Upper Basin Demand Management Economic Study in Western Colorado

The Colorado River Water Bank Work Group (WBWG) commissioned this study in 2019 as part of its examination of the possibility of a water demand management program in Western Colorado that includes voluntary, temporary, and compensated reductions in water use. Demand management (DM) is being evaluated in each of the Upper Colorado River Basin states due to concerns about risks of a future Colorado River Compact curtailment.

The study included two meetings with invited stakeholders in each of the four major Western Slope river basins to gather input and review results, and focused on three primary objectives:

1. Examine and document baseline economic conditions and trends in West Slope communities;

2. Estimate the magnitude of potential positive and negative secondary economic and social impacts on West Slope communities from voluntary, temporary, and compensated reductions in agricultural water use; and

3. Identify ideas for maximizing positive benefits and avoiding, minimizing, or mitigating negative impacts.

Demand management scenarios. Two hypothetical scenarios were developed to examine potential impacts on agriculture and agriculture-related businesses and communities. Although the study focused on consumptive use reductions from Western Colorado irrigators, an actual demand management program – if implemented – should support participation from the range of geographic areas and water using sectors that benefit from use of the Colorado River while avoiding disproportionate impacts.

- "Moderate" DM assumed 125,000 AF of consumptive use reductions would be obtained from a demand management program involving Western Colorado irrigators over a five-year period – or, put more simply, a 25,000 AF annual reduction in consumptive use from participating Western Colorado farms and ranches for five years. About one in every 60 irrigated acres currently in hay or corn production across Western Colorado would be temporarily fallowed by participants under this scenario.
- "Aggressive" DM assumed an annual 25,000 AF reduction in consumptive use in each of the four major river basins, which could also correspond to a 100,000 AF annual reduction in consumptive use. The proportion of acres fallowed for demand management could range from about one in eight currently irrigated acres (in the Yampa/White Basin) to about one in 18 acres in the Gunnison Basin.[1]

[1] The demand management scenarios are for illustration only, and do not imply endorsement of demand management or specific consumptive use reduction targets in any basin or across Western Colorado as a whole.

Key findings. Some highlights from the numerous metrics provided in the report.

- Annual payments to participating irrigators were projected to range from $194 to $263 per AF (approximately double those amounts per acre). Payment levels necessary to successfully enroll participants could vary from year to year and location to location.

- If the funding to compensate participating irrigators in a demand management program comes from outside of Western Colorado, those payments – and the multiplier effects from the portion of the payments that is spent locally – would provide a regional economic benefit that could help offset adverse impacts on local communities.

- Reduced production of forage crops is likely to require fewer purchases of agricultural inputs such as seed, fertilizer, custom labor, hauling and other services. An estimated 55 full and part-time agricultural support jobs could be eliminated under the Moderate DM scenario, 236 jobs under the Aggressive DM scenario.
- Overall, the projected secondary economic benefits from payment spending are comparable in scale to the projected negative secondary impacts from reduced production. But, the jobs that would be supported by local payment spending could well be different from the jobs currently supported by forage production.
- Based on historical correlations between hay production, hay prices and the Western Colorado livestock inventory, the Aggressive DM scenario could increase local hay prices by about 6 percent, and decrease the regional livestock inventory by about 2 percent. Potential price and livestock impacts under the Moderate DM scenario would be much smaller.

Uncertainties and limitations. The economic estimates in this study are based on publicly available information and basin-level average characteristics of farms and ranches in Western Colorado. Actual effects would likely differ from the estimates depending on the specific characteristics of participating farms and ranches. Other important uncertainties:

- The analysis included estimated multi-year impacts on grass hay yields from fallowing (ceasing irrigation) for a single year. No studies were identified that had evaluated effects on subsequent grass hay yields from more extended fallowing periods.
- Assumptions incorporated in this analysis – full fallowing of harvested acres and potential reductions in livestock production – could result in larger economic impacts than alternative strategies for reducing consumptive use such as split season fallowing.
- Stakeholders in each basin emphasized their concerns about potential impacts on return flows relied on by downstream irrigators and other users. This analysis assumes that return flow issues associated with DM will be resolved – either through avoiding these issues or effectively mitigating them.

Summary Comparison of Potential Economic Benefits and Adverse Impacts from Demand Management in Western Colorado

Moderate DM scenario

	River Basin				
	Colorado River	Gunnison	Southwest	Yampa/White	Western Colorado
Participating Acres	3,400	3,850	3,700	1,750	12,700
Percent of Irrigated	1-in-60	1-in-60	1-in-60	1-in-60	1-in-60
On-Farm/Ranch Effects					
Decrease in Production Output*	-$1,374,000 to -$2,210,000	-$1,780,000 to -$2,731,000	-$1,725,000 to -$2,274,000	-$783,000 to -$1,455,000	-$5,662,000 to -$8,670,000
Reduced On-Farm/Ranch Jobs**	-17 to -22	-19 to -25	-19 to -22	-9 to -13	-64 to -81
Annual DM Payments	$1,375,000	$1,917,000	$1,756,000	$806,000	$5,854,000
Payments vs. On-farm Value-added (net)*	$682,000 to $473,000	$1,093,000 to $873,000	$735,000 to $606,000	$391,000 to $233,000	$2,901,000 to $2,185,000
Secondary Effects					
Increased Jobs from Payment Spending***	6 to 10	9 to 14	8 to 12	4 to 5	27 to 40
Decreased Jobs tied to Production*	-13 to -19	-16 to -22	-16 to -20	-10 to -15	-55 to -76
Net change in Secondary Jobs****	-3 to -13	-2 to -13	-4 to -12	-5 to -11	-14 to -49
Value-added****	$72,000 to -$417,000	$136,000 to -$351,000	$231,000 to -$211,000	$107,000 to -$186,000	$546,000 to -$1,165,000

Aggressive DM scenario

	River Basin				
	Colorado River	Gunnison	Southwest	Yampa/White	Western Colorado
Participating Acres	12,000	12,100	13,800	14,200	52,100
Percent of Irrigated	1-in-17	1-in-19	1-in-16	1-in-8	1-in-15
On-Farm/Ranch Effects					
Decrease in Production Output*	-$4,847,000 to -$7,795,000	-$5,574,000 to -$8,552,000	-$6,458,000 to -$8,515,000	-$6,334,000 to -$11,775,000	-$23,213,000 to -$36,637,000
Reduced On-Farm/Ranch Jobs**	-60 to -77	-60 to -77	-69 to -81	-71 to -102	-260 to -337
Annual DM Payments	$4,851,000	$6,005,000	$6,573,000	$6,524,000	$23,953,000
Payments vs. On-farm Value-added (net)*	$2,406,000 to $1,670,000	$3,424,000 to $2,734,000	$2,752,000 to $2,269,000	$3,166,000 to $1,890,000	$11,748,000 to $8,563,000
Secondary Effects					
Increased Jobs from Payment Spending***	23 to 34	28 to 43	29 to 44	29 to 43	109 to 164
Decreased Jobs tied to Production*	-45 to -67	-50 to -70	-59 to -75	-82 to -119	-236 to -331
Net change in Secondary Jobs****	-12 to -45	-7 to -41	-14 to -46	-39 to -90	-72 to -222
Value-added****	$252,000 to -$1,473,000	$424,000 to -$1,105,000	$863,000 to -$791,000	$863,000 to -$1,509,000	$2,402,000 to -$4,878,000

Notes: *Low end of range if 60% spent locally, high end if 90% spent locally.

**Right-hand side (RHS) impact estimates include potential effects on livestock activity.

***On-farm employment is FTEs. Left-hand side (LHS) estimate is jobs on participating operations only (who would be compensated). RHS estimates include potential livestock effects.

****RHS impacts on secondary jobs reflects low share of lease spending in basin and adverse impacts including livestock effects.

Program design considerations. A demand management program involving up to four to five percent of the irrigated forage acres in Western Colorado (about 30,000 acres or 60,000 acre-feet per year) would be within the range of historical variability in hay production. Program design elements to help reduce adverse impacts on Western Colorado agricultural communities could include:

- Designing the program to widely spread participation and impacts among and within the four Western Colorado basins;
- Limiting the frequency and duration of participation to avoid demand management becoming an irrigated land retirement program;
- Providing the opportunity for participants to opt out under exceptionally dry conditions like 2002, 2012 and 2018 (if the program is based on multi-year contracts); and
- Offering opportunities for split season fallowing or other forms of deficit irrigation which could reduce impacts and costs.