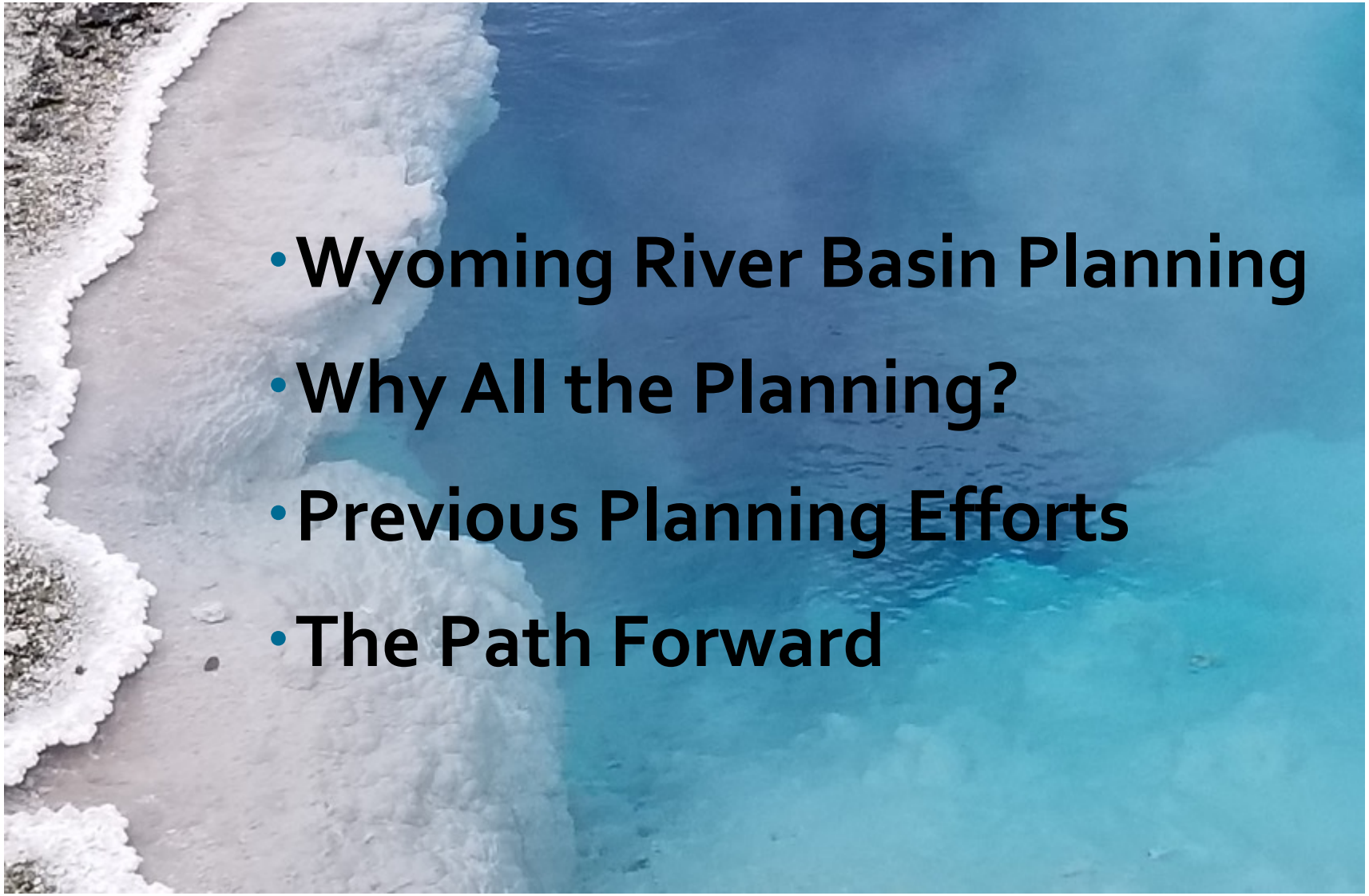
Wyoming River Basin Planning:

Data Presentation and Delivery

Presentation to ICWP

October 6, 2020

Today's Presentation



- Wyoming River Basin Planning
- Why All the Planning?
- Previous Planning Efforts
- The Path Forward

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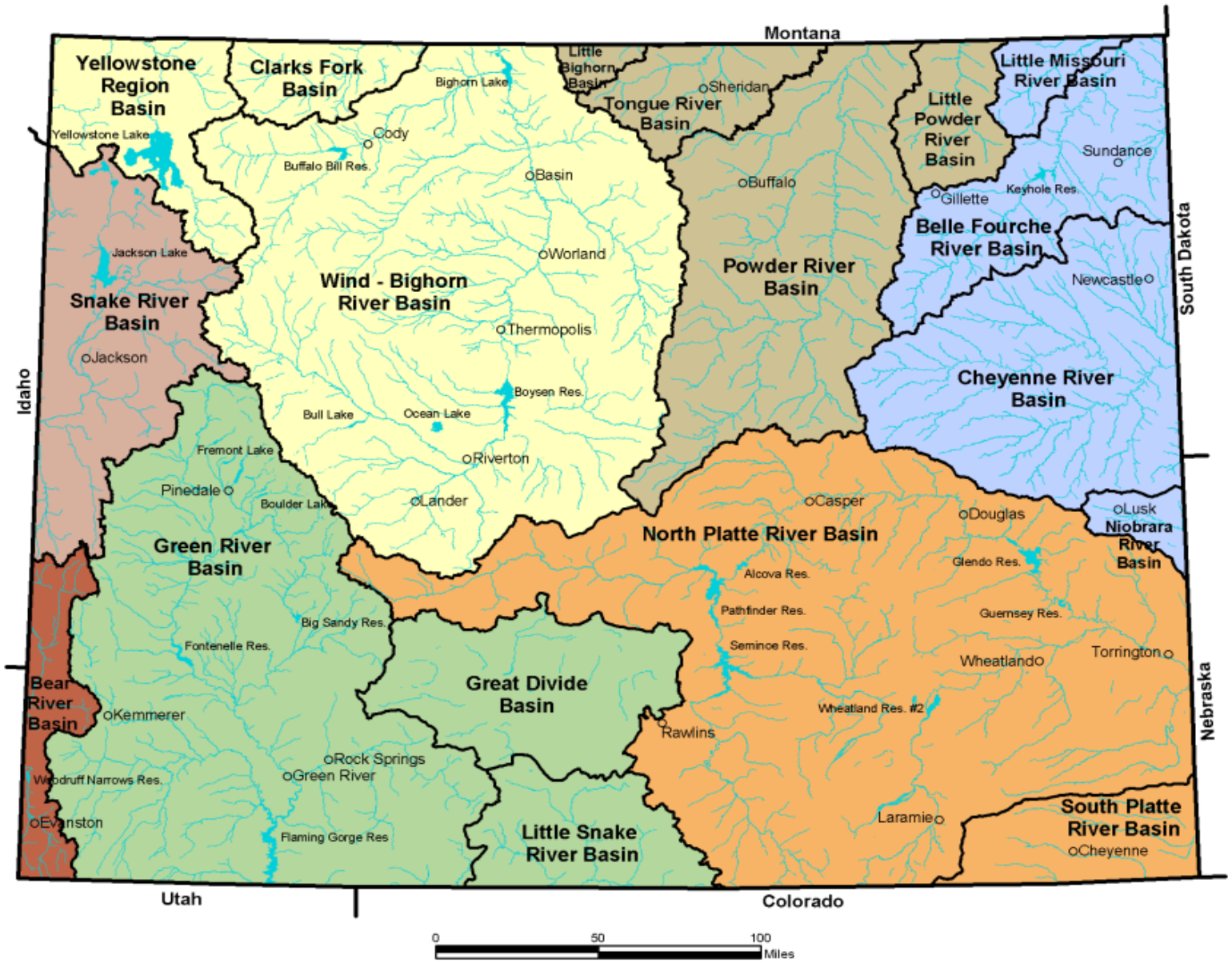
Wyoming River Basin Plan Areas



Legend

- Cities
- Major Streams
- Lakes/Reservoirs
- Major River Basins

River Basin Plans

- Bear
- Green/Little Snake
- Northeast
- Platte
- Powder/Tongue
- Snake/Salt
- Wind/Bighorn

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Wyoming River Basin Planning

Basin Planning Mission Statement: Develop essential information concerning the current status and future availability of water resources in Wyoming

- Inform state water policy and project development
- Provide a proactive stance in the legal arena
- Provide an opportunity for local input on water policy and projects

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Why All the Planning?

41-2-109. Water resources plans; contents.

(a) The water resources plans **shall**, to the extent deemed practical:

(i) **Identify, describe and inventory** the occurrence, amounts, availability and quality of water resources….

(ii) **Identify and describe** prospective needs and demands for water and opportunities for water development…

(iii) **Identify and specify** for each plan appropriate state, regional and local goals and objectives for management of water resources…

(iv) **Evaluate and compare** prospective and anticipated uses and projects…

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Previous Planning Efforts

- The State has gone through two cycles of planning.
- First round took place between 2001 – 2006
- Second round took place between 2010 – 2018
- Resulted in lots of valuable information

AND…….

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Previous Planning Efforts

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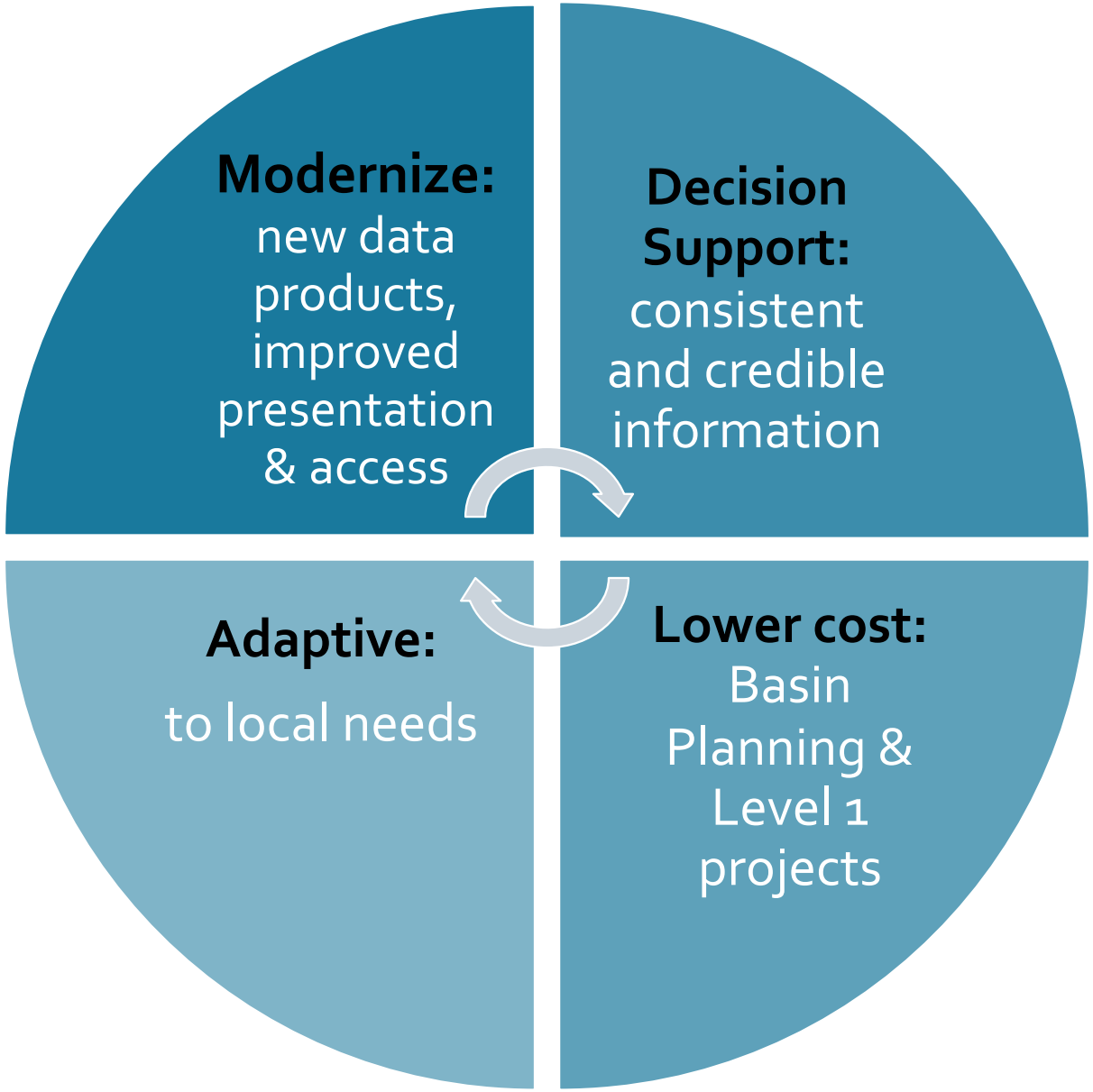
The Path Forward

How is the process changing?



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Water Data Products, Delivery and Presentation

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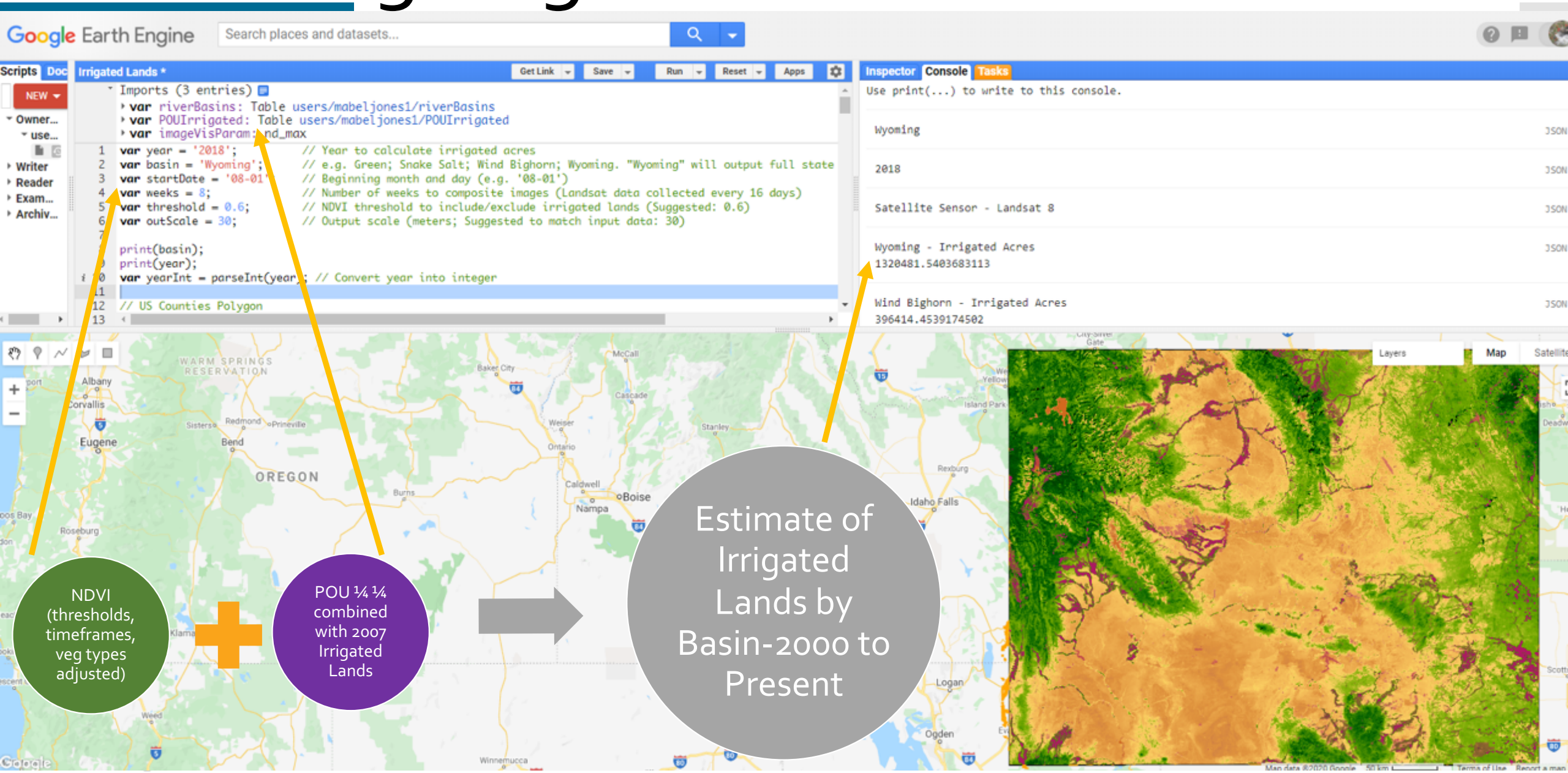
Estimating Irrigated Lands



44	Consumptive Use	Ground Water	41,911	45,505	31,944	51,612	45,685	51,790	38,820	46,757	51,220	59,681	58,769	58,458	34,026	44,238	66,591	60,820	60,816	67,123	60,878	#DI
45	Municipal Use	Total	-	-	30,643	30,883	31,231	31,377	31,687	32,059	32,589	33,225	33,597	33,909	34,570	25,448	25,735	25,860	25,897	25,772	15,361	
46		Surface Water	-	-	10,710	10,799	10,921	10,973	11,083	11,215	11,405	11,633	11,754	11,873	12,110	13,605	13,850	13,899	13,986	13,942	0	
47		Ground Water	-	-	19,933	20,084	20,310	20,404	20,605	20,843	21,184	21,592	21,843	22,036	22,459	11,842	11,885	11,961	11,911	11,830	15,361	
48	Domestic Use	Total	11,880	11,921	11,994	12,082	12,214	12,268	12,387	12,534	12,738	12,981	13,131	13,253	13,501	11,578	11,618	11,693	11,649	11,564	11,552	
49		Surface Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
50		Ground Water	11,880	11,921	11,994	12,082	12,214	12,268	12,387	12,534	12,738	12,981	13,131	13,253	13,501	11,578	11,618	11,693	11,649	11,564	11,552	

Indexed Water Use | Agricultural Water Use Calcs | NDVI Acreage | Muni & Domestic Water Use Calcs | US Census Population Estimates | Industrial Water Use Cals | Electrical Generation | Oil and Gas Production | Natrual Gas Processing | Mine Production

Ready

Full Water Use Index Results

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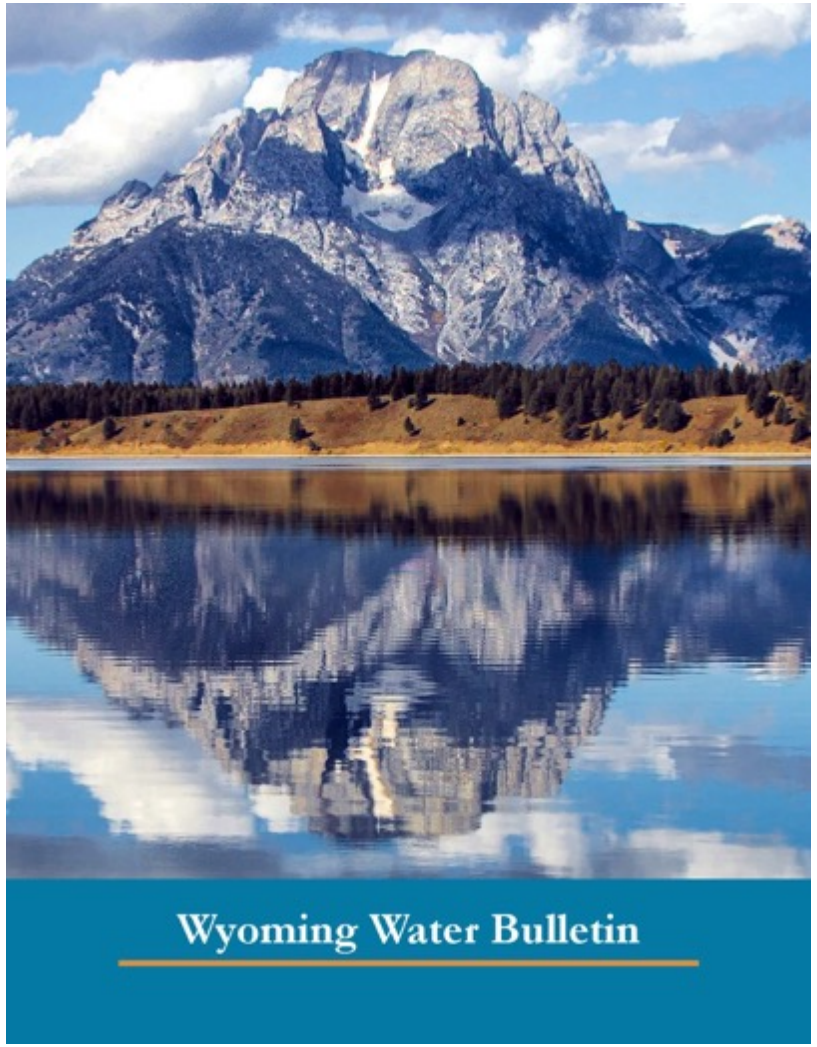
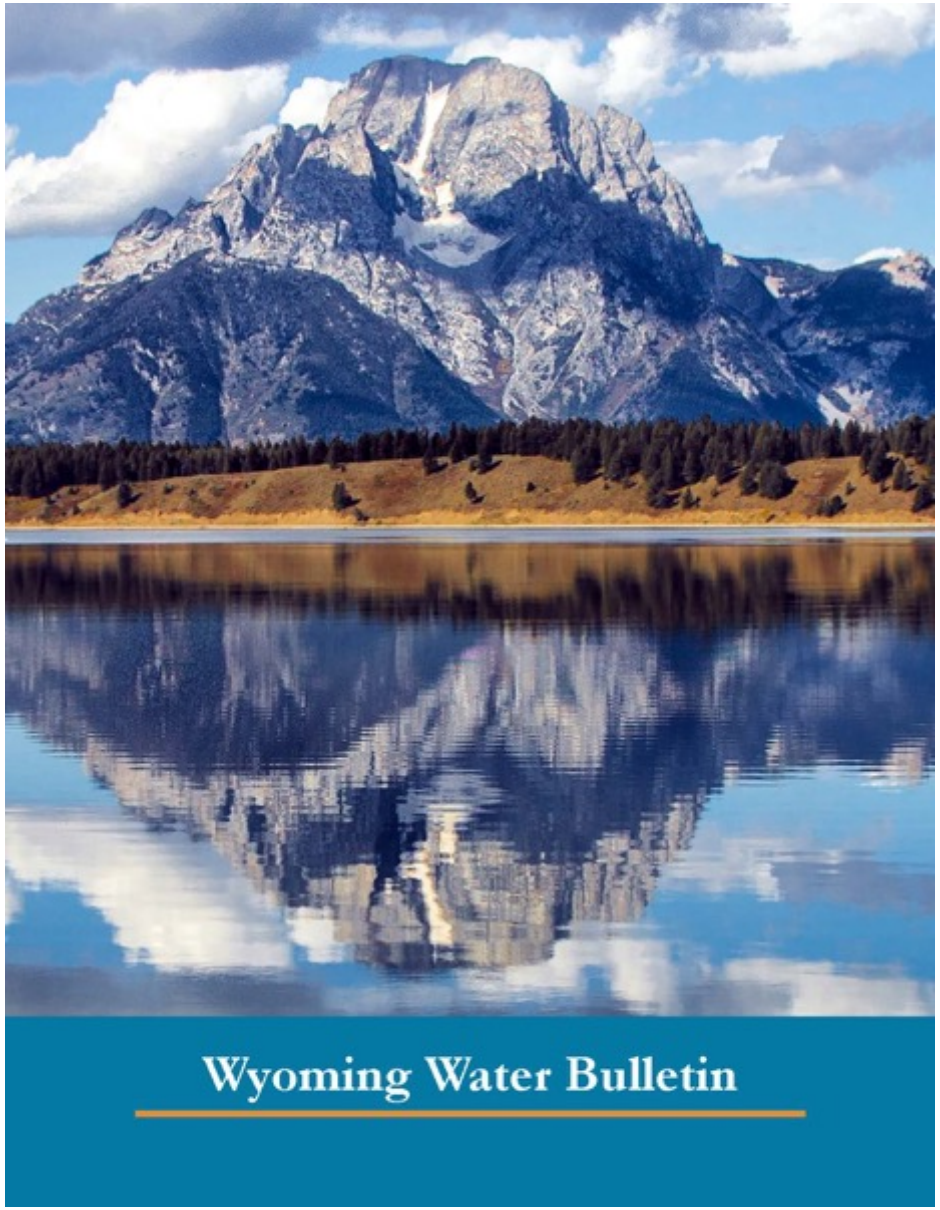
Water Use by Basin			2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Platte River Planning Basin	Agricultural Consumptive Use	Total	327,415	529,012	468,254	530,833	397,892	479,250	524,986	611,717	602,364	599,175	348,756	453,428	682,536	623,392
		Surface Water	295,471	477,400	422,570	479,043	359,072	432,492	473,766	552,036	543,595	540,717	314,730	409,190	615,945	562,572
		Ground Water	31,944	51,612	45,685	51,790	38,820	46,757	51,220	59,681	58,769	58,458	34,026	44,238	66,591	60,820
	Municipal Use	Total	30,643	30,883	31,231	31,377	31,687	32,059	32,589	33,225	33,597	33,909	34,570	25,448	25,735	25,860
		Surface Water	10,710	10,799	10,921	10,973	11,083	11,215	11,405	11,633	11,754	11,873	12,110	13,605	13,850	13,899
		Ground Water	19,933	20,084	20,310	20,404	20,605	20,843	21,184	21,592	21,843	22,036	22,459	11,842	11,885	11,961
	Domestic Use	Total	11,994	12,082	12,214	12,268	12,387	12,534	12,738	12,981	13,131	13,253	13,501	11,578	11,618	11,693
		Surface Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Ground Water	11,994	12,082	12,214	12,268	12,387	12,534	12,738	12,981	13,131	13,253	13,501	11,578	11,618	11,693
	Industrial Use	Total	84,086	80,535	84,444	87,002	89,983	95,122	95,831	89,373	107,799	114,436	117,803	129,808	147,948	160,753
		Surface Water	20,598	20,943	20,748	20,979	20,902	21,197	21,426	20,463	22,540	23,575	23,761	25,829	33,149	35,663
		Ground Water	63,488	59,592	63,696	66,023	69,081	73,925	74,405	68,909	85,259	90,861	94,042	103,979	114,799	125,091
Wind-Bighorn River Planning	Agricultural Consumptive Use	Total	782,591	1,024,009	1,045,219	1,090,002	903,845	988,923	1,038,026	1,122,973	988,686	1,009,417	860,045	978,983	1,172,697	1,126,434
		Surface Water	777,227	1,016,990	1,038,054	1,082,530	897,650	982,144	1,030,910	1,115,276	981,908	1,002,497	854,150	972,272	1,164,658	1,118,713
		Ground Water	5,365	7,019	7,165	7,472	6,196	6,779	7,116	7,698	6,777	6,919	5,896	6,711	8,039	7,722
	Municipal Use	Total	13,666	13,633	13,686	13,757	13,812	14,041	14,186	13,428	13,653	13,707	13,817	13,880	13,775	13,749
		Surface Water	4,373	4,380	4,400	4,439	4,494	4,562	4,631	7,728	7,875	7,923	8,014	8,047	8,001	7,962
		Ground Water	9,293	9,253	9,286	9,318	9,318	9,479	9,555	5,700	5,778	5,784	5,802	5,832	5,774	5,787
	Domestic Use	Total	9,434	9,437	9,477	9,549	9,640	9,790	9,923	7,877	8,017	8,057	8,134	8,170	8,115	8,088
		Surface Water	2,453	2,453	2,464	2,483	2,506	2,545	2,580	2,048	2,084	2,095	2,115	2,124	2,110	2,103
		Ground Water	6,981	6,983	7,013	7,066	7,133	7,244	7,343	5,829	5,933	5,962	6,019	6,045	6,005	5,985
	Industrial Use	Total	88,094	88,453	91,596	89,415	90,680	92,086	88,095	92,240	96,954	97,566	100,201	95,485	94,323	89,598
		Surface Water	77,374	77,689	80,450	78,534	79,645	80,880	77,375	982	1,032	1,039	1,067	1,017	1,004	954
		Ground Water	10,720	10,764	11,146	10,881	11,035	11,206	10,720	91,258	95,922	96,528	99,134	94,468	93,319	88,644
Statewide Water Use Index	Agricultural Consumptive Use	Total	1,659,789	2,282,009	2,266,452	2,483,118	1,942,043	2,105,140	2,373,348	2,606,244	2,458,626	2,564,955	1,770,883	2,181,373	2,824,937	2,597,624
		Surface Water	1,609,855	2,207,948	2,200,618	2,406,169	1,884,436	2,037,893	2,295,550	2,519,295	2,369,588	2,477,249	1,719,839	2,108,343	2,723,906	2,503,536
		Ground Water	49,934	74,061	65,834	76,949	57,607	67,247	77,798	86,948	89,038	87,706	51,044	73,030	101,031	94,088
	Municipal Use	Total	79,686	80,177	81,099	81,847	82,877	84,380	85,896	88,659	89,663	90,251	81,401	84,617	75,434	72,633
		Surface Water	33,841	34,089	34,461	34,976	35,363	35,789	36,394	41,362	41,985	42,248	32,503	46,062	36,715	33,742
		Ground Water	45,016	45,240	45,761	45,987	46,593	47,597	48,455	46,193	46,561	46,890	47,749	37,417	37,558	37,743
	Domestic Use	Total	30,685	30,868	31,151	31,505	31,954	32,601	33,240	31,787	32,221	32,443	31,059	29,235	29,287	29,405
		Surface Water	5,348	5,354	5,409	5,524	5,624	5,797	5,911	5,508	5,512	5,546	5,638	5,652	5,631	5,609
		Ground Water	27,403	27,567	27,811	28,138	28,527	29,063	29,613	28,635	29,020	29,236	27,795	25,973	26,016	26,155
	Industrial Use	Total	258,010	247,519	251,041	253,286	271,041	274,695	274,533	258,376	277,312	279,067	272,744	273,499	288,146	291,009
		Surface Water	164,330	164,133	169,061	159,416	160,290	162,341	159,505	79,353	82,790	80,200	81,710	87,209	91,204	92,159
		Ground Water	219,267	207,389	210,720	206,512	223,133	225,284	228,875	287,183	305,327	302,695	297,236	299,636	303,642	302,500


Wyoming Water Bulletin

Improved Water Data Delivery and Presentation



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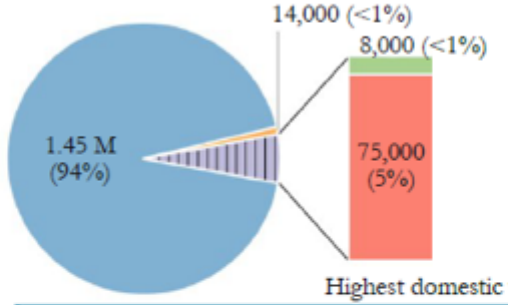
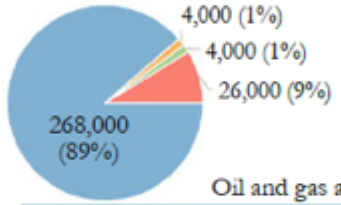
Wyoming Irrigated Lands and Water Use (acre-feet) by Sector

Statewide water use (acre-feet)

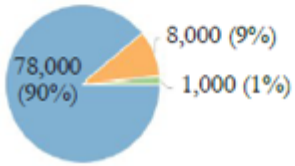
- Agricultural
- Municipal
- Domestic
- Industrial
- More than One Sector
- Irrigated Lands



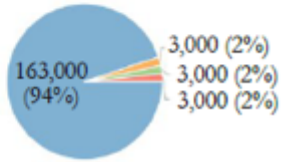
Highest domestic water use (8,000 ac-ft)



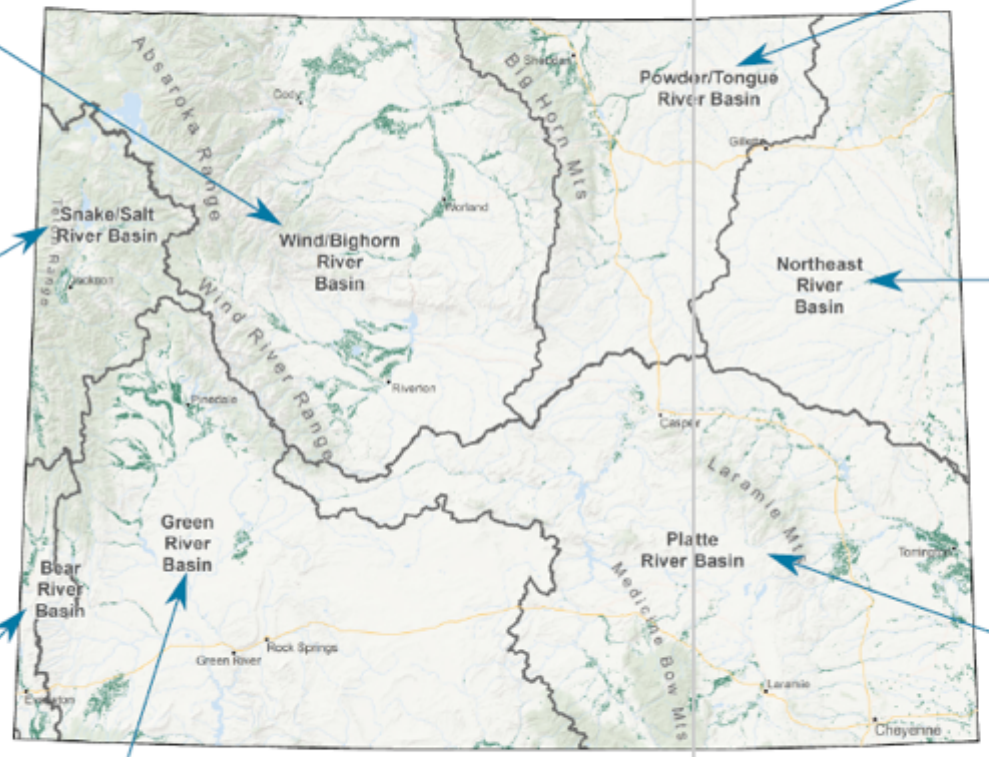
Oil and gas account for majority of industrial water use

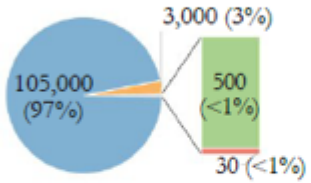


Highest municipal water user by percent (9%)

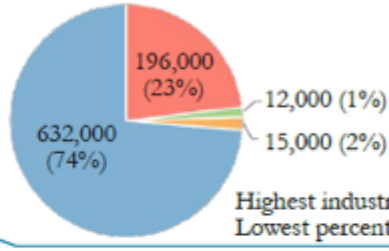


The Northeast and Platte River Basins use proportionally more groundwater (19%) than all other basins

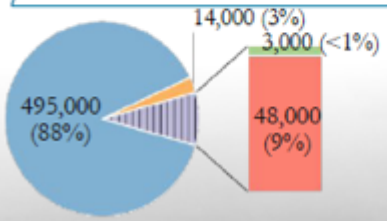




97% of water is used for agricultural purposes

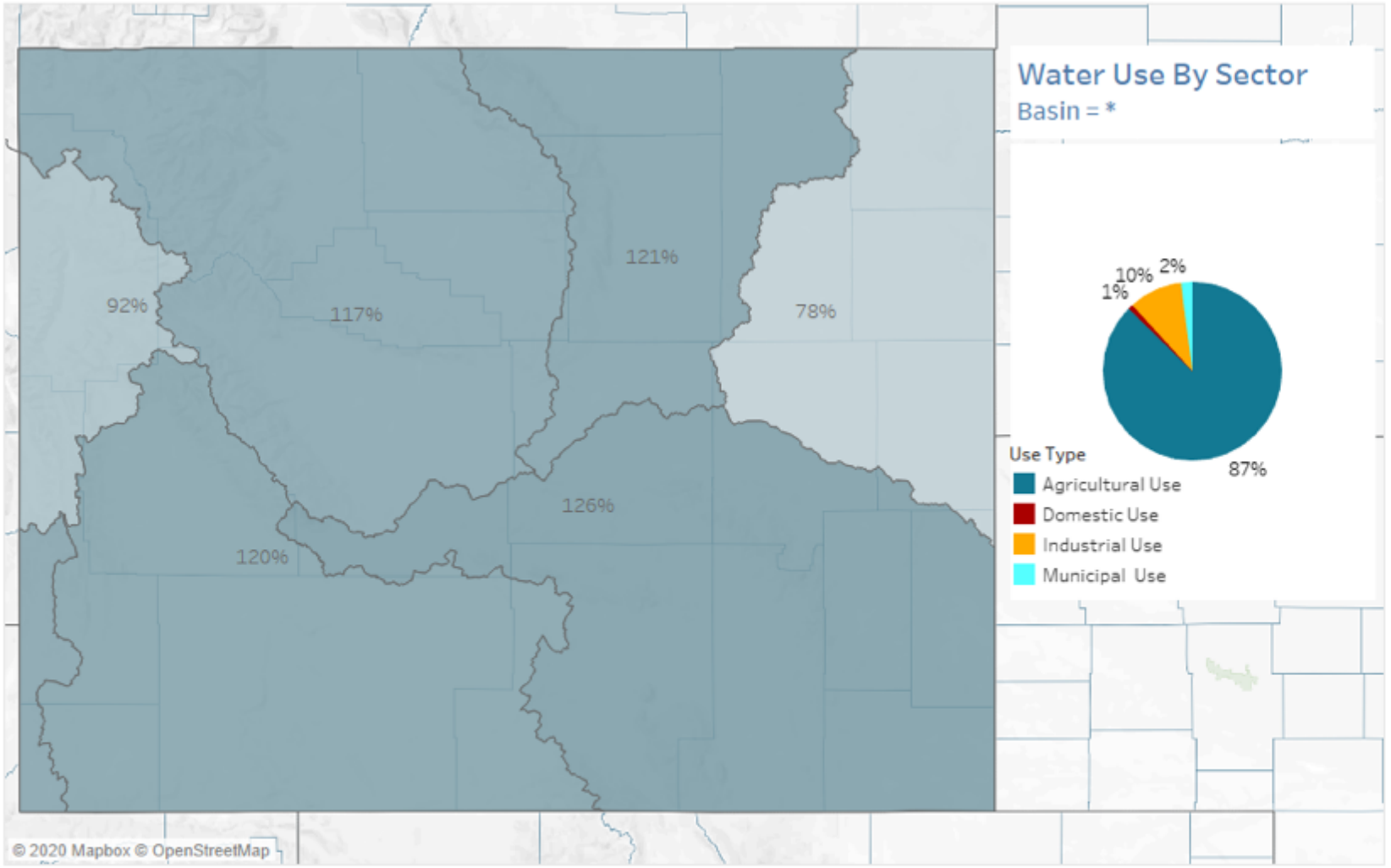


Highest industrial water use (196,000 ac-ft)
Lowest percent agricultural water use (74%)



Highest municipal water use (14,000 ac-ft). A large portion of the Green River Basin municipal use is consumed by Cheyenne through a water transfer.
Primary industrial use: Thermal electric power generation

2017 Percent of Water Use Compared to Period of Record (2000 to Present)



Water Use By Sector

Basin = *

Use Type
- Agricultural Use
- Domestic Use
- Industrial Use
- Municipal Use

Water Use Sector
- [x] Agricultural Use
- [x] Domestic Use
- [x] Industrial Use
- [x] Municipal Use

Year of Comparison

2017 Show history

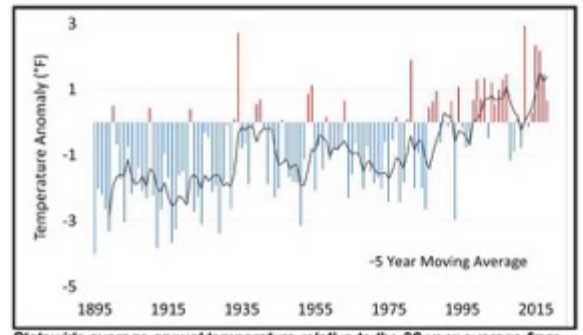
Variation from POR

49% 175%

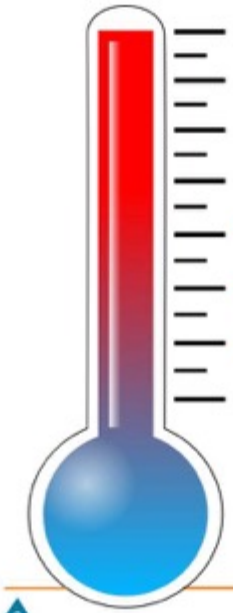
ter Source
- [ ] Cross Basin Diversion
- [x] Ground Water
- [x] Surface Water

Water and Climate

Because water and climate are intricately related, examining climate trends helps us better understand water use and water availability. The average annual temperature over time supports our understanding of potential water use and management strategies to address climate variability.



Statewide average annual temperature relative to the 30-year average from 1981 - 2010. The 5-year moving average is the average temperature over the previous 5 years. (Courtesy of PRISM Climate Group, Oregon State University)



43.1° 5-year average statewide temperature from 2014 to 2018

42.4° 2018 average statewide temperature

41.7° 30-year average statewide temperature from 1981 to 2010

1.4 °F statewide temperature increase over the past 5 years compared to 30-year average

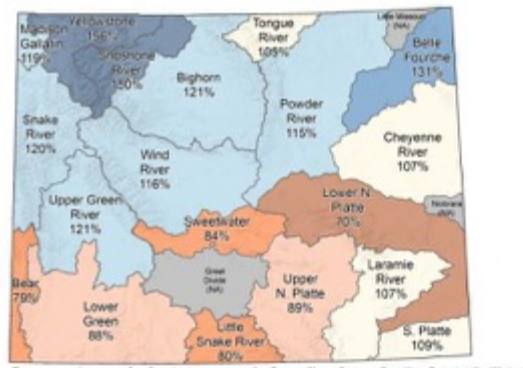
Wyoming's mountains function as reservoirs, providing runoff in spring and summer for our state as well as for millions of people downstream. Snowpack in Wyoming is melting earlier due to higher temperatures, changes in canopy cover and less spring moisture and can result in late-season water shortages.

Northern Wyoming above average snowpack. Yellowstone and Shoshone River sub-basins (part of the Wind/Bighorn River Basin) highest levels of snow pack at 150% of median.

WETTER

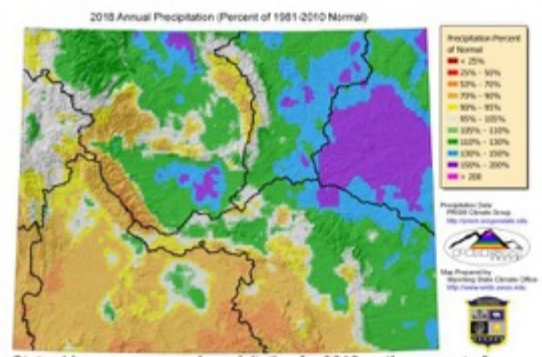
DRIER

Southern Wyoming below historic averages. Lower North Platte lowest amount of snowpack at 70% of median.



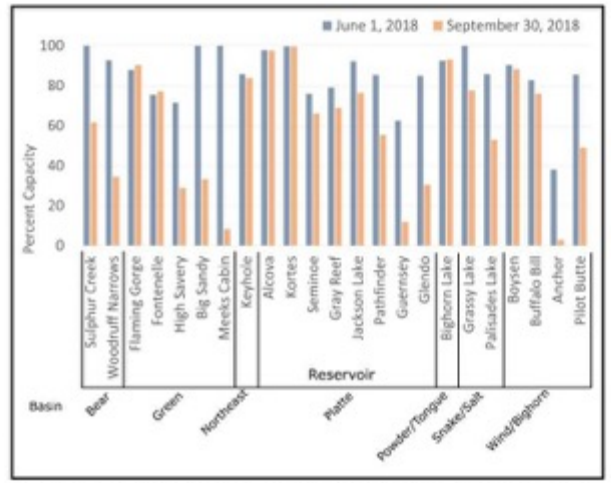
Snow water equivalent as percent of median for April 1st (generally recorded as the date of maximum snowpack), 2018. (Courtesy of Natural Resources Conservation Services (NRCS) and WRDS)

Precipitation patterns in 2018 were split along the continental divide, with the northeast portion above normal and the southwest portions below normal. At a basin-scale, the Northeast Basin received significant precipitation with large areas recording 150-200% above normal. Conversely, the Bear River and Green River Basins were 70-90% of normal.



Statewide average annual precipitation for 2018 as the percent of normal. (Courtesy of WRDS and the PRISM Climate Group)

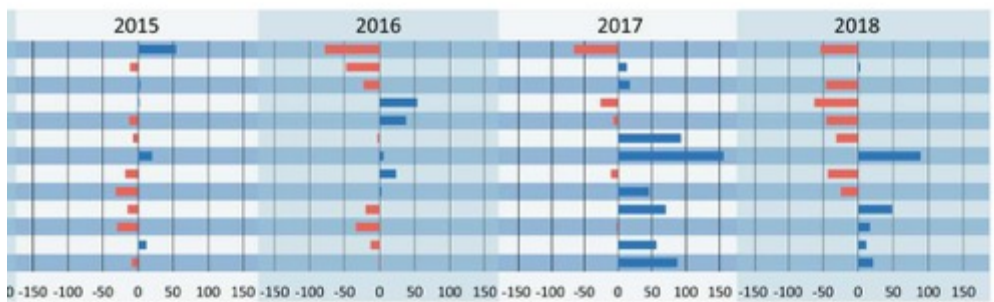
Wyoming's reservoirs are an important source of surface water that provide hydro-power, reduce flooding and play an important role in supplying water for uses including agriculture, municipal, industrial, recreation and fisheries. Reservoirs recharge from snowmelt in the spring and are used throughout the year. It is useful to assess reductions in reservoir capacity over the summer months to better understand year to year water use and availability. The Bear and Green River Basins had particularly large draw-downs, averaging reductions of 49% and 40%, respectively.

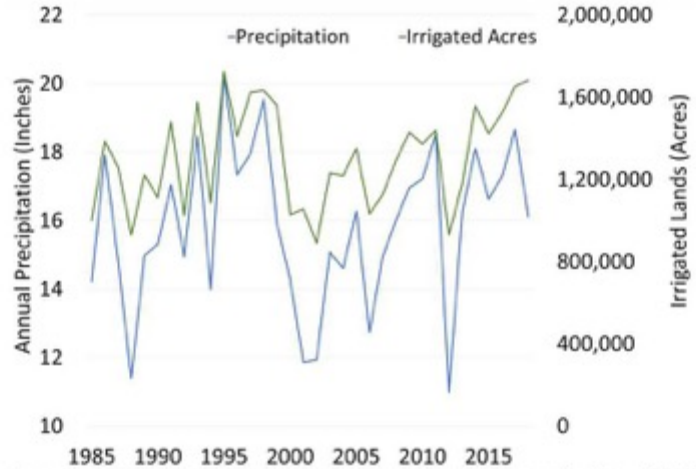


Reservoir percent capacity comparison for early summer (June) to late summer (September) for 2018. Courtesy of WRDS. Data provided by USBR, WWDO, WSEO.

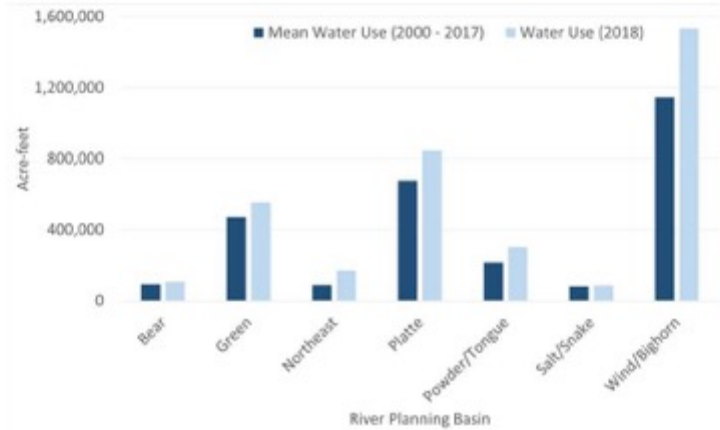
67% (Sept. 2017) → **88%** (June 2018) → **62%** (Sept. 2018)

Average reservoir capacities remaining at the end of the summer in 2018 were 5% less than 2017.
The average reduction across all reservoirs from June 2018 to September 2018 was 26%.
The mean (2016 – 2018) capacity in September was 63%.



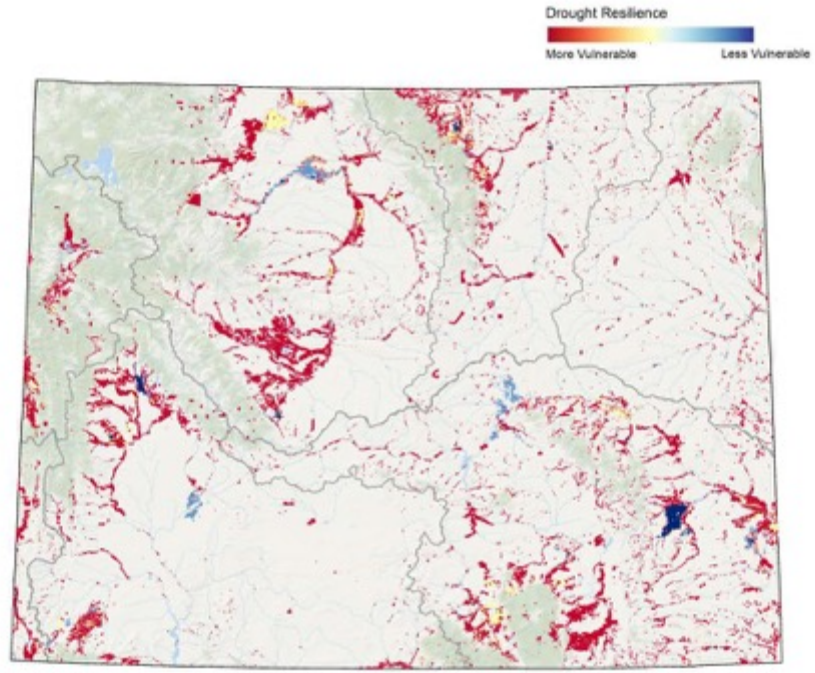


Annual precipitation statewide compared with agricultural water use *(courtesy of PRISM Climate Group)*. The extent of irrigated lands varies annually depending on water availability in the form of snowpack and summer precipitation. High snowpack allows users to irrigate more acreage and irrigate later into the season.



2018 water use by basin compared to basin averages. Overall, water use in 2018 was above average relative to the 2000 – 2017 average. Although many basins had higher water use in 2017, high snowpack and precipitation levels in 2018, particularly in the Powder/Tongue and Northeast River basins, led to more irrigation and more overall water use when compared to previous years. Statewide, 2018 had 21% higher agricultural water use when compared to the 30 year average and slightly more than 2017, making it the second highest year on record since 1985.

Even though surface water sustains Wyoming, access to multiple sources of water increases drought resilience during low water years. Having access to groundwater when surface water sources are diminished can be critical during periods of drought.

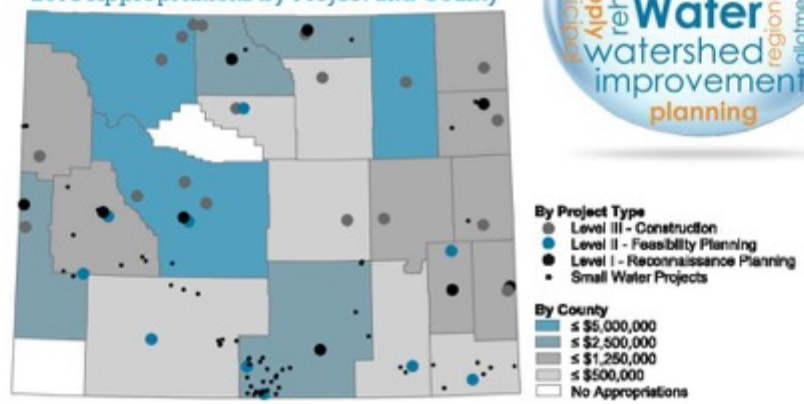


Statewide drought resiliency (determined by supply type). Drought resiliency is determined by the number of supplies available to the user, where those with access to multiple supplies are more resilient than those with only surface water access.

Other potential drought resiliency factors include water use relative to water in the basin, access to groundwater, annual climate and river flows (specifically related to appropriations), and availability of stored water. Increased water use across the state continues to be driven by more irrigated lands in the Wind/Bighorn and Northeast River Basins and industrial use in the Platte River Basin. Increased water use in these regions may affect resilience to drought conditions. While climate conditions were relatively positive in 2018 (specifically for northern Wyoming), stream gauges showed variability across the state. Lower than average flows were reported in the Platte, Northeast, Bear, and parts of the Green, and Powder River Basins, making these regions more susceptible to drought conditions and more reliant on groundwater. Reservoirs play an important role supplementing water availability in many of these regions.

In 2018, the Wyoming Water Development Commission funded 111 projects across Wyoming. Of these projects, 106 benefit 21 of the 23 Wyoming counties and include water transmission pipelines, irrigation upgrades for special districts and reservoir improvements. Five projects have statewide or broad regional scope. This includes development of resources for River Basin Planning, extension of the Platte River Recovery and Implementation Plan (PRRIP) and assets associated with Lake Desmet.

2018 Appropriations by Project and County



The State of Wyoming has acquired several water storage assets around the state for future use. The purchase of over 62,000 acre-feet of storage space in Lake DeSmet plus the Clear Creek Diversion, pump station, supply pipeline and Healy Reservoir are a beneficial addition to the State's water asset portfolio.

2020 Aging Infrastructure Survey

- Survey requested by Legislative Joint Agriculture, State and Public Lands & Water Resources Committee
- Objective: to try and better understand the condition of aging infrastructure in Wyoming
- Sent to 116 entities via email
- Entities asked to complete survey based on capacity of system
  - Small (50-100 cfs)
  - Medium (100-200 cfs)
  - Large (> 200 cfs)

Wyoming WATER Development Office

Medium Conveyance Facilities (Capacity between 100-200 cfs)

Name of Entity _____ Type of Entity (district, company, association, etc.) _____

Contact Person _____ Address _____ Zip Code _____

Phone _____ City/Town _____ County _____

Email _____

		Condition Grade						Facility Age				
		Percentage with a condition equal to:						Percentage with an age equal to:				
CONVEYANCES	Total Length (miles)	Very Good	Good	Fair	Poor	Very Poor	Sum Should = 100%	>80 years	50-79 years	25-49 years	0-24 years	Sum Should = 100%
Unlined Main Canals												
Lined Main Canals												
Main Pipelines												
Main Tunnels or Siphons												
Unlined Lateral Canals or Ditches												
Lined Lateral Canals or Ditches												
Lateral Pipelines												
Lateral Tunnels or Siphons												
STRUCTURES	Total Number	Very Good	Good	Fair	Poor	Very Poor	Sum Should = 100%	>80 years	50-79 years	25-49 years	0-24 years	Sum Should = 100%
Main Diversion or Check Structures												
Main Headgates												
Main Flumes												
Main Chutes or Drop Structures												
Main Wasteways												
Other Structures												

	DAMS/RESERVOIRS (Please list)	Storage Capacity (Acre-Feet)	Age	Very Good Good Fair Poor Very Poor	Year of Last Major Rehabiliation
1.					
2.					
3.					
4.					
5.					

	DAMS/RESERVOIRS (Continued)	Storage Capacity (Acre-Feet)	Age	Very Good Good Fair Poor Very Poor	Year of Last Major Rehabiliation
6.					
7.					
8.					
9.					
10.					

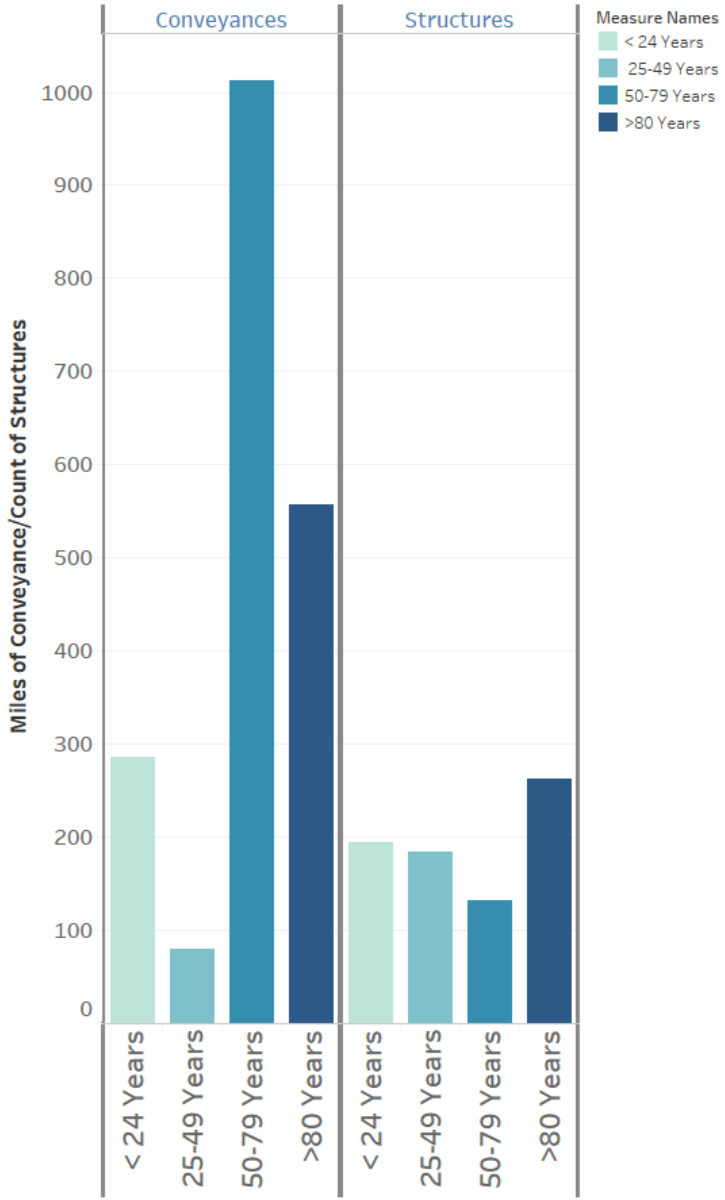
PLANNED PROJECTS (by timeframe)	Project 1			Project 2			Project 3			Project 4		
	Name	Cost ($)	State Funds? Est. amount	Name	Cost ($)	State Funds? Est. amount	Name	Cost ($)	State Funds? Est. amount	Name	Cost ($)	State Funds? Est. amount
0-5 years												
6-10 years												
11-20 years												
>20 years												

Extent of Conveyances (in miles) and Structures (by count)

		Large (>200 cfs)	Medium (100-200 cfs)	Small (50-100 cfs)	Grand Total
Conveyances	Lateral Pipelines	887	31	5	923
	Unlined Main Canals	482	92	69	643
	Unlined Lateral Canals or Ditches	214	27	13	254
	Lined Main Canals	24	20	0	44
	Lateral Tunnels or Siphons	11	0	0	11
	Main Tunnels or Siphons	10	2	1	13
	Main Flumes	6	14	3	23
	Lined Lateral Canals or Ditches	2	20	0	22
	Main Pipelines	0	16	8	24
	Total	**1,635**	**222**	**99**	1,957
Structures	Main Diversions or Check Structures	185	21	40	246
	Other Structures	177	40	49	266
	Main Chutes or Drop Structures	87	4	1	92
	Main Headgates	56	49	83	188
	Main Wasteways	49	0	11	60
	Total	**554**	**114**	**184**	852

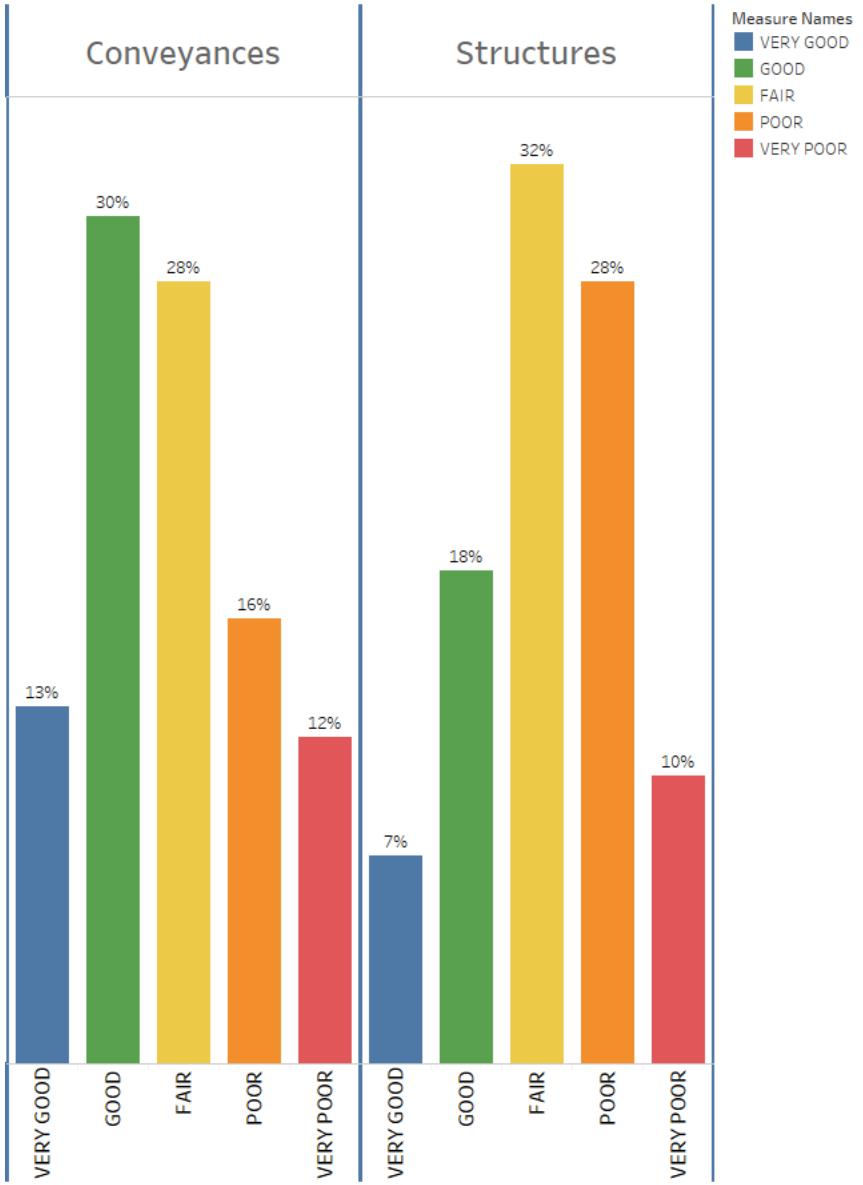
Sum of Total Length/Number broken down by Conveyance Size vs. Category and Type 1. The view is filtered on Category, which keeps Conveyances and Structures.

Age of Conveyances and Structures



< 24 Years, 25-49 Years, 50-79 Years and >80 Years for each Category. Color shows details about < 24 Years, 25-49 Years, 50-79 Years and >80 Years. The view is filtered on Category, which keeps Conveyances and Structures.

Conveyance and Structure Condition

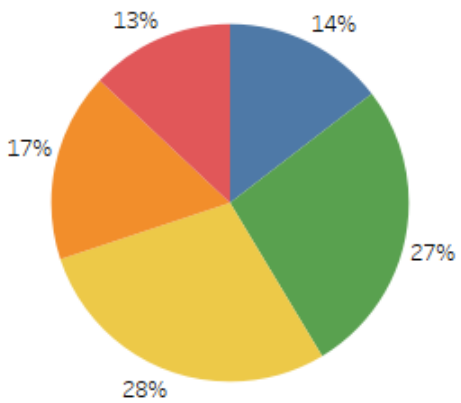


VERY GOOD, GOOD, FAIR, POOR and VERY POOR for each Category. Color shows details about VERY GOOD, GOOD, FAIR, POOR and VERY POOR. The marks are labeled by VERY GOOD, GOOD, FAIR, POOR and VERY POOR. The data is filtered on Conveyance Size, which keeps Large (>200 cfs), Medium (100-200 cfs) and Small (50-100 cfs). The view is filtered on Category, which keeps Conveyances and Structures.

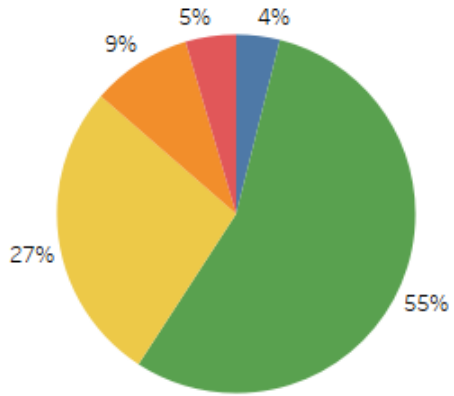
Infrastructure Condition Class by Capacity

Conveyances

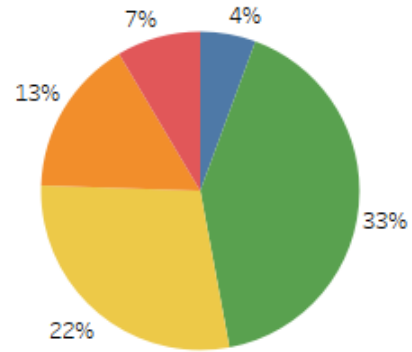
Large (>200 cfs)



Medium (100-200 cfs)



Small (50-100 cfs)



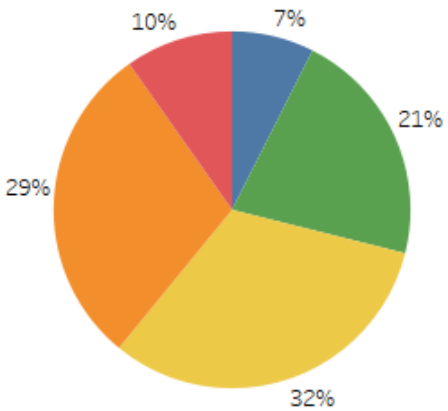
Measure Names
- VERY GOOD
- GOOD
- FAIR
- POOR
- VERY POOR

VERY GOOD, GOOD, FAIR, POOR and VERY POOR broken down by Conveyance Size on page Conveyances . Color shows details about VERY GOOD, GOOD, FAIR, POOR and VERY POOR. Size shows VERY GOOD, GOOD, FAIR, POOR and VERY POOR. The marks are labeled by VERY GOOD, GOOD, FAIR, POOR and VERY POOR. Details are shown for VERY GOOD, GOOD, FAIR, POOR and VERY POOR. The view is filtered on Conveyance Size, which keeps Large (>200 cfs), Medium (100-200 cfs) and Small (50-100 cfs).

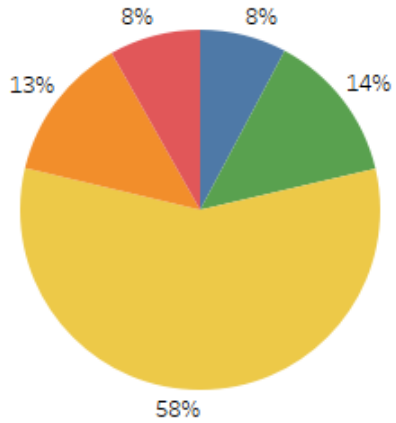
Infrastructure Condition Class by Capacity

Structures

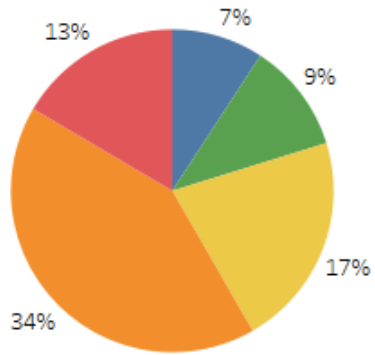
Large (>200 cfs)



Medium (100-200 cfs)



Small (50-100 cfs)



Measure Names
- VERY GOOD
- GOOD
- FAIR
- POOR
- VERY POOR

VERY GOOD, GOOD, FAIR, POOR and VERY POOR broken down by Conveyance Size on page Structures. Color shows details about VERY GOOD, GOOD, FAIR, POOR and VERY POOR. Size shows VERY GOOD, GOOD, FAIR, POOR and VERY POOR. The marks are labeled by VERY GOOD, GOOD, FAIR, POOR and VERY POOR. Details are shown for VERY GOOD, GOOD, FAIR, POOR and VERY POOR. The view is filtered on Conveyance Size, which keeps Large (>200 cfs), Medium (100-200 cfs) and Small (50-100 cfs).

Reservoir Condition by Storage Capacity

Storage Capacity (group)	Very Good	Good	Fair	Poor	Grand Total
Greater than 50,001 AC-FT				2	2
10,001 to 50,000 AC-FT	1	4	1		6
5001 to 10,000 AC-FT		1	1		2
1001 to 5000 AC-FT	2	1	5	1	9
151 to 1000 AC-FT	1		3		4
Less than 150 AC-FT		1	1	1	3
Grand Total	4	7	11	4	26

Count of Condition broken down by Condition vs. Storage Capacity (group). Color shows count of Condition. The marks are labeled by count of Condition. The data is filtered on sum of Storage Capacity (AC-FT), which ranges from 0 to 170,252.8. The view is filtered on Storage Capacity (group), which excludes 0.0.

Planned Projects Cost

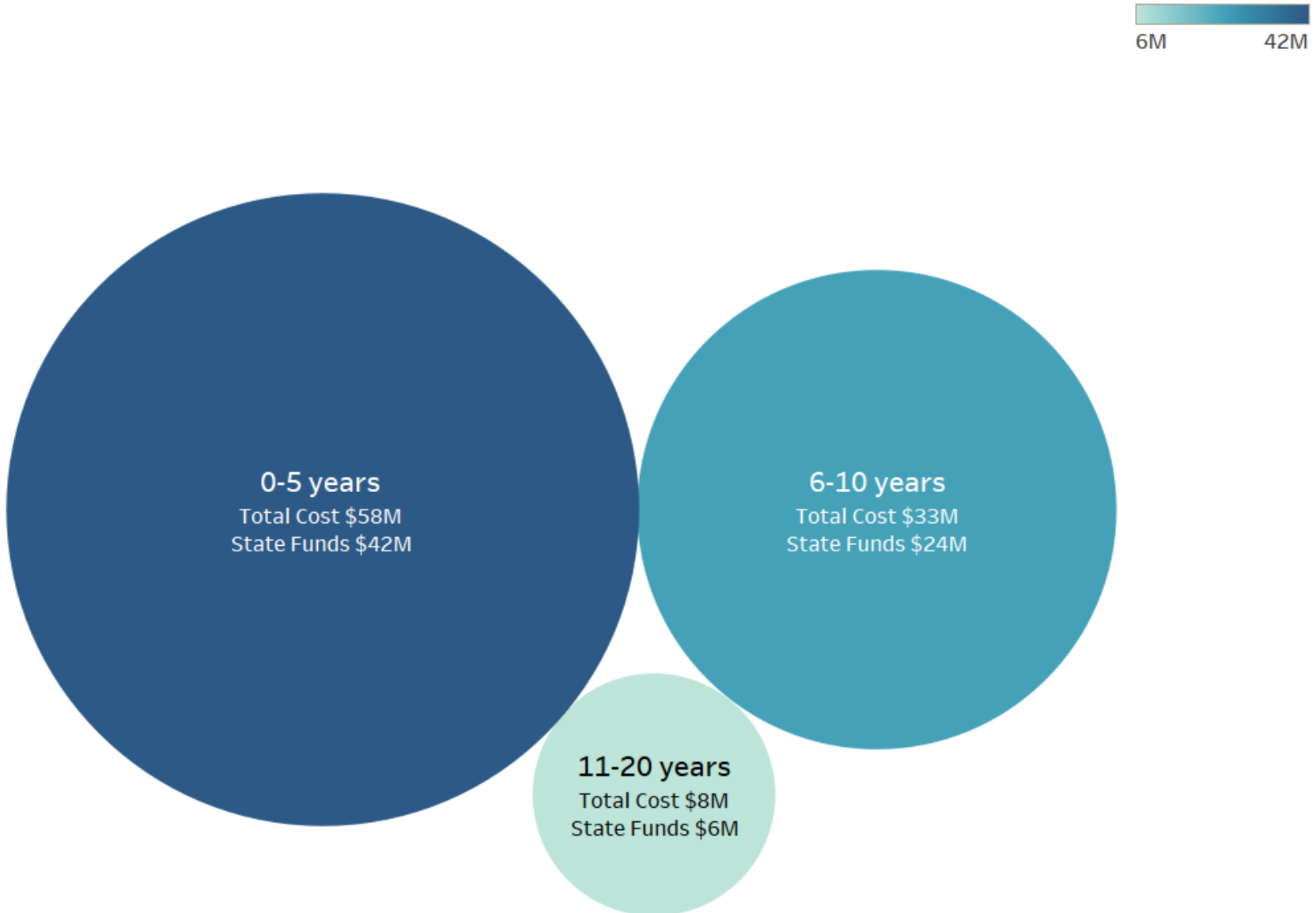
	TOTAL COST	STATE FUNDING
0-5 years	$57,633,734	$41,879,461
6-10 years	$33,066,206	$24,152,851
11-20 years	$8,470,000	$5,552,500
Grand Total	**$99,169,940**	**$71,584,812**

TOTAL COST and STATE FUNDING broken down by Time Frame1. Color shows STATE FUNDING. The marks are labeled by TOTAL COST and STATE FUNDING.

Planned Projects Costs

Total Cost $99,169,940

Anticipated State Funds $71,584,812



What's Next?

Contact:

Water Development Office

307-777-7626

Jodee Pring	jodee.pring@wyo.gov
Mabel Jones	mabel.jones1@wyo.gov
Mike Robertson	mike.robertson1@wyo.gov