American Falls Subbasin
Total Maximum Daily Load Plan: Subbasin Assessment and Loading Analysis

Idaho Department of Environmental Quality
Shoshone-Bannock Tribes
U. S. Environmental Protection Agency
March 2009

*Revised portions highlighted in red

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American Falls Subbasin Total Maximum Daily Load Plan: Subbasin Assessment and Loading Analysis

March 2009

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Abbreviations, Acronyms, and Symbols

303(d), §303(d)	Refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section
§	Section (usually a section of federal or state rules or statutes)
ac-ft	acre foot (feet)
avg	average
BLM	United States Bureau of Land Management
BMP	best management practice
BOR	United States Bureau of Reclamation
BURP	Beneficial Use Reconnaissance Program
C	Celsius
CAFO	confined animal feeding operation
CFR	Code of Federal Regulations (refers to citations in the federal administrative rules)
cfs	cubic foot (feet) per second
cm	centimeter(s)
CWA	Clean Water Act
DEQ	Idaho Department of Environmental Quality
DMR	Discharge Monitoring Reports
DO	dissolved oxygen
EIFAC	European Inland Fisheries Advisory Commission
EPA	United States Environmental Protection Agency
EPTC	s-ethyl dipropylthiocarbamate
F	Fahrenheit
GIS	Geographical Information Systems
GWLF	Generalized Watershed Loading Functions
HUC	Hydrologic Unit Code
IDAPA	Refers to citations of Idaho administrative rules
in	inch
INL	Idaho National Laboratory
ĶLṢÇP	Universal Soil Loss Equation parameters
km	kilometer
km^2	square kilometer
L	liter
LA	load allocation
LC	load capacity
m	meter
m^3	cubic meter
MCL	maximum contaminant level
mg	milligram
mg/L	milligrams per liter
mi	mile
mi^2	square miles
mm	millimeter
MOS	margin of safety
N	nitrogen
NAE	National Academy of Engineering
NAS	National Academy of Sciences
NAWQA	National Water Quality Assessment
NB	natural background
nda	no date available
NDEP	Nevada Division of Environmental Protection
NDEQ	Nebraska Department of Environmental Quality
NH_3	ammonium
NO_2	nitrite
NO_3	nitrate
NPDES	National Pollutant Discharge Elimination System
nr	near
NRCS	Natural Resources Conservation Service
ODEQ	Oregon Department of Environmental Quality

P	phosphorus
PO_4	phosphate
ppm	part(s) per million
QAPP	quality assurance project plan
STATSGO	State Soil Geographic Database
T&E	threatened and/or endangered species
TIN	total inorganic nitrogen
TKN	total Kjeldahl nitrogen
TMDL	total maximum daily load
TP	total phosphorus
TSS	total suspended solids
*u*g/L	micrograms per liter
UNEP	United Nations Environment Programme
U.S.	United States
U.S.C.	United States Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey
WAG	Watershed Advisory Group
WLA	wasteload allocation
WWTP	wastewater treatment plant
WY	water year (October to September)

Cross Reference for Water Body Identification

NOTE: assessment units may include more than the specified water body.

Water body	Water quality limited segment boundary		Water quality standards unit	Water quality limited segment number	Assessment unit
	Upper	Lower			
Snake River	Bingham-Bonneville county line	Ferry Butte	US-22	2348	SK022_02
Snake River	Ferry Butte	American Falls Reservoir	US-22	2347	SK022_02
American Falls Reservoir			US-1	2346	SK001L_0L
McTucker Creek	Headwaters	Snake River	US-24	2356	SK024_02
Danielson Creek					SK000_02a
Hazard Creek/Little Hole Draw			US-25		SK025_02, 02a
Cedar spillway					SK026_03
Colburn wasteway					SK000_02; SK001_02
Crystal springs					SK001_02
Nash spill					SK026_02
R spill	None				
Spring Hollow					SK026_02
Sterling wasteway					SK001_02
Spring Creek			US-20		SK020_02, 03
Clear Creek			US-19		SK019_02
Bannock Creek	Headwaters	Pauline	US-2	2349	SK002_02, 03
Bannock Creek	Pauline	American Falls Reservoir	US-2	6351	SK002_04, 05; SK001_05
Moonshine Creek	Headwaters	Reservation boundary	US-6	6349	SK006_02, 04
Rattlesnake Creek	Headwaters	Reservation boundary	US-10	2350	SK010_02, 03, 04
West Fork Bannock Creek	Headwaters	Reservation boundary	US-8	6350	SK008_02
Knox Creek	Headwaters	Bannock Creek	US-9	5263	SK009_02, 03
Seagull Bay tributary	None				
Sunbeam Creek			US-5		SK005_02, 03

TMDL at a Glance

Subbasin:	*American Falls*
HUC:	*17040206*
Key Resources:	*Cold water Aquatic Life, Salmonid Spawning, Primary/Secondary Contact Recreation, Domestic & Agricultural Water Supply, Aesthetics, Wildlife Habitat*
Uses Affected:	*Cold water Aquatic Life, Salmonid Spawning, Primary/Secondary Contact Recreation, Domestic Water Supply, Aesthetics*
Pollutants:	*Sediment, Nutrients, Bacteria, Dissolved Oxygen, Flow Alteration, Unknown*
Sources Considered:	*Point Sources – wastewater treatment plants, fish hatcheries, stormwater* *Non-Point Sources - agriculture, grazing, roads, urban*

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. 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 four 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 American Falls 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 American Falls Subbasin located in southeast 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. Nine assessment units in American Falls Subbasin were included 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

American Falls Subbasin covers 2,869 square miles (1.8 million acres, 0.75 million hectares) in southeast Idaho. Urban areas within or adjacent to the subbasin are American Falls, Aberdeen, Blackfoot, Firth, and Shelley. Much of the subbasin lies within the Fort Hall Reservation. Major land uses include: dryland and irrigated agriculture, and livestock grazing. American Falls Reservoir is the predominant water body in the subbasin and provides both irrigation water and electricity. Major subbasin tributaries to the reservoir include Snake River from the reservoir to Bingham-Bonneville county line, Spring Creek, McTucker Creek, Danielson Creek, Bannock Creek, and Ross Fork.

Historically, American Falls Subbasin water bodies sustained several beneficial uses (Table ES-1). All streams supported cold water aquatic life, agriculture and industrial water supply, aesthetics, and wildlife habitat as well as secondary contact recreation, with the bigger streams also supporting primary contact recreation. Most streams also maintained spawning populations of salmonids. Domestic water supply has been officially declared a designated use in Snake River and American Falls Reservoir. Current information suggests that some beneficial uses, such as cold water aquatic life and salmonid spawning, are impaired and are not fully supported in several water bodies in the subbasins.

There are nine water quality assessment units included on the 1998 303(d) list. In addition to American Falls Reservoir, three streams that flow into the reservoir are on the list – Snake River, McTucker Creek, and Bannock Creek. The remaining listed water bodies are tributaries of

Bannock Creek and include Moonshine Creek, Rattlesnake Creek, West Fork Bannock Creek, and Knox Creek.

Key Findings

The current list of water quality limited water bodies includes streams from previous lists and those added to the 1998 list. All streams listed prior to 1998 had sediment, nutrients, or both listed as a pollutant of concern.

Dissolved oxygen was identified as a problem in both American Falls Reservoir and Snake River, with the river also listed for flow alteration. Bannock Creek was also on the list for bacteria concerns. For Knox Creek, which was added to the list in 1998, pollutants of concern were listed as unknown. Key beneficial uses affected by these pollutants are cold water aquatic life, salmonid spawning, and contact recreation.

Sources of Pollutants

Several sources of pollutants have been identified in American Falls Subbasin. Agriculture has been positively related to both nutrient and sediment loading. Stormwater runoff is also a source of both sediments and nutrients. Other likely contributors to sediment loading in subbasin streams are livestock practices, stream channels and banks, and roads. Windblown sediment and shoreline erosion add to sediment loading in American Falls Reservoir. In addition to agriculture and stormwater, wastewater treatment plants are a source of nutrients in the subbasin. Waterfowl add to nutrient loading, primarily in the reservoir. Another source of phosphorus in the reservoir is bottom sediments, which add to overall phosphorus loading through internal recycling. Other possible contributors of nutrients include livestock grazing, recreation, and failed septic systems. From a geographical perspective, a major contributor of both nutrients and sediment to American Falls Reservoir is an out-of-subbasin tributary, the Portneuf River.

There are thirteen National Pollutant Discharge Elimination System (NPDES) dischargers within American Falls Subbasin. Four are wastewater treatment plants at Aberdeen, Blackfoot, Firth, and Shelley. Four additional permits relate to fish hatcheries with Crystal Springs holding three permits and Indian Springs holding one permit. The other five NPDES permits relate to large confined animal feeding operations – Snake River Cattle Company, Tom Anderson Cattle Company, Bragg feedlot, Kerry Ward feedlot, and Alan Andersen dairy. Additional NPDES permits are required for the control of stormwater from construction activities that disturb greater than one acre.

Table ES-1. Water body quality limited assessment units in American Falls Subbasin on the 303(d) list including listed pollutants and beneficial uses.

Water body	Assessment unit(s)	Listed pollutants[1]	Beneficial uses[2]				
			Cold water aquatic life	Salmonid spawning	Contact recreation		Domestic water supply
					Primary	Secondary	
American Falls Reservoir	ID17040206SK001L0L	DO, Nut, Sed	D		D	P	D
Snake River	ID17040206SK02202	DO, Flow Alt, Nut, Sed	D	D	D	P	D
McTucker Creek	ID17040206SK02402	Sed	P			P	
Bannock Creek	ID17040206SK00105; ID17040206SK00204, 05	Bact, Nut, Sed	D	E	E	D	
	ID17040206SK00202, 03	Bact, Nut, Sed	D	E	E	D	
Moonshine Creek	ID17040206SK00602, 03, 04	Sed	P			P	
Rattlesnake Creek	ID17040206SK01002, 03, 04	Sed	P			P	
West Fork Bannock Creek	ID17040206SK00802	Sed	P			P	
Knox Creek	ID17040206SK00902, 03	Unknown	P			P	

[1]DO=dissolved oxygen, Flow Alt=flow alteration, Nut=nutrients, Sed=sediment, Bact=bacteria

[2]D=designated in State Water Quality Standards, P=use not designated so presumed to support use, E=existing use; all water bodies are considered to support agriculture and industrial water supply, wildlife habitat, and aesthetics; beneficial use information from the Idaho Water Quality Standards and Wastewater Treatment Requirements and Beneficial Use Reconnaissance Program monitoring

Load Allocations

Load allocations (quantity of pollutants a stream can assimilate without impairing beneficial uses) were based on target concentrations chosen such that attainment of the target would result in meeting beneficial uses:

- Phosphorus is considered the most likely limiting nutrient in American Falls Reservoir. The target for total phosphorus is set at 0.05 mg/L for tributaries and point sources to the reservoir, with an interim total phosphorus target of 0.07 mg/L to be achieved in the short-term and until the 0.05 mg/L target is reevaluated.
- No chlorophyll *a* load allocations were placed on the reservoir, although a target average not to exceed chlorophyll *a* concentration for July and August of 0.015 mg/L is set.
- An average concentration not to exceed 60 mg/L of suspended sediment over a 14-day period was recommended for water bodies in American Falls Subbasin listed for sediment problems, except for Bannock Creek watershed. For Bannock Creek and tributaries, a surrogate sediment target of 80% streambank stability was used to develop load allocations.

Load allocations were not established for flow alteration, dissolved oxygen (DO), or bacteria:

- Flow alteration is not considered a pollutant, and TMDLs need to be written only for pollutants.
- Data did not indicate dissolved oxygen was a problem in the Snake River, and it was assumed that control of nutrients and subsequent reduction in algal densities will lead to observance of water quality standards for dissolved oxygen in the reservoir.
- Data were insufficient to conclude contact recreation impairment by bacteria in Bannock Creek, so a plan was recommended to collect necessary data to determine beneficial use support.

Margins of Safety

TMDLs must also include a margin of safety (MOS) and consider seasonality in the analysis. In TMDLs for American Falls Subbasin, the choice of conservative targets result in an inherent margin of safety when estimating load and wasteload allocations. Seasonality was only considered in the establishment of the chlorophyll *a* target for the reservoir, which is based on a July and August average. It is during these months that recreational use is high as is the potential for growth of aquatic vegetation.

The amount and periodicity of data varied by water body, load allocations were thus based on available data. Most of the data used to calculate loads were collected since 2000 and generally reflect drought conditions in southeast Idaho. Discharge Monitoring Reports (DMRs) provided the basis for estimating wasteloads for NPDES permit holders.

Loading Analysis

A quick overview of both listed and unlisted water bodies, and point sources, for which load and wasteload allocations were recommended is as follows:

American Falls Reservoir – This water body is listed for DO, nutrients, and sediment (Table ES-1). No data were reviewed to indicate sediment was impairing beneficial uses in the reservoir, so no TMDL was done. The reservoir has a history of algae problems exacerbated by nutrient loading to the reservoir. The primary beneficial use affected is cold water aquatic life. Sources of nutrients into the reservoir include: tributaries, springs, drains, waterfowl; and internal recycling of phosphorus. The target for chlorophyll *a* is an average (July and August) concentration not to exceed 0.015 mg/L of chlorophyll *a* for the reservoir, with the assumption that attainment of this target will lead to observance of water quality standards for dissolved oxygen and support of cold water aquatic life beneficial use. A rudimentary model was employed to examine effects of suggested reductions in phosphorus loading to the reservoir. The model predicts that, with recommended phosphorus load allocations, average concentration of chlorophyll *a* will meet the target concentration of 0.015 mg/L, and DO water quality standards will be supported except in the highest of water years. This reservoir should be scheduled for future Beneficial Use Reconnaissance Program (BURP) monitoring to determine support of beneficial uses. Interim load allocations and reductions are detailed in Table ES-2b.

Snake River – American Falls Reservoir to Bingham-Bonneville county line – This water quality limited assessment unit is listed for flow alteration, DO, nutrients, and sediment (Table ES-1). As mentioned, no TMDLs were prepared for stream reaches affected by flow alteration. Data do not indicate that DO levels are violating water quality standards, thus no TMDL was written for dissolved oxygen.

No data were reviewed that suggest sediment is impairing beneficial uses in this reach; however, the effect of bedload and water column sediment in average to high water years is unknown. Until such data are collected, or BURP assessment indicates beneficial support, it is assumed that sediment is impairing beneficial uses in the reach. Beneficial uses possibly affected are cold water aquatic life and salmonid spawning. Eroding streambanks, stormwater runoff from the City of Blackfoot, and agriculture are sources of sediment. Other possible sediment sources are livestock grazing and instream channel. The load allocations for suspended sediment as measured at the U.S. Geological Survey (USGS) gages at Ferry Butte near Blackfoot (13069500) and near Shelley (13060000) are 164,471 tons/year and 118,286 tons/year, respectively (Table ES-2a).

Nutrients do not appear to be impairing beneficial uses in the Snake River, but as the river discharges to American Falls Reservoir, a load allocation was established for phosphorus. Nitrogen is also an important component of nutrient dynamics in lotic as well as lentic waters; although load allocations for nitrogen are not established, DEQ recommends maintaining current levels of nitrogen. Wastewater treatment plants (WWTP) in Blackfoot, Firth, and Shelley, as well as City of Blackfoot stormwater runoff, contribute nutrients to the Snake River in this reach. Other possible nutrient sources include agriculture and livestock. Annual load allocations at USGS gage sites at Ferry Butte, at Blackfoot (13062500), and near Shelley are 167, 146, and 171 tons of total phosphorus. This stream segment should be scheduled for future BURP monitoring to determine support of beneficial uses. Interim load allocations and reductions are detailed in Table ES-2b.

Table ES-2a. Load and wasteload allocations for phosphorus (TP targets of 0.5 mg/L) and sediment for American Falls Subbasin water bodies & point sources.

Water body		Site	Total phosphorus (tons/year)				Suspended sediment (tons/year)			
			Annual load		Annual wasteload		Annual load		Annual wasteload	
			Allo-cation	Reduc-tion	Allo-cation	Reduc-tion	Allo-cation	Reduc-tion	Allo-cation	Reduc-tion
303(d) listed water bodies										
Snake River		nr Blackfoot USGS gage[1]	167	0			164,471	0		
		at Blackfoot USGS gage	146	0						
		nr Shelley USGS gage	171	0			118,286	0		
Bannock Creek			2.6	3.9			948	99		
Moonshine Creek							168	218		
Rattlesnake Creek							307	327		
West Fork Bannock Creek							55	0		
McTucker Creek			6.5	0.0			1,439	0.0		
Portneuf River[2]		Tyhee USGS gage	22	365						
Non 303(d) listed water bodies										
Clear Creek			1.07	0.00						
Danielson Creek			1.92	0.00			548	0		
Hazard Creek (Little Hole Draw)			0.82	3.26			164	0		
Seagull Bay tributary			0.27	0.89						
Spring Creek			8.62	0.00						
Sunbeam Creek			0.22	0.85			261	153		
Cedar spillway			0.49	0.00						
Colburn wasteway			0.26	0.00						
Crystal springs			2.34	0.00						
Nash spill			0.009	0.00						
R spill			0.003	0.00						
Spring Hollow			0.26	0.48						
Sterling wasteway			0.27	0.17						
Point sources										
Aberdeen WWTP					0.03	0.79			7.3	0.0
Blackfoot WWTP					9.46	0.00			72.5	0.0
Firth WWTP					0.49	0.00			8.0	0.0
Shelley WWTP					1.28	0.00			21.0	0.0
Crystal Springs Trout Farm					1.22	0.00			61.1	0.0
City of Blackfoot stormwater runoff					0.33	0.00			21.9	68.0

[1] This gage site is actually at Ferry Butte and Tilden Bridge

Table ES-2b. Interim Load and wasteload allocations for phosphorus (TP targets of 0.07 mg/L) and sediment for American Falls Subbasin water bodies & point sources.

Water body	Site	Total phosphorus (tons/year)				Suspended sediment (tons/year)			
		Annual load		Annual wasteload		Annual load		Annual wasteload	
		Allo-cation	Reduc-tion	Allo-cation	Reduc-tion	Allo-cation	Reduc-tion	Allo-cation	Reduc-tion
303 (d) listed water bodies									
Snake River	nr Blackfoot USGS gage[1]	167	0			164,471	0		
	at Blackfoot USGS gage	146	0						
	nr Shelley USGS gage	171	0			118,286	0		
Bannock Creek		3.6	3.0			948	99		
Moonshine Creek						168	218		
Rattlesnake Creek						307	327		
West Fork Bannock Creek						55	0		
McTucker Creek		6.5	0.0			1,439	0.0		
Portneuf River[2]	Tyhee USGS gage	30.5	356						
Non 303(d) listed water bodies									
Clear Creek		1.07	0.00						
Danielson Creek		1.92	0.00			548	0		
Hazard Creek (Little Hole Draw)		0.1.16	2.95			164	0		
Seagull Bay tributary		0.38	0..78						
Spring Creek		8.62	0.00						
Sunbeam Creek		0.31	0..77			261	153		
Cedar spillway		0.49	0.00						
Colburn wasteway		0.26	0.00						
Crystal springs		2.34	0.00						
Nash spill		0.009	0.00						
R spill		0.003	0.00						
Spring Hollow		0.37	0.38						
Sterling wasteway		0.38	0.06						
Point sources									
Aberdeen WWTP				0.16	0.66			7.3	0.0
Blackfoot WWTP				9.46	0.00			72.5	0.0
Firth WWTP				0.49	0.00			8.0	0.0
Shelley WWTP				1.28	0.00			21.0	0.0
Crystal Springs Trout Farm				1.22	0.00			61.1	0.0
City of Blackfoot stormwater runoff				0.33	0.00			21.9	68.0

[1] This gage site is actually at Ferry Butte and Tilden Bridge

[2] Portneuf River is not on the 303(d) list under American Falls Subbasin, but is on the 303(d) list under its own subbasin

Bannock Creek – American Falls Reservoir to Knox Creek confluence – This water quality limited assessment unit is listed for bacteria, nutrients, and sediment (Table ES-1). Data were incomplete to confirm violations of water quality standards for *E. coli*; therefore, no TMDL was written for bacteria. It was recommended that DEQ and Shoshone-Bannock Tribes cooperate in a sampling effort to confirm bacteria standards violations. No data were reviewed as to support of beneficial uses in this water quality limited assessment unit of Bannock Creek.

The beneficial use most likely affected is cold water aquatic life. Load allocations were established for both nutrients and sediment. Land management activities (e.g., agriculture and livestock grazing) are major sources of nutrients into mainstem Bannock Creek. Nutrient load allocation is 2.6 tons/year for total phosphorus. Possible sources of sediment include agriculture, livestock grazing, and roads. Additional sediment sources may include the instream channel and streambanks. The Generalized Watershed Loading Functions (GWLF) model was used to establish a sediment load for Bannock Creek in comparison to streambank stability and water column sediment data from West Fork Bannock Creek, which served as a reference for Bannock Creek watershed streams. The annual load allocation for sediment is 948 tons (Table ES-2a). This stream assessment unit should be scheduled for future BURP monitoring to determine support of beneficial uses. Interim load allocations and reductions are detailed in Table ES-2b.

Bannock Creek – Knox Creek confluence to headwaters – This water quality limited assessment unit is listed for bacteria, nutrients, and sediment (Table ES-1). Data were incomplete to confirm violations of water quality standards for *E. coli*; therefore, no TMDL was written for bacteria. It was recommended that DEQ and Shoshone-Bannock Tribes cooperate in a sampling effort to confirm bacteria standards violations. Assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial use affected is cold water aquatic life. Load allocations were not stratified based on water quality limited assessment unit, i.e., only one overall load allocation for each pollutant was recommended (see Bannock Creek – American Falls Reservoir to Reservation boundary above for nutrient and sediment load allocations). Interim load allocations and reductions are detailed in Table ES-2b.

Moonshine Creek – This tributary to Bannock Creek is listed on the 303(d) list for sediment (Table ES-1). No data were reviewed as to support of beneficial uses in Moonshine Creek. The beneficial use most likely affected is cold water aquatic life. Possible sources of sediment include agriculture, livestock grazing, and roads. Additional sediment sources may include the instream channel and streambanks. The GWLF model was used to establish a sediment load for Moonshine Creek in comparison to streambank stability and water column sediment data from West Fork Bannock Creek, which served as a reference for Bannock Creek watershed streams. The annual load allocation for sediment is 168 tons (Table ES-2a). This stream should be scheduled for future BURP monitoring to determine support of beneficial uses. Interim load allocations and reductions are detailed in Table ES-2b.

Rattlesnake Creek – This tributary to Bannock Creek is listed on the 303(d) list for sediment (Table ES-1). Assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial use affected is cold water aquatic life. Possible sources of sediment include agriculture, livestock grazing, and roads. Additional sediment sources may include the instream channel and streambanks. The GWLF model was used to establish a sediment load for Rattlesnake Creek in comparison to streambank stability and water column sediment data from West Fork Bannock Creek, which served as a reference for Bannock Creek

watershed streams. The annual load allocation for sediment is 307 tons (Table ES-2a). Interim load allocations and reductions are detailed in Table ES-2b.

West Fork Bannock Creek – This tributary to Bannock Creek is listed on the 303(d) list for sediment (Table ES-1). No data were reviewed as to support of beneficial uses in West Fork. This tributary presently displays significant water quality and habitat improvement. These improvements are directly related to the management measures (fencing of riparian corridor) that have been implemented in the subwatershed. This improvement in water and habitat quality is deemed significant enough to consider West Fork a viable target in the GWLF model for gaging the level of improvement necessary in other 303(d) listed water bodies within Bannock Creek watershed. The annual load allocation for sediment is 55 tons (Table ES-2a). This stream should be scheduled for future BURP monitoring to determine support of beneficial uses. Interim load allocations and reductions are detailed in Table ES-2b.

Knox Creek – This tributary to Bannock Creek is listed on the 303(d) list for unknown pollutants (Table ES-1). Assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial use affected is cold water aquatic life. Possible pollutant sources are agriculture and livestock grazing. Additional sediment sources may include the instream channel, streambanks, and roads. No data were available to indicate nutrients are affecting beneficial uses, although the overall nutrient load allocation for Bannock Creek would encompass Knox Creek. An individual load allocation for sediment was not made for Knox Creek, but is part of the overall sediment load allocation for Bannock Creek (see Bannock Creek – American Falls Reservoir to Reservation boundary). More data are needed to determine what is causing impairment of beneficial uses in Knox Creek. Interim load allocations and reductions are detailed in Table ES-2b.

McTucker Creek – This stream is listed on the 303(d) list for sediment (Table ES-1). Assessment of BURP data indicates the stream is not supporting its beneficial uses. Beneficial uses affected are cold water aquatic life and salmonid spawning. Possible sources of sediment are historic activities, livestock grazing, instream channel, and streambanks. The annual load allocation for sediment is 1,439 tons (Table ES-2a). As this stream contributes to nutrients in American Falls Reservoir, a load allocation is recommended for total phosphorus at 6.5 tons/year. Interim load allocations and reductions are detailed in Table ES-2b.

Danielson Creek – This stream is not on the 303(d) list, but assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial uses affected are cold water aquatic life and salmonid spawning. It is unknown what is causing impairment of beneficial uses in Danielson Creek so load allocations are recommended for both nutrients and sediment. In addition, Danielson Creek is a source of nutrients into American Falls Reservoir. Possible pollutant sources are agriculture and livestock grazing. Additional sediment sources may include the instream channel and streambanks. Total phosphorus load allocation is 1.92 tons/year (Table ES-2a). The annual load allocation for sediment is 548 tons. Interim load allocations and reductions are detailed in Table ES-2b.

Hazard Creek/Little Hole Draw – This stream is not on the 303(d) list, but assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial uses affected are cold water aquatic life and salmonid spawning. It is unknown what is causing impairment of beneficial uses in Hazard Creek/Little Hole Draw so load allocations are recommended for both nutrients and sediment. In addition, Hazard Creek/Little Hole Draw is a source of nutrients into American Falls Reservoir. While Aberdeen WWTP contributes nutrients and some sediment to the creek, other possible pollutant sources are agriculture,

livestock grazing, and urban activities. Additional sediment sources may include the instream channel and streambanks. Total phosphorus load allocation is 0.82 tons/year (Table ES-2a). The annual load allocation for sediment is 164 tons. Interim load allocations and reductions are detailed in Table ES-2b.

Sunbeam Creek – This stream is not on the 303(d) list, but assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial use affected is cold water aquatic life. It is unknown what is causing impairment of beneficial uses in Sunbeam Creek so load allocations are recommended for both nutrients and sediment. In addition, Sunbeam Creek is a source of nutrients into American Falls Reservoir. Possible pollutant sources are agriculture and livestock grazing. Additional sediment sources may include the instream channel and streambanks. Total phosphorus load allocation is 0.22 tons/year (Table ES-2a). The annual load allocation for sediment is 261 tons. Interim load allocations and reductions are detailed in Table ES-2b.

Clear Creek – This stream is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus load allocation is 1.07 tons/year (Table ES-2a). This stream should be scheduled for future BURP monitoring to determine support of beneficial uses. Interim load allocations and reductions are detailed in Table ES-2b.

Seagull Bay tributary – This stream is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus load allocation is 0.27 tons/year (Table ES-2a). This stream should be scheduled for future BURP monitoring to determine support of beneficial uses. Interim load allocations and reductions are detailed in Table ES-2b.

Spring Creek – This stream is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus load allocation is 8.62 tons/year (Table ES-2a). This stream should be scheduled for future BURP monitoring to determine support of beneficial uses. Interim load allocations and reductions are detailed in Table ES-2b.

Cedar spillway – This agricultural return drain is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus load allocation is 0.49 tons/year (Table ES-2a). Interim load allocations and reductions are detailed in Table ES-2b.

Colburn wasteway – This agricultural return drain is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus load allocation is 0.26 tons/year (Table ES-2a). Interim load allocations and reductions are detailed in Table ES-2b.

Crystal springs – This water body is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus load allocation is 2.34 tons/year (Table ES-2a). Interim load allocations and reductions are detailed in Table ES-2b.

Nash spill – This agricultural return drain is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus load allocation is 0.009 tons/year (Table ES-2a). Interim load allocations and reductions are detailed in Table ES-2b.

R spill – This agricultural return drain is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus load allocation is 0.003 tons/year (Table ES-2a). Interim load allocations and reductions are detailed in Table ES-2b.

Spring Hollow – This water body is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus load allocation is 0.26 tons/year (Table ES-2a). Interim load allocations and reductions are detailed in Table ES-2b.

Sterling wasteway – This agricultural return drain is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus load allocation is 0.27 tons/year (Table ES-2a). Interim load allocations and reductions are detailed in Table ES-2b.

Portneuf River – This stream is on the 303(d) list and a TMDL has already been approved for the Portneuf River Subbasin. The river contributes to nutrient loads in American Falls Reservoir. The total phosphorus load allocation is 22 tons/year (Table ES-2a). Interim load allocations and reductions are detailed in Table ES-2b.

Aberdeen wastewater treatment plant – This point source contributes nutrients and some sediment to Hazard Creek/Little Hole Draw, and ultimately to American Falls Reservoir. The total phosphorus load allocation is 0.03 tons/year (Table ES-2a). The annual wasteload allocation for sediment is 7.3 tons. The total phosphorus load allocation requires a reduction of current estimated wasteloads, while the sediment wasteload allocation does not. Interim wasteload allocations and reductions are detailed in Table ES-2b.

Blackfoot wastewater treatment plant – This point source contributes nutrients and some sediment to the Snake River, and ultimately to American Falls Reservoir. The total phosphorus load allocation is 9.46 tons/year (Table ES-2a). The annual wasteload allocation for sediment is 72.5 tons. Neither phosphorus nor sediment wasteload allocations require a reduction of current estimated wasteloads. Interim wasteload allocations and reductions are detailed in Table ES-2b.

Firth wastewater treatment plant – This point source contributes nutrients and some sediment to the Snake River, and ultimately to American Falls Reservoir. The total phosphorus load allocation is 0.49 tons/year (Table ES-2a). The annual wasteload allocation for sediment is 8.0 tons. Neither phosphorus nor sediment wasteload allocations require a reduction of current estimated wasteloads. Interim wasteload allocations and reductions are detailed in Table ES-2b.

Shelley wastewater treatment plant – This point source contributes nutrients and some sediment to the Snake River, and ultimately to American Falls Reservoir. The total phosphorus load allocation is 1.28 tons/year (Table ES-2a). The annual wasteload allocation for sediment is 21.0 tons. Neither phosphorus nor sediment wasteload allocations require a reduction of current estimated wasteloads. Interim wasteload allocations and reductions are detailed in Table ES-2b.

Crystal Springs Trout Farm – This point source contributes nutrients and some sediment that ultimately reach American Falls Reservoir. The total phosphorus load allocation is 1.22 tons/year (Table ES-2a). The annual wasteload allocation for sediment is 61.1 tons. Neither phosphorus nor sediment wasteload allocations require a reduction of current estimated wasteloads. Interim wasteload allocations and reductions are detailed in Table ES-2b.

City of Blackfoot stormwater runoff – This point source contributes nutrients and sediment to the Snake River, and ultimately to American Falls Reservoir. The total phosphorus load allocation is 0.33 tons/year (Table ES-2a). The annual wasteload allocation for sediment is 21.9 tons. Phosphorus wasteload allocation does not require a reduction of current estimated

wasteloads while the sediment wasteload allocation does. Interim wasteload allocations and reductions are detailed in Table ES-2b.

Water bodies Recommended for Delisting

Information used to prepare this document justifies the delisting of pollutants for several water bodies in the subbasin. No data were reviewed to indicate sediment was affecting beneficial uses in American Falls Reservoir. Monitoring of dissolved oxygen in the Snake River showed no violations of water quality standards. Levels of nutrients observed in the Snake River were low compared to target concentrations used to establish load allocations. Thus, it is recommended that for future 303(d) lists, American Falls Reservoir (assessment unit ID17040206SK001L0L) be delisted for sediment, and the Snake River (assessment unit ID17040206SK02202) be delisted for dissolved oxygen and nutrients.

Possible Additions to 303(d) List

Data examined during preparation of the TMDL imply possible impairment of beneficial uses due to pollutants additional to those on the 303(d) list. Violations of water quality standards for temperature in the Snake River were documented, and the water body should have temperature included on future 303(d) lists. Assessment of BURP data indicated several other non 303(d)-listed streams not supporting their beneficial uses. The following did not support cold water aquatic life and/or salmonid spawning in at least a portion of the watershed and should be considered for inclusion on future 303(d) lists: Danielson Creek, Hazard Creek (Little Hole Draw), and Sunbeam Creek.

Data Gaps

Several aspects of the TMDL would be improved with additional data. These data would serve to better refine links between pollutants and beneficial uses, natural background levels, more appropriate targets, and better estimates of load allocations. The following is by no means an exhaustive list of all data needs in the American Falls Subbasin:

- natural background levels of nutrients and sediment
- nutrient and sediment data from average and above average water years
- refinement of nutrient levels necessary to support beneficial uses
- contribution of springs to reservoir nutrient loads
- bathymetric data from American Falls Reservoir
- better estimates of internal phosphorus loading in American Falls Reservoir
- increased sampling of the reservoir to include more sites over a longer period (e.g., April through September)
- sediment bedload data from average to above average water years in subbasin streams, especially the Snake River
- complete survey of streambank stability in Bannock Creek watershed streams
- additional water quality information from tributaries on the Fort Hall Reservation
- regular stream flow information throughout the year for tributaries

- bacteria sampling in Bannock Creek
- ambient monitoring above and below wastewater treatment plant effluent discharges identification of pollutant sources in the subbasin

Implementation Strategies

Any implementation plan will concentrate on reducing nutrients and sediment. For point sources such as wastewater treatment plants, it is expected that future NPDES permits will include recommended limitations on nutrients. Reduction in pollutant loadings for nonpoint sources will most likely require a mix of policy changes, program initiatives, and implementation of *Best Management Practices*.

Certain state agencies have been designated to work with particular industries that have the potential for contributing nonpoint source pollutants. For example, the *Idaho Soil Conservation Commission* has the responsibility to work with agriculture and the livestock industry on development of their implementation plan to meet recommendations set out in the American Falls Subbasin TMDL.

No timelines are presented as to when water quality will improve to the point of supporting beneficial uses. Such dates are dependent on a myriad of factors such as financial support, landowner cooperation, and geological processes (e.g., sufficient stream flows to mobilize sediment and move it out of the system). The hope would be so see some significant changes toward meeting the goals of the TMDL within ten years.

Interim Targets and Load Allocations in a Phased TMDL Approach

Phased TMDLs are appropriate for situations in which the state expects, because of data gaps, to revise the TMDL, including the loading capacity and allocation scheme, as additional information is collected. Clarification Regarding "Phased" Total Maximum Daily Loads, August 2, 2006 ("Clarification"), at page 3. A prime example of when a phased TMDL is appropriate is a TMDL for phosphorous in a lake watershed where there are uncertain loadings from the major land uses and limited knowledge of the in-lake processes. Id. Even where there is little data uncertainty, TMDLs may contain provisions for adaptive implementation using flexible load allocation/wasteload allocation schemes. Clarification at page 4.

The Idaho Water Quality Act, Idaho Code § 39-3611(7), requires DEQ to review and reevaluate each TMDL, including the water quality criteria used, instream targets, pollution allocations, and the underlying assumptions and analysis, at intervals no greater than five years.

With respect to the AF TMDL, DEQ acknowledges uncertainties and data gaps regarding the model used in connection with setting tributary targets and load allocations. Uncertainty regarding loading and a limited knowledge of in-reservoir processes required the use of certain assumptions and estimates in the model, which in turn affect the certainty of the load reductions necessary to meet water quality standards. See AF TMDL, pages 122-125. More data and more sophisticated or detailed analytical techniques may increase DEQ's ability to predict water quality conditions and set load allocations that will achieve water quality standards. Since the development of the original TMDL, DEQ has already begun the process of collecting additional data and information regarding water quality in the AF reservoir and the

significant tributaries. Given these circumstances and the applicable Idaho law, DEQ intends to reevaluate, and as appropriate revise, the targets and load allocations set forth in this TMDL within 5 years of its issuance.

Within the next 5 years additional data will be gathered that measures AF Reservoir water quality conditions, tracks progress in attaining TMDL objectives, and fills data gaps. DEQ shall form a Technical Advisory Committee to develop a work plan for additional monitoring and analysis. The work plan will be reviewed/revised on an annual basis. The work plan may include more refined modeling and DEQ expects at a minimum the work plan will include the measurement of water column total phosphorus, chlorophyll a, and dissolved oxygen within each segment addressed by the TMDL during time frames that represent high, low and average flow conditions, if possible. The work plan will also establish a timetable for revision of the TMDL, as appropriate, within the 5 year time period required by Idaho Code 39-3611(7).

Until the TMDL is reevaluated, and while the additional data is being gathered, DEQ believes an interim water quality target of 0.07 mg/l total phosphorus for the tributaries is appropriate. Load allocations based on this target are set out below. DEQ has selected this interim water quality target of 0.07 mg/l total phosphorus based upon data comparing median chlorophyll a concentration with median total phosphorous concentration data for lakes and reservoirs in the Pacific Northwest. See Snake River Hells Canyon TMDL, Figure 3.2.13.b. This data suggests that, for the water bodies evaluated, total phosphorous concentrations of 0.07 mg/l correlate with chlorophyll a concentrations of 13 ug/l or less. Please note that where current loads are lower than the target, the load allocations are set at the current loads.

Adaptive Implementation

As noted, TMDLs may use an iterative implementation approach that makes progress toward achieving water quality goals while using any new data and information to reduce uncertainty and adjust implementation activities. Clarification at page 3-4. Implementation can also be staged.

The Idaho Water Quality Act provides that TMDLs should be implemented through pollution control strategies, which are defined as cost-effective actions in TMDL implementation plans to control the discharge of pollutants that can reasonably be taken to improve the water quality within the physical, operational, economic and other constraints that affect individual enterprises and communities. Idaho Code § 39-3602 (5); 39-3611(4).

DEQ intends to facilitate development of an Implementation Plan for the AF TMDL within 18 months of the TMDL's approval by EPA. The Implementation Plan will take into account the fact that long-term targets and allocations will be reevaluated within five years, and that interim water quality goals have been set. **In** the case of sources on the Portneuf River, load allocations, wasteload allocations and implementation will be controlled by the Portneuf River TMDL and an implementation plan developed by DEQ and other designated agencies in consultation with the WAG for that tributary.

The Implementation Plan should consider the following principles:

1. Attainable water quality goals should reflect control strategies that are feasible on a broad, watershed basis. Highest cost management practices should not be the basis for water quality planning. For example, it is not reasonable to expect sources to achieve zero discharge, or to expect all of irrigated agriculture to convert to sprinkler irrigation, or to expect all point sources to retrofit with the most expensive pollution control technology available.

2. After completing an implementation plan, site-specific analyses must be performed to determine the most appropriate and effective control strategies for particular locations and land use actives. The time required for ground-level planning and project approval process varies widely depending upon then nature of the land and related hydrology, the land use, the parties involved, the type of treatment selected, and other factors.

3. Construction and implementation of management practices follows project approval. As with the planning and approval process, the time required to complete a project and realize water quality improvements varies from more the more immediate, as with introduction of rotational grazing as a management practice, to longer term, as with stream bank re-vegetation and created wetlands (6-7 years may be necessary to establish vegetation that will produce adequate results).

4. In addition to the time required to achieve effective reductions, the time required for the river and reservoirs to fully respond to the improvement in inflowing water quality and process the existing pollutant loads already in place within the system must also be recognized.

5. Data collection will continue throughout the implementation process to determine progress and improve understanding of the AF TMDL system. As this TMDL is a phased process, it is projected that the goals and objectives of this TMDL will be revisited periodically to evaluate new information and assure that the goals and milestones are consistent with the overall goal of meeting water quality standards in the AF TMDL reach.

6. The load allocation mechanism established and implemented through tributary TMDLs should allow attainment of water quality targets through (to the extent possible) fair and equitable distribution of the identified pollutant loads, and result in productive implementation without causing undue hardship on any single pollutant source.

7. The adaptive implementation process will address the use of water quality trading.

Implementation of the American Falls TMDL and the Portneuf TMDL

The Portneuf TMDL is designed to be implemented in phases. According to the February 2001 Supplement to Final TMDL Plan for the Portneuf River, phase I of implementation consists of the collection and analysis of additional water quality data and the implementation of short term control measures. Based on the additional water quality data and the evaluation of control measures and progress towards water quality goals, new load and waste load allocations are intended to be submitted to EPA. Final Supplement at page 4. The allocation of pollutant loads for the Portneuf will be refined taking into account several principles: 1. Future growth; 2. Seasonal or climatic variations; 3 Temporal aspects; 4. Antibacksliding requirements; 5. Antidegradation requirements; 6. Margin of safety; 7. Allocation refinement; and 8. Principles of fairness.

With the cooperation of Portneuf River stakeholders, DEQ has collected additional data regarding Portneuf River water quality. DEQ has begun to meet with the Portneuf River WAG to refine allocations and appropriate pollution control strategies. DEQ intends to evaluate the Portneuf TMDL as a Phased TMDL and will continue to follow the staged approach for implementation of the Portneuf TMDL. Implementation of the Portneuf TMDL will function as the means of implementing the AF TMDL for the sources on the Portneuf River. The AF TMDL will not set load or waste load allocations for sources on the Portneuf River. Those load and waste load allocations will be set in the Portneuf TMDL.