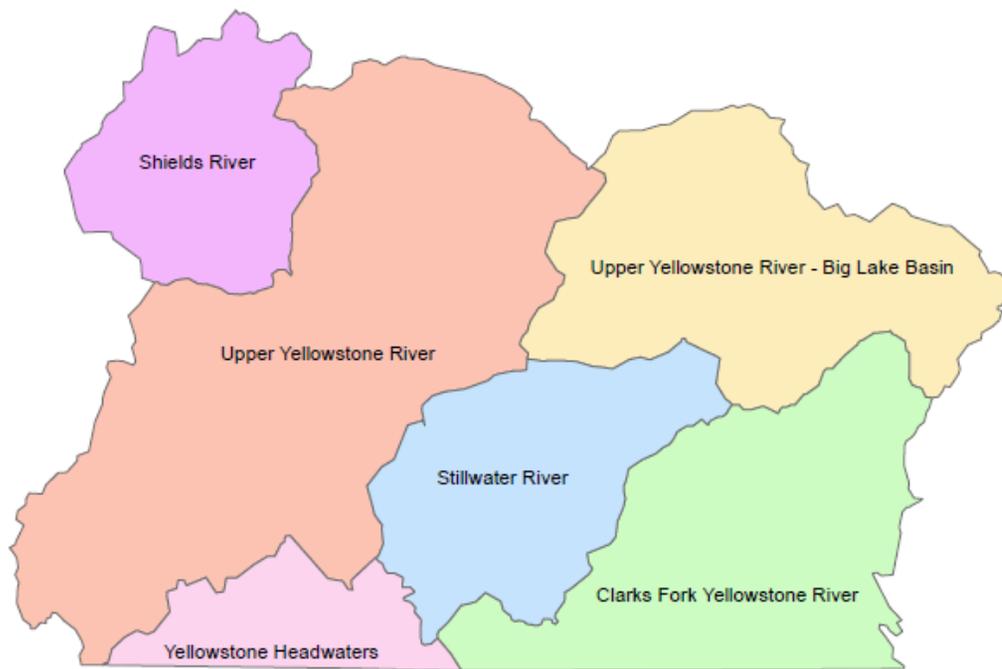


## **Appendix E: Section IV. Water Resources in the Yellowstone River Basin: Water Quality**

### **Water Quality In the Yellowstone River Basin**

The Montana Department of Environmental Quality 303 d listing of water-quality impaired streams (draft 2014) is provided on the following pages. For a more complete and up-to-date description of the information see:

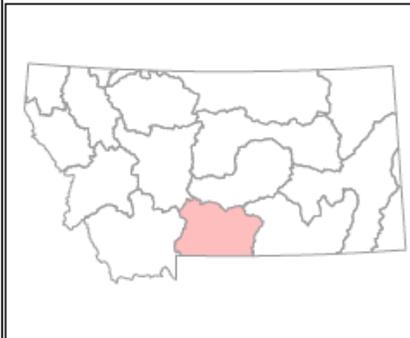
<http://deg.mt.gov/wqinfo/cwaic/reports.mcp>



## Upper Yellowstone Sub-Major Basin

### Yellowstone River Basin

USGS HUC	HUC NAME
10070001	Yellowstone Headwaters
10070002	Upper Yellowstone River
10070003	Shields River
10070004	Upper Yellowstone River - Big Lake Basin
10070005	Stillwater River (Yellowstone R)
10070006	Clarks Fork Yellowstone River



Montana Department of  
Environmental Quality

A-127 of 233

Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10070001	Yellowstone Headwaters	Watershed	Upper Yellowstone									
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name	
Yellowstone River	MT43B001_010	YELLOWSTONE RIVER, Yellowstone Park Boundary to Reese Creek	5	4.79	MILES	B-1	N	F	N	F	Ammonia (Total) Arsenic Copper Lead Nitrate/Nitrite (Nitrite + Nitrate as N) Sedimentation/Siltation	Highway/Road/Bridge Runoff (Non-construction Related) Impacts from Abandoned Mine Lands (Inactive) Natural Sources Source Unknown Subsurface (Hardrock) Mining Surface Mining	
Yellowstone River	MT43B001_011	YELLOWSTONE RIVER, Wyoming border to Yellowstone National Park Boundary	5	8.68	MILES	A-1	N	X	N	X	Ammonia (Un-ionized) Arsenic Copper Nitrate/Nitrite (Nitrite + Nitrate as N) Sedimentation/Siltation	Highway/Road/Bridge Runoff (Non-construction Related) Impacts from Abandoned Mine Lands (Inactive) Natural Sources Source Unknown Subsurface (Hardrock) Mining Surface Mining	
Paradise	MT43B002_010	REESE CREEK, Wyoming border to mouth (Yellowstone River)	4C	5.23	MILES	A-1	N	F	F	F	Fish-Passage Barrier	Source Unknown	
Paradise	MT43B002_021	BEAR CREEK, 1/2 mile below Jardine Mine to mouth (Yellowstone River)	5	3.03	MILES	B-1	N	F	F	N	Low flow alterations Temperature, water	Flow Alterations from Water Diversions	
Cooke City	MT43B002_031	SODA BUTTE CREEK, McLaren Tailings to Wyoming Border	4A	4.86	MILES	B-1	N	X	X	F	Copper Iron Lead Manganese	Acid Mine Drainage Mine Tailings	
Cooke City	MT43B002_040	MILLER CREEK, headwaters to mouth (Soda Butte Creek)	4A	2.56	MILES	B-1	N	X	N	X	Aluminum Cadmium Copper Iron Lead Manganese Zinc	Acid Mine Drainage Mine Tailings Natural Sources	

F=Fully Supporting; T=Threatened; N=Not Fully Supporting; I=Insufficient Information; X=Not Assessed; - = Beneficial Use Not Assigned

Appendices Yellowstone River Basin Water Plan - 2014

**Appendix A: Impaired Waters**

HUC	10070002	Upper Yellowstone	Watershed		Upper Yellowstone								
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name	
Yellowstone River	MT43B003_010	YELLOWSTONE RIVER, Reese Creek to Bridger Creek	4C	119	MILES	B-1	N	X	X	X	Alteration in stream-side or littoral vegetative covers Physical substrate habitat alterations	Loss of Riparian Habitat Site Clearance (Land Development or Redevelopment) Streambank Modifications/destabilization	
Yellowstone - Sweet Grass	MT43B004_011	OTTER CREEK, 2 mi downstream of Highway 191 bridge to mouth (Yellowstone River)	4C	29.57	MILES	B-1	N	X	X	X	Other flow regime alterations Physical substrate habitat alterations	Impacts from Hydrostructure Flow Regulation/modification	
Yellowstone - Sweet Grass	MT43B004_012	OTTER CREEK, headwaters to 2 mi downstream of Highway 191 bridge	5	24.5	MILES	B-1	N	F	F	I	Alteration in stream-side or littoral vegetative covers Sedimentation/Siltation	Agriculture	
Yellowstone - Sweet Grass	MT43B004_021	BIG TIMBER CREEK, Swamp Creek to mouth (Yellowstone River)	4C	5.37	MILES	B-1	N	X	X	N	Low flow alterations	Impacts from Hydrostructure Flow Regulation/modification	
Yellowstone - Sweet Grass	MT43B004_022	BIG TIMBER CREEK, headwaters downstream to Swamp Creek	5	26.75	MILES	B-1	N	F	N	I	Alteration in stream-side or littoral vegetative covers Arsenic Cadmium Copper Iron Lead Manganese Nickel Sedimentation/Siltation Selenium Solids (Suspended/Bedload)	Agriculture Grazing in Riparian or Shoreline Zones Source Unknown	
Yellowstone - Sweet Grass	MT43B004_031	LOWER DEER CREEK, 4 mile upstream to mouth (Yellowstone River)	4C	4.43	MILES	B-1	N	X	X	N	Low flow alterations	Impacts from Hydrostructure Flow Regulation/modification	
Yellowstone - Sweet Grass	MT43B004_041	UPPER DEER CREEK, Cartwright Gulch to mouth (Yellowstone River)	4C	6.95	MILES	B-1	N	X	X	N	Low flow alterations	Impacts from Hydrostructure Flow Regulation/modification	
Yellowstone - Sweet Grass	MT43B004_042	UPPER DEER CREEK, headwaters to Cartwright Gulch	5	16.63	MILES	B-1	N	F	F	I	Alteration in stream-side or littoral vegetative covers Solids (Suspended/Bedload)	Grazing in Riparian or Shoreline Zones Silviculture Activities	
Paradise	MT43B004_051	BILLMAN CREEK, 1.3 miles upstream to mouth (Yellowstone River)	5	1.37	MILES	B-1	N	F	F	N	Excess Algal Growth Fish-Passage Barrier	Agriculture Channelization	

F=Fully Supporting; T=Threatened; N=Not Fully Supporting; I=Insufficient Information; X=Not Assessed; -- Beneficial Use Not Assigned

Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10070002	Upper Yellowstone	Watershed	Upper Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Paradise	MT43B004_051	BILLMAN CREEK, 1.3 miles upstream to mouth (Yellowstone River)	5	1.37	MILES	B-1	N	F	F	N	Nitrate/Nitrite (Nitrite + Nitrate as N) Sedimentation/Siltation	Habitat Modification - other than Hydromodification Source Unknown		
Paradise	MT43B004_052	BILLMAN CREEK, headwaters to 1.3 miles above mouth (Yellowstone River)	5	13.44	MILES	B-1	N	F	F	F	Combined Blota/Habitat Bioassessments Nitrate/Nitrite (Nitrite + Nitrate as N) Sedimentation/Siltation	Agriculture Channelization Source Unknown		
Paradise	MT43B004_061	TOM MINER CREEK, Tepee Creek to mouth (Yellowstone River)	5	.73	MILES	B-1	N	F	F	N	Low flow alterations Temperature, water	Flow Alterations from Water Diversions		
Paradise	MT43B004_071	MILL CREEK, National Forest boundary to mouth (Yellowstone River)	4C	7.4	MILES	B-1	N	X	X	N	Low flow alterations	Agriculture Impacts from Hydrostructure Flow Regulation/modification		
Paradise	MT43B004_081	PINE CREEK, 2.5 miles upstream to mouth (Yellowstone River)	4C	2.42	MILES	B-1	N	X	X	N	Low flow alterations	Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production		
Paradise	MT43B004_090	SUCE CREEK, Absaroka-Beartooth Wilderness boundary to mouth (Yellowstone River)	4C	3.85	MILES	B-1	N	X	X	N	Low flow alterations	Impacts from Hydrostructure Flow Regulation/modification		
Paradise	MT43B004_101	SIX MILE CREEK, National Forest boundary to mouth (Yellowstone River)	4C	6.19	MILES	B-1	N	X	X	N	Low flow alterations	Impacts from Hydrostructure Flow Regulation/modification		
Paradise	MT43B004_102	SIX MILE CREEK, Absaroka-Beartooth Wilderness boundary to National Forest boundary	5	2.54	MILES	B-1	N	X	X	X	Other anthropogenic substrate alterations Sedimentation/Siltation	Loss of Riparian Habitat Placer Mining		
Big Creek (Yellowstone)	MT43B004_111	BIG CREEK, National Forest boundary to mouth (Yellowstone River)	4C	4.25	MILES	B-1	N	X	X	N	Low flow alterations	Flow Alterations from Water Diversions		
Paradise	MT43B004_120	MOL HERON CREEK, Yellowstone National Park boundary to mouth (Yellowstone River)	4C	9.03	MILES	B-1	N	F	F	F	Low flow alterations	Agriculture		
Boulder - Big Timber	MT43B004_131	BOULDER RIVER, Clayton Ditch to mouth (Yellowstone River)	5	5.51	MILES	B-1	N	F	F	N	Copper Iron Lead Low flow alterations Silver	Impacts from Abandoned Mine Lands (Inactive) Irrigated Crop Production		
Boulder - Big Timber	MT43B004_132	BOULDER RIVER, Natural Bridge and Falls (T3S R12E S26) to Clayton Ditch	5	27.84	MILES	B-1	N	F	F	F	Alteration in stream-side or littoral vegetative covers	Agriculture		

F=Fully Supporting; T=Threatened; N=Not Fully Supporting; I=Insufficient Information; X=Not Assessed; - = Beneficial Use Not Assigned

Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10070002	Upper Yellowstone	Watershed	Upper Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Boulder - Big Timber	MT43B004_132	BOULDER RIVER, Natural Bridge and Falls (T3S R12E S26) to Clayton Ditch (T1N R14E S34)	5	27.84	MILES	B-1	N	F	F	F	Chromium (total) Copper Iron Lead Nickel Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrogen (Total)	Grazing in Riparian or Shoreline Zones Source Unknown		
Boulder - Big Timber	MT43B004_133	BOULDER RIVER, confluence of the East Fork Boulder River to Natural bridge and Falls (T3S R12E S26)	5	24.08	MILES	B-1	N	F	F	N	Copper Excess Algal Growth Iron Lead Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrogen (Total) Phosphorus (Total)	Coal Mining Discharges (Permitted) Hardrock Mining Discharges (Permitted) Source Unknown		
Boulder - Big Timber	MT43B004_134	BOULDER RIVER, headwaters to confluence of East Fork Boulder River	4A	9.02	MILES	B-1	N	F	N	F	Copper Iron Lead	Impacts from Abandoned Mine Lands (Inactive)		
Boulder - Big Timber	MT43B004_141	EAST BOULDER RIVER, Elk Creek to mouth (Boulder River)	5	3.14	MILES	B-1	N	F	F	N	Chlorophyll-a Low flow alterations Other anthropogenic substrate alterations Sedimentation/Siltation	Flow Alterations from Water Diversions Source Unknown Streambank Modifications/destabilization		
Boulder - Big Timber	MT43B004_142	EAST BOULDER RIVER, National Forest boundary to Elk Creek	4C	3.07	MILES	B-1	N	F	I	N	Chlorophyll-a Low flow alterations	Agriculture Source Unknown		
Yellowstone - Sweet Grass	MT43B004_150	SWEET GRASS CREEK, headwaters to mouth (Yellowstone River)	4C	79.33	MILES	B-1	N	F	F	I	Alteration in stream-side or littoral vegetative covers	Agriculture		
Boulder - Big Timber	MT43B005_010	BASIN CREEK, headwater to mouth (Boulder River)	4A	1.55	MILES	B-1	N	X	X	X	Copper Iron			

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Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10070002	Upper Yellowstone	Watershed	Upper Yellowstone										
TMDL Planning Area	ID365B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Boulder - Big Timber	MT438005_010	BASIN CREEK, headwater to mouth (Boulder River)	4A	1.55	MILES	B-1	N	X	X	X	Lead			

Appendix A: Impaired Waters

HUC	10070003	Shields	Watershed	Upper Yellowstone										
TMDL Planning Area	ID365B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Shields	MT43A001_011	SHIELDS RIVER, Cottonwood Creek to mouth (Yellowstone River)	4A	18.99	MILES	B-1	N	X	X	N	Alteration in stream-side or littoral vegetative covers Low flow alterations Physical substrate habitat alterations Sedimentation/Siltation	Agriculture Impacts from Hydrostructure Flow Regulation/modification Streambank Modifications/destabilization		
Shields	MT43A001_012	SHIELDS RIVER, headwaters to Cottonwood Creek	4A	44.99	MILES	B-1	N	X	X	N	Alteration in stream-side or littoral vegetative covers Low flow alterations Physical substrate habitat alterations Sedimentation/Siltation	Grazing in Riparian or Shoreline Zones Impacts from Hydrostructure Flow Regulation/modification Silviculture Activities Streambank Modifications/destabilization		
Shields	MT43A002_010	POTTER CREEK, headwaters to the mouth (Flathead Creek), T3N R9E S16	4A	27.76	MILES	B-1	N	F	F	F	Low flow alterations Sedimentation/Siltation Solids (Suspended/Bedload)	Impacts from Hydrostructure Flow Regulation/modification		
Shields	MT43A002_020	ANTELOPE CREEK, headwaters to mouth (Shields River)	5	10.37	MILES	B-1	N	F	F	N	Alteration in stream-side or littoral vegetative covers Excess Algal Growth Solids (Suspended/Bedload)	Agriculture Livestock (Grazing or Feeding Operations) Source Unknown		
Shields	MT43A002_031	COTTONWOOD CREEK, confluence of Trespas Creek to mouth (Shields River)	4C	18.32	MILES	B-1	N	F	F	N	Low flow alterations	Irrigated Crop Production		
Shields	MT43A002_040	ELK CREEK, headwaters to mouth (Shields River)	4C	3.83	MILES	B-1	N	X	X	X	Alteration in stream-side or littoral vegetative covers	Grazing in Riparian or Shoreline Zones		
Shields	MT43A002_051	ROCK CREEK, National Forest boundary to mouth (Shields River)	4C	14.34	MILES	B-1	N	F	F	N	Low flow alterations	Flow Alterations from Water Diversions		

F=Fully Supporting; T=Threatened; N=Not Fully Supporting; I=Insufficient Information; X=Not Assessed; -- Beneficial Use Not Assigned

Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10070004	Upper Yellowstone-Lake Basin	Watershed	Upper Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Yellowstone River	MT43F001_011	YELLOWSTONE RIVER, City of Laurel PWS to City of Billings PWS	5	19.4	MILES	B-2	N	F	I	N	Cause Unknown Chlorophyll-a Nitrate/Nitrite (Nitrite + Nitrate as N) Oil and Grease Other anthropogenic substrate alterations Physical substrate habitat alterations	Channelization Crop Production (Crop Land or Dry Land) Municipal Point Source Discharges Pipeline Breaks Streambank Modifications/destabilization		
Yellowstone - Sweet Grass	MT43F002_010	DUCK CREEK, headwaters to mouth (Yellowstone River)	5	13.68	MILES	B-2	N	F	F	F	Alteration in stream-side or littoral vegetative covers Low flow alterations Sedimentation/Siltation	Channelization Drought-related Impacts Grazing in Riparian or Shoreline Zones		
Yellowstone - Sweet Grass	MT43F002_021	CANYON CREEK, highway 532 to mouth (Yellowstone River)	4C	19.6	MILES	B-1	N	X	X	X	Other flow regime alterations	Flow Alterations from Water Diversions		
Yellowstone - Sweet Grass	MT43F002_022	CANYON CREEK, headwaters to highway 532	5	29.7	MILES	B-2	N	F	F	F	Alteration in stream-side or littoral vegetative covers Low flow alterations Oxygen, Dissolved Sedimentation/Siltation	Agriculture Channelization Drought-related Impacts		
Yellowstone - Sweet Grass	MT43F002_040	VALLEY CREEK, headwaters to mouth (Yellowstone River)	5	14.75	MILES	B-2	N	F	F	F	Alteration in stream-side or littoral vegetative covers Benthic-Macrolnvertebrate Bioassessments Other flow regime alterations Oxygen, Dissolved Sedimentation/Siltation	Agriculture Channelization Drought-related Impacts Irrigated Crop Production Loss of Riparian Habitat		
Lake Basin - Spidel	MT43F003_010	BIG LAKE	5	2583	ACRES	B-2	N	N	N	X	Salinity	Agriculture		
Lake Basin - Spidel	MT43F003_020	HAILSTONE LAKE	5	114.7	ACRES	B-2	N	N	N	X	Salinity	Agriculture		
Lake Basin - Spidel	MT43F003_030	HALFBREED LAKE	5	211	ACRES	B-2	N	N	N	X	Salinity	Agriculture		

F=Fully Supporting; T=Threatened; N=Not Fully Supporting; I=Insufficient Information; X=Not Assessed; -- Beneficial Use Not Assigned

Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC 10070005 Stillwater		Watershed Upper Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name
Cooke City	MT43C001_010	STILLWATER RIVER, headwaters to Flood Creek	4A	21.69	MILES	B-1	N	F	N	X	Copper	Acid Mine Drainage
											Iron	Highway/Road/Bridge Runoff (Non-constructio Related)
											Manganese	Impacts from Abandoned Mine Lands (Inactive)
											Sedimentation/Sittation	Mine Tailings
											pH	Natural Sources
Stillwater - Columbus	MT43C001_020	STILLWATER RIVER, Forest Service Boundary to the mouth (Yellowstone River), T2S R20E S20	5	45.59	MILES	B-1	N	F	N	F	Cadmium	Hardrock Mining Discharges (Permitted)
											Chromium (total)	Impacts from Abandoned Mine Lands (Inactive)
											Copper	Natural Sources
											Cyanide	Source Unknown
											Mercury	Watershed Runoff following Forest Fire
											Nickel	
											Nitrate/Nitrite (Nitrite + Nitrate as N)	
Stillwater - Columbus	MT43C002_010	LODGEPOLE CREEK, headwaters to mouth (Castle Creek)	5	5.91	MILES	B-1	N	F	F	N	Chlorophyll-a	Irrigated Crop Production
											Nitrate/Nitrite (Nitrite + Nitrate as N)	Rangeland Grazing
												Source Unknown
Stillwater - Columbus	MT43C002_020	BAD CANYON CREEK, headwaters to mouth (Stillwater River)	4C	11.34	MILES	B-1	F	F	F	N	Chlorophyll-a	Rangeland Grazing
Stillwater - Columbus	MT43C002_030	CASTLE CREEK, headwaters to the mouth (Limestone Creek), T4S R15E S29	5	8.29	MILES	B-1	N	F	F	N	Chlorophyll-a	Livestock (Grazing or Feeding Operations)
											Nitrate/Nitrite (Nitrite + Nitrate as N)	Source Unknown
												Upstream Source
Stillwater - Columbus	MT43C002_041	GROVE CREEK, confluence of South Fork Grove Creek, T4S R18E S13 to the mouth (Stillwater River), T3S R18E S34	5	5.23	MILES	B-1	N	F	F	N	Alteration in stream-side or littoral vegetative covers	Grazing in Riparian or Shoreline Zones
											Chlorophyll-a	Irrigated Crop Production
											Phosphorus (Total)	Loss of Riparian Habitat
											Sedimentation/Sittation	Natural Sources
Stillwater - Columbus	MT43C002_050	FISHTAIL CREEK, headwaters to mouth (West Rosebud Creek)	5	14.8	MILES	B-1	N	F	F	F	Iron	Source Unknown
											Lead	
Stillwater - Columbus	MT43C002_070	JOE HILL CREEK, headwaters to mouth (Stillwater River)	5	13.16	MILES	B-1	N	F	F	N	Chlorophyll-a	Flow Alterations from Water Diversions

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Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10070005	Stillwater	Watershed		Upper Yellowstone								
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name	
Stillwater - Columbus	MT43C002_070	JOE HILL CREEK, headwaters to mouth (Stillwater River)	5	13.16	MILES	B-1	N	F	F	N	Low flow alterations Sedimentation/Siltation	Irrigated Crop Production	
Stillwater - Columbus	MT43C002_081	BUTCHER CREEK, highway 78 to mouth (Rosebud Creek)	5	22.02	MILES	B-1	N	F	F	X	High Flow Regime Physical substrate habitat alterations Solids (Suspended/Bedload)	Streambank Modifications/destabilization Transfer of Water from an Outside Watershed	
Stillwater - Columbus	MT43C002_082	BUTCHER CREEK, headwaters to highway 78	5	4.98	MILES	B-1	N	F	F	N	Chlorophyll-a Fish-Passage Barrier Phosphorus (Total) Sedimentation/Siltation Solids (Suspended/Bedload)	Hydrostructure Impacts on Fish Passage Natural Sources Source Unknown	
Stillwater - Columbus	MT43C002_090	WEST ROSEBUD CREEK, headwaters to mouth (Rosebud Creek)	5	40.45	MILES	B-1	N	F	F	F	Benthic-Macroinvertebrate Bioassessments	Source Unknown	
Stillwater - Columbus	MT43C002_100	ROSEBUD CREEK, East and West Branches to mouth (Stillwater River)	5	3.93	MILES	B-1	N	F	F	F	Benthic-Macroinvertebrate Bioassessments	Source Unknown	
Cooke City	MT43C002_140	DAISY CREEK, headwaters to mouth (Stillwater River)	4A	1.94	MILES	B-1	N	N	N	N	Aluminum Cadmium Copper Iron Lead Manganese Sedimentation/Siltation Zinc pH	Acid Mine Drainage Highway/Road/Bridge Runoff (Non-construction Related) Impacts from Abandoned Mine Lands (Inactive) Mine Tailings Natural Sources	

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Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10070006	Clarks Fork Yellowstone	Watershed	Upper Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Clarks Fork Yellowstone	MT43D001_011	CLARKS FORK YELLOWSTONE RIVER, Bridger Creek to mouth (Yellowstone River)	5	43.32	MILES	B-2	N	N	I	N	Ammonia (Total) Chlorophyll-a Copper Iron Lead Low flow alterations Mercury Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrogen (Total) Phosphorus (Total) Physical substrate habitat alterations Solids (Suspended/Bedload) Temperature, water	Habitat Modification - other than Hydromodification Impacts from Hydrostructure Flow Regulation/Modification Irrigated Crop Production Source Unknown Streambank Modifications/destabilization		
Cooke City	MT43D001_020	CLARKS FORK YELLOWSTONE RIVER, headwaters to Montana Border	4A	5.06	MILES	B-1	N	F	F	X	Cadmium Copper Lead Silver Zinc pH	Acid Mine Drainage Impacts from Abandoned Mine Lands (Inactive) Mine Tailings		
Clarks Fork Yellowstone	MT43D002_010	ELBOW CREEK, headwaters to mouth (Clarks Fork)	5	38.57	MILES	B-1	N	F	F	N	Alteration in stream-side or littoral vegetative covers Chlorophyll-a Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrogen (Total) Sedimentation/Siltation Solids (Suspended/Bedload)	Animal Feeding Operations (NPS) Grazing in Riparian or Shoreline Zones Irrigated Crop Production Rangeland Grazing		
Clarks Fork Yellowstone	MT43D002_020	BEAR CREEK, headwaters to mouth (Clarks Fork)	5	21.14	MILES	B-1	N	F	F	N	Alteration in stream-side or littoral vegetative covers Chlorophyll-a	Impacts from Abandoned Mine Lands (Inactive) Irrigated Crop Production		

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Appendices Yellowstone River Basin Water Plan - 2014

**Appendix A: Impaired Waters**

HUC	10070006	Clarks Fork Yellowstone	Watershed	Upper Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Clarks Fork Yellowstone	MT43D002_020	BEAR CREEK, headwaters to mouth (Clarks Fork)	5	21.14	MILES	B-1	N	F	F	N	High Flow Regime Iron Nitrate/Nitrite (Nitrite + Nitrate as N) Phosphorus (Total) Sedimentation/Siltation	Loss of Riparian Habitat Rangeland Grazing Transfer of Water from an Outside Watershed		
Clarks Fork Yellowstone	MT43D002_031	BLUEWATER CREEK, unnamed tributary at T6N R24E S7 NWNE to mouth (Clarks Fork Yellowstone River)	5	11.41	MILES	B-1	N	F	F	N	Chlorophyll-a Nitrate/Nitrite (Nitrite + Nitrate as N) Phosphorus (Total) Sedimentation/Siltation Solids (Suspended/Bedload)	Agriculture Animal Feeding Operations (NPS) Aquaculture (Permitted) Irrigated Crop Production		
Clarks Fork Yellowstone	MT43D002_050	RED LODGE CREEK, headwaters to Cooney Reservoir	4C	17.93	MILES	B-1	N	F	F	F	Alteration in stream-side or littoral vegetative covers	Crop Production (Crop Land or Dry Land) Grazing in Riparian or Shoreline Zones		
Clarks Fork Yellowstone	MT43D002_060	RED LODGE CREEK, Cooney Reservoir to mouth (Rock Creek)	5	12.07	MILES	B-1	N	X	X	X	Organic Enrichment (Sewage) Biological Indicators Other flow regime alterations Physical substrate habitat alterations	Impacts from Hydrostructure Flow Regulation/modification Streambank Modifications/destabilization		
Clarks Fork Yellowstone	MT43D002_070	WILLOW CREEK, headwaters to mouth (Cooney Reservoir)	5	36.46	MILES	B-1	N	X	X	X	Low flow alterations Sedimentation/Siltation	Irrigated Crop Production		
Clarks Fork Yellowstone	MT43D002_080	WEST RED LODGE CREEK, Absaroka-Beartooth Wilderness boundary to mouth (Red Lodge Creek)	5	14.39	MILES	B-1	N	F	F	F	Sedimentation/Siltation	Natural Sources Source Unknown		
Clarks Fork Yellowstone	MT43D002_100	SILVERTIP CREEK, Wyoming border to mouth (Clarks Fork Yellowstone River)	5	21.77	MILES	B-1	N	N	N	F	Alteration in stream-side or littoral vegetative covers Nitrogen (Total) Other flow regime alterations Oxygen, Dissolved Phosphorus (Total) Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems) Solids (Suspended/Bedload)	Channelization Dam or Impoundment Grazing in Riparian or Shoreline Zones Loss of Riparian Habitat Natural Sources Petroleum/natural Gas Production Activities (Permitted) Pipeline Breaks		

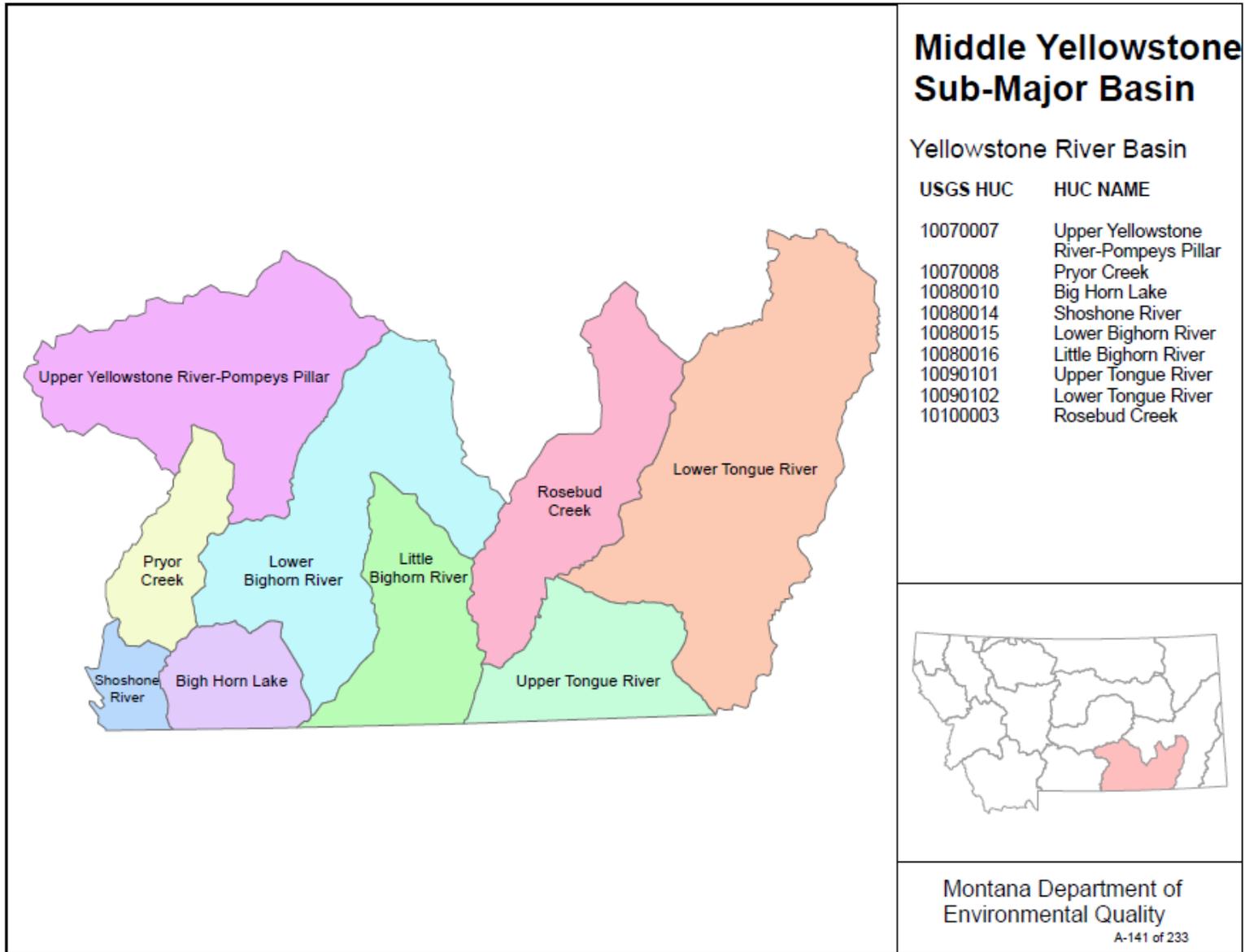
F=Fully Supporting; T=Threatened; N=Not Fully Supporting; I=Insufficient Information; X=Not Assessed; -- Beneficial Use Not Assigned

Appendices Yellowstone River Basin Water Plan - 2014

**Appendix A: Impaired Waters**

HUC	10070006	Clarks Fork Yellowstone	Watershed	Upper Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Clarks Fork Yellowstone	MT43D002_100	SILVERTIP CREEK, Wyoming border to mouth (Clarks Fork Yellowstone River)	5	21.77	MILES	B-1	N	N	N	F	Specific Conductance Temperature, water Total Dissolved Solids Turbidity	Rangeland Grazing Upstream Source		
Cooke City	MT43D002_110	FISHER CREEK, headwaters to mouth (Clarks Fork Yellowstone River)	4A	3.34	MILES	B-1	N	N	N	N	Aluminum Cadmium Copper Iron Lead Manganese Sedimentation/Siltation Silver Zinc pH	Acid Mine Drainage Highway/Road/Bridge Runoff (Non-construction Related) Impacts from Abandoned Mine Lands (Inactive) Mine Tailings		
Clarks Fork Yellowstone	MT43D002_120	ROCK CREEK, Red Lodge Creek to mouth (Clarks Fork)	4C	16.02	MILES	B-1	N	X	X	N	Low flow alterations	Flow Alterations from Water Diversions Irrigated Crop Production		
Clarks Fork Yellowstone	MT43D002_131	ROCK CREEK, West Fork Rock Creek to Red Lodge Creek	4C	27.47	MILES	B-1	N	X	X	N	Low flow alterations	Flow Alterations from Water Diversions Irrigated Crop Production		
Clarks Fork Yellowstone	MT43D002_140	COTTONWOOD CREEK, headwaters to the mouth (Clarks Fork of Yellowstone), T3S R24E S24	5	19.57	MILES	B-1	N	F	F	F	Alteration in stream-side or littoral vegetative covers Oxygen, Dissolved Solids (Suspended/Bedload)	Agriculture Drought-related Impacts Grazing in Riparian or Shoreline Zones		
Clarks Fork Yellowstone	MT43D002_180	SOUTH FORK BRIDGER CREEK, Headwaters to mouth (Bridger Creek)	5	9.39	MILES	B-1	N	F	N	F	Arsenic Iron Sedimentation/Siltation	Grazing in Riparian or Shoreline Zones Natural Sources Source Unknown		

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Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10070007	Upper Yellowstone-Pompeys Pillar	Watershed	Middle Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Yellowstone River	MT43F001_010	YELLOWSTONE RIVER, City of Billings PWS to Huntley Diversion Dam	5	10.62	MILES	B-3	N	F	N	N	Arsenic Benthic-Macroinvertebrate Bioassessments Dissolved oxygen saturation Excess Algal Growth Nutrient/Eutrophication Biological Indicators Oil and Grease Periphyton (Aufwuchs) Indicator Bioassessments Solids (Suspended/Bedload)	Agriculture Municipal Point Source Discharges Natural Sources Pipeline Breaks		
Yellowstone River	MT43Q001_011	YELLOWSTONE RIVER, Huntley Diversion Dam to mouth of Big Horn River	5	58.31	MILES	B-3	N	I	I	N	Ammonia (Un-ionized) Oil and Grease Sedimentation/Siltation Total Dissolved Solids	Agriculture Industrial Point Source Discharge Irrigated Crop Production Municipal Point Source Discharges Natural Sources Pipeline Breaks		
Yellowstone - Lower Bighorn	MT43Q002_010	FLY CREEK, Crow Indian Reservation boundary to mouth (Yellowstone River)	5	55.88	MILES	C-3	N	-	-	N	Alteration in stream-side or littoral vegetative covers Chlorophyll-a Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrogen (Total) Oxygen, Dissolved	Agriculture Dam or Impoundment Drought-related Impacts Loss of Riparian Habitat		
Lake Basin - Spidel	MT43Q003_010	SPIDEL WATERFOWL PRODUCTION AREA	5	659.8	ACRES	B-1	N	N	N	X	Other anthropogenic substrate alterations Salinity Selenium	Highways, Roads, Bridges, Infrastructure (New Construction) Non-Irrigated Crop Production		

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Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10070008	Pryor	Watershed		Middle Yellowstone							
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name
Yellowstone - Lower Bighorn	MT43E001_010	PRYOR CREEK, Interstate 90 bridge to mouth (Yellowstone River)	5	14.98	MILES	C-3	N	-	-	N	Benthic-Macroinvertebrate Bioassessments Low flow alterations	Flow Alterations from Water Diversions Irrigated Crop Production Source Unknown
Yellowstone - Lower Bighorn	MT43E001_011	PRYOR CREEK, Crow Reservation Boundary to Interstate 90 bridge	5	2.88	MILES	B-1	N	F	F	N	Excess Algal Growth Low flow alterations Sedimentation/Sitation	Agriculture Flow Alterations from Water Diversions Natural Sources Sources Outside State Jurisdiction or Borders Upstream Source

Appendix A: Impaired Waters

HUC	10080010	Bighorn Lake	Watershed		Middle Yellowstone							
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name
Bighorn Lake - Shoshone	MT43P002_010	CROOKED CREEK, headwaters to Wyoming Border	4C	15.07	MILES	B-1	N	X	X	X	Physical substrate habitat alterations	Agriculture

Appendix A: Impaired Waters

HUC	10080015	Lower Bighorn	Watershed		Middle Yellowstone							
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name
Yellowstone - Lower Bighorn	MT43R001_010	BIGHORN RIVER, Crow Indian Res. Boundary to mouth (Yellowstone River)	5	40.02	MILES	B-2	X	F	N	X	Lead Mercury	Source Unknown
Bighorn Lake - Shoshone	MT43R001_020	BIGHORN RIVER, Yellowtail Afterbay Dam to Crow Indian Reservation boundary at 45 32E Sec 34/27 boundary	5	14.6	MILES	B-1	N	F	X	X	Nitrogen (Total)	Source Unknown
Yellowstone - Lower Bighorn	MT43R002_010	TULLOCK CREEK, Crow Indian Reservation Boundary to mouth (Bighorn River)	5	58.83	MILES	C-3	N	-	-	F	Alteration in stream-side or littoral vegetative covers Iron Low flow alterations Nitrogen (Total) Phosphorus (Total) Sedimentation/Sitation	Dam or Impoundment Flow Alterations from Water Diversions Irrigated Crop Production Loss of Riparian Habitat Natural Sources Rangeland Grazing

Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10090101	Upper Tongue	Watershed	Middle Yellowstone									
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name	
Tongue	MT42B001_010	TONGUE RIVER, Wyoming border to Tongue River Reservoir	5	5.9	MILES	B-2	N	F	F	F	Iron Low flow alterations	Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources Streambank Modifications/destabilization	
Tongue	MT42B001_020	TONGUE RIVER, Tongue River Dam to Prairie Dog Creek	4C	22.05	MILES	B-2	N	F	F	I	Low flow alterations	Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Streambank Modifications/destabilization	
Tongue	MT42B001_021	TONGUE RIVER, Prairie Dog Creek to Hanging Woman Creek	4C	12.27	MILES	B-3	N	I	I	I	Low flow alterations	Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Streambank Modifications/destabilization	
Tongue	MT42B002_031	HANGING WOMAN CREEK, Stroud Creek to mouth (Tongue River)	5	18.27	MILES	C-3	N	N	-	I	Iron Low flow alterations Salinity Sedimentation/Siltation	Grazing In Riparian or Shoreline Zones Irrigated Crop Production Natural Sources Rangeland Grazing Streambank Modifications/destabilization	
Tongue	MT42B002_032	HANGING WOMAN CREEK, Wyoming border to Stroud Creek	5	31.37	MILES	C-3	N	N	-	I	Low flow alterations Salinity	Irrigated Crop Production Natural Sources	
Tongue	MT42B003_010	TONGUE RIVER RESERVOIR	5	2158.5	ACRES	B-2	N	I	I	I	Chlorophyll-a Oxygen, Dissolved Solids (Suspended/Bedload)	Irrigated Crop Production Municipal Point Source Discharges	

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Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10090102	Lower Tongue	Watershed		Middle Yellowstone								
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name	
Tongue	MT42C001_011	TONGUE RIVER, Twelve Mile Dam to mouth (Yellowstone River)	5	20.9	MILES	B-3	N	N	N	I	Cadmium Copper Iron Lead Low flow alterations Nickel Salinity Solids (Suspended/Bedload) Sulfates Zinc	Dam Construction (Other than Upstream Flood Control Projects) Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources Streambank Modifications/destabilization	
Tongue	MT42C001_013	TONGUE RIVER, Hanging Woman Creek to Beaver Creek	5	74.97	MILES	B-3	N	F	F	I	Iron Low flow alterations Solids (Suspended/Bedload)	Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources Streambank Modifications/destabilization	
Tongue	MT42C001_014	TONGUE RIVER, Beaver Creek to Twelve Mile Dam, T6N R46E S29	5	72	MILES	B-3	N	F	F	I	Iron Low flow alterations Solids (Suspended/Bedload)	Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources Streambank Modifications/destabilization	
Tongue	MT42C002_020	OTTER CREEK, headwaters to mouth (Tongue River)	5	108.1	MILES	C-3	N	N	-	I	Alteration in stream-side or littoral vegetative covers Iron Salinity	Agriculture Grazing in Riparian or Shoreline Zones Highways, Roads, Bridges, Infrastructure (New Construction) Natural Sources Site Clearance (Land Development or Redevelopment)	
Tongue	MT42C002_061	PUMPKIN CREEK, headwaters to Little Pumpkin Creek	5	87.68	MILES	C-3	N	N	-	I	Low flow alterations Salinity Temperature, water	Irrigated Crop Production Natural Sources	

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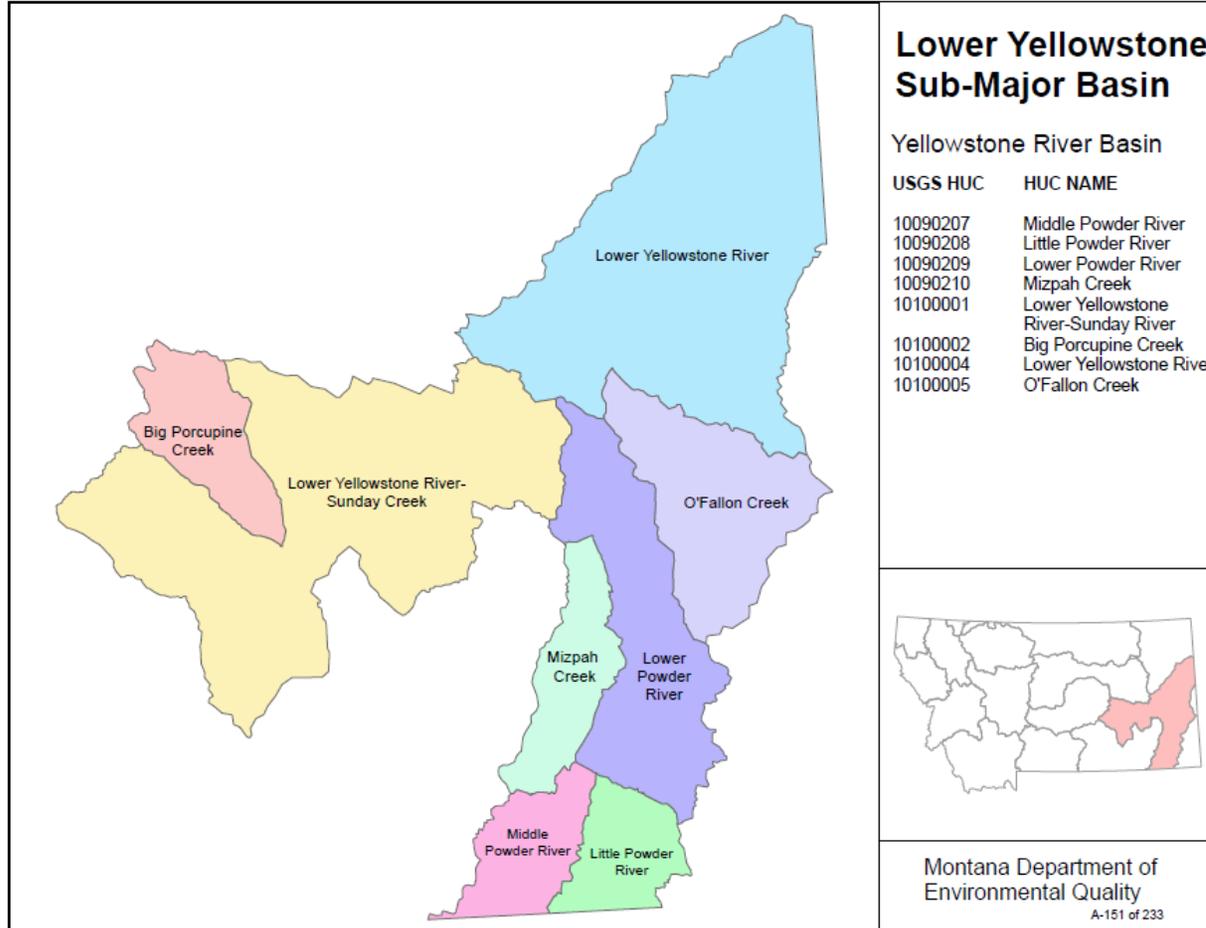
Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10090102	Lower Tongue	Watershed		Middle Yellowstone								
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name	
Tongue	MT42C002_062	PUMPKIN CREEK, Little Pumpkin Creek to the mouth (Tongue River)	5	92.19	MILES	C-3	N	N	-	I	Low flow alterations Salinity Temperature, water	Irrigated Crop Production Natural Sources	

Appendix A: Impaired Waters

HUC	10100003	Rosebud	Watershed		Middle Yellowstone								
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name	
Rosebud	MT42A001_011	ROSEBUD CREEK, boundary at S28/29 T6N R42E to mouth (Yellowstone River)	4C	4.28	MILES	C-3	N	-	-	X	Physical substrate habitat alterations	Loss of Riparian Habitat	
Rosebud	MT42A001_012	ROSEBUD CREEK, Northern Cheyenne Reservation boundary to boundary at S28/29 T6N R42E	5	111.77	MILES	C-3	N	-	-	X	Other	Dam Construction (Other than Upstream Flood Control Projects)	



Appendices Yellowstone River Basin Water Plan - 2014

**Appendix A: Impaired Waters**

HUC	10090207	Middle Powder	Watershed	Lower Yellowstone									
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AGL	AG	DW	Rec	Cause Name	Source Name	
Powder	MT42.001_010	POWDER RIVER, Wyoming border to Little Powder River	5	78.21	MILES	C-3	X	N	-	X	Salinity	Natural Sources Source Unknown	

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Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10090208	Little Powder	Watershed		Lower Yellowstone								
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name	
Powder	MT42I001_010	LITTLE POWDER RIVER, Wyoming border to mouth (Powder River)	5	63.31	MILES	C-3	X	N	-	X	Salinity	Natural Sources Source Unknown	

Appendix A: Impaired Waters

HUC	10090209	Lower Powder	Watershed		Lower Yellowstone								
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name	
Powder	MT42J003_011	POWDER RIVER, Little Powder River to Mizpah Creek	5	99	MILES	C-3	X	N	-	X	Salinity	Natural Sources Source Unknown	
Powder	MT42J003_012	POWDER RIVER, Mizpah Creek to mouth (Yellowstone River)	5	45.33	MILES	C-3	X	N	-	X	Salinity	Natural Sources Source Unknown	
Powder	MT42J004_010	STUMP CREEK, headwaters to mouth (Powder River)	5	29.77	MILES	C-3	X	N	-	X	Salinity	Natural Sources	

Appendix A: Impaired Waters

HUC	10090210	Mizpah	Watershed		Lower Yellowstone								
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name	
Powder	MT42J005_011	MIZPAH CREEK, headwaters to Corral Creek	5	131.98	MILES	C-3	X	N	-	X	Salinity	Natural Sources	
Powder	MT42J005_012	MIZPAH CREEK, Corral Creek to the mouth (Powder River)	5	22.98	MILES	C-3	X	N	-	X	Salinity	Natural Sources	

Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	1010001	Lower Yellowstone-Sunday	Watershed	Lower Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Middle Yellowstone Tributaries	MT42K002_060	DEADMAN CREEK, headwaters to mouth (North Fork Sunday Creek)	5	17.28	MILES	C-3	N	-	-	F	Phosphorus (Total)			
Middle Yellowstone Tributaries	MT42K002_070	STELLAR CREEK, headwaters to mouth (Little Porcupine Creek)	5	42.96	MILES	C-3	N	-	-	N	Cadmium Chlorophyll-a Phosphorus (Total) pH	Rangeland Grazing Source Unknown		
Middle Yellowstone Tributaries	MT42K002_080	NORTH FORK SUNDAY CREEK, Custer/Rosebud County border to mouth (Sunday Creek)	5	33.76	MILES	C-3	N	-	-	F	Sedimentation/Siltation Sodium Solids (Suspended/Bedload) Specific Conductance Total Dissolved Solids	Channelization Crop Production (Crop Land or Dry Land) Natural Sources		
Middle Yellowstone Tributaries	MT42K002_090	SARPY CREEK, Crow Indian Reservation Boundary to mouth (Yellowstone River)	5	89.35	MILES	C-3	N	-	-	F	Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrogen (Total) Phosphorus (Total)	Grazing In Riparian or Shoreline Zones Non-Irrigated Crop Production		
Middle Yellowstone Tributaries	MT42K002_110	EAST FORK ARMELLS CREEK, Colstrip to mouth (Armells Creek)	5	32.36	MILES	C-3	N	-	-	F	Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrogen (Total) Specific Conductance Total Dissolved Solids	Agriculture Coal Mining Transfer of Water from an Outside Watershed		
Middle Yellowstone Tributaries	MT42K002_160	LITTLE PORCUPINE CREEK, headwaters to mouth (Yellowstone River)	5	118.8	MILES	C-3	N	-	-	N	Chlorophyll-a Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrogen (Total) Phosphorus (Total) Total Dissolved Solids	Rangeland Grazing Source Unknown		
Middle Yellowstone Tributaries	MT42K002_170	EAST FORK ARMELLS CREEK, headwaters to Colstrip	4C	24.67	MILES	C-3	N	-	-	F	Alteration in stream-side or littoral vegetative covers	Surface Mining		

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Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10100004	Lower Yellowstone	Watershed	Lower Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Yellowstone River	MT42M001_011	YELLOWSTONE RIVER, Lower Yellowstone Diversion Dam to North Dakota border	5	53.67	MILES	B-3	N	F	F	F	Alteration in stream-side or littoral vegetative covers Chromium (total) Copper Fish-Passage Barrier Lead Nitrogen (Total) Phosphorus (Total) Sedimentation/Siltation Total Dissolved Solids pH	Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Natural Sources Rangeland Grazing Source Unknown Streambank Modifications/destabilization		
Yellowstone River	MT42M001_012	YELLOWSTONE RIVER, Powder River to Lower Yellowstone Diversion Dam	4C	76.73	MILES	B-3	N	F	X	X	Fish-Passage Barrier	Dam Construction (Other than Upstream Flood Control Projects)		
Lower Yellowstone	MT42M002_010	BENNIE PEER CREEK, North Dakota border to mouth (Yellowstone River)	4C	10.17	MILES	C-3	N	-	-	N	Alteration in stream-side or littoral vegetative covers Low flow alterations Physical substrate habitat alterations	Channelization Highways, Roads, Bridges, Infrastructure (New Construction) Irrigated Crop Production		
Lower Yellowstone	MT42M002_020	FOURMILE CREEK, headwaters to North Dakota border	5	29.74	MILES	C-3	N	-	-	N	Chlorophyll-a Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrogen (Total) Other flow regime alterations Total Dissolved Solids	Dam or Impoundment Source Unknown		
Lower Yellowstone	MT42M002_030	FIRST HAY CREEK, headwaters to mouth (Yellowstone River)	5	33.37	MILES	C-3	N	-	-	N	Copper Fish-Passage Barrier Iron Lead Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrogen (Total) Other flow regime alterations Phosphorus (Total)	Hydrostructure Impacts on Fish Passage Irrigated Crop Production Source Unknown Transfer of Water from an Outside Watershed		

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Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10100004	Lower Yellowstone	Watershed	Lower Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Lower Yellowstone	MT42M002_030	FIRST HAY CREEK, headwaters to mouth (Yellowstone River)	5	33.37	MILES	C-3	N	-	-	N	Solids (Suspended/Bedload) Total Dissolved Solids			
Lower Yellowstone	MT42M002_040	LONE TREE CREEK, confluence of North Fork to mouth (Yellowstone River)	5	17.27	MILES	C-3	N	-	-	N	Alteration in stream-side or littoral vegetative covers Chlorophyll-a Iron Nitrate/Nitrite (Nitrite + Nitrate as N) Other flow regime alterations Solids (Suspended/Bedload)	Channelization Habitat Modification - other than Hydromodification Irrigated Crop Production		
Lower Yellowstone	MT42M002_051	FOX CREEK, headwaters to mouth (Yellowstone River), T22N R59E S19	5	49.85	MILES	B-2	N	N	N	N	Arsenic Excess Algal Growth Iron Lead Low flow alterations Mercury Nitrogen (Total) Phosphorus (Total) Physical substrate habitat alterations Solids (Suspended/Bedload) Sulfates Total Dissolved Solids	Channelization Irrigated Crop Production Natural Sources Source Unknown		
Lower Yellowstone	MT42M002_052	NORTH FORK FOX CREEK, headwaters to mouth (Fox Creek), T22N R58E S21	5	20.32	MILES	B-2	N	N	N	N	Arsenic Excess Algal Growth Iron Lead Low flow alterations Mercury Nitrogen (Total)	Channelization Irrigated Crop Production Natural Sources Source Unknown		

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Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10100004	Lower Yellowstone	Watershed	Lower Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Lower Yellowstone	MT42M002_052	NORTH FORK FOX CREEK, headwaters to mouth (Fox Creek), T22N R58E S21	5	20.32	MILES	B-2	N	N	N	N	Phosphorus (Total) Physical substrate habitat alterations Solids (Suspended/Bedload) Sulfates Total Dissolved Solids			
Lower Yellowstone	MT42M002_060	O'BRIEN CREEK, North Dakota border to mouth (Yellowstone River)	5	15.53	MILES	C-3	N	-	-	N	Excess Algal Growth Nitrate/Nitrite (Nitrite + Nitrate as N) Selenium	Animal Feeding Operations (NPS) Irrigated Crop Production		
Lower Yellowstone	MT42M002_070	CRANE CREEK, headwaters to mouth (Yellowstone River, T21N R58E S23)	5	24.25	MILES	C-3	N	-	-	F	Alteration in stream-side or littoral vegetative covers Other flow regime alterations Sedimentation/Siltation	Channelization Irrigated Crop Production		
Lower Yellowstone	MT42M002_080	SMITH CREEK, headwaters to mouth (Yellowstone River)	4C	45.57	MILES	C-3	N	-	-	F	Fish-Passage Barrier	Low Water Crossing		
Lower Yellowstone	MT42M002_100	COTTONWOOD CREEK, headwaters to mouth (Yellowstone River)	5	21.99	MILES	C-3	N	-	-	F	Cadmium Fish-Passage Barrier Iron Physical substrate habitat alterations	Channelization Flow Alterations from Water Diversions Hydrostructure Impacts on Fish Passage Natural Sources Source Unknown		
Lower Yellowstone	MT42M002_110	BURNS CREEK, headwaters to mouth (Yellowstone River)	5	53.66	MILES	C-3	N	-	-	N	Chlorophyll-a Fish-Passage Barrier Iron Nitrogen (Total) Other flow regime alterations Phosphorus (Total) Solids (Suspended/Bedload)	Crop Production (Crop Land or Dry Land) Hydrostructure Impacts on Fish Passage Irrigated Crop Production Natural Sources		
Lower Yellowstone	MT42M002_120	MORGAN CREEK, headwaters to mouth (Yellowstone River)	4C	19.8	MILES	C-3	N	-	-	F	Alteration in stream-side or littoral vegetative covers	Grazing in Riparian or Shoreline Zones		
Lower Yellowstone	MT42M002_130	GLENDIVE CREEK, headwaters to mouth (Yellowstone River)	5	55.89	MILES	C-3	N	-	-	F	Alteration in stream-side or littoral vegetative covers	Grazing in Riparian or Shoreline Zones		

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Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10100004	Lower Yellowstone	Watershed	Lower Yellowstone										
TMDL Planning Area	ID005B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Lower Yellowstone	MT42M002_130	GLENDIVE CREEK, headwaters to mouth (Yellowstone River)	5	55.89	MILES	C-3	N	-	-	F	Cadmium Chromium (total) Copper Iron Lead Nickel Selenium Solids (Suspended/Bedload) Zinc	Natural Sources Source Unknown		
Lower Yellowstone	MT42M002_141	CEDAR CREEK, 26 miles upstream to mouth (Yellowstone River)	5	27.49	MILES	C-3	N	-	-	X	Alteration in stream-side or littoral vegetative covers Arsenic Copper Iron Lead	Grazing in Riparian or Shoreline Zones Natural Sources Spills from Trucks or Trains		
Lower Yellowstone	MT42M002_142	CEDAR CREEK, tributary confluence at 12N 57E S35 to tributary confluence at 13N 56E S27	5	20.13	MILES	C-3	N	-	-	F	Copper Iron Lead Selenium	Natural Sources		
Lower Yellowstone	MT42M002_150	CABIN CREEK, headwaters to mouth (Yellowstone River)	5	102.54	MILES	C-3	N	-	-	F	Nitrogen (Total) Oxygen, Dissolved Sedimentation/Siltation	Dam or Impoundment Natural Sources Rangeland Grazing		
Lower Yellowstone	MT42M002_180	SEARS CREEK, headwaters to mouth (Yellowstone River)	5	15.15	MILES	C-3	N	-	-	N	Alteration in stream-side or littoral vegetative covers Copper Excess Algal Growth Fish-Passage Barrier High Flow Regime Iron	Channelization Hydrostructure Impacts on Fish Passage Irrigated Crop Production Rangeland Grazing Source Unknown Transfer of Water from an Outside Watershed		

F=Fully Supporting; T=Threatened; N=Not Fully Supporting; I=Insufficient Information; X=Not Assessed; -- Beneficial Use Not Assigned

Appendices Yellowstone River Basin Water Plan - 2014

Appendix A: Impaired Waters

HUC	10100004	Lower Yellowstone	Watershed	Lower Yellowstone										
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name		
Lower Yellowstone	MT42M002_180	SEARG CREEK, headwaters to mouth (Yellowstone River)	5	15.15	MILES	C-3	N	-	-	N	Lead Solids (Suspended/Bedload)			

Appendix A: Impaired Waters

HUC	10100005	O' Fallon	Watershed	Lower Yellowstone								
TMDL Planning Area	ID305B	Waterbody Name/Location	Category	Size	Units	Use Class	AQL	AG	DW	Rec	Cause Name	Source Name
O' Fallon	MT42L001_010	PENNEL CREEK, headwaters to mouth (O'Fallon Creek)	5	65.97	MILES	C-3	N	-	-	F	Total Dissolved Solids	Source Unknown
O' Fallon	MT42L001_020	SANDSTONE CREEK, headwaters to mouth (O'Fallon Creek)	5	72.78	MILES	C-3	N	-	-	F	Nitrate/Nitrite (Nitrite + Nitrate as N) Nitrogen (Total)	Agriculture Municipal Point Source Discharges

## Water Quality : U.S. Geological Survey Information

### National Water Quality Assessment (NAWQA)

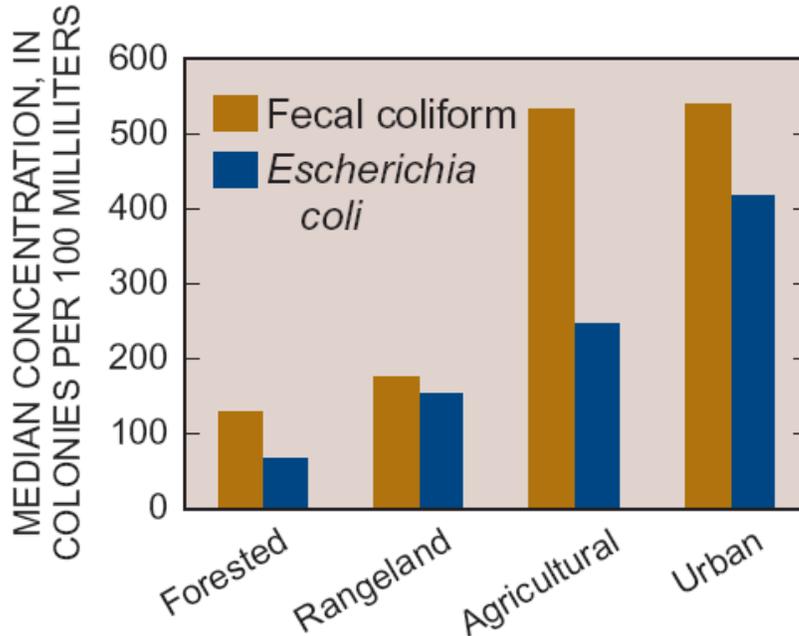


Figure IV. Median concentrations of coliform bacteria are highest in urban and agricultural areas. (Source: Peterson and others, 2004.)

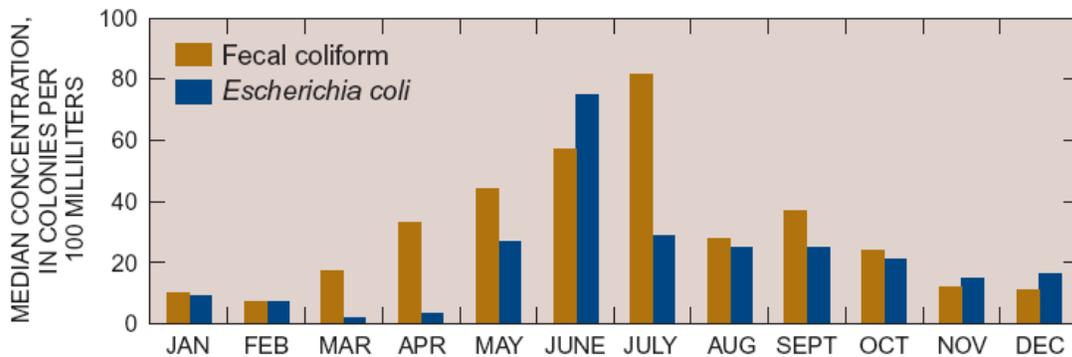


Figure IV. Median concentrations of coliform bacteria are highest in the spring and summer. (Source: Peterson and others, 2004.)

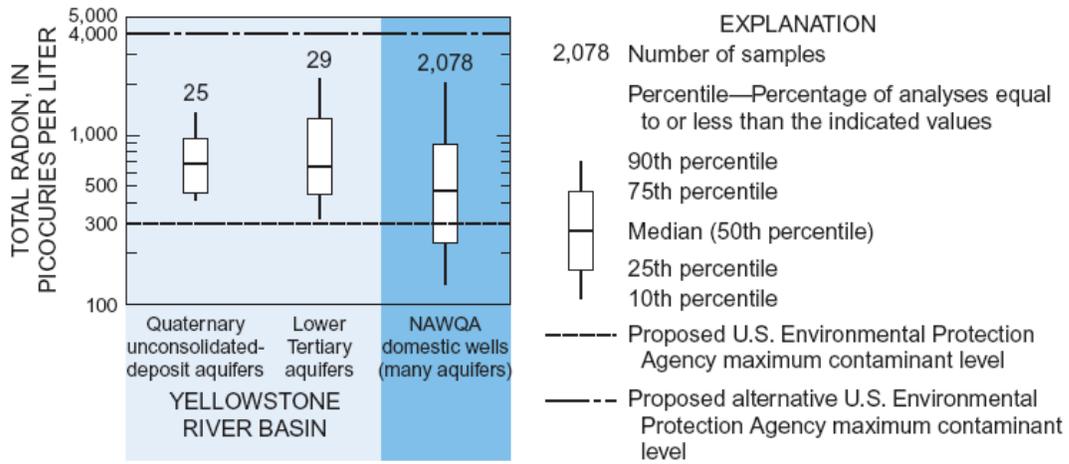


Figure IV. Median concentrations of radon in water samples from Quaternary and Tertiary aquifers in the Yellowstone River Basin were higher than in other NAQWA study units in the United States. (Source: Peterson and others, 2004.)

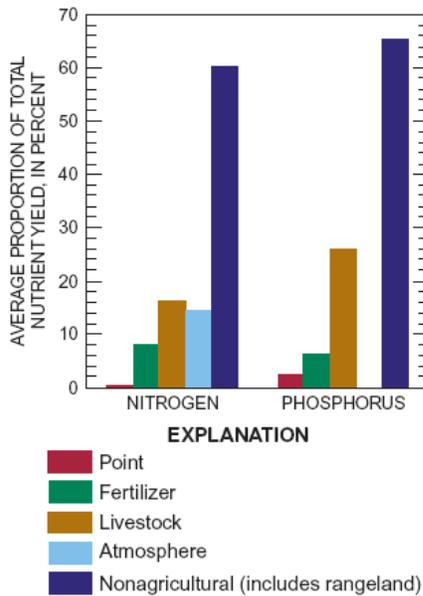


Figure IV. Sources of nitrogen and phosphorous in the Yellowstone River Basin are predominately nonagricultural, as estimated from nationwide analysis using the SPARROW model (Smith and others 1997—as reported by Peterson and others, 2004.)

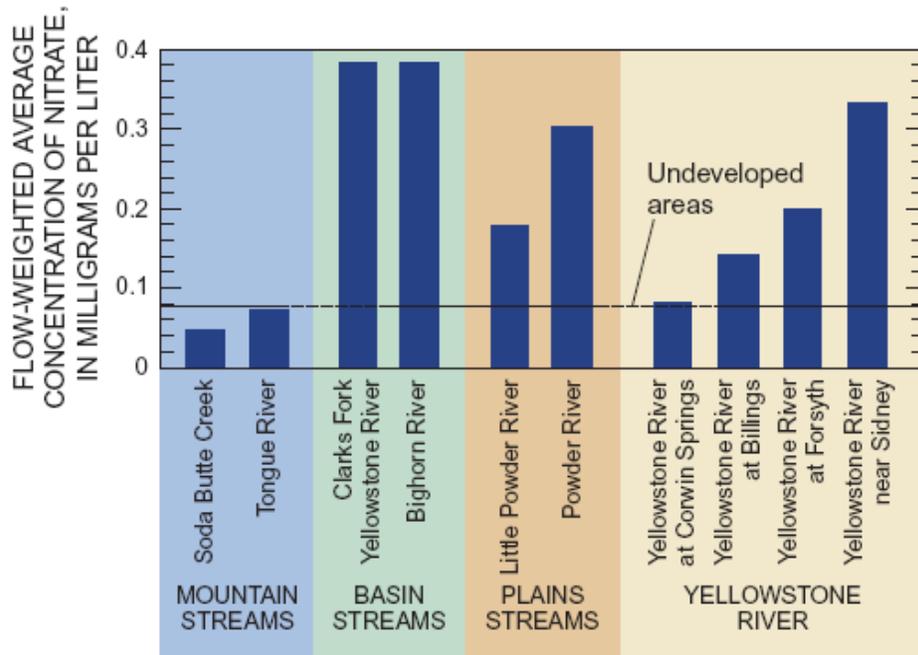


Figure IV. concentrations of nitrate in mountain streams were less than concentrations for other developed areas. Concentrations of nitrate were largest in basin streams (Peterson and others, 2004.)

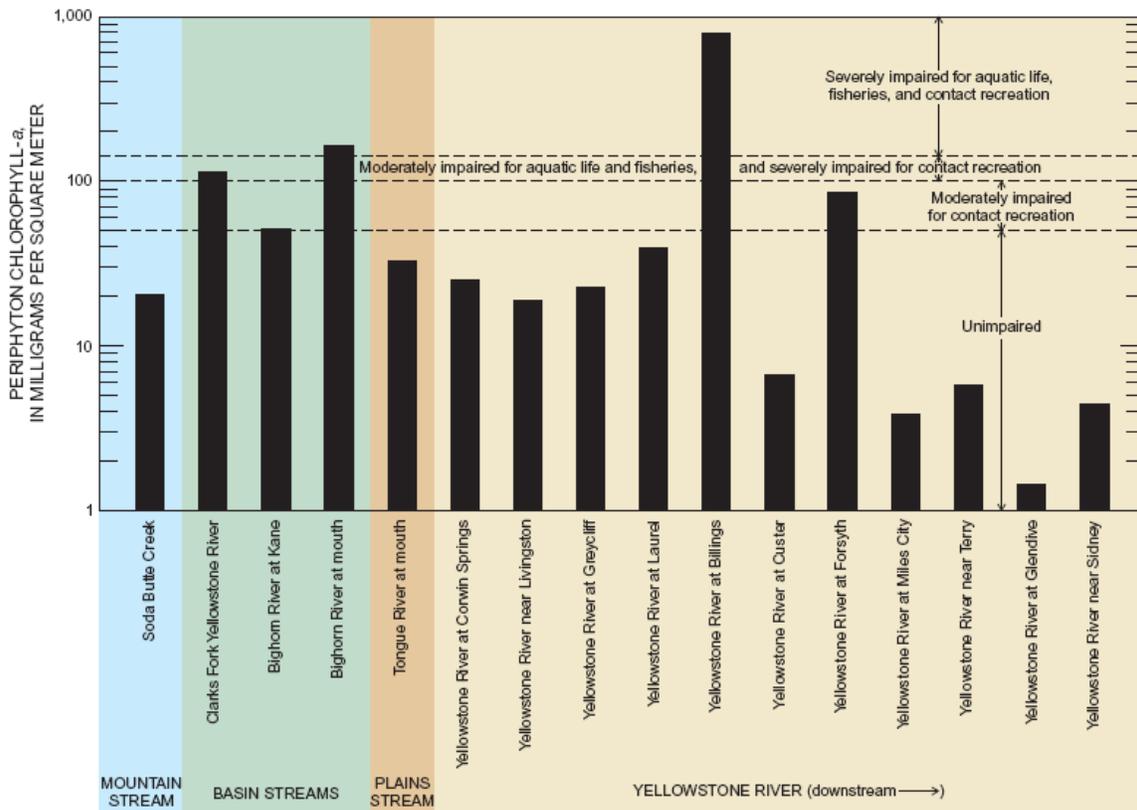
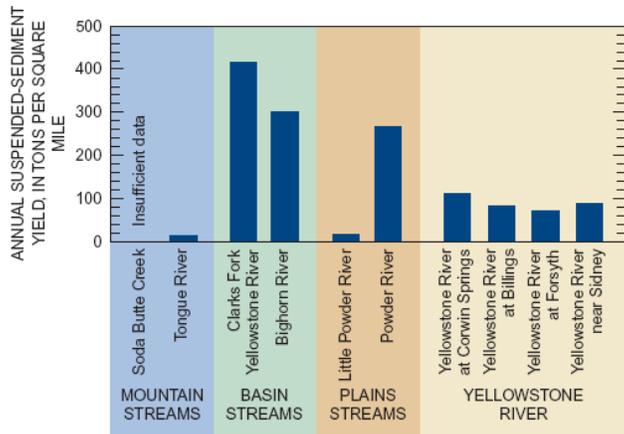
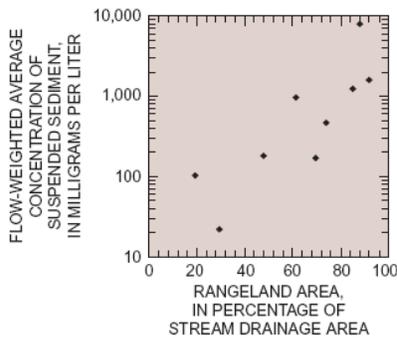
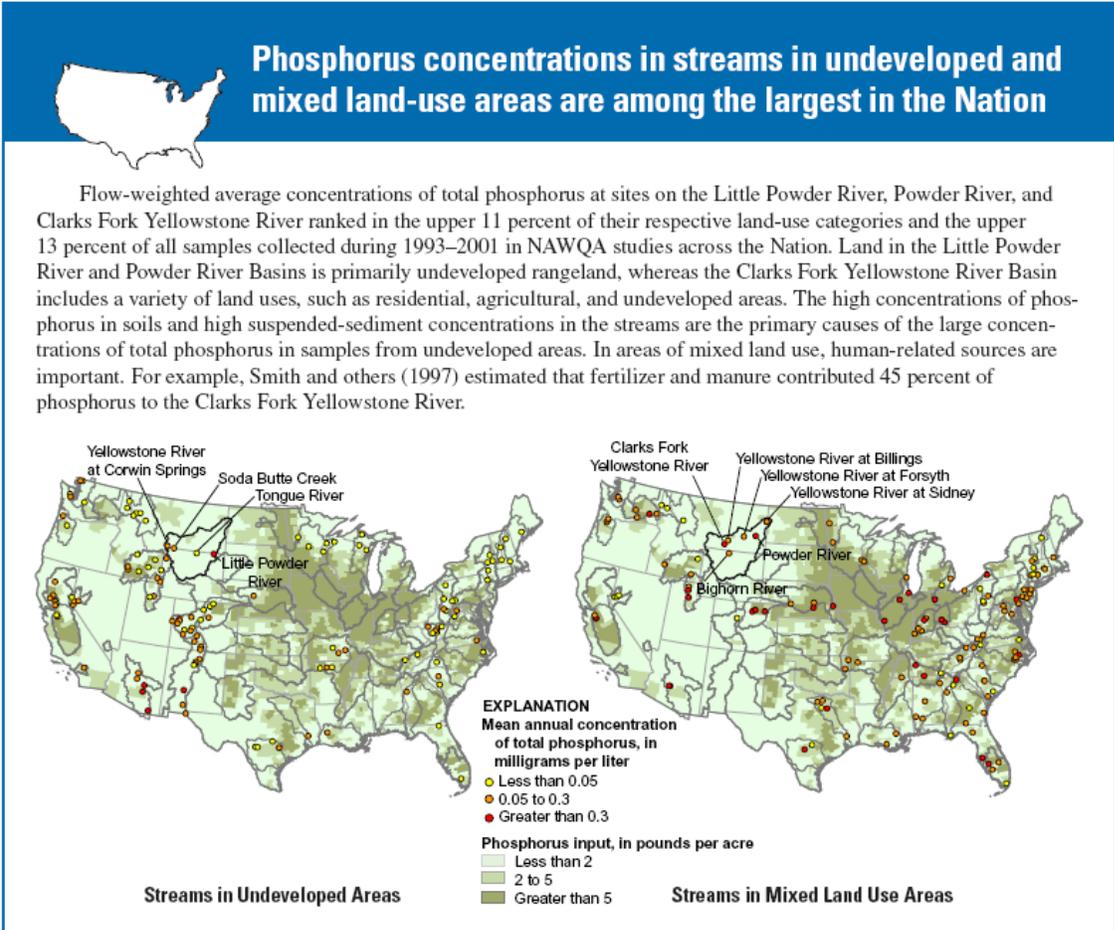
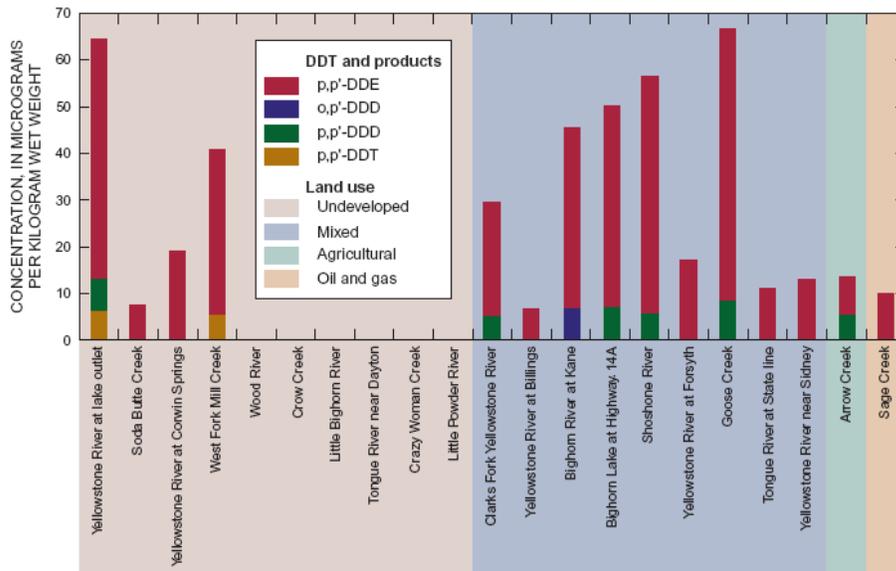
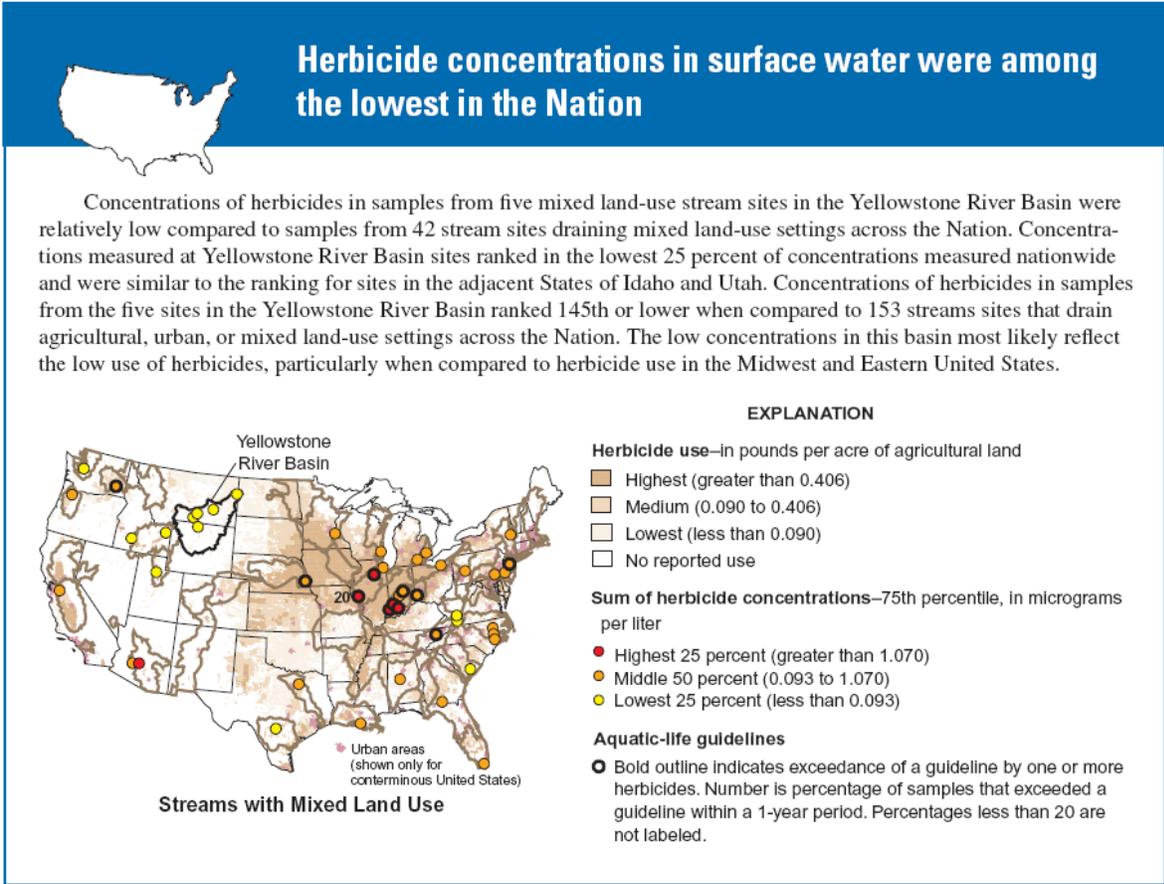


Figure 19. Periphyton chlorophyll-a concentrations during August 2000 exceeded screening-level criteria for the protection of designated uses listed by the Montana Department of Environmental Quality (2003).

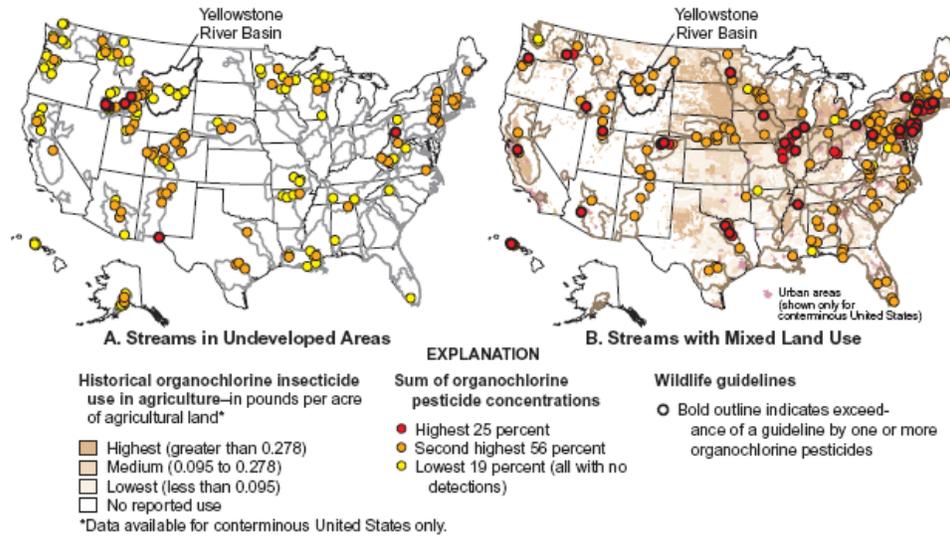


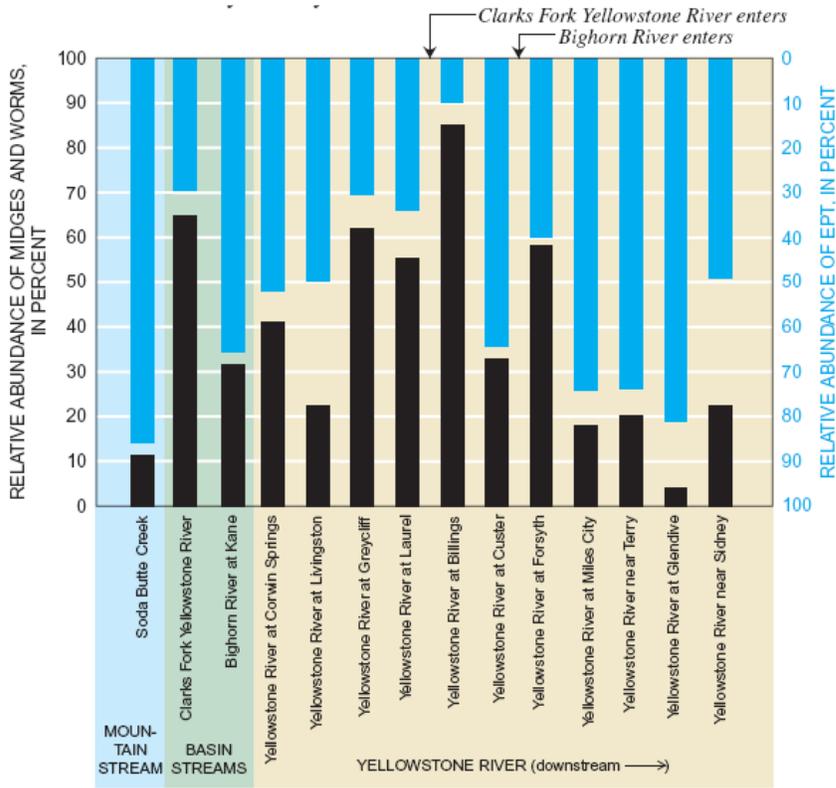


**Figure 16.** Concentrations of DDT and its breakdown products, DDD and DDE, in fish tissue generally were higher at sites with mixed land use and those near Yellowstone National Park than in other undeveloped areas.

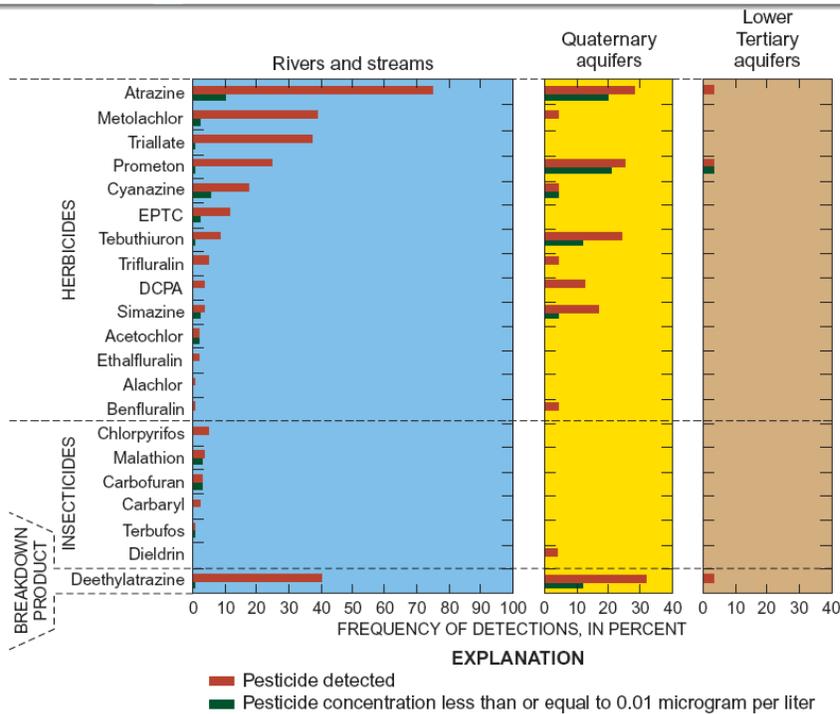
## Concentrations of pesticide compounds in fish from the Yellowstone River Basin were low to moderate compared to the rest of the Nation

Fish-tissue samples from 6 of 10 sites draining undeveloped land in the Yellowstone River Basin contained no detectable concentrations of organochlorine insecticide compounds, such as DDE and chlordane. Those sites included rangeland sites and forested mountain sites. This finding is consistent with national findings. About 50 percent of 165 sites in undeveloped areas sampled by NAWQA during 1992–2001 contained no detectable concentrations of pesticides (map A). Pesticide concentrations in fish from areas of mixed land uses in the Yellowstone River Basin were in the second-highest 56 percent on a national basis (map B). None of the concentrations of pesticides in fish tissue from the basin was in the highest 25 percent nationally nor did they exceed guidelines for the protection of fish-eating wildlife. Similarly, concentrations of organochlorine pesticides in bed sediment, PCBs in fish tissue and bed sediment, and semi-volatile organic compounds in bed sediment generally were low in the basin, compared to national concentrations.





**Figure 20.** The high percentage of pollution-intolerant mayflies, stoneflies, and caddisflies indicates good water quality and habitat conditions in the upper and lower sections of the Yellowstone River, but a lower percentage indicates degraded conditions in the middle sections.



**Figure 15.** Herbicides were detected more often than insecticides in streams and aquifers.

B. USGS SPARROW water-quality analysis

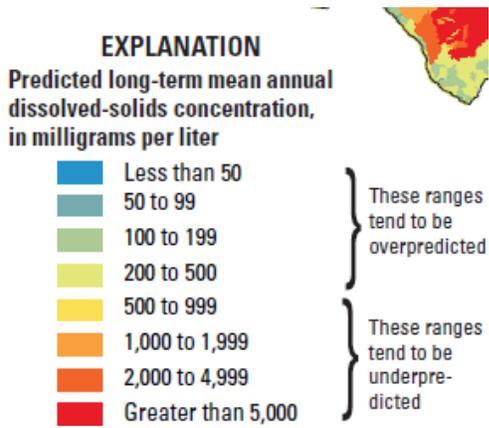
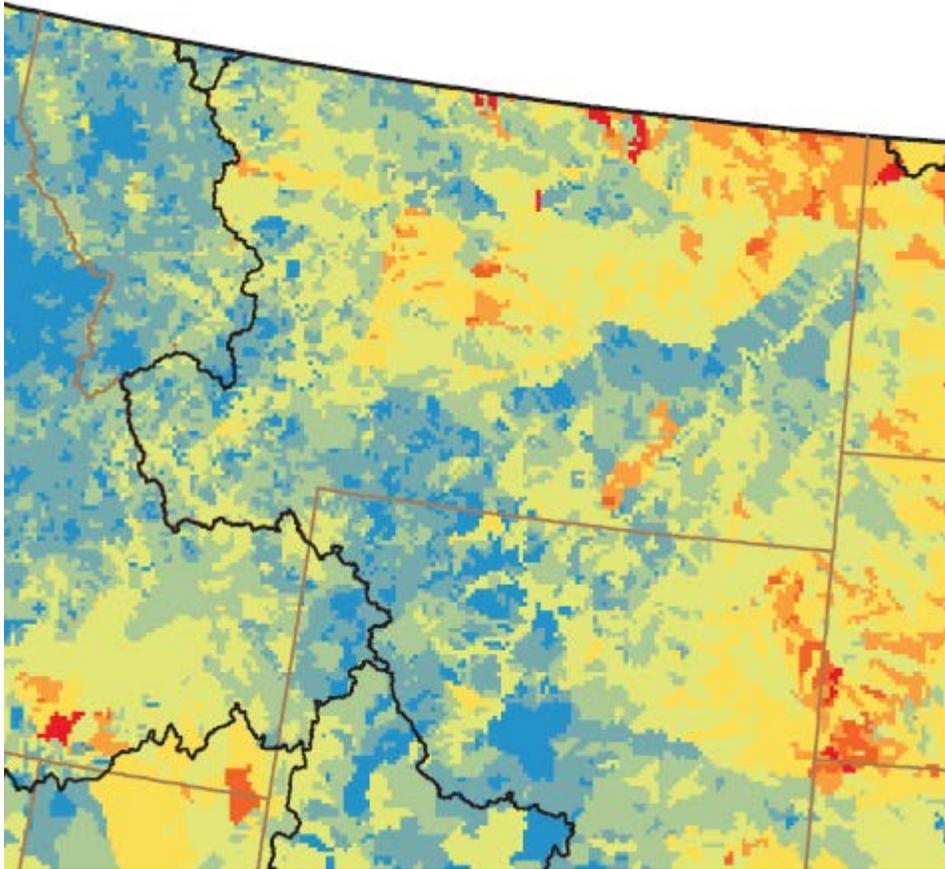


Figure 21. Map of the conterminous U.S. showing long-term mean annual flow-weighted dissolved-solids concentrations, predicted from the national SPARROW model of dissolved-solids transport.

Powder and Tongue River Water Quality Trend Analysis

Previous trend analyses generally used non-parametric statistical methods (for example, the seasonal Kendall analysis), which are robust and generally do not require extensive data sets, to test for monotonic trends (single direction through the entire trend period). Parametric trend analysis procedures, which are more rigorous and sometimes require more extensive data sets, present alternative trend-analysis approaches to non-parametric procedures (Vecchia, 2005; Hirsch and others, 1982). The U.S. Geological Survey (USGS) in cooperation with the Montana Department of Natural Resources and Conservation, conducted this study to test for temporal trends in water quality using two parametric trends analysis methods: a joint time-series model (TSM; Vecchia, 2005) for concentration and streamflow; and ordinary least squares regression (OLS) of concentration on time, streamflow, and season. Also, this study included sites in Montana and Wyoming in the Tongue and Powder River watersheds. The trend analysis includes an extended period of record (water years 1980–2010) to represent a recent historic context for evaluating any trends that might be potentially attributable to CBM development.

Table 1. Information for selected sampling sites in the Rosebud Creek, Tongue River, and Powder River watersheds, Montana and Wyoming.  
 [Abbreviations: OLS, ordinary least squares regression on time, streamflow, and season; TSM, time-series model]

Site number (fig. 1)	USGS site identification number	USGS site name	Abbreviated site name	Drainage area, in square miles	General Site Classification
<b>Rosebud Creek watershed</b>					
1	06295113	Rosebud Creek at reservation boundary, near Kirby, Mont.	Rosebud Creek at reservation boundary	123	Rosebud Creek
<b>Tongue River watershed</b>					
2	06299980	Tongue River at Monarch, Wyo.	Tongue River at Monarch	478	Tongue River mainstem
3	06305500	Goose Creek below Sheridan, Wyo.	Goose Creek	392	Tongue River mountain tributary
4	06306250	Prairie Dog Creek near Acme, Wyo.	Prairie Dog Creek	358	Tongue River plains tributary
5	06306300	Tongue River at State line, near Decker, Mont.	Tongue River at State line	1,453	Tongue River mainstem
6	06307500	Tongue River at Tongue River Dam, near Decker, Mont.	Tongue River at Tongue River Dam	1,770	Tongue River mainstem
7	06307600	Hanging Woman Creek near Birney, Mont.	Hanging Woman Creek	470	Tongue River plains tributary
8	06307616	Tongue River at Birney Day School, near Birney, Mont.	Tongue River at Birney Day School	2,621	Tongue River mainstem
9	06307740	Otter Creek at Ashland, Mont.	Otter Creek	707	Tongue River plains tributary
10	06308400	Pumpkin Creek near Miles City, Mont.	Pumpkin Creek near Miles City	697	Tongue River plains tributary
11	06308500	Tongue River at Miles City, Mont.	Tongue River at Miles City	5,379	Tongue River mainstem
<b>Powder River watershed</b>					
12	06313500	Powder River at Sussex, Wyo.	Powder River at Sussex	3,090	Powder River mainstem
13	06317000	Powder River at Arvada, Wyo.	Powder River at Arvada	6,050	Powder River mainstem
14	06324500	Powder River at Moorhead, Mont.	Powder River at Moorhead	8,086	Powder River mainstem
15	06324970	Little Powder River above Dry Creek, near Weston, Wyo.	Little Powder River above Dry Creek	1,237	Little Powder River
16	06325500	Little Powder River near Broadus, Mont.	Little Powder River near Broadus	1,974	Little Powder River
17	06326500	Powder River near Locate, Mont.	Powder River near Locate	13,068	Powder River mainstem

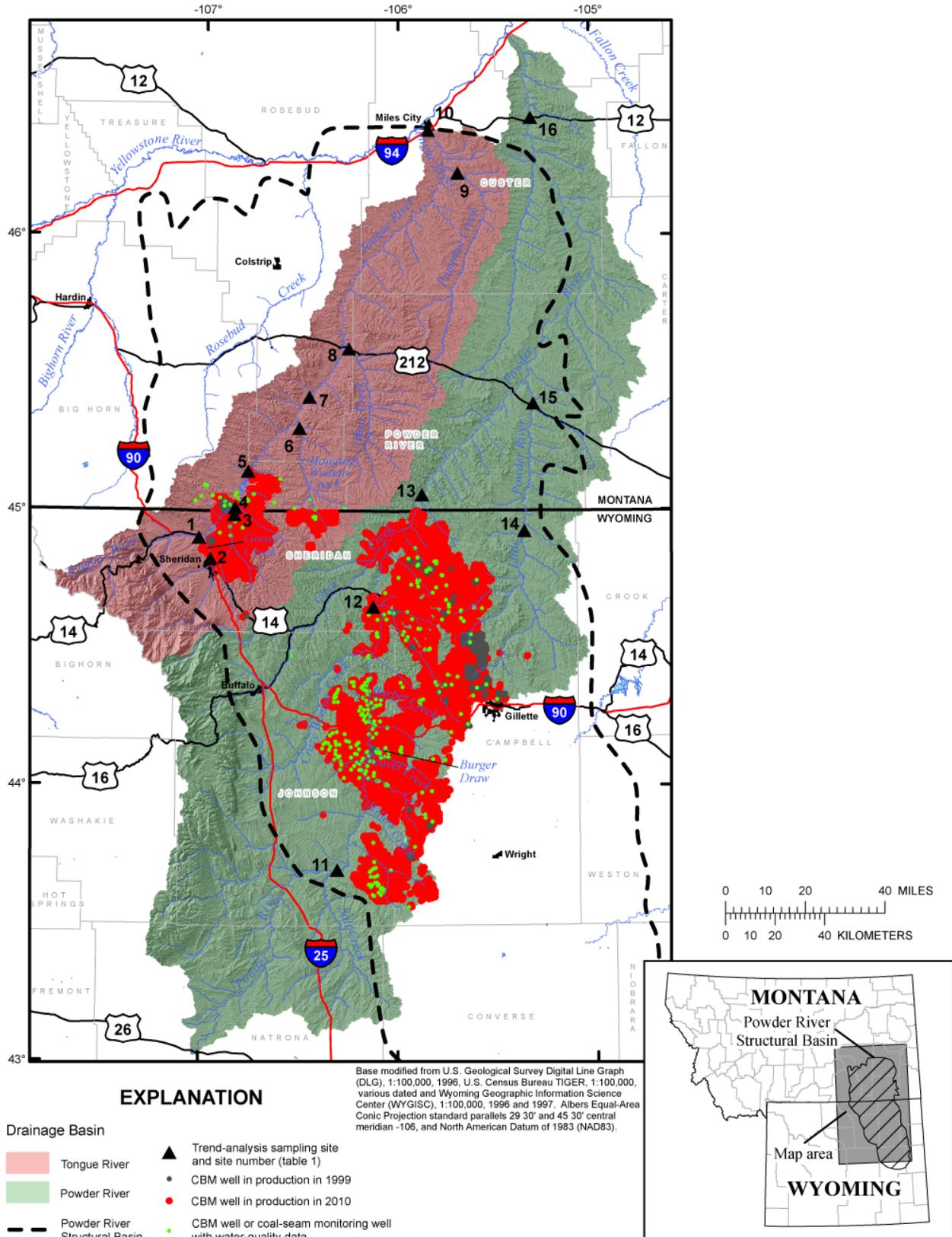


Figure 1. Location of selected sampling sites, coal-bed methane (CBM) wells, and monitoring wells in CBM seams in the Tongue River and Powder River watersheds, Montana and Wyoming.

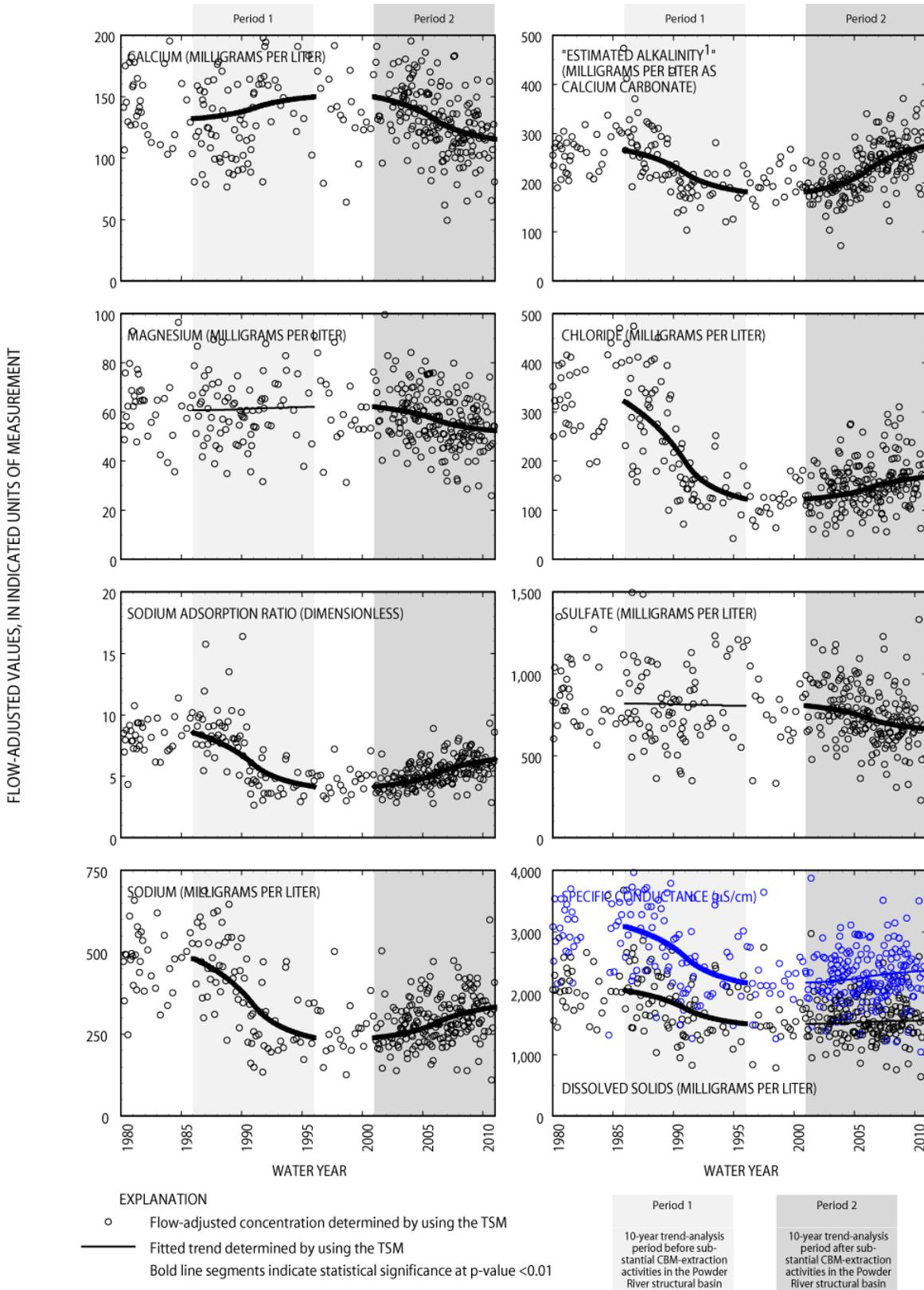


Figure S4.12. Fitted trends determined by using the time-series model (TSM) for selected constituents and properties for Powder River at Arvada, Wyo. (Site 12) based on analysis of data collected during water years 1980–2010. [Abbreviations:  $\mu\text{S}/\text{cm}$ , microsiemens per centimeter at 25° Celsius]

<sup>1</sup>"Estimated alkalinity" data were developed by selecting either alkalinity or acid-neutralizing-capacity (ANC) measurements, depending primarily on which measurement was available for a given sample, as discussed in the section of this report "Sampling and Analytical Methods."

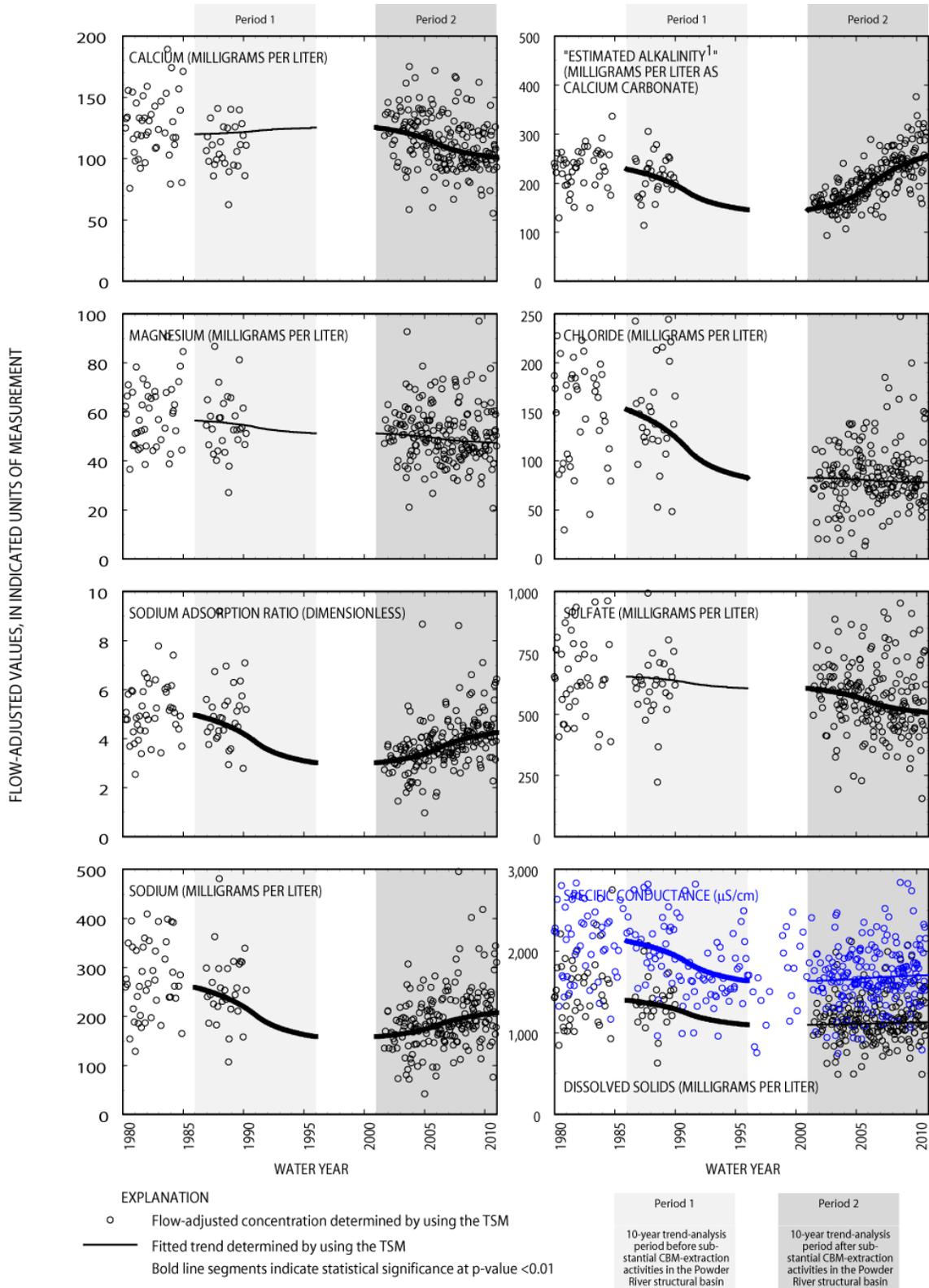


Figure S4.13. Fitted trends determined by using the time-series model (TSM) for selected constituents and properties for Powder River at Moorhead, Mont. (Site 13) based on analysis of data collected during water years 1980–2010. [Abbreviations:  $\mu\text{S}/\text{cm}$ , microsiemens per centimeter at 25<sup>o</sup> Celsius]

<sup>1</sup>"Estimated alkalinity" data were developed by selecting either alkalinity or acid-neutralizing-capacity (ANC) measurements, depending primarily on which measurement was available for a given sample, as discussed in the section of this report "Sampling and Analytical Methods."

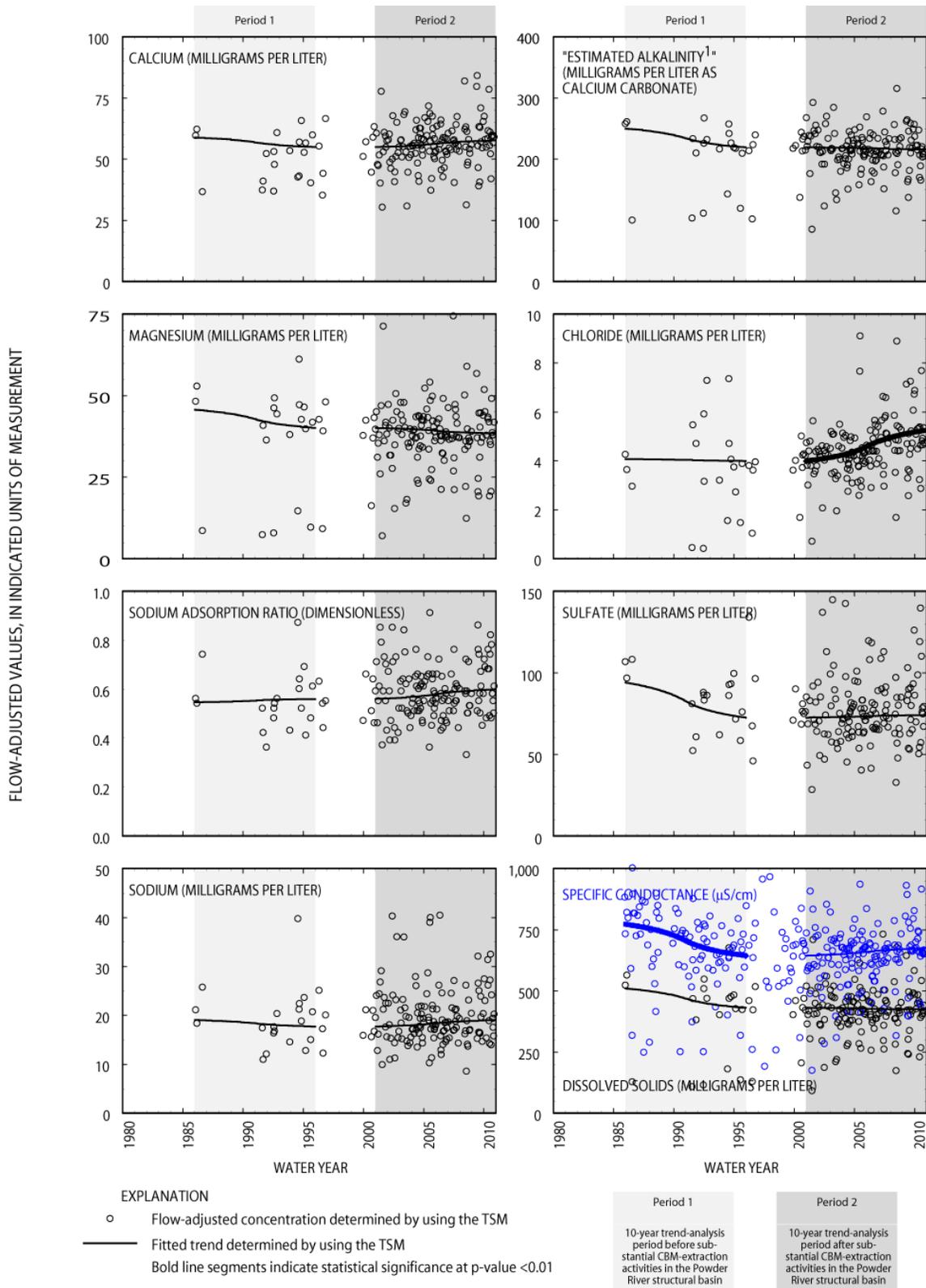


Figure S4.4. Fitted trends determined by using the time-series model (TSM) for selected constituents and properties for Tongue River at State line, near Decker, Mont. (Site 4) based on analysis of data collected during water years 1980–2010. [Abbreviations:  $\mu\text{S}/\text{cm}$ , microsiemens per centimeter at 25° Celsius]

<sup>1</sup>"Estimated alkalinity" data were developed by selecting either alkalinity or acid-neutralizing-capacity (ANC) measurements, depending primarily on which measurement was available for a given sample, as discussed in the section of this report "Sampling and Analytical Methods."

For main-stem Tongue River sites analyzed by using the TSM and downstream from substantial CBM-extraction activities [Tongue River at State line (site 4), Tongue River at Tongue River Dam (site 5), Tongue River at Birney Day School (site 7), and Tongue River at Miles City (site 10)], generally small significant or nonsignificant decreases in most constituents are indicated for period 1. For period 2 for these sites, the TSM trend results do not allow confident conclusions concerning detection of effects of CBM-extraction activities on stream water quality. Detection of significant trends in major-ion constituents and properties for period 2 generally was infrequent, and direction, magnitudes, and significance of fitted trends were not strongly consistent with relative differences in water quality between stream water and CBM-produced water. The TSM indicated significant or generally large magnitude increases in median values of sodium adsorption ratio (SAR), sodium, and alkalinity for period 2 for sites 5 and 7, which might indicate potential effects of CBM-extraction activities on stream water. However, other factors, including operations of Tongue River Reservoir, irrigation activities, contributions of saline groundwater, and operations of the Decker coal mine, confound confident determination of causes of detected significant trends for sites 5 and 7. For all main-stem Tongue River sites, trends for period 2 generally are within ranges of those for period 1 before substantial CBM-extraction activities.

For main-stem Powder River sites analyzed by using the TSM [Powder River at Sussex (site 11), Powder River at Arvada (site 12), Powder River at Moorhead (site 13), and Powder River near Locate (site 16)], significant or generally large magnitude decreases in median values of SAR, sodium, estimated alkalinity<sup>2</sup>, chloride, fluoride, specific conductance, and dissolved solids are indicated for period 1. Patterns in trend results for period 1 for main-stem Powder River sites are consistent with effects of Salt Creek oil-brine reinjection that started in 1990. Trend results for all main-stem Powder River sites downstream from substantial CBM-extraction activities (sites 12, 13, and 16) indicate evidence of potential effects of CBM-extraction activities on stream water quality, although evidence is stronger for sites 12 and 13 than for site 16. Evidence in support of potential CBM effects includes significant increases in median values of SAR, sodium, and estimated alkalinity for period 2 for sites 12, 13, and 16 that are consistent with relative differences between stream water and CBM-produced water. Significant increases in median values of these constituents for period 2 are not indicated for Powder River at Sussex (site 11) upstream from substantial CBM-extraction activities. In interpreting the trend results, it is notable that the fitted trends evaluate changes in median concentrations and also notable that changes in median concentrations that might be attributed to CBM-extraction activities probably are more strongly evident during low to median streamflow conditions than during mean to high streamflow conditions. This observation is relevant in assessing trend results in relation to specific water-quality concerns, including effects of water-quality changes on irrigators and effects on stream biota and ecology.

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<sup>2</sup> Estimated alkalinity data were developed by selecting either alkalinity or acid neutralizing capacity (ANC) measurements, depending primarily on which measurement was available for a given sample, as discussed in the section of this report "Sampling and Analytical Methods."