White River
Integrated Water Initiative

Final Report

Phase II

May 2023

Phases I and II

Background

Phase I

The White River Integrated Water Initiative (Initiative) is a community driven water plan organized and governed by the White River and Douglas Creek Conservation Districts. The Planning Advisory Committee (PAC) was formed to represent the diverse composition of Rio Blanco County and the White River Community. It is composed of environmental, industrial, municipal, recreation, and agriculture interests. The PAC also receives guidance from its technical advisors from the educational, government, natural resources, and extension communities. This broad coalition of groups has allowed the Initiative to move forward with decisions, studies, and projects that represent all aspects of the community. Additionally, the Initiative hosted public meetings throughout the county to ensure the collective priorities of the White River Community are represented. After gathering this input, the PAC authored the Mission Statement and long-term goals for the Initiative and made recommendations to the Conservation District Boards on what they feel will best move the stream planning effort forward and yield information that is vital to the White River Community.

See Phase I final report at https://wrcd-dccd.colorado.gov/projects/wr-integrated-water-initiative/final-pac-reports.

Mission Statement and Overall Goals

(As amended during Phase II)

Mission Statement

Community based initiative to identify actions promoting a healthy river that ensures a vibrant economic community capable of securing the future vitality of agriculture, fisheries, recreation, municipalities, and industry while protecting water rights, quantity, and quality with respect for the local customs, cultures, and property rights.

Over-all River Goals for Current and Future Generations

1) Protect and preserve existing water rights and other beneficial water uses
2) Protect and enhance water quantity and quality through promoting best management practices for:
   a. Agriculture Enhancements
   b. Favorable Conditions of Streamflow
   c. Forest Health
   d. Rangeland Health
   e. Riparian Health
3) Identify opportunities for creation or improvement of infrastructure to support efficient consumptive and non-consumptive uses
4) Support the development and maintenance of efficient and necessary long term storage solutions that will improve, enhance and ensure irrigation, river health, water quantity, water quality, and native and recreational fisheries.

Phase II

In order to determine the focus and needs of the White River moving forward, the PAC meetings focused on bringing in speakers to provide information on the overall goals of the Initiative. The speakers and meeting focus were:

- Trout Unlimited – Ian Wilson
  - The importance of river connectivity for trout passage and environmental health
- Colorado State Forest Service – Ron Cousineau
  - The importance of forest health to the watershed and to reduce fire risk.
  - Identifying areas of concern for forest treatments
  - How the Good Neighbor Authority works to accomplish forest treatments across property boundaries
- Instream Flow Discussion - Speakers
  - Colorado Water Conservation Board – Rob Viehl, Chief Stream and Lake Protection Section
  - Bureau of Land Management – Roy Smith, Water Rights/Wild and Scenic River lead for BLM
  - Colorado Parks and Wildlife – Katie Birch, Instream Flow Program Specialist
  - Colorado Water Trust – Kate Ryan and Alyson Gould, Attorneys
  - Peter Fleming – General Counsel for the Colorado River Water Conservation District

  The purpose of the discussion was to understand how the instream flow program works, what its goals are, how the program differs from the Wild and Scenic program, and how water is put into the instream flow program.
- Agency and Powell Park Aquifers – Dr. Mario Sullivan
  - Obtain a basic understanding of what is known and what is uncertain concerning these unique aquifers.
- Rangeland Health -Linda Masters
  - Understand the importance of rangeland health to water quantity and quality.
  - Understand the pressures on the rangeland during prolonged drought
  - Understand the difference between upland vegetation and riparian vegetation

The PAC utilized this information along with the input from 16 public meetings held throughout the county to define the Initiative's priorities for the Phase III Scope of Work. They are:

1. Water Supply Study
2. Upland Vegetation Management
3. Diversion and Riparian Assessments
4. Public education in water related issues

These priorities reflect the Mission Statement and long-term goals set forth in Phase I and refined in Phase II.

See the Phase II Report at https://wrcd-dccd.colorado.gov/sites/wrcd-dccd/files/documents/WRIWI%20Phase%20II%20Report_0.pdf for detailed information.

PHASE III
Scope of Work

#1: Water Supply Study

The White River average annual flows have declined over the last twenty years. As a tributary to the Colorado River, the White River is subject to the regulatory decisions that are made for the Colorado River. Relative to other basins that are tributary to Colorado River, the White River holds numerous junior water rights. Because of these facts, there is widespread concern in the White River Basin of how big river issues may affect water use and availability. Research has revealed there are no studies available that explore the relationship between irrigation and return flows to the White River. PAC members are aware of several river systems that have been negatively impacted when water managers have made decisions without the benefit of data that will help them predict the impacts of those decisions on the river system. All of these factors led to the commitment to conduct a Water Supply Study on the White River. For the purposes of this study, the PAC has chosen to focus on the land region that has the highest number of irrigated acres in Rio Blanco County, the middle reach of the White River. The upper boundary of the study is the river gauge at Buford (State Gauge WHIBUFCO), the lower boundary is the river gauge below Meeker (USGS Gauge WHIBMECO).

The purpose of the Water Supply Study is to explore the relationship, if any, between agricultural irrigation and return flows to the White River, examine the effect agricultural irrigation has on domestic and municipal water wells, and characterize the Agency and Powell Park aquifers. The Initiative will be working with Dr. Ryan Bailey from Colorado State University to develop a model of return flows on the White River. The goal of the study is to provide a modelling tool for water managers to make informed decisions on the best use of the water they manage.

Water Supply Study
Initiative's Scope of Work

Objectives

1. Identify and quantify the effect of flood irrigation in the middle reach of the White River on return flows, municipal wells, and domestic wells within the Rio Blanco Community.
2. Identify the timing and location of return flows in the middle reach to the White River.
3. Identify and quantify the effect flood irrigation has on the aquifers of the middle reach of the White River.
4. Identify the effect the aquifers have on White River flows.

Tasks

1. Gather data to inform the development of an accurate model of return flows in the middle reach of the White River.
2. Characterize the aquifers of the middle reach.
3. Test and verify the model created.
4. Once model is determined to be valid, use the model to run different scenarios involving irrigation applications, return flows, and their effect on the community.

Water Supply Study (cont.)

CSU's Scope of Work

Development and application of a hydrologic model for the White River corridor in the Meeker, Colorado region, to quantify the impacts of irrigation practices on streamflow.

Dr. Ryan Bailey
Dept. of Civil and Environmental Engineering
Colorado State University

Scope of Work
The following four items constitute the Scope of Work for this project.

1. **Collect and process data for model construction and testing**
    a. Prepare a map of groundwater levels and groundwater flow paths from historical groundwater monitoring well records.
        i. Source: USGS groundwater data
        ii. Source: CDSS well permit data (static water level when well was first drilled)
        iii. Source: groundwater levels from local well driller
    b. Daily canal discharge rates
        i. Source: CDSS
    c. Geologic units
        i. Source: USGS geologic maps
    d. Daily weather data (rainfall, temperature)
        i. Source: NOAA, CoAgMet (station MKR01, 2018-2020)
    e. Land use / crop type for fields
        i. Source: USDA CropScape
    f. Groundwater pumping rates
        i. Source: CDSS
    g. Stream discharge
        i. Source: USGS stream gages

2. **Construct hydrologic model**. The model will be based on MODFLOW-NWT (https://www.usgs.gov/software/modflow-nwt-newton-formulation-modflow-2005), a USGS groundwater modeling software code. For this study, the model will simulate: irrigation application, crop ET, surface runoff, percolation, groundwater recharge, groundwater flow, and groundwater-stream exchange within the White River corridor in the Meeker region. The model will include the following hydrologic features: White River, tributaries, irrigation canals, pumping wells, aquifer.
    a. Prepare model grid
    b. Prepare input files using collected/processed data (see 1.)

3. **Calibrate and test hydrologic model**. Model output will be tested against:
    a. Stream discharge at USGS sites (9304500, 9304800)
    b. Groundwater head at USGS monitoring wells
    c. Groundwater head at wells with data loggers (5 sites)
    d. Groundwater return flow rates to the White River, as estimated from a water balance assessment of streamflow, canal diversions, and tributary inflow.

e. Groundwater return flow rates to the White River, as estimate from a synoptic stream discharge study, summer 2023 (USGS).
f. Satellite-based estimates of crop ET

4. **Use hydrologic model to assess impact of irrigation practices on groundwater flow patterns and streamflow**
    a. Quantify baseline spatial and temporal patterns of recharge, groundwater levels, groundwater flow, and groundwater return flow to the White River.
    b. Determine impacts of changes in irrigation practices on:
        i. Surface runoff
        ii. Crop ET
        iii. Groundwater recharge
        iv. Groundwater levels
        v. Groundwater return flows
        vi. Stream flow (all along the White River)
    c. Irrigation practices to assess:
        i. Conversion from flood to sprinkler
        ii. Increase in irrigation efficiency
        iii. Retiming of flood irrigation (earlier start and later start, as compared to present start)
        iv. Loss of irrigated land to urbanization
        v. Lining of irrigation canals
        vi. Loss of irrigated lands due to ATM (demand management)

#2: Upland Vegetation Management

Forest and rangeland management are both foundational to the health of the watershed.

Rangeland health is most important in the lower White River. Currently, the Conservation Districts and the Bureau of Land Management (BLM) have a Coordinated Range Management Plan (CRMP) Program that is facilitating range improvements within the Conservation District boundaries. This program is very successful, therefore; the PAC decided the Initiative should support the CRMP.

The forest in the upper White River is rated by the Colorado State Forest Service (CSFS) as a moderate fire risk, but if a fire occurs it will likely be a very high intensity fire. This would likely devastate the health of the White River by creating conditions that would lead to high sedimentation in the river. Additionally, the upper White River is home to a genetically pure strain of Greenback cutthroat trout that would be threatened by the consequences of a fire. The United States Forest Service (USFS) Blanco District Ranger is concerned about the geography of the region making it unsafe to deploy firefighters, the safety of the homeowners that own homes within the forest boundaries, and the significant probability that a fire in the upper White River would quickly move to the wilderness area. The USFS has been unable to perform significant fuels reduction in the upper White River because of a lack of personnel.

Presentations by the Colorado State Forest Service as well as conversations with the United States Forest Service Technical Advisor to the PAC and the National Forest Foundation revealed the lack of personnel available to build local consensus for forest fuels reduction projects and get the projects permitted. The PAC decided the most valuable contribution the Initiative can make is providing personnel to accomplish permitting and coalition building.

Upland Vegetation Management
Scope of Work

Goals:

1. **Reduce fire risks and impacts to improve the health of the watershed.**
2. **Improve and maintain upland forest and rangeland health.**
3. **Reduce sedimentation into the White River drainage.**

Objectives

1. Reduce coarse and fine fuels in areas at risk for a high intensity fire.
2. Improve rangeland by removing unwanted woody growth and fine fuels.
3. Perform treatments in areas that would be negatively impacted by fire and that can become part of a landscape scale project.
    a. Work across public/private property boundaries.
    b. Utilize adaptive grazing practices to appropriately manage forage.
4. Identify and implement desirable projects that have widespread public support.

Upland Vegetation Management
Scope of Work (cont.)

Tasks

2. Hold public meetings to solicit ideas and foster support for forest treatment and rangeland treatment.
3. Encourage adaptive grazing practices, including for the purpose of emergency fuels reduction.
4. Work with local, state, and federal agencies, private landowners, and other stakeholders to get treatments completed across property boundary lines.
5. Work in concert with Rio Blanco Emergency Manager to keep the Community Wildfire Protection Plan updated and inclusive of prospective projects.
6. Coordinate with the Conservation Districts and Agencies to support the existing CRMP efforts and other projects that reduce sediment flow to the White River drainage.
    a. Identify projects that will reduce sediment flow into the White River drainage.
7. Seek funding for a Forestry Program Coordinator to facilitate planning and implementation of active forestry management.

#3: Diversion Structure and Riparian Assessments

Diversion and Riparian assessments were performed in Phase II of the Initiative. Assessments were made by a trained team of local citizens with expertise in their fields. The assessments resulted in multiple projects that are having a positive impact on the White River Basin. The PAC decided to continue the assessments because of their benefits to the health of the river system and their importance as outreach to the community.

Diversion Assessments
Scope of Work

Objectives

1. Perform environmental health and infrastructure assessments on ~10 diversions on the White River and Piceance Creek for those interested in improving their structures.
2. Provide information to water rights holders on the status of their infrastructure and the environmental health of the diversion.

Tasks

1. Review previous assessment criteria and make improvements as needed with the goal of having uniformity in the process.
2. Solicit water rights holders for diversions that are needing/wanting to make improvements.
3. Work with the Planning Advisory Committee to develop prioritizing criteria for the assessments.
4. Provide a written report to each water right owner.
5. Provide summary information to the Douglas Creek and White River Conservation Districts to be published on their website.

Riparian Assessments

Objectives

1. Perform PFC assessments on ~10 riparian areas on the White River and Piceance Creek.
2. Provide information to landowners on the riparian health on their property.

Tasks

1. Review the previous assessment criteria and make improvements as needed with the goal of having uniformity in the process.
2. Solicit property owners for riparian areas that are needing/wanting to make improvements.
3. Work with the Planning Advisory Committee to develop prioritizing criteria for the assessments.
4. Provide a written report to each property owner.
5. Provide summary information to the Douglas Creek and White River Conservation Districts to be published on their website.

#4: Education Outreach

The Initiative is a locally driven water planning coalition that depends on informed public opinion and comments. In order to promote local knowledge, the Initiative is proposing two avenues of activity. The first is a hands-on water measurement demonstration that will showcase the number of devices that can be utilized to accurately measure water that is diverted into ditch systems. The second is a series of seminars organized and hosted by Colorado Northwest Community College as part of its Workforce Program. Each seminar will feature a topic of local interest/concern and bring in outside expertise to conduct the seminar.

Water Measurement
Scope of Work

Objectives

1. Demonstrate the variety of measurement devices that are used to measure water in ditches.
2. Inform water rights holders' choice in deciding which water measurement device is appropriate for their water diversion.
3. Public education on methods of water measurement.

Tasks

1. Identify a location and partners to build the demonstration.
2. Identify who will be responsible for long-term maintenance and liability of the demonstration.
    a. Enter into an agreement with that group that defines each entities responsibilities and liabilities.
    b. Participate in an advisory role for the final design, construction and testing of the system.
3. Utilize the WRIWI preliminary design to.
    a. Coordinate design and construction with a cooperating entity.
    b. Integrate the project's educational opportunities with interested schools and organizations.
    c. Engineer, build and install the demonstration system.