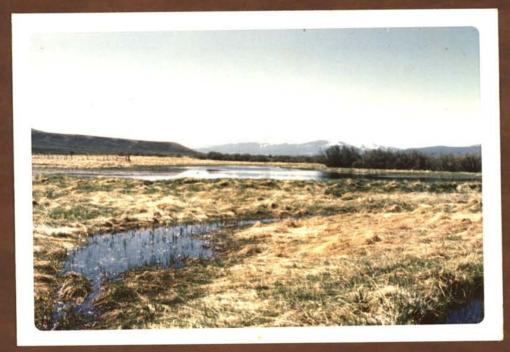
ARAPAHO NWR

NARRATIVE REPORTS

1970

NARRATIVE REPORT ARAPAHO NATIONAL WILDLIFE REFUGE JANUARY - DECEMBER 1970



UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE BUREAU OF SPORT FISHERIES AND WILDLIFE WALDEN, COLORADO

COVER PHOTO

1 1

We thought that a view of some typical high altitude waterfowl habitat on Arapaho Refuge, with Parkview Mountain (Elevation 12,433 ft.) would be appropriate to adorn our NR cover. Photo by Heffernan, June 2, 1970.

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

WATERFOWL

			Week	e o f	(2)	ting	norio	d	,	
(1) Species -	8/30 - 9/5	9/6-12 2	9/13-19	9:9:/20-26	9/27-10/3	3:10/4-10 : 6	10/11-17	:10/18-24	10/25-31	11/1-7
wans: Whistling										2
Trumpeter eese:										
Canada										
Cackling										
Brant			1							
White-fronted			1			1				
Snow										
Blue			1							
Other										
ucks:										10
Mallard	50	40	40	35	20	20	20	20	5	5
Black ~										
Gadwall	40	35	30	25	15	10	10	5		
Baldpate	60	50	50	50	30	25	20	15	5	5
Pintail	50	40	30	25	15	15	10	10	10	10
Green-winged teal	60	75	60	50	40	30	20	10	5	
Blue-winged teal	10	15	15	10	-, 10	5				
Cinnamon teal	15	15	15	10	5	5				
Shoveler	1.0	10	10	5	5					
Wood										
Redhead						· Pape				
Ring-necked										
Canvasback										
Scaup	20	15	15	15	15	10	10	10		
Goldeneye										
Bufflehead										
Ruddy			5	Ę	R					
Other C. Merg.										
Total Ducks:	315	295	270	230	160	120	90	70	25	20
Coot:	10	5	5	5	5					

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

WATERFOWL (Continuation Sheet)

Species : wans: Whistling Trumpeter eese:		. 11	13		15 .	2/13-19	12/20-26 : 17 :	5 davs) 12/27-31	waterfowl : days use :	Broods:	
Trumpeter						10 .	-1.	10 :	uays use :	seen :	
		the second second		PRS UPLIC	s vo pot:	a te lan	C UNATE P				
eese:	CONTRACTOR OF	a transa	and the second		10 11 0 0 0	der Gal - Frank	THE SUBJEST	A CONTRACTOR	and the second		
				CERGISTORE	12 and 14	and a state	- Index			ALL ST VOI	
Canada	the state of the	Hanena a	Statistican area				-				
Cackling	-	and the second		ALL DESCRIPTION OF		CT - North H	Far Huch	nau los -			
Brant											
White-fronted	- TRANSFORMER OF										
Snow			A Diaman D	1000 1 SAUS							
Blue											
Other	no heren	-									
ucks:			J. Jodal	and man o		of one of					
Mallard				Water A	eas Froze	n		T UTUAL	1.785	R. C. March	1
Black		1 1 1 1 1 1 1		a salara	1. C. 1. C. 1.	areas manager	and the second second	10 A 10 A 10	nes qui i se pre	(A	
Gadwall									1,190		
Baldpate	Mittahi Chill	Come Seal		acound 25	THE REAL	1. 1. 1 T'IS	Freilie B	(annel)	2,170		
Pintail									1,505		
Green-winged teal									2.450		-
Blue-winged teal									455		
Cinnamon teal			the second second	1 13	The Party of the			6	455		
Shoveler	1								280		-
Wood											-
Redhead											-
Ring-necked	375			19	-thoâgu 1	A STATUS	Thursday 1				-
Canvasback											-
Scaup				1					770		
Goldeneye									110		-
Bufflehead				1	True Land	Martin Contraction	ALVEN THE N		10.010.023		-
											-
Ruddy OtherX C. Merg.	and the second		1/5/04/00/0				ACCORDANCE IN THE	-	105		
Total Ducks				1					11,165		
oot:									210		

101-5 1-10-51		/=\$	3	
(5) Total Days Use :	(6) Peak Number : Total	(7) Production	SUMMARY	
ans :			Principal feeding areas Open meadows near wat	er,
ese:	;;		temporary potholes.	
eks11,165:			Principal nesting areas Open meadows in sedge	es and
ots 210:	10 :		grasses.	
			Reported by V. Carrol Donner Observed by David E. Heffernan	
INS	TRUCTIONS (See Secs.	7531 through	n 7534, Wildlife Refuges Field Manual)	
INS!	In addition to the reporting period sh	birds listed hould be adde	d on form, other species occurring on refuge dur: ed in appropriate spaces. Special attention show	
INS!) Species:) Weeks of	In addition to the reporting period sh to those species of	birds listed hould be adde f local and n	d on form, other species occurring on refuge dur ed in appropriate spaces. Special attention show national significance.	
) Species:	In addition to the reporting period sh to those species of Estimated average r	birds listed hould be adde f local and n refuge popula	d on form, other species occurring on refuge dur ed in appropriate spaces. Special attention show national significance.	
INS) Species:) Weeks of Reporting period:) Estimated Waterfowl	In addition to the reporting period sh to those species of Estimated average r Average weekly popu Estimated number of breeding areas. Br	birds listed hould be adde f local and n refuge popula ulations x nu f young produ rood counts s	d on form, other species occurring on refuge dur ed in appropriate spaces. Special attention show national significance. ations.	uld be given representative
INS:) Species:) Weeks of Reporting period:) Estimated Waterfowl Days Use:) Production:	In addition to the reporting period sh to those species of Estimated average r Average weekly popu Estimated number of breeding areas. Br	birds listed hould be adde f local and n refuge popula ulations x nu f young produ rood counts s Estimates ha	d on form, other species occurring on refuge dur ed in appropriate spaces. Special attention show national significance. ations. umber of days present for each species. uced based on observations and actual counts on a should be made on two or more areas ggregating aving no basis in fact should be omitted.	uld be given representative 10% of the

3-1/51		L	1	5	7	1	-	3	
--------	--	---	---	---	---	---	---	---	--

	' Arapah			than Waterfo Months of <u>S</u>	eptemb <mark>er</mark>		December 3		19 <u>70</u>	I) Lesvoq III
(1) Species	(2 First	2) Seen		3) centration	_ (4 Last			(5) Production	svož 10	(6) Total
Common Name	Number	Date	Number	Inclusive Dates	Number	Date		Total #	Total Young	Estimated Use
I. <u>Water and Marsh</u> <u>Birds</u> :		-		1	-					IV. <u>Predace</u> Golden Duck N
Freat blue heron Black-crowned night	5	9/1	5	9/1-15	_ 1	9/26			1	boarraid 100
heron Merican bittern Virginia rail Sora	9 5 10 150	9/1 9/1 9/1 9/1	10 5 10 150=	9/10-30 9/1-10 9/1-30 9/1-20	2 - 1 - 2 - 10	10/10 9/26 10/10 10/15				350 85 -350 4,250
II. Shorebirds, Gulls and Terns:				- 1						(1)
Gilldeer Common snipe Spotted sandpiper Millet Mmerican avocet Milson's phalarope	15 15 5 1 10 25	9/1 9/1 9/1 9/1 9/1 9/1	30 25 15 5 10 60	9/5-30 9/10-10/10 9/10-30 9/10-10/10 9/1-10/1 9/10-30	2	10/30 11/5 10/10 10/15 10/10 10/10				1,200 1,150 500 200 350 1,900
- And Color	-			interna o					and parts	(6.)
	-								J	(1)

(over) (over)

(1)	(2)	(3	3)	(4)	(5)	r	(6)
II. <u>Doves and Pigeons</u> : Mourning dove White-winged dove	60 9/	/1 150	9/10-30	15	11/15			6,000
W. <u>Predaceous Birds</u> : Golden ëagle Duck hawk Horned owl Magpie Raven	1 10 10 9/	/1 5 0/1 1 /1 10 /1 200	9/1-30 10/1-30 9/1-10/15 9/1-11/1	3 1 6 150	12/31 10/30 12/31 12/31			425 30 1,000 _21,500
Crow Turkey vulture Red-tailed hawk Swainson's hawk Rough-legged hawk Ferruginous hawk Marsh hawk Osprey	2 9/ 1 9/ 20 9/ 1 10 1 9/ . 7 9/	/1 10	9/1-30 9/1-12/31 9/26-10/30 9/1-30 10/28-11/0 9/16-30 9/16-30 9/5-10/5 9/25-27	52131121	12/31 12/31 10/30 12/31 11/6 9/30 12/31 9/27			2,500 244 35 1,050 10 15 600
Prairie falcon Pigeon hawk Sparrow hawk Obser		id E. Heffernan	9/1-30 9/20-30 9/1-30		ee Sec. 75	by V. Carro	Refuges Fie	ld Manual)
Prairie falcon Pigeon hawk Sparrow hawk (1) Species: 1	ved by: Davi Jse the corr order. Avoi form, other priate space	id E. Heffernan rect names as fo id general term species occurr es. Special at e. Groups: I. II.	9/1-30 9/20-30 9/1-30 INSTRUCTIO ound in the s as "seagul ing on refug tention show Water and M Shorebirds, Doves and I	NS (S A.O.U. C 1", "ter ge during ild be gi Marsh Bir Gulls a Pigeons (ee Sec. 75 hecklist, n", etc. the repor ven to tho ds (Gaviif and Terns (Columbifor	32, Wildlife 1931 Edition, In addition t ting period a se species of ormes to Cico Charadriiform	Refuges Fie and list g to the birds thould be ad local and oniiformes a mes)	roup in A.O.U listed on ded in appro- National and Gruiiforme
Prairie falcon Pigeon hawk Sparrow hawk (1) Species:	15 9/ ved by: Davi Jse the corr order. Avoi form, other priate space significance	id E. Heffernan rect names as fo id general term species occurr es. Special at e. Groups: I. II.	9/1-30 9/20-30 9/1-30 INSTRUCTIO ound in the s as "seagul ing on refug tention show <u>Water and M</u> <u>Shorebirds</u> , <u>Doves and I</u> <u>Predaceous</u>	NS (S A.O.U. C 1", "ter ge during ild be gi Marsh Bir Gulls a Pigeons (Birds (F	ee Sec. 75 hecklist, n", etc. the report ven to tho ds (Gaviif and Terns (Columbifor alconiform	32, Wildlife 1931 Edition, In addition t ting period a se species of ormes to Cicc Charadriiforn mes) es, Strigifor	Refuges Fie and list g to the birds hould be ad local and oniiformes a nes)	ld Manual) roup in A.O.U listed on ded in appro- National and Gruiiforme
Prairie falcon Pigeon hawk Sparrow hawk (1) Species: 1 (2) First Seen: 2	15 9/ ved by: Davi Jse the corr order. Avoi form, other priate space significance	id E. Heffernan rect names as fo id general term species occurr es. Special at e. Groups: I. II. II. IV.	9/1-30 9/20-30 9/1-30 INSTRUCTIO ound in the s as "seagul ing on refug tention show Water and M Shorebirds, Doves and I Predaceous for the spe	NS (S A.O.U. C 1", "ter ge during 1d be gi Marsh Bir Gulls a Pigeons (Birds (F ecies for	ee Sec. 75 hecklist, n", etc. the repor ven to tho cds (Gaviif and Terns (Columbifor alconiform the repor	32, Wildlife 1931 Edition, In addition t ting period a se species of ormes to Cico Charadriiforn mes) es, Strigifor ting period.	Refuges Fie and list g to the birds hould be ad local and oniiformes a mes) mes and pre Passerifo	ld Manual) roup in A.O.U listed on ded in appro- National and Gruiiforme edaceous ormes)
Prairie falcon Pigeon hawk Sparrow hawk (1) Species: U (1) Species: U (2) First Seen: 1 (3) Peak Numbers: I	15 9/ ved by: Davi Jse the corr order. Avoi form, other priate space significance	id E. Heffernan rect names as fo id general term species occurr es. Special at e. Groups: I. II. III. IV.	9/1-30 9/20-30 9/1-30 INSTRUCTIO ound in the s as "seagul ing on refug tention shou <u>Water and M</u> <u>Shorebirds</u> , <u>Doves and I</u> <u>Predaceous</u> for the spe sive dates v	NS (S A.O.U. C 1", "ter ge during 11d be gi Marsh Bir , Gulls a Pigeons (Birds (F ecies for when peak	ee Sec. 75 hecklist, n", etc. the repor ven to tho ds (Gaviif and Terns (Columbifor alconiform the repor	32, Wildlife 1931 Edition, In addition t ting period a se species of ormes to Cico Charadriiforn mes) es, Strigifor ting period. n of the spec	Refuges Fie and list g to the birds hould be ad local and oniiformes a mes) mes and pre Passerifo	ld Manual) roup in A.O.U listed on ded in appro- National and Gruiiforme edaceous ormes)
Prairie falcon Pigeon hawk Sparrow hawk (1) Species: 1 (2) First Seen: 1 (3) Peak Numbers: 1 (4) Last Seen: 1	15 9/ ved by: Davi Jse the corr order. Avoi form, other priate space significance The first mi Estimated nu The last ref	id E. Heffernan rect names as fo id general terms species occurr es. Special at e. Groups: I. II. III. igration record umber and inclu	9/1-30 9/20-30 9/1-30 INSTRUCTIO ound in the s as "seagul ing on refug tention show Water and M Shorebirds, Doves and I Predaceous for the species the species	MS (S A.O.U. C 1", "ter ge during ild be gi Marsh Bir Gulls a Pigeons (Birds (F ecies for when peak s during	ee Sec. 75 hecklist, n", etc. the report ven to tho ds (Gaviif ind Terns (Columbifor alconiform the report population the season	32, Wildlife 1931 Edition, In addition t ting period a se species of ormes to Cicc Charadriiforn mes) es, Strigifor ting period. n of the spec concerned.	Refuges Fie and list g to the birds should be ad local and oniiformes a mes and pre Passerifo	ld Manual) roup in A.O.U listed on ded in appro- National and Gruiiforme edaceous ormes)

3-1750c Form NR-1C

(Sept. 1960)

WATERFOWL HUNTER KILL SURVEY

Refuge _ Arapaho Year 196 70

(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
	-red-	à <mark>pai l</mark> hú	Refuge closed to hunting.	white end many little	entres (References)	ni litinit în Sint încite	Roma (ar Roma	br s	
		est or a Service as Prist/Dece Decentral							
		ettei Lació			1990 - 20 97 - 97 - 97 97 - 96	ili onne speciel Bedroid U Be		nter ania	
			all and the stands of a second of		dinia Sinia	An Antoniaus An Antoniaus B First 7 Berr	indan Kanad Kanada Kanada	neer (n) neer (n) neer (n)	
	5.5				101 14 4 .43 199 (dd)	icia indua minici) en ficial de la com		ngerf (19 1946 - 19) 2013 - 19)	
	. azəbit	9 <mark>8</mark>	541: 	(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), Greenwinged 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 = $\frac{\text{Column 8}}{\text{Column 2}} \times \text{Column 7}$.

NR-1C

3-1752

Form NR-2 (April 1946)

UPLAND GAME BIRDS

Dof

Refuge Arapaho

Months of September 1 to December 31 , 19 70

(1) Species	(2) Density	1.72	Yc	3) Dung luced	(4) Sex Ratio		(5) Remov	als	(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.
Common Name	Sagebrush flats and draws, open meadows. 2,500 acres	33.3		a susua a singe fadaqa a i a i a i a i a i a i a i a i a i a	100:100	1.1	-		75	Refuge closed to hunting. Surrounding area season; Sept. 12-14, 2 birds/day, 4 in possession. Some utilization by hunters as birds move off refuge. Hunting pressure around
	ika rénett parles. pere parles. Peters retena dering certific	a arr	ned at	1	in the parts	au tai	iun i us Tr	ktad Doc 1	Estimate	refuge light, success good
						U-I N	1 72.1	nontre r	nan trind Long Isol	

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.*

(1) SPECIES:

Use correct common name.

(2) DENSITY:

(4) SEX RATIO:

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.

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	3
Form 1	VR-3
(June	1945)

Refuge Arapaho

BIG GAME

Calendar Year 1970

(1) Species	(2) Density	(3) Young Produced	(4) Removals			(5) Losses		Ir	(6) ntroductions	(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	r1
Pronghorn	Sagebrush flats and draws, some meadow areas. 1,000 A.	1										10	5	20:100
Mule deer	Sagebrush draws, willow- choked meadows. 1,200 A.	2								-		200	40	20:100
8														
ţ,														
											.		82 3	

Remarks:

Observed		David E. Heffernan
Reported	by	V. Carrol Donner

V

INSTRUCTIONS

Form NR-3 (Form-1753) - 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 fur nish 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 each species on the refuge at period of its greatest abundance and also as of December 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 Arapaho Tear 19.70 Lead Poisoning or other Disease Botulism Period of outbreak None observed. Kind of disease None observed. Period of heaviest losses Species affected Losses: Number Affected Actual Count Actual Count Estimated Estimated Species (a) Waterfowl Annual second second second (b) Shorebirds (c) Other _____ % Recovered Number Recovered Number Hospitalized No. Recovered Number lost_____ (a) Waterfowl (b) Shorebirds Source of infection (c) Other Areas affected (location and approximate acreage) Water conditions Water conditions (average depth of water in sickness areas, reflooding of exposed flats, etc. Food conditions Condition of vegetation and invertebrate life Remarks Remarks

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

NONAGRICULTURAL COLLECTIONS, RECEIPTS, AND PLANTINGS

Refuge

Arapaho

Year 19 70

(1)

	1			s and Re			1		Plant		 	
Species	(See Amount (Lbs., bus., etc.)	(2) C or R	Date	Method or Source		(3) Total Amount	Location of Area Planted	Rate of Seeding or Planting	Marsh - Aqua Amount Planted (Acres or Yards of Shoreline)	Amount and Nature of Propagules	Survival	Cause of Los
Nothir	g to rep	ort.										
(2) C = C	t agrond collectio 'S" to de	ns ar note	nd R =	Receipte	Form NR	8	Remarks:					
Marsh ar Hedgerow Food str	nd aquati ns, cover	c pato d pat										

3-1758

Form NR-8 (Rev. Jan. 1956)

Fish and Wildlife Service Branch of Wildlife Refuges

CULTIVATED CROPS - HAYING - GRAZING

Refuge Arapaho

County Jackson

State Colorado

	Perm	nittee's	Gove	rnment's	Share or	Return		Green Manure	2,	
Cultivated Crops	Share	Harvested	Har	vested	Unha	rvested	Total Acreage	Cover and Wa fowl Browsin		Tota
Grown	Acres	Bu./Tons	Acres	Bu./Tons	Acres	Bu./Tons		Type and Kind		Acreage
				E L L			1 - 1 - 1	1.200 - 1.5		
None					3 1 5		1000			
	2 2			1.1.1		10.0		a the second		
	19 18					14 au		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
						1.1	1.1.2			
						1.1				
						16 e 15	- 4	Fallow Ag.	Land	
	1. 24					13 - E	1023	1 and 1 a		None
o. of Permittees:	Agricultur	al Operati	ons	. 0	Having	Operations	0 G1	azing Operation	18 1	
		ar operati				operatione,		and operation		
Hay - Improved	Tons	T	Cash		GRAZING	Num	ber AUN	I'S Cash	ACREAG	E
Hay - Improved (Specify Kind)	Tons Harvested	Acres	Cash Reven	ue		Ani	ber AUN mals	I'S Cash Revenue	ACREAG	E
		Acres		ue	GRAZING . Cattle*	Ani 1453	mals	Revenue	ACREAG	
		Acres		lue 1		Ani	mals	Revenue		
(Specify Kind)		Acres		1	. Cattle*	Ani 1453 6 hor	mals	Revenue 12,001.20		

* Includes horses incidental to grazing operations. •Reporting period, January 1 - December 31, 1970.

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.

<u>Cultivated Crops Grown</u> - 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.

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

<u>Government's Share or Return - Harvested</u> - Show the acreage and number of bushels harvested for the Government of crops produced by permittees or refuge personnel. <u>Unharvested</u> - 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 Unharvested column.

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

<u>Green Manure, Cover and Waterfowl Grazing Crops</u> - 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.

<u>Hay - Improved</u> - List separately the kinds of improved hay grown. Annual plantings should also be reported under <u>Cultivated Crops</u>, 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.



REFUGE GRAIN REPORT

Refuge _____Arapaho

Months of September 1 through December 31, 195 70

(1)	(2) (3) (4) ON HAND RECEIVED			GRAIN DI	5) SPOSED OF		(6) On Hand	(7) Proposed or Suitable Use*				
VARIETY*	BEGINNING OF PERIOD	EGINNING DURING TOT F PERIOD PERIOD	TOTAL	Transferred	Seeded	Fed	Total	END OF PERIOD	Seed	Feed	Surplus	
efer to Hutton Lake	Refuge N	arrative	Report.									
	1.	1 X 1 1 1	1.2				Lawrence	and see				
	AL		April 1	and the second						_		
	19X Server		net to phy	Sector Sector	_				-			
			101 200 10	1						-		
	1.1.1											
			in anyor									
				tel para								
	1									-		
			Sector 1				-		100			
		-		4					1.1.1			
· · · · · · · · · · · · · · · · · · ·	-											
	· · ·		" dans	255	1.5			2			31	
	1								-	1		

1

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.

NR-8a

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

Refuge Bureau of Sport Fisheries and Wildlife Arapaho ANNUAL REPORT OF PESTICIDE APPLICATION Proposal Number Reporting Year 1-70 INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395. 1970 Location Total Amount Total Carrier Method Date(s) of List of Chemical(s) Application of Area Acres of and of Application Target Pest(s) Used Rate Treated Treated Chemical Applied Application Rate (1) (2) (3) (6) (4) (5) (7) (8) (9) 7/13/70 Oklahoma #1 2,4-D 7.5 gal. 4 lb. acid-Willow, spp. Water, Pickup Less than to 8/4/70 equivalent irrigation ditch 1 part 5 acres. mounted chemical banks. per acre gasoline 200 part engine H20 powered sprayer with handgun.

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

Nearly 100% kill on treated willows.

<u>NARRATIVE REPORT</u>

Arapaho National Wildlife Refuge

January through December 1970

REFUGE PERSONNEL

Refuge Manager	•	•	•	•	•	•	•	•	0	•	•	٠	•	• • V. Carrol Donner
Refuge Manager	•	•	٠	•	۰	٠	•	•	•	0	•	•	•	• David E. Heffernan
Clerk Typist .	•	•	•	•	٠	0	•	٠	•	•	•	٠	•	• • Barbara J. Smith
Engineering Equi	.pn	nei	nt	OI	pei	at	101		•					William O. McDermith sferred in EOD 5/4/70)

TEMPORARY PERSONNEL

 Farm Equipment Operator
 John G. Hartman (May 6 - June 30, 1970)

 Summer Aid
 Orlando O. Romero (June 10 - July 17, 1970)

 Farm Equipment Operator
 Bennie H. Baldonado (June 12 - June 16, 1970)

 Farm Equipment Operator
 Rodney F. Krey (August 31, 1970 - January 5, 1971)

Satellite refuges administered from the Arapaho office are:

Hutton Lake National Wildlife Refuge Pathfinder National Wildlife Refuge Bamforth National Wildlife Refuge

Separate reports were prepared and submitted for Hutton Lake and Pathfinder Refuges, with Bamforth covered in the Hutton Lake Report. There are no personnel assigned to these satellites.

> UNITED STATES DEPARTMENT OF THE INTERIOR Fish and Wildlife Service Bureau of Sport Fisheries and Wildlife Walden, Colorado

NARRATIVE REPORT 1970

Arapaho National Wildlife Refuge

$\underline{\mathsf{T}} \ \underline{\mathsf{A}} \ \underline{\mathsf{B}} \ \underline{\mathsf{L}} \ \underline{\mathsf{E}} \quad \underline{\mathsf{O}} \ \underline{\mathsf{F}} \quad \underline{\mathsf{C}} \ \underline{\mathsf{O}} \ \underline{\mathsf{N}} \ \underline{\mathsf{T}} \ \underline{\mathsf{E}} \ \underline{\mathsf{N}} \ \underline{\mathsf{T}} \ \underline{\mathsf{S}}$

I.		VERAL Weathe	er	Con	di	tio	ns						•			•			0	•	٥			Page 1-3
		Habita																						3-6
II.	WII	LDLIFE																						
	A.	Migra	tor	y B	ir	ds				•	•				•	•	•	•		•		•	•	6-10
		Uplan																						10-
		Big Ga																						11
		Fur A																						11-12
		Hawks																						12
		Other																						12
		Fish																						12-14
		Repti																						14
	I.	Disea	se	0	•	• •	٠	0	•	•	٠	٠			٠		٠	•	۰	٠	٠	•	٠	14
								2 192	SELV															
III.		FUGE M																						
		Physi																						14-15
		Plant																						15
		Colle																						15
		Contro																						16 16
		Plann																						16
	F.	Fires	•	٠	•	• •	٠	٠	•	•	٠	•	٠	٠	٠	•	۰	٥	٠	•	•	•	•	TO
TW	DTY	SOURCE	MA	NAC	TOW	ENT																		
TA.		Grazi																						16-17
	A.	Grazi	ng	•	0	• •	•	•	٠		٠	۰	•	٠	٠	0		٠	•	•	٠	0	•	10-1(
77	FTI	ELD IN	TTC	mTC	A m	TON	17	T	A 1	וסס	TI	en l	DI	POI	PAT		I							17
۷.	ΓIJ	CTO TW	V ES	110	TA1	TON	AL	UV	AJ	rr.	41	ŝ	TUE	101	SAL	101	1							11
VT	PIII	BLIC R	ET.A	TTC	MS																			
VI.		Recre					C		1023						125	021			-				10	17-18
		Refug																						18-20
		Refug																						20-21
		Hunti																						21
		Viola																						22
		Safet																						22
		Sares,	, .		•	• •	•	•	0	•	•	•	•	•	•	•	•	•	•	•	•	•	•	for fin
VII.	OTH	HER IT	EMS	5																				
100000	1.00	Acqui			Ú							2												22-23
		Perso																						23
		Perso																						23
		Items																						23
		Photo																						

NARRATIVE REPORT January through December 1970

Arapaho National Wildlife Refuge

I. GENERAL

A. Weather Conditions

An official weather station is located in Walden, approximately eight miles north of the refuge subheadquarters. An unofficial station was established on the refuge in 1969 for comparative purposes, and figures recorded at this station are also included.

The following tables present a summary of weather conditions for the year, as recorded at the official Walden station, and at the refuge station.

		Precipit	Temperature			
Month	Snowfall	This Month	Normal*	Max.	Min.	
January	10.5	.46	.43	44	-33	
February	5.5	.35	.47	41	-10	
March	6.0	.31	.43	48	-15	
April	5.5	.37	.69	62	- 2	
May		.39	.86	77	11	
June	5.0	1.54	1.27	87	21	
July		.67	.96	84	32	
August		1.01	1.39	86	30	
September	•5	. 98	1.67	74	14	
October	12.0	1.41	.52	71	0	
November	7.8	.67	.43	51	- 2	
December Totals	4.0	· 39 8.55	<u>.60</u> 9.72	43	- 5	
Extremes	2-10		2010	87	-33	

Walden Weather Station

*Normal = 1961-67 Average

-1-

		Precipit	Temperature			
Month	Snowfall	This Month	Walden	Max.	Min.	
January	7.0	.41	.46	43	-24	
February	7.0	.18	.35	46	-15	
March	5.0	.17	.31	47	-16	
April	5.0	.31	.37	59	0	
May	.5	.22	.39	74	5	
June	4.0	1.33	1.54	85	19	
July		1.33	.67	82	25	
August		.89	1.01	85	29	
September	2.0	1.35	. 98	73	15	
October	16.5	1.63	1.41	69	- 3	
November	16.0	.63	.67	50	- 1	
December	6.0-	.15	•39	44	- 7	
Totals	69.0	8.60	8.55			
Extrem	es			85	-24	

Arapaho Refuge Weather Station

The valley floor of North Park experienced a dry year, even when compared to the norm for the area. This was in contrast to the surrounding mountains, which had snow-pack conditions much above normal by late spring.

The January-April months produced an official total of only 1.5 inches of precipitation, or 75% of normal. This was a cold, dry period, marked by infrequent light snows. The low temperature for the year, -33°, was recorded during this period.

Precipitation was also less than normal during the May-August period, as 3.61" was recorded in Walden, nearly one inch below normal. A wet snowstorm on June 12 accounted for a large portion of the precipitation for that month, as five inches of snow was recorded.

The September-December period was the only one which produced more precipitation than the normal, and this only by a small degree. Snowstorms in early October accounted for most of the gain for that month, and the remaining three months were typically dry.

Data recorded at the refuge weather station did not differ greatly from that recorded in Walden. The total precipitation figure of 8.60" compared with 8.55" recorded in Walden. Total snowfall at the refuge subheadquarters was 12.2 inches more than that recorded in town.

In general, 1970 was a cold, dry year on the refuge itself. With the exception of the June 12 snowstorm, precipitation amounts during the growing season were quite low. However, snow-pack conditions above the refuge, along the Illinois River, were above normal, and meadow plants flourished once flood-trrigation began in May. Freezing temperatures occurred during all twelve months of the year at both locations.

B. Habitat Conditions

1. Water

The water supply during 1970 was more than adequate for the Refuge and all other users on the Illinois River and its tributaries. Normally the runoff comes in two separate peaks, one during the latter part of April, the other in the early part of June. This year the Illinois River started rising the last weeks of April and continued running very high until after June 15. Much of this time it was completely overflowing the banks, providing automatic irrigation on most of the bottomlands. Only on the higher grounds lying under the Oklahoma #1 Ditch was it necessary to divert water in the early part of the season to accomplish irrigation. At no time during the irrigation season was it necessary to "check up" the main stream in order to divert water.

Normal irrigation season on the meadows locally is about May 1 to July 10 with some variation on both ends due to numerous factors. We began diverting water on May 18 and shut all water off on June 29. The pressing need for work on facilities before irrigation began, and the need to 'dry up' for subsequent work was our reason for cutting short the irrigation period. The shortened season seemed to have little or no adverse effect on plant growth.

As peported earlier and also in other sections of this report, permanent impoundments on the refuge are very scarce. With some major repairs completed on diversion facilities, we are planning and preparing for installation of facilities that will create numerous small ponds along old channels and in other strategic places.

We will follow our example of last year and use this section to discuss water rights and decree data. The writer now has a full year's experience on the Allard Tract plus several days time searching court records to back up his knowledge regarding water rights on the Illinois River. The information presented last year is quite accurate and nearly complete. During the irrigation period this summer we found that we have one more water diversion point for the Allard Tract that was listed in last years' NR. This makes a total of 8 diversion points for the Allard Tract. Four of these are for use solely on the Allard Tract, the other four are shared with other land owners.

Acquisition of two additional tracts of land during 1970 has added several miles of ditches, 3 small reservoirs (296 AF total storage) and numerous water control structures to our irrigation system.

As regards the water right and diversion facilities, these acquisitions will have only moderate effect on the refuge. Operationally, the impact will be somewhat greater. A usereservation until May 1, 1972 on the Case Tract will give us time to absorb this unit into our operations in an orderly fashion.

Acquisition of the Case Tract, 2,954 acres, adds no new facilities for diversion from the Illinois River. This transaction gives us complete ownership of the Hubbard #1 diversion right and control system and additional ownership in the Hubbard #2 system. Actually we now share Hubbard #2 with only one other party.

The Case property includes a diversion from Potter Creek, a decree on Antelope Spring and three storage reservoirs with decreed water rights. Handling of the water and care of the facilities on this tract will not become our responsibility until May 1, 1972.

The Hackley Tract (631 acres, 170 irrigated) was purchased during 1970 also. There is no use-reservation on the land so this tract will come under our jurisdiction upon completion of all paperwork related to the deed. This property adjoins the portion of the former Allard land lying west of State Route 125. Water for this tract comes from the Midland Ditch, which also supplies the former Allard land just mentioned.

There is a 5.0 cfs decree of medium priority water attached to the Hackley Tract. Drainage water from this tract runs to the former Allard land **ind** is available for our reuse there. Irrigation of the Hackley Tract ties into lands already acquired and will add only slightly to the irrigation work load.

The Refuge Manager has undertaken and nearly finished a complete run-down on water right appropriations on the Illinois River. After the information is digested and put in brief form, it will be made a matter of record here in the office and possibly appended to a future Narrative Report.

2. Food and Cover

The amount of available waterfowl food produced on the refuge is relatively small and may become one of the basic management problems for the refuge. Currently, seed production by the various species of grasses, sedges, spikerushes and forbs is more than adequate for even a large number of ducks, but the availability of this food source is limited by the absence of open water areas on the meadows. As small ponds are established at strategic locations, this particular food source will become more accessible as birds are better dispersed.

There are very few permanent or semi-permanent impoundments on the refuge at present. Aquatic plant growth is therefore very limited. The many small depressions on the meadows fill with water during the irrigation season, but dry up as water diversion is discontinued in July. Very little aquatic plant growth is realized.

Several of the larger irrigation ditches, as well as the river itself, exhibited fair amounts of aquatic plants by late summer, usually in the form of widgeongrass. These sites were frequented by ducks during the late summer and fall, and most brooding was carried out on these areas.

Another food source found in the river and, to a lesser extent, in the larger ditches, is in the form of <u>aquatic insects</u> and small <u>crustaceans</u>. These are among the principle foods of the ducklings and brood hens as well. <u>Terrestrial insects</u>, such as mosquitos and small flies, are also fed on by ducklings and adult birds, and the nutrient value of this source is quite high.

Since the upland areas of the refuge are dominated by <u>sagebrush</u>, little use by ducks occurs on them. However, sage grouse, mule deer, antelope and several species of small perching birds depend on these sagebrush areas during a large part of the year, particularly during the winter months. The moisture during the past growing season was adequate for upland sites, and the winter food source for deer and sage grouse should be sufficient.

Cover conditions on the refuge were good throughout the period. As birds began arriving late in the spring, they found good grass cover remaining from the previous years' growing season. Nesting cover was more than adequate for the number of nesting ducks, even **ear**ly in the season. As the growth of various meadow plants became more evident in June, their mixture with dead vegetation provided excellent nest and brood cover. The current years growth of meadow plants also served as sufficient cover during the late summer and fall. Cover in the form of low-growing willows is also present throughout the meadow area.

Upland cover was also good throughout the year. Sage grouse production was influenced more by inclement weather than by a lack of nesting cover, as large expanses of suitable cover are located near strutting grounds. Cover for other species on the upland areas was also adequate.

II. WILDLIFE

A. Migratory Birds

1. Ducks

Duck-use during the first full year of active waterfowl management was very encouraging. Abundant cover remained following the 1969 grazing season, and spring runoff was much above normal, producing favorable conditions for birds as they began arriving in April.

As the flood-irrigated meadows contain only small potholes formed as irrigation waters build up in depressions, dabbling duck species are the most common waterfowl present, and production was also restricted to dabblers.

Nesting begins relatively late in North Park, and ducks did not begin nesting in large numbers until early June. The peak of nesting occurred on about June 20, and several nests were still recorded as "laying" as late as June 29.

Again this year, nest transect lines were used to obtain nesting data. These lines closely coincided with those established last year, which served as the basis for the limited amount of premanagement data we were able to get. Under this system, lines were walked at 900 foot intervals across (east-west) the wet areas and well into the uplands. Nests located were flagged for rechecking, and all pertinent data concerning the status of the nest, primary and secondary cover types, and subsequent fate of the nest were recorded. A total of thirty transects were walked, totalling approximately 35 miles. The transect lines were first walked from June 2 through June 16. All transect lines were rewalked during the period from June 2h to June 29, at which time all flagged nests were rechecked and any new nests found were flagged and information recorded.

During the late summer months, transect lines were marked permanently. This will aid greatly in future nest surveys. A total of 44 nests were located while walking the transect lines, as compared to only 19 found in 1969, prior to management. <u>Mallards</u>, with 19 nests, and <u>pintails</u> with 11, accounted for two-thirds of the total number of nests located. Other species, and the number of nests located for each, included <u>shoveler</u> (4), <u>green-winged teal</u> (4), <u>cinnamon teal</u> (3), <u>gadwall</u> (2), and widgeon (1).

The primary nest cover selected appeared to be the various species of sedges (<u>Carex spp.</u>) present on the meadows, as 17 nests were located in this type of vegetation. Thirty nests were built within 20 feet of standing or moving water on the flooded meadows.

In addition to nest surveys, brood counts were made along the river itself and on the few small ponds that remained during late summer. From these counts, the <u>mallard</u> again appeared to be the main producer, as 11 broods were recorded. The <u>American</u> widgeon again produced a good number of broods, despite the few nests located. <u>Pintails</u> and green-winged teal followed in the number of broods recorded. A total of 305 ducks were produced, nearly double the number recorded in 1969.

Mallards and pintails were also the most numerous waterfowl in terms of use-days. The following table (Table 1) illustrates the breakdown in use-days and production. Data from 1969 is included for comparison.

	19	70	1969 (July	1-Dec. 31)
Species	Use-days	Prod.	Use-days	Prod.
Pintail	10,465	35	3,235	10
Mallard	9,555	100	5,430	40
American widgeon	7,581	65	11,065	65
Green-winged teal	6,580	55	4,660	25
Gadwall	5,180	20	7,080	65 25 25
Lesser scaup	2,905		466	
Cinnamon teal	1,561	20	525	
Blue-winged teal	1,162		1,568	5
Shoveler	959	10	312	-
Common merganser	287		124	
Totals	46,235	305	34,465	170

Table 1: Duck Use-days and Production, 1969 - 1970

The <u>mallard</u> and <u>pintail</u> were present in nearly equal numbers, and the combined total was nearly half of the total use-days. Both of these species increased by a marked degree over last year's figures, which included only the period from July 1 -December 31, 1969. The <u>American widgeon</u> and <u>gadwall</u> declined in use-days, but were still present in good numbers. Most other species showed sizable increases.

Production figures were also recorded for the Case Tract, which is due for inclusion in the refuge project in May, 1972. These figures are based on brood counts made on the many small ponds and lakes on this area. Line-transects were not used on this tract; however, as tracts are acquired, the line-transect system established on the present refuge area will be expanded to include the acquired lands. Based, therefore, on brood counts, the American widgeon was the main producer on the Case Tract, with the pintail producing nearly equal numbers. The mallard was third in production and these three species combined produced a total of h20 ducklings. Of interest also was the production of 100 lesser scaup on this area. The numerous small lakes and reservoirs attract good numbers of scaup, and suitable nesting cover for this species is present. Twenty ruddy ducks were also produced, reflecting the presence of marshy areas on thes tract.

Waterfowl censuses were also made on several of the larger lakes within about 20 miles of the refuge. Lakes included were the same as those mentioned in the 1969 narrative. The spring migration peaked at 6,695 ducks, recorded on May 5. This included 2,000 redheads and 2,100 scaup. The fall migration peak was much higher than this, as 28,050 birds were recorded on September 28, compared to a peak number of 24,000 in 1969. During the peak this year, 15,000 widgeons were present, along with 5,000 gadwalls and 2,000 mallards. The main use occurs on Walden Reservoir, which is approximately five miles from the present boundary and less than one mile from the proposed boundary. Thousands of coots also frequent this reservoir, as it is a large, fairly shallow, weed-choked body of water. The total summer duck population on these lakes is approximately 3,000 birds.

2. Geese

There are relatively few geese in the park as a whole. Approximately 75 birds were present in the park during a large part of the summer, but their use was largely confined to Lake John and its annex, which is about 10 miles from the present refuge boundary. It is here that the Colorado Game, Fish and Parks Department released 198 goslings in 1969 in an attempt to establish a nesting flock. However, only a very small fraction of these birds returned in 1970. Again in August of this year, the state department released 225 live-trapped birds, which had been taken near Ft. Collins, Colorado. Most of these were mature birds and the feeling was that they would be less vulnerable to hunters as they migrated out of the park.

Goose hunting was not allowed in the county again this year, in an attempt to allow the birds to become used to the area.

The <u>Canada goose</u> is the most common migrant in the area, and all transplants were of this species. <u>Snow geese</u> are rarely seen in North Park.

No geese were recorded on the refuge during 1970. Small flocks were often observed on the lakes on the Case Tract, but suitable habitat on the present tract is lacking.

3. Swans

No swans were recorded on the refuge or in North Park. It is doubtful that birds frequent the area, and recent records for the park would bear this out.

4. Coots

Coots are not abundant on the present refuge area. The limited small marshy areas account for nearly 100% of the coot-use, and in one particular marsh, all of the small amount of coot nesting takes place. Production was estimated to be ten coots during 1970.

The Case Tract attracts the largest number of coots, when compared to all other proposed refuge tracts. An estimated 150 coots were produced on this tract.

Walden Reservoir supported as many as 4,000 coots during the fall migration. The total North Park population peaked at about 8,000 birds.

5. Other Waterbirds

The sora was the most abundant bird in this category again this year. This small rail was present on nearly all meadow areas. A peak of 150 sora's was recorded during most of the summer months, and 65 young were produced. Other small birds present in good numbers were the <u>common snipe</u> and the <u>Wilson's</u> phalarope, and each produced young on the refuge.

Larger birds which were present throughout the summer and produced young included the great blue heron and the blackcrowned hight heron. The American bittern was present during the late summer and increased greatly compared to last year's use-days. Three species of "waterbirds" were seen this year for the first time. Two snowy egrets made a brief stop during early June. One <u>long-billed curlew</u> was noted on the south end of the refuge, also during June. An adult yellow-crowned night heron was observed several times during the early part of June and was noted with interest. This particular species is largely confined to the gulf coast states and has seldom been recorded in Colorado.

6. Mourning Doves

Mourning doves are present on the refuge during all but the winter months. A peak population of 150 birds was recorded during the fall migration. A few birds nest on the refuge, and 15 young doves were produced. This is a decrease in production from last year and may reflect unfavorable weather conditions during June. Use for mourning doves as a whole was well above that recorded in 1969, as 8,900 use-days were recorded this year.

B. Upland Game Birds

The <u>sage grouse</u> is the only species of upland game bird occurring on the refuge, and is present in good numbers. Again during the spring of this year, the two "strutting" grounds located east of the present refuge boundary were observed. One of these is located just inside the proposed refuge boundary, the other just outside. Presently, both areas are on BIM land.

On ground No. 1 (inside proposed boundary) a total of 63 birds were recorded, including 24 cocks and 39 hens, on April 21. On this same day, ground No. 2 contained 18 cocks and 31 hens for a total of 49 birds. The two grounds together showed a total of 112 adult birds, although a few birds may have left the grounds before daybreak, while others may have been elsewhere that particular morning.

A count on May 7 showed only 81 adults, as many hens had already begun nesting.

Although hatching success may have been good, ultimate production figures were quite low, as inclement weather in mid-June inflicted heavy losses on small chicks. A wet snowstorm on June 12 produced μ -6" of snow and many chicks may have died from exposure. Thirty young grouse were recorded as being produced on the refuge this year, compared to 50 in 1969.

A peak refuge population of 120 grouse was recorded and was present during most of the summer and early fall period. This compares to a peak of 150 last year.

C. Big Game Animals

Mule deer were present on the refuge throughout the year, but were most numerous during the winter months, as animals moved down to their winter range. As many as 250 deer were seen along the slopes of Owl Ridge during February and early March, and many of these wandered on and off the refuge. A peak number of 200 animals was recorded on the refuge during this period.

A relatively small number of deer were present on the refuge at other times during the year. Approximately **ten** animals were present during the summer months, and two fawns were produced on the refuge.

Pronghorn numbers were generally quite low on the refuge. Sizable herds are present north of the town of Walden, but few animals are seen south of town, in the area of the refuge. A peak population of ten animals was recorded during the year, and these were present during most of the summer. One pronghorn was produced on the refuge and it was seen several times during July and August.

A small group of about 20 pronghorns was present on an on-off basis on the Case Tract. This is the area of maximum pronghorn numbers on the proposed refuge area.

D. Fur Animals, Predators, Rodents and Other Mammals

The beaver and muskrat are present on the refuge in fair numbers. Muskrats number about 20, with beavers somewhat more plentiful, numbering around 35 animals. The river channel itself is marked by numerous beaver dams, as are several irrigation ditches. Dams have been removed when and where necessary for proper water control.

The striped skunk is the most abundant mammalian predator on the refuge, particularly in the meadow areas. For this reason it does present a problem to nesting ducks. No predator control plan has been finalized for the refuge, but nuisance animals around the living quarters are generally removed.

Badgers are common in the sagebrush areas, and are also seen quite commonly in the vicinity of the refuge subheadquarters. These may be a problem to mesting sage grouse, but as they are largely confined to upland areas, little problem concerning nesting ducks was encountered this year. Their main diet consists of ground squirrels, prairie dogs, and other small rodents.

Other large predators include the coyote and red fox. These are largely confined to the upland areas, but animals are occasionally seen on the meadows. The diet of these animals is largely restricted to jackrabbits and small rodents. Among rodents, the <u>Richardson's ground squirrel</u> is probably the most abundant. An estimated 600 animals were present during the summer months. A lone <u>porcupine</u> was observed on the refuge during the late summer.

White-tailed jackrabbits are common in the sagebrush areas and <u>Nuttall's cottontails</u> are frequently encountered in areas of dense willow growth on the meadows.

E. Hawks, Eagles, Owls, Crows and Magpies

A large variety of hawks was observed during the year, including the Swainson's, marsh, red-tailed, rough-legged and ferruginous. Of this group, only two are known nesters, as the Swainson's hawk produced ten young and the marsh hawk, 4.

Golden eagles are common on the refuge, and bald eagles are occasionally seen during the spring and fall migrations. An osprey was observed along the river on the refuge in September. This was the first sighting of this bird on the refuge.

Among owls, the great horned owl is the most common, with other species occasionally seen.

Crows are fairly common and nest on the refuge, as do sizable numbers of black-billed magpies. The magpie accounts for more use-days than any other bird species, as it is present in large numbers throughout the year.

Both the peregrine falcon and prairie falcon were seen this year, and the latter produced four young on the refuge.

A pigeon hawk was noted around the subheadquarters in September. It seemed to feed principally on the mourning doves which gathered around the buildings for grit. <u>Sparrow hawks</u> were also present during most of the year.

F. Other Birds

Many species of small perching birds have been recorded on the refuge. Finches, blackbirds, larks, and various other groups are present. These are included in a refuge birdlist compiled for the refuge and now awaiting publication.

G. Fish

The Illinois River, which flows through the refuge, is regarded as one of the top brown trout streams in northern Colorado. Many forms of aquatic insects are present in the river and these serve



Heffernan

7/11/70

Added note of interest:

While fishing on Goose Creek in the northwest corner of North Park, Operator McDermith noticed what he thought was an osprey, nesting; However, he was not sure of his identification.

On July 11, Refuge Manager Heffernan accompanied Mr. McDermith on a return visit to the same area and verified identity of the bird as an osprey. They also determined that the bird was nesting and had actually hatched young, which were still in the nest. The number of young was not determined.

There are very few known instances of ospreys nesting in Colorado. Dr. Ryder of CSU and the curator, Denver Museum of Natural History were notified.

The nest was in an old dead pine tree close to a series of beaver ponds. The tree leans considerably, so Mr. Heffernan decided against making a close-up examination of the nest. as one of the main food sources for the brown, as well as the much less abundant <u>rainbow</u> and <u>brook trout</u>. Terrestrial insects are also fed on, as they drop from overhanging willow branches. One particular brown trout caught during the late summer **had** even ingested a full grown mouse, which was found in its stomach.

As was the case in 1969, various sections of the river were shocked during the fall in order to obtain fish population and condition data, and stomach samples were taken from a few of the collected fish. Colorado Game, Fish and Parks Department personnel carried out the shocking on October 15, with refuge personnel assisting. From the data collected from the sample areas shocked, it appears that public fishing pressure during August and September had little effect on the trout population as a whole.

The refuge portion of the Illinois River was opened to public fishing on August 1, 1970. A public parking area was established near the river, and creel checks were made at the parking area on weekends, when the most fishing pressure was exerted. During August, fair numbers of fishermen were recorded on weekends, with a maximum of about sixty on August 1. During weekdays this number dropped to about four fishermen per day. Very few fishermen were seen during September, which is about the end of open water fishing on streams in North Park:

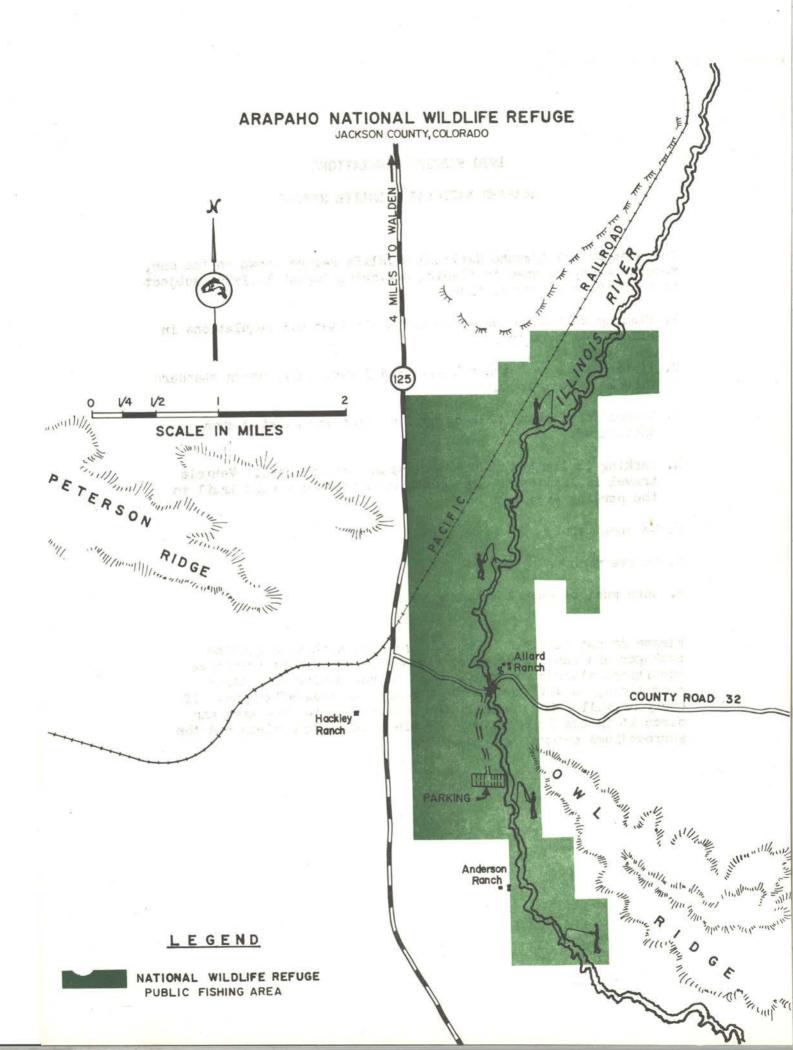
A total of 153 trout were checked at the parking area by refuge personnel. Included in this total were 125 browns, 20 rainbows, and 8 brookies. This proportion is nearly the same as that recorded from shocking, although rainbows appeared to be less numerous than creel checks would indicate. Rainbows are reputed to be easier to catch, at least in part due to the browns' nocturnal feeding habits. This may well account for the larger number of rainbows in the fishermens' creel.

Most fish caught ranged in size from 10-14", although a few larger fish were taken, up to about 2 1/2 lbs. An average twelve-inch brown will weigh about one pound.

The river itself is relatively difficult to fish, due in part to overhanging willows, and it is felt that only the devoted stream fishermen will return on a regular basis.

Several species of <u>suckers</u>, including the northern redhorse, western longnose, and western white, are present in varying numbers in the river, as are several species of <u>chubs</u>, <u>daces</u>, and other small minnows.

A leaflet showing the portion of the Arapaho Refuge open to public fishing, with regulations included, is appended. The fishing plan



1970 FISHING REGULATIONS

ARAPAHO NATIONAL WILDLIFE REFUGE

The area of the Arapaho National Wildlife Refuge shown on the map, reverse side, is open to fishing beginning August 1, 1970, subject to the following restrictions:

- 1. Fishing will be governed by the State laws and regulations in effect for this area.
- 2. Fishing will be between 4 a.m. and 9 p.m. only, using standard time in effect locally.
- 3. Access for fishing will be by foot from the parking area désignated.
- 4. Parking is limited to the designated parking area. Vehicle travel is limited to the county road and the marked trail to the parking area.

5. No open fires.

6. No overnight camping.

7. Dogs must be on a leash.

Please do not litter. Even small pieces, such as cigarette packages and gum wrappers, accumulate and spoil the primitive conditions along our stream. Just as you prefer unlittered conditions, so will the people who use the area after you. If everyone will bring their litter back to the parking area and place it in the litter cans, the area will remain clean and the surroundings natural and enjoyable. calls for closure during the months of June and July, to avoid disturbance of nesting ducks and early broods. With the exception of these two months, the refuge will be open to fishing year-round, although the months of May, August, and September will provide the most opportunities for anglers.

H. Reptiles

No reptiles were seen on the refuge during 1970.

I. Disease

None noted.

III. REFUGE DEVELOPMENT AND MAINTENANCE

A. Physical Development

There was no formal refuge development carried out in 1970. Several rehabilitation jobs, major in nature were accomplished with operation and maintenance funds.

Most of the activity in this category during the early part of the year consisted of screening and picking up of surplus equipment and materials. Several trips were made to Pueblo Ordnance Depot to pick up materials suitable for small bridges.

An Allis Chalmers HD-6 crawler with a matching hydraulic scraper was picked up from Bureau of Land Management in Glenwood Springs. The tractor had 1900 actual hours on it, and the scraper is like new. A new hydraulic angle dozer was purchased to match the tractor. The tractor-dozer unit has really been a handy item here.

Mr. William McDermith transferred here from Monte Vista Refuge as Engineering Equipment Operator. Since his arrival in early May field work accomplishments have been noticeably greater.

During June the entire Arapaho project was flown for vertical aerial photos. Contact prints were in color; several black and white mosaics were made also. Preparation for this was quite a task, but the resulting photos are very worthwhile.

Opening of the Illinois River to fishing on August 1 required some preparatory work. A parking area was fenced. Access required about 1/2 mile of new road, parts of which will require fills of various height. This is only about one-half done at present. A local man starting a new dirt moving business was contracted to finish cleaning the Oklahoma #1 ditch. This job was started last year, but the original contractor was unable to finish the job.

The Oklahoma #2 ditch carries water from a diversion point on the Burr ranch. It follows an old channel nearly a mile before reaching the Allard Tract. This portion of the Burr ranch is a veritable willow jungle. The new contractor was hired to remove the willows from one bank of this ditch and restore a channel. The work was done during October and the ditch is in good shape to our present boundary.

Work is needed on the lower end of the Oklahoma #2 ditch but the really bad part is finished. Beaver dams were nearly too numerous to count. Some of them were four feet high. Prior to cleaning, it was virtually impossible to find the dams, let along remove them.

An extended high water period during the spring runoff put the river diversion structures completed in 1969 to a good test. These structures survived the test in fine shape and as a result this work was pursued with added vigor in 1970.

New Diversion structures were installed at five diversion points: Oklahoma #1, Hubbard #1, Hubbard #2, Ward #1 and Ward #3.

Facilities for controlling the amount of water diverted into the irrigation ditches were installed at Hubbard #2 and Ward #3. These facilities consisted of tubes with screw-controlled headgates fabricated to the culverts.

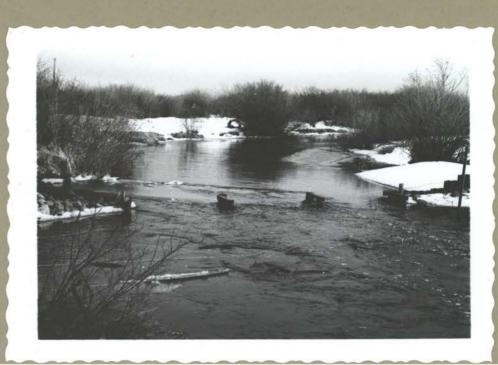
As winter weather restricted field activity, work moved to the refuge shop. The various types of control gates, as received from our suppliers, have several features added to them in our shop before they are installed. A large amount of this work is "stock piled" for winter activity here. As the year ended this work was well underway.

B. Plantings

None

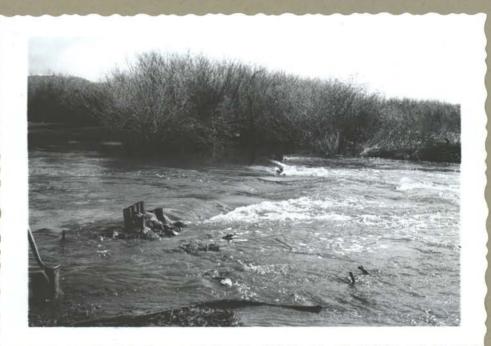
C. Collections and Receipts

None



4/13/70

The diversion check-structures designed by the Refuge Manager and installed in 1969 were well-tested in the spring of 1970, as this series of pictures will show. Above is Oklahoma #2 at moderately high river.



Donner

5/21/70

This picture shows the same structure (Oklahoma #2) with the Illinois really rolling along.



5/21/70

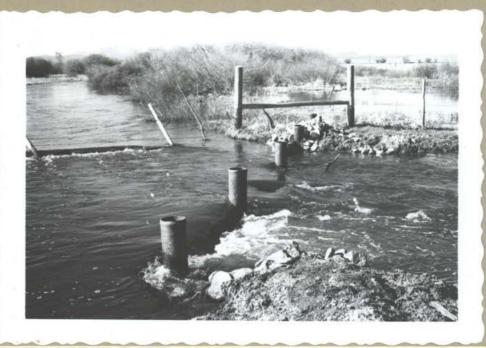
Different shot of Oklahoma #2 with Operator McDermith checking to see if riprap is still in place.



Donner

Aug/ 70

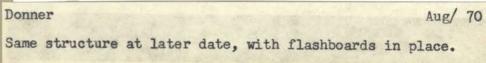
Oklahoma #2 is still in place after Illinois River has resumed being a creek.

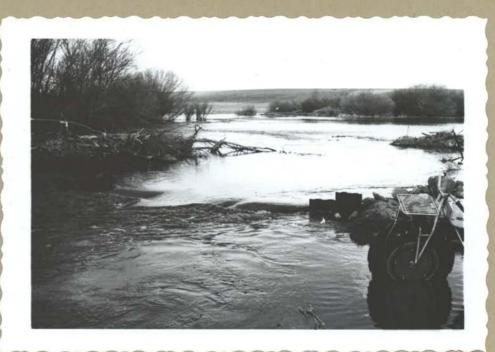


5/22/70

Island 2-bay structure during "flood stage".







. 5/21/70

North Park #6, 1-bay diversion structure during "flood stage".



Donner

Aug/ 70

Same structure at later date, with flashboards in place.

D. Control of Vegetation

Chemical control of vegetation was the only means of control used here in 1970. Herbicide use was limited to willow-infested ditch banks, where removal of willows facilitates proper maintenance.

The chemical used was 2,4D ester, 4 lbs. acid-equivalent per gallon. It was mixed at the rate of 1 gallon of chemical per 200 gallons of water. A pickup mounted, gasoline-engine powered, sprayer with handgun was used for application. A spreader-sticker solution was added also.

Individual plants were wetted thoroughly. It is difficult to measure the acres treated, but 5 acres is a reasonable estimate. Seven and one-half gallons of spray chemical were used. Total cost of the operation was \$200.

E. Planned Burning

None

F. Fires

None

IV. RESOURCE MANAGEMENT

A. Grazing

This is the first full year of the grazing program on the Arapaho Refuge. A permit authorizing 5,500 AUM's grazing by 1,550 cattle and 10 horses was issued to the former owners, the Allard Cattle Company. Actual use was 5,463 AUM's by 1,453 cattle and six horses. Grazing occurred on 4,433 acres of fee title land and some 5,000 acres of BLM land under our administration by memorandum of understanding until such time as formal withdrawal can be accomplished.

Main grazing period was from May 1 until October 1. One hundred thirty-six bred heifers were left until November 24.

The grazing fee per AUM is \$2.40. The basic animal unit is one cow over 18 months old. For stocking rate and billing purposes, adjustments are made for different age-classes of cattle. Horses also have an adjusted rate.

Yearling cattle, aged 6 to 18 months, are figured at a .75 userate. A cow with calf up to 6 months is figured at 1.25, horses any age are figured at 1.5. This makes it that a yearling costs \$1.80 per month, a dry adult cow \$2.40, cow and calf \$3.00 and horses \$3.60. Only enough horses to carry out handling of the cattle are allowed each permittee. From the time cattle are put on the refuge in the spring until October 1, the Allards have a rider living at the subheadquarters.

B. Haying

None

C. Fur Harvest

None

D. Timber Removal

None

E. Commercial Fishing

None

F. Fires

None

V. FIELD INVESTIGATION AND APPLIED RESEARCH

A. Progress Report

There was no activity along this line during 1970.

VI. PUBLIC RELATIONS

A. Recreational Uses

Stream fishing along the Illinois accounted for over 60% of the public use on Arapaho Refuge in 1970. Results of fishing activity is discussed in a previous section of this report.

Other recreational uses of the refuge were bird-watching, general sight-seeing and non-fishermen accompanying fishermen.

A summary of recreational use in 1970 indicates a total of 590 visits, 365 of which were fishermen.

As the public becomes aware of the presence of Arapaho Refuge we expect more birders and sight seers. There will adso be quite a

'come and go' clientele looking for a good fishing spot. Vehicle access to our fishing is limited and the fishing itself is quite difficult. With the several easily accessible lakes available nearby, we expect to wind up with only the hardy, devoted fishermen returning on a regular basis.

B. Refuge Visitors

Date	Name	Organization	Purpose
1/16	T.M. Conrardy	R.O. Realty Albuquerque, N.M.	Acquisition
1/16	D. H. Kimbrell	R.O. Realty Albuquerque, N.M.	Acquisition
2/5	T.M. Conrardy	R.O. Realty Albuquerque, N.M.	Acquisition
2/25	Rolf Nittmann	Game & Fish Dept. Ft. Collins, Colo.	visit
2/25	Jerry Lorentzen	Game & Fish Dept. Ft. Collins, Colo.	visit
4/29	M.G."Red" Sheldon	R.O. Refuges Albuquerque, N.M.	Earth Day Program
5/ 12	Gordon Folzenlogen	Wildlife Biologist Jet, Oklahoma	grassland, grazing, S&M inspection
5/20	Vic Medina	R.O. Engineering Albuquerque, N.M.	cadestral survey
5/22	Gene De cker and about 40 students	CSU Ft. Collins, Colo.	refuge tour
5/27	Bob Osthoff	R.O. Engineering Albuquerque, N.M.	survey
6/2	Ken Ystesund	R.O. Realty Albuquerque, N.M.	acquisition
6/23	Bill Wilson	Quivira NWR Stafford, Kansas	visit
6/23	David Mickelson	Lansing Unit, Upper Mississippi NWR Lansing, Iowa	visit

Date	Name	Organization	Purpose
6/28	Robert Scott	Refuges Washington, D.C.	visit
7/3	Morris Le Fever	Laguna Atascosa NWR San Benito, Texas	visit
7/6	George Wiseman	Assoc. Reg. Supervisor Atlanta, Georgia	visit
7/10	Wes Signs	State Engr. Office Steamboat Spgs, Colo.	water
7/13	Marcus Nelson	Reg. Supervisor Albuquerque, N.M.	BLM land
7/13	Ken Istesund	R.O. Realty Albuquerque, N.M.	acquisition
8/10	D.H. Kimbrell	R.O. Realty Albuquerque, N.M.	acquisition
8/10	Glen Jacobs	Sacramento NWR Willows, Calif.	visit
8/25	Ken Ystesund	R.O. Realty Albuquerque, N.M.	acquisition
8/27	Vern Helbig	River Basin Studies Denver, Colorado	visit
8/27	Art Hale	River Basin Studies Denver, Colorado	visit
9/15	Harvey Combs	R.O. Engineering Albuquerque, N.M.	cadestral survey
9/24	Rolf Nittmann Frank Bush Jerry Lorentzen	Game & Fish Dept. Ft. Collins, Colo.	visit
9/30	Vic Medina	R.O. Engineering Albuquerque, N.M.	cadestral survey
10/8	Ken Ystesund	R.O. Realty Albuquerque, N.M.	acquisition

Date	Name	Organization	Purpose
10/15	Rolf Nittmann	Game & Fish Dept. Ft. Collins, Colo.	fisheries investigation
10/22	George Wiseman	Assoc. Reg. Supervisor Atlanta, Georgia	visit
11/6	Eldie Mustard	SCS, Denver, Colo.	tour
11/9	Charles "Pete" Bryant	Monte Vista NWR Monte Vista, Colo.	water rights
11/19	Jim Harman Jim Pulliam	R.O. Refuges Albuquerque, N.M.	Game & Fish Club Program
12/2	Ken Ystesund	R.O. Realty Albuquerque, N.M.	acquisition
12/22	Ken Ystesund	R.O. Realty Albuquerque, N.M.	acquisition

C. Refuge Participation

Refuge Manager Donner belongs to the Jackson County Lions Club and attends meetings and work sessions quite regularly. He is also a member of the North Park Game and Fish Club.

Refuge Manager Heffernan belongs to the North Park Game and Fish Club and is an active member. In addition, Mr. Heffernan leads a 4-H Wildlife Conservation Club with 8 members.

In addition to the recurring participation previously mentioned, refuge personnel attended the following meetings.

- February 9-12 Refuge Manager Donner attended the annual National meeting of the American Society of Range Management in Denver, Colorado.
- March 21 Refuge Manager Donner attended the Annual Meeting of North Park Stockgrowers Association.
- April 3 Refuge Manager Donner attended annual banquet of North Park Soil Conservation District. Immediately preceding the banquet, the District held an open house in their office building to show the public the office facilities they have developed and have rented to several government agencies. Agencies with offices

.

in the building are: Arapaho Refuge, Bureau of Land Management, Agricultural Stabilization and Conservation Service and Soil Conservation Service. Each organization was requested to have someone present to show their offices. We were proud to show them ours.

- April 10 Refuge Manager Donner attended the cooperative meeting of Wyoming Game and Fish Department relative to annual seasons and regulations; held in Laramie, Wyoming.
- April 29 Refuge Managers Donner and Heffernan attended Earth Day Program at North Park Jr.-Sr. High School Mr. M.G. "Red" Sheldon of R.O., Albuquerque was one of several featured speakers.
- May 22 The Senior year Wildlife students from Colorado State University visited the Arapaho Refuge on their Spring Tour. Refuge Managers Donner and Heffernan explained our operation and outlined our plans for making this refuge into a waterfowl production area.
- July 6 Refuge Manager Donner attended a meeting in Steamboat Springs, called by the District Engineer to explain new legislation and other changes in water administration in Colorado.
- July 29 Refuge Manager Donner attended a water meeting in Walden similar to the one in Steamboat Springs.
- August 27-30 Refuge Manager Donner attended the Fall Tour of the Colorado Section, American Society of Range Management, held near Saguache, Colorado.
- October 8 Refuge Manager Donner attended the IMEAC meeting at Cheyenne, Wyoming.
- November 5 Refuge Managers Donner and Heffernan attended an RC&D meeting in Craig, Colorado.
- November 20 All members of the regular refuge staff plus temporary employee Rodney Krey, and their spouses attended the November meeting of the North Park Game and Fish Club, held at Gould. Messrs. Harman and Pulliam of the Albuquerque office were on the program.

D. Hunting

None

E. Violations

No violators were apprehended.

F. Safety

Safety meetings have been held monthly since March. The monthly Safety publication TIPS has been the source of most topics discussed. One movie, "Passport to Safe Winter Fun", stressing snowmobile Safety was shown. All personnel in the building saw the movie.

Safety is discussed seriously at all meetings, also during informal on-the-job discussions. It is our belief that employee attitude plays a great part in the overall safety program. It is a responsibility of management to provide safe working conditions, but poor employee attitude can quickly wreck a good safety record.

At the end of 1970, Arapaho Refuge has a record of 777 days without a lost-time accident.

In reviewing Narrative Reports for Hutton Lake Refuge it was noted that Hutton Lake did not have a lost time accident during the 13 years that the refuge was staffed. We hope we can continue and equal this record at Arapaho.

VII. OTHER ITEMS

A. Acquisition

Acquisition of land for Arapaho Refuge is progressing well. The Case Tract (2,954 acres) is ours in title now, but is subject to a complete use-reservation until May 1, 1972.

Negotiations for the Hackley Tract (631 acres) are completed and only minor items of legal transfer remain to be taken care of before this land is officially ours. The only use-reservation on this tract is for the house, which is reserved until December 31, 1971. We are expecting to get possession of this tract at any time.

A purchase agreement has been signed on the Brocker Tract (891 acres). There is a complete use-reservation on this tract until December 31, 1972.

An item that seems to be taking considerable time is withdrawal of public (BIM) lands that are scheduled to be included in the project by direct withdrawal. The Bureaus involved are working on a plan which calls for withdrawal of all lands within the proposed boundary at the same time. However, actual custody of the lands involved would not fall to us until such time as the lands to which they were originally attached come under our full jurisdiction. Thus, BIM would continue to administer lands attached to base properties scheduled for inclusion in the refuge until such time as acquisition is complete and use-reservations are ended.

Under this plan we would take over fee title lands and attached BLM lands at the same time.

Presently we are operating the 5,000 acres of BLM land formerly attached to the Allard Tract under a special Memorandum of Understanding between us and Bureau of Land Management.

B. Personnel Actions

Mr. William O. McDermith transferred here from the Monte Vista Refuge on May & to fill the Engineering Equipment Operator position allotted this station.

David Heffernan's position as Refuge Manager (part-time) was converted to full-time effective July 9. Mr. Heffernan had been in the Refuge Manager position on a 36 hours per week schedule since beginning here on May 5, 1969.

Barbara Smith, Clerk Typist, was promoted to GS-4 effective August 23.

C. Personnel Training

Refuge Manager Heffernan attended the Wingbee in Ft. Collins, February 16 through 20.

Refuge Manager Heffernan and Operator McDermith attended the Law Enforcement Workshop in Albuquerque July 27-31, and successfully completed the instruction course.

Refuge Manager Donner attended the Systems Analysis Training Session held in Albuquerque, October 12-13.

D. Items of Interest

On October 9, Refuge Manager Donner presented a check for \$6,787.08 from the Bureau to the Jackson County Treasurer. This money is paid the County as a result of the Refuge Revenue Sharing Act.

Sections I and II, except the Water portion, were written by Heffernan. Smith compiled the visitor list and did the typing. The remainder of the report was written by Donner. Editing, proofreading, and the many other tasks involved are by joint effort of the staff. Any and all accomplishments reported herein are also by 'joint effort'.

E. Photographs

A few photographs are included in the body of the report, but the major portion of them is included in a separate section. Photo credits are included with the date on each picture.

Black and white pictures were taken with a government camera and film processing was at government expense.

Color pictures are prints made from slides belonging to Mr. Heffernan. Processing of prints from the slides was at government expense.

Submitted by:

V. Carrol Donner Refuge Manager

February 11, 1971

Reviewed by

Assistant Regional Director-Operations

APR 3 0 1971

1....

Acquisition Progress

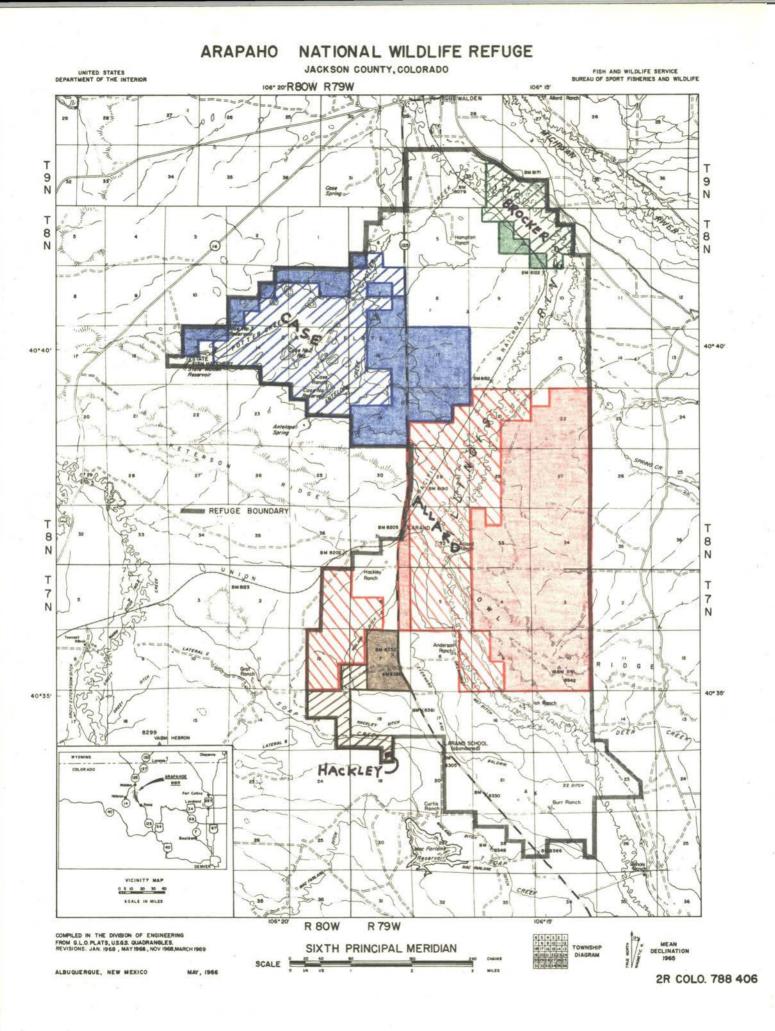
Allard Tract - under Bureau jurisdiction since July 1, 1969.

Hackley Tract - to come under Bureau jurisdiction momentarily.

Case Tract - to come under full Bureau jurisdiction May 1, 1972.

Brocker Tract - purchase agreement made, use-reservation to be in effect until December 31, 1972.

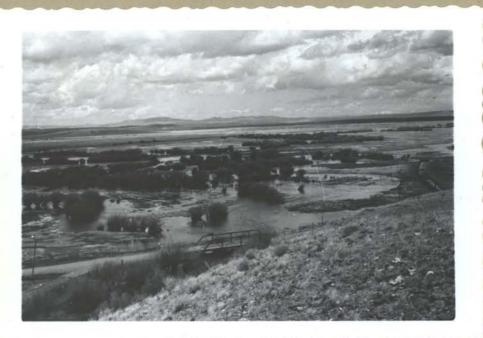
BLM land attached to tracts acquired or in process of acquisition are shaded in colors the same as base property to which formerly attached. This land will come under Bureau jurisdiction at such time as withdrawal occurs and/or the base property comes under our full control.





1/6/71

The ARAPAHO 'crew'. Left to right: Heffernan, Smith McDermith and Donner.



Donner

May/ 70

This depicts the water situation in 1970. Plenty. The flow-level of the Illinois River ranged from 'high' to 'out of its banks' from May 1 through June 15.



1/31/70

Making "snowfence" on the meadows can save considerable on keeping the inroad to subheadquarters passable in winter.



Heffernan



Heffernan

5/22/70

The Illinois bottom at one of its narrower points at high flow. The channel enters the opening in the willows in the very immediate foreground. About 300 yards above road to subheadquarters.



Heffernan

6/12/70

In the evening, following the June rain-snow storm. Flooding in this case is from irrigation water supplemented by precipitation. Improved control at diversions should prevent this.



Heffernan

6/12/70

This is how it looked as we headed for the office on June 12.



Looking back (east) from hill.



Mule deer on south slope of Owl Ridge.



Heffernan

4/21/70

Sage grouse on strutting ground 2 miles east of sub-headquarters. Wildlife that stays year-round in North Park is of the hardy types.



Heffernan

5/2/70

At times the subheadquarters takes on the aspects of its former status - a cattle ranch. Above are cattle in the yards ready to go to summer pasture, below the bull wagons are waiting to take them out.



Donner

10/3/70



10/3/70

With some 500 head of yearlings yet to be loaded and hauled, this truck fell through the bridge.



Donner

10/4/70

The next day, 2 "straight trucks" hauled them across the gravel-bottom "river" and discharged them into the "big jobs".



5/28/70

An ambitious young man starting a new contracting business was hired to finish a job started last fall - cleaning Oklahoma ditch No. 1.



Donner

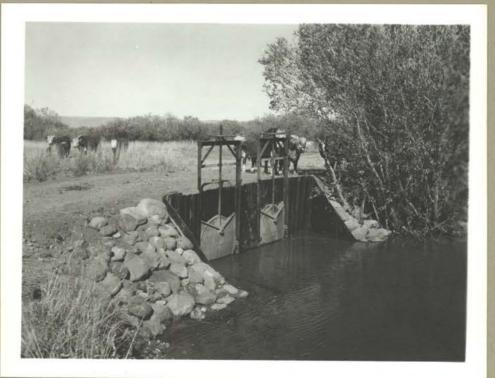
9/8/70

A used backhoe adapted to our International tractor comes in mighty handy. Here, Operator McDermith is setting a canalcheck, to be used in creating a small pond for "brood water" - a much needed item here.



Aug/ 70

Headgates on Hubbard #2 Ditch BEFORE. Most of the water in this ditch is attached to Case Tract, purchased this year. George Allard, former owner of land on which it was located, says it washed out annually.



Donner

9/17/70

Same headgate as above, with our added features. Anti-seep collars were installed in center of fill also. We plan on this one staying.



Aug/ 70

Diversion and control gate at Oklahoma #1, before. A beaver had 'volunteered' his help here.



Donner

8/26/70

First step of 'rehabilitation'. The county's special postdriver mounted on a mobile crane was used to drive the pipe posts.



9/4/70

Further progress on Oklahoma #1. Operators McDermith and Krey laying out pieces of sheet piling to be used in extending 'wall' into bank when backhoe operator (contracted) returns from lunch.



Donner

9/9/70

Refuge Manager Heffernan and Operator Krey "on the rockpile". Riprap is an important part of these structures.



Nov/ 70

Hubbard #1 diversion check and control gate in place. Wherever feasible the check structure in the river and the control-gate to the irrigation ditch will be installed as a single unit.



Donner

Nov/ 70

Refuge Manager Heffernan looks over our diversion check and headgate control combination at Ward #3.



Nov/ 70

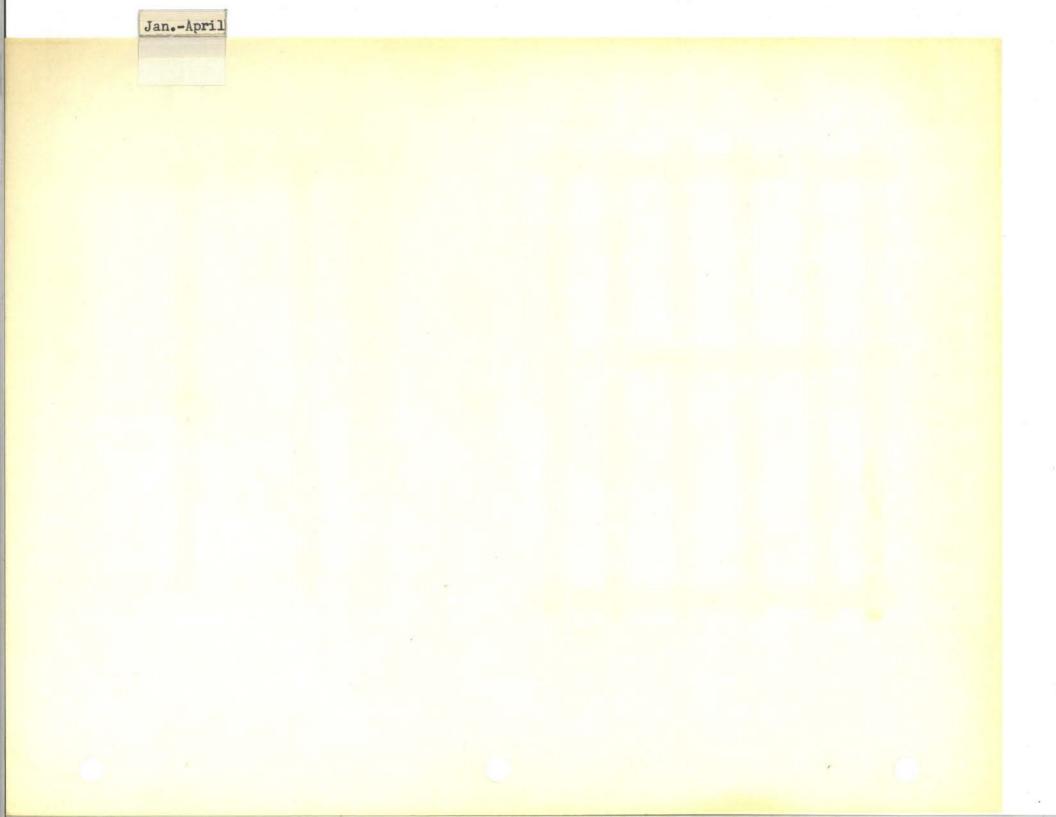
All our canal-checks and headgates get some "added features" before being installed. Above is a small portion of the structures receiving treatment in our shop this fall.



Donner

Nov/ 70

Here, Operator McDermith contemplates our work as 'cut out for us' next summer.



3-1750 Form -1

(Rev. .arch 1953)

WATERFOWL

Arapaho REFUGE

MONTHS OF January TO April

, 1970

	:	(2)								
(1)	: Weeks of reporting period :1/1-3 :1/1-10 1/11-17 :1/18-2h:1/25-31 :2/1-7 :2/8-1h :2/15-21 :2/22-28 : 3/1- : 1 : 2 : 3 : 4 : 5 : 6 : 7 :2/8-1h :2/15-21 :2/22-28 : 3/1-								: . h .	
Species -	:1/1-3	: 2	: 3	: 4	: 5	2/1-7	2/8-14	2/15-21	2/22-20	3/1-7
wans.	1									1
Whistling	1						1	_		
Trumpeter										
eese:										
Canada										
Cackling										
Brant										
White-fronted										
Snow										
Blue										
Other										
Ducks:										1
Mallard				ALL WAT	RS FROZEN					
Black -							1			
Gadwall			1							
Baldpate				1						
Pintail			1							
Green-winged teal			1						1	
Blue-winged teal					04		1			
Cinnamon teal										
Shoveler										
Wood										
Redhead						s Rps				1
Ring-necked										
Canvasback										
Scaup										
Goldeneye										
Bufflehead		1								1
Ruddy										1
Other										
1								1		
				9						

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

WATERFOWL (Continuation Sheet)

	:			(2)			:	(3)	: (4)
	: Weeks of reporting					, per	period			Production	
(1)	:3/8-14	:3/15-21	:3/22-28	3/29-4/4	1/5-11	:h/12-18	:h/19-25	L/26-5/2	waterfowl	Broods:	
Species	: 11	: 12	: 13	: 14 :	15	: 16	: 17	: 18 :	days use	seen :	to
wans:					-						
Whistling					ALC: NO			12			
Trumpeter											
eese:		1		*							
Canada		100	1		TT THE T						
Cackling				-	-						
Brant											
White-fronted		Strends bits	Harrison Pro-	A GOT STATE		a used at a	A PY Second		INCOMENT.		-
Snow											
Blue	miler b	in sighter the	-	and the state	100		and and a				
Other	the later and d	in Coloma		ata haron			durate at -				
ucks:				- 11 tom ht	1		of the second				-
Mallard		1		5	20	60	75	75	1,645		1
Black										the second	
Gadwall			-		5	15	15	10	315	and the second second	
Baldpate					5	10	15	20	315 350		
Pintail				5	30	90	85	80	2.030		- 1
Green-winged teal		There is a		10	20	40	25	25	2,030 840		
Blue-winged teal					5	15	15	15	350		-
Cinnamon teal				the set of	and the	10	15	15	280	A Street Barry	
Shoveler				and the second	d stored	-	5	5	70		
Wood			-	1. aland		the second second	and the start				-
Redhead			-	1		1	1	-		1	
Ring-necked					1:1:1	and and and and	-		I and I a	and failed	
Canvasback	3		+	1			1				
Scaup	-		1	A Sugar	The states	5	10	10	175	Frank Street	- 1
Goldeneye									-12	the second	
Bufflehead					1	- And And And	Cont ortal		X	and I allow	- 1
Ruddy			-			-					-
Other				-	1			++			
Total Ducks	N		1	20	85	245	260	255	6.055		
pot:			1	1		1	2	2	6,055 35		

			A PART REPAIL OF A PART OF
		(6) (7) Peak Number : Total Production	SUMMARY
Swan			Principal feeding areas Rivers, nearby meadows, temporary
Gees	e	:	ponds.
Duck	s 6,055 :	260	Principal nesting areas Open meadows in sedges and
Coot	s <u>35</u> :	2	grasses.
			Reported by V. C. Donner
			Observed by D. E. Heffernan
	INSI	RUCTIONS (See Secs. 7531 throug	gh 7534, Wildlife Refuges Field Manual)
(1)	Species:		ed on form, other species occurring on refuge during the led in appropriate spaces. Special attention should be given
(2)	Weeks of		
	Reporting period:	Estimated average refuge popul	Lations.
(3)	Estimated Waterfowl		
(5)	Days Use:	Average weekly populations x r	number of days present for each species.
(4)	Production:	breeding areas. Brood counts	luced based on observations and actual counts on representative should be made on two or more areas ggregating 10% of the naving no basis in fact should be omitted.
(5)	Total Days Use:	A summary of data recorded und	ler (3).
(6)	Peak Number:	Maximum number of waterfowl pr	resent on refuge during any census of reporting period.
(7)	Total Production:	A summary of data recorded und	ler (4).

3-1752

Form NR-2

(April 1946)

UPLAND GAME BIRDS

Refuge Arapaho

Months of January

to April

, 19 70

(1)	(2)		(3)	(4)	1	(5)		(6)	(7)
Species	Density	ing b	Yo	ung uced	Sex Ratio		Remov	als	Total	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.
Sage grouse	Sagebrush flats and draws, open meadows. 2,500 A.	50	the of the fill the f	scurz esricu syskri . Fig tartvo he is	75M./100P.		bard hard an ata bad bar an bar atya	burt bl.c bl.c ans tquit b tquit t	50	At least two "strutting" grounds situated on BLM land east of Allard tract. This land will ultimately be withdrawn for inclusion in Arapaho refuge. Approximately 135 birds on these two grounds.
	as are, induction data	nona	n, (760	tat bl	martly to al				Les still es selfai	(4) DEX BATTON
	defining weaper real		bacca	a gar	gazap Hueral	100	and 1	0.7 - 1	earaibii)	2.14V0/04 (2.)
	anzi potrado dina ma	ह जानि प्रयोग व	gal in ant _{i 10}	b agai	uting the te	nodis a bri i	en la ent b	aon t blast	interiori tali inteliado	(3) (3)(31)
	- WARTER IN SALARIAN				a animista a neltametri i				ndioate Andioae	(T) REMARKS
				unen s	r" bioiste brim	ven	hio 3 7 a	n all	of scientific	(an anta-ina (faa) *

.....

Form NR-2 - UPLAND GAME BIRDS,*

(1) SPECIES:

Use correct common name.

(2) DENSITY:

count information of a second se

. thent build in fact here!

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.

Applies particularly to those species considered in removal programs (public

- (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.

3-1751

Form -1A

MIGRATORY BI

(1) Species	() First	2) Seen		3) centration	(4 Last		F	(5) roduction	3	(6) Total
Common Name	Number	Date	Number	Inclusive Dates	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Use
. <u>Water and Marsh</u> <u>Birds</u> :			-	1	-		2		-17	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)
Great blue heron Sora rail	12	1/15 1/18	15	4/15-30 1/20-30	15	4/30 4/30			*	15 60
					-					
			12.2							
			and a	1	1	2	21			
I. <u>Shorebirds</u> , <u>Gulls and</u> <u>Terns</u> :	ar on the program		.ast est	5. 2. A . da		1 120	Linner	2 - 4	- she	- di
Killdeer Common snipe	21	3/11 3/6	20 10	h/10-30 h/15-30	20 10	1/30 1/30				500 250
									•	
		-11 ×								2
no na transfer				· .						- 9 ° c
1 11 11 11 12 12 12 12 12 12 12 12 12 12					(

3-1751 Form -1A

(1)	(2)		(3)	(4)	(5)	1.10	(6)
III. <u>Doves and Pigeon</u> Mourning dove White-winged dov	2 3/20	20	4/15-30	20	b/30	n n te dan s	(1 rate qu	1:00
IV. <u>Predaceous Birds</u> : Golden èagle Duck hawk Horned owl Magpie Raven	5 1/1 1 3/20 8 1/1 150 1/1	5 2 8 150	1/1-2/28 h/20-h/30 1/1-h/30 1/1-2/15	3 2 8 100	レ/30 レ/30 レ/30 レ/30		fu self one u	500 50 1,000 15,000
Crow Turkey vulture Marsh hawk Red-tailed hawk Swainson's hawk Swainson's hawk Rough-legged hawk Ferruginous hawk Bald eagle Prairie falcon	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	30 2 5 1 8 2 3 1 3	3/15-4/30 2/1-4/1 4/15-30 4/16-25 4/10-30 1/1-2/28 1/1-3/15 1/1-3/31 4/1-4/30	30 1 5 1 8 1 2 1 3	4/30 4/30 4/30 4/25 4/30 3/15 4/30 3/31 4/30	hv		2,000 180 100 10 600 135 325 90 275
Sparrow hawk Saw-whet owl	form, other space	ids occur		Ob	ported by served by	V. C. Donne D. E. Heffe	rnan be added	the depro-
	priate spaces. significance. (Groups: I II III IV	. Water and . Shorebirds . Doves and . Predaceous	Marsh Bir , Gulls a Pigeons (Birds (F	ds (Gaviif <u>nd Terns</u> (Columbifor alconiform	ormes to Cid Charadriifon mes) es, Strigifo	coniiformes and rmes) ormes and predac Passeriforme	Gruiiformes) eous
(2) First Seen:(3) Peak Number	The first migrat					1		
(4) Last Seen:	The last refuge	record fo	or the specie	s during	the season	concerned.		
(5) Production:	Estimated number	of young	produced bas	ed on obs	ervations	and actual of	counts.	~
(6) Total:	Estimated specie reporting period		se (average p	opulation	n X no. day	s present) (of refuge <u>during</u>	the

3-1754 Form N. +

(June 1945)

Refuge Arapaho

10-month period Mean ending April 30, 1970

-714

(1) Species	(2) Density	10. 11		Rei	(3) mova	ls	-48	tart is	Dispo	(4) sition	of F	urs		(5) Total
-10	n and the second , a test for jacks should be the the first second	heres	11	100 H	Fuel Care S	193 193 795		Share	Trappi	ng	fuge pped	ted		Popula-
Common Name		Acres Per Animal	Hunting	Fur Harvest	Predator Control*	For Re-	For Re-	Permit Number	Trappers' Share	Refuge Share	Total Ref Furs Ship	urs Donated	urs estroyed	tion
Long-tailed weasel	Sagebrush-meadow transition, 750 A.	75	10	5 (51)	103	100 178 - 1			HS	AK S	HA	E4	P	10
Striped skunk	All irrigated meadowland, 3,000 A.	60	bn	e £90 bitte		- 22			nina 5- piomini	int int				50
Badger	Sagebrush and sage- brush-meadow transi-			aterry Luxit	11 12 8 14 4 60									
Red fox Coyote	tion. 2,000 A.	133 500 200	1 10 A	a ,ai i ao li	ata:	1		5 58 . 1 1 10 10	Sec. 24	ed ver	1 . ¥			15 4 10
ichardson's ground squirrel	toutes up merceun	3,3	1 - 9	9 sadu Titeti	Ier	sos ho	1	Survey	b Luarli Sectors	boots				600
White-tailed prairie dog	8	100					8	PLANK B						20
Huskrat balle in Beaver	River, standing water areas. 500 A. River, old oxbows,	25		101 100 1 11 10		indi Fi	12.44	Sand and	Year		1			20
and the second	irrigation ditches. 1,000 A.	28.5	iuni	1.		-		and the	NOT X-	esada -	2 1	813	io Poli	35
hite-tailed jackrabbit	Sagebrush and sage- brush-meadow transi-	40			14.6				T S					60
*List removals by		er 60		5-554	-	1075		lare de la	ada a	é billion				25

SMALL MAM

Observed by D. E. Heffernan Reported by V. C. Donner

Form NR-4 - SMALL MAMMALS (Include data on all species of importance in the management program; i.e., muskrats, beaver, coon, mink, coyote. Data on small rodents may be omitted except for estimated total population of each species considered in control operations.)

(1) SPECIES:

A DOUT

Use correct common name. Example: Striped skunk, spotted skunk, shorttailed weasel, gray squirrel, fox squirrel, white-tailed jackrabbit, etc. (Accepted common names in current use are found in the "Field Book of North American Mammals" by H. E. Anthony and the "Manual of the Vertebrate Animals of the Northeastern United States" by David Starr Jordan.)

Applies particularly to those species considered in removal programs. (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, bottom land 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) REMOVALS:

Indicate the total number under each category removed since April 30 of the previous year, including any taken on the refuge by Service Predatory Animal Hunter. Also show any removals not falling under headings listed.

(4) DISPOSITION OF FUR: On share-trapped furs list the permit number, trapper's share, and refuge share. Indicate the number of pelts shipped to market, including furs taken by Service personnel. Total number of pelts of each species destroyed because of unprimeness or damaged condition, and furs donated to institutions or other agencies should be shown in the column provided.

(5) TOTAL POPULATION: Estimated total population of each species reported on as of April 30.

REMARKS:

Indicate inventory method(s) used, size of sample area(s), introductions, and any other pertinent information not specifically requested.

NR-4



3-1750

Form 1

(Rev. march 1953)

WATERFOWL

REFUGE Arapaho

MONTHS OF May TO August , 19 70

	: (2) : Weeks of reporting period												
(1)	5/3-9	5/10-16	Week 5/17-23	$\frac{s \circ f}{5/2 - 30}$	r e p o 5/31-6/6	<u>6/7-13</u>	perio	6/21-27	:6/28-7/4	. 7/5-11			
Species -	: 1		: 3		: 5	: 6	: 7	: 8		: 10			
Swans:			1	T						1			
Whistling			1				1						
Trumpeter									1				
eese:									1	1			
Canada													
Cackling													
Brant													
White-fronted													
Snow													
Blue													
Other													
Ducks:		T								×			
Mallard	40	50	60	60	65	50	55	50	60	50			
Black ~													
Gadwall	5	10	15	30	45	40	40	35	30	35			
Baldpate	10	15	18	40	45 55 50	60	60	<u>35</u> 55 55	40	45			
Pintail	50	70	80	60	50	50	50	55	50	55			
Green-winged teal	20	30	37	30	18	15	20	20	25	20			
Blue-winged teal		5	10	5	6	5							
Cinnamon teal		10	15	10	8	5	5	5	5	5			
Shoveler		5	5	5	7	5	5	5	5	5			
Wood													
Redhead						- 72 ju							
Ring-necked													
Canvasback									_				
Scaup	10	10	15	15	20	15	15	15	15	15			
Goldeneye									_				
Bufflehead								_		-			
Ruddy													
XXXXXX C. Merg.				5	6	5							
Total Ducks	135	205	255	260	280	250	250	240	230	230			
Coot:	5	5	5	5	5	5	5	5	5	5			

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

WATERFOWL (Continuation Sheet)

REFUGE Arapaho	ola mini	10 31 /The				M	ONTHS OF	May	TO Augus	· · · · · ·	19 70
	:				(2)			. :	(3)		4)
(1)	7/12-18	Week.	s of r :7/26-8/1: : 13 :	e p o 8/2-8	rtin :8/9-15	g per :8/16-22	:8/23_29		Estimated waterfowl	: Produ : Broods	
Species Species	.[[]]]	: 12	: 13 :	14	: 15	: 16	: 17	18	days use	: seen	: to
Swans:										1	1
Whistling							101	10		1	1
Trumpeter											
eese:		3.0000	Carma0 .	V Va	-						
Canada		TORAL TORAL	. J bive	1 10 1	bernanit						1
Cackling											
Brant											
White-fronted		I tok bio		Lin		and the					
Snow						1					1
Blue	- 45. 2 1	La patrimina		- 64 J			A DE DE A		1		1
Other				2121		e ed	June 1st	1	-		
ucks:					a long	Arte Lat			-		
Mallard	55	50	45	40	LO	50	55		6,125	11	100
Black										-	
Gadwall	30	30	30	30	35	10	45		3,675	2	20
Baldpate	40	40	ho	40	50		60		5.061	6	65
Pintail	50	劳	60	60	50 65	55	65		6,930	3	30
Green-winged teal	50 25	25	30	30	35	40	50		3,290	5	30
Blue-winged teal				5	5	5	5		357		
Cinnamon teal	5	5	5	5	10	10	10		826	2	20
Shoveler	5	5	5	E	5	5	10		609	2	10
Wood				- /			10		009	-	- 40
Redhead							-				
Ring-necked						-	-	1	and the second se		-
Canvasback						-				-	
Scaup	15	20	15	20	20	20	25	1	1,960		+
Goldeneye		20		20	20	20	62		1,900		
Bufflehead					-		-				+
					-		-				
Ruddy				5	5			++	182		
											+
Total Ducks	225	230	230	240	270	290	325		29,015	30	30
oot:	. 5.	5	10	10	10	10	10		770	1	10
	*				(over)			1			

CT TO DE A TOY	- Change	7)	. Moda	(6)	Tee	(5)	
SUMMARY	<u>م</u>	roduction	: TOTE	Peak Number	Jse :	Total Days U	0.7
areas Open meadows, along shoreline of	Principal feeding areas	-	:		_ :		Swans
kponds.	river, small stockponds.	-	:		_ :	-	Jeese
areas In open and willow-choked meadow	Principal nesting areas	5	:	325	_ :	29,015	Ducks
		0	:	10	2 :	770	Coots
arrol Donner 1 E. Heffernan	Reported by V. Carrol Do Observed by David E. Her						
uges Field Manual)	7534, Wildlife Refuges Fi	7531 through	ee Secs	TRUCTIONS (S	INS		_
cies occurring on refuge during the aces. Special attention should be giver		ould be adde	period	reporting		pecies:	1) S
24 R		iocar and i	Pecter	to those a	1.0	eks of	
	tions.	efuge popula	average	Estimated	od:	porting peric	· · · · · · · · · · · · · · · · · · ·
					rfowl	stimated Water	3) E
							- · ·
	nber of days present for e	lations x nu	ekly po	Average we	15	ys Use:	CLC 1
t for each species. ations and actual counts on representati o or more areas ggregating 10% of the	ced based on observations	young produ ood counts s	number reas.	Estimated breeding a		roduction:	
t for each species. ations and actual counts on representati o or more areas ggregating 10% of the	ced based on observations hould be made on two or mo ving no basis in fact shou	young produ ood counts s	number reas. abitat.	Estimated breeding a breeding h		oduction:	4) I
t for each species. ations and actual counts on representati o or more areas ggregating 10% of the ct should be omitted.	ced based on observations hould be made on two or mo ving no basis in fact shou r (3).	young produ ood counts s Istimates ha ecorded unde	number reas. abitat. of data	Estimated breeding a breeding h A summary		roduction:	(4) I
t for each species. ations and actual counts on representati o or more areas ggregating 10% of the ct should be omitted. ng any census of reporting period.	ced based on observations hould be made on two or mo ving no basis in fact shou r (3). sent on refuge during any	young produ ood counts s Istimates ha ecorded unde	number reas. abitat. of data mber of	Estimated breeding a breeding h A summary Maximum nu	:	oduction:	(5) 1 (6) 1
t for each species. ations and actual counts on representati o or more areas ggregating 10% of the ct should be omitted.	ced based on observations hould be made on two or mo ving no basis in fact shou r (3). sent on refuge during any	young produ ood counts s Istimates ha ecorded unde aterfowl pre	number reas. abitat. of data mber of	Estimated breeding a breeding h A summary Maximum nu	: on:	oduction:	(4) I (5) I (6) I
t for each species. ations and actual counts on representations or more areas ggregating 10% of the ot should be omitted. ng any census of reporting period.	ced based on observations hould be made on two or mo ving no basis in fact shou r (3). sent on refuge during any	young produ ood counts s Istimates ha ecorded unde aterfowl pre	number reas. abitat. of data mber of	Estimated breeding a breeding h A summary Maximum nu A summary	: on:	oduction: otal Days Use: eak Number: otal Productic	(4) I (5) I (6) I

(1) Species	(2 First	2) Seen		3) centration		4) Seen	F	(5) Production	9	(6) Total
Common Name	Number	Date	Number	Inclusive Dates	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Use
L. Water and Marsh Birds:						7				1005100
Great blue heron Snowy egret Black-crowned night	1 2	5/1 6/16	52	8/1-30 6/15-30	52	8/31 6/30	N.	1	2	350 30
heron	5	5/18	9	8/10-31	9	8/31		3	6	675
Tellow-crowned night heron American bittern Virginia rail Sora	1235	6/1 6/1 6/1 5/1	1 5 10 150	6/1-10 8/10-31 8/1-31 7/1-8/31	- 1 5 10 150	6/10 8/31 8/31 8/31		10	65	10 325 650 13,500
									20	
I. Shorebirds, Gulls and Terns:										
Killdeer Common snipe Long-billed curlew	20 10 1	5/1 5/1 6/1	35 15 1	7/15-8/15 7/15-8/31 6/1-30	15 15 1 5	8/31 8/31 6/30		8 6	20 18	2,750 1,500 30
Spotted sandpiper Willet American avocet Wilson's phalarope Forster's tern Black tern	5 2 5 25 2 25 2 1	5/20 5/15 6/1 5/15 5/15 6/1	10 4 10 75 3	6/15-7/15 6/1-30 7/1-8/31 7/1-8/15 6/1-30 6/1-10	5 1 25 3	6/30 8/31 8/31 8/31 6/30 6/10		2 5 20	10 5 10 50	675 250 800 5,800 120 10

3-1751

(over)

(1)	(2	2)		(3)	(4)	(5	5)		(6)
II. <u>Doves and Pigeons</u> : Mourning dove White-winged dove	20	5/1	60	8/15-31	60	8/31		2	15	2,500
V. <u>Predaceous Birds</u> : Golden ëagle Duck hawk Horned owl Magpie	3 2 8 100	5/1 5/1 5/1 5/1	5 2 10 200	7/1-8/31 5/1-6/30 7/15-8/31 7/15-8/31	5 1 10 200	8/31 8/10 8/31 8/31		1 25	4 100	450 160 1,050
Raven			1	1/13=0/31	-		- 17 L		100	18,500
Crow Turkey vulture Red-tailed hawk Swainson's hawk Rough-legged hawk Ferruginous hawk	30118121578	55556555555	502120131775	8/1-31 7/1-8/31 5/1-8/12 7/15-8/31 5/1-15 7/1-30	50 2 -20 1	8/31 8/31 8/12 8/15 8/15 8/12		5 4	15 10	4,000 180 100 1,900 15 225
Bald eagle Marsh hawk Prairie falcon Sparrow hawk	1538	5/1	7 7 15	5/10-20 8/1-31 8/1-31 7/15-8/31	- 1 7 15	5/20 8/31 8/31 8/31 Reported	i by <u>V. Carı</u>	l ol Donner	4 4 6	10 675 600 1,400
	Use the corder. A form, ot priate s signific	correct n Avoid gen her speci paces. S ance. Gr	eral ter es occur pecial a coups: I II III IV	INSTRUCTI found in the ms as "seagu ring on refu ttention sho . Water and . Shorebirds . Doves and . Predaceous d for the sp	A.O.U. C 11", "ter uge during ould be gi Marsh Bir , Gulls a Pigeons (Birds (F	hecklist, n", etc. the report ven to tho ds (Gaviif and Terns (Columbifor alconiform	1931 Edition In addition ting period se species ormes to C Charadriifo mes) mes, Strigin	h to the bir should be of local an iconiiformes ormes) formes and p Passeri	group ds list added i ad Natio a and Gr oredaced	in A.O.U. ed on in appro- onal cuiiformes
(0)	Estimate	d number	and incl	usive dates	when peak	populatio	n of the sp	pecies occur	red.	
(3) Peak Numbers: 1			ecord fo	r the specie	s during	the season	concerned			
	The last	refuge r	ecord re	i che opeore	0			8		
(4) Last Seen:				produced bas						

1

3-1750ъ Form NR-1B (Rev. Nov. 1957)

UNITED STATES DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE BUREAU OS SPORT FISHERIES AND WILDLIFE

WATERFOWL UTILIZATION OF REFUGE HABITAT

Reported by V			Title	Refuge Ma	anager	
bserved by D	avid E. 1	leffernan	_			
(1)		2)		(3)	(4)	(5)
Area or Unit		itat			Breeding	
Designation	Туре	Acreage	1 1 x 1	Use-days	Population	Production
	Crops		Ducks	50,330	175	305
	Upland	1,518	Geese	315	257,00 • •	
Meadow -		2,900	Swans	-da da		
	Water	15	Coots	805	4	10
	Total	4,433	Total	51,450	179	315
- Alternation	Crops	n Laiet I	Ducks	Sec. 128		
	Upland		Geese		turn th	
	Marsh		Swans			
	Water	and but	Coots	11 MONTESET	00010	CT (A) Salating (
	Total .		Total	agentin over	13 July 1	
entir dance	Crops	Land and	Ducks		1000 C	
	Upland		Geese		the state of the s	
	Marsh		Swans	1403 2	a stand	-
	Water		Coots	1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2	s)(oc_1)	
	Total .		Total	0	NE IN	
Contraction for	Crops	stu lorin e	Ducks		194	
	Upland		Geese	CHER DELTA		
	Marsh		Swans			
	Water		Coots		040	
	Total		Total			
test task of t	Crops		Ducks			
	Upland		Geese	ula devia p	10 10 14 1	
	Marsh	A DISTRICT OF	Swans		2001	
	Water	100	Coots	ingani Sinis e	- 10	
	Total		Total			
1.8 P	Crops	13 TH 1817	Ducks		n vitaa.	
	Upland		Geese			
	Marsh		Swans			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Water	artic Service	Coots		(qp	
	Total	and the second second	Total			
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans		949)	
	Water		Coots			
	Total	and the second	Total	and the second s		Sec. Strate

All tabulated information should be based on the best available techniques for obtaining these data. Estimates having no foundation in fact must be omitted. Refuge grand totals for all categories should be provided in the spaces below the last unit tabulation. Additional forms should be used if the number of units reported upon exceeds the capacity of one page. This report embraces the preceding 12-month period, NOT the fiscal or calendar year, and is submitted annually with the May-August Narrative Report.

- (1) Area or Unit: A geographical unit which, because of size, terrain characteristics, habitat type and current or anticipated management practices, may be considered an entity apart from other areas in the refuge census pattern. The combined estimated acreages of all units should equal the total refuge area. A detailed map and accompanying verbal description of the habitat types of each unit should be forwarded with the initial report for each refuge, and thereafter need only be submitted to report changes in unit boundaries or their descriptions.
- (2)Habitat: Crops include all cultivated croplands such as cereals and green forage, planted food patches and agricultural row crops; upland is all uncultivated terrain lying above the plant communities requiring seasonal submergence or a completely saturated soil condition a part of each year, and includes lands whose temporary flooding facilitates use of non-aquatic type foods; marsh extends from the upland community to, but not including, the water type and consists of the relatively stable marginal or shallow-growing emergent vegetation type, including wet meadow and deep marsh; and in the water category are all other water areas inundated most or all of the growing season and extending from the deeper edge of the marsh zone to strictly open-water, embracing such habitat as shallow playa lakes, deep lakes and reservoirs, true shrub and tree swamps, open flowing water and maritime bays, sounds and estuaries. Acreage estimates for all four types should be computed and kept as accurate as possible through reference to available maps supplemented by periodic field observations. The sum of these estimates should equal the area of the entire unit.
 - (3) Use-days: Use-days is computed by multiplying weekly waterfowl population figures by seven, and should agree with information reported on Form NR-1.
 - Breeding
 Population: An estimate of the total breeding population of each category of birds for each area or unit.
 - (5) Production: Estimated total number of young raised to flight age.

Interior Duplicating Section, Washington, D. C. 27580

UPLAND GAME BIRDS

Months of May

to August

, 1970

Refuge Arapaho

(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	umber roods bs'v'd	Estimated Total	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Sage grouse	3,000 acres	25	3	30	100:100	bei on bei on he	on in turni transi transi transi		120	Refuge closed to hunting. Chick mortality high due to late spring snowstorms.
	tibes boldten voveril (8) Jedennaft v	liev b	e is at t	o, ad	attends busine	-		d out to	10 98.01	
	nen leutin ^k os antie	in ante	1.000	turne	weighter automatic	1997. 1997. 1997. 1997.			noonline of names ar	100000 (800) (C)

to wild turner, whith the bi include data

1 DOCT TO D GENERAL become Propert 1 1930 51

19 190 holyes ogular and kind Salara S the set to 1 Kale ALL TRIJETS

00 UD De mathe

> 2 ALCONCLUME AND AND blands baseles boligs of

3-1752 Form NR-2

(April 1946)

Form NR-2 - UPLAND GAME BIRDS,*

(1) SPECIES:

Use correct common name.

(2) DENSITY:

"Three closed to hurthart

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.

3-1750 Form 1

(Rev. ..arch 1953)

WATERFOWL

due for inclu	ision in	project 1	ay, 197	2	(2)					
	:		Week	s of		ting	perio	d	-	
(1) Species —	5/3-9	5/10-16	5/17-23	5/24-30	5/31-6/6	6/7-13	6/14-20	6/21-27	6/28-7/4	7/5-11
wans:										
Whistling										
Trumpeter								_		
eese:										
Canada										
Cackling										
Brant										
White-fronted										
Snow										
Blue										1
Other		1			1					
ucks:		1								0
Mallard	250	250	300	325	275	200	200	200	200	200
Black ~		690	- 300	349	612	200	200	200	200	003
Gadwa11	450	475	575	600	200	350	100	330	300	300
Baldpate	300	250	400	100	300	200	180	110	100	100
Pintail	125	350	170	175	150	125	125	175	170	170
Green-winged teal	150	150	125	110	60	50	20	20	100	100
Blue-winged teal	50	10	25	25	10	5	-			,
Cinnamon teal	75	60	- 50	10	20		20	24	20	1 20
Shoveler	15	15	-15	10		10	10	15	10	10
Wood	-13-	1-12-	19	10		10	10	10		10
Redhead	00	100	120	200	10	25	-			
Ring-necked	90	100	120	100	40	25	- 5	5	5-	5
Canvasback	5			1					1	
Scaup	3.95	000	007							
Goldeneye	175	200	225	175	- 75-	50			30	25
Bufflehead						1			1	1
Ruddy		1							1	
Other					10	- 5	5	5	- 5	5
Total Ducks	1685	1785	2005	1960	1900	820	600	607	110	100
					1200	830	685	695	660	655
Coots:	100	100	100	100	125	125	125	150	150	150

3-1770a Cont. L 1 (Rev. March 1953)

WATERFOWL (Continuation Sheet)

REFUGE Case Tract (And due for inclusion			1072			MO	MONTHS OF May TO August					
due for flictua	ston in pi	to ject ha	19 17/6		(2)		44 14		(3)	:	(4)	
		Weeks	of r	.epo		g per	iod		Estimated	: -Prod		
(1) :	: 7/12-18: 7/19-25:7/26-8/1:8/2-8 :8/9-15 :8/16-22 : 8/23-29 : : waterfo											
Species	11 :	12 :	13 :	14	: 15	: 16	: 17	: 18 :		: seen		
wans:							T	1		1	1	
Whistling			men bus.	Bashell	a standard		150	and the state		7.75		
Trumpeter										1		
eese:		"LOUTOC	. Carrol	1								
Canada		10070119	. S hive	Trat	Cheverter	-						
Cackling												
Brant			-									
White-fronted	(TH	WWW. Print	1		14	Renter 1	and the second second	1	The second second			
Snow											-	
Blue	and the second	and they there	and the second	Trail T-		Sec. Mark	M. and t. Col.	and a stand of	1	and the second		
Other	St. M. Brook St. of	La Stran		the lease	and and	d be edd	thirds the feet	in the second	-			
ucks:				10 June		Inter Detor	C. No. 1 and		and the second	1		
Mallard	175	150	150	150	150	175	180		24,710	12	12	
Black									Inter a dabe	1.1.2.1.1		
Gadwall	100	90	85	85	85	100	110	in the translate	25.305	7	7	
Baldpate	175	175	175	160	160	175	180		26,565	7/4	15	
Pintail	125	120	120	115	115	125	130		15,680	13	14	
Green-winged teal	10	25	30	50	170	180	200		9.520	8	8	
Blue-winged teal				5	15	30	50		1.785			
Cinnamon teal	15	10	10	10	6	25	50	In the second second	2,982	2	2	
Shoveler	10	10	15	15	15	20	20	- In the	1,540	1	1	
Wood					1 on se	/	1 7	teo an thur				
Redhead	5								3,500			
Ring-necked						ter land beating	the second second		35	real court	1	
Canvasback	1										1	
Scaup	25	30	25	20	19	20	30	1 Martin Contraction	8,288	9	10	
Goldeneye												
Bufflehead					16-3	the bolt	det - red	V V TANTA	A model of		1	
Ruddy	5	5	5	5	5	10	10		560	3	2	
Other												
Total Ducks	645	615	615	615	740	860	960		120,470	72	76	
oot:	150	175	175	175	200	200	210		17,570	20	15	
				and the local diversity of	(over)			++				

(5)	(6)	(7)	Juchian			2	1100(47)37		
Total Days Use	e : Peak Number	: Total Pro	duction				SUMMARY	A Labor	11 Artista Dire
wans _ = =		:		Princip	al feedi	ng areas	Open po	onds, marsh	ies,
eese -	:	:		open me	eadows.				
ucks 120,470	: 2,005	: 765		- Princip	al nesti	ng areas	In mead	lows in via	cinity of small
coots,570	: 210	: 150		ponds,	lakes,	and marsi	les.		and the second se
						Carrol 1			1 - 2 Street
				Observed	d by Da	vid E. He	effernan		
710 22 125	to those s	period should species of lo				-	ogl		in the section
 Weeks of Reporting period Estimated Waterform 	to those s Estimated	average refu	ocal and n uge popula	ational s	ignifica	ince.	110 110 110	175 175 171 145	ita 11.200 Jack 12.000 Jack 12.000 Jack
 Weeks of Reporting period Estimated Waterford Days Use: 	to those a Estimated Owl Average we Estimated breeding a	average refu eekly populat number of yo areas. Brood	ocal and n nge popula tions x nu pung produ i counts s	ational s mber of d uced based should be	ays pres on obse made on	ence. Sent for rvations two or m	each spec and actu ore areas	cies. ual counts	on representative
 Weeks of Reporting period Estimated Waterfor Days Use: Production: 	to those s Estimated Owl Average we Estimated breeding a breeding h	average refu eekly populat number of yo areas. Brood nabitat. Est	ocal and n uge popula tions x nu oung produ d counts s timates ha	ational s ations. mber of d aced based should be aving no b	ays pres on obse made on	ence. Sent for rvations two or m	each spec and actu ore areas	cies. ual counts	on representative
 Weeks of Reporting period Estimated Waterfor Days Use: Production: 	to those s Estimated Owl Average we Estimated breeding a breeding h	average refu eekly populat number of yo areas. Brood	ocal and n uge popula tions x nu oung produ d counts s timates ha	ational s ations. mber of d aced based should be aving no b	ays pres on obse made on	ence. Sent for rvations two or m	each spec and actu ore areas	cies. ual counts	on representative
 Weeks of Reporting period Estimated Waterfor Days Use: Production: Total Days Use: 	to those a Estimated owl Average we Estimated breeding a breeding h A summary	average refu eekly populat number of yo areas. Brood nabitat. Est	ocal and n age popula tions x nu bung produ d counts s timates ha orded unde	ational s mber of d aced based should be aving no b er (3).	ignifica ays pres on obse made on asis in	ent for ervations two or m fact sho	each spec and actu ore areas uld be or	cies. ual counts s ggregat nitted.	on representative ing 10% of the ng period.
 Weeks of Reporting period Estimated Waterfor Days Use: Production: Total Days Use: Peak Number: 	to those a Estimated owl Average we Estimated breeding a breeding h A summary Maximum nu	average refu eekly populat number of yo areas. Brood nabitat. Est of data reco	ocal and n age popula tions x nu bung produ d counts s timates ha orded unde erfowl pre	ational s ations. mber of d aced based should be aving no b er (3). esent on r	ignifica ays pres on obse made on asis in	ent for ervations two or m fact sho	each spec and actu ore areas uld be or	cies. ual counts s ggregat nitted.	on representative ing 10% of the ng period.
 Weeks of Reporting period Estimated Waterfor Days Use: Production: Total Days Use: Peak Number: 	to those a Estimated owl Average we Estimated breeding a breeding h A summary Maximum nu	average refu eekly populat number of yo areas. Brood nabitat. Est of data reco umber of wate	ocal and n age popula tions x nu bung produ d counts s timates ha orded unde erfowl pre	ational s ations. mber of d aced based should be aving no b er (3). esent on r	ignifica ays pres on obse made on asis in	ent for ervations two or m fact sho	each spec and actu ore areas uld be or	cies. ual counts s ggregat nitted.	on representative ing 10% of the ng period.
 Weeks of Reporting period Estimated Waterfor Days Use: Production: Total Days Use: Peak Number: Total Production 	to those a Estimated owl Average we Estimated breeding a breeding h A summary Maximum nu	average refu eekly populat number of yo areas. Brood nabitat. Est of data reco umber of wate	ocal and n age popula tions x nu bung produ d counts s timates ha orded unde erfowl pre	ational s ations. mber of d aced based should be aving no b er (3). esent on r	ignifica ays pres on obse made on asis in	ent for ervations two or m fact sho	each spec and actu ore areas uld be or	cies. ual counts s ggregat nitted.	on representative ing 10% of the

3-1750b Form NR-1B

UNITED STATES

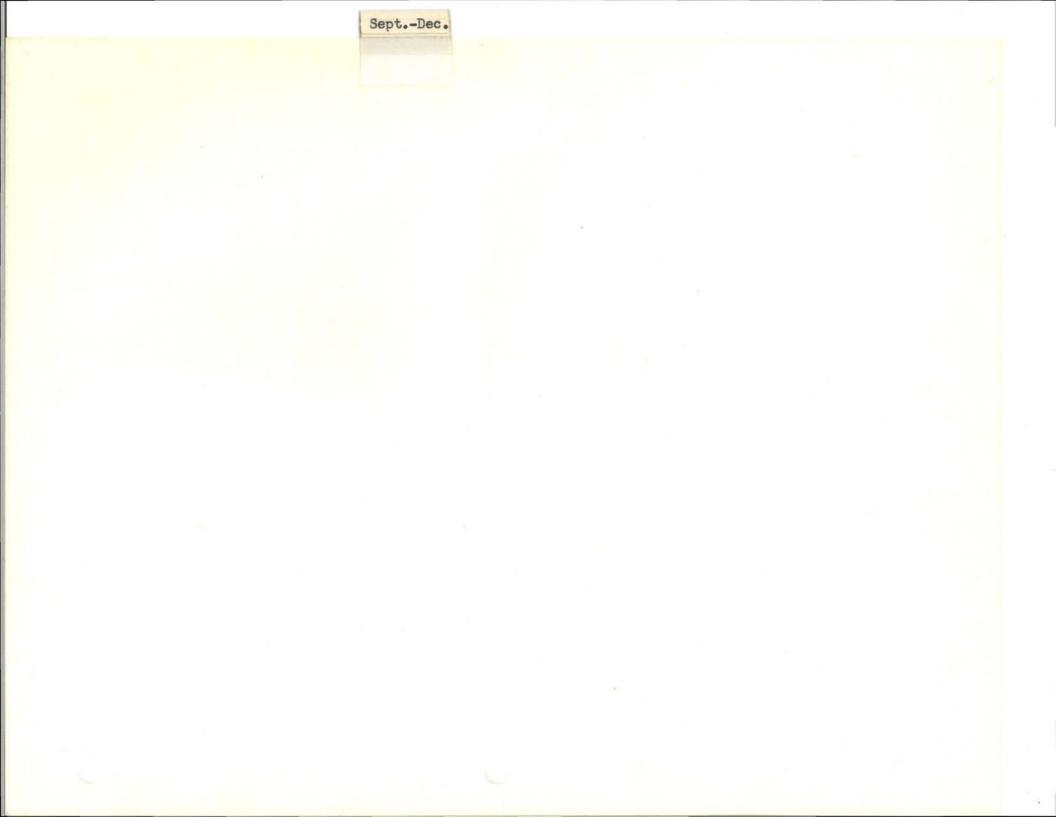
Form NR-1B (Rev. Nov. 1957) EUREAU OS SPORT FISHERIES AND WILDLIFE

Refuge Case Tra	WATERFOWL UTIL: act (Arapaho)	May-	lugust	od ending Au	gust 31, 19 <u>1</u>						
Reported by V.	Carrol Donner	Title	Refuge Mana	ager	61 1						
Observed by Da	avid E. Heffernan										
(1) Area or Unit	(2) Habitat		(3)	(4) Breeding	(5)						
Designation	Type Acreage		Use-days	Population	Production						
	Crops	Ducks	120,470	400	765						
ection	Upland	Geese	-0 -01- - -01								
Incomplete	Marsh	Swans		10010	00 00						
pending actual		Coots	17,570	75	150						
equisition	Total	Total	138,040	475	915						
	Crops	Ducks	orth children	terr oa							
	Upland	Geese		TIL							
	Marsh	Swans									
	Water	Coots	To approved	LQC*C1	· · · · · · · · · · · · · · · · · · ·						
	Total	Total	Autol Lan	(
entre (serpe	Crops	Ducks									
	Upland	Geese	CO Prode YA	193/1-20							
	Marsh	Swans	AN 1346 20	275.94							
	Water	Coots	ST PUT SHE								
	Total	Total	ri abrozon	(= <u>Ter</u>							
	Crops	Ducks									
	Upland	Geese									
	Marsh	Swans	TOW SOL								
	Water	Coots									
	Total	Total	out or o mos		<u></u>						
	Crops	Ducks									
	Upland	Geese									
	Marsh	Swans									
	Water		170 miles and 1								
	Total	Coots Total	Tiperto 1 - 1 (m)	VIIIOT							
	Crops	Ducks	2								
	Upland	Geese									
	Marsh	Swans	(PLO / 1	1997	made-outions						
	Water	Coots		10.201							
	Total	Total									
	Crops	Ducks			a						
	Upland	Geese			-						
	Marsh	Swans		5 - C - C - C - C - C - C - C - C - C -							
	Water	Coots									
	Total	Total			Party of the Party						

All tabulated information should be based on the best available techniques for obtaining these data. Estimates having no foundation in fact must be omitted. Refuge grand totals for all categories should be provided in the spaces below the last unit tabulation. Additional forms should be used if the number of units reported upon exceeds the capacity of one page. This report embraces the preceding 12-month period, NOT the fiscal or calendar year, and is submitted annually with the May-August Narrative Report.

- (1) Area or Unit: A geographical unit which, because of size, terrain characteristics, habitat type and current or anticipated management practices, may be considered an entity apart from other areas in the refuge census pattern. The combined estimated acreages of all units should equal the total refuge area. A detailed map and accompanying verbal description of the habitat types of each unit should be forwarded with the initial report for each refuge, and thereafter need only be submitted to report changes in unit boundaries or their descriptions.
- (2)Habitat: Crops include all cultivated croplands such as cereals and green forage, planted food patches and agricultural row crops; upland is all uncultivated terrain lying above the plant communities requiring seasonal submergence or a completely saturated soil condition a part of each year, and includes lands whose temporary flooding facilitates use of non-aquatic type foods; marsh extends from the upland community to, but not including, the water type and consists of the relatively stable marginal or shallow-growing emergent vegetation type, including wet meadow and deep marsh; and in the water category are all other water areas inundated most or all of the growing season and extending from the deeper edge of the marsh zone to strictly open-water, embracing such habitat as shallow playa lakes, deep lakes and reservoirs, true shrub and tree swamps, open flowing water and maritime bays, sounds and estuaries. Acreage estimates for all four types should be computed and kept as accurate as possible through reference to available maps supplemented by periodic field observations. The sum of these estimates should equal the area of the entire unit.
 - (3) Use-days: Use-days is computed by multiplying weekly waterfowl population figures by seven, and should agree with information reported on Form NR-1.
 - Breeding
 Population: An estimate of the total breeding population of each category of birds for each area or unit.
 - (5) Production: Estimated total number of young raised to flight age.

Interior Duplicating Section, Washington, D. C. 27580



3-1750 Form -1

(Rev. ..arch 1953)

WATERFOWL

	:		Week	rs of	(2)	ting	perio	d		
(1) Species —	8/30+9/5	9/6212						01	10/25-31	11/107
Swans:										
Whistling										
Trumpeter										
eese: Canada										
Cackling										
Brant										
White-fronted										
Snow										
Blue			1							
Other										
Ducks:					1					
Mallard	50		ho	35	20	20	20	20	-	~
Black ~	20	40	40	37	20	20	20	20	5	>
Gadwa11	40	35	30	25	15	10	10	5		
Baldpate	60	50	50	50	30	25	20	15	5	5
Pintail	50	40	30	25	15	15	10	10	10	10
Green-winged teal	60	- 75	60	50	40	30	20	10	5	
Blue-winged teal Cinnamon teal	10	15	15	10	10	- 5				
Shoveler	- 15	15	15	10	5	5				
Wood	10	10	10	5	5			+		
Redhead			1		-	· 1814		1	1	
Ring-necked								1		
Canvasback			Í							
Scaup	00	20	20	20	25	10	10	20		
Goldeneye	20	15	15	15	15	10	10	10		
Bufflehead					- "					
Ruddy										
Other XXXX C. Merg.			5	5	5					
Total Ducks:	315	295	270	230	160	120	90	70	25	20
A CONTRACTOR OF A CONTRACT OF		295	210	1261	- 13	120	90	10	63	20
Coots	10	5	5	5	5					

3-17⁻ a Cont. A 1 (Rev. March 1953)

WATERFOWL (Continuation Sheet)

:				(2)			:	(3)	: (4)
(6) · Peak Number;	Maximum	Weeks	s of r	epor	ting	per	i o d (9 12/20-26:	(5 days) :	Estimated	: Produc	tion
(1) :	11/8-14 :	11/15-21	11/22-28:	11/29-12	/512/6-1	2 12/13-1	9 12/20-26:	12/27-31:	waterfowl		
Species :	11 :	12 :	: 13 :	14 :	15 :	16	: 17 :	18 :	days use	: seen :	to
Swans:											
Whistling	Turbed (1	habitat	Settime	ALL PLAT	and the base	1 10 1 m	4 (#\$PUT)2 2	- (Feel) - (Deel)			
Trumpeter	brewell're	2 STREER.	Encod oc	supe and	DACH WE	THE PUT THE	Hor mare a	Cane - Arra	early the property	1000	
Geese:	Rationt	ed wumber	OF TOPLE	HPC GHDR	Early of the	b observe	tot care in care	of a los	DDI N IST COL	the second second	
Canada											
Cackling	ACCOL BATC	ADERIV I	sonu 1 anti on	a x numbe	ar inf duny	e preción	for par	Connect and a			
Brant											
White-fronted											
Snow	Ratilmet	SULTER FUE	ne - strait (sare	ao ba Table	ale.						
Blue						1					
Other											
Ducks:	TO LUDS	per contra me	a dr. tonna	lind out	comer 124	La l'i cerver					
Mallard			Water Are	as Froze					1,785	24 F1461	
Black	In and H	alfon BO-1	Ne Wirds	curated of	flowers a	sher snee	tes coorder	Care-Care The	the during the	1	
Gadwall					-				1,190		
Baldpate	MUCTO OTE	(See Bos	AL TERI N	urough 7	301 70110	life Heft	ace Meld	dam mult	2,170		
Pintail						-			1,505		
Green-winged teal [CONTRACTOR IN	NO NO STA			1,505 2,450 455		
Blue-winged teal [455		
Cinnamon teal				1	e txar text	1.			455		
Shoveler					- International State				280		
Wood											
Redhead									Contractor Solution and		
Ring-necked					Thursday	troe of the	SOLC 4R				
Canvasback											
Scaup									770		
Goldeneye			- in the second	and the second sec	75 11 7 20				and the second of	-	
Bufflehead					Ting Ta	Thend I are	JIGHE P				
Ruddy							-				-
other C. Merg.	Peak Witte	ber - Tob	al Freque	-Ton			11116AV	32	105		
Total Ducks:	16)		. 111		-				11,165		
Coot:									C.130	1	1

Cool :					5.80
(5) Total Days Use	(6) (7) : Peak Number : Total Producti	on		SUMMARY	3.942
vans 200		Principal	feeding	areas Open meadow	near water,
eese	· ·	temporar			1.50
ucks	: 315 :	Principal	nesting	areas Open meador	rs in sedges and
oots 210	: :	grasses.			
Cinnapop teal		Reported 1	y v c	arrol Donner	
Bipe-winged besi				E. Heffernan	
1) Species:	STRUCTIONS (See Secs. 7531 thr In addition to the birds li reporting period should be	sted on form, or	ther spec	ties occurring on r	
Gedwald TI	the second s				efuge during the
1) Species:	the second s	sted on form, or added in appropr	ther spec riate spa	ties occurring on r aces. Special atte	
2) Weeks of	In addition to the birds li reporting period should be to those species of local a	sted on form, o added in approp nd national sign	ther spec riate spa	ties occurring on r aces. Special atte	
 Species: Weeks of Reporting period: 	In addition to the birds li reporting period should be to those species of local a Estimated average refuge po	sted on form, o added in approp nd national sign	ther spec riate spa	ties occurring on r aces. Special atte	
1) Species:	In addition to the birds li reporting period should be to those species of local a Estimated average refuge po	sted on form, or added in approp and national sign opulations.	ther spec riate spa nificance	cies occurring on r aces. Special atte	ntion should be given
 Species: Weeks of Reporting period: Estimated Waterfow Days Use: 	In addition to the birds li reporting period should be to those species of local a Estimated average refuge po	sted on form, or added in appropri- and national sign opulations. x number of days produced based on ts should be made	ther spec riate spa nificance s present n observa de on two	ties occurring on r aces. Special atte t for each species. ations and actual c o or more areas ~gg	ounts on representativ regating 10% of the
 Species: Weeks of Reporting period: Estimated Waterfow Days Use: Production: 	In addition to the birds li reporting period should be to those species of local a Estimated average refuge po Average weekly populations Estimated number of young p breeding areas. Brood count	sted on form, or added in appropri- and national sign opulations. x number of days produced based or its should be made as having no base	ther spec riate spa nificance s present n observa de on two	ties occurring on r aces. Special atte t for each species. ations and actual c o or more areas ~gg	ounts on representativ regating 10% of the
 Species: Weeks of Reporting period: Estimated Waterfow Days Use: Production: 	In addition to the birds li reporting period should be to those species of local a Estimated average refuge po Average weekly populations Estimated number of young p breeding areas. Brood coun breeding habitat. Estimate	sted on form, or added in appropri- ind national sign opulations. x number of days produced based on its should be made as having no base under (3).	ther spec riate spa nificance s present n observa de on two is in fac	ties occurring on r aces. Special atte t for each species. ations and actual c o or more areas gg t should be omitte	ntion should be given ounts on representativ regating 10% of the d.

WATERTOWL

×

3-1751

Form	1-1A	
14.10	CONTRACTOR OF A	

MIGRATORY BI

(1) Species	(2) First Seen			3) centration	_ (4 Last		F	(6) Total		
Common Name	Number	Date	Number	Inclusive Dates	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Use
. <u>Water and Marsh</u> Birds:				× 8	-			1	alges	Colden
reat blue heron lack-crowned night	5	9/1	5	9/1-15	1	9/26				Duck ne
heron merican bittern irginia rail	9 5 10	9/1 9/1	10 5 10	9/10-30 9/1-10 9/1-30	2 1 2	10/10 9/26 10/10				350 85
ora	150	9/1 9/1	150	9/1-20	- 10	10/15				350
										1
				1						
I. <u>Shorebirds</u> , <u>Gulls and</u> <u>Terns</u> :	2 - 1 - 1 -				-	_			201 1. 1. 1. 1. 1.	(1)
illdeer ommon snipe potted sandpiper illet merican avocet	15 15 5 1	9/1 9/1 9/1 9/1	30 25 15 5 10 60	9/5-30 9/10-10/10 9/10-30 9/10-10/10 9/1-10/1	2	10/30 11/5 10/10 10/15 10/10				1,200 1,150 500 200 350
ilson's phalarppe	25	9/1	00	9/10-30	10	10/10			•	1,900
									and the	st.
							1 <mark>-</mark> -		•	112

(1)	(2	2)		(3)		(4)	(5)	(6)
II. <u>Doves and Pigeons</u> : Mourning dove White-winged dove	60	9/1	150	9/10-30	15	11/15			6 ,000
V. <u>Predaceous Birds</u> : Golden èsgle Duck hawk Horned owl Magpie	5 1 10 200	9/1 10/1 9/1 9/1	5 1 10 200	9/1-30 10/1-30 9/1-10/15 9/1-11/1	3 1 6 150	12/31 10/30 12/31 12/31	E.		425 30 1,000 21,500
Raven Crow Turkey vulture Red-tailed hawk SwainsoN's hawk Rough-legged hawk Ferruginous hawk Marsh hawk Osprey Prairie falcon Pigeon hawk Sparrow hawk	5 212117-1515	9/1 9/26 9/1 10/28 9/16 9/16 9/16 9/25 9/20 9/20 9/1	50 21221-121-5-15	9/1-30 9/1-12/31 9/26-10/30 9/1-30 10/28-11/6 9/16-30 9/5-10/5 9/25-27 9/1-30 9/20-30 9/1-30	S NUMBER OF STREET	12/31 12/31 10/30 12/31 11/6 9/30 12/31 9/27 12/31 9/30 12/31 Reporte	d by V. Car	rol Donner	2,500 2144 35 1,050 10 15 600 3140 10 800
(1) Species:	order. A form, ot priate s signific	correct n Avoid gen her speci paces. S ance. Gr	eral ter les occur Special a coups: I II III IV	ms as "seagu ring on refu attention sho . <u>Water and</u> . <u>Shorebirds</u> . <u>Doves and</u>	A.O.U. 11", "te ge durin ould be Marsh B , Gulls Pigeons Birds	Checklist, ern", etc. ng the report given to the irds (Gavii and Terns (Columbifor (Falconiform	1931 Editio In addition rting period ose species formes to Ci (Charadriifo rmes) mes, Strigif	ormes and pred Passerifor	oup in A.O.U. listed on ed in appro- ational d Gruiiformes aceous
(3) Peak Numbers:									•
				produced bas					
Production'	LSLIMACE	ununber	or young	produced bas	eu on on	Der val 1008	and actual	counco.	

.

WATERFOWL H" TER KILL SURVEY

(Sept. 1960)

Year 196 70

8 20

Refuge Arapaho

(1) (5) (6) (8) (9) (2) (3) (4) (7)Est. No. Weeks of No. Hunters Hunter Total Crippling Total Est. Total Hunting Checked Hours Waterfowl Species and Nos. of Each Bagged Bagged Loss Kill of Hunters Kill Refuge closed to hunting.

04 - 110 BE

3-1750c

Form NR-1

- (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), Greenwinged 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 = $\frac{\text{Column 8}}{\text{Column 2}} \times \text{Column 7}$.

NR-1C

3-1752

Form NR-2

UPLAND GAME BIRDS

(April 1946)

Refuge Arapaho

Months of September 1

toDecember 31

. 1970

(1) Species	(2) Density	el L	Yo	3) oung luced	(4) Sex Ratio		(5) Remov		(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird		g	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Sage grouse	Sagebrush flats and			bac an 1985 an 1986 an 1987 an 1987 an	anter parte a contractor contractor contractor neco porcela		on da Grann Grann Grann Grann Grann	finis Gent (3 1351 - 1 151 - 1	nandar ngganas ngganas ngganas ngganas	
	draws, open meadows. 2,500 acres	33.3		evitus gi en i tiseud			5 167 576 5 5 165	man' te	75	Refuge closed to hunting. Surrounding area season: Sept. 12-14, 2 birds/day, h in possession. Some
	nas olas içilmele dalaş				an praint and a	1.7	s i foi	6 mm	le ungal tala ung tala ung	utilization by hunters as birds move off refuge. Hunting pressure around refuge light, success good.
	the second political	(Control)	1016	1 (12)	aning parts a	-	aug	t oța	a (no f bri	(5) <u>939600010</u> :
	an det altinos tes			ti sent Marine	ering the ve star those o	i i i i li t	up le r' ine	t tet	list(mute 1 octude	-B(SG) = (6)
	energia se étames. A				n debre altre p		1		find loans (an) sub-	(7) BEELARE

a reputaeble to the presed coverent should be prese bidy scalaces at

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 of be begatt a ule

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 Forn R-3 (June 1945)	Refuge Arapah	10		Blu	GA	ME			Calend	ar Ye	ar 1970			
(1) Species	(2) Density	(3) Young Produced	Young Removals				(5) Losses In		(6) troductions	(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	
Pronghorn	Sagebrush flats and draws, some meadowmareas. 1,000 A.	1										10	5	20:100
Mule deer	Sagebrush draws, willow- choked meadows. 1,200 A.	2									2	200	ho	20:100
*													1	
, I (1)													4	

Remarks:

Observed by David E. Heffernan Reported by V. Carrol Donner

Form NR-3 (Form-1753) - 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 fur nish 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 each species on the refuge at period of its greatest abundance and also as of December 31.
- (8) SEX RATIO: Indicate the percentage of males and females of each species as determined from field observations or through removals.

116008

1000

3 -1755	
Form .	-5

Refuge_

Arapaho

DISE

Year 19. 70 ----

.

В	otulism		Lead Poisoning or other Disease						
Period of outbreak No	one observed.		Kind of disease None observed.						
Period of heaviest loss	es		Species affected						
Losses: (a) Waterfowl (b) Shorebirds (c) Other	Actual Count	Estimated	Number Affected Species	Actual Count	Estimated				
Number Hospitalized	No. Recovered	% Recovered	Number Recovered						
 (a) Waterfowl (b) Shorebirds (c) Other Areas affected (location) Water conditions (avera areas, areas, areas) 		acreage)	Number lost Source of infection Water conditions Food conditions	-					
Condition of vegetation			Remarks						

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

Y				(1)
NONAGRICULTURAL	COLLECTIONS,	RECEIPTS,	AND	PLANTINGS	

Refuge

Arapaho

Year 19 70

	Collections and Receipts (Seeds, rootstocks, trees, shrubs)						Plantings (Marsh - Aquatic - Upland)							
	(See	ds, r	ootsto	cks, tre	es, sh	rubs)		(and the second se	tic - Upland)			
Species	Amount (Lbs., bus., etc.)	(2) C or R	Date	Method or Source		(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 Los	
Nothin	g to rep	ort.			5									
 (2) C = C (3) Use * Total acre Marsh ar Hedgerow Food str 		ns ar note ted: .c patc od pat	nd R = surplu	Receipte			Remarks :							

3-1758

Form Nk-0 (Rev. Jan. 1956)

Fish and Wildlife Service Branch of Wildlife Refuges

CULTIVATED CROPS - HAYING - GRAZING

Arapaho Refuge State Colorado County Jackson Government's Share or Return Permittee's Green Manure, Share Harvested Harvested Unharvested Cultivated Total Cover and Water-Crops fowl Browsing Crops Total Acreage Acres Bu./Tons Acres Bu./Tons Acres Bu./Tons Type and Kind Grown Acreage None Fallow Ag. Land None 0 No. of Permittees: Agricultural Operations 0 Haying Operations Grazing Operations Hay - Improved Cash GRAZING Number AUM'S ACREAGE Tons Cash (Specify Kind) Animals Harvested Acres Revenue Revenue 1453 1. Cattle # 5,001 12,001,20 4.433 6 horses 2. Other None 1. Total Refuge Acreage Under Cultivation None Hay - Wild 2. Acreage Cultivated as Service Operation None

* Includes horses incidental to grazing operations. Reporting period, January 1 - December 31, 1970.

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.

<u>Cultivated Crops Grown</u> - 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.

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

<u>Government's Share or Return - Harvested</u> - Show the acreage and number of bushels harvested for the Government of crops produced by permittees or refuge personnel. <u>Unharvested</u> - 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 Unharvested column.

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

<u>Green Manure, Cover and Waterfowl Grazing Crops</u> - 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.

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

<u>Total Refuge Acreage Under Cultivation</u> - Report total land area devoted to agricultural purposes during the year.

NR-8



REFUGE GRAIN REPORT

Months of September 1 through December 31, 19\$ 70 Arapaho Refuge (1) (5) GRAIN DISPOSED OF (6) (7) PROPOSED OR SUITABLE USE* (2) (3) (4) ON HAND ON HAND RECEIVED VARIETY* TOTAL BEGINNING DURING END OF OF PERIOD PERIOD PERIOD Transferred Seeded Fed Total Seed Feed Surplus Refer to Hutton Lake Refuge Narrative Report. (8) Indicate shipping or collection points __ (9) Grain is stored at Hutton Lake Refuge Granary.

(10) Remarks

*See instructions on back.

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.

NR-8a

- (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.

3-1979 (NR-12 (9/63)	ANNUAL RI	eau of Sport Fisherie EPORT OF PESTIC	CIDE APPLI			fuge Arapaho oposal Number 1-70	Reporting Year 1970	
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)
7/13/70 to 8/4/70	Willow, spp.	Oklahoma #1 irrigation ditch banks.	Less than 5 acres.	2,4-D	7.5 gal.	h lb. acid- equivalent per acre	Water, 1 part chemical 200 part H ₂ 0	Pickup mounted gasoline engine powered sprayer with hand- gun.

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

Nearly 100% kill on treated willows.