

EAGLE COUNTY CONSERVATION DISTRICT IRRIGATION ASSET INVENTORY

PROJECT SUMMARY REPORT



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Prepared by



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Introduction

The Eagle County Conservation District (ECCD) Irrigation Asset Inventory (Project) was a success. This Project was built around offering free ditch assessments to identify priority ditch maintenance and funding opportunities to address areas of concern in the community. The project objectives were:

1. Support regional agriculture industry
2. Prevent ditch emergencies
3. Provide resource binder documenting important ditch history, operations and local resources
4. Prioritize projects for assistance by the ECCD
5. Develop a project list for outside funding sources to assist on collaborative projects (*ditch owners could opt out for privacy reasons*)
6. Evaluate a minimum of 25 ditches within the ECCD service area
7. Provide an overview map to district leaders, identifying evaluated ditches and prioritized regional projects

Methods

The Project commenced on June 1, 2016 and was implemented through October 31, 2016. SGM contacted and interviewed ditch owners throughout the ECCD project area and inventoried 25 ditches. The alignment and locations of structures and environmental impacts were documented with a sub-foot GPS unit. The assessment included portions of a ditch or the entire ditch from the headgate to the last lateral turnout and did not include on-field delivery or application infrastructure. The condition of the ditch, structural details, concerns, and environmental concerns were also documented. At identified areas of concern or structure along the ditch the following would be taken: a GPS point, photos of the area, type of structure, name of structure, condition rating, clean rating, approximate flow, size of structure, material of structure, general remarks, and whether structure should be replaced.

Areas of medium to high concern were ranked and prioritized in a list of potential improvement projects. Appendix A provides the priority matrix template for these rankings. A report was provided to each ditch owner describing the status and location of their ditch. Sections and a brief description of each section included in each report were:

1. Summary of Ditch Operations
 - a. Overview: Described the location of the ditch, the decreed absolute cubic feet per second (cfs) of water in the ditch, history of the ditch, and what the ditch is used for (i.e. livestock watering, irrigation of hay or pasture grass, etc.).
 - b. Environmental Concerns: Indicated main environmental concerns caused by the ditch or impacting the stream reach near the ditch. Examples of environmental concerns include: sedimentation, erosion, potentially impacted riparian areas, fish barriers and debris issues.
 - c. Regionally specific Stream Management and Development Plans: A list and web site links of the stream management plans and watershed research papers specific to each ditch.

For example:

Eagle River Watershed Plan (2013). A downloadable PDF document of the plan can be found at: <http://www.erwc.org/publications/eagle-river-watershed-planning-efforts/ERWP-FINAL-with-MAPS-053113.pdf>

2. Eagle County Area Overview
 - a. Climate: Description of the annual climate of the Eagle County area.
 - b. Geology: Description of the geology of the Eagle County area.
 - c. Soil: a Natural Resource Conservation Service (NRCS) Soil Survey Report of the ditch alignment. This information was found at:
<http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>
3. Ditch Condition Review
 - a. The Ditch Condition Review focused on structural or environmental concerns along the ditch alignment. Examples of structural or environmental components included: headgates, diversion structures, flumes, highly eroded areas, sedimentation deposits, reservoirs, laterals, culverts, piped areas, pump stations, intake screens, etc.
 - b. Each structural or environmental component was evaluated using the following information: photographs, year built, type of material, size of structure, current condition, areas of concern, additional details, and concern rating.
4. Priority Issues
 - a. Structures and areas along the ditch that were determined to have a medium to high concern were prioritized using a priority matrix.
5. Funding Opportunities
 - a. Lists the different grant opportunities and potential funding partners available for the ditch owner to consider including organizations, website, and programs that are available.
6. Ecological Considerations
 - a. Provides references for ecological design methods with website links for general ditch design methods, erosion control methods, and riparian habitat composition.
7. Appendices
 - a. Map of ditch alignment with priority structures and main structures
 - b. Priority matrixes
 - c. Structure summary reports
 - d. Ditch Decrees
 - e. NRCS Soil Survey map of the ditch

Project Feedback

Project participants found the reports to be very useful. Several participants expressed their desire for the project to continue to address additional water rights on the property or an opportunity for additional ditch owners to participate. Participants specifically identified the following as highlights of the Project:

- Privacy of collected ditch information
- Accurate map of ditch alignment and structure locations

- Presented summaries of water rights decreed to their specific ditch
- A ditch specific binder to stay with the property for future generations or to pass along to new owners
- Advice on ditch repairs and general ditch maintenance resources
- Interest in funding resources and potential project partners
- A third party review and documentation of ditch needs
- Process provided an opportunity for multipart ditch owners to come together.

Discussion/ Results

Twenty five ditches were inventoried throughout the ECCD area as a result of this Project. The ditches were distributed within the ECCD boundary and located off of the Colorado River as well as tributaries to the Colorado and Eagle Rivers including: Salt Creek, Brush Creek, Frost Creek, Bruce Creek, Eby Creek, Derby Creek, Castle Creek, Gypsum Creek, Sunnyside Creek, Sweetwater Creek, Teepee Creek, and Elk Creek.

Each ditch owner or manager received a copy of their ditch report. The owner/manager had an opportunity to comment on the draft report prior to it being finalized. All reports were sent out to the ditch owners/managers by November 30, 2016.

A summary of the inventories is presented in the attached table and appendices. These project summaries will be used by ECCD to advocate project for partnerships with local organizations, particularly on the top identified projects. ECCD will be meeting with Eagle River Watershed Council, Eagle County Commissioners and others to review the list of top ranked projects. As project partners are identified, SGM will coordinate with the ditch owners to maintain the privacy of ditch infrastructure.

Table 1 shows the ranking of projects by drainage based on the results of the priority matrix for each ditch. Appendix B contains a map that shows the headgates of each ditch surveyed. The headgates are not labeled in an effort to protect the privacy of the ditch owners. Appendix C shows photographs of sample structural and environmental potential projects. Appendix D has the funding opportunities presented in each report.

The top ten prioritized projects were located on Gypsum Creek, Sweetwater Creek, Salt Creek, Brush Creek, Frost Creek, and Elk Creek. The projects ranged from headgate and/or diversion structure repair, flume repair or replacement, install or repair pipe sections, repair ditch sections due to environmental conditions (sediment loading or sinkhole formation).

5.0 Lessons Learned

Partnerships

The success of this project was largely due to the efforts put forth by the ECCD and the local NRCS staff. Both organizations dedicated time to planning, organizing and promoting. ECCD board led by example by volunteering some of their personal ditches and sharing the reports with their membership to provide an example of what this project could offer. The NRCS was essential in capitalizing on the

established relationships built over years of working in this region. The community respects their work and the security of the information they have collected on the ditch systems. Without the involved partnership of these two agricultural focused groups this project would not have succeeded.

The NRCS, Eagle River Watershed Council and others met prior to the commencement of the Project to determine the opportunities for partnering. This step was crucial in getting the buy in from these groups on our ditch assessment project. It also allowed the assigned staff to better understand the types of projects they may be interested in funding. Discussing specific watershed basins of interests with partnering groups at earlier stages in the project would have better furthered the success of this project.

Project Challenges

Many of the ditches are long and the key to a wide spread assessment is simplifying the ditch assessments. This Projects' approach was to let the ditch owners, or ditch runner, guide the tour to show the most prominent points to inventory. This approach saved time and allowed for more ditch points of interested to be inventoried.

Table 1: Top Concerns and Project Opportunities by Drainage

Drainage	Type of Project	Project	Score	Ranking
Gypsum Creek	Pipe Repair or New Install	Upgrade infrastructure by installing a pipe that allows for the operation of gravity fed sprinkling of the furthest fields. This would allow for more efficient use of the diverted water and significantly reduce the lost seepage from the open channel ditch currently being used.	92%	1
Sweetwater Creek	Pipe Repair or New Install	Install pipe along the ditch would significantly improve its function and prevent recurring issues along the open channel. The ditch currently experiences debris-clogged culverts, rock falls from surrounding hillsides, and varying inflow from the mountain side spring and streams. This project would involve the installation of pipe from the headgate to the largest users who would like to use the gravity pressure for future sprinkling system. However, even piping the first section of the ditch or providing more durable lining in certain sections would be a substantial improvement to the ditch.	87%	2
Gypsum Creek	Pipe Repair or New Install	Pipe the ditch to provide a solution to better regulate ditch inflows and outflows, particularly ditch seepage. Seepage may be contributing to high groundwater issues observed in a nearby residential community.	84%	3
Gypsum Creek	Pipe Repair or New Install	Restore the historical ditch headgate and alignment. Several piped section inlets are in need of serious maintenance prior to carrying water again. The piped sections appeared to have been placed more than 30 years ago and showing signs of degradation. A new pipe should be placed to convey the water efficiently to the historically irrigated acres and specifically to the existing gated pipe.	81%	4
Brush Creek	Sediment Control	Implement an erosion control plan for the Salt Creek drainage which contributes to heavy sediment loading in Salt Creek and Brush Creek.	79%	5
Brush Creek	Headgate and/or Diversion Structure	Replace the headgate and diversion structure, and add headwall and wingwalls.	77%	6

Drainage	Type of Project	Project	Score	Ranking
Brush Creek	Pipe Repair or New Install	In-operable Pipe Section: This section of the ditch is not functional. It has a buried section of pipe and open piped sections that do not convey water as the metal pipe is in poor shape.	76%	7
Gypsum Creek	Flume Repair	Flume was submerged at the time of observation (no water surface drop through the structure). Flume should be raised to create a drop on the downstream side. Another option could be to install a Nuway flume that doesn't require as much of a drop in the ditch.	76%	7
Brush Creek	Headgate and/or Diversion Structure	Rock push-up dam needs maintenance throughout the year to guarantee flows are diverted towards headgate. The 36-inch CMP downstream of the headgate can fill with sediment and limit ditch capacity.	73%	8
Brush Creek	Headgate and/or Diversion Structure	Replace headgate and headwall and the addition of wingwalls to the east and the west headgate.	73%	8
Gypsum Creek	Environmental	A natural forming sinkhole was observed above the ditch near the culvert inlet. The culvert was likely installed because of soil instability in the area similar to the sinkhole. Without more knowledge of when the sinkhole was formed it is recommended to monitor this area for growth and impact on ditch capacity. Sinkholes in the area are generally formed by the irrigation of highly soluble soils like the salts found in the Eagle Valley Evaporite Formation found in the area.	73%	8
Gypsum Creek	Headgate and/or Diversion Structure	Structures require above average maintenance and should be stabilized before addition erosion around the headgate bypasses the diversion dam. Diversion structure should be improved to more permanent structure.	73%	8
Gypsum Creek	Laterals	The addition of more formal controllable turnouts will assist with controlling flows in the ditch for down ditch uses and proper distribution of the collected flows. Additionally, formal headgates will help control the overabundance of water in the Ditch that could be contributing to high groundwater in the area.	73%	8

Drainage	Type of Project	Project	Score	Ranking
Bruce Creek	Headgate and/or Diversion Structure	Construct a sedimentation pond, diversion structure, replace headgate, and add headwall and wingwalls.	72%	9
Brush Creek	Pipe Repair or New Install	Replace 3-foot diameter corrugated metal pipe.	69%	10
Elk Creek	Flume Repair	Install flume back into the ditch. The flume was removed for maintenance and replaced with a metal half pipe that leaks.	69%	10
Elk Creek	Sediment Control	Install sediment control from upland gullies washing sediment into the ditch.	69%	10
Gypsum Creek	Flume Repair	No flume was found on the ditch at either the historical (Gypsum Creek) or current diversion location. A Parshall Flume or similar measuring device needs to be installed in order to measure flows used in structure.	68%	11
Gypsum Creek	Seepage Loss	The first half mile of the ditch loses approximately 10% of the water as the ditch flows along the floodplain bank to the main irrigated fields. The Ditch loses another 10% by the time it crosses Gypsum Creek Road. The ditch should be evaluated for a lining or piping especially in the first half mile at a minimum.	68%	11
Gypsum Creek	Headgate and/or Diversion Structure	The ditch headgate and diversion structure are vulnerable to being eroded away during peak flows in Gypsum Creek. More permanent structures should be constructed making sure to utilize wingwalls and toewalls to minimize erosion around the structures.	65%	12
Bruce Creek	Pipe Repair or New Install	Re-install a pipeline with larger diameter, install filtration screen.	64%	13
Brush Creek	Environmental	Remove some of the vegetation around the ditch.	63%	14
Colorado River	Pipe Repair or New Install	Pipe ditch to mitigate against sink holes forming in and along the ditch path.	63%	14
Eby Creek	Culvert Repair	Replace the undersized culvert with an appropriate size.	63%	14

Drainage	Type of Project	Project	Score	Ranking
Frost Creek	Flume Repair	Replacement of measuring device on west flume, extended toe walls, backfill with sediment, plant additional vegetation.	63%	14
Gypsum Creek	Pipe Repair or New Install	The siphon across Gypsum Creek was damaged during the spring runoff approximately 3 years ago and has not been able to carry water since. The siphon needs repair so the ditch can flow again.	63%	14
Sweetwater Creek	Pipe Repair or New Install	The 36-inch corrugated metal pipe at the headgate of the Ditch needs to be reset. This project will allow easier passage of sediment to maintain the required ditch capacity.	63%	14
Sunnyside Creek	Intake Screen	Redesign the intake screen and add an efficient emergency overflow outlet.	61%	15
Brush Creek	Sediment Control	Develop and implement a sediment control plan and preventative erosion measures for Brush Creek.	60%	16
Frost Creek	Flume Repair	Installation of flume downstream of the headgate.	60%	16
Derby Creek	Pipe Repair or New Install	Replace older portions of metal pipe, installed in 1950s, to eliminate possible leaks.	59%	17
Colorado River	Pond Repair	Construct a larger pond to support pump irrigation needs as the current pond leaks and is not holding a suitable amount of water.	57%	18
Eby Creek	Sediment Control	Redesign the sedimentation ponds to increase effectiveness.	57%	18
Gypsum Creek	Flume Repair	The flume should be reset to level for accurate readings.	57%	18
Salt Creek	Headgate and/or Diversion Structure	Stabilize ditch headgate with the installment of a headwall and wingwalls.	57%	18
Castle Creek	Pipe Repair or New Install	Piping a portion of the ditch that experiences high water loss.	55%	19

Drainage	Type of Project	Project	Score	Ranking
Colorado River	Pipe Repair or New Install	Repair PVC piped section that crosses the Colorado River. This section has some major water leaks at adjoining sections of pipe. The wooden bridge holding the pipe will also need some repairs in the next 5 years.	55%	19
Brush Creek	Environmental	Remove two damaged trees above the ditch headgates.	55%	19
Gypsum Creek	Ditch Repair	Lateral headgates aren't able to fully close causing unnecessary diversions from the Ditch. Replace or maintain lateral headgates to preserve flows in the ditch for downstream use.	55%	19
Bruce Creek	Pond Repair	Redesign the irrigation pond to eliminate leakage and store water more efficiently.	53%	20
Elk Creek	Flume Repair	Replace flume with a new flume. The existing flume is rusted.	53%	20
Colorado River	Sediment Control	Develop and implement a river bank erosion-control plan to protect riparian area.	51%	21
Gypsum Creek	Laterals	Several turnouts were observed in the ditch to flood irrigate the fields between the ditch and Gypsum Creek. Typical turn-outs were not controlled and consisted of continuous flows into the field likely over irrigating the fields. Controllable lateral headgates will assist in better management of irrigation on the fields.	49%	22
Derby Creek	Headgate and/or Diversion Structure	Replace the old headgate with a new structure.	48%	23
Elk Creek	Headgate and/or Diversion Structure	New headgates should be installed in each of the ditches, as no headgates are present.	48%	23
Sunnyside Creek	Flume Repair	Replace the flume and place upstream near the headgate. Make sure flume is installed with wingwalls and toewalls to decrease erosion around the structure.	48%	23
Sunnyside Creek	Sediment Control	Develop erosion control methods and line to prevent blowout along the ditch.	48%	23

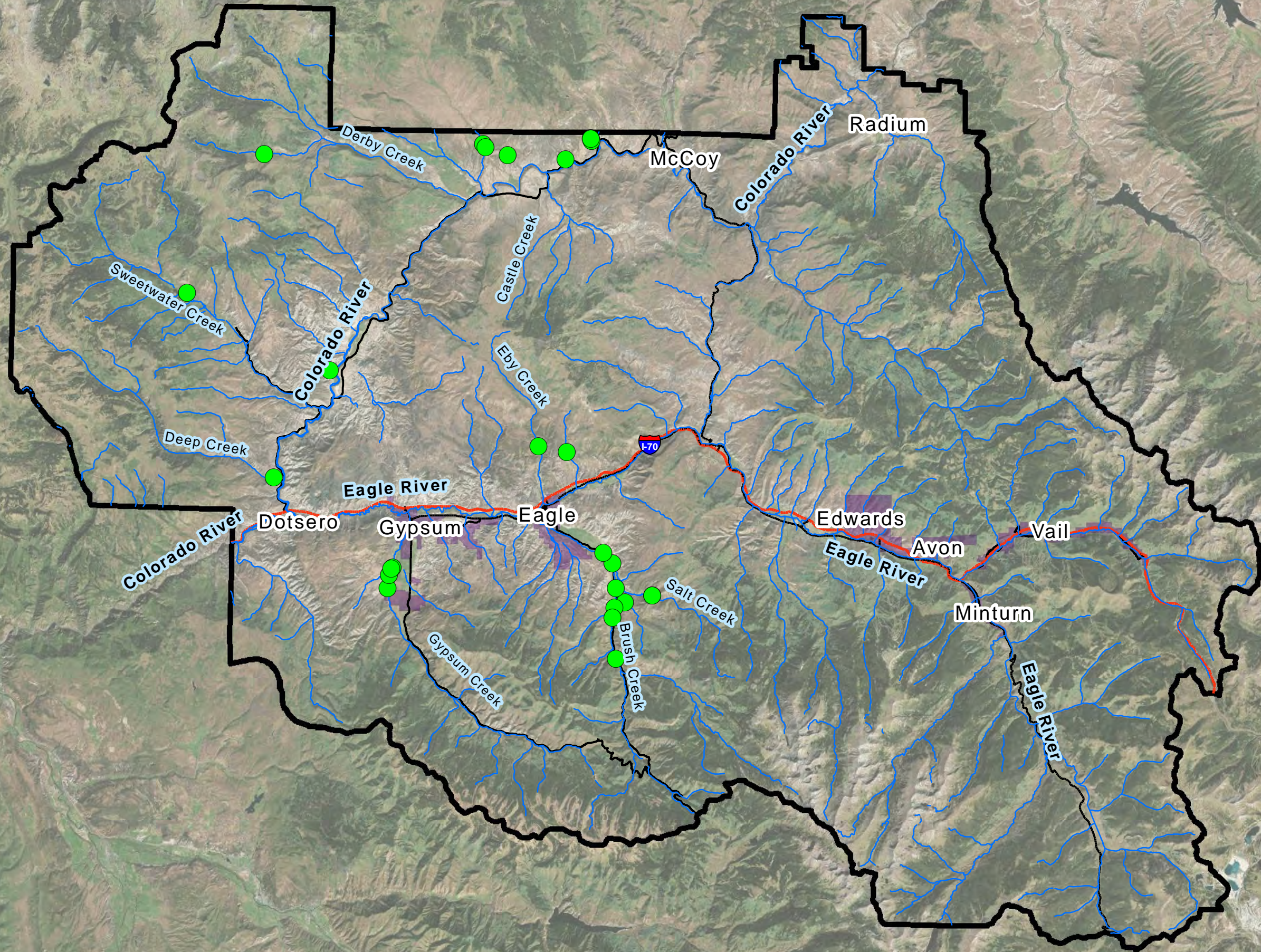
Drainage	Type of Project	Project	Score	Ranking
Brush Creek	Culvert Repair	The majority of metal culverts were rusted on the bottom, but no holes had yet formed. There was also some sediment buildup in the culverts that should be cleaned out prior to next year's irrigation season. These culverts will need to be replaced in the future, likely in the next 10 years.	47%	24
Brush Creek	Culvert Repair	Culverts under Brush Creek Road and diversion structures will need to be replaced in the future.	41%	25
Colorado River	Pipe Repair or New Install	The pipe over the railroad tracks is in poor condition. Although the Railroad has historically maintained the pipe, the current owner of the ditch has been trying to work with the railroad for the past 3 years to replace the pipe and bridge over the railroad tracks.	41%	25
Castle Creek	Flume Repair	Remove the crumbling concrete lining around the flumes and flow splitters, and re-line the channel.	39%	26
Tepee Creek	Sediment Control	Line the wasteway outlet to reduce erosion.	29%	27

Appendix A- Priority Matrix Template

Irrigation Asset Inventory Evaluation Matrix		Meets?	Weight	Score	Possible Score by Category
1	Conditional Rating in Ditch Report				
1a	High		3	0	3
1b	Medium		1	0	
1c	Low		0.5	0	
			Subtotal	0	
2	Benefits multiple Agricultural parties or objectives				
2a	3 or more		0.75	0	0.75
2b	2		0.5	0	
2c	1		0	0	
			Subtotal	0	
3	Estimated Remaining Years till Structural Failure				
3a	0-5 years		3	0	3
3b	5-15 years		1	0	
3c	15+ Years out		0	0	
			Subtotal	0	
4	Impact on Ditch Operations				
4a	High		3	0	3
4b	Medium		1	0	
4c	Low		0	0	
			Subtotal	0	
5	Size of Structure				
5a	10+ cfs		2	0	2
5b	5-10 cfs		1.5	0	
5c	0-5 cfs		1	0	
			Subtotal	0	
6	Environmental Impact				
6a	Water Quality Impacts (yes = 1, potentially = 0.5)		1	0	4
6b	Riparian Impacts (yes = 1, potentially = 0.5)		1	0	
6c	Sedimentation Impacts (yes = 1, potentially = 0.5)		1	0	
6d	Aquatic Habitat/transportation Impacts (yes = , potentially = 0.5)		1	0	
			Subtotal	0	
7	Sustain Agricultural Industry				
7a	Maintain irrigated agriculture		2	0	3
7b	Will restore irrigated lands		1	0	
			Subtotal	0	
Total				0	18.75

Score 0%

Appendix B- Map of Irrigation Asset Inventory Ditch Locations



Appendix C- Photographs of Potential Projects

Examples of Ditch Structure Concerns and Identified Projects



Photo 1: Leaking piped joints.



Photo 2: Rusty culverts being rotated to extend useful life.



Photo 3: Rusty out and leaking culvert.



Photo 4: Unstable and inaccurate flume from lack of wingwalls and toewall.



Photo 5: Unstable and unsafe headgates from erosion around structures.



Photo 6: Sinkhole observed near ditch.

Examples of Environmental Concerns and Identified Projects



Photo 1: Sediment filled ditch from unstable upgradient watershed.



Photo 2: Approx. 2 cfs leak in ditch through liner damaged by rock fall.



Photo 3: Ineffective diversion structure with hazardous tarps in creek .



Photo 4: Sediment filled culvert from highly soils in watershed.



Photo 5: Unstable river bank eroding riparian area (at top of picture)



Photo 6: Sinkhole located above a ditch due to underlying salty soils.

Appendix D- Funding Opportunities

Grant Opportunities

Colorado Water Conservation Board (CWCB)

<http://cwcb.state.co.us/>

<http://cwcb.state.co.us/LoansGrants/Pages/LoansGrantsHome.aspx>

- Water Project Loan Program
- Water Efficiency Grants
- Water Supply Reserve Account Grants
- Severance Tax Trust Fund Operational Account Grants
- Colorado Watershed Restoration Grants
- Agricultural Emergency Drought Response Program
- Alternative Agricultural Water Transfer Methods Grant
- Fish and Wildlife Resources Fund Grants
- Weather Modification Grants
- Non-Reimbursable Project Investment Grants
- Invasive Phreatophyte Control Program
- Wild and Scenic Rivers Fund
- Stream Restoration Account of the Flood and Drought Response Fund

Natural Resources Conservation Service (NRCS)

<http://www.nrcs.usda.gov/>

<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/?cid=stelprdb1048817>

- Agricultural Management Assistance (AMA)
- Conservation Stewardship Program (CSP)
- Environmental Quality Incentives Program (EQIP)
- Agricultural Conservation Easement Program (ACEP)
- Healthy Forest Reserve Program (HFRP)
- Wetlands Reserve Program (WRP)
- Farm and Ranch Lands Protection Program (FRPP)
- Grasslands Reserve Program (GRP)
- Wildlife Habitat Incentive Program (WHIP)

Colorado Parks and Wildlife

<http://cpw.state.co.us/>

<http://cpw.state.co.us/aboutus/Pages/GrantPrograms.aspx>

- Colorado Wildlife Habitat Protection Program (CWHPP)
- Habitat Partnership Program
- Ranching for Wildlife

Colorado River District

<http://www.coloradoriverdistrict.org/>

<http://www.coloradoriverdistrict.org/grant-program/>

- Annual Grant Program

Bureau of Reclamation<http://www.usbr.gov/>

- WaterSMART Grant

Great Outdoors Colorado<http://www.goco.org>

- Habitat Restoration Grants
- Protect Initiative Grants

Additional Funding Opportunities Compiled by Riparian Restoration Connection can be found at <http://www.riparianrestorationconnection.com/funding-board>

Potential Funding Partners

Eagle River Watershed Council (ERWC)www.erwc.org/

Holly Loff, Executive DirectorLoff@erwc.org

Brooke Ranney, Projects and Events Coordinator..... Ranney@erwc.org

Trout Unlimited<http://www.tu.org/>

Richard Van Gytenbeek, Colorado River Basin CoordinatorR.VanGytenbeek@tu.org

American Rivers<http://www.americanrivers.org/region/rockies/>

Matt Rice, Director, Colorado Basin Program MRice@americanrivers.org

Ditch and Reservoir Company Alliance (DARCA)<http://www.darca.org>

John McKenzie, Executive DirectorJohn.McKenzie@darca.org