stat	<126 Sup Neg	53.5 NS -	N & P Sup -	Excel Sup Pos
BWR-4	Exc NS	≥ 6 Sup	War Sup	War Sup	<25 Sup	<0.02 Sup	Exc NS	Exc NS	<126 Sup	58.6 NS	N Sup	Good Sup

	Stat	Stat	Pos	Stat	Stat	Neg	Neg	Stat	Stat	-	-	Stat
BWR-5	Exc NS Stat	≥ 6 Sup Neg	War Sup Pos	War Sup Neg	<25 Sup Stat	<0.02 Sup Neg	Exc NS Stat	Exc NS Stat	<126 Sup Neg	31.3 Sup -	N Sup -	Good Sup Pos
BWR-6	Exc NS -	Exc NS -	War Sup -	Exc NS -	Exc NS -	<0.02 Sup -	Exc NS -	Exc NS -	<126 Sup -	44.2 NS -	N Sup -	Poor NS -
BWR-7	Exc NS Stat	≥ 6 Sup Neg	War Sup Pos	War Sup Stat	Exc NS Stat	<0.02 Sup Neg	Exc NS Stat	Exc NS Neg	<126 Sup Stat	54.9 NS -	N Sup -	Poor NS Neg
BWR-8	Exc Sup -	≥ 6 Sup -	War Sup -	War Sup -	<50 Sup -	<0.02 Sup -	Exc NS -	Exc NS -	<126 Sup -	52.9 NS -	N Sup -	Good Sup -
Tributaries or Tributary Segments												
Horse Creek	<10 Sup Stat	≥ 6 Sup Neg	War Sup Stat	War Sup Stat	<25 Sup Stat	<0.02 Sup Pos	<0.3 Sup Pos	<0.05 Sup Neg	<126 Sup Stat	30.8 Sup -	N & P Sup -	Excel Sup Stat
Owl Creek	<10 Sup Stat	≥ 6 Sup Neg	War Sup Pos	War Sup Stat	<25 Sup Stat	<0.02 Sup Stat	<0.3 Sup Neg	<0.05 Sup Neg	<126 Sup Stat	19.9 Sup -	N Sup -	Excel Sup Stat
Baker Creek	<10 Sup Neg	≥ 6 Sup Neg	War Sup Stat	War Sup Stat	<25 Sup Stat	<0.02 Sup Pos	<0.3 Sup Neg	<0.05 Sup Stat	<126 Sup Stat	24.7 Sup -	N Sup -	Excel Sup Stat
Eagle Creek	<10 Sup Stat	≥ 6 Sup Neg	War Sup Stat	War Sup Neg	<25 Sup Stat	<0.02 Sup Stat	<0.3 Sup Stat	Exc NS Neg	<126 Sup Stat	27.2 Sup -	N Sup -	Good Sup Stat
Lake Creek	<10 Sup Stat	≥ 6 Sup Stat	War Sup Stat	War Sup Neg	<25 Sup Stat	<0.02 Sup Stat	Exc NS Stat	Exc NS Stat	<126 Sup Stat	21.4 Sup -	N Sup -	Excel Sup Stat
Placer Creek	<10 Sup Stat	≥ 6 Sup Neg	War Sup Stat	War Sup Stat	<25 Sup Stat	<0.02 Sup Neg	Exc NS Stat	Exc NS Pos	<126 Sup Stat	31.6 Sup -	N Sup -	Excel Sup Stat
Cove Creek	<10 Sup Stat	≥ 6 Sup Stat	War Sup Pos	Exc NS Neg	Exc NS Stat	<0.02 Sup Stat	<0.3 Sup Neg	Exc NS Stat	<126 Sup Neg	51.7 NS -	N NS -	Good Sup Stat
EFWR	<10 Sup Neg	≥ 6 Sup Stat	War Sup Stat	War Sup Stat	<25 Sup Stat	<0.02 Sup Stat	<0.3 Sup Stat	<0.05 Sup Stat	<126 Sup Stat	15.4 Sup -	N Sup -	Good Sup Stat
Green-horn G	Exc NS Stat	≥ 6 Sup Neg	War Sup Stat	War Sup Stat	Exc NS Stat	<0.02 Sup Stat	<0.3 Sup Stat	Exc NS Stat	<126 Sup Stat	36.1 NS -	N Sup -	Fair NS -
Quigley Creek	Exc NS Stat	≥ 6 Sup Stat	War Sup Pos	War Sup Neg	<25 Sup Stat	<0.02 Sup Stat	Exc NS Stat	Exc NS Neg	<126 Sup Neg	62.8 NS -	N NS -	Good Sup Stat
Croy Creek	<10 Sup Stat	≥ 6 Sup Stat	War Sup Stat	War Sup Stat	<25 Sup Pos	<0.02 Sup Pos	<0.3 Sup Pos	Exc NS Pos	<126 Sup Stat	68.9 NS -	N NS -	Good Sup Neg
Sea-mans Creek	Exc NS Stat	≥ 6 Sup Stat	War Sup Pos	War Sup Neg	<25 Sup Stat	<0.02 Sup Stat	Exc NS Stat	Exc NS Stat	<126 Sup Neg	44.7 NS -	N NS -	Fair NS Neg
Rock Creek	Exc NS Stat	≥ 6 Sup Neg	War Sup Pos	War Sup Neg	<25 Sup Stat	<0.02 Sup Neg	Exc NS Stat	Exc NS Stat	Exc NS Neg	54.5 NS -	N NS -	Fair NS Stat
EFRC	Exc NS -	≥ 6 Sup Neg	War Sup Stat	War Sup -	<25 Sup -	<0.02 Sup -	Exc NS -	Exc NS -	<126 Sup -	83.5 NS -	P NS -	Good Sup -
Thorn Creek	Exc NS	Exc NS	War Sup	Exc NS	Exc NS	<0.02 Sup	Exc NS	Exc NS	<126 Sup	84.5 NS	N NS	Poor NS

	-	-	-	-	-	-	-	-	-	-	-	-

Prepared by IDEQ-TFRO. The water column parameters are per waterbody and have three (3) attributes or descriptive components summarized criteria exceedence, beneficial use support, and trend analysis. The criteria exceedence is described per water quality parameter. The beneficial use support is either Supports (Sup) or Not Support (NS). The trend analysis is based on data collected from the 1970s through the 1990s and is either Positive (Pos) or increasing, Negative (Neg) or decreasing, or Static (Stat) or unchanging.

Temperature (Tem): Cold water aquatic life and salmonid spawning diel values are either < 10% exceedances (Exc) and thus supporting (Sup) beneficial uses or else not supporting (NS) meeting beneficial uses. For the most part cold water aquatic life is supported and salmonid spawning is not.

Dissolved Oxygen (DO): Cold water aquatic life and salmonid spawning both require DO values ≥ 6 mg/L. Exceedances (Exc) are all < 6 mg/L.

pH: Values may range between pH 6.5 and pH 9.5 for cold water aquatic life and salmonid spawning and meet beneficial uses, thus within acceptable range (War). Otherwise exceedances (Exc) exist beyond the normal pH range.

Turbidity (NTU): NTU values are described in accordance with apparent background and statutory background. NTU values need to be < statutory background, thus falling within acceptable range (War). Otherwise, they are exceedances (Exc).

Total suspended solids (TSS): TSS targets are set at < 25 mg/L or < 50 mg/L based on whether the stream exists above or below the Magic Reservoir, respectively. Otherwise, they are exceedances (Exc).

Total ammonia (NH3): NH3 values as un-ionized values requires values to be < 0.020 mg/L. Otherwise, they are exceedances (Exc).

Total nitrite + nitrate (NOX): NOX values need to be < 0.300 mg/L. Otherwise, they are exceedances (Exc).

Total phosphorus (TP): TP values have been set as targets at < 0.050 mg/L and < 0.100 mg/L, above and below the Magic Reservoir, respectively. Exceedances (Exc) will be shown as % instantaneous values > instream target.

E. coli: Bacteria values must be < 126 cfu[9]/100 mL (geometric mean), otherwise they are considered exceedances (Exc).

Streambed substrate (Sub) sediments: Sub targets need to be < 35.0%. Otherwise, they are considered exceedances (Exc). Only the overall Sub sediments are considered in this analysis. Individual segments need to be considered separately.

TN:TP Ratio: Limiting ratio may be nitrogen limiting (N) or phosphorus limiting (P). Actual visual observations of excess algae, macrophytes, slimes, mold, or mosses are critical to the assessment.

Water Quality Index (WQI): The WQI ranges from Bad, Fair, Good, to Excellent (Excel). A grade of 90%+ is Excellent, 85-90% Good, 80-84% Fair, and < 74% Bad.

Biological and Other Data

This section summarizes the macroinvertebrate data, fisheries data, habitat data, and other organic chemical data. The major sources of information are IDEQ-TFRO and IDFG. Other agencies and organizations data was reviewed but its applicability was either too old (before 1980) or without quality assurance/quality control. Tables AA, BB, and CC summarize these three biological data, respectively.

The collecting of macroinvertebrates in wadable streams is an essential part of the Beneficial Use Reconnaissance Program (BURP) with IDEQ. Macroinvertebrates reflect the overall ecological integrity of a stream's biological community. Because the biologic community is exposed to the stream's condition over a long period of time, it provides an integrated representation of water conditions and thereby allows for a better classification of the stream's condition and support status. Table AA has the macroinvertebrate biotic index

(MBI) for each 303(d) segment. The MBI is comprised of seven- (7) metrics. Data was collected using BURP and assessed through the Waterbody Assessment Guidance (WBAG) process. For purposes of the Big Wood River subbasin assessment, MBI values > 3.5 were considered Full Support, indicating Full Support status of the stream's biologic condition. By default, MBI values < 3.5 were considered Not Support, indicating Not Support status of the stream's biologic condition. Macroinvertebrate data in Table AA does not possess information for the mainstem Big Wood River as this is classified as a large river and protocols have yet to be established for large rivers and macroinvertebrate collections.

Table AA. MBI scores for 303(d) wadable streams of the Big Wood River subbasin

STREAM NAME	BURP No.	Location	MBI Score	Support Status
Horse Creek	95STWFB047	Entire Creek	4.61	Full Support
Owl Creek	95STWFB055	Upper	4.74	Full Support
Baker Creek	93STWF027	Middle	4.75	Full Support
	95STWFB016	Upper	3.70	Full Support
	95STWFB040	Lower	4.61	Full Support
Eagle Creek	95STWFB017	Upper	3.96	Full Support
	95STWFB042	Lower	1.03	Not Full Support
Lake Creek	95STWFB019	Upper	4.62	Full Support
	96STWFA011	Lower	3.13	Not Full Support
Placer Creek	96STWFA054	Upper	1.91	Not Full Support
Cove Creek	95STWFB029	Middle	1.55	Not Full Support
East Fork Wood River	93 STWF032	Upper	3.26	Not Full Support
	95STWFB041	Upper	5.70	Full Support
	96STWFA049	Middle	4.77	Full Support
	96STWFA051	Middle	5.18	Full Support
Greenhorn Gulch	95STWFB028	Upper	1.55	Not Full Support
	96STWFB06	Upper	4.57	Full Support
Quigley Creek	95STWFB020	Upper	2.24	Not Full Support
	96STWFB009	Upper	3.69	Full Support
Croy Creek	95STWFB030	Lower	1.02	Not Full Support
	96STWFB016	Lower	3.64	Full Support
Seamans Creek	95STWFA054	Middle	3.11	Not Full Support
	95STWFA056	Lower	1.92	Not Full Support
Rock Creek	95STWFA018	Middle	2.42	Not Full Support
	95STWFA019	Lower	2.54	Not Full Support
East Fork Rock Creek	95STWFA022	Lower	2.08	Not Full Support
Thorn Creek	95STWFB010	Upper	1.39	Not Full Support
Prepared by IDEQ-TFRO. Data summarized from information in repository with IDEQ-TFRO.				

The same reasoning for sampling macroinvertebrates is applicable to fish. Fish provide a long-term indication of the stream's biological condition. In this section a review of existing fisheries data for IDEQ-TFRO and IDFG is provided in Table BB on a per stream segment or tributary basis. The data is indicative of the presence or absence of fisheries for both agencies. The presence of juvenile salmonids (< 100 mm) is used as an indicator that salmonid spawning is present in the stream. From the data four families (Castostomidae, Cottidae, Cyprinidae, and Salmonidae) represent the fish fauna of the Big Wood River. Wild rainbow trout are the predominant game fish comprising an average of 85% of the trout.

Brook trout comprise about 2% of the trout. Brown trout are present due to illegal introductions. Cutthroat trout were once common but no longer are seen in their historical numbers. Mountain whitefish are present in all reaches of the river above the Magic Reservoir. And, hatchery rainbow trout comprise a majority (about 52%) of the total trout harvested (IDFG 1990 [pp 7, 15, 40, 47, 51, 52, and 57]).

Table BB. Summary of fisheries data in Big Wood River subbasin

Stream Name	Age Class			Fish Species Presence							Comments
	YOY	Juv	Ad	RT	BkT	BnT	CT	MW	WR	MS	
Mainstem Big Wood River											
BWR-1	X	X		X	X	X		X	X	X	Fish size normally small; S
BWR-2	X	X	X	X	X	X	X	X	X		Most productive fishing; Q; S
BWR-3	X	X	X	X	X	X	X	X			Q; NS
BWR-4	X	X	X	X	X	X	X	X			BnT redds have declined; Q; S
BWR-5	X	X	X	X							RT redds present; Q; S
BWR-6	X	X	X	X							Q; NS
BWR-7	X	X	X	X							Warm water fish present; Q; NS
BWR-8	X	X	X	X							Warm water fish present; Q; S
Tributaries or Tributary Segments											
Horse Creek	X	X		X	X		X		X	X	Fish size normally small; S
Owl Creek	X	X	X	X	X		X		X	X	Recreational fishing; S
Baker Creek	X	X	X	X	X	X	X	X	X	X	Recreational fishing; S
Eagle Creek	X	X	X	X	X				X	X	Q; S
Lake Creek	X	X	X	X	X				X	X	Q; S
Placer Creek	X	X		X	X				X	X	Fish size normally small; NS
Cove Creek	X	X		X	X						Q; spawning in upper stretch; NS
EFWR	X	X		X	X		X	X	X	X	S; Fish size is normally small
Greenhorn G	X	X		X	X				X	X	NS; Q; spawning unlinked to BW
Quigley Ck	X	X		X	X				X	X	S; Q
Croy Creek	X	X		X	X						NS; Q
Seamans Ck	X	X		X	X						NS; Q
Rock Creek	X	X		X	X	X					NS; Q; Sediment problems
EFRC	X	X		X	X				X	X	NS; Sediment problems
Thorn Creek	X	X		X	X						NS; Q; Sediment problems

Prepared by IDEQ-TFRO. BWR or BW = Big Wood River. Ck = Creek. EFWR = East Fork Wood River. EFRC = East Fork Rock Creek. G = Gulch.

Fish Age Class: YOY = Young of year, < 100 mm. Juv = Juvenile = 100-200 mm. Ad = Adult = > 200 mm. RT = Rainbow trout (wild and hatchery combined). BkT = Brook trout. BrT = Brown Trout. CT = Cutthroat trout. MW = Mountain whitefish. WR = Wood River sculpin. MS = Mottled sculpin. Q = Flow; de-watering of stream is possible. S = Supports beneficial uses. NS = Does not support beneficial uses.

For purposes of the Big Wood River Subbasin, various measurements of the physical habitat of the stream channel, floodplain, and water constituents can provide important information. The physical condition of a waterbody may be associated with human activities, such as logging, agriculture, livestock grazing, or urban development (Clarkson and Wilson 1995; Connolly and Hall 1999; Li *et al.* 1994; Platts and Nelson 1989; Roth *et al.* 1996; Waite and Carpentar 2000; Yoder and Smith 1999). Such information is important because when the physical habitat is in poor condition it is expected that the biological health of the stream will be affected adversely as well. Table CC summarizes the habitat index (HI) as used in the BURP process for the wadable streams. It does not include the Big Wood River since it is considered a large river. The IDEQ has chosen the range of HI scores according to ecoregion to be trisected so as to identify the "best" versus the "worst" streams. These trisections are used to differentiate between levels of impairment. For Northern Rockies (NR) ecoregion the trisections occurred at < 43 (Impairment), 43 – 84 (Needs Verification), and > 84 (Not Impaired). For the Snake River Plain/High Desert (SRP/HD) ecoregion the trisections occurred at < 37 (Impairment), 37 – 72 (Needs Verification), and > 72 (Not Impaired) (IDEQ 1996 [p 59]. For purposes of the Big Wood River subbasin assessment, the trisections are utilized as Not Impaired (NR > 84; SRP/HD > 72) versus Impaired/Needs Verification (or Impaired) categories. All streams that do not fall in the Not Impaired category (with appropriate ground truthing) are considered impaired at some level until more information is collected to suggest otherwise.

Table CC. HI information on wadable tributaries in the Big Wood River subbasin

Stream Name (BURP ID)	DATE	% GRADIENT	% FINES	HI	Impairment
Horse Creek	95STWFB047	7.0	40.3	58	Impaired
Horse Creek – Upper	091900	12.0	25.0	137	Not Impaired
Horse Creek – Middle	091900	6.0	27.3	130	Not Impaired
Horse Creek – Upper	091900	8.0	28.8	158	Not Impaired
Horse Creek, average values			30.4	121	Not Impaired
Owl Creek	(95STWFB055)	11.0	5.1	115	Not Impaired
Owl Creek – Upper	09-19-2000	10.5	5.1	141	Not Impaired
Owl Creek – Middle	09-19-2000	38.3	14.2	136	Not Impaired
Owl Creek – Lower	09-19-2000	12.1	27.2	109	Not Impaired
Owl Creek, average values			12.9	125	Not Impaired
Lake Creek	(95STWFB019)	6.0	18.3	96	Not Impaired
Lake Creek	(96STWFA011)	3.0	29.2	84	Not Impaired
Lake Creek – Upper	10-13-2000	2.0	18.5	92	Not Impaired
Lake Creek – Lower	10-13-2000	3.0	24.5	76	Impaired
Lake Creek, average values			22.6	87	Not Impaired
Cove Creek	(95STWFB029)	2.0	14.7	68	Impaired
Cove Creek – Upper	10-13-2000	6.0	86.9	74	Impaired
Cove Creek – Middle	10-13-2000	1.0	16.8	83	Impaired
Cove Creek – Lower	10-13-2000	4.0	30.3	57	Impaired
Cove Creek, average values			37.2	71	Impaired
East Fork Wood River	(93STWF032)	3.0	32.2	115	Not Impaired
East Fork Wood River	(95STWFB041)	3.5	15.2	81	Impaired
East Fork Wood River	(96STWFA049)	2.8	11.2	100	Not Impaired
East Fork Wood River	(96STWFA051)	2.1	24.4	101	Not Impaired
East Fork Wood River	10-13-2000	12.0	16.3	111	Not Impaired
East Fork Wood River, average values			19.9	102	Not Impaired
Croy Creek	(95STWFB030)	0.5	55.3	56	Impaired
Croy Creek	(96STWFB016)	2.8	72.3	25	Impaired

Croy Creek – A	10-9-2000	1.6	82.1	50	Impaired
Croy Creek - B	10-9-2000	2.2	65.8	45	Impaired
Croy Creek, average values			68.9	38	Impaired
Quigley Creek	(95STWFB020)	2.0	80.0	64	Impaired
Quigley Creek	(96STWFB009	3.1	49.7	76	Impaired
Quigley Creek – Upper	10-9-2000	9.0	63.2	55	Impaired
Quigley Creek – Middle	10-9-2000	5.0	45.0	76	Impaired
Quigley Creek – Lower	10-9-2000	2.0	74.6	59	Impaired
Quigley Creek, average values			62.5	66	Impaired
Eagle Creek	(95STWFB017)	2.5	16.5	88	Not Impaired
Eagle Creek	(95STWFB042)	4.5	17.7	84	Not Impaired
Eagle Creek – Upper	9-19-2000	16.0	15.7	103	Not Impaired
Eagle Creek – Middle	9-19-2000	4.0	16.6	85	Not Impaired
Eagle Creek - Lower	9-19-2000	4.0	43.2	71	Impaired
Eagle Creek, average values			21.9	86	Not Impaired
Placer Creek	(96STWFA054)	5.1	30.1	96	Not Impaired
Placer Creek – Upper	10-13-2000	12.0	29.9	102	Not Impaired
Placer Creek - Lower	10-13-2000	5.0	26.9	87	Not Impaired
Placer Creek, average values			29.0	95	Not Impaired
Baker Creek	(93STWF027)	1.5	25.2	87	Not Impaired
Baker Creek	(95STWFB016)	4.0	18.5	90	Not Impaired
Baker Creek	(95STWFB040)	1.0	26.4	84	Not Impaired
Baker Creek – Upper	9-19-2000	24.0	16.0	117	Not Impaired
Baker Creek – Middle	9-19-2000	6.0	21.1	112	Not Impaired
Baker Creek - Lower	9-19-2000	5.0	24.4	106	Not Impaired
Baker Creek, average values			21.9	99	Not Impaired
Greenhorn	(95STWFB028)	1.0	30.6	89	Not Impaired
Greenhorn	(96STWFB06)	4.0	46.5	85	Not Impaired
Greenhorn – Upper	10-9-2000	7.0	44.1	85	Not Impaired
Greenhorn – Middle	10-9-2000	6.0	29.9	82	Impaired
Greenhorn – Lower	10-9-2000	2.0	28.7	90	Not Impaired
Greenhorn Gulch, average values			36.0	86	Not Impaired
Seamans Creek	(95STWFA054)	1.2	55.4	87	Not Impaired
Seamans Creek	(95STWFA056)	6.0	30.2	88	Not Impaired
Seamans Creek – Up	10-9-2000	1.0	31.5	81	Impaired
Seamans Creek – Mid	10-9-2000	2.0	63.2	72	Impaired
Seamans Creek – Low	10-9-2000	3.0	46.4	71	Impaired
Seamans Creek, average values			45.3	80	Impaired
Rock Creek	(95STWFA018)	1.0	55.2	102	Not Impaired
Rock Creek	(95STWFA019)	2.0	45.5	111	Not Impaired
Rock Creek – Upper	8-22-2000	1.0	33.7	61	Impaired
Rock Creek – Lower A	8-22-2000	1.0	50.6	58	Impaired
Rock Creek – Lower B	8-22-2000	1.0	38.5	58	Impaired
Rock Creek, average values			44.7	78	Impaired
East Fork Rock Creek	(95STWFA022)	2.0	82.7	59	Impaired
EFRC – Up	8-22-2000	14.0	81.6	54	Impaired
EFRC – Low	8-22-2000	4.0	76.5	45	Impaired

East Fork Rock Creek, average values			80.3	53	Impaired
Thorn Creek	(95STWFB010)	2.0	94.4	30	Impaired
Thorn Creek – Up A	9-15-2000	4.0	82.9	53	Impaired
Thorn Creek – Up B	9-15-2000	3.4	75.3	53	Impaired
Thorn Creek – Up C	9-15-2000	2.6	85.4	48	Impaired
Thorn Creek, average values			84.5	46	Impaired
Prepared by IDEQ-TFRO. HI = Habitat index. I = Impaired. NI = Not Impaired. EFRC = East Fork Rock Creek. Up = Upper. Mid = Middle. Low = Lower.					

- <u>Other Organic Chemical Data</u>
  During the course of data collection it was brought to the attention of IDEQ-TFRO by the Wood River WAG that phenolic acids, as a bark by-product of rotting lodgepole pines, might have an effect on the water quality of the Big Wood River. The inference was that elevated water temperatures and certain fish toxicities were due to the introduction of phenolic acid type compounds into the surface waters. The application of this inference was that these phenolic acid compounds were impacting most drainages of the Big Wood River from its headwaters to where it discharges to the Snake River and causing the elevated stream temperatures. Upon preliminary assessment of the situation, IDEQ-TFRO met with representatives of IDFG, USGS, USFS, and BLM. Additionally, three (3) independent fish toxicologists from Purdue University, Colorado State University, and Texas A & M University were also consulted. The express opinion of the group was that the values from the independent data collection and the literary citations proved very little to address the issue of phenolic acids in the Big Wood River system. Additionally, very little information or data was present or in the historical literature that could implicate phenolic acid compounds as the source (or additional source) for elevated temperature values in the Big Wood River system or its tributaries.

  IDEQ-TFRO decided to do some field investigations. IDEQ-TFRO made site visitations of all 303(d) streams in the higher, middle, and lower elevations and found no evidence of “abnormally high levels of rotting biomass” that could potentially get into the Big Wood River. Therefore, it has concluded initially that the possibility of phenolic acids leaching from these biomass sources is relatively minor to account for any significant changes to water quality and/or the fisheries. In particular, a very detailed search of these “abnormally high levels of rotting biomass” was conducted on Horse Creek, Baker Creek, Owl Creek, Eagle Creek, Lake Creek, Placer Creek, East Fork Wood River, Cove Creek, Greenhorn Gulch, and the entire headwaters to Glendale Diversion stretch of the Big Wood River. Such significant sources were not evident even in areas where previous avalanche activity had occurred. IDEQ-TFRO was forced to conclude that phenolic acid compounds were not a significant source to cause elevated temperatures in any stretch of the Big Wood River or and 303(d) tributary.

  More recently, the USFS (Boise National Forest) has modified their initial scientific opinion on phenolic acid compounds. Their current scientific opinion is that the potential does, in fact, exist for phenolic acids to be a "problem" if there has been a hot burn through an old growth area (particularly if lodgepole pines are present). In fact, if phenolic acids are causing a problem, it is only in isolated areas of a National Forest and not necessarily throughout the entire forest. Based on this best professional opinion, the IDEQ-TFRO has joined with USFS to explore this issue. In particular are those areas of the USFS ground where a hot burn has taken out an old growth area (particularly if lodgepole pines are present) and if the stream of concern is a 303(d) stream. IDEQ-TFRO will continue to investigate this issue and will provide resolution during the implementation-planning phase.

Status of Beneficial Uses

Throughout §2.3, Summary and Analysis of Existing Water Quality Data, an attempt has been made to provide linkage on all data to beneficial use support status. This linkage is described as follows.

1. Table Y summarizes the flow characteristics (described in Tables V, W, and X) on each 303(d) stream and what the potential impact from flow alteration or flow diversion is on the beneficial uses relative to critical time periods for salmonid spawning. If flow alteration or flow diversion has the potential to de-water the stream below the estimated summer flow, then the beneficial uses are Not Support (ed). If flow alteration or flow diversion remains above the estimated summer flow, then the beneficial uses is Support (ed). Flow diversion and/or flow alteration has the potential to affect riparian areas, habitat, instream temperature, suspended sediment, substrate sediment, turbidity, and other biological components of a stream's ecology.

2. Table Z summarizes the water column data on each 303(d) stream and whether the beneficial uses (as state water quality standards or as instream water quality targets) are being supported. Additionally, the TN: TP ratio and the WQI provide additional substantiation of the condition of the water column chemistry relative to beneficial use support. State water quality standards being considered include temperature, dissolved oxygen, pH, turbidity, un-ionized ammonia, and *E. coli*. The beneficial uses involved here include cold water aquatic life, salmonid spawning, and recreation. Instream water quality targets considered include NOX, TP, Sub, TN: TP, and WQI. The beneficial uses involved here include cold water aquatic life, salmonid spawning, recreation, aesthetics, and wildlife habitats. If the water quality data is Sup (Support), then the beneficial uses are fully supported. If the water quality data is NS (Not Support), then the beneficial uses are not fully supported.

3. Table AA summarizes the MBI scores for the 303(d) wadable streams and whether the biological community is being supported by the multi-metrics used to obtain the MBI score. If the support status is Full Support, then the beneficial uses are fully supported according to the MBI score. If the support status is Not Full Support, then the beneficial uses are not fully supported according to the MBI score. The beneficial use involved here is cold water aquatic life.

4. Table BB summarizes the fisheries data according to age classification and the presence of salmonids. If the support status is S (Support), then the beneficial uses are fully supported. If the support status is NS (Not Support), then the beneficial uses are not fully supported. The beneficial uses involved here are cold water aquatic life and salmonid spawning.

5. Table CC summarizes the HI information on wadable streams. Included in this summary is the stream gradient and the percent fines. If the habitat is in poor condition (Impaired), then it is expected that the biological health of the stream will be adversely affected. If the habitat is in good condition (Not Impaired), then it is expected that the biological health of the stream will not be adversely affected. The beneficial use involved here is cold water aquatic life and wildlife habitats.

Conclusions

Table DD summarizes the following: (1) which listed streams are truly water quality limited and need a loading analysis, (2) times of critical flow for impaired uses, (3) clarification of boundaries or extent of water quality criteria exceedances or use impairment, (4) critical reaches most sensitive to use impairment, and (5) key indicators of use impairment.

Table DD. Summary conclusions of water quality data and beneficial uses

Stream Name	Truly WQLS	Require TMDL	Times of Critical Q	Boundaries	Critical Reach	Key Indicators
Mainstem Big Wood River						
BWR-1	No	No	Apr to May	Hwt to Trail Ck	None	None
BWR-2	Yes	Yes	Apr to May	Trail Ck to Glen Div	None	Q, Tem, TP, Sub, WQI
BWR-3	Yes	Yes	Apr to May	Glen Div to Base Line	None	Q, Tem, NOX, TP, Sub
BWR-4	Yes	Yes	Apr to May	Base Line to MR	None	Q, Tem, NOX, TP, Sub
BWR-5	Yes	Yes	May to Jun	MR to Hwy 75	None	Q, Tem, NOX, TP
BWR-6	Yes	Yes	May to Jun	Hwy 75 to LWR	None	Q, Tem, DO, NTU, TSS, NOX, TP, Sub, WQI
BWR-7	Yes	Yes	May to Jun	LWR to Int 84	None	Q, Tem, TSS, NOX, TP, Sub, WQI
BWR-8	Yes	Yes	May to Jun	Int 84 to SR	None	Q, NOX, TP, Sub
Tributaries or Tributary Segments						
Horse Ck	No	No	Apr to May	Hwt to BWR	None	None

Owl Ck	No	No	Apr to May	Hwt to BWR	None	None
Baker Ck	No	No	Apr to May	Hwt to BWR	None	None
Eagle Ck	Yes	Yes	Apr to May	Hwt to BWR	Lower Upper	Q, TP
Lake Ck	Yes	Yes	Apr to May	Hwt to BWR	Lower Upper	Q, NOX, TP
Placer Ck	Yes	Yes	Apr to May	Hwt to WSCk	None	NOX, TP
Cove Ck	Yes	Yes	Apr to Jun	Hwt to EFWR	Lower Upper	Q, NTU, TSS, TP, Sub, TN: TP
EFWR	No	No	Apr to May	Hwt to Blind Can	None	None
Greenhorn	Yes	Yes	Apr to May	Hwt to BWR	Lower Upper	Q, Tem, TSS, TP, Sub, WQI
Quigley Ck	Yes	Yes	Apr to Jun	Hwt to mouth	Lower Middle Upper	Q, Tem. NOX, TP, Sub, TN: TP
Croy Ck	Yes	Yes	Apr to Jun	Elk Ck to BWR	None	Q, TP, Sub, TN: TP
Seamans	Yes	Yes	Apr to Jun	Hwt to mouth	Lower Middle Upper	Q, Tem, NOX, TP, Sub, TN: TP, WQI
Rock Ck	Yes	Yes	Apr to Jun	Hwt to MR	None	Q, Tem, NOX, TP, *E. coli*, Sub, TN: TP, WQI
EFRC	Yes	Yes	Apr to Jun	Hwt to Rock Ck	None	Tem, NOX, TP, Sub, TN: TP
Thorn Ck	Yes	Yes	Apr to Jun	Hwt to Schooler Ck	None	Q, Tem, DO, NTU, TSS, NOX, TP, Sub, TN: TP, WQI

Prepared by IDEQ-TFRO. WQLS = Water quality limited stream. TMDL = Total maximum daily load. Q = Flow. BWR = Big Wood River. Ck = Creek. EFWR = East Fork Wood River. Greenhorn = Greenhorn Gulch. Seamans = Seamans Creek. EFRC = East Fork Rock Creek. Glen Div = Glendale Diversion. MR = Magic Reservoir. Hwy = Highway. LWR = Little Wood River. Int = Interstate. SR = Snake River. WSCk = Warm Springs Ck. Blind Can = Blind Canyon.

The Critical Reach explicitly divides the stream into reaches based on land ownership, predominantly USFS, BLM, and private ground. These reaches are necessary because additional monitoring may indicate that a reach in one stream may be meeting beneficial uses while the rest are not.

2.4 Data Gaps

Water quality data gaps that currently exist in the Big Wood River Subbasin include the following:

1. Diel pattern studies for a continuous number of days and months.
2. Seasonal comparisons between irrigation (April to September) versus non-irrigation (September to March).
3. An on-going annual trend-monitoring program on all 303(d) listed waterbodies.

4. Macrophyte, moss, and algal biomass studies.
5. Scientific assessment of reference conditions based on “least impacted streams” meeting their beneficial uses.
6. The use of reference sites on all trend-monitoring.
7. A coordinated monitoring program between agencies, organizations, and industries as part of the overall trend-monitoring program.
8. Characterization of 303(d) listed streams into impaired versus unimpaired segments.
9. Total suspended solids and surface fines should be monitored continuously in the trend-monitoring program.
10. Bedload sediment analysis and cobble embeddedness should be included as part of the trend-monitoring program.
11. Monitoring of major canals as part of maintenance plan for canal companies.
12. Fish and macroinvertebrate analysis should be included as part of the overall trend-monitoring program.
13. Pathogen studies, such as *Escherichia coli*.

The two major pollutants-of-concern for which data is insufficient to completely evaluate impairment (particularly for salmonid spawning and cold water aquatic life) are temperature and dissolved oxygen. As a consequence streams with temperature and dissolved oxygen as a pollutant are realistically in the “needs verification” mode. Certainly, IDEQ-TFRO intends to follow-up on these pollutants-of-concern with additional monitoring within two (2) years of TMDL acceptance and to establish TMDLs for these parameters if necessary. As a consequence, additional monitoring sites will be selected within each of the segments of the Big Wood River, and on selected tributaries, to capture temperature and dissolved oxygen data during critical periods of spawning. BOD5 will also be collected to more fully ascertain the condition of biological activity in these segments.

Additionally, flow regime is not sufficiently known in the tributaries to be able to quantify periods of critical flow and seasonality, although a major attempt was done to arrive at these values in the Big Wood River Watershed Management Plan.

3. Subbasin Assessment – Pollutant Source Inventory

This section summarizes the various pollutant sources. These include point and nonpoint sources. Point sources include municipalities. There are no NPDES aquaculture facilities or industrials in the subbasin. Nonpoint sources include forestry, rangeland grazing, irrigated agriculture, and riparian background. These are considered the major nonpoint sources. Other nonpoint sources of pollutants may include construction, roads, stream crossings, mining, urban runoff, rural runoff, diversions, septic tanks, and recreation, but these are considered minor and not significant sources.

3.1 Sources of Pollutants of Concern

This section provides an inventory of known or suspected sources of pollutant(s) including both point sources and nonpoint sources. Point sources include the type, location, and pollutants discharged. Nonpoint sources are categorized into major sources (which include their land use and land ownership area), minor nonpoint sources (which includes roads, construction, stream crossings, mining, urban runoff, rural runoff, diversions, septic tanks, and recreation), and natural background sources. Also, a description of the delivery potential from various pollutant sources is described for impaired 303(d) segments.

<u>Point Sources</u>

- Other than short-term emergency response type activities, there are no Superfund sites on any of the 303(d) listed stream segments of the Big Wood River subbasin. Additionally, there has not been any Resource Conservation Recovery Act (RCRA) type activities on any of the 303(d) listed stream segments of the Big Wood River subbasin.

  During the subbasin assessment phase of the Big Wood River Watershed Management Plan the Minnie Moore mine site (northwest of Bellevue, Idaho) was identified as an “active mine site on the Big Wood River.” It was recommended to the USEPA to place it on the Preliminary Assessment/Site Investigation phase of the CERCLA process. This recommendation was as a consequence of the Wood River TAC and the Idaho Abandoned Mine Lands Group technical advise to IDEQ-TFRO. It is located on Carbonate Mountain in Unit 2 of the Big Wood River.

  Similarly, at Triumph, Idaho is the Triumph Mine, which is currently listed on USEPA’s listing of CERCLA projects. However, the state of Idaho (IDEQ) holds primacy for remediation (with oversight from USEPA). It is currently undergoing remediation of its mine tailings and physical hazards, as well as hazardous materials removal. It is located on the East Fork Wood River (Blind Canyon to confluence), a segment that is not on the 303(d) list.

- The only NPDES permitted point sources are listed in Table EE with their appropriate attributes.

Table EE. NPDES permitted point sources

Point Source	NPDES No.	Expiration Date	Location	Permit Limits	Design Q Volume
City of Hailey	002030-3	Jun 12, 2006	RM 84.0	BOD, TSS, Fecal, *E. coli*, TP, NH3, TKN, pH	2.475 cfs
City of Ketchum	002028-1	Jun 12, 2006	RM 99.0	BOD, TSS, Fecal, *E. coli*, TRC, TP, pH	3.821 cfs
The Meadows	002442-2	Nov 30, 2004	RM 95.8	BOD, TSS, Fecal, pH	0.15 cfs
Prepared by IDEQ-TFRO. RM = River mile. BOD = Biological oxygen demand. TSS = Total suspended solids. Fecal = Fecal coliform. *E. coli* = *Escherichia coli*. TP = Total phosphorus. NH3 = Total ammonia. TKN = Total Kejdahl nitrogen. Q = Flow.					

- The only general permit in Idaho at this time is the aquaculture general permit. There are no aquaculture facilities (permitted or unpermitted) in the Big Wood River Subbasin. A review of IDWR water rights indicates that several water rights have fish propagation as a benefical use. However, no aquaculture facilities are known to exist even though the water right may indicate otherwise.

- There are currently no unpermitted point sources in the Big Wood River Subbasin.

Nonpoint Sources

- For purposes of estimating land use, Table FF describes the land use and the land ownership of each 303(d) stream or stream segment.

Table FF. Landuse and land ownership of 303(d) streams

Stream Name	Land Use, % Area				Land Ownership, % Area				
	F	RG	IA	R	FS	BLM	IDL	Priv	OW
Big Wood River Mainstem Segments									
BWR – 1	34.8	49.2	0.3	15.7	82.7	5.0	0.0	12.2	0.0
BWR – 2	0.0	34.9	35.2	30.0	0.0	16.6	1.9	81.5	0.0
BWR – 3	0.0	2.5	77.0	20.5	0.0	4.5	0.0	95.5	0.0
BWR – 4	0.0	45.8	44.8	9.3	0.0	27.3	5.4	66.1	1.2
BWR – 5	0.0	91.5	1.5	7.0	0.0	83.9	0.6	7.0	8.4
BWR – 6	0.0	56.8	43.1	0.0	0.0	44.9	4.3	50.8	0.0
BWR – 7	0.0	38.3	61.7	0.0	0.0	20.4	0.0	79.6	0.0
BWR - 8	0.0	24.0	75.1	0.9	0.0	7.0	6.3	86.6	0.1
Tributaries or Tributary Segments									
Horse Creek: HW to BWR	100.	0.0	0.0	0.0	99.8	0.0	0.0	0.2	0.0
Owl Creek: HW to BWR	78.4	10.2	0.0	11.4	100.	0.0	0.0	0.0	0.0
Baker Creek: HW to NC	72.6	27.4	0.0	0.0	100.	0.0	0.0	0.0	0.0
Eagle Creek: HW to BWR	18.6	81.4	0.0	0.0	94.4	0.0	0.0	5.6	0.0
Lake Creek: HW to BWR	2.1	96.4	0.0	1.5	82.6	12.6	0.0	4.8	0.0
Placer Creek: HW to WSC	88.1	11.9	0.0	0.0	100.	0.0	0.0	0.0	0.0
Cove Creek: HW to EFWR	0.0	100.	0.0	0.0	52.0	2.9	0.0	45.2	0.0
EFWR: HW to Blind Canyon	24.7	75.3	0.0	0.0	89.8	0.0	0.0	10.2	0.0

Greenhorn Gulch: HW to BWR	0.0	74.2	6.9	19.0	55.6	15.7	0.0	28.7	0.0
Quigley Creek: HW to mouth	0.0	87.1	12.9	0.0	5.0	9.5	7.0	78.5	0.0
Croy Creek: Elk Creek to BWR	0.0	82.0	13.3	4.7	0.0	43.3	6.7	49.9	0.0
Seamans Creek: HW to BWR	0.0	70.7	23.0	6.2	0.0	5.3	11.4	83.3	0.1
Rock Creek: HW to Magic Res	0.0	88.0	11.5	0.4	0.0	43.4	7.8	48.1	0.7
EFRC: HW to Rock Creek	0.0	100.	0.0	0.0	0.0	60.5	5.2	34.3	0.0
Thorn Creek: TC Res to Sch Ck	0.0	100.	0.0	0.0	0.0	91.6	2.5	5.0	0.9

Prepared by IDEQ-TFRO. F = Forestry. RG = Rangeland grazing. IA = Irrigated agriculture. R = Riparian land. FS = U.S. Forest Service. BLM = Bureau of Land Management. IDL = Idaho Department of Lands. Priv = Private land. OW = Open water. Div = Diversion. Hwy = Highway. HW = Headwaters. BWR = Big Wood River. NC = Norton Creek. WSC = Warm Springs Creek. EFWR = East Fork Wood River. Res = Reservoir. EFRC = East Fork Rock Creek. TC = Thorn Creek. Sch = Schooler. Ck = Creek. BWR = Big Wood River.

- Other sources of nonpoint source pollution include construction, roads, stream crossings, mining, urban runoff, rural runoff, diversions, and septic systems. These have been identified by IDEQ-TFRO to not be significant contributors of pollution relative to nonpoint sources. In fact, their pollutant contributions when compared to forestry, rangeland grazing, irrigated agriculture, and riparian lands are very small. However, IDEQ-TFRO and the Wood River Executive Board do not believe that all areas of the Big Wood River Subbasin have miniscule pollutant contributions from these minor nonpoint sources. In fact, this is a data gap that is yet to be resolved by IDEQ-TFRO and the Wood River Executive Board. Table GG describes these "minor" nonpoint sources of pollution as to if they occur within these 303(d) segments described.

Table GG. The presence of other "minor" nonpoint sources

303(d) Stream Name	Construction	Roads	Stream Crossings	Mining	Urban Runoff	Rural Runoff	Diversions	Septic Tanks
Big Wood River Mainstem Segments								
BWR – 1	No	Yes	Yes	Yes	No	Yes	No	Yes
BWR – 2	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
BWR – 3	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
BWR – 4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BWR – 5	No	Yes	Yes	No	No	Yes	Yes	No
BWR – 6	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
BWR – 7	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
BWR – 8	No	Yes	Yes	No	No	Yes	Yes	Yes
Tributaries or Tributary Segments								
Horse Creek: HW to BWR	No	Yes	Yes	No	No	Yes	No	No
Owl Creek: HW to BWR	No	Yes	Yes	No	No	Yes	No	No
Baker Creek: HW to NC	No	Yes	Yes	No	No	Yes	No	Yes
Eagle Creek: HW to BWR	Yes	Yes	No	No	Yes	Yes	Yes	Yes

Lake Creek: HW to BWR	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Placer Creek: HW to WSC	No	Yes	Yes	No	No	Yes	No	No
Cove Creek: HW to EFWR	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
EFWR: HW to Blind Canyon	No	Yes	Yes	No	No	Yes	No	No
Greenhorn Gulch: HW to BWR	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Quigley Creek: HW to mouth	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Croy Creek: Elk Creek to BWR	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Seamans Creek: HW to BWR	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Rock Creek: HW to Magic Res	No	Yes	Yes	No	No	Yes	Yes	Yes
EFRC: HW to Rock Creek	No	Yes	Yes	No	No	Yes	No	No
Thorn Creek: TC Res to Sch Ck	No	Yes	Yes	No	No	Yes	Yes	Yes

Prepared by IDEQ-TFRO. HW = Headwaters. BWR = Big Wood River. Div = Diversion. NC = Norton Creek. WSC = Warm Springs Creek. EFWR = East Fork Wood River. Res = Reservoir. EFRC = East Fork Rock Creek. Sch = Schooler.

Confined feeding operations (or confined animal feeding operations) as feedlots or dairies exist in the Big Wood River Subbasin. However, they are not present in the drainage watersheds of the 303(d) streams. Consequently, they are not listed in Table GG.

- Natural processes contribute pollutant loads. These natural processes have been identified as natural background and included barren/rock, wetlands, riparian lands, and water. Table HH describes the condition of natural background which has been accepted at 10% for the Big Wood River mainstem and 6% for the tributaries by IDEQ-TFRO, the Wood River TAC, and the Wood River WAG.

Table HH. Natural background surrogate in the Big Wood River Subbasin

Stream Name	Natural Background				
	Barren	Wetlands	Riparian	Water	Total
Big Wood River Mainstem (%): Mean Total = 10%					
BWR – 1	0.1	0.0	8.6	0.0	8.7
BWR – 2	0.0	2.9	13.0	0.0	15.9
BWR – 3	0.2	2.6	7.8	0.0	10.6
BWR – 4	0.1	3.3	16.6	0.3	20.3
BWR – 5	2.3	0.3	2.2	5.7	10.5
BWR – 6	6.8	0.0	0.0	0.7	7.5
BWR – 7	0.0	0.0	0.9	0.0	0.9
BWR – 8	0.1	0.0	0.6	0.1	0.8
Tributaries or Tributary Segments (%): Mean Total = 6%					
Horse Creek: HW to BWR	0.8	0.1	5.4	0.1	6.4
Owl Creek: HW to BWR	4.3	0.3	3.7	0.0	8.3
Baker Creek: HW to Norton Ck	2.7	0.0	4.9	0.0	7.6
Eagle Creek: HW to BWR	2.8	0.2	4.0	0.0	7.0
Lake Creek: HW to BWR	0.0	0.1	3.0	0.0	3.1
Placer Creek: HW to WSC	0.5	0.0	2.7	0.0	3.2
Cove Ck: HW to EFWR	0.0	0.0	1.9	0.0	1.9
EFWR: HW to Blind Can	27.4	2.0	2.1	0.0	31.5
Greenhorn Gulch: HW to BWR	0.0	0.0	5.0	0.0	5.0

Quigley Creek: HW to mouth	0.0	0.0	0.9	0.0	0.9
Croy Creek: Elk Creek to BWR	0.0	0.0	2.2	0.0	2.2
Seamans Creek: HW to BWR	0.0	3.4	4.7	0.0	8.1
Rock Creek: HW to Magic Res	0.0	0.0	1.8	0.3	2.1
EFRC: HW to Rock Ck	0.0	0.0	0.6	0.0	0.6
Thorn Creek: TC Res to Sch Ck	0.0	0.0	1.0	0.6	1.6
Prepared by IDEQ-TFRO. Ck = Creek. TC = Thorn Creek. Res = Reservoir. Can = Canyon. LWR = Little Wood River. WSC = Warm Springs Creek. EFWR = East Fork Wood River. EFRC = East Fork Rock Creek. Sch = Schooler.					

- There are certain Federal Energy Regulatory Commission (FERC) licensed facilities that exist in the Big Wood River subbasin, which at one time were licensed as NPDES facilities also. This was in fulfillment of §402 of the Clean Water Act. These facilities are listed in Table II along with those listed as FERC facilities.

Table II. NPDES permitted FERC licensed facilities

Name of Facility	NPDES or FERC Permit No.	Receiving Waters	Monitoring Requirements
IPC, Upper Malad Plant	NPDES No. 002259-4	Malad River (3 outfalls)	Outfall flow, Tem
IPC, Lower Malad Plant	NPDES No. 002258-6	Snake River (3 outfalls)	Outfall flow, Tem
Magic Dam Hydro, Inc.	FERC No. 3407	Big Wood River	DO, Tem
Ravenscroft Ranch Project	FERC No. 4055	Malad River	Exempt status
Prepared by IDEQ-TFRO. IPC = Idaho Power Company. Tem = Temperature. DO = Dissolved oxygen.			

Pollutant Transport

- The data collected by IDEQ-TFRO on the Big Wood River subbasin indicates that as a whole, the Big Wood River and its tributaries have water quality that is of higher quality than that of the Middle Snake River. Parameter levels are much lower in concentration. Thus, the delivery load potential to most reaches is less when compared to the overall Upper Snake Rock stream segments. However, because the delivery load potential is less, and because the tendency is greater in such streams for beneficial uses to be met, such streams are highly sensitive to moderate impairment particularly where habitat alteration may occur. Stream segments above the Magic Reservoir are more prone to be affected by urban, grazing, forestry, and recreation. Stream segments below the Magic Reservoir and localized areas such as Rock Creek in Blaine County are more prone to be affected by grazing and agriculture.

- Little is known about the seasonal pollutant delivery from both point and nonpoint sources. However, IDEQ-TFRO and the Wood River Executive Board are set to develop a more intensive monitoring program that addresses this issue for the benefit of the water user industries. Therefore, during the implementation period the IDEQ-TFRO in conjunction with the Wood River TAC, the Wood River WAG, and the

Wood River executive will develop a more comprehensive monitoring plan that includes the Big Wood River and the 303(d) listed tributaries.

- The relationships between pollutants specific to identified sources are identified in Table JJ. These relationships are generalized based on what has been monitored in the field by IDEQ-TFRO, other agencies, and water user industries.

Table JJ. Generalized linkage of pollutants to identified sources

Sources	Most common pollutants-of-concern							
	TSS	Sub	TP	Tem	DO	NH3	Q	Other
Municipalities	**Yes**	**No**	**Yes**	**No**	**Yes**	**Yes**	**No**	**Yes**
Forestry	Yes	Yes	Yes	No	No	No	No	No
Rangeland grazing	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Irrigated agriculture	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Construction	Yes	Yes	No	No	No	No	No	Yes
Roads	Yes	Yes	No	No	No	No	No	No
Stream crossings	Yes	Yes	No	No	No	No	No	No
Mining	Yes	Yes	Yes	No	No	No	No	Yes
Urban runoff	Yes	Yes	Yes	No	No	No	No	No
Rural runoff	Yes	Yes	Yes	No	No	No	No	Yes
Septic systems	Yes	No	Yes	No	Yes	Yes	No	Yes
Diversions	No	No	No	Yes	Yes	No	Yes	Yes
FERC facilities	No	No	No	Yes	Yes	No	Yes	No

Prepared by IDEQ-TFRO. TSS = Total suspended solids. Sub = Substrate sediments. TP = Total phosphorus. Tem = Temperature. DO = Dissolved oxygen. NH3 = Total ammonia as N. Q = Flow. Other = Other pollutants may include bacteria, heavy metals, oil and grease by-products, etc.

- The delivery potential to stream reaches most sensitive to impairment is dependent for the most part on the gradient of the stream channel. Table KK categorizes the gradients by type and sediment risk as utilized in the Big Wood River Watershed Management Plan. Avalanche potential is seen where the gradient exceeds 30%, and this is found only on Lake Creek, Eagle Creek, Baker Creek, Owl Creek, and Horse Creek.

Table KK. Stream channel gradient sediment considerations

Gradient	Grade	Type	Sediment Risk
< 5%	Flat, plateau	Deposition	High
5 – 7.9%	Hilly, rolling	Deposition	Moderate
8 – 12%	Steep, sloping	Transport	Low
> 12%	Very steep	Transport	Very low

Prepared by IDEQ-TFRO.

3.2 Data Gaps

This section describes any data gaps where little or no information has been obtained on the Big Wood River subbasin for the 303(d) listed streams. A lack of information or data does not prevent the TMDL process from continuing. However, it does provide for important or critically needed information to be identified so that the TMDL can be modified at that time when scientifically obtained data answers those specific data gaps. The three- (3) pollutants that have substantial data gaps are TP, Tem, and DO. These are described in the following sections.

Point Sources

- Unit 2 (or Segment 2) of the Big Wood River (Trail Creek to Glendale Diversion) has point and nonpoint sources. There is sufficient data to promulgate a TMDL for TP. However, more TP data is required to segregate the point from the nonpoint source TP. IDEQ-TFRO has discussed this issue with the Wood River Executive Board and the Wood River Municipality Committee and has ascertained that more TP data is indeed required. Therefore, a more explicit monitoring program will be developed by IDEQ-TFRO in conjunction with the municipality committee in 2002-2003.

- Other pollutants that will require intensive monitoring include Tem and DO. These are also tentatively scheduled for 2002-2003.

Nonpoint Sources

- The greatest areas of uncertainty are the contributions from golf courses and where construction development is occurring in Segment 2. More information is required.

- More data on pollutant yield is needed to understand if seasonality should be a concern or not.

- More detailed breakdown of land use would be of value. In fact, little information is present on such nonpoint sources as construction, roads, stream crossings, mining, urban runoff, rural runoff, diversions, and septic systems.

- The Big Wood River Canal Company confirms with support of the Wood River WAG that from the Lincoln Bypass Canal diversion to Interstate 84 that the Big Wood River is intermittent. Thus, salmonid spawning is not necessarily true.

- The Wood River Executive Board affirms strongly that no salmonids (or salmonid spawning) occur in the Big Wood River from the Little Wood River confluence to Interstate 84. They affirm that the conditions of this stretch of the Big Wood River is more conducive to a warm water fishery, but with intermittent characteristics. Therefore, a beneficial use attainability analysis is proposed by the Board.

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4. Subbasin Assessment – Summary of Past and Present Pollution Control Efforts

Past and present pollution control efforts in the Big Wood River include a number of point and nonpoint source projects on various tributaries. These are described in Table LL.

Table LL. Water quality projects of the Big Wood River subbasin

Name of Project	Acres	Problem Assessment
Public Funding Sources		
Rock Creek Blaine County[1]	26,000	Blaine County SCD identified improperly grazed rangeland, pastureland, and unstable streambanks and riparian zones with accelerated erosion rates that affect the beneficial uses.
City of Hailey-Croy Creek (2000-2001)	None cited	Wood River Land and Trust secured access to property along the Big Wood River to turn into a wetland with recreational access. Sediment, nutrients, and pathogens would be reduced by 10-15% by returning the stream to its natural channel.
Big Wood River & Magic Reservoir[2]	None cited	Review previous studies and determine "baseline" conditions
Effects of Drought on BWR[3]	None cited	Document and analyze the ecological conditions of the Big Wood River during the 1977 drought.
Effect of N wastes on macrophytes in the BWR[4]	None cited	To determine the local, short term effects of increased nitrogen loading on the Big Wood River near Ketchum, Idaho.
Impacts of sewage disposal facilities on mountain valleys[5]	7,500	Assessment of increased residential development and its effect on on-site sewage disposal system and hydrologic groundwater drainage area from North Fork to Croy Creek.
City of Ketchum Municipal Construction Grant (1978-1988)	14	City of Hailey sludge disposal at Ohio Gulch Blaine County Landfill.
Private Funding Sources: The Big Wood Canal Company		
1995 Jim Byrns Slough WQ Project	-	Sediment catch basin at head of Lateral 975.
1997 Ed Lucero WQ Project	-	Pipe drain from dairy corral to avoid discharge to canal system.
1998 Jim Byrns Slough WQ Project	-	Flow by-pass to allow better quality water below the canal diversion.
1999 Black Butte WQ Project	-	Sediment catch basin to create wetland area for wildlife.
Prepared by IDEQ-TFRO. BWR = Big Wood River. [1]ISCC 1990. [2]Minshall 1977. [3]Bruns and Minshall 1979. [4]Manuel, Minshall and Bruns 1978. [5]Luttrell and Brockway 1982 and 1984. WQ = Water Quality.		

In general pollution control projects are in their infancy in the Big Wood River Subbasin. Although Table LL sites various past and present projects, the number of water quality projects that could be done is untapped. For the most part the projects have been successful with the exception of the Rock Creek Blaine County Project, which never materialized. Efforts to date have been inadequate simply because little emphasis has been placed on water quality projects in lieu of other projects that may not necessarily fit the definition of a true water quality project (as defined under the Section 319 process of the Clean Water Act). However, the Wood River WAG in conjunction with IDEQ-TFRO will be exploring numerous potential projects in the Big Wood River Subbasin, and will submit 319 projects (or other water quality projects) on a regular basis as a consequence of the Big Wood River Watershed Management Plan. In fact, a funding committee will be setup by the Wood River WAG to explicitly seek funding sources for projects within the subbasin.

- History of issuance and revision to point source permits
  The history of the issuance and revision of NPDES permits in the Big Wood River subbasin is much the same as other subbasins in the State of Idaho. NPDES permits are issued/ revised in 5-year increments unless they have been administratively extended. Under administrative extension the facility continues to operate under their most current permit unless modification or revision occurs as a consequence of a federal action (such as a TMDL). All NPDES permitted facilities require 401 water quality certification by IDEQ before the permit becomes effective. Table MM summarizes the effective and expiration dates of the most current permits for the three- (3) point sources in the subbasin.

Table MM. Sewage treatment facilities of the Big Wood River subbasin

Facility	NPDES Permit No.	Receiving Water	Effective Date of Permit	Expiration Date of Permit
City of Ketchum	002028-1	Big Wood River	Jun 11, 2001	Jun 12, 2006
City of Hailey	002030-3	Big Wood River	Jun 11, 2001	Jun 12, 2006
The Meadows	002442-2	Big Wood River	Nov 30, 1999	Nov 30, 2004
Prepared by IDEQ-TFRO.				

It should be noted that the NPDES permits for the cities of Ketchum and Hailey were issued prior to the public comment period of the Big Wood River Watershed Management Plan. The NPDES permitting process and the TMDL process are separate programs and under separate timelines. The Wood River WAG and its Executive Board are concerned that the USEPA issued these permits without considering the TMDL that was being developed. In particular, the segment of the Big Wood River where these three point sources discharge was previously evaluated in 1980 and 1983 by IDEQ-TFRO and USEPA. The conclusions from these evaluations indicated that any additional combined discharge from all three entities "must not cause a measurable reduction in ambient water quality." In effect, "the future waste load allocation for the Upper Big Wood River Valley must be based on this provision" (IDEQ 1980 [p 2]). And that provision was that all three facilities be considered at the same time in evaluation the impacts to the Big Wood River because of the special resource water and domestic water supply designations. For purposes of this TMDL, the sewage treatment plants will use their design flow volume (see Table EE) to establish preliminary interim targets based on annual mean TSS and TP values.

- Other watershed improvement projects (public and private lands)
  Beyond those projects listed in Table LL, no other water quality projects are known to exist at the present time.

- Are ongoing activities expected to improve water quality in a reasonable time?
  "Programs to control nonpoint source pollution tend to be largely unsuccessful because of the difficulties involved in applying point source approaches to diffuse nonpoint source problems. Additionally, efforts to measure or gauge water quality improvement have not been successful because of an inability to associate water quality standards with biological integrity" (Karr 1991; IDEQ 1997b [p III-1]). One of the main concerns with water quality improvement projects is the length in time required before improvements to water quality are seen. Water quality improvement projects will be successful only if the projects are fully funded, implemented, and maintained for long-term periods especially where sediment is the predominant pollutant. Therefore, all planned actions shall be done in accordance "within a reasonable period of time" based on the degree and complexity of the implementation plan. Essentially, a period of 10-years will be used as the preliminary target for achieving the goals of the Big Wood River TMDL. IDEQ feels that 10-years to achieve water quality standards is a reasonable and practical point between a few months and decades for restoration. If restoration will require more than 10-years, then IDEQ will require the industry to justify the necessity of more than 10-years in achieving water quality standards and beneficial uses.

In general, however, nonpoint source pollution control projects are successful, yet excess sediment continues to be the major problem in certain reaches of the Big Wood River and its associated 303(d) listed tributaries. Excess sediment is a complex problem requiring a complex solution. Yet, the key to reducing sediment on certain reaches of the Big Wood River is to reduce the sediment in the individual tributaries and agricultural return flows through reductions in sediment at individual farm sites. When this is accomplished, the overall water quality of the Big Wood River and its tributaries will be improved greatly. Public education; application of functional, voluntary, and cost-effective best management practices; effectiveness monitoring for the short- and long-term; and, constant vigilance of the applied best management practices through the feedback loop are key considerations in developing a functional and workable sediment reduction strategy for the Big Wood River subbasin.

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5. Total Maximum Daily Load(s)

A TMDL prescribes an upper limit on discharge of a pollutant from all sources so as to assure water quality standards are met. It further allocates this load capacity (LC) among the various sources of the pollutant. Pollutant sources fall into two broad classes: point sources, each of which receives a waste load allocation (WLA); and nonpoint sources, which receive a load allocation (LA). Natural background (NB), when present, is considered part of the load allocation, but is often broken out on its own because it represents a part of the load not subject to control. Because of uncertainties regarding quantification of loads and the relation of specific loads to attainment of water quality standards, the rules regarding TMDLs (40 CFR § 130) require a margin of safety (MOS) be a part of the TMDL.

Practically, the MOS is a reduction in the load capacity that is available for allocation to pollutant sources. The natural background load is also effectively a reduction in the load capacity available for allocation to human made pollutant sources. This can be summarized symbolically as the equation: LC = MOS + NB + LA + WLA = TMDL. The equation is written in this order because it represents the logical order in which a loading analysis is conducted. First the LC is determined. Then the LC is broken down into its components: the necessary MOS is determined and subtracted; then NB, if relevant, is quantified and subtracted; and then the remainder is allocated among pollutant sources. When the breakdown and allocation is completed we have a TMDL, which must equal the LC.

Another step in a loading analysis is the quantification of current pollutant loads by source. This allows the specification of load reductions as percentages from current conditions, considers equities in load reduction responsibility, and is necessary in order for pollutant trading to occur. Also a required part of the loading analysis is that the LC be based on critical conditions – the conditions when water quality standards are most likely to be violated. If protective under critical conditions, a TMDL will be more than protective under other conditions. Because both LC and pollutant source loads vary, and not necessarily in concert, determination of critical conditions can be more complicated than it may appear on the surface.

A load is fundamentally a quantity of a pollutant discharged over some period of time, and is the product of concentration and flow. Due to the diverse nature of various pollutants, and the difficulty of strictly dealing with loads, the federal rules allow for “other appropriate measures” to be used when necessary. These “other measures” must still be quantifiable, and relate to water quality standards, but they allow flexibility to deal with pollutant loading in more practical and tangible ways. The rules also recognize the particular difficulty of quantifying nonpoint loads, and allow “gross allotment” as a load allocation where available data or appropriate predictive techniques limit more accurate estimates. For certain pollutants whose effects are long term, such as sediment and nutrients, EPA allows for seasonal or annual loads.

5.1 Instream Water Quality Targets

The goal of instream water quality targets is to restore "full support of designated beneficial uses" (Idaho Code 39.3611, 3615) to 303(d) listed streams. The targets-of-concern include total suspended solids (for excess sediments), substrate sediments (for excess sediments), total phosphorus (for excess nutrients), and *Escherichia coli* (for primary contact recreation). Dissolved oxygen and temperature targets (both for cold water aquatic life and salmonid spawning) are being deferred until 2003 until additional monitoring data is collected to establish a loading capacity and a total phosphorus to dissolved oxygen relationship. Recovery of beneficial uses is also described by interim goals.

Design Conditions

Critical time periods for all 303(d) streams are categorized into three (3) periods-of-concern: (1) spawning period for salmonids and non-salmonid sensitive species, (2) spring flushing flows, and (3) low summer flows. The potential impairment of designated beneficial uses includes salmonid spawning and cold water aquatic life for the fisheries. Salmonid species includes Mountain whitefish, brown trout, Redband trout, cutthroat trout, rainbow trout, and brook trout. Non-salmonid sensitive species includes the Wood River sculpin. Table NN provides a general description of these critical time periods for the salmonid and non-salmonid sensitive species.

Table NN. Critical time periods for fisheries of concern

Fisheries	Non-critical Flows					Spring Flows			Summer Flows		
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Salmonid species											
Mountain whitefish											
Redband trout											
Brown trout											
Cutthroat trout											
Rainbow trout											
Brook trout											
Non-salmonid sensitive species											
Wood River sculpin											
Prepared by IDEQ-TFRO. Cells in gray represent approximate salmonid spawning period.											

Critical flow time periods (spring or summer) has the potential to affect spawning depending on the pollutant-of-concern. In the case of spring flushing flows, total suspended solids and substrate sediments may impugn the ability for salmonids or non-salmonid sensitive species to spawn effectively due to sediment coverage of spawning gravels. Summer flows, on the other hand, may exacerbate other environmental effects not normally seen in the spring (such as high temperatures, low dissolved oxygen). Therefore, the potential impacts by either spring or summer flows is described as follows based on the number of months in which spring or summer flows occur against the number of months in which spawning occurs:

	Effects From Flow	
Fisheries	Spring Flows	Summer Flows
Mountain whitefish	1/6 = 17%	0/6 = 0%
Redband trout	3/5 = 60%	2/5 = 40%
Brown trout	2/7 = 29%	0/7 = 0%
Cutthroat trout	2/5 = 40%	3/5 = 60%
Rainbow trout	3/7 = 43%	2/7 = 29%
Brook trout	3/9 = 33%	1/9 = 11%
Wood River sculpin	½ = 50%	½ = 50%

The Mountain whitefish and the Brown trout are affected by spring flows at the end of their spawning cycle. Brook trout is affected by spring flows and summer flows towards the end of its spawning cycle. Redband trout and cutthroat trout are affected by spring flows at the beginning of their spawning cycle. And, rainbow trout is affected by spring flows during the middle of its spawning cycle and by summer flows towards the end of its spawning cycle. Wood River sculpin is affected by spring flows and summer flows in all of its spawning cycle.

Spawning gravels above and below the Magic Reservoir in the Big Wood River are significantly different. Above the Magic Reservoir, spawning gravels in the Big Wood River are predominantly gravels, sand, cobbles, and boulders, which are conducive to salmonid spawning. Spawning, however, is threatened in the stretch of the Big Wood River from Trail Creek to Magic Reservoir, principally due to alluvial sands mixed with silts and clays that make up the streambed. Below the Magic Reservoir, spawning gravels in the Big Wood River are predominantly lava rocks, basalt rocks, minimum gavels and cobbles, and much higher levels of silt and clay. Although some spawning occurs below Magic Reservoir in the Big Wood River, spawning is threatened due to the higher incidence of silts and clays. IDEQ-TFRO has no BURP information on the type of percent fines that are present. However, during the low flow season of 2000, IDEQ-TFRO did undertake a streambed sediment assessment on those wadable areas. Table Q provides a general summary of the streambed characteristics of the Big Wood River. Table OO summarizes the streambed characteristics for percent fines (as silt/clay versus sand) and embeddedness. The data indicates that in general the silt/clay fraction comprises 18.5% versus 25.1% above and below the Magic Reservoir, respectively. The sand fraction comprises 29.2% versus 20.7% above and below the Magic Reservoir, respectively. The percent fines are represented by 47.7% versus 45.8% above and below the Magic Reservoir, respectively. The higher amount of silt/clay fraction below the Magic Reservoir is supported by the embeddedness. Embeddedness is 36.3% versus 55.3% above and below the Magic Reservoir, respectively. The data confirms that as the silt/clay fraction increases, so does the embeddedness. On the other hand, as the sand fraction increases, embeddedness decreases.

Table OO. Summary of streambed characteristics of the Big Wood River

Big Wood River Segment	Embeddedness %	Silt/Clay %	Sand %	Fines %
BWR – 1	18.5	6.0	26.2	32.2
BWR – 2	32.0	14.8	31.5	46.3
BWR – 3	42.5	22.7	30.8	53.5
BWR – 4	52.0	30.5	28.1	58.6
BWR – 5	60.0	18.8	12.5	31.3
BWR – 6	56.0	24.8	19.4	44.2
BWR – 7	65.5	36.0	18.9	54.9
BWR – 8	39.5	20.9	32.0	52.9
Prepared by IDEQ-TFRO. BWR = Big Wood River. Silt/clay = 0.0 – 1.0 mm. Sand = 1.1 – 2.5 mm.				

Stream Corridor Approach Model

For purposes of allocating loads to nonpoint sources, and taking into account that upland disturbances may not necessarily directly affect the delivery of pollution to a stream, a "stream corridor" of 2 miles wide was used as a reasonable preliminary approach to a load allocation. Based on the scientific literature (Kindschy et al. 1982; Van Dyke et al. 1983; Platts 1990; USDA ARS, *et al.* 1998), it was assumed that 90-95% impact to any stream would be coming from this 2-mile transect (1-mile per side of stream). A one-mile per side of stream is a reasonable preliminary approach to apply as previously used in the Upper Snake Rock and Lake Walcott Watershed Management Plans. The model does not exclude upland activities, but rather categorizes the various sources into two general groups. The first group makes up those nonpoint sources closest to the stream. The second group makes up those sources away from the stream. This approach has been endorsed by the USDA NRCS and by the ISCC as a mechanism to evaluate critical acres affecting a stream, particularly in focusing on land management practices that will help in reducing impacts to the stream.

The stream corridor approach model will be used for the allocation of loads on those streams where the allocation of nonpoint source to various industries will be managed by landuse or land ownership. IDEQ-TFRO recognizes that landuse or land ownership is the predominant nonpoint stressor on any watershed. Water quality monitoring conducted at the confluence of a tributary to the Big Wood River (or to another stream) will be used as the source for load allocation on the tributary and prorated based on landuse. For example, water quality monitoring of tributary X shows an average total suspended solids concentration of 15 mg/L with an average flow of 20 cfs. This yields an average annual load of 295 tons/year. If the landuse estimates for tributary X are 30% agriculture, 40% grazing, and 30% background; then, the 295 tons/year is prorated into the landuse as 88.5 tons/year agriculture, 118.0 tons/year grazing, 88.5 tons/year background, respectively. The same could be done for land ownership.

Target Selection

Target selection is dependent on existing numeric criteria and/or existing narrative criteria. No site-specific criteria is proposed for the Big Wood River Subbasin since existing numeric criteria exist for temperature, dissolved oxygen, *Escherichia coli*, and turbidity. Existing narrative data include total suspended solids, substrate sediments, total phosphorus, and nitrite+nitrate. Additionally, target selections were studied by the use of the TN: TP ratio and the Water Quality Index. Both the ratio and the index are used in combination with other in-stream parameters as described in Table Z.

- Existing numeric criteria include temperature (IDAPA 53.01.02.250(02)(d)(ii)), dissolved oxygen (IDAPA 58.01.02.250.02.1), *Escherichia coli* (IDAPA 58.01.02.251.01), and turbidity (IDAPA 58.01.02.250.02.c.iv). Table DD summarizes temperature as a key indicator (and thus a TMDL is required) for the waterbodies BWR-2, BWR-3, BWR-4, BWR-5, BWR-6, BWR-8, Greenhorn Gulch, Quigley Creek, Seamans, Creek, Rock Creek, East Fork Rock Creek, and Thorn Creek. Temperature TMDLs are scheduled for completion in 2003 so that more substantive data can be collected in 2002-2003.

  Table DD summarizes dissolved oxygen as a key indicator (and thus a TMDL is required) for the waterbodies BWR-6 and Thorn Creek. Dissolved oxygen TMDLs are being deferred until 2003 so that more substantive data can be collected in 2002-2003.

  Table DD summarizes *Escherichia coli* as a key indicator (and thus a TMDL is required) for the waterbody Rock Creek. An *E. coli* TMDL will be developed with an instream target of a geometric mean of 126 cfu[9].

  Although turbidity is an existing numeric criteria, turbidity (NTU) values > their statutory limit have linkage to total suspended solids and substrate sediment increases. Increases in TSS and Sub yield increases in NTU. Therefore, decreases in TSS and Sub will result in decreases in NTU. No NTU TMDL is proposed or will be developed at this time as the TMDLs for TSS and Sub will yield decreases in turbidity as well and meet beneficial uses.

- Existing narrative criteria include total suspended solids (IDAPA 58.01.02.200.08), substrate sediments (IDAPA 58.01.02.200.08), total phosphorus (IDAPA 58.01.02.200.06), and nitrite + nitrate (IDAPA 58.01.02.200.06). Table DD summarizes total suspended solids (TSS) as a key indicator (and thus a TMDL is required) for the waterbodies BWR-6, BWR-7, Cove Creek, Greenhorn Gulch, and Thorn Creek. A TSS TMDL will be developed on these waterbodies. There is no easily defined concentration of suspended sediments above, which fisheries are damaged and below which fisheries are protected (Alabaster and Lloyd 1982). Kerr (1995) identifies the problems of establishing fixed standards or guidelines for sediment release, and includes the following: (1) there are substantial daily and seasonal variations in suspended solids in most flowing waters; (2) acute effects on aquatic organisms are often difficult to demonstrate; (3) tolerance varies according to the species and life stage of various aquatic biota; (4) impacts to aquatic biota depend not only on the concentration of suspended materials but also on the duration of exposure and size of materials in suspension; (5) impacts differ depending on whether solids remain in suspension or settle to the substrate (standing versus flowing waters); and, (6) impacts on fish habitat are strongly influenced by sediment availability and transport dynamics through the system. Using a number of literature references (such as EIFAC 1965) and based on the water quality data of the Big Wood River Subbasin, it was determined to establish two interim preliminary targets over a ten- (10) year period for TSS. For tributaries and canals that discharge above the Magic Reservoir an average monthly target of < 25 mg/L TSS was selected with a daily maximum of < 40 mg/L TSS. This provides a “no effect” on fish survival and sub-lethal effects and meets beneficial uses. An average value of 5.4 mg/L TSS is found amongst most streams and canals above the Magic Reservoir, although seasonal fluctuations and site-specific problems affect some. For tributaries and canals that discharge below the Magic Reservoir an average monthly target of < 50 mg/L TSS was selected with a daily maximum of 80 mg/L TSS. This target had already been established by the Upper Snake Rock Watershed Management Plan. This provides for a “slight effect on production” on fish survival and sub-lethal effects and meets beneficial uses. An average value of 21.7 mg/L TSS is found amongst most streams and canals below the Magic Reservoir, although seasonal fluctuations and site-specific problems affect some.

Table DD summarizes substrate sediments (Sub) as a key indicator (and thus a TMDL is required) for the waterbodies BWR-2, BWR-3, BWR-4, BWR-6, BWR-7, BWR-8, Cove Creek, Greenhorn Gulch, Quigley Creek, Croy Creek, Seamans Creek, Rock Creek, East Fork Rock Creek, and Thorn Creek. A Sub TMDL will be developed on these waterbodies with the surrogate Wolman pebble counts for percent fines. Using a number of literature references (such as Everest *et al.* 1987) and based on the water quality data of the Big Wood River Subbasin, it was determined to establish two interim preliminary targets over a ten- (10) year period for substrate sediments. Like TSS the Sub targets were set above and below the Magic Reservoir. For tributaries and canals that discharge above the Magic Reservoir an average monthly target of < 35% substrate sediments was selected. For tributaries and canals that discharge below the Magic Reservoir an average monthly target of < 40% substrate sediments was selected. These targets are comparable to those already existing in the subbasin on streams meeting beneficial uses. In fact a review of existing percent fines (based on BURP and additional substrate sediment monitoring) indicates that streams above the Magic Reservoir average 36.5% whereas streams below the Magic Reservoir average 38.8%. These values are close to the interim preliminary targets of 35% (36.5%) above the Magic Reservoir and 40% (38.8%) below the Magic Reservoir.

As described previously, TSS TMDL and Sub TMDL reductions will cause reductions in turbidity and thus an NTU TMDL is not required at this time.

Table DD summarizes total phosphorus (TP) as a key indicator (and thus a TMDL is required) for the waterbodies BWR-2, BWR-3, BWR-4, BWR-5, BWR-6, BWR-7, BWR-8, Eagle Creek, Lake Creek, Placer Creek, Cove Creek, Greenhorn Gulch, Quigley Creek, Croy Creek, Seamans Creek, Rock Creek, East Fork Rock Creek, and

Thorn Creek. A TP TMDL will be developed on these waterbodies. Like TSS the targets for TP were set above and below the Magic Reservoir. For tributaries and canals that discharge above the Magic Reservoir an average monthly target of < 0.050 mg/L TP with a daily maximum of 0.080 mg/L TP was selected. This target is based on the hydrologic characteristics of a flowing stream discharging into a reservoir or lake. The USEPA recommends 0.050 mg/L TP as the target (EPA 1986). Therefore, beneficial uses are being met at this target level. For tributaries and canals that discharge below the Magic Reservoir an average monthly target of < 0.100 mg/L TP with a daily maximum of 0.160 mg/L TP was selected. This target is based on the hydrologic characteristics of a flowing stream discharging into another flowing stream. The USEPA recommends 0.100 mg/L TP as the target (EPA 1986). Therefore, beneficial uses are being met at this target level.

Table DD summarizes nitrite + nitrate (NOX) as a key indicator but no TMDL is proposed at this time. The concentration of NOX in the streams is not considered toxic to the fisheries, nor is there any evidence that nuisance aquatic plant growths, algae, slimes, or molds are present to affect beneficial uses in any of the 303(d) streams or other unlisted streams. The Wood River Technical Advisory Committee reviewed the available data and advised IDEQ-TFRO that an NOX TMDL was inappropriate at this time. IDEQ-TFRO concurred. Therefore, an NOX TMDL will not be considered at this time. However, IDEQ-TFRO will continue to monitor as appropriate the NOX levels and ground truth the existence of nuisance aquatic plant growths, algae, slimes, or molds and if these do impact beneficial uses, then an NOX TMDL will be seriously considered for development.

- Table PP summarizes the interim preliminary targets for temperature, dissolved oxygen, *E. coli*, TSS, substrate sediments, and TP with target milestones. It is assumed that lags in recovery and response to load reductions will occur, but these lags are included as part of the milestone targets. As described previously, temperature and dissolved oxygen TMDLs will be deferred until 2003. During 2002 and 2003 data will be collected to establish TMDLs. Depending on the recovery of the individual streams, TMDL targets set in 2003 will be maintained through 2011. *E. coli*, TSS, substrate sediment, and TP targets will be maintained through 2011. At 2011 the Wood River Technical Advisory Committee in conjunction with IDEQ-TFRO will do a complete review and assessment of the all-303 (d) streams. Streams not meeting their interim preliminary targets may be subject to more stringent reductions. In particular, the issue of substrate sediments will be seriously considered for reductions to < 25% above the Magic Reservoir and < 30% below the Magic Reservoir.

Table PP. Summary of interim preliminary targets for streams with TMDLs

TMDL Parameter		2002	2003	2006	2011	2016	2021
Temperature		Data collection.		TMDL	Complete review of temperature targets.		
Dissolved oxygen		Data collection.		TMDL	Complete review of dissolve oxygen targets.		
E. coli, cfu[9]		< 126	< 126	< 126	Complete review of *E. coli* targets.		
TSS, mg/L	Above	< 25	< 25	< 25	Complete review of TSS targets.		
	Below	< 50	< 50	< 50			
Sub sed	Above	< 35%	< 35%	< 35%	Complete review of Sub sed targets.		
	Below	< 40%	< 40%	< 40%			
TP, mg/L	Above	< 0.050	< 0.050	< 0.050	Complete review of TP targets.		
	Below	< 1.000	< 1.000	< 1.000			

Prepared by IDEQ-TFRO. Sub sed = Substrate sediments as percent fines. TSS = Total suspended solids. TP = Total phosphorus. *E. coli* = *Escherichia coli*. TSS, Substrate sediments, and TP have two sets of numbers in the 2002, 2003, and 2006 categories. These represent targets above and below the Magic Reservoir, respectively. Above = Above the Magic Reservoir. Below = Below the Magic Reservoir.

Monitoring Points

- The Wood River WAG and IDEQ-TFRO will develop a detailed trend-monitoring plan during the implementation phase of the TMDL. This plan will specifically account for all segments of the Big Wood River along with 303(d) tributaries.

- Monitoring point(s) are summarized in the Table QQ. The parameters of interest are also described as the minimum monitoring parameters for consideration.

Table QQ. Monitoring sites for trend-monitoring plan

Monitoring Sites	Tem	DO	*E. coli*	TSS	WPC	TP
Mainstem Big Wood River						
BWR – 1, Near Galena lodge - Background	X	X	X	X	X	X
BWR – 1, Trail Creek	X	X	X	X	X	X
BWR – 2, Glendale Diversion	X				X	X
BWR – 3, Base Line	X				X	X
BWR – 4, Magic Reservoir	X				X	X
BWR – 5, Magic Reservoir	X					X
BWR – 5, Highway 75	X					X
BWR – 6, Little Wood River confluence	X	X		X	X	X
BWR – 7, Interstate 84	X			X	X	X
BWR – 8, Snake River	X				X	X
Tributaries of Tributary Segments						
Horse Creek: confluence to BWR	X	X	X	X	X	X
Owl Creek: confluence to BWR	X	X	X	X	X	X
Baker Creek: confluence to Norton Ck	X	X	X	X	X	X
Eagle Creek: USFS area						X
Eagle Creek: confluence to BWR						X
Lake Creek: USFS area						X
Lake Creek: confluence to BWR						X
Placer Creek: confluence to Warm Springs Ck						X
Cove Ck: USFS area				X	X	X

Cove Ck: confluence to East Fork Wood River				X	X	X
EFWR: at Blind Canyon confluence	X	X	X	X	X	X
Greenhorn Gulch: USFS area	X			X	X	X
Greenhorn Gulch: confluence to BWR	X			X	X	X
Quigley Creek: at mouth	X				X	X
Croy Creek: confluence to BWR					X	X
Seamans Creek: mouth	X				X	X
Rock Creek: confluence to BWR	X		X		X	X
EFRC: confluence to Rock Creek	X				X	X
Thorn Creek: At Schooler Creek confluence	X	X		X	X	X
Prepared by IDEQ-TFRO.						

- The parameters to be monitored and the methods to be used are listed as follows:

Parameter	Frequency	Methodology	Holding Time	MDL
Temperature	Continuous	USEPA 170.1	Immediate, on site	0.20°C
Dissolved Oxygen	Monthly	USEPA 360.1	Immediate, on site	0.20 mg/L
Escherichia coli	Monthly	USEPA III-C2	6 hours	MPN
TSS	Monthly	USEPA 160.2	7 days	1.0 mg/L
Wolman counts	Quarterly	BURP Protocol	Immediate, on site	5.0%
TP	Monthly	USEPA 365.2	28 days	0.005 mg/L

MDL = Method detection limit. TSS = Total suspended solids. TP = Total phosphorus. Wolman counts = Wolman pebble counts = Percent fines. MPN = Most probable number.

5.2 Load Capacity

The loading capacity of a stream or waterbody is “the greatest amount of loading that a water can receive without violating water quality standards” (40 CFR §130.2). Loading capacities for total suspended solids, substrate sediments, *Escherichia coli*, and total phosphorus in the Big Wood River TMDL are calculated from the numeric instream target as an monthly average load and as a daily maximum load. The maximum load each waterbody can accommodate and still meet the water quality standard for load capacity is grounded in the instream water quality target. This target was selected to meet “...water quality standards with season variations and a margin of safety which takes into account any lack of knowledge...” (CWA § 303(d)(C)). The time period for which the loading is calculated is based on a monthly mean and a daily maximum for an entire year. Seasonality was not considered as a component because little information existed to account for seasonal loads. However, the collection of additional information through 2003 may allow for seasonal loads to be considered. Until seasonal loads are considered, the daily maximum will suffice for any fluctuations in the system.

As described in §5.1 under Design Conditions, the spawning gravels above and below the Magic Reservoir are substantially different. Similarly, the water quality is also substantially different above and below the Magic Reservoir. Consequently, the water quality should be considered appropriately based on the beneficial uses that are designated and existing for both sections and reaches of the Big Wood River. What is proposed by IDEQ-TFRO at this time is an appropriate first cut at interim instream targets for TSS, substrate sediments, TP, and *E. coli*. These may be refined at Years 5, 10, 15, or 20 if corroborative scientific data supports it. Such refinement of water quality targets will be done with the Wood River WAG (representing the industries and interests of the subbasin) and the IDEQ-TFRO. Based on the existing and designated beneficial uses of the Big Wood River system above and below the Magic Reservoir, the loading capacity is defined according to those uses. Since the tributaries flowing into the Big Wood River have a direct impact on the water quality of the Big Wood River, it is appropriate to set the same loading capacity for the tributaries as well. Therefore, all waterbodies discharging directly to the Big Wood River (above or below the Magic Reservoir) must meet the loading capacity defined for their particular area. If the waterbodies are natural streams, then the loading capacity is accountable for the entire stream. If the waterbodies are canalways, then the point of compliance is at the discharge point to the Big Wood River or to any tributary above or below the Magic Reservoir. Therefore, the IDEQ-TFRO shall set a limit (or loading capacity) as a monthly average instream target. It will also set a daily maximum where appropriate to allow for variability and spikes within the system.

- Total Suspended Solids

  It is appropriate in the Big Wood River subbasin to consider both total suspended sediment (TSS) instream water quality targets and substrate sediment targets due to the water quality of the Big Wood River system. The loading capacity (LC) of TSS is based on the annual average flow. Target TSS loads are calculated as follows:

$$\text{TSS LC, t/yr} = \frac{(\text{Annual mean flow, cfs} \times \text{TSS, mg/L} \times 5.39) \times 365 \text{ days/yr}}{2000 \text{ lb/t}}$$

  Table RR summarizes the mainstem Big Wood River TSS loading capacities per unit based on the instream water quality targets. Table SS summarizes the tributaries TSS loading capacities per unit based on the instream water quality targets.

Table RR. Mainstem Big Wood River TSS loading capacities per unit

Unit	Segment Boundary	WQLS No.	Annual Mean Flow cfs	TSS (WLA + LA) Target mg/L	TSS (WLA + LA) LC t/yr
1	BWR – 1	NA	87.7	25.0 (2.5)	2,156.7
2	BWR – 2 - NPS	2483	266.05	25.0 (10.9)	6,670.9
	BWR – 2 – Hailey		2.475	- (1.36)	3.3
	BWR – 2 – Ketchum		3.821	- (7.04)	26.5
	BWR – 2 – Meadows		0.15	- (4.0)	0.6
	BWR – 2 – Total		272.5	25.0 (10.9)	6,701.3
3	BWR – 3	2482	444.5	25.0 (3.5)	10,931.1
4	BWR – 4	NA	465.7	25.0 (13.1)	11,452.4
5	BWR – 5	2478	345.2	50.0 (6.0)	16,978.2
6	BWR – 6	2477	36.6	50.0 (22.0)	1,800.1
7	BWR – 7	2476	500.7	50.0 (25.9)	24,626.3
8	BWR – 8	NA	525.1	50.0 (10.6)	25,826.4

Prepared by IDEQ-TFRO. TSS LC, t/yr = Flow (cfs) x TSS (mg/L) x 0.9837. TSS concentrations in parenthesis represent the current average conditions based on water quality monitoring. BWR = Big Wood River. NPS = Nonpoint source. WQLS = Water quality limited stream. TSS = Total suspended solids. WLA = Wasteload allocation. LA = Load allocation. Point source Q in Segment 2 based on design flow of facility.

Table SS. 303(d) Tributary TSS loading capacities per unit

Unit	303(d) Stream	WQLS No.	Annual Mean Flow, cfs	TSS (WLA + LA) TARGET mg/L	L.C. t/yr
1	Horse Creek	7613	1.7	25.0 (1.2)	41.8
	Owl Creek	5290	2.9	25.0 (1.2)	71.3
	Baker Creek (entire creek)	5292	11.8	25.0 (2.5)	290.2
	Eagle Creek	5291	2.8	25.0 (3.6)	68.9
	Lake Creek	7614	2.2	25.0 (5.6)	54.1
2	Placer Creek	5293	2.2	25.0 (4.1)	54.1
	Cove Creek	5296	1.4	25.0 (12.9)	34.4
	East Fork Wood River	5295	4.6	25.0 (1.0)	113.1
	Greenhorn Gulch	5294	0.6	25.0 (22.9)	14.8
	Quigley Creek	5297	9.9	25.0 (6.2)	243.5
	Croy Creek	2491	2.2	25.0 (7.4)	54.1
	Seamans Creek	5298	0.6	25.0 (4.7)	14.8
3	No 303(d) Streams	NA	-	-	-
4	East Fork Rock Creek	5299	1.1	25.0 (4.1)	27.1
	Rock Creek	2487	1.8	25.0 (6.3)	44.3
5	No 303(d) Streams	NA	-	-	-
6	Thorn Creek	5300	3.8	50.0 (21.7)	186.9
7	No 303(d) Streams	NA	-	-	-
8	No 303(d) Streams	NA	-	-	-
Prepared by IDEQ-TFRO. TSS LC, t/yr = Flow (cfs) x Target (mg/L) x 0.9837. TSS concentrations in parenthesis represent the current average conditions based on water quality monitoring. WQLS = Water quality limited stream. TSS = Total suspended solids. WLA = Wasteload allocation. LA = Load allocation.					

- Substrate Sediments
  For the Big Wood River system (mainstem, tributaries, and canals) above the Magic Reservoir, a percent fines target of < 35% fines (Wolman pebble counts) was selected as the surrogate for substrate sediments and as the surrogate for LC. For the Big Wood River system below the Magic Reservoir, a substrate sediment target of < 40% fines (Wolman pebble counts) was selected as the surrogate for substrate sediments and as the surrogate for LC. These are interim preliminary targets. These targets are considered average annual values based on data collected by IDEQ-TFRO through BURP and TMDL monitoring. By the end of year 10 of the watershed management plan, these targets may potentially be reduced to 25% and 30%, respectively.

  Table TT summarizes the mainstem Big Wood River substrate sediment loading capacities per unit based on the instream water quality targets. Point sources for wastewater treatment plants are not considered sources of substrate sediments and therefore are represented as zero (0) in the Target and Actual columns.

Table TT. Mainstem Big Wood River substrate sediment loading capacities per unit

Unit	Segment Boundary	WQLS No.	Annual Mean Flow cfs	TSS (WLA + LA) Target % Fines	Actual % Fines
1	BWR – 1	NA	87.7	35.0	32.2
2	BWR – 2 – NPS	2483	266.05	35.0	46.3
	BWR – 2 – Hailey		2.475	0.0	0.0
	BWR – 2 – Ketchum		3.821	0.0	0.0
	BWR – 2 – Meadows		0.15	0.0	0.0
	BWR – 2 - TOTAL		272.5	35.0	46.3
3	BWR – 3	2482	444.5	35.0	53.5
4	BWR – 4	NA	465.7	35.0	58.6
5	BWR – 5	2478	345.2	40.0	31.3
6	BWR – 6	2477	36.6	40.0	44.2
7	BWR – 7	2476	500.7	40.0	54.9
8	BWR – 8	NA	525.1	40.0	52.9

Prepared by IDEQ-TFRO. Substrate sediments LC = Instream water quality target. The actual % fines is the actual current condition of the substrate fines based on site evaluation. BWR = Big Wood River. WQLS = Water quality limited stream. TSS = Total suspended solids. WLA = Wasteload allocation. LA = Load allocation. NPS = Nonpoint sources. Point source Q in Segment 2 is based on design flow of facility.

Table UU summarizes the tributaries' substrate sediment loading capacities per unit based on the instream water quality targets. Additionally, nine (9) 303(d) streams were subdivided into segments for more specific identification of where the substrate sediments are more or less localized. For example, Eagle Creek has upper, middle, and lower segments that indicate that the lower segment alone has the problem with substrate sediments. Other streams like Rock Creek and East Fork Rock Creek indicate that their upper and lower segments are both problematic and require substrate sediment reductions.

Table UU. 303(d) Tributary substrate sediment loading capacities per unit

UNIT	303(d) STREAM	WQLS No.	ANNUAL MEAN FLOW, cfs	SED (WLA + LA) TARGET %Fines	ACTUAL % Fines
1	Horse Creek	7613	1.7	35.0	30.8
	Owl Creek	5290	2.9	35.0	19.9
	Baker Creek (entire creek)	5292	11.8	35.0	24.7
	Eagle Creek (**See Notes below**)	5291	2.8	35.0	27.2
	Lake Creek	7614	2.2	35.0	21.4
2	Placer Creek	5293	2.2	35.0	31.6
	Cove Creek (**See Notes below**)	5296	1.4	35.0	51.7
	East Fork Wood River	5295	4.6	35.0	15.4
	Greenhorn Gulch (**See Notes**)	5294	0.6	35.0	36.1
	Quigley Creek (**See Notes below**)	5297	9.9	35.0	62.8
	Croy Creek (**See Notes below**)	2491	2.2	35.0	68.9
	Seamans Creek (**See Notes below**)	5298	0.6	35.0	44.7
3	No 303(d) Streams	NA	-	-	-
4	East Fork Rock Creek (**See Notes**)	5299	1.1	35.0	83.5

	Rock Creek (**See Notes below**)	2487	1.8	35.0	54.5
5	No 303(d) Streams	NA	-	-	-
6	Thorn Creek (**See Notes below**)	5300	3.8	40.0	84.5
7	No 303(d) Streams	NA	-	-	-
8	No 303(d) Streams	NA	-	-	-

Prepared by IDEQ-TFRO. TSS L.C. SED = Substrate sediments. Target = Substrate sediment target from Section 3.2.1.2. Actual = actual field trial determination of Wolman pebble counts.

The following streams have segments of their streams that do not meet the substrate targets and will require some reductions.

Eagle Creek (the lower segment is 46.0%, while the middle and upper segments meet the target);
Cove Creek (the upper segment is 90.3%, while the middle and lower segments meet the target);
Greenhorn Gulch (the upper segment is 45.6%, while the middle and lower segments meet the target);
Quigley Creek (the upper segment is 67.2%, the middle segment is 47.4%, and the lower segment is 70.1%);
Croy Creek (only the lower segment was sampled at 68.9%);
Seamans Creek (the upper segment meets the target, while the middle is 59.3% and the lower is 44.1%);
East Fork Rock Creek (the upper segment is 90.3% and the lower segment is 79.0%);
Rock Creek (the upper was 57.6% and the lower was 52.0%.);
Thorn Creek (the upper segment was 84.5%. No middle or lower segment was selected.).

These segments are summarized as follows:

STREAM SEGMENTS

Unit	303(d) Stream	WQLS No.	ANNUAL MEAN FLOW, cfs	SED (WLA + LA) TARGET Fines	ACTUAL % Fines
1	Eagle Creek	5291 – Up	0.3	35.0	16.0
		5291 – Mid	1.0	35.0	16.6
		5291 - Low	2.8	35.0	46.0
2	Cove Creek	5296 – Up	0.3	35.0	90.3
		5296 – Mid	0.8	35.0	15.8
		5296 - Low	1.4	35.0	29.7
	Greenhorn Gulch	5294 – Up	0.2	35.0	45.6
		5294 – Mid	0.4	35.0	30.3
		5294 - Low	0.6	35.0	28.7
	Quigley Creek	5297 – Up	0.3	35.0	67.2
		5297 – Mid	1.4	35.0	47.4
		5297 - Low	9.9	35.0	70.1
	Croy Creek	UPPER	NOT ON THE 303(d) LIST		
		2491 - Low	2.2	35.0	68.9
	Seamans Creek	5298 – Up	0.6	35.0	30.9
		5298 – Mid	1.0	35.0	59.3
		5298 - Low	0.6	35.0	44.1
4	East Fork Rock Creek	5299 – Up	0.4	35.0	90.3
		5299 - Low	1.1	35.0	79.0
	Rock Creek	2487 – Up	0.8	35.0	57.6
		2487 - Low	1.8	35.0	52.0
6	Thorn Creek	5300 - Up	3.8	40.0	84.5
		LOWER	NOT ON THE 303(d) LIST		

- Total Phosphorus
  The provision regarding excess nutrients is the starting point for the development of nutrient targets in the TMDL for total phosphorus (TP). This provision states that "surface waters of the State shall be free from excess nutrients that can cause visible

slime growths or other nuisance growths impairing designated beneficial uses" (IDAPA §58.01.02.200.06). Nutrients are defined as "the major substances necessary for the growth and reproduction of aquatic plant life, consisting of nitrogen, phosphorus, and carbon compounds" (IDAPA §58.01.02.003.66). Based on the physical reality that the Big Wood River "discharges" into the Magic Reservoir (which allows for a target of 0.050 mg/L TP in the waterbody), and that it "discharges" into the Middle Snake River (which would allow for a target of 0.100 mg/L TP), it is appropriate to have two separate targets. The loading capacity (L.C.) of TP is based on the annual average flow. Target TP loads are calculated as follows:

L.C. (lbs/day) = Mean flow, cfs x TP, mg/L x 5.39

Above the Magic Reservoir the IDEQ-TFRO shall set a limit of 0.050 mg/L TP as a monthly average instream target. It also sets a daily maximum of 0.080 mg/L TP to allow for variability and spikes within the system. Below the Magic Reservoir, the IDEQ-TFRO shall set an instream water quality target of 0.100 mg/L TP since the discharge of this portion of the drainage is into the Middle Snake River. It also sets a daily maximum of 0.160 mg/L TP to allow for variability and spikes within the system. Recognizing the potential need to refine these targets, the Big Wood River TMDL shall consider any waterbody for site-specific criteria development if it demonstrates it is below the instream water quality. Site-specific criteria development shall occur after Year 5 of plan implementation (or sooner where applicable).

Table VV summarizes the mainstem Big Wood River total phosphorus loading capacities per unit based on the instream water quality targets. Unit 2 has three (3) point sources, which when combined yields 17.4 lb/day TP. The gross LA for nonpoint sources is 56.0 lb/day TP.

Table VV. Mainstem Big Wood River TP loading capacities per unit

Unit	Segment Boundary	WQLS No.	Annual Mean Flow cfs	TP (WLA + LA) TARGET mg/L	TP (WLA + LA) L.C. lb/day
1	BWR – 1	NA	87.7	0.050 (0.033)	23.6
2	BWR – 2 – NPS	2483	266.05	0.050 (-)	56.0
	BWR – 2 – Hailey		2.475	- (0.39)	5.2
	BWR – 2 – Ketchum		3.821	- (0.48)	9.9
	BWR – 2 – Meadows		0.15	- (2.891)	2.3
	BWR – 2 - TOTAL		272.5	0.050 (0.037)	73.4
3	BWR – 3	2482	444.5	0.050 (0.063)	119.8
4	BWR – 4	NA	465.7	0.050 (0.066)	125.5
5	BWR – 5	2478	345.2	0.100 (0.065)	186.1
6	BWR – 6	2477	36.6	0.100 (0.131)	19.7
7	BWR – 7	2476	500.7	0.100 (0.116)	269.9
8	BWR – 8	NA	525.1	0.100 (0.050)	283.0

Prepared by IDEQ-TFRO. TP LC, lb/day = Flow (cfs) x Target (mg/L) x 5.39. BWR = Big Wood River. WQLS = Water quality limited stream. TP = Total phosphorus. WLA = Wasteload allocation. LA = Load allocation. Point source Q in Segment 2 is based on facility design flow.

Table WW summarizes the 303(d) tributary TP loading capacities per unit.

Table WW. 303(d) Tributary TP loading capacities per unit

Unit	303(d) Stream	WQLS No.	Annual Mean Flows cfs	TP (WLA + LA) TARGET mg/L	L.C. lbs/day
1	Horse Creek	7613	1.7	0.050 (0.024)	0.5
	Owl Creek	5290	2.9	0.050 (0.016)	0.8
	Baker Creek (entire creek)	5292	11.8	0.050 (0.022)	3.2
	Eagle Creek	5291	2.8	0.050 (0.032)	0.8
	Lake Creek	7614	2.2	0.050 (0.042)	0.6
2	Placer Creek	5293	2.2	0.050 (0.018)	0.6
	Cove Creek	5296	1.4	0.050 (0.086)	0.4
	East Fork Wood River	5295	4.6	0.050 (0.020)	1.2
	Greenhorn Gulch	5294	0.6	0.050 (0.138)	0.2
	Quigley Creek	5297	9.9	0.050 (0.038)	2.7
	Croy Creek	2491	2.2	0.050 (0.047)	0.6
	Seamans Creek	5298	0.6	0.050 (0.044)	0.2
3	No 303(d) Streams	NA	-	-	-
4	East Fork Rock Creek	5299	1.1	0.050 (0.080)	0.3
	Rock Creek	2487	1.8	0.050 (0.029)	0.5
5	No 303(d) Streams	NA	-	-	-
6	Thorn Creek	5300	3.8	0.100 (0.133)	2.0
7	No 303(d) Streams	NA	-	-	-
8	No 303(d) Streams	NA	-	-	-

Prepared by IDEQ-TFRO. TSS L.C., t/yr = Flow (cfs) x Target (mg/L) x 0.9837. WQLS = Water quality limited stream. TP = Total phosphorus. WLA = Wasteload allocation. LA = Load allocation.

- *Escherichia coli*

  Above and below the Magic Reservoir, IDEQ-TFRO shall set a limit of for *Escherichia coli* (*E. coli*) as a geometric mean of < 126-cfu/100 mL for a monthly average. To allow for variability and spikes within the system, a geometric mean < 200-cfu/100 mL was selected for a daily maximum. The development of the *E. coli* loading capacity presents challenges, because it is a most probable number (MPN) measurement. A simple, first cut approach is to estimate a surrogate load using colony forming units (cfu) expressed in billions (cfu^9) as follows:

$$\text{L.C. } (cfu^9) = \text{Mean flow, cfs} \times \textit{E. coli}\text{, cfu/100 mL} \times 0.02445$$

Recognizing the potential need to refine these targets, the Big Wood River TMDL shall consider any waterbody for site-specific criteria development if it demonstrates it is below the instream water quality. Site-specific criteria development shall occur after Year 5 of plan implementation (or sooner where applicable).

Table XX summarizes the *E. coli* loading capacities of the mainstem Big Wood River per unit. The three- (3) point sources are summarized within the LC and subtracted out to obtain the LC for the nonpoint source component.

Table XX. Mainstem Big Wood River *E. coli* loading capacities per unit

Unit	Segment Boundary	WQLS No.	Annual Mean Flow cfs	E. coli (WLA + LA) TARGET cfu/100 mL	LC cfu[9]
1	BWR – 1	NA	87.7	126 (6)	270.2
2	BWR – 2 – NPS	2483	266.05	126	345.3
	BWR – 2 – Hailey		2.475	-	1.2
	BWR – 2 – Ketchum		3.821	-	2.7
	BWR – 2 – Meadows		0.15	-	0.2
	BWR – 2 - TOTAL		272.5	126 (419)	349.4
3	BWR – 3	2482	444.5	126 (21)	1,369.4
4	BWR – 4	NA	465.7	126 (162)	1,434.7
5	BWR – 5	2478	345.2	126 (97)	1,063.5
6	BWR – 6	2477	36.6	126 (102)	112.8
7	BWR – 7	2476	500.7	126 (81)	1,542.5
8	BWR – 8	NA	525.1	126 (21)	1,617.7

Prepared by IDEQ-TFRO. *E. coli* LC (cfu^9/day) = Flow (cfs) x Target (cfu/100 mL) x 0.02445. BWR = Big Wood River. WQLS = Water quality limited stream. LC = loading capacity.

Table YY summarizes the E. coli loading capacities of the 303(d) tributaries per unit of the Big Wood River.

Table YY. 303(d) Tributary *E. coli* loading capacities per unit

Unit	303(d) Stream	WQLS No.	Annual Mean Flow cfs	*E. coli* (WLA + LA) TARGET cfu/100 mL	LC cfu[9]
1	Horse Creek	7613	1.7	126 (1)	5.2
	Owl Creek	5290	2.9	126 (1)	8.9
	Baker Creek (entire creek)	5292	11.8	126 (9)	36.4
	Eagle Creek	5291	2.8	126 (10)	8.6
	Lake Creek	7614	2.2	126 (26)	6.8
2	Placer Creek	5293	2.2	126 (4)	6.8
	Cove Creek	5296	1.4	126 (5)	4.3
	East Fork Wood River	5295	4.6	126 (3)	14.2
	Greenhorn Gulch	5294	0.6	126 (41)	1.8
	Quigley Creek	5297	9.9	127 (23)	30.5
	Croy Creek	2491	2.2	126 (18)	6.8
	Seamans Creek	5298	0.6	126 (137)	1.8
3	No 303(d) Streams	NA	-	-	-
4	East Fork Rock Creek	5299	1.1	126 (31)	3.4
	Rock Creek	2487	1.8	126 (170)	5.5
5	No 303(d) Streams	NA	-	-	-
6	Thorn Creek	5300	3.8	126 (105)	11.7
7	No 303(d) Streams	NA	-	-	-
8	No 303(d) Streams	NA	-	-	-

Prepared by IDEQ-TFRO. ECOLI L.C. (cfu^9/day) = Flow (cfs) x Target (cfu/100 mL) x 0.02445. WQLS = Water quality limited stream. LC = loading capacity.

- Anti-degradation Policy
  Idaho's water quality standards also incorporate protection under the anti-degradation policy, such that "the existing in-stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected" (IDAPA §58.01.02.051(01)). Therefore, any 303(d) waterbody that currently has an existing load that is less than the target LC shall be protected at the existing level so that degradation up to the LC does not occur. Recognizing the potential need to refine these targets, the Big Wood River TMDL shall consider any waterbody for site-specific criteria development if it demonstrates it is below the instream water quality target. Site-specific criteria development may occur after Year 5 of plan implementation (or sooner where applicable).

5.3 Estimates of Existing Pollutant Loads

Regulations allow that loadings "...may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading," (40 CFR 130.2(I)). An estimate must be made for each point source. Nonpoint sources are typically estimated based on the type of sources (land use) and area (such as a subwatershed), but may be aggregated by type of source or land area. To the extent possible, background loads should be distinguished from human-caused increases in nonpoint loads. In the Big Wood River Subbasin every effort has been made to the extent practical and scientifically possible to distinguish between point sources, nonpoint sources, and natural background.

- Method(s) of Estimation of Allocation
  The method of estimation of allocation used is based on the principal TMDL equation:

$$TMDL = LC = WLA + LA + NB + MOS$$

TMDL = Total maximum daily load
LC = Loading Capacity
WLA = Wasteload allocation for point sources
LA = Load allocation for nonpoint sources
NB = Natural background
MOS = Margin of safety

Based on the instream water quality targets for TSS, TP, and *E. coli*, an estimate of the LC was first determined to establish the limit required for the stream segment. Therefore and as previously define in §5.2 the LC was defined first.

Second, the WLA for the point sources (3 wastewater treatment facilities in Unit 2 of the Big Wood River) was determined based on an annual mean of facility flow, TSS, TP, and *E. coli*. Where TP was unknown (as in the case of The Meadows), it was estimated based on a comparison o facility flows and TP using a linear regression.

Since fecal coliform was used and little information was collected for *E. coli*, IDEQ-TFRO ascertained a confirmation from the Idaho Department of Health and Welfare Laboratory (Boise, Idaho) that the fecal coliform test was “near equivalent at 99% confidence” to be similar to *E. coli*. Therefore, and as a first cut the *E. coli* LC was estimated as similar to the fecal coliform LC. From these estimates the WLA were determined and subtracted from the LC for TSS, TP, and *E. coli*, leaving a value equivalent to the LA + NB + MOS. In the case of substrate sediments, it was assumed that point sources do not contribute to substrate sediments since these represent a higher probable contribution from nonpoint sources only.

Third, natural background was estimated as described in Table HH for barren lands, wetlands, riparian lands, and water. To the extent scientifically possible, natural background was estimated at 10% for the Big Wood River mainstem and 6% for the tributaries. Therefore, the estimated 10% or 6% was taken from the remaining LA + NB + MOS. This is further described in §5.4, thus leaving LA + MOS.

Fourth, the MOS was estimated at 10% for TSS, TP, and *E. coli*. A 20% MOS was estimated for substrate sediments. Therefore, the estimated 10% or 20% was taken from the remaining LA + MOS. This is further described in §5.4, thus leaving LA.

Fifth, the LA for nonpoint sources was estimated as the remaining LC, which means that:

$$LA = LC – (WLA + NB + MOS)$$

This process was used to describe the LC (or TMDL) into its WLA, its NB and MOS, and finally its LA, and follows a similar mathematical pattern to other TMDLs used within the State of Idaho and the Pacific Northwest – Region 10 area.

- Appendix C summarizes the water quality data used, its sources, etc. The current conditions of water quality during the years 1999-2001 was such that a serious drought, the 4th worse in southcentral Idaho according to USBOR, caused flows to be less than their normal base flow. This caused spring flushing flows to be depressed, potentially skewing the LC to be less than normal. IDEQ-TFRO and the WAG recognize this, and will allow for adjustments based on more current natural flows when flows recover to average conditions. However, the use of the low flow conditions allows for the worst case scenario to be used as a model, meaning that under average and high flows achievement of beneficial uses should be easier.

- Major nonpoint sources are described in Table FF based on land ownership. These sources include USFS, BLM, IDL, private lands, and open water. These sources cover the land types for forestry, rangeland, irrigated agriculture, and riparian lands. By defining the sources according to land ownership it is easier to assign load allocations to the nonpoint source agencies or groups versus having to have to define explicitly the land type according to landuse. However, to the extent practical the degree of uncertainty is minimized in the estimates for land ownership. This uncertainty factor is less with land ownership than with landuse.

Minor nonpoint sources are described in Table GG. These will be evaluated more closely during the implementation-planning phase. It is assumed that their contribution accounts for a very small portion of the load allocation of nonpoint sources and their accumulative load does not add much to the major nonpoint sources (as far as the LC). Confined feeding operations as feedlots or dairies do exist in the Big Wood River Subbasin. However, they are not present in the drainage watersheds of the 303(d) streams for either the mainstem Big Wood River or the tributaries.

Point sources are confined to Unit 2 (Trail Creek to the Glendale Diversion) of the mainstem Big Wood River. These sources include the City of Hailey, the City of Ketchum, and The Meadows. All three point sources are exhibiting population and growth development. To the extent practical, growth of these facilities is confined to their current design flow capacity. New point sources are not allowed to increase in the special resource water section of the Big Wood River, nor are the existing point sources allowed to expand beyond their design capacities.

- Little information or data exists to allow for accounting of seasonality for TSS, TP, or *E. coli*. Substrate sediments are currently not being considered for seasonal loads. With the collection of new data, seasonality will be explored more fully with the point sources, irrigated agriculture, and with rangeland grazing. Pollutant allocations in the Big Wood River TMDL are expressed as annual average values. Seasonal variation was considered in the development of the TMDL but insufficient water quality data was obtained to allow for seasonal variation calculations. However, as more information is collected over the next 3-5 years, seasonal targets may be developed and adjustments made, if necessary.

- <u>Existing Loading Rates for Each Parameter</u>
  The existing loading rates for each parameter are defined as follows:

  <u>Total suspended solids</u>: Table RR and Table SS describe the existing TSS conditions of the 303(d) streams. These are summarized in parenthesis within the TARGET column as mg/L.

  <u>Suspended sediments</u>: Table TT and Table UU describe the existing substrate sediment conditions of the 303(d) streams. These are summarized within the TARGET column as % Fines.

  <u>Total phosphorus</u>: Table VV and Table WW describe the existing TP conditions of the 303(d) streams. These are summarized in parenthesis within the TARGET column as mg/L.

E. coli: Table XX and Table YY describe the existing *E. coli* conditions of the 303(d) streams. These are summarized in parenthesis within the TARGET column as cfu/100 mL.

- Background Load
  Background load is summarized in Table HH. This is a surrogate background load and includes barren lands, wetlands, riparian lands, and total water. The extent to which it is purely background or aggregated with other nonpoint loads is depended on the extent to which major and minor nonpoint sources are integrated with natural background, and the segregation of man induced versus non-man induced.

- Wasteloads from Point Sources.
  The wasteloads for all point sources are summarize in Table ZZ by source (type, RM location, load, NPDES permit No.). These loads are mean annual loads from 2000 to 2001 for the City of Hailey, 1990 to 2001 for The Meadows, and from 1995 to 2001 for the City of Ketchum. The City of Hailey went on-line with a new treatment plant in September 2000. Due to this upgrade, the pollutant averages in Table ZZ reflect the upgraded status for < 2 years. Therefore, more data will be collected during the implementation phase of the TMDL to ascertain more directly what the true nature of the upgrade is.

Table ZZ. Wasteloads from point sources in Big Wood River Subbasin

Wasteload Type	RM Discharge	Wasteload Allocations				NPDES[1] Permit Number
		TSS t/yr	Sub % Fines	TP lb/day	*E. coli* cfu[9]	
City of Ketchum POTW	RM 99.0	26.5	0.0	9.9	2.7	002028-1
City of Hailey POTW	RM 84.0	3.3	0.0	5.2	0.2	002030-3
The Meadows STP	RM 95.8	0.6	0.0	2.3	0.1	002442-2
Total Wasteloads	-	30.4	0.0	17.4	3.0	-

Prepared by IDEQ-TFRO. Data taken from Tables EE and MM. [1]National Pollutant Discharge Elimination System. POTW = Privately owned treatment works. STP = Sewage treatment plant. RM = River mile. TSS = Total suspended solids. Sub = Substrate sediments. TP = Total phosphorus. *E. coli* = *Escherichia coli*.

- Loads from Nonpoint Sources
  Nonpoint sources are generally summarized in Table AA by land ownership (estimation method). The estimation method is based on the use of ArcView land ownership coverage for USFS, BLM, IDL, and private lands. These will be further defined in §5.4.

Table AAA. Loads from nonpoint sources in Big Wood River Subbasin.

Unit	Stream Name	Land Ownership Nonpoint Sources, %			
		USFS	BLM	IDL	Private

Mainstem Big Wood River					
1	BWR – 1	82.7	5.0	0.0	12.3
2	BWR – 2	0.0	16.6	1.9	81.5
3	BWR – 3	0.0	4.5	0.0	95.5
4	BWR – 4	0.0	27.3	5.4	67.3
5	BWR – 5	0.0	83.9	0.6	15.5
6	BWR – 6	0.0	44.9	4.3	50.8
7	BWR – 7	0.0	20.4	0.0	79.6
8	BWR – 8	0.0	7.0	6.3	86.7
Tributaries or 303(d) Tributary Segments					
1	Horse Creek	99.8	0.0	0.0	0.2
	Owl Creek	100.0	0.0	0.0	0.0
	Baker Creek (entire creek)	100.0	0.0	0.0	0.0
	Eagle Creek	94.4	0.0	0.0	5.6
	Lake Creek	82.6	12.6	0.0	4.8
2	Placer Creek	100.0	0.0	0.0	0.0
	Cove Creek	52.0	2.9	0.0	45.2
	East Fork Wood River	89.8	0.0	0.0	10.2
	Greenhorn Gulch	55.6	15.7	0.0	28.7
	Quigley Creek	5.0	9.5	7.0	78.5
	Croy Creek	0.0	43.3	6.7	50.0
	Seamans Creek	0.0	5.3	11.4	83.3
3	No 303(d) Streams	-	-	-	-
4	East Fork Rock Creek	0.0	60.5	5.2	34.3
	Rock Creek	0.0	43.4	7.8	48.8
5	No 303(d) Streams	-	-	-	-
6	Thorn Creek	0.0	91.6	2.5	5.9
7	No 303(d) Streams	-	-	-	-
8	No 303(d) Streams	-	-	-	-
Prepared by IDEQ-TFRO.					

5.4 Overall Load Allocation

The total allocations must include a margin of safety to take into account seasonal variability and uncertainty. Uncertainty arises in selection of water quality targets, load capacity, and estimates of existing loads, and may be attributed to incomplete knowledge or understanding of the system, such as assimilation not well known, sketchy data, or variability in data. The margin of safety is effectively a reduction in loading capacity that "comes off the top" (i.e., before any allocation to sources). Second in line is the background load, a further reduction in loading capacity available for allocation. It is also prudent to allow for growth by reserving a portion of the remaining available load for future sources. The load capacity is then apportioned among existing and future pollutant sources. Allocations may take into account equitable cost, cost effectiveness, and credit for prior efforts, but all within the ceiling of remaining available load. These allocations may take the form of percent reductions rather than actual loads. Each point source must receive an allocation. Nonpoint sources may be allocated by subwatershed, landuse, land ownership, responsibility for actions, or a combination. It is necessary to allocate a reduction in load for all nonpoint sources so long as water quality targets can be met with the reductions that are specified. Therefore, LA = TMDL (or LC) – (WLAs + Nat Bk + MOS).

Margin of Safety

The Clean Water Act requires that each TMDL be established with a margin of safety (MOS). The statutory requirement that the Big Wood River TMDL incorporate a MOS is intended to account for uncertainty in available data or in the actual effect that controls will have on loading reductions and receiving water quality. The MOS may be implicit, as in conservative assumptions used in calculating the loading capacity, wasteload allocations, and load allocations. Or, it may be an explicit MOS where a value is assigned to it based on actual data or as an estimate. The MOS is not meant to compensate for a failure to consider known sources.

- It cannot be known at this time the exact nature and magnitude of pollutant loads from various nonpoint sources and the specific impacts of those pollutants on the chemical and biological quality of complex natural waterbodies. However, there is sufficient information to ascertain that each TMDL is derived from a unique set of circumstances in terms of nonpoint source landuse and point source discharges. Thus, different combinations affect water quality in different ways. Also, "current" conditions vary across the subbasin, which indicates that different reductions and MOSs are needed for different TMDLs. Because of these uncertainties, the MOS accounts for this uncertainty in a manner that is conservative from the standpoint of protection of the environment. Uncertainties in the TMDL include:

    1. The degree of excess sediment to the mainstem Big Wood River is difficult to quantify or define. Instream indicators of sediment, such as substrate sediments (using Wolman pebble counts) provide a preliminary surrogate for substrate fines. Site specific considerations need to be considered.

    2. High flow sediment inputs from tributaries may be underestimated.

    3. Little data available to define sediment targets more specifically for tributary and mainstem waterbodies, particularly for seasonality.

    4. The degree of excess nutrients to the mainstem Big Wood River is difficult to quantify or define.

    5. Little information is available to define TP targets more specifically according to seasonality.

    6. Little information is available to define pathogens more specifically, and possibly include seasonality.

- The Big Wood River Watershed Management Plan has explicit margins of safety for all of its instream water quality targets – total suspended solids, substrate sediments, total phosphorus, and *E. coli*. Any conservative assumptions in target selection or load estimation are interwoven within the explicit margin of safety.

- Region 10 of the USEPA-Seattle has recently "required" a defined or explicit MOS in its review of Idaho TMDLs. Following the precedence of the Mid-Snake TMDL (Implicit MOS), the Upper Snake Rock TMDL (20% MOS), the Lake Walcott TMDL (Implicit MOS), and the Bruneau TMDL (10% MOS) a uniform value of 10% of the loading capacity is assigned as the explicit MOS for TSS, TP, and pathogens. This will account for average conditions. Insufficient data exists to account for a more accurate value for the MOS for individual TMDLs. The explicit MOS for substrate sediments is 20% and is comparable to other non-Idaho TMDLs written for substrate sediments (as % fines). For the Big Wood River Watershed Management Plan the MOS for the TSS TMDL can be found in Tables BBB and CCC for the mainstem Big Wood River and its tributaries, respectively. For the substrate sediments TMDL the MOS can be found in Tables DDD and EEE for the mainstem Big Wood River and its tributaries, respectively. For the TP TMDL the MOS can be found in Tables FFF and GGG for the mainstem Big Wood River and its tributaries, respectively. And, for the *E. coli* TMDL the MOS can be found in Tables HHH and III for the mainstem Big Wood River and its tributaries, respectively.

Natural Background

IDAPA §58.01.02.003.06 defines background as "the biological, chemical, or physical condition of waters measured at a point immediately upstream of the influence of an individual point or nonpoint source discharge." As used in this definition, background indicates both natural and artificial sources of background. Natural background, on the other hand, may be considered the level of any constituent in the surface water that are unaffected by human activities. Little scientific information exists that describes natural background, particularly sedimentation background in the Big Wood River Subbasin. A surrogate for natural background was developed using GIS landuse coverage on each 303(d). Natural background was defined as barren/rock, wetlands, riparian, and open water with a relative percentage for each. Thus, the relative percentage for total natural background is 10% for the mainstem Big Wood River and 6% for the remaining tributaries (as overall averages).

Load Allocation

The following tables describe the allocation of the LC (as TMDL) into WLAs (where appropriate), natural background, margin of safety, and their appropriate load allocation. Where reductions are expected, these are summarized as % Red (% Reduction) in the final column. The overall load allocation (LA) for the nonpoint sources was obtained from the following formula: TMDL = LC – (WLAs + Nat Bk + MOS).

Total Suspended Solids

Table BBB and Table CCC defines the TSS TMDL for the mainstem Big Wood River and associated 303(d) tributaries.

Table BBB. Mainstem Big Wood River TSS TMDL and allocations

Unit	Segment Boundary	WQLS No.	TMDL tons/yr	WLAs tons/yr	LAs tons/yr	Nat Bk 10% tons/yr	MOS 10% tons/yr	% Red
1	BWR – 1	NA	2,156.7	0.0	1,725.3	215.7	215.7	0.0
2	BWR – 2	NPS	6,670.9	0.0	5,330.7	670.1	670.1	0.0
		Hailey	3.3	3.3	-	-	-	-
		Ketchum	26.5	26.5	-	-	-	-
		Meadows	0.6	0.6	-	-	-	-
		2483	6,701.3	30.4	5,330.7	670.1	670.1	0.0
3	BWR – 3	2482	10,931.1	0.0	8,744.9	1,093.1	1,093.1	0.0
4	BWR – 4	NA	11,452.4	0.0	9,162.0	1,145.2	1,145.2	0.0
5	BWR – 5	2478	16,978.2	0.0	13,582.6	1,697.8	1,697.8	0.0
6	BWR – 6	2477	1,800.1	0.0	1,440.1	180.0	180.0	0.0
7	BWR – 7	2476	24,626.3	0.0	19,701.1	2,462.6	2,462.6	0.0
8	BWR – 8	NA	25,826.4	0.0	20,661.2	2,582.6	2,582.6	0.0

Prepared by IDEQ-TFRO. TSS L.C., tons/yr = Flow (cfs) x Target (mg/L) x 0.9837. WLAs = wasteload allocations for point sources. LAs = load allocations for nonpoint sources = TMDL – (WLAs + Nat Bk + MOS). Nat Bk = 10% natural background. MOS = 10% margin of safety. Red = reduction = Actual concentration/Target concentration x 100%. NPS = Nonpoint sources.

Table CCC. 303(d) Tributary TSS TMDL and allocations

Unit	303(d) Stream	WQLS No.	TMDL t/yr	WLAs t/yr	LAs t/yr	Nat Bk 6% t/yr	MOS 10% t/yr	% Red
1	Horse Creek	7613	41.8	0.0	35.1	2.5	4.2	0.0
	Owl Creek	5290	71.3	0.0	59.9	4.3	7.1	0.0
	Baker Ck (entire ck)	5292	290.2	0.0	243.8	17.4	29.0	0.0
	Eagle Creek	5291	68.9	0.0	57.8	4.1	6.9	0.0
	Lake Creek	7614	54.1	0.0	45.4	3.2	5.4	0.0
2	Placer Creek	5293	54.1	0.0	45.4	3.2	5.4	0.0
	Cove Creek	5296	34.4	0.0	28.9	2.1	3.4	0.0
	E Fork Wood River	5295	113.1	0.0	95.0	6.8	11.3	0.0
	Greenhorn Gulch	5294	14.8	0.0	12.4	0.9	1.5	0.0
	Quigley Creek	5297	243.5	0.0	204.5	14.6	24.3	0.0
	Croy Creek	2491	54.1	0.0	45.4	3.2	5.4	0.0
	Seamans Creek	5298	14.8	0.0	12.4	0.9	1.5	0.0
3	No 303(d) Streams	NA	-	-	-	-	-	-
4	E Fork Rock Creek	5299	27.1	0.0	22.7	1.6	2.7	0.0
	Rock Creek	2487	44.3	0.0	37.2	2.7	4.4	0.0
5	No 303(d) Streams	NA	-	-	-	-	-	-
6	Thorn Creek	5300	186.9	0.0	157.0	11.2	18.7	0.0
7	No 303(d) Streams	NA	-	-	-	-	-	-
8	No 303(d) Streams	NA	-	-	-	-	-	-

Prepared by IDEQ-TFRO. TMDL = WLAs + LAs + Nat Bk + MOS. WLAs = Wasteload allocations. LAs = Load allocations. Nat Bk = Natural background at 6%. MOS = 10%. Red = reduction = Actual concentration/Target concentration x 100%. Since the TSS actual values are < Target concentrations (on an average basis), no reductions are planned. E = East. Ck = ck = creek. WQLS = Water quality limited stream.

Substrate Sediments

Table DDD and Table EEE defines the substrate sediment TMDL for the mainstem Big Wood River and associated 303(d) tributaries. Unit 2 describes the three- (3) point sources.

Table DDD. Mainstem Big Wood River substrate sediment TMDL and allocations

Unit	Segment Boundaries	WQLS No.	TMDL % Fines	WLAs % Fines	LAs % Fines	Nat Bk 10 % Fines	MOS 20 % Fines	% Red
1	BWR – 1	NA	35.0	0.0	24.5	3.5	7.0	0.0
2	BWR –2 – NPS	2483	35.0	-	24.5	3.5	7.0	24.4
	Hailey		0.0	0.0	-	-	-	-
	Ketchum		0.0	0.0	-	-	-	-
	Meadows		0.0	0.0	-	-	-	-
	BWR – TOTAL	2483	35.0	0.0	24.5	3.5	7.0	24.4
3	BWR – 3	2482	35.0	0.0	24.5	3.5	7.0	34.6
4	BWR – 4	NA	35.0	0.0	24.5	3.5	7.0	40.3
5	BWR – 5	2478	40.0	0.0	28.0	4.0	8.0	0.0
6	BWR – 6	2477	40.0	0.0	28.0	4.0	8.0	9.5
7	BWR – 7	2476	40.0	0.0	28.0	4.0	8.0	27.1
8	BWR – 8	NA	40.0	0.0	28.0	4.0	8.0	24.4

Prepared by IDEQ-TFRO. TSS L.C. Substrate sediments are attributed to nonpoint sources and not necessarily point sources. % Red = % Reduction of the actual fines and the amount that needs to be reduced to get to the substrate target. WQLS = Water quality limited stream. TMDL = WLAs + LAs + Nat Bk + MOS. WLAs = Wasteload allocations. LAs = Load allocations. Nat Bk = Natural background at 10%. MOS = 10%. Red = reduction = Actual concentration/Target concentration x 100%.

Table EEE. 303(d) Tributary substrate sediment TMDL and allocations

Unit	303(d) Stream	WQLS No.	TMDL % Fines	WLAs % Fines	LAs % Fines	NatBk 6 % Fines	MOS 20 % Fines	% Red
1	Horse Creek	7613	35.0	0.0	25.9	2.1	7.0	0.0
	Owl Creek	5290	35.0	0.0	25.9	2.1	7.0	0.0
	Baker Ck (entire ck)	5292	35.0	0.0	25.9	2.1	7.0	0.0
	Eagle Creek	5291	35.0	0.0	25.9	2.1	7.0	0.0
	Lake Creek	7614	35.0	0.0	25.9	2.1	7.0	0.0
2	Placer Creek	5293	35.0	0.0	25.9	2.1	7.0	0.0
	Cove Creek	5296	35.0	0.0	25.9	2.1	7.0	32.3
	East Fork Wood River	5295	35.0	0.0	25.9	2.1	7.0	0.0
	Greenhorn Gulch	5294	35.0	0.0	25.9	2.1	7.0	3.0
	Quigley Creek	5297	35.0	0.0	25.9	2.1	7.0	44.3
	Croy Creek	2491	35.0	0.0	25.9	2.1	7.0	49.2
	Seamans Creek	5298	35.0	0.0	25.9	2.1	7.0	21.7
3	No 303(d) Streams	NA	-	-	-	-	-	-

4	E Fork Rock Creek	5299	35.0	0.0	25.9	2.1	7.0	58.1
	Rock Creek	2487	35.0	0.0	25.9	2.1	7.0	35.8
5	No 303(d) Streams	NA	-	-	-	-	-	-
6	Thorn Creek	5300	40.0	0.0	29.6	2.4	8.0	52.7
7	No 303(d) Streams	NA	-	-	-	-	-	-
8	No 303(d) Streams	NA	-	-	-	-	-	-

Prepared by IDEQ-TFRO. TMDL = WLAs + LAs + Nat Bk + MOS. Red = reduction = Actual concentration/Target concentration x 100%. Since the TSS actual values are < Target concentrations (on an average basis), no reductions are planned. WLAs = Wasteload allocations. LAs = Load allocations. Nat Bk = Natural background. MOS = Margin of safety. Red = Reduction.

The following streams have segments of their streams that do not meet the substrate targets and will require some reductions:

Eagle Creek (the lower segment is 46.0%, while the middle and upper segments meet the target);
Cove Creek (the upper segment is 90.3%, while the middle and lower segments meet the target);
Greenhorn Gulch (the upper segment is 45.6%, while the middle and lower segments meet the target);
Quigley Creek (the upper segment is 67.2%, the middle segment is 47.4%, and the lower segment is 70.1%);
Croy Creek (only the lower segment was sampled at 68.9%);
Seamans Creek (the upper segment meets the target, while the middle is 59.3% and the lower is 44.1%);
East Fork Rock Creek (the upper is 90.3% and the lower segment is 79.0%);
Rock Creek (the upper was 57.6% and the lower was 52.0%.);
Thorn Creek (the upper segment was 84.5%. No middle or lower segment was selected.). These are summarized as follows:

STREAM SEGMENTS

UNIT	303(d) STREAM	WQLS No.	TMDL % Fines	WLAs % Fines	LAs % Fines	Nat Bk 6 % Fines	MOS 20 % Fines	% Red
1	Eagle Creek	5291 – Up	35.0	0.0	29.4	2.1	3.5	0.0
		5291 – Mid	35.0	0.0	29.4	2.1	3.5	0.0
		5291 - Low	35.0	0.0	29.4	2.1	3.5	23.9
2	Cove Creek	5296 – Up	35.0	0.0	29.4	2.1	3.5	61.2
		5296 – Mid	35.0	0.0	29.4	2.1	3.5	0.0
		5296 - Low	35.0	0.0	29.4	2.1	3.5	0.0
	Greenhorn Gulch	5294 – Up	35.0	0.0	29.4	2.1	3.5	23.2
		5294 – Mid	35.0	0.0	29.4	2.1	3.5	0.0
		5294 - Low	35.0	0.0	29.4	2.1	3.5	0.0
	Quigley Creek	5297 – Up	35.0	0.0	29.4	2.1	3.5	47.9
		5297 – Mid	35.0	0.0	29.4	2.1	3.5	26.2
		5297 - Low	35.0	0.0	29.4	2.1	3.5	50.1
	Croy Creek	UPPER	NOT ON THE 303(d) LIST					
		2491 - Low	35.0	0.0	29.4	2.1	3.5	49.2
	Seamans Creek	5298 – Up	35.0	0.0	29.4	2.1	3.5	0.0
		5298 – Mid	35.0	0.0	29.4	2.1	3.5	41.0
		5298 - Low	35.0	0.0	29.4	2.1	3.5	20.6
4	East Fork Rock Creek	5299 – Up	35.0	0.0	29.4	2.1	3.5	61.2
		5299 - Low	35.0	0.0	29.4	2.1	3.5	55.7
	Rock Creek	2487 – Up	35.0	0.0	29.4	2.1	3.5	39.2
		2487 - Low	35.0	0.0	29.4	2.1	3.5	32.7
6	Thorn Creek	5300 - Up	40.0	0.0	33.6	2.4	4.0	52.7
		LOWER	NOT ON THE 303(d) LIST					

Total Phosphorus

Table FFF and Table GGG defines the total phosphorus TMDL for the mainstem Big Wood River and associated 303(d) tributaries.

Table FFF. Mainstem Big Wood River TP TMDL and allocations

Unit	Segment Boundary	WQLS No.	TMDL lb/day	WLAs lb/day	LAs lb/day	Nat Bk 10% lb/day	MOS 10% lb/day	% Red
1	BWR – 1	NA	23.6	0.0	18.9	2.4	2.4	0.0%
2	BWR – 2	NPS	56.0	-	41.4	7.3	7.3	0.0%
		Hailey	5.2	5.2	-	-	-	
		Ketchum	9.9	9.9	-	-	-	
		Meadows	2.3	2.3	-	-	-	
		2483	73.4	17.4	41.4	7.3	7.3	
3	BWR – 3	2482	119.8	0.0	95.8	12.0	12.0	20.6%
4	BWR – 4	NA	125.5	0.0	100.4	12.6	12.6	24.2
5	BWR – 5	2478	186.1	0.0	148.9	18.6	18.6	0.0
6	BWR – 6	2477	19.7	0.0	15.8	2.0	2.0	23.7
7	BWR – 7	2476	269.9	0.0	215.9	27.0	27.0	13.8
8	BWR – 8	NA	283.0	0.0	226.4	28.3	28.3	0.0

Prepared by IDEQ-TFRO. TP L.C., lbs/day = Flow (cfs) x Target (mg/L) x 5.39. WLAs = wasteload allocations for point sources. LAs = load allocations for nonpoint sources = TMDL – (WLAs + Nat Bk + MOS). Nat Bk = 10% natural background. MOS = 10% margin of safety. Red = reduction = Actual concentration/Target concentration x 100%. Where TP actual values are < Target concentrations (on an average basis), no reductions are planned. NPS = Nonpoint sources.

Table GGG. 303(d) Tributary TP TMDL and allocations

UNIT	303(d) STREAM	WQLS No.	TMDL lb/day	WLAs lb/day	LAs lb/day	NatBk 6% lb/day	MOS 10% lb/day	% Red
1	Horse Creek	7613	0.5	0.0	0.38	0.03	0.05	0.0
	Owl Creek	5290	0.8	0.0	0.66	0.05	0.08	0.0
	Baker Ck (all)	5292	3.2	0.0	2.67	0.19	0.32	0.0
	Eagle Creek	5291	0.8	0.0	0.63	0.05	0.08	0.0
	Lake Creek	7614	0.6	0.0	0.50	0.04	0.06	0.0
2	Placer Creek	5293	0.6	0.0	0.50	0.04	0.06	0.0
	Cove Creek	5296	0.4	0.0	0.32	0.02	0.04	41.9
	EF Wood River	5295	1.2	0.0	1.04	0.07	0.12	0.0
	Greenhorn G	5294	0.2	0.0	0.14	0.01	0.02	63.8
	Quigley Creek	5297	2.7	0.0	2.24	0.16	0.27	0.0
	Croy Creek	2491	0.6	0.0	0.50	0.04	0.06	0.0
	Seamans Ck	5298	0.2	0.0	0.14	0.01	0.02	0.0
3	No 303(d) Strs	NA	-	-	-	-	-	-
4	EF Rock Creek	5299	0.3	0.0	0.25	0.02	0.03	37.5
	Rock Creek	2487	0.5	0.0	0.41	0.03	0.05	0.0
5	No 303(d) Strs	NA	-	-	-	-	-	-
6	Thorn Crk	5300	2.0	0.0	1.72	0.12	0.20	24.8
7	No 303(d) Strs	NA	-	-	-	-	-	-

8	No 303(d) Strs	NA	-	-	-	-	-	-

Prepared by IDEQ-TFRO. TMDL = WLAs + LAs + Nat Bk + MOS. Nat Bk = Natural background at 6% based on Section 3.5. A 10% MOS. Red = reduction = Actual concentration/Target concentration x 100%. Strs = Streams. Crk = ck = creek. EF = East Fork. G = Gulch. (all) = entire creek.

Escherichia coli (*E. coli*)

Table HHH and Table III defines the *E. coli* TMDL for the mainstem Big Wood River and associated 303(d) tributaries.

Table HHH. Mainstem Big Wood River *E. coli* TMDL and allocations

Unit	Segment Boundary	WQLS No.	TMDL cfu^9	WLAs cfu^9	LAs cfu^9	Nat Bk 10% cfu^9	MOS 10% cfu^9	% Red
1	BWR – 1	NA	270.2	0.0	216.1	27.0	27.0	0.0
2	BWR – 2	NPS	346.4	-	276.6	34.9	34.9	69.9
		Hailey	1.2	1.2	-	-	-	
		Ketchum	2.7	2.7	-	-	-	
		Meadows	0.1	0.1	-	-	-	
		2483 - Total	349.4	3.0	276.6	34.9	34.9	
3	BWR – 3	2482	1,369.4	0.0	1,095.5	136.9	136.9	0.0
4	BWR – 4	NA	1,434.7	0.0	1,147.7	143.5	143.5	22.2
5	BWR – 5	2478	1,063.5	0.0	850.8	106.3	106.3	0.0
6	BWR – 6	2477	112.8	0.0	90.2	11.3	11.3	0.0
7	BWR – 7	2476	1,542.5	0.0	1,234.0	154.3	154.3	0.0
8	BWR – 8	NA	1,617.7	0.0	1,294.1	161.8	161.8	0.0

Prepared by IDEQ-TFRO. *E. coli* LC (cfu^9/day) = Flow (cfs) x Target (cfu/100 mL) x 0.02445. 10% Natural Background and 10% MOS were initially taken from *E. coli* TMDL value. % Reduction based on *E. coli* mean concentration values to reach instream target. WQLS = Water quality limited stream. WLA = Wasteload allocations. LAs = Load allocations. Nat Bk = Natural background. MOS = Margin of safety. Red = Reduction.

Table III. 303(d) Tributary *E. coli* TMDL and allocations

UNIT	303(d) STREAM	WQLS No.	TMDL cfu^9	WLAs cfu^9	LAs cfu^9	Nat Bk 6% cfu^9	MOS 10% cfu^9	% Red
1	Horse Creek	7613	5.2	0.0	4.4	0.3	0.5	0.0
	Owl Creek	5290	8.9	0.0	7.5	0.5	0.9	0.0
	Baker Ck (all)	5292	36.4	0.0	30.5	2.2	3.6	0.0
	Eagle Creek	5291	8.6	0.0	7.2	0.5	0.9	0.0
	Lake Creek	7614	6.8	0.0	5.7	0.4	0.7	0.0
2	Placer Creek	5293	6.8	0.0	5.7	0.4	0.7	0.0
	Cove Creek	5296	4.3	0.0	3.6	0.3	0.4	0.0
	EFWood River	5295	14.2	0.0	11.9	0.9	1.4	0.0
	Greenhorn G	5294	1.8	0.0	1.6	0.1	0.2	0.0
	Quigley Creek	5297	30.5	0.0	25.6	1.8	3.0	0.0
	Croy Creek	2491	6.8	0.0	5.7	0.4	0.7	0.0
	Seamans Ck	5298	1.8	0.0	1.6	0.1	0.2	8.0
3	No 303(d) Strs	NA	-	-	-	-	-	-
4	EFRock Creek	5299	3.4	0.0	2.8	0.2	0.3	0.0

	Rock Creek	2487	5.5	0.0	4.7	0.3	0.6	25.9
5	No 303(d) Strs	NA	-	-	-	-	-	-
6	Thorn Creek	5300	11.7	0.0	9.8	0.7	1.2	0.0
7	No 303(d) Strs	NA	-	-	-	-	-	-
8	No 303(d) Strs	NA	-	-	-	-	-	-

Prepared by IDEQ-TFRO. TMDL = WLAs + LAs + Nat Bk + MOS. Natural background 6% for tributaries. The MOS is 10% for tributaries. There are no point sources on any of the tributaries, therefore the WLAs = 0.0. And, LAs = TMDL – (WLAs + Nat Bk + MOS). (all) = entire creek. EF = East Fork. G = Gulch. Ck = Creek. Strs = Streams.

Load Allocation by Land Ownership

The overall LA for TSS, substrate sediments, TP, and *E. coli* is further categorized for the nonpoint sources as land ownership percentages of the land area from Table AAA. These land ownership sources include USFS, BLM, IDL, and private lands. This was the simplest method that IDEQ-TFRO and the Wood River TAC had of coming up with a uniform but equitable method to assign loads. During the implementation phase of the TMDL these major land owners will define specifically how these loads will be assigned to the various groups that they service.

Total Suspended Solids

Tables JJJ and KKK further categorize the total suspended solids allocation of the LA for the mainstem Big Wood River and its 303(d) tributaries, respectively.

Table JJJ. Mainstem Big Wood River Detailed TSS TMDL and allocations

Unit	Segment Boundary	WQLS No.	Source by Land Ownership	% Land Owned	Type	LAs t/yr
1	Headwaters to Trail Creek	NA	USFS	82.7%	LA	1,426.8
			BLM	5.0%	LA	86.3
			IDL	0.0%	LA	0.0
			Private	12.3%	LA	212.2
			10% Nat Bk	-	Nat Bk	215.7
			10% MOS	-	MOS	215.7
			TOTAL	-	-	2,156.7
2	Trail Creek to Glendale Diversion	2483	USFS	0.0%	LA	0.0
			BLM	16.6%	LA	884.9
			IDL	1.9%	LA	101.3
			Private	81.5%	LA	4,344.5
			City of Hailey	-	WLA	3.3
			City of Ketchum	-	WLA	26.5
			The Meadows	-	WLA	0.6
			10% Nat Bk	-	Nat Bk	670.1
			10% MOS	-	MOS	670.1
			TOTAL	-	-	6701.3
3	Glendale Diversion to Base Line	2482	USFS	0.0%	LA	0.0
			BLM	4.5%	LA	393.5
			IDL	0.0%	LA	0.0

			Private	95.5%	LA	8,351.4
			10% Nat Bk	-	Nat Bk	1,093.1
			10% MOS	-	MOS	1,093.1
			TOTAL	-	-	10,931.1
4	Base Line to Magic Reservoir	NA	USFS	0.0%	LA	0.0
			BLM	27.3%	LA	2,501.2
			IDL	5.4%	LA	494.7
			Private + Water	67.3%	LA	6,166.1
			10% Nat Bk	-	Nat Bk	1,145.2
			10% MOS	-	MOS	1,145.2
			TOTAL	-	-	11,452.4
5	Magic Reservoir to Highway 75	2478	USFS	0.0%	LA	0.0
			BLM	83.9%	LA	11,395.8
			IDL	0.6%	LA	81.5
			Private + Water	15.5%	LA	2,105.3
			10% Nat Bk	-	Nat Bk	1,697.8
			10% MOS	-	MOS	1,697.8
			TOTAL	-	-	16,978.2
6	Highway 75 to Little Wood River	2477	USFS	0.0%	LA	0.0
			BLM	44.9%	LA	646.6
			IDL	4.3%	LA	61.9
			Private + Water	50.8%	LA	731.6
			10% Nat Bk	-	Nat Bk	180.0
			10% MOS	-	MOS	180.0
			TOTAL	-	-	1,800.1
7	Little Wood River to Interstate 84	2476	USFS	0.0%	LA	0.0
			BLM	20.4%	LA	4,019.0
			IDL	0.0%	LA	0.0
			Private	79.6%	LA	15,682.1
			10% Nat Bk	-	Nat Bk	2,462.6
			10% MOS	-	MOS	2,462.6
			TOTAL	-	-	24,626.3
8	Interstate 84 to Snake River	NA	USFS	0.0%	LA	0.0
			BLM	7.0%	LA	1,446.3
			IDL	6.3%	LA	1,301.7
			Private + Water	86.7%	LA	17,913.2
			10% Nat Bk	-	Nat Bk	2,582.6
			10% MOS	-	MOS	2,582.6
			TOTAL	-	-	25,826.4

Prepared by IDEQ-TFRO. Type refers to the type of allocation: LA = Load allocation for nonpoint sources; WLA = wasteload allocation for point sources; Nat Bk = natural background, and MOS = margin of safety.

Table KKK is similar to Table JJJ. No wasteload allocations (WLA) are known for any of these tributaries and so do not include an allocation portion for point sources.

Table KKK. 303(d) Tributary detailed TSS TMDL and allocations

Unit	303(d) Stream	WQLS No.	Source by Land Ownership	% Land Owned	Type	LAs t/yr
1	Horse Creek	7613	USFS	99.8%	LA	35.0
			BLM	0.0%	LA	0.0

			IDL	0.0%	LA	0.0
			Private	0.2%	LA	0.1
			10% Nat Bk	-	Nat Bk	2.5
			10% MOS	-	MOS	4.2
			TOTAL	-	-	41.8
	Owl Creek	5290	USFS	100.0%	LA	59.9
			BLM	0.0%	LA	0.0
			IDL	0.0%	LA	0.0
			Private	0.0%	LA	0.0
			10% Nat Bk	-	Nat Bk	4.3
			10% MOS	-	MOS	7.1
			TOTAL	-	-	71.3
	Baker Creek	5292	USFS	100.0%	LA	243.8
			BLM	0.0%	LA	0.0
			IDL	0.0%	LA	0.0
			Private	0.0%	LA	0.0
			10% Nat Bk	-	Nat Bk	17.4
			10% MOS	-	MOS	29.0
			TOTAL	-	-	290.2
	Eagle Creek	5291	USFS	94.4%	LA	54.6
			BLM	0.0%	LA	0.0
			IDL	0.0%	LA	0.0
			Private + Water	5.6%	LA	3.3
			10% Nat Bk	-	Nat Bk	4.1
			10% MOS	-	MOS	6.9
			TOTAL	-	-	68.9
	Lake Creek	7614	USFS	82.6%	LA	37.5
			BLM	12.6%	LA	5.7
			IDL	0.0%	LA	0.0
			Private + Water	4.8%	LA	2.3
			10% Nat Bk	-	Nat Bk	3.2
			10% MOS	-	MOS	5.4
			TOTAL	-	-	54.1
2	Placer Creek	5293	USFS	100.0%	LA	45.4
			BLM	0.0%	LA	0.0
			IDL	0.0%	LA	0.0
			Private + Water	0.0%	LA	0.0
			10% Nat Bk	-	Nat Bk	3.2
			10% MOS	-	MOS	5.4
			TOTAL	-	-	54.1
	Cove Creek	5296	USFS	52.0%	LA	15.0
			BLM	2.9%	LA	0.8
			IDL	0.0%	LA	0.0
			Private + Water	45.2%	LA	13.1
			10% Nat Bk	-	Nat Bk	2.1
			10% MOS	-	MOS	3.4
			TOTAL	-	-	34.4
	East Fork Wood River	5295	USFS	89.8%	LA	85.3
			BLM	0.0%	LA	0.0
			IDL	0.0%	LA	0.0
			Private + Water	10.2%	LA	9.7
			10% Nat Bk	-	Nat Bk	6.8

			10% MOS	-	MOS	11.3
			TOTAL	-	-	113.1
	Greenhorn Gulch	5294	USFS	55.6%	LA	6.9
			BLM	15.7%	LA	1.9
			IDL	0.0%	LA	0.0
			Private + Water	28.7%	LA	3.6
			10% Nat Bk	-	Nat Bk	0.9
			10% MOS	-	MOS	1.5
			TOTAL	-	-	14.8
	Quigley Creek	5297	USFS	5.0%	LA	10.2
			BLM	9.5%	LA	19.4
			IDL	7.0%	LA	14.3
			Private + Water	78.5%	LA	160.5
			10% Nat Bk	-	Nat Bk	14.6
			10% MOS	-	MOS	24.3
			TOTAL	-	-	243.5
	Croy Creek	2491	USFS	0.0%	LA	0.0
			BLM	43.3%	LA	19.7
			IDL	6.7%	LA	3.0
			Private + Water	50.0%	LA	22.7
			10% Nat Bk	-	Nat Bk	3.2
			10% MOS	-	MOS	5.4
			TOTAL	-	-	54.1
	Seamans Creek	5298	USFS	0.0%	LA	0.0
			BLM	5.3%	LA	0.7
			IDL	11.4%	LA	1.4
			Private + Water	83.3%	LA	10.3
			10% Nat Bk	-	Nat Bk	0.9
			10% MOS	-	MOS	1.5
			TOTAL	-	-	14.8
3	No 303(d) Streams	NA	-	-	-	-
4	East Fork Rock Creek	5299	USFS	0.0%	LA	0.0
			BLM	60.5%	LA	13.7
			IDL	5.2%	LA	1.2
			Private + Water	34.3%	LA	7.8
			10% Nat Bk	-	Nat Bk	1.6
			10% MOS	-	MOS	2.7
			TOTAL	-	-	27.1
	Rock Creek	2487	USFS	0.0%	LA	0.0
			BLM	43.4%	LA	16.1
			IDL	7.8%	LA	2.9
			Private + Water	48.8%	LA	18.2
			10% Nat Bk	-	Nat Bk	2.7
			10% MOS	-	MOS	4.4
			TOTAL	-	-	44.3
5	No 303(d) Streams	NA	-	-	-	-
6	Thorn Creek	5300	USFS	0.0%	LA	0.0
			BLM	91.6%	LA	143.8
			IDL	2.5%	LA	3.9
			Private + Water	5.9%	LA	9.3
			10% Nat Bk	-	Nat Bk	11.2
			10% MOS	-	MOS	18.7

			TOTAL	-	-	186.9
7	No 303(d) Stream	NA	-	-	-	-
8	No 303(d) Stream	NA	-	-	-	-

Prepared by IDEQ-TFRO. Type refers to the type of allocation: LA = Load allocation for nonpoint sources; WLA = wasteload allocation for point sources; Nat Bk = natural background, and MOS = margin of safety.

Substrate Sediments

Tables LLL and MMM further categorize the substrate sediment allocation of the LA for the mainstem Big Wood River and its 303(d) tributaries, respectively.

Table LLL. Mainstem Big Wood River detailed substrate sediment TMDL and allocations

Unit	Segment Boundary	WQLS No.	Source by Land Ownership	% Land Owned	Type	LAs % Fines
1	Headwaters to Trail Creek	NA	USFS	82.7%	LA	20.3
			BLM	5.0%	LA	1.2
			IDL	0.0%	LA	0.0
			Private	12.2%	LA	3.0
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	3.5
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
2	Trail Creek to Glendale Diversion	2483	USFS	0.0%	LA	0.0
			BLM	16.6%	LA	4.0
			IDL	1.9%	LA	0.5
			Private	81.5%	LA	20.0
			Hailey WLA	-	WLA	0.0
			Ketchum WLA	-	WLA	0.0
			Meadows WLA	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	3.5
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
3	Glendale Diversion to Base Line	2482	USFS	0.0%	LA	0.0
			BLM	4.5%	LA	1.1
			IDL	0.0%	LA	0.0
			Private	95.5%	LA	23.4
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	3.5
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
4	Base Line to Magic Reservoir	NA	USFS	0.0%	LA	0.0
			BLM	27.3%	LA	6.7
			IDL	5.4%	LA	1.3
			Private + Water	67.3%	LA	16.5
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	3.5
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0

5	Magic Reservoir to Highway 75	2478	USFS	0.0%	LA	0.0
			BLM	83.9%	LA	23.5
			IDL	0.6%	LA	0.2
			Private + Water	15.4%	LA	4.3
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	4.0
			20% MOS	-	MOS	8.0
			TOTAL	-	-	40.0
6	Highway 75 to Little Wood River	2477	USFS	0.0%	LA	0.0
			BLM	44.9%	LA	12.6
			IDL	4.3%	LA	1.2
			Private + Water	50.8%	LA	14.2
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	4.0
			20% MOS	-	MOS	8.0
			TOTAL	-	-	40.0
7	Little Wood River to Interstate 84	2476	USFS	0.0%	LA	0.0
			BLM	20.4%	LA	5.7
			IDL	0.0%	LA	0.0
			Private	79.6%	LA	22.3
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	4.0
			20% MOS	-	MOS	8.0
			TOTAL	-	-	40.0
8	Interstate 84 to Snake River	NA	USFS	0.0%	LA	0.0
			BLM	7.0%	LA	1.9
			IDL	6.3%	LA	1.8
			Private + Water	86.7%	LA	24.3
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	4.0
			20% MOS	-	MOS	8.0
			TOTAL	-	-	40.0

Prepared by IDEQ-TFRO. Type refers to the type of allocation: LA = Load allocation for nonpoint sources; WLA = wasteload allocation for point sources; Nat Bk = natural background, and MOS = margin of safety.

Table MMM. 303(d) Tributary detailed substrate sediment TMDL and allocations

Unit	303(d) Stream	WQLS No.	Source by Land Ownership	% Land Owned	Type	LAs % Fines
1	Horse Creek	7613	USFS	99.8%	LA	25.8
			BLM	0.0%	LA	0.0
			IDL	0.0%	LA	0.0
			Private	0.2%	LA	0.1
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
	Owl Creek	5290	USFS	100.0%	LA	25.9
			BLM	0.0%	LA	0.0
			IDL	0.0%	LA	0.0
			Private	0.0%	LA	0.0

			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
	Baker Creek	5292	USFS	100.0%	LA	25.9
			BLM	0.0%	LA	0.0
			IDL	0.0%	LA	0.0
			Private	0.0%	LA	0.0
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
	Eagle Creek	5291	USFS	94.4%	LA	24.4
			BLM	0.0%	LA	0.0
			IDL	0.0%	LA	0.0
			Private + Water	5.6%	LA	1.5
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
	Lake Creek	7614	USFS	82.6%	LA	21.4
			BLM	12.6%	LA	3.3
			IDL	0.0%	LA	0.0
			Private + Water	4.8%	LA	1.2
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
2	Placer Creek	5293	USFS	100.0%	LA	25.9
			BLM	0.0%	LA	0.0
			IDL	0.0%	LA	0.0
			Private + Water	0.0%	LA	0.0
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
	Cove Creek	5296	USFS	52.0%	LA	13.5
			BLM	2.9%	LA	0.8
			IDL	0.0%	LA	0.0
			Private + Water	45.2%	LA	11.7
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
	East Fork Wood River	5295	USFS	89.8%	LA	23.3
			BLM	0.0%	LA	0.0
			IDL	0.0%	LA	0.0
			Private + Water	10.2%	LA	2.6
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0

	Greenhorn Gulch	5294	USFS	55.6%	LA	14.4
			BLM	15.7%	LA	4.1
			IDL	0.0%	LA	0.0
			Private + Water	28.7%	LA	7.4
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
	Quigley Creek	5297	USFS	5.0%	LA	1.3
			BLM	9.5%	LA	2.5
			IDL	7.0%	LA	1.8
			Private + Water	78.5%	LA	20.3
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
	Croy Creek	2491	USFS	0.0%	LA	0.0
			BLM	43.3%	LA	11.2
			IDL	6.7%	LA	1.7
			Private + Water	50.0%	LA	13.0
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
	Seamans Creek	5298	USFS	0.0%	LA	0.0
			BLM	5.3%	LA	1.4
			IDL	11.4%	LA	3.0
			Private + Water	83.3%	LA	21.6
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
3	No 303(d) Streams	NA	-	-	-	-
4	East Fork Rock Creek	5299	USFS	0.0%	LA	0.0
			BLM	60.5%	LA	15.7
			IDL	5.2%	LA	1.3
			Private + Water	34.3%	LA	8.9
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
	Rock Creek	2487	USFS	0.0%	LA	0.0
			BLM	43.4%	LA	11.2
			IDL	7.8%	LA	2.0
			Private + Water	48.8%	LA	12.6
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.1
			20% MOS	-	MOS	7.0
			TOTAL	-	-	35.0
5	No 303(d) Streams	NA	-	-	-	-
6	Thorn Creek	5300	USFS	0.0%	LA	0.0
			BLM	91.6%	LA	27.1

			IDL	2.5%	LA	0.7
			Private + Water	5.9%	LA	1.7
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.4
			20% MOS	-	MOS	8.0
			TOTAL	-	-	40.0
7	No 303(d) Stream	NA	-	-	-	-
8	No 303(d) Stream	NA	-	-	-	-

Prepared by IDEQ-TFRO. Type refers to the type of allocation: LA = Load allocation for nonpoint sources; WLA = wasteload allocation for point sources; Nat Bk = natural background, and MOS = margin of safety.

Total Phosphorus

Tables NNN and OOO further categorize the total phosphorus allocation of the LA for the mainstem Big Wood River and its 303(d) tributaries, respectively.

Table NNN. Mainstem Big Wood River detailed TP TMDL and allocations

Unit	Segment Boundary	WQLS No.	Source by Land Ownership	% Land Owned	Type	LAs lbs/day
1	Headwaters to Trail Creek	NA	USFS	82.7%	LA	15.5
			BLM	5.0%	LA	0.9
			IDL	0.0%	LA	0.0
			Private	12.2%	LA	2.3
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.4
			10% MOS	-	MOS	2.4
			TOTAL	-	-	23.6
2	Trail Creek to Glendale Diversion	2483	USFS	0.0%	LA	0.0
			BLM	16.6%	LA	6.9
			IDL	1.9%	LA	0.8
			Private	81.5%	LA	33.7
			Hailey	-	WLA	5.2
			Ketchum	-	WLA	9.9
			The Meadows	-	WLA	2.3
			10% Nat Bk	-	Nat Bk	7.3
			10% MOS	-	MOS	7.3
			TOTAL	-	-	73.4
3	Glendale Diversion to Base Line	2482	USFS	0.0%	LA	0.0
			BLM	4.5%	LA	4.3
			IDL	0.0%	LA	0.0
			Private	95.5%	LA	91.5
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	12.0
			10% MOS	-	MOS	12.0
			TOTAL	-	-	119.8
4	Base Line to Magic Reservoir	NA	USFS	0.0%	LA	0.0
			BLM	27.3%	LA	27.4
			IDL	5.4%	LA	5.4
			Private + Water	67.3%	LA	67.5
			WLAs	-	WLA	0.0

			10% Nat Bk	-	Nat Bk	12.6
			10% MOS	-	MOS	12.6
			TOTAL	-	-	125.5
5	Magic Reservoir to Highway 75	2478	USFS	0.0%	LA	0.0
			BLM	83.9%	LA	124.9
			IDL	0.6%	LA	1.0
			Private + Water	15.4%	LA	22.9
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	18.6
			10% MOS	-	MOS	18.6
			TOTAL	-	-	186.1
6	Highway 75 to Little Wood River	2477	USFS	0.0%	LA	0.0
			BLM	44.9%	LA	7.1
			IDL	4.3%	LA	0.7
			Private + Water	50.8%	LA	8.0
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	2.0
			10% MOS	-	MOS	2.0
			TOTAL	-	-	19.7
7	Little Wood River to Interstate 84	2476	USFS	0.0%	LA	0.0
			BLM	20.4%	LA	44.0
			IDL	0.0%	LA	0.0
			Private	79.6%	LA	171.9
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	27.0
			10% MOS	-	MOS	27.0
			TOTAL	-	-	269.9
8	Interstate 84 to Snake River	NA	USFS	0.0%	LA	0.0
			BLM	7.0%	LA	15.8
			IDL	6.3%	LA	14.3
			Private + Water	86.7%	LA	196.3
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	28.3
			10% MOS	-	MOS	28.3
			TOTAL	-	-	283.0
Prepared by IDEQ-TFRO. Type refers to the type of allocation: LA = Load allocation for nonpoint sources; WLA = wasteload allocation for point sources; Nat Bk = natural background, and MOS = margin of safety.						

Table OOO. 303(d) Tributary Detailed TP TMDL and allocations

Unit	303(d) Stream	WQLS No.	Source by Land Ownership	% Land Owned	Type	LAs lbs/day
1	Horse Creek	7613	USFS	99.8%	LA	0.38
			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00
			Private	0.2%	LA	0.00
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.03
			10% MOS	-	MOS	0.05
			TOTAL	-	-	0.5
	Owl Creek	5290	USFS	100.0%	LA	0.66

			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00
			Private	0.0%	LA	0.00
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.05
			10% MOS	-	MOS	0.08
			TOTAL	-	-	0.8
	Baker Creek	5292	USFS	100.0%	LA	2.67
			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00
			Private	0.0%	LA	0.00
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.19
			10% MOS	-	MOS	0.32
			TOTAL	-	-	3.2
	Eagle Creek	5291	USFS	94.4%	LA	0.59
			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00
			Private + Water	5.6%	LA	0.04
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.05
			10% MOS	-	MOS	0.08
			TOTAL	-	-	0.8
	Lake Creek	7614	USFS	82.6%	LA	0.41
			BLM	12.6%	LA	0.06
			IDL	0.0%	LA	0.00
			Private + Water	4.8%	LA	0.02
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.04
			10% MOS	-	MOS	0.06
			TOTAL	-	-	0.6
2	Placer Creek	5293	USFS	100.0%	LA	0.50
			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00
			Private + Water	0.0%	LA	0.00
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.04
			10% MOS	-	MOS	0.06
			TOTAL	-	-	0.6
	Cove Creek	5296	USFS	52.0%	LA	0.17
			BLM	2.9%	LA	0.01
			IDL	0.0%	LA	0.00
			Private + Water	45.2%	LA	0.14
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.02
			10% MOS	-	MOS	0.04
			TOTAL	-	-	0.4
	East Fork Wood River	5295	USFS	89.8%	LA	0.93
			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00
			Private + Water	10.2%	LA	0.11
			WLAs	-	WLA	0.00

			10% Nat Bk	-	Nat Bk	0.07
			10% MOS	-	MOS	0.12
			TOTAL	-	-	1.2
	Greenhorn Gulch	5294	USFS	55.6%	LA	0.08
			BLM	15.7%	LA	0.02
			IDL	0.0%	LA	0.00
			Private + Water	28.7%	LA	0.04
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.01
			10% MOS	-	MOS	0.02
			TOTAL	-	-	0.2
	Quigley Creek	5297	USFS	5.0%	LA	0.11
			BLM	9.5%	LA	0.21
			IDL	7.0%	LA	0.16
			Private + Water	78.5%	LA	1.76
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.16
			10% MOS	-	MOS	0.27
			TOTAL	-	-	2.7
	Croy Creek	2491	USFS	0.0%	LA	0.00
			BLM	43.3%	LA	0.22
			IDL	6.7%	LA	0.03
			Private + Water	50.0%	LA	0.25
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.04
			10% MOS	-	MOS	0.06
			TOTAL	-	-	0.6
	Seamans Creek	5298	USFS	0.0%	LA	0.00
			BLM	5.3%	LA	0.01
			IDL	11.4%	LA	0.02
			Private + Water	83.3%	LA	0.12
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.01
			10% MOS	-	MOS	0.02
			TOTAL	-	-	0.2
3	No 303(d) Streams	NA	-	-	-	-
4	East Fork Rock Creek	5299	USFS	0.0%	LA	0.00
			BLM	60.5%	LA	0.15
			IDL	5.2%	LA	0.01
			Private + Water	34.3%	LA	0.09
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.02
			10% MOS	-	MOS	0.03
			TOTAL	-	-	0.3
	Rock Creek	2487	USFS	0.0%	LA	0.00
			BLM	43.4%	LA	0.18
			IDL	7.8%	LA	0.03
			Private + Water	48.8%	LA	0.20
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.03
			10% MOS	-	MOS	0.05
			TOTAL	-	-	0.5

5	No 303(d) Streams	NA	-	-	-	-
6	Thorn Creek	5300	USFS	0.0%	LA	0.00
			BLM	91.6%	LA	1.58
			IDL	2.5%	LA	0.04
			Private + Water	5.9%	LA	0.10
			WLAs	-	WLA	0.00
			10% Nat Bk	-	Nat Bk	0.12
			10% MOS	-	MOS	0.20
			TOTAL	-	-	2.0
7	No 303(d) Stream	NA	-	-	-	-
8	No 303(d) Stream	NA	-	-	-	-
Prepared by IDEQ-TFRO. Type refers to the type of allocation: LA = Load allocation for nonpoint sources; WLA = wasteload allocation for point sources; Nat Bk = natural background, and MOS = margin of safety.						

Escherichia coli (*E. coli*)

Tables PPP and QQQ further categorize the *E. coli* allocation of the LA for the mainstem Big Wood River and its 303(d) tributaries, respectively.

Table PPP. Mainstem Big Wood River Detailed *E. coli* TMDL and allocations

Unit	Segment Boundaries	WQLS No.	Source by Land Ownership	% Land Owned	Type	LAs cfu[9]
1	Headwaters to Trail Creek	NA	USFS	82.7%	LA	178.7
			BLM	5.0%	LA	10.8
			IDL	0.0%	LA	0.0
			Private	12.2%	LA	26.7
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	27.0
			10% MOS	-	MOS	27.0
			TOTAL	-	-	270.2
2	Trail Creek to Glendale Diversion	2483	USFS	0.0%	LA	0.0
			BLM	16.6%	LA	45.9
			IDL	1.9%	LA	5.3
			Private	81.5%	LA	225.4
			Hailey	-	WLA	1.2
			Ketchum	-	WLA	2.7
			The Meadows	-	WLA	0.1
			10% Nat Bk	-	Nat Bk	34.9
			10% MOS	-	MOS	34.9
			TOTAL	-	-	349.4
3	Glendale Diversion to Base Line	2482	USFS	0.0%	LA	0.0
			BLM	4.5%	LA	49.4
			IDL	0.0%	LA	0.0
			Private	95.5%	LA	1,046.2
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	136.9
			10% MOS	-	MOS	136.9
			TOTAL	-	-	1,369.4
4	Base Line to Magic Reservoir	NA	USFS	0.0%	LA	0.0
			BLM	27.3%	LA	313.3
			IDL	5.4%	LA	62.0

			Private + Water	67.3%	LA	772.4
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	143.5
			10% MOS	-	MOS	143.5
			TOTAL	-	-	1,434.7
5	Magic Reservoir to Highway 75	2478	USFS	0.0%	LA	0.0
			BLM	83.9%	LA	713.9
			IDL	0.6%	LA	5.1
			Private + Water	15.4%	LA	131.9
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	106.3
			10% MOS	-	MOS	106.3
			TOTAL	-	-	1,063.5
6	Highway 75 to Little Wood River	2477	USFS	0.0%	LA	0.0
			BLM	44.9%	LA	40.5
			IDL	4.3%	LA	3.9
			Private + Water	50.8%	LA	45.8
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	11.3
			10% MOS	-	MOS	11.3
			TOTAL	-	-	112.8
7	Little Wood River to Interstate 84	2476	USFS	0.0%	LA	0.0
			BLM	20.4%	LA	251.7
			IDL	0.0%	LA	0.0
			Private	79.6%	LA	982.2
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	154.3
			10% MOS	-	MOS	154.3
			TOTAL	-	-	1,542.5
8	Interstate 84 to Snake River	NA	USFS	0.0%	LA	0.0
			BLM	7.0%	LA	90.6
			IDL	6.3%	LA	81.5
			Private + Water	86.7%	LA	1,122.0
			WLAs	-	WLA	0.0
			10% Nat Bk	-	Nat Bk	161.8
			10% MOS	-	MOS	161.8
			TOTAL	-	-	1,617.7

Prepared by IDEQ-TFRO. Type refers to the type of allocation: LA = Load allocation for nonpoint sources; WLA = wasteload allocation for point sources; Nat Bk = natural background, and MOS = margin of safety.

Table QQQ. 303(d) Tributary Detailed *E. coli* TMDL and allocations

Unit	303(d) Stream	WQLS No.	Source by Land Ownership	% Land Owned	Type	LAs cfu[9]
1	Horse Creek	7613	USFS	99.8%	LA	4.39
			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00
			Private	0.2%	LA	0.01
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.3
			10% MOS	-	MOS	0.5

			TOTAL	-	-	5.2
	Owl Creek	5290	USFS	100.0%	LA	7.50
			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00
			Private	0.0%	LA	0.00
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.5
			10% MOS	-	MOS	0.9
			TOTAL	-	-	8.9
	Baker Creek	5292	USFS	100.0%	LA	30.60
			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00
			Private	0.0%	LA	0.00
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	2.2
			10% MOS	-	MOS	3.6
			TOTAL	-	-	36.4
	Eagle Creek	5291	USFS	94.4%	LA	6.84
			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00
			Private + Water	5.6%	LA	0.41
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.5
			10% MOS	-	MOS	0.9
			TOTAL	-	-	8.6
	Lake Creek	7614	USFS	82.6%	LA	4.70
			BLM	12.6%	LA	0.72
			IDL	0.0%	LA	0.00
			Private + Water	4.8%	LA	0.27
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.4
			10% MOS	-	MOS	0.7
			TOTAL	-	-	6.8
2	Placer Creek	5293	USFS	100.0%	LA	5.69
			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00
			Private + Water	0.0%	LA	0.00
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.4
			10% MOS	-	MOS	0.7
			TOTAL	-	-	6.8
	Cove Creek	5296	USFS	52.0%	LA	1.88
			BLM	2.9%	LA	0.11
			IDL	0.0%	LA	0.00
			Private + Water	45.2%	LA	1.64
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.3
			10% MOS	-	MOS	0.4
			TOTAL	-	-	4.3
	East Fork Wood River	5295	USFS	89.8%	LA	10.69
			BLM	0.0%	LA	0.00
			IDL	0.0%	LA	0.00

			Private + Water	10.2%	LA	1.21
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.9
			10% MOS	-	MOS	1.4
			TOTAL	-	-	14.2
	Greenhorn Gulch	5294	USFS	55.6%	LA	0.86
			BLM	15.7%	LA	0.24
			IDL	0.0%	LA	0.00
			Private + Water	28.7%	LA	0.40
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.1
			10% MOS	-	MOS	0.2
			TOTAL	-	-	1.8
	Quigley Creek	5297	USFS	5.0%	LA	1.28
			BLM	9.5%	LA	2.43
			IDL	7.0%	LA	1.79
			Private + Water	78.5%	LA	20.15
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	1.8
			10% MOS	-	MOS	3.0
			TOTAL	-	-	30.5
	Croy Creek	2491	USFS	0.0%	LA	0.00
			BLM	43.3%	LA	2.47
			IDL	6.7%	LA	0.38
			Private + Water	50.0%	LA	2.85
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.4
			10% MOS	-	MOS	0.7
			TOTAL	-	-	6.8
	Seamans Creek	5298	USFS	0.0%	LA	0.00
			BLM	5.3%	LA	0.08
			IDL	11.4%	LA	0.18
			Private + Water	83.3%	LA	1.28
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.1
			10% MOS	-	MOS	0.2
			TOTAL	-	-	1.8
3	No 303(d) Streams	NA	-	-	-	-
4	East Fork Rock Creek	5299	USFS	0.0%	LA	0.00
			BLM	60.5%	LA	1.72
			IDL	5.2%	LA	0.15
			Private + Water	34.3%	LA	0.99
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.2
			10% MOS	-	MOS	0.3
			TOTAL	-	-	3.4
	Rock Creek	2487	USFS	0.0%	LA	0.00
			BLM	43.4%	LA	2.02
			IDL	7.8%	LA	0.36
			Private + Water	48.8%	LA	2.26
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.3

			10% MOS	-	MOS	0.6
			TOTAL	-	-	5.5
5	No 303(d) Streams	NA	-	-	-	-
6	Thorn Creek	5300	USFS	0.0%	LA	0.00
			BLM	91.6%	LA	9.01
			IDL	2.5%	LA	0.25
			Private + Water	5.9%	LA	0.58
			WLAs	-	WLA	0.0
			6% Nat Bk	-	Nat Bk	0.7
			10% MOS	-	MOS	1.2
			TOTAL	-	-	11.7
7	No 303(d) Stream	NA	-	-	-	-
8	No 303(d) Stream	NA	-	-	-	-

Prepared by IDEQ-TFRO. Type refers to the type of allocation: LA = Load allocation for nonpoint sources; WLA = wasteload allocation for point sources; Nat Bk = natural background at 6% for tributaries, and MOS = margin of safety at 10% for tributaries.

Reserve

An allowance in the TMDL for a portion of the loading capacity to be set aside for future growth is permissible and encouraged. Careful documentation, however, of the decision-making process must accompany the TMDL. This allowance for future growth is based on existing and readily available data at the time the TMDL is established or as soon thereafter as conceivably possible. Future allocations may represent current surplus assimilative loading capacity that is either currently available, or projected to become available due to planned implementation of environmental controls or other changes. The Big Wood River Watershed Management Plan supports the growth and responsible resource development of its water quality. To the extent possible, the Wood River Executive Board undertook a reserve for future, but the needed information was not available. A 5% reserve was suggested by IDEQ-TFRO but the Executive Board was unable to agree on this. Yet, population growth and economic development are a major component in the future growth of the subbasin. Therefore, the Wood River WAG will consider an allocation for future growth during the implementation-planning phase. Public involvement will be encouraged so that responsible economic growth is considered in the planning process for all industries. Until then a zero (0) portion of the loading capacity is assigned to future growth at this time. The Wood River WAG will aggressively pursue the study of the economic effect, and, if need be, address some percentage of economic growth as part of the overall TMDL. Future growth and sustainability of beneficial uses is clearly one if not the most vital areas of concern for the Big Wood River Subbasin.

Remaining Available Load

All remaining available load for the load allocations is temporally assigned to nonpoint sources until the IDEQ-TFRO and the Wood River WAG have an opportunity to fully discuss and collect additional data. During the implementation phase of the TMDL, a more refined allocation for future growth and nonpoint sources will be constructed if needed. Until then:

- Each point source has received a wasteload allocation.

- Nonpoint sources have been allocated according to land ownership.
- Only the major nonpoint sources were allocated a load allocation. Minor nonpoint sources were not allocated a load allocation at this time, but they do belong to the overall load allocation for nonpoint sources. Until further information is collected, it is assumed that water quality targets will be met by the aggregate reductions of the major nonpoint sources.
- Allocations have been summarized in tables as follows:

  Total Suspended Solids
  - Load capacity = Tables RR and SS
  - MOS, Nat Bk, LA = Tables BBB and CCC
  - LA/Land Ownership = Tables JJJ and KKK

  Substrate Sediments
  - Load capacity = Tables TT and UU
  - MOS, Nat Bk, LA = Tables DDD and EEE
  - LA/Land Ownership = Tables LLL and MMM

  Total Phosphorus
  - Load capacity = Tables VV and WW
  - MOS, Nat Bk, LA = Tables FFF and GGG
  - LA/Land Ownership = Tables NNN and OOO

  Escherichia coli
  - Load capacity = Tables XX and YY
  - MOS, Nat Bk, LA = Tables HHH and III
  - LA/Land Ownership = Tables PPP and QQQ

- Idaho’s antidegradation policy is applied on all 303(d) streams where existing water quality and existing beneficial uses are being met by State water quality standards. These streams may be significantly lower than the instream water quality targets, and are protected at their existing level of water quality so that degradation of their water quality does not continue to occur.

- A time has been specified which will meet all allocations. That time frame is 10 years. Years 1-5 encompass achievement of water quality standards and/or beneficial uses. Year 6-10 encompass maintaining of water quality standards and/or beneficial uses. In the event that beneficial uses are not met by year 10, then a reassessment of instream targets will be done as defined by the implementation plan for both point and nonpoint sources.

- Pollutant trading comes after allocations have been made and thus will technically not occur until after year 5 if beneficial uses have been achieved. Until such time as pollutant trading becomes a possibility, Appendix D will be used initially as the allocation map for the Big Wood River as the receiving waterbody for both the Big Wood River and its tributaries.

5.5 Public Participation

Part of the process in the development of the Big Wood River subbasin assessment and TMDL was participation by the public. This was accomplished to a reasonable extent by utilizing the Wood River Watershed Advisory Group (Wood River WAG), the Wood River Technical Advisory Committee (Wood River TAC), and the Wood River WAG Executive Board. Through these organized groups IDEQ-TFRO was able to provide and submit information to as many of the public in the subbasin. The greatest public participation and comments came from the TAC and WAG members themselves. Comments were incorporated into the document and allowed IDEQ-TFRO to develop a subbasin assessment from which a TMDL was eventually developed. An administrative record of all public meetings held by the Wood River WAG, Wood River TAC, and Wood River Executive Board for the development of the Big Wood River Watershed Management Plan is in possession of IDEQ-TFRO and available for public review.

- The Wood River WAG, as part of their statutory stewardship under Idaho Code §39-3601 *et seq.*, provided necessary and valuable comment on the subbasin assessment. Each representative industry provided additional insight and comments that helped make the final version of the document more scientifically defendable. The assessment was presented by IDEQ-TFRO to the Wood River WAG over a 12-month period during year 2000. The TMDL development sections were presented to the Wood River WAG during the year 2001. Comments were incorporated into the body of the document prior to the official public comment period, which occurred from September 24, 2001 through October 24, 2001.

- The Wood River TAC served as the scientific arm of the Wood River WAG. The committee provided technical assistance to IDEQ-TFRO in the development of the final version of the subbasin assessment and TMDL. They also helped to review all technical databases, sources, and references, and provided guidance on the technical aspects of the assessment and TMDL. Beyond the TAC members, various specialists were also contacted by IDEQ-TFRO from various governmental agencies, organizations, and industry representatives. These also provided their technical expertise. A tour of select 303(d) sites was developed by IDEQ-TFRO. In conjunction with members of the TAC, the first tour was done on August 10, 2000 and covered sites from the headwaters of the Big Wood River to Rock Creek in Blaine County. The second tour was done on September 26, 2000 and covered the Magic Reservoir to the Malad River. In addition to the TAC, the IDEQ-TFRO conducted a general tour of select sites of the Big Wood River subbasin for members of the Upper Snake Basin Advisory Group (Upper Snake BAG). The BAG tour was held on September 6, 2000 and covered Baker Creek, Lake Creek, Warm Springs Creek, East Fork Wood River, and Cove Creek.

- The Wood River Executive Board provided valuable input in various portions of the final versions of the both the subbasin assessment and the TMDL. In particular the Board was able to provide guidance to IDEQ-TFRO on the best way to bring to the stakeholders' table the grazing and cattleman's industry as well as the development community from various sectors of the subbasin.

- No official public comment was required for the Big Wood River subbasin assessment. However, IDEQ-TFRO held an official 60-day public comment period on the subbasin assessment from June 12, 2001 to August 12, 2001. Also, when the TMDL was advertised for public comment, IDEQ-TFRO took in any additional comments that were provided on all the sections of the subbasin assessment as well as the TMDL. A final draft watershed management plan (subbasin assessment + TMDL) was presented to the TAC and WAG in August 2001. Then, an official 30-day public comment period was held from September 24, 2001 to October 24, 2001. Public comments were incorporated into the document such that the Big Wood River Watershed Management Plan was submitted to IDEQ-State Office on December 28, 2001. The watershed management plan was then submitted to USEPA-Boise on December 28, 2001.

5.6 Reasonable Assurance and Implementation Schedule

At this time implementation plans are not considered mandatory to the state delegated TMDL process. However, it is anticipated that by 2003 implementation plans may be required under federal Clean Water Act regulations. In Idaho IDEQ is required to develop an implementation plan both under Idaho Code and pursuant to a court negotiated TMDL lawsuit settlement. TMDL's subjects to the provisions of the court settlement include the Big Wood River and the implementation plan must be completed within 18 months of USEPA approval of the Big Wood River TMDL." IDEQ-TFRO has opted to do an implementation plan in the Big Wood River TMDL to focus on post-TMDL activities on the 303(d) waterbodies. The implementation plan will provide reasonable assurance to USEPA that both point and nonpoint source industries will have reduction plans in place that meet beneficial use attainment over a 10-year period. This has precedence in the Upper Snake Rock TMDL (IDEQ 2000), the Mid-Snake TMDL (IDEQ 1997), and the Lake Walcott TMDL (IDEQ 2000b) of Southcentral Idaho. "The primary purpose of any implementation plan under the TMDL process is to identify and describe the specific pollution controls or management measures to be undertaken; the mechanisms by which the selected pollution control and management measures will be put into action; and, the authorities, regulations, permits, contracts, commitments, or other evidence sufficient to ensure that implementation will take place. The plan also describes when implementation will take place, identifies when various tasks or actions items will begin and end, when mid-term and final objectives will be met, and establishes dates for meeting water quality targets" (IDEQ 1999 [Appendix D, p 5]).

The objective of the Big Wood River TMDL is to allocate allowable loads among different pollutant sources so that appropriate control actions can be taken and water quality standards achieved. The total pollutant load of a waterbody is derived from point, nonpoint, and background sources. The Big Wood River TMDL has attempted to consider the effect of all activities or processes that cause or contribute to the water quality limited streams. Control measures to implement this TMDL are not limited to NPDES authorities, but are based on the reasonable assurance that State and local authorities and actions to reduce nonpoint source pollution will also occur. "There must be assurances that nonpoint source control measures will achieve expected load reductions in order to allocate a wasteload to a point source with a TMDL that also allocates expected nonpoint source load reductions (USEPA 1991b [p 22])." The Big Wood River TMDL has load allocations and wasteload allocations calculated with margins of safety to meet water quality standards. However, the allocations are based on estimates, which have used available data and information. Therefore, monitoring for the collection of new data is necessary and required. For the Big Wood River TMDL the reasonable assurance that it will meet its goal of water quality standards is based on three components. First, point source NPDES permits will require monitoring for generation of new data that will be used for wasteload allocation concerns. Second, nonpoint source implementation of BMPs that will be based on land management agency assurances that reductions will occur. And, third, a trend-monitoring plan that will be used to document relative changes in various aquatic organism populations. This trend-monitoring plan will also consider physical and chemical water quality parameters over a 10-year period in conjunction with data from various agencies, organizations, and water user industries to assess overall progress towards attainment of water quality standards and related beneficial uses.

Finally, "members of each watershed advisory group shall be representative of the industries and interests affected by the management of that watershed, along with representatives of local government and the land managing or regulatory agencies with an interest in the management of that watershed and the quality of the water bodies within it" (Idaho Code §39-3615). The Wood River Watershed Advisory Group is made up of these interests and will continue to assist IDEQ-TFRO in the management of the watershed for beneficial use attainment of 303(d) listed waterbodies.

In terms of industry goals, short-term and long-term milestones will be defined for point sources and nonpoint sources and will demonstrate adherence to their implementation plan. The measurable milestones will include maintaining and meeting target reductions as defined in effluent permit limits for point sources, and maintaining and meeting best management plans as defined by the land management agencies, the Mid-Snake WAG, and IDEQ-TFRO for nonpoint sources. Quantification of goals will be further defined in the overall trend-monitoring plan for the Big Wood River (which will also include monitoring for tributaries). As explained previously, the Big Wood River implementation plan is a 10-year plan for attainment of beneficial uses and State water quality standards by point and nonpoint source industries.

In conjunction with §319(a)(1)(C) provision of the Clean Water Act, IDEQ-TFRO and the WAG in conjunction with the designated land management agency for a particular industry shall:

a. Review the BMPs and measures that were identified for nonpoint sources and revise them as necessary to assure that they continue to produce the maximum practicable pollution reduction;

b. Identify any additional nonpoint sources (or classes of nonpoint sources) that should participate in achieving the goals of the Big Wood River TMDL;

c. Identify any additional management measures and/or controls that, to the maximum extent practicable, will reduce the pollutant-of-concern from nonpoint sources from the affected water; and,

d. Exercise or seek after any additional legal authorities to address nonpoint sources, as necessary, beyond those defined in the Idaho Agricultural Pollution Abatement Plan for irrigated agriculture, or the specific best management plans defined for rangeland, forestry, CFOs, and/or stormwater, or other nonpoint source industry.

Point Sources

"Both technology-based and water quality-based controls are implemented through the NPDES permitting process. Permit limits based on TMDLs are called water quality-based limits. Wasteload allocations establish the level of effluent quality necessary to protect water quality in the receiving water and ensure attainment of water quality standards. Once allowable loadings have been developed through wasteload allocations for specific pollution sources, limits are incorporated into NPDES permits (USEPA 1991b [p 23])." For the Big Wood River subbasin Table RRR describes the short-term and long-term goals that are prescribed for point source industries that will reasonably assure that point sources will comply with their reduction plans per pollutant. As a condition of the NPDES permit, all point sources will be required to have specific limitations and monitoring requirements; monitoring, recording, and reporting requirements; compliance responsibilities; and general requirements (where applicable). A quality assurance plan will be developed by each permittee and a best management practices plan (with a schedule for implementation) as part of their monitoring requirements. These provisions will be described in their NPDES permits. The plan calls for a 5-year period to reach state water quality standards (or instream targets), and an additional 5 years to maintain these targets for achievement of beneficial uses.

Table RRR. Short- and long-term goals for point sources and IDEQ-TFRO

Pollutant	Industry/ Agency	Year 1 (2002)	Year 3 (2004)	Year 5 (2006)	Year 8 (2009)	Year 10 (2011)
TSS Sub TP *E. coli*	Municipalities	Maintain NPDES Permits	Review	Review & Assessment	Review	Review & Assessment
	IDEQ-TFRO	NPDES Database				

Tem	Re-evaluation of temperature criteria based on more current monitoring data.
DO	Re-evaluation of DO criteria based on more current monitoring data.
Flow	No Flow TMDL; Conservation flows encouraged
Industry Plans	Each industry will be responsible for the development of an annual summary review or assessment of water quality goals and targets for the Big Wood River subbasin.
Prepared by IDEQ-TFRO. A database of each industry will be maintained by IDEQ-TFRO. TP = total phosphorus, TSS = total suspended solids, TKN = total Kjeldahl nitrogen, DO = dissolved oxygen, LA = Land Application. The feedback loop is an important component in all short-term and long-term goals. Sub = Substrate sediments. Tem = Temperature.	

IDEQ-TFRO will provide oversight for review and assessment of short-term and long-term goals. IDEQ-TFRO will also maintain a database for purposes of review and assessment of wasteload allocation limits. Reviews and/or assessments will be done in the third, fifth, eighth, and tenth year of plan implementation. Such reviews and/or assessments will be presented to the Wood River WAG and Wood River TAC for their comments.

Nonpoint Sources

Nonpoint source industries in the Big Wood River subbasin include grazing, agriculture, FERC facilities, forestry, CFOs, and recreation. "When establishing permits for point sources in the watershed, the record should show that in the case of any credit for future nonpoint source reductions, (1) there is reasonable assurance that nonpoint source controls will be implemented and maintained or (2) that nonpoint source reductions are demonstrated through an effective monitoring program (USEPA 1991b [p 24])." Essentially, reasonable assurance for nonpoint sources means that nonenforceable actions will result in load allocations for nonpoint sources required by the Big Wood River TMDL.

In order to expedite the reasonable assurances for nonpoint source implementation, the Wood River WAG has formed a Funding Committee that will evaluate and seek funding of implementation projects to clean up 303(d) water quality listed streams. IDEQ-TFRO supports the *Idaho Nonpoint Source Management Plan* in which a list of programs is identified in its Appendix D that can be sought for implementation of nonenforceable actions for nonpoint sources. Besides these programs the Funding Committee will pursue other programs over the life of the watershed management plan. Additionally and where necessary, IDEQ-TFRO is prepared to discuss with any federal, State, or local agency/entity, private landowners, the possibility of carrying out such nonenforceable actions through the signing of necessary agreements to achieve success on the water quality limited streams. Such agreements will be pertinent to the restoration of beneficial uses and water quality standards and may include water quality monitoring. Additionally, IDEQ-TFRO supports the *Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters* (USFS & USBLM & USEPA 1999) which is to "protect and maintain water quality where standards are met or surpassed, and restore water-quality-limited waterbodies within their jurisdiction to conditions that meet or surpass standards for designated beneficial uses."

It is expected that management and control actions to implement the Big Wood River TMDL will begin immediately after approval of the TMDL by USEPA. However, some industries have taken a proactive approach by already beginning their management and control actions. The Big Wood River TMDL is designed with the goal of expeditiously attaining compliance with water quality standards. It is the belief of IDEQ-TFRO that attainment of water quality standards and beneficial uses will be met as expeditiously as practicable within a 10-year time frame. However, it is highly possible that some 303(d) streams may not recover completely within a 10-year period due to the nature of the sedimentation source or sources. In the event that beneficial uses are not attained within the 10-year time frame, then the feedback loop as a component of adaptive management in conjunction with monitoring will be used for re-evaluation and re-assessment of the 303(d) stream. If more time is required then scientific proof will be used to demonstrate this requirement. Otherwise, it may be that implementation of more stringent measures is required.

There are two (2) phases in the nonpoint source implementation plan. These phases are described as follows:

- <u>Phase 1</u>

  <u>Year 1-3</u>: In the first phase, the stream corridor (within the 2 miles) would be reviewed over a 5-year period for the development of critical acres that directly impact the stream. These critical acres would be defined by the land management agency during the implementation phase of the TMDL or sooner. Critical acres could include acreage outside the stream corridor if a portion of the area included the stream corridor. Within the first 3 years, all water quality limited stream segments will have land management plans developed that specifically target the reduction of listed pollutants. These land management plans become the critical focus of the implementation plan for nonpoint sources. Monitoring would be specifically defined to determine if BMPs are functional and the overall goals of the Big Wood River TMDL are met. Funding sources would be identified and procurement of those sources would be emphasized. BMPs will be identified for each water quality limited stream segment with BMP implementation by the land management agency, IDEQ, and the WAG.

  <u>Year 3</u>: In year 3, a preliminary evaluation of the water quality limited stream segments with BMP implementation and funding will be conducted by the land management agencies, IDEQ, and the WAG to determine if the goals of the Big Wood River TMDL are being met.

  <u>Year 5</u>: In year 5, the land management agencies and IDEQ will conduct a re-evaluation of the land management plans, their funding, and imposed BMPs to determine if the goals of the Big Wood River TMDL are being met.

- <u>Phase 2</u>

  <u>Years 5-8</u>: In the second phase (years 5-8) critical acres would be defined for areas outside the stream corridor but within the 5th field watersheds-of-concern

that affect the 19 water quality limited stream segments. These critical acres would be defined similarly as in the first phase. Critical acres could include acreage within the stream corridor if a portion of the acres were included outside the stream corridor. Land management plans would also be developed and included as addenda to the particular water quality limited stream segment.

Year 8: In year 8 an assessment of beneficial use attainment will be conducted on the 19 water quality limited stream segments by IDEQ, the land management agency, and specialists of the TAC, to determine compliance with the Big Wood River TMDL.

Year 10: In year 10, the IDEQ, land management agencies and specialists of thee TAC will conduct a re-evaluation of the land management plans, their funding, and a reassessment of the 303(d) streams to determine beneficial use attainment.

Years 10-15: If it is determined in year 10 that beneficial uses and water quality standards are met, then the Big Wood River TMDL will be maintained "as is" for an additional 5 years. If at the end of the additional 5 years beneficial uses and water quality standards are met by any or all water quality limited stream segments, then IDEQ with support of the industries will seek for de-listing of those streams (assuming that imposed measures are continued and maintained). However, if it is determined in year 10 that beneficial uses and water quality standards are ***not*** met, then a re-evaluation and re-allocation of loads for point and nonpoint sources will be determined. More effective BMPs will be sought, defined, and implemented in the critical acres or in those areas that are causing the most damage to water quality.

A description of control actions (management measures) that could be implemented to achieve the goals of the TMDL for nonpoint sources should be defined for all nonpoint source industries. For the Big Wood River subbasin Table SSS describes the short-term and long-term goals that are prescribed for nonpoint source industries and IDEQ-TFRO. These goals will provide a reasonable assurance that nonpoint sources will comply with their reduction plans per pollutant. Each short-term and long-term goal follows suit with the point source industry short-term and long-term industries.

Table SSS. Short- and long-term goals for nonpoint sources and IDEQ-TFRO

Pollutant	Nonpoint Source Industry	Year 1 (2001)	Year 3 (2003)	Year 5 (2005)	Year 8 (2008)	Year 10 (2010)
TSS Sub TP *E. coli*	Grazing	Development & Plan Implementation	Review	R & A	Review	R & A
	Agriculture					
	FERC Facilities					
	Forestry					

	CFOs	Zero Discharge	Zero Discharge			
			Review	R & A	Review	R & A
	Recreation	Development & Plan Implementation	Minimal Impacts	R & A	Minimal Impacts	R & A
	Roads		Review		Review	
	Construction					
	Mining (AML)					
	Runoff: Urban & Rural					
	Septic Tanks					
	FERC facilities	Database				
Tem	Re-evaluation of temperature criteria via project study by IDEQ-State Office					
DO	Re-evaluation of DO criteria based on more current monitoring data.					
Flow	No Flow TMDL; Conservation flows encouraged					
Industry Plans	Each industry will be responsible for the development of an annual summary review and assessment of water quality goals and targets for the Big Wood River sub basin. Plans developed under the Big Wood River TMDL will be revised and applied on the Big Wood River TMDL specific for the water quality limited streams.					

Prepared by IDEQ-TFRO. A database of each industry will be maintained by IDEQ-TFRO. TP = total phosphorus, TSS = total suspended solids, Sub = Substrate sediments, DO = dissolved oxygen, LA = Land Application, NPS = Nonpoint source. Dev. & Imp. = Development and implementation of management plans. Review = Review of management plans by IDEQ, WAG, and designated agency. Assessment = Assessment of beneficial use attainment by IDEQ, TAC, and designated agency. R & A = Review and beneficial use assessment. Land management agencies in conjunction with IDEQ-TFRO will review BMP maintenance periodically. The feedback loop and adaptive management are important components the short-term and long-term goals. *E. coli* = *Escherichia coli*. AML = Abandoned mine lands. Tem = Temperature.

The specifics for each nonpoint source industry implementation plan are defined as follows:

- Grazing
  BLM, USFS, IDL, and private ownership conduct rangeland grazing as a landuse in the Big Wood River subbasin. For USBLM and USFS the 1999 Water Quality Protocol (USFS and USBLM 1999) will be used in the development of a water quality restoration plan as the primary mechanism to address and restore impaired waters under implementation. Additionally, environmental impact statements, environmental and biological assessments, allotment assessments, allotment plans, and grazing permits may be used to supplant the water quality restoration plan. IDEQ-TFRO supports the 1999 Water Quality Protocol and will coordinate with USFS and USBLM in the development of water quality restoration plans. IDEQ-TFRO will continue to comment on environmental impact statements, environmental and biological assessments, allotment assessments, and the grazing permits, as these become available through the public comment process.

  For the IDL a grazing allotment plan will need to be developed on those State lands that border or encompass the 303(d) stream in question. In many cases their existing grazing plans or permits will provide sufficient assurance to be retained as an implementation plan. For private ownership, the ISCC is the designated agency that will develop their implementation plan with individual owners or as grazing associations on those lands that border or encompass the 303(d) stream in question.

IDEQ-TFRO will conduct reviews and/or assessments in the third, fifth, eighth, and tenth year of plan implementation in conjunction with the designated agency. Such reviews and/or assessments will be presented to the Wood River WAG for their comments.

- Agriculture
  For agriculture the ISCC is the designated agency that will develop their implementation plan with individual owners or as agricultural associations, organizations, or groups on those lands that border or encompass the 303(d) stream in question. IDEQ-TFRO will conduct reviews and/or assessments in the third, fifth, eighth, and tenth year of plan implementation in conjunction with the designated agency. Such reviews and/or assessments will be presented to the Wood River WAG for their comments.

- FERC Facilities
  All FERC facilities will comply with the requirements of their permit. They will also monitor as prescribed in their permit. IDEQ-TFRO will continue to comment on environmental impact statements and environmental/biological assessments, as these become available through the public comment process. Additionally and pursuant to §401(a)(1) of the CWA and 33 U.S.C. §1341(a)(1), "an applicant for a federal license for any activity that may result in a discharge into the navigable waters of the United States must apply for a certification from the state in which the discharge originates (or will originate) (*so*) that the licensed activity will comply with state and federal water quality standards." IDEQ has jurisdiction over §401 water quality certification for FERC licensed facilities and will continue to provide such certification in support of TMDL activities.

- Forestry
  Where applicable on USFS lands as a consequence of timbering or logging, the 1999 Water Quality Protocol (USFS and USBLM 1999) will be used in the development of a water quality restoration plan as the primary mechanism to address and restore impaired waters under implementation. Additionally, environmental impact statements, environmental and biological assessments, allotment assessments, and grazing permits that be used to supplant the water quality restoration plan. IDEQ-TFRO will conduct reviews and/or assessments in the third, fifth, eighth, and tenth year of plan implementation in conjunction with the designated agency. Such reviews and/or assessments will be presented to the Wood River WAG for their comments.

- Confined Feeding Operations
  Confined feeding operations (like dairies and feedlots) are considered to be a part of the agriculture industry, although larger operations may have a stormwater

NPDES permit. The ISCC is the designated agency that will develop their implementation plan. IDEQ-TFRO will conduct reviews and/or assessments in the third, fifth, eighth, and tenth year of plan implementation in conjunction with the designated agency. Such reviews and/or assessments will be presented to the Wood River WAG for their comments.

- Recreation
  If evidence indicates that recreational pressure is impacting a 303(d) stream on USFS or BLM lands, the 1999 Water Quality Protocol (USFS and USBLM 1999) will be used in the development of a water quality restoration plan as the primary mechanism to restore impaired waters under implementation. Additionally, environmental impact statements and environmental/biological assessments may be used to supplant the water quality restoration plan. IDEQ-TFRO will conduct reviews and/or assessments in the third, fifth, eighth, and tenth year of plan implementation in conjunction with the designated agency. Such reviews and/or assessments will be presented to the Wood River WAG for their comments.

- Roads
  For the most part, roads and road activities are found on USFS, BLM, IDL, private lands, IDT, county lands, and city property. In order for roads to be considered in an implementation plan, evidence must exist that roads or road activities are directly contributing to a 303(d) listed waterbody. Road systems are dynamic thus requiring continual road maintenance. Prioritization of road remediation under the Big Wood River TMDL is dependent on the stream corridor approach model. Simply stated roads closest to the stream will have the greater impact than those furthest away will. Where applicable the USFS and BLM will include in their water quality restoration plans those activities or best management practices that will be used to minimize impacts from roads or road activities. Otherwise, a road maintenance plan must be developed that describes the conditions and what best management practices will be applied to minimize impacts to the 303(d) stream. IDEQ-TFRO will continue to comment on environmental impact statements, environmental and biological assessments, allotment assessments, and grazing permits that may describe road impacts, as these become available through the public comment process.

  Where applicable the IDL will provide a road maintenance plan on those roads that impact 303(d) streams on State lands. The IDT is the designated agency for public road construction. Where applicable the IDT (highway districts) will provide an implementation plan or road maintenance plan on those roads that impact 303(d) waterbodies.

  Where applicable the county and city local governments will provide a road maintenance plan on those roads that impact 303(d) waterbodies.

  Where applicable IDEQ-TFRO will conduct reviews and/or assessments in the third, fifth, eighth, and tenth year of plan implementation in conjunction with the designated agency to ascertain if applied best management practices are commensurate with the goals and targets of the TMDL. Such reviews and/or assessments will be presented to the Wood River WAG for their comments.

- Mining
  Mining in the Big Wood River subbasin is divided into abandoned mine lands and active mine sites. Active mine sites are very minimal in number, such as the Minnie Moore Mine near Bellevue. Abandoned mine lands make up the greatest component of mining. IDEQ-TFRO in coordination with the Idaho Abandoned Mine Lands group (representing USBLM, USFS, IDL, USGS, IGS, USEPA, IDEQ, and the University of Idaho) decided on the 0.5 mile corridor per 303(d) listed stream to identify abandoned mine lands that may potentially impact the streams. Sixty-four abandoned mine sites evolved from this approach and will be used as a first look (first cut) at the more than 360 abandoned mine sites in the subbasin. Over the next five years additional assessment of these sites will be done by the Idaho AML group to fully assess the condition of these sites. Both environmental and physical hazards will be assessed as part of an ongoing program. Several conclusions can already be surmised from these 65 abandoned mine sites:

  1. If any discharge is occurring to surface waterbodies or groundwater, such discharge has been tested for pH and those tested were >pH 7.5. Thus, acid mine drainage is not a problem in any of these AML sites.

  2. The geology of these 65 AML sites is not conducive to acid mine drainage, therefore acid mine drainage is not considered a problem at this time.

  3. Where placer mining has occurred, no acid mine drainage is evident since the placer mining is a short-term event (generally less than a month).

  4. Because of the physical location of these AML sites in relationship to the 303(d) stream, it is highly unlikely that any surface water discharge from stormwater could occur to the stream. Some of the sites are altogether abandoned without recognition or knowledge of a principle responsible party. However, remediation of the sites for potential cleanup projects is currently being assessed as part of the AML program.

  5. Although the AML site may not be a source of pollutants to 303(d) streams, it is possible that roads leading to the site and which may parallel (or are adjacent) to or cross the stream may pose a source of pollutants (such as sediment). These roads will be assessed during the implementation phase of the TMDL for possible remediation or restoration projects on the road itself.

  6. There is no known discharge to groundwater from any of these AML sites. Whatever groundwater is present on any of these sites its water quality is alkaline and similar to the geologic and soil conditions of its respective area.

7. The single most critical item that is characteristic of most AML sites is its physical hazards and the potential effects these may have on the public. These hazards include but are not limited to open mine shafts or holes, unmaintained wooden structures, unmaintained metal structures (inclusive of pipes), caved-in sites that pose serious physical hazards to the public, and etc.

8. A great number of the AML sites are known as “little tiny prospects,” which makes them very small operations without the potential (in most cases) to cause serious environmental loss or damage.

Where applicable IDEQ-TFRO will conduct reviews and/or assessments in the third, fifth, eighth, and tenth year of plan implementation in conjunction with the Idaho AML group to ascertain if applied best management practices are commensurate with the goals and targets of the TMDL. Such reviews and/or assessments will be presented to the Wood River WAG for their comments.

- Urban and Rural Stormwater Runoff
  Urban and rural runoff poses a potential threat to water quality if left unmanaged. Because of the diverse nature of stormwater runoff, it is imperative that a multi-coordinated management effort be in place that involves local government, agencies, and land management managers. Where and when applicable, stormwater management plans will be developed that are supportive of the TMDL. Where applicable IDEQ-TFRO will conduct reviews and/or assessments in the third, fifth, eighth, and tenth year of plan implementation in conjunction with involves local government, agencies, and land management managers to ascertain if applied best management practices are commensurate with the goals and targets of the TMDL. Such reviews and/or assessments will be presented to the Wood River WAG for their comments.

- Septic Systems
  Many areas in the Big Wood River subbasin utilize septic tank systems in lieu of a wastewater treatment facility. Because of this the upkeep and maintenance of septic systems is critical and important to water quality. It is uncertain that septic tanks are necessarily a problem for water quality due to a lack of data or the location of many of these systems. Therefore, the Wood River TAC (with oversight by IDEQ-TFRO) will develop a coordinated effort to define more specifically those areas within the subbasin where septic tanks may potentially pose a risk to water quality. IDEQ-TFRO will continue to provide oversight for review and assessment of short-term and long-term goals. IDEQ-TFRO will also maintain a database for purposes of review and assessment of load allocation limits. Reviews and/or assessments will be done in the third, fifth, eighth, and tenth year of plan implementation. Such reviews and/or assessments will be presented to the Wood River WAG for their comments.

- IDEQ-TFRO Responsibilities
  IDEQ-TFRO will provide oversight for review and assessment of short-term and long-term goals. IDEQ-TFRO will also maintain a database for purposes of review and assessment of load allocation limits. Reviews and/or assessments will be done in the third, fifth, eighth, and tenth year of plan implementation. Such reviews and/or assessments will be presented to the Wood River WAG for their comments.

Trend-monitoring Plan

Idaho Code §39-3621 provides that "the designated agencies, in cooperation with the appropriate land management agency and the IDEQ shall ensure BMPs are monitored for their effect on water quality. The monitoring results shall be presented to the IDEQ on a schedule agreed to between the designated agency and the IDEQ." "Where no monitoring program exists, or where additional assessments are needed, it is necessary for States to design and implement a monitoring plan. The objectives of monitoring include the assessment of water quality standards attainment, verification of pollution source allocations, calibration or modification of selected models, calculation of dilutions and pollutant mass balances, and evaluation of point and nonpoint source control effectiveness. In their monitoring programs, States should include a description of data collection methodologies and quality assurance/quality control procedures, a review of current discharger monitoring reports, and be integrated with volunteer and cooperative monitoring programs where possible. The monitoring program will result in a sufficient database for assessment of water quality standard attainment and additional predictive modeling if necessary (USEPA 1991a [p 22])." Monitoring provides the information needed to evaluate management. Trend monitoring in conjunction with implementation of BMPs will be used to determine which management measures and BMPs are being implemented, whether management measures and BMPs are being implemented as designed, and the need for increased efforts to promote or induce use of management measures and BMPs. It may be necessary to modify current or proposed monitoring programs to those that are more inline with an adaptive management style for the watershed. The Wood River TAC and IDEQ-TFRO will develop a trend-monitoring plan during the implementation phase.

Legal Authorities That Defend Control and Management Actions

For point sources, IDEQ operates under the NPDES federal permit program that is under the primacy of USEPA for aquaculture, food processors, and municipalities. USEPA operates and enforces the permit, while IDEQ assists with inspections, compliance monitoring, and technical assistance. IDEQ, however, has statutory rights over the NPDES permits through its •401 Water Quality Certification. Under this certification, IDEQ can impose more stringent limits or monitoring requirements than what USEPA would request. For FERC licensed facilities, FERC has primacy for its permits. IDEQ provides technical assistance. However, like the NPDES program, IDEQ has •401, •402, and •404 Water Quality Certification responsibilities for parameters, design modifications, or stream alterations that the FERC facility may require or request.

For nonpoint source CFOs (or CAFOs by USEPA), an NPDES stormwater permit is secured by facilities that allows for discharge on a once-per-24-hours every 25 years. For cases of inspection for dairy operations, the Idaho Dairy Pollution Prevention Initiative Memorandum of Understanding signed by ISDA, IDEQ, IDA, and USEPA allows for ISDA to conduct the inspections. ISDA has the statutory authority to revoke milk permits for recalcitrant operators. Feedlots are not part of the Idaho MOU and are administered to by IDEQ and have a zero discharge. All CFOs or CAFOs have zero discharge. For nonpoint sources such as irrigated agriculture and grazing, no NPDES permits are required for discharging to canals, waters of the State, or waters of the United States. BMPs are supported and encouraged by IDEQ according to the recognized agencies that provide guidance and technical assistance as summarized in Table TTT.

Table TTT. Recognized agencies in the TMDL process

Nonpoint Source Activity/BMPs	Agency	Code/Regulations
Grazing	ISCC; IBLC	IC •39-3602; IDAPA •58.01.02.003.62; IDAPA •58.01.02.350.03
	IDA	Grazing MOU (USFS, USBLM, U of I, IDA); Executive Order 98-09 (Allotment Management Plan on Public Lands)
Agriculture	ISCC	Idaho Agriculture Pollution Abatement Plan; IDAPA •58.01.58.200.02.iv
Silviculture	IDL; IBLC	IC •39-3602; IDAPA •58.01.02.003.62; IDAPA •58.01.02.350.03
Construction sites	IDT	IC •39-3602; IDAPA •58.01.02.003.62; IDAPA •58.01.02.350.03
Septic tanks	District Health	IC •39-3602; IDAPA •58.01.02.003.62; IDAPA •58.01.02.350.03;
	IDEQ: Waste disposal	IDAPA •58.01.15
Mining	IDL; IBLC	IC •39-3602; IDAPA •58.01.02.003.62; IDAPA •58.01.02.350.03
CFOs (CAFOs)	Dairies: IDA	MOU 1995 (ISDA, IDEQ, USEPA, IDA)
	Poultry and Swine: IDEQ	IDAPA §58.01.09
	NPDES Permits: USEPA	40 CFR §123.25
Reservoir backwaters	IDL	Lake Protection Act (boat docks, ramps and streambank protection)
Confined Aquatic Feeding Operations	BMPs: IDA	IC §22-4602(1)(e); IC •39-3602; IDAPA •58.01.02.003.21; IDAPA •58.01.02.350.03
	NPDES Permits: IDEQ	IC §39-118; 40 CFR 122.24; 40 CFR 122, Appendix C; IC §22-4602(1)(e); IDAPA •58.01.02.003.21; IDAPA §58.01.02.400; CWA 401, 402, 404.

Prepared by IDEQ-TFRO. IC = Idaho Code; IDAPA = Idaho Administrative Procedures Act; MOU = Memorandum of Understanding; ISCC = Idaho Soil Conservation Commission. IBLC = Idaho Bureau of Land Commissioners. IDA = Idaho Department of Agriculture. IDL = Idaho Department of Lands. IDT = Idaho Department of Transportation. IDHW = Idaho Department of Health and Welfare. IDEQ = Idaho Department of Environmental Quality.

It is evident from an historical perspective that to some extent nonpoint source pollution is the result of activities essential to the economic and social welfare of the state. It is recognized that the real extent of most nonpoint source activities prevents the practical application of conventional wastewater treatment technologies. However, “nonpoint source pollution management, including BMPs, is a process for protecting the designated beneficial uses and ambient water quality. BMPs should be designed, implemented and maintained to provide full protection or maintenance of beneficial uses. Violations of water quality standards that occur in spite of implementation of BMPs will not be subject to enforcement action. However, if subsequent water quality monitoring and surveillance by IDEQ based on the criteria listed in §200 and §250, indicate water quality standards are not met due to nonpoint source impacts, even with the use of current BMPs, the practices will be evaluated and modified as necessary by the appropriate agencies in accordance with the provisions of the Administrative Procedures Act. If necessary, injunctive or other judicial relief may be initiated against the operator of a nonpoint source activity in accordance with the Administrator of IDEQ’s authorities provided in §39-108 Idaho Code. In certain cases, revision of the water quality standards may be appropriate (IDAPA §58.01.02.350.01.a).” As long as a nonpoint source activity “is being conducted in accordance with applicable rules, regulations and BMPs or in the absence of referenced applicable BMPs, conducted in a manner that demonstrates a knowledgeable and reasonable effort to minimize resulting adverse water quality impacts, the activity will not be subject to conditions or legal actions. In all cases, if it is determined by the Administrator of IDEQ that imminent and substantial danger to the public health or environment is occurring, or may occur as a result of a nonpoint source by itself or in combination with other point or nonpoint source activities, then the Administrator of IDEQ may seek immediate injunctive relief to stop or prevent that danger as provided in §39-108 Idaho Code (IDAPA §58.01.02.350.02.a).” Other pertinent nonpoint source restrictions may be found in IDAPA §58.01.02.350.02 & 03.

Connectivity Effect

Pollution reduction management and control actions that occur in the Big Wood River Subbasin over the next 10 years may have a direct effect on subbasins downstream of the Malad River. These subbasins include the Middle Snake River in the Upper Snake Rock TMDL, the Bruneau River TMDL, the C.J. Strike TMDL, and the Hells Canyon Complex. There are no subbasins upstream of Horse Creek that directly connect to the Big Wood River, so no connectivity issues may be expressed from an upstream source. But there are connectivity issues on the Little Wood River and the Camas Creek subbasins since these flow into the Big Wood River subbasin. This connectivity effect of a subbasin upon its downstream neighbor subbasins is a hydrological linkage that TMDLs do not normally address. The Upper Snake Rock TMDL has specifically defined that all waterbodies flowing into the Middle Snake River must meet the instream standards defined in its instream targets. The Big Wood River (via the Malad River) discharges to the Middle Snake River, and therefore by default must meet this criteria for the present.

Connectivity is an issue that has been discussed by the Wood River TAC, particularly as to what effect loadings on the Big Wood River (the Malad River) will have on the Middle Snake River or any downstream hydrologic neighbor. One of those concerns deals with algal growth between King Hill and Brownley Reservoir and its linkage to instream total phosphorus concentrations. Implications are that instream total phosphorus concentrations at King Hill are not stringent enough to effectively reduce excess algal growth that appears downstream of King Hill. At this time no changes in the proposed TMDL for the Big Wood River subbasin will be made as a consequence of the Upper Snake Rock TMDL, the Bruneau TMDL, the C.J. Strike TMDL, or the Hells Canyon Complex until after these TMDLs implement all the appropriate water quality reductions with their own point and nonpoint source industries. If changes need to be made to the Big Wood River TMDL as a consequence of connectivity, it will be after Year 10 of the implementation of the Big Wood River TMDL, and with scientific proof that additional reductions in the Big Wood River subbasin will cause reductions in any of these downstream TMDLs. In other words, a scientific linkage needs to be established between the Big Wood River system and any of its downstream neighbors such that beneficial uses cannot be made unless further reductions are imposed in the Big Wood River subbasin.

Feedback Loop and Adaptive Management

The feedback loop is a component of the Big Wood River TMDL strategy that provides for accountability of plan goals for various pollutants. As part of the TMDL process, the Big Wood River TMDL will use adaptive management as a style and process whereby: (1) management of the watershed is initiated by the State, federal agencies, and the water user industries; (2) an evaluation process will ascertain the direction in which the reductions are progressing; and, (3) based on monitoring information collected from various agencies, organizations, and water users the goals, targets, and BMPs will be refined based on short-term and long-term objectives for ecosystem management of the Big Wood River watershed. Past management experiences may be used to evaluate both success and failure and to explore new management options where necessary. By learning from both successes and failures, the Big Wood River TMDL will be iterative to allow implementation of those techniques which may be most useful and helpful, as well as gain insights into which practices best promote recovery for restoration of beneficial uses and State water quality standards (Williams et *al.* 1997).

In order for the feedback loop to be successful in the Big Wood River TMDL, a concrete mechanism has been designed with short-term and long-term goals for the IDEQ-TFRO, industries, and the Wood River WAG. These will regularly review progress on implementation, monitoring results, and evaluate plan effectiveness. Sufficient flexibility in management plans is allowed for corrections in management strategies that may not be effective in achieving beneficial uses or State water quality standards. Both point and nonpoint source industries will follow the feedback loop under the following provisions: (1) identification of critical water quality parameter(s); (2) development of site-specific BMPs; (3) application and monitoring of BMPs; and, (4) effectiveness evaluations of BMPs by comparing established water quality standards and then modifying the BMPs where needed to achieve water quality goals.

The IDEQ-TFRO will review all monitoring results for point and nonpoint sources, and will provide an opportunity for the Wood River WAG and USEPA to review and comment on an annual basis. Each industry will provide an annual summary review/report to the IDEQ-

TFRO on its monitoring efforts, strategies, and on-going reduction mechanisms. Each industry will provide its own data in their annual report. Based on these reports and other data, the Big Wood River TMDL will be revised accordingly as an iterative plan. All industry plans will also be iterative and further developed through adaptive management as new knowledge and technology is discovered for pollution reduction efforts.

Because of the diverse nature of the partnerships and commitments within the Wood River WAG from various agencies, organizations, and water users; and, because adaptive management is inherently a characteristic of the Big Wood River Watershed Management Plan; restoration and education efforts will be guided by IDEQ-TFRO via the WAG through its technical and education committees. These committees will take advantage of their partner's technical knowledge, experience, existing management plans, and resources in determining which types of activities are appropriate for continued implementation of the Big Wood River TMDL. The Mid-Snake WAG will continue to meet as prescribed in their bylaws and to ensure good communication with its partners though monthly newsletters (as an example) and/or minutes of their meetings. Through its TAC, the WAG will have available the technical expertise of biologists, hydrologists, range conservationists, foresters, and other water quality and watershed specialists. Monitoring done by the various agencies, organizations, and water users will be coordinated and evaluated by IDEQ-TFRO. Results will be provided to the TAC and WAG as a feedback mechanism that is science-based; and, through adaptive management such scientific knowledge will be adapted to the task of watershed restoration almost immediately.

5.7 Conclusions

The Big Wood River Watershed Management Plan was written with the express purpose of restoring beneficial uses and/or state water quality standards by Year 10 of plan implementation. The subbasin assessment and the TMDL analysis have been developed to comply with Idaho's TMDL schedule. The subbasin assessment describes the physical, biological, and cultural setting; water quality status; pollutant sources; and recent pollution control actions in the Big Wood River Subbasin located in the southcentral portion of Idaho. Management actions to bring about significant changes on the 303(d) streams will be developed during the implementation phase of the overall TMDL process. To the extent practical, a trend-monitoring plan, future growth assessment, and more explicit monitoring of point source and nonpoint source interactions will be undertaken during the implementation phase. Deferred TMDLs for temperature and dissolved oxygen will be developed in 2003 based on more recent collected water quality data.

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STATSGO, soil coverage, NRCS
Precip95, areal precipitation for Idaho, Idaho Climate Service, University of Idaho
4^{th} & 5^{th} Field HUCs, IDWR

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Glossary

305(b) — Refers to section 305 subsection "b" of the Clean Water Act. 305(b) generally describes a report of each state's water quality, and is the principle means by which the U.S. Environmental Protection Agency, congress, and the public evaluate whether U.S. waters meet water quality standards, the progress made in maintaining and restoring water quality, and the extent of the remaining problems.

303(d) — Refers to section 303 subsection "d" of the Clean Water Act. 303(d) requires states to develop a list of water bodies that do not meet water quality standards. This section also requires total maximum daily loads (TMDLs) be prepared for listed waters. Both the list and the TMDLs are subject to U.S. Environmental Protection Agency approval.

Acre-Foot — A volume of water that would cover an acre to a depth of one foot. Often used to quantify reservoir storage and the annual discharge of large rivers.

Adsorption — The adhesion of one substance to the surface of another. Clays, for example, can adsorb phosphorus and organic molecules.

Aeration — A process by which water becomes charged with air directly from the atmosphere. Dissolved gases, such as oxygen, are then available for reactions in water.

Aerobic — Describes life, processes, or conditions that require the presence of oxygen.

Assessment Database (ADB) — The ADB is a relational database application designed for the U.S. Environmental Protection Agency for tracking water quality assessment data, such as use attainment and causes and sources of impairment. States need to track this information and many other types of assessment data for thousands of water bodies, and integrate it into meaningful reports. The ADB is designed to make this process accurate, straightforward, and user-friendly for participating states, territories, tribes, and basin commissions.

Adfluvial — Describes fish whose life history involves seasonal migration from lakes to streams for spawning.

Adjunct — In the context of water quality, adjunct refers to areas directly adjacent to focal or refuge habitats that have been degraded by human or natural disturbances and do not presently support high diversity or abundance of native species.

Alevin	A newly hatched, incompletely developed fish (usually a salmonid) still in nest or inactive on the bottom of a waterbody, living off stored yolk.
Algae	Non-vascular (without water-conducting tissue) aquatic plants that occur as single cells, colonies, or filaments.
Alluvium	Unconsolidated recent stream deposition.
Ambient	General conditions in the environment. In the context of water quality, ambient waters are those representative of general conditions, not associated with episodic perturbations, or specific disturbances such as a wastewater outfall (Armantrout 1998, EPA 1996).
Anadromous	Fish, such as salmon and sea-run trout, that live part or the majority of their lives in the salt water but return to fresh water to spawn.
Anaerobic	Describes the processes that occur in the absence of molecular oxygen and describes the condition of water that is devoid of molecular oxygen.
Anoxia	The condition of oxygen absence or deficiency.
Anthropogenic	Relating to, or resulting from, the influence of human beings on nature.
Anti-Degradation	Refers to the U.S. Environmental Protection Agency's interpretation of the Clean Water Act goal that states and tribes maintain, as well as restore, water quality. This applies to waters that meet or are of higher water quality than required by state standards. State rules provide that the quality of those high quality waters may be lowered only to allow important social or economic development and only after adequate public participation (IDAPA 58.01.02.051). In all cases, the existing beneficial uses must be maintained. State rules further define lowered water quality to be 1) a measurable change, 2) a change adverse to a use, and 3) a change in a pollutant relevant to the water's uses (IDAPA 58.01.02.003.56).
Aquatic	Occurring, growing, or living in water.
Aquifer	An underground, water-bearing layer or stratum of permeable rock, sand, or gravel capable of yielding of water to wells or springs.
Assemblage (aquatic)	An association of interacting populations of organisms in a given waterbody; for example, a fish assemblage, or a benthic macroinvertebrate assemblage (also see Community) (EPA 1996).
Assimilative Capacity	The ability to process or dissipate pollutants without ill effect to beneficial uses.

Autotrophic An organism is considered autotrophic if it uses carbon dioxide as its main source of carbon. This most commonly happens through photosynthesis.

Batholith A large body of intrusive igneous rock that has more than 40 square miles of surface exposure and no known floor. A batholith usually consists of coarse-grained rocks such as granite.

Bedload Material (generally sand-sized or larger sediment) that is carried along the streambed by rolling or bouncing.

Beneficial Use Any of the various uses of water, including, but not limited to, aquatic biota, recreation, water supply, wildlife habitat, and aesthetics, which are recognized in water quality standards.

Beneficial Use Reconnaissance Program (BURP) A program for conducting systematic biological and physical habitat surveys of water bodies in Idaho. BURP protocols address lakes, reservoirs, and wadeable streams and rivers.

Benthic Pertaining to or living on or in the bottom sediments of a waterbody.

Benthic Organic Matter The organic matter on the bottom of a waterbody.

Benthos Organisms living in and on the bottom sediments of lakes and streams. Originally, the term meant the lake bottom, but it is now applied almost uniformly to the animals associated with the lake and stream bottoms.

Best Management Practices (BMPs) Structural, nonstructural, and managerial techniques that are effective and practical means to control nonpoint source pollutants.

Best Professional Judgment A conclusion and/or interpretation derived by a trained and/or technically competent individual by applying interpretation and synthesizing information.

Biochemical Oxygen Demand (BOD) The amount of dissolved oxygen used by organisms during the decomposition (respiration) of organic matter, expressed as mass of oxygen per volume of water, over some specified period of time.

Biological Integrity 1) The condition of an aquatic community inhabiting unimpaired water bodies of a specified habitat as measured by an evaluation of multiple attributes of the aquatic biota (EPA 1996). 2) The ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to the natural habitats of a region (Karr 1991).

Biomass The weight of biological matter. Standing crop is the amount of biomass (e.g., fish or algae) in a body of water at a given time. Often expressed as grams per square meter.

Biota The animal and plant life of a given region.

Biotic A term applied to the living components of an area.

Clean Water Act (CWA) The Federal Water Pollution Control Act (Public Law 92-50, commonly known as the Clean Water Act), as last reauthorized by the Water Quality Act of 1987 (Public Law 100-4), establishes a process for states to use to develop information on, and control the quality of, the nation's water resources.

Coliform Bacteria A group of bacteria predominantly inhabiting the intestines of humans and animals but also found in soil. Coliform bacteria are commonly used as indicators of the possible presence of pathogenic organisms (also see Fecal Coliform Bacteria).

Colluvium Material transported to a site by gravity.

Community A group of interacting organisms living together in a given place.

Conductivity The ability of an aqueous solution to carry electric current, expressed in micro (μ) mhos/cm at 25 °C. Conductivity is affected by dissolved solids and is used as an indirect measure of total dissolved solids in a water sample.

Cretaceous The final period of the Mesozoic era (after the Jurassic and before the Tertiary period of the Cenozoic era), thought to have covered the span of time between 135 and 65 million years ago.

Criteria In the context of water quality, numeric or descriptive factors taken into account in setting standards for various pollutants. These factors are used to determine limits on allowable concentration levels, and to limit the number of violations per year. EPA develops criteria guidance; states establish criteria.

Cubic Feet per Second A unit of measure for the rate of flow or discharge of water. One cubic foot per second is the rate of flow of a stream with a cross-section of one square foot flowing at a mean velocity of one foot per second. At a steady rate, once cubic foot per second is equal to 448.8 gallons per minute and 10,984 acre-feet per day.

Cultural Eutrophication The process of eutrophication that has been accelerated by human-caused influences. Usually seen as an increase in nutrient loading (also see Eutrophication).

Culturally Induced Erosion caused by increased runoff or wind action due to the work

Erosion of humans in deforestation, cultivation of the land, overgrazing, and disturbance of natural drainages; the excess of erosion over the normal for an area (also see Erosion).

Debris Torrent The sudden down slope movement of soil, rock, and vegetation on steep slopes, often caused by saturation from heavy rains.

Decomposition The breakdown of organic molecules (e.g., sugar) to inorganic molecules (e.g., carbon dioxide and water) through biological and nonbiological processes.

Depth Fines Percent by weight of particles of small size within a vertical core of volume of a streambed or lake bottom sediment. The upper size threshold for fine sediment for fisheries purposes varies from 0.8 to 6.5 mm depending on the observer and methodology used. The depth sampled varies but is typically about one foot (30 cm).

Designated Uses Those water uses identified in state water quality standards that must be achieved and maintained as required under the Clean Water Act.

Discharge The amount of water flowing in the stream channel at the time of measurement. Usually expressed as cubic feet per second (cfs).

Dissolved Oxygen (DO) The oxygen dissolved in water. Adequate DO is vital to fish and other aquatic life.

Disturbance Any event or series of events that disrupts ecosystem, community, or population structure and alters the physical environment.

E. coli Short for *Escherichia Coli*, *E. coli* are a group of bacteria that are a subspecies of coliform bacteria. Most *E. coli* are essential to the healthy life of all warm-blooded animals, including humans. Their presence is often indicative of fecal contamination.

Ecology The scientific study of relationships between organisms and their environment; also defined as the study of the structure and function of nature.

Ecological Indicator A characteristic of an ecosystem that is related to, or derived from, a measure of a biotic or abiotic variable that can provide quantitative information on ecological structure and function. An indicator can contribute to a measure of integrity and sustainability. Ecological indicators are often used within the multimetric index framework.

Ecological Integrity The condition of an unimpaired ecosystem as measured by combined chemical, physical (including habitat), and biological attributes (USEPA 1996).

Ecosystem The interacting system of a biological community and its non-living (abiotic) environmental surroundings.

Effluent A discharge of untreated, partially treated, or treated wastewater into a receiving waterbody.

Endangered Species Animals, birds, fish, plants, or other living organisms threatened with imminent extinction. Requirements for declaring a species as endangered are contained in the Endangered Species Act.

Environment The complete range of external conditions, physical and biological, that affect a particular organism or community.

Eocene An epoch of the early Tertiary period, after the Paleocene and before the Oligocene.

Eolian Windblown, referring to the process of erosion, transport, and deposition of material by the wind.

Ephemeral Stream A stream or portion of a stream that flows only in direct response to precipitation. It receives little or no water from springs and no long continued supply from melting snow or other sources. Its channel is at all times above the water table. (American Geologic Institute 1962).

Erosion The wearing away of areas of the earth's surface by water, wind, ice, and other forces.

Eutrophic From Greek for "well nourished," this describes a highly productive body of water in which nutrients do not limit algal growth. It is typified by high algal densities and low clarity.

Eutrophication 1) Natural process of maturing (aging) in a body of water. 2) The natural and human-influenced process of enrichment with nutrients, especially nitrogen and phosphorus, leading to an increased production of organic matter.

Exceedance A violation (according to DEQ policy) of the pollutant levels permitted by water quality criteria.

Existing Beneficial Use or Existing Use A beneficial use actually attained in waters on or after November 28, 1975, whether or not the use is designated for the waters in Idaho's *Water Quality Standards and Wastewater Treatment Requirements* (IDAPA 58.01.02).

Exotic Species A species that is not native (indigenous) to a region.

Extrapolation Estimation of unknown values by extending or projecting from known values.

Fauna Animal life, especially the animals characteristic of a region, period, or special environment.

Fecal Coliform Bacteria Bacteria found in the intestinal tracts of all warm-blooded animals or mammals. Their presence in water is an indicator of pollution and possible contamination by pathogens (also see Coliform Bacteria).

Fecal Streptococci A species of spherical bacteria including pathogenic strains found in the intestines of warm-blooded animals.

Feedback Loop In the context of watershed management planning, a feedback loop is a process that provides for tracking progress toward goals and revising actions according to that progress.

Fixed-Location Monitoring Sampling or measuring environmental conditions continuously or repeatedly at the same location.

Flow See Discharge.

Fluvial In fisheries, this describes fish whose life history takes place entirely in streams but migrate to smaller streams for spawning.

Focal Critical areas supporting a mosaic of high quality habitats that sustain a diverse or unusually productive complement of native species.

Fully Supporting In compliance with water quality standards and within the range of biological reference conditions for all designated and exiting beneficial uses as determined through the *Water Body Assessment Guidance* (Grafe et al. 2000).

Fully Supporting Cold Water Reliable data indicate functioning, sustainable cold water biological assemblages (e.g., fish, macroinvertebrates, or algae), none of which has been modified significantly beyond the natural range of reference conditions (EPA 1997).

Fully Supporting but Threatened An intermediate assessment category describing water bodies that fully support beneficial uses, but have a declining trend in water quality conditions, which if not addressed, will lead to a "not fully supporting" status.

Geographical Information Systems (GIS) A georeferenced database.

Geometric Mean A back-transformed mean of the logarithmically transformed numbers often used to describe highly variable, right-skewed data (a few large values), such as bacterial data.

Grab Sample A single sample collected at a particular time and place. It may represent the composition of the water in that water column.

Gradient The slope of the land, water, or streambed surface.

Ground Water Water found beneath the soil surface saturating the layer in which it is located. Most ground water originates as rainfall, is free to move under the influence of gravity, and usually emerges again as stream flow.

Growth Rate — A measure of how quickly something living will develop and grow, such as the amount of new plant or animal tissue produced per a given unit of time, or number of individuals added to a population.

Habitat — The living place of an organism or community.

Headwater — The origin or beginning of a stream.

Hydrologic Basin — The area of land drained by a river system, a reach of a river and its tributaries in that reach, a closed basin, or a group of streams forming a drainage area (also see Watershed).

Hydrologic Cycle — The cycling of water from the atmosphere to the earth (precipitation) and back to the atmosphere (evaporation and plant transpiration). Atmospheric moisture, clouds, rainfall, runoff, surface water, ground water, and water infiltrated in soils are all part of the hydrologic cycle.

Hydrologic Unit — One of a nested series of numbered and named watersheds arising from a national standardization of watershed delineation. The initial 1974 effort (USGS 1987) described four levels (region, subregion, accounting unit, cataloging unit) of watersheds throughout the United States. The fourth level is uniquely identified by an eight-digit code built of two-digit fields for each level in the classification. Originally termed a cataloging unit, fourth field hydrologic units have been more commonly called subbasins. Fifth and sixth field hydrologic units have since been delineated for much of the country and are known as watershed and subwatersheds, respectively.

Hydrologic Unit Code (HUC) — The number assigned to a hydrologic unit. Often used to refer to fourth field hydrologic units.

Hydrology — The science dealing with the properties, distribution, and circulation of water.

Impervious — Describes a surface, such as pavement, that water cannot penetrate.

Influent — A tributary stream.

Inorganic — Materials not derived from biological sources.

Instantaneous — A condition or measurement at a moment (instant) in time.

Intergravel Dissolved Oxygen — The concentration of dissolved oxygen within spawning gravel. Consideration for determining spawning gravel includes species, water depth, velocity, and substrate.

Intermittent Stream	1) A stream that flows only part of the year, such as when the ground water table is high or when the stream receives water from springs or from surface sources such as melting snow in mountainous areas. The stream ceases to flow above the streambed when losses from evaporation or seepage exceed the available stream flow. 2) A stream that has a period of zero flow for at least one week during most years.
Interstate Waters	Waters that flow across or form part of state or international boundaries, including boundaries with Indian nations.
Irrigation Return Flow	Surface (and subsurface) water that leaves a field following the application of irrigation water and eventually flows into streams.
Key Watershed	A watershed that has been designated in Idaho Governor Batt's *State of Idaho Bull Trout Conservation Plan* (1996) as critical to the long-term persistence of regionally important trout populations.
Knickpoint	Any interruption or break of slope.
Land Application	A process or activity involving application of wastewater, surface water, or semi-liquid material to the land surface for the purpose of treatment, pollutant removal, or ground water recharge.
Limiting Factor	A chemical or physical condition that determines the growth potential of an organism. This can result in a complete inhibition of growth, but typically results in less than maximum growth rates.
Limnology	The scientific study of fresh water, especially the history, geology, biology, physics, and chemistry of lakes.
Load Allocation (LA)	A portion of a waterbody's load capacity for a given pollutant that is given to a particular nonpoint source (by class, type, or geographic area).
Load(ing)	The quantity of a substance entering a receiving stream, usually expressed in pounds or kilograms per day or tons per year. Loading is the product of flow (discharge) and concentration.
Loading Capacity (LC)	A determination of how much pollutant a waterbody can receive over a given period without causing violations of state water quality standards. Upon allocation to various sources, and a margin of safety, it becomes a total maximum daily load.
Loam	Refers to a soil with a texture resulting from a relative balance of sand, silt, and clay. This balance imparts many desirable characteristics for agricultural use.
Loess	A uniform wind-blown deposit of silty material. Silty soils are among the most highly erodible.

Lotic An aquatic system with flowing water such as a brook, stream, or river where the net flow of water is from the headwaters to the mouth.

Luxury Consumption A phenomenon in which sufficient nutrients are available in either the sediments or the water column of a waterbody, such that aquatic plants take up and store an abundance in excess of the plants' current needs.

Macroinvertebrate An invertebrate animal (without a backbone) large enough to be seen without magnification and retained by a 500μm mesh (U.S. #30) screen.

Macrophytes Rooted and floating vascular aquatic plants, commonly referred to as water weeds. These plants usually flower and bear seeds. Some forms, such as duckweed and coontail (*Ceratophyllum sp.*), are free-floating forms not rooted in sediment.

Margin of Safety (MOS) An implicit or explicit portion of a waterbody's loading capacity set aside to allow the uncertainly about the relationship between the pollutant loads and the quality of the receiving waterbody. This is a required component of a total maximum daily load (TMDL) and is often incorporated into conservative assumptions used to develop the TMDL (generally within the calculations and/or models). The MOS is not allocated to any sources of pollution.

Mass Wasting A general term for the down slope movement of soil and rock material under the direct influence of gravity.

Mean Describes the central tendency of a set of numbers. The arithmetic mean (calculated by adding all items in a list, then dividing by the number of items) is the statistic most familiar to most people.

Median The middle number in a sequence of numbers. If there are an even number of numbers, the median is the average of the two middle numbers. For example, 4 is the median of 1, 2, 4, 14, 16; and 6 is the median of 1, 2, 5, 7, 9, 11.

Metric 1) A discrete measure of something, such as an ecological indicator (e.g., number of distinct taxon). 2) The metric system of measurement.

Milligrams per Liter (mg/l) A unit of measure for concentration in water, essentially equivalent to parts per million (ppm).

Million gallons per day (MGD) A unit of measure for the rate of discharge of water, often used to measure flow at wastewater treatment plants. One MGD is equal to 1.547 cubic feet per second.

Miocene	Of, relating to, or being an epoch of, the Tertiary between the Pliocene and the Oligocene periods, or the corresponding system of rocks.
Monitoring	A periodic or continuous measurement of the properties or conditions of some medium of interest, such as monitoring a waterbody.
Mouth	The location where flowing water enters into a larger waterbody.
National Pollution Discharge Elimination System (NPDES)	A national program established by the Clean Water Act for permitting point sources of pollution. Discharge of pollution from point sources is not allowed without a permit.
Natural Condition	A condition indistinguishable from that without human-caused disruptions.
Nitrogen	An element essential to plant growth, and thus is considered a nutrient.
Nodal	Areas that are separated from focal and adjunct habitats, but serve critical life history functions for individual native fish.
Nonpoint Source	A dispersed source of pollutants, generated from a geographical area when pollutants are dissolved or suspended in runoff and then delivered into waters of the state. Nonpoint sources are without a discernable point or origin. They include, but are not limited to, irrigated and non-irrigated lands used for grazing, crop production, and silviculture; rural roads; construction and mining sites; log storage or rafting; and recreation sites.
Not Assessed (NA)	A concept and an assessment category describing water bodies that have been studied, but are missing critical information needed to complete an assessment.
Not Attainable	A concept and an assessment category describing water bodies that demonstrate characteristics that make it unlikely that a beneficial use can be attained (e.g., a stream that is dry but designated for salmonid spawning).
Not Fully Supporting	Not in compliance with water quality standards or not within the range of biological reference conditions for any beneficial use as determined through the *Water Body Assessment Guidance* (Grafe et al. 2000).
Not Fully Supporting Cold Water	At least one biological assemblage has been significantly modified beyond the natural range of its reference condition (EPA 1997).
Nuisance	Anything which is injurious to the public health or an obstruction to the free use, in the customary manner, of any waters of the state.

Nutrient	Any substance required by living things to grow. An element or its chemical forms essential to life, such as carbon, oxygen, nitrogen, and phosphorus. Commonly refers to those elements in short supply, such as nitrogen and phosphorus, which usually limit growth.
Nutrient Cycling	The flow of nutrients from one component of an ecosystem to another, as when macrophytes die and release nutrients that become available to algae (organic to inorganic phase and return).
Oligotrophic	The Greek term for "poorly nourished." This describes a body of water in which productivity is low and nutrients are limiting to algal growth, as typified by low algal density and high clarity.
Organic Matter	Compounds manufactured by plants and animals that contain principally carbon.
Orthophosphate	A form of soluble inorganic phosphorus most readily used for algal growth.
Oxygen-Demanding Materials	Those materials, mainly organic matter, in a waterbody which consume oxygen during decomposition.
Parameter	A variable, measurable property whose value is a determinant of the characteristics of a system; e.g., temperature, dissolved oxygen, and fish populations are parameters of a stream or lake.
Partitioning	The sharing of limited resources by different races or species; use of different parts of the habitat, or the same habitat at different times. Also the separation of a chemical into two or more phases, such as partitioning of phosphorus between the water column and sediment.
Pathogens	Disease-producing organisms (e.g., bacteria, viruses, parasites).
Perennial Stream	A stream that flows year-around in most years.
Periphyton	Attached microflora (algae and diatoms) growing on the bottom of a waterbody or on submerged substrates, including larger plants.
Pesticide	Substances or mixtures of substances intended for preventing, destroying, repelling, or mitigating any pest. Also, any substance or mixture intended for use as a plant regulator, defoliant, or desiccant.
pH	The negative $\log_{10}$ of the concentration of hydrogen ions, a measure which in water ranges from very acid (pH=1) to very alkaline (pH=14). A pH of 7 is neutral. Surface waters usually measure between pH 6 and 9.
Phased TMDL	A total maximum daily load (TMDL) that identifies interim load allocations and details further monitoring to gauge the success of management actions in achieving load reduction goals and the effect

	of actual load reductions on the water quality of a waterbody. Under a phased TMDL, a refinement of load allocations, waste load allocations, and the margin of safety is planned at the outset.
Phosphorus	An element essential to plant growth, often in limited supply, and thus considered a nutrient.
Physiochemical	In the context of bioassessment, the term is commonly used to mean the physical and chemical factors of the water column that relate to aquatic biota. Examples in bioassessment usage include saturation of dissolved gases, temperature, pH, conductivity, dissolved or suspended solids, forms of nitrogen, and phosphorus. This term is used interchangeable with the terms "physical/chemical" and "physicochemical."
Plankton	Microscopic algae (phytoplankton) and animals (zooplankton) that float freely in open water of lakes and oceans.
Point Source	A source of pollutants characterized by having a discrete conveyance, such as a pipe, ditch, or other identifiable "point" of discharge into a receiving water. Common point sources of pollution are industrial and municipal wastewater.
Pollutant	Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.
Pollution	A very broad concept that encompasses human-caused changes in the environment which alter the functioning of natural processes and produce undesirable environmental and health effects. This includes human-induced alteration of the physical, biological, chemical, and radiological integrity of water and other media.
Population	A group of interbreeding organisms occupying a particular space; the number of humans or other living creatures in a designated area.
Pretreatment	The reduction in the amount of pollutants, elimination of certain pollutants, or alteration of the nature of pollutant properties in wastewater prior to, or in lieu of, discharging or otherwise introducing such wastewater into a publicly owned wastewater treatment plant.
Primary Productivity	The rate at which algae and macrophytes fix carbon dioxide using light energy. Commonly measured as milligrams of carbon per square meter per hour.
Protocol	A series of formal steps for conducting a test or survey.
Qualitative	Descriptive of kind, type, or direction.

Quality Assurance (QA)	A program organized and designed to provide accurate and precise results. Included are the selection of proper technical methods, tests, or laboratory procedures; sample collection and preservation; the selection of limits; data evaluation; quality control; and personnel qualifications and training. The goal of QA is to assure the data provided are of the quality needed and claimed (Rand 1995, EPA 1996).
Quality Control (QC)	Routine application of specific actions required to provide information for the quality assurance program. Included are standardization, calibration, and replicate samples. QC is implemented at the field or bench level (Rand 1995, EPA 1996).
Quantitative	Descriptive of size, magnitude, or degree.
Reach	A stream section with fairly homogenous physical characteristics.
Reconnaissance	An exploratory or preliminary survey of an area.
Reference	A physical or chemical quantity whose value is known, and thus is used to calibrate or standardize instruments.
Reference Condition	1) A condition that fully supports applicable beneficial uses with little affect from human activity and represents the highest level of support attainable. 2) A benchmark for populations of aquatic ecosystems used to describe desired conditions in a biological assessment and acceptable or unacceptable departures from them. The reference condition can be determined through examining regional reference sites, historical conditions, quantitative models, and expert judgment (Hughes 1995).
Reference Site	A specific locality on a waterbody that is minimally impaired and is representative of reference conditions for similar water bodies.
Representative Sample	A portion of material or water that is as similar in content and consistency as possible to that in the larger body of material or water being sampled.
Resident	A term that describes fish that do not migrate.
Respiration	A process by which organic matter is oxidized by organisms, including plants, animals, and bacteria. The process converts organic matter to energy, carbon dioxide, water, and lesser constituents.
Riffle	A relatively shallow, gravelly area of a streambed with a locally fast current, recognized by surface choppiness. Also an area of higher streambed gradient and roughness.
Riparian	Associated with aquatic (stream, river, lake) habitats. Living or located on the bank of a waterbody.

Riparian Habitat Conservation Area (RHCA)	A U.S. Forest Service description of land within the following number of feet up-slope of each of the banks of streams: - 300 feet from perennial fish-bearing streams - 150 feet from perennial non-fish-bearing streams - 100 feet from intermittent streams, wetlands, and ponds in priority watersheds.
River	A large, natural, or human-modified stream that flows in a defined course or channel, or a series of diverging and converging channels.
Runoff	The portion of rainfall, melted snow, or irrigation water that flows across the surface, through shallow underground zones (interflow), and through ground water to creates streams.
Sediments	Deposits of fragmented materials from weathered rocks and organic material that were suspended in, transported by, and eventually deposited by water or air.
Settleable Solids	The volume of material that settles out of one liter of water in one hour.
Species	1) A reproductively isolated aggregate of interbreeding organisms having common attributes and usually designated by a common name. 2) An organism belonging to such a category.
Spring	Ground water seeping out of the earth where the water table intersects the ground surface.
Stagnation	The absence of mixing in a waterbody.
Stenothermal	Unable to tolerate a wide temperature range.
Stratification	An Idaho Department of Environmental Quality classification method used to characterize comparable units (also called classes or strata).
Stream	A natural water course containing flowing water, at least part of the year. Together with dissolved and suspended materials, a stream normally supports communities of plants and animals within the channel and the riparian vegetation zone.
Stream Order	Hierarchical ordering of streams based on the degree of branching. A first-order stream is an unforked or unbranched stream. Under Strahler's (1957) system, higher order streams result from the joining of two streams of the same order.
Storm Water Runoff	Rainfall that quickly runs off the land after a storm. In developed watersheds the water flows off roofs and pavement into storm drains that may feed quickly and directly into the stream. The water often carries pollutants picked up from these surfaces.

Stressors Physical, chemical, or biological entities that can induce adverse effects on ecosystems or human health.

Subbasin A large watershed of several hundred thousand acres. This is the name commonly given to 4th field hydrologic units (also see Hydrologic Unit).

Subbasin Assessment (SBA) A watershed-based problem assessment that is the first step in developing a total maximum daily load in Idaho.

Subwatershed A smaller watershed area delineated within a larger watershed, often for purposes of describing and managing localized conditions. Also proposed for adoption as the formal name for 6th field hydrologic units.

Surface Fines Sediments of small size deposited on the surface of a streambed or lake bottom. The upper size threshold for fine sediment for fisheries purposes varies from 0.8 to 605 mm depending on the observer and methodology used. Results are typically expressed as a percentage of observation points with fine sediment.

Surface Runoff Precipitation, snow melt, or irrigation water in excess of what can infiltrate the soil surface and be stored in small surface depressions; a major transporter of nonpoint source pollutants in rivers, streams, and lakes. Surface runoff is also called overland flow.

Surface Water All water naturally open to the atmosphere (rivers, lakes, reservoirs, streams, impoundments, seas, estuaries, etc.) and all springs, wells, or other collectors that are directly influenced by surface water.

Suspended Sediments Fine material (usually sand size or smaller) that remains suspended by turbulence in the water column until deposited in areas of weaker current. These sediments cause turbidity and, when deposited, reduce living space within streambed gravels and can cover fish eggs or alevins.

Taxon Any formal taxonomic unit or category of organisms (e.g., species, genus, family, order). The plural of taxon is taxa (Armantrout 1998).

Tertiary An interval of geologic time lasting from 66.4 to 1.6 million years ago. It constitutes the first of two periods of the Cenozoic Era, the second being the Quaternary. The Tertiary has five subdivisions, which from oldest to youngest are the Paleocene, Eocene, Oligocene, Miocene, and Pliocene epochs.

Thalweg The center of a stream’s current, where most of the water flows.

Threatened Species Species, determined by the U.S. Fish and Wildlife Service, which are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Total Maximum Daily Load (TMDL) A TMDL is a waterbody's loading capacity after it has been allocated among pollutant sources. It can be expressed on a time basis other than daily if appropriate. Sediment loads, for example, are often calculated on an annual bases. TMDL = Loading Capacity = Load Allocation + Waste Load Allocation + Margin of Safety. In common usage, a TMDL also refers to the written document that contains the statement of loads and supporting analyses, often incorporating TMDLs for several waterbodies and/or pollutants within a given watershed.

Total Dissolved Solids Dry weight of all material in solution in a water sample as determined by evaporating and drying filtrate.

Total Suspended Solids (TSS) The dry weight of material retained on a filter after filtration. Filter pore size and drying temperature can vary. American Public Health Association Standard Methods (Greenborg, Clescevi, and Eaton 1995) call for using a filter of 2.0 micron or smaller; a 0.45 micron filter is also often used. This method calls for drying at a temperature of 103-105 °C.

Toxic Pollutants Materials that cause death, disease, or birth defects in organisms that ingest or absorb them. The quantities and exposures necessary to cause these effects can vary widely.

Tributary A stream feeding into a larger stream or lake.

Trophic State The level of growth or productivity of a lake as measured by phosphorus content, chlorophyll *a* concentrations, amount (biomass) of aquatic vegetation, algal abundance, and water clarity.

Turbidity A measure of the extent to which light passing through water is scattered by fine suspended materials. The effect of turbidity depends on the size of the particles (the finer the particles, the greater the effect per unit weight) and the color of the particles.

Vadose Zone The unsaturated region from the soil surface to the ground water table.

Waste Load Allocation (WLA) The portion of receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. Waste load allocations specify how much pollutant each point source may release to a waterbody.

Waterbody A stream, river, lake, estuary, coastline, or other water feature, or portion thereof.

Water Column Water between the interface with the air at the surface and the interface with the sediment layer at the bottom. The idea derives from a vertical series of measurements (oxygen, temperature, phosphorus) used to characterize water.

Water Pollution Any alteration of the physical, thermal, chemical, biological, or radioactive properties of any waters of the state, or the discharge of any pollutant into the waters of the state, which will or is likely to create a nuisance or to render such waters harmful, detrimental, or injurious to public health, safety, or welfare; to fish and wildlife; or to domestic, commercial, industrial, recreational, aesthetic, or other beneficial uses.

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

Water Quality Criteria Levels of water quality expected to render a body of water suitable for its designated uses. Criteria are based on specific levels of pollutants that would make the water harmful if used for drinking, swimming, farming, or industrial processes.

Water Quality Limited A label that describes water bodies for which one or more water quality criterion is not met or beneficial uses are not fully supported. Water quality limited segments may or may not be on a 303(d) list.

Water Quality Limited Segment (WQLS) Any segment placed on a state's 303(d) list for failure to meet applicable water quality standards, and/or is not expected to meet applicable water quality standards in the period prior to the next list. These segments are also referred to as "303(d) listed."

Water Quality Management Plan A state or area-wide waste treatment management plan developed and updated in accordance with the provisions of the Clean Water Act.

Water Quality Modeling The prediction of the response of some characteristics of lake or stream water based on mathematical relations of input variables such as climate, stream flow, and inflow water quality.

Water Quality Standards State-adopted and EPA-approved ambient standards for water bodies. The standards prescribe the use of the waterbody and establish the water quality criteria that must be met to protect designated uses.

Water Table The upper surface of ground water; below this point, the soil is saturated with water.

Watershed 1) All the land which contributes runoff to a common point in a drainage network, or to a lake outlet. Watersheds are infinitely nested, and any large watershed is composed of smaller "subwatersheds." 2) The whole geographic region which contributes water to a point of interest in a waterbody.

Water Body Identification Number (WBID) A number that uniquely identifies a waterbody in Idaho ties in to the Idaho Water Quality Standards and GIS information.

Wetland	An area that is at least some of the time saturated by surface or ground water so as to support with vegetation adapted to saturated soil conditions. Examples include swamps, bogs, fens, and marshes.
Young of the Year	Young fish born the year captured, evidence of spawning activity.

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Appendix A. Unit Conversion Chart

Table UUU. Metric – English unit conversions

	English Units	Metric Units	To Convert
Distance	Miles (mi)	Kilometers (km)	1 mi = 1.61 km 1 km = 0.62 mi
Length	Inches (in) Feet (ft)	Centimeters (cm) Meters (m)	1 in = 2.54 cm 1 cm = 0.39 in 1 ft = 0.30 m 1 m = 3.28 ft
Area	Acres (ac) Square Feet (ft^2) Square Miles (mi^2)	Hectares (ha) Square m (m^2) Square km (km^2)	1 ac = 0.40 ha 1 ha = 2.47 ac 1 ft^2 = 0.09 m^2 1 m^2 = 10.76 ft^2 1 mi^2 = 2.59 km^2 1 km^2 = 0.39 mi^2
Volume	Gallons (g) Cubic Feet (ft^3)	Liters (L) Cubic m (m^3)	1 g = 3.78 L 1 L = 0.26 g 1 ft^3 = 0.03 m^3 1 m^3 = 35.3 ft^3
Flow Rate	Cubic Feet per Second (ft^3/sec)[1]	Cubic m per second (m^3/sec)	1 ft^3/sec = 0.03 m^3/sec 1 m^3/sec = ft^3/sec
Concentration	Parts per Million (ppm)	Milligrams per L (mg/L)	1 ppm = 1 mg/L[2]
Weight	Pounds (lb)	Kilograms (kg)	1 lb = 0.45 kg 1 kg = 2.20 lb
Temperature	Fahrenheit (°F)	Celsius (°C)	C = 0.55 (F-32) F = (Cx1.8)+32

Prepared by IDEQ-TFRO. [1]1 ft^3/sec = 0,65 million gallons per day; 1 million gallons per day is equal to 1.55 ft^3/sec. [2]The ratio of 1 ppm = 1 mg/L is approximate and is only accurate for water at a specific gravity of 1.000.

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Appendix B. State and Site-Specific Standards and Criteria

Appendix B summarizes the state of Idaho's general standards and criteria. Currently, there are no site-specific standards for the Big Wood River subbasin.

General Standards and Beneficial Uses

Water Quality Limited Segments

Water quality limited segments are streams (or segments of streams) "where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-based effluent limitations required by sections 301(b) and 306 of the Clean Water Act" (40 CFR §130.2(j) and 40 CFR §131.3(h)). IDAPA §58.01.02.003.117 supports this definition. The process to designate water quality limited segments is established by 40 CFR §180.7(b)(1) by USEPA. Under this process, such waters require a TMDL when certain specified pollution reduction requirements (identified in 40 CFR §130.7(b)(1)(i), (ii), and (iii)) are not stringent enough to implement water quality standards. Idaho Code §39-3602(27) defines the TMDL process "for a waterbody not fully supporting designated beneficial uses."

Toxic Substances and Nutrients

Pollutants may be toxic-based or nutrient-based. According to IDAPA §58.01.02.003.106, a **toxic substance** is "any substance, material or disease-causing agent, or a combination thereof, which after discharge to waters of the State and upon exposure, ingestion, inhalation or assimilation into any organism (including humans), either directly from the environment or indirectly by ingestion through food chains, will cause death, disease, behavioral abnormalities, malignancy, genetic mutation, physiological abnormalities (including malfunctions in reproduction) or physical deformations in affected organisms or their offspring." Toxic substances include, but are not limited to, the 126 priority pollutants identified by USEPA pursuant to §307(a) of the Clean Water Act. On the other hand, according to IDAPA 58.01.16.002.18, a **nutrient** is "any one of the natural elements including, but not limited to, carbon, hydrogen, oxygen, nitrogen, potassium, phosphorus, magnesium, sulfur, calcium, sodium, iron, manganese, copper, zinc, molybdenum, vanadium, boron, chlorine, cobalt and silicon, that are essential to plant and animal growth." IDAPA 16.01.02.003.67 defines nutrients as "the major substances necessary for the growth and reproduction of aquatic plant life, consisting of nitrogen, phosphorus, and carbon compounds."

Beneficial Uses

According to IDAPA §58.01.02.050.02.a, "wherever attainable, surface waters of the state shall be protected for **beneficial uses** which for surface waters includes all recreational use in and on the water surface and the preservation and propagation of desirable species of aquatic life." As defined in 40 CFR §131.3(f), "designated uses are those uses specified in water quality standards for each waterbody or segment whether or not they are being attained."

Surface water use designations are defined in IDAPA §58.01.02.100 and are to be protected wherever attainable. These designations include aquatic life (cold water biota, salmonid spawning, seasonal cold water, warm water, and modified), recreation (primary contact recreation and secondary contact recreation), water supply (domestic, agricultural, and industrial), wildlife habitats, and aesthetics. “The beneficial use is dependent upon actual use, the ability of the water to support a non-existing use either now or in the future, and its likelihood of being used in a given manner” (IDAPA §16.01.02.003.04).

According to IDAPA §58.01.02.101.01, surface waters not designated in the Big Wood River subbasin “shall be designated according to Idaho Code §39-3604 taking into consideration the use of the surface water and such physical, geological, chemical, and biological measures as may affect the surface water. Prior to designation, undesignated waters shall be protected for beneficial uses, which includes all recreational use in and on the water and the protection and propagation of fish, shellfish, and wildlife, wherever attainable.” IDEQ presumes by IDAPA §58.01.02.101.01.a that “most waters in the state will support cold water aquatic life and primary or secondary contact recreation beneficial uses.” Therefore, IDEQ will apply cold water aquatic life and primary and secondary contact recreation criteria to undesignated waters unless IDAPA §58.01.02.101.01.b and §58.01.02.101.01.c are followed.

As described in Idaho Code §39-3604 the determination of beneficial uses support status will take into consideration the use of the surface water and such physical, geological, chemical, and biological measures as may affect the surface water to ascertain the weight-of-evidence approach. Designated beneficial uses are those uses the State of Idaho chooses to protect for a given waterbody. The Clean Water Act indicates that the State of Idaho shall designate uses that include fishable and swimable goals. It should also take into account propagation of fish, shellfish, and wildlife, recreation in and on the water, and water supply uses. The State of Idaho is required to do a use attainability analysis when it cannot justify that fishable and swimable goals cannot be met if a waterbody is designated for uses that do not meet the goals of the Clean Water Act. Existing beneficial uses are those uses presently existing in the waterbody or those that were existing in the waterbody on or after November 28, 1975, although they may not be existing now. Existing uses are to be considered for designation since an existing use must be protected. Existing use decisions are based on data. Attainable uses are those beneficial uses that would be expected to be present in a waterbody if all point sources were controlled by technology-based limits and all nonpoint sources had appropriate best management practices in place to control pollution. Attainability decisions are often based on best professional judgement and not necessarily on data. The State of Idaho may demonstrate that attaining a use is not reasonably justified based on physical features or socio-economic situations, and may choose not to designate the attainable use.

Manmade Waterways

According to IDAPA §58.01.02.101.02, “manmade waterways are to be protected for the use for which they were developed” unless they are designated in IDAPA §58.01.02.150.21 for the Big Wood Subbasin. This applies to Magic Reservoir, which is a constructed manmade reservoir for water storage as described in §2.1.3.3. It is specifically listed, as Waterbody Unit Number US-3 and designated for cold water biota and primary contact recreation.

IDAPA §58.01.02.280.02 proposes to protect water quality in the Big Wood River as a canal system. It is recognized that the North Side Canal Company uses the waterway "for the purposes of conveying canal water and shall also be protected for that use." The segment runs on the Big Wood River from the point of union with the North Side Canal Company located at T5S, R15E, Section 31, downstream to the last irrigation diversion of the North Side Canal Company from the Malad River located in T6S, R13E, Section 25.

According to IDAPA §58.01.02.101.03, private waters include "lakes, ponds, pools, streams, and springs outside public lands but are located wholly and entirely upon a person's land." Private waters are not protected specifically or generally for any beneficial use unless they are designated in IDAPA §58.01.02.150.21 for the Big Wood Subbasin. At this time, and with the exception of the Magic Reservoir, there are no private waters that have designated beneficial uses in IDAPA for the Big Wood Subbasin.

Anti-degradation Policy

According to IDAPA §58.01.02.051.01 (The Anti-degradation Policy), there is maintenance of existing uses for all waters of the State. Thus, "the existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." Certain waterbodies of the Big Wood River subbasin have high quality waters. As part of the anti-degradation policy, if "the quality of the waters exceeds levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water," then "that quality shall be maintained and protected" (IDAPA §58.01.02.051.02). As a consequence, IDEQ "shall assure water quality adequate to protect existing uses fully" (IDAPA §58.01.02.051.02). A high quality water is a water that does not have "a measurable adverse change in a chemical, physical, or biological parameter of water relevant to a beneficial use, and which can be expressed numerically" (IDAPA §58.01.02.003.56). "Measurable change is determined by a statistically significant difference between sample means using standard methods for analysis and statistical interpretation appropriate to the parameter. Statistical significance is defined as the 95% confidence limit when significance is not otherwise defined for the parameter in standard methods or practices" (IDAPA §58.01.02.003.56). One provision of the antidegradation policy allows for "lower water quality" when it "is necessary to accommodate important economic or social development in the area in which the waters are located" (IDAPA §58.01.02.051.02). Under this provision, however, IDEQ "shall assure water quality adequate to protect existing uses fully."

Narrative Criteria

According to IDAPA §58.01.02.200, there are eight (8) general surface water quality criteria that apply to all surface waters of the State of Idaho. These criteria are beyond those that are set for specifically designated waters. Those criteria are hazardous materials; toxic substances; deleterious materials; radioactive materials; floating, suspended, or submerged matter; excess nutrients; oxygen-demanding materials; and, sediment.

Industrial and Agricultural Water Supply

According to IDAPA §58.01.02.100.03.b, all surface waters of the State of Idaho shall be protected for agricultural water supply. This includes the irrigation of crops or as drinking water for livestock. According to IDAPA §58.01.02.100.03.c, all surface waters of the State of Idaho shall be protected for industrial water supply.

Wildlife Habitat Modifications

It is IDEQ's position that habitat modification, while it may adversely affect beneficial uses, is not a pollutant per 303(d) of the Clean Water Act. There are no Idaho water quality standards for habitat, nor is it suitable for estimation of load capacity or load allocations. Because of these practical limitations, TMDLs will not be developed at this time that address habitat modification. However, IDAPA §58.01.02.233.01 stipulates that "water quality criteria for wildlife habitats will generally be satisfied by the general water quality criteria set forth in §200."

Flow Alteration

It is IDEQ's policy that flow alteration or flow modification, while it may adversely affect beneficial uses, is not a pollutant per 303(d) of the Clean Water Act. There are no Idaho water quality standards for flow, although it is suitable for estimation of load capacity or load allocations. Because of these practical limitations, TMDLs will not be developed at this time that address flow alteration or flow modification. However, in terms of the apportionment of water, IDAPA §58.01.02.050.01 states that the adoption of water quality standards and the enforcement of such standards are not intended to conflict or interfere:

1. With the apportionment of water to the State through any of the interstate compacts or court decrees.

2. With the rights of Idaho appropriators, either now or in the future, in the utilization of the water appropriations, which have been granted to them under the statutory procedure. This is supported by 40 CFR §131.4(a) such that the "water quality standards shall not be construed to supersede or abrogate rights to quantities of water."

3. With water quality criteria established by mutual agreement of the participants in the interstate water pollution control enforcement procedures.

Aesthetics

Aesthetics is considered a surface water classification and is applicable to all surface waters of the state (IDAPA §58.01.02.100.05). "Water quality criteria for aesthetics will generally be satisfied by the general water quality criteria set forth in Section 200 (IDAPA §58.01.02.250.05)." Section 200 of IDAPA covers general surface water quality criteria for hazardous materials; toxic substances; deleterious materials; radioactive materials; floating, suspended or submerged matter (does not imply suspended sediment); excess nutrients; oxygen-demanding materials; and sediment. Therefore, under the Big Wood River TMDL, aesthetics concerns are satisfied through IDAPA §58.01.02.200.

Sediment

IDAPA §58.01.02.200.08 states that "sediment shall not exceed quantities which impair designated beneficial uses." Determinations of impairment shall be based on water quality monitoring and surveillance. "Available data indicates sediment yields from rangelands are less than one (1) ton per acre (range 0.50 to 0.75 tons/acre). Much of this appears to come from steep and eroding channel banks and during high water runoff periods. Erosion from seriously overgrazed or burned ranges will occur if heavy rain should fall before vegetation re-growth or re-establishment occurs" (ISCC 1979). Erosion rate for undisturbed lands on the Idaho Batholith averages about 0.07 tons/mile^2/day (USEPA 1976 [p 176]).

Nutrients

"Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses" (IDAPA 58.01.02.200.06). The two most common nutrients that affect water quality are nitrogen (as nitrite+nitrate, or NOX) and phosphorus (as total phosphorus, or TP). In general, organic enrichment (or eutrophication) of a surface waterbody is the result of an excess of one or more of these nutrients, which tend to overwhelm the natural cycles. The excessive inputs, usually the result of human activity and development, appear to cause an imbalance in the "production versus consumption" of living material (biomass) in an ecosystem. The system reacts by producing more phytoplankton/vegetation than can be consumed by the ecosystem. Overproduction leads to a variety of problems ranging from anoxic waters (through decomposition) to toxic algal blooms and decreased diversity, food supply, and habitat destruction.

Numeric Criteria

The State of Idaho surface water IDAPA regulations or from scientific sources provide general estimates on water quality numeric criteria for sediment, nutrients, ammonia, dissolved oxygen, temperature, bacteria, and turbidity.

Ammonia

Ammonia is toxic to fish and has many effects. Fish mortality caused by ammonia may be due to different effects in different cases, and it is likely that ammonia has a different mode of action at high that at low concentrations (Rand and Petrocelli 1981 [pp 456-457]). Salmonid species are more susceptible to ammonia than are nonsalmonid species, at least on an acute toxicity basis. However, the ammonia levels of nonsalmonids are only slightly higher than for salmonids, suggesting that sensitivity differences between these groups are not large (Rand and Petrocelli 1981 [p 457]). The acute toxicity of ammonia towards fisheries has been shown to increase as pH decreases, and increases as the temperature decreases. Therefore, USEPA recommends no concentration greater than 0.020 mg/L of un-ionized ammonia. IDAPA §16.01.02.250.(02)(c)(iii) specifies an un-ionized fraction or a total ammonia criteria at selected water temperatures and pH values for protection of cold water biota.

Dissolved Oxygen

As a surface water quality criterion for cold water aquatic life, IDAPA §58.01.02.250.02.a stipulates that that dissolved oxygen should exceed 6 mg/L at all times. This criterion does not apply to lakes and reservoirs where (1) the bottom 20% of water depth in natural lakes and reservoirs where depths are 35 m or less, (2) the bottom seven (7) m of water depth in natural lakes and reservoirs where depths are greater than 35 m, or (3) those waters of the hypolimnion in stratified lakes and reservoirs. IDAPA §58.01.02.276 further states that "waters discharged from dams, reservoirs, and hydroelectric facilities shall not be subject to the provisions of Subsection 250.02.a or 250.02.e.i." The following shall apply to all waters below dams, reservoirs, and hydroelectric facilities "as far downstream as the point of measurement as defined in Subsection 276.05:

June 15 – October 15
30-day Mean = 6.0 mg/L DO
7-day Mean Minimum = 4.7mg/L DO
Instantaneous Minimum = 3.5 mg/L DO

Downstream of that point of measurement, all discharges to the waters shall be subject to the provisions of Subsections 250.02.1 or 250.02.e.i" (IDAPA §58.01.02.276.01).

"Modifications of existing facilities or new facilities are subject to the provisions of Subsection 276.02 unless the state has documented the existence of significant fish spawning areas below the facility. If such areas exist, then waters below those facilities shall contain the dissolved oxygen concentrations shown" in the previous table for cutthroat trout for the annual time period of July 1 through October 15 (IDAPA §58.01.02.276.03). For cold water salmonid spawning, IDAPA §58.01.02.250.02.e stipulates that water-column dissolved oxygen of a one-day minimum of not less than 6.0 mg/L. Intergravel dissolved oxygen of one day minimum of not less than 5.0 mg/L, or a seven day average mean of not less than 6.0 mg/L.

Temperature

The current IDEQ policy on stream temperature TMDLs is that they won't be undertaken until such time that a thorough scientific review of the temperature standards takes place. This is to occur before 2002. IDAPA §58.01.02.250(02)(c)(ii) states that waters designated for cold water biota are to exhibit water temperatures of 22°C or less (daily maximum) with a maximum daily average of no greater than 19°C. For salmonid spawning, IDAPA §58.01.02.250(02)(d)(ii) states that waters so designated are to exhibit water temperatures of 13°C or less (daily maximum) with a maximum daily average of no greater than 9°C. The National Academy of Sciences has listed rainbow and brook trout (adults and juveniles) the maximum weekly average temperature for summer growth as 19°C, and the short-term maximum temperature limit for summer survival as 24°C. The average weekly maximum temperature is reported as 9°C and 13°C as the short-term maximum for survival of their embryos (USEPA 1986; USDA FS 1990 [p 11]). IDAPA 58.01.02.080.04 provides for a temperature exemption such that a water quality standard violation does not occur "when the air temperature exceeds the ninetieth percentile of the seven (7) day average daily maximum air temperature calculated in yearly series over the historic record measured at the nearest weather reporting station."

Stream temperatures in the Big Wood River subbasin are predominantly temperatures that fit the cold water biota and salmonid spawning criteria. However, some streams have temperatures that exceed the standard criteria for and allow for the presence of fish populations that include warm water species. IDFG has the statutory authority (Idaho Code §36-103) to preserve, protect, perpetuate, and manage all wildlife, including all wild animals, wild birds, and fish, within the state of Idaho and to manage a waterbody according to the fishery type present. That fishery type includes cold water (for salmonids), warmwater (for warmwater or coolwater fisheries), mixed (for cold water and warmwater), and anadromous fisheries (for anadromous salmonids). The IDFG manages the Big Wood River and all its tributaries according to the fishery present. It should be noted that rainbow trout and brown trout exist in both cold water and mixed fishery types.

Bacteria and Recreational Standards

Waterbodies designated for primary or secondary contact recreation are based on *Escherichia coli* (*E. coli*) levels. According to IDAPA §58.01.02.251.01, "waters designated for primary contact recreation are not to contain *E. coli* bacteria significant to the public health in concentrations exceeding a single sample of 406 *E. coli* organisms per 100 mL" of sample. If an instantaneous sample exceeds 406, then a geometric mean not greater than 126 E. coli organisms per 100 mL based on a minimum of five (5) samples taken every three (3) to five (5) days over a thirty (30) day period shall be the determinant. For secondary contact recreation, the instantaneous value should not exceed 576 *E. coli* organisms per 100 mL. If so, then a geometric mean similar to primary contact recreation should not exceed 126 *E. coli* organisms per 100 mL. IDAPA 58.01.02.080.03 provides for a bacteria "exemption" when a single sample exceeding an *E. coli* standard. "Additional samples shall be taken for the purpose of comparing the results to the geometric mean criteria" as defined in IDAPA 58.01.02.251. Any discharger responsible for providing samples or IDEQ shall take five (5) additional samples as defined in IDAPA 58.01.02.251.

Turbidity

By definition, turbidity and sediment concentrations are closely intertwined. A turbidity standard can be used to address the effects of turbidity as an optical property of water and as an indicator of suspended sediment concentrations (Lloyd 1987 [p 38]). Increases in both turbidity and suspended sediment have been associated with reduced light penetration, decreased production and abundance of plant production, decreased fish food organisms, aesthetics, and decreased fish production and abundance (Lloyd 1987; USDA NRCS 1991 [p 120]). IDAPA §58.01.02.250.02.c.iv for cold water biota states that "turbidity, below any applicable mixing zone set by the Department, shall not exceed background turbidity by more than fifty (50) NTU instantaneously or more than twenty-five (25) for more than ten (10) consecutive days.” For point source treatment requirements, IDAPA §58.01.02.401.03.b states that “the wastewater must not increase the turbidity of the receiving water outside the mixing zone by (i) more than five (5) NTU over background turbidity, when background turbidity is fifty (50) or less; or, (ii) more than ten percent (10%) increase in turbidity when background turbidity is more than fifty (50) NTU, not to exceed a maximum increase of twenty-five (25) NTU.”

Appendix C. Data Sources

Appendix C summarizes the data sources used to develop the Big Wood River Watershed Management Plan. These data sources are summarized here but are distinctly found in two documents within IDEQ-TFRO. The first document is the actual administrative record. Within this multi-notebook 3-ring bound documents are hard copies of the numerous sources used. The second document is an electronic library of electronic files (as text files, Excel files, and MS Word files) developed by the author for the watershed management plan. Once approved by USEPA, these electronic files will be downloaded and copied to a CD writeable disk and included in the administrative record. The administrative record is made up of the Wood River Watershed Advisory Group minutes, the Wood River Executive Board minutes, the Wood River Technical Advisory Committee minutes, the numerous technical support documents, and additional sources and documents used.

Table VVV summarizes the technical support documents used in developing the Big Wood River Watershed Management Plan.

Table VVV. Data sources for Big Wood River Subbasin Assessment.

Waterbody	Data Source	Type of Data	When Collected
Mainstem Big Wood River			
Big Wood River	USFS–TF	Archival Water Quality Data Record	1971
BWR - Galena	IDEQ-TFRO	Water Quality Protection	2000
BWR – Owl Creek	IDEQ-TFRO	Water Quality Protection	2000
BWR – Baker Creek	IDEQ-TFRO	Water Quality Protection	2000
Big Wood River	Minshall, ISU	Water Quality Data	1972-1977
Big Wood River	IDEQ-TFRO	Water Quality Protection	1972-1977
Big Wood River	USBOR	Water Quality Data	1972-1977
Big Wood River	Parametrix	Water Quality Data	1972-1977
BWR – Trail Creek	IDEQ-TFRO	Water Quality Protection	2000
Big Wood River	USGS	Water Year Flow Data	1914-2000
BWR-Warm Springs	IDEQ-TFRO	Water Quality Protection	2000
BWR-East Fork Rd	IDEQ-TFRO	Water Quality Protection	2000
Big Wood River	USGS	Water Quality Data	1974
Big Wood River	USGS	Water Quality Data	1977
Big Wood River	USGS	Water Quality Data	1992
Big Wood River	USGS	Water Quality Data	1994
Big Wood River	USGS	Water Quality Data	1996
Big Wood River	USGS	Water Quality Data	1997
BWR-Glendale Brid	IDEQ-TFRO	Water Quality Protection	2000
Big Wood River	USGS	Water Quality Data	1999
BWR-Stanton Cross	IDEQ-TFRO	Water Quality Protection	2000
BWR-Magic Res	IDEQ-TFRO	Water Quality Protection	2000
BWR-Richfield Div	IDEQ-TFRO	Water Quality Protection	2000
BWR-Highway 75	IDEQ-TFRO	Water Quality Protection	2000
Malad River	IDEQ-TFRO	Water Quality Protection	2000
Malad River	FERC	Malad High Drop Project No. 3924	1990

Malad River	USGS	Water Quality Data	1973
Malad River	USGS	Water Quality Data	1974
Malad River	USGS	Water Quality Data	1977
Malad River	USGS	Water Year Water Quality Data	1990
Malad River	Brockway *et al.*	Phase I Study, Appendix C-71	1992
Malad River	USGS	Water Quality Data	1997
Malad River	USGS	Water Year Flow Data	1991
Malad River	USGS	Water Year Flow Data	1992
Malad River	USGS	Water Quality Data	1993
Malad River	USGS	Water Quality Data	1994
Malad River	USGS	Water Quality Data	1995
Malad River	USGS	Water Quality Data	1996
Malad River	USGS	Water Quality Data	1997
Malad River	IDWR & USGS	Unpublished SRB Adjudication	1996
Big Wood River	IDFG – Jerome	Fish – Presence or Absence	1993
Big Wood River	IDFG – Jerome	Fish – Presence or Absence	1991
Big Wood River	IDFG – Jerome	Fish – Presence or Absence	1996
Big Wood River	IDEQ – TFRO	BURP Fish Data	1996
Big Wood River	IDEQ – TFRO	BURP Fish Data	1991
Big Wood River	IDEQ – TFRO	BURP Fish Data	1993
Big Wood River	IDEQ – TFRO	BURP Fish Data	1996
Tributaries or Tributary Segments			
Horse Creek	IDEQ-TFRO	BURP Database	1999
Horse Creek	IDEQ-TFRO	Water Quality Protection	2000
Horse Creek	USFS – TF	Archival Water Quality Data Record	1971
Owl Creek	IDEQ-TFRO	Water Quality Protection	2000
Owl Creek	USFS – TF	Archival Water Quality Data Record	1971
Owl Creek	IDEQ-TFRO	BURP Database	1999
Baker Creek	IDEQ-TFRO	Water Quality Protection	2000
Baker Creek	IDEQ-TFRO	BURP Database	1998
Baker Creek	USFS – TF	Archival Water Quality Data Record	1971
N Fork Wood River	IDEQ-TFRO	Water Quality Protection	2000
Eagle Creek	USFS – TF	Archival Water Quality Data Record	1971
Eagle Creek	IDEQ-TFRO	Water Quality Protection	2000
Lake Creek	USFS – TF	Archival Water Quality Data Record	1971
Lake Creek	IDEQ-TFRO	Water Quality Protection	2000
Trail Creek	USFS – TF	Archival Water Quality Data Record	1971
Trail Creek	IDEQ-TFRO	Water Quality Protection	2000
Warm Springs Ck	IDEQ-TFRO	Water Quality Protection	2000
Placer Creek	USFS – TF	Archival Water Quality Data Record	1971
Placer Creek	IDEQ-TFRO	Water Quality Protection	2000
Elkhorn Creek	IDEQ-TFRO	Water Quality Protection	2000
E Fork Wood River	IDEQ-TFRO	Water Quality Protection	2000
E Fork Wood River	USFS – TF	Archival Water Quality Data Record	1971
Hyndman Creek	IDEQ-TFRO	Water Quality Protection	2000
Cove Creek	IDEQ-TFRO	Water Quality Protection	2000
Cove Creek	Minshall, ISU	Water Quality Data	1972-1977
Cove Creek	IDEQ-TFRO	Water Quality Protection	1972-1977
Greenhorn Gulch	IDEQ-TFRO	Water Quality Protection	2000
Croy Creek	IDEQ-TFRO	Water Quality Protection	2000
Croy Creek	Minshall, ISU	Water Quality Data	1972-1977
Croy Creek	IDEQ-TFRO	Water Quality Protection	1972-1977

Croy Creek	IDEQ-TFRO	BURP Database	1995
Croy Creek	IDEQ-TFRO	BURP Database	1999
Quigley Creek	IDEQ-TFRO	Water Quality Protection	2000
Quigley Creek	Minshall, ISU	Water Quality Data	1972-1977
Quigley Creek	IDEQ-TFRO	Water Quality Protection	1972-1977
Seamans Creek	IDEQ-TFRO	Water Quality Protection	2000
Seamans Creek	Minshall, ISU	Water Quality Data	1972-1977
Seamans Creek	IDEQ-TFRO	Water Quality Protection	1972-1977
Rock Creek	IDEQ-TFRO	Water Quality Protection	2000
Rock Creek	Minshall, ISU	Water Quality Data	1972-1977
Rock Creek	IDEQ-TFRO	Water Quality Protection	1972-1977
Little Rock Creek	IDEQ-TFRO	Water Quality Protection	2000
Smiths Creek	IDEQ-TFRO	Water Quality Protection	2000
Guy Canyon	IDEQ-TFRO	Water Quality Protection	2000
Dry Gulch	IDEQ-TFRO	Water Quality Protection	2000
Hatty Gulch	IDEQ-TFRO	Water Quality Protection	2000
Kent Canyon	IDEQ-TFRO	Water Quality Protection	2000
Long Gulch	IDEQ-TFRO	Water Quality Protection	2000
E Fork Rock Creek	IDEQ-TFRO	Water Quality Protection	2000
Camas Creek	IDEQ-TFRO	Water Quality Protection	2000
Lava Canyon Creek	IDEQ-TFRO	Water Quality Protection	2000
Richfield Canal	IDEQ-TFRO	Water Quality Protection	2000
Thorn Creek	IDEQ-TFRO	Water Quality Protection	2000
Schooler Creek	IDEQ-TFRO	Water Quality Protection	2000
Preacher Creek	IDEQ-TFRO	Water Quality Protection	2000
N Gooding Main C	IDEQ-TFRO	Water Quality Protection	2000
Dry Creek	IDEQ-TFRO	Water Quality Protection	2000
Little Wood River	IDEQ-TFRO	Water Quality Protection	2000
Baker Creek	IDEQ – TFRO	BURP Fish Data	1993
Baker Creek	IDEQ – TFRO	BURP Fish Data	1995
E Fork Wood River	IDFG – Jerome	Fish – Presence or Absence	1996
Hyndman Creek	IDFG – Jerome	Fish – Presence or Absence	1996
Castle Creek	IDEQ – TFRO	BURP Fish Data	1995
Deer Creek	IDEQ – TFRO	BURP Fish Data	1993
Hyndman Creek	IDFG – Jerome	Fish – Presence or Absence	1993
Greenhorn Gulch	IDEQ – TFRO	BURP Fish Data	1995
N Fork Wood River	IDEQ – TFRO	BURP Fish Data	1996
Baker Creek	IDEQ-TFRO	BURP Fish Data	1993
Baker Creek	IDEQ-TFRO	BURP Fish Data	1995
Boulder Creek	IDEQ-TFRO	BURP Fish Data	1995
Deer Creek	IDEQ-TFRO	BURP Fish Data	1993
Eagle Creek	IDEQ-TFRO	BURP Fish Data	1995
East Fork Wood River	IDFG - Jerome	Fish – Presence or Absence	1996
Horse Creek	IDEQ-TFRO	BURP Fish Data	1995
Horse Creek	IDEQ-TFRO	BURP Fish Data	1996
Lake Creek	IDEQ-TFRO	BURP Fish Data	1995
N Fork Wood River	IDEQ-TFRO	BURP Fish Data	1996
Owl Creek	IDEQ-TFRO	BURP Fish Data	1996
Quigley Creek	IDEQ-TFRO	BURP Fish Data	1995
Senate Creek	IDEQ-TFRO	BURP Fish Data	1996
Slaughterhouse Creek	IDEQ-TFRO	BURP Fish Data	1995
Trail Creek	IDEQ-TFRO	BURP Fish Data	1996

Warm Springs Creek	IDEQ-TFRO	BURP Fish Data	1993
Other Sources			
Big Wood River	IGS	Mines of the Big Wood River Subbasin	1998
Croy Creek	IGS	Mines of the Big Wood River Subbasin	1998
Eagle Creek	IGS	Mines of the Big Wood River Subbasin	1998
East Fork Wood River	IGS	Mines of the Big Wood River Subbasin	1998
Greenhorn Gulch	IGS	Mines of the Big Wood River Subbasin	1998
Horse Creek	IGS	Mines of the Big Wood River Subbasin	1998
Lake Creek	IGS	Mines of the Big Wood River Subbasin	1998
Quigley Creek	IGS	Mines of the Big Wood River Subbasin	1998
Rock Creek	IGS	Mines of the Big Wood River Subbasin	1998

Prepared by IDEQ-TFRO. BWR = Big Wood River. USFS – TF = US Forest Service – Twin Falls office. ISU = Idaho State University at Pocatello, Idaho. USBOR = US Bureau of Reclamation. Warm Springs = Warm Springs Creek. Brid = Bridge. Cross = Crossing. USGS = US Geological Survey. Res = Reservoir. Div = Diversion. Brockway *et al.* = Brockway and Robison. IDWR = Idaho Department of Water Resources. SRB = Snake River Basin. N = North. Ck = Creek. E = East. N Gooding Main C = North Gooding Main Canal. IGS = Idaho Geological Survey.

Appendix D. A Rivermile Index of the Big Wood River system

Table WWW summarizes in detail the cartographic rivermile distribution of the Big Wood River and its tributaries. USGS topographic quadrangle maps of the Big Wood River system were utilized as the main source of documentation for ascertaining inputs and outputs to the system. IDEQ-TFRO did ground truthing of sites. Rivermiles were estimated using a Silva® hand cartographic roller at the 1:24,000 scale. Several quadrangle maps showed variant rivermiles and are corrected in this appendix. Such variants are due to updating flaws that were not incorporated in the various updated quadrangle maps. Suggestions for updating this appendix are encouraged and appreciated by IDEQ-TFRO. For purposes of interpretation, when looking downstream the left side is considered the left bank, the right side is considered the right bank.

Table WWW. Rivermile index of the Big Wood River system

River mile (RM)	RIGHT BANK	LEFT BANK	ELEVATION feet above sea level	QUADRANGLE MAP 1:24,000
0.0	Malad River confluence to Middle Snake River		2734	Hagerman, Idaho
0.15	USGS 13153500		2750	
0.45	Highway 30 (“Bliss-Hagerman Highway”)		2875	
0.65	**USGS 13152940**: Flume		2875	
0.75	Spring		2900	
1.0	Diversion Dam: Flume		2900	
1.0	King Hill Main Canal (output)		2900	
1.95		Ditch (input)	3040	Tuttle, Idaho
2.0			3045	
2.65	Interstate 84 (“Twin Falls-Boise Highway”)		3270	
2.7	Union Pacific Railroad		3270	
3.0			3275	
3.2		Ditch (output)	3280	
3.3	Ditch (output)		3285	
4.0			3290	
4.45		Mine	3300	
4.55	Mine		3310	
4.6		Mine	3310	
4.7	Mine		3320	
4.8		Ditch (input)	3320	
4.95	Mine	Mine	3320	
5.0	Mine		3320	
5.05	Mine		3320	
5.15	Mine		3320	
5.2	Mine		3320	
5.25	Mine		3320	
5.5		Ditch (output)	3330	
6.0			3340	
6.2		Ditch (input)	3360	
6.6		Ditch (input)	3360	

River mile (RM)	RIGHT BANK	LEFT BANK	ELEVATION feet above sea level	QUADRANGLE MAP 1:24,000
6.8	USGS 13152500		3360	
7.0	Braided (input)		3360	
7.3		Ditch (input)	3380	
8.0		Ditch (input)	3380	
8.3	Braided (output) + Dam		3380	
9.0			3380	
9.2		Unnamed (input)	3380	
9.8	Interstate 26 ("Bliss-Gooding Highway")		3380	
10.0			3400	
11.0			3420	
11.6		Powerhouse (Little Wood River)	3430	
11.7	Braided channel (input)	Penstock	3440	
12.0			3480	
12.3	Braided channel (input)		3480	
13.0			3480	
13.8	Dry Creek (input)		3500	
13.9	Diversion Dam (output)		3500	
14.0			3500	
15.0			3500	
15.1		Ditch	3510	Gooding, Idaho
15.6	Dam		3520	
15.6		Ditch	3520	
16.0		Gravel pits	3530	
16.6		Clover Creek (= X Canal)	3540	
17.0			3540	
17.05	Dam		3540	
17.5	Highway 46 (*Gooding*; "Wendell-Gooding Highway")		3540	
18.0			3540	
18.9	Dam (Ditch)		3570	
19.0			3570	
19.2		Ditch.	3580	
20.0			3600	
21.0			3620	
21.1	Flume (Poorman Ditch)	Ditch	3635	
21.2	Ditch		3640	
21.9	Dam (Ditch)		3650	
22.0			3650	
23.0			3660	
23.4	Dam (Ditch)		3690	
23.6	Ditch + Ditch		3690	
23.7	Diversion Dam		3710	Thorn Creek SE, Idaho
24.0			3720	
24.2	Thorn Creek		3720	
24.2	Robertson Ditch		3720	
25.0			3740	Tunupa, Idaho
26.0			3750	
27.0			3770	
28.0			3790	
29.0			3800	

River mile (RM)	RIGHT BANK	LEFT BANK	ELEVATION feet above sea level	QUADRANGLE MAP 1:24,000
30.0			3810	
31.0			3830	
31.5	Ditch		3840	Shoshone, Idaho
32.0			3870	
32.2	Ditch		3870	
32.25	Ditch		3870	
32.3	Ditch		3870	
32.4	Ditch		3880	
33.0			3890	
33.6	Unnamed		3900	
33.7	Flume		3900	
33.7	Unnamed		3900	
34.0			3900	
34.8	Flume (Milner Gooding Canal)		3940	
35.0			3950	
35.2	Unnamed		3950	
35.5	Unnamed		3960	
36.0			3980	
36.25	Unnamed		3990	
36.5	Highway 75 (*Shoshone*; “Shoshone-Bellevue Highway”)		3990	
36.9	Unnamed		4000	
37.0			4000	
37.3	Unnamed		4000	
37.4	Unnamed		4010	Dietrich, Idaho
38.0			4020	
39.0			4050	
40.0			4070	Kinzie Butte, Idaho
40.05	Braided Input		4080	
41.0	Braided Output		4100	
41.2		Unnamed	4110	
41.6		Unnamed	4130	
42.0			4150	
43.0			4200	
43.5	Footbridge		4240	
44.0			4260	
44.6		Unnamed	4290	
44.9		Unnamed	4290	
45.0			4300	
45.8	Dam (North Shoshone Canal + Lincoln Bypass Canal)		4350	
45.8		Ditch	4350	
46.0			4370	
47.0			4410	
47.4		Unnamed	4420	
47.9		Unnamed	4440	
48.0			4440	
49.0	Siphon		4460	
50.0			4470	
50.3	Unnamed		4480	
50.4	Unnamed		4490	

River mile (RM)	RIGHT BANK	LEFT BANK	ELEVATION feet above sea level	QUADRANGLE MAP 1:24,000
51.0			4510	Shoshone Ice Cave, Idaho
51.05	Unnamed		4500	
51.1		Unnamed	4500	
51.3-51.8	Gravel Pit		4500	
51.7		Unnamed	4500	
52.0			4500	
52.7	Siphon		4510	
53.0			4520	
53.6-53.9	Gravel Pit		4570	
53.9	Ditch	Ditch	4570	
54.0			4570	
54.6	Diversion Dam		4570	
54.6	Lincoln Bypass Canal	Canal output (Cottonwood Slough)	4570	
55.0			4570	
55.7		Unnamed	4580	
56.0			4590	
56.5	Highway 75 (“Shoshone-Bellevue Highway)		4600	
56.1		Unnamed	4600	
56.9	Braided Section		4610	
57.0			4620	
57.05	Braided Section	Braided Section	4620	
57.5		Braided Section	4650	
58.0			4650	
58.5		Ditch (Connects Richfield Canal)	4660	
58.9	Unnamed	Diversion Dam (Ditch)	4680	
59.0			4680	
59.05	Unnamed		4680	
59.1	Unnamed		4680	
59.25		Unnamed	4680	
59.8		Unnamed (Culvert Reservoir)	4690	
59.9	Unnamed		4690	
59.95	Unnamed		4690	
60.0			4690	
60.4		Unnamed (Trestle Reservoir)	4690	
61.0	USGS 13142500		4690	
61.3			4700	Magic Reservoir East, Idaho
61.5	Magic Reservoir: Spillway Discharge **USGS 13142000**: usable contents and bank storage		4797	
62.0	Magic Reservoir1 West Side	East Side	4800	
62.05	Unnamed		4800	
62.15	Unnamed (Reservoir)		4800	
62.8		Unnamed	4800	
63.0	Magic Reservoir West Side	East Side	4800	

River mile (RM)	RIGHT BANK	LEFT BANK	ELEVATION feet above sea level	QUADRANGLE MAP 1:24,000
63.4		Calhoun Spring	4945	
63.4	Unnamed		4800	
63.4-63.7	Magic Resort		4800-4830	
63.5		Unnamed Spring	4930	
63.8	Unnamed		4800	
64.0	Magic Reservoir West Side	East Side	4800	
64.0		Magic City	4800-4900	
64.05	Pofferman Spring		4800	
64.1	Unnamed		4800	
64.15	Unnamed		4800	
64.2	Lava Canyon Creek (7 springs)		4800	
64.4	Unnamed		4800	
64.5	Unnamed		4800	
65.0	Magic Reservoir West Side	East Side	4800	Magic Reservoir West, Idaho
65.05		Unnamed	4800	
65.2		Clay Bank Spring	4800	
65.25		Unnamed Spring	4800	
65.4	Metcalf Spring		4800	
65.5	Unnamed	Unnamed	4800	
66.0	Magic Reservoir West Side	East Side	4800	
66.6		Unnamed	4800	
66.9	Camas Creek		4800	
67.0		Unnamed	4800	
67.2	Unnamed (1 spring)		4800	
67.65	Magic Reservoir: NE Boundary		4800	
67.65	Rock Creek (Blaine County)		4800	
68.0			4800	Magic Reservoir East, Idaho
68.25		Unnamed	4800	
68.4		Unnamed	4800	
68.8	Unnamed (1 spring); **USGS 1314100**, "Sheep Bridge" site.		4800	
69.0			4820	
69.4	1 Spring + Unnamed		4820	
69.8		Martin Spring + Unnamed	4820	
69.9		Unnamed	4820	
69.95	USGS 13140800**: Big Wood River at Stanton Crossing**		4820	
70.0			4820	
70.1		Unnamed	4820	
70.4		Unnamed	4820	
70.6		Willow Creek (+ Spring Creek)	4820	
71.0			4840	

River mile (RM)	RIGHT BANK	LEFT BANK	ELEVATION feet above sea level	QUADRANGLE MAP 1:24,000
71.15	Highway 20 (Stanton Crossing; "Fairfield Highway")		4840	
71.6	Unnamed		4860	
71.9		Black Slough (input)	4855	
72.0			4880	
73.0			4890	
74.0			4810	
74.5		Black Slough (output)	4930	
75.0		Unnamed	4940	
75.55	Unnamed		4960	Bellevue, Idaho
75.65		Unnamed	4960	
75.8	Unnamed	Unnamed	4960	
76.0	Unnamed		4960	
76.05		Unnamed	4960	
76.1	Unnamed		4960	
76.2	Unnamed	Unnamed	4960	
76.25	Unnamed		4960	
76.3	Unnamed		4960	
76.35		Unnamed	4960	
76.4	Unnamed	Unnamed	4960	
76.7		Unnamed	4960	
76.95		Unnamed	4960	
77.0			5000	
77.15		Unnamed	5000	
77.25-78.0	Gravel Pits		5000-5020	
77.3	Unnamed		5000	
77.5		Unnamed	5010	
77.55		Unnamed	5010	
77.65		Unnamed	5010	
77.7	Unnamed		5010	
77.8	Unnamed		5010	
78.0			5030	
78.1	Unnamed		5030	
78.2	Unnamed		5030	
78.45	Unnamed		5040	
78.6		Unnamed	5040	
78.7	Unnamed		5050	
78.8		Unnamed	5050	
78.9		Unnamed	5050	
78.95	Unnamed		5055	
79.0			5055	
79.15		3 Unnamed	5060	
79.3	Glendale Bridge		5072	
79.35		Bypass Canal	5070	
79.5	Glendale Canal (Poverty Flat)		5140	
79.55	Canal		5140	
79.6		Unnamed	5140	
80.0			5140	
80.05	Dipper Gulch		5140	

River mile (RM)	RIGHT BANK	LEFT BANK	ELEVATION feet above sea level	QUADRANGLE MAP 1:24,000
80.65	Unnamed		5140	
80.8	Unnamed		5140	
81.0			5140	
82.0			5140	
82.3		District Canal # 45 (*Bellevue, ID*)	5150	
83.0			5180	
83.6	Unnamed		5200	
84.0		City of Hailey POTW discharge	5205	
84.75		Unnamed	5225	
85.0			5235	
85.1		Unnamed	5250	
85.9	Colorado Gulch		5280	
86.0			5280	
86.8		Cove Canal	5280	
87.0			5280	
87.25		Ditch	5280	
87.4	Croy Creek [*Hailey, ID*]		5300	
87.75	**USGS 13139500** [*Hailey, ID*]		5310	
88.0			5320	
88.65		Justus Ditch	5340	
88.85		2 Springs + Unnamed	5350	
89.0			5360	
89.1		Ditch	5360	
89.45		Ditch	5360	
90.0			5380	
90.1		Ditch	5390	
90.4	Deer Creek + Osborn Gulch		5400	
90.85	Deer Creek		5420	
91.0			5420	
91.15	Unnamed		5440	
91.75		Ditch	5460	
91.85		Ditch	5460	
92.0	Unnamed		5480	Hailey, Idaho
92.05	Unnamed		5485	
92.55		Unnamed	5505	
92.7		Unnamed	5505	
92.2		Braided Segment (Hiawatha Canal)	5500	
92.85	Greenhorn Gulch		5510	
93.0			5520	
93.5		Mizer Ditch	5560	
93.5	Highway 93		5560	
93.9		East Fork Wood River [*Gimlet*]	5560	
94.0			5560	
94.2		Braided Segment	5565	
94.3	Braided Segment		5570	

River mile (RM)	RIGHT BANK	LEFT BANK	ELEVATION feet above sea level	QUADRANGLE MAP 1:24,000
94.35		Braided Segment	5575	
94.4		Braided Segment	5580	
94.6		Braided Segment	5585	
94.75		Braided Segment	5590	
94.9	Braided Segment	Braided Segment	5595	
95.0			5600	
95.3		Braided Segment	5600	
95.4		Braided Segment	5600	
95.75		Unnamed	5600	
95.8		The Meadows STP Discharge	5610	
95.95		Unnamed	5620	
96.0			5620	
97.0			5680	
97.05		Unnamed (Elkhorn Gulch)	5680	Sun Valley, Idaho
97.1	Comstock Ditch		5740	
97.5	Highway 93		5750	
97.75	Small Bridge		5750	
98.0			5760	
98.05	Braided Section		5760	
98.15	Braided Section		5760	
98.7		Trail Creek [*Sun Valley/ Ketchum*]	5770	
98.95	Unnamed		5780	
99.0		City of Ketchum Discharge	5780	
99.7	Braided		5790	
99.9	Braided		5790	
100.0			5800	Griffin Butte, Idaho
100.05	Warm Springs Creek		5800	
100.1		Braided	5800	
101.0			5830	
101.2		Unnamed	5840	
101.75	Adams Gulch		5920	Sun Valley, Idaho
102.0			5920	
102.1		Unnamed	5920	
103.0			5960	
103.4	Lake Creek		5960	
104.0			6000	
104.5	Unnamed		6040	Griffin Butte, Idaho
104.55	Unnamed		6040	
105.0			6040	
105.1		Dip Creek	6040	
105.95	Fox Creek		6080	
106.0			6120	
106.7		Eagle Creek	6120	
106.9	Unnamed		6160	
107.0			6160	
107.3		Unnamed	6160	

Amber Lakes,
Idaho

River mile (RM)	RIGHT BANK	LEFT BANK	ELEVATION feet above sea level	QUADRANGLE MAP 1:24,000
107.65	Oregon Gulch		6200	
107.8		Leroux Creek	6200	
107.9		Unnamed	6240	
108.0	North Fork Campground	North Fork Big Wood River	6240	
108.05	Highway 93		6240	
108.25		Headquarters Canyon	6240	
108.3		USGS 13135500	6240	
109.0			6280	
110.0	Big Wood Campground		6360	
110.65		Konrad Creek	6400	
110.8		Goat Creek	6400	
110.9		Unnamed	6400	
111.0			6400	
111.2		Unnamed	6400	
111.25	Braided Section		6400	
111.3		Dry Canyon	6400	
111.6	Braided Section		6440	
111.7	Kendall Gulch		6440	
111.75		Unnamed	6440	
112.0			6440	
112.65		Boulder Creek	6480	
112.75	Unnamed		6480	
113.0			6480	
113.75	Unnamed		6560	Easley Hot Springs, Idaho
113.9		Unnamed	6560	
114.0			6560	
114.2		Unnamed	6560	
114.45		Unnamed	6560	
114.5	Unnamed		6560	
115.0			6600	
115.2		Easley Creek	6600	
115.3	Easley Gulch		6600	
115.65	Unnamed		6640	
115.8	Highway 93		6640	
116.0			6640	
116.3	Baker Creek	Easley Hot Springs Camp area	6660	
116.6		Snow Creek	6680	
116.7	Braided Section		6680	
117.0		Silver Creek	6720	
117.15	Logged Canyon		6720	
117.45		Unnamed	6720	
117.6	Butterfield Creek		6720	
117.8	Spruce Creek		6760	
118.0			6760	
118.4	Anderson Creek	Unnamed	6800	
118.5	Dooley Creek		6800	
119.0	Quadrant Creek	Unnamed	6840	
119.55	Prairie Creek		6880	

River mile (RM)	RIGHT BANK	LEFT BANK	ELEVATION feet above sea level	QUADRANGLE MAP 1:24,000
119.7	Prairie Creek Campground	Unnamed	6880	
119.85		Unnamed	6880	
120.0			6920	
120.45		Unnamed	6920	
120.9	Unnamed		6960	
121.0			6960	
121.15	Unnamed		7000	
121.5	Highway 93		7000	
121.75	Unnamed		7080	Galena, Idaho
121.95		King Creek	7080	
122.0			7080	
122.05		Unnamed	7080	
122.15	Owl Creek		7080	
122.25		Spring Creek	7080	
122.95		South Cherry Creek	7160	
123.0			7160	
123.35	Coyote Creek	Cherry Creek	7160	
123.4		North Cherry Creek	7200	
124.0			7240	
124.2		Unnamed	7240	
124.3	Unnamed		7240	
124.5		Senate Creek	7280	
124.6	Titus Creek		7280	
124.7	Galena Lodge	Gladiator Creek	7320	
125.0			7360	
125.45	Enid Gulch		7400	Horton Peak, Idaho
125.5		Emma Gulch	7440	
125.8		Horse Creek	7440	
126.0			7480	
126.5		Unnamed	7640	
126.55		Unnamed	7680	
126.8		Unnamed	7840	
127.0			8000	
128.0			8760	Galena, Idaho
128.2			9000	
Prepared by IDEQ-TFRO.				

Appendix E. Public Comments

Table XXX describes summarizes the public comments received and IDEQ-TFRO's response to comments. The official public comment period ran from September 24, 2001 to October 24, 2001.

Table XXX. Public comments and responses to the Big Wood River Watershed Management Plan

Source and Comments	IDEQ-TFRO's Response to Comments
USEPA Comments Lorraine Edmond, Office of Environmental Assessment, Seattle WA 98101	
USEPA 1: In the summary block of information for each reach, (section 2.2.9.6 is the first one) it would be helpful to include whether or not the reach is on the 303(d) list, and if so, for which parameters it is listed. An explanation of the basis for the critical condition and the critical time period designation should also be included. For example, most or all of the segments seem to have only "flushing spring flows" included under critical conditions. Wouldn't low flow conditions also be critical for some reaches and some parameters, such as nutrients and temperature? While high flows may be most significant for loading, low flows might be more significant in terms of seeing environmental effects.	IDEQ-TFRO concurs. In the final submission of the TMDL, these comments will be addressed directly in various sections.
USEPA 2: In the block where the loss and gain of the flow are summarized, there are numbers, but no units, just a •Q• designation.	IDEQ-TFRO will make this modification. Q is the same as flow and thus equates to cfs.
USEPA 3: The water quality summary information presented for each reach is a useful way to look at the weight of evidence approach regarding the current condition of the stream. It would help to interpret this information if, prior to the first summary, an introduction to the measures, approaches, and indices were included. Some sections are self explanatory, but others are not.	IDEQ-TFRO will make this modification where appropriate. The final submission will incorporate these modifications.
USEPA 4: #10, Streambed Sediments The substrate target is described as being exceeded or met, but the target itself is not specified in this section. The targets used are relatively high (35% and 40% fines) and are justified by stating that these levels support beneficial uses elsewhere in the subbasin. For this reference approach to be used, additional documentation is needed. The reference streams need to be specifically identified, along with their per cent fines, the documentation that they meet the appropriate beneficial uses, and the rationale explaining why they are considered	IDEQ-TFRO will make this modification as described in USEPA 3.

appropriate comparisons for the stream(s) they are being compared to.	
USEPA 5: #12, Water Quality Index This index needs some explanation. It often seems to conclude that beneficial uses are supported when other indications are that they are not. What is the origin of this index and what parameters is it based on?	IDEQ-TFRO will make this modification as described in USEPA 3. The WQI was originally formulated in 1968, to which the author was a participant at A & M University at College Station, Bryan, Texas. USEPA provided funding for this project.
USEPA 6: #13, Habitat Index This index needs an introduction as well. What measures are included in the index? These sections also describe conclusions regarding meeting or exceeding targets without specifying the targets. Is there a target value for embeddedness, for example?	IDEQ-TFRO will make this modification as described in USEPA 3.
USEPA 7: #14, Land Use Evaluation This one was most difficult to understand. An introductory explanation of what is included in this analysis is needed. What is the basis for the estimates of surface erosion for each land use? Every section concludes that •generally speaking, the degradation of the land based on land use, vegetation coverage, and potential surface sediment erosion does not impair beneficial uses.••This sounds like such a broad conclusion considering some of the other lines of evidence regarding effects of erosion in some areas, that it needs to be placed in some context in order to be interpreted correctly. Does it simply imply that problematic sediment sources are of a much more local nature? Without knowing the basis for the analysis, it is difficult to interpret its conclusions, especially since the conclusion seems to be the same in impaired and unimpaired reaches.	IDEQ-TFRO will make this modification as described in USEPA 3.
USEPA 8: The segment summaries include a table, which contains much useful information. One aspect of some of the tables however does not make sense. It sounds as though the Rosgen classification, as used here, may be based solely on gradient. Even the most fundamental Rosgen classification (A, B, C, etc.), is based on several factors, not just gradient alone. If the streams were not actually classified, this should be explained. In addition, the Rosgen classification (which should not be labeled •stream order") cannot be <u>averaged</u> over a long, geomorphically diverse reach. On page 2-86, for example, a C and D reach are averaged to characterize the stream as a B reach, overall. This is not meaningful•while the gradient can be averaged, the classification cannot. An alternative would be	IDEQ-TFRO respectfully disagrees. Rosgen classification scores (or values) were not averaged over a long, geomorphically diverse reach, nor are they based solely on gradient. Rosgen values were taken from the BURP protocols, which allows for streams or reaches to be classified as meaningful reaches, segments, or streams based on gradient, sinuosity, entrenchment, stream patterns, stream characteristics, valley description, and width/depth characteristics. The example cited on page 2-86 is wrongly cited and misrepresented in the question. The C and D reach were not average to characterize the stream as a B reach, overall. In order to reduce confusion, we will remove the overall stream classification from the table.

to characterize a stream or reach by the percentages in different Rosgen classes, e.g.: A - 5%; B - 20%; C - 60%.	
USEPA 9: It would be very helpful in interpreting the SBA if one of the index maps showed both the beginning and ending points of the segments on the mainstem as well as the location of the point sources.	IDEQ-TFRO will provide such a map in the final submission of the TMDL.
USEPA 10: Page 2-4, Table 2-3 It does not make sense to report sinuosity as a value less than one, since sinuosity =1.0 describes a perfectly straight channel, and stream miles cannot be less than valley miles. (Since sinuosity describes the shape of the channel itself, it does not matter whether or not it contains water.)	IDEQ-TFRO respectfully disagrees. Stream sinuosity can be < 1.0, and when it is it is representative of a wetland condition. This is one of the characteristics of Camas Creek and certain sections of the Big Wood River where braiding is characteristic. We agree though that most sinuosity values are > 1.0 since most streams in the Big Wood River Subbasin do not have wetlands.
USEPA 11: Page 2-6, Geology Sediments do not form •basement' rock, which refers to metamorphic and/or igneous complexes underlying sedimentary rocks.	IDEQ-TFRO respectfully disagrees, particularly since the Idaho Geological Survey and the U.S. Geological Survey reviewed §2.1.4.3. Also, the section is based on Link and Hackett's work. By definition, basement rock refers to undifferentiated rocks, commonly igneous and metamorphic that underlies the sedimentary rocks. As used here the basement rock refers to the uncommon rocks, which end up being younger than the Precambrian age, thus being "thousands of feet of accumulated sediments." This is the basement rock of the Big Wood River drainage.
USEPA 12: Page 2-36 This section on Magic Reservoir is confusing. It describes •storage flows,• measured in acre-feet, which is a volume, not a discharge rate. It also says that •upstream passage has been blocked... however, trout... continue to migrate upstream,• which needs to be clarified.	IDEQ-TFRO respectfully disagrees, particularly since the Big Wood Canal Company, the Watermaster for Districts 37 and 37M, and the University of Idaho reviewed §2.2.9.10. Additionally, IDFG-Jerome confirms that the Magic Reservoir has "blocked" upstream salmonid spawning passage of rainbow trout since a majority of the trout does not migrate out of the reservoir. Yet, a minority does continue to make it out of the reservoir into the Big Wood River upper reaches.
USEPA 13: Page 2-47 and -48, Section 2.2.9.14 This section regarding the elevated temperatures in the contributing springs could be clearer. It is not apparent how the data from Idaho Power relate to the conclusions regarding the temperature of the river. Where were the data collected and how do data from those locations answer the questions being asked? It may be that all that is needed here is some more explanation regarding the relative position of the springs in relation to the river and to the data collection locations. [*There also needs to be*] some indication of the relative contribution of the	IDEQ-TFRO concurs and will make the necessary modifications to provide more explanation.

spring flow to the river's total flow in this reach.	
USEPA 14: Page 2-55, Streambed substrate sediments •The lower stream functions much like a depositional zone... thus causing the stream to function as a transport system.• This is contradictory. In fact, in most of these sections on substrate, there are some confusing statements about streams behaving as transport systems, or not. This could be clarified. Since two primary functions of streams are to move water and to move sediment, it does not make sense to define them in terms of whether or not they are transport systems. Perhaps these statements would be more understandable if they were clearly characterizing just the reach, or a specific subset of the reach rather than the system as a whole.	IDEQ-TFRO concurs with a portion of this. It can certainly make the clarification more striking to account of reach characteristics. However, the USFS and BLM geomorphologists reviewed these sections and provided necessary verbiage to account for "some confusing statements about streams behaving as transport systems, or not." IDEQ-TFRO has done site visits of all these streams and their respective reaches, has reviewed all the statements in each section, and concurs with USFS and BLM that streams function as transport or depositional systems in the Big Wood River Subbasin. What makes one reach transport and another depositional is dependent on the amount of percent fines that build up in the reach. Gradient allows for movement of the percent fines, and this movement is subject to the amount of flow available in any given year.
USEPA 15: Similarly, on p. 2-69, Placer Creek is described as a •sediment-driven• system, without an explanation of what the term is intended to mean.	IDEQ-TFRO will define this term more specifically in the final version of the TMDL.
USEPA 16: On page 2-70, the last part of the Hazard Index section does not make sense, where it describes the segment as functioning like a 1st order stream because embeddedness exceeds the substrate target.	IDEQ-TFRO concurs and will modify the explanation accordingly in the final version of the TMDL.
USEPA 17: Page 2-73, section 10. This streambed substrate section needs clarification. It says the reach is a transport system (I think it means a transport reach), but that sediment accumulates to the extent that the percent fines are above the substrate target. Then it seems to conclude that beneficial uses are impaired because of the presence of beaver dams and marshland. This statement needs to be explained and qualified. It implies that beaver dams and marshland are inherently negative. Perhaps it is a matter of pointing out that substrate fines targets are designed for different kinds of systems. It is also not clear how a steep Rosgen •A• channel supports beaver dams and marshlands. Perhaps describing the relative amounts of the different environments would help answer some of these questions. (Similar statements are found on p 2-80, and perhaps elsewhere.)	IDEQ-TFRO can and will provide a better explanation of the reach's characteristics. The intent was not to imply that beaver damns and marshland are inherently negative.
USEPA 18: Page 2-73, section 12 This is one of the places where a previous explanation of the water quality index would have been helpful. Several different lines of evidence	IDEQ-TFRO concurs and will provide a better explanation of the WQI. However, IDEQ-TFRO respectfully suggests that when a weight–of-evidence approach is used, no one individual component can be "the most significant"

have been presented that lead to the conclusion that this tributary is quite impaired, yet this index concludes it •supports beneficial uses due to good water quality.• This raises the issue of how useful an index this is. It may be that it does not tell us much if it says water quality is good, but if it says it is poor, we know it is very impaired.	component against the rest of the components used. In the case of the Big Wood River assessment, the weight-of-evidence took into account 17 components, each equally important as the next one. The combination of all components by applying a "school report card" grading system provided the mechanism in which to interpret support or not support. Values > 90% were considered support. Values < 90% were considered not support. The fact that the WQI supports beneficial uses and that substrate sediments do not does not negate the value of the WQI. In fact, it demonstrates that water quality parameters by themselves are insufficient to judge the nature of a streams support status.
USEPA 19: Page 2-109 Confined feeding operations are described on this page, but are shown as not being present in the table on the previous page. Please clarify whether or not they currently exist in the subbasin.	IDEQ-TFRO has researched quite extensively the CFO/CAFO situation in the Big Wood River Subbasin. Although they do exist as both feedlots and dairies, they do NOT occur in the 303(d) drainages, and so are not listed as a nonpoint source affecting these streams.
USEPA 20: Page 2-112, Relative Yield of Pollutants This would be a good place to add some description regarding the data that are included in the pool of "all data collected" and average to form what is described as an "annual" mean. A true annual mean would only result if there were no bias in the sample design, such as timing of the sample collection, for example. Acknowledgment of this issue is reflected in the title, which is careful to include the word •relative.• What is known regarding the data used in this pool? How often are data collected? Do they reflect conditions during the entire year? Are they biased in any way that would lead to either an under-estimate or an over-estimate of actual loads? Are there trends present that would be obscured by averaging? Answering some of these questions would help put the relative nature of the yields in some perspective. (It may still be a good way to describe relative yields as it is the simplest approach to looking at the wide range of stream segments in a consistent way.)	IDEQ-TFRO concurs and will provide an explanation in the final version of the TMDL.
USEPA 21: Page 2.4.4, Evaluation of Successes and Failures in Pollution Control This section contains some fundamental conclusions regarding the condition of the basin, such as the statement that •excess sediment continues to be the major problem...• This is an important conclusion, but this the first place this statement is found. I would expect to have seen it earlier, such as in the Executive Summary. It	IDEQ-TFRO can and will provide additional clarification where appropriate. However, although excess sediment continues to be the major problem, the qualifier is that this is true only "in certain reaches of the Big Wood River and its associated 303(d) listed tributaries."

would also be useful to find the summary contain some explanation of how the sediment and nutrient issues are linked.	
USEPA 22: Waste Load Allocations A wasteload allocation must be included in each TMDL for each point source discharging the pollutant limited by the TMDL. Three point sources were identified in the subbasin (Ketchum, Hailey and The Meadows), but specific WLAs for these facilities were not included in the TMDLs for sediment, phosphorus and E.coli. The final TMDL must include WLAs for these facilities, and the more specific these allocations are expressed (for example, as concentrations with defined averaging periods) the more readily they can be incorporated as NPDES permit limits without additional interpretation. We encourage such specificity since it will provide the facilities a clear picture of limits they will have to achieve as a result of the permit.	IDEQ-TFRO concurs and will provide such documentation. This was an oversight on our part and will be modified to reflect USEPA's request.
USEPA 23: Load Allocations Section 3.7.3. Total Phosphorus, Main Stem The section describing the reach containing the point sources has some serious problems. According to the TMDL, current permits allow a total wasteload (from all 3 point sources) of 38.7-lbs/day total phosphorus. Measurements summarized in the TMDL suggest that approximately 32.4 lbs/day are currently being discharged from the point sources. (I think that is what paragraph #2 says, but it describes this as a loading capacity, rather than a load, which is confusing). Another paragraph (#1) describes the old permits, which allowed a similar total load, although it had a different distribution among the dischargers. (I'm not sure how the old permits are relevant to the TMDL.)	IDEQ-TFRO will provide clarification accordingly in the final version of the TMDL. Segment 2 was totally reviewed by IDEQ-TFRO and it was determined in review that the mean flow value was incorrect as printed. Instead of 113.4 cfs, it should be 272.5 cfs. This will be modified in the final version of the TMDL.
USEPA 24: The problem with this reach is that the TMDL calculates a loading capacity for the reach of 30.6 lbs./day. This means that both the currently measured load and the currently permitted load exceed the calculated load capacity. Thus, there is no remaining capacity for nonpoint sources or background sources of phosphorus and no margin of safety to account for uncertainty. This problem is illustrated in Table 3-20, which shows a **negative** load allocation of -8 lbs/day for nonpoint sources. Load allocations cannot be negative. A nonpoint allocation for nutrients cannot even logically be zero, because we know sources exist.	IDEQ-TFRO will provide more appropriate clarification in the final version of the TMDL. However, IDEQ-TFRO firmly concludes, based on the scientific data, that Unit 2 of the Big Wood River is "maxed out" when it comes to additional point sources or expansion of current point sources.
USEPA 25: Load allocations must be assigned to	IDEQ-TFRO concurs and has determined the

nonpoint sources (preferably with a separate allocation for background), each point source discharging the pollutant of concern must receive a wasteload allocation, and the TMDL must include a margin of safety. The allocations plus the margin of safety must not exceed the load capacity, per the equation: Load allocations + Wasteload allocations + Margin of safety = Load Capacity. The choice of how much the point sources must reduce versus how much nonpoint sources must reduce loading in order to meet the load capacity is a policy call which IDEQ and the WAG must determine, but the TMDL must include allocations for all these sources.	extent to which reductions must and will occur in the Big Wood River Subbasin. Nonpoint source allocations at this time are confined to the Major nonpoint sources and do not include the Minors because it is totally uncertain how much these Minors make up the LA portion if any. To the extent possible and practical, IDEQ-TFRO with the Wood River WAG is looking at defining these Minors more explicitly, but this won't occur until the start of implementation planning.
USEPA 26: Ideally, this TMDL would have been completed prior to issuance of the 2001 NPDES permits, but in this case, the two independent schedules got •out of synch,• and the permit was issued prior to completion of the TMDL. Wasteload allocations in these TMDLs will be incorporated in the next renewal or revision of these permits. The current permits do contain the following language, which helps bridge the gap: **"State Certification Requirement.** When the Big Wood River Watershed Management Plan (Management Plan) is finalized by IDEQ, and approved by EPA, the permittee must develop a plan and schedule for the wastewater treatment facility. This plan must meet the Management Plan/wasteload allocation target(s) to ensure compliance with the permit effluent limit(s) that will be developed from the wasteload allocation target(s) when this permit is modified or reissued."	IDEQ-TFRO concurs and will provide this explanation in the final version of the TMDL.
USEPA 27: Clearly, using the analysis presented in the TMDL, wasteload allocations for the point sources will have to be reduced in order to ensure that water quality standards will be met in this reach of the Big Wood River. The TMDL is the document that explains, quantifies, and allocates the necessary reductions. The TMDL sets the new allocations for all point sources so that NPDES permits can be revised to meet those requirements. The TMDL also needs to define the averaging period for phosphorus, since it has already taken into account seasonality and critical conditions.	IDEQ-TFRO concurs and will provide this explanation in the final version of the TMDL.
USEPA 28: E. coli reductions Section 3.7.4, E. coli, Main Stem The segment containing the point sources also currently exceeds the target for E.coli. Table 3-26 concludes that the per cent reduction needed to meet the target is 69.9%. If this reduction is intended to apply equally to each of the three	IDEQ-TFRO will make the necessary modification in the final version of the TMDL.

point sources, that intention needs to be stated explicitly, so it can be taken into account when the permits are revised. Additionally, the TMDL should define the averaging period associated with the allocation, and the wasteload allocation should be converted back into a concentration and expressed as X colonies/100ml for each point source. For example, currently the Ketchum and Hailey NPDES permits include E.coli limits of 126/100 ml. expressed as a monthly geometric mean of five samples. An E.coli limit is not currently included in The Meadows NPDES permit.	
USEPA 29: It is not clear from the table whether point sources are included in the 69.9% reduction or not. If the WLA in the table is based on what they are allowed in their current permits, then they would not be required to make reductions as long as they are not exceeding current limits (but note that The Meadows does not currently have an E.coli permit limit). This would mean that the 69.9% reduction was all being allocated to nonpoint sources. If this is what is intended, it should be spelled out in the text.	IDEQ-TFRO will make the necessary modifications in the final version of the TMDL.
USEPA 30: Page 3-1 Here, a TSS concentration is described in units of tons/year, which is a rate, not a concentration. It looks like this should be mg/l.	IDEQ-TFRO concurs and will make the necessary modifications.
USEPA 31: Page 3-4 A reference or citation for the TSS targets should be included here. Perhaps it was discussed in the subbasin assessment and I did not locate it.	IDEQ-TFRO concurs and will make the necessary modification.
USEPA 32: Page 3-8, #3 No parameter is listed for the target of 52 mg/l.	IDEQ-TFRO concurs and will make the necessary modifications.
USEPA 33: Page 3-8 There is no allocation for future growth, which is optional in a TMDL. But elsewhere (p. 3-44) the basin described as experiencing exponential growth. Is most of this growth in areas served by the point sources or outside that area? How is it being considered in developing the TMDL?	IDEQ-TFRO concurs and has discussed this extensively with the Wood River WAG and Wood River Executive Board as described in this section (§3.4). The WAG and Executive Board will be addressing this issue more directly during the implementation phase of the plan.
USEPA 34: Page 3-9 What is meant by •artificial sources of background? What would that include and how is it taken into account in the TMDL analysis?	Artificial sources of background are all those background sources additional to natural background sources. The term is being used in a very general sense.
USEPA 35: Page 3-10 According to table 3-7, the “current average condition” for TSS in all reaches is already below	The “current average conditions” for TSS in the Big Wood River is that TSS is not a significant problem because data is not existent during high flow events. Most of the data has been collected

the target concentration, so no reductions are needed. Yet, fine sediment problems are known to exist. What does this indicate about the usefulness of TSS as a target? Is it only useful in its application as a daily maximum rather than a monthly average? Or does it indicate that the "average condition" of TSS is not effective at describing the problem, since we rarely have data from the highest flows? (Perhaps all it means is that the substrate sediment targets will drive all reductions.)	during average or low flow conditions. Yet, sediments are a problem because substrate sediments will effectively by driving a majority of the reductions. The usefulness of the TSS targets is to establish targets where no targets have been established as interim preliminary targets. If these targets end up being insufficient, then it is expected that these targets will be modified accordingly to reflect the more realistic conditions where appropriate.
USEPA 36: Table 3-15 and 3-18 The tables on substrate sediments need to be corrected to show that the MOS for that parameter is 20% rather than 10%. The allocations themselves seem to be correct, only the label is wrong. Also, the labels for Table 3-18 need to be changed to reflect the 6% (instead of 10%) allocated to natural background for tributaries.	IDEQ-TFRO concurs and will make the necessary modifications.
USEPA 37: Table 3-17 has a footnote statement that seems to be left over from the TSS table, stating no reductions are needed.	IDEQ-TFRO concurs and will make the necessary modifications.
USEPA 38: Table 3-20 The background and margin of safety columns are not 10% of the total load capacity (they are assigned 3.1 lbs/day compared to a total load capacity is 32.4 lbs./day.). While 3.1 is close to 10% of 32.4, the difference suggests that perhaps a spreadsheet was changed without some cells reflecting the results of the change. More significantly, with regard to this table, the wasteload allocation needs to be corrected as described above, which will change these actual numbers. The resulting numbers will need to be checked to ensure they reflect the correct percentages.	IDEQ-TFRO concurs and will make the necessary modifications.
Daryle R. James, Chairman Wood River Watershed Advisory Group Comments October 23, 2001	
As you are aware, the affect of setting TMDL's without any growth factor could potentially have a deleterious effect on the economics of communities in this area. It is for this reason that the Watershed Advisory Group would like to have a statement placed in the TMDL document that would allow the Advisory group to aggressively pursue the study of the economic affect, and, if need be, address some percentage of economic growth as part of the overall TMDL.	IDEQ-TFRO is willing to place a statement in the TMDL that reflects the WAG's desire to tackle the future growth issue. However, be aware that the assigning of a percentage of the loading capacity to future growth does not create a "deleterious effect on the economics of communities in this area." If anything, it provides a mechanism within the TMDL that protects the communities for some level of future growth, which needs to be defined more explicitly.
We will use the time to study the economic sections of comprehensive plans from each	IDEQ-TFRO will write into the TMDL that the future growth deliberations will be covered during

community and county and try to discern the anticipated needs of those effected entries. Please be aware that the Watershed Advisory Group would not intend to allow the future economic growth of public entities to affect the status of current industries.	the implementation phase of the TMDL.
Valdon Hancock, USFS – Twin Falls October 24, 2001	
On page 2-109, Table 2-40, for Owl Creek, you indicate septic tanks as a source of pollution, albeit non-major. I know of no such development up that drainage. It requires a ford of BWR, and there is only the road up the drainage and some dispersed camping.	IDEQ-TFRO will make the necessary corrections in the final document to reflect this deletion.
Raymond Hyde, City of Hailey October 22, 2001	
The City of Hailey Wastewater Department takes great pride in the ability to discharge a high quality effluent that enhances the environment.	IDEQ-TFRO recognizes and appreciates the environmental stewardship that the City of Hailey and its wastewater department have for its ability to discharge high quality effluent to the Big Wood River.
As you know, the City of Hailey went on-line with a new treatment plant in September 2000. Due to this upgrade we believe that the data utilized in the TMDL plan does not represent current practices. Nutrients discharged from this facility are greatly reduced from when the data was gathered for the TMDL plan. We believe other point dischargers have also enhanced their quality of effluent discharged from their facilities.	Table ZZ in the final TMDL versions has mean annual averages for TSS, substrate sediments, TP, and *E. coli*. IDEQ-TFRO recognizes that this data is a mean annual average for the period 1991-1999 (or 1991-2000) and may not necessarily reflect the current practices of the facility. As a consequence, an average was utilized to best reflect the data as it exists with the intent that modifications to the TMDL limits for the municipality industry will be accommodated as more information and data is collected prior to re-issuance of the permits. As the enhancement of effluent discharges from the other point sources, additional data will be collected during the implementation phase of the TMDL to be able to ascertain their status relative to effluent quality.
We feel that in order for the TMDL process to achieve its goal, establishment of federal monitoring of in-stream water quality to track trends within segments of the drainage is needed. Presently limited data are used in this report and do not represent current data in our segment of the river.	IDEQ-TFRO concurs that additional in-stream monitoring of the Big Wood River is essential to be able to better characterize the basics of point versus nonpoint sources per segment. However, although the presently limited data does not necessarily represent "current data", it is sufficient to be able to develop a preliminary TMDL, which will be followed up by in-stream water quality monitoring after approval of the TMDL by USEPA.
Presently, point sources are being burdened by exclusion of measurable best management practices. Point sources are burdened with measurable limitation within their NPDES permits, which are becoming increasingly difficult to achieve, while nonpoint sources of pollution have not been truly identified. We would like to see measurable BMP's for nonpoint sources of	IDEQ-TFRO appreciates and understands why point sources, of which there are only three (3) in the subbasin, might feel over burdened with NPDES constraints. However, the "exclusion of measurable best management practices" from point sources is not true. Certainly, point sources are allowed to incorporate into their facility maintenance and waste management system

pollution based on federal monitoring of in-stream quality.	any number of best management practices that are approved by the IDEQ and/or USEPA. We encourage the use of BMPs within point sources. Relative to nonpoint sources, identification of these has been settled to land ownership. This provides us with four (4) sources: USFS, BLM, IDL, or private lands. Approved and measurable BMPs will be required on all 303(d) streams, and these will need to be identified during the development of the implementation plan for the Big Wood River Subbasin. Relative to federal monitoring of in-stream quality. For the most part, IDEQ in conjunction with water user industries does most of the monitoring under the State's TMDL program. Monitoring by federal agencies (such as USFS and BLM) is being done on most 303(d) streams where it is a part of range or timber allotment.
The City of Hailey appreciates the opportunity to take part in this process as a member of the Technical Advisory Committee and will commit to continued participation. We are dedicated to the protection of the Big Wood River and we would like to work with IDEQ and USEPA to establish additional data that are more representative of the present.	IDEQ-TFRO concurs and supports the City of Hailey's proactive approach to additional monitoring of Unit 2 of the Big Wood River. IDEQ-TFRO will shortly setup a meeting with all municipalities to establish a monitoring program on the river.
Daryle R. James, Chairman Wood River Watershed Advisory Group October 23, 2001	
The Wood River Watershed Advisory Group met on August 28th and discussed the possibility of phenolic acids leaching from abnormally high levels of rotting biomass polluting the Big Wood River.	IDEQ-TFRO has done site visitations of all 303(d) streams in the higher, middle, and lower elevations and has found no evidence of "abnormally high levels of rotting biomass" that could potentially get into the Big Wood River via these 303(d) streams. Therefore, it has concluded initially that the possibility of phenolic acids leaching from these biomass sources is relatively minor to account for any significant changes to water quality and/or the fisheries. In particular, a very detailed search of these "abnormally high levels of rotting biomass" was conducted on Horse Creek, Baker Creek, Owl Creek, Eagle Creek, Lake Creek, Placer Creek, East Fork Wood River, Cove Creek, Greenhorn Gulch, and the entire headwaters to Glendale Diversion stretch of the Big Wood River. Such significant sources were not found even in areas where previous avalanche activity had occurred.
This river is already on the 303(d) list for excessive temperatures, and phenolic acids would contribute to that problem by increasing the waters absorption of solar radiation, as well as by their heat of combustion as they slowly	IDEQ-TFRO concurs that excessive temperatures are a significant problem to the Big Wood River, as well as to several tributaries. However, the value in doing the detailed search to find "abnormally high levels of rotting biomass"

oxidize in the water.	revealed to IDEQ-TFRO the relative significance of flow alteration and flow diversion in the Big Wood River and in several of the 303(d) streams. In fact, the addition of flow alteration to USEPA's pollution list will be incorporated as a consequence of this detailed search. Consequently, IDEQ-TFRO's preliminary conclusion is that flow alteration and flow diversions appear to have a greater impact on temperature than the possibility of phenolic acids from natural biomass sources.
These chemicals [*phenolic acids*] are also deadly to fish, aquatic insects and interfere with the reproduction of plankton, as primary fish food. They also chelate toxic cations such as aluminum into solution at pHs where these cations will not normally solubilize.	IDEQ-TFRO concurs that phenolic acids are deadly to fish, aquatic insects, and to some extent plankton. There inherent chelation properties are effective on aluminum, zinc, manganese, copper, iron, calcium, and magnesium. These characteristics are evident at pH levels < 6, and all Big Wood River water and 303(d) tributary waters were > pH 6.5.
Forest Service and USGS testing for dissolved organic carbon in other streams in southern Idaho indicate that all the streams they are testing in southern Idaho exceed USEPA's limit.	IDEQ-TFRO has discussed this with USFS, USGS, and IDFG. All three agencies indicate that testing for dissolved organic carbon and equating that test to phenolic testing is inappropriate. Consequently, one cannot possibly conclude that phenolic acids are a problem from this type of comparison.
Preliminary proof of concept testing for these phenolics using both a spectrophotometer and Chemets ampoules for phenol have been positive and indicate that the Big Wood River exceeds EPA's maximum allowed concentration of 0.1 mg/L … Chemets ampoules only give readings down to 0.1 mg/L and not below this value.	IDEQ-TFRO has discussed this testing with IDHW-Lab (Boise) and USFS and has ascertained that levels down to 0.1 mg/L are insufficient for phenolic acid testing. In fact, they should be at levels < 0.1 mg/L. The method is not applicable to the determination of trace levels. It is applicable to the monitoring of phenolic compounds in wastewater. IDEQ-TFRO has discussed the chronic and acute toxicity levels with USEPA and concurs that 10.2 mg/L and 2.56 mg/L are the chronic and acute toxicity levels, respectively, for aquatic life. Protection of human health is at 3.5 mg/L. Additionally, there is no discernable correlation between a spectrophotometric method that uses Chemets ampoules and a GC/mass chromatograph procedure. The well established 4-aminoantipyrine method is employed as a spectrophotometric procedure. Phenolic compounds react with 4AAP in alkaline solution in the presence of ferricyanide to produce a red reaction product. Phenol, meta- and ortho-substituted phenols and some para-substituted phenols, under proper pH conditions, will register with this method. Results are expressed as ppm (mg/L) phenol.
The Wood River WAG voted unanimously that IDEQ should begin monitoring streams for these	IDEQ-TFRO does not concur with the establishment of monitoring in the Big Wood

pollutants … We therefore feel it would be more informative to use highly accurate GC/MS testing to establish a concentration correlation with UV/VIS spectroscopy testing of the streams to save money. The chemicals of greatest concern due to their extreme toxicity are the stilbenes, dihydroquercitin, pentacyclic triterpenes, tropolones, rotenoids, phenanthrene and phenols including ortho, meta, and para substrituted rings.	River subbasin since the argument has not been sufficiently demonstrated or proven that sufficient biomass occurs to produce sufficient phenolic acids to enter the natural system. However, IDEQ-TFRO has discussed the issue with John L. Thornton, Boise National Forest, and has ascertained that the potential does, in fact, exist for phenolic acids to be a "problem" if there has been a hot burn through an old growth area (particularly if lodgepole pines are present). In fact, if phenolic acids are causing a problem, it is only in isolated areas of a National Forest and not necessarily throughout the entire forest. Therefore, IDEQ-TFRO has joined with USFS to explore this issue, particularly in those areas of the USFS ground where a hot burn has taken out an old growth area (particularly if lodgepole pines are present.
Josephine Lowe, Idaho Conservation League October 18, 2001	
I understand the political reason for changing the sediment load or level from 20-25% up to 35-40% as a more attainable short-term goal. However, it is very important to state clearly in the document that studies indicate that over time sediment levels greater than 25% threaten healthy salmonid spawning conditions, and that the 35-40% goal is only a working goal, subject to reduction to the optimum level of less than 25%.	IDEQ-TFRO concurs. In all of our deliberations with the Wood River WAG we have made it a point that the 35-40% targets (above and below Magic Reservoir) as substrate sediments were interim preliminary targets subject to change at the 5, 10, 15, or 20 year milestone. And, yes, making the goals more achievable in the short-term allows for long-term goals to take on fruition. To the extent practical we will state clearly in the document the intent of the 35-40% initial targets.
“Attainability decisions are often based on best professional judgement and not necessarily on data.” Please define “best professional judgment.” Whose and based on what?	As defined in this section, IDEQ-TFRO has been given statutory responsibility for ascertaining a stream’s existing beneficial uses. To the extent practical, IDEQ-TFRO will use physical, geological, chemical, and biological measures as a weight-of-evidence to arrive at a best profession judgment. Best professional judgment is a judgment call based on the best professional and scientific knowledge and experience of an individual or individuals for ascertaining a decision on an environmental subject. The BPJ falls upon IDEQ-TFRO and is based on their knowledge base and experience base.
Concerning the understated but very real relationship of water quantity affecting temperature and other pollutant levels, please mention clearly that although IDEQ defers water apportionment issues to IDWR, it does recognize that in reality flow alteration affects the levels of temperature as well as other pollutants, and therefore affects the health and beneficial uses of the Big Wood Special Resource Waters of the river.	IDEQ-TFRO recognizes that water quality has a direct impact on water quality. We recognize this not by deferring the issue to IDWR, but rather by proposing a listing of flow alteration or flow diversion on USEPA’s pollution list. IDEQ-TFRO also recognizes that the Big Wood River’s Special Resource Water issue cannot be maintained as long as flow diversions and flow alterations continue to be a major impact on this river system. To the extent practical, IDEQ-TFRO

	can only provide an educational perspective on this controversial issue. It must and has deferred a number of flow alteration or flow diversion issues to IDWR who holds primacy on water flows in Idaho.
Please state that although there is insufficient information at this time concerning the counties and municipalities future build-out plans, it is of utmost importance to recognize the impact of further growth (population and industry) on the infrastructure of an already compromised water system. (The word “sustainability” comes to mind.) Future growth and sustainability of beneficial uses is clearly one if not the most vital areas of concern for this watershed.	IDEQ-TFRO concurs and will provide a statement that describes your concerns.
Change the support status of the following segments to 303(d) listing: Big Wood River, Base Line to Magic Reservoir, and Big Wood River, Interstate 84 to Snake River.	IDEQ-TFRO concurs as a consequence of its weight-of-evidence assessment and will submits these for inclusion on the 303(d) list.
Prepared by IDEQ-TFRO.	

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