

Lower Payette River

TMDL Five-Year Review (HUC 170150122)



Final

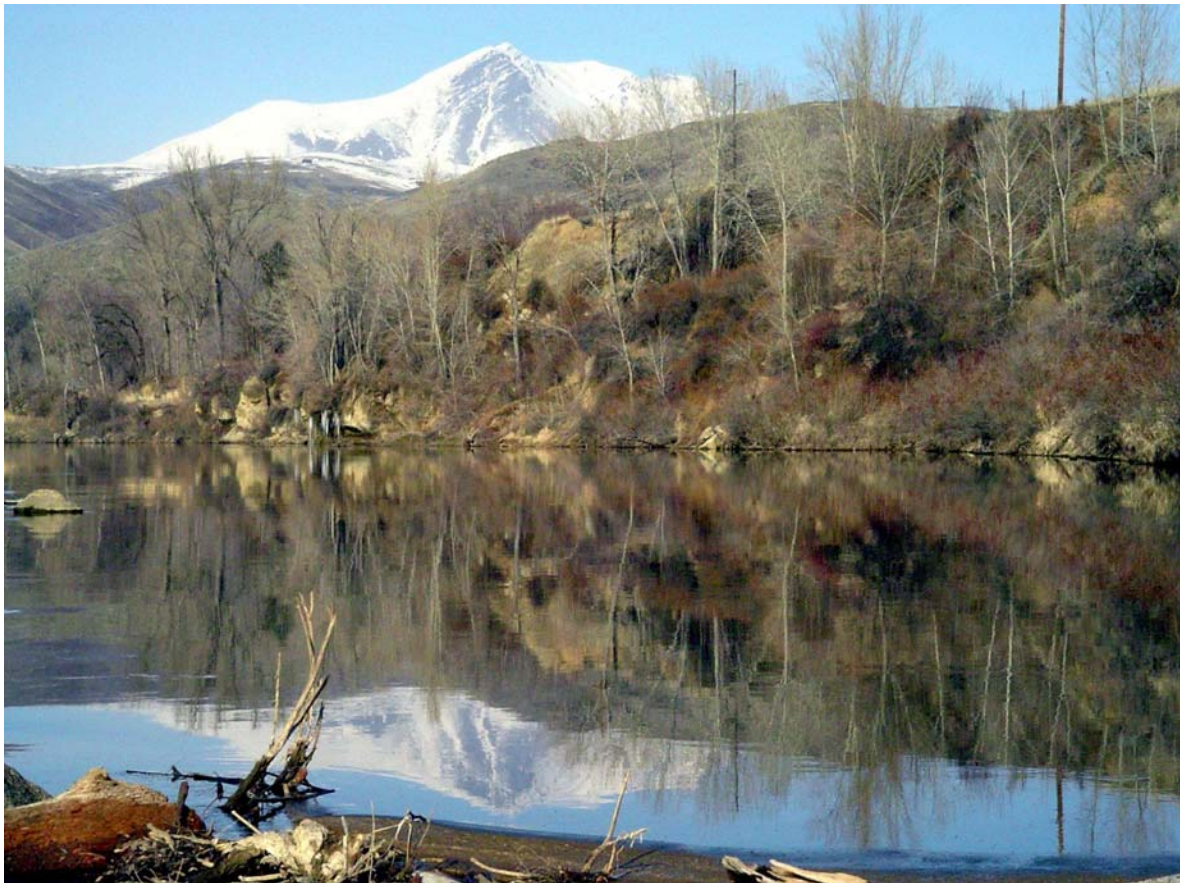


Department of Environmental Quality

February 2010

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Lower Payette River TMDL Five-Year Review



Payette River. Photograph by Krista Cole, Off The Bench Marketing.

February 2010

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Table of Contents

Table of Contents	v
List of Tables	vii
List of Figures	ix
Abbreviations, Acronyms, and Symbols.....	xiii
Executive Summary	xv
Subbasin At A Glance	xvii
About Assessment Units	xix
TMDL Targets and Load Allocations	xxi
Key Findings	xxi
Summary of Recommendations.....	xxvi
Section 1: Introduction	1
About Assessment Units	1
Subbasin at a Glance.....	2
Section 2: TMDL Overview	9
Approved TMDLs	9
Permitted Point Sources	12
Nonpoint Sources	13
TMDL Targets	15
Water Quality Criteria	15
Control Location Monitoring	16
Load Capacity	20
Load Allocations	23
Margin of Safety	27
Seasonal Variation	28
Reserve for Growth	30
Section 3: Beneficial Use Status	33
Beneficial Uses	33
Changes to Subbasin Characteristics	36
Current Water Quality Data Sources.....	37
Pollution Source Review	39
Point Sources	39
Nonpoint Sources.....	42
Natural Events.....	42
Flow and Habitat Alteration	42
Analysis of Current Water Quality Data	43
Data Collection.....	43
Bacteria	48
Sediment	53
Phosphorus	59
Temperature.....	70
Dissolved Oxygen	78
pH.....	81
Ammonia	82
Flow and Habitat	82

Summary of Beneficial Uses	85
Status of Beneficial Uses	87
Summary of Recommendations.....	92
Section 4. Review of Implementation Plans and Activities.....	101
Implementation Plans	101
Responsible Parties	101
Planned Activities.....	102
Point Sources	102
Nonpoint Sources.....	103
Accomplished Activities	106
Monitoring	109
Bacteria	110
Sediment, Pesticides, and Total Phosphorus.....	112
Future Strategy.....	114
Time Frame	114
Section 5. Summary of Five Year Review.....	115
Review Process	115
Changes in Subbasin	115
TMDL and Constituent Analysis.....	116
Bacteria	116
Sediment	117
Temperature.....	117
Total Phosphorus	118
Pesticides	118
Dissolved Oxygen (DO).....	118
Review of Beneficial Uses	119
Water Quality Criteria.....	119
Future TMDLs	119
Watershed Advisory Group Consultation	120
References Cited	121
Glossary	127
Appendix A. Unit Conversion Chart	139
Appendix B. State and Site-Specific Standards and Criteria	141
Appendix C. Data Tables and Graphs	149
Appendix D. Assessment Unit Maps.....	187

List of Tables

Table A. Summary of approved TMDLs in or relating to the lower Payette River subbasin, associated load allocations, and available monitoring data.....	xv
Table B. Summary of Subbasin TMDLs, Implementation Plans, and Recommended Listing Status Changes for 2010.....	xviii
Table C. Summary of assessment units, 2008 Integrated Report, and five-year review recommendations.	xxii
Table 1. Summary of historical §303(d) listings, approved Idaho TMDLs (DEQ, 1999, 2003, 2008; IDEQ and ODEQ, 2004), and load allocations (LAs) assigned to the lower Payette River.	10
Table 2. Bacteria load allocations (LAs) for the lower Payette River TMDL as published in Table 19 of the TMDL (DEQ, 1999).....	11
Table 3. Load allocations (LAs) assigned to the Payette River in Bissel Creek (DEQ, 2003), Snake River-Hells Canyon (IDEQ and ODEQ, 2004), and Big Willow Creek (DEQ, 2008) TMDLs, based on 1998 §303(d) list.	12
Table 4. Municipal wastewater treatment plants (WWTP) and known NPDES-permitted point sources discharging to the lower Payette River and its tributaries in 1998, as taken from Table 9 in the TMDL (DEQ, 1999).....	13
Table 5. Control monitoring locations with corresponding location number for Figure 5 (map) for the lower Payette River, Bissel Creek, and Snake River-Hells Canyon TMDLs.	19
Table 6. Subbasin point source load analysis for lower Payette River bacteria TMDL (DEQ, 2003).	24
Table 7. Lower Payette River Subbasin TMDL (DEQ, 2003) tributary, drain, and nonpoint source load allocations for bacteria.	24
Table 8. Existing sediment and bacteria loads, load allocations, and required reduction for sediment and bacteria at control monitoring locations in Bissel Creek (DEQ, 2003).	26
Table 9. Summary of 2008 Integrated Report listing status for lower Payette River subbasin assessment units (AU), and beneficial uses established in Idaho Water Quality Standards (2007).....	33
Table 10. Idaho Water Quality Standards (2007) applicable to surface waters of the lower Payette River subbasin.	36
Table 11. Summary of lower Payette River subbasin data sources used in the five-year review, determination of beneficial use status, and pollutant type.	38
Table 12. Individual NPDES-permitted point sources in the lower Payette River subbasin, as of March 2009.....	40
Table 13. Data collection locations in the lower Payette River subbasin from 2000-2009...	46
Table 14. Summary of suspended sediment (SSC or TSS), phosphorus, and bacteria concentration data reported for lower Payette River subbasin TMDL control monitoring and data collection locations between 2000 and 2009.....	47
Table 15. Average monthly and seasonal discharge of drains and tributaries in the lower Payette River subbasin, April through September 2000-2009.	64

Table 16. Average monthly and seasonal total phosphorus loads from drains and tributaries in the lower Payette River subbasin, April through September 2000-2009.	65
Table 17. Summary of benthic macroinvertebrate data from lower Payette River subbasin locations, 2004-2007, compared to DEQ temperature tolerance indices.	76
Table 18. Summary of temperature tolerance of fish community data collected by the USGS and DEQ from several Assessment Units between 2002 and 2006.	77
Table 19. Summary of assessment units, 2008 Integrated Report, existing TMDLs, and five-year review results.	88
Table 20. Summary of agricultural sector activities from the Lower Payette River TMDL Implementation Plan (DEQ, 2003). Blank spaces indicate information was not reported for this review.	107
Table 21. Summary of agricultural sector activities from the Bissel Creek TMDL Implementation Plan (DEQ, 2006). The TMDL applies to AU 015-03a.	108
Table 22. Summary of agricultural sector activities from the Snake River-Hells Canyon TMDL Implementation Plan (DEQ, 2004).	109
Table 23. Bacteria data at TMDL control monitoring locations for tributary and nonpoint sources compared to TMDL targets (126 geomean cfu/100mL).	111
Table 23-continued. Bacteria data at TMDL control monitoring locations for tributary and nonpoint sources compared to TMDL targets (126 geomean cfu/100mL).	112
Table 24. Summary of reported suspended sediment concentration and total phosphorus sample results from locations in the lower Payette River subbasin between 2000 and 2009.	113
Table A-1. Metric - English unit conversions.	140
Table C-1. USGS data from Lower Payette River subbasin locations between 2003 and 2008.	150
Table C-2. USGS daily mean discharge and maximum recorded water temperature from the Payette River near Payette, 2008-2009.	151
Table C-3. Data provided by the Idaho State Department of Agriculture from locations in the Lower Payette River subbasin between 2000 and 2009.	160
Table C-4. Data collected by Wastewater Treatment Plants in the Lower Payette River Subbasin between 2003 and 2008.	174
Table C-5. Reported results of data collected by the Bureau of Reclamation from locations in the Lower Payette River subbasin between 2003 and 2008.	176
Table C-6. Data collected by DEQ from locations in the Lower Boise River subbasin in 2009.	182
Table C-7. Aquatic life data collected by USGS and DEQ from lower Payette River subbasin locations between 2003 and 2008.	183
Table C-8. Fish community data collected by USGS and DEQ from Lower Payette River subbasin locations between 2003 and 2008.	184
Table C-9. Location of TMDL control monitoring points in the Lower Payette River Subbasin.	185
Table C-10. Flow proportion of tributaries, drains, and selected control monitoring locations of the mainstem river compared to flow reported at the mouth of the Payette River during the irrigation season (from averaged monthly reported values), 2000-2009.	186

List of Figures

Figure A. Streams in the Lower Payette River Subbasin, HUC 17050122.	xx
Figure 1. Streams and Watersheds within the Lower Payette River Subbasin.....	3
Figure 2. Permitted (IDWR) and Observed Dams and Diversions (Canals) in the Lower Payette River Subbasin.	5
Figure 3. Land Stewardship in Lower Payette River Subbasin.	6
Figure 4. Land Use and 303(d)-Listed Streams in the Lower Payette River Subbasin.....	7
Figure 5. Map of Control Monitoring Locations in the Lower Payette River Subbasin. *.....	18
Figure 6. Process and Criteria for Determining Support Status of Beneficial Uses in Wadeable Streams: Water Body Assessment Guidance, Second Edition (Grafe et al., 2002).	35
Figure 7. NPDES-Permitted Point Sources in the Lower Payette River Subbasin as Reported on the EPA Web Site of NPDES Permits in March 2009.....	41
Figure 8. Map of Data Collection Locations in the Lower Payette River Subbasin. Location Numbers Correspond to the Location Numbers in Table 13.	45
Figure 9. <i>E. coli</i> Bacteria Data Reported for Control Monitoring Locations on the Lower Payette River, 2003 -2009.....	49
Figure 10. <i>E. coli</i> Bacteria Data Collected and Reported by the Bureau of Reclamation for Control Monitoring Locations on Bissel Creek, 2004.....	49
Figure 11. <i>E. coli</i> Bacteria Data Collected and Reported by the Idaho State Department of Agriculture for Control Monitoring Locations on Bissel Creek, 2008.	50
Figure 12. <i>E. coli</i> Bacteria Data Collected and Reported by the Idaho State Department of Agriculture for AU_017 and AU_018, Lower Payette River Subbasin, 2007.....	50
Figure 13. <i>E. coli</i> Bacteria Data Collected and Reported by the Bureau of Reclamation (BOR) and the Idaho State Department of Agriculture (ISDA) from North-Side Irrigation Systems in AU 015 and AU 018, 2003 and 2004.....	51
Figure 14. <i>E. coli</i> Bacteria Data Collected and Reported by the Idaho State Department of Agriculture (ISDA) from S-Drain Irrigation System in AU 001, 2000-2002.	51
Figure 15. <i>E. coli</i> Bacteria Data Collected and Reported by the Idaho State Department of Agriculture (ISDA) from S-Drain Irrigation System in AU 001_02, 2008.	52
Figure 16. <i>E. coli</i> Bacteria Data Collected and Reported from North-Side Irrigation Systems in AU 001, 2008 and 2009.....	52
Figure 17. <i>E. coli</i> Bacteria Data Collected and Reported from Irrigation Drains in AU 001_02, 2009.	53
Figure 18. Suspended Sediment Concentration Data from Bissel Creek Irrigation Inflow and Monitoring Locations, 2004.	54
Figure 19. Suspended Sediment Concentration Data from Bissel Creek Monitoring Locations, 2008.	54
Figure 20. Suspended Sediment Concentration Data from Control Monitoring Location at the Confluence with the Snake River (LPR-007), 2002-2006.....	55
Figure 21. Reported Suspended Sediment Concentration Data from Control Monitoring Locations on the Lower Payette River (AU 001_06), 2003-2009.	56

Figure 22. Suspended Sediment Concentration Data Reported by the Idaho State Department of Agriculture for AU 017 and AU 018, Lower Payette River Subbasin, 2007.	56
Figure 23. Suspended Sediment Concentration Data Reported by the Idaho State Department of Agriculture for the S-Drain Irrigation System (AU 001_02), 2000-2002.	57
Figure 24. Suspended Sediment Concentration Data Reported by the Idaho State Department of Agriculture for the S-Drain Irrigation System (AU 001_02), 2008.	57
Figure 25. Suspended Sediment Concentration Data Reported by DEQ for Irrigation Drains (AU 001_02), 2009.	58
Figure 26. Suspended Sediment Concentration Data Reported for the North-Side Irrigation System (AU 001_02), 2008.	58
Figure 27. Total Phosphorus Concentration Data Reported for the Lower Payette River (AU 001_06), 2003-2009.	59
Figure 28. Total Phosphorus Concentration Data Reported for Bissel Creek (AU 015), 2008.	60
Figure 29. Total Phosphorus Concentration Data Reported from the North-Side Irrigation System (AU 001_02), 2003.	60
Figure 30. Total Phosphorus Concentration Data Reported from the North-Side Irrigation System (AU 001_02), 2008.	61
Figure 31. Total Phosphorus Concentration Data Reported from Big and Little Willow Creek (AU 017 and AU 018), 2007.	61
Figure 32. Total Phosphorus Concentration Data Reported from Irrigation Drains (AU 001_02), 2009.	62
Figure 33. Total Phosphorus Concentration Data Reported from S-Drains (AU 001_02), 2000 through 2002.	62
Figure 34. Total Phosphorus Concentration Data Reported from S-Drains (AU 001_02), 2008.	63
Figure 35. Lower Payette River Subbasin Total Phosphorus Monthly and Seasonal Proportional Loads Calculated From TMDL Control Monitoring Location Averaged Data, April Through September, 2000 – 2009. Note: The legend key applies to pages 66-69.	66
Figure 36. Graph of Daily Maximum and Minimum, and Average Maximum and Minimum Air Temperatures from 1906-2008.	70
Figure 37. Graph of Daily Maximum and Minimum, and Average Maximum and Minimum Air Temperatures from 1892-2008 as Retrieved from the Western Regional Climate Center for the Payette Weather Station.	71
Figure 38. Daily Maximum Water Temperature Reported for Lower Payette River Monitoring Locations (AU 001_06) Compared to Water Quality Standards for Salmonid Spawning and Cold-Water Aquatic Life, 2003-2008.	72
Figure 39. Instantaneous Water Temperature Reported for North-Side Irrigation Systems (AU 015_03 and AU 018_03) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2003-2004.	72

Figure 40. Instantaneous Water Temperature Reported for North-Side Irrigation Systems (AU 001_02) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2008.	73
Figure 41. Instantaneous Water Temperature Reported for Bissel Creek (AU 015_03a) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2004.	73
Figure 42. Instantaneous Water Temperature Reported for Bissel Creek (AU 015_03a) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2008.	74
Figure 43. Instantaneous Water Temperature Reported for Big and Little Willow Creeks (AU 017 and AU 018) Compared to Water Quality Standards for Salmonid Spawning (AU 017) and Cold-Water Aquatic Life, 2007.	74
Figure 44. Instantaneous Water Temperature Reported for Monitoring Locations in the S-Drain Irrigation System (AU 001_02) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2000-2002.	75
Figure 45. Instantaneous Water Temperature Reported for the S-Drain Irrigation Monitoring Locations (AU 001_02) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2008.....	75
Figure 46. Reported Instantaneous Dissolved Oxygen Concentrations from Lower Payette River Control Monitoring Locations, 2003-2008.	78
Figure 47. Reported Instantaneous Dissolved Oxygen Concentrations for Big and Little Willow Creeks (AU 017 and 018), Monitoring Locations, 2007.	79
Figure 48. Reported Instantaneous Dissolved Oxygen Concentrations for North-Side Irrigation System Monitoring Locations in AU 001_02 and AU 016_03, 2008.....	79
Figure 49. Graph of Reported Instantaneous Dissolved Oxygen Concentrations from Irrigation System in AU 018_03, 2003.....	79
Figure 50. Reported Instantaneous Dissolved Oxygen Concentrations from Control Monitoring Locations in Bissel Creek (AU 015_03 and 03a), 2008.	80
Figure 51. Reported Instantaneous Dissolved Oxygen Concentrations for S-Drain Irrigation System Monitoring Locations in AU 001_02, 2000-2002.	80
Figure 52. Reported Instantaneous Dissolved Oxygen Concentrations from S-Drain Irrigation System Monitoring Locations in AU 001_02, 2008.....	81
Figure 53. Reported Instantaneous Dissolved Oxygen Concentrations from Irrigation Drain Monitoring Locations in AU 001_02, 2009.....	81
Figure 54. Flow Control Features in the Lower Payette River Subbasin as Observed or Documented in 2009.	83
Figure 56. Continuous Mean Daily Discharge of Lower Payette River near Emmett, Letha, and Payette, 2007 and 2008.	85
Figure E-1. Lower Payette River Assessment Unit 001 (lower Payette River from Black Canyon Dam outfall to the mouth), with surface water bodies and potential surface water pollutant sources.....	188
Figure E-2. Lower Payette River Assessment Unit 001 (lower Payette River from Black Canyon Dam outfall to the mouth), with roads and urban areas.	189
Figure E-3. Lower Payette River Assessment Unit 015 (Bissel Creek), with surface water bodies and potential surface water pollutant sources.....	190
Figure E-4. Lower Payette River Assessment Unit 015 (Bissel Creek), with roads and urban areas.	191

Figure E-5. Lower Payette River Assessment Unit 016 (Sand Hollow Creek), with surface water bodies, roads and potential surface water pollutant sources.....	192
Figure E-6. Lower Payette River Assessment Unit 017 (Big Willow Creek), with surface water bodies and potential surface water pollutant sources.....	193
Figure E-7. Lower Payette River Assessment Unit 017 (Big Willow Creek), with roads and water features.....	194
Figure E-8. Lower Payette River Assessment Units 018, 019, 020, and 021 (Little Willow Creek), with surface water bodies and potential surface water pollutant sources.	195
Figure E-9. Lower Payette River Assessment Units 018, 019, 020, and 021 (Little Willow Creek), with surface water bodies and roads.	196

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	DOI	U.S. Department of the Interior
μ	micro, one-one thousandth	EPA	United States Environmental Protection Agency
§	Section (usually a section of federal or state rules or statutes)	F	Fahrenheit
AU	assessment unit	FWS	U.S. Fish and Wildlife Service
BLM	United States Bureau of Land Management	GIS	Geographical Information Systems
BMP	best management practice	HUC	Hydrologic Unit Code
BOR	United States Bureau of Reclamation	I.C.	Idaho Code
BURP	Beneficial Use Reconnaissance Program	IDAPA	Refers to citations of Idaho administrative rules
C	Celsius	IDFG	Idaho Department of Fish and Game
CFR	Code of Federal Regulations (refers to citations in the federal administrative rules)	IDL	Idaho Department of Lands
cfs	cubic feet per second	IDWR	Idaho Department of Water Resources
cm	centimeters	ISDA	Idaho State Department of Agriculture
CWA	Clean Water Act	km	kilometer
CWAL	cold water aquatic life	km²	square kilometer
DEQ	Department of Environmental Quality	LA	load allocation
DO	dissolved oxygen	LC	load capacity
		m	meter
		m³	cubic meter
		mi	mile

mi²	square miles	SSC	suspended sediment concentration
MGD	million gallons per day	STATSGO	State Soil Geographic Database
mg/L	milligrams per liter	TDS	total dissolved solids
mm	millimeter	TKN	total Kjeldahl nitrogen
MOS	margin of safety	TMDL	total maximum daily load
MWMT	maximum weekly maximum temperature	TP	total phosphorus
n.a.	not applicable	TS	total solids
NA	not assessed	TSS	total suspended solids
NB	natural background	t/y	tons per year
nd	no data (data not available)	U.S.	United States
NFS	not fully supporting	U.S.C.	United States Code
NPDES	National Pollutant Discharge Elimination System	USDA	United States Department of Agriculture
NRCS	Natural Resources Conservation Service	USFS	United States Forest Service
NTU	nephelometric turbidity unit	USGS	United States Geological Survey
ORV	off-road vehicle	WAG	Watershed Advisory Group
ORW	Outstanding Resource Water	WBAG	<i>Water Body Assessment Guidance</i>
PCR	primary contact recreation	WBID	water body identification number
ppm	part(s) per million	WLA	wasteload allocation
SBA	subbasin assessment	WQS	water quality standards
SCR	secondary contact recreation		
SS	salmonid spawning		

Executive Summary

This document presents a five-year review of the Lower Payette River Subbasin Assessment (SBA) and Total Maximum Daily Load (TMDL) for bacteria (DEQ, 1999). This review addresses the water bodies in the lower Payette River subbasin that are in Idaho's current and most recent Section 4(a) of the Integrated Report. This five-year review has been developed to comply with Idaho Statute 39-3611 (7). The review describes current water quality status, pollutant sources, and recent pollution control efforts in the lower Payette River subbasin, located in southwest Idaho (Figure A).

The TMDLs subject to five-year review are shown in Table A and Table B. The initial SBAs and TMDLs for the subbasins and watersheds mentioned in this review are available from the Department of Environmental Quality (DEQ) Web site at http://www.deq.state.id.us/water/data_reports/surface_water/tmdls/sba_tmdl_master_list.cfm#region and describe the physical, biological, and cultural setting; water quality status; pollutant sources; and previous pollution control actions. This five-year review includes a review of SBAs, TMDLs, and Implementation Plans for Bissel Creek and Big Willow Creek; and an evaluation of information pertinent to the LAs assigned to the lower Payette River in the Snake River-Hells Canyon (SR-HC) TMDL (IDEQ and ODEQ, 2004)

Table A. Summary of approved TMDLs in or relating to the lower Payette River subbasin, associated load allocations, and available monitoring data.

Stream Segment Description	Assessment Unit	TMDL	Load Allocation	Monitoring Data
Unnamed and named tributaries and drains (north and south side) of the Payette River from Black Canyon Reservoir outfall to the mouth.	001_02	Lower Payette River Subbasin Assessment and Total Maximum Daily Load (1999). Lower Payette River Total Maximum Daily Load Implementation Plan and Addendum to the Lower Payette River Subbasin Assessment and Total Maximum Daily Load (IP-Addendum) (2003).	Fecal coliform bacteria 8.90E+03 to 1.110E+06 cfu/sec. <i>E. coli</i> bacteria 126 cfu/100mL (geomean).	Sediment, temperature, bacteria (BOR, 2004); BURP (DEQ, 2004); DO, pH, phosphorus, Sediment, bacteria, temperature, discharge (ISDA, 2001-03, 2008).
Mainstem Payette River from the outfall of the Black Canyon Dam to the confluence with the	001_06	Lower Payette River Subbasin Assessment and Total Maximum Daily Load (1999). IP-Addendum (2003).	Fecal coliform bacteria 1.74E+07 cfu/sec. <i>E. coli</i> geomean bacteria 126 cfu/100mL.	Fish, macroinvertebrates, discharge, temperature, DO, pH, nutrients, sediment (USGS, 2001-08). WWTPs (2003-08). Discharge, temperature, DO, pH, nutrients, sediment, turbidity,

Stream Segment Description	Assessment Unit	TMDL	Load Allocation	Monitoring Data
Snake River.		Snake River-Hells Canyon Total Maximum Daily Load (TMDL) (2004).	Total phosphorus 469 kg/day (a target of 0.07 mg/L). Total suspended sediment* 137,887 kg/day (a target of 50 mg/L).	chlorophyll-a (BOR, 2003-08).
Third-order Bissel Creek from the North side Main Canal to the mouth.	015_03a	Lower Payette River Subbasin Assessment and Total Maximum Daily Load (1999). IP-Addendum (2003). Bissel Creek Subbasin Assessment and Total Maximum Daily Load (2003).	Fecal coliform bacteria 4.77E+05 cfu/sec. <i>E. coli</i> bacteria geomean 126 cfu/100mL. Total suspended sediment 22 mg/L.	Sediment, bacteria, temperature (BOR, 2004); BURP (2004). Sediment, bacteria, temperature, nutrients (ISDA, 2008).
Third-order unnamed north side tributaries between Bissel and Sand Hollow Creeks, from Unfinished Rd. to the Payette River.	016_03	Lower Payette River Subbasin Assessment and Total Maximum Daily Load (1999). IP-Addendum (2003).	Fecal coliform bacteria 4.77E+05 to 1.11E+06 cfu/sec. <i>E. coli</i> geomean bacteria 126 cfu/100mL.	Sediment, bacteria, temperature (BOR, 2004).
First- and second-order Big Willow Creek and named and unnamed tributaries.	017_02	Big Willow Creek Subbasin Assessment and Total Maximum Daily Load: Addendum to Lower Payette River Subbasin Assessment and TMDL (2008).	Thermal load 1,698kWh/day (1 to 21% required increase in shade).	
Third-order Big Willow Creek and tributaries.	017_03	Big Willow Creek Subbasin Assessment and Total Maximum Daily Load: Addendum to Lower Payette River Subbasin Assessment and TMDL (2008).	Thermal load 642,828kWh/day (0 to 35% required increase in shade).	BURP (2005, 2007); Solar load (2006); DO, pH, phosphorus, sediment, bacteria, temperature, discharge (ISDA, 2007).

Stream Segment Description	Assessment Unit	TMDL	Load Allocation	Monitoring Data
Fourth-order Big Willow Creek and tributaries.	017_04	Big Willow Creek Subbasin Assessment and Total Maximum Daily Load: Addendum to Lower Payette River Subbasin Assessment and TMDL (2008).	Thermal load 1,867,704kWh/day (0 to 30% required increase in shade).	BURP (2003); Solar load (2006); DO, pH, phosphorus, sediment, bacteria, temperature, discharge (ISDA, 2007).
Sixth-order Big Willow Creek	017_06	Big Willow Creek Subbasin Assessment and Total Maximum Daily Load: Addendum to Lower Payette River Subbasin Assessment and TMDL (2008).	Thermal load 863,166kWh/day (5 to 25% required increase in shade).	
Mainstem Little Willow Creek from Indian Creek to the confluence with Big Willow Creek and Payette Ditch.	018_04	Lower Payette River Subbasin Assessment and Total Maximum Daily Load (1999). IP-Addendum (2003).	Fecal coliform bacteria 4.10E+06 cfu/sec. <i>E. coli</i> geomean bacteria 126 cfu/100mL.	DO, pH, phosphorus, sediment, bacteria, temperature, discharge (ISDA, 2007).

*Documented to be interchangeable with suspended sediment concentration (SSC) and total suspended solids (TSS) for the LA location on the Payette River identified in the Snake River-Hells Canyon TMDL (IDEQ, ODEQ; 2004).

Subbasin At A Glance

The current status of TMDLs related to the lower Payette River subbasin is summarized in Table B. AUs not listed in Table B, but included in the 2008 Integrated Report, should be listed in the 2010 Integrated Report as they are in the 2008 list. Details regarding current (2008) listing status are in this section's Summary of Decisions and Table C; and the rationale for recommended list changes is provided in Section 3 of this report.

Table B. Summary of Subbasin TMDLs, Implementation Plans, and Recommended Listing Status Changes for 2010.

Approved TMDLs	Pollutants Addressed	Assessments Units Recommended for listing in Section 2
<i>Lower Payette River Subbasin Assessment and Total Maximum Daily Load (1999). Lower Payette River Total Maximum Daily Load Implementation Plan and Addendum to the Lower Payette River Subbasin Assessment and Total Maximum Daily Load (2003).</i>	Bacteria	020L_0L
		Assessment Units Recommended for listing in Section 3
		015_03
<i>Bissel Creek Subbasin Assessment and Total Maximum Daily Load (2003).</i>	Bacteria and Sediment	Assessment Units Recommended for listing in Section 4a
<i>Snake River-Hells Canyon Total Maximum Daily Load (TMDL) (2004).</i>	Phosphorus and Pesticides	017_02, 017_03, 017_04, 017_06
<i>Big Willow Creek Subbasin Assessment and Total Maximum Daily Load: Addendum to Lower Payette River Subbasin Assessment and TMDL (2008).</i>	Temperature	
Implementation Plans	Implementation Actions	Assessment Units Recommended for Section 4c
<i>Lower Payette Total Maximum Daily Load Implementation Plan and Addendum to the Lower Payette River Subbasin Basin Assessment and Total Maximum Daily Load (2003).</i>	Agricultural BMPs	001_02, 001_06, 015_02, 015_03a, 017_02, 017_03, 017_04, 018_04
<i>Bissel Creek TMDL Implementation Plan (2006).</i>	None documented	Assessment Units Recommended for Section 5
<i>Snake River-Hells Canyon Total Maximum Daily Load (TMDL): Section 6 General Water Quality Management and Implementation Plans (2004).</i>	None documented	001_02, 017_03, 017_04, 018_04
		Estimated Percent of Subbasin in Section 4a or 5
		50

Based on the results of the five-year review, changes from the current (2008) Integrated Report recommended for the next (2010) Integrated Report (identified in Table B) are as follows:

- 1 AU added to Section 2 (Full Support)
- 1 AUs added to Section 3 (Unassessed Waters)
- 4 AUs added to Section 4a (Approved TMDLs)
- 8 AUs added to Section 4c (Rivers Impaired by Flow or Habitat Alteration)
- 4 AUs added to Section 5 (Impaired Waters)
- 1 AU de-listed for impairments listed in the 2008 Integrated Report

About Assessment Units

Prior to 2002, impaired waters were defined as stream segments with geographical descriptive boundaries. In 2002, DEQ modified the structure and format of Idaho's 303(d) list by combining it with the 305(b) report, which is required by the Clean Water Act (CWA) to inform Congress of the state of Idaho's waters. This modification included identifying stream segments by assessment units (AUs) instead of non-uniform stream segments, and defining the use support of stream AUs by five categories, each of which is published as a section in the integrated report. AUs now define all the waters of the state of Idaho. These units and the methods used to describe them can be found in the Water Body Assessment Guidance, second edition (WBAG II) (Grafe, et al., 2002). AUs are groups of similar streams that have similar land use practices, ownership, or land management. Stream order, however, is the main basis for determining AUs— even if ownership and land use change significantly, an AU remains the same. Because AUs are an extension of water body identification numbers and each water body has individual water quality standards (WQS), there is now a direct tie between AUs and WQS, so that beneficial uses defined in the WQS are clearly tied to streams on the landscape.

To facilitate comparisons between the 1998 303(d) list and the 2002 Section 5 “impaired waters” category in the integrated report, a crosswalk from the 1998 303(d) list to the new AUs was included in the 2002 Integrated Report. A copy of the report is available from the DEQ Web site at

http://www.deq.state.id.us/water/data_reports/surface_water/monitoring/2002.cfm#2002final. The boundaries from the 1998 303(d)-listed segments were transferred to the new AU framework using an approach quite similar to how DEQ has been writing SBAs and TMDLs. All AUs contained in any listed segment were carried forward to the 2002 303(d) listings in Section 5 of the Integrated Report (DEQ, 2005). Any AU not wholly contained within a previously listed segment, but partially contained (even minimally), was also included on the 303(d) list. This was necessary to maintain the integrity of the 1998 303(d) list and continuity with the TMDL program. The lower Payette River subbasin review is focused on the 2008 Integrated Report status lists.

When new monitoring data indicate full support, only the AU that the data represents will be removed (de-listed) from the 303(d) list (Section 5 of the integrated report).

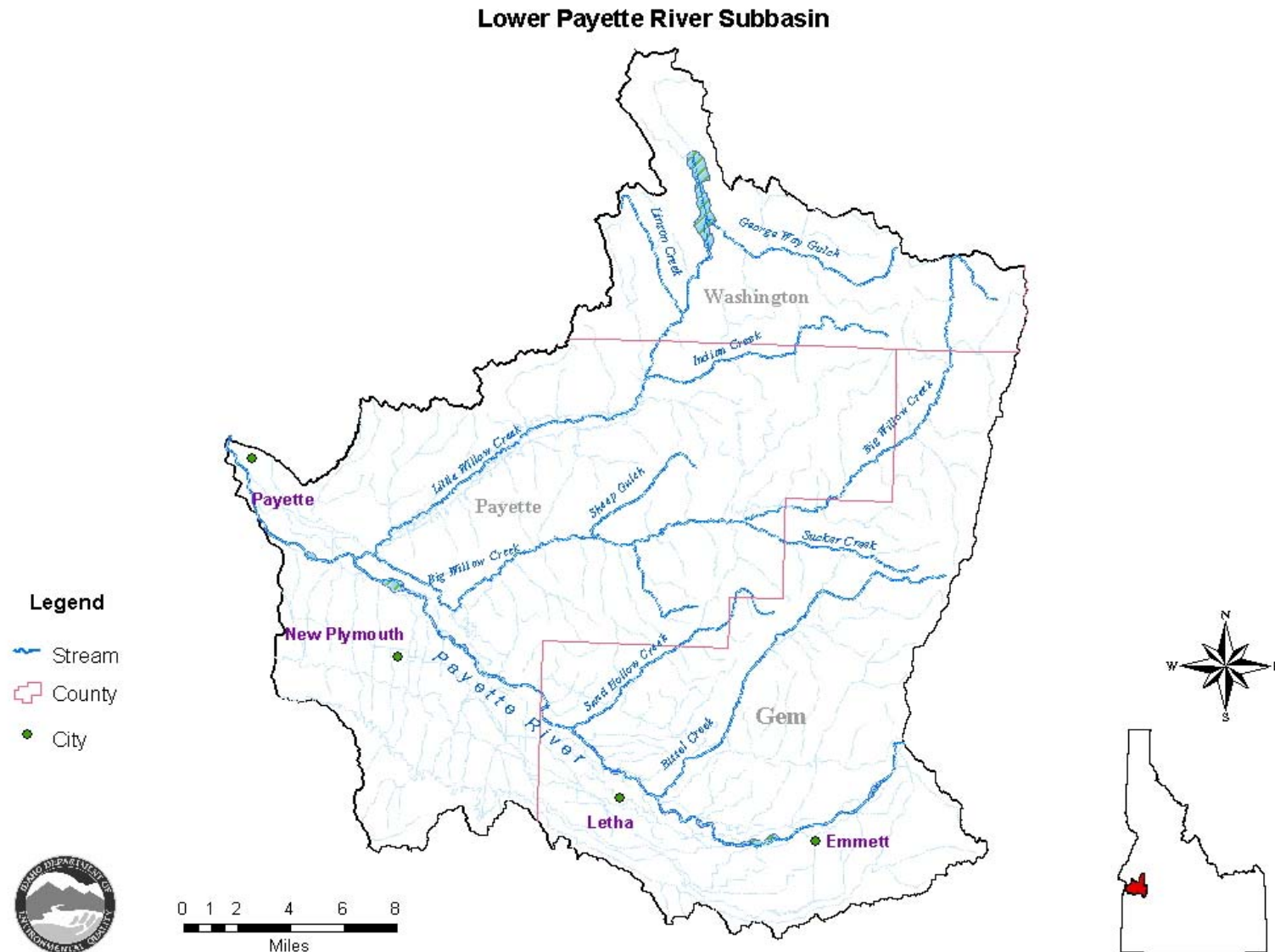


Figure A. Streams in the Lower Payette River Subbasin, HUC 17050122.

TMDL Targets and Load Allocations

There are four TMDLs that establish load allocations (LAs) in the lower Payette River subbasin for specific pollutants. The 1999 lower Payette River TMDL established targets and LAs at 27 locations for bacteria in the lower Payette River subbasin and identified six mainstem river and 26 drain and tributary control monitoring locations. In 2003 an addendum for the TMDL was written to address the change in WQS beneficial use criteria from fecal coliform to *E. coli*. The Bissel Creek TMDL (2003) established targets for sediment and bacteria with control monitoring at four locations. The Big Willow Creek TMDL (2008) established solar load and natural vegetation targets and specified the percent of required increased shade for the entire mainstem of the creek. Control monitoring for the temperature TMDL may take place at any location on Big Willow Creek and results can be compared to the charts and diagrams in the TMDL. The Snake River-Hells Canyon TMDL (2004) established load allocations (LAs) for total phosphorus and pesticides by allocating a limit for monthly average suspended sediment concentrations of 50 mg/L, during the irrigation season, at the mouth of the Payette River, its confluence with the Snake River, which is also control monitoring location LP-007 in the lower Payette River TMDL.

Recognizing that sediment, phosphorus, temperature, pesticides, and bacteria loads in the mainstem river and major tributaries are most likely the result of cumulative effects of loads from influent sources such as tributaries and drains; waste load allocations (WLAs) for bacteria were established for all permitted effluent sources and LAs for bacteria were established at 36 river, tributary, and drain locations. Sediment and bacteria LAs were established for three locations in Bissel Creek; and sediment, pesticide, and phosphorus LAs were established at the mouth of the Payette River. Assigning LAs for tributaries and drains is not synonymous with listing those tributaries and drains as impaired for pollutants. The purpose of the LAs is to restore the listed waterbodies (lower Payette River, Bissel and Big Willow Creeks, and the Snake River between the Boise and Weiser Rivers) to beneficial use support status.

Key Findings

The review process includes an evaluation of current data in accordance with the WBAG II (Grafe, et. al., 2002), to determine attainment status of beneficial uses for each AU. During the review process, some AUs were found to be impaired by one or more of the following: flow and habitat alteration, temperature, sediment, DO, and bacteria. TMDLs are required for water bodies determined to be impaired by pollutants. However, impairments caused by non-pollutants, such as flow and habitat alteration, do not require a TMDL. Results of the review process for each AU are included in Table C and discussed in this section's Summary of Decisions and discussed in detail in Section 3 of this report. Determination of beneficial use support is based on evaluation of Beneficial Use Reconnaissance Program (BURP) surveys, water quality data collected by DEQ or third parties, and a review of other relevant information as discussed in Section 3.

Table C. Summary of assessment units, 2008 Integrated Report, and five-year review recommendations.

Assessment Unit	Stream Segment Description	2008 List Pollutant	Summary of Data and Observations	Recommended Changes to Next Integrated Report
001_02	Unnamed and named tributaries and drains (north and south sides) of the Payette River from Black Canyon Reservoir outfall to the mouth.		Paleo channels, oxbows, and numerous meander scars. Modified by canals, drains, urban/suburban development, irrigated and non-irrigated agriculture and industrial activities. Reported bacteria concentrations exceed single-sample criteria, sediment concentrations exceed criteria, and DO concentrations are below criteria. South-side drains meet temperature criteria; north-side drains exceed temperature criteria for the mainstem river.	Add to Section 4c for flow and habitat alteration. List in Section 5 for DO and sediment.
001_06	Mainstem Payette River from the outfall of the Black Canyon Dam to the confluence with the Snake River.	Temperature	Flow is controlled by Black Canyon Dam and modified by diversions and drains for agricultural uses. Diversions remove up to 76% of flow between Emmett and Letha, and up to 53% is returned between Letha and Payette. Temperature data exceeds criteria, some single-sample <i>E. coli</i> data exceeds criteria, and all other reported data meets criteria.	Add to Section 4c for flow and habitat alteration.
015_02	First- and second-order Bissel Creek and named and unnamed tributaries.	Sediment	Numerous impoundments and diversions. Dewatered channel between headwater dam and cultivated fields. Water quality data has not been collected.	List in Section 3 as unassessed and 4c for flow alteration.
015_03	Third-order Bissel Creek to the North Side Main Canal.		Modified by dams, diversions, canals and drains for agricultural purposes. Dewatered channel upstream of North Side Main Canal.	

Assessment Unit	Stream Segment Description	2008 List Pollutant	Summary of Data and Observations	Recommended Changes to Next Integrated Report
015_03a	Third-order Bissel Creek from the North side Main Canal to the mouth.		Channel alterations, canals and drains to support agricultural activities. Reported bacteria concentrations exceed single-sample criteria and TMDL targets. Sediment data exceeds TMDL target. All other data meets criteria.	List in Section 4c for flow and habitat alteration.
016_02	First- and second-order unnamed north side tributaries to the Payette River between Bissel and Sand Hollow Creeks.		Spring impoundments with no outflow and numerous channel alterations. No water quality data.	
016_03	Third-order unnamed north side tributaries between Bissel and Sand Hollow Creeks, from Unfinished Rd. to the Payette River.		Ephemeral flow upstream of the North Side Main Canal. Numerous channel alterations, two canals, and one dairy. No water quality data.	
017_02	First- and second-order Big Willow Creek and named and unnamed tributaries.	Temperature	Numerous dams and de-vegetated riparian zones to support grazing and agriculture activities. No water quality data.	Move to Section 4a for approved temperature TMDL and Section 4c for flow and habitat alteration.

Assessment Unit	Stream Segment Description	2008 List Pollutant	Summary of Data and Observations	Recommended Changes to Next Integrated Report
017_03	Third-order Big Willow Creek and tributaries.		Altered channels with numerous dams, diversions and drains. De-vegetated riparian zone to accommodate grazing and agricultural practices. Dissolved oxygen (DO) is below minimum criteria, bacteria occasionally exceed single-sample criteria, and temperature criteria are exceeded. All other data meet criteria.	Move to Section 4a for an approved temperature TMDL and Section 4c for flow and habitat alteration. List in Section 5 for DO.
017_04	Fourth-order Big Willow Creek and tributaries.	Sediment, Temperature	Altered channel with dams, diversions and drains. DO is below minimum criteria, bacteria occasionally exceeds single-sample criteria and temperature data exceed criteria. All other data meets criteria.	Move to Section 4a for an approved temperature TMDL and Section 4c for flow and habitat alteration. List in Section 5 for DO. De-list for sediment.
017_06	Sixth-order Big Willow Creek.	Habitat and Flow Alteration	Channel is modified and actively managed as a canal by the Payette Irrigation Company. No water quality data.	Move to Section 4a for an approved temperature TMDL.
018_02	First- and second-order Little Willow Creek and named and unnamed tributaries downstream of Paddock Valley Reservoir.		Numerous dams and channel modifications to facilitate grazing and agriculture. No water quality data.	

Assessment Unit	Stream Segment Description	2008 List Pollutant	Summary of Data and Observations	Recommended Changes to Next Integrated Report
018_03	Third-order Little Willow Ck from Paddock Valley Reservoir to Indian Creek. Includes Payette Irrigation Drain.		Dams, canals, diversions, and channel modifications to support grazing and agriculture. No water quality data.	
018_04	Mainstem Little Willow Ck from Indian Ck to the confluence with Big Willow Ck and Payette Ditch.		Numerous dams and channel alterations to accommodate grazing and agriculture. Bacteria single-sample criteria are exceeded most of the time and sediment concentrations exceed WQS. Temperature criteria are exceeded for approximately 40 days in the summer. All other data meet criteria.	List in Section 4c for flow and habitat alteration. List in Section 5 for sediment.
019_02	First- and second-order of Indian Ck and named and unnamed tributaries.		Very little observable human influence.	
019_03	Third-order Indian Ck to the confluence with Little Willow Ck.		One dam, some channel modification and very little land disturbance. No water quality data.	
020_02	Little Willow Ck and unnamed tributaries upstream of Paddock Valley Reservoir.		Two dams (Paddock Valley Reservoir) and some grazing activity. No water quality data.	

Assessment Unit	Stream Segment Description	2008 List Pollutant	Summary of Data and Observations	Recommended Changes to Next Integrated Report
020L_0L	Paddock Valley Reservoir.		Listed on the National Wetlands Inventory map as a wetland. Inundated as a result of two dams. Managed as a mixed fishery by Idaho Department of Fish and Game (IDFG). Water quality data indicate full support.	Move to Section 2 for full support.
021_02	First- and second-order unnamed tributaries east of Paddock Valley Reservoir.		Very little observable human influence.	
021_03	Unnamed east side tributary to Paddock Valley Reservoir.		Very little observable human influence.	

Summary of Recommendations

All recommendations for the next integrated report refer to the 2010 Integrated Report. The following paragraphs are brief explanations of the recommendations summarized in Table B. Because all of the AUs discussed in this review are in the lower Payette River subbasin, (HUC 17050122) the AUs are referred to by the numerical suffix assigned to each AU in Idaho's WQS. For example, the AU identified in Idaho WQS as ID17050122SW001_02 is abbreviated to 001_02. The following paragraphs are brief explanations of the beneficial use attainment status of each AU and the rationale used in offering recommendations for the next integrated report. Beneficial uses (designated, existing, or presumed), WQS, and criteria for each AU are defined and summarized in Section 3 of this document. Some AUs received LAs in the TMDL because it was determined that, while the AU is not impaired, the AU was a significant pollutant source contributor to a downstream segment of concern to the TMDL. An LA is not equivalent to a listing of impairment. Maps of each AU are included in Appendix E.

001_02

This AU includes named and unnamed first and second order tributaries and drains to the lower Payette River from the outfall of Black Canyon Reservoir to the mouth; including Graveyard Gulch, Sand Hollow and Haw Creeks, and several constructed irrigation system water ways (S-drains, Graveyard Gulch Wasteway, Sevenmile Slough, Farmers Cooperative Canal, Emmett Irrigation District North Canal, Noble Canal). Beneficial uses (for natural streams) are not designated and are presumed to meet cold water aquatic life (COLD) and

primary and secondary contact recreation (PCR/SCR) uses. Many locations in this AU have LAs for bacteria in the TMDL (DEQ, 1999) and the AU is listed in Section 3 of the 2008 Integrated Report as unassessed.

A review of satellite photo images from 2006 indicate that this AU is modified by urban and suburban development, agricultural and industrial land uses. The southern boundary of the AU is defined by the Farmers Cooperative Canal which delivers water from the Bureau of Reclamation (BOR) Black Canyon Reservoir across the valley to Payette, ID. The northern edge of the AU is bounded by the North Side Canal and numerous canals and drains have been constructed to deliver and drain irrigation water across the AU from the reservoir outfall to the Snake River. Meander scars, paleo channels and oxbow features are visible and irrigated lands appear to be cultivated up to the banks of all water features. Land use activities outside of urban uses include 14 sand and gravel mines, 2 silica mines, 5 metal ore mines and 1 clay mine; 18 dairies and 2 feedlots. There are also three landfills and four NPDES-permitted point source discharge facilities.

From the Black Canyon Reservoir outfall to river mile 18, numerous named and unnamed drains convey irrigation water to the river, with LAs at eleven locations requiring load reductions between 63 and 92 %. Water delivered through the Farmers Cooperative Canal system is drained north to the lower Payette River through a series of consecutively-numbered drains (S-Drains). S-1 drains agricultural lands near river mile 18, between Letha and New Plymouth; and S-15 drains lands near Fruitland and Payette (river mile 1). All fifteen drains have LAs for bacteria which require load reductions between 28 and 88 %.

Data has been collected from 16 locations in this AU since 2000. Data was collected by the BOR in 2004, the Idaho State Department of Agriculture (ISDA) in 2000, 2001, 2002, 2003, and 2008, and DEQ in 2004 (BURP, 2004SBOIA040) and 2009. Reported results of data collection efforts indicate that single-sample bacteria data exceeds criteria 50% of the time; suspended sediment concentrations can be reasonably concluded to exceed turbidity criteria at all sampled locations, with 44% of reported results between 100 and 1,000 mg/L. Temperature data indicates that criteria are exceeded in summer months in north-side drains. The S-Drains (south-side) meet water temperature criteria. Dissolved oxygen (DO) is below the minimum WQS criteria for beneficial use support in the Payette, Beacon, and Big 4 drains, with Beacon reporting the lowest concentration of 2.25 mg/L in August of 2008. Measured pH values were below the minimum criteria for six weeks at two locations in 2009. This AU has the highest concentrations of phosphorus (0.04 to 1.4 mg/L) in the subbasin and may contribute between 38 to 75% of the total TP load allocated to the Payette River in the SR-HC TMDL (IDEQ, ODEQ, 2004). Ammonia and geometric mean bacteria data was not collected and all other reported values meet criteria.

This AU should be added to Section 5 for DO and sediment and to Section 4c for flow and habitat alteration.

001_06

This AU includes the mainstem Payette River from the outfall of Black Canyon Reservoir to the mouth, including the confluence of Forty-nine Slough, Haw Creek and unnamed streams. The designated uses for this AU are COLD, salmonid spawning (SS), domestic water supply (DWS) and PCR. This AU is listed in Section 4a of the 2008 Integrated Report for an approved TMDL (DEQ, 1999, 2003) and LAs for pesticides and phosphorus in the SR-HC

TMDL (ODEQ, IDEQ, 2004); and in Section 5 for temperature. There are seven control monitoring locations for the TMDLs in this AU. The WQS for PCR have changed to an *E. coli*-based standard for bacteria since the TMDL (1999) was developed and the addendum to address that change was included in the Implementation Plan (IP) (DEQ, 2003).

There are five NPDES discharge facilities, six sand and gravel mines, and two feedlots in this AU. Data has been collected sporadically from all control monitoring locations at some time in the past five years by the BOR, USGS, municipal WWTPs, and DEQ. Based on reported results, pH criteria was exceeded three times (at two locations) in 2004 and three times in 2009. Reported bacteria concentrations exceeded single-sample criteria once at LPR-001 (near the dam outfall) and geomean samples have not been collected. Reported suspended sediment data meet the SR-HC TMDL target at the control monitoring location LPR-007 (Payette River near Payette) 94% of the time. Continuous temperature data has been collected at one location in the past five years and reported measurements exceed criteria most of the time May through October. Instantaneous temperature data has been collected at all locations at least once during the past five years and reported measurements exceed criteria at all locations during some part of the year. Benthic macroinvertebrate and fish community data collected from LPR-007 and LPR-002 (Payette River near Emmett) indicate that COLD and SS beneficial uses are not supported. During the irrigation season, total phosphorus (TP) concentrations at the control monitoring location exceed the LA of 0.07 mg/L designated to the Payette River in the SR-HC TMDL, by approximately 14%; which represents an irrigation season reduction of 20% over the past ten years. All other reported values meet criteria.

Numerous diversions have been constructed and urbanization has resulted in modified channels throughout the AU. Water District 65 controls flows from the dam through diversions and drains. In most years up to 76% of the flow is diverted for irrigation between Emmett and Letha and up to 53% of diverted flow is returned to the mainstem between Letha and Payette.

This AU should be added to Section 4c for flow and habitat alteration.

015_02

This AU includes the first and second order streams of Bissel Creek. The beneficial uses are not designated and are presumed to be COLD and PCR/SCR. There are several channel alterations, two dams, one large reservoir, several diversions, one pumice mine, and one feedlot. The first stream mile of the mainstem of Bissel Creek below the dam appears to be dewatered and cultivated fields completely fill the floodway and floodplain of the flowing segment of the stream. This AU is listed in Section 5 of the 2008 Integrated Report as impaired by sediment.

Data has not been collected from this AU.

This AU should be added to Section 3 as unassessed in the next integrated report and 4c for flow alteration.

015_03

This AU includes the third order of Bissel Creek to the North Side Main Canal, one mile upstream of Hillview Road in Gem County. Beneficial uses are not designated and are

presumed to meet COLD and PCR/SCR uses. This AU is listed in Section 2 of the 2008 Integrated Report as supporting all uses. There are four dams, two canals, several drains, and numerous channel alterations. The mainstem of Bissel Creek in this AU appears to be dewatered for three miles upstream of the North Side Main Canal. The primary land uses are irrigated and non-irrigated agriculture, grazing, and animal husbandry.

BURP data collected in 2004 document dry stream conditions and 2007 data is from beaver ponds. Water quality data was collected from the North Side Main Canal near Bissel Creek in 2004, but is not representative of streams in this watershed.

015_03a

This AU includes the third order of Bissel Creek, downstream of North Side Main Canal to the mouth. Beneficial uses are not designated and are presumed to meet COLD and PCR/SCR uses. This AU is listed in Section 4a of the 2008 Integrated Report for approved sediment and bacteria TMDLs (DEQ, 2004) and has an LA for bacteria in the lower Payette River TMDL (DEQ, 1999) requiring a 70% bacteria load reduction. The target for bacteria is the current WQS (geomean of 126 cfu/100mL) and 22 mg/L for sediment. There are three control monitoring locations in this AU. Land use in this AU is entirely cultivated agriculture and animal feeding operations (AFOs). There is evidence of channel relocation throughout the AU and paleo meander scars and remnant channel features are evident in satellite photographs.

Water quality data was collected by the BOR in 2004 and by the ISDA in 2008. Reported results of single-sample *E. coli* analysis exceed criteria for 43 % of all samples. ISDA collected samples at two to twelve day intervals from July 23 to August 18, 2008 and calculated a geomean value for each monitoring location. However, the WQS require sample collection five times at five to seven day intervals for geomean values used to determine use support, and a use support determination cannot be made at this time. Reported suspended sediment concentrations exceed the TMDL target at all locations sampled between 54 and 85% of the time. TP concentrations may exceed the SR-HC TMDL LA to the Payette River of 0.07 mg/L. Instantaneous temperature data reported for 2004 indicates that criteria are exceeded during the summer months in Bissel Creek at Idaho Blvd (BC-1) and the North Side Canal at Bissel Creek. Reported instantaneous temperature data did not exceed criteria in 2008. Ammonia data was not collected and all other reported values are within criteria.

It may be beneficial to collect continuous water temperature and instantaneous ammonia data. This AU should be added to Section 4c of the next integrated report for flow and habitat alteration.

016_02

This AU includes unnamed north-side tributaries to the Payette River between Bissel and Sand Hollow Creeks. The beneficial uses of this AU are not designated and are presumed to meet COLD and PCR/SCR uses. It is listed in the 2008 Integrated Report as unassessed. Two springs have been developed into reservoirs with no visible outflow.

Water quality data has not been collected from this AU.

016_03

This AU includes an unnamed north-side tributary to the lower Payette River from Unfinished Road to the mouth. The beneficial uses are not designated and are presumed to support COLD and SCR/PCR uses. The AU is listed in the 2008 Integrated Report as unassessed. There is no water quality data for this AU and a review of satellite images indicates that there is no visible stream channel, flow, or vegetation upstream of the North Side Main Canal and the stream may only flow in response to the canal.

No water quality data has been collected.

017_02

This AU includes the first and second order of Big Willow Creek and tributaries. The beneficial uses are designated as COLD, SS, and PCR and it is listed in the 2008 Integrated Report for temperature. There is an approved temperature TMDL (DEQ, 2008) requiring an increase in shade between 1 and 18%.

Water quality data has not been collected from this AU but a survey of satellite images indicates that there are at least 24 dams, most with little or no outflow.

This AU should be moved to Section 4a of the next Integrated Report for an approved temperature TMDL and added to Section 4c for flow and habitat alteration.

017_03

This AU includes the third order of Big Willow Creek and tributaries. It is designated for COLD, SS, and PCR beneficial uses and has an approved temperature TMDL (DEQ, 2008). This AU was unintentionally excluded from the 2008 Integrated Report. The stream channel is visibly altered with eight dams, numerous diversions and drains; and the riparian zone has been de-vegetated to facilitate agricultural uses.

BURP data collected from this AU in 2005, and 2007 (2005SBOIA020, 2007SBOIA096, 2007SBOIA021) indicate that beneficial uses are not supported. ISDA collected data at two locations (BW-2 and BW-3) in 2007. Based on reported sample results minimum DO criteria are not met 77% of the time, 23% of single-sample bacteria results exceed criteria, and temperature exceeds criteria for SS uses, but meets COLD uses. TP concentrations may exceed the SR-HC TMDL LA to the Payette River of 0.07 mg/L. Ammonia and geomean bacteria data was not collected. All other reported values meet criteria.

Ammonia and geomean bacteria data should be collected and this AU should be added to Section 4a for an approved temperature TMDL, Section 5 for DO, and Section 4c for flow and habitat alteration in the next integrated report.

017_04

This AU includes the fourth order of Big Willow Creek from the confluence with Dry Creek to the Payette Irrigation Ditch. Beneficial uses are designated as COLD, SS, and PCR. The AU is listed in the 2008 Integrated Report for sediment and temperature and has an approved temperature TMDL (DEQ, 2008) requiring increases in shade between 0 and 30%. There is

one dam in this AU and the channel has been modified to accommodate agricultural and AFO activities.

Data was collected from this AU by the ISDA in 2007 and by DEQ in 2008. Results indicate that single-sample bacteria criteria are exceeded 20% of the time; temperature data exceed criteria for SS from May to July and meet criteria for COLD. Reported DO measurements are below minimum criteria 77% of the time. TP concentrations may exceed the SR-HC TMDL LA to the Payette River of 0.07 mg/L. Ammonia and geomean bacteria data was not collected. All other reported values meet criteria.

In the next integrated report this AU should be moved to Section 4a for an approved temperature TMDL, added to Section 5 for DO and Section 4c for flow and habitat alteration, and de-listed for sediment. Ammonia and geomean bacteria samples should be collected.

017_06

This AU includes the sixth order of Big Willow Creek, a paleo channel of the Payette River, which is modified and maintained as an agricultural irrigation canal. It is designated for COLD, SS, and PCR beneficial uses. The AU is listed in the 2008 Integrated Report for flow and habitat alteration. This AU has an approved temperature TMDL (DEQ, 2008) requiring increases in shade between 5 and 25%.

Water quality data has not been collected from this AU.

In the next integrated report this AU should be moved to Section 4a for an approved temperature TMDL.

018_02

This AU includes the first and second order of Little Willow Creek and tributaries downstream of Paddock Valley Reservoir. This includes Alkali and Linson Creeks and McIntyre Canal. The beneficial uses are not designated and are presumed to be COLD and PCR/SCR. It is listed in the 2008 Integrated Report as unassessed. There are 19 dams in this AU and most streams have been modified to facilitate grazing or irrigation for agricultural purposes.

Water quality data has not been collected from this AU.

018_03

This AU includes the third order of Little Willow Creek, from Paddock Valley Reservoir to Indian Creek. Beneficial uses are not designated and are presumed to be COLD and PCR/SCR. It is listed in the 2008 Integrated Report in Section 2 as fully supporting beneficial uses. There are two dams in this AU and streams have been modified to accommodate agricultural and grazing practices.

BURP data was collected in 2004 (2004SBOIA141) that document full support of beneficial uses.

018_04

This AU includes the fourth order of Little Willow Creek from Indian Creek to the mouth, at the confluence with Big Willow Creek and the Payette Irrigation Ditch. Beneficial uses are not designated and are presumed to be COLD and PCR/SCR. It is listed in the 2008 Integrated Report in Section 3 as unassessed. There are 15 dams in this AU and Little Willow Creek received an LA for bacteria in the TMDL (DEQ, 1999) requiring a load reduction of 79%.

A 2003 BURP attempt failed due to non-wadeable conditions (2003SBOIA053). ISDA collected water quality data from one irrigation canal in 2003 and three mainstem locations in 2007. Reported results indicate that single-sample *E. coli* concentrations exceed criteria 66% of the time, temperature criteria for COLD uses is exceeded 7% of the time, and suspended sediment concentrations exceed the Bissel Creek TMDL target (similar watershed) 87% of the time. Bacteria geomean and ammonia data were not collected and all other reported values meet criteria. This AU has the second highest concentration of TP (0.273-0.911 mg/L) in the subbasin and may exceed the SR-HC TMDL LA to the Payette River of 0.07 mg/L.

This AU should be listed in Section 5 for sediment, and Section 4c for flow and habitat modification in the next integrated report.

019_02

This AU includes the first and second order of Indian Creek and tributaries, including Rattlesnake and Hog Cove Creeks. Beneficial uses are not designated and are presumed to be COLD and PCR/SCR. This AU is listed in Section 3 of the 2008 Integrated Report as unassessed.

Water quality data has not been collected from this AU, but a review of satellite images indicates that the AU does not experience much human influence. There are no visible structures, one dirt road, and no observable agricultural or industrial activity.

No changes are recommended for the next integrated report.

019_03

This AU includes third order Indian Creek to the confluence with Little Willow Creek. Beneficial uses are not designated and are presumed to be COLD and PCR/SCR. This AU is listed in Section 3 of the 2008 Integrated Report as unassessed and there is one dam in the AU.

Water quality data has not been collected from this AU since 2004 BURP surveys documented dry stream conditions (2004SBOIA142). The only sign of disturbance is a cultivated field near the confluence with Little Willow Creek.

No changes are recommended for the next integrated report.

020_02

This AU includes Little Willow Creek and unnamed tributaries upstream of Paddock Valley Reservoir. Beneficial uses are not designated and are presumed to be COLD and PCR/SCR. This AU is listed in Section 3 of the 2008 Integrated Report as unassessed. There is one dam in the AU and small-scale agricultural activity is evident in the floodplain of the stream.

Water quality data has not been collected from this AU.

No changes are recommended for the next integrated report.

020L_0L

This AU includes Paddock Valley Reservoir. The beneficial uses are not designated and are presumed to be COLD and PCR/SCR. Paddock Valley Reservoir is identified as a wetland on the National Wetlands Inventory Map. The wetland has been inundated by the construction of two dams. The AU is listed in the 2008 Integrated Report as unassessed. The Idaho Department of Fish and Game (IDFG) manage this AU as a mixed fishery and rainbow trout are documented as existing in this AU.

Water quality data was collected from this AU in 2009 and satellite images indicate that there is little activity in the AU beyond creation of the reservoir, recreational fishing, and grazing. Water quality data indicate that beneficial uses are supported in this AU.

This AU should be moved to Section 2 in the next integrated report.

021_02

This AU includes first and second order unnamed tributaries east of Paddock Valley Reservoir. The beneficial uses are not designated and are presumed to be COLD and PCR/SCR. The AU is listed in the 2008 Integrated Report as unassessed.

Water quality data has not been collected from this AU and satellite images indicate that there is very little activity in the AU that may affect water quality.

No changes are recommended for the next integrated report.

021_03

This AU includes an unnamed east-side tributary to Paddock Valley Reservoir, from the first and second order tributaries to the mainstem third order tributary. The beneficial uses are not designated and are presumed to be COLD and PCR/SCR. The AU is listed in the 2008 Integrated Report as unassessed.

Water quality data has not been collected from this AU and satellite images indicate that there is very little activity in the AU that may affect water quality.

No changes are recommended for the next integrated report.

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Section 1: Introduction

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 (WQS) necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the nation's 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 WQS). States and tribes must periodically publish a priority list (a "§303(d) list") of impaired waters. 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.

Idaho Statute 39-3611(7) requires a five-year cyclic review process for Idaho TMDLs:

The director shall review and reevaluate each TMDL, supporting subbasin assessment, implementation plan(s) and all available data periodically at intervals of no greater than five (5) years. Such reviews shall include the assessments required by section 39-3607, Idaho Code, and an evaluation of the water quality criteria, instream targets, pollutant allocations, assumptions and analyses upon which the TMDL and subbasin assessment were based. If the members of the watershed advisory group, with the concurrence of the basin advisory group, advise the director that the water quality standards, the subbasin assessment, or the implementation plan(s) are not attainable or are inappropriate based upon supporting data, the director shall initiate the process or processes to determine whether to make recommended modifications. The director shall report to the legislature annually the results of such reviews.

This report has been developed to meet the intent of Idaho Statute 39-3611(7). The report documents the review of an approved Idaho TMDL and implementation plan (IP) and provides consideration of the most current and applicable information in conformance with Idaho Statute 39-3607, evaluation of the appropriateness of the TMDL to current watershed conditions, evaluation of the implementation plan, and consultation with the watershed advisory group (WAG). An evaluation of the recommendations presented is provided. Final decisions regarding TMDL modifications are made by the Department of Environmental Quality (DEQ) Director. Approval of any such TMDL modifications is decided by the U.S. EPA, with consultation by DEQ.

The reader is advised to refer to the TMDL for more complete explanations and descriptions than may be provided in TMDL-review portions of this document.

About Assessment Units

Prior to 2002, impaired waters were defined as stream segments with geographical descriptive boundaries. In 2002, DEQ modified the structure and format of Idaho's 303(d) list by combining it with the 305(b) report, which is required under the CWA to inform Congress of the state of Idaho's waters, to form what is now known as the Integrated Report. This modification included a change from identifying non-uniform stream segments by geographical boundaries to identifying them by assessment units

(AUs), and defining the use support of stream AUs as belonging in one of five categories, each of which is published as a section in the integrated report. AUs now define all surface waters of the state of Idaho. These units and the methods used to describe them can be found in the Water Body Assessment Guidance, second edition (WBAG II) (Grafe, et al., 2002). AUs are groups of similar streams that have similar land use practices, ownership, or land management. Stream order, however, is the main basis for determining AUs— even if ownership and land use change significantly, an AU remains the same. Because each AU number is an extension of one of the water body identification numbers specified in the water quality standards, each AU now has a direct tie to the WQS so that beneficial uses defined in the WQS are clearly tied to streams on the landscape.

To facilitate comparisons between stream segments listings in the 1998 303(d) list and the “impaired waters” listed in the 2002 integrated report (Section 5 of the integrated report), a crosswalk from the 1998 303(d) list to the new AUs was included in the 2002 Integrated Report (DEQ, 2005). A copy of the report is available on the DEQ Web site at http://www.deq.state.id.us/water/data_reports/surface_water/monitoring/2002cfm#2002final. The boundaries from the 1998 303(d)-listed segments were transferred to the new AU framework using an approach quite similar to how DEQ has been writing SBAs and TMDLs. All AUs contained in any listed segment were carried forward to the 303(d) listings in Section 5 of the 2002 Integrated Report (DEQ, 2005). Any AU not wholly contained within a previously listed segment, but partially contained (even minimally), was also included on the 303(d) list. This was necessary to maintain the integrity of the 1998 303(d) list and continuity with the TMDL program. The lower Payette River subbasin water bodies from Black Canyon Dam to the confluence with the Snake River at river mile 365, listed on the 2008 303 (d) list, are included in this report and the review is focused on that list.

When new monitoring data indicate full support of beneficial use has been achieved, only the AU that the data represents will be removed (de-listed) from the 303(d) list (Section 5 of the integrated report).

Because all of the AUs discussed in this review are in the lower Payette River subbasin, (HUC 17050122) the AUs are referred to by the numerical suffix assigned to each AU in Idaho’s WQS. For example, the AU identified in Idaho WQS as ID17050122SW001_02 is abbreviated to 001_02.

Subbasin at a Glance

The lower Payette River subbasin is identified in the Idaho WQS as water body ID17050122, with 20 AUs that have WQS described under Section 150.12 (IDAPA 58.01.02). As described in the Lower Payette River TMDL (DEQ, 1999), the subbasin drains approximately 380,000 acres of rangeland, irrigated and non-irrigated agricultural lands, and urban areas through a 38.5-mile long seventh-order stream into the Snake River at river mile 365, near the city of Payette, Idaho. The lower Payette River flows west from Black Canyon Dam outfall through Gem and Payette counties, and also drains a portion of Washington County. Tributaries to the lower Payette River include one sixth-order, one fourth-order, and four third-order streams (Figure 1).

Lower Payette River Subbasin

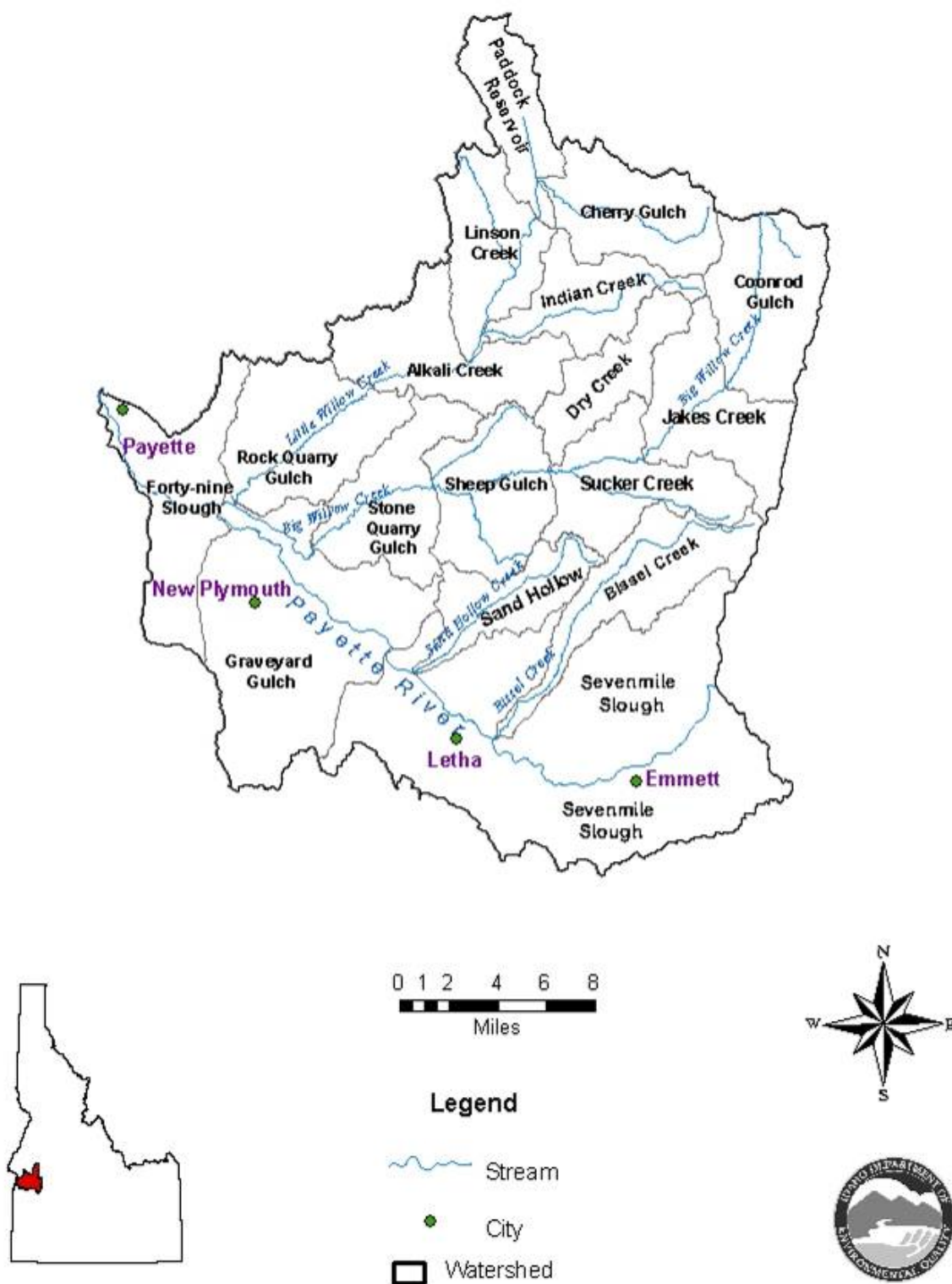


Figure 1. Streams and Watersheds within the Lower Payette River Subbasin.

The lower Payette River subbasin was listed as impaired by temperature, nutrients, and bacteria on Idaho's 1994 303 (d) list. Two other subbasin streams were subsequently listed as impaired in 1998; Big Willow Creek for temperature and Bissel Creek for sediment. During the subbasin assessment (SBA), Bissel Creek was found to be additionally impaired by bacteria. TMDLs were approved for Bissel Creek in 2003 and Big Willow Creek in 2008. Because the lower Payette River is a tributary of significance to the Snake River, it was assigned load allocations (LAs) for phosphorus and pesticides (controlled by an LA for sediment), as measured at the mouth of the Payette River. These LAs were established in the Snake River-Hells Canyon (SR-HC) TMDL (IDEQ, ODEQ, 2004), which can be accessed at http://www.deq.state.id.us/water/data_reports/surface_water/tmdls/snake_river_hells_canyon/snake_river_hells_canyon.cfm#SBA.

Idaho's 2008 Integrated Report lists two AUs in Section 2, as waters that support beneficial uses; 11 AUs in Section 3, as unassessed waters; two AUs in Section 4a, as waters with EPA-approved TMDLs; and five AUs in Section 5, as impaired waters. While there are observations of connectivity and interaction between shallow ground water and surface water in the lower Payette subbasin, conjunctive use issues in the subbasin are outside the focus of this report and will not be addressed here.

The geology, climate, hydrology (ground and surface), channel morphology and biologic characteristics of the subbasin have all been discussed in detail in existing SBAs and TMDLs (DEQ, 1999, 2003, 2008; IDEQ and ODEQ, 2004). This review has yielded no new information on these topics, but will address subbasin characteristics that have changed since the previous TMDLs were written: population, land use, point sources, WQS, and LAs assigned to the subbasin and its tributaries since 1999.

Human activities have affected pollutant loads in the lower Payette River subbasin since the mid-1800s, through modification of natural systems to accommodate permanent human residence and irrigation systems that were developed throughout the subbasin by the 1860s (ISHS, various works). There are 13 dams regulated by the Idaho Department of Water Resources (IDWR) which impound 1,607 surface acres of water, 104 observed impoundments, and many diversions; not all of which are documented (Figure 2). The water quality and storage capacity of these structures is not documented.

The population in Payette and Gem counties is presently estimated at 39,247, with most of the population (22,751) residing in Payette County (US Census Bureau, 2007). The growth rate of Payette County between 2000 and 2007 is almost double that of Gem County (15.7% and 8.7%, respectively) for the same time period. Land ownership in the lower Payette River subbasin is 25% private, 37% federal, and 37% state (Figure 3). With 13% of the surface area covered by water features, land use is divided among irrigated crop and pasture (29%), rangeland (27%), non-irrigated crops (18%) and urban/suburban (12%) (Figure 4). There are approximately 1,200 miles of paved roads and approximately 200 miles of unpaved roads in the subbasin.

Section 2 of this report provides details of the existing TMDLs and Section 3 provides details regarding current beneficial uses for each AU and recent water quality data.

Section 4 is a review of implementation activities throughout the subbasin in the past five years and Section 5 summarizes the five year review.

Lower Payette River Subbasin

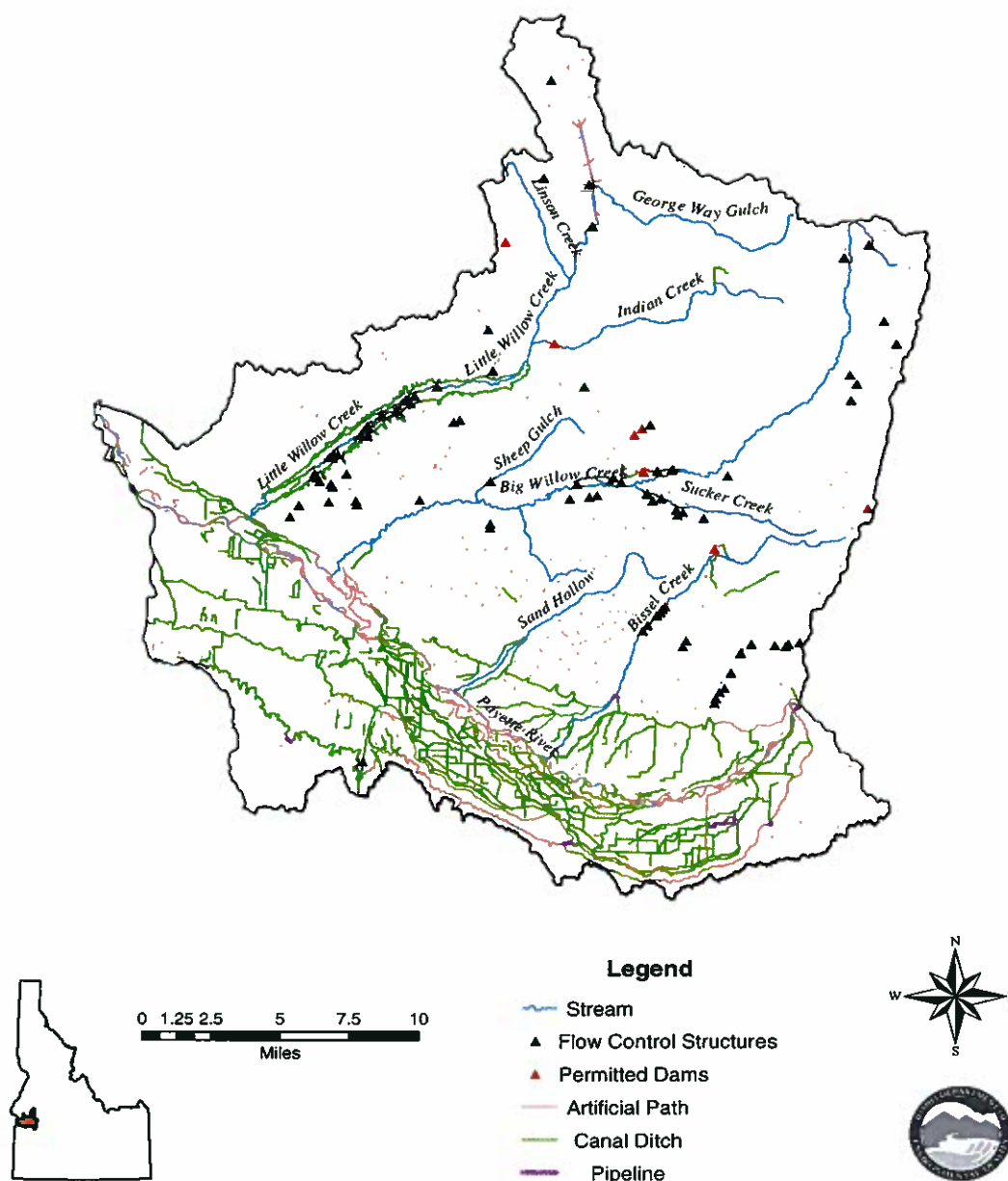


Figure 2. Permitted (IDWR) and Observed Dams and Diversions (Canals) in the Lower Payette River Subbasin.

Lower Payette River Subbasin

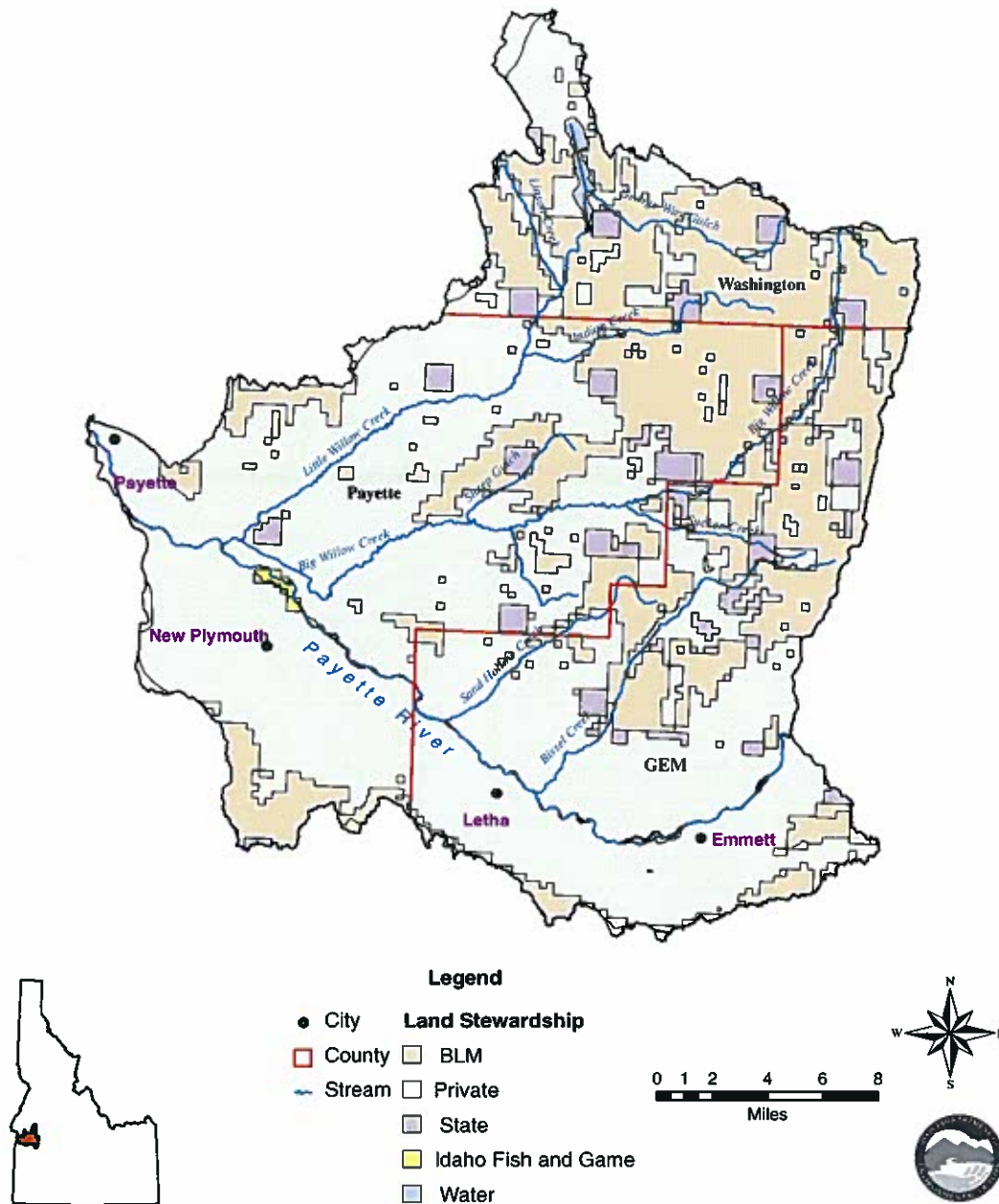
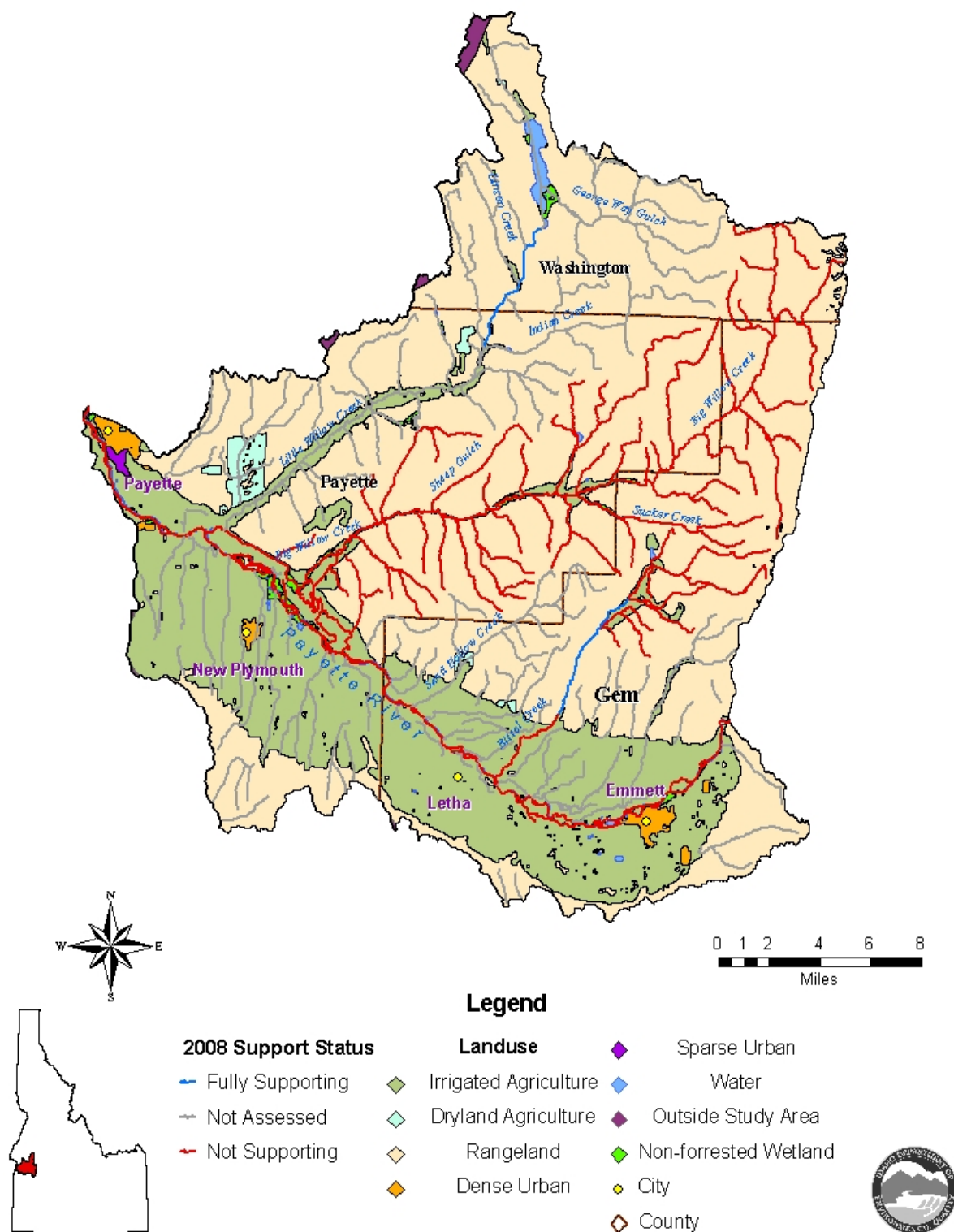


Figure 3. Land Stewardship in Lower Payette River Subbasin.

Lower Payette River Subbasin



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Section 2: TMDL Overview

When the Lower Payette River TMDL (DEQ, 1999) was developed, one stream segment and two tributaries were on the 303(d) list for a variety of pollutants (Table 1). Based on the results of the SBA, a TMDL was developed for bacteria, with load allocations (LAs) for all major tributaries and most documented drains at their confluence with the lower Payette River. In 2003, the TMDL implementation plan (IP) included an addendum to revise the TMDL target from being based on fecal coliform bacteria to being based on *Escherichia coliform* (*E. coli*), in conformance to revised WQS. In 2003, TMDLs for sediment and bacteria were approved for Bissel Creek; and in 2008, a potential natural vegetation (PNV) temperature TMDL was approved for Big Willow Creek. The lower Payette River is also a tributary of significance to the Snake River between the Boise and Weiser Rivers and has LAs for phosphorus and pesticides (through an LA for sediment) at the confluence as established in the Snake River-Hells Canyon (SR-HC) TMDLs (IDEQ and ODEQ, 2004). These documents are available from the DEQ website at http://www.deq.state.id.us/water/data_reports/surface_water/tmdls/sba_tmdl_master_list.cfm#region.

Approved TMDLs

The information in this section of the report is summarized or annotated from existing approved TMDLs (DEQ, 1999; 2003, 2008; IDEQ and ODEQ, 2004) to describe the 1998 and 2002 §303(d)-listed stream segments, beneficial uses, and WQS criteria associated with stream segments for which TMDLs have been written and approved (Table 1). LAs and pollutant load reductions established in the TMDLs are described in Table 2 and Table 3.

Table 1. Summary of historical §303(d) listings, approved Idaho TMDLs (DEQ, 1999, 2003, 2008; IDEQ and ODEQ, 2004), and load allocations (LAs) assigned to the lower Payette River.

Water Body Name	Assessment Units with LAs	Boundaries	Pollutants Listed in 1998	1998 or 2002 Beneficial Uses	Pollutants Listed in 2002	SBA/TMDL
Payette River	001_06	Black Canyon Dam to Snake River	Bacteria, Nutrients, Temperature	DWS, CWB, SS, PCR, SCR	unknown	Bacteria-1999, *Phosphorus and Pesticides (through an LA for sediment at the Snake River confluence) –SR-HC, 2004
Bissel Creek	015_03a	Bissel Creek from the North Side Irrigation Canal to the mouth	Sediment	CWB, AG, PCR		Bacteria-1999, Sediment and Bacteria-2003
Big Willow Creek	017_02, 017_03, 017_04, 017_06	Headwaters to mouth	Temperature, Bacteria	CWB, PCR, SS	Unknown	Temperature-2008
*Snake River	001_06	SNAKE RIVER Boise River to Weiser River	Nutrients, Sediment, DO, Temperature, Bacteria	CWB, DWS, PCR	Nutrients, DO, Sediment, Temperature	Phosphorus and Pesticides (through an LA for sediment)- 2004

SBA/TMDL – subbasin assessment/total maximum daily load, DWS – domestic water supply, CWB – cold water biota [now COLD -- cold water communities], PCR – primary contact recreation, SCR – secondary contact recreation, SS – salmonid spawning, DO – dissolved oxygen;

* Pollutants listed for the Snake River stream segment that includes the confluence with the Payette River. The Payette River is not listed for these pollutants.

The lower Payette River TMDL (DEQ 1999) established LAs for bacteria that use fecal coliform as the WQS surrogate measure for PCR/SCR beneficial use support. LAs, which were calculated using die-off rates and presumption of uniform conditions, were assigned to 27 water bodies that were identified as contributing sources for bacteria to the lower Payette River during the irrigation season in general and the critical time period, August, in particular. These locations are identified in Table 2, as they appear in the TMDL and in the sequence they exist in the subbasin, in downstream order from the outfall of Black Canyon Reservoir to the mouth, at the confluence with the Snake River. For the full explanation of how LAs for bacteria were established, refer to the lower Payette River TMDL (DEQ 1999).

Table 2. Bacteria load allocations (LAs) for the lower Payette River TMDL as published in Table 19 of the TMDL (DEQ, 1999).

River Station				Current Load	Load After Die-Off	Load Allocation ¹	Reduction
	Name	Point Source	Non-Point Source	Load CFU/sec	Load CFU/sec	Load CFU/sec	%
LPR-001	Lower Payette River						
	Emmett WWTP	WWTP		7.82E+02	7.82E+02	5.11E+04	
	Plaza Drain		Drain	2.31E+06	2.20E+06	1.89E+05	90%
	Mesa Drain		Drain	2.98E+06	2.89E+06	2.97E+05	88%
	Big 4 Drain		Drain	6.70E+06	6.57E+06	9.80E+05	82%
	CAFO's	CAFOs		0.00E+00	0.00E+00	0.00E+00	
LPR-002	Lower Payette River						
	Tunnel #7		Drain	3.60E+06	3.51E+06	1.110+06	64%
	Bissel Cr.		Drain	1.85E+06	1.83E+06	4.77E+05	70%
	Beacon		Drain	6.51E+06	6.36E+06	9.67E+05	70%
	CAFOs	CAFOs		0.00E+00	0.00E+00	0.00E+00	
LPR-003	Lower Payette River						
	Silverleaf		Drain	7.79E+06	7.06E+06	4.43E+05	92%
	7 Mile Slough		Drain	3.78E+06	3.42E+06	9.51E+05	63%
	Countyline		Drain	4.88E+06	4.51E+06	5.98E+05	83%
	S-1		Drain	7.50E+06	7.08E+06	1.20E+06	78%
	S-2		Drain	2.84E+06	2.70E+06	6.59E+05	69%
	S-3		Drain	3.37E+06	3.21E+06	3.17E+05	87%
	S-4		Drain	1.45E+06	1.42E+06	8.28E+05	28%
	Sand Hollow		Drain	4.28E+05	3.89E+05	8.85E+04	70%
	CAFOs	CAFOs		0.00E+00	0.00E+00	0.00E+00	
LPR-005	Lower Payette River						
	S-5		Drain	8.23E+06	7.58E+06	1.58E+06	75%
	S-6		Drain	1.37E+06	1.26E+06	5.47E+05	48%
	S-7		Drain	7.93E+04	7.33E+04	1.76E+05	-188%
	S-8		Drain	2.08E+06	1.94E+06	5.28E+05	67%
	S-9		Drain	3.96E+05	3.73E+05	1.77E+05	43%
	S-10		Drain	3.75E+06	3.54E+06	6.34E+05	78%
	S-11		Drain	4.56E+06	4.32E+06	1.78E+05	95%
	S-12		Drain	2.15E+06	2.04E+06	2.05E+05	88%
	S-13		Drain	1.57E+07	1.49E+07	1.15E+06	91%
	S-14		Drain	5.78E+06	5.50E+06	4.36E+05	90%
	S-15		Drain	1.12E+07	1.09E+07	7.84E+05	91%
	Willow Creek		Trib.	2.44E+07	2.32E+07	4.10E+06	79%
	New Plymouth WWTP	WWTP		3.85E+02	3.37E+02	8.90E+03	
	CAFOs	CAFOs		0.00E+00	0.00E+00	0.00E+00	
LPR-007	Lower Payette River						
	49er Slough		Drain	1.64E+07	1.61E+07	1.19E+06	91%
	Fruitland WWTP	WWTP		5.95E+01	5.95E+01	3.96E+03	
	Payette WWTP	WWTP		4.76E+03	4.76E+03	3.17E+04	
	CAFOs	CAFOs		0.00E+00	0.00E+00	0.00E+00	
LPR-008	Lower Payette River						
Totals				1.52E+08	1.45E+08	2.09E+07	

¹ Load Capacity or Target Loading Does Not Calculated Die-off Rates to the Snake River, Approximately 17.4%

Table 3. Load allocations (LAs) assigned to the Payette River in Bissel Creek (DEQ, 2003), Snake River-Hells Canyon (IDEQ and ODEQ, 2004), and Big Willow Creek (DEQ, 2008) TMDLs, based on 1998 §303(d) list.

Water Body Name	Boundaries	Assessment Unit	Pollutants 1998 303(d) List	1998 Beneficial Uses	Load Allocation (LA) in TMDL
Bissel Creek	North Side Main Canal to the mouth	015_03a	Sediment	CWB, AG, PCR	Sediment- 22 mg/L-April 1-September 30; Bacteria- <i>E. coli</i> - 126 cfu/100mL (geomean)
Snake River	Boise River to Weiser River	001_06	Nutrients, pH, Sediment	DWS, CWB, SS, PCR, SCR	Phosphorus- 0.07 mg/L (469 kg/day- 34% reduction); Pesticides -water column- DDT- 0.024 ng/L, 0.83 ng/L DDD, 0.59 ng/L DDE; Dieldrin 0.07 ng/L, through sediment LA of 137,887 kg/day (0 reduction).
Big Willow Creek	Rock Creek to Payette River; Headwaters to mouth	017_02, 017_03, 017_04, 017_06	Unknown, Temperature	CWB, PCR, SS	Shade increase of 1 to 35%

CWB – cold water biota [now COLD -- cold water communities], AG – agriculture supply, DWS – domestic water supply, PCR – Primary Contact Recreation, SS – Salmonid Spawning, SCR – Secondary Contact Recreation, *E. Coli.* – *Escherichia Coliform*; cfu – colony-forming units; mg/L – milligrams per liter; kg/day – kilograms per day; ng/L – nanograms per liter.

Permitted Point Sources

Lower Payette River

Point sources require a National Pollutant Discharge Elimination System (NPDES) permit from the EPA in order to discharge effluent into a surface water body. In 1999, there were relatively few permitted point sources in the subbasin (Table 4). These permits required monitoring of bacteria and other parameters, but there were no bacteria wasteload allocations (WLAs) for any point sources. Bacteria WLAs from the TMDL were intended to be included in future NPDES permits in the subbasin. The city of Letha is not included in Table 4 because the city does not directly discharge to the lower Payette River.

Bissel Creek

There are no point sources in Bissel Creek.

Snake River-Hells Canyon

The point sources in the lower Payette River are identified in Table 4 and their discharges to the lower Payette River are regulated by NPDES permits administered by EPA. The SR-HC TMDL indicates that point source permits will be revised to include WLAs for phosphorus after the current permits expire in 2007. The contribution of phosphorus to the Snake River from permitted point sources is as yet undetermined, but the permitted facilities contribute less than 1% of the flow of the Payette River, and the Payette River accounts for 17.9% of the total flow of the Snake River at its confluence. The highest reported concentrations of phosphorus in the mainstem of the Payette River are from samples collected at locations downstream of the Emmett wastewater treatment plant (WWTP) in February and November of 2007 and 2008.

Big Willow Creek

There are no point sources in Big Willow Creek.

Table 4. Municipal wastewater treatment plants (WWTP) and known NPDES-permitted point sources discharging to the lower Payette River and its tributaries in 1998, as taken from Table 9 in the TMDL (DEQ, 1999).

MUNICIPALITIES WWTP	NPDES IDENTIFICATION NUMBER
City of Emmett	ID-002031-1
City of New Plymouth	ID-002038-9
City of Fruitland	ID-002119-9
City of Payette	ID-002067-2
INDUSTRIAL	
American Fine Foods	ID-0000213
CAFOs or CFAs	
CM Ranch	ID-002214-4
Emmett Feedlot	ID-002174-1
American Dairy Heifer Feedlot	ID-002282-9
Bien Livestock	ID-002132-6
Callender's Inc.	ID-G-01-0017
Collingsworth Brother Dairy	ID-G-01-0005
David Holm	ID-G-01-0019
Ankerman Dairy Farm	ID-G-01-0009

Nonpoint Sources***Lower Payette River***

The nonpoint sources of sediment and bacteria pollution in the subbasin are discussed in the SBA as possibly including agricultural activities, stormwater runoff, urban and suburban sources, non-designated CAFOs and AFOs, mining, waste application sites, roads, construction activity, septic systems, and wildlife. Water quality data from the mainstem river below the outfall of the Black Canyon Dam represents background conditions for the subbasin.

Ground water studies conducted in 1996 and 1997 by the ISDA determined that in some subbasin watersheds, groundwater contributes to elevated nitrate concentrations in surface waters.

Bissel Creek***Sediment***

The SBA (DEQ, 2003) determined that the agricultural irrigation water draining into the creek from April through September is the primary source of sediment to Bissel Creek and no data has been collected to identify other sources.

Bacteria

The SBA (DEQ, 2003) documented that the irrigation season average concentrations of bacteria exceed the WQS criteria by a factor of five and the non-irrigation season average concentrations are less than WQS criteria. Potential sources of bacteria are identified as farm/ranch animals, wildlife, domestic pets, and septic systems, but studies to determine the proportional contribution from each type of nonpoint source have not been conducted.

There are 18 structures within 0.25 mile of Bissel Creek in AU015_03a (the AU with the TMDL) that may have septic systems and the status of those systems has not been determined. The IP (2006) documented the presence of two CAFOs.

Snake River-Hells Canyon***Phosphorus***

The Payette River contributes less phosphorus than any other tributary or drain studied for the SR-HC TMDL and was not listed as impaired for nutrients when the TMDL was developed. The Black Canyon Reservoir delivers water to the lower Payette River with phosphorus concentrations between 0.03 and 0.04 mg/L; equivalent to one-half of the subbasin LA. The potential nonpoint sources of phosphorus in the lower Payette River subbasin are from upstream reservoirs and agriculture irrigation drain water; which has reported concentrations that exceed the TMDL target by more than two orders of magnitude. The highest reported concentrations of phosphorus are from samples collected from north-side tributaries and north- and south-side irrigation drains from April through September.

Pesticides

Pesticides of concern in the SR-HC TMDL are from legacy application and transport of DDT, the daughter products DDE and DDD, and Dieldrin; which are banned in the United States with no expectation for future use (IDEQ and ODEQ, 2004). These pesticides are known to be colloids of fine sediment and the LAs are intended to be met by reducing sediment delivery to subbasin streams. The sources of sediment in the subbasin are primarily from erosion induced by irrigated agriculture practices during the irrigation season and the TMDL allows no increase in sediment delivery (from 2000 loads) from the Payette River.

Big Willow Creek***Temperature***

The sources of excess solar load to Big Willow Creek are largely the result of land use activities to support cultivated agriculture, grazing, and AFO practices. De-vegetation of the riparian zone, dewatering channels during summer months, and impounding tributary and mainstem water all have the effect of increasing solar heat load to the stream. Damage from the December 1996-January 1997 flood event described in the Big Willow

Creek TMDL (DEQ, 2008) is still evident, but natural vegetation is re-populating the new terraces and some sections of the flood-scoured riparian zone.

TMDL Targets

Water Quality Criteria

In 1998, Idaho WQS contained numeric and narrative criteria to protect beneficial uses. The following water quality criteria were applicable to the pollutants of concern listed on the 1998 Section 303(d) lists for existing, presumed, and designated uses on the lower Payette River at the time each TMDL (DEQ, 1999, 2003, 2008; IDEQ and ODEQ, 2004) was published.

Lower Payette River

Bacteria

For primary contact recreation (PCR) (May 1 - September 30), fecal coliform bacteria colonies:

Primary Contact Recreation (May 1 - September 30) fecal coliform bacteria colonies:

- may not exceed 500/100 ml at any time;
- may not exceed 200/100 ml in more than 10% of the total samples taken over a thirty-day period; and
- may not exceed a geometric mean of 50/100 ml based on a minimum of five samples taken over a thirty-day period (IDAPA 16.10.02.250.01.a).

For secondary contact recreation (SCR) (all year), fecal coliform bacteria colonies:

- may not exceed 800/100 ml at any time;
- may not exceed 400/100 ml in more than 10% of the total samples taken over a thirty-day period; and
- may not exceed a geometric mean of 200/100 ml based on a minimum of five samples taken over a thirty-day period (IDAPA 16.01.02.250.01.b).

Sediment

Sediment shall not exceed quantities specified in IDAPA 15.01.02.250, or, in the absence of specific sediment criteria, quantities that impair designated beneficial uses.

Determinations of impairment are based on water quality monitoring and surveillance and the information used as described in Sub 350.02.b (IDAPA 16.01.02.200.08). The sediment target was established in the 1999 TMDL by a literature review and comparison with other states' total suspended solids (TSS) criteria. It was found that no more than 80 mg/L TSS in a 14-day acute exposure period would be protective of adult fish. The target of no more than 50 mg/L TSS in a 60-day chronic exposure period would be protective of the eggs and larval stages of fish.

Turbidity

For cold water biota, turbidity downstream of any applicable mixing zone established by the Department of Health and Welfare, DEQ, shall not exceed background turbidity by

more than 50 Nephelometric Turbidity Units (NTU) instantaneously, or more than 25 NTU for more than 10 consecutive days (IDAPA 15.01.02.250.02.c.iv).

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 16.01.02.200.06).

Temperature

For cold-water biota (CWB, now defined as cold water communities [COLD]), waters are to exhibit the following characteristics:

Water temperatures of 22 °C or less with a maximum daily average no greater than 19 °C. (IDAPA 16.01.02.250.02.c.ii).

For salmonid spawning (SS), waters are to exhibit the following characteristics during the spawning and incubation period for the particular species inhabiting those waters:

Water temperatures of 13 °C or less with a maximum daily average no greater than 9 °C. (IDAPA 16.01.02.250.02.d.ii).

The time periods for salmonid spawning that apply to species in the Payette River are: rainbow trout, January 15 to July 15; and mountain whitefish, October 15 to March 15.

Bissel Creek

The presumed beneficial uses for Bissel Creek at the time the TMDL was developed are cold water communities (COLD) and primary/secondary contact recreation (PCR/SCR), and no additional existing uses are documented.

Snake River-Hells Canyon

Designated beneficial uses for the Snake River between the Boise and Weiser Rivers at the time the SR-HC TMDL was developed were COLD, PCR, and drinking water supply (DWS). Additional existing uses are not documented.

Big Willow Creek

The designated uses for Big Willow Creek at the time the TMDL was developed are COLD, SS, and PCR. Additional existing uses are not documented.

Control Location Monitoring

The lower Payette River WAG (WAG) selected 32 control monitoring locations for the Lower Payette River TMDL and three locations for the Bissel Creek TMDL. One location for the Snake River-Hells Canyon TMDL was identified by the SR-HC TMDL participants and is the same location (LPR-007) as one of lower Payette River control monitoring locations. The WAG collaborated with the ISDA, local municipalities, and DEQ to continue collecting physical, chemical, and biological data from the river and selected tributaries and drains. There are six mainstem river monitoring locations for bacteria and the other locations are distributed throughout the subbasin at the mouths of tributaries and drains (Table 5 and Figure 5).

Initially, four locations were selected for monitoring in Bissel Creek; however, the most upstream location, and the only location in AU 015_03, was removed from the control

monitoring location list due to beaver activity that interferes with data collection. The three remaining control monitoring locations are downstream of the North Side Main Canal, in AU 015_03a.

The SR-HC TMDL LAs apply to the lower Payette River subbasin at the mouth of the Payette River with the control monitoring location close to the confluence at the same control monitoring location identified as LPR-007 in the Lower Payette TMDL.

Big Willow Creek may be monitored at any location and the data collected can be compared to the TMDL maps and charts to measure progress.

The city of Emmett, Water District 65, ISDA, the Bureau of Reclamation (BOR), and DEQ have collected water quality data, or have contracted to have water quality data collected, at many locations throughout the subbasin during the past five years. Data not collected by DEQ was retrieved from public databases or provided by other agencies as a professional courtesy. A full list of data sources is provided in Table 5 and the data used for this review is provided in Appendix C. Water quality monitoring data required by the EPA-administered NPDES permits include data collected near the points of discharge for each permitted point source and are evaluated only in the absence of other relevant data for the AU of interest.

Lower Payette River Subbasin

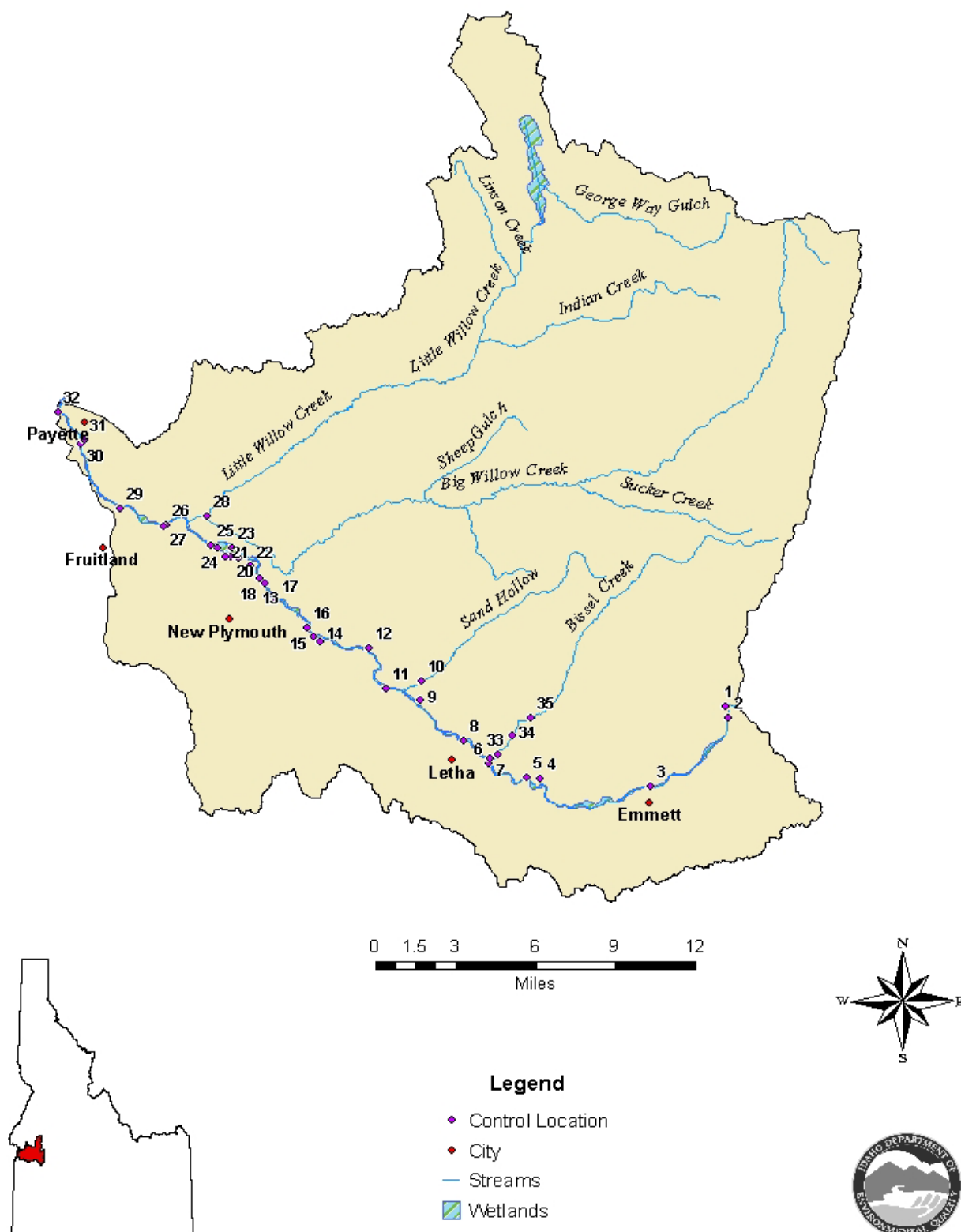


Figure 5. Map of Control Monitoring Locations in the Lower Payette River Subbasin. *Control Monitoring Location Labels and Corresponding Locations are Presented in Table 5.

Table 5. Control monitoring locations with corresponding location number for Figure 5 (map) for the lower Payette River, Bissel Creek, and Snake River-Hells Canyon TMDLs.

Control Location Number	Site ID/Water Body Name	Assessment Unit	Approximate GIS Coordinates (NAD83)	Year Monitored
1	LPR-001 / EMM015	001_06	43.9288, -116.4450	2003-2009
2	Plaza Drain	001_02	43.9224, -116.4432	2009
3	LPR-002 / WA St. Bridge / 13249500	001_06	43.8822, -116.5003,	2007-2009
4	Mesa Drain	001_02	43.8850, -116.5831	2008
5	Big 4 Drain	001_02	43.8855, -116.5937	2008
6	Tunnel #7	001_02	43.8922, -116.6222	2008
7	Beacon Drain	001_02	43.8951, -116.6220	2008
8	LPR-003	001_06	43.9053, -116.6423	2005-2009
9	Silverleaf Drain	001_02	43.9270, -116.6716	2008
10	Sand Hollow Drain	001_02	43.9378, -116.675	2008
11	Sevenmile Slough	001_02	43.9332, -116.7018	2008
12	Countyline Drain	001_02	43.9590, -116.7154	2008
13	LPR-005 (Blacks Bridge)	001_06	43.9903, -116.7959	2007-2008
14	S-1	001_02	43.9584, -116.7524	
15	S-2	001_02	43.9610, -116.7572	
16	S-3	001_02	43.9658, -116.7624	
17	S-4	001_02	43.9802, -116.7870	
18	S-5	001_02	43.9928, -116.7993	
19	S-6	001_02	44.0038, -116.8164	
20	S-7	001_02	44.0043, -116.8220	
21	S-8	001_02	44.0049, -116.8259	2000-2002, 2008
22	S-9	001_02	43.9998, -116.8071	
23	S-10	001_02	44.0100, -116.8210	2000-2002, 2008
24	S-11	001_02	44.0097, -116.8320	
25	S-12	001_02	44.0110, -116.8373	2000-2002, 2008
26	S-13	001_02	44.0214, -116.8714	2000-2002, 2008
27	S-14	001_02	44.0205, -116.8737	2000-2002
28	Willow Creek/ LWC-1	018_04	44.0270, -116.8410	2007
29	S-15-Sand Hollow	001_02	44.0295, -116.9069	2008
30	LPR-007 /EMM010/ 13251000	001_06	44.0656, -116.9383	2003-2004, 2006, 2009
31	Forty-nine Slough	001_02	44.0482, -116.9232	2009
32	LPR-008	001_06	44.0832, -116.9567	2003-2004
33	Bissel Creek (BC-1)	015_03a	43.8976, -116.6161	2004, 2008
34	Bissel Creek (BC-2)	015_03a	43.9084, -116.6054	2004, 2008
35	Bissel Creek (BC-3)	015_03a	43.9191, -116.5920	2004, 2008

*Blank cells in the Year Monitored column indicate data has not been collected or reported.

Load Capacity

Lower Payette River

Bacteria

At the time the TMDL was developed, Idaho WQS criteria used fecal coliform bacteria as a surrogate for determining use support of contact recreation. In 2007, Idaho adopted new WQS that use *E. coli* bacteria instead of fecal coliform. Methods used to determine use support for either standard are the same. The only difference between the WQS at the time the TMDL was developed and now is the change in the surrogate used to establish target criteria. The change in surrogate does not alter the use support status of the lower Payette River. Load reductions are still required to support contact recreation beneficial uses.

Load capacities (LCs) for the lower Payette River TMDL were calculated for bacteria based on the concentration of fecal coliform colony forming units per 100mL of sample water (cfu/100 mL) using data collected in June, August, and September of 1996 and 1997 from six mainstem river locations. The data was used to calculate geometric means (geomeans) for comparison to WQS. Geomean results were used to identify the time period when criteria are exceeded by the greatest amount, and data from that time period (August) was used to calculate LCs and LAs. The calculations were based on flow, initial concentrations, diversions, die-off rates, and time. Using the methods described in the TMDL, there is a 30% difference between the predicted and measured concentrations at the Letha Bridge monitoring point (LPR-003), with the measured concentration less than the predicted concentration. This difference can be accounted for in the boundary conditions established for the calculation.

The calculations presume that the distribution of bacteria is uniform throughout the water column and that the confidence interval of the flow rate and diversions is at least 95 %. While this calculation may be appropriate to predict concentrations under those conditions, uniform distribution conditions are unlikely to be present in natural systems and estimated flow values do not meet the 95 % confidence interval, which results in an unpredictable range of accuracy from which to derive useful information. These inaccuracies are reflected in the large difference between the measured and predicted concentrations at the control monitoring locations. It may be more appropriate for loads and LC to be determined using measured results compared to the criteria maximum concentration to calculate the percent reduction necessary to meet criteria at each of the control locations.

Example: Data reported for Little Willow Creek (LWC-1) AU 018_04

Date	<i>E. Coli</i> (cfu/100 mL)	Maximum Criteria
5/22/2007	2400	406

$$2400 - 406 = 1994$$

$$(1994/2400) * 100 = 83.08$$

Reducing the concentration by 83.08% will meet single-sample PCR criteria (406 cfu/100 mL).

Recent advances in genotyping technology make it possible to identify the proportional contribution of *E. coli* bacteria from specific species of mammals. This may be an efficient method of identifying the controllable fraction of bacteria at various locations in the lower Payette River subbasin.

Bissel Creek

The Bissel Creek sediment and bacteria TMDLs apply to AU 015-03a; which is almost entirely owned by private parties. Irrigated agriculture is the primary land use (Figure 3 and Figure 4) and these AUs receive water from the North Side Main Canal and numerous irrigation return drains from April through October. There are nine flow control structures and one large reservoir in the watershed (Figure 2). There are no point source discharges to Bissel Creek and the source of pollutants is entirely from nonpoint sources. There are three control monitoring locations on Bissel Creek (all in Gem County): BC-1, near the Payette River; BC-2 near Old Black Canyon Hwy; BC-3 near Big 4 Avenue. The TMDL targets apply to all stream locations.

Sediment

The WQS use turbidity as a surrogate for sediment in the same manner as described for bacteria in the “Water Quality Targets” paragraphs earlier in this section. Given the absence of data on turbidity and suspended sediment concentration (referred to by different analytical labs as TSS or suspended solids concentration [SSC]) for Bissel Creek, it is not possible to determine if the TMDL target is above or below the numeric WQS criteria for sediment. Application of the general WQS narrative criteria is an appropriate method to determine a TMDL target. The TMDL target maximum thresholds were derived through an evaluation of published studies to identify values determined to be protective of COLD beneficial uses (Rowe, et al., 2003).

To arrive at a sediment LC protective of the beneficial uses of Bissel Creek, the use of SSC and TSS concentration values was identified as an appropriate surrogate measure. Because historical turbidity and SSC data is not available for Bissel Creek, a stream for which an approved sediment TMDL had recently been developed in a similar ecoregion with similar or comparable physical characteristics (lower Succor Creek) was identified as a substitute for determining a sediment LC most likely to support COLD beneficial uses (DEQ, 2003).

The target selected for Bissel Creek was based on results of a multi-variant matrix which identified the most likely background conditions for the stream and then selected a target concentration based on published ranges of SSC known to be protective of COLD beneficial uses under the most likely conditions, absent human influence. This was determined to be 22 mg/L for lower Succor Creek (DEQ, 2003) and was approved by EPA as appropriate for Bissel Creek as well (DEQ, 2003). The critical time frame for sediment contributions to Bissel Creek was determined to be during irrigation season, from April through September, because data indicated that SSC did not exceed maximum concentration thresholds for COLD beneficial uses during other times of year.

Bacteria

The LC for bacteria is based on existing WQS criteria for PCR beneficial use, using *E. coli* concentrations as a surrogate indicator. The Bissel Creek TMDL was developed using reported concentrations from three locations compared to the WQS criteria to calculate required load reductions. Because the beneficial use is presumed to exist throughout the year, there is no critical time frame for control monitoring and the target applies at all times. Recent advances in genotyping technology make it possible to identify the proportional contribution of *E. coli* bacteria from specific species of mammals. This may be an efficient method of identifying the controllable fraction of bacteria at various locations in the Bissel Creek watershed.

Snake River-Hells Canyon

The SR-HC TMDL allocated phosphorus and pesticide loads to the Payette River for pollutants impairing the beneficial uses of the Snake River. Phosphorus allocations are the method selected to manage aesthetic impairments related to excessive algae growth and aquatic life uses impaired by low DO concentrations. The pesticides of concern are Dieldrin (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,exo-1,4:5,8-dimethanonaphthalene), DDT (1,1,1-trichloro-2,2-bis (p-chlorophenyl) ethane) and its daughter products DDD (1,1-dichloro-2,2-bis (p-chlorophenyl) ethane) and DDE (1,1-dichloro-2,2-bis(chlorophenyl) ethylene). Allocation of loads to the Payette River is not a determination that the Payette River is impaired for those pollutants; it simply represents the method selected to restore the water quality of the Snake River by reducing loads from all potential sources that cumulatively prevent the Snake River from supporting beneficial uses.

Phosphorus

The WQS for nutrients are narrative and specify that nutrients not exceed concentrations that promote the growth of nuisance algal matter or slime on the water surface. It has been determined that phosphorus is the limiting nutrient for nuisance aquatic flora in the Snake River segment that includes the Payette River. The phosphorus allocation of 0.07 mg/L at the confluence of the Payette River with the Snake River is the same concentration allocated to all tributaries in this segment of the Snake River, and the Payette River contributes less phosphorus to the Snake River than any other tributary in this segment. The SR-HC TMDL discussed a nutrient TMDL for the Payette River that was deferred pending the completion of the SR-HC TMDL and expected that a nutrient TMDL would be developed for the Payette River to address nutrient issues in the Payette River. Subsequent data collection did not identify nutrient impairments in the Payette River and a nutrient TMDL has not been developed.

Pesticides

The pesticides of concern in the TMDL are no longer used in the United States and concentrations reported from sample analyses are legacy constituents likely to persist in the environment for the foreseeable future. The LC and targets established in the TMDL for the pesticides of concern are as follows.

Dieldrin: less than 0.07 ng/L water column concentration

DDT: less than 0.024 ng/L water column concentration

DDD: less than 0.83 ng/L water column concentration

DDE: less than 0.59 ng/L water column concentration

Due to the nature of occurrence and transport of pesticides identified in the TMDL, the best management strategy is to limit the sediment contribution to the Snake River through LAs to the Payette River for sediment. The LC for the Payette River indicates that while no reduction is required, any increase in suspended sediment concentrations from the values reported in 2000 would contravene the anti-degradation directives in the CWA and the state WQS (IDEQ and ODEQ, 2004).

Big Willow Creek

Temperature

The temperature TMDL is based on potential natural vegetation (PNV) determined by analyzing aerial photographs, vegetation at comparable streams, and regional shade curves for the assemblage of identified vegetation. Increases of shade from 0 to 35% are required on stream segments identified in the TMDL and the required percentages are presented in tables and maps (DEQ, 2008). The implementation plan is due by January of 2010 and is in publication by the responsible agency (ISDA) at this time.

Load Allocations

The rationale for each pollutant and load allocation (LA) is thoroughly described in the TMDLs and summarized in the following paragraphs and tables.

Lower Payette River

Bacteria

LAs for bacteria in the lower Payette River were assigned to six river control locations and 27 drains and tributaries. Required reductions ranged from 0 to 85% at the river locations and from 28 to 95% at the drain and tributary locations. Because the TMDL was developed before the WQS was modified to use *E. coli* as the surrogate for bacteria, the LA tables could be updated using recent *E. coli* data for each LA location, but the IP includes an addendum to address this issue and the reduction percentages are anticipated to be similar to those required with the LAs developed under the previous WQS criteria.

Because an evaluation of septic system contribution to bacteria load in the subbasin was not conducted, it may be useful to evaluate the density and age of systems within ¼, ½, 1, and 2 miles of perennial streams or agricultural drains identified as contributing bacteria pollution to the mainstem river in comparison to bacteria concentrations. It may be possible to determine the likelihood of load contribution from this sector using proximity and system age analysis. If a load contribution analysis indicates that orphan sources contribute to impairment, an LA could be developed for these systems, either by general area, age class, stream proximity, or some combination of these variables.

Point Source Waste Load Allocations

The TMDL anticipated that point source permits would be revised to comply with current WQS and as the cumulative total of point sources contribute less than one one-hundredth of one percent (<0.01%) of total bacteria load and < 0.01% of total flow to the lower

Payette River, these sources (Table 6) are considered to be negligible contributors of this pollutant.

Table 6. Subbasin point source load analysis for lower Payette River bacteria TMDL (DEQ, 2003).

Source	Load (cfu/sec)	Load After Die-Off (cfu/sec)	Percent of Total Load	Load Capacity at 50 cfu/100mL /and 200 cfu/100mL-in cfu/sec	Load Reduction Required to Meet Criteria
Emmett WWTP	7.82E+02	7.82E+02	0.00053	1.28E+04 / 5.11E+04	0 / 0
New Plymouth WWTP	3.85E+02	3.37E+02	0.00023	2.27E+03 / 9.08E+03	0 / 0
Fruitland WWTP	5.95E+01	5.95E+01	0.00004	9.63E+02 / 3.96E+02	0 / 0
Payette WWTP	4.76E+03	4.76E+03	0.00324	7.98E+03 / 3.16E+03	0 / 0

WWTP = Waste Water Treatment Plant; cfu = colony forming unit

Nonpoint Source Load Allocations

The bacteria LAs to nonpoint sources (Table 7) were based on LC calculations for fecal coliform described in the TMDL to comply with WQS criteria in effect in 1998. Reductions ranging from 0 to 95% are required in the mainstem river as well as at all LA locations. Because animal feeding operations (CAFOs or AFOs) are prohibited from discharging to surface water bodies, there is no LA for designated AFOs in the subbasin. The LA for S-7, a south-side drain between New Plymouth and Fruitland, was reported with a negative value in the TMDL, implying that additional bacteria load could be allocated to that drain. However, in conformance with the anti-degradation requirements of the CWA, and as there is no additional carrying capacity in the lower Payette River due to bacteria pollution, the correct load reduction requirement is zero (0). If further amendments are prepared for this TMDL, this correction should be included.

Table 7. Lower Payette River Subbasin TMDL (DEQ, 2003) tributary, drain, and nonpoint source load allocations for bacteria.

Location	Load Allocation (in cfu/sec)	Required Load Reduction (in %)
LPR-001	2.02E+06	0
Plaza Drain	1.89E+05	90
Mesa Drain	2.97E+05	88
Big 4 Drain	9.80E+05	82
LPR-002	1.61E+07	0
Tunnel # 7	1.11E+06	64
Bissel Creek	4.77E+05	70
Beacon	9.67E+05	70
LPR-003	1.34E+07	10
Silverleaf	4.43E+05	92
Sevenmile Slough	9.51E+05	63
Countyline	5.98E+05	83
S-1	1.20E+06	78
S-2	6.59E+05	69
S-3	3.17E+07	87
S-4	8.28E+05	28
Sand Hollow Creek	8.85E+04	70
LPR-005	1.10E+07	69

Location	Load Allocation (in cfu/sec)	Required Load Reduction (in %)
S-5	1.58E+06	75
S-6	5.47E+05	48
S-7	1.76E+05	-188
S-8	5.28E+05	67
S-9	1.77E+05	43
S-10	6.34E+05	78
S-11	1.78E+05	95
S-12	2.05E+05	88
S-13	1.15E+06	91
S-14	4.36E+05	90
S-15	7.84E+05	91
Willow Creek	4.10E+06	79
LPR-007	1.82E+07	81
Forty-nine Slough	1.19E+06	91
LPR-008	1.76E+07	85

Bissel Creek

Based on the information in the TMDL (DEQ, 2003), nonpoint sources related to agricultural land uses are the only sources believed to contribute to sediment and bacteria impairment in the watershed. LAs are assigned to three control monitoring locations and WQS criteria apply to the entire creek.

Sediment

Using the LC concentration (22 mg/L) derived in the TMDL as the LA target, required reductions in Bissel Creek range from 0 to 34%, with the greatest reduction required near the mouth. The control location BC-2 indicates that there are no required sediment load reductions, and there is also no allowance for additional sediment contributions near this location (Table 7). This LA applies during the irrigation season because that is documented as the time when impairment is most likely to occur. The current irrigation season is from April through October of each year.

Bacteria

Bacteria LAs for Bissel Creek (Table 8) are intended to meet the WQS criteria for support of beneficial uses and are applicable at all locations throughout the year. Reductions between 81 and 87 % are required at all locations.

There was no evaluation of septic system contribution to bacteria load in the subbasin. It may be useful to evaluate the density and age of systems within ¼, ½, 1, and 2 miles of perennial streams. It may be possible to determine the likelihood of load contribution from this sector using these methods. It may also be useful to conduct an AFO proximity and bacteria concentration analysis using aerial photographs to identify and prioritize sources of bacteria to Bissel Creek.

Table 8. Existing sediment and bacteria loads, load allocations, and required reduction for sediment and bacteria at control monitoring locations in Bissel Creek (DEQ, 2003).

Location	Existing Sediment Load (lbs/day)	Sediment Load Allocation (lbs/day at 22 mg/L)	Required Sediment Load Reduction (in %)	Existing Bacteria Load (geomean cfu/100 ml)	Bacteria Load Allocation (geomean cfu/100mL)	Required Bacteria Load Reduction (in %)
BC-1	3,383	2,232	34	662	126	81
BC-2	1,766	1,916	0	669	126	81
BC-3	1,635	1,398	19	986	126	87

Snake River-Hells Canyon

The LAs for phosphorus and pesticides are for the purpose of attaining beneficial uses in the Snake River at the control monitoring location (LPR-007) near the mouth of the Payette River. The point source NPDES permits in effect from 2001 through 2007 do not have a WLA for phosphorus or pesticides and all facilities are operating under terms of expired permits until new permits are developed and approved. In addition to meeting permit requirements, the city of Emmett collects samples upstream and downstream of the WWTP on a regular basis and that data is included in this report.

Phosphorus

As described in the SR-HC TMDL, the existing phosphorus load at the confluence of the Payette with the Snake River is 710 kg/day; which is a value calculated from a mean concentration 0.101 mg/L (DEQ, 2004). Based on the load calculations developed for the SR-HC TMDL, the lower Payette River contributes 17% of the total phosphorus load to this reach of the Snake River. The critical time period identified in the TMDL is May through September. Data collected by the U.S. Bureau of Reclamation (BOR) between 2003 and 2006 indicates that the average concentration of phosphorus at the outfall of the Black Canyon Dam is 0.03 mg/L, which is 42% of the LA to the Payette River. In order to identify and quantify the load sources in the Payette River subbasin, the SR-HC TMDL recommends that a tributary-specific TMDL be completed as part of the IP for approved TMDLs in the Payette River. To achieve the TMDL targets, a 34% reduction in phosphorus, resulting in a load of 469 kg/day and a mean concentration of 0.07 mg/L, is required at the confluence of the Payette and Snake Rivers.

There was no evaluation of septic system contribution to phosphorus load in the subbasin. It may be useful to evaluate the density and age of systems within ¼, ½, 1, and 2 miles of perennial streams or agricultural drains identified as contributing phosphorus concentrations to the mainstem river that exceed the TMDL target. It may be possible to determine the load contribution from this sector using proximity and system age analysis. If a proximity analysis indicated that orphan sources contribute to impairment, an LA could be developed for these systems, either by general area, age class, stream proximity, or some combination of these variables.

Pesticides

For reasons discussed in the SR-HC TMDL, the LA for pesticides is calculated with no value for natural background and a value of zero (0) for reference conditions. Because pesticide transport and deposition is largely dependent on transport and deposition of sediment, achievement of the TMDL targets is dependent on reducing erosion and sediment transport from agricultural fields into tributaries that supply the Snake River. The sediment LA for the Payette River, measured at the control location LPR-007 (Payette River near Payette), is 137,886 kg/day (50 mg/L monthly mean) and allows for no increase above concentrations reported in 2000 (19.08 mg/L). This is necessary to meet the anti-degradation requirements of the CWA (IDEQ and ODEQ, 2004). The TMDL also established that TSS is an appropriate surrogate for turbidity at the control monitoring location, and TSS and turbidity data can be used interchangeably to determine TMDL attainment and trend evaluation. It may be possible to apply the same method to other subbasin streams, but simultaneous turbidity/TSS or SSC data need to be collected for each location to confirm accuracy.

Margin of Safety

Lower Payette River

Bacteria

When the TMDL was developed, WQS criteria used fecal coliform as a surrogate measure for contact recreation. Because a change to *E. coli* as a surrogate measure was anticipated, the TMDL evaluated *E. coli* data instead of fecal coliform and developed LCs and LAs for *E. coli*. The margin of safety (MOS) was calculated by determining 0.1% of the bacteria LC and using the resulting value as the LA ($3.05\text{E}+06$ cfu/sec). The calculation used die-off rates from the drains to the monitoring location LPR-008 (Figure 5 and Table 4). This value is 17.4% and was assumed to be longitudinally constant. Because the MOS in the recently-revised WQS (2007) criteria for single-sample and geomean results is implicit in the methodology that EPA approved for the determination and reporting of *E. coli* in water, it is no longer necessary to develop a separate MOS for bacteria TMDLs. Therefore, in using the WQS criteria maximum as the TMDL target, there is no need for an additional MOS to be calculated or applied.

Bissel Creek

Sediment

The MOS is 5% for the TMDL (DEQ, 2003) target of 22 mg/L and was discussed as implicit at downstream segments because the target is achieved at upstream locations. However, if all locations in the stream achieve the target of 22 mg/L, only the 5% used in calculating the target value actually exists and the implicit MOS is only realized at concentrations below 22 mg/L.

Bacteria

The MOS for bacteria is considered as implicit because the LC and LA calculations did not use a dilution factor to account for load reductions in spite of known groundwater influence to the stream below the North Side Canal. Because the bacteria concentration of the groundwater is not documented, the MOS cannot be quantified. The MOS in the

WQS criteria for single-sample and geomean results is implicit in the methodology that EPA approved for the determination and reporting of *E. coli* in water. Therefore, in using the criteria maximum as the TMDL target, there is no need for an additional MOS to be calculated or applied.

Big Willow Creek

Temperature

The MOS for the PNV TMDL is implicit in the calculations used to determine shade from the aerial photographs. The MOS varies from 1 to 9% because the canopy cover is assigned a single value representing the bottom of intervals that are in 10% subdivisions ranging from 0 to 100%. The method is designed for errors to be biased toward the most conservative estimate, resulting in an MOS ranging from 1 to 9% at any given location.

Snake River-Hells Canyon

The methods and rationale for determining and applying MOS for the SR-HC TMDLs is thoroughly described in the TMDL.

Phosphorus

The MOS for the phosphorus TMDL was determined explicitly using Chlorophyll-*a* samples as a surrogate measure for total phosphorus. By determining the range of accuracy of sample collection and sample analysis and then using the result of that cumulative average (13%) as the value to subtract from the initial threshold determined to support beneficial uses, 14ug/L is determined to be the target for Chlorophyll-*a* and can be used as one method to determine TMDL attainment.

Pesticides

The MOS for this TMDL is implicit in the variability of sample types and collection conditions across several years and multiple sources of data. Conservative values were used to determine LCs for sediment also, so errors are variable and biased toward the most protective values.

Seasonal Variation

Lower Payette River

Bacteria

Based on data collected between June and September in 1996 and 1997, August was determined to be the most critical month for loading of bacteria to the Payette River. However, the most sensitive beneficial use to be protected through this TMDL takes place all year. At the time the TMDL was developed, fecal coliform criteria was the surrogate measure for beneficial use standards. The WQS have since been revised so that *E. coli* criteria are now the surrogate measure for PCR standards. If any single *E. coli* sample (collected using methods described in WBAG II [Grafe, et al., 2001]) collected from any location on the mainstem of the lower Payette River exceeds 406 cfu/100 mL, additional sampling should be initiated to determine geomean bacteria concentrations,

which exceed criteria at results greater than 126 cfu/100 mL. While this is most likely to occur in the month of August, the criteria apply in all months of the year.

Bissel Creek

The SBA determined that sediment and bacteria are seasonally variable in the Bissel Creek watershed. For both constituents, there is a direct correlation between the irrigation season and increased constituent loads, but sediment has been documented not to impair beneficial uses during the non-irrigation season while bacteria are a year-round concern.

Sediment

Data collected for the SBA identified that from April through September, which is the normal irrigation season, load reductions between 81 and 87% are required in order to support beneficial uses.

Bacteria

The bacteria concentrations in Bissel Creek are the highest in the entire subbasin, with between 69 and 77% of all samples exceeding criteria. Data has only been reported during the irrigation seasons of 2004 and 2008 and concentrations remain relatively consistent during that time, so it is not possible to determine seasonal variations. While some reported data indicate a slight decrease in loads in September, the presumed beneficial uses apply throughout the year, and the watershed should be monitored in all seasons.

Big Willow Creek

The Big Willow Creek TMDL was developed for the mainstem and did not evaluate the tributaries to the stream. It also did not address the flow alterations that are evident throughout the watershed. The TMDL only addresses PNV as a method to restore natural shade conditions to the riparian zone, but water impoundments and diversions that warm and dewater streams account for a significant portion of thermal load and may need to be addressed to implement the TMDL and restore support for beneficial uses. Vegetation can only exist if water is present during the growing season to support vegetated riparian conditions.

Temperature

The critical time period for the most sensitive beneficial use is in the summer, during the irrigation season. Because this TMDL requires that shade be restored to natural conditions using vegetation that would naturally occur in the watershed, implementation of the TMDL is expected to restore beneficial uses throughout the year.

Snake River-Hells Canyon

Seasonal variation of flow in this segment of the Snake River is approximately 10,000 cubic feet per second (cfs), with the yearly high occurring in April and the yearly low occurring in August. The Payette River accounts for 17.9% of the total flow in the SR-HC TMDL reach and the constituents of concern usually have higher loads at low flows,

indicating that the sources of the pollutants are from effluent added to the system and not due to naturally occurring variation in loads. The pattern of increased pollutant concentrations during low flow conditions indicates the contributions are from point sources across a landscape dominated by irrigated agriculture, such as irrigation drain pipes, canals, and ditches. The classification of irrigation drain water as belonging to the nonpoint source category is a legislated definition unrelated to physical reality.

Phosphorus

The SR-HC TMDL (IDEQ and ODEQ, 2004) explains in detail the methods and process of data evaluation to determine the critical time period for this constituent. Data collected by the Idaho Power Company indicate an increasing trend in total phosphorus between 1996 and 1999 during the months of June through September, when flows are lowest. Because tributary contributions account for 76% of the phosphorus load to this reach of the Snake River, reductions must come from those sources, one of which is the lower Payette River. Based on the results of the TMDL analysis, May through September is the critical time period for total phosphorus in the SR-HC TMDL. Data collected from numerous locations in the lower Payette River subbasin indicate that while concentrations increase in the summer months in relation to irrigation practices, non-irrigation season concentrations also exceed the target threshold at locations near point source discharges and mouths of tributary streams. Additional evaluation of point source and off-irrigation season tributary contribution may be useful for future modifications or revisions to the TMDL.

Pesticides

Critical time periods or seasonal variability was not identified for this constituent in the SR-HC TMDL because the planned method to reduce loads relies on implementation of the sediment portion of the TMDL, and sediment can be transported through the system under conditions that are known to occur at any time of year. There is no sediment load reduction required for the Payette River and there is no allowance for any load increase from the load identified (50 mg/L monthly average) in the TMDL.

Reserve for Growth

Lower Payette River

Bacteria

While there is no explicit reserve capacity for growth in the TMDL, the Payette River, and any other surface water body with a beneficial use of contact recreation, is considered impaired when *E. coli* concentrations exceed WQS criteria. While the CWA anti-degradation regulations apply to bacteria as a pollutant, there may be some reserve capacity in areas that are documented to have concentrations of *E. coli* below the WQS criteria.

Bissel Creek

Based on data presented in the TMDL, there is no allowance for reserve capacity of sediment or bacteria. The TMDL identifies conditions that allow for growth as being through water quality trading, no increase in TMDL targets, and no discharge to surface water where land application is a preferred option.

Big Willow Creek

Based on information provided in the TMDL, there is no reserve capacity or allowance for additional thermal load to Big Willow Creek. Growth must be managed to avoid and prevent thermal impacts to Big Willow Creek from all possible sources.

Snake River-Hells Canyon

A thorough description of the methods and processes used to determine the reserve capacity in the SR-HC reach is provided in the SR-HC TMDL.

Phosphorus

Point sources are assigned WLAs that allow for increases based on the difference between the discharge at the time of the TMDL and the design capacity. This allows for growth through water quality trading or demonstration of an offset in the SR-HC system. Reserve for growth from nonpoint sources is not addressed in the SR-HC TMDL.

Pesticides

Because pesticides identified and assigned LAs or WLAs in the TMDL are banned, there is no reserve capacity or allowance for growth. These constituents are expected to decrease in concentration and occurrence over time. Because the TMDL expects to control pesticides through LAs for sediment, and CWA anti-degradation requirements apply to this constituent, the threshold established by the TMDL (50 mg/L, monthly mean) will be considered in future management options.

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Section 3: Beneficial Use Status

Idaho WQS were revised and defined in IDAPA 58.01.02 in 2007 and have been partially approved by EPA. The WQS designate beneficial uses for Idaho surface water bodies, by hydrologic unit (commonly known as a HUC: hydrologic unit code) and subbasin (or specific water body), and establish water quality criteria for the waters of the State. Idaho WQS require that surface waters of the State be protected for the most sensitive beneficial uses (IDAPA 58.01.02) that are interpreted as existing uses, designated uses, or presumed uses. The WBAG II (Grafe et al., 2002) gives a detailed description of beneficial use identification for use assessment purposes.

Existing uses under the CWA are “those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards.” Designated uses are specifically listed for water bodies in Idaho in tables in the Idaho WQS (see IDAPA 58.01.02.003.27 and .02.109-.02.160 in addition to citations for existing uses).

Undesignated uses are protected for uses presumed by the state to exist in natural surface water bodies. Absent information on existing uses, DEQ presumes that most waters in the state will support COLD and either PCR/SCR uses (IDAPA 58.01.02.101.01). To protect presumed uses, DEQ will apply numeric COLD and PCR/SCR criteria to undesignated waters. Criteria that apply to water bodies in the lower Payette River subbasin are summarized in Table 9.

Beneficial Uses

Table 9 summarizes current Idaho WQS for each of the AUs in the lower Payette River subbasin that are listed in the 2008 Integrated Report. Recently-approved TMDLs not included in the 2008 Integrated Report will be added to the next (2010) integrated report.

Table 9. Summary of 2008 Integrated Report listing status for lower Payette River subbasin assessment units (AU), and beneficial uses established in Idaho Water Quality Standards (2007).

Assessment Unit	Stream Description	Listed Impairments and Status*	Beneficial Use
001_02	Unnamed and named tributaries and drains (north and south sides) of the Payette River from Black Canyon Reservoir outfall to the mouth.	Section 3-Unassessed	Undesignated
001_06	Mainstem Payette River from the outfall of the Black Canyon Dam to the confluence with the Snake River.	Section 4a- <i>E. coli</i> ; Section 5-Temperature	COLD, SS, DWS, PCR
015_02	First- and second-order Bissel Creek and named and unnamed tributaries.	Section 5-Sediment	Undesignated
015_03	Third-order Bissel Ck to the North Side Main Canal.	Section 2-Supporting All Uses	Undesignated
015_03a	Third-order Bissel Ck from the North side Main Canal to the mouth.	Section 4a-Sediment, Bacteria	Undesignated

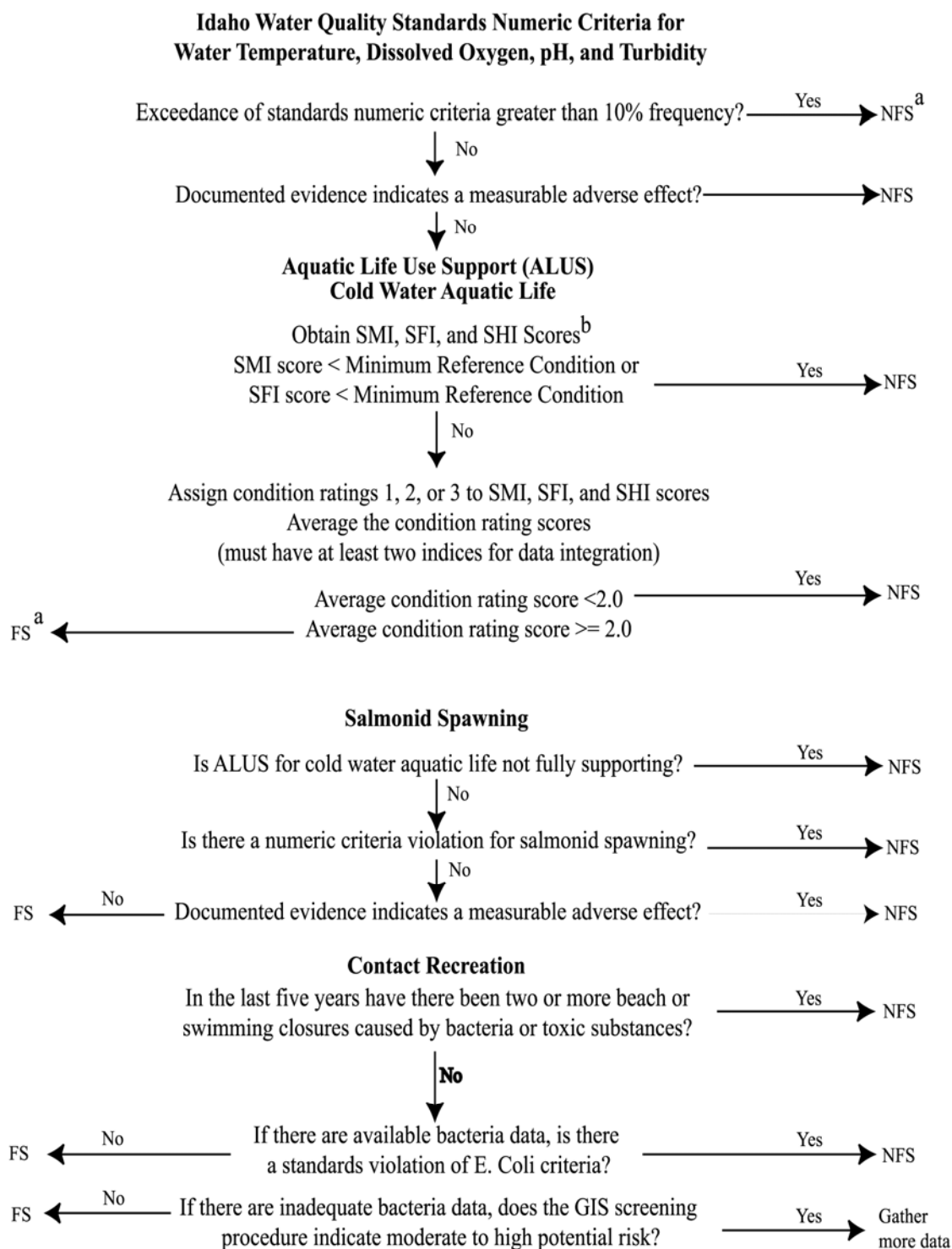
Assessment Unit	Stream Description	Listed Impairments and Status*	Beneficial Use
016_02	First- and second-order unnamed north side tributaries to the Payette River between Bissel and Sand Hollow Creeks.	Section 3-Unassessed	Undesignated
016_03	Third-order unnamed north-side tributaries between Bissel and Sand Hollow Creeks, from Unfinished Rd to the Payette River.	Section 3-Unassessed	Undesignated
017_02	First-and second-order Big Willow Ck and named and unnamed tributaries.	Section 5- Temperature	COLD, SS, PCR
017_03	Third-order Big Willow Ck and tributaries.	**	COLD, SS, PCR
017_04	Fourth-order Big Willow Ck and tributaries.	Section 5- Sediment and Temperature	COLD, SS, PCR
017_06	Sixth-order Big Willow Ck.	Section 5-Habitat Alteration	COLD, SS, PCR
018_02	First- and second-order Little Willow Ck and named and unnamed tributaries downstream of Paddock Valley Reservoir.	Section 3-Unassessed	Undesignated
018_03	Third-order Little Willow Ck from Paddock Valley Reservoir to Indian Ck.	Section 2-Supporting All Uses	Undesignated
018_04	Mainstem Willow Ck from Indian Ck to the confluence with Big Willow Ck and Payette Ditch.	Section 3-Unassessed	Undesignated
019_02	First- and second-order Indian Ck and named and unnamed tributaries.	Section 3-Unassessed	Undesignated
019_03	Third-order Indian Ck to the confluence with Little Willow Ck.	Section 3-Unassessed	Undesignated
020_02	Little Willow Ck and unnamed tributaries upstream of Paddock Valley Reservoir.	Section 3-Unassessed	Undesignated
020L_0L	Paddock Valley Reservoir.	Section 3-Unassessed	Undesignated
021_02	First- and second-order unnamed tributaries east of Paddock Valley Reservoir.	Section 3-Unassessed	Undesignated
021_03	Unnamed east side tributary to Paddock Valley Reservoir.	Section 3-Unassessed	Undesignated

* Section 4a = TMDL completed; Section 5 = TMDL needed

COLD – cold water aquatic life; SS – salmonid spawning; DWS – domestic water supply; PCR – primary contact recreation

**-- The correct listing status was inadvertently omitted from the 2008 Integrated Report and therefore there is no listing status officially approved.

Beneficial uses can be designated, existing, or presumed and are protected by use-specific criteria. Criteria may be narrative, for pollutants such as nutrients; or numeric, for pollutants such as bacteria, DO, pH, ammonia, temperature, and turbidity (IDAPA 58.01.02.250). Figure 6 provides an outline of the stream assessment process for determining beneficial use support status for COLD, SS, and PCR/SCR. Table 10 includes the numeric criteria used for reviewing the beneficial use status pertinent to the waters of the lower Payette River subbasin.



^a FS = fully supporting, NFS = not fully supporting

^b SMI = Stream Macroinvertebrate Index, SFI = Stream Fish Index, SHI = Stream Habitat Index

Figure 6. Process and Criteria for Determining Support Status of Beneficial Uses in Wadeable Streams: Water Body Assessment Guidance, Second Edition (Grafe et al., 2002).

Table 10. Idaho Water Quality Standards (2007) applicable to surface waters of the lower Payette River subbasin.

Beneficial Use Criteria			
Water Quality Parameter	Contact Recreation	Cold Water Aquatic Life	Salmonid Spawning (During Spawning and Incubation Periods for Inhabiting Species)
Water Quality Standards: IDAPA 58.01.02.250			
Bacteria, pH, and Dissolved Oxygen (DO)	<i>E. coli</i> --Less than 126 cfu/100 mL as a geometric mean of five samples over 30 days; no sample greater than 406 cfu /100 mL (Primary); 526 cfu /100mL (Secondary)	pH between 6.5 and 9.0. DO exceeds 6.0 mg/L ^b .	pH between 6.5 and 9.5 Water Column DO: DO exceeds 6.0 mg/L in water column or 90% saturation, whichever is greater; Intergravel DO: DO exceeds 5.0 mg/L for a one day minimum and exceeds 6.0 mg/L for a seven day average mean.
Temperature ^c		22 °C or less daily maximum; 19 °C or less daily average.	13 °C or less daily maximum; 9 °C or less daily average.
Turbidity		Turbidity shall not exceed background by more than 50 NTU ^d instantaneously or more than 25 NTU for more than 10 consecutive days.	
Ammonia		Ammonia not to exceed calculated concentration based on pH ^e .	

^a *Escherichia coli* colony forming units per 100 milliliters^b milligrams per liter^c Temperature Exemption - Exceeding the temperature criteria will not be considered a violation when the air temperature exceeds the ninetieth percentile of the seven-day average daily maximum air temperature calculated in yearly series over the historic record measured at the nearest weather reporting station.^d Nephelometric turbidity units^e Maximum Contaminant Level

Changes to Subbasin Characteristics

The physical and cultural characteristics of the subbasin are described in detail in the 1999 TMDL and only changes considered to have a significant impact on surface water quality or resources are addressed in this review. Population growth in the city of Payette since the TMDL was written has increased at a rate of approximately 1% per year, while Emmett's population has increased almost 2% per year (Sperlings, 2009). Even though only about one-third of the subbasin is irrigated cropland; that portion of the subbasin also includes every municipal area (Figure 4), so changes in irrigation practices and population densities have a greater effect on water quality of the lower Payette River than changes elsewhere in the subbasin. Between 1993 and 2003, the number of irrigated acres has remained constant (IDFG, 2008).

The flow control structures in the subbasin constructed by federal agencies to deliver water to irrigation districts for agricultural purposes have been renovated with automated devices to improve flow control and delivery efficiency. Sevenmile Slough is the most recent project and was completed in 2007.

The TMDL (DEQ, 1999) reported that while there are many CAFO operations in the subbasin, none were documented as having more than 1,000 animals. There are now seven facilities permitted to operate with more than 1,000 animals and there are an estimated 25,000 animals in AFOs or dairies at any given time. This is a 58% reduction from the TMDL estimate of 60,000 animals but is still equivalent to slightly more than one-half (0.64) of a confined stock animal per person. Most feedlot or dairy operations are located near or in the riparian zone of perennial streams (Appendix E).

Based on climate data reported by the Western Region Climate Center (WRCC), the average maximum daily temperature at Emmett for December through March has increased 0.1°F and the minimum daily temperature for the same time period has increased by 1.3°F since the development of the TMDL. The annual average precipitation has increased by 0.6 inches from the value reported in the TMDL (DEQ, 1999). There have been no extreme flooding events in the subbasin since the development of the TMDL.

Beyond documenting the presence and potential water quality effects of the Black Canyon Dam on the lower Payette River, the TMDL did not evaluate constructed flow controls and the impact they have on water quality conditions in the subbasin. Recent advances in remote sensing technology make it possible to identify and document structures that are known to alter flow and habitat, such as dams, reservoirs, and diversions. Subbasin and watershed maps have been updated with this new information and are included in Appendix E.

Current Water Quality Data Sources

A request for data collected during the past five years was made by DEQ to the Lower Payette WAG in December 2008 and March 2009. A compilation of the data received in response to those requests, and located from agency databases, is included in the appendices. Because data collected from any site within the AU may be extrapolated to infer conditions throughout the AU, Tier I data as defined in the WBAG II (Grafe, et al., 2002) is used to make recommendations about future listing status.

Several agencies and point source NPDES permit holders collect water quality data from locations throughout the subbasin. Table 11 summarizes data collected by agencies involved in regulatory or land management activities, including data collected and reviewed for this report, and Appendix C includes data from those sources. The WAG contracted with the ISDA to collect instantaneous water quality data from the control monitoring locations to determine TMDL progress over the past five years.

Table 11. Summary of lower Payette River subbasin data sources used in the five-year review, determination of beneficial use status, and pollutant type.

Assessment Unit	Stream Segment Description	Collection Agency	Data Collected	Year
001_02	Unnamed and named tributaries and drains (north and south sides) of the Payette River from Black Canyon Reservoir outfall to the mouth.	¹ DEQ, ⁵ BOR, ³ ISDA	¹ BURP, Satellite photo image review; ⁵ Temperature, sediment, bacteria. ³ Nutrients, bacteria, sediment, field parameters.	¹ 2004, 2009; ⁵ 2004; ³ 2000-2002, 2008
001_06	Mainstem Payette River from the outfall of the Black Canyon Dam to the confluence with the Snake River.	¹ DEQ, ² USGS, ⁴ WWTP, ⁵ BOR	¹ Satellite photo image review; ² Biology, field parameters, nutrients, sediment, bacteria; ⁴ Nutrients, bacteria, sediment, field parameters; ⁵ Field parameters, nutrients, bacteria, sediment.	¹ 2009, ² 2002, 2005, 2006, 2008; , 2005; ⁴ 2003-2008, ⁵ 2003-2008
015_02	First- and Second-Order Bissel Creek and named and unnamed tributaries.	¹ DEQ	¹ Satellite photo image review.	¹ 2009
015_03	Third-Order Bissel Creek to the North Side Main Canal.	¹ DEQ	¹ BURP, Satellite photo image review.	¹ 2004, 2007, 2009
015_03a	Third-Order Bissel Creek from the North side Main Canal to the mouth.	¹ DEQ, ⁵ BOR, ³ ISDA	¹ BURP, Satellite photo image review; ⁵ Temperature, sediment, bacteria; ³ Nutrients, bacteria, sediment, field parameters.	¹ 2004, 2009; ⁵ 2004; ³ 2008
016_02	First- and Second-Order unnamed north side tributaries to the Payette River between Bissel and Sand Hollow Creeks.	DEQ,	Satellite photo image review.	2009
016_03	Third-Order unnamed north side tributaries between Bissel and Sand Hollow Creeks, from Unfinished Rd to the Payette River.	¹ DEQ, ³ ISDA	¹ Satellite photo image review. ³ Nutrients, bacteria, sediment, field parameters.	¹ 2009, ³ 2008
017_02	First- and Second-Order Big Willow Creek and named and unnamed tributaries.	DEQ	Satellite photo image review.	2008
017_03	Third-Order Big Willow Creek and tributaries.	¹ DEQ, ³ ISDA	¹ BURP, Satellite photo image review; ³ Nutrients, bacteria, sediment, field parameters.	¹ 2005, 2007, 2008; ³ 2007
017_04	Fourth-Order Big Willow Creek and tributaries.	¹ DEQ, ³ ISDA	¹ BURP, Satellite photo image review; ³ Nutrients, bacteria, sediment, field parameters.	¹ 2008; ³ 2007
017_06	Sixth-Order Big Willow Creek.	DEQ	Satellite photo image review.	2008
018_02	First- and Second-Order Little Willow Creek and named and unnamed tributaries downstream of Paddock Valley Reservoir.	DEQ	Satellite photo image review.	2009
018_03	Third-Order Little Willow Creek from Paddock Valley Reservoir to Indian Creek.	¹ DEQ	¹ BURP, Satellite photo image review.	¹ 2004, 2009
018_04	Mainstem Willow Creek from Indian Creek to the confluence with Big Willow Creek and Payette Ditch.	¹ DEQ, ³ ISDA	¹ BURP, Satellite photo image review; ³ Nutrients, bacteria, sediment, field parameters.	¹ 2003, 2009; ³ 2007
019_02	First- and Second-Order of Indian Creek and named and unnamed tributaries.	DEQ	Satellite photo image review.	2009
019_03	Third-Order Indian Creek to the confluence with Little Willow Creek.	DEQ	BURP, Satellite photo image review	2004, 2009

Assessment Unit	Stream Segment Description	Collection Agency	Data Collected	Year
020_02	Little Willow Creek and unnamed tributaries upstream of Paddock Valley Reservoir.	DEQ	Satellite photo image review.	2009
020L_0L	Paddock Valley Reservoir.	DEQ	Satellite photo image review, Field parameters and turbidity.	2009
021_02	First- and Second-Order unnamed tributaries east of Paddock Valley Reservoir.	DEQ	Satellite photo image review.	2009
021_03	Unnamed east side tributary to Paddock Valley Reservoir.	DEQ	Satellite photo image review.	2009

¹ Department of Environmental Quality (DEQ), ² United States Geological Survey (USGS), ³ Idaho State Department of Agriculture (ISDA), ⁴ Waste Water Treatment Plants (WWTP), ⁵ Bureau of Reclamation (BOR),

Pollution Source Review

This report includes a review of identified or observed sources of impairment to surface water in the subbasin, including permitted point sources, nonpoint sources, natural events, and documented or otherwise known accidental releases. The EPA published a new Multi Sector General Permit (2008 MSGP) on September 29, 2008, to replace the 2000 MSGP. This permit covers industrial facility stormwater management in areas where EPA has NPDES authority, such as the lower Payette River subbasin. The 2008 MSGP applies to all new and existing facilities and requires that stormwater be controlled in accordance with terms and conditions of the permit. The permit can be accessed at: <http://cfpub.epa.gov/npdes/stormwater/msgp.cfm>. An online database allows the public to view information about the MSGP entities under EPA's authority and can be accessed at: <http://cfpub.epa.gov/npdes/stormwater/indust.cfm>.

Due to changes in the NPDES system administered by EPA there are more NPDES permits in the subbasin now than when the TMDL was developed. These permits include AFOs as well as construction, industrial and municipal permitted stormwater, or point source discharges. The locations of permitted facilities are summarized in Figure 7 and have also been added to watershed maps included in Appendix E.

Because of a change in WQS criteria for recreational uses, bacteria data is now evaluated using *E. coli* as a surrogate measure for bacteria pollution. Agencies and organizations that collect data for the lower Payette River WAG have been collecting *E. coli* data for several years in anticipation of this change in WQS.

Point Sources

Permitted point sources in Payette and Gem counties, as identified on the EPA website and summarized in Table 12 and Figure 7, are required to meet all permit conditions. Details regarding the permitted facilities can be queried from the EPA web site: <http://www.epa.gov/enviro/index.html>. The permitted point sources in the lower Payette River subbasin that discharge effluent to the Payette River collectively contribute less than one-tenth of one percent of the total flow of the Payette River. Recent federal requirements for construction sites to develop and implement stormwater control systems have facilitated reductions in sediment loads from those sources in the past five years. EPA has recently published a draft guidance document, *TMDLs to Stormwater Permits*

Handbook: Draft (2008) to assist in the development of TMDLs with identified stormwater sources for certain pollutants. This guidance draft can be accessed from http://www.epa.gov/owow/tmdl/pdf/tmdl-sw_permits11172008.pdf.

In addition to monitoring required by the NPDES permit; the city of Emmett collects data on a quarterly basis from the mainstem of the lower Payette River, upstream and downstream of the Emmett WWTP. The sampled locations are in AU 001_06 and the data is included in the appendices of this report. Data from the lower Payette River AU 001_06 is also collected by the cities of Payette, Fruitland, and New Plymouth in compliance with permit requirements and is included in the appendices. Activities that are covered in general nationwide NPDES permits, such as general CAFO/AFO and stormwater permits, are not included in Table 12 or Figure 7 because they are not allowed to discharge effluent or stormwater off-site and/or are temporary in nature.

Table 12. Individual NPDES-permitted point sources in the lower Payette River subbasin, as of March 2009.

Sewage Treatment Facilities				
Longitude	Latitude	Facility	Receiving Water	Permit #
Payette County				
-116.930277	44.045	City of Fruitland	Payette River	ID0021199
-116.803694	43.988111	City of New Plymouth	Payette River	ID0020389
-116.948777	44.080611	City of Payette	Payette River	ID0020672
-116.938086	44.074669	Seneca Foods	Payette River	ID0000213
Gem County				
-116.495594	43.876314	City of Emmett	Payette River	ID0020311
Animal Feeding Operations				
Payette County				
-116.867998	44.040546	Miller Ranching	Payette River	IDG010068
		Rod Johnson Feedlot	Payette River	IDU000073
Gem County				
-116.501201	43.875419	David Little Farms, Inc.	Payette River	IDG010075
-116.500355	43.933411	Lewis Smith Feedlot #2	Payette River	IDU000061
-116.502046	43.926992	Lewis Smith	Payette River	IDU000060
Waste Transfer				
-116.893622	43.985679	Henggeler Packing	Payette River	ID0027901

Lower Payette River Subbasin

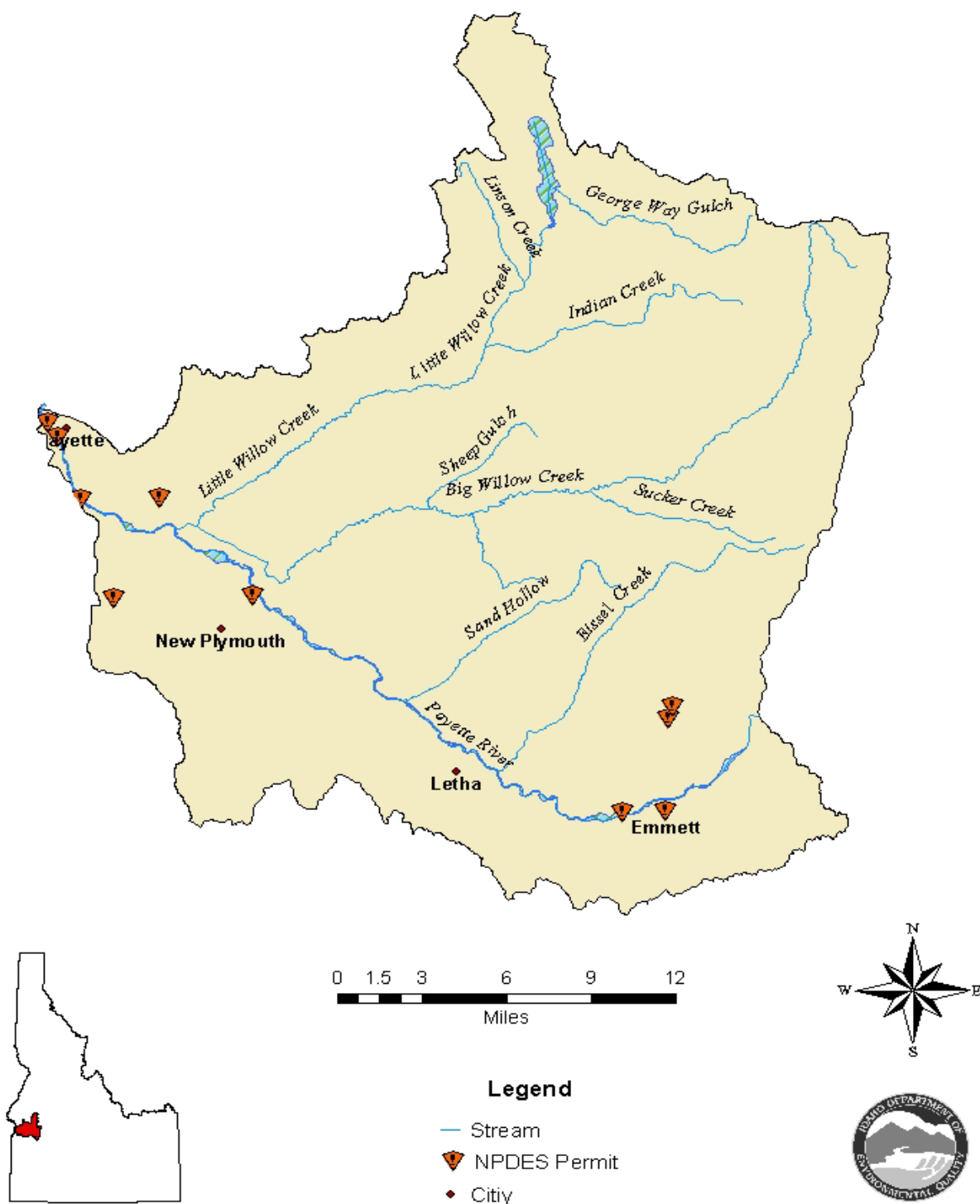


Figure 7. NPDES-Permitted Point Sources in the Lower Payette River Subbasin as Reported on the EPA Web Site of NPDES Permits in March 2009.

Nonpoint Sources

The TMDL identified nonpoint sources as primary contributors of bacteria pollution in the subbasin. The IDFG (2008) estimates that approximately 160,000 acres of subbasin land are irrigated for agricultural purposes and a 1966 USGS study estimated that water diverted from the Payette River between Black Canyon Dam and river mile 4.1 (near Payette) irrigates 53,000 acres of farmland in adjacent basins (Boise and Weiser).

While locations of 175 agricultural diversions (Orgill, 2006) and numerous drains in the lower Payette River subbasin can be indicated as specific points on the landscape, the CWA designates these as nonpoint sources due to the impact that widespread land use activities have on the water channeled through agricultural irrigation systems.

The TMDLs identify urban/suburban stormwater, septic system leakage, and paved and unpaved road surfaces as unquantified sources likely to contribute sediment, bacteria, and phosphorus to subbasin surface waters. Contributions from these orphan sources are acknowledged data gaps and implementation plans include details regarding future data collection from these sources. In comparison to the observed and documented contribution from agricultural sources, orphan sources of pollution are considered to be a small, possibly inconsequential, contributor to nonpoint source pollution in the subbasin.

Based on the existing economic conditions in the local and national economy, no significant change in land use or demographics are anticipated in the lower Payette River subbasin within the next five years.

Natural Events

Wildland fires, intense rainstorms, rain-on-snow events and similar events that are infrequent and isolated, but high-impact, occur in the subbasin and have been observed and documented to have an acute negative effect on surface water quality. During the past five years, no events of significance occurred in the lower Payette River subbasin.

Flow and Habitat Alteration

Initially, flow and habitat modifications in the subbasin were an indirect result of ore mining in the upper Boise River subbasin. As mining camps expanded, the demand for food spurred the growth of agriculture in the lower Payette River subbasin, leading to the development of reservoirs and canal systems as early as 1872 (ISHS, 1993a). With the expansion of the territories of the United States, federal agencies were created and tasked with the responsibility for flood control and irrigation system development and operation.

The BOR, created in 1902 to develop and manage irrigation projects, is the responsible agency for managing water flow in the lower Payette River subbasin and is responsible for the development and operation of the Black Canyon Reservoir and all water contracted for that project. Because this project is the primary source of water to the subbasin, the quality of the water released from the reservoir affects all stakeholders downstream of the dam. All existing canals and irrigation systems were incorporated into the BOR-managed project. The agency negotiates contracts with water districts, water user associations, and other federal agencies to operate the water systems.

Diversions remove 76% of the annual flow from the mainstem for irrigation, with 360,000 acre-feet delivered to the Boise River subbasin (BOR, 2008, 1997). The most

recent water use study indicates that 47% of diverted water is lost each irrigation season to system deficiencies (BOR, 2002). The portion of diverted water that is not consumed is returned to the mainstem at multiple locations between the cities of Letha and Payette. The volume of water impounded in non-permitted structures is not known, but there are at least 104 identified constructed impoundments in the subbasin ranging from less than ½ acre to more than 6 acres in surface area with unknown ranges of depth. Tributary streams are routinely de-watered in the summer months as natural flow is diverted for irrigation or impounded for other uses. Cultivated agriculture, tributary impoundments, and grazing of upland areas not suitable for cultivation have resulted in straightened, narrowed and deepened stream channels with de-vegetated riparian zones. This results in degraded water quality, reduced populations of aquatic organisms, and sparse native riparian vegetation.

Analysis of Current Water Quality Data

Since the TMDL was approved DEQ has collected data, requested data from other agencies and organizations, searched external databases, and reviewed university publications and municipal or regional resource management plans for additional and recent water quality data. The results of that effort are compiled in this review and recommendations for future action and the next integrated report is based on that data. The remainder of this section will address water quality data related to beneficial uses, pollutants, or impairments in the lower Payette River subbasin that are addressed by an approved TMDL or used by Idaho to determine water quality status.

Pollutants of concern for this review are limited to constituents for which numeric criteria are established in Idaho WQS or have been identified as current or potential limiting factors for attainment of designated, existing, or presumed beneficial uses in the lower Payette River subbasin. Those constituents are bacteria, sediment, temperature, DO, pH, phosphorus, ammonia, flow, and habitat.

Data Collection

Each TMDL includes control monitoring locations and numerical targets for the pollutants specified in the TMDL. The lower Payette River subbasin TMDL identified 32 control monitoring locations, 23 of which have been monitored between 2003 and 2009 to provide data for this review (Figure 8 and Table 13). The Plaza Drain has been modified since the TMDL was developed and is now a diversion from the lower Payette River just below the dam and because water does not flow from the drain into the river, this control location could be removed from the list of control monitoring locations and should no longer have an LA in any TMDL. The Bissel Creek TMDL identified 3 control monitoring locations and ISDA collected data from those locations and one other location in 2008. The SR-HC TMDL identified one control monitoring location for the Payette River, which is also a control monitoring location for the lower Payette River TMDL (LPR-007). Data has been collected from 34 locations by the ISDA, USGS, BOR, city of Emmett, city of Payette, city of New Plymouth, and DEQ between 2000 and 2009.

The location in AU 015_03 of Bissel Creek was removed from the Control Monitoring Locations in the Bissel Creek TMDL (2003) because reported beaver activity made future data collection at this location of questionable value. Since that time, data collection at a location identified as BC-4, near the upstream boundary of 015_03a, has been conducted because it was determined that it provided good natural background data for water quality comparison with downstream sites.

Lower Payette River Subbasin

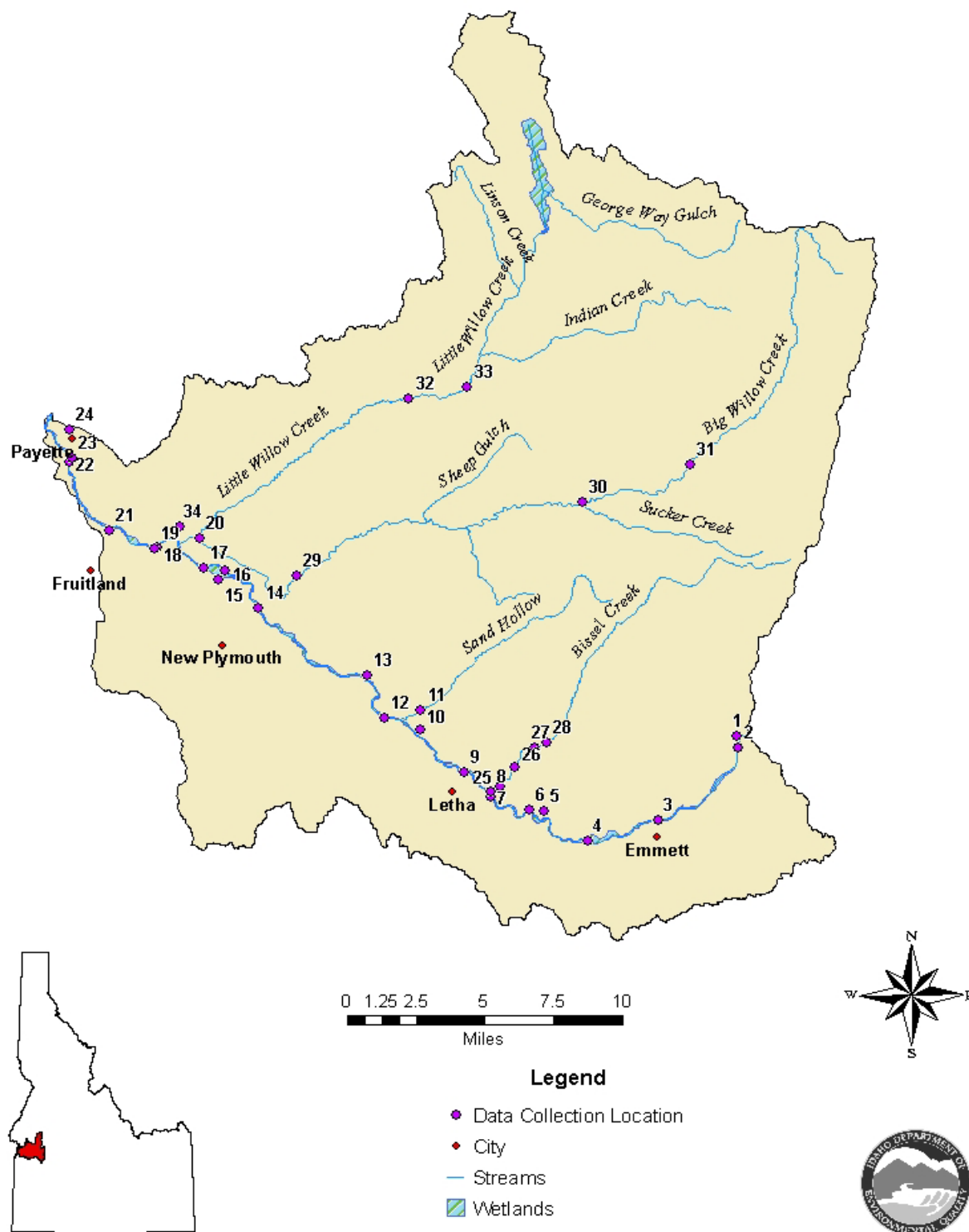


Figure 8. Map of Data Collection Locations in the Lower Payette River Subbasin. Location Numbers Correspond to the Location Numbers in Table 13.

Table 13. Data collection locations in the lower Payette River subbasin from 2000-2009.

Location Number	Site ID/Water Body Name	Assessment Unit	Approximate GIS Coordinates (NAD83)	Year Monitored
1	LPR-001 / EMM015	001_06	43.9288, -116.4450	2003-2008
2	Plaza Drain	001_02	43.9224, -116.4432	2009
3	LPR -002/ WA St. Bridge	001_06	43.8201, -116.5696	2007-2008
4	LPR downstream Emmett WWTP	001_06	43.8701, -116.5511	2003-2004
5	Mesa Drain	001_02	43.8850, -116.5831	2008
6	Big 4 Drain	001_02	43.8855, -116.5937	2008
7	Tunnel #7	001_02	43.8922, -116.6222	2008
8	Beacon Drain	001_02	43.8951, -116.6220	2008
9	LPR-003 (Letha Bridge)	001_06	43.9053, -116.6423	2005, 2007-2008
10	Silverleaf Drain	001_02	43.9270, -116.6716	2008
11	Sand Hollow Drain	001_02	43.9378, -116.6752	2008
12	Sevenmile Slough	001_02	43.9332, -116.7018	2008
13	Countyline Drain	001_02	43.9590, -116.7154	2008
14	LPR-005 (Blacks Bridge)	001_06	43.9903, -116.7959	2007-2008
15	S-8	001_02	44.0049, -116.8259	2000-2002, 2008
16	S-10	001_02	44.0100, -116.8210	2000-2002, 2008
17	S-12	001_02	44.0110, -116.8373	2000-2002, 2008
18	S-13	001_02	44.0214, -116.8714	2000-2002, 2008
19	S-14	001_02	44.0205, -116.8737	2000-2002
20	Little Willow Creek (LW-1)	018-04	44.0270, -116.8410	2007
21	S-15-Sand Hollow	001_02	44.0295, -116.9069	2008
22	LPR-007 / EMM010	001_06	44.0656, -116.9383	2003, 2006
23	Forty-nine Slough	001_02	44.0482, -116.9232	2009
24	LPR-008	001_06	43.8701, -116.5511	2003-2004
25	Bissel Creek (BC-1)	015_03a	43.8976, -116.6161	2004, 2008
26	Bissel Creek (BC-2)	015_03a	43.9084, -116.6054	2004, 2008
27	Bissel Creek (BC-3)	015_03a	43.9191, -116.5920	2004, 2008
28	Bissel Creek (BC-4)	015_03a	43.9226, -116.5831	2004, 2008
29	Big Willow Creek (BWC-1)	017_04	44.0083, -116.7689	2007, 2009
30	Big Willow Creek (BWC-2)	017_03	44.0527, -116.5629	2007
31	Big Willow Creek (BWC-3)	017_03	44.0749, -116.4853	2007
32	Little Willow Creek (LW-2)	018_03	44.1057, -116.6915	2007
33	Little Willow Creek (LW-3)	018_03	44.1135, -116.6491	2007
34	Payette Drain (PD-3)	018_04	44.0329, -116.8558	2003

* BC-4 was removed from the Control Monitoring Locations in the Bissel Creek TMDL (2003) because reported beaver activity made future data collection at this location of questionable value. Since that time, data collection has continued because it was determined that it provided good background/source data for water quality comparison with downstream sites.

The following table summarizes data collected from control monitoring locations for pollutants which have approved TMDLs, or have been assigned LAs in TMDLs, in the lower Payette River subbasin (Table 14). In order to determine potential sources of pollutants for which TMDLs have been developed and identify additional impairments or improvement trends, data collected from all locations in the subbasin were evaluated for this review.

Based on data reviewed for this report, Bissel Creek (AU 015), Little Willow Creek (AU 018), and the north-side and south-side irrigation drains (S-Drains) (AU 001_02) contribute sediment, bacteria, and phosphorus concentrations to the lower Payette River that exceed TMDL targets or criteria. Big Willow Creek (AU 017) and south-side irrigation drains (AU 001_02) contribute bacteria and phosphorus to the lower Payette River in concentrations that exceed TMDL targets or criteria.

Table 14. Summary of suspended sediment (SSC or TSS), phosphorus, and bacteria concentration data reported for lower Payette River subbasin TMDL control monitoring and data collection locations between 2000 and 2009.

Control Monitoring Location Data Summary				
Sample Location	Range of <i>E. coli</i> (cfu/100mL) Concentrations	<i>E. coli</i> Single- Sample Criteria Exceedance (in %)	Range of SSC (mg/L)	Range of TP (mg/L) Concentrations
Bissel Creek-2008				
BC-1	81 - 1,300	77	16 - 92	0.124 - 0.268
BC-2	69 - 2,500	69	9 - 135	0.124 - 0.388
BC-3	3 - 2,000	77	1 - 229	0.017 - 0.235
BC-4	4 - 2,500	23	11 - 99	0.083 - 0.236
Big Willow Creek-2007, 2009				
BWC-1	26 - 1,553	31	2 - 11	0.10 - 0.19
BWC-2	65 - 2,400	31	1 - 9	0.09 - 0.57
BWC-3	1 - 120	0	1 - 5	0.02 - 0.05
Little Willow Creek-2007				
LWC-1	75 - 2,400	77	9 - 165	0.27 - 0.91
LWC-2	190 - 2,000	69	4 - 56	0.18 - 0.70
LWC-3	23 - 690	31	3 - 21	0.15 - 0.63
North Side Drains-2008				
Big-4	170 - 2,000	69	9 - 53	0.08 - 0.27
Mesa	130 - 2,400	85	14 - 425	0.04 - 1.36
Beacon	78 - 2,401	50	5 - 45	0.11 - 0.40
Silverleaf	17 - 2,000	62	29 - 399	0.20 - 0.58
Sand Hollow	1 - 1,100	38	3 - 146	0.06 - 0.25
Fortynine	178 - 2,421	50	20 - 98	0.11 - 0.30
PD-3 (2003)	80 - 2,600	30	8 - 49	0.05 - 0.10
South Side Drains-2008-2009				
Plaza	2 - 36	0	5 - 20	0.32 - 0.40
Tunnel #7	58 - 690	53	5 - 21	0.07 - 0.29
Sevenmile Slough	180 - 2,000	62	5 - 23	0.03 - 0.11
Countyline	64 - 1,700	53	4 - 25	0.04 - 0.22

S-Drains-2008				
Sample Location	Range of <i>E. coli</i> (cfu/100mL) Concentrations	<i>E. coli</i> Single- Sample Criteria Exceedance (in %)	Range of SSC (mg/L)	Range of TP (mg/L) Concentrations
S-8	46 - 2,000	75	40 - 177	0.17 - 0.65
S-10	180 - 920	18	25 - 336	0.19 - 2.21
S-12	200 - 980	50	77 - 586	0.23 - 0.87
S-13	140 - 1,400	91	53 - 486	0.13 - 0.79
S-14 (2001)	30 - 3,700	75	4 - 193	0.05 - 0.27
S-15	180 - 1,100	58	11 - 136	0.15 - 0.26
Lower Payette River-2003-2008				
LPR-001	<1 - 660	1	1 - 39	0.01 - 0.09
LPR-002	<1 - 21	0	3 - 12	0.03 - 0.10
LPR-003	<1 - 168	0	1 - 349	0.01 - 0.17
LPR-005	11 - 301	0	4 - 16	0.05 - 0.14
LPR-007	31 - 326	0	10 - 56	0.05 - 0.11
LPR-008	110 - 310	0	1 - 18	0.04 - 0.06

Bacteria

E. coli bacteria concentrations are used as a surrogate measure to evaluate support of contact recreation beneficial uses. Primary contact recreation (PCR) is a year-round designated beneficial use of the Lower Payette River and Bissel Creek and the TMDLs identified bacteria pollution as limiting beneficial uses of those streams. The following graphs are representations of data reported by the ISDA, BOR, WWTPs, or DEQ during the past five years at the control monitoring locations identified in the lower Payette River or Bissel Creek TMDLs and other locations in the lower Payette River subbasin. Because the WQS criteria specify numeric criteria for single samples and samples collected to calculate geomean values, both thresholds are on the graph.

Lower Payette River

The TMDL established LAs at 32 specific locations in the subbasin that require load reductions between 0 and 95%. Data has been collected from all six river control monitoring locations, but the sporadic and irregular nature of the data collection is inadequate for determining use attainment or meaningful trends. Single-sample criteria were exceeded once at control monitoring location LPR-001 (near the dam outfall) since 2003, but geomean data was not collected.

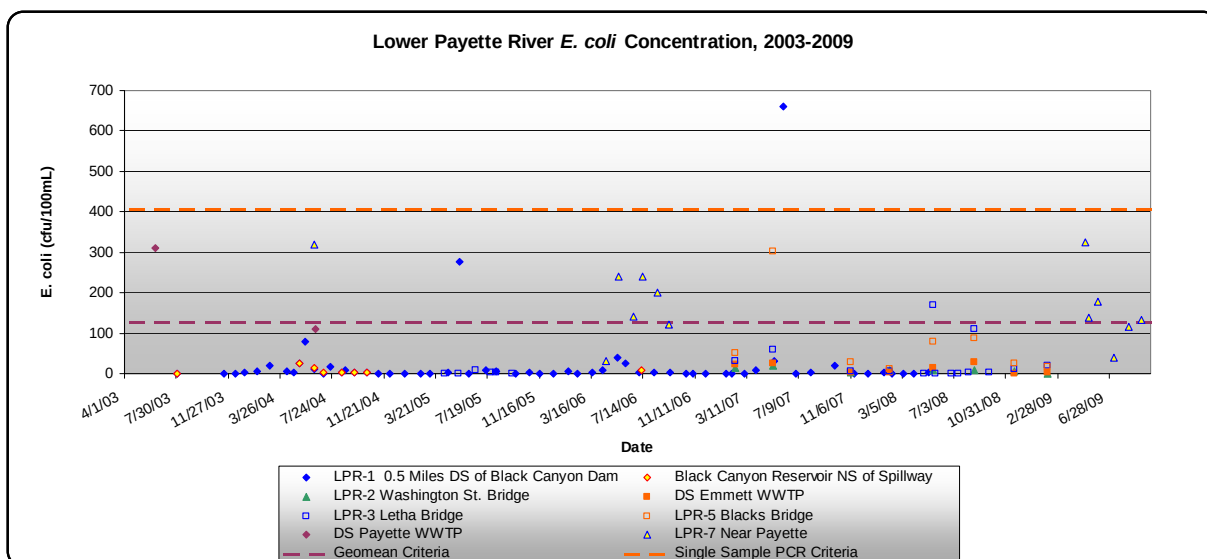


Figure 9. *E. coli* Bacteria Data Reported for Control Monitoring Locations on the Lower Payette River, 2003 -2009.

Bissel Creek

Based on data reported by the BOR from control monitoring locations on Bissel Creek in 2004, bacteria loads required a reduction between 81 and 87% in order to meet WQS. Reported values from data collected by ISDA in 2008 indicate *E. coli* loads have been reduced between 15 and 66% since 2004. The TMDL targets will be achieved with an additional 19 to 66% reduction in loads (Figure 10 and Figure 11).

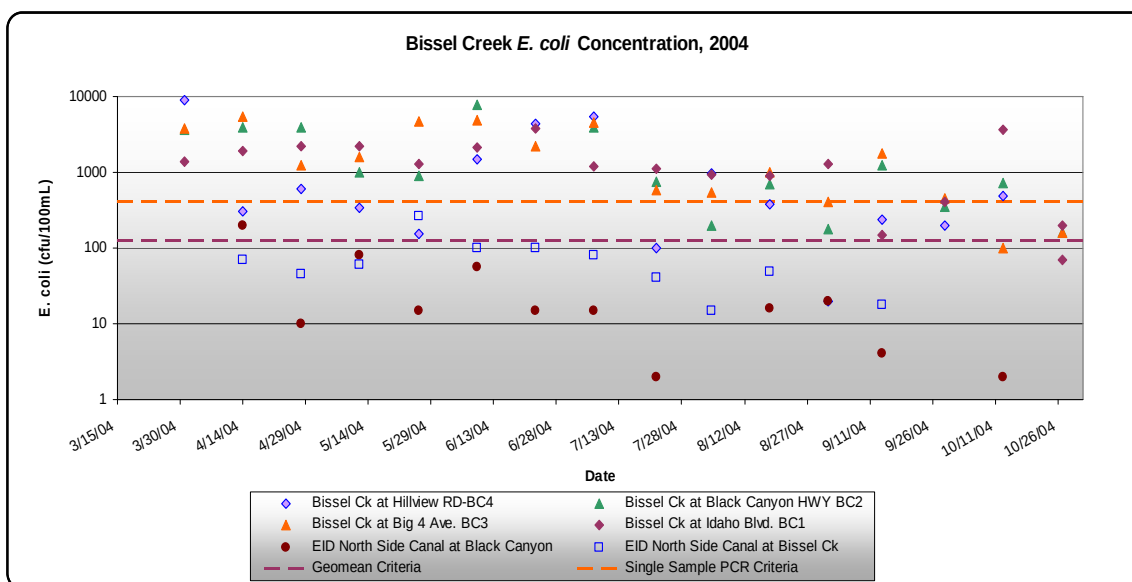


Figure 10. *E. coli* Bacteria Data Collected and Reported by the Bureau of Reclamation for Control Monitoring Locations on Bissel Creek, 2004.

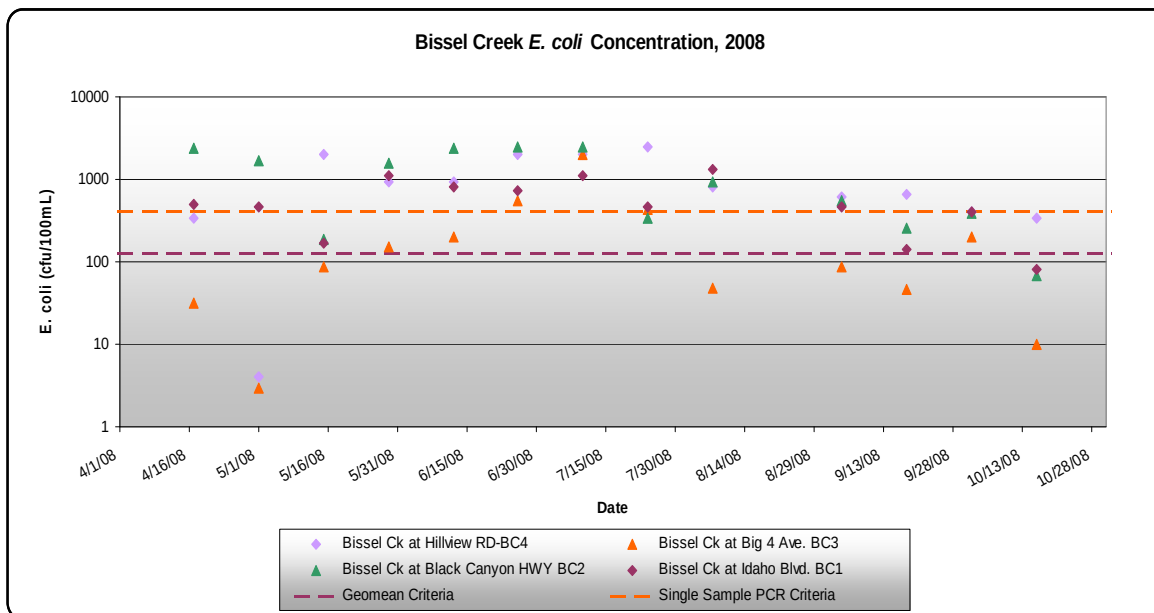


Figure 11. *E. coli* Bacteria Data Collected and Reported by the Idaho State Department of Agriculture for Control Monitoring Locations on Bissel Creek, 2008. Remaining Tributaries and Irrigation Systems

The following graphs represent data collected by the ISDA in partnership with the Lower Payette WAG in preparation for this review. Data collected by DEQ in 2009 are also used to determine use support and have been included in the appendices of this report. ISDA collected samples at two to twelve day intervals from July 23 to August 18, 2008 and calculated a geomean value for each monitoring location. However, the WQS require sample collection five times at five to seven day intervals for geomean values used to determine use support, and a use support determination cannot be made at this time. The reported data indicate that beneficial uses are not supported in Big and Little Willow Creeks (AUs 017_03, 17_04, and 018_04).

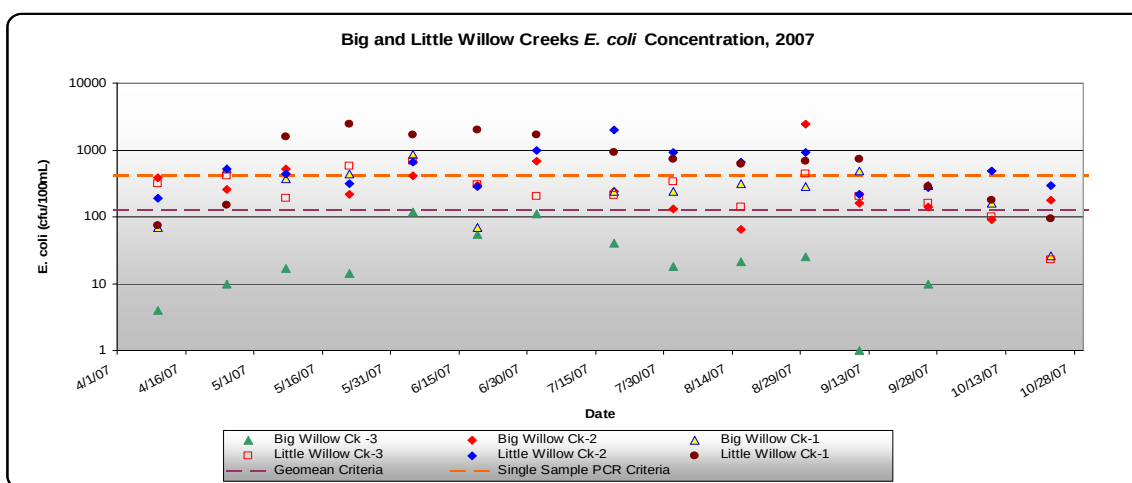


Figure 12. *E. coli* Bacteria Data Collected and Reported by the Idaho State Department of Agriculture for AU_017 and AU_018, Lower Payette River Subbasin, 2007.

Based on the data reported for the north-side irrigation system, the irrigation system in AU_018 contributes water to Little Willow Creek with *E. coli* concentrations that support beneficial uses. The irrigation system in AU_015 contributes water to Bissel Creek with *E. coli* concentrations that do not support beneficial uses (Figure 13).

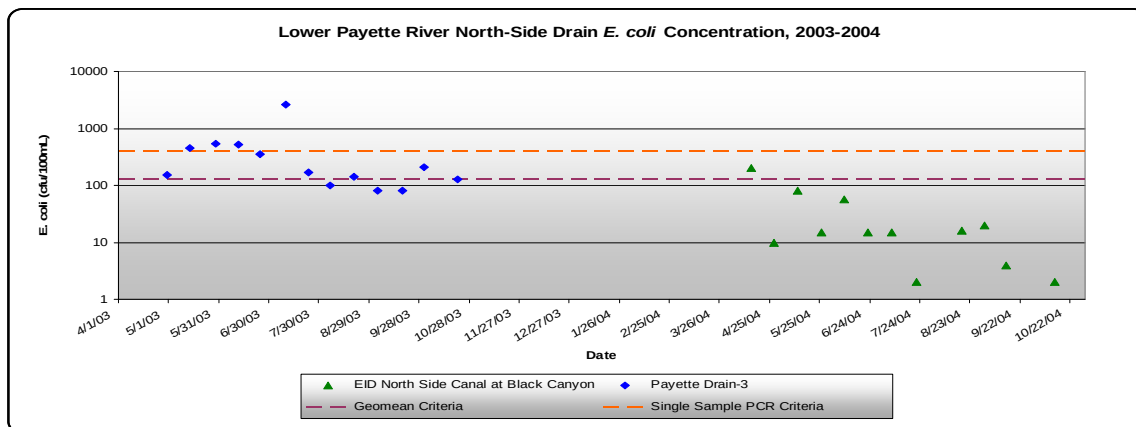


Figure 13. *E. coli* Bacteria Data Collected and Reported by the Bureau of Reclamation (BOR) and the Idaho State Department of Agriculture (ISDA) from North-Side Irrigation Systems in AU 015 and AU 018, 2003 and 2004.

Based on the *E. coli* analysis results reported for samples collected in 2000-2002 and 2008, the S-Drain irrigation system contributes water to AU 001_02 that does not support beneficial uses. However, between 2000-2002 and 2008, reported *E. coli* concentrations of S-Drain samples have been reduced between 35 and 73% (Figure 14 and Figure 15).

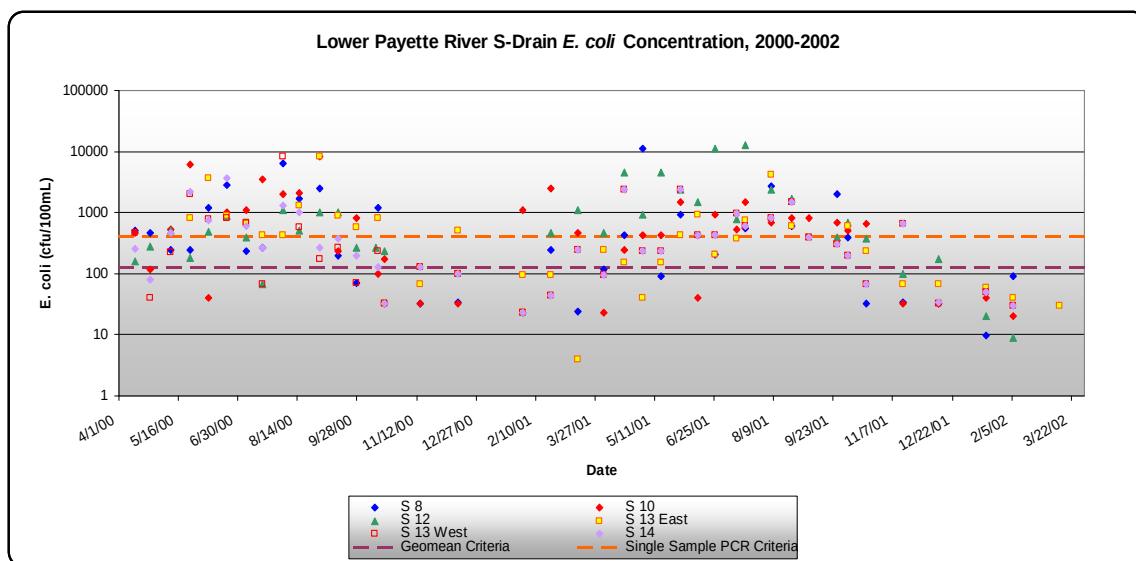


Figure 14. *E. coli* Bacteria Data Collected and Reported by the Idaho State Department of Agriculture (ISDA) from S-Drain Irrigation System in AU 001, 2000-2002.

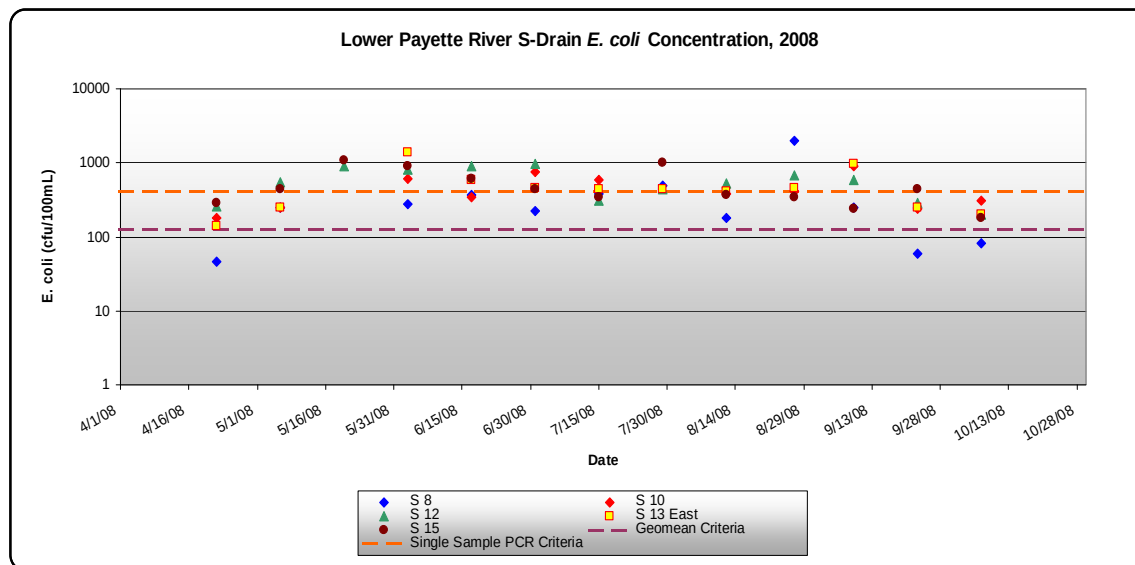


Figure 15. *E. coli* Bacteria Data Collected and Reported by the Idaho State Department of Agriculture (ISDA) from S-Drain Irrigation System in AU 001_02, 2008.

Data reported by the ISDA and DEQ in 2008 and 2009 from Sand Hollow and north-side irrigation channels near their confluence with the Payette River indicate that all sampled north-side tributaries contribute water to the lower Payette River that exceeds single-sample criteria for bacteria. Even though geomean samples were not collected, most samples exceed single-sample criteria to an extent that makes attainment of WQS under geomean conditions unlikely from May through September (Figure 16).

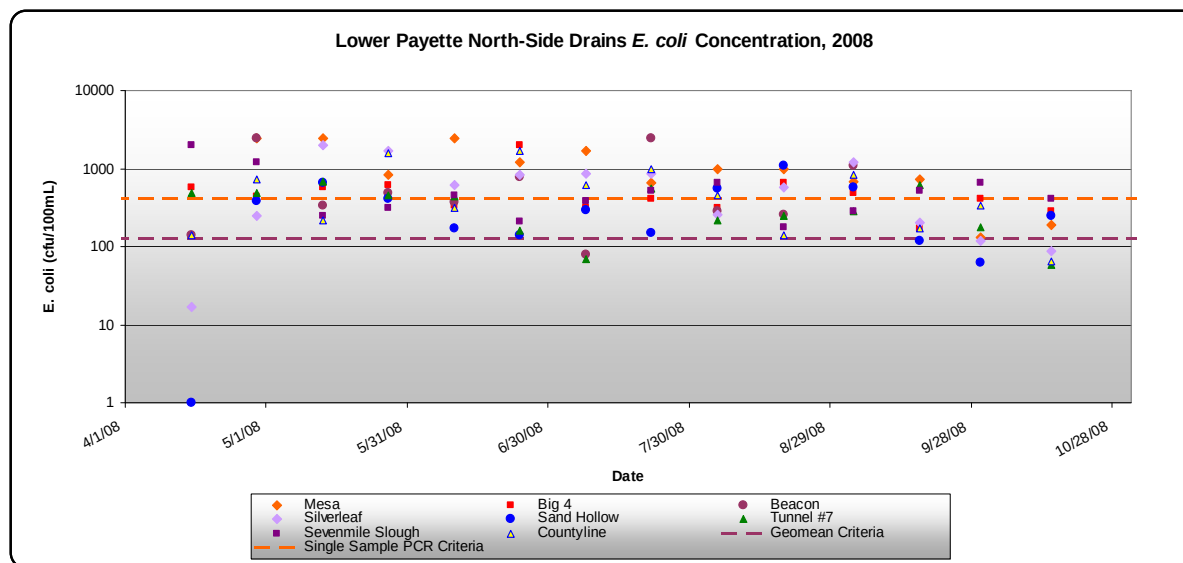


Figure 16. *E. coli* Bacteria Data Collected and Reported from North-Side Irrigation Systems in AU 001, 2008 and 2009.

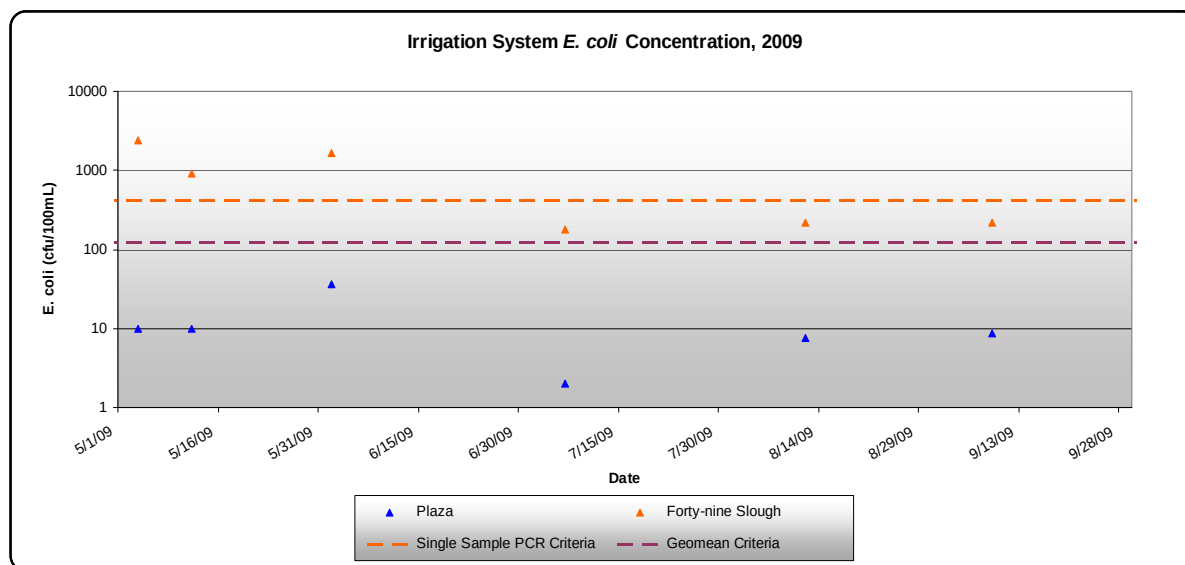


Figure 17. *E. coli* Bacteria Data Collected and Reported from Irrigation Drains in AU 001_02, 2009.

Bacteria results reported for Forty-nine Slough exceed TMDL LA targets and indicate that Forty-nine Slough contributes water to the lower Payette River that exceeds criteria for beneficial use support during the irrigation season. As the Plaza Drain is now a diversion instead of a drain, data collected from that location is representative of water withdrawn from the river just below the Black Canyon Dam (Figure 17).

Sediment

Suspended sediment concentrations (SSC) are used to determine attainment of COLD beneficial uses in the Bissel Creek TMDL and for measuring compliance with the SR-HC pesticide TMDL. The target concentration of 22 mg/L applies to Bissel Creek at any location downstream of the North Side Main Canal and an annual mean concentration of 50 mg/L applies at one location (LPR-007) in the Payette River. The Bissel Creek TMDL identified three control monitoring locations, and the SR-HC TMDL identified the mouth of the Payette River (LPR-007) as the control monitoring location.

For surface waters that do not have TMDL targets or allocations, WQS criteria are used to determine beneficial use support. Idaho has numeric WQS (Table 8) using turbidity as a surrogate measure to infer sediment impairment and the SR-HC TMDL describes that SSC and turbidity values can be used interchangeably to determine TMDL compliance. DEQ also uses multi-variant measures described in the WBAG II (Grafe, et al., 2002) to identify impairment of beneficial uses by sediment.

Based on the data collected in 2004 and 2008, sediment loads to Bissel Creek have increased between 2004 and 2008 at two monitoring locations and decreased at two locations. The total SSC load in Bissel Creek has increased 13.34% since 2004, with the largest increase identified near BC-4 (Hillview RD) (Figure 18 and Figure 19).

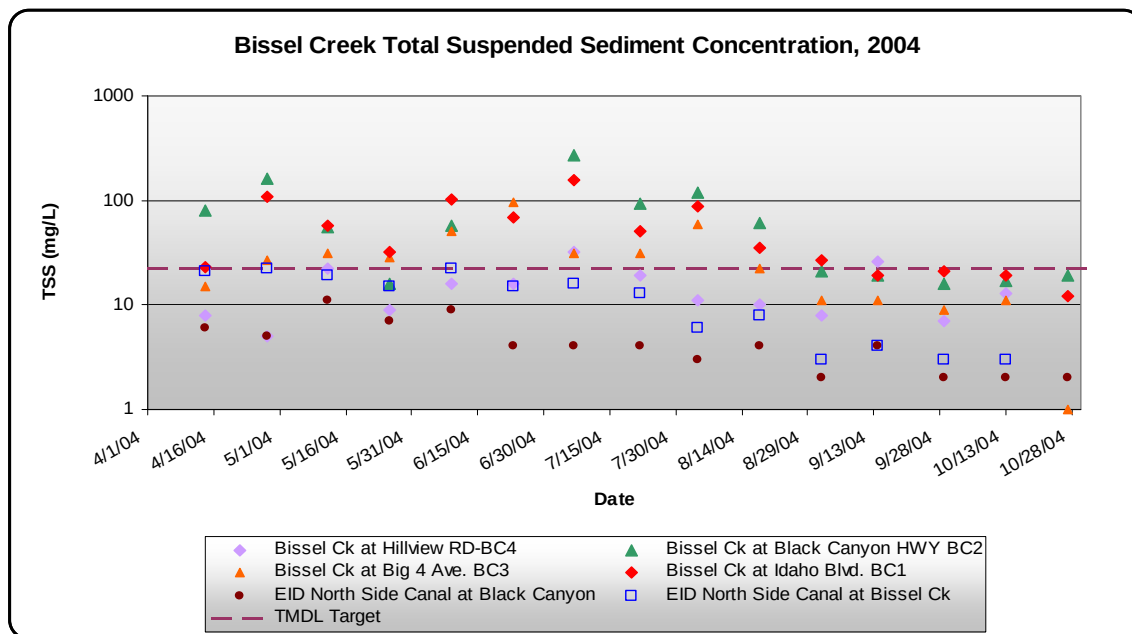


Figure 18. Suspended Sediment Concentration Data from Bissel Creek Irrigation Inflow and Monitoring Locations, 2004.

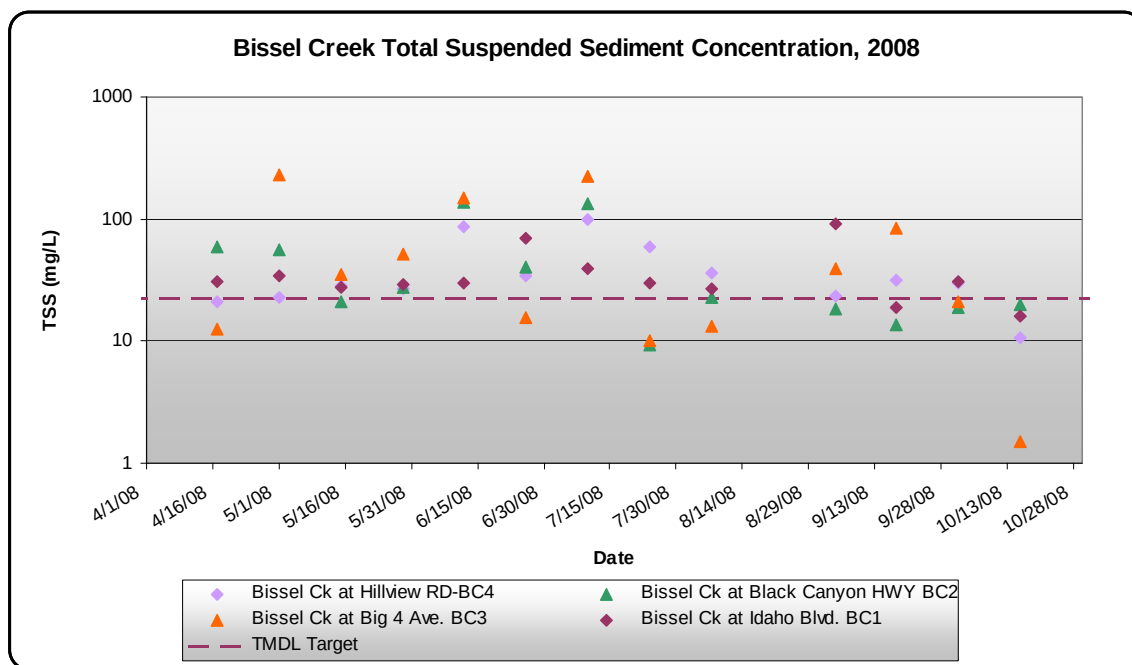


Figure 19. Suspended Sediment Concentration Data from Bissel Creek Monitoring Locations, 2008.

Reported results from the SR-HC TMDL control location, LPR-007, indicate that sediment loads decreased between 2002 and 2003, but have not decreased since 2003 and remain above the annual mean of 19.08 mg/L documented when the TMDL was developed, and below the threshold target of 50 mg/L (Figure 20).

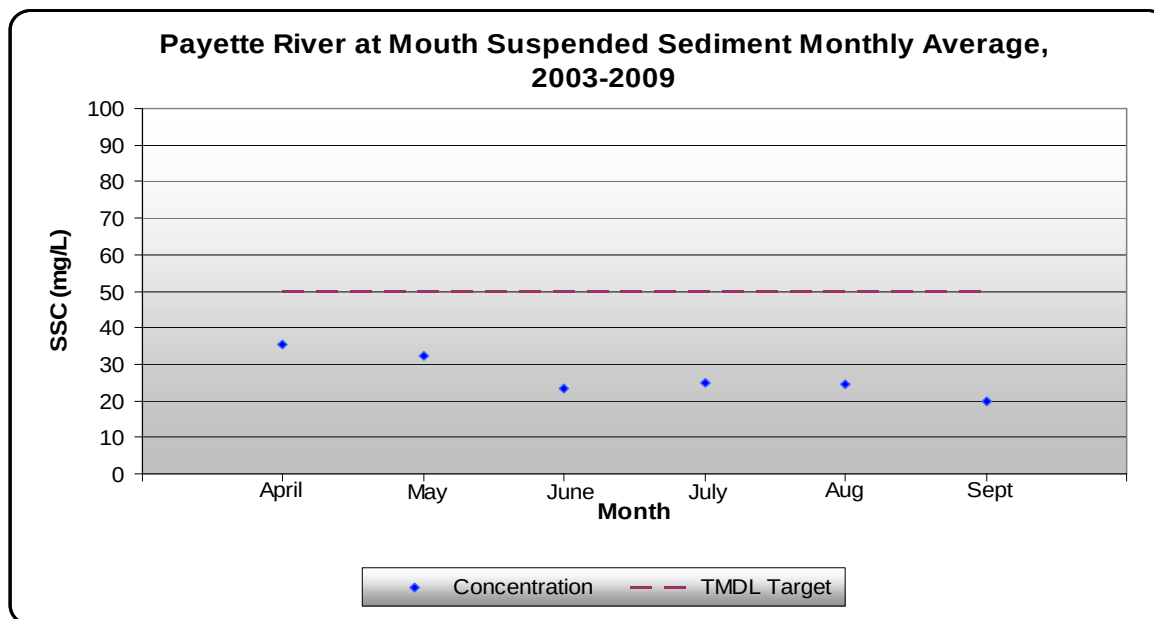


Figure 20. Suspended Sediment Concentration Data from Control Monitoring Location at the Confluence with the Snake River (LPR-007), 2002-2006.

The following graphs are based on reported results of instantaneous TSS or SSC samples collected from monitoring locations in the lower Payette River subbasin over the past few years. Because there is no turbidity data, the values are compared with the targets and thresholds established for existing stream or river TMDLs.

The lower Payette River has an LA for pesticides at the mouth which is intended to be met by managing SSC so that there is no increase from the concentrations documented when the TMDL was developed. The maximum threshold was established at 137,887 kg/day, which correlates to an average monthly value of 50 mg/L. While data from the mainstem river locations is sporadic and may not be representative of the true average, the target threshold for the SR-HC TMDL has been exceeded once since 2003, and concentrations at the mouth are not significantly greater than concentrations at the outfall of the Black Canyon Reservoir (Figure 20).

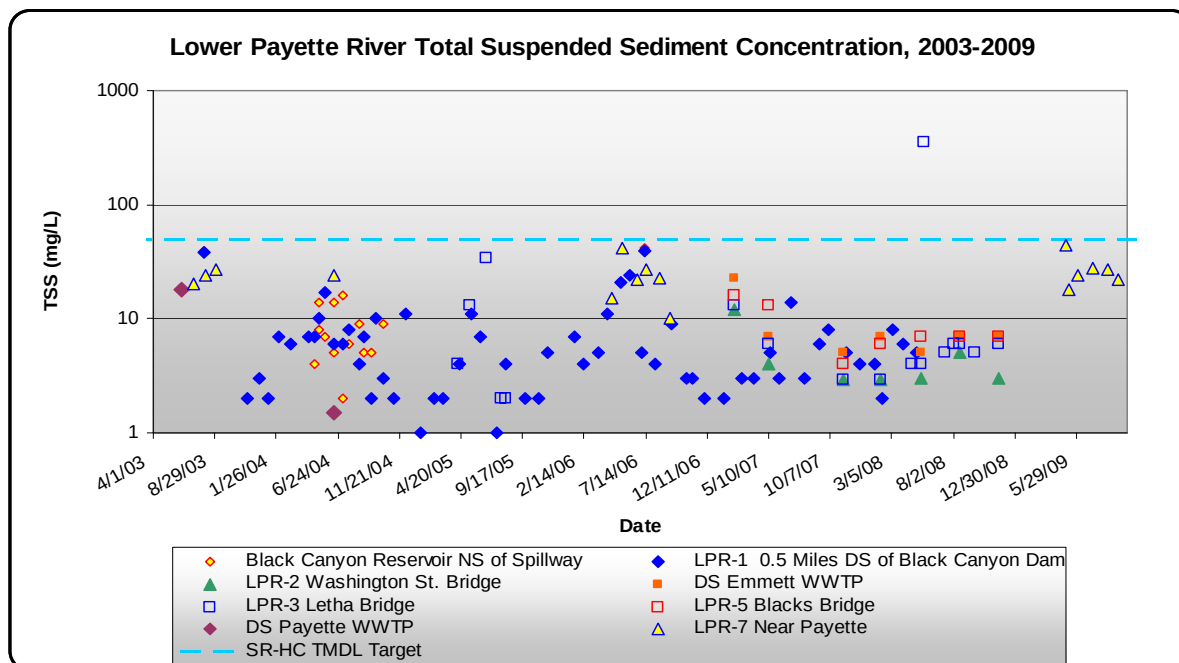


Figure 21. Reported Suspended Sediment Concentration Data from Control Monitoring Locations on the Lower Payette River (AU 001_06), 2003-2009.

Instantaneous data collected from north-side tributaries in AUs 017 and 018 (Big and Little Willow Creeks) indicate that Little Willow Creek exceeds the threshold target for the Bissel Creek TMDL and that sediment may impair beneficial uses in AU_018 during the irrigation season (Figure 22).

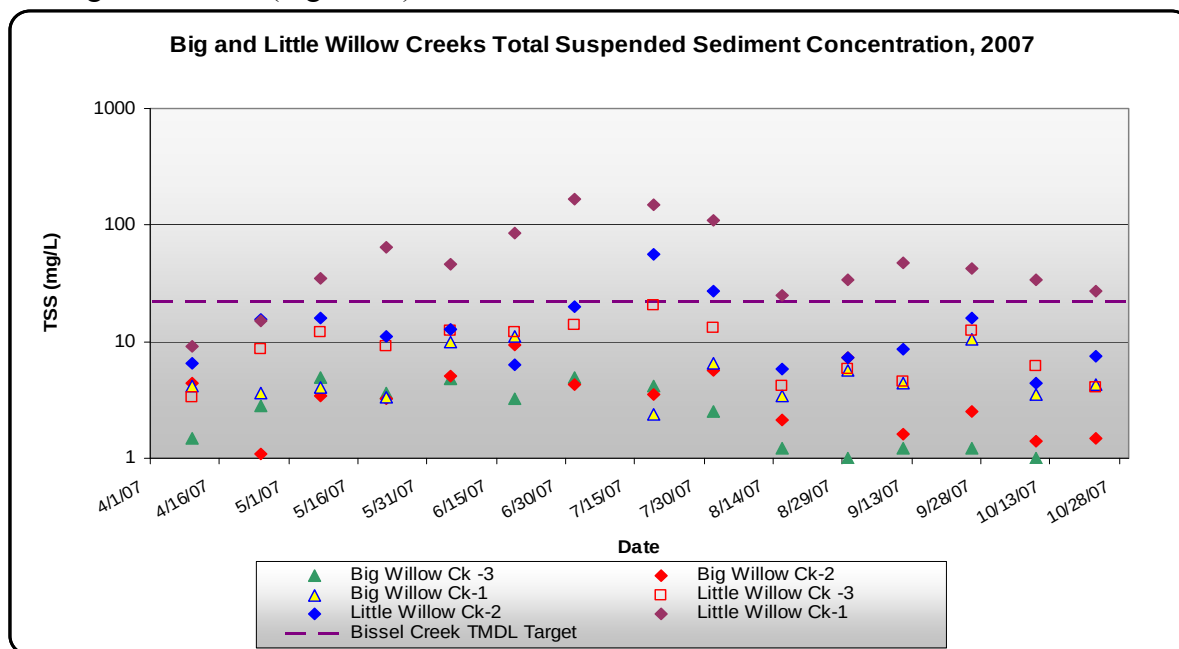


Figure 22. Suspended Sediment Concentration Data Reported by the Idaho State Department of Agriculture for AU 017 and AU 018, Lower Payette River Subbasin, 2007.

Because AU 001_02 contributes water to the lower Payette River and does not have a TMDL target that applies to sediment concentrations, the reported instantaneous concentrations were compared to the target that applies to the lower Payette River in the SR-HC TMDL (Figure 23 and Figure 24).

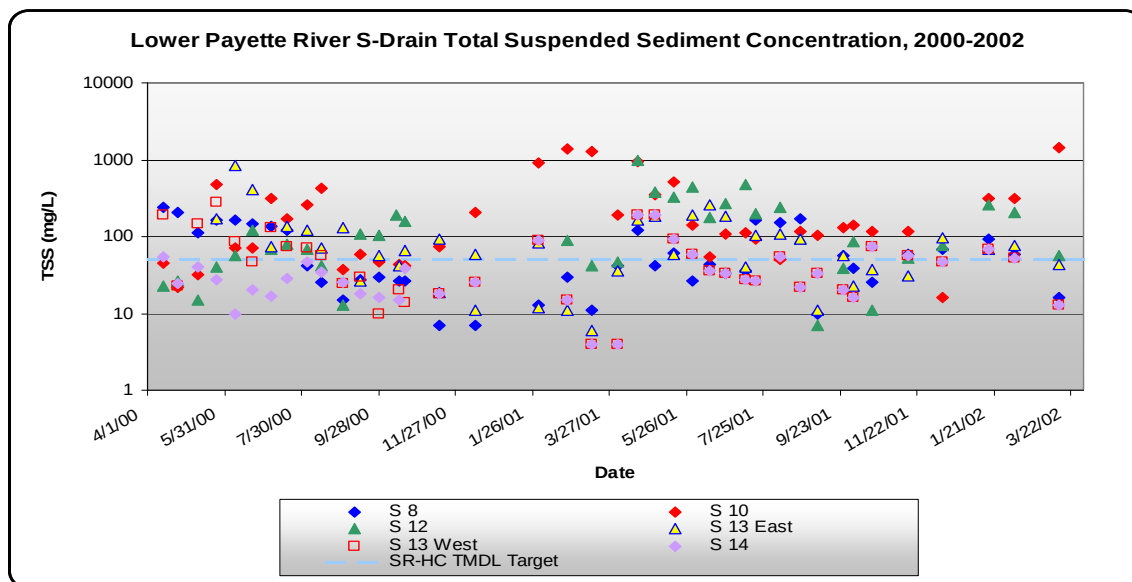


Figure 23. Suspended Sediment Concentration Data Reported by the Idaho State Department of Agriculture for the S-Drain Irrigation System (AU 001_02), 2000-2002.

Based on the data reported by the data collection agencies, SSC from the S-Drain irrigation system has increased between 9 and 111 mg/L at all monitored locations except for S-12; which has decreased SSC by 152 mg/L, but still exceeds the target threshold (Figure 24).

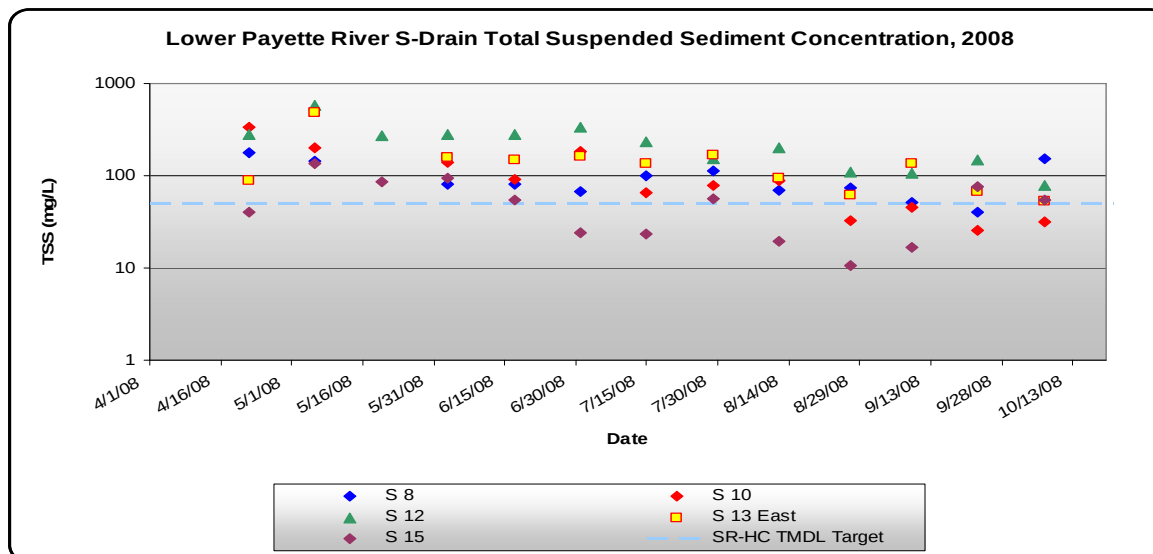


Figure 24. Suspended Sediment Concentration Data Reported by the Idaho State Department of Agriculture for the S-Drain Irrigation System (AU 001_02), 2008.

Reported results from data collected at irrigation system control monitoring locations in 2009 indicate that Forty-nine Slough contributes water exceeding the SR-HC TMDL threshold target to the mainstem river during the irrigation season and data collected from Plaza Drain represents river water just below the dam (Figure 25).

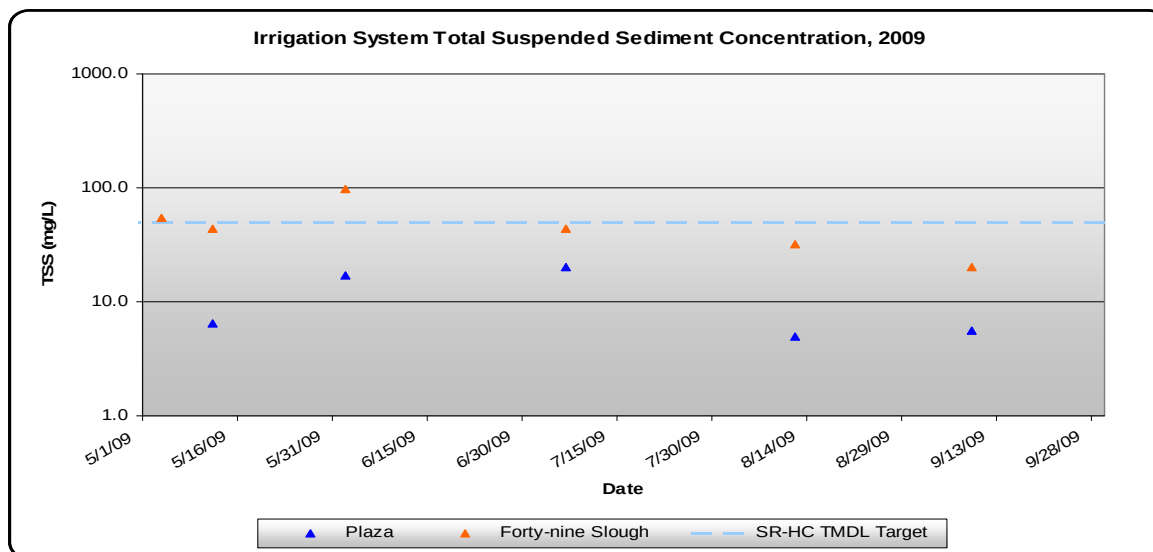


Figure 25. Suspended Sediment Concentration Data Reported by DEQ for Irrigation Drains (AU 001_02), 2009.

Data also indicate that some north-side irrigation drains contribute SSC that exceeds the SR-HC TMDL target. The most significant contributions are from the Silverleaf and Mesa drains (Figure 26).

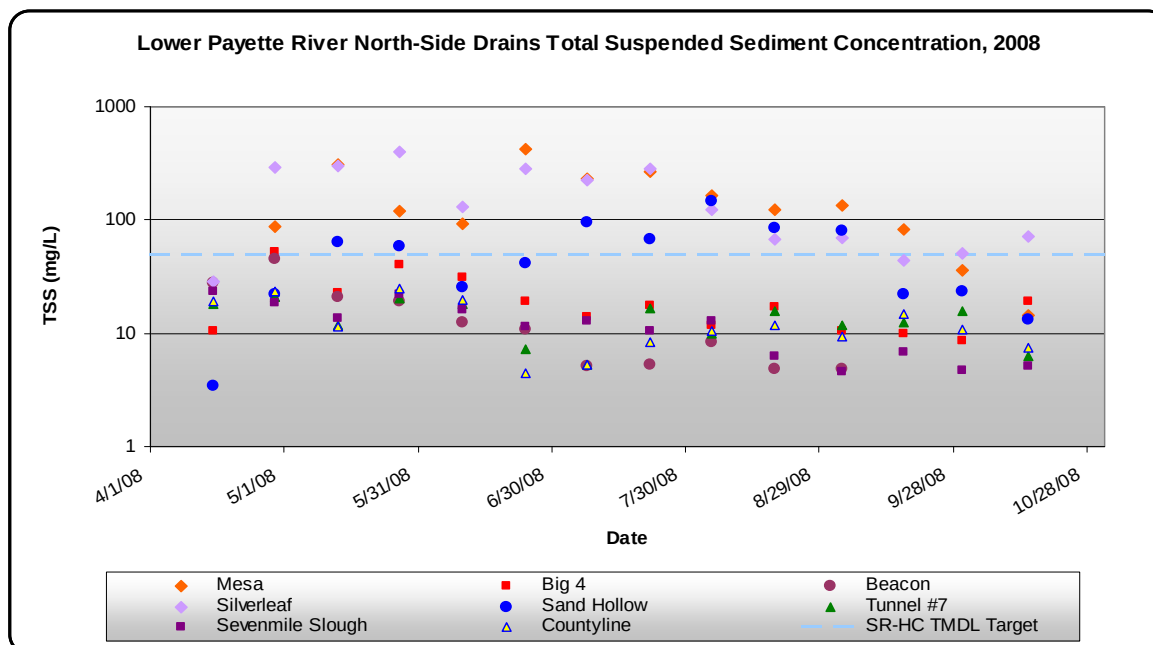


Figure 26. Suspended Sediment Concentration Data Reported for the North-Side Irrigation System (AU 001_02), 2008.

Phosphorus

The Black Canyon Reservoir delivers water to the lower Payette River with concentrations of total phosphorus (TP) that equal or exceed half of the LA to the lower Payette River. It is common for TP concentrations 0.5 mi downstream of the outfall to equal 75% of the LA to the Payette River during the critical time period (May to September) and to meet or exceed the LA from January to March (non-critical months) (Figure 27).

Concentration Analysis

Total phosphorus data has been collected from all of the six lower Payette River TMDL control monitoring locations between 2003 and 2009 in the same manner that *E. coli* data was collected. This pattern of data collection makes it difficult to identify trends or perform analysis beyond general observations. Concentrations of TP in the mainstem river near Letha have increased more than concentrations at any other monitored location between 2003 and 2008, while mainstem concentrations near Payette have remained fairly constant over the same time period (Figure 27).

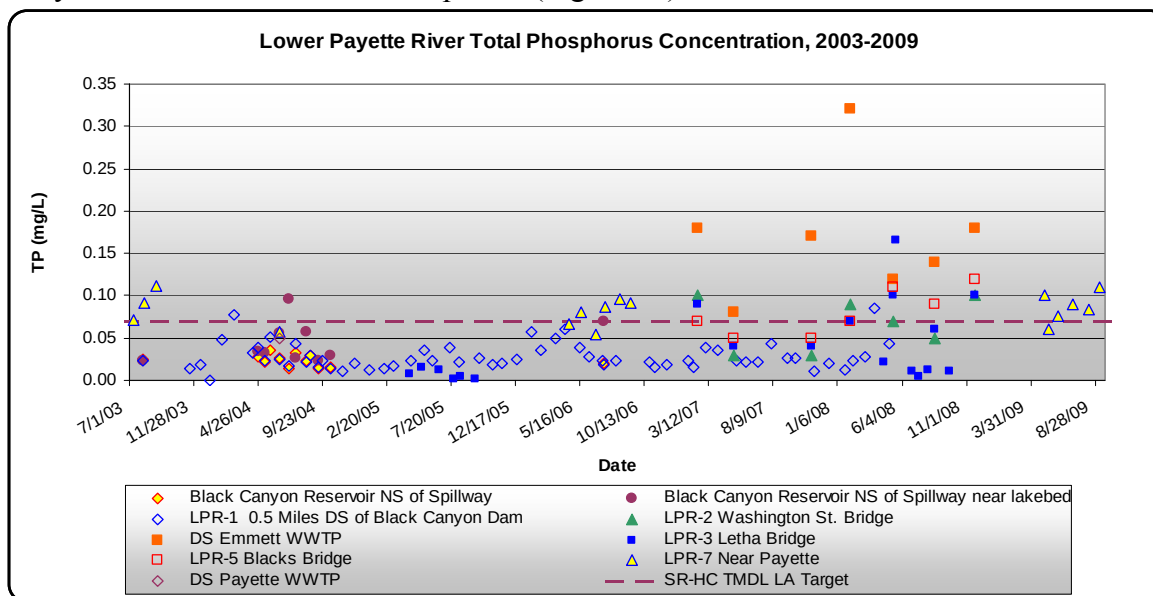


Figure 27. Total Phosphorus Concentration Data Reported for the Lower Payette River (AU 001_06), 2003-2009.

While there is no historical data from Bissel Creek for comparison, recent data indicates that Bissel Creek is a source of phosphorus to the lower Payette River with the control location near Black Canyon Highway (BC-2) reporting consistently higher concentrations than any other location (Figure 28).

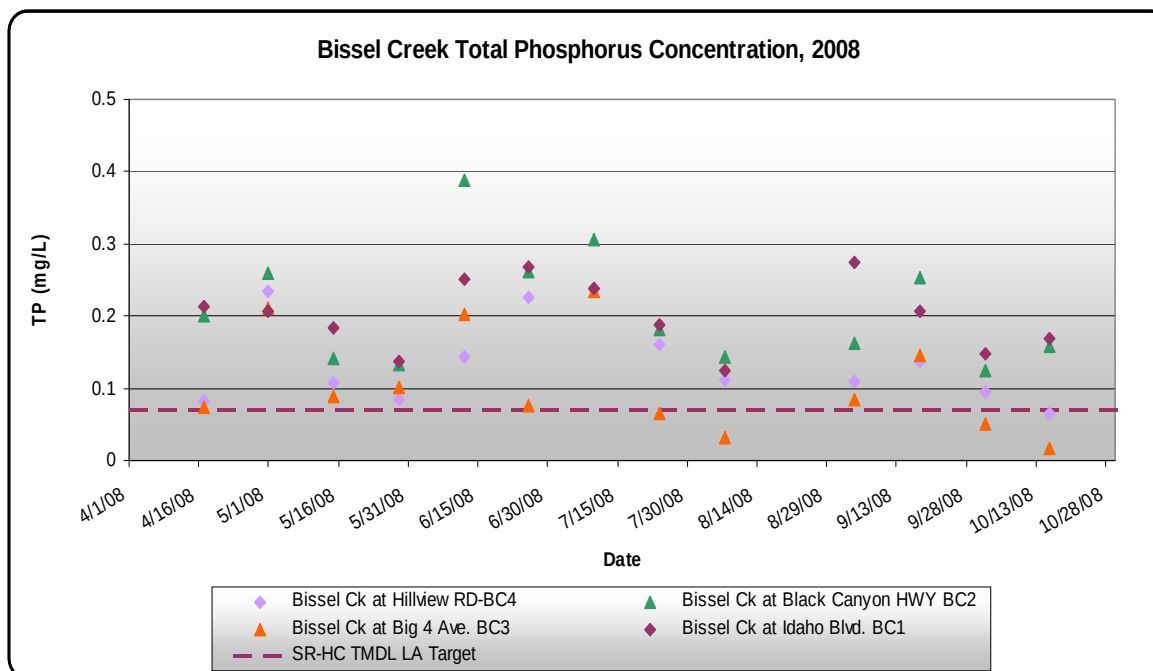


Figure 28. Total Phosphorus Concentration Data Reported for Bissel Creek (AU 015), 2008.

North-side irrigation drains contribute TP concentrations above the LA for the Payette River during the entire irrigation season and possibly during non-irrigation months (Figure 29 and Figure 30).

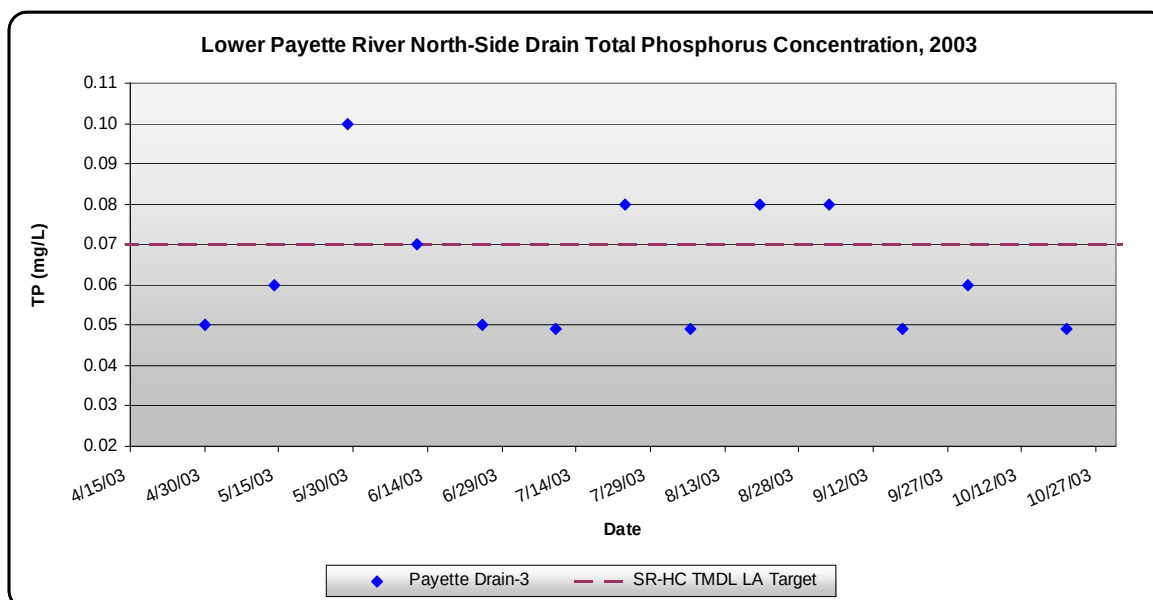


Figure 29. Total Phosphorus Concentration Data Reported from the North-Side Irrigation System (AU 001_02), 2003.

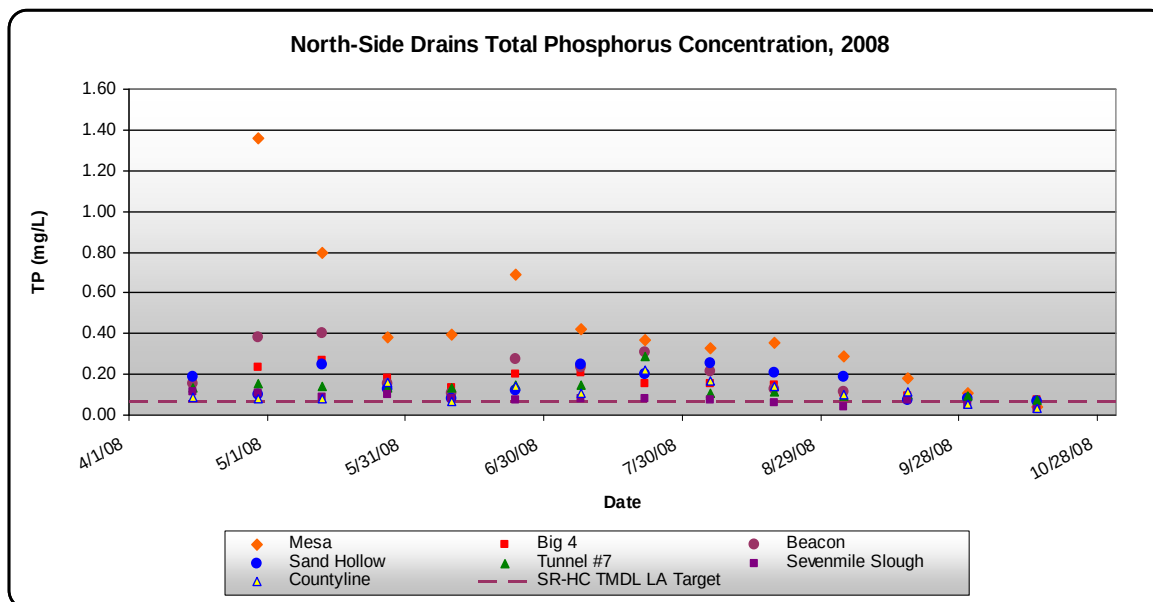


Figure 30. Total Phosphorus Concentration Data Reported from the North-Side Irrigation System (AU 001_02), 2008.

The north-side tributaries Big and Little Willow Creeks (AUs 017 and 018) also contribute concentrations of TP that exceed the LA for the lower Payette River, with Little Willow Creek contributing concentrations three to ten times greater than Big Willow Creek (Figure 31).

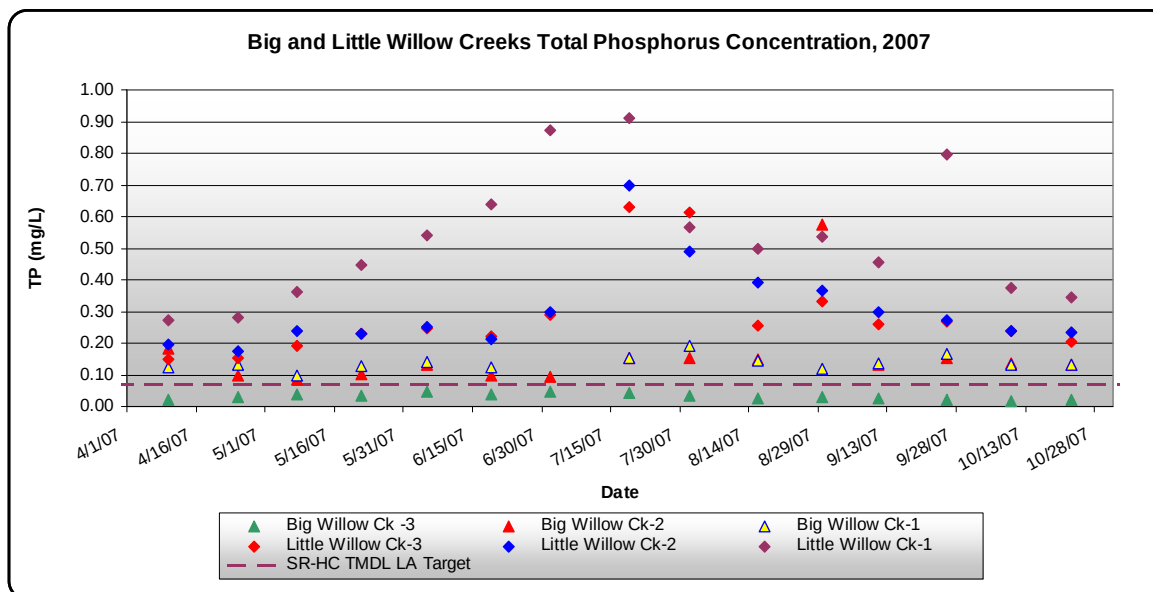


Figure 31. Total Phosphorus Concentration Data Reported from Big and Little Willow Creek (AU 017 and AU 018), 2007.

Data collected from irrigation system control monitoring locations in 2009 (AU 001_02) indicate that TP concentrations of Forty-nine Slough exceed the SR-HC TMDL target

between May and September, and water collected at Plaza Drain indicates that water delivered to the lower Payette River from the Black Canyon Reservoir is a significant source of phosphorus (Figure 32).

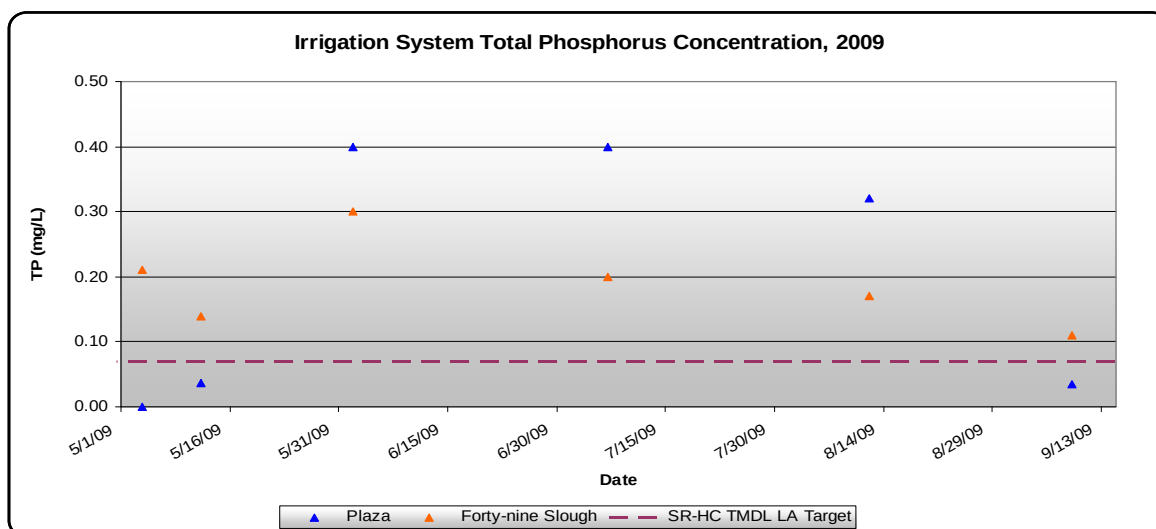


Figure 32. Total Phosphorus Concentration Data Reported from Irrigation Drains (AU 001_02), 2009.

The S-Drains contribute concentrations that exceed the TMDL LA for the Payette River every year, with S-10 contributing progressively greater concentrations over the irrigation season and between 2002 and 2008. All locations sampled between 2000 and 2002 that were re-sampled in 2008 reported increases in TP concentrations from 22 to 49%, with S-8 reporting the greatest increase (Figure 33 and Figure 34).

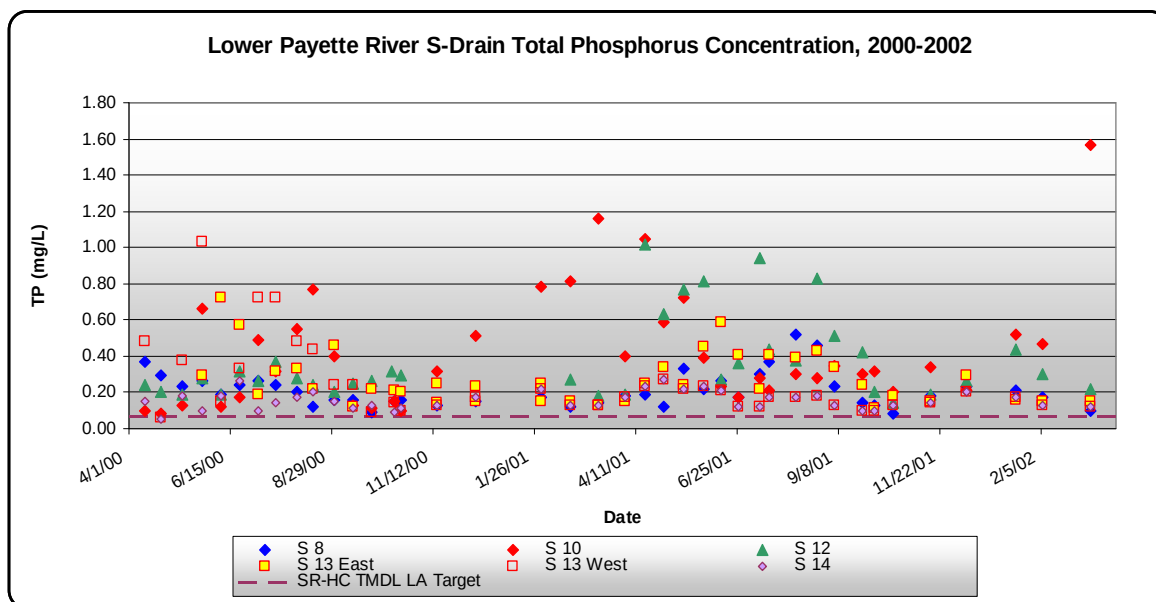


Figure 33. Total Phosphorus Concentration Data Reported from S-Drains (AU 001_02), 2000 through 2002.

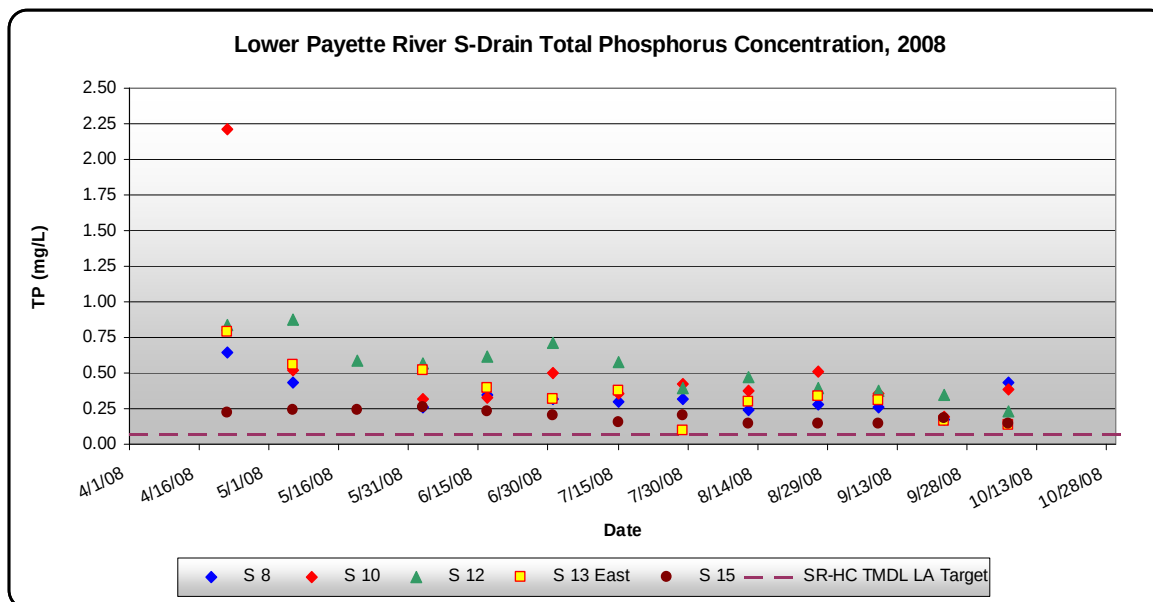


Figure 34. Total Phosphorus Concentration Data Reported from S-Drains (AU 001_02), 2008.

Load Analysis

It is possible to determine the primary sources of TP in the subbasin using load proportion analysis. Proportional loads are more useful than concentrations in identifying sources of TP because the values are calculated using flow as one of the factors, so the result is a “flow-weighted” value. Continuous discharge data was collected at four mainstem river control monitoring locations (LPR-001, LPR-002, LPR-003, and LPR-007) by the USGS. The USGS calculated and published daily mean discharge data for those locations and that information was used to calculate monthly average discharge values. Average discharge values for other locations and average TP monthly and seasonal values for all locations were calculated from reported instantaneous measurements or analyses collected by several agencies (Table 11).

The method used to determine TP loads delivered to the lower Payette River by drains and tributaries is as follows. Flow and concentration data measured or collected between 2000 and 2009 at the control monitoring locations was used to calculate a monthly average value for discharge and TP (Table 15 and Table 16). The monthly and seasonal average values were used in this equation:

$$\text{Load} = \text{Unit conversion factor(s)} \times \text{Concentration} \times \text{Discharge}$$

The unit conversion factor to convert a concentration in mg/L to pounds per day (lbs/day) is 5.39, and from lbs/day to kilograms per day (kg/d) the conversion factor is 0.45359 (Washington Department of Ecology, 1994). Monthly load values were calculated for April through September and the seasonal average load for each control monitoring location was calculated from the monthly average values (Table 16).

Table 15. Average monthly and seasonal discharge of drains and tributaries in the lower Payette River subbasin, April through September 2000-2009.

Lower Payette River TMDL Control Monitoring Location Average Discharge (cfs), 2000-2009							
Location	Month						Seasonal Average
	April	May	June	July	Aug	Sept	
LPR-001 PR near Emmett (Daily Average)	4,237	5,490	4,575	1,919	1,551	862	3,106
LPR-002 PR at Washington St. Bridge		4,925			1,764		3,345
Mesa Drain	15	13	8	14	14	15	13
Big 4	27	41	46	46	55	51	44
Tunnel #7	20	42	17	9	19	29	23
Beacon	7	12	8	11	10	9	10
BC-1 Bissel Ck	12	22	13	20	27	20	19
LPR-003 PR near Letha (Daily Average)	3,813	4,797	3,900	1,277	1,053	460	2,550
Silverleaf Drain	160	348	204	256	96	55	186
Sand Hollow Drain	3	7	7	7	8	5	6
Sevenmile Slough	53	39	20	8	21	11	25
Location	Month						Seasonal Average
	April	May	June	July	Aug	Sept	
Countyline Drain	28	43	30	12	13	20	25
S-8	8	13	13	14	18	15	13
S-10	11	16	12	18	19	17	15
S-12	4	5	7	19	12	6	9
Big Willow Creek	3	10	2	1	1	2	3
Little Willow Creek	2	4	3	8	11	16	7
S-13	19	9	13	14	13	10	10
S-14	8	19	18	26	16	17	17
S-15-SH	36	45	35	21	17	62	36
Fortynine Slough	41	47	44	37	37	49	46
LPR-007 PR near Payette (Daily Average)	4,194	5,221	4,231	1,502	1,359	858	2,894

Based on the data reported between 2000 and 2009, the TP load delivered to the Snake River at the control monitoring location (LPR-007) for the SR-HC TMDL has been reduced approximately 20% since the development of the TMDL. The load entering the Snake River from the lower Payette River subbasin is now 14% above the target load (469 kg/day) instead of 34% above target at the time the SR-HC TMDL was developed.

Table 16. Average monthly and seasonal total phosphorus loads from drains and tributaries in the lower Payette River subbasin, April through September 2000-2009.

Lower Payette River TMDL Control Monitoring Location TP Loads, 2000-2009							
Location	Average monthly load kg/day						Seasonal Average
	April	May	June	July	Aug	Sept	
LPR-001 PR near Emmett	477	479	268	132	102	48	251
LPR-002 PR at Washington St. Bridge		602			216		136
Mesa Drain	50	19	11	14	12	7	19
Big 4	13	23	19	20	20	11	18
Tunnel #7	7	14	6	5	5	7	7
Beacon	5	8	4	8	4	2	5
BC-1 Bissel Ck	6	9	8	11	8	12	9
LPR-003 PR near Letha	140	1118	95	16	62	6	239
Silverleaf Drain	135	491	181	270	67	28	195
Sand Hollow Drain	1	3	2	4	5	1	3
Sevenmile Slough	14	9	4	2	3	1	6
Countyline Drain	6	13	7	5	5	4	7
S-8	7	8	8	10	12	6	9
S-10	21	20	7	16	21	10	16
S-12	5	7	7	25	12	5	10
Big Willow Creek	1	3	1	1	0	1	1
Little Willow Creek	1	4	5	17	14	24	10
S-13	14	9	13	11	11	5	10
S-14	2	9	8	8	7	5	7
S-15-SH	20	26	21	10	6	25	18
Fortynine Slough	21	16	32	18	16	13	19
LPR-007 PR near Payette	677	1030	648	305	300	220	530

In order to provide a better visualization of sources of TP to the lower Payette River, load proportion diagrams have been created from the data presented in Table 15 and Table 16 (Figure 35). The loads calculated for LPR-001, near the outfall of the Black Canyon Dam, are used in the proportional analysis as the source water for the subbasin. The loads calculated for the other mainstem locations (LPR-002, LPR-003, and LPR-007) are not used in the proportional analysis because those values represent cumulative loads in the mainstem, not loads delivered to the mainstem from other sources. Figure 35 displays the sources of TP to the lower Payette River mainstem for each month from April through September and the seasonal average, by proportion, for each of the 20 control monitoring locations identified in the legend. For cases in which the proportional load is less than 1%, the color designated in the legend may not be visible in the diagram. Based on the results of this analysis, the six primary irrigation-season load sources are Black Canyon Reservoir; Silverleaf, Mesa and Big 4 drains; Little Willow and Bissel Creeks; and the S-10 drain (Figure 35).

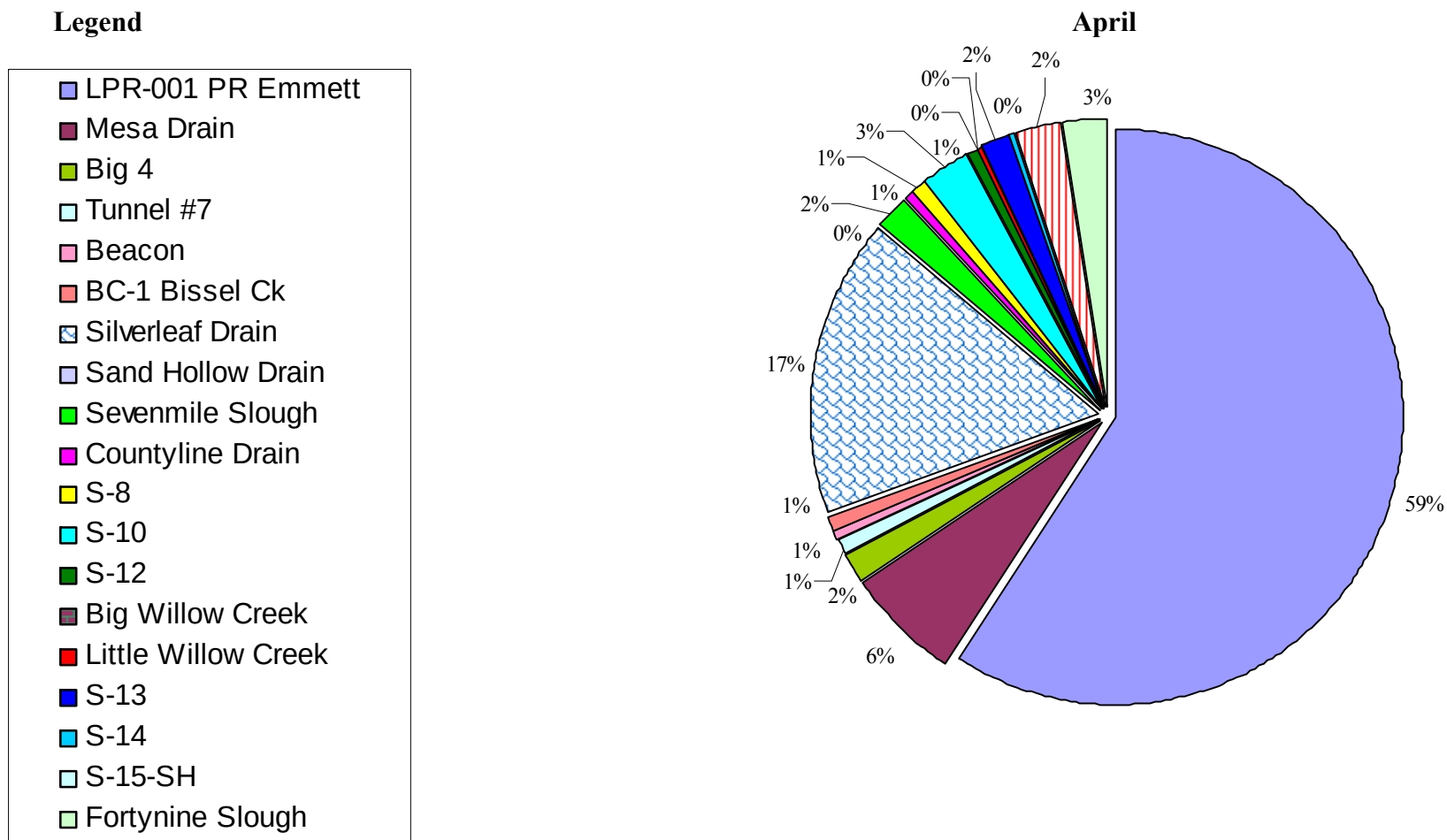
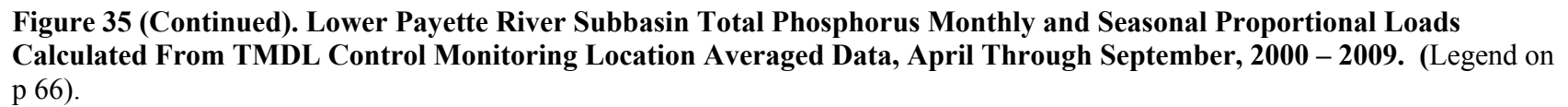


Figure 35. Lower Payette River Subbasin Total Phosphorus Monthly and Seasonal Proportional Loads Calculated From TMDL Control Monitoring Location Averaged Data, April Through September, 2000 – 2009. Note: The legend key applies to pages 66-69.



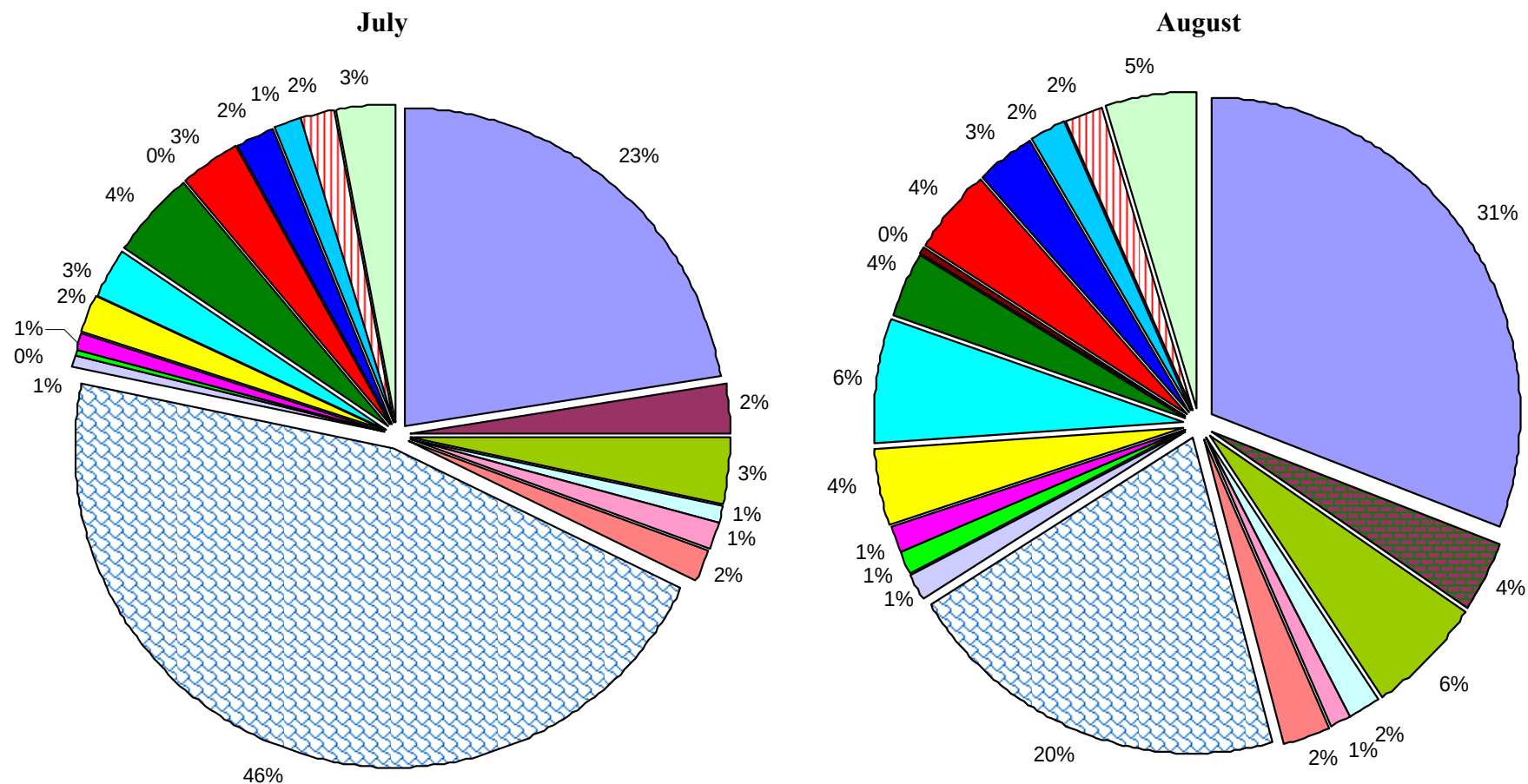


Figure 35 (Continued). Lower Payette River Subbasin Total Phosphorus Monthly and Seasonal Proportional Loads Calculated From TMDL Control Monitoring Location Averaged Data, April Through September, 2000 – 2009. (Legend on p 66).



Temperature

The mainstem lower Payette River (AU 001_06) must meet the temperature criteria for SS and COLD beneficial uses. Information from the mid-1800s indicates the subbasin can reasonably be expected to support a thriving salmonid fishery (ISHS, 1993a). For species of salmonids that are documented as existing in the lower Payette River subbasin, the time period during which they spawn was determined as the time frame specified in the WBAG II (Grafe, et. al, 2002) and verified by reports published by the Idaho Department of Fish and Game (IDFG) (1975, 1984).

Even though geothermal ground water sources exist in the lower Payette River subbasin, geothermal waters are not discharging into surface waters in a way that influences surface water temperature. Geothermal ground water wells have been drilled along the mainstem river channel and in Little Willow Creek. There is no documentation that lower Payette River subbasin surface waters receive water from geothermal sources.

As described in the WBAG II (Grafe, et al., 2002), if the temperature exceedance of numeric criteria is less than 10% and there is no other evidence of thermal impairment, delisting (removing the AU from the “§303(d) list” of impaired waters) for temperature pollution may be considered. Idaho WQS also provide an exemption for numeric temperature criteria exceedance in the event that air temperature is above the 90th percentile of a yearly series of maximum weekly maximum air temperatures (MWMT) calculated over the historic record from the nearest weather reporting station (IDAPA 58.01.02.03). Air temperature data has been collected in the subbasin from the late 1800s and early 1900s and is summarized in Figure 36 and Figure 37. Because the statistical information is different at the Emmett weather station than information from the Payette weather station, both summaries are included.

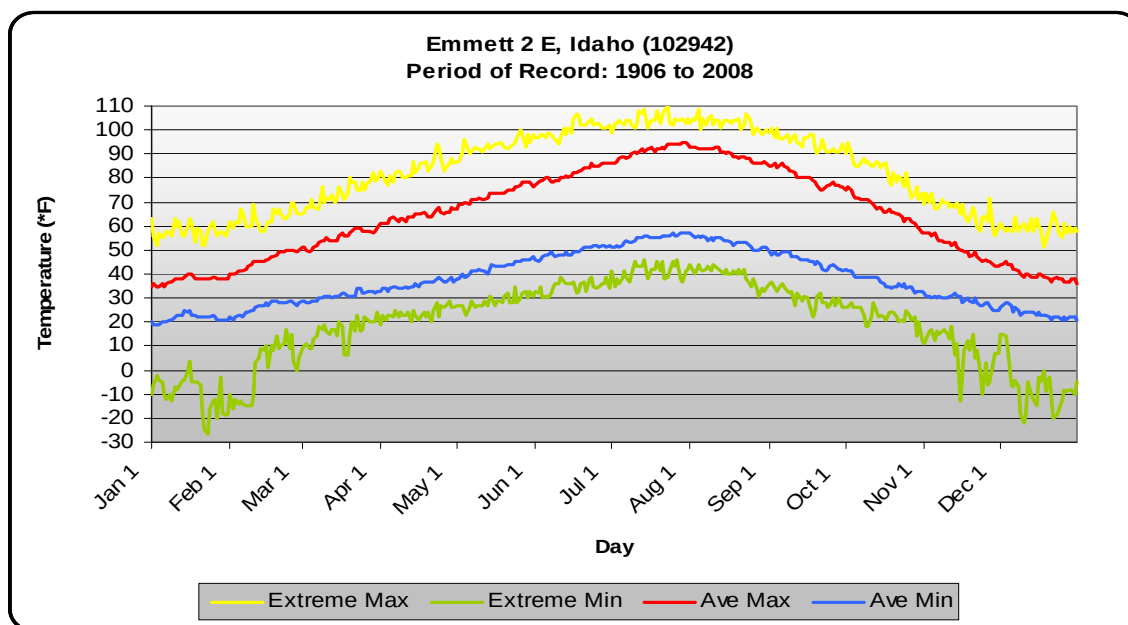


Figure 36. Graph of Daily Maximum and Minimum, and Average Maximum and Minimum Air Temperatures from 1906-2008. Created from Data Retrieved from the Western Regional Climate Center for the Emmett 2E Weather Station.

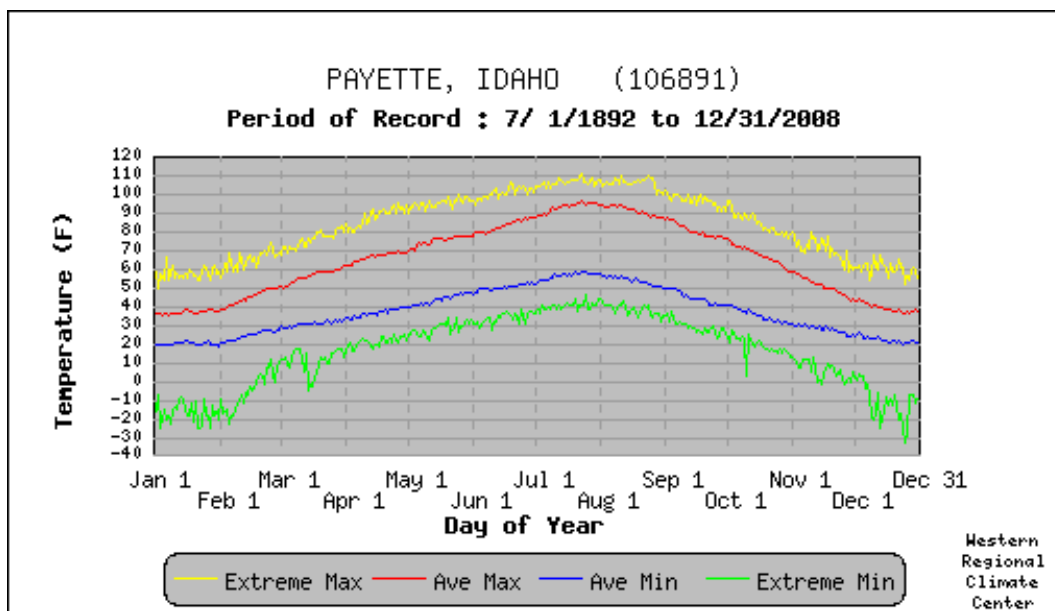


Figure 37. Graph of Daily Maximum and Minimum, and Average Maximum and Minimum Air Temperatures from 1892-2008 as Retrieved from the Western Regional Climate Center for the Payette Weather Station.

While there is no continuous data available for most of the control monitoring locations in the river, data from 2008 was evaluated using the MWMT 90th percentile method. Air temperature as recorded at Payette, ID is 10 and 25 °F below the standard for all but one week from May through June, and 2 to 15 °F below the standard from mid-August through September. Based on that analysis, there is enough data to confirm that AU 001_06 is impaired for temperature and that the water delivered to the subbasin by Black Canyon Dam is the most prominent source of thermally altered water. The mainstem river water temperature exceeds criteria May through October (Figure 38) and water temperature of the river usually gains 5 °C, or 20%, between the outfall of the dam and the confluence with the Snake River. The remainder of this section includes graphical representations of water temperature data reviewed for this report and brief summaries of the temperature data collected throughout the subbasin.

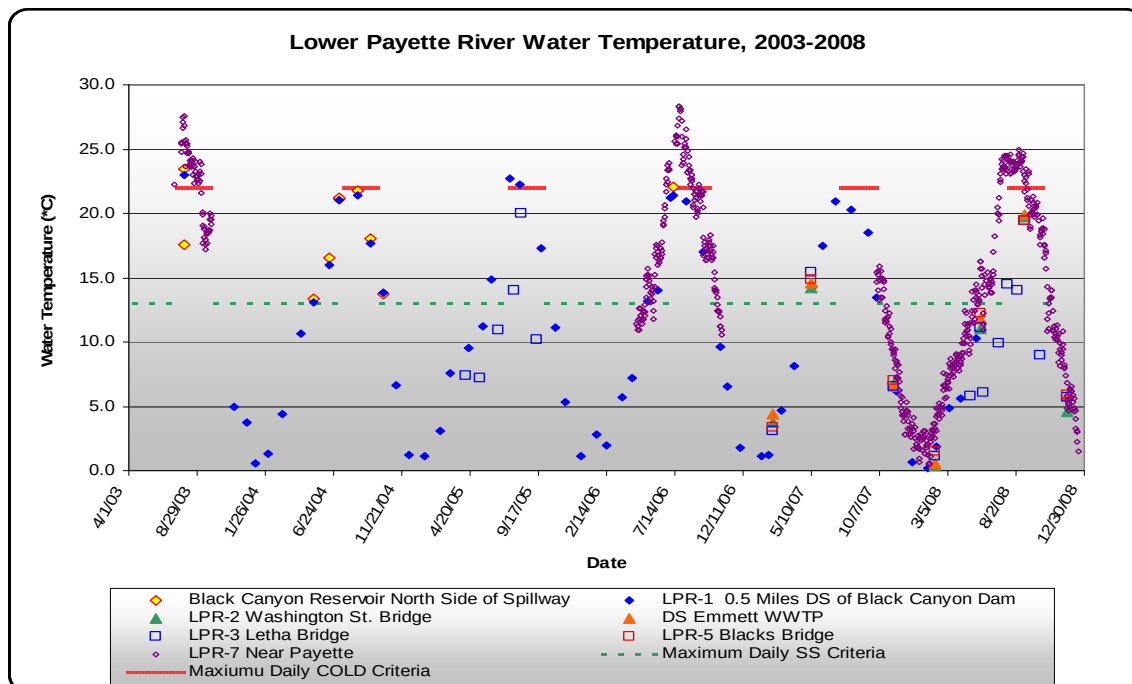


Figure 38. Daily Maximum Water Temperature Reported for Lower Payette River Monitoring Locations (AU 001_06) Compared to Water Quality Standards for Salmonid Spawning and Cold-Water Aquatic Life, 2003-2008.

The instantaneous water temperature measurements reported from north-side irrigation systems (AU 001_02, AU 015_03, AU 018_03, and AU 016) indicate that while criteria required of natural streams is not required in canals or drains, water contributed to the lower Payette River from the north-side irrigation channels exceeds beneficial use criteria in July and August. (Figure 39 and Figure 40).

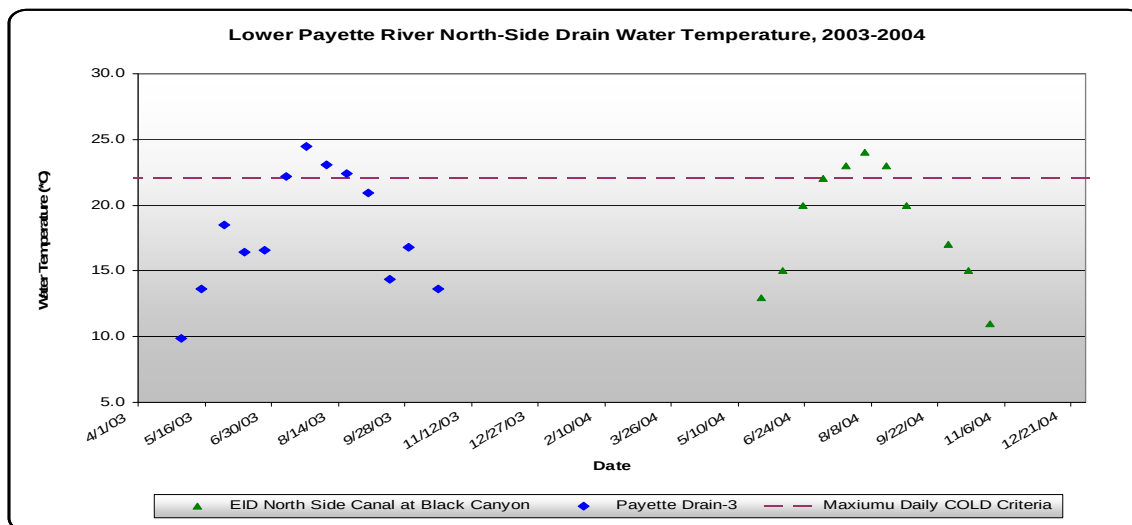


Figure 39. Instantaneous Water Temperature Reported for North-Side Irrigation Systems (AU 015_03 and AU 018_03) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2003-2004.

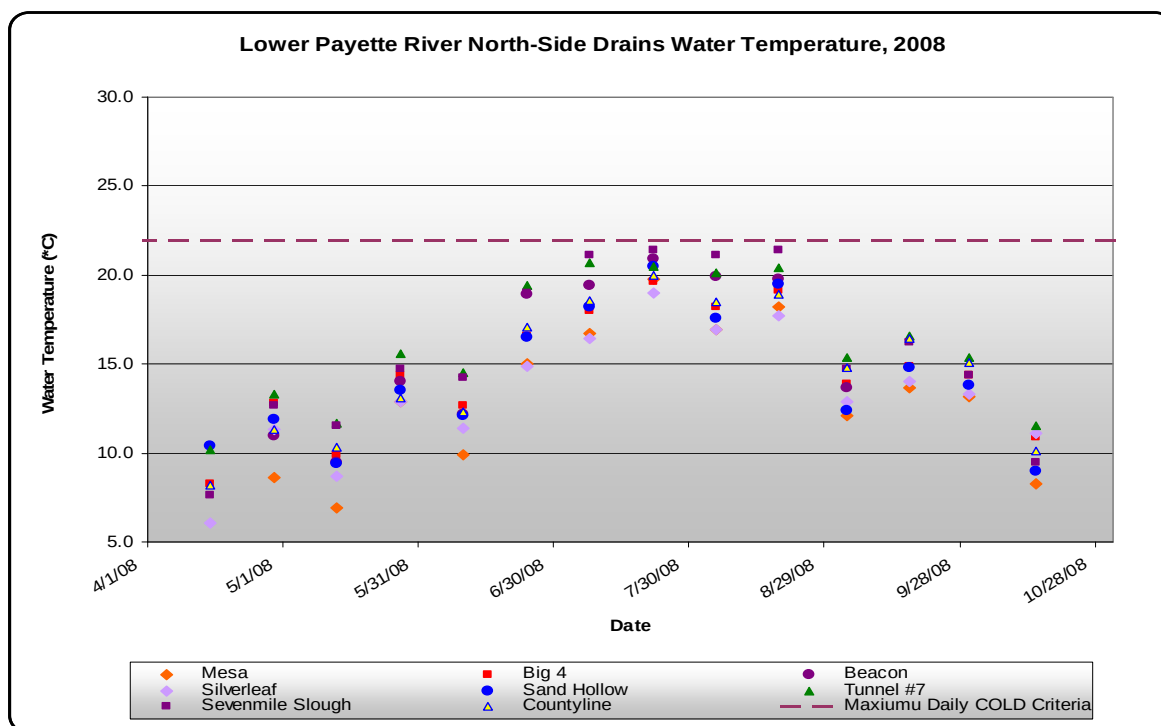


Figure 40. Instantaneous Water Temperature Reported for North-Side Irrigation Systems (AU 001_02) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2008.

Instantaneous water temperature data reported for one north-side tributary, Bissel Creek (AU 015_03a), does not exceed temperature criteria (Figure 41 and Figure 42).

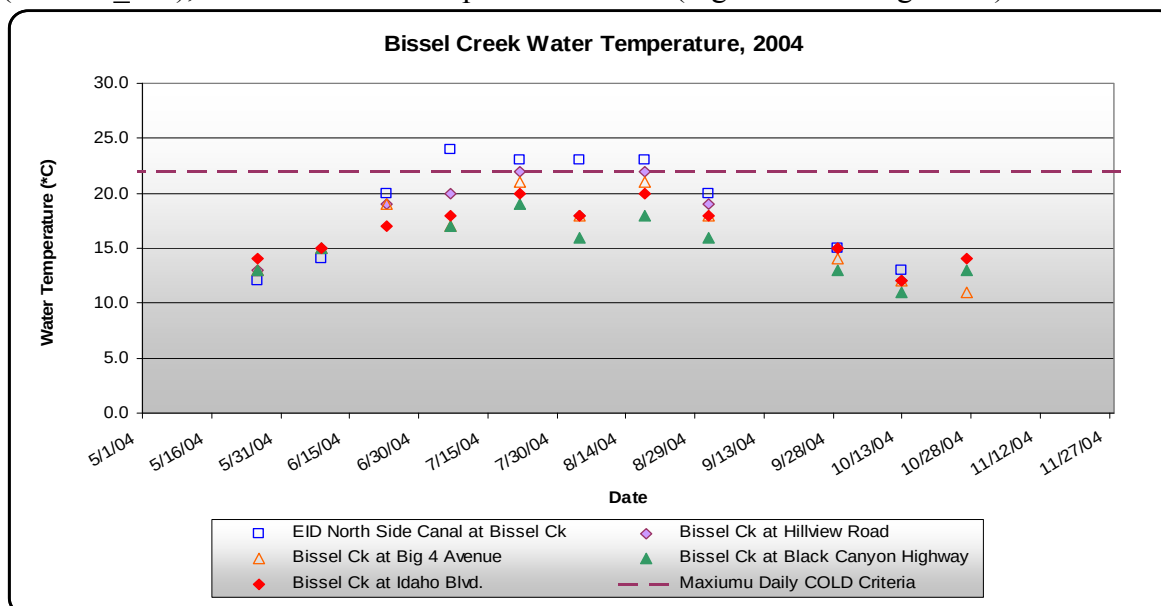


Figure 41. Instantaneous Water Temperature Reported for Bissel Creek (AU 015_03a) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2004.

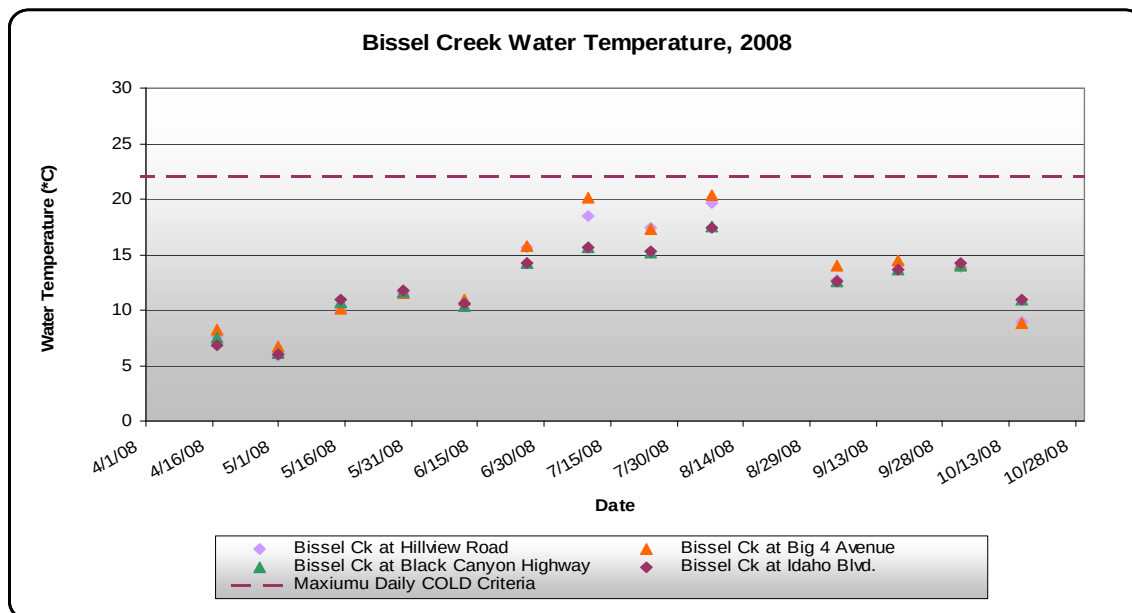
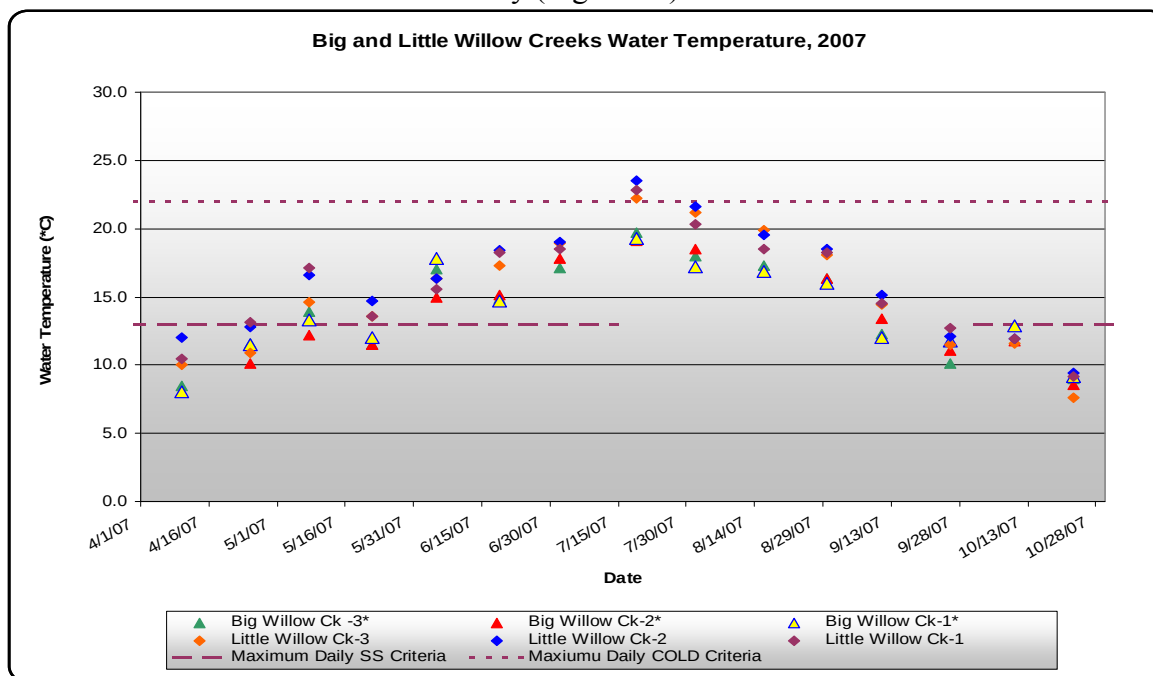


Figure 42. Instantaneous Water Temperature Reported for Bissel Creek (AU 015_03a) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2008.

Instantaneous water temperature data reported for Big Willow Creek (AU 017) exceeds the beneficial use criteria from May through July, and Little Willow Creek (AU 018) exceeds the beneficial use criteria in July (Figure 43).



* Salmonid spawning beneficial use applies to this location.

Figure 43. Instantaneous Water Temperature Reported for Big and Little Willow Creeks (AU 017 and AU 018) Compared to Water Quality Standards for Salmonid Spawning (AU 017) and Cold-Water Aquatic Life, 2007.

The south-side irrigation systems, including the S-Drains, contribute water with temperatures cooler than most of the north-side irrigation system channels and tributaries. While water in constructed channels is not required to support the same beneficial uses as natural channels, this water may serve to cool the lower Payette River between Letha and Payette (Figure 44 and Figure 45).

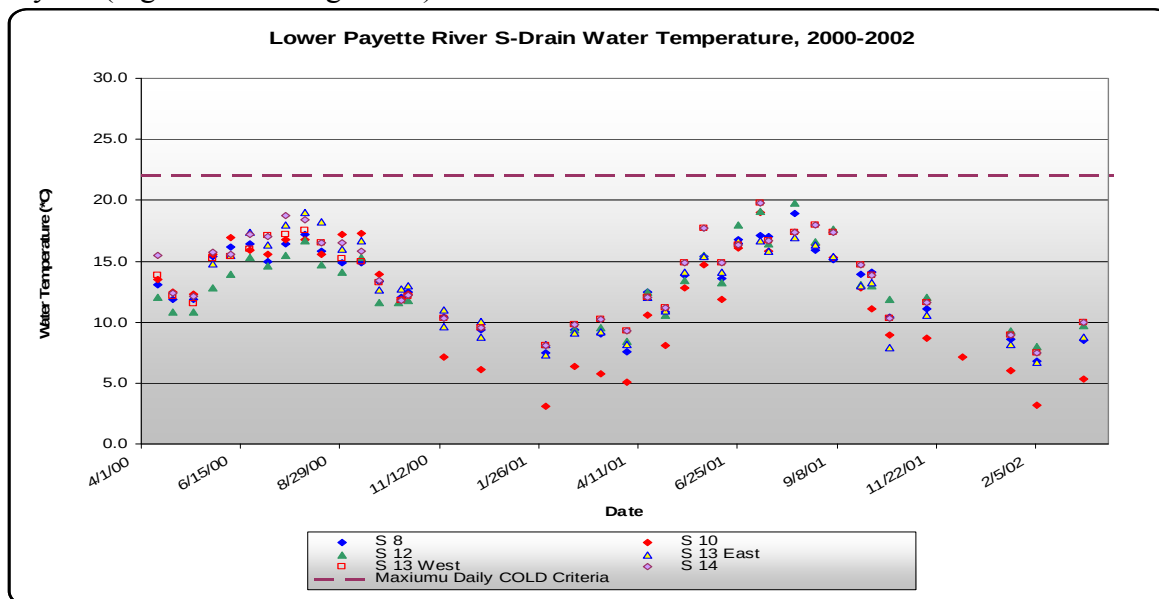


Figure 44. Instantaneous Water Temperature Reported for Monitoring Locations in the S-Drain Irrigation System (AU 001_02) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2000-2002.

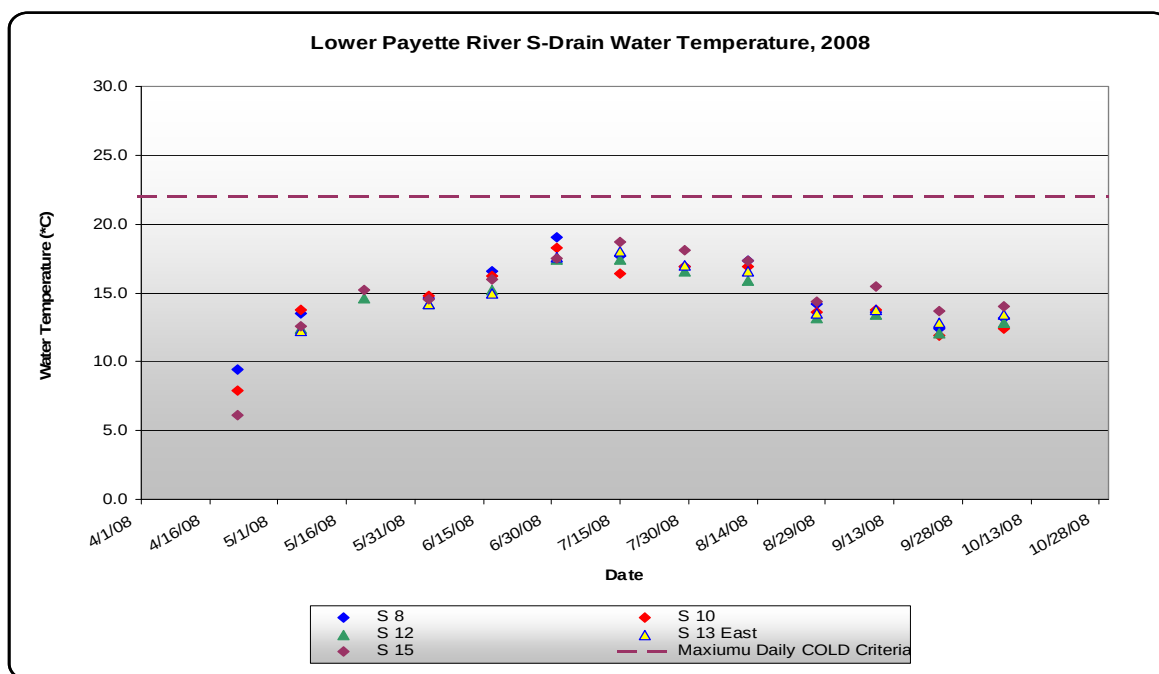


Figure 45. Instantaneous Water Temperature Reported for the S-Drain Irrigation Monitoring Locations (AU 001_02) Compared to Water Quality Standards for Cold-Water Aquatic Life, 2008.

While there are seasonal variations in temperature in the south-side channels, the maximum and minimum recorded temperatures have never exceeded 20 °C. The Black Canyon Reservoir outfall (including North-Side Main Canal) and Big and Little Willow Creeks (including Payette Irrigation Ditch) are the only surface water bodies that contribute water to the lower Payette River and have reported temperatures that exceed WQS criteria.

Based on the numeric temperature data reported by various agencies during the past five years; AUs 001_06, 017_03, 017_04, and 018_04 exceed temperature criteria for support of beneficial uses. AUs 001_02, 015_03a, and 016_03 are within criteria for support of beneficial uses.

Benthic Macroinvertebrate Data

In accordance with the WBAG II (Grafe, et. al., 2002), benthic macroinvertebrate data may be used to support other reported data to determine beneficial use support status or to infer temperature regimes as cold, cool, warm, or hot by using an appropriate index to identify the temperature tolerance of the dominant species. When the data is collected during the times specified in the WBAG II, it can be used as Tier I data and used to make beneficial use attainment determinations. Based on the data reported from instantaneous water measurements and benthic macroinvertebrate sample analyses (Table 16), AUs 001_02, 001_06, and 017_03 do not support COLD beneficial uses. For AU 018_04, there is no data on biota, and the exceedance is less than 10%; for AU 017_04, data is lacking; therefore, no determination is made for these two AUs.

Table 17. Summary of benthic macroinvertebrate data from lower Payette River subbasin locations, 2004-2007, compared to DEQ temperature tolerance indices.

USGS Benthic Macroinvertebrate Data			
Payette River near Payette, ID (AU 001_06)			
Water Year 2006			
5 riffle composite*			
Date	8/22/2006		
Cold	0		
Cool	307		
Warm	5,578		
Hot	0		
Unclassified	3,872		
Distribution by Temperature Tolerance			
Total Classified	5,885		
%Cold	0		
%Cool	5		
%Warm	95		
%Hot	0		
BURP Benthic Macroinvertebrate Data			
AU 001_02			
ID	2004SBOIA041		
Date	9/9/2004		
Cold	0		
Cool	17		
Warm	436		
Hot	4		
unclassified	81		

Distribution by Temperature Tolerance			
Total Classified	457		
%Cold	0		
%Cool	4		
%Warm	95		
%Hot	1		
AU 017_03			
ID	2005SBOIA020	2007SBOIA096	2007SBOIA021
Date	7/15/2005	8/8/2007	7/2/2007
Cold	0	0	0
Cool	40	60	91
Warm	469	342	348
Hot	0	4	0
Unclassified	10	112	79
Distribution by Temperature Tolerance			
Total Classified	509	406	439
%Cold	0	0	0
%Cool	8	15	21
%Warm	92	84	79
%Hot	0	1	0

Fish Data

Water temperature and other habitat measures can also be inferred from an analysis of fish communities observed in water bodies. The USGS and DEQ collected fish community data from a few locations in the lower Payette River subbasin and this data can be used in a manner consistent with the macroinvertebrate data. Table 18 summarizes the temperature tolerance of the fish species collected between 2002 and 2006. The fish community data support the interpretation of the numeric temperature data to determine use support for AUs 001_06 and 017_03 and the interpretation of the benthic macroinvertebrate data for AU 001_02.

Table 18. Summary of temperature tolerance of fish community data collected by the USGS and DEQ from several Assessment Units between 2002 and 2006.

Site Name	Site ID	AU	Date	% Cold	% Cool	% Warm	% Salmonids	Total	Number of Species
USGS Data									
Payette River near Emmett, ID	13245900	001_06	8/21/02	17	76	7	17	692	11
Payette River near Payette, ID	13251000	001_06	8/22/06	2	82	16	0	111	10
BURP Data									
Site ID	WT (*C)								
2004SBOIA040	19	001_02	9/9/04	0	100	0	0	106	3
2005SBOIA020	19	017_03	7/15/05	8	92	0	8	65	5

Dissolved Oxygen

Dissolved oxygen (DO) is another parameter with numeric WQS criteria used to determine attainment of beneficial uses in the lower Payette River subbasin. DO data was collected and reported by the same entities as other data reviewed for this report and the following graphs summarize the DO data reviewed for this report.

Based on the data collected by the ISDA and other agencies, beneficial use criteria for DO are not met in all monitored AUs (Figure 47 and Figure 48). The reported data indicate a 20% decrease in maximum summer DO concentrations recorded at LPR-001 (0.5 mile downstream of Black Canyon Dam outfall) between 2003 and 2008 (Figure 46). The DO concentrations reported for other locations in the mainstem segment between the dam outfall and the mouth do not exhibit a similar trend.

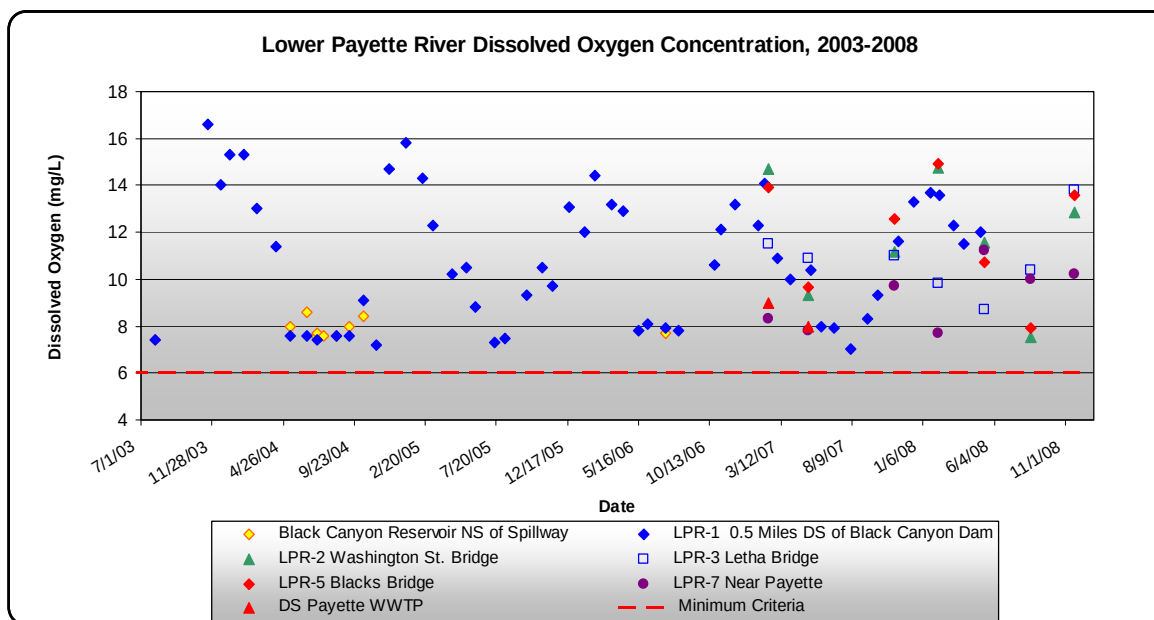


Figure 46. Reported Instantaneous Dissolved Oxygen Concentrations from Lower Payette River Control Monitoring Locations, 2003-2008.

Reported concentrations from north-side irrigation systems in AU 001_02 (Beacon and Big 4), and AU 017_03 and 017_04 (Big Willow Creek), indicate that DO concentrations are below minimum numeric WQS criteria for support of COLD beneficial uses. Other locations in AU 001_02, AU 016_03 (Sand Hollow), and north-side drains and tributaries in AU 018_04 (Little Willow Creek) are within DO criteria (Figure 47, Figure 48, and Figure 49).

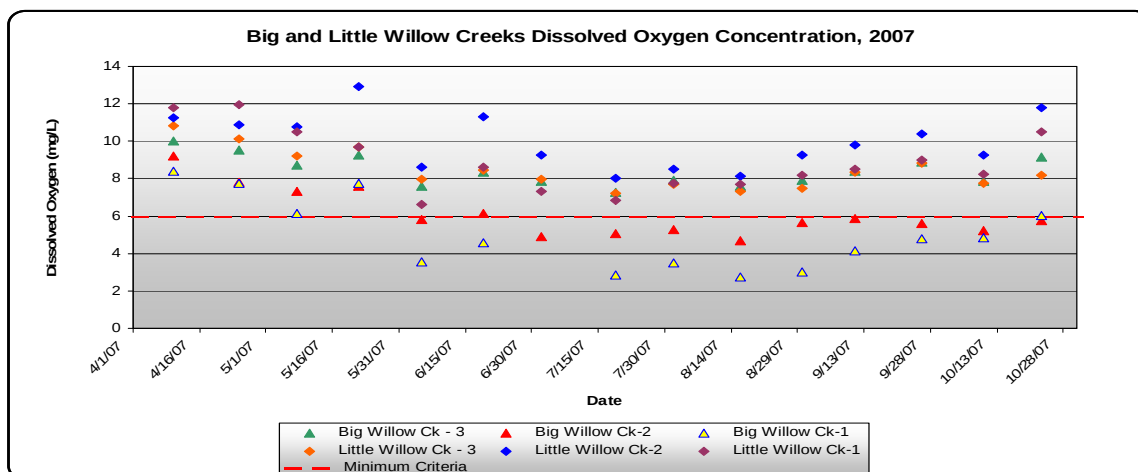


Figure 47. Reported Instantaneous Dissolved Oxygen Concentrations for Big and Little Willow Creeks (AU 017 and 018), Monitoring Locations, 2007.

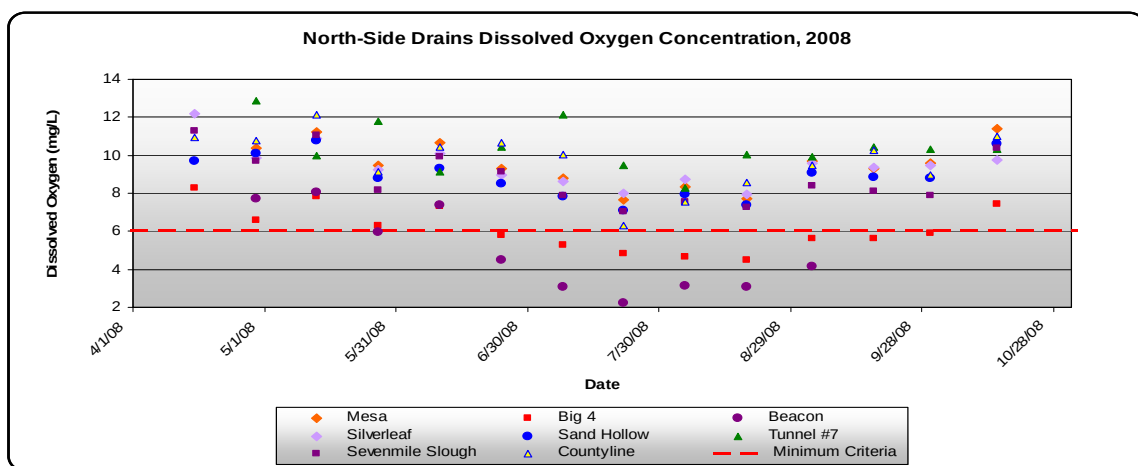


Figure 48. Reported Instantaneous Dissolved Oxygen Concentrations for North-Side Irrigation System Monitoring Locations in AU 001_02 and AU 016_03, 2008.

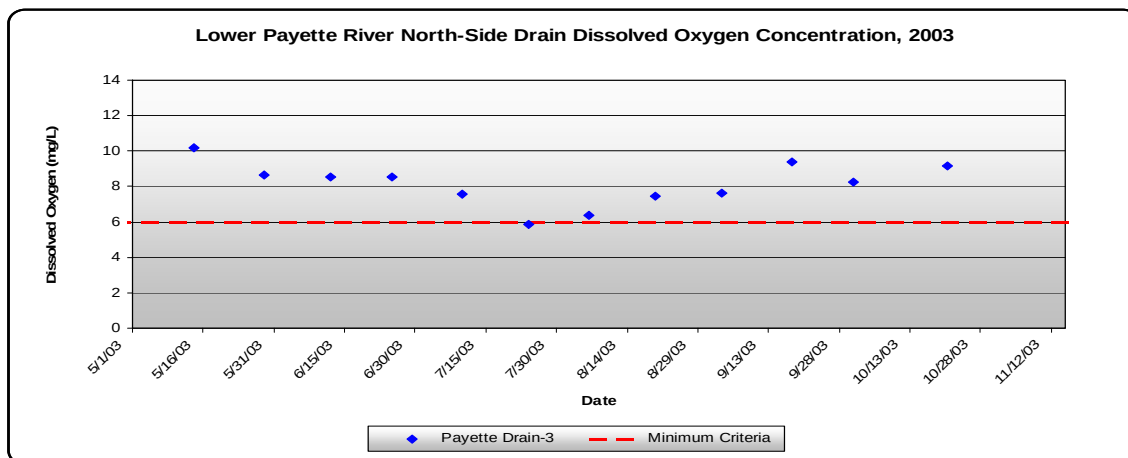


Figure 49. Graph of Reported Instantaneous Dissolved Oxygen Concentrations from Irrigation System in AU 018_03, 2003.

Data reported for control monitoring locations in Bissel Creek (AU 015_03a) indicate that while DO concentrations decrease by almost 50% during the irrigation season, minimum criteria are met (Figure 50). Based on reported data, the irrigation drains Beacon and Big 4 are delivering water to the lower Payette River that does not meet minimum DO criteria for support of COLD beneficial uses (Figure 48).

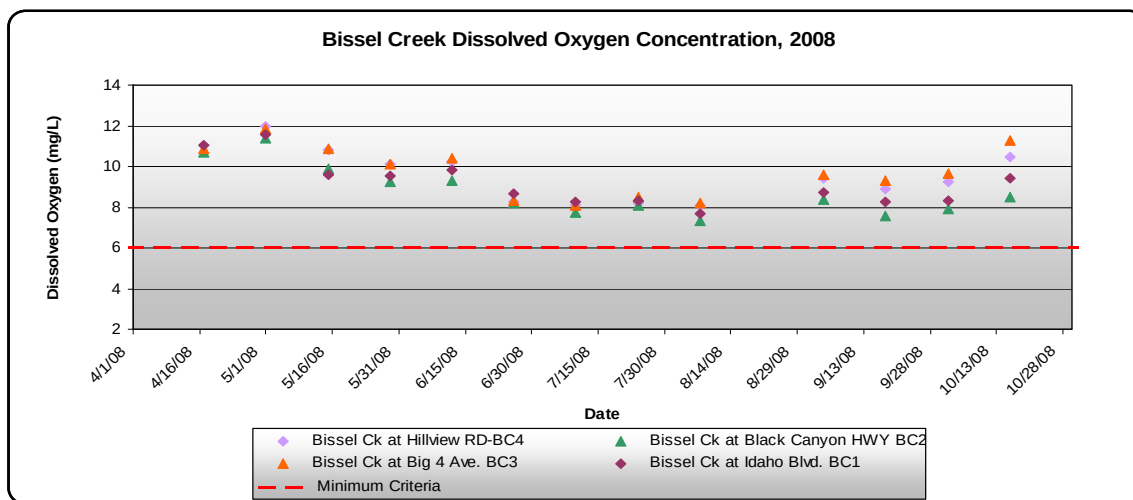


Figure 50. Reported Instantaneous Dissolved Oxygen Concentrations from Control Monitoring Locations in Bissel Creek (AU 015_03 and 03a), 2008.

Data reported from south-side irrigation system control monitoring locations, including the S-Drains, exhibit a similar pattern to the 2008 data from Bissel Creek. DO concentrations decrease by almost 50% during the irrigation season, and sometimes approach the minimum criteria, but no values below the minimum criteria are reported (Figure 51, Figure 52, and Figure 53). Based on data reported for the south-side irrigation systems in AU 001_02, DO concentrations support COLD beneficial uses.

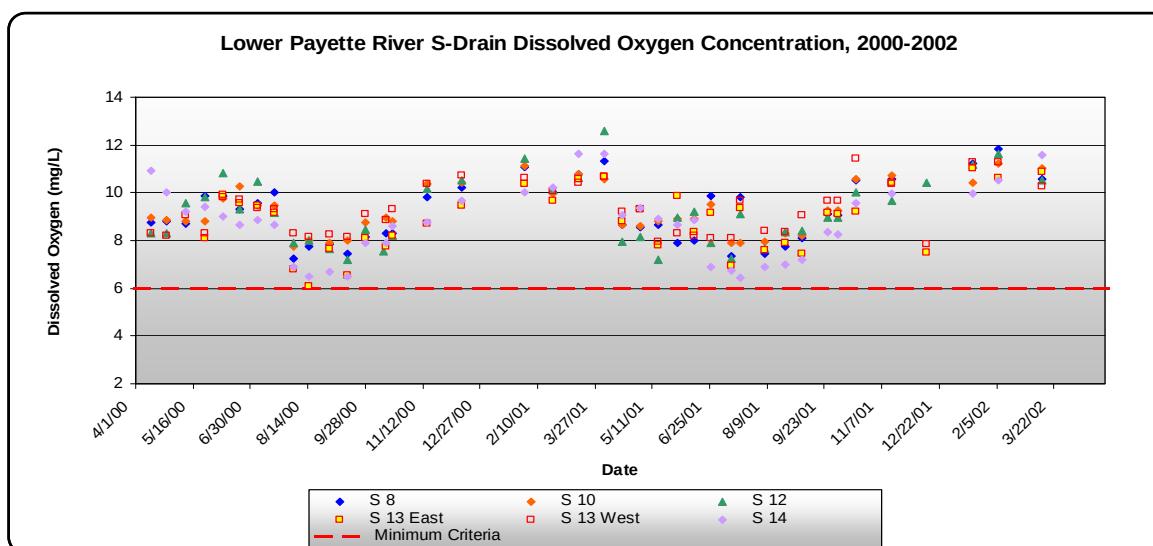


Figure 51. Reported Instantaneous Dissolved Oxygen Concentrations for S-Drain Irrigation System Monitoring Locations in AU 001_02, 2000-2002.

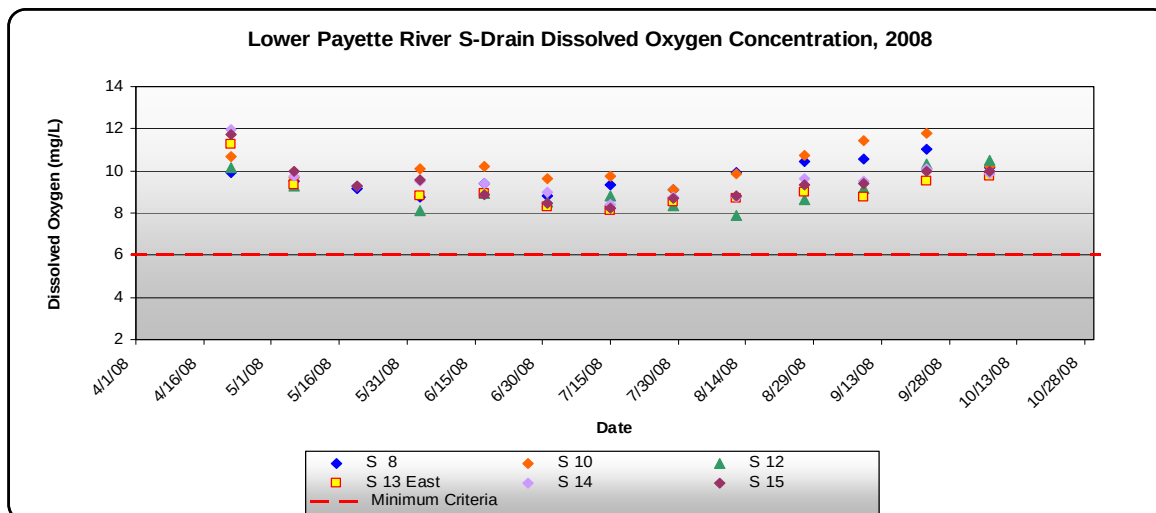


Figure 52. Reported Instantaneous Dissolved Oxygen Concentrations from S-Drain Irrigation System Monitoring Locations in AU 001_02, 2008.

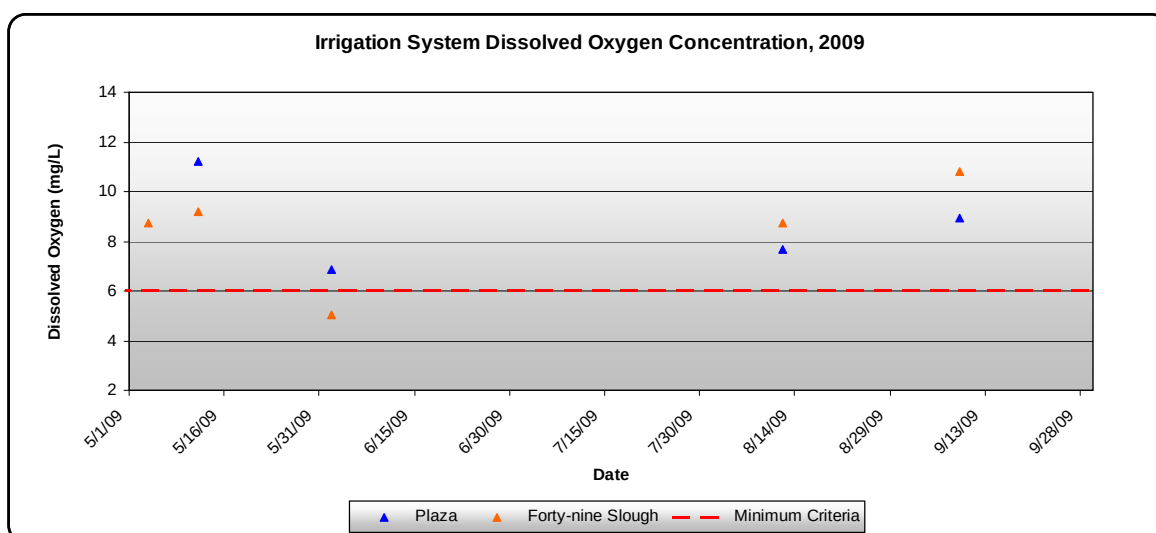


Figure 53. Reported Instantaneous Dissolved Oxygen Concentrations from Irrigation Drain Monitoring Locations in AU 001_02, 2009.

pH

The criteria for pH (6.5 to 9.0) are intended to protect aquatic life beneficial uses (COLD, SS, etc.). Data was collected by the ISDA, city of Emmett, BOR, and DEQ at monitoring locations throughout the subbasin. The only reported exceedances of WQS maximum criteria occurred at two locations (LPR-001 and LPR-007) in May and June of 2004. In spring of 2009, pH measurements recorded at four control monitoring locations in May and June exceeded the minimum criteria enough to prompt additional data collection and a review of recent pH data from various locations in the larger Payette River subbasin and the Boise River subbasin. Values ranging from 3.9 to 5.9 were measured and recorded at multiple locations in the lower Payette River from the upper and lower

Payette Lakes to the mouth from May 4 to June 2, 2009. A review of data collected in the lower Boise River subbasin in the summer of 2008 revealed pH values for the Boise River at Diversion Dam and Glenwood Bridge were reported to be between 6.0 and 6.4; the lowest values reported for the entire period of record (approximately 40 years). pH values were below standard for at least 6 weeks this spring and returned to normal historical values by July.

Potential sources for this anomaly are being actively investigated. Because there are no other reports of pH values that do not meet WQS in the subbasin, the data will not be used in making beneficial use support determinations at this time.

Ammonia

Ammonia concentration criteria are intended to protect aquatic life beneficial uses. The criteria are dependent on pH, with a maximum acute concentration (CMC) criterion and a maximum chronic criterion (CCC). The WWTPs may be required to collect samples for ammonia analysis when new permits are written, but it is not a requirement at this time and only the city of Emmett routinely collects this data. Most of the reported concentrations are at or below the minimum detection level and ammonia is not a known or suspected impairment in the mainstem of the lower Payette River. However, the combination of AFOs, irrigated agricultural lands, high bacteria concentrations, and the presence of pesticides in ground and surface water suggest that ammonia is a potential pollutant.

Because of the widespread use of riparian zones for AFOs, and the documented increase of sediment and bacteria in proximity to this land use, it is reasonable to suspect that ammonia concentrations also increase in close proximity to AFOs. This constituent is a predictive parameter for beneficial uses and it is not possible to make an accurate support determination for aquatic life uses in AUs 001, 017, 018, and 015 without this information.

Flow and Habitat

Prior to westward expansion of the population of the United States, human population in the lower Payette River subbasin was sparse. Ore mining in the region in the mid-1800s promoted rapid migration to the area. To provide food for mining towns in the Boise Mountains, the natural hydrology of river valleys was modified to support irrigated agriculture by the late 1800s (ISHS, various dates). By the early 1900s, federal land management agencies had been created to develop water resource projects to control flooding and provide improved irrigation systems in the western United States (BOR, 1997).

The results of those activities in the lower Payette River subbasin are hundreds of miles of canals and drains, 13 permitted dams, at least 90 other impoundments, and an unknown number of privately-operated diversions and drains (Figure 54). These modifications have altered the natural flow dynamic of the lower Payette River so that the stream segment between Emmett and Letha loses up to 76% of natural flow between April and October and flow between Letha and Payette is artificially increased by approximately 53% during the same time frame (Figure 55 and Figure 56). A flow

proportion table for the subbasin during the irrigation season can be found in Appendix C.

Lower Payette River Subbasin

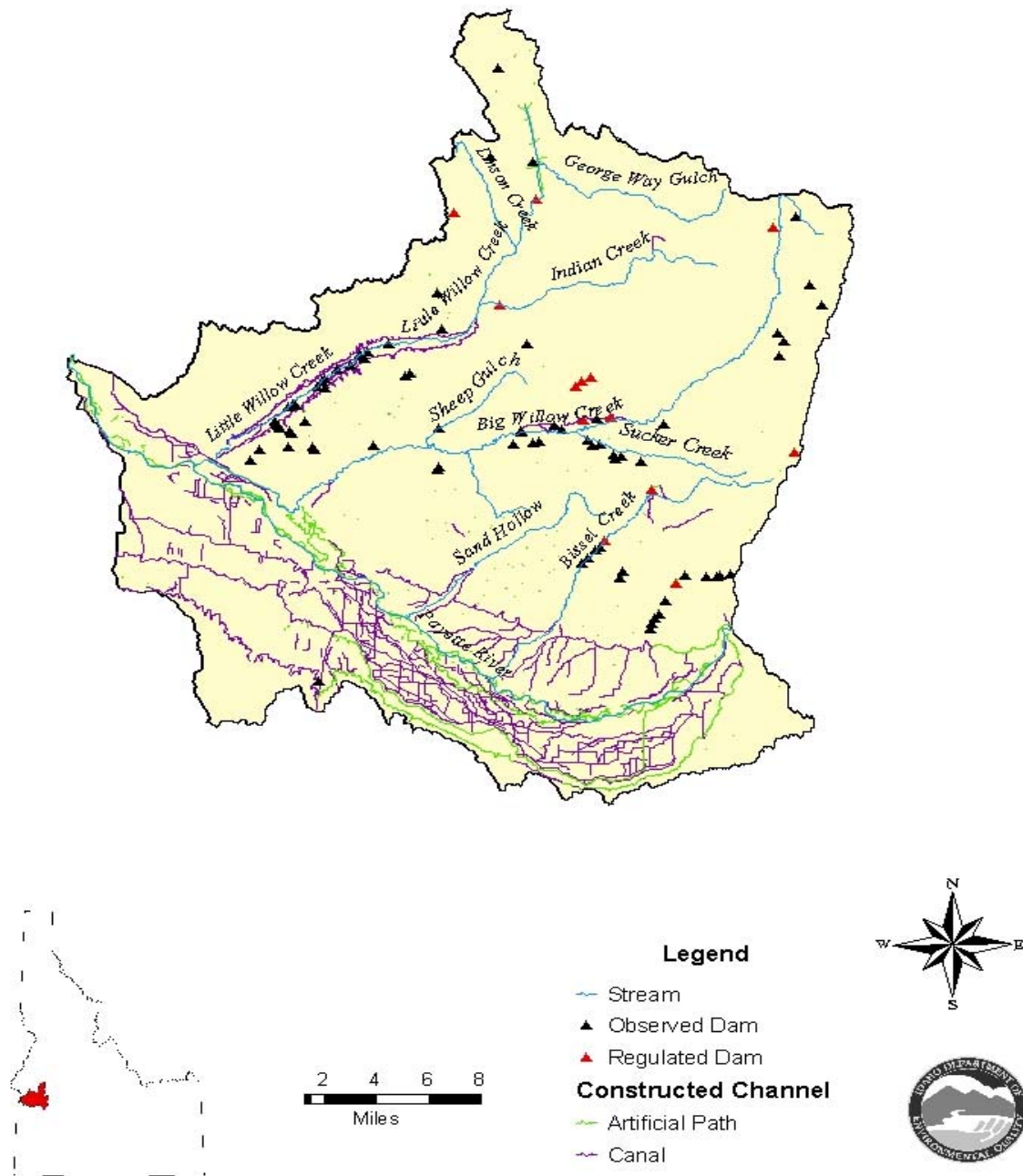


Figure 54. Flow Control Features in the Lower Payette River Subbasin as Observed or Documented in 2009.

All streams in the subbasin have been altered or modified and in most years 76% (500,000 acre feet [af]) of the mainstem flow is diverted between Emmett and the Letha Bridge, with an estimated 53% (265,000 af) of diverted water returned to the mainstem through drains or subsurface flow between Letha and Payette (Figure 55 and Figure 56). During the non-irrigation season groundwater recharge adds an average of 16% of total flow to the mainstem between Letha and Payette. In an average year the mainstem between Emmett and Payette gains 25% during the non-irrigation season and loses 8% during the irrigation season. This indicates that irrigated agriculture in the lower Payette River subbasin consumes 33% of total mainstem flow in most years .

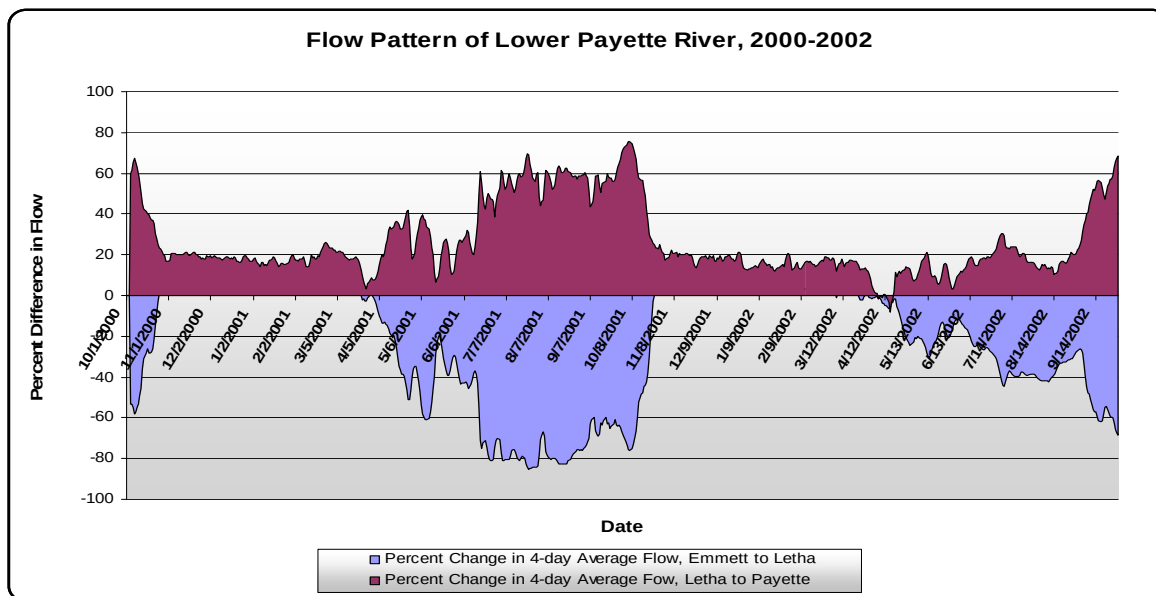


Figure 55. Lower Payette River Percent Change in Reported Measured Discharge at USGS Gages Near Emmett, Letha, and Payette, Idaho.

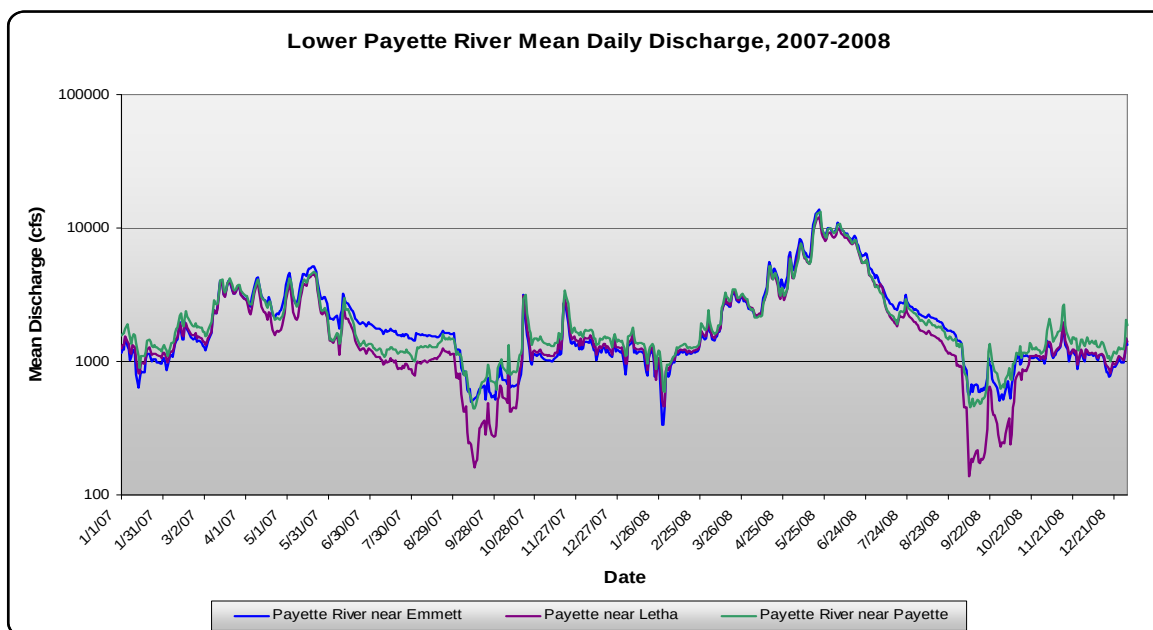


Figure 56. Continuous Mean Daily Discharge of Lower Payette River near Emmett, Letha, and Payette, 2007 and 2008.

Summary of Beneficial Uses

Based on a review of available data, the dominant factors affecting water quality in the lower Payette River subbasin are related to flow alteration and near-stream land use. While these impairments may not be wholly remedied through the TMDL process, negative effects can be mitigated through adoption of flow control practices that more closely resemble natural flow dynamics and restoring natural riparian zone conditions. Federal water project management agencies, subbasin stakeholders, and private land stewards can address all identified impairments through a variety of restoration projects and consistent BMP implementation.

Bacteria in surface and ground water can be directly related to land use practices, with elevated concentrations occurring more often near areas with active AFOs. While no regular sampling has taken place at the six mainstem control monitoring locations, concentrations appear to generally increase in the downstream direction from the outfall of Black Canyon Dam to the confluence, with the control monitoring location LPR-007 (near Payette) reporting concentrations between the geomean and single-sample maximum criteria more frequently than any other mainstem location. Data collected from contributing source control monitoring locations indicate a 22% reduction in concentrations from AU 015, and a reduction of 9% from AU 001_02 over the last 5 years. Big and Little Willow Creeks report concentrations that exceed maximum single-sample criteria 36% of the time, with 72% of samples exceeding the geomean maximum criteria. Based on concentrations reported in 2004 by the ISDA and the BOR, the North Side Irrigation Canal does not contribute bacteria concentrations that exceed criteria to the lower Payette River.

In Bissel Creek, bacteria concentrations reported for the BC-3 (near Big 4) control monitoring location are 86% less than concentrations reported in 2004. While this represents near achievement of TMDL reduction targets (87%), 64% of samples collected in 2008 exceed single-sample criteria for beneficial use support and concentrations at all sampled locations are between 15 and 64% above beneficial use criteria.

Concentrations of suspended sediment (SSC) can be directly related to land use practices in the subbasin, with elevated concentrations frequently occurring near areas that are irrigated with gravity flow systems or where domesticated animals have open access to streams. While the sediment LAs only apply to Bissel Creek and one mainstem control monitoring location (LPR-007), the target values for SSC are exceeded at LPR-007 6% of the time and in Bissel Creek (AU 015) 67% of the time. The SSC reported from the S-Drains (AU 001_02) in 2008 exceed the SR-HC TMDL maximum target in 97% of all samples, but indicate a slight decrease in concentrations from the 2000-2002 reported concentrations. The reported concentrations in the north-side drains are similar to those in the S-Drains, and reported concentrations in Little Willow Creek (AU 018) are similar to those in Bissel Creek.

Temperature criteria exceedance appears to be driven by, or closely related to, impoundments. Data collected from the outlet of Black Canyon Reservoir, North Side Irrigation Canal, Payette Ditch, the mainstem river (AU 001_06) at LPR-001 (near the dam outfall), LPR-003 (Letha Bridge), and LPR-007 (near Payette) indicate that the water delivered to the lower Payette River by the Black Canyon Reservoir exceeds beneficial use criteria by 4 °C (15%) from June to November. The north-side tributaries with the most impoundments, Big Willow Creek (AU 017) and Little Willow Creek (AU 018), also exceed temperature criteria for beneficial use support from May through July and contribute water to the Payette Ditch and the lower Payette River that exceeds criteria. Bissel Creek (AU 015) and numerous north- and south-side irrigation system drains contribute water that meets temperature criteria for support of beneficial uses.

Concentrations of TP from multiple locations throughout the subbasin indicate that half of the SR-HC TMDL LA is delivered to the subbasin from the Black Canyon Reservoir; which was constructed and is managed by the BOR. Even though the lower Payette River delivers less phosphorus to the Snake River than any other tributary included in the SR-HC TMDL, the average annual concentration from 2003-2008 exceeds the LA target by 0.01 mg/L (14%); which is a reduction of almost 21% from 1999 concentrations. Tributaries and drains throughout the subbasin frequently contribute concentrations of phosphorus several factors above the target concentration and may even exceed the concentrations and loads discharged by WWTPs. The S-Drains 10 and 12 (AU 001_02) and Little Willow Creek (AU 018_04) report the highest annual average concentrations, between three and ten times the target concentration, but the Silverleaf Drain delivers a larger load to the lower Payette River (after the Black Canyon Reservoir) than any other surface water body in the subbasin (Figure 35).

Reported dissolved oxygen (DO) concentrations in several north-side irrigation channels and Big Willow Creek include summer values that are less than the minimum criterion for support of beneficial uses. This indicates that the irrigation system (AU 001_02) delivers water to the mainstem that does not support beneficial uses and that aquatic life beneficial uses are not supported in Big Willow Creek (AU 017), which contributes water

to the irrigation system and the lower Payette River that does not support aquatic life beneficial uses. In order to meet beneficial uses, DO concentrations must be increased by a factor of 2 (double the lowest reported values).

Based on the data reviewed for this report, it appears that impoundments, or tributaries with impoundments, contribute pollutants that prevent support of beneficial uses of the lower Payette River. The current status of each AU, based on a review of the data available at this time, is discussed in the following section.

Status of Beneficial Uses

Current designated beneficial uses, 2008 §303(d) listing status (as published in the 2008 Integrated Report), impairments, and recommendations for the next integrated report are identified for each AU in Table 19 and discussed in the following “Summary of Recommendations” section. AUs recommended for listing in Section 4c (Waters Impaired by Non-Pollutants) are either observably impaired by flow and habitat alteration, or are impaired by pollutants where flow and habitat alteration may be influencing the pollutant.

Table 19. Summary of assessment units, 2008 Integrated Report, existing TMDLs, and five-year review results.

Assessment Unit	Stream Segment Description	2008 List Pollutant	Summary of Data and Observations	Recommended Changes to Next Integrated Report
001_02	Unnamed and named tributaries and drains (north and south sides) of the Payette River from Black Canyon Reservoir outfall to the mouth.		Paleo channels, oxbows, and numerous meander scars. Modified by canals, drains, urban/suburban development, irrigated and non-irrigated agriculture and industrial activities. Reported bacteria concentrations exceed single-sample criteria, sediment concentrations exceed criteria, and DO concentrations are below criteria. South-side drains meet temperature criteria; north-side drains exceed temperature criteria for the mainstem river.	Add to Section 4c for flow and habitat alteration. List in Section 5 for DO and sediment.
001_06	Mainstem Payette River from the outfall of the Black Canyon Dam to the confluence with the Snake River.	Temperature	Flow is controlled by Black Canyon Dam and modified by diversions and drains for agricultural uses. Diversions remove up to 76% of flow between Emmett and Letha, and up to 53% is returned between Letha and Payette. Temperature data exceeds criteria, some single-sample <i>E. coli</i> data exceeds criteria, and all other reported data meets criteria.	Add to Section 4c for flow and habitat alteration.
015_02	First- and second-order Bissel Creek and named and unnamed tributaries.	Sediment	Numerous impoundments and diversions. Water quality data has not been collected.	List in Section 3 as unassessed and 4c for flow alteration.
015_03	Third-order Bissel Creek to the North Side Main Canal.		Modified by dams, diversions, canals and drains for agricultural purposes. Dewatered channel upstream of North Side Main Canal.	

Assessment Unit	Stream Segment Description	2008 List Pollutant	Summary of Data and Observations	Recommended Changes to Next Integrated Report
015_03a	Third-order Bissel Creek from the North side Main Canal to the mouth.		Channel alterations, canals and drains to support agricultural activities. Reported bacteria concentrations exceed single-sample criteria and TMDL targets. Sediment data exceeds TMDL target. All other data meets criteria.	List in Section 4c for flow and habitat alteration.
016_02	First- and second-order unnamed north side tributaries to the Payette River between Bissel and Sand Hollow Creeks.		Spring impoundments with no outflow and numerous channel alterations. No water quality data.	
016_03	Third-order unnamed north side tributaries between Bissel and Sand Hollow Creeks, from Unfinished Rd. to the Payette River.		Ephemeral flow upstream of the North Side Main Canal. Numerous channel alterations, two canals, and one dairy. No water quality data.	
017_02	First- and second-order Big Willow Creek and named and unnamed tributaries.	Temperature	Numerous dams and de-vegetated riparian zones to support grazing and agriculture activities. No water quality data.	Move to Section 4a for approved temperature TMDL and Section 4c for flow and habitat alteration.

Assessment Unit	Stream Segment Description	2008 List Pollutant	Summary of Data and Observations	Recommended Changes to Next Integrated Report
017_03	Third-order Big Willow Creek and tributaries.		Altered channels with numerous dams, diversions and drains. De-vegetated riparian zone to accommodate grazing and agricultural practices. Dissolved oxygen (DO) is below minimum criteria, bacteria occasionally exceed single-sample criteria, and temperature criteria are exceeded. All other data meet criteria.	Move to Section 4a for an approved temperature TMDL and Section 4c for flow and habitat alteration. List in Section 5 for DO.
017_04	Fourth-order Big Willow Creek and tributaries.	Sediment, Temperature	Altered channel with dams, diversions and drains. DO is below minimum criteria, bacteria occasionally exceeds single-sample criteria and temperature data exceed criteria. All other data meets criteria.	Move to Section 4a for an approved temperature TMDL and Section 4c for flow and habitat alteration. List in Section 5 for DO. De-list for sediment.
017_06	Sixth-order Big Willow Creek.	Habitat and Flow Alteration	Channel is modified and actively managed as a canal by the Payette Irrigation Company. No water quality data.	Move to Section 4a for an approved temperature TMDL.
018_02	First- and second-order Little Willow Creek and named and unnamed tributaries downstream of Paddock Valley Reservoir.		Numerous dams and channel modifications to facilitate grazing and agriculture. No water quality data.	

Assessment Unit	Stream Segment Description	2008 List Pollutant	Summary of Data and Observations	Recommended Changes to Next Integrated Report
018_03	Third-order Little Willow Ck from Paddock Valley Reservoir to Indian Creek. Includes Payette Irrigation Drain.		Dams, canals, diversions, and channel modifications to support grazing and agriculture. No water quality data.	
018_04	Mainstem Little Willow Ck from Indian Ck to the confluence with Big Willow Ck and Payette Ditch.		Numerous dams and channel alterations to accommodate grazing and agriculture. Bacteria single-sample criteria are exceeded most of the time and sediment concentrations exceed WQS. Temperature criteria are exceeded for approximately 40 days in the summer. All other data meet criteria.	List in Section 4c for flow and habitat alteration. List in Section 5 for sediment.
019_02	First- and second-order of Indian Ck and named and unnamed tributaries.		Very little observable human influence.	
019_03	Third-order Indian Ck to the confluence with Little Willow Ck.		One dam, some channel modification and very little land disturbance. No water quality data.	
020_02	Little Willow Ck and unnamed tributaries upstream of Paddock Valley Reservoir.		Two dams (Paddock Valley Reservoir) and some grazing activity. No water quality data.	

Assessment Unit	Stream Segment Description	2008 List Pollutant	Summary of Data and Observations	Recommended Changes to Next Integrated Report
020L_0L	Paddock Valley Reservoir.		Listed on the National Wetlands Inventory map as a wetland. Inundated as a result of two dams. Managed as a mixed fishery by Idaho Department of Fish and Game (IDFG). Water quality data indicate full support.	Move to Section 2 for full support.
021_02	First- and second-order unnamed tributaries east of Paddock Valley Reservoir.		Very little observable human influence.	
021_03	Unnamed east side tributary to Paddock Valley Reservoir.		Very little observable human influence.	

Summary of Recommendations

All recommendations for the next Integrated Report refer to the 2010 Integrated Report. The following paragraphs are brief explanations of the beneficial use attainment status of each AU and the rationale used in offering recommendations summarized in Table 19. Some AUs received LAs in TMDLs because it was determined that the AU may be contributing, in a cumulative manner, to impairment of a stream segment of concern to a specific TMDL. An LA is not equivalent to a listing of impairment.

001_02

This AU includes named and unnamed first and second order tributaries and drains to the lower Payette River from the outfall of Black Canyon Reservoir to the mouth; including Graveyard Gulch, Sand Hollow and Haw Creeks, and several constructed irrigation system water ways (S-drains, Graveyard Gulch Wasteway, Sevenmile Slough, Farmers Cooperative Canal, Emmett Irrigation District North Canal, Nobel Canal). Beneficial uses (for natural streams) are not designated and are presumed to meet cold water aquatic life (COLD) and primary and secondary contact recreation (PCR/SCR) uses. Many locations in this AU have LAs for bacteria in the TMDL (DEQ, 1999) and the AU is listed in Section 3 of the 2008 Integrated Report as unassessed.

A review of satellite photo images from 2006 indicate that this AU is modified by urban and suburban development, agricultural and industrial land uses. The southern boundary

of the AU is defined by the Farmers Cooperative Canal which delivers water from the BOR Black Canyon Reservoir across the valley to Payette, ID. The northern edge of the AU is bounded by the North Side Canal and numerous canals and drains have been constructed to deliver and drain irrigation water across the AU from the reservoir outfall to the Snake River. Meander scars, paleo channels and oxbow features are visible and irrigated lands appear to be cultivated up to the banks of all water features. Land use activities outside of urban uses include 14 sand and gravel mines, 2 silica mines, 5 metal ore mines and 1 clay mine; 18 dairies and 2 feedlots. There are also three landfills and four NPDES-permitted point source discharge facilities.

From the Black Canyon Reservoir outfall to river mile 18, numerous named and unnamed drains convey irrigation water to the river, with LAs at eleven locations requiring load reductions between 63 and 92 %. Water delivered through the Farmers Cooperative Canal system is drained north to the lower Payette River through a series of consecutively-numbered drains (S-Drains). S-1 drains agricultural lands near river mile 18, between Letha and New Plymouth; and S-15 drains lands near Fruitland and Payette (river mile 1). All fifteen drains have LAs for bacteria which require load reductions between 28 and 88 %.

Data has been collected from 16 locations in this AU since 2000. Data was collected by the BOR in 2004, the Idaho State Department of Agriculture (ISDA) in 2000, 2001, 2002, 2003, and 2008, and DEQ in 2004 (BURP, 2004SBOIA040) and 2009. Reported results of data collection efforts indicate that single-sample bacteria data exceeds criteria 50% of the time; suspended sediment concentrations can be reasonably concluded to exceed turbidity criteria at all sampled locations, with 44% of reported results between 100 and 1,000 mg/L. Temperature data indicates that criteria are exceeded in summer months in north-side drains. The S-Drains (south-side) meet water temperature criteria. Dissolved oxygen (DO) is below the minimum WQS criteria for beneficial use support in the Payette, Beacon, and Big 4 drains, with Beacon reporting the lowest concentration of 2.25 mg/L in August of 2008. Measured pH values were below the minimum criteria for six weeks at two locations in 2009. This AU has the highest concentrations of phosphorus (0.04 to 1.4 mg/L) in the subbasin and may contribute between 38 to 75% of the total TP load allocated to the Payette River in the SR-HC TMDL (IDEQ, ODEQ, 2004). Ammonia and geomean bacteria data was not collected and all other reported values meet criteria.

This AU should be added to Section 5 for DO and sediment and to Section 4c for flow and habitat alteration.

001_06

This AU includes the mainstem Payette River from the outfall of Black Canyon Reservoir to the mouth, including the confluence of Forty-nine Slough, Haw Creek and unnamed streams. The designated uses for this AU are COLD, salmonid spawning (SS), domestic water supply (DWS) and PCR. This AU is listed in Section 4a of the 2008 Integrated Report for an approved TMDL (DEQ, 1999, 2003) and LAs for pesticides and phosphorus in the SR-HC TMDL (ODEQ, IDEQ, 2004); and in Section 5 for temperature. There are seven control monitoring locations for the TMDLs in this AU. The WQS for PCR have changed to an *E. coli*-based standard for bacteria since the

TMDL (1999) was developed and the addendum to address that change was included in the Implementation Plan (IP) (DEQ, 2003).

There are five NPDES discharge facilities, six sand and gravel mines, and two feedlots in this AU. Data has been collected sporadically from all control monitoring locations at some time in the past five years by the BOR, USGS, municipal WWTPs, and DEQ. Based on reported results, pH criteria was exceeded three times (at two locations) in 2004 and three times in 2009. Reported bacteria concentrations exceeded single-sample criteria once at LPR-001 (near the dam outfall) and geomean samples have not been collected. Reported suspended sediment data meet the SR-HC TMDL target at the control monitoring location LPR-007 (Payette River near Payette) 94% of the time. Continuous temperature data has been collected at one location in the past five years and reported measurements exceed criteria most of the time May through October. Instantaneous temperature data has been collected at all locations at least once during the past five years and reported measurements exceed criteria at all locations during some part of the year. Benthic macroinvertebrate and fish community data collected from LPR-007 and LPR-002 (Payette River near Emmett) indicate that COLD and SS beneficial uses are not supported. During the irrigation season, total phosphorus (TP) concentrations at the control monitoring location exceed the LA of 0.07 mg/L designated to the Payette River in the SR-HC TMDL, by approximately 14%; which represents an irrigation season reduction of 20% over the past ten years. All other reported values meet criteria.

Numerous diversions have been constructed and urbanization has resulted in modified channels throughout the AU. Water District 65 controls flows from the dam through diversions and drains. In most years up to 76% of the flow is diverted for irrigation between Emmett and Letha and up to 53% of diverted flow is returned to the mainstem between Letha and Payette.

This AU should be added to Section 4c for flow and habitat alteration.

015_02

This AU includes the first and second order streams of Bissel Creek. The beneficial uses are not designated and are presumed to be COLD and PCR/SCR. There are several channel alterations, two dams, one large reservoir, several diversions, one pumice mine, and one feedlot. The first stream mile of the mainstem of Bissel Creek below the dam appears to be dewatered and cultivated fields completely fill the floodway and floodplain of the flowing segment of the stream. This AU is listed in Section 5 of the 2008 Integrated Report as impaired by sediment.

Data has not been collected from this AU.

This AU should be added to Section 3 as unassessed in the next integrated report and 4c for flow alteration.

015_03

This AU includes the third order of Bissel Creek to the North Side Main Canal, one mile upstream of Hillview Road in Gem County. Beneficial uses are not designated and are presumed to meet COLD and PCR/SCR uses. This AU is listed in Section 2 of the 2008 Integrated Report as supporting all uses. There are four dams, two canals, several drains,

and numerous channel alterations. The mainstem of Bissel Creek in this AU appears to be dewatered for three miles upstream of the North Side Main Canal. The primary land uses are irrigated and non-irrigated agriculture, grazing, and animal husbandry.

BURP data collected in 2004 document dry stream conditions and 2007 data is from beaver ponds. Water quality data was collected from the North Side Main Canal near Bissel Creek in 2004, but is not representative of streams in this watershed.

015_03a

This AU includes the third order of Bissel Creek, downstream of North Side Main Canal to the mouth. Beneficial uses are not designated and are presumed to meet COLD and PCR/SCR uses. This AU is listed in Section 4a of the 2008 Integrated Report for approved sediment and bacteria TMDLs (DEQ, 2004) and has an LA for bacteria in the lower Payette River TMDL (DEQ, 1999) requiring a 70% bacteria load reduction. The target for bacteria is the current WQS (geomean of 126 cfu/100mL) and 22 mg/L for sediment. There are three control monitoring locations in this AU. Land use in this AU is entirely cultivated agriculture and animal feeding operations (AFOs). There is evidence of channel relocation throughout the AU and paleo meander scars and remnant channel features are evident in satellite photographs.

Water quality data was collected by the BOR in 2004 and by the ISDA in 2008. Reported results of single-sample *E. coli* analysis exceed criteria for 43 % of all samples. ISDA collected samples at two to twelve day intervals from July 23 to August 18, 2008 and calculated a geomean value for each monitoring location. However, the WQS require sample collection five times at five to seven day intervals for geomean values used to determine use support, and a use support determination cannot be made at this time. Reported suspended sediment concentrations exceed the TMDL target at all locations sampled between 54 and 85% of the time. TP concentrations may exceed the SR-HC TMDL LA to the Payette River of 0.07 mg/L. Instantaneous temperature data reported for 2004 indicates that criteria are exceeded during the summer months in Bissel Creek at Idaho Blvd (BC-1) and the North Side Canal at Bissel Creek. Reported instantaneous temperature data did not exceed criteria in 2008. Ammonia data was not collected and all other reported values are within criteria.

It may be beneficial to collect continuous water temperature and instantaneous ammonia data. This AU should be added to Section 4c of the next integrated report for flow and habitat alteration.

016_02

This AU includes unnamed north-side tributaries to the Payette River between Bissel and Sand Hollow Creeks. The beneficial uses of this AU are not designated and are presumed to meet COLD and PCR/SCR uses. It is listed in the 2008 Integrated Report as unassessed. Two springs have been developed into reservoirs with no visible outflow.

Water quality data has not been collected from this AU.

016_03

This AU includes an unnamed north-side tributary to the lower Payette River from Unfinished Road to the mouth. The beneficial uses are not designated and are presumed to support COLD and SCR/PCR uses. The AU is listed in the 2008 Integrated Report as unassessed. There is no water quality data for this AU and a review of satellite images indicates that there is no visible stream channel, flow, or vegetation upstream of the North Side Main Canal and the stream may only flow in response to the canal.

No water quality data has been collected.

017_02

This AU includes the first and second order of Big Willow Creek and tributaries. The beneficial uses are designated as COLD, SS, and PCR and it is listed in the 2008 Integrated Report for temperature. There is an approved temperature TMDL (DEQ, 2008) requiring an increase in shade between 1 and 18%.

Water quality data has not been collected from this AU but a survey of satellite images indicates that there are at least 24 dams, most with little or no outflow.

This AU should be moved to Section 4a of the next Integrated Report for an approved temperature TMDL and added Section 4c for flow and habitat alteration.

017_03

This AU includes the third order of Big Willow Creek and tributaries. It is designated for COLD, SS, and PCR beneficial uses and has an approved temperature TMDL (DEQ, 2008). This AU was unintentionally excluded from the 2008 Integrated Report. The stream channel is visibly altered with eight dams, numerous diversions and drains; and the riparian zone has been de-vegetated to facilitate agricultural uses.

BURP data collected from this AU in 2005 and 2007 (2005SBOIA020, 2007SBOIA096, 2007SBOIA021) indicate that beneficial uses are not supported. ISDA collected data at two locations (BW-2 and BW-3) in 2007. Based on reported sample results minimum DO criteria are not met 77% of the time, 23% of single-sample bacteria results exceed criteria, and temperature exceeds criteria for SS uses, but meets COLD uses. TP concentrations may exceed the SR-HC TMDL LA to the Payette River of 0.07 mg/L. Ammonia and geomean bacteria data was not collected. All other reported values meet criteria.

Ammonia and geomean bacteria data should be collected and this AU should be added to Section 4a for an approved temperature TMDL, Section 5 for DO, and Section 4c for flow and habitat alteration in the next integrated report.

017_04

This AU includes the fourth order of Big Willow Creek from the confluence with Dry Creek to the Payette Irrigation Ditch. Beneficial uses are designated as COLD, SS, and PCR. The AU is listed in the 2008 Integrated Report for sediment and temperature and

has an approved temperature TMDL (DEQ, 2008) requiring increases in shade between 0 and 30%. There is one dam in this AU and the channel has been modified to accommodate agricultural and AFO activities.

Data was collected from this AU by the ISDA in 2007 and by DEQ in 2008. Results indicate that single-sample bacteria criteria are exceeded 20% of the time; temperature data exceed criteria for SS from May to July and meet criteria for COLD. Reported DO measurements are below minimum criteria 77% of the time. TP concentrations may exceed the SR-HC TMDL LA to the Payette River of 0.07 mg/L. Ammonia and geomean bacteria data was not collected. All other reported values meet criteria.

In the next integrated report this AU should be moved to Section 4a for an approved temperature TMDL, added to Section 5 for DO and Section 4c for flow and habitat alteration, and de-listed for sediment. Ammonia and geomean bacteria samples should be collected.

017_06

This AU includes the sixth order of Big Willow Creek, a paleo channel of the Payette River, which is modified and maintained as an agricultural irrigation canal. It is designated for COLD, SS, and PCR beneficial uses. The AU is listed in the 2008 Integrated Report for flow and habitat alteration. This AU has an approved temperature TMDL (DEQ, 2008) requiring increases in shade between 5 and 25%.

Water quality data has not been collected from this AU.

In the next integrated report this AU should be moved to Section 4a for an approved temperature TMDL.

018_02

This AU includes the first and second order of Little Willow Creek and tributaries downstream of Paddock Valley Reservoir. This includes Alkali and Linson Creeks and McIntyre Canal. The beneficial uses are not designated and are presumed to be COLD and PCR/SCR. It is listed in the 2008 Integrated Report as unassessed. There are 19 dams in this AU and most streams have been modified to facilitate grazing or irrigation for agricultural purposes.

Water quality data has not been collected from this AU.

018_03

This AU includes the third order of Little Willow Creek, from Paddock Valley Reservoir to Indian Creek. Beneficial uses are not designated and are presumed to be COLD and PCR/SCR. It is listed in the 2008 Integrated Report in Section 2 as fully supporting beneficial uses. There are two dams in this AU and streams have been modified to accommodate agricultural and grazing practices.

BURP data was collected in 2004 (2004SBOIA141) that document full support of beneficial uses.

018_04

This AU includes the fourth order of Little Willow Creek from Indian Creek to the mouth, at the confluence with Big Willow Creek and the Payette Irrigation Ditch. Beneficial uses are not designated and are presumed to be COLD and PCR/SCR. It is listed in the 2008 Integrated Report in Section 3 as unassessed. There are 15 dams in this AU and Little Willow Creek received an LA for bacteria in the TMDL (DEQ, 1999) requiring a load reduction of 79%.

A 2003 BURP attempt failed due to non-wadeable conditions (2003SBOIA053). ISDA collected water quality data from one irrigation canal in 2003 and three mainstem locations in 2007. Reported results indicate that single-sample *E. coli* concentrations exceed criteria 66% of the time, temperature criteria for COLD uses is exceeded 7% of the time, and suspended sediment concentrations exceed the Bissel Creek TMDL target (similar watershed) 87% of the time. Bacteria geomean and ammonia data were not collected and all other reported values meet criteria. This AU has the second highest concentration of TP (0.273-0.911 mg/L) in the subbasin and may exceed the SR-HC TMDL LA to the Payette River of 0.07 mg/L.

This AU should be listed in Section 5 for sediment, and Section 4c for flow and habitat modification in the next integrated report.

019_02

This AU includes the first and second order of Indian Creek and tributaries, including Rattlesnake and Hog Cove Creeks. Beneficial uses are not designated and are presumed to be COLD and PCR/SCR. This AU is listed in Section 3 of the 2008 Integrated Report as unassessed.

Water quality data has not been collected from this AU, but a review of satellite images indicates that the AU does not experience much human influence. There are no visible structures, one dirt road, and no observable agricultural or industrial activity.

No changes are recommended for the next integrated report.

019_03

This AU includes third order Indian Creek to the confluence with Little Willow Creek. Beneficial uses are not designated and are presumed to be COLD and PCR/SCR. This AU is listed in Section 3 of the 2008 Integrated Report as unassessed and there is one dam in the AU.

Water quality data has not been collected from this AU since 2004 BURP surveys documented dry stream conditions (2004SBOIA142). The only sign of disturbance is a cultivated field near the confluence with Little Willow Creek.

No changes are recommended for the next integrated report.

020_02

This AU includes Little Willow Creek and unnamed tributaries upstream of Paddock Valley Reservoir. Beneficial uses are not designated and are presumed to be COLD and PCR/SCR. This AU is listed in Section 3 of the 2008 Integrated Report as unassessed. There is one dam in the AU and small-scale agricultural activity is evident in the floodplain of the stream.

Water quality data has not been collected from this AU.

No changes are recommended for the next integrated report.

020L_0L

This AU includes Paddock Valley Reservoir. The beneficial uses are not designated and are presumed to be COLD and PCR/SCR. Paddock Valley Reservoir is identified as a wetland on the National Wetlands Inventory Map. The wetland has been inundated by the construction of two dams. The AU is listed in the 2008 Integrated Report as unassessed. The Idaho Department of Fish and Game (IDFG) manage this AU as a mixed fishery and rainbow trout are documented as existing in this AU.

Water quality data was collected from this AU in 2009 and satellite images indicate that there is little activity in the AU beyond creation of the reservoir, recreational fishing, and grazing. Water quality data indicate that beneficial uses are supported in this AU.

This AU should be moved to Section 2 in the next integrated report.

021_02

This AU includes first and second order unnamed tributaries east of Paddock Valley Reservoir. The beneficial uses are not designated and are presumed to be COLD and PCR/SCR. The AU is listed in the 2008 Integrated Report as unassessed.

Water quality data has not been collected from this AU and satellite images indicate that there is very little activity in the AU that may affect water quality.

No changes are recommended for the next integrated report.

021_03

This AU includes an unnamed east-side tributary to Paddock Valley Reservoir, from the first and second order tributaries to the mainstem third order tributary. The beneficial uses are not designated and are presumed to be COLD and PCR/SCR. The AU is listed in the 2008 Integrated Report as unassessed.

Water quality data has not been collected from this AU and satellite images indicate that there is very little activity in the AU that may affect water quality.

No changes are recommended for the next integrated report.

Section 4. Review of Implementation Plans and Activities

Implementation Plans

The TMDL implementation plan (IP) for the lower Payette River TMDL was published in 2003 and addresses the approved bacteria TMDL for stream segments of the lower Payette River listed on the 1994 and 1996 303(d) list. The IP designates pollution control efforts for point sources, urban and suburban storm water, agricultural and other nonpoint sources. The IP can be accessed at <http://www.scc.state.id.us/TMDL%20Plans/LowerPayetteRiverImpPlanJan2003.pdf> and includes a watershed implementation schedule with milestones and an estimate of the date that WQS are expected to be met. A summary of the IP and the progress made on achieving the milestones and goals is in Table 20.

The IP for the Bissel Creek TMDL was published in 2006 and can be accessed at http://www.deq.idaho.gov/water/data_reports/surface_water/tmdls/bissel_creek/impleme ntation_plan.pdf. This IP addresses the approved bacteria and sediment TMDL for stream segments of Bissel Creek listed on the 1996 303(d) list and includes a watershed implementation schedule with milestones and an estimate of the date that WQS are expected to be met. Pollution control efforts for this watershed are designated to agricultural and AFO nonpoint sources because there are no identified point sources in the watershed. A summary of the IP and the progress made on achieving the milestones and goals is in Table 21.

The IP for the Snake River-Hells Canyon TMDL was published in 2004 and can be accessed at http://www.deq.state.id.us/water/data_reports/surface_water/tmdls/snake_river_hells_canyon/snake_river_hells_canyon_part6.pdf. The IP designates pollution control efforts for point sources, urban and suburban storm water, agricultural, and other nonpoint sources; and includes a watershed implementation schedule with milestones and an estimate of the date that WQS are expected to be met. A summary of the IP and the progress made on achieving the milestones and goals is in Table 22.

Responsible Parties

Nonpoint sources in the subbasin are primarily from the agricultural sector. Presently, the CWA and Idaho WQS specify that irrigated agriculture pollution control is voluntary and return flows from irrigated agriculture are specifically excluded from the definition of “point source” in the CWA. However, Idaho has invested in creating several agencies and elected groups to address nonpoint source pollution through industry/activity-specific BMP development and implementation. These agencies and organizations develop the nonpoint source components of the TMDL IPs, which provide guidance and support to members of the agricultural community in reducing or preventing pollution coming from agricultural activities and entering subbasin waters.

Land management agencies and private parties are expected to implement the portion of the plan that applies to lands they have an interest in or are responsible for. Most plans rely on implementation of BMPs that are described in Idaho WQS, but some sections of the plan may identify parties that have specific responsibilities beyond Idaho WQS.

In the lower Payette River subbasin, the EPA is responsible for developing and issuing NPDES permits for industrial, municipal, or AFO dischargers and ensuring that point sources are assigned WLAs that are consistent with the goals of each TMDL. Because the population centers in the lower Payette River subbasin have populations below the threshold for mandatory municipal stormwater pollution protection plans, the IP addresses the urban and suburban sector in general terms and does not identify specific entities to address pollutants from this sector. Future IPs could be improved with participation and designation of responsibility for implementing BMPs from this sector.

The Bissel Creek IP does not include point sources or municipal sector participants because the sources of sediment and bacteria pollution are identified in the SBA and TMDL as being solely nonpoint source in nature and the primary responsibility of the agriculture sector.

The SR-HC IP, “Section 6: General Water Quality Management and Implementation Plans”, included in the TMDL, is a general plan that stated more specific plans would be prepared within 18 months of EPA approval of the TMDL. The general plan is intended to be used as a framework for a more detailed plan developed by the WAG(s), BAG and Public Advisory Team (PAT). All stakeholders have a responsibility to implement the plan with oversight responsibility delegated to the Idaho Department of Lands (IDL), DEQ, Idaho Soil Conservation Commission (ISCC), ISDA, and the Idaho Transportation Department (ITD).

Planned Activities

There are three IPs in place and one IP under development for watersheds and streams in the lower Payette River subbasin at this time. The lower Payette River subbasin nonpoint source sector identified a likely timeline for complete attainment of beneficial uses at 20 years (2019). Information has been solicited from agencies identified in the IPs to complete this section and there may be activities to improve water quality that are not managed by a specific agency that have not been included in this section.

Point Sources

Based on the information provided by the responsible NPDES permittees, point source compliance monitoring in the lower Payette River subbasin is taking place as anticipated by the TMDL IP.

EPA has issued a new national multi-sector general permit (MSGP) which includes industry-specific BMPs to prevent stormwater discharges from industrial facilities from entering surface water bodies. All businesses or industries covered under the MSGP must comply with permit conditions. The permit can be accessed at:

<http://cfpub.epa.gov/npdes/stormwater/msgp.cfm>.

Most municipalities and highway districts in the subbasin are not required to apply for stormwater NPDES permits and have yet to develop or implement the voluntary stormwater activities as described in the plan. A multi-agency effort produced the BMP Handbook of Best Management Practices for Idaho Rural Road Maintenance (University of Idaho, 2005) and highway district personnel were trained in the new methods through a training program funded with public funds through various agencies.

Nonpoint Sources

The primary sources of pollutants in the lower Payette River subbasin are related to rural land uses and the agricultural industry. In 2004, ISDA planned to provide maintenance and support to 45 water quality projects to support TMDL implementation throughout the state (ISDA, 2004). The ISDA 2003 and 2006 annual reports state that the agency plans to “develop BMP effectiveness protocols for agricultural TMDL program” (ISDA, 2003, 2006).

ISDA collected water quality data from 18 tributaries and drains in the subbasin from 2000 through 2008 and published a brief report for each subwatershed. An agricultural BMP IP and a guidance document for evaluating effectiveness were developed in 2003. The TMDL IP for agricultural lands identifies critical acres and prioritizes land for BMP applications by identifying acres that have the greatest effect on pollutant delivery to the lower Payette River as Tier I lands.

For bacteria pollutant reduction, critical acres were identified as irrigated pasture, dairy operations, and feedlots. Many livestock operations in Idaho do not meet the EPA definition of an Animal Feedlot Operation (AFO) or Confined Animal Feedlot Operation (CAFO) but contribute sediment and bacteria pollutants to the lower Payette River. If a facility meets the definition of an AFO or a CAFO, a federal NPDES permit must be obtained and BMPs to limit pollution must be implemented. For sediment pollutant reduction, priority acres are surface-irrigated croplands with the steepest slopes or closest to the Payette River, and riparian acres grazed by livestock.

Lower Payette River

The lower Payette River IP includes details of specific BMPs to be used by each community or business sector. The IP states that the ISCC and the ISDA are responsible for developing, funding, and implementing a BMP monitoring plan and identified the following activities for the agricultural sector.

1. Develop a water quality monitoring plan that allows for trend analysis and progress assessment toward meeting TMDL load reductions.
2. Nutrient Management Plans (NMPs) for all dairies by 2005 that meet restrictions for surface run-off on the land owned by the dairy.
3. Watersheds prioritized by dairies, feedlots, drains, surface-irrigated cropland, pastureland adjacent to drains, creeks or rivers; and projects implemented using priority as a determining factor.
4. Soil testing completion for dairy facilities, by watershed. (100% by 2008).
5. *E. coli* monitoring data from Treatment Unit 1 (irrigated cropland), 2 (19 CAFOs), and 3 (Irrigation return drains) in each priority watershed.

6. Confirmation of continued maintenance and operation for each BMP installed.
7. 66% of Treatment Units 1 through 3 in each watershed will have water quality contracts by 2011 (47% as of 2008).
8. Implementation of water quality contracts on private agricultural lands. Tracking of contracts by watershed and Treatment Unit.
9. Annual status review of BMPs installed on private agricultural lands. Tracking BMPs installed in each watershed and conducting status reviews each year in each watershed.

To address general issues within the subbasin, the IP identified these general activities.

1. DEQ will conduct BURP monitoring with available funds.
2. ISCC and ISDA will develop, fund, and implement a BMP monitoring plan as outlined in the Agricultural Pollution Abatement Plan (1991).
3. Data collected by entities other than DEQ will conform to practices and procedures outlined in the WBAG II (Grafe, et al., 2002).
4. DEQ will populate a tracking database with data provided by other agencies.

The BOR is required to develop water conservation plans for each project and the most recent plan for the Black Canyon Reservoir and Dam was prepared by the Black Canyon Irrigation District in 2002. The conservation plan identifies the need to improve farm efficiency by converting gravity flow irrigation to sprinkler irrigation throughout the district. The district encourages the following activities to improve water quality and conserve the resource.

1. Line canals with clay and gravel.
2. Construct sediment basins (initial construction only).
3. Install pipe in laterals.
4. Automate flow control.
5. Educate water users regarding crop requirements, diversion volume, and yield response to over-watering.
6. Develop long-term budget for improvements to system.

Bissel Creek

The IP for Bissel Creek was developed in 2006 and established a method of prioritizing implementation efforts directed through ISDA, ISCC, and soil and water conservation districts (SWCDs). Because nonpoint sources are the only sources of pollutants in the watershed and agriculture is the primary industry, the IP focus is on the agricultural sector.

1. Land treatment through BMP installation will be pursued in three tiers. Tier I- fields adjacent to or directly influencing Bissel Creek; Tier II- fields with an indirect substantial influence on the creek; Tier III- fields indirectly influencing the creek or with wastewater that had re-use potential before entering the creek.
2. Natural Resources Conservation Service, Gem SWCD, and ISCC will certify installed BMPs.
3. Annual installed BMP inspections and status review.
4. Monitoring locations identified.

5. ISDA, DEQ, Gem SWCD, and NRCS will develop a water quality monitoring plan that allows for trend analysis and TMDL progress evaluation.

Snake River-Hells Canyon

The IP for the SR-HC TMDLs was developed with the expectation that all responsible parties would develop and implement BMPs, establish and adhere to milestones, and monitor to track TMDL compliance. The sector-specific general activities are as follows.

Agricultural Source Implementation

1. Develop and submit source-specific implementation and monitoring plan by 2006.
2. All nonpoint source LAs will be incorporated into specific (IPs).
3. Specific IPs will include source description, category or subcategory pollutant reduction measures, and specific BMPs that will be applied to reduce loads; with estimated pollutant reductions.
4. For each source and reduction measure, frequency and extent of application will be provided in the IP.
5. Identify potential constraints and develop plans to mitigate the constraints.
6. Implementation of source-specific plans-2006-2011.
7. Annual report to IDEQ on Sept. 30 of each year.
8. BMP implementation monitoring—Properly installed, functioning, maintained.
9. Water quality monitoring.

Urban/Suburban Nonpoint Source Implementation

1. Each source category will incorporate the allocations into their specific IP.
2. Each source category will describe the existing loads, BMPS, and estimated pollutant reduction.
3. Management measures will be directly linked with pollutant reduction effectiveness.

Point Source Implementation

1. EPA will continue to administer the NPDES permit program and allocate waste loads to permitted facilities.
2. CAFOs and AFOs are also permitted facilities prohibited from discharging to surface water except under infrequent extreme weather conditions.
3. The state will use the 401 certification process to review projects and applications to discharge to surface waters in a manner appropriate for the goals of the TMDL.
4. All facilities with WLAs will have allocations incorporated into the NPDES permits by EPA.
5. All NPDES permits will be reviewed and modified if necessary to ensure compliance with the WLAs.

6. *Big Willow Creek*

The IP for Big Willow Creek will be completed by July 2010.

Accomplished Activities

Several designated agencies are responsible for development and oversight of source-specific TMDL implementation plans. The primary purpose of this review is to evaluate the progress of TMDL implementation and measure progress in attaining beneficial uses and current WQS.

Lower Payette River

The WAG contracted with ISDA to collect data from 18 of the 32 control monitoring locations during the past five years and DEQ collected BURP data from randomly selected locations and general water quality data from four of the control monitoring locations to monitor TMDL progress and identify trends in the subbasin.

The development of a tracking database was completed in 2006 but has not proven to be as practical as anticipated, so most data continues to be shared between agencies through reports and informal mechanisms. Table 20 summarizes progress on TMDL implementation activities.

The Black Canyon Irrigation District has implemented all activities identified in the conservation plan (2002), with Sevenmile Slough being the most recent lateral to be converted to an automated system (BOR, 2007).

The city of Emmett has developed a plan to monitor water quality of the mainstem upstream and downstream of the WWTP on a quarterly basis, in addition to responsibilities mandated by the NPDES permit. There are no other planned activities for the urban or suburban sector.

Table 20. Summary of agricultural sector activities from the Lower Payette River TMDL Implementation Plan (DEQ, 2003). Blank spaces indicate information was not reported for this review.

Ag Implementation							
	yes	no	Not Documented				
Water Quality Plan			X				
Trend analysis	X						
TMDL target progress	X						
Dairies							
Watershed	Payette	Letha	Bissel	Upper Big Willow	Lower Big Willow	Little Willow	Paddock
AU	001_02, 001_06	001_02, 001_06, 016	015_03a	017_02, 017_03	017_03, 017_04, 017_06	018_02, 018_03, 019_02, 019_03	020_02, 020L_0L, 021-02, 021_03
Nutrient Management Plan by 2005 (# verified)	17	7	7	0	1	2	2
No surface run-off (# verified)	*	*	*	*	*	*	*
Soil testing (# facilities)	15	7	7	0	1	2	1
BMPs							
BMPs (# acres)	23,191			0	35,478	1,793	7,734
Treatment Unit (1,2, or 3)	19,492 ¹	334.5*	279.6*	0	*	*	*
E. coli monitoring data (yes/no)	no	no	yes	yes	yes	yes	no
BMP contracts (#)	33	10	10	0	7	1	1
BMP maintenance (# verified)	33	10	10	0	7	1	1
Annual status review (#)	33	10	10	0	7	1	1
Water Quality Contracts							
Treatment Unit 1 (% acres)	84	*	*	0	3	42	<1
Treatment Unit 2 (% acres)	4	*	*	0	<1	0	0
Treatment Unit 3 (% acres)	12	*	*	0	3	0	7
Contracts on private land (#)	*	*	*	0	*	*	*

Treatment Unit (TU)1 = High priority; TU 2 = Medium priority; TU 3 = Low priority; * = unknown; 1= TU 1; 2 = TU 2; 3 = TU 3

Bissel Creek

The lower Payette River IP identified 21 AFOs in 2002 and the Bissel Creek IP revised that number to two AFOs in 2006. A recent GIS coverage (2006) of the watershed identified two dairies and one feedlot that meet the recently revised EPA definition of an AFO. The ISDA collected data from the control monitoring locations in 2008 to track implementation effectiveness and monitor trends. Table 21 summarizes the progress on other activities.

Table 21. Summary of agricultural sector activities from the Bissel Creek TMDL Implementation Plan (DEQ, 2006). The TMDL applies to AU 015-03a.

Ag Implementation			
	yes	no	Not Documented
Water Quality Plan			x
Trend analysis	x		
TMDL target progress	x		
Tiers identified	x		
<i>BMPs</i>			
Watershed	First- and Second-Order Bissel Creek	Bissel Creek to North Side Main Canal	Bissel Creek from North Side Main Canal to mouth
AU	015_02	015_03	015_03a
BMPs (certified, # acres)			
Tier (1,2, or 3)			
Monitoring data (location)			
BMP contracts (#)			
BMP maintenance			
Annual status review (#)			
<i>Water Quality Contracts</i>			
Watershed	First- and Second-Order Bissel Creek	Bissel Creek to North Side Main Canal	Bissel Creek from North Side Main Canal to mouth
AU	015_02	015_03	015_03a
Tier 1 (% acres)			
Tier 2 (% acres)			
Tier 3 (% acres)			
Contracts (#)			

Tier I = High priority; Tier II = Medium priority; Tier III = Low priority. Blank spaces indicate information was not reported.

Snake River-Hells Canyon

Table 22 summarizes progress on IP activities for the SR-HC TMDL.

Table 22. Summary of agricultural sector activities from the Snake River-Hells Canyon TMDL Implementation Plan (DEQ, 2004).

Ag Implementation			
<i>Implementation Plan Development</i>			
			Year Completed
Specific Implementation Plan for meeting the LA for the Payette River			
Source Description and category reduction measures			
Estimated reduction calculations for each source and category			
Frequency and extent of specific source reduction measures			
Identify potential constraints and develop mitigation for constraints			
AU 001_06	2006	2007	2008
<i>Implementation of Nonpoint Source Plan</i>			
Source (identify)			
Phosphorus			
Sediment			
<i>BMPs (#, acres)</i>			
Source (identify)			
Phosphorus			
Sediment			
<i>Reduction Calculations</i>			
Source (identify)			
Phosphorus			
Sediment			
<i>Annual Report</i>			
BMP monitoring			
Water quality monitoring			

Blank spaces indicate that information was not reported.

Big Willow Creek

The WAG has contracted with the Idaho Association of Soil Conservation Districts (IASCD) to develop the IP for Big Willow Creek with a planned publication date of July 2010.

Monitoring

The WAG identified 32 control monitoring locations for the lower Payette River bacteria TMDL, three control monitoring locations for the Bissel Creek sediment and bacteria TMDLs, and one control monitoring location for the SR-HC pesticide and phosphorus (sediment) TMDL. The WAG contracted with the ISDA to monitor the lower Payette River and Bissel Creek for compliance with the TMDLs, and the USGS, BOR, and DEQ have also collected data from control monitoring and BURP locations in the subbasin. Since 2000, data has been collected from 22 control monitoring locations and eight additional locations throughout the subbasin in an effort to determine compliance with the TMDL and identify potential sources of beneficial use impairment in subbasin tributaries. Data has also been collected from all control monitoring locations for the Bissel Creek and SR-HC TMDLs.

The IP specified that monitoring would provide reasonable assurance that pollutant reductions will be achieved. The objectives of the monitoring plan are to determine BMP effectiveness for nonpoint and point sources and to monitor 32 control locations in the subbasin to determine general implementation effectiveness and beneficial use attainment status.

Bacteria

The IP details how compliance with the bacteria TMDL is determined. The WQS for contact recreation uses at the time the TMDL was developed were based on a surrogate measure using fecal coliform concentrations. The target concentration for each location assigned an LA was 50 cfu/100mL during PCR critical times. The revised WQS (2007) use *E. coli* concentrations as a surrogate measure to determine contact recreation use attainment. The IP includes an addendum which explains how the *E. coli* surrogate measure is applied as the target for TMDL achievement. WQS apply to calculated geomean concentrations from a minimum of five samples in 30 days, triggered by an exceedance of single-sample concentration maximum values. Because geomean data is not available for control monitoring locations, Table 23 uses an estimated geomean by calculating the average of the *E. coli* single-sample concentrations reported for the most recent year (2000, 2005, 2008, and 2009) to determine achievement of the TMDL bacteria target. Based on a review of the most current data, reductions between and 86% are needed at most control locations throughout the subbasin to achieve the TMDL target for Bissel Creek and the lower Payette River. Stormwater sources must comply with permit limits that cannot exceed WQS, so those sources did not receive a WLA for bacteria in the TMDL.

Table 23. Bacteria data at TMDL control monitoring locations for tributary and nonpoint sources compared to TMDL targets (126 geomean cfu/100mL).

Lower Payette River Subbasin TMDL Control Monitoring Locations					
Name	AU	1997 Geomean Fecal Coliform Load ((cfu/sec))	Estimated <i>E. coli</i> Geomean Load *(cfu/100mL) (2000, 2007, 2008, 2009)	1999 Estimated Percent Reduction to Meet Target	2009 Estimated Percent Reduction to Meet Target
LPR-001	001_06		22		0
Plaza*	001_02	2.31E+06	12.4		0
LPR-002	001_06		9		0
Mesa	001_02	2.98E+06	878	86	85
Big 4	001_02	6.70E+06	452	73	69
Tunnel 7	001_02	3.60E+06	282	55	53
Beacon	001_02	6.51E+06	469	73	50
LPR-003	001_06		22		0
Silverleaf	001_02	7.79E+06	392	67	62
Sand Hollow	016_03	4.28E+05	188	33	38
7 Mile Slough	001_02	3.78E+06	455	72	62
Countyline	001_02	4.88E+06	394	68	53
LPR-005	001_06		75		0
S-1	001_02	7.50E+06	ND	78	U
S-2	001_02	2.84E+06	ND	69	U
S-3	001_02	3.37E+06	ND	87	U
S-4	001_02	1.45E+06	ND	28	U
S-5	001_02	8.23E+06	ND	75	U
S-6	001_02	1.37E+06	ND	48	U
S-7	001_02	7.93E+04	ND	0	U
S-8	001_02	2.08E+06	398	67	68
S-9	001_02	3.96E+05	ND	43	U
S-10	001_02	3.75E+06	230	78	45
S-11	001_02	4.56E+06	ND	95	U
S-12	001_02	2.15E+06	405	88	69
S-13	001_02	1.57E+07	517	91	75
S-14	001_02	5.78E+06	446	90	72
S-15	001_02	1.12E+07	447	91	72
Willow Creek/ LWC-1	018_04	2.44E+07	574	79	78
LPR-007	001_06		171	37	35
Forty-nine Slough	001_02	1.64E+07	936	91	86
LPR-008	001_06		ND		U

Table 23-continued. Bacteria data at TMDL control monitoring locations for tributary and nonpoint sources compared to TMDL targets (126 geomean cfu/100mL).

Name	AU	1997 Geomean Fecal Coliform Load (cfu/sec)	Estimated <i>E. coli</i> Geomean Load *(cfu/100mL) (2000, 2007, 2008, 2009)	1999 Estimated Percent Reduction to Meet Target	2009 Estimated Percent Reduction to Meet Target
Bissel Creek Control Monitoring Locations					
BC-1/ EMM111	015_03a	1.85E+06	455	70	72
BC-2/ EMM112	015_03a	1,021 cfu/100mL	742		83
BC-3/ EMM113	015_03a	1,186 cfu/100mL	588		78

*Estimated geomean value calculated from instantaneous data collected at irregular intervals over the most recent calendar year. ND = No Data; U = Unknown.

Sediment, Pesticides, and Total Phosphorus

The Bissel Creek TMDL assigned LAs to the control monitoring locations and the SR-HC TMDL identifies sediment load reduction as the primary method for controlling TP and pesticide pollution in the Snake River. The SR-HC TMDL also states that for the purposes of determining compliance with the LA for sediment, SSC, TSS, and turbidity measurements can be used interchangeably. There is very little turbidity data for locations in the lower Payette River subbasin, so this review relies on reported SSC data to identify trends and determine TMDL progress. Because the WQS criteria for sediment are narrative and numeric, sediment TMDLs do not all have the same target value. During the development of the Bissel Creek TMDL, it was determined that the numeric sediment target most likely to support the designated beneficial uses for Bissel Creek is 22 mg/L. Because beneficial use support has not yet been attained, and the annual average of the most recent data (2008) indicates the TMDL target is exceeded at all control monitoring locations, there is no recommendation to revise the sediment TMDL for Bissel Creek. The SR-HC TMDL sediment allocation for the lower Payette River is a monthly mean concentration of 50 mg/L, which has been met 94% of the time during the past five years, but sediment concentrations in the lower Payette River appear to be increasing steadily over time.

While TP and pesticides have not been identified as pollutants impairing beneficial uses in the lower Payette River, they are identified as pollutants impairing the beneficial uses in the Snake River in the SR-HC TMDL. In order for the Snake River to attain full use support status, all sources of TP and pesticides to the SR-HC stream segment, including the lower Payette River, have been given an LA of 0.07 mg/L for TP and LAs for pesticides applied through LAs for sediment. In order to meet the LAs at the control monitoring location (LPR-007) near the mouth of the Payette River, sources of TP and sediment within the lower Payette River subbasin have been identified. Those sources are summarized in this report (Figure 35 and Table 24) and also appear to be increasing over time in the S-Drain system and in the mainstem river near Letha.

Table 24. Summary of reported suspended sediment concentration and total phosphorus sample results from locations in the lower Payette River subbasin between 2000 and 2009.

Sample Location	Annual Average Suspended Sediment Concentration (SSC) in mg/L	Annual Average Total Phosphorus (TP) in mg/L
Bissel Creek-2008		
BC-1	36.6	0.20
BC-2	44.5	0.21
BC-3	39.2	0.14
BC-4	68.2	0.11
Big Willow Creek-2007		
BWC-1	11	0.156
BWC-2	3.8	0.16
BWC-3	2.5	0.03
Little Willow Creek-2007		
LWC-1	59.3	0.53
LWC-2	14.8	0.30
LWC-3	9.5	0.29
North Side Drains-2008		
Big-4	20.4	0.16
Mesa	160.3	0.44
Beacon	14.9	0.22
Silverleaf	168.8	0.35
Sand Hollow	53.4	0.16
Fortynine	48.67	0.19
PD-3-2003	22.8	0.06
South Side Drains-2008-2009		
Tunnel #7	13.5	0.13
Sevenmile Slough	12.1	0.07
Countyline	13.0	0.11
S-Drains-2008		
S-8	135.6	0.37
S-10	96.1	0.33
S-12	110.1	0.53
S-13	233.0	0.43
S-14	153.5	0.39
S-15	53.0	0.19
Lower Payette River		
LPR-001	5	0.03
LPR-002	5	0.07
LPR-003	32	0.06
LPR-005	9	0.08
LPR-007	26.4	0.08

Future Strategy

The status of beneficial use attainment for surface water bodies in the lower Payette River subbasin is described and summarized in the Executive Summary and Section 3 of this report. Beneficial use attainment was determined by reviewing all of the available pertinent data from the sources identified in Section 3, Table 11. While data has been collected from 67% of the control locations, specific monitoring plans have not been developed as planned in the IPs for the lower Payette River, Bissel Creek, or SR-HC. Table 20, Table 21, and Table 22 could be used to direct future efforts in the subbasin to document activities and achieve the goals of the TMDLs.

Taking steps to actively encourage voluntary watershed restoration and pollution prevention could expedite implementation of the Bissel Creek and SR-HC TMDLs and reverse the upward trend of sediment and phosphorus in subbasin streams.

Time Frame

The lower Payette River IP estimated that it would take approximately 15 years to implement all of the activities identified in the IP. Based on the information reviewed for this report and activities summarized in Table 20, all activities not yet completed or documented would be accomplished by 2014. The Bissel Creek IP did not identify a timeframe for attaining full support of beneficial uses or implementing the TMDL. The SR-HC TMDL acknowledged that it may take 50 to 70 years to attain use support status, but a specific IP for the TMDL allocations to the lower Payette River has not been developed.

Section 5. Summary of Five Year Review

Review Process

The process to create this report in a manner compliant with Idaho Statute 39-3611 (7) includes a review of existing TMDLs, SBAs, public databases, current and draft integrated reports, and other published reports or credible sources of data for the lower Payette River subbasin. A call for data was made at the December 4, 2008 and March 19, 2009 WAG meetings.

Data and information is reviewed in relationship or comparison to designated, existing, or presumed beneficial uses and applicable WQS. This report compared review data to the TMDL targets, designated or presumed uses, and current WQS (2007). In order to determine if the existing use may be different than the designated or presumed use, DEQ searched for fish community data collected in the past 10 years to determine if SS exists in AUs not presently designated for that use. DEQ determined that SS does not appear to exist in AUs designated for SS (AU 001_06, 017). DEQ also contacted the IDFG to verify the applicable spawning periods for the AUs with SS as a designated use. IDFG confirmed that the SS time periods listed in Table F-1 of the WBAG II (Grafe, et al., 2002) are valid for the lower Boise River subbasin (Jeff Dillon, IDFG, personal communication, January 22, 2009) and as no published reports exist to confirm otherwise, are valid for the lower Payette River as well.

Data was determined to be relevant if it met the criteria described in detail in the WBAG II (Grafe, et al, 2002). This review used Tier I and Tier II data to make comparisons to targets and standards and to determine existing uses where data was available.

Changes in Subbasin

There are few changes in the subbasin that are likely to have an effect on water quality.

Point sources have decreased in number, from 13 to 11, since the TMDL was developed. It is not known how many AFOs are in the subbasin that cannot be identified because the herd population is less than the minimum required to register in that category. Revisions in the NPDES regulations for AFOs account for some of this change, but there is also an estimated 41% reduction in the number of livestock animals in the subbasin.

An increase in population between 2000 and 2007 has resulted in a 1% decrease in land use categorized as irrigated agriculture, but has not increased the urban population enough to meet the criteria for subbasin communities to be required to develop stormwater pollution prevention programs or be permitted under the NPDES program for urban areas.

TMDL and Constituent Analysis

The SBAs developed with the TMDLs applied the WQS for bacteria, sediment, turbidity, nutrients, and temperature for comparison with available data to determine the type and degree of impairment to the lower Payette River, Bissel Creek, SR-HC, and Big Willow Creek. The SBAs indicated that some pollutants listed on the 1994 and 1998 303(d) list were not impairing beneficial uses and those pollutants were delisted. Based on the review of the available pertinent data, those determinations are supported.

The SBAs also identified bacteria as an additional pollutant for Bissel Creek and a bacteria and sediment TMDL was approved by EPA in 2003. Sediment was determined to be an impairment using empirical methods to synthesize qualitative data with benthic macroinvertebrate, fish community, and water column data compared to thresholds identified in appropriate literature. Literature-derived numerical targets were selected for critical time periods, for Bissel Creek and the SR-HC, to protect the most sensitive beneficial uses (COLD), and available data were compared to those targets. Because the lower Payette River is identified as a tributary load source to the Snake River between the Boise and Weiser Rivers, LAs were assigned for sediment (to reduce pesticide pollution) and phosphorus.

Big Willow Creek was added to the 1998 303 (d) list for temperature by EPA and a Potential Natural Vegetation (PNV) TMDL was approved by EPA in 2008.

Bacteria

The lower Payette River and Bissel Creek have TMDLs for bacteria. The targets for bacteria were derived based on the WQS criteria for bacteria at the time the TMDL was developed. Because modification of the WQS surrogate measure for PCR and SCR beneficial uses from fecal coliform to *E. coli* was anticipated, the Lower Payette Total Maximum Daily Load Implementation Plan and Addendum to the Lower Payette River Subbasin Assessment and Total Maximum Daily Load (2003) and the Bissel Creek TMDL use a numeric geometric mean concentration of 126 *E. coli* cfu/100mL for waters in AUs designated for PCR and SCR uses. The Payette River IP (DEQ, 2003) states “For the purposes of the Lower Payette TMDL Implementation Plan, *E. coli* bacteria will be hereby used as a surrogate indication of bacteriological water quality within the subbasin. As such, all future monitoring within the Lower Payette River down stream of the Black Canyon Dam associated with the Lower Payette River TMDL Implementation Plan will be collected in relationship to and for *E. coli* bacteria analysis.” The calculated reductions at control monitoring locations range from 0 to 95%. Using *E. coli* numerical WQS criteria for bacteria targets is supported by research and EPA as a valid method for determining attainment of contact recreation beneficial uses.

Data collected at control monitoring locations between 2000 and 2009 indicate that progress in load reductions has been made at all Bissel Creek locations and 30% of irrigation system locations. However, 70% of the irrigation system control monitoring locations have increased loads and not enough data has been collected from the mainstem river to determine trends in bacteria load. Recent data (ISDA, 2007) indicates that Big Willow Creek is not meeting beneficial uses in AUs 017_03 and 017_04; and Little Willow Creek is not meeting beneficial uses in AU 018_04.

The TMDL identified that the percent of the load delivered to the lower Payette River from WWTPs is cumulatively 4 thousandths of 1% (0.00404%); which indicates that 99.99% of the load is from nonpoint sources. Because land use in the subbasin is dominated by agricultural operations and rural domiciles, with at least 60% of the population in Payette and Gem counties living outside areas serviced by municipal wastewater systems, domestic animals and septic systems are the most likely controllable sources. Consideration should be given to using emerging technologies to determine the proportion of controllable and uncontrollable (wildlife) sources in Bissel Creek, Big Willow Creek, and the lower Payette River so that IPs can be modified if human sources are identified as a significant contribution to bacteria pollution in the subbasin.

Sediment

The Bissel Creek TMDL established targets and calculated load reductions for sediment based on data collected between October and March (non-irrigation season) and concentrations of sediment that are shown to support beneficial uses in nearby watersheds with similar characteristics (ecoregion and land use). Using numerical literature-derived targets for sediment is supported by research and EPA as a valid method for determining attainment of beneficial uses.

Data indicating beneficial uses are supported is not available, and the most recent SSC data (ISDA, 2008) indicates that sediment loads have increased at three of the four control monitoring locations between 22 and 61%. Given the apparent trend of this pollutant in Bissel Creek, there is no reason to modify the TMDL at this time.

The SR-HC TMDL uses sediment as a surrogate constituent to reduce TP and pesticide pollution to the Snake River and established targets and calculated loads for one control monitoring location using the same method as the Bissel Creek and lower Boise River TMDLs. The SR-HC TMDL established the maximum sediment target (for reduction of TP and pesticides) for the lower Payette River at 50 mg/L monthly average, even though the existing load was 19.08 mg/L annual average. Since the TMDL was developed, the annual average TP concentration has been reduced by 20% while the average annual SSC has increased 21% to 23 mg/L.

Using the SSC targets established for other streams in the subbasin, it appears that Little Willow Creek AU 018_04 does not support beneficial uses and the irrigation system in AU 001_02 is a significant source of sediment and TP to the lower Payette River.

Temperature

The SBA discusses temperature criteria for beneficial uses (SS and COLD) compared to available data for the lower Payette River. The only control monitoring location from which continuous temperature data was collected is LR-007 (Payette River near Payette). The data indicate that when maximum instantaneous temperature in the lower Payette River is exceeded at LPR-007, 12% of the load can be attributed to sources other than the Black Canyon Reservoir. Because Idaho WQS recognize that when reservoirs prevent attainment of beneficial uses, a variance of criteria is acceptable when granted to a specific entity for a specific pollutant. Using numerical WQS and numerical literature-derived targets is supported by research and EPA as a valid method for determining attainment of beneficial uses.

Big Willow Creek exceeds criteria from May to mid-July. Little Willow Creek and the north-side irrigation system exceed temperature criteria in Mid-July at 13% of the locations monitored. Given the fact that up to 100% of the flow is diverted from Big Willow Creek during the irrigation season, and there are more than 30 impoundments in the watershed, it is possible that modifying water use in conjunction with riparian zone restoration would provide support for beneficial uses more quickly than PNV alone.

Based on information and data reviewed for this report, the Black Canyon Reservoir is the primary contributor of thermal load to the lower Payette River, and water use and riparian zone de-vegetation are controlling factors for temperature impairment in Big Willow Creek. While temperature is a pollutant for which a TMDL can be developed, the cause of temperature impaired streams in the lower Payette River subbasin is most likely due to flow and habitat alteration; which are not addressed through the TMDL process.

Total Phosphorus

The lower Payette River has an LA for TP that establishes dual target values for determining trends and compliance with the SR-HC TMDL. The target uses SSC and a monthly mean concentration as methods to determine trends and/or compliance with the TMDL. The target of 50 mg/L monthly mean for sediment is the lowest target threshold for similar rivers in the same ecoregion and physical characteristics. This value has not been exceeded in the past 9 years and the TMDL plans for TP concentration reductions to accompany SSC load reductions. However, it appears that TP concentrations may be less dependent on SSC loads than previously recognized. While SSC concentrations have increased over time the TP concentrations have decreased by 20%. Based on a review of the available data, the largest proportional contributions of TP to the lower Payette River are the irrigation drains and the Black Canyon Reservoir. Reductions of 14% are necessary to meet the SR-HC TMDL, and this seems achievable as the sources are controllable.

Pesticides

The SR-HC TMDL assigned an LA to the lower Payette River for pesticides using the same rationale as for TP. While pesticide data has not been collected from the control monitoring location in the past 9 years, the method of achieving load reductions using surrogate measures to determine trends is valid. If pesticides behave differently than TP in the lower Payette River, but behave as predicted by the TMDL, then a slight increase in pesticide loads coincident with increases in reported SSC data is expected.

Dissolved Oxygen (DO)

The DO required for beneficial use support in the lower Payette River subbasin is not met in the summer months in Big Willow Creek, AU 107_03 and 017_04. Data also indicate that 25% of the north-side irrigation system (AU 001_02) delivers water to the lower Payette River that is deficient in DO during the irrigation season. The data suggests that aquatic life beneficial uses are not supported in those AUs.

pH

Until this year, reported pH values in the lower Payette River met WQS criteria more than 95% of the time. pH measurements recorded at four control monitoring locations in

May and June deviated from the criteria enough to prompt additional data collection and a review of recent pH data from various locations in the larger Payette River subbasin and the Boise River subbasin. pH values were below standard for at least 6 weeks this spring and returned to normal historical values by July. Potential sources for this anomaly are being actively investigated.

Review of Beneficial Uses

Since the SBAs and TMDLs were developed, Idaho has adopted a method of identifying waters by AU instead of stream-reach-specific geographical descriptions of surface water bodies (DEQ, 2002). Using this method, the lower Payette River subbasin includes 20 AUs, eleven of which are listed as unassessed in 2008 Integrated Report. The results of the review are presented in Section 3, Table 18 and the accompanying Summary of Recommendations. There is one AU (019_02) in the lower Payette River subbasin that fully supports beneficial uses.

Water Quality Criteria

In Idaho WQS were modified to use numeric criteria for *E. coli* as a surrogate measure for recreational beneficial uses instead of fecal coliform numeric criteria. To address this change, the TMDL IP included an addendum using the *E. coli* criteria as the target for recreational beneficial uses. All other criteria that apply to surface waters in this subbasin remained the same.

Future TMDLs

Not all of the water bodies listed as impaired in the 2008 Integrated Report will require a TMDL. However, a thorough review of available data was completed before this conclusion was made. This review evaluated appropriateness of WQS to designated uses throughout the subbasin and compared available data to WQS to determine use attainment.

The most common impairment to water quality throughout the lower Payette River subbasin is a result of human occupation and associated exploitation of resources in the subbasin to support the population, and is not subject to allocations through the TMDL process. Flow and habitat alteration coincident with population expansion is documented in numerous reports to have begun as early as the mid-1800s (ISHS, 1993b). Temperature and sediment pollution is closely linked to flow and habitat alteration, while nutrient, bacteria, DO, pH, and other impairment causes are more closely related to contributions from human sources.

AUs that do not meet WQS due to influence of a pollutant for which a TMDL should be written are recommended for listing in Section 5 of the next integrated report, which will lead to TMDL development for pollutants that can be quantified and for which loads can be allocated. For AUs that have data that indicate the AU is inappropriately listed recommendations are made to correct the listing status.

Watershed Advisory Group Consultation

In compliance with consultation requirements in Idaho Code § 39-3611, DEQ has met regularly with the lower Payette River WAG that was appointed by the state.

The group met regularly over the course of the development of the 1999 TMDL and continues to hold regular public meetings in Emmett. In 2008 the WAG met on December 4 and in 2009 the WAG met on March 13 and October 22.

A call for data was made at the 2008 and 2009 WAG meetings. Data was received from WAG members and agencies that were contacted by the WAG or referred to DEQ by the WAG. The results of that interaction and consultation are included in the information presented in this report and summarized in Table A and Table 11.

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GIS Coverages

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Glossary

§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.

Anthropogenic

Relating to, or resulting from, the influence of human beings on nature.

Aquatic

Occurring, growing, or living in water.

Assemblage (aquatic)

An association of interacting populations of organisms in a given water body; for example, a fish assemblage or a benthic macroinvertebrate assemblage (also see Community) (EPA 1996).

Assessment Unit (AU)

A segment of a water body that is treated as a homogenous unit, meaning that any designated uses, the rating of these uses, and any associated causes and sources must be applied to the entirety of the unit.

Beneficial Use

Any of the various uses of water, including, but not limited to, aquatic life, 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 water body

Best Management Practices (BMPs)

Structural, nonstructural, and managerial techniques that are effective and practical means to control nonpoint source pollutants.

Biomass

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 (commonly known as the Clean Water Act), as last reauthorized by the Water Quality Act of 1987, 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, <i>E. coli</i> , and Pathogens).
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/centimeter at 25 °C. Conductivity is affected by dissolved solids and is used as an indirect measure of total dissolved solids in a water sample.
Constituents	A measurable element or component which is part of the whole. Water sample constituents may include common ions, dissolved solids, nutrients, bacteria, dissolved and suspended organic carbon, pesticides, metals, and suspended sediment.
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. The U.S. Environmental Protection Agency 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.
Decomposition	The breakdown of organic molecules (e.g., sugar) to inorganic molecules (e.g., carbon dioxide and water) through biological and nonbiological processes.
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.
<i>E. coli</i>	Short for <i>Escherichia coli</i> , <i>E. coli</i> are a group of bacteria that are a subspecies of coliform bacteria. Most <i>E. coli</i> are essential to the healthy life of all warm-blooded animals, including humans, but their presence

	in water is often indicative of fecal contamination. <i>E. coli</i> are used by the state of Idaho as the indicator for the presence of pathogenic microorganisms.
Ecology	The scientific study of relationships between organisms and their environment; also defined as the study of the structure and function of nature.
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 water body; or a discharge of water mixed with waste material into a stream.
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.
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 Geological Institute 1962).
Erosion	The wearing away of areas of the earth's surface by water, wind, ice, and other forces.
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 <i>Water Quality Standards and Wastewater Treatment Requirements</i> (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.
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, <i>E. coli</i> , and Pathogens).

Flow	See <i>Discharge</i> .
Fluvial	In fisheries, this describes fish whose life history takes place entirely in streams but migrate to smaller streams for spawning.
Fully Supporting	In compliance with water quality standards and within the range of biological reference conditions for all designated and existing beneficial uses as determined through the <i>Water Body Assessment Guidance</i> (Grafe et al. 2002).
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.
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.
Habitat	The living place of an organism or community.
Headwater	The origin or beginning of a stream.
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, and 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.
Influent	A tributary stream.
Inorganic	Materials not derived from biological sources.

Instantaneous	A condition or measurement at a moment (instant) in time.
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.
Irrigation Return Flow	Surface (and subsurface) water that leaves a field following the application of irrigation water and eventually flows into streams.
Load Allocation (LA)	A portion of a water body'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.
Load(ing) Capacity (LC)	A determination of how much pollutant a water body 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.
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 (<i>Ceratophyllum sp.</i>), are free-floating forms not rooted in sediment.
Margin of Safety (MOS)	An implicit or explicit portion of a water body's loading capacity set aside to allow the uncertainty about the relationship between the pollutant loads and the quality of the receiving water body. 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.
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 is 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, and 16; 6 is the median of 1, 2, 5, 7, 9, and 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, it is 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.
Monitoring	A periodic or continuous measurement of the properties or conditions of some medium of interest, such as monitoring a water body.
Mouth	The location where flowing water enters into a larger water body.
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	The condition that exists with little or no anthropogenic influence.
Nitrogen	An element essential to plant growth, and thus is considered a nutrient.
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 <i>Water Body Assessment Guidance</i> (Grafe et al. 2002).

Nuisance	Anything that 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.
Orthophosphate	A form of soluble inorganic phosphorus most readily used for algal growth.
Parameter	A variable, measurable property whose value is a determinant of the characteristics of a system, such as temperature, pH, dissolved oxygen, and fish populations are examples of parameters of a stream or lake.
Pathogens	A small subset of microorganisms (e.g., certain bacteria, viruses, and protozoa) that can cause sickness or death. Direct measurement of pathogen levels in surface water is difficult. Consequently, indicator bacteria that are often associated with pathogens are assessed. <i>E. coli</i> , a type of fecal coliform bacteria, is used by the state of Idaho as the indicator for the presence of pathogenic microorganisms.
Perennial Stream	A stream that flows year-around in most years.
Periphyton	Attached microflora (algae and diatoms) growing on the bottom of a water body 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.
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 term “physical/chemical.”
Point Source	A source of pollutants characterized by having a discrete conveyance, such as a pipe, ditch, or other identifiable “point” of discharge into

	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.
Protocol	A series of formal steps for conducting a test or survey.
Qualitative	Descriptive of kind, type, or direction.
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 affects 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).
Riparian	Associated with aquatic (stream, river, lake) habitats. Living or located on the bank of a water body.
River	A large, natural, or human-modified stream that flows in a defined course or channel or in 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.
Stratification	A 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 4 th 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 6 th 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 millimeters 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).

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 water body's load 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 basis. A TMDL is equal to the load capacity, such that load capacity = margin of safety + natural background + load allocation + wasteload allocation = TMDL. 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.

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 (Franson et al. 1998) call for using a filter of 2.0 microns 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.

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.
Wasteload Allocation (WLA)	The portion of receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. Wasteload allocations specify how much pollutant each point source may release to a water body.
Water Body	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 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 U.S. Environmental Protection Agency-approved ambient standards for water bodies. The standards prescribe the use of the water body 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 water body.

Water Body Identification Number (WBID)

A number that uniquely identifies a water body in Idaho and 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.

Appendix A. Unit Conversion Chart

Table A-1. Metric - English unit conversions.

	English Units	Metric Units	To Convert	Example
Distance	Miles (mi)	Kilometers (km)	1 mi = 1.61 km	3 mi = 4.83 km
			1 km = 0.62 mi	3 km = 1.86 mi
Length	Inches (in)	Centimeters (cm)	1 in = 2.54 cm	3 in = 7.62 cm
	Feet (ft)	Meters (m)	1 cm = 0.39 in	3 cm = 1.18 in
			1 ft = 0.30 m	3 ft = 0.91 m
			1 m = 3.28 ft	3 m = 9.84 ft
Area	Acres (ac)	Hectares (ha)	1 ac = 0.40 ha	3 ac = 1.20 ha
	Square Feet (ft ²)	Square Meters (m ²)	1 ha = 2.47 ac	3 ha = 7.41 ac
	Square Miles (mi ²)	Square Kilometers (km ²)	1 ft ² = 0.09 m ²	3 ft ² = 0.28 m ²
			1 m ² = 10.76 ft ²	3 m ² = 32.29 ft ²
			1 mi ² = 2.59 km ²	3 mi ² = 7.77 km ²
Volume	Gallons (gal)	Liters (L)	1 km ² = 0.39 mi ²	3 km ² = 1.16 mi ²
	Cubic Feet (ft ³)	Cubic Meters (m ³)	1 gal = 3.78 L	3 gal = 11.35 L
			1 L = 0.26 gal	3 L = 0.79 gal
			1 ft ³ = 0.03 m ³	3 ft ³ = 0.09 m ³
			1 m ³ = 35.32 ft ³	3 m ³ = 105.94 ft ³
Flow Rate	Cubic Feet per Second (cfs) ^a	Cubic Meters per Second (m ³ /sec)	1 cfs = 0.03 m ³ /sec	3 ft ³ /sec = 0.09 m ³ /sec
			1 m ³ /sec = 35.31 cfs	3 m ³ /sec = 105.94 ft ³ /sec
			1 ppm = 1 mg/L ^b	3 ppm = 3 mg/L
Concentration	Parts per Million (ppm)	Milligrams per Liter (mg/L)		
Weight	Pounds (lbs)	Kilograms (kg)	1 lb = 0.45 kg	3 lb = 1.36 kg
Temperature	Fahrenheit (°F)	Celsius (°C)	1 kg = 2.20 lbs	3 kg = 6.61 lb
			°C = 0.55 (F - 32)	3 °F = -15.95 °C
			°F = (C x 1.8) + 32	3 °C = 37.4 °F

^a 1 cfs = 0.65 million gallons per day; 1 million gallons per day is equal to 1.55 cfs.

^b The ratio of 1 ppm = 1 mg/L is approximate and is only accurate for water.

Appendix B. State and Site-Specific Standards and Criteria

IDAPA 58 TITLE 01 CHAPTER 02**58.01.02 - WATER QUALITY STANDARDS****056. SPECIAL RESOURCE WATERS.**

01. Designations. Waters of the state may be designated as special resource waters. Designation as a special resource water recognizes at least one (1) of the following characteristics: (7-1-93)

- a. The water is of outstanding high quality, exceeding both criteria for primary contact recreation and cold water aquatic life; (4-5-00)
- b. The water is of unique ecological significance; (7-1-93)
- c. The water possesses outstanding recreational or aesthetic qualities; (7-1-93)
- d. Intensive protection of the quality of the water is in paramount interest of the people of Idaho; (7-1-93)
- e. The water is a part of the National Wild and Scenic River System, is within a State or National Park or wildlife refuge and is of prime or major importance to that park or refuge; or (4-5-00)
- f. Intensive protection of the quality of the water is necessary to maintain an existing, but jeopardized beneficial use. (4-5-00)

02. Designated Waters. Those waters of the state determined to be special resource waters are listed in Sections 110 through 160. (4-5-00)

03. Restrictions of Point Source Discharges to Special Resource Waters and Their Tributaries. Point source discharges to special resource waters and their tributaries shall be restricted as specified in Subsection 400.01.b.

100. SURFACE WATER USE DESIGNATIONS.

Waterbodies are designated in Idaho to protect water quality for existing or designated uses. The designated use of a waterbody does not imply any rights to access or ability to conduct any activity related to the use designation, nor does it imply that an activity is safe. For example, a designation of primary or secondary contact recreation may occur in areas where it is unsafe to enter the water due to water flows, depth or other hazardous conditions. Another example is that aquatic life uses may be designated in areas that are closed to fishing or access is not allowed by property owners. Wherever attainable, the designated beneficial uses for which the surface waters of the state are to be protected include: (3-15-02)

01. Aquatic Life. (7-1-93)

- a. Cold water (COLD): water quality appropriate for the protection and maintenance of a viable aquatic life community for cold water species. (4-5-00)
- b. Salmonid spawning (SS): waters which provide or could provide a habitat for active self-propagating populations of salmonid fishes. (3-30-07)
- c. Seasonal cold water (SC): water quality appropriate for the protection and maintenance of a viable aquatic life community of cool and cold water species, where cold water aquatic life may be absent during, or tolerant of, seasonally warm temperatures. (4-5-00)
- d. Warm water (WARM): water quality appropriate for the protection and maintenance of a viable aquatic life community for warm water species. (4-5-00)
- e. Modified (MOD): water quality appropriate for an aquatic life community that is limited due to one (1) or more conditions set forth in 40 CFR 131.10(g) which preclude attainment of reference streams or conditions. (4-5-00)

02. Recreation. (7-1-93)

- a. Primary contact recreation (PCR): water quality appropriate for prolonged and intimate contact by humans or for recreational activities when the ingestion of small quantities of water is likely to occur. Such activities include, but are not restricted to, those used for swimming, water skiing, or skin diving. (4-5-00)
- b. Secondary contact recreation (SCR): water quality appropriate for recreational uses on or about the water and which are not included in the primary contact category. These activities may include fishing, boating, wading, infrequent swimming, and other activities where ingestion of raw water is not likely to occur. (4-5-00)

03. Water Supply. (7-1-93)

- a. Domestic: water quality appropriate for drinking water supplies. (4-5-00)
- b. Agricultural: water quality appropriate for the irrigation of crops or as drinking water for livestock. This use applies to all surface waters of the state. (4-5-00)
- c. Industrial: water quality appropriate for industrial water supplies. This use applies to all surface waters of the state.

101. NONDESIGNATED SURFACE WATERS.

01. Undesignated Surface Waters. Surface waters not designated in Sections 110 through 160 shall be designated according to Section 39-3604, Idaho Code; 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 include all recreational use in and on the water and the protection and propagation of fish, shellfish, and wildlife, wherever attainable. (3-23-98)

- a. Because the Department presumes most waters in the state will support cold water aquatic life and primary or secondary contact recreation beneficial uses, the Department will apply cold water aquatic life and primary or secondary contact recreation criteria to undesignated waters unless Sections 101.01.b and 101.01.c. are followed. (4-5-00)
- b. During the review of any new or existing activity on an undesignated water, the Department may examine all relevant data or may require the gathering of relevant data on beneficial uses; pending determination in Section 101.01.c. existing activities will be allowed to continue. (3-23-98)
- c. If, after review and public notice of relevant data, it is determined that beneficial uses in addition to or other than cold water aquatic life and primary or secondary contact recreation are appropriate, then the Department will: (4-5-00) i. Complete the review and compliance determination of the activity in context with the new information on beneficial uses, and (3-23-98) ii. Initiate rulemaking necessary to designate the undesignated water, including providing all necessary data and information to support the proposed designation.

109. HUC INDEX AND ABBREVIATIONS FOR SECTIONS 110, 120, 130, 140, 150, AND 160.**03. Abbreviations.** (4-5-00)

- a. COLD -- Cold Water Communities. (4-5-00)
- b. SS -- Salmonid Spawning. (4-5-00)
- c. SC -- Seasonal Cold Water Communities. (4-5-00)
- d. WARM -- Warm Water Communities. (4-5-00)
- e. MOD -- Modified Communities. (4-5-00)
- f. PCR -- Primary Contact Recreation. (4-5-00)
- g. SCR -- Secondary Contact Recreation. (4-5-00)
- h. DWS -- Domestic Water Supply. (4-5-00)
- i. SRW -- Special Resource Water. (4-5-00)
- j. NONE -- Use Unattainable. (4-5-00)
- k. No entry in the Aquatic Life or Recreation columns -- nondesignated waters for those uses. (3-15-02)

140. SOUTHWEST IDAHO BASIN.

Surface waters found within the Southwest basin total nineteen (19) subbasins and are designated as follows: (4-5-00)

16. PAYETTE RIVER SUBBASIN, HUC 17050122 (modified from WQS to include Lower Payette River watersheds).

Unit	Waters	Aquatic Life	Recreation	Other
SW-1	Payette River - Black Canyon Reservoir Dam to mouth	COLD SS	PCR	DWS
SW-15	Bissel Creek - source to mouth			
SW-16	Sand Hollow - source to mouth			
SW-17	Big Willow Creek - source to mouth	COLD SS	PCR	
SW-18	Little Willow Creek - Paddock Valley Reservoir Dam to mouth			
SW-19	Indian Creek - source to mouth			
SW-20	Paddock Valley Reservoir			
SW-21	Little Willow Creek - source to Paddock Valley Reservoir			

200. GENERAL SURFACE WATER QUALITY CRITERIA.

The following general water quality criteria apply to all surface waters of the state, in addition to the water quality criteria set forth for specifically designated waters. (4-5-00)

01. Hazardous Materials. Surface waters of the state shall be free from hazardous materials in concentrations found to be of public health significance or to impair designated beneficial uses. These materials do not include suspended sediment produced as a result of nonpoint source activities. (8-24-94)

02. Toxic Substances. Surface waters of the state shall be free from toxic substances in concentrations that impair designated beneficial uses. These substances do not include suspended sediment produced as a result of nonpoint source activities. (8-24-94)

03. Deleterious Materials. Surface waters of the state shall be free from deleterious materials in concentrations that impair designated beneficial uses. These materials do not include suspended sediment produced as a result of nonpoint source activities. (8-24-94)

04. Radioactive Materials. (7-1-93)

a. Radioactive materials or radioactivity shall not exceed the values listed in the Code of Federal Regulations, Title 10, Chapter 1, Part 20, Appendix B, Table 2, Effluent Concentrations, Column 2. (8-24-94)

b. Radioactive materials or radioactivity shall not exceed concentrations required to meet the standards set forth in Title 10, Chapter 1, Part 20, of the Code of Federal Regulations for maximum exposure of critical human organs in the case of foodstuffs harvested from these waters for human consumption. (7-1-93)

05. Floating, Suspended or Submerged Matter. Surface waters of the state shall be free from floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses. This matter does not include suspended sediment produced as a result of nonpoint source activities. (8-24-94)

06. Excess 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. (8-24-94)

07. Oxygen-Demanding Materials. Surface waters of the state shall be free from oxygen-demanding materials in concentrations that would result in an anaerobic water condition. (7-1-93)

08. Sediment. Sediment shall not exceed quantities specified in Sections 250 and 252, or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Section 350. (4-5-00)

09. Natural Background Conditions as Criteria. When natural background conditions exceed any applicable water quality criteria set forth in Sections 210, 250, 251, 252, or 253, the applicable water quality criteria shall not apply; instead, there shall be no lowering of water quality from natural background conditions. Provided, however, that temperature may be increased above natural background conditions when allowed under Section 401. (3-30-07)

250. SURFACE WATER QUALITY CRITERIA FOR AQUATIC LIFE USE DESIGNATIONS.

01. General Criteria. The following criteria apply to all aquatic life use designations. Surface waters are not to vary from the following characteristics due to human activities: (3-15-02)

- a. Hydrogen Ion Concentration (pH) values within the range of six point five (6.5) to nine point zero (9.0); (3-30-01)
- b. The total concentration of dissolved gas not exceeding one hundred and ten percent (110%) of saturation at atmospheric pressure at the point of sample collection; (7-1-93)

02. Cold Water. Waters designated for cold water aquatic life are not to vary from the following characteristics due to human activities: (3-15-02)

- a. Dissolved Oxygen Concentrations exceeding six (6) mg/L at all times. In lakes and reservoirs this standard does not apply to: (7-1-93) i. The bottom twenty percent (20%) of water depth in natural lakes and reservoirs where depths are thirty-five (35) meters or less. (7-1-93) ii. The bottom seven (7) meters of water depth in natural lakes and reservoirs where depths are greater than thirty-five (35) meters. (7-1-93) iii. Those waters of the hypolimnion in stratified lakes and reservoirs. (7-1-93)
- b. Water temperatures of twenty-two (22) degrees C or less with a maximum daily average of no greater than nineteen (19) degrees C. (8-24-94)
- c. Temperature in lakes shall have no measurable change from natural background conditions. Reservoirs with mean detention times of greater than fifteen (15) days are considered lakes for this purpose. (3-15-02)
- d. Ammonia. The following criteria are not to be exceeded dependent upon the temperature, T (degrees C), and pH of the water body: (3-15-02)

i. Acute Criterion (Criterion Maximum Concentration (CMC)). The one (1) hour average concentration of total ammonia nitrogen (in mg N/L) is not to exceed, more than once every three (3) years, the value calculated using the following equation: (3-15-02)

$$CMC = \frac{0.275}{1 + 10^{7.204 - pH}} + \frac{39.0}{1 + 10^{pH - 7.204}}$$

ii. Chronic Criterion (Criterion Continuous Concentration (CCC)). (3-15-02) (1) The thirty (30) day average concentration of total ammonia nitrogen (in mg N/L) is not to exceed, more than once every three (3) years, the value calculated using the following equations: (3-15-02)

(a) When fish early life stages are likely present:

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688 - pH}} + \frac{2.487}{1 + 10^{pH - 7.688}} \right) \cdot \text{MIN}(2.85, 1.45 \cdot 10^{0.028(25 - T)})$$

(b) When fish early life stages are likely absent:

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688 - pH}} + \frac{2.487}{1 + 10^{pH - 7.688}} \right) \cdot 1.45 \cdot 10^{0.028(25 - T)}$$

(2) The highest four-day (4) average within the thirty-day (30) period should not exceed two point five (2.5) times the CCC. (3-15-02)

(3) Because the Department presumes that many waters in the state may have both spring-spawning and fall-spawning species of fish present, early life stages of fish may be present throughout much of the year. Accordingly, the Department will apply the CCC for when fish early life stages are present at all times of the year unless: (3-15-02)

(a) Time frames during the year are identified when early life stages are unlikely to be present, and (3-15-02)

(b) The Department is provided all readily available information supporting this finding such as the fish species distributions, spawning periods, nursery periods, and the duration of early life stages found in the water body; and (3-15-02)

(c) The Department determines early life stages are likely absent. (3-15-02)

e. 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) NTU for more than ten (10) consecutive days. (8-24-94)

f. Salmonid Spawning. The Department shall determine spawning periods on a waterbody specific basis taking into account knowledge of local fisheries biologists, published literature, records of the Idaho Department of Fish and Game, and other appropriate records of spawning and incubation, as further described in the current version of the "Water Body Assessment Guidance" published by the Idaho Department of Environmental Quality. Waters designated for salmonid spawning, in areas used for spawning and during the time spawning and incubation occurs, are not to vary from the following characteristics due to human activities: (3-30-07)

i. Dissolved Oxygen. (8-24-94) (1) Intergravel Dissolved Oxygen. (8-24-94) (a) One (1) day minimum of not less than five point zero (5.0) mg/L. (8-24-94)

(b) Seven (7) day average mean of not less than six point zero (6.0) mg/L. (8-24-94)

(2) Water-Column Dissolved Oxygen. (8-24-94)

(a) One (1) day minimum of not less than six point zero (6.0) mg/L or ninety percent (90%) of saturation, whichever is greater. (8-24-94)

ii. Water temperatures of thirteen (13) degrees C or less with a maximum daily average no greater than nine (9) degrees C. (8-24-94)

g. Bull Trout Temperature Criteria. Water temperatures for the waters identified under Subsection 250.02.g.i. shall not exceed thirteen degrees Celsius (13C) maximum weekly maximum temperature (MWMT) during June, July and August for juvenile bull trout rearing, and nine degrees Celsius (9C) daily average during September and October for bull trout spawning. For the purposes of measuring these criteria, the values shall be generated from a recording device with a minimum of six (6) evenly spaced measurements in a twenty-four (24) hour period. The MWMT is the mean of daily maximum water temperatures measured over the annual warmest consecutive seven (7) day period occurring during a given year. (3-30-01)

i The bull trout temperature criteria shall apply to all tributary waters, not including fifth order main stem rivers, located within areas above fourteen hundred (1400) meters elevation south of the Salmon River basin- Clearwater River basin divide, and above six hundred (600) meters elevation north of the Salmon River basin- Clearwater River basin divide, in the fifty-nine (59) Key Watersheds listed in Table 6, Appendix F of Governor Batt's State of Idaho Bull Trout Conservation Plan, 1996, or as designated under Sections 110 through 160 of this rule. (3-23-98)

ii. No thermal discharges will be permitted to the waters described under Subsection 250.02.g.i. unless socially and economically justified as determined by the Department, and then only if the resultant increase in stream temperature is less than five-tenths degrees Celsius (0.5C).

03. Seasonal Cold Water. Between the summer solstice and autumn equinox, waters designated for seasonal cold water aquatic life are not to vary from the following characteristics due to human activities. For the period from autumn equinox to summer solstice the cold water criteria will apply: (3-15-02)

a. Dissolved Oxygen Concentrations exceeding six (6) mg/L at all times. In lakes and reservoirs this standard does not apply to: (4-5-00)

i. The bottom twenty percent (20%) of water depth in natural lakes and reservoirs where depths are thirty-five (35) meters or less. (4-5-00)

- ii. The bottom seven (7) meters of water depth in natural lakes and reservoirs where depths are greater than thirty-five (35) meters. (4-5-00)
- iii. Those waters of the hypolimnion in stratified lakes and reservoirs. (4-5-00)

b. Water temperatures of twenty-six (26) degrees C or less as a daily maximum with a daily average of no greater than twenty-three (23) degrees C. (3-30-01)

c. Temperature in lakes shall have no measurable change from natural background conditions. Reservoirs with mean detention times of greater than fifteen (15) days are considered lakes for this purpose. (3-15-02)

d. Ammonia. Concentration of ammonia is not to exceed the criteria defined at Subsection 250.02.d. (3-15-02)

04. Warm Water. Waters designated for warm water aquatic life are not to vary from the following characteristics due to human activities: (3-30-07)

a. Dissolved oxygen concentrations exceeding five (5) mg/L at all times. In lakes and reservoirs this standard does not apply to: (7-1-93)

i. The bottom twenty percent (20%) of the water depth in natural lakes and reservoirs where depths are thirty-five (35) meters or less. (7-1-93)

ii. The bottom seven (7) meters of water depth in natural lakes and reservoirs where depths are greater than thirty-five (35) meters. (7-1-93)

iii. Those waters of the hypolimnion in stratified lakes and reservoirs. (7-1-93)

b. Water temperatures of thirty-three (33) degrees C or less with a maximum daily average not greater than twenty-nine (29) degrees C. (8-24-94)

c. Temperature in lakes shall have no measurable change from natural background conditions. Reservoirs with mean detention times of greater than fifteen (15) days are considered lakes for this purpose. (3-15-02)

d. Ammonia. The following criteria are to be met dependent upon the temperature, T (degrees C), and pH of the water body: (3-15-02)

i. Acute Criterion (Criterion Maximum Concentration (CMC)). The one (1) hour average concentration of total ammonia nitrogen (in mg N/L) is not to exceed, more than once every three (3) years, the value calculated using the following equation:

$$CMC = \frac{0.411}{1 + 10^{7.204 - pH}} + \frac{58.4}{1 + 10^{pH - 7.204}}$$

ii. Chronic Criterion (Criterion Continuous Concentration (CCC)). Concentrations of ammonia are not to exceed the criteria defined at Subsection 250.02.d.ii. (3-15-02)

05. Modified. Water quality criteria for modified aquatic life will be determined on a case-by-case basis reflecting the chemical, physical, and biological levels necessary to attain the existing aquatic life community. These criteria, when determined, will be adopted into these rules. (3-15-02)

251. SURFACE WATER QUALITY CRITERIA FOR RECREATION USE DESIGNATIONS.

01. E. Coli Bacteria. Waters designated for recreation are not to contain *E. coli* bacteria, used as indicators of human pathogens, in concentrations exceeding: (4-11-06)

a. Geometric Mean Criterion. Waters designated for primary or secondary contact recreation are not to contain *E. coli* bacteria in concentrations exceeding a geometric mean of one hundred twenty-six (126) *E. coli* organisms per one hundred (100) ml based on a minimum of five (5) samples taken every three (3) to seven (7) days over a thirty (30) day period. (4-11-06)

b. Use of Single Sample Values. A water sample exceeding the *E. coli* single sample maximums below indicates likely exceedance of the geometric mean criterion, but is not alone a violation of water quality standards. If a single sample exceeds the maximums set forth in Subsections 251.01.b.i., 251.01.b.ii., and 251.01.b.iii., then additional samples must be taken as specified in Subsection 251.01.c.: (4-11-06)

- i. For waters designated as secondary contact recreation, a single sample maximum of five hundred seventy-six (576) *E. coli* organisms per one hundred (100) ml; or (4-11-06)
 - ii. For waters designated as primary contact recreation, a single sample maximum of four hundred six (406) *E. coli* organisms per one hundred (100) ml; or (4-11-06)
 - iii. For areas within waters designated for primary contact recreation that are additionally specified as public swimming beaches, a single sample maximum of two hundred thirty-five (235) *E. coli* organisms per one hundred (100) ml. Single sample counts above this value should be used in considering beach closures. (4-11-06)
- c. Additional Sampling. When a single sample maximum, as set forth in Subsections 251.01.b.i., 251.01.b.ii., and 251.01.b.iii., is exceeded, additional samples should be taken to assess compliance with the geometric mean *E. coli* criteria in Subsection 251.01.a. Sufficient additional samples should be taken by the Department to calculate a geometric mean in accordance with Subsection 251.01.a. This provision does not require additional ambient monitoring responsibilities for dischargers. (4-11-06)

252. SURFACE WATER QUALITY CRITERIA FOR WATER SUPPLY USE DESIGNATION.

01. Domestic. Waters designated for domestic water supplies are to exhibit the following characteristics: (4-5-00)

- a. Radioactive materials or radioactivity not to exceed concentrations specified in Idaho Department of Environmental Quality Rules, IDAPA 58.01.08, "Rules Governing Public Drinking Water Systems." (8-24-94)
- b. Small public water supplies (Surface Water). (8-24-94)
 - i. The following Table identifies waters, including their watersheds above the public water supply intake (except where noted), which are designated as small public water supplies.

Appendix C. Data Tables and Graphs

Table C-1. USGS data from Lower Payette River subbasin locations between 2003 and 2008.

USGS Analyses, Lower Payette River, 2003-2008														
Site ID	Date	Time	WT (°C)	AT (°C)	Q (cfs)	SpC (uS/cm ³)	DO (mg/L)	pH	TP (mg/L)	NTU	Ammonia (N) (mg/L)	TSS (mg/L)	SSQ (t/d)	<i>E. coli</i> (cfu/100ml)
Payette River near Letha, ID (LPR-003) (AU001_06)														
13235000	4/12/2005	12:50	7.4	9.5	489	91	11.5	7.4	0.008	< 2.0	0.01	4	5.3	< 1
13235000	5/12/2005	13:30	7.2	20.5	1230	66	10.9	7.8	0.016	3.4		13	43	< 1
13235000	6/21/2005	11:00	10.9	23	1290	68	11	7.7	0.013	< 2.0		34	118	S 8
13235000	7/26/2005	11:00	14	16.5	511	85	9.8	8	0.002	< 2.0		2	2.8	S 4
13235000	8/9/2005	17:00	20	35.5	384	85	8.7	8.3	0.004	< 2.0		2	2.1	S 2
13235000	9/15/2005	12:15	10.2	13.5	303	94	10.4	8.1	0.002	< 2.0		0	0	S 1
13235000	4/24/2008	12:58	5.8	8	768	82	11.7	8	0.021	E 1.1		4	8.3	S 1
13235000	5/22/2008	15:52	6.1	13	3940	45	10.1	7.8	0.166	25		349	3710	< 1
13235000	6/26/2008	12:12	9.9	25	2430	44	12.3	7.7	0.011	E 2.0		< 0.5		S 1
13235000	7/14/2008	15:05	14.5	27	1020	60	8.5	8	0.005	< 2.0		5	14	S 1
13235000	8/5/2008	12:20	14	23.5	583	78	8.7	8.1	0.012	E 1.8		6		S 3
13235000	9/23/2008	12:38	9	15	358	91	11.1	8	0.011	E 1.0		5		S 3
Payette River near Payette, ID (LPR-007) (AU001_06)														
13251000	7/10/2003	10:15	22.2	30	1970	125	8.3	7.8	0.072			20	106	
13251000	8/5/2003	10:25	22.2	23	1850	148	7.8	7.8	0.092			24	120	
13251000	9/2/2003	14:50	21.5	32	1280	157	9.7	8	0.112		0.02	27	93	
13251000	4/21/2006	12:52	8.9	17.5	9480	70	11.2	7.6	0.066	9	E 0.01	15	384	31
13251000	5/18/2006	12:08	13.6	25	12100	53	10	7.3	0.081	23	0.01	42	1370	240
13251000	6/22/2006	9:40	15.5	23.5	5360	75	10.2	7.5	0.054	7.2		22	318	140
13251000	7/14/2006	12:46	22.2	26.5	2300	123	9.4	8	0.087	9.7	E 0.01	27	168	240
13251000	8/17/2006	11:35	19.1	20	1560	177	9.1	7.9	0.096	11	E 0.01	23	97	200
13251000	9/11/2006	15:56	20	28	911	227	10.3	8.3	0.092	6.2	0.01	10	25	120

WT = Water Temperature; (°C) = degrees Celsius; AT = air Temperature; Q = discharge; cfs = cubic feet per second; SpC = Specific Conductance; uS/cm³ = microSiemens per cubic centimeter; DO = Dissolved Oxygen; mg/L = milligrams per liter; % sat = percent saturation; Amm Dis. = Dissolved Ammonia; TP = Total Phosphorus; OP Dis. = Dissolved Ortho-Phosphorus; cfu = colony-forming units; SSC = Suspended Sediment Concentration; SSQ = Suspended Sediment Discharge

Table C-2. USGS daily mean discharge and maximum recorded water temperature from the Payette River near Payette, 2008-2009.

USGS Discharge and Temperature Data, 2003-2009			
Payette River near Payette, ID			
Site ID	Date	Q (cfs)	WT (°C)
13251000	3/5/2008	1710	6.8
13251000	3/6/2008	1600	7.1
13251000	3/7/2008	1630	6.4
13251000	3/8/2008	1670	8.3
13251000	3/9/2008	1850	7.4
13251000	3/10/2008	1860	7.9
13251000	3/11/2008	1900	8.7
13251000	3/12/2008	2500	8.1
13251000	3/13/2008	2690	8
13251000	3/14/2008	3310	7.5
13251000	3/15/2008	3020	
13251000	3/16/2008	2990	
13251000	3/17/2008	2850	7.3
13251000	3/18/2008	2800	7.9
13251000	3/19/2008	3120	7.7
13251000	3/20/2008	3460	8.1
13251000	3/21/2008	3460	8.3
13251000	3/22/2008	3200	8.4
13251000	3/23/2008	3010	8.3
13251000	3/24/2008	2980	9.1
13251000	3/25/2008	3070	9
13251000	3/26/2008	3190	8.7
13251000	3/27/2008	3210	8.9
13251000	3/28/2008	3090	7.9
13251000	3/29/2008	2930	8.7
13251000	3/30/2008	2920	8.2
13251000	3/31/2008	2640	7.8
13251000	4/1/2008	2520	8.2
13251000	4/2/2008	2450	8.4
13251000	4/3/2008	2470	8.9
13251000	4/4/2008	2410	8.7
13251000	4/5/2008	2120	9.2
13251000	4/6/2008	2130	9.9
13251000	4/7/2008	2160	10.3
13251000	4/8/2008	2200	9.2
13251000	4/9/2008	2180	9.9
13251000	4/10/2008	2230	9.9
13251000	4/11/2008	2650	10.7
13251000	4/12/2008	2950	11.4
13251000	4/13/2008	3260	12.4

Site ID	Date	Q (cfs)	WT (°C)
13251000	4/14/2008	4050	12.2
13251000	4/15/2008	5160	10.5
13251000	4/16/2008	5150	10.8
13251000	4/17/2008	4430	11.2
13251000	4/18/2008	4120	11.4
13251000	4/19/2008	4430	10.9
13251000	4/20/2008	4590	9.3
13251000	4/21/2008	3990	9.1
13251000	4/22/2008	3330	10.5
13251000	4/23/2008	3080	10.3
13251000	4/24/2008	3530	9.8
13251000	4/25/2008	3550	11.5
13251000	4/26/2008	3100	12
13251000	4/27/2008	3170	12.4
13251000	4/28/2008	3560	13.9
13251000	4/29/2008	4490	13.3
13251000	4/30/2008	5890	11.5
13251000	5/1/2008	5430	11.5
13251000	5/2/2008	4440	11.8
13251000	5/3/2008	4230	12.4
13251000	5/4/2008	4560	14
13251000	5/5/2008	5050	14.5
13251000	5/6/2008	5900	14
13251000	5/7/2008	7120	13.8
13251000	5/8/2008	7630	13.5
13251000	5/9/2008	7120	13
13251000	5/10/2008	6650	13.4
13251000	5/11/2008	5970	12.9
13251000	5/12/2008	5990	13.3
13251000	5/13/2008	5630	13.2
13251000	5/14/2008	5400	13.6
13251000	5/15/2008	5620	15.7
13251000	5/16/2008	6780	16.3
13251000	5/17/2008	8990	16.3
13251000	5/18/2008	10600	15.7
13251000	5/19/2008	11500	15.1
13251000	5/20/2008	12800	14.2
13251000	5/21/2008	13100	12.2
13251000	5/22/2008	13200	10.9
13251000	5/23/2008	10200	11.4
13251000	5/24/2008	9410	13.6
13251000	5/25/2008	9100	14.5
13251000	5/26/2008	8540	15.2
13251000	5/27/2008	8510	14.8
13251000	5/28/2008	9730	
13251000	5/29/2008	9990	

Site ID	Date	Q (cfs)	WT (°C)
13251000	5/30/2008	9740	
13251000	5/31/2008	9500	
13251000	6/1/2008	9180	
13251000	6/2/2008	9270	15.4
13251000	6/3/2008	9470	14.5
13251000	6/4/2008	10600	14.2
13251000	6/5/2008	10800	14.3
13251000	6/6/2008	9990	13.8
13251000	6/7/2008	9690	14.9
13251000	6/8/2008	9400	15
13251000	6/9/2008	9010	14.5
13251000	6/10/2008	8750	13.8
13251000	6/11/2008	8970	14.7
13251000	6/12/2008	8600	15.2
13251000	6/13/2008	8150	15.5
13251000	6/14/2008	7730	17
13251000	6/15/2008	7840	18.2
13251000	6/16/2008	8130	
13251000	6/17/2008	8130	
13251000	6/18/2008	7500	
13251000	6/19/2008	6700	
13251000	6/20/2008	6430	
13251000	6/21/2008	5530	
13251000	6/22/2008	5450	20
13251000	6/23/2008	5580	20.5
13251000	6/24/2008	5440	19.4
13251000	6/25/2008	5770	19.9
13251000	6/26/2008	5240	19.9
13251000	6/27/2008	4490	21.2
13251000	6/28/2008	4290	22.4
13251000	6/29/2008	4100	23.1
13251000	6/30/2008	3940	22.6
13251000	7/1/2008	3630	23.5
13251000	7/2/2008	3630	23.8
13251000	7/3/2008	3700	24.2
13251000	7/4/2008	3480	23.6
13251000	7/5/2008	3310	23.5
13251000	7/6/2008	3180	24.1
13251000	7/7/2008	2960	23.5
13251000	7/8/2008	2730	23.6
13251000	7/9/2008	2530	24.5
13251000	7/10/2008	2400	24.5
13251000	7/11/2008	2340	23.1
13251000	7/12/2008	2260	23.4
13251000	7/13/2008	2220	23.7
13251000	7/14/2008	2160	24.2

Site ID	Date	Q (cfs)	WT (°C)
13251000	7/15/2008	2060	24.5
13251000	7/16/2008	2030	24.1
13251000	7/17/2008	1910	
13251000	7/18/2008	2100	
13251000	7/19/2008	2350	24
13251000	7/20/2008	2380	24.6
13251000	7/21/2008	2360	24.1
13251000	7/22/2008	2410	23.1
13251000	7/23/2008	2910	23.5
13251000	7/24/2008	2790	23.2
13251000	7/25/2008	2530	24
13251000	7/26/2008	2470	24
13251000	7/27/2008	2440	24
13251000	7/28/2008	2390	23.9
13251000	7/29/2008	2290	23.5
13251000	7/30/2008	2280	23.3
13251000	7/31/2008	2190	23.4
13251000	8/1/2008	2150	23.5
13251000	8/2/2008	2100	23.6
13251000	8/3/2008	2000	23.8
13251000	8/4/2008	2030	23.7
13251000	8/5/2008	1980	24.1
13251000	8/6/2008	1900	23.7
13251000	8/7/2008	1880	24.5
13251000	8/8/2008	1970	24.6
13251000	8/9/2008	2040	25
13251000	8/10/2008	1960	24
13251000	8/11/2008	1950	23.6
13251000	8/12/2008	1880	23.9
13251000	8/13/2008	1850	24
13251000	8/14/2008	1810	24.1
13251000	8/15/2008	1780	24.4
13251000	8/16/2008	1820	24.4
13251000	8/17/2008	1780	24.7
13251000	8/18/2008	1820	24.4
13251000	8/19/2008	1730	23.3
13251000	8/20/2008	1680	22.5
13251000	8/21/2008	1510	23
13251000	8/22/2008	1490	21.7
13251000	8/23/2008	1460	22.3
13251000	8/24/2008	1540	22.8
13251000	8/25/2008	1520	23.5
13251000	8/26/2008	1460	21
13251000	8/27/2008	1440	21.2
13251000	8/28/2008	1500	21.9
13251000	8/29/2008	1310	23.1

Site ID	Date	Q (cfs)	WT (°C)
13251000	8/30/2008	1340	23.3
13251000	8/31/2008	1290	20.6
13251000	9/1/2008	1340	19
13251000	9/2/2008	1340	18.8
13251000	9/3/2008	1100	19.9
13251000	9/4/2008	834	20.1
13251000	9/5/2008	774	20
13251000	9/6/2008	650	21
13251000	9/7/2008	500	21.3
13251000	9/8/2008	454	20.8
13251000	9/9/2008	492	20.3
13251000	9/10/2008	528	20
13251000	9/11/2008	459	19.7
13251000	9/12/2008	498	19.9
13251000	9/13/2008	517	20.4
13251000	9/14/2008	506	20.7
13251000	9/15/2008	476	20.6
13251000	9/16/2008	487	20.5
13251000	9/17/2008	523	19.9
13251000	9/18/2008	523	20.8
13251000	9/19/2008	547	19.9
13251000	9/20/2008	658	19.4
13251000	9/21/2008	1180	
13251000	9/22/2008	1350	
13251000	9/23/2008	1170	17.6
13251000	9/24/2008	995	18.1
13251000	9/25/2008	915	18.3
13251000	9/26/2008	850	18.6
13251000	9/27/2008	809	18.8
13251000	9/28/2008	742	18.6
13251000	9/29/2008	683	18.4
13251000	9/30/2008	622	18.9
13251000	10/1/2008	644	19.6
13251000	10/2/2008	670	18.8
13251000	10/3/2008	634	17.5
13251000	10/4/2008	733	17.6
13251000	10/5/2008	795	16.5
13251000	10/6/2008	896	17.1
13251000	10/7/2008	746	16.9
13251000	10/8/2008	723	15.7
13251000	10/9/2008	954	14.3
13251000	10/10/2008	962	11.8
13251000	10/11/2008	1040	10.8
13251000	10/12/2008	1160	11
13251000	10/13/2008	1130	12.2
13251000	10/14/2008	1310	13

Site ID	Date	Q (cfs)	WT (°C)
13251000	10/15/2008	1050	13.4
13251000	10/16/2008	1160	13.5
13251000	10/17/2008	1160	13.4
13251000	10/18/2008	1160	14
13251000	10/19/2008	1140	14
13251000	10/20/2008	1180	13.5
13251000	10/21/2008	1380	12.4
13251000	10/22/2008	1320	10.9
13251000	10/23/2008	1230	10.8
13251000	10/24/2008	1250	10.4
13251000	10/25/2008	1240	11.2
13251000	10/26/2008	1270	11.2
13251000	10/27/2008	1230	11
13251000	10/28/2008	1200	10.3
13251000	10/29/2008	1140	10.7
13251000	10/30/2008	1170	10.2
13251000	10/31/2008	1180	10.5
13251000	11/1/2008	1240	10.2
13251000	11/2/2008	1360	11.3
13251000	11/3/2008	1690	10.7
13251000	11/4/2008	2070	9.2
13251000	11/5/2008	1850	8.4
13251000	11/6/2008	1670	8.1
13251000	11/7/2008	1410	9.9
13251000	11/8/2008	1450	9.4
13251000	11/9/2008	1520	9
13251000	11/10/2008	1580	9.2
13251000	11/11/2008	1680	8.6
13251000	11/12/2008	1710	9.8
13251000	11/13/2008	1940	10.8
13251000	11/14/2008	2560	9.4
13251000	11/15/2008	2680	8.2
13251000	11/16/2008	1860	8
13251000	11/17/2008	1680	7.9
13251000	11/18/2008	1570	7.4
13251000	11/19/2008	1500	
13251000	11/20/2008	1340	
13251000	11/21/2008	1510	6.8
13251000	11/22/2008	1510	5.8
13251000	11/23/2008	1450	4.9
13251000	11/24/2008	1480	5.4
13251000	11/25/2008	1240	5.2
13251000	11/26/2008	1200	5.1
13251000	11/27/2008	1450	4.7
13251000	11/28/2008	1450	5
13251000	11/29/2008	1350	6.3

Site ID	Date	Q (cfs)	WT (°C)
13251000	11/30/2008	1300	6.4
13251000	12/1/2008	1410	5.7
13251000	12/2/2008	1520	6.5
13251000	12/3/2008	1420	6.2
13251000	12/4/2008	1350	5.9
13251000	12/5/2008	1440	4.8
13251000	12/6/2008	1390	5.3
13251000	12/7/2008	1340	4.9
13251000	12/8/2008	1430	5.6
13251000	12/9/2008	1300	4.6
13251000	12/10/2008	1270	4.7
13251000	12/11/2008	1280	4
13251000	12/12/2008	1410	3.3
13251000	12/13/2008	1380	3.1
13251000	12/14/2008	1310	3
13251000	12/15/2008	1200	2.2
13251000	12/16/2008	1140	1.5
13251000	12/17/2008	1050	
13251000	12/18/2008	1100	
13251000	12/19/2008	994	
13251000	12/20/2008	1110	
13251000	12/21/2008	1190	
13251000	12/22/2008	1160	
13251000	12/23/2008	1150	
13251000	12/24/2008	1210	
13251000	12/25/2008	1270	
13251000	12/26/2008	1240	
13251000	12/27/2008	1260	
13251000	12/28/2008	1220	
13251000	12/29/2008	1400	
13251000	12/30/2008	2040	
13251000	12/31/2008	1880	
13251000	1/1/2009	1560	
13251000	1/2/2009	1560	
13251000	1/3/2009	1720	
13251000	1/4/2009	1820	
13251000	1/5/2009	1750	
13251000	1/6/2009	1610	
13251000	1/7/2009	1490	
13251000	1/8/2009	1720	
13251000	1/9/2009	2370	
13251000	1/10/2009	1890	
13251000	1/11/2009	1730	
13251000	1/12/2009	1370	
13251000	1/13/2009	1190	
13251000	1/14/2009	1470	

Site ID	Date	Q (cfs)	WT (°C)
13251000	1/15/2009	2070	
13251000	1/16/2009	1440	
13251000	1/17/2009	1340	2.6
13251000	1/18/2009	1050	2.5
13251000	1/19/2009	1000	2.4
13251000	1/20/2009	1000	2.4
13251000	1/21/2009	1260	2.1
13251000	1/22/2009	1250	2.4
13251000	1/23/2009	1320	2.9
13251000	1/24/2009	1370	3.2
13251000	1/25/2009	1320	3.2
13251000	1/26/2009	1310	1.6
13251000	1/27/2009	1070	0.6
13251000	1/28/2009	815	2.3
13251000	1/29/2009	778	3.2
13251000	1/30/2009	841	3.5
13251000	1/31/2009	890	2.8
13251000	2/1/2009	875	2.6
13251000	2/2/2009	871	3.3
13251000	2/3/2009	1010	3.6
13251000	2/4/2009	1370	3.3
13251000	2/5/2009	1180	3.2
13251000	2/6/2009	1220	4.2
13251000	2/7/2009	1270	5.2
13251000	2/8/2009	1240	4.1
13251000	2/9/2009	1250	3.6
13251000	2/10/2009	1220	2.8
13251000	2/11/2009	1240	3.8
13251000	2/12/2009	1220	3.8
13251000	2/13/2009	1190	4.2
13251000	2/14/2009	1160	4.7
13251000	2/15/2009	1240	3.4
13251000	2/16/2009	1190	4.4
13251000	2/17/2009	1190	5.3
13251000	2/18/2009	1190	5.9
13251000	2/19/2009	1220	5.5
13251000	2/20/2009	1160	6.3
13251000	2/21/2009	1190	6
13251000	2/22/2009	1200	5.4
13251000	2/23/2009	1220	7.7
13251000	2/24/2009	1390	8.9
13251000	2/25/2009	1830	7.4
13251000	2/26/2009	1740	5.9
13251000	2/27/2009	1730	5.5
13251000	2/28/2009	1450	5.9
13251000	3/1/2009	1340	6.1

Site ID	Date	Q (cfs)	WT (°C)
13251000	3/2/2009	1470	7.9
13251000	3/3/2009	1770	7.9
13251000	3/4/2009	2630	6.5

WT = Water Temperature; (°C)= degrees Celsius; Q = discharge; cfs = cubic feet per second

Table C-3. Data provided by the Idaho State Department of Agriculture from locations in the Lower Payette River subbasin between 2000 and 2009.

ISDA Water Quality Analyses, 2000-2008											
Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	E. coli (cfu/100 mL)
North Side Tributaries and Drains											
Mesa (AU 001_02)											
4/15/2008	no water										
4/29/2008	10.4	89.1	8.6	102.4	50	7.87	15.34	86.8	1.36	0.58	>2400
5/13/2008	11.24	92.5	6.9	93.4	46	7.88	12.6	305.3	0.797	0.431	2400
5/27/2008	9.47	90	12.9	71.2	35	7.85	12.6	120	0.384	0.211	820
6/10/2008	10.66	94.2	9.9	82	40	7.89	6.54	93.8	0.397	0.184	2400
6/24/2008	9.28	92	15	89.5	44	7.78	10.4	425	0.687	0.249	1200
7/8/2008	8.79	90.5	16.7	100	49	7.73	11.5	231	0.425	0.175	1700
7/22/2008	7.66	84	19.8	80	39	7.75	17.4	268	0.368	0.098	650
8/5/2008	8.36	86.4	16.9	76.6	38	7.96	15.5	165	0.326	0.127	1000
8/19/2008	7.74	82.2	18.2	97.1	48	7.88	12.4	123	0.352	0.181	980
9/3/2008	9.71	90.2	12.1	108	53	7.72	13.1	134	0.29	0.122	690
9/17/2008	9.28	89.3	13.7	96.6	47	7.62	17.2	81.9	0.182	0.06	730
9/30/2008	9.6	91.7	13.2	105	51	7.81	16.1	36	0.104	0.047	130
10/15/2008	11.37	96.9	8.3	114	56	7.64	5.04	14.2	0.039	0.019	190
Big-4 (AU 001_02)											
4/15/2008	8.27	70.3	8.3	504	247	8.15	19.43	10.4	0.172	0.083	580
4/29/2008	6.58	61.9	12.8	355	174	7.91	35.23	52.9	0.235	0.084	440
5/13/2008	7.85	69.2	9.9	267.2	131	7.55	38.5	22.7	0.265	0.158	580
5/27/2008	6.3	61.8	14.4	235	115	7.47	44.2	40.8	0.184	0.083	610
6/10/2008	7.31	68.9	12.7	279	136	7.47	47.1	30.8	0.131	0.039	340
6/24/2008	5.81	59.6	16.6	296	145	7.43	45.8	19.3	0.2	0.122	2000
7/8/2008	5.28	55.7	18	289.2	142	7.58	42.5	13.8	0.206	0.2	310
7/22/2008	4.82	52.6	19.6	261	128	7.91	50.1	17.8	0.157	0.101	410
8/5/2008	4.65	49.5	18.2	277	136	7.63	53.1	11.7	0.157	0.1	310
8/19/2008	4.48	48.5	19.1	269	132	7.83	56.2	17.1	0.146	0.09	650
9/3/2008	5.61	54.3	13.9	286	140	7.56	52.3	10.4	0.104	0.07	490
9/17/2008	5.64	55.7	14.9	285	140	7.72	48.2	9.8	0.094	0.071	170
9/30/2008	5.89	57.6	14.4	306	150	7.87	52	8.5	0.078	0.052	410
10/15/2008	7.41	67.2	10.9	329	161	7.72	38.7	19.1	0.075	0.04	280
Bissel Creek											
BC-1 Near Idaho Blvd. (AU 015_03a)											
4/17/2008	11.07	90.6	6.8	438	215	8.05	12.15	30.9	0.214	0.077	490
5/1/2008	11.55	92.9	6	233	114	7.89	13.58	34.2	0.206	0.133	460
5/15/2008	9.62	87.2	11	208.9	102	7.59	20.7	27.3	0.184	0.117	170
5/29/2008	9.53	88.1	11.8	180	88	7.53	31.1	29.1	0.138	0.076	1100
6/12/2008	9.8	88.1	10.6	338	166	7.56	11.01	29.9	0.251	0.155	820
6/26/2008	8.65	84.5	14.2	359	176	7.78	14.5	69.5	0.268	0.163	730

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	<i>E. coli</i> (cfu/100 mL)
7/10/2008	8.27	83.1	15.6	309	152	7.8	20.9	39.8	0.238	0.169	1100
7/24/2008	8.32	83.1	15.3	383	188	8.1	19.7	29.9	0.188	0.141	460
8/7/2008	7.71	80.7	17.4	275	135	7.93	27.2	27	0.124	0.102	1300
9/4/2008	8.73	82.2	12.6	345	169	7.53	23.7	92.5	0.274	0.122	460
9/18/2008	8.28	79.7	13.6	430	231	7.69	16	19	0.207	0.156	140
10/2/2008	8.29	80.8	14.2	265	130	7.71	32.8	30.7	0.148	0.091	410
10/16/2008	9.43	85.3	11	474	232		14.8	16.1	0.168	0.13	81
BC-2 Near Black Canyon Hwy. (AU 015_03a)											
4/17/2008	10.7	88.9	7.5	164	81	7.86	12.78	59.1	0.2	0.059	2400
5/1/2008	11.39	91.9	6.1	171.5	84	7.71	9.32	56.4	0.259	0.154	1700
5/15/2008	9.88	89	10.7	151	74	7.83	16.9	21.1	0.141	0.085	190
5/29/2008	9.27	85.4	11.7	136.4	67	7.63	28.2	27.4	0.133	0.069	1600
6/12/2008	9.29	83	10.3	197.1	97	7.76	15.9	136	0.388	0.12	2400
6/26/2008	8.21	80	14.2	317	155	7.6	11.03	40.8	0.262	0.187	>2400
7/10/2008	7.75	78	15.7	286	140	7.76	14.7	135	0.305	0.149	>2400
7/24/2008	8.1	80.6	15.2	379	186	7.78	10.95	9.3	0.182	0.146	340
8/7/2008	7.32	76.9	17.5	222	109	7.83	18.6	23	0.143	0.094	920
9/4/2008	8.35	78.5	12.6	299	146	7.74	17.2	18.4	0.162	0.121	550
9/18/2008	7.56	72.8	13.7	398	195	7.73	18.1	13.6	0.254	0.153	260
10/2/2008	7.91	77	14	241	118	7.56	21.8	19	0.124	0.078	390
10/16/2008	8.47	76.9	11	429	210		10.4	19.8	0.159	0.119	69
BC-3 Near Big 4 Road (AU 015_03a)											
4/17/2008	11.06	92.6	7.7	70.6	35	7.91	10.77	20.9	0.083	0.024	340
5/1/2008	11.99	96.1	5.9	73.1	36	7.86	6.87	22.9	0.234	0.159	4
5/15/2008	10.8	96	10.1	58.8	29	7.98	13.4	28.1	0.107	0.038	2000
5/29/2008	10.11	92.8	11.5	55.2	27	7.62	23.7	27	0.085	0.032	920
6/12/2008	10.25	92.1	10.6	72.5	36	7.82	13.7	85.5	0.144	0.036	920
6/26/2008	8.26	83.2	15.7	95.6	47	7.53	2.88	34.7	0.226	0.134	2000
7/10/2008	8.07	86.1	18.5	76	37	7.78	5.12	99.1	0.236	0.133	2000
7/24/2008	8.19	85.5	17.4	125	61	7.63	2.17	58.9	0.161	0.087	>2400
8/7/2008	8.1	88.3	19.6	69	34	7.86	16.9	35.9	0.112	0.041	820
9/4/2008	9.41	88.8	12.7	109	53	7.87	9.43	23.3	0.11	0.065	610
9/18/2008	8.88	86.3	14.1	154	76	7.52	5.68	32	0.138	0.073	650
10/2/2008	9.23	89.3	13.9	101	50	7.57	19.9	30.2	0.095	0.026	410
10/16/2008	10.46	90.4	9	163	80		2.29	10.6	0.065	0.035	340
BC-4 Near Hillview Road (AU 015_03a)											
4/17/2008	10.87	92.3	8.2	71.1	35	7.89	9.37	12.6	0.073	0.021	32
5/1/2008	11.87	97.1	6.7	61.8	30	7.8	16.89	229	0.21	0.031	3
5/15/2008	10.85	96.4	10.1	57.1	28	7.93	14.3	35.5	0.088	0.026	88
5/29/2008	10.13	93.2	11.5	47.4	23	7.62	21.2	51	0.101	0.023	150
6/12/2008	10.38	93.9	10.9	62.1	30	7.8	15.4	148	0.203	0.019	200
6/26/2008	8.34	84	15.8	55.2	27	7.6	0.43	15.6	0.077	0.047	550
7/10/2008	8.11	89.4	20.1	52	26	7.9	12.2	224	0.235	0.041	2000
7/24/2006	8.47	88.4	17.3	59	29	7.81	0.34	10.1	0.065	0.04	440

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	E. coli (cfu/100 mL)
8/7/2008	8.23	91.1	20.3	54	27	7.82	7.24	13.3	0.032	0.019	48
9/4/2008	9.6	93.2	14	59	29	7.85	4.2	39.3	0.085	0.033	88
9/18/2008	9.31	91.5	14.5	65	32	7.64	5.68	85.2	0.145	0.056	47
10/2/2008	9.65	93.9	14.1	73	36	7.63	13.6	21.2	0.051	0.014	200
10/16/2008	11.28	97.2	8.8	86	42	an	2.2	1.49	0.017	0.01	10
Beacon (AU 001_02)											
4/15/2008				6.48	318	8.32	2	27.6	0.156	0.081	140
4/29/2008	7.7	70.6	11	307	150	7.78	11.8	45	0.382	0.234	>2400
5/13/2008	8.03	70.2	9.5	294.6	144	7.74	10.59	20.8	0.404	0.28	340
5/27/2008	5.97	58	14	197.7	97	7.79	12.6	19.4	0.151	0.099	490
6/10/2008	7.37	68.7	12.2	243	119	7.78	9.22	12.3	0.105	0.055	370
6/24/2008	4.49	48.7	18.9	320	157	7.59	7.6	10.9	0.277	0.204	770
7/8/2008	3.06	33.3	19.4	348	170	7.45	9.8	5.1	0.232	0.197	78
7/22/2008	2.25	25.1	20.9	276	135	7.5	13.1	5.3	0.306	0.229	>2400
8/5/2008	3.11	34.2	19.9	267.1	131	7.62	12.24	8.3	0.213	0.149	280
8/19/2008	3.09	33.8	19.8	285	140	7.77	8.35	4.8	0.13	0.092	260
9/3/2008	4.15	40	13.7	325	159	7.5	8.24	4.9	0.111	0.065	1100
9/17/2008	locked out										
9/30/2008	locked out										
10/15/2008	locked out										
Sand Hollow (AU 016_03)											
4/15/2008	9.67	86.5	10.4	461	226	8.06	0.5	3.4	0.186	0.16	1
4/29/2008	10.08	93.2	11.9	81.9	40	7.72	4.64	22	0.102	0.031	390
5/13/2008	10.79	94.3	9.4	91.9	45	7.93	6.05	64	0.248	0.083	650
5/27/2008	8.77	85	13.5	61.2	30	8.18	7.26	57.8	0.125	0.049	410
6/10/2008	9.29	86.6	12.1	70.5	35	7.87	8.14	25.4	0.083	0.03	170
6/24/2008	8.51	87	16.5	65.7	32	7.88	6.88	41.9	0.12	0.05	140
7/8/2008	7.82	82.9	18.2	83	41	7.58	2.9	94.8	0.247	0.094	290
7/22/2008	7.1	79.5	20.5	68.7	34	7.45	10.6	68.3	0.202	0.066	150
8/5/2008	7.93	83.5	17.6	75	37	8	9.93	146	0.253	0.067	550
8/19/2008	7.35	80.2	19.5	79.5	39	7.83	6.25	85	0.208	0.057	1100
9/3/2008	9.05	84.6	12.4	159	78	7.82	5.63	80.3	0.189	0.038	580
9/17/2008	8.85	87.4	14.8	98.5	48	7.25	5.33	22	0.074	0.026	120
9/30/2008	8.79	84.9	13.8	124	61	7.7	5.41	23.7	0.08	0.036	63
10/15/2008	10.6	91.5	9	100	49	7.78	8.21	13.2	0.065	0.035	250
Silverleaf (AU 001_02)											
4/15/2008	12.2	98.4	6.1	625	306	8.69	2.14	28.8	0.252	0.198	17
4/29/2008	9.88	90.3	11.3	247.9	121	8.12	8.95	290.7	0.438	0.125	250
5/13/2008	10.89	93.8	8.7	191.7	94	8.04	15.57	297.1	0.581	0.182	2000
5/27/2008	9.22	87.4	12.9	197.4	97	7.96	16.21	399	0.573	0.113	1700
6/10/2008	10.08	92.3	11.4	210	103	8.06	14.4	129	0.301	0.118	610
6/24/2008	8.99	89	14.9	245	120	7.93	14.8	280	0.425	0.169	820
7/8/2008	8.64	88.3	16.4	226	111	7.69	21.2	226	0.397	0.167	870
7/22/2008	8.01	86.3	19	218	107	7.89	22.4	285	0.466	0.164	870

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	<i>E. coli</i> (cfu/100 mL)
8/5/2008	8.73	89.8	16.9	210	103	8.07	26	125	0.319	0.142	260
8/19/2008	7.92	83.1	17.7	234	115	7.97	24.9	66.7	0.253	0.153	580
9/3/2008	9.58	90.7	12.9	238	117	7.93	70.4	70.4	0.222	0.119	1200
9/17/2008	9.34	90.6	14	274	134	7.41	23.7	43.4	0.195	0.118	200
9/30/2008	9.47	90.4	13.3	321	157	7.75	24.2	51.1	0.205	0.141	120
10/15/2008	9.75	88.7	11.1	501	246	7.99	9.63	71.3	0.299	0.205	86
County Line (AU 001_02)											
4/15/2008	10.92	92.6	8.2	136.8	67	8.1	30.35	19.4	0.086	0.016	140
4/29/2008	10.77	98.4	11.3	113.3	56	7.9	26.4	23.6	0.08	0.025	730
5/13/2008	12.13	108.6	10.3	93.4	46	8.07	40.3	11.3	0.079	0.035	220
5/27/2008	9.16	87.1	13.1	92.7	45	8	46.4	24.5	0.16	0.076	1600
6/10/2008	10.43	97.4	12.3	133.8	66	7.9	53.4	19.8	0.064	0.021	310
6/24/2008	10.66	110.6	17.1	240	118	7.92	7.69	4.4	0.14	0.1	1700
7/8/2008	10.02	107.3	18.6	203	100	7.7	9.5	5.2	0.11	0.092	610
7/22/2008	6.29	69.2	20	197	96	7.58	13.6	8.4	0.224	0.152	1000
8/5/2008	7.55	80.5	18.5	227	111	7.77	13.5	10.4	0.166	0.12	460
8/19/2008	8.55	91.9	18.9	245	120	7.94	12.1	11.6	0.139	0.094	140
9/3/2008	9.5	93.9	14.8	181	89	7.86	12.58	9.4	0.103	0.066	820
9/17/2008	10.25	104.8	16.4	175	86	7.6	13.5	15	0.111	0.064	170
9/30/2008	8.99	89.3	15.1	115	56	7.65	34.9	10.9	0.052	0.025	330
10/15/2008	11.02	98.1	10.1	112	55	7.74	38.7	7.4	0.036	0.017	64
Big Willow Creek											
BWC-1 (AU 017_04)											
4/10/2007	8.38	70.5	8	639	307	7.89	2.45	4.2	0.124	0.11	68
4/25/2007	7.76	71.4	11.5	634	316	7.73	2.91	3.6	0.133	0.118	520
5/8/2007	6.16	59	13.3	709	350	7.63	2.77	4	0.096	0.085	370
5/22/2007-moved site upstream from diversion											
5/22/2007	7.78	71.9	12	704	347	7.65	3.07	3.3	0.127	0.103	440
6/5/2007	3.57	37.2	17.8	763	383	7.19	1.46	10	0.141	0.138	870
6/19/2007	4.58	45.2	14.7	734	370	7.56	2.03	11	0.125	0.103	68
7/19/2007	2.86	31.1	19.3	670	340	7.31	1.55	2.4	0.155	0.137	240
8/1/2007	3.52	36.4	17.2	589	298	7.38	1.45	6.5	0.193	0.159	240
8/16/2007	2.73	28.1	16.9	606	307	7.38	1.68	3.4	0.146	0.132	310
8/30/2007	3.02	30.3	16	717	363	7.62	1.06	5.6	0.119	0.089	280
9/11/2007	4.15	39.2	12	747	366	7.48	1.36	4.4	0.137	0.1	490
9/26/2007	4.78	44.2	11.8	652	316		4.23	10.6	0.167	0.143	290
10/10/2007	4.86	45.7	12.9	793	397	7.47	2.3	3.5	0.132	0.116	160
10/23/2007	6.05	52.5	9.2	944	451	7.7	4.22	4.3	0.134	0.13	26
BWC-2 (AU 017_03)											
4/10/2007	9.2	77.6	8	437	217	7.77	4.48	4.4	0.182	0.108	390
4/25/2007	7.8	69.2	10.1	590	297	7.66	1.09	1.1	0.099	0.094	260
5/8/2007	7.31	68.2	12.2	590	296	7.68	1.31	3.4	0.087	0.083	520
5/22/2007	7.6	69.8	11.5	584	293	7.65	1.24	3.2	0.103	0.085	220
6/5/2007	5.81	57.4	15	552	280	7.46	1.32	5	0.13	0.128	410

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	<i>E. coli</i> (cfu/100 mL)
6/19/2007	6.14	61.1	15.1	509	256	7.57	1.83	9.4	0.096	0.09	290
7/2/2007	4.88	52	17.8	414	210	7.23	1.55	4.3	0.094	0.093	690
7/19/2007	5.04	59.5	19.1	507	255	7.4	1.26	3.5	0.155	0.137	240
8/1/2007	5.28	56.5	18.5	520	262	7.49	1.31	5.6	0.153	0.135	130
8/16/2007	4.66	47.8	16.8	559	280	7.38	0.59	2.1	0.15	0.15	65
8/30/2007	5.63	57.2	16.3	457	228	7.61	1.21	7.3	0.573	0.516	2400
9/11/2007	5.85	56.2	13.4	631	310	7.51	1.15	1.6	0.131	0.132	160
9/26/2007	5.6	50.9	11.1	678	332		0.87	2.5	0.152	0.137	140
10/10/2007	5.21	44.8	11.8	646	323	7.38	1.05	1.4	0.137	0.128	91
10/23/2007	5.74	45.2	8.6	655	319	7.54	1.3	1.5	0.132	0.127	180
BWC-3 (AU 017_03)											
4/10/2007	10.04	86.1	8.5	156.7	78.6	8.31	9.3	1.5	0.022	0.014	4
4/25/2007	9.55	87.6	11.6	160	79.9	8.32	7.75	2.8	0.03	0.025	10
5/8/2007	8.72	84.3	13.9	162	81	8.21	6.57	4.9	0.037	0.031	17
5/22/2007	9.28	85.5	11.5	185.4	93.6	8.23	5.93	3.6	0.036	0.03	14
6/5/2007	7.59	78.5	17	158.5	79.2	8.02	6.11	4.8	0.046	0.046	120
6/19/2007	8.36	82.8	14.9	193.6	92	8.11	4.92	3.2	0.04	0.04	55
7/2/2007	7.85	81.5	17.1	158.4	80.1	8.04	4.46	4.9	0.047	0.039	110
7/19/2007	7.28	79	19.7	185.4	94.1	8.03	4.16	4.2	0.044	0.043	40
8/1/2007	7.9	83.2	18	204	103	8.12	4.22	2.5	0.035	0.023	18
8/16/2007	7.57	78.9	17.3	158.1	79.4	7.99	4.94	1.2	0.027	0.027	21
8/30/2007	7.92	80.8	16.3	187.8	93.3	8.1	5.62	1	0.029	0.025	25
9/11/2007	8.39	78.3	12.3	162.3	80.8	8.05	6.01	1.2	0.026	0.02	1
9/26/2007	8.91	79.1	10.1	165.7	82.8		5.58	1.2	0.023	0.019	10
10/10/2007	7.87	74.4	12.9	188.1	91	7.87	6.09	1	0.017	0.017	<1
10/23/2007	9.18	75.5	9	184.1	92	8.03	6.45	0.025	0.02	0.015	<1
Little Willow Creek											
LWC-1 (AU 018_04)											
4/10/2007	11.78	105.4	10.5	609	310	8.2	1.88	9.2	0.273	0.24	75
4/25/2007	11.97	113.9	13.1	780	394	8.17	1.45	15.2	0.28	0.28	150
5/8/2007	10.48	109	17.1	657	337	8.33	5.55	34.7	0.363	0.242	1600
5/22/2007	9.7	93.3	13.6	556	282	8.08	2.56	64.7	0.445	0.327	2400
6/5/2007	6.6	6.5	15.6	593	298	7.8	3.25	45.7	0.539	0.406	1700
6/19/2007	8.6	91.2	18.2	578	297	8.05	3.03	86.2	0.638	0.345	2000
7/2/2007	7.3	76.3	18.5	526	270	7.91	6.23	165	0.874	0.382	1700
7/19/2007	6.85	79.4	22.8	495	249	7.87	9.59	151.4	0.911	0.406	920
8/1/2007	7.74	85.7	20.3	487	245	8.03	15.39	109.2	0.565	0.432	730
8/16/2007	7.71	82.2	18.5	486	249	7.93	13.6	24.7	0.5	0.038	610
8/30/2007	8.2	86.2	18.2	577	298	8.11	4.18	33.7	0.535	0.406	690
9/11/2007	8.49	83.3	14.5	496	259	8.06	14.7	46.8	0.454	0.314	730
9/26/2007	8.98	84.6	12.7	570	298		16.7	42.3	0.796	0.318	280
10/10/2007	8.25	76.3	11.9	727	365	8.08	9.2	34	0.373	0.321	180
10/23/2007	10.52	91.6	9.2	735	374	8.34	12.8	27.3	0.345	0.303	93

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	E. coli (cfu/100 mL)
LWC-2 (AU 018_04)											
4/10/2007	11.28	104.7	12	356	179	8.26	6.37	6.5	0.194	0.148	190
4/25/2007	10.9	103	12.8	181.5	90.5	8.43	21.57	15.4	0.175	0.146	520
5/8/2007	10.76	110.8	16.6	164	82	8.42	31.1	16.1	0.24	0.151	440
5/22/2007	12.91	127.4	14.7	201	100	8.69	18.36	11.1	0.228	0.163	310
6/5/2007	8.59	87.8	16.3	174.1	87.1	7.86	21.1	12.7	0.25	0.198	650
6/19/2007	11.33	120.7	18.4	179.9	89.2	8.64	26.7	6.4	0.212	0.148	280
7/2/2007	9.27	100.1	19	194	98	7.93	23.8	20	0.299	0.211	1000
7/19/2007	8.01	94.2	23.5	194	98	7.85	24.1	56.2	0.696	0.349	2000
8/1/2007	8.5	96.2	21.6	195	98	7.92	25.2	27.2	0.49	0.345	920
8/16/2007	8.15	88.7	19.5	209	106	7.79	21.9	5.8	0.392	0.298	650
8/30/2007	9.26	98.8	18.5	240	121	8.01	16.14	7.3	0.365	0.246	920
9/11/2007	9.79	97.3	15.1	279	143	7.97	15.18	8.7	0.299	0.213	220
9/26/2007	10.41	96.8	12.1	305	158		7.54	16	0.271	0.191	270
10/10/2007	9.28	85.7	11.9	510	256	7.98	4.52	4.4	0.239	0.21	490
10/23/2007	11.8	103.1	9.4	494	255	8.26	4.38	7.5	0.232	0.206	290
LWC-3 (AU 018_04)											
4/10/2007	10.8	95.7	10	302	151	7.92	3.73	3.3	0.149	d	310
4/25/2007	10.14	91.6	10.9	154.8	77.5	8.01	16.3	8.5	0.152	0.126	410
5/8/2007	9.19	90.3	14.6	128	65	8.06	13.1	12.2	0.19	0.113	190
5/22/2007	9.7	93.3	13.6	160	79.5	8.03	12.2	9	0.231	0.151	580
6/5/2007	7.97	81.3	16.3	131.4	65.9	7.77	14.6	12.3	0.246	0.182	690
6/19/2007	8.43	88	17.3	144.9	73.4	8.05	18.3	11.9	0.221	0.14	300
7/2/2007	7.95	85.7	18.9	137.9	69.6	7.75	17.6	13.7	0.29	0.211	200
7/19/2007	7.19	82.9	22.2	150.6	75.9	7.89	19.4	20.6	0.63	0.351	210
8/1/2007	7.68	86.2	21.2	152.2	77.1	7.87	20.1	13.2	0.612	0.374	330
8/16/2007	7.31	80.5	19.9	149	75	7.78	16	4.2	0.255	0.252	140
8/30/2007	7.5	79.4	18.1	169.9	85.5	7.76	15.1	5.8	0.332	0.215	440
9/11/2007	8.37	81.4	14.4	167.9	85.3	7.87	10.16	4.5	0.261	0.164	200
9/26/2007	8.83	81	11.5	197	100		11.25	12.3	0.266	0.164	160
10/10/2007	7.76	71.2	11.6	387	194	7.72	1.88	6.1	0.239	0.189	100
10/23/2007	8.21	68.3	7.6	386	200	7.81	1.62	4.1	0.203	0.174	23
Payette Drain											
PD-3 (AU 018_04)											
4/30/2003	10.09	86.5	9.9	92	46	7.6		13	0.05	<0.05	150
5/14/2003	10.19	97.9	13.6	97	49	7.64		19	0.06	<0.05	450
5/29/2003	8.63	86.8	18.5	61	31	7.13		49	0.1	<0.05	550
6/12/2003	8.52	87	16.4	64	34	7.15		37	0.07	<0.05	530
6/25/2003	8.52	87.5	16.6	77	39	7.07		19	0.05	<0.05	360
7/10/2003	7.59	86.8	22.2	86	44			25	<0.05	<0.05	>2500
7/24/2003	5.88	70.8	24.5	97	50			29	0.08	<0.05	170
8/6/2003	6.36	73.9	23.1	93	47			19	<0.05	<0.05	100
8/20/2003	7.45	85.9	22.4	103	51			12	0.08	<0.05	140
9/3/2003	7.62	84.8	20.9	110	56			30	0.08	<0.05	80

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	<i>E. coli</i> (cfu/100 mL)
9/18/2003	9.4	92.2	14.4	178	89			8	<0.05	<0.05	80
10/1/2003	8.24	84.7	16.8	194	98	8.03		18	0.06	<0.05	210
10/21/2003	9.15	87.9	13.6	186	94	8		19	<0.05	<0.05	130
South Side Irrigation Drains											
Tunnel #7 (AU 001_02)											
4/15/2008	12.87	114.5	10.2	182	89	8.77	15.1	17.9	0.133	0.057	490
4/29/2008	9.98	95.1	13.3	185.3	91	7.94	25.2	20.7	0.152	0.07	490
5/13/2008	11.82	109.1	11.7	163.2	80	8.17	41	11.7	0.14	0.084	690
5/27/2008	9.11	91.5	15.6	174.8	86	7.84	42.3	20.2	0.131	0.065	460
6/10/2008	10.46	102.8	14.5	187	91	7.92	31.9	18	0.132	0.064	440
6/24/2008	12.14	131.4	19.4	163.8	80	8.1	2.86	7.2	0.148	0.107	160
7/8/2008	9.49	106.2	20.7	189	93	7.51	4.2	5.3	0.148	0.106	70
7/22/2008	8.3	93.2	20.5	222	109	7.73	13.3	16.4	0.286	0.077	550
8/5/2008	10.05	111.2	20.1	202	99	7.99	15.2	9.9	0.105	0.066	220
8/19/2008	9.93	109.9	20.4	191.1	94	8.06	22.8	15.5	0.116	0.076	250
9/3/2008	10.42	104.5	15.4	185	91	7.85	24.2	11.8	0.093	0.057	280
9/17/2008	10.31	105.5	16.6	187	92	7.67	25.6	12.5	0.098	0.06	610
9/30/2008	10.33	103.4	15.4	171	84	7.75	36.7	15.7	0.092	0.055	180
10/15/2008	11.77	108	11.5	205	101	7.93	39.6	6.2	0.074	0.052	58
Sevenmile Slough (AU 001_02)											
4/15/2008	11.29	94.2	7.6	165.3	81	7.97	59.48	23.3	0.114	0.023	2000
4/29/2008	9.71	91	12.7	115	56	7.8	46.87	18.5	0.105	0.023	1200
5/13/2008	11.06	101.3	11.5	129.4	63	7.78	55.02	13.5	0.088	0.029	250
5/27/2008	8.16	80.6	14.7	103.2	51	7.85	23.84	22.3	0.102	0.02	310
6/10/2008	9.92	96.5	14.2	116	57	7.6	25.48	15.9	0.08	0.02	460
6/24/2008	9.16	97	19	171.1	84	7.88	13.54	11.4	0.071	0.026	210
7/8/2008	7.89	88.9	21.1	176	86	7.57	1.62	13	0.079	0.029	390
7/22/2008	7.03	69.9	21.4	107	52	7.6	15.18	10.6	0.08	0.028	520
8/5/2008	7.56	84.7	21.1	120	59	7.74	23.51	12.8	0.072	0.02	650
8/19/2008	7.27	82.3	21.4	114	56	7.78	18.72	6.3	0.06	0.016	180
9/3/2008	8.38	82.8	14.7	129	63	7.73	10.11	4.6	0.04	0.018	280
9/17/2008	8.13	82.6	16.2	161	79	7.34	9.37	6.9	0.071	0.033	520
9/30/2008	7.91	77.5	14.4	152	75	7.55	12.72	4.7	0.044	0.012	650
10/15/2008	10.4	90.8	9.5	138	68	7.7	24.3	5.1	0.03	0.013	410
S- Drains											
S-8 (AU 001_02)											
4/13/2000	8.76	83.7	13.1	300	149	7.87	6.2	244	0.37	0.1	500
4/25/2000	8.83	82.1	11.9	334	166	7.65	8.5	208	0.29	0.05	460
5/10/2000	8.7	80.6	11.9	301	151	8.2	11.9	114	0.23	0.07	240
5/25/2000	9.89	88.8	15.4	236	120	7.91	12.2	165	0.26	0.08	240
6/8/2000	9.85	100	16.2	339	171	7.91	11.5	162	0.19	0.1	1200
6/22/2000	9.32	94.8	16.4	330	167	7.76	12.6	147	0.24	0.1	2800
7/6/2000	9.57	95.2	15	326	165	7.74	15.6	136	0.26	0.12	230
7/19/2000	10.01	102.3	16.4	362	182	7.63	14.1	120	0.24	0.14	270

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	<i>E. coli</i> (cfu/100 mL)
8/3/2000	7.25	75.1	17.2	333	166	7.93	19.8	42	0.2	0.17	6500
8/15/2000	7.75	78	15.8	344	173	7.94	19.9	25	0.12	0.12	1700
8/31/2000	7.87	77.4	14.9	375	188	7.85	17.6	15	0.16	0.13	2500
9/14/2000	7.47	73.8	14.9	414	208	7.98	13.4	27	0.16	0.13	200
9/28/2000	8.13	77.7	13.3	299	148	8	22.2	30	0.09	0.09	70
10/14/2000	8.31	76.1	12	326	159	7.89	23.1	26	0.15	0.1	1200
10/19/2000	8.29	78	12.5	446	222	8.1	8.86	26	0.16	0.11	33
11/15/2000	9.81	85.6	9.5	578	284	8.31	3.98	8	0.15	0.14	33
12/13/2000	10.2	87.1	8.6	593	285	8.49	4.05	13	0.18	0.14	33
1/31/2001	11.1	89.1	6.1	596	295	8.41	2.56	21	0.12	0.12	1100
2/22/2001	10.01	86.4	8.8	585	287	8.41	3.34	33	0.17	0.14	460
3/14/2001	10.79	91.2	8	571	291	8.39	3.22	17	0.16	0.1	93
4/3/2001	11.31	93.1	6.9	441	214	8.25	3.9	70	0.2	0.11	1100
4/18/2001	8.64	80.6	12.2	228	114	8.23	10.13	151	0.23	0.08	240
5/2/2001	8.55	76.4	10.4	234	117	8.06	12.9	186	0.37	0.15	4600
5/16/2001	8.64	84.3	13.9	252	126	7.99	14.8	62	0.22	0.12	930
5/31/2001	7.89	75.3	14.9	273	139	7.89	13.1	87	0.24	0.13	430
6/13/2001	7.99	75.1	12.6	297	149	7.97	17.4	50	0.19	0.11	930
6/26/2001	9.88	101.3	16.1	340	177	8.03	15.8	52	0.17	0.11	210
7/12/2001	7.33	76.2	18.3	352	178	7.98	14.3	51	0.13	0.1	300
7/19/2001	9.84	100.2	16.2	313	156	7.89	17	40	0.17	0.12	600
8/7/2001	7.43	77.1	17.6	362	182	8.02	15.5	49	0.16	0.13	1400
8/23/2001	7.74	78.4	16	398	199	8.21	13.8	42	0.19	0.1	200
9/5/2001	8.12	80.9	15.3	452	232		10.3	41	0.19	0.14	300
9/26/2001	9.13	86.3	12.9	453	227	8.16	9.66	35	0.14	0.13	200
10/4/2001	9.07	86	12.8	428	213	8.16	7.27	35	0.14	0.12	1400
10/18/2001	10.5	92.1	9.6	426	209	8.15	7.02	37	0.13	0.11	130
11/15/2001	10.56	94.9	10.5	561	278	8.37	4.11	8	0.12	0.1	200
12/12/2001				585	283		3.82	10	0.2	0.12	<33
1/17/2002	11.21	93.8	7.6	600	290	8.42	2.86	23	0.17	0.11	70
2/6/2002	11.83	94	5.6	596	295	8.39	2.25	36	0.19	0.12	40
3/13/2002	10.56	89	8	589	288	8.25	2.16	19	0.12	0.11	60
4/22/2008	9.91	90.7	11.4	311	152	8.14	9.69	274	1.02	0.135	460
5/6/2008	9.53	95.7	15.3	337	165	8.22	13.6	114.8	0.391	0.172	99
5/20/2008	9.14	89.2	14.4	378	185	8.24	15.8	97.7	0.29	0.119	1400
6/3/2008	8.73	86.4	14.9	408	200	8.23	15.2	94.8	0.309	0.136	1000
6/17/2008	9.42	99.6	18.1	386	189	8.42	6.19	106	0.306	0.151	440
7/1/2008	8.79	96.2	19.7	416	204	8.24	8.06	433	0.651	0.202	1400
7/15/2008	9.34	98.8	18.1	372	182	8.34	12.2	210	0.352	0.136	520
7/29/2008	9.1	95.6	17.7	403	198		13.4	81.1	0.269	0.154	610
8/12/2008	9.93	105.2	18.1	341	167	8.51	19.1	83.9	0.259	0.134	410
8/27/2008	10.46	103.4	14.8	363	178	8.47	18.1	51.5	0.199	0.106	580
9/9/2008	10.57	104.9	15	393	193	8.21	12.5	51.8	0.239	0.151	200
9/23/2008	11.04	105.9	13.5	380	186	8.35	24.7	42.2	0.17	0.096	75
10/7/2008	10.18	98.4	13.8	337	165	8.31	23.2	122	0.366	0.078	140

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	<i>E. coli</i> (cfu/100 mL)
S-10 (AU 001_02)											
4/13/2000	8.95	86.2	13.5	221	110	7.82	18	45	0.1	<0.05	460
4/25/2000	8.87	83	12.5	228	113	7.57	11.8	22	0.08	<0.05	120
5/10/2000	8.82	82.6	12.3	212	106	8.22	19.6	32	0.13	0.05	520
5/25/2000	8.81	88.4	15.6	232	118	8.02	12.6	479	0.66	0.14	>5000
6/8/2000	9.76	100.9	16.9	237	118	7.85	16.7	72	0.12	0.12	40
6/22/2000	10.25	103.8	15.9	390	199	7.74	8.9	72	0.17	0.12	1000
7/6/2000	9.46	94.9	15.6	307	155	7.56	12.9	314	0.49	0.17	1100
7/19/2000	9.48	97.8	16.8	340	172	7.61	13.5	173	0.32	0.17	3500
8/3/2000	7.74	80.1	16.8	336	169	7.98	14.2	261	0.55	0.25	2000
8/15/2000	7.98	80.5	15.6	375	187	7.97	16.3	420	0.77	0.3	2100
8/31/2000	7.92	82.2	17.2	234	117	7.94	24.4	37	0.4	0.12	>8300
9/14/2000	7.99	83.2	17.3	195	98	7.84	25.3	58	0.13	0.06	230
9/28/2000	8.76	84.3	13.9	198	95	8.04	27.9	46	0.11	0.06	830
10/14/2000	8.97	83.1	11.9	216	106	7.91	28.7	43	0.15	0.08	100
10/19/2000	8.83	82.6	12.3	329	164	8.12	7.89	41	0.1	0.08	170
11/15/2000	10.39	93	10.4	550	264	8.31	2.31	7	0.13	0.12	33
12/13/2000	10.4	91.5	9.4	555	266	8.55	4.92	7	0.15	0.11	<33
1/31/2001	11.14	93.2	7.5	561	275	8.47	1.59	13	0.17	0.11	23
2/22/2001	9.97	87.4	9.4	564	279	8.39	2.48	30	0.12	0.12	240
3/14/2001	10.79	93.2	9	557	280	8.4	1.94	11	0.14	0.09	24
4/3/2001	10.57	88.4	7.6	510	244	8.16	1.94	42	0.18	0.12	120
4/18/2001	8.67	81.4	12.5	190	95	8.24	17.1	123	0.19	0.08	430
5/2/2001	8.58	77.5	10.8	247	124	8.09	10.9	42	0.12	0.1	11000
5/16/2001	8.79	85.2	13.8	258	129	8.01	21.2	62	0.33	0.27	90
5/31/2001	8.89	86.5	15.4	267	132	8.02	17.1	26	0.22	0.19	930
6/13/2001	8.9	84.6	13.6	270	137	8.17	13.2	43	0.26	0.21	430
6/26/2001	9.49	98.4	16.8	307	157	8.27	20.2	33	0.17	0.16	210
7/12/2001	7.89	82.2	17.1	382	192	8.05	22.1	36	0.3	0.27	
7/19/2001	7.92	83.2	17	306	153	8.01	23.5	162	0.37	0.15	550
8/7/2001	7.97	85.9	18.9	330	166	8.13	20.1	151	0.52	0.19	2700
8/23/2001	8.29	84.2	15.9	386	193	8.28	22.6	172	0.46	0.15	600
9/5/2001	8.22	81.7	15.1	410	208	13	2.43	10	0.23	133	>25000
9/26/2001	9.24	89.5	13.9	310	155	8.28	15.1	56	0.14	0.11	2000
10/4/2001	9.27	90.1	14.1	287	143	8.14	14.4	38	0.13	0.09	400
10/18/2001	10.59	94.6	10.4	266	130	8.09	13.6	25	0.08	0.06	33
11/15/2001	10.71	97.9	11.1	534	265	8.3	3.56	58	0.18	0.12	<33
12/12/2001				570	275		3.74	68	0.23	0.1	33
1/17/2002	10.4	89.2	8.6	577	281	8.27	2.95	93	0.21	0.1	<10
2/6/2002	11.21	92.3	6.8	576	286	8.21	2	59	0.17	0.12	90
3/13/2002	11.02	94.3	8.5	577	285	8.27	2.14	16	0.1	0.1	
4/22/2008	10.69	93.3	9.4	457	224	8.35	5.73	177.3	0.647	0.369	46
5/6/2008	9.67	93.8	13.5	434	212	8.31	13.3	143.9	0.432	0.119	250
6/3/2008	10.1	98.8	14.6	446	218	8.42	6.2	82	0.255	0.083	280
6/17/2008	10.22	104.6	16.6	408	200	8.44	5.65	81.3	0.342	0.218	370
7/1/2008	9.62	103.8	19	380	186	8.25	20.6	66.9	0.317	0.2	220
7/15/2008	9.74	102.1	17.7	418	205	8.28	12.3	101	0.298	0.142	390

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	<i>E. coli</i> (cfu/100 mL)
7/29/2008	9.09	95.8	16.9	392	192		19.4	112	0.314	0.134	490
8/12/2008	9.87	102.7	17.3	448	220	8.4	20.6	69.6	0.238	0.135	180
8/27/2008	10.71	104.4	14.2	408	200	8.45	15.7	73.1	0.278	0.139	2000
9/9/2008	11.44	110.2	13.6	451	221	8.28	15.6	52	0.262	0.145	250
9/23/2008	11.79	110.6	12.4	434	213	8.37	13.2	39.7	0.172	0.091	60
10/7/2008	10.24	97.7	13.2	465	228	8.17	14.1	154	0.432	0.074	83
S-12 (AU 001_02)											
4/13/2000	8.28	77.1	12	979	489	8.12	0.74	23	0.24	0.23	160
4/25/2000	8.31	75.2	10.8	823	412	7.82	0.94	26	0.2	0.17	280
5/10/2000	9.54	86.2	10.8	786	389	8.32	2.21	15	0.19	0.14	500
5/25/2000	9.84	92.9	12.8	577	292	8.04	3.9	40	0.28	0.2	180
6/8/2000	10.8	104.7	13.9	508	254	8.05	5.3	56	0.19	0.19	480
6/22/2000	9.33	93.1	15.3	386	195	7.74	6.3	123	0.32	0.21	870
7/6/2000	10.45	102.6	14.6	318	160	7.68	11.7	68	0.26	0.15	400
7/19/2000	9.15	91.6	15.5	474	239	7.72	11.6	81	0.37	0.22	67
8/3/2000	7.88	81	16.7	427	216	8.02	12.3	68	0.28	0.17	1100
8/15/2000	7.98	79	14.7	473	236	8	8.52	41	0.24	0.21	500
8/31/2000	7.66	74.8	14.1	421	210	7.89	8.88	13	0.2	0.13	1000
9/14/2000	7.17	71.7	15.3	336	169	7.86	4.2	107	0.25	0.09	1000
9/28/2000	8.46	78	11.6	403	205	7.95	4.1	103	0.26	0.17	270
10/12/2000	7.55	69.5	11.6	437	218	7.97	3.14	190	0.32	0.13	270
10/19/2000	8.18	75.5	11.8	479	240	8.03	2.11	160	0.29	0.12	230
11/15/2000	10.17	83.8	7.1	799	397	8.25	1.9	73	0.32	0.23	33
12/13/2000	10.53	85.7	6.1	820	402	8.44	1.28	207	0.51	0.26	33
1/31/2001	11.41	84.1	3.1	818	400	8.36	0.69	893	0.78	0.21	1100
2/22/2001	10.11	82.1	6.4	824	408	8.31	0.8	1380	0.81	0.24	>2400
3/14/2001	10.61	84.5	5.8	812	401	8.29	0.81	1300	1.16	0.19	460
4/3/2001	12.61	99.1	5.1	853	414	8.23	1.03	192	0.4	0.22	23
4/18/2001	7.97	71.9	10.6	292	144	8.03	2.4	958	1.05	0.14	240
5/2/2001	8.17	69.3	8.1	374	185	8.11	6.46	356	0.59	0.21	430
5/16/2001	7.2	67.8	12.8	348	174	8	7.48	512	0.72	0.2	430
5/31/2001	8.97	80.2	14.7	285	142	7.96	5.46	143	0.39	0.14	1500
6/13/2001	9.2	91.2	11.9	274	135	7.97	13.1	55	0.23	0.15	40
6/26/2001	7.88	82.6	16.1	342	172	7.98	8.33	108	0.17	0.14	930
7/12/2001	7.26	74.2	19	349	174	7.95	8.12	110	0.28	0.13	530
7/19/2001	9.12	90.3	15.8	362	179	7.95	9.2	91	0.21	0.11	1500
8/7/2001	7.65	76.5	17.4	515	258	8.03	9.02	51	0.3	0.24	700
8/23/2001	8.34	84.9	16.3	467	232	8.31	17	116	0.28	0.12	800
9/5/2001	8.41	84	15.3	503	251		6.6	103	0.35	0.22	800
9/26/2001	8.94	84.7	12.8	372	183	7.84	6.39	131	0.3	0.16	700
10/4/2001	8.96	81.5	11.1	473	234	8.02	3.6	141	0.32	0.16	500
10/18/2001	10	85.8	8.9	462	225	8.04	4.92	115	0.2	0.11	670
11/15/2001	9.64	89	8.7	783	388	8.25	2.16	118	0.34	0.22	<33
12/12/2001	10.42	87	7.1	842	412		3.17	174	0.43	0.21	33
1/17/2002	11.17	91.3	6	838	404	8.3	0.88	309	0.52	0.22	40
2/6/2002	11.65	88	3.2	822	406	8.32	0.34	312	0.47	0.23	20
3/13/2002	10.5	82.7	5.3	819	406	8.25	0.32	1420	1.57	0.2	

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	<i>E. coli</i> (cfu/100 mL)
4/22/2008	10.17	85.7	7.9	303	148	8.18	12.75	336.4	2.21	0.173	180
5/6/2008	9.3	89.5	13.74	547	268	8.25	2.8	201.5	0.518	0.18	250
6/3/2008	8.1	80.4	14.8	436	214	8.19	5.1	138	0.322	0.125	610
6/17/2008	8.93	90.7	16.2	406	199	8.3	5.33	90.3	0.323	0.167	340
7/1/2008	8.55	91	18.3	399	196	8.08	7.88	186	0.502	0.203	770
7/15/2008	8.84	90.5	16.4	572	280	8.18	3.45	65.3	0.355	0.249	580
7/29/2008	8.36	86.4	16.9	426	208	8.24	78.8	78.8	0.285	0.426	390
8/12/2008	7.86	81.2	16.9	376	184	8.24	13.5	89.7	0.374	0.248	390
8/27/2008	8.66	83.3	13.6	377	185	8.18	14.3	32.6	0.51	0.383	410
9/9/2008	9.15	88.5	13.8	385	189	8.06	7.87	45.2	0.356	0.221	920
9/23/2008	10.35	95.8	11.9	505	248	8.22	5.02	25.2	0.194	0.138	240
10/7/2008	10.49	98.3	12.4	487	238	8.12	5.3	31.8	0.389	0.298	310
S-13 East (AU 001_02)											
5/25/2000	8.1	79.8	14.8	314	160	7.95	0.34	0.29	0.09	171	800
6/8/2000	9.94	99.9	15.5	310	150	7.84	5.3	0.72	0.12	838	3600
6/22/2000	9.56	99.8	17.4	274	141	7.77	7.26	0.57	0.14	402	900
7/6/2000	9.46	96.6	16.3	246	125	7.83	7.88	0.19	0.09	74	670
7/19/2000	9.16	96.9	18	306	154	7.62	7.76	0.32	0.14	137	430
8/3/2000	6.81	73.4	19	389	195	7.82	4.64	0.33	0.14	120	430
8/15/2000	6.1	64.7	18.2	399	201	7.88	6.65	0.22	0.14	71	1300
8/31/2000	7.66	77.7	16	333	166	7.82	17.2	0.46	0.14	133	>8300
9/14/2000	6.55	67.3	16.7	424	215	7.86	7.69	0.12	0.07	26	900
9/28/2000	8.1	76.1	12.6	455	230	7.9	5.1	0.22	0.18	56	570
10/14/2000	7.76	73.1	12.7	649	322	8.02	1.89	0.21	0.17	42	800
10/19/2000	8.18	77.5	13	699	349	8.09	1.51	0.2	0.16	67	33
11/15/2000	8.72	78.8	11	746	361	8.23	0.91	0.25	0.13	91	130
12/13/2000	9.47	84	10.1	735	360	8.57	0.73	0.23	0.15	58	100
1/31/2001	10.38	87.7	8.2	729	358	8.39	0.5	0.25	0.11	83	93
2/22/2001	9.67	84.5	9.4	755	372	8.38	0.79	0.27	0.14	90	460
3/14/2001	10.58	92.7	9.5	718	363	8.36	0.46	0.18	0.09	41	1100
4/3/2001	10.69	91.1	8.4	777	376	8.22	0.64	0.19	0.12	46	460
4/18/2001	8.81	82.7	12.5	302	154	8.21	1.58	1.02	0.12	963	4600
5/2/2001	9.31	83.5	10.6	298	155	8.14	3.27	0.63	0.12	372	930
5/16/2001	7.8	74.7	13.4	353	176	8.02	5.3	0.77	0.28	327	4600
5/31/2001	9.86	98.5	15.5	323	165	7.88	6.96	0.81	0.23	445	2400
6/13/2001	8.34	79.6	13.2	277	139	8.13	8.63	0.27	0.13	180	1500
6/26/2001	9.14	95.2	18	281	141	8.02	8.1	0.36	0.09	267	11000
7/12/2001	6.95	72.2	19.1	447	227	8.13	6.1	0.94	0.29	468	770
7/19/2001	9.35	95.6	16.4	395	197	7.93	7.32	0.44	0.13	202	12600
8/7/2001	7.62	83.4	19.8	407	205	8.19	8.52	0.38	0.17	237	2400
8/23/2001	7.91	81.1	16.6	522	260	8.22	8.33	0.83	0.61	93	1700
9/5/2001	7.44	78	17.6	544	274	6.69	5.35	0.51	31	7	
9/26/2001	9.18	87.1	13.1	637	322	8.22	3.1	0.42	0.41	39	400
10/4/2001	9.13	86.6	13	717	361	8.17	1.51	0.2	0.15	86	700
10/18/2001	9.2	85.2	11.9	762	368	8.13	3.1	0.14	0.13	11	370
11/15/2001	10.4	96.6	12	739	361	8.3	2.43	0.19	0.15	53	100

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	<i>E. coli</i> (cfu/100 mL)
12/12/2001				755	367		2.15	0.26	0.1	78	170
1/17/2002	11.02	95.7	9.3	755	361	8.28	0.48	0.44	0.1	263	20
2/6/2002	10.61	89.6	8	747	368	8.44	0.42	0.3	0.11	203	<10
3/13/2002	10.88	96	9.7	734	363	8.54	0.39	0.22	0.11	56	
4/22/2008	11.28	91.4	6.3	336	165	8.23	18.8	0.84	0.165	283.5	260
5/6/2008	9.35	87.6	12.4	416	204	8.14	23.5	0.872	0.144	586	550
5/20/2008			14.6	408	200	8.01	36.8	0.582	0.166	271	920
6/3/2008	8.8	85.7	14.2	371	182	8.1	35	0.564	0.12	280	820
6/17/2008	8.94	89.1	15.2	364	178	8.14	33.2	0.613	0.15	283	920
7/1/2008	8.32	86.9	17.4	400	196	8.03	30.5	0.709	0.156	337	980
7/15/2008	8.13	84.7	17.4	416	204	8.1	24.5	0.58	0.193	236	310
7/29/2008	8.55	87.7	16.6	434	217		30.7	0.397	0.166	154	440
8/12/2008	8.67	87.6	15.9	426	209	8.19	35.3	0.47	0.17	200	520
8/27/2008	8.98	85.6	13.2	478	234	8.19	35.2	0.391	0.186	110	690
9/9/2008	8.74	83.7	13.4	460	225	7.98	33.5	0.371	0.198	107	580
9/23/2008	9.54	88.7	12.1	528	259	8.12	21.1	0.347	0.109	149	290
10/7/2008	9.75	92.1	12.8	435	213	7.99	20.3	0.233	0.079	77.3	200
S-13 West (AU 001_02)											
4/13/2000	8.3	80.3	13.8	255	127	7.67	3.3	0.48	0.17	191	460
4/25/2000	8.2	77.6	12.1	650	323	7.98	1.48	0.06	0.06	23	40
5/10/2000	9.08	83.2	11.5	495	250	8.18	3.46	0.38	0.14	148	220
5/25/2000	8.3	82.7	15.2	381	197	7.83	8	1.03	0.57	277	2000
6/8/2000	9.81	98.2	15.4	373	188	7.73	7	0.15	0.15	86	780
6/22/2000	9.71	98.6	16	457	232	7.55	5.24	0.33	0.29	47	830
7/6/2000	9.38	96.9	17.1	381	192	7.61	8.87	0.72	0.55	130	700
7/19/2000	9.29	96.2	17.2	420	213	7.71	12.8	0.72	0.52	74	67
8/3/2000	8.32	87.2	17.5	417	209	8	9.41	0.48	0.37	72	>8300
8/15/2000	8.15	83.6	16.5	380	196	7.97	11.2	0.44	0.37	57	570
8/31/2000	8.25	82.3	15.2	477	247	7.98	7.3	0.24	0.23	24	170
9/14/2000	8.14	80.7	15	460	234	8.02	6.07	0.24	0.2	30	270
9/28/2000	9.13	87.2	13.2	382	202	8.1	5.84	0.09	0.09	10	70
10/14/2000	8.87	82	11.8	315	156	7.98	6.53	0.14	0.1	20	230
10/19/2000	9.33	87	12.1	415	211	8.2	4.1	0.1	0.07	14	33
11/15/2000	10.35	90.5	9.6	738	354	8.38	1.04	0.14	0.11	19	66
12/13/2000	10.7	92.3	8.8	745	361	8.58	0.72	0.15	0.1	11	500
1/31/2001	10.6	88.1	7.3	734	367	8.43	0.61	0.15	0.09	12	23
2/22/2001	10.07	87.4	9.1	732	367	8.45	0.79	0.15	0.1	11	93
3/14/2001	10.42	90.6	9.2	720	366	8.46	0.75	0.13	0.06	6	4
4/3/2001	10.68	90.7	8.2	763	378	8.27	0.57	0.15	0.09	36	240
4/18/2001	9.23	85.6	12	201	102	8.19	2.67	0.25	0.1	164	150
5/2/2001	9.3	84.1	10.9	271	139	8.16	4.78	0.34	0.12	181	40
5/16/2001	7.93	77.1	14.1	386	195	8.09	3.8	0.24	0.15	59	150
5/31/2001	8.28	83.5	15.4	375	191	7.95	6.43	0.45	0.24	188	430
6/13/2001	8.21	79.6	14.1	337	170	8.09	8.72	0.59	0.24	261	930
6/26/2001	8.1	83.2	16.7	396	199	8.06	9.73	0.41	0.21	187	210
7/12/2001	8.09	82.8	16.7	515	263	8.07	5.98	0.22	0.14	40	370

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	<i>E. coli</i> (cfu/100 mL)
7/19/2001	9.64	97.6	15.8	440	221	8.05	9.85	0.41	0.23	105	750
8/7/2001	8.4	87.1	16.9	531	269	8.16	4.35	0.39	0.24	108	4100
8/23/2001	8.35	85.3	16.3	512	269	8.23	7.72	0.43	0.22	94	600
9/26/2001	9.66	92	13	418	212	8.29	5.38	0.24	0.17	57	300
10/4/2001	9.64	92	13.2	460	239	8.2	3.38	0.11	0.08	23	600
10/18/2001	11.44	96.5	7.9	392	194	8.17	4.39	0.18	0.14	37	230
11/15/2001	10.35	93.5	10.6	719	359	8.46	2.39	0.15	0.12	31	66
12/12/2001				787	369		2.78	0.29	0.1	95	66
1/17/2002	11.29	95.5	8.2	770	372	8.14	1.02	0.16	0.09	68	60
2/6/2002	11.29	93.7	6.7	738	370	8.42	1.15	0.15	0.09	77	40
3/13/2002	10.28	88.4	8.8	726	368	8.4	1.09	0.15	0.09	43	
S- 14 (AU 001 02)											
4/13/2000	10.92	109.5	15.5	465	234	8.34	2.34	0.15	0.08	54	250
4/25/2000	10.04	93.6	12.4	296	148	8.01	4.01	<0.05	<0.05	24	80
5/10/2000	9.19	85.78	12.1	231	119	8.2	6.87	0.18	0.07	40	460
5/25/2000	9.43	94.8	15.7	395	204	7.94	7.7	0.1	0.1	27	2200
6/8/2000	9.01	90.4	15.6	491	247	7.67	6.6	0.18	0.18	10	740
6/22/2000	8.65	89.7	17.2	371	187	7.68	8.68	0.26	0.23	20	3700
7/6/2000	8.87	92	17	209	105	7.51	17.9	0.1	0.08	17	600
7/19/2000	8.66	93.6	18.7	248	125	7.51	18	0.14	0.09	29	270
8/3/2000	6.91	73.3	18.4	334	169	7.87	12.8	0.17	0.05	47	1300
8/15/2000	6.51	66.6	16.5	413	207	7.85	11.5	0.2	0.16	35	1000
8/31/2000	6.71	68.1	16.5	308	156	7.85	13.2	0.15	0.12	25	270
9/14/2000	6.49	65.6	15.8	311	157	7.68	9.95	0.11	0.08	18	370
9/28/2000	7.88	75.3	13.4	269	136	7.91	13.4	0.13	0.12	16	200
10/14/2000	7.91	73.1	11.8	232	115	7.81	10.5	0.09	0.05	15	130
10/19/2000	8.59	79.9	12.2	239	120	7.95	9.78	0.11	0.06	39	33
11/15/2000	8.77	78.1	10.3	752	371	8.21	3.86	0.13	0.1	18	130
12/13/2000	9.65	83.2	9.5	782	374	8.43	1.69	0.17	0.1	25	100
1/31/2001	10.01	84.1	8.1	774	386	8.27	2.46	0.22	0.09	90	23
2/22/2001	10.24	90.4	9.8	773	385	8.38	2.86	0.13	0.1	15	43
3/14/2001	11.61	103.3	10.2	767	399	8.45	3.14	0.13	0.07	4	240
4/3/2001	11.62	101.6	9.3	796	398	8.32	2.02	0.17	0.09	4	93
4/18/2001	9.07	84.3	12	134	68	7.99	12.1	0.23	0.08	193	2400
5/2/2001	9.35	85.2	11.2	137	68	8.07	13.2	0.27	0.05	193	230
5/16/2001	8.89	87	14.9	183	92	7.98	12.9	0.22	0.08	91	230
5/31/2001	8.67	92.8	17.7	200	103	7.92	16.9	0.23	0.12	58	2400
6/13/2001	8.85	86.9	14.9	247	123	8.09	17.9	0.21	0.14	36	430
6/26/2001	6.88	70.2	16.3	470	238	8.01	13.7	0.12	0.1	33	430
7/12/2001	6.76	73.2	19.8	313	161	7.94	30.7	0.12	0.11	27	970
7/19/2001	6.46	64.5	16.7	369	194	7.93	20.9	0.17	0.1	26	600
8/7/2001	6.88	71.8	17.4	444	225	8.01	7.05	0.17	0.1	54	800
8/23/2001	7.01	74.2	18	308	156	8.14	12.9	0.18	0.1	22	1500
9/5/2001	7.21	75.9	17.4	312	157		12.5	0.13	0.08	33	400
9/26/2001	8.34	82.3	14.7	281	142	8.14	11.1	0.1	0.08	20	300
10/4/2001	8.24	79	13.8	392	197	8	7.4	0.1	0.08	16	200

Date	DO (mg/L)	DO (%Sat.)	WT (°C)	Sp. Cond. (uS/cm ³)	TDS (mg/L)	pH	Q (cfs)	SSC (mg/L)	TP (mg/L)	OP (mg/L)	<i>E. coli</i> (cfu/100 mL)
10/18/2001	9.55	85.1	10.3	314	154	8.08	8.54	0.13	0.05	75	66
11/15/2001	9.99	91.4	11.6	734	364	8.23	6.94	0.14	0.1	56	670
12/12/2001				790	378		2.58	0.2	0.08	46	<33
1/17/2002	9.96	86.5	8.9	776	367	8.01	2.22	0.17	0.07	69	50
2/6/2002	10.51	87.7	7.5	767	381	8.33	1.62	0.13	0.08	53	30
3/13/2002	11.56	102.6	10	764	385	8.44	1.54	0.12	0.08	13	
S-15 (AU 001_02)											
4/22/2008	11.75	94.7	6.1	119.6	59	8.16	36.4	40.2	0.22	0.037	290
5/6/2008	9.96	93.6	12.6	137.4	67	7.7	44.3	135.7	0.241	0.063	440
5/20/2008	9.3	92.6	15.2	164	80	7.52	46.5	85.2	0.236	0.072	1100
6/3/2008	9.56	93.9	14.5	144.5	71	7.97	48.7	93	0.262	0.062	920
6/17/2008	8.89	90.1	16	274.5	134	7.48	21	54.5	0.233	0.119	610
7/1/2008	8.48	89.5	17.5	348	171	8.12	17	24.3	0.206	0.152	440
7/15/2008	8.26	88.7	18.7	251	123	7.65	18.1	23.5	0.158	0.109	340
7/29/2008	8.67	91.7	18.1	259	127		27.8	56.2	0.205	0.111	1000
8/12/2008	8.81	91.9	17.3	287	141	8.23	17.8	19.2	0.148	0.111	370
8/27/2008	9.35	91.5	14.4	340	167	8.11	15.7	10.6	0.145	0.101	340
9/9/2008	9.39	94.1	15.5	212	104	7.94	36.7	16.7	0.149	0.077	240
9/23/2008	9.98	96.3	13.7	200	98	7.94	87.1	75	0.18	0.046	440
10/7/2008	9.96	96.6	14	183	90	7.71	82.7	54.4	0.148	0.03	180

DO = Dissolved Oxygen; mg/L = milligrams per liter; % sat = percent saturation; WT = Water Temperature; °C = degrees Celsius; Sp. Cond. = Specific Conductance; uS/cm³ = microSiemens per cubic centimeter; TDS = Total Dissolved Solids; Q = discharge; cfs = cubic feet per second; SSC = Suspended Sediment Concentration; TP = Total Phosphorus; OP = Dissolved Ortho-Phosphorus; *E. coli* = Escherichia coliform; cfu = colony-forming units.

Table C-4. Data collected by Wastewater Treatment Plants in the Lower Payette River Subbasin between 2003 and 2008.

NPDES Permit Water Quality Analyses											
Date	DO (mg/L)	WT (°C)	pH	Q (cfs)	TP (mg/L)	OP (mg/L)	Ammonia (N mg/L)	TKN (mg/L)	Nitrate/Nitrite (mg/L)	TSS (mg/L)	<i>E. coli</i> (cfu/100mL)
Payette River at Washington Street Bridge-US Emmett (AU 001_06)											
2/14/2007	14.7	3.7	7.77	1450	0.1	<0.06	<0.05	0.28	0.41	12	13
5/10/2007	9.32	14.2	7.4	3282.00	0.03	<0.06	<0.06	0.1	0.03	4	21
11/7/2007	11.19	6.7	7.65	1035	0.03	0.02	<0.06	<0.1	0.03	<3	4
2/6/2008	14.74	0.4	7.16	993	0.09	0.02	<0.06	0.2	0.11	<3	9
5/15/2008	11.55	11	7.19	6568.49	0.07	0.05	<0.06	<0.1	0.06	3	9
8/20/2008	7.55	19.7	7.19	1763.75	0.05	0.05	<0.06	0.1	<0.02	5	8
11/21/2008	12.83	4.6	7.27	1239.74	0.1	0.1	<0.06	0.2	0.08	3	5
Payette River Downstream Emmett WWTP (LPR-002) (AU 001_06)											
2/14/2007	13.1	4.4	7.76		0.18	0.06	0.28	0.69	0.48	23	23
5/10/2007	9.12	14.6	7.67		0.08	0.07	<0.06	0.58	0.04	7	25
11/7/2007	10.5	6.5	7.64		0.17	0.1	0.22	0.41	0.12	5	4
2/6/2008	13.64	0.6	7.23		0.32	0.22	1.21	1.29	0.16	7	2
5/15/2008	11.16	11.8	7.36		0.12	0.08	<0.06	0.28	0.12	5	15
8/20/2008	7.48	19.9	7.78		0.14	0.06	<0.06	0.48	0.03	7	28
11/21/2008	12.37	5.8	7.45		0.18	0.09	0.26	0.67	0.15	7	<1
Letha Bridge (LPR-003) (AU 001_06)											
2/14/2007	13.8	3.1	7.5		0.09	<0.06	<0.05	0.2	0.5	13	30
5/10/2007	9.51	15.4	7.6		0.04	<0.06	<0.06	0.2	0.03	6	58
11/7/2007	12.63	6.5	8.12		0.04	0.04	<0.06	<0.1	0.03	<3	5
2/6/2008	14.84	1.1	7.19		0.07	0.05	<0.06	0.2	0.15	<3	5
5/15/2008	11.29	11.1	7.2		0.1	0.04	<0.06	0.26	0.07	4	168
8/20/2008	7.78	19.4	7.6		0.06	0.05	<0.06	0.25	<0.02	6	110
11/21/2008	13.09	5.7	7.63		0.1	0.04	<0.06	0.2	0.1	6	12
Blacks Bridge (LPR-005) (AU 001_06)											
2/14/2007	13.9	3.4	7.78		0.07	<0.06	<0.05	0.2	0.58	16	50
5/10/2007	9.64	14.9	7.8		0.05	<0.06	<0.06	0.2	0.12	13	>300

Date	DO (mg/L)	WT (°C)	pH	Q (cfs)	TP (mg/L)	OP (mg/L)	Ammonia (N mg/L)	TKN (mg/L)	Nitrate/Nitrite (mg/L)	TSS (mg/L)	<i>E. coli</i> (cfu/100mL)
11/7/2007	12.59	7	8.34		0.05	0.04	<0.06	<0.1	0.12	4	27
2/6/2008	14.93	1.5	7.8		0.07	0.03	<0.06	0.2	0.27	6	11
5/15/2008	10.7	12.2	7.21		0.11	0.06	<0.06	0.27	0.11	7	80
8/20/2008	7.94	19.4	7.6		0.09	0.06	<0.06	0.24	0.14	7	87
11/21/2008	13.57	5.9	8.35		0.12	0.06	<0.06	0.2	0.2	7	25
Payette River Upstream Payette WWTP (AU 001_06)											
3/12/2003	11.5		7.6		<0.05	<0.05	<0.04	0.17	0.09		60
Payette River Downstream Payette WWTP (LPR-008) (AU 001_06)											
6/11/2003	9		7.2		0.06	<0.05	<0.04	0.21	0.08	18	310
6/16/2004	8		7.3		<0.05	<0.05	<0.04	0.34	0.11	1.5	110

DO = Dissolved Oxygen; mg/L = milligrams per liter; WT = Water Temperature; °C = degrees Celsius; Q = discharge; cfs = cubic feet per second; TP = Total Phosphorus; OP = Ortho-Phosphorus (Dissolved); TSS = Total Suspended Sediment; *E. coli* = *Escherichia Coliform*; cfu = colony-forming units.

Table C-5. Reported results of data collected by the Bureau of Reclamation from locations in the Lower Payette River subbasin between 2003 and 2008.

Bureau of Reclamation Water Quality Analyses, 2003-2008									
Date	Site ID	WT (°C)	Q (cfs)	DO (ug/L)	pH	TSS (ug/L)	NTU	<i>E. coli</i> (cfu/100mL)	TP (ug/L)
Black Canyon Reservoir North Shore of Spillway									
8/1/2003	EMM081	23.5	39.6	7400	7.87		2	0	25
8/1/2003	EMM081	17.6	728.4		7.3	38900	3	0	23
4/27/2004	EMM081		68.4			4000	4		28
4/27/2004	EMM081		744				4		34
5/10/2004	EMM081	13.4	39.6	8000	7.49	8000	5	12	21
5/10/2004	EMM081		31.49	8200	7.46				
5/10/2004	EMM081		117.6						
5/10/2004	EMM081	13	196.8	8300	7.48				
5/10/2004	EMM081	12.7	276	8400					
5/10/2004	EMM081	12.6	354	8400	7.46				
5/10/2004	EMM081	12.4	433.2	8400	7.43				
5/10/2004	EMM081	12.2	512.4	8400	7.39				
5/10/2004	EMM081	11.7	590.4	8300	7.36				
5/10/2004	EMM081	11.2	669.6	7800	7.23	14000	7		
5/10/2004	EMM081	10.4	775.2	6800	7.08			24	32
5/24/2004	EMM081		19.2			7000	4		
5/24/2004	EMM081		555.6						35
6/14/2004	EMM081	16.5	39.6	8600	7.52	5000	2	15	27
6/14/2004	EMM081	16.3	117.6	8500	7.49				
6/14/2004	EMM081	16.1	196.8	8500	7.47				
6/14/2004	EMM081	15.3	276						
6/14/2004	EMM081	14.8	354	8500	7.43				
6/14/2004	EMM081	14.7	433.2	8400	7.42				
6/14/2004	EMM081	14.4	512.4	8400	7.4				
6/14/2004	EMM081		590.4						
6/14/2004	EMM081	14.2	669.6	8000	7.3				
6/14/2004	EMM081	14	747.6	7600	7.21	14000	6		
6/14/2004	EMM081	13.9	799.2	7100	7.15			10	56
7/5/2004	EMM081	21.1	117.6	7600	7.26				
7/5/2004	EMM081	20.9	196.8	7400	7.24				
7/5/2004	EMM081	20.8	276	7600	7.24				
7/5/2004	EMM081		354						
7/5/2004	EMM081	19.5	433.2	6800	7.1				
7/5/2004	EMM081	19.5	512.4						
7/5/2004	EMM081	19	590.4	6200	7.02				
7/5/2004	EMM081	16.5	669.6	1900	6.99				
7/5/2004	EMM081	15.1	747.6	200	6.89				
7/6/2004	EMM081	21.2	39.6	7700	7.28	2000	2	2	14
7/6/2004	EMM081	15	802.8	200	6.85	16000	7		96
7/21/2004	EMM081		500.4	7600		6000	3		33
7/21/2004	EMM081		39.6		7.33	4000	2		26
8/17/2004	EMM081	21.8	39.6	7600	7.33	3000	2	4	24

Date	Site ID	WT (°C)	Q (cfs)	DO (ug/L)	pH	TSS (ug/L)	NTU	<i>E. coli</i> (cfu/100mL)	TP (ug/L)
8/17/2004	EMM081	21.7	117.6	7800	7.32				
8/17/2004	EMM081	21.7	196.8	7600	7.32				
8/17/2004	EMM081	21.6	276	7600	7.3				
8/17/2004	EMM081	21.2	354						
8/17/2004	EMM081	20.7	433.2	7000	7.23				
8/17/2004	EMM081		512.4	6500	7.19				
8/17/2004	EMM081	19.8	590.4	5400	7.12				
8/17/2004	EMM081	19.5	669.6						
8/17/2004	EMM081	19.4	747.6	3200	6.99	9000	5		
8/17/2004	EMM081	19.4	807.6	2900				0	57
8/26/2004	EMM081		586.8			5000	3		29
9/13/2004	EMM081	18	39.6	8000	7.6	2000	1	0	14
9/13/2004	EMM081	18	117.6	7800					
9/13/2004	EMM081	18	196.8	7800	7.57				
9/13/2004	EMM081	18	276	7800	7.57				
9/13/2004	EMM081	17.9	354	7500	7.55				
9/13/2004	EMM081	17.4	433.2	7000					
9/13/2004	EMM081	17.2	512.4	6700	7.36				
9/13/2004	EMM081	17.1	590.4	6500	7.31				
9/13/2004	EMM081	16.7	669.6	5700	7.23				
9/13/2004	EMM081	16.6	720	5600	7.16	5000	2	4	24
10/12/2004	EMM081	13.7	39.6	8400	7.77	2000	1	2	15
10/12/2004	EMM081	13.7	117.6	8400	7.74				
10/12/2004	EMM081		196.8	8200	7.71				
10/12/2004	EMM081	13.6	276						
10/12/2004	EMM081	13.6	354	8200	7.69				
10/12/2004	EMM081	13.3	433.2						
10/12/2004	EMM081	13	512.4	7100	7.55				
10/12/2004	EMM081	13	590.4	6800	7.52				
10/12/2004	EMM081	12.8	669.6	5800	7.45				
10/12/2004	EMM081		747.6						
10/12/2004	EMM081	12.3	783.6	8000	7.48	9000	4	2	30
7/11/2006	EMM081	22.1	39.6	7700	7.63	3000	2	8	20
7/11/2006	EMM081	22	117.6	7600	7.58				
7/11/2006	EMM081	21.8	196.8	7500	7.46				
7/11/2006	EMM081	20.2	276	7000	7.38				
7/11/2006	EMM081		354		7.23				
7/11/2006	EMM081	19.4	433.2	6400	7.09				
7/11/2006	EMM081	18.9	512.4	4200	7.08				
7/11/2006	EMM081		590.4		7.08				
7/11/2006	EMM081	18.1	669.6	2500					
7/11/2006	EMM081	17.5	747.6	800	7.07				
7/11/2006	EMM081		802.8			41200	7	2	70
Payette River at Bridge 0.5mi below Black Canyon Dam (AU 001_06)									
8/1/2003	EMM015	23	2016	7400	7.65	38300	2	0	23
11/18/2003	EMM015	5	701	16600	7.77	2000	1	0	14

Date	Site ID	WT (°C)	Q (cfs)	DO (ug/L)	pH	TSS (ug/L)	NTU	<i>E. coli</i> (cfu/100mL)	TP (ug/L)
12/15/2003	EMM015	3.7	1389	14000	7.49	3000	3	0	18
1/5/2004	EMM015	0.6	732	15300	7.54	2000	2	2	0
2/2/2004	EMM015	1.3	1020	15300	7.83	7000	9	6	48
3/2/2004	EMM015	4.4	1804	13000	7.77	6000	9	20	77
4/12/2004	EMM015	10.7	2498	11400	7.22	7000	5	6	32
4/27/2004	EMM015					7000	3	4	38
5/10/2004	EMM015	13.1	3405	7600	9.4	10000	5	26	23
5/24/2004	EMM015		3433			17000	4	80	51
6/14/2004	EMM015	16	4320	7600	9.6	6000	3	10	25
7/6/2004	EMM015	21	2367	7400	8.1	6000	2	0	17
7/21/2004	EMM015					8000	2	16	44
8/17/2004	EMM015	21.4	2510	7600	7.8	4000	3	4	22
8/25/2004	EMM015		1878			7000	3	8	30
9/13/2004	EMM015	17.7	722	7600	8.2	2000	1	4	15
9/23/2004	EMM015		579.2			10000	2		24
10/12/2004	EMM015	13.8	593	9100	7.71	3000		4	14
11/8/2004	EMM015	6.6	1089	7200	13.3	2000	0	0	11
12/6/2004	EMM015	1.2	1025	14700	6.93	11000	2	0	20
1/10/2005	EMM015	1.1	1062	15800	7.2	1000	1	0	12
2/14/2005	EMM015	3.1	893	14300	7.8	2000	1	0	14
3/7/2005	EMM015	7.6	1042	12300	8.12	2000	2	0	17
4/18/2005	EMM015	9.5	2080	10200	7.57	4000	3	4	24
5/17/2005	EMM015	11.2	692	10500	7.28	11000	6	276	35
6/5/2005	EMM015	14.9	695.6	8800	7.5	7000	3	0	24
7/17/2005	EMM015	22.7	1506	7300	7.5	1000	1	8	38
8/8/2005	EMM015	22.2	754	7500	7.74	4000	1	6	21
9/22/2005	EMM015	17.3		9300	7.6	2000	2	0	26
10/25/2005	EMM015	11.1	999	10500	7.29	2000	1	2	18
11/16/2005	EMM015	5.3	864	9700	7.24	5000	2	0	20
12/19/2005	EMM015	1.1	610	13100	7.07	0	1	0	25
1/23/2006	EMM015	2.8	1610	12000	7.29	7000	9	6	57
2/13/2006	EMM015	2	1510	14400	7.14	4000	5	0	36
3/20/2006	EMM015	5.7	4190	13200	7.41	5000	6	4	50
4/12/2006	EMM015	7.2	9950	12900	7.62	11000	8	8	61
5/16/2006	EMM015	13.2	12800	7800	7.96	21000	7	40	39
6/5/2006	EMM015	14	9679	8100	8.07	24000	8	26	28
7/6/2006	EMM015	21.2	3296		7.99	5000	3	2	24
7/11/2006	EMM015	21.4		7900	7.8	39200			18
8/8/2006	EMM015	20.9	1571	7800	6.74	4000	2	2	23
9/14/2006	EMM015	17	731		8.14	9000	2	2	
10/23/2006	EMM015	9.6	747	10600	7	3000	1	0	21
11/6/2006	EMM015	6.5	1528	12100	7.45	3000	2	0	15
12/5/2006	EMM015	1.8	805	13200	7.58	2000	2	0	18
1/22/2007	EMM015	1.1	1023	12300	7.6	2000	2	0	23
2/5/2007	EMM015	1.2	1182	14100	7.41	0	1	0	16
3/5/2007	EMM015	4.7	1392	10900	7.51	3000	4	0	39

Date	Site ID	WT (°C)	Q (cfs)	DO (ug/L)	pH	TSS (ug/L)	NTU	<i>E. coli</i> (cfu/100mL)	TP (ug/L)
4/2/2007	EMM015	8.1	2953	10000	7.72	3000	3	8	36
5/14/2007	EMM015	14.3	4497	10400	7.18	5000	4	30	23
6/5/2007	EMM015	17.5	2237	8000	7.52	3000	2	660	21
7/3/2007	EMM015	20.9	1792	7900	7.48	14000	2	0	22
8/6/2007	EMM015	20.3	1528	7000	7.65	3000	2	4	43
9/11/2007	EMM015	18.5	560	8300	7.66	6000	2		26
10/1/2007	EMM015	13.5	699	9300	7.56	8000	3	20	26
11/14/2007	EMM015	6.2	1097	11600	7.41	5000	2	0	11
12/18/2007	EMM015	0.7	1334	13300	7.83	4000	3	0	20
1/22/2008	EMM015	.2	611	13700	7.53	4000	3	2	13
2/10/2008	EMM015	1.9	1159	13600	8.2	2000	2	0	24
3/9/2008	EMM015	4.9	1685	12300	7.8	8000	6	0	28
4/1/2008	EMM015	5.6	2490	11500	7.09	6000	5	0	85
5/5/2008	EMM015	10.3	6440	12000	7.4	5000	5	2	43
Bissel Creek at Idaho Blvd. (BC-1 [AU 015_03a])									
3/31/2004	EMM111					19000		1400	
4/14/2004	EMM111					23000		1900	
4/28/2004	EMM111					110000		2200	
4/28/2004	EMM111					110000		2200	
5/12/2004	EMM111					58000		1300	
5/26/2004	EMM111	14				32000		2100	
6/9/2004	EMM111	15				102000		3800	
6/23/2004	EMM111	17				69000		1200	
7/7/2004	EMM111	18				158000		1100	
7/22/2004	EMM111	20				50000		920	
8/4/2004	EMM111	18				88000		900	
8/18/2004	EMM111	20				35000		1300	
9/1/2004	EMM111	18				27000		150	
9/14/2004	EMM111					19000		400	
9/29/2004	EMM111	15				21000		3600	
10/13/2004	EMM111	12				19000		200	
10/27/2004	EMM111	14				12000		70	
Bissel Creek at Black Canyon Highway (BC-2 [AU 015_03a])									
3/31/2004	EMM112					22000		3600	
4/14/2004	EMM112					79000		3900	
4/28/2004	EMM112					161000		3900	
5/12/2004	EMM112					56000		1000	
5/26/2004	EMM112					16000		900	
6/9/2004	EMM112					57000		7800	
7/7/2004	EMM112					274000		3900	
7/22/2004	EMM112					92000		740	
8/4/2004	EMM112					118000		200	
8/18/2004	EMM112					60000		700	
9/1/2004	EMM112					21000		175	

Date	Site ID	WT (°C)	Q (cfs)	DO (ug/L)	pH	TSS (ug/L)	NTU	<i>E. coli</i> (cfu/100mL)	TP (ug/L)
9/14/2004	EMM112					19000		1240	
9/29/2004	EMM112					16000		350	
10/13/2004	EMM112					17000		720	
10/27/2004	EMM112					19000		160	
Bissel Creek at Big 4 Avenue (BC-3 [AU 015_03])									
3/31/2004	EMM113					10000		3800	
4/14/2004	EMM113					15000		5500	
4/28/2004	EMM113					27000		1250	
5/12/2004	EMM113					31000		1600	
5/26/2004	EMM113	13				28000		4700	
6/9/2004	EMM113	15				50000		4800	
6/23/2004	EMM113	19				95000		2200	
7/7/2004	EMM113	17				31000		4500	
7/22/2004	EMM113	21				31000		580	
8/4/2004	EMM113	18				59000		550	
8/18/2004	EMM113	21				22000		1000	
9/1/2004	EMM113	18				11000		400	
9/14/2004	EMM113					11000		1800	
9/29/2004	EMM113	14				9000		450	
10/13/2004	EMM113	12				11000		100	
10/27/2004	EMM113	11				1000		160	
Bissel Creek at Hillview Road (BC-4 [AU 015_03a])									
3/31/2004	EMM114					11000		9000	
4/14/2004	EMM114					8000		300	
4/28/2004	EMM114					5000		595	
5/12/2004	EMM114					22000		340	
5/26/2004	EMM114	13				9000		155	
6/9/2004	EMM114	15				16000		1460	
6/23/2004	EMM114	19				16000		4400	
7/7/2004	EMM114	20				32000		5500	
7/22/2004	EMM114	22				19000		100	
8/4/2004	EMM114	18				11000		980	
8/18/2004	EMM114	22				10000		380	
9/1/2004	EMM114	19				8000		20	
9/14/2004	EMM114					26000		240	
9/29/2004	EMM114	15				7000		200	
10/13/2004	EMM114	12				13000		480	
Emmett Irrigation District North Side Canal at Black Canyon (AU 001_02)									
4/14/2004	EMM115					6000		200	
4/28/2004	EMM115					5000		10	
5/12/2004	EMM115					11000		80	
5/26/2004	EMM115	13				7000		15	
6/9/2004	EMM115	15				9000		56	

Date	Site ID	WT (°C)	Q (cfs)	DO (mg/L)	pH	TSS (ug/L)	NTU	<i>E. coli</i> (cfu/100mL)	TP (ug/L)
6/23/2004	EMM115	20				4000		15	
7/7/2004	EMM115	22				4000		15	
7/22/2004	EMM115	23				4000		2	
8/4/2004	EMM115	24				3000		0	
8/18/2004	EMM115	23				4000		16	
9/1/2004	EMM115	20				2000		20	
9/14/2004	EMM115					4000		4	
9/29/2004	EMM115	17				2000		0	
10/13/2004	EMM115	15				2000		2	
10/27/2004	EMM115	11				2000		0	
Emmett Irrigation District North Side Canal at Bissel Creek (AU 015_03)									
4/14/2004	EMM116					21000		70	
4/28/2004	EMM116					22000		45	
5/12/2004	EMM116					19000		60	
5/26/2004	EMM116	12				15000		260	
6/9/2004	EMM116	14				22000		100	
6/23/2004	EMM116	20				15000		100	
7/7/2004	EMM116	24				16000		80	
7/22/2004	EMM116	23				13000		40	
8/4/2004	EMM116	23				6000		15	
8/18/2004	EMM116	23				8000		48	
9/1/2004	EMM116	20				3000		0	
9/14/2004	EMM116					4000		18	
9/29/2004	EMM116	15				3000		0	
10/13/2004	EMM116	13				3000		0	
Payette River Near Payette (AU 001_06)									
6/14/2004	EMM010	15.5		7.7	9.1	24000	5	320	58

WT = Water Temperature; °C = degrees Celsius; Q = discharge; cfs = cubic feet per second; DO = Dissolved Oxygen; ug/L = micrograms per liter; mg/L = milligrams per liter; TSS = Total Suspended Sediment; NTU = Nephelometric Turbidity Units; *E. coli* = *Escherichia Coliform*; cfu = colony forming units; TP = Total Phosphorus

Table C-6. Data collected by DEQ from locations in the Lower Boise River subbasin in 2009.

Department of Environmental Quality Water Quality Analyses, 2009									
Date	WT (°C)	Q (cfs)	DO (ug/L)	SpC (uS/cm ³)	pH	TSS (mg/L)	Ammonia (N) mg/L	<i>E. coli</i> (cfu/100mL)	TP (mg/L)
Plaza Drain (AU 001_06)									
5/4/2009	9.73	2.17 (g.h.)	8.85	59	4.81	6.9	0.016	10	0.036
5/12/2009	11.3	2.2 (g.h.)	11.22	54	4.91	6.4	0.09	10	0.037
6/2/2009	13.82	2.67 (g.h.)	6.85		4.89	17	0.01	36	0.4
7/7/2009	20.86	3.06 (g.h.)		47	7.59	20	0.18	2	0.4
8/12/2009	20.12	2.86 (g.h.)	7.66	54	7.03	<5	0.30	7.5	0.32
9/9/2009	19.65	2.46(g.h.)	8.95	63	6.8	6	<0.010	8.6	0.034
Big Willow Creek (AU 017_04)									
5/4/2009	12.42	20.93	9.4	717	7.47	67	<0.01	1553	0.005
5/12/2009	14.78	15.1	11.05	594	7.26	<5	<0.01	155	0.21
6/2/2009	17.18	1.04	6.26	693	6.7	6	0.05	299	0.22
7/7/2009	21.63	0.26		669	7.4	8.2	0.02	387.3	0.21
8/12/2009	21.9	0.2e	11.3	653	7.62	<5	<0.010	201.4	0.2
9/9/2009	17.88	.2e	11.71	702	7.26	<5.0	<0.010	365.4	0.2
Fortynine Slough (AU 001_02)									
5/4/2009	10.12		8.75	175	5.45	54	0.05	>2420	0.21
5/12/2009	13.13		9.17	154	5.89	44	0.03	921	0.14
6/2/2009	17.04		5.03	160	5.03	98	0.15	1664	0.3
7/7/2009	21.25			146	7.7	44	<0.010	178.5	0.2
8/12/2009	22.27		8.75	184	7.72	32	0.02	218.7	0.17
9/9/2009	17.57		10.82	256	7.64	20	<0.010	215.7	0.11
LPR-007 (AU 001_06)									
5/4/2009	9.38		9.32	101	4.33	44	<0.01	326	0.1
5/12/2009	10.9		10.39		4.11	18	<0.01	138	0.061
6/2/2009	15.7		6.53	63	3.9	24	<0.01	179	0.076
7/7/2009	20.2			105	7.08	28	0.36	39.9	0.09
8/12/2009	21.49		6.71	132	7.97	27	<0.010	116.2	0.083
9/9/2009	17.77			261	7.95	22	<0.010	132.3	0.11

Q = discharge; cfs = cubic feet per second; °C = degrees Celsius; WT = Water Temperature; DO = Dissolved Oxygen; mg/L = milligrams per liter; SpC = Specific Conductance; uS/cm³ = microSiemens per cubic centimeter; *E. coli* = *Escherichia Coliform*; cfu = colony-forming units; TP= Total Phosphorus; TSS - Suspended Sediment Concentration; e = Estimated; g.h. = gage height.

Table C-7. Aquatic life data collected by USGS and DEQ from lower Payette River subbasin locations between 2003 and 2008.

USGS Benthic Macroinvertebrate Data			
Payette River near Payette, ID (AU 001_06)			
5 riffle composite*			
Water Year	2006		
Date	8/22/2006		
Cold	0		
Cool	307		
Warm	5,578		
Hot	0		
Unclassified	3,872		
Distribution by Temperature Tolerance			
Total Classified	5,885		
%Cold	0		
%Cool	5		
%Warm	95		
%Hot	0		
BURP Benthic Macroinvertebrate Data (DEQ)			
2004SBOIA041 (AU 001_02)			
Date	9/9/04		
Cold	0		
Cool	17		
Warm	436		
Hot	4		
unclassified	81		
Distribution by Temperature Tolerance			
Total Classified	457		
%Cold	0		
%Cool	4		
%Warm	95		
%Hot	1		
2005-2007 (AU 017_03)			
ID	2005SBOIA020	2007SBOIA096	2007SBOIA021
Date	7/15/05	8/8/07	7/2/07
Cold	0	0	0
Cool	40	60	91
Warm	469	342	348
Hot	0	4	0
Unclassified	10	112	79
Distribution by Temperature Tolerance			
Total Classified	509	406	439
%Cold	0	0	0
%Cool	8	15	21
%Warm	92	84	79
%Hot	0	1	0

Table C-8. Fish community data collected by USGS and DEQ from Lower Payette River subbasin locations between 2003 and 2008.

Station Name	Site ID	AU	Date	% Cold	% Cool	% Warm	% Salmonids	Total	Number of Species
USGS Data									
Payette River near Emmett, ID	13245900	001_06	8/21/2002	17	76	7	17	692	11
Payette River near Payette, ID	13251000	001_06	8/22/2006	2	82	16	0	111	10
BURP Data (DEQ)									
Site ID	AU	WT (*C)	Date	% Cold	% Cool	% Warm	% Salmonids	Total	Number of Species
2004SBOIA041	001_02	19	9/9/2004	0	100	0	0	106	3
2005SBOIA020	017_03	19	7/15/2005	8	92	0	8	65	5

Table C-9. Location of TMDL control monitoring points in the Lower Payette River Subbasin.

Lower Payette River Subbasin TMDL Control Monitoring Locations				
ID Number	Latitude	Longitude	Name	Agency
1	43.9288	-116.4450	LPR-001/ EMM015	BOR
2	43.9224	-116.4432	Plaza	DEQ
3	43.8822	-116.5003	LPR-002/ Washington St. Bridge/ 13249500	City of Emmett/ USGS
4	43.8851	-116.5831	Mesa	ISDA
5	43.8855	-116.5937	Big 4	ISDA
6	43.8922	-116.6223	Tunnel 7	ISDA
7	43.8951	-116.6220	Beacon	ISDA
8	43.9053	-116.6423	LPR-003/ Letha Bridge/ 1325000	BOR/ City of Emmett/ USGS
9	43.9270	-116.6752	Silverleaf	ISDA
10	43.9378	-116.6752	Sand Hollow	ISDA
11	43.9332	-116.7019	7 Mile Slough	ISDA
12	43.9559	-116.7154	Countyline	ISDA
13	43.9903	-116.7959	LPR-005/ Blacks Bridge	City of Emmett
14	43.9584	-116.7524	S-1	
15	43.9610	-116.7572	S-2	
16	43.9658	-116.7624	S-3	
17	43.9802	-116.7870	S-4	
18	43.9928	-116.7993	S-5	
19	44.0038	-116.8164	S-6	
20	44.0043	-116.2682	S-7	
21	44.0049	-116.8259	S-8	ISDA
22	43.9999	-116.8071	S-9	
23	44.0100	-116.8210	S-10	ISDA
24	44.0097	-116.8320	S-11	
25	44.0110	-116.8373	S-12	ISDA
26	44.0214	-116.8714	S-13	ISDA
27	44.0205	-116.8737	S-14	ISDA
28	44.0270	-116.8410	Willow Creek/ LWC-1	ISDA
29	44.0295	-116.9069	S-15 Sand Hollow	ISDA
30	44.0420	-116.9259	LPR-007/ EMM010/ 13251000	City of Payette/ DEQ /BOR
31	44.0676	-116.9358	Forty-nine Slough	DEQ
32	44.0832	-116.9567	LPR-008/ PR DS Payette WWTP	City of Payette
Bissel Creek Control Monitoring Locations				
33	43.8976	-116.6161	EMM111/ BC-1	BOR/ ISDA
34	43.9084	-116.6054	EMM112/ BC-2	BOR/ ISDA
35	43.9191	-116.5920	EMM113/ BC-3	BOR/ ISDA
Snake River-Hells Canyon Control Monitoring Location				
30	44.042	-116.9259	LPR-007/ EMM010	DEQ/ BOR

Table C-10. Flow proportion of tributaries, drains, and selected control monitoring locations of the mainstem river compared to flow reported at the mouth of the Payette River during the irrigation season (from averaged monthly reported values), 2000-2009.

Lower Payette River TMDL Control Monitoring Location Flow Proportions, 2000-2009							
Location	Percent of Flow Compared to LPR-007						
	Month						Seasonal Average
	April	May	June	July	Aug	Sept	
LPR-001 PR near Emmett	101	105	108	128	114	100	109.43
LPR-002 PR at Washington St. Bridge		94			130		112.05
Mesa Drain	0.36	0.25	0.19	0.93	1.03	1.75	0.75
Big 4	0.64	0.79	1.09	3.06	4.05	5.95	2.59
Tunnel #7	0.48	0.80	0.40	0.60	1.40	3.38	1.18
Beacon	0.16	0.22	0.20	0.76	0.76	1.04	0.52
BC-1 Bissel Ck	0.29	0.42	0.30	1.35	2.00	2.33	1.12
LPR-003 PR near Letha	90.91	91.87	92.18	85.00	77.43	53.66	81.84
Silverleaf Drain	3.81	6.67	4.82	17.04	7.06	6.41	7.64
Sand Hollow Drain	0.06	0.13	0.17	0.47	0.59	0.58	0.33
Sevenmile Slough	1.26	0.75	0.47	0.53	1.54	1.28	0.97
Countyline Drain	0.67	0.82	0.71	0.80	0.96	2.33	1.05
S-8	0.19	0.25	0.31	0.93	1.32	1.75	0.79
S-10	0.26	0.31	0.28	1.20	1.40	1.98	0.90
S-12	0.10	0.10	0.17	1.18	0.97	1.02	0.59
Big Willow Creek	0.06	0.20	0.04	0.06	0.08	0.22	0.11
Little Willow Creek	0.04	0.08	0.07	0.53	0.81	1.83	0.56
S-13	0.45	0.17	0.31	0.93	0.96	1.17	0.66
S-14	0.19	0.36	0.43	1.73	1.18	1.98	0.98
S-15-SH	0.87	0.86	0.83	1.40	1.25	7.23	2.07
Fortynine Slough	0.98	0.89	1.04	2.49	2.75	5.74	2.32
LPR-007 PR near Payette	100	100	100	100	100	100	100.00

Appendix D. Assessment Unit Maps

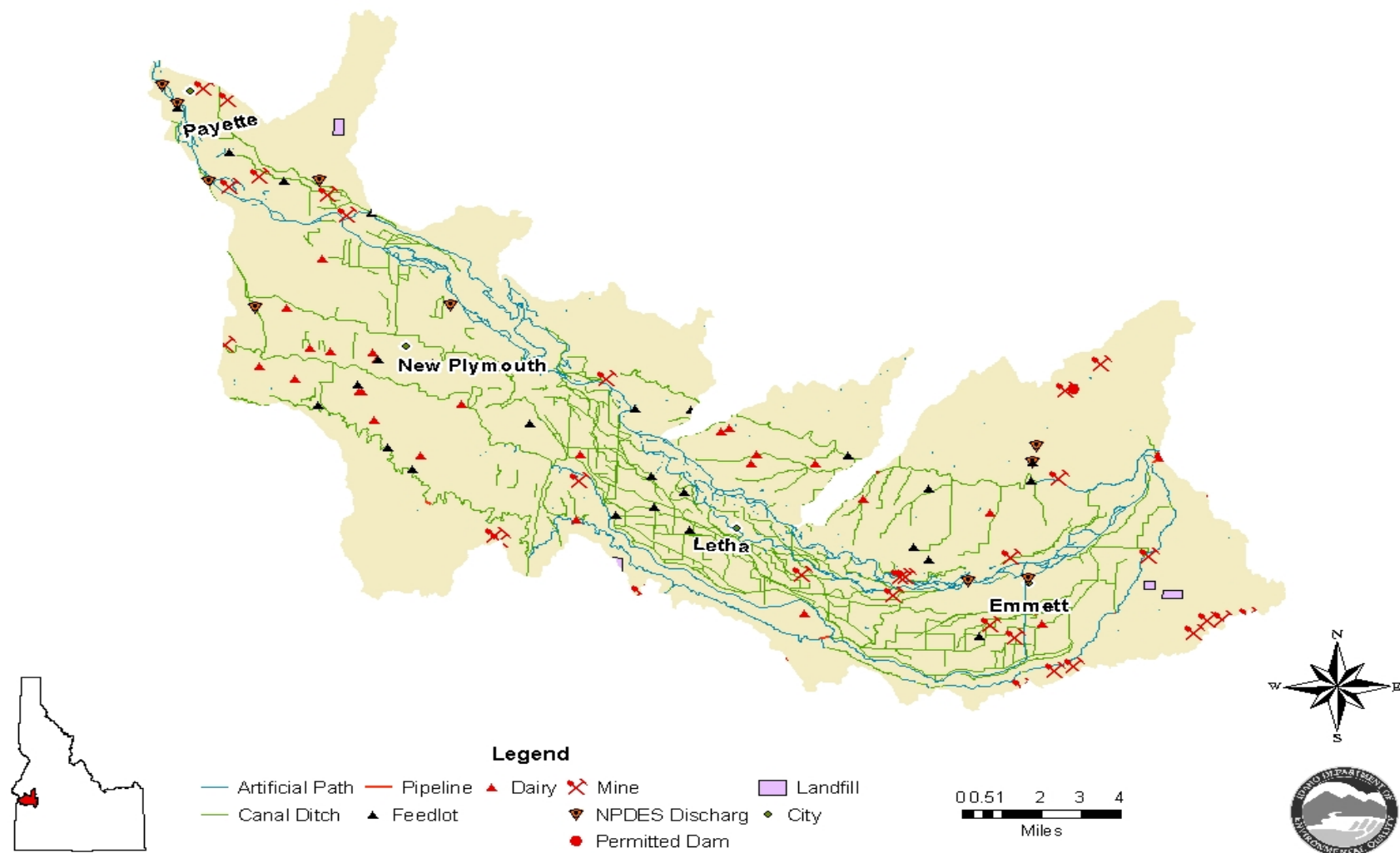


Figure E-1. Lower Payette River Assessment Unit 001 (lower Payette River from Black Canyon Dam outfall to the mouth), with surface water bodies and potential surface water pollutant sources.

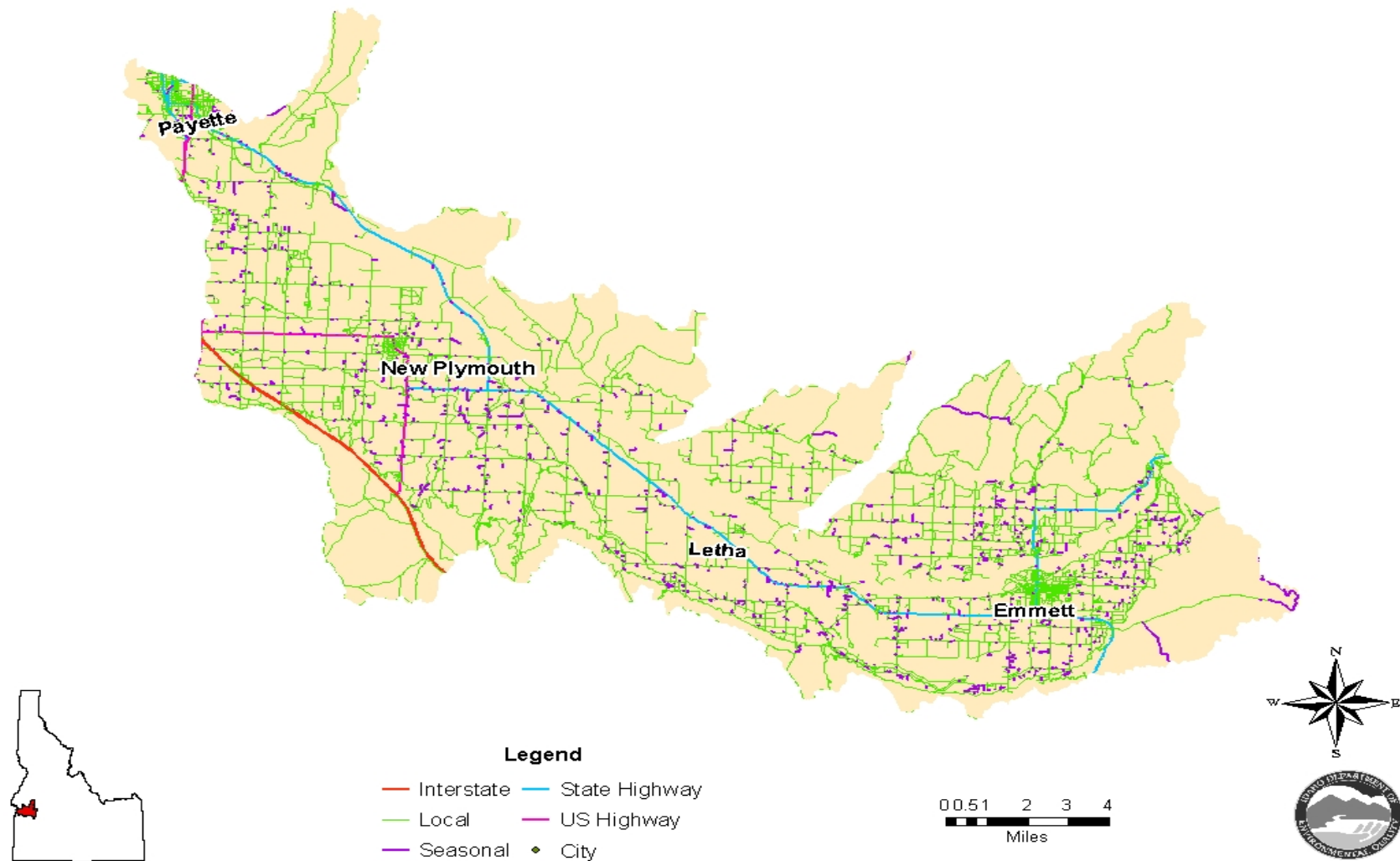


Figure E-2. Lower Payette River Assessment Unit 001 (lower Payette River from Black Canyon Dam outfall to the mouth), with roads and urban areas.

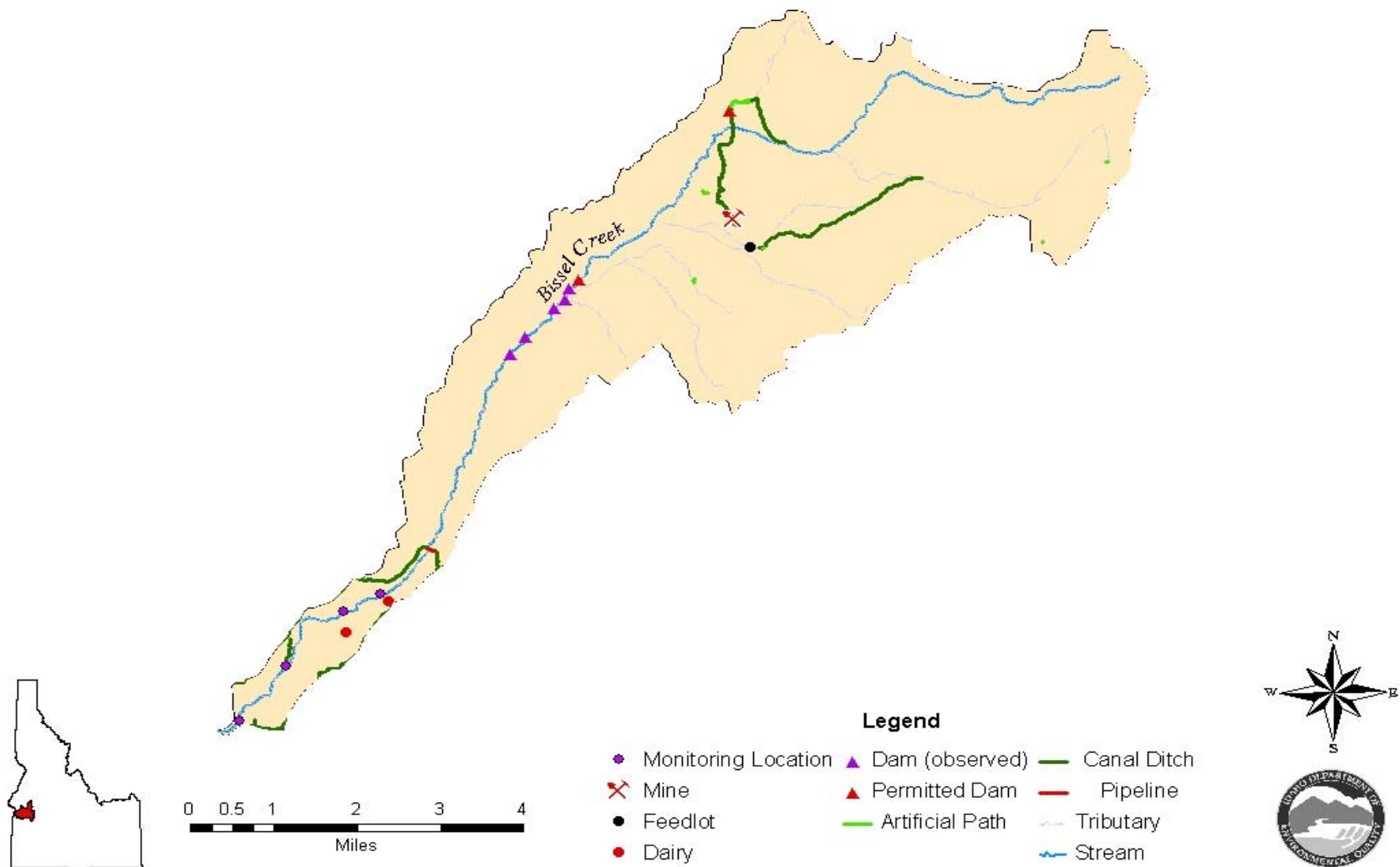


Figure E-3. Lower Payette River Assessment Unit 015 (Bissel Creek), with surface water bodies and potential surface water pollutant sources.

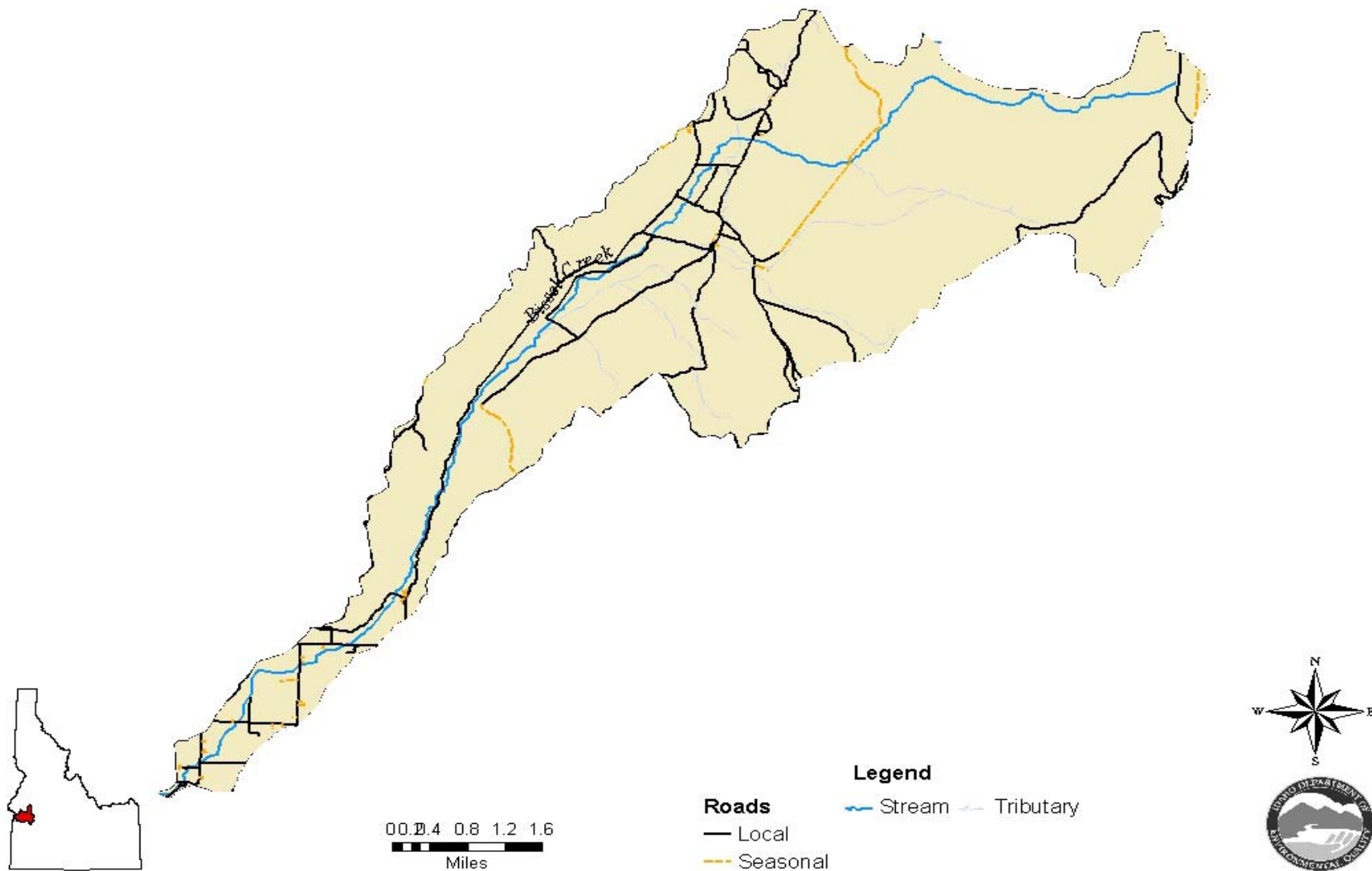


Figure E-4. Lower Payette River Assessment Unit 015 (Bissel Creek), with roads and urban areas.

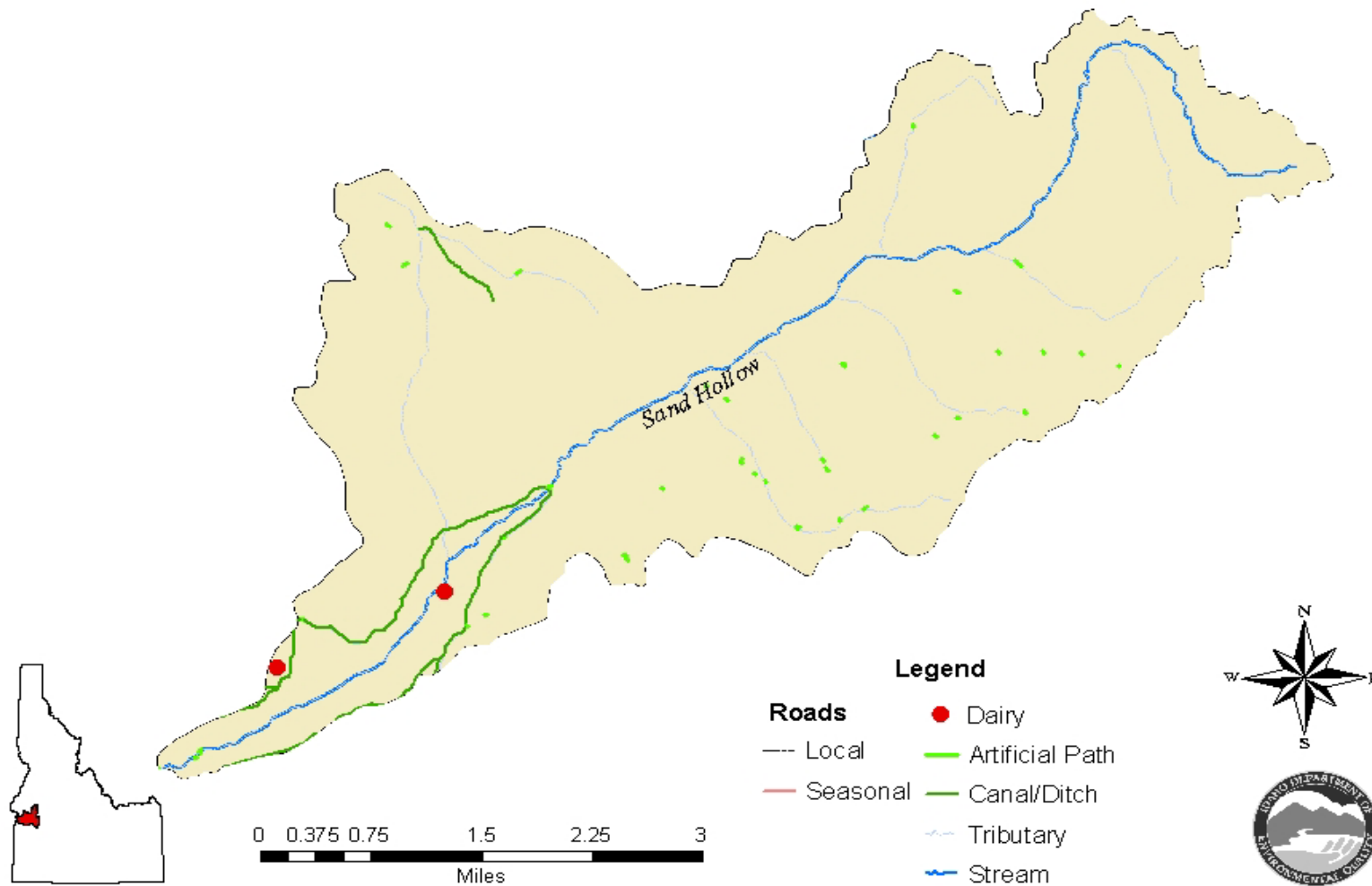


Figure E-5. Lower Payette River Assessment Unit 016 (Sand Hollow Creek), with surface water bodies, roads and potential surface water pollutant sources.

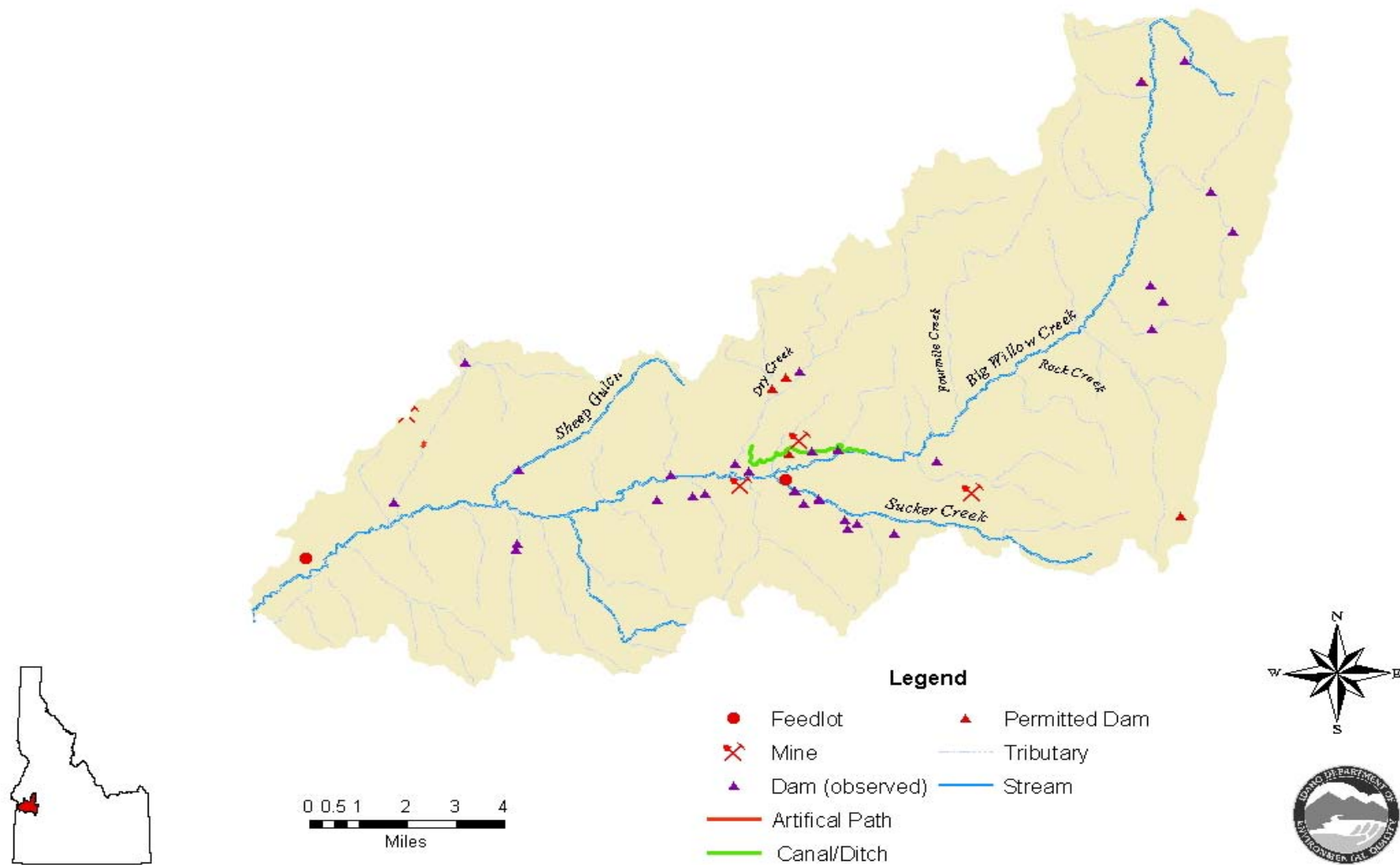


Figure E-6. Lower Payette River Assessment Unit 017 (Big Willow Creek), with surface water bodies and potential surface water pollutant sources.

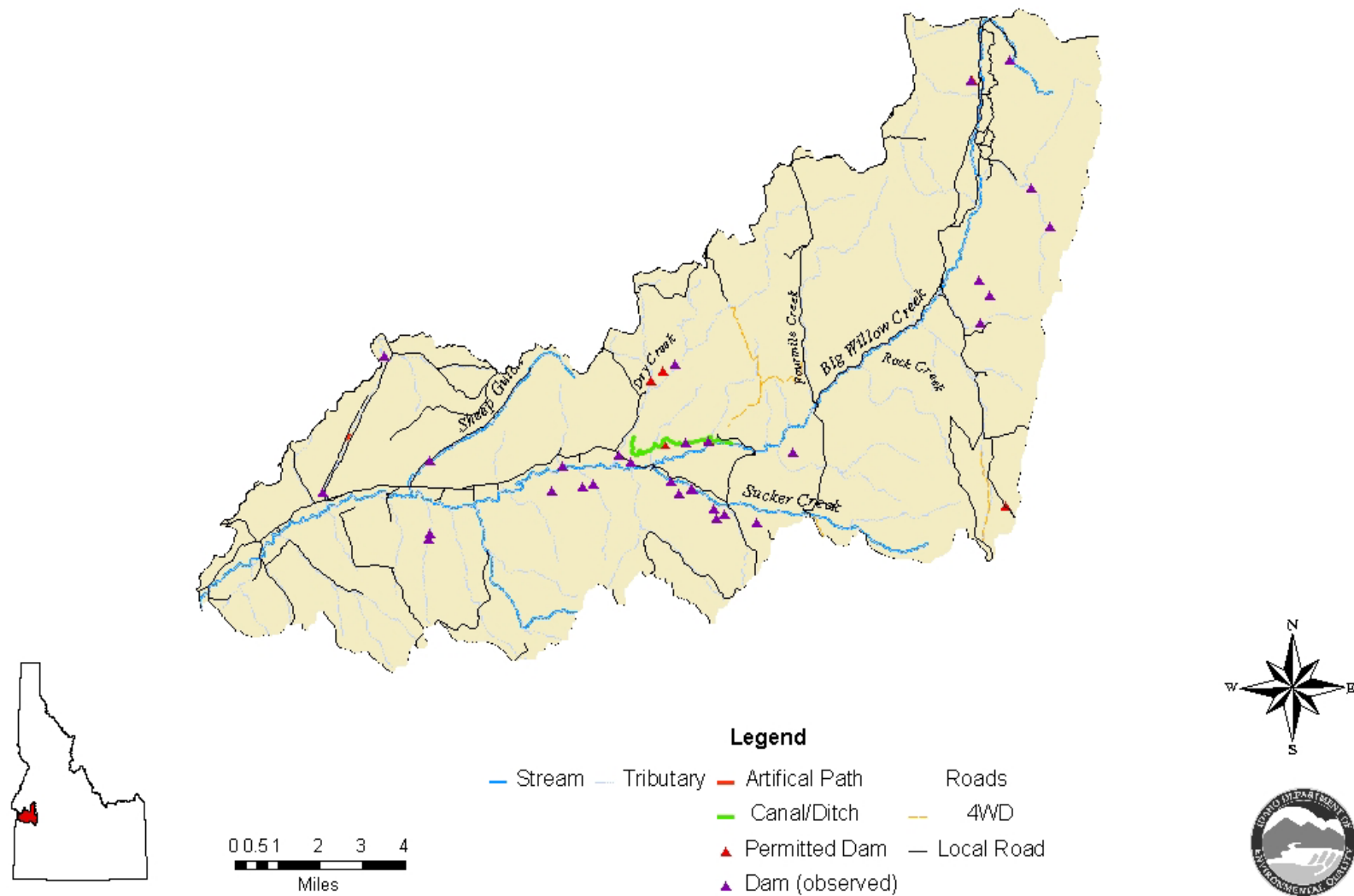


Figure E-7. Lower Payette River Assessment Unit 017 (Big Willow Creek), with roads and water features.

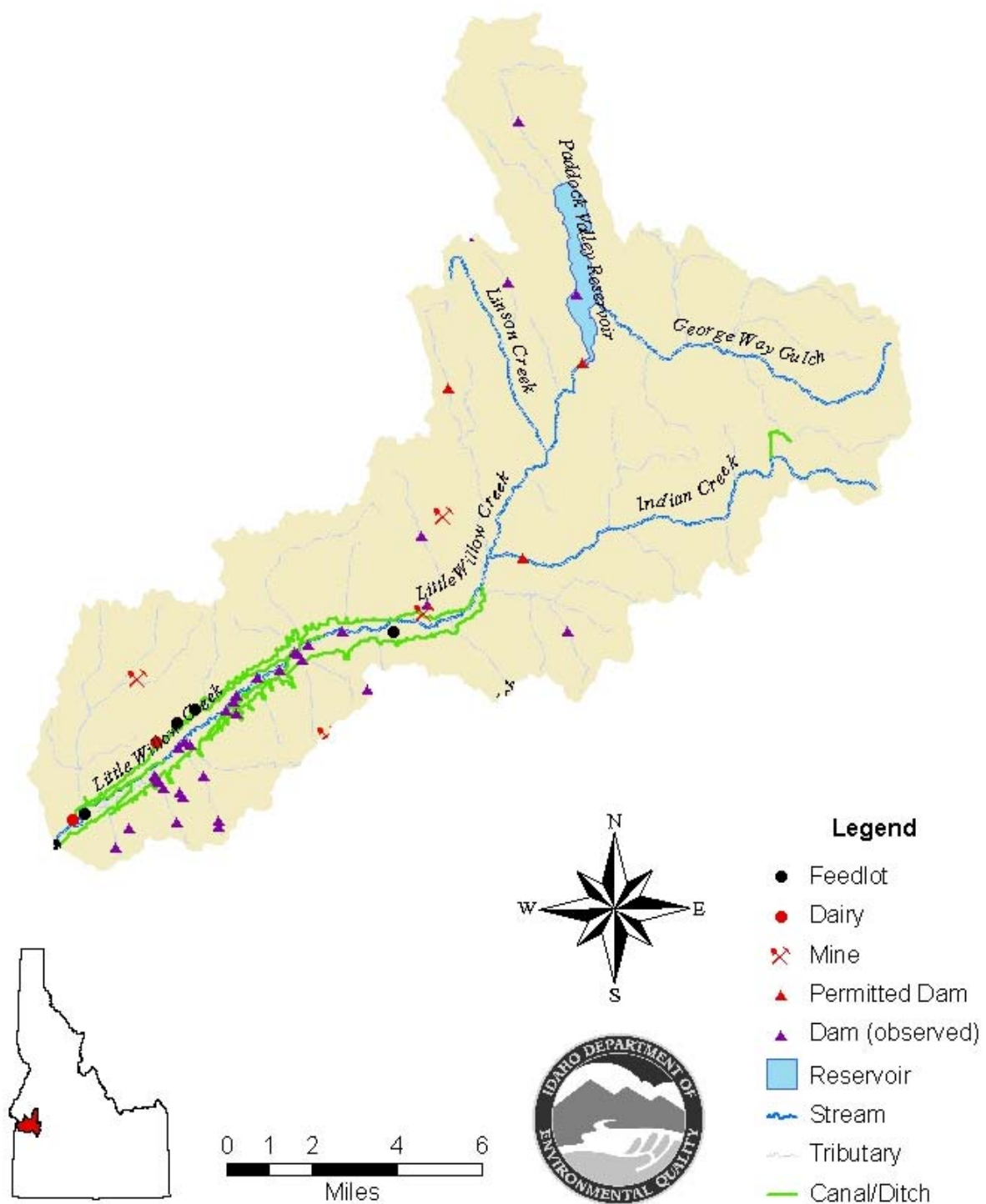
Lower Payette River Assessment Units 018, 019, 020, and 021

Figure E-8. Lower Payette River Assessment Units 018, 019, 020, and 021 (Little Willow Creek), with surface water bodies and potential surface water pollutant sources.

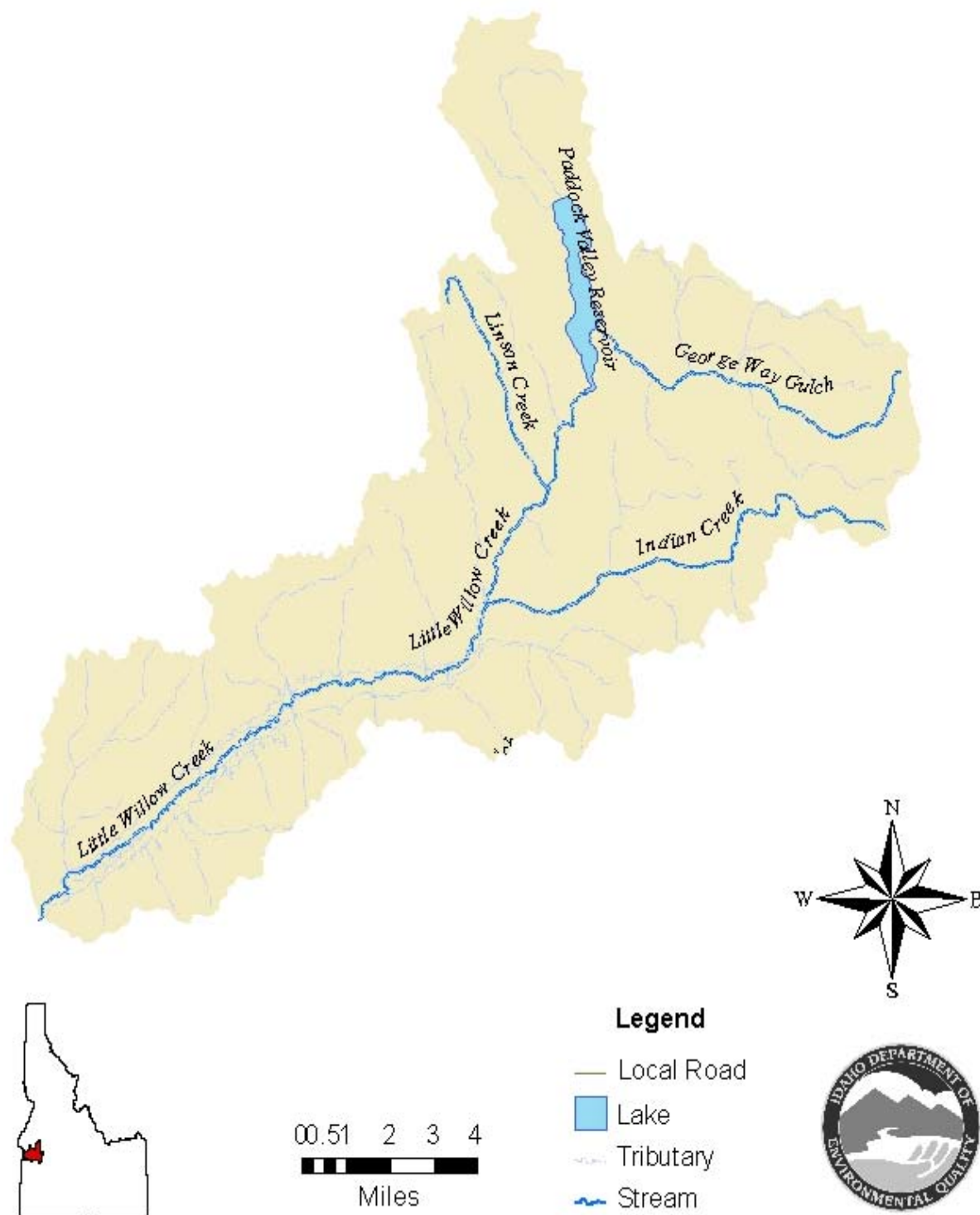
Lower Payette River Assessment Units 018, 019, 020 and 021

Figure E-9. Lower Payette River Assessment Units 018, 019, 020, and 021 (Little Willow Creek), with surface water bodies and roads.

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