

Platte River Recovery Implementation Program



2006

Platte River Recovery Implementation Program Technical Appendix

Economics Agricultural Economics



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^{*} Located in the "Addendum" file, which is separate from this "Agricultural Economics Appendix" file.

^{**} Located in the "Platte River Agricultural Model" file, which is separate from this "Agricultural Economics Appendix" file.

Agricultural Economics Appendix

Affected Environment

Economic Impact Regions. In order to identify the economic effects of potential activities carried out under the Platte River Cooperative Agreement, eight separate economic impact regions were defined. The purpose of breaking the entire Platte River Basin into smaller regions is to identify and locate, as accurately as possible, where various economic impacts will occur. A number of factors were used to determine each economic impact region, including agricultural production areas and practices, location of recreation sites and activities, origin and final use of water supplies, location and size of cities or industrial markets, highways or other transportation routes, and availability of appropriate economic data, just to name a few.

The eight economic impact regions defined include 18 counties in Colorado, 22 counties in Nebraska, and 8 counties in Wyoming. Figure 1 shows the location of economic impact regions geographically, and Table 1 identifies which specific counties are included in each region. Agricultural economics and land use data have been collected for each of the 48 counties comprising the eight impact regions.

Impact Indicators

Impact indicators used to determine how much each alternative affects the agricultural economy in the Platte River Basin economic impact regions are: 1) deliveries of irrigation water, 2) acres of farmland, 3) cropping patterns and crop production, and 4) gross farm revenues.

As the conditions and assumptions of each alternative change the amount of irrigation water delivered to area farms, additional changes are expected to occur to the other indicators. Farmers will adapt to these changes in water supply in a number of ways. They may change the amount of land that they irrigate. They may produce crops that require less water or just not apply as much water to the same type of crops they are currently growing. Each of these farmer responses will probably affect the amount of crops produced (either through a change in yields or in the number of acres planted to certain crops). Such changes in crop production are expected to affect on-farm revenues received by irrigators – as both income and expenses are likely to change. Ultimately, it is these changes to farm income that is used to measure the direct impacts of a specific alternative to the agricultural economy in each of the economic impact regions identified in the Platte River Basin.

Methods

The following methods were used to estimate the present condition and impacts to each of the indicators:

Irrigated acres, cropping patterns, and yields were estimated using a ten-year (1988 to 1997) average of data obtained from the annual State Agricultural Statistical Reports published by Colorado, Nebraska, and Wyoming. Crop revenues were estimated using the above data along with the ten-year average state-level price for each crop. State prices were also obtained from the annual State Agricultural Statistical Reports published by each state.

Economic Region	Counties Included
Central Platte Habitat Area	Adams, Buffalo, Dawson, Gosper, Hall, Hamilton, Kearney, Merrick, and Phelps in Nebraska.
Lake McConaughy Area	Arthur, Cheyenne, Custer, Deuel, Garden, Keith, Lincoln, and Mcpherson in Nebraska. Logan and Sedgwick in Colorado.
Scott's Bluff Area	Banner, Kimball, Morrill, Scotts Bluff, and Sioux in Nebraska. Goshen in Wyoming.
Eastern Wyoming	Albany, Laramie, and Platte in Wyoming.
North Platte Headwaters	Carbon, Converse, Fremont, and Natrona in Wyoming. Jackson in Colorado.
East Central Colorado	Larimer, Morgan, Washington, and Weld in Colorado.
South Platte Headwaters	Clear Creek, Gilpin, Park, and Teller in Colorado.
Denver Metro	Adams, Arapahoe, Boulder, Denver, Douglas, Elbert, and Jefferson in Colorado.

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Present Conditions

Irrigated Acreage and Crop Data. Data on crop acreage, yields, prices, and production costs were compiled or calculated for each of the economic regions within the Platte River Basin. Since the above information is available only on either a state or county basis, individual state and county data were used to compute regional values. The principal agricultural economic sectors analyzed in the EIS as well as the specific crops grown in the Platte River Basin used to represent those sectors in the analysis are listed in Table 2.

Economic Sector	Representative Crops Used in Agricultural Model
Forage	Alfalfa hay, All Other Hay, Corn Silage
Feed Grains	Barley, Corn grain, Sorghum
Food Grains	Wheat
Vegetables	Dry Beans, Potatoes
Oil Crops	Soybeans
Sugar Crops	Sugar Beets

Table 2.—Economic Sector Categories and Representative Crops

Cropping Patterns and Yields

The cropping pattern indicates the number of acres within a particular region planted to individual crops or categories of crops. Acreage values used in the PRAM were based on the ten-year average of harvested acres from 1988 to 1997. The total acreage of irrigated crops included in the model is almost 11 million acres. Of this total value, 2.70 million acres, or 24.8 percent, were located in Colorado, 6.98 million acres, or 63.9 percent; were located in Nebraska, and 1.23 million acres, or 11.3 percent, were in Wyoming.

Table 3 summarizes the average acres of irrigated crops harvested between 1988 and 1997 for the three states of the Platte River Basin (Colorado, Nebraska, and Wyoming). Table 4 shows the same information for each of the eight economic impact areas within the basin. It should be noted that values shown for the impact areas were computed using total county data available for all of the counties comprising an impact area, even though, in many cases, portions of each individual county are located outside of the geographical boundary of the Platte River Basin.

There is considerable variation in cropping pattern and associated gross value of crop production among the regions. On the basis of irrigated acres harvested, corn for grain is the most important, comprising almost 60 percent of the harvested acres in the basin. Corn is the leading crop harvested in four of the economic regions, and is especially important in the Central Platte Habitat Area with more than 85 percent of the total harvested area. Alfalfa hay is the second-most important crop in the Platte River Basin, in terms of irrigated acres harvested. Alfalfa ranks second in terms of irrigated acres harvested in all of the impact regions except the Denver Metro Area, where it ranks first, and the Central Platte Habitat Area, where it is third.

	F	Platte River	Basin Dat	<u></u> a		Total St	ate Data	
Crop	CO NE		WY	Totals	CO	NE	WY	Totals
Alfalfa Hay	191,090	180,260	192,800	564,150	706,900	391,800	436,350	1,535,050
All Other Hay	120,140	0	209,060	329,200	467,600	0	482,000	949,600
Barley	21,350	0	15,150	36,500	96,700	0	100,500	197,200
Corn - grain	356,000	2,018,620	41,490	2,416,110	811,900	5,210,000	49,060	6,070,960
Corn - silage	70,870	51,310	21,470	143,650	104,600	138,000	34,400	277,000
Dry Beans	65,780	108,980	20,380	195,140	138,550	193,900	37,600	370,050
Oats	5,080	0	0	5,080	20,750	0	16,850	37,600
Potatoes	1,560	13,690	0	15,250	76,722	0	0	76,722
Sorghum	0	156,190	0	156,190	49,333	94,889	0	144,222
Soybeans	42,621	46,190	20,799	109,610	0	799,700	0	799,700
Sugar Beets	24,680	15,870	0	40,550	44,050	68,850	61,950	174,850
Wheat	42,700	28,570	9,590	80,860	184,620	78,900	14,830	278,350
TOTALS	941,871	2,619,680	530,739	4,092,290	2,701,725	6,976,039	1,233,540	10,911,304

 Table 3.—Irrigated Crop Acres

Other hay is the leading crop harvested in the North Platte Headwaters, Eastern Wyoming, and South Platte Headwaters impact regions. Dry beans are important in the Scotts Bluff, McConaughy, and East Central Colorado regions, where they are ranked 3rd, 3rd, and 4th, respectively, in terms of harvested acreage. Sugar beets are produced in all but two regions, with the majority of the acreage found in the Scotts Bluff and East Central Colorado regions. Even though the 10-year average of harvested acres is relatively small, potatoes are an important crop grown in the East Central Colorado region, while soybeans are the second largest irrigated crop produced in the Central Platte Habitat area.

"All other hay" is the only crop grown in the South Platte Headwaters region. It should be recognized that in all regions, pasture, hay and alfalfa are often marketed through livestock production. The complementary relationship between forage production and livestock enhances the actual return.

County crop yields from 1988 to 1997 were obtained from the annual State Agricultural Statistical Reports published by Colorado, Nebraska, and Wyoming. County yields and harvested acres of irrigated crops were used to compute a weighted average yield for each economic impact area. Weighted-average yields by crop and region are shown in Table 5.

	Tabl	e 4.—Har	vested Aci	reage of Ir	rigated C	rops, by Ir	npact Reg	ion, 10-Y	ear Avera	ge (1988-1)	997)	Т
Impact Region	Alfalfa	All Other Hay	Barley	Corn for Grain	Corn Silage	Dry Beans	Potatoes	Sorghum Grain	Soybeans	Sugarbeets	Wheat	Region Totals
Central Platte Habitat Area	50,580	0	0	1,481,020	22,630	0	0	13,190	138,990	0	0	1,706,410
Lake McConaughy Area	102,560	5,760	0	480,470	23,820	39,770	0		17,110	7,860	7,860	701,030
Scotts Bluff Area	92,790	11,300	0	172,490	17,900	91,920	0		0	56,280	56,280	454,490
Eastern Wyoming	51,420	86,250	3,370	8,870	8,430	6,940	0		0	4,540	6,760	176,580
North Platte Headwaters	117,770	186,780	11,190	1,890	6,590	2,700	0		0	0	0	326,920
East Central Colorado	121,450	22,100	18,350	254,730	60,640	51,150	5,120		0	35,550	17,940	587,030
South Platte Headwaters	0	8,460	0	0	0	0	0		0	0	0	8,460
Denver Metro	34,900	13,010	0	16,790	3,980	2,660	0		0	1,930	4,170	80,250
Crop Totals	571,470	333,660	35,720	2,416,260	143,990	195,140	5,120	13,190	156,100	106,160	64 360	4,041,170

 Table 4.—Harvested Acreage of Irrigated Crops, by Impact Region, 10-Year Average (1988-1997)

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Impact Region	Alfalfa (ton)	All Other Hay (ton)	Barley (bu)	Corn for Grain (bu)	Corn Silage (ton)	Dry Beans (cwt)	Potatoes (cwt)	Sorghum (bu)	Soy- beans (bu)	Sugar- beets (ton)	Wheat (bu)
Central Platte Habitat Area	4.61	0	0	148.68	18.55	0	0	92.48	47.09	0	0
Lake McConaughy Area	4.50	2.16	0	141.69	18.55	17.37	0	0	42.44	19.41	51.33
Scotts Bluff Area	4.30	1.65	0	123.24	18.76	19.20	0	0	0	19.12	52.81
Eastern Wyoming	3.40	1.35	67.34	103.40	15.99	18.85	0	0	0	17.59	58.47
North Platte Headwaters	2.88	1.40	79.77	98.16	17.31	19.43	0	0	0	0	0
East Central Colorado	4.97	2.25	83.30	149.17	23.11	20.50	302.33	0	0	22.08	59.14
South Platte Headwaters	0	1.32	0	0	0	0	0	0	0	0	0
Denver Metro Area	4.16	2.18	72.18	136.62	19.90	18.76	0	0	0	21.10	56.19

 Table 5.—Weighted Average Crop Yields, by Region (1988-1997)

Crop Revenues

Agricultural revenues generated from crop production were estimated using data collected from the annual State Agricultural Statistical Reports published by Colorado, Nebraska, and Wyoming for 1988 through 1997. Baseline crop production was projected using the 10-year county averages for harvested acres and yields for each of the crops modeled. Corresponding gross crop revenues were estimated by multiplying the harvested production by the 10-year average state-level price for each crop. Baseline projections of gross crop revenues for each impact region are shown in Table 6.

Crop_Name	Denver Metro Area	East Central CO	Eastern WY	Central Platte Habitat Area	McConaughy Area	North Platte Headwaters	Scott's Bluff Area	South Platte Headwaters	Crop Total
Alfalfa Hay	\$12,630,000	\$52,480,000	\$13,590,000	\$14,190,000	\$28,100,000	\$26,350,000	\$24,270,000	0	\$171,610,000
All Other Hay	2,390,000	4,200,000	8,380,000	0	760,000	18,730,000	1,140,000	940,000	36,540,000
Barley	580,000	4,390,000	700,000	0	0	2,750,000	0	0	8,420,000
Corn - grain	6,120,000	101,450,000	2,520,000	620,950,000	191,980,000	510,000	59,950,000	0	983,480,000
Corn - silage	1,730,000	30,590,000	2,490,000	9,170,000	9,650,000	2,490,000	7,330,000	0	63,900,000
Dry Beans	980,000	2,660,000	2,580,000	0	14,460,000	1,030,000	36,920,000	0	58,630,000
Potatoes	0	6,940,000	0	0	0	0	0	0	6,940,000
Soybeans	0	0	0	40,380,000	4,480,000	0	0	0	44,860,000
Sugar Beets	1,550,000	29,860,000	3,260,000	0	5,580,000	0	39,340,000	0	79,590,000
Wheat	860,000	3,890,000	1,430,000	0	4,400,000	0	2,260,000	0	12,840,000
Region Total	\$26,840,000	\$236,460,000	\$35,400,000	\$684,690,000	\$259,410,000	\$51,860,000	\$171,210,000	\$940,000	\$1, 466, 810,000

 Table 6. —Estimated Crop Revenues by Crop and Impact Region, 10-Year Average, 1988-1997

Crop Prices Received

Prices received for crops were obtained from the Departments of Agriculture in Colorado, Nebraska, and Wyoming. Reported prices are averages of the marketing year average prices over 1988-97. The different state-level prices are weighted proportionally by the number of acres each state contributes to the total irrigated acres within a specific economic impact region. Table 8 shows the prices received used in the agricultural economic analysis.

Сгор	Yield Units	State A	Average Price Re	eceived
		Colorado	Nebraska	Wyoming
Alfalfa	Ton	85.23	62.24	75.97
Other Hay	Ton	81.75	62.24	70.37
Barley	Bushel	2.97	1.97	3.18
Corn - grain	Bushel	2.56	2.47	2.66
Corn - silage	Ton	21.61	0.00	0.00
Dry Beans	CWT	21.40	20.93	20.83
Potatoes	CWT	4.90	0.00	0.00
Soybeans	Bushel	0.00	6.08	0.00
Sugar Beets	Ton	39.51	38.96	41.42
Wheat	Bushel	3.49	3.46	3.46
Source: Colorado,	Nebraska, and	Wyoming Agricult	ural Statistics	

Table 7.—State-Level, Marketing Year Crop Prices, Average for 1988-1997

Irrigation Water Deliveries

Deliveries of irrigation water to each of the economic impact regions are based on the 48-year hydrologic period from 1947 to 1994. Three different hydrology models were used to estimate irrigation deliveries within the Platte River Basin. Assumptions and methodologies pertinent to each model are described in the Hydrology Appendix. Annual deliveries of irrigation water from facilities in the Platte River Basin were averaged over the 48-year period and used as the present condition baseline for deliveries of irrigation water. The estimated amount of irrigation water delivered to crops modeled in each of the impact regions is presented in Table 8.

Impact Region	Irrigation Deliveries (ac-ft)
Central Platte Habitat Area	391,500
Lake McConaughy Area	140,800
Scotts Bluff Area	438,500
Eastern Wyoming	143,400
North Platte Headwaters	225,200
East Central Colorado	1,065,700
South Platte Headwaters	8,100
Denver Metro	151,900

Table 8.—Annual Irrigation Deliveries Modeledby Impact Region, 48-Year Average, 1947-1994

Agricultural Economic Impacts

As each alternative was analyzed to determine the effects of various actions, it was determined that two of the identified impact regions (South Platte Headwaters and Denver Metro) incurred no economic impacts, regardless of alternative. Consequently, these two regions are not included in the presentation of economic effects.

Irrigation Water Deliveries. Three different hydrology models were used to estimate water deliveries for each of the three sub-basins of the Platte River Basin and each model expresses water delivery results somewhat differently. In order to maintain consistency of input data used in the agricultural model, the irrigation water output from each of the hydrology models was converted to acre-feet of water consumptively used on farm. Therefore, changes in the amount of irrigation water deliveries mentioned in this section are expressed as on-farm consumptive use (on-farm CU).

Average irrigation deliveries and on-farm consumptive use (on-farm CU) are predicted to decline in five economic impact areas under three of the analyzed alternatives (Water Emphasis, Water Leasing, and the Governance Committee Alternative). The Wet Meadow Alternative affects only the North Platte Headwaters and the Scott's Bluff impact areas. Economic impacts occur as a result of two general types of activities that will be implemented to accomplish the objectives of the Cooperative Agreement. The first type of program activity expected to affect irrigation deliveries and on-farm CU within the Platte River basin is water acquisition. These activities include, but are not limited to, purchasing water rights, water banking, water marketing, dry-year leasing, etc. The second type of program activity expected to affect irrigation deliveries and onfarm CU is operating changes of Platte River storage and diversion facilities. Changing the timing and amount of releases from various facilities along the Platte River to improve habitat conditions for the target species (such as from the Pathfinder and McConaughy Environmental Accounts) are expected to result in periodic reductions in irrigation deliveries and on-farm CU in some areas. Reductions in on-farm CU range from 2,900 acre-feet under the Wet Meadow alternative to a reduction of 90,900 acre-feet under the Water Emphasis alternative. Table 9 shows the irrigation shortages estimated to occur in each impact area as a result of the combined effects of all the actions implemented under each alternative. A graphical representation of the irrigation shortages are displayed in Figure 2.

Alternative	Central Platte Habitat Area	Lake McConaughy Area	Scott's Bluff Area	Eastern Wyoming	North Platte Headwaters	East Central Colorado
Water Emphasis	-27,000	-21,300	-9,900	0	-6,400	-9,800
Water Leasing	-27,000	-30,000	-40,200	0	-7,500	-13,800
Wet Meadow	0	100	-1,700	0	-2,200	0
Governance Committee	-15,900	100	-100	-1,500	-7,200	0

 Table 9.—Changes in Consumptive Use of Irrigation Water by Alternative, Acre-Feet

On a percentage basis for the entire Platte River Basin, these reductions in irrigation water range from a shortage of about one-tenth of one percent for the Wet Meadow alternative to approximately 3.5 percent less water for both the Water Emphasis and Water Leasing alternatives. The Governance Committee alternative has a reduction of just over one percent. Some of the impact areas are affected more than others. Even though the Central Platte Habitat area has the largest overall reduction for three of the alternatives, the reductions predicted to occur under the Water Emphasis and Water Leasing alternatives are less than 7 percent of the 50-year average irrigation water supply. The reduction predicted under the Governance Committee alternative is just over 4 percent. The Lake McConaughy area irrigation supply receives the largest percentage reduction of all impact areas under the Water Emphasis and Water Leasing alternatives at 11.5 percent. While the East Central Colorado area has a reduction of over 23,000 acre-feet, it is only about 2.2 percent of the 50-year average of on-farm CU. The Scott's Bluff area reduction of 18,400 acre-feet and 19,100 acre-feet for Water Leasing and Water Emphasis, respectively, translates to 4.2 and 4.1 percent.

Note that the precise distribution of effects across regions depends upon where elements like water leasing will be focused. While the analysis of these alternatives represents one set of assumptions, the actual distribution of water leasing will be under the direction of each state and dependent upon the participation of willing lessors, and may differ from this analysis.

Changes in Irrigation Consumptive Use





Figure 2.—Changes in Consumptive Use of Irrigation Water by Alternative

Irrigated Acres and Cropping Patterns. Given the changes to irrigation deliveries and onfarm CU expected to occur as a result of implementing each of the alternatives, a corresponding change to irrigated acres is predicted for each of the economic impact regions. The changes are expected to affect both the total number of irrigated acres within each economic impact region as well as the proportion of each irrigated crop as a percent of the total land irrigated.

Two different responses were modeled to estimate the range of potential impacts to irrigated acres in each of the economic impact regions. The first response is based on the assumption that no dryland conversion occurs when irrigation deliveries and on-farm CU are reduced. In other words, when irrigation water supplies are reduced, irrigated land is taken completely out of production. This response represents the maximum direct impact to the agricultural economy. The impacts of this response are shown in Table 10 and Figure 3. The second response assumes that, where feasible, irrigated land is converted to dryland agricultural production when irrigation deliveries and on-farm CU are reduced. This conversion of irrigated land to dryland represents the minimum economic impact predicted in each impact area. The minimum range of impacts are shown in Table 11 and Figure 4.

When substitution of non-irrigated crops for irrigated crops is assumed, the land is still projected to be lost from agricultural production in the Eastern Wyoming and the North Platte Headwaters areas. This is based on the assumption that without irrigation water, lands in these areas would revert to dry rangeland with essentially no capability to produce any type of crop. This assumption was reinforced by the lack of available data for non-irrigated crops, such as crop census data or enterprise budgets, in these areas. The other four impact areas were assumed to be suitable for producing (at least some) crops without irrigation water. The largest impact to acres under agricultural production occurs under the Governance Committee alternative with a

loss of almost 6,000 acres or less than two-tenths of one percent of the total land in agriculture. Even when these acres are concentrated in the North Platte Headwaters area, the impact is still less than 2 percent of farmland in the area. Even when farmland is taken out of production entirely rather than converted to dryland farming, the only area that sees a decline of as much as four percent in farmed area is the Scott's Bluff area. This reduction occurs under the Water Leasing alternative. For the Platte River Basin as a whole, the maximum reduction in irrigated acres was just over 85,000 acres or 2.1 percent.

Alternative	Central Platte Habitat Area	Lake McConaughy Area	Scott's Bluff Area	Eastern Wyoming	North Platte Headwaters	East Central Colorado	
Water Emphasis	-18,800	-10,900	-4,900	0	-4,300	-2,100	
Water Leasing	-38,300	-16,100	-21,800	0	-5,100	-4,100	
Wet Meadow	0	0	-300	0	-1,500	0	
Governance Committee	-10,700	0	0	-1,000	-4,900	0	

Table 10.—Predicted Changes in Irrigated Acres by Alternative No Substitution of Dryland Farming for Irrigation Assumed

 Table 11.—Predicted Changes in Irrigated Acres by Alternative

 Assumes Substitution of Dryland Farming for Irrigation

Alternative	Central Platte Habitat Area	Lake McConaughy Area	Scott's Bluff Area	Eastern Wyoming	North Platte Headwaters	East Central Colorado
Water Emphasis	0	0	0	0	-4,300	0
Water Leasing	0	0	0	0	-5,100	0
Wet Meadow	0	0	0	0	-1,500	0
Governance Committee	0	0	0	-1,000	-4,900	0

Changes in Irrigated Acres by Alternative and Economic Impact Region (No Dryland Substituted for Irrigated Land)





Changes in Farmed Acres by Alternative and Economic Impact Region (Assumes Substitution of Dryland Farming) 0 🗄 East Central CO -10,000 🖾 North Platte -20,000 Headwaters* Eastern WY -30,000 Acres -40,000 Scott's Bluff Area -50,000 III Lake McConaughy -60,000 Area 🖾 Central Platte -70,000 Habitat Area -80,000 Full Water Leasing Water Emphasis Wet Meadow Governance Committee



Agricultural Revenues. The various alternatives analyzed in the EIS affect the quantity of irrigation water delivered to each of the economic impact areas. Such changes to irrigation deliveries and on-farm CU result in corresponding changes to the amount and type of crops produced and, ultimately, in the revenues generated by farms within the impact areas. Revenue changes occur when the production of irrigated crops varies due to changes in the supply of irrigation water. Crop production and farm revenues vary as previously irrigated farmland is converted from irrigation to dryland farming, or when it is removed entirely from agricultural production. Table 12 and Figure 5 present the maximum direct economic impact predicted to occur to the agricultural economy of each impact area under each alternative.

Alternative	Central Platte Habitat Area	Lake McConaughy Area	Scott's Bluff Area	Eastern Wyoming	North Platte Headwaters	East Central Colorado		
Water Emphasis	-7,642	-3,448	-1,198	0	-496	-1,123		
Water Leasing	-15,476	-5,138	-5,509	0	-583	-1,853		
Wet Meadow	0	0	-17	0	-174	0		
Governance Committee	-4,421	0	8	-115	-560	0		

 Table 12.—Predicted Changes in Agricultural Revenues by Alternative (\$1,000)

 (No Substitution of Dryland Farming for Irrigation Assumed)

Note that a very slight increase in revenues occurs to the agricultural economy in the Scott's Bluff area under the Governance Committee alternative. This is due to the projected change in the cropping pattern of irrigated crops in these areas. The agricultural model predicts a substitution of irrigated crops with a lower consumptive use requirement for those crops currently being grown with a higher consumptive use requirement. The increase in acres of crops that require less water generates more revenue than is lost by the decrease in acres of crops with a higher water requirement. This substitution effect is most likely to occur when predicted changes in water deliveries and consumptive use are fairly small, as in the situation mentioned above.

When land is retired from agriculture, the reduction in agricultural revenue is approximately \$29 million for the Water Leasing alternative and almost \$14 million for the Water Emphasis alternative with the majority of those amounts occurring in the Central Platte Habitat area. When measured as a percent of total agricultural revenues, the Scott's Bluff area bears the largest proportion of impacts with a 3.2 percent reduction. Under the Governance Committee alternative, the only area that sustains a revenue reduction greater than 1 percent is the North Platte Headwaters area at 1.1 percent.

Changes in Gross Agricultural Revenues by Alternative and Economic Impact Region (No Dryland Substituted for Irrigated Land)



Figure 5.—Predicted Changes in Agricutltural Revenues by Alternative (No Substitution of Dryland Farming for Irrigation Assumed)

As mentioned in the Irrigated Acres and Cropping Patterns section above, a range of direct impacts to the agricultural economy was predicted. The values shown in Table 12 are estimated assuming that a reduction in irrigation water requires farmers to take land out of production completely. This provides an estimate of the maximum impact to the agricultural economy of the Platte River Basin. The values shown in Table 13 and Figure 6 are estimated assuming that farmers will produce non-irrigated crops in those areas where conditions are suitable for dryland agriculture. These values provide the minimum estimate of the range of direct impacts to the agricultural economy. In areas where climatic conditions won't support non-irrigated agriculture, the minimum and maximum impacts are the same.

 Table 13.—Predicted Changes in Agricultural Revenues by Alternative (\$1,000)

 (Assumes Substitution of Dryland Farming for Irrigation)

Alternative Water	Central Platte Habitat Area	Lake McConaughy Area	Scott's Bluff Area	Eastern Wyoming	North Platte Headwaters	East Central Colorado
Emphasis	-4,038	-2,024	-711	0	-496	-879
Water Leasing	-8,127	-3,049	-3,361	0	-583	-1,369
Wet Meadow	0	0	14	0	-174	0
Governance Committee	-2,356	0	8	-115	-560	0

Changes in Gross Agricultural Revenues



by Alternative and Economic Impact Region (Assumes Substitution of Dryland Farming)



When non-irrigated crops are substituted for irrigated crops, where appropriate, the impacts to agricultural revenues are reduced by about 40 percent. Only the Wet Meadow alternative remains essentially the same whether dryland substitution occurs or not. Figure 7 shows the range of impacts to total agricultural revenues in the Platte River Basin for each alternative modeled.



Figure 7.—Range of Impacts to Gross Agricultural Revenues, (\$1,000) Platte River Basin – Total

Habitat Acquisition and Management Effects. Efforts to acquire and manage specific tracts of land to provide improved habitat for the target species are expected to impact the agricultural economy of only the Central Platte Habitat area. In addition, based on the current land uses and types of vegetation expected to exist on lands that would be suitable for habitat, the impacts are expected to be much smaller than those projected to occur from changes to irrigation deliveries and on-farm CU. Tracts of land assumed to be typical of those that would be suitable to acquire and manage for habitat were selected to estimate potential changes to existing land covers, including agricultural production. Converting some existing cover types to those specifically required for habitat areas could require eliminating some of the more intensive agricultural cropping practices. On the other hand, establishing additional acres of grasslands within the habitat management areas could provide additional agricultural production and revenues from grazing or haying activities.

Grazing and hay production yields on habitat lands were estimated using information on the type of management practices and average yields in the study area. It was assumed that grazing and hay production would be used to manage habitat areas restored as wet meadows or natural grassland and would be employed on a rotational production schedule. Under this schedule, pastureland would be hayed or grazed, burned or rested on an annual basis. Grazing and hay production was assumed to commence on program lands two years after restoration when natural grasses are established. A summary of the estimated changes in crop acres and corresponding changes to farm income is provided in Table 14.

	Summary of Changes to High culture in the changes, sy filter had to									
	Gove Com Dowr Protecti	ernance mittee - nstream on Option	Net Area Gover Comn Upst Restorati	a Change (Gains minus Losse rnance nittee - tream ion Option Water Emphas		Losses) mphasis	Wet Meadow			
IMPLAN Sector	Acres	Gross Revenue	Acres	Gross Revenue	Acres	Gross Revenue	Acres	Gross Revenue		
Forage	3,532.8	304,899	4,248	367,177	774	68,264	7,447	643,447		
Feed Grains	-1,564	-592,956	-1,835	-696,037	-216	-82,033	-3,233	-1,226,049		
Grains	-	0	-	0	-	0	-	0		
Vegetables	-	0	-	0	-	0	-	0		
Oil Crops	-145	-42,269	-170	-49,617	-20	-5,848	-300	-87,398		
Sugar Crops	-	0	-	0	-	0	-	0		
Total	1,823	-330,325	2,241.9	-378,476	538	-19,617	3,912	-670,000		

Table 14.—Habitat Acquisition and Management Program Summary of Changes to Agricultural Area and Revenues, by Alternative

Summary of Agricultural Economic Effects. In general, each of the alternatives analyzed is expected to cause a slight decrease in the amount of irrigation water consumptively used by farms within the Platte River basin from just under 4,000 to over 145,000 acre-feet. Reduced irrigation water deliveries are expected to reduce both irrigated acres and the value of agricultural commodities produced. Irrigated acres are expected to decrease somewhere in the range of 1,500 to 85,000 acres, depending on how individual farmers respond to the change in available irrigation water, in addition to the specific alternative selected. The change in the amount of agricultural commodities produced is estimated to cause a decrease in farm revenues of from about \$160,000 to more than \$28,000,000.

With the exception of the Wet Meadow alternative (where the impacts are projected to occur only in the Scotts Bluff and North Platte Headwaters area), the impacts to farm revenues will probably be spread throughout the entire basin. However, under the three other alternatives analyzed (Governance Committee, Water Leasing and Water Emphasis), farm revenue impacts are expected to be greatest in the Central Platte Habitat area. The Governance Committee alternative reduces the farm revenue impacts in three regions (Central Platte Habitat, North Platte Headwaters, and Eastern Wyoming), but revenues in the Lake McConaughy, Scotts Bluff, and East Central Colorado areas are not affected. Under the Water Emphasis alternative, the Lake McConaughy area is the second most impacted region, followed by the Scotts Bluff, North Platte Headwaters, and the East Central Colorado areas. Under the Water Leasing alternative, farm revenue impacts are greater in the Lake McConaughy area than the Scotts Bluff area, with the order of the other economic regions remaining the same. As each alternative was analyzed to determine the effects of various actions, it was determined that two of the identified impact regions (South Platte Headwaters and Denver Metro) incurred no economic impacts, regardless of alternative. Consequently, these two regions are not included in the presentation of economic effects.