Platte River Basin Plan Overview 2017

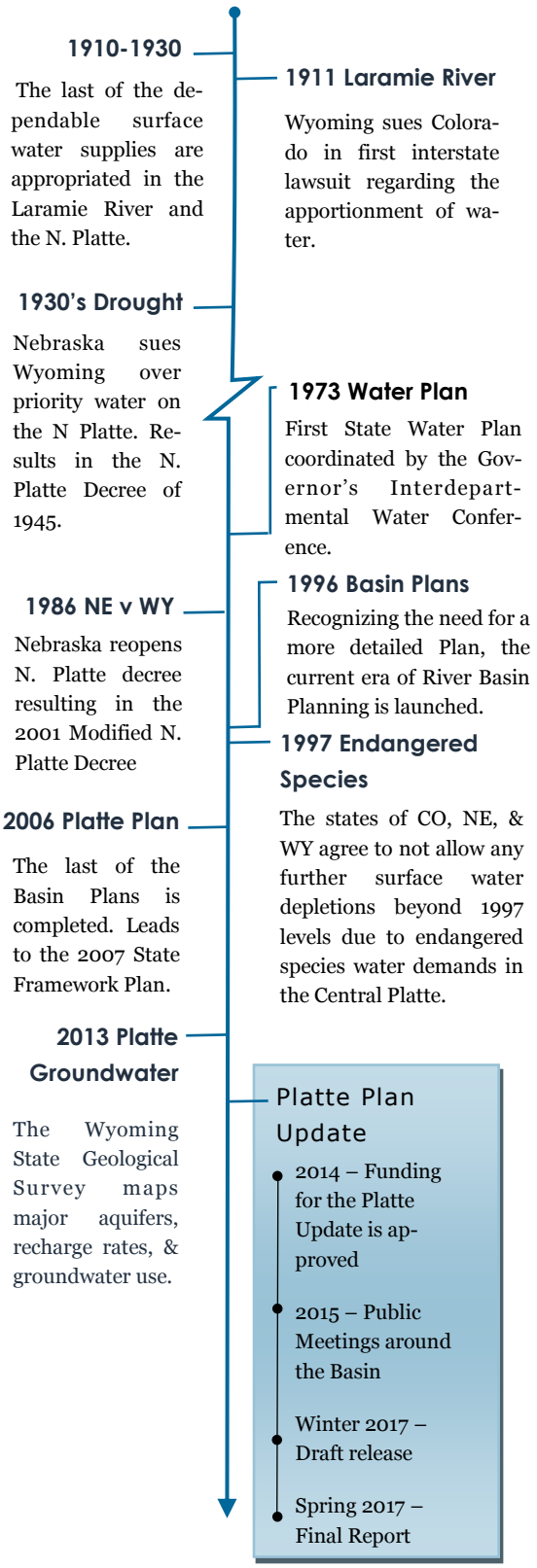
Wyoming Water Development Commission

"Water is Wyoming's most important natural resource. It is critically important not only to Wyoming but to our country. Wyoming is a headwaters state. The water that begins in our mountains travels down our nation's great rivers. Water that starts here makes its way to the Pacific Northwest, the Gulf of California, and the Gulf of Mexico. From statehood, we have recognized the need to protect and develop our water."

-- Matthew H. Mead, Governor.

INTRODUCTION TO RIVER BASIN PLANNING

Events that Inspired Comprehensive Planning on the Platte River



This document provides an overview of the Wyoming Platte River Basin Plan and highlights findings and results. Each section of this overview references back to the appropriate volume of the full report.

Wyoming has a long history of water planning, with the first plan completed in 1973. Since 1999 the planning has taken place at the river basin scale. Basin Plans document the need for water in Wyoming and how future demands for water can be met. This is especially important in the Platte Basin where over 40% of the State's population lives and traditional water supplies are considered fully appropriated.

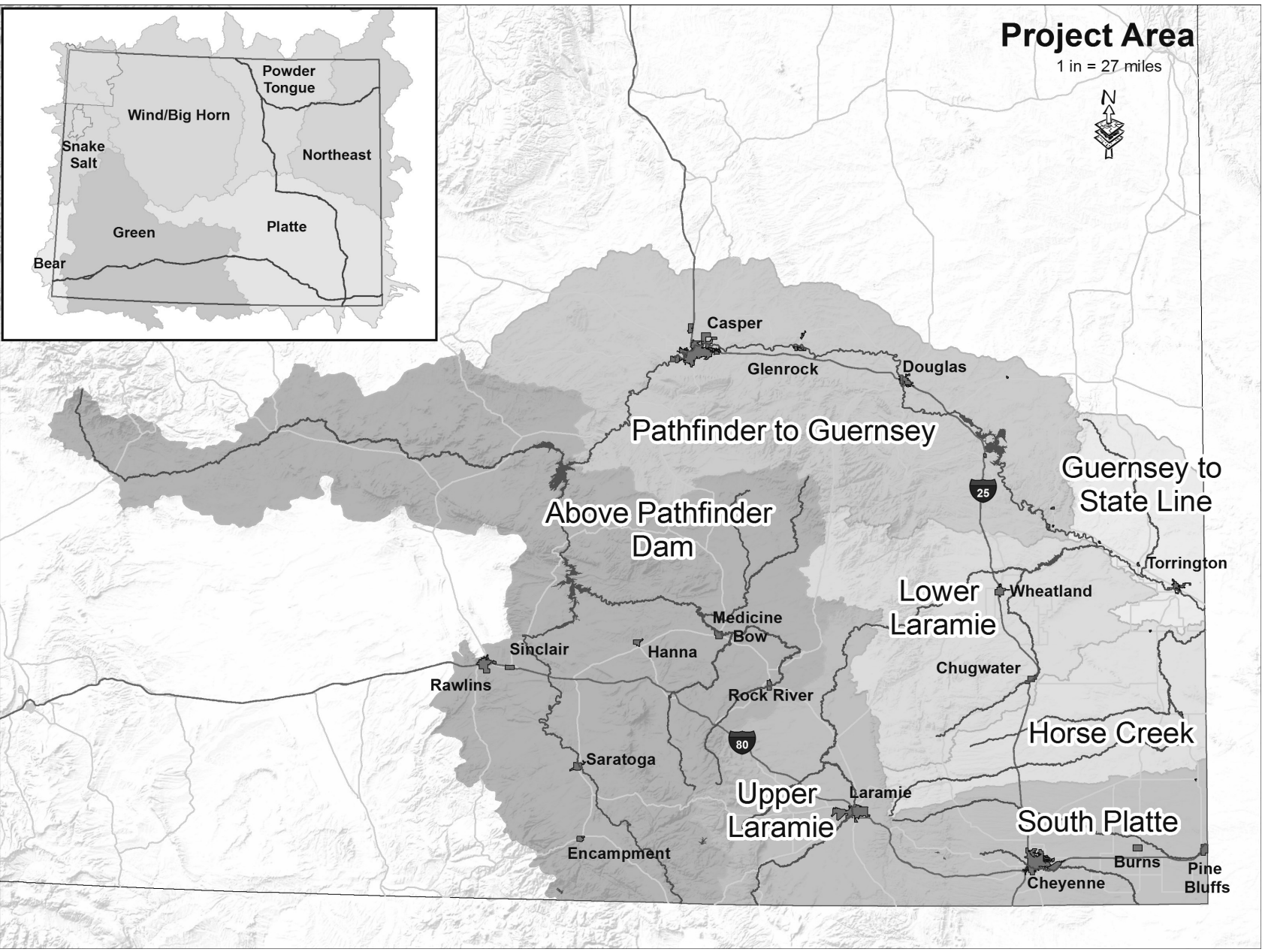
The Platte River Basin Plan was initially completed in 2006. Wenck Associates began work on the plan update in June 2014. This work culminates in a summary of the Modified North Platte Decree, irrigated lands mapping, hydrologic modeling of major streams, current water use determinations, future use projections, and identification of water development opportunities.

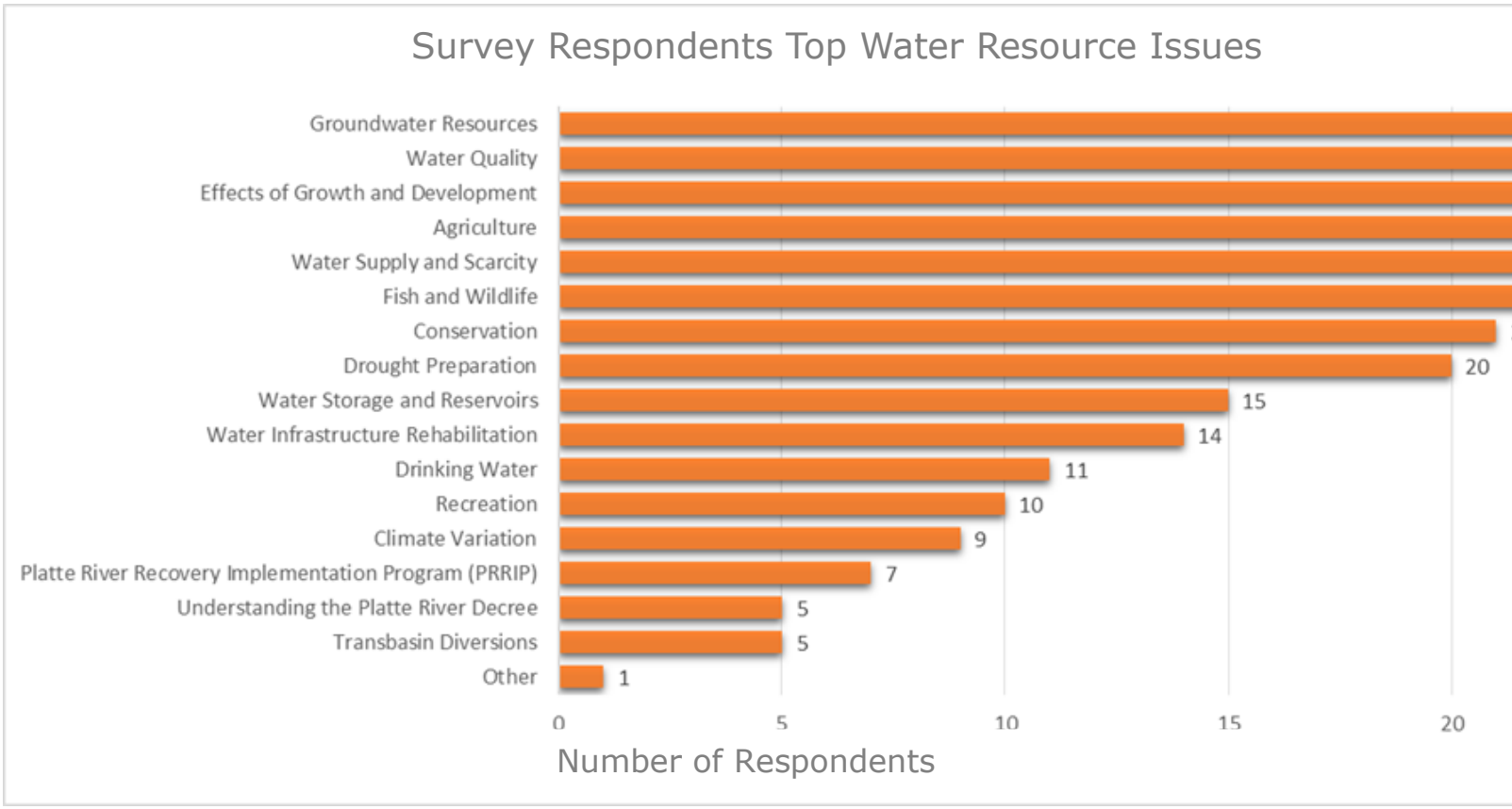
The cool, clear waters of the North Platte are legendary with fishing enthusiasts, and wildlife are abundant in the fertile bottomlands and open rangelands. The Plan includes recreational and environmental use of water in the basin.

For a copy of the full report please see the River Basin Planning Page of the Wyoming Water Development Commission web site (http://wwdc.state.wy.us/).

GEOGRAPHY OF THE PLATTE

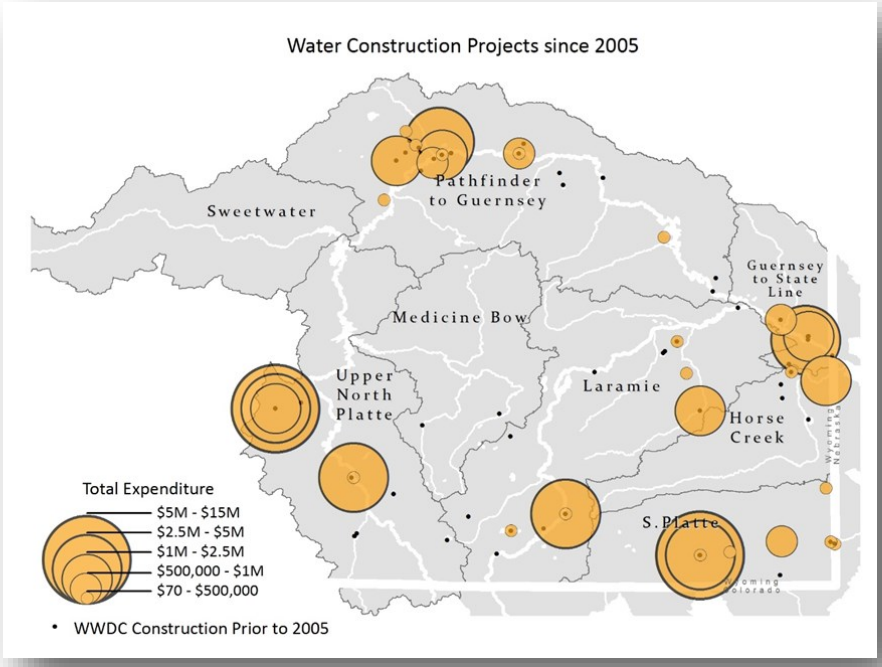
Located in southeast Wyoming, with headwaters in Wyoming and Colorado, the Platte Basin is comprised of two major subbasins: 1) the North Platte subbasin and 2) the South Platte subbasin. The North Platte River flows north into Wyoming from Colorado and sweeps east and south in a horseshoe bend nearly 350 miles long, draining the entire southeast quarter of the state. The Sweetwater River, one of the North Platte's major tributaries, flows into Pathfinder Reservoir from the west. The South Wind River Mountains provide are the primary source of water supply for the Sweetwater River. The Wyoming portion of the North Platte subbasin covers 21,907 square miles and, in the far southeast corner of the state, Wyoming's portion of the South Platte subbasin encompasses approximately 2,000 square miles. In total, the Platte Basin comprises more than 24% of the total land mass of Wyoming. The Platte Basin in Wyoming is divided into seven subbasins.

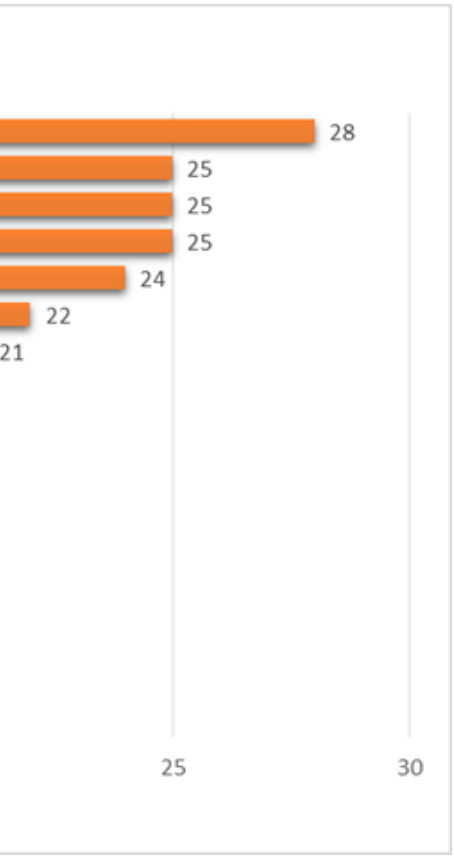




$111 MILLION IN WATER DEVELOPMENT

WYOMING WATER DEVELOPMENT COMMISSION PROJECTS. The WWDC has been actively engaged in assisting municipalities, domestic water districts and irrigation districts improve the efficiency of their systems and develop new water supplies. Since 2006, the WWDC has committed more than $111M to construct 78 projects in the Platte River Basin. There are currently 45 projects underway with appropriations totaling nearly $70M.





PLATTE BASIN SURVEY

In January of 2016 a web survey was sent out to approximately 260 people via email and was also posted on the Water Resource Data Systems Twitter and Facebook pages. We received 56 responses, or 21% of the email list.

In general, the top issues were related to groundwater, agriculture, development, water supplies, and quality. The respondents are interested in better data, and would like to be a part of reviewing drafts of the Plan. This Plan focuses on water quantity issues, but improved water quality often comes with water supply projects. A summary of water quality issues can be found in Volume 5, Section 5.3.

BETTER DATA ARE NEEDED. Majority of the respondents (62%) utilize water data in some capacity, from streamflow and climate data to water rights and reservoir levels. 85% believe that better water use data and hydrologic data should be developed.

UTILIZE THE SMALL WATER PROJECTS PROGRAM

Platte River Basin water supplies in Wyoming are heavily regulated and limited by court decrees, federal project water contracts, and endangered species agreements. However, expansion of existing storage and small reservoirs impounding less than 20 acre-feet are generally easier to permit.

WWDC's Small Water Program funds projects with a total cost up to $135,000 with a public benefit. WWDC grants are available to fund up to 50% of the cost or a maximum of $35,000. Check with your Conservation District - they act as a project sponsor to the WWDC. Projects eligible for SWPP grant funding assistance include:

- Construction or rehabilitation of small reservoirs
- New wells, and spring development
- Pipelines and conveyance facilities
- Solar platforms
- Irrigation works
- Windmills, and
- Wetland developments.

(http://wwdc.state.wy.us/small_water_projects/small_water_project.html)

RECOMMENDATION

INTERSTATE DECREES AND REGULATORY ISSUES

There are significant constraints imposed on the use of water in the Platte River Basin based on allocations and apportionment within the North Platte Modified Decree, the Laramie River Decree and Wyoming's participation within the PRRIP. The limitations affect the management of existing water uses and future water opportunities. Any new major water developments within the Basin are unlikely without mitigation efforts to offset the proposed new depletions. For the future development of small water uses serving domestic, stock, recreation, fish and wildlife, environmental and other deminimus uses; Wyoming's Depletion Plan addresses new depletions in the North Platte River Basin if the proposed water project does not exceed 20 acre-feet per year in net water depletions.

PLATTE RIVER AND LARAMIE RIVER The water supplies in the Platte River Basin are some of the most regulated in Wyoming. Contentious legal battles have shaped the use and regulation of Platte River Basin water resources in Wyoming. Interstate water squabbles and court battles began shortly after Wyoming was granted statehood - a reflection of the limited water supplies in Platte River Basin needed to meet all of Wyoming, Colorado, and Nebraska's needs. An earlier 1922 court decree apportioned Laramie River supplies between Wyoming and Colorado. During the past 125 years, there have been only a few periods when Wyoming or Cowboy State water users were not engaged in litigation involving the development or usage of Platte Basin water resource.

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM. Water management and development in the North Platte River Basin has been constrained since designation of critical habitat for whooping cranes, piping plover, and least terns in the Central Platte River in Nebraska was finalized in the

North Platte River Decree, 1945 -- The Supreme Court ruled that Wyoming could irrigate up to 168,000 acres. Natural flow split at the state line 25% to Wyoming and 75% to Nebraska.

The 2001 Modified Decree expanded the limitation on irrigation in Wyoming to include both consumptive use and irrigated acreage above Guernsey Reservoir. The Modified Decree added a consumptive use cap for irrigation purposes and expanded the 1945 Decree's limitation on irrigated acreage above Guernsey Reservoir. The 2001 Modified Decree and related settlement stipulations also provided for an automatic priority call for the mainstem federal North Platte River reservoirs in Wyoming when forecasted water supplies are less than 1.1 million acre feet.

Laramie River Decree 1922 (Amended in 1957) -- Permits Colorado to divert from the Laramie River and its tributaries 49,375 acre-feet per year, subject to limitations.

1970s. In 2007 the states of Wyoming, Nebraska, and Colorado entered into a cooperative agreement for the PRRIP with the Department of Interior. The term of the first period (through 2019) is 13 years. The ESA provided the USFWS the authority to require the replacement of existing water depletions in Nebraska and the upstream states to achieve a water supply goal for the critical habitat in the Central Platte River in Nebraska. The water supply goal for the PRRIP is 417,000 acre-feet per year.

The PRRIP serves as the reasonable and prudent alternative under the ESA for irrigation, municipal, industrial, and other water uses in place on or before July 1, 1997 in each state. Without the PRRIP, the USFWS would use the ESA for future federal actions (permits, including renewals; funding; contracts; easements; and others) to require water users (irrigators, municipalities, industries, and others) to replace existing and proposed new depletions until the water goals were met.

Water users seeking water rights for water projects exceeding 20 acre-feet per year of net depletions will likely need to mitigate those depletions by retiring existing water uses in the same quantities and timing as the new depletions or by providing other forms of mitigation.

In November 2016, the Wyoming Water Development Office worked with the states and the federal government to extend the existing agreement's expiration date until 2032. Some form of the PRRIP is likely to continue until the Service de-lists the target species and determines that the Program is no longer needed to prevent the species from being re-listed under the ESA. For more information on decrees and PRRIP see Volume 5, Section 5.2 and Appendix 5-A.

The Pathfinder Modification Project provides water storage to help satisfy Wyoming's share of the water supply goal for the PRRIP, and secures water for Wyoming's municipalities, and for groundwater wells in the "triangle" located below Whalen Diversion Dam.

CLIMATE

5th

The Wyoming State Climate Office identified the Cowboy State as the fifth driest state in the country. As such, drought is a constant, and frequent threat to all sectors reliant upon surface water supplies. Between 2001 and 2008, more than half of the state experienced moderate to severe drought conditions. Although this prolonged drought varied from year to year and from region to region within the state, this drought was a significant event. Drought conditions returned to most of the state again from 2012 to 2014. The economic impacts of drought are often felt for several years after the precipitation has returned to "normal".

The average annual precipitation ranges from 9 to 15 inches in the Basin interior areas, to as much as 60 inches in the high mountain ranges

According to NOAA's (NOAA, 2015) National Centers for Environmental Information, average annual temperatures in both Climate Divisions 8 and 10 have increased at a rate of 0.3F per decade between 1895 and 2015.

The overall climate of the Platte Basin in Wyoming is described in a word: Variable. Broadly separated into Highland (Alpine) and Semi-Arid Steppe, the temperature can exceed 100° F during the summer in the lower elevations and sink below -20° F in the winter. In the Snowy and Sierra Madre Mountains, snow has been recorded every month of the year. Temperature swings can come quickly with changes of more than 30° F occurring in a few hours. For more on how climate drives water supply and information on warming trends, see **Volume 5, Section 5.4.**

City	Average Annual Temp	Average Annual Precip
Rawlins, WY	42.35	9.24
Laramie, WY	41.15	11.45
Casper, WY	45.25	12.48
Douglas, WY	45.65	12.63
Wheatland, WY	49.55	13.7
Torrington, WY	44.55	13.8
Denver, CO	50.7	14.16
Cheyenne, WY	46.4	15.92
North Platte, NE	49	20.77

WEATHER MODIFICATION EFFORTS. Weather modification, commonly known as cloud seeding, is the application of scientific technology that can enhance a cloud's ability to produce precipitation. Cloud seeding is used primarily to promote additional rain or snow to increase local water supplies. The principle of cloud seeding was first discovered in 1946, and the results of the first cloud seeding experiments were reported to Congress in 1951 (National Research Council, 2003).

The WWDC funded the Weather Modification Pilot Program research project from 2006 to 2014 to determine the viability of cloud seeding to increase existing water supplies. The study also sought to quantify the potential increase in water supply due to seeding and the associated costs. The research was conducted in the Medicine Bow and Sierra Madre Mountains, and the Wind River Range. Pilot programs were undertaken for six winters and concluded the following (WWDC, 2014):

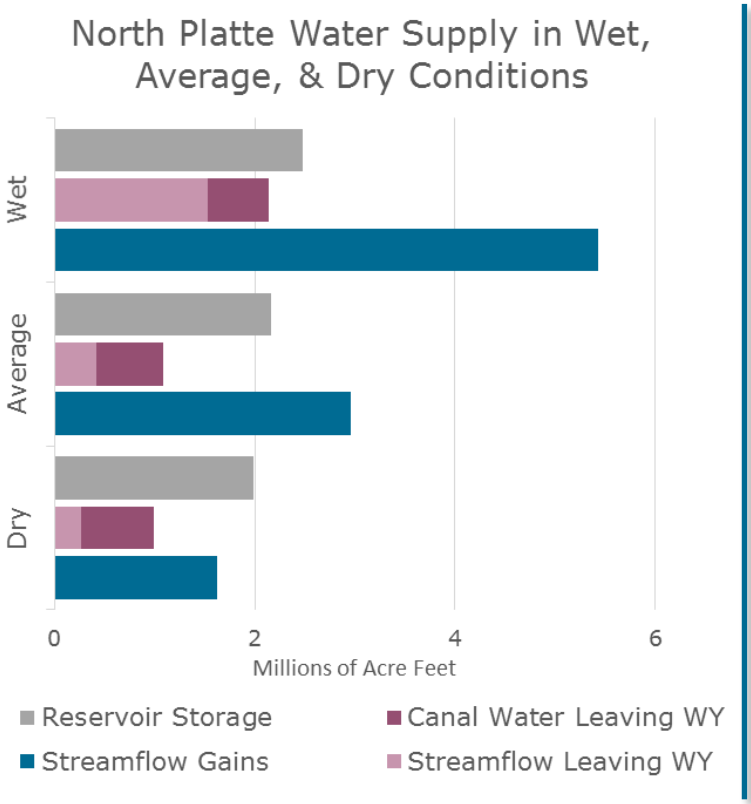
"A pilot program for the accumulation of evidence from statistical, physical, and modeling analysis suggests that cloud seeding is a viable technology to augment existing water supplies, for the Medicine Bow and Sierra Madre Ranges...

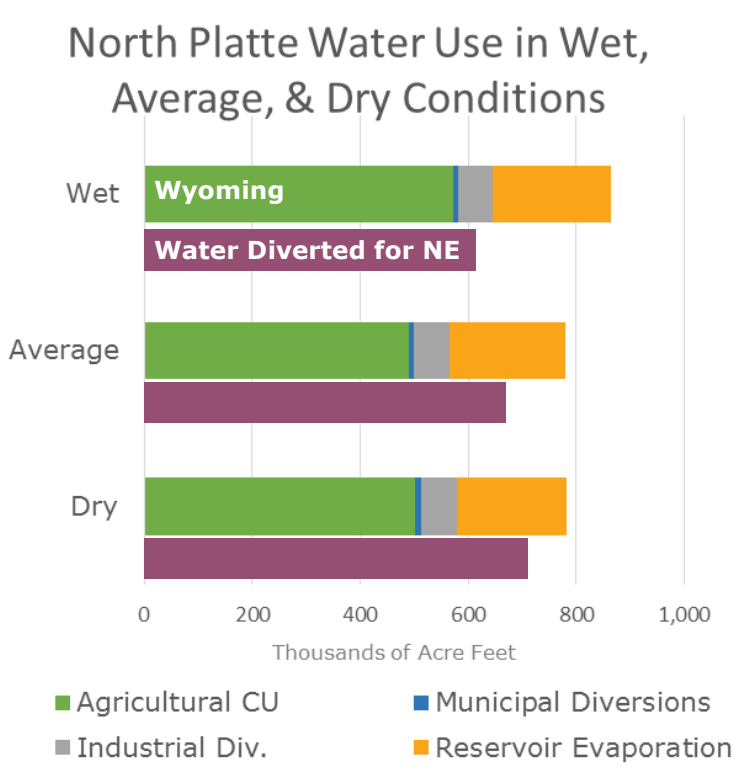
In spite of the result of no seeding effect from the primary randomized statistical experiment, ancillary studies, using physical considerations to stratify the RSE (Relative Standard Error) data, and modeling studies over full winter seasons, led to an accumulation of evidence from the statistical, modeling, and physical analysis which suggest a positive seeding effect on the order of 5 to 15%.

...Using the lower cost estimate for an operational cloud seeding program, along with the range of seeding effects and cloud seeding impact areas, the cost of the water ranges from $27 to $214 per acre-foot. Applying the higher cost operational program option with evaluation, the costs range from $53 to $427 per acre-foot."

MODEL RESULTS

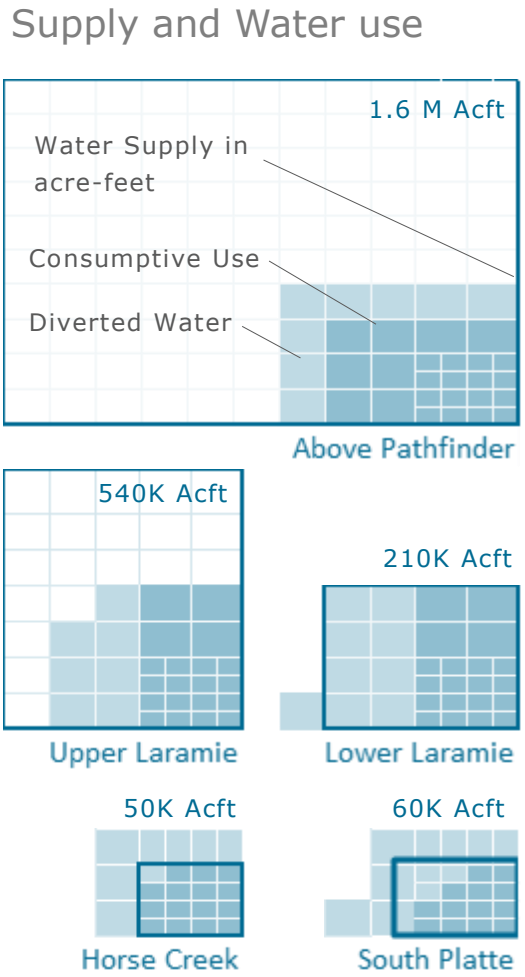
The purpose of the model development for this Platte Basin Plan Update was to develop a water balance within each of the seven subbasins to help determine how much flow each of the subbasins contributes to the North and South Platte River basins. Seven spreadsheet models were developed, one for each of the seven subbasins. The summaries contain information for a dry, average and wet year scenario. The numbers reflect a new study period of 1972 through 2013. See **Volume 2** of the full Plan for model results





WATER DISTRIBUTION. Within the seven subbasins in the Platte River Basin water supply varies considerably. Water supplies generated, diverted for use, and consumptively used on an average stream flow year are shown in the neighboring figure.

Except for the Lower Laramie subbasin, water supply and water usage are not evenly balanced. The North Platte above Pathfinder and Upper Laramie watersheds provide most of the water used in the other subbasins. The Guernsey Dam to the State Line and South Platte subbasins, use more water than precipitation provides. The Crow Creek watershed in the South Platte Basin receives approximately 8,000 acft of water (included in the figure) from the upper North Platte watershed and the Colorado River drainage on the west slope of the Sierra Madre Mountains.



IMPROVE STREAM FLOW MONITORING AND MODELING

Throughout the entire basin, complete records of gage data were very scarce, particularly within the plains and high desert regions. More geographically comprehensive flow data and changes in that data over time could represent a material improvement to water planning in Wyoming.

- Collect precipitation, weather and streamflow data on specific watersheds within the subbasins where the modeling results did not correlate well with the gage data.
- Utilize actual consumptive use values for agricultural depletions and address the timing of return flows.
- Continue irrigated lands mapping. Irrigated land varies with climate conditions, storage water availability, fuel costs and agricultural commodity prices. Continued evaluation of irrigated lands should be done to see if the marked decrease in irrigation is a trend or just a product of a single data year.

RECOMMENDATION

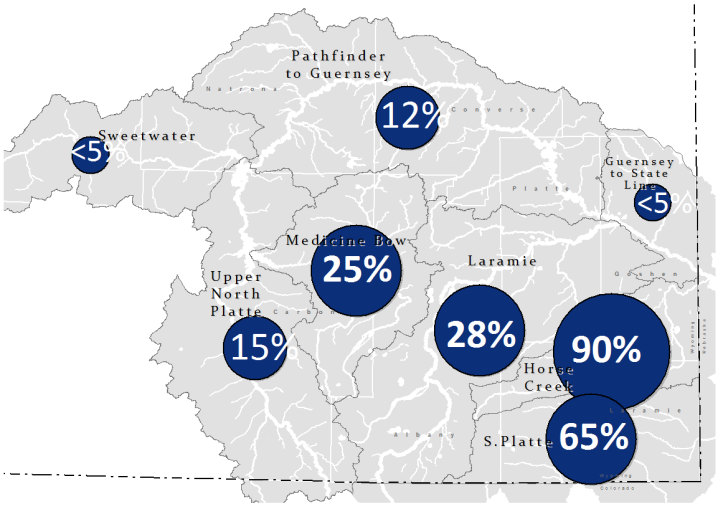
WATER RESILIENCY

Quantifying water availability on a system as managed and sought after as the Platte is difficult and perhaps unnecessary given that water is considered fully appropriated in the basin. However, providing a understanding of how well the system can handle short term disturbance to supply is possible using a few key indicators from the modeling work:

- Water use (relative to the amount of water in the subbasin)
- Access and reliance on groundwater,
- Variability in stream flows from a wet to a dry year, and
- Availability of stored water in reservoirs.

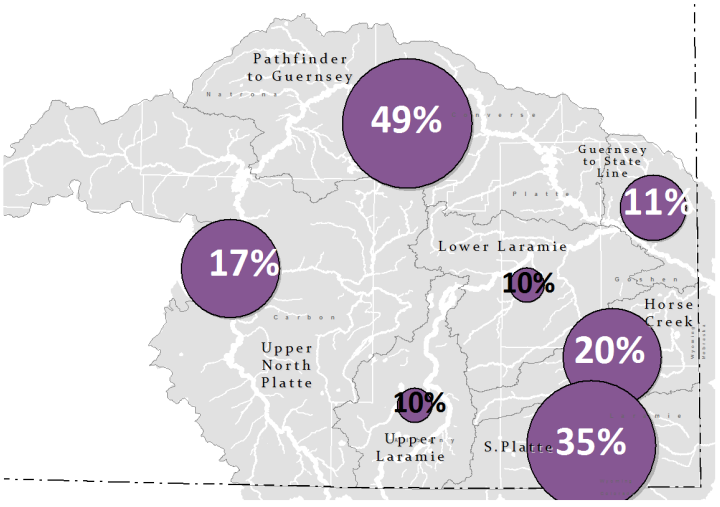
Using these four variables we can get an idea of how resilient a subbasin might be to short term impacts to water supply. For example water users in a subbasin with a highly variable streamflow regime, with a high amount of surface water use and low storage supply would be highly impacted by drought. Conversely, if there are fairly consistent stream flows from a wet to dry year, and a low water use, a drought may not be as serious of a problem.

Annual Water Use



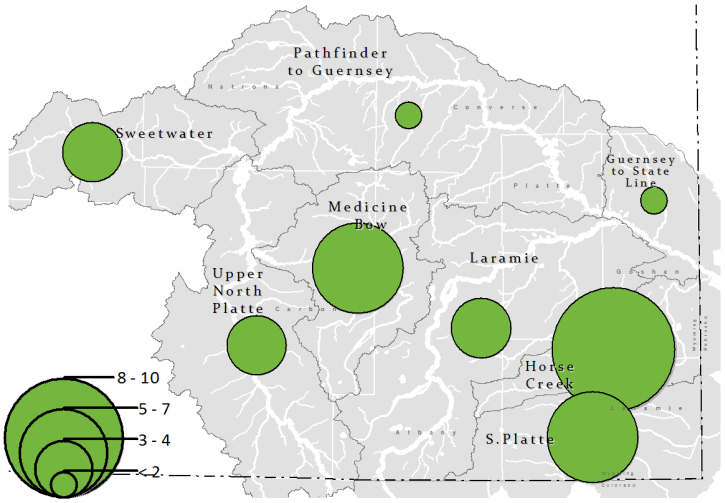
Water Use as a % of annual yield (gains) on average.

Groundwater Use by Subbasin



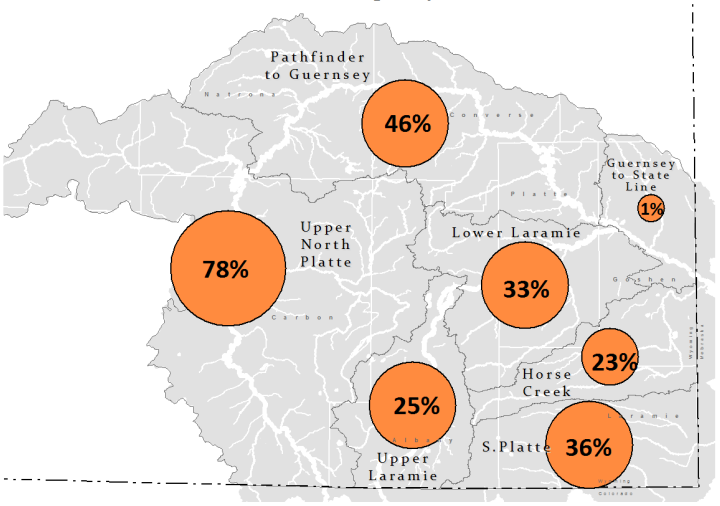
Proportion of consumptive use from groundwater.

Variability of Water Supply Under Existing Conditions



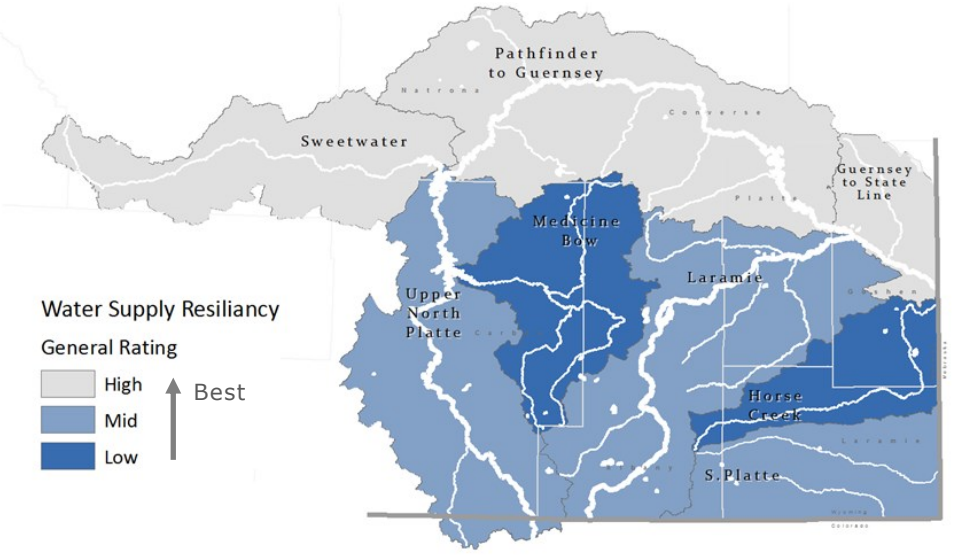
Ratio of annual wet year gains to dry year. Higher is more variable.

Annual Reservoir Storage by Subbasin



Proportion of avg. annual yield (gains) stored in reservoirs.

This map summarizes the four indicators to illustrate short term water resiliency relative to other subbasins within the Platte. A high resiliency rating means a more dependable water supply. The results are described below:



ABOVE PATHFINDER has significant spring runoff available due to the high mountain ranges on either sides of the valley and varies less from a wet to dry year than in lower ranges of the Platte. Even with the highest amount of irrigation of any subbasin, the consumptive use is low compared to the natural yield of the basin. Within in the subbasin the **Medicine Bow** stands out as highly variable stream flows and a relatively high amount of water use. This is somewhat buffered by storage in the basin, however, most of the storage is not available in the Medicine Bow since it is stored in Seminoe and Pathfinder reservoirs. High overall resiliency rating on **Sweetwater** subbasin reflects the low water use average of 6,500 acre feet.

PATHFINDER TO GUERNSEY subbasin is more resilient relative to other subbasins due to availability of reservoir storage, low amount of water use, consistency of stream flows, and significant amount of groundwater use.

GUERNSEY TO STATE LINE has a high resiliency due to the consistency of flows, largely due to regulated flows from Guernsey and other upstream federal reservoir projects.

UPPER LARAMIE has a fairly high amount of annual use to yield, and a lower access to stored water than the North Platte or the Lower Laramie subbasins. With an annual stream flow that is only three times lower on a dry year from wet year the lower variability improves its resiliency.

LOWER LARAMIE has a similar score to Upper Laramie but mainly due to the amount of storage that is available.

HORSE CREEK subbasin gets the lowest resiliency score due to highly variable streamflows from dry years to wet years, a low amount of storage on average under 25% of water yield, and a high amount of water use.

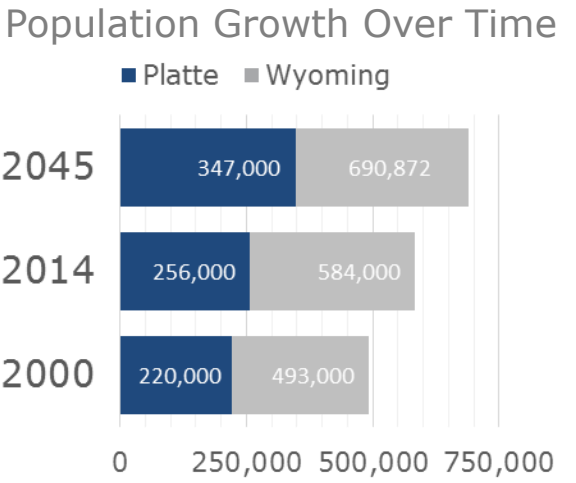
SOUTH PLATTE also has highly variable stream flows, but is moderated by reservoir storage and diversions from outside of the South Platte subbasin and significant groundwater use. For these reasons it has a higher resilience than the similar Horse Creek subbasin.


Water for
Tomorrow

SOCIO-ECONOMIC CHARACTERISTICS

44% of Wyoming's population dwells in the Platte River Basin. Industry, agriculture, government services, higher education and outdoor recreation are the primary economic drivers in the Platte River Basin. The value of the Platte River Basin water resources cannot be overstated…They are the vital economic lifeblood of southeast Wyoming.

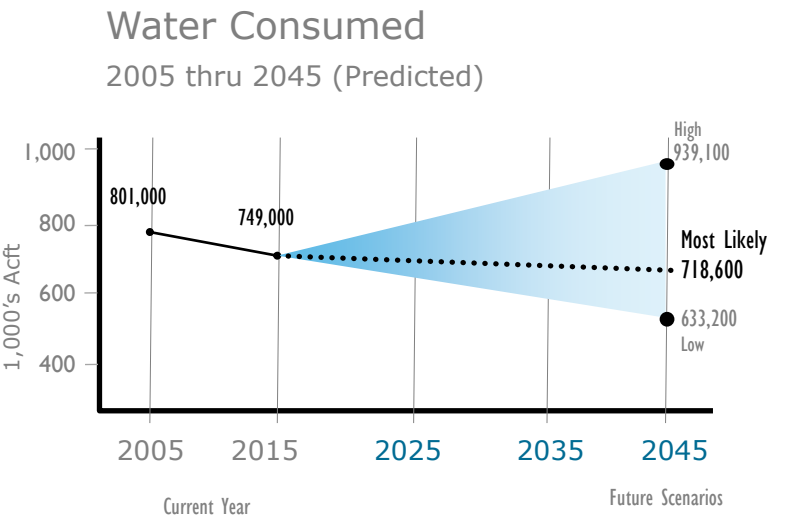
Between 2000 and 2014, the Platte River Basin's population increased by over 36,000 people, or about 16.3%. Eighty percent of the Platte Basin's growth occurred in the South Platte and Pathfinder to Guernsey subbasins. Between 2000 and 2013, in-migration comprised about half the Platte River Basin's population growth as the burgeoning oil and gas industry attracted workers from outside Wyoming. Other demographic changes include an aging population and decreasing household size. The estimates of future population drive the projections of future water demands for the municipal and rural domestic sector.



WATER DEMAND ESTIMATES

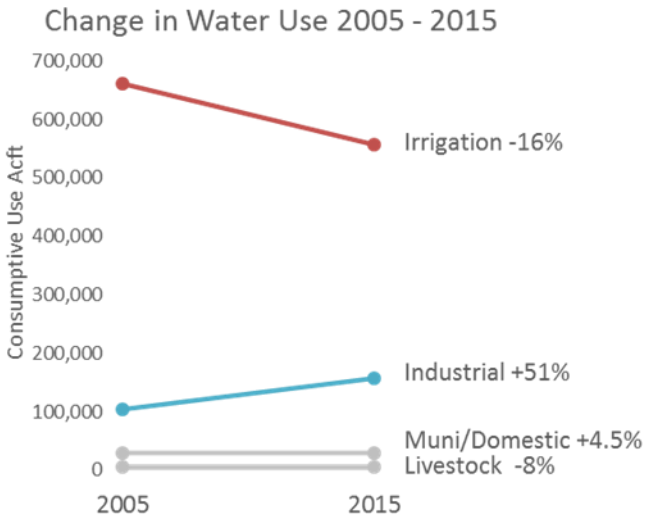
Water demand projections were developed for three alternative scenarios. Water use factors for each water use sector together with projected demographic and economic information were applied to develop annual water use projections under three alternative scenarios, thirty years into the future.

Consumptive use projections for all sectors in 2045 range from 633,200 AF in the low use scenario up to 939,100 AF in the high use scenario depending on the level of future economic activity within the industrial, irrigated agriculture, livestock, and municipal/domestic sectors. The reduction in total consumptive use demand for the mid and low scenarios resulting from an assumed reduction in irrigated acreage. These projections must be considered with a bit of imagination and consideration of historical trends as the future has proven hard to predict.

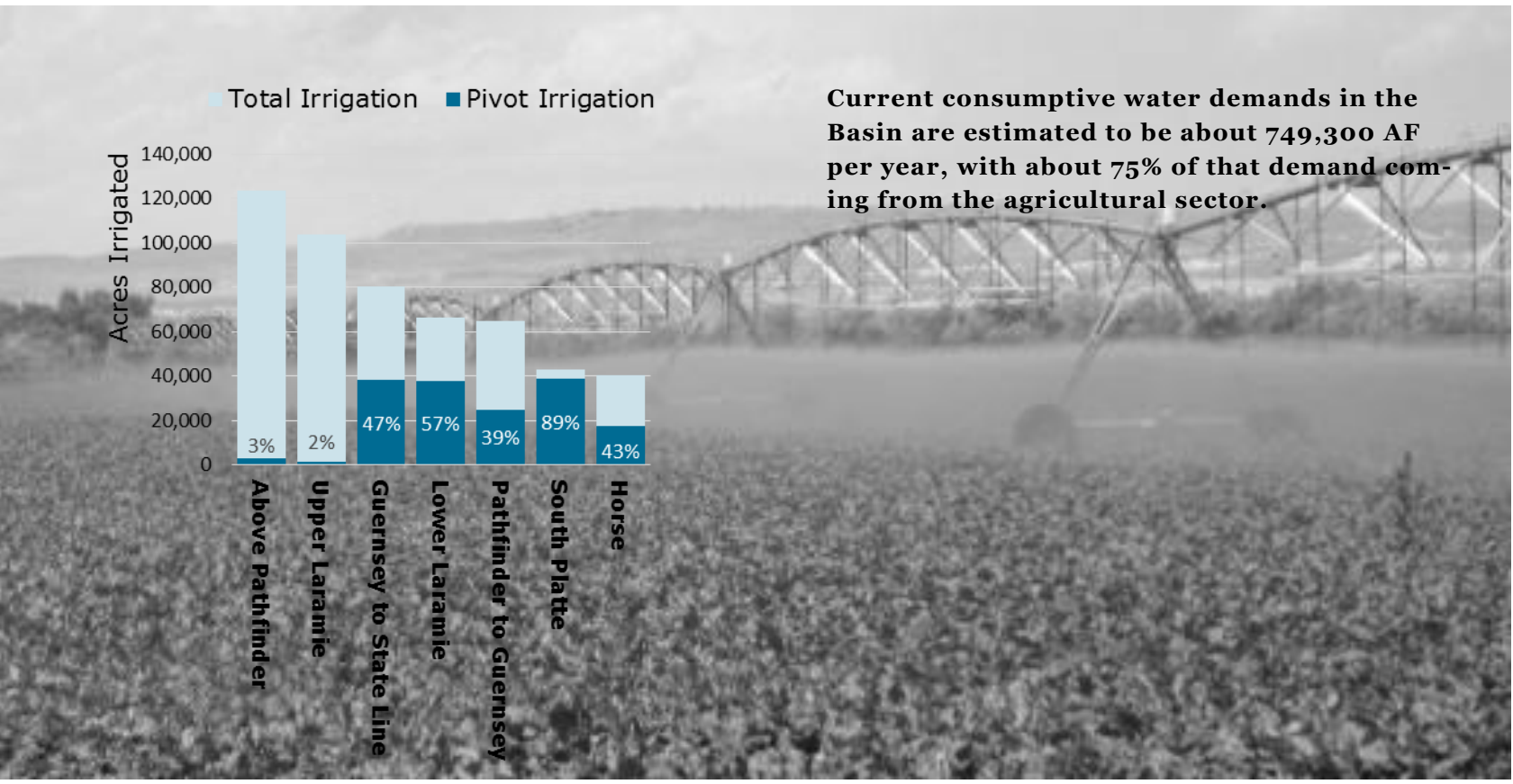


WATER DEMAND ESTIMATES CONT...

Between 2005 and 2015, total estimated consumptive use in the Platte River Basin (under normal year conditions) decreased by about 6.5%. That net decrease was made up of changes in individual sectors: 1) a 16% decrease in total agricultural water demand (due to a reduction of about 88,000 irrigated acres and 30,000 fewer head of livestock); 2) about a 4.5% increase in municipal/rural domestic demand (population growth and changes in per capita water usage); and 3) an almost 51% increase in industrial demands (increased water demands for oil and gas production, mining activity, power generation, aggregate production and other miscellaneous industrial demands).

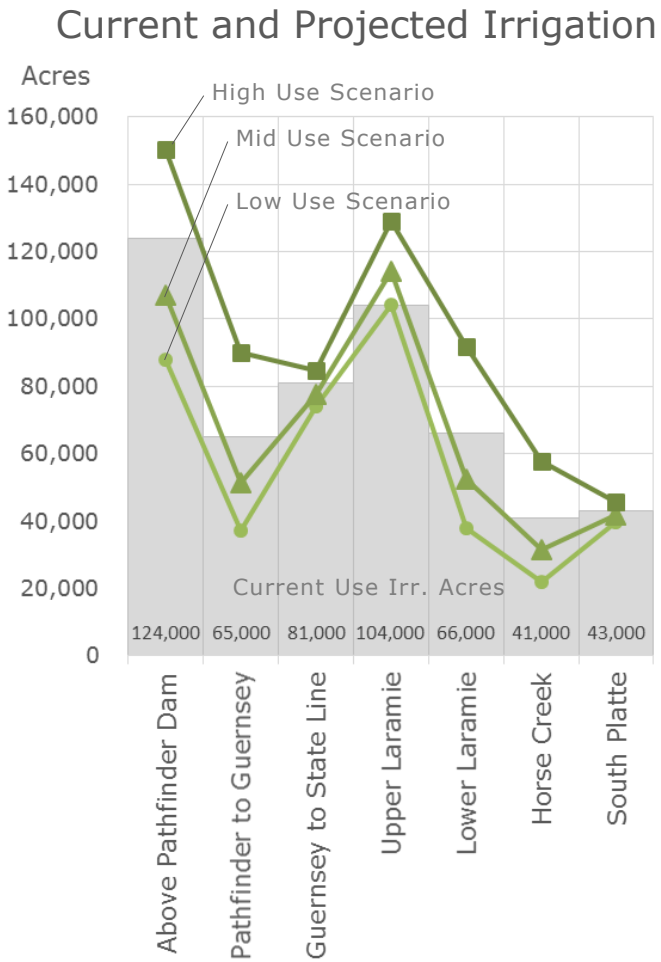


AGRICULTURE. Agriculture is comprised primarily of cattle ranching and hay production. Irrigated acreage has decreased in recent years (a 14% reduction over the last decade), likely due to increases in technology and changes in commodity prices, among other factors. Currently, there were about 524,000 irrigated acres in the Basin and about 656,000 head of livestock, compared to about 613,000 irrigated acres and 686,000 head of livestock at the time of the previous Basin Plan. As a result, Basin wide agricultural water use has decreased somewhat in recent years, although fluctuations in water use do occur from year to year.



Current consumptive water demands in the Basin are estimated to be about 749,300 AF per year, with about 75% of that demand coming from the agricultural sector.

AGRICULTURE CONT... Based on data from the State Engineer's Office Depletions Plan 2011-2013, irrigated acreages varies considerably between sub-basins and years. The Above Guernsey area experienced an 18.6% increase in irrigated acreage in an above average water year, and decreased only 1.5% in a below average water year. This area appears to be far more dependent upon surface water flow for irrigation supplies. Similarly, irrigated land in the Upper and Lower Laramie subbasins increased 18% and 17.6%, respectively, in an above average water year. During a below average water year, irrigated lands in Lower Laramie decreased 3.9%, while those in the Upper Laramie increased almost 14%. The reason for this is unknown, but the limited number of years used for comparison likely has an effect. In contrast, the Guernsey to State Line area exhibited less significant swings in irrigated land of approximately 8% during above and below average years. The stability of this area could be attributed to pumping from triangle groundwater wells and/or regulation in favor of this area.



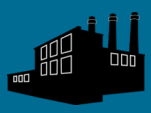
AGRICULTURAL EFFICIENCIES AND WATER SUPPLY AGREEMENTS

Improved diversion works or flumes should be targeted in watersheds where down-stream reservoirs do not fill. More precise diversion controls can increase water passage when in "open river" conditions. Funding more efficient conveyance infrastructure when sourced from a reservoir could extend the reservoir pool by saving water lost in conveyance to the field. Improved on-farm efficiencies also saves water and may improve crop yield, but may lower complementary environmental and recreational benefits from irrigation return flows.

An **interruptible water supply agreement** (IWSA) protects an appropriator with an agreement with another water user. An IWSA allows an agricultural appropriator to temporarily lease their historic consumptive use without requiring a permanent change in their water rights. The IWSA's in Colorado allow for leasing periods with terms up to 10 years and can be renewed up to two times. These agreements allow the agricultural producers to rely on active use of the water right up to 3 years during the 10-year period. The agreements allow for flexible water use based on water supply conditions and the water needs of the two parties. This type of agricultural conservation and efficiency agreement could require Wyoming legislative reform.

RECOMMENDATION

OIL AND GAS. A large portion of the State's oil production comes from within the Basin (about 21% produced in Basin counties in 2002 and about 38% by 2014). Oil production from Basin counties has increased annually through 2015, with crude oil production reaching over 34.5 million barrels in that year. There are three oil refineries in the Basin, which use large amounts of water for cooling towers and steam generation. In 2015, about 16% of the State's natural gas was produced in Basin counties. Annual production in those counties has generally declined in recent years, mainly in response to changes in commodity prices; however, both 2014 and 2015 saw small increases in natural gas production in the Basin, even as total statewide production continued to decline. Basin wide, permitted water use in this industrial sector increased by more than 50% over the last 10 years.



ENERGY AND MINERALS. These sectors have historically added volatility to the Basin economy but also provide high paying jobs and often require a comparatively large amount of water. Permitted water use for uranium recovery and processing operations has increased substantially in the Basin in recent years. All coal mines in the Basin have now closed and no coal is currently produced within the Basin.

POWER GENERATION. In terms of major power generation facilities, the U.S. Bureau of Reclamation (USBR) operates six hydropower facilities within the Basin and the Laramie River Station and Dave Johnston Power Plant are also located in the Basin. In 2014, the 132 MW natural-gas fired Cheyenne Prairie Generating Station began operation. Water demands for power generation have increased slightly in the interim since the previous Basin Plan.

RECREATION. Overall, travel spending in the Basin represented about 35% of all travel spending in the State in 2014 (Dean Runyan, 2015). These activities contribute greatly to the retail trade and accommodation and food services sectors, which are among the largest employers in the Basin. In 2014, more than 12,000 jobs were generated by travel and tourism in Basin counties. Since 2000, travel spending in the Basin has increased about 5% each year, on average.

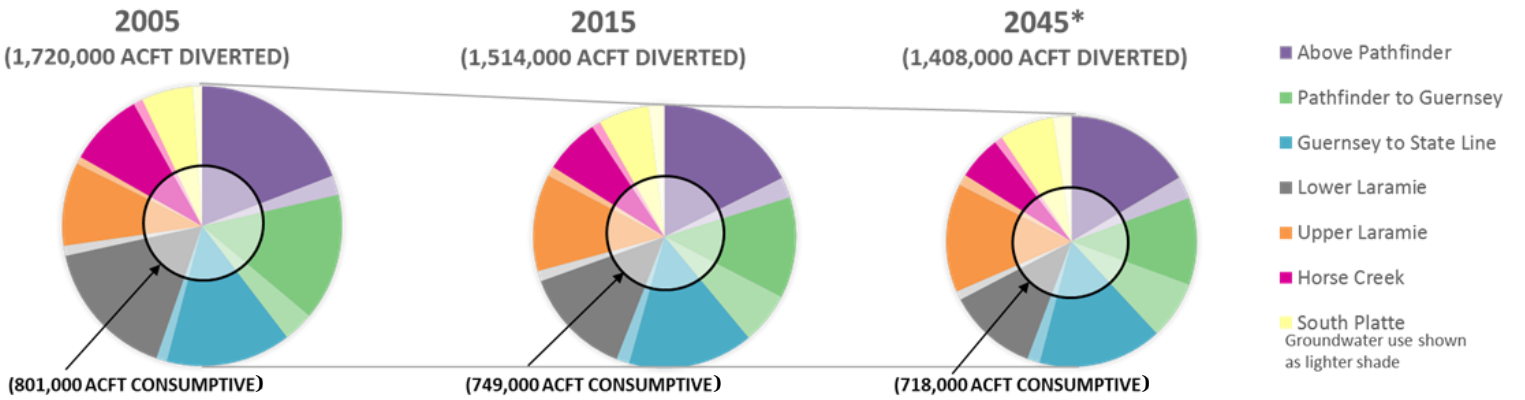
OTHER ECONOMIC ACTIVITY. In addition to the activities described above, the Basin is home to the University of Wyoming in Laramie, the Wyoming State Penitentiary in Rawlins and several large retailers and distribution facilities located in larger cities. However, the Wyoming Ethanol facility in Torrington closed in 2015 and the Western Sugar Cooperative plans on closing its Torrington location by 2017.

WATER DEMAND ESTIMATES CONT…

MID GROWTH SCENARIO FOR 2045. Harvey Economics projected three scenarios, a high growth, mid, and low growth scenario. The mid growth scenario is included in the overview, as it is determined to be most likely of the scenarios. In both normal and high demand years, total Basin water diversions are projected to decrease by about 7%. Consumptive use is projected to decrease by about 4%. The projected difference in aggregate diversions and consumptive use amounts to roughly 104,000 acre-feet and 30,000 acre-feet, respectively. See **Volume 4** of the full Plan for more on these scenarios.

Total agricultural water demand declines by about 11% over the projection period, measured in terms of diversions or consumptive use. Agriculture continues to comprise the vast majority of total water demand; agriculture is responsible for 82% of total water diverted and roughly 70% of total consumptive use in year 2045. Consumptive use is only 44% of total diversions for irrigated agricultural production within the Basin, reflecting low efficiencies and reuse of return flows.

Under the Mid Scenario, while municipal water demand increases by 37% over the 30-year projection period, it remains a relatively small sector, accounting for only 4% of total water diversions and total consumptive use. Industrial water diversions and consumptive use in the Basin industrial sector are projected to increase by 11% from current levels. Industrial water use will become a larger portion of the overall Basin water demand, increasing to 12% of diversions and 24% of consumptive use in a normal demand year 2045.



RECREATION AND ENVIRONMENTAL CONSIDERATIONS

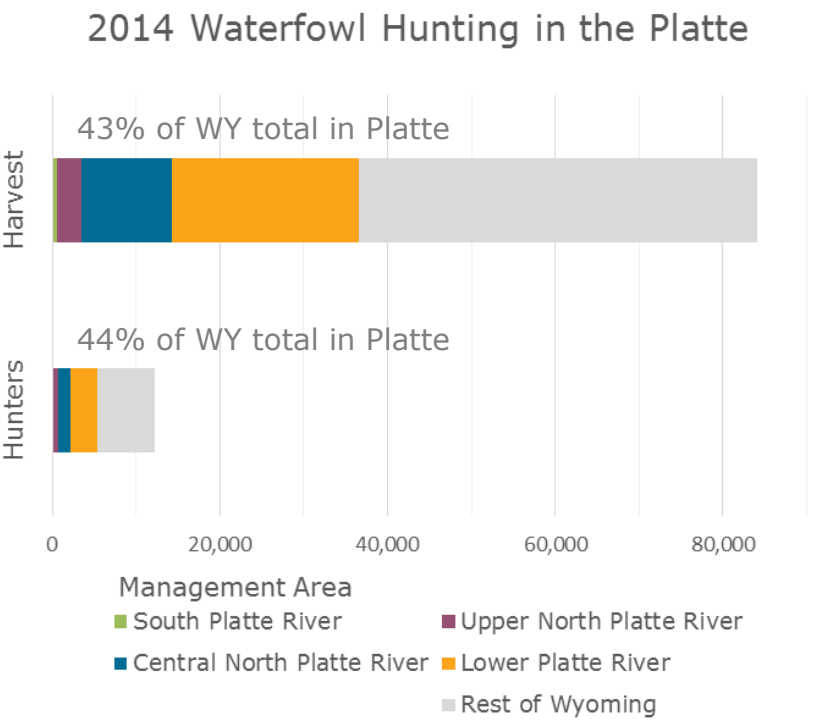
Wyoming is a premier, world class, destination for hunting, fishing, camping and all forms of outdoor recreation and tourism. The quality of these assets depends upon the availability of adequate water supplies and existing land uses that need to be properly protected and enhanced. The existing agricultural water uses provide for a ranching and farming lifestyle that can be very complementary to fish, wildlife, and recreation resources. Adaptive management strategies and agreements to conserve and transfer water supplies to meet future environmental and recreational (E & R) needs can maintain and expand future recreation opportunities. E & R water uses include: fishing sites, whitewater rafting, trout streams, In-stream Flow Segments, crucial stream corridors, Trout Unlimited projects, Aquatic Enhancement Priority Areas, and wetlands. The relationship between these water uses and traditional permitted water uses provides the basis for categorizing E & R use into Protected water uses, E & R Complementary, or E & R Competing water uses. See **Volume 3, Section 3.5** for categorized uses by subbasin.

90

Miles

Miles of protected stream flows. In-stream flows represent a permitted and thus protected water use. There are 13 instream flow segments in the permitted through the Wyoming State Engineer on the North Platte River.

All seven subbasins have significant flat water recreation resources that provide outstanding fishing, boating, wildlife viewing and hunting opportunities. In addition, world class stream fisheries abound in the Above Pathfinder and Below Pathfinder subbasins. Numerous ponds, small lakes and wetlands are scattered throughout the basin and the Laramie Plains support over 100,000 acres of wetlands and is an important breeding area for waterfowl, shorebirds, several species of hawks and numerous songbirds. The Goshen/Lower Platte wetlands complex comprises an additional 7,100 acres of pond, marsh, and wet meadow habitats in addition to thousands of acres of riverine riparian habitat. Although the acreage of the Goshen/Lower Platte wetlands is less than the Laramie Plains complex, these wetlands provide over winter refuge for thousands of geese and ducks attracting local and out of state waterfowl hunters. In all seven subbasins, there are streams that support game fish populations and provide and habitat for numerous plant and animal species. However, many streams in the eastern portion of the Basin are on private land.

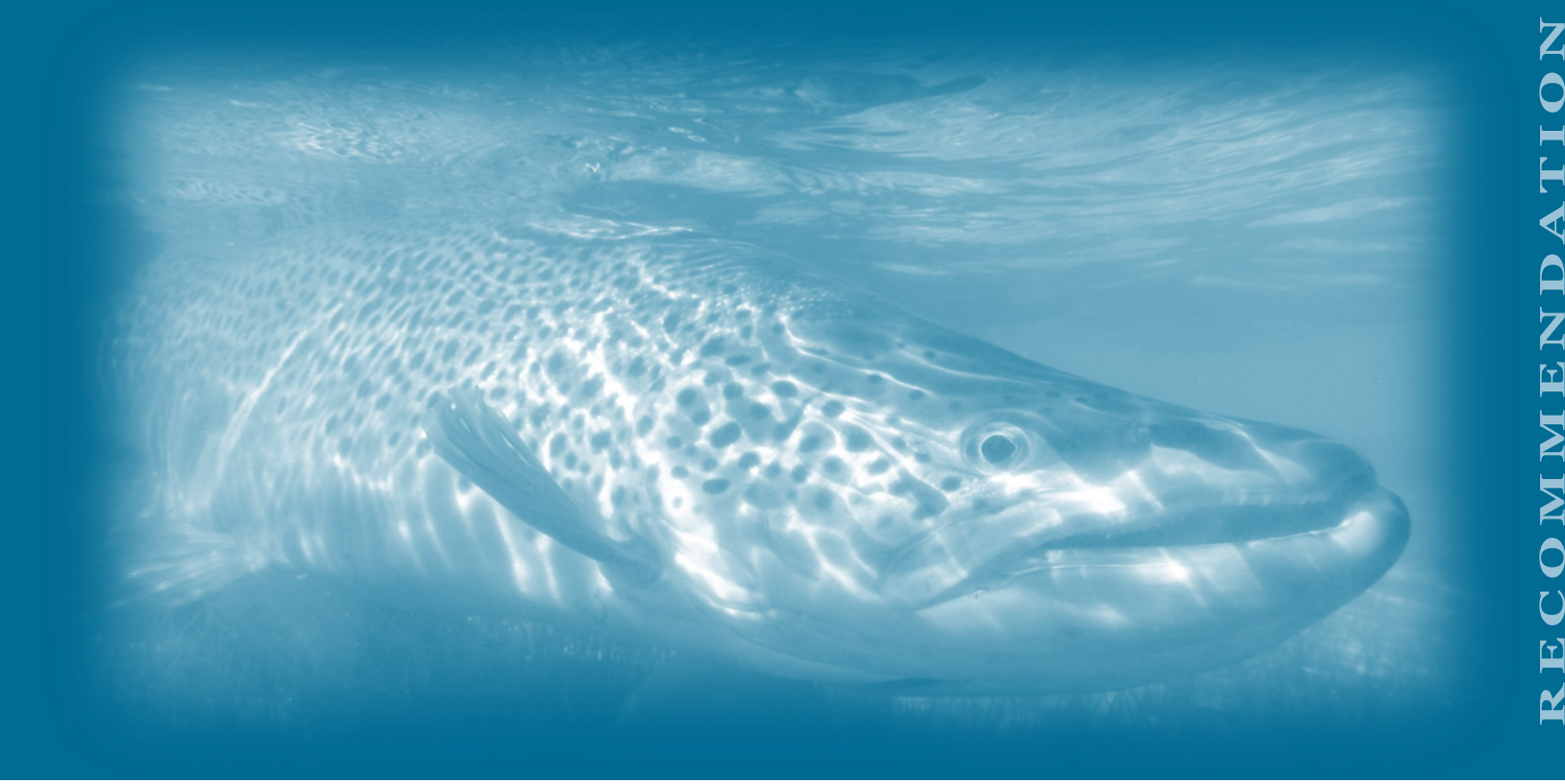


ENCOURAGE RECREATIONAL AND ENVIRONMENTAL USES

Platte River Basin water supplies in Wyoming are heavily regulated and limited by court decrees, federal project water contracts, and endangered species agreements. New traditional, out-of-stream water uses will be difficult to grow. Recreational and environmental in-stream uses supported by existing out-of-stream water uses hold promise to bring tourism and money into Wyoming. There is little data available to accurately determine the economic value of the recreation sector within the Platte River Basin. However, there are numerous opportunities to enhance the environment and provide recreational attractions without impeding traditional uses:

Reallocation of water (temporary and permanent) to water focused recreation and wildlife facilities. In Wyoming, a water right is tied to the land, and in some cases a change in Wyoming statute and State Engineers Office administrative rules may be necessary:

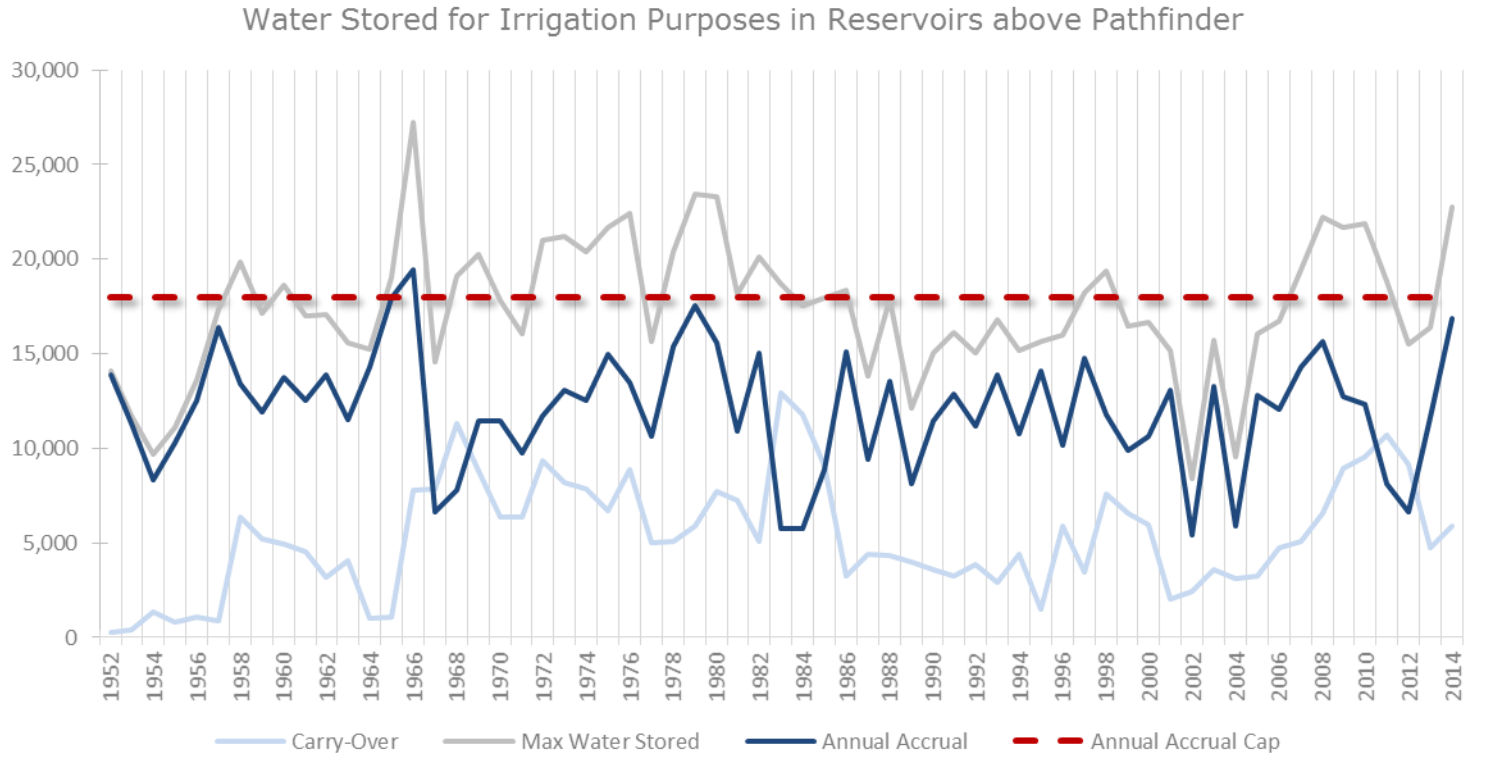
- Allow for the temporary change of water rights acquired through purchase, gift, or lease for up to a 2-year term. These temporary water right transfers are subordinate to all other permanent water rights. When the 2 -year term ends, the appropriation automatically reinvests back to the original water right unless the agreement is renewed. This is especially important if the trend for agriculture to use less water continues. The 2016 Platte River Basin Update identified that irrigators used 50,000 acre-feet less than in 2006.
- Explore the potential to raise additional revenue through user fees to enhance the environment and recreation facilities. These could include camping fees at some recreation areas and day use or annual use passes to recreation areas.
- Encourage development and enhancement of privately owned recreation areas.
- Target the Colorado Front Range market for advertising the water based recreation opportunities in southeast Wyoming.



STRATEGIES AND RECOMMENDATIONS

As has been previously noted, the water development constraints imposed by the courts and endangered species requirements in the Platte River Basin are significant. However, there are numerous opportunities to meet future agricultural, municipal and industrial water supply needs in the Platte watershed. For more information on **Strategies see Volume 5, Section 5.7**.

- Operational Enhancements – Existing Storage and Conservation
- Evaluating re-operation of Glendo Reservoir
- Evaluating reservoir storage in the Above Pathfinder Subbasin (Page 23)
- Municipal and Agricultural Water Use Conservation
- Implement Weather Modification (Page 9)
- New, Imported, Exchanged, and Transferred Water Supplies
- Industrial Water Use Changes
- Transbasin Diversions
- Watershed Planning and Small Storage Program (Page 5)
- Control and Enhancement of Groundwater Resources
- Regulatory Controls on Groundwater Use Imposed by the Wyoming State Engineer
- Aquifer Storage and Recovery
- Cooperative agreements between agricultural and recreation and environmental organizations, with the shared goal of conserving irrigation water for the benefit of multiple water users by wisely and effectively meeting agricultural water needs as well as addressing the water needs of fish and wildlife, recreation and the environment. (Page 21)



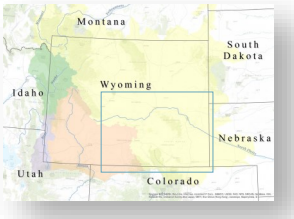
STRATEGIES CONT.. Many of the water opportunities and strategies are successfully being implemented in the Platte River Basin with new and expanded activities anticipated in future including:

- Developing and relying upon non-hydrologically connected groundwater sources for existing and new wells serving municipal and other water uses.
- Laramie County Groundwater Regulatory Controls
- The development and reliance on raw water sources to irrigate municipal green areas. Municipalities and other entities are performing feasibility analysis studying the development of raw irrigation for new or existing golf courses and other green areas.
- Expansion of wastewater reuse programs such as those planned for the City of Cheyenne's successful reuse system.
- The Pathfinder Modification Project provides water storage helping to secure water supplies
- Cooperative municipal and agricultural conservation projects such as the Casper-Alcova Irrigation District and the City of Casper canal lining project that prevents seepage. The saved irrigation water partially meets municipal water needs.

MAXIMIZING WYOMING'S STORAGE QUANTITIES

In accordance with interstate Decree requirements, Wyoming is only able to accrue up to 18,000 acre-feet of water from the North Platte River and its tributaries above Pathfinder Reservoir for irrigation purposes during any one year. **Wyoming's annual accrual amount has averaged 12,038 acre-feet** since reporting began in 1951. The estimated overall total storage capacity of all the reservoirs (active and inactive combined) is 27,525 acre-feet so there is a possibility of exceeding the cap in any one year; although Wyoming has never exceeded the accrual cap. A potential non-structural recommendation is to facilitate coordination of storage accruals amongst the reservoir owners. Reservoir operational plans that address targeted accrual quantities based on carryover amounts and anticipated runoff would be developed for the largest reservoirs. The new measuring device equipment installed on the largest 11 reservoirs allows for near real-time monitoring of accruals and maximum storage amounts. See **Volume 3, Section 3.6** of the Platte Basin Plan for more information.

RECOMMENDATION



WYOMING STATUE 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, current uses of water, activities that affect the quality of water, and activities that are dependent on, affected by, or relate to water and uses of water;

(ii) Identify and describe prospective needs and demands for water and opportunities for water development, control, withdrawal, storage, conservation, supply, distribution, drainage and disposal;

(iii) Identify and specify for each plan appropriate state, regional and local goals and objectives for management of water resources, including the obtaining of economic efficiency and a desirable distribution of income, the protection of the health, safety and welfare of the people, the protection and encouragement of particular industries and activities, the protection and enhancement of the environment and recreation; and

(iv) Evaluate and compare prospective and anticipated uses and projects, including combinations and coordinations thereof, uses of alternative sources of water and alternative uses of water, in terms of goals identified pursuant to paragraph (iii) of this subsection.

This document is a planning tool developed for the Wyoming Water Development Commission. It presents estimated current and future water uses of Wyoming's Platte River Basin (Platte Basin). This Plan has not been prepared to determine compliance with or administration of state law, federal law, court decrees, interstate compacts, or interstate agreements. This document provides an highlights the findings and results of the 2017 Platte River Basin Plan update *(http://wwdc.state.wy.us/)*.