

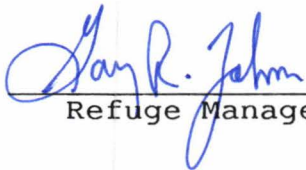
REVIEW AND APPROVALS

MERCED NATIONAL WILDLIFE REFUGE

Los Banos, California

ANNUAL NARRATIVE REPORT

Calendar Year 1992



Refuge Manager

9/13/93

Date

Associate Manager Review

Date

Assistant Regional Director Approval

Date

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(Inside Back Cover)



## INTRODUCTION

The Merced National Wildlife Refuge (NWR) consists of 4,155 acres and is located in Merced County, northern San Joaquin Valley, California. The original 2,562 acre Merced NWR was established in 1951 with Lea Act funds for a three-fold purpose:

1. To aid in the alleviation of agricultural crop depredation by waterfowl;
2. To provide waterfowl habitat as a substitute for habitat lost due to agricultural development, flood control drainage, and water diversion projects;
3. To provide wildlife oriented recreation and public hunting where compatible with the above objectives.

Six hundred-thirty six acres were purchased in 1990 using Wetlands Loan Act funds. An additional 948 acres were acquired by the Nature Conservancy in 1991 and were transferred to the Service early in April of 1992 (section C.1).

Merced NWR, and the surrounding "Grasslands" area of Merced County, are critically important to wintering waterfowl. Merced Refuge attracts large concentrations of ducks (mainly pintails and mallards), geese (mostly snow and Ross'), and lesser sandhill cranes. Approximately 60% of the Pacific Flyway migratory waterfowl population winters in the Central Valley of California. At one time, the Central Valley had 5 million acres of wetlands. Intensive agricultural and water control development has reduced that total to approximately 300,000 acres, or 6% of the original wetland acreage. Decreasing habitat has concentrated waterfowl, diminished winter food supplies, caused higher disease losses, and is largely responsible for the present decline in some waterfowl populations.

A. HIGHLIGHTS

The Service acquires the remaining 956 acres of the 1,592 acre Reininghaus Ranch (section C.1).

The wetland management program is expanded to 821 acres (section F.2).

Average water use and cost for the wetland management program drop to 10.4 acre-feet of water and \$126.50 per acre respectively (section F.2).

The cooperative farming program is expanded to 772 acres (section F.4).

A June wildfire destroys 215 acres of cropland, upland, and riparian habitat (section F.9).

425 acres were successfully burned during the year (section F.9).

Facilities were upgraded during the year to appropriate waters from Deadman Creek (section F.11).

Waterfowl use days increase 33% over 1991 (section G.3), while sandhill crane numbers climbed to 11,500 (section G.4).

Seven deep wells were rehabilitated during the year (section I.2).

Purchase of a new plowdisc, road grader, welder and corrugator occurred during the year (section I.4).

B. CLIMATIC CONDITIONS

Although California did experience its sixth consecutive year of drought, conditions locally were not quite so bleak. Rainfall during the January through March period totalled 6.62 inches, or 143% of normal. Precipitation during this critical period sets the stage for the rest of the year in terms of annual grass germination/production and whether or not the vernal pools will fill. As a result of this abundant rainfall, grass production was excellent and for the first time since 1986.

The high temperature for the year (108°F) was recorded in August with the low temperature (64°F) occurring in January. Table 1 summarizes climatic conditions for the year, recorded in Los Banos, 12 miles southwest of Merced NWR.

Table 1. Climatic Conditions for 1992

Month:	High	Avg. High	Low	Avg. Low	# Days ≥ 100°	# Days ≤ 32°	Precipitation	
January	64	49	27	37	-	5	1.09"	
February	78	65	31	46	-	1	3.38"	
March	77	68	42	48	-	-	2.15"	
April	91	76	41	51	-	-	-	
May	97	88	57	47	-	-	-	
June	102	89	45	58	2	-	.01"	
July	103	94	54	62	5	-	.52"	
August	108	98	53	63	14	-	.21"	
September	99	92	52	57	-	-	-	
October	94	82	47	54	-	-	.30"	
November	79	67	32	43	-	1	.02"	
December	68	55	29	36	-	10	1.66"	
					Total:	21	17	9.13"

### C. LAND ACQUISITION

#### 1. Fee Title

After three years of appraisals and negotiations, the acquisition of the final 956 acres of the Reininghaus Ranch was completed on April 15, 1992. At a cost of \$1,463,500, this acquisition, coupled with the 636 acres acquired in 1990, added 1,592 acres of native wetlands and agricultural lands to the Merced Refuge. Over 400 acres of the 1992 purchase are former wetlands within the Duck Slough floodplain that are scheduled for restoration.

### D. PLANNING

#### 4. Compliance with Environmental and Cultural Resource Mandates

Refuge Biologist Woolington represented the Complex at meetings of the Tricolored Blackbird Recovery Strategy Planning Team. This multi-agency group worked with researchers to determine the true population status, plan pro-active habitat management and fund research for a species that was being proposed for both Federal and State listing under the Endangered Species Act. Cooperating researchers from Univ. Calif., Davis determined through field inventories that the 1992 population of tricolors blackbirds exceeded 340,000 rather than a previous researcher's 1991 estimate of less than 35,000 (determined through review of known sites and telephone interviews). Based on this new information, both Federal and State listing efforts were suspended.

#### 5. Research and Investigations

##### Merced NWR NR92 - Survival and habitat use of northern pintails wintering in the San Joaquin Valley.

Joe Fleskes, Northern Prairie Wildlife Research Center (NPWRC - Dixon Field Station) continued the first winter of his radio-telemetry study of northern pintails in the San Joaquin Valley (SJV) from January until mid-March (field work initiated in September 1991, see San Luis NWR 1991 Annual Narrative). Preliminary data from the first winter of the study indicated:

- 1) Survival was lower for hatch-year birds than adults.
- 2) Survival in the SJV was lower than in the Sacramento Valley (SV) (1987-1990 data).
- 3) 20% of the marked birds had departed the SJV by the opening day of hunting season (Oct. 24, 1991). However, 40% of the birds marked in August had left by that date (including 5% in Mexico).
- 4) Some marked birds (2/week) shifted to the SV throughout November 1991 and large numbers (50% of the remaining marked birds) moved primarily into the Sacramento-San Joaquin Delta, and to a lesser extent, the SV in mid December.
- 5) 83% of all marked pintails were outside the SJV by January 1992, primarily in the SV where most remained until spring migration.
- 6) Day use in the SJV was equal between private and public wetlands, however, 80% of the night-use was on private wetlands.

Field activities for the second season of this 3-year study resumed in August. Trapping activities were conducted primarily on State and private lands with a total sample of 60 adult females and 60 immature females being radio-marked.

Tracking of individuals began immediately after release and has continued throughout the 1992/1993 season. Unlike 1991, when many of the pintail moved out of the San Joaquin Valley early in the season, 75% still remained by December.

#### Merced NWR NR 92 - Evaluation of Tricolored Blackbird Reproductive Success at San Luis NWR Complex.

Dr. William Hamilton, Univ. Calif., Davis, and his graduate students initiated a breeding ecology study on tricolored blackbirds (Federal Candidate 2 species) on the Complex. Most research activities occurred on Kesterson and San Luis. By 1992, because of concerns about statewide population size estimates, the study evolved into an inventory of breeding colonies in California and Oregon and determination of reproductive success and population size. Two colonies on and near Merced NWR were monitored throughout the reproductive cycle (see Section G.2). An end of season progress report was submitted to the refuge. The most significant finding in 1992 was their field documentation of a 1992 world population size exceeding 340,000.

## 1. Personnel

The following is a complete list of personnel who worked at the San Luis NWR Complex in 1992. The Easement Biologist and Project Leader have direct responsibility for the Grasslands WMA's:

1. Gary Zahm, Refuge Manager, GM-13, PFT
2. James Houk, Primary Assistant Manager, GS-12, PFT, Transferred to Portland Regional Office 4/5/92 (not pictured)
3. Tom Melanson, Asst. Refuge Manager, San Luis NWR, GS-11, PFT
4. Charlie Stenvall, Asst. Refuge Manager, Merced NWR, GS-11, PFT,
5. Bob Flores, Asst. Refuge Manager, Kesterson NWR, GS-9, PFT, Transferred to Kern NWR 2/9/92 (not pictured)
6. Scott Frazer, Asst. Refuge Manager, Kesterson NWR, GS-11, PFT, EOD 7/12/92
7. Joel Miller, Easement Program Manager, GS-12, PFT
8. Dale Garrison, Wildlife Biologist (Easement Program) GS-9, PFT
9. Dennis Woolington, Wildlife Biologist, GS-11, PFT
10. Sheri Melanson, Wildlife Biologist, GS-9, PFT
11. Mike Peters, Wildlife Biologist (Easement Program), GS-7, TFT, EOD 5/4/92
12. Cliff Imler, Engineering Equip. Operator, San Luis NWR, WG-9, PFT
13. Roy Shearer, Engineering Equip. Operator, San Luis NWR, WG-9, PFT
14. Walt Hammond, Engineering Equip. Operator, San Luis NWR, WG-9, PFT
15. B. Lee Grissom, Engineering Equip. Operator, San Luis NWR, WG-9, PFT
16. Lenny Mark, Maintenance Worker, San Luis NWR, WG-8, PFT, EOD 5/4/92
17. Ray Fuller, Engineering Equip. Operator, Merced NWR, WG-10, PFT (not pictured), Retired 2/28/92 (not pictured)
18. Denise Hammond, Administrative Support Assistant, GS-7, PFT
19. Esther Rodarte, Clerk/Typist, GS-4, PFT, Resigned 10/31/92
20. Sue Cortese, Purchasing Agent, GS-5, PFT
21. Mary Crist, Clerk, GS-1, TFT, EOD 3/23/92
22. Sylvia Carvalho, Office Automation Clerk, GS-4, TFT, EOD 6/22/92
23. Lauri Sanchez, Tractor Operator, San Luis NWR, WG-6, TFT, EOD 5/1/92
24. Anthony Merrill, Tractor Operator, San Luis NWR, WG-6, TFT, EOD 7/6/92
25. Steve Moitozo, Tractor Operator, San Luis NWR, WG-6, Intermittent, resigned 3/19/92
26. Donald Placek, Tractor Operator, San Luis NWR, WG-6, Terminated 6/16/92
27. Reed Duston, SCA Volunteer, Temporary Tour 1/6 - 3/27/92
28. Tom Hughes, SCA Volunteer, Temporary Tour 6/1 - 8/7/92

1992 proved to be a busy year in terms of personnel transfers, promotions, upgrades and new hires. Late in 1991, Kesterson Assistant Refuge Manager Bob Flores was selected for the Primary Assistant Refuge Manager at Kern NWR. Bob transferred on February 2 and this position was subsequently filled by Scott Frazer who came on board on July 12. Scott came from the Soil Conservation Service in Lakeview, Oregon.

Primary Assistant Refuge Manager Jim Houk was selected as the new Assistant Associate Manager for Idaho, Oregon and Washington refuges early in the year. Jim transferred out on April 5 and his position remained vacant at year's end.

Engineering Equipment Operator Ray Fuller's disability retirement was finally completed on February 28. Ray had been injured while operating the old Caterpillar model 12 road grader at Merced Refuge during April 1991 (see 1991 Annual Narrative Report).

Clerk/Typist Esther Rodarte requested being placed on Leave Without Pay (LWOP) status during the later stages of her pregnancy. Esther entered LWOP status on June 14. After the birth of her daughter in early September, Esther decided she wanted to spend more time with her family and resigned effective October 31.

Promotions/upgrades occurring this year included:

- a. Maintenance Worker Walt Hammond was promoted to an Engineering Equipment Operator WG-9 on February 2.
- b. Wildlife Biologist Sheri Melanson was converted from temporary full time to permanent full time on March 8.
- c. Tractor Operator Lee Grissom was promoted to an Engineering Equipment Operator WG-9 on April 5.
- d. Office Automation Clerk Sue Cortese was promoted to a Purchasing Agent GS-5 on December 13.

A previously existing but vacant Maintenance Worker WG-8 position was filled by Lenny Mark on May 4. Another existing but vacant position was filled when Mike Peters came on board as a TFT Wildlife Biologist GS-7 on May 4.

Sylvia Carvalho joined the staff on June 22 as an Office Automation Clerk GS-4 to fill in for Esther Rodarte who was on maternity leave. Mary Crist was also new to the staff, coming on board as a Clerk GS-1 on March 23.

San Luis Assistant Refuge Manager Tom Melanson was selected as the new Primary Assistant Refuge Manager at the Western Oregon Refuge Complex in early December. Tom will be leaving in February 1993.

Positions on the approved Complex Staffing Plan (Figure 1) which were vacant at the end of the year included:

- a. PFT, GS-12 Primary Assistant Refuge Manager
- b. PFT, WG-8 Maintenance Worker/Irrigator
- c. PFT, GS-9 Outdoor Recreation Planner

Table 2. Staffing levels at the San Luis NWR Complex, Fy 84-92.

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FY	Permanent Staff	Temporary Staff
92	18 <u>a/</u>	5
91	17 <u>b/</u>	5
90	15	4
89	12	10
88	12	16
87	13	12
86	11	20
85	11	14
84	10	4

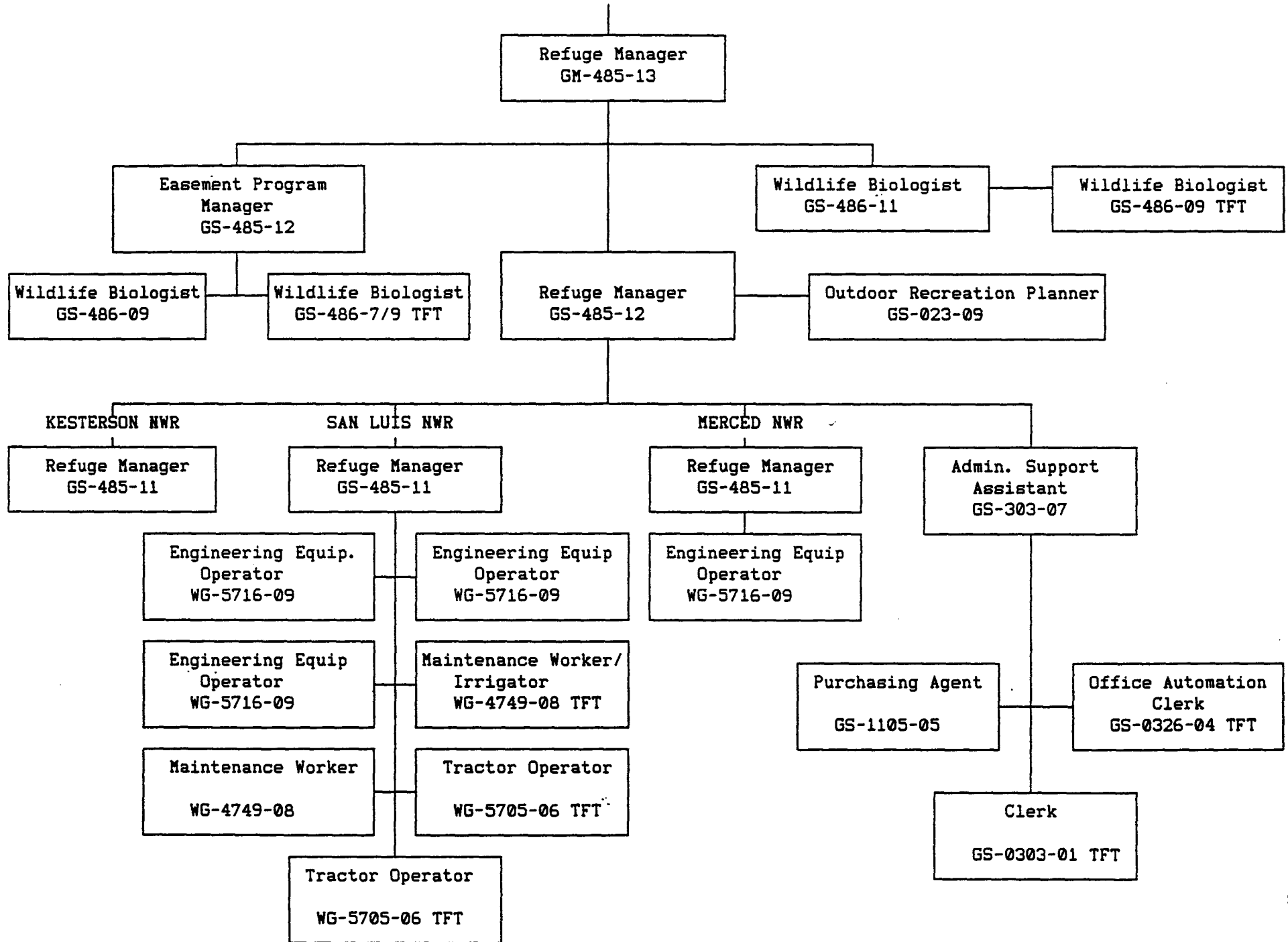
a/ - Maintenance Worker/Irrigator and Outdoor Recreation Planner positions were vacant.

b/ - Maintenance Worker and Engineering Equipment Operator position were vacant.

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San Luis National Wildlife Refuge Complex



#### 4. Volunteer Program

The refuge entered into agreements with the Student Conservation Association (SCA) to enroll volunteers to assist the biological program of Complex. Reed Duston, from Bellingham, Washington, assisted biologists from January 6 through March 27. Duties at Merced included: riparian habitat enhancement; avian disease control; goose collar observation; raptor, crane, and songbird surveys; Reed was subsequently employed as a temporary biological technician at the Kern NWR Complex.

Tom Hughes, from Memphis, Tennessee, assisted from June 1 through August 7. His activities at Merced included: conducting wildlife surveys (breeding bird, waterfowl, shorebird, and raptor); assisting in pre-burn vegetation transects and rare plant surveys; planting and subsequently irrigating oak seedlings; and data entry/survey report preparation.

Los Banos resident Robert Edminster continued his long-standing volunteer agreement as a botanist for the Complex. His contributions at Merced included donating 40 oak seedlings, assisting in tree planting, and conducting rare plant surveys.

Boy Scouts from Merced assisted in an oak planting effort on July 1 (see F.6). Eagle Scout Spencer Weed organized a group of 8 scouts to assist refuge personnel in planting the seedlings, and subsequently helped water the trees every 2 weeks through August. Spencer developed a report of the riparian restoration activities to obtain a merit badge.

The parents of 2 teenaged boys "volunteered" their sons' labor after discovering that they had destroyed the refuge mailbox on Sandy Mush Road during the summer. The youths spent 16 hours removing barbed wire fencing on the Reininghaus unit.



Refuge volunteers plant valley oak seedlings along Deadman Creek after June 1 wildfire. 7/92 SM

## 5. Funding

Management of the 1992 budget at the San Luis Complex again proved to be challenging and time consuming. Administrative Support Assistant Denise Hammond and Primary Assistant Refuge Manager Jim Houk had primary responsibility for the management of the station funding sources. After PARM Jim Houk left in April to assume his new position in the Regional Office, Refuge Manager Gary Zahm provided budget advice and guidance for budget management.

Funds were utilized from 18 different sources (Table 3). Total funds available to the Refuge Complex were \$2,789,202 (this includes funds programmed to the Complex as well as funds charged against). The Complex received \$1,169,500 in 1261 and 1262 base funds (126X funds) which included \$262,000 for fire funds. The Complex expended \$1,169,916 in 126X funds or \$341 more than what was allocated (of course, prior year expenditure reports continued to be received long after we prepared a final 1992 budget report in December and after our 1992 RBASE budget system files had been removed from the budget tracking program).

In late September 1992, we anticipated being deficit spent in 1261 funds by approximately \$12,000 and \$5,000 in 1262 funds (Refuge Supervisor CA/NV was alerted to our findings). However, by the end of December, our deficits in 1261 and 1262 were greatly reduced due to yearend projections, gas credits, coop farming refunds, etc.

Specific 1262 MMS projects funded were as follows:

a. Rehabilitation of Kesterson Gallo Ditch ..	\$ 50,000
b. San Luis Kiosk .....	\$ 5,000
c. Purchase new grader for Merced NWR .....	\$105,000
d. Replace Kesterson entrance signs .....	<u>\$ 5,000</u>
	\$165,000

The refuge charged against \$1,469,779.46 in carry-over funds in Drought Relieve (2696 funds). A total of 13 Drought Relief Projects were identified and expenditures to each of these projects were tracked. A total of \$458,945 was spent in Drought Relief Projects; remaining funds will carry over to 1993.

Table Table 3. Total funds utilized by the San Luis NWR Complex during FY 92.

<u>Name of Fund</u>	<u>Amount Allocated</u>	<u>Funds Expended</u>	<u>Balance</u>
Base 1261 (includes \$262,200 for Water Costs)	771,000.00	771,796.60	- 796.60
Challenge Grant (Ducks Unlimited)	16,500.00	16,500.00	.00
Contaminant Cleanup (Mud Slough)	20,000.00	20,495.85	- 495.85
	<u>807,500.00</u>	<u>808,792.45</u>	<u>-1,292.45</u>
Base 1262	197,000.00	214,221.41	- 17,221.41
MMS 1262	165,000.00	146,145.00	18,855.00
Total 1262	<u>362,000.00</u>	<u>360,366.41</u>	<u>- 1,633.59</u>
Total 126X Funds (includes \$27,000 for Fire Funds)	1,169,500.00	1,169,915.88	341.14
11650-1120 Administrative Funds associated with Farm Bill Cost Share projects ...	35,000.00	35,345.34	- 345.34
10120-1120 Farm Bill (Enhancement)	6,990.00	6,860.73	129.27
11420-1110 Farm Bill (Enhancement)	1,900.00	1,904.41	- 4.41
11650-1971-14 BOR Transfer Funds for Kesterson Program	15,005.00	14,942.96	62.04
11650-2696-E003 Drought Relief Funds for Santa Fe Canal Project	1,369.03	1,351.68	17.35
11650-2696-E004 Drought Relief Funds for Well Rehab.	10,142.00	10,141.83	.17
11650-2696-E006 Drought Relief Funds for San Luis Water Delivery System Improvement (A Canal Ext.)	103,799.73	94,827.88	8,971.85 a/
11650-2696-E012 Drought Relief Funds for KST/Drill 2 new wells	180,000.00	.00	180,000.00 a/
11650-2696-E012 Drought Relief Funds for KST/Wetland Restoration	250,000.00	121,386.15	127,447.04 a/
11650-2696-E012 Drought Relief Funds for KST/Rehab existing deep well, irrigation well & elec. syst, discharge canal.	15,000.00	14,411.98	588.02 a/
11650-2696-E013 Drought Relief Funds for Merced (Rehab wells)	55,000.00	55,000.00	.00
11650-2696-E013 Drought Relief Funds for Merced (Water deliv. syst/Reininghaus & Deadman unit)	180,000.00	79,781.00	100,219.00 a/
11650-2696-E013 Drought Relief Funds for Merced water deliv. syst (weir in Deadman Creek)	80,000.00	75,893.64	4,106.36 a/
11650-2696-E014 Drought Relief Funds for SNL water del. syst (drill 3 new wells)	270,000.00	22,617.96	247,382.04 a/
11650-2696-E014 Drought Relief Funds for SNL water del. syst (complete A Canal Ext. project)	100,000.00	100,269.24	- 269.24 a/

<u>Type of Fund</u>	<u>Amount Allocated</u>	<u>Funds Expended</u>	<u>Balance</u>
)-2696-E014 Drought Relief s for SNL (Pump #6)	100,000.00	49,302.65	50,697.35 a/
10130-2696-E005 Drought Relief Funds for Merced Refuge	122,130.00	22,961.04	99,168.06 a/
10138-8451- Del Terra, Inc. (10181-2-0368) Land survey services of GWMA	.00	19,879.50	.00 b/
8610 Merced NWR Quarters maint.	2,844.13	1,773.01	1,071.12 a/
11650-9110 PreSuppression Fire Funds	1,000.00	956.75	43.25
11650-9120 PreSuppression Fire Funds	81,000.00	80,959.93	40.07
9231-1052 R.O. Fire Funds	2,703.51	2,703.51	.00
9240-1052 R.O. Fire Funds Vegetation Recovery/Deadman Creek at Merced NWR	5,818.76	5,815.29	3.47
Total:	\$2,789,202.16	\$1,988,245.34	\$ 819,690.60

a/ - These funds "carry over" into the next fiscal year. (\$819,381.60)

b/ - No funds were allocated to SNL - transaction was charged to RO fund source.

Table 4. AWWPA funding levels, FY 83-92.

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Total "126X" AWWPA Funds	
FY92 (w/add-ons)	\$1,169,500
FY91 (w/add-ons)	1,047,900
FY90 (w/add-ons)	893,700
FY89 (w/add-ons)	768,600
FY88	779,300
FY87	710,800
FY86	864,900
FY85	719,300
FY84	570,800
FY83	578,200

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Table 5. Projects this fiscal year.

<u>Subactivity</u>	<u>Project</u>	<u>Project Name</u>	<u>Amount Allocated</u>	<u>Amount Spent</u>
1261	MMS	MER ENTRANCE/MMS	\$ 17,976.99	\$ 18,951.00
	FIRE	ADMIN/1000	\$ 1,000.00	\$ 1,289.93
	FIRE	PLNG/2000	\$ 5,000.00	\$ 4,539.13
	FIRE	EQMT M/5300	\$ 7,500.00	\$ 5,232.91
	FIRE	PRSD BRN/6500	\$ 20,000.00	\$ 20,759.30
	FIRE	MONT/EVAL/8000	\$ 1,500.00	\$ .00
			<u>\$ 35,000.00</u>	<u>\$ 31,821.28</u>
	OTHER	CONTAM CLEANUP	\$ 20,000.00	\$ 20,495.85
	OTHER	DU CHALLENGE GR	\$ 16,500.00	\$ 16,500.00
1262	MMS	KST DITCH/MMS	\$ 50,000.00	\$ 33,490.00
	MMS	KST SIGNS/MMS	\$ 5,000.00	\$ .00
	MMS	MER GRADER/MMS	\$105,000.00	\$105,000.00
	MMS	SNL KIOSK/MMS	\$ 5,000.00	\$ 7,655.08
1971	BOR	HAZING FUNDS/14	\$ 15,005.00	\$ 14,942.96
2696	DROUGHT	KST SF CANAL/E3	\$ 1,369.03	\$ 1,351.68
	DROUGHT	WELL REHAB/E4	\$ 10,142.00	\$ 10,141.83
	DROUGHT	KST SF CANAL/E6	\$106,138.43	\$ 94,827.88
			<u>\$117,649.46</u>	<u>\$106,321.39</u>
	DROUGHT	KST 2 WELLS/E12	\$180,000.00	\$ .00
	DROUGHT	KST WETLAND/E12	\$250,000.00	\$121,386.15
	DROUGHT	KST REHAB/E12	\$ 15,000.00	\$ 14,411.98
			<u>\$445,000.00</u>	<u>\$135,798.13</u>
	DROUGHT	MER REHAB/E13	\$ 55,000.00	\$ 55,000.00
	DROUGHT	MER 2 WELLS/E13	\$180,000.00	\$ 79,781.00
	DROUGHT	MER DEADMAN/E13	\$ 80,000.00	\$ 75,893.64
			<u>\$315,000.00</u>	<u>\$210,674.64</u>
	DROUGHT	SNL 3 WELLS/E14	\$270,000.00	\$ 22,617.96
	DROUGHT	SNL A-CANAL/E14	\$100,000.00	\$100,269.24
	DROUGHT	SNL PUMP #6/E14	\$100,000.00	\$ 49,302.65
			<u>\$470,000.00</u>	<u>\$172,189.85</u>
10130-2696	DROUGHT	MER WATER/E5	\$122,130.00	\$ 22,961.04
			<u>=====</u>	<u>=====</u>
			\$1,469,779.46	\$647,945.05
9110	FIRE	ADMIN/1000	\$ 1,000.00	\$ 956.75
9210	FIRE	EQMT P/5100	\$ 73,000.00	\$ 72,937.69
	FIRE	EQMT M/5300	\$ 8,000.00	\$ 7,244.30
	FIRE	OTHR/9000	\$ .00	\$ 777.94
			<u>\$ 81,000.00</u>	<u>\$ 80,959.93</u>

6. Safety

Safety meetings were held throughout the year and covered such topics as vision care, winter driving, rotary mower operation, fire truck operation, and equipment maintenance. Proper use of personal protective equipment and the Complex policy on the use of hardhats was also reviewed.

Assistant Refuge Managers Melanson and Stenvall completed a CPR refresher course while attending in-Service law enforcement training in Marana, Arizona. In addition, steel toe safety shoes were purchased for all wage grade personnel.



## F. HABITAT MANAGEMENT

### 2. Wetlands

During 1992, ground water from the refuge's deep wells provided most of the water used in managing Merced's wetlands. Other water utilized was obtained by using the low lift pump in Deadman Creek when surface water was available. Deep well pumping costs have increased 231% over the past 17 years, resulting in a decrease in managed wetland habitat and the length of the flooding interval. The reduction of wetland habitat has reduced the quantity of available food as well as aggravated the already crowded conditions in the Central Valley wetlands, which in turn increases the potential for disease outbreaks.

In 1992, 821 acres of managed wetland habitat required approximately 8,501 acre-feet (AF) of water, averaging 10.4 AF per acre of wetland habitat. A total of \$103,861 (\$126.50/acre) was spent for pumping costs for the wetland program.

These figures compare to 746 acres of managed wetland habitat in 1990 and 1991 requiring 11.1 AF and 12.0 AF of water per acres of wetland habitat respectively. Pumping costs for 1990 totaled \$77,856 for an average cost of \$104.36 per acre. Pumping costs for 1991 totalled \$102,690 for an average cost of \$137.65 per acre. Acres of managed wetland, water use and costs for the past 17 years is summarized in Table 6.

Despite the annual water costs for the wetland management program remaining the same as in 1991, significant difference in water use took place. The acre-feet of water required for winter maintenance and spring/summer irrigations decreased by 1% and 23% respectively in 1992. The reduction in water use for irrigation was achieved by combining several well outputs when irrigating thereby minimizing water losses to percolation and evaporation. Additionally, an aggressive irrigation schedule enabled irrigations to be completed earlier in the year thus avoiding higher evaporation losses. However, water cost for winter maintenance and spring/summer irrigations rose by 6% and 17% respectively due to the deteriorated conditions of the deep wells, pumps and motors.

Seasonal water use and cost for 1991 and 1992 are displayed in Table 7. Figure 2 displays monthly water use and cost for 1992.

Table 6. Energy Consumption and Water Costs for Merced NWR from 1976 to 1992.

Year	Acres of Flooded Habitat (a/)	Kilowatt Hours (b/)	\$/KWH	Total Water costs (b/)	# AF/ Wetland Acre	Cost Per Acre
76	1,088	2,122,744	.022	\$46,054	c/	42.33
77	747	2,485,355	.042	103,401 d/	c/	138.42
78	917	1,815,911	.042	76,830	c/	83.78
79	1,011	1,913,062	.035	66,108	c/	65.34
80	1,280	1,967,325	.040	79,088	c/	61.79
81	811	1,278,138	.057	72,222	c/	89.05
82	590	730,000	.068	50,000	c/	84.75
83	830	193,687	.080	15,452 e/	c/	18.62
84	693	385,910	.111	42,682	c/	61.59
85	664	729,332	.083	60,411	8.1	90.98
86	684	553,111	.093	51,600	8.8	75.44
87	684	604,298	.084	50,851	7.9	\$73.00
88	729	1,014,404	.066	66,660	11.0	91.49
89	746	1,002,508	.074	74,744	9.0	100.20
90	746	1,138,628	.068	77,856	11.1	104.36
91	746	1,475,514	.070	102,690	12.0	137.65
92	821	1,550,844	.073	103,861	10.4	126.50
-----						
17 year Average:	811	1,232,987	.065	67,677		85.73

a/ Acreage figures were updated in 1981 and all habitat acres were corrected back to 1976. Acres of habitat represent the peak number flooded during the year. The Eastside Bypass, though sometimes flooded naturally, was not counted as managed habitat.

b/ Figures for 1976 through 1980 have been readjusted to eliminate farming expense, so figures would be more consistent with actual Refuge use and with other figures that do not include farming. Ten percent was used as an adjustment factor.

c/ Data not available.

d/ Drought year, fuel tax attached.

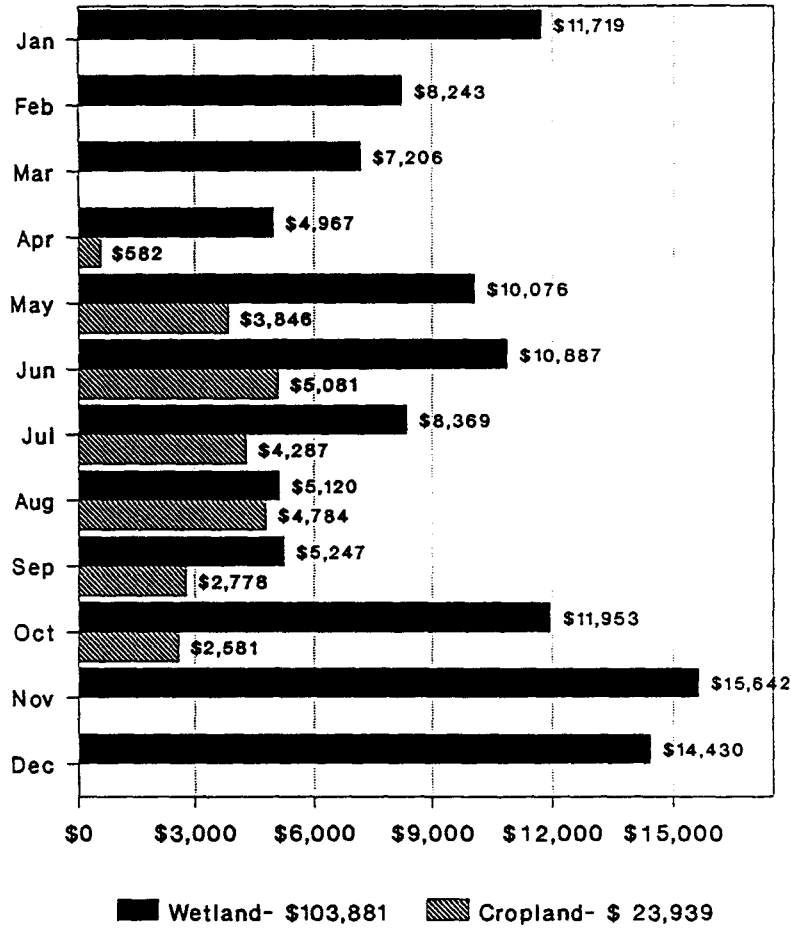
e/ Large quantities of abandoned flood water were used for the first time.

Overall acre-feet of water required for the fall flood-up was essentially the same as in 1991 despite the increase in wetland acreage from 746 acres to 821 acres. By altering the flood-up schedule to flood units with good water retention capabilities, more acreage was able to be flooded for the same amount of water. Water costs for fall flood-up dropped 13% from 1991 due to the rehabilitation of the deep wells, pumps and motors during the summer months.

Table 7. Comparative water costs and use for wetland management program at Merced NWR 1991 and 1992.

	Water Use		% Change	Water Costs		% Change
	1991	1992		1991	1992	
Winter Maintenance (January - April)	2,828	2,787	- 1	30,392	32,136	6
Irrigation (May-August)	1,649	1,271	- 23	29,455	34,452	17
Flood-up (Sept-Dec)	4,447	4,443	0	42,843	37,272	- 13

### Monthly Water Costs, Merced NWR, 1992



### Monthly Water Use, Merced NWR, 1992

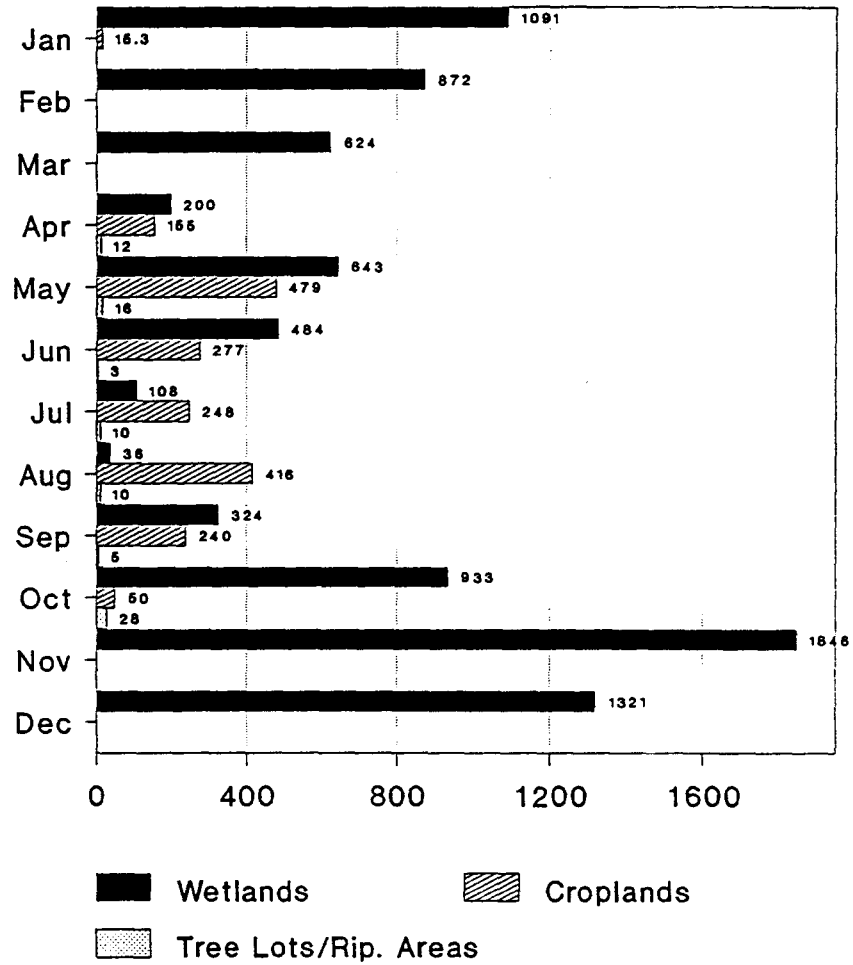


Figure 2.

Surface water from the Eastside Bypass or Deadman Creek is used whenever possible, as costs of operating these low-lift pumps average \$1.36/AF versus an average of \$12.21/AF for the 16 most heavily used deep wells. Due to the prolonged drought, no water was available in the Eastside Bypass, however, limited flows in Deadman Creek allowed for appropriation of 43 AF of water in February.

Water levels in the marsh units were generally held at 5" to 10 $\frac{1}{2}$ " depths except in East Grasslands B & C which were held at 4" to 6" for the traditional goose and crane roosts. All water levels were drawdown to the low ends of the established ranges in March to accommodate the large numbers of teal and shorebirds, or to stimulate swamp timothy germination.

Management practices involving drawdowns are, for the most part, dictated by the plant species objectives set for each unit. Units scheduled for alkali bulrush production were drawdown by March 9. Units which were planned as swamp timothy units or mixed marsh units with a small millet component, were drawdown by April 30. Mixed marsh units with a good millet component were not drawdown until April 6. Millet units remained flooded until April 20. WM-E/F, although designated as a mixed marsh, was maintained as long as possible for brood habitat by directing tailwater from drawdowns and irrigations of other units. Figure 3 displays drawdown dates for specific marsh units.

Due to a complete failure of the polypipe from pump 13 to EG-E, the unit was prematurely drawdown on Feb. 29. However, due to the timely rehabilitation of the Pump 13 ditch (see I.2), the unit was still managed as a mixed marsh despite an invasion of dock. WM-B and LF-A were drawdown Feb. 22 in order to rehabilitate them as a millet and a swamp timothy unit respectively. The middle check of EG-B, although scheduled for rehabilitation as a timothy unit, was not drawdown until March 23 due to the roosting crane and goose population.

The number of irrigations a unit receives depends on the soils and plant species objectives. Millet units may require up to four irrigations to produce a viable crop, while alkali bulrush units can often get by with one irrigation. Swamp timothy units generally require two irrigations unless a unit has been rehabilitated whereby a third irrigation may be necessary. In general, marsh units produce a better crop with a greater number of irrigations.

Total number of irrigations per marsh unit is displayed in Figure 4. Comparison of wetland acres and total number of irrigations is displayed in Figure 5.

# Merced National Wildlife Refuge

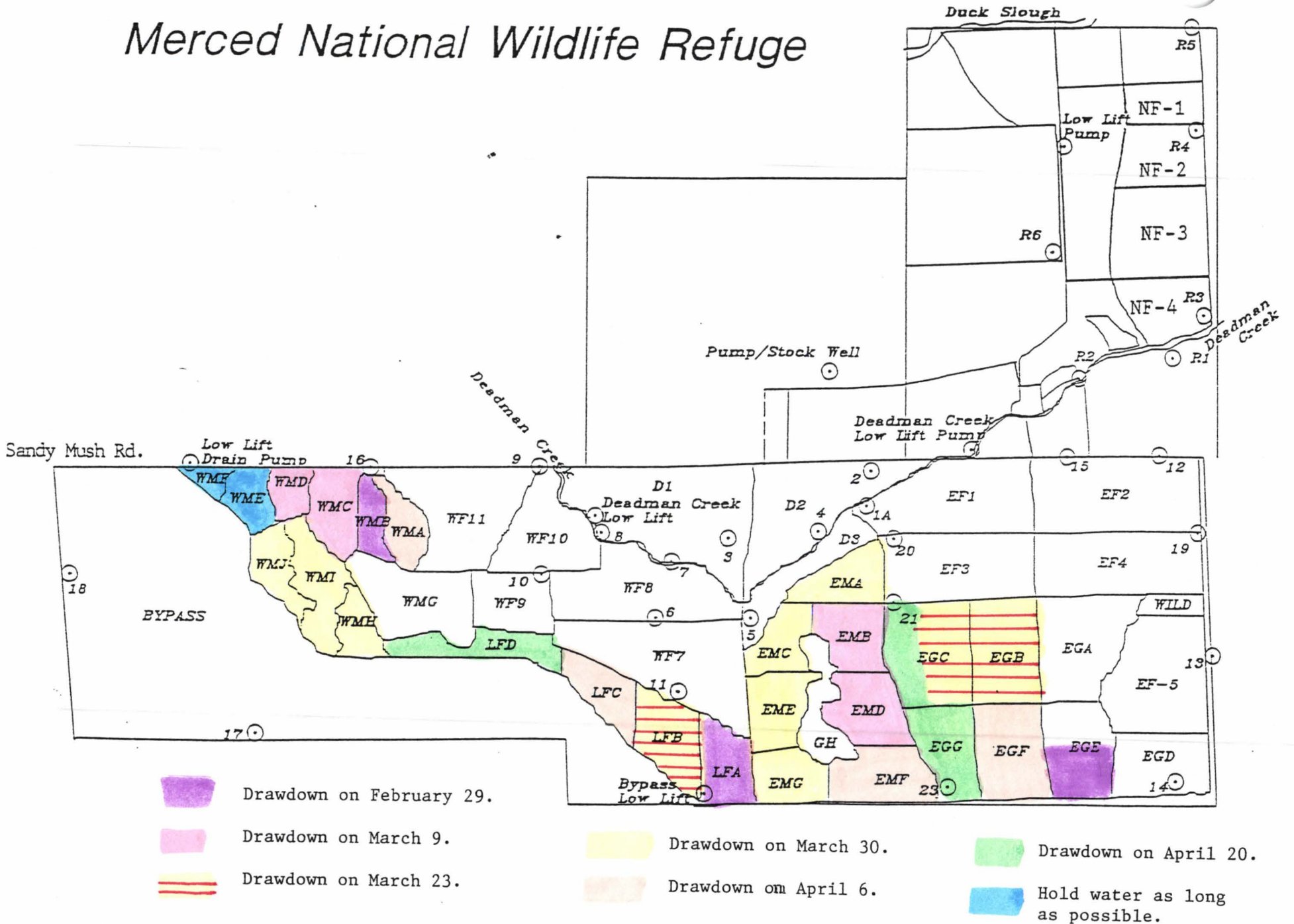


Figure 3. 1992 Drawdown dates for season marsh units.

# Merced National Wildlife Refuge

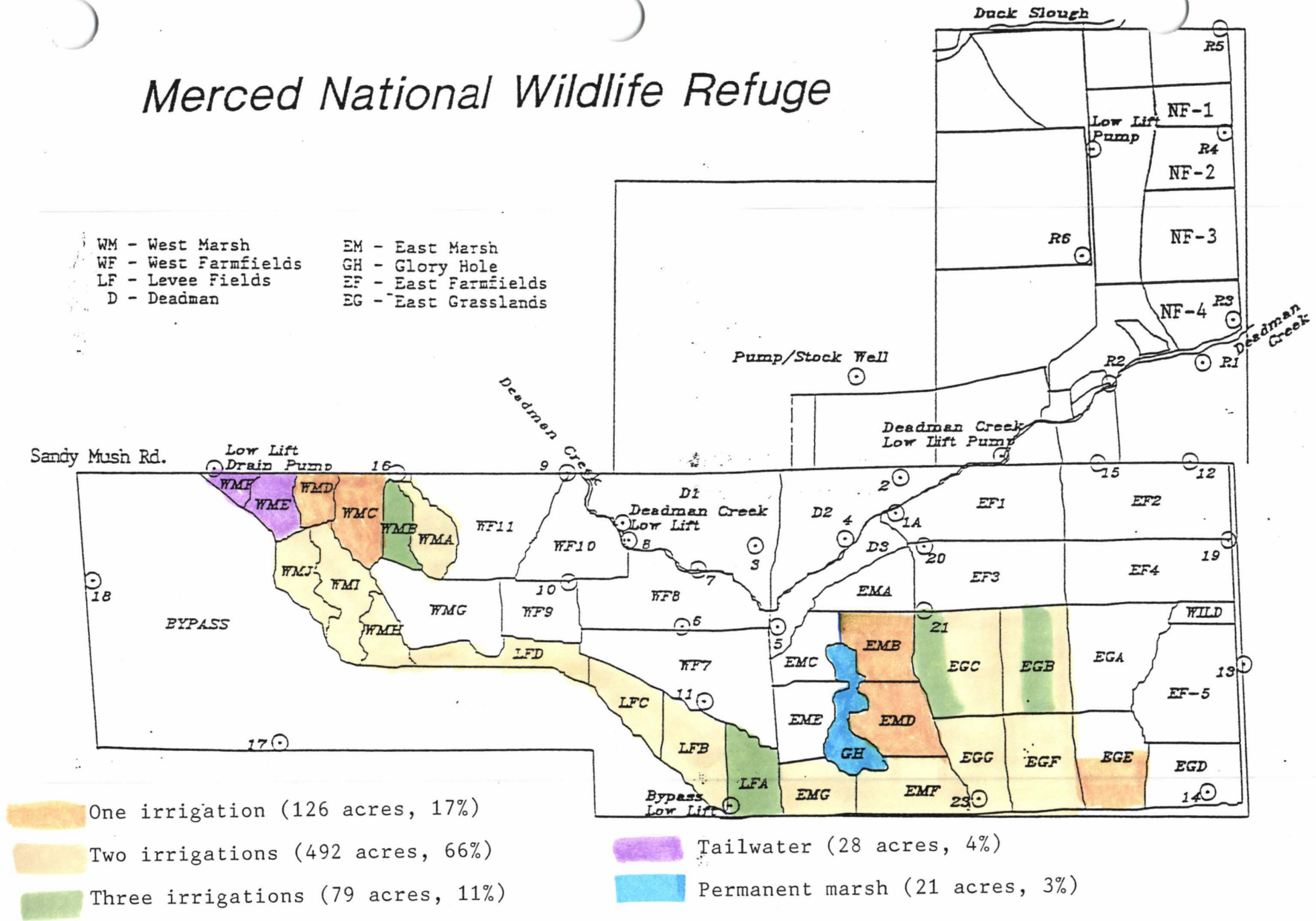
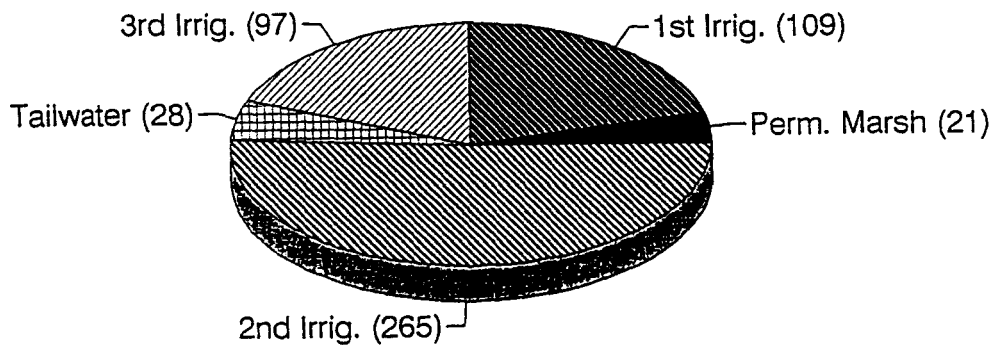


Figure 4. 1992 Total number of irrigations, Merced NWR.

1991 Acres Per Irrigation



1992 Acres Per Irrigation

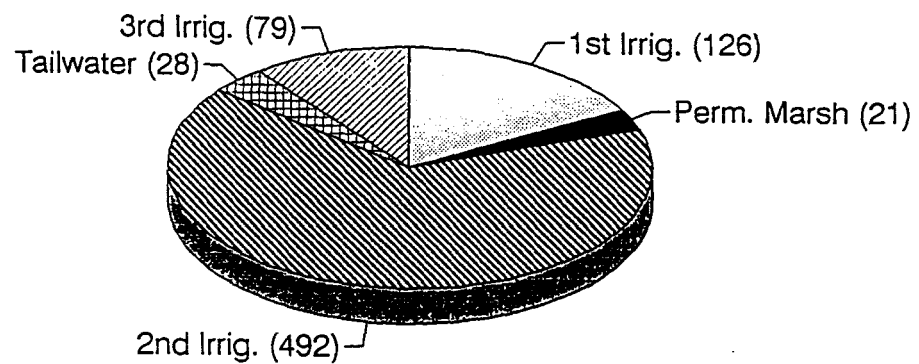


Figure 5. Comparison of the number of irrigations on Merced NWR, 1991 and 1992.



Irrigation of all marsh units were completed by July and were usually completed one month earlier than in 1991. Irrigation of units which were drawndown early and scheduled for alkali bulrush (one irrigation) were completed by April (May 1991). Mixed marsh and swamp timothy irrigations were completed by May or June (June or July 1991). West Marsh B, which was rehabilitated as a millet unit, received a final irrigation in July. Completion of unit irrigations is displayed in Figure 6.

Rehabilitation of 61 acres of existing seasonal marsh and 7 acres of permanent marsh were completed in 1992. WM-B, predominately cocklebur, was disced in May, seeded with millet and irrigated three times. Prior to seeding of WM-B, scrapers removed high spots within the marsh and built up the access road/dike along the western boundary. The existing road was in poor shape and at times, inaccessible.

LF-A and EG-B (middle), which were predominately stunted timothy units in 1991, were drawndown, disced, corrugated, and irrigated three times. Both units produced a large amount of millet in addition to the swamp timothy. Corrugations, which are similar to rows used in row cropping, help distribute water and promote better root zone darinage in alkali soils.





Shorebirds find the corrugations helpful in searching for invertebrates. 2/92 GRZ

Fluctuating water levels in the 21 acre Glory Hole's permanent marsh during 1987 and 1988 resulted in the loss of almost all open water habitat. Solid stands of cattail and tules took over approximately 85% of the marsh. Although open water habitat was lost (sago pondweed for tundra swans and diving ducks), the extensive emergent growth has provided habitat for roosting egrets and redwing blackbirds, roosting/nesting tricolored blackbirds (Federal Candidate 2), and black-crowned night herons.

To provide a balance between open water and emergent growth habitat, it was decided to rehabilitate the north cell of the Glory Hole (7 acres) by deepening the unit to ensure open water habitat. The unit was allowed to dry during 1991, and in February 1992, the unit was burned and disced. In August, Williams Land Leveling Company with assistance of the refuge D-6 dozer, lowered the pond bottom with a 10 cu. yd. scraper. Removed material was used to construct a loafing levee in EM-D and a vehicle turnout along the auto interpretive route in EM-C. Approximately 4 acres of pond bottom were lowered one foot and several islands were constructed in areas too moist to work in. A moat (or deep water trench) was dug around the perimeter by D & S Dragline Service. The unit was reflooded in September.

# Merced National Wildlife Refuge

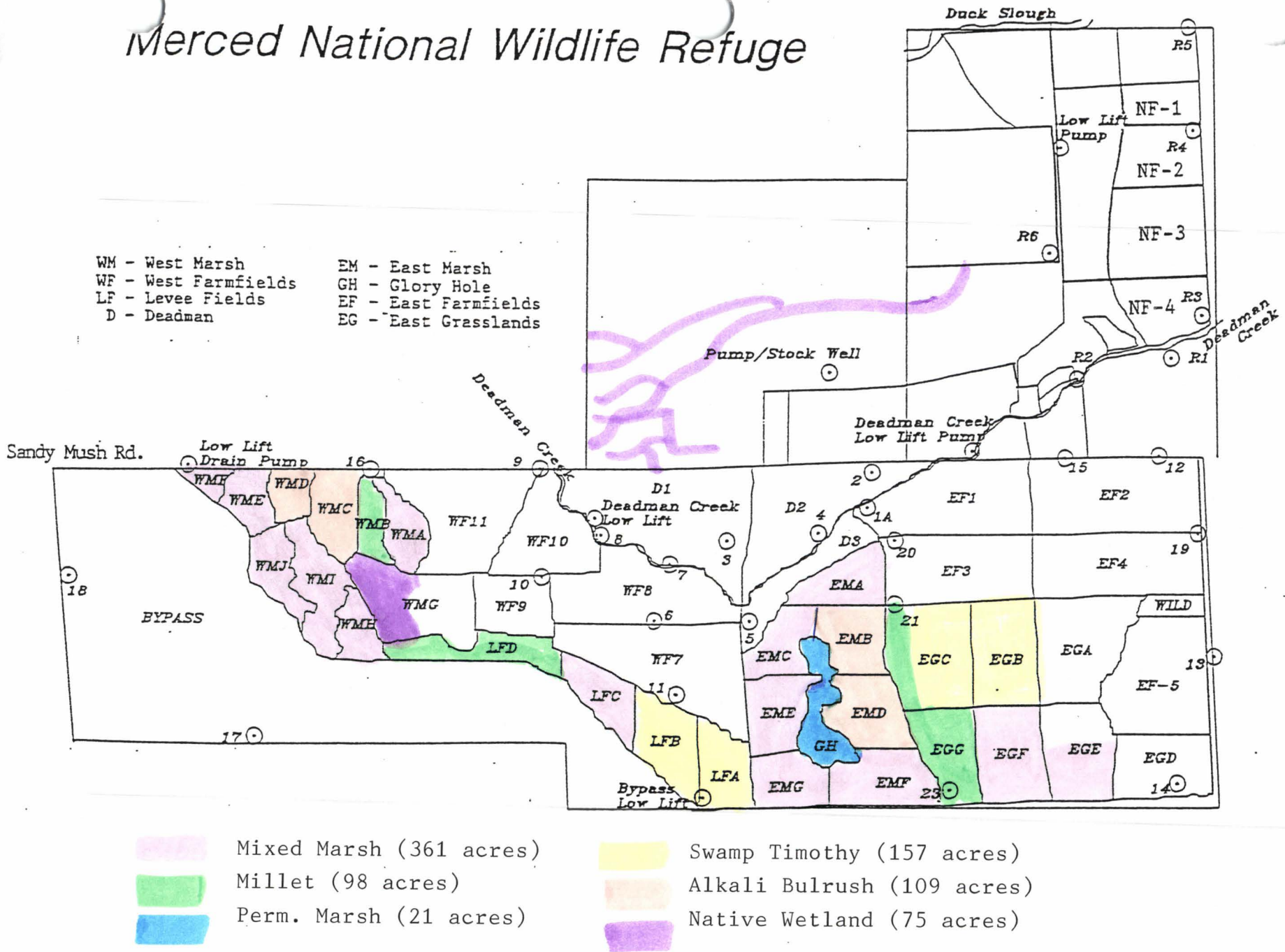


Figure 7. Marsh management objectives, Merced NWR.



Prior to flooding, all levees and roads were mowed to provide loafing areas for waterfowl and improve wildlife observation opportunities. Cockleburr, sunflower, and aster stands in all wetland units were mowed to provide open roosts and access to food crops. Openings were also mowed in dense millet and alkali bulrush stands to encourage waterfowl use.

In addition to mowing, selected areas in marsh units were spot disced. This discing suppresses weeds and alkali bulrush, retards succession, loosens compacted soils, exposes the seed and tuber bank and generally results in greatly improved food production in subsequent years. Millet and swamp timothy seem to be especially dependent upon occasional soil disturbance (discing) and reseedling is even necessary to maintain a viable stand of millet for more than 3-4 years. Over a period of a few years, healthy stands of millet decline to near monotypic swamp timothy fields, which then eventually become stunted and sparse. Units spot disced during 1992 include EM-A (6 acres jointgrass), EM-F (15 acres jointgrass), EM-G (10 acres jointgrass), EG-G (2 acres alkali bulrush), EM-D (2 acres alkali bulrush), LF-B (2 acres jointgrass), and WM-H/I/J/E (15 acres alkali bulrush).

Construction or rehabilitation of 16 border levees in select marsh units (EG-F/G, EM-E/F/G, LF-B) was completed before fall flood-up. These levees provide for an even distribution of irrigation water and provide excellent loafing areas for waterfowl and wading birds.

Fall flood-up was initiated in EG-C due to the unit's water holding capabilities and the need to provide roost areas for early arriving sandhill cranes. Wildlife viewing opportunities along the tour route were provided by the early flooding of EG-C.

Flooding of the West Marsh and Levee Field hunting area (236 acres) began in November to ensure completion by the December 5 opening of the waterfowl season. Figure 8 displays the monthly flood-up schedule and Table 8 compares 1991 and 1992 flood-up schedule.

Table 8. Fall flood-up, 1991-92, Merced NWR.

---

<u>Month:</u>	1991		1992	
	<u>Total Acres Flooded:</u>	<u>%</u>	<u>Total Acres Flooded</u>	<u>%</u>
Sept.	120	16	121	15
Oct.	287	38	294	36
Nov.	661	88	746	91
Dec.	746	100	821	100

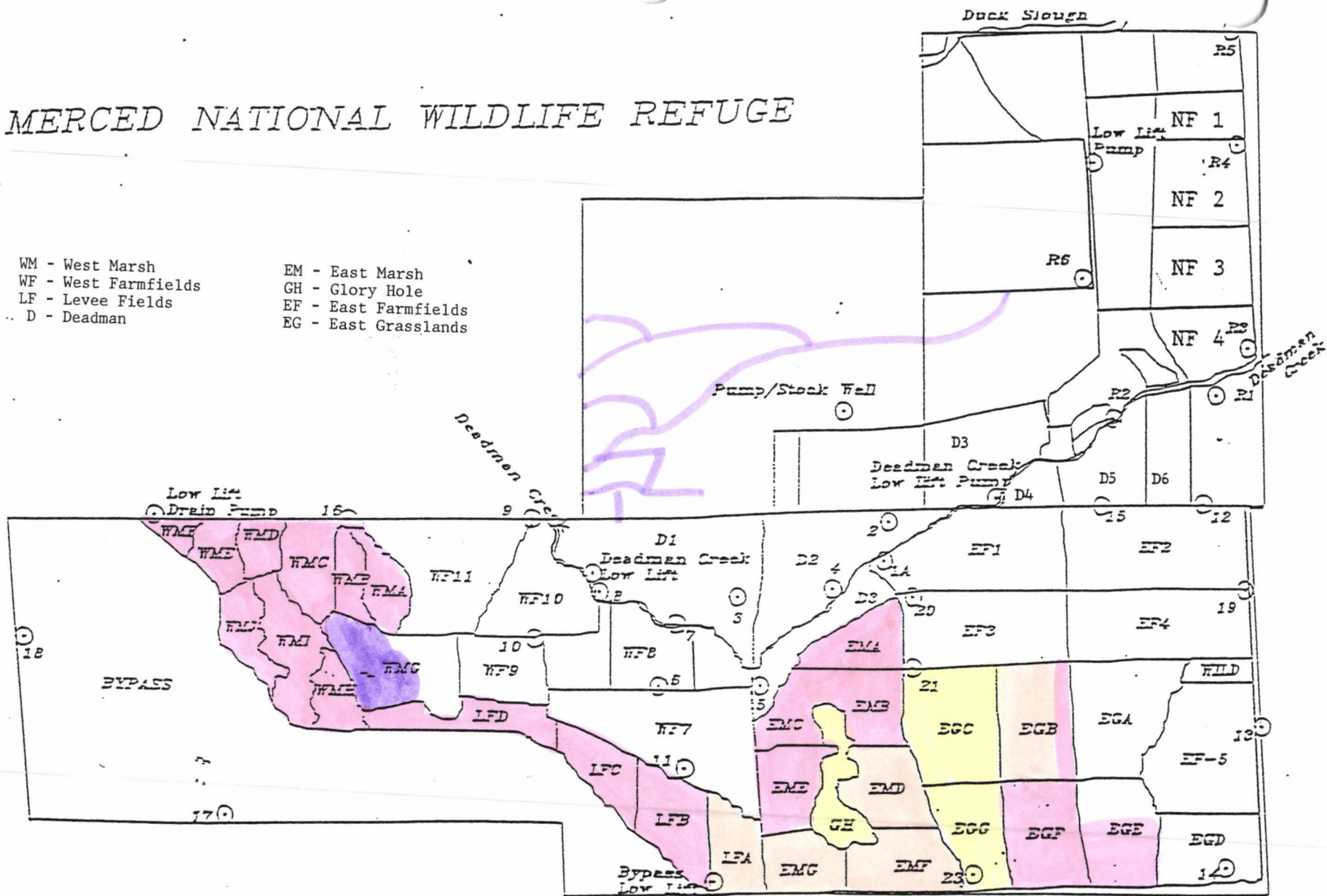
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Flood-up was in general, quicker than expected due to rehabilitation of deep wells and installation of new pipelines and water delivery ditches (see section I.2). Minor delays in flood-up were caused by ruptured waterlines and power outages (due to goose and crane collisions with power lines).

Despite the relative ease of the flood-up and the larger acreage flooded, efficient large scale floodings and maintenance of wetland habitat will not occur until the refuge receives 15,000 acre-feet of delivered water in 1995.

# MERCED NATIONAL WILDLIFE REFUGE

- WM - West Marsh
- WF - West Farmfields
- LF - Levee Fields
- D - Deadman
- EM - East Marsh
- GH - Glory Hole
- EF - East Farmfields
- EG - East Grasslands



	September (121 acres, 15%)		October (173 acres, 21%)
	November (452 acres, 55%)		December (75 acres, 9%)

Figure 8. Units flooded on Merced NWR by month, 1992.

#### 4. Croplands

Challenges facing the refuge farming program during 1992 were diverse and complicated. Due to drought, low commodity prices, and general farming practices, farmlands outside of the refuge used in past years by geese and cranes had little food value for wildlife in 1992. Goose, cranes, and other migratory bird use of refuge croplands dramatically increased during 1992 (see section G. Wildlife). However, due to falling commodity prices and restrictions in pesticide use, the cooperative farming program almost collapsed.

With the additional acquisition of 948 acres in April (the majority of it agricultural land), a significant opportunity to expand the farming program existed. A majority of the cropland on the new acquisition was marginal and therefore, was enrolled in the ASCS land set aside program. Payments from the set aside program were incorporated into the farmer's share for the farming program. In return, an additional 23 acres of corn and 23 acres of winter wheat in the D-2 units were planted. Cropland in good condition was directly incorporated into the farming program. This included an existing 40 acres of alfalfa and 95 acres planted to winter wheat. Figures 9 and 10 display the 1992 cooperative farming crop rotation plan and areas farmed under contract.

During 1992, a total of 800 acres were cultivated, up from 665 acres in 1991 and 600 in 1990. All but 28 acres of milo were involved in the cooperative farming program. The cooperative farmer receives 75% of the value of crops and the FWS receives 25% (standard agreement in Merced County as per refuge manual guidelines). However, all crops planted must provide for refuge wildlife needs despite being harvested or not (e.g., waste grain, green browse, etc.). The farmer pays all water and production costs while the Service provides maintenance on all wells, pumps, and water delivery systems. Strips of "natural" vegetation are usually left along the ends of selected farm fields to provide wildlife habitat and to break up the "cleaned farmed" profile of the fields. Table 9 depicts crop yields, values and shares.

The farmer's share of the refuge farming program is obtained by summer cuttings of alfalfa and improved pasture, and in some years, green chop or grain harvest from winter wheat fields. Corn is rotated between winter wheat and alfalfa fields every five years.



# Merced National Wildlife Refuge

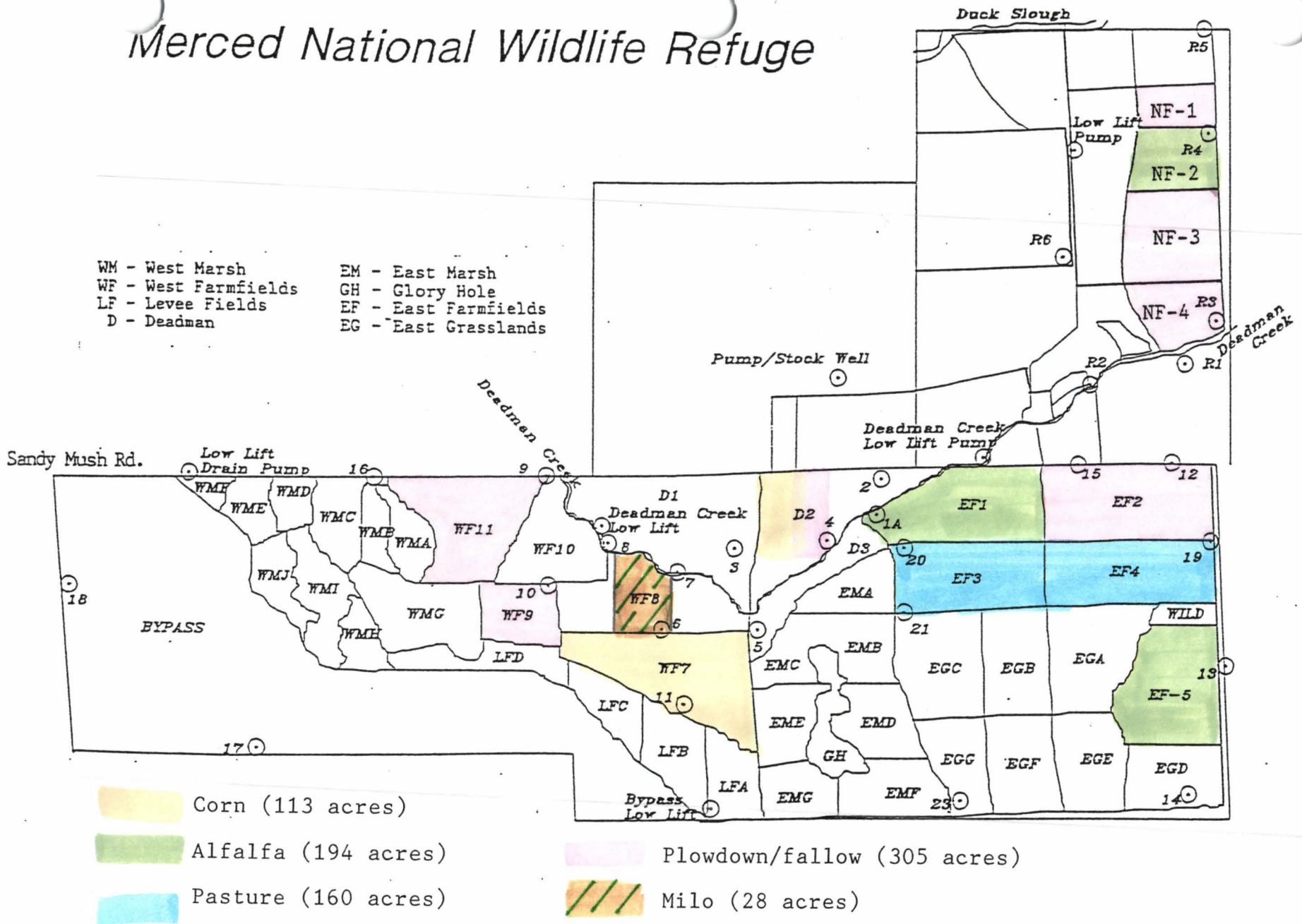


Figure 9. Spring/Summer Crop Schedule, Merced NWR, 1992.

# Merced National Wildlife Refuge

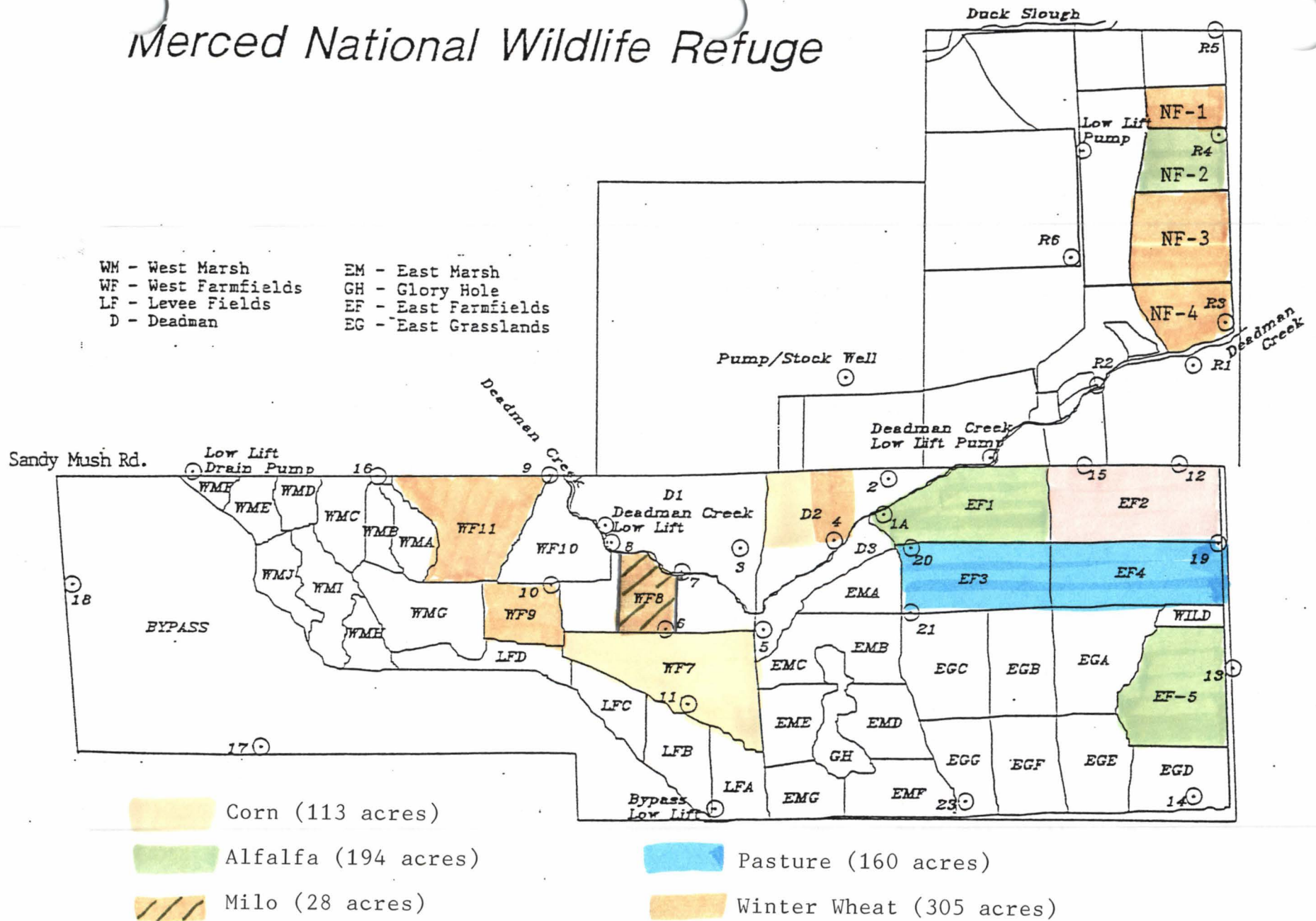


Figure 10. Fall Crop Schedule, Merced NWR, 1992.

Table 9. 1992 Crop Yield, Values, and Shares, Merced NWR

<u>Unit</u>	<u>Acres</u>	<u>Crop</u>	<u>Tons</u>	<u>Value</u>	<u>Total Value</u>	<u>Shares</u>
D2	23	Corn	69	\$100/ton	6,900	FWS
D2	23	Winter Wheat	-	1993 share	-	
NF-1	25	Winter Wheat	-	1993 share	-	
NF-2	40	Alfalfa	238	47.69/ton	11,350	Farmer
NF-3	35	Winter Wheat	-	1993 share	-	
NF-4	35	Winter Wheat	-	1993 share	-	
EF-1	76	Alfalfa	459	65.43/ton 65.43/ton	30,032 3,272	Farmer FWS
EF-2	80	Winter Wheat	-	1993 share	-	
EF-3/4	160	Pasture	263	38.69/ton	10,175	Farmer
EF-5	78	Alfalfa	365 50	63.28/ton 63.28/ton	23,097 3,164	Farmer FWS
WF-7	90	Winter Wheat (green chop)	746	7.50/ton	5,595	Farmer
WF-7	90	Corn	270	100/ton	27,000	FWS
WF-8	28	Milo	56	90/ton	5,040	FWS
WF-9	33	Winter Wheat (green chop)	203	7.50/ton	1,522	Farmer
WF-11	74	Winter Wheat (grain)	136	106/ton	14,416	Farmer

The market value for alfalfa and hay continued to decline in 1992. Alfalfa averaged \$63.71/ton during 1992. This compares to \$68.19 ton in 1991 and \$106/ton in 1990. Pasture hay dropped below the cost of production in 1992 (irrigating, swathing, raking and baling) to \$38.69/ton. This compares to \$57.38/ton in 1992 and \$80/ton in 1990. Due to the cost of irrigations vs. the crop value, the cooperative farmer reduced the number of irrigations on the alfalfa fields and eliminated all irrigations of the pasture from August on. Correspondingly, pasture yields dropped 40% to 263 tons down 436 tons in 1991. The overall alfalfa yield (1,162 tons including 100 tons consumed by geese) remains virtually the same as the 1991 overall yield of 1,136 tons. However, an additional 40 acres of alfalfa was brought into the cooperative farming program making the average yield-per-acre much lower than in past years.

The rotation in which alfalfa was scheduled to be planted in EF-2, as EF-5 was to be taken out of alfalfa and planted to corn in 1993, was delayed for one year due to the high planting costs and low values for alfalfa. This rotation will instead occur in 1993 and 1994.

Annual surveys were conducted to monitor composition trends in the improved pasture (Table 10). Based on the cooperative farmer's agreement, the coop. farmer must try to maintain a 50:50 legume:grass ratio. Attempts in 1991 to interseed strawberry clover in EF-4 to obtain the 50:50 ratio seemed to have failed with no noticeable increase in clover.

However, the percentage of trefoil continued to increase in EF-3. According to Jim Farley, U.C. Agricultural Cooperative Extension Agent, the early induced dormancy of the pasture in August caused by lack of water will probably reduce the clover percentages even further. Although damage to the pasture from lack of water will be minimal, and a regular irrigation schedule will be continued in 1993, it should be noted that goose use of the pasture in the fall was non-existent (see G.5).

Considering the outstanding wildlife use on winter wheat, and the ability for the farmer to market winter wheat, the winter wheat acreage was expanded. Planting of winter wheat was conducted over a two month time period and varied in seeding rate, mixture, and pre-irrigation requirements.

TABLE 10

Percent species composition in East Farmfields 3 & 4, from June 1989 through October 1992, Merced NWR.

	----- EF-3 -----								----- EF-4 -----							
	1988 Seed Mix	6/89	10/89	5/90	5/91	10/91	4/92	10/92*	1986 Seed Mix	6/89	10/89	5/90	5/91	10/91	4/92	10/92*
Clover	45	12	34	15	6	10	10	1	40	27	20	9	6	15	10	-
Ryegrass	52	49	41	40	1	1	4	-	33	15	5	6	1	4	2	-
Trefoil	3	3	4	32	67	50	59	64	7	15	16	28	22	25	39	41
Orchard- grass	-	-	-	-	-	-	-	-	20	37	46	47	66	41	43	38
Cupgrass	-	-	5	-	-	15	1	16	-	-	5	-	-	10	-	12
Bermuda	-	-	1	-	1	6	-	14	-	-	3	-	-	1	-	4
Setaria	-	-	3	-	-	7	-	-	-	-	-	-	-	-	-	-
Plantain	-	-	-	-	2	7	10	1	-	-	-	-	-	-	-	-
Yellow sweet clover	-	8	2	4	9	-	12	-	-	2	1	8	1	-	2	-
Knotweed	-	11	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Other weeds	-	17	9	8	14	4	3	-	-	4	3	2	4	4	3	3
Bare	-	-	1	1	-	-	-	-	-	-	1	-	-	-	-	1
Litter	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-1

\* Last irrigation early August, last cutting late July, clover and trefoil stressed and drying, and orchardgrass dormant.

The normal planting schedule of winter wheat and vetch (110 lbs./acre and 10 lbs./acre) in WF-9 & 11 was altered this year. A local dairyman agreed to purchase the seed and provide manure for the scheduled corn planting in 1993 in return for the right to green chop the wheat fields in spring. Canadian trapper peas were substituted for vetch and at a higher seeding rate (10 lbs./acre vetch vs. 30 lbs./acre peas) to produce more tonnage in green chop, and because of the pea's increased nitrogen fixing capabilities. Due to the importance of WF-9 & 11 in the hunt program, pre-irrigation of these fields was conducted and paid for by the Service. Farmfield D-2 was also planted with the same seeding rate and pre-irrigated, but the cooperative farmer paid for the pre-irrigation as negotiated for including refuge lands in the ASCS land set aside program.

Due to the one year scheduled delay in planting EF-2 to alfalfa, it was decided to plant the field to winter wheat. With the expected (and experienced) heavy use of the field by cranes and geese, winter wheat was drilled at 140 lbs./acre. Fertilizer was applied to the field prior to drilling. No pre-irrigation was conducted and wheat sprouted with the onset of the winter rains.

The North Farmfields 1, 3, & 4 were also treated with fertilizer and drilled with winter wheat at 120 lbs./acre. Although the seeding rate was not as high as EF-2, it was still higher than what normal wheat fields in the area would be planted with because of the anticipated heavy use by geese and cranes. Table 11 displays the planting schedule for the wheat fields. All wheat fields were disced/fallowed during the summer two times. NF-1, 3, 4 and D-2 required land planing three times prior to seeding. (For wildlife response, see section G. Wildlife).

Preparations for planting corn in WF-7 and D-2 started in April. West Farmfield 7, which had been planted to wheat/clover - rye/vetch combination, was green chopped for silage and sold to a local dairyman in exchange for manure and spreading of the manure onto WF-7 and D-2. Manure was applied at the rate of 25 cubic yards/acre. West Farmfield 7 was disced twice, fertilized, listed into rows, pre-irrigated and cultivated prior to planting the corn. Deadman 2 required four discings and was land planed three times before listing rows. Corn in D-2 was irrigated up due to the unlevel field and the possibility of delays in cultivating and planting after pre-irrigation.

Table 11. 1992 Planting schedule for winter wheat, Merced NWR.

<u>Unit</u>	<u>Ac.</u>	<u>Rate/Seed</u>	<u>Pre-Irrig?</u>	<u>Planting Date</u>	<u>Shares</u>
WF-9	33	100 lbs/ac. wheat 30 lbs/ac. peas *	Y	10/20	FWS - goose/crane use Farmer - green chop
WF-11	74	100 lbs/ac. wheat 30 lbs/ac. peas *	Y	10/20	FWS - goose/crane use Farmer - green chop
D-2	23	100 lbs/ac. wheat 30 lbs/ac. peas *	Y	10/20	FWS - goose/crane use Farmer - green chop
EF-2	80	140 lbs/ac. wheat	N	11/23	FWS - goose/crane use Farmer - wheat
NF-1	25	120 lbs/ac. wheat	N	11/23	FWS - goose/crane use Farmer - wheat
NF-3	40	120 lbs/ac. wheat	N	11/23	FWS - goose/crane use Farmer - wheat
WF-4	30	120 lbs/ac. wheat	N	11/23	FWS - goose/crane use Farmer - wheat

\* - Canadian trapper peas

Two varieties of corn were planted in 1992. In WF-7, a standard silage corn (SX-90), especially suited to alkali soils, was selected. In D-2, a new double hybrid corn (5250) was planted which was a shorter plant, with a higher grain yield and a quicker maturation. General observation seemed to point to the fact that the 5250 out-produced the SC-90 variety of corn although the higher alkaline conditions in WF-7 may have contributed to the results.

Preparations for planting milo in WF-8 to replace the volunteer barley lost in the June wildfire started in July. Discing of the unit was conducted by refuge personnel. The remaining land preparation, planting, and production costs (excluding water) were contracted out after money was provided by the Regional Office specified under a wildfire rehabilitation plan. Due to the late planting date (July 15), the milo crop did not mature until late September/early October. Most of the milo was consumed by redwing and tricolored blackbirds. Production costs for the 28 acres of milo are listed in Table 12.

Table 12. Contract farmed production costs for 28 acres of milo, Merced NWR.

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Materials:	
Seed (15 bags at \$35/bag) .....	\$ 525.00
Fertilizer (150 lbs./acre at \$50/acres) ..	\$1,400.00
Water (pumping costs, 80 acre-feet) .....	\$2,000.00
Labor:	
Land planing (\$5/acre) two times .....	\$ 280.00
Fertilizer application (\$6/acre) .....	\$ 168.00
Seeding (\$3.50/acres) .....	\$ 98.00
Listing (\$6/acre) .....	\$ 168.00
Irrigation (\$7/acre, labor only, 3X .....	\$ 588.00
	Total: \$5,227.00

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Irrigation costs for the cooperative farmer dropped due to the restricted irrigations of the pasture and alfalfa, and since the pre-irrigation cost of WF-7 & 11 were paid by the Service. Annual costs for the cooperative farmer totalled \$23,939, which represents a 34% decrease over 1991 (\$36,183). Other production costs: discing, land planing, custom swathing, raking, baling, etc., continued to rise reducing profit margins to near zero.

Crop value for the farming program totalled \$141,563. The cooperative farming program crop value totalled \$136,523, while the contract farmed milo value was \$5,040. The Service's share of the cooperative farming program totalled \$40,336 and the cooperative farmer's share including the \$17,426 ASCS land set aside payment totalled \$113,613 for a 26:74 Service:Farmer split. Crop values and yields were provided by the cooperative farmer or commodity brokers in Merced County.



## 6. Other Habitats

A total of 301 cuttings, tree seedlings and native shrubs were planted in 1992 (Table 13). Planting efforts during January to mid-March were concentrated along the new entrance road in the Deadman 2 units. The objective was to establish a grove of native trees and shrub to enhance diversity and over-all appearance of the refuge entrance. The planting was designed so that most of the area could be periodically flood irrigated. During the summer, shrubs planted in the unirrigated areas died and several oaks and shrubs hidden in tall weeds were accidentally cut down when the area was mowed to control weeds. The whole area was completely inundated by high flood waters of Deadman Creek during the fall. Despite the losses incurred during the summer, overall survival and plant vigor in the area appeared good.

A second major planting effort occurred on July 1 to restore an area damaged by wildfire along Deadman Creek northwest of the shop area. Bob Edminster donated 40 valley oak seedlings and other native seedlings, and along with 10 Boy Scouts, 2 adults and refuge biological staff, planted them along Deadman Creek. Small numbers were also planted around the residence, shop area and refuge entrance. The trees were planted in tractor-augured holes, protected by chicken wire enclosures wrapped with shade cloth, and watered twice a month until mid-September. The intense heat of July and August and/or shock of transplanting caused partial dessication of many oak leaves and complete loss of leaves in a few trees, but all had resprouted new leaves by September and appeared healthy.

Table 13. Trees and shrubs planted on Merced NWR, spring/summer 1992.<sup>a</sup>

Unit	Willow	Cotton -wood	Oak	Box- elder	Coyote Brush	Elder -berry	Sycamore	Quail Brush	Bay Laurel	Holly- leafed Cherry
Deadman 2	113	53	13	5	20	10	5	8	-	-
Airstrip	-	-	-	-	7	-	-	-	-	-
EG-D	-	-	-	-	10	10	5	-	-	-
Deadman Creek	-	-	39	-	-	-	-	-	2	1
Sub-Total	113	53	52	5	37	20	10	8	2	1

**TOTAL = 301**

<sup>A</sup> Deadman 2, the Airstrip, and EG-D were planted during January to March. The Deadman Creek area was planted July 1.

## 9. Fire Management

Two wildfires occurred during the year. The first wildfire occurred on April 29 when the exhaust of a harrow bed hay stacker ignited a load of hay from the pasture unit. The entire load was dumped and eventually burned. The fire was controlled and eventually extinguished by ARM Stenvall using the Merced fire truck.

A second wildfire occurred on June 1, burning 215 acres including trees along Deadman Creek, annual grassland and 40 acres of volunteer barley. Merced County fire fighters responded to the fire (six engines, two water tankers) and were assisted by refuge personnel with two engines. Due to high winds and thistle patches, the fire jumped numerous firebreaks and eventually was brought under control by backfiring on a line next to the office/shop complex and Manager's residence. The cause of the fire was not officially determined, however, ignition by a cigarette butt or intentional firing along Sandy Mush road was suspected.

A wildfire rehabilitation plan was submitted to the Regional Office which included planting to replace destroyed trees along Deadman Creek, cultivating 28 acres of milo to replace the barley, and flood irrigation of bare ground to stimulate annual grasses. All three projects were ultimately completed despite funds being cut for the tree planting efforts (see H.6). For cost breakdown for the milo, see section H.4.

Four prescribed burns totalling 425 acres were conducted in 1992. As part of the north cell Glory Hole rehabilitation, seven acres of cattail and bulrush were burned in February to expose the pond bottom (see section H.2 wetlands).

New prescribed burn proposals and an environmental assessment were developed in August and September (see SNL, F.9). The San Luis fire management plan will continue to be utilized for Merced until a specific plan can be developed for Merced (scheduled FY 93). The burn proposals and E.A. were approved in mid-October, days before the first units were scheduled for burning.

In October, 418 acres of annual grasslands were burned to reduce litter and provide a foraging area for geese and cranes once the rains started. Pre-burn vegetation transects were completed prior to burns. West Marsh G (38 acres) and the Eastside Bypass (95 and 285 acres) were successfully burned by refuge staff (for wildlife response, see section G. Wildlife). Figure 11 displays the history of wildfires and prescribed burns on the refuge since 1981.

Although annual grasses within the prescribed burn sites germinated soon after the first rains in early November, grass seed within the wildfire site along Deadman Creek was slow to germinate (seedlings were still quite sparse by late December). The hotter wildfire and summer winds burned off or scoured the duff layer remaining on the soil surface. The cooler fall burns, on the other hand, had a 1-2" layer of charred litter remaining to retain moisture and to shade and protect the soil and emerging seedlings from drying sun and wind. The early June fire may have destroyed seeds not yet shattered from the grass inflorescences, however, the seed bank in the soil should have been sufficient to produce a new crop of seedlings in the fall.

The fence line north of Sandy Mush Road in the Reininghaus unit was surveyed on May 7 for the presence of any candidate plants prior to the discing of a fireline. Although no candidate species were located, abundant Lippia, Navarretia, and Pogogyne were in bloom throughout the area.

## 10. Pest Control

The variety and quantity of pesticides used on Merced NWR was reduced in 1992. Aside from the herbicides (Rodeo, Roundup, 2-4-D) used to control weeds along roads, ditches, parking lots, etc., the only other pesticides/herbicides used were in conjunction with the cooperative farming program and used exclusively for alfalfa.

Karmex and velpar, which provide pre- and post-emergent control of a variety of weeds, was applied only to EF-1. Since EF-5 was scheduled to be rotated out of production and had been treated in previous years for weed infestation, the cooperative farmer felt that treating the stand was an unnecessary expense. Application of malathion was once again required as an alfalfa weevil outbreak occurred.

Weevil infestations have occurred annually since 1987. Discussions with U.C. agricultural extension agents and integrated pest management specialist indicate that production of alfalfa as a cash crop will not be economically viable without some sort of insecticide application or an effective biological control. Unfortunately, a proven biological control has yet to be found leaving insecticides as the only available option.

The experimental release of parasitic weevil wasps (54 Bathyplectes anurus and 290 Microtonus aethiopoides) conducted in 1991 in an attempt to control weevils biologically, was further expanded upon in 1992. Adult weevils were captured in EF-5 and transferred to a two-acre test plot in the EF-1 alfalfa. An attempt to improve the wasps' odds for survival, test areas in both alfalfa fields were off limits to any herbicide or pesticide application. In areas of the country where weevil wasps are successful in controlling weevil outbreaks, it has taken five to six years for wasp populations to build up to provide adequate protection. Even with successful control of weevils by parasitic wasps, weevil damage to alfalfa stands still occurs on an average of one out of every five years.

An aerial application of Roundup in May was applied to EF-2 to control a solid stand of johnsongrass. Suggestions of flooding, burning and grazing the farm field by the Regional Office proved ineffective and/or impractical.

Roundup and 2-4-D was used as needed from spring through fall to control weeds on the auto tour route, water delivery ditches, around pumps and other buildings. 1992 pesticides use on the refuge is summarized in Table 14 and Figure 12.



# Merced National Wildlife Refuge

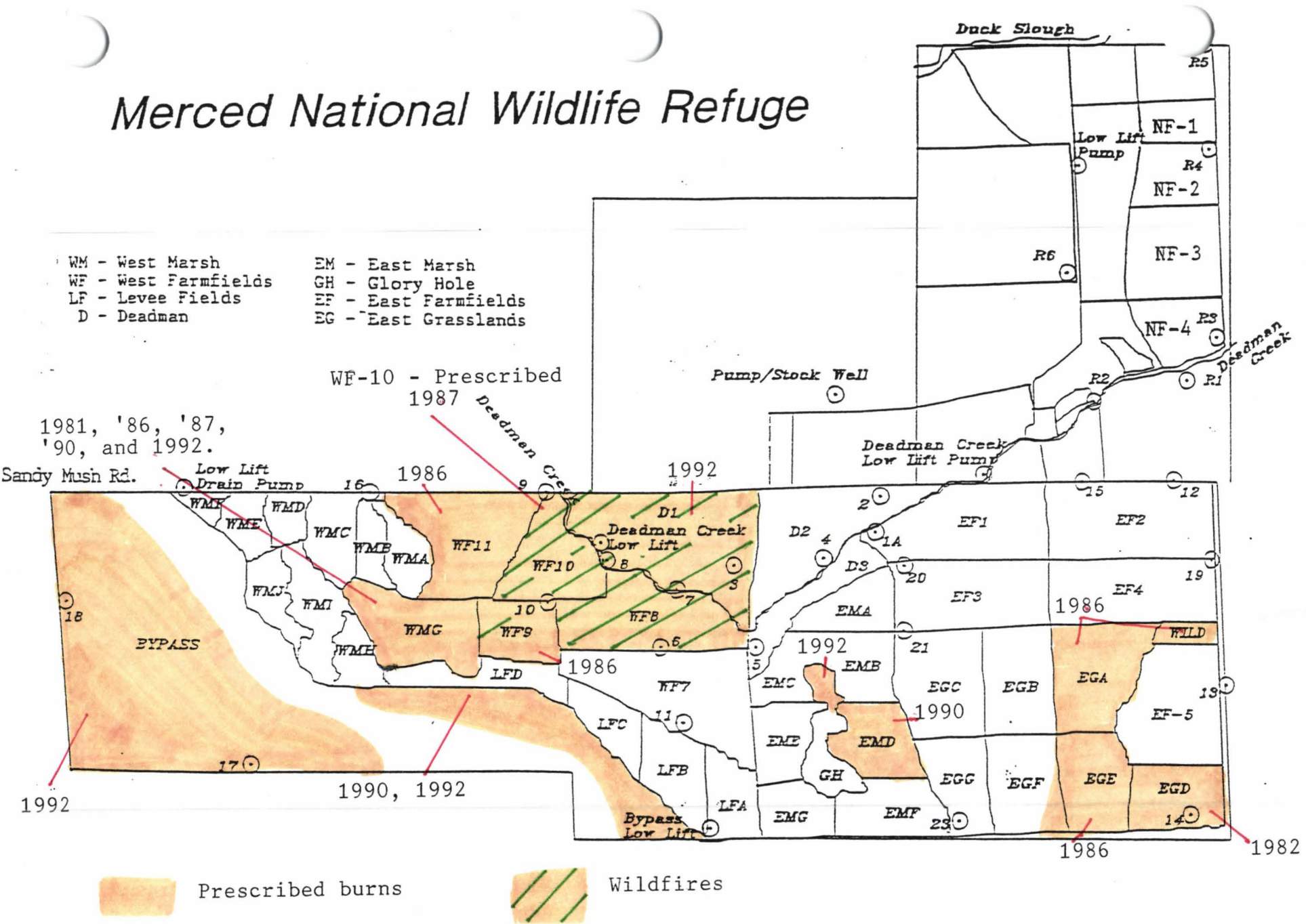


Figure 11. Merced NWR fires, 1981-1992.

# Merced National Wildlife Refuge

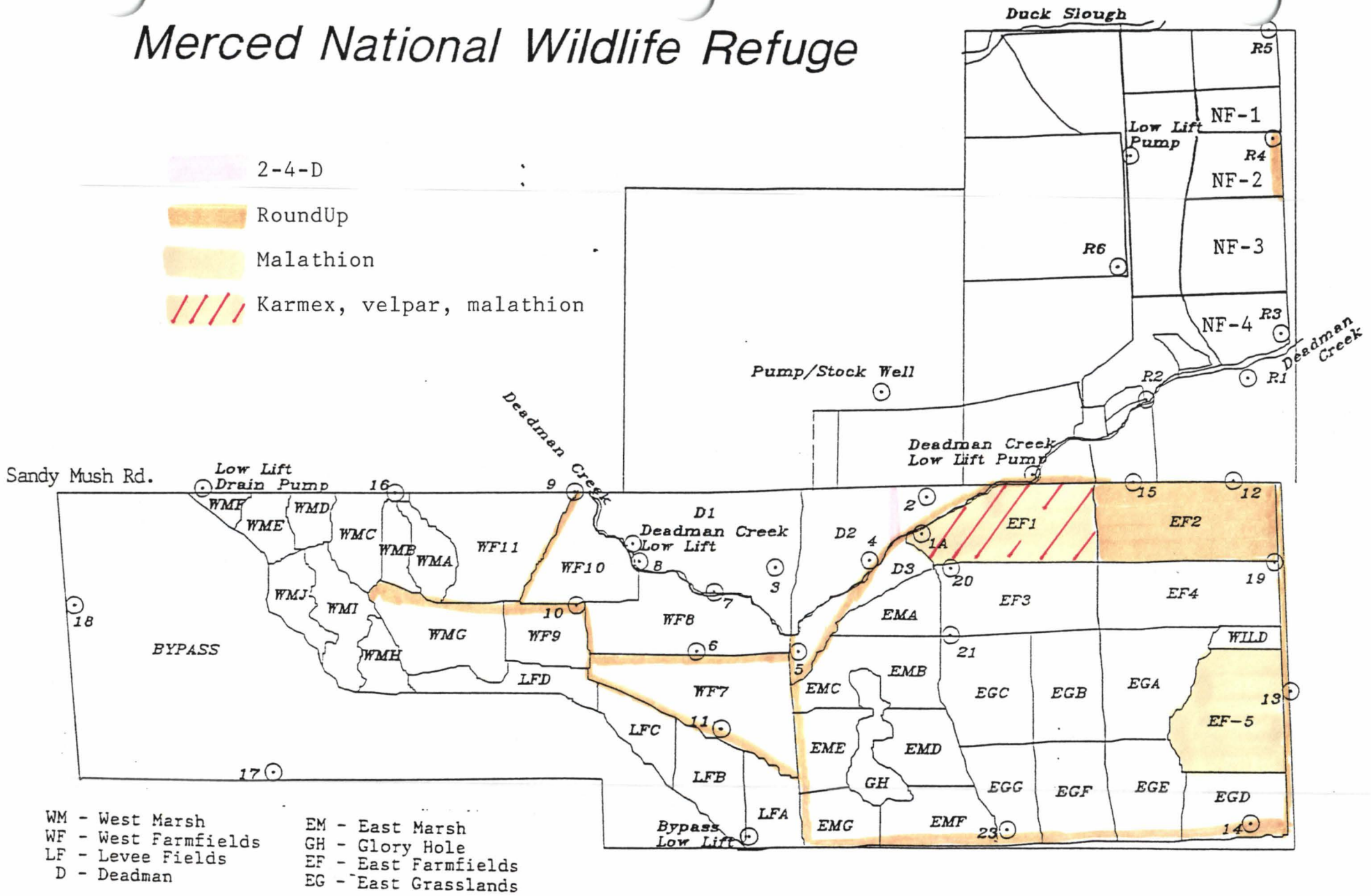


Figure 12. Herbicides/pesticides applied to Merced NWR, 1992.



## 11. Water Rights

On June 2, the Service was notified by the State Water Resources Control Board that the permit for the use of water on Deadman Creek had expired. The permit issued in 1985 was for the Service to prove that it could appropriate up to 3,000 acre-feet (AF) from Deadman Creek. Due to the drought since 1986 and curtailment orders from the Water Resources Control Board, only 235 AF in 1987 and 43 AF in 1992 had been appropriated.

During July 1992, after an inspection of diversion facilities on Deadman Creek by Harry O'Leary of the State Water Resources Control Board, it became apparent that proceeding with a water rights license would not be in the Service's interest as the water right is based on how much water had been diverted in past years under the issued permit. It was decided to apply for an extension of the water right permit in hopes that with normal rainfall levels, the refuge would be able to appropriate a significant amount of water.

In order to efficiently appropriate available water from Deadman Creek, instream check structures were installed in November. Previous to that, water when available came in sporadic surges and continued downstream allowing only a short time period in which to appropriate water. The installed structures will also facilitate distribution of delivered water down Deadman Creek scheduled to begin in 1995.

With the acquisition of the Reininghaus tract (see section D. Land Acquisition), an appropriative water right for Duck Slough and a riparian claim for Deadman Creek were added to the refuge. Flood water from both sources inundated part of the acquisition during 1992 but occurred prior to the closing of the sale to the refuge. A summary of existing water rights is listed in Table 15.

Table 15. Water Rights, Merced NWR, 1992.

Source	Claim	Diversion Rate	Time of Use	1992 Use
Duck Slough	Appropriate (Lic #10139)	3 cfs	4/1-6/1	Flood water/ tailwater. Amount not determined.
Deadman Creek	Riparian (Use #9575)	- - - undetermined - -		Flood water, Amount not determined.
Deadman Creek	Appropriative (Permit #19473)	9 cfs	12/15- 5/31	43 AF

The issue of obtaining delivered water from the Merced Irrigation District (MID) arose in 1986, when the Federal Energy Regulatory Commission (FERC) notified MID that they had never complied with the original 1964 licensing agreement for the New Exchequer Project. Article 45 of this agreement provides that:

*"The licensee shall cooperate with the U.S. Fish & Wildlife Service to determine means of providing up to 15,000 acre-feet of project water and return flow waters to the Merced National Wildlife Refuge."*

The FWS and MID differed in their interpretation of this article. The FWS interpreted the article to mean the 15,000 acre-feet of delivered water was intended to mitigate for the loss of 4,000 acres of wildlife habitat due to inundation of the reservoir, including 17 miles of riparian habitat; as well as alteration of 5,000 acres of riparian land along 51 miles of the Merced River due to changes in flow pattern. MID interpreted the article to mean they were merely to assist FWS in designing a water delivery system, or at most, deliver the water but not pay for the delivery system nor provide the water at no cost.

A ruling was requested of FERC by FWS in 1988. The San Francisco Regional Office of FERC stated that MID must provide 15,000 acre-feet at no cost to Merced annually and that MID must develop the conveyance system needed to delivery the water. MID then appealed the decision to FERC's Washington office, in late 1988.

On February 2, 1989, FERC's Washington office upheld the earlier ruling made by FERC's Regional office in San Francisco. On March 6, MID requested a rehearing of FERC's February 2 ruling concerning how the delivery of water to the refuge should be made. On May 26, 1989, the Washington office of FERC ruled that:

*"Merced Irrigation District (District) shall negotiate with the U.S. Fish and Wildlife Service (Service) to resolve the means of delivering 15,000 acre-feet of water to the Merced National Wildlife Refuge, a schedule for constructing any new facilities, and the timing of water deliveries."*

*"The District shall file, within 90 days of the date of this order, a status report of its discussions with the Service. If the District and the Service have reached an agreement, the District shall file for Commission approval the agreement, with a schedule for constructing any new facilities, a schedule for water deliveries, and the comments of the Service. The Commission reserves the right to require modifications to the agreement."*

*"If after 90 days no agreement is reached, the District shall, within 180 days of the date of this order, file for Commission approval a plan for providing the 15,000 acre-feet of project waters to the Merced National Wildlife Refuge. The plan shall include, but not limited to: (1) functional design drawings of the facility to be used for water delivery; (2) a schedule for development of the water delivery facility; (3) identification of the rate and timing of the water deliveries; and (4) the Service's comments on the plan."*

MID then petitioned the U.S. Court of Appeals in Washington, D.C. for a review of FERC's February 2 and May 26 rulings. The petition for review was accepted by the U.S. Court of Appeals and is currently ongoing.

In the interim, the FWS and MID began negotiating the issue of water delivery, with formal meetings being conducted in July and December 1989. During the negotiation process, the FWS conceded that MID would be unable to deliver water from approximately mid October through February due to flood control responsibilities in their operating license. Several alternatives were offered to MID for delivering water or compensating for the lack thereof, during their shutdown period. Our preferred option at this point is to have MID sell the balance of our undelivered water and reimburse the Service for our winter pumping costs.

Currently, MID's boundary ends at Gurr Road approximately three miles northeast of the refuge. Several water delivery route options were identified during negotiations including:

- 1) Modification of existing MID laterals to dump water into Deadman Creek and deliver to the refuge at Sandy Mush Road (preferred FWS option).
- 2) Extend existing MID lateral to northeast corner of refuge. (Preferred FWS option).
- 3) Modify existing MID laterals to dump water into Deadman Creek and then lift water out of the creek into a new lateral and deliver to the northeast corner of the refuge.

The delivery of 15,000 acre-feet of water to the northwest corner of the refuge, without deductions for delivery losses, was considered a non-negotiable point by the FWS.

During the July meeting MID was willing to deliver water down Deadman to the refuge boundary. However, at the December meeting, MID withdrew this offer and stated that they would not be responsible for the water after it was dumped into Deadman Creek at their district boundary. At this point, we decided further negotiations would only delay the ultimate delivery of our water, so we informed MID to comply with the FERC order and put its' proposal in writing which we (FWS) would then comment on. MID's proposals, along with the FWS comments, were sent to FERC in February of 1991 for a final ruling.

On May 22, 1992, FERC issued their ruling with the major points stating:

*"(A) The licensee, within 6 months of the date of this order, shall install and have the option 4 alternative system operational for delivery of up to 15,000 acre-feet of water to the Merced National Wildlife Refuge (Refuge) as required by article 45 of the license. To enable the transmission of 45 cubic feet per second of flow from the licensee's irrigation system to the Refuge, the licensee shall complete the following activities: (1) clean about a 4 mile section of the existing Benedict Lateral canal; (2) install a 120 foot long pipe to connect Benedict Lateral at its southern terminus to deadman Cree; (3) clean the section of Deadman Creek from the interconnection with Benedict Lateral to the location of the lift station on Deadman Creek, located at the intersection of Deadman Creek and the western edge of Section 32, Twp. 8S, Range 13E; (4) construct a lift station in Deadman Creek; (5) construct a      mile long channel from Deadman Creek to the northeast corner of the Refuge; and (6) make any other facility modifications or additions required to implement a functional water delivery system to the Refuge, under the option 4 scenario."*

*(C) Within 4 months of the issuance date of this order, and after consultation with the U.S. Fish and Wildlife Service (FWS), the licensee shall file with the Commission, for approval, a water release plan to provide up to 15,000 acre-feet of water annually to the Merced National Wildlife Refuge (Refuge) via the option 4 water delivery system. The plan shall include the monthly rate and timing of water releases, and shall include provision for Refuge water needs during the licensee's non-irrigation season. Further, to document compliance with the water delivery specifications, the plan shall also include provisions for filing annual reports with the Commission."*

MID request a meeting with the FWS in July to discuss their mandated responsibility. During the meeting, MID stated that they planned on requesting a rehearing which would delay any progress of the FERC directive for at least two years, should MID and FWS be unable to come to a negotiated settlement.

After much negotiation, the FWS and MID finally agreed to the following settlement:

- MID will delivery 15,000 AF of water to the refuge boundary without losses by 1995.
- MID will construct the needed facilities to delivery 45 cfs water to the northeast corner of the refuge and Sandy Mush Road.
- MID will reimburse the FWS for pumping costs until 1995, a minimum of \$90,000 and a maximum of \$210,000; provided that:
- MID will be allowed to sell the refuge's 15,000 AF of water until 1995 to fund construction of delivery facilities and pay for refuge pumping costs.

## G. WILDLIFE

### 1. Wildlife Diversity

The refuge consists of various habitat types including 800 acres of seasonal and 21 acres of permanent managed wetlands, 800 acres of agricultural fields, 4.3 miles of tree-lined sloughs, and almost 2,400 acres of grassy uplands and wetland swales subject to periodic flooding. The recent additions of the Reininghaus tracts (1990 and 1991) greatly increased the overall diversity of the refuge by adding a large mosaic of native grasslands and unmanaged wetlands to the land base.



Neotropical migratory birds, such as this yellow-rumped warbler, use refuge agricultural lands as well as weedy uplands and riparian habitats.  
2/92 GRZ

## 2. Endangered and/or Threatened Species

An adult and immature bald eagle (Federal endangered) were observed on January 1. Individual bald eagles were occasionally observed stooping on waterfowl in the East Grassland units through January.

Fourteen Aleutian Canada geese (Federal threatened) were observed in WF-9 and 11 foraging with cackling Canada, snow, Ross', and white-fronted geese during early December. None of the Aleutians were banded, but subspecies identity was verified by staff experienced in observing those geese.

Seven greater sandhill cranes (State threatened) were observed with 150 lesser sandhills in a receding, shallow EM-E on November 4.

A pair of Swainson's hawks (State threatened) was first observed in the Deadman Creek area on April 4. The pair began incubating eggs in a cottonwood along Deadman Creek late April. Although a wildfire in June (see F.9) killed the tree, at least one chick was observed soon after the fire and had fledged from the nest by mid-July. An immature was observed with another Swainson's (of unknown age) over the shop area in mid-August. The two were observed battling over a small mammal in mid-air, one swooping down to catch the released prey. A second pair was observed in the nest area in late August.

Small numbers (2-40) of white-faced ibis (Federal candidate 2) regularly roosted in the mid cell roost of the Glory Hole during January through March. Ibis returned to the refuge in August when 10 began using the reflooded north cell of the Glory Hole to forage at the encroaching water's edge.

A ferruginous hawk (Federal candidate 2) was observed standing in EF-2 on November 13. Two additional birds were observed over the East Farmfields and off of Turner Island Road on December 29.

Table 16. Monthly Waterfowl Use-Days on Merced NWR, 1992.

<u>Month</u>	<u>Duck Use-Days</u>	<u>Goose Use-Days</u>	<u>Total Waterfowl Use-Days</u>
Jan	281,790	1,793,846	2,075,636
Feb	308,763	1,180,300	1,489,063
Mar	267,282	485,925	753,207
Apr	135,150	112,800	247,950
May	8,649	0	8,649
Jun	4,860	0	4,860
Jul	3,286	0	3,286
Aug	10,850	0	10,850
Sep	121,350	390	310,390
Nov	1,200,000	150,000	1,350,000
Dec	1,302,000	170,500	1,472,500
Totals	3,953,980	3,893,761	7,847,741

Fall flood-up was started in September as done the previous year to provide early fall habitat for migrants and to compensate for the delay in the flood-up of private wetlands through much of October. Large concentrations of mallards and pintails flocked into the first flooded units in the East Grasslands. Numbers were high (approximately 15,000), relative to past years, through October until the opening of the waterfowl hunt season off-refuge at the end of the month. Numbers doubled at this time as birds flew in from the Grasslands hunting clubs. Large flocks, primarily pintails, flew in and concentrated in EG-B and C on hunt days and flew out to the clubs every evening throughout November until the season split. However, numbers remained relatively constant throughout during the split as many of the birds remained on the refuge to forage in the flooding ponds.

A total of 3,953,980 duck use-days were recorded for the calendar year (Table 17). This figure represents a 53% increase over than recorded for 1991 and a 55% increase over the 10-year average (1983-1992). However, when factoring in the high population levels of the early 1980's, trend analysis over that 10-year period indicates no pattern of change in use levels over time ( $r_s = -2.432E-02$ ,  $p = 0.398$ ).



Table 17. Waterfowl Use-Days on Merced NWR, 1983-1992.

Year	Duck Use-Days	Goose Use-Days	Total Waterfowl Use-Days
1983 <sup>a</sup>	5,010,735	1,334,700	6,345,435
1984	2,550,060	1,271,100	3,821,160
1985	938,190	1,322,280	2,260,470
1986 <sup>a</sup>	1,957,290	1,231,200	3,188,490
1987	2,285,250	1,709,850	3,995,100
1988 <sup>b</sup>	2,860,000	2,940,000	5,800,000
1989	1,949,250	2,368,500	4,317,750
1990	1,427,063	2,605,527	4,032,590
1991	2,581,627	3,289,850	5,871,477
1992	3,953,980	3,893,761	7,847,741
10-yr. Average:	2,551,345	2,196,677	4,748,021

<sup>a</sup> - Flood year.

<sup>b</sup> - Figures derived from sources other than PPBE reports.



The peak count of 67,000 geese on Merced during January was the highest number recorded in years.  
1/92 GRZ

Geese were present on the refuge during January - April and October-December. Numbers increased from approximately 40,000 to over 60,000 during the first week of January. A peak of 65,000+ were observed by late January. The major foraging areas included the cornfields in Deadman 1 and EF-2 as well as refuge marshes and other agricultural units (WF-7: wheat and rye; WF-10: barley; EF-3/4: pastures). Goose numbers declined to 30,000 by early February and 10,000-20,000 by late February/mid March as refuge foods were depleted and grass began greening up in flooded pastures the East Grasslands area. Geese left the refuge and surrounding areas completely by late April - early May.

The return of geese in the fall was first noted on October 31 when approximately 300 snow geese were observed in LF-A. Within 1 week, 2,000 were present browsing in EF-4 and the Bypass burn unit and grubbing for alkali bulrush tubers in EM-D & E. This number increased to 10,000-15,000 white geese (predominately snow) and 1,000 white-fronted geese by mid-November. White geese numbers declined to 5,000 during the split before hunting season while white-fronts continued to increase to 1,800. After the resumption of the hunting season, the number of white geese quickly increased to over 20,000 (95% Ross) by December 5 and remained at this level through the month.



Arctic nesting geese fed extensively on the green browse of the winter wheat fields in West Farmfield 7 unit... 1/92 GRZ

Throughout this period, geese roosted in EG-B and C and in several East Marsh, West Marsh, and Levee Field units. White-fronts began loafing and foraging in flooded sloughs north of Sandy Mush Road in early December. The birds browsed in the agricultural fields and loafed and grubbed for marsh vegetation and tubers in the marsh units from mid-November through December. The wheat in WF-9 & 11 was heavily browsed within 2 weeks and the geese switched to the alfalfa in EF-1 and 5 in early December. As the heavily grazed wheat fields slowly recovered, some birds broke into smaller flocks and resumed foraging in the wheat fields by mid-December. Several thousand snow geese began grubbing in the recently germinated wheat in EF-2 around December 10. Larger, mixed flocks utilized the field periodically as the seedlings matured throughout the month. Two hundred white-fronts were observed in the wheat field of Deadman 2 in early December, but for the most part, this small field received very little use for the remainder of the year. No use was observed in the EF-3 and 4 pasture units due to their condition (see F.4). However, large concentrations flocked into the pastures adjacent to the former ranch compound north of Sandy Mush Road by late December.

A statewide white goose survey was conducted on December 2. Over 41,000 snow and Ross' geese in the northern San Joaquin Valley, compared to 35,000 on a similar date in 1991. During the split season, the birds were equally divided between the north and south grasslands, but on shoot days, moved onto closed zones at Merced NWR and Los Banos WA.

Miscellaneous observations included: a blue-phase Ross' on February 29 and December 1 and 14; 11 tundra swans in EG-C(E) on November 6; and 6 partial albino (cream-colored) white-fronted geese on December 2.

A total of 3,893,761 goose use-days were recorded for the calendar. This figure represents an 18% increase over that recorded for 1991, and a 77% increase over the 10-year average (1983-1992). Trend analyses over that 10-year period also indicates an upward trend in goose use over time ( $r^s = 0.877$ ,  $p = 0.0001$ ). This increase is being attributed to management practices that have increased the effectiveness of the sanctuary (realignment of the waterfowl hunting area in the early 1980's and elimination of pheasant hunting in 1991) and a general increase in the cackling Canada goose population.



#### 4. Marsh Birds

Approximately 3,000 lesser sandhill cranes used the refuge as a night roost during January and February. Of the 2,570 cranes tallied during a sunrise survey on February 6, 90% roosted in the East Grasslands units, 50% in EG-E, and 40% in EG-B while the remainder roosted in East Marsh F and Levee Field B. Over 80% of the birds flew off the refuge to the south, but by mid-morning, 300 cranes returned in small flocks to the cornfield in Deadman 1 and 200 to a resprouting clover field in EF-41. Day-use by 500-1,000 cranes was typical throughout February as birds returned for corn in Deadman 1 and EF-2 or browse in the pastures and EG-A. Over 90 flew in to roost in EG-C as late as March 27. The last birds (2) on the refuge were heard midday of April 3.



Sandhill cranes are a highly visible winter resident of Merced NWR. They forage extensively in agricultural lands such as this cornfield in East Farmfield 2 ... 1/92 GRZ



However, many use Merced as a night roost and fly off refuge to forage during the day. 11/92 GRZ

Fall migrating cranes were first recorded in the East Grasslands areas on September 14 when 4 were observed on Sunrise Ranch NWR. Use of Merced NWR was first observed when a pair flew into in EG-C(W) on September 11. Birds began using that site as a night roost and numbers increased to 100 by mid-September. By mid-October, day-use on the refuge exceeded 2,000. Birds primarily loafed and foraged in flooding units (rapid flood-up schedule similar to last fall). Small numbers were also observed during the day in newly drilled wheat fields, grubbing for invertebrates and ungerminated wheat seeds and Canadian trapper peas. However, up to 1,000 cranes were frequently observed in these fields during the early evenings and then flying to an off-refuge night roost for several weeks. Several hundred birds foraged and loafed during the day in the agricultural fields in the East Farmfield and Reininghaus units surrounding the EG-C roost. However, during this time, most day-use by cranes was off-refuge with birds roosting on Merced at night. During an October 15 survey, many of the 2,000 cranes observed in the late afternoon flew south off the refuge an hour before sunset, presumably to feed in a nearby grain field before returning to roost. Approximately 11,500 cranes were recorded coming into roost at dusk during that survey (almost double the number recorded in a similar October 1991 survey). Over 11,000 cranes were again recorded coming in to roost in a mid-November survey.

The cranes primarily roosted in EG-B and C, however, a small number roosted in LF-B, EM-F and G, and, during flood-up, in WM-I and J.

Overall crane day-use appeared to have been slightly less than occurred last year. During flood-up, many of the cranes would then fly off-refuge before sunrise, however, 2,000-8,500 birds would then fly back on-refuge by mid-morning to forage in marsh units and sloughs. The cranes were not provided with as much mowed grain as last year (almost continuous supply of barley and corn in 1991). Only a small amount of corn (20 rows) in WF-7 adjacent to LF-A and a narrow swath of milo in WF-8 were mowed for the cranes in mid-October and mid-November, respectively. After flooding LF-A, the cranes quickly consumed the corn, however, only a small number (less than 200 at a time) showed any interest in the milo. By mid-December, only small numbers of cranes were observed in the agricultural units in midday.

Sandhill cranes made extensive use of off-refuge lands. Birds were observed returning from mowed grain fields to the south, east, and north. Much of the early fall crane use during the recent years was in private fields to the south where they found an abundant supply of mowed/disc'd corn and barley. Most of this food supply will be eliminated because much of the croplands will be converted from cereal grains to crops such as cotton, sugar beets, and tomatoes. Thousands of cranes were observed grubbing for waste rice in burned fields off Gurr Road and waste barley in mowed fields to the south in early November. However, by mid-month, many of the rice, corn, and barley fields had been disked under, eliminating this food source.

Equipment operator Grissom witnessed an unusual event in late March. A coyote, crouched along the northern EG-B road, leaped several feet into the air and captured a crane flying low out of the unit. After much wing-bashing, the coyote trotted off with its prize.

An albino sandhill crane was observed by several individuals between December 26 and 28. Based on observation dates, the bird apparently moved from the North Grasslands (near the Salinas club) into the East Grasslands (off Gurr Road).

Great blue herons (3-10 through July), great egrets (10-15 through March), and snowy egrets (approximately 45 throughout March and 15 in April) were frequently observed foraging in flooded ponds and ditches. Up to 30 egrets roosted in the mid-cell roost of the Glory Hole with white-faced ibis in February and March.



Twenty snowy egrets and 10 ibis immediately flocked into the reflooded north cell of the Glory Hole in late August to forage at the encroaching water's edge on the islands. Although large numbers of egrets roosted in the Glory Hole and in the flooded East Grassland units in the past (August-November), only 20 great egrets flew into EG-C in mid-September. However, by mid-October, 160 snowy egrets and 35 great egrets flew in from the south at sunset to roost (with cranes) in EG-B. Large numbers (50-100) of egrets were observed foraging in flooding marsh units from October through mid-December and in the reflooded sloughs on Section 35 in early December. Several egrets were observed catching and consuming mice as well as crickets and other invertebrates which presumably flushed out of the dry pond bottoms as the water encroached.



Great egrets forage for food in corn stubble fields as well as wetlands. 1/92 GRZ

Between 55 and 80 black-crowned night herons were flushed from the Glory Hole on February 27 and April 3. Ninety percent of the birds came out of the northern edge of the south cell and the remainder from the roost in the mid cell. Over 12 were flushed from the area in late April. Subsequent nesting was not confirmed, however, no night herons were flushed from the Glory Hole in late May. At least 10 night herons roosted in the mid cell in August and September.

Only 8-40 white pelicans were observed from January through March. The single, injured pelican, present since last year, continued to be observed through early April. When last observed, it flew, but only 30 yards. From 35-80 pelicans were occasionally observed loafing on an EG-C dike in November and December.

Ten to 15 double-crested cormorants were observed loafing on pond dikes or within the deep waterholes in the Mariposa Slough channel throughout March and early April. Single cormorants were occasionally observed during the fall.

A green-backed heron was observed at the inlet into the mid cell of the Glory Hole on May 8.

#### 5. Shorebirds, Gulls, Terns, and Allied Species

Shorebird totals increased through March as pond water levels were allowed to drop to stimulate moist-soil plant germination. The peak number for the year (17,150 recorded on March 27 - Table 18) exceeded last year's total. However, numbers fluctuated widely during the period as water level conditions changed and as the migrating birds passed through the area. This staggered drawdown and slow evaporation of the ponds provided the maximum benefit for migrating shorebirds. Black-bellied plovers were regularly observed loafing on the dikes in EG-B or F. Long-billed curlews were observed in EG-E, EF-4, and the privately owned (Newhall) uplands south of the Refuge. The large number of gulls observed on January 28 loafed in EG-F, a favorite goose roost as well, and were probably scavenging the few geese that died from avian cholera. Avocets were primarily observed in EG-B, where they initiated nesting in April after the drawdown of the checks. Several avocet and stilt broods were observed in May and June in the EG-B/C area, however, many of the ponds were dry or nearly dry by this time which reduced survival of the chicks. Although several checks were irrigated in mid-May, the fledging success of the birds is unknown.

Fewer shorebirds are typically observed at Merced in the fall than in the spring. This is due to many shorebirds migrating through in August prior to flood-up, and once initiated in September, the rapid flooding of each pond to depths unsuitable for most foraging shorebird species.



Table 18. Shorebird totals, Merced NWR, Spring 1992.

SPECIES	1/27	1/28	2/13	2/27	3/27	4/4	4/27	9/16	10/15
Stilt	100	85	-	575	370	425	110	75	65
Avocet	-	-	-	17	145	145	135	-	-
Yellowleg	-	-	-	40	65	90	1	-	15
Curlew	20	-	55	120	-	-	-	-	-
B-b plover	-	100	-	700	2700	1265	-	-	-
Dowitcher	200	10	-	1600	7200	7250	2450	-	25
Killdeer	-	-	-	-	20	10	25	5	10
Dunlin	70	20	-	100	5300	3200	355	-	10
Sandpiper	-	-	-	-	1350	1580	3200	-	120
Herr. gull	-	10	-	12	-	-	-	-	-
Ring-b. gull	-	50	-	-	-	1	-	-	-
Whimbrel	-	-	-	-	-	5	7	-	-
Semi-palm. plvr	-	-	-	-	-	-	20	-	-
<b>TOTALS</b>	<b>390</b>	<b>275</b>	<b>55</b>	<b>3,164</b>	<b>17,150</b>	<b>13,971</b>	<b>6,303</b>	<b>80</b>	<b>245</b>

A variable number were observed throughout the flood-up, however, the recorded peak of 3,000 birds occurred in early November (1,400 dowitcher, 900 dunlin, 300 sandpipers, 200 stilts, 150 yellowlegs, etc). Well over 100 plovers (killdeer and/or black-bellied plover) were scattered throughout much of the prescribed burn areas in the West Bypass in early November and were probably foraging for invertebrates beneath the 1-inch layer of charred duff. Long-billed curlews (55 seen in mid-October) were occasionally observed from mid-October through December, foraging in flooded swamp timothy and jointgrass in the marsh units. A large number of curlews were observed during the flood-up of sloughs on Section 35 in early December. Short, rank vegetation flooded with sheet water created wet meadows adjacent to the sloughs which were attractive to the curlews as well as egrets and cranes.



Shorebirds, such as these black-bellied plovers and black-necked stilts use levees between management units as loafing sites. 1/92 GRZ

## 6. Raptors

Twenty-two red-tailed hawks, 8 northern harriers, and 6 kestrels were tallied on January 27. A pair of great-horned owls nested in a pine in front of the office. One downy owlet fell from nest and was given to the raptor rehabilitation group in Merced, however, the second owlet fledged from the nest in late May. Other incidental observations included: a sharp-shinned hawk on January 14; a Cooper's hawk along Deadman on January 16 and 27 and in EG-D on December 1; a rough-legged hawk on January 13 and 16 and February 8; a burrowing owl in Deadman 1 on January 16, at a burrow in the Wild unit on January 16 and 28, at a burrow along the eastern EF-2/4 road January through April, and at a burrow along the western EF-5 road in mid-October; one black-shouldered kite on January 27 and 4 kites in the EG-A cottonwood roost in early October; and a red-tailed hawk pair building a nest in the eucalyptus near the new entrance road on February 19 (also see section G.2).



Great horned owls use the scattered stands of trees (EG-D) for nesting and as daytime roosts.  
12/92 GRZ



7. Other Migratory Birds

Tens of thousands of brewer's, redwinged, and tricolored blackbirds streamed into the Glory Hole roost each night by mid-September. Based on brief counts of tens of thousands of birds flying in during several 10-second periods in mid-October, there might very well be over 1 million blackbirds roosting in these cattails.



Mourning doves are present as resident nesters and as winter migrants. 1/92 GRZ

16. Marking and Banding

Approximately 117 goose collars (95 Ross', 14 snow, 5 cackling Canada, 3 white-fronted) were read by the biological staff in regular surveys from January 14 through March 6. Higher priority issues on the Complex, primarily disease abatement near Modesto, and tree planting at San Luis and Merced, limited the time allocated for band observations during that period. Twenty-two Ross' collars and 1 snow goose collar were read as incidental observations during other activities in December.

17. Disease Prevention and Control

A total of 160 dead birds (78% snow and Ross' geese) were picked up during the calendar year (Table 19). This represented 148 in the 1991-92 disease year (part) and 12 in the 1992-93 disease year. The daily losses remained stable from January through early February but quickly declined. Over 65% of the carcasses were recovered from EG-B/C/F/G and EM-B/C/D, ponds that are heavily used for loafing. Losses resumed in the fall when 1 Ross' goose was picked up in EM-E on November 6 and another 4 Ross' and 7 snow geese were salvaged between December 8 and 31. Most birds throughout the year were field-diagnosed as having died from avian cholera. Three snow geese were shipped to the National Wildlife Health Research Center. Two were diagnosed with avian cholera and 1 with lead poisoning.

A sick coyote pup was euthanized on July 13. Although no diagnostic tests were performed, the staggering and weak pup exhibited some signs of distemper. No other sick coyotes were observed in the following weeks.

Table 19. Birds picked up in disease abatement activities at Merced NWR, weekly totals 1991/92 & 1992/93.

Species	----- 1991/92 Disease Year (part) <sup>1</sup> -----												-- 1992/93 Disease Year (part) ---					1992 Totals				
	January				February				March				November				December					
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1		2	3	4	5
Ross'	8	6	3	14	5	1	-	-	-	1	-	-	1	-	-	-	-	-	-	4	-	43
Snow	20	13	15	12	8	3	-	-	3	-	-	-	-	-	-	-	-	2	1	1	3	81
White-front	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Cackler	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	3
Mallard	-	-	1	1	3	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	6
Pintail	1	-	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Green-wing	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Gadwall	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Shoveler	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Coot	-	-	13	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17
Stilt	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	29	19	34	32	23	5	0	1	3	4	0	0	1	0	0	0	0	2	1	5	3	161

<sup>1</sup> Official disease year runs from April 1 - March 31.

## H. PUBLIC USE

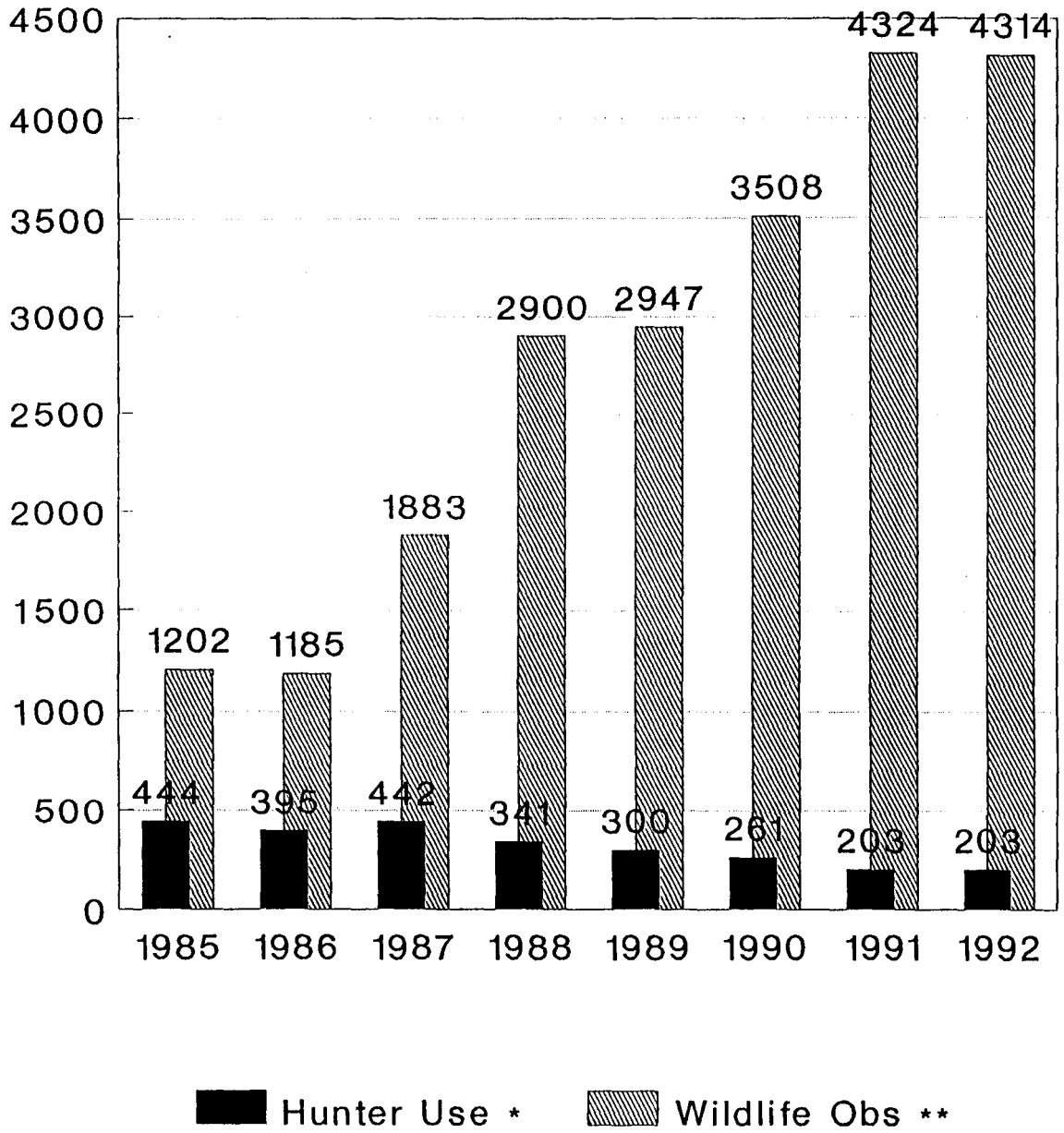
### 1. General

Overall public use on Merced NWR remained virtually unchanged from 1991 with a total of 4,517 people visiting the refuge (Figure 13). Non-consumptive use (i.e., photography, wildlife observation) comprised 96% of visitor use. Overall number of hunters remained at 203 persons representing 4% of the visitor use at the refuge.

As would be expected, visitor use coincided with peak numbers of waterfowl and other migratory birds. Peak visitor use with visitation exceeding 500 people/month occurred in January, February, March, November and December. Figure 14 summarizes monthly visitor use trends for 1992.



Non-consumptive use, such as birdwatching, continues to be the major public use activity on Merced NWR. 2/92 GRZ



\* Waterfowl & pheasant through 1990,  
 waterfowl only in 1991 & 1992.  
 \*\* Includes photography.

Figure 13. Consumptive Vs. Non-Consumptive Use.



# Monthly Public Use, Merced NWR, 1992

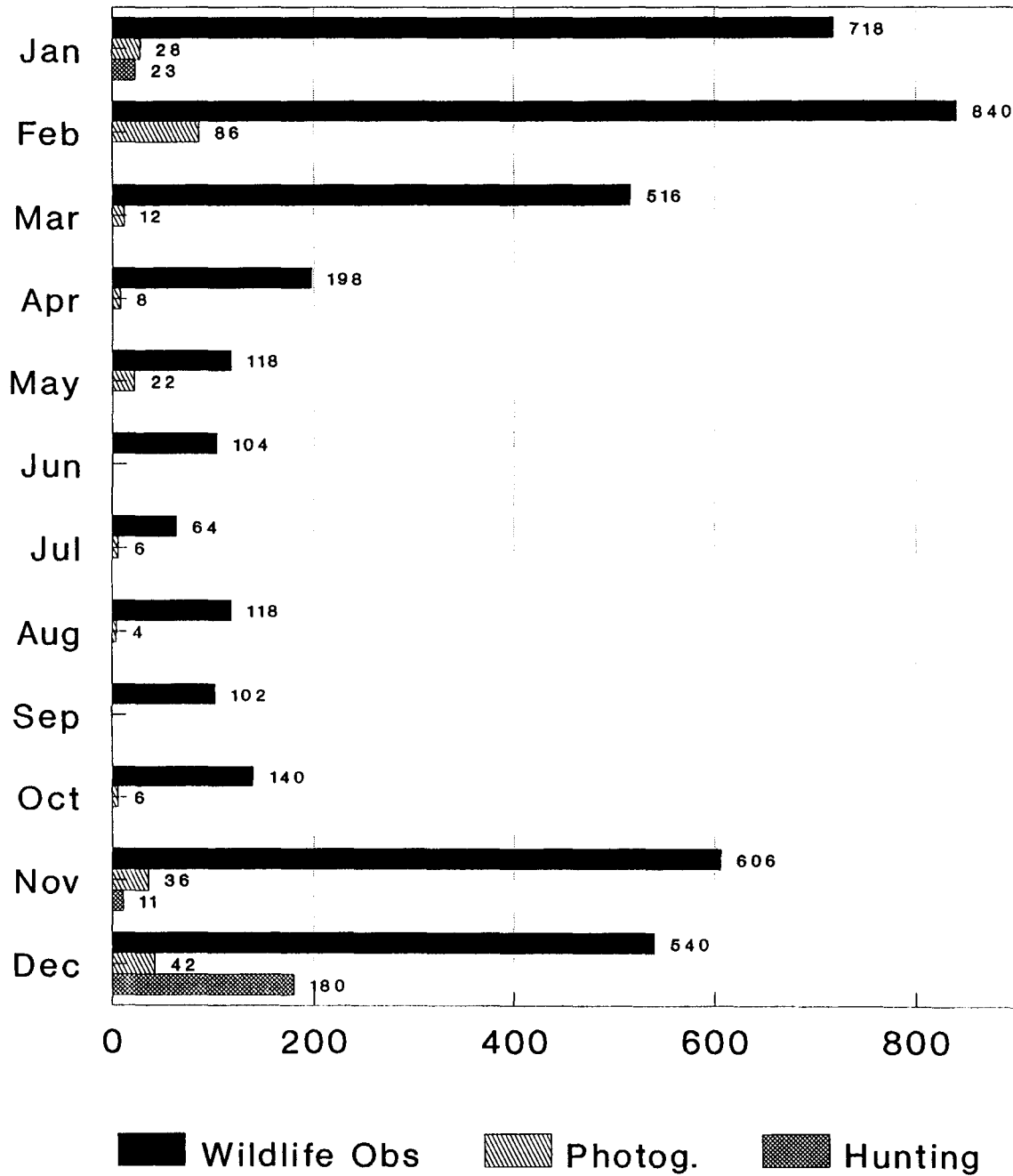


Figure 14. Public Use on Merced NWR.

With the completion of the wildlife observation platform, information kiosk, and interpretive panels, visitor satisfaction and use is expected to increase significantly.

#### 5. Interpretive Tour Routes

The new entrance road constructed in 1991 was opened for use in April after signs, kiosk, and restroom facilities were relocated. The routing of visitors away from the refuge office and shop compound to along managed wetlands improved the security of refuge property while enhancing visitor's wildlife viewing opportunities.

#### 8. Hunting

Prior to 1991, pheasant hunting was permitted on the refuge. Due to incompatibility of the pheasant hunting program (specifically the impacts to non-target species plus impacts to non-consumptive users), the program was eliminated.

A total of 374 acres are included in the waterfowl hunting area. The 645 acre Eastside Bypass is also opened to waterfowl hunting if flooded by storm runoff, however, it was not during the 1992-93 season. Nine sets of double blinds are located in the 267 acre West Marsh and LF-D, and two three-man blinds are located within 107 acres of WF-9 and WF-11. The daily hunter quota for 1992-93 was 24.

The hunt program is cooperatively administered by the Service and the California Department of Fish and Game (CDF&G) and all hunting is done on a reservation and/or first-come, first-served basis. The refuge was open for the second half of the 1992-93 duck season December 5 - January 9 until noon on Saturdays and Wednesdays. A total of 248 waterfowl hunters used the refuge during the 1992-93 season which represents 94% of the maximum 264 hunter use days available.

A total of 286 ducks and 203 geese were harvested during the season yielding an overall hunter success rate of 1.97. Table 20 summarizes and compares species composition of the waterfowl bag for the past six seasons.

Since waterfowl hunters are designated blinds and must shoot only from their blind (no free roam or jump shooting except when the Bypass floods), the success rate of each blind is monitored to evaluate effectiveness of the blind arrangement. Table 21 displays overall blind success for the season. Figure 15 displays waterfowl harvest.

Prior to 1987, there were actually only two blinds that were very successful. Although no blind relocation took place during 1992, several blinds have in past years been moved from sites on contour dikes and roadsides to improve hunting opportunity/success at all blinds.

Table 20. Overall blind success during 1992-93 waterfowl season, Merced NWR.

Date	# of Ducks	# of Geese	Total Waterfowl	# of Hunters	Hunter Success
Dec. 5	30	4	34	20	1.70
Dec. 9	18	14	32	23	1.39
Dec. 12	13	16	23	21	1.10
Dec. 16	20	23	43	23	1.87
Dec. 19	15	31	46	24	1.92
Dec. 23	25	43	68	22	3.09
Dec. 26	33	37	70	23	3.04
Dec. 30	46	11	57	24	2.38
Jan. 2	40	17	57	24	2.38
Jan. 6	36	6	42	24	1.75
Jan. 9	10	7	17	20	.85
Totals:	286	203	489	248	Avg 1.97

Table 21. Waterfowl hunter success per spaced blind, 1992-93.

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<u>Blind</u>	<u># of Ducks</u>	<u># of Geese</u>	<u>Total Birds</u>	<u># of Hunters</u>	<u>Hunter Success</u>
A	2	43	45	31	1.45
B	4	57	61	30	2.03
1	15	8	23	17	1.35
2	34	12	46	21	2.19
3	34	11	45	22	2.05
4	25	13	38	22	1.73
5	47	7	54	22	2.45
6	48	4	52	22	2.36
7	45	16	61	21	2.36
8	15	17	32	18	1.78
9	<u>16</u>	<u>13</u>	<u>29</u>	<u>22</u>	<u>1.32</u>
Totals:	286	203	489	248	Avg = 1.97

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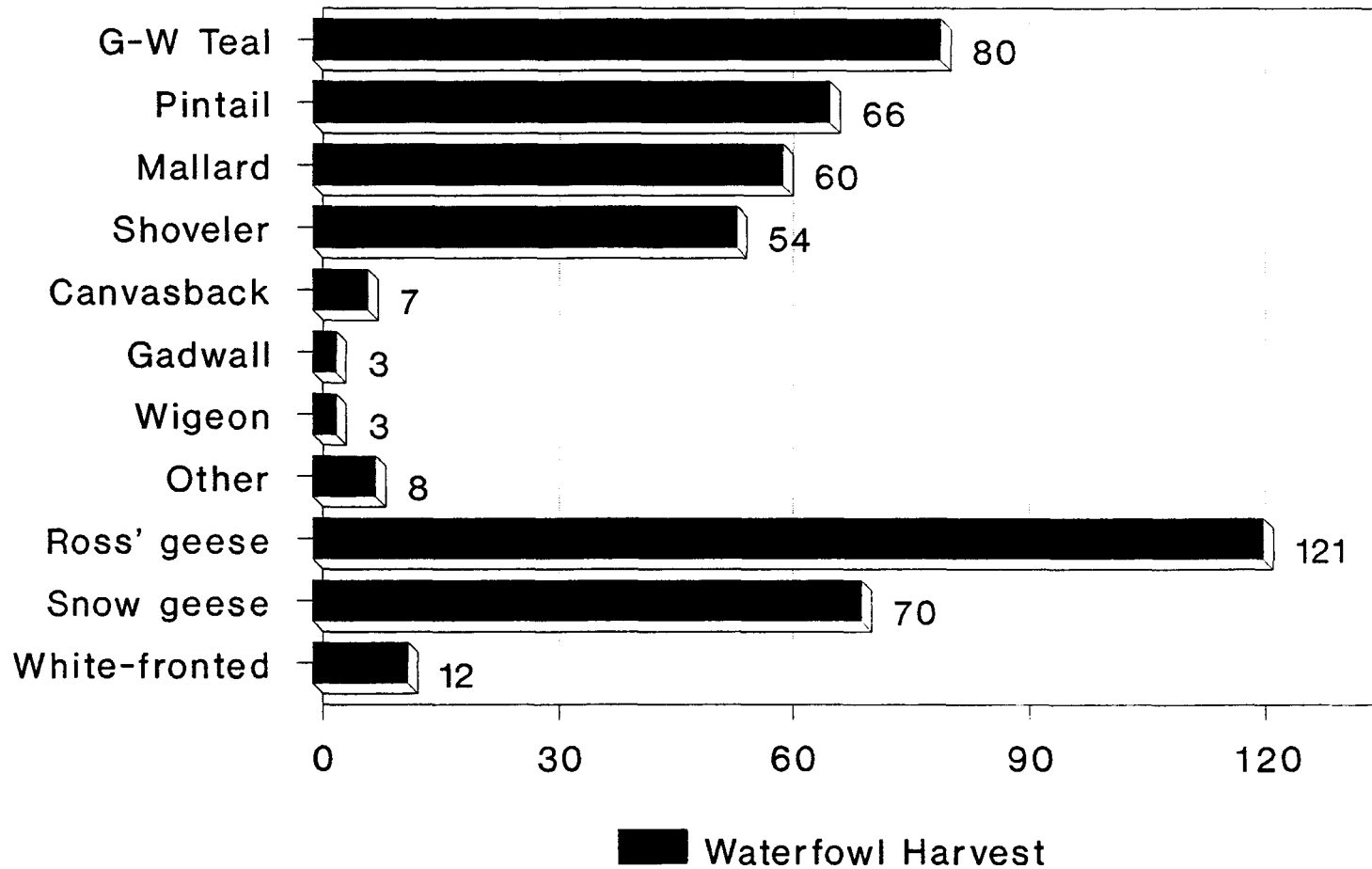


Figure 15. Species composition of harvested waterfowl on Merced NWR, 1992/93.

17. Law Enforcement

Law enforcement activities on Merced NWR and the San Luis Complex coincide basically with the migratory bird hunting seasons (September through early January). During 1992, two station personnel exercised law enforcement authority on the Complex. ARM Stenvall conducted the majority of law enforcement patrols on Merced and was assisted by ARM Melanson during the waterfowl season. ARM Stenvall also conducted law enforcement activities on San Luis and Kesterson NWR throughout the waterfowl season. Five violation notices were issued on Merced NWR as follows:

Exceeding 25 shotshell limit .....	2
Hunting in closed area .....	1
Possession of Alcoholic Beverages...	1
Taking of protected species .....	1

Refuge Officers Melanson and Stenvall also conducted law enforcement activities on private duck clubs in the area as well as patrolling the area refuges on the opening day of dove season. No violation notices were issued.

Complex law enforcement personnel attended the annual 40 hour in-service refresher/training. In addition, Officers Melanson and Stenvall qualified with during the year.

## I. EQUIPMENT AND FACILITIES

### 2. Rehabilitation

Major rehabilitation of the deep wells on Merced occurred during 1992. A service contract with Anderson Pump Company was issued to conduct all rehabilitation work. \$55,000 was provided for this through drought emergency funds (see section E.5 funding). Seven wells (5, 6, 8, 10, 11, 16 & R6) underwent major rehabilitation which involved removing sediments and oil from wells, replacing or rebuilding bowls, tubing, shaft, strainers, etc. Motor load adjustments and pump tests were conducted for all wells used for the marsh management program. Table 22 displays deep well outputs for 1992 and changes in output from 1991.

The concrete pipeline from Pump 1A to the Pump 20 ditch was replaced in October with a PVC line. The concrete pipeline had been irreparably damaged by farming operations in 1990 and prevented the use of several deep wells for managing wetland units. Installation of the PVC line (at a 4 ft. depth as opposed to the 3 ft. depth) was carried out by Weimers Irrigation Supply for a total cost of \$4,500.

A complete rehabilitation and rerouting of the Pump 13 ditch and rehabilitation of the Pump 14 ditch to EG-E was completed in April. Washouts of the existing ditches were so common and widespread that the pumps could not be used for managing important wetland units. Williams Land Leveling completed ditch work with two 23 cubic yard scrapers for \$8,500. In addition, Williams Land Leveling also rehabed and raised existing roads from Pump 16 to West Marsh G, the West Marsh G/West Marsh H/I/J boundary road, and the Pump 8 to Pump 10 road.

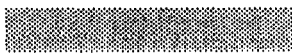
Class II road base was applied to the Pump 16 road, Pump 10-Deadman Creek to Pump 9 road, as well as the Pump 6 and Pump 11 roads for a total cost of \$18,200, creating all weather access to important wells and diversion structures.

Table 22. Volume, change in output, and cost of water for deep wells on Merced NWR.

Well #	1991		1992		% Change Output	Cost Per AF
	CFS	AF/Day	CFS	AF/Day		
1	2.91	5.8	2.73	5.4	- 6	14.21
2	2.86	5.7	-	-	-	-
3	-	-	-	-	-	-
4	2.42	4.8	-	-	-	-
5	1.73	3.4	2.44	4.8	41	17.49
6	2.91	5.8	3.39	6.7	16	16.00
7	-	-	-	-	-	-
8	.84	1.7	1.70	3.4	102	11.75
9	1.70	3.4	2.18	4.3	28	12.09
10	1.36	2.7	3.54	7.0	160	12.53
11	3.06	6.1	3.28	6.5	7	12.11
12	2.95	5.9	2.88	5.7	- 3	13.74
13	2.56	5.1	2.44	4.8	- 5	11.63
14	3.15	6.2	1.92	3.8	- 39	15.12
15	2.83	5.6	-	-	-	-
16	2.25	4.5	2.35	4.7	4	14.20
17	-	-	-	-	-	-
18	-	-	-	-	-	-
19	2.80	5.5	2.57	5.1	- 8	14.53
20	3.46	6.9	3.21	6.4	- 7	14.60
21	1.72	3.4	1.73	3.4	0	21.28
22	-	-	-	-	-	-
23	2.22	4.4	2.28	4.5	2	17.60
R1	2.55	5.2	-	-	-	10.01
R2	2.44	4.8	-	-	-	9.56
R3	2.78	5.5	-	-	-	8.43
R4	.79	1.6	-	-	-	10.46
R5	4.77	9.5	-	-	-	10.84
R6	1.8	3.6	3.09	6.12	100	9.25



Wells rehabilitated in 1992.



Wells rehabilitated in 1991.

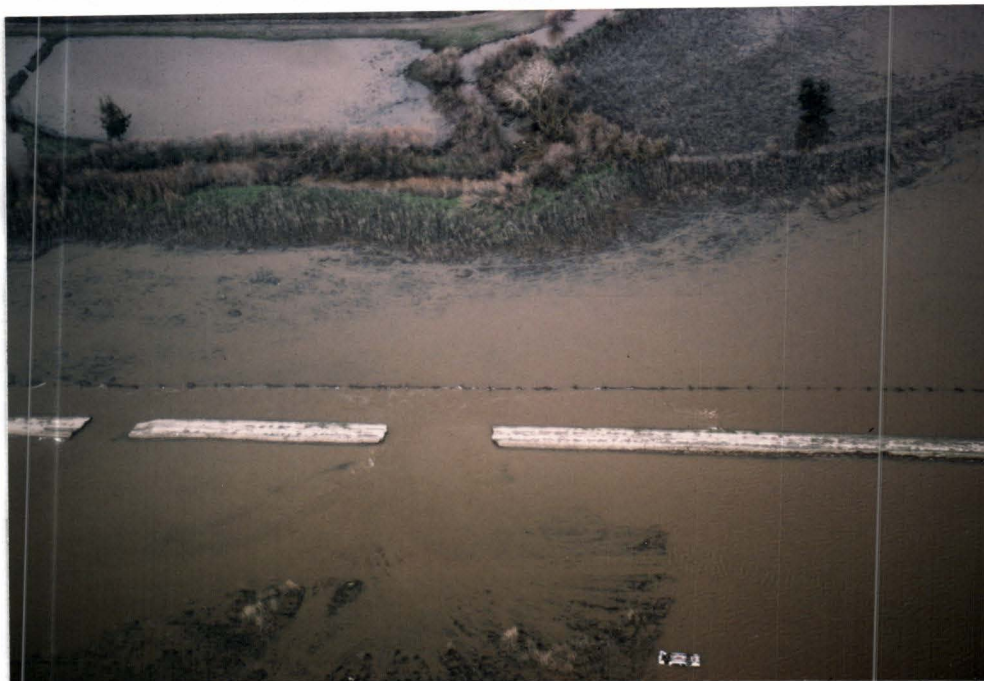




The pump 16 road was one of many roads which underwent extensive rehabilitation and graveling. 9/92 TJM

The complete rehabilitation of 10 water control structures in the Levee Field and West Marsh delivery system was completed during the year. Existing WCS's lacked sufficient sized board channels and were installed without tarred coupling bands and headwalls resulting in significant amount of water leaks.

The Duck Slough dike on the newly acquired 956 acres required major rehabilitation after flood waters washed out portions of the dike in 1991. In October, rehabilitation of the dike to its pre-damaged condition was completed. However, unprecedented flood flows in January 1993 overtopped the dike causing washouts in several areas. A substantially larger dike is scheduled for construction in the fall of 1993.



... and once again washed out due to large flood flows down Duck Slough. 1/93 CS

### 3. Major Maintenance

Repair of leaking underground concrete water pipelines is a continuous year round project. This year, only seven leaks required attention. However, due to the rehabilitation of the deep wells and the associated increased output, an increase in the number of repairs is expected.

The annual chore of clearing water delivery ditches of silt and vegetation was expanded when a Case excavator was transferred from Stillwater NWR to the San Luis Complex. All major ditches (East Grassland/East Marsh, Levee Field, West Marsh delivery ditches) were cleared of debris and vegetation. In addition, portions of Deadman Creek were cleared to allow for unobstructed flow of floodwater in the winter months.

All graveled access roads, the entrance road and tour route were graded several times during the year. In addition, several dirt roads, which were severely rutted, were graded as well.

All deep well motors were greased, oil reservoirs and motor bearings were checked and filled. Oil reservoirs and automatic drips for pump bearings were emptied of accumulated water (condensation), cleaned, filled, and reset during the year.

#### 4. Equipment Utilization and Repair

Aside from the regularly scheduled service, the following equipment was repaired during the year at Merced NWR.

##### John Deere 8430

Replace diesel engine . . . . .	13,351
Repair rear hinge oil leak . . . . .	1,222
Replace fuel pump, gaskets, O-rings and service a/c . . . . .	488
Replace hoses at hydraulic oil pump . . . . .	235
Replace fuse holder, o-rings, hyd. hose . . . . .	16
Replace transmission gasket/cover . . . . .	115
Repair flat tire . . . . .	10
Repair remotes, lights and seat	

##### John Deere 770 Grader

Service a/c, replace worn belts . . . . .	349
Replace worn cutting blades . . . . .	322
Replace engine shrouds . . . . .	
Repairs hydraulic leaks . . . . .	

##### Caterpillar D-6 Dozer

New battery. . . . .	425
Install new top roller . . . . .	212
Repair blade adjustment lever . . . . .	371
Service a/c . . . . .	83

##### International 2656

Replace orchard rim	
Repair air filter assemble	
Replace front tires	
Repair starter and electrical wiring . . . . .	555
Repair Murphy switch	
Repair flat	

International 656

Valve job and rebuild injectors . . . . .	2161
Repair flat . . . . .	20

Ford TW10

Replace fuel pump	
Repair lights	
Repair oil pressure gauge	
Replace upper fuel tank gauge	
Repair starter . . . . .	136
Replace bearings and sleeve . . . . .	244

Case 580C Backhoe

Replace hydraulic hose . . . . .	13
Repair trans axle and shuttle shift . . . . .	5,261

John Deere 1008 Mower

Repair PTO drive . . . . .	145
Install new blades and hardware . . . . .	211
Install new clutch plates . . . . .	54

John Deere 709 Mower

Rotate blades	
Install new clutch assembly and replacement parts . . . . .	518

PTO Driver Auger

Replacement of bits and roll pins . . . . .	190
Frame, hitch repair . . . . .	308

Drag Disc

Replace bolts . . . . .	73
Check bearings	
Install blades on front gang . . . . .	720

Kewanee Disc

Install hydraulic remotes . . . . .	100
Replace roll pins with solid caps	
Replace broken blade	
Install pintle hitch . . . . .	206
Install ram bushings . . . . .	112
Rotate gangs	
Repair flat . . . . .	26
Reattach striker blade	

Bean Sprayer

Install hose reel . . . . . 206  
 Replace head bolts, gasket, hose . . . . . 10

Crucifulli Pump

Replace U-joints . . . . . 150  
 Install discharge pipe . . . . . 60

Merced Cultipacker

Install 10 rings . . . . . 100  
 Check bearings  
 Install pintle loop on tongue

Water Tanker

Replace hitch

A Kewanee plow disc was purchased during the year (\$14,500) to replace the Towner disc which was deemed too costly to repair (\$12,000). Extensive structural problems surfaced during its use on the Santa Fe Canal project on Kesterson NWR in 1991.

A new Caterpillar 12G road grader was purchased during the year (\$136,296) to replace the "red-tagged" 1951 model 12 Caterpillar grader at Merced NWR. The new grader was transferred to the San Luis refuge and the John Deere 770 grader stationed at Merced.

A gas-driven Lincoln 225 welder was purchased (\$2,204) and installed on a trailer for use in responding to emergency and scheduled field repairs.

A corrugator used in the wetland management program was constructed during the year from parts purchased at an ag equipment supply store (\$577).

J. OTHER ITEMS4. Credits

ARM Tom Melanson contributed to section B. Biologists Sheri Melanson and Dennis Woolington prepared sections E.4, D.5, 6, F.6, and G. Joel Miller contributed to section C.1. Assistant Refuge Manager Charles Stenvall prepared the rest of the report and was assisted in preparing graphs, charts, and tables by Sue Cortese. Gary Zahm edited the report and Sue Cortese typed the report. Photo credits: GRZ - Gary Zahm; TM - Tom Melanson; CS - Charles Stenvall.

<u>Federally Listed Species</u>	<u>Classification<sup>1</sup></u>		<u>Presence<sup>2</sup></u>
	<u>Federal</u>	<u>State</u>	
San Joaquin Pocket Mouse <i>Perognathus inornatus inornatus</i>	2		
Riparian Woodrat <i>Neotoma fuscipes riparia</i>	2	CSC	
Southwestern Otter <i>Lutra canadensis sonora</i>	2		
Ferruginous Hawk <i>Buteo regalis</i>	2		D
Swainson's Hawk <i>Buteo swainsoni</i>	3	T	D
Fulvous Whistling Duck <i>Dendrocygna bicolor</i>	2	CSC	D
White-faced Ibis <i>Plegadis chichi</i>	2	CSC	D
Western Snowy Plover <i>Charadrius alexandrinus nivosus</i>	2	CSC	
Mountain Plover <i>Charadrius montanus</i>	2		D
Long-billed Curlew <i>Numenius americanus</i>	2		D
Tricolored Blackbird <i>Agelaius tricolor</i>	P		D
Giant Garter Snake <i>Thamnophis couchi gigas</i>	2	T	
Northwestern Pond Turtle <i>Clemmys marmorata marmorata</i>	2		
California Tiger Salamander <i>Ambystoma tigrinum californiense</i>	2	CSC	D
California Red-legged Frog <i>Rana aurora draytoni</i>	2	CSC	
Molestan Blister Beetle <i>Lytta molesta</i>	2		
Merced Phacelia <i>Phacelia ciliata</i> var. <i>opaca</i>	2		

<u>Federally Listed Species</u>	<u>Classification<sup>1</sup></u>		
	<u>Federal</u>	<u>State</u>	<u>Presence<sup>2</sup></u>
Hispid Bird's-Beak <i>Cordylanthus mollis</i> ssp. <i>hispidus</i>	2		
Delta Button Celery <i>Eryngium racemosum</i>	2	E	D
Colusa Grass <i>Neostapfia colusana</i>	2	E	
Bearded Allocarya <i>Plagiobothrys hystriculus</i>	2		
Valley Spearscale <i>Atriplex joaquiniana</i>	2		
Slough Thistle <i>Cirsium crassicaule</i>	2		

State Listed Species (without Federal status)

Western Yellow-billed Cuckoo <i>Coccyzus americanus occidentalis</i>		E	
Greater Sandhill Crane <i>Grus canadensis tabida</i>		T	D
Willow Flycatcher <i>Empidonax traillii</i>		E	

<sup>1</sup> Classification: (E) Endangered; (T) Threatened;  
(P) Proposed: currently being considered for listing;  
(2) Category 2 candidate for Federal listing: may warrant listing but insufficient biological data available; (CSC) California Dept. of Fish and Game "Species of Special Concern": possibly declining or vulnerable to extirpation and being considered for listing or for special management and protection measures (other species with this status alone were not listed).

<sup>2</sup> Presence: (D) Documented presence; (blank) Potential presence due to current/historic range and availability of suitable habitat.



Federal and State listed threatened or endangered species that do or potentially occur on San Luis National Wildlife Refuge.

<u>Federal Listed Species:</u>	<u>Classification<sup>1</sup></u>	<u>Presence<sup>2</sup></u>
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	E	D
Bald eagle <i>Haliaeetus leucocephalus</i>	E	D
American peregrine falcon <i>Falco peregrinus anatum</i>	E	D
Blunt-nosed leopard lizard <i>Gambelia silus</i>	E	
Palmate-bracted bird's beak <i>Cordylanthus palmatus</i>	E	
Aleutian Canada goose <i>Branta Canadensis leucopaeria</i>	T	
Valley elderberry longhorn beetle <i>Desmocerus californica dimorphus</i>	T	
 <u>Federal Candidate Species</u>		
White-faced ibis <i>Plegadis chichi</i>	2	D
Tricolored blackbird <i>Agelaius tricolor</i>	P	D
Western snowy plover <i>Charadrius alexanderinus nivosus</i>	2	
Long-billed curlew <i>Numenius americanus</i>	2	D
Ferruginous hawk <i>Buteo regalis</i>	2	D
Mountain plover <i>Charadrius montanus</i>	2	
Giant garter snake <i>Thamnophis couchi gigas</i>	2	
California tiger salamander <i>Abystoma tigrinum californiense</i>	2	
Western pond turtle <i>Clemmys marmorata</i>	2	D
Molestan blister beetle <i>Lytta molesta</i>	2	
Occult myotis <i>Myotis lucifugus occultus</i>	2	
San Joaquin kangaroo rat <i>Dipodomys nitratooides</i>	2	
Western big-eared bat <i>Plecotus townsendii townsendii</i>	2	
Spotted bat <i>Euderma maculatum</i>	2	
Western mastiff bat <i>Eumops perotis californicus</i>	2	
Nelson's antelope ground squirrel <i>Ammospermophilus nelsoni</i>	2	
San Joaquin pocket mouse <i>Perognatus inornatus inornatus</i>	2	

<u>Federal Listed Species:</u>	<u>Classification</u> <sup>1</sup>	<u>Presence</u> <sup>2</sup>
Southwestern otter <i>Lutra canadensis</i>	2	D
Hispid bird's beak <i>Cordylanthus mollis</i> subsp. <i>hispidus</i>	2	D
Delta coyote thistle <i>Eryngium racemosum</i>	2	D
Bearded allocarya <i>Plagiobothrys hystriculus</i>	2	
Valley spearscale <i>Atriplex joaquiniana</i>	2	
Slough thistle <i>Cirsium crassicaule</i>	2	

State Listed Species: (Without Federal Listing)

Swainson's hawk <i>Buteo swainsoni</i>	T	D
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	E	
Greater sandhill crane <i>Grus canadensis tabida</i>	T	D

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<sup>1</sup> Classification: (E) Endangered; (T) Threatened; (P) Proposed;  
(2) Candidate, may warrant listing but biological information lacking. Some species also have State listing status.

<sup>2</sup> Presence: (D) Documented present; (blank) Potential present due to range and suitable habitat.