

# WATER QUALITY MONITORING PLAN

## 2015



**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 designed to meet the State's surface water quality monitoring needs. Primary objectives are attained 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 numeric criteria or revise existing criteria. Evaluation of best management practices used to reduce non-point source pollutants is accomplished through a joint effort between the monitoring, NPS and TMDL groups. Likewise, development of some TMDL study designs, data collection in support of TMDLs, and data analysis and interpretation occurs through coordinated efforts between the monitoring and TMDL groups.

### **Purpose of the Annual Water Quality Monitoring Plan**

The annual water quality monitoring plan identifies annual objectives used to achieve the objectives of the monitoring strategy and ties them to specific monitoring projects planned for a given year. The plan serves as an informational and outreach tool for the public, government, non-profit and other stakeholders, and provides statewide and regional contact information for questions about regional monitoring activities.

### **Annual Monitoring Objectives – 2015 Field Season**

- 1) Complete Probabilistic Survey of the Green River Basin
- 2) Monitor Lakes, Reservoirs, and Streams in Support of Nutrient Criteria Development
- 3) Continue Large Reservoir Status and Trend Monitoring
- 4) Verify and Re-sample Reference Sites
- 5) Monitor Condition of Currently Impaired Streams

#### **Objective 1 – Complete Probabilistic Survey of the Green River Basin (See Figure 1; Table 1)**

Probabilistic rotating basin surveys are the primary tool for assessing the current water quality condition of Wyoming's rivers and streams. Wyoming uses a stratified-random survey design to select 50 primary sites on perennial, non-headwater (>1<sup>st</sup> Strahler order) rivers and streams outside of national parks, congressionally-designated wilderness areas and the Wind River Reservation within each of five 'superbasins.' The five superbasins are delineated based on combinations of 6-digit (3<sup>rd</sup> level) Hydrologic Unit Codes (HUC) and geographical location. The five superbasins and the associated HUC 6 basins they represent are:

Bighorn/Yellowstone [Bighorn and Yellowstone Basins]

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

Platte [Niobrara, North Platte and South Platte Basins]

Green [Great Divide, Green and Little Snake Basins]

Bear/Snake [Bear and Snake Basins]

Site selection is further stratified into aggregations of eight digit (4<sup>th</sup> level) HUCs, or “HUC 8 clusters,” within each superbasin. The additional 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 is generated for each superbasin that are used as replacements when a primary site cannot be sampled. Oversample sites generated for a HUC 8 cluster within a superbasin are only 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 50 sites sampled within each superbasin are used to make statistical inferences of the water quality condition within each superbasin, including the proportion of target stream miles likely achieving water quality standards, and the occurrence, extent and relative risk of various pollutants. The surveys also identify waters of high quality and those where designated use-support may be limited and are candidates for future targeted monitoring for use support determinations. Waterbodies designated for targeted monitoring will be based on a priority ranking derived from findings of the probabilistic rotating basin survey where results suggest impairments to designated use-support. The Green River basin is the third probabilistic rotating basin survey implemented by the Monitoring Program. Fifty randomly-selected sites within the Green superbasin will be sampled in 2015 followed by analyses of the data in 2016, and targeted monitoring of priority waterbodies in 2017 and 2018.

**Objective 2 – Monitor Lakes, Reservoirs and Streams in Support of Nutrient Criteria Development (See Figure 2; Table 2 and 3)**

*Wyoming Basin Lake and Reservoir Nutrient Monitoring-* The monitoring and water quality standards groups will embark on a third 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). The primary design element for this study is similar to what is used for the probabilistic rotating basin surveys. Twenty-one primary perennial lakes/reservoirs further stratified by three size classes and five level IV ecoregions are selected for sampling. This stratification results in equal spatial allocation of the 21 primary lakes/reservoirs among all three size classes within each level IV ecoregion. Following the same design, a population of oversample lakes/reservoirs generated for each size class/level IV ecoregion combination are used as replacements when a primary lake/reservoir cannot be sampled. Oversample lakes/reservoirs generated for a size class/level IV ecoregion combination are only used as replacements for primary lakes/reservoirs within the same size class/level IV ecoregion combination to maintain representativeness of the study design.

While the objective of this primary design element was largely accomplished in 2013-14, additional data is needed to further understand temporal variability in nutrient and response variables, better represent a size class and geographic area of the Wyoming Basin not well represented in the original random selection of sites, and collect data on larger reservoirs where site-specific nutrient criteria will likely be established. In 2015, up to ten small reservoirs in the northern Bighorn Basin will be sampled for the first time, in addition to a second year of data collection on eight reservoirs in the northern Bighorn Basin that were sampled in 2014.

*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 2015, including the Green River probabilistic stream survey, large reservoir trend monitoring and stream reference site validation and sampling.

**Objective 3 – Continue Large Reservoir Status and Trend Monitoring (See 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 two reservoirs scheduled for monitoring in 2015 (*Fontenelle, and Buffalo Bill*) are in year 2 and 3 of their three year sampling schedules, respectively.

**Objective 4 – Verify and Re-sample Reference Sites (See Figure 2; Table 5)**

Wyoming's reference site network consists of over 200 sites identified between 1992 and the present and distributed across six level III ecoregions. Most of the earlier (pre-2000) sites have been sampled two or more times since their establishment, with their reference status verified, though several remain unverified and sampled only once. In 2015, most of the remaining unverified sites will be revisited, evaluated with the reference site screening checklist, and re-sampled, if their reference status is confirmed.

With all reference site networks, enhancing their accuracy and representativeness is a continuous and iterative process. Specifically, additional reference sites on plains and basin streams are needed. Enhancing the existing reference site network within these areas will improve the accuracy and representativeness of reference expectations for water quality and biological condition. In 2015, WDEQ will continue to identify new reference sites as opportunities arise, including the Green River probabilistic survey and possible relocation of several existing sites where reference status is questionable.

**Objective 5 – Monitor Condition of Currently Impaired Streams**

The Hams Fork River is a tributary to the Green River that originates in the Wyoming Range north of Kemmerer, Wyoming. A 7.6 mile segment of the Hams Fork has been on WDEQ/WQD's 303(d) List of impaired waters since 1996 due to non-support of the cold-water game fisheries and aquatic life other than fish designated uses (WDEQ 2012). Cause of the impairment was identified as elevated pH with a municipal waste water treatment facility as the source. For the past few years, the Monitoring Program in cooperation with the TMDL Program has been collecting credible data on this waterbody to evaluate current condition, pollutants, and sources for possible development of a TMDL. Monitoring in 2015 will be a continuance of monitoring conducted in 2013, although study design modifications are being considered.

Figure 1. Green River Basin probability survey sampling sites

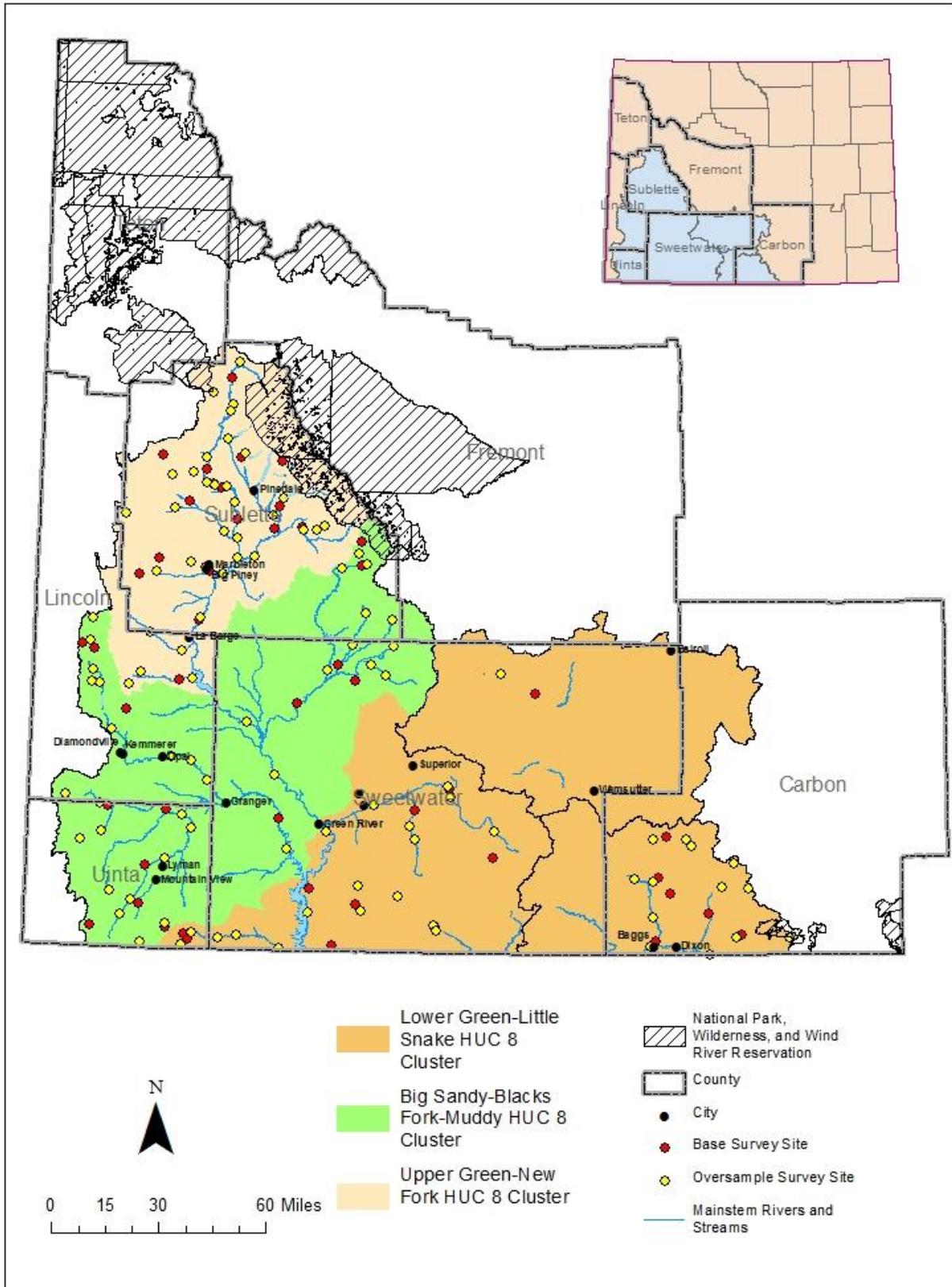
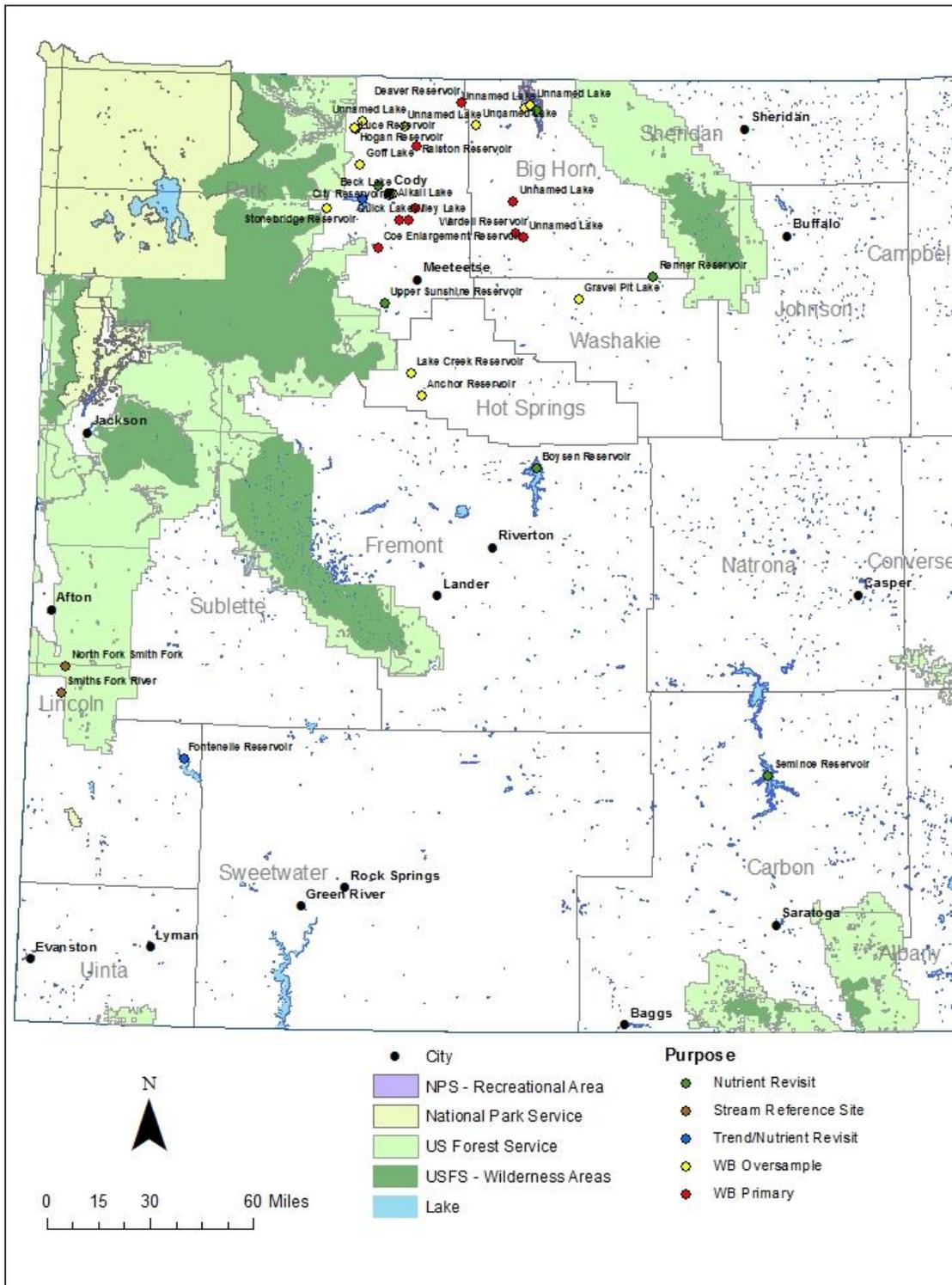


Figure 2. Stream reference sites and Wyoming Basin lake and reservoir nutrient criteria sampling sites.



## Watershed Protection Program Monitoring Schedule for 2015

The 2015 monitoring schedule is shown in Tables 1-5. General locations of most waters selected for monitoring in 2015 are illustrated in Figure 1 and Figure 2. Contact information is shown below:

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

## Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) procedures are a critical aspect of the Watershed Protection Program monitoring plans. QA/QC affects the use, repeatability and validation of monitoring data. QA/QC is involved in all aspects of the Monitoring Program, including:

- Education and training of monitoring program field staff;
- Development of project-specific sampling and analysis plans
- Sample collection and analysis;
- Field audits;
- Data entry, management and analysis;
- Application, interpretation and reporting of data

The WDEQ Watershed Protection Program collects and reviews data in accordance with approved procedures as described in WDEQ (2001) and WDEQ (2011).

## **Other Watershed Protection Program-Supported Monitoring Projects for 2015**

### **WDEQ-USGS Monitoring Network**

WDEQ cooperates with the United States Geological Survey (USGS) to sample 28 locations across the state (Appendix B-1). 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.

### **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 (Appendix B-2). 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.

**Table 1. Green River Basin probability survey sites.**

Site ID	Stream Name	Type	Longitude	Latitude	HUC 8 Cluster	HUC8	Field Office
201	Little Muddy Creek	Base	-110.65863	41.57713	Big Sandy-Blacks Fork-Muddy	14040108	To be determined
202	Sage Creek	Base	-110.28166	41.08169	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
203	Little Muddy Creek	Base	-110.61203	41.56541	Big Sandy-Blacks Fork-Muddy	14040108	To be determined
204	Hay Creek	Base	-109.09009	42.35099	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
205	East Fork Hams Fork	Base	-110.71431	42.20094	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
206		Base	-110.68988	41.07666	Big Sandy-Blacks Fork-Muddy	14040108	To be determined
207	Smiths Fork	Base	-110.42919	41.17236	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
208	Big Sandy River	Base	-109.60387	42.00298	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
209	West Fork Hams Fork	Base	-110.78341	42.22152	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
210	Quarry Creek	Base	-110.40073	41.32764	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
211	Squaw Creek	Base	-109.26742	42.56951	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
212		Base	-109.29067	42.09980	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
213	Willow Creek	Base	-110.53121	41.95901	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
214	Little Muddy Creek	Base	-110.29364	41.55656	Big Sandy-Blacks Fork-Muddy	14040108	To be determined
215	Little Sandy Creek	Base	-109.38286	42.16060	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
216	Blacks Fork	Base	-109.68981	41.53335	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
217	Big Sandy River	Base	-109.27051	42.66387	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
218	Henrys Fork	Base	-110.18419	41.05681	Lower Green-Little Snake	14040106	Cheyenne
219	Antelope Creek	Base	-108.52843	41.38903	Lower Green-Little Snake	14040105	Cheyenne
220	Muddy Creek	Base	-107.59057	41.47788	Lower Green-Little Snake	14050004	Cheyenne
221	Muddy Creek	Base	-107.64678	41.05350	Lower Green-Little Snake	14050004	Cheyenne
222	Currant Creek	Base	-109.51675	41.25199	Lower Green-Little Snake	14040106	Cheyenne
223	Bitter Creek	Base	-108.76998	41.66721	Lower Green-Little Snake	14040105	Cheyenne
224	Battle Creek	Base	-107.18829	41.07925	Lower Green-Little Snake	14050003	Cheyenne
225		Base	-108.83129	41.10893	Lower Green-Little Snake	14040109	Cheyenne
226	Trout Creek	Base	-109.25977	41.19156	Lower Green-Little Snake	14040106	Cheyenne
227	Salt Wells Creek	Base	-108.95398	41.58010	Lower Green-Little Snake	14040105	Cheyenne
228	Savery Creek	Base	-107.35994	41.16662	Lower Green-Little Snake	14050003	Cheyenne
229	Poison Creek	Base	-110.16111	41.03195	Lower Green-Little Snake	14040106	Cheyenne
230	Bear Creek	Base	-108.30744	42.05821	Lower Green-Little Snake	14040200	Cheyenne
231	Cow Creek	Base	-107.63402	41.31221	Lower Green-Little Snake	14050004	Cheyenne
232	Cherokee Creek	Base	-107.56582	41.24870	Lower Green-Little Snake	14050004	Cheyenne
233	Spring Creek	Base	-109.38502	41.02146	Lower Green-Little Snake	14040106	Cheyenne
234	Green River	Base	-110.01147	43.31724	Upper Green-New Fork	14040101	Lander
235	Middle Piney Creek	Base	-110.10069	42.52875	Upper Green-New Fork	14040101	Lander
236		Base	-110.09120	42.88555	Upper Green-New Fork	14040101	Lander
237	Green River	Base	-110.13538	42.94296	Upper Green-New Fork	14040101	Lander
238	Green River	Base	-110.14855	42.33054	Upper Green-New Fork	14040101	Lander
239	South Beaver Creek	Base	-110.37892	42.99772	Upper Green-New Fork	14040101	Lander
240		Base	-110.04597	42.87175	Upper Green-New Fork	14040101	Lander

241	North Cottonwood Creek	Base	-110.22276	42.81304	Upper Green-New Fork	14040101	Lander
242	South Piney Creek	Base	-110.48712	42.50938	Upper Green-New Fork	14040101	Lander
243		Base	-109.95668	42.74402	Upper Green-New Fork	14040101	Lander
244	Boulder Creek	Base	-109.72770	42.80421	Upper Green-New Fork	14040102	Lander
245	Middle Piney Creek	Base	-110.38081	42.57692	Upper Green-New Fork	14040101	Lander
246		Base	-110.25038	42.08788	Upper Green-New Fork	14040101	Lander
247		Base	-109.75359	42.70769	Upper Green-New Fork	14040102	Lander
248	Willow Creek	Base	-109.94146	42.99804	Upper Green-New Fork	14040102	Lander
249	Sweeney Creek	Base	-109.71501	42.98391	Upper Green-New Fork	14040102	Lander
250	East Fork River	Base	-109.59537	42.71860	Upper Green-New Fork	14040102	Lander
651	Hams Fork Creek	Oversample	-110.73063	42.32575	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
652	Little Muddy Creek	Oversample	-110.65985	41.57697	Big Sandy-Blacks Fork-Muddy	14040108	To be determined
653	Blacks Fork	Oversample	-110.16118	41.48611	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
654	Big Sandy River	Oversample	-109.37582	42.55620	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
655	Elk Creek	Oversample	-110.73680	42.23683	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
656	Clear Creek	Oversample	-110.64595	41.46138	Big Sandy-Blacks Fork-Muddy	14040108	To be determined
657	Blacks Fork	Oversample	-110.20791	41.53963	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
658	Hay Creek	Oversample	-109.09209	42.34952	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
659	Hams Fork	Oversample	-110.16630	41.76092	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
660	Gilbert Creek	Oversample	-110.41892	41.01732	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
661	Green River	Oversample	-109.71536	41.71262	Big Sandy-Blacks Fork-Muddy	14040103	To be determined
662	Jack Morrow Creek	Oversample	-109.20270	42.16393	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
663	Hams Fork	Oversample	-110.67835	42.06170	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
664	Little Creek	Oversample	-110.58637	41.21957	Big Sandy-Blacks Fork-Muddy	14040108	To be determined
665	Squaw Creek	Oversample	-109.23888	42.57613	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
666		Oversample	-109.08221	42.24117	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
667	Clear Creek	Oversample	-110.75689	41.42442	Big Sandy-Blacks Fork-Muddy	14040108	To be determined
668	Little Sandy Creek	Oversample	-109.23668	42.37538	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
669	Carter Creek	Oversample	-110.84533	41.60941	Big Sandy-Blacks Fork-Muddy	14040108	To be determined
670	Jack Morrow Creek	Oversample	-109.12566	42.12335	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
671	Horse Creek	Oversample	-110.52435	41.12779	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
672	Little Sandy Creek	Oversample	-109.30884	42.24572	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
673	Blacks Fork	Oversample	-110.47577	41.18933	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
674	Big Sandy River	Oversample	-109.43862	42.14210	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
675	Hams Fork	Oversample	-110.72063	42.11719	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
676	Hams Fork	Oversample	-110.08167	41.68326	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
677	Hams Fork	Oversample	-110.28032	41.77328	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
678	Sage Creek	Oversample	-110.28141	41.09735	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
679		Oversample	-110.60558	41.87715	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
680	Blacks Fork	Oversample	-109.64333	41.41123	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
681	Wilkinson Creek	Oversample	-110.72453	42.06637	Big Sandy-Blacks Fork-Muddy	14040107	To be determined
682	Big Sandy River	Oversample	-109.28162	42.61807	Big Sandy-Blacks Fork-Muddy	14040104	To be determined
683	Blacks Fork	Oversample	-110.29655	41.36119	Big Sandy-Blacks Fork-Muddy	14040107	To be determined

684	Green River	Oversample	-109.87200	41.92206	Big Sandy-Blacks Fork-Muddy	14040103	To be determined
685	Salt Wells Creek	Oversample	-108.98163	41.51404	Lower Green-Little Snake	14040105	Cheyenne
686	Bitter Creek	Oversample	-108.75705	41.63377	Lower Green-Little Snake	14040105	Cheyenne
687	Cow Creek	Oversample	-107.65870	41.29604	Lower Green-Little Snake	14050004	Cheyenne
688	Sage Creek	Oversample	-109.25069	41.26874	Lower Green-Little Snake	14040106	Cheyenne
689	Salt Wells Creek	Oversample	-108.94568	41.45786	Lower Green-Little Snake	14040105	Cheyenne
690	North Fork Little Snake River	Oversample	-106.92892	41.06948	Lower Green-Little Snake	14050003	Cheyenne
691	Fish Creek	Oversample	-107.22756	41.37097	Lower Green-Little Snake	14050003	Cheyenne
692	Henrys Fork	Oversample	-109.66730	41.00443	Lower Green-Little Snake	14040106	Cheyenne
693	Muddy Creek	Oversample	-107.66323	41.46821	Lower Green-Little Snake	14050004	Cheyenne
694	Little Snake River	Oversample	-107.35524	41.00365	Lower Green-Little Snake	14050003	Cheyenne
695	East Fork Savery Creek	Oversample	-107.15005	41.26782	Lower Green-Little Snake	14050003	Cheyenne
696	Poison Creek	Oversample	-110.19359	41.01224	Lower Green-Little Snake	14040106	Cheyenne
697	Bear Creek	Oversample	-108.49715	42.13423	Lower Green-Little Snake	14040200	Cheyenne
698	Muddy Creek	Oversample	-107.75814	41.30840	Lower Green-Little Snake	14050004	Cheyenne
699		Oversample	-108.83980	41.10964	Lower Green-Little Snake	14040109	Cheyenne
700	Henrys Fork	Oversample	-109.99544	41.04210	Lower Green-Little Snake	14040106	Cheyenne
701	Bitter Creek	Oversample	-109.17453	41.59446	Lower Green-Little Snake	14040105	Cheyenne
702	Bitter Creek	Oversample	-108.52324	41.49476	Lower Green-Little Snake	14040105	Cheyenne
703	Little Snake River	Oversample	-107.67782	41.03430	Lower Green-Little Snake	14050003	Cheyenne
704	Gooseberry Creek	Oversample	-109.23435	41.16679	Lower Green-Little Snake	14040106	Cheyenne
705		Oversample	-109.42920	41.48707	Lower Green-Little Snake	14040106	Cheyenne
706	Coyote Creek	Oversample	-108.82667	41.09183	Lower Green-Little Snake	14040109	Cheyenne
707	Savery Creek	Oversample	-107.28995	41.27539	Lower Green-Little Snake	14050003	Cheyenne
708	Upper Marsh Creek	Oversample	-109.51501	41.15509	Lower Green-Little Snake	14040106	Cheyenne
709	Muddy Creek	Oversample	-107.48492	41.46841	Lower Green-Little Snake	14050004	Cheyenne
710	Battle Creek	Oversample	-107.21706	41.06947	Lower Green-Little Snake	14050003	Cheyenne
711	Muddy Creek	Oversample	-107.45381	41.44434	Lower Green-Little Snake	14050004	Cheyenne
712	Poison Creek	Oversample	-110.13869	41.06009	Lower Green-Little Snake	14040106	Cheyenne
713	Bitter Creek	Oversample	-108.77529	41.67535	Lower Green-Little Snake	14040105	Cheyenne
714	Muddy Creek	Oversample	-107.66438	41.15328	Lower Green-Little Snake	14050004	Cheyenne
715	Gap Creek	Oversample	-109.03447	41.22755	Lower Green-Little Snake	14040105	Cheyenne
716	Henrys Fork	Oversample	-109.90138	41.05762	Lower Green-Little Snake	14040106	Cheyenne
717	Roney Creek	Oversample	-110.52001	42.06382	Upper Green-New Fork	14040101	Lander
718	Boulder Creek	Oversample	-109.70713	42.83643	Upper Green-New Fork	14040102	Lander
719	North Horse Creek	Oversample	-110.32054	42.92009	Upper Green-New Fork	14040101	Lander
720	Fontenelle Creek	Oversample	-110.17825	42.09072	Upper Green-New Fork	14040101	Lander
721	Rock Creek	Oversample	-110.10929	43.25500	Upper Green-New Fork	14040101	Lander
722	Willow Creek	Oversample	-109.92700	43.01211	Upper Green-New Fork	14040102	Lander
723		Oversample	-110.20589	42.56357	Upper Green-New Fork	14040101	Lander
724	New Fork River	Oversample	-109.85910	42.59662	Upper Green-New Fork	14040102	Lander
725	Marsh Creek	Oversample	-110.02353	43.06853	Upper Green-New Fork	14040102	Lander

726		Oversample	-110.13313	42.88842	Upper Green-New Fork	14040101	Lander
727	South Piney Creek	Oversample	-110.39291	42.52339	Upper Green-New Fork	14040101	Lander
728	Green River	Oversample	-110.03032	42.52224	Upper Green-New Fork	14040101	Lander
729	Green River	Oversample	-109.95547	42.67120	Upper Green-New Fork	14040101	Lander
730	Beaver Creek	Oversample	-110.13185	42.99367	Upper Green-New Fork	14040101	Lander
731	Green River	Oversample	-110.14104	42.34037	Upper Green-New Fork	14040101	Lander
732	Cottonwood Creek	Oversample	-109.47502	42.72413	Upper Green-New Fork	14040102	Lander
733	New Fork River	Oversample	-109.75671	42.76383	Upper Green-New Fork	14040102	Lander
734		Oversample	-110.23764	42.20699	Upper Green-New Fork	14040101	Lander
735		Oversample	-110.08980	42.88301	Upper Green-New Fork	14040101	Lander
736	Green River	Oversample	-109.94779	42.58555	Upper Green-New Fork	14040101	Lander
737		Oversample	-110.02377	42.87639	Upper Green-New Fork	14040101	Lander
738	East Fork River	Oversample	-109.58868	42.70855	Upper Green-New Fork	14040102	Lander
739	South Cottonwood Creek	Oversample	-110.30360	42.78396	Upper Green-New Fork	14040101	Lander
740	Cottonwood Creek	Oversample	-109.51632	42.71139	Upper Green-New Fork	14040102	Lander
741	Gypsum Creek	Oversample	-110.00014	43.20955	Upper Green-New Fork	14040101	Lander
742	Horse Creek	Oversample	-110.20214	42.93084	Upper Green-New Fork	14040101	Lander
743	Green River	Oversample	-110.01075	43.18535	Upper Green-New Fork	14040101	Lander
744	West Meadow Canyon Creek	Oversample	-110.12292	42.54671	Upper Green-New Fork	14040101	Lander
745		Oversample	-109.97542	42.81253	Upper Green-New Fork	14040101	Lander
746	La Barge Creek	Oversample	-110.41405	42.27524	Upper Green-New Fork	14040101	Lander
747		Oversample	-110.02874	42.69361	Upper Green-New Fork	14040101	Lander
748	Dutch George Creek	Oversample	-110.45970	42.11573	Upper Green-New Fork	14040101	Lander
749	South Cottonwood Creek	Oversample	-110.56858	42.75627	Upper Green-New Fork	14040101	Lander
750	Crow Creek	Oversample	-109.96963	43.38178	Upper Green-New Fork	14040101	Lander

**Table 2. Wyoming Basin lake and reservoir nutrient criteria monitoring - revisits from 2014**

Size Class	River 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	Green	Fontenelle Reservoir	42.079256	-110.143156	Sheridan
1	Shoshone	East Newton Lake	44.544695	-109.117791	Sheridan
1	Nowood	Renner Reservoir	44.174139	-107.500718	Sheridan
2	Shoshone	Beck Lake	44.511948	-109.048014	Sheridan
3	Bighorn	Bighorn Reservoir	44.867819	-108.189713	Sheridan
3	Shoshone	Buffalo Bill Reservoir	44.489769	-109.205573	Sheridan
3	Greybull	Upper Sunshine Reservoir	44.051165	-109.062885	Sheridan

**Table 3. Wyoming Basin lake and reservoir nutrient criteria monitoring - new random survey sites.**

Size Class	Level IV Ecoregion	Reservoir/Lake	Type	Latitude	Longitude	Crew
1	Bighorn Basin	Quick Lake	Primary	44.401621	-108.990697	Sheridan
2	Bighorn Basin	Wiley Lake	Primary	44.400609	-108.935807	Sheridan
2	Bighorn Basin	Ralston Reservoir	Primary	44.712872	-108.894182	Sheridan
2	Bighorn Basin	Lake Katrine	Primary	44.454747	-108.898030	Sheridan
1	Bighorn Basin	Luce Reservoir	Primary	44.779544	-109.257271	Sheridan
1	Bighorn Basin	City Reservoir	Oversample	44.507736	-109.049738	Sheridan
1	Bighorn Basin	Unnamed Lake	Oversample	44.815932	-109.219931	Sheridan
2	Bighorn Basin	Alkali Lake	Oversample	44.510120	-109.030658	Sheridan
2	Bighorn Basin	Anchor Reservoir	Oversample	43.664391	-108.837496	Sheridan
1	Bighorn Basin	Hogan Reservoir	Oversample	44.786438	-109.259044	Sheridan
1	Bighorn Basin	Goff Lake	Oversample	44.629484	-109.224642	Sheridan
1	Bighorn Basin	Stonebridge Reservoir	Oversample	44.443497	-109.417607	Sheridan
1	Bighorn Salt Desert Shrub Basin	Unnamed Lake	Primary	44.339069	-108.261626	Sheridan
1	Bighorn Salt Desert Shrub Basin	Wardell Reservoir	Primary	44.351862	-108.310823	Sheridan
1	Bighorn Salt Desert Shrub Basin	Unnamed Lake	Primary	44.483127	-108.321675	Sheridan
1	Bighorn Salt Desert Shrub Basin	Deaver Reservoir	Primary	44.901233	-108.635440	Sheridan
1	Bighorn Salt Desert Shrub Basin	Unnamed Lake	Oversample	44.797724	-108.964815	Sheridan
2	Bighorn Salt Desert Shrub Basin	Unnamed Lake	Oversample	44.806209	-108.544200	Sheridan
1	Bighorn Salt Desert Shrub Basin	Unnamed Lake	Oversample	44.881089	-108.259613	Sheridan
1	Bighorn Salt Desert Shrub Basin	Unnamed Lake	Oversample	44.892207	-108.226264	Sheridan
1	Bighorn Salt Desert Shrub Basin	Gravel Pit Lake	Oversample	44.077632	-107.934671	Sheridan
1	Foothill Shrublands and Low Mountains	Coe Enlargement Reservoir	Primary	44.282608	-109.110429	Sheridan
1	Foothill Shrublands and Low Mountains	Lake Creek Reservoir	Oversample	43.760563	-108.905575	Sheridan

**Table 4. Large reservoir trend monitoring.**

Basin	Reservoir Name	HUC	Crew
Green	Fontenelle Reservoir (Year 2 of 3)	14040101	Sheridan
Bighorn	Buffalo Bill Reservoir (Year 3 of 3)	10080012, 10080013	Sheridan

**Table 5. Reference site validation and sampling.**

Basin	Stream	HUC	Crew
Bear	North Fork Smiths Fork (MRWi39)	16010102	Lander
Bear	Smiths Fork (MRWi32, MRW55, MRW5)	16010102	Lander

**Table 6. Monitoring of currently impaired streams.**

Basin	Stream	HUC-8	Crew
Green	Hams Fork River	14040107	Lander

**Table 7. WDEQ-USGS monitoring network for 2015.**

USGS	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 (major anions and cations, selected trace elements, WWR As), 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
	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
09209400	Green River near LaBarge	Field, CBM (major anions and cations, selected trace elements, WWR As), Nutrients	4/yr
13025500	Crow Creek nr 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: field parameters, major anions and cations, select filtered trace metals, arsenic

**Table 8. WDEQ-USGS CBM-based monitoring network for 2015.**

Station	Name	Code (1,2)	Frequency
06299980	Tongue R at Monarch	CBM, Gage	12/yr
06304500	Little Goose Cr at Sheridan	CBM, Nutrients, Bacteria	4/yr
06306020	Tongue R bel Youngs Cr nr Acme	CBM, FIL Se, FIL Hg	12/yr
06306250	Prairie Dog Cr nr Acme	CBM, Gage	12/yr
06313400	Salt Cr nr Sussex	CBM, Se	12/yr
06313500	Powder R at Sussex	CBM, Se, Gage, EC Monitor	12/yr
06313605	Powder R bel Burger Draw nr Buffalo	CBM	12/yr
06316400	Crazy Woman Cr at Upper Station nr Arvada	CBM	4/yr
06317000	Powder R at Arvada	CBM, Nutrients	12/yr
06320210	Clear Cr ab Kumor Draw nr Buffalo	CBM	12/yr
06324000	Clear Cr nr Arvada	CBM, Gage, EC Monitor	12/yr
06324970	Little Powder R ab Dry Cr nr Weston	CBM, Nutrients	12/yr
06386500	Cheyenne R nr Spencer	CBM	12/yr
06425900	Caballo Cr at mouth nr Piney	CBM, Nutrients	12/yr
06426400	Donkey Cr nr Moorcroft	CBM	12/yr
06426500	Belle Fourche R bel Moorcroft	CBM, Nutrients	12/yr
06428050	Belle Fourche R bel Hulett	CBM, Nutrients	4/yr
06635000	Medicine Bow R ab Seminoe Res nr Hanna	CBM, Nutrients	12/yr
06636000	N Platte R ab Pathfinder Res	CBM, Nutrients	12/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: field parameters, major anions and cations, select filtered trace metals, arsenic

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