

THE YAMPA RIVER

WATER, ENERGY, AND CLIMATE CHANGE

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Yampa River photos used in this report were contributed by Kent Vertrees of [Friends of the Yampa](#), unless otherwise noted

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LITTLE YAMPA CANYON ON THE YAMPA RIVER

INTRODUCTION

THIS REPORT IS AIMED AT ESTABLISHING NPCA'S KNOWLEDGE BASE REGARDING THE YAMPA RIVER. IT EXAMINES THE PHYSICAL FEATURES OF THE RIVER, EXISTING USES, MANAGEMENT PRACTICES, INVOLVEMENT OF LOCAL ACTORS, AND THE FUTURE CHALLENGES ON THE RIVER. THE WATER ON THE YAMPA HAS MANY COMPETING USES, AND NPCA'S INVOLVEMENT IN BALANCING ENVIRONMENTAL FLOWS AGAINST THE DEMANDS OF DEVELOPMENT AND ENERGY USE CAN HELP ENSURE A HEALTHY RIVER ECOSYSTEM.

The life of the Yampa River has many important lessons, it remains the wildest tributary to the Colorado River system and makes up a significant share of the Upper Basin's water flows. The Yampa River provides a 3rd of flows to the Green River, which is the largest tributary to the Colorado River. With the exception of a few reservoirs, the Yampa has survived thus far, undammed and in harmony with the people who depend on this water. Over the years, the many stewards and managers watching over the

Yampa have beaten back large infrastructure projects to keep this river wild and free flowing. Climate change, the biggest anthropogenic threat of all, is causing snowpack to melt earlier, and adversely impacting base flows in this largely melt water fed river. As demand increases for the water provided by this dwindling resource, what does the future hold for the last wild river of Colorado? Can the Yampa continue to ebb and flow into the future, and still balance the needs of its people and the environment?



NPCA'S ROLE

THE LONG RUNNING DROUGHT IN THE SOUTHWEST WILL CONTINUE TO WORSEN AS TEMPERATURES RISE, SOME CLIMATE SCIENTISTS ARE CALLING IT A "MEGA-DROUGHT" WHILE OTHERS ARE SEEING THIS AS AN INCREASING TREND TOWARDS ARIDIFICATION OF THE REGION. THE IMPACTS OF THIS DROUGHT ARE EVIDENT IN THE WATER SYSTEMS OF THE STATE OF COLORADO AND AS A MAJOR TRIBUTARY TO THE COLORADO RIVER, THE IMPORTANCE OF CONSERVING THE YAMPA RIVER CANNOT BE UNDERSTATED.

In the 2018 water year, river basins in Colorado had precipitation levels from 25% to more than 50% below long running averages. The Yampa River basin received 75% of an average year's precipitation, and many analyses show that this drought is likely the new normal for the region. High temperatures and low precipitation are causing harm to both natural and built environments. Demand for an increasingly scarce resource is increasing, and reservoir levels across the state are dropping drastically. Heat and low flow conditions are also stressing fish populations and a large number of fish kills are regularly being reported across the state. The human side of water scarcity is evident in the tagged and shut off water diversion for agricultural users as rivers, including the Yampa River are placed on call. Voluntary and mandatory closures across the state's rivers are on an all-time high. Water managers are working to find new ways of mitigating shortages; at the interstate, state, and town levels, balancing the competing water needs of various stakeholders, and often working with limited capacity and funding.

Add to this the overarching obligations of the state of Colorado to the system of Colorado River Basin. The prior appropriation system of water rights in the West means that Colorado may have to set aside its own water needs and deliver water to the lower basin whenever a compact call inevitably happens. With all of its intricacies and stakeholders, solving the water issues of the Colorado River with justice, equity, and environmental integrity might be amongst the most pressing challenges of the 21st century in the country.

The Yampa River is one piece in this big complicated puzzle, but one that is important to NPCA's work for the protection of parks and park adjacent lands. The City of Steamboat Springs located close to the Yampa River headwaters has already taken an active role in the management of this water and creating plans to mitigate shortages. The Stagecoach Reservoir and its managing entities have also partnered with local and national organizations to manage low flows and keep a minimum level of water flowing in the river during dry years. Additionally, two coal plants in the Yampa River Basin are shutting down in the next decade, the Hayden and Craig Power Plants hold relatively senior rights to a significant amount of water. This water made available by their closure is an important asset for many stakeholders, and provides a chance for environmental groups to secure instream flows for restoring river health. NPCA's involvement will be crucial in securing future water rights for supplementing receding base flows and ensuring that Dinosaur National Monument located downstream to other users, continues to receive an adequate amount of water. The prospect of expanding this monument to National Park status also hinges on the availability of water. The importance of water conservation, and balancing developmental needs with environmental needs in the Yampa River Basin cannot be overstated. The remainder of this report provides context for wider issues, background on its management history, and current efforts. At the conclusion of this report, NPCA specific recommendations are listed, and additional resources are available to begin work on the most pressing action items.

GEOGRAPHY OF THE YAMPA RIVER

THE 250 MILE STRETCH OF THE YAMPA RIVER STARTS IN THE FLATTOPS WILDERNESS AREA IN NORTHWESTERN COLORADO¹. THE RIVER FLOWS NORTH, PAST THE CITY OF STEAMBOAT SPRINGS, AND THEN TURNS WEST, FLOWING TOWARDS ITS CONFLUENCE WITH THE GREEN RIVER AT DINOSAUR NATIONAL MONUMENT - RIGHT AT THE EDGE OF COLORADO'S WESTERN BORDER².

The basin size is approximately 7660 square miles with the highest elevation as 12,200 feet at Mount Zirkel in the park range, and the lowest elevation is 5100 feet at Echo Park, where it meets the Green River³. Average annual rainfall varies from 60-10 inches annually⁴. Similar to precipitation, Yampa's annual flows vary greatly, with a range from 0.5 - 2.3 million acre feed MAF³. With average annual flows at approximately 1.3 MAF, the Yampa River makes up a third of the Green River flows, and ultimately contributes to 15% of the total streamflow out of the Colorado River. During peak years, the Yampa has enough runoff to make up almost the entire share of the Colorado River water that Arizona is entitled to annually (2.8 MAF annually).

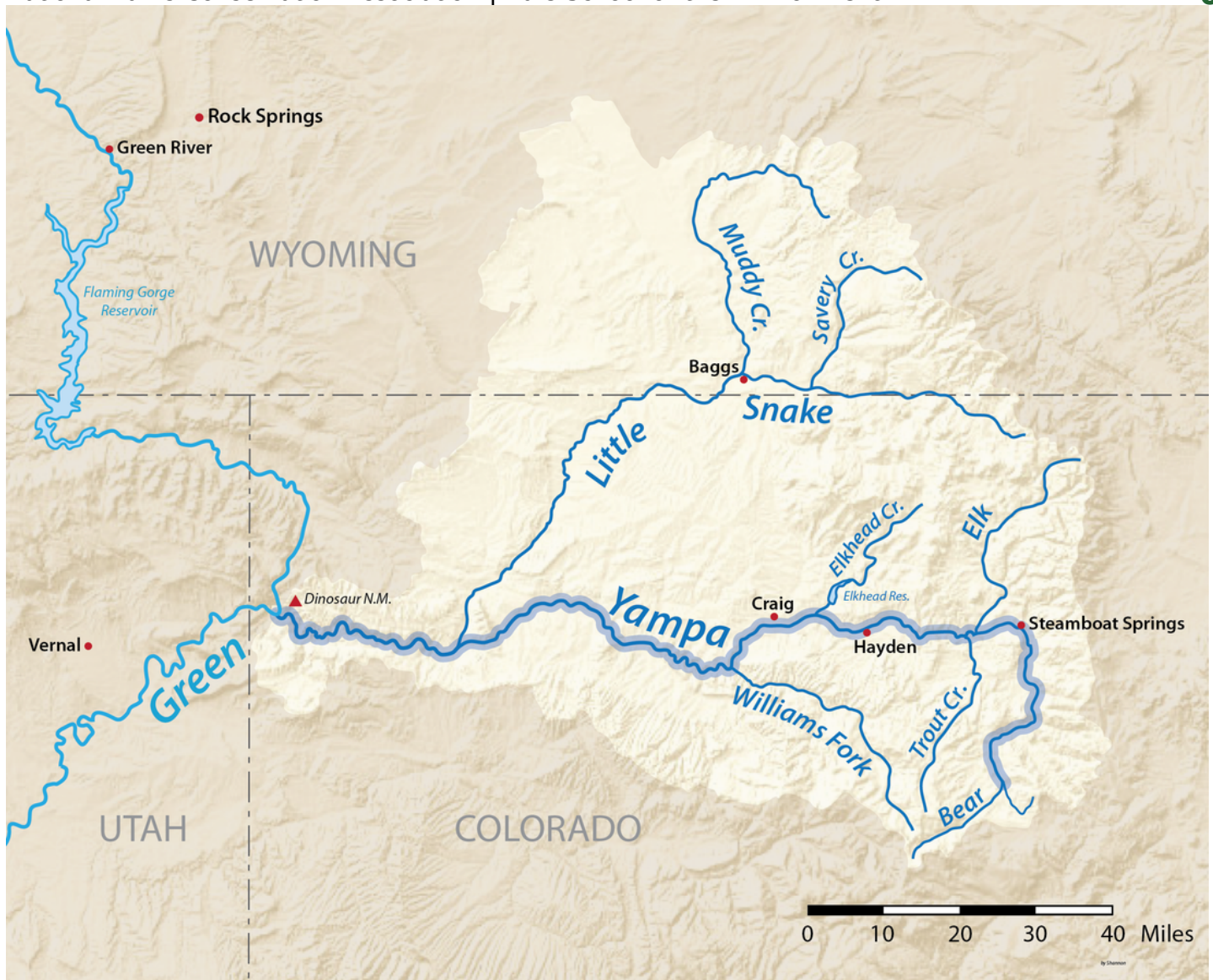
The Yampa River flows mostly wild and free, with the exception of small reservoirs located close to the headwaters. It's the main stream in the basin, beginning at the junction of Bear River and Chimney Creek, other tributaries including Walton Creek, Fish Creek, Trout Creek, Elk River, Elkhead Creek, Fortification Creek, the Williams Fork River, and the Little Snake River all feed water into the main stem of the river. The absence of large federal dams and diversions on the Yampa make it an anomaly as compared to other

western rivers of the same size. The Yampa is one of the wildest rivers in the west, and the last free flowing tributary with significant contributions to the Colorado River System.

The status of Yampa River as the last free flowing tributary to the Colorado River can be debated because of the presence of the two reservoirs in the headwaters, and the series of small agricultural, municipal, and industrial diversions on its winding way down to the Dinosaur National Monument. The basis of Yampa River's claim to wilderness lies in the fact that it still retains a natural hydrograph. The river is able to flood its banks at peak flows and recede to bare trickles at times of minimal flows. Flows in the Yampa river are dominated by snowmelt as its drainage basin is located at a high elevation. Majority of the precipitation occurs as snow and melts over a relatively short period of time in spring and early summer⁵.

The upstream reservoirs on the Yampa are not big enough to attenuate base flows to a constant level during times of scarcity, nor are they big enough to hold back flood waves during times of abundance. Mostly, the Yampa river continues to flow with minimal alterations to its hydrology.





MAP SHOWING THE YAMPA RIVER AND ITS TRIBUTARIES AS IT MAKES ITS WAY THROUGH COLORADO AND JOINS THE GREEN RIVER (SOURCE: AMERICAN RIVERS)

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2. "Yampa River | American Rivers". *American Rivers*, <https://www.americanrivers.org/river/yampa-river/>. Accessed 14 Aug 2020.
3. "Yampa River Statistics, Facts & Maps - Friends Of The Yampa". *Friends Of The Yampa*, <https://friendsoftheyampa.com/stats-facts-maps/>. Accessed 14 Aug 2020.
4. "Yampa River Basin Information". *Dnrweblink.State.Co.Us*, 2009, <https://dnrweblink.state.co.us/cwcb/ElectronicFile.aspx?docid=146636&dbid=0#:~:text=On%20the%20main%20stem%20there,over%20any%2010%2Dyear%20period.>
5. "Upper Yampa River Watershed Plan". *Friendsoftheyampa.Com*, 2016, <https://friendsoftheyampa.com/wp-content/uploads/2018/09/Upper-Yampa-Basin.pdf>.

DIVERSIONS ON THE YAMPA RIVER

SMALL SCALE WATER RESOURCE DEVELOPMENTS ON THE YAMPA HAVE BEEN ONGOING SINCE THE LATE 1800’S, THE EARLIER DIVERSIONS WERE IN THE FORM OF DITCHES AND STORAGE SYSTEMS FOR AGRICULTURE. AGRICULTURAL WATER USE MAKES UP A SIGNIFICANT PROPORTION OF WATER DIVERTED FROM THE RIVER. IRRIGATION AREAS ARE PRIMARILY FOCUSED IN MOUNTAIN MEADOWS, CATTLE RANCHES CLOSE TO THE HEADWATERS AND UPPER BASIN AREAS CLOSE TO ELK CREEK, AND THE LITTLE SNAKE RIVER.¹

The Allen Basin and Stillwater reservoirs, two of the earliest projects were built in the headwaters of the Bear River (one of the main tributaries to the Yampa) to attenuate late summer **irrigation water shortages**¹. In the 1950’s municipal water development began with the town of Steamboat Springs. The amount of water diverted increased significantly with the creation of two coal powered electric generating stations: The Craig and Hayden Power Plants. Later water

resource developments, of which Stagecoach reservoir is the most significant, were the result of water management efforts among different stakeholders. Steamboat Lake, Elkhead Reservoir, and Yamcolo reservoir were jointly created by Colorado Division of Parks and Outdoor Recreations, Colorado Division of Wildlife, and Craig and Hayden Power Plants to supply water for recreation, energy development, and irrigation¹.

Key Water Resources Developments

Date	Description
1939	Stillwater Reservoir
1956	Fish Creek Reservoir
1963	Craig Station Ditch and Pipeline
1964	Cheyenne Stage I
1965	Steamboat Lake
1974	Elkhead Reservoir
1977	Lake Catamount
c. 1979	Cheyenne Stage II
1981	Yamcolo Reservoir
1988	Stagecoach Reservoir
1996	Fish Creek Reservoir enlargement
2003	High Savery Reservoir

**TABLE SHOWING THE WATER RESOURCE DEVELOPMENT PROJECTS ON THE YAMPA RIVER
(SOURCE: COLORADO DEPARTMENT OF NATURAL RESOURCES)**

STILLWATER RESERVOIR

This is located on the Bear River tributary of the Yampa, and is the most upstream of all water developments. Owned by Bear River Reservoir Co, the approximately 5175 acre-feet of water from this reservoir is primarily used for supplemental irrigation purposes. The water rights on Stillwater were appropriated in January 1935¹. The reservoir is able to hold approximately 6392 acre-feet of water, however only 5175 acre-feet is allocated among 22 users. The upstream and remote location of the reservoir causes it to be filled during average and above average years. As flows continue to diminish in an increasingly warmer climate, the water users on Stillwater may see negative impacts on the amount of water flowing into the reservoir. Since this reservoir is not on the main stem of the Yampa River, only about 58% of the water from the reservoir is diverted to areas within the Yampa River basin, the rest is attributed to drainage areas outside of the basin¹.

YAMCOLO RESERVOIR

This reservoir is owned and operated by the Upper Yampa Water Conservancy District (UYWCD). Similar to Stillwater, Yamcolo is also used for supplemental irrigation water in the Bear River/and upper reaches of the Yampa River valley. The storage capacity for Yamcolo is slightly higher than Stillwater at 9,096 acre-feet¹. However, the reservoir maintains a dead storage/or conservation pool storage of 1086 acre-feet, bringing its active storage capacity to approximately 8,010 acre-feet. Of the active storage water, approximately 3,000 acre-feet goes to the Yamcolo Irrigators Association for irrigation, and 4,000 acre-feet goes to Colorado-Ute Electric Association (a predecessor of Tri-State Generation and Transmission Association, Inc) for industrial uses.

Interestingly, water rights on the Yamcolo reservoir were appropriated for 11,471 acre-feet which is in excess of the reservoir's total storage capacity, and also highlights a bigger issue with

water rights appropriation in the west. If all appropriated water rights in the reservoir were to be used, there would be no conservation pool of water left.

STAGECOACH RESERVOIR

The biggest water development facility on the Yampa, located on the main stem of the river it is also owned and operated by UYWCD. As compared to other projects, Stagecoach has a significantly higher storage capacity of approximately 36,000 acre-feet, with 3,275 acre-feet of dead storage¹.

Work on the reservoir started in the 1980s, with the primary goal to supplement runoff in low flow years and to provide a reliable source of water for agricultural lands located near the Yampa River headwaters. 1977 was a major drought year, when some ranchers had failed harvests, unable to secure winter feeds, many had to sell their herds². In 1983, the Stagecoach project was decided on by the Board of the Upper Yampa Conservancy District (UYWCD) and aimed to mitigate the low flow problem as both the population and economy of Northwest Colorado continued to grow. UYWCD describes Stagecoach as a multipurpose conservation reservoir, it provides water for agricultural irrigation, surrounding municipalities, and industry. The reservoir also helps generate 800 kilowatt hours of hydroelectric power, and supports a recreation industry³.

Within Stagecoach approximately 11,000 acre-feet of water is allocated for industrial use by Tri-State Utilities, 2000-acre feet is allocated to municipal users including the city of Steamboat Spring, and town of Hayden among others, recreation water and dead storage is approximately 18,275 acre feet, and 2000 acre-feet is unallocated municipal and industrial water¹. Stagecoach reservoir also has some conservation features incorporated within its design. The reservoir, hydro dam, power plant, and the surrounding land is owned by the UYWCD. However, the reservoir and land are also

part of the Stagecoach State Park, and management of recreation and conservation features is overseen by Colorado Parks and Wildlife⁴.

To the west of the reservoir is an 80-acre wetland aquatic habitat refuge, an additional 124 acres of wetlands are also present surrounding the reservoir. On the north side, 642 acres have been dedicated to big game habitat, and UYWCD provides approximately \$9000 annually to Colorado Parks and Wildlife for fish stocking in the reservoir³. Active management of fisheries at Stagecoach offers rainbow trout and northern pike fishing opportunities for visitors. Fish habitat structures downstream of the dam aim to keep the river ecology intact, the reservoir also has structural provisions to keep release temperatures at an optimum level for trout. Surrounding the reservoir is a buffer zone that provides public access to the periphery and includes a biking and walking trail. A 100-unit campground with boat camps, swimming beach, marina, bath house, and comfort stations with potable water make up some of the recreation facilities here. The 2019 Stagecoach Reservoir Fishery Management Plan can be found [here](#).

LAKE CATAMOUNT

The only other main stem reservoir on the Yampa River apart from Stagecoach. It is primarily used for recreation purposes and can store about 7500 acre-feet of water. Water rights on Lake Catamount, similar to the Yamcolo Reservoir were allocated in excess of the lake's total storage capacity.

FISH CREEK RESERVOIR

On the main stem of the Yampa River, is owned by the city of Steamboat Springs as a reserve area for raw water storage and for the Mt. Werner Water & Sanitation District. It has a storage capacity of approximately 4000 acre-feet.

The remaining reservoirs, including Allen Basin, Steamboat Lake, Elkhead Creek, Pearl Lake are located on Yampa River Tributaries. These small reservoirs have storage capacities ranging from 4000-24000 acre-feet. This however is not indicative of total appropriated water rights, which are often allocated in excess of total storage capacity. The remaining reservoirs also have varied uses including agricultural, industrial, and recreational. The water that fills up these reservoirs is not necessarily water that would have flown into the Yampa River in their absence. As these reservoirs are not on the main stem their drainage basins often overlap with areas outside of the Yampa River basin.



YAMPA RIVER LOOKING EAST TOWARDS HAYDEN

PROJECTS OF FUTURE-PAST

The Yampa River is an anomaly of the west in many ways due to the absence of any large dams or federal projects on it. Over the years, environmentalists and water managers alike have beaten back many water development projects. Most notable amongst these is the Echo Park Dam. In the 1940s, the Bureau of Reclamation had proposed a dam at Echo Park in the Dinosaur National Monument, at the confluence of **Green and Yampa Rivers**. This dam was a proposition under the Colorado River Storage Project, which oversaw the water resource developments in the Upper Colorado to ensure that upper basin states would meet their water delivery requirements to the lower basin states under the Colorado River Compact. The dam would have flooded approximately 46 miles of the Yampa River all the way up to Deerlodge park, and 67 miles on the Green River, going up to Flaming Gorge Dam⁵. The dam at Echo Park became contentious because many environmentalists, including David Brower of the Sierra Club believed that water resource development at national monuments would set a dangerous precedent for the future.

The suggested dam structure at 529 feet tall would have drowned many of the unique canyons within the Dinosaur National Monument. Brower and other environmentalists kept opposing the project until more than a decade later the dam plans at Echo Park were finally abandoned. In return however, Glen Canyon dam was built without any formal opposition from environmental groups⁶.

Colorado's ever-growing Front Range settlements, including Denver and its expanding suburbs are a constant threat to the Yampa River water. Water development projects proposing to pipe the water from the west to east of the Rockies and digging under the Continental Divide are a common occurrence. One such pipeline project that would have taken water out of the Yampa was beaten back in the last few years. A 2019 analysis by the **Denver Post** highlights the upcoming development projects in the Front Range, while these are not directly linked to water in the Yampa⁷, unmitigated growth is bound to threaten the river sooner rather than later.



ECHO PARK AT DINOSAUR NATIONAL MONUMENT (SOURCE: [NATIONAL PARK SERVICE](#))



1. "Yampa River Basin Information". *Dnrweblink.State.Co.Ut*, 2009, <https://dnrweblink.state.co.us/cwcb/ElectronicFile.aspx?docid=146636&dbid=0#:~:text=On%20the%20main%20stem%20there,over%20any%2010%2Dyear%20period>.
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3. "The Stagecoach Reservoir Project". *Upperyampawater.Com*, <http://www.upperyampawater.com/projects/stagecoach-reservoir/>. Accessed 14 Aug 2020.
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7. Finley, Bruce. "Colorado's Yampa River Symbol Of Competing Waters Rights Demands". *Denverpost.Com*, 2019, <https://www.denverpost.com/2019/06/23/yampa-river-colorado-water-rights/>.

CLIMATE CHANGE

THE 2018 WATER YEAR WAS THE FIFTH DRIEST YEAR IN THE 123 YEAR RECORD OF COLORADO¹. STATE AVERAGES OF TEMPERATURE ARE OFTEN NOT A GOOD MEASURE OF INDIVIDUAL BASIN LEVEL TEMPERATURES, BUT 2018, WAS A PARTICULARLY WARM AND DRY YEAR FOR THE YAMPA RIVER BASIN AS WELL. CLIMATE CHANGE INDUCED RISING TEMPERATURES HAVE A THREEFOLD IMPACT ON THE YAMPA RIVER;

- 1. CAUSES SNOWPACK TO MELT EARLIER, DISRUPTING THE FLOW PATTERNS, PEAK FLOWS CAN OCCUR MUCH EARLIER IN THE SEASON, EXACERBATES DROUGHT CONDITIONS, HIGHER EVAPOTRANSPIRATION REDUCES THE FLOW OF WATER INTO THE SYSTEM**
- 2. IMPACTS AQUATIC SPECIES ADAPTED TO COLD WATER ENVIRONMENTS, SUCH AS TROUT**
- 3. CAUSES A JUNIOR WATER RIGHTS HOLDERS TO LOSE ACCESS TO WATER AS THERE ISN'T ENOUGH DISCHARGE TO MEET EVERYONE'S NEEDS**

REDUCED FLOWS IN THE UPPER COLORADO RIVER BASIN

The long running drought in the west, and climate change have been reducing water flows in the Colorado River for nearly two decades now. As an important tributary of the upper reaches of the Colorado River, the Yampa River is facing a similar water shortage. Over the years a few scientific studies have delved deeper into understanding the relationship between temperature increases, soil moisture, reduced rainfall, and the resulting deficits in the river runoff. Additionally, there is ample anecdotal evidence showing us that climate change adversely impacts river flows, the exact nature of these relationships is still being worked out.

A study by **Milly and Dunne (2020)** shows that Colorado River flows reduced on average by 9.3% per degree Celsius of warming². This is because of increased evapotranspiration, driven by high temperatures, snow loss and a consequent decrease in reflection of solar radiation. This research used the Coupled Model Intercomparison Project Phase 5 (CMIP5) climate models and also looked at precipitation projections for the future. Even as warming temperatures are expected to increase precipitation, this rainfall will not be enough to cancel out the increase in soil moisture evaporation that is caused by high temperatures.

Western Rivers in the future will run significantly lower than their historic levels².

Another analysis done by the Washington Post's **2 Degrees Celsius Beyond the Limit** series shows that western US, and specifically Colorado is amongst the worst climate hotspots, warming at a rate faster than other regions of the continent³. The Yampa River Basin fits squarely within the fastest warming region in the lower 48 states, and this hotspot has already warmed 2 degrees in the last century. According to some estimates the Colorado River has lost approximately 20% of its water in the last century³.

In the absence of specific scientific studies on the Yampa River, one can extrapolate the results of Upper Colorado River Basin studies in the same region. Milly and Dunne predict 9-10% decrease in flows for every degree of warming. The Post analysis shows us a warming trend close to 2 degrees Celsius in this region. Hence, even by a rough estimate, the Yampa River has lost 18-20% of its water over the last century due to climate change.

Another Upper Colorado River Basin study by **McCabe et al (2017)**, shows that in the last three decades, flows in the Upper Colorado have reduced by an annual average of 7%, this is the largest mean reduction in runoff since record

keeping began⁴. Maximum reduction in flows was driven by the summer months of April through September suggesting that evaporating and snowmelt have a larger impact on diminishing runoff than precipitation (which is typically higher in colder months from October through March)⁴. As temperatures continue rising this summer season effect will become even more pronounced.

An empirical study by [Woodhouse et al \(2016\)](#) also links the increased frequency of warm years with diminishing flows in the upper basin rivers⁵. Over the last two decades there has been a persistent drought in the west, which has negated any positive impacts that a handful of relatively wet years (2005, 2008, 2011, and to a

lesser extent 2019) might have had on river flows.

The analysis by Woodhouse also sounds a warning note about the widely accepted hydrological flow prediction practices. Most water management practices use water year estimates (typically starting on October 1st) or the amount of precipitation during cooler months as a predictor of river flows⁵. However, as these studies have indicated, summer month evaporation and high temperatures are significant drivers of evapotranspiration and diminishing flows. This suggests that the scientific community needs greater recognition of temperature driven reductions in river flows to accurately predict how much water may be lost in the upper basin as climate change worsens.

RIVER ON CALL

In summer 2018, the Yampa River was placed on a call for the first time due to diminished flows caused by climate change. Being placed on call means that water uses on the Yampa river were curtailed⁶. This primarily impacts holders of junior water rights, as those with senior water rights get their full allotment of water first. Closures on the river can be announced under three conditions: if the river reaches temperature 75 F or above, stream flows fall below 85 cubic feet per second (cfs) or when the dissolved oxygen levels fall below a certain threshold⁶. The previous water year (starting in September 2017) broke records on the Yampa River as temperatures were the highest ever recorded.

In June 2018, Colorado Park and Wildlife closed a 0.6 mile stretch of the Yampa River at Stagecoach State park to fishing⁷. Critically low flow conditions caused by reduced precipitation and minimal snowpack caused this closure to stay in effect for months⁸.

This closure was necessary because dry conditions and stressors of fishing can inflict immense pressure on fish populations, causing them to concentrate in residual pool habitats.

Increased competition for food and decreased access to suitable habitat makes these fish easy prey for anglers and can cause rapid declines in population if not managed properly⁷. As water temperatures rise up to 75 degrees close to headwater areas, trout and other cold water adapted species are under threat. [Trout](#) function best in water temperatures from 50-60 F, above 70 F the fish often stops feeding and becomes susceptible to diseases⁵. Upper temperature tolerance limits for trout fall between 74-79 F⁶.

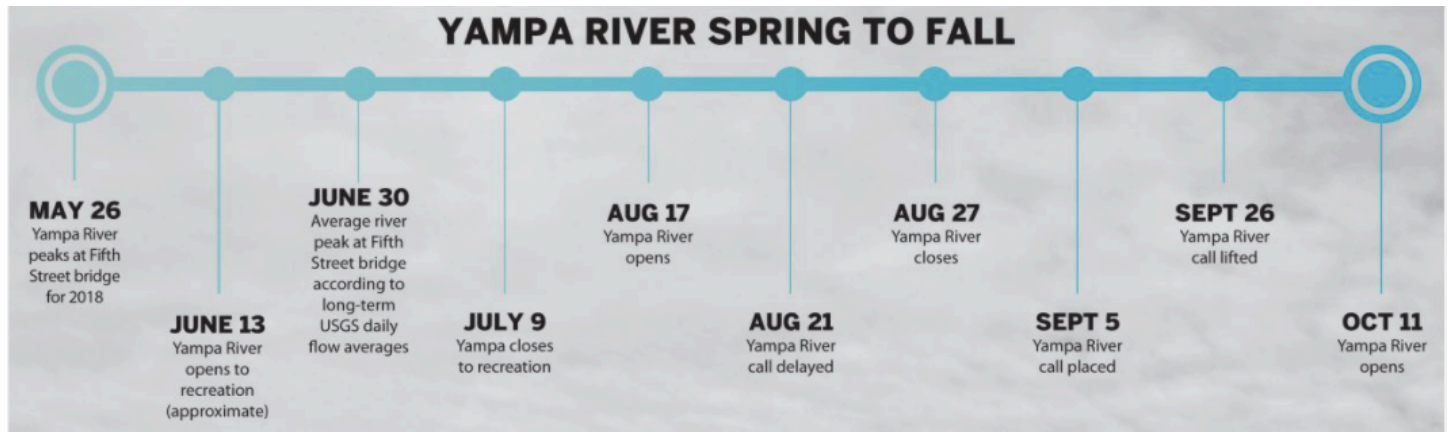
The 2018 closure was eventually lifted due to an agreement between the Colorado Water Trust and UYWCD. After the agreement a total of 600 acre-feet of water was released from [Stagecoach Reservoir](#) to increase downstream flows. Even with the additional flows, water levels observed in the river were more than 50% below the long-term average flow for that time of the year⁸. In July 2018, the average river flow below stagecoach was approximately 90 cfs, whereas the long-term average for that time period is 273 cfs⁸.

The city of steamboat spring curtailed recreational uses of the river with a combination

of mandatory and voluntary closures, the fishing, tubing, paddling season in 2018 only lasted about 40, one of the shortest in history⁹.

Voluntary closures are often used as a tool by the local management bodies to protect the river, it's a tool that has seen some success over the years. Education around the river, and other initiatives bringing public attention to these issues is vital

for the success of the voluntary recreation closure model to work. However, voluntary and mandatory closures also have an adverse impact on the local economy. Recreation based business also lose income and employees have to be laid off when a critical revenue stream like the river becomes inaccessible⁶.



THE 2018 TIMELINE FOR THE YAMPA RIVER BEING PLACED ON CALL
(SOURCE: [CRAIG DAILY PRESS](#))

IMPLICATIONS OF A COMPACT CALL

The Yampa River being placed on call for the first time ever in 2018, also raised questions about the overall administration of water rights on the river, and the relationship of Yampa River to the Green and Colorado Rivers. The Yampa's status as the biggest tributary to the Green River is important in this context because the Green River is the largest tributary to the Colorado River, and in whenever there is a compact call from the lower basin states, the upper basin (having junior water rights) must deliver the agreed upon water to the lower basin. [17][18] Yampa River being placed on call is one small piece in the larger picture of complicated water right holdings in the west. Approximately 52% of the water flowing into Lake Powell from the State of Colorado comes from the combined Yampa/Green/White River basins⁹. The rules of the Colorado River Compact of 1922, also dictate that on a ten-year timeline, Colorado must send a set amount of water to Lake Powell for use by Arizona,

California, Nevada and portions of Utah and New Mexico. This allows Colorado for some flexibility to send less water in particularly dry years, but the deficit has to be made up in the following years.

When the Yampa River was placed on call in 2018, no precedent existed for cutting off users' water supplies. The physical aspects of cutting off water rights involved the presence of measuring devices and proper headgates. Any users in the Yampa river without measuring devices were the first to lose their water, these were mostly agricultural users¹⁰. Any users without formal court-decreed rights were also curtailed. Beyond these measures, the Division of Water Resources picked water uses with appropriated rights after September 16, 1951¹⁰. If the river conditions hadn't improved, this cutoff date had the potential of being moved to an earlier time, impacting even more users.

Water commissioners visited individual diversion sites for inspection. Non-compliance areas had their water shut off and tagged with a notice¹⁰. During the 2018 episode, the city of Steamboat springs also lost some of its water rights, fortunately this was a small proportion of the overall water used by the city. Steamboat Springs augmented its supply by purchasing additional water rights from the Stagecoach Reservoir.

The water rights held by Craig and Hayden Power Stations were older than many of the agricultural and municipal users, and these facilities were in no danger of having their water cut off in 2018¹⁰. The water situation in the Yampa River would have to get a lot worse before the consumptive use of coal fired power plants is curtailed.



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MANAGEMENT OF THE YAMPA RIVER

MANAGEMENT OF THE YAMPA RIVER WATER IS OVERSEEN ON SEVERAL LEVELS. THE UPPER BASIN STATES MUST MEET THEIR OBLIGATIONS TO THE LOWER BASIN STATES UNDER THE COLORADO RIVER COMPACT OF 1922, AND AS A TRIBUTARY TO THE COLORADO RIVER, THE YAMPA HAS TO CONTRIBUTE ITS SHARE. THIS LEADS US TO THE UPPER COLORADO RIVER BASIN COMPACT OF 1948, WHICH STATES THAT FLOWS IN THE YAMPA CANNOT BE DEPLETED BELOW 5 MAF OVER A 10 YEAR PERIOD¹. STATE LEVEL MANAGEMENT PLANS GIVE WAY TO BASIN LEVEL MANAGEMENT, AND EVENTUALLY CITY LEVEL ORGANIZATIONS STEP IN. COLLABORATION AMONG AGENCIES, AND INVOLVEMENT OF COMMUNITY VOICES WORKING ON THE GROUND ARE VITAL FOR THIS MODEL'S EFFECTIVENESS.

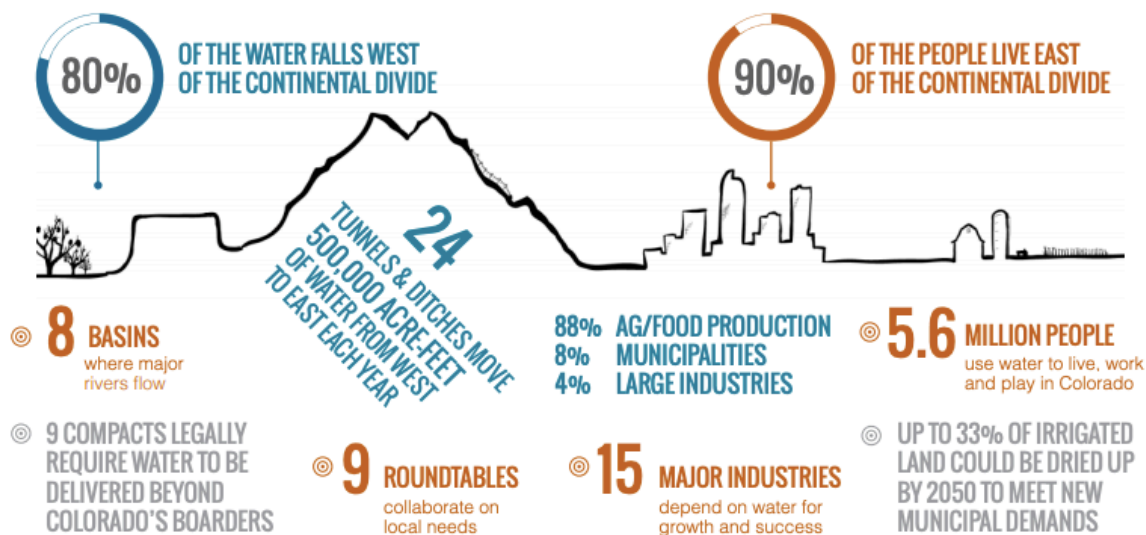
ON THE STATE LEVEL

The state of Colorado manages its water through the Colorado Water Conservation Board (CWCB). The **Colorado Water Plan** was first released in 2015, CWCB describes this plan as a living document and there have been multiple technical and analysis updates since then². The most recent **technical update** was completed in 2019³. State level water consumption is bound by nine interstate compacts, and two equitable apportionment decrees.

CWCB takes a basin roundtable approach to assessing water resources in the state. The Yampa/White/Green River Basin is one of the eight major river basins, and there are nine river basin roundtable committees that contribute to the overall plan². Input from dozens of state agencies, the basin roundtables, and thousands of public comments was incorporated in the Colorado Water Plan,

The three overarching managing themes for the river basins are

1. A productive economy that supports vibrant and sustainable cities, agriculture, recreation and tourism
2. Efficient and effective water infrastructure
3. A strong environment with healthy watersheds, rivers, streams, and wildlife



OVERVIEW OF WATER USE AND MANAGEMENT IN THE STATE OF COLORADO (SOURCE: COLORADO WATER PLAN)

ON THE BASIN LEVEL

After the overall Colorado Water Plan, the Yampa River is then managed under **the Yampa/White/Green Basin Roundtable**⁴. There are five key future water management issues for the basin;

1. Agricultural producers would like to increase irrigated land by 14,000 acres but lack finances to do so.
2. Implementation of a successful Upper Colorado River Endangered Fish Recovery Program is vital to ensuring protection of existing and future water uses.
3. The emerging development of gas and oil shale resources is affecting water demand, for both direct production and the associated increase in municipal use. Industrial uses, especially power production, are a major water use. Future energy development is less certain.
4. While rapidly growing in the Steamboat Springs area, the basin as a whole is not developing as quickly as other portions of the state. Concerns have arisen that the basin will not get a “fair share” of water under the Colorado River Compact in the event of a compact call.
5. Agriculture, tourism, and recreation are vital components of this basin’s economy. As the needs of communities and industry grow, competition among sectors could increase.

In addition to priority areas, the technical update to the Colorado Water Plan also highlighted specific issues that are already arising and need to be addressed on the basin level⁴;

1. Agricultural demand for water is increasing and the basin because of new acreage and the already consumptive uses of water. Climate change will further exacerbate these gaps, especially in the Yampa River
2. Climate change is reducing summer flows which poses risks to cold and warm water fish. Below average stream flows are imminent in many locations
3. Municipal and Industrial water demand in the basin ranges between 6-10% of agricultural demand. In the Yampa basin, rising population and increasing demand for thermoelectric power is creating water supply gaps

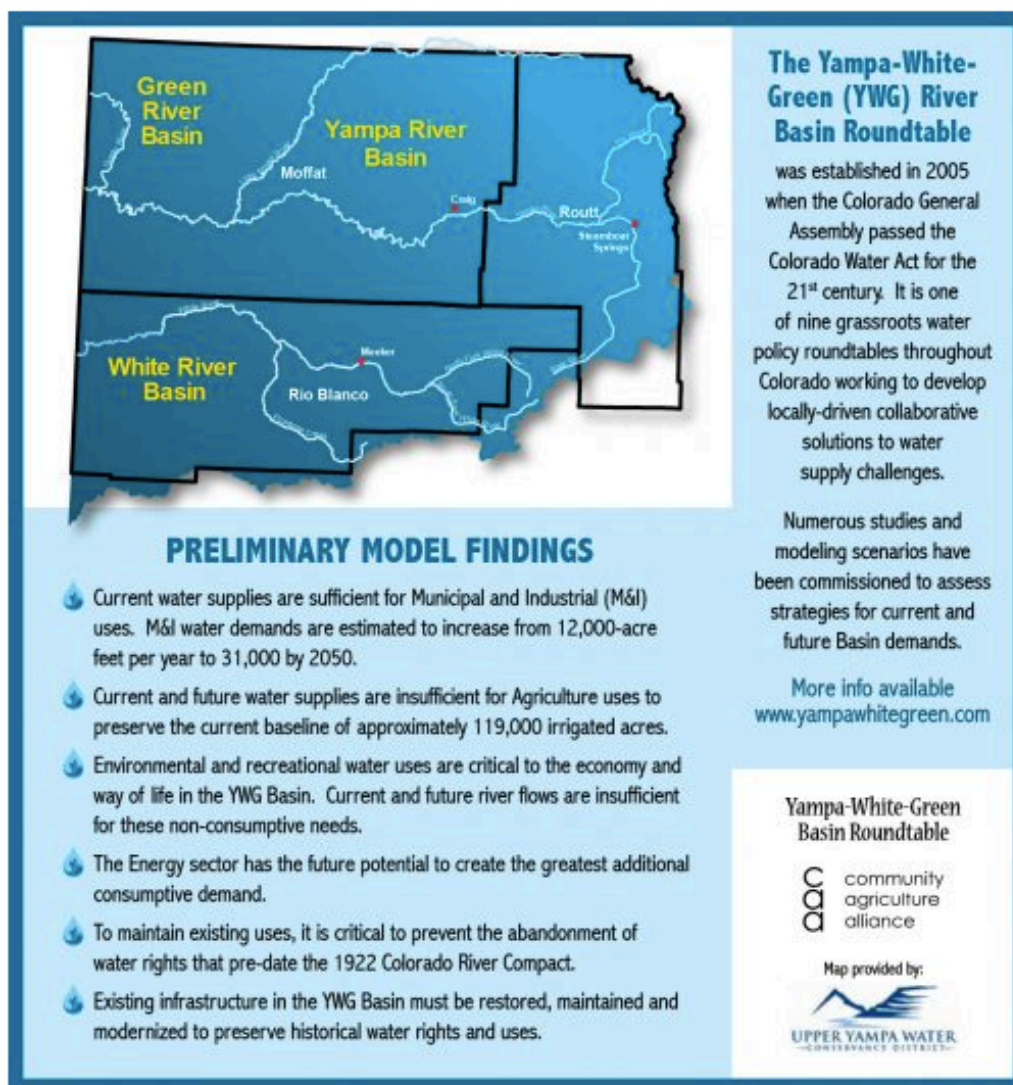
The **Yampa/White/Green Basin Implementation Plan** (YWG BIP), released in 2015 was developed by the basin roundtable as an extension of the state level water plan⁵. This plan provides more context and specific action areas for the basin level water management needs. While the plan recognizes Yampa River’s role in the bigger picture of the Colorado Compact, it also places specific emphasis on how to protect the Yampa from negative impacts of compact water curtailment.

The eight basin level management goals identified in this document are;

1. Protect the YWG Basin from compact curtailment of existing decreed water uses and some increment of future uses.
2. Protect and encourage agriculture uses of water in the YWG Basin within the context of private property rights.
3. Improve agricultural water supplies to increase irrigated land and reduce shortages. The agricultural needs study of the YWG BRT identified an additional 14,805 acres of potential new agricultural production in the future.
4. Identify and address municipal and industrial (M&I) water shortages.
5. Quantify and protect environmental and recreational water uses at locations identified in the non- consumptive needs study of the YWG BRT.

6. Maintain and consider the existing natural range of water quality that is necessary for current and anticipated water uses.
7. Restore, maintain, and modernize water storage and distribution infrastructure.
8. Develop an integrated system of water use, storage, administration and delivery to reduce water shortages and meet environmental and recreational needs⁵.

The BIP highlights an important facet in the administration of Colorado water rights. Pre-compact water rights that go unused in the state can be placed on an abandonment list. The Colorado Division of Water Resources, division 6 in this case, can then allot these rights to some other beneficial use⁶. To maintain uses of existing water rights, the BIP lays the groundwork for encouraging rights holders to be active participants in the management decisions. The most recent abandonment list of water rights in the state, from July 2020 includes more than two dozen individual water rights decrees on the Yampa River that are considered unused⁶.



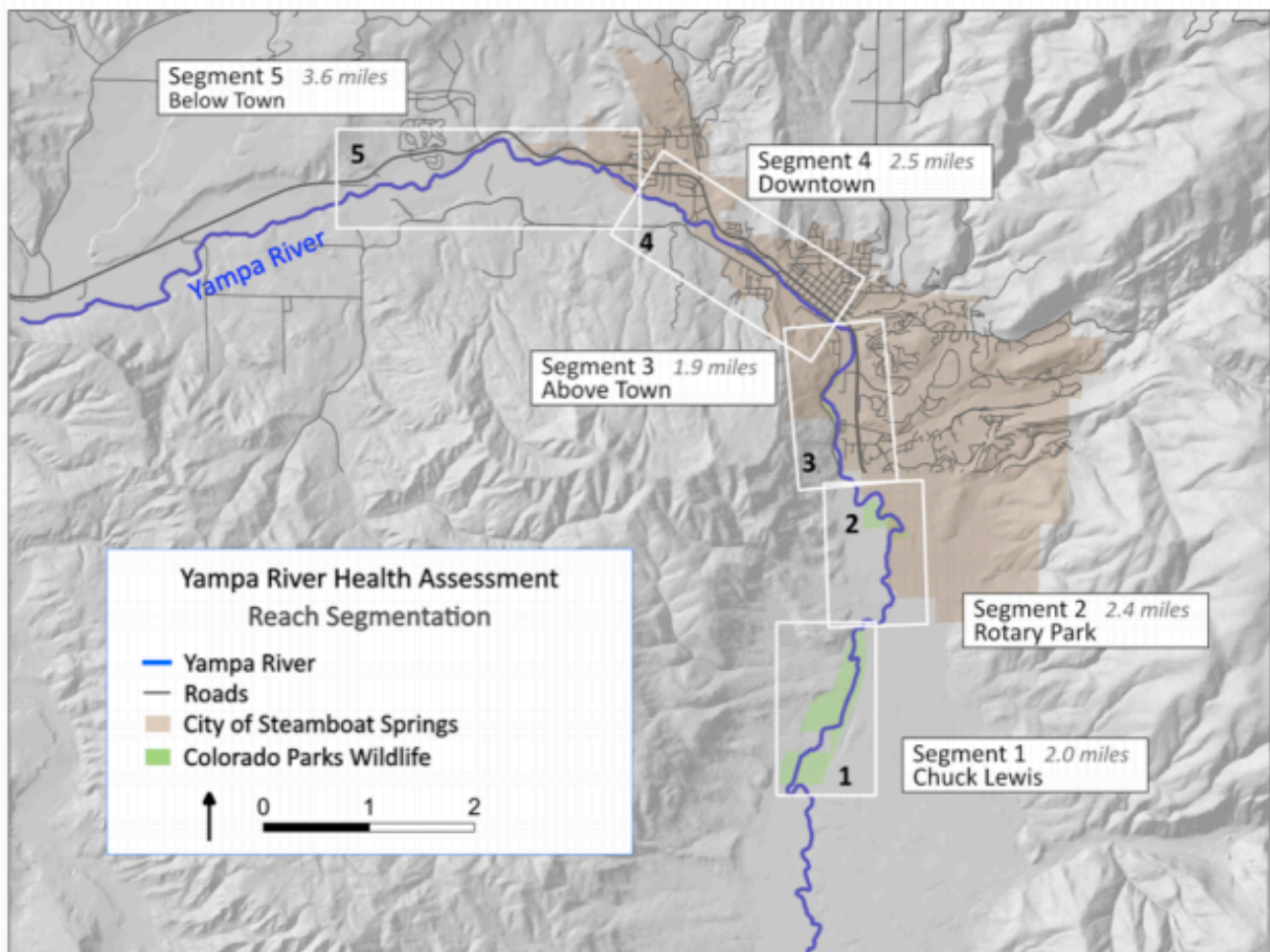
**FACT SHEET WITH KEY FINDINGS FROM THE BASIN IMPLEMENTATION PLAN
(SOURCE: FRIENDS OF THE YAMPA)**

ON THE CITY LEVEL

Steamboat Springs is the major city in the Upper Yampa, and takes an active approach to managing its water resources. In 2018, the [Yampa River Health Assessment and Streamflow Management Plan](#) was released by the city⁸. The plan addresses drought conditions, high temperature, increasing demand and the placement of a stretch of the Yampa River near steamboat springs on the list of the State's 303d Impaired Water Body list for temperature⁸. The plan goals and action items were decided on by a participatory process involving stakeholders and community members. Overall health and integrity of the ecosystem emerged as a primary concern for the residents superseding the importance of any one specific

water use. Targeting water temperature, and setting practical development standards for land use are considered critical areas in need of immediate attention. The city level planning document also highlights the need to focus on policy tools and funding streams that would be necessary to implement any long-term management strategies.

The Health assessment also assessed 11 separate variables in the Yampa that are indicative of river function and health. The stretch of Yampa River passing through Steamboat Springs was further divided into 5 sections to study each variable. The results were presented in a report card, showing areas of improvement⁸.



**MAP OF THE RIVER SEGMENTS ASSESSED ON THE YAMPA RIVER NEAR STEAMBOAT SPRINGS
(SOURCE: [YAMPA RIVER HEALTH ASSESSMENT AND STREAMFLOW MANAGEMENT PLAN](#))**

Yampa River Stream Health Report Card: Reach Summaries							
Scale	Variable	Subvariable	Assessment Reach				
			1	2	3	4	5
Watershed	Flow regime	Total volume	A	A	A	A	A
		Peak flow	B	A-	A	A	A
		Base flow	A-	A-	A-	A-	A-
		Rate of change	B	B+	A-	A	A-
	Sediment regime	Land sources	A-	A-	B	B-	B-
		Channel sources	A-	A-	A-	A-	A-
		Continuity	C+	B-	B+	B	B
	Water quality	Temperature	D	D	D	D	D
		Nutrients	C+	B	B	B	B
		Chemical Condition	B	B	B+	B+	B+
	Landscape	Buffer capacity	B	C+	C+	D	C+
		Terrestrial connectivity	B-	B	C-	D	B-
		Aquatic connectivity	B	B+	C+	C	B
Riparian	Floodplain connectivity	High Frequency	D+	C+	D	D	C+
		Medium Frequency	C-	B	D	D	B-
	Riparian Condition	Riparian Condition	B-	B-	C	D	B-
	Organic material	Wood	B-	B	B	C	B-
		Detritus	B-	B	B	B-	B-
Stream	Morphology	Planform	D	B-	C	D	C+
		Dimension	C	B-	C+	D+	B-
		Profile	C+	B	C+	C	B
	Stability	Resistance	B-	B-	B	B-	B
		Equilibrium	C+	B-	B	B-	B
		Resilience	D+	B-	D-	D	C
	Physical structure	Macrohabitat	C-	C+	C	C	B-
		Microhabitat	C+	B-	B	B-	B
	Trophic Structure	Trophic structure	C	B-	C+	C	B-
Overall River Health			C	B-	C+	C	B-

REPORT CARD SHOWING OVERALL HEALTH OF THE 11 VARIABLES STUDIED IN THE YAMPA RIVER STRETCH PASSING THROUGH THE CITY OF STEAMBOAT SPRINGS
(SOURCE: YAMPA RIVER HEALTH ASSESSMENT AND STREAMFLOW MANAGEMENT PLAN)

Key findings of the assessment highlighted the natural flow regime and wildness of the Yampa River as a primary indicator of good health. Undeveloped forests, low density roads, and generally few anthropogenic disturbances in the upper Yampa are important for maintaining the health and integrity of this ecosystem⁷. In downtown Steamboat Springs, where urban development is at its highest density, river health is the most impaired. Damage to riparian vegetation, habitat fragmentation, depletion of buffer capacity are some factors contributing to degraded river health in this reach⁸.

The reasons for higher than normal temperature in this reach of the river are both anthropogenic and natural. However, for a sustainable yearlong Trout fishery, and occasional mountain white fish to thrive, this stretch of the river needs to be managed for cooler water regardless of the factors that are causing the warming. Changing river health also supports the growth of invasive species such as Northern Pike, at the expense of native and sport fish. The Walton Creek confluence area is particularly afflicted with an overabundance of northern pike which is causing damage to the recreational value of the river⁸.

Historically, mining operations caused significant damage to the river channel, the effects of which are still visible today. Mining operations led to excavations in the flood plain, channelization of the river, and confinement between dikes and levees. The Yampa River continues to run wild for most of its length but stretches near the city have reduced level of floodplain connectivity and this has been flagged as one of the most critically impaired aspects of the ecosystem⁸.

Whereas a completely wild river would regularly inundate its floodplain, near the city, the floodplain is only inundated in exceptionally high runoff years. That possibility is swiftly turning into a rarity because climate change is already reducing the available water. The completed plan presents an opportunity for improvement for the city, and serves as a guiding document for future conservation actions. Steamboat Spring only contains about 10 square miles of the 636 square miles of watershed area that contributes runoff to the river, but the reach of city level water planning extends far beyond its own boundaries⁹. A healthy river ecosystem in the city also promotes downstream health.

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ENERGY TRANSITION AND THE DECLINE OF COAL

MANY COAL PLANTS ACROSS THE WEST ARE FACING INCREASINGLY SEVERE WATER RISKS AND HAVE TO CONTEND WITH THE HARSH REALITY OF CLIMATE CHANGE INDUCED WATER SCARCITY. OVERALL, A HANDFUL OF COAL PLANTS WILL BE CLOSING THEIR OPERATIONS OVER THE NEXT DECADE, INCLUDING SOME IN COLORADO. CUMULATIVE WATER CONSUMPTION OF 30 COAL PLANTS ACROSS THE WEST AMOUNTS TO 76 BILLION GALLONS OF WATER EACH YEAR, THIS TRANSLATES TO APPROXIMATELY 0.24 MAF, NEARLY EQUIVALENT TO THE ENTIRE SHARE OF COLORADO RIVER WATER THAT THE STATE OF NEVADA IS ENTITLED TO (0.3 MAF)¹. THE MAJORITY OF COAL PLANTS SLATED FOR CLOSURE ARE IN THE COLORADO RIVER BASIN, THEY DRAW SURFACE WATER EITHER DIRECTLY FROM THE MAIN RIVER, OR ONE OF ITS CONTRIBUTING TRIBUTARIES.

COAL POWER PLANTS ALONG THE YAMPA RIVER

Specific to the Yampa River, Craig Station, and Hayden Generating Station located in Moffat and Routt counties respectively have high consumptive water footprints. The two power plants concede upwards of 12 million gallons of water daily from the Yampa river¹. Both these plants are slated for closure by 2030, with one unit at Hayden expected to remain operational till 2036. As the power plants on the Yampa River close, this frees up valuable water that can be put to other uses. In the next two decades, as the power plants are shutting off operations, they will still consume over 50 billion gallons of water¹.

Colorado coal plant water consumption data. All figures are in millions of gallons.

Coal plant name	Total water consumption 2014 – 2018	Average annual water consumption	Average daily water consumption	Water source	Closure date	Estimated water consumption 2020 – 2040/ closure date
Comanche Generating Station	17,127	3,425	9.38	Arkansas River	Unit 1: 2022 Unit 2: 2025 Unit 3: None	31,343
Craig Station	15,274	3,055	8.37	Yampa River	Unit 1: 2025 Unit 2: 2028 Unit 3: 2030	26,510
Hayden Generating Station	8,064	1,613	4.42	Yampa River	Unit 1: 2030 Unit 2: 2036	23,547
Martin Drake Power Plant	1,613	323	0.88	Reclaimed municipal water	Unit 1: 2017 Units 2 & 3: 2023	902
Pawnee Generating Station	8,412	1,682	4.61	Groundwater	None	33,648
Rawhide Energy Station	5,478	1,096	3.00	Reclaimed municipal water	2030	10,956
Ray D Nixon Power Plant	2,663	533	1.46	Groundwater	2030	5,326
Totals	58,631	11,727	32.12			132,232

WATER CONSUMPTION DATA FOR COAL POWER PLANTS IN THE STATE OF COLORADO, CRAIG AND HAYDEN STATIONS ARE SPECIFIC TO THE YAMPA RIVER BASIN (SOURCE: ENERGY AND POLICY INSTITUTE)

Craig Station, which provides power to Tri-State Utilities, PacifiCorp, Salt River Project, Xcel Energy, and Platte River Power Authority, announced in January 2020 the closure of all its units. Unit 1 will close in 2025, and Unit 2 by 2028, and Unit 3 by 2030². Tri-State, which owns all of Unit 3 at Craig Station, has not made public any plans for its share of the Yampa River water once the power plant shuts down⁴. At the Hayden Generating Station, Unit 1 will close by 2030, whereas the Xcel Energy owned Unit 2 is set to operate till 2036. This makes Xcel one of the only large utility companies in the state to still be supplying coal power well into the next two decades². The closing power plants have important implications for users along the entire

stretch of the Yampa River. As coal plants have senior water rights to most agricultural and municipal users, their availability to other users can provide certain assurances against future curtailments. When the main stem of Yampa River was placed on a call in 2018, both power plants continued receiving their share of water whereas many agricultural diversions were shut off. These water rights can also help Colorado meet its obligations under the Colorado River Compact. Cities, municipalities, and national park units could all benefit from acquiring retired power plant water rights, which makes the fate of this water an issue of interest for many stakeholders.



TRI STATE GENERATION POWER PLANT

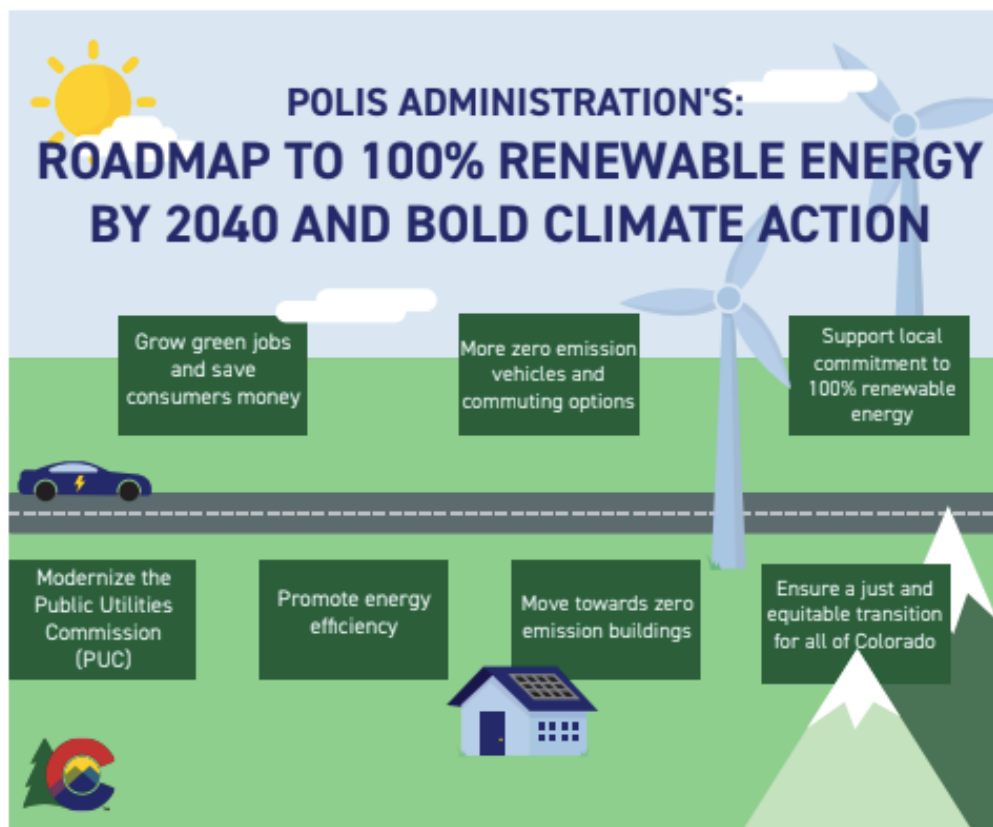
STATE LEGISLATION TO SUPPORT RENEWABLE ENERGY

The closure of Colorado's coal plants came about as a result of the **2010 Clean Air Clean Jobs Act**. Intended as a tool to bring the state in compliance with federal clean air standards, this legislation spurred coal plants into action³. Replacement of old coal facilities with gas fired and renewable facilities has many advantages for air quality, but the nexus with water scarcity is just as important. After all, diminishing water flows are a direct result of climate change, which in turn is made worse by greenhouse gas emissions. In many ways strengthening air quality standards further can help free up even more water in Colorado's rivers.

Legislative actions pushing for higher climate change mitigation policies and introduction of renewable energy policies is already pushing large utility providers such as Xcel Energy

towards firmer decarbonization commitments. **Colorado's Climate Action Plan of 2019**, also has a goal of reducing statewide greenhouse gas emissions by 50% of 2005 levels in the next decade⁴. This plan also introduced policies requiring utility companies to transition their energy portfolio to include certain percentages of renewable sources.

The **Roadmap to Renewable Energy by 2040 and Bold Climate Action** an accompanying document to the legislative actions lays down the groundwork for direct action, and progress made to date in achieving state goals⁵. However, even in these documents, connections between reducing emissions, air quality control, and the resulting benefits to water resources are not made explicit or quantified.



THE OVERARCHING ACTIONS FOR THE STATE OF COLORADO TO ACHIEVE FULL RENEWABLE ENERGY CAPACITY BY 2040

(SOURCE: ROADMAP TO RENEWABLE ENERGY BY 2040 AND BOLD CLIMATE ACTION)

Colorado as a state is fortunate to have access to an abundance of mineral resources, but it is also a state with an abundance of sunshine, nearly 300 days of it by some estimates. However, shifting to renewable sources and the will to stop digging up fossil fuels requires more than sunny days and ambitious policy goals. In this largely rural state, and the agriculture heavy river basin

of the Yampa, creation of green jobs and retraining of displaced coal workers needs to be a priority. Renewable energy sources protect the air and water quality, but this transition will also require infrastructure modifications, the laying of new transmission lines for connecting remote areas, and funding sources to finance these operations.

BIG PICTURE OF ENERGY TRANSITION

The water use in Yampa River is inextricably connected to air quality, energy policy, and land development issues. To save the water, the overarching economic issues also need to be addressed. In the town of Craig, which also houses its namesake power plant, these bigger picture conversations are already taking place. The 9000 residents of this small-town use less than 10% of the water as compared to the generating station⁶. Residents' primary concerns are tied to loss of jobs, and changes in the economic structure. Many are also wondering about the massive water portfolio of the power plant. Tri State Utilities, which owns a sizable portion of this water portfolio has commented that it's too early for these water discussions⁶.

Among the local residents there is some support keeping this water in the river, maintaining the wilderness and ecological integrity of the Yampa, and moving from a commodities-based region to a recreation-based region. The wild northwest of Colorado could benefit economically and environmentally with the expansion of Dinosaur National Monument to a National Park. There are others who support expansion of agriculture and would like to see this water go towards ranching and land use operations. Conversations about the fate of power plant water are still in their infancy and this is the optimal time for environmental advocacy organizations to step in and create campaigns for lasting change.



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CURRENT ADVOCACY

FRIENDS OF THE YAMPA RIVER

The Friends of the Yampa River (FOTY) is a local organization with the mission “to protect and enhance the environmental and recreational integrity of the Yampa River and its tributaries, through stewardship, advocacy, education and partnerships”¹. They have been active in the watershed since 1981 and work to increase awareness about the health and integrity of the river system. FOTY organizes community events, educational campaigns, and brings together river enthusiasts for recreational activities. The organization is primarily run by volunteer

members who are committed to preserving the wilderness and beauty of the Yampa. They are well respected in the community and have been contributing vital resources for the conservation of Yampa River for a few decades now². FOTY also works with other basin level committees and is involved in conversations around management plans for the river including the Basin Implementation Plan. FOTY website is also a good source for primary facts and statistics about the river, and building a knowledge base about the river basin³.



COLORADO WATER TRUST

The Colorado Water Trust (CWT) has been instrumental in helping keep water levels steady within the Yampa River during the recent low flow years. The CWT works in partnership with the Colorado Water Conservation Board (CWCB), and Upper Yampa Water Conservancy District (UYWCD). Their Stagecoach Reservoir Project, started in 2012 when the drought was severely impacting streamflow. This collaborative project executes short-term instream flows by leasing water from the Stagecoach Reservoir. The 2012 Instream Flow Program was the first in Colorado’s history, more releases were negotiated in 2013,

and 2015⁴. CWT has also worked with the City of Steamboat Springs to bolster their water supply. In 2016, when the city ran out of its own purchased water the Stagecoach Reservoir, CWT stepped in, this helped maintain fishery health and recreational activities⁴. Unfortunately, the pattern of drier than average years, and low rainfall has continued to impact river flows, and Stagecoach Reservoir has limited effectiveness when it comes to attenuating low flow years. The legal and partnership tools used by CWT will soon need innovative changes to meet future water demand challenges.



THE NATURE CONSERVANCY

The Nature Conservancy (TNC), worked in partnership with CWT, City of Steamboat Springs, Friends of the Yampa, and a few other key partners, to establish the Yampa River Fund in 2019⁵. TNC has established more than 30 such funds internationally, and this endowment supports the existing efforts of CWT by helping raise funds for reservoir releases, and also supporting a healthier watershed overall. The Yampa River Fund supports conservation and restoration projects such as planting new trees to cool the river, and fencing cottonwood trees

along the banks to keep beavers away⁵. This fund also helps agricultural users shift to more efficient water management, including better irrigation and diversion practices. Much of the agricultural infrastructure in the Yampa Valley is old and in dire need of upgrades. A key way to build partnerships on ground is to work directly with farmers and help create programs that provide funding for updating irrigation and diversion equipment. The fund is still in its infancy and capacity building initiatives are needed to make it grow even further.



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POLICY RECOMMENDATIONS

CLIMATE CHANGE IS THE BIGGEST THREAT TO THE YAMPA RIVER CURRENTLY. THE BOOMING FRONT RANGE ECONOMY IS GETTING INCREASINGLY DANGEROUS FOR THE RIVER BASIN AS WATER DEVELOPMENT PROJECTS FOR SUBURBAN POPULATIONS ON THE OTHER SIDE OF THE CONTINENTAL DIVIDE CREATE UNCERTAINTY. WITH THESE BACKGROUND THREATS IN MIND, THE YAMPA RIVER IS CURRENTLY TACKLING THE ISSUE OF LOW BASE FLOWS, AND COMING TO TERMS WITH THE REALITY THAT IN THE FUTURE NOT ALL WATER RIGHTS HOLDERS ON THE RIVER WILL GET THEIR SHARE OF WATER. THE PHASE OUT OF COAL POWER PLANTS AND SHIFTS TO RENEWABLE ENERGY HAS CREATED AN AVENUE FOR CONSERVING LARGE AMOUNTS OF WATER, AND THIS SHIFT IN THE ENERGY PORTFOLIO HAS THE POTENTIAL TO SERVE AS A CATALYST FOR INNOVATIVE WATER MANAGEMENT STRATEGIES. MOVING FROM AN EXTRACTIVE ECONOMY TO A RECREATION-BASED ECONOMY WILL BE IMPORTANT FOR THE YAMPA RIVER BASIN IN THE FUTURE. THIS WILL CREATE MORE GREEN JOBS AS COAL BASED JOBS GET PHASED OUT, AND IS AN OPPORTUNITY TO REALIGN THE NEXT GENERATION OF RESIDENTS IN THE RIVER BASIN WITH GOALS OF ENVIRONMENTAL PROTECTION. BUILDING COMMUNITY PARTNERSHIPS SHOULD BE AT THE FOREFRONT OF ALL EFFORTS TO INSIGHTFULLY SOLVE CLIMATE CHANGE PROBLEMS IN THE YAMPA RIVER. CONNECTIONS WITH LOCAL ORGANIZATIONS WORKING ON THE GROUND ARE AN IMPORTANT FIRST STEP, BECAUSE THE BEST CONSERVATION HAPPENS WITH COMMUNITY SUPPORT.

The recommendations below are focused on the role NPCA can play in these conversations and where there is an opportunity to build more partnerships, contribute capacity, and promote the vision of healthier water systems. NPCA's work is focused on park and park adjacent lands, because the Yampa River ultimately flows into the dinosaur national monument, these upstream issues need to be resolved for the continued protection of priceless natural vistas.

NPCA SPECIFIC RECOMMENDATIONS

- The **Yampa/White/Green Basin Roundtable** is currently working on an **Integrated Water Management Plan** for the region, for the next two years the plan is completing science and engineering assessments, and working with community groups to create a ranked list of issues that need to be tackled. Partnering with this working group can help NPCA get park specific water issues on the agenda.
- The Yampa/White/Green Basin Roundtable has also compiled a list of **funding opportunities** for water projects in the river basin. These opportunities should be leveraged into connections with contributing agencies. If NPCA is interested in creating new partnerships this list provides a good starting point to discuss conservation programs.
- Focusing efforts on the recreation industry requires the presence of a healthy river, without the Yampa River flowing as it does now, recreation is not possible. On the Yampa River, there are a few sites identified by the Bureau of Land Management (BLM) as suitable for receiving the Wild and Scenic River Designation. Although still lacking the formal title, these areas are popular recreation spots which has led the Colorado River Conservation District to abandon plans for building reservoirs here. However, a Wild and Scenic designation would still be extremely useful

in securing the future of these stretches and bringing tourism money to nearby areas, including Steamboat Springs. NPCA should partner with **Friends of the Yampa River** and **American Rivers** on this issue.

- The recreation industry is losing money because of the persistent drought conditions and low base flows. The shortened **river running seasons** are one example of negative impacts to the recreation industry. Some of this water scarcity can be remedied by keeping the retired coal water in the river basin. **Brian Richter** from **Sustainable Waters** has written on this issue and is an advocate for healthy rivers all around, but specifically in the Colorado River System. Partnering with Sustainable Waters can help NPCA build a stronger water issues presence in the region
- **Colorado's air quality and climate change legislation** was vital in bringing about the plans for coal plant closures in the west, and this legislation has helped push forward an agenda for water conservation. The **2019 Climate Action Plan** to reduce pollution made Colorado the first state in the nation to set the target of reducing climate pollution by half in the next decade. NPCA should integrate goals of water management within its air quality advocacy work and push for further climate change mitigation targets in the state. The adage "what gets measured, gets managed" is very appropriate in this context, water benefits resulting from air quality legislation should be quantified, advertised, and advocated for.
- As a continuation of state level advocacy, partnerships with renewable energy companies, and utilities switching their portfolios to include more renewable sources, such as **Xcel Energy**, and **Tri-State** can be beneficial to both air and water work being done by NPCA. These partnerships can help clarify connections between the switch to renewable energy and its resulting benefits to water. These benefits need to be quantified and assigned a monetary or social value, and made explicit in state level water management planning. Partnering with energy companies will help NPCA get a seat at the table where water management and planning decisions are made
- Capacity issues within local organizations are a limiting factor for building a coalition of environmental protection around the river basin. Many local groups are managed by volunteers, and the few full-time staff members working on Yampa River issues can only devote capacity to a few key issues at any given time. **The Yampa River Health Assessment and Streamflow Management Plan** has already identified many action ideas for the future which couldn't be implemented because of lack of resources. This list can serve as a blueprint for future NPCA efforts, the name brand recognition that comes with the involvement of a national advocacy organization can help bring new funding sources and technical expertise to the river basin.
- The Colorado Water Trust, and the Nature Conservancy recently came together to partner with local groups and create the **Yampa River Fund**. This fund helps prioritize river health projects, especially increasing riparian cover to keep summertime evaporations low. As the initiative just launched in 2019, fundraising and capacity building are still needed to take it fully off the ground and help raise awareness. NPCA's involvement in this initiative can bring valuable partners to the table and help the fund grow further.

- As Colorado is already ahead of the curve in mitigating its climate pollution, picking a river basin within the state for the creation of an integrated climate change/water/air advocacy plan presents new opportunities for NPCA to grow its work. The Yampa River basin is a prime location for such a plan and can serve as a pilot location for cross cutting advocacy initiatives, pushing Colorado forward on water conservation issues
- Further research is needed to determine if a new reservoir will help the Yampa remain wild: it seems counterintuitive to suggest building another embankment to preserve natural flows in the river, but climate change is severely harming how this river flows and floods through its basin. Another upstream reservoir could help store additional water during the rare high precipitation years, and attenuate base flows during the extremely dry years. However, this would require further study and a detailed look at the impacts of such a project.



LOOKING TO THE FUTURE

It is common to hear about climate change problems manifesting in various ways for different communities, but the nuances of how these problems play a role in everyday implications is not always well understood. Working on this Yampa River project provided an opportunity to closely examine issues of water scarcity in the Western U.S. Understanding the role that intersecting natural resource management plays with everyday concerns of communities living in increasingly water scarce river basins was the overarching goal of this research. The Yampa River Basin embodies all the facets of a western waterway in distress. Focusing research on one small watershed in the west, rather than a multi-state region allowed me to better understand how climate change induced issues will continue to modify every small aspect of our lives.

The Yampa River is a considerably healthy ecosystem, and the absence of large dams and reservoirs on it makes it stand out among all the other highly modified western river systems. In the past, Yampa River's natural hydrograph has been enough to support its aquatic life, open floodplains, agriculture, municipal and industrial use, and a robust recreation industry. With

Colorado being among the worst climate change hotspots in the country and the prospect of 2 degrees Fahrenheit of warming looming large, the Yampa River cannot continue as it has in the past. A combination of good fortune, and some active management has saved the Yampa River so far, continuing to save it for future generations will require innovation, collaboration, and bridging of political gaps. I started this project with the goal to understand what those integrative measures would look like, to fully grasp the meaning of collaborative management, the role of centering community voices, and how scientific knowledge can be a friend to policy making. Creating a water secure future for the west will require us to view water/air/land management issues as related to each other. This report, and its NPCA specific recommendations are meant to provide the initial knowledge needed to start those important conversations. Capacity building and funding sources are the big needs within the Yampa River Basin that NPCA can help address. With western coal plants shutting down soon, and hopefully an administration change in our future, right now is the time to take action.

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