PLAN FORMULATION AND ALTERNATIVE PLANS

Plan Formulation

The first step in plan formulation was to determine the tons of salt being delivered to the Mancos River under current conditions. The loading was split between conveyance irrigation delivery and on-farm irrigation application. Each of the 26 ditch systems was evaluated independently to estimate the amount of salt loading that could be attributed to each system. During the system evaluations the needs and opportunities in each system were identified. Both on-farm and off-farm improvements were evaluated. On-farm improvements included improved surface systems and conversion to sprinkler systems. Off-farm improvements were limited to replacing the present earthen ditches with pipelines and using polyacrylamide application to reduce ditch seepage.

All of the plans formulated included, as a minimum, measuring devices so that the amount of water delivered to each farm can be determined.

Candidate Plans

Plan No. 1 - Future with No Action (Ongoing Activities with Current Programs and Rate of Implementation)

This alternative assumes that no salinity control program will be implemented in the Mancos Valley. Other programs will continue to operate as they have in the past. This alternative is the benchmark from which the effects of other alternative plans are measured.

On-farm application system improvement will occur at a significantly slower pace than with the proposed action. An estimated 1,205 acres would see on-farm system improvements over the next 25 years.

Conversion to sprinkler systems and improvements to surface applications systems will continue in the Mancos Valley. Based on current projections, the rate of conversion to sprinklers is estimated to be 500 acres over the next 25 years and improved surface application systems on 705 acres. No delivery system improvements are expected.

Implementation of this plan will not reduce the amount of water diverted annually for irrigation. The lower deep percolation from the 500 acres converted to sprinkler systems and the 705 acres with improved surface application systems will result in an estimated 915 tons/year salt load reduction.

The estimated construction cost for this plan is shown in Table 10. Cost-share funds may be available from the USDA's Environmental Quality Incentive Program. Using a 75% cost-share rate, the annual cost per ton of salt reduction is $44.17.

TABLE 10: Future Without (No Action Alternative)

Practice	Unit	Quantity	Construction Cost 1/
Sprinkler System Technical Assistance	AC	500	$250,000 $100,000
Surface Systems Technical Assistance	AC	705	$106,015 $42,406
TOTAL			**$498,421**

1/ Price base 2003

Plan No. 2 –Future with Proposed Action

The proposed alternative reduces seepage from approximately 16 ditches and increasing the irrigation efficiency on 5,400 acres.

On-farm application would proceed at an accelerated rate. Approximately 1,330 acres of those currently surface irrigated will have improved surface application systems installed and 4,070 acres will have side roll sprinkler systems installed.

Implementation will not significantly reduce the amount of irrigation water diverted annually. The irrigation application and delivery system improvements associated with this alternative result in seepage and deep percolation reductions which will reduce salt loading to the Mancos River by an estimated 11,940 tons per year. In some cases it may be desirable for the applicants to consider consolidating ditches and requesting approval for changes in points of diversion. Any of these changes will need to be reviewed and approved by the Colorado Division 7 Water Court prior to a specific ditch project moving forward. This proposal is not intended to bring new land under irrigation or to provide water to land which has only been infrequently marginally irrigated. Any project proposed on lands without an adequate irrigation history will not be considered for funding without project approval by the Colorado Division 7 Water Court prior to initiation of such project.

The total estimated project cost of this alternative is $8,753,357.

Unresolved Conflicts

The proposed action has no known unresolved conflicts.

TABLE 11: Plan No. 2 Delivery and Application System Improvement

Practice	Systems Ac, Ditches Ft.	Total Cost	Tech. Asst.	Fed. Cost @ 75% Cost Share	Tot. Fed. Cost	Salt Reduct. Tons	Project Cost per Ton
Spinklers	4,070	$2,035,000	$814,000	$1,526,250	$2,340,250	3,500	
Surface Systems	1,330	$200,000	$80,000	$150,000	$230,000	1,000	
On-farm Total	**5,400**	**$2,235,000**	**$894,000**	**$1,676,250**	**$2,570,250**	**4,500**	**$43.10**
Off-Farm At 60% Participation							
Pipeline [1/]	228,940	$4,007,854	$1,603,141	$3,005,890	$4,609,031	5,700	**$61.02**
Polyacrylamide	71,558	$9,544	$3,818	$7,158	$10,976	1,740	
Off-farm Total	**$300,498**	**$4,017,398**	**$1,606,959**	**$3,013,048**	**$4,620,007**	**7,440**	**$46.86**
Total Construction Cost @ 60% Participation		**$6,252,398**					
Grand Total Fed. Cost @ 60% Participation w/ Polyacrylamide					**$7,190,257**	**11,940**	**$45.44**
Grand Total Fed. Cost @ 60% Participation w/o Polyacrylamide					**$7,179,281**	**10,200**	**$53.11**
Total Project Cost w/ Polyacrylamide			**$8,753,357**				
Total Project Cost w/o Polyacrylamide			**$8,739,995**				
*** Costs Amortized at 5.625% for 25 years**							

2004 Price Base

1/ In a few cases concrete ditch or other canal lining practices may be necessary or requested. If used, these practices will need to be engineered for the Mancos Valley conditions.

Comparison of Candidate Plans

Projected Measures and Extents Being Applied with Current Programs and Landowner Implementation (No Action), and Measures and Extents Applied with the Proposed Action

	Current Activity – Future with No Action	**Proposed Action**
PRACTICE	**EXTENT**	**EXTENT**
Conservation Crop Rotation	400 Ac.	1100 Ac.
Drip Irrigation	15 Ac.	25 Ac.
Filter Strips	13 Ac.	13 Ac.
Irrigation Pipeline	20,000 L.F.	228,940 L.F. *
Gated Pipe	15,000 L.F.	21,589 L.F.
Irrigation System (sprinkler)	500 Ac.	4,070 Ac.
Irrigation Water Management	1,200 Ac.	5,400 Ac.
Land Leveling	26 Ac.	50 Ac.
Nutrient Management	433 Ac.	700 Ac.
Forage Harvest Management	250 Ac.	2,160 Ac.
Pasture and Hayland Planting	98 Ac.	2,160 Ac.
Pest Management	100 Ac.	700 Ac.
Polyacrylamide ditch treatment	1,000 L.F.	71,558 L.F.**
Pond (multipurpose)	4 No.	15 No.
Residue Management	100 Ac.	2,400 Ac.
Riparian Forest Buffer	3 Ac.	30 Ac.
Structure for Water Control	3 No.	30 No.
Upland Wildlife Habitat Mgt.	10 Ac.	250 Ac.
Wetland Restoration	5 Ac.	25 Ac.
Wetland Enhancement	9 Ac.	245 Ac.
Wetland Wildlife Habitat Mgt.	14 Ac.	270 Ac.

***** In areas with inadequate slope or large flows, concrete ditch or other alternative practices may replace irrigation pipeline.

** Polyacrylamide has been used to significantly reduce seepage from irrigation ditches at several locations in western Colorado and locations in other western states. The full benefits are still being tested and approval for use of this product in irrigation ditches is still pending. Preliminary studies show seepage reductions typically above 50 percent. The full range of application technology and appropriate areas for use are being studied by both the Agricultural Research Service and the Bureau of Reclamation. The product will also be tested in the Mancos Valley area. The implementation of this portion of the project will not be done until the final testing is complete.

ENVIRONMENTAL CONSEQUENCES

Because of the low intensity of expected impacts and the relatively small size of the project area, there are no anticipated significant effects on the human environment from either of the alternatives discussed in this plan. Refer to Table 12 for a comparison of alternatives.

It is not anticipated that there will be unaddressed environmental controversies related to the proposed action.

FUTURE WITH NO ACTION

Environmental Quality

Water
The amount of water diverted for irrigation will not change. The amount of water available to apply to fields will not change. No improvements to the delivery system are expected.

The quality of water in the Colorado River will only be improved slightly. The net reduction in salt loading from limited system improvements is expected to reach 915 tons per year. This is a 4% reduction in irrigation salt loading from the project area. The domestic water supply is not impacted.

The stream flows are anticipated to remain the same as at present. No new land is expected to be brought under irrigation.

Soils
The soils within the watershed will be minimally impacted. The amount of soil lost due to irrigation will be reduced only slightly due to the conversion of 500 acres of surface irrigated alfalfa to sprinkler irrigated alfalfa. The 705 acres of improved surface irrigated alfalfa will also reduce the amount of irrigation erosion occurring by providing more control of the water application. These two changes will also reduce soil deposition at the end of irrigated fields. A minor reduction in the amount of soil sealing at the ends of fields is expected due to the deposition of fine grained sediment. The soil condition will not change.

Air
The project area doesn't currently experience violations of air quality standards. Any increase in the number of irrigation pumping plants in the area will be minimal. They would likely be powered by electricity. No significant changes in air quality are expected.

Plants
The cropland suitability of the area will not be impacted. The crops grown in the watershed are not expected to change.

The irrigated crop health in the area will only be improved slightly due to implementation of improved irrigation water application systems. Plant stress caused by water limitations will be reduced on 1,200 acres.

Animals
The domestic livestock in the area are not expected to experience significant impacts. The numbers are not expected to change in either direction. Animals have been adequately nourished in the past, therefore health was maintained, and this is not expected to change.

Wildlife in the Mancos Valley, including birds, mammals, reptiles, amphibians, and fish, will not be significantly impacted. Species listed as "Endangered" or "Threatened" will not be affected. Some wetland habitat adjacent to and within farm fields treated with existing programs may see a slight reduction in quantity or quality. The majority of this habitat type has a relatively low value for wildlife because of the fragmented nature of the existing habitat. Efforts will be made on a case-by-case basis to minimize and avoid these impacts. Habitat values lost through ongoing program activities will be evaluated and replaced on a case by case basis.

Clean Water Act
The Mancos River water quality will not be significantly improved. The river, which provides the majority of the irrigation water for the project area, has four use classifications: aquatic life cold water 1, recreation 1, water supply, and agricultural. It is listed as impaired due to sediment on the Colorado 303(d) list. There will be very little reduction in sediment loading to the river from irrigated agriculture. The aquatic habitat aspect of the river will not be improved to a great extent as a result of reduced return flows carrying salts and other contaminants.

Cultural Resources
Impacts to cultural resources are minimal and related to on-farm improvements.

Field evaluations and file searches will be done on a site-specific case-by-case basis. In the event a cultural resource is discovered while making an on-farm irrigation improvement, the project will be stopped to investigate. If a significant site is discovered, it will be preserved or documented to the satisfaction of the responsible state agency.

Endangered or Threatened Species
Although there are known endangered or threatened species in the vicinity, and species may periodically migrate through, there are no confirmed resident species inhabiting the

site. The acres of these habitats will remain consistent. The distribution or composition of habitat components is not expected to change.

Environmental Justice
This concern is evaluated for every on-farm improvement funded in part with federal funds. Due to the scope of the ongoing program no groups would be expected to be harmed.

Fish and Wildlife Coordination
Coordination with both State and Federal fish and wildlife agencies would be carried out on a case-by-case basis.

Floodplain Management
No development in the 100-year flood plain will result from this alternative. For this reason it is assumed that the dimension and location of the floodplain will not change. There are no known facilities for storing or producing toxic materials in the 500-year flood plain.

Invasive Species
The open irrigation ditches may act as carriers for invasive species.

Migratory Birds
There will be no impact to migratory bird populations. The project is not within a major waterfowl flyway.

Natural Areas
There are no known designated natural areas within the project area.

Prime and Unique Farmlands
The number of acres of these two land classifications will remain constant. The distribution of these farmlands will not change. For these reasons the project is expected to have no effect on these resources.

Riparian Area
The riparian areas associated with natural drainages, which make up the majority of riparian acres, will not be significantly affected.

Scenic Beauty
The landscape texture and composition will not be affected. For this reason the scenic beauty of the area will not be affected by project action.

Wetlands
Many of wetlands in the project area are “irrigation induced.” A minimal number of these acres would be impacted. Wetland functions for the majority of these are already impacted by the land use associated with them. They are either heavily grazed or cut for hay several times a year. The distribution and size of these wetlands is not likely to

change. Any habitat values lost through ongoing program activities will be evaluated and replaced on a case by case basis.

Wild and Scenic Rivers
There are no designated wild and scenic rivers in the project area.

Social and Economic Effects

Land Use
The land use in the area is not expected to change as a result of project action. No new land will be brought under production. The distribution of the various land uses is not expected to change. Investigations provide no evidence that the acres of the various uses will change.

Capital and Labor
The proposed action will not have an impact on the capital available in the project area. The labor base will not be affected.

Management Level
The management level related to the irrigated cropland will not change significantly. The labor to manage and set irrigation water will be reduced slightly on fields with improved irrigation systems.

Profitability
The overall profitability of the project area will not be impacted dramatically. There will be a labor savings of small proportion due the limited implementation of irrigation improvements. Crop production will not change significantly.

FUTURE WITH PROPOSED ACTION

Environmental Quality

Water
The amount of water diverted for irrigation is not expected to change as a result of the proposed project action. The timing and placement of water available to meet crop consumptive use needs will improve. However, the irrigated acres and actual crop consumptive use is not expected to change. The improved timing and placement is the result of the proposed changes to the irrigation water delivery system and improved on-farm distribution systems.

The quality of water in the Mancos River and Colorado River will be improved as a result of the project. A reduction of salt loading due to project action is expected to be 11,940

tons per year. This is an average anticipated 46% reduction in irrigation salt loading from the project area. The domestic water supply is not impacted by the project.

The majority of river flows are anticipated to remain approximately the same as present. However, there may be some opportunity to improve specific reaches of the river by improving the method used to deliver irrigation water through the individual ditch systems. Since the Mancos River is fully adjudicated, the implementation of this project does not foresee any changes in distribution or allocation of adjudicated water rights from what historically has been done. If water user groups propose projects where a change might be anticipated, the water user group will need to work with the appropriate state agency to resolve any water rights issues prior to proceeding with their project. The project will not bring any new land under irrigation, nor increase the irrigation demand on the existing stream flow.

Soils

The soils within the watershed will be minimally impacted. The amount of soil loss due to irrigation will be reduced due to the conversion of 4,070 acres of surface irrigated alfalfa to sprinkler irrigated alfalfa and the reduced potential for irrigation-induced erosion. The 1,330 acres of improved surface irrigated alfalfa will also reduce the amount of irrigation erosion occurring by providing better and more uniform control of water application. These two changes will also reduce soil deposition at the end of irrigated fields. This will reduce the amount of soil sealing at the ends of fields due to the deposition of fine grained sediment. Overall the soil condition that existed prior to the project will not significantly change as a result of the proposed action.

Air

The project area does not currently experience any violations of air quality standards. An increase in the number of irrigation pumping plants in the area is expected. It is believed that the majority will be powered by electricity. Because of this and the scope of the project, no significant changes in air quality are expected with project action.

Plants

The cropland in the area will not be impacted by the proposed action. The crops grown in the watershed are not expected to change.

The irrigated crop health in the area is likely to be improved due to implementation of improved irrigation water application resulting in a more uniform irrigation application. Plant stress caused by excess or deficit water will be reduced in the majority of the irrigated area.

Animals

The domestic livestock in the area are not expected to experience significant impacts resulting from the project. The numbers are not expected to change in either direction. Animals have been adequately nourished in the past, therefore health was maintained and this is expected to remain the case after the project. With the implementation of the project, winter livestock water that historically used the existing irrigation ditches for

conveyance could be impacted. The need for adequate livestock water supplies has been recognized and will be addressed as part of each landowner or group project plan. A number of possible alternatives may be available, such as maintaining the ditch for winter water, using the existing rural water system, installing a pipeline outlet, or installing a small pipe in conjunction with any ditch enclosure project to supply livestock water. The site-specific alternatives and impacts will be evaluated as part of the environmental evaluation completed prior to the implementation of each project. Acceptable alternatives will be developed to address the livestock water issues.

Figure 6. (Diversion structure in the Mancos Valley)

Wildlife in the area, including birds, mammals, reptiles, amphibians, and fishes, will not be significantly impacted. Waterfowl, shorebird, and neo-tropical bird populations should remain stable. Habitat enhancement activities in strategic locations and block treatment will be implemented when there are negative impacts to habitats related to the proposed action. Hawks, eagles, and owl populations will not be affected, as they utilize a broad range within the valley and overall impacts to perching, roosting, or feeding habitat will be insignificant.

Of the habitats in the watershed, the wetland habitat (predominantly PEM) will be the only habitat type which may see a reduction in quantity or quality from the proposed action. The majority of this habitat type is found below earthen irrigation ditches or within over-irrigated pasture and hayland, and has a relatively low habitat value due to intensive management activities (grazing, haying) and fragmented distribution. Efforts will be made to minimize and avoid these impacts. Suitable wetland areas will be enhanced or restored and riparian areas will be improved both onsite and offsite to replace any habitat values lost.

Clean Water Act

The Mancos River water quality will be improved as a result of project action. The river, which provides the majority of the irrigation water for the project area, has four use classifications: aquatic life cold water 1, recreation 1, water supply, and agricultural. It is listed as impaired due to sediment on the Colorado 303(d) list. The project will reduce sediment loading to the river from irrigated agriculture. The aquatic habitat aspect of the river will be improved as a result of reduced subsurface return flows carrying salts and other contaminants.

Cultural Resources

The project is not expected to have any negative impacts on the cultural resources in the area. The composition and intactness of known sites will be preserved during project action. Some of the sites are in close proximity to areas where project activity is anticipated, but the project is not expected to affect these areas. Any sites of record or sites recorded during field investigations will be avoided as the preferred alternative. In the event a site cannot be avoided or may be impacted, an archaeological investigation will be completed in accordance with National Historic Preservation Act regulations and an acceptable course of action will be used to mitigate any impacts. In the event a new potential site is discovered during construction, work will be suspended until an investigation is made. If a significant site is discovered, it will be preserved or documented to the satisfaction of the responsible state agency and meet the stipulations set forth in a Memorandom of Agreement between the Natural Resource Conservation Service (NRCS) and the State Historic Preservation Officer (SHPO).

Endangered or Threatened Species

Although there are known endangered or threatened species in the vicinity, and while species may periodically migrate through the Mancos Valley, there are no confirmed resident species inhabiting the site. The habitats used by the species known to migrate through the area will be preserved or enhanced through project action. The acres of these habitats will remain consistent with the before project inventoried acres. The distribution or composition of habitat components is not expected to change significantly with project action. It is possible the proposed wetland enhancement and protection activities may improve habitat value for the bald eagle and Southwestern willow flycatcher.

Environmental Justice

The public was involved in the development of the proposed action. Refer to Appendix A, Public Participation. This has ensured that the proposed action does not cause harm to any group affected by the project.

Fish and Wildlife Coordination

Preliminary coordination with both State and Federal fish and wildlife agencies was carried out through correspondence and personal contacts. To date, they have not raised issues with our assessment of no significant impacts to fish and wildlife due to implementation of the proposed action, because of a commitment to and opportunities for voluntary replacement of any habitat losses. Coordination with State and Federal fish and wildlife agencies continued through the interagency review process and will continue with project implementation. Coordination will also occur throughout the project life with the habitat monitoring and replacement activities.

Floodplain Management

No development in the 100-year flood plain will result from project action. For this reason it is assumed that the dimension and location of the floodplain will not change. There are no known facilities storing or producing toxic materials in the 500-year flood plain.

Invasive Species

Piping the irrigation delivery systems typically reduces the transport and spread of invasive species. The proposed action will not introduce invasive species. Areas disturbed as a result of project action will need to be seeded and managed to prevent the proliferation and spread of noxious weeds. When planting is carried out in conjunction with this project, the seed used will be certified free of noxious weeds, which include invasive species identified for Colorado.

Migratory Birds

The project is not expected to significantly impact any migratory bird populations. There will be an opportunity to protect and enhance a known feeding and resting area through project funds. The project is not within a major water fowl flyway. Any impacts to wetland habitat types will be monitored, evaluated, and replaced as part of the project implementation.

Natural Areas

There are no known designated natural areas within the project area.

Prime and Unique Farmlands

The number of acres of these two land classifications will remain constant throughout project implementation. The distribution of these farmlands will not change over the life of the project. For these reasons the project is expected to have no effect on these resources.

Riparian Areas

The riparian areas associated with natural drainages, which make up the majority of riparian acres, will not be significantly affected and may be improved through habitat enhancement activities.

Scenic Beauty

The landscape texture and composition will not be significantly affected by the proposed action. Some areas may experience short-term negative effects due to construction. In the long term vegetation changes will be offset, by revegetation, habitat developments, and habitat enhancement performed in conjunction with the works of improvement implemented through this project. For these reasons, the scenic beauty of the area will not be significantly affected by project action.

Wetlands

Many of wetlands in the project area are “irrigation-induced.” These wetlands may be impacted by implementation of project practices. Wetland functions for the majority of these are already impacted by the land use associated with them. They are either heavily grazed or cut for hay several times a year. The distribution and size of these wetlands will decrease.

Figure 7. (Typical outlet structure)

The irrigation-induced wetland areas associated with ditches and current irrigation practices will be impacted negatively by project action. These areas will likely see a reduction in water availability. Both the extent and density of vegetation associated with these areas may be reduced. The habitat values of these impacted wetlands will be evaluated as part of individual project planning and effects will be monitored. Habitat values lost will be replaced with suitable habitat developments or enhancements implemented with program funds to provide a habitat replacement of equal or greater value than the habitat value lost.

Natural wetland areas along the river and perennial drainages will not be impacted. Their composition, distribution, and size will remain the same or improve after project action.

Wetlands encompass a substantial area within the Mancos Watershed, approximately 1,314 acres (see Table 9, page 28). About 50% are irrigation induced wetlands that may not meet the jurisdictional wetland criteria, but which do provide wetland habitat values. Most of the natural wetlands are associated with the major river drainages and their tributaries.

Irrigation water management practices and irrigation system improvements may impact irrigation-induced wetlands. Preliminary estimates are that the Palustrine Emergent (PEM) may have up to 256 acres impacted, the Palustrine Scrub/Shrub (PSS) may have up to 12 acres impacted, and the Riverine Upper Perennial Unconsolidated Shore (R3US) may have up to 4 acres impacted. Some minor impacts may occur to natural wetlands from the improvement of diversion structures, but these will be short term.

The majority of the irrigation-induced wetlands impacted are Palustrine Emergent, associated with ditch lateral seepage and over-irrigation. Large wetland areas exist on more than one landowner's property and, in some cases are currently subdivided. Many of these are relatively low value habitats, heavily grazed or harvested for hay. As irrigation systems are improved (from flood irrigation to sprinklers) and laterals and open ditches replaced with buried pipe, these wetlands may be lost, reduced in size, or altered. The actual extent of the impacts will be dependent upon participation in the program.

It is not anticipated that farming practices and field boundaries will change significantly as a result of the project action. Habitat losses will be predominantly as result of ditch replacement by pipelines. Habitat values lost will be evaluated and replaced on a case-by-case basis. Habitat development and enhancement will be done in suitable areas with willing landowners. Monitoring will be done throughout the project to evaluate changes in habitat as the result of project action and to track the success of the replacement activities. This will be coordinated with the State and Federal fish and wildlife agencies.

Ditch or lateral lining with pipe may directly affect associated scrub/shrub habitat if the lining occurs within the existing right-of-way. Those areas not directly impacted may see only minor changes as the vegetative component (buffaloberry, woods rose, coyote willow, narrowleaf cottonwood) can survive under the normal climatic regime. Irrigation pipelines have been installed in the Mancos Valley without negatively impacting the existing woody vegetation. However, when woody vegetation is lost it will be replaced as part of the habitat development and enhancement activities. Many individuals are interested in maintaining this cover type for aesthetics and as wildlife habitat.

The intention is to focus wetland replacements and enhancements in riparian areas and natural tributaries. Improved grazing management and water conservation practices may improve wetlands along the natural drainages. Landowners with approximately 3.5 miles of the Mancos River and its tributaries under their control have expressed an interest in improving the associated wetland and riparian habitat along these drainages. Proper

grazing management, livestock exclusion, and habitat enhancement (riparian plantings, fencing, flooding) are a few of the conservation practices under consideration. Where scrub/shrub habitat exists along ditches and laterals being replaced by pipelines, supplemental irrigation water may be supplied by the individual landowner to maintain these areas. These types of projects will be cost-shared under the funding program.

The U.S. Fish and Wildlife Service expressed an interest in assuring long-term protection for some of the wetland replacements. The NRCS staff will inform landowners interested in long term habitat protection about easement opportunities and possible programs to help them accomplish their objectives. Statutorily, we will use existing easement programs such as the Wetland Reserve Program (WRP) to assist landowners who have an interest in providing long term protection through easements. The restoration and enhancement work can be completed with program funds, and the easement can be achieved through the WRP or similar program. It is also recognized that some of the wetland replacement and enhancement areas may be altered during the life of the project. Wetland and other wildlife related projects will continue to be a project priority with funding available for interested landowners throughout the life of the project to provide the maximum opportunity to replace all lost habitat values lost.

Palustrine emergent wetlands will be more difficult to replace. If the planned conversion is wild flooding to gated pipe irrigation system, these areas will be maintained. Sprinkler systems will probably eliminate more of the PEM wetlands. Certain areas within the valley are suitable for enhancement of these types of wetlands. Old river oxbows have the potential for re-introduction of water either through the river or from irrigation tail water. These types of losses will be replaced by cost-sharing with interested landowners to protect or enhance suitable areas.

Several landowners have expressed a desire to develop or improve fish habitat within the Mancos River. To meet landowner goals and objectives in-stream structures may used to enhance aquatic habitat. These practices, along with grazing management and riparian habitat improvement, will provide for more sustainable fisheries, and help to restore hydrology for associated wetlands.

The goal is to focus replacement activities in areas suitable for wetland development or enhancement and with landowners that have an interest in enhancing wildlife habitat. This approach will focus efforts on important habitats and on development of more contiguous areas, resulting in higher overall habitat value. A variety of wetland enhancement and protection activities will be implemented with interested landowners within and adjacent to the project area, sufficient to replace the measured habitat values lost concurrent with the irrigation system improvements. Wildlife contracts will be funded and implemented early in the project timeline so they can produce replacement values ahead of, or at least concurrent with, anticipated habitat losses. Habitat assessments and monitoring activities will be used to track the replacement habitat functions.

The Avian Richness Evaluation Method (AREM) appears to be the most effective and consistent tool for monitoring wetland impacts at this time. This evaluation method was developed by Paul R. Adamus in cooperation with the Environmental Protection Agency for use in the "lowland wetlands of the Colorado Plateau," specifically the Salinity Control Units in Utah, Colorado and Wyoming. Unit values are obtained by averaging six habitat scores weighted by species (Relative Dependency on Wetlands, Relative Abundance, Taxonomic Uniqueness, Neo-tropical Migrant Status, Official Conservation Designations and Hunted Status), multiplied by .01, and then multiplied by the acres. A limited sample (12 sites including PEM, PFOA, and PSS) of wetlands in the Mancos Valley has been evaluated using AREM to determine suitability of the method and criteria being evaluated (water source, tree/shrub canopy, herbaceous cover, seclusion, land use, and predation potential). It appears that all AREM criteria can be utilized with consistent results.

Wild and Scenic Rivers
There are no designated wild and scenic rivers in the project area.

Social and Economic Effects

Land Use
The land use in the area is not expected to change as a result of project action. No new land will be brought under production. The distribution of the various land uses is not expected to change. Investigations provide no evidence that the acres of various uses will be different after project installation.

Capital and Labor
The proposed action will not have an impact on the capital available in the project area. The labor base will not be affected by this project.

Management Level
The management level related to the irrigated cropland will improve. The labor to manage and set irrigation water will be reduced slightly on fields with the improved irrigation systems.

Profitability
The overall profitability of the project area will be increased due to project action. There will be a labor savings on operations implementing irrigation improvements related to the project. Crop production will increase with the improved irrigation, which is facilitated through the project.

Risk and Uncertainty
The level of participation may vary from our estimate.

There is some risk and uncertainty associated with the salt loading calculations. If ditch seepage rates are in error, the loading from this source would be affected. If deep percolation improvements for sprinkler and surface irrigation systems are not similar to

some of the other project areas, (Grand Valley, Lower Gunnison, Uintah Basin, and McElmo Creek), then the loading estimates could be different. The preliminary indications are that the area will produce similar values to the other project areas. Polyacrylamide has been used to significantly reduce seepage from irrigation ditches at several locations in western Colorado and locations in other western states. The full benefits are still being tested and approval for use of this product in irrigation ditches is still pending. Preliminary studies show seepage reductions typically around 50 percent. The full range of application technology and appropriate areas for use are being studied by both the Agricultural Research Service and the Bureau of Reclamation. The product will also be tested in the Mancos Valley area. The implementation of this portion of the project will not be done until the final testing is complete. There is a possibility the product may not be as successful in the Mancos Valley as it has been in the other areas tested. If polyacrylamide is not suitable for use as part of this project in the Mancos Valley alternative practices may be needed, and the planned improvements and anticipated effects may not occur.

If the amount of wetland source water derived from the irrigation systems in the area is estimated incorrectly, then the indirect impacts to wetlands could change. A site-specific assessment of the wetland impacts will be made during the planning process for each project so that adjustments can be made to offset the impacts of the projects. Color satellite photos were taken in July of 2003 to help determine the extent of existing wetland and to establish baseline data to monitor the effects of the project.

The extent of unexposed cultural resources in the area is unknown. The field survey of potential sites could fail to identify new sites that might be impacted. In the event sites are exposed during excavation, work will be suspended immediately and an investigation completed. The extent and exact location of earth movement during project implementation are based on preliminary estimates. Site-specific field evaluations and file searches will be done as part of each planned project. The unknown or unexposed sites create some uncertainty in the assumption of not having impacts to the cultural resources of the project area. If a significant site is discovered, it will be preserved or documented to the satisfaction of the responsible state agency and meet the stipulations set forth in a Memorandum of Agreement between the Natural Resource Conservation Service (NRCS) and the State Historic Preservation Officer (SHPO).

Endangered and threatened species may change in the Mancos Valley area during the life of the project. Site-specific evaluations will be made during the planning process for each specific project. Critical habitats and possible impacts to endangered and threatened species will be evaluated on a case-by-case basis before each individual project is implemented.

Table 12: Comparison of Alternatives

Effects	No Action (existing program activity)	Proposed Action
Total Project Cost	$498,421	$8,753,357
Environmental Quality Account		
WATER	WATER QUANTITY Improved timing, placement, and amount 1,200 acres, no reduction in ditch seepage	WATER QUANTITY Improved timing, placement, and amount 5,400 acres, reduction in ditch seepage on 300,000 feet of delivery ditch
	IMPROVED Mancos and Colorado River quality, reduce salt load 915 tons per year	IMPROVED Mancos and Colorado River quality, reduce salt load 11,900 tons per year
SOILS	IRRIGATION EROSION reduction on 1,200 acres	IRRIGATION EROSION reduction on 5,400 acres
	SOIL DEPOSITION reduction on 1200 acres	SOIL DEPOSITION reduction on 5400 acres
	SOIL PERMEABILITY maintain a better water intake rate on 1,200 acres	SOIL PERMEABILITY maintain a better water intake rate on 5,400 acres
AIR	NO CHANGE in quality	NO CHANGE in quality
PLANTS	CROP HEALTH Improvement on 1200 acres	CROP HEALTH Improvement on 5400 acres
	PLANT STRESS REDUCTION 1200 Ac.	PLANT STRESS REDUCTION 5400 Ac.
ANIMALS	NO CHANGE domestic livestock health	NO CHANGE domestic livestock health
	NO NET CHANGE wetland habit	NO NET CHANGE wetland habitat
CLEAN WATER ACT	REDUCED SALINITY Mancos and Colorado Rivers 915 tons/year	REDUCED SALINITY Mancos and Colorado Rivers 11,900 tons/year
CULTURAL RESOURCES	NO IMPACTS to integrity	NO IMPACTS to integrity
ENDANGERED SPECIES	NO CHANGE to habitat components	NO CHANGE to habitat components
ENVIRONMENTAL JUSTICE	NO HARM to any group	NO HARM to any group
FISH AND WILDLIFE COORDINATION	NO SPECIAL COORDINATION	ADDITIONAL OPPORTUNITY to work with State and Federal Wildlife agencies

Effects	No Action (existing program activity)	Proposed Action
FLOODPLAIN MANGAGEMENT	NO DEVELOPMENT or STORAGE of toxic materials in floodplain	NO DEVELOPMENT or STORAGE of toxic materials in floodplain
INVASIVE SPECIES	SPREADING facilitated	NO SPREADING facilitated
MIGRATORY BIRDS	NO IMPACT to population or habitat	NO IMPACT to population or habitat
NATURAL AREAS	NO IMPACT none designated	NO IMPACT none designated
PRIME and UNIQUE FARMLANDS	NO EFFECT on acres or distribution	NO EFFECT on acres or distribution
RIPARIAN AREA	NO EFFECT on natural or irrigation induced areas along irrigation ditches	NO EFFECT to natural areas, OFFSET IMPACTS to irrigation-induced areas along irrigation ditches
SCENIC BEAUTY	NO IMPACT to significant landscape textural or compositional features	NO IMPACT to significant landscape textural or compositional features
WETLANDS	INSIGNIFICANT CHANGE in size or distribution	OFFSET IMPACTS irrigation-induced wetlands reduced in size and distribution, replaced as part of program implementation
	NO IMPACT natural wetlands	NO IMPACT natural wetlands
WILD and SCENIC RIVERS	NO IMPACT none present	NO IMPACT none present
OTHER SOCIAL EFFECTS		
LAND USE	NO CHANGE acres or distribution	NO CHANGE acres or distribution
CAPITAL and LABOR	NO CHANGE in labor base	NO CHANGE in labor base
MANAGEMENT LEVEL	IMPROVED water management on 1,200 acres	IMPROVED water management on 5,400 acres.
PROFITABILITY	LABOR SAVINGS on 1,200 acres	LABOR SAVINGS on 5,400 aces
	INCREASE in crop production and quality on 1,200 acres	INCREASE in crop production and quality on 5,400 acres