

WATER QUALITY MONITORING PLAN 2016



WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY DIVISION
WATERSHED PROTECTION PROGRAM

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Wyoming's Surface Water Quality Monitoring Strategy 2010-2019

Wyoming's surface water quality monitoring strategy (WDEQ 2010) specifies primary and secondary objectives used to meet the State's surface water quality monitoring needs. Primary objectives are attained mostly by rotating-basin probabilistic surveys used to assess statewide and regional water quality conditions and direct future targeted monitoring efforts for making designated use-support determinations. Secondary objectives are accomplished through cooperation between the Watershed Protection Program's monitoring, water quality standards, nonpoint source (NPS) and total maximum daily load (TMDL) sub-programs and other entities. The monitoring group works closely with the water quality standards group to develop study designs and acquire the data necessary to develop new or revised numeric criteria. Best management practices used to reduce non-point source pollutants are evaluated through a joint effort between the monitoring, NPS and TMDL sub-programs. Likewise, some TMDL study designs and supporting data collection occurs through coordinated efforts between the monitoring and TMDL sub-programs.

Purpose of the Annual Water Quality Monitoring Plan

The annual water quality monitoring plan identifies annual objectives used to achieve the overall objectives of the monitoring strategy and ties them to specific Watershed Protection Program (WPP) monitoring projects planned for a given year. The plan serves as an information-sharing tool for the public, government, non-profit and other stakeholders.

Annual Monitoring Objectives – 2016 Field Season

- 1) Complete Probabilistic Rotating Basin Survey of the Platte Basin
- 2) Monitor Lakes, Reservoirs, and Streams in Support of Nutrient Criteria Development
- 3) Conduct Pre- and Post-Project Best Management Practice Evaluation
- 4) Conduct Targeted Designated Use Support Studies
- 5) Continue Large Reservoir Status and Trend Monitoring

Objective 1 – Complete Probabilistic Rotating Basin Survey of the Platte Basin (Figure 1; Table 1)

Probabilistic rotating basin surveys (PRBS) address the primary objectives of the Wyoming Surface Water Quality Monitoring Strategy (WDEQ 2010). PRBS involve sampling a randomly selected subsample of a population of interest, similar to a census, in order to make inferences about characteristics of the population as a whole. Wyoming uses a customized generalized random tessellation-stratified (GRTS) survey design using the 1:100,000 scale National Hydrographic Dataset Plus (NHD+) as the base sample frame (see <http://archive.epa.gov/nheerl/arm/web/html/presents.html>; Stevens and Olson, 2004) from which 50 primary sites are randomly selected from a target population of perennial, non-headwater (>1st Strahler order) rivers and streams outside of national parks, congressionally-designated wilderness areas and the Wind River Reservation within each of five geographic divisions of the State. The geographic divisions are referred to in this document and WDEQ (2010) as 'superbasins' due to their delineation using combinations of 6-digit (3rd level) Hydrologic Unit Codes (HUC) and geographical location. The five superbasins, the associated HUC 6 basins

they represent, and the year (or anticipated year) the probabilistic survey was or would be completed are:

Bighorn/Yellowstone [Bighorn and Yellowstone Basins] - 2010

Northeast [Belle Fourche, Cheyenne, Little Missouri, Powder and Tongue Basins] - 2011

Green [Great Divide, Green and Little Snake Basins] - 2015

Platte [Niobrara, North Platte and South Platte Basins] - 2016

Bear/Snake [Bear and Snake Basins] - 2020

Site selection is further stratified into aggregations of 8-digit (4th level) HUCs, or “HUC8 clusters,” within each superbasin. The additional level of stratification helps achieve more equal spatial allocation of the 50 primary sites among all HUC 8 clusters and across a superbasin. Following the same design, a population of 100 oversample sites (also stratified by HUC8 cluster) is generated for each superbasin to be used as replacements when a primary site cannot be sampled. Oversample sites are used as replacements for primary sites occurring within the same HUC 8 cluster to maintain representativeness and minimize logistical complexities of sampling. Data from the approximately 50 sites ultimately sampled within each superbasin are used to make statistical inferences about water quality conditions within each superbasin, including the proportion of the stream target population likely achieving water quality criteria or statistically derived expected conditions, and the occurrence, extent and relative risk of various pollutants. Data from PRBS are not used to make determinations of designated use support or resultant categorization decisions in Wyoming’s §305(b)/303(d) Integrated Report. PRBS data are used to identify waters of high quality and those where designated use-support may be limited, and thus are candidates for future targeted monitoring for determinations of designated use support. Waterbodies will be selected for targeted monitoring based on a priority ranking derived from findings of the probabilistic rotating basin survey and other factors such as public interest, human health risk, restoration potential, and agency resources.

The Platte superbasin is the fourth probabilistic rotating basin survey implemented by the Monitoring Program. Fifty randomly-selected sites within the Platte superbasin will be sampled in 2016 followed by analyses of the data in 2017, and targeted designated use support monitoring of priority waterbodies in 2018 and 2019.

Objective 2 – Monitor Reservoirs and Streams in Support of Nutrient Criteria Development (Figure 2; Table 2)

Wyoming Basin Lake and Reservoir Nutrient Monitoring - The monitoring and water quality standards sub-programs will embark on a fourth year of collecting nutrient and supporting data on lakes and reservoirs within the Wyoming Basin level III ecoregion (Chapman et al. 2003). Data from this study will be used to develop nutrient-based water quality criteria for lakes and reservoirs within the Wyoming Basin ecoregion in general accordance with Wyoming’s plans for nutrient criteria development (WDEQ 2008, 2009). While the objective of the primary design element was largely accomplished in 2013-15, additional data is needed to improve the observed nutrient stressor-response gradient with more measurements at the upper end of the range of observed nutrient concentrations. Additional data also is needed on three larger reservoirs (Boysen, Pathfinder and Seminole Reservoirs) in the Wyoming Basin where modeling approaches will be used to develop site-specific nutrient criteria. In 2016, up to six reservoirs in the northern Bighorn Basin with generally higher nutrient concentrations and the three previously noted large reservoirs will be re-sampled.

Supplemental Lake, Reservoir & Stream Nutrient Monitoring - The Monitoring Program will

continue to opportunistically acquire the data necessary to support development of numeric nutrient criteria for Wyoming. Nutrient and associated response variable data will be collected as part of all other monitoring objectives for 2016, including the Platte superbasin probabilistic stream survey and large reservoir status and trend monitoring.

Objective 3 – Conduct Pre- and Post-Project Best Management Practice Evaluation

A 7.8 mile segment of Crow Creek (within Cheyenne) has been on WDEQ's 303(d) List of impaired waters since 2012 due to non-support of fisheries and aquatic life other than fish designated uses. Excess sediment was identified as a cause of the impairment with storm water as the primary source. A TMDL was completed for this waterbody in 2014. The TMDL identified the Lower Capitol Basin urban watershed as a primary contributor of excess sediment to Crow Creek. During the spring of 2016, the City of Cheyenne plans to construct a stormwater wetland complex to capture urban runoff from the Lower Capitol Basin, thereby reducing the amount of excess sediment entering Crow Creek. To evaluate the effectiveness of this BMP on addressing the excess sediment, the Monitoring Program in coordination with the NPS Program, City of Cheyenne and Laramie County Conservation District will conduct limited pre- and post-BMP geomorphic data collections at select locations on Crow Creek in 2016 with the possibility of additional monitoring in 2017.

Objective 4 – Conduct Targeted Designated Use Support Studies (Table 3)

Data submitted to WDEQ in 2011 by a non-governmental organization suggested that Clarks Draw, Lander Creek, and Pacific Creek may not attain applicable recreation criteria. These streams were placed on the 2012 303(d) list of impaired waters, then were proposed for removal from the 2014 303(d) list after the E. coli data was found to not meet data quality requirements. WDEQ committed to independently evaluate these streams to determine if applicable recreation criteria are attained. Lander Creek and Pacific Creek will be evaluated in 2016, whereas Clarks Draw will be evaluated in the future.

The Fish Creek watershed has experienced rapid residential and commercial growth and development within the last several decades. There is concern amongst local residents that these changes have led to excessive nutrient pollution in Fish Creek and that the biological community of the creek has become degraded. WDEQ recently prioritized Fish Creek for surface water quality monitoring and assessment with the goal of determining whether aquatic life designated uses are impaired by nutrient pollution. Physical, chemical and biological water quality data and other information will be collected at targeted and control study sites between 2016 and 2019. Results will be combined with those from two Teton Conservation District studies for the purpose of determining whether Fish Creek's designated aquatic life uses are impaired by nutrients.

Objective 5 – Continue Large Reservoir Status and Trend Monitoring (Figure 2; Table 4)

Lake and reservoir monitoring was initiated as part of the original 1997 TMDL workplan directive. The need for multiple years of data collection for understanding status and trends in large reservoir water quality led to development of an extended sampling program for the ten largest reservoirs in the State. The ten largest reservoirs are sampled on a rotation where approximately four are sampled in any given year. Each reservoir is sampled for three consecutive years, followed by three years without sampling. The only reservoir scheduled for monitoring in 2016 (*Fontenelle Reservoir*) is in the third year of a second three-year monitoring period. Findings of the evaluation will be documented in a water quality evaluation report.

Figure 1. Platte superbasin probabilistic survey sites

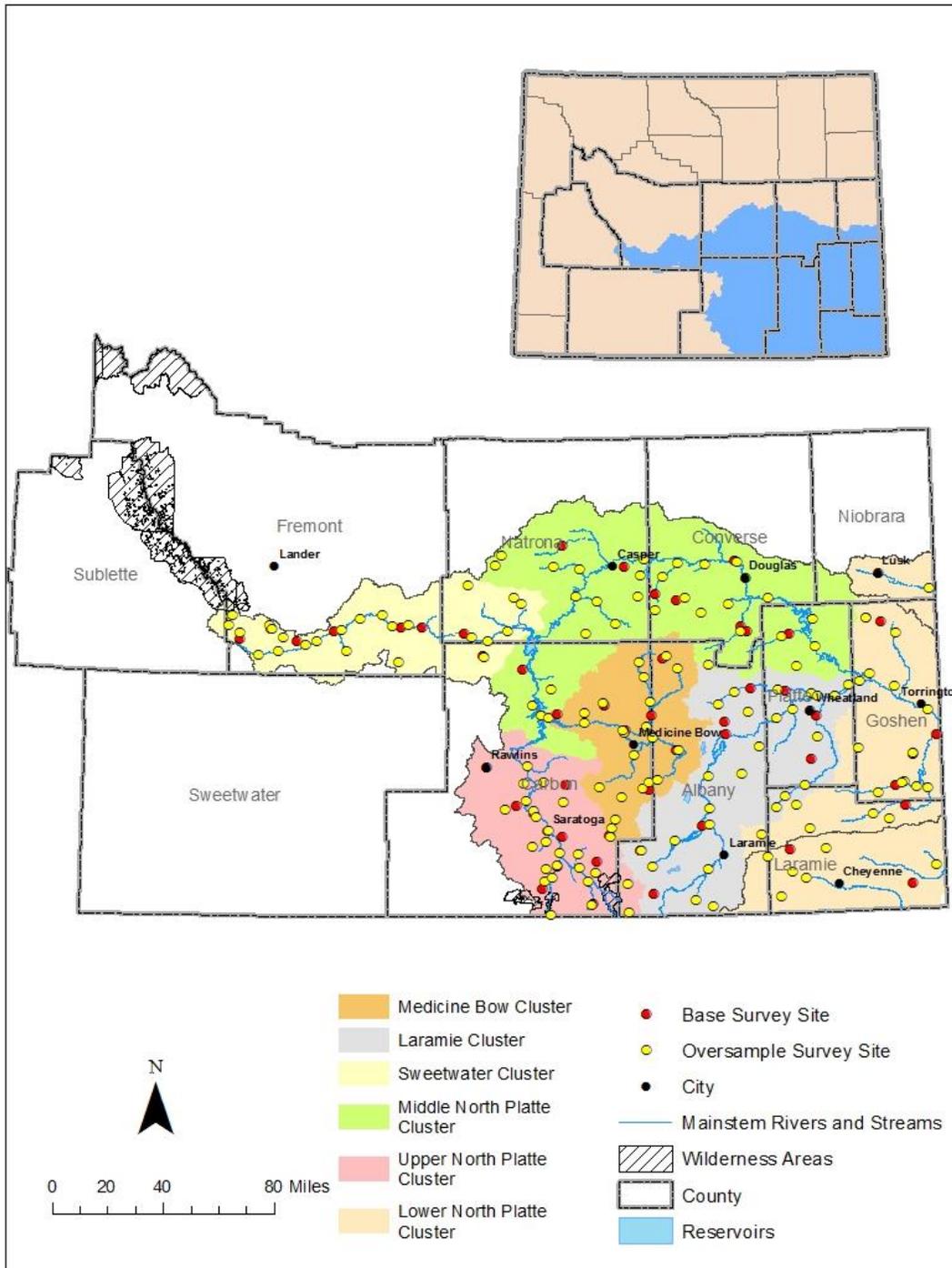
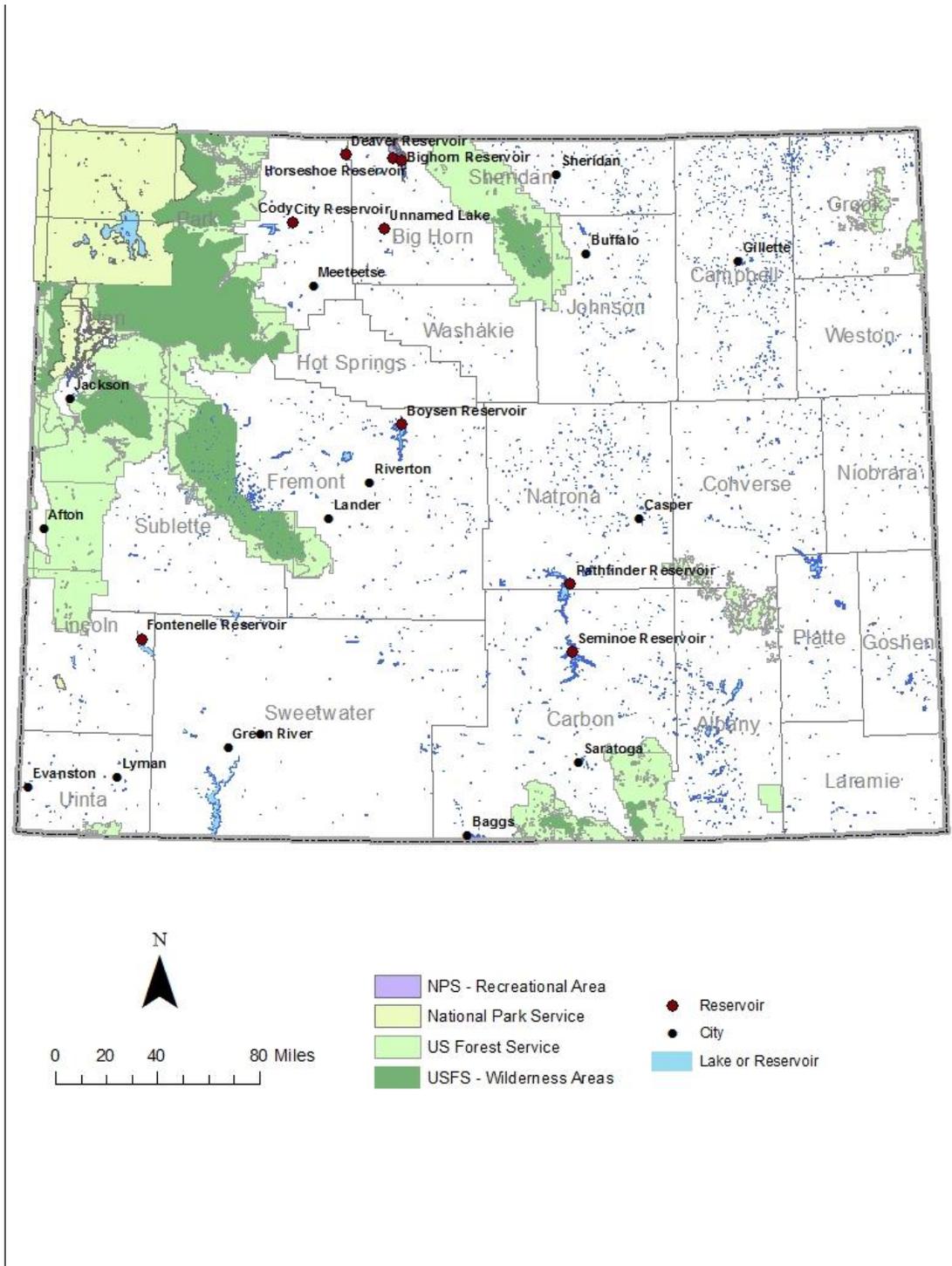


Figure 2. Reservoir nutrient criteria and status and trend monitoring



Watershed Protection Program Monitoring List for 2016

The 2016 monitoring list is shown in Tables 1-5. General locations of most waters selected for monitoring in 2016 are illustrated in Figure 1 and Figure 2. Monitoring staff contact information is shown below:

Statewide: Jeremy Zumberge (phone: 307-675-5638, email: jeremy.zumberge@wyo.gov)
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Wyoming Department of Environmental Quality - Water Quality Division
2100 W. 5th, Sheridan, WY 82801

Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) procedures are critical aspects of WPP monitoring plans. QA/QC procedures are applied to all monitoring strategy operations to ensure that the results obtained are of known and suitable quality to meet WPP's objectives. Read WDEQ (2016) and WDEQ (2015) for details regarding QA/QC procedures integrated into the WPP Monitoring Program.

Other Watershed Protection Program-Supported Monitoring Projects for 2016

WDEQ-USGS Statewide Monitoring Network

WDEQ-WPP cooperates with the United States Geological Survey (USGS) to sample 23 locations across the state (Table 5). Flow measurement gages exist at many of the sites, though WDEQ supports only four gages. The current emphasis of this network is on nutrient criteria development, though sample locations can be chosen for a variety of reasons, including monitoring of currently impaired waters, waters associated with Wyoming Pollutant Discharge Elimination System (WYPDES) permits, or trends in large river system water quality. Sampling is conducted either quarterly or monthly, depending on objectives. Specific sampled parameters

also vary by site depending on objectives, but include field parameters, major ions, trace metals, nutrients, sediment, and/or bacteria. At the time this document was completed, changes to the network were being considered that would go into effect on July 1, 2016. Contact the Monitoring Supervisor for more information.

WDEQ-USGS CBM-Based Monitoring Network

WDEQ also cooperates with the USGS to sample 33 locations in regions where coal-bed methane (CBM) development is present, most of which are in northeast Wyoming (Table 6). WDEQ supports flow measurement gages at four sites and continuous electrical conductivity monitoring and two sites. This project monitors water quality in areas affected by CBM development to determine trends and patterns, establish baseline data in areas that have received minimal or no CBM development, and to determine compliance with existing water quality standards and WYPDES permit conditions. At the time this document was completed, changes to the network were being considered that would go into effect on July 1, 2016. Contact the Monitoring Supervisor for more information.

References

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http://www.epa.gov/wed/pages/ecoregions/wy_eco.htm

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WDEQ. 2008. Wyoming nutrient criteria development plan. Wyoming Department of Environmental Quality, Water Quality Division, Cheyenne, Wyoming. <http://deq.wyoming.gov/wqd/nutrient-pollution/>

Table 1. Platte Superbasin probabilistic survey sites

Survey ID	Stream Name	Type	Latitude	Longitude	HUC8 Cluster	Field Office
WY09C-151	Fox Creek	Base	41.11047465	-106.07806993	Laramie	Cheyenne
WY09C-152	Nash Fork	Base	41.33910435	-106.16901799	Laramie	Cheyenne
WY09C-153	Richeau Creek	Base	41.80001592	-104.96583519	Laramie	Cheyenne
WY09C-154	North Laramie River	Base	42.17860928	-105.37706562	Laramie	Cheyenne
WY09C-155		Base	42.15878462	-105.13436314	Laramie	Cheyenne
WY09C-156	Duck Creek	Base	42.00696918	-105.56636047	Laramie	Cheyenne
WY09C-157	Little Laramie River	Base	41.46219899	-105.73370493	Laramie	Cheyenne
WY09C-158	Chugwater Creek	Base	42.02367824	-104.92258182	Laramie	Cheyenne
WY09C-159	Laramie River	Base	41.93798965	-105.55701856	Laramie	Cheyenne
WY09C-501	North Fork Little Laramie River	Oversample	41.33980791	-106.15978893	Laramie	Cheyenne
WY09C-502	North Sybille Creek	Oversample	41.72996279	-105.45512457	Laramie	Cheyenne
WY09C-503	Laramie River	Oversample	42.19750898	-104.60668165	Laramie	Cheyenne
WY09C-504		Oversample	42.16654628	-105.18794250	Laramie	Cheyenne
WY09C-505	Little Laramie River	Oversample	41.25346108	-106.08508232	Laramie	Cheyenne
WY09C-506	Sand Creek	Oversample	41.54849420	-105.21245134	Laramie	Cheyenne
WY09C-507	Sybille Creek	Oversample	42.06142113	-105.08397307	Laramie	Cheyenne
WY09C-508	North Laramie River	Oversample	42.15942357	-105.48835762	Laramie	Cheyenne
WY09C-509	Laramie River	Oversample	41.23754440	-105.69984808	Laramie	Cheyenne
WY09C-510	Laramie River	Oversample	41.72296998	-105.68461373	Laramie	Cheyenne
WY09C-511	North Laramie River	Oversample	42.14045320	-104.94914822	Laramie	Cheyenne
WY09C-512	Halleck Creek	Oversample	41.87059642	-105.32860178	Laramie	Cheyenne
WY09C-513		Oversample	41.07352379	-105.79211711	Laramie	Cheyenne
WY09C-514	Laramie River	Oversample	41.55209560	-105.68513821	Laramie	Cheyenne
WY09C-515	Laramie River	Oversample	42.12462130	-104.78700201	Laramie	Cheyenne
WY09C-516	Laramie River	Oversample	42.01582344	-105.19889980	Laramie	Cheyenne
WY09C-517	Threemile Creek	Oversample	41.61076624	-105.15109968	Laramie	Cheyenne
WY09C-518	Chugwater Creek	Oversample	41.66056393	-105.01153629	Laramie	Cheyenne
WY09C-519	North Laramie River	Oversample	42.30405501	-105.66671360	Laramie	Cheyenne
WY09C-520	Laramie River	Oversample	42.13070135	-104.91121149	Laramie	Cheyenne
WY09C-521	McFarlane Creek	Oversample	42.05654227	-105.39855660	Laramie	Cheyenne
WY09C-522	Laramie River	Oversample	41.46841760	-105.68283637	Laramie	Cheyenne
WY09C-523		Oversample	41.91559136	-104.91512779	Laramie	Cheyenne
WY09C-524	Mill Creek	Oversample	41.38694627	-105.92519724	Laramie	Cheyenne
WY09C-525	Lone Tree Creek	Oversample	41.04119193	-105.67078549	Laramie	Cheyenne
WY09C-526	Laramie River	Oversample	42.18020881	-104.68344649	Laramie	Cheyenne
WY09C-527	Antelope Creek	Oversample	42.09877247	-105.60367393	Laramie	Cheyenne
WY09C-160	Lodgepole Creek	Base	41.33212748	-105.12570463	Lower Platte	Cheyenne
WY09C-161	Horse Creek	Base	41.54033978	-104.31851985	Lower Platte	Cheyenne
WY09C-162	Horse Creek	Base	41.80792451	-104.25581830	Lower Platte	Cheyenne

WY09C-163	Muskrat Creek	Base	42.52887549	-104.54918770	Lower Platte	Cheyenne
WY09C-164	Muddy Creek	Base	41.13554019	-104.28641904	Lower Platte	Cheyenne
WY09C-165	Rawhide Creek	Base	42.50626884	-104.44305504	Lower Platte	Cheyenne
WY09C-166	Bear Creek	Base	41.64948090	-104.38266363	Lower Platte	Cheyenne
WY09C-167	Horse Creek	Base	41.90264525	-104.08511660	Lower Platte	Cheyenne
WY09C-528	Horse Creek	Oversample	41.50494711	-104.54191542	Lower Platte	Cheyenne
WY09C-529	Horse Creek	Oversample	41.62570466	-104.15557602	Lower Platte	Cheyenne
WY09C-530	Horse Creek	Oversample	41.40984626	-105.32283556	Lower Platte	Cheyenne
WY09C-531	North Platte River	Oversample	42.03298403	-104.14014009	Lower Platte	Cheyenne
WY09C-532	North Bear Creek	Oversample	41.56099210	-105.07480801	Lower Platte	Cheyenne
WY09C-533	Little Horse Creek	Oversample	41.47592791	-104.43393786	Lower Platte	Cheyenne
WY09C-534	Middle Lodgepole Creek	Oversample	41.29104135	-105.28625156	Lower Platte	Cheyenne
WY09C-535	Horse Creek	Oversample	41.81122926	-104.25050060	Lower Platte	Cheyenne
WY09C-536	Lodgepole Creek	Oversample	41.32861087	-104.88214763	Lower Platte	Cheyenne
WY09C-537	Fox Creek	Oversample	41.66565206	-104.32333645	Lower Platte	Cheyenne
WY09C-538	Lone Tree Creek	Oversample	41.08630545	-105.19731510	Lower Platte	Cheyenne
WY09C-539	Niobrara River	Oversample	42.67025519	-104.09599464	Lower Platte	Cheyenne
WY09C-540	Horse Creek	Oversample	41.43411424	-104.98937565	Lower Platte	Cheyenne
WY09C-541	Bear Creek	Oversample	41.63957791	-104.23222390	Lower Platte	Cheyenne
WY09C-542		Oversample	42.23454901	-104.53493705	Lower Platte	Cheyenne
WY09C-543	Rawhide Creek	Oversample	42.44116987	-104.34305908	Lower Platte	Cheyenne
WY09C-544	Spring Run	Oversample	41.61296379	-104.50218322	Lower Platte	Cheyenne
WY09C-545	Bear Creek	Oversample	41.65779922	-104.34285355	Lower Platte	Cheyenne
WY09C-546	North Fork Crow Creek	Oversample	41.21040606	-105.11652378	Lower Platte	Cheyenne
WY09C-547	Box Elder Creek	Oversample	41.85191290	-104.63372052	Lower Platte	Cheyenne
WY09C-548	Chivington Draw	Oversample	41.22810619	-104.11850797	Lower Platte	Cheyenne
WY09C-549		Oversample	41.17544246	-105.02078944	Lower Platte	Cheyenne
WY09C-550		Oversample	42.16584437	-104.36993021	Lower Platte	Cheyenne
WY09C-551	Muskrat Creek	Oversample	42.53028855	-104.54837901	Lower Platte	Cheyenne
WY09C-168	Little Medicine Bow River	Base	41.96681914	-106.25823515	Medicine Bow	Lander
WY09C-169	Austin Creek	Base	42.05796730	-106.73363396	Medicine Bow	Lander
WY09C-170	Threemile Creek	Base	41.65329583	-106.09808064	Medicine Bow	Lander
WY09C-171		Base	42.34193783	-105.98599892	Medicine Bow	Lander
WY09C-172	Difficulty Creek	Base	42.09775800	-106.40145674	Medicine Bow	Lander
WY09C-173	Turpin Creek	Base	41.42235137	-106.38167131	Medicine Bow	Lander
WY09C-174	Rock Creek	Base	41.86346051	-105.90635992	Medicine Bow	Lander
WY09C-175	Little Medicine Bow River	Base	42.04617606	-106.07547515	Medicine Bow	Lander
WY09C-552		Oversample	42.05420156	-106.84862243	Medicine Bow	Lander
WY09C-553	Little Medicine Bow River	Oversample	42.11581146	-106.08682806	Medicine Bow	Lander
WY09C-554	Watkins Creek	Oversample	41.66154797	-106.14365882	Medicine Bow	Lander
WY09C-555	Medicine Bow River	Oversample	41.46130924	-106.36233413	Medicine Bow	Lander
WY09C-556		Oversample	42.04145922	-106.79996710	Medicine Bow	Lander
WY09C-557	Little Medicine Bow River	Oversample	42.24711903	-106.11968751	Medicine Bow	Lander

WY09C-558		Oversample	41.69837305	-106.10136832	Medicine Bow	Lander
WY09C-559	Wagonhound Creek	Oversample	41.62093025	-106.29521026	Medicine Bow	Lander
WY09C-560		Oversample	42.28763258	-105.88436186	Medicine Bow	Lander
WY09C-561	Troublesome Creek	Oversample	42.06062734	-106.54174026	Medicine Bow	Lander
WY09C-562		Oversample	41.92822449	-106.06875082	Medicine Bow	Lander
WY09C-563	Mill Creek	Oversample	41.67429765	-106.44676697	Medicine Bow	Lander
WY09C-564	Little Medicine Bow River	Oversample	42.32516841	-106.15405074	Medicine Bow	Lander
WY09C-565	Difficulty Creek	Oversample	42.11212733	-106.41398638	Medicine Bow	Lander
WY09C-566	Little Medicine Bow River	Oversample	41.98763109	-106.11498576	Medicine Bow	Lander
WY09C-567	Little Medicine Bow River	Oversample	41.95822332	-106.26686790	Medicine Bow	Lander
WY09C-568	Turpin Creek	Oversample	41.41487680	-106.37376088	Medicine Bow	Lander
WY09C-569	Medicine Bow River	Oversample	42.00868696	-106.54189517	Medicine Bow	Lander
WY09C-570	Medicine Bow River	Oversample	41.83766913	-106.20188879	Medicine Bow	Lander
WY09C-571	East Fork Medicine Bow River	Oversample	41.50591705	-106.33755598	Medicine Bow	Lander
WY09C-572	Threemile Creek	Oversample	42.35623534	-105.96606430	Medicine Bow	Lander
WY09C-573	Threemile Creek	Oversample	41.70950068	-106.03805100	Medicine Bow	Lander
WY09C-574	Merna (historical)	Oversample	41.85955825	-105.88798966	Medicine Bow	Lander
WY09C-575	Little Medicine Bow River	Oversample	41.96915094	-106.27633715	Medicine Bow	Lander
WY09C-176	East Fork Elkhorn Creek	Base	42.82580943	-106.25169227	Middle North Platte	Sheridan
WY09C-177	Deweese Creek	Base	42.29183002	-106.98107500	Middle North Platte	Sheridan
WY09C-178	Mill Creek	Base	42.50121694	-105.43064609	Middle North Platte	Sheridan
WY09C-179	Virden Creek	Base	42.64432450	-105.88676606	Middle North Platte	Sheridan
WY09C-180	Mill Creek	Base	42.47372311	-105.39317696	Middle North Platte	Sheridan
WY09C-181	Horseshoe Creek	Base	42.45560419	-105.09283919	Middle North Platte	Sheridan
WY09C-182	South Fork Casper Creek	Base	42.93890470	-106.69380206	Middle North Platte	Sheridan
WY09C-183	Deer Creek	Base	42.68016275	-106.03726590	Middle North Platte	Sheridan
WY09C-184	North Platte River	Base	42.84814088	-105.46353054	Middle North Platte	Sheridan
WY09C-576	Middle Fork Casper Creek	Oversample	42.89124218	-107.12134119	Middle North Platte	Sheridan
WY09C-577	Deer Creek	Oversample	42.83598682	-105.87503984	Middle North Platte	Sheridan
WY09C-578	North Platte River	Oversample	42.86028347	-106.10987796	Middle North Platte	Sheridan
WY09C-579	North Platte River	Oversample	42.84051107	-105.44562409	Middle North Platte	Sheridan
WY09C-580	Poison Spider Creek	Oversample	42.81396486	-106.56741987	Middle North Platte	Sheridan
WY09C-581	Deer Creek	Oversample	42.76890100	-105.98038178	Middle North Platte	Sheridan
WY09C-582	North Platte River	Oversample	42.64744530	-105.23240801	Middle North Platte	Sheridan
WY09C-583	Cottonwood Creek	Oversample	42.53159605	-104.92509413	Middle North Platte	Sheridan
WY09C-584	Bates Creek	Oversample	42.67252257	-106.59775594	Middle North Platte	Sheridan
WY09C-585	Bates Creek	Oversample	42.52988308	-106.32041309	Middle North Platte	Sheridan
WY09C-586	Prele Creek, La	Oversample	42.57940892	-105.71086768	Middle North Platte	Sheridan
WY09C-587	Cottonwood Creek	Oversample	42.28913397	-105.04498314	Middle North Platte	Sheridan
WY09C-588	Bolton Creek	Oversample	42.47433717	-106.53022271	Middle North Platte	Sheridan
WY09C-589	Smith Creek	Oversample	42.66493839	-106.15517433	Middle North Platte	Sheridan
WY09C-590	Indian Creek	Oversample	42.47455846	-105.43992181	Middle North Platte	Sheridan
WY09C-591	Hurt Creek	Oversample	42.10726897	-106.90528777	Middle North Platte	Sheridan

WY09C-592	Box Elder Creek	Oversample	42.65802989	-105.82545059	Middle North Platte	Sheridan
WY09C-593	Poison Spider Creek	Oversample	42.82891844	-106.75542237	Middle North Platte	Sheridan
WY09C-594	North Platte River	Oversample	42.38692815	-104.91438023	Middle North Platte	Sheridan
WY09C-595	Wagon Hound Creek	Oversample	42.62205946	-105.51581726	Middle North Platte	Sheridan
WY09C-596	Lost Creek	Oversample	42.18504170	-106.77725236	Middle North Platte	Sheridan
WY09C-597	Clear Fork Muddy Creek	Oversample	42.77540710	-106.13487789	Middle North Platte	Sheridan
WY09C-598	Horseshoe Creek	Oversample	42.44099176	-105.15125036	Middle North Platte	Sheridan
WY09C-599	Deer Creek	Oversample	42.59596758	-106.03381837	Middle North Platte	Sheridan
WY09C-600	Bates Creek	Oversample	42.64627655	-106.44977671	Middle North Platte	Sheridan
WY09C-601	Box Elder Creek	Oversample	42.82686878	-105.67828639	Middle North Platte	Sheridan
WY09C-602	Middle Fork Casper Creek	Oversample	42.83415224	-107.16746521	Middle North Platte	Sheridan
WY09C-193	Pete Creek	Base	42.36258710	-107.25229161	Sweetwater	Lander
WY09C-194	East Sweetwater River	Base	42.44487819	-108.97361477	Sweetwater	Lander
WY09C-195	Sweetwater River	Base	42.51586116	-107.83208857	Sweetwater	Lander
WY09C-196	Strawberry Creek	Base	42.43959273	-108.57126094	Sweetwater	Lander
WY09C-197	Rock Creek	Base	42.50273411	-108.75068040	Sweetwater	Lander
WY09C-198	Sweetwater River	Base	42.48429112	-107.38588722	Sweetwater	Lander
WY09C-199	Crooks Creek	Base	42.51628292	-107.68079368	Sweetwater	Lander
WY09C-200	Sweetwater River	Base	42.49098300	-108.30456289	Sweetwater	Lander
WY09C-627	Sweetwater River	Oversample	42.41642133	-108.50190301	Sweetwater	Lander
WY09C-628	Sweetwater River	Oversample	42.51738433	-107.89282706	Sweetwater	Lander
WY09C-629	Sweetwater River	Oversample	42.44347087	-107.21863608	Sweetwater	Lander
WY09C-630	Blair Creek	Oversample	42.56798921	-109.02499614	Sweetwater	Lander
WY09C-631	Sweetwater River	Oversample	42.43848212	-108.42538202	Sweetwater	Lander
WY09C-632	Sweetwater River	Oversample	42.52493524	-107.78472519	Sweetwater	Lander
WY09C-633	Horse Creek	Oversample	42.63560866	-106.98687134	Sweetwater	Lander
WY09C-634	Sweetwater River	Oversample	42.51908479	-109.04988532	Sweetwater	Lander
WY09C-635	East Alkali Creek	Oversample	42.38894670	-108.22009793	Sweetwater	Lander
WY09C-636	Sweetwater River	Oversample	42.45892398	-107.33371483	Sweetwater	Lander
WY09C-637	Crooks Creek	Oversample	42.33029334	-107.84989600	Sweetwater	Lander
WY09C-638	Sweetwater River	Oversample	42.38390248	-108.69565873	Sweetwater	Lander
WY09C-639	Sweetwater River	Oversample	42.58063962	-107.96630216	Sweetwater	Lander
WY09C-640	Horse Creek	Oversample	42.66748952	-107.03414345	Sweetwater	Lander
WY09C-641	Rock Creek	Oversample	42.52229513	-108.76316512	Sweetwater	Lander
WY09C-642	Rock Creek	Oversample	42.45616701	-108.65975891	Sweetwater	Lander
WY09C-643	Sweetwater River	Oversample	42.49795572	-108.25565653	Sweetwater	Lander
WY09C-644	Dry Creek	Oversample	42.73662585	-107.35806143	Sweetwater	Lander
WY09C-645	Pete Creek	Oversample	42.35868397	-107.24848247	Sweetwater	Lander
WY09C-646	Rock Creek	Oversample	42.50068092	-108.74699622	Sweetwater	Lander
WY09C-647	Sweetwater River	Oversample	42.55924645	-108.12424555	Sweetwater	Lander
WY09C-648	Sweetwater River	Oversample	42.49595138	-107.07827471	Sweetwater	Lander
WY09C-649	East Sweetwater River	Oversample	42.47566283	-108.97455251	Sweetwater	Lander
WY09C-650	Sweetwater River	Oversample	42.36604386	-108.83514334	Sweetwater	Lander

WY09C-185	North Fork Miner Creek	Base	41.14457360	-106.84786894	Upper North Platte	TBD
WY09C-186		Base	41.41472443	-106.71037222	Upper North Platte	TBD
WY09C-187		Base	41.53812348	-106.90400889	Upper North Platte	TBD
WY09C-188		Base	41.28428205	-106.46990536	Upper North Platte	TBD
WY09C-189	Encampment River	Base	41.25949071	-106.74595873	Upper North Platte	TBD
WY09C-190	Rattlesnake Creek	Base	41.68590224	-106.67593588	Upper North Platte	TBD
WY09C-191	Sage Creek	Base	41.57733112	-107.02803884	Upper North Platte	TBD
WY09C-192	Big Creek	Base	41.06535639	-106.50214202	Upper North Platte	TBD
WY09C-603	East Fork Encampment River	Oversample	41.00868534	-106.78700919	Upper North Platte	TBD
WY09C-604		Oversample	41.69415880	-106.97479014	Upper North Platte	TBD
WY09C-605		Oversample	41.44700612	-106.80078396	Upper North Platte	TBD
WY09C-606	Brush Creek	Oversample	41.32729152	-106.60023348	Upper North Platte	TBD
WY09C-607	Big Creek	Oversample	41.05967546	-106.50978769	Upper North Platte	TBD
WY09C-608	Sage Creek	Oversample	41.55834835	-107.10546117	Upper North Platte	TBD
WY09C-609	Pass Creek	Oversample	41.59614213	-106.70166727	Upper North Platte	TBD
WY09C-610	North Platte River	Oversample	41.25571489	-106.58732855	Upper North Platte	TBD
WY09C-611	Pass Creek	Oversample	41.70387124	-106.83463241	Upper North Platte	TBD
WY09C-612	North Platte River	Oversample	41.55157165	-106.90459778	Upper North Platte	TBD
WY09C-613	Cow Creek	Oversample	41.25058101	-106.82626736	Upper North Platte	TBD
WY09C-614	Encampment River	Oversample	41.26668709	-106.74103400	Upper North Platte	TBD
WY09C-615	North Platte River	Oversample	41.78434512	-106.94893777	Upper North Platte	TBD
WY09C-616	North Spring Creek	Oversample	41.36656411	-106.91844266	Upper North Platte	TBD
WY09C-617	French Creek	Oversample	41.22582679	-106.48324973	Upper North Platte	TBD
WY09C-618		Oversample	41.33121044	-106.72491692	Upper North Platte	TBD
WY09C-619	Pelton Creek	Oversample	41.01398389	-106.25127916	Upper North Platte	TBD
WY09C-620		Oversample	41.52086621	-106.89219013	Upper North Platte	TBD
WY09C-621	North Fork Encampment River	Oversample	41.18484308	-106.83477193	Upper North Platte	TBD
WY09C-622		Oversample	41.20591842	-106.77637415	Upper North Platte	TBD
WY09C-623	North Platte River	Oversample	41.60513062	-106.95993846	Upper North Platte	TBD
WY09C-624	South Spring Creek	Oversample	41.39010979	-106.82204663	Upper North Platte	TBD
WY09C-625	North Platte River	Oversample	41.17890566	-106.52912448	Upper North Platte	TBD
WY09C-626	Douglas Creek	Oversample	41.16304981	-106.25706116	Upper North Platte	TBD

Table 2. Wyoming Basin lake and reservoir nutrient criteria monitoring

Size Class	Basin	Reservoir	Latitude	Longitude	Crew
3	Wind	Boysen Reservoir	43.367743	-108.175406	Sheridan
3	North Platte	Seminole Reservoir	42.073924	-106.853805	Sheridan
3	North Platte	Pathfinder Reservoir	42.46366	-106.866197	Sheridan
3	Bighorn	Bighorn Reservoir	44.8678194	-108.18971	Sheridan
1	Bighorn	City Reservoir	44.507736	-109.049738	Sheridan
1	Bighorn	Deaver Reservoir	44.901233	-108.635440	Sheridan
1	Bighorn	Horseshoe Reservoir	44.881089	-108.259613	Sheridan
1	Bighorn	Unnamed Lake	44.483127	-108.321675	Sheridan

Table 3. Targeted Use Support Studies

Basin	Stream	Parameter(s) of concern	Designated Use(s)
Green	Pacific Creek	E. coli bacteria	Recreation
North Platte	Lander Creek	E. coli bacteria	Recreation
Snake	Fish Creek	Nutrients	Fisheries and Aquatic Life

Table 4. Large reservoir status and trend monitoring

Basin	Reservoir	HUC	Crew
Green	Fontenelle Reservoir (Year 3 of 3)	14040101	Sheridan

Table 5. WDEQ/USGS cooperative monitoring agreement

Station	Station Name	Constituents (1,2)	Frequency
06236100	Wind River above Boysen Reservoir	Field, Major ions, Nutrients, Trace Elements, Bacteria, TSS	12/yr
06253000	Fivemile Creek near Shoshoni	Field, Major ions, Nutrients, Trace Elements, Bacteria, TSS	12/yr
06258000	Muddy Creek near Shoshoni	Field, Major ions, Nutrients, Trace Elements, Bacteria, TSS	12/yr
06259000	Wind River below Boysen Reservoir	Field, CBM, Nutrients	12/yr
06264700	Bighorn River at Lucerne	Field, Major ions, Nutrients, Trace elements, Bacteria, Sediment	4/yr
06268600	Bighorn River at Worland	Field, Major ions, Nutrients, Trace elements, Bacteria, TSS, Sediment	4/yr
06274300	Bighorn River at Basin	Field, Major ions, Nutrients, Trace elements, Bacteria, TSS, Sediment	4/yr
06279500	Bighorn River at Kane	Field, Major ions, Nutrients, Trace elements, Bacteria, TSS, Sediment	4/yr
06279940	North Fork Shoshone River at Wapiti	Field, Major ions, Nutrients, Trace elements, Bacteria, TSS, Sediment	12/yr
06281000	South Fork Shoshone River above Buffalo Bill Reservoir	Field, Major ions, Nutrients, Trace elements, Bacteria, TSS, Sediment	12/yr
06281700	Shoshone River above Demaris	Field, Major ions, Nutrients, Trace elements, Bacteria, TSS, Sediment	4/yr
06285100	Shoshone River at Lovell	Field, Major ions, Nutrients, Trace elements, Bacteria, TSS, Sediment	4/yr
06630000	North Platte River above Seminoe, near Sinclair	Field, Major ions, Nutrients, Trace Elements, Bacteria, TSS	12/yr
06635000	Medicine Bow River above Seminoe Reservoir near Hanna	Field, CBM, Nutrients	12/yr
06634060	Little Medicine Bow River above Sand Creek, near Shirley Basin	Gage only	
06636000	N Platte River ab Pathfinder Reservoir	Field, CBM, Nutrients	12/yr
06641000	North Platte River below Pathfinder Reservoir	Field, Major ions, Nutrients, Trace Elements, Bacteria, TSS	4/yr
06639000	Sweetwater River near Alcova	Field, Major ions, Nutrients, Trace Elements, Bacteria, TSS	4/yr
06642000	North Platte River at Alcova	Field, Major ions, Nutrients, Trace Elements, Bacteria, TSS	4/yr
06645000	North Platte River below Casper	Field, Major ions, Nutrients, Trace elements, Bacteria	4/yr
06755960	Crow Creek at 19 th St in Cheyenne	Gage only	
09209400	Green River near LaBarge	Field, CBM, Nutrients	4/yr
13025500	Crow Creek near Fairview	Field, Major Anions and Cations, Trace Metals, Nutrients, Gage	4/yr

1. Field parameters: discharge, pH, water temperature, dissolved oxygen, electrical conductivity (EC)
2. CBM parameters: major anions and cations, select filtered trace metals, arsenic

Table 6. WDEQ/USGS cooperative CBM-related monitoring agreement

Station	Name	Code (1,2)	Frequency
06299980	Tongue R at Monarch	Field, CBM, Gage	12/yr
06304500	Little Goose Cr at Sheridan	Field, CBM, Nutrients, Bacteria	4/yr
06306020	Tongue R bel Youngs Cr nr Acme	Field, CBM, FIL Se, FIL Hg	12/yr
06306250	Prairie Dog Cr nr Acme	Field, CBM, Gage	12/yr
06306300	Tongue River at State Line near Decker, MT	Field, CBM, Nutrients (cost-share with other cooperators)	12/yr
06313400	Salt Cr nr Sussex	Field, CBM, Se	12/yr
06313500	Powder R at Sussex	Field, CBM, Se, Gage, EC Monitor	12/yr
06313605	Powder R bel Burger Draw nr Buffalo	Field, CBM	12/yr
06316400	Crazy Woman Cr at Upper Station nr Arvada	Field, CBM	4/yr
06317000	Powder R at Arvada	Field, CBM, Nutrients	12/yr
06320210	Clear Cr ab Kumor Draw nr Buffalo	Field, CBM	12/yr
06324000	Clear Cr nr Arvada	Field, CBM, Gage, EC Monitor	12/yr
06324500	Powder River near Moorhead , MT	Field, CBM, Nutrients	12/yr
06324970	Little Powder R ab Dry Cr nr Weston	Field, CBM, Nutrients	12/yr
06386500	Cheyenne R nr Spencer	Field, CBM	12/yr
06425900	Caballo Cr at mouth nr Piney	Field, CBM, Nutrients	12/yr
06426400	Donkey Cr nr Moorcroft	Field, CBM	12/yr
06426500	Belle Fourche R bel Moorcroft	Field, CBM, Nutrients	12/yr
06428050	Belle Fourche R bel Hulett	Field, CBM, Nutrients	4/yr
06313540	Willow Cr nr mouth nr Sussex	Field, Major Anions and Cations, TDS	4/yr
06313560	Pumpkin Cr nr mouth nr Sussex	Field, Major Anions and Cations, TDS	4/yr
06313585	Beaver Cr at mouth nr Sussex	Field, Major Anions and Cations, TDS	4/yr
06313604	Burger Draw at mouth nr Buffalo	Field, Major Anions and Cations, TDS	4/yr
06313633	Van Houten Draw at mouth nr Buffalo	Field, Major Anions and Cations, TDS	4/yr
06317030	Wild Horse Cr at mouth at Arvada	Field, Major Anions and Cations, TDS	4/yr
06317100	Powder R ab Clear Cr nr Arvada	Field, Major Cations	4/yr
06323550	Clear Cr ab Double Crossing Cr nr Clearmont	Field, Major Cations	4/yr
06324200	L X Bar Cr at mouth nr Moorhead MT	Field, Major Anions and Cations, TDS	4/yr
06324300	S A Cr at mouth nr Moorhead MT	Field, Major Anions and Cations, TDS	4/yr
06324870	Rawhide Cr at mouth nr Gillette	Field, Major Cations	4/yr
06324940	Horse Cr at mouth nr Weston	Field, Major Cations	4/yr
06324950	Little Powder R bel Elk Cr nr Weston	Field, Major Cations	4/yr
06425720	Belle Fourche R bel Rattlesnake Cr nr Piney	Field, Major Cations	4/yr

1. Field parameters: discharge, pH, water temperature, dissolved oxygen, electrical conductivity (EC)

2. CBM parameters: major anions and cations, select filtered trace metals, arsenic

FIL=filtered (dissolved) fraction