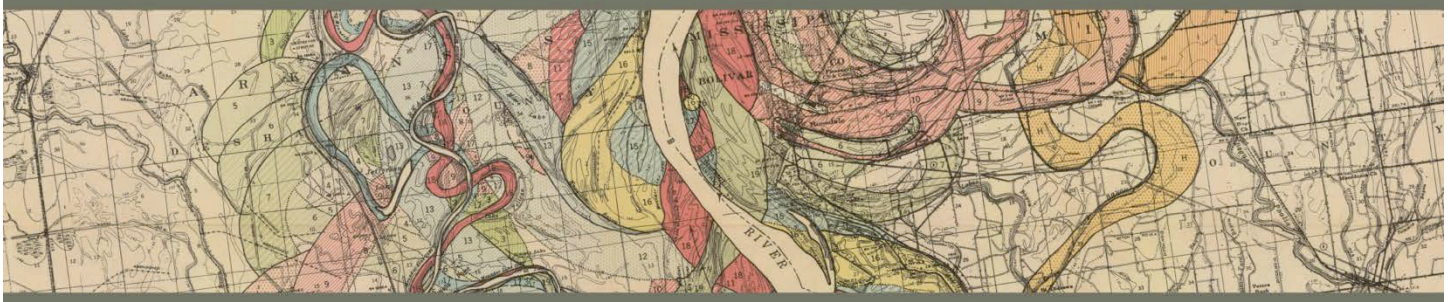
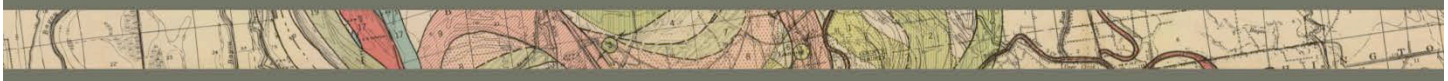
Prepared for Harvard University and the Bessemer Project Association

Harvard University
Graduate School of Design



Investing in Water Optimization

New Markets for Conservation on Colorado's Bessemer Ditch



INNOVATIVE CONSERVATION SOLUTIONS, LLC

Palmer Land Trust

Investing in Water Optimization

New Markets for Conservation on Colorado's Bessemer Ditch

Scott Campbell, Owner and Principal, Innovative Conservation Solutions, LLC
Prepared for Harvard University and the Bessemer Project Association in partnership with Palmer Land Trust

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March 19, 2020

Introduction

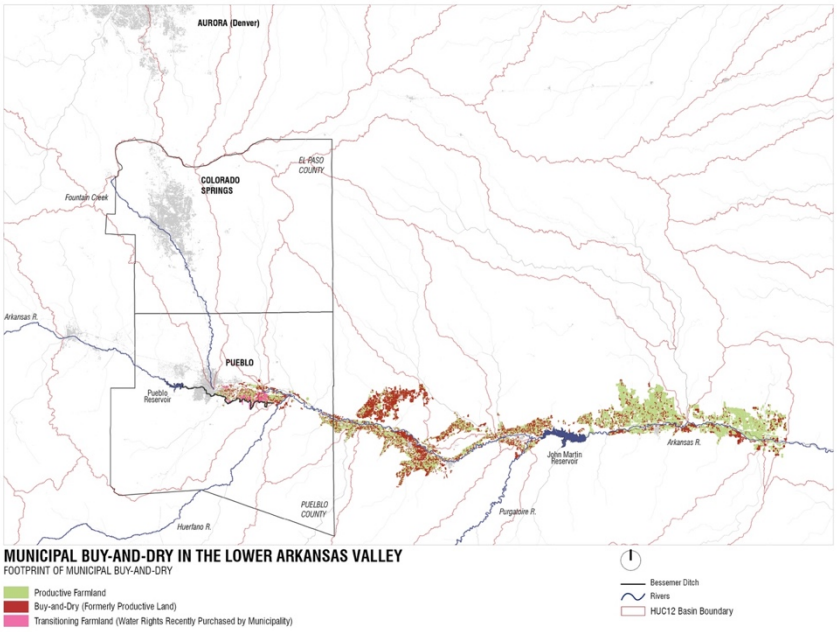
In the late 19th century, irrigation promoters called Colorado's Lower Arkansas Valley the "Valley of Content." Prime soils, productive farms, an ideal growing season, and bucolic river towns lent credence to the name. Lands irrigated by the Bessemer Ditch, in Pueblo County, Colorado—an epicenter of agricultural activity—were emblematic of this Valley of Content visage. Lying on the outskirts of the City of Pueblo—and surrounding the communities of St. Charles Mesa, Vineland, and Avondale—they include some of the best production ground for fruits, vegetables, and other crops in the state. Designated as Farmlands of National Importance by the Natural Resources Conservation Service (NRCS), Bessemer-irrigated lands are home to the famed Pueblo chile, one of the American Southwest's largest green onion producers, organic growers, exporters of pinto beans to Mexico, agricultural innovators, and agribusiness entrepreneurs. The ditch itself, which boasts some of the most senior water rights in the Arkansas River Basin, was formed around a post-Gilded Age ideal: a cooperative enterprise where worker ownership drives a more democratic form of capitalism. There are approximately 800 BIDC shareholders in the ditch system.

Bessemer-irrigated farmland in Pueblo County, Colorado. Beyond lies one of the greatest expanses of native grasslands left in the country. The Arkansas River is on the left. The City of Pueblo (pop. 111,000) is behind the photographer. Bessemer farms represent some of the best production lands in the state. They are served by the most senior water rights in the Arkansas River. A recent municipal water purchase threatens the fabric of this agricultural landscape. The Bessemer Project offers an alternative.

By the time the name Valley of Content was in common usage, the waters of Arkansas River were already fully appropriated. (A native surface water right on the Arkansas River with an appropriation date of 1890 or later is in priority less than 25% of the time.) Altered hydrological regimes and surface irrigation practices were beginning to have detrimental effects on Arkansas River ecological systems and water quality. Cities and agriculture entered into an interesting dynamic over the control of water, which fostered both competition for ownership and cooperation around transbasin diversions and storage projects—a dynamic that would define western water management throughout the 20th century.

A big development in this dynamic emerged when diversion and storage projects began to wane in the 1970s and 80s. Water was still needed by growing Front Range cities, and the Lower Arkansas Valley became the crucible for a new trend in western water appropriations: agricultural-to-municipal water transfers, also known as municipal "buy-and-dry." While small transfers from farms to cities had been occurring here and there since the turn of the century, large transfers began to occur at an unprecedented scale beginning in the 1970s. With these large transfers, communities started to witness not only the permanent loss of prime farmland to dry-up, but the subsequent failure of related agricultural industries, decline of main street businesses, diminishing alternative enterprise potential,

increasing hardships for farmers who remained in farming (incentivizing additional water sales), environmental degradation, and significant fiscal and land use challenges for local governments. Just as natural ecosystems require a critical mass of contiguous, interconnected lands to function, so, it seems, agricultural-economic ecosystems do as well. But nowhere in the western United States during the last half-century have communities been able to reconcile the free-market concept of "willing buyer, willing seller" that drives agricultural-to-municipal water sales with the collateral damage and unintended casualties that often follow in the wake of these sales.[1]



Colorado's Lower Arkansas Valley extends from the City of Pueblo (where the Arkansas River leaves the Rocky Mountains and enters the plains) to the State of Kansas (where it continues its four-state journey to the Mississippi River). Over the last 40 years, buy-and-dry activities in the Lower Arkansas Valley have eroded one-third (over 100,000 acres) of the region's irrigated farmland and contributed to poverty rates exceeding 35% in some counties. Pueblo County will soon address the buy-and-dry impacts of a major agricultural-to-municipal water transfer.

In the Lower Arkansas Valley, the acquisition of farm interests by cities has resulted in the dry-up of over one-third of the region's irrigated farmland—more than 100,000 acres. Counties like Crowley County, where the bulk of dry-up has taken place, rank among the poorest in the nation. Pueblo County was relatively unaffected by large-scale buy-and-dry activities—a last stand in the Valley of Content—until recently. In 2009, a consortium of farmers on the Bessemer Ditch—78 shareholders representing approximately 50 families—offered to sell shares to the Pueblo Board of Water Works (Pueblo Water), the City of Pueblo's municipal water provider. Pueblo Water had made an earlier offer on the water in 2006 but now was coming to grips with the fact that its junior Colorado River rights, which supply a good portion of the city's water, were not as reliable as it had once thought. Following severe droughts and the emergence of hydrological and climate change data that put forth ominous forecasts for Colorado River water supplies, Pueblo Water faced a new 21st century reality: that its rights might be curtailed to meet the needs of downstream states in the event of a compliance call under the Colorado River Compact—the agreement that governs the use of the river's waters among seven U.S. states and

[1] The exception to this may be mutual irrigation ditch companies whose bylaws prohibit out-of-ditch water transfers. However, these are few and far between. As the value of water increases, ditch companies face greater pressures to amend bylaws and allow out-of-ditch transfers to occur (this happened on the Bessemer Ditch); and even where bylaws prohibiting out-of-ditch transfers remain intact, the sale of water from farms on nearby ditches can have a comparable negative economic impact on farm communities, creating added pressure to allow out-of-ditch sales as agricultural-economic opportunities diminish.

Mexico. The water utility determined that it was in the city's best interest to acquire the supply. Following the purchase, it leased the water back to farmers through 2029. Thus, a sale of water interests from less than 10% of the ditch company's shareholders, now stands to dry-up one-third of the production ground in the St. Charles Mesa, Vineland, and Avondale communities—creating repercussions that will affect more than 700 remaining shareholders and the greater agricultural industry sector as a whole.

Frequently, in buy-and-dry contexts, the primary (and often only) community-oriented strategic objective that "willing buyer, willing seller" supports is a municipal one: obtaining a maximum yield of water through a minimal number of purchase transactions. Municipal acquisitions often target the most senior water rights (since the most senior rights are the most reliable), the largest holdings (reducing the number of transactions required), and the most productive lands (since the most productive lands often demonstrate the greatest consumptive use history and therefore yield the most water). Municipal water leadership would, in fact, be remiss not to approach the matter of acquisition in this way—to do otherwise would be fiscally irresponsible—and cities with growing populations in river basins where demand exceeds supply continue to appropriate water from farms in this manner because viable alternatives have yet to be brought to scale.

More equitable market frameworks are needed that counteract the detrimental effects of buy-and-dry practices and build equity between cities (which have substantial means to acquire water resources in the face of scarcity) and rural communities (which often lack the means to protect water resources for their own benefit). Markets that allow the value of water to be realized in ways other than outright municipal sales are essential in this regard. The Bessemer Project—the focus of this report—has created new markets for agricultural land and water in the wake of pending dry-up that could help retain a resilient agricultural base and restore vital ecosystem services. By establishing opportunities for land and water conservation transactions that could be backed by a variety of capital structures, it provides a vehicle to protect a critical mass of prime farmland and ensure municipal water acquisitions do not result in zero-sum games—where cities survive and rural agricultural communities do not.

Executive Summary

The Bessemer Project launched in 2015 as an effort to mitigate the projected impacts of a major agricultural-to-municipal water sale in Pueblo County, Colorado. Following five years of formative planning—and extensive work with farmers, the Pueblo Board of Water Works (Pueblo Water), and Colorado's Division 2 Water Court—the Bessemer Project Association (BPA) established an innovative market mechanism that could help retain a resilient agricultural base by making better use of limited water resources. This new mechanism is codified in a "substitution of dry-up" provision in Pueblo Water's decree and creates opportunities for land and water conservation transactions that could be backed by a variety of capital structures. The goal of these transactions would be to:

- protect Farmlands of National Importance;
- support more strategic application of limited water supplies;
- improve water quality in river systems;
- restore native ecosystems;
- increase farm real-estate values;
- increase per-acre production yields;
- support new practices in regenerative agriculture and soil carbon capture; and
- create resilience in farm communities and agricultural-economic systems.

Peppers from Milberger Farms. Whole Foods supplies stores with Pueblo chiles from Bessemer-irrigated lands; Walmart and Kroger source produce here; and an assortment of small grocers, retailers, livestock producers, and distribution networks rely on Bessemer farms for product. Throughout the area, independent family farms drive production.

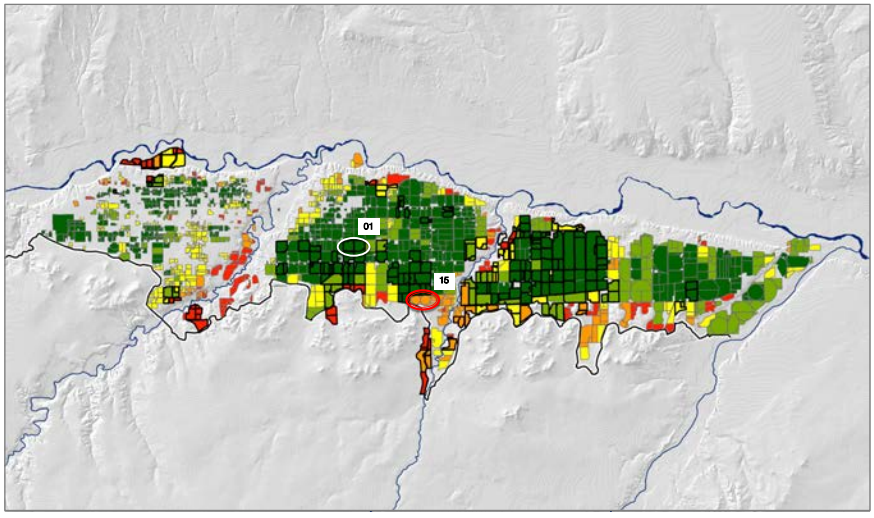
Harvard University, with additional support from the Gates Family Foundation, underwrote an effort to explore the types of capital structures and conservation transactions that could advance Bessemer Project efforts. A grant from the university's Loeb Fellowship Alumni Council enabled Harvard Loeb Fellows Peter Stein ('81), Marc Norman ('15), and Scott Campbell ('15) to convene conservation, finance, and water experts in Pueblo County in October 2019, to explore opportunities. This report discusses the results of that effort and provides an updated synthesis of Bessemer Project history, objectives, and financial models—explored through case studies with Palmer Land Trust (PLT), the Bessemer Project's lead organization, and two Bessemer farm operations: DiSanti Farms and Rusler Produce.

Pueblo Water's acquisition of 5,540 Bessemer Irrigating Ditch Company (BIDC) shares in 2009—undertaken to provide City of Pueblo residents and industry with reliable sources of water long into the future—threatens to dry up one-third of the farmland on the Bessemer Ditch (5,000 acres), a significant portion of farmland. More disconcerting still, it threatens to dry up much of best farmland. From a land-use, economic, or environmental perspective, there is nothing strategic about this dry-up. Prime farmland will be taken out of production. Subprime farmland with lower yields will remain in production. Soils with good water-retention characteristics will be dried. Lands with significant runoff characteristics that contribute to nonpoint source water quality impairments in the Arkansas River and its tributaries through surface-irrigation practices will continue to be irrigated. Ditch hydraulics, perfected over a century, will be more difficult to manage. Farm units will be fragmented, creating the potential for future land uses that are incompatible with agriculture and make farm-management more

burdensome and complex. Agribusiness and related industries that might otherwise invest in the area may be dissuaded when they consider the pending reductions in prime farmland and the trajectory of agricultural-economic change the future holds.

Pueblo Water's cooperation in the creation of a substitution of dry-up provision creates the potential for an alternative future where contiguous clusters of the most productive lands remain intact. It enables the acquisition of real property by farmers, conservation groups, or impact investors, who can then facilitate exchanges of water interests from less productive farmland—where wetlands and native ecosystems can be restored and water quality improved—to highly productive food-growing areas that risk being permanently fallowed by Pueblo Water's purchase. The result is better farmland retained in agriculture and improved environmental conditions.

Financial modeling indicates that these transactions can be profitable for farmers and impact investors. For example, a PLT case study explores a buy-protect-sell transaction on two 80-acre farms. One farm, which sold its water to Pueblo Water and whose market value (like all sellers' farms) fell substantially after the sale, is considered a Critical Production Area (CPA). This is a farm that, under any agricultural-economic objective, should be retained in irrigated agriculture. The other farm—a property with shallow soils and lower production potential, contiguous with native prairie and proximate to riparian corridors and drainage pathways—does not meet CPA criteria and is a better candidate for dry-up (a Dry-Up Candidate Area or DCA). PLT's case study examines a scenario where the organization purchases both properties, restores permanent water to the CPA by substituting the DCA for dry-up, reclaims DCA, and then sells both properties with conservation easement protections. In the case study, an initial investment of $930K produced a $359K estimated net return and the potential for higher returns up to $817K.



The Palmer Land Trust case study examines both the financial and conservation outcomes in a hypothetical buy-protect-sell transaction involving two properties. The model is based on actual sales data collected during the five-year period following Pueblo Water's purchase (2011-2015). The results are promising.

Why are these transactions profitable? Because, by making better use of limited water resources, they restore high values to land with optimal growing characteristics. Analyses of market data reveal the basic value proposition: CPAs with farmer-owned water have a mean value of $12,000/acre. DCAs with farmer-owned water have a mean value of $8,500/acre. CPAs where Pueblo Water purchased water and

is leasing that water back to farmers (the leases are transferable) have a mean value of $2,500/acre. Under the substitution of dry-up provision, any person or organization that purchases one CPA acre with Pueblo Water-owned water for $2,500 and one DCA acre for $8,500 (for a total cost of $11,000) can strategically dry-up the DCA in order to preserve water on the CPA—restoring the CPA value to $12,000 and realizing a minimum $1,000 gross gain over the initial investment of $11,000. This gain does not even take into account the residual value in the DCA. The strategic dry-up value proposition not only enhances property values, it maximizes productivity on a per-acre and per-share basis—optimizing both land and water.

When farmers execute substitution of dry-up efforts between parcels using land and water assets they own or obtain, equally beneficial outcomes follow, especially when organizations like PLT aid these transactions by providing technical assistance (e.g., engineering and legal services required to support substitutions) and financial assistance (e.g., conservation easement, nonpoint source mitigation, or other ecosystem service payments that help underwrite transactions and establish the desired conservation outcomes). For farmers, the substitution of dry-up provision creates land access opportunities on the best farmland, the opportunity to improve farm value, and the ability increase annual production yields by shifting production to better ground. For example, a farmer who owns and irrigates a parcel that would be considered a good DCA can purchase a CPA where Pueblo Water owns water and substitute his or her own parcel for dry-up in order to restore permanent water to the CPA. What's more, conservation payments can underwrite much, and in some cases all, of the transaction costs.

The Bessemer Project builds on the work of some of the country's oldest farmland trusts, which have recognized that a protected land base preserves the production potential of farm communities and, thereby, opportunities for economic growth in the agricultural sector. At the same time, it advances innovative market developments bolstered by emergent ideas in the field of conservation finance. With Pueblo Water's decree finalized and the substitution of dry-up provision a reality, PLT is beginning to advance conservation transactions that will not only mitigate buy-and-dry impacts but will improve agricultural and ecological conditions and create new business opportunities for farmers who remain in farming. The project won't restore lost acreage, but it can ensure the retention of a resilient agricultural base, with the best lands permanently preserved in irrigated agriculture.

Purpose of the Harvard Grant

The purpose of the 2019 Harvard University Loeb Fellowship Alumni Council grant was to enable PLT to explore, in greater depth, the different kinds of capital structures and conservation transactions that could support Bessemer Project efforts. The grant facilitated PLT's work with Harvard Loeb Fellows—Peter Stein ('81), Marc Norman ('15), and ICS owner and principal Scott Campbell ('15). Loeb Fellows facilitated a two-day convening of water, conservation, and finance experts (see Appendix E) to investigate approaches and establish strategies for financing conservation transactions. The work culminated in a charrette, the goal of which was to design a water optimization fund—a conceptual investment vehicle that could advance Bessemer Project objectives.

The Loeb team defined a water optimization fund as a pool of capital that could support the acquisition of real property by farmers, conservation groups, or impact investors, who would then facilitate exchanges of water interests from less productive farmland—where wetlands and native ecosystems can be restored and water quality improved—to highly productive food-growing areas that will otherwise be dried by Pueblo Water. Harvard University is interested in the potential for the model to be scaled and applied in other water-short regions—optimizing water management for urban residents, food producers, and nature. Other participants in the effort are interested in the model's applicability to drought contingency planning in the Colorado River Basin, where over-appropriation of the Colorado River threatens the water supplies of 40 million residents and farmers who irrigate 5.5 million acres.

The water optimization fund would invest in conservation transactions that:

1. preserve irrigation on CPAs;
2. substitute DCAs for dry-up; and
3. generate the most optimal agricultural, economic, ecological, environmental, and land-use outcomes possible.

Financial modeling conducted by ICS in 2016 and 2017 indicates that substitutions—advanced through voluntary market transactions—can be profitable for farmers and impact investors. Questions Loeb Fellows hoped to answer through the convening charrette included:

- What types of capital structures could support exchanges of land and water interests that result in substitutions?
- What sorts of conservation transactions would they support?
- What sources of capital would they draw from?
- What financial returns could they produce?
- Who would invest in this effort?
- Who would manage it?

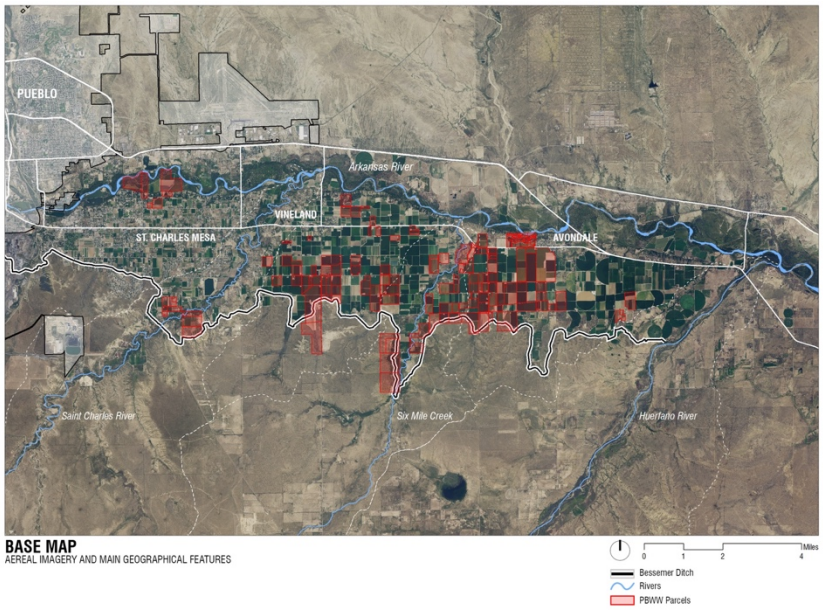
The Conservation Finance Network's (CFN) market development framework—from CFN's *Private Capital for Working Lands Conservation: A Market Development Framework*—provided contextual reference for the work. The Bessemer Project can be seen as sitting squarely between the Market Formation & Definition Phase and the Pilot Phase. PLT launched pilot implementation efforts in December 2019, after Colorado's Division 2 Water Court issued Pueblo Water's final decree with the substitution of dry-up provision intact. The decree establishes the legal/regulatory framework that allows a substitution of dry-up market to exist.

	Market Formation & Definition	Pilot	Early Market	Mature
PHASE	☑ Define the market opportunity ☑ Develop the cash flows and benefit flow ☑ Define returns and opportunities ☑ Develop protocols and regulations (science) ☑ Define and negotiate the unit of measure ☑ Build data and processes to support the "unit of measure"	☐ First pilot transactions, often one-off deals ☐ Modify and test regulations ☐ Test the "unit of measure" ☐ Validate cash flows, benefit flows and return models ☐ Establish asset and risk pricing ☐ Build market rules	☐ Stabilize regulations ☐ Repeat transactions that begin to increase in size ☐ Define risk and return expectations ☐ Decrease deal friction and transaction costs ☐ Multiple entrants engaging across all aspects of the market ☐ Investors become educated on asset and strategy	☐ Regulations stable ☐ Transactions scale relative to total available market ☐ Sometimes, the market is constrained by an aspect of strategy, geography, or biophysical context ☐ Sometimes the market is less constrained and becomes mainstream
DELIVERABLE	• No returns	• Attempts to return capital	• Return based on risk and asset class	• Return based on risk and asset class
CAPITAL	• Grants (Innovation often occurs within nonprofit structures)	• Grants and PRIs • Niche investors or early adopters driven by impact or mission • Credit enhancements and guarantees critical	• Grants and PRIs • Niche investors or early adopters driven by impact or mission • Credit enhancements and guarantees critical	• Niche includes federal, philanthropic, family office, or other investor driven by impact or mission • Mainstream includes impact investors, institutional investors, retail investors, and other finance-first investors

Background to the Bessemer Project

Project History

The Bessemer Project was set in motion six years after Pueblo Water purchased its 5,540 BIDC shares. In 2015, in anticipation of the Water Court change case filing and the termination of Pueblo Water's leases to farmers in 2029, Rocky Mountain Farmers Union (RMFU), with financial support from the Colorado Farm Bureau, convened community stakeholders to address the pending transition. Stakeholders included Pueblo County commissioners; Pueblo Water representatives; BIDC directors and staff; PLT representatives; Colorado Water Conservation Board (CWCB) directors; Arkansas Basin Roundtable leaders; NRCS staff; farmers; and regional chamber of commerce, planning, and economic development representatives. The intent was to see what could be done to avoid the buy-and-dry outcomes seen in other Lower Arkansas Valley communities. More optimal community transformation—marked by the retention of a resilient agricultural base, municipal water security, growing economic opportunity, intraregional cooperation, healthy ecosystems, and innovative water management practices that benefit farms and cities—was the goal. RMFU, serving as the fiscal agent for the group, commissioned a planning effort in light of that goal.



The Pueblo Water acquisition threatens to permanently fallow approximately 5,000 acres of irrigated land (in red), mostly in Vineland and Avondale.

The resulting plan, *Navigating the Wake of Municipal Water Sales: Alternatives to Improve Agricultural and Ecological Outcomes on the Bessemer Ditch*, developed by ICS and issued in 2017, outlines an alternative path for dry-up.[2] The plan is predicated on legal mechanisms that enable more strategic dry-up by means of a substitution of dry-up provision in Pueblo Water's decree. The provision would create opportunities to:

1. optimize limited water supplies—to retain the best lands in irrigated agriculture;
2. create ecosystem service benefits through strategic dry-up and reclamation efforts; and
3. improve farm value and productivity through business development opportunities for farmers.

[2] *Navigating* results were updated for this report. Maps were revised using the best available data, and case studies were streamlined using improved economic figures. These updates create some data discrepancies between this report and the *Navigating* report. The data used in this report should be considered the most current.

Dr. Michael Bartolo, Senior Research Scientist at Colorado State University's Arkansas Valley Research Center (above left), and Dan Hobbs, Cooperative Development Specialist at the Rocky Mountain Farmers Union (above right)—both Bessemer Ditch shareholders—initiated a series of community meetings in 2015 to address the risks imposed upon the farm community by Pueblo Water's water purchase. Earlier that year, Harvard University Lincoln-Loeb Fellow and ICS Principal Scott Campbell (below left) and Harvard Graduate School of Design researchers Flavio Sciaraffia (below center) and Sourav Biswas (below right) conducted a landscape analysis, exploring transfer alternatives. The efforts converged at the first community meeting, jointly sponsored by the Rocky Mountain Farmers Union and the Colorado Farm Bureau.

Following the issue of *Navigating*, RMFU worked with PLT and Pueblo Water to incorporate the recommended substitution of dry-up provision into Pueblo Water's proposed decree. RMFU and PLT then established the Bessemer Project Association (BPA), an unincorporated non-profit association that became an opposer in the Water Court change case—to ensure that the substitution of dry-up provision remained intact throughout change case proceedings, given opposition from some of the 26 parties to the case. PLT became the fiscal agent of BPA, assumed leadership for the overall effort, and closely monitored the change case until a settlement was reached in the summer of 2019.

Palmer Land Trust (Executive Director Rebecca Jewett, right) leads Bessemer Project efforts today. Palmer Land Trust also serves as the fiscal and managerial agent for the Bessemer Project Association. Water attorney and Bessemer Project Association legal counsel Jeff Kahn (far right) established the substitution of dry-up provision in the Pueblo Water's decree, which makes more strategic dry-up possible. Without that provision, Pueblo Water would have to dry farms it purchased water from—some of Colorado' best production ground. The substitution of dry-up provision enables more strategic dry-up via market-based mechanisms that can be profitable for farmers and impact investors.

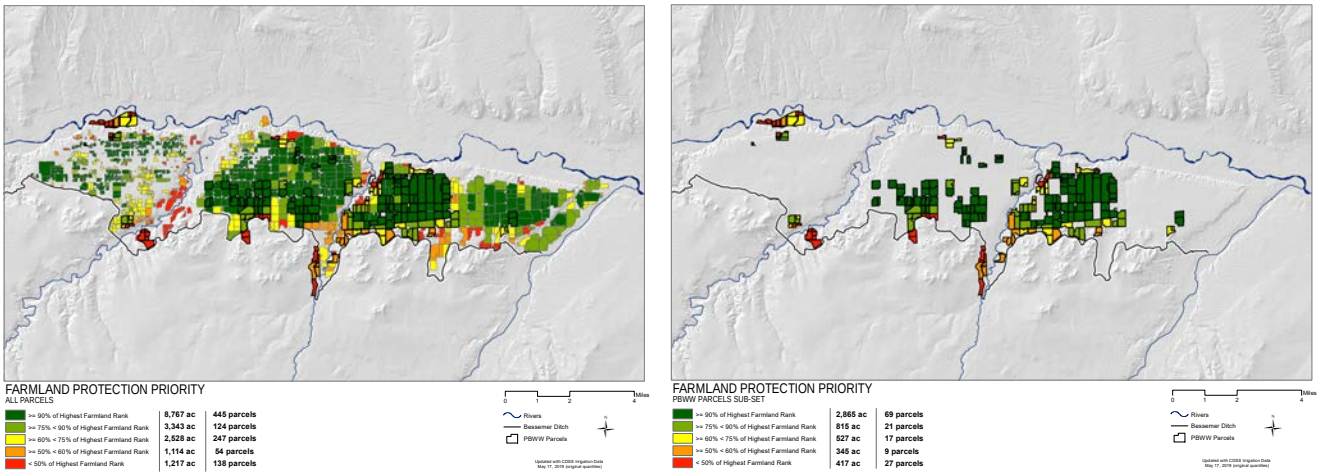
Project Objectives

Dry-up in agricultural communities reduces production potential and seeds risk of economic decline. As such, the term "strategic dry-up" should not suggest a sustainable approach to water procurement. Rather, strategic dry-up is presented as a mitigation mechanism, specific to the Bessemer Ditch, where *but for* the ability to dry-up strategically, economic decline will be exacerbated.

That being said, the planning approach BPA has taken regarding strategic fallowing on the Bessemer Ditch could seed planning efforts focused on numerous types of optimization—for example, improving precision irrigation practices, guiding rotational fallowing projects that support agricultural/municipal water-sharing efforts, or planning for interruptible supply transfers to restore reservoir levels following periods of drought. The approach holistically integrates ecological, environmental, and supply considerations while remaining focused on maximizing agricultural production in ways that benefit individual farmers and agricultural communities as a whole. It looks at monetizing ecosystem services on lands where fallowing occurs (for example, through ecological conservation easements or nonpoint source mitigation payments) to maximize economic returns from fallowing activities themselves. An overview of three fundamental Bessemer Project objectives outlined in the *Navigating* report underlies the case for strategic dry-up in Pueblo County and provides a basis for understanding how new capital structures could advance conservation transactions with strategic dry-up components in ways that are financially beneficial.

1. Preserve Critical Production Areas

Preserving Critical Production Areas is the first objective. 74% of the land where Pueblo Water purchased water (3,680 acres) lies in a CPA; 78% of this land (2,865 acres) scores in the 90th percentile for Farmland Protection Priority rank—marking it as the best of the best. CPAs represent Pueblo County's most valuable farmlands. Under any agricultural-economic objective, these are the farms that should be retained in irrigated agriculture. Preserving irrigation on these lands can sustain a strong, resilient agricultural industry in St. Charles Mesa, Vineland, and Avondale. Strategic dry-up—where DCA parcels are dried in lieu of CPA parcels—can help preserve these lands.

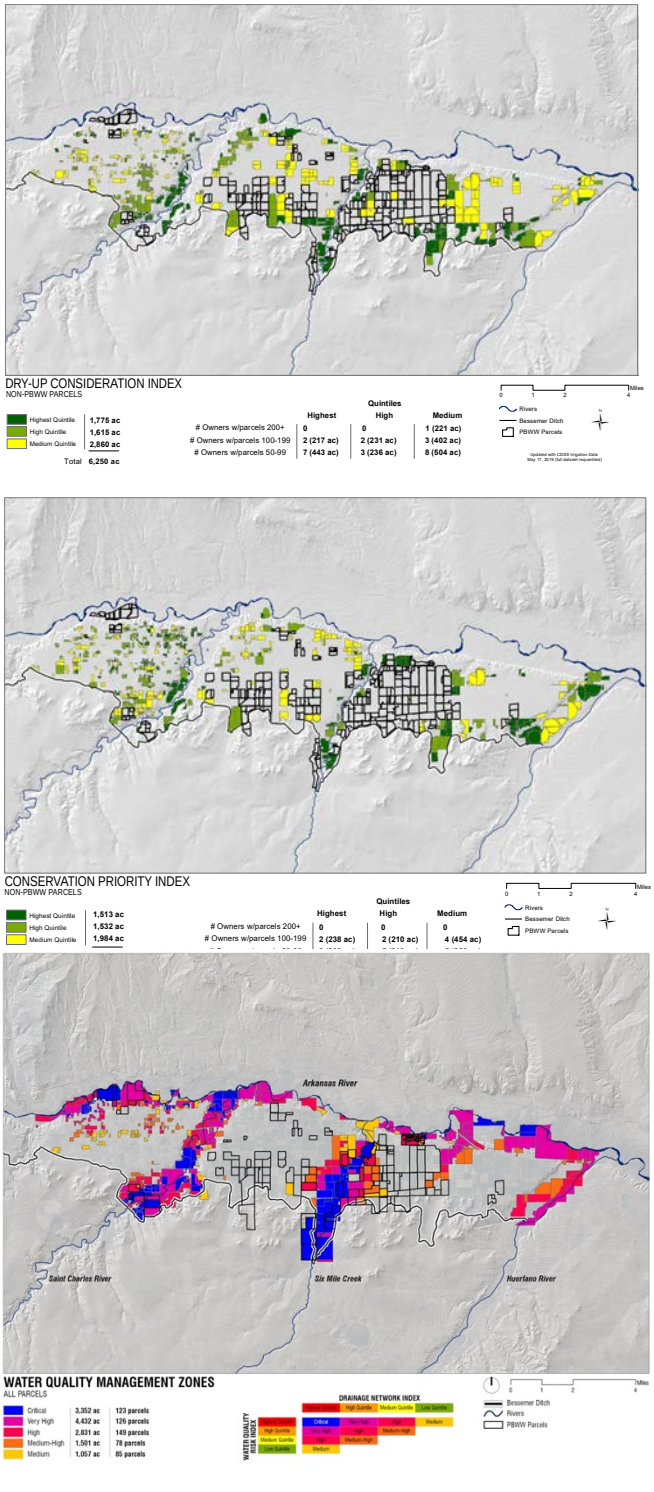


Above left: Critical Production Areas (CPAs) along the Bessemer Reach are shown in light and dark green. Under any agricultural-economic objective, these are the lands that should be retained in irrigated agriculture. Above right: Production areas where Pueblo Water purchased water, poised to be fallowed. 74% of these lands are defined as CPAs.

2. Create Environmental Wins

The second objective is to create environmental wins, and strategic dry-up on DCAs can not only minimize impacts to the agricultural community, it can maximize ecological gains. For example, strategically drying-up and restoring farmland in or adjacent to riparian corridors can improve habitat and provide vegetative buffers that limit sedimentation and nutrient loading from surface irrigation return flows. Strategic dry-up can also remove parcels from irrigation that, through subsurface return flows, contribute substantially to high water tables and the salt, selenium, uranium, arsenic and other total dissolved solids concentrations in the Arkansas River Watershed. Targeted revegetation can create contiguity across native grasslands and riparian corridors and help rebuild the Central Shortgrass Prairie's fragile ecological systems.

A variety of analyses were conducted to examine alternative DCAs. A Dry-Up Consideration Index (top) identifies acreage where revegetation efforts can be most successful and/or impactful (not all areas are expected to revegetate with equal success or at equal cost). The index identified 6,250 non-CPA acres that qualified. A Conservation Priority Index (middle) identifies areas of potential ecological significance based on (1) grassland cover, (2) wetland conditions, and (3) riparian zones with similar results: 5,029 acres qualified. Other analyses examined water quality management zones (bottom) by looking at the potential for both surface and subsurface return-flow contamination. 10,615 acres were identified as a high to critical contamination risk area (the analysis included well-irrigated—in addition to Bessemer-irrigated—lands). Pueblo Water purchased water on 1,917 of these acres. The Bessemer-irrigated portions of the remaining 8,698 acres offer opportunities to improve water quality in the Arkansas River and its tributaries if dried and reclaimed in lieu of CPA ground.



Dry Up Candidate Areas (DCAs) target strategic dry-up opportunities based on: grassland revegetation suitability (top); ecological restoration priorities (middle): and water quality improvements (bottom).

3. Produce a Return on Investment

The ability to produce a return on investment (the third objective) is what makes strategic dry-up a business proposition rather than a theoretical concept. On the Bessemer Ditch, substitution of dry-up activities will be initiated when owners of BIDC shares fallow DCAs (where Pueblo Water does not own water) in order to preserve water on CPAs (where Pueblo Water does own water, and which will otherwise be fallowed through its purchase). Why would owners of Bessemer land and water interests (farmers, conservation groups, others) want to do this? There is an economic value proposition in making better use of limited water resources by applying that water to the best farmland.

Analyses of market data reveal the basic value proposition: CPAs with farmer-owned water have a mean value of $12,000/acre. DCAs with farmer-owned water have a mean value of $8,500/acre. CPAs where Pueblo Water purchased water and is leasing that water back to farmers (the leases are transferable) have a mean value of $2,500/acre. Under the substitution of dry-up provision, any person or organization that purchases one CPA acre with Pueblo Water-owned water for $2,500 and one DCA acre for $8,500 (for a total cost of $11,000) can strategically dry-up the DCA in order to preserve water on the CPA—restoring the CPA value to $12,000 and realizing a minimum $1,000 gross gain over the initial investment of $11,000. This strategic dry-up value proposition not only enhances property values, it maximizes productivity on a per-acre and per-share basis.

> ***The Economic Value of Strategic dry-up***
>
> *In the five years following Pueblo Water's purchase, there were fourteen Bessemer-irrigated farm sales and two listings. Some sales occurred on CPAs. Some occurred on DCAs. Half included water still owned by farmers. Half included water now owned by Pueblo Water—meaning there was no guarantee those properties will have water after 2029. The sales reveal a stark difference in values and an intriguing value proposition:*
>
> - *CPAs with owned water have a mean value of $12,000/acre.*
> - *DCAs with owned water have a mean value of $8,500/acre.*
> - *CPAs with leased water from Pueblo Water have a mean value of $2,500/acre.*
>
> *If a farmer, conservation group, or investor purchased one CPA acre with Pueblo Water-owned water for $2,500 and one DCA acre for $8,500 (for a total of $11,000), under the substitution of dry-up provision in Pueblo Water's decree, that purchaser could strategically dry up the DCA in order to preserve water on the CPA—restoring the CPA value to $12,000 and realizing an immediate $1,000 gross gain over the initial investment of $11,000. This gain does not include the residual value of the DCA once water is removed or consider any conservation easement payments or payments for ecosystem services that could also underwrite the transaction.*

In this manner, the substitution of dry-up provision negotiated into Pueblo Water's draft decree provides voluntary, market-based opportunities to keep Pueblo County's best farmland in production. The *Navigating* report analyzes the microeconomics that make substitution of dry-up frameworks viable (see the following section: Case Studies—Exploring Return Investment Potential), and PLT has commissioned new macroeconomic analyses to examine how strategic dry-up—when combined with CPA preservation, crop optimization, environmental restoration, and other buy-and-dry mitigation efforts—can obviate the cycle of decline seen in other Lower Arkansas Valley communities affected by agricultural-to-municipal water transfers.

Project Case Studies—Exploring Market Potential

To test the value proposition inherent in strategic dry-up, ICS worked with PLT, Rusler Produce, and DiSanti Farms to develop economic models that analyzed substitution of dry-up investment returns in case study scenarios. Although the scenarios are hypothetical, they are firmly grounded in the business objectives of the case study participants and the goals of the *Navigating* report, and they allow for robust economic modeling. The case studies provide strong quantitative evidence that strategic dry-up is not only feasible, but profitable. For case study participants who sought to acquire both CPA and DCA parcels to conduct strategic dry-up efforts, returns on investment are promising, with rates of return equivalent to a 14% internal rate of return (IRR) over the life of the project. The case studies also identify qualitative benefits for farmers and the community at large that can be quantified in subsequent studies. These include: expanded holdings, increased production potential, reduced reclamation costs for Pueblo Water, better ecological outcomes for the community (ecosystem service benefits), and better production ground retained permanently in agriculture.

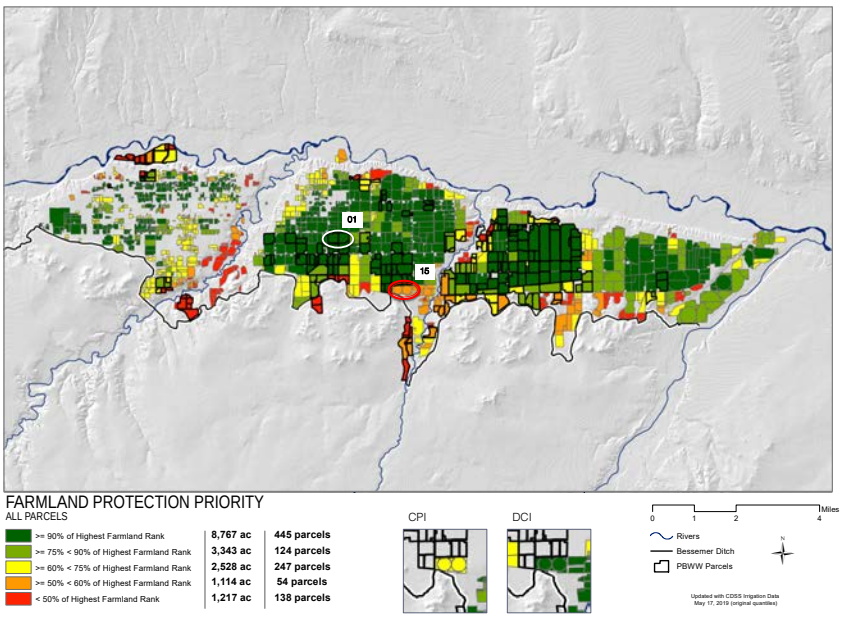
1. Palmer Land Trust

The first case study asks how PLT, if it had been active in the market during the 2011-2015 period, might facilitate strategic dry-up efforts in order to accomplish its mission to protect farmland and preserve and restore important ecological areas. As a 501(c)(3) nonprofit conservation organization, PLT raises (and spends) money to purchase conservation easements and initiate environmental protection and restoration activities. Could the value proposition identified in the market help the organization advance its mission at lower cost and/or at greater scale? For the case study, two properties that were on the market during the 2011-2015 period were used—an 80-acre DCA property with 73 owned Bessemer shares and a 79.32-acre CPA property with 86 Pueblo Water leased shares. How would PLT have fared if it had acquired both properties, facilitated a substitution of dry-up on the 80-acre DCA, restored permanent water on the 79.32-acre CPA, and then disposed of both properties?

The case study examines only land and water values—not improvement values. Based on property and soil characteristics and interviews with farmers, the land and water value of the 80-acre DCA property (which was taken off the market) is estimated at $8,500/acre or less. Because the list price was higher than the estimated value, the case study is conservatively predicated on a sale price of $9,000/acre. The value of the 79.32-acre CPA property with leased water was $2,143/acre (the actual per-acre sales price was slightly higher when the improvement values are considered).

In the case study scenario, PLT acquires the 80-acre DCA property for $760,000 and the 79.32-acre CPA property for $170,000—a purchase price of $930,000 for both properties. Palmer maintains the Pueblo Water water lease after the exchange (enabling irrigation on the 80-acre DCA property for 10 years before its water is "transferred" to the 79.32-acre CPA property). Both properties are leased to local producers at or slightly below market rates, and property taxes, dues, upkeep, and other costs are factored into annual expenses. A conservation easement is sold on the CPA property, which, following the end of the 10-year period and the restoration of permanent water to the CPA, will protect the property as irrigated farmland in perpetuity. A range of anticipated property values were assigned to the two properties following the ten-year period (anticipated, lower-than-anticipated, and higher-than-anticipated)—values that considered not only the movement of water on and off of the properties, but also annual appreciation (the historic average is about 2-3% per year).

Palmer Land Trust Case Study Results



The PLT case study *postulates that PLT was the purchaser of two properties listed during the 2011-2015 period: a 79-acre CPA with 86 Pueblo Water-leased BIDC shares (sale number 1) and an 80-acre DCA with 73 farmer-owned shares (listing number 15). PLT holds and leases the production ground for ten years, "transfers" the owned water from the DCA to the CPA at the end of the ten years, sells a conservation easement on the CPA, then disposes of both properties.*

Quantitative Results

- Initial Investment	*$ 930,000*
- Investment Term	*10 Years*
- Anticipated Gross Return	*$1,248,647*
- Max Gross Return	*$1,706,859*
- Anticipated Net	*$ 358,647*
- Max Net	*$ 816,859*
- IRR	*7% - 14%*

Qualitative Results

- *79 acres of farmland protected*
- *80 acres of grasslands restored*
- *tributary drainage improvements*
- *best farmland retained in agriculture*

Important to Note

This was a fairly conservative case study for several reasons: (i) the DCA was purchased at a high value—less expensive DCAs existed; (ii) homes and buildings on the premises could have been leased for additional revenue; and (iii) payments for ecosystem services (or ecological conservation easements) were not secured, but might have been.

The anticipated earnings following disposal of both properties would be $1,248,647. This represents a net gain of $358,647 and an IRR of 7%. Worst case scenarios show a net gain that is just in the black. Best case scenarios show a net gain of $816,859 (almost double the initial investment)—an IRR of 14%. The case study positioned PLT as the property investor. Farmers or other entities could just have easily been the property investor, and PLT could have served as the conservation easement purchaser. The case study was conservative in that, while it did not account for the legal and engineering costs required to manage the substitution of dry-up between the CPA and the DCA, it also did not account for the possibility of leasing the homes and other structures on the property, investing in improvements to increase property values, or receiving conservation easement or ecosystem service benefit payments for the DCA. It may also be that retaining minimal irrigated acreage on the DCA would increase resale value beyond the value of the shares not used in the substitution—provided enough shares were available to restore water to the CPA.

2. Rusler Produce

The second case study involves the region's largest agricultural water shareholder, Rusler Produce. With irrigated holdings spanning more than 1,000 acres in both DCAs and CPAs, and with non-Rusler CPAs that sold water to Pueblo Water surrounding Rusler production units, the Rusler case study examines the potential for Rusler Produce to acquire CPA parcels with leased Pueblo Water water, "move" water from existing DCA production units to those parcels, reclaim DCA lands well suited for dry-up, and add better production ground into their operations. Some CPA parcels in the case study are owned by farmers that have historically grown crops for (or have leased production land to) Rusler Produce—a fact that underscores the manner in which buy-and-dry impacts are systemic: they don't just affect the buyer and seller; they affect a host of producers, packers, distributors, and others who depend upon an intact network of production land to meet specific business income thresholds.

A 565-acre production area with dry-land pasture and approximately 150 acres of irrigated land (served by 150 shares) was selected as the DCA for the case study. The case study developed a substitution-of-dry-up model predicated on the following:

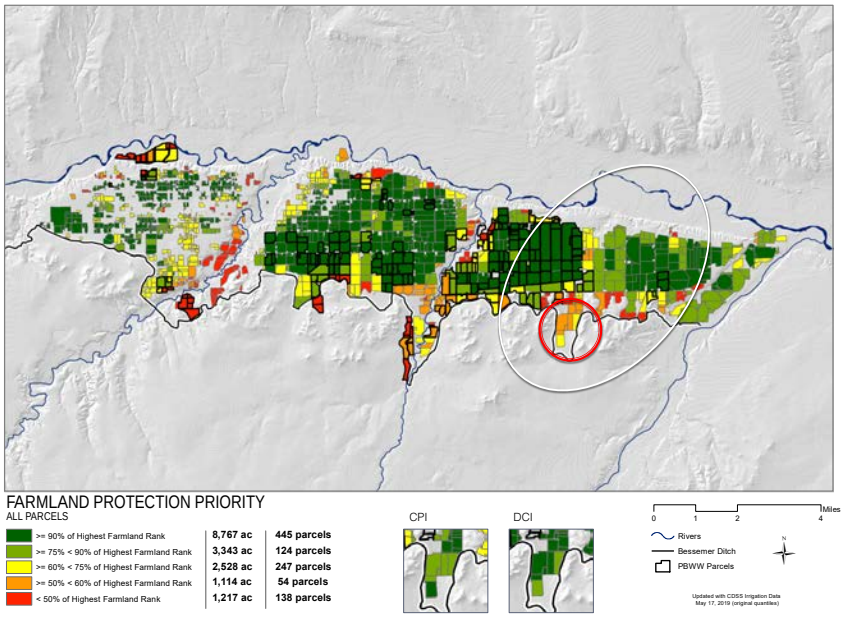
1. Strategically dry-up 50-60 acres of land in the 565-acre DCA that is contiguous with native grasslands and served by 50-60 Bessemer shares.
2. Sell a conservation easement on the 565 acres, encumbering the remaining shares, and continue to farm this more limited area.
3. Use the proceeds to acquire a CPA parcel where Pueblo Water currently owns water, and restore 50-60 acres of permanent irrigation water to that parcel.
4. Sell a conservation easement on the CPA parcel once permanent water has been restored.

Multiple CPA parcels where Pueblo Water owns water, ranging in size from 40-80 acres, were identified as potential acquisitions in the case study. Many of these parcels rank in the highest category for Farmland Protection Priority and the lowest quintile for Grassland Revegetation Suitability—meaning they are exceptional production lands, not ideally suited to reclaim as native grasslands—a fact that could save Pueblo Water as much as $1,000/acre in reclamation costs if DCA lands, in fact, prove easier to reclaim.

Using current market rates for PLT conservation easement purchases of irrigated and dry land, an easement sale on the 565-acre production unit with 90 to 100 shares of retained water would net Rusler Produce an estimated $257,520. Estimated costs of CPA parcels in need of 50-60 shares ranged from $187,402 to $349,552. A CPA with an estimated cost to Rusler Produce of $268,477 was used in the analysis. Selling an easement on this CPA property with water restored would net an estimated $242,748, producing a total anticipated net cash gain of $231,791.

Numbers were run using higher and lower easement payments. Considering these and other additional variables, anticipated, worse-than-anticipated, and better-than-anticipated outcomes were determined. These indicate a potential, worst-case-scenario net gain of $89,038 and a potential, better-than-anticipated net gain of $374,544. (Transaction costs were not included in the calculations.) The change in net asset value (due to diminutions in property value from conservation easement encumbrances) is anticipated to be $-119,779—far less than the anticipated net cash gain.

Rusler Produce Case Study Results



The Rusler Produce case study *postulates that Rusler sells a conservation easement on a 565-acre production unit with 150-owned Bessemer shares (in red circle above). Only 90-100 shares are encumbered by the conservation easement. 50-60 shares, which irrigate a DCA adjacent to native prairie, are not encumbered. Rusler uses the easement proceeds to purchase a 50-60-acre CPA with Pueblo Water-owned water within their area of operation (white circle). Substitution of dry-up on the DCA allows Rusler to restore water to the CPA. Rusler then sells a conservation easement on the CPA with restored water, protecting irrigation on the newly acquired farmland in perpetuity.*

Quantitative Results

- Initial Investment	*Minimal*
- Project Term	*2-3 Years*
- Anticipated Net Earnings	*$ 231,791*
- Max Net Earnings	*$ 374,544*
- Anticipated Asset Dim.	*$ 119,779*
- Max Asset Dim.	*$ 159,516*
- IRR	*NA*

Qualitative Results

- *expanded holdings*
- *better production ground*
- *increased annual yields*
- *reduced Pueblo Water reclamation cost*
- *better ecological outcomes*
- *over 600 acres of farmland and native prairie protected*

Important to Note

The transaction generates between $231,791 and $374,544 in cash for the Ruslers and provides them with better production ground, no loss of irrigated land, and new pastureland—cost-effectively reclaimed by Pueblo Water. In addition, enhanced property values—created by restoring water to CPAs—more than offsets diminution in property values created by easement sales.

Furthermore, case study outcomes demonstrate opportunities for increased future earnings and cost savings: increased earnings for Rusler Produce through enhanced production potential and reduced reclamation costs for Pueblo Water through more strategic selection of dry-up land. Finally, some donated easement value is reclaimable in the form of saleable tax credits. This earning potential is in addition to the earnings generated by direct easement sales to PLT, summarized herein.

Of all the case studies, the Rusler Case study demonstrates the greatest cash value proposition for the landowner; and, in addition to a six-figure net income gain, it provides Rusler Produce with better production ground, no loss of irrigated land, and new pastureland—cost-effectively reclaimed by Pueblo Water.

3. DiSanti Farms

The third case study is the most complex. It involves DiSanti Farms, one of the region's prominent green chile and vegetable growers. Unlike the Rusler case study, the DiSantis have limited water to transfer to CPA parcels, so the case study is premised on the acquisition of water through a hypothetical water optimization fund. The water optimization fund created for this case study does three things that a real water optimization fund might do:

1. acquire DCA property or water from DCA property in order to serve as a "water bank"—a provider of Bessemer shares to those looking to restore permanent water to CPAs.
2. provide low-interest loans to farmers through a revolving loan fund to help them acquire CPAs and restore permanent water to those CPAs (in other words, operate as a "real bank"); and
3. work with conservation partners to lower total acquisition costs for farmers by facilitating conservation easement sales on CPAs with restored water.

The DiSanti case study also examines the complexities (and higher costs) involved in facilitating water exchanges from DCAs, where Bessemer shares exhibit low historic consumptive use, to CPAs where historic consumptive use is higher. Accordingly, the CPA will require more DCA shares to restore water than the number of shares purchased by Pueblo Water in 2009.

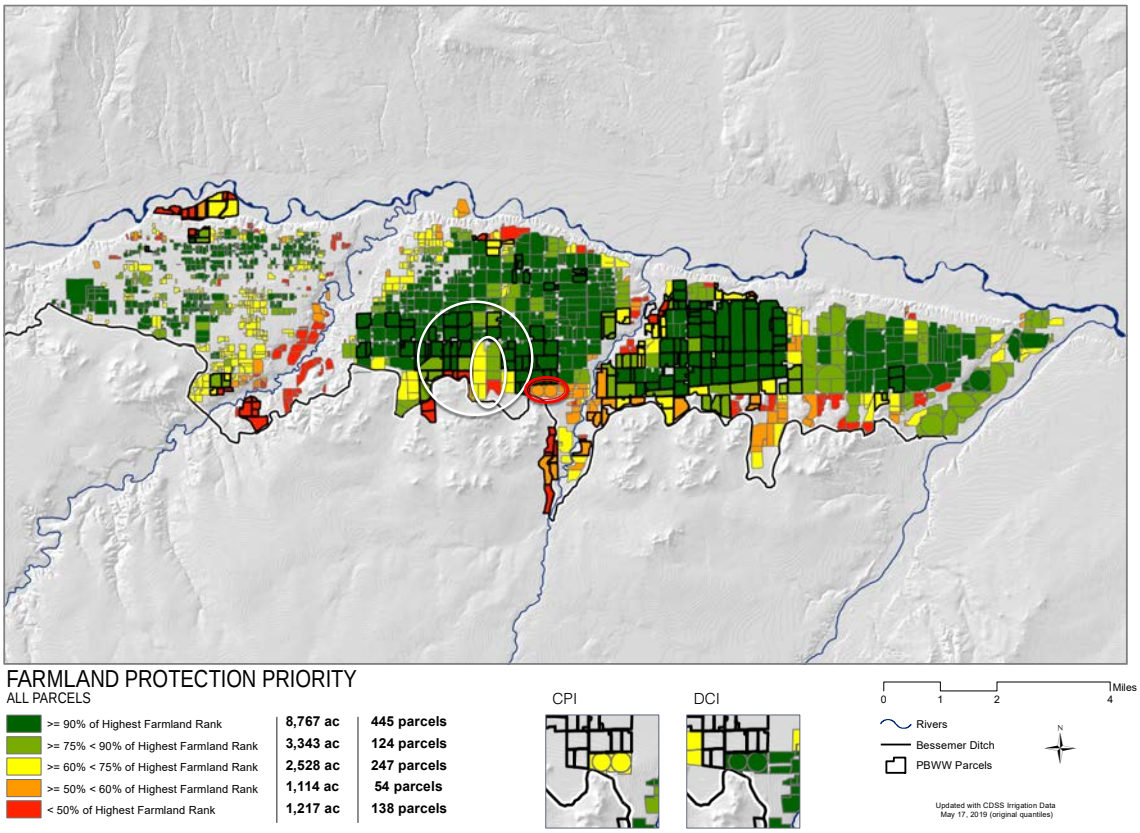
DiSanti production units are dispersed throughout the St. Charles Mesa and Vineland areas. The case study focuses on a production unit in the Vineland area comprised mostly of leased ground. Leases are on 5-year terms, which limits the DiSantis' ability to make long-term business/production decisions. The production unit is surrounded by CPAs that sold water to Pueblo Water—most of which rank in the 90th percentile or higher for Farmland Protection Priority. DiSanti's objectives in the case study are to purchase and restore permanent water to CPAs around the production unit in order to:

1. expand production unit operations;
2. increase business stability by balancing the ratio of fee to leased ground; and
3. shift production reliance from alkaline soils near the Bessemer Ditch to better CPA ground.

In the case study, the water optimization fund purchases an 80-acre DCA with 73 Bessemer shares. It provides a 10-year, low-interest loan to the DiSanti's so that they can acquire a 48-acre CPA (where Pueblo Water owns water) near their production unit. The loan also supports the DiSanti's acquisition of water from the water optimization fund, which the DiSantis will need in order to restore permanent water to the CPA. The water optimization fund facilitates the purchase of a conservation easement on the CPA from the DiSantis by PLT. This helps the DiSantis underwrite the land and water purchase cost, and it protects the CPA as irrigated farmland in perpetuity.[3] The water optimization fund manages (and leases) the DCA property for the remainder of the Pueblo Water lease term (10 years). The DiSantis operate the CPA under the Pueblo Water water lease during that time. After that, up to 56 shares from the DCA land are dedicated to the CPA, where permanent water is restored. The DCA is fallowed and reclaimed. The water optimization fund sells the DCA, with 17-25 of the better production acres remaining in irrigation.

[3] Standard practice is for lenders to subordinate their interests to the conservation easement holder. Lenders will not do this if there is not enough equity in the property to guarantee the loan balance. Typically, conservation easement diminution makes putting easements on recently mortgaged properties challenging without large down payments. Because of the value proposition inherent in strategic dry-up, that proved not to be an issue in this case study.

DiSanti Farms Case Study Results



The DiSanti case study *is the most complex. In it, the DiSantis purchase a 48-acre CPA (from within the large white circle) adjacent to a Vineland area production unit (the small white oval). A water optimization fund sells them Bessemer shares to restore water to the CPA at the end of the Pueblo Water lease period. The fund helps the DiSantis finance the acquisition of both the land and water through a low-interest loan. A conservation easement helps underwrite the purchase. To acquire water to sell, the water optimization fund purchases an 80-acre DCA (red circle), and manages it until the substitution of dry-up process is complete. The fund then disposes of it with a limited amount of irrigated land remaining.*

Quantitative Results—DiSanti

- *CPA Cost (leased water) $ 2,450/acre*
- *DCA Water Purchase $ 6,500/share*
- *Easement Revenue $ 2,750/acre*
- *DiSanti Total Cost $ 6,664/acre*
- *Typical Cost (with CE) $ 8,050/acre*
- *Typical Cost (no CE) $11,500/acre*

Quantitative Results—Water Fund

- *DCA Cost $1,007,640*
- *DCA Net Lease Revenue $ 280,000*
- *DiSanti Interest $ 53,693*
- *DiSanti Water Sale $ 335,191*
- *DCA Sale $ 708,759*
- *Total Net $ 191,109*
- *IRR: 1.75% anticipated; 5.74% best*

Qualitative Results

- *expanded DiSanti holdings*
- *increased DiSanti production*
- *higher quality production land retained in agriculture*
- *48 acres of farmland protected*

Important to Note

The case study generates great outcomes for the DiSantis. Water optimization fund returns of 1.75% - 5.74% per year could attract public investment or program-related investments from foundations. It would be harder to attract private investment, unless private investments were guaranteed a minimal rate of return by some sort of public backing.

The case study tests outcomes for both the DiSantis and the water optimization fund. For the DiSantis, it seeks to understand if taking advantage of strategic dry-up frameworks offers better value in terms of high-quality land access than simply buying a CPA with owned water and selling a conservation easement on that land or buying CPA land with a conservation easement already on it. Strategic dry-up has more legal, technical, and administrative burdens associated with it. Is it worth the effort? For the water optimization fund, the case study evaluates investment returns both for property acquisitions and loans. It also examines the potential for the fund to offer Bessemer shares at below market rates to farmers looking to restore water to CPAs when the farmers use the fund to finance the purchase of the property and the water.

Anticipated, worse-than-anticipated, and better-than-anticipated calculations were evaluated in every step of the DiSanti case study. The anticipated cost to the DiSantis of the CPA property is $2,450/acre. The anticipated cost of the DCA to the water optimization fund is $9,000/acre. The anticipated cost of water for the DiSantis from the water optimization fund is $6,500/share. The value of the CPA property purchased by the DiSantis (with permanent water restored to it) is conservatively estimated at $11,500/acre. The sale of a conservation easement on the property is anticipated to net $2,750/acre. The loan term for the DiSantis from the water optimization fund is 10 years at 3.9% with 20% down. The final cost of the DiSanti's CPA with permanent water restored is $6,664/acre.

Juan Carlos Vargas, Principal at GeoAdaptive, LLC (right) with DiSanti Farms proprietor Justin DiSanti. GeoAdaptive, working with Sourav Biswas, developed the spatial analysis for the Navigating report.

The comparable value of similar conservation-easement-encumbered property not requiring a water exchange is $8,050/acre. As such, the case study demonstrates great value for the DiSantis. How did the water optimization fund fare? It makes little difference whether the fund finances the DiSanti acquisition or not because, in the model, the earned interest is offset by discounting the sale of water. That service, however, provided significant benefit to the DiSantis. The greatest returns for the fund came from the acquisition, management, and sale of assets: acquiring the DCA parcel in fee, leasing the ground for the duration of the Pueblo Water lease period, selling off the needed water to supply to the CPA, overseeing restoration of the DCA by Pueblo Water, and disposing of the property. Case study participants believe retaining some water on DCA properties may enhance resale value to a greater degree than that indicated by the case studies.

Convening Results

Identifying Opportunities & Challenges

Participants in the Harvard-sponsored convening saw, in the Bessemer Project, opportunities for conservation transactions to support the substitution of dry-up, which could be backed by a variety of capital structures. Two types of transactions, which participants felt held the most promise and could be pursued in early phases of the project, are:

1. Farmer-directed transactions. In this type of transaction, farmers would execute substitution of dry-up efforts between CPA and DCA parcels using land and water assets they own or obtain. PLT would assist these transactions by providing technical assistance (e.g., engineering and legal services required to support substitutions) and financial assistance (e.g., conservation easement, nonpoint source mitigation, or other ecosystem service payments that help underwrite transactions and establish the desired conservation outcomes).
2. Buy-protect-sell transactions. In this type of transaction, PLT and/or investors would acquire CPA and DCA parcels in fee; execute substitution-of-dry-up, improvement, and preservation activities (e.g., conservation easement sales), and dispose of properties following a holding period advantageous to the transaction.

The Rusler case study (page 18) is emblematic of a farmer-directed transaction. The PLT case study (page 16) is emblematic of a buy-protect-sell transaction. The potential for hybrid transactions, which mix elements of farmer-directed and buy-protect-sell transactions, also exists (see the DiSanti case study on page 20); but complex capital structures such as revolving loan funds designed to incentivize substitution of dry-up transactions were dismissed by participants as complex, with potentially little value proposition for investors or farmers (i.e., returns are low and the need for low-interest financing is undemonstrated).

Convening participants also identified a number of challenges that could affect the development of these transactions. These challenges can be grouped into three categories:

1. the uncertainties inherent in the actions/inactions of stakeholders who could influence success;
2. the technical and financial challenges of implementation; and
3. the temporal and spatial challenges of scaling the effort.

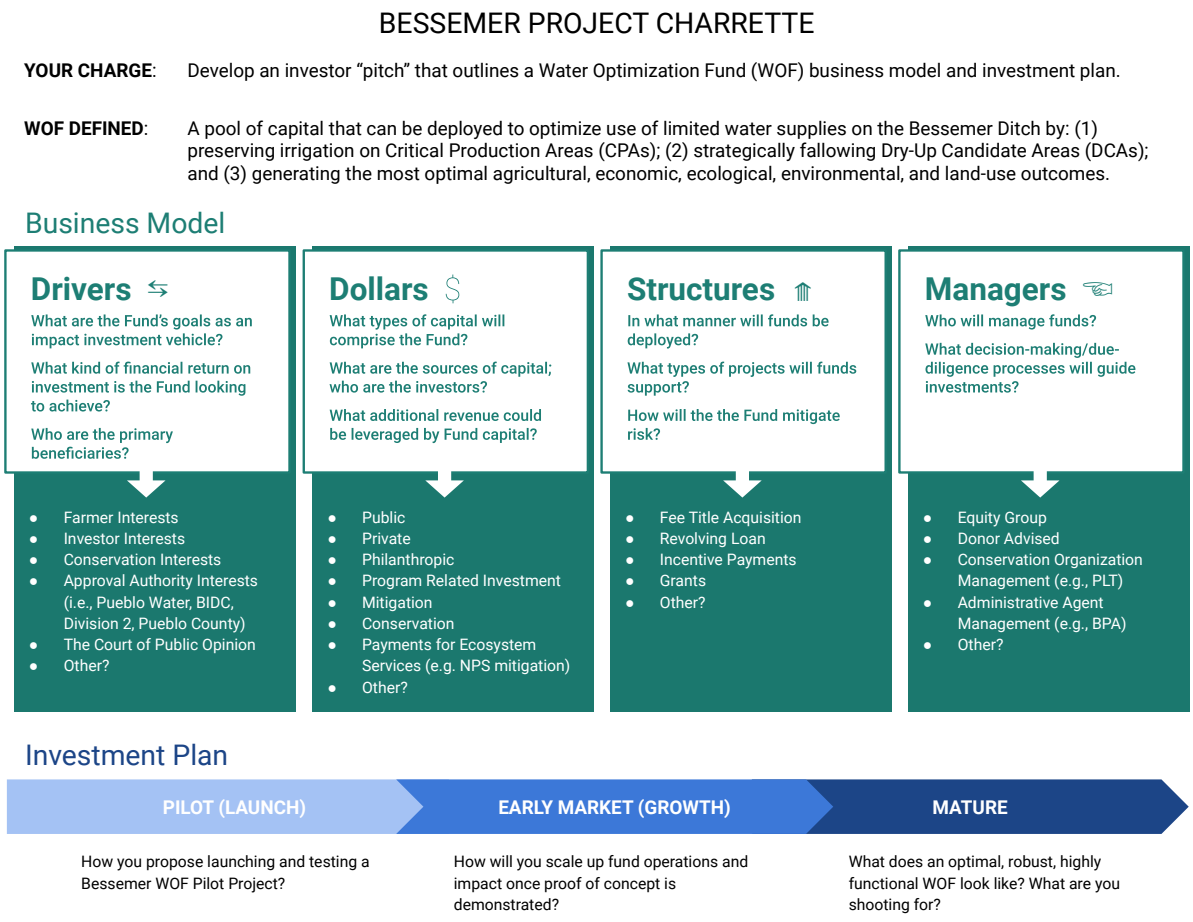
A full list of challenges identified at the convening can be found in Appendix F.

I really liked the energy/thinking that would give structure to a fund strategy. [With a strategy in place, we can then ask]: What are the things we need to do right now to move in that direction? What are the next three highest-level priorities over the next 18 months? Where do we want to get to in the next five years?

– Russ Schnitzer, Senior Program Officer
Gates Family Foundation

Exploring Capital Structures

The design charrette that concluded the convening used a worksheet, inspired by CFN's Market Development Framework, to facilitate thinking about capital structures that could advance substitution-of-dry-up projects through the development of a water optimization fund.



The charrette produced important project development considerations, as well, as participants were asked to consider the types of capital structures that might advance transactions from Pilot to Early Market to Mature phases. Convening participants split into two charrette groups, each with a mix of farming, finance, and conservation representatives. The approaches taken by the two groups were quite distinct. Group 1 focused on community engagement strategies to reduce implementation challenges, mitigate investment risks, and address a broad range of higher-order needs farmers face if substitution transactions are going to become priorities that get incorporated into their business plans. The focus of Group 1, therefore, largely considered what would be needed to promote, support, and execute farmer-directed transactions. Group 2 honed in on fund structure, recognizing two key facts distinct from, but not necessarily at odds with, Group 1. First, the farmers in Group 2 said that it may be unrealistic to expect these efforts to be farmer-driven; but that doesn't mean they can't be farmer-centered. Second, and building on this notion, Group 2 believed the opportunity to scale impact lay in direct fee-title acquisitions. (These might also, in turn, support farmer-directed transactions.) The buy-protect-sell

approach could also address what may be a unique opportunity in time. The value of land and water in this geography, at present, appears to make substitutions viable and profitable; but there is no guarantee this will be the case in the future.

Group 2 also saw the purchase of DCAs as being lower risk than CPAs, although purchases of each were contemplated. They believed philanthropic capital would be needed to seed efforts on the front end, with PRI and private capital coming in later on. And they saw the need to "lubricate" transactions by providing some financial/transaction assistance.

Thinking About Implementation

The convening helped identify three important areas of focus regarding implementation and next steps:

1. the need to engage stakeholders—to build a robust base of support and reduce uncertainties;
2. the need to initiate pilot efforts to demonstrate proof of concept; and
3. the need to seed a system-wide strategy to scale the effort.

Educating stakeholders about the "substitution of dry-up" achievement and the opportunities this presents farmers and the greater Pueblo community is needed to build public support and political will for four overarching goals of the Bessemer Project:

1. retain a resilient agricultural base—with the best ground **permanently** preserved in agriculture;
2. advance innovative water management practices that benefit farms, cities, and the environment;
3. grow economic opportunity in the agricultural sector; and
4. guarantee a secure water future for city residents.

Continued work with Pueblo Water, Pueblo County, and BIDC is needed to reduce uncertainties pertaining to the pace of water development (i.e., how soon Pueblo Water will need BIDC water) and the possibility of lease renewals. Partnering with City of Pueblo elected officials and staff is needed to create important synergies around the Pueblo Food project—a new effort, underwritten by former Whole Foods CEO Walter Robb to promote innovation, entrepreneurialism, and growth in the food and agriculture sectors. (Food Project staff, the mayor of Pueblo, and the mayor's chief of staff joined a convening dinner reception to discuss the project.) The launch of a pilot project is needed to test assumptions regarding financial models, engineering and legal costs for substitution of dry-up, and the time required to move through the retained jurisdiction process (which guides the substitution of dry-up).

Finally, seeding a system-wide strategy to scale the effort—so that what may be a unique opportunity in time is not lost—is deemed critically important. The use of options or rights of first refusal to preserve the ability to undertake this work at scale is an approach many participants like. It was thought that early investors might be more comfortable making commitments based on options thresholds (e.g., secured options on a certain number of properties, or a certain number of CPA and DCA acres). This type of approach creates the ability to scale up the effort as proof of concept is demonstrated, and different sources of funds (philanthropic, PRI, private investment) can be accessed at different threshold points.

Conclusion

Clearly, the Bessemer Project represents a niche market opportunity. The legal/regulatory framework that enables a conservation market to exist—created by the substitution of dry-up provision in Pueblo Water's decree—is geographically specific, applying only to lands historically irrigated by the Bessemer Ditch. However, three aspects of the Bessemer Project model hold promise for replicability in water-short regions across the West—whether these regions are impacted by rising municipal demand (as in Pueblo County's case) or are affected by drought contingency planning and demand management efforts (as is the case across the Colorado River Basin). These aspects are:

1. The Bessemer Project model integrates a scientific framework with a market-driven approach to create alternatives to the zero-sum-game, buy-and-dry scenarios produced by willing buyer, willing seller—which usually support urban growth at the expense of rural communities. Importantly, the model creates new business and land access opportunities for farmers who want to remain in farming.
2. Considering the incredible planetary need to improve soil health, increase soil carbon capture, and improve water quality, the model holds inherent potential to create more impactful and permanent conservation outcomes when compared to other alternative transfer mechanisms (e.g., lease-fallow)—provided the model results in a critical mass of productive lands being permanently retained in agriculture (a key goal of alternative transfer mechanisms).
3. Finally, the Bessemer Project establishes new legal precedents for this work. It should be noted that, during the course of the project, three Colorado decrees were identified with provisions that could be used to produce conservation outcomes similar to those supported by the substitution of dry-up provision in Pueblo Water's decree (for example, a decree with an 18,000-acre anticipated dry-up has a reirrigation provision that could be used to support the preservation of prime farmland through substitution of dry-up activities as well).

The Bessemer Project is no easy lift. It addresses what have been seemingly intractable problems around buy-and-dry practices, farmland preservation, and ecological restoration. But neither is the Bessemer Project starting from scratch. After nearly five years of effort, project proponents have created a legal doorway that makes voluntary, market-based conservation transactions—transactions that help individual producers while establishing robust agricultural and ecological outcomes—possible.

Furthermore, the City of Pueblo and Pueblo County are in a unique position to set new precedents in dealing with the problems created by agricultural-to-municipal water transfers. No other transfer of this magnitude has occurred within such a proximate urban-agricultural interface, and no other transfer provides the window of opportunity afforded by Pueblo Water's lease to farmers. Close economic, social, and political ties between the City of Pueblo and the unincorporated communities of St. Charles Mesa, Vineland, and Avondale can fuel intraregional cooperation. The City of Pueblo is not water-stressed, meaning it has an opportunity to focus on mitigating the unintentional but anticipated social, economic, and environmental impacts of its acquisition. The potential for community and landscape transitions that support regional economic growth strategies benefitting both the City of Pueblo and Pueblo County is high.

Appendices

A. Bibliography

For bibliographic reference, please note works cited in the ICS report:

Campbell, Scott. (2017). *Navigating the wake of municipal water sales: Alternatives to improve agricultural and ecological outcomes on the bessemer ditch*. Rocky Mountain Farmers Union.

In addition, note:

Whelpton, Leigh, & Ferri, Andrea. (2017). *Private capital for working lands conservation: A market development framework*. The Conservation Finance Network.

B. Economic Data & Market Analysis *(from "Appendix 2: Market Analysis" in the Navigating report)*

Using markets to restore permanent water to farmland where Pueblo Water currently owns water requires an understanding of market conditions and the manner in which real estate transactions that advance strategic dry-up efforts can also benefit farmers, the farm community, and the environment. With no precedents for this type of undertaking, methodologies were driven by analyses of economic data described in this appendix.

Data Collection

ICS worked with PLT, McCarty Land & Water Valuation, Inc., and GeoAdaptive, LLC, to assemble critical data. ICS used this data to develop substitution of dry-up strategies—considering local and outside market influences that could influence (positively or negatively) the "movement" of water. It also considered sources of capital that could come into play to facilitate land acquisitions and advance substitution of dry-up efforts.

Unrestricted Sales Tabulation

Sale #	Grantor:	Grantee:	Sale Date:	Total Sale Price	Land & Water Value	% Land Value in Sale	Site Size (Acres):	Overall $/Acre	Land (Incl. Water) $/Ac.	Water Rights
1	Patterson, Mildred Estate	Klun, Thomas A. and Klun, Joseph L.	04/08/2011	$200,000	$170,000	85%	79.32	$2,521	$2,143	86 sh Bessemer, All PBWW lease
2	Buckles, Harry and Marilyn	Martin, Dale and Carla	10/13/2011	$400,000	$200,000	50%	19.38	$20,640	$10,320	20 sh Bessemer, All owned
3	Boss, Gary and Donna	Dionisio, Charles R.	05/11/2012	$315,000	$175,000	56%	49.19	$6,404	$3,558	No Bessemer, 5 irr. wells/AGUA
4	R & S Dionisio Real Estate & Equipment	TR Bessemer, LLC (Two Rivers)	06/15/2012	$975,000	$940,000	96%	177.19	$5,503	$5,305	146.4 sh Bessemer, all owned - 2 wells
5	McKinney, James and Beth Anne	Rice Land & Cattle, LLC	11/05/2012	$525,000	$165,000	31%	76.30	$6,881	$2,163	55 sh Bessemer w/PBWW lease - 2 owned shares
6	Jersin, Edward Estate	Pueblo Farms, LLC (Two Rivers)	11/21/2013	$580,000	$480,000	83%	78.04	$7,432	$6,151	81 sh Bessemer, All owned - 2 wells
7	Allen, William R.	Pueblo Farms, LLC (Two Rivers)	12/04/2013	$287,500	$200,000	70%	76.10	$3,778	$2,628	70 sh Bessemer w/PBWW lease - 5 owned shares
8	The Pantleo Family Trust	Agri Equities, LLC (Two Rivers)	04/03/2014	$300,000	$300,000	100%	73.24	$4,096	$4,096	28 sh Bessemer w/PBWW lease - 9 owned shares - 1 well
9	Greenlee, Carol Ann	Bond, Kelly and Jodi	05/28/2014	$150,000	$75,000	50%	36.00	$4,167	$2,083	39 sh Bessemer w/PBWW lease - 1 owned share
10	Vigil, Ronald S. & Duncan, Todd	Skull, Lewis D.	06/30/2014	$290,000	$130,000	45%	36.46	$7,954	$3,566	35 sh Bessemer, All PBWW lease
11	Prutch, Phil S.	Dionisio, Jack & Fesmire, Louis M.	03/24/2015	$145,000	$145,000	100%	40.50	$3,580	$3,580	35 sh Bessemer, All PBWW lease
12	Perry, Kevin And JoLynn	Pisciotta, Joe and Jennifer	04/03/2015	$64,000	$64,000	100%	20.26	$3,159	$3,159	16 sh Bessemer w/PBWW lease - 4 owned shares
13	School District No. 70	Milberger, Shane	06/26/2015	$363,900	$363,900	100%	30.00	$12,130	$12,130	30 sh Bessemer, All owned
14	Stricca, Duilio Estate & Stricca Trust	Disanti Land & Cattle, LLC	12/09/2015	$1,400,000	$1,300,000	93%	117.29	$11,936	$11,084	120 sh Bessemer, All owned - 2 wells
15	Hanratty	(Listing)		$1,250,000	$944,000	76%	80.00	$15,625	$11,800	73 sh Bessemer, All owned
16	Mead	(Listing)		$260,000	$200,000	77%	9.00	$28,889	$22,222	10 sh Bessemer, All owned

Figure 2-1

Irrigated Farmland Fair Market Value. PLT contracted McCarty Land & Water Valuation, Inc., to develop a basic market data report (McCarty, 2016). In the report, sales histories of irrigated farmland were examined from 2011 through 2015 (see Figure 2-1). Market values of land with farmer-owned water, land with Pueblo Water-owned (leased) water, and land with water protected by conservation easements were established. Fourteen sales and two listings were examined. The report places the value of high-quality farmland with owned water at $12,000/acre with some variance depending upon

geographic location (in Figure 2-1, sales 13 and 14 were considered representative sales). Values on lower quality ground range between $6,151/acre to $10,320/acre (the $5,305 value is deemed unreliable due to circumstances surrounding the sale). Half (seven) of the sales analyzed were sales of land irrigated by Pueblo Water leased water (i.e., farms that sold their water). Land with water leased from Pueblo Water was valued from $1,476/acre to $3,580/acre—producing a mean value of $2,544/acre.

Dryland Fair Market Value. Discussions with PLT and farmers indicate a range of dryland values in the region. Fallowed ground, inadequately restored with few natural or scenic amenities in the A2 zoning area (limited subdivision potential), is estimated to be worth $200/acre or less. Good pastureland can be worth between $200/acre to $400/acre. Smaller parcels of non-irrigated land possessing additional attributes and amenities (rivers, riparian corridors, scenic areas, bottomlands, subdivision potential, etc.) can be worth $1,000/acre or more depending upon location.

Irrigated Farmland Lease Value. PLT interviewed local farmers to garner information on lease rates for agricultural land. Cash leases average around $175/acre/season for irrigated lands. Low-quality ground leases as low as $100/acre; high-quality ground as high as $250/acre. Exceptionally high-quality vegetable ground can lease as high as $350/acre.

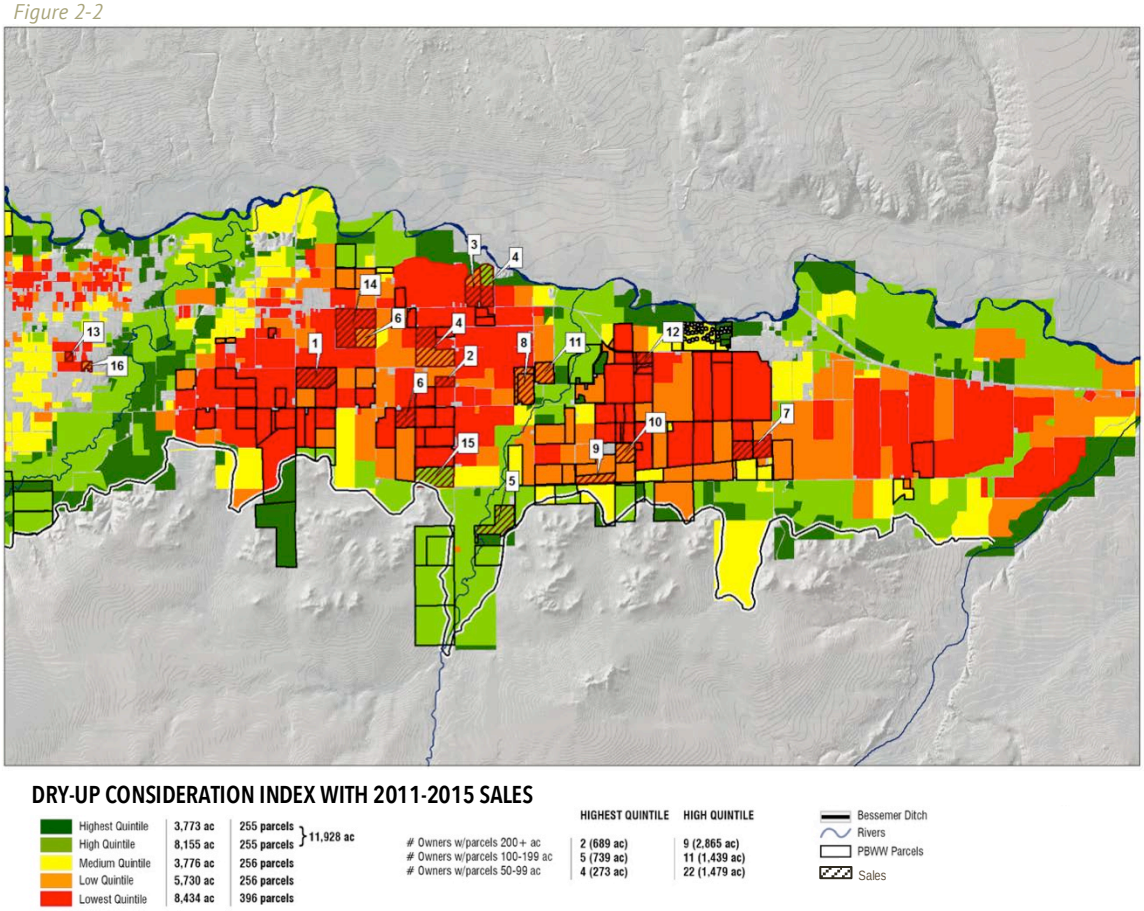
Bessemer Share Value. The Pueblo Water acquisition at $10,150/share represents the highest known price paid for Bessemer shares. McCarty Land & Water Valuation reports 58.5 shares selling in 2015 for $7,500/share and another ten selling for $10,000/share. These shares did not have a demonstrable consumptive use history. Farmers report selling or buying shares between $6,500/share to $8,500/share. David Simpson with the St. Charles Mesa Water District reports the district pays $6,500/share for shares with a good consumptive use history—less for shares without a good consumptive use history.

Conservation Easement Value. Sales of Bessemer-irrigated lands with conservation easements are limited, but the work by McCarty Land & Water Valuation and recent 2017 sales would indicate value diminutions in the 25% to 30% range. This means that high quality farmland worth $12,000/acre would be worth $8,400/acre to $9,000/acre if encumbered by a conservation easement—placing the range of easement values at $3,000/acre to $3,600/acre for good ground. PLT reports that the Lower Arkansas Valley Water Conservancy District (LAVWCD) pays $2,500/acre for easements on farm ground meeting specific conservation criteria (this equates to approximately 70% to 83% of fair market value for easements on high quality Bessemer-irrigated ground; closer to 100% of fair market value or higher for easements on lower quality ground).

Sales Histories—Spatial Examinations.
GeoAdaptive and ICS examined the 2011 – 2015 sales reported by McCarty Land & Water Valuation in light of various spatial analyses, specifically the Dry-Up Consideration Index (see Figure 2-2), then developed a longer, fifteen-year sales history (2001 – 2015) drawing from three sources: the McCarty Land & Water Valuation report, a Metroscan (sales database) property search facilitated by McCarty Land & Water Valuation, and a Pueblo County parcel records search (see Figure 2-3). Criteria focused on real sales, greater than or equal to 20 acres, irrigated by the Bessemer. Results were once again overlaid

against the Dry-Up Consideration Index (see Figure 2-4). The purpose here was not to examine values, but to consider the frequency of sales in CPAs and DCAs.

Figure 2-2



Appreciation. Bill Barnes with Farm Credit of Southern Colorado reported to PLT's Matt Heimerich that farmland appreciation in the Vineland and Avondale areas generally ranges between 2% and 3% annually. GeoAdaptive and ICS examined county parcel data to identify properties that had a history of three or more real sales between 1980 and 2016. These properties demonstrate an average annual appreciation rate of 2.69% for irrigated farms with improvements (the high was 7.88%; the low was 0.24%), less for irrigated land without improvements. When plotting individual sales over time, and discounting outliers, farmland

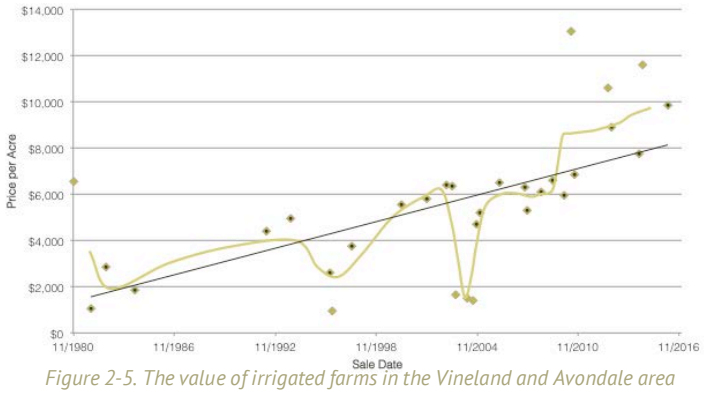
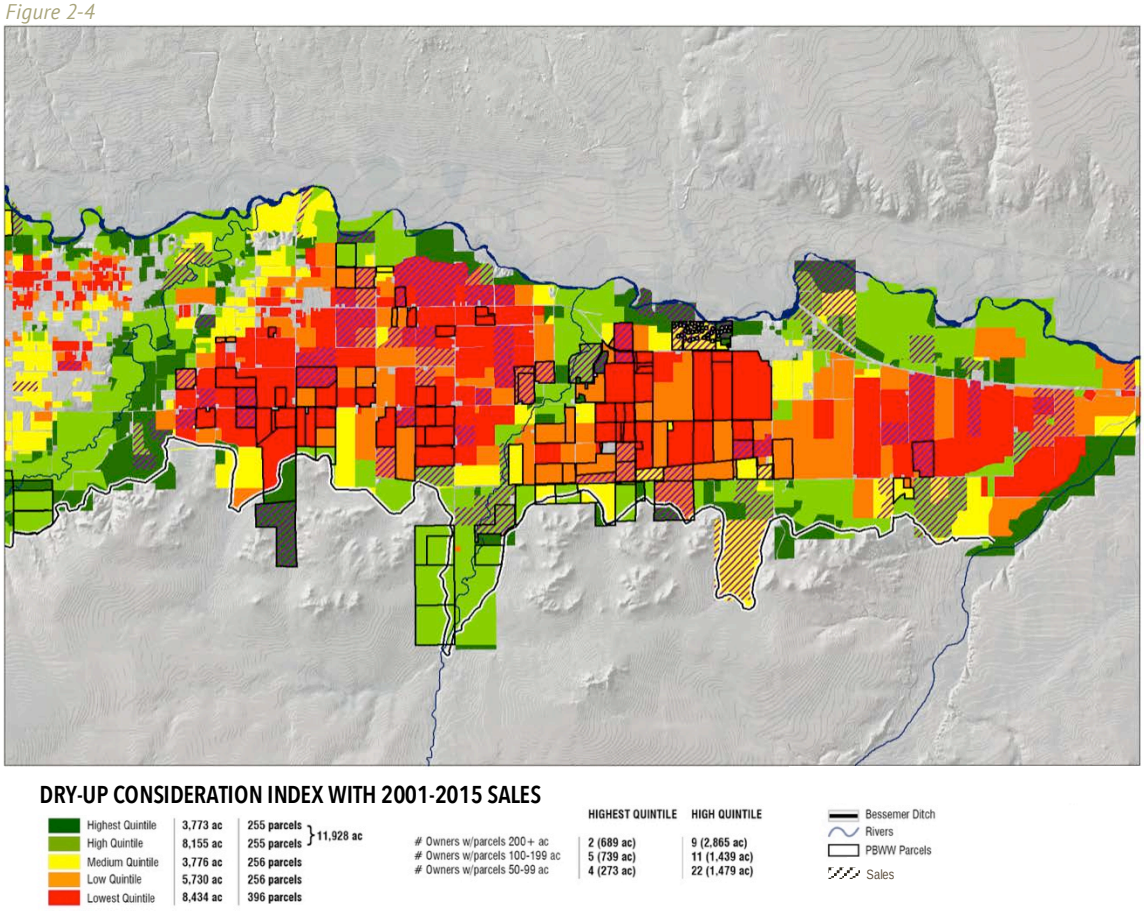


Figure 2-5. The value of irrigated farms in the Vineland and Avondale area has steadily increased over time. This analysis considers individual sales from properties with a history of three or more real sales in the last 36 years. Note the dip in sales prices following the 2002 drought—the time when farmers began organizing to negotiate the bulk municipal water sale that resulted in the Pueblo Water purchase.

in the area appears to be appreciating at a higher rate: 6.27% (see Figure 2-5).

Figure 2-4



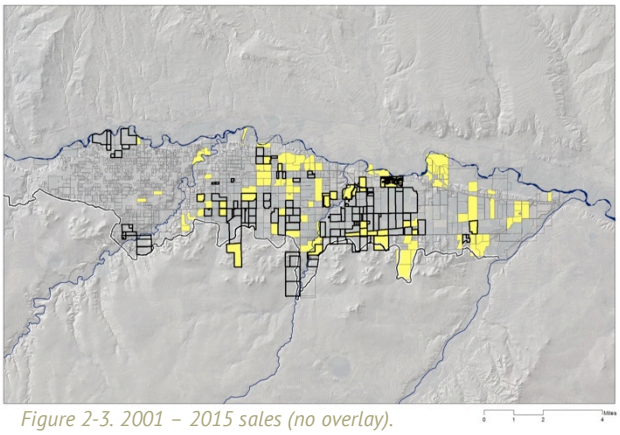


Figure 2-3. 2001 – 2015 sales (no overlay).

Market Analysis

When trying to harness market forces to "move" water back to CPAs, the data reveals multiple factors to consider:

1. Value Proposition. The market data reveal an inherent value proposition in making better use of water resources by moving water from DCAs to CPAs. For example, if one CPA acre (worth $12,000 with owned water) is purchased with Pueblo Water leased water for $2,500; and one DCA acre is purchased for $8,500 (for a total of $11,000); and the owned water is transferred from the $8,500/acre ground to the $2,500/acre ground, the purchaser now owns two acres, one of which alone (the one that has permanent water restored to it) is worth $12,000—$1,000 more than the original investment. Furthermore, the acre that was originally worth $8,500 possesses, in all likelihood, some enhanced non-agricultural market value if it is proximate to riparian or river corridors, hillside overlooks, or other scenic/natural attributes. The value proposition still exists, but is diminished, when a Bessemer share (rather than DCA land) is purchased to restore water to CPA land.

2. Addressing Value Diminution. Restoring water to CPAs in a manner that negates future water-sales risk necessitates placement of conservation easement deeds or deed restrictions on properties with restored water. This will diminish property value from (for example) $12,000/acre to $8,400/acre. Thus, to recoup an $11,000 investment, the DCA acre, once fallowed, will have to retain $2,600 of value, an unlikely scenario given that the value of dry ground may be worth (for example) $300/acre—a $2,300 variance. How can this variance be accounted for? In developing the case studies, multiple methods were explored. The following hold the greatest promise:

    a. Securing conservation easement payments to offset the diminution.
    b. Holding DCA properties and building value through market appreciation.
    c. Leasing DCA production ground to generate revenue for the duration of the Pueblo Water lease.

3. Sources of Transaction Capital. These methods of capitalization will, in some cases, produce strong rates of return for an investor. In other cases, returns will not be strong and may require other sources of underwriting. Conservation-oriented investment organizations such as REITs and TIMOs could be tapped to restore water to and conserve some properties, but the community will be stronger if farmers themselves can recognize gains from substitution of dry-up. It would be helpful if investment models directed a percentage of returns back into the community, offsetting the costs of projects that may be only marginally profitable. In addition to the private capital farmers bring, other sources of capital used to facilitate transactions may include: philanthropic capital, public funding mechanisms, private equity, payments for ecosystem services, mitigation funds. This capital will be necessary to support the engineering, legal, and administrative costs involved in facilitating dry-up substitutions. While some property acquisition and holding costs were accounted for in the case studies, these expenses, which will be incurred by BPA and/or transaction-affiliated parties, were not accounted for.

4. Pace of Market Activity. Spatial examinations of sales histories show that the pace and type of farm sales is not sufficient to restore water to 2,000 acres by the end of the lease period in 2029. Sales during the 2011-2015 period demonstrate most market activity occurs on CPA ground. When overlaid on the Dry-Up Consideration Index, no sales occurred in the highest quintile (highest priority for dry-up) and only 307 acres fell within the second-highest quintile (see Figure 2-6). Compare this to 1,314 acres sold in the lowest two quintiles (lowest priority for dry-up/highest priority to maintain in irrigated farming), and a ratio of 1 DCA acre sold for every 4.3 CPA acres sold is produced. Thus, while it may be possible to acquire exceptional farmland with leased water from Pueblo Water at low rates, what will be more difficult will be to acquire DCA parcels with water to transfer to that property. This fact reveals an inherent risk-mitigation investment objective: to reduce risk, it will be important to assure water resources can be secured prior to or simultaneous with a CPA property acquisition in need of restored water. When examining sales across the 2001-2015 period, results were more favorable: 1 DCA acre was sold for every 1.4 CPA acres (see Figure 2-7). However, it must also be noted that CPA acres likely contain a higher percentage of Bessemer-irrigated ground than DCA acres. (Some parcels are irrigated by both Bessemer shares and wells and many DCAs exhibit greater percentages of well irrigation.

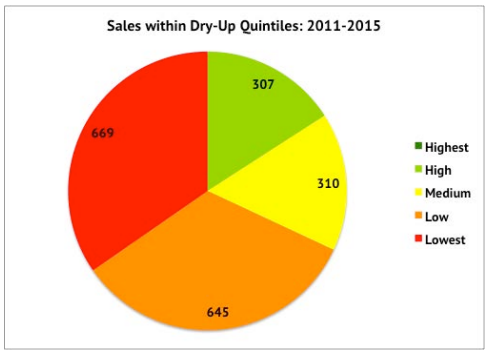


Figure 2-6

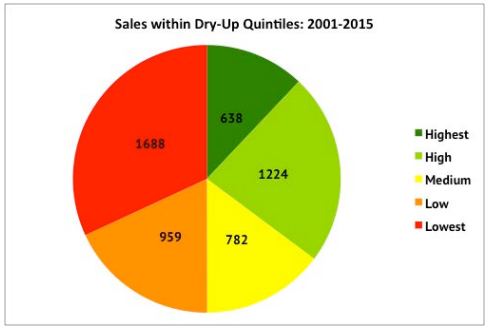


Figure 2-7

Quintile	Acreage	Count of Owner
Highest	638	10
High	1224	22
Medium	782	15
Low	959	23
Lowest	1688	33
Total	**5291**	**103**

5. Incentivizing Sales. Incentivizing DCA sales or substitution of dry-up on DCA parcels through the purchase of Bessemer shares will be important. What will incentivize these sales/transfers? First, farmers who own DCA parcels are inherently incentivized by opportunities to increase their holdings, the value of those holdings, and their production potential when they acquire CPA parcels with leased water and move some of their DCA water to those parcels. Second, BPA or a conservation agent partner can be poised to purchase and hold DCA parcels as soon as they come up for sale. Third, higher prices for Bessemer shares and/or DCA land might be paid when considering the gains that can be made in moving water to CPA ground.

C. Substitution of Dry Up: Pueblo Water Decree Section 6.2.4

6.2.4 Substitution of Dry-Up. Notwithstanding the foregoing provisions, Pueblo Water may in the future seek to dry up lands other than those identified as "Subject to Dry-Up" on Exhibit 4 (the "Original Lands"), in order to produce more desirable agricultural, environmental, economic or other conditions, without loss of water yield for Pueblo Water or injury to any other water user. Original Lands for which revegetation pursuant to paragraph 6.3 has been initiated or completed by Pueblo Water will not be eligible for substitution under this paragraph, and Pueblo Water shall not initiate dry up or revegetation on any Original Lands for which a proposed substitution is pending under this paragraph. Lands that are not required to be revegetated pursuant to paragraph 6.3.2 will not be eligible for substitution starting at the time Pueblo Water designates the particular Subject Shares that historically irrigated those farms as Designated Changed Shares. Original Lands no longer irrigated shall be eligible for substitution until such time as revegetation has been initiated on those Original Lands. Original Lands subject of a completed substitution shall not be subject of another Substitution. An approved substitution of dry up does not change the water rights associated with any Bessemer Shares involved in such substitution; only the Subject Shares are changed by this Decree.

6.2.4.1 If Pueblo Water seeks to dry-up lands in substitution of the Original Lands, Pueblo Water will file a petition with the Court, with or without co-petitioners, with notice to the Division Engineer and all other Opposers. The petition will include all information required for a change of water rights application including but not limited to the following: (1) identify the location and acreage of the Original Lands that are no longer proposed to be dried up, the number of Subject Shares associated with such lands, and the number of Subject Shares historically used to irrigate the Original Lands throughout the period of 1950 through the date of the petition (including but not limited to Affiliated Shares and Retained Shares); (2) identify the acreage and location of the new parcel(s) of land Pueblo Water is requesting to dry-up (the "Substitute Lands") and the location and area of irrigation during 1950 through date of the petition; (3) identify the number of Bessemer Shares historically used to irrigate the Substitute Lands during 1950 through date of the petition, and the proposed future locations of use of such shares, including but not limited to the number of those shares that are proposed to be used to irrigate the Original Lands; (4) identify any other source of water used to irrigate the Substitute Lands; (5) include the documents providing for enforceable dry-up of the Substitute Lands; (6) identify the source of any other water in addition to the Bessemer Shares transferred from the Substitute Lands that are intended to be used to irrigate the Original Lands (including but not limited to any BIDC shares that were not changed in Case No. 17CW3050); (7) document that the BIDC has taken action on the substitution as may be required by its bylaws; and (8) include all information required for a change of water right application on the Bessemer Shares historically irrigating the Substitute Lands not otherwise required above, except that no change of water rights will be decreed for those Bessemer Shares pursuant to this process. The petition shall be accompanied by an engineering report which will include, at a minimum, an analysis of the historical irrigation of the Substitute Lands, including HCU and return flows amounts, timing and location, and will demonstrate that: (1) there will be no expansion of diversion or use of BIDC water rights, including that the historical consumptive use by the BIDC Shares on the Substitute Lands and sought to be moved onto Original Lands is at least as much as the HCU on the Original Lands; (2) historical return flows from both the Original Lands and the Substitute Lands will continue to either be replaced or maintained in time, location and amount; (3) all other terms and conditions of this Decree will continue to be satisfied; and (4) no other water user will be

injured. Any substitution of dried up land will be on HCU for HCU basis, not an acre for acre or share for share basis. Any Substituted Lands will be revegetated in compliance with the revegetation provisions described in paragraph 6.3. The petition shall also include a proposed order describing the substitution, including but not limited to terms and conditions needed to prevent injury and terms and conditions related to maintenance and/or replacement of ditch loss, lateral loss and return flows. The proposed order shall include any revised exhibits that are intended to replace the exhibits attached to this decree including but not limited to Exhibit 4 with the Substitute Lands taking the place of the Original Lands subject of the Substitution.

6.2.4.2 The Division Engineer, State Engineer and the other Opposers will have 120 days to file objections to such a petition, which shall include the information required for a statement of opposition to an application in water court.

6.2.4.3 No substitution shall occur unless and until the Court enters an order approving such Substitution. If no objection is timely filed, the Court may grant the petition and enter an order detailing the substitution including those terms and conditions necessary to prevent injury to other water users. The order granting the petition shall be served on all parties to this application and the Division and State Engineers. If an objection is filed, a hearing shall be set and discovery and proceedings before the Court shall be governed by Rule 11 of the Uniform Water Court Rules and other applicable portions of the Uniform Water Court Rules and the Colorado Rules of Civil Procedure. The at issue date shall be 49 days after the expiration of the 120 day period allowed for the filing of objections to a petition. Pueblo Water and any co-petitioners shall have the burden of production and the burden of proving that the substitution of dry-up lands can occur without injury to any other water user. In the proceeding, the consumptive use of water on the Original Lands as determined by this decree shall not be subject to modification. However, the terms and conditions in this Decree are subject to modification. Issues that may be raised include but are not limited to the historical use of water on the Substitute Lands, including the historical consumptive use; changes in ditch and/or lateral loss; the appropriate period to determine the historical use; the amount, timing, and location of return flows from irrigation of the Substitute Lands; the ability to achieve and enforce dry-up; expansion of diversion or use of the BIDC water rights; and the ability of Pueblo Water and any co- petitioners to maintain return flows.

6.2.4.4 In the event the dry-up of the Substitute Lands results in HCU credits in excess of those from the Original Lands, Pueblo Water and/or co-petitioners may reserve those HCU credits solely for the purpose of applying them in a future substitution filed with Court pursuant to this provision.

6.2.4.5 Pueblo Water acknowledges that BIDC, to the extent lawfully authorized to do so, could impose additional conditions to ensure that the substitution of dry-up lands will not adversely impact ditch operations and deliveries to other BIDC shareholders.

6.2.4.6 In order to reasonably regulate the number of such petitions as well as to correlate such petitions with and regulate the filing of petitions under the retained jurisdiction provisions of this decree, for the purpose of preventing excessive expenses to other parties to mobilize engineering and legal resources, the following requirements shall apply:

6.2.4.6.1 all petitions to dry-up lands in substitution of the Original Lands shall be accumulated and filed together not more than once every two years.

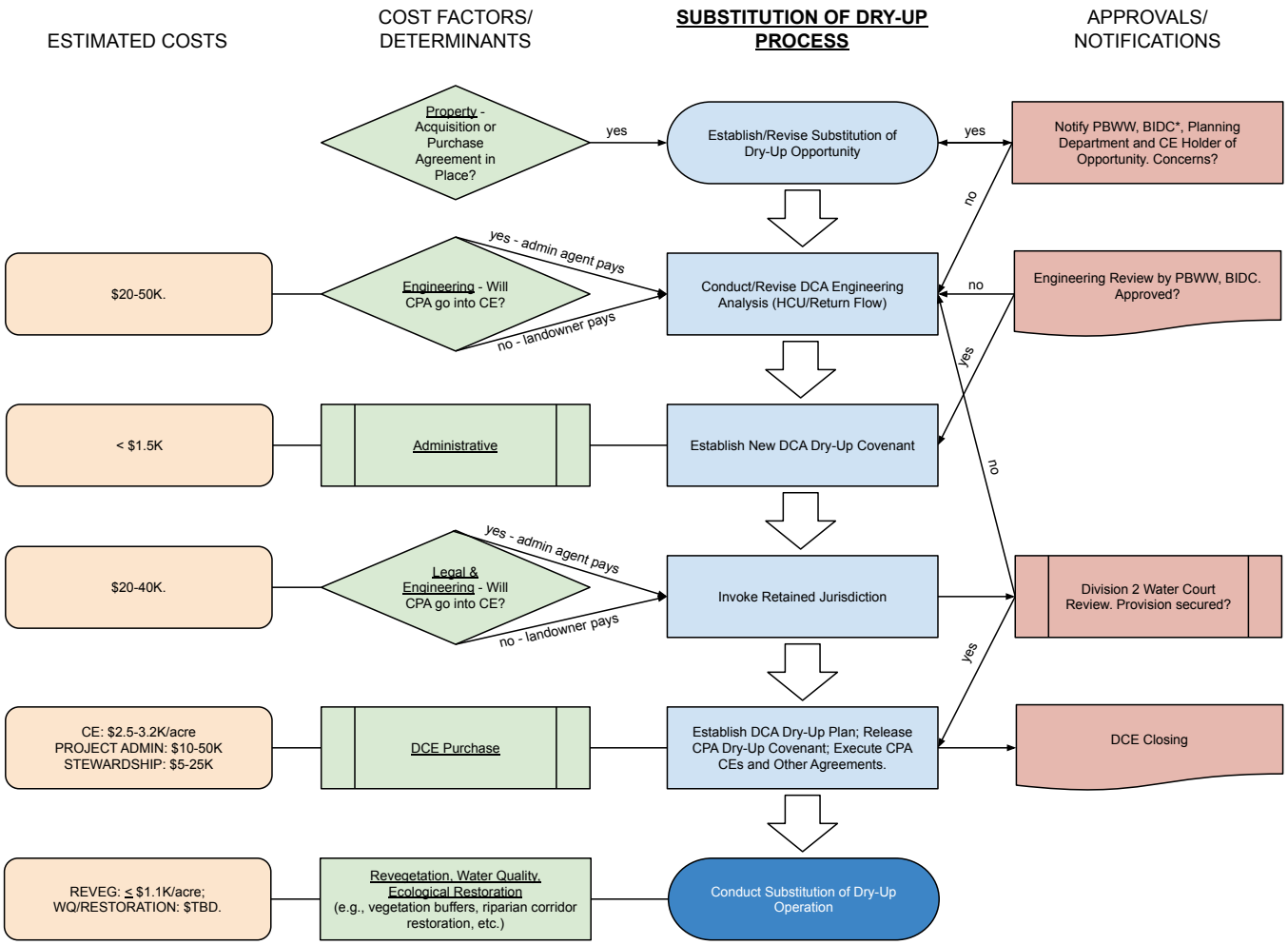
6.2.4.6.2 if such a petition to dry-up lands in substitution of the Original Lands is filed, any additional petition to dry-up lands in substitution for the Original Lands, by the earlier petitioner or any other petitioner, shall be filed within 60 days after the original request is served on the parties in this case, or shall not be filed until two years after the filing of such earlier petition.

6.2.4.6.3 if any requests, motions or petitions to the Court under any of the retained jurisdiction provisions in this Decree are filed, any petition regarding dry-up lands in substitution of the Original Lands must be filed within 60 days or shall not be filed until two years after the filing of such retained jurisdiction petition.

D. Substitution of Dry-up: Process Flow Chart

The substitution of dry-up process involves six steps, identified in blue. Required approval processes with Pueblo Water and BIDC (who assisted with the development of this flow chart) and Division 2 Water Court are in red. Cost factors (transaction expenses) and potential cost determinants (who pays what) are in green.

Estimated costs to execute substitution of dry-up projects are in tan. The combined engineering and legal cost of a substitution is estimated at $40-90K. Significant cost savings are possible when substitutions are bundled, as the legal/engineering costs for multiple transactions increases only slightly over a single transaction.



* The BIDC has an approval process for transferring shares between laterals, with applications due on or before January 31 for transfers occurring in that year. Notices are sent to shareholders following application, who have opportunity to object to the transfer by making their case to the board.

E. Convening Participants

Two-Day Convening

- Michael Bartolo, Senior Research Scientist, Arkansas Valley Research Center, Colorado State University
- Rob Bleiberg, Executive Director, Colorado West Land Trust
- Scott Campbell, Principal, ICS Consulting
- David Cockrell, Trustee, Great Outdoors Colorado Trust Fund
- Matt Heimerich, Lower Arkansas Valley Conservation Director, Palmer Land Trust
- Rebecca Jewett, Executive Director, Palmer Land Trust
- Jeff Kahn, Attorney/Shareholder, Lyons Gaddis Attorneys & Counselors
- Mary Kelly, Partner, Culp & Kelly, LLP
- Chris Markuson, Principal, Anza Group, LLC
- Matt Moorhead, Conservation Partnerships Director, The Nature Conservancy
- Marc Norman, Associate Professor of Practice in Urban and Regional Planning, A. Alfred Taubman College of Architecture and Urban Planning, University of Michigan
- Ed Roberson, Conservation Director, Palmer Land Trust
- Russell Schnitzer, Senior Program Officer, Natural Resources, Gates Family Foundation
- Sarah Parmar, Director of Conservation, Colorado Open Lands
- Peter Stein, Managing Director, The Lyme Timber Company
- Marisa Stoller, Economic Development Specialist, Pueblo County

Farm Tour

- Dominic DiSanti, Owner, DiSanti Farms
- Justin DiSanti, Owner, DiSanti Farms
- Nick Rusler, Owner, Rusler Produce
- Tom Rusler, Owner, Rusler Produce

Reception

- Nick Gradisar, Mayor, City of Pueblo
- Dan Hobbs, Cooperative Development Specialist, Rocky Mountain Farmers Union
- Laura Solano, Chief of Staff, City of Pueblo
- Linda Tremblay, Lead Consultant, Pueblo Food Project
- Chris Wiseman, Commissioner, Pueblo County

F. Challenges Identified by Convening Participants

Convening participants identified challenges that could affect success and suggested addressing those challenges that could be addressed through community engagement, outreach, and negotiation activities. Challenges fall into four categories and include:

1. Uncertainties Related to Pueblo Water Actions
   - **The Need for Water and Pueblo Water's Messaging Regarding the Need for Water**. Pueblo Water's change case was predicated on a need for purchased water within a fifty-year time horizon. But participants heard from Pueblo Water representatives (past and present) that there is little risk to agriculture, as there is no immediate need for water. Mixed messages create uncertainty and may ultimately undermine solutions to permanently protect CPAs. Statements that municipal water is not needed may inflate prices of CPAs. Pueblo Water's needs must be clarified and messages made consistent.
   - **Lease Renewals and Lease Cost**. Pueblo Water said it will be negotiating lease renewals at higher costs. The number of renewals, renewal terms, lease duration, and lease cost will all factor into CPA values, which, in turn, affect market-driven substitution potential.
   - **1041 Permit Process**. It is not clear when Pueblo Water intends to initiate the 1041 Permit process. The 1041 Permit process will bring greater clarity to the conditions of dry-up (if any) imposed by Pueblo County.
2. Uncertainties Related to Pueblo County Actions
   - **1041 Permit Requirements**. Pueblo County code regarding the "efficient utilization of water" calls for mitigating the adverse socioeconomic, land use, and environmental impacts stemming from dry-up in buy-and-dry contexts via a 1041 Permit process. 1041 requirements are unknown at this juncture.
   - **Master Planning / Zoning / Land Use Variances**. The irrigated lands along the Bessemer are generally zoned A1 and A2, which restrict subdivision to 5 and 35 acres, respectively. Changes to the master plan or zoning, or variances under the existing plan, were they to allow for development of CPAs, would increase CPA values—adversely affecting CPA preservation/substitution efforts.
3. Uncertainties Related to Farmer Engagement
   - **Demand for Land**. Farmer demand for additional, high-quality production land needs to be gauged. Is the market as robust as the DiSanti and Rusler case studies would indicate? Is there demand among new or young farmers?
   - **Seller / Substitution Interest**. Likewise is there seller interest? Historically, DCAs have been selling with less frequency than CPAs. Are DCA owners interested in selling or participating in substitution projects themselves? And among those who sold water rights on CPAs to Pueblo Water, what is their level of interest in selling or participating in substitutions? Is it as robust as our 2011-2015 sales history would indicate?
4. Risks Related to Market forces
   - **Agricultural**. Pricing, labor, processing, distribution, and other market shifts can positively or negatively affect market-driven substitution projects.
   - **Real Estate**. New markets for non-irrigated land (residential, commercial, industrial) could inflate CPA values, negatively affecting market-driven substitution projects.
   - **Water**. Additional municipal water sales could affect the availability of water and the capacity to implement substitution projects.

G. About the Harvard Loeb Fellowship

When Harvard's Graduate School of Design (GSD) kicked off its capital campaign in 1968, the theme was "Crisis: The chaos in our cities, the loss of control over our environment, the urgent need for leadership for the future." John L. Loeb (Harvard College '24 and member of the Visiting Committee of the GSD), the chairman of that campaign, saw the American city in disarray and believed Harvard could help. He imagined bringing highly promising innovators of the built and natural environment to Harvard for a year and challenging them to do more and do better, convinced they would return to their work with new ideas and energy.

John and his wife Frances endowed the Loeb Fellowship as part of their gift to the "Crisis" campaign. They worked closely with William A. Doebele, the Frank Backus Williams Professor of Urban Planning and Design (now Emeritus). Together they designed a Fellowship that would bring emerging leaders to the GSD for independent study, reflection and engagement. Professor Doebele, the founding curator, guided the program through its first 27 years and shaped an experience that has had a powerful impact on generations of urban, rural, and environmental practitioners.

Loeb Fellows are accomplished practitioners whose work is advancing positive social and environmental outcomes in the US and around the world. In the middle of promising careers they step away from their hectic professional lives for one academic year, serving as paid fellows in residence at Harvard University. Loeb Fellows audit classes at the GSD and throughout the vast network of Harvard and MIT schools. They conduct research, teach, engage with faculty and students, participate in Fellowship events, and collaborate with their peers. They become part of a powerful growing network of colleagues—over 500 strong—passionately committed to revitalizing communities.

Today's environmental risks, tensions of race and equity, and global conflicts have an unnerving resonance with the racial tensions, urban riots, decline of cities, and Cold War that alarmed John Loeb in the late 1960s. At the same time, the current spirit of innovation and opportunity is reminiscent of the hope and aspirations of the Great Society and space programs. Now in its fifth decade, the extraordinary, transformative learning experience that is the Loeb Fellowship continues to have a critical role to play in preparing leaders to address these urgent concerns and instigate important future advances through their work in the built and natural environment.

See: https://loebfellowship.gsd.harvard.edu/

Loeb Fellow Participants

Scott Campbell, 2015 Lincoln-Loeb Fellow
Principal, ICS Consulting
Colorado Springs, Colorado

ROLE: Scott's company, ICS Consulting, has been the principal contractor on the Bessemer Project since 2015. The project was conceived during his Loeb year, when he teamed up with GSD students, post-graduate researchers, staff at the Wyss Institute for Biologically Inspired Engineering, and the Zofnass Program for Sustainable Infrastructure to explore alternatives to Pueblo County's pending agricultural-to-municipal water transfer. Scott served as lead project facilitator for the Harvard grant.

Marc Norman, 2015 Loeb Fellow
Associate Professor of Practice in Urban and Regional Planning
A. Alfred Taubman College of Architecture and Urban Planning, University of Michigan
Ann Arbor, Michigan

ROLE: In leadership roles with companies such as Lehman Brothers, Duvernay + Brooks, and Deutsche Bank, Marc has worked in the field of community development and finance for over 20 years—specializing in complex financing for affordable housing and economic development projects. Marc helped design the convening charrette and assessed potential project capital and transaction structures.

Peter Stein, 1981 Loeb Fellow
Managing Director, The Lyme Timber Company
Hanover, New Hampshire

ROLE: As a managing director of a private equity fund, and with more than 30 years of experience in the acquisition, operation, protection, and disposition of conservation properties, Peter facilitated professional exchanges with private equity groups, impact investors, and foundations focused on water conservation across the nation to explore capital structures that could support a variety of Bessemer Project conservation transactions.

Strategic consultation, planning, & project management services for landowners, organizations, governments, & partnerships.

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