U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
FISH AND WILDLIFE SERVICE
P. O. BOX J,
CARTERVILLE, ILLINOIS.

CRAB ORCHARD NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

1970

3-1751
Form NR-1A
(Nov. 1945)

MIGRATORY BIRDS
(other than waterfowl)

Refuge CRAB ORCHARD Months of SEPTEMBER to DECEMBER 1970

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. Water and Marsh Birds:										
LESSER YELLOWLEGS	PRESENT AT BEGINNING OF PERIOD		5	10-9-70	3	11-6-70				
PECTORAL SANDPIPER	1	9-4-70	30	10-30-70	30	11-6-70				
SHORT BILLED DOWITCHER	2	9-4-70	5	9-25-70	5	9-25-70				
Avocet	1	10-30-70	1	10-30-70	1	10-30-70				
II. Shorebirds, Gulls and Terns:										
HERRING GULL	25	11-27-70	150	12-30-70	STILL PRESENT.					
RING-BILLED GULL	5	10-30-70	900	12-30-70	"	"				
BLACK TERN	5	9-4-70	5	9-4-70	5	9-25-70				
CASPIAN TERN	5	9-11-70	6	9-25-70	6	9-25-70				
WESTERN GREBE	1	11-27-70	1	11-27-70	1	11-27-70				
GREAT BLUE HERON	PRESENT AT BEGINNING OF PERIOD.		60	11-6-70	STILL PRESENT					
COMMON EGRET	"	" "	25	10-9-70	5	11-20-70				
YELLOW CROWN NIGHT HERON	"	" "	20	9-25-70	10	10-16-70				

(over)

(1)	(2)		(3)		(4)		(5)	(6)
III. Doves and Pigeons:								
Mourning dove	RESIDENT							
White-winged dove								
IV. Predaceous Birds:								
Golden eagle								
Duck hawk								
Horned owl	RESIDENT							
~~Magpie~~								
~~Raven~~								
Crow	RESIDENT							
MISSISSIPPI KITE	1	10-20-70	1	10-20-70	1	10-20-70		
OSPREY	1	9-24-70	1	9-24-70	1	9-24-70		
BALD EAGLE	2	10-16-70	11	12-30-70	STILL PRESENT			

Reported by J. R. Rice

INSTRUCTIONS

(1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiiformes)
II. Shorebirds, Gulls and Terns (Charadriiformes)
III. Doves and Pigeons (Columbiformes)
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)

(2) First Seen: The first refuge record for the species for the season concerned.

(3) Peak Numbers: The greatest number of the species present in a limited interval of time.

(4) Last Seen: The last refuge record for the species during the season concerned.

(5) Production: Estimated number of young produced based on observations and actual counts.

(6) Total: Estimated total number of the species using the refuge during the period concerned.

INT.-DUP. SEC., WASH., D.C.

59317

3-1750c
Form NR-1C
(Sept. 1960)

WATERFOWL HUNTER KILL SURVEY

Refuge CRAB ORCHARD

Year 1970

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est. Total Kill
11/12-18	970	3880	CANADA GEESE	56	12	68	1060	**
11/19-25	738	2952	CANADA GEESE	48	10	58	812	
11/26 - 12-2	1125	4500	CANADA GEESE	154	31	185	1237	
12/3-9	1238	4952	CANADA GEESE	133	27	160	1361	
12/10-16	1521	6084	CANADA GEESE	336	67	403	1673	
12/17-23	1774	7096	CANADA GEESE	274	55	329	1951	
1/2-3	611	2444	CANADA GEESE	432	86	518	672	
TOTALS	7977	31,908		1433	288	1721	8766	

** A mandatory registration system is used in public hunting areas. As most hunters bagging geese register their kill, a heavy bias exists that would make a projected kill figure in this column inaccurate.

(over)

INSTRUCTIONS

(1) The first week of hunting begins with opening day and ends at the close of hunting 6 days later. Successive weeks follow the same pattern.

(2) The goal is to survey a minimum of 25 percent of refuge hunters each week and to record data only from those who have completed their day's hunting. This information should be collected during each day of the week and in each area hunted in relative proportion to the hunter effort expended. When the 25 percent goal cannot be achieved, particular care should be taken to collect representative data.

(3) Record the total number of hours the hunters spent hunting on the refuge.

(4) List waterfowl species in decreasing order of numbers bagged. Sample entry: Mallard (61), Pintail (36), Redhead (16), Gadwall (11), Widgeon (6), Coot (4), Canada Goose (3), Green-winged Teal (1).

(5) Record total numbers of waterfowl bagged.

(6) Record total numbers of waterfowl reported knocked down but not recovered.

(7) Total of Columns 5 and 6.

(8) Estimate the total number of hunters who hunted on the refuge during the week, including hunters checked (Column 2).

(9) Kill sample projected to 100 percent. Column 9 = $\frac{\text{Column 8}}{\text{Column 2}}$ x Column 7.

3-1752
Form NR-2
(April 1946)

UPLAND GAME BIRDS

Refuge CRAB ORCHARD Months of SEPTEMBER to DECEMBER, 1970

(1) Species	(2) Density	(3) Young Produced			(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres Per Bird	Number broods observed	Estimated Total	Percentage	Hunting	For Re-stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Bob White Quail	Upland Brush, Meadow & Forest Edges				55:45				1,500	figure based on road-side observations and Natural Population Renewal Index.
	Area I & III 15,345 acres	10.2								
	Area II 18,609 acres	8.5			55:45				2,200	
Turkey	II IV V				Unknown				200	figures based on casual observations by Refuge staff.

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS*

(1) SPECIES: Use correct common name.

(2) DENSITY: Applies particularly to those species considered in removal programs (public hunts,etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.

(4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.

(5) REMOVALS: Indicate total number in each category removed during the report period.

(6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.

(7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

*Only columns applicable to the period covered should be used.

3-1753
Form NR-3
(June 1945)

BIG GAME

Refuge CRAB ORCHARD Calendar Year 1970

(1) Species	(2) Density	(3) Young Produced	(4) Removals				(5) Losses			(6) Introductions		(7) Estimated Total Refuge Population		(8) Sex Ratio
Common Name	Cover types, total Acreage of Habitat	Number	Hunting	For Re-stocking	Sold	For Research	Predation	Disease	Winter Loss	Number	Source	At period of Greatest use	As of Dec. 31	
WHITETAIL DEER	UPLAND AND BOTTOMLAND HARDWOODS 14,600 ACRES BRUSHLAND 6,900 ACRES. AGRICULTURE LAND 5,086 ACRES. GRASSLAND 3,684 ACRES. 1,900 ACRES ABSORBED IN ROADS, RECREATION AND INDUSTRIAL AREAS. TOTAL ACREAGE 32,170	400	229	-	-		8	NONE	(70 ROAD KILLS)			2,500	2,193	0.29: 1.00: 0.79:

279 KILLED IN WILLIAMSON COUNTY SIX-DAY SEASON

80% TAKEN FROM REFUGE.

Remarks:

Reported by _____

INSTRUCTIONS

Form NR-3 - BIG GAME

(1) SPECIES: Use correct common name; i.e., Mule deer, black-tailed deer, white-tailed deer. It is unnecessary to indicate sub-species such as northern or Louisiana white-tailed deer.

(2) DENSITY: Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge: once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated total number of young produced on refuge.

(4) REMOVALS: Indicate total number in each category removed during the year.

(5) LOSSES: On the basis of known records or reliable estimates indicate total losses in each category during the year.

(6) INTRODUCTIONS: Indicate the number and refuge or agency from which stock was secured.

(7) TOTAL REFUGE POPULATION: Give the estimated population of <u>each</u> <u>species</u> on the refuge at period of its greatest abundance and also as of Dec. 31.

(8) SEX RATIO: Indicate the percentage of males and females of each species as determined from field observations or through removals.

116008

3-1755
Form NR-5
60701

DISEASE

Refuge CRAB ORCHARD Year 19 70

Botulism

Period of outbreak NONE

Period of heaviest losses _____

Losses:

	Actual Count	Estimated
(a) Waterfowl		
(b) Shorebirds		
(c) Other		

Number Hospitalized	No. Recovered	% Recovered
(a) Waterfowl		
(b) Shorebirds		
(c) Other		

Areas affected (location and approximate acreage) _____

Water conditions (average depth of water in sickness areas, reflooding of exposed flats, etc.

Condition of vegetation and invertebrate life _____

Remarks _____

Lead Poisoning or other Disease

Kind of disease NONE

Species affected _____

Number Affected Species	Actual Count	Estimated

Number Recovered _____

Number lost _____

Source of infection _____

Water conditions NORMAL

Food conditions POOR

Remarks NO NOTICEABLE LOSS OF ANY KIND.

(1)

3-1757
Form NR-7
(Rev. June 1960)

NONAGRICULTURAL COLLECTIONS, RECEIPTS, AND PLANTINGS

Refuge CRAB ORCHARD Year 19&)

Species	Collections and Receipts (Seeds, rootstocks, trees, shrubs)						Plantings (Marsh - Aquatic - Upland)						
	Amount (Lbs., bus., etc.)	(2) C or R	Date	Method or Source	Cost	(3) Total Amount on Hand	Location of Area Planted	Rate of Seeding or Planting	Amount Planted (Acres or Yards of Shoreline)	Amount and Nature of Propagules	Date	Survival	Cause of Loss
							Sec.18,T9S, R1E		500	Red Bud	April	Poor	Drought
							Small Food Plots in various locations in Areas I & III.		500	Autumn Olive	April	Good	

(1) Report agronomic farm crops on Form NR-8
(2) C = Collections and R = Receipts
(3) Use "S" to denote surplus

Total acreage planted:
Marsh and aquatic _____
Hedgerows, cover patches _____
Food strips, food patches About 2
Forest plantings _____

Remarks: _____

3-1758
Form NR-8
(Rev. Jan. 1956)

Fish and Wildlife Service Branch of Wildlife Refuges

CULTIVATED CROPS - HAYING - GRAZING

Refuge CRAB ORCHARD County WILLIAMSON State ILLINOIS

Cultivated Crops Grown	Permittee's Share Harvested		Government's Share or Return Harvested		Government's Share or Return Unharvested		Total Acreage Planted	Green Manure, Cover and Waterfowl Browsing Crops Type and Kind	Total Acreage
	Acres	Bu./Tons	Acres	Bu./ Tons	Acres	Bu. /Tons			
CORN	2374.9	70,000	710.2	21,000 Bu.				WHEAT	600
CLOVER, RED	1632.5	1,630T.						CLOVER	1632
RICE	28	2,100Bu.							
MILO	22	~~No Est.~~ 45 bu/A							
MILLET	55	~~No Est.~~ 35 bu/A							
LESPEDEZA	156	~~No Est.~~ 8 bu/A							
SOYBEANS*	36	No. Est. 25 bu/A							
								Fallow Ag. Land.	200

No. of Permittees: Agricultural Operations 26 Haying Operations ____ Grazing Operations 20

Hay - Improved (Specify Kind)	Tons Harvested	Acres	Cash Revenue	Grazing	Number Animals	AUM'S	Cash Revenue	ACREAGE
LISTED UNDER CROPS				1. Cattle	667	3100.62	6976.39	3684
				2. Other				
				1. Total Refuge Acreage Under Cultivation				4556
Hay - Wild	NONE			2. Acreage Cultivated as Service Operation				537

*CROPPING RIGHTS WITHHELD ON WATSON TRACT

DIRECTIONS FOR PREPARING FORM NR--8'
CULTIVATED CROPS - HAYING - GRAZING

Report Form NR-8 should be prepared on a calendar-year basis for all crops which were planted during the calendar year and for haying and grazing operations carried on during the same period.

Separate reports shall be furnished for Refuge lands in each county when a refuge is located in more than one county or State.

Cultivated Crops Grown - List all crops planted, grown and harvested on the refuge during the reporting period regardless of purpose. Crops in kind which have been planted by more than one permittee or this Service shall be combined for reporting purposes.

Permittee's Share - Only thenumber of acres utilized by the permittee for his own benefit should be shown under the Acres column, and only the number of bushels of farm crops harvested by the permittee for himself should be shown under the Bushels Harvested column. Report all crops harvested in bushels or fractions thereof except such crops as silage, watermelons, cotton, tobacco, and hay, which should be reported in tons or fractions thereof.

Government's Share or Return - Harvested Show the acreage and number of bushels harvested for the Government of crops produced by permittees or refuge personnel. Unharvested Show the exact acreage and the estimated number of bushels of grain available for wildlife. If grazing is made available to waterfowl through the planting of grain, cover, green manure, grazing or hay crops, estimate the tonnage of green food produced or utilized and report under Bushels Unharvesed column.

Total Acreage Planted - Report all acreage planted, including crop failures.

Green Manure, Cover and Waterfowl Grazing Crops Specify the acreage kind and purpose of the crop. These crops and the acreage may be duplicated under cultivated crops if planted during the year, or a duplication may occur under hay if the crop results from a perennial planting.

Hay - Improved - List separately the kinds of improved hay grown. Annual plantings should also be reported under Cultivated Crops, and perennial hay should be listed in the same manner at time of planting

Total Refuge Acreage Under Cultivation Report total land area devoted to agricultural purposes during the year.

3-1758
Form NR-8
(Rev. Jan. 1956)

Fish and Wildlife Service Branch of Wildlife Refuges

CULTIVATED CROPS - HAYING - GRAZING

Refuge CRAB ORCHARD County JACKSON State ILLINOIS

Cultivated Crops Grown	Permittee's Share Harvested		Government's Share or Return				Total Acreage Planted	Green Manure, Cover and Waterfowl Browsing Crops Type and Kind	Total Acreage
			Harvested		Unharvested				
	Acres	Bu./Tons	Acres	Bu./ Tons	Acres	Bu. /Tons			
								Fallow Ag. Land.	

No. of Permittees: Agricultural Operations _____ Haying Operations _____ Grazing Operations 3

Hay - Improved (Specify Kind)	Tons Harvested	Acres	Cash Revenue	Grazing	Number Animals	AUM'S	Cash Revenue	ACREAGE
				1. Cattle	25	150	$237.50	122
				2. Other				
				1. Total Refuge Acreage Under Cultivation				
Hay - Wild				2. Acreage Cultivated as Service Operation				

DIRECTIONS FOR PREPARING FORM NR--8'
CULTIVATED CROPS - HAYING - GRAZING

Report Form NR-8 should be prepared on a calendar-year basis for all crops which were planted during the calendar year and for haying and grazing operations carried on during the same period.

Separate reports shall be furnished for Refuge lands in each county when a refuge is located in more than one county or State.

Cultivated Crops Grown - List all crops planted, grown and harvested on the refuge during the reporting period regardless of purpose. Crops in kind which have been planted by more than one permittee or this Service shall be combined for reporting purposes.

Permittee's Share - Only thenumber of acres utilized by the permittee for his own benefit should be shown under the Acres column, and only the number of bushels of farm crops harvested by the permittee for himself should be shown under the Bushels Harvested column. Report all crops harvested in bushels or fractions thereof except such crops as silage, watermelons, cotton, tobacco, and hay, which should be reported in tons or fractions thereof.

Government's Share or Return - Harvested Show the acreage and number of bushels harvested for the Government of crops produced by permittees or refuge personnel. Unharvested Show the exact acreage and the estimated number of bushels of grain available for wildlife. If grazing is made available to waterfowl through the planting of grain, cover, green manure, grazing or hay crops, estimate the tonnage of green food produced or utilized and report under Bushels Unharvesed column.

Total Acreage Planted - Report all acreage planted, including crop failures.

Green Manure, Cover and Waterfowl Grazing Crops Specify the acreage kind and purpose of the crop. These crops and the acreage may be duplicated under cultivated crops if planted during the year, or a duplication may occur under hay if the crop results from a perennial planting.

Hay - Improved - List separately the kinds of improved hay grown. Annual plantings should also be reported under Cultivated Crops, and perennial hay should be listed in the same manner at time of planting

Total Refuge Acreage Under Cultivation Report total land area devoted to agricultural purposes during the year.

3-1570
NR-8a

REFUGE GRAIN REPORT

Refuge CRAB ORCHARD Months of JANUARY through DECEMBER 1970, 19~~7x~~

(1) Variety*	(2) On Hand Beginning of Period	(3) Received During Period	(4) Total	(5) Grain Disposed of				(6) On Hand End of Period	(7) Proposed or Suitable Use*		
				Transferred	Seeded	Fed	Total		Seed	Feed	Surplus
Corn Shelled	1500 Bu.	1050 Bu	2250 Bu			2550 Bu	2550 Bu.				
Indian Grass	10 Lbs.		10 Lbs.					10 Lbs.	10 Lbs.		
Blue Stem	10 Lbs.		10 Lbs.					10 Lbs.	10 Lbs.		
Japanese Millet		1600 Lbs	1600 Lbs		1600 Lbs		1600 Lbs.				
Wheat		2000 Bu	2000 Bu.		2000 Bu		2000 Bu.				
Grain Sorghum		500 Lbs	500 Lbs		500 Lbs.		500 Lbs.				
Orchard Grass	50 Lbs.	2400 Lbs	2450 Lbs		2450 Lbs.		2450 Lbs.				
Fescue (Ky 31)	200 Lbs	1700 Lbs	1900 Lbs		1900 Lbs.		1900 Lbs.				
Timothy	100 Lbs	500 Lbs	600 Lbs		600 Lbs.		600 Lbs.				
Lespedeza (Korean)		1400 Lbs	1400 Lbs					1400 Lbs	1400 Lbs.		
Red Clover (Mammoth)		1900 Lbs	1900 Lbs					1900 Lbs	1900 Lbs.		

(8) Indicate shipping or collection points

(9) Grain is stored at CRAB ORCHARD GRAINERY

(10) Remarks

*See instructions on back.

NR-8a

REFUGE GRAIN REPORT

This report should cover all grain on hand, received, or disposed of, during the period covered by this narrative report.

Report all grain in bushels. For the purpose of this report the following approximate weights of grain shall be considered equivalent to a bushel: Corn (shelled)—55 lb., corn (ear)—70 lb., wheat—60 lb., barley—50 lb., rye—55 lb., oats—30 lb., soy beans—60 lb., millet—50 lb., cowpeas—60 lb., and mixed—50 lb. In computing volume of granaries, multiply the cubic contents (cu. ft.) by 0.8 bushels.

(1) List each type of grain separately and specifically, as flint corn, yellow dent corn, square deal hybrid corn, garnet wheat, red May wheat, durum wheat, spring wheat, proso millet, combine milo, new era cowpeas, mikado soy beans, etc. Mere listing as corn, wheat, and soybeans will not suffice, as specific details are necessary in considering transfer of seed supplies to other refuges. Include only domestic grains; aquatic and other seeds will be listed on NR–9.

(3) Report all grain received during period from all sources, such as transfer, share cropping, or harvest from food patches.

(4) A total of columns 2 and 3.

(6) Column 4 less column 5.

(7) This is a proposed break-down by varieties of grain listed in column 6. Indicate if grain is suitable for seeding new crops.

(8) Nearest railroad station for shipping and receiving.

(9) Where stored on refuge: "Headquarters granary," etc.

(10) Indicate here the source of grain shipped in, destination of grain transferred, data on condition of grain, unusual uses proposed.

3-1761
Form NR-11

TIMBER REMOVAL

Refuge CRAB ORCHARD Year 1970

Permittee	Permit No.	Forest Mgmt Compartment Unit or Location	Acreage	No. of Units Expressed in B. F., ties, etc.	Rate of Charge	Total Income	Reservations and/or Diameter Limits	Species Cut
Miller, Dale	SUP-91-70	5	1	500 Posts	.09	45.00	3"-6"Dia x 7'	Black Locust
		5	2	26 Cords	1.00	26.00	Firewood	White Oak
Cache River Lbr. Co.	SUP-1-70	8	16					
		9	17	317.455 MBM	Various	3837.30	Variable-Contact	Mixed Hard Woods
		19	30					
Cache River Lbr. Co.	SUP-64-70	10	8					
		20	25	350.650 MBM	Various	10,112.20	Variable-Contract	Mixed Hardwoods
		24	32					
		16	5					

Total acreage cut over 136 Total income 19,020.50

No. of units removed B. F. 668,105 Method of slash disposal Lop & Scatter

Cords 26

Ties

Locust Posts 500

NOTE: This form shows cut activity only; sold but uncut not shown.

Interior--Duplicating Section, Washington, D. C.

3-1979 (NR-12)
(9/63)

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge: CRAB ORCHARD

Proposal Number: CO-1-70

Reporting Year: 1970

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
APRIL - MAY - JUNE	BROADLEAFS	CORNFIELDS in AREAS 1 & 2	957	ATRAZINE	2300	2½ Lbs./Ac.	H20	PREMERGE

10. Summary of results (continue on reverse side, if necessary)

RESULTS GOOD

35500

3-1979 (NR-12)
(9/63)

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge: CRAB ORCHARD

Proposal Number: CO-2-70

Reporting Year: 1970

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MAY JUNE	GRASSES	CORNFIELDS	320	RAMROD	640	2 LBS/AC.	H20	PREMERGE

10. Summary of results (continue on reverse side, if necessary)

RESULTS FAIR

35500

3-1979 (NR-12)
(9/63)

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge: CRAB ORCHARD

Proposal Number: CO-3-70

Reporting Year: 1970

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
JUNE	BROADLEAFS	A-25	127	24D Amine	64 Lbs.	1/2 Lb./Ac.	H20	GROUND SPRAYER

10. Summary of results (continue on reverse side, if necessary)

RESULTS POOR

35500

3-1979 (NR-12)
(9/63)

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge: CRAB ORCHARD

Proposal Number: CO-6-70

Reporting Year: 1970

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MAY	EXISTING VEGETATION	A-11, A-13	150 Ac.	PARAQUAT	40 GALLONS SOLUTION	1 QT./AC.	H20	GROUND SPRAYER

10. Summary of results (continue on reverse side, if necessary)

USED ON NO-TILL CORN RESULTS VERY GOOD

35500

3-1750
Form NR-1
(Rev. March 1953)

WATERFOWL

REFUGE CRAB ORCHARD NWR

MONTHS OF SEPTEMBER TO DECEMBER, 19 70

(1) Species	Weeks of reporting period (2)									
	9/1 1	9/8 2	9/15 3	9/22 4	9/29 5	10/6 6	10/13 7	10/20 8	10/27 9	11/3 10
Swans:										
Whistling										
Trumpeter										
Geese:										
Canada	100	100	100	160	4,000	15,000	32,000	46,000	69,500	59,000
Cackling										
Brant										
White-fronted										
Snow					10	10	20	180	180	200
Blue					40	40	80	720	720	800
Other RICHARDSON'S										90
Ducks:										
Mallard	275	275	275	440	505	1080	1475	2475	2575	6025
Black				10	20	45	275	1080	1120	1250
Gadwall				5	15	30	55	120	185	115
Baldpate		15	15	100	265	345	625	470	565	330
Pintail		25	25	45	65	55	65	395	345	480
Green-winged teal	85	65	65	45	160	115	170	460	490	505
Blue-winged teal	205	275	275	245	475	370	290	130	115	40
Cinnamon teal										
Shoveler		10	10	35	25	25	35	50	50	30
Wood	300	300	300	300	300	300	300	335	345	370
Redhead							5	5	5	5
Ring-necked							170	145	80	240
Canvasback							10	10	10	10
Scaup							125	20	85	1410
Goldeneye										
Bufflehead										
Ruddy							130	10	25	135
Other HOODED MERG.							5	5	10	10
AMERICAN MERG.										
Coot:	30	210	265	220	75	35	35	700	1250	1475

Int. Dup. Sec., Wash., D.C. 37944

3-1750a
Cont. NR-1
(Rev. March 1953)

WATERFOWL
(Continuation Sheet)

REFUGE CRAB ORCHARD

MONTHS OF SEPTEMBER TO DECEMBER, 1970

(1) Species	(2) Weeks of reporting period: 11/10 11	11/17 12	11/24 13	12/1 14	12/8 15	12/15 16	12/22 17	+3 DAYS 18	(3) Estimated waterfowl days use	(4) Production Broods seen	(4) Production Estimated total
Swans:											
Whistling											
Trumpeter											
Geese:											
Canada	60,000	53,000	50,000	60,000	46,000	50,000	50,000	58,000	4,338,720		
Cackling											
Brant											
White-fronted											
Snow	200	200	150	20	10	5	5		8,330		
Blue	800	800	400	125	20	11	11		31,969		
Other	150	100	120	130	150	150	100		6,930		
Ducks:											
Mallard	6675	6675	1875	1700	1570	1500	1275	1375	260,815		
Black	1015	1015	820	1000	665	600	685	865	69,795		
Gadwall	100	100	25	25	30	20	35	15	6,065		
Baldpate	235	235	25	20	15	15	15	10	23,060		
Pintail	385	385	200	125	55	50	80	10	19,490		
Green-winged teal	480	480	150	100	50	25	75	10	24,670		
Blue-winged teal									16,940		
Cinnamon teal											
Shoveler	10								1,960		
Wood	370	300	150	100	35	--	--		28,735		
Redhead									140		
Ring-necked	120	120	130	75	40	50	85	150	9,235		
Canvasback	5	5							350		
Scaup	20	20	10	20	15	20	15	5	12,335		
Goldeneye			20	10	25	25	35	120	1,165		
Bufflehead			5	5	10	10	15		315		
Ruddy									2,100		
Other	40	40	65	40	10	10	20	25	1,850		
Coots:			415	450	590	600	1435	3700	35,530		
	1475	25	15		(over)				40,670		

	(5) Total Days Use	(6) Peak Number	(7) Total Production
Swans			
Geese	4,385,949	69,500	
Ducks	514,550	11,000	2
Coots	40,670	1,475	

SUMMARY

Principal feeding areas CRAB ORCHARD LAKE AREA I, II, III

Principal nesting areas LOCAL STREAMS, ISLANDS AND SHORELINES

Reported by James R. Rice

INSTRUCTIONS (See Secs. 7531 through 7534, Wildlife Refuges Field Manual)

(1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance.

(2) Weeks of Reporting Period: Estimated average refuge populations.

(3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.

(4) Production: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.

(5) Total Days Use: A summary of data recorded under (3).

(6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.

(7) Total Production: A summary of data recorded under (4).

Interior Duplicating Section, Washington, D. C.
1953

NARRATIVE REPORT

1970

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
FISH AND WILDLIFE SERVICE

CRAB ORCHARD NATIONAL WILDLIFE REFUGE
Post Office Box J
Carterville, Illinois - 62918

CRAB ORCHARD NATIONAL WILDLIFE REFUGE

R E F U G E S T A F F

Administrative, Managerial and Technical

L. A. MEHRHOFF. . . . . .PROJECT MANAGER
DARRELL D. UPTEGRAFT. . . . . REFUGE MANAGER
G. HILEY HUNTER..(E.O.D. from Temp. Assign. 7/1/70). . . .ADM. OFFICER
EDWARD H. NICHOLS. : . . . . . PUBLIC USE SPECIALIST
WESLEY F. JAMES. . . . . ASSISTANT ADM. OFFICER
LEROY E. HOVELL. . . . . .SOIL CONSERVATIONIST
RICHARD J. JOHNSON. . . . . FORESTER
JAMES R. RICE . . . . . .BIOLOGICAL TECHNICIAN (WILDLIFE)
GORDON W. TRIPP . . . . . .FORESTRY TECHNICIAN
ROBERT E. WILSON. . . . . WILDLIFE BIOLOGIST (GENERAL)
H. T. GUALDONI. . . . . REFUGE CLERK
ARLIE JACK. . . . . .SUPPLY CLERK
ESTHER M. DUNGEY. . . . . CLERK-STENOGRAPHER
MARSOLIE MCCARTY. . . . . CLERK-STENOGRAPHER
STELLA M. GRIMES. . . . . .FISCAL ACCOUNTING CLERK
WILLIAM J. MCCOY. .(E.O.D. July 6, 1970). . . . .PUBLIC USE SPECIALIST
GERALD GAFFNEY. . . . . OUTDOOR LABORATORY COORDINATOR (PART TIME)

Construction, Operations and Maintenance

J. J. PICKAR. . . . . MAINTENANCE & OPERATIONS FOREMAN
R. E. GOLDSMITH. . .AUTOMOTIVE & ENGINEERING EQUIPMENT REPAIRER FOREMAN
R. L. BASLER. . . . . .FIRE CHIEF
A. G. BOLES. . . . . .WATER TREATMENT PLANT OPERATOR FOREMAN
W. T. CAMPBELL. . . . . MAINTENANCEMAN FOREMAN
P. E. EASTWOOD. . .(Retired 6/5/70) . . . . . .FIREFIGHTER
J. T. GIBBENS. . . . . FIREFIGHTER
W. E. WEBB. . . . . .FIREFIGHTER
K. W. SUMMERS. . . . . FIREFIGHTER
L. J. GASS. . . . . .FIREFIGHTER
H. L. SUMMERS. . . . . GUARD
C. B. ORANGE. . . . . .GUARD
J. E. STEPHENS . . . . . GUARD
J. A. DEJULIO. . . . . GUARD
J. E. BRUSH. . . . . GUARD

J. C. COX. . . . . .FILTER & DISPOSAL PLANT OPERATOR
H. L. DAVIS. . . . . .FILTER & DISPOSAL PLANT OPERATOR
J. C. LILLICH. . . . . FILTER & DISPOSAL PLANT OPERATOR
L. R. PARKS . . . . . FILTER & DISPOSAL PLANT OPERATOR
H. L. CARNER. . . . . FILTER & DISPOSAL PLANT OPERATOR
J. C. CALCATERRA . . . . . .BUILDING REPAIRMAN
C. L. DAVIS. . . . . .BUILDING REPAIRMAN
W. C. HERRING . . . . . OPERATOR GENERAL
L. MORSE. . . . . OPERATOR GENERAL
E. E. DARNELL . . . . . OPERATOR GENERAL
R. H. HOWELL. . . . . MAINTENANCEMAN
C. ADAMS. . . . . MECHANIC, AUTOMOTIVE
R. MASSIE . . . . . MECHANIC, AUTOMOTIVE
G. L. HANKS. . . . . MECHANIC'S HELPER, AUTOMOTIVE
J. H. MOORE . . . . . MAINTENANCEMAN
J. W. BOOTH. . . .(Retired 2/21/70) . . . . . MAINTENANCEMAN
T. GALINES . . . . . MAINTENANCEMAN
W. J. STACEY . . . . . MAINTENANCEMAN
J. L. SMITH . . . . . MAINTENANCEMAN
G. STAPLETON . . . . . MAINTENANCEMAN
C. L. FLORA . . . . . .LABORER
R. L. VENEGONI. . . . . LABORER
J. A. NEWBURY . . . . . .LABORER
J. TAYLOR. . . . . LABORER

Temporary Help

25 Employees - WAE

11 Laborers

1 Patrolman

6 Lifeguards

4 Fee Collectors

2 Maintenance Workers

1 Recreational Aid

C O N T E N T S

I. GENERAL

A. Weather Conditions

	Precipitation			Max.	Min.
	Month	Normal	Snowfall	Temp.	Temp.
January	0.51	3.68	0.76	68	-8
February	2.23	3.75	3.00	61	0
March	5.45	4.63	4.40	67	23
April	6.98	4.40	.00	84	35
May	4.27	4.58	.00	89	41
June	4.29	3.64	.00	94	58
July	2.21	3.16	.00	98	60
August	4.83	4.01	.00	96	60
September	4.60	3.56	.00	94	48
October	4.05	3.46	. 00	82	35
November	2.08	3.30	T	72	11
December	1.52	3.27	.00	69	19
Annual Totals:	43.02	45.44	7.76	Extremes: 98	-8

All that can be said for the climate of 1970 is that it made a good topic of conversation.

During the year we had 108 days of measurable rainfall for a total of 43.02 inches; 2.42 inches below the norm.

April, with rain occurring on 13 days for 6.98 inches was our wettest month. The rain of April 19th, a 2.45 inch gully-washer, was the year's heaviest. May 10th showered us with another gully-washer, a 2.15 incher.

March, April and May, with 34 rains measuring 16.70 inches, accounted for 39% of the year's total. The theme song for the area during this 3-month period was "Raindrops Keep Falling On My Head". Not only did the rains fall on our heads, but also on our corn and milo fields. This hampered cultivation of these crops.

Weather data was obtained from the U. S. Forest Service Wood Pilot Plant located at Southern Illinois University's Vocational Training Institute in Area II of the refuge.

B. Habitat Conditions

1. Water

The reporting period started with the three lakes at spillway level. Crab Orchard Lake valve was opened 12 inches on February 27 and remained open until May 27. This had little effect on the lake level, as it remained above spillway level the entire period. By the 13th of September evaporation had taken Crab Orchard down 6 inches below spillway. Devils Kitchen was down 6 inches, and Little Grassy had dropped 11 inches.

Crab Orchard valve was opened 6 inches on September 21. This was increased to 18 inches on October 1 for 8 days. On November 4 we opened the valve 20 inches for 9 days and drew the lake down to 403.5 feet. These conditions continued for the balance of the period.

On May 15 we started pumping Crab Orchard Bay. It was dry and seeded with millet on June 7. It was flooded October 12.

Rice in A-41 was flooded June 28. Water was left in the unit the rest of the season.

2. Food and Cover

Corn blight! Those two words sum up the situation this year. A-27 had a beautiful stand of corn with over 20,000 plants per acre growing under good moisture and fertility conditions. It was the best prospect for 150 bushels per acre yield that has been seen on Crab Orchard Refuge. Blight hit the field on August 7, and the resulting harvest yielded 15 bushels per acre.

A-34 was not picked. A-37 yield was 20 bushels per acre. The highest corn yield of 80 bushels per acre was on a unit on the east side of the refuge. The yield estimate of corn for the geese was approximately 20,000 bushels from 710 acres of corn.

There were 631 acres of good clover on the refuge, and 856 acres of fair clover. Geese made good use of this during the season. As the season progressed, the green blanket gradually retreated to the roads. By the end of the season the clover had been browsed to the last leaf.

Millet in Crab Orchard Bay was affected by cocklebur infestation; however, a fair yield and good use resulted in spite of that weed! Rice and milo had good production and use.

Wheat conditions were good this year. Germination was good, and growth was fast. The geese used these plantings early and heavy. By the end of October the wheat was completely utilized.

Wet conditions in the spring caused much weed growth where pre-merge sprays were not used. This, and the corn falling from stalk rot, created a better feeding situation for upland game and doves.

II. WILDLIFE

A. Migratory Birds

1. Geese

The first migrant geese arrived on schedule. A flock of 60 new birds was observed resting in a wheat field at the northeast edge of Crab Orchard Bay. The first arrivals have been sighted on September 22 for the past 17 years. This flock was the smallest group of first arrivals that we have recorded. The build-up occurred quite rapidly this year, as 31,000 had arrived by October 15. It is interesting to note, however, that the peak population of 69,500 occurred the last week of October as compared to the last week of November in previous years. This is a decrease of 15,000 birds compared to our peak population of 80,000 one year ago.

A flock of 10 snow and 40 blue geese arrived October 10. They peaked at 1,000 birds the first week in November. A flock of 150 Richardson's stopped by the refuge for a short visit. A small number of these birds were taken during the hunting season.

Banding

We no longer use cannon nets for trapping geese on the refuge. The construction of the second large swim-in trap was completed this year. These traps have reduced the cost of banding ducks and geese. The initial cost of materials for these traps is equal to the cost of a 50 x 60 nylon net. The banding program can be carried out in a minimum amount of time, and banding may be done any time of the day at our convenience.

These traps require very little time in baiting and attendance, as banding is done only once or twice a week instead of daily.

GOOSE BANDING SUMMARY - 1970

Banding Period	Age and Sex Classification						
	AM	AF	SUB-TOTAL	IM	IF	SUB-TOTAL	TOTAL
January-February	400	359	759	113	128	241	1,000
October-November	132	111	243	128	129	257	500
Totals -	532	470	1,002	241	257	498	1,500

2. Ducks

The duck population again compares with previous counts. The peak for 1970 was about the same as for 1969: 11,000 birds. Mallards make up 50 percent of this total, with the remainder divided among 17 different species.

Duck production was high this year, with an estimated total of 500 young, with the mallard estimates placed at 300. The wood duck brood surveys indicate a total of 200 young produced.

Duck banding is done incidentally with the goose banding program at this station.

3. Coot

A peak number of 1,500 coot was reached, with a total of 73,990 use days for the year.

4. Swan

Nothing to report.

5. Mourning Dove

The mourning dove population on the refuge and throughout Southern Illinois is down from last year. We believe this was due to the wet and cold weather conditions during the early part of the nesting period. Hunting was very poor on the public use areas of the refuge.

The pre-season banding program started on June 22, and ended July 20, 1970. The banding quota was for 200 adult birds. The Reward Program was initiated for the first time in Illinois this banding season. Reward bands were put on every 10th hatch year bird; none were put on adult birds. We were able to place 8 of

these bands on young birds. The purpose of the bonus band program is to increase the return of bands from the hunters killing banded doves.

Pre-Season Dove Banding
(June 22 to July 20, 1970)

AHYM	AHYF	HY	TOTAL
127	102	87	316

6. Water and Marsh Birds

The overall use of the refuge by water and marsh birds remained static. The most common sightings are the great blue heron. Our peak population of great blues was up to 60 as compared to 45 last year.

The common egrets were somewhat fewer in number than last year. A peak number of 25 birds utilized the mudflats until mid-October. The last 5 birds moved out November 20th.

The yellow-crowned night herons nested along Crab Orchard Creek for the fourth consecutive year. The estimated number of young was five.

7. Shorebirds, Gulls and Terns

The year 1970 continued to show a decline in the number of shorebirds utilizing the refuge.

The presence of 5 Caspian terns was a welcome sight. They remained for two weeks before moving on.

Ten willet frequented the A-27 pond area for a 2-week stay.

Sighting of a lone avocet was made October 10, the only sighting of the year.

B. Upland Game Birds

1. Quail

The bob white quail appears to be on a downward trend. Our records have reflected this for the past two years.

The latest figures released by the Wildlife Research Laboratory at Southern Illinois University indicate the population is down by 60 percent on their wildlife study areas. This area is adjacent to refuge property on the north. It is not known if this drop is due to cold, wet conditions during the nesting period or if other contributing factors are involved.

A number of hunters questioned concerning this low population agreed that coveys were hard to find, and that the kill was very poor. However, the birds taken were in good physical condition.

C. Big Game Animals

Deer

Research on the white-tailed deer continues to be conducted by the Cooperative Wildlife Research Laboratory at Southern Illinois University. They are currently in the 9th year on this project. NR-3 reflects the actual recorded figures current with this study. Food and habitat conditions are fair to poor. The absence of standing corn is the contributing factor involved. Due to these conditions the remaining food supply is utilized to the fullest; however, there does not appear to be much of an impact on the browse species, and the deer themselves continue to look good. Present population for the refuge is 1900 in Area II (closed), and 600 deer in Areas I and III (open to public), for a total of 2,500. A total of 78 deer were killed by cars on refuge roads this year.

Turkey

Observations of turkey throughout the refuge and nearby areas indicate the population is still on the increase. Occasional sightings again this year in the heart of the public use area were most interesting. Broods were seen on several occasions this year. Our turkey population is now estimated to be 125 to 150 birds.

D. Fur Animals, Predators, Rodents, and Other Mammals

The beaver population continues on the upswing. New dams and lodges are appearing along all major creeks and streams. Three permits were issued for trapping of fur animals in Area II of the refuge. One lodge produced 5 blankets, of which 2 were super blankets. The largest beaver taken weighed in at 87 pounds. The muskrat population continues to be a problem in some of our farm ponds. Trapping has done little to control this situation.

Other populations such as fox and woodchuck appear to be normal for this area. Observations indicate there has been no great change in numbers.

Feral dogs remain common throughout the area. A research project continues to determine the effects of these dogs on the area and their sociological behavior.

E. Hawks, Eagles, and Owls

The bald eagles made their appearance on October 16 of this year. This is two weeks earlier than last year. The peak population for eagles this year included 12 bald and one golden.

Sparrow and red-tailed hawks continue to be the dominant hawk species.

Great horned and screech owls continue to nest on the refuge.

Wood duck nest boxes are commonly used by the screech owls.

F. Other Birds

There was nothing unusual to report this year either on general song bird migration or in species noted.

G. Fish

Fishing is one of the more popular past-times engaged in by the many visitors to the refuge. During 1970 a total of 131,300 visitors fished in Crab Orchard waters. This is 18,650 less than the 1969 figure, which was 149,950. Fishing interest was below average, since there are more and more good lakes in the Southern Illinois area. The main species sought by fishermen are largemouth bass, crappie, bluegill, channel catfish and bullheads. During the fall, winter, and spring months good catches of crappie are made along the causeways crossing Crab Orchard Lake. This is a very popular spot for the elderly fishermen since they are able to park their cars and walk a short distance to a prime fishing spot.

Fishermen are expressing concern over the bass populations in Crab Orchard Lake, and it is very possible that some habitat improvement programs will soon be started to improve bass fishing in Crab Orchard.

The Third Annual Southern Illinois Bass Fishing Team Championship tournament was held on Crab Orchard Lake April 11 and 12, and attracted 70 four-man teams. This contest is sponsored by a local bass fishing club and is limited to Illinois residents. It is probably one of the largest team championships in the midwest. The largest bass caught was 7½ pounds and is considerably under what Crab Orchard should produce. Eight and nine-pounders are not uncommon during the spring months on Crab Orchard Lake.

A second bass tournament was held on Devils Kitchen Lake on May 16 and 17. This was the first time a tournament had been held on Devils Kitchen, and we were very interested in the results of this fishing contest. This was also a team championship, but the teams were composed of two members each, and the entry fee was $40 per team.

Little Grassy Lake had its tournament in October, and the rules and regulations were very similar to the other two. The entry fee there was $50 per team of two men.

We believe the most startling result from these contests is that regardless of how hard a fisherman fishes, if the fish don't want to cooperate, they don't get caught. All three of the tournaments were way below the expectations, yet at any one day during the year a few men can take as many fish as were caught during the entire tournament. As an example, during the weekend Devils Kitchen tournament was taking place, the winning team at Devils Kitchen had a total of 18 pounds of bass. Two other Southern Illinois fishermen who were not interested in fishing in the tournament were fishing in Little Grassy Lake, and their combined catch during one day of that two-day period was in excess of 30 pounds. The angler who spends day after day on these lakes is the one who is right on top when the bass decide to bite.

Refuge personnel, in cooperation with the Central States Fishery Station personnel, made frequent checks on the refuge ponds, as well as starting some new introductions of northern pike. The results of this study are reported under the Research section.

H. Reptiles

Three copperheads were found while clearing one timber sale log loading site. The largest measured 40 inches in length.

I. Disease

Nothing to report this period.

J. Rare and Endangered Species

The bald and golden eagles made their appearance here about mid-October. Our surveys indicated the presence of 12 bald eagles and one golden eagle using the refuge. No nesting occurred by these species.

One osprey was sighted here during the month of October.

No other sightings for the endangered species have been recorded.

III. REFUGE DEVELOPMENT AND MAINTENANCE

A. Physical Development

The maintenance activities for the refuge continued at normal work load levels for all departments -- high! It takes a lot of paint, boards, and nails to keep our myriad of buildings, vehicles, and other facilities operating properly. For example, the automotive shop, responsible for the repair and maintenance of all motorized equipment, did complete overhaul work on almost 100 separate items, made over 40 tuneups, and did the periodic maintenance on 80 pieces of equipment.

New development work activity was below normal this year. Planned projects were available and ready to go but -- the universal complaint -- no extra money. There were bright spots, though. Many of the established programs in wildlife habitat improvement, recreation, soil and moisture, and forestry continued to show progress. Campground construction had first priority this year, and our efforts resulted in a new shower house and a good fence around the new sewage lagoon. Other construction completed by contractors included 2 dump stations, 2 shower houses, and a section of new water system.

B. Plantings

1. Aquatic and Marsh Plants

Nothing to report this period.

2. Trees and Shrubs

Tree planting activity was slow this year. Normally, we anticipate a planting project of about 10 acres on selected sites within timber sale cut-over areas to improve the diversity and quality of the new forest. However, since no logging of this type was done this year, no planting was done.

About 500 redbud and 500 autumn olive trees were planted at selected areas throughout the refuge in the form of food plots for wintering wildlife.

3. Cultivated Crops

Many factors worked against our corn crop this year. Corn blight was probably the most destructive; however, stalk rot, smut, southwestern corn borer, European corn borer, ear worm, and even the weather contributed to the problem.

Frequent rainfalls during the early growing season prevented the farmers from cultivating properly. Some fields were eventually taken over by grasses, particularly in Units A-8, A-9, A-25, and A-34. The frequent rains and the heavy morning dews made ideal growth conditions for the corn blight fungus. All corn on the refuge was heavily infected with blight.

To complicate an already bad crop situation, the rains failed to come when needed in July and August. This resulted in drought damage to the corn. The diseases, adverse weather, and the various insect damages combined to give us one of the worst crop years on record. Many of the fields were so severely damaged that the farmers did not bother to harvest them.

Because of the stalk rot, 80 percent of the corn that was produced had broken and fallen to the ground by October 15th. The geese made short work of this. The grain itself had a low oil content and did not give full nutrition to the geese. Geese began their annual off-refuge foraging a little early this year.

Other grain crops did reasonably well. Weeds were a problem in the millet and rice fields. Milo was planted on a limited acreage and produced well. These small grains were used heavily by blackbirds and sparrows as well as by ducks.

Mr. Broeking used the "zero-till" method of raising corn again this year. This method, because neither plowing nor cultivation is required, is very desirable for use on lands that are easily eroded. Ground preparation includes spreading fertilizer, weed control spraying with paraquat-atrazine-water solution, and planting. The herbicide ratio is one quart paraquat - 2.5 pounds of atrazine - 20 gallons water per acre. The dead weeds form a duff that practically eliminates erosion and slows runoff water.

Specialized equipment is needed, but conservation benefits to be gained are well worth it. Some of the best yields on the refuge have come from our zero-till corn fields. We really like it.

C. Collections and Receipts

We received one carload of wheat from DeSoto Refuge this year. This was used for seed.

D. Control of Vegetation

We had planned the same weed control program this year that was used in 1969. However, Diazonon was not used because root worms were not a problem.

The zero-till farming is discussed under Crops.

E. Planned Burning

Controlled fire is used on selected areas to improve upland game habitat and to control brush. We continue to get productive results from this practice and use it as often as possible. Weather is our main limiting factor, as we are located in a wet climate. This year only 67.5 acres were burned, which is about 15 percent of the acreage burned last year.

During these times of environmental pollution we, as resource managers, can expect to bear our share of the scrutiny and must be constantly prepared to defend our management methods. Most of us who use controlled fire recognize it for what it is: a cheap, effective, and completely natural way of doing the work. We also recognize the hazards of possible escape and the potential damage that could result from that. We must also acknowledge that our fire puts particles into the air that under today's definitions can only be described as pollutants.

If we continue to use our fires intelligently, and with regard to the temporary impact it may have on the environment, there should be no reason for us to lose this valuable method of management. It appears that education is the key.

For this reason, we have included a 1/2 acre prescribed burning plot within the pine management portion of the Conservation Demonstration Area. This gives us a chance to explain our management practices to a lot of people.

F. Forest and Range Fires

Man and nature cooperated this year and gave us a "good" fire year. We had two small fires on refuge land, both man-caused. A total of two acres of brushland was burned, with no significant loss to the resource.

Refuge crews were called to one other fire which was on private land within our area of control responsibility. It was a 2½ acre grass fire that had the potential of burning onto refuge property.

All things considered, 1970 was a very satisfactory wildfire year.

IV. RESOURCE MANAGEMENT

A. Grazing

Frequent rains created good grazing conditions throughout the summer. However, the high cost of feeder calves, high grazing fee and low use have limited permittees. For the first time in the history of the refuge grazing program, we have excess pasture. Last year 4 pastures were not rented. This is not a bad situation. We can rotate our pastures more and thus increase the use gradually. We still have enough use for the goose browse maintenance and are getting more monetary income for the government.

We feel that for the first time we are truly competitive with private grazing enterprise.

B. Haying

Haying on the refuge is handled as a part of the cropping program.

C. Fur Harvest

No trapping was done by refuge personnel (See Fur Animals, II-D).

D. Timber Removal

A small pine pulpwood sale was prepared in our plantations and sold to Westvaco, a Kentucky-based paper mill. This will be a selection thinning, where suppressed and surplus trees are removed and the larger, more vigorous trees are left to grow.

Refuge pine plantations need thinning badly. With an expanding pulpwood market in our area, we should be able to develop these stands into good wildlife-recreation areas before too long. They are not very productive in their present condition.

Fire must be used to maintain pine in this area. Without it, the ever-present hardwood brush will eventually reclaim the site. We initially treat the stand with fire to facilitate marking and logging and to reduce the fuel accumulation. After cutting, fire will again be used to get rid of the slash and logging debris. Thereafter, until the next thinning, fire will be used as a maintenance practice to keep the brush checked and to reduce the fuel build-ups. It is interesting to

observe these burns while they are in progress. One anticipates seeing wildlife leaving the burning area ahead of the flames. It just doesn't happen. These areas are practically devoid of wildlife of any kind. On each burn, whether it is on a brush area or in the pines, we watch for wildlife. After the burn we search the ground for victims. In total, we have seen a few rabbits, several bob whites, and some woodcock, but never any "victims". Fire does not panic the animals; in fact, on two separate occasions rabbits were seen to emerge from the fire front, gaze around, and pop back into the burning area, showing more concern over the people standing around than with the fire. For this reason, we feel that there is very little impact on existing wildlife populations as a result of our burning activities.

Hardwood cutting was active during the summer months of 1970. The weatherman cooperated by providing practically rain-free logging conditions during the entire time. This is really appreciated when logs must go out on unsurfaced roads.

In a 3-month period, one crew from the Cache River Lumber Company cut and hauled about 670,000 board feet of mixed hardwood saw timber worth about $19,000. Most of the cutting was in the form of small clear-cut blocks. The trees are old and decadent. Clear-cutting prepares the site for the natural regeneration of a new stand of trees. Where native desirable species such as black walnut and yellow poplar are absent, they are planted the following spring on selected sites.

The clear-cut areas are small, usually only 2 to 3 acres in size, and mature timber either borders or encircles so that the impact on forest wildlife is kept as low as possible. We regard each logging area as a potential showcase of proper forest-wildlife management for tours and show-me trips. In this way, we feel that our management efforts can reach beyond refuge boundaries and perhaps influence other people who control or manage other land. This is the challenge that we see, and our attempts at showcase forestry form our approach to it.

During 1970, timber management produced 355 cords of pine pulpwood, 700 black locust posts, 26 cords of oak firewood, and 350.6 MBM of mixed hardwood sawtimber, having a total monetary value of $11,301.70. Over the years, we anticipate that the worth of the non-monetary values will make this look like small change.

E. Commercial Fishing

Two special use permits were issued for commercial fishing of carp, buffalo, drum, bullheads, turtles, and shad in Crab Orchard Lake. All fishing was done between February 6 and November 12. The use of trammel nets was authorized by the Illinois Department of Conservation. The following table summarizes the catch in pounds for the year.

Permittee	Buffalo	Carp	Drum	Bullhead	Turtle
Ross DeSherlia, Grafton, Illinois	2,380	12,572	60	44	290
Oscar T. Smith, Belleville, Illinois	4,977	6,825	597	5	500
TOTAL -	7,357	19,397	657	49	790

The total of 27,460 pounds of fish and 790 pounds of turtle compares with 31,791 pounds of fish and 11,545 pounds of turtle removed in 1969. In 1969, one permittee trapped turtles only.

F. Other Uses

Annual revenue received from all phases of recreational operations are listed in the following table:

RECREATIONAL REVENUES

Concessions:	
Southern Sports, Inc. -	$2,807.83
Pirates Cove, Inc. -	5,211.82
Devils Kitchen -	1,720.89
Little Grassy -	3,229.31
Camp Leases:	103.00
Use Permits:	932.50
Refuge Campground Operation:	29,070.18
Entrance Fees:	24,790.18
TOTAL -	$67,865.71

V. FIELD INVESTIGATIONS OR APPLIED RESEARCH

A. Progress Reports

1. Wildlife Studies

a. The Crab Orchard National Wildlife Refuge White-tailed Deer: WMS - Project No. 3a; Progress Report No. 9 (Cooperative Project)

ABSTRACT

This project covers research completed during 1970, which was the ninth year of the project. The project is sponsored by the BSFW and the Cooperative Wildlife Research Laboratory of Southern Illinois University, with some financial support furnished by a McIntire-Stennis grant.

A total of 93 deer were captured in 1970, with only one mortality. Approximately 8,850 visual observations of marked deer were recorded from a total marked population of about 110. The number of deer observed per mile along the 20-mile census route varied from a low of 1.48 in July to a high of 9.07 in March. The buck:doe:fawn ratio for January-March was 0.39:1.00:1.01, for April-June 0.40:1.00:1.06, for July-September 0.56:1.00:0.44, and for October-December 0.29: 1.00:0.79. Ten marked deer were either road-killed or hunter-harvested off the inviolate area, an average distance of 3.3 miles from original capture sites. Sixty-five unmarked deer were road-killed on the refuge and adjacent highways. The population in Area 13 (key population) increased from 57 to 75 deer from March-April 1969 to the same period in 1970. Approximately 1,100 locations were recorded for 23 radio-marked deer.

Papers published as a result of the research during the year included: (1) A Preliminary Study of the Social Organization of White-tailed Deer, by R. E. Hawkins and W. D. Klimstra (J. Wildl. Mgmt. 34(2): 407-419); (2) Significant Mortality Factors of Deer on Crab Orchard National Wildlife Refuge, by R. E. Hawkins, W. D. Klimstra, and D. C. Autry (Trans. Ill. State Acad. Sci. 63(2): 202-206); (3) Deer Trapping Correlated with Weather Factors, by R. E. Hawkins and W. D. Klimstra (Trans. Ill. State Acad. Sci. 63(2): 198-201); (4) A New Remote Capture Method for Free-Ranging Deer, by R. E. Hawkins, W. D. Klimstra, L. W. Lamely, and D. C. Autry (J. Mammal. 51(2): 392-394).

Manuscripts which are forthcoming will include the following topics: deer feeding preference, food availability relationships, deer movement patters, and deer dispersal.

There were no advanced degrees confirmed during 1970 as a result of this research.

b. Ecology of Feral Dogs (Canis familiaris) on Crab Orchard National Wildlife Refuge. (Southern Illinois University)

This study is under the supervision of Dr. H. J. Stains, Department of Zoology, Southern Illinois University. The principal investigator is W. H. Nesbitt, who is conducting the research in partial fulfillment for his doctor's degree.

ABSTRACT

The study began in January 1969, with three basic objectives: (1) investigate daily and seasonal activities of individuals and pack members, (2) evaluate home range in relationship with ecological characteristics of the area, and (3) describe the social relationships between individuals of the pack.

Preliminary work consisted of finding the dog packs, locating the feeding areas, and identifying individual dogs. During 1970 most efforts were directed toward the collection of data from the Area 10 pack. Telemetry studies were disappointing due to malfunctions and/or loss of collars. Telemetry range was poor, generally 1/4 mile or less.

Pack bonds were "loosened" over the summer months and strengthened during fall and winter. Predation on deer was found to be "classic", sick and/or injured, but not common. Area "pets" accounted for the only livestock loss -- 2 calves. A snow census conducted around the inviolate area during January 1970 gave an ingress-egress figure of 29 dogs over a 24-hour period. Results of the study and a final report are expected to be completed during 1971.

c. Effect on Canada Goose Crop Impaction Mortality by Elimination of Soybeans from Crab Orchard National Wildlife Refuge. WMS - Project No. 6, Progress Report No. 3 (Bureau Project)

From 1951 to 1966 there were several years of high goose mortality due to crop impaction by soybeans. Therefore, soybeans were dropped from the refuge farming agreements.

A refuge survey system was initiated in 1967 to collect data on goose mortality and to compare this data to years when soybeans were allowed in the area. The results are shown in the following table.

GOOSE MORTALITY SURVEY

Year	Total	Impacted	Other
1967	5	No	5
1968	9	No	9
1969	6	2	4
1970	6	No	6

With the continued decrease in goose mortality, we can assume that our restriction of soybeans on the area was a sound management decision. It is recommended that this study be continued for at least one more season to give us a basis of five years of data.

d. Food Intake and Periodicity of Feeding of Largemouth Bass in the Wild. WMS - Project No. 8 (Southern Illinois University)

This study is under the general supervision of Dr. W. M. Lewis, Director of the Cooperative Fisheries Research Laboratory at Southern Illinois University.

ABSTRACT

This study seeks to (1) determine forage available to bass in different lakes by stomach content analysis, (2) calculate as a percentage of body weight the food intake of bass populations, (3) determine the feeding periodicity of bass, and (4) compare the percentage of full stomachs in a planktophagic fish population (gizzard shad) to a population of a piscivorous form (largemouth bass).

The following tentative conclusions can be made concerning the bass in Crab Orchard Lake: (1) primary forage for the bass is the gizzard shad, (2) average size shad eaten by bass 12 inches or larger was 6 inches; (3) 50 percent of all fish sampled had food in their stomachs, and (4) the bass fed randomly throughout a 24-hour period.

The data collecting phase of this project is completed. A change in the computer system at the university has caused a delay in the data analysis. It is expected that the final report will be completed the spring of 1971.

e. Aquatic Plant Ecology on Crab Orchard National Wildlife Refuge. WMS - Project No. 12, Progress Report No. 2 (Southern Illinois University)

This project is under the supervision of Dr. R. H. Mohlenbrock, Chairman, Department of Botany at Southern Illinois University. Research is being conducted by Donald C. Autry to fulfill requirements for a Doctor's degree.

ABSTRACT

Objectives of this study include: (1) describe aquatic flora, particularly vascular plants, (2) determine patterns of seasonal and annual succession, and (3) derive a mathematical expression of certain environmental factors for the purpose of predicting plant abundance.

Data concerning the vegetation and water chemistry was collected on 44 ponds during April-September 1969. All field work has been completed. Data will be transferred to cards for computer analysis. Preliminary data suggests correlations between certain environmental parameters and plant abundance. Considerable vegetational varieties existed between ponds which, at first glance, appeared similar.

It is expected that this study and submission of thesis will be completed during 1971.

f. Habitat Improvement and Management for Recreational Uses WMS - Project No. 14; Progress Report No. 4 (Bureau Project)

ABSTRACT

This project was initiated in 1966 to plan, execute, and evaluate habitat development work within the public hunting area. All work has been conducted by refuge personnel and equipment.

Of the six basic objectives set up for this study, the following progress has been made: (1) review of wildlife species habitat requirements was completed, (2) review of past land practices and habitat management history in the study areas (Areas I and III) was completed, (3) cover-type maps were completed, (4) development of a unit management system was completed (McBee card systems), (5) development of specific units have been done as funds and manpower allowed (approximately 30 acres of food plots were completed this year, and 65 acres received control burning, and (6) long-range management plans were completed on the Grassy Bay area, Group Picnic area, and Carterville area.

g. The Density and Territory Size of Brueling Prothonotary Warblers (Prothonotaria citrea) with Respect to Various Habitats in Southern Illinois. WMS - Project No. 17 - Progress Report No. 1 (Southern Illinois University)

ABSTRACT

This study is under the general supervision of Dr. H. I. Fisher, Chairman, Department of Zoology, Southern Illinois University. The principal investigator is Vernon M. Kleen, who is conducting the research in partial fulfillment for his Master's degree.

The study began in the spring of 1970 and will attempt to determine six basic objectives: (1) breeding densities, (2) territory sizes, (3) breeding success, (4) effects of nesting boxes in less favorable habitats, (5) changes in territories for re-nesting attempts, and (6) factors that influenced the breeding of the birds.

From April to July 1970, birds were color banded and their movements plotted within a study area. Of 14 male birds using the study area, 11 were color banded. Territories ranged from a minimum of .75 acres to a maximum of 25 acres. Thirteen nests were found, and 11 young were banded. Only 5 females were banded so pair bonds could not be established for all the rest.

h. The Effect of Prescribed Burning on Quail Habitat. WMS - Project No. 16, Progress Report No. 1 (Southern Illinois University)

ABSTRACT

This study is under the general supervision of Dr. Roger C. Anderson, Botany Department, Southern Illinois University. The principal investigator is Frank Novak, who is conducting the research in partial fulfillment for his Master's degree.

This study began in the spring of 1970 and is concerned with three basic objectives: (1) determine the response of desirable quail cover and food species to burning, (2) record the response of tree and shrub species to burning, and (3) provide information to help formulate a program for quail habitat management.

The study area was established and vegetation inventory completed. One unit was burned in March 1970; other units will be burned as requested by Mr. Novak and approved by the refuge.

i. Life History and Ecology of Wood Duck.
WMS - Project No. 10, Progress Report No. 2
(Cooperative Project)

This project was established in June 1969 to provide long-term objectives, goals, and direction for all Wood duck research on the area. The project is sponsored by BSFW and the Department of Zoology of Southern Illinois University. Dr. John N. Krull is the principal investigator for all work undertaken, as described in Special Use Permit No. SUP-68-69. Various phases of the research will be conducted by graduate students in fulfilling their requirements for advanced degrees.

The current objectives for this study include: (1) delineate potential and actual breeding habitat, and actual production from the various refuge habitats, (2) delineate potential and actual brood rearing habitat and ecologically describe and evaluate these areas, (3) ecologically describe and evaluate potential and actual limiting factors on overall wood duck production, (4) study the summer-fall wood duck population on the refuge, (5) thoroughly evaluate an artificial nesting structure program on the refuge, and (6) thoroughly evaluate a wood duck introduction program with emphasis being placed on building up an imprinted population of birds that return annually to breed.

There are presently two graduate students working on this project.

Characteristics of Wood Duck (Aix sponsa) Brood Rearing Habitat on the C.O.N.W.R. WMS - Project No. 10a (Robert L. Delaney - Master's degree)

ABSTRACT

Objectives of this study were to: (1) delineate potential brood rearing habitat, (2) locate actual brood rearing habitat, (3) ecologically describe this habitat, and (4) make recommendations for the improvement of both actual and potential brood rearing habitat.

All field work for this study has been completed with most of the data analyzed. A first draft of the final report has been submitted, and there remains the final acceptance of this work and receipt of thesis.

A Survey of Wood Duck (Aix sponsa) Nest Sites on the C.O.N.W.R.
WMS - Project No. 10b. (James C. Kenney - Master's degree)

The objectives of this study are to: (1) determine the abundance of potential and actual nesting cavities, (2) characterize the occupied

cavities, and (3) determine what percentage of all cavities seen from the ground are usable nesting cavities.

Mr. Kenney has dropped the project and has not reported any significant progress on his data to date. Michael Joyce has been scheduled to take over this phase of the study and it is hoped he will bring it to successful conclusion.

2. Forestry Studies

a. Tree Fertilization Study (Cooperative Project with Illinois Natural History Survey)

This project was completed this year with a final report on file. Copies are available from the Illinois Natural History Survey (Ill. Nat. Hist. Surv. Bul., Vol. 30, Art. 4, Sept. 1970, Urbana, Illinois).

ABSTRACT

If you would like to see your trees grow faster, this publication will be of interest to you. The study shows that fertilizing with nitrogen primarily, will increase the growth rate of trees substantially. This nicely printed and illustrated bulletin will tell you how to do it.

b. Walnut Study (Cooperative Project with the U. S. Forest Service, Carbondale Research Station)

This is a relatively long-term study, 10 to 15 years, designed to measure the growth response of black walnut trees to various methods and intensities of cultural treatments. Measurements taken during the past six growing seasons show that black walnut does respond favorably to these practices. This is to be expected. The real problem remains: how much of what practice is needed to produce merchantable black walnut from plantations. The answers to this and other walnut questions will come from this study.

c. Hybrid Chestnut Study (In cooperation with the U. S. Forest Service)

This study, started in 1949, continues to record and interpret the progress of a 100-tree hybrid chestnut plantation. The plantation is one of many that were established throughout the original range of the native American chestnut in an attempt to develop a blight resistant strain.

Of the thousands of seedlings planted over 20 years ago, one tree, Number B-26, continues to stand out because of its desirable characteristics. B-26 is known throughout the world of forestry as the "Clapper Chestnut" in honor of its developer, Russell B. Clapper. In 1967, this tree became infected with the chestnut blight. In spite of this, the tree continues to thrive, each year exhibiting the vigorous growth and fine form that makes it a champion.

At the close of the 1970 growing season, measurements show that the tree gained 1/2 inch in diameter and 2 feet in height. Considering the dry summer we had, this was very good. The tree now measures 12.5 inches D.B.H. and 66 feet total height. In October the tree produced its usual abundant crop of nuts. It appeared that every squirrel in the woods visited the tree in the hope of getting some.

When notified that the "Clapper" was still hanging in there, Russell Clapper wrote back: "It is indeed surprising how this tree continues to thrive despite the serious basal canker of Endothia parasitica". We are surprised too, but remain optimistically hopeful that it will make it all the way.

3. Recreational Studies

A study on the "Effects of Camping on the Soil and Vegetation at Crab Orchard Refuge Campground" was done during the year by Dennis Foss, a Southern Illinois University graduate student.

Three units of similar size, soil type, topography, and vegetative overstory were selected from loops B and C in the campground. Two of the units have had established camping use since 1964. The third had never had any established camping use. It was used as a control. All three units were sampled at the end of the camping use season to compare relationships between bulk density and the following characteristics: (1) soil depth, (2) degree of use on the unit, (3) percent of herbaceous vegetative coverage, and (4) litter weight.

The results of these comparisons showed that: (1) bulk density values were higher on the camping units than on the control unit, (2) as bulk densities increased, percent of vegetation and litter weight decreased, (3) bulk density values were highest on the heaviest used portion of the unit, and (4) greatest bulk density values or greatest degree of soil compaction occurred primarily in the surface soil (one inch depth).

4. Fisheries Research

During the past three years the refuge has been experimenting with several species of game fish not now in Crab Orchard Lake. The experimental plantings of walleye are still being evaluated, and it is doubtful that these fish will ever be stocked in any number in Crab Orchard Lake. Although the growth rate for these fish was good, we believe other species hold more promise. The one-year old walleye are about 12 inches in length and appear to be doing well.

Northern pike have shown some spectacular growth rates, as well as an adaptability to the environment in the Crab Orchard area. Northern pike fingerlings planted in a refuge pond in June 1968 were 30 inches long and weighed 5½ pounds in October 1970. Both the growth rate and the survival are encouraging, and we are proceeding with additional steps to place this fish into Crab Orchard Lake.

In April of 1970, 450,000 northern pike fry were obtained from Gavins Point National Fish Hatchery. About 350,000 of these were released into Crab Orchard Bay, a 100-acre empoundment at the upper end of Crab Orchard Lake; another 75,000 into a 5-acre pond, and 75,000 into a hatchery pond. Survival in the Crab Orchard Bay site was minimal, because of the shallow water and turbidity. The 5-acre pond showed good survival rate, and adult carp and shad were introduced prior to spawning in order to furnish forage for these pike. We moved some northerns from the hatchery and from the 5-acre pond site to a 20-acre marsh which had been improved and prepared for their use in March 1970. This rearing pond has a maximum depth of 6 feet and averages about 3 feet. Native vegetation covered much of the basin before it was filled with water. Carp, shad, bluegill, and golden shiner were stocked in early April.

In May and again in July the fingerlings acquired from the hatchery and the 5-acre test pond were released into Pigeon Creek. These fingerlings varied in size from 4 inches to 6 inches. Forage in the Pigeon Creek marsh was very good throughout the summer, and on October 15, the marsh was drawn down, and approximately 1,000 fish were recovered from the 1200 stocked. In this 5½ month period these fish that were obtained as fry now averaged 16.1 inches with the largest pushing 18 inches. These fish were released directly into Crab Orchard Lake. The next step in our northern pike operation is to try to release into Crab Orchard Lake about 10,000 pike per year that are 16 inches in length. We believe this can be done by utilizing the existing ponds and marshes at Crab Orchard at relatively no expense to the refuge.

VI. PUBLIC RELATIONS

A. Recreational Uses

The refuge recorded 1,631,824 visits during 1970. In 1969, 1,997,614 visits were recorded. Visits are calculated by the use of counters, random use surveys, and camper registrations. Refer to the following Form 3-123 for a complete breakdown on public use.

The decrease in use in 1970 is primarily due to the closing of Southern Illinois University in early May because of student disorders. Student use of public use areas is quite heavy in late spring. The five-week early closing of the university made quite a change in the use pattern as well as decreasing some of our annual "spring problems".

Wildlife-oriented use accounted for 25 percent of the visits in 1970. This compares to only 11 percent wildlife oriented visits in 1968. We expect this type of use to increase as we begin to offer more interpretive programs and services and gradually re-orient our public use program.

A Bureau entrance fee program was put into operation in 1970, due to the expiration of the Land and Water Conservation Fund Act. An annual entrance fee of $5 was charged instead of the $7 under the LWCF program. The daily entrance fee remained at $1. Even with the reduced annual fee and use, fee collections increased slightly over 1969 -- $24,790 in 1970 compared to $24,270 in 1969. Better collection coverage this year was primarily responsible for this figure.

The three campgrounds on the refuge were heavily used this year. The refuge-operated 312-site campground was near or at capacity on most summer weekends and holidays. The weekly campfire program was continued at the Crab Orchard Campground and added at the Little Grassy Campground. These resource-oriented programs are extremely popular and attracted 2,750 people. This year, special emphasis was placed on environmental problems.

The Playport, Pirates Cove, and Little Grassy concessions received good use this year. The Devils Kitchen concession showed some improvement over 1969 but still is a marginal operation. An audit of all concessions was made in May by Mel Anderson from the Regional Office. The audit indicated that concessions operations are satisfactory.

The annual refuge "Open House" was extended to two days this year and was held on Saturday and Sunday, November 7 and 8. The entire refuge was open from 8:00 A.M. until 5:00 P.M. each day. Good weather and the two-day opening attracted 10,352 visitors in 2,588 cars touring the area. This year, Southern Illinois University's Outdoor Laboratory located on the leased area at Little Grassy Lake, held an open house in conjunction with the refuge. The affair was jointly publicized and conducted. Many people visited the refuge area first and then drove to the Outdoor Laboratory. We believe this joint endeavor was worthwhile. Many people learned for the first time about the outdoor and environmental education program of the Outdoor Laboratory as well as the fact that the Bureau is cooperating in this program. Copies of the visitor handout material is appended.

Three fatalities occurred during the 1970 public use season. On April 29, an 18-year old Chicago youth drowned while swimming in an unauthorized area in Crab Orchard Lake. On August 23, a young boy from Chicago fishing from the Wolf Creek bridge fell into the water and drowned, along with an adult companion who had gone into the water to rescue him.

A total of 468 man-days were spent on patrol, visitor protection, and visitor services during the year. This includes operation of the public hunting area as well as the general public use areas. This does not include voluntary overtime by patrol personnel. Much of the patrol and visitor protection is preventive enforcement, and we believe this greatly contributes to the relatively low incidence of vandalism and accidents on the area.

A scheduled May 8-10 Rock Festival adjacent to the refuge did not materialize. A last-minute court injunction prohibiting the promoters from holding it forced cancellation of their plans. Additional refuge and Management and Enforcement personnel were assigned to Crab Orchard as a precaution against any possible problems. Fortunately, none materialized.

THE DEPARTMENT OF INTERIOR, BUREAU OF SPORT FISHERIES AND WILDLIFE

and

SOUTHERN ILLINOIS UNIVERSITY

HAVE BEEN WORKING TOGETHER FOR ALMOST TWENTY YEARS!

****

The initial lease on property adjoining Little Grassy Lake was signed by the University and the United States Department of Interior, Bureau of Sport Fisheries and Wildlife in 1951. The Cooperative Conservation Education program started in 1968 when the University and the Bureau signed a Memorandum of Understanding for the use of Federal land for such programs. A Memorandum of Understanding signed in September of 1970 by the Bureau and the University provides for the establishment of teaching satellites of the Cooperative Environmental Studies Program. These will be located on SIU and Refuge lands best suited for teaching. The Crab Orchard National Wildlife Refuge works closely with many SIU departments.

The Outdoor Laboratory at Little Grassy Lake is located eight miles south of Carbondale on the Giant City blacktop road which connects with old Route 13 east of Carbondale. Giant City State Park adjoins the Laboratory on the south.

Dean Paul A. Yambert supervises a multitude of educational, service, and research projects for many of the University's academic departments as well as for organizations and individuals outside the University community. Dr. Gerald Gaffney has a joint appointment with the Bureau of Sport Fisheries and Wildlife and the Outdoor Laboratory. His duties include the coordination of the cooperative programs.

Students, researchers, and visitors leave the area with a heightened awareness of their natural environment and the knowledge necessary to make wise use of that environment.

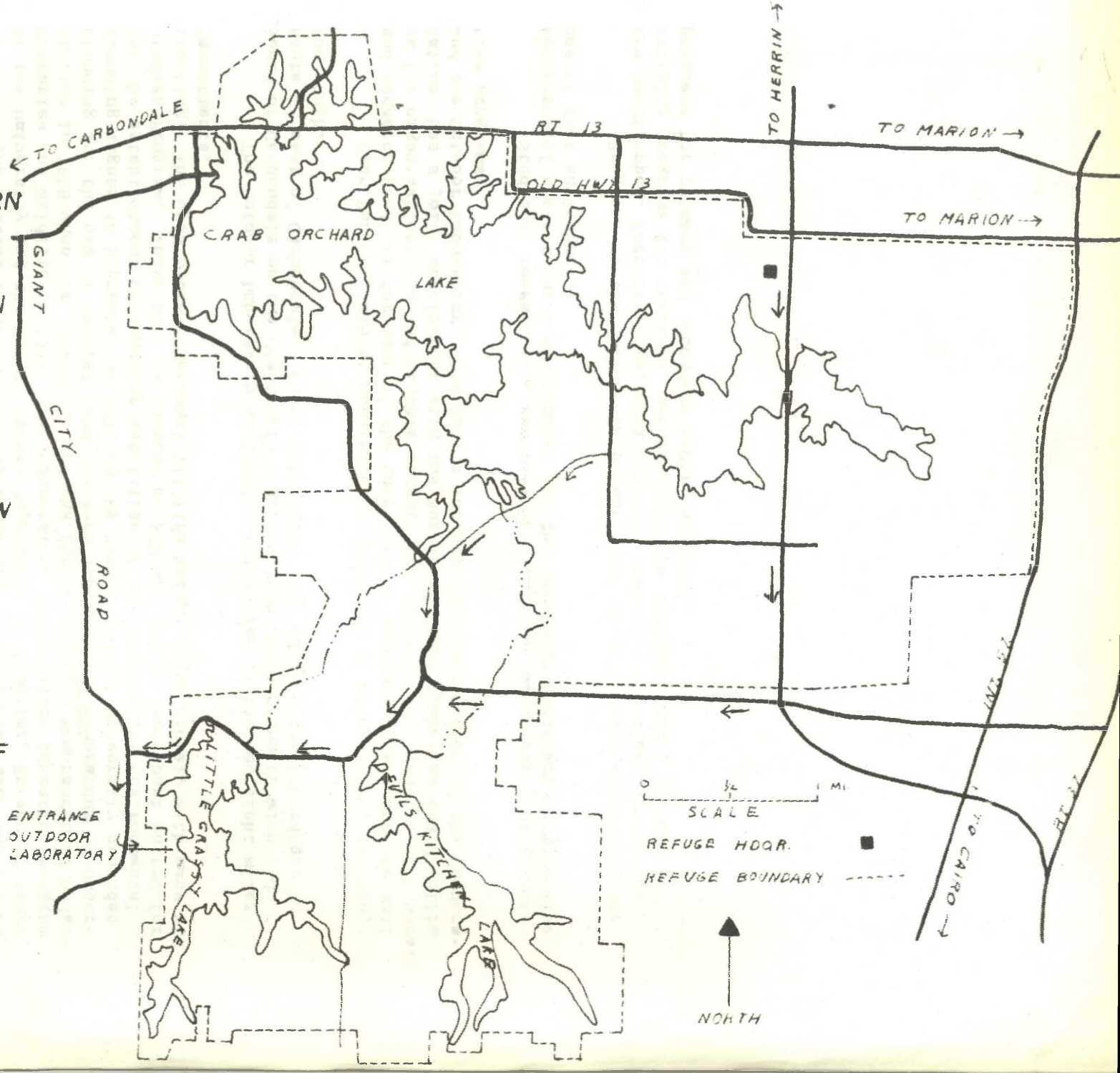
Programs at the Outdoor Laboratory include year-round activities for the handicapped, forestry camp, environmental resources training, in-service training programs for teachers, natural resource workshops and a variety of programs for primary and secondary school students.

FOLLOW THE ARROWS TO THE S.I.U. OUTDOOR LABORATORY

WHERE THE BUREAU OF SPORT FISHERIES AND WILDLIFE, DEPARTMENT OF INTERIOR, AND SOUTHERN ILLINOIS UNIVERSITY CONDUCT COOPERATIVE CONSERVATION EDUCATION PROGRAMS:

THE OPEN HOUSE PROGRAM AT THE OUTDOOR LABORATORY INCLUDES A SLIDE SHOW OF VARIOUS PROGRAMS PLUS A BUS TOUR OF THE AREA.

THE UNIVERSITY IS PLEASED TO HAVE THIS OPPORTUNITY OF JOINING THE REFUGE IN WELCOMING YOU!



6 *To the right you can see U. S. Powder Company's dynamite plant, one of the most modern in the world. It occupies buildings of the Ordnance Plant. An important by-product here is the production of ammonium nitrate fertilizer.*

6a *The Refuge map indicates the route to the Cooperative Conservation Education area at the SIU Outdoor Laboratory. Directional signs have been posted for your convenience. You are invited to see a slide show and take a bus tour.*

(Continue straight east across State Route 148)

13 *You are now driving on Chamnesstown Road across the Crab Orchard Creek bottom. You probably remember or have heard stories of the Model "T" and horse and buggy days around 1920, when this stretch of concrete road was constructed. In those days it was an exciting experience to be able to drive, even for a mile or two, on what was probably then considered a "super highway".*

14 *The large mounds to the right are earth-covered concrete "igloos". They were used during World War II for the storage of bombs, mines, shells and other high explosives. Most of the igloos are now leased to Olin Mathieson Chemical Corporation and U. S. Powder Company for storage of explosives. Woodchucks and foxes find the mounds very attractive for their burrows and dens.*

7 *About 6,500 acres of crops are grown in cooperation with 35 neighboring farmers. Major crops are corn and hay. You will notice that in most of the cornfields some rows are still standing. This is the Government's share which is left for the geese. The farmer has taken three-fourths of his share.*

8 *Diagraph-Bradley Industries, Inc. is the oldest and largest manufacturer of stencil cutting machines in the country, established in 1893. It also occupies Ordnance Plant buildings.*

9 *This area was once the site of Chamnesstown community. On the right was Mauser's General Store which sold groceries, hardware, clothing, wagons, and many miscellaneous items. A three-story flour mill and several residences were located at this site. The community was completely abandoned in 1935.*

10 *Approximately 3/4 mile south of this point is the new Federal Maximum Security Penitentiary.*

11 *Crab Orchard Field Trial Club is headquarters for several national and local hunting dog events in the fall and spring of the year. Early this month, the National Quail Futurity was run, followed by the Crab Orchard Field Trial Open All Age Stakes. On the far end of the field to your right you will note an observation tower. This tower is used in connection with deer research by Southern Illinois University.*

12 *The group of warehouse buildings which you are approaching is part of the Ordnance Plant that was used for the storage of non-explosive items. The buildings are now rented to private industry for manufacturing or storage purposes.*

NOTE---You may turn right here and will exit on "Old" Route 13.

15 *Note the large earthen dam you are now passing. This dike impounds approximately 45 acres for the use of ducks. From your present position on the road the water level of this pond would be about 12 feet over the vehicle.*

We hope you have enjoyed the tour and that you have learned something about the many activities on this National Wildlife Refuge. You may now proceed south on Route 148 about one and one-half miles to the "Observation Towers". From these towers you may see three species of geese-Canada, Blue and Snow. Also, you may return to Wolf Creek Road to observe our "Display Pond" located about one-half mile north from the tour start.

Your map of the Refuge shows you routes to the Cooperative Conservation Education area. Slide shows and bus tours are available. Follow the signs to the SIU Outdoor Laboratory on the Giant City Blacktop.

ANNUAL OPEN HOUSE

Crab Orchard

Welcome to our Annual Open House. Most of you have already enjoyed the recreation facilities in the Public Use Area. Today we are pleased to offer you an opportunity to see a part of the wildlife area normally closed to public traffic.

Crab Orchard is one of over 300 National Wildlife Refuges in the United States, dedicated to the preservation of migratory waterfowl or rare and endangered wildlife species. Crab Orchard Refuge occupies the land and facilities of the former Illinois Ordnance Plant (Ordill).

The primary wildlife management objective at Crab Orchard Refuge is to provide migration and wintering habitat for Canada geese.

The Canada geese you see today were hatched and raised in northern Ontario and northwestern Quebec, Canada. Blue and snow geese nest on Baffin Island near the Arctic Circle.

Geese start leaving the nesting grounds late in August. They fly south across the Great Lakes through Wisconsin, Michigan, Ohio, Indiana and Illinois. The first migrant geese always arrive within one or two days of September 23rd, and flocks continue to come in until late November when the greatest number is usually present.

As you drive along, you may see other kinds of wildlife. There are about 1,200 white-tailed deer in the closed area, some of which have white or blue numbered collars. These animals were captured and marked by SIU students who are studying deer movement. Bobwhite quail, rabbits, turkey, squirrels and woodchuck are common.

The main tour route is marked with signs. We have left several other roads open and you are welcome to use these roads for side trips.

If you see something of particular interest, you may stop, but please stay on the road. Refuge employees along the tour route will be glad to answer questions.

Numbered signs along the route indicate the points of interest described below:

1 *The building on the left is the refuge water treatment plant, which supplies water for the industries and residences, and the new Federal Maximum Security Penitentiary. It has a capacity of approximately two million gallons a day, which is the normal need of a city of about 10,000 people. It was constructed by the War Department in 1942 for the Ordnance Plant.*

2 *This portion of Crab Orchard Lake, (east of Carterville Beach) is open for boat and bank fishing during daylight hours from March 15, through September 30. From October 1, through March 14, it is reserved as a resting area for waterfowl.*

NOTE---You may proceed straight ahead to the No. 3 Station or take the right alternate route to No. 3 Station.

3 *The cleared area to the left is an improved pasture unit. Grazing privileges are leased to neighboring farmers from May 1 to October 31. From November through April the pastures are reserved as feeding and resting areas for geese.*

3a *This year, for the first time, visitors to the Annual Open House have the opportunity to visit our Cooperative Conservation Education area on Little Grassy Lake. The program is a joint effort of the Bureau of Sport Fisheries and Wildlife, U.S. Department of Interior, and Southern Illinois University. It is located at the Outdoor Laboratory on the Giant City Blacktop road. A map of the area is attached. You may leave the tour here or at 6-a or at the end of the tour at 15-a. Routes are marked on the Refuge map. Bus tours of the Outdoor Laboratory are available.*

4 *Wildlife ponds such as these are developed throughout the areas. Each pond provides suitable nesting and brood habitat for several species of ducks, especially mallards and wood ducks. In addition, these ponds provide excellent habitat for furbearers such as the muskrat.*

5 *The pine trees on the left are in a plantation set out by the U. S. Soil Conservation Service in 1939. There are about 3,500 acres of similar plantations on the refuge. As time permits, these areas are thinned by removing every other tree. The remaining trees will grow faster and will be harvestable for lumber in a few years. High value trees such as walnut are not removed during the thinning operation.*

B. Refuge Visitors

JANUARY

Date	Name	Title or Organization	Purpose of Visit
13	Maj.Gen. Johnson	Army Reserve	Courtesy Call
19	Bill Miller	Engineering, R.O.	Construction Project
20	Eugene Simon	Mark Twain NWR	Pick up equipment
20	Marvin Duncan	R.O. Div. of Refuges	Recreation use

FEBRUARY

2 thru 3	Forrest Carpenter	Regional Supervisor, Div. of Refuges, R.O.	Meeting on proposed "Rock Festival"
2 thru 3	Daniel S. Boos	Field Solicitor, R.O.	Meeting on Festival and Tour
25	Jim Beers	GMA Trainee	Courtesy Call
26	Dr. Charles Hartsoe	Penn. State University	Visit Practicum Student and Tour
26	Bob Billetdeaux	Student, Penn State Univ.	Refuge Tour

MARCH

2	Clint Rand	FBI	Law Enforcement
11 thru 12	Phillip Morgan	Asst. Supvr., Div. of Refuges	Goose Population Survey
	Gerald Cummings	Area Biologist, Havana, Ill.	" " "
	Bob Timmerman	Refuge Manager, Swan Lake NWR	" " "
	Parker Smith	Asst. Supvr., M & E, Atlanta	" " "
	Curtis Wilson	Asst., Supvr., Refuges, Atlanta	" " "
18	Robert Burwell	Regional Director	Meeting at SIU

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12	Bob Timmerman	Refuge Manager, Swan Lake NWR	" " "
	Parker Smith	Asst. Supvr., M & E, Atlanta	" " "
	Curtis Wilson	Asst., Supvr., Refuges, Atlanta	" " "
18	Robert Burwell	Regional Director	Meeting at SIU

APRIL

Date	Name	Title or Organization	Purpose of Visit
1	Wendell Crews	Asst.Mgr., Tennessee NWR	Survey Rec. Areas
1	Tom Sweet	Tennessee NWR	" " "
8	Robert W. Sharp	Reg.Supvr., Fishery Services	Northern Pike
27	M. S. Anderson	Asst. Prop. Officer, R.O.	Concessions

MAY

5	Loren Bonde	GMA-In-Charge, Nebraska	Courtesy Call
5	Lloyd Lindvall	GMA, Wisconsin	Courtesy Call
8	Gerald L. Clawson	Mgr., Chautauqua NWR	Courtesy Call
8	Jim Vetter	Central Office, Wash., D.C.	Law Enforcement, "Rock Festival"
18	Bill Thomas	Photo-Journalist for "Sports Afield"	Story on Devils Kitchen and Little Grassy Lakes

JUNE

4 thru 5	John R. Langenbach	ARD, Operations, R.O.	J. C. Property
5	Dr. Paul Yambert	SIU Outdoor Laboratories	J. C. Property
5	Dr. Gerald Gaffney	SIU Outdoor Laboratories	J. C. Property
15	W. D. Carter	Refuge Mgr., Sheldon-Hart, Lakeview, Oregon.	Courtesy Call
17	Jerry Clutts	U. S. Forest Service	Law Enforcement
25	Phillip Sharpe	Asst.Reg. Supv., Div. of Fishery Services.	Courtesy Call

JULY

22	Charles Griffith	C.E. Coordinator, R.O.	SIU Outdoor Lab.

AUGUST

Date	Name	Title or Organization	Purpose of Visit
21	George R. Garris	Carolina Sandhills NWR	Courtesy Call
21	Charles Hendricks	Supervisor, Shawnee National Forest	Courtesy Call

SEPTEMBER

8	Bob Feeley	Field Solicitor's Office, Washington, D. C.	Schurtz Tort Claim
10	Robert G. Personius	Refuge Manager, Horicon NWR	Courtesy Call
10	Maj.Gen. Johnson	Army Reserve	Courtesy Call

OCTOBER

1	Gerald Wise	Indiana Dept. Natural Resources	Employment
7	Gerald E. Cummings	Area Biologist	Cannon net equipment
7	Gerald L. Clawson	Refuge Mgr., Chautauqua NWR	" " "
8	Tom Parisot	Fishery Research	Refuge Management

NOVEMBER

2	Ivan L. Lotton	Artist-Illustrator for American Field	Field Trials
9	Murl Teske	Environmental Protection Agency	Complaint on C.O.Creek
9 thru 10	Bill Thomas	Outdoor Writer, Sports Afield	Article on Wildlife and Industry at Crab Orchard
9 thru 10	Mark Boesch	Forest Service, Milwaukee	Tour of Refuge
12	Ralph VonDane	GMA-Pilot, Peoria, Illinois	Goose Census

Date	Name	Title or Organization	Purpose of Visit
17	Joe Hopkins	GMA, Fergus Falls, Minn.	Law Enforcement
17	Marshall Stinnett	M & E, Washington, D. C.	Law Enforcement
17	Edward M. Bosak	GMA, Springfield, Ill.	Law Enforcement
20	Dr. John Wanamaker	Principia College, Elsah, Ill.	Field Trip
25	Ralph VonDane	GMA-Pilot, Peoria, Ill.	Goose Census
30	David V. Smith	Realty Div., R.O.	Land Appraisal
30	Carl Rasmussen	Wetlands, Fergus Falls, Minn.	" "
30	Morton Smith	M & E, Washington, D. C.	Goose Kill Count
30	Dr. Henry Kyle	Steilacoom, Washington	Courtesy Call

DECEMBER

16	Earl Cunningham	Area Biologist, Region 4, Wapanocca NWR	Cannon Trapping Equipment
21 thru 22	Ross Hanson	Flyway Biologist - Regional Pilot	Goose Census
22	Bob Reeves	Cape Girardeau, Mo.	Taped TV Program
23	Pete Brown	SIU News Service	Story on Canada Geese

FREQUENT VISITORS

David Purinton	GMA, Anna, Illinois
David Kennedy	Union County Refuge
John Schwegman	Illinois Nature Preserve Commission
Earl Fairley	Illinois Department of Conservation
Art Reid	Outdoor Writer, Southern Illinoisan newspaper

FREQUENT VISITORS (Cont.)

Jim Harrison	Central States Fishery Station, Princeton, Indiana
Del Robinson	" " " " " "
Gary Steinbach	" " " " " "
Dr. Paul Yambert	SIU Outdoor Laboratories
Dr. Gerald Gaffney	" " "
C. E. Harris	Warden, U. S. Penitentiary, Marion, Illinois.
George Pickett	Asst. Warden, U. S. Penitentiary, Marion, Illinois.
Dean Tresch	GMA, Quincy, Illinois
Lester Daulby	Deputy Fire Marshal, DuQuoin, Illinois
Maurice Whitacre	Little Grassy State Fish Hatchery, Carbondale, Ill.
Capt. Carl Kirk	SIU Security Police, Carbondale, Illinois
Karl Siderits	U. S. Forest Service, Marion, Illinois
Edwin Greer	Southern Illinoisan Newspaper Photographer
Dr. Dwight McCurdy	Forestry, SIU, Carbondale, Illinois.

C. Refuge Participation

PROGRAMS PRESENTED	Hovell	Hunter	Johnson	McCoy	Maruska	Mehrhoff	Nichols	Pickar	Rice	Stapleton	Uptegraft	Wilson
Sportsmen's Clubs						1						1
Bird,Garden,Nature Clubs				1								
Schools	9		9	15	1	3	4	2	7		14	13
Church Groups											1	
Service Clubs	4					1		1			4	1
Youth Groups	6		2	7	4	1	2			1		
Professional/Scientific			3	1		1	1	1				
State/Federal Government												
Television & Radio						2	1				1	2
Campground				13	16							
TOTALS	19		14	37	21	6	8	4	7	1	20	17
ACTIVITIES ATTENDED												
Sportsmen's Clubs	2		1			2	2				4	
Bird,Garden,Nature Clubs			1									
Schools	1		2			1	2				1	1
Service Clubs						1						
Youth Groups						1						
State/Federal Government		2	2			14	7				1	1
Professional/Scientific		1	2			7	15				2	5
Other						1	1					
TOTALS	3	3	8			26	27				8	7

D. Hunting

Squirrel hunting was good this year. Hunting pressure was heavy, but well dispersed because of the large amount of good squirrel hunting area that was available. Many hunters took their daily limit of five around Devils Kitchen Lake where there are mature oak and hickory trees.

Mourning dove hunting was very poor on the refuge public hunting area. The concentration of doves which usually moves into the refuge during September never arrived. Consequently, most dove hunters didn't fill their daily bag limit anytime during the season.

Illinois again had an early teal season lasting nine days during September. Hunting pressure was very light and success limited. The best hunting was on opening day on a small lake adjacent to the refuge. Thirty-two blue-winged teal were killed by nine hunters. One university professor was cited for taking wood ducks out of season. He thought they were teal.

This year duck season lasted 55 days and found Illinois initiating a point system based on 100 points. A point value was assigned to each species and sex of duck. A hunter reached his daily limit when the point value of the last duck shot, added to the sum of point values of other birds already taken during that day, equaled or exceeded 100 points. The possession limit was the maximum number of birds, by species and sex, which could legally be bagged in two days hunting. The point values are listed below:

90 Points	20 Points
hen mallards	drake mallards
black ducks	hen pintails
wood ducks	ring-neck ducks
redheads	
canvasbacks	
hooded mergansers	

All other species and sexes of ducks counted 10 points.

Duck hunter success was typical for Crab Orchard. Ten or twelve of the more avid duck hunters, who hunt nearly every day,

bagged the majority of the ducks killed. Very few mallards were taken this season. Mostly scaup, teal, ringnecks and wood ducks were bagged. Several hunters had good pass shooting at teal and wood ducks by wading out to the closed area boundary line in Grassy Bay of Crab Orchard Lake and concealing themselves in the lotus.

An objective analysis of the point system in our area cannot be made, mainly because of the lack of ducks. As could be expected, many of the hunters checked were confused and didn't really know what they could kill. For those experienced duck hunters who could identify ducks in flight, the point system was a great innovation; primarily, because they could kill more ducks.

In areas other than the refuge where there was a concentration of mallards, it was reported that many hunters were leaving hen mallards in the field, particularly when the hen mallard was killed first.

Goose season opened November 12 and closed December 23. Since the four-county quota had not been reached by the end of the regular season, the season was extended two days, January 2 and 3.

Goose hunting in the Crab Orchard Refuge area was the best recorded. A total of 7,139 geese were bagged in or near the refuge area. This compares to the previous high of 5,109 in 1969. The high kill can be attributed greatly to the southern corn blight which reduced the refuge corn crop by better than 50 percent.

A total of 27,274 geese were bagged in the four-county zone. This was 726 birds shy of the 28,000 bird quota set for the zone. On the refuge public hunting area, 8,320 hunters bagged 1,164 geese, the best recorded kill since 1960.

Goose kill figures were compiled on a daily basis by the refuge staff and reported weekly to the Union County Wildlife Refuge Supervisor. These figures were based on club kill records, registers kept in 13 of the major refuge public hunting areas, field checks, registers kept at four check stations adjacent to the refuge, and records kept by private individuals.

A comparison of the 1970 season with the previous ten seasons follows:

Year	Number Clubs	Club Kill	Public Hunting Area Kill	Private Non-Club Kill	Season Totals
1970	50	4731	1164	1244	7139
1969	31	2506	748	1855	5109
1968	29	2521	636	593	3750
1967		711	567	141	1419
1966	33	1575	432	267	2294
1965	37	264	279	107	650
1964	43	1533	305	276	2114
1963	43	1547	395	228	2170
1962	42	1944	532	249	2725
1961		1289	872	424	2585
1960		2864	1307	334	4505

Bow and arrow hunting for deer is a popular sport in this area, and there is plenty of good deer country available in which to hunt. Heaviest hunting pressure was on opening day; however, the sport remained popular throughout the 78-day season. Even with this long hunting season, very few deer were taken.

Shotgun deer hunters killed 242 deer in Williamson County during the first 3-day season, November 20-22. Hunting pressure was much lighter the second 3-day season, December 11-13, and only 37 deer were taken. The largest buck killed field dressed at 185 pounds, while the largest doe field dressed at 113 pounds. Approximately 80 percent of all the deer harvested in Williamson County were taken from refuge lands.

Quail hunting on the refuge public hunting area was very spotty. Coveys were fairly difficult to locate. Southern Illinois University reported that their study areas indicated a 60 percent decrease in the Southern Illinois quail population.

Rabbit hunting on the public hunting area was very poor for the third year in a row. The hunting pressure was very light.

E. Violations

The violations listed below were handled by refuge personnel this year.

Violation	Number	Fine and Cost
Speeding	5	$130.00
Improper Parking	1	35.00
Drive too fast for conditions	3	45.00
Drive vehicle off roadway	1	30.00
Litter roadway	1	35.00
Illegal transportation of liquor	4	125.00 -- $35.00 suspended on condition subject left town.
Illegal possession of liquor	11 2	375.00 2 years probation
Transport uncased gun	3	95.00
Trespass	16	540.00
Battery	2	140.60
Disorderly conduct	1	26.00 Cash bond forfeited
Public nudity (disorderly conduct)	5	126.50
Possession of marijuana	2	490.50 + 4 years probation
Operate motorboat w/out proper lights	1	15.00
Operate motorboat w/out life preserver	1	15.00 $10.00 fine suspended
Pull waterskier w/o observer	2	70.00
Operate motorboat in restricted area	6	175.00
Operating motor over 10 h.p. on Devils Kitchen Lake	1	20.00

Violation	Number	Fine and Cost	
Fish w/out license	3	$45.00	
Hunt w/out license	1	35.00	
Hunt waterfowl w/out duck stamp	3	100.00	
Shooting before hours	1	35.00	
Take wood ducks out of season	1	35.00	
Take protected species	2	70.00	
Take geese outside of blind	3	105.00	
Take geese within 100 yards of property line	1	35.00	Suspended
Falsify kill slips and goose registration sheets	1	55.00	
Hunt geese without registering prior to entering public hunting area	16 5	410.00 175.00	 Suspended
Assault on Federal Officer	1	Pending in Federal Court	
TOTAL -	105	$3,622.60	
		255.00	Suspended
		Total - $3,367.60	
			72 Months Probation

A total of 44 hours of work in lieu of fines was done on the refuge. An additional 196 cases were handled in which no charges were filed. These do not include the "countless" contacts during the year in which only verbal warnings were given.

Federal cases were handled before the U. S. Commissioner in Carbondale. State cases were filed in Circuit Court in Marion.

The following incidents were investigated by refuge personnel. In the more serious cases, assistance in the investigations was given by state or local authorities.

Incident	Number
Motor vehicle accident	12
Theft	25
Breaking and entering - vandalism	7
Injury to using public	6
Discharge of firearms	1
Boating accident	2
Possession of marijuana	2
Illegal growing of marijuana plants	1
Auto theft	1
Illegal possession of liquor	3
Trespass	4
Disorderly conduct	5
Bomb threat	1
Illegal hunting	7
Sexual deviate	1
Fire	1
Abandoned vehicle	3
Drowning	3
Death (natural)	1
Heart attack	4
Miscellaneous	22
Total -	112

Excellent cooperation and assistance were received throughout the year from the Illinois State Police, the Williamson County Sheriff, and the Southern Illinois University Police. The Illinois Department of Conservation assigned a patrol boat and personnel to Crab Orchard Lake for assistance in enforcing boating regulations and boater safety on several of the high-use weekends during the summer months.

Assistance was also provided throughout the year by Williamson County States Attorney Kenneth Powless and his staff. Mr. Powless' understanding of our many problems, advice, and handling of several important cases have been greatly appreciated. The major fines imposed in several cases were a direct result of his efforts in our behalf.

F. Safety

The Refuge Safety Officer is Darrell Uptegraft. The Safety Committee members for 1970 were: from Management - Richard Johnson, Chairman, and Rolla Basler; from the Union - Leon Parks and Russell Massie.

Safety Meeting Schedule
1970

Date	Department	Suggested Topic
January	Office	New Schedule and Administration
February	Shop	Equipment Safety
March	Fire Station	First Aid
April	Soil and Moisture	Farm Equipment
May	Recreation	Water Safety
June	Refuge Manager	Vacation Time
July	Water and Sewage	Pollution Problems
August	Wesley James	Defensive Driving
September	Wesley James	Defensive Driving
October	Wesley James	Defensive Driving
November	Wesley James	Defensive Driving
December	Wesley James	Defensive Driving

The Safety program was carried out this year with enthusiasm and vigor. All recommendations to the Safety Officer and Project Manager were followed up and placed into operation. Several items of equipment were recommended and purchased (chlorine gas mask, smoke mask, and self-contained oxygen breathing apparatus).

In response to the Bureau Safety Award program, all personnel safety records were forwarded to Regional Office for consideration for individual awards. This action is still pending.

Refuge personnel, equipment, and facilities were involved in very few accidents this last year. Unfortunately the visiting public did not fare as well, with several fatalities occurring. Following are highlights of these incidents in 1970:

February 20 - Explosion and fire at Central Technology, Inc. injured 14 employees, with only two requiring hospitalization.

April 29 - Edward Kozil (18) of Chicago drowned while swimming in an unauthorized area at Cambria Neck.

June 3 - Wilma Harris was speeding on A-5 Road and was unable to stop in time to avoid colliding with our locomotive. There were no personal injuries and only minor damage to the car and locomotive.

June 6 - Clarence Pirtle of Mounds, Illinois, died of a heart attack while camping at the Crab Orchard Campground.

August 23 - Edward Buie (9) and Lonnie Williams (30) drowned at Wolf Creek bridge. The young boy fell into the water while fishing, and the man attempted to rescue the boy.

November 2 - Nick Zanter (58) died of a heart attack. He was caretaker at the Playport Concession.

December 6 - Arthur Kidd, Southern Illinois University student, was found dead in his car which had hit a tree south of the spillway area.

We are pleased that there were no work-related personal injuries this past year.

At the end of this period the record was as follows:

Total accident-free driving -	631,642
Prior accident-free miles -	627,164
Number of days without lost-time accident * -	836
Man-days without lost time * -	37,755.5
Man-hours without lost time * -	302,045
Date of last lost-time accident -	August 29, 1968
Date of last vehicle accident -	May 30, 1969

* Period ending 12/12/70.

VII. INDUSTRIAL ACTIVITIES

A. Water Use

1. Industrial Consumption

Production of treated water decreased by 66,925,000 gallons during 1970. This is due to the decreased production and employment of the industries, apparently reflecting the national trend.

We anticipate that the future demand for treated water and sewage will continue to remain around our 1970 figures. Below is a comparison of the gallons treated:

	1969	1970
Water -	311,478,000	244,553,000
Sewage -	79,164,000	77,131,000

2. Municipal Consumption

Of the four cities connected to Crab Orchard Lake, only Carbondale and Herrin pumped water this year. Carbondale pumped 107,357,000 gallons more water this year than in 1969. Their water requirements are increasing constantly, posing a probable threat to our reservoir. Herrin exceeded their 1969 figure by 24,480,000 gallons.

Following is the tabulation of the gallons of water pumped, and the revenues received per city:

	Gallons Pumped	Revenue
Marion -	-0-	-0-
Herrin -	110,880,000	$2,217.60
Carterville -	-0-	-0-
Carbondale -	1,474,118,000	29,482.00
	1,584,998,000	$31,699.60
Annual Fees -		400.00
		$32,099.60

B. Facility Activities

1. Railroad

The switching schedule of 3 days per week established last year appears to be adequate and is working quite well.

No major breakdowns nor repairs occurred this year. Forty-two (42) man-days were spent in maintaining the track right-of-way and trestles. Daily checks were performed on the two diesel electric locomotives.

We switched 392 railroad cars to refuge tenants, for an annual revenue of $5,880.00. Rail shipments have dropped considerably the past several years.

2. Water and Sewage Plants

The daily operations of the water and sewage facilities were routine. No major breakdowns occurred nor renovations required. The five million gallon reservoir that provided a reserve supply of treated and filtered water was drained and removed from the distribution system. This reservoir is made of concrete and is 216 feet in diameter by 27 feet deep. It has been suggested that the reservoir should be converted into a swimming pool or a fish rearing pond. We are thinking of calling it the world's largest bird bath.

3. Fire and Security

At 4:45 A.M. on October 30, 1970, the refuge guard on his regular patrol heard a loud explosion followed a few seconds later by a second blast. On investigation, it was found that one of the igloos in Area 13, full of explosives, had exploded, tearing the heavy steel door from its hinges and blowing the door across the road. Fortunately, at that hour, no one was in the vicinity and damage was limited to the door and ventilation fixtures. Cause of the detonation has not been determined.

The fire department answered two minor industrial building fires and eight grass fires during the year; in addition, they issued 33 violation tickets, 46 parking tickets, and filed 38 incident reports.

C. Industrial Lease Management

During 1970, the industries on Crab Orchard Refuge suffered many of the problems and frustrations that industries suffered throughout the

country. While we predicted a good year for these industries, 1970 proved otherwise. Industrial employment dropped from 2200 to 1500, and one of the major industries closed its doors in a bankruptcy procedure. Although all of the floor space available on Crab Orchard Refuge is under lease except that in bankruptcy proceedings, the industries were required to cut back on employment.

At the close of the period there were 41 industrial tenants actively engaged in operations on the refuge. Growth seems to be limited to the smaller industrial operations, and several of these have contacted us for additional space in which to operate. The largest single employer is Olin-Mathieson, which now employs about 700 people. A year ago at this time they were employing close to 1300 people.

Central Technology, Inc. filed for bankruptcy in September 1970. This company was engaged in the manufacturing of pyrotechnic devices for the military. Their major contract was for a Mark II ground burst simulator which was used by the armed forces as a training device. At the time of bankruptcy, the company had $800,000 in orders for this simulator, but due to poor management was required to shut their doors. We believe this company was severely hurt by the truck strike which lasted almost four months. This caused the company to over-use their operating capital.

They were operating on a tight budget to start with, and by the time shipments started flowing it was too late. This company also manufactured the cannon net cartridges used in our banding operations. In addition, they were the principal developer of the recoilless cannon net trap. They were the only supplier of the projectile and charge. One of their former employees is now engaged in manufacturing the charges for this cannon and hopes to continue to furnish supplies to our stations. A new company not on the refuge is also engaged in the manufacturing of charges for the recoilless and regular cannons and charges.

The Small Business Administration held the first secured loan on CTI property, and at the present time is searching for a suitable manufacturer who can take over this operation. We are not sure of what the future holds for those buildings but hope to have them leased within the next two or three months.

D. Lease Prospects

The prospects in 1971 are as good as they were in 1970. The only buildings that are available for lease would be the CTI buildings. Frequently we get requests to lease a tract of land for industrial

programs, but our policy has been not to lease any land beyond that which is already being used for industrial operations.

U. S. Powder, a division of Commercial Solvents Corporation, has consolidated its operation, and perhaps some of the buildings now vacant but still under lease will be utilized by a sub-contractor who will make ammonium nitrate explosives.

The industrial operations on Crab Orchard this year were rather static. We like them like this and hope that 1971 will bring even fewer problems.

TABLE NO. 1 - INDUSTRIAL LEASING, REVENUE, & EMPLOYMENT

	Lease Footage		Monetary Return				Total Number Employed	
	1/1/70	12/31/70	Rent	Wat. & Sew.	Switching	Total	1/1/70	12/31/70
Trojan - US Powder	311,590	286,885	$ 31,786.67	$12,378.85	$ 390.00	$ 44,555.52	73	52
Trojan - US Powder	8,552	1,069	730.62	---	---	730.62	---	---
Turco	10,250	10,250	1,742.52	---	---	1,742.52	---	5
American Telegraph	---	---	5.00	---	---	5.00	---	---
City Distributing	---	10,250	100.00	---	---	100.00	---	---
Civil Air Patrol	1,069	1,069	106.90	---	---	106.90	---	---
Deneal, Sam B.	1,069	1,069	271.72	---	---	271.72	---	---
Dodson, Jim H.	---	---	10.00	---	---	10.00	---	---
Francis, James	1,069	---	---	---	---	---	---	---
Heidbreder, Warren G.	1,069	1,069	106.90	---	---	106.90	---	---
Hutchinson, Dr. Ronald	---	---	10.00	---	---	10.00	---	---
Missouri Research	2,138	2,138	258.35	---	---	258.35	---	---
Monsanto Chemical	1,069	1,069	106.90	---	---	106.90	---	---
Petroff Trading Co.	9,618	1,603	240.46	---	---	240.46	---	---
Propellex Chemical	1,069	1,069	106.90	---	---	106.90	---	---
Simonds, E. T.	---	---	300.00	---	---	300.00	---	---
TOTALS, 1970		1,297,561	$218,640.06	$63,032.35	$5,880.00	$287,552.41		1,504 +1,592 (Students)
TOTALS, 1969	1,476,956		$215,358.60	$79,326.28	$8,985.00	$303,669.88	2,358 +1,561 (Students)	

TABLE NO. 1 - INDUSTRIAL LEASING, REVENUE, & EMPLOYMENT

	Lease Footage		Monetary Return				Total No. Employed	
	1/1/70	12/31/70	Rent	Wat. & Sew.	Switching	Total	1/1/70	12/31/70
Allen Industries	83,000	83,000	$ 14,397.60	$ 265.68	$1,530.00	$ 16,193.28	20	20
Austin Powder	7,483	9,261	908.82	---	90.00	998.82	---	---
Central Fixtures	33,181	33,181	6,328.68	139.28	225.00	6,692.96	27	22
Central Technology	97,811	---	5,441.00	316.40	45.00	5,802.40	205	---
CO Field Trial Club	---	---	500.00	82.80	---	582.80	---	---
CO Job Corps CCC	---	---	---	678.00	---	678.00	5	---
CO Sportsmens Assoc.	---	---	200.00	106.73	---	306.73	---	---
Dept. of Justice	---	---	---	14,124.37	30.00	14,154.37	264	278
Diagraph Bradley	100,052	104,052	17,470.98	866.44	225.00	18,562.42	153	162
East Side Lumberyard	35,850	35,850	7,170.00	82.80	810.00	8,062.80	10	12
Electric & Machine	14,394	14,394	2,070.72	165.60	---	2,236.32	10	11
W. R. Grace & Co.	10,250	---	1,708.30	---	---	1,708.30	---	---
Great Lakes Terminal	30,971	30,971	5,329.88	55.20	285.00	5,670.08	6	5
Humitube	42,191	42,191	8,163.96	1,443.08	375.00	9,982.04	87	98
Marion Civil Defense	8,460	8,460	1,371.40	82.80	---	1,454.20	2	2
Mark Twain Marine	102,156	71,406	13,941.36	816.42	---	14,757.78	75	12
Midwest Brush	12,005	8,524	1,434.03	82.80	---	1,516.83	22	20
National Reproductions	3,891	3,891	778.20	82.80	---	861.00	3	2
National Tape	22,818	---	2,532.44	55.20	45.00	2,632.64	---	---
Norge Division	4,224	7,552	800.00	---	---	800.00	1	---
Olin Corporation	228,268	218,428	36,805.33	24,936.88	1,365.00	63,107.21	1213	533
Olin - Pyrotechnic	134,435	144,685	26,447.58	---	---	26,447.58	---	---
Phelps-Dodge Cable	10,250	20,500	1,857.89	---	135.00	1,992.89	---	---
Seyer Buckner Tool	21,932	21,932	4,502.40	165.60	---	4,668.00	---	4
Southern Illinois Paper	10,250	10,250	1,742.52	---	315.00	2,057.52	7	4
SIU - Geology Dept.	2,021	2,021	515.35	---	---	515.35	6	---
SIU - Housing	---	---	798.00	60.00	---	858.00	---	---
SIU - Purchasing	19,833	24,642	2,464.26	41.40	---	2,505.66	5	---
SIU - Tech. Adult Ed.	46,292	46,292	9,275.28	435.75	---	9,711.03	16(105 Students)	31(178 Students)
SIU - Training	32,593	32,593	5,761.08	500.40	---	6,261.48	30(56 Students)	44(114 Students)
SIU - VTI	---	---	---	1,279.95	---	1,279.95	110(1400 Students)	181(1300 Students)
Supreme Plating	2,464	5,945	1,015.02	3,787.12	---	4,802.14	7	6
Technical Tape	10,250	---	1,025.04	---	15.00	1,040.04	1	---

VIII. OTHER ITEMS

A. Items of Interest

There have been frequent sightings of black bears around Crab Orchard Refuge the last few years. Several years ago one was killed near Benton. This summer a bear started giving trouble on the county road south of the closed area. It was found eating seed corn in an old barn, and three or four calls were received about it frightening horses. On June 11, Hovell was returning from an evening Scout Leaders' meeting and discovered a "bear jam" on the county road. Someone had thrown some bluegills and bass to the bear, and someone else had scattered rock candy on the road. Hovell informed the people about the dangers involved and attempted to get the bear off the road. The candy had been crushed by passing autos, and all of it could not be removed from the road surface. At 4:00 A.M. the next morning, while the bear was attempting to lick candy off the blacktop, it was struck and killed by an auto. A few days later, shortly after nightfall, a second bear was reported in a farmer's chickens west of the fire tower. Hovell and Trip went over to investigate and found the bear in a chicken yard. It had eaten three chickens. Hovell and Tripp borrowed a hog crate, chased the bear into it, and loaded it onto a truck. It was released in the middle of the closed area.

The first cultivated crop on the land acquired from John A. Logan Junior College was 22 plants of Cannalis sativa (marijuana). Also, a bag containing 57.5 grams of Acapulco Gold was found by the Sewage Plant, and two shoe boxes, each containing 30 dime bags, were picked up on the refuge. Could this prove the contention that Crab Orchard has "gone to pot"?

During the last few days of drawdown, in preparation for millet seeding, Crab Orchard Bay was opened to the public for fishing, mountain style. Like Lil Abner's rassling, this is a very informal catch-as-catch-can form of fishing -- no place for the purist! A lot of people turned out for the event, and a good time was had by all. The main restriction was that all game fish had to be released unharmed into the lake. All other fish could be caught by hand, rod and reel, gig, or what-have-you. One fellow noodled out a very nice bass, about 4 to 5 pounds worth, and was immediately faced with a decision. As we observed, unnoticed by him, he looked at that bass, struggled mightily with his conscience, and then very quickly went across the dike to the lake and released the big fish unharmed. We spoke to him later and complimented him on his strength of character. "Well", he replied, "Thanks for your kind words. I still think I was a d----d fool for turning him loose." Later in the day, as he dragged a washtub full of fish toward his car, he was seen to have a smile on

his face -- not a big one, but at least a smile. This event is always well received by the public. We aren't always able to do this, but when we can, it is a pleasure for us too. A lot of fish which would otherwise be wasted are put to good use, and the people have fun catching them.

The public tour program is increasing year by year at Crab Orchard Refuge. The figures below give some idea of the time spent in refuge public relations work. The average tour took two hours.

1970	Tours	Off-Refuge Slides & Talks	Attendance
January	2	5	267
February	7	5	433
March	0	0	0
April	3	0	95
May	8	2	464
June	3	2	184
July	4	3	231
August	3	2	159
September	4	2	168
October	12	3	665
November	12	4	611
December	11	0	382
TOTALS -	69	28	3659

A 10-week Field Practicum program was established this year with the Pennsylvania State University. One purpose of the Field Practicum is to provide senior students with an opportunity to observe, participate and assist in the various phases of the refuge's program. This provides the student with an exposure to a wide variety of work situations and gives him practical background experience. The student does not receive any remuneration during the practicum. The first student, John Tyger, was at Crab Orchard from January 5 to March 13. A second

student, Robert Billetdeaux, arrived June 15 and left August 28. Both students worked in such areas as recreational management, conservation education and interpretation, visitor protection, recreational maintenance, and general refuge management during their assignments. We were very pleased with the program and with the caliber of young men in the Penn State program.

Dr. Gerald E. Gaffney, the Outdoor Laboratory Coordinator, occupies the unique position of being employed by both the BSFW and Southern Illinois University. With a foot in each camp, he serves as liaison man and makes sure there are no conflicts between the programs of both organizations. Southern Illinois University's Outdoor Laboratory at Little Grassy Lake is the location for a multitude of educational, service, and research projects. The Outdoor Laboratory provides a resource base for instruction and research for nearly all academic departments within the University, as well as services to numerous groups and individuals outside the University community. The Outdoor Laboratory is operated jointly by the Bureau of Sport Fisheries and Wildlife and Southern Illinois University. Crab Orchard Refuge is the contact agency for the Outdoor Laboratory. The 6,500 acres of land and 1,000-acre Little Grassy Lake provide the resources for implementing the major mission of the Laboratory -- providing visitors with a heightened awareness of their natural environment and the knowledge necessary to make wise use of that environment. A large staff, with a variety of skills, is charged with the responsibility of fulfilling this goal. A major portion of staff attention is directed toward educational programs for the young. These programs presently include year-round conservation workshops for junior and senior high school students, outdoor education programs for elementary and secondary students, and cooperative projects with the Bureau of Sport Fisheries and Wildlife and such University departments as Conservation and Outdoor Education, Forestry, Recreation, and Speech Pathology and Audiology. Significantly related to the educational function is the Outdoor Laboratory's participation in area services and research. Resident and non-resident camping programs, operated year-round, are oriented toward providing participants with a fun-filled recreational experience and increasing their awareness and appreciation of their natural environment.

B. Personnel

John W. Booth, Maintenanceman, retired on disability on February 21, 1970, with approximately 25 years of Federal service. Johnnie worked for various agencies involved with the operation and maintenance of the Illinois Ordnance Plant and moved over to the Refuge when the Bureau acquired jurisdiction in March 1948.

We were all shocked and saddened by the sudden death of Arlie Jack on March 18, 1970, of a cerebral stroke. Arlie worked for the refuge as a supply control clerk, receiving his appointment on May 24, 1950. Previously, Arlie worked for the Ordnance Department at this location before coming to the Bureau.

Congratulations to the following personnel who received promotions this year: Esther M. (Bonnie) Dungey to Secretary GS-5; Lewis J. Gass to Firefighter GS-5; Joseph A. DeJulio to Guard GS-4; and Wesley F. James, Administrative Assistant, to GS-9. Robert H. Howell accepted a re-assignment May 3, 1970 to Maintenanceman.

William J. McCoy Jr. entered on duty as Public Use Specialist on July 6, 1970. He received his B.S. degree in Outdoor Education and Interpretation from Pennsylvania State University. Bill is doing a fine job on Crab Orchard interpretive programs, and we wish him a long, rewarding, and successful career with the Bureau.

Paul E. Eastwood, Firefighter, accepted retirement on disability June 5, 1970 after approximately 24 years of federal service. Paul accumulated his federal time working for various agencies at the old Illinois Ordnance Plant, joining the Bureau in March of 1948.

The following temporary seasonal employees were used during the summer:

No.		
12	- Laborers, for maintenance work -	4/06/70 - 9/30/70
4	- Fee Collectors -	5/01/70 - 9/30/70
6	- Lifeguards -	5/01/70 - 9/30/70
2	- Maintenance workers -	7/01/70 - 12/31/70
1	- Recreation Aid -	5/01/70 - 9/30/70
25		

A new coordinated Federal pay wage scale was effective on January 11, 1970 for all wage board employees. Another wage survey was conducted in November for the St. Louis, Missouri area. Results of this latter survey will be effective commencing January 10, 1971.

The President's New Executive Order 11491 on Labor-Management Relations in the Federal Service became effective on January 1, 1970. It now appears that a new Basic Agreement needs to be negotiated as soon as Bureau guidelines are received to comply with the new Executive Order.

Training Received This Reporting Period

L. A. Mehrhoff Jr. - Employment Management Relations Seminar at Bureau of Mines, Minneapolis, February 6, 1970.

- Refuge Managers Workshop on Systems Analysis, St. Louis, Missouri - April 27-30, 1970.

- Attended Third Annual Public Use Workshop at Okefenokee Refuge, Georgia - October 4-10, 1970.

Wesley F. James - Seminar on Basic Labor Relations in Kansas City, Missouri - February 26 and 27, 1970.

- The Job and His Supervisor, SIU Winter Quarter.

Darrell D. Uptegraft - Attended Refuge Managers Workshop on Systems Analysis at Mattamuskeet Refuge, October 26 and 27, 1970.

Edward H. Nichols - Attended Third Annual Public Use Workshop at Okefenokee Refuge, Georgia - October 4-10, 1970.

- Attended FBI 8-Hour Instruction course on bombs and explosive devices, Carbondale, Illinois - October 14, 1970.

Robert E. Wilson - Attended FBI 8-Hour Instruction course on bombs and explosive devices held in Carbondale, Illinois on October 14, 1970.

Richard J. Johnson - Attended Regional Forestry Workshop at Hayward, Wisconsin, during week of December 13, 1970.

Edward H. Nichols, Public Use Specialist, accepted a three-week detail assignment to the Central Office, Washington, D. C. in September. He worked on visitor protection policies for the public on refuge lands.

A Law Enforcement Training Workshop was conducted at the Marion Holiday Inn on May 4-7, 1970, attended by the following Crab Orchard employees: Forester Richard Johnson, General Foreman Johnnie Pickar, Administrative Assistant Wesley James, Maintenance Foreman William Campbell, Fire Chief Rolla Basler, Guard James Brush, and Guard Carl Orange.

A Labor-Management Seminar was held by the Civil Service Commission at the Marion VA Hospital on December 9, 1970. In attendance from Crab Orchard Refuge were Hiley Hunter, Wesley James, Leroy Hovell, Johnnie Pickar, and Rolla Basler.

C. Photographs (Appended)

Crab Orchard Refuge is known nationally for its diversity of programs and activities. This diversity extends not only through the various programs on the refuge but also throughout the habitat. Birds and mammals that inhabit the refuge exhibit a wide range of preference for most portions of the area. The contrasts between wildlife, industry, and recreation are not as great as one would suspect. In fact, we find the wildlife and industry quite compatible if some controls are placed on the industrial tenants.

In addition to the usual photographs, in the circulating copy of the Narrative Report, we have added 20 selected slides of Crab Orchard Refuge. These were taken during the calendar year and should be of interest to many. We hope you take time to view these slides. They are easily removed from the folder. Take them home and show them to the family!

All photographs and slides were taken by L. A. Mehrhoff. Many were opportunity shots, others were planned. He hopes you enjoy them as much as he enjoyed taking them.

D. Credits for This Report

Section I -	(A) Gualdoni, (B-1 and 2) Hovell.
Section II -	Rice.
Section III -	(A) Staff: Hovell, Nichols, Johnson, Pickar, Rice, Goldsmith, McCoy; (B-1) Rice; (B-2, E, F) Johnson; (B-3, C, D) Hovell.
Section IV -	(A, B) Hovell, (C) Rice, (D) Johnson, (E) Wilson, (F) Nichols.
Section V -	(A-1) Uptegraft, (A-2) Johnson, (A-3) Nichols.
Section VI -	(A) Nichols, (B, C) McCarty, (D, E) Wilson, (F) Uptegraft.
Section VII -	(A, B) Hunter, (C, D) Mehrhoff.
Section VIII -	(A) Staff: McCoy, Gaffney, Johnson, Hovell, Nichols; (B) James, (C) Mehrhoff, (D) Johnson.
NR Forms:	(1, 1a, 1b, 2, 3, 4, 5) Rice; (1c) Wilson, (3-123) Nichols, (7, 11) Johnson, (8, 8a, 12) Hovell.

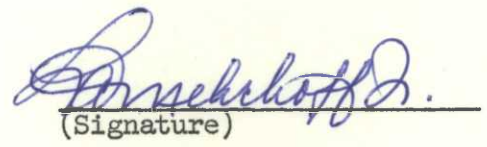
Report typed by Bonnie Dungey.

NR Forms typed by Marsolie McCarty.

Report Editor - Richard Johnson.

SIGNATURE PAGE

Submitted by:


(Signature)

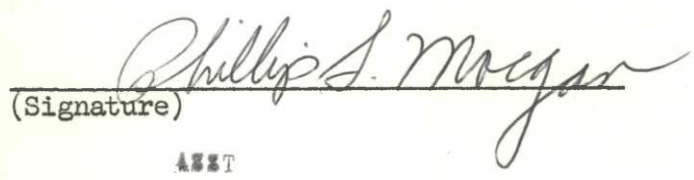
L. A. Mehrhoff Jr.

Date: February 10, 1971

Project Manager
Title

Approved, Regional Office:

Date: FEB 22 1971


(Signature)

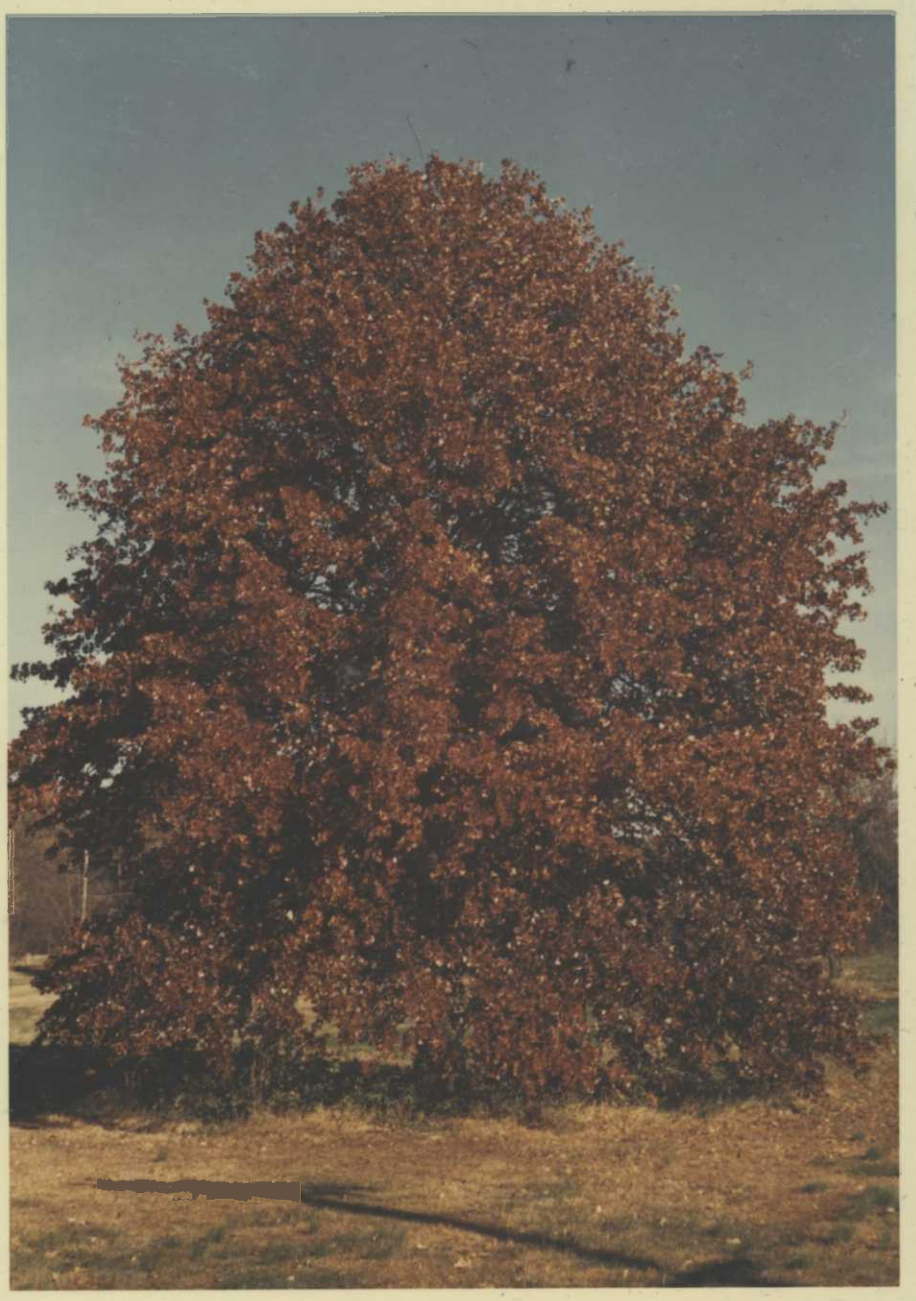
ASST

Regional Refuge Supervisor

PHOTOGRAPHIC SECTION

Crab Orchard is located in an area between the northern and southern climates. Seasonal changes are different in the type of scenery displayed, and we believe the fall months offer some of the most spectacular color varieties. This maple tree is located near the refuge staff houses. The color remains for several weeks during the fall months, and it adds much to the overall attractiveness of the area.

This red oak is located about 100 yards from the maple tree, and offers sharp contrast in color. This oak probably is photographed more than any other tree on the refuge. Each fall it displays brilliant red leaves that extend from ground level to the top, and when the sun shines from a certain direction, it appears to be on fire. The tree is 50 yards from the staff houses.



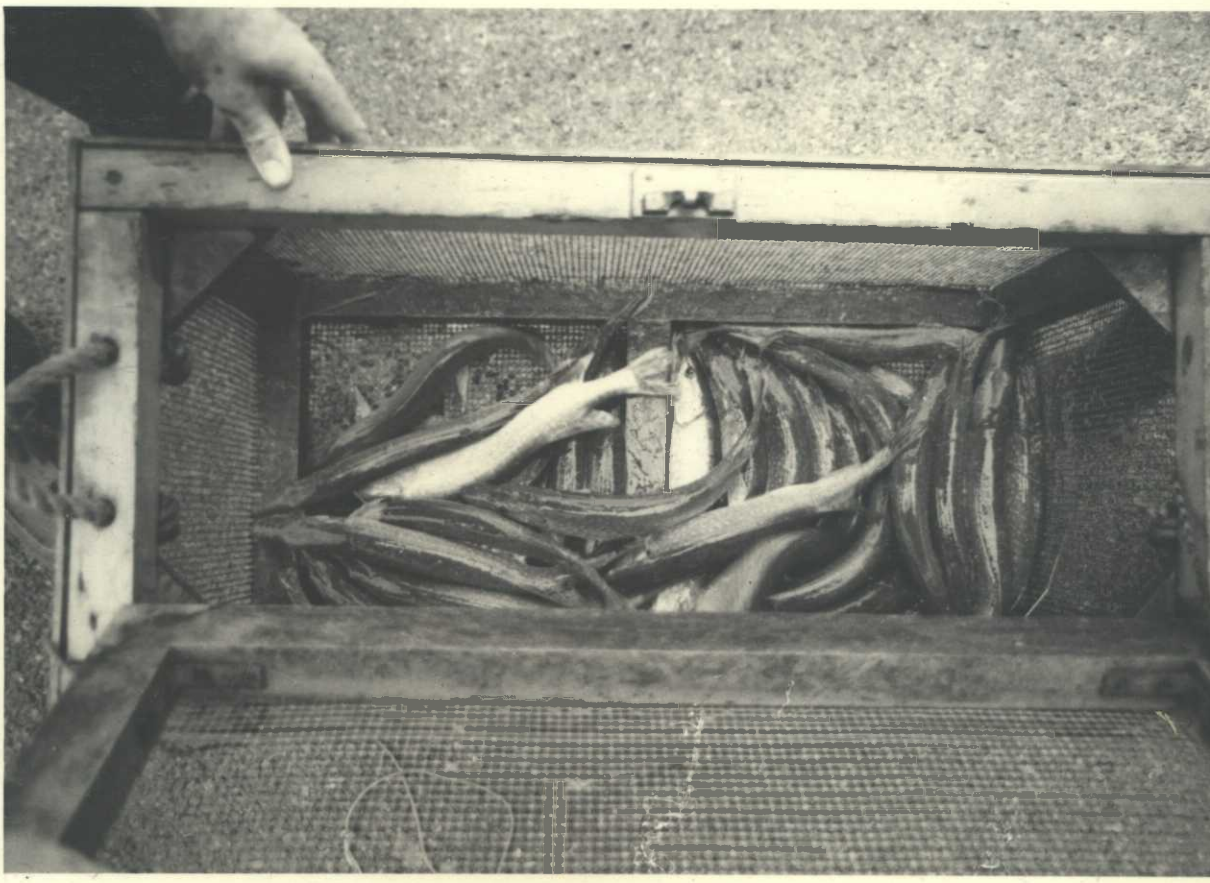
Canada geese usually are thought to be birds of a very wild nature and quite suspicious of tree lines and people. After a period of time, even Canada geese become familiar with their surroundings and gradually move into the tree line borders. Acorns and green browse entice the birds to move farther and farther into the woods. We have found Canada geese 200 yards or more in these wooded areas, and it was impossible for them to fly out. All acorns have been long gone from the oak trees in this area, but the geese continue to come back and search for any other goodies that may be present.

Not only do the Canada geese become familiar with their natural surroundings, they also become familiar with unnatural conditions. Olin Mathieson Corp. keeps their front lawn mowed and spruced up, and the Canada geese utilize this for grazing during fall and winter months. The fact that an industrial plant is located 50 feet away makes little difference. The cars park, people get out, laugh and talk, but the geese merely keep a sharp watch and continue grazing or resting. Persons employed by these industries have been cautioned not to walk into the fields where they are grazing. For the most part, the people have accepted these conditions, and the Canada geese continue to furnish a picturesque setting for these employees.

For the past several years we have been interested in increasing the fishing opportunities for Crab Orchard Lake. Through continued requests and pressure on our part, we finally acquired several thousand northern pike fry. These fish were placed in rearing ponds on Crab Orchard as a test to see if the northern pike could survive in these southern waters. The waters of Crab Orchard Lake are turbid, therefore these fish were placed in ponds that also were turbid. The food fish were the same as in Crab Orchard Lake, mainly shad, carp, bluegill, bullheads, and crappie. This bag contains 75,000 northern pike about two days old. They were placed in a pond which had been prepared for their use. A hay mulch was scattered and the pond was fertilized. The fry were placed in the pond on April 10. In June about 1200 fingerling pike were removed from the initial rearing ponds into the holding ponds which contained more forage fish and were easy to drain. In July these fish were re-checked and they were about 6 inches long. The fish were feeding heavily on the forage that was available, and from all tests, the pike were not over-utilizing the forage fish.

Pigeon Creek marsh where the northerns spent the summer and fall is approximately 10 acres in size and about 2 feet in depth. Water temperatures in this pond became quite high during the summer, yet we saw no evidence that the pike were unable to survive. Forage checks were continued throughout the summer. The Fishery Services station at Princeton, Indiana kept a constant check on the fish. On October 15, the Pigeon Creek marsh was drawn down as low as possible, and it was estimated that the northern population was around 800 fish. The size of these fish ranged from 15 to 18 inches. This picture shows an average pike 16-3/4 inches long, and the associated forage with it. Carp, shad, bluegill, and golden shiner were numerous in the pond, and the northern pike had sufficient forage to carry them throughout the entire year. We believe this pond can be stocked much heavier, and a similar program is planned next year with a higher stocking rate. Our goal is to put 25,000 northerns into Crab Orchard Lake each year.

The 800 fish were taken from Pigeon Creek pond and placed in Crab Orchard Lake or in one of the other large ponds on the refuge. Many of the fish were fin-clipped in order to check the recovery and growth rate. We believe this northern pike program can be of much benefit to the Crab Orchard Lake fishermen. At the present time about 90 percent of the fish population in Crab Orchard Lake is non-game, with gizzard shad occupying most of the habitat. By the introduction of a large predator fish, the shad population can be reduced, and the sport fishing improved.



Canada geese continue to use the pasture areas of Crab Orchard, sometimes in preference to the corn fields. During the early fall, it is common practice for the geese to fly to a clover field first and then fly to one of the corn fields later. This red clover plant shows the frost crystals that cover both the plant and blossom during the early morning hours.

As fall progresses into winter, we can expect two good snowfalls. These snowfalls will measure about four inches. Temperatures are variable, and the freezing and thawing causes the snow to become crusted for the first inch. This makes it difficult for geese to get food below the snow cover. Canada geese are adaptable enough to search out the hidden corn ears below the snow, break the crust with their beaks, eat the corn and leave the cob.

During the hunting season, Canada geese utilize all of the fields on Crab Orchard. Outside hunting pressure keeps the birds confined to the refuge area. During this period the clover fields receive extremely heavy use, and thousands of birds remain in these fields, sometimes in plain view of goose hunters 200 yards away.

Many kinds of goose hunting pits are seen around the refuge, some below and some above ground, some camouflaged and some not. One of the more successful areas was located next to the east boundary of Crab Orchard, where the club operator placed 250 decoys in a big hay field. Pits were dug and well camouflaged with hay. We believe the pit-type blind is more successful than the above-ground type since it affords less of a silhouette and the geese seem to decoy more readily to this type of set-up.

Being closely associated with the protection of Canada geese on one hand and still enjoying the sport of hunting them on the other, offers an opportunity to observe the actions of goose hunters during the pursuit of their sport. Even veteran hunters sometimes become as excited as those who are experiencing their first goose hunt. Goose hunting was very successful adjacent to the refuge this year, and approximately 7,000 birds were taken during the season.

Many hunters are satisfied with the first bird and would be willing to call it a day or spend the rest of the day in the pit without firing another shot. Other hunters feel that the limit is two, therefore they must kill two in order to have a successful day. The hunter pictured in this photograph killed one bird about 8:00 in the morning and stayed until 3:00 in the afternoon without firing another shot, yet he said it was one of the most enjoyable goose hunts he had ever participated in. There were plenty of birds in the air, the weather was nice, the pit was comfortable, and he was completely satisfield with one bird.

The refuge lakes hold many attractions for the visitor. Some prefer the lakes for swimming, boating, sailing, or fishing. Others like to come and sunbathe, or just look at nature. Many of our summer visitors enjoy the solitude of Devils Kitchen Lake which offers many areas for sunbathing and getting away from the hustle and bustle of the larger communities. The young lady shown in the photograph was one of these. She and her dog enjoyed the opportunity to sunbathe and observe the plants and animals around Devils Kitchen. While she enjoyed the scenery, so did we.

We can have people and wildlife both, as long as the people realize that the wildlife also must receive consideration. The visitor can come and observe the white-tailed deer without destroying his habitat.

Each year the Crab Orchard Refuge holds its annual Open House. This year the Open House was held on two days, and fortunately the weather both days was excellent. During this period approximately 10,352 visitors drove through the refuge and observed our programs and watched the wildlife. Wesley James, the Assistant Administrative Officer, greeted the visitors at the initial contact station, where he passed out literature and explained some of the rules and regulations to each as they drove into the refuge.

One family which drove through the refuge during the Open House spotted an injured barred owl and reported it to Lee Hovell. Mr. Hovell carefully captured the owl, placed it in a sack, and removed it to our wildlife pen for observation. This family was quite interested in wildlife. The parents were both instructors at Southern Illinois University. Their five children and the parents were all dressed in yellow windbreakers. Mr. Hovell explained what had happened to the owl -- a fractured wing probably from hitting one of the power lines. The visitors asked many questions about the refuge and the wildlife during this brief encounter.

The visitors to Crab Orchard, whether wildlife or human, move at sundown. Evenings on Crab Orchard offer some of the best times to observe wildlife as well as sunsets. We particularly like the ones where the Canada geese are outlined against the sky as they come back from feeding in adjacent fields.

Parts of Crab Orchard Lake are open all year long and both day and night. The closed area is open during the spring, summer, and fall months to fishing by boat, but the boating public must leave at sundown. As these boats leave the closed area at sundown, the visitor can reflect on the day just spent and feel that he is wanted and will return.

3-17[illegible]
For[illegible]-1
(Rev. March 1953)

WATERFOWL

REFUGE Crab Orchard MONTHS OF January TO April 30, 1970

(1) Species	(2) Weeks of reporting period: 1/7 (1)	1/14 (2)	1/21 (3)	1/28 (4)	2/4 (5)	2/11 (6)	2/18 (7)	2/25 (8)	3/4 (9)	3/11 (10)
Swans:										
Whistling										
Trumpeter										
Geese:										
Canada	64,000	10,500	10,500	12,000	23,350	30,000	30,000	30,000	30,000	12,000
Cackling										
Brant										
White-fronted										
Snow										
Blue										
Other										
Ducks:										
Mallard	1,620	715	715	875	1,190	1,075	1,040	735	590	440
Black	1,040	530	1,500	1,050	1,005	1,665	1,325	380	120	50
Gadwall							5	5	10	10
Baldpate								5	20	25
Pintail	130	70	10	10	10	20	30	40	40	30
Green-winged teal										
Blue-winged teal										
Cinnamon teal										
Shoveler	80	-	-	-	-	-	-	-	-	10
Wood										25
Redhead							40	150	205	65
Ring-necked	100	175	235	20	115	90	35	85	110	110
Canvasback	10	10	10	10	25	15	20	30	30	10
Scaup	75	50	25	5	35	15	100	95	225	60
Goldeneye	65	90	55	55	105	140	175	195	180	45
Bufflehead	35	15	10	15	25	20	5	15	10	15
Ruddy	5	-	-	-	-	-	-	-	-	20
Other Hooded Merg.	65	30	5	10	5	15	5	10	5	15
Amer. Merg.	3,325	1,350	1,325	675	4,650	5,600	7,860	7,725	6,560	2,060
Coot										60
Coot:										

Int. Dup. Sec.,
Wash. D. C.[illegible]

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(Rev. March 1953)

WATERFOWL
(Continuation Sheet)

REFUGE Crab Orchard MONTHS OF January TO April 30, 19 70

(1) Species	(2) Weeks of reporting period: 3/18 (11)	3/25 (12)	4/1 (13)	4/8 (14)	4/15 (15)	4/22 (16)	4/29 (17)	+1 day (18)	(3) Estimated waterfowl days use	(4) Production: Broods seen	Estimated total
Swans:											
Whistling											
Trumpeter											
Geese:											
Canada	2,000	1,500	650	1,125	405	390	300	125	1,811,165	-	-
Cackling											
Brant											
White-fronted											
Snow											
Blue											
Other											
Ducks:											
Mallard	325	305	305	280	280	275	200	270	77,025	2	300
Black	35								60,900		
Gadwall	15	35	40	20	20	5	5		1,190		
Baldpate	20	40	100	20	25	10	10		1,925		
Pintail	35	30	20	10					3,395		
Green-winged teal	15	20	70	25	35	20			1,295		
Blue-winged teal		5	15	105	75	120	120	35	3,115		
Cinnamon teal											
Shoveler	55	110	80	70	80	120	100	35	5,075		
Wood	35	40	50	55	55	80	120	120	3,340	-	400
Redhead	50	65	55						4,410		
Ring-necked	480	550	675	120	115	95			21,770		
Canvasback	10	20	15	10	5	5			1,645		
Scaup	50	165	1,835	805	225	445			29,470		
Goldeneye	50	145	50						9,450		
Bufflehead	15	30	35	25	20	25			2,205		
Ruddy	10	40	90	25	15	55			1,820		
Other Hooded Merg.	15	40							2,240		
Amer. Merg.	1,500	1,500	1,425	375					321,510		
Coot:	100	160	250	1,060	1,060	1,060	1,000	70	33,320		

(over)

	(5) Total Days Use	(6) Peak Number	(7) Total Production
Swans			
Geese	1,811,165	64,000	
Ducks	551,780	10,640	700
Coots	33,320	1,060	

SUMMARY

Principal feeding areas Crab Orchard Lake, Areas II and III.

Principal nesting areas Bays and islands, and local streams.

Reported by James R. Rice

INSTRUCTIONS (See Secs. 7531 through 7534, Wildlife Refuges Field Manual)

(1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance.

(2) Weeks of Reporting Period: Estimated average refuge populations.

(3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.

(4) Production: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.

(5) Total Days Use: A summary of data recorded under (3).

(6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.

(7) Total Production: A summary of data recorded under (4).

Interior Duplicating Section, Washington, D. C. 37944
1953

3-1750
Form 3-1-1
(Rev. March 1953)

WATERFOWL

REFUGE Crab Orchard MONTHS OF May TO August, 19 70

(1) Species	Weeks of reporting period (2)									
	5/7 1	5/14 2	5/21 3	5/28 4	6/5 5	6/12 6	6/19 7	6/26 8	7/3 9	7/10 10
Swans:										
Whistling										
Trumpeter										
Geese:										
Canada	125	125	100	100	100	00	100	100	100	100
Cackling										
Brant										
White-fronted										
Snow										
Blue										
Other										
Ducks:										
Mallard	270	270	270	270	270	270	270	270	270	270
Black										
Gadwall										
Baldpate										
Pintail										
Green-winged teal										
Blue-winged teal	25	10								
Cinnamon teal										
Shoveler	15									
Wood	120	120	135	135	135	150	150	150	300	300
Redhead										
Ring-necked										
Canvasback										
Scaup	40									
Goldeneye										
Bufflehead										
Ruddy										
Other										
Coot:										

Int. Dup. Sec., Wash., D.C. 37944

3-1750a
(Rev. March 1953)

WATERFOWL
(Continuation Sheet)

REFUGE Crab Orchard MONTHS OF May TO August, 1970

(1) Species	(2) Weeks of reporting period: 7/17 (11)	7/24 (12)	7/31 (13)	8/7 (14)	8/14 (15)	8/21 (16)	8/28 (17)	~~8/28~~ (18)	(3) Estimated waterfowl days use	(4) Production: Broods seen	Estimated total
Swans:											
Whistling											
Trumpeter											
Geese:											
Canada	100	100	100	100	100	100	100	100	12,550		
Cackling											
Brant											
White-fronted											
Snow											
Blue											
Other											
Ducks:											
Mallard	270	270	300	300	350	350	350	350	35,280	8	300
Black											
Gadwall											
Baldpate											
Pintail											
Green-winged teal											
Blue-winged teal											
Cinnamon teal											
Shoveler											
Wood	300	300	300	300	300	300	300	300	27,165	10	200
Redhead											
Ring-necked											
Canvasback											
Scaup											
Goldeneye											
Bufflehead											
Ruddy											
Other											
Coots:											

(over)

	(5) Total Days Use	(6) Peak Number	(7) Total Production
Swans			
Geese	12,590	100	
Ducks	63,375	650	500
Coots			

SUMMARY

Principal feeding areas ~~Crab Orchard Lake,~~ ~~Areas I, II, III.~~

Principal nesting areas ~~Local streams, islands, and shoreline.~~

Reported by ~~James R. Rice.~~

INSTRUCTIONS (See Secs. 7531 through 7534, Wildlife Refuges Field Manual)

(1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance.

(2) Weeks of Reporting Period: Estimated average refuge populations.

(3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.

(4) Production: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.

(5) Total Days Use: A summary of data recorded under (3).

(6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.

(7) Total Production: A summary of data recorded under (4).

Interior Duplicating Section, Washington, D. C.
1953

3-1750
Form R-1
(Rev. March 1953)

WATERFOWL

REFUGE CRAB ORCHARD NWR

MONTHS OF SEPTEMBER TO DECEMBER, 19 70

(1) Species	Weeks of (2) reporting period									
	9/1 1	9/8 2	9/15 3	9/22 4	9/29 5	10/6 6	10/13 7	10/20 8	10/27 9	11/3 10
Swans:										
Whistling										
Trumpeter										
Geese:										
Canada	100	100	100	160	4,000	15,000	32,000	46,000	69,500	59,000
Cackling										
Brant										
White-fronted										
Snow					10	10	20	180	180	200
Blue					40	40	80	720	720	800
Other RICHARDSON'S										90
Ducks:										
Mallard	275	275	275	440	505	1080	1475	2475	2575	6025
Black				10	20	45	275	1080	1120	1250
Gadwall				5	15	30	55	120	185	115
Baldpate		15	15	100	265	345	625	470	565	330
Pintail		25	25	45	65	55	65	395	345	480
Green-winged teal	85	65	65	45	160	115	170	460	490	505
Blue-winged teal	205	275	275	245	475	370	290	130	115	40
Cinnamon teal										
Shoveler		10	10	35	25	25	35	50	50	30
Wood	300	300	300	300	300	300	300	335	345	370
Redhead							5	5	5	5
Ring-necked							170	145	80	240
Canvasback							10	10	10	10
Scaup							125	20	85	1410
Goldeneye										
Bufflehead										
Ruddy							130	10	25	135
Other HOODED MERG.							5	5	10	10
AMERICAN MERG.										
Coot:	30	210	265	220	75	35	35	700	1250	1475

Int. Dup. Sec., Wash., D.C. 37944

3-1750a
...t. NR-1
(Rev. March 1953)

WATERFOWL
(Continuation Sheet)

REFUGE _____ MONTHS OF **SEPTEMBER** TO **DECEMBER**, 19**70**

(1) Species	(2) Weeks of reporting period: 11/10 11	11/17 12	11/24 13	12/1 14	12/8 15	12/15 16	12/22 17	+3 DAYS 18	(3) Estimated waterfowl days use	(4) Production: Broods seen	Estimated total
Swans:											
Whistling											
Trumpeter											
Geese:											
Canada	60,000	53,000	50,000	60,000	46,000	50,000	30,000	58,000	4,338,720		
Cackling											
Brant											
White-fronted											
Snow	200	200	150	20	10	5	5		8,330		
Blue	800	800	400	125	20	11	11		31,969		
Other	150	100	120	130	150	150	100		6,930		
Ducks:											
Mallard	6675	6675	1875	1700	1570	1500	1275	1375	260,815		
Black	1015	1015	820	1000	665	600	685	865	69,795		
Gadwall	100	100	25	25	30	20	35	15	6,065		
Baldpate	235	235	25	20	15	15	15	10	23,060		
Pintail	385	385	200	125	55	50	80	10	19,490		
Green-winged teal	480	480	150	100	50	25	75	10	24,670		
Blue-winged teal									16,940		
Cinnamon teal											
Shoveler	10								1,960		
Wood	370	300	150	100	35	--	--		28,735		
Redhead									140		
Ring-necked	120	120	130	75	40	50	85	150	9,235		
Canvasback	5	5							350		
Scaup	20	20	10	20	15	20	15	5	12,335		
Goldeneye			20	10	25	25	35	120	1,165		
Bufflehead			5	5	10	10	15		315		
Ruddy									2,100		
Other	40	40	65	40	10	10	20	25	1,850		
Coots:			415	450	590	600	1435	3700	35,530		
	1475	25	15		(over)				40,670		

	(5) Total Days Use	(6) Peak Number	(7) Total Production
Swans			
Geese	4,385,949	69,500	
Ducks	514,550	11,000	
Coots	40,670	1,475	

SUMMARY

Principal feeding areas CRAB ORCHARD LAKE AREA I, II, III

Principal nesting areas LOCAL STREAMS, ISLANDS AND SHORELINES

Reported by James R. Rice

INSTRUCTIONS (See Secs. 7531 through 7534, Wildlife Refuges Field Manual)

(1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance.

(2) Weeks of Reporting Period: Estimated average refuge populations.

(3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.

(4) Production: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.

(5) Total Days Use: A summary of data recorded under (3).

(6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.

(7) Total Production: A summary of data recorded under (4).

Interior Duplicating Section, Washington, D. C.
1953

3-1751
Form N. .A
(Nov. 1945)

MIGR ORY BIRDS
(other than waterfowl)

Refuge Crab Orchard Months of January to April 30, 1970

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. Water and Marsh Birds:										
Lesser Yellowlegs	3	4-10	3	4-10	Still Present					
Spotted Sandpiper	1	4-10	5	5-1	Still Present					
Solitary Sandpiper	1	4-24	2	5-1	Still Present					
Pectoral Sandpiper	25	4-10	25	4-10	Still Present					
Great Blue Heron	1	4-10	10	5-1	Still Present					
Common Egret	1	4-3	5	5-1	Still Present					
Yellow C. Night Heron	1	3-7	10	5-1	Still Present					
II. Shorebirds, Gulls and Terns:										
Herring Gull	Present at beginning of period		500	2-6	20	3-20				
Ring-billed Gull	Present at beginning of period		3600	2-6	25	Still Present				
Common Tern	3	4-17	5	5-1		Still Present				

(over)

(1)	(2)		(3)		(4)		(5)		(6)
III. Doves and Pigeons:									
Mourning dove	Resident								1,000
White-winged dove									
IV. Predaceous Birds:									
Golden eagle	1	1-2	1	1-2	1	2-23			
Duck hawk									
Horned owl	Resident								
Magpie									
Raven									
Crow	Resident								
Bald Eagle	Present at beginning of period.		6	1-9	1	3-27			

Reported by James R. Rice

INSTRUCTIONS

(1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiiformes)
II. Shorebirds, Gulls and Terns (Charadriiformes)
III. Doves and Pigeons (Columbiformes)
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)

(2) First Seen: The first refuge record for the species for the season concerned.

(3) Peak Numbers: The greatest number of the species present in a limited interval of time.

(4) Last Seen: The last refuge record for the species during the season concerned.

(5) Production: Estimated number of young produced based on observations and actual counts.

(6 Total: Estimated total number of the sp es using the refuge during the period concerned.

INT.-DUP. SEC., WASH., D.C.

59317

3-1751
Form N. A
(Nov. 1945)

MIGR RY BIRDS
(other than waterfowl)

Refuge Crab Orchard Months of May to August 1970

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. Water and Marsh Birds:										
Lesser Yellowlegs	Present of beginning of period.		20	8-28	Still Present					
Spotted Sandpiper	"	"	5	8-28	Still Present					
Great Blue Heron	"	"	12	8-28	Still Present					
Common Egret	"	"	5	8-28	Still Present					
Yellow C. Night Heron	"	"	10	8-28	Still Present			3	6	25
II. Shorebirds, Gulls and Terns:										
Ring-Billed Gull	Present of beginning of period.		25	5-15	10	6-15				
Common Tern	"	"	5	5-15	Still Present					
Willet	10	8-11	10	8-20	10	8-20				

(over)

(1)	(2)	(3)	(4)	(5)	(6)
III. Doves and Pigeons:					
Mourning dove	Resident				
White-winged dove					
IV. Predaceous Birds:					
Golden eagle					
Duck hawk					
Horned owl	Resident				
Magpie					
Raven					
Crow	Resident				

Reported by James R. Rice

INSTRUCTIONS

(1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiiformes)
II. Shorebirds, Gulls and Terns (Charadriiformes)
III. Doves and Pigeons (Columbiformes)
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)

(2) First Seen: The first refuge record for the species for the season concerned.

(3) Peak Numbers: The greatest number of the species present in a limited interval of time.

(4) Last Seen: The last refuge record for the species during the season concerned.

(5) Production: Estimated number of young produced based on observations and actual counts.

(Total: Estimated total number of the sp es using the refuge during the period concerned.

INT.-DUP. SEC., WASH., D.C.

59317

3-[illegible]1
Form NR-1A
(Nov. 1945)

MIGRATORY BIRDS
(other than waterfowl)

Refuge CRAB ORCHARD Months of SEPTEMBER to DECEMBER 195 X70

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. Water and Marsh Birds:										
LESSER YELLOWLEGS	PRESENT AT BEGINNING OF PERIOD		5	10-9-70	3	11-6-70				
PECTORAL SANDPIPER	1	9-4-70	30	10-30-70	30	11-6-70				
SHORT BILLED DOWITCHER	2	9-4-70	5	9-25-70	5	9-25-70				
Avocet	1	10-30-70	1	10-30-70	1	10-30-70				
II. Shorebirds, Gulls and Terns:										
HERRING GULL	25	11-27-70	150	12-30-70	STILL PRESENT.					
RING-BILLED GULL	5	10-30-70	900	12-30-70	"	"				
BLACK TERN	5	9-4-70	5	9-4-70	5	9-25-70				
CASPIAN TERN	5	9-11-70	6	9-25-70	6	9-25-70				
WESTERN GREBE	1	11-27-70	1	11-27-70	1	11-27-70				
GREAT BLUE HERON	PRESENT AT BEGINNING OF PERIOD.		60	11-6-70	STILL PRESENT					
COMMON EGRET	"	"	25	10-9-70	5	11-20-70				
YELLOW CROWN NIGHT HERON	"	"	20	9-25-70	10	10-16-70				

(over)

(1)	(2)		(3)		(4)		(5)	(6)
III. Doves and Pigeons:								
Mourning dove	RESIDENT							
White-winged dove								
IV. Predaceous Birds:								
Golden eagle								
Duck hawk								
Horned owl	RESIDENT							
~~Magpie~~								
~~Raven~~								
Crow	RESIDENT							
MISSISSIPPI KITE	1	10-20-70	1	10-20-70	1	10-20-70		
OSPREY	1	9-24-70	1	9-24-70	1	9-24-70		
BALD EAGLE	2	10-16-70	11	12-30-70	STILL	PRESENT		

Reported by J. R. Rice

INSTRUCTIONS

(1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiiformes)
II. Shorebirds, Gulls and Terns (Charadriiformes)
III. Doves and Pigeons (Columbiformes)
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)

(2) First Seen: The first refuge record for the species for the season concerned.

(3) Peak Numbers: The greatest number of the species present in a limited interval of time.

(4) Last Seen: The last refuge record for the species during the season concerned.

(5) Production: Estimated number of young produced based on observations and actual counts.

(6) Total: Estimated total number of the species using the refuge during the period concerned.

INT.-DUP. SEC., WASH., D.C.

59317

3-1[illegible]c
Form [illegible]R-1C
(Sept. 1960)

WATERFOWL HUNTER KILL SURVEY

Refuge CRAB ORCHARD

Year 1970

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est. Total Kill
11/12-18	970	3880	CANADA GEESE	56	12	68	1060	**
11/19-25	738	2952	CANADA GEESE	48	10	58	812	
11/26 - 12-2	1125	4500	CANADA GEESE	154	31	185	1237	
12/3-9	1238	4952	CANADA GEESE	133	27	160	1361	
12/10-16	1521	6084	CANADA GEESE	336	67	403	1673	
12/17-23	1774	7096	CANADA GEESE	274	55	329	1951	
1/2-3	611	2444	CANADA GEESE	432	86	518	672	
TOTALS	7977	31,908		1433	288	1721	8766	

** A mandatory registration system is used in public hunting areas. As most hunters bagging geese register their kill, a heavy bias exists that would make a projected kill figure in this column inaccurate.

(over)

INSTRUCTIONS

(1) The first week of hunting begins with opening day and ends at the close of hunting 6 days later. Successive weeks follow the same pattern.

(2) The goal is to survey a minimum of 25 percent of refuge hunters each week and to record data only from those who have completed their day's hunting. This information should be collected during each day of the week and in each area hunted in relative proportion to the hunter effort expended. When the 25 percent goal cannot be achieved, particular care should be taken to collect representative data.

(3) Record the total number of hours the hunters spent hunting on the refuge.

(4) List waterfowl species in decreasing order of numbers bagged. Sample entry: Mallard (61), Pintail (36), Redhead (16), Gadwall (11), Widgeon (6), Coot (4), Canada Goose (3), Green-winged Teal (1).

(5) Record total numbers of waterfowl bagged.

(6) Record total numbers of waterfowl reported knocked down but not recovered.

(7) Total of Columns 5 and 6.

(8) Estimate the total number of hunters who hunted on the refuge during the week, including hunters checked (Column 2).

(9) Kill sample projected to 100 percent. Column 9 = $\frac{\text{Column 8}}{\text{Column 2}}$ x Column 7.

3-17
Form NR-2
(April 1946)

UPLAND GAME BIRDS

Refuge Crab Orchard Months of January to April 30, 1940

(1) Species	(2) Density	(3) Young Produced			(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres Per Bird	Number broods observed	Estimated Total	Percentage	Hunting	For Re-stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Bob White Quail	Upland brush, meadows and forest edges.									
	Areas I and III - 15,345 acres.	7.6			55:45				2,000	Figures based on roadside observations and natural population renewal index
	Area II - 18,609 acres.	4.7			55:45				3,900	
Turkey	II, IV, V				- -				85	Figure based on casual observations by Refuge staff.

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS*

(1) SPECIES: Use correct common name.

(2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.

(4) SEX RATIO: This column applies primarily to wild turkey, phesants, etc. Include data on other species if available.

(5) REMOVALS: Indicate total number in each category removed during the report period.

(6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.

(7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

*Only columns applicable to the period covered should be used.

3-1 2
Form NR-2
(April 1946)

UPLAND GAME BIRDS

Refuge Crab Orchard Months of May to August, 19 70

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'v'd.	Estimated Total	Percentage	Hunting	For Re-stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Bob White Quail	Upland brush, meadows and forest edges Area I and III 15,345 acres	5.9	15	650	55:45				2600	Figures based on roadside observations and natural population renewal index.
	Area II 18,609 acres	4.2	6	900	55:45				4400	
Turkey	II, IV, V		2	15	--				100	Figures based on observation by Refuge staff.

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.*

(1) SPECIES: Use correct common name.

(2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.

(4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.

(5) REMOVALS: Indicate total number in each category removed during the report period.

(6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.

(7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

* Only columns applicable to the period covered should be used.

3-1752
Form NR-2
(April 1946)

UPLAND GAME BIRDS

Refuge **CRAB ORCHARD** Months of **SEPTEMBER** to **DECEMBER**, 19**70**

(1) Species	(2) Density	(3) Young Produced			(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres Per Bird	Number broods observed	Estimated Total	Percentage	Hunting	For Re-stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Bob White Quail	**Upland Brush, Meadow & Forest Edges**				**55:45**				**1,500**	**figure based on road-side observations and Natural Population Renew Renewal Index.**
	Area I & III 15,345 acres	**10.2**								
	Area II 18,609 acres	**8.5**			**55:45**				**2,200**	
Turkey	**II IV V**				**Unknown**				**200**	**figures based on casual observations by Refuge staff.**

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS*

(1) SPECIES: Use correct common name.

(2) DENSITY: Applies particularly to those species considered in removal programs (public hunts,etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.

(4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.

(5) REMOVALS: Indicate total number in each category removed during the report period.

(6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.

(7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

*Only columns applicable to the period covered should be used.

1753
Form NR-3
(June 1945)

BIG GAME

Refuge CRAB ORCHARD Calendar Year 1970

(1) Species	(2) Density	(3) Young Produced	(4) Removals				(5) Losses			(6) Introductions		(7) Estimated Total Refuge Population		(8) Sex Ratio
Common Name	Cover types, total Acreage of Habitat	Number	Hunting	For Re-stocking	Sold	For Research	Predation	Disease	Winter Loss	Number	Source	At period of Greatest use	As of Dec. 31	
WHITETAIL DEER	UPLAND AND BOTTOMLAND HARDWOODS 14,600 ACRES BRUSHLAND 6,900 ACRES. AGRICULTURE LAND 5,086 ACRES. GRASSLAND 3,684 ACRES. 1,900 ACRES ABSORBED IN ROADS, RECREATION AND INDUSTRIAL AREAS. TOTAL ACREAGE 32,170	400	229	-	-	-	8	NONE	(70 ROAD KILLS)			2,500	2,193	0.29: 1.00: 0.79:

279 KILLED IN WILLIAMSON COUNTY SIX-DAY SEASON
80% TAKEN FROM REFUGE.

Remarks:

Reported by _____

INSTRUCTIONS

Form NR-3 - BIG GAME

(1) SPECIES: Use correct common name; i.e., Mule deer, black-tailed deer, white-tailed deer. It is unnecessary to indicate sub-species such as northern or Louisiana white-tailed deer.

(2) DENSITY: Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge: once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated total number of young produced on refuge.

(4) REMOVALS: Indicate total number in each category removed during the year.

(5) LOSSES: On the basis of known records or reliable estimates indicate total losses in each category during the year.

(6) INTRODUCTIONS: Indicate the number and refuge or agency from which stock was secured.

(7) TOTAL REFUGE POPULATION: Give the estimated population of <u>each</u> <u>species</u> on the refuge at period of its greatest abundance and also as of Dec. 31.

(8) SEX RATIO: Indicate the percentage of males and females of each species as determined from field observations or through removals.

116008

3 55
Form NR-5
60701

DISEASE

Refuge CRAB ORCHARD Year 19 70

Botulism

Period of outbreak NONE

Period of heaviest losses _____

Losses:

	Actual Count	Estimated
(a) Waterfowl		
(b) Shorebirds		
(c) Other		

Number Hospitalized	No. Recovered	% Recovered
(a) Waterfowl		
(b) Shorebirds		
(c) Other		

Areas affected (location and approximate acreage) _____

Water conditions (average depth of water in sickness areas, reflooding of exposed flats, etc.

Condition of vegetation and invertebrate life _____

Remarks _____

Lead Poisoning or other Disease

Kind of disease NONE

Species affected _____

Number Affected Species	Actual Count	Estimated

Number Recovered _____

Number lost _____

Source of infection _____

Water conditions NORMAL

Food conditions POOR

Remarks NO NOTICEABLE LOSS OF ANY KIND.

3-175
Form NR-7
(Rev. June 1960)

(1)

NONAGRICULTURAL COLLECTIONS, RECEIPTS, AND PLANTINGS

Refuge CRAB ORCHARD Year 19&)

	Collections and Receipts (Seeds, rootstocks, trees, shrubs)						Plantings (Marsh - Aquatic - Upland)						
Species	Amount (Lbs., bus., etc.)	(2) C or R	Date	Method or Source	Cost	(3) Total Amount on Hand	Location of Area Planted	Rate of Seeding or Planting	Amount Planted (Acres or Yards of Shoreline)	Amount and Nature of Propagules	Date	Survival	Cause of Loss
							Sec.18,T9S, R1E		500	Red Bud	April	Poor	Drought
							Small Food Plots in various locations in Areas I & III.		500	Autumn Olive	April	Good	

(1) Report agronomic farm crops on Form NR-8
(2) C = Collections and R = Receipts
(3) Use "S" to denote surplus

Total acreage planted:
Marsh and aquatic _____
Hedgerows, cover patches _____
Food strips, food patches About 2
Forest plantings _____

Remarks: _____

3-1758
Fo NR-8
(Rev. Jan. 1956)

Fish and Wil ife Service Branch of Wildlife Refuges

CULTIVATED CROPS - HAYING - GRAZING

Refuge **CRAB ORCHARD** County **WILLIAMSON** State **ILLINOIS**

Cultivated Crops Grown	Permittee's Share Harvested		Government's Share or Return Harvested		Government's Share or Return Unharvested		Total Acreage Planted	Green Manure, Cover and Waterfowl Browsing Crops Type and Kind	Total Acreage
	Acres	Bu./Tons	Acres	Bu./ Tons	Acres	Bu. /Tons			
CORN	2374.9	70,000	710.2	21,000 Bu.				**WHEAT**	**600**
CLOVER, RED	1632.5	1,630T.						**CLOVER**	**1632**
RICE	28	2,100Bu.							
MILO	22	~~No Est.~~ 45 bu/a							
MILLET	55	~~No Est.~~ 35 bu/a							
LESPEDEZA	156	~~No Est.~~ 8 bu/a							
SOYBEANS*	36	~~No Est.~~ 25 bu/a							
								Fallow Ag. Land.	**200**

No. of Permittees: Agricultural Operations **26** Haying Operations _____ Grazing Operations **20**

Hay - Improved (Specify Kind)	Tons Harvested	Acres	Cash Revenue	Grazing	Number Animals	AUM'S	Cash Revenue	ACREAGE
LISTED UNDER CROPS				1. Cattle	**667**	**3100.62**	**6976.39**	**3684**
				2. Other				
				1. Total Refuge Acreage Under Cultivation				**4556**
Hay - Wild	**NONE**			2. Acreage Cultivated as Service Operation				**537**

***CROPPING RIGHTS WITHHELD ON WATSON TRACT**

DIRECTIONS FOR PREPARING FORM NR--8'
CULTIVATED CROPS - HAYING - GRAZING

Report Form NR-8 should be prepared on a calendar-year basis for all crops which were planted during the calendar year and for haying and grazing operations carried on during the same period.

Separate reports shall be furnished for Refuge lands in each county when a refuge is located in more than one county or State.

Cultivated Crops Grown - List all crops planted, grown and harvested on the refuge during the reporting period regardless of purpose. Crops in kind which have been planted by more than one permittee or this Service shall be combined for reporting purposes.

Permittee's Share - Only thenumber of acres utilized by the permittee for his own benefit should be shown under the Acres column, and only the number of bushels of farm crops harvested by the permittee for himself should be shown under the Bushels Harvested column. Report all crops harvested in bushels or fractions thereof except such crops as silage, watermelons, cotton, tobacco, and hay, which should be reported in tons or fractions thereof.

Government's Share or Return - Harvested Show the acreage and number of bushels harvested for the Government of crops produced by permittees or refuge personnel. Unharvested Show the exact acreage and the estimated number of bushels of grain available for wildlife. If grazing is made available to waterfowl through the planting of grain, cover, green manure, grazing or hay crops, estimate the tonnage of green food produced or utilized and report under Bushels Unharvesed column.

Total Acreage Planted - Report all acreage planted, including crop failures.

Green Manure, Cover and Waterfowl Grazing Crops Specify the acreage kind and purpose of the crop. These crops and the acreage may be duplicated under cultivated crops if planted during the year, or a duplication may occur under hay if the crop results from a perennial planting.

Hay - Improved - List separately the kinds of improved hay grown. Annual plantings should also be reported under Cultivated Crops, and perennial hay should be listed in the same manner at time of planting

Total Refuge Acreage Under Cultivation Report total land area devoted to agricultural purposes during the year.

3-1758
F. NR-8
(Rev. Jan. 1956)

Fish and Wi[illegible]ife Service Branch of Wildlife Refuges

CULTIVATED CROPS - HAYING - GRAZING

Refuge **CRAB ORCHARD** County **JACKSON** State **ILLINOIS**

Cultivated Crops Grown	Permittee's Share Harvested		Government's Share or Return				Total Acreage Planted	Green Manure, Cover and Water-fowl Browsing Crops Type and Kind	Total Acreage
			Harvested		Unharvested				
	Acres	Bu./Tons	Acres	Bu./ Tons	Acres	Bu. /Tons			
								Fallow Ag. Land.	

No. of Permittees: Agricultural Operations _____ Haying Operations _____ Grazing Operations 3

Hay - Improved (Specify Kind)	Tons Harvested	Acres	Cash Revenue	Grazing	Number Animals	AUM'S	Cash Revenue	ACREAGE
				1. Cattle	**25**	**150**	**$237.50**	**122**
				2. Other				
				1. Total Refuge Acreage Under Cultivation				
Hay - Wild				2. Acreage Cultivated as Service Operation				

DIRECTIONS FOR PREPARING FORM NR--8'
CULTIVATED CROPS - HAYING - GRAZING

Report Form NR-8 should be prepared on a calendar-year basis for all crops which were planted during the calendar year and for haying and grazing operations carried on during the same period.

Separate reports shall be furnished for Refuge lands in each county when a refuge is located in more than one county or State.

Cultivated Crops Grown - List all crops planted, grown and harvested on the refuge during the reporting period regardless of purpose. Crops in kind which have been planted by more than one permittee or this Service shall be combined for reporting purposes.

Permittee's Share - Only thenumber of acres utilized by the permittee for his own benefit should be shown under the Acres column, and only the number of bushels of farm crops harvested by the permittee for himself should be shown under the Bushels Harvested column. Report all crops harvested in bushels or fractions thereof except such crops as silage, watermelons, cotton, tobacco, and hay, which should be reported in tons or fractions thereof.

Government's Share or Return - Harvested Show the acreage and number of bushels harvested for the Government of crops produced by permittees or refuge personnel. Unharvested Show the exact acreage and the estimated number of bushels of grain available for wildlife. If grazing is made available to waterfowl through the planting of grain, cover, green manure, grazing or hay crops, estimate the tonnage of green food produced or utilized and report under Bushels Unharvesed column.

Total Acreage Planted - Report all acreage planted, including crop failures.

Green Manure, Cover and Waterfowl Grazing Crops Specify the acreage kind and purpose of the crop. These crops and the acreage may be duplicated under cultivated crops if planted during the year, or a duplication may occur under hay if the crop results from a perennial planting.

Hay - Improved - List separately the kinds of improved hay grown. Annual plantings should also be reported under Cultivated Crops, and perennial hay should be listed in the same manner at time of planting

Total Refuge Acreage Under Cultivation Report total land area devoted to agricultural purposes during the year.

3-1
NR-

REFUGE GRAIN REPORT

Refuge CRAB ORCHARD Months of JANUARY through DECEMBER 1970

(1) Variety*	(2) On Hand Beginning of Period	(3) Received During Period	(4) Total	(5) Grain Disposed of				(6) On Hand End of Period	(7) Proposed or Suitable Use*		
				Transferred	Seeded	Fed	Total		Seed	Feed	Surplus
Corn Shelled	1500 Bu.	1050 Bu	2250 Bu			2550 Bu	2550 Bu.				
Indian Grass	10 Lbs.		10 Lbs.					10 Lbs.	10 Lbs.		
Blue Stem	10 Lbs.		10 Lbs.					10 Lbs.	10 Lbs.		
Japanese Millet		1600 Lbs	1600 Lbs		1600 Lbs		1600 Lbs.				
Wheat		2000 Bu	2000 Bu.		2000 Bu		2000 Bu.				
Grain Sorghum		500 Lbs	500 Lbs		500 Lbs.		500 Lbs.				
Orchard Grass	50 Lbs.	2400 Lbs	2450 Lbs		2450 Lbs.		2450 Lbs.				
Fescue (Ky 31)	200 Lbs	1700 Lbs	1900 Lbs		1900 Lbs.		1900 Lbs.				
Timothy	100 Lbs	500 Lbs	600 Lbs		600 Lbs.		600 Lbs.				
Lespedeza (Korean)		1400 Lbs	1400 Lbs					1400 Lbs	1400 Lbs.		
Red Clover (Mammoth)		1900 Lbs	1900 Lbs					1900 Lbs	1900 Lbs.		

(8) Indicate shipping or collection points

(9) Grain is stored at CRAB ORCHARD GRAINERY

(10) Remarks

*See instructions on back.

NR-8a

REFUGE GRAIN REPORT

This report should cover all grain on hand, received, or disposed of, during the period covered by this narrative report.

Report all grain in bushels. For the purpose of this report the following approximate weights of grain shall be considered equivalent to a bushel: Corn (shelled)—55 lb., corn (ear)—70 lb., wheat—60 lb., barley—50 lb., rye—55 lb., oats—30 lb., soy beans—60 lb., millet—50 lb., cowpeas—60 lb., and mixed—50 lb. In computing volume of granaries, multiply the cubic contents (cu. ft.) by 0.8 bushels.

(1) List each type of grain separately and specifically, as flint corn, yellow dent corn, square deal hybrid corn, garnet wheat, red May wheat, durum wheat, spring wheat, proso millet, combine milo, new era cowpeas, mikado soy beans, etc. Mere listing as corn, wheat, and soybeans will not suffice, as specific details are necessary in considering transfer of seed supplies to other refuges. Include only domestic grains; aquatic and other seeds will be listed on NR–9.

(3) Report all grain received during period from all sources, such as transfer, share cropping, or harvest from food patches.

(4) A total of columns 2 and 3.

(6) Column 4 less column 5.

(7) This is a proposed break-down by varieties of grain listed in column 6. Indicate if grain is suitable for seeding new crops.

(8) Nearest railroad station for shipping and receiving.

(9) Where stored on refuge: "Headquarters granary," etc.

(10) Indicate here the source of grain shipped in, destination of grain transferred, data on condition of grain, unusual uses proposed.

3-1761
Form 7-R-11
(2/46)

TIMBER REMOVAL

Refuge CRAB ORCHARD Year 195x70

Permittee	Permit No.	Forest Mgmt. Compartment Unit or Location	Acreage	No. of Units Expressed in B. F., ties, etc.	Rate of Charge	Total Income	Reservations and/or Diameter Limits	Species Cut
Miller, Dale	SUP-91-70	5	1	500 Posts	.09	45.00	3"-6"Dia x 7'	Black Locust
		5	2	26 Cords	1.00	26.00	Firewood	White Oak
Cache River Lbr. Co.	SUP-1-70	8	16					
		9	17	317.455 MBM	Various	837.30	Variable-Contact	Mixed Hard Woods
		19	30					
Cache River Lbr. Co.	SUP-64-70	10	8					
		20	25	350.650 MBM	Various	10,112.20	Variable-Contract	Mixed Hardwoods
		24	32					
		16	5					

Total acreage cut over 136

No. of units removed B. F. 668,105
Cords 26
Ties
Locust Posts 500

Total income 19,020.50

Method of slash disposal Lop & Scatter

NOTE: This form shows cut activity only; sold but uncut not shown.

INT.-DUP. SEC., WASH., D.C. 36103

3-1979 (NR-12)
(9/62

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge: **CRAB ORCHARD**

Proposal Number: **CO-1-70**

Reporting Year: **1970**

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
APRIL - MAY - JUNE	BROADLEAFS	CORNFIELDS in AREAS 1 & 2	957	ATRAZINE	2300	2½ Lbs./Ac.	H20	PREMERGE

10. Summary of results (continue on reverse side, if necessary)

RESULTS GOOD

35500

3-1979 (NR-12)
(9/62

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge: **CRAB ORCHARD**

Proposal Number: **CO-2-70**

Reporting Year: **1970**

INSTRUCTIONS: Wildlife Refuges Manual, secs, 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MAY JUNE	**GRASSES**	**CORNFIELDS**	**320**	**RAMROD**	**640**	**2 LBS/AC.**	**H20**	**PREMERGE**

10. Summary of results (continue on reverse side, if necessary)

RESULTS FAIR

35500

3-1979 (NR-12)
(9/6?

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge: **CRAB ORCHARD**

Proposal Number: **CO-3-70**

Reporting Year: **1970**

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
JUNE	**BROADLEAFS**	**A-25**	**127**	**24D Amine**	**64 Lbs.**	**1/2 Lb./Ac.**	**H20**	**GROUND SPRAYER**

10. Summary of results (continue on reverse side, if necessary)

RESULTS POOR

35500

3-1979 (NR-12)
(9/63)

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge: CRAB ORCHAR.

Proposal Number: CO-6-70

Reporting Year: 1970

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MAY	EXISTING VEGETATION	A-11, A-13	150 Ac.	PARAQUAT	40 GALLONS SOLUTION	1 QT./AC.	H20	GROUND SPRAYER

10. Summary of results (continue on reverse side, if necessary)

USED ON NO-TILL CORN RESULTS VERY GOOD

35500