Status of gray foxes in Wisconsin, 1975. Report 94 [1977]

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DEPARTMENT OF NATURAL RESOURCES

RESEARCH

REPORT 94

JUNE 1977

STATUS OF GRAY FOXES IN WISCONSIN, 1975

By
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ABSTRACT

A study of the geographic distribution and relative abundance of gray fox (Urocyon cinereoargenteus ocythous) in Wisconsin was conducted in 1975-76. Methods included the use of mailed questionnaires, public appeals for observation locations and opinions on current population status.

Gray fox populations in Wisconsin are currently stable to declining. Foxes have virtually disappeared since 1950 from a large area of formerly occupied range in the upper Mississippi River Valley. The current high pelt values have caused a high percentage harvest of the gray fox population. These factors suggest a definite cause of concern. Management considerations for gray foxes in Wisconsin are discussed, including an adequate status monitoring system, modifications of seasonal harvest framework, and additional harvest regulations.

CONTENTS

INTRODUCTION

The Wisconsin Endangered Species Law (Chap. 29.415 Wis. Stats.) gives responsibility to the Department of Natural Resources for recommending necessary changes in management for species whose status is not clarified. Management plans cannot be sharpened until basic population trends and distribution information are available.

The population status of the gray fox (Urocyon cinereoargenteus ocythous) in Wisconsin was classified as "unknown", i.e. as "Sufficient information is not available to make a decision as to status in Wisconsin," Hine et al. (1975:1). This study was designed to provide base data necessary for: (1) evaluating the current gray fox hunting and trapping season; and (2) establishing the status of this species.

PROCEDURES

Procedures to determine the present geographic distribution of gray foxes in Wisconsin involved the collection of observational locations from the following sources:

1. Wisconsin Trappers Association (WTA). Questionnaires requesting observations of gray foxes seen during the 1974-75 and 1975-76 trapping seasons were enclosed in the 1975 and 1976 WTA spring newsletter, the "Voice". The WTA provided a membership mailing list of 853 different addresses (two or more members with the same last names and addresses were counted as one). The printed questionnaires consisted of a pre-paid, self-addressed return portion, separated by perforations for removal from the explanation portion (Append. A and B).

2. County Conservation Congress (CCC) delegates. Mimeographed 1-page questionnaires were mailed to 359 County Conservation Congress delegates and their alternates requesting 1975 sightings and population status opinions for gray foxes (Append. C).

3. Public observations. Appeals for observational assistance were made in "Wisconsin Sportsman" (A Wisconsin-oriented bimonthly magazine for outdoor enthusiasts) (January-February 1976, Vol. 4. No. 1, p. 51 and March-April 1976, Vol. 4, No. 2, p. 32) and the "Wisconsin Natural Resources Bulletin" (a bimonthly publication by the Wisconsin Department of Natural Resources) (January-February 1976, Vol. 41, No. 1, pp. 15-16) (Append. D).

4. The Wisconsin DNR's "Endangered and Threatened Animal Observation" records. Compiled observations for 1974 were examined, and additional observations were requested for 1975. Agencies cooperating with DNR personnel in collecting field observations were the U.S. Forest Service, U.S. Soil Conservation Service, U.S. Fish and Wildlife Service, and College and University personnel.

5. Wisconsin DNR Conservation Wardens. Questionnaires were sent to all DNR conservation wardens requesting 1975 field observations and subjective opinions on the status of gray foxes in their respective areas (Append. E). Status opinions were asked only from wardens who had resided at their station for at least 5 years.

6. Bounty records and taxidermist reports. State bounty records for gray fox from Richards and Hine (1953) were examined and updated until termination of bounty payments in 1958. Taxidermist reports for 1973-75 were used to examine the extent of gray fox harvest not available from furbuyer records.

7. Special Gray Fox Harvest Questionnaire. Furbuyers throughout the state were contacted to obtain names and addresses of people who sold gray fox pelts during the 1975-76 season. A second questionnaire was then mailed to each seller requesting location, date, and means of harvesting the reported gray fox (Append. F).

Reported observations from all sources were plotted on a state map to the nearest civil town (town and range). Land use and cover maps, as compiled by the U.S. Geological Survey (Hindall and Flint 1970) and the U.S. Forest Service (Spencer and Thorne 1972) were compared with habitat preferences of gray foxes to determine geographic distribution. Available literature on habitat preferences and food habits was examined in order to establish isolines of common abundances. Gray fox kill records, obtained primarily from the special gray fox harvest questionnaire, were plotted by government townships, and were collated with known habitat preferences (requirements) to also determine abundance isolines.

DISTRIBUTION AND ABUNDANCE

Historic

Gray fox distribution in Wisconsin before 1900 remains relatively unknown. Ecologically, Wisconsin lies on the northern edge of the gray fox range in North America (Burt and Grossenheider 1961:49). In Pennsylvania, Doutt et al. (1966:191) wrote that gray foxes preferred habitat of ". . . unbroken forest, rough rocky country, brushland, and abandoned farmland." It was unlikely that the gray fox made any substantial penetration into the unbroken conifer-hardwood forests of the upper Great Lakes region. In southern Ontario, historical accounts and archaeological excavations verified the occurrence of gray foxes only during a period in the mid-seventeenth century, and a reappearance in the middle of the twentieth century (Banfield 1974:303-4). During 1900 to 1910, gray foxes were present in the southeast portion of Wisconsin and along the Wisconsin and Mississippi Rivers (Jackson 1961:309). Jackson also found that the species had successfully invaded northern Wisconsin during the 1910 to 1960 period, and while gray fox records exist for every county in the state, it has remained relatively rare in the northeastern third of the state.

Leopold (1931:219), after collecting reports from local outdoor people, reported gray fox distributed in west central and southwestern Wisconsin (Fig. 1). Richards and Hine (1953:13) used the 1946-49 bounty records to determine gray fox distribution and abundance (Fig. 2). During the late 1950's, subjective opinions of DNR game managers and bounty records were used by Hine (1970:10) to again estimate gray fox distribution and abundance in Wisconsin (Fig. 3). The latter two distribution surveys indicated an eastward and somewhat northward expansion of gray fox as suggested by Jackson (1961:309).

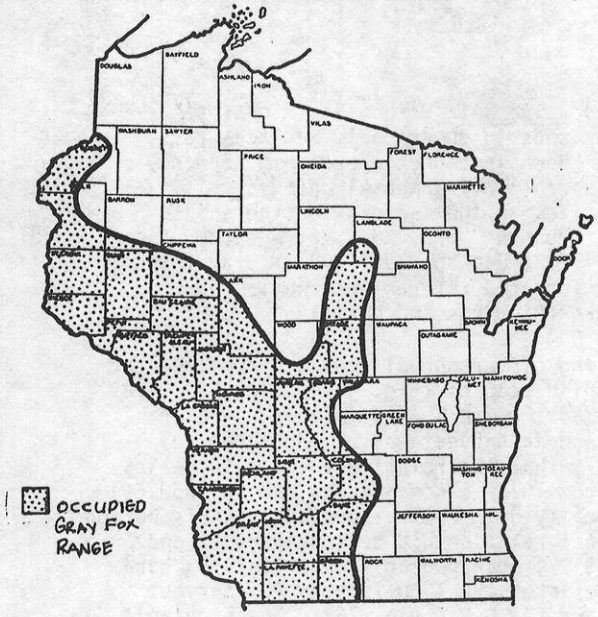

FIGURE 1. Gray fox distribution in Wisconsin, 1921. (Leopold 1921)

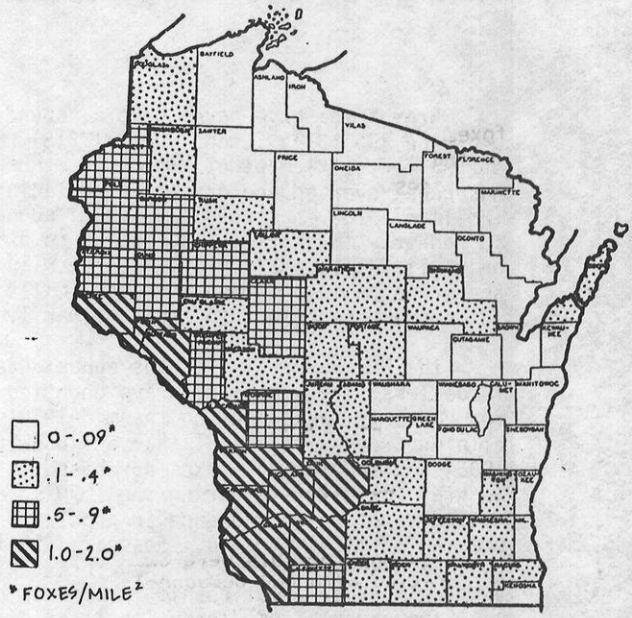

FIGURE 2. Gray fox distribution and abundance in Wisconsin, 1949. (Richards and Hine 1953)

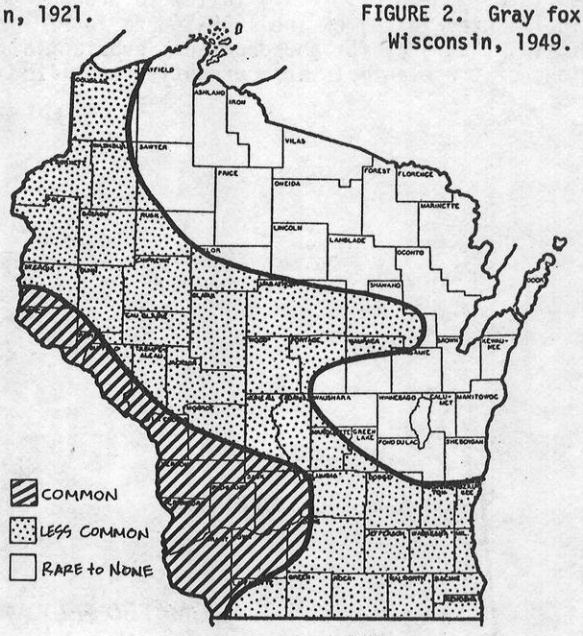

FIGURE 3. Gray fox distribution and abundance in Wisconsin, 1955. (Hine 1970)

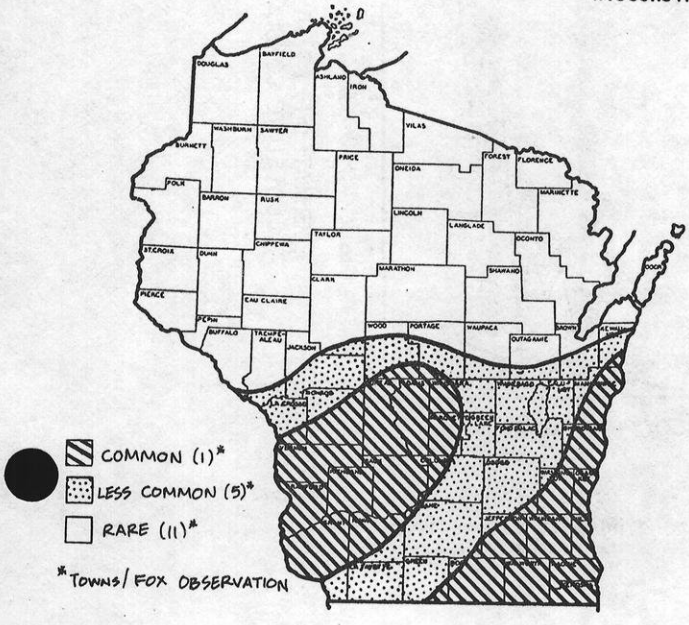

FIGURE 5. Gray fox distribution and abundance in Wisconsin as determined by observations, 1975-76.

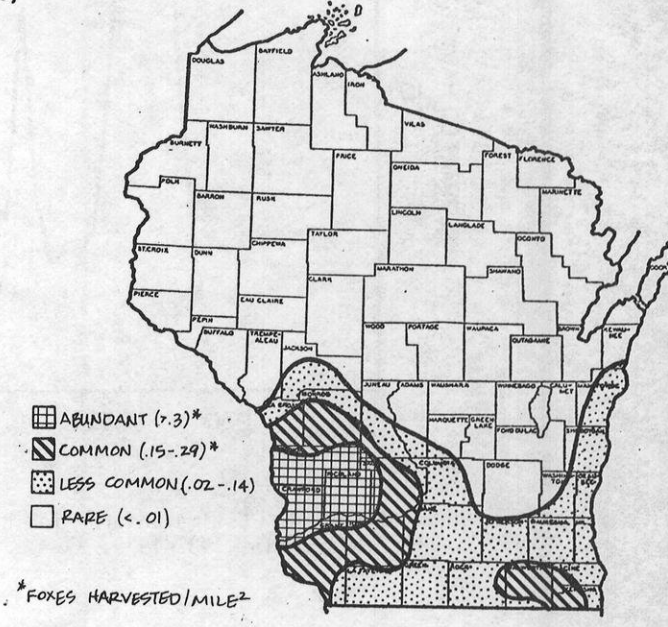

FIGURE 6. Gray fox distribution and abundance in Wiscons as determined by harvest estimates, 1975-76.

Gray foxes have never been as abundant as red fox (Vulpes vulpes) in Wisconsin (Richards and Hine 1953:31). Leopold (1931:218) reported a tendency for reds to numerically replace grays during the settlement of Wisconsin. However, there have been known instances where this tendency has been reversed and grays are replacing reds without any apparent environmental changes (Follman 1973). Leopold (1931:224) suggested disease or parasites as the factors causing shifts in red-gray fox ratios. According to other theories, red fox "run out" gray fox, or reds thrive on civilization while grays require wild forests (Leopold 1931:222, Jackson 1961:308). Gray foxes appear to be most common in rough, hilly terrain with heavily forested riverbottoms while red foxes are more common in areas primarily devoted to agriculture (Richards and Hine 1953:5).

The DNR has estimated the annual gray fox harvests by using either annual reports from licensed furdealers, the number of grays bountied, or hunting and trapping records (Fig. 4, Append. G). Gray fox harvests peaked during the mid-1930's, with a second peak during the 1940's followed by a declining trend with a small harvest upswing in the 1970's. The peak harvest was 21,385 taken in 1935, and the low 276 foxes purchased in 1961. It was unlikely that the relatively small increases in gray fox harvests during the 1970's (an average of 1,616 from 1970-75 compared to 600 in 1960-69) actually reflected a change in population levels as the abnormally high pelt values during this period created atypical demands. Seagears (1944) found a strong direct relationship between harvest and pelt values of red foxes in New York. Richards and Hine (1953:27) observed an independent fox harvest-pelt price relationship in Wisconsin. A regression analysis of the 1960-75 gray fox harvest with the corresponding annual pelt values was highly significant ($P<0.01$, $r = .76$). The high pelt values during the 1970's (1970-75 mean of $10.11) failed to produce the mean harvest levels typical of the 1932-44 period (10,174 gray foxes) or the 1945-56 era (4,970 gray foxes). Therefore, it does appear from harvest estimates that gray fox abundance has substantially decreased over the last 30 years, and that populations of these animals are currently stabilized at a much lower level.

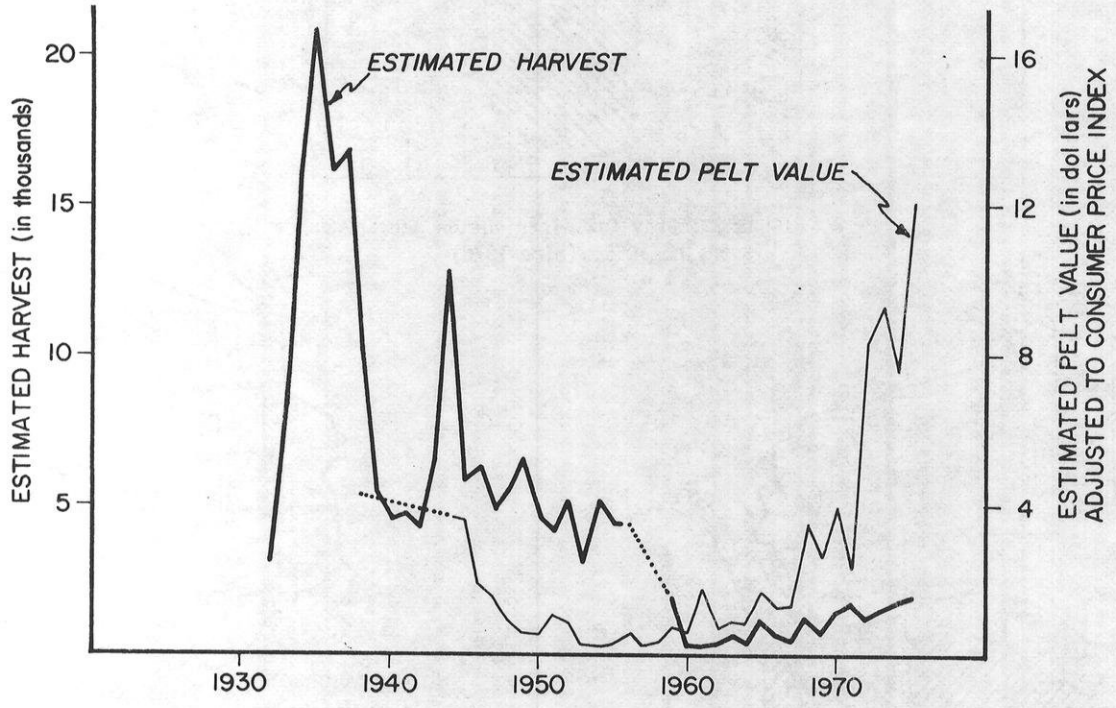

FIGURE 4. Estimated gray fox harvest and corresponding pelt values from Wisconsin, 1932-1975.

Current

The Wisconsin Trappers Association questionnaire produced 50 gray fox observations in 1974-75 and 131 sightings in 1975-76. County Conservation Congress delegates and alternates provided 91 gray fox observations during 1975. Magazine requests from the general public resulted in an additional 136 sightings. Twenty-five gray fox sightings were obtained in 1975 from the Endangered Species Program. Finally, DNR Conservation Wardens yielded an additional 17 reliable locations from sign or sightings of gray fox (Table 1). The total 450 observations were plotted to determine Figure 5, while 750 kill locations from the Special Harvest Questionnaire were used to determine Figure 6.

TABLE 1. Summary of questionnaires for gray fox.

Sources	Questionnaires (or letters) No. mailed	No. received	Percent received	No. Reported Observations
WTA, 1974-75	853	73	8.3	50
WTA, 1975-76	853	182	21.3	131
County Conservation Congress	359	200	61.3	91
Magazine requests	unknown	340	--	136
Endangered Species Program, 1974	--	--	--	unknown
Endangered Species Program, 1975	--	--	--	25
DNR conservation wardens	139	83	59.7	17
Total				450

It was not possible to obtain the locations of all gray foxes harvested during the 1975-76 season. Six furbuyers did not separate gray and red foxes in their records, but estimated the number of gray foxes purchased (20% of the total foxes harvested) when filing their annual furbuyers' reports to the DNR. In addition, addresses of many sellers were inadequately recorded by furbuyers; over 11 percent of the mailed questionnaires were returned for insufficient addresses. An estimate of gray foxes harvested in 1975-76 was determined from a review of nearly 95 percent of the furbuyers' annual reports. The special harvest questionnaire provided 670 kill locations with an additional 80 sites collected from magazine responses and WTA returns for 750 locations or 42 percent of the 1,800 gray foxes harvested in 1975-76.

Current gray fox distribution and abundance were determined by two methods: (1) plotting of observations by civil towns and using sight frequency as an abundance index (Fig. 5) and (2) plotting of the 1975-76 gray fox seasonal harvest by government townships with relative density based on observed harvest per square mile (Fig. 6). Both methods are biased in their derivation. Plotting observations produced abundance indexes which tended to be proportional to human density, and sightings were also limited in hilly or heavily wooded terrain where visibility was restricted. Determining an index to gray fox distribution and abundance from harvest data assumed a uniform statewide harvest "pressure" which in fact would vary with human populations and topography. To eliminate the effect of changing pelt values on estimated harvest, harvest data from only a single season (1975-76) were used, which was believed to provide the most reliable gray fox status information. During 1975-76, the high pelt value for gray fox ($19.38) encouraged the substantial statewide harvesting of gray foxes. The high pelt value meant that nearly all collected gray foxes were eventually sold to furbuyers. Harvested gray foxes that are not included in the annual furdealers' reports are animals taken directly to taxidermists for mounting purposes. A small, insignificant number of gray foxes were handled by taxidermists during the last 3 years (1973-76; varied from 9 to 11 animals annually).

Two current gray fox status maps were produced to compare with distributions obtained in earlier years (Figs. 5, 6). Both status maps show the best gray fox range in the "driftless area" (unglaciated) of southwestern Wisconsin. However, the "abundant" range was apparent only in Figure 6. A "common" range pocket in southeastern Wisconsin was also identifiable on both maps although the boundaries varied considerably. Finally, the northern edge of the "less common" gray fox range, especially in the Lake Winnebago region, was considerably broader in Figure 5. In spite of these discrepancies, the gray fox status map plotted from observations does provide a reasonable impression of gray fox distribution and abundance in Wisconsin. The technique of using observations to determine status maps was therefore considered a viable censusing procedure.

The accuracy of Figure 6 was tested by comparing the 1975-76 gray fox harvest estimates of 1,800 from the fur dealers' reports, with a summary of the calculated kill for each area of different density. The area of each density level was determined by planimeter measurements and multiplied by the derived harvest levels. The calculated minimum and maximum gray fox harvests in 1975-76 were 1,500 and 2,300 foxes, respectively.

The better gray fox range on both status maps was generally found in regions of "significant topography." Significant topography is defined as areas having 12 percent or greater slope encompassing 160 acres or more with a change in elevation of at least 40 feet (Wis. Dept. Admin. 1975). The driftless area is the only region in Wisconsin where significant topography occurs in a uniformly widespread manner. Land use patterns in the driftless area (typically 30 percent forested and 40 percent cultivated), greatly influenced by the prevalent topography, were examined as a possible key to gray fox abundance. In the driftless area, the percent of total land surface classed as forested, cropped, and pastured both within and outside the "abundant" or "common" range failed to differ appreciably, especially to the north in Buffalo and Trempealeau Counties. East of the driftless area, land use patterns and topography change rapidly, and decreased gray fox abundance was observed (Fig. 6). Cropland in the driftless area is commonly found on ridge tops and valley floors while the intervening slopes are wooded. Woodlots and croplands, therefore, tend to exist along narrow areas, with an abundance of "edges." It is probable that a combination of significant topography, with approximately 30 percent of the land surface forested and around 40 percent in cropland, and a great amount of woodland-cropland (or pasture) edge are the essentials for higher gray fox densities in Wisconsin.

The "common" range in southeastern Wisconsin proved to be somewhat of an anomaly. The better gray fox habitat was centered around the southern "kettle moraine" area where conditions are locally similar to the driftless area. However, this population of gray foxes appeared to be expanding into less desirable habitat (especially seen on Fig. 5), as "common" range existed in intensively cultivated areas, with little relief, and a small percentage wooded (around 7% forested and 73% cropped). The high human densities indicate high harvest demands, which suggests that a substantial portion of the existing gray fox population is harvested and this is brought out by harvest records (Fig. 6).

A short-term ($\leq$ 5 years) indication of gray fox population status was obtained from questionnaires. Recipients of questionnaires were asked if the local gray fox populations had increased in abundance, decreased, or remained the same during the last 5 years. Unfortunately, WTA, CCC, and the special gray fox questionnaire did not offer a fourth choice of gray fox being absent in their area, resulting in some confusion and partial response. A summary of all responses from all sources did not indicate any discernible trend (Table 2). The opinions of WTA members, DNR wardens, and CCC delegates suggested a stable to declining gray fox population, while the special gray fox questionnaire respondents indicated increasing to stable abundance. Each group of respondents was subjectively appraised in order to evalute the current status of gray foxes. An experienced trapper would probably provide a better indicator of gray fox population status than most hunters or people who picked up road-killed foxes. WTA members were believed to be the most reliable status source, followed in turn by DNR wardens, the special gray fox questionnaire respondents, and CCC delegates. Quality ranking of groups was primarily based on field experience with gray foxes as their sign. Therefore, our judgment of respondent groups suggested a stable to declining gray fox population. Status opinions obtained from questionnaires support the DNR gray fox harvest estimates.

TABLE 2. Summary of status opinions of gray foxes from mailed questionnaires.

Source	Indicated gray fox populations were Increasing	Decreasing	Stable	Total received
WTA members	12 (17)[1]	28 (40)	30 (43)	76
WDNR wardens	3 (10)	15 (48)	13 (42)	31
CCC delegates	15 (10)	80 (55)	51 (35)	146
Special questionnaire	186 (44)	104 (25)	129 (31)	419
Total	216 (32)	227 (34)	223 (33)	666

[1]Number received (percentage)

Such opinions are further supported by the almost complete absence of gray fox harvested in the upper Mississippi River Valley, not including the small increase in "common" range in southeastern Wisconsin.

A rough estimate of the current gray fox population may be determined by examining harvest data. Zarnoch et al. (1976) found that a stable red fox population was maintained when the human fox harvest level was 54.7 percent of the annual fox population, which was applied to gray foxes. Therefore, the recent annual harvests of 1,600 gray foxes (1970-75) would roughly represent one-half of the total gray fox population, suggesting a pre-season fall gray fox population from 3,000 to 4,000 animals.

Harvest characteristics were determined from an analysis of the special gray fox harvest questionnaires. The peak of the 1975-76 harvest occurred during the month of November (Fig. 7). Over 40 percent of the harvested gray foxes were taken in November, as compared to 21 percent in December and 21 percent in January. Trappers accounted for 57 percent of the total harvest, while hunters killed 32 percent and the remaining 11 percent were from other causes. The leading "other" sources were road-killed foxes, which represented 90 percent of all "other" causes. Trappers had their greatest impact in November when they harvested 28 percent of the total kill, while hunters had a more balanced harvest of 9 percent in November, 8 percent in December, and 10 percent in January. The first statewide Wisconsin fox season ran from 16 October 1976 to 28 February 1977. No restrictions were placed on the daily bag or possession limits. Previously, the Conservation Congress, with DNR approval, voted to implement the fox season on a county level (i.e., 45 of 72 counties with a fox season in 1975-76). The 1976-77 fox season offers little protection for gray foxes because 99 percent of the 1975-76 gray fox harvest was taken from 1 October to the end of February (Fig. 7).

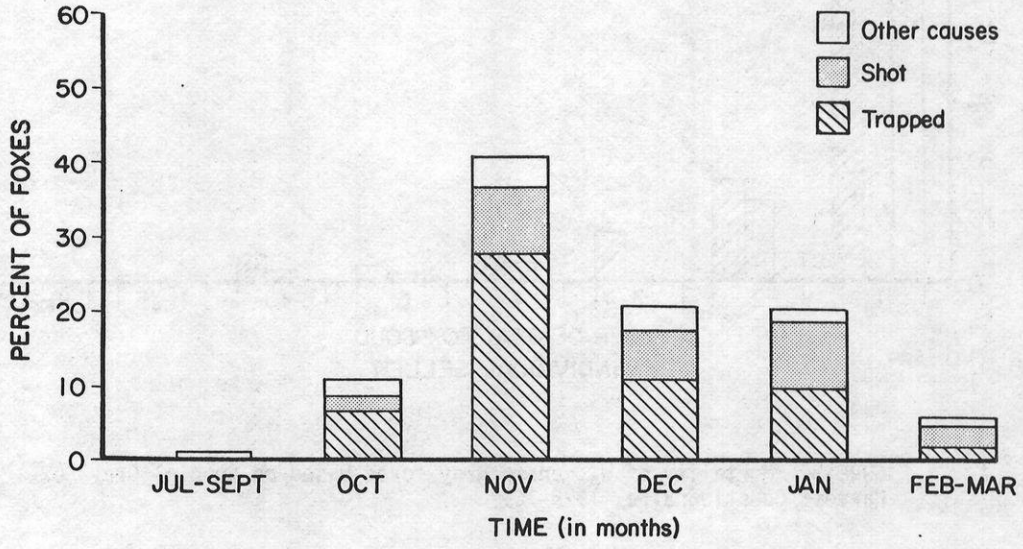

FIGURE 7. Causes of death and time of death of gray fox sold to fur buyers in Wisconsin, 1975-76.

The gray fox harvest is believed to be greatly determined by the demand for red foxes and raccoons. The high mean 1975-76 pelt values for the more abundant red foxes ($40.79) and raccoons (Procyon lotor) ($15.30) encouraged substantial demand for these two furbearers. The gray fox harvest is directly related to the harvest of red fox and raccoon; 1932-75 harvest estimates were significantly correlated at the 99 percent level of confidence (r = 0.64, 0.67).

Apparently, gray foxes were incidental targets of most trappers and hunters, who harvested 23,364 reds, 205,845 raccoons, and 1,800 grays during 1975-76. Sixty-five percent of all reporting trappers and 80 percent of all hunters took only one gray fox during the entire 1975-76 season (Fig. 8). By using terriers to flush grays from dens, two highly successful Richland County hunters registered a combined harvest of 39 gray foxes in 1975-76. However, these individuals are exceptions in comparison with the usual gray fox hunters and trappers.

The kill locations and home address of the harvester were taken from a sample of 150 special gray fox questionnaire returns. Fifty-one percent of the gray foxes were taken within the same township in which the seller resided, compared to 35 percent removed from township adjacent to the harvester-seller's residence.

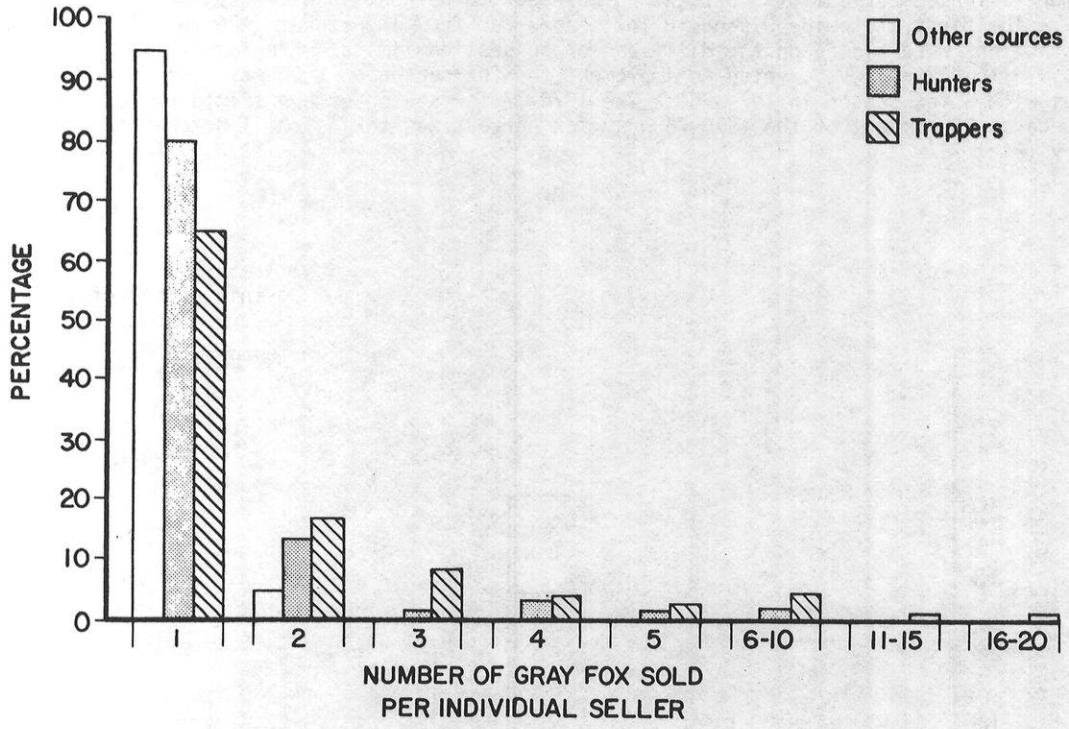

FIGURE 8. Mortality of Wisconsin gray foxes based on Special Gray Fox Harvest Questionnaire, 1975-76.

CONCLUSIONS AND MANAGEMENT CONSIDERATIONS

Gray foxes occur in almost every county of Wisconsin, but gray fox populations are stable to declining throughout the state. The once fairly common gray fox populaton of the upper Mississippi River valley has been virtually eliminated during the last 25 years, although the causes remain unknown. The best gray fox range in terms of relative fox abundance is found in the driftless area of southwestern Wisconsin, specifically in Vernon, Crawford and Richland Counties. A pocket of

"common" range was also found in the southeastern portion of the state primarily in the kettle moraine county where conditions are locally similar to the driftless area. There was some evidence to suggest that gray foxes are increasing in the southeastern pocket of the "common" range.

The 1975 state gray fox population was estimated at between 3,000 to 4,000 animals. The abnormally high pelt values for long-haired mammals have created a correspondingly high demand that has the potential to depress populations as long as fox fur is in vogue. Currently, nearly half of the October 1 gray fox population is believed to be harvested annually. High gray fox densities (greater than 0.3 animal harvested per square mile) are generally found in areas of significant topography, regions with approximately 30 percent of the land surface forested and 40 percent cropped, and where extensive woodland-cropland (or pastured) edges exists.

The most feasible and effective gray fox management procedures involve harvest regulations. Because the gray fox harvest is directly related to the harvest of red foxes and raccoons, modifications of harvest regulations for the latter two furbearers thus may be necessary to influence gray fox populations.

The recent apparent stabilization of gray fox harvests is a cause of concern. During the 1960-69 period, the relatively low gray fox pelt values suggest a low percentage harvest of the gray fox population. Logically, gray fox abundance should have increased during this period of low harvest pressure. However, the 1972-75 harvest with correspondingly high pelt values indicated a relatively depressed population when compared to the 1932-56 harvests. Harvest regulations usually reflect the guideline that total mortality from harvest and natural causes should not exceed recruitment to the population. While a lack of information precludes the development of gray fox recruitment rates, indications suggest a threshold situation in 1975-76 and that further gray fox harvests at recent rates may cause population declines.

Information gathered during this study has led to the identification of the following regulation changes that should be considered in the development of a management plan for gray foxes:

1. A shortened statewide season will be necessary if pelt values remain high, and if the state gray fox population is to be maintained or increased beyond the current level of 3-4,000 animals.

2. Different season openings for hunters and trappers, as currently practiced in Iowa, Illinois, Indiana, and Missouri, may provide a means for minimizing differences of opinion shown by our correspondents to exist between fox hunters and trappers. Each group believes the other group is harvesting a disproportionately high share of both gray and red foxes.

3. Concurrent opening dates for terrestrial furbearers within the present zoned framework could make regulations easier to understand and enforce.

4. Trapping privileges made available only through the purchase of a trapper's license could provide furbearer distribution and a synopsis of the attitudes and characteristics of trappers by periodic surveys.

Reliable status data from annual purchase reports of fur dealers can be important base data for fox as well as other furbearer management in Wisconsin. Evidence gathered during our study suggested that the current voluntary fur dealers' reports may not provide reliable harvest indexes.

Gray foxes represent a small, but important segment of Wisconsin's wildlife resource. In view of the high demand for foxes as well as other furbearers, plus the recreational hours and dollars they provide, additional management and research input is desirable to adequately safeguard this resource.

LITERATURE CITED

Banfield, A. W. F.
1974. The mammals of Canada. Nat. Mus. Nat. Hist., Nat. Mus. of Canada, and Univ. Toronto Press, Toronto and Buffalo. 438 pp.

Burt, W. H., and P. P. Grossenheider.
1961. A field guide to the mammals. Houghton Mifflin Co., Boston. 200 pp.

Doutt, J. K., C. A. Heppenstall, and J. E. Guilday.
1966. Mammals of Pennyslvania. Penn. Game Comm. and Carnegie Museum. 273 pp.

Follman, E. H.
1973. Comparative ecology and behavior of red and gray foxes. Unpubl. Ph.D. Thesis. Southern Ill. Univ., Carbondale. 19 pp.

Hindall, S. M., and R. F. Flint.
1970. Sediment yields of Wisconsin streams. U.S.G.S. Hydrological Investigations Atlas HA-376.

Hine. R. L., ed.
1970. Wildlife, people and the land. Wis. Dept. Nat. Resour. un-number publ. 46 pp.

Hine, R. L., R. F. Nicotera, L. M. Christenson, C. E. Germain, J. B. Hale, H. D. Hettrick, B. Les, and L. A. Posekany.
1975. Endangered species program, progress report, 1974. Wis. Dept. Nat. Res. memo. 30 pp.

Jackson, H. H. T.
1961. Mammals of Wisconsin. Univ. Wis. Press, Madison. 504 pp.

Leopold, A.
1931. Report of a game survey of the north central states. Sporting Arms and Ammunition Manufacturers Inst. 299 pp.

Richards, S. H., and R. L. Hine.
1963. Wisconsin fox population. Wisc. Conserv. Dept., Tech. Wildl. Bull. 6. 78 pp.

Seagears, C. B.
1944. The red fox in New York. New York Conserv. Dept., Educ. Bull. 85 pp.

Spencer, J. S., Jr. and H. W. Thorne.
1972. Wisconsin's 1968 timber resource, a perspective. U.S. For. Serv. Resour. Bull. NC-15. 80 pp.

Wisconsin Department of Administration.
1975. Major areas of potential flood hazards and steep slope, land resources and analysis program. W.D.A. State Planning Office, Map 6.

Zarnoch, S. J., R. G. Anthony, and G. L. Storm.
1976. Computer simulated dynamics of a local red fox population. In R. L. Phillips and C. J. Jonkel, eds. Proc. of the 1975 predator sym., Montana Forest and Conserv. Exp. Stn., School of Forestry, Univ. of Montana, Missoula, Montana.

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Edited by Ruth L. Hine.

APPENDIX A. Wisconsin Trappers Association Questionnaire, 1974-75 Season.

INSTRUCTIONS: Please complete the following questions in this section at your earliest convenience; detach from the lower portion and mail. No postage required.

1. If you have observed badger, fisher or gray fox during the 1974-75 trapping season, please complete this chart:

	MONTH & YEAR	LOCATION OF OBSERVATION		COMMENTS
		COUNTY	CIVIL TOWN OR NEAREST ROAD INTERSECTION	
BADGER				
FISHER				
GRAY FOX				

DETACH HERE

2. If you have regularly or occasionally observed badger, fisher, or gray fox in Wisconsin during the past 5 years, please complete the following chart:

Badger Populations Are:			AREA IN WISCONSIN	
DECLINING	RELATIVELY STABLE	INCREASING	COUNTY OR SECTOR	COMMENTS

Fisher Populations Are:			AREA IN WISCONSIN	
DECLINING	RELATIVELY STABLE	INCREASING	COUNTY OR SECTOR	COMMENTS

Gray Fox Populations Are:			AREA IN WISCONSIN	
DECLINING	RELATIVELY STABLE	INCREASING	COUNTY OR SECTOR	COMMENTS

DETACH HERE

BADGER, FISHER AND GRAY FOX QUESTIONNAIRE

MAY 1, 1975

DEAR WISCONSIN TRAPPER:

YOUR COOPERATION IS NEEDED FOR A SURVEY OF BADGER, FISHER AND GRAY FOX DISTRIBUTION AND ABUNDANCE IN WISCONSIN. BADGER AND GRAY FOX HAVE BEEN REPORTED DECLINING WHILE THE FISHER IS APPARENTLY ON THE INCREASE IN THE NORTH DURING THE LAST DECADE. THIS SURVEY WILL ASSIST THE DNR BUREAU OF RESEARCH IN PREPARING A CURRENT RANGE MAP FOR THESE SPECIES.

PLEASE COMPLETE THE UPPER PORTION OF THIS QUESTIONNAIRE AT YOUR EARLIEST CONVENIENCE; DETACH AND MAIL. WE NEED YOUR RESPONSE EVEN IF YOUR REPORT IS NEGATIVE. YOUR ANSWERS TO THE QUESTIONNAIRE WILL BE KEPT IN STRICTEST CONFIDENCE.

VERY TRULY YOURS,
BUREAU OF RESEARCH

Cy Kabat

CY KABAT
DIRECTOR

APPENDIX B. Wisconsin Trappers Association Questionnaire, 1975-76 Season.

BADGER, FISHER AND GRAY FOX QUESTIONNAIRE

February 1, 1976

Dear Wisconsin Trapper:

Last year a BADGER, FISHER, AND GRAY FOX questionnaire was mailed to many Wisconsin trappers. We wanted to find out more about where these species are found. We hope that many more of you will answer this year to help us fill out our results.

Did you see any BADGER, FISHER, OR GRAY FOX during the 1975-76 trapping season? Yes or no, please fill out and send back the bottom part of this card. Write in "none" for counties you trapped where animals were not seen.

Sincerely,
BUREAU OF RESEARCH
Cy Kabat
Cy Kabat
Director

DETACH HERE

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO 448 MADISON, WIS.
Business Reply

DEPARTMENT OF NATURAL RESOURCES
BOX 450
MADISON, WISCONSIN 53701

ATT. LEROY PETERSEN

DETACH HERE

INSTRUCTIONS – Please complete the following questions in this section at your earliest convenience; detach from the upper portion and mail. No postage required.

1. IF YOU HAVE OBSERVED BADGER, FISHER OR GRAY FOX DURING THE 1975-76 TRAPPING SEASON, PLEASE COMPLETE THIS CHART:

SPECIE	MONTH & YEAR	WHERE WAS ANIMAL SEEN		COMMENTS
		COUNTY	CIVIL TOWN OR NEAREST ROAD INTERSECT.	
BADGER				
FISHER				
GRAY FOX				

APPENDIX C. County Conservation Congress Questionnaire.

Farm Wildlife Research
Dept. of Natural Resources
3911 Fish Hatchery Road
Madison, Wisconsin 53711

1976 BADGER, FISHER, AND GRAY FOX STATUS QUESTIONNAIRE
Wisconsin Conservation Congress Delegates

Dear Conservation Congress Delegate:

Your assistance is needed to help determine the present population status of badger, fisher, and gray fox in Wisconsin. We want to know the current geographic distribution and relative abundance of the 3 species of furbearers so that solid future management plans can be formulated.

As it stands now:

1. The badger, entirely protected since 1955 and offering little potential value as a furbearer, may not be holding their own in Wisconsin.

2. Fishers, also entirely protected, have been restocked in the Nicolet and Chequamegon National Forests during 1956-66. These stockings in 3 counties have possibly increased fisher numbers and range.

3. A sharp increase in estimated purchases of gray fox during the past 4 years, as compared to years prior to 1971, has caused DNR field personnel to be concerned over a possible reduction in statewide populations. If the abundance of gray fox is declining in Wisconsin, changes must be made in the current hunting and trapping regulations, and in the status classification.

We encourage you to fill out and return the enclosed questionnaire. The population status of badger, fisher, and gray fox cannot be clarified without your help. Thank you.

Sincerely,

LeRoy R. Petersen

Charles M. Pils

Project Leaders

P:P:jh

1. Have you seen any live badger, fisher, or gray fox since January 1, 1975?

No_____ Yes_____

If yes, where? (Be as specific as possible on locations)

Animal Seen	County	Section	Township	Range

2. Have you seen badger, fisher or gray fox "sign" (tracks, scat, diggings) since January 1, 1975? No_____ Yes_____ If yes, where?

Animal Seen	County	Section	Township	Range

3. In your opinion, how does the current badger, fisher and gray fox population compare to that of 5 years ago? (check one)

_____Badger _____Fisher _____Gray Fox now more abundant than 5 years ago.

_____Badger _____Fisher _____Gray Fox now less abundant than 5 years ago.

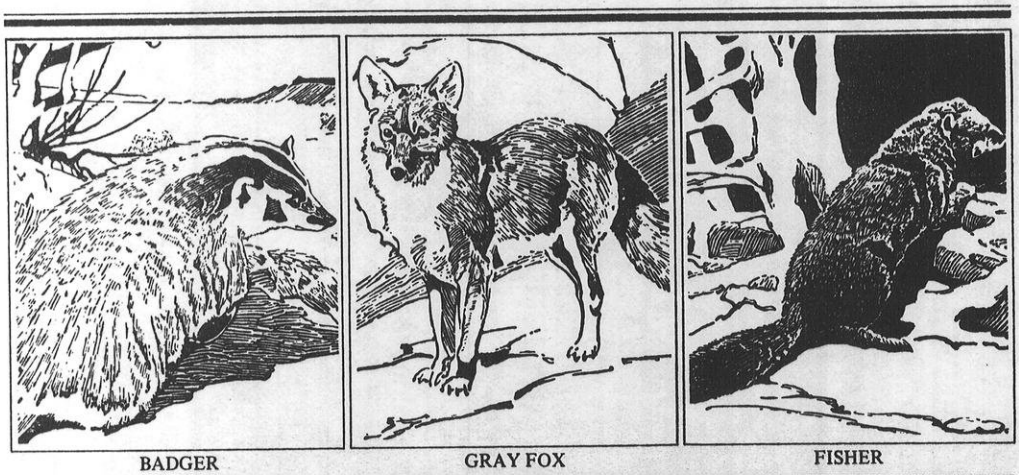
_____Badger _____Fisher _____Gray Fox about the same as 5 years ago.

_____No Opinion

4. Any comments you would like to offer regarding badger, fisher or gray fox populations, regulations, or anything else concerning these 3 fur bearers: (Use back or separate sheet if necessary).

APPENDIX D. Magazine Appeal for Public Observations.

WANTED



BADGER GRAY FOX FISHER

HAVE YOU OBSERVED ANY BADGER, GRAY FOX, OR FISHER IN WISCONSIN DURING 1975?

IF SO, THEN WE NEED YOUR HELP! THE DNR IS CURRENTLY UPDATING DISTRIBUTION AND ABUNDANCE DATA FOR THESE THREE FURBEARERS.

YOUR OBSERVATIONS SHOULD INCLUDE INFORMATION ON:

1. **SPECIES OF FURBEAREB SEEN**
2. **DATE SEEN (month in 1975)**
3. **COUNTY and CIVIL TOWNSHIP OF OBSERVATION**

SEND YOUR OBSERVATIONS BY 6/1/76 TO: LEROY R. PETERSON, WISCONSIN DEPARTMENT OF NATURAL RESOURCES, 3911 FISH HATCHERY RD., MADISON WI 53711.

THE WELFARE OF WISCONSIN'S WILDLIFE IS EVERYONE'S RESPONSIBILITY.

APPENDIX E. WDNR Conservation Warden Questionnaire.

1976 Badger, Fisher, and Gray Fox Status Questionnaire

Department of Natural Resources Personnel

1. Name_____ Station_____

2. Have you seen any live badger, fisher, or gray fox since January 1, 1975?

   No_____ Yes_____ If yes, where?

Animal Seen	County	Township	Town and Range

3. Have you seen badger, fisher, or gray fox "sign" (tracks, scat, diggings) since January 1, 1975? No_____ Yes_____ If yes, where?

Animal Seen	County	Township	Town and Range

4. Answer this question only if you have been at your present area for the last 5 years. Over the past 5 years:

   Badger numbers are: more____, less____, about the same____, nonexistent in area_____

   Fisher numbers are: more____, less____, about the same____, nonexistent in area_____

   Gray Fox numbers are: more____, less____, about the same____, nonexistent in area_____

5. Any comments you would like to offer regarding badger, fisher, or gray fox populations, regulations, or anything else concerning these 3 fur bearers: (Use back or separate sheet if necessary)

Return to: LeRoy R. Petersen, Southern District Headquarters by March 15, 1976

APPENDIX F. Special Gray Fox Harvest Questionnaire, Cover Letter and Post Card Return.

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
Southern District Headquarters
3911 Fish Hatchery Road, Route 4
Madison, WI 53711

Anthony S. Earl
Secretary

March 4, 1976

IN REPLY REFER TO: 2310-4

Mr. Hubert Mundth
RFD
Sauk City, WI 53583

Dear Mr. Mundth:

The Wisconsin Department of Natural Resources is currently conducting a survey to map the geographic distribution and to determine the relative abundance of the gray fox throughout the state.

According to our records, you sold a gray fox during this past winter to Buckhorn Fur Center. We would like you to fill out and mail the enclosed postcard questionnaire concerning the gray fox. Thank you.

Sincerely,

Charles M. Pils
Wildlife Biologist

CMP:mad

Enc.

GRAY FOX HARVEST QUESTIONNAIRE

ANSWER the following questions:

1) LOCATION you obtained gray fox?
County:_____, AND Township:_____

2) DATE you obtained this animal? Month:_____

3) HOW obtained (check one)? shot___, trapped___, other___

4) IN YOUR OPINION, gray fox numbers are (check one):
increasing___, decreasing___, about the same for the past 5 years___

THANK YOU!
Department of Natural Resources

CODE: 000674

APPENDIX G. Wisconsin gray fox harvest estimates and pelt values, 1932-75[1]

Year	Annual Harvest Estimates				Pelt Values	
	Hunting/ Trapping Rept.	Number Bountied	Tagged by Wardens	Fur Dealers Report	Actual Value	Adjusted Value[2]
1932-33	3085					
1933-34	8819					
1934-35	16223					
1935-36	21385					
1936-37	16181					
1937-38	17909					
1938-39	10352				1.82	4.31
1939-40	5482					
1940-41	4540					
1941-42	4659					
1942-43	4311					
1943-44	6506				3.11	6.00
1944-45	12809				1.98	3.75
1945-46		5865			1.96	3.64
1946-47		6216			1.11	1.90
1947-48		4867			.99	1.48
1948-49		5494			.67	.93
1949-50		6489			.42	.59
1950-51		4606			.39	.54
1951-52		4031			.86	1.10
1952-53		5045			.68	.85
1953-54		3149			.21	.26
1954-55		5062			.18	.22
1955-56		4431			.29	.36
1956-57		4410			.44	.54
1957-58		Not Known			.18	.21
1958-59		Not Known			.31	.38
1959-60			1723		.72	.82
1960-61				387	.54	.61
1961-62				276	1.59	1.77
1962-63				287	.63	.69
1963-64				525	.86	.94
1964-65				330	.82	.88
1965-66				1074	1.57	1.66
1966-67				714	1.26	1.30
1967-68				487	1.37	1.37
1968-69				1109	3.68	3.53
1969-70				803	2.83	2.58
1970-71				1484	4.56	3.92
1971-72				1716[3]	2.79	2.30
1972-73				1361[3]	10.38	8.28
1973-74				1494[3]	12.34	9.27
1974-75				1839[3]	11.22	7.60
1975-76				1800[3]	19.38	12.02

[1]WDC Dept. Nat. Resour., Unpubl. Data.

[1]WDC Dept. Nat. Resour., unpubl. data.
[2]Adjusted from Consumer Price Index, base year of 1967.
[3]Corrected harvest estimate.

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