MONITORING & EVALUATION REPORT--2007
MCELMO CREEK UNIT
COLORADO RIVER SALINITY CONTROL PROJECT
USDA-NRCS

IWM MONITORING & EVALUATION REPORT
Joel Lee, Planning Team Leader
Larry Kawanabe, IWM Specialist
Mike Rich, District Conservationist

WILDLIFE MONITORING & EVALUATION
Bob Fuller,Wildlife Biologist

M&E EXECUTIVE SUMMARY
HYDROSALINITY

Project: McElmo Creek

- The project plan is to treat **21,550** acres with improved irrigation systems.

- To date, **11,172** acres have improved irrigation systems planned/applied.

- The project plan is to reduce salt loading to the Colorado River system by **46,400** tons of salt.

- In FY 2007, salt loading has been reduced by **1,999** tons/year.

The cumulative salt load reduction is **24,233** tons/year.

Cost effectiveness –

- The ***planned*** cost per ton of salt saved with prior year contracts is **$78.92/ton**. This is based on the following formula:

FA + TA = Total Cost X Amortization Factor = Total amortized cost
Total amortized cost divided by total annual tons salt saved = Cost/Ton

FA is total dollars obligated in EQIP & Parallel Program (including wildlife).
TA is 67% of the FA (This number includes education and monitoring).
Amortization factor for 2007 is **.07007**

Hydro Salinity Monitoring & Evaluation Summary

2007

- Irrigation Systems Applied Acres
  Acres Treat in 2007 = **611 Acres**
  Program totals = **4,647 Acres**

- Irrigation water conveyance delivery/ gated pipe
  Acres treated in 2007 = **401 Acres**
  Program Totals **= 1,868 Acres**
  Average Efficiency = **50%**

- Sprinkler & Drip irrigation systems installed= **210 Acres**
  (Includes Linear, Center Pivot, Side Roll, & Big Gun)
  Acres treated in 2007 = **210 Acres**
  Program Totals = **2,779 Acres**
  Average Efficiency = **75%**

- **Overall Average systems efficiency**
  In 2007 = **59%**
  Cumulative = **65%**

MCELMO CREEK IRRIGATION MONITORING & EVALUATION
2007 REPORT
USDA & NRCS

Introduction

For numerous years, the Natural Resources Conservation Service (NRCS) has been applying improved irrigation systems and practices with cooperators in the McElmo Creek Salinity Control Area. This has occurred through the Colorado River Salinity Control Program including both Environmental Quality Incentives Program (EQIP) and Basin States Parallel Program Funding. All EQIP and Basin applications undergo a ranking process that yields the most cost-effective projects on cost per ton of salt saved. Monitoring and evaluation of the salinity levels has been critical to implementing and maintaining these programs. The McElmo Creek Monitoring & Evaluation Plan was established in August 1988 and revised April 1994. Monitoring of on-farm hydro-salinity was continued for five years from 1995-1999. Monitoring was suspended in 2000 because it was determined that the values were redundant from the previous five years. A revised hydro-salinity, monitoring plan was implemented in 2002. This plan included monitoring 2 sites per year and completing 20 interviews of participants to see how their irrigation systems were working.

The majority of the improved irrigation in the Cortez-Montezuma County (McElmo Creek) area is characterized by side-roll move sprinklers on gently rolling, wind-blown loess soils. The intake rates of the soils are generally medium to high. Previous irrigation was by very inefficient surface flow over the same soils. By converting the surface flow irrigation to side-roll irrigation, the efficiencies have been greatly increased. Hence, the deep percolation losses of water have been greatly lessened. It is anticipated that the trend of moving from flood irrigation to sprinkler irrigation will continue. This is primarily due to the increased development in the area. Large water rights and land parcels are being sold and split into multiple small ownerships. This division makes the large volume required for flood systems infeasible.

2007 Activities

Several activities were undertaken in 2007 to improve salinity management. The largest emphasis was placed on irrigation water management. In 2007 66 IWM plans where written on 611 acres of pasture and hayland and 858 acres if IWM was applied. The IWM specialist held 5 half day classes where the fundamentals of IWM where taught. These classes also include some hands on teachings on how to test for soil moisture. A stronger effort was put forth to provide on farm one on one training of IWM. This included

multiple pivot evaluations to ensure that systems were nozzled correctly and being operated at the correct speed for optimal efficiency.

Other activities included outreach to educate people about the salinity program and its benefits. Some of the activities included displays at the Four Corners Ag Expo, newspaper articles, and radio announcements. Work was also done with the local conservation districts and irrigation water districts to encourage large canals and ditches to consider converting to pipeline systems to reduce seepage and improve efficiency.

Future IWM Goals & Recommendations & Tasks

1. Future monitoring efforts should focus on the conversion of large agricultural tracts into smaller tracts to monitor the effects the change in land use has had on Salinity. Future monitoring efforts should also focus on maturing irrigation conservation practices to address their declining Irrigation efficiencies. This should include the investigation of cost-share methods to help producers adapt their existing systems to the new technologies, to bring these systems up to new NRCS Irrigation standards.
2. It is recommended that the Irrigation Water Management Specialists continue to provide assistance to the landowners during the **First season of use**, for the improved irrigation systems installed under the Salinity Program.
3. It is also recommended that the IWM Specialist use a random selection process to follow up with a representative sample of all the systems installed and funded by the Salinity Program. This random sampling will help evaluate the current efficiency and the operation and the maintenance of the designed irrigation systems.
4. The remaining time of the IWM Specialists should be spent assisting landowners whom are requesting a higher level of irrigation water management and technical assistance. Technical assistance can be provided, through workshops, field days, tours, news & media events and technical references.
5. It is also recommended that the IWM Specialists attend the necessary training to keep up to date on the new irrigation systems and technology.
6. The Goal of IWM program is to provide the necessary assistance and information to help the Salinity Program achieve the level of

salinity reduction above what the program originally planned for. This IWM activity will provide the lacking and much needed follow up assistance and public relations, with the landowners to help them maximize their irrigation efficiencies and over-all success.

7. Utilizing and partnering with other skilled professionals like the CSU Extension, Irrigation Suppliers, Conservation District Boards, and Irrigation Districts can accelerate the Success of the IWM Program and its acceptance.

2008 OUTLOOK

Several major endeavors are being planned or implemented in 2008. The conversion of a large supply canal, the May Lateral, to a piped system is currently underway. It is anticipated that the pipeline will aid tremendously in increasing the amount of on farm projects. It is anticipated that there will be a large amount of conversion from flood to sprinkler irrigation because the pressure generated from the pipeline will allow sprinklers to function without the added cost of pumping.
A second large canal, the Lone Pine, is being considered for conversion to pipeline as well. The planning process is in the preliminary stages but it is anticipated that this project will also result in many new on farm contracts being developed.

Continued improvement of the IWM program offered by the NRCS is planned. It is anticipated that the new mobile irrigation labs might be able to be utilized to increase irrigation knowledge and effectiveness in the area. It is also anticipated that more one on one attention will be given to educating landowners. More comprehensive field by field assessment of existing conditions and planned crops will be conducted by IWM Specialists prior to irrigation season. The mobile irrigation lab and other new tools will allow documentation of soil infiltration rates under sprinkler irrigation with consideration of current field status of tillage, crop residue, and available water holding capacity of soil profile will be accomplished by means of an infiltrometer. Increased accuracy of surface irrigation systems will result from flow metering devices. Monitoring of salinity issues will now be available to the area to identify and target control problem areas. Special emphasis is planned for areas in McElmo Canyon where potential salt problems are higher. Efforts are also underway with the cooperation of the local conservation districts to obtain an automated weather station to provide

a local and more accurate source of ET data for agricultural producers to use when scheduling their irrigations. All of this equipment will also afford the chance to offer services and data never available to the area before.

Monitoring of projects in O&M phase of contracts will be expanded. Especially with the trend of sub-dividing old large farms and ranches into "ranch-etts", IWM assistance will be critical to maintaining good water management to ensure water quantity and quality for all users.

Part 2. M&E EXECUTIVE SUMMARY- McElmo WILDLIFE

HEP/HSI Data involving accomplishments made by I-EQIP, EQIP, WHIP and parallel program
1996-2007

Species	**Cumulative HUV's 2006**	**Cumulative HUV's 2007**	**Net Change for 2007**
	(Applied)	(Applied)	
Pheasant	- 471.00	- 493.03	- 22.03
Mallard Winter	+ 134.84	+ 140.28	+ 5.44
Mallard Breeding	-1182.93	-1236.73	- 53.80
Yellow Warbler	- 24.59	- 25.68	- 01.09
Meadow Vole	- 139.67	- 146.20	-06.53
Marsh Wren	+ 112.79	+ 117.17	+04.38
Screech Owl	- 102.73	- 104.69	-01.96
Snipe	+ 21.14	+ 22.08	+00.94

Acres of Wildlife Habitat Applied 2007

	Cumulative acres 2006	Cumulative acres 2007	Net change for 2007
Upland	**736.40**	**736.0**	**0.00**
Wetland	**359.09**	**359.09**	**0.00**

Wetland Data 2007

Cumulative acres impacted year 2005	Cumulative acres impacted year 2006	Net AREM Unit change 2005	Net AREM Unit change 2006	Net change for 2006
161.79	**163.83**	**+6.38**	**-0.45**	**+5.93**

Funding for Wildlife Habitat 2007

% of total funds spent on wildlife through	% of total funds spent on wildlife through

2005	2006
2.2%	**2.0%**

The McElmo Unit did not show any significant changes in habitat values gained or lost as no wildlife practices were installed. Little interest in enhancing or developing habitat has been shown in this unit for several years. We did pick up four FY2007 wildlife contracts totaling $71,979.00 which will improve 152 acres of upland habitat, 21 acres of wetland habitat and 31 acres of riparian habitat. These are in the process of being implemented at this time so they do not appear in this data base.

Projected HSI values have remained consistent with past years. The positive values appear to reflect the enhancement and creation of several large wetland areas and the construction of many ponds in the earlier years of the program. The negative values tend to reflect the loss of ditch bank cover and the intensive management of irrigated cropland associated with improved irrigation systems and management strategies to increase production. The large loss to mallard breeding is still a mystery and that value should probably be dropped in the future.

M&E REPORT, WILDLIFE

HISTORY

PROJECT SETTING

The McElmo Creek Unit, known locally as the Montezuma Valley, is in the southwest corner of Colorado within Montezuma County. The City of Cortez, centrally located in the project area, is at an elevation of 6200 feet above mean sea level. The McElmo Creek watershed originates in the lower foothills of the LaPlata Mountains to the East. Its north boundary is the Dolores River Canyon Rim and the South by Mesa Verde and the Ute Mountain to the Southwest. McElmo Creek is a tributary to the San Juan River.

The McElmo Creek basin, having a limited watershed area, is a relatively dry basin under natural conditions. Montezuma Valley Irrigation Company (MVIC), the major user and distributor of irrigation water, diverts approximately 116,000 acre feet of Dolores River water annually (1957-1973 data) into the Montezuma Valley. Diverting water from McPhee reservoir on the Dolores River through a tunnel and extensive canal system, MVIC presently distributes water to approximately 29,000 acres. Return flows from irrigation and municipal discharges constitute most of the continuous channel flow in McElmo creek.

Mancos Shale underlies much of the Montezuma Valley. This shale is of marine origin with a high salt content, and provides the main salt source for the return flow into McElmo Creek. Excessive irrigation and seepage from delivery systems cause deep percolation. This water dissolves salts, which move downward until they reach McElmo Creek, then the San Juan River, and finally the Colorado River.

The farmland elevation ranges from 5,800 to 7,000 feet. The annual precipitation is nearly 12 inches, including snowfall.

METHODS

The Habitat Evaluation Procedures (HEP) were used on six alternative plans including future without. An interagency team determined the change of Habitat Unit Values (HUV) for all the alternatives. Eight wildlife species models were used, representative of the ten prevalent cover types in the study area (see list below).

SPECIES

- marsh wren
- mallard-winter
- mallard-breeding
- ring-necked pheasant
- great-horned owl
- yellow warbler
- meadow vole
- common snipe.

COVERTYPES

- Cropland (AC)
- Annual Herbland (ANNHERB)
- Perennial Herbland (PERHERB)
- Woodland (WOODY)
- Pasture and Hayland (AP)
- Native Rangeland (SSSB)
- Orchards and Vineyards (AO)
- Palustrine Emergent Wetlands (PEM)
- Streams, Rivers and Canals (RIVERSn)
- Lakes, Ponds and Reservoirs (LAKESn)

NRCS also conducted a wetland inventory between 1979 and 1980. These wetlands were mapped, classified according to Circular 39 and the Cowardin System for Classification of Wetlands and Deepwater Habitats, and given a wildlife value rating using a system developed by Francis Golet (which gives wetlands a numerical value). This system rates factors such as water regime, wetland class richness, size and juxtaposition.

AVIAN RICHNESS EVALUATION PROCEDURES (AREM)

Paul R. Adamus developed this evaluation method 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).

In 1994 the State of Colorado Natural Resources Conservation Service decided to adopt AREM for evaluating wetland impacts in the McElmo Creek, Lower Gunnison and Grand Valley salinity control units.

Evaluation of all McElmo Creek salinity contracts used this method.

Values were obtained by averaging the "six habitat scores weighted by species," multiplied by .01, and then multiplied by the acres to obtain unit values. Approximately 103.8 net wetland acres of the 615 acres projected in the EIS have been lost. Through creation of new and enhancement of existing wetlands we have perceived a net gain of 22.4 value points.

HABITAT EVALUATION PROCEDURES (HEP)

Since 1997, we have discontinued wildlife tracking and monitoring measures as outlined for the salinity program. In 1999, due to increased workloads and a 75% reduction in staff, we chose to track cost-share, acres and wildlife practices for EQIP salinity. A statistical analysis of HEP data (collected through 1998) was conducted to determine adequate sample size needed to calculate mean habitat suitability indices (HSI) with 95% confidence. The calculated mean is within + or -.1 of the real mean. Data from 1999 and 2001 was also collected, desired sample sizes were achieved, and mean HSI values calculated for each wildlife species (for contracts with and without wildlife practices). Habitat Unit Values (HUV's) were then calculated by multiplying HSI's by HUV's, to estimate project impacts.

WILDLIFE PRACTICES

Wildlife practices implemented to improve or develop upland and wetland wildlife habitat have changed over the years, mainly to reflect certain constraints and NRCS priorities (as well as those of the various agencies charged with oversight). We have eliminated the practice of pothole blasting in wetlands due to the continued encroachment of dwellings and the limited effectiveness. Pond construction has been limited by the Division of Water Resources permitting process and the limited values achieved by the practice. If shallow water is designed into the practice it becomes more effective. But the permitting process also limits shallow water construction. Management practices such as rotational grazing, setting aside alfalfa for nesting and small grain for food are not popular practices in the area.

The following practices are used effectively within the study area:

- Grass/legume cover plantings for upland nesting and roosting
- Shallow water developments for waterfowl and shorebird feeding and resting
- Tree and shrub plantings for upland wildlife nesting, roosting and food
- Fencing to exclude livestock grazing either permanently or during critical use periods
- Bioengineering practices to improve or protect riparian habitat
- Occasional development of irrigation to improve forage quality for wildlife
- Brush management to enhance under story in pinon/juniper stands.

1990-1996

The following four tables summarize the data tracked from one hundred and three (1990 through 1996) contracts. All contracts have been applied and these figures represent our best assessment of impacts.

Table 1

1990-1996 Wetland Impacts
(Acres/Values)

Type	Existing		Applied		Change	
	Acres	Value	Acres	Value	Acres	Value
1	5.08	0.84	2.30	.54	-2.78	-.30
2	203.76	82.60	112.7	76.41	-91.10	-6.20
3	106.3	47.94	106.9	72.81	+.57	+24.87
4	10.80	5.95	9.30	7.95	-1.50	+.20
5	10.40	8.35	28.50	16.19	+10.10	+7.84
6	46.85	19.68	41.49	19.48	- 5.36	-.20
9	24.20	4.73	11.20	.87	-13.70	-3.86

Table 2

1990-1996 Cover Type Changes (Acres)

Cover	Exist	Apply	Change
AC	.00	109.97	+109.97
ANNHERB	327.90	189.70	-138.20
AP	2963.50	3118.3	+154.80
LAKESn	25.80	37.10	+11.30
PEM	375.20	259.60	-115.60
PERHERB	146.50	198.20	+51.70
SSSB	172.60	115.3	-57.30
WOODY	299.40	275.90	-23.50
AO	12.30	9.70	- 2.60

Table 3

1990-1996 HUV Summary (Values)

Species	Existing	Applied	Change
Pheasant	3585.50	3484.70	- 99.80
Warbler	51.33	43.21	- 8.12
Mallard	4074.00	4552.40	+478.40
Breeding			
Mallard	6.6	97.75	+ 91.15
Winter			
Vole	873.40	866.93	- 6.47
Wren	101.73	143.75	+ 42.02
Owl	3235.43	2956.68	- 278.75
Snipe	326.33	259.43	- 66.90

Table 4
(Replacement Summary-Applied 1990-1996)

Practices	Planned	Applied
Cover Plantings	74.9 ac	36.68 ac
Fencing	85,465 ft	53,785 ft
Pipelines	538 ft	507 ft
Tree/shrub Plantings	18.22 ac	8.86 ac
Sprinklers	240 ft	160 ft
Wildlife Upland Habitat Management	277.84 ac	152.9 ac
Shallow Water Development (includes Ponds)	18.43 ac	15.94 ac
Potholes	42	25
Wildlife Wetland Habitat Management	294.74 ac	297.3ac

1996-1997

Since 1997 we have discontinued wildlife tracking and monitoring measures as outlined for the salinity program. Currently we are tracking cost-share, acres and wildlife practices planned and applied. WHIP planning efforts within the priority unit were also recorded. The following table reflects wildlife habitat planning and application activity between 1996 and 2007 under Interim-EQIP, EQIP, WHIP and the Basin States Parallel Program.

Table 5

1996-2007: 282 contracts, $6,388,176.00 obligated, $214,669.00 obligated for wildlife

	ft.	ac.	ac.	ft.	ac.	ac.	ft.	no.	ac.	ac.	ac.
	Gated Pipe	Brush Mgt.	burn	fence	cover plantings	Shrub Plantings	Pipe lines	pond	grazing mgt.	upland mgt.	wetland mgt.
Planned	7354	5	20	18419	169.26	6.55	11918	9	240.2	540.9	143.8
Applied	3074	5	5	8350	105.1	5.23	8678	6	156.7	397.9	61.79

The following table is a compilation of long term impacts (Using the Avian Richness Evaluation Method) to wetlands associated with salinity control measures, including wetland habitat creation or enhancement, occurring between 1996 and 2007. Overall impacts have been positive. Protection and enhancement of larger riparian areas along stream corridors is beginning to gain popularity. This focus will hopefully allow us to compensate for losses from large canal piping projects which we are now embarking on.

Table 6

					AREM-1997-2006				
AREM WETLAND SCORES FOR EQIP PRIORITY APPLIED CONTRACTS						**CONTRACTS NOT APPLIED**			
NAME	ACRES	EXISTING	APPLIED	NET CHANGE	WETLAND TYPE	NAME	ACRES	EXISTING	WETLAND TYPE
Drew	4	1.66	3.88	2.22	LAC/PEM Complex	Bilger	30.7	6.18	PEM
Hinman	2	0.25	0.69	0.44	LAC/PEM Complex	Garratt	2.3	4.26	PEM/PSS
Vieira	2		1.7	1.7	LAC	May	12.7	13.0	PEM/PSS
Schroeder	1		1.2	1.2	LAC	Holmgren	4.1	3.79	PSS
McAfee	1.5	0.16	0.87	0.71	LAC/PEM Complex	Fury	30.6	55.83	PSS
Jones	0.5		0.13	0.13	LAC	Berdzar	1.8	2.57	PEM/PSS
Moise	2.9	0.69	0.95	0.26	LAC/PEM Complex				
	2.1	1.95	2.59	0.64	LAC/PEM Complex				
C.Bauer	1.7	0.905	1.09	0.185	LAC				
	0.2	0.128	0.128	0	PEM				
Denny	15	10.19	10.74	0.55	LAC/PEM Complex				
Battlerock	1	0.19	0	-0.19	PEM				
Reimers	4.2	2.1	2.1	0	PEM/LAC Complex				
Forth	0.54	0.068	0	-0.068	PEM				
Thomas	4.99	8.82	10.95	2.13	PEM				
Hill	0.25	0.267	0.267	0	PEM/LAC Complex				
Millard	1.4	0.18	0	-0.18	PEM				
Thomas	26.6	52.14	56.59	4.45	PEM/LAC Complex				
Steves	.8	.025	0	-.025	PEM				
Sattley	2.04	.45	0	-.45	PSS				
				0					
				0					
				0					
				0					
				0					
Total				13727					

DISCUSSION & CONCLUSION:

Plans for 2007 included 4 for wildlife accounting for 6% of funds ($71,979.00) obligated under Salinity. Approximately 151 acres of upland habitat, 21 acres of wetland habitat and 31 acres of riparian/river bottom will be developed or enhanced.

We are beginning to see an increased interest in developing and enhancing habitat for wildlife. This may be due to more individuals moving into the area that are interested in wildlife specifically or the increased costs of farming and ranching making it less profitable on smaller acreages. The popularity of conservation easements through our local land conservancy may also be stimulating an interest in improving habitat. Between both the McElmo and the Mancos units we are seeing a greater enthusiasm for the protection and enhancement of riparian areas along major stream and river corridors. For the McElmo Unit this includes over 1.25 miles of McElmo Creek fenced to exclude grazing.

Right now our level of replacement is adequate if we continue to fund and implement wildlife contracts at 2007 levels and if we can offset some of losses in the McElmo Unit with some of the gains in the Mancos Unit. We will also need to target larger or greater numbers of projects in the future that focus on wildlife habitat if we continue to fund more large canals under salinity. The losses to habitat on these types of projects are going to be far more significant than any of the losses from on-farm.

Since data collection and formatting for M&E Reports has been changed several times since 1990, overall interpretation has never been consistent between the two time periods (1990-1996, 1997-2007) nor between the three salinity units. With implementation of the “Lower Gunnison” format for data presentation and interpretation we will need to spend more time this year compiling and synthesizing our data so it resembles that format. This will allow us to be consistent with their reporting format in the future. The possibility of tracking acreage of habitat replacement in the McElmo unit rather than a combination of HUVs (now statistically derived) and acres would make the data more tangible in the long run.