

**Colorado Division of Water Resources**  
**Add Sites from the Lower South Platte Alluvial Aquifer**  
**to the National Ground-Water Monitoring Network**

U.S. Geological Survey Cooperative Agreement  
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**COLORADO**  
**Division of Water Resources**  
Department of Natural Resources

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## **ACKNOWLEDGMENTS**

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## I. INTRODUCTION

The National Ground-Water Monitoring Network (NGWMN) provides public access to long-term, high-quality water-level data, with the goal of achieving sufficient temporal and spatial coverage in order to create a regional groundwater baseline. The Colorado Division of Water Resources (CODWR) joined the NGWMN as a new water-level data provider under Cooperative Agreement G17AC000179 beginning in July, 2017. Upon completion of this first project, CODWR had added 160 wells providing water-level data to the NGWMN from the High Plains aquifer (HPA) and Colorado Plateau aquifers (CPA). Later during July 1, 2019 to June 30, 2021, under Cooperative Agreement G19AC000192, CODWR added 618 wells from the HPA to the NGWMN to support the USGS Nebraska Water Science Center's High Plains Water-Level Monitoring study. A CODWR lithology database and web service was also developed for this project and lithology data was provided for all wells for which there were records. In June of 2022, CODWR was awarded funding under Cooperative Agreement G22AC00136 to add more than twenty new water-level sites from the Lower South Platte Alluvial aquifer (LSP) and to maintain persistent data services for new and existing sites. This project was completed within a one-year period from July 15, 2022 to June 30, 2023, with 128 new water-level sites added to the NGWMN from the LSP aquifer.

## II. OVERVIEW OF ACTIVE GROUNDWATER MONITORING NETWORKS

CODWR actively monitors water levels throughout Colorado and currently maintains an active network of 890 wells serving water-level data to the NGWMN (Figure 4). These wells are completed throughout 3 distinct aquifer systems with individualized monitoring networks: the Colorado Plateau (CPA), the High Plains (HPA), and the newly added Lower South Platte Alluvial aquifer (LSP). Although CODWR monitors groundwater levels from many aquifers across Colorado beyond these three aquifer systems, this project focused on maintaining existing data services in the Colorado Plateaus and the High Plains, as well as providing new water-level data from Lower South Platte Alluvial aquifer.

### COLORADO PLATEAUS MONITORING NETWORK

In western Colorado, CODWR provides water-level data to the NGWMN for 36 sites within the Colorado Plateaus principal aquifer system (CPA). The wells are completed in the Dakota aquifer (1), Fruitland aquifer (1), Lower Piceance Basin aquifer (10), Upper Piceance Basin aquifer (13), Mesa Verde aquifer (5), Morrison aquifer (1), San Jose aquifer (1) and Wasatch aquifer (4). Wells in the CPA are measured once per year, due to their high elevation, normally in the summer when they are most accessible. These wells are all surveillance wells with 7 wells in the Background subnetwork, 11 wells in the Suspected Changes subnetwork, and 18 wells in the Known Changes subnetwork. 1 well was recently removed from this network due to well abandonment (Table 4, Site ID. 23).

## HIGH PLAINS MONITORING NETWORK

CODWR provides water-level data to the NGWMN for 726 sites within the High Plains Aquifer system (HPA) located in Colorado's eastern plains. All wells are in the Known Changes subnetwork due to the heavy irrigation in the region from almost exclusively HPA groundwater. These wells are all labeled as surveillance wells as they are measured once per year. The majority of these wells are measured by local groundwater management district managers and the data is then uploaded to the CODWR website. 13 wells were removed from this network during this data cycle primarily due to well abandonment and access issues (Table 4). Other network changes include the replacement of 2 wells in the HPA (Table 4).

## LOWER SOUTH PLATTE MONITORING NETWORK

The South Platte River and its alluvial aquifer flow across the Colorado border into Nebraska where it meets with the North Platte River to form the Platte River. The aquifer has important interstate water sharing implications as a result of the 1923 South Platte River Compact, which governs the water rights of this resource. In addition to its significance as an interstate aquifer, approximately 70% of Colorado's population resides in the South Platte River Basin. This Basin contributes up to 40% of the State's agricultural production and contains a complex network of diversion ditches, canals, and reservoirs which impact the aquifer health in this region. As a result, though not considered a principal aquifer system as defined in the USGS Ground Water Atlas of the United States, the Lower South Platte monitoring network provides critical water-level data in an important and economically significant interstate aquifer system.

CODWR actively monitors water-levels in 142 wells completed in the Lower South Platte Alluvial Aquifer (LSP), 128 of which are included in the NGWMN (Table 1, Figure 1). This aquifer has 79 Surveillance wells measured annually to biannually, and 49 Trend wells measured quarterly or more frequently (Table 5). 7 of these Trend wells are considered Backbone wells, due to their lengthy periods of record and the expected stability of future monitoring access. 16 of these wells are in the Background subnetwork due to minimal perceived human impact, 55 wells are in the Suspected Changes subnetwork, and 57 wells fall into the Known Changes subnetwork due to definitive anthropologic impact (Table 6, Figure 3).

### III. ADDITION OF THE LOWER SOUTH PLATTE MONITORING NETWORK

CODWR identified 142 wells actively monitored in the Lower South Platte Alluvial Aquifer (LSP) under Cooperative Agreement G22AC00136. After evaluating the existing data services with the NGWMN, CODWR worked to add these water-level sites to the Lower South Platte Monitoring Network in support of the NGWMN framework goals. Out of 142 wells identified in the LSP, 128 wells were chosen to include and display in the NGWMN after reviewing basic well data, damage, water-level data, and spatial density (Table 1, Table 2, Figure 1). CODWR reviewed well permits and well construction reports to confirm well location and minimum data requirements as well as to provide maximal information on well construction and borehole lithology. An analysis was conducted to individually characterize wells into a well type defined by monitoring frequency

(Table 5) as well as a subnetwork based on the anthropologic impact as determined by groundwater signatures, local land use, and well use (Table 6, Figure 3). A NGWMN registry entry was created for each well site and each entry was reviewed to ensure that the required registry data elements are correct, contemporary, and consistent across databases. The 128 sites were populated in the registry and water-level, construction, and lithology data were connected through CODWR's REST web services. Additional information regarding the REST web services can be found in the following links;

<https://dwr.state.co.us/rest/get/help?show=ngwmn> &  
<https://dwr.state.co.us/Rest/GET/Help/Api/GET-api-v2-ngwmn-lithology>.

#### **IV. DATA ENTRY FOR LITHOLOGY AND WELL CONSTRUCTION**

Well construction and lithology information were entered for all wells in the Lower South Platte Alluvial Aquifer with available data. Well construction information is being provided to the NGWMN for 98 LSP wells through the CODWR Well Construction database and web services. In order to make this data available, well construction information was manually entered into CODWR's Hydrobase database. Construction report information for each well was interpreted and codified into CODWR's REST web services in order to programmatically serve this data to the NGWMN.

Out of the 128 LSP wells in the NGWMN, lithology data are being served for 88 sites. In order to deliver this data, lithologic data contained in each well construction report were transcribed into tabular data. Using professional judgment, the original driller's description for each lithologic interval was classified into one of the standards listed in CODWR's Lithology Description table for data clarity and delivery.

In the LSP monitoring network, 30 wells are missing construction data and 39 wells are missing lithologic information due to illegible documentation or missing reports (Table 3, Figure 2). Of the 128 displayed wells, 56 wells were initially found to be missing construction information, and 55 wells were missing lithology data. Additional data collection was conducted to locate missing construction records on older USGS observation wells and USGS wells in the NAQWA program. CODWR was able to recover 26 construction reports, including 15 lithology logs, through collaboration with the Denver-based USGS data management unit (DMU) and thorough review of paper files. The remaining wells with missing lithology and/or well construction data could be subject to future cooperative agreements to fill data gaps from this network.

#### **V. WELL CLASSIFICATION**

Aquifer specific analysis was conducted in order to classify LSP wells into one of three subnetworks based on local anthropologic impact on groundwater levels (WL). Among the 128 displayed LSP sites, there are 16 Background, 55 Suspected/Anticipated Changes, and 57 Known Changes sites (Table 6, Figure 2).

1. Background - Isolation from land use and development; minimal effects from human activities (and the expectation that the situation will remain as such). By definition,

background wells cannot be pumped or impacted by proximal pumping. Must be a monitoring well, AND have less than 15' WL change, AND have less than 5' WL change within 1 year.

2. Suspected Changes - Aquifer may have suspected or anticipated anthropogenic effects; area may have withdrawals, but no regional water-level changes have occurred. Wells may be permitted for water use, OR have a WL change between 15'-30', OR have more than 1 instance of 5'-15' WL change within 1 year.
3. Known (Documented) Changes - Aquifers known to: a. be heavily pumped, b. have substantial recharge-altering land-use changes, and/or c. be used for groundwater management (managed aquifer recharge, aquifer storage and recovery). Wells may have active pumping in field notes, OR have a WL change 30' or greater, OR have more than 1 instance of 15' or greater WL change within 1 year, OR have 2 or more "Suspected" characteristics present (i.e. 16' WL change AND multiple instances of 5' WL changes within 1 year).

## VI. DESCRIPTION OF WEB SERVICES

The Water Information Team (WIT) manages DWR's groundwater information management system known as HydroBase. HydroBase contains, among other data, water-level measurements for more than 22,700 wells. The water-level tool is just one in a collection of tools collectively called Colorado's Decision Support Systems (CDSS), a water data management system developed by the Colorado Water Conservation Board (CWCB) and CODWR (<https://cdss.colorado.gov/>).

The HydroBase database consists of several Microsoft SQL Server databases, running on Microsoft Windows database servers. DWR websites and services are maintained on Microsoft web servers. The WIT maintains a variety of data-sharing applications through several websites. The CDSS REST services provide HydroBase data programmatically for consumption by outside entities, including the NGWMN. WIT and USGS developers coordinated to deliver water-level data and well construction data through these REST services. Users can request data by entering a properly constructed URL in a web browser or spreadsheet or by sending a properly constructed request object with a header.

In order to ensure the smooth delivery of large datasets to the NGWMN, the Data Portal was registered to allow for large data requests through an API Key/token. The data can be requested in Json, Xml, CSV, or GeoJson formats. DWR is routinely implementing updates and other required changes to the IT infrastructure and continuing to work to improve data delivery to the NGWMN via web services.

## VII. DESCRIPTION OF FIELD METHODS

[Groundwater level monitoring protocols](#)

## **VIII. DATA QUALITY/ASSURANCE**

Water-level data are manually collected 1-2 times per year by CODWR staff and subcontractors for each selected site within the LSP, HPA, and CPA networks. All water-level data are recorded on paper forms in the field and additional continuous monitoring data may be uploaded from the field or delivered in real time as well. Data are entered into CODWR's 'Water Levels' database within HydroBase after returning from the field. The 'Water Levels' database stores water-level data at a 0.01 foot resolution and currently displays one (1) value per day. Historic water-level data in the database have been reviewed for accuracy.

Handheld GPS equipment is used to accurately locate well sites as needed and location is recorded in decimal degrees. Land surface elevation is calculated from USGS digital elevation models with ten (10) meter grid cell size at a one (1) meter vertical resolution.

Site information and well construction information are entered into HydroBase for selected sites on an as-needed basis. A well must be permitted (or registered) with CODWR before the basic site information or well construction information can be stored. Lithologic data for the wells exist on scanned well construction forms within the DWR Laserfiche Electronic File Management System prior to its tabular storage in HydroBase. The CODWR HydroBase database is backed up twice daily and stored in redundant offsite data centers. Where available, paper USGS well construction reports and geophysical logs have been scanned into the Laserfiche system. The Laserfiche system is also backed up daily with offsite storage.

All data collected for this project are available through the NGWMN data portal without restriction, and contain no personal information, nor intellectual property. The data are provided securely over web services for appropriate use within the NGWMN.

## **IX. FUTURE WORK**

CODWR may apply for future funding to accomplish updates for current networks and/or additions to the NGWMN. One goal is to fill in data gaps for existing wells in the NGWMN. Such data gaps include 202 wells for which CODWR does not currently possess lithologic data and 166 wells for which construction data are missing across the 3 current monitoring networks. The LSP monitoring network alone contains 30 wells missing construction data and 39 wells missing lithologic data (Table 3). Future funding would allow CODWR staff to invest time and resources into data recovery by reviewing paper files, collaborating with external organizations, and/or producing new data through geophysical logging. Filling data gaps in the existing monitoring networks would allow for a clearer picture of these essential groundwater resources being monitored.

There are also several damaged or defunct wells in the CPA, HPA, and LSP monitoring networks which could use repair or replacement (Table 2, Table 4), given additional funding. Adding back these wells would allow for the continuation of significant historical water-level records as well as greater spatial data coverage within each monitoring network.

CODWR also hopes to identify and equip compatible wells in the High Plains Aquifer with continuous monitoring equipment. Introducing data loggers would convert these wells from surveillance sites to trend sites and provide greater clarity of the nuances in groundwater level changes and health of these systems. In addition, there are 4 prospective sites for the LSP monitoring network which require replacement data loggers in order to meet data standards and be displayed in the NGWMN (Table 2). Future cooperative agreements would aid in accomplishing these goals.

In terms of additions and expansion of NWGMN sites, CODWR has identified 50 wells suitable to be added into the High Plains monitoring networks in subsequent years. Additional resources would be needed to gather, enter, and analyze the appropriate data in order to add these new sites to the NGWMN. Other future work includes adding new monitoring networks to the NGWMN for the two remaining principal aquifers in Colorado: the Denver Basin aquifer and the Rio Grande aquifer. Both aquifer systems are classified as principal aquifers, as defined in the USGS Ground Water Atlas of the United States, and present economically and environmentally significant groundwater resources for the state and the people of Colorado.



**Table 1. New Wells added to NGWMN**

<b>Site No.</b>	<b>Site Name</b>	<b>Well Depth (ft)</b>	<b>Principal Aquifer</b>
7054	LSP-001	70	Alluvial Aquifers
1265	LSP-002	61	Alluvial Aquifers
1231	LSP-003	75	Alluvial Aquifers
1232	LSP-004	65	Alluvial Aquifers
1290	LSP-005	55	Alluvial Aquifers
1266	LSP-006	61	Alluvial Aquifers
1291	LSP-007	40	Alluvial Aquifers
1268	LSP-008	76	Alluvial Aquifers
1292	LSP-009	55	Alluvial Aquifers
1278	LSP-010	56	Alluvial Aquifers
1293	LSP-011	83	Alluvial Aquifers
47391	LSP-013	60	Alluvial Aquifers
7485	LSP-014	160	Alluvial Aquifers
154221	LSP-015	116	Alluvial Aquifers
13159	LSP-016	140	Alluvial Aquifers
34200	LSP-017	75	Alluvial Aquifers
1237	LSP-018	64	Alluvial Aquifers
1296	LSP-019	60	Alluvial Aquifers
1274	LSP-020	56	Alluvial Aquifers
47393	LSP-021	30	Alluvial Aquifers
47389	LSP-023	90	Alluvial Aquifers
1259	LSP-024	213	Alluvial Aquifers
13161	LSP-025	110	Alluvial Aquifers
13160	LSP-026	146	Alluvial Aquifers
13158	LSP-027	70	Alluvial Aquifers
47387	LSP-028	32	Alluvial Aquifers
1260	LSP-029	59	Alluvial Aquifers
47388	LSP-030	36	Alluvial Aquifers
1287	LSP-031	60	Alluvial Aquifers
1261	LSP-032	80	Alluvial Aquifers
1262	LSP-033	63	Alluvial Aquifers
11338	LSP-034	48	Alluvial Aquifers
1270	LSP-035	83	Alluvial Aquifers
47377	LSP-036	30	Alluvial Aquifers
47378	LSP-037	37	Alluvial Aquifers
11350	LSP-039	72	Alluvial Aquifers
13157	LSP-040	44	Alluvial Aquifers
1275	LSP-041	84	Alluvial Aquifers
11361	LSP-042	27	Alluvial Aquifers
11343	LSP-043	102	Alluvial Aquifers
13162	LSP-044	105	Alluvial Aquifers
47392	LSP-045	12	Alluvial Aquifers
11261	LSP-046	84	Alluvial Aquifers
47390	LSP-047	79	Alluvial Aquifers

**Table 1. New Wells added to NGWMN**

<b>Site No.</b>	<b>Site Name</b>	<b>Well Depth (ft)</b>	<b>Principal Aquifer</b>
1240	LSP-048	32	Alluvial Aquifers
1298	LSP-049	85	Alluvial Aquifers
47380	LSP-050	15	Alluvial Aquifers
47385	LSP-051	43	Alluvial Aquifers
11452	LSP-053	93	Alluvial Aquifers
47381	LSP-055	59	Alluvial Aquifers
47382	LSP-056	44	Alluvial Aquifers
11339	LSP-057	69	Alluvial Aquifers
11298	LSP-058	88	Alluvial Aquifers
1242	LSP-060	45	Alluvial Aquifers
1243	LSP-061	65	Alluvial Aquifers
1244	LSP-062	29	Alluvial Aquifers
13164	LSP-063	80	Alluvial Aquifers
1247	LSP-064	33	Alluvial Aquifers
13165	LSP-065	44	Alluvial Aquifers
1286	LSP-066	55	Alluvial Aquifers
1220	LSP-067	78	Alluvial Aquifers
1221	LSP-068	32	Alluvial Aquifers
47394	LSP-069	30	Alluvial Aquifers
13166	LSP-070	44	Alluvial Aquifers
1222	LSP-071	55	Alluvial Aquifers
1223	LSP-072	46	Alluvial Aquifers
1224	LSP-073	40	Alluvial Aquifers
150409	LSP-074	120	Alluvial Aquifers
1225	LSP-075	32	Alluvial Aquifers
1226	LSP-076	41	Alluvial Aquifers
13167	LSP-077	74	Alluvial Aquifers
11324	LSP-078	77	Alluvial Aquifers
47395	LSP-079	24	Alluvial Aquifers
47396	LSP-080	12	Alluvial Aquifers
1272	LSP-081	55	Alluvial Aquifers
1289	LSP-082	46	Alluvial Aquifers
47376	LSP-083	41	Alluvial Aquifers
13169	LSP-084	113	Alluvial Aquifers
1267	LSP-085	73	Alluvial Aquifers
1269	LSP-086	48	Alluvial Aquifers
1294	LSP-088	41	Alluvial Aquifers
13168	LSP-089	60	Alluvial Aquifers
1281	LSP-090	85	Alluvial Aquifers
1253	LSP-091	64	Alluvial Aquifers
1282	LSP-092	30	Alluvial Aquifers
49452	LSP-093	15	Alluvial Aquifers
1284	LSP-095	54	Alluvial Aquifers
1258	LSP-096	55	Alluvial Aquifers

**Table 1. New Wells added to NGWMN**

<b>Site No.</b>	<b>Site Name</b>	<b>Well Depth (ft)</b>	<b>Principal Aquifer</b>
7496	LSP-097	73	Alluvial Aquifers
150555	LSP-098	56	Alluvial Aquifers
7572	LSP-099	55	Alluvial Aquifers
1297	LSP-100	50	Alluvial Aquifers
1276	LSP-102	45	Alluvial Aquifers
150577	LSP-103	17	Alluvial Aquifers
1285	LSP-104	21	Alluvial Aquifers
7153	LSP-105	20	Alluvial Aquifers
34935	LSP-106	52	Alluvial Aquifers
1239	LSP-107	20	Alluvial Aquifers
1364	LSP-108	51	Alluvial Aquifers
7745	LSP-109	25	Alluvial Aquifers
8287	LSP-110	21	Alluvial Aquifers
8367	LSP-111	80	Alluvial Aquifers
6955	LSP-112	21	Alluvial Aquifers
7578	LSP-113	22	Alluvial Aquifers
11336	LSP-114	87	Alluvial Aquifers
8698	LSP-115	40	Alluvial Aquifers
11270	LSP-116	80	Alluvial Aquifers
150633	LSP-117	160	Alluvial Aquifers
7752	LSP-118	40	Alluvial Aquifers
11335	LSP-120	45	Alluvial Aquifers
34359	LSP-121	21	Alluvial Aquifers
152098	LSP-122	17	Alluvial Aquifers
11445	LSP-123	31	Alluvial Aquifers
11434	LSP-124	13	Alluvial Aquifers
11453	LSP-125	47	Alluvial Aquifers
11454	LSP-126	31	Alluvial Aquifers
11442	LSP-127	31	Alluvial Aquifers
11443	LSP-128	18	Alluvial Aquifers
11447	LSP-131	15	Alluvial Aquifers
11449	LSP-133	16	Alluvial Aquifers
11450	LSP-134	30	Alluvial Aquifers
34898	LSP-135	27	Alluvial Aquifers
11438	LSP-136	12	Alluvial Aquifers
11441	LSP-138	36	Alluvial Aquifers
11451	LSP-139	23	Alluvial Aquifers
150480	LSP-140	19	Alluvial Aquifers
152965	LSP-141	35	Alluvial Aquifers
154213	LSP-142	134	Alluvial Aquifers

**Table 2. Lower South Platte Wells Excluded from the NGWMN**

<b>Site ID</b>	<b>Well Name</b>	<b>Reason</b>
11279	LSP-012	Needs replacement. Well abandoned.
11435	LSP-022	Needs new data logger.
47379	LSP-038	Over well density guideline in area.
47386	LSP-052	Over well density guideline in area.
47383	LSP-054	Over well density guideline in area.
13163	LSP-059	Needs new data logger.
47374	LSP-087	Over well density guideline in area.
1257	LSP-094	Needs replacement (well deemed unsafe). Missing well depth.
1271	LSP-101	Needs replacement. Well abandoned.
153149	LSP-119	Needs new data logger.
11444	LSP-129	Needs replacement (no water access). Needs new data logger.
11446	LSP-130	Needs replacement. Well damaged.
11448	LSP-132	Needs replacement. Well damaged.
11439	LSP-137	Needs replacement. Well damaged.

**Table 3. NGWMN LSP Wells Missing Construction and/or Lithology Information**

Missing Construction		Missing Lithology	
Site ID	Well Name	Site ID	Well Name
1265	LSP-002	1265	LSP-002
11452	LSP-053	1266	LSP-006
1225	LSP-075	1268	LSP-008
11324	LSP-078	1260	LSP-029
1253	LSP-091	1287	LSP-031
150555	LSP-098	11338	LSP-034
7572	LSP-099	1270	LSP-035
150577	LSP-103	11350	LSP-039
1285	LSP-104	1275	LSP-041
7153	LSP-105	11343	LSP-043
34935	LSP-106	1240	LSP-048
1239	LSP-107	11452	LSP-053
1364	LSP-108	1242	LSP-060
7745	LSP-109	1243	LSP-061
8287	LSP-110	1221	LSP-068
6955	LSP-112	1222	LSP-071
7578	LSP-113	1223	LSP-072
34359	LSP-121	11324	LSP-078
11445	LSP-123	1272	LSP-081
11453	LSP-125	1289	LSP-082

Missing Construction		Missing Lithology	
Site ID	Well Name	Site ID	Well Name
11454	LSP-126	1267	LSP-085
11442	LSP-127	1269	LSP-086
11443	LSP-128	1253	LSP-091
11447	LSP-131	1282	LSP-092
11449	LSP-133	150555	LSP-098
11450	LSP-134	7572	LSP-099
34898	LSP-135	150577	LSP-103
11438	LSP-136	1364	LSP-108
11441	LSP-138	7752	LSP-118
150480	LSP-140	11335	LSP-120
<b>Total</b>	<b>30</b>	11445	LSP-123
		11442	LSP-127
		11443	LSP-128
		11447	LSP-131
		11449	LSP-133
		11450	LSP-134
		11441	LSP-138
		11451	LSP-139
		150480	LSP-140
		<b>Total</b>	<b>39</b>

**Table 4. Changes to Existing Networks: Colorado Plateau and High Plains Sites**

Site ID	Well Name	Reason
23	WS-07	Needs replacement. Well abandoned.
1131	SHP-06	Needs replacement. Unable to measure.
1163	SHP-43	Needs replacement. Access issues.
581	NHP-CY-012	Needs replacement.
613	NHP-CY-042	Needs replacement. Access issues.
619	NHP-CY-048	Needs replacement.
489	NHP-FR-070	Needs replacement.
512	NHP-FR-076	Needs replacement.
1087	NHP-EC-008	Well re-drilled in new location. New well being monitored. Replaced.
995	NHP-EC-023	Well re-drilled in new location. New well being monitored. Replaced.
151050	NHP-AR-100	Needs replacement. Access issues.
150558	NHP-WY-033	Needs replacement. Well abandoned.
150415	NHP-WY-045	Needs replacement. Well abandoned.
411	NHP-WY-055	Needs replacement. Well abandoned.
403	NHP-WY-073	Needs replacement. Well abandoned.
402	NHP-WY-074	Needs replacement. Well abandoned.

**Table 5. Lower South Platte Well Types: Monitoring Frequency**

<b>Well Type</b>	<b>Number of Sites</b>
Surveillance	79
Trend	49
*Backbone	7
<b>Total</b>	<b>128</b>

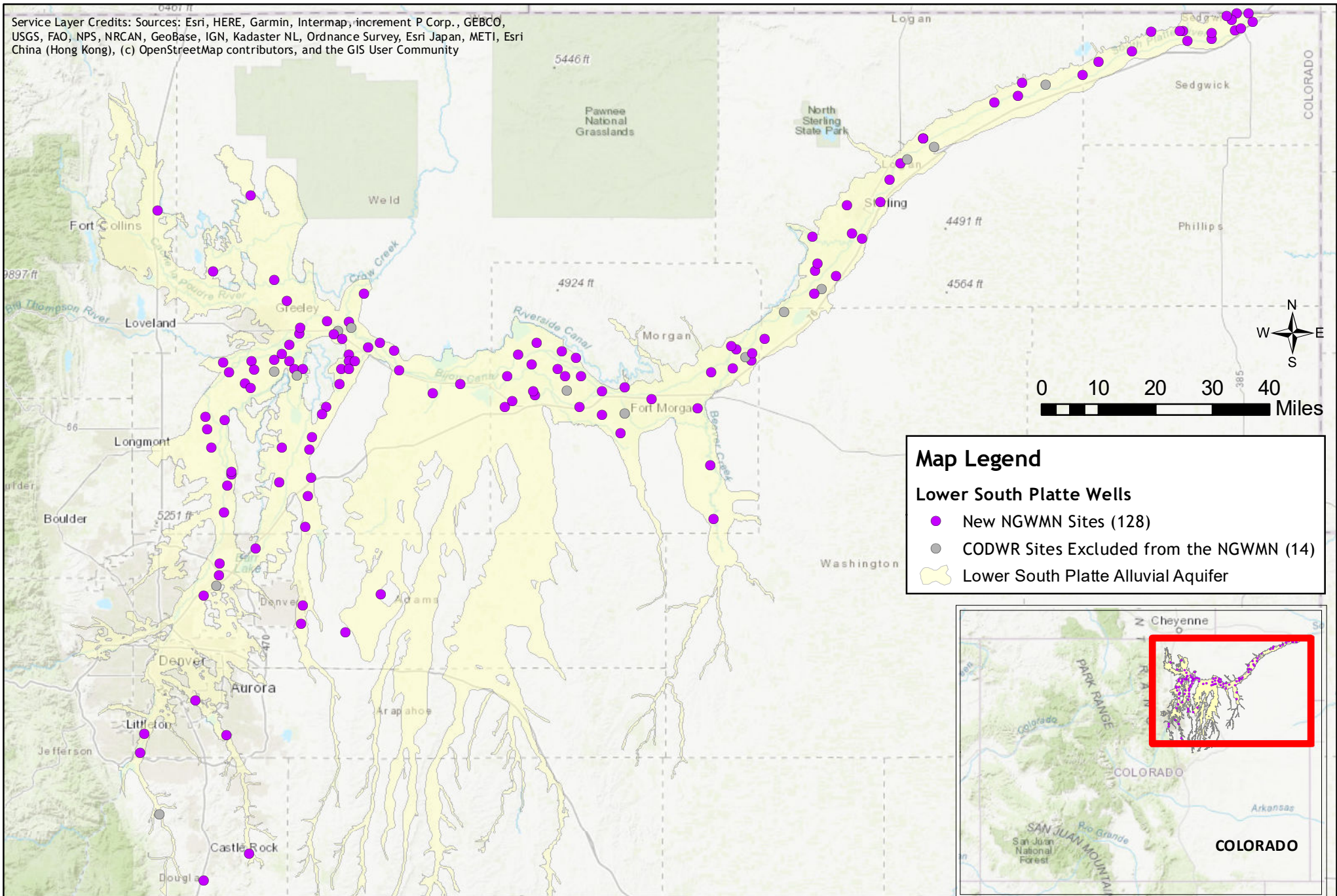
\*Backbone is a subset of the trend well category, defined by expected long term access and a strong period of record

**Table 6. Lower South Platte Well Characteristics: Anthropologic Impact**

<b>Well Characteristics</b>	<b>Number of Sites</b>
Background	16
Suspected/Anticipated Changes	55
Known Changes	57
<b>Total</b>	<b>128</b>



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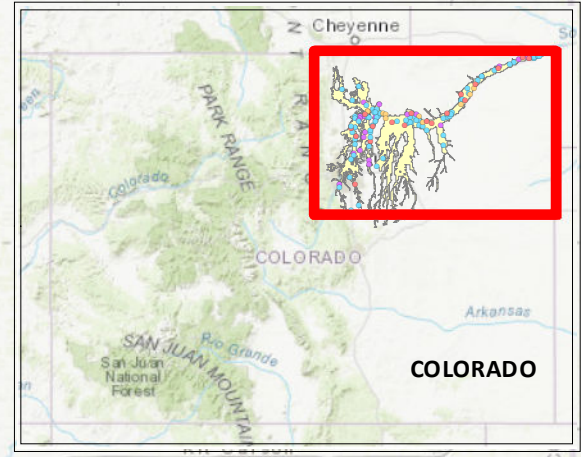
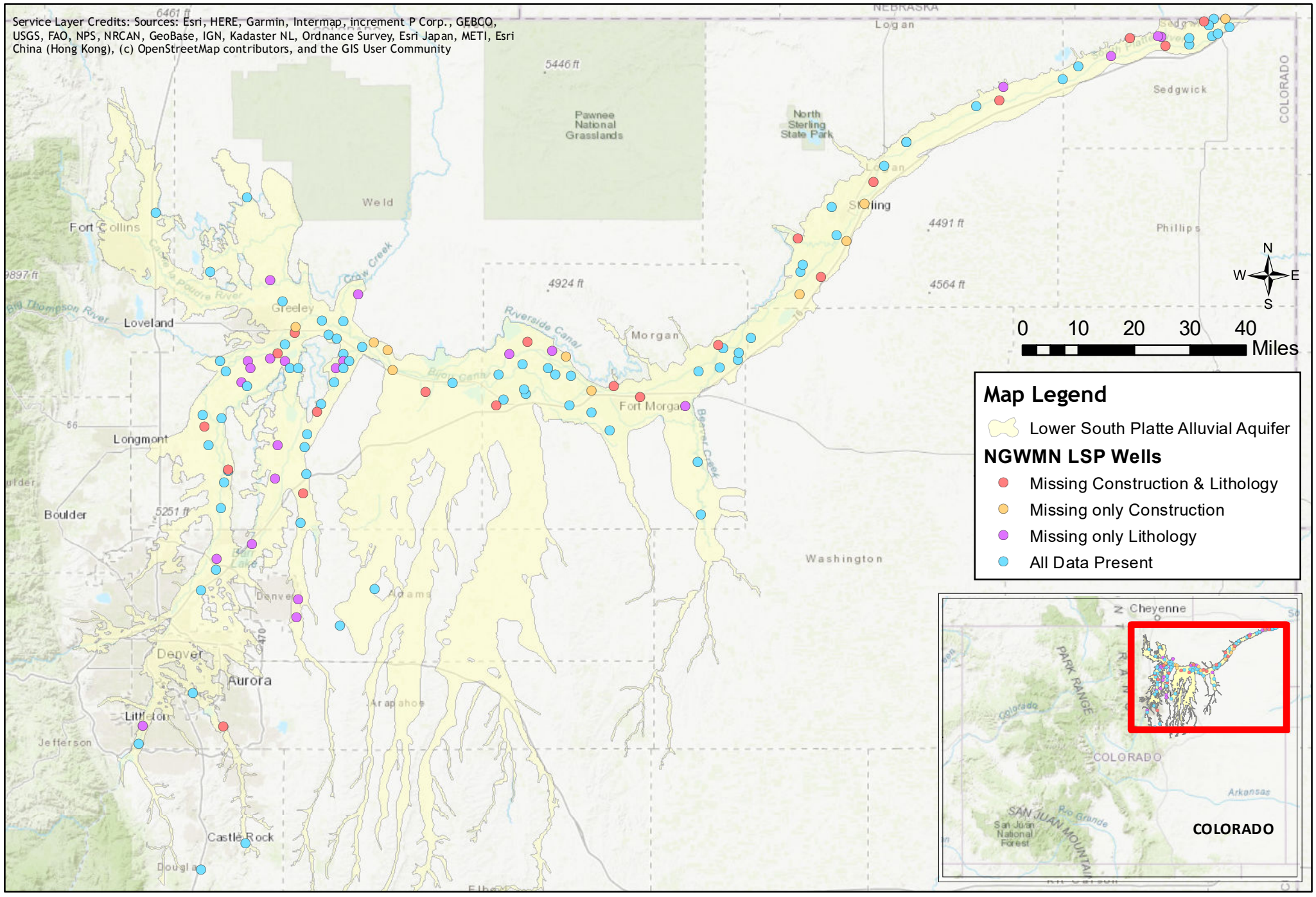
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**Lower South Platte  
 Monitoring Wells**

**Figure  
 1**



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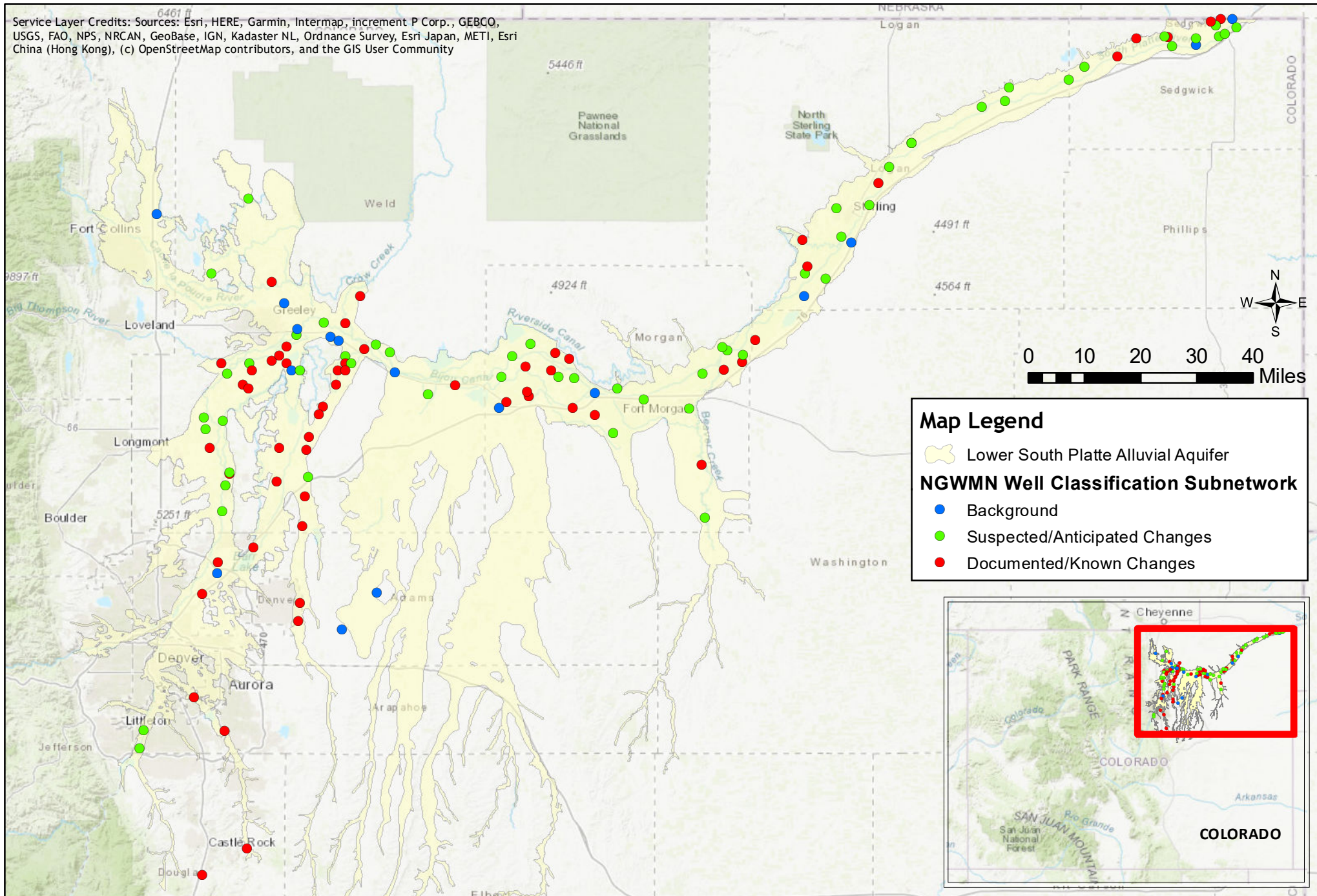
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**Lower South Platte NGWMN Sites**  
**Missing Lithology and/or Construction Information**

**Figure**  
**2**



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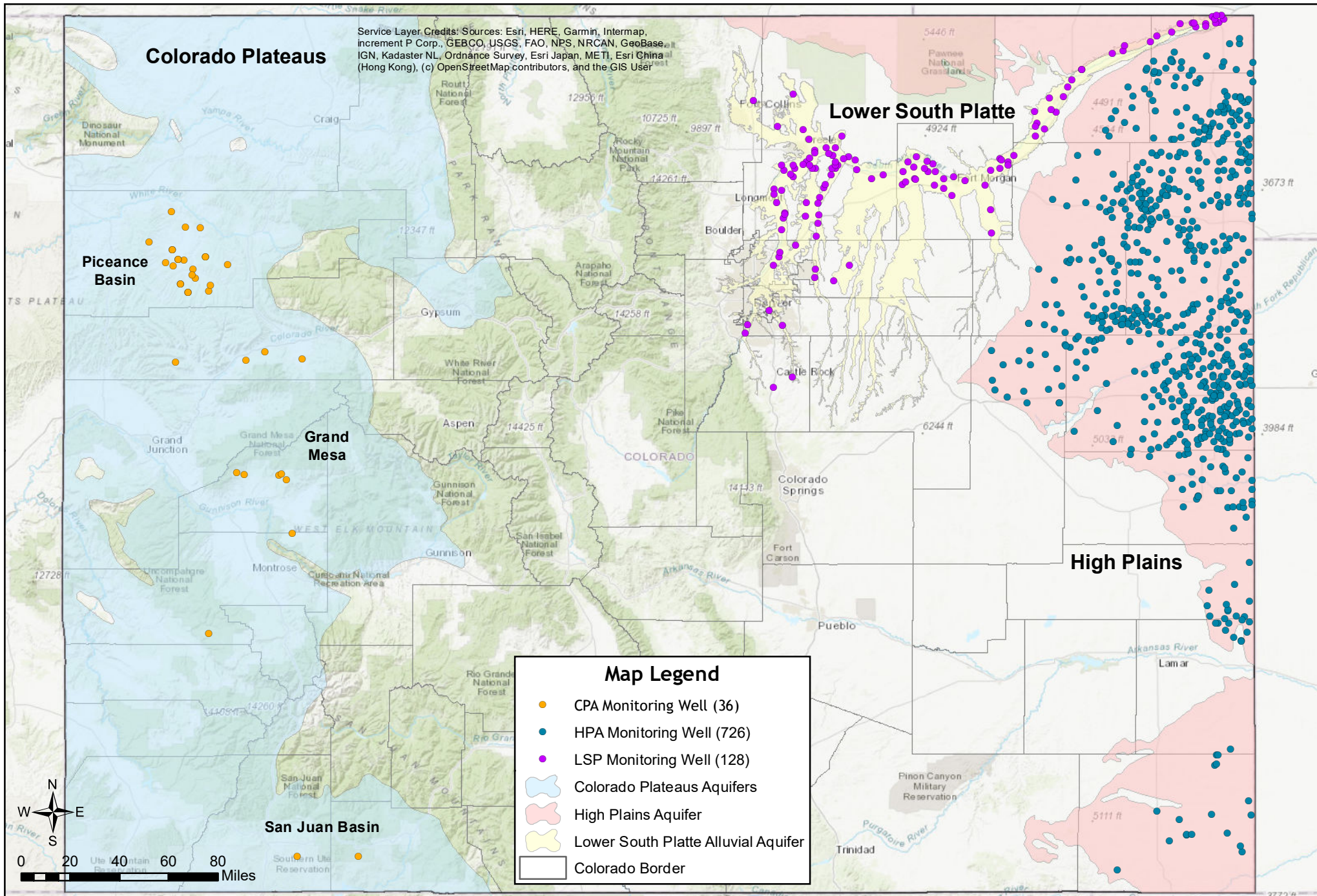


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Lower South Platte NGWMN Sites  
 NGWMN Well Classification Subnetworks

Figure  
 3





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**Current Water Level Wells Provided to the National Groundwater Monitoring Network by CODWR**

**Figure 4**