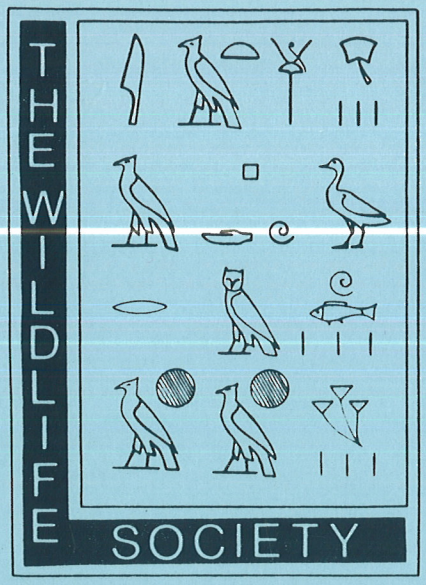


27th Annual Meeting of the Montana Chapter of The Wildlife Society

Missoula, Montana
February 23-24, 1989

ABSTRACTS
&
PAPERS

THE WILDLIFE SOCIETY
MONTANA CHAPTER

FEBRUARY, 1990

THE EFFECTS OF THE 1988 DROUGHT AND FIRES ON WILDLIFE

1. 1988 Summer Revisited - Governor Ted Schwinden.
2. 1988 Sharp-tailed Grouse Production in the Missouri River Breaks - Pat Gunderson.
3. Duck Populations After the Drought of 1988 - Jeff Herbert and Tom Hinz.
4. Impacts of Predator Control on Duck Production at Benton Lake N.W.R. - Kristi DuBois.
5. The Yellowstone Wildfires of 1988--Impacts to Birdlife - Terry McEneaney.
6. Impact of Drought on Nesting Birds in Northeastern Montana During 1988 - Dwain Prellwitz, Stephen Martin, Paul Mayer, Mark Dryer and John Grensten.
7. Montana Rivers Study: Wildlife Data Base - Gael Bissell.
8. Effects of the 1988 Fires and Drought Upon Elk in Yellowstone National Park - Francis Singer.

1989/90 OFFICERS

Mike Aderhold
President
P.O. Box 67
Kalispell, MT 59901

Ray Mule
Sec./Treasurer
Box 658
Culbertson, MT 59218

Fritz Prellwitz
President-Elect
Box 1408
Malta, MT 59538

THE DROUGHT OF 1988 REVISITED

By

Governor Ted Schwinden

I grew up in northeastern Montana pronouncing the letters d-r-o-u-g-h-t the way everyone else in our rural community said the word...drought. And we had ample opportunity to use the work because from the mid-thirties on drought became the norm, not the anomaly.

That childhood memory of burned up crops...burned out neighbors...has dimmed little over the years. To this day, I hate wind because it brings back the most terrifying memories of the drought years..the dust storms that tore topsoil from the land and farmers from their homesteads.

If the word drought rekindles those memories, it also reminds those of us who experienced its devastation that drought is as much a part of the Montana climatic picture as the breathtaking greenery that is pictured so graphically in our travel promotion brochures! It is trite, but all too true, to say that Montana weather is not only variable...it is also unpredictable.

Case in point. In late May of 1985--Memorial Day to be precise--I was visiting our farm--and our son--at Wolf Point. It was his first year as the <u>real</u> operator and the weather gods had been good. Our--his--stand of spring grain was as even, healthy and promising as I had seen in a good many years. Drawing on the vast historical knowledge I had acquired in my own farming days, I ventured...no, I flatly stated...that with June, the wettest month of the years only a day or two away, a good, if not bumper, the first time in my memory we had no measurable precipitation in June and temperatures soared to well above normal levels. Needless to say, crop insurance played a major role in the income picture for the Schwinden farm in 1985!

My intent in sharing these opening comments is not to generate sympathy for the plight of the farmer. Nor do I want to argue that I have some genuine expertise in climatology...I do not. I do submit that to some degree, at least, gubernatorial behavior inevitably is conditioned to some extent by personal experience. I say that by way of explanation, not excuse.

Now, to the summer of '88.

The shortfall in runoff last year, aggravated by inadequate snowpack in prior years was clear to all last spring. As streams and rivers shrank to a fraction of normal...in some cases to dry streambeds...the administration and the institutionalized drought groups urged water users to conserve. In some cases, cooperation clearly helped to maintain stream flows to the benefit of the fishery resource. Without question, the failure of voluntary cooperation to achieve desired results gave added impetus to the efforts of the Department

of Natural Resources and Conservation to develop...with public input...a comprehensive state water plan. And, the willingness of the current Legislature and administration to consider the adoption of legislation that would allow the state to acquire instream rights by lease or purchase is, without a doubt, a reaction to the drought of 88.

By mid-August, water shortages were not the only drought-related problems facing the state. The early loss of snowpack and lack of rainfall had combined to create an increasingly dangerous situation in forest and prairie alike. Low moisture levels in fuels and hot dry days made the risk of fire worsen daily.

During the week of August 22, my chief of staff, Terry Cohea, met with Brace Hayden--senior resource person on my staff--Dennis Hemmer, Director of Department of State Lands, and Ron Marcoux to discuss the pros and cons of a delay of the hunting season or a general closure. They also explored the impact of county-by-county by initiative of the governor or the county officials. Almost simultaneously, the Advisory Council to the Fish and Game Commission met, and recommended that the hunting season should open on schedule the first of September.

At that point in time, it is certainly appropriate to begin to second guess the Governor! Cohea's meeting had not produced agreement of appropriate action, although there was total agreement that we had a potentially dangerous fire situation. In agonizing over the appropriate decision, then and now, I am reminded of a meeting I had many, many years ago with the then vice-president of the Great Northern Railway Company. I had argued that the GN grain rates were not only penalizing the grain producers, but were also counterproductive too the railroad because truckers were making serious inroads into the most profitably part of their operation.

Scanlon responded by saying that the quandary faced by every "ratemaker" was the impossibility of knowing with certainty whether their action would be, in his works, "too much too soon, or too little too late!" Governor Schwinden never appreciated those words any more than in August, 1988.

Were I to take the action that I ultimately took on September (shutting down all recreation) I would have not only run the normal risk that overdue rainfall might make my action seem ridiculous, I would have exercised an unprecedented order without the existence of a fully documented emergency.

Within a week, it became increasingly clear that further action was necessary. Twelve major fires were then burning in the state, nine of them in the prior week! On August 29 and 30, I met with Hemmer and DFWP Director Jim Flynn and we concluded that it would be irresponsible to allow thirty or forty thousand hunters to hit the field on September 1. Flynn contacted the DFWP commissioners the evening of August 30 to set up a conference call (meeting) the following morning. Prior to that meeting, I talked to commissioners Bailey and Oakland, both of whom had expressed strong objections to closing the hunting season on a temporary basis. Their concerns were reflected in their votes against the Commission's action of August 31, delaying the opening of the season until September 15. As an aside, my birthday is August 31...a year before I had chosen that date

to announce that I would not seek re-election in 1988. That 1987 decision looked even better as the calls began to come in from irate hunters who, to their credit, objected for the most part to being singled out by the closure.

The decision of the FWP Commission was strongly endorsed in a release to the media on the 31st...as a matter of record I made it clear that I had requested their action. In the press statement, I also pleaded with the public in Montana to exercise extreme caution and old fashioned common sense in their out-of-door activities. For those who may have forgotten, on that day in August some 5,000 firefighters were on line and we had already lost to fire in the state--including Yellowstone--an area larger than the state of Rhode Island!

On the day or two following the closure decisions, we dealt with the complaints of out-of-state hunters already in the state or in the field, outfitters with clients on hold. Bowhunters worried about lost opportunities..and, naturally, those who argued we had not gone ar enough. I would be remiss if I failed to mention that the leadership of organizations like the Bowhunters and MOGA demonstrated a level of understanding and support that illustrated their appreciation of the fire danger and the need to accept restraint...even though they felt unfairly singled out.

On September 2, a new "problem" surfaced. Influenced by the devastating fires in Yellowstone Park, the Gallatin County commission requested that I close their county under my authority to close parts of the state to non-essential activity. Their request was rejected by the State Land Department as not meeting the requirements of MCA 87-3-106. Worried that we might begin to see a piecemeal implementation of closure orders--with the inevitable confusion that would result--I had a conference call with Missoula Commissioner Ann Mary Dussault and MACO officials. They responded by issuing a release and county by county communication urging county officials not to act unilaterally.

On September 6, with hot dry weather continuing and fires still out of control, in conjunction with federal and state agencies, I issued a first-ever Executive Order closing all land in Montana to non-essential activities outside incorporated cities and towns. LA "red flag" wind alert had been issued that day for the state. For the first time in the history of the state, the fishing season was closed!

Telephone lines were still open, however, and it didn't take long for those in our offices to begin to ring. The questions and the answers were tough. What possible dangers in operating the excursion boats on Flathead? Did the football games held in non-incorporated communities need to be cancelled? Could the commercial fishermen remove their gears from a river? Could cabin owners up the North Fork of the Flathead access their summer homes?

For the following days, the Citizens Advocate, resource staff and the famous 442-1262 at the Governor's mansion all got a workout! On September 9, I flew to Missoula, and along with top federal and state officials, including the FWP Commission, took part in an extensive briefing on the fire/drought situation. In conjunction with federal agencies, I extended the closure order but amended it to allow planned group activities outside cities

and towns with a permit. I also jointed federal spokesmen in urging a voluntary suspension of logging activities.

At this point, I want to do two things..reiterate the critical level of fire danger and note the extraordinary cooperation of people around the state.

At the briefing on September 9, we were advised that in all of Montana, east of the divide, the incendiary potential was 100--simply stated, that means that if 100 matches are dropped onto ground fuel, that 100 fires will begin. A short time earlier, I had travelled to Ekalaka where a significant portion of the Custer Forest had burned. Forest Service officials there said that ground fuel temperatures had exceeded all previous records (over 120 degrees) and moisture levels in the overgrowth was the lowest on record! At the Missoula briefing, the fire expert from the Forest Service explained it in unforgettable terms. He said moisture levels of 2 percent registered in some areas was the same level one would attain by taking a #2 lead pencil and baking it in an oven for 24 hours!

Thankfully, Montanans didn't need a Forest Service expert--or their Governor for that matter, to tell them how dry it was. Citizen cooperation was overwhelmingly positive. A poll taken by Congressman Pat Williams in mid-September asked the question: "Did Governor Ted Schwinden act properly in closing the state to recreation?", 88 percent said yes, 10 percent said no. I would add that in responding, 60 percent "strongly approved" the closure...and in my years of polling I have never seen 60 percent strongly approve of anything!

The cooperation of Montanans, especially local officials, was unprecedented. After the closure order, the media had a heyday asking the inevitable questions bout implementation...enforcement. Local enforcement officials responded as I had expected...with common sense. Man caused fires dropped to near zero, I can't recall an instance of abuse of authority being reported to my office.

And, finally it rained. On September 10-11, rain and snow hit large portions of the state, and on September 12, I lifted the Executive Order while urging the public to continue to use caution. And, I added that I would reimpose the closure if necessary. Thankfully, it was not.

Although recreation was generally back to normal, the drought was certainly not over. Nor were all of the drought-related problems. That quickly became apparent when our request for legislative approval for authority to pay the fire bills, which at that time were estimated at over 11 million dollars was denied! Since I also brought along with my drought memories of the 1930's the oft-repeated admonition of my parents that "bills are to be paid", after careful legal review by my attorney, I issued a disaster proclamation allowing Lands to pay the legally incurred costs of the fires. Based on action by the current session it appears that the nest time around the governor will be required to call special session to get authority to pay fire costs.

By late September, we were able to submit for approval to the federal government requests for disaster designation in sixteen Montana counties. And, across the state, citizens and institutions were beginning to add up the short and long-term cost of the "drought of 88".

What did we learn last year...I'm not sure.

Certainly we are yet a way--I believe a long way-- from being able to accurately predict the onset, the severity, or the length of drought.

Decision by a governor to use emergency authority to suspend some or all nonessential outdoor activity will depend as much on "gut instinct" as climatological data. And, the political risks of being wrong--or right--will not lessen.

Much...if not most...of the success of drought response will depend upon the citizens of the state, and the degree to which they accord credibility to their governmental institutions.

The Legislature should adopt...this year...a measure which would give to the state additional authority...and a funding source...to permit the lease of purchase of instream water to protect valuable fisheries and habitat.

The state water plan currently under review should be finalized, and it should provide a mechanism to investigate and implement additional storage in those drainages that clearly are subject to over-utilization.

Water users...irrigators in particular...must be educated and encouraged to conserve the resource.

And, finally, the accusatory rhetoric that has characterized all too much of the drought dialogue needs to be replaced by thoughtful and productive discussion. In truth, isn't that the case with nearly every issue on the agenda today...from nuclear dumps to defense strategy, from deficits to tax policy.

Thank you for the opportunity to share some memories--pleasant and not so pleasant--about my last summer in the office of the governor, and a drought that few of us will ever forget.

1988 SHARP-TAILED GROUSE PRODUCTION IN THE MISSOURI RIVER BREAKS

By

Pat Gunderson

This study was initiated as an effort to determine year round habitat needs of the sharp-tailed grouse (Tympanuchus phasianellus) in the Missouri River breaks. This progress report deals specifically with the nesting success and brood survival during 1988.

The study, funded by the U.S. Fish and Wildlife Service, is being conducted on the Charles M. Russell National Wildlife Refuge in Valley County, approximately ten miles west of Fort Peck, Montana. The study area consists of upland areas up to seven miles away from the reservoir with vegetative communities ranging from sparsely vegetated, loose shales slopes along the reservoir to stands of Ponderosa Pine (Pinus ponderosa) on many of the ridges. The most intensive fieldwork was centered in areas dominated b Big Sagebrush (Artemesia tridentata) and Rocky Mountain Juniper (Juniperus scopulorum).

Data collection was dependent on the use of radio transmitters. Seventeen females and three males were fitted with bib-mounted transmitters.

Trough radio tracking, sixteen sharp-tailed grouse nests were located early in incubation. The hens were flushed from their nests and several nest measurements taken. Mean time spent at a nest site was 20 minutes. All hens returned and continued incubating. Hens were then monitored until nest fate was determined. At this time, more intensive nest measurements were taken.

Clutch sizes ranged from 9-15 eggs with a mean of 12.9 eggs. Of the 16 nests, 3 were predated, 2 abandoned and 1 was destroyed by project personnel after the hen had been incubating for over 35 days. The embryos had died when only 3-4 days from hatching. Ten of the nests (62.5%) had at least 1 egg hatch. Only one other study found in the literature had a higher nesting success at 64 percent (Brown 1968b), although when only considering nests in native vegetation, Hart et al. (1950) had 70 percent success in Utah. Despite high nest success, 50 percent of the nests in my study had eggs that didn't hatch. Eight partially pipped eggs were also found in three separate successful nests. The chicks either became desiccated or overheated before they could escape the shell. The high mortality at hatching appeared unusual since I have not located published reports of similar losses. On two separate occasions, despite successfully exiting the shell, a newly-hatched chick was found dead within ten feet of the nest. With one exception, hens with newly-hatched broods were not disturbed. The one hen disturbed had one chick nearby that looked in very poor shape and according to the hens movements, died a short time later. Three hens and their broods were killed within one week after hatching. The movements of the remaining hens indicated that within two weeks after hatching, no broods existed.

The peak of hatch occurred in the first week and a half of June. The average daily high for the first ten days of June was 96.4° Fahrenheit, including 8 days over 90° and 4 over 100°. In comparison, the first ten days of June 1987 had a mean daily high of 80.8° F. Daily highs of over 90° occurred 22 times and over 100°, 6 times in June 1988. In 1987, 11 daily highs were over 90° and none over 100°. June precipitation in 1988 was one half inch higher than in 1987.

The drop in production in 1988 becomes strongly evident when these data are compared to the Montana Department of Fish, Wildlife and Parks wing harvest survey data. In 1987, the wings collected in Valley County revealed that 30.7 percent of the sharptails harvested were adults. In 1988, with a slightly larger sample size, 81.6 percent of those harvested were adults.

The study will be continued through 1989. Present conditions suggest a different moisture regime than in 1988 which should permit additional comparisons in the effects of weather on hatching success.

LITERATURE CITED

Brown, Robert L. 1968b. Sharp-tailed grouse production study. Montana Fish and Game Department Project W-91-R-9, Job II-E. Montana Fish and Game Department Mimeo. 18 pages.

Hart, C.M., O.S. Lee, and J.B. Low. 1950. The sharp-tailed grouse in Utah. Utah Fish and Game Publ. 3. 79 pages.

Status of Duck Populations After the Drought of 1988 and Ongoing Management Programs Designed to Reverse these Declines

Jeff Herbert; Statewide Waterfowl Coordinator, Montana Dept. Fish, Wildlife, and Parks, Helena

Tom Hinz; Central Flyway Coordinator, Montana Dept. Fish, Wildlife, and Parks, Billings

Abstract

The Drought of 1988 although gaining national headlines due to its broad geographic scope was only a continuation of several years of drought in eastern Montana. Duck populations in the area continued to be depressed during 1988 reflecting the small number of available water areas, as well as the low water level in those remaining. Duck populations in eastern Montana are expected to increase once water areas refill, however some continental populations will likely continue an overall decline. The North American Waterfowl Management Plan (USDI 1986), endorsed by the governments of Canada and the U. S., was developed to guide efforts to reverse these declines in duck populations. The portion of that plan aimed at increasing duck production on the northern breeding areas is called the Prairie Pothole Joint Venture (PPJV). The PPJV is a cooperative effort of waterfowl management agencies in the Dakotas, Minnesota, Iowa, and Montana. Montana's initial thrust in the PPJV is in two project areas, the Beaver Creek Project Area and the Comertown Project Area.

INTRODUCTION

The Drought of 1988 was characterized by below average moisture conditions in nearly all of the Great Plains. Crops failed, water supplies disappeared, and a variety of natural disasters affected fish and wildlife populations across a broad area. Longtime rural residents of parts of eastern Montana reported that water areas went dry during the summer which were not dry even during the drought of the 1930's.

Of international concern was the effect of the drought on waterfowl populations, notably ducks. Resource management agencies as well as many user groups called for reductions in harvest as an attempt to safeguard breeding stocks.

In much of the northern Great Plains, the heart of duck breeding habitat in North America, the dry conditions of 1988 were only a continuation of a series of dry years. Parts of eastern Montana for example have experienced no major snowfall runoff since the winter of 1978-79. Most winters since that time have been characterized by below average precipitation and above normal temperatures. This situation has resulted in little if any snow to melt, run off, and fill wetlands in the spring. Maintenance of wetlands during the last 10 years then has been dependent on high run-off periods during the spring and summer months. One such

event occurred on September 24, 1986 when from one to five inches of rain fell in a short period over most of eastern Montana. Widespread flooding resulted in some areas. Flood damage on the Hi-Line between Havre and Malta received national news coverage. Although this storm refilled many ponds overnight, others were lost by dam destruction from the flooding. Insufficient run-off since that time has left most of eastern Montana's ponds and natural lakes dry.

METHODS

Data discussed below were collected by the U. S. Fish and Wildlife Service and Canadian Wildlife Service during aerial surveys conducted from 1955 to 1988. Techniques used for data collection are described by the U.S. Fish and Wildlife Service (1987) and data summarized in the 1988 Status of Waterfowl and Fall Flight Forecasts (USFWS 1988a). Trend lines shown are "best fit" lines using Harvard Graphics software (Software Publishing Corp.; Mountain View, CA 94039).

RESULTS

Figures 1-10 show the trend of continental breeding populations of the ten major duck species. Mallard (Figure 1), pintail (Figure 2), blue-winged teal (Figure 3), and canvasback populations (Figure 4) are all shown to be declining. Despite the fact that the drought had major impacts on the condition of the breeding habitat in 1988, several of these populations reached all-time record lows in prior years. Mallards for example reached a record low in 1985 when the breeding population index reached 5.475 million. Blue-winged teal reached record low levels in 1983 with 3.381 million breeders. Canvasbacks reached their third lowest level in the 34 years of surveys in 1985 when 411,000 breeders were estimated. Pintails did however reach bottom in 1988 when the breeding population index fell to 2.577 million breeders, only one-fourth the breeding population present when surveys began.

American wigeon (Figure 5), gadwall (Figure 6), northern shoveler (Figure 7), green-winged teal (Figure 8), redhead (Figure 9), and lesser scaup (Figure 10) breeding populations despite recent declines have generally increased during the survey period.

In Montana, trends of the major breeding populations track those of continental populations. Mallard breeding populations in the last 20 years have steeply declined (Figure 11) according to U.S. Fish and Wildlife Service estimates (USFWS 1988b). Declines in pintail breeding populations have been similar (Figure 12). Lesser scaup indicated to be increasing continentally also appear to be on an increasing trend in Montana (Figure 13). For the ten major duck species combined, the trend in breeding numbers has fallen significantly in two decades (Figure 14).

Both the continental and state breeding population estimates demonstrate fluctuation in populations in response to availability of wetlands for breeding. In Montana, for example, 1979 was one of the wettest springs on record, and pintail, scaup, and total duck populations reached their peaks in that year. Similarly, continental populations of most species reached recent peaks in the early 1970's, a period of wet years over most of the breeding range.

DISCUSSION

The reasons for the differences in the population trends for the various species are widely speculated. Early nesting species, i.e. mallards and pintails, are believed to be declining due to poor recruitment (Cowardin et al. 1985) resulting from low nesting success (e.g. less than 15% for mallards).

The decline of the blue-winged teal population has been suggested to be related to excessive harvest since current surveys do not quantify harvest resulting from largely unregulated shooting on wintering areas south of the U.S./Mexico border. Recent reports of widespread illegal harvest in the Gulf Coast states (Anderson 1988) have added to the argument that more of these ducks may be killed on their wintering areas than established harvest surveys can measure. More likely however, declines in blue-wings is probably the result of the drought as they are attracted to small wetlands to breed, the type of wetland least persistent during periods of extended drought.

The canvasback population decline shown (Figure 4) may not be statistically significant. However, since the species nests exclusively in emergent wetland vegetation, it is likely that drought and continuing wetland drainage will have significant and long-term effects on the maintenance of this species.

The low numbers of nearly all major species of ducks during the last five years demonstrate the temporary depressant effect of the drought compared to "good" water years such as during the 1970-72 and 1977-1980 periods (Figures 1-14). Despite these temporary bright spots however populations of some ducks, e.g. mallards and pintails, still remain on a declining trend, exhibiting lower peaks in good water years, and lower troughs in poor water years. This is a reflection of habitat changes of a longterm nature, which is only masked in part by changes in the availability of water.

Cowardin et al. (1983) showed that since the 1860's, over 80% of the original grassland in the state of North Dakota has been plowed. Loss of grassland nationally proceeds at the rate of an additional 2 percent annually (USDI 1986). Wetland loss nationally has exceeded 50% to date. These broad habitat changes have finally pushed species like the mallard and pintail

to where their backs are against the wall. Over large parts of their range, previously the most productive parts, there no longer remains enough secure breeding habitat to sustain a level of recruitment which will maintain their populations. The best-case scenario for these species now is to experience adequate recruitment only in good water years or in a few remaining areas where nest success is above average (over 15%).

CHALLENGE FOR THE FUTURE

Resolution of both temporary and long-term declines in duck populations is one of the goals of the North American Waterfowl Management Plan (USDI 1986). A component of that plan is the Prairie Pothole Joint Venture (PPJV), a five-state cooperative effort to increase duck production from the major production states. These states include Montana, the two Dakotas, Minnesota, and Iowa. A companion effort, the Prairie Joint Venture, is also underway in the Canadian prairie provinces.

The PPJV comes at a time when several other significant habitat development programs have justly recently begun in Montana. In 1986, for the first time a $5 waterfowl stamp was required of hunters in Montana, which is expected to generate about $150,000 annually on a continuing basis for the enhancement of waterfowl habitat. In addition, two Ducks Unlimited programs, the M.A.R.S.H. (Matching Aid to Restore States Habitat) and the Habitat USA programs provide the option to complete both large- and small-scale development projects throughout the state. Under the auspices of the North American, these three programs as well as additional funding generated by the North American will be directed to help accomplish the goals of the PPJV. To date, much of the effort and money that has gone into the PPJV in Montana has been redirected effort of partnership agencies but new outside funding is forthcoming.

The PPJV in Montana currently centers around two project areas. The first is the Beaver Creek Project Area located in south Phillips County. The other is the Comertown Project Area which lies in Sheridan County in the Prairie Pothole Region of extreme northeastern Montana. Additional project areas may be developed as the PPJV proceeds depending on the success of the overall program and the commitment of outside funding sources.

Cooperating organizations involved in the BCPA include the Bureau of Land Management, the U.S. Fish and Wildlife Service, Ducks Unlimited, and the Montana Department of Fish, Wildlife, and Parks. Coordination also involves Dr.'s R. L. Eng of Montana State University and Joe Ball of the Montana Cooperative Wildlife Research Unit. It is crucial to the project's success that the Bureau of Reclamation and other agencies as well as private landowners are active participants in the project design and implementation. Hopefully additional support will be provided

once the project gains momentum.

The Beaver Creek Project Area (BCPA) is characterized by dry rolling plains dissected by streams and coulees. Vegetation is typically sagebrush/grasslands. Studies by numerous researchers over the years (Ball et al. 1988, Eng et al. 1979, Gjersing 1971, Gjersing 1975, Hudson 1980, Mundinger 1975, and Rundquist 1973) have all demonstrated a tremendous potential in this area to produce waterfowl. This production is limited to some extent by the impact of grazing on the quality of emergent and upland vegetation. However, even in a grazed condition this habitat produces a higher rate of duckling recruitment than in other key breeding areas (Ball et al. 1988). The ultimate limiting factor is probably the small amount of wetland acreage in the area (L. Cowardin, pers. commun.).

The BCPA is approximately 300 square miles in size of which approximately half are administered by the Bureau of Land Management. Most of the area is used to graze livestock, primarily cattle. Numerous artificial stock-watering reservoirs have already been constructed in the area. The project calls for the construction or reconstruction of an additional 3800 acres of wetlands. Most of these will be small retention reservoirs capable of holding less than 15 acre-feet of water.

Grazing management will be discussed with livestock operators in the area to provide more residual cover for upland nesting birds. It is hoped that the construction of additional stock-watering areas will be viewed by some operators as increasing the real value of their property which may in itself open the door to upland cover enhancement through grazing adjustments. However, it is expected that some form of economic incentive to compensate the landowner may be necessary in some cases.

Creation of 3800 acres of additional wetlands could potentially attract an additional 12,000 pairs to the area, based on an estimated 3.1 pairs per wetland acre (Ball et al. 1988). Assuming an average production rate of 55 broods per hundred pairs (Gjersing 1971, Mundinger 1975, Hudson 1980), this could result in an additional production of 6,500 broods or approximately 50,000 ducklings annually once aquatic communities develop in the newly-constructed ponds. This is admittedly a rough projection but it illustrates the tremendous potential that does exist.

The Comertown Project Area (COPA) is bordered on the north by the province of Saskatchewan and on the east by the state of North Dakota. It is approximately 220 sections in size of which over 90% is privately owned. In this area lies the best Prairie Pothole breeding habitat in Montana, having the highest number of breeding ducks per mile of transect surveyed by the U.S. Fish and Wildlife Service in Montana (R. Croft, pers. commun.).

Because this area was heavily glaciated it has an abundance of natural wetlands, in stark contrast to the BCPA. As a result, the objectives of the COPA differ significantly from those of the Beaver Creek project. Because so much of the area is intensively used for agricultural production, secure upland nesting cover is limited. In this respect it is similar to parts of North Dakota. Although nesting success has been demonstrated to be higher than in some areas of the eastern Dakotas (Johnson et al. 1987) it is likely that improvements in nest success would produce substantial increases in duckling production from this area given the large pair population.

Cooperating agencies in the COPA include the U.S. Fish and Wildlife Service, The Nature Conservancy, Ducks Unlimited, and the Montana Department of Fish, Wildlife, and Parks. The level of cooperation that these agencies are able to develop with private landowners will determine the success of this program. As a result, a joint position utilizing matching funds was created.

The Nature Conservancy (TNC) will play a significant role in the COPA as they have identified the area as having unique habitat values. In addition to their concern for waterfowl, preservation of prairie pothole habitat, nongame, and threatened and endangered species of the area are high priorities with them. This emphasis on a wide range of resource values is in line with the broad goals of the PPJV which hopes not only to secure waterfowl habitat for the future, but also to safeguard for the future, the associated ecological values unique to the northern Great Plains.

A study of nesting ducks in dense nesting cover and native grassland on Medicine Lake National Wildlife Refuge (immediately south of the project area) showed nest densities of 0.3 nests per hectare and nest success rates of about 50% (Rodriguez 1984). Given the current intensity of land use on private lands it is assumed that nest success rates may be half or less of that documented on the refuge. An ambitious goal has been set to raise this level of nest success to an average of 50% on all lands. This would produce an unknown but very large additional increment of recruitment from the area since the number of ducklings produced annually would be two to three times what the area currently produces.

Management strategies planned for the COPA include grazing management, planting of dense nesting cover, and planting and maintaining set-aside acres attractive to nesting ducks.
Also planned are specific intensive management techniques to isolate nesting hens from predators including artificial nesting structures, islands in wetlands, and predator-excluding electric fences.

Acquisition of fee titles and easements in both the Beaver Creek and Comertown Project Areas is intended to play a minimal role in the overall projects. Due to the unique nature of the natural wetlands present in the Comertown area however, some wetland preservation will be attempted where fee title or easement possibilities present themselves. In both areas, the goal is to succeed in effecting changes in land use by the private landowner, rather than having to reduce it to public ownership to gain the right to manage it for waterfowl production. In other words, these projects hope to demonstrate that these lands can continue to be owned and farmed by private individuals and yet support viable, increasing waterfowl populations.

SUMMARY

The Drought of 1988 further depressed duck populations. Some species, including the mallard and the pintail, are expected to continue their long-term declines once drought conditions abate. More importantly, the loss of wetlands, upland vegetation, and soil which has accompanied this decline in duck populations represents a serious decline in the quality of the environment that is the northern Great Plains. Long-term changes in land use must be effected to reverse the decline of their populations. The Prairie Pothole Joint Venture of the North American Waterfowl Management Plan is intended to accomplish that end. It's success is critical to maintenance of duck populations into the next century.

LITERATURE CITED

Anderson, D. 1988. America's ducks in crisis. St. Paul Pioneer Press Dispatch. Special reprint. 12pp.

Ball, I.J., R.L. Eng, and S.K. Ball. 1988. Density and productivity of ducks on western rangelands: An assessment in northcentral Montana and evaluation of methodology. Central Flyway Waterfowl Council Report. 19pp.

Cowardin, L.M., A.B. Sargent, and H.F. Duebbert. 1983. Problems and potentials for prairie ducks. Naturalist 34(4): 4-11.

Cowardin, L.M., D.S. Gilmer, and C.W. Shaiffer. 1985. Mallard recruitment in the agricultural environment of North Dakota. Wildl. Monogr. No.92. 37pp.

Eng, R.L., J.D. Jones, and F.M. Gjersing. 1979. Construction and management of stockponds for waterfowl. Bur. Land Manage. Technical Note. 39pp.

Gjersing, F.M. 1971. A study of waterfowl production on two rest-rotation grazing units in northcentral Montana. M.S.

Thesis. Montana St. Univ., Bozeman. 42pp.

Gjersing, F.M. 1975. Waterfowl production in relation to rest-rotation grazing. J. Range Manage. 28(1): 37-42.

Hudson, M.S. 1980. Waterfowl production on three age-classes of stockponds in Montana. J. Wildl. Manage. 47(1): 112-117.

Johnson, M.A., T.C. Hinz, and T.L. Kuck. 1987. Duck nest success and predators in North Dakota, South Dakota, and Montana: The Central Flyway study. Proc. 8th Gt. Plains Animal Dam. Ctrl. Workshop. Rapid City, SD. 10pp.

Mundinger, J.G. 1975. The influence of rest-rotation grazing management on waterfowl production on stock-water reservoirs in Phillips County, Montana. M.S. Thesis. Montana St. Univ., Bozeman. 100pp.

Rodriguez, E.F. 1984. Dense nesting cover versus native grassland in relation to duck nesting success and density. M.S. Thesis, Colorado St. Univ., Ft. Collins. 61pp.

Rundquist, V.M. 1973. Avian ecology on stock ponds in two vegetational types in northcentral Montana. PhD. Thesis, Montana St. Univ., Bozeman. 116pp.

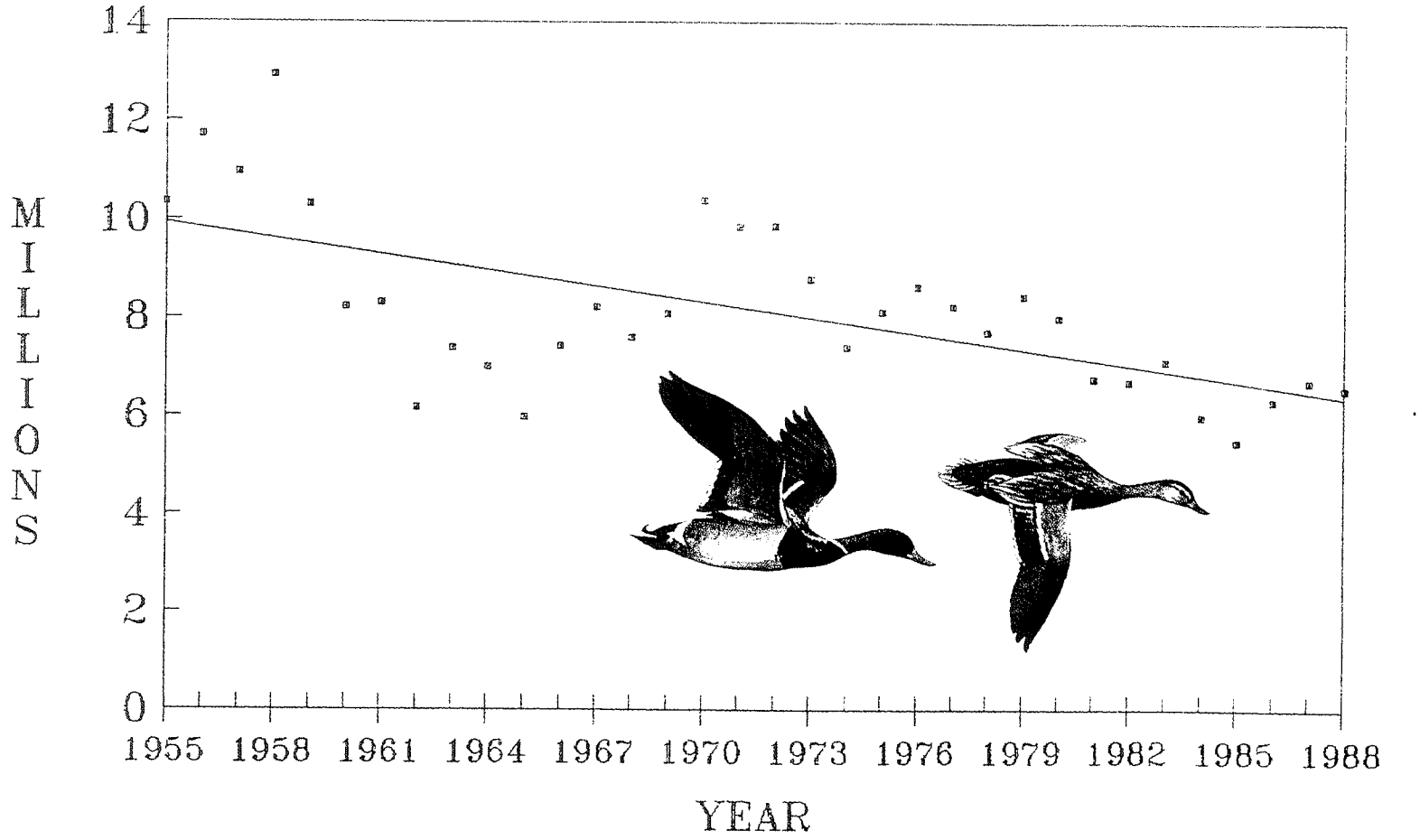
U.S. Dept. of Interior. 1986. North American Waterfowl Management Plan. U.S. Gov't. Printing Off., Washington, D.C. 19pp.

U.S. Fish and Wildlife Service. 1987. Standard operating procedures for aerial waterfowl breeding ground population and habitat surveys in North America. U.S. Gov't. Printing Off., Washington, D.C. 105pp.

U.S. Fish and Wildlife Service. 1988a. 1988 Status of waterfowl and fall flight forecast. U.S. Gov't. Printing Off., Washington, D.C. 38pp.

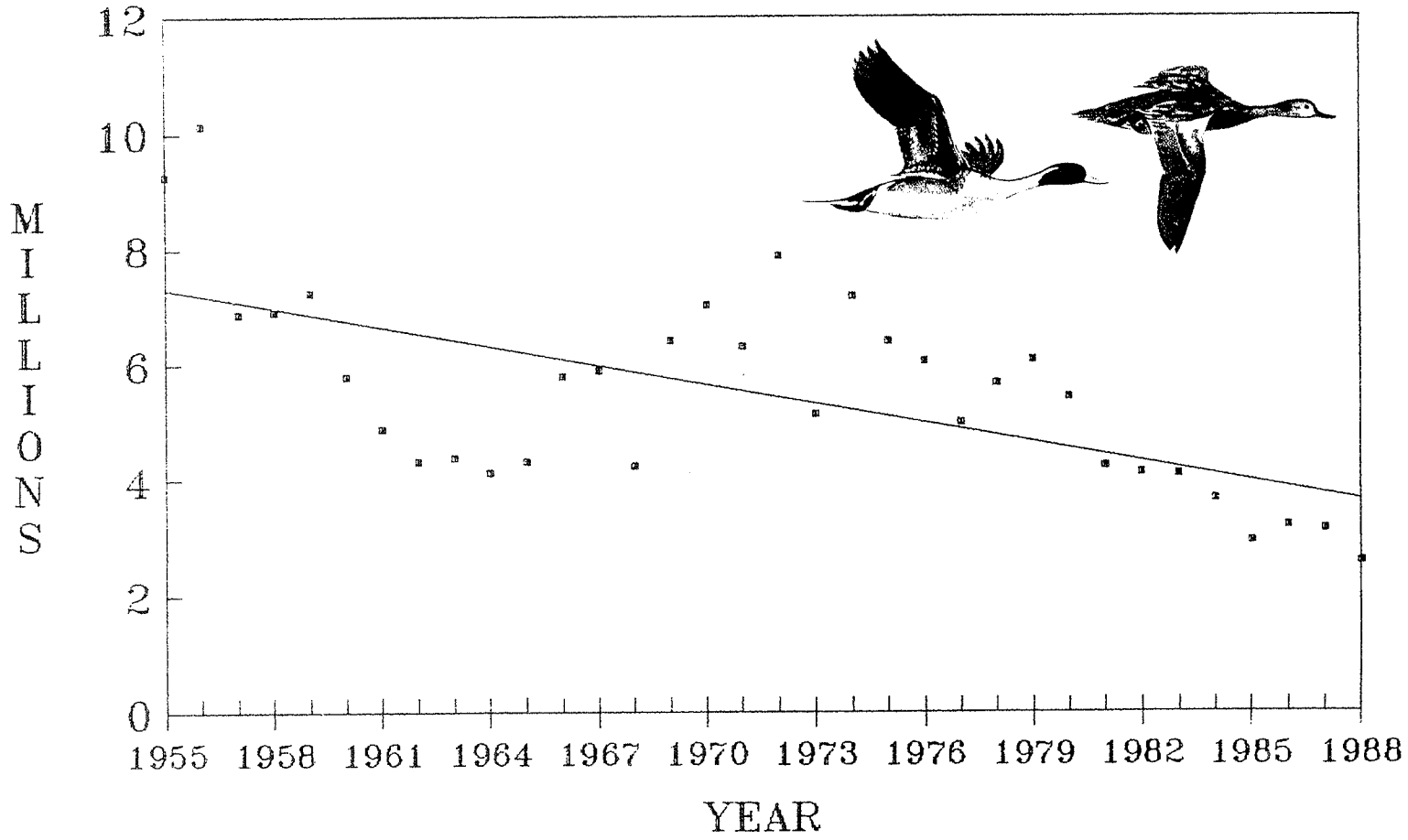
U. S. Fish and Wildlife Service. 1988b. Waterfowl breeding population survey for Montana. U.S. Fish and Wildlife Service report. 18pp.

FIG.1. MALLARD BREEDING POPULATIONS*
1955–1988



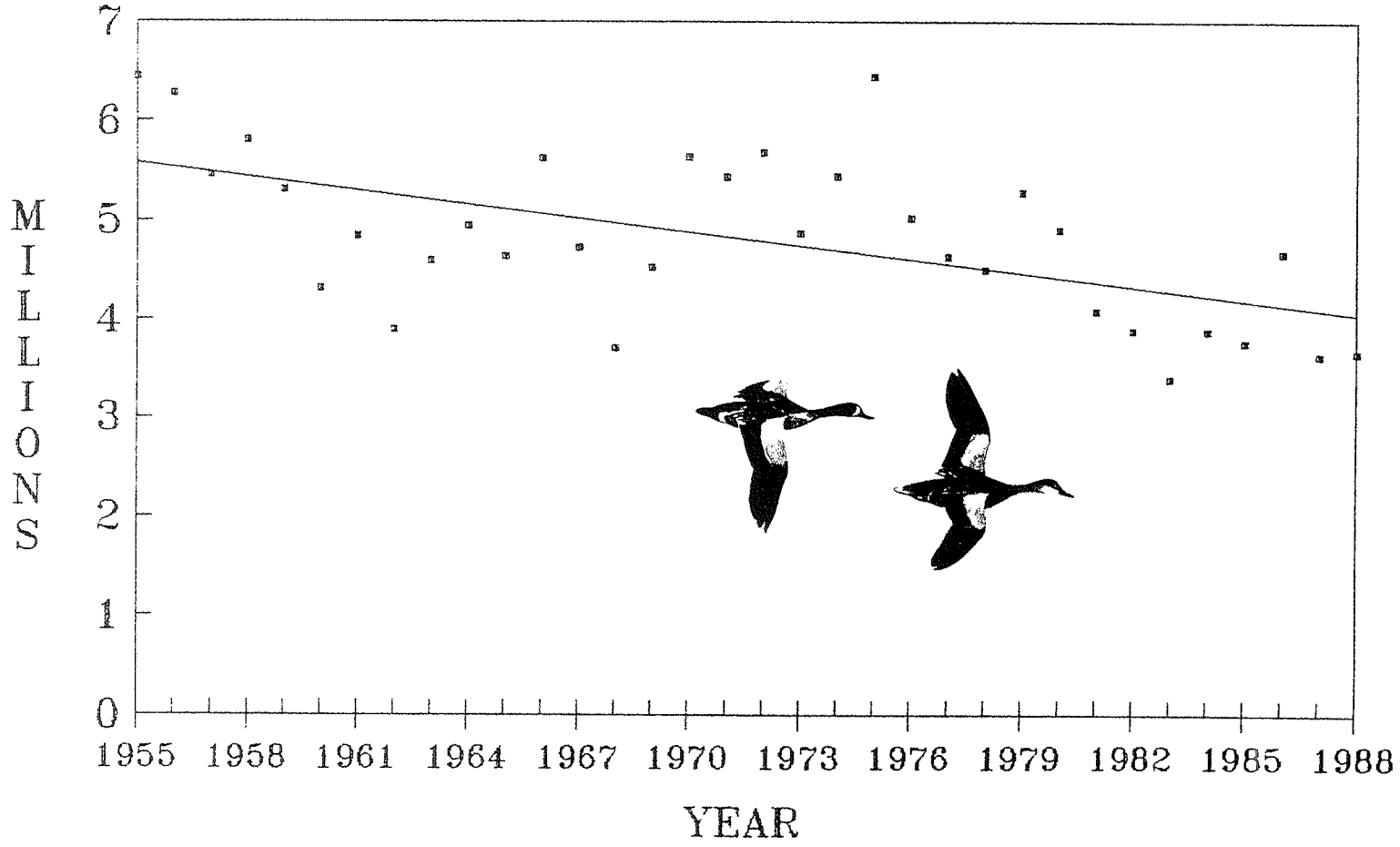
*USFWS BREEDING POPULATION SURVEY DATA

FIG.2. PINTAIL BREEDING POPULATIONS*
1955–1988



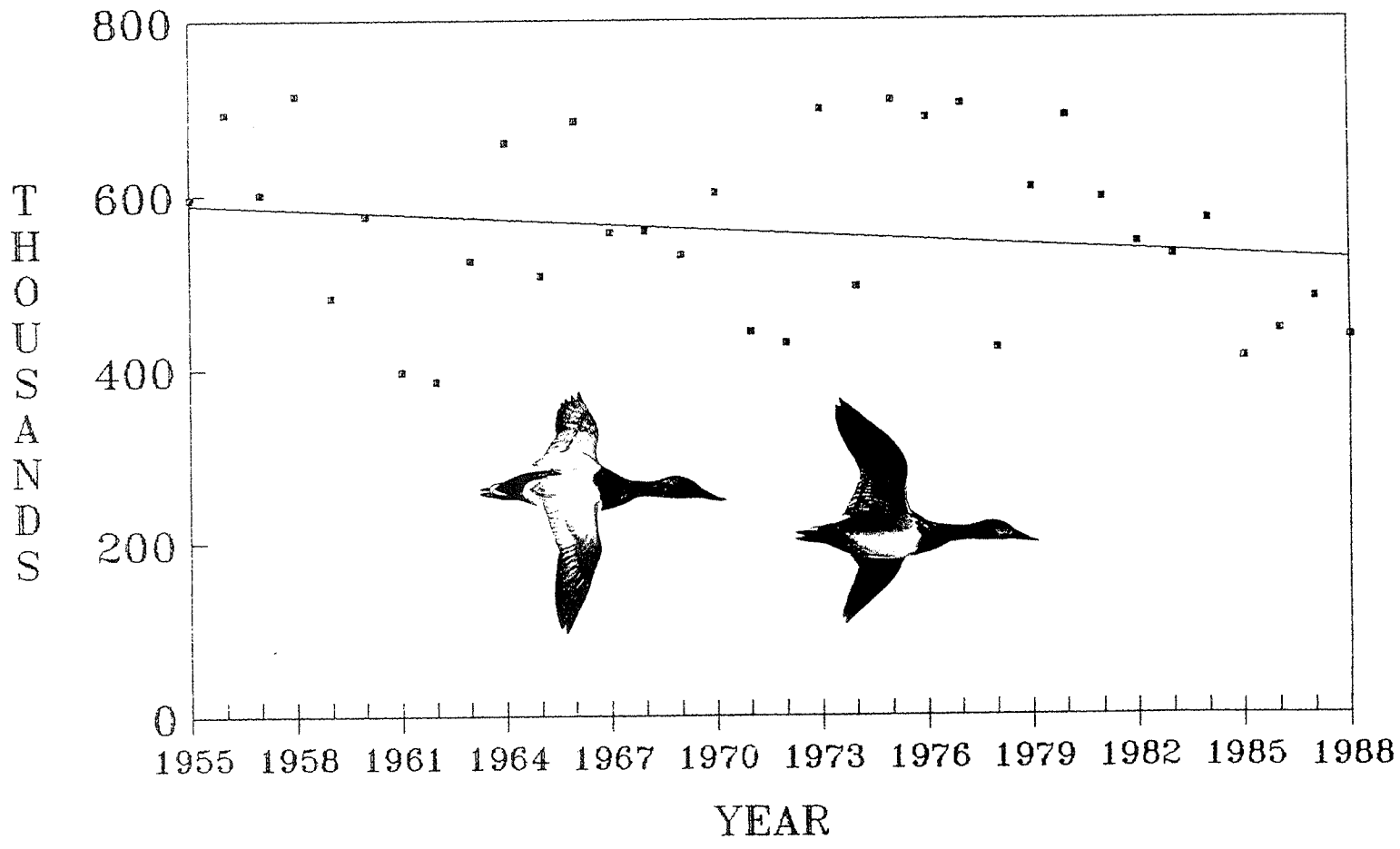
*USFWS BREEDING POPULATION SURVEY

FIG.3. B-W. TEAL BREEDING POPULATIONS*
1955-1988



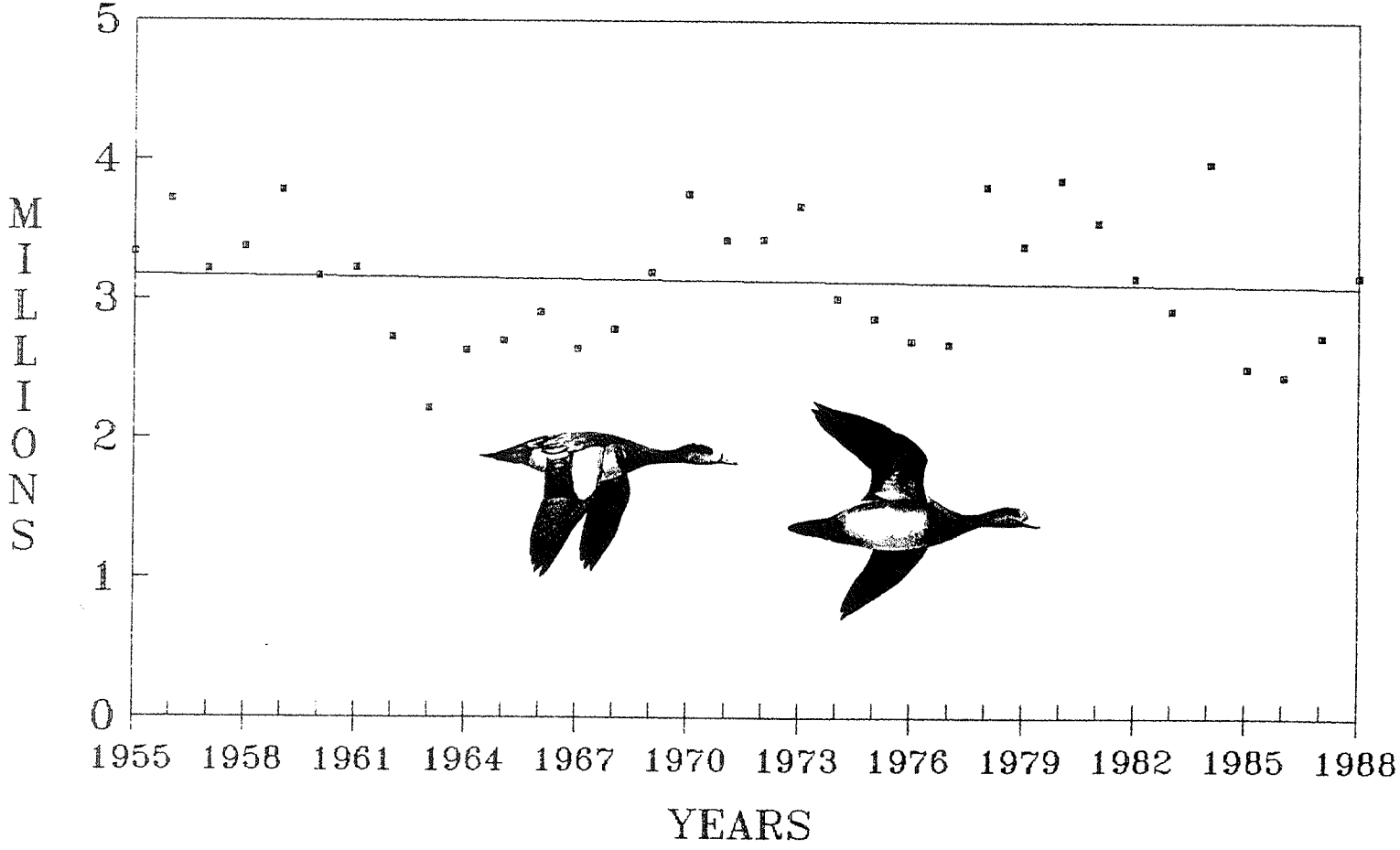
*USFWS BREEDING POPULATION SURVEY

FIG.4. CANVASBACK BREEDING POPULATIONS*
1955–1988



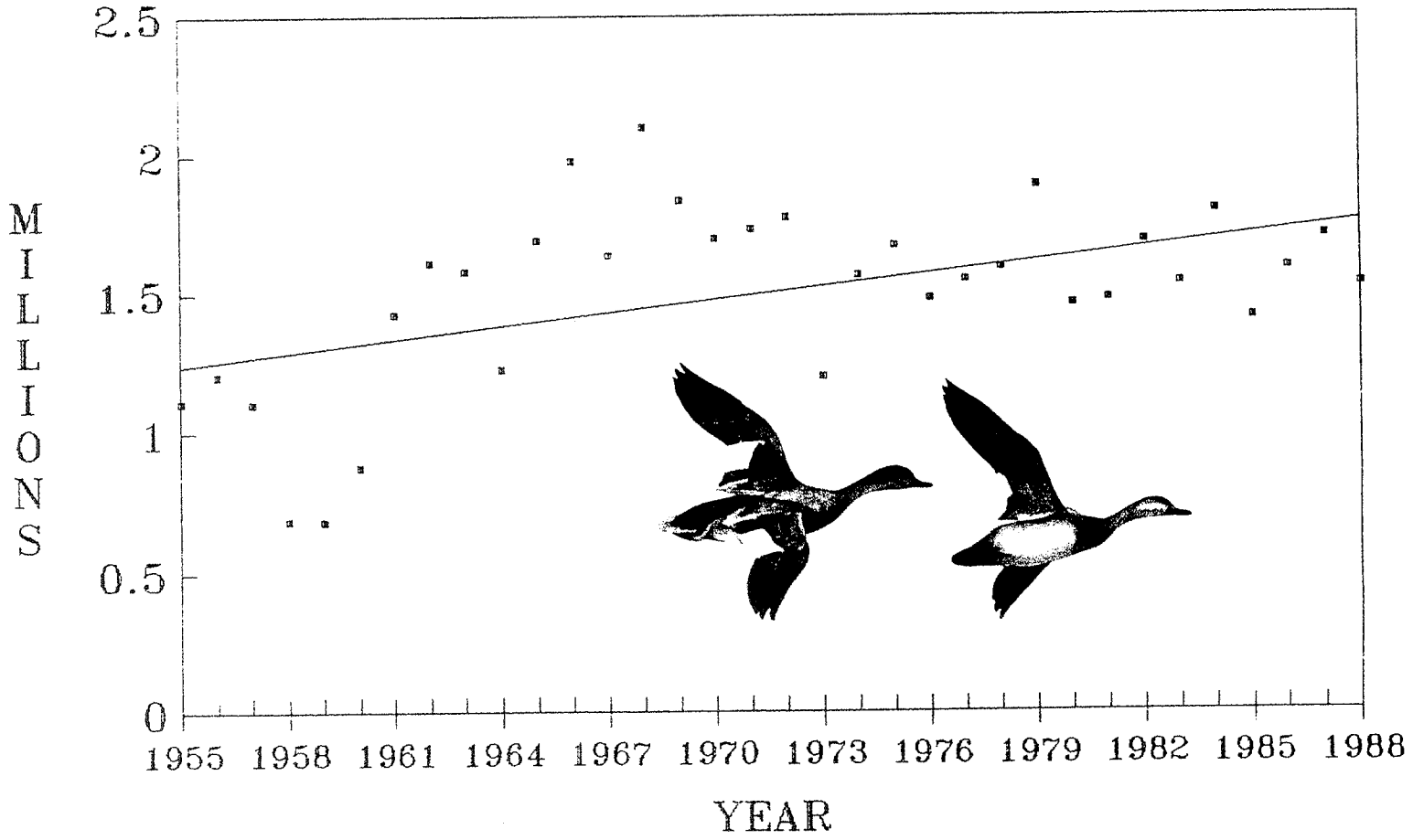
*USFWS BREEDING POPULATION SURVEY DATA

FIG.5. WIGEON BREEDING POPULATIONS*
1955-1988



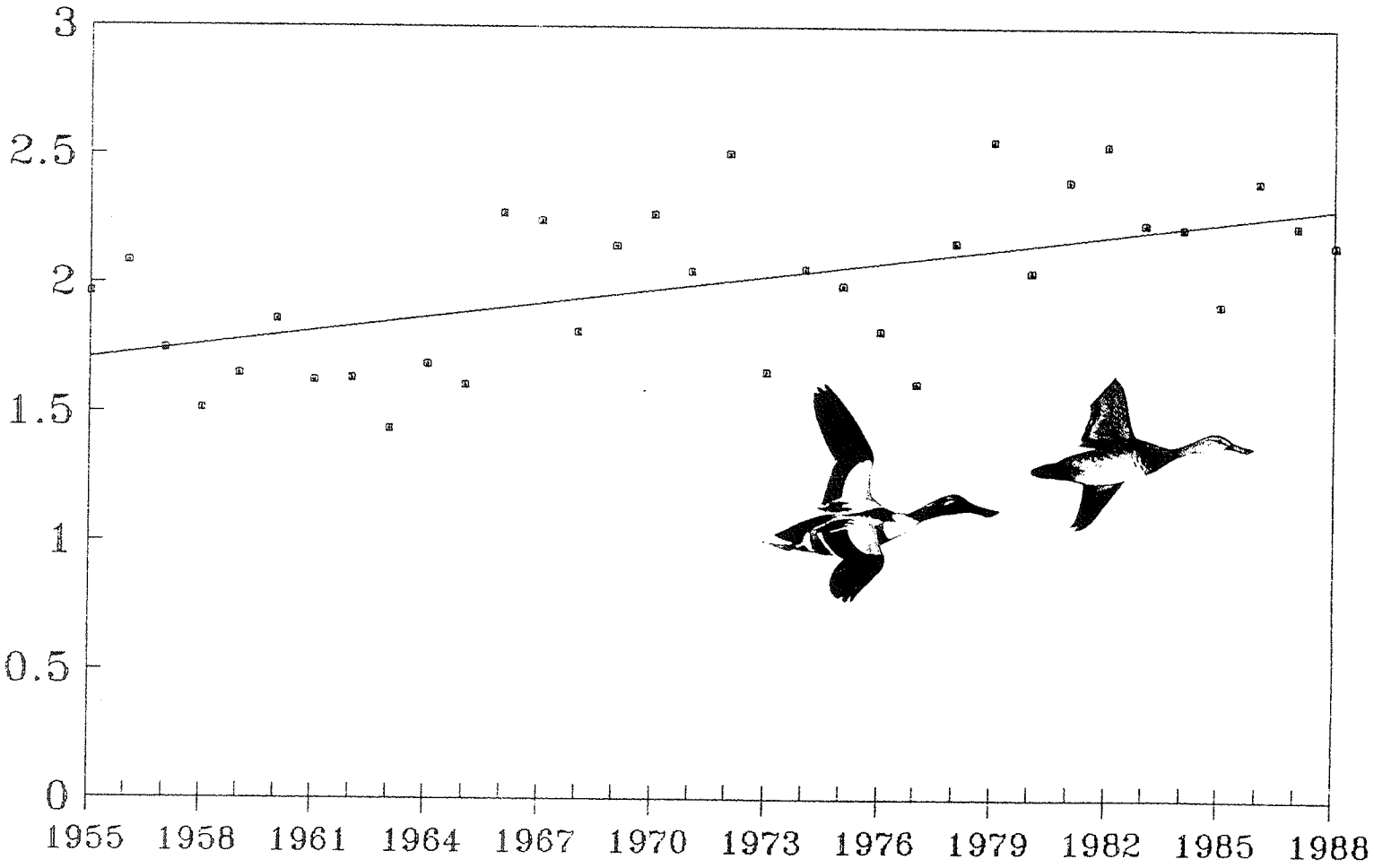
*USFWS BREEDING POPULATION SURVEY DATA

FIG.6. GADWALL BREEDING POPULATIONS*
1955–1988



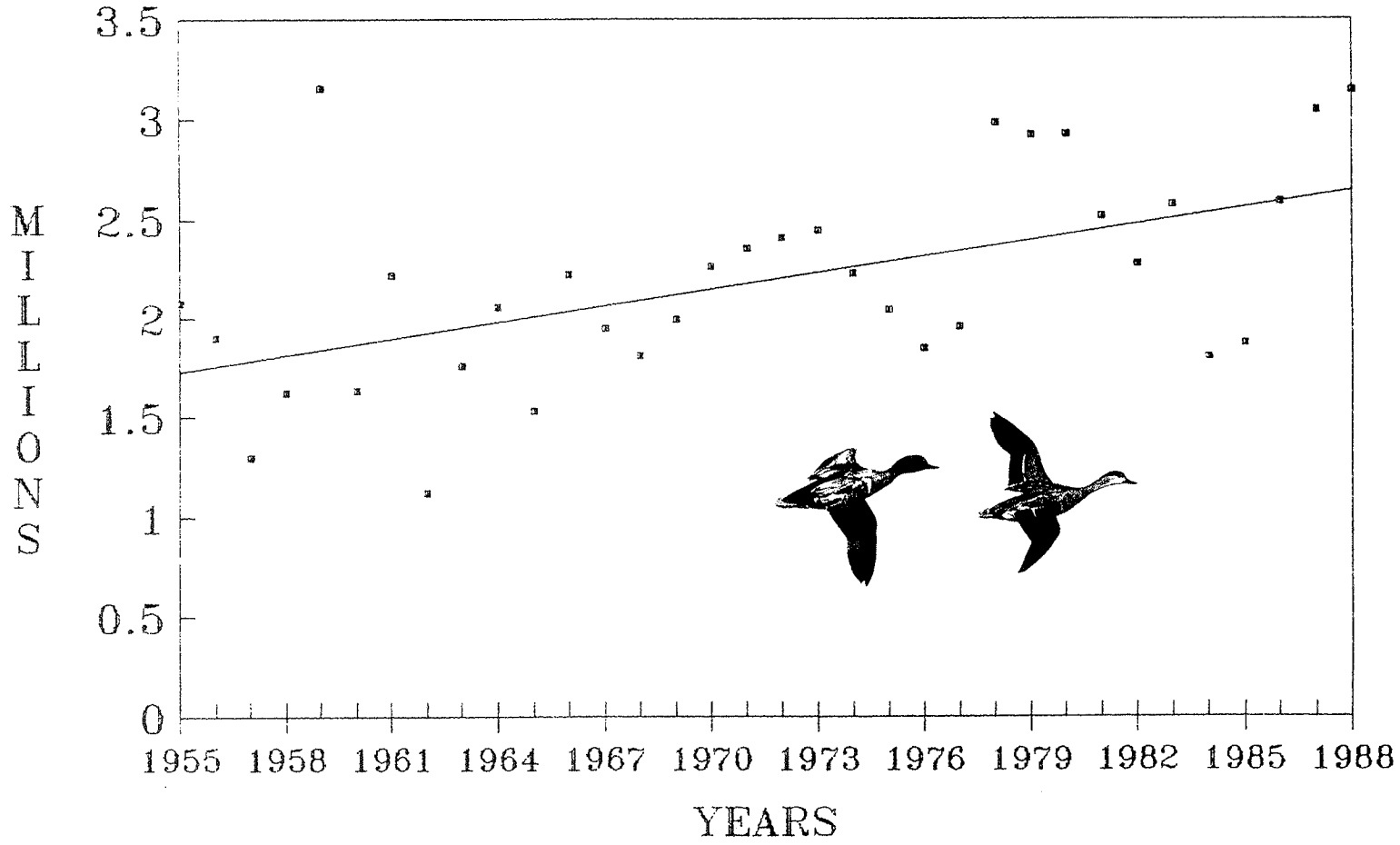
*USFWS BREEDING POPULATION SURVEY DATA

FIG.7. SHOVELER BREEDING POPULATIONS*
1955–1988



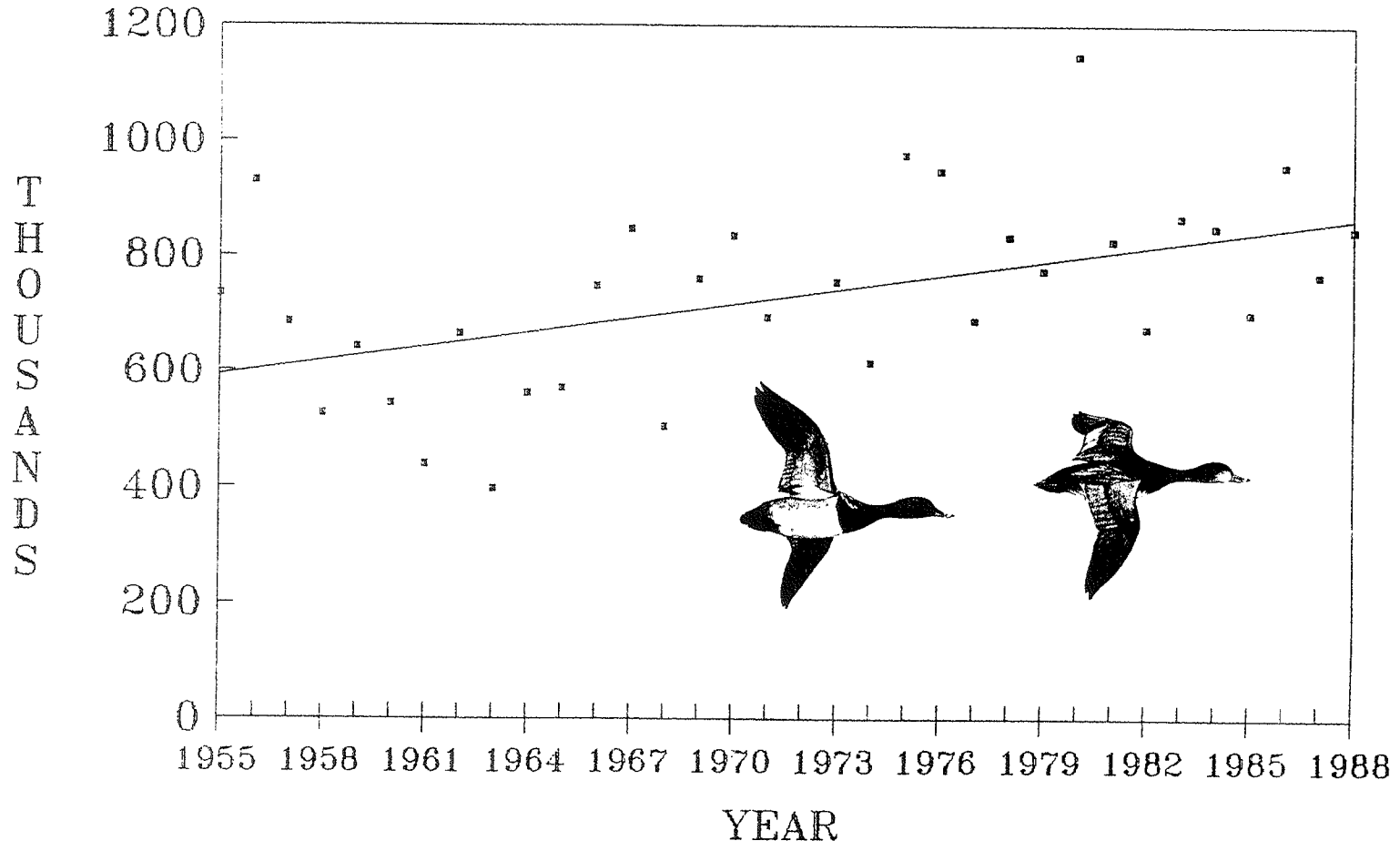
*USFWS BREEDING POPULATION SURVEY

FIG.8. G–W. TEAL BREEDING POPULATIONS*
1955–1988



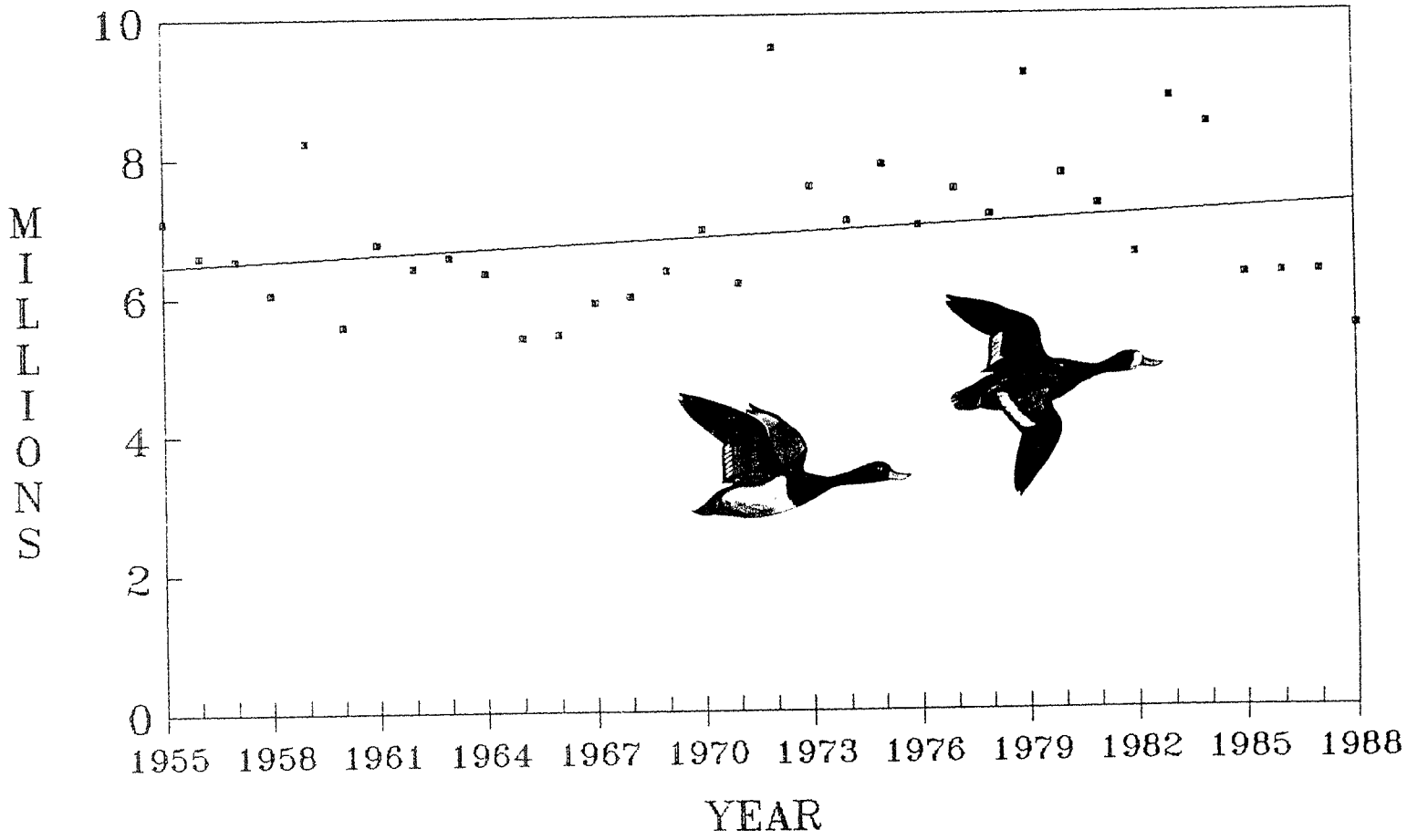
*USFWS BREEDING POPULATION SURVEY DATA

FIG.9. REDHEAD BREEDING POPULATIONS*
1955–1988



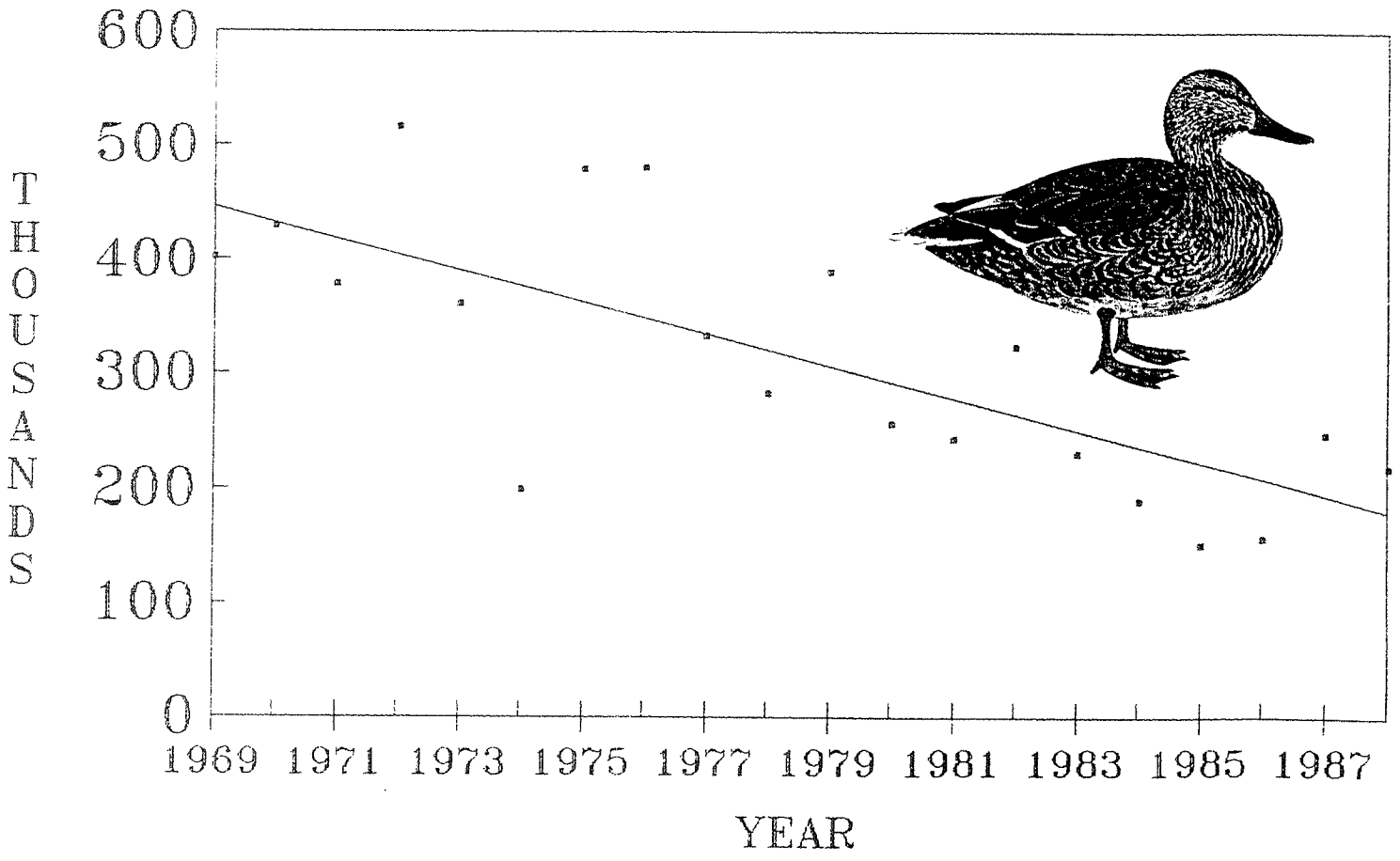
*USFWS BREEDING POPULATION SURVEY DATA

FIG.10. SCAUP BREEDING POPULATIONS*
1955–1988



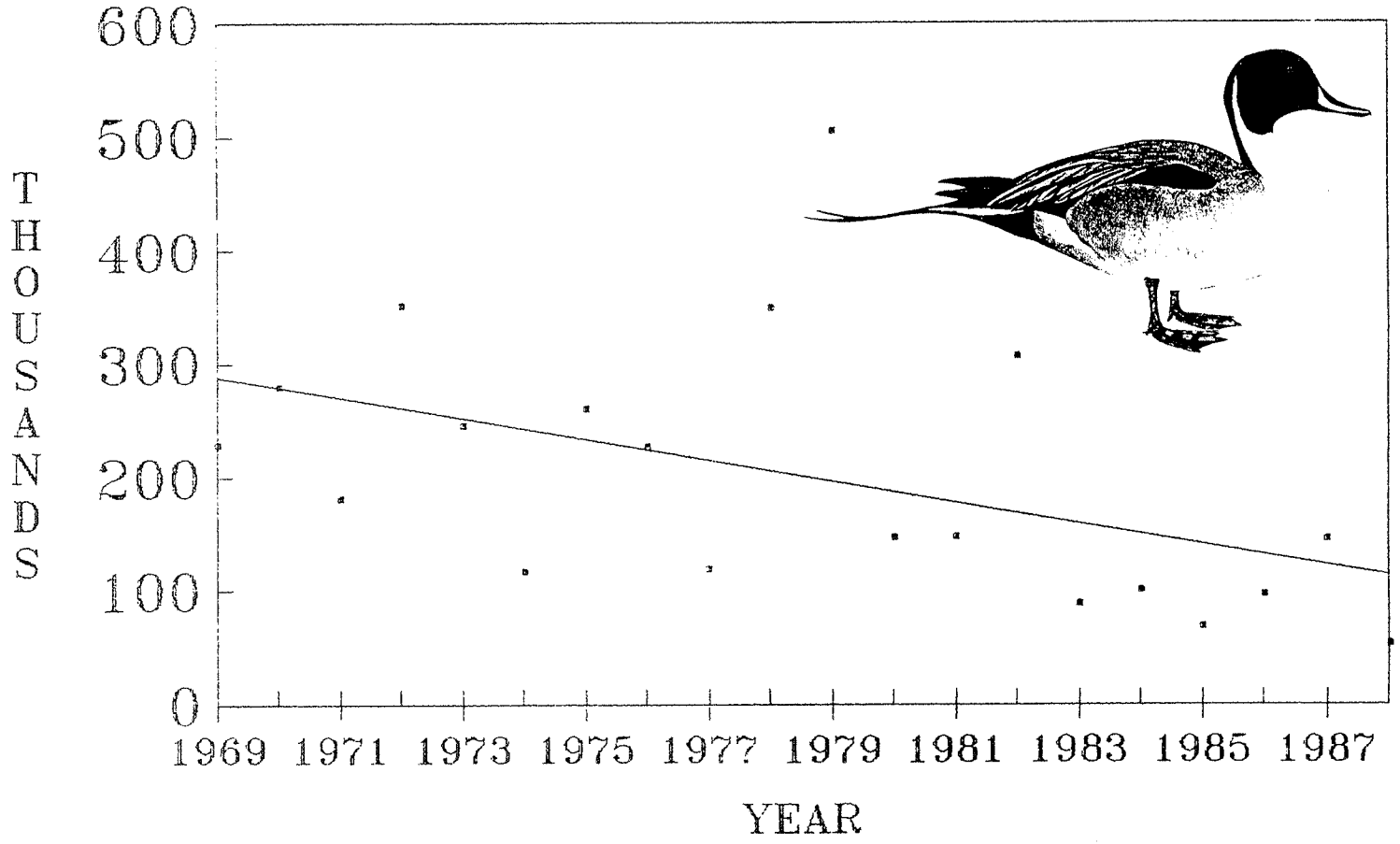
*USFWS BREEDING POPULATION SURVEY DATA

Fig.11. Mallard Breeding Populations* Montana: 1969–1988



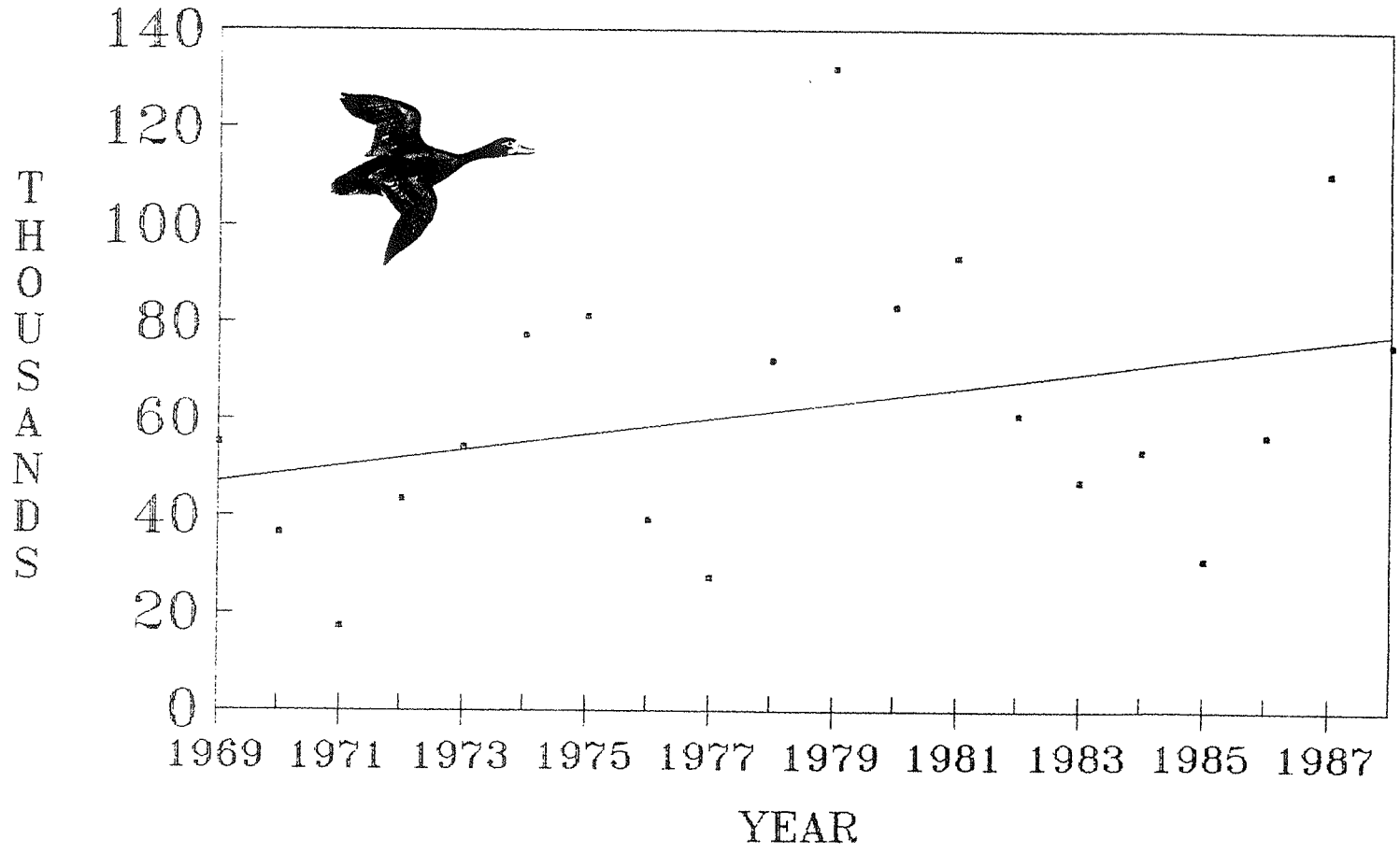
*USFWS Breeding Population Survey Data

Fig.12. Pintail Breeding Populations* Montana: 1969–1988



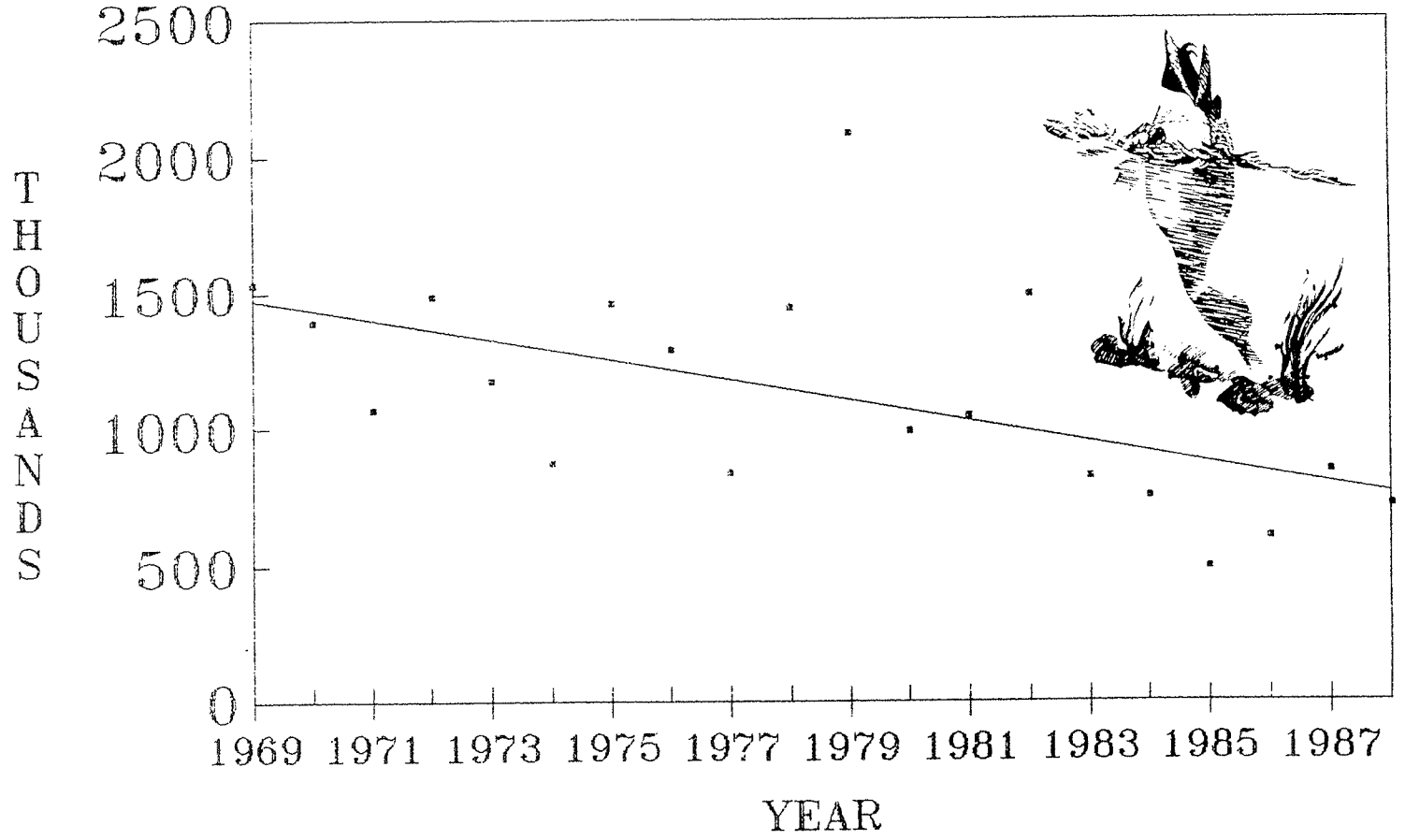
*USFWS Breeding Population Survey Data

Fig.13. Scaup Breeding Populations* Montana: 1969–1988



*USFWS Breeding Population Survey Data

Fig.14. Duck Breeding Populations* Montana: 1969–1988



*USFWS Breeding Population Survey Data

IMPACTS OF PREDATOR CONTROL ON DUCK PRODUCTION AT BENTON LAKE NATIONAL WILDLIFE REFUGE, NORTHCENTRAL MONTANA

Kristi DuBois

I. INTRODUCTION

Intensive nesting studies of ducks were initiated in 1983, to measure the impacts of management practices on duck production. High rates of nest failure due to predation were observed during the initial years of the study. A predator control plan and Environmental Assessment was prepared in 1985. The plan called for a three-year study to determine the impacts of predator control on duck nesting success and production.

II. STUDY AREA DESCRIPTION AND HISTORY OF MANAGEMENT PRACTICES

Benton Lake National Wildlife Refuge, located about 15 miles north of Great Falls, Montana, was established as a refuge in 1929 when President Herbert Hoover set aside, by Executive Order, the original 12,235 acres for "use as a refuge and breeding grounds for birds." The area historically received water from Lake Creek, draining a 240 square mile watershed. The refuge was managed out of Pishkun National Wildlife Refuge until 1961, when it was staffed with an on-site manager. Active management was initiated in 1961, by diking the lake into six separate ponds and diverting water from Muddy Creek to maintain water levels in both wet and dry years. The refuge currently has 12,383 acres, with about 5,000 acres of shallow marsh divided by dikes into 8 water management units. Water levels can be regulated by pumping water from Muddy Creek and distributing the water between the units by gravity flow and pumping.

Mammalian predators were protected on the refuge until the 1970's, when the refuge allowed muskrat trapping to control damage to the dikes. Small predators such as mink were occasionally trapped by muskrat trappers, but were not targeted for removal. Skunks and raccoons were only rarely killed when they found their way into duck traps or other inappropriate places. During the early 1980's, skunks and raccoons were killed when an opportunity presented itself, after the first nesting studies showed high levels of predation in some habitats. Raccoons were rarely observed on the refuge until the 1980's, when they became much more numerous. Systematic predator control began in 1986, with the initiation of a three-year study to determine the impacts of predator control on nesting success and duck production.

III. METHODS

Predators were trapped by refuge personnel using conibears (220) and live traps (three sizes) from March 1 to July 15 during the three years of the study (1986-1988). Target species were the raccoon and striped skunk. A maximum of 46 conibears and 28 live traps were set out at one time. Traps were set in all areas and habitats of the refuge, including islands. Bait consisted primarily of fish, but commercial fish oil, predator scents, and

cat food were also used. Live traps were checked on a daily basis, and conibears were checked 3-5 times per week. Non-target predators such as badgers and coyotes were released from live traps. No poisons were used.

Estimates of duck production have been made since 1962. Methods during the earlier years consisted of a combination of breeding pair counts, brood counts, and best guess. Systematic sampling (nest "dragging") of nesting habitats was initiated in 1983, with test sampling of 198 acres of native prairie and Dense Nesting Cover. During 1984, systematic sampling was limited to Dense Nesting Cover, while the techniques were further tested. From 1985 through 1988, systematic sampling of all the major nesting habitats was conducted.

Sampling procedures followed those described by Klett et al. (1986). Sample plots were set up in Dense Nesting Cover (7 plots), native grassland (6), shoreline (4), dike (4), and alkali bulrush (1) habitats. Some islands and structures were also surveyed during 1986-88. DNC and native grassland sample plots were dragged with either a 200 foot chain or 200 ft cable/chain pulled by vehicles. Dikes and shorelines were dragged with a 50 ft cable/chain pulled by ATV's. Other habitats were sampled on foot. Two or three nest searches were completed between late April and late June. Important nesting habitats on the refuge were mapped from aerial photos (Figure 1). Nest data were recorded on standard nest cards from the Northern Prairie Wildlife Research Center.

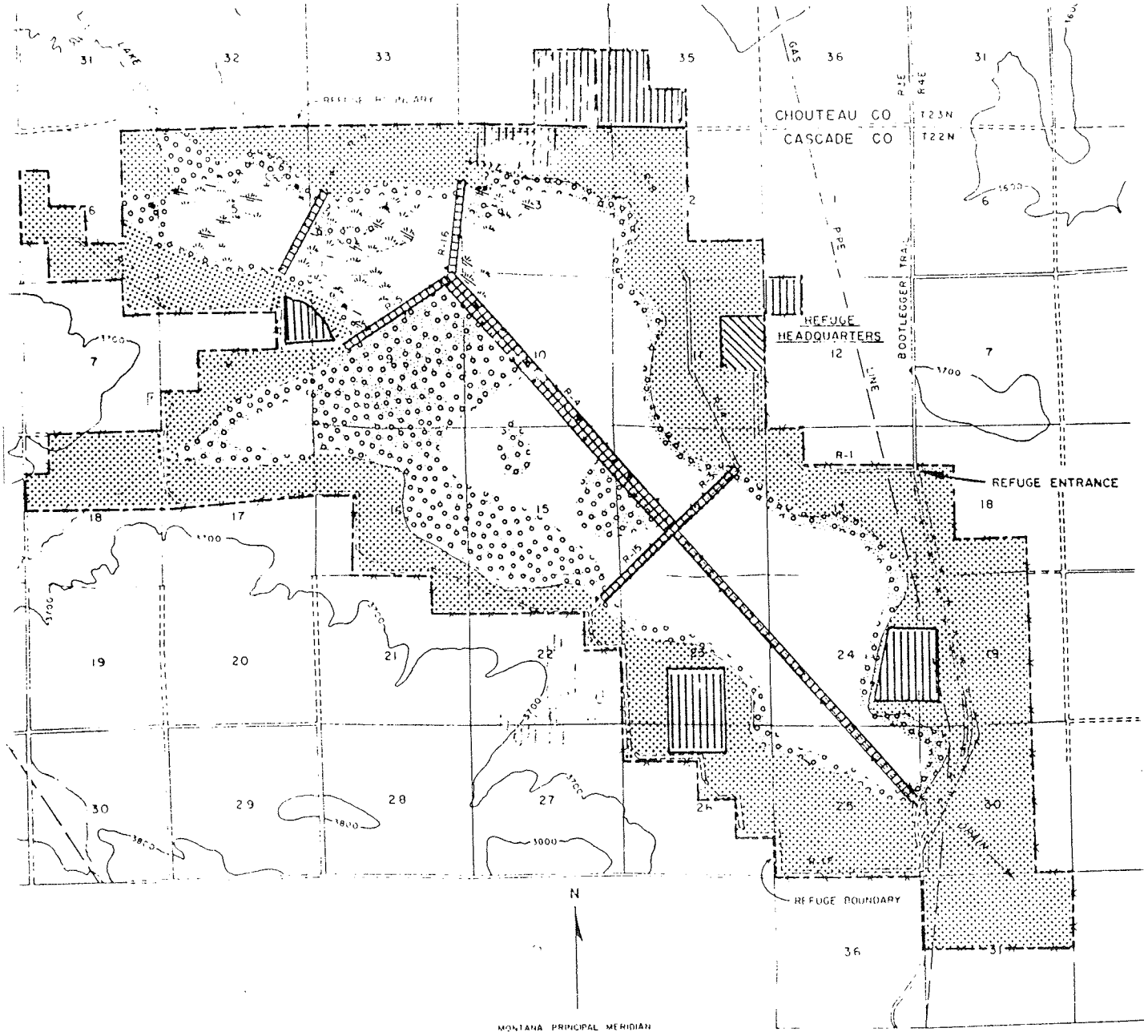
Nest success rates for each habitat were calculated using the Mayfield 40% method as described in Miller and Johnson (1978). The Mayfield method (originally developed during studies of warblers) calculates the daily nest mortality rate from the number of known nest failures and the period over which the successful and unsuccessful nests are observed (exposure days). By using the Mayfield method, the number of nests which are missed between sampling periods can be calculated. The apparent nest success rate, calculated by dividing the observed number of successful nests by the total number of nests found, tends to overestimate nest success and underestimate nesting densities.

From 1983 to 1985, refuge duck production was estimated by multiplying the Mayfield nesting success rate times the number of pairs of breeding ducks taken from breeding pair counts to get the total number of hatched nests. The number of successful nests was then multiplied times the average brood size taken from brood surveys to come up with total refuge production.

ESTIMATING DUCK PRODUCTION - OLD METHOD

PRODUCTION = BREEDING PAIR COUNTS X MAYFIELD NEST SUCCESS X AVERAGE BROOD SIZE AT FLIGHT STAGE

Figure 1. Important duck nesting habitats, Benton Lake National Wildlife Refuge, Northcentral Montana.



Native Grassland (5873 Ac.)

Dense Nesting Cover (669 Ac.)

Lake Shore Vegetation (1946 Ac.)

Cattail/Hardstem Bulrush (312 Ac.

Dikes (76 Ac.)

Open Water (3276 Ac.)

This method may have overestimated production by 1) counting transient pairs as breeding pairs, 2) over-estimating brood size due to brood consolidations, and 3) failing to take into account brood fledging success. Breeding pair counts and brood surveys were terminated after 1985.

From 1985 to 1988, refuge duck production was estimated by calculating duck nesting density by habitat, then using the amount of habitat present to estimate number of nests. The number of broods hatched was estimated by multiplying the Mayfield nest success times the Mayfield nest density in each habitat, then multiplying that times the total habitat acres to get the total number of broods hatched per habitat type for the refuge. Next, the production was estimated by multiplying the number of broods hatched times an estimated brood survival rate of 0.74 to get the total number of broods fledged. The number of broods fledged was then multiplied times the estimated average brood size at fledging. The brood survival rate and estimated brood size at fledging were estimates obtained from studies done in the prairie pothole region (Cowardin 1987, Pospahala et al. 1974).

ESTIMATING DUCK PRODUCTION - NEW METHOD

NUMBER OF BROODS HATCHED = MAYFIELD NEST SUCCESS X NEST DENSITY IN EACH HABITAT X TOTAL HABITAT ACRES.

PRODUCTION = NUMBER OF BROODS HATCHED X .74 BROOD SURVIVAL RATE X AVERAGE BROOD SIZE AT FLIGHT STAGE.

This method eliminated many of the problems of the breeding pair-based method, but caution should still be used when interpreting the resulting production estimates. The brood survival rate and brood size at fledging were estimates based on research in other areas, and may not be representative of the situation at Benton Lake. Studies done by Orthmeyer (1987) at Benton Lake documented a lower brood size at fledging than other studies. Orthmeyer's results may have been influenced by small sample size.

Both breeding pair and nesting density methods were used to calculate duck production in 1985 - the only year when both breeding pair counts and complete sampling of nesting habitats were accomplished. One year of overlap is probably not sufficient to provide a conversion factor between the two methods.

IV. RESULTS/DISCUSSION

Predator Control Program

A total of 109 skunks and 40 raccoons were removed during the study period (Table 1). A total of 32 non-target animals were trapped, including Richardson's ground squirrel, yellow-bellied marmot, badger, long-tailed weasel, domestic dog, rabbit, and American crow. Total cost for predator control, including salaries, was $5,082 for the three year study.

Table 1. Striped skunk and raccoons removed from Benton Lake National Wildlife Refuge, 1986-1988.

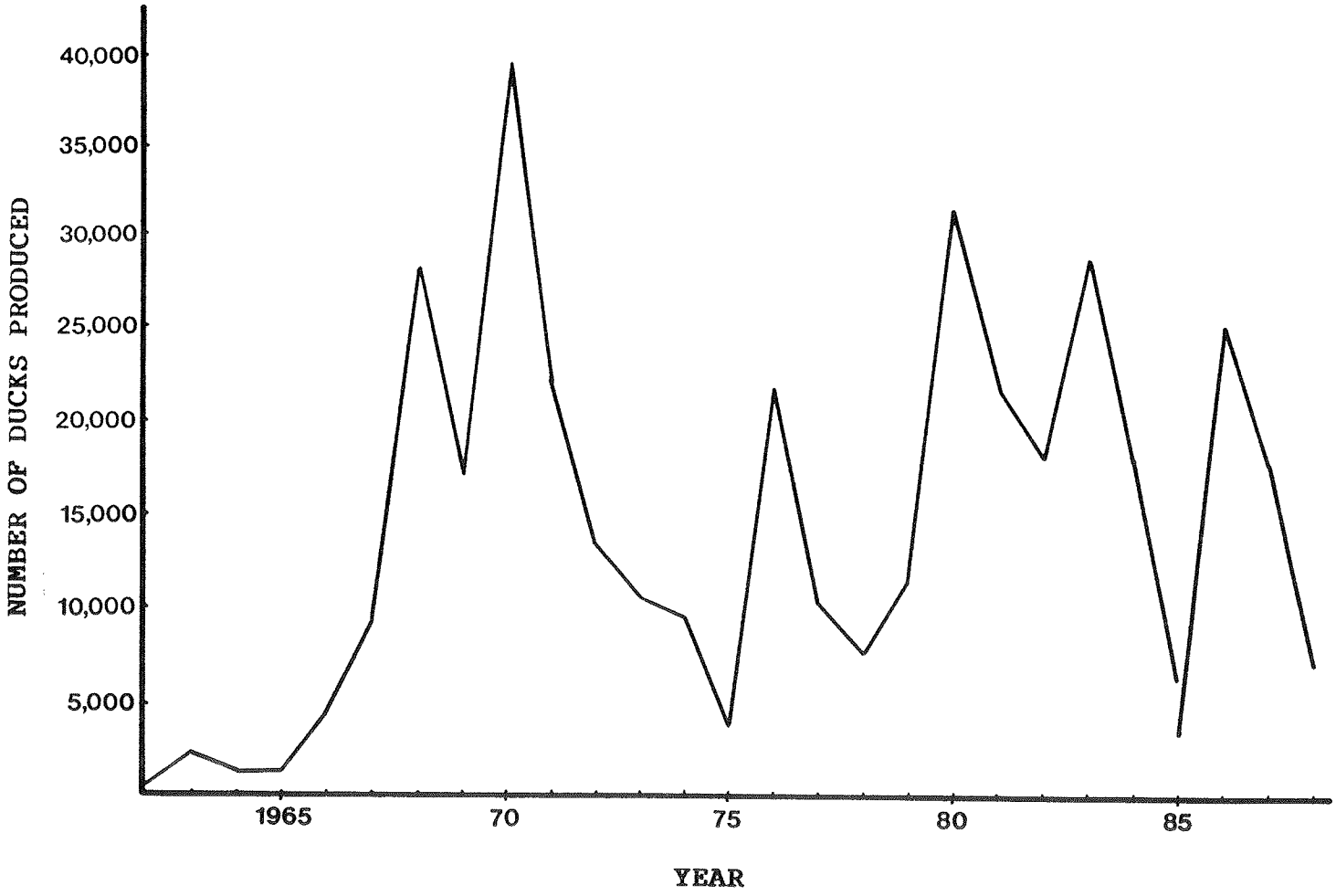
YEAR	TRAP DAYS	SKUNKS	RACCOONS	NON-TARGET SPECIES	COST
1986	9,175	65	21	10	$1,746
1987	3,176	12	5	16	$1,544
1988	6,924	32	14	7	$1,792[1]
TOTALS	19,275	109	40	33	$5,082

[1] An additional $735 was used to purchase live traps.

Duck Nesting Studies

Duck production estimates back to 1962 were obtained from refuge files to provide background information on refuge production (Figure 2). Although production estimates were obtained through different methods over the years, it is clear that duck production has fluctuated widely since the refuge was developed. Fluxuations were probably due to a combination of weather, management practices, and habitat changes.

Figure 2. Estimated duck production at Benton Lake National Wildlife Refuge, 1962-1988.



Duck production during the 1983-1988 period when nesting studies were done also fluxuated widely. During the three years of predator control, Mayfield nesting success showed a dramatic increase over the previous three years, and remained consistently above 70% (Table 2). Other studies have documented a dramatic increase in nesting success with predator control (Greenwood 1986, Duebbert and Lokemoen 1980). In spite of the consistently high nesting success, duck production dropped during the three-year study. This differed from the situation described by Duebbert and Lokemoen (1980) in which duck production and nesting populations increased dramatically during several years of predator control. Duck nesting density during the 1983-88 period fluxuated roughly in sync with the annual precipitation (Figure 3). Drought conditions were still present during the spring of 1985, contributing to the low nesting density and production in spite of above average precipitation.

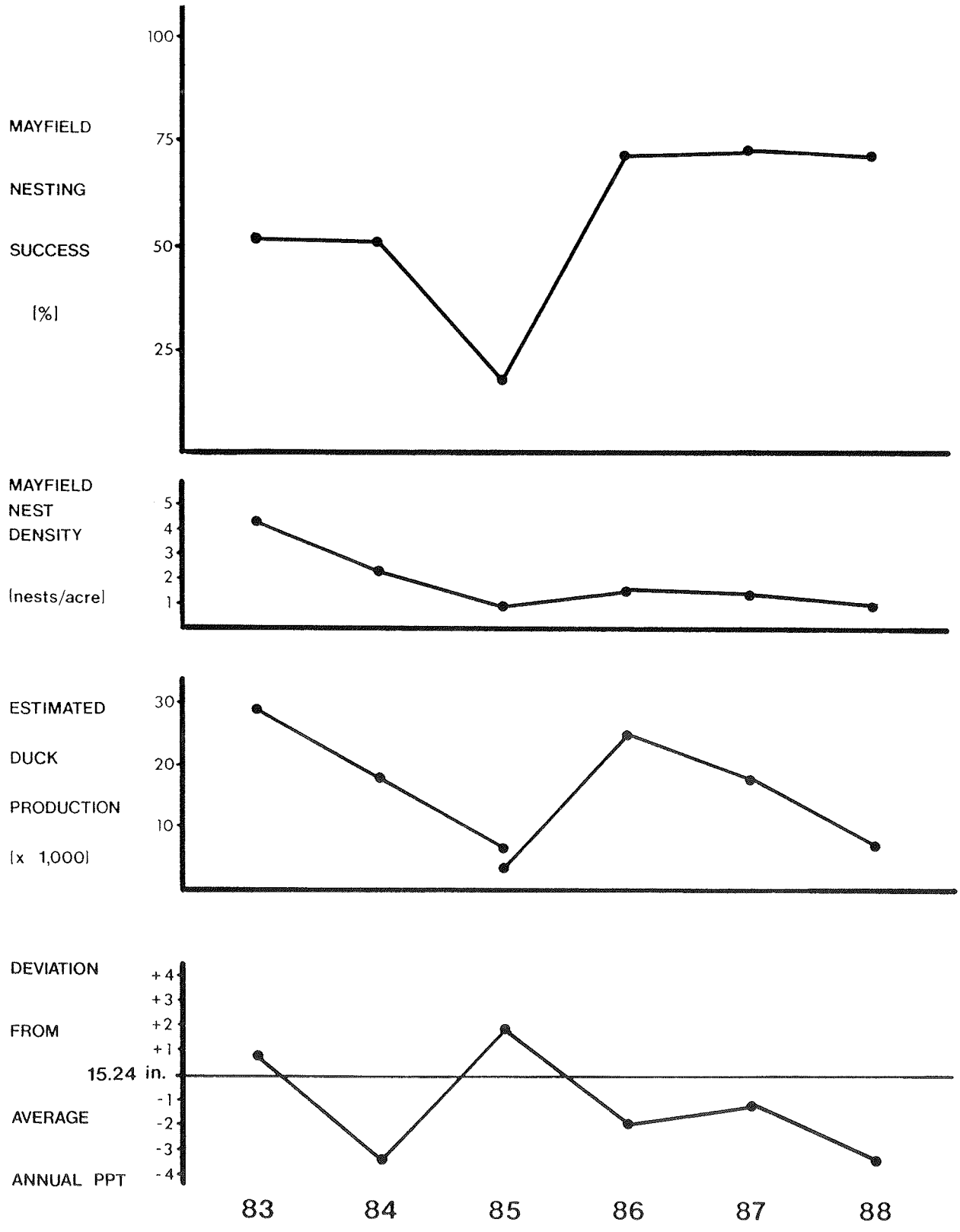
Table 2. Comparison of duck production, Mayfield nesting success, nest densities, and annual precipitation at Benton Lake National Wildlife Refuge, 1983-1988.

YEAR	1983	1984	1985	1986	1987	1988
MAYFIELD NEST SUCCESS	50.7	52.0	18.5	72.6	74.4	72.1
MAYFIELD NEST DENSITY (NESTS/ACRE)	4.33	2.30	0.90	1.51	1.44	0.90
ESTIMATED PRODUCTION	28,894	18,100	6,601[1] 3,276[2]	25,125	17,857	7,205
DEVIATION FROM AVERAGE ANNUAL PPT	+0.94	-3.43	+1.95	-1.91	-1.20	-3.44

1 Production calculated by multiplying the Mayfield nesting success times breeding pair counts and brood counts.

2 Production calculated by multiplying the Mayfield nesting success times the nesting density for each habitat, then times the estimated brood survival rate and average size.

Figure 3. Comparison of duck production, Mayfield nesting success, nest densities, and annual precipitation at Benton Lake National Wildlife Refuge, 1983-1988.



Three-year averages of Mayfield nesting success, nest densities, and duck production were calculated for the 1983-85 and 1986-88 periods (Table 3). Average Mayfield nest success was 40% without predator control and 73% with predator control. Average duck nest density dropped from 2.51 nests/acre before control to 1.28 nests/acre during predator removal. The result was nearly identical average duck production for the three year periods before and during predator control, of about 16,700 ducks. Thus, drought has offset the effects of predator control (or predator control has offset the effects of drought).

Table 3. Comparison of three-year averages of duck nesting success, nest densities, and estimated production for periods with and without predator control.

	NO PREDATOR CONTROL 1983-1985 AVERAGES	PREDATOR CONTROL 1986-1988 AVERAGES
MAYFIELD NEST SUCCESS	40.4	73.0
MAYFIELD NEST DENSITY (NESTS/ACRE)	2.51	1.28
ESTIMATED PRODUCTION	16,757	16,729

The only area that was consistently sampled from 1983 to 1988 was DNC 7 (Dense Nesting Cover). Comparison of Mayfield Nesting Success and duck nesting density on DNC 7 revealed the same clear rise in Mayfield nest success during predator control, but failed to show a distinct decline in nesting densities (Table 4). It is possible that nesting densities in DNC were not as severely affected by the drought as other habitats, due to hens selecting the best habitats for nesting. Fewer hens might mean less competition for nest sites in good habitat such as DNC, resulting in fewer hens nesting in more marginal areas such as native grasslands.

Table 4. Duck nesting density and success on DNC 7, Benton Lake NWR, 1983-1988.

	1983	1984	1985	1986	1987	1988
MAYFIELD NEST SUCCESS	51.2	48.6	13.4	68.7	81.4	64.3
MAYFIELD NEST DENSITY (NESTS/ACRE)	8.49	4.66	4.73	9.74	10.46	5.48
DEVIATION FROM AVERAGE ANNUAL PPT	+0.94	-3.43	+1.95	-1.91	-1.20	-3.44

To eliminate the effects of weather and inconsistent sampling techniques, duck production was re-calculated for the 1986-88 period, using the average pre-control Mayfield nest success of 40% to compare with the observed duck production. Estimated duck production with 40% nest success was 26,742 ducks for the 1986-88 period, a decrease of 23,445 ducks from what was actually observed (Table 5). At a three-year cost of $5,082, 5.26 additional ducks were produced per dollar spent on predator control.

Table 5. Comparison of estimated duck production with and without predator control during the 1986-1988 predator control period, Benton Lake NWR.

	ESTIMATED DUCK PRODUCTION			
	1986	1987	1988	3 YR TOTAL
WITH CONTROL (MAYFIELD = 73%)	25,125	17,857	7,205	50,187
WITHOUT CONTROL (MAYFIELD = 40%)	12,190	10,048	4,504	26,742
DIFFERENCE	12,935	7,809	2,701	23,445

V. MANAGEMENT IMPLICATIONS

The pros and cons of predator control have been debated widely by many different special interest groups. The studies at Benton Lake are not presented as an argument for or against predator control. Managers must make that decision based on the unique problems of the area they are managing. Other options besides predator control need to be considered before making decisions. The effect of predator control on other recreational uses of the area, such as photography and bird watching, should be considered. Many potential nest predators provide values which may exceed the value of the ducks they eliminate.

The results from Benton Lake NWR indicated that overall duck production was affected more by habitat conditions (water, nesting cover) than by predator control. Habitat enhancement should receive higher priority than predator control to enhance wildlife populations. Predator control is a tool that can be used to bring duck production up when predation is a problem. It can help offset declines in duck numbers caused by habitat deterioration, until the habitat can be restored. If wetland habitat continues to deteriorate, predator control may become more essential on waterfowl areas to maintain huntable duck populations.

Predator control methods should be chosen to reflect the problems of the area. The predator control program at Benton Lake NWR protected coyotes, because they usually displace fox, which are more efficient predators on ducks. By directing predator control

at the two most damaging species, nest success at Benton Lake was maintained above 70%. Duebbert and Lokemoen (1980) achieved a 96% nest success only after trapping and poisoning all predators. Even when mammalian predators are eliminated, avian predators can still be a problem. Some avian predators, such as the great horned owl and bald eagle, are highly valued by many refuge visitors as "watchable wildlife." Predator control will not result in more huntable ducks in areas with high duckling mortality from habitat limitations.

Finally, know what predator control is doing. Chose methods to evaluate the impacts of management practices such as predator control carefully. All steps used in calculations and all raw data should be documented and saved for reference, so that future managers can re-evaluate the data using the latest methods. Good documentation of methods used to calculate duck production at Benton Lake NWR made it possible to standardize production estimates from past years to be comparable with the current year. With duck production calculations, small changes in "fudge factors" such as brood survival rates, can result in large differences in the final figures. Managers need to be able to justify their production estimates in order to justify the proposed management practices.

VI. LITERATURE CITED

Cowardin, L.M. 1987. Four Square Mile breeding pair count progress report. North. Prairie Wildl. Res. Center, Jamestown, N.D. 14 pp.

Duebbert, H.F. and J.T. Lokemoen. 1980. High duck nesting success in a predator-reduced environment. J. Wildl. Manage. 44:428-437.

Greenwood, R.J. 1986. Influence of striped skunk removal on upland duck nest success in North Dakota. Wildl. Soc. Bull. 14:6-11.

Klett, A.T., H.F. Duebbert, C.A. Faanes, and K.F. Higgins. 1986. Techniques for studying nest success of ducks in upland habitats in the Prairie Pothole Region. U.S. Fish Wildl. Serv., Resour. Publ. 158. 24 pp.

Klett, A.T., and D.H. Johnson. 1982. Variability in nest survival rates and implications to nesting studies. Auk 99:77-87.

Miller, H.W. and D.H. Johnson. 1978. Interpreting the results of nesting studies. J. Wildl. Manage. 42:471-476.

Orthmeyer, D.L. 1987. Survival of mallard broods on Benton Lake National Wildlife Refuge in north-central Montana. M.S. Thesis, Univ. of Montana, Missoula, MT. 58 pp.

Pospahala, R.S., D.R. Anderson, and C.J. Henny. 1974. Population ecology of the mallard. II. Breeding habitat conditions, size of breeding populations, and production indices. U.S. Fish Wildl. Serv. Resour. Publ. 115. 73 pp.

The Yellowstone Wildfires of 1988--- What Happened To The Birdlife? What Is In Store For Yellowstone Birds In The Future?

Terry McEneaney
Management Biologist
P.O. Box 168
Yellowstone National Park, Wyoming 82190

To understand what happened to Yellowstone National Park's birdlife during the 1988 Yellowstone wildfires, and to speculate on its future, it is necessary to examine the type and extent of damage to various habitats. Media reports of the death of Yellowstone's vegetation and wildlife may be greatly exaggerated.

Before the fires began, vegetation in the park was already in trouble due to the drought which had been building since 1986. The fuel moisture content in plants was estimated to be less than 15% by mid-summer 1988. This figure is based on one thousand hour fuels such as dead trees and fallen logs.

Preliminary surveys indicate 44% of the 2.2 million acre park burned to some degree or another. Of these 988,925 acres, 57% was considered totally burned or blackened by a canopy type burn in which the trees were completely burned from the trunk to the crown. Thirty eight percent of the burned acreage experienced a light ground surface burn, which did not affect the canopy. A further five percent involved sedge meadows and sagebrush grassland.

As the wind-driven Yellowstone wildfires skipped across the landscape, burning at different intensities depending on wind-speed, humidity, fuel load and time of day, a mosaic of different age and/or types of vegetation was left behind. Despite what looks like apparent damage, the fires' effect on the Park illustrates how this sort of cataclysmic event can be instrumental in increasing vegetative diversity, which in turn, can increase and improve the diversity of birdlife. Considering total numbers, the collective Yellowstone bird population is expected to increase as newly-created habitats are exploited. Population status, predictions, and observations of endangered and rare birds during and after the Yellowstone wildfires will be discussed in detail.

IMPACTS OF DROUGHT ON NESTING BIRDS IN NORTHEASTERN MONTANA DURING 1988

Dwain M. "Fritz" Prellwitz, USF&WS, Bowdoin NWR, Malta, MT 59538
Stephen Martin, USF&WS, Medicine Lake NWR, Medicine Lake, MT 59247*
Paul M. Mayer, USF&WS, Bismarck, ND 58501
Mark P. Dryer, USF&WS, Bismarck, ND 58501
John J. Grensten, Bureau of Land Management, Malta, MT 59538

The severity of the 1988 drought in Northeastern Montana was compounded by its persistence over the past decade. Annual precipitation was below normal in 5 of the years since 1979, and near normal in 3 others. Impacts of drought on nesting birds and their habitats during 1988 varied by species. While waterfowl and upland birds experienced poor nesting success, the threatened piping plover (Charadrius melodus) and endangered least tern (Sterna antillarum) had good years as the amount of available nesting habitat for these species increased as water levels fell.

The severity of the drought was intensified by unusually high temperatures during early summer. Weather data from Bowdoin National Wildlife Refuge (NWR) reported a high of 105 F on 4 days in June, and a high of 100 F or greater on 5 additional days. The temperature was in the 90's F or higher on 22 days in June and on 15 days in July. Many of these hot days occurred during the peak of hatching for early nesting waterfowl and upland game birds.

Low precipitation amounts in 1988 continued a trend started in October 1987. Total precipitation at Bowdoin NWR for October 1987 through April 1988 was 1.14 inches. Total precipitation for 1988 was 9.59 inches, significantly below the long-term average of 12.72 inches. Over 5 inches of this moisture fell during May and June and was quite timely for vegetative growth. The Bowdoin area in Phillips County, however, was much wetter than the neighboring counties of Hill and Blaine. Rainfall at the Havre weather station in Hill County for the period of April through the middle of July was at 50% of normal, resulting in very little vegetative growth throughout the summer.

Drought, extremely high temperatures and predation decreased duck nesting attempts and success at Bowdoin NWR in 1988. Approximately 1260 acres of upland nesting cover at Bowdoin NWR were nest-dragged 3 times with a cable-chain drag during the 1988 nesting season. Nest-dragging had last been done in 1982 and 1983 as part of Jeff Holm's graduate project for the University of Montana. It was obvious from the start of the 1988 nest-dragging that many of the waterfowl seen during spring pair

* Present Address: USF&WS, Benton Lake NWR, Black Eagle, MT 59414

counts were not nesting. Less ducks nested, less eggs hatched, more hens died on the nest and more broods perished while travelling to water in 1988 than in the years of Holm's study. Nest density data indicated that 81% of the breeding pairs on the refuge did not nest, perhaps because of the absence of water in many of the breeding ponds. Thirty-nine and 49% fewer duck nests were found in 1988 than in 1982 and 1983.

Those ducks that did nest were confronted with temperature extremes. Nests with pipped eggs were found that apparently had begun to hatch on extremely hot days, but the hen was forced by hot temperatures to take the first hatchlings to water before the remaining ducklings had hatched. Some dead ducklings were found in nests along with a higher than expected number of unhatched eggs. Mayfield nest success (%) dropped from 47.6 in 1982 and 50.4 in 1983 to 19.5 in 1988. Much of the nest destruction appeared to have been by striped skunk (Mephitis mephitis) and red fox (Vulpes vulpes), both of which were more abundant in 1988 than in the early 1980's. A lack of high quality residual nesting cover because of drought contributed to the predation rate. Gadwall was the only species with nest success comparable for the 3 years. One tract on Big Island had much higher nest success in 1988 than the other study tracts, probably because of less predation.

Production of many bird species at Bowdoin NWR decreased in 1988. Duck production was estimated at 950 ducks hatched, down considerably from 4,653 in 1987. Only 2 of 102 duck nests found were mallard (Anas platyrhynchos) nests. Canada goose production dropped from 429 in 1987 to 185 in 1988. Apparent nest success for upland game birds and for upland-nesting shorebirds was 47% and 59%. Most upland gamebird broods were smaller than in 1987, and were observed later in summer. This was probably due to first nesting attempts being unsuccessful during the extreme heat in early June.

Personnel at Medicine Lake NWR nest-dragged 646 acres of dense nesting cover and native grassland 3 times in 1988, and produced results similar to those at Bowdoin NWR. Nest density, Mayfield nest success and number of nests for ducks were lower in 1988 than in 1987 when the same sites were sampled. The number of nests dropped from 399 to 224, and Mayfield nest success (%) dropped from 63 to 46. Similar results were found on scattered tracts within the Northeast Montana Wetland Management District which were dragged twice in 1988. Number of nests dropped from 61 in 1987 to 20 in 1988, although Mayfield success was 62% and 60% for the same years. Nesting habitat had slowly deteriorated during the persistent drought, and many ducks did not nest due to a lack of breeding ponds.

Piping plovers and least terns, however, responded better to drought conditions. The 2 species often nest together in colonies on exposed sand and gravel bars and islands. Nest temperatures on light-colored gravel substrate can exceed 160 F, and adults often must shade eggs to maintain the proper incubation temperature. Hot and dry conditions in 1988 apparently were not detrimental to nesting for these species in Northeastern Montana.

Piping plover production at Nelson Reservoir in Phillips County during 1988 was the highest recorded since plovers were first observed there in 1986. The reservoir water level fell 12 feet from the end of March to the end of July, exposing gravel beaches hundreds of yards wide. With the reservoir 18 feet below full pool, plovers had considerable nesting habitat which was relatively safe from predators due to the extensive widths of the beaches. Nine of 11 known nests hatched in 1988, with at least 28 eggs hatching and at least 16 young plovers observed. The previous best year was 1986 when 2 of 4 nests hatched producing at least 5 young. The wide beaches even provided some protection from recreational vehicles.

Piping plover production also increased at Medicine Lake NWR and within the Northeast Montana Wetlands Management District during 1988. The number of nests on the refuge increased from 7 in 1987 to 20 in 1988, with 12 successful nests producing 21 young. Plover nests on scattered wetlands within the Wetland District increased from 5 in 1987 to 24 in 1988, with 27 young produced in 16 successful nests.

The number of known piping plover pairs on Fort Peck Reservoir has not changed significantly in the last 3 years, but production almost doubled in 1988, from 8 in 1987 to 17 in 1988. Low water levels and extensive beach widths probably were factors in this increased production.

Several other areas in Northeastern Montana, although not having plovers, showed increases in available habitat during 1988. Low water levels on Whitewater and Whitcomb Lakes and on Wildhorse Reservoir in Phillips County exposed suitable habitat for nesting plovers. These areas could be used by plovers in future years if the population in Montana continues to grow and expand.

Least tern sightings in Northeastern Montana increased substantially in 1988. Terns were again observed on Fort Peck Reservoir, as they had been in 1987, but several new colonies were found on the Missouri River downstream from Fort Peck Dam. Although many of these areas were not searched in previous years, it is significant that the first record of production of terns in Montana occurred in such a dry year with low water levels. All 15 young observed were on islands of the Missouri River.

The summer of 1988 was not a good one for birds in Northeastern Montana, especially if they were species adapted to nesting under cooler and wetter conditions. Duck production dropped considerably across Northeastern Montana, at a time when continental populations were already very low. Upland game birds and upland nesting shorebirds had fair nest success, but brood survival was not good. Many young birds died either in the nest or while travelling to water during extremely hot temperatures. Gray partridge broods seemed to be as abundant as in 1987, but brood sizes were smaller. Pheasant broods were scarce until late in summer suggesting that early nests failed while renesting attempts were more successful. The piping plover and least tern, however, appeared to have responded to improved nesting conditions in 1988 by having the most productive year on record in Northeastern Montana.

THE MONTANA RIVERS STUDY: DESCRIPTION OF WILDLIFE DATA BASE AND ITS APPLICATIONS TO WILDLIFE MANAGEMENT. Gael N. Bissell, Montana Department of Fish, Wildlife and Parks, P.O. Box 67, Kalispell, Montana 59903.

Abstract: The Montana Rivers Study (MRS), Montana's portion of the Pacific Northwest Rivers Study was initiated in 1985 by a measure in the Northwest Power Planning Council's (NWPPC) Fish and Wildlife Program. This study, funded by the Bonneville Power Administration, was designed to identify, assess, and rank river reaches on the basis of significant natural resources for the purpose of future hydroelectric power planning. More than 4,000 stream reaches are included in the MRS data system. The wildlife data base, one of 5 resource areas evaluated, consists of both habitat and species data. Habitat data describe key characteristics of the riparian zone and presence of any lands managed for wildlife or habitat protection. The species portion consists of importance values for threatened and endangered species, species of special concern, and game and furbearing wildlife. The planned expansion of the wildlife data base to include or access much more wildlife information by Environmental Protection Agency (EPA) river reach system (a GIS system) will enable the data base to be of great use in many wildlife management programs. One major application of the MRS in 1988 was the identification of 2056 stream miles in western Montana as "off-limits" to any future hydroelectric development through the NWPPC's Protected Areas Program. More than 1400 miles were protected for wildlife. Other applications for the wildlife portion of MRS' data bases may include the review of Forest Plans, timber sales, tranportation systems, proposed developments such as mines or powerlines, speices management plans, and plans to acquire or protect wildlife habitat. All 5 MRS data bases are stored and accessed through dBase III+ software. The Natural Resource Information System at the State Library in Helena is responsible for data dissemination and management.

EFFECTS OF THE 1988 FIRES AND DROUGHT UPON ELK IN YELLOWSTONE NATIONAL PARK

Francis J. Singer

The fires of 1988 burned about 50% of the grassland/willow winter range of the Thorofare group of elk (500 elk), about 42% of the meadow/willow winter range for the Madison-Firehole elk herd (800-1,000 elk) burned, about 9% of the grasslands for the northern herd (21,000 elk) burned, while only a trace of the of the key winter range for the Gallatin herd burned (about 500 winter in the park). Due to the drought of 1988, summer range production was down about 40-60%, but winter range production was down only about 20%. Winter range growth was closer to normal because of a wet April and May. The drought effects were more pronounced during winter and from June on. Due to the combined effects of drought and the fires, larger migrations and winter kill are predicted for the the winter of 1988-89, as influenced by winter severity. A total of 257 elk, 9 bison, 4 mule deer and 2 moose were found within the park boundaries that had been killed by the 1988 fires. About 1% of the park's summering elk herd were killed by the fires. Starting with spring of 1989, the effects of the fires on elk summer and winter range will be largely positive. The ecological carrying capacity for all the park's elk herds will be increased as a result of the fires.

27TH ANNUAL MEETING
OF THE
MONTANA CHAPTER OF THE WILDLIFE SOCIETY

HOLIDAY INN -- PARKSIDE
(formerly Sheraton Hotel)
Missoula, Montana
February 23-24, 1989

THURSDAY, FEBRUARY 23

7:00 - 10:30	REGISTRATION - Lobby
8:45 - 9:00	WELCOME & INTRODUCTION Joe Ball, President, Montana Cooperative Wildlife Research Unit, Missoula. Mike Aderhold, President-elect, Montana Department of Fish, Wildlife and Parks, Kalispell.
9:00 - 9:30	EFFECT OF THE 1988 FIRES AND DROUGHT UPON ELK IN YELLOWSTONE NATIONAL PARK Frank Singer, Research Ecologist, National Park Service, Yellowstone Park Headquarters.
9:30 - 10:00	IMPACT OF THE 1988 YELLOWSTONE FIRES ON THE PARK'S BIRDLIFE Terry McEneaney, Management Biologist, National Park Service, Yellowstone Park Headquarters.
10:00 -10:30	REFRESHMENT BREAK
10:30 - 11:00	THE AUGUST 31, 1988, DECISION TO DELAY THE HUNTING SEASON AND THE SEPTEMBER 6, 1988, DECISION TO RESTRICT NON-ESSENTIAL ACTIVITIES - A PERSONAL ACCOUNT. Ted Schwinden, Governor -- January 1981 to January 1989, Helena.
11:00 - 11:20	IMPACT OF THE 1988 DROUGHT ON WATERFOWL IN THE CENTRAL FLYWAY Tom Hinz, Central Flyway Representative, MDFWP, Billings.
11:20 - 11:45	IMPACT OF THE 1988 DROUGHT ON WATERFOWL IN THE PACIFIC FLYWAY Jeff Herbert, Pacific Flyway Representative, MDFWP, Helena.
Noon - 1:15	SOUP AND SANDWICH LUNCH ENTERTAINMENT by Lou Kis, retired 20-year Warden Captain and first class photographer. Musical slide presentation on the Yellowstone fires and Lou's best bear photos.

1:30 - 2:00 THE 1988 FIRES AND HOW THEY MAY INFLUENCE FUTURE LAND MANAGEMENT IN MONTANA
Ron Wakimoto, Fire Ecologist, School of Forestry, University of Montana, Missoula.

2:00 - 2:30 CANYON CREEK FIRE/FIRE MANAGEMENT DECISIONS -- A FOREST SUPERVISOR'S PERSPECTIVE
Orville Daniels, Lolo Forest Supervisor, USFS, Missoula.

2:30 - 3:00 REFRESHMENT BREAK

3:00 - 3:30 SOME 1988 DROUGHT IMPACTS OBSERVED ON REFUGE AND PUBLIC RESOURCE LANDS IN NORTHEAST MONTANA
Dwain "Fritz" Prellwitz, Assistant Refuge Manager, Bowdoin NWR, Fish and Wildlife Service, Malta.

3:30 - 4:00 SHARP-TAILED GROUSE IN THE MISSOURI BREAKS -- 1988 NESTING SUCCESS
Pat Gunderson, student, Montana State University, Bozeman

4:00 - 4:30 BUREAU OF LAND MANAGEMENT PRESENTATION

6:00 - 7:00 SOCIAL HOUR

7:00 PM SUPPER

Featured Dinner Speaker
Les Pengelly
Wildlife Professor Emeritus
University of Montana
Charter Member and first Secretary/Treasurer
of the Montana Chapter ofthe Wildlife Society
Former president of the national organization of The Wildlife Society

FRIDAY, FEBRUARY 24

7:30 - 9:00 CHAPTER BUSINESS BREAKFAST
Joe Ball, President, conducting
Richard Mackie, president-elect of the National Wildlife Society
Ray Mule', Treasurer's Report
Mike Aderhold, 1989 president, goals and objectives
Election results
Issues needing member discussion

9:00 - 9:30 THE MONTANA RIVERS STUDY: DESCRIPTION OF WILDLIFE DATA BASE AND IT'S APPLICATIONS TO WILDLIFE MANAGEMENT
Gael Bissell, MDFWP, Kalispell

9:30 - 10:00 IMPACTS OF PREDATOR CONTROL ON DUCK PRODUCTION AT BENTON LAKE NWR

Kristi DuBois, Biologist, Fish and Wildlife Service, Great Falls.

10:00 - 10:30 UPDATE ON THE RESEARCH OF THE WOLF ECOLOGY PROJECT WITH EMPAHSIS ON POPULATION, FOOD HABITS AND DISPERSAL

Daniel Pletscher, Associate Professor, School of Forestry, University of Montana, Missoula.

11:00 - 11:30 RESULTS OF THE FIRST YEAR OF THE SOUTH FORK GRIZZLY BEAR STUDY -- PLANS FOR IMMEDIATE FUTURE

Keith Aune, Project Leader, Montana Department of Fish, Wildlife and Parks, Kalispell