Monitoring and Evaluation Report
Lower Gunnison Unit
Colorado River Salinity Control Project
2011
USDA-NRCS

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EXECUTIVE SUMMARY
LOWER GUNNISON UNIT
2011

Hydro-Salinity -

- The project plan is to treat approximately **135,000 acres** with improved irrigation systems.
- To date **61,124 acres** [/1] have been treated with improved irrigation systems.
- The project plan is to reduce salt loading to the Colorado River system by **166,000 tons/year** of salt.
- In FY 2011, salt loading has been reduced by **2,948 tons/year** as a result of installed salinity reduction practices.
- The cumulative salt load reduction is **109,034 tons/year**, or 66 percent of the project goal.

[/1] Note: The 61,124 acres include fields that have been treated a second time to a higher level of irrigation improvement and salt savings over the course of this salinity project.

Cost Effectiveness -

- The planned cost per ton of salt saved with FY 2011 contracts (one year) is **$108.55 /ton**. This figure is calculated as follows:

(FA + TA = Total Cost) X Amortization factor = Amortized cost
Amortized cost / Tons salt reduced = Cost/Ton
FA = Total dollars obligated in EQIP and Basin States/ Parallel Program (including wildlife)
Amortization for 2011 = 0.0623
TA = technical assistance cost: (FA x 0.67)

Wildlife Habitat Replacement -

- The habitat replacement goal is at 2% of the current irrigation improvement acres, or 2% of 61,124 irrigation improvement acres equals **1,222 acres** of habitat developed or significantly enhanced.
- In Fiscal Year 2011, **48.3 acres** of upland habitat and **21.6 acres** of wetland habitat were reported as applied.
- To date, a cumulative **877 acres** or 82% of the current wildlife habitat replacement goal has been established.
- Additional efforts are being made through wildlife only sign-ups, with various conservation groups, and with other Federal and State agencies to accelerate the implementation of wildlife habitat enhancement projects.

Key Considerations and Conclusions –

- A meeting was conducted with Bureau of Land Management, Bureau of Reclamation, US Fish and Wildlife Service, and NRCS to look for additional opportunities to develop or enhance wildlife habitat to meet the replacement goals.
- The 2012 salinity sign-up shows a significant increase over 2010 and 2011. The outreach activities and improving economic conditions encouraged additional participation.

HYDRO-SALINITY MONITORING AND EVALUATION, COLORADO

Introduction

The Water Quality Act of 1965 (Public Law 89-234), as amended by the Federal Water Pollution Control Act of 1972, mandated efforts to maintain water quality standards in the United States. Congress enacted the Colorado River Basin Salinity Control Act (PL 93-320 in June 1974. Title I of the Act addresses the United States' commitment to Mexico and provided means for the U.S. to comply with provisions of Minute 242. Title II of the Act created a water quality program for salinity control in the United States. Primary responsibility was assigned to the Secretary of Interior and the Bureau of Reclamation (BOR). USDA was instructed to support BOR's program with its existing authorities.

The Environmental Protection Agency (EPA) promulgated a regulation in December, 1974, which established a basin wide salinity control policy for the Colorado River Basin and also established a water quality standards procedure requiring basin states to adopt and submit for approval to the EPA, standards for salinity, including numeric criteria and a plan of implementation. In 1984, PL 98-569 amended the Salinity Control Act, authorizing the USDA Colorado River Salinity Control Program. Congress appropriated funds to provide financial assistance through Long-Term Agreements administered by Agricultural Stabilization and Conservation Service (ASCS) with technical support from the Soil Conservation Service (SCS). PL 98-569, also required continuing technical assistance along with monitoring and evaluation to determine the effectiveness of measures applied.

In 1995, PL 103-354 reorganized several agencies of USDA, transforming SCS into the Natural Resources Conservation Service (NRCS) and ASCS into the Farm Services Agency (FSA). In 1996, the Federal Agricultural Improvement and Reform Act (PL 104-127) combined four existing programs, including the Colorado River Basin Salinity Control Program, into the Environmental Quality Incentives Program (EQIP). The Farm Security and Rural Investment Act of 2002 and Food, Conservation, and Energy Act of 2008 reauthorized and amended EQIP, continue opportunities for USDA funding of salinity control measures.

Colorado River Salinity Control

The USDA-Natural Resources Conservation Service (NRCS), formerly USDA-Soil Conservation Service (SCS), both herein referenced as NRCS, initiated a program to make a variety of irrigation improvements to reduce deep percolation and on-farm ditch seepage to reduce the salt load potential to the Colorado River. Salinity control projects were initiated in Colorado starting with Grand Valley Unit in 1979, Lower Gunnison Unit in 1988, McElmo Creek Unit in 1989, Mancos Valley in 2004, and Silt in 2005. The NRCS irrigation improvement work included piping or lining irrigation ditches and small laterals, and improving the on-farm irrigation systems. In 1982 the NRCS identified the need to establish an irrigation monitoring and evaluation program for Grand Valley to assess the effects to deep percolation and seepage from making the various irrigation improvements, and to assess economic impacts and wildlife habitat replacement activities.

The NRCS developed a Monitoring and Evaluation Plan to assess the effects of the Colorado River Basin Salinity Control Program being implemented, "Monitoring and Evaluation Plan,

Colorado River Basin Salinity Control Program for Grand Valley Unit, Colorado and Uinta Basin Unit, Utah, July 1982." The long-range monitoring plan described uniform guidelines and procedures to assess the effectiveness of the NRCS program to reduce salt loading to the Colorado River, to determine the effects of the irrigation improvements on wildlife, and to identify the monetary benefits to the individual participants.

The Natural Resources Conservation Service (NRCS) has been placing improved irrigation methodology with selected cost-sharing to cooperators since 1979 through the Colorado River Salinity Control Program. Irrigation in the Colorado salinity control areas is characterized by mostly gravity-fed systems installed on heavy clayey soils or medium textured soils derived from or overlaying a marine shale formation (typically Mancos shale) that is very saline. The intake rates of the soils are generally low to medium. Plentiful and inexpensive irrigation water coupled with the long irrigation set times, and typically abundant flow rates contribute to the potential salinity mobilization. The available irrigation water and lower efficiency irrigation systems leads to excess deep percolation loss of water and low application efficiencies. The excess water from deep percolation contacts the underlying Mancos shale and subsequently loads salt to the Colorado River. Deep percolation and ditch seepage are considered to be the primary indicators of the effectiveness of the irrigation application.

A variety of irrigation systems were evaluated including earthen ditches with earth feeder ditches, earthen ditches with siphon tubes, concrete ditches with siphon tubes, ported concrete ditches, pipeline to gated pipe, side roll sprinklers, and micro spray. Crops included alfalfa, corn, small grain, dry beans, orchards, grapes, onions, pasture, and vegetables. This monitoring of irrigation system performance took place through the Salinity Program period from 1984 through 2003. The monitoring of wildlife and economic impacts started with each project and continues throughout the life of the project.

Colorado NRCS initiated irrigation monitoring in the Grand Valley Unit in 1984 and to a limited extent in the Lower Gunnison Unit in 1992 and the McElmo Unit in 1993. The irrigation monitoring was designed to assess deep percolation changes and estimate changes to the salt loading derived from irrigated agricultural lands. Those assessments provided a baseline of deep percolation characteristics on agricultural land, and have been used by NRCS to make management decisions related to salinity control projects. Colorado State University, Cooperative Extension took over the irrigation monitoring activities from 1999 through 2003 utilizing the NRCS equipment and similar sampling techniques. The NRCS also conducted selected economic analysis and wildlife habitat analysis in all of the project areas.

The irrigated monitoring sites were selected to represent the variety of conditions common in the salinity control units. The need was identified for each irrigation event to be monitored and evaluated throughout the irrigation season for each site. From the NRCS Monitoring and Evaluation Plan, "Data will be collected to determine the amount of irrigation water infiltrated into the soil." "For each site on-farm water budgets will be prepared for each irrigation event, starting with pre-plant or start of growing season until crop harvest. The most significant output from the water budget is deep percolation." The plan proposed water budget was, "…deep percolation equals the amount of inflow plus rainfall prior to or during the irrigation event, less surface runoff and the net irrigation requirement [expressed as the amount of water needed to bring the soils profile to field capacity]." Data was compiled for 289 site years of measured irrigation inflows, outflows, crop consumptive use, precipitation, and deep percolation.

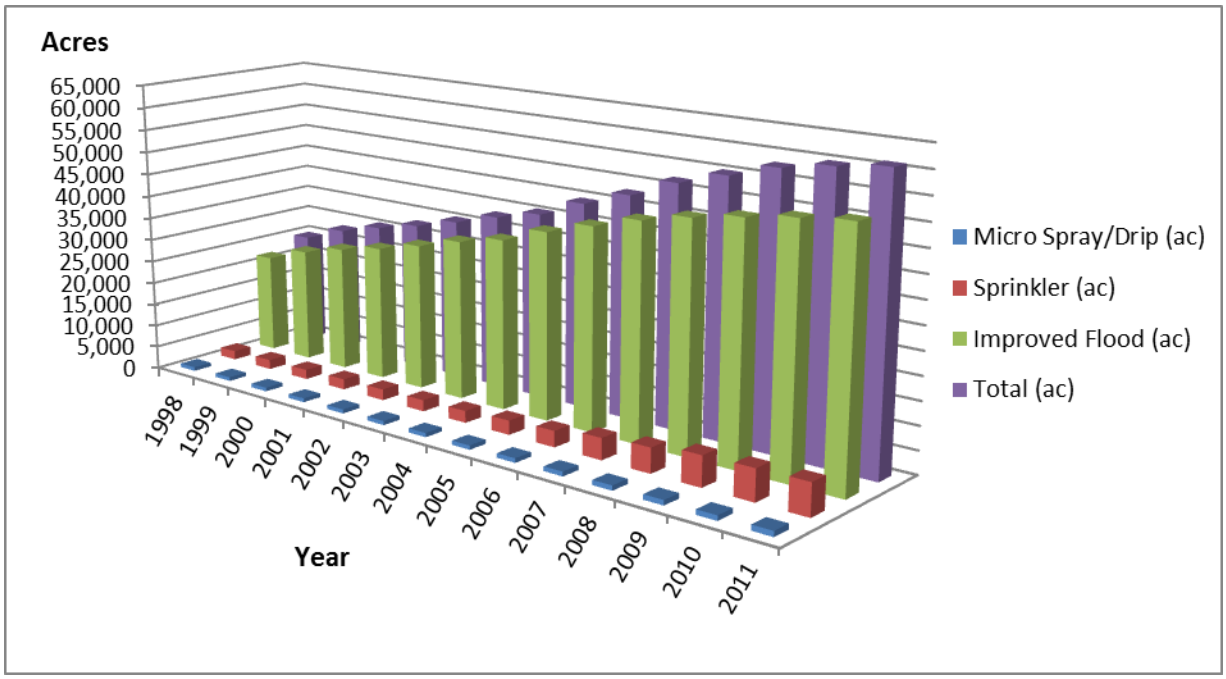
The data indicate that the salinity projects in Colorado are typically achieving a deep percolation plus field ditch seepage reduction of at least 10 to 15 inches for each acre treated which meets or exceeds the deep percolation reduction estimated in the original project reports.
Areas with a greater conversion to sprinkler or micro spray will be at the 15 inch reduction and areas with predominantly flood irrigation will be at the 10 inch reduction. Areas that are converting from unimproved flood systems will have deep percolation plus seepage reductions in the 25 to 30 inch range. Areas that are converting very old flood irrigation systems with limited improvements, will most likely be somewhere between the higher values and the lower values, but probably closer to the 10 to 15 inch reduction.

Table 1 - NRCS Irrigation Application Efficiency Standards for Evaluation

TYPE OF IRRIGATION SYSTEM	% OF MONITORED EFFICIENCY
Open ditch	35%
Open ditch w/ siphon tubes	40%
Concrete ditch w/siphon tubes	50%
Gated pipe	50%
Underground pipe & Gated pipe	50%
Underground pipe/Gated pipe/Surge	55%
Center Pivot Sprinkler	90%
Big Gun Sprinkler	70%
Side roll Sprinkler	75%
Micro spray	90%
Drip Irrigation	95%

Note: Efficiencies listed are the NRCS planning standards for the various types of irrigation systems.

Graph 1 – Lower Gunnison Unit Cumulative Irrigation Systems Installed



IRRIGATION SYSTEMS APPLIED (acres)	FY2011	CUMULATIVE
Sprinkler	150	6,915
Improved Surface System	1,099	53,026
Drip System	86	1,183
TOTAL	1,335	61,124

Graph 1 and sub-set table display the cumulative acres of the various irrigation improvements in the Lower Gunnison project area. The earliest micro-spray systems were installed in the late 1980's, and there has been a relatively consistent, although small acreage of micro-spray irrigation systems installed through-out the life of the project.

The Lower Gunnison Unit typically has some areas with larger and more uniform field sizes where sprinkler system are becoming more popular, however many areas have relatively small and sometimes irregular field sizes that make the installation of field sprinkler systems problematic. In addition, the relatively flat topography in the areas with the larger field sizes limits the opportunity to build gravity pressure through pipeline delivery systems, so the sprinkler systems in this area typically require some type of pumped pressure to operate. Regardless, there has been an increase in the number of sprinkler systems installed on some of the larger and more uniform fields in more recent years. The ease of operation and uniformity of application make sprinklers a desirable option for many irrigators.

The number of vineyard and orchard operations in some of the upper areas in the Lower Gunnison unit account for most of the drip and micro-spray systems installed, and although they represent a significant number of systems, the fields are typically small and do not account for a large acreage. The systems perform very well from an irrigation application efficiency

perspective, but are often relatively expensive on an acre treatment basis and typically are more attractive for the high value crops.

In the project area the deep percolation reduction and subsequent salinity control is typically about 50 to 60% reduction for a well-managed improved flood system, about 75 to 85% reduction for a well-managed sprinkler system, and about 85 to 95% reduction for a well-managed drip or micro-spray system.

Graph 2 – Lower Gunnison Unit Cumulative On-Farm Salinity Load Reduced

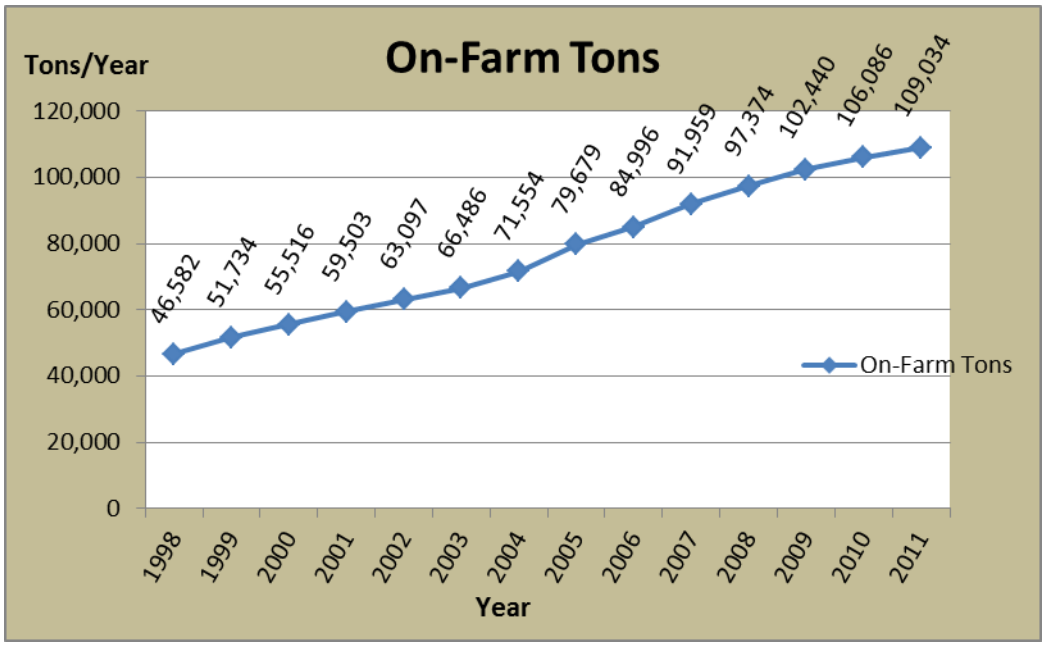


Table 2 - USGS Trend Analysis and Agency Reported Salinity Reduction

Unit	Trend Years	NRCS Project Start Year	NRCS Reported Reduction (tons/year) /1	BOR Reported Reduction (tons/year) /1	Total Predicted Reduction (tons/year) /1	Measured Reduction (tons/year)	Unclaimed Reduction (tons/year)
Grand Valley	1986 - 2003	1979	103,551	122,300	225,851	322,200	96,349
Lower Gunnison	1986 - 2003	1988	66,486	43,675	110,161	201,600	91,439
McElmo	1978 - 2006	1989	20,012	32,000	52,012	90,450 /2	38,438

/1 The number is the cumulative salt load reduction reported for the final trend analysis year for each study, either 2003 or 2006

/2 Includes a measured reduction plus projected salinity increase due to the introduction of the Dolores Project Water

USGS completed two salinity trend analysis reports for the gaging stations that include salt loading trends below three of the Colorado River Salinity Control Projects, and their analysis covered part of the salinity control implementation period. The measured salinity trends in the

river exceeded the salinity control reductions claimed by the participating agencies for all three locations for the years represented. Certainly other management and land-use changes contributed to either increases and/or reductions to salt loading in the river, however the USGS trend analysis was corrected to account for the salt variations with changes in annual flow, and is intended to represent a flow adjusted annual change in salinity loading trends. The fact the trend reductions exceed the predicted loading reductions from the program helps support the irrigation improvement work is significantly reducing the annual load contribution from irrigation, and possibly the amount of improvement is somewhat greater than predicted.

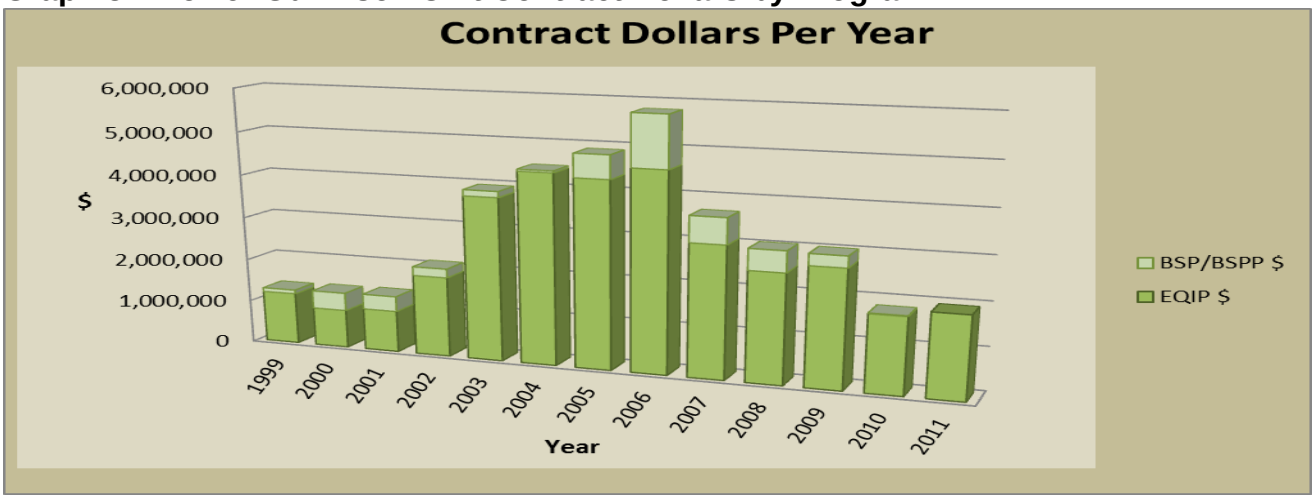
Table 2 References

"Salinity Trends in the Upper Colorado River Basin Upstream from the Grand Valley Salinity Control Unit, Colorado, 1986—2003", USGS Scientific Investigations Report 2007-5288, Kenneth J. Leib and Nancy J. Bauch, 2008.

"Characterization of Hydrology and Salinity in the Dolores Project Area, McElmo Creek Region, Southwest Colorado, Water Years 1978-2006", USGS Scientific Investigations Report 2010-5218, Rodney J. Richards and Kenneth J. Leib, 2011.

US BOR Reported Salt Load Reductions from personal communication with Nicholas Williams, Environmental Engineer, US Bureau of Reclamation, Salt Lake City, Utah.

Graph 3 – Lower Gunnison Unit Contract Dollars by Program



Note: The funding programs represented include the NRCS Environmental Quality Incentives Program (EQIP), and the Bureau of Reclamation funded Basin States Program (BSP, formerly known as the Basin States Parallel Program (BSPP).

Graph 3 displays the Environmental Quality Incentive Program (EQIP) and Basin States Program (BSP/BSPP) contract dollars per year from 1999 through 2011. The amounts varied significantly on an annual basis in part due to program allocations, the local economy, the cost of the installed systems, and the landowner's ability to cover their portion of the cost. The public funding was typically intended to cover approximately 75 percent of the installation cost, however many of the peripheral costs such as getting power to the site, possible non-irrigation equipment changes, additional management costs, the cost of learning and adapting new technologies, etc. were paid by the landowner and were not eligible for public cost-share.

Although the numbers fell within some of the previous annual contract dollar ranges, 2010 and 2011 are relatively low contract years. The recession, low hay prices, and higher input costs have made farmers apprehensive about signing contracts for irrigation improvements. There is

opportunity to make significant irrigation improvements and outreach efforts have been increased. The estimated number of contracts is down by about two thirds as a result of the recession. The re-funding of the Basin States Program should allow for additional future contracts with landowner's who may not be EQIP eligible, and it is assumed the amount of both EQIP and BSP contracts will increase[/1] as the local economy improves.

[/1] Note: The on-going 2012 EQIP salinity sign-up has increased significantly from 2010 and 2011

The trend in Lower Gunnison is to continue the installation of new systems, and to upgrade and improve some of the previous improved flood systems. Improvements to technology and design offer additional salinity reduction by improving the more primitive flood systems to pipeline gated pipe with or without surge irrigation valves, or in some cases change from improved flood irrigation to either sprinkler or micro-spray/drip irrigation. The salinity reductions claimed in these situations are based on the incremental improvement offered by making the change from the current system to the improved system. Additionally the higher levels of improvement typically have more management built into the system and the level of performance has a higher assured performance.

The economic value to the community and adjacent states is significant. The projects offer a downstream benefit from reduced damages through the amortized cost per ton that typically covers the public cost of installation. In addition the landowners receive economic benefits from improved crop quality, better utilization of fertilizers, reduced irrigation labor costs, etc. The local community benefits though the economic turnover in the area from the public cost-share funds, the improved crop qualities, agricultural sustainability, etc.

2011 Highlights

Since the salinity program's inception in 1988, the Natural Resources Conservation Service (NRCS) in partnership with Conservation Districts has been applying improved irrigation systems and practices with cooperators in the Lower Gunnison Colorado River Salinity Control Program (CRSCP). Funding for the CRSCP has been primarily made possible through the Environmental Quality Incentives Program (EQIP) and the Basin States Program (BSP). Within the past year former Basin States Parallel Program (BSPP) is transitioning to the new Basin States Program (BSP). This transition is gradually shifting the focus from on farm improved surface delivery systems to that of piping large scale main lateral off farm canal and ditch delivery systems. This has created a great deal of interest from group and irrigation companies in future participation in BSP. Also, there is a greater trend toward conversion of existing improved surface systems to highly efficient, advanced irrigation technology (AIT) and in particular Center Pivot sprinkler systems. This is evident in the status review of practices by acreage, crop and practice section of this report. Currently, this trend is primarily occurring in Delta County of the project area. With the advent of the new BSP and piping main stem delivery systems the conversion of existing improved surface on farm systems to AIT is expected to increase making it possible for irrigators to tap into pressurized gravity flow delivery systems.

Salinity Outreach Activities include:

2010

January 2010 - Meeting with staff to get information published in the Ouray papers about the annexation of Ouray County into the Lower Gunnison Salinity Control Area.

February 2010 - Submitted article to local paper about the Watershed Input Session regarding NRCS program delivery and resource priorities

March 2010 - Submitted news release to the local paper about the Watershed Input Session

June 2010 - SCD employees did a Water module presentation for the Montrose Recreation District

July 2010 - News release published in the Service Center news-letter about EQIP programs

July 2010 - Gunnison Delores Watershed tour- Steve did a presentation at one of the Ouray County irrigation projects

July 2010 - SCD constructed a fair booth at the Montrose County Fair along with FSA & the NRCS donating articles related to different programs

September 2010 - Engineering staff participated in the FSA County committee tour reviewing irrigation projects

September 2010 - Article submitted to the Daily Press regarding EQIP programs

2011

December 2011 - State Office news release submitted to the local paper regarding the EQIP Organic Producer Program application period.

February 2011 - EQIP organic sign up information was submitted to the Daily Press

March 2011 - News release was submitted to the Ridgway Sun regarding EQIP programs

Irrigation Water Management

The 2011 year saw a large improvement in the Irrigation Water Management (IWM) program for the Delta/Montrose field offices. An IWM Specialist was hired early in the year in Delta, and the IWM position in Montrose was lost in April, but replaced in July. The IWM program for the most part was initiated during the beginning of the season through contacts with producers having IWM scheduled in their contracts on an incentive basis and working with them in establishing an irrigation schedule using the irrigation tool box work sheet. Factors such as system type, soils,

crops and available water were all taken into consideration. Soil moisture monitoring was evaluated in the field to establish a baseline for future management adjustments. In some situations the IWM Specialist would accompany the Planner in the field to accomplish this task. Producers were instructed on how and when to maintain records of their irrigation application rates and frequencies so this data could be evaluated against soil moisture monitoring results in order to make necessary adjustments to achieve optimum efficiencies. Most of these efficiencies and records were achieved in 2011, using a list of higher expectations for IWM certification, including more ET documentation and improved records from each grower. All IWM contracts in the Montrose field office included an ET checkbook and Tool Box water analysis for each grower, as well as much improved record keeping. The IWM in Delta made more field visits than in 2010 and included ET documentation and infrared leaf temperatures as part of irrigation scheduling. However, the planners had to certify the Delta IWM contracts once again with the loss of the position late in the year. The position has been filled and the prospects for accurate IWM in 2012 is positive as the two men are working as a team in bringing the level of irrigation scheduling and record keeping to a higher level than ever before.

IWM Accomplishments include the following:

- Follow-up Contacts: 283
- Paid IWM Contract Evaluations: 149
- Unpaid IWM Contract Evaluations: 35

MIL Utilization: 76

2011 Practice's Reviewed

BASIN: 6 Contracts
EQIP: 107 Contracts
TOTAL: 113 Evaluations on 5,103 acres

Table 3 - 2011 IWM Status Review of Evaluated Practices by Acreage / Crop Type / Practice, Delta and Montrose Field Offices

Type of Practice	Hay (acres)	Pasture (acres)	Row Crop (acres)	Specialty Crop (acres)	Total (acres)	% by Practice
Concrete Lined Ditch w/Siphon Tubes	120	0	282	0	402	7.9
Underground Delivery w/Gated Pipe	1,698	434	697	61	2,890	56.6
Gated Pipe w/Surge	41	0	76	0	116	2.3
Side-Roll Sprinkler	74	0	0	0	74	1.5
Center Pivot Sprinkler	806	0	676	0	1,481	29.0
Solid-Set Sprinkler	0	0	0	0	0	0.0
Big-Gun Sprinkler	30	0	0	0	30	0.6
Micro-Spray	0	0	0	48	48	0.9
Sub-Surface Drip	0	0	62	0	62	1.2
Total Acres	2,769	434	1,793	109	5,103	100.0

2011 IRRIGATION WATER MANAGEMENT SUMMARY & OUTLOOK

As Advanced Irrigation Technology gains acceptance by a greater number of producers the use of soil infiltration tests will become increasingly important information for system operation and maintenance and proper management. IWM Specialists, through workshops, field days, tours, news articles and coordination with CSU Extension, irrigation equipment suppliers, Conservation District Boards, and irrigation water districts, can continue to bridge the gap between producers and the latest advancement of irrigation technology.

Uncertain economics will continue to focus agriculture producers on the price of fuel, fertilizer, seed, equipment, technology, and the value of their commodity. Producers must become efficient consumers of water and energy in order to remain in business. Efficient water application, reduced tillage, and other methods that incorporate efficient use of water and energy resources deserve to be advocated, publicized, and incorporated into project ranking considerations. Education and support of all minimum-till practices to enhance crop residue, improve soil health, increase water infiltration and conserve energy will be a priority in producer relations by the IWM Specialists.

As this trend continues, a point may be reached where there are limited returns on investment because the biggest return has already been achieved, when improved systems were installed on previously untreated acres. More advanced and highly efficient systems are being installed on previously treated acres at a much higher cost with reduced incremental salinity control benefits. A shift in emphasis to off-farm conveyance systems will not only achieve greater salt

savings, by addressing previously non-treated land, but will provide an incentive for the continued demand and advancement toward highly efficient gravity flow, pressurized, sprinkler irrigation systems. The development and piping of main-stem irrigation canals and laterals will provide the groundwork for the transition to sprinkler irrigation systems.

A guidance document was developed that outlines the steps, timeframes and appropriate action that needs to be taken in order to achieve successful program delivery. This guidance document included:

-A list of all producers applying IWM
-An initial field visit to establish baseline conditions
-IWM plan development

- Soil moisture levels
- Crops being produced and target consumptive use requirements
- Follow-up monitoring and recommendations for necessary adjustments
- Documentation of irrigation applications, frequency and adjustments in management to achieve improved efficiencies
- Certification based on documented measurable improvements in system operation efficiency.

The NRCS Mobile Irrigation Lab is a valuable tool in providing effective follow-up and monitoring for acquiring data in order to make effective recommendations for improvements in management. Additional training is needed for the newly employed IWM specialists to fully utilize the tools in the Lab, such as the salinity mapping and analysis, and the infiltrometers.

This resource was utilized more efficiently in 2011 through:

-Prioritizing those clients and monitoring needs that would have the greatest benefit from its use.
-Scheduling the Lab by the month to better benefit all areas of the basin.

M&E SUMMARY – WILDLIFE - 2011

Lower Gunnison Unit

Table 4 – Acres of Wildlife Habitat Applied

Habitat Type	Cumulative Acres 2010	Cumulative Acres 2011	Net Change for 2011
Upland	564.4	612.7	(+) 48.3
Wetland	242.9	264.5	(+) 21.6

Table 5 – Wetland Data

Cumulative acres impacted year 2010	Cumulative acres impacted year 2011	NET AREM Unit change 2010	Net AREM Unit change 2011	Net change for 2011
No New Data	No New Data	No New Data	No New Data	No New Data

Note: Due to workload and the desire to have the staff Biologists focusing on promoting, planning, and implementing wildlife habitat replacement projects with landowners, the active analysis and collection of wetland data was discontinued. This activity needs to be reconsidered, on some type of sample collection basis to assure the salinity control habitat replacement responsibilities are being met. See comments in the Discussion and Conclusion section.

Table 6 – Funding for Wildlife Replacement Habitat

% of total funds contracted on wildlife through 2010	% of total funds contracted for wildlife through 2011	% of total funds spent on wildlife through 2010	% of total funds spent on wildlife through 2011
4%	4%	2%	2%

Table 7 – Current Habitat Replacement Goals

Habitat Replacement	Acres
Salinity acres treated to date	61,124
Habitat mitigation goal @ 2% of salinity acres treated	1,222
Habitat replacement acres to date	877 /1
Remaining acres needed to meet habitat replacement goal	345

/1 **This does not include 20.8 acres of upland and 13.6 acres of wetland wildlife habitat applied through WHIP and WRP within the Lower Gunnison salinity area.**

WILDLIFE
2011 MONITORING & EVALUATION REPORT
LOWER GUNNISON UNIT

HISTORY

Salinity control work by Natural Resources Conservation Service (NRCS) has gone through 4 different phases during the duration of the Lower Gunnison project. The first was under the Colorado River Salinity Control program (CRSCP) from 1984-1995. Phase 2 was called the Interim Environmental Quality Incentives Program (I-EQIP), and was only for fiscal year 1996. The third phase, from 1997 through 2007 was funded through the EQIP Program which

included matching funds from the Bureau of Reclamation under what was called the Basin States Parallel Program (BSPP). The first three phases are covered by the same NEPA process and documents that report "**replacement of wildlife values foregone" and impacts to wildlife will be accounted using a value system**. NRCS chose to use the Habitat Evaluation Procedure (HEP) developed by the U.S. Fish and Wildlife Service for tracking "on farm" changes in wildlife habitat values. Six species models were chosen to represent different aspects of wildlife habitat in the unit that may be impacted by the project. Pheasant was chosen to represent habitat diversity, edge effect and edge habitat. Yellow warbler represents cottonwood-willow and other woody habitat associated with irrigation ditches and tail water. Mallard breeding habitat represents shallow wetlands and nesting habitat surrounding these wetlands. Mallard –winter habitat represents winter roosting areas (large water bodies and ice free water) and management of crop residues. Meadow vole represents sedge- rush wet meadows often associated with leaky ditches and inefficient irrigation. Marsh wren represents cattail- bulrush (robust emergent) wetlands and the screech owl is associated with groups of large deciduous trees. The models are custom models that underwent peer review and were developed explicitly for this project with the assistance of USFWS. Changes in wetland values are supposed to be tracked using the Avian Richness Evaluation Method (AREM) developed by Paul Adamus under contract with the Environmental Protection Agency (EPA). Refer to the 1994 Monitoring and Evaluation Plan for the Lower Gunnison Unit for details on monitoring methods used under the Colorado River Salinity Control Program.

The fourth phase from 2007 to present continues funding through EQIP and the re-defined Basin States Program (BSP/BSPP); however **habitat replacement goals are now at 2% of the irrigated acres treated for salinity,** rather than replacement of habitat values forgone using the Habitat Evaluation Procedure (HEP) as a habitat quality measurement. The U.S. Fish and Wildlife Service concurred with this decision to change habitat replacement tracking from habitat values to acres. It is estimated NRCS has reached approximately 55% of their salinity treatment goals, and 877.2 acres of wildlife habitat replacement have been applied and still exist. By the time 100% of NRCS's salinity treatment goals are achieved it is projected that approximately 1,222 acres[/1] of wildlife habitat replacement acres will be applied and still existing. A key issue with the U.S. Fish and Wildlife Service is that credited mitigation acres must be on the ground and functioning as habitat replacement when the salinity project is complete. Some loss of wildlife habitat will take place as operation and maintenance agreements expire and land uses change in the Valley. To account for the loss, it is likely NRCS will need to apply more habit replacement acres than the goaled amount. NRCS biologists will visit all habitat replacement projects every 3 years and adjust credited acres to what is actually on the ground and functioning. Acres lost for whatever reason will be removed from the credited replacement acres.

[/1]Depending on how many irrigated acres are ultimately treated for salinity control, it is estimated that the final habitat replacement goal will be between 1,400 and 2,600 acres.

METHODS

HEP is very labor intensive. Through 1995 habitat was evaluated and a HEP analysis was completed on more than 70% of all contracted acres before and after application of salinity control practices. Reductions in staff made this method unfeasible. To make the workload more manageable a statistical analysis of HEP data collected through 1998 was conducted to determine adequate sample size needed to calculate mean habitat suitability indexes (HSI) with

95% confidence the calculated mean is within + or - 0.1 of the real mean. HSI's are indexes ranging from 0 to 1.0 of the habitat value for selected wildlife species.

The indexes are calculated using measurements of various habitat variables that are identified in habitat models (See 1994 Lower Gunnison Unit Monitoring and Evaluation Plan for complete details of the HEP procedure used). In 1999 and 2000 additional data was collected, desired sample sizes were achieved, and mean HSI values were calculated. The mean HSI for species models for 6 wildlife species were calculated for 2 separate categories; operating units not applying wildlife practices and operating units applying wildlife. In 2003 the Colorado State Program Manager ordered all WHIP and WRP contracts that had been applied in the salinity area to be counted for habitat replacement. These contracts were entered into the spreadsheet as plans with wildlife and plans applying wildlife. These indexes were then multiplied with the average acres of habitat found on the operating units for each wildlife species to obtain Habitat Units Values (HUV's). To estimate project impacts HUV's were calculated both before and after project application. Analysis of data in 2001 indicated additional inventories are needed for yellow warbler and marsh wren to obtain the desired confidence levels. Those were completed this year and are included in the data analysis.

In 2004 and again in 2006, NRCS biologists reviewed results of the previous year's HEP analysis and discovered some errors in how conservation plans without wildlife practices were being compared to plans with wildlife practices. The errors in the spread sheet were rectified which resulted in large changes in Habitat Unit Values credited to the project. NRCS biologists looked at the new calculations with much scrutiny and determined the new calculation methods were the correct way to account for changes in Habitat Unit Values.

A spread sheet was developed to track additional information that may be useful in evaluating the project in reference to wildlife habitat and mitigation goals. Data such as wetland values, number of contracts planning and/or applying wildlife practices, acres of land managed for wildlife, and dollars spent on wildlife were recorded. The data was then analyzed to determine effectiveness of wildlife habitat replacement efforts.

Applications for financial assistance were awarded funding through ranking processes. The processes varied from 1996-2006 but incentives for applying wildlife habitat were included in all of them. In 1996 Interim-EQIP wildlife practices were prioritized the same as they were under the Colorado River Salinity Program. Under this system, applicants planning to apply wildlife practices received 3 to 5 extra points out of a possible 46. In 1997 ranking systems began to include cost-benefit computations and wildlife practices were given 2 extra points/acre not to exceed 10 total points. Wildlife practices are relatively expensive and with the cost benefit computations and 10 point maximum, many wildlife practices were not being funded. In an attempt to increase wildlife funding ranking points were increased in 1998, to 6 points/acre with a 30 point maximum for wetland habitat and 4 points/acre with a 20 point maximum for upland habitat. In 1999 the Montrose field office again increased points awarded for wildlife habitat development to 30 points/acre with a maximum of 150 points for either upland or wetland habitat. Delta created a sub fund of $37,800 to be spent only on wildlife habitat development. Wildlife applications were ranked using the system developed for the Wildlife Habitat Incentives Program. If money was left in the wildlife sub-fund it was transferred to salt control funds.

In 2000, Montrose used the same ranking they did in 1999. Sub-funds were no longer allowed in 2000 so Delta changed their ranking to 10 points/acre for upland or wetland habitat with a maximum of 50 points. Ranking procedures remained unchanged in 2003, but in 2004 a new ranking procedure using the habitat evaluation index change from existing condition to planned condition was used. Also in 2004, a separate EQIP fund for wildlife habitat projects in salinity areas was set up by the NRCS State Office.

In 2004, managers of the Basin States Program (BSP/BSPP) were approached to assist with funding wildlife projects to offset salinity project impacts. The forum that oversees the program agreed. Projects are selected through an RFP process. Proposals are ranked and selected by an inter-agency committee with representatives from the Colorado Division of Wildlife, U.S. Fish and Wildlife Service, Bureau of Reclamation, Colorado State Land Board, and NRCS. The committee also decides which Salinity Control Area (McElmo, Lower Gunnison or Grand Valley) will be credited with habitat replacement by these projects. Many of the BSP/BSPP projects are considerably larger than those funded through NRCS programs. The committee decided to not include large BSP/BSPP projects in the indexing system described above, but instead, add HUV's derived from these large projects directly to the HUV's calculated with the indexes. Prior to development of the RFP process, 3 wildlife projects were funded with the BSP/BSPP. An RFP was requested in the spring of 2004, 2007 and 2008. To date the BSP/BSPP program has funded 12 wildlife projects totaling $387,613.

In 2007 the method for crediting habitat replacement was changed from habitat values to acres (see history section). Databases and spreadsheets have been developed to track the data shown in the tables in the results sections. These are updated annually for this monitoring and evaluation report. Additionally, every 3 years an NRCS biologist will visit all habitat replacement acres to determine if they still exist and function as habitat acres. Acres that cease to exist and/or function as habitat acres will be subtracted from the credited acres.

RESULTS

CRSCP contracts are all now completed so there will be no further changes for those figures. The data totals for CRSCP does not include canceled contracts. The totals and percentages are for contract dollars actually obligated. Since 1985 the data indicates $1,969,189 which represents 4% of the total obligated funds ($45,884,335) in the Lower Gunnison Unit have been contracted for installing wildlife practices (Wildlife Summary Table 1). To date, approximately 49% of the wildlife funds and 2% of the total funds have been spent on wildlife. $966,092 of obligated wildlife money has not been spent to date due to practices deleted or not yet installed. All contracts are completed to date for contracts through 2001, and are complete in 2003. These years show real dollars spent and actual acres installed. For 2002 and from 2004 to present, less than 100% of contracts have been completed and represent planned cost-share dollars. Twenty-two percent of all contracts developed since 1989 have at least 1 wildlife practice planned for application and **16% have applied at least 1 wildlife practice** (Wildlife Summary Table 2).

Wildlife Summary Table 1: Money obligated and spent on wildlife practices.

OFFICE	YEAR	TOTAL CONTRACT DOLLARS	PLANNED WILDLIFE CONTRACT DOLLARS	APPLIED WILDLIFE CONTRACT DOLLARS	PERCENT PLANNED TO SPEND ON WILDLIFE	PERCENT OF WILDLIFE DOLLARS SPENT TO-DATE:	PERCENT OF TOTAL DOLLARS SPENT ON WILDLIFE TO-DATE
MONTROSE							
CRSCP	1989-1995*	$2,476,057	$318,193	$171,315	13%	54%	7%
IEQIP	1996*	$718,898	$45,536	$33,922	6%	74%	5%
EQIP	1997*	$460,390	$9,825	$3,988	2%	41%	1%
	1998*	$419,012	$5,051	$3,411	1%	68%	1%
	1999*	$306,934	$18,400	$13,132	6%	71%	4%
	2000*	$270,760	$34,557	$18,748	13%	54%	7%
	2001*	$431,425	$43,268	$29,205	10%	67%	7%
	2002	$696,547	$59,228	$23,901	9%	40%	3%
	2003*	$1,732,471	$15,822	$12,856	1%	81%	1%
	2004	$2,133,306	$100,621	$48,793	5%	48%	2%
	2005	$1,629,024	$44,621	$18,545	3%	42%	1%
	2006	$1,261,432	$7,050	$5,601	1%	79%	0%
	2007	$792,335	$53,130	$12,231	7%	23%	2%
	2008	$856,734	$0	$0	0%	#DIV/0!	0%
	2009	$1,429,563	$76,363	$6,000	5%	8%	0%
	2010	$1,134,874	$142,487	$4,000	13%	3%	0%
	2011	$950,603	$53,878		6%		
BSP/BSPP	1997-2011	$1,626,316	$156,834	$58,903	10%	38%	4%
	SUBTOTAL	$19,326,681	$1,184,864	$464,551	6%	39%	2%
DELTA							
CRSCP	1984-1995*	$7,057,848	$195,289	$128,354	2.8%	66%	1.8%
IEQIP	1996*	$719,698	$23,701	$5,734	3.3%	24%	0.8%
EQIP	1997*	$159,132	$0	$0	0.0%	#DIV/0!	0.0%
	1998*	$147,205	$2,997	$456	2.0%	15%	0.3%
	1999*	$611,404	$75,509	$61,129	12.4%	81%	10.0%
	2000*	$361,383	$1,254	$672	0.3%	54%	0.2%
	2001*	$355,737	$0	$0	0.0%	#DIV/0!	0.0%
	2002*	$698,657	$25	$0	0.0%	0%	0.0%
	2003*	$1,497,366	$28,976	$40,414	1.9%	139%	2.7%
	2004*	$1,914,619	$10,925	$10,752	0.6%	98%	0.6%
	2005	$1,677,526	$4,663	$4,056	0.3%	87%	0.2%
	2006	$2,345,609	$2,775	$1,258	0.1%	45%	0.1%
	2007	$1,420,058	$109,306	$25,745	7.7%	24%	1.8%
	2008	$1,093,680	$66,619	$30,553	6.1%	46%	2.8%
	2009	$1,327,538	$4,465	$3,448	0.3%	77%	0.3%
	2010	$738,432	$0	$0	0.0%	#DIV/0!	0.0%
	2011	$1,037,281	$27,043	$0	2.6%	0%	0.0%
BSP/BSPP	1997-2011	$3,394,481	$230,779	$188,972	6.8%	82%	5.6%
	SUBTOTAL	$26,557,654	$784,325	$501,541	3.0%	64%	1.9%
	GRAND TOTAL	**$45,884,335**	**$1,969,189**	**$966,092**	**4%**	**49%**	**2%**

* Indicates 100% of contracts have been completed for that year. As a result, total contract dollars reflects actual dollars spent. Program years that do not have an * have less than 100% of contracts complete, therefore total contract dollars reflects contract dollars planned.

Wildlife Summary Table 2: Number and percent of contracts planning and/or applying wildlife practices.

OFFICE	YEAR	TOTAL # OF CONTRACTS	# OF CONTRACTS WITH PLANNED WILDLIFE PRACTICES	PERCENT CONTRACTS WITH PLANNED WILDLIFE PRACTICES	# OF CONTRACTS WITH APPLIED WILDLIFE PRACTICES	PERCENT OF WILDLIFE CONTRACTS WITH APPLIED WILDLIFE PRACTICES	PERCENT OF ALL CONTRACTS THAT HAVE APPLIED WILDLIFE PRACTICES
MONTROSE							
CRSCP	1989-1995	78	64	82%	59	92%	76%
IEQIP	1996	35	31	89%	25	81%	71%
EQIP	1997	63	13	21%	8	62%	13%
	1998	38	7	18%	4	57%	11%
	1999	22	6	27%	5	83%	23%
	2000	26	16	62%	9	56%	35%
	2001	24	17	71%	12	71%	50%
	2002	39	10	26%	7	70%	18%
	2003	15	4	27%	3	75%	20%
	2004	57	5	9%	5	100%	9%
	2005	44	4	9%	4	100%	9%
	2006	42	1	2%	1	100%	2%
	2007	17	2	12%	2	100%	12%
	2008	27	0	0%	0	0%	0%
	2009	27	2	7%	2	100%	7%
	2010	20	2	10%	2	100%	10%
	2011	25	3	12%	1	33%	4%
BSP/BSPP	1997-2011	69	8	12%	6	75%	9%
	SUBTOTAL	668	195	29%	155	79%	23%
DELTA							
CRSCP	1985-1995	180	59	33%	27	46%	15%
IEQIP	1996	26	8	31%	4	50%	15%
EQIP	1997	23	2	9%	0	0%	0%
	1998	7	1	14%	1	100%	14%
	1999	38	9	24%	8	89%	21%
	2000	18	1	6%	1	100%	6%
	2001	17	0	0%	0	0%	0%
	2002	28	1	4%	0	0%	0%
	2003	20	4	20%	4	100%	20%
	2004	58	2	3%	2	100%	3%
	2005	33	1	3%	1	100%	3%
	2006	36	1	3%	1	100%	3%
	2007	20	1	5%	1	100%	5%
	2008	22	2	9%	1	50%	5%
	2009	19	1	5%	0	0%	0%
	2010	12	0	0%	0	0%	0%
	2011	14	1	7%	0	0%	0%
BSP/BSPP	1997-2011	76	4	5%	3	75%	4%
	SUBTOTAL	647	98	15%	54	55%	8%
	GRAND TOTAL	**1315**	**293**	**22%**	**209**	**71%**	**16%**

Wildlife Summary Table 3 outlines the acres of habitat management planned and applied. Approximately 460.2 acres of wetland habitat and 1346.5 acres of upland habitat have planned

management practices. Habitat management practices have been applied to 264.5 acres of wetland and 612.7 acres of upland habitat. To date, 57% of planned wetland management and 46% of planned upland management practices have been applied. There were no reported wetland impacts positive or negative.

Wildlife SummaryTable 3. Acres of wildlife habitat management planned and applied and wetland impacts.

OFFICE	YEAR	ACRES OF WETLAND HABITAT PLANNED	ACRES OF WETLAND HABITAT APPLIED	% OF PLANNED WETLAND ACRES APPLIED	ACRES OF UPLAND HABITAT PLANNED	ACRES OF UPLAND HABITAT APPLIED	% OF PLANNED UPLAND ACRES APPLIED	ACRES OF WETLANDS IMPACTED	WETLAND VALUE BEFORE	WETLAND VALUE AFTER
MONTROSE										
CRSCP	1989-1995	129.8	97.4	75%	180	108.9	61%	No Data	No Data	No Data
IEQIP	1996	17.5	12.9	74%	29.2	23.2	79%			
EQIP	1997	14.1	13.1	93%	31.5	27.3	87%			
	1998	3.5	1.5	43%	4.4	3.2	73%			
	1999	16.1	12.5	78%	6	5.8	97%			
	2000	10.8	9	83%	41.6	16.6	40%			
	2001	7.2	6.8	94%	48.9	39.9	82%			
	2002	7.2	3.3	46%	13.3	12	90%			
	2003	9.7	2	21%	13	13.5	104%			
	2004	15	11.3	75%	92.2	65.1	71%			
	2005	8.5	5.5	65%	43.5	40.9	94%			
	2006	0	1	0%	15.8	14.8	94%			
	2007	2	0.5	25%	26.9	19.8	74%			
	2008	0	0	0%	0	0	0%			
	2009	0	0	0%	114.2	0	0%			
	2010	7	0	0%	57.6	0	0%			
	2011	6.3	0	0%	23.4	0	0%			
BSP/BSPP	1997-2011	37.9	27.1	72%	77.9	48.4	62%			
	SUB TOTAL	292.6	203.9	70%	819.4	439.4	54%	No Data	No Data	No Data
DELTA										
CRSCP	1985-1995	70.5	29.1	41%	136.2	35.3	26%	No Data	No Data	No Data
IEQIP	1996	21.0	7.0	33%	61.2	8.5	14%			
EQIP	1997	15.7	0.0	0%	66.7	0.0	0%			
	1998	5.4	0.0	0%	15.8	4.2	27%			
	1999	8.5	3.0	35%	26	5.7	22%			
	2000	0.0	0.0	0%	11.2	0.0	0%			
	2001	0.0	0.0	0%	0	0.0	0%			
	2002	0.5	0.0	0%	2.5	0.0	0%			
	2003	2.0	1.5	75%	35.7	25.2	71%			
	2004	3.9	2.0	51%	1.8	6.3	350%			
	2005	0.0	0.0	0%	0.5	0.1	20%			
	2006	0.0	0.0	0%	1.3	1.3	100%			
	2007	7.0	0.0	0%	36.9	16.3	44%			
	2008	4.1	2.9	71%	20.5	12.3	60%			
	2009	0.0	0.0	#DIV/0!	2.3	0.3	13%			
	2010	0.0	0.0	#DIV/0!	0	0.0	#DIV/0!			
	2011	1.4	0.0	0%	1.7	0.0	0%			
BSP/BSPP	1997-2011	27.6	15.1	55%	106.8	57.8	54%			
	SUB TOTAL	167.6	60.6	36%	527.1	173.3	33%	No Data	No Data	No Data
	GRAND TOTAL	**460.2**	**264.5**	**57%**	**1346.5**	**612.7**	**46%**	**No Data**	**No Data**	**No Data**

DISCUSSION AND CONCLUSION

The habitat replacement goal is 2% of the acres treated for salinity. To date 61,124 acres have been treated with salinity practices. To be concurrent with project application, 1,222.5 acres of habitat replacement should currently be on the ground and functioning. To date 877.2 acres of habitat replacement are applied on the ground and functioning. The project is currently at approximately 72% of the concurrent habitat replacement goals. In 2007 NRCS biologist field checked all acres that had been reported as habitat replacement. The inventory resulted in a reduction of acres considered habitat replacement from 776 acres in 2006 to 684.4 acres in 2007. Urban development, changes in management and changes in land ownership are major reasons that some acres no longer met habitat replacement criteria and were removed from the accounting system. In 2011, 32.8 acres of habitat replacement was planned and 69.9 acres were applied. There were 8 contracts cancelled, of which 1 had wildlife practices planned.

NRCS is currently 376.2 acres below concurrent habitat replacement goals. To be concurrent with salinity project implementation, NRCS will need to continue to place higher priority on habitat replacement. Acres of habitat management and impacts to wetlands have also been tracked previously as indicators of impacts. However, new wetland data has not been collected and efforts to resume this tracking responsibility need to be considered and addressed by management.