1963

Waterfowl Production Surveys, Canada Goose Nesting Data (1961-1963)

MONTE VISTA REFUGE

WATERFOWL PRODUCTION

1963

Ducks

1. Size of area sampled = 8180 acres 11,570
2. Acreage of 16.5 foot wide transects = 157 acres — 640
3. Total active nests found on transects (both runs) = 67 ✓ 178
4. % clutches successfully hatched = 75.% ✓ 53% 88%
5. Size of average (conservative) Class III brood = 5 5
6. Species composition of nests found on transect:

Mallard	82 %
Pintail	3 %
Gadwall	11 %
Teal	3 %
Unknown	1 %
	100 %

7. Projected active nests for 8180 acres:

$$X = N \bar{x}$$
$$= 8180 \cdot \frac{67}{157}$$
$$= 3517 \text{ active nests}$$

8. Confidence limits of projected active nests at 95% level:

$$= \bar{X} \pm t_{.05} \cdot S_{\bar{x}}$$
$$= .43 \pm 1.97 \cdot \frac{.888}{\sqrt{157}}$$
$$= .43 \pm .14$$
$$= 3517 \pm 114 \text{ nests } (\pm 33\%)$$

9. Projected total production to Class III brood size for 8180 acres:

$$3517 \cdot .75 \cdot 5 = 13{,}190$$ ✓

10. Projected total production for entire refuge (14,000 acres of which 12,000 acres is waterfowl habitat):

15,000 duck production ✓

11. Corrected species composition (corrected by breeding population counts) of total refuge production:

	% Comp.	Number
Mallard	75	11,250
Pintail	7	1,050
Gadwall	11	1,650
Teal (Blue-winged, cinnamon, green-winged)	5	750
Other (redhead, shoveler, ruddy)	2	300
	100	15,000

Canada Geese

1.	Total nests found outside goose pen	=	8 11
2.	Number of nesting pairs observed with at least one bird with neck collar or colored leg band	=	5
3.	Average clutch size	=	4.6
4.	Number clutches believed successfully hatched	=	7
5.	Estimated average hatch per successful clutch	=	3
6.	Estimated total production from located nests	=	21
7.	Estimated total refuge goose production outside goose pen	=	25

4/

MONTE VISTA REFUGE

CANADA GOOSE NESTING DATA

1963

Nest No.	Date First Observed Incubating	Location	No. Eggs	No. Hatched	Identification		Remarks
					Male	Female	
1	4/25	14P4, N.W.greasewood point on ground	6	-	No necktie	No necktie	Same as (3) 1961 & 1962
2	4/25	7P1, Island	5	-	Necktie, no leg band	Necktie, left leg alum. banded	New nest site
3	5/6	7P2, Island	5	5	No necktie No leg band	No necktie No leg band	Same as (4) 1962 Hatching when first seen
4	4/25	7P4, Island	6		---	No necktie	Same as (5) 1962
5	4/22	17P3, E. of stockyard at So. end of pond, on ground, in greasewood	4	3	No necktie Yellow leg band	No necktie	New nest site
6	4/22	17P3, So. dike of Eastern small pond at N.end of 17P3 saltgrass	5	5	No necktie No leg bands	No necktie	New nest site
7	4/25	15P4, Second point extending to E. from N. end of pond, on ground	2	-	No necktie No leg band	Necktie Left leg alum band	New nest site
8	4/23	Unit 19, Spring Creek, E. Fork of S.Fork, west bank	1	0	---	Necktie, no plastic leg band	Nest deserted, then destroyed(5/7/63)
9	4/23	Unit 19, Spring Ck. at Sheridan S. Diversion	4	0	Necktie, metal leg band	Necktie, metal leg band	Destroyed (5/7/63)

1963 (Continued)

Nest No.	Date First Observed Incubating	Location	No. Eggs	No. Hatched	Identification		Remarks
					Male	Female	
10	5/7	Unit 19, Spring Ck., Lowest Island on South Fork, lowest group of Islands	6	-	No necktie	No necktie	Same as (6) 1962
11	5/7	Unit 19, Spring Ck., N. Fork, Uppermost Island	--	0	No necktie	No necktie	2 destroyed eggs found

MONTE VISTA REFUGE

CANADA GOOSE NESTING DATA

1962

Nest No.	Date First Observed Incubating	Location	No. Eggs	No. Hatched	Identification		Remarks
					Male	Female	
1	4/10	14P1, NE large island	4	1	Alum. leg band, left. No.necktie	Unknown No necktie	Same as (1) 1961?
2	4/10	14, Mead. Ditch Div. Pond, Crescent island	7	5	No necktie Left leg alum.	No necktie Left leg.alum.	Same as (2) 1961
3	4/23	14P4, N.W. greasewood point, on ground	6	6	No necktie	No necktie	Same as (3) 1961
4	4/10	7P2, Island	4	-	No necktie	No necktie	
5	4/18	7P4, Island	7	-	No necktie	No necktie	
6	4/26	19, S.Spring Ck. Lower Isl, Isl. group, above diversion, on spoil pile	6	-	No necktie	No necktie rt. leg. alum. banded	
7	4/26	19, S.Spring Ck., E. bank 100 yds. below goose pen, E. fork	4	-	No necktie Alum.leg band	No necktie Left leg yellow plastic band	

MONTE VISTA REFUGE

CANADA GOOSE NESTING DATA

1961

Nest No.	Date First Observed	Location	No. Eggs	No. Hatched	Identification	
					Male	Female
4		15, SW quarter, E. artesian pond, cattail Island				
1		14 P1, Small inner island				
2		14, Mead. Ditch Div. Pond, Crescent Island				
3		14P4,				
5		S. Spring Creek, E. Bank of E. Fork, 50 ft. below goose pen				

Duck Hunting Information: Robert Ballou, Charles Bryant

DEC 20 1963

Miss [redacted]

Mr. Robert Bolleu, Monte Vista National Wildlife Refuge, Monte Vista, Colo.

December 20, 1963

Assistant Director, Migratory Bird Populations Station

Report on the Experimental Hunting Season - San Luis Valley

Enclosed is the work outline for preparing a report on the experimental season with subject assignment that we discussed and planned last week when we met in Colorado. If this outline does not agree with your understanding of our plans, please let me know.

In regard to a schedule to completing the first draft of this report, the major sections headed "Introduction," "Procedures followed in 1963 and Plans for 1964," and Section I and II, A, of "Preliminary Results and Discussion" can be completed with no additional information. Therefore, it would be highly desirable to complete them for circulation by mail between Bolleu, Grieb, and myself, prior to a meeting at the wing session at Fort Collins. Let's get them in the mail no later than January 17. The rest of the report depends on data obtained from: (1) age ratio determinations from wings, (2) the results of the mail questionnaire surveys, and (3) band recoveries. We will hand tabulate the age ratios obtained from wings at Fort Collins on or about January 29. I'll bring or have mailed to me the latest information on band recovery. The results of the mail questionnaire survey will be the most difficult to have available by that time, since they depend on duck stamp sales information and the results of the regular season mail questionnaire survey that will not be completely in at that time. Ed Kozaseo (Acting Chief of our Section of Mail Surveys) has been negotiating with the Post Office Department to get duck stamp sales information as soon as possible, so I am hopeful that we will have this information. If this information isn't available, however, we may have to assume that duck stamp sales are of about the same magnitude as during some previous year. What would be a good year to select if we must do this? The consideration here is what year had a level of hunting activity similar to 1963. Maybe hunting activity during the regular season on the public shooting area at the Monte Vista Wildlife Refuge will give us a clue. Please answer this question soon, since in order to have kill estimates available at the wing session, I'll probably have to make them using "old" duck stamp sales information. Then we can revise the estimates based on current sales information, if available, before we go to press. We should plan on completing the estimates of population size, age ratios, etc. for the remainder of the report while we are together at the wing session. We can then complete the first draft of the report by no later than mid-February, sooner if possible. We should get the completed report in the mail in time to be received prior to the flyway

technical section meetings in late February and March, and the flyway council meetings at the North American Wildlife Conference. Please advise if the plan outlined above is not okay.

Enclosed are (1) the outline followed in the air-ground comparison studies conducted thus far in the prairie pothole region and (2) the form and instructions used in the calculation of the breeding population index values based on aerial surveys that I promised to send. I'll send plans for the collapsible trap that we used later.

I certainly enjoyed the recent meetings at which we planned the report on the 1963 experimental season and dicussed the work to be done in 1964. Not only was this profitable, but the field work we did increased my understanding of duck harvest conditions in the San Luis Valley.

Lastly, but certainly not least, I would like to thank you, Bob, and your fine family for your gracious hospitality.

Aelred D. Geis

Enclosures

Region 2
R. Buller
C. Bryant ✓
E. Rosasco
R. Smith
S. Carney
J. Grieb

Work Outline for Preparing Report On:

"Preliminary Report on the Evaluation of the Experimental Duck Hunting Season in the San Luis Valley, Colorado - 1963"

INTRODUCTION

(prepared by R. Ballou)

I. Need for Research on Effect of Hunting Pressure on Population Levels

II. Unique Situation in San Luis Valley

III. Purpose of this Report - Outline Procedures Being Followed to Evaluate the Experimental Season and Some Preliminary Findings

PROCEDURES FOLLOWED IN 1963 AND PLANS FOR 1964

I. Breeding Population Survey (Grieb)

II. A. San Luis Valley - Procedures that were followed in the population survey conducted in the San Luis Valley in 1963 will be summarized and changes and sampling intensity, stratification, and the inclusion of air-ground comparison studies planned for 1964 outlined.

II. (Ballou)

A. Production Survey - Monte Vista National Wildlife Refuge

B. Production Information Relative to the Entire Valley

Plans for recording water conditions so that this may be related to age ratios in an attempt to better understand factors affecting mallard production and to permit the prediction of production in the Valley.

Under Part A, the production survey conducted in the Monte Vista National Wildlife Refuge will be described and its results presented for 1963 with plans for 1964.

III. Banding Program (Geis, except as noted below)

A. Local Banding: Definition of harvest areas and times.

(The purpose of local banding will be outlined. It will be pointed out that at least for the time being we appear to have sufficient information of this sort to justify curtailing this activity for the time being, in favor of more urgently needed banding.)

1. Proportion harvested in Valley

2. Early vs. regular season

3. Need for local banding in Valley foothills (prepared by Grieb) - will describe banding program planned to evaluate the extent to which birds produced in the foothills move into the Valley prior to the Valley experimental season.

B. Pre-season Banding

1. Kill rates

a. Index shooting pressure

b. Basis for estimate of proportion bagged

c. Differential vulnerability (basis for adjusting age ratio in kill)

2. Distribution of kill - chronologic and geographic

a. Extent to which pre-season population harvested outside Valley.

b. Kill in early vs. regular season.

Because of the great versatility and wide use of this type of banding, this program will be substantially expanded in 1964, including not only larger sample sizes, but a better geographic distribution of the sample within the Valley.

C. Winter Post-season Banding

1. Define harvest areas - (compared with A and B)

2. Compare with recovery rates from other banding period to measure mortality during part of year

3. Define extent to which wintering birds are a different "population" than pre-season birds.

The objectives of winter banding will be outlined. It will be pointed out that this type of banding contributes substantially less information than does pre-season banding to our understanding of the basic issues associated with the experimental hunting season; therefore, it will be mentioned that the winter banding program will be either substantially curtailed or eliminated in 1964.

IV. Wing Collection Survey

A. Mail (Geis)

B. Field Wing Collection (Grieb)

V. Kill Surveys

A. Monte Vista National Wildlife Refuge (Bellou)

B. Mail Questionnaire Survey (Geis)

C. Measurement of Response Bias in Mail Questionnaire Survey Results - (Geis)

VI. Measurement of BandiReporting Rates (Geis)

A. Mail Questionnaire Survey

B. Proportion of Bands Observed Reported

VII. Winter Inventory (Grieb)

PRELIMINARY RESULTS AND DISCUSSION

I. Breeding Population Levels (Bellou)

A. Breeding Population Survey - Entire Valley

B. Refuge

II. Production - Age Ratio Data

A. Refuge - Production Survey - prepared by Bellou who will attempt to translate the production survey on the Refuge to an anticipated age ratio.

B. Age Ratios in Kill (Grieb)

1. Early Season

a. Refuge vs. rest of Valley - geographic variation with Valley

b. Variation with season

c. Corrected for differential vulnerability to yield age composition of population.

2. Regular Season

a. Age ratios compared with early season age ratios

b. Geographic and chronologic variation

Grieb will prepare all of this, except "A" - Gale will provide the necessary band recovery rate information, when available, to correct age ratios in the kill for differential vulnerability in order to estimate the age composition that actually existed in the pre-season population.

III. Size of the Hunting Kill (Gale)

A. Early Experimental Season

1. Entire Valley - Mail Questionnaire Survey

2. Kill on Refuge

B. Regular Season

1. Compared with early season

2. Proportion of Valley summer population killed in late season.

C. Crippling Loss

1. Entire Valley

Note: It will be necessary to determine how the regular routine questionnaire can be used in determining the kill within the San Luis Valley during regular season. If this cannot be done, it may be necessary to estimate the kill during the regular season by some system of relating size of the kill during the experimental season to the estimated kill during the regular season, based on the distribution of band recoveries or some other indirect method.

IV. Pre-Season Population Levels (Bailey)

A. Surveys (It should be pointed out that these were attempted but are not to be feasible)

B. Indirect Estimate of Pre-Early Season Population Based on Kill, Recovery Rates and Age Ratios

C. Pre-regular Season Population Estimates or Estimates of Total Population Related to the Regular Season (It appears that this may be very difficult and probably will be deleted)

V. Hunting Activity Experimental Hunting Season in the San Luis Valley (Bellew)

A. Total Valley-wide (Geis will provide Bellew with information from the mail questionnaire survey on this)

B. Monte Vista National Wildlife Refuge (Information obtained from the hunter check there)

C. Hunter Residence (This will be based on mail questionnaire information provided by Geis, the residence of hunters checked at passes by Colorado bag check (provided by Grieb), plus the residence of hunters shooting on the public hunting areas on the Monte Vista NWR)

VI. Summary of Population Movements and Status within the San Luis Valley during the Year (This section prepared by Bellew and will mesh together the information preceding this section to give a continuity to the flow of birds in and out of the Valley. It will to some extent be a "life equation" of San Luis Valley mallards, coupled with information on the arrival and departure of "non-Valley" birds.

VII. Extent of Harvest of the San Luis Valley Mallard Population

A. Early Season's Kill Plus Late Season Kill of Valley Birds Compared to Pre-Season Population Estimates (prepared by Geis)

B. Recovery Rates Adjusted for Non-report of Bands and Crippling Loss - (Geis)

C. Information Needed to Evaluate Effect of Shooting Pressure on San Luis Valley Breeding Population Levels. (Geis)

1. Effect of kill on rate of mortality rate.

2. Relationship between size (crerate) of kill and breeding population levels.

3. Extent to which Valley may be repopulated by birds produced elsewhere

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

NOV 8 1963

TO : Refuge Manager
Monte Vista National Wildlife Refuge

DATE: November 1, 1963

FROM : Assistant Director, Migratory Bird Populations Station

SUBJECT: Waterfowl kill statistics, Monte Vista National Wildlife Refuge, during experimental hunting season, 1963.

I have reviewed with great interest the waterfowl hunting statistics gathered on the public shooting areas on the Monte Vista National Wildlife Refuge during the early experimental waterfowl season. Using the basic information summarized in the table you provided, it was possible to calculate a number of additional interesting statistics. The attached table includes much of the same information furnished on your table plus the additional values. You will note that the estimated total kill shown on the attached table disagrees very slightly during each of the first 5 days of the season from your table due to a slight difference in rounding. It is highly commendable that the estimated total kill is based on a check of 87.8 percent of all hunters utilizing the area. This gives me considerable confidence that the total estimated kill probably is quite adequate for our intended purpose. The data also suggest that certain kill statistics vary greatly from day to day, emphasizing the need for a fairly thorough daily check. Note, for example, that the kill per hunter varied from 2.8 ducks per hunter on opening day down to only .5 ducks per hunter on the second Saturday of the season. Hunting success expressed as number of birds bagged per hunter-hour also showed considerable variation during the season; however, this also showed some interesting similarities. Note that during the entire first week of the season the kill ran about half a duck per hunter-hour despite the fact that the kill per hunter varied from 2.8 to 1.3 birds per hunter. The marked difference in kill per hunter was due to the marked differences in hunter hours per hunter. For example, on the opening day of the season hunters averaged 5 hours per hunter during which they bagged 2.8 ducks, while on 2 days later they hunted only half as long (2.5 hours per hunter) and killed only ½ as many ducks (1.4); thus the kill per hour was remarkably similar (0.56 on Tuesday and 0.55 on Thursday). It is clear that starting with the first week-end of the season, hunting success was substantially lower in terms of kill per hunter hour than during the first 4 week days. There was also rather interesting shift in the species composition of the kill during the season. During the first two days of the season, 75 percent of the kill was mallards, while during the remainder of the season 87 percent was mallards. Thus, during the opening two days, one out of every 4 birds taken was something other than a mallard, while later it was only 1 bird other than mallard for every 7.7 birds taken.

The reported crippling loss of 16 percent of the total retrieved kill is suspiciously low. We will probably need some "spy-blind" observations to check the accuracy of the reported unretrieved kill. Is any such data presently available? It is interesting to note that during the 18-day season on the public shooting area on the Monte Vista National Wildlife Refuge alone, over 4,000 hours of recreation was afforded.

It is noteworthy that 89 percent of the total hunting effort and 88 percent of the retrieved kill was concentrated in 6 days: the first 2 days of the season and the 4 Saturdays and Sundays.

Most interesting of all, however, will be a comparison of the kill estimate based on bag checks at Monte Vista and those obtained from hunters' reports on the mail questionnaire survey. As we discussed earlier, in order to obtain a representative sample for the entire Valley it is necessary to use a mail questionnaire survey; however, there is need to evaluate the amount of reporting bias that may be present in this measurement of the kill. The situation we have at the Monte Vista National Wildlife Refuge where a substantial fraction of the total kill is concentrated in a well defined area where the kill is reliably measured by field bag checks provides an excellent opportunity to get this important information. It is fortunate that we have this somewhat unique situation associated with the evaluation of the early experimental hunting season in the San Luis Valley.

Aelred D. Geis

Attachment

cc: Jack Grieb
R.J. Buller
Region II
R. Ballou

SUMMARY OF WATERFOWL KILL STATISTICS, PUBLIC SHOOTING AREAS, MONTE VISTA N.W. R. DURING EARLY EXPERIMENTAL HUNTING SEASON 1963

Date	No. Hunters Checked	% Ck'd of Est. Total Hunters	Hunter Hours	No. of Ducks Checked	Rept'd Crippling Loss	Reported Total Kill	Estimated						% Total Kill Made up of Mallards	Kill per hntr.	Hours per Hunter	Birds Bagged per Hunter hr.
							Total Hunters	Hunter Hours	Total Kill All Wtfwl	Total Kill Mallards	Total Bag All Wtfwl	Total Bag Mallards				
10/1/63 Tues.	141	84	705	397	47	444	167	835	526	380	470	340	72	2.82	5.0	0.56
10/2/63 Wed.	121	95	423	236	42	278	127	444	292	233	248	198	80	1.95	3.5	0.56
10/3/63 Thurs.	58	95	145	78	15	93	61	153	98	84	82	70	86	1.34	2.5	0.55
10/4/63 Fri.	46	75	135	67	11	78	61	179	103	86	89	74	84	1.46	2.9	0.50
10/5/63 Sat.	166	87	664	143	49	192	190	760	220	191	164	142	87	0.86	4.0	0.21
10/6/63 Sun.	93	76	465	139	41	180	122	610	236	204	182	157	86	1.49	5.0	0.30
10/7/63 Mon.	23	100	69	26	0	26	23	69	26	24	26	24				
10/8/63 Tues.	16	100	48	12	4	16	16	48	16	16	12	12				
10/9/63 Wed.	20	77	60	16	2	18	26	78	23	19	21	17	84	0.86	3.2	0.27
10/10/63 Thurs.	13	100	39	11	0	11	13	39	11	9	11	9				
10/11/63 Fri.	18	100	72	12	0	12	18	72	12	7	12	7				
10/12/63 Sat.	83	100	415	41	11	52	83	415	52	39	41	31	76	0.49	5.0	0.10
10/13/63 Sun.	56	82	336	65	21	86	68	408	104	85	79	64	82	1.16	6.0	0.19
10/14/63 Mon.	15	100	60	14	0	14	15	60	14	11	14	11				
10/15/63 Tues.	21	100	63	18	4	22	21	63	22	20	18	16				
10/16/63 Wed.	16	100	48	9	0	9	16	48	9	7	9	7	87	0.91	3.2	0.29
10/17/63 Thurs.	20	71	60	15	5	20	28	84	28	24	21	18				
10/18/63 Fri.	3	100	6	12	0	12	3	6	12	12	12	12				
Totals	929	87	3813	1311	252	1563	1058	4371	1804	1451	1493	1225				

OPTIONAL FORM NO. 10
1010-104

UNITED STATES GOVERNMENT

Memorandum

WRes

TO : Regional Director, Albuquerque, N. Mex. DATE: November 29, 1963

FROM : Assistant Director, Migratory Bird Populations Station

SUBJECT: Change of itinerary

There has been a change in plans as outlined in my letter of November 20 to Mr. Ballou. My schedule has been moved up two days; therefore, I will be arriving in Albuquerque December 9, at 2:06 p.m., on Frontier's flight 382, and will be leaving December 10 at 8:23 a.m. on Frontier's flight 92. I am looking forward to discussing the evaluation of the experimental San Luis Valley season and other mutual problems with interested personnel in the Regional Office.

Aelred D. Geis

DEC 5 1963
RECEIVED

RECEIVED
DEC 3 - 1963
REGION 2 - ALBUQUERQUE

WRes

Wildlife Management Biologist, Monte Vista National Wildlife Refuge, Box 566, Monte Vista, Colorado

November 20, 1963

Assistant Director, Migratory Bird Populations Station

Plans for preparing report on experimental season - proposed visit

Based on Jack's letter of November 12, your memo of November 14, and our subsequent phone discussion, I am now scheduled to arrive in Alamosa on Thursday, December 12, on Frontier's flight 92 at 9:48 a.m. This flight is coming from Albuquerque. I hope to discuss the evaluation of the experimental season with personnel in the Regional Office the afternoon of December 11. I will plan on leaving sometime Monday, December 16. I now hold a reservation on the flight leaving at 4:48 p.m. However, if James D. Russell of KKTV feels strongly about "taping" the TV show, it may be necessary for me to leave that morning on a 9:55 flight and swing by Colorado Springs. One thing that I wish to insure, however, is that we have the report covering the special early experimental season thoroughly outlined and to some extent "roughed out" before I leave. If need be, I will delay my departure until the 17th. I suspect that by working diligently I should have no difficulty in being able to get away by Monday. Unless you hear something from me between now and then, I will plan on seeing you or Jack at the airport in Alamosa when I arrive at 9:48 a.m. on December 12.

I would appreciate it, Bob, if you would make a reservation for me at the motel at which I stayed last time, or if it is more convenient for you (since I won't have a car) I have no objections to "camping" in the dormitory at the Refuge. If, however, Jack is there staying at the motel in Monte Vista, my lack of transportation will pose no problem.

Aelred D. Geis

cc:
Region II
R. Buller
C. Bryant ✓

OPTIONAL FORM NO. 10
5010-104
UNITED STATES GOVERNMENT

Memorandum

TO : Assistant Director, Migratory Bird Population Station, Patuxent Research Center
Bureau of Sports Fisheries & Wildlife, Laurel, Maryland
DATE: November 12, 1963

FROM : Wildlife Management Biologist
Monte Vista Refuge, Box 566
Monte Vista, Colorado

SUBJECT: Band reporting rate in the San Luis Valley - Plans for preparing a report on the Experimental Season

Please excuse the "booboo"! The prefix for the first four band numbers in my memo of October 25 is 627, not 672. I believe we put these bands on here.

Just received a note from Howard Funk. He sent two more band numbers which should be included in with those listed on my October 25 memo. These are as follows:

Band No.	Date	Location (County)
627-87381	October 1, 1963	Rio Grande
687-78920	October 1, 1963	Rio Grande

These were checked in the field, elsewhere than on the refuge.

Since the regular season will not be checked nearly as closely as the experimental season, the number of bands that can be recorded without the hunter's knowing it will be quite limited. However, I imagine we can add a few to the list.

Your suggestion on the timing and content of a report on the experimental season sounds all right to me. The first week in December is fine. If this date is okay with Jack, let us know definitely when you plan to arrive and we will meet you at the airport.

Robert M. Ballou

cc: Raymond Buller
Jack Grieb
Refuge Manager ✓
Monte Vista Refuge

NOV 8 1963

RECEIVED

Wildlife Management Biologist
Monte Vista Refuge
Box 566, Monte Vista, Colorado (Bob Ballou)
Assistant Director, Migratory Bird Populations Station

November 1, 1963

Band reporting rate in the San Luis Valley - plans for preparing a report on the Experimental Season.

Thank you very much for your memorandum of October 25, 1963, listing the numbers on banded waterfowl that were encountered in hunters' bags and recorded without the hunters' knowledge. It will be extremely interesting to see what fraction of these are reported by the hunters. As of October 30 only 5 of the 45 numbers we could check were entered in a catalog as having been reported. There are many recovery letters, however, not yet cataloged. The first four numbers on the list could not be checked because there is something wrong with the number. The third digit in the number indicates band size and it seems unlikely that those Mallards were bearing size 2 bands. The first three digits of the first four numbers on the list were 672. Do you or Jack know the correct numbers?

It is vital to the success of the evaluation of the special San Luis Valley season that we have some sort of an index to the band reporting rate. Noting the proportion of surreptitiously recorded numbers that are reported should provide this information. It will also be obtained from a question that we will ask on the mail questionnaire survey; thus, we will have two approaches to determining the reporting rate changes from year to year and will get some idea what it is. There is apparently an extremely high incidence of banded birds in the San Luis Valley and it is certainly reasonable to suspect that hunters' zeal for reporting bands may go down as banded birds become more common and as they learn they have all been banded in the Valley. I was very favorably impressed by the very surreptitious manner in which the numbers were recorded. It is essential that the same technique be applied in the future. I suggest that you continue to record bands without the hunters' knowing it during the regular season so that we can enlarge the sample upon which to base the band reporting tendencies of hunters. I would assume that largely the same hunters will be involved in the regular season that participated in the early season. Since we are measuring human behavior, the observations during the later season should contribute to our knowledge of band reporting rates for the area.

I can't help but suspect that ducks examined at checking stations on the passes represent a better cross section of the kill in the Valley than birds examined at the Monte Vista Refuge. Therefore, to get at the Lincoln index type population and kill estimates that interest Jack and me, we can perhaps confine our considerations to those birds. This will depend upon the State

having made a complete record of all banded birds passing through the checking station in addition to those whose numbers were obtained as well as having a complete record of the total number of birds checked. If I recall correctly, Jack indicated that this information was available; therefore, although the sample size of banded birds is too small to yield anything very reliable, it might be interesting to see what comes up when Lincoln index estimates are made based on the ratio of banded to unbanded birds in the kill. I am sending a copy of this to Jack so he can reflect on the feasibility of doing this. Next year, it would be a good idea to simply make a note of the number of banded birds seen whose numbers were not recorded along with those whose numbers were recorded. I suspect, however, that we will find that the ratio of banded to unbanded birds on the refuge may be atypical and therefore not useful for making Valley-wide population estimates. However, if the distribution of banding effort is changed next year this will be less likely to be true than it was this year.

We have sent out the special questionnaire to Colorado hunters purchasing duck stamps early enough to be potential participants in the San Luis Valley season. We are disappointed in that we received only 1124 names and addresses for the entire State of Colorado, some of which relate to hunting west of the Divide or simply early purchasers of duck stamps who intend to hunt elsewhere. We only received 594 names and addresses from post offices in the San Luis Valley, Pueblo and Colorado Springs. This suggests that the observations of Ken Baer and others were correct, that the postcards were not being distributed very well in the post offices. Before the next special early season rolls around we will have to do something about missionary work with the local postmasters; however, we should not say anything to them now because I want their behavior during the regular season to be the same as during the special early season.

Mr. Crissey and I feel that a report of the experimental season should be distributed prior to the various flyway council meetings in late February and March. We feel that it is more important to get out a report illustrating the types of information we are obtaining in order to place the evaluation of the experimental season on a sound foundation than it is to get out a report that has the most complete information as possible. The report should illustrate the fact-finding program required to justify a season of this sort. I hope that this will short stop at least some of the unsound requests for other special experimental seasons similar to that in the San Luis Valley by spelling out that the evaluation of such a season requires considerable effort and cannot be casually done with only limited manpower.

I would like to discuss the contents of this report with you and Jack sometime in early December. It would be best if this was a real work session in which at least certain portions of the report would be roughed out while we are together. Will the first week in December be a suitable time for both you and Jack to work on this report? If this is okay, I'll

try to arrive in Alamosa the evening of December 2 and stay as long as necessary to get well organized. Following this meeting, I will be traveling to Tucson so Alamosa is not out of my way and besides your somewhat isolated office at the refuge would be an ideal place to work on this.

While visiting a club at the north end of the Valley with Jack, I met James D. Russell, President and General Manager of KKTV, Colorado Springs - Pueblo, Colorado. He made a strong pitch to Ray Buller and me to participate in a TV show on the experimental season and even suggested that he would arrange to have my participation "video taped" in the Washington area if I could not visit Colorado Springs. To some extent his great enthusiasm may have been prompted by the very good bourbon he was drinking so I would appreciate the advice of you and others receiving copies of this memorandum concerning whether or not it would be "in the best interest of the government" and sound waterfowl management in Colorado to let him know that such a "Show" might be possible when we have our meeting.

Best wishes,

Aelred D. Geis

cc: Jack Grieb
R. J. Buller
Region II
Charles Bryant ✓

BUREAU OF SPORT FISHERIES AND WILDLIFE

Director, BSFW, Washington, D. C. Oct. 10, 1963

Central Flyway Representative, P. O. Box 1306,
Albuquerque, New Mexico

Progress Report: Experimental Duck Season, San Luis Valley, Colo.

I spent the week of September 30-October 6 in the San Luis Valley, Colorado, to observe a portion of the experimental duck season and to assist in the collection of data (hunter pressure, hunter success, wing collection, etc.) that will be used in evaluating the season, and the following report summarizes my observations during the first six days of this season.

A meeting of all State and Bureau personnel permanently stationed in the San Luis Valley and those assigned to work there during the special season was held the afternoon of September 30. During this meeting, Assistant Game Manager Jack Grieb, Colorado Game, Fish and Parks Department, briefly reviewed the purpose of the special season, the data that was to be collected, and how it was to be collected. Wildlife Management Biologist Ballou, Branch of Wildlife Refuges, reported that the mid-September Valley duck population approximated 30,000 birds and that feeding in harvested barley fields commenced the latter part of August. It was also reported that 520 adult and 800+ young mallards were trapped and banded during the preseason banding program. District Conservation Officer Benson and Game Agent-in-Charge Hayes collaborated in making patrol assignments and assignment of personnel to check stations that were manned Sunday afternoon and evening (October 6) on the main highways leading north, east and south from the Valley. Personnel assignments to check hunters utilizing the public hunting portion of the Monte Vista National Wildlife Refuge were made by Refuge Manager Bryant and Mr. Grieb.

Information on hunting pressure and success is presently available for the open portion of the refuge only. During the first six days of the season (Tuesday through Sunday) 632 hunters were contacted, and these hunters bagged 1,089 ducks; this is regarded to be 90-95% of the total number of hunters using the refuge during this period. The number of hunters checked and the daily kill is shown in the following table:

Date	No. of Hunters	Total Kill
Oct. 1	167	450
2	102	212
3	58	78
4	46	67
5	166	143
6	93	139

Refuge hunters were contacted at parking areas (6) as they returned to their autos, their names and addresses obtained and number and species of ducks bagged recorded. Species composition of the refuge kill was predominantly mallard, although a few pintails, shovellers, baldpates, and blue-winged and green-winged teal were also tallied. Observance of the sunrise to sunset shooting hours by refuge hunters was good, and I am aware of but four violations that occurred on the refuge. These were shooting protected species--redheads (3 cases) and 1 hunting without a duck stamp. In each instance these violations were encountered as the hunters returned to their autos. At least one redhead case and a few late shooting and "plug" cases were made off the refuge.

Weather during the first week of the season was warm, ranging from the low 30's during the early morning hours to the high 70's and low 80's at mid-day, and clear.

Many of the hunters that utilized the public hunting area on the refuge came from cities and towns outside the San Luis Valley; e.g., Pueblo, Colorado Springs, Denver and suburbs, Fort Collins, and Lamar, and Los Alamos, Santa Fe and Albuquerque, New Mexico.

Some confusion existed prior to the opening regarding the area open to hunting during the experimental season. The area approved does not include all of the San Luis Valley, and handouts prepared by the Colorado Game, Fish and Parks Department and an article that appeared in Fishing and Hunting, a weekly trade paper, indicated that portions of Mineral and Hinsdale Counties were also open to hunting during the season. Moreover, the handout prepared by the State omitted Rio Grande County from the open area. These errors were corrected by Regional Information and Education Officer Williams (State) who contacted the local and Denver radio stations and made arrangements for public service announcements. Stories correctly outlining the open area were also supplied the local newspapers.

The failure to include the coot in the bag limit could have resulted in embarrassment for some hunters. A few coots were on the portion of the refuge open to hunting, and one or more of the Game Management Agents reported finding dead coots while on patrol; however, I am not personally aware that any coot cases were made.

Over 1,000 duck wings were collected from the refuge, a local picking plant, and from one of the hunting clubs near Saguache.

The State and Bureau personnel who worked the first week of the special San Luis Valley duck season recognize it as an experiment and are hopeful that evaluation of the kill, mortality rates, 1964 breeding population, etc., will permit continuation of the season. If continuation is permitted, the State will probably request that all of the San Luis Valley be included and that the coot be added to the bag limit. Moreover, it is hoped that it will be possible to lift the redhead restriction next year.

Hunters contacted on the refuge were generally satisfied with the season length and bag limit, and the birds were in good flesh, although many were still in the pin feather stage.

Raymond J. Buller

cc:
Monte Vista NWR

FISH SPRINGS NATIONAL WILDLIFE REFUGE

Public hunting of migratory game birds on the Fish Springs National Wildlife Refuge, Utah, is permitted only on the area designated by signs as open to hunting. This open area, comprising 5,152 acres or 29 percent of the total area of the refuge, is delineated on a map available at the refuge headquarters, Dugway, Utah, and from the Regional Director, Bureau of Sport Fisheries and Wildlife, P.O. Box 1306, Albuquerque, New Mexico, 87103. Hunting shall be subject to the following conditions:

(a) Species permitted to be taken: Coots, gallinules, and ducks (except canvasback and redhead).

(b) Open season: Ducks, coots, and gallinules—from 12 o'clock noon (standard time) to sunset October 5, and from one-half hour before sunrise to sunset October 6, 1963 through January 2, 1964, inclusive.

(c) Daily bag limits: Ducks 5, coots and gallinules (singly or aggregate) 25. The daily bag limit of 5 ducks may not include more than 2 wood ducks and 1 hooded merganser. In addition to the limits on other ducks, the daily bag limit on American and red-breasted mergansers is 5, singly or in the aggregate of both kinds.

(d) Methods of hunting:

(1) Weapons—shotguns only (not larger than 10 gauge and incapable of holding more than 3 shells) fired from the shoulder.

(2) Dogs—not to exceed two dogs per hunter may be used only to retrieve wounded or dead waterfowl, coots, and gallinules.

(3) Blinds—temporary blinds of approved material may be constructed.

(4) Guides—persons may employ guides while hunting on the area subject to restrictions of State laws and regulations.

(e) Other provisions:

(1) The provisions of this special regulation supplement the regulations which govern hunting on wildlife refuge areas generally which are set forth in Title 50, Code of Federal Regulations, Part 32, and in the current Federal Migratory Bird Regulations.

(2) A Federal permit is not required to enter the public hunting area.

(3) The provisions of this special regulation are effective to January 3, 1964.

KANSAS

KIRWIN NATIONAL WILDLIFE REFUGE

Public hunting of migratory game birds on the Kirwin National Wildlife Refuge, Kansas, is permitted only on the area designated by signs as open to hunting. This open area, comprising 3,520 acres or 23 percent of the total area of the refuge, is delineated on a map available at the refuge headquarters, Kirwin, Kansas, and from the Regional Director, Bureau of Sport Fisheries and Wildlife, P.O. Box 1306, Albuquerque, New Mexico, 87103. Hunting shall be subject to the following conditions:

(a) Species permitted to be taken: Coots, ducks (except canvasback and redhead), and geese.

(b) Open season: Ducks and coots—from 12 o'clock noon (standard time) to sunset October 26, and from sunrise to sunset October 27 through November 29, 1963, inclusive. Geese—from sunrise to sunset October 5 through December 18, 1963, inclusive.

(c) Daily bag limits: Ducks 4, coots 8, geese 5. The daily bag limit of 4 ducks may not include more than (a) 1 hooded merganser; (b) 2 wood ducks; (c) 2 mallards. In addition to the limits on other ducks, the daily bag limit on American and red-breasted mergansers is 5, singly or in the aggregate of both kinds. The daily bag limit for geese may not include more of the following species than (a) 1 Ross' goose; (b) in the alternative, 2 Canada geese or subspecies; 1 Canada goose or subspecies and 1 white-fronted goose; or (c) 1 white-fronted goose.

(d) Methods of hunting:

(1) Weapons—Shotguns only (not larger than 10 gauge and incapable of holding more than 3 shells) fired from the shoulder.

(2) Dogs—not to exceed two dogs per hunter may be used only to retrieve wounded or dead waterfowl and coots.

(3) Blinds—temporary blinds of approved material may be constructed.

(4) Guides—persons may employ guides while hunting on the area subject to restrictions of State laws and regulations.

(e) Other provisions:

(1) The provisions of this special regulation supplement the regulations which govern hunting on wildlife refuge areas generally which are set forth in Title 50, Code of Federal Regulations, Part 32, and in the current Federal Migratory Bird Regulations.

(2) A Federal permit is not required to enter the public hunting area, but hunters, upon entering or leaving, shall report at designated checking stations as may be established for the regulation of the hunting activity and shall furnish information pertaining to their hunting, as requested.

(3) The provisions of this special regulation are effective to December 19, 1963.

COLORADO

MONTE VISTA NATIONAL WILDLIFE REFUGE

Public hunting of migratory game birds on the Monte Vista National Wildlife Refuge, Colorado, is permitted only on the area designated by signs as open to hunting. This open area, comprising 4,682 acres or 35 percent of the total area of the refuge, is delineated on a map available at refuge headquarters, Monte Vista, Colorado, and from the Regional Director, Bureau of Sport Fisheries and Wildlife, P.O. 1306, New Mexico, 87103. Hunting shall be subject to the following conditions:

(a) Species permitted to be taken: Coots and ducks (except canvasback and redhead).

(b) Open season: Ducks and coots—from 12 o'clock noon (standard time) to sunset November 15, and from sunrise to sunset November 16 through December 19, 1963, inclusive.

(c) Daily bag limits: Ducks 4, coots 8. The daily bag limit of 4 ducks may not include more than (a) 1 hooded merganser; (b) 2 wood ducks; (c) 2 mallards. In addition to the limits on other ducks, the daily bag limit on American and red-breasted mergansers is 5, singly or in the aggregate of both kinds.

(d) Methods of hunting:

(1) Weapons—shotguns only (not larger than 10 gauge and incapable of holding more than 3 shells) fired from the shoulder.

(2) Dogs—not to exceed two dogs per hunter may be used only to retrieve wounded or dead waterfowl and coots.

(3) Blinds—temporary blinds of approved material may be constructed.

(4) Guides—persons may employ guides while hunting on the area subject to restrictions of State laws and regulations.

(e) Other provisions:

(1) The provisions of this special regulation supplement the regulations which govern hunting on wildlife refuge areas generally which are set forth in Title 50, Code of Federal Regulations, Part 32, and in the current Federal Migratory Bird Regulations.

(2) A Federal permit is not required to enter the public hunting area, but hunters, upon entering or leaving, shall report at designated checking stations as may be established for the regulation of the hunting activity and shall furnish information pertaining to their hunting, as requested.

(3) The provisions of this special regulation are effective to December 29, 1963.

NEW MEXICO

BITTER LAKE NATIONAL WILDLIFE REFUGE

Public hunting of migratory game birds on the Bitter Lake National Wildlife Refuge, New Mexico, is permitted only on the area designated by signs as open to hunting. This open area, comprising 2,321 acres or 10 percent of the total area of the refuge, is delineated on a map available at refuge headquarters, Roswell, New Mexico, and from the Regional Director, Bureau of Sport Fisheries and Wildlife, P.O. Box 1306, Albuquerque, New Mexico, 87103. Hunting shall be subject to the following conditions:

(a) Species permitted to be taken: Coots, ducks (except canvasback, redhead and wood duck), and geese.

(b) Open season: Ducks and coots—from 12 o'clock noon (standard time) to sunset November 29, and from sunrise to sunset November 30, 1963, through January 2, 1964, inclusive. Geese—from 12 o'clock noon (standard time) to sunset November 29, and from sunrise to sunset November 30, 1963 through January 15, 1964, inclusive.

(c) Daily bag limits: Ducks 4, coots 8, geese 5. The daily bag limit of 4 ducks may not include more than 1 hooded merganser and 2 mallards. In addition to the limits on other ducks, the daily bag limit on American and red-breasted

and in the current Federal Migratory Bird Regulations.

2. A Federal permit is not required to enter the public hunting area.

3. The provisions of this special regulation are effective to January 6, 1964.

UPPER KLAMATH NATIONAL WILDLIFE REFUGE

Public hunting of migratory game birds on the Upper Klamath National Wildlife Refuge, Oregon, is permitted only on the area designated by signs as open to hunting. This open area, comprising 3,364 acres or twenty-seven percent of the total area of the refuge, is delineated on a map available at the refuge headquarters, Tule Lake National Wildlife Refuge, Tulelake, California, and from the Regional Director, Bureau of Sport Fisheries and Wildlife, 1002 Northeast Holladay, Portland, Oregon, 97208. Hunting shall be subject to the following conditions:

(a) Species permitted to be taken: Ducks (except canvasback and redhead), geese, coots, and gallinules.

(b) Open season: From 12 o'clock noon (standard time) to sunset October 8 and from one-half hour before sunrise to sunset October 9, 1963, through January 5, 1964, inclusive.

(c) Daily bag limits: Ducks 4, geese 6, coots and gallinules (singly or aggregate) 25. The daily bag limit on ducks may not include more than two wood ducks and one hooded merganser. In addition to the limits on other ducks, the daily bag limit on American and red-breasted mergansers is five, singly or in the aggregate of both kinds. The daily bag limit on geese may not include more than three of the dark species. Only one Ross' goose is allowed in the daily bag limit.

(d) Methods of hunting:

1. Weapons — Shotguns only (not larger than 10 gauge and incapable of holding more than three shells) fired from the shoulder.

2. Dogs—Not to exceed two dogs per hunter may be used only to retrieve wounded or dead birds.

3. Blinds—Portable blinds or blinds made of vegetative material may be used for hunting. The digging of and/or hunting from pits are prohibited. Blinds in designated pass shooting areas may be constructed only at locations staked and appropriately posted by the officer in charge. Hunting in areas so staked and posted is prohibited except at staked blind sites.

4. Retrieving—Where retrieving zones are established within public hunting areas or adjacent to the refuge boundary, a hunter may enter to retrieve dead or crippled birds which he has shot providing he does not carry weapons. Possession of firearms in the retrieving zone or closed portion of the refuge is prohibited, except that unloaded firearms may be carried only along established routes of travel through the zone or closed area when necessary to reach or leave the hunting area.

5. Boats—Boats are permitted. Motors not larger than 10 h.p. may be used for access to the hunting area. Sculling and air-thrust boats are prohibited.

6. Access to hunting areas—Hunters may not enter the public hunting areas earlier than one and one-half hours before start of shooting time and must be off the area one hour after close of shooting time.

7. Persons may employ guides while hunting on the area subject to restrictions of State law and regulations.

(e) Other provisions:

1. The provisions of this special regulation supplement the regulations which govern hunting on wildlife refuge areas generally which are set forth in Title 50, Code of Federal Regulations, Part 32, and in the current Federal Migratory Bird Regulations.

2. Abandonment of property—Leaving boats, decoys, or other hunting equipment in other than designated areas is prohibited. Boats, decoys, or other equipment so left one hour after close of shooting time will be subject to impoundment.

3. A Federal permit is not required to enter the public hunting area.

4. The provisions of this special regulation are effective to January 6, 1964.

LANSING A. PARKER,
Acting Director, Bureau of Sport Fisheries and Wildlife.

SEPTEMBER 12, 1963.

[F.R. Doc. 63-10047; Filed, Sept. 19, 1963; 8:45 a.m.]

PART 32—HUNTING

Monte Vista National Wildlife Refuge

The following special regulation is issued and is effective on date of publication in the FEDERAL REGISTER. The limited time ensuing from the date of the adoption of the national migratory game bird regulations to and including the establishment of State hunting seasons makes it impracticable to give public notice of proposed rule making.

§ 32.12 Special regulations; migratory game birds; for individual wildlife refuge areas.

COLORADO

MONTE VISTA NATIONAL WILDLIFE REFUGE

Public hunting of migratory game birds on the Monte Vista National Wildlife Refuge, Colorado, by a special experimental early season, is permitted only on the area designated by signs as open to hunting. This open area, comprising 4,682 acres or 39 percent of the total area of the refuge, is delineated on a map available at the refuge headquarters and from the Regional Director, Bureau of Sport Fisheries and Wildlife, P.O. Box 1306, Albuquerque, New Mexico. Hunting shall be subject to the following conditions:

(a) Species permitted to be taken: Ducks (except canvasback and redhead).

(b) Open season: From sunrise to sunset October 1, 1963, through October 18, 1963.

(c) Daily bag limit: Ducks 5.

(d) Methods of hunting:

(1) Weapons—Shotguns only (not larger than 10 gauge and incapable of holding more than 3 shells) fired from the shoulder.

(2) Dogs—Not to exceed two dogs per hunter may be used only to retrieve wounded or dead ducks.

(3) Blinds—Temporary blinds of approved material may be constructed.

(4) Guides—Persons may employ guides while hunting on the area subject to restrictions of State law and regulations.

(e) Other provisions:

(1) The provisions of this special regulation supplement the regulations which govern hunting on wildlife refuge areas generally which are set forth in Title 50, Code of Federal Regulations, Part 32, and in the current Federal Migratory Bird Regulations.

(2) A Federal permit is not required to enter the public hunting area.

(3) The provisions of this special regulation are effective to October 19, 1963.

A. V. TUNISON,
Acting Director, Bureau of Sport Fisheries and Wildlife.

SEPTEMBER 4, 1963.

[F.R. Doc. 63-10048; Filed, Sept. 19, 1963; 8:46 a.m.]

PART 32—HUNTING

New Jersey and Vermont

The following special regulations are issued and are effective on date of publication in the FEDERAL REGISTER. The limited time ensuing from the date of the adoption of the national migratory game bird regulations to and including the establishment of State hunting seasons makes it impracticable to give public notice of proposed rule making.

§ 32.12 Special regulations; migratory game birds; for individual wildlife refuge areas.

NEW JERSEY

BRIGANTINE NATIONAL WILDLIFE REFUGE

Public hunting of migratory game birds on the Brigantine National Wildlife Refuge, New Jersey, is permitted only on the area designated by signs as open to hunting. This open area, comprising 4,480 acres or thirty-four percent of the total area of the refuge, is delineated on a map available at the refuge headquarters, Oceanville, New Jersey, and from the Regional Director, Bureau of Sport Fisheries and Wildlife, 59 Temple Place, Boston 11, Massachusetts. Hunting shall be subject to the following conditions:

(a) Species permitted to be taken: Coots, ducks (except canvasback and redhead), geese (except snow geese), and brant.

(b) Open season: Ducks and coots—From 12:00 noon (standard time) to sunset October 26, 1963, and from sunrise to sunset October 27, 1963, through November 16, 1963, inclusive. From 12:00 noon (standard time) to sunset, December 13, 1963, and from sunrise to sunset December 14, 1963, through January 4, 1964, inclusive. Geese and brant —From 12:00 noon (standard time) to sunset October 26, 1963, and from sun-

and in the current Federal Migratory Bird Regulations.

2. A Federal permit is not required to enter the public hunting area.

3. The provisions of this special regulation are effective to January 6, 1964.

UPPER KLAMATH NATIONAL WILDLIFE REFUGE

Public hunting of migratory game birds on the Upper Klamath National Wildlife Refuge, Oregon, is permitted only on the area designated by signs as open to hunting. This open area, comprising 3,364 acres or twenty-seven percent of the total area of the refuge, is delineated on a map available at the refuge headquarters, Tule Lake National Wildlife Refuge, Tulelake, California, and from the Regional Director, Bureau of Sport Fisheries and Wildlife, 1002 Northeast Holladay, Portland, Oregon, 97208. Hunting shall be subject to the following conditions:

(a) Species permitted to be taken: Ducks (except canvasback and redhead), geese, coots, and gallinules.

(b) Open season: From 12 o'clock noon (standard time) to sunset October 8 and from one-half hour before sunrise to sunset October 9, 1963, through January 5, 1964, inclusive.

(c) Daily bag limits: Ducks 4, geese 6, coots and gallinules (singly or aggregate) 25. The daily bag limit on ducks may not include more than two wood ducks and one hooded merganser. In addition to the limits on other ducks, the daily bag limit on American and red-breasted mergansers is five, singly or in the aggregate of both kinds. The daily bag limit on geese may not include more than three of the dark species. Only one Ross' goose is allowed in the daily bag limit.

(d) Methods of hunting:

1. Weapons — Shotguns only (not larger than 10 gauge and incapable of holding more than three shells) fired from the shoulder.

2. Dogs—Not to exceed two dogs per hunter may be used only to retrieve wounded or dead birds.

3. Blinds—Portable blinds or blinds made of vegetative material may be used for hunting. The digging of and/or hunting from pits are prohibited. Blinds in designated pass shooting areas may be constructed only at locations staked and appropriately posted by the officer in charge. Hunting in areas so staked and posted is prohibited except at staked blind sites.

4. Retrieving—Where retrieving zones are established within public hunting areas or adjacent to the refuge boundary, a hunter may enter to retrieve dead or crippled birds which he has shot providing he does not carry weapons. Possession of firearms in the retrieving zone or closed portion of the refuge is prohibited, except that unloaded firearms may be carried only along established routes of travel through the zone or closed area when necessary to reach or leave the hunting area.

5. Boats—Boats are permitted. Motors not larger than 10 h.p. may be used for access to the hunting area. Sculling and air-thrust boats are prohibited.

6. Access to hunting areas—Hunters may not enter the public hunting areas earlier than one and one-half hours before start of shooting time and must be off the area one hour after close of shooting time.

7. Persons may employ guides while hunting on the area subject to restrictions of State law and regulations.

(e) Other provisions:

1. The provisions of this special regulation supplement the regulations which govern hunting on wildlife refuge areas generally which are set forth in Title 50, Code of Federal Regulations, Part 32, and in the current Federal Migratory Bird Regulations.

2. Abandonment of property—Leaving boats, decoys, or other hunting equipment in other than designated areas is prohibited. Boats, decoys, or other equipment so left one hour after close of shooting time will be subject to impoundment.

3. A Federal permit is not required to enter the public hunting area.

4. The provisions of this special regulation are effective to January 6, 1964.

LANSING A. PARKER,
Acting Director, Bureau of Sport Fisheries and Wildlife.

SEPTEMBER 12, 1963.

[F.R. Doc. 63-10047; Filed, Sept. 19, 1963; 8:45 a.m.]

PART 32—HUNTING

Monte Vista National Wildlife Refuge

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§ 32.12 Special regulations; migratory game birds; for individual wildlife refuge areas.

COLORADO

MONTE VISTA NATIONAL WILDLIFE REFUGE

Public hunting of migratory game birds on the Monte Vista National Wildlife Refuge, Colorado, by a special experimental early season, is permitted only on the area designated by signs as open to hunting. This open area, comprising 4,682 acres or 39 percent of the total area of the refuge, is delineated on a map available at the refuge headquarters and from the Regional Director, Bureau of Sport Fisheries and Wildlife, P.O. Box 1306, Albuquerque, New Mexico. Hunting shall be subject to the following conditions:

(a) Species permitted to be taken:

Ducks (except canvasback and redhead).

(b) Open season: From sunrise to sunset October 1, 1963, through October 18, 1963.

(c) Daily bag limit: Ducks 5.

(d) Methods of hunting:

(1) Weapons—Shotguns only (not larger than 10 gauge and incapable of holding more than 3 shells) fired from the shoulder.

(2) Dogs—Not to exceed two dogs per hunter may be used only to retrieve wounded or dead ducks.

(3) Blinds—Temporary blinds of approved material may be constructed.

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(e) Other provisions:

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(2) A Federal permit is not required to enter the public hunting area.

(3) The provisions of this special regulation are effective to October 19, 1963.

A. V. TUNISON,
Acting Director, Bureau of Sport Fisheries and Wildlife.

SEPTEMBER 4, 1963.

[F.R. Doc. 63-10048; Filed, Sept. 19, 1963; 8:46 a.m.]

PART 32—HUNTING

New Jersey and Vermont

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§ 32.12 Special regulations; migratory game birds; for individual wildlife refuge areas.

NEW JERSEY

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(a) Species permitted to be taken: Coots, ducks (except canvasback and redhead), geese (except snow geese), and brant.

(b) Open season: Ducks and coots—From 12:00 noon (standard time) to sunset October 26, 1963, and from sunrise to sunset October 27, 1963, through November 16, 1963, inclusive. From 12:00 noon (standard time) to sunset, December 13, 1963, and from sunrise to sunset December 14, 1963, through January 4, 1964, inclusive. Geese and brant —From 12:00 noon (standard time) to sunset October 26, 1963, and from sun-

Mr. Charles Bryant

WKas

Rec'd. Sept. 26, 1963
[illegible]

September 19, 1963

Mr. Jack Grieb
Department of Game and Fish
Game and Fish Research Center
Box 513
Fort Collins, Colorado

Dear Jack:

Just tried to phone you today to discuss plans for the evaluation of the San Luis Valley season and learned you would not be back in the office until Friday. Therefore, I will outline my thoughts in this letter and we can discuss the situation thoroughly on the phone early the week of September 23.

First, we intend to conduct a mail questionnaire survey of hunters participating in the San Luis Valley season. We will send a special questionnaire to those hunters who purchase a duck stamp by October 15. This questionnaire will run something like this:

SURVEY OF DUCK HUNTING DURING THE SAN LUIS VALLEY
EXPERIMENTAL EARLY SEASON

Important: Please read enclosed instruction card, etc. (as on hunter kill questionnaire).

1. Did you hunt ducks in the San Luis Valley during the OCTOBER 1-18 EXPERIMENTAL EARLY DUCK SEASON? /_/ Yes /_/ No

   (If "no," please mail us your questionnaire without answering the remaining questions. If "yes," please complete all of the remaining questions, even if you did not shoot any ducks.)

2. How many DUCKS did you RETRIEVE that you yourself shot during only the San Luis Valley season? (Do NOT include ducks shot by other hunters. Please answer with numbers, including zero: 0, 1, 2, 3, etc.). __________ducks retrieved.

3.

3. How many DUCKS did you LOSE that you yourself knocked down within your sight? (Do not include ducks of other hunters. Answer with numbers only.) _____ ducks lost.

4. On how many DAYS did you hunt ducks during the early SAN LUIS VALLEY season? _____ days.

5. In the first calendar, please show in the proper date spaces the number of ducks that you yourself shot and retrieved during only the experimental early SAN LUIS VALLEY season. Mark zeros (0) when you hunted but did not kill any ducks. Leave blank all dates not hunted.

SUN	MON	TUE	WED	THU	FRI	SAT

6. Please complete the next calendar as you did the one above, EXCEPT to show ONLY your hunting on the Monte Vista National Wildlife Refuge. Leave blank all dates when you did not hunt on the Refuge.

SUN	MON	TUE	WED	THU	FRI	SAT

7. (Optional) How many of the ducks you shot during the early season were Fish and Wildlife Service metal leg bands? _____
Bank Number; if known: (1)_____(2)_____(3)_____.

Note that this questionnaire requests information on the kill in the Monte Vista National Wildlife Refuge as well as the entire San Luis VAlley. I would very much like to see a thorough check of hunters on the Monte Vista National Wildlife Refuge so that the kill there could be determined with considerable accuracy, based on field checks. This will provide information needed to determine the extent of exaggeration in hunters' reports on the mail questionnaire survey and will also provide an interesting check on the wing collection survey.

A second type of questionnaire relative to the regular season will be sent to all Colorado hunters. This will be similar to our regular questionnaire except that it will clearly request that we wish information on the kill only during the regular season. It will also ask the question: Did the hunter participate in this special early San Luis Valley season? This question is essential in order to estimate hunter participation in this special season. In order to expand a response to the earlier questionnaire survey relative to the San Luis Valley it is necessary to have a universe to expand to. This appears to be a problem which might be approached from several different directions. The easiest is to assume that we can obtain an unbiased estimate of those participating in this season by the question asked on the questionnaire sent to all Colorado hunters. However, it would be very worthwhile to pursue other angles as well, such as the distribution of dates at which hunter-contact cards are mailed to us from sample post offices, or even possibly a check of sales at a sample of the post offices to determine what fraction of their total sales occurred in time for the special season. It is entirely conceivable that virtually the entire duck stamp sales for post offices within the San Luis VAlley occur early enough for the hunters to be regarded as participants in this special early season. In any event, I would appreciate your suggestions concerning how we might most accurately expand the results of the special early season survey.

I wish to emphasize the need to have an accurate kill estimate for the Monte Vista Refuge so that we can compare this with the information secured from the mail questionnaire survey and the wing collection surveys. Both of these mail surveys will provide us with information on the size and distribution of the kill during various portions of the season. Usually, the mail questionnaire survey suggests that the kill is much more evenly distributed throughout the season than does the wing collection survey. Possibly the truth lies somewhere in the middle; therefore, it will be desirable to have a sound independent estimate of what is going on in an important well-defined area.

Another problem that concerns us is the possibility that your wardens will remove wings from the ducks of hunters who are part of the mail wing collection survey. This could seriously complicate the interpretation of wing collection results and, therefore, I think every possible step should be taken to minimize this. One approach is to have the wardens inquire as to whether or not the hunter has received a supply of wing collection envelopes before removing a wing. Perhaps a better approach is to keep these bag checks to a minimum. In this regard, if increased manpower is required to obtain a truly sound estimate of the kill on the Monte Vista Refuge this represents a very worthwhile use of manpower that might be otherwise spent on less productive activities.

Next I would like to discuss the procedure for handling wings that will be received at Fort Collins. A procedure which we wish to offer for your consideration is as follows:

1. Pick up wings at the post office daily and deliver to freezer storage.

2. Keep a running record of the wing receipts and mail on Friday ,a copy of the weekly receipts through stay on Thursday to Sam Carney at the Migratory Bird Populations Station. A relatively small number of envelopes will be received that have been forwarded from Puxico, Missouri. It would be best to keep these separate and not include them in the daily totals, since they represent envelopes distributed in 1962 or relate to spy blind studies.

3. Prior to the "wing bee" at Fort Collins (tentatively scheduled for January 28 to February 1) the frozen wings should be separated according to species and marked with a species number code and repacked. This should be done as follows:

    a. Open the envelope, determine the species within, replace the wing, fasten the clasp to seal the envelope, and toss it into the proper box (i.e. mallards, pintails, etc). When all envelopes are sorted, stamp with a numbering stamp the proper AOU number in the space marked SP. We can furnish both boxes and stamps for this. Note the separation into species can probably be done most effectively about once a week. Ron Ryder has suggested that his students might be available for this work. By participating in this they would certainly learn their ducks. I am sending a copy of this letter to Ryder so that he can plan how his students might best engage in this activity.

In regard to payment for picking up wings, etc., we would prefer to pay the State of Colorado a fixed amount for rent of storage space. You can then use the money in any way you see fit. We pay Wisconsin $300 for the use their facilities at Poynette and would be pleased to issue a purchase order to Colorado for the same amount if this is satisfactory to you. Please phone me collect early the week of the 23rd to firm up plans both for the collection of data relative to the San Luis Valley season and the handling of wings at Fort Collins.

Sincerely yours,

Aelred D. Geis
Assistant Director

cc: C. Bryant
R. Ballou
R. Ryder
Region II
S. Carney

WRes

September 25, 1963

Mr. Jack R. Grieb
Colorado Game and Fish Department
Robertson Building
Fort Collins, Colorado

Dear Jack:

This will confirm the plans we discussed on the phone last night for my visit to the San Luis Valley to discuss the special experimental season and to Fort Collins to make arrangements for receipt of duck wings there. I am scheduled to arrive in Denver on October 5 at 10:04 a.m. on Frontier flight 307. I will drive up to Fort Collins to visit Carl Leonard regarding the handling of duck wings, arriving approximately at noon at the State Nursery. I must return in time to take Frontier flight 19 leaving Denver at 5 p.m., arriving Alamosa at 6:42 p.m. I will use either a rental or GSA car for transportation from Denver to Fort Collins and return.

I am looking forward to spending Saturday evening, Sunday, and possibly Monday discussing the evaluation of the special early San Luis Valley season with you, Bob Ballou, Charles Bryant, and anyone else concerned. I am also looking forward to discussing some other matters with Bob Ballou. At present I am scheduled to leave Alamosa on Tuesday, October 8, on the flight leaving at 7:16 a.m. for my return to the Migratory Bird Populations Station. In the event that I have an adequate opportunity to visit with Bureau personnel before you leave on Monday, October 7, I may take advantage of your kind offer to travel back to Denver with you by automobile.

I am looking forward to seeing you and my visit to the San Luis Valley.

Sincerely yours,

Aelred D. Geis
Assistant Director

cc:
R. Ballou
C. Leonard
C. Bryant
Region II

DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service Regional Information
BUREAU OF SPORT FISHERIES AND WILDLIFE

P. O. Box 1306
Albuquerque, New Mexico

August 15, 1963
FOR IMMEDIATE RELEASE

ALBUQUERQUE--

Colorado duck hunters will enjoy a special experimental duck season, in addition to the regular statewide season, in the San Luis Valley, according to an announcement by the Bureau of Sport Fisheries and Wildlife.

There will be an open season on all ducks except canvasbacks and redheads, October 1 through October 18, in Alamosa, Conejos, Costilla, and Rio Grande Counties, and Saguache County east of the Continental Divide. Interior Secretary Udall approved the request for the special season made by the Colorado Department of Game, Fish and Parks and concurred in by the Central Flyway Council.

The daily bag limit will be five ducks, with a possession limit of ten. Shooting hours will be from sunrise to sunset, including the opening day.

Purpose of the experimental season, which opens and closes before the regular waterfowl season in Colorado, is to study the effects of intensive hunting on a local population of ducks. The San Luis Valley is a concentration point for locally produced ducks early in the fall. A study of band returns shows that a great portion of these ducks are shot right in the Valley. The Colorado Department has cooperated with the Federal wildlife agency in banding over 10,000 ducks in the Valley since 1940. More will be banded by State and Bureau personnel prior to the season, which is scheduled early enough to allow harvest of the local birds before migrants start coming into the Valley. Hunters will be allowed to take five mallards per day in the experimental season, but not more than two mallards per day in the regular season.

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
WASHINGTON 25, D. C.

August 8, 1963

MEMORANDUM

To: All Field Officials, Bureau of Sport Fisheries and Wildlife

From: Assistant to the Commissioner - Public Affairs

Subject: Official Background to Waterfowl Regulations

Attached is a copy of the official waterfowl status report which may serve as general background information to the 1963-64 waterfowl regulations soon to be issued.

We urge that you and your staffs familiarize yourself with this report, especially those sections relating to subjects and areas about which inquiries may arise in the future.

Dwight F. Rettie

Dwight F. Rettie

Attachment

THE 1963 STATUS OF WATERFOWL

AS PRESENTED TO THE WATERFOWL ADVISORY COMMITTEE

Washington, D. C. August 6, 1963

W. F. Crissey

History has a way of repeating itself. A drought in important breeding areas occurred during the mid-1930's which markedly reduced the North American duck population. Season lengths were reduced to 30 days during the fall hunting seasons of 1934, 1935, 1936, and 1937. Again in the late 1940's a somewhat less severe drought in the prairie and parkland pothole breeding range decreased the population to the extent that in 1947 and 1948, a 30-day season was judged necessary in the two eastern flyways and a 35-day season in the two western flyways. I am certain you are all familiar with the current drought which has prompted the short seasons and small bag limits during the last 4 years.

Although population records are meager and of little management value for the 20-year period 1930-1950, the last cycle of duck population increase and decrease is well documented. Also, much corollary information is available concerning hunting pressure, kill by hunters, production ratios, and mortality rates. It seems appropriate to review briefly "where we have been," since if we can read correctly the history of the past 14 years, we should be able to glean much information which will be of use in determining "where do we go from here?" and "how do we get there?".

Where have we been? According to a critical analysis of our various population surveys, the breeding ground survey conducted during May and June provides the most reliable measure of trend in population of most species of ducks important to the hunter. A recent improvement in this survey has provided estimates of the proportion of birds present that are seen and recorded by the aerial crews. With this improvement, it is possible to estimate the total breeding population of the most important duck species in North America. The population trend for all ducks except scoter, eider, merganser, and old squaw is presented in slide 1 for the period 1950-1963. It is important to note that the breeding population in the spring of 1962 reached a point which was 38 percent below the average of the previous 12 years; 47 percent below the peak population reached in 1956; and 17 percent below 1961. We hope this is the lowest duck breeding population we will experience in North America for many years to come.

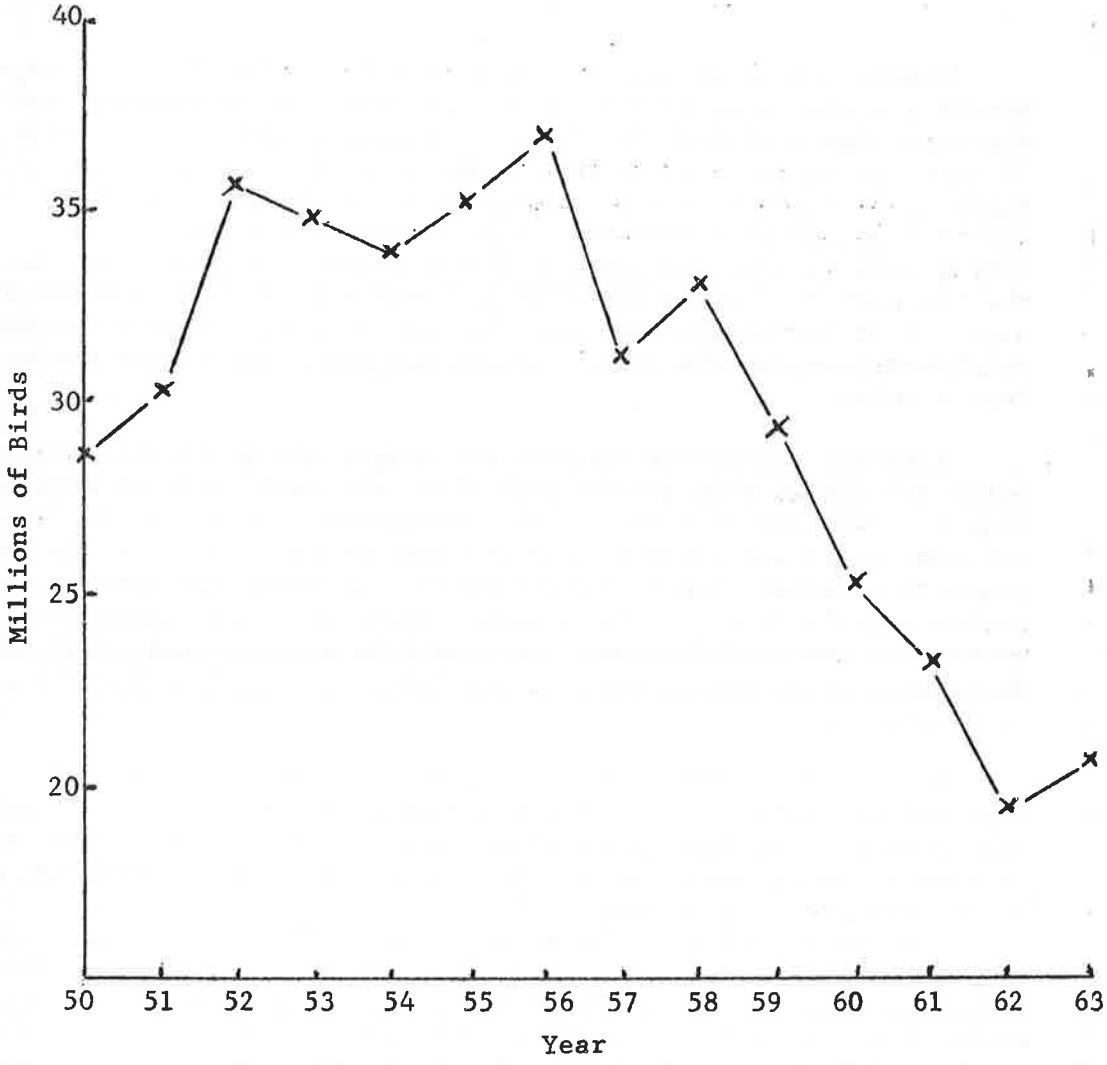


Figure 1.--Trend in North American duck breeding populations (excluding scoter, eider, merganser and old squaw)

Another series of data related to the period begins in 1953 when our survey to measure kill was developed to a point where we could begin to rely on the results. The estimated kill of ducks by flyway for the period 1953-1962 is shown in slide 2. Proportionately, the decrease in kill of ducks since 1957 has exceeded the decrease in breeding population. Specifically, the estimated number of ducks bagged reached a peak of about 12.8 million in 1957 and decreased to about 3 million in 1962, a decrease of about 75 percent. The breeding population reached a peak in 1956 and by 1962 had decreased 47 percent. This difference is as it should be. During the mid-1950's when habitat conditions were good and production ratios were high, we were killing a large portion of the fall flight without reducing the population level. In 1962, there were few young in the fall flight and only a small portion of the population could be killed if the population level was to be maintained.

The difference in kill rates between the mid-1950's and the early 1960's is confirmed by banding data. When corrected for non-reporting rate, of which we have a measure, the portion of banded birds that are taken and reported by hunters can be used to measure the portion of the population that is bagged by hunters. Particularly in the Central and Mississippi Flyways, band recovery rates for important species have decreased markedly in the last 2 or 3 years, coincident with the very restrictive regulations.

It is significant to note that band recovery rates associated with the Pacific Flyway have not decreased nearly so much and are now considerably higher than in either the Central or Mississippi Flyways. This is not surprising in view of the longer season and larger bag limit in the Pacific Flyway, but it means that hunters there are now killing a higher portion of the birds available to them during the shooting season than are hunters in the other flyways.

You will note in slide 2 that the pattern of decrease in kill for the period 1958-1962 in the Pacific Flyway is very similar to the pattern of decrease in the Central and Mississippi Flyways. In all three flyways, there was a marked decrease in 1959, no change or a slight increase in 1960, a sharp decrease in 1961, and another decrease in 1962. With a measure of kill for each year, and with a measure of the proportion this kill was of the total population present, as supplied by band recovery rates, it is possible to estimate the comparative size of the population available to hunters during the shooting season. When this approach is applied to the Pacific Flyway for the period 1958-1962, it leads to the conclusion that during the shooting season the number of ducks available to hunters has decreased about 50 percent for the period.

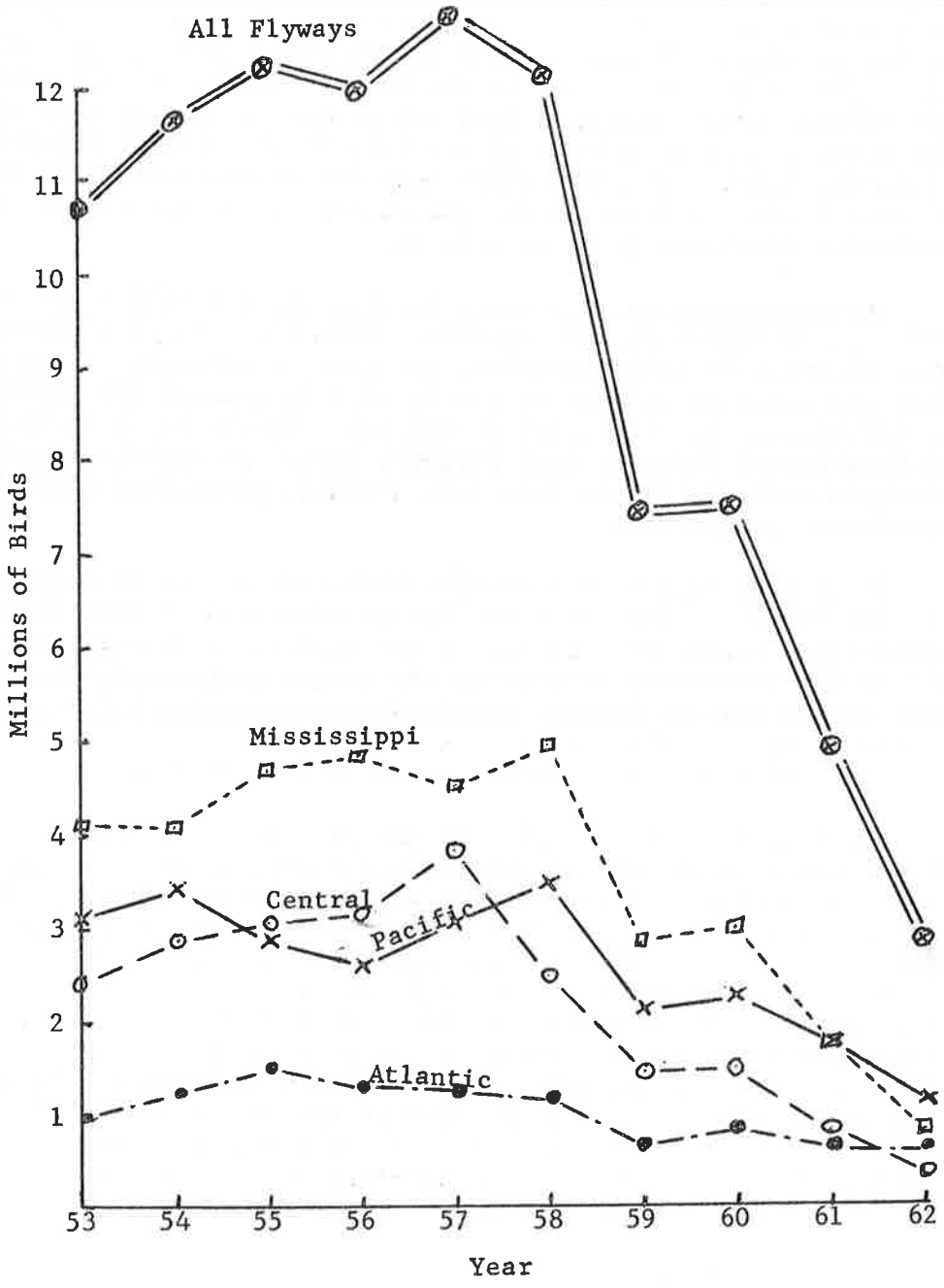


Figure 2.--Estimated number of ducks bagged, 1953-1962

Another series of data of extreme importance is derived from a combination of age ratio data from our wing collection surveys and mortality estimates from banding. Sufficient data are now available from the wing collection surveys conducted during the period 1959-1962 that we can be quite specific concerning the overall production rates for those years. In addition, mallard age ratios determined by a less efficient method and obtained primarily from the Mississippi Flyway provide a measure of production success for mallards as far back as 1939. These data demonstrate that production ratios can vary from a high of about 4 young per pair of adults during periods of good breeding habitat conditions to a low of about 1 young per pair during drought periods. Similar differences have been recorded for other important prairie nesting ducks. Using mallard to illustrate the recent situation, in 1959 there was an average of 1 young per pair in the fall flight. In 1960 there was considerable improvement when 2.6 young per pair were recorded. In 1961 and 1962 the ratios were quite similar, averaging about 1.4 young per pair.

Total annual mortality can be determined from banding. To illustrate one method for accomplishing this, if 1,000 birds were banded prior to the shooting season in a given year, we might receive 100 recoveries during the first hunting season following banding, 50 the second, 25 the third, etc. In this example, the number of bands received was being reduced by one-half each year, which would be indicative of 50 percent mortality annually from all causes. "Annual" in this instance would refer to the 12 months period from the beginning of one hunting season to the start of the next. When information on production ratios obtained from the wing collection survey is combined with a measure of mortality from banding, a comparison of the two rates provides a measure of the net change in population levels which can be expected in a given year. The decrease in population level since 1958 is confirmed by this approach.

The point I wish to make is that we are not dependent on a single source of information for determining the answers to many population status problems. We are now operating a series of surveys which complement each other to a marked degree. When data from two or more sources agree, we place greater reliance on the results. When they disagree, we are often able to understand the reason for the discrepancies.

One of the discrepancies we have looked into recently has been the results of the winter survey, particularly in the Mississippi and Pacific Flyways, as compared to population status determined by breeding ground surveys, kill surveys, band recovery rates, mortality rates, and production ratios. For example, in the Mississippi Flyway during

the past 4 years, the total number of ducks recorded during the annual winter survey has exceeded the number recorded during the period of high populations in the mid-1950's. Although the number of mallards wintering in the Flyway has decreased markedly, this decrease has been more than compensated for by increases in scaup, blue-winged teal, pintail, shoveler, baldpate, and gadwall. The bulk of these increases has been recorded in Louisiana.

The nature of the problem can be determined by comparing data from breeding ground surveys with the results of the winter survey. Since about 1.5 million of the increase in Louisiana was made up of scaup, we can use this species as an example. The total scaup breeding population index based on breeding ground surveys and winter surveys for the period 1954-1963 is presented in slide 3. Generally speaking, the breeding ground survey results in an estimated population which is two to three times the number of birds recorded during the winter survey the previous January. Since the breeding population index is a minimum estimate, we interpret the difference between the two figures to mean that the winter survey crews find only a fraction of the birds which must be someplace on the wintering grounds. When the data are examined in detail, it is important to note that the winter index increased from 2.0 million in 1959 to 3.1 million in 1963, coincident with a decrease according to the breeding surveys from 7.2 million to 5.6 million. During the period of increase in the total winter index, the number of scaup in the Mississippi Flyway increased from 306,000 in 1959 to 1,685,000 in 1963. It is quite clear that due to a change in the location of the birds, plus development of a census technique for counting birds a considerable distance from shore in the Gulf of Mexico, where surveys were not conducted in prior years, the winter survey crews have been recording a higher portion of the total scaup population during recent years than they did several years ago. However, it is equally clear that they are still finding only about half of the total population.

Another example is blue-winged teal (slide 4). Again, you will note that the breeding ground surveys reveal the presence in North America of many more blue-winged teal than have been recorded by the winter survey crews. This is not surprising, since banding data reveal that northern Columbia and northern Venezuela are the primary wintering areas for this species. It is important, however, to note that the number of bluewings recorded in the winter survey increased sharply beginning in 1958. Most of this increase occurred in the Gulf Coast marshes in Louisiana. Quite obviously this increase was caused by marked improvement in habitat conditions brought about as an aftermath of hurricane Audrey in 1957. These improved habitat conditions stopped not only blue-winged teal, but several other species as well, which were enroute to other wintering areas. It is significant to note that with the exception of scaup, which is a northern nester and not affected by drought, all species making up the increase in wintering population recorded in Louisiana

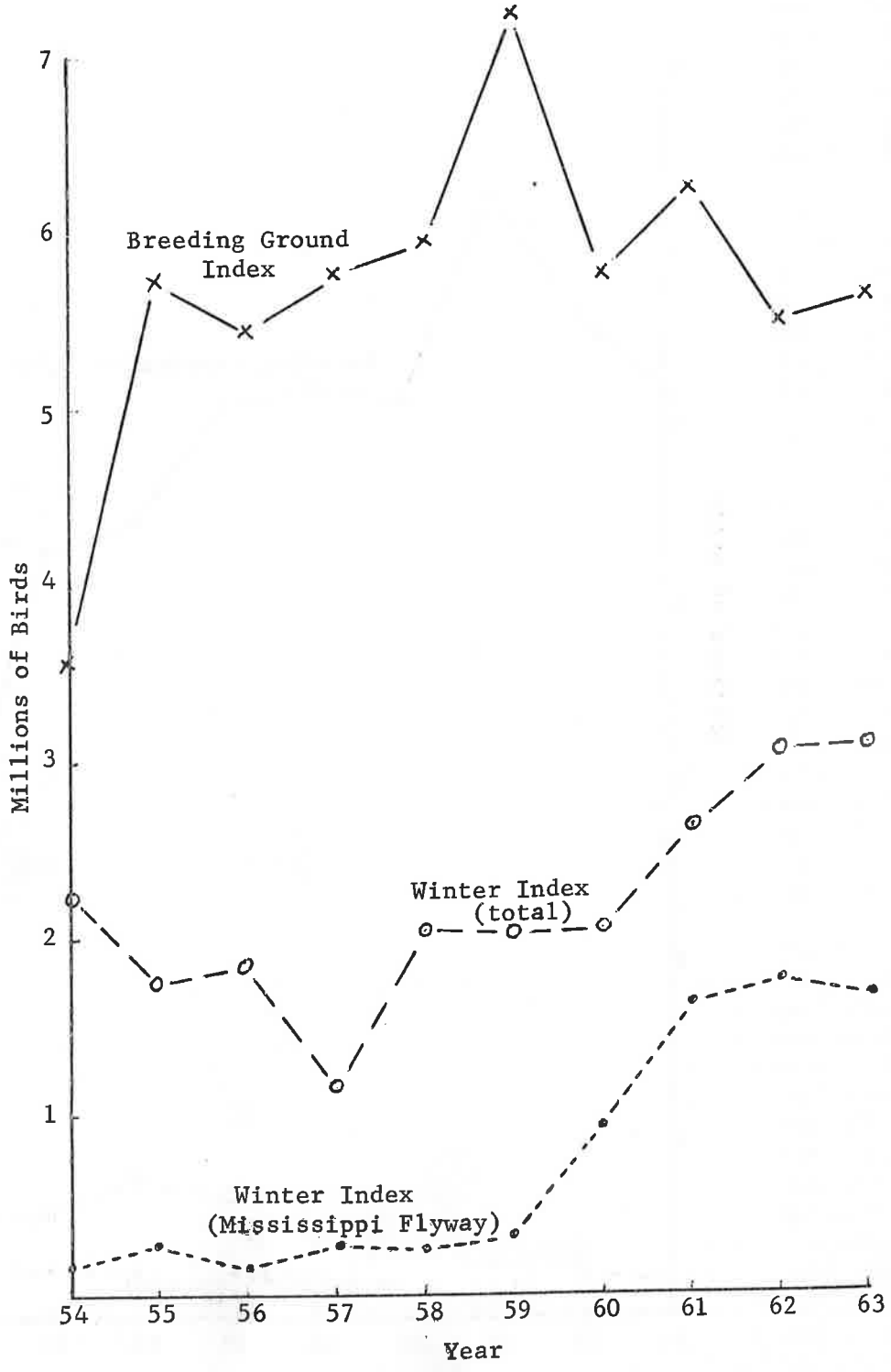


Figure 3.-- Status of scaup populations, 1954-1963

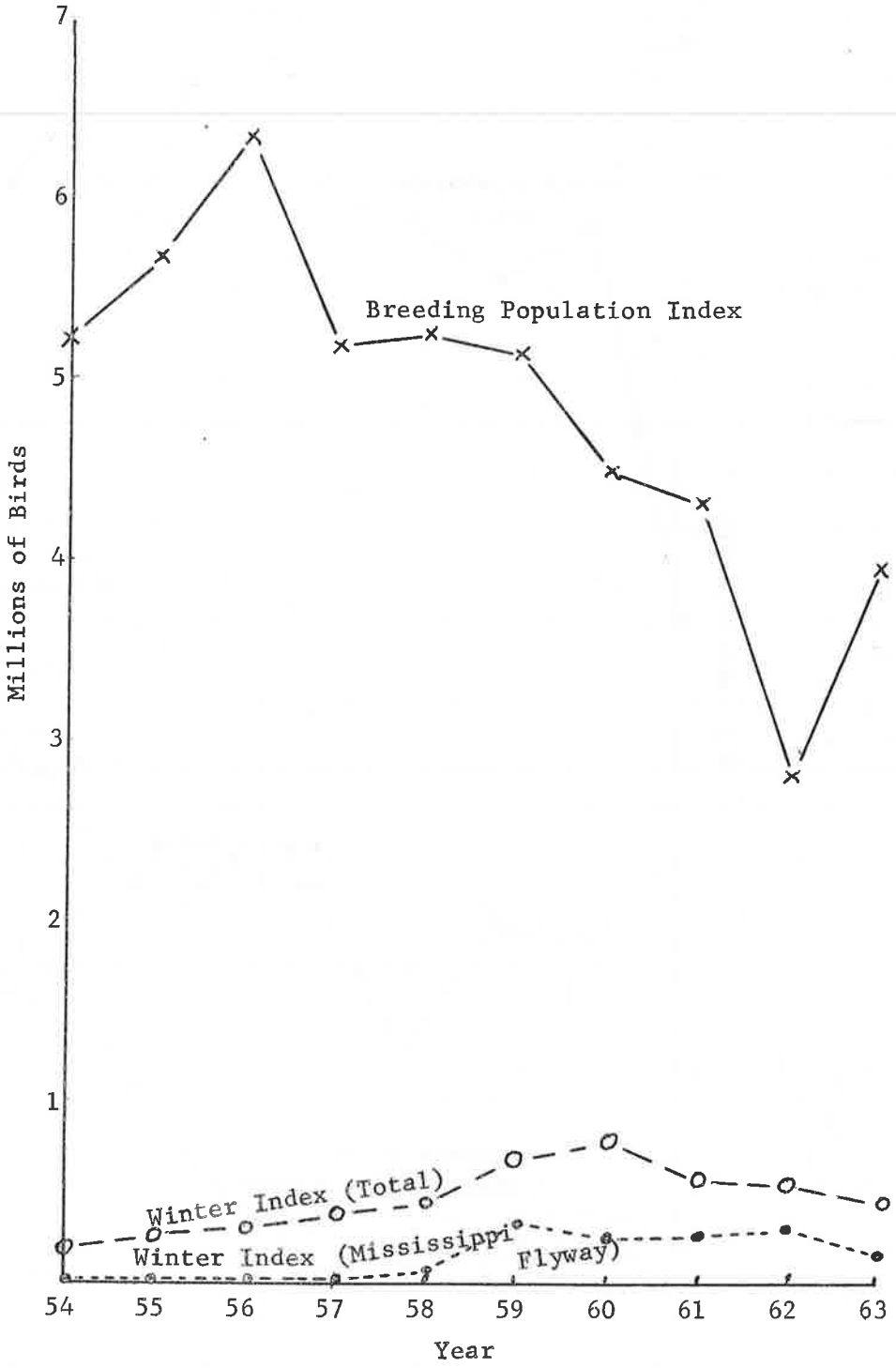


Figure 4.--Status of blue-winged teal populations, 1954-1963

decreased markedly on the breeding grounds. We have concluded that we cannot use winter survey data as a measure of population trend when it is clear that the crews are finding only a fraction of the total population, and particularly when it is apparent that the portion they are locating changes from year to year due to either shifts in the location of the wintering birds or improvements in census techniques. We do use the results of the winter survey to measure population trends for species with greater fidelity to specific wintering areas. This is true for most species of geese.

A subject of considerable importance is the effect of kill by hunters on waterfowl population levels. For several species of resident game there is an accepted game management principle that kill by hunters has little effect on the number of birds that will be available the following fall. This is not the case with waterfowl. During the past year, research at the Migratory Bird Populations Station has demonstrated conclusively that survival of several species of waterfowl important to the hunter has been controlled to a marked degree by means of appropriate shooting regulations. The evidence is clear that for several important species of waterfowl, a high portion of the birds will survive from one year to the next if they are not shot. This is important during periods of low production, such as the one we have just experienced. It is clear also that even with decreased populations, the gregarious nature of waterfowl causes them to concentrate in many locations where liberal regulations would result in a large kill. During periods of low production, a large kill could have no other result than to reduce the breeding population the following year. We have concluded that shooting regulations constitute a powerful and most necessary tool for managing the waterfowl resource.

At this point, a few words concerning our management objectives are certainly in order. When developing regulations, our objective is not to hold breeding populations in North America at a fixed level. Rather, we recognize that due to sharp fluctuations in the amount of breeding habitat and associated changes in production ratios, increases and decreases in continental populations are inevitable. Our objective, therefore, is to hold the breeding population within a selected bracket of high and low populations. The low level is determined by the minimum number of breeders which we feel is necessary to insure rapid recovery under improved habitat conditions. The population level reached in the spring of 1962 was as low as we think the North American duck population should be allowed to go. Our regulations last year were designed to halt the decline. According to the data collected during the May survey this year, we accomplished this objective, since the duck breeding population remained essentially unchanged as compared to 1962.

This year we are faced with a problem of numbers. Using mallards as an example, the estimated breeding population during the spring of 1962 totaled about 4.8 million birds. In contrast, during 1958, the peak year, the mallard breeding population totaled about 12 million birds. In 1958, an estimated 5.7 million mallards were killed in the United States. According to the distribution of mallard band recoveries between the United States and Canada, the kill of mallards in the United States was about 60 percent of the total. Therefore, the estimated continental kill of mallards in 1958 was about 9.5 million birds. It is quite obvious that with the mallard breeding population at the 1962 level, and with the below-average production ratios of last year, the total mallard flight last fall was smaller than the number of birds harvested in 1958. This was true also for several other important species of ducks which nest primarily in the area affected by drought.

Expectation of a reasonable bag during the season is one of the basic reasons why many hunters buy a duck stamp. In 1958, 2,166,000 stamps were sold and these hunters averaged 5.6 ducks apiece during the season. With the duck breeding population at the 1962 level, there were not enough birds in the fall flight to supply more than half of the number of 1958 hunters with sufficient birds to make hunting worthwhile.

Since it appears that habitat conditions in the prairies and parklands are improving rapidly, we have an important decision to make this year. Either we can establish a liberal regulation which is likely to harvest all of the available surplus, or we can continue for another year or so with comparatively restrictive regulations aimed at returning a portion of the surplus to the breeding areas the following year. Of one thing I am certain; the duck breeding population must be allowed to increase considerably if there are to be enough birds in the United States during the fall to support 2 million duck hunters.

Related to this is the rate of increase which can be expected under various breeding habitat conditions. Some people seem to believe that given good conditions, the weeds will be crawling with birds the following fall, regardless of the size of the breeding population. History does not demonstrate this to be so. Age ratio data collected during the period of best breeding habitat conditions in the mid-1950's reveal that averages in excess of 4 young per pair of adults in the breeding population cannot be expected. I realize that average brood size in most years exceeds 4 ducklings, but the important point is that not all females are successful in raising a brood even in the best years. With a ratio of 4 young per pair, or 2 young per adult, there will be many extra millions of birds in a fall flight starting with 37 million breeders than will come from a breeding population of 20 million. Yet differences of this magnitude have taken place in North America since 1956.

With this as background, the next item for consideration is the current situation. I am certain that everyone in this room has heard rather glowing reports concerning the improvement this year in pothole breeding habitat. I am pleased to report that there seems no question but what the backbone of the drought period has been broken, but I hasten to add that the sick patient is far from being a well man (slide 5). The May pond count in the southern portions of the Prairie Provinces increased 17 percent as compared to 1962, but is still 36 percent below the average for the period 1951-1962 and 60 percent below the peak level recorded in 1955. Rains during the summer period increased the July pond count by approximately 100 percent over the 1962 level, but the July count this year is still 29 percent below the average of the previous 12 years and 52 percent below the peak level reached in 1955.

The distribution and density of ponds in the southern portions of the Prairie Provinces is presented in more detail in slide 6. Based on the data concerning number of ponds along the aerial survey transect routes, it is possible to construct maps of pond distribution and density for any particular survey. The sketch map at the top shows the average distribution and density of ponds during the period 1955 and 1956. In contrast, the lower sketch map presents the distribution and density of ponds during May this year. The chief difference between the wet period during the mid-1950's and this year occurs in southern Saskatchewan. This area is truly the heart of the duck production habitat in North America and it is still quite dry in comparison to the conditions which produced the bumper crops of ducks in the mid-1950's. I am sorry it was not possible to construct a similar map to compare the July pond distribution and density, but time did not permit.

In the Dakotas and western Minnesota, the May pond count increased 18 percent as compared to last year, while the July count increased 7 percent over the previous year. You may recall, however, that water conditions in the eastern Dakotas and Minnesota improved greatly last year, which means that the count this year represents improvement over a situation that was already quite favorable.

For the most part, weather conditions favored production this year. The weather was mild in late April and early May throughout much of the pothole breeding range, fostering early nesting. However, a heavy snowfall on May 19 in some pothole areas followed by temperatures of 20 degrees or lower throughout much of the important Canadian breeding areas a day or so later, disrupted nesting to some extent.

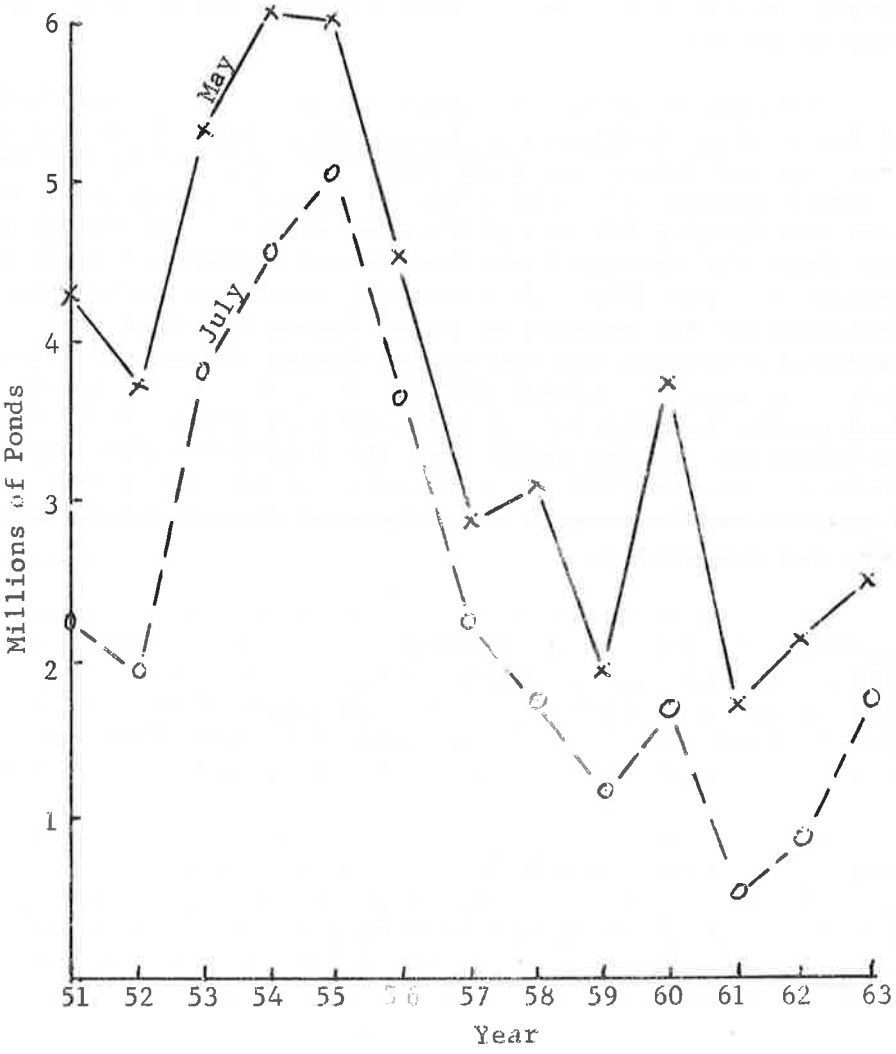
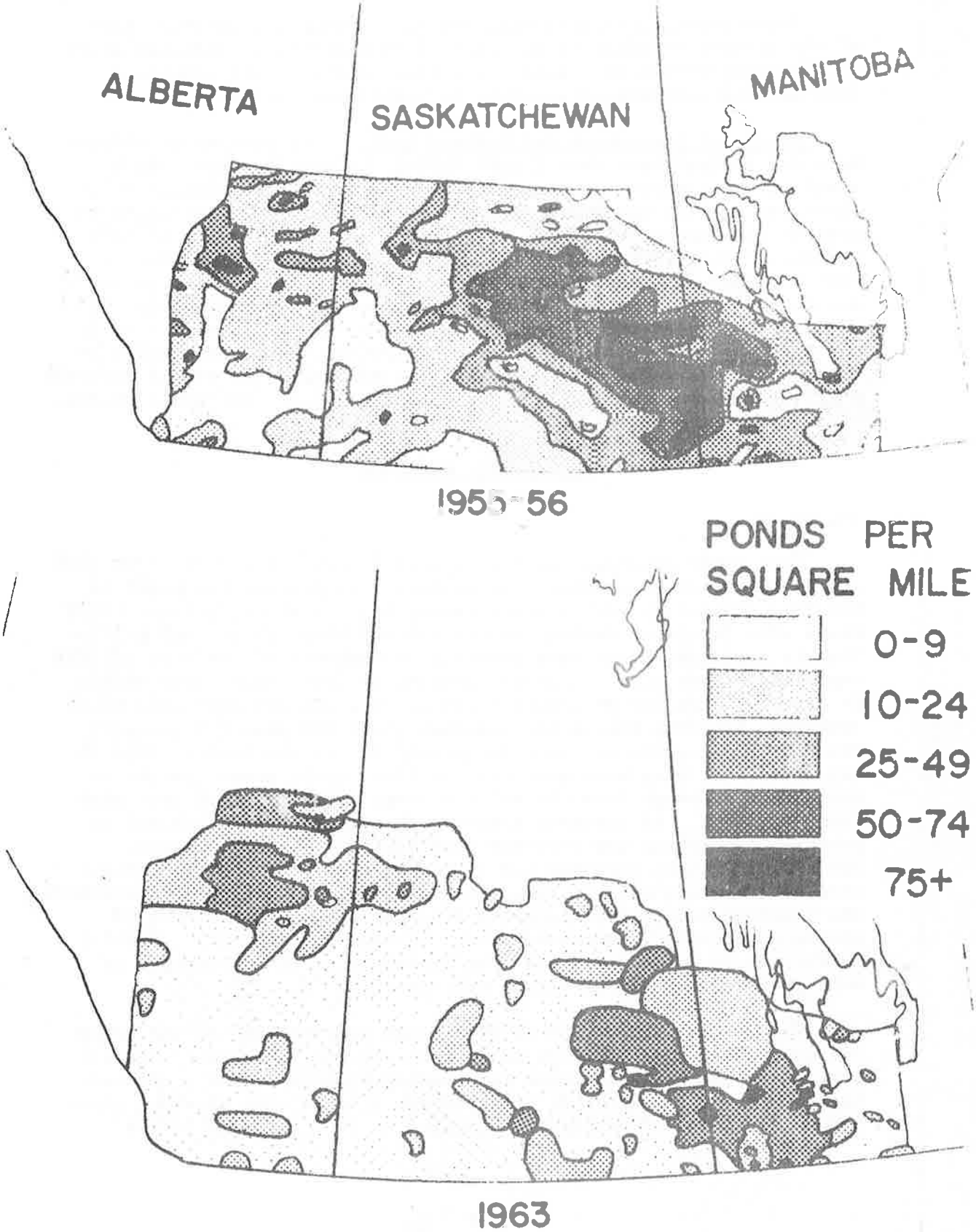


Figure 5.--Number of water areas - Southern Prairie Provinces

FIGURE 6 POND DISTRIBUTION AND DENSITY



Above-average precipitation during the summer throughout most of the pothole breeding range resulted in a moisture condition which is fostering renesting. Also, this precipitation will provide a soil moisture condition favorable to runoff next spring.

Status of Canvasback and Redhead Ducks: The seasons on canvasback and redhead have been closed during the past 3 years. As a result of this protection, there is evidence that the population of these two species has improved. Specifically, redhead increased 13 percent as compared to 1962, while canvasback increased 83 percent. Redhead population now stands 14 percent below the average for the past 10 years, and canvasbacks are 11 percent below. These increases are encouraging. However, much of the canvasback breeding population increase this year occurred in northern Alberta and particularly in the Northwest Territories where successful nesting is problematical. Regardless, overwater nesting habitat is much improved in the southern parts of the Prairie Provinces and in the Dakotas. Increased production is expected this year.

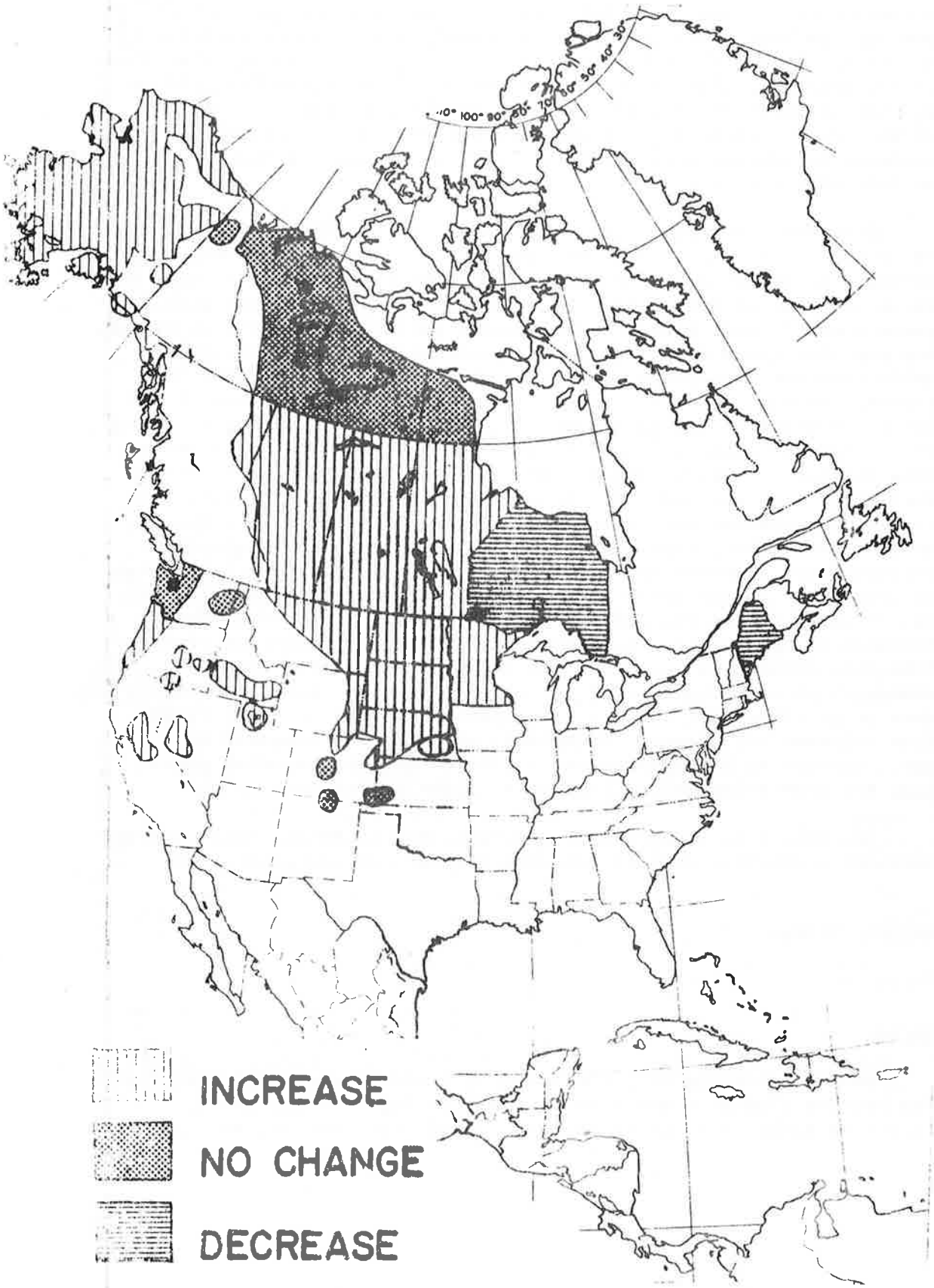
Fall Flight Forecast

(Slide 7)

This slide presents the fall flight forecast for ducks from each of the major breeding areas. In Alaska, a 15 percent reduction in breeding population was recorded during May. However, weather conditions were favorable during the nesting and brood period and production is expected to increase markedly as compared to the poor success experienced last year. A small increase in fall flight from Alaska is expected. In the Northwest Territories along the MacKenzie River drainage, breeding population remained about the same (-8 percent). Production prospects are poor due primarily to cold weather late in May. However, they were poor also in 1962, which means that we do not expect a change from the below average fall flight of last year from this area. In northern Alberta, an increase of 25 percent in breeding population was recorded this year as compared to 1962. Habitat conditions improved and it is expected that the fall flight from this section will increase considerably. In northern Saskatchewan, the breeding population increased slightly (+13 percent), and in northern Manitoba it remained about the same (-5 percent). Habitat conditions in these two areas were favorable so that increases in both production and fall flight are expected.

In Ontario, a decrease of 49 percent was recorded in the breeding population and, although production appears to be good, it will not offset the large decrease in breeding population and a decrease in fall flight is expected. In southern Alberta, the breeding population increased 13 percent as compared to 1962. Production is

DUCK FLIGHT FORECAST 1963



judged to be much improved and the fall flight is expected to increase considerably. In southern Saskatchewan, the breeding population increased 10 percent. Habitat conditions did not improve as much as they did in southern Alberta and, although production is expected to increase, the amount of increase in fall flight will be somewhat less, proportionately, than in southern Alberta. In southern Manitoba, a 34 percent increase in breeding population was recorded during May. An increase in production is expected but nesting effort was disrupted somewhat by adverse weather during late May and only a moderate increase in fall flight is expected.

Stateside, and beginning in the West, in the State of Washington there were increases in some portions of the State and decreases in others. It is expected that the fall flight from that State will be about the same as last year. In Oregon, the drought of the past few years seems to have broken and increases were recorded both in breeding population and in production. Essentially the same situation holds true for California, Nevada, Idaho, Utah, and Wyoming. In Montana, habitat conditions improved in the eastern portions of the State and deteriorated in the western part. Surveys in May revealed the highest breeding population index in Montana since the surveys were initiated. Production is expected to be good and an increased fall flight is expected. In the Dakotas and western Minnesota a 32 percent increase in breeding population was recorded during May. Data on production collected during July revealed that production will increase somewhat above last year and an increase in fall flight is forecast. In Nebraska, a major increase in breeding population was recorded during May and surveys during July revealed a similar increase in production. A major increase in fall flight is expected from this State. In Colorado, the breeding population remained unchanged as compared to 1962 (+7 percent). Since water conditions were poorer than last year, it is anticipated that the fall flight from Colorado will remain essentially unchanged as compared to a year ago. Surveys in Michigan reveal increases both in breeding population and production and an increased flight is forecast.

The only area reporting in the Northeast is Maine, where surveys revealed a decrease both in breeding populations and production.

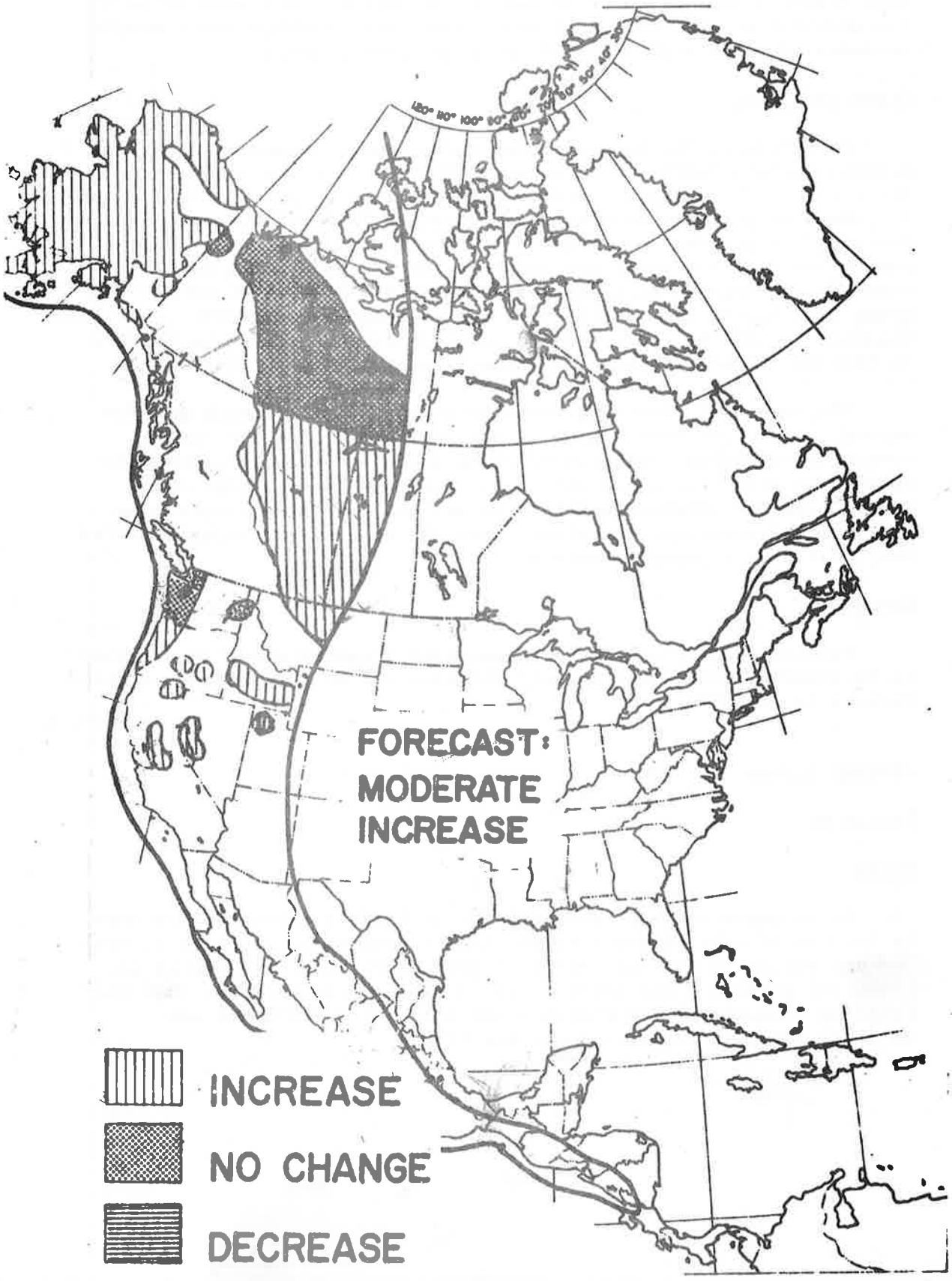
PACIFIC FLYWAY

(Slide:8)

Ducks:

When considering only the breeding areas which supply birds to the Pacific Flyway, a moderate increase is expected in the fall flight of ducks as compared to 1962. Production ratios, as reflected

PACIFIC FLYWAY
DUCK FLIGHT FORECAST 1963



by age ratios in the kill, should be approximately equal to 1960. It is emphasized that this increase is in relation to the 1962 fall flight which was about 50 percent below the level reached in the mid-1950's. The number of mallards in the Columbia Basin should increase over the high level of the past several years.

Geese and Brant:

According to the annual winter survey, populations of all geese except cacklers decreased in January 1963, as compared to the previous year. Cackling geese increased 25 percent, while Canadas decreased 22 percent, Ross's geese decreased 10 percent, snow geese decreased 11 percent, and white-fronts decreased 36 percent. Since production data for geese are lacking, average production must be assumed. Therefore, it is estimated that the fall flight of all geese will be the same as in 1962, but as compared with 1961, the flights of cackling geese will be somewhat larger, while the flights of Canadas, Ross's, snows, and white-fronts will be smaller.

The number of wintering brant decreased a small amount for the second consecutive year. Also, a severe storm during the nesting season on the Yukon-Kuskokwim breeding ground completely eliminated production from this important area. Recently, a crew captured 4,000 brant for banding in this area without finding a single immature. It is expected, therefore, that the fall flight of brant this year will show a sharp reduction.

Coots:

Production of coots in most important breeding areas is expected to be somewhat better and a small increase in the fall flight of this species is expected.

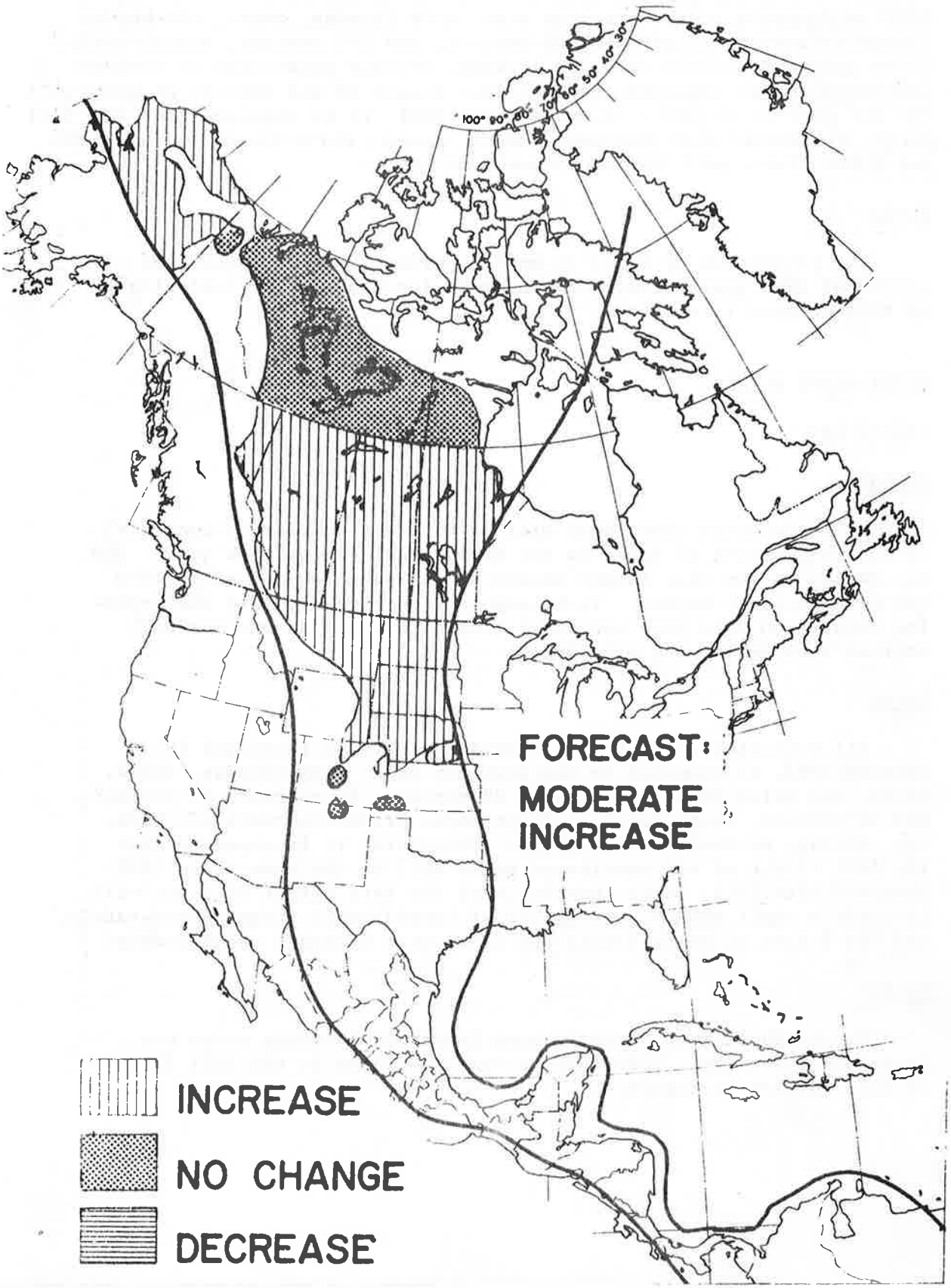
CENTRAL FLYWAY

(Slide 9)

Ducks:

It is expected that there will be at least a moderate increase in the fall flight of ducks in the Central Flyway as compared to 1962. The age ratios in the fall flight should be at least as good as in 1960, and perhaps a bit better. It is emphasized, however, that the breeding population this year was smaller than in 1960 and was markedly smaller than during the mid-1950's.

CENTRAL FLYWAY
DUCK FLIGHT FORECAST 1963



Geese:

All wintering geese in the Central Flyway increased in January 1963 as compared to the previous year, with Canadas, snows, and white-fronts increasing 23 percent, 85 percent, and 147 percent, respectively. Since goose production data are lacking, average production is assumed. Therefore, it is expected that the fall flight of all species of geese will be the same as in 1962. Compared with 1961, it is expected that the fall flight of Canadas will increase a small amount, while the flight of snows and white-fronts will increase considerably.

Coots:

The production of coots in most important breeding areas has increased this year. Therefore, a small increase in the fall flight of this species is expected.

MISSISSIPPI FLYWAY

(Slide 10)

Ducks:

It is expected that there will be at least a moderate increase in the fall flight of ducks in the Mississippi Flyway this year. The age ratios in the fall flight should be at least as good as in 1960 and perhaps a bit better. It is emphasized, however, that the breeding population this year was smaller than in 1960 and was markedly smaller than during the mid-1950's.

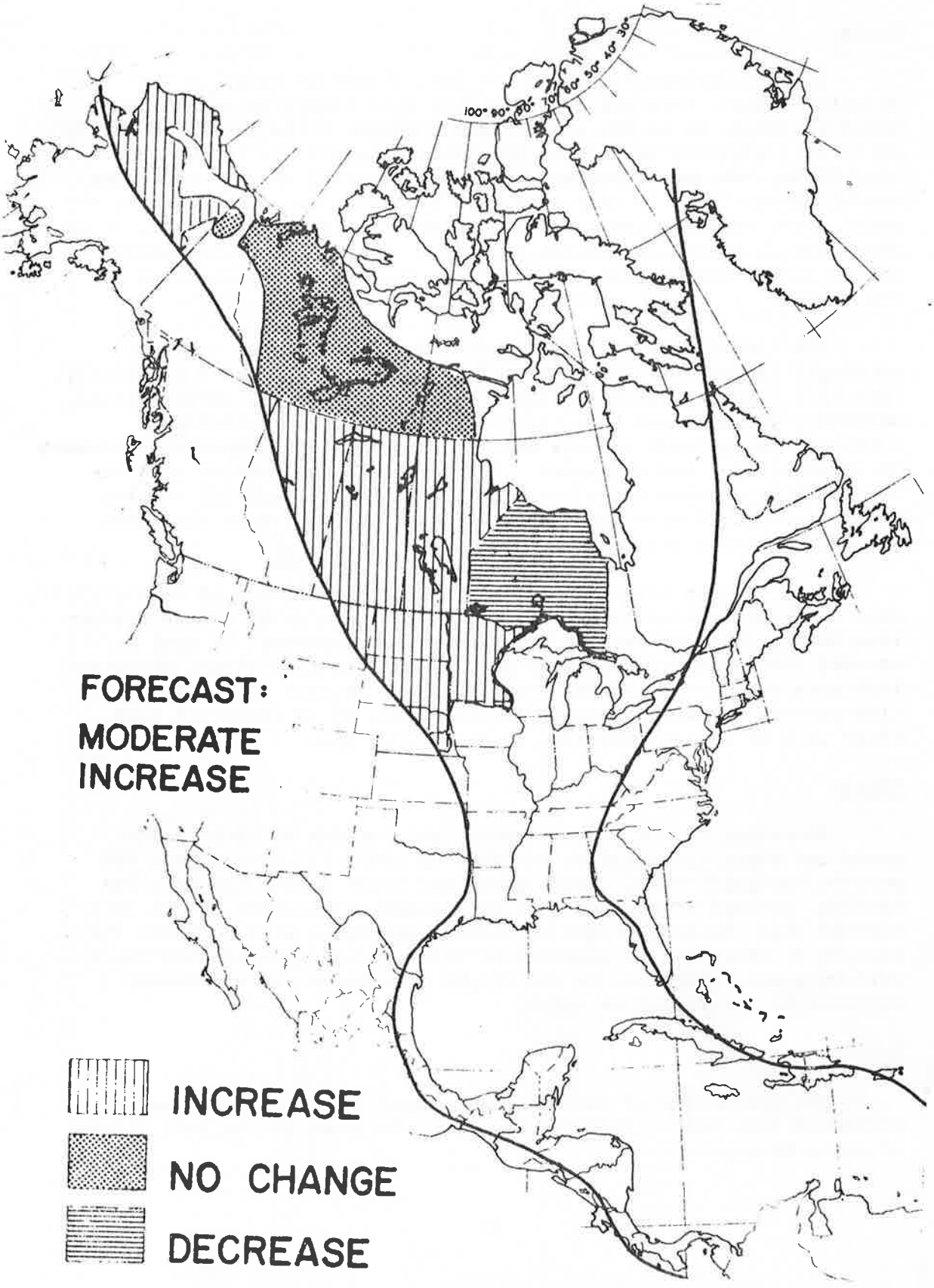
Geese:

All wintering geese in the Mississippi Flyway increased in January 1963, as compared to the previous year, with Canadas, snows, blues, and white-fronts increasing 29 percent, 53 percent, 15 percent, and 61 percent, respectively. Since goose production data are lacking, average production is assumed. Therefore, it is expected that the fall flight of all species of geese will be the same as in 1962. Compared with 1961, it is expected that the fall flight of blues will increase a small amount, the flight of Canadas will increase moderately, and the flight of white-fronts and snows will increase considerably.

Coots:

The production of coots in most important breeding areas has increased this year. Therefore, a small increase in the fall flight of this species is expected.

MISSISSIPPI FLYWAY
DUCK FLIGHT FORECAST 1963



ATLANTIC FLYWAY

(Slide 11)

Ducks:

In forecasting changes in the fall flight of ducks in the Atlantic Flyway, breeding ground survey data cannot be used to so great an extent as in the other three flyways. This is due primarily to lack of adequate techniques for conducting surveys in the important Quebec-Labrador breeding area. Experimental surveys are being conducted this year in this area, but they have not progressed to the point where reliance can be placed on the findings. Therefore, it is necessary to depend to a large extent on the results of the annual winter survey for determining trends in the breeding population for the flyway.

The number of black ducks wintering in the Flyway remained unchanged as compared with 1962 (-2 percent). All ducks collectively, increased 7 percent with the chief increases occurring among mallard, shoveler, green-winged teal, redhead, ringneck, and goldeneye. Increases among these species were in part counterbalanced by decreases in scaup, ruddy, and merganser. For the sixth consecutive year the wintering population index has remained at about the 2-1/2 million level as compared with the 5-year period 1952-1956, when the index averaged nearly 4-1/4 million.

From western areas supplying the Atlantic Flyway, it is expected that there will be an increased fall flight this year. Since production survey data are lacking from Quebec and Labrador, it must be assumed that production will be average and the fall flight of ducks from this region will remain about the same as last year. When data from eastern and western areas are combined, it is estimated that there will be a small increase in ducks this year.

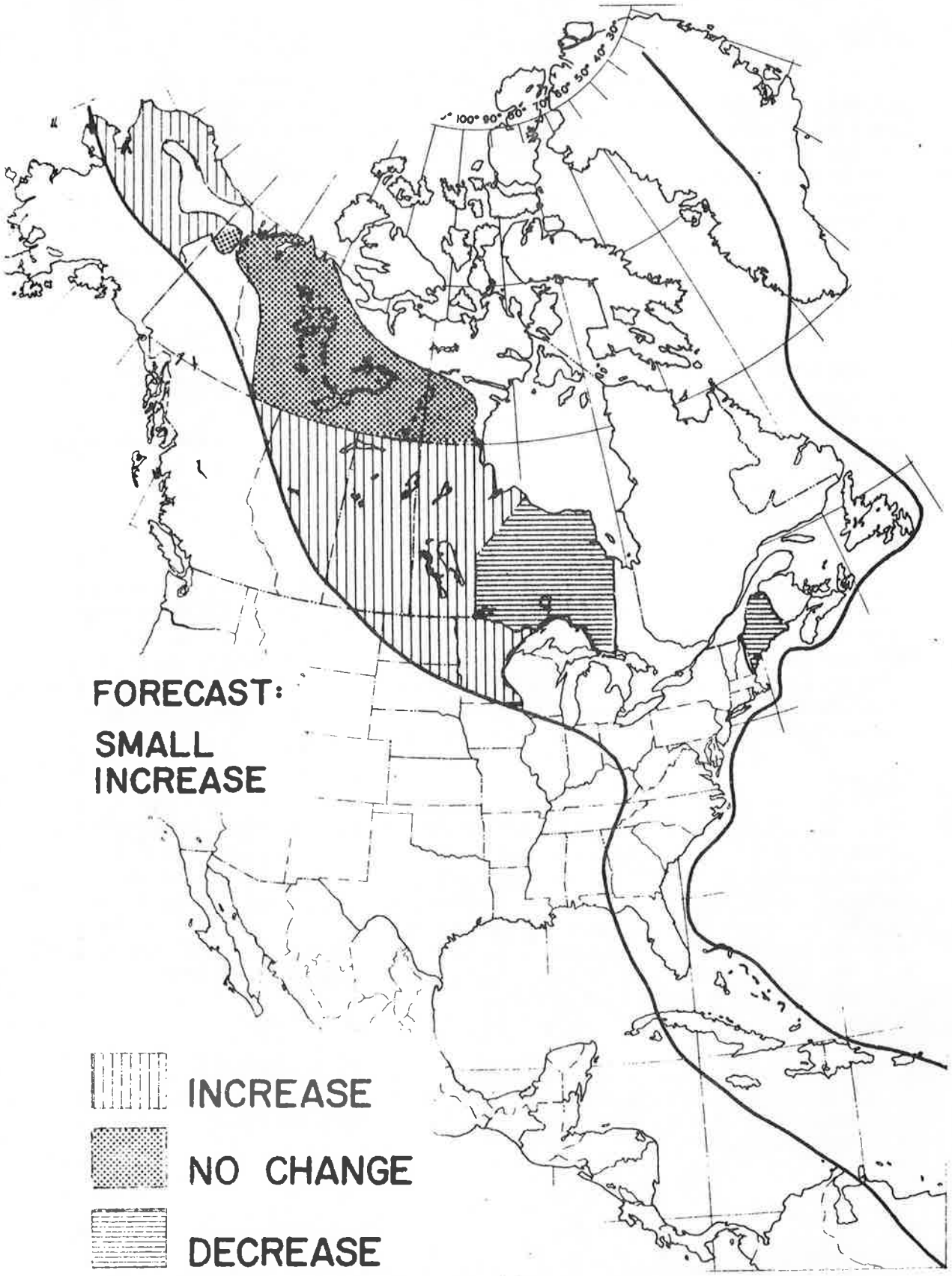
Geese:

According to the winter survey, populations of both Canada geese and brant increased as compared to 1962 (+15 percent and +39 percent, respectively). Since goose and brant production data are lacking, average production must be assumed. Therefore, it is anticipated that the fall flight of Canadas and brant will be about the same as in 1962, but as compared to 1961, it is expected that there will be a small increase in the flight of Canadas and a moderate increase in the flight of brant.

Coots:

The production of coots in most important breeding areas has increased this year. Therefore, a small increase in the fall flight of coots is expected.

ATLANTIC FLYWAY
DUCK FLIGHT FORECAST 1963



August 20, 1963

Regional Director, Bureau of Sport
Fisheries and Wildlife, Box 1306
Albuquerque, New Mexico
Wildlife Management Biologist
Monte Vista Refuge, Box 566
Monte Vista, Colorado
Meeting for San Luis Valley Duck Season

After talking with Mr. Gunther by phone this morning, I contacted Jack Grieb and Chuck Hayes. We have scheduled a meeting for the morning of August 30 at the State cabin on Upper Browns Lake above Creede. The purpose of this meeting is to reach agreement among the various agencies and branches on what information is needed to properly conduct and evaluate the experimental duck season in the San Luis Valley. In addition to Mr. Grieb, the Colorado Department will probably be represented by Bob Elliott, Assistant Director, and Smokey Till, Regional Coordinator. Mr. Hayes, Mr. Bryant and I will represent the Bureau.

I believe it would be most appropriate if Flyway Representative Ray Buller and Management and Enforcement Supervisor Larry Merovka could attend this meeting, as well as any others from the Regional Office.

RMB
Robert M. Ballou

cc: Refuge Manager
Monte Vista Refuge

DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE REGIONAL INFORMATION
BUREAU OF SPORT FISHERIES AND WILDLIFE
P. O. Box 1306
Albuquerque, New Mexico

August 16, 1963
FOR IMMEDIATE RELEASE

ALBUQUERQUE--

Duck hunters in the Central Flyway will have bigger bag limits and a longer season to look forward to when the 1963-1964 seasons open this fall. The Central Flyway states of North and South Dakota, Nebraska, Kansas, Oklahoma, Texas, and those parts of Montana, Wyoming, Colorado, and New Mexico lying east of the Continental Divide have been given options of selecting 35 consecutive days of duck shooting or split seasons totaling 32 days, according to the Bureau of Sport Fisheries and Wildlife.

Daily bag and possession limits of four and eight were approved by Secretary of the Interior Stewart L. Udall. This is double the bag and possession limit of the 1962 season in the Central Flyway.

The restriction on taking mallard ducks continues this year, with only two mallards allowed in the daily bag and four in possession. Mallard breeding populations set an all time low in 1962 and have not shown marked recovery this year. Average mallard production is expected this year from the lowered breeding populations, and the Bureau hopes that continued restrictions will allow for an increase in the 1964 mallard breeding stock.

Bag and possession limits on wood ducks remain at two and two as in 1962. The bag and possession limits on coots have been increased to eight and sixteen.

A complete closure on canvasbacks and redheads will continue this fall, with these species still below the long-term average population level, despite closed seasons the past three years.

The individual states are allowed to select their season within the period starting October 5 and ending January 5. Shooting hours are from sunrise to sunset, except on opening day when gunning will start at noon.

Central Flyway states may select a 75 day consecutive or split season goose shoot within the period starting Tuesday, October 1, and ending Wednesday, January 15.

The daily bag and possession limit on geese will be five, including not more than two Canada geese or their subspecies, or one Canada goose or its subspecies and one white-fronted goose, or one white-fronted goose. Only one Ross's goose will be allowed in the daily bag and possession limits.

Restrictive bag limits in 1962 accomplished their objective of protecting a greatly depressed breeding population of ducks which occurred at a time of prolonged drouth throughout the important waterfowl breeding grounds of the continent. While above average rainfall improved habitat conditions somewhat this year, total production of ducks remained well below the long-term average, particularly on mallards which have not shown any marked increase in numbers this summer.

In recommending continued restrictions on species still in short supply, the Bureau hopes to increase the breeding populations for 1964. With the Canadian drouth cycle apparently ended, this increased breeding population could take advantage of improved water conditions next year.

The framework within which the states select their seasons represents an increase of one week at the start and one week at the end of this year's hunting period, compared with 1962.

Hunters in eastern New Mexico and western Texas will be allowed a 30 day season on sandhill (little brown) cranes, beginning November 2 and ending December 1, with a bag and possession limit of two birds.

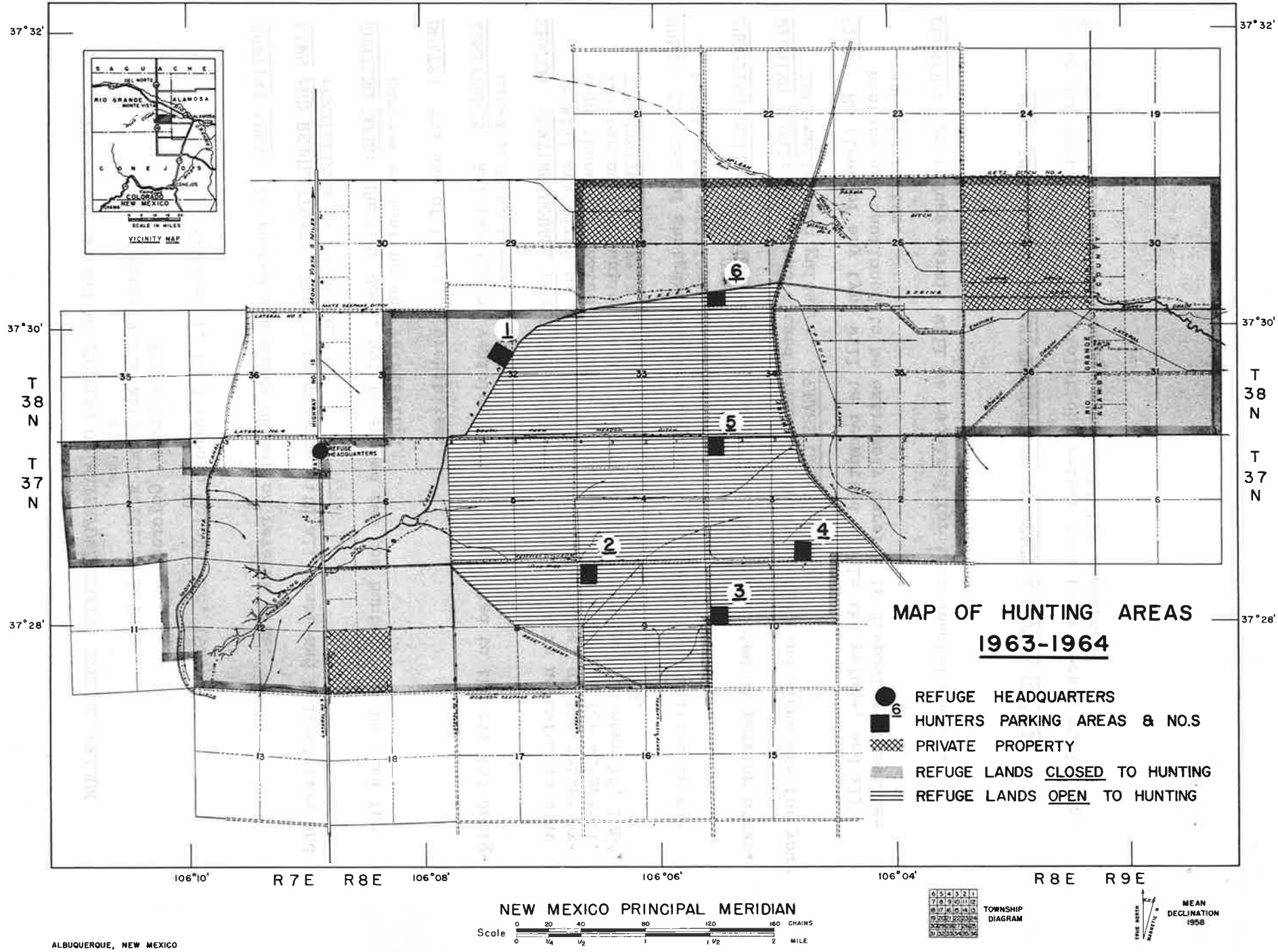
A special permit season will allow the taking of 1,000 whistling swans in Utah.

MONTE VISTA NATIONAL WILDLIFE REFUGE

RIO GRANDE AND ALAMOSA COUNTIES, COLORADO

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



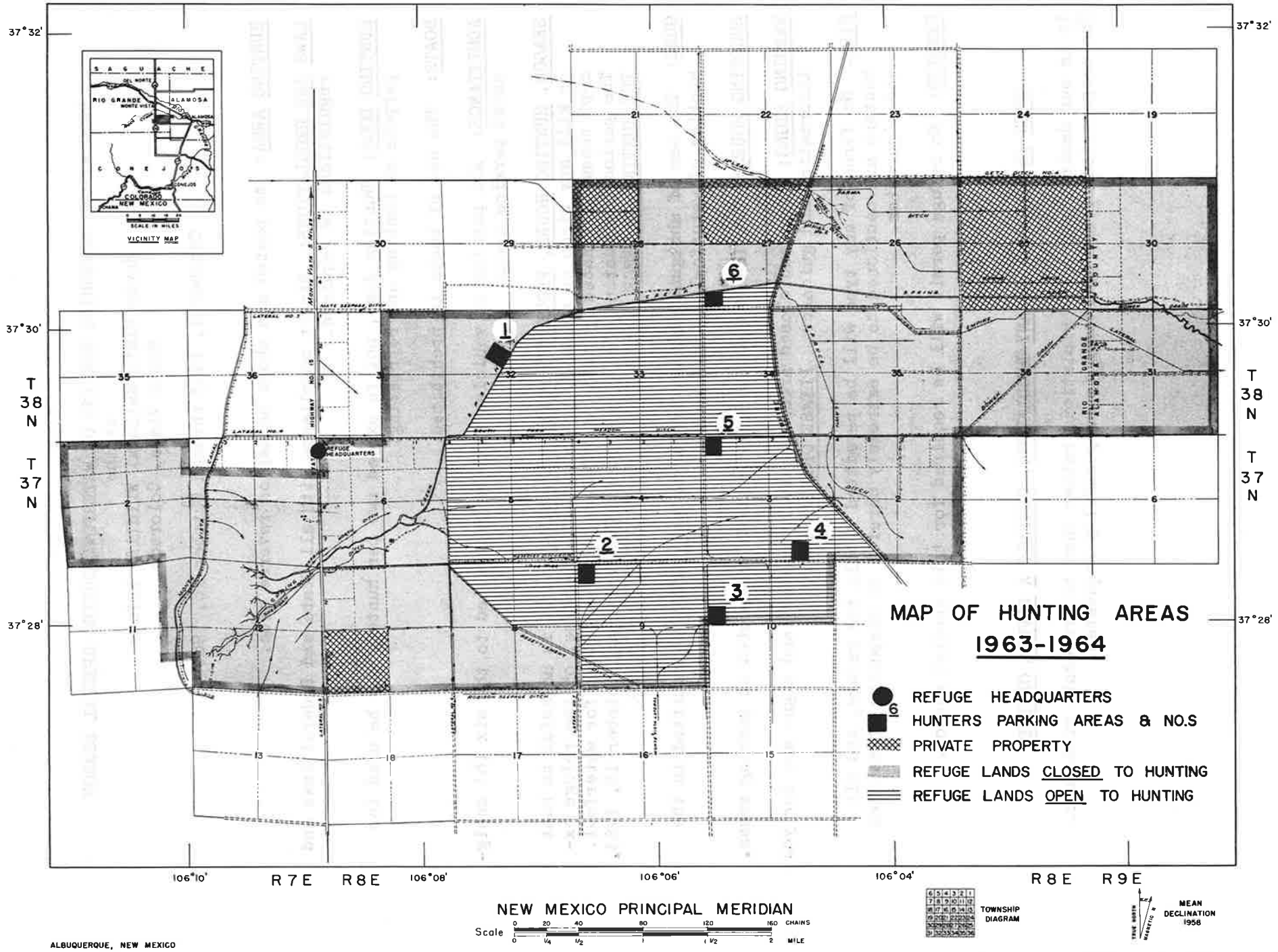
ALBUQUERQUE, NEW MEXICO

MONTE VISTA NATIONAL WILDLIFE REFUGE

RIO GRANDE AND ALAMOSA COUNTIES, COLORADO

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



ALBUQUERQUE, NEW MEXICO

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RIO GRANDE AND ALAMOSA COUNTIES, COLORADO

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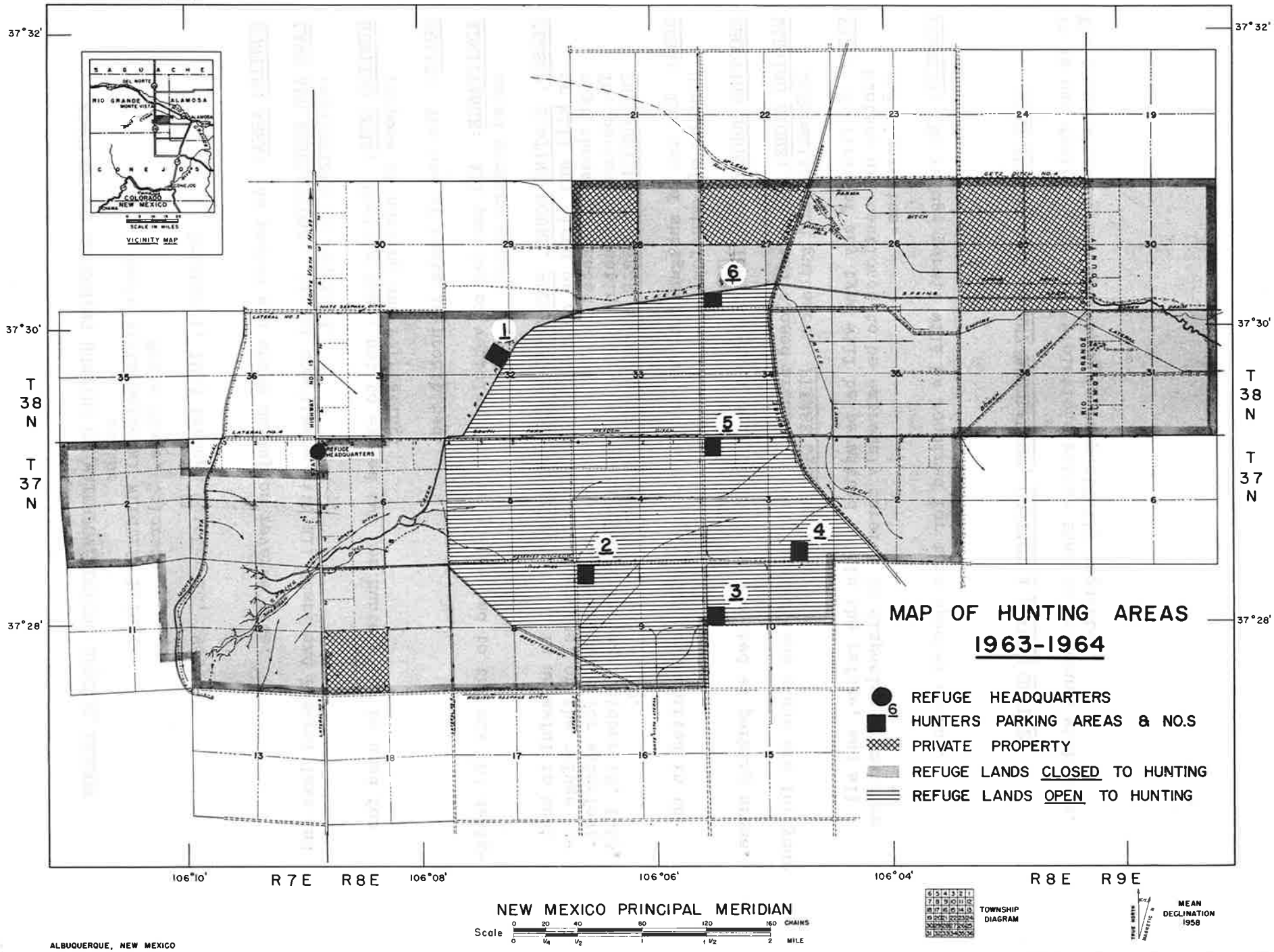

ALBUQUERQUE, NEW MEXICO

MONTE VISTA NATIONAL WILDLIFE REFUGE

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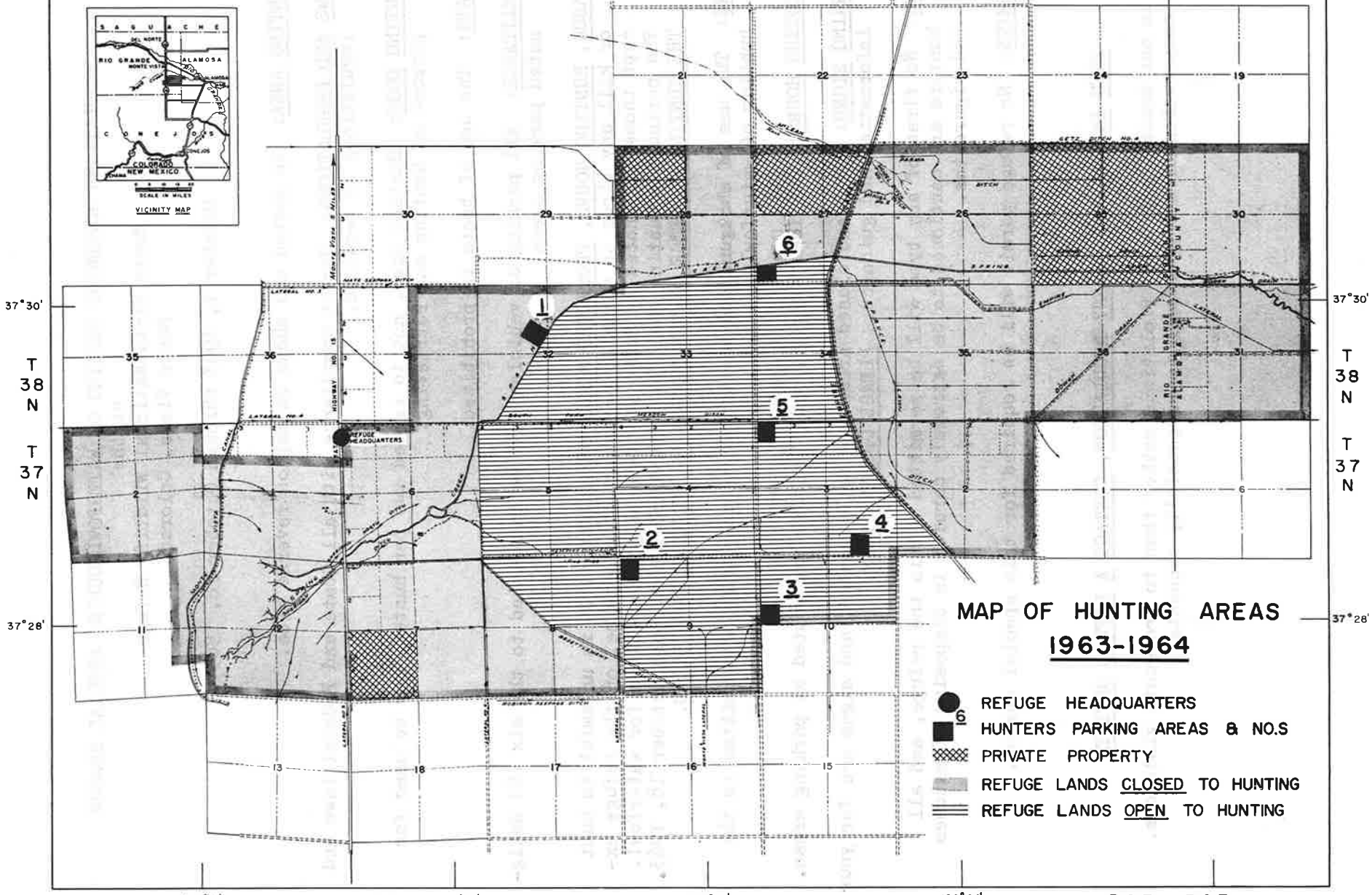


NEW MEXICO PRINCIPAL MERIDIAN

Scale 0 20 40 80 120 160 CHAINS
0 1/4 1/2 1 1 1/2 2 MILE

TOWNSHIP DIAGRAM

MEAN DECLINATION 1958

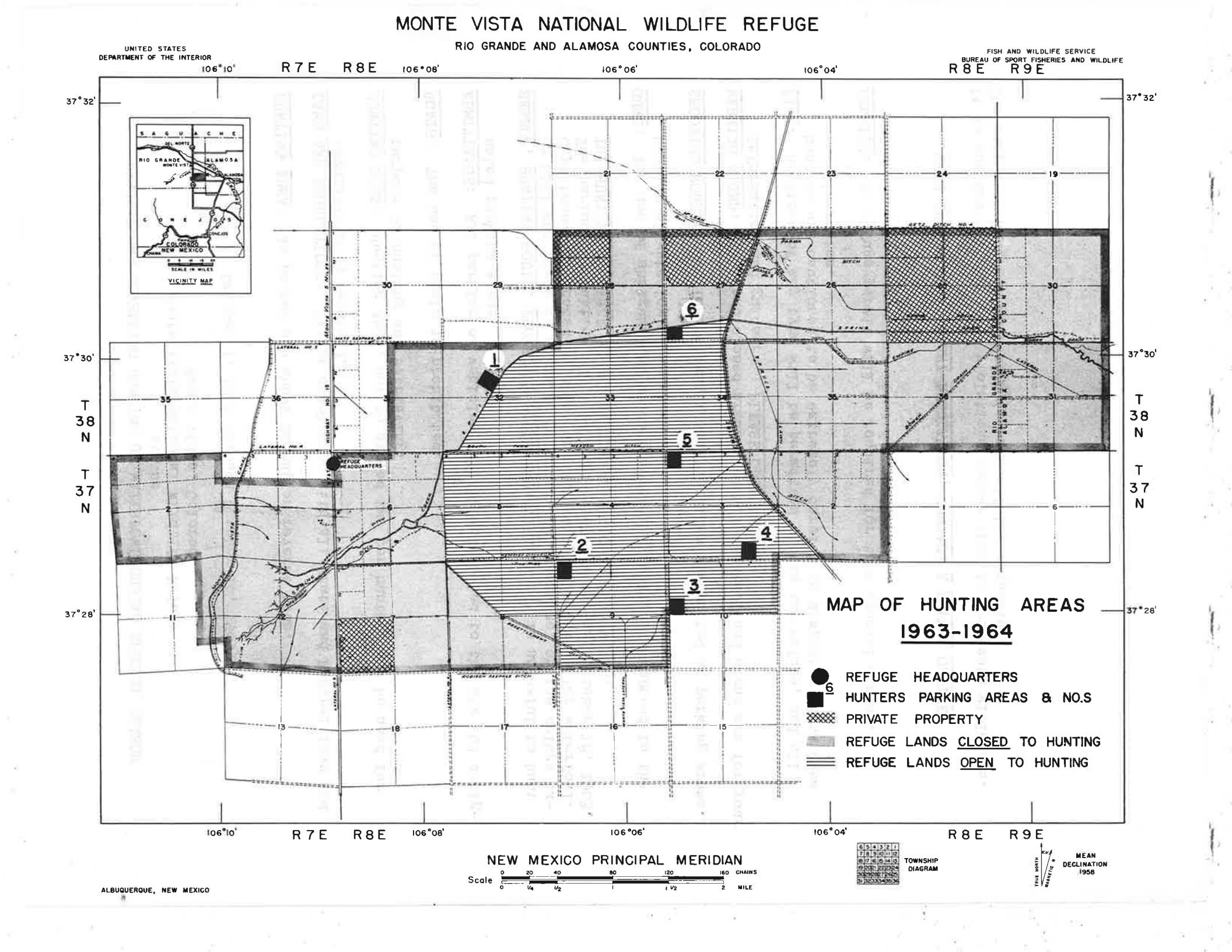
ALBUQUERQUE, NEW MEXICO

MONTE VISTA NATIONAL WILDLIFE REFUGE

RIO GRANDE AND ALAMOSA COUNTIES, COLORADO

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



ALBUQUERQUE, NEW MEXICO

MONTE VISTA NATIONAL WILDLIFE REFUGE

RIO GRANDE AND ALAMOSA COUNTIES, COLORADO

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

VICINITY MAP

106°10' R7E R8E 106°08' 106°06' 106°04' R8E R9E

37°32'

37°30'

37°28'

T 38 N

T 37 N

REFUGE HEADQUARTERS

1 2 3 4 5 6

MAP OF HUNTING AREAS
1963-1964

- REFUGE HEADQUARTERS
- 6 HUNTERS PARKING AREAS & NO.S
- PRIVATE PROPERTY
- REFUGE LANDS CLOSED TO HUNTING
- REFUGE LANDS OPEN TO HUNTING

NEW MEXICO PRINCIPAL MERIDIAN

Scale 0 20 40 80 120 160 CHAINS
0 1/4 1/2 1 1 1/2 2 MILE

TOWNSHIP DIAGRAM

MEAN DECLINATION 1958

ALBUQUERQUE, NEW MEXICO

50, Code of Federal Regulations. The purpose of the designation is to aid administration of the Cross Creeks National Wildlife Refuge and to increase the effectiveness of the refuge for the purpose for which it was established by the United States.

Interested persons were given 30 days in which to submit written comments, suggestions, or objections to the proposed designation. No written communications were received, and the proposed designation is hereby adopted without change and is set forth below. This designation shall become effective at the beginning of the 30th calendar day following the date of this publication in the FEDERAL REGISTER.

STEWART L. UDALL,
Secretary of the Interior.

OCTOBER 4, 1963.

The text of the designation is as follows:

This action is taken by virtue of and pursuant to section 3 of the Migratory Bird Treaty Act of July 3, 1918 (40 Stat. 755), as amended by the Act of June 20, 1936 (49 Stat. 1555), and by virtue of the Reorganization Plan II (53 Stat. 1431) and in accordance with section 4(a) of the Administrative Procedure Act of June 11, 1946 (60 Stat. 238).

Having due regard to the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of migratory birds included in the terms of the Convention between the United States and Great Britain for the protection of migratory birds, concluded August 16, 1916, and the Convention between the United States and the United Mexican States for the protection of migratory birds and game mammals, concluded February 7, 1936, I hereby designate as a closed area in or on which pursuing, hunting, taking, capturing, or killing of migratory birds, or attempting to take, capture, or kill migratory birds is not permitted, all that area of land and water in Stewart County, Tennessee, described as follows:

All the area of the bed of the Cumberland River, bank to bank, submerged or exposed, including the waters thereof, between river mile 90.0, approximately one-quarter mile downstream from Dover Island, and river mile 102.25, approximately one-half mile downstream from the confluence of Wells Creek with the Cumberland River. The area is immediately contiguous to and abutting upon lands of the United States (Cross Creeks National Wildlife Refuge) acquired by the Corps of Engineers as part of the Barkley Dam and Lake Barkley Project.

[F.R. Doc. 63-10735; Filed, Oct. 7, 1963; 11:34 a.m.]

SUBCHAPTER C—THE NATIONAL WILDLIFE REFUGE SYSTEM

PART 32—HUNTING

Kern National Wildlife Refuge, California

On page 9645 of the FEDERAL REGISTER of August 31, 1963, there was published a notice of a proposed amendment to § 32.11 of Title 50, Code of Federal Regulations. The purpose of this amendment is to provide for public hunting of migratory game birds on the Kern National Wildlife Refuge, California, as legislatively permitted.

Interested persons were given 30 days in which to submit written comments, suggestions, or objections with respect to the proposed amendment. No comments, suggestions, or objections have been received. The proposed amendment is hereby adopted without change.

Since this amendment benefits the public by relieving existing restrictions on hunting, it shall become effective upon publication in the FEDERAL REGISTER (sec. 10, 45 Stat. 1224; 16 U.S.C. 715i).

1. Section 32.11 is amended by the addition of the following area as one where hunting of migratory game birds is authorized:

§ 32.11 List of open areas; migratory game birds.

* * * * *

CALIFORNIA

Kern National Wildlife Refuge.

STEWART L. UDALL,
Secretary of the Interior.

OCTOBER 1, 1963.

[F.R. Doc. 63-10648; Filed, Oct. 7, 1963; 8:48 a.m.]

PART 32—HUNTING

Monte Vista National Wildlife Refuge, Colorado

The following special regulation is issued and is effective on date of publication in the FEDERAL REGISTER.

§ 32.22 Special regulation; upland game; for individual wildlife refuge areas.

COLORADO

MONTE VISTA NATIONAL WILDLIFE REFUGE

Public hunting of upland game on the Monte Vista National Wildlife Refuge, Colorado, is permitted only on the area designated by signs as open to hunting. This open area, comprising 4,682 acres or 35 percent of the total area of the refuge, is delineated on a map available at the refuge headquarters, Monte Vista, Colorado, and from the Regional Director, Bureau of Sport Fisheries and Wildlife, P.O. Box 1306, Albuquerque, New Mexico, 87103. Hunting shall be subject to the following conditions:

(a) Species permitted to be taken: Pheasants, cottontail and jackrabbits.

(b) Open season: Pheasants—from 12 o'clock noon, s.t., to sunset November 9, and from sunrise to sunset November 10 through November 17, 1963, inclusive. From 12 o'clock noon, s.t., to sunset December 14, and from sunrise to sunset December 15 and 16, 1963. Cottontail and jackrabbits—from 12 o'clock noon, s.t., to sunset November 9, and from sunrise to sunset November 10 through November 14, 1963, inclusive. From 12 o'clock noon, s.t., to sunset November 15, and from sunrise to sunset November 16 through December 13, 1963, inclusive. From 12 o'clock noon, s.t., to sunset December 14, and from sunrise to sunset December 15 through December 19, 1963, inclusive.

(c) Daily bag limits: Pheasants 3 cocks, cottontail 10, jackrabbits no limit.

(d) Methods of hunting: (1) Weapons—Shotguns only (not larger than 10 gauge and incapable of holding more than 3 shells) fired from the shoulder.

(2) Dogs—Not to exceed two dogs per hunter may be used for the purpose of hunting and retrieving.

(e) Other provisions: (1) The provisions of this special regulation supplement the regulations which govern hunting on wildlife refuge areas generally which are set forth in Title 50, Code of Federal Regulations, Part 32.

(2) A Federal permit is not required to enter the public hunting area.

(3) The provisions of his special regulation are effective to December 20, 1963.

JOHN C. GATLIN,
Regional Director, Bureau of Sport Fisheries and Wildlife.

SEPTEMBER 17, 1963.

[F.R. Doc. 63-10621; Filed, Oct. 7, 1963; 8:45 a.m.]

PART 32—HUNTING

Kirwin National Wildlife Refuge, Kansas

The following special regulation is issued and is effective on date of publication in the FEDERAL REGISTER.

§ 32.22 Special regulation; upland game; for individual wildlife refuge areas.

KANSAS

KIRWIN NATIONAL WILDLIFE REFUGE

Public hunting of upland game on the Kirwin National Wildlife Refuge, Kansas, is permitted only on the area designated by signs as open to hunting. This open area, comprising 1,890 acres or 18 percent of the total area of the refuge, is delineated on a map available at the refuge headquarters, Kirwin, Kansas, and from the Regional Director, Bureau of Sport Fisheries and Wildlife, P.O. Box 1306, Albuquerque, New Mexico, 87103. Hunting shall be subject to the following conditions:

(a) Species permitted to be taken: Pheasants, quail, and rabbits.

(b) Open season: From one-half hour before sunrise to sunset. Pheasants—from November 9 through December 8, 1963, inclusive. Quail—from November 16 through November 24, 1963, inclusive; and on November 26, 28, 29, 30, December 1, 3, 5, 7, 8, 10, 12, 14, and 15, 1963. Rabbits—only during those hours and on those days during the legal open season for the taking of pheasants and quail.

(c) Daily bag limits: Pheasants 3 cocks, quail 8, cottontails 10, jackrabbits no limit.

(d) Methods of hunting: (1) Weapons—Shotguns only (not larger than 10 gauge and incapable of holding more than 3 shells) fired from the shoulder.

(2) Dogs—Not to exceed two dogs per hunter may be used only to hunt and retrieve upland game.

UNITED STATES GOVERNMENT

2-Way Memo

Subject: Hunting Regulations for Upland Game

DATE OF MESSAGE: Sept. 10, 1963

DATE OF REPLY:

INSTRUCTIONS
Use routing symbols whenever possible.
SENDER:
Forward original and one copy. Conserve space.
RECEIVER:
Reply below the message, keep one copy, return one copy.

To: Refuge Manager
Monte Vista Refuge
Monte Vista, Colorado

5027—101

FOLD — USE BRIEF, INFORMAL LANGUAGE — FOLD

Attached is a draft prepared for upland game hunting regulations on the Monte Vista Refuge. Please review and return, with any corrections or insertions to be made.

On the December 14 pheasant hunting--does it begin at 12 o'clock noon or at sunrise?

Lloyd F. Gunther

Lloyd F. Gunther

SEP 13 1963

RECEIVED

Attachment

On December 14, shooting hours for pheasant will begin at 12 o'clock noon. Please notice corrections on attached sheet. Pheasant and Waterfowl shooting hours are not run concurrent, therefore shooting of pheasants will continue from sunrise to sunset from November 10 through November 17, even though there will be a noon opening for waterfowl on November 15. It will also be noted that a noon opening will be present for Pheasants on December 14th., but that waterfowl hunting for this day will be permitted from sunrise to sunset.

The hunting of rabbits will be within the most restrictive hours as set up for waterfowl and pheasants, please note change we have made on attachment.

We realize it would probably be better to have all hours of hunting start at the same time but as hunters will be permitted to hunt earlier on Pheasants on November 15 throughout the valley, it is suggested that we go along with the same hunting times as the State has set up as it would be extremely difficult to conduct the hunt here on the refuge at different times than the state.

Charles R. Bryant

Charles R. Bryant

From: Acting Regional Supervisor
Branch of Wildlife Refuges
Bureau of Sport Fisheries and Wildlife
P. O. Box 1306
Albuquerque, New Mexico 87103

OPTIONAL FORM 27
OCTOBER 1962
GSA GEN. REG. NO. 27

1. TO BE RETAINED BY ADDRESSEE

Regional Director, Bureau Sport Fisheries and Wildlife, P.O. Box 1306
Albuquerque, New Mexico
Refuge Manager, Monte Vista National Wildlife Refuge
P.O. Box 566, Monte Vista, Colorado

9/9/63

Regulations Governing Hunting Waterfowl, Pheasants, Rabbits during 1963 Hunting Season

As your office knows the State Department recently chose the dates of November 15 through December 19 for the regular waterfowl season in the state and it is requested that your office issue the necessary information to the Washington office for publication in the Federal Register for opening certain portions of the Monte Vista Refuge to waterfowl hunting.

On September 6, the Game and Fish Commission set the dates from noon of November 9 through November 17 and December 14, 15 and 16 for hunting pheasants in the San Luis Valley of Colorado. The bag limit will be three cock birds with 6 in possession after opening day. The shooting hours after the first day will be from sunrise to sunset, which are the same as those for waterfowl, therefore, it is recommended that we also adopt this season for the refuge.

We are also recommending that a season be permitted on cottontail rabbits and jackrabbits during the pheasant and regular waterfowl season. The shooting hours for rabbits will be concurrent for those permitted on pheasant and migratory waterfowl, with the bag limit and possession limit being 10 with no limitations being placed on jack rabbits.

For information concerning rabbit hunting, please refer to "Ammendment to Regulations of the Game and Fish Commission of the State of Colorado" Sections #900, 901 and 902, which is attached.

We are also attaching a copy of the regulations governing the hunting of waterfowl, pheasants and rabbits on the Monte Vista National Wildlife Refuge for the 1963 hunting season. The map on the reverse side of these regulations needs corrections as shown and certain portions on the front side need changing as we have indicated on the attached sheets. It will be noted that we are recommending that no permits be required this year, as the necessary information needed can be secured by contact with the hunters at the various parking areas, or through field contact.

It will be appreciated if 3,000 copies of these regulations can be sent tc us in the near future.

Charles R. Bryant

CRB/mg

Monte Vista National Wildlife Refuge
P.O. Box 566
Monte Vista, Colorado

August 29, 1963

Dr. Aelred Geis
Assistant Director
Migratory Bird Population Station
Bureau of Sport Fisheries & Wildlife
Laurel, Maryland

Dear Al:

Pete Bryant, Refuge Manager, Monte Vista Refuge, is sending you 200 names of persons who hunted on the refuge last year. This should solve our problem for the wing collection program in the San Luis Valley.

These names will not be sent until Tuesday because of the long week end. Also, we have no idea of their normal season harvest potential.

Yours truly,

Jack R. Grieb

cc: Charles R. Bryant ✓
Robert M. Ballou

Assistant Director, Migratory Bird Population
Station, Bureau of Sport Fisheries & Wildlife
Laurel, Maryland

9/3/63

Refuge Manager, Monte Vista National Wildlife Refuge
P.O. Box 566, Monte Vista, Colorado

Wing Collection Program, San Luis Valley, Colorado, for the 1963 Hunting Season

Listed below are waterfowl hunter's names that can be used in the wing collection program during the 1963 hunting season for the San Luis Valley, Colorado

The following people reside in Saguache, Colorado and have no post office box numbers or street addresses, but mail sent to them at the local post office will reach them:

SAGUACHE, COLORADO

1. Coba, Darrel
2. Coleman, Paul
3. Crowley, George
4. Hawkins, Earl
5. Howard, Dan
6. Schmittle, Kenneth
7. Spriggs, Earl
8. Welton, Leo
9. Woodard, John

The following names are from Center, Colorado and may be reached through the local postoffice.

CENTER, COLORADO

10. Alexander, Mickey
11. Baker, John
12. Beiriger, Penard
13. Bernard, Bob
14 Bloxom, Ernest
15. Bowers, Bryan
16. Campbell, Ross
17. Clutter, Ray
18. Cooper, Bob
19. Cottrell, L.A.
20. Dabney, Ralph
21. Dalby, Ross
22. Davis, John
23. Dillon, Cecil
24. Dillon, Duane
25. Edwards, Keith
26. Entz, Lewis
27. Esterbrooke, Ronnie
28. Felmlee, Robert
29. Felmlee, Don
30. Finley, R. E.
31. Ford, William
32. Fox, Ray
33. Gardner, Bruce
34. Gardner, Robert
35. Guthrie, Ed
36. Kendrick, Ralph
37. Kinser, Lloyd
38. Kopfman, Bill
39. McClure, John
40. Montgomery, Kenner
41. Noffsinger, William
42. Oliver, David
43. Olson, Jim
44. Olson, Nels
45. Rice, John
46. Scott, Gene
47. Stoddard, Burt
48. Taylor, Carl
49. Twite, Harvey
50. Willis, Jack
51. Lewis, Hubert

The following names are from Del Norte, Colorado and may be reached through the local post office.

DEL NORTE, COLORADO

52. Armstrong, Mike
53. Armstrong, Patrick
54. Bower, Barnett
55. Black, Ernest
56. Cogburn, Travis
57. Cook, Cory
58. Davis, Art
59. Davis, Paul
60. Dilley, Don
61. DeVine, James
62. Davis, Mick
63. Frye, K. W.
64. Fuller, Stanley
65. Gerstner, Rudy
66. Goodrow, Dr. W. E.
67. Heriford, Delbert
68. Higman, Ed
69. Hibbs, Alva B.
70. Keeling, W. O.
71. Murray, Francis
72. Off, Chet Jr.
73. Robers, Jesse
74. Sittler, Paul
75. Spikes, Leo
76. Simpson, Alfred
77. Smedley, Howard
78. Smedley, Albert
79. Stewart, Eugene
80. Terrell, Tim
81. Wellman, Bill Jr.
82. Wright, R. Sam
83. Zayac, Dr. Edward
84. Robran, Forrest

The following names are from South Fork, Colorado and may be reached through the local post office:

SOUTH FORK, COLORADO

85. Bacher, Joseph c/o Glynn Carson
86. Carson, Glynn
87. Carson, Roy c/o Glynn Carson
88. Chapman, Orville
89. Cochran, Earl
90. Cochran, Myron
91. Easterling, Ken
92. Robran, Forest
93. Steele, Charles
94. Wellman, Leonard
95. Wheeler, Gordon

The following names are from La Jara, Colorado and may be reached through the local post office:

LA JARA, COLORADO

96. Bahr, Greg
97. Bahr, John
98. Cooper, William
99. Cornum, Dale
100. Cornum, Parley
101. Hamilton, Claude
102. Hamilton, Hugh
103. Hamilton, James
104. Hostetter, Harvey
105. Kelloff, Thomas
106. Lara, Max
107. Marquez, Albert
108. Skinner, Dell T.
109. Skinner, George
110. Skinner, Harold
111. Sanders, Marion
112. Sullivan, William
113. Valdez, Louis

The following names are from Sanford, Colorado and may be reached through the local post office:

SANFORD, COLORADO

114. Bailey, Robert
115. Bailey, Stanley B.
116. Canty, John
117. Crawford, Richard
118. Crowther, Elwin
119. Crowther, Evert
120. Crowther, Norman
121. Crowther, Quinten
122. Crowther, Raymond
123. Crowther, Wayne
124. Crowther, Willard

The following names are from Antonito, Colorado and may be reached through the local post office:

ANTONITO, COLORADO

125. Bedford, Billy Jr.
126. Cope, Roscoe B.
127. Davis, Ralph
128. Fulton, James W.
129. Haberlein, Jack
130. Logback, Ivar
131. Wallace, Claude

The following names are from Blanca, Colorado and may be reached through the local post office:

BLANCA, COLORADO

132. Noble, Roe
133. Peoples, Chester

The following names are from Mesita, Colorado and may be reached through the local post office:

MESITA, COLORADO

134. Blackstone, James B.
135. Buhr, Edward E.
136. Buhr, Edward
137. Hall, Edgar
138. Quiller, Edward E.

The following names, which include mailing addresses, are from Alamosa, Colorado:

ALAMOSA, COLORADO

139. Anderson, Andrew, 111 Pike Ave.
140. Andre, John, 713 2nd St.
141. Babnick, William, 525 Alamosa, Ave.
142. Bachus, Paul, 211 Ross
143. Bates, Dexter, West of Alamosa, Rural Route
144. Beckley, James, 195 Edgemont

Continuation of names and mailing addresses from Alamosa, Colorado:

ALAMOSA, COLORADO

145. Bennett, Al - 116 San Juan
146. Bergman, Carl - 1416 2nd Ave.
147. Bertch, Charles - 614 2nd Ave.
148. Blasi, Roger,- 89 El Camino Drive
149. Blickhahn, Henry - 815 3rd Ave.
150. Buhr, La Verne - Malt Shop
151. Chacon, Al - 902 10th
152. Cook, James - North-west of Alamosa
153. DeSouche, William 211 West Ave.
154. Foote, Robert - East of Alamosa
155. Guzman, G. F. - 86 Sierra Ave.
156. Hartley, Ray - 616 1st.
157. Hartman, Cliff - Zipprodt Finance Co.
158. Headlee, L. N. - Box 244
159. Higel, Harold - Rt. 1
160. Hill, Douglas - 312 West Ave.
161. Hutcheson, Wayne - 519 1st.
162. Kavanaugh, L. D. - 208 Richardson
163. Keating, Delmar P. - South of Alamosa
164. Knapp, Bernard - South-west of Alamosa
165. Koch, William - 1214 3rd. Ave.
166. Krout, A. J. - 817 2nd Ave.
167. Linn, Ray L. - 424 9th Ave.
168. Leary, Dr. Wallace - Rt. 1
169. Langston, Nyle - 102 Blanca Ave.
170. Ness, Paul - 615 Berkley Ave.
171. Newton, Arthur - West of Alamosa
172. Newton, Robert - Rt. 1
173. Peterson, Carl A. - Rt. 1
174. Peterson, Robert C. - Rt. 1
175. Price, Curtis - 95 El Camino Drive
176. Reese, Elton A. - 119 Poncha Ave.
177. Relyea, Albram - North-west of Alamosa
178. Seaburg, John - 317 Edison
179. Sherman, C. A. - 1364 Main
180. Sidmore, Keith - Rt. 2
181. Stevens, Newton - 517 Bell
182. Sooter, Parker - 431 Poncha Ave.
183. Sutak, John - Rt. 2
184. Thompson, Claus - 529 9th St.
185. White, R. E. - 119 La Veta
186. Watkins, Paul - 115 Edison
187. Holmquist, R. E. - 81 Sierra
188. Jack, Richard - 705 Berkley
189. Janney, Charles - North-east of Alamosa
190. Milyard, R. E. - East of Alamosa

The following names, which include mailing addresses are from Monte Vista, Colorado:

MONTE VISTA, COLORADO

191. Allen, Archie - 348 Morris
192. Arnett, Kenneth - 34 Washington
193. Bartlett, William R. - 929 1st. Ave.
194. Beatty, John H. - 325 1st. Ave.
195. Bever, Jack - 330 Morris
196. Bethe, E. E. - 113 Euclid
197. Bielser, Harry - 1535 Grand Ave.
198. Burkholder, Howard - Rt. 1
199. Brown, J. L. (Dr.) - 404 Dunham
200. Burkhart, H. W. - Rt. 1
201. Burns, Doyle - 212 Davis
202. Cannon, M. R. - 350 Dennis
203. Cassidy, Dr. C. A. - 358 Dunham
204. Chrisite, Jack E. - Rt. 1
205. Colwell, Robert - 51 Country Club Drive
206. Corlett, Charles - 924 1st. Ave.
207. Corlett, Claude - 927 1st. Ave.
208. Crenshaw, V. P. - Henderson Rd.
209. Crook, Jack - 135 Adams
210. Crook, John W. - 459 Madison
211. Crook, Purl - 229 Jefferson
212. Deacon, Harold L. - 320 Farraday
213. Deacon, Warren - 416 2nd.
214. DeSautell, Bud - 240 Dennis
215. Detweiler, Robert - 249 Davis
216. Ditto, Claude - 116 Washington
217. Drake, Orville - Rt. 1
218. Eckles, R. V. - 1st & Washington
219. Ellsworth, William - 357 Bronk
220. Fassett, Willis - West of Monte Vista
221. Firkins, Walt - Verde Vista Ave.
222. Garnett, Dean - 347 Davis
223. Haefeli, John - Henderson Rd.
224. Headlee, Don S. - 245 Dunham
225. Hinkley Dr. C. W. - 208 Morris
226. Hoffman, Richard L. - 248 Morris
227. Jackson, B. F. - West of Monte Vista
228. Jones, Robert L. - Verde Vista
229. Jones, W. J. -
230. Kelso, Bill - Rt. 2
231. Kunugi, Jim - 326 Batterson
232. Lancaster, Ike - 159 Morris
233. Lentz, Joe - Rt. 1
234. Lenzini, Albert - Verde Vista
235. Lockhart, Al - 236 Batterson
236. Lounsbury, Donald - 729 Adams
237. Malouff, Joe - Henderson Rd.
238. Mathias, Ward - 253 Morris
239. Metz, Kenneth - Rt. 1
240. Mitchell, James - 219 Dunham
241. Nielsen, R. W. - Verde Vista
242. Reay, Jim - 405 Davis
243. Rensdale, R. W. - 331 Dunham

Continuation of names and addresses from Monte Vista, Colorado:

MONTE VISTA, COLORADO

244. Remick, T. R. - 28 Dennis
245. Rheingans, Howard - 243 Dennis
246. Rhoe, Gordon H. - 255 Bronk
247. Sanchez, Albert - 611 Washington
248. Shriver, Henry - Rt. 2
249. Sickles, Frank - 245 Stallo
250. Spencer, Dale W. - 259 Jackson
251. Stehwien, Howard C. - 107 Dunham
252. Stephens, H. E. - Rt. 1
253. Swartz, S. U. - 18 Morris
254. Stevens, E. W. - 111 Bronk
255. Velasquez, A. S. - 323 Farraday
256. Young, G. E. Jr. - Rt. 1

Charles R. Bryant

CRB/mg

cc: Regional Office
Jack Grieb
Robert M. Ballou

Regional Director, Bureau of Sport Fisheries and Wildlife, Box 1306, Albuquerque, New Mexico

August 22, 1963

Refuge Manager, Monte Vista National Wildlife Refuge
Box 566, Monte Vista, Colorado

Informational Sheet For Special Waterfowl Season on the Monte Vista National Wildlife Refuge - October 1 through 18, 1963.

Please find attached a regulation sheet covering the hunting of Waterfowl, Pheasant, and Rabbits that has been in effect in the past that has been corrected so that it will fill the needs for the special season on waterfowl this year. It will be noted that several changes are needed in the map to show new lands that are now owned by the service. These lands are all in the closed portion of the refuge.

If the revision meets with you approval, it is requested that we be furnished with at least three thousand copies.of

Mr. Parker Sooter, President of the Colorado Game and Fish Commision was contacted this morning and it was found that the regular waterfowl season will be set by the commision on August 27th. and that the Pheasantsseason will be set on Sept. 6th.. It appears now as if the pheasant season will fall within the regular waterfowl season for the state but in any case we will keep your office informed on the seasons set just as soon as possible.

Charles R. Bryant

Charles R. Bryant

Instructions for Conducting the Waterfowl Production Survey Based on Duck Nesting Transects (3 duplicates)

~1963-1964

MONTE VISTA REFUGE

INSTRUCTIONS FOR CONDUCTING THE WATERFOWL PRODUCTION SURVEY BASED ON DUCK NESTING TRANSECTS

INTRODUCTION

The annual waterfowl production survey on the Monte Vista Refuge is designed to accomplish a number of things:

1) Provide a representative, statistically adequate sample of the duck hatch by species as a basis to project for refuge duck production.

2) Provide information on the location, cover types used and success of duck nesting throughout the refuge by species and habitat unit as a means to evaluate the effect upon nesting of ecological succession and the effectiveness of habitat management practices.

3) Provide a consistent record of long-term population trends of other wildlife species important to the refuge.

The above information is vital to the refuge and it is therefore of utmost importance that the procedures outlined below be thoroughly understood and carefully and accurately executed.

APPROACH

From pre-sampling of Unit 15 in 1961 and of the entire refuge in 1962 and 1963 it was calculated that approximately 640 acres of transect sampling throughout the refuge would be required to obtain nesting data accurate within $\pm$ 10 - 15 percent at the 95 percent level.

One hundred forty-two permanent transects, 16½ feet wide and 300 feet apart, have been established in a north-south direction across all existing and proposed waterfowl habitat on the refuge. Croplands, upland rangelands and the headquarters site were eliminated from the area sampled by transects. Total area sampled is 11,570 acres. Acreage of the 320.50 miles of transects is 640, or a 5.5% sampling intensity. One half mile of transect 16½ feet wide equals one acre. Transect No. 1 was established a random distance from the southwest corner of the refuge in Unit 19; Transect No. 2 was established 300 feet east of No. 1, and this interval between transects was maintained across the refuge.

Transects are numbered consecutively from west to east. The markers for the odd-numbered transects are rectangular and are numbered along roads and at their north and south extremities. The markers for the even-numbered transects are square. For each transect, markers have been established about one half mile apart so that with binoculars at least two markers ahead are in sight.

FIELD PROCEDURES

Breeding Population Count

During late April and early May sufficient counts should be made throughout the entire refuge and in all types of habitat to obtain both an index to the size of the breeding population and its species composition. Early counts will provide information most useful for the early nesting mallards and pintails, and the late counts for mid- and late-season nesters. The accuracy of the results for each species will be improved if counts are made to record birds as pairs, single males, single females, and groups.

This information will serve as an index to waterfowl production potential and will be used in computing the species composition of waterfowl production.

Nesting Transects

The nesting transects will be covered three times each year. The first series will commence at the beginning of the week that includes May 20; the second series at the beginning of the week that includes June 16; and the third series the week that includes July 13. The purpose of this is to space the series about 27 days apart. Four men should be able to walk all of the transects in about 10 working days. This is an average of 8 miles per man per day. It is desirable to complete each series in as short a period as available manpower permits.

The first two series will be complete coverages to locate all nests within the transects; the third series will be a partial coverage to complete the history of nests recorded in the second series.

Each man walking transects should have the following equipment:

- Hip boots or wading equipment
- Binoculars
- Aerial photos w/overlays of units to be covered
- Supply of field forms B-1 and B-2
- Aerial photo protective covers
- Field forms protective binder
- 2 sharp 4H-6H pencils with erasers
- Supply of 36" lathe sharpened to a point at one end
- Hammer or other driving device for lathe
- Felt-tipped marking pen (Marks-A-Lot type)
- 8 1/4 or 4 1/8 foot conduit measuring rod
- Mosquito repellant

A pack sack is convenient for carrying the above equipment.

Each transect series should start at the west side of the refuge and work east. As a general rule, each man should complete the unit he is on before progressing to the next one. As an example, the following schedule might work out well: First man, Unit 19; second man, Unit 14; third man, Unit 20; fourth man, Unit 6. When the first man finishes Unit 19, he would move over and begin on Unit 21.

Instructions and suggestions for each man running transects are as follows:

1) Estimate the amount of transect you will cover in a half day so that you can park your vehicle near where you will be at lunch time and at quitting time.

2) Make sure each day that you have all the necessary equipment with you.

3) Make sure you are on the right transect and the right location on that transect.

4) Always begin each day at a transect marker, not half way in between somewhere; by the same token, finish each day at a transect marker.

5) A requirement for this procedure is that all three series cover exactly the same ground. This is extremely important. Therefore, the center line of each transect is a straight line between one transect marker and the next. The transect extends 8¼ feet to the east and west of this center line. In establishing the transect markers, an attempt was made to place them in a perfectly straight line, but not always successful. Therefore, to determine the center line, stand at the transect marker and, with your binoculars, sight ahead to the next transect marker. Pick out some landmark (either the second transect marker ahead or some physical feature) that is beyond and directly in line with the next transect marker. While walking the transect you can always place yourself exactly on the center line by lining up the next transect marker and the landmark you have picked out. The shape of the marker (square or rectangular) will aid you in sighting on the right one. When you reach the first marker ahead, re-establish the center line to the next marker in the same way.

6) In walking the transect, it is not necessary that you always walk the exact center line of the transect so long as you thoroughly search all cover that lays 8¼ feet on each side of the center line.

7) As you walk the transect, refer to the aerial photo frequently enough so that you can always locate yourself on the photo. Ditches, sharp changes of cover type, roads, water, etc., are helpful references. With a little practice and experience, you will find that you can usually spot yourself exactly on the aerial photo.

8) Only record and mark nests (ducks, coots, and pheasants) that are within the transect. To determine this, position yourself on the transect so that the next marker ahead and the marker or landmark beyond that are in exactly the same relative position as when you started. This should place you on the center line of the transect. By placing one end of the measuring rod on

your belt buckle or midway between your feet and extending it at right angles to the transect line, you can determine whether the nest falls within the transect. If half, or over half, of the nest is within the transect, it should be recorded.

9) Each recorded duck nest will be assigned a number. Before starting the transects, the survey leader will assign you a series of numbers (1-50, 51-100, 101-150, etc.) to prevent duplication of numbers. Nests will be numbered consecutively as you find them. Should you run through all the numbers assigned you, obtain a new series of numbers from the survey leader.

10) Mark each duck, coot and pheasant nest, whether active, destroyed, deserted, flooded, or whatever, at its exact location on the field overlay. Coot nests will be identified by the abbreviation "Co". Pheasant nests will be identified by the abbreviation "X". Duck nests will be identified by their number and by the abbreviations given below: Circle the active nests on the overlay (the number, not the abbreviation for ducks).

Mallard	- Ma
Pintail	- Pi
Gadwall	- Ga
Shoveller	- Sh
Blue-winged teal	- Bwt
Cinnamon teal	- Ct
Green-winged teal	- Gwt
Unidentified teal	- Tx
Baldpate	- Ba
Redhead	- Rd
Ruddy	- Ru
Unknown	- Ux
Coot	- Co

11) For <u>active</u> nests only (laying, incubating or hatching) of ducks, coots and pheasants, erect a lathe 10 feet to the west of the nest and write the nest number, species abbreviation, and number of eggs on the lathe with the felt-tipped pen.

For <u>inactive</u> nests (destroyed, deserted, flooded, hatched) place a 4" - 6" piece of lathe in the nest to indicate to the man who next runs the transect that the nest has been recorded.

12) If the eggs are exposed (usually as a result of the hen flushing at your approach) cover them with down or other nest material and arrange nest cover to conceal nest.

13) Use of Form D-1 --- Duck Nesting Survey

a. Before starting out, fill out <u>Observer</u>, <u>Year</u>, and <u>Unit No.</u> Use a separate form for each unit.

PUT ONLY ONE UNIT ON A FORM

b. Upon finding a nest of a duck or coot, fill out all of the form except for Fate of nest.

c. Most of the entries are obvious

Nest No: Use the same number for duck nests you assigned on the overlay. Merely indicate the abbreviation "Co" for coot nests (no number).

Species: If unknown, so state. The hen will often flush from the nest as you approach and she can then usually be easily identified. If she is not present, refresh your knowledge of duck eggs and nests by reference to the Refuge collections, and of nests by reference to the Journal of Wildlife Management, October, 1950, Vol. 14, pages 452 to 457.

Nest Status: Check one

Cover Type: A key to the symbols is attached. Check one or more, whatever is appropriate, and circle the primary cover type in a 20' radius circle around the nest. If the nest site is flooded or if it is apparent that it was flooded at the time the nest was constructed, check Flooded. Examples: For a nest in flooded greasewood, you would check Sve and Flooded and circle your check under Sve; for a nest in mixed sweetclover and grasses, you would check Mof and Gx and circle your check under Mof.

Remarks: For observations of special interest, place a check in this column and write out the remark on the back of the form, identifying it with its nest number.

d. During the next transect series make sure you have the forms of the previous series for the units you will cover, and fill out the appropriate columns under Fate for those active nests marked with a lathe. Try and determine the fate of the nest from clues to the condition of the nest and eggs. If unknown, so state. When the fate of a nest (active nest from previous transect series) has been recorded, remove the erected lathe and place a piece of it in the nest.

14) Use of Form D-2 --- Wildlife Trend Data

a. You will note that a separate form will be used for each Unit. Fill in the Unit No., Observer, and Year. Concern yourself only with those species listed.

PUT ONLY ONE UNIT ON A FORM

b. Study this form. The second column indicates during which transect series you should keep records for each species. You will note that the pheasant is the only species on which records should be kept for more than one series.

c. Record only those items for which blank spaces are provided:

Pheasant: Locate each nest on the aerial photo overlay with and X. There are five spaces (starting with the Transect No. column) to record information on each nest. Fill these in, in accordance with instructions given for ducks. Locate each active nest with a lathe marked with an X. Record the fate of the nest during the next transect series and place a small piece of lathe in the nest. Make sure you have the forms of the previous series for the units you will cover.

Snowy egret, black-crowned night heron, avocet, phalarope, short-eared owl, marsh hawk, blackbird, muskrat, badger, skunk: keep track of the number of active nests, dens, or houses that are within the transects for each of these species. Enter the totals in the spaces provided.

Red-tailed hawk, great-horned owl, magpie: keep track of the number of nests seen for each of these species, both on and off transects, and enter the totals in the appropriate spaces.

Cottontail, jackrabbit, mourning dove: Record the totals of all observations of these species. There will be some duplication, but this is expected and should not affect the validity of trends. However, don't record an individual more than once if you are sure he is just moving along ahead of you.

Brood Samples

During late June, July and early August, enough brood surveys should be run on the refuge to obtain records of the number of ducklings per brood of a minimum of 10, and preferably 20, complete Class IIc and III broods of at least each of the following species:

Mallard	Shoveller
Pintail	Blue-winged (Cinnamon) Teal
Gadwall	Green-winged Teal

In conducting the survey, care should be taken to representatively sample all brood areas on the refuge, to record only those broods for which you are sure you have seen the entire brood, and to avoid recording the same brood more than once. Early morning and late evening are oftentimes the best for observing broods. Binoculars and spotting scope are recommended

equipment. You should familiarize yourself with the age classification of broods as presented in the attached diagram. Form D-3, Duck Brood Sample Data, should be used in recording field observations.

PLANT SPECIES SYMBOLS

Sci. Abbr.	Scientific Name	Common Name	Type Formula Abbr.
Clx	Chlorophyceae species	Green Algae	Green Algae (Clx)
Lmi	Lemna minow	Duckweed	Duckweed (Lmi)
Raq	Ranunculus aquatilis	Buttercup	Buttercup (Raq)
Ppe	Potamogeton pectinatus	Sago Pondweed	S.Pondweed (Ppe)
Zpa	Zannichellia palustris	Horned Pondweed	H.Pondweed (Zpa)
Chx	Chara species	Muskgrass	Muskgrass (Chx)
Sgx	Sagittaria species	Arrowhead	Arrowhead (Sgx)
Tla	Typha latifolia	Cattail	Cattail (Tla)
Sva	Scirpus Validus	Softstem Bulrush	S. Bulrush (Sva)
Sac	Scirpus acutis	Hardstem Bulrush	H. Bulrush (Sac)
Jba	Juncus balticus var. littoralis	Wiregrass	Wiregrass (Jba)
Ex	Eleocharis species	Spikerush	Spikerush (Ex)
Cx	Carex species	Sedge	Sedge (Cx)
Dst	Distichlis stricta	Saltgrass	Saltgrass (Dst)
Hju	Hordeum jubatum	Foxtail Barley	F. Barley (Hju)
Car	Cirsium arvense	Canadian Thistle	C. Thistle (Car)
Mof	Melilotus officinalis	Sweetclover	Sweetclover (Mof)
Ksc	Kochia scoparia	Kochia Weed	Kochia Weed (Ksc)
Sx	Salix species	Willow	Willow (Sx)
Sve	Sarcobatus vermiculatus	Greasewood	Greasewood (Sve)
Crx	Chrysothamnus species	Rabbit Brush	Rabbit Brush (Crx)
Gx	Grass species (other than listed)		Grasses (Gx)
Wx	Weed species (other than listed)		Weeds (Wx)
B	Bare ground and debris		Bare (B)
OW	Open water		Open water (OW)

x - indicates species

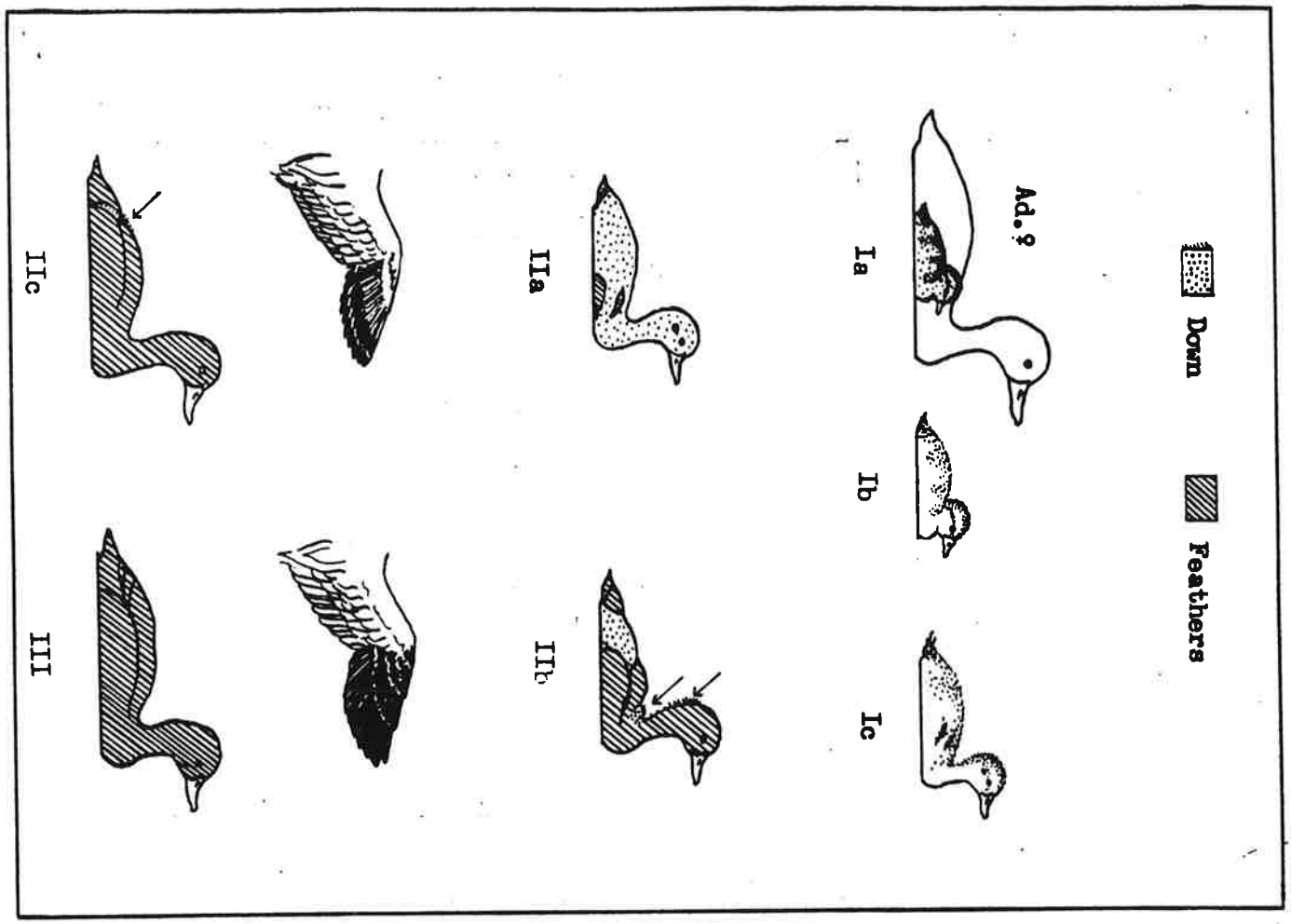


Figure I

Appearance of Young at Beginning Point of Each Plumage Subclass*

*Class I: Eyeline in dabblers only (except baldpate)

Table II - Approximate Age Span (in days) For Each Plumage Subclass by Species

	Ia	Ib	Ic	IIa	IIb	IIc	III	Flying
Mallard	1- 6	7-12	13-18	19-25	26-35	36-45	46-55	52-60
Black Duck	1- 5	6-12	13-18	19-25	26-33	34-43	44-60	58-63
Gadwall	1- 6	7-14	15-18	19-27	28-38	39-44	45-50	48-52
Baldpate	1- 7	8-12	13-18	19-26	27-35	36-41	42-50	47+
Pintail	1- 5	6-12	13-18	19-23	24-33	34-43	44-51	46-57
Blue-wgd Teal	1- 5	6- 9	10-13	14-21	22-30	31-36	37-40	35-44
Shoveller	1- 6	7-13	14-17	18-27	28-35	36-44	45-50	47-54
Redhead	1- 6	7-18	19-24	25-32	33-45	46-54	55-60	60-63
Ring-neck	1- 5	6-10	11-16	17-24	25-30	31-38	39-49	49-53
Canvasback	1- 9	10-17	18-23	24-29	30-40	41-50	51-60	57-68
Lesser Scaup	1- 6	7-13	14-20	21-28	29-33	34-42	43-50	47+

Form D-1 | Field Form | Unit No.__________

Observer:__________ WATERFOWL PRODUCTION SURVEY DUCK & COOT NESTING DATA Year:__________

		First Observation				Nest Status							Cover Type															Fate							
Unit No.	Transect No.	Date	Nest No.	Species	No. Eggs	Laying	Incub.	Covered	Desert.	Destr.	Flooded	Unknown	Sx	Sve	Crx	Dst	Gx	Mof	Wx	Jba	Cx	Ex	Tla	Sva	Dike	Ditch	Flooded	Date	Hatched	No. Hatch.	Desert.	Destr.	Flooded	Unknown	Remarks (No.& expl. on back

Form D-2 Field Form

Unit No:_____ WATERFOWL PRODUCTION SURVEY--WILDLIFE TREND DATA Obs:_____ Year:____

Species	Record Data on Trans. Series: 1	2	3	Total Obs.	Total Nests, Dens, or Houses Obs.	Active Nests, Dens, & Houses on Trans.	Map Symbol	Trans. No.	Date 1st Obs.	No. Eggs	Fate: Hatched	No. hatch.	Desert.	Destr.	Flooded	Unknown	Cover Type: Sx	Sve	Crx	Dst	Gx	Mof	Wx	Jba	Cx	Ex	Tla	Sva	Dike	Ditch	Flood.
Pheasant	X	X	X	XXXXX XXXXX XXXXX XXXXX XXXXX	XXXXXX XXXXXX XXXXXX XXXXXX XXXXXX	XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX	X																								
Snowy Egret		X		XXXXX	XXXXXX																										
B.C.Night Her.		X		XXXXX	XXXXXX																										
Avocet		X		XXXXX	XXXXXX																										
Phalarope		X		XXXXX	XXXXXX																										
Short-ear.Owl		X		XXXXX	XXXXXX																										
Marsh Hawk		X		XXXXX	XXXXXX																										
R.-T.Hawk		X		XXXXX		XXXXXXXX																									
G.H.Owl	X			XXXXX		XXXXXXXX																									
Magpie	X			XXXXX		XXXXXXXX																									
Blackbird		X		XXXXX	XXXXXX																										
Muskrat	X			XXXXX	XXXXXX																										
Badger	X			XXXXX	XXXXXX																										
Skunk	X			XXXXX	XXXXXX																										
Cottontail	X				XXXXXX																										
Jack Rabbit	X				XXXXXX																										
Mourn. Dove		X			XXXXXX																										

Form D-3
Observer: ____________

WATERFOWL PRODUCTION SURVEY -- DUCK BROOD SAMPLE DATA

Year: ________

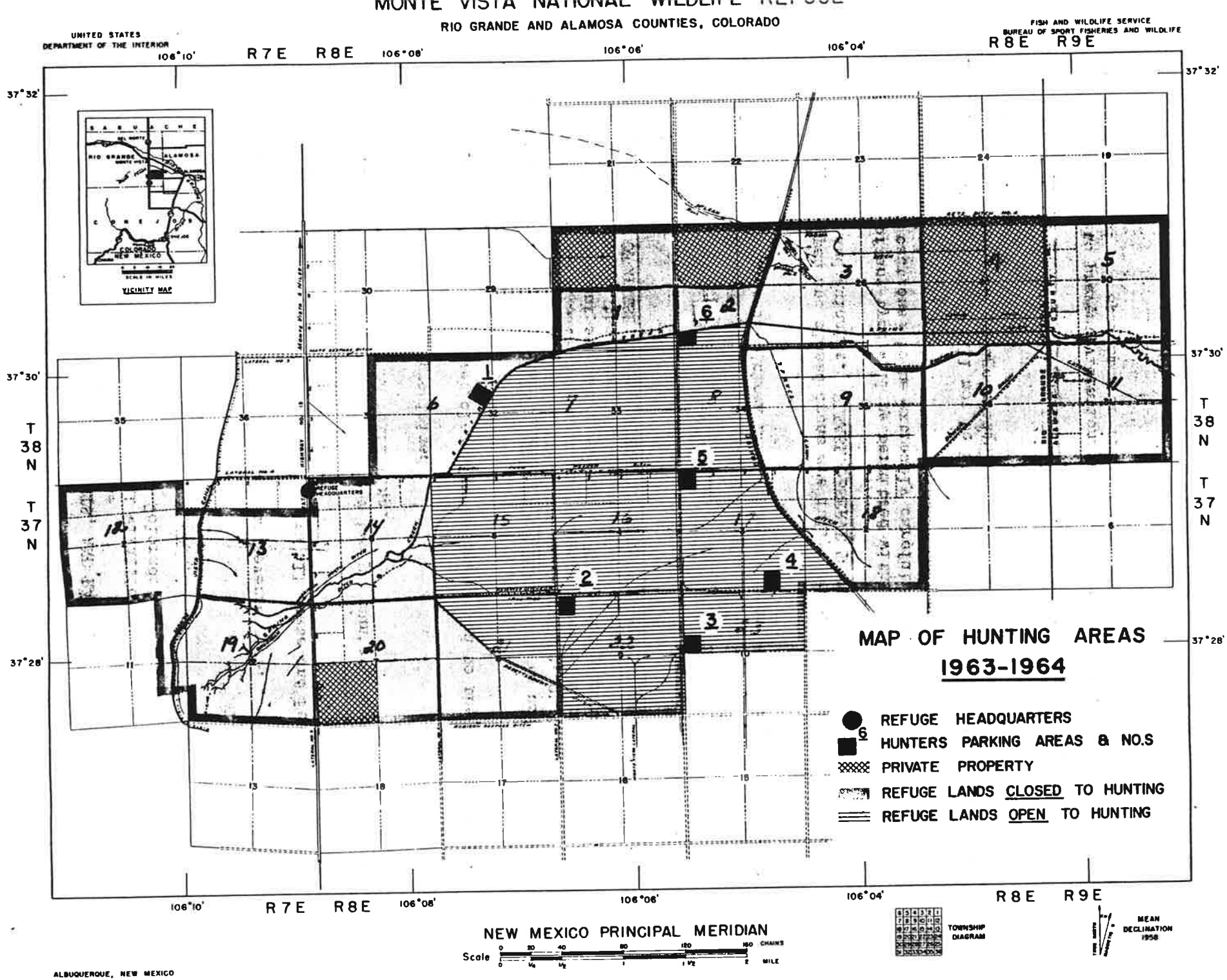
Date	Mallard			Pintail			Gadwall			Shoveller			B-W Teal			G-W Teal								
	Unit No.	Pond No.	No.duckl. Class IIc & III Br.	Unit No.	Pond No.	No.duckl. Class IIc & III Br.	Unit No.	Pond No.	No.duckl. Class IIc & III Br.	Unit No.	Pond No.	No.duckl. Class IIc & III Br.	Unit No.	Pond No.	No. duckl. Class IIc & III Br.	Unit No.	Pond No.	No.duckl. Class IIc & III Br.	Unit No.	Pond No.	No.duckl. Class IIc & III Br.	Unit No.	Pond No.	No.duckl. Class IIc & III Br.

MONTE VISTA NATIONAL WILDLIFE REFUGE

RIO GRANDE AND ALAMOSA COUNTIES, COLORADO

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



ALBUQUERQUE, NEW MEXICO

KEY

I. Down wholly white
   (A) Vane of breast feather wholly white (not applicable)

   (B) Vane of breast feather not wholly white
      1. (not applicable)
      2. Breast feather brown with white tip
         a. Down when flattened shows dense white 'center'; down and breast feather small; darkened portion of shaft breast feather darker than adjacent vane (Plate 13,D). . . . . Ruddy Duck

         b. Down without dense white 'center'; down and feather large; darkened portion of shaft of breast feather same as adjacent vane (Plate 13,E). . . . . Redhead

II. Down not wholly white
   (A) Vane of breast feather mainly white (white at distal end; basal downy portion light grayish-beige)
      1. (not applicable)
      2. Pigmented portion of down feather darker beige
         a. (not applicable)

         b. Down feathers (in bulk) half beige, half white; down diffuse white 'center'; down feather relatively small; shaft of breast feather light (Plate 14,D) . . . . . Green-winged Teal

   (B) Vane of breast feather not mainly white
      1. (not applicable)
      2. Vane of breast feather with conspicuous markings
         a. Vane of breast feather dusky with definite light terminal band and no other markings
            (1) Total shaft of breast feather dusky
               (a) Dark portion of breast feather evenly colored; narrow white tip; almost no white in down feather (Plate 15,B) . . . . . Greater Scaup Duck

               (b) Dark portion of breast feather unevenly colored
                  1. Darkest portion of breast feather adjacent to terminal white band (Plate 15,C) . . . . . Ring-neck Duck

                  2. Dark portion of breast feather shades gradually into wide white terminal band (Plate 15,D) . . . . . Lesser Scaup Duck

(2) Proximal third of shaft of breast feather light; distal portion darker

(a). Demarcation of dark area and light tip of breast feather vane a fairly straight transverse line; down feather with inconspicuous light tips (Plate 15,E). . . . . Canvasback

(b) Line of color demarcation decidely curved

i. Dark area of breast feather conspicuous tips (Plate 15,F). . . . . Widgeon

ii. Dark area of breast feather darkest in center; down feather with inconspicuous white tips (Plate 16,A). . . . . Gadwall

b. Vane of breast feather with conspicuous markings irrespective of tip characteristics

(1) Vane of breast feather with conspicuous dark central area surrounded on at least 3 sides with light marginal area

(a). Vane of breast feather with dark circular subterminal area (Plate 16,B) . . . . . Shoveller

(b). Vane of breast feather with dark elongated subterminal area

i. Down feather with conspicuous white 'center' and dark tips; proximal portion of breast feather very light (Plate 16,C) . . . Blue-winged Teal

ii. Down feather with inconspicuous white 'center'; down feathers appear (in bulk) almost evenly colored throughout; no white in vane of breast feather (Plate 16,D) . Pintail

(2) Vane of breast feather with alternating bars or a dark triangular area

(a). Either alternating bars of dusky and very pale buff or with more or less triangular area coming to point at distal end of shaft (Plate 16,E) . . Mallard

(b). (not applicable)

ANALYSIS AND SUMMARY OF DATA

Judgment should be exercised in drawing conclusions from the data.

The waterfowl production survey, when completely and carefully executed, is designed to provide information on the total nesting effort and number of successful duck nests for the entire refuge within an accuracy of ± 10 - 15 percent at the 95 percent level. Confidence limits will vary somewhat each year depending on the number and distribution of nests. In those years when it is only practical to run every other transect, or every third transect, confidence limits will widen substantially, as will become apparent when data are analyzed.

Since waterfowl production to flying age for the refuge is determined by applying sample counts of Class IIc and III broods to the nesting data, it is clear that errors in the sampling of broods will result in greater errors for waterfowl production estimates than for nesting success. Moreover, this procedure assumes no loss of total broods. In dry years this may seriously bias results.

Species composition of waterfowl production is based on the species composition of nesting data. For the more common species, particularly mallards, these data should be accurate. However, because the transects cover only five and one half percent of the nesting habitat, it is quite likely that nests of some of the less common breeding species will all be located off transects and will therefore not be recorded, or will be disproportionately represented on transects. Finally, even though every effort will be made to locate all nests on transects, it is possible that some nests of species like green-winged teal will be missed. For these reasons, the species composition of the breeding population is also used (given half the weight of the species composition of nesting data) in determining the species composition of duck production.

Even though it is highly desirable to maintain records on breeding populations, nesting, and broods by habitat unit, as a means to evaluate management practices and performance in each unit, reliability can be quite low for projections of waterfowl production on a habitat unit basis. From presampling, forinstance, it is estimated that confidence limits for waterfowl nesting in Unit 6, based on this procedure, would have been around ± 60 percent in 1963. Trends over the years can be followed, however, by reference to the mosaic overlays and Summary Forms D-4, D-5 and D-7.

Collection of data on other wildlife species during the nesting transects, with the exception of pheasants, is chiefly of value as long-term trends. Unless wide differences are noted between years, or a strong upward or downward trend is apparent over a short period of years, modest fluctuations should not be given much weight. Form D-11 presents this data from year to year for comparison purposes.

Procedure for Summarizing Duck and Coot Data and Estimating Production

Immediately upon completion of the third and final transect series, all forms (D-1 and D-2), maps and equipment should be turned in to the survey leader. He can then fill out Summary Forms D-4, D-5 and D-7. In some years it may not be possible to run all of the transects. In these cases every other transect, or every third transect could be run. Provision is made on these forms to indicate percent transect coverage so that for comparison purposes between years, a correction factor can be applied. Forinstance, nesting data from a transect coverage of every other transect would be multiplied by a correction factor of 2; a correction factor of 3 would be used for a transect coverage of every third transect.

Following the third transect run, the survey leader should also transpose the location, number and species abbreviation of all duck and pheasant nests from the field overlays onto the mosaic overlays in the office. Pheasants will be shown by an "X". On the mosaics circle the number for the nests that hatched, not the active nests (as was done for the field overlays).

New mosaic overlays should be used each year to record duck and pheasant nest locations.

Upon completion of the brood surveys, refuge duck production can be estimated. If desirable, Columns 1 - 13 of Summary Form D-6 and 6a (See Examples 4 and 4a on pages 14 & 15) can be completed prior to receipt of brood data from Field Form D-3. Computations logically should proceed in the following order:

A. Number of Nests and the Sum of their Squares

Prepare a listing of the number of duck nests found (for all three series combined) in each acre of transect, as shown in Example 1. Since one half mile of transect (8 inches on the mosaic overlay) equals one acre, lay off half mile segments of the transects on the mosaics and record number of duck nests found on each segment. Do not include coot or pheasant nests. Start with the south end of Transect No. 1, follow it all the way through, and then continue from the north end of Transect No. 2. In this way you will be recording nests per acre from south to north on odd transect numbers and from north to south on even transect numbers as you progress eastward across the refuge. Be sure and follow each transect line all the way through from one end of the refuge to the other. If you end up with two extra inches at the end of one transect line, you will include six inches of the next transect line to the east to complete one acre. When you have completed this listing, square the number of nests found in each acre in the next column. Your listing should look something like this:

- -

Example 1:

	Acre	No. Nests/Acre	Squares of Nests/Acre
	1	0	--
	2	0	--
	3	3	9
	4	0	--
	5	2	4
	6	0	--
	7	0	--
	8	0	--
	9	1	1
	10	0	--
	⋮	⋮	⋮
	640	0	--
Total	640	$Ex = 320^*$	$Ex^2 = 450^*$

*These are hypothetical totals to be used in following examples:

B. Estimate of total nests

$\bar{x} = \frac{Ex}{n}$

$\bar{x}$ = Mean (avg. No. nests/acre on transects)

n = No. acres in sample (640)(constan

Ex = Total nests on transect (obtain from bottom of listing of nests/acre ---Sample 1)

$X = N\bar{x}$

X = Total estimated nests on refuge

N = Total acres sampled (11,570)(constant)

Example 2:

$\bar{x} = \frac{Ex}{n} = \frac{320}{640} = .50$

n = 640 (constant)

Ex = 320

N = 11,570 (constant)

$X = N\bar{x} = (11{,}570)(.50) = 5{,}785$ total estimated nests on Refuge

---

C. Confidence (Fiducial) Limits for Estimate of total Nests on Refuge at the 95% level.

To determine how reliable the above estimate is, you compute the following:

$s = \sqrt{\frac{Ex^2}{n-1}}$

s = Standard deviation of sample

Ex^2 = Obtain from bottom of listing of sum of squares of nests/acre (Example 1)

$(s\ \bar{x}) = \frac{s}{\sqrt{n}}$

n = No. acres in sample (640)(constant)

$s\bar{x}$ = Sample standard error of the mean

$CL = \bar{x} \pm (t.05)(s\bar{x})$

CL = Confidence limits of the mean at the 95% level

$\bar{x}$ = Mean (avg. No. nests/acre)

t.05 = 1.96 (constant)(from Fishers "T" table)

Confidence limits expressed in percent = $\frac{\pm (5.05)(s\bar{x})}{\bar{x}}$

Therefore, total estimated nests with confidence limits = $X \pm X(t.05)(s\bar{x})$

These results can also be expressed by stating that the best estimate of total nests is X and that in 95 out of 100 times the true number of nests will fall between

$X - X(t.05)(s\bar{x})$ and $X + X(t.05)(s\bar{x})$

- -

Example 3:

$$s = \sqrt{\frac{Ex^2}{n-1}}$$

$$s = \sqrt{\frac{450}{639}} = \sqrt{.704} = .837$$

s = Standard deviation of sample

Ex^2 = Sum of squares of nests/acre = 45

n = No. of acres in sample = 640 (constant)

$$s\bar{x} = \frac{s}{\sqrt{n}}$$

$s\bar{x}$ = Sample standard error of the mean

$$s\bar{x} = \frac{.837}{\sqrt{640}} = \frac{.837}{25.3} = .033$$

$$CL = \bar{x} \pm (t.05)(s\bar{x})$$

$$CL = .50 \pm (1.96)(.033)$$

$$CL = .50 \pm .061$$

CL = Confidence limits of the mean

$\bar{x}$ = .50

t.05 = 1.96 (constant)

$s\bar{x}$ = .033

Expressed as a percentage:

$$CL = \bar{x} \pm \frac{(t.05)(s\bar{x})}{\bar{x}}$$

$$CL = .50 \pm \frac{.061}{.50}$$

$CL = .50 \pm .122$ or $\pm$ 12.2%

Expressed in terms of total estimated nests

$CL = (11{,}570)(.50) \pm (11{,}570)(.061)$

$CL = 5785 \pm 706$ nests

To better express these limits, it can be stated that the best estimate of total nests for the refuge is 5,785, and that in 95 out of 100 times the true number of nests will fall between 5,079 and 6,491.

C. Species Composition, Hatching Success and Duck Production

The remaining calculations are illustrated in Example 4 and 4a on pages 14 and 15. Preparation of a similar table will facilitate analysis. Form D-6 and 6a are provided for this purpose.

Column 1 -- List all those species recorded as breeders in the breeding population survey and those found on transects.

Column 2 -- From Summary Form D-5, record the number of nests found for each species. Total the number of nests of known species, then add to it the number of nests of unknown species. The latter total should be the same as the total for nests/acre (Ex) in your previous listing as described under (A) above.

Column 3 -- Determine the species composition in percentage of the known nests from Column 2, using the total of the known nests as a divisor.

Column 4 -- Double the percentage figures of Column 3.

Column 5 -- Use either refuge periodic counts for the last week in April and the first week in May, or special counts made during this period.

Column 6 -- Determine from Column 5 the species composition in percentage of the breeding population.

Column 7 -- Transpose the figures from Column 6.

Column 8 -- Add together the percentages from Column 4 and Column 7. Prorate the percentages for the three teal species proportionately to the weight given them in Column 7.

Column 9 -- Divide the percentages in Column 8 by 3.

Column 10-- First insert the TOTAL (use estimate of total nests obtained from calculations in B. above), then multiply this figure by the percentages in Column 9.

Column 11-- From Summary Form D-5 list the total number of nests on transect that hatched for each species.

Column 12-- Determine the hatching success in percentage by dividing Column 11 by Column 2. First determine this for the total (average hatching success), then by species. For those species for which there were less than 10 nests found, use the average hatching success, but insert actual hatching success in parenthesis above.

Form D-6

Example 4

CALCULATIONS FOR DETERMINATION OF CORRECTED SPECIES COMPOSITION

(1) Species	Species Composition of Transect Data (2) No Nests From Form D-5	(3) Sp. Comp. Known Nests In %	(4) Weight (Col. 3 x 2)	Species Composition of Breeding Population (5) No. Breeding Ducks	(6) Sp. Comp. in %	(7) Weight (Col. 6 x 1	(8) Weight (Col. 4 + Col. 7)	Corrected Sp. Comp. of Nests (9) Sp. Comp. in % (Col. 8 / 3)	(10) Sp.Comp. in Nos. (Col. 9 x total
Mallard	240	78.7	157.4	12,600	70.0	70.0	227.4	75.8	4,385
Pintail	16	5.2	10.4	1,444	8.0	8.0	18.4	6.1	353
Gadwall	26	8.5	17.0	1,616	9.0	9.0	26.0	8.7	503
Shoveller	10	3.3	6.6	1,080	6.0	6.0	12.6	4.2	243
B.W. Teal				360	2.0	2.0	4.8	1.6	93
Cinn.Teal	13	4.3	8.6	186	1.0	1.0	14.6 2.4	0.8	46
G.W. Teal				534	3.0	3.0	7.4	2.4	139
Redhead	--	--	--	92	0.5	0.5	0.5	0.2	12
Ruddy	--	--	--	88	0.5	0.5	0.5	0.2	11
(Total)	305								
Unknown	15	0	0	--	--	--	--	--	--
TOTAL	320	100%	200%	18,000	100%	100%	300%	100%	5,785
Coot	28								

Form D-6a CALCULATIONS FOR DETERMINATION OF DUCKS PRODUCED BY SPECIES

Example 4a

(1) Species	(10) Sp. Comp in Nos. (Col. 9 x total	Hatching Success of Nests: (11) No. Nests Hatched on Transects (From Form D-5)	(12) Hatching Success in % (Col.11 / Col.2)	(13) Total Nests Hatched (Col.10 x Col.12)	Average Class IIc & III Broods: (14) No. Broods Recorded* (From Form D-3)	(15) No. Ducklings Recorded* (From Form D-3)	(16) Average Brood Size (Col.15 / Col.14)	Sp.Comp.of Ducks Prod.to flight Age: (17) No. Ducks Produced (Cols.13 x 16)	(18) Sp. Comp. in %
Mallard	4,385	165	68.8	3,018	36	209	5.8	17,504	73.3
Pintail	353	12	75.0	265	21	139	6.6	1,749	7.4
Gadwall	503	18	72.0	362	38	281	7.4	2,679	11.3
Shoveller	243	6	60.0	146	8	54	(6.8) 6.2	905	3.8
B.W. Teal	93			58				278	1.2
Cinn.Teal	46	8	61.5	29	16	77	4.8	139	0.6
G.W. Teal	139			86	7	38	(5.4) 6.2	533	1.7
Redhead	12	--	68.8	8	2	11	(5.5) 6.2	50	0.2
Ruddy	11	--	68.8	8	5	24	(4.8) 4.8	38	0.1
Unknown	--	11	73.3	--	21	130	6.2	--	--
TOTAL	5,785	220	68.8	3,980	154	950	6.2	23,875	100%
Coot	509	17	60.7	309	16	84	5.3	1,638	

*One brood of Baldpate observed

Column 13 -- Multiply Column 10 by Column 12.

Column 14 and 15 -- In these columns use figures summarized from Field Form D-3. Since you will not be able to distinguish between blue-winged and cinnamon teal; brood data for these two species will be lumped. Broods of species not listed should be noted by an asterisk as shown in the example.

Column 16 -- Determine average brood size for each species by dividing Column 15 by Column 14. First determine this for the total (average brood size of all broods observed); then by species. For those species for which there were less than 10 broods recorded, use the average brood size of all broods observed, but insert observed average brood size in parentheses above.

Column 17 -- Determine the estimated number of ducks produced to flight age by species by multiplying Column 13 by Column 16.

Column 18 -- Determine species composition in percentage of duck production from Column 17.

Fill in Summary Form D-8 from Column 17 and from confidence limits calculated from formulas presented under (C.) above.

Procedure for Summarizing Duck Nesting Cover Use

Summary Forms D-9 and D-10 are for summarizing duck nesting cover use and preference on an annual basis for the refuge by species and for comparison between years on the refuge, respectively. Data for Form D-9 is obtained from Form D-4. Form D-10 is filled out from totals at the bottom of Form D-9.

Procedure for Summarizing Wildlife Trend Data

Since data collected on other species during the transect runs is designed to provide trends only, no population projections will be made. Summary Form D-11 enables comparison of refuge totals from year to year, keeping in mind that figures may have to be adjusted if transect coverage is not 100%. Do not adjust figures for Red-tailed hawk, great horned owl, magpie, cottontail, jackrabbit, and mourning dove since nearly as many of these animals and their nests will be observed even though transect coverage is not complete.

Form D-4

WATERFOWL PRODUCTION SURVEY

DUCK NESTING TRANSECTS----INDIVIDUAL UNIT SUMMARY*

Unit No._____ Recorder:_____ Year:_____

Transect Coverage in %_____(All transects=100%, every other transect = 50%,etc.)

	Total Nests on Transects	Nests		No. Deserted	No. Destroyed	No. Flooded	Unknown	Sx	Primary Covery Type (No. of nests in each primary type)													
		No. Hatched	% Hatched						Sve	Crx	Dst	Gx	Mof	Wx	Jba	Cx	Ex	Tla	Sva	Dike	Ditch	Flooded
Mallard																						
Pintail																						
Gadwall																						
Shoveller																						
Teal B-W & Cinn.																						
G-W Teal																						
Ruddy																						
Unknown																						
Total																						
Coot																						

*Obtain data from Field Form D-1

Form D-5

WATERFOWL PRODUCTION SURVEY

DUCK NESTING TRANSECTS----REFUGE ANNUAL SUMMARY*

Recorder: _____ Year: _____

Transect Coverage in % ___ (All transects 100%, every other transect 50%, etc.)

(1) No. Nests transect
(2) % Refuge total
(3) % Hatch

Species		Unit No. 1	2	3	4	5	6	7	8	9	10	11	14	15	16	17	18	19	20	21	22	23	Total
Mallard	(1)																						
	(2)																						
	(3)																						
Pintail	(1)																						
	(2)																						
	(3)																						
Gadwall	(1)																						
	(2)																						
	(3)																						
Shov.	(1)																						
	(2)																						
	(3)																						
B-W & Cinn. Teal	(1)																						
	(2)																						
	(3)																						
G-W Teal	(1)																						
	(2)																						
	(3)																						
Redhead	(1)																						
	(2)																						
	(3)																						
Ruddy	(1)																						
	(2)																						
	(3)																						
____	(1)																						
	(2)																						
	(3)					6																	
____	(1)																						
	(2)																						
	(3)																						
Unknown	(1)																						
	(2)																						
	(3)																						
Total	(1)																						
	(2)																						
	(3)																						
Coot	(1)																						
	(2)																						
	(3)																						

* Obtain data from Summary Form D-4

Form D-6

CALCULATIONS FOR DETERMINATION OF CORRECTED SPECIES COMPOSITION

(1)	Species Composition of Transect Data			Species Composition of Breeding Population			(8)	Corrected Sp. Comp. of Nests	
Species	(2) No. Nests From Form D-5)	(3) Sp. Comp. Known Nests in %	(4) Weight (Col. 3 x Col. 2	(5) No. Breed-ing Ducks	(6) Sp. Comp. in %	(7) Weight (Col. 6 x 1)	Weight (Col. 4 + Col. 7)	(9) Sp. Comp. in % ($\frac{\text{Col. 8}}{3}$)	(10) Sp.Comp. in Nos. (Col. 9 x total
Mallard									
Pintail									
Gadwall									
Shoveller									
Cinn.Teal									
G.W. Teal									
Redhead									
Ruddy									
(Total)									
Unknown									
TOTAL									
Coot									

Form D-6a

CALCULATIONS FOR DETERMINATION OF DUCKS PRODUCED BY SPECIES

Species	(10) Sp. Comp. in Nos. (Col. 9 x total	Hatching Success of Nests			Average Class IIc & III Broods			Sp.Comp.of Ducks Produced to Flight Age	
		(11) No. Nests Hatched on Transects (From Form D-5)	(12) Hatching Success in % ($\frac{\text{Col.11}}{\text{Col. 2}}$)	(13) Total Nests Hatched (Col. 10 x Col.12)	(14) No. Broods Recorded (From Form D-3)	(15) No. Ducklings Recorded (From Form D-3)	(16) Average Brood Size ($\frac{\text{Col.15}}{\text{Col.14}}$)	(17) No. Ducks Produced (Cols.13 x 16)	(18) Sp. Comp. in %
Mallard									
Pintail									
Gadwall									
Shoveller									
B.W. Teal									
Cinn. Teal									
G.W. Teal									
Redhead									
Ruddy									
Unknown									
TOTAL									
Coot									

Form D-7

WATERFOWL PRODUCTION SURVEY

DUCK NESTING TRANSECTS----HABITAT UNIT SUMMARY BY YEARS*

Recorder: ____________________

Year (1) No. Nests (2) Corr. No. Nests** (3) % Hatch	% Coverage	Unit No. 1	2	3	4	5	6	7	8	9	10	11	14	15	16	17	18	19	20	21	22	23	Total
____ (1)																							
(2)																							
(3)																							
____ (1)																							
(2)																							
(3)																							
____ (1)																							
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(2)																							
(3)																							
____ (1)																							
(2)																							
(3)																							

* Obtain data from Summary Form D-5

** Adjust figures to represent 100% transect coverage

Form D-8

WATERFOWL PRODUCTION SURVEY

WATERFOWL PRODUCTION ESTIMATES----REFUGE SUMMARY BY YEARS*

Recorder: _____

Year	Mal-lard	Pin-tail	Gad-wall	Shov-eller	B-W Teal	Cinn. Teal	G-W Teal	Red-head	Ruddy			Total	Conf. Limits of Data in %	Coot

* Obtain data from Column 17, Summary Form D-6a
Obtain confidence limits from calculation (C) in text

Form D-9

WATERFOWL PRODUCTION SURVEY

PRIMARY DUCK NESTING COVER TYPES----REFUGE ANNUAL SUMMARY*

Recorder: _____ Year: _____

(1) No. Nests (2) % in Primary Type		Primary Type																
		Sx	Sve	Crx	Dst	Gx	Mof	Wx	Jba	Cx	Ex	Tla	Sva	Dike	Ditch	Flooded		
Mallard	(1)																	
	(2)																	
Pintail	(1)																	
	(2)																	
Gadwall	(1)																	
	(2)																	
Shoveller	(1)																	
	(2)																	
B-W & Cinn. Teal	(1)																	
	(2)																	
G.W. Teal	(1)																	
	(2)																	
Redhead	(1)																	
	(2)																	
Ruddy	(1)																	
	(2)																	
_____	(1)																	
	(2)																	
_____	(1)																	
	(2)																	
Total	(1)																	
	(2)																	
Coot	(1)																	
	(2)																	

* Obtain data from Summary Form D-4

Form D-10

WATERFOWL PRODUCTION STUDY

PRIMARY DUCK NESTING COVER TYPES----REFUGE SUMMARY BY YEARS*

Recorder: ____________________

Year		Primary Cover Type															
(1) No. Duck Nests (2) % in Primary Type		Sx	Sve	Crx	Dst	Gx	Mof	Wx	Jba	Cx	Ex	Tla	Sva	Dike	Ditch	Flooded	
____	(1)																
	(2)																
____	(1)																
	(2)																
____	(1)																
	(2)																
____	(1)																
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____	(1)																
	(2)																
____	(1)																
	(2)																
____	(1)																
	(2)																

* Obtain data from Summary Form D-9

Form D-11

WATERFOWL PRODUCTION SURVEY

WILDLIFE TREND DATA----REFUGE SUMMARY BY YEARS*

Recorder: ____________________

Year	(1) No. Found (2) Corrected No.**	Percent Transect Coverage	Pheasant: No. Nests on Transect	Pheasant: % Hatched	Snowy Egret Act. Nests on Transect	B.C.Night Heron Act. Nests on Transect	Avocet Act. Nests on Transect	Phalarope Act. Nests on Transect	Sh.-eared Owl Act. Nests on Transect	Marsh Hawk Act. Nests on Transect	Red-T. Hawk Total Nests Obs.	Great-H. Owl Total Nests Obs.	Magpie Total Nests Obs.	Blackbirds Act. Nests on Transect	Muskrat Act. Dens & House on Transect	Badger Act. Dens on Transect	Skunk Act. Dens on Transect	Cottontail Total Observed	Jack Rabbit Total Observed	Mourning Dove Total Observed			
____	(1)																						
____	(2)										XX	XX	XX					XXX	XXX	XXX			
____	(1)																						
____	(2)										XX	XX	XX					XXX	XXX	XXX			
____	(1)																						
____	(2)										XX	XX	XX					XXX	XXX	XXX			
____	(1)																						
____	(2)										XX	XX	XX					XXX	XXX	XXX			
____	(1)																						
____	(2)										XX	XX	XX					XXX	XXX	XX			
____	(1)																						
____	(2)										XX	XX	XX					XXX	XXX	XX			
____	(1)																						
____	(2)										XX	XX	XX					XXX	XXX	XX			
____	(1)																						
____	(2)										XX	XX	XX					XXX	XXX	XX			
____	(1)																						
____	(2)										XX	XX	XX					XXX	XXX	XX			
____	(1)																						
____	(2)										XX	XX	XX					XXX	XXX	XX			

* Obtain data from Field Form D-2 ** Adjust figures to represent 100% Transect coverage

Waterfowl Production Study: Final Report, Robert Ballou

REPORT OF

WILDLIFE MANAGEMENT STUDY

FINAL REPORT

Branch of Wildlife Refuges
Region 2

Project: Monte Vista - 4
Reg. Code: 111-12-Mv
Date: September 15, 1962

Title: Waterfowl Production Study

OBJECTIVES

To determine the size sample (acres of transect) needed to give nesting success information for the entire refuge within confidence limits of 10% at the 95% level.

ACKNOWLEDGEMENTS

Much of the work reported here was done by others. For the field work, thanks go to the following Monte Vista Refuge personnel: Bob Brown, Assistant Manager; Eugene Grossman, Student Trainee; and Leslie Beaty, Student Trainee. Refuge Manager Pete Bryant again generously provided all available refuge personnel and facilities when needed. Jack Grieb of the Colorado Game and Fish Department assisted in the preliminary planning of statistical sampling, and Dr. R. K. Zeigler, Los Alamos Laboratory, checked statistical calculations and made a number of helpful suggestions for future work.

INTRODUCTION

The objective of this study was accomplished. The purpose of this report is to review what was done, discuss the meaning and limitations of the data, and to recommend procedures for annually obtaining information for refuge waterfowl production estimates and nesting habitat evaluation.

PROCEDURES

Breeding Pair Counts

Breeding pair counts were made by vehicle between April 25 and May 2, 1962. Counts were concentrated on the larger ponds and were timed to observe the birds after they had returned from their early morning dispersal areas. We were more interested in obtaining species composition than in determining nesting areas. Two observers, binoculars, and a 20x spotting scope were used. A number of supplementary counts were

also made of ditches, small ponds, and flooded meadows by driving the various refuge roads to determine if results differed substantially from those obtained on larger and more permanent bodies of water.

Nesting Transects

Unproductive waterfowl breeding habitat on the refuge, upon completion of development, was eliminated from the area to be sampled. This left approximately 12,000 acres of present and potential (to be developed) nesting habitat. A transect width of 16.5 feet was used because this width can be readily searched by one man and because of ease in converting to acres (⅓ mile of transect equals one acre).

One north-south transect line was selected from each tier of sections by dividing the tier in an east-west direction into tenths of a mile and randomly selecting one of them. Another series of transects was established by mechanically placing them three-tenths of a mile to the east of the first series, and a third series was plotted by establishing them three-tenths of a mile to the east of the second series. In so doing, rather than crossing over into the next tier of sections, a line was established the appropriate distance east of the west boundary of the tier involved. Each series was approximately 27½ miles long, or 55 acres.

The first series was run the week of May 14, and the second series between June 11-18. The third series was not run because of shortness of time, indications that very few additional nests would be located, and because it was apparent that enough information had already been collected.

Transects were inked on overlays of 8" to 1 mile aerial photographs (Map I). A laborador retriever was used to assist in locating nests. All nests discovered were plotted and numbered on the overlays; however, separate records were kept for nests outside of the transect boundaries. Data on species, clutch size, status of nest, nesting cover, and other pertinent information was recorded in a notebook.

Brood Survey

No brood surveys were conducted as part of this study. However, student trainee brood counts will be discussed under the next heading.

RESULTS

Breeding Pair Counts

A summation of breeding pair counts is given in Table I. No non-breeding groups were observed; all appeared paired. This is normal for

the refuge in early May. The differences in species composition between birds recorded on the larger ponds and those counted on lesser areas are not too great, nor very consistent. One obvious difference is that very few of the divers and minor species (baldpate, merganser) were found on the small and temporary ponds. If anything, this comparison points up the advisability of sampling both large and small, permanent and temporary impoundments to obtain the species composition of the spring breeding population. The weekly periodic refuge count for the period May 1 - 15 was 15,205 ducks. This study therefore sampled about 25% of the estimated population. This took parts of six days for two people, possibly 24 man hours.

Since breeding pair counts provide one accepted method for determining species composition of the breeding population, I believe the information obtained for preliminary determination of the status of the population and for subsequent comparisons of nesting transect and brood data is worth the effort.

Breeding pair information, however, needs to be qualified and interpreted. For one thing, at the time of the counts it was very apparent that baldpates, scaup, and some of the green-winged teal, although paired, were evidently still migrating and would probably not nest on the refuge. Green-winged teal were observed this spring in unusually large numbers and probably represented birds that were held up from reaching their nesting areas by the late spring in the mountains. Further discussion of the composition of the population is found under Nesting Transects below.

Nesting Transects

From Map I the distribution of the nesting transects can be determined. To analyze the data the information from the first and second series was combined on a per acre basis (two per mile) as is shown in Table II. The distribution of nests in the "combined" column was then analyzed statistically (Table III) to determine the number of acres of transects necessary to obtain accuracies of 10% and 15% for total numbers of nests on the refuge. These computations indicate that it will require 671 acres of transects to determine total nests within 10% accuracy at the 95% level, and 291 acres of transects within 15% accuracy. The study a year ago of Section 5 indicated 654 acres of nesting transects would be needed to obtain accuracy within 10% on the entire refuge.

There are apparently a number of formulas that can be used to project sample data to total estimates and to determine the variance (confidence limits). Which ones to use are evidently based upon the nature and distribution of the data. Since I am in no position to stick my neck out in matters statistical, which formulas to use to give the best estimates will have to await further consultation and perhaps a full set of data.

As mentioned under PROCEDURE above, it can be argued that combining of information from the two series will not necessarily give the same distribution and number of nests as would be obtained by running one of the series twice. This is true. However, I am confident that the results obtained are plenty good enough to establish the number of transect acres needed to secure information within any accuracy limits under consideration.

Table III points out that accuracy can be within 15% with less than half the number of transects and total effort required to get within 10% accuracy. This revelation is intriguing in that it could mean that about half the manpower will be required for the operation during years when closer production estimates are not necessary. From interpreting a letter from Dr. Zeigler, it also seems that one-fourth of the transects required for 10% accuracy would give results accurate within 20%. These possibilities are further discussed below.

Moreover, Dr. Zeigler points out that the sample size (acres of transect) can be further reduced if the refuge is stratified by grouping areas with similar number of nests per acre (ie: Strata A = 0-1 nests per acre; Strata B = 2-4 nests per acre; etc.). This approach is indeed tempting, but does not meet the problems existing on this refuge, and it fails to recognize the secondary, but equally important, objective of providing a means to evaluate habitat in terms of waterfowl production. For at least the next decade, and more probably for 20 years, the refuge habitat and its use by waterfowl will be constantly and dramatically changing. To stratify requires a reasonably accurate prediction of what each portion of the refuge will produce in the way of nests per acre, and running enough transects in each stratum to give the desired result. Projections can perhaps be made for a year or two in advance, but would mean that every few years transects would have to be re-established at a greater cost than would be saved. Even more important would be the loss of uninterupted records from permanent transects on habitat and waterfowl use. Stratifying may have application if various combinations of permanent transects can be used, and if the whole procedure does not become too complicated. However, it seems quite likely that upon completion of development there will be very few, if any, blocks of habitat large enough to make stratification practical.

The species composition of transect nests (Table IV) does not conform with what was observed on breeding pair counts (Table I). As with last year, it appears that the numbers of mallards actually nesting was disproportionately high when compared to what was believed to be the duck breeding population. Nor do I have any better explanation than I did last year, although the nesting sample this year was admittedly small. If nothing else, this discrepancy strengthens the advisability of making breeding pair counts, at least until the mystery is solved.

Brood Survey

The prime objective for brood surveys in the nesting transect approach to refuge duck production is to determine the average brood size, by species, that reach flight age (class IIc and III). This can be done by sampling throughout the summer.

In 1961 Student Trainee Pearson tallied 133 broods on the refuge during parts of 20 days between July 5 and August 9. Of these, 27 were recorded as Class III. In 1962 Student Trainee Groseman counted 126 broods during parts of 8 days between July 14 and August 1. Unfortunately for the purposes of this report, he counted only those that were in the young, downy stages (Class I and IIa). Although it will take specific instructions and some care, it should be entirely feasible to classify enough Class IIc and III broods of at least the more common nesting species to obtain average brood size by species.

DISCUSSION AND RECOMMENDATIONS

This report completes the investigational phase of developing a waterfowl production procedure for the Monte Vista Refuge. The next step is to adapt the findings of this study into an operational procedure which will annually give reliable estimates of refuge waterfowl production. Because the recommended procedure outlined below demands a major initial effort and substantial manpower annually thereafter, it is perhaps appropriate at this time to review briefly the reasons for supporting this approach.

There is a real need, particularly on the Monte Vista Refuge, for accurate waterfowl production estimates. This refuge is, and will continue to be, a costly venture. Production estimates are a measure of the success of the refuge, but are of little use unless they are reliable. Moreover, such figures in time can help establish what it costs to raise a duck on a modern refuge primarily designed for production.

More important than annual production estimates, however, the proposed procedure is admirably suited to evaluate how well the refuge, and portions of it, are being managed for waterfowl production.

The proposed nesting transects are an integral part of the continuing habitat inventory and evaluation studies getting under way on the refuge. Vegetative mapping and inventory, photographic series, plant trend transects, and soil and water measurements tell what the habitat is and how it changes. The nesting transects show how wildlife responds to the habitat and the way it changes.

Permanent nesting transects, whether run annually or every few years, will provide a lasting and continuing record throughout the entire

refuge of the performance of the breeding habitat as reflected by breeding ducks. These transects will tell the same story for other wildlife-pheasants, owls, shorebirds, herons, egrets, blackbirds, etc. They will provide an invaluable backlog of information for future more intensive studies on the effects of water management, grazing, ecological succession, and other practices. In fact, the transects in many cases can readily be used to delineate study areas and to establish photo points, water and soil measuring points, vegetative trend transects, and to locate specific areas for numerous investigational and management purposes.

The findings of this study clearly demonstrate that nesting transects will give more accurate refuge production estimates than any other approach explored. There is a tremendous advantage in being able to establish confidence limits on data. Everyone then knows how good the figures are.

The nesting transect approach, however, is not without its limitations. If it is properly designed and carried through so that sampling is adequate and representative, and so that errors in execution are held to a minimum, it will annually yield a figure of how many duck nests there are on the refuge. This figure can be accurate within 10%. From there on, accuracy almost inevitably deteriorates without the benefit, at least at this time, of knowing confidence limits. Because of errors in sampling (usually as a result of working with an unrepresentative or small sample), or because of the necessity of making certain assumptions, the following information will undoubtedly be less accurate than data on total refuge nests, but to an unknown degree:

1) Fate of nests --- destroyed, deserted and hatched.
2) Number of ducklings hatched.
3) Number of ducklings reaching flying age. Other than errors in sampling Class IIc and III broods, this procedure makes the premise that virtually no complete broods are lost to predation or other causes. Available literature was not at all helpful in determining the validity of this assumption.
4) Brood mortality and cause.
5) Species composition of breeding population and production.
6) Nesting cover preferences.
7) Brood habitat preferences.
8) Any and all of the above information, as well as total nests, on any lesser size area (habitat unit) than the entire refuge breeding habitat of 12,000 acres.

In time it may be possible to determine accuracy limits on a number of the above items as information accumulates. Be that as it may, the purpose of emphasizing the limitations of the nesting transect approach is not to discourage it, but rather to be realistic about what it can and cannot do.

It is therefore recommended that the second phase of this study, as

set forth in last year's report, be initiated as soon as manpower and funds are available. As seen at this time, it includes the following:

1. The Wildlife Management Biologist will actively participate in the first year of the program. He will be responsible for preparing a Wildlife Management Outline to cover the first year's activities; planning and assisting with the establishment and running of transects; assisting with breeding pair and brood counts; preparing forms and written procedures for the operation; and preparing the final report. Thereafter, the waterfowl production procedure will become operational and will be a regular refuge function.

2. The survey will be designed to cover the entire refuge, as proposed and as it will be developed under the Master Plan, including tracts that are to be acquired and eliminating those that will be disposed of. From this, the areas that are, and will be, non-productive breeding habitat (croplands, building sites, etc.) will be further deleted. This will leave a working area of approximately 12,000 acres, or 19 sections.

3. Permanent transects will be established throughout the breeding habitat. Transects will run north and south and will be mechanically spaced 300 feet apart. The first transect will be established 150 feet from the west boundary of the breeding habitat. In all there will be approximately 132 transect lines. Transects will be 16.5 feet wide, giving an approximate total transect acreage of 640. Transect markers will be easily visible targets erected on poles at least 8 feet high. Each marker will be identified by its transect line and position in the transect. For example, the third marker from the north in the sixteenth transect from the west would be lettered 16-3. There will be at least one transect marker for every one half mile of transect so that when running the transect it will always be possible to line up two markers ahead or behind.

4. Species composition of the breeding population, by unit, will be determined each year by vehicle counts, with the aid of binoculars and spotting scope. This will require approximately 5 man days (2 men) annually in late April and early May.

5. During at least the first two years, complete transect runs will be made in mid-May and mid-June. A third partial transect coverage will be made in early July. Species, nesting cover, and nest and egg hatching success will be recorded for each nest. Nests will be plotted on overlays of aerial photographs. Standard field forms and overlay procedures will be

prepared. Nesting cover will be expressed in such a way that it can be directly correlated with the vegetative inventory. It is believed that running the transects will require 40 man days (4 men for 10 days), annually, for each complete coverage and 20 man days (4 men for 5 days) for the third partial coverage.

Once a reliable base of total waterfowl production has been established, it will probably not be necessary to run all transects each year. Although this decision can be made after the first two years' data is in, it is suggested that complete transect coverage be made every third or fifth year, with every other, third, a fourth transect line run during the intervening years.

6. Brood counts, by unit, in late June, July, and early August will determine the size of broods, by species, reaching Class IIc and III size. An estimated 20 man days (2 men) annually will be needed.

7. Projection of nesting transect data will determine the total refuge duck hatch, within anticipated confidence limits of 10% at the 95% level, when all transect lines are run. Species composition of the hatch will be determined from the nesting data, corrected by correlation with the breeding population count. Total production (ducks reaching flight age) will be determined by multiplying the number of hatched broods (from nesting data) by average brood size reaching class IIc and III age. Other pertinent information will be compiled. Ten man days (1 man) annually is estimated for this work.

Submitted by: Robert M. Ballou
Robert M. Ballou, Wildlife Management Biologist

Date 1/11/63

Reviewed by: _____
Refuge Manager, Monte Vista Refuge

Date _____

Distribution

Central Office	1	Wildlife Management Biologist-Victoria	1
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TABLE I

MONTE VISTA REFUGE

Comparison of Waterfowl Breeding Pair Counts between Large, Permanent Impoundments and Small and/or Temporary Impoundments (Flooded Meadows)
April 25 - May 2, 1962

Species	Large, Permanent Impoundments Ponds 7P1, 7P2, 7P3, 7P4, 14P3, 14P4, 15P2, 15P3, 15P4, 17P1, 17P3, 18P2				Small and/or Temporary Impoundments in Units 1, 6, 7, 8, 10, 16, 17, 22				Total (Combined)			
	Pairs	Singles	Total	Sp.Comp. %	Pairs	Singles	Total	Sp.Comp. %	Pairs	Singles	Total	Sp.Com %
Mallard	533	261	1588	46	69	42	222	50	602	303	1810	46
Gadwall	146	3	298	9	11	--	22	5	157	3	320	8
Pintail	97	140	474	14	11	13	48	11	108	153	522	13
G-W Teal	165	22	374	11	27	1	56	13	192	23	430	11
B-W Teal	31	--	62	2	4	2	12	3	35	2	74	2
Cinnamon Teal	80	11	182	5	22	4	52	12	102	15	234	6
Shoveller	107	45	304	9	10	2	24	5	117	47	328	8
Redhead	35	1	72	2	1	--	2	-1	36	1	74	2
Ruddy	7	3	20	-1	--	--	--		7	3	20	1
Other	37	3	80	2	2	--	4	1	39	3	84	2
Total	1238	489	3454		157	64	442		1395	553	3896	

TABLE II

MONTE VISTA REFUGE

Distribution of Duck Nests per acre in Transect Sample, West to East
1962

All Nests

Unit	5/14-18/62	6/11-18	Combined	Unit	5/14-18/62	6/11-18	Combined
19	0	0	0	7	-	1	1
	0	0	0		-	0	0
20	0	0	0	23	0	0	0
	0	0	0				
14	0	0	0	17	0	0	0
	0	0	0		1	4	5
6	0	1	1	8	1	2	3
	0	0	0		1	0	1
21	0	0	0	2	1	0	1
	1	0	1		0	0	0
15	0	1	1	23	0	-	0
	0	1	1				
6	1	1	2	17	0	0	0
	0	0	0				
21	0	-	0	18	1	1	2
	0	-	0				
15	0	-	0	9	0	4	4
	3	0	3		2	0	2
7	1	-	1	3	0	0	0
	0	-	0		0	0	0
22	0	0	0	18	0	0	0
	0	0	0		2	0	2
16	0	1	1	9	0	1	1
	0	0	0		0	1	1
	-	0	0				
7	1	0	1	3	1	1	2
	2	0	2		0	0	0
1	0	0	0	10	0	0	0
	0	1	1		0	0	0
22	-	0	0	4	0	0	0
	-	0	0		0	0	0
16	-	1	1	11	0	0	0
	-	0	0		0	2	2
				5	0	0	0
					19 nests	24 nests	43 nests
					55 acres	55 acres	62 acres

TABLE III

MONTE VISTA REFUGE

Statistical Calculations Used to Determine Sample Size needed on Entire Refuge for 10% and 15% accuracy, 95 times out of a 100, in Estimating Total Duck Nests

$$s = \frac{1}{N}\sqrt{N \cdot Sx^2 - (Sx)^2}$$

$$s = \frac{1}{62}\sqrt{62 \cdot 101 - (43)^2}$$

$$s = \sqrt{\frac{4419}{62}}$$

$$s = 1.07$$

s = Standard deviation

N = Acres of transect

x = Variates

S = Sum of

10% Accuracy

$$N = \frac{(t.05)^2\ (s)^2}{(.1 \cdot \bar{x})^2}$$

$$N = \frac{(1.671)^2(1.07)^2}{(.1 \cdot .69)^2}$$

N = 671 acres

N = Acres of sample needed

t.05 = Tabular value for the number of observations.

s = Standard deviation

$\bar{x}$ = Mean of the sample data

15% Accuracy

$$N = \frac{(t.05)^2(s)^2}{(.15 \cdot \bar{x})^2}$$

$$N = \frac{(1.671)^2(1.07)^2}{(.15 \cdot .69)^2}$$

N = 291 acres

TABLE IV

MONTE VISTA REFUGE

Species Composition of Nests Found on Transects

1962

Species	No. of Nests	Species Composition - %
Mallard	25	71
Gadwall	2	6
Pintail	5	14
Teal	2	6
Shoveller	1	3
	35	
Unknown	8	
	43	

Approved

WILDLIFE MANAGEMENT STUDY OUTLINE

Branch of Refuges, Region 2 Project: Monte Vista - 4

Reg. Code Design: 111-21-Mv

1. Title of Study: Waterfowl Production Study

2. Objectives: To determine the size sample (acres of transect) needed to give nesting success information for the entire refuge within confidence limits of 10% at the 95% level.

3. Justification: Justification for developing an accurate waterfowl production procedure on the Monte Vista Refuge was provided in the first segment of this project (Reg. Code Design:111-11-Mv). There is no need to reiterate here.

   The final report of that segment indicated that a representative transect sample of approximately 650 acres on the entire refuge would give nesting information accurate to within 10% at the 95% level. This is based on the assumption that nesting distribution throughout the refuge is similar to the study area. The study this year is to determine if that assumption is valid, and if not, what intensity of sampling will be required to obtain the desired confidence limits for nesting data.

4. Procedure:

   a. Literative review. The Wildlife Mgt. Biologist will attempt to learn a little bit more about the puzzling science of statistics during the course of this study.

   b. Data Collecting. Two or more days each during the week of April 23 and May 7 will be spent throughout the refuge on vehicle breeding pair counts by species. Care will be taken to obtain good counts in all water types. This information will be compared with subsequent species composition from nesting data in an attempt to reconcile differences, or determine cause of differences, noted last year in the two methods.

      Nesting transects have been established as follows: Areas that are and will be unproductive breeding habitat (croplands) upon completion of development were eliminated, leaving approximately 12,750 acres of present and potential nesting area. One north-south transect line was selected from each tier of sections by dividing the tier in an east-west direction into tenths of a mile and randomly selecting one of them. Another series of transects was established

by mechanically placing them three-tenths of a mile to the east of the first series, and a third series was plotted by establishing them three-tenths of a mile to the east of the second series. In so doing, rather than crossing over into the next tier of sections, a line was established the appropriate distance east of the west boundary of the tier involved. Each series is approximately 25 miles long, or 50 acres.

The first series of transects will be run during the week of May 14. The second series will be run the week of June 11, and the third the week of July 9. This procedure has the disadvantage of not being able to follow through on nests to determine their fate; it will also distort to some degree computations on the total distribution of nests in the sample for statistical purposes, but probably not enough to prevent meeting the objective of the study. It has the practical advantage of not being forced to cover precisely the same areas on each series when time and manpower are not available this year to establish markers to make such preciseness possible: also, this approach has the advantage of being able to look over the nesting habitat on more of the refuge.

Nests will be located and numbered on overlays of 8" to 1 mile aerial photographs. Data on species, clutch size, status of nest, nesting cover, and other pertinent information will be recorded in a notebook.

Brood areas in each habitat unit will be located. Cursory brood counts will be made to determine best dates, times, places, etc., to obtain information on Class III broods.

c. Data analysis and interpretation. The Wildlife Mgt. Biologist will be primarily responsible for this function. Assistance will be obtained from the Refuge and solicited from qualified statisticians.

5. Cooperators: None

6. Responsibility: The Wildlife Mgt. Biologist is responsible for this study. Occasional assistance from the Refuge will be given if necessary and available.

7. Costs: No costs anticipated other than for salary and transportation.

8. Schedule:

Estimated starting date: April 15, 1962
Estimated closing date: September 15, 1962

Item	Dates	Man-days
Breeding pair counts	April 23-May 11	6
Nesting transects	May 14-July 13	15
Brood survey	July 1-Aug. 15	5
Report	Sept. 1-15	10
		36

9. Reports:

Final report due date: September 15, 1962

Distribution of final report:

Central Office	1
Regional Office	2
Monte Vista Refuge	1
Wildl. Mgt. Biologist	1
Extra copies	1

10. Publication: Not planned

11. Submitted by: Robert M. Ballou
Robert M. Ballou, Wildlife Mgt. Biologist

Date: April 2, 1962

12. Endorsed by Charles R. Bryant
Charles R. Bryant, Refuge Manager

Date: April 2, 1962

13. Approved by: [illegible]

Date: 4/12/62

Column 13 -- Multiply Column 10 by Column 12.

Column 14 and 15 -- In these columns use figures summarized from Field Form D-3. Since you will not be able to distinguish between blue-winged and cinnamon teal; brood data for these two species will be lumped. Broods of species not listed should be noted by an asterisk as shown in the example.

Column 16 -- Determine average brood size for each species by dividing Column 15 by Column 14. First determine this for the total (average brood size of all broods observed); then by species. For those species for which there were less than 10 broods recorded, use the average brood size of all broods observed, but insert observed average brood size in parentheses above.

Column 17 -- Determine the estimated number of ducks produced to flight age by species by multiplying Column 13 by Column 16.

Column 18 -- Determine species composition in percentage of duck production from Column 17.

Fill in Summary Form D-8 from Column 17 and from confidence limits calculated from formulas presented under (C.) above.

Procedure for Summarizing Duck Nesting Cover Use

Summary Forms D-9 and D-10 are for summarizing duck nesting cover use and preference on an annual basis for the refuge by species and for comparison between years on the refuge, respectively. Data for Form D-9 is obtained from Form D-4. Form D-10 is filled out from totals at the bottom of Form D-9.

Procedure for Summarizing Wildlife Trend Data

Since data collected on other species during the transect runs is designed to provide trends only, no population projections will be made. Summary Form D-11 enables comparison of refuge totals from year to year, keeping in mind that figures may have to be adjusted if transect coverage is not 100%. Do not adjust figures for Red-tailed hawk, great horned owl, magpie, cottontail, jackrabbit, and mourning dove since nearly as many of these animals and their nests will be observed even though transect coverage is not complete.

OPTIONAL FORM NO. 10
5010-103

UNITED STATES GOVERNMENT

Memorandum

TO : Refuge Manager, Monte Vista Refuge
Monte Vista, Colorado

DATE: August 16, 1965

FROM : Biologist, Woodworth Station
Woodworth, North Dakota 58496

SUBJECT: Instructions for Conducting the Waterfowl Production Survey Based on Duck Nesting Transects

Would you please send me 2 copies of the above document. We plan to develppe plans for nesting studies on the prairies during the coming winter and will find your data very helpful.

I wondered about one thing in your plan. Do you have varying land uses on your lowlands? If so, do you record land use someplace on your nesting forms?

Leo Kirsch
Biologist in Charge

Leo Kirsch, Biologist in Charge
Woodworth Station
Woodworth, North Dakota 58496

8/24/65

Refuge Manager, Monte Vista National Wildlife Refuge
P.O. Box 511, Monte Vista, Colorado 81144

Instructions for Conducting the Waterfowl Production Survey Based on Duck Nesting Transects

Please find enclosed two copies of the above mentioned document which you requested in you memorandum of August 16, 1965.

In response to paragraph two in you letter, we do not have varying land uses on the portion of the refuge which are considered as nesting habitat. The farming portion of the refuge and those lands unsuited for nesting habitat are eliminated from the survey.

Charles R. Bryant

CRB/mg

Monte Vista Refuge

Director
Denver Wildlife Research Center
Denver, Colorado

May 26, 1965

Refuge Manager, Monte Vista Refuge and Regional Refuge Biologist, Albuquerque, New Mexico 2-R

Thanks!

Red and I want to express our thanks for the willing cooperation received from the wildlife - pesticide personnel in assisting us in the large task of gathering duck production data at Monte Vista Refuge. This was accomplished while Kirke King and Refuge personnel were walking the 320 miles of duck production transects and locating duck nests for egg collections connected with the wildlife - pesticide section's program.

Through this type of cooperation, Wildlife Research, Refuges, and the waterfowl resource must surely have benefitted. A copy of this memorandum will apprise Glen and Kirke of our gratitude.

Pete & Red
Pete and Red

cc: D. G. Crabtree, Denver Wildlife Research Center
Kirke King, Denver Wildlife Research Center
William T. Krummes
Refuge Manager, Monte Vista Refuge

MGSheldon:sr

Robert M. Ballou, Department of
Interior, Bureau of Sport Fisheries and Wildlife, Central Office, Washington, D.C.
Refuge Manager, Monte Vista National Wildlife Refuge
P.O. Box 566, Monte Vista, Colorado

6/26/64

Nesting Transects - Second Run

We have just completed the second run on transects and the following information is now available:

	Active	Hatched	Destroyed Nests From All Factors	Total
First Run	88	0	29	117
Second Run	91	15	51	157
Totals	179	15	80	274

Charles R. Bryant

CRB/mg

For Bolber

Duck Nests Found
Totals

Running	Nest Active	Nests Hatched	Destroyed Nests from #11 factors Other	Total
First Run	88	0	29	117
Second Run	91	15	51	157
Totals	179	15	80	274

Fate of Nests
From 1st Running

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Refuge Manager, Monte Vista, Refuge, Monte Vista, Colorado

DATE: June 17, 1964

FROM : Wildlife Management Biologist
Monte Vista Refuge, Box 566
Monte Vista, Colorado

SUBJECT: Preliminary summary of nesting transects

In working up data while in Washington ~~on~~ for the San Luis Valley experimental season, it would be really helpful if I could get some preliminary information on what the nesting transect survey indicates. As you recall, last year the transects indicated .43 active nests per acre. Would you be able to send this information to me for this year at the Central Office as soon as the second transect run is completed? It will involve adding up all the active nests (those not destroyed or deserted) and dividing the resulting number by 640 acres (the number of acres in the transects). This will give some idea, as compared to last year, on how good our refuge production might be.

Bob

Robert M. Ballou

Bank of Middle Refuges

BUREAU OF SPORT FISHERIES AND WILDLIFE

Wildlife Management Biologist Ballou
Refuge Manager, Monte Vista Refuge
Monte Vista, Colorado

February 6, 1963

2-R

Regional Supervisor, Branch of Wildlife Refuges
Albuquerque, New Mexico

Waterfowl production study - Monte Vista Refuge

The enclosed copy of Mr. Gillett's memorandum of January 31 is self explanatory, the sentiments of which we wholeheartedly endorse.

CONGRATULATIONS!

George E. Barclay

Encl.

Regional Director, Albuquerque, New Mexico January 31, 1963

Chief, Branch of Wildlife Refuges

Waterfowl production study - Monte Vista Refuge

Reference is made to your memorandum of January 23 on this subject.

It is our feeling that Mr. Ballou has done an outstanding job in arriving at an operational duck production census procedure on the Monte Vista Refuge. According to Mr. Ballou's calculations, the total refuge duck production may be determined within anticipated confidence limits of 10 percent at the 95 percent level with an expenditure of about 95 man-days annually.

This represents real progress to us, and we are hopeful that you will not only budget for this operation annually but find ways to extend similar production census criteria to other areas. Please relay our commendation to Messrs. C. R. Bryant and R. M. Ballou for this fine piece of work.

F. C. Gillett

BUREAU OF SPORT FISHERIES AND WILDLIFE

Director
Bureau of Sport Fisheries and Wildlife — January 23, 1963
Washington, D. C.

Regional Director, Region 2 — 2-R
Albuquerque, New Mexico

Final Report, Waterfowl Production Study - Monte Vista Refuge

For your information and files, we are enclosing a copy of Biologist Ballou's final report on waterfowl production study carried on at the Monte Vista Refuge.

John C. Gatlin

Attachment

cc:
Biologist Ballou, Monte Vista Refuge

Monte Vista Refuge

January 10, 1963

Regional Director, Bureau of Sports
Fisheries and Wildlife, Box 1306
Albuquerque, New Mexico
Wildlife Management Biologist
Monte Vista Refuge, Box 566
Monte Vista, Colorado
Waterfowl Production Study - Final Report

Submitted herewith in duplicate is the final report of the Waterfowl Production Study. One copy is intended for the Central Office. I am also distributing one copy each to Monte Vista Refuge, Wildlife Management Biologist - Victoria, and one for my own use. I am also holding one extra copy in the event someone should need it.

This report represents the completion of the investigational phase of this study. In it, I have made a strong plea for the adoption of the nesting transect approach, and I would urge its initiation as soon as possible. However, there will be a tremendous problem in attempting to establish the transect markers in time for the production study this coming spring. Because of this I recommend that we plan to have the transects completely established and ready to go by the spring of 1964. This coming spring the waterfowl production will be based on small sample of temporary, unmarked transects, much as was done this past year. If this schedule is followed, it will mean that I will be spending one additional year on this study and will, therefore, not be available for similar studies elsewhere until the spring of 1965.

RMB

Robert M. Ballou

In duplicate

Enclosure

cc: Refuge Manager, Monte Vista ✓

Approved

WILDLIFE MANAGEMENT STUDY OUTLINE

Branch of Refuges, Region 2 Project: Monte Vista - 4

Reg. Code Design: 111-21-Mv

1. Title of Study: Waterfowl Production Study

2. Objectives: To determine the size sample (acres of transect) needed to give nesting success information for the entire refuge within confidence limits of 10% at the 95% level.

3. Justification: Justification for developing an accurate waterfowl production procedure on the Monte Vista Refuge was provided in the first segment of this project (Reg. Code Design:111-11-Mv). There is no need to reiterate here.

   The final report of that segment indicated that a representative transect sample of approximately 650 acres on the entire refuge would give nesting information accurate to within 10% at the 95% level. This is based on the assumption that nesting distribution throughout the refuge is similar to the study area. The study this year is to determine if that assumption is valid, and if not, what intensity of sampling will be required to obtain the desired confidence limits for nesting data.

4. Procedure:

   a. Literative review. The Wildlife Mgt. Biologist will attempt to learn a little bit more about the puzzling science of statistics during the course of this study.

   b. Data Collecting. Two or more days each during the week of April 23 and May 7 will be spent throughout the refuge on vehicle breeding pair counts by species. Care will be taken to obtain good counts in all water types. This information will be compared with subsequent species composition from nesting data in an attempt to reconcile differences, or determine cause of differences, noted last year in the two methods.

      Nesting transects have been established as follows: Areas that are and will be unproductive breeding habitat (croplands) upon completion of development were eliminated, leaving approximately 12,750 acres of present and potential nesting area. One north-south transect line was selected from each tier of sections by dividing the tier in an east-west direction into tenths of a mile and randomly selecting one of them. Another series of transects was established

by mechanically placing them three-tenths of a mile to the east of the first series, and a third series was plotted by establishing them three-tenths of a mile to the east of the second series. In so doing, rather than crossing over into the next tier of sections, a line was established the appropriate distance east of the west boundary of the tier involved. Each series is approximately 25 miles long, or 50 acres.

The first series of transects will be run during the week of May 14. The second series will be run the week of June 11, and the third the week of July 9. This procedure has the disadvantage of not being able to follow through on nests to determine their fate; it will also distort to some degree computations on the total distribution of nests in the sample for statistical purposes, but probably not enough to prevent meeting the objective of the study. It has the practical advantage of not being forced to cover precisely the same areas on each series when time and manpower are not available this year to establish markers to make such preciseness possible: also, this approach has the advantage of being able to look over the nesting habitat on more of the refuge.

Nests will be located and numbered on overlays of 8" to 1 mile aerial photographs. Data on species, clutch size, status of nest, nesting cover, and other pertinent information will be recorded in a notebook.

Brood areas in each habitat unit will be located. Cursory brood counts will be made to determine best dates, times, places, etc., to obtain information on Class III broods.

c. Data analysis and interpretation. The Wildlife Mgt. Biologist will be primarily responsible for this function. Assistance will be obtained from the Refuge and solicited from qualified statisticians.

5. Cooperators: None

6. Responsibility: The Wildlife Mgt. Biologist is responsible for this study. Occasional assistance from the Refuge will be given if necessary and available.

7. Costs: No costs anticipated other than for salary and transportation.

8. Schedule:

Estimated starting date: April 15, 1962
Estimated closing date: September 15, 1962

Item	Dates	Man-days
Breeding pair counts	April 23-May 11	6
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Extra copies	1

10. Publication: Not planned

11. Submitted by: Robert M. Ballou
Robert M. Ballou, Wildlife Mgt. Biologist

Date: April 2, 1962

12. Endorsed by Charles R. Bryant
Charles R. Bryant, Refuge Manager

Date: April 2, 1962

13. Approved by: Bruce E. Bowler

Date: 4/12/62

Copy

REPORT OF

WILDLIFE MANAGEMENT STUDY

FINAL REPORT

Branch of Wildlife Refuges
Region 2

Project: Monte Vista - 4
Reg. Code: 111-12-Mv
Date: September 15, 1962

Title: Waterfowl Production Study

OBJECTIVES

To determine the size sample (acres of transect) needed to give nesting success information for the entire refuge within confidence limits of 10% at the 95% level.

ACKNOWLEDGEMENTS

Much of the work reported here was done by others. For the field work, thanks go to the following Monte Vista Refuge personnel: Bob Brown, Assistant Manager; Eugene Grossman, Student Trainee; and Leslie Beaty, Student Trainee. Refuge Manager Pete Bryant again generously provided all available refuge personnel and facilities when needed. Jack Grieb of the Colorado Game and Fish Department assisted in the preliminary planning of statistical sampling, and Dr. R. K. Zeigler, Los Alamos Laboratory, checked statistical calculations and made a number of helpful suggestions for future work.

INTRODUCTION

The objective of this study was accomplished. The purpose of this report is to review what was done, discuss the meaning and limitations of the data, and to recommend procedures for annually obtaining information for refuge waterfowl production estimates and nesting habitat evaluation.

PROCEDURES

Breeding Pair Counts

Breeding pair counts were made by vehicle between April 25 and May 2, 1962. Counts were concentrated on the larger ponds and were timed to observe the birds after they had returned from their early morning dispersal areas. We were more interested in obtaining species composition than in determining nesting areas. Two observers, binoculars, and a 20x spotting scope were used. A number of supplementary counts were

also made of ditches, small ponds, and flooded meadows by driving the various refuge roads to determine if results differed substantially from those obtained on larger and more permanent bodies of water.

Nesting Transects

Unproductive waterfowl breeding habitat on the refuge, upon completion of development, was eliminated from the area to be sampled. This left approximately 12,000 acres of present and potential (to be developed) nesting habitat. A transect width of 16.5 feet was used because this width can be readily searched by one man and because of ease in converting to acres (½ mile of transect equals one acre).

One north-south transect line was selected from each tier of sections by dividing the tier in an east-west direction into tenths of a mile and randomly selecting one of them. Another series of transects was established by mechanically placing them three-tenths of a mile to the east of the first series, and a third series was plotted by establishing them three-tenths of a mile to the east of the second series. In so doing, rather than crossing over into the next tier of sections, a line was established the appropriate distance east of the west boundary of the tier involved. Each series was approximately 27½ miles long, or 55 acres.

The first series was run the week of May 14, and the second series between June 11-18. The third series was not run because of shortness of time, indications that very few additional nests would be located, and because it was apparent that enough information had already been collected.

Transects were inked on overlays of 8" to 1 mile aerial photographs (Map I). A laborador retriever was used to assist in locating nests. All nests discovered were plotted and numbered on the overlays; however, separate records were kept for nests outside of the transect boundaries. Data on species, clutch size, status of nest, nesting cover, and other pertinent information was recorded in a notebook.

Brood Survey

No brood surveys were conducted as part of this study. However, student trainee brood counts will be discussed under the next heading.

RESULTS

Breeding Pair Counts

A summation of breeding pair counts is given in Table I. No non-breeding groups were observed; all appeared paired. This is normal for

the refuge in early May. The differences in species composition between birds recorded on the larger ponds and those counted on lesser areas are not too great, nor very consistent. One obvious difference is that very few of the divers and minor species (baldpate, merganser) were found on the small and temporary ponds. If anything, this comparison points up the advisability of sampling both large and small, permanent and temporary impoundments to obtain the species composition of the spring breeding population. The weekly periodic refuge count for the period May 1 - 15 was 15,205 ducks. This study therefore sampled about 25% of the estimated population. This took parts of six days for two people, possibly 24 man hours.

Since breeding pair counts provide one accepted method for determining species composition of the breeding population, I believe the information obtained for preliminary determination of the status of the population and for subsequent comparisons of nesting transect and brood data is worth the effort.

Breeding pair information, however, needs to be qualified and interpreted. For one thing, at the time of the counts it was very apparent that baldpates, scaup, and some of the green-winged teal, although paired, were evidently still migrating and would probably not nest on the refuge. Green-winged teal were observed this spring in unusually large numbers and probably represented birds that were held up from reaching their nesting areas by the late spring in the mountains. Further discussion of the composition of the population is found under Nesting Transects below.

Nesting Transects

From Map I the distribution of the nesting transects can be determined. To analyze the data the information from the first and second series was combined on a per acre basis (two per mile) as is shown in Table II. The distribution of nests in the "combined" column was then analyzed statistically (Table III) to determine the number of acres of transects necessary to obtain accuracies of 10% and 15% for total numbers of nests on the refuge. These computations indicate that it will require 671 acres of transects to determine total nests within 10% accuracy at the 95% level, and 291 acres of transects within 15% accuracy. The study a year ago of Section 5 indicated 654 acres of nesting transects would be needed to obtain accuracy within 10% on the entire refuge.

There are apparently a number of formulas that can be used to project sample data to total estimates and to determine the variance (confidence limits). Which ones to use are evidently based upon the nature and distribution of the data. Since I am in no position to stick my neck out in matters statistical, which formulas to use to give the best estimates will have to await further consultation and perhaps a full set of data.

As mentioned under PROCEDURE above, it can be argued that combining of information from the two series will not necessarily give the same distribution and number of nests as would be obtained by running one of the series twice. This is true. However, I am confident that the results obtained are plenty good enough to establish the number of transect acres needed to secure information within any accuracy limits under consideration.

Table III points out that accuracy can be within 15% with less than half the number of transects and total effort required to get within 10% accuracy. This revelation is intriguing in that it could mean that about half the manpower will be required for the operation during years when closer production estimates are not necessary. From interpreting a letter from Dr. Zeigler, it also seems that one-fourth of the transects required for 10% accuracy would give results accurate within 20%. These possibilities are further discussed below.

Moreover, Dr. Zeigler points out that the sample size (acres of transect) can be further reduced if the refuge is stratified by grouping areas with similar number of nests per acre (ie: Strata A = 0-1 nests per acre; Strata B = 2-4 nests per acre; etc.). This approach is indeed tempting, but does not meet the problems existing on this refuge, and it fails to recognize the secondary, but equally important, objective of providing a means to evaluate habitat in terms of waterfowl production. For at least the next decade, and more probably for 20 years, the refuge habitat and its use by waterfowl will be constantly and dramatically changing. To stratify requires a reasonably accurate prediction of what each portion of the refuge will produce in the way of nests per acre, and running enough transects in each stratum to give the desired result. Projections can perhaps be made for a year or two in advance, but would mean that every few years transects would have to be re-established at a greater cost than would be saved. Even more important would be the loss of uninterupted records from permanent transects on habitat and waterfowl use. Stratifying may have application if various combinations of permanent transects can be used, and if the whole procedure does not become too complicated. However, it seems quite likely that upon completion of development there will be very few, if any, blocks of habitat large enough to make stratification practical.

The species composition of transect nests (Table IV) does not conform with what was observed on breeding pair counts (Table I). As with last year, it appears that the numbers of mallards actually nesting was disproportionately high when compared to what was believed to be the duck breeding population. Nor do I have any better explanation than I did last year, although the nesting sample this year was admittedly small. If nothing else, this discrepancy strengthens the advisability of making breeding pair counts, at least until the mystery is solved.

Brood Survey

The prime objective for brood surveys in the nesting transect approach to refuge duck production is to determine the average brood size, by species, that reach flight age (class IIe and III). This can be done by sampling throughout the summer.

In 1961 Student Trainee Pearson tallied 133 broods on the refuge during parts of 20 days between July 5 and August 9. Of these, 27 were recorded as Class III. In 1962 Student Trainee Grossman counted 126 broods during parts of 8 days between July 14 and August 1. Unfortunately for the purposes of this report, he counted only those that were in the young, downy stages (Class I and IIa). Although it will take specific instructions and some care, it should be entirely feasible to classify enough Class IIe and III broods of at least the more common nesting species to obtain average brood size by species.

DISCUSSION AND RECOMMENDATIONS

This report completes the investigational phase of developing a waterfowl production procedure for the Monte Vista Refuge. The next step is to adapt the findings of this study into an operational procedure which will annually give reliable estimates of refuge waterfowl production. Because the recommended procedure outlined below demands a major initial effort and substantial manpower annually thereafter, it is perhaps appropriate at this time to review briefly the reasons for supporting this approach.

There is a real need, particularly on the Monte Vista Refuge, for accurate waterfowl production estimates. This refuge is, and will continue to be, a costly venture. Production estimates are a measure of the success of the refuge, but are of little use unless they are reliable. Moreover, such figures in time can help establish what it costs to raise a duck on a modern refuge primarily designed for production.

More important than annual production estimates, however, the proposed procedure is admirably suited to evaluate how well the refuge, and portions of it, are being managed for waterfowl production.

The proposed nesting transects are an integral part of the continuing habitat inventory and evaluation studies getting under way on the refuge. Vegetative mapping and inventory, photographic series, plant trend transects, and soil and water measurements tell what the habitat is and how it changes. The nesting transects show how wildlife responds to the habitat and the way it changes.

Permanent nesting transects, whether run annually or every few years, will provide a lasting and continuing record throughout the entire

refuge of the performance of the breeding habitat as reflected by breeding ducks. These transects will tell the same story for other wildlife-pheasants, owls, shorebirds, herons, egrets, blackbirds, etc. They will provide an invaluable backlog of information for future more intensive studies on the effects of water management, grazing, ecological succession, and other practices. In fact, the transects in many cases can readily be used to delineate study areas and to establish photo points, water and soil measuring points, vegetative trend transects, and to locate specific areas for numerous investigational and management purposes.

The findings of this study clearly demonstrate that nesting transects will give more accurate refuge production estimates than any other approach explored. There is a tremendous advantage in being able to establish confidence limits on data. Everyone then knows how good the figures are.

The nesting transect approach, however, is not without its limitations. If it is properly designed and carried through so that sampling is adequate and representative, and so that errors in execution are held to a minimum, it will annually yield a figure of how many duck nests there are on the refuge. This figure can be accurate within 10%. From there on, accuracy almost inevitably deteriorates without the benefit, at least at this time, of knowing confidence limits. Because of errors in sampling (usually as a result of working with an unrepresentative or small sample), or because of the necessity of making certain assumptions, the following information will undoubtedly be less accurate than data on total refuge nests, but to an unknown degree:

1) Fate of nests --- destroyed, deserted and hatched.
2) Number of ducklings hatched.
3) Number of ducklings reaching flying age. Other than errors in sampling Class IIc and III broods, this procedure makes the premise that virtually no complete broods are lost to predation or other causes. Available literature was not at all helpful in determining the validity of this assumption.
4) Brood mortality and cause.
5) Species composition of breeding population and production.
6) Nesting cover preferences.
7) Brood habitat preferences.
8) Any and all of the above information, as well as total nests, on any lesser size area (habitat unit) than the entire refuge breeding habitat of 12,000 acres.

In time it may be possible to determine accuracy limits on a number of the above items as information accumulates. Be that as it may, the purpose of emphasizing the limitations of the nesting transect approach is not to discourage it, but rather to be realistic about what it can and cannot do.

It is therefore recommended that the second phase of this study, as

set forth in last year's report, be initiated as soon as manpower and funds are available. As seen at this time, it includes the following:

1. The Wildlife Management Biologist will actively participate in the first year of the program. He will be responsible for preparing a Wildlife Management Outline to cover the first year's activities; planning and assisting with the establishment and running of transects; assisting with breeding pair and brood counts; preparing forms and written procedures for the operation; and preparing the final report. Thereafter, the waterfowl production procedure will become operational and will be a regular refuge function.

2. The survey will be designed to cover the entire refuge, as proposed and as it will be developed under the Master Plan, including tracts that are to be acquired and eliminating those that will be disposed of. From this, the areas that are, and will be, non-productive breeding habitat (croplands, building sites, etc.) will be further deleted. This will leave a working area of approximately 12,000 acres, or 19 sections.

3. Permanent transects will be established throughout the breeding habitat. Transects will run north and south and will be mechanically spaced 300 feet apart. The first transect will be established 150 feet from the west boundary of the breeding habitat. In all there will be approximately 132 transect lines. Transects will be 16.5 feet wide, giving an approximate total transect acreage of 640. Transect markers will be easily visible targets erected on poles at least 8 feet high. Each marker will be identified by its transect line and position in the transect. For example, the third marker from the north in the sixteenth transect from the west would be lettered 16-3. There will be at least one transect marker for every one half mile of transect so that when running the transect it will always be possible to line up two markers ahead or behind.

4. Species composition of the breeding population, by unit, will be determined each year by vehicle counts, with the aid of binoculars and spotting scope. This will require approximately 5 man days (2 men) annually in late April and early May.

5. During at least the first two years, complete transect runs will be made in mid-May and mid-June. A third partial transect coverage will be made in early July. Species, nesting cover, and nest and egg hatching success will be recorded for each nest. Nests will be plotted on overlays of aerial photographs. Standard field forms and overlay procedures will be

prepared. Nesting cover will be expressed in such a way that it can be directly correlated with the vegetative inventory. It is believed that running the transects will require 40 man days (4 men for 10 days), annually, for each complete coverage and 20 man days (4 men for 5 days) for the third partial coverage.

Once a reliable base of total waterfowl production has been established, it will probably not be necessary to run all transects each year. Although this decision can be made after the first two years' data is in, it is suggested that complete transect coverage be made every third or fifth year, with every other, third, a fourth transect line run during the intervening years.

6. Brood counts, by unit, in late June, July, and early August will determine the size of broods, by species, reaching Class IIc and III size. An estimated 20 man days (2 men) annually will be needed.

7. Projection of nesting transect data will determine the total refuge duck hatch, within anticipated confidence limits of 10% at the 95% level, when all transect lines are run. Species composition of the hatch will be determined from the nesting data, corrected by correlation with the breeding population count. Total production (ducks reaching flight age) will be determined by multiplying the number of hatched broods (from nesting data) by average brood size reaching class IIc and III age. Other pertinent information will be compiled. Ten man days (1 man) annually is estimated for this work.

Submitted by: Robert M. Ballou
Robert M. Ballou, Wildlife Management Biologist

Date 1/11/63

Reviewed by: _____
Refuge Manager, Monte Vista Refuge

Date _____

Distribution

Central Office	1	Wildlife Management Biologist-Victoria	1
Regional Office	1		
Monte Vista Refuge	1	Wildlife Management Biologist-Monte Vista	-
Extra copy	1		

TABLE I

MONTE VISTA REFUGE

Comparison of Waterfowl Breeding Pair Counts between Large, Permanent Impoundments and Small and/or Temporary Impoundments (Flooded Meadows)
April 25 - May 2, 1962

Species	Large, Permanent Impoundments Ponds 7P1, 7P2, 7P3, 7P4, 14P3, 14P4, 15P2, 15P3, 15P4, 17P1, 17P3, 18P2				Small and/or Temporary Impoundments in Units 1, 6, 7, 8, 10, 16, 17, 22				Total (Combined)			
	Pairs	Singles	Total	Sp.Comp. %	Pairs	Singles	Total	Sp.Comp. %	Pairs	Singles	Total	Sp.Com %
Mallard	533	261	1588	46	69	42	222	50	602	303	1810	46
Gadwall	146	3	298	9	11	--	22	5	157	3	320	8
Pintail	97	140	474	14	11	13	48	11	108	153	522	13
G-W Teal	165	22	374	11	27	1	56	13	192	23	430	11
B-W Teal	31	--	62	2	4	2	12	3	35	2	74	2
Cinnamon Teal	80	11	182	5	22	4	52	12	102	15	234	6
Shoveller	107	45	304	9	10	2	24	5	117	47	328	(
Redhead	35	1	72	2	1	--	2	-1	36	1	74	2
Ruddy	7	3	20	-1	--	--	--		7	3	20	1
Other	37	3	80	2	2	--	4	1	39	3	84	2
Total	1238	489	3454		157	64	442		1395	553	3896	

TABLE II

MONTE VISTA REFUGE

Distribution of Duck Nests per acre in Transect Sample, West to East
1962

All Nests

Unit	5/14-18/62	6/11-18	Combined	Unit	5/14-18/62	6/11-18	Combined
19	0	0	0	7	-	1	1
	0	0	0		-	0	0
20	0	0	0	23	0	0	0
	0	0	0				
14	0	0	0	17	0	0	0
	0	0	0		1	4	5
6	0	1	1	8	1	2	3
	0	0	0		1	0	1
21	0	0	0	2	1	0	1
	1	0	1		0	0	0
15	0	1	1	23	0	-	0
	0	1	1				
6	1	1	2	17	0	0	0
	0	0	0				
21	0	-	0	18	1	1	2
	0	-	0				
15	0	-	0	9	0	4	4
	3	0	3		2	0	2
7	1	-	1	3	0	0	0
	0	-	0		0	0	0
22	0	0	0	18	0	0	0
	0	0	0		2	0	2
16	0	1	1	9	0	1	1
	0	0	0		0	1	1
	-	0	0				
7	1	0	1	3	1	1	2
	2	0	2		0	0	0
1	0	0	0	10	0	0	0
	0	1	1		0	0	0
22	-	0	0	4	0	0	0
	-	0	0		0	0	0
16	-	1	1	11	0	0	0
	-	0	0		0	2	2
				5	0	0	0
					19 nests	24 nests	43 nests
					55 acres	55 acres	62 acres

TABLE III

MONTE VISTA REFUGE

Statistical Calculations Used to Determine Sample Size needed on Entire Refuge for 10% and 15% accuracy, 95 times out of a 100, in Estimating Total Duck Nests

$$s = \frac{1}{N}\sqrt{N \cdot Sx^2 - (Sx)^2}$$

$$s = \frac{1}{62}\sqrt{62 \cdot 101 - (43)^2}$$

$$s = \sqrt{\frac{4419}{62}}$$

$$s = 1.07$$

s = Standard deviation

N = Acres of transect

x = Variates

S = Sum of

10% Accuracy

$$N = \frac{(t.05)^2\ (s)^2}{(.1 \cdot \bar{x})^2}$$

$$N = \frac{(1.671)^2(1.07)^2}{(.1 \cdot .69)^2}$$

N = 671 acres

N = Acres of sample needed

t.05 = Tabular value for the number of observations.

s = Standard deviation

$\bar{x}$ = Mean of the sample data

15% Accuracy

$$N = \frac{(t.05)^2(s)^2}{(.15 \cdot \bar{x})^2}$$

$$N = \frac{(1.671)^2(1.07)^2}{(.15 \cdot .69)^2}$$

N = 291 acres

TABLE IV

MONTE VISTA REFUGE

Species Composition of Nests Found on Transects

1962

Species	No. of Nests	Species Composition - %
Mallard	25	71
Gadwall	2	6
Pintail	5	14
Teal	2	6
Shoveller	1	3
	35	
Unknown	8	
	43	

MONTE VISTA NATIONAL WILDLIFE REFUGE

RIO GRANDE AND ALAMOSA COUNTIES, COLORADO

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

VICINITY MAP

106°10' R7E R8E 106°08' 106°06' 106°04' R8E R9E

37°32'

37°30'

37°28'

T 38 N

T 37 N

Map I

Nesting Transects

1962

REFUGE BOUNDARY

1st Series

2nd Series

Deleted Area

COMPILED IN THE BRANCH OF ENGINEERING
FROM AERIAL PHOTOGRAPHS, B.L.M. SURVEYS,
AND SURVEYS BY U.S.F. & W.S., JUNE 1954.
REVISED JAN. 1959, JUNE 1959.

ALBUQUERQUE, NEW MEXICO APRIL 1960

NEW MEXICO PRINCIPAL MERIDIAN

Scale 0 20 40 80 120 160 CHAINS
0 1/4 1/2 1 1 1/2 2 MILE

TOWNSHIP DIAGRAM

MEAN DECLINATION 1958

2R COLO. 450 407