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# Effects of striped skunk removal on duck nest success in the Mission Valley Montana

Nathan E. Hall
*The University of Montana*

NATHAN HALL

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# EFFECTS OF STRIPED SKUNK REMOVAL ON DUCK NEST SUCCESS IN THE MISSION VALLEY, MONTANA

by

NATHAN E. HALL

B. S., UNIVERSITY OF MONTANA--MISSOULA. 1988

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Dean, Graduate School

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**ABSTRACT**

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Effects of Striped Skunk Removal on Duck Nest Success in the Mission Valley, Montana

Director: I. J. Ball

From 1986 to 1990 I examined the effects on upland nesting ducks of removing striped skunks (*Mephitis mephitis*) from a 52 km$^2$ area (Ninepipe). Nest success, nest density, and nesting phenology were evaluated at inepipe and a nearby non-removal area (Pablo). Following a baseline period (1986-1987), skunks were removed annually from Ninepipe. Skunk capture rates declined each year 1988-1990 (1.5, 1.0, 0.6 captures per 100 trap nights). Nest success at Ninepipe during 1988 was not significantly different from baseline levels and was combined with 1986 and 1987 [$x_{86-88}$=21.5% for all duck species, 11.0% for mallards (*Anas platyrhynchos*) only]. Nest success for all duck species at Ninepipe increased to 44.3% in 1989, and to 59.8% in 1990. Mallard nest success at Ninepipe for 1989 and 1990 increased to 39.4% and 54.9%. Nest success at Pablo did not change ($x_{86-88}$ = 25.3% vs $x_{89-90}$ = 24.8%). Apparent nest densities of mallards at Ninepipe increased 3.4x from 1986 to 1990, reaching a density of 24 nests per 100 ha. Apparent mallard nest densities at Pablo increased 2.4x from 1986 to 1990, probably due to habitat improvements. Nesting phenology of mallards on the removal area advanced progressively as nest success increased between 1986 and 1990. By 1990, mean nest initiation date was 16 days earlier and mean hatching date 19 days earlier than during the baseline period. Overall range of nest initiation and hatch dates varied little from the baseline period.
Although cost of the removal program increased the annual management budget, the cost per hatched duckling decreased from $21.75 to $8.75. The cost per additional duckling hatched in 1990 was $4.52.

## TABLE OF CONTENTS

## LIST OF TABLES

Table | Page

**LIST OF FIGURES**

| Figure | | Page |
|---|---|---|

## ACKNOWLEDGMENTS

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Shamanski, K. Tsai, and S. Leasure all worked on this project with dedication and enthusiasm. Their help and friendship were greatly appreciated. D. Orthmeyer's encouragement and suggestions on this study were an enormous help. I also thank the numerous private landowners who let us trap skunks on their land. W. Hall provided me with support when it was most needed.

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# INTRODUCTION

Ground-nesting ducks evolved with considerable nest predation, as evidenced by cryptic coloration of hens, persistent renesting, and selection for dense nesting cover by most species. However, the species composition and density of predators have changed a great deal since pristine times on the prairies and plains when large carnivores such as gray wolves (*Canis lupus*), and later coyotes (*Canis latrans*), were dominant. With European settlement came severe impacts to both predator communities and habitats. Wolves, and to a lesser extent coyotes, were extirpated. This removal of the dominant carnivores, in conjunction with human augmentation of food and shelter, allowed smaller but more numerous predators such as red fox (*Vulpes vulpes*) and raccoon (*Procyon lotor*) to increase in distribution and density (Sargeant et al. 1984). The effects of human activities on populations of striped skunks (*Mephitis mephitis*) are less clear, but anthropogenic sources of food and den sites are thought to have contributed to northward range expansion and to high population densities in some areas (Rosatte 1987).

Concurrently, waterfowl habitat was being destroyed by cultivation and drainage, and degraded by over-grazing (and other ground-nesting birds) are attempting to reproduce in relatively small "islands" of habitat that are surrounded by intensive agriculture and are shared with relatively high densities of efficient nest predators. Low duck nest success, below that needed to maintain populations, has been recognized as a serious and widespread problem (Cowardin and Johnson 1979, Cowardin et al. 1983, Sargeant and Arnold 1984, Greenwood et al. 1987, Klett et al. 1988, Fleskes and Klaas 1991).

Nest predation by mammals, and to a lesser extent by birds, is the major proximate cause of nest failure (Sargeant and Arnold 1984, Cowardin et al. 1985, Greenwood et al. 1987, Klett et al. 1988). The most common management tool used to increase nest success has been to improve nesting cover, but cover improvement alone often does not produce viable rates of nest success (Duebbert and Kantrud 1974, Sargeant et al. 1984, Holm 1984, Clark and Nudds 1991). In fact, small fields of "good" cover could operate as population sinks by attracting high densities of nesting ducks to areas where nest success rates are below maintenance levels.

Relatively little information has been reported concerning nest success and the effects of predator management outside the Prairie Pothole Region. Baseline data collected on upland nesting ducks in the lower

Flathead (Mission) Valley during 1986 and 1987 indicated that nest success of mallards (*Anas platyrhyncos*) was well below the 15% level thought necessary to maintain a stable population (Cowardin et al. 1985). This finding was particularly troubling because it reflected conditions in the best nesting cover present in the Valley. In addition, nest densities in 1986 and 1987 had declined approximately 85% from those found in the same area 50 years earlier (Girard 1938). Predation caused 97% of all nest failures during 1986-87, with the majority of losses attributed to striped skunks. We noted that skunks were extremely common in the managed cover where nesting ducks concentrated. Furthermore, virtually all of the skunk dens we encountered were anthropogenic (in abandoned foundations, beneath buildings, in culverts and irrigation pipes, etc.). Even the few "natural" dens we did find were associated with human activities (i.e., excavated under irrigation flumes or into the side of irrigation ditch banks). Thus, we came to suspect that skunk populations in the area were subsidized by past and current human activities. The United States Fish and Wildlife Service (USFWS), National Bison Range, proposed to initiate a selective trapping program for striped skunks during the spring of 1988, in an attempt to increase nest success. Resistance to this proposal among the human population in the Valley, which includes a large component of environmentally aware and active individuals and organizations, was substantial at first. However, the program was accepted after groups and individuals became convinced that a serious problem existed, that it was probably human caused, that the reduction would be conducted humanely, and that nonlethal alternatives would be explored.

The overall goal of my project was to monitor the effect (if any) of skunk removal on nest success. Specific objectives were to:

1) document nest success, nest density, and nesting chronology in relation to skunk removal;

2) evaluate the costs and benefits of skunk removal; and

3) develop recommendations for management.

My research hypothesis was that a reduction in skunk density would cause an increase in duck nest success. Increased nest success, if it occurred, was expected to cause an increase in the breeding population, particularly for species like the mallard which is known to exhibit a high rate of homing by successful hens and their female offspring (Lokemoen et al. 1990). Over large portions of the Prairie Pothole Region, the average age of duck broods observed during July aerial surveys has decreased in recent decades (Pospahala et al. 1974, Reynolds 1987).

One plausible explanation for this pattern is that increasing rates of nest predation, and the resultant repeated renesting attempts, have retarded the seasonal phenology of hatching. I reasoned that, if nest success increased (i.e. predation rates decreased), then seasonal nesting phenology should advance.

## STUDY AREA

The study was conducted in the Mission Valley of west-central Montana within the Flathead Indian Reservation of the Confederated Salish and Kootenai Tribes (CSKT). Land ownership on the study area was divided among CSKT, USFWS, Montana Department of Fish, Wildlife and Parks (MTDFWP), and private farms and ranches. Land uses included tame grass pasture, alfalfa and grass hay, small grain crops, and planted wildlife cover on state and federal lands. Irrigation water was delivered to much of the area by an irrigation system that included numerous canals and three large reservoirs.

Although surrounded by mountains, the Valley resembles the Prairie Pothole Region in topography, hydrology, land use, and high rates of nest predation. Portions of the study area contain at least 58 wetland basins per $km^2$, among the highest concentrations found in the lower 48 states (Jobes 1980). The wetlands are located on a large terminal moraine, formed during the Bull Lake glacial period, 70,000-150,000 years ago (Alt and Hyndman 1986). Precipitation patterns, deep wetland basins, and irrigation runoff make the Valley somewhat less susceptible to drought than many parts of the Prairie Pothole Region.

The climate is characterized by hot dry summers and

The climate is characterized by hot dry summers and mild winters, with an average frost-free season of 115 days. Approximately 40% of the 38-cm annual precipitation occurred during the spring (April-May).

A 52-km$^2$ area surrounding Ninepipe National Wildlife Refuge (NWR) served as the treatment (skunk removal) area (Fig. 1). Nest searches were conducted in the best nesting cover in the Valley located on three Federal Waterfowl Production Areas (WPA) and a portion of the MTDFWP Ninepipe Wildlife Management Area (WMA)(Fig. 1). The WPAs (Sandsmark, Montgomery, and Herak) were planted to dense nesting cover (DNC) which consisted primarily of tall wheatgrass (*Agropyron elongatum*), intermediate wheatgrass (*A. intermedium*), and alfalfa (*Medicago sativa*). The WMA, while containing some areas of DNC, consisted primarily of smooth brome (*Bromus inermis*), bluebunch wheatgrass (*A. spicatum*), and blue grasses (*Poa* spp.). Weeds, such as Canada thistle (*Cirsium arvense*) and whitetop (*Cardaria draba*), required persistent control (spraying or mowing) on parts of most areas managed as nesting cover.

Pablo NWR (16-km$^2$) is located approximately 15-km north of Ninepipe, and served as the experimental control (nonremoval) area (Fig. 1). Pablo consisted of a large irrigation reservoir surrounded by lightly grazed pasture

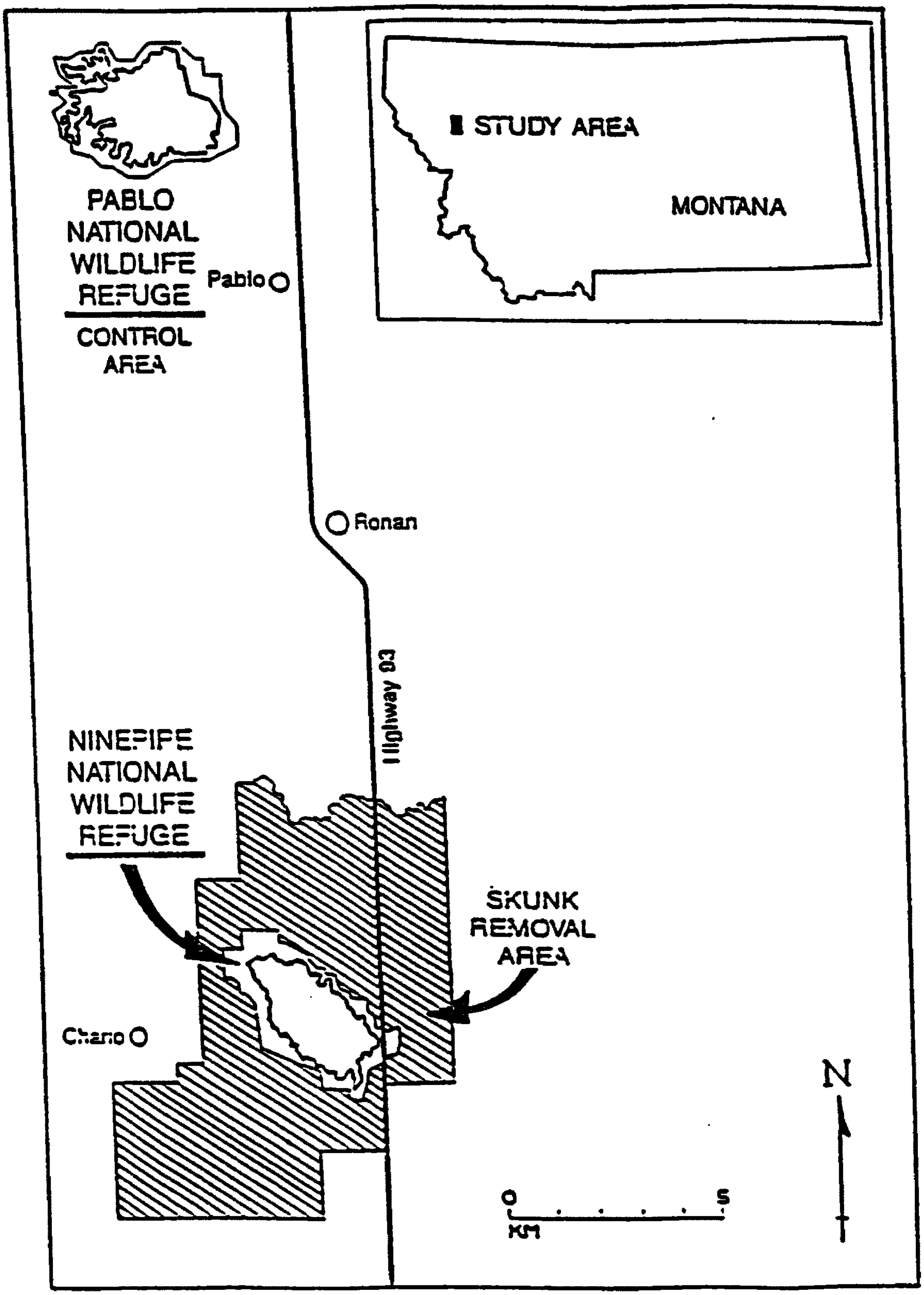


Fig. 1. The Lower Flathead Valley including the Ninepipe skunk removal area and Pablo NWR (control area).

Russian olive (*Elaeagnus angustifolia*), and woods rose (*Rosa woodsii*). Fields intensively managed as nesting cover at Pablo consisted of alfalfa mixed with quack grass (*Agropyron repens*). These areas were mowed annually, but the single cutting was delayed until after 15 July. Most nesting was completed by this date so that mowing had little direct impact on incubating hens. This system also allowed a period of regrowth so that considerable residual vegetation was available as nesting cover the following spring. Ducks Unlimited constructed an extensive dike and canal system along the south and west sides of the reservoir. The resulting impoundments were isolated from reservoir fluctuations and greatly improved wetland habitat for duck pairs and broods. Construction of the impoundments and establishment of improved nesting cover occurred in 1987, and nest searching was not conducted at Pablo that year.

## METHODS

Duck nests were located using an 80-m cable-chain drag pulled through the vegetation by two jeeps (Higgins et al. 1977, Klett et al. 1986). Several areas were also searched using a 30-m chain dragged between two all-terrain cycles. Two nest searches were conducted from the first week of May through the second week of July, 1987-1990. During 1986, three nest searches were conducted during this same time period. However, the 1986 nest records were screened so that only those nests that would have been found during two searches were used. This allowed for direct comparisons among years. Nest searches were conducted between about 0700 and 1200 hours to maximize the chances of finding hens on their nests. To minimize vegetation damage, nest searches and nest checks were not conducted when vegetation was wet from dew or rainfall.

Methods for locating nests and recording nest data followed Klett et al. (1986). Height-density (H-D) measurements of vegetation (Robel et al. 1970) were recorded at the nest when it was found. H-D was measured to the nearest 0.5 dm and recorded as the average of sightings taken from each of the four cardinal directions. Nests were checked, usually at 7-10 day intervals, until fate was determined; a successful nest was defined as one in which at least one egg hatched. Nests damaged by search activities or apparently abandoned because of observer disturbance were used to calculate nest numbers and density but were deleted from nest success calculations. Observer-caused abandonment was inferred if a hen did not lay more eggs or advance the incubation stage after the nest was originally found.

Striped skunks were intensively trapped from mid-March through early July of 1988-1990 in a 52-$km^2$ area centered around Ninepipe NWR (Pengeroth 1991). Skunk removal occurred on all lands within this area except for the narrow (30-800 m) strip of NWR land surrounding Ninepipe Reservoir and several small parcels of private land where permission to trap could not be obtained. Live traps (1988-1990) and #220 Conibear traps in cubbies (1988-1989), baited with canned sardines, were set near den sites, travel lanes, and wherever skunk activity was observed. Traps were checked daily, and nontarget species released from live traps. Detailed descriptions of methods and trap densities were presented by Pengeroth (1991).

Nest success was estimated using the method developed by Mayfield (1961, 1975) and modified by Johnson (1979). Exposure days were computed using the midpoint assumption (Mayfield 1961, 1975) for nests where the exposure period between rechecks was <15 days. In the few cases where a nest was not checked within 15 days and was destroyed, 40% of the time period was used in calculating exposure days (Johnson 1979). Nest success was determined using the program SAH for DBase III software written by Steve Hicks at LaCreek National Wildlife Refuge, South Dakota. Differences in daily survival rates among areas and years were evaluated using Z-tests (Johnson 1979).

Nest densities are reported as observed nest densities and Mayfield nest densities (Miller and Johnson 1978), with computation as follows:

100 ha searched

100 nests found

65 nests hatched

Nest success = 50% (computation not shown)

Observed nest density = 100 nests/100 ha = 1.0 nest/ha

Mayfield nest density = (65/0.5)/100 ha = 1.3 nest/ha

Because destroyed nests cannot be found with the nest drag, an increasing proportion of the nests initiated are found (i.e., detectability increases) as nest success increases. Although the statistical properties of Mayfield nest densities have not been explored, some form of adjustment seemed necessary.

Student's *t*-tests were conducted on the H-D data to determine whether the nesting cover changed between years, and whether H-D differed between successful and unsuccessful nests. Nesting phenology was determined for mallards by back dating from the nest age when initially found, as determined by candling (Weller 1956). Mallards were selected for the analysis of changes in nesting phenology because they are the primary early nesting species in the area, they were expected to exhibit the greatest response to skunk removal, and interest in their management was high.

Spring wetland conditions were evaluated and ranked using a variety of criteria: percent of basins holding water during July; mean precipitation during January-June; and subjective observations of water levels.

## RESULTS

### Results of Skunk Trapping

Capture rates (skunks per 100 trap nights) were similar between live traps and Conibear traps (1.5 vs 1.6 in 1988 and 1.1 vs 0.8 in 1989). Therefore the data were combined for analysis of annual changes. Total number of skunks removed from the 52-$km^2$ Ninepipe area declined 69% from 109 in 1988 to 34 in 1990 (Table 1). Similarly, capture rates declined progressively from 1.5 in 1988 to 0.6 in 1990. During 1988-1989, no skunks were observed or captured in the large, heavily grazed pasture situated in the northeast portion of the study area, and these areas were not trapped in 1990. This change in the trapping program caused a substantial reduction in the total number of trap nights and, presumably, no change in the number of skunks captured.

### Nest Success

Nest success for all duck species on the Ninepipe area did not change significantly during 1986-1988 ($\underline{Z}$ tests, $\underline{P}$ >0.05, Table 2), so these years were combined to increase the sample sizes for comparison with 1989 and 1990 ($\overline{x}_{86-88}$ = 21.5%, 95% CI 16.6-27.7%).

Table 1. Results of trapping in the 52-km$^2$ Ninepipe skunk removal area, 1988-1990.

| Year | Total Trap Nights | Total Removed | Skunks/ 100 Trap Nights |
|---|---|---|---|
| 1988 | 7257 | 109 | 1.5 |
| 1989 | 7470 | 76 | 1.0 |
| 1990 | 5745 | 34 | 0.6 |

Table 2. Nest numbers and success for all duck species on the Ninepipe (removal) area, 1986-1990.

| Year | Total Nests[a] | Total Hatch | Exposure Days | % Nest Success | 95% CI | Z[c] | P[c] |
|---|---|---|---|---|---|---|---|
| 1986 | 56(92)[b] | 22(41)[b] | 717.4 | 19.0 | 10.6 - 33.7% | - | - |
| 1987 | 85 | 45 | 1082.0 | 27.7 | 18.1 - 42.3% | 1.00 | 0.32 |
| 1988 | 115 | 51 | 1388.4 | 20.2 | 13.1 - 30.8% | 1.33 | 0.18 |
| 1989 | 139 | 87 | 2231.1 | 44.3 | 35.7 - 54.9% | 3.83 | <0.01 |
| 1990 | 253 | 199 | 3606.5 | 59.8 | 52.1 - 68.8% | 2.00 | 0.04 |
| 1986-88 | 256 | 118 | 3187.8 | 21.5 | 16.6 - 27.7% | - | - |
| 1989-90 | 392 | 286 | 5837.6 | 52.9 | 47.6 - 58.9% | 6.25 | <0.01 |

[a] Excluding nests damaged during nest search or observer influenced abandonment.

[b] Partial search in 1986. Figure in parentheses is the number of nests present assuming that densities of nests in the unsearched portion was the same in 1986 as in 1987.

[c] Compared to previous year or set of years (i.e., 1986 vs 1987 or 1986-88 vs 1989-90).

In 1989, the second year of skunk removal, success increased to 44.3%, then increased again to 59.8% in 1990. Thus, duck nest success in 1990 reached 2.8X the baseline level. Mallard nests at Ninepipe during 1986-88 were approximately half as successful as all species combined (11.0 vs 21.5%; Table 3). However, mallard nest success increased more sharply, to 3.6X in 1989 and 5.0X in 1990. By 1990, mallard nest success was comparable with success of all species combined (54.9 vs 59.8%). Nest success of all duck species at Pablo during 1986-1988 was comparable to that at Ninepipe (25.3% vs 21.5%, $Z = 1.73$, $P = 0.08$), and did not increase between time periods (25.3% vs 24.8%, $Z = 0.25$, $P = 0.80$, Table 4).

Sample size of mallard nests at Pablo ($N_{86\text{-}90} = 26$) was inadequate to evaluate success by time periods.

## Nest Densities

By 1990, apparent nest density at Ninepipe had increased 2.7x over baseline (1986-1988) levels (Table 5). The increase varied from 5.7x on "other WPA's" to 1.5x on the State WMA. The increase in apparent nest density at

Table 3. Nest numbers and success for mallards on the Ninepipe (removal) area, 1986 - 1990.

| Year | Total Nests[a] | Total Hatch | Exposure Days | Nest Success | 95% CI | Z[c] | P[b] |
|---|---|---|---|---|---|---|---|
| 1986-88 | 70 | 24 | 758.3 | 11.0% | 5.8 - 20.7% | - | - |
| 1989 | 45 | 28 | 643.9 | 39.4% | 25.8 - 61.0% | 4.37 | <0.001 |
| 1990 | 67 | 52 | 962.5 | 54.9% | 41.2 - 72.9% | 1.57 | 0.12 |

[a]Excluding nests damaged during nest search or observer influenced abandonment.

[b]Compared to previous year or set of years (i.e. 1986-88 vs 1989).

Table 4. Nest numbers and success for all duck species on the Pablo (nonremoval) area.

| Year | Total Nests[a] | Total Hatch | Exposure Days | Nest Success | 95% CI | Z | P[c] |
|---|---|---|---|---|---|---|---|
| 1986 & 1988[b] | 33 | 17 | 380.2 | 25.3% | 12.9 - 49.1% | - | - |
| 1989 & 1990 | 66 | 34 | 815.3 | 24.8% | 14.9 - 41.2% | 0.25 | >0.80 |

[a]Excluding nests damaged during nest search or observer influenced abandonment.

[b]Wetland construction and habitat improvements conducted in 1987: nest searching not conducted.

[c]Compared to previous set of years.

Table 5. Apparent duck nest densities [nests/100ha] on Ninepipe (removal) and Pablo (nonremoval) areas.

| Area | hectares | 1986 | 1987 | 1988 | 1989 | 1990 | Proportional Increase[a] |
|---|---|---|---|---|---|---|---|
| Sandsmark | 130 | 40 | 35 | 47 | 59 | 126 | 3.4 |
| Other WPAs | 40 | 15 | 8 | 17 | 37 | 68 | 5.9 |
| All WPAs | 170 | 32 | 30 | 40 | 52 | 111 | 3.6 |
| State WMA | 103 | - | 42 | 44 | 47 | 62 | 1.5 |
| All Removal | 273 | 32 | 35 | 42 | 52 | 91 | 2.7 |
| Pablo | 121 | 12 | - | 17 | 22 | 32 | 2.7 |

[a]$\bar{X}$ 1986-1987 vs 1990 except State WMA (1987 vs 1990) and Pablo (1986 vs 1990).

Pablo was 2.7x, comparable to the Ninepipe area as a whole. Because nest success was lower for mallards than other species during the baseline period, and because mallards are known to exhibit relatively high rates of homing by successful hens and female offspring, I expected any population increase attributable to improved nest success to be most obvious in the mallard. Apparent nest densities of mallards on the Ninepipe area increased 3.4x from 1986 to 1990, reaching a density of 24 nests per 100 ha during the final year of my study (Table 6). Mallard nests on the Pablo area increased substantially (4.4x) between 1986 and 1988, the first year of improved water and cover conditions, but then declined to 4.2 nests per 100-ha during 1990 (2.4x 1986 levels).

Mayfield nest densities at Ninepipe averaged 2.2x greater than apparent nest densities during 1986-1988 when nest success was relatively low (Fig. 2). That discrepancy narrowed to 1.3x during 1989-1990. Mayfield nest densities increased substantially (2.5x) during the study period, with most of the increase occurring between 1989 and 1990.

Table 6. Apparent density of mallard nests (nests/100ha) for Ninepipe (removal) and Pablo (nonremoval) areas.

| Area | hectares | 1986 | 1987 | 1988 | 1989 | 1990 | Proportional Increase[a] |
|---|---|---|---|---|---|---|---|
| Ninepipe | 273 | 7.1 | 6.7 | 14.6 | 16.5 | 24.4 | 3.4 |
| Pablo | 121 | 1.7 | - | 7.4 | 7.4 | 4.2 | 2.4 |

[a]1986 vs 1990.

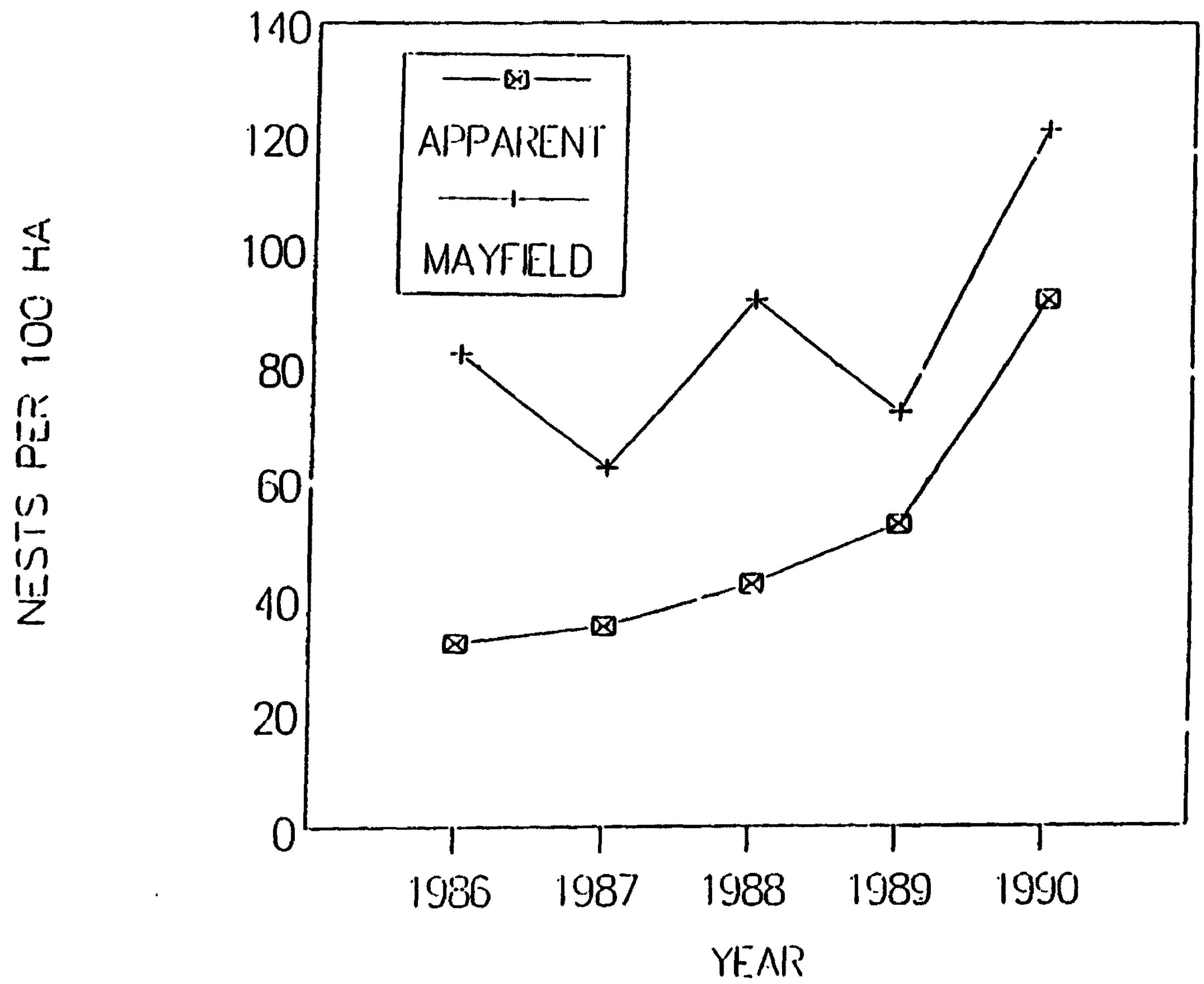


**Fig. 2. Mayfield versus apparent nest densities at Ninepipe (removal area).**

## Nesting Phenology

Mean date of nest initiation and hatch in mallards advanced progressively when nest success increased between 1988 and 1990 (Fig. 3), as predicted under the hypothesis that high rates of nest predation were a primary determinant of retarded hatching phenology. By 1990, mean initiation date was 16 days earlier and mean hatching date was 19 days earlier than during the baseline period. The overall range of initiation and hatch dates, in contrast, varied little between low nest success (baseline) years and high nest success years. Mean April temperatures were nominally higher in 1986-1988 ($\bar{X}$ = 8.6 C) than in 1989-1990 ($\bar{X}$ = 7.1 C).

## Vegetation Height-Density Measurements

Annual mean H-D measurements at duck nest sites at Ninepipe were consistently in the 2.5-2.6 dm range during the first 3 years of the study (Table 7). A nominal decline (to 2.4 dm) occurred in 1989; the 1.7 dm mean found during 1990 was the lowest of the 5-year period, and differed significantly from the 1986-1989 mean ($t$ = 6.4, df = 133, $P < 0.01$). Mean H-D values at Pablo increased between 1986 and 1988 as new nesting habitat was developed. During 1990, when nest success at Pablo was less than half found at Ninepipe, cover conditions at nest sites were substantially better at Pablo (3.0 vs 1.7 dm, $t$ = 6.3, df = 36, $P < 0.01$).

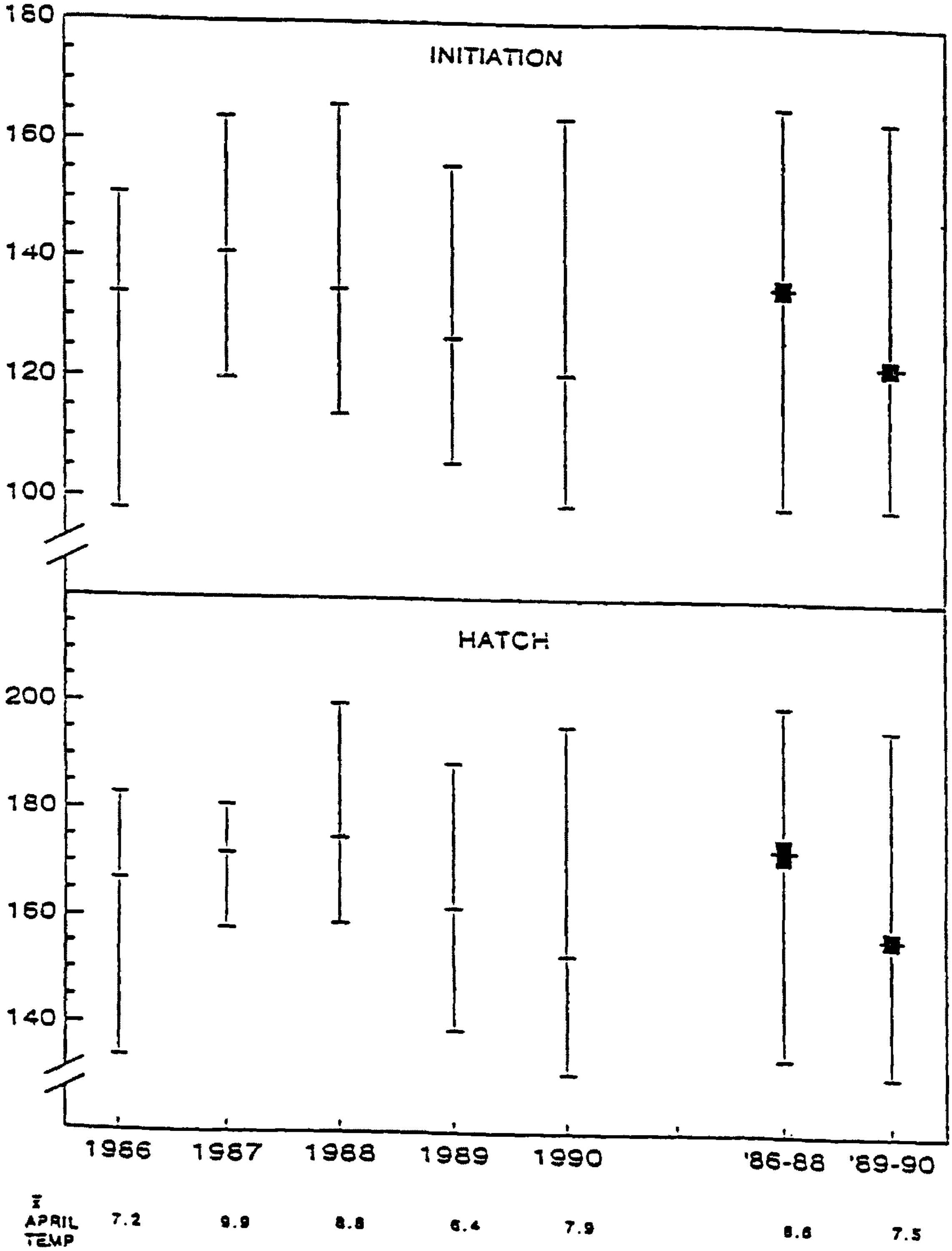


Fig. 3. Mallard nest phenology for the Ninepipe (removal) area, 1986 - 1990. Reported as range and mean for individual years, and as range, mean, and SE for grouped years. Mean April temperature in degrees centigrade, from NOAA reports.

Table 7. Vegetation Height-Density at duck nest sites during 1986 through 1990 at Ninepipe and Pablo.

| | Ninepipe Area | | Pablo Area | |
|---|---|---|---|---|
| Year | Mean Nest | SE | Mean Nest | SE |
| 1986 | 2.5 | 0.14 | 2.0 | 0.26 |
| 1987 | 2.5 | 0.11 | ---[a] | --- |
| 1988 | 2.6 | 0.11 | 3.1 | 0.28 |
| 1989 | 2.4 | 0.10 | 3.8 | 0.22 |
| 1990 | 1.7 | 0.05 | 3.0 | 0.20 |
| 1989-90 | 2.0 | 0.05 | 3.3 | 0.15 |

[a]Pablo not searched in 1987 because of management activities to improve nesting cover and wetland conditions.

Mean H-D of vegetation at nest sites (measured when each nest was found) was nominally higher for hatched nests than for destroyed nests during each of the 5 years of study, but the difference was significant only in 1987 and 1990 (Student's *t*-test, $P < 0.05$, Table 8).

## Wetland Conditions

Wetland conditions at Ninepipe varied from excellent in 1986, to extremely dry in 1988, to good in 1990 (Table 9). Although water levels in the summer of 1990 were nearly equal to those in 1986, wetland recharge in 1990 occurred during heavy rains in late May and early June. This was well after settling of pairs had occurred in most species, and peak of nest initiation in some species. Longtime residents of the study area reported that several of the basins that were dry in 1988 had not been dry in the previous 20-30 years.

Table 8. Vegetation Height-Density means, t values, degrees of freedom, and probability values for hatched and destroyed nests found at Ninepipe, 1986-1990.

| Year | $\bar{X}$ Height-Density | | t[a] | DF | P |
|---|---|---|---|---|---|
| | Hatch | Destroyed | | | |
| 1986 | 2.8 | 2.4 | 1.28 | 21 | >0.20 |
| 1987 | 2.7 | 2.2 | 2.50 | 37 | <0.02 |
| 1988 | 2.7 | 2.5 | 0.70 | 47 | >0.30 |
| 1989 | 2.4 | 2.3 | 0.38 | 51 | >0.50 |
| 1990 | 1.8 | 1.5 | 2.50 | 50 | <0.02 |

[a]Student's t-test.

Table 9. Wetland conditions in the Ninepipe area during 1986 - 1990, ranked from wet to dry.

| Year | Rank (Wet to Dry) | Percent Basins With Water in Mid-July[a] | Jan - June Precipitation Deviation[b] | Comments |
|---|---|---|---|---|
| 1986 | 1 | 100 | +18 | Heavy precipitation in late winter and early spring. Nearly all basins full, and considerable sheet water present in April. |
| 1990 | 2 | 95 | - 4 | Conditions moderately dry in April but heavy rains in late May and June recharged nearly all basins. |
| 1989 | 3 | 61 | + 2 | Above average precipitation during late winter, but below average precipitation during April-June. |
| 1987 | 4 | -[c] | -14 | Only March and May received average or above average precipitation, but due to the excellent conditions during 1986, wetland levels were similar to 1989. |
| 1988 | 5 | 32 | -15 | Many basins dry in April and only the deepest basins or those fed by irrigation water remained wet during July. |

[a]From United States Agricultural Stabilization and Conservation Service cropland aerial photos, using 1986 as 100%.

[b]Percent change from 30-year mean for January-June.

[c]Comparable photography not available for 1987.

## DISCUSSION

My study was a combination of description, experimentation, and management. As such, it is difficult to "prove" the effects of skunk removal on nest success. However, by examining events at Ninepipe versus Pablo, trends in vegetation density, and changes in wetland conditions, I believe a strong case can be made that skunk removal was primarily responsible for increased nest success at Ninepipe.

Duck nest success for all species on the Ninepipe area remained unchanged during the 2 baseline years and the first year of skunk removal, when 109 skunks were removed. Plausible explanations of this result include a late start in trapping during 1988, rapid replacement of removals by skunks from surrounding areas, lack of adequate trap densities in key nesting areas, and drought conditions during 1988. The occurrence of a 1-year lag time between the start of predator removal and a response in nest success has been reported elsewhere (Balser et al. 1968, Chesness et al. 1968, Duebbert and Lokemoen 1980). When predator densities are high enough (biologically, economically, and socially) to make a removal program feasible, a full trapping season may be needed to reduce numbers sufficiently to make a detectable difference. Also, the trapping operation itself involved a learning process of how, where, and when to trap.

The increase in overall nest success was dramatic during 1989 and 1990 as skunk densities were reduced. Even more striking was the change in mallard nest success and the increase in nest densities that followed. Mallard nest densities more than tripled from baseline to 1990, as would be expected after high nest success during 1989 and the increasing number of successful hens and offspring homing to the area (Lokemoen et al. 1990). This trend of increasing nest densities should continue as long as nest success remains high and populations are below the carrying capacity of the habitat (primarily, the area of spring surface water [Patterson 1976]).

Nest success on the Pablo area did not change during this same time period. One problem encountered at Pablo was difficulty in obtaining adequate sample sizes of nests to compute annual estimates of Mayfield nest success. However, I felt justified in combining years because examination of the data provided no hint of any change. Low initial nest densities at Pablo probably reflected both high predation rates and low habitat quality of wetlands and uplands. The habitat improvements accomplished at Pablo in 1988 may have caused an increase in numbers of pairs and nests, but apparently did not promote an increase in nest success. Hence, if one accepts that low nest success is a primary proximate cause of low populations, the prediction would be that the increases in nest density at Pablo should be short-lived. The apparent decline in mallard nest densities at Pablo in 1990 may support that prediction, but additional years of study are needed.

As predicted, nest initiation and hatching by mallards advanced when nest success increased. Nesting phenology of dabbling ducks is known to be partly a function of spring temperatures (Sowls 1955, Evans and Black 1956). However, the pattern observed at Ninepipe, lower mean temperatures during 1989 and 1990, was the opposite expected if April temperatures had been the primary determinant. Furthermore, although water conditions were good in both 1986 and 1990, the late arrival of water in 1990 should have retarded nest initiation, if it had any impact at all. Although average initiation and hatch dates advanced more than 2 weeks, the range of dates recorded changed little between baseline and high nest success years. I conclude that most of the change was the simple result of reduced early nest loss and the resultant decrease in the amount of renesting. The primary benefit of increased nest success to recruitment and production is obvious, but several other benefits also may be important. The probability of the hen being killed by a predator during incubation is reduced (Sargeant et al. 1984), the physiological stress of renesting declines, and molting can occur well before migration or wintering increases energy demands. In addition, clutch size is highest early in the season (Dzubin and Gollop 1972, Batt 1979, Cowardin et al. 1985, Lokemoen et al. 1990), and early-hatched broods commonly survive at a higher rate than late-hatched broods (Dzubin and Gollop 1972, Ringelman and Longcore 1982, Orthmeyer and Ball 1990).

Morrison et al. (1992:42) stated: "No single factor has been a greater cause of declines in wildlife populations than the loss of habitat." Indeed, the idea that quality of habitat is central to maintaining wildlife populations is arguably the most well-accepted idea in wildlife biology and management. Nevertheless, the results of my study do not support the idea that cover quality at the nest site (as measured by H-D) was a primary determinant of nest success. Although H-D was always higher for successful nests than unsuccessful nests, only during 1987 (high H-D for both successful and unsuccessful nests, yet low overall nest success) and 1990 (lowest annual H-D values of the study, yet highest nest success) were the differences statistically significant. Nest success at Ninepipe was highest in 1990 when H-D measurements at the nest were relatively low, and nest success was higher at Ninepipe than Pablo during 1989-1990 in spite of higher H-D at Pablo. Furthermore, if nesting cover was a key limiting factor for nest success, then improvement of nesting cover at Pablo should have resulted in increased nest success, which it did not. Clark and Nudds (1992) concluded that when mammals or both mammals and birds were the primary nest predators in an area, vegetation density (at the nest) was not an important determinant of nest success. Black-billed magpies (*Pica pica*) and common ravens (*Corvus corax*) were common in the Mission Valley, and were known to depredate some nests each year. Predation by these two species may explain some of the relationships between cover density and nest success, as may increasing nest success as the season progresses. Whatever the cause, however, the overall role of vegetation H-D at the nest site appeared to be minimal.

The decline in H-D at Ninepipe during 1990 may have resulted from several factors, including early nesting phenology and increasing stand decadence in some fields.

Although density of skunks at Ninepipe declined markedly during the removal period, as indicated by the decline in trap success and rare observations of skunks on the study area, the possibility that the decline occurred for reasons other than the trapping effort cannot be discounted entirely. However, subjective observations of skunk densities at Pablo (12-km north), Missoula (100-km south), and limited trapping at Blasdel Waterfowl Production Area (100-km north) and Lee Metcalf NWR (140-km south) indicated that skunk populations in much of the surrounding region remained high through 1990.

Among the potential alternative explanations to skunk removal as a cause for increased nest success at Ninepipe, changes in microtine populations as buffer prey is probably the most plausible. Byers (1974) and Weller (1979) reported that waterfowl nest success and small mammal populations were positively correlated. I did not study small mammal densities and hence cannot rigorously evaluate any effect. However, several lines of evidence tend to discount microtine cycles as a primary determinant of changes in nest success. Periodicity of microtine cycles is typically 2 to 5 years (Jones et al. 1983, Jones and Birney 1988), so the 1986-1990 period should have encompassed at least one full cycle. Voles (*Microtus montanus*) were seen commonly during field work in both 1986 and 1990 at both Ninepipe and Pablo. Thus the supposed effect (high nest success) apparently was absent at both Ninepipe and Pablo when the potential cause, high vole populations (subjectively evaluated), was present. Similarly, nest success remained low at Pablo in 1990 when vole populations were high there (as well as throughout much of western Montana). I conclude that variation in microtine populations is implausible as a primary cause of the observed change in nest success at Ninepipe. However, I also urge that long-term monitoring of vole populations be conducted as part of ongoing wildlife research and management programs in the Valley.

The strong positive influence of intensive, broad-spectrum predator control on productivity of ducks is well established (Balser et al. 1968, Duebbert and Kantrud 1974, Duebbert and Lokemoen 1980). However, both ecological considerations and demands by some segments of the public dictate that any manipulation of predator populations be limited to the minimum necessary to obtain the desired result or, perhaps, to those predator species existing at unnaturally high densities because of commensal relationships with humans. Greenwood (1986) found that removing skunks for one nesting season from WPA's in central North Dakota resulted in a 3-fold increase in nest success (5% to 15%) of upland nesting ducks. However, WPA's with active red fox dens or high densities of Franklin's ground squirrels (*Spermophilus franklinii*) failed to show an increase. Also, the positive influence of skunk removal on nest success did not continue into the following year (presumably because the relatively small areas were rapidly repopulated through immigration). On a proportional basis, the increase in nest success demonstrated by Greenwood was at least comparable to that occurring at Ninepipe. I attribute the much higher absolute response at Ninepipe to the absence of red fox and relatively low densities of other mammalian nest predators. Red fox are present in the Mission Valley within a few kilometers of the study area, but apparently are excluded from the largest blocks of uncultivated land by the presence of coyotes (Sargeant et al. 1987). The apparent residual effect of skunk removal from year to year, as evidenced by the declining skunk capture rates in my study, was probably a function of the large size of the removal area at Ninepipe compared to the removal areas in North Dakota (52-$km^2$ vs 10-$km^2$).

Predator removal programs are costly, and must be funded in addition to monies already allocated for habitat management. Total USFWS operation and management costs for the three WPA's were approximately $4,700 per year (B. West, National Bison Range, Pers. Commun.). At the levels of nest densities and nest success occurring during 1986-1988, this resulted in a cost of approximately $21.75 per duckling hatched. Annual trapping costs were approximately $3,000, but total cost per duckling declined to $8.75 by 1990. The annual cost per additional duckling hatched in 1990 was $4.52 (i.e., $3000/644 additional ducklings hatched). This interpretation of benefit could be considered somewhat liberal because the apparent 1-year lag in response and because the level of production attained in 1990 may not be sustainable (i.e. 1990 may have been an unusually good year). Alternatively, the 1990 results may be a somewhat conservative prediction of long-term benefits if:

1. benefits of reduced skunk populations extend beyond WPA boundaries and to ground-nesting birds other than ducks;

2. advanced nesting phenology and less renesting reduced physiological stress on hens or increased brood survival;

3. the breeding duck population continued to increase (until the wetland component of carrying capacity was saturated);

4. costs of the trapping program could be reduced by shortening the trapping period as the skunk population declined; or

5. low skunk populations could be stabilized at levels compatible with viable rates of nest success by removing anthropogenic den sites.

Lokemoen (1984) investigated the cost effectiveness of numerous management programs for duck production, and also found that predator management programs were considerably more cost effective than habitat management alone in the Prairie Pothole Region.

I maintain that the cost benefit figures reported here for skunk removal and duck production are encouraging and, quite likely, conservative. Nevertheless, long term success or failure in sustaining viable populations of ducks and other ground nesting birds in the Valley will hinge on broader issues. For instance, if current trends toward subdivision of the Valley for residential development continue, then problems with human commensal nest predators (both wild and domestic) will worsen. If coyote populations are lost, foxes, raccoons, and dogs will replace sustainable rates of nest predation with unsustainable rates.

Management Recommendations

1. Continue to remove skunks and monitor the density and success of duck nests for 2-4 more years (1992-1994) to allow continued high nest success and growth of the breeding duck population.

2. Begin to institute nonlethal skunk control by removing anthropogenic den sites.

3. Improve nest search techniques so that nests of other ground-nesting bird species can also be effectively located and monitored.

4. Continue to encourage the maintenance of coyote populations in the area and discourage the further establishment of a red fox population. Public education is a priority in this effort.

5. Irreversible degradation of the Valley through development and subdivision is the greatest long-term threat to the duck populations and biological integrity in general. All possible efforts should be made to protect the current land base through easements and purchase. These efforts should be concentrated around the Ninepipe area, where a large land base is already protected.

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**APPENDIX 1**

**Duck Nest Species Composition**

Species composition of duck nests found on Ninepipe (removal) area reported as total nests, (% of total nests found that year), and number hatch.

| Species | 1986 | 1987 | 1988 | 1989 | 1990 | Proportional Increase[a] |
|---|---|---|---|---|---|---|
| Mallard (*Anas platyrhynocs*) | 12 (21) 5 | 18 (21) 6 | 40 (35) 13 | 45 (32) 28 | 67 (26) 52 | 3.4 |
| Cinnamon Teal (*Anas cyanoptera*)[b] | 16 (29) 6 | 13 (15) 10 | 24 (21) 16 | 41 (29) 27 | 69 (27) 51 | 3.1 |
| Northern Shoveler (*Anas clypeata*) | 12 (21) 6 | 4 (5) 1 | 24 (21) 11 | 18 (13) 12 | 41 (16) 51 | 2.2 |
| Gadwall (*Anas strepera*) | 8 (14) 2 | 15 (18) 9 | 18 (16) 8 | 19 (14) 10 | 31 (12) 25 | 1.8 |
| American Green-winged Teal (*Anas crecca*) | 0 (0) 0 | 32 (38) 18 | 2 (2) 1 | 3 (2) 3 | 16 (6) 14 | 0.8 |
| American Wigeon (*Anas americana*) | 1 (2) 1 | 2 (2) 0 | 3 (3) 1 | 4 (3) 3 | 13 (5) 7 | 4.3 |
| Northern Pintail (*Anas acuta*) | 4 (7) 2 | 1 (1) 1 | 4 (3) 1 | 5 (4) 2 | 7 (3) 7 | 2.0 |
| Redhead (*Aythya americana*) | 2 (4) 0 | 1 (1) 1 | 0 (0) 0 | 2 (1) 1 | 9 (4) 6 | 5.0 |
| Lesser Scaup (*Aythya affinis*) | 1 (2) 0 | 0 (0) 0 | 0 (0) 0 | 2 (1) 1 | 0 (0) 0 | - |

[a] $\bar{x}_{1986\text{-}88}$ vs $\bar{x}_{1989\text{-}90}$.

[b] Includes approximately 20% Blue-winged Teal (*Anas discors*).

## APPENDIX 2

Nest Data for 1986 - 1990
(Field Number, Year, Species, Robel [H-D], Fate,
Initiation Date, and Exposure Days)

Key of terms used for nest data 1986 - 1990

Field Number:
1 - Hanging 80 of Sandsmark Waterfowl Production Area (searched 1986 - 1990)
2 - East DNC of Sandsmark Waterfowl Production Area (searched 1986 - 1990)
3 - West DNC of Sandsmark Waterfowl Production Area (searched 1986 - 1990)
4 - North DNC of Sandsmark Waterfowl Production Area (searched 1986 - 1990)

15 - Herak Waterfowl Production Area (searched 1986-1990)
16 - Montgomery Waterfowl Production Area (searched 1986-1990)

27 - Ninepipe Wildlife Management Area ( T20N, R20W, Sec 26, East of shelterbelt), searched 1987 - 1990
28 - Ninepipe Wildlife Management Area ( T20N, R20W, Sec 26, West of shelterbelt), searched 1987 - 1990

Species AOU #
132 - Mallard
135 - Gadwall
137 - American wigeon
139 - Green-winged teal
140 - Blue-winged and Cinnamon teal
142 - Northern Shoveler
143 - Northern pintail
146 - Redhead

Robel Average to the nearest 0.1 dm. Code 88.8 = no reading

Fate
1 - Successful
2 - Abandoned[a] (not due to observer influence)
3 - Destroyed (Predation)
5 - Unknown (still use exposure days)

Initiation Date: Estimated date of nest initiation in Julian days.

Exposure Days: The number of days, starting when the nest was found, that the nest was viable.

[a]Nests abandonded due to observer influence are not reported

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 1 | 86 | 140 | 1.1 | 3 | 125 | 15.8 |
| 1 | 86 | 140 | 1.9 | 3 | 146 | 16.5 |
| 1 | 86 | 142 | 2.3 | 1 | 131 | 9.0 |
| 1 | 86 | 142 | 1.3 | 1 | 128 | 5.0 |
| 1 | 86 | 142 | 1.9 | 1 | 120 | 28.0 |
| 2 | 86 | 132 | 4.0 | 3 | 147 | 6.4 |
| 2 | 86 | 132 | 2.6 | 3 | 126 | 3.5 |
| 2 | 86 | 132 | 4.1 | 1 | 129 | 4.0 |
| 2 | 86 | 132 | 1.6 | 3 | 124 | 4.5 |
| 2 | 86 | 135 | 2.7 | 1 | 137 | 13.0 |
| 2 | 86 | 135 | 2.6 | 3 | 152 | 6.4 |
| 2 | 86 | 135 | 2.3 | 3 | 155 | 6.4 |
| 2 | 86 | 137 | 3.6 | 1 | 135 | 8.0 |
| 2 | 86 | 140 | 3.3 | 3 | 158 | 6.4 |
| 2 | 86 | 140 | 3.5 | 1 | 142 | 16.0 |
| 2 | 86 | 140 | 2.0 | 3 | 123 | 14.4 |
| 2 | 86 | 142 | 4.7 | 1 | 143 | 12.0 |
| 2 | 86 | 142 | 1.0 | 3 | 108 | 11.5 |
| 2 | 86 | 142 | 2.9 | 1 | 150 | 26.0 |
| 2 | 86 | 142 | 3.4 | 1 | 151 | 25.0 |
| 2 | 86 | 142 | 2.6 | 3 | 143 | 6.4 |
| 2 | 86 | 142 | 2.7 | 3 | 143 | 6.4 |
| 2 | 86 | 143 | 1.6 | 3 | 110 | 12.0 |
| 2 | 86 | 143 | 3.7 | 1 | 158 | 30.0 |
| 2 | 86 | 146 | 5.0 | 3 | 131 | 2.5 |
| 3 | 86 | 132 | 3.5 | 2 | 150 | 15.5 |
| 3 | 86 | 132 | 1.7 | 1 | 97 | 7.0 |
| 3 | 86 | 132 | 1.5 | 3 | 114 | 4.0 |
| 3 | 86 | 132 | 1.6 | 3 | 124 | 4.0 |
| 3 | 86 | 132 | 3.5 | 3 | 146 | 14.0 |
| 3 | 86 | 135 | 2.9 | 3 | 143 | 15.5 |
| 3 | 86 | 135 | 2.7 | 3 | 151 | 5.0 |
| 3 | 86 | 135 | 2.7 | 3 | 149 | 24.5 |
| 3 | 86 | 135 | 3.7 | 1 | 151 | 29.0 |
| 3 | 86 | 140 | 3.1 | 1 | 148 | 25.0 |
| 3 | 86 | 140 | 1.7 | 3 | 122 | 4.5 |
| 3 | 86 | 140 | 1.3 | 3 | 114 | 4.5 |
| 3 | 86 | 140 | 4.4 | 3 | 151 | 17.0 |
| 3 | 86 | 142 | 1.1 | 3 | 120 | 4.5 |
| 3 | 86 | 146 | 88.8 | 3 | 140 | 5.0 |
| 3 | 86 | 149 | 3.0 | 3 | 152 | 24.0 |
| 4 | 86 | 132 | 1.7 | 1 | 144 | 20.0 |
| 4 | 86 | 132 | 4.3 | 1 | 147 | 22.0 |
| 4 | 86 | 135 | 3.0 | 3 | 151 | 7.0 |
| 4 | 86 | 140 | 2.0 | 1 | 133 | 16.0 |
| 4 | 86 | 140 | 2.8 | 3 | 143 | 7.0 |
| 4 | 86 | 140 | 1.6 | 3 | 120 | 14.8 |
| 4 | 86 | 142 | 2.7 | 3 | 128 | 3.0 |
| 4 | 86 | 143 | 1.9 | 3 | 126 | 27.5 |
| 4 | 86 | 143 | 1.9 | 1 | 137 | 14.0 |
| 15 | 86 | 142 | 1.1 | 3 | 124 | 3.0 |
| 16 | 86 | 132 | 2.7 | 1 | 146 | 18.0 |
| 16 | 86 | 140 | 2.6 | 1 | 134 | 6.0 |
| 16 | 86 | 140 | 1.9 | 1 | 142 | 16.0 |
| 16 | 86 | 140 | 1.9 | 3 | 153 | 18.0 |
| 16 | 86 | 140 | 1.1 | 1 | 121 | 27.0 |
| 1 | 87 | 132 | 1.6 | 3 | 123 | 6.0 |
| 1 | 87 | 132 | 2.4 | 3 | 139 | 5.5 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 1 | 87 | 132 | 2.4 | 3 | 133 | 5.5 |
| 1 | 87 | 135 | 1.9 | 3 | 137 | 5.5 |
| 1 | 87 | 140 | 1.9 | 1 | 145 | 27.0 |
| 1 | 87 | 142 | 2.1 | 1 | 130 | 12.0 |
| 1 | 87 | 142 | 2.1 | 1 | 135 | 16.0 |
| 1 | 87 | 142 | 2.2 | 2 | 144 | 17.0 |
| 1 | 87 | 142 | 2.0 | 1 | 122 | 4.0 |
| 2 | 87 | 132 | 4.2 | 1 | 139 | 18.0 |
| 2 | 87 | 132 | 3.8 | 3 | 151 | 6.5 |
| 2 | 87 | 132 | 2.0 | 3 | 123 | 5.0 |
| 2 | 87 | 132 | 2.4 | 3 | 147 | 7.0 |
| 2 | 87 | 132 | 4.2 | 3 | 148 | 7.0 |
| 2 | 87 | 132 | 2.4 | 1 | 146 | 26.0 |
| 2 | 87 | 135 | 2.6 | 1 | 145 | 26.0 |
| 2 | 87 | 135 | 3.5 | 1 | 133 | 11.0 |
| 2 | 87 | 140 | 3.6 | 1 | 130 | 8.0 |
| 2 | 87 | 140 | 3.0 | 1 | 145 | 24.0 |
| 2 | 87 | 140 | 2.6 | 1 | 147 | 26.0 |
| 2 | 87 | 140 | 2.9 | 1 | 147 | 26.0 |
| 2 | 87 | 140 | 88.8 | 1 | 136 | 15.0 |
| 2 | 87 | 142 | 3.1 | 1 | 138 | 16.0 |
| 2 | 87 | 142 | 1.9 | 3 | 114 | 15.0 |
| 2 | 87 | 142 | 3.6 | 1 | 144 | 20.0 |
| 2 | 87 | 142 | 2.0 | 1 | 124 | 2.0 |
| 2 | 87 | 142 | 1.0 | 3 | 121 | 5.0 |
| 2 | 87 | 142 | 2.2 | 1 | 117 | 25.0 |
| 2 | 87 | 142 | 2.5 | 1 | 150 | 29.0 |
| 2 | 87 | 143 | 3.2 | 1 | 126 | 2.0 |
| 2 | 87 | 143 | 2.0 | 3 | 124 | 5.5 |
| 3 | 87 | 132 | 3.1 | 1 | 145 | 27.0 |
| 3 | 87 | 132 | 5.0 | 3 | 144 | 6.0 |
| 3 | 87 | 132 | 1.5 | 1 | 123 | 6.0 |
| 3 | 87 | 135 | 4.4 | 1 | 131 | 13.0 |
| 3 | 87 | 137 | 2.8 | 3 | 146 | 3.5 |
| 3 | 87 | 140 | 1.9 | 3 | 121 | 23.5 |
| 3 | 87 | 140 | 1.9 | 3 | 122 | 5.5 |
| 3 | 87 | 142 | 5.5 | 1 | 127 | 8.0 |
| 3 | 87 | 143 | 3.6 | 3 | 142 | 6.0 |
| 4 | 87 | 132 | 3.5 | 1 | 144 | 22.0 |
| 4 | 87 | 132 | 2.5 | 3 | 119 | 6.5 |
| 4 | 87 | 140 | 2.4 | 1 | 128 | 8.0 |
| 4 | 87 | 140 | 2.2 | 1 | 127 | 8.0 |
| 4 | 87 | 140 | 0.5 | 3 | 147 | 7.0 |
| 4 | 87 | 143 | 1.9 | 3 | 146 | 3.5 |
| 16 | 87 | 140 | 2.5 | 3 | 115 | 4.0 |
| 16 | 87 | 140 | 2.0 | 3 | 121 | 4.0 |
| 16 | 87 | 140 | 2.3 | 3 | 129 | 4.0 |
| 27 | 87 | 132 | 2.8 | 3 | 150 | 6.0 |
| 27 | 87 | 132 | 4.5 | 3 | 157 | 18.5 |
| 27 | 87 | 132 | 2.9 | 1 | 134 | 2.0 |
| 27 | 87 | 135 | 88.8 | 3 | 124 | 6.0 |
| 27 | 87 | 135 | 2.1 | 1 | 144 | 17.0 |
| 27 | 87 | 135 | 2.0 | 1 | 150 | 21.0 |
| 27 | 87 | 135 | 1.9 | 3 | 156 | 6.0 |
| 27 | 87 | 137 | 1.2 | 3 | 153 | 6.0 |
| 27 | 87 | 140 | 1.0 | 3 | 159 | 5.5 |
| 27 | 87 | 140 | 1.4 | 3 | 156 | 17.5 |
| 27 | 87 | 140 | 88.8 | 3 | 159 | 19.0 |
| 27 | 87 | 140 | 1.1 | 1 | 156 | 27.0 |
| 27 | 87 | 140 | 1.4 | 3 | 143 | 5.5 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 27 | 87 | 140 | 1.2 | 1 | 146 | 16.0 |
| 27 | 87 | 140 | 1.6 | 1 | 152 | 20.0 |
| 27 | 87 | 140 | 2.0 | 3 | 151 | 5.5 |
| 28 | 87 | 132 | 2.2 | 3 | 163 | 5.0 |
| 28 | 87 | 135 | 2.4 | 3 | 167 | 4.5 |
| 28 | 87 | 135 | 3.4 | 1 | 149 | 17.0 |
| 28 | 87 | 135 | 2.6 | 3 | 170 | 22.5 |
| 28 | 87 | 135 | 2.5 | 3 | 152 | 14.5 |
| 28 | 87 | 135 | 3.9 | 1 | 158 | 19.0 |
| 28 | 87 | 135 | 3.6 | 1 | 126 | 17.0 |
| 28 | 87 | 135 | 3.6 | 1 | 155 | 21.0 |
| 28 | 87 | 140 | 0.9 | 3 | 161 | 14.5 |
| 28 | 87 | 140 | 2.2 | 1 | 161 | 20.0 |
| 28 | 87 | 140 | 2.2 | 1 | 161 | 27.0 |
| 28 | 87 | 140 | 4.5 | 1 | 145 | 2.0 |
| 28 | 87 | 140 | 1.8 | 1 | 163 | 29.0 |
| 28 | 87 | 140 | 1.4 | 3 | 161 | 14.5 |
| 28 | 87 | 140 | 2.2 | 1 | 151 | 14.0 |
| 28 | 87 | 140 | 1.5 | 3 | 165 | 16.0 |
| 28 | 87 | 140 | 2.6 | 1 | 153 | 16.0 |
| 28 | 87 | 140 | 1.6 | 1 | 139 | 6.0 |
| 28 | 87 | 142 | 2.0 | 1 | 141 | 7.0 |
| 28 | 87 | 146 | 4.0 | 1 | 144 | 8.0 |
| 1 | 88 | 132 | 4.3 | 1 | 138 | 6.0 |
| 1 | 88 | 132 | 1.9 | 3 | 124 | 5.5 |
| 1 | 88 | 132 | 4.3 | 3 | 142 | 3.5 |
| 1 | 88 | 132 | 5.5 | 1 | 136 | 4.0 |
| 1 | 88 | 132 | 3.3 | 1 | 138 | 7.0 |
| 1 | 88 | 140 | 1.9 | 1 | 133 | 1.0 |
| 1 | 88 | 140 | 1.7 | 1 | 132 | 1.0 |
| 1 | 88 | 142 | 2.6 | 3 | 145 | 6.0 |
| 1 | 88 | 142 | 1.0 | 1 | 129 | 33.0 |
| 1 | 88 | 142 | 1.5 | 1 | 143 | 8.0 |
| 1 | 88 | 143 | 0.5 | 3 | 125 | 5.0 |
| 2 | 88 | 132 | 2.1 | 3 | 129 | 4.5 |
| 2 | 88 | 132 | 2.1 | 3 | 131 | 4.5 |
| 2 | 88 | 132 | 3.0 | 1 | 143 | 4.0 |
| 2 | 88 | 132 | 2.4 | 3 | 131 | 16.8 |
| 2 | 88 | 132 | 88.8 | 5 | 125 | 10.0 |
| 2 | 88 | 132 | 4.0 | 3 | 127 | 16.8 |
| 2 | 88 | 132 | 3.5 | 3 | 122 | 14.8 |
| 2 | 88 | 132 | 1.9 | 3 | 122 | 5.0 |
| 2 | 88 | 132 | 2.0 | 3 | 155 | 6.4 |
| 2 | 88 | 132 | 2.1 | 3 | 130 | 4.5 |
| 2 | 88 | 132 | 2.9 | 1 | 146 | 7.0 |
| 2 | 88 | 132 | 3.0 | 3 | 127 | 15.8 |
| 2 | 88 | 132 | 4.7 | 3 | 157 | 6.0 |
| 2 | 88 | 132 | 3.9 | 1 | 146 | 7.0 |
| 2 | 88 | 135 | 5.3 | 1 | 145 | 6.0 |
| 2 | 88 | 135 | 2.0 | 1 | 149 | 9.0 |
| 2 | 88 | 135 | 4.7 | 3 | 157 | 6.0 |
| 2 | 88 | 135 | 3.5 | 1 | 142 | 6.0 |
| 2 | 88 | 140 | 1.6 | 1 | 110 | 10.0 |
| 2 | 88 | 140 | 4.1 | 3 | 163 | 6.0 |
| 2 | 88 | 142 | 3.6 | 3 | 144 | 2.0 |
| 2 | 88 | 142 | 1.5 | 3 | 112 | 5.0 |
| 2 | 88 | 142 | 1.5 | 3 | 123 | 17.0 |
| 2 | 88 | 142 | 1.4 | 3 | 115 | 12.5 |
| 2 | 88 | 142 | 1.9 | 3 | 125 | 4.5 |
| 2 | 88 | 142 | 2.1 | 1 | 109 | 10.0 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 2 | 88 | 143 | 1.9 | 3 | 128 | 4.5 |
| 2 | 88 | 143 | 1.6 | 1 | 113 | 11.0 |
| 2 | 88 | 143 | 2.4 | 3 | 131 | 4.5 |
| 3 | 88 | 132 | 3.4 | 1 | 153 | 20.0 |
| 3 | 88 | 132 | 1.7 | 3 | 124 | 18.6 |
| 3 | 88 | 132 | 4.3 | 1 | 143 | 10.0 |
| 3 | 88 | 135 | 3.4 | 1 | 150 | 19.0 |
| 3 | 88 | 135 | 4.5 | 1 | 153 | 21.0 |
| 3 | 88 | 135 | 3.1 | 3 | 157 | 8.4 |
| 3 | 88 | 135 | 3.3 | 1 | 159 | 27.0 |
| 3 | 88 | 135 | 4.5 | 3 | 149 | 6.8 |
| 3 | 88 | 140 | 2.6 | 1 | 140 | 8.0 |
| 3 | 88 | 140 | 2.5 | 1 | 142 | 12.0 |
| 3 | 88 | 142 | 0.6 | 3 | 115 | 15.0 |
| 3 | 88 | 142 | 1.7 | 3 | 129 | 18.0 |
| 4 | 88 | 132 | 1.6 | 1 | 165 | 28.0 |
| 4 | 88 | 135 | 88.8 | 3 | 126 | 14.2 |
| 4 | 88 | 140 | 2.4 | 3 | 126 | 4.0 |
| 4 | 88 | 140 | 1.7 | 1 | 122 | 24.0 |
| 4 | 88 | 140 | 1.4 | 1 | 117 | 20.0 |
| 4 | 88 | 140 | 1.7 | 1 | 144 | 4.0 |
| 4 | 88 | 140 | 2.6 | 3 | 124 | 15.2 |
| 4 | 88 | 142 | 88.8 | 1 | 106 | 8.0 |
| 4 | 88 | 142 | 88.8 | 1 | 115 | 16.0 |
| 4 | 88 | 142 | 1.1 | 1 | 113 | 16.0 |
| 15 | 88 | 132 | 2.1 | 3 | 127 | 7.6 |
| 15 | 88 | 132 | 0.6 | 3 | 164 | 6.4 |
| 15 | 88 | 140 | 2.7 | 1 | 154 | 18.0 |
| 15 | 88 | 142 | 2.3 | 3 | 133 | 7.6 |
| 16 | 88 | 132 | 2.5 | 3 | 128 | 7.2 |
| 16 | 88 | 140 | 1.7 | 1 | 131 | 29.0 |
| 16 | 88 | 140 | 1.1 | 1 | 145 | 5.0 |
| 27 | 88 | 132 | 4.6 | 3 | 126 | 4.5 |
| 27 | 88 | 132 | 3.5 | 1 | 134 | 31.0 |
| 27 | 88 | 132 | 0.8 | 3 | 120 | 7.0 |
| 27 | 88 | 132 | 3.1 | 3 | 136 | 13.0 |
| 27 | 88 | 132 | 5.0 | 3 | 113 | 3.0 |
| 27 | 88 | 132 | 4.0 | 3 | 132 | 21.0 |
| 27 | 88 | 132 | 2.3 | 3 | 130 | 22.0 |
| 27 | 88 | 132 | 3.9 | 1 | 137 | 34.0 |
| 27 | 88 | 132 | 4.7 | 3 | 133 | 6.0 |
| 27 | 88 | 132 | 3.5 | 3 | 125 | 4.5 |
| 27 | 88 | 132 | 2.0 | 3 | 133 | 13.0 |
| 27 | 88 | 135 | 2.6 | 3 | 163 | 6.0 |
| 27 | 88 | 135 | 1.6 | 3 | 152 | 4.5 |
| 27 | 88 | 137 | 4.9 | 1 | 166 | 23.0 |
| 27 | 88 | 139 | 2.9 | 3 | 136 | 11.0 |
| 27 | 88 | 140 | 3.0 | 1 | 131 | 25.0 |
| 27 | 88 | 140 | 3.0 | 1 | 125 | 20.0 |
| 27 | 88 | 140 | 1.5 | 3 | 132 | 20.5 |
| 27 | 88 | 140 | 3.1 | 3 | 129 | 6.0 |
| 27 | 88 | 140 | 1.9 | 3 | 136 | 6.0 |
| 27 | 88 | 140 | 0.9 | 1 | 166 | 20.0 |
| 27 | 88 | 140 | 1.5 | 3 | 166 | 13.0 |
| 27 | 88 | 142 | 2.4 | 1 | 129 | 25.0 |
| 27 | 88 | 142 | 3.1 | 1 | 121 | 18.0 |
| 27 | 88 | 142 | 1.3 | 3 | 161 | 6.0 |
| 27 | 88 | 142 | 1.5 | 3 | 130 | 21.5 |
| 27 | 88 | 142 | 2.4 | 1 | 127 | 23.0 |
| 28 | 88 | 132 | 3.3 | 1 | 131 | 22.0 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 28 | 88 | 132 | 3.6 | 1 | 124 | 16.0 |
| 28 | 88 | 132 | 3.5 | 3 | 127 | 6.0 |
| 28 | 88 | 135 | 4.0 | 3 | 173 | 21.5 |
| 28 | 88 | 135 | 2.4 | 1 | 157 | 11.0 |
| 28 | 88 | 135 | 4.9 | 1 | 162 | 6.0 |
| 28 | 88 | 135 | 2.3 | 3 | 175 | 21.5 |
| 28 | 88 | 135 | 3.9 | 3 | 172 | 4.0 |
| 28 | 88 | 135 | 2.5 | 3 | 134 | 7.0 |
| 28 | 88 | 137 | 88.8 | 3 | 137 | 6.8 |
| 28 | 88 | 137 | 2.9 | 3 | 134 | 18.0 |
| 28 | 88 | 139 | 1.7 | 1 | 165 | 6.0 |
| 28 | 88 | 140 | 1.5 | 3 | 122 | 5.0 |
| 28 | 88 | 140 | 0.9 | 1 | 132 | 25.0 |
| 28 | 88 | 140 | 1.3 | 3 | 130 | 7.0 |
| 28 | 88 | 142 | 1.5 | 3 | 128 | 16.0 |
| 28 | 88 | 142 | 1.1 | 3 | 125 | 6.0 |
| 28 | 88 | 142 | 2.0 | 1 | 165 | 12.0 |
| 28 | 88 | 142 | 1.0 | 1 | 140 | 33.0 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 1 | 89 | 132 | 4.6 | 2 | 140 | 6.5 |
| 1 | 89 | 135 | 2.6 | 1 | 150 | 26.0 |
| 1 | 89 | 140 | 1.2 | 3 | 117 | 15.4 |
| 1 | 89 | 140 | 3.0 | 1 | 126 | 1.0 |
| 1 | 89 | 140 | 2.4 | 5 | 145 | 13.0 |
| 1 | 89 | 140 | 2.0 | 1 | 141 | 18.0 |
| 1 | 89 | 142 | 1.1 | 1 | 105 | 14.0 |
| 2 | 89 | 132 | 1.2 | 3 | 120 | 7.0 |
| 2 | 89 | 132 | 4.0 | 1 | 137 | 7.0 |
| 2 | 89 | 132 | 3.0 | 1 | 155 | 24.0 |
| 2 | 89 | 132 | 4.2 | 1 | 136 | 6.0 |
| 2 | 89 | 132 | 1.6 | 3 | 125 | 4.0 |
| 2 | 89 | 132 | 1.4 | 1 | 117 | 24.0 |
| 2 | 89 | 132 | 88.8 | 1 | 132 | 30.0 |
| 2 | 89 | 132 | 3.2 | 1 | 134 | 6.0 |
| 2 | 89 | 132 | 4.2 | 1 | 150 | 20.0 |
| 2 | 89 | 132 | 2.2 | 1 | 123 | 30.0 |
| 2 | 89 | 132 | 2.5 | 3 | 121 | 13.5 |
| 2 | 89 | 132 | 3.0 | 1 | 139 | 10.0 |
| 2 | 89 | 132 | 4.0 | 3 | 146 | 14.5 |
| 2 | 89 | 132 | 4.1 | 1 | 139 | 7.0 |
| 2 | 89 | 132 | 2.2 | 1 | 115 | 20.0 |
| 2 | 89 | 135 | 3.8 | 1 | 149 | 19.0 |
| 2 | 89 | 135 | 3.8 | 1 | 163 | 34.0 |
| 2 | 89 | 135 | 4.4 | 1 | 159 | 31.0 |
| 2 | 89 | 137 | 3.8 | 1 | 156 | 25.0 |
| 2 | 89 | 140 | 1.5 | 1 | 121 | 25.0 |
| 2 | 89 | 140 | 2.8 | 1 | 144 | 14.0 |
| 2 | 89 | 140 | 3.1 | 1 | 141 | 12.0 |
| 2 | 89 | 140 | 2.5 | 1 | 134 | 4.0 |
| 2 | 89 | 140 | 2.9 | 1 | 136 | 2.0 |
| 2 | 89 | 140 | 2.7 | 3 | 124 | 3.5 |
| 2 | 89 | 142 | 1.6 | 1 | 123 | 27.0 |
| 2 | 89 | 142 | 1.5 | 5 | 121 | 20.0 |
| 2 | 89 | 142 | 1.4 | 1 | 119 | 23.0 |
| 2 | 89 | 142 | 1.5 | 1 | 120 | 24.0 |
| 2 | 89 | 142 | 1.0 | 1 | 119 | 25.0 |
| 2 | 89 | 142 | 1.4 | 1 | 121 | 27.0 |
| 2 | 89 | 143 | 1.5 | 1 | 122 | 27.0 |
| 2 | 89 | 143 | 3.0 | 3 | 142 | 4.0 |
| 2 | 89 | 143 | 3.8 | 1 | 145 | 12.0 |
| 2 | 89 | 143 | 0.9 | 3 | 126 | 1.0 |
| 2 | 89 | 146 | 3.4 | 1 | 156 | 27.0 |
| 3 | 89 | 132 | 1.9 | 1 | 147 | 27.0 |
| 3 | 89 | 132 | 88.8 | 3 | 128 | 4.5 |
| 3 | 89 | 132 | 1.0 | 3 | 117 | 14.4 |
| 3 | 89 | 132 | 3.9 | 1 | 144 | 22.0 |
| 3 | 89 | 132 | 2.8 | 1 | 131 | 10.0 |
| 3 | 89 | 132 | 3.0 | 1 | 126 | 8.0 |
| 3 | 89 | 132 | 2.5 | 3 | 118 | 4.5 |
| 3 | 89 | 132 | 1.8 | 3 | 120 | 4.0 |
| 3 | 89 | 132 | 2.5 | 1 | 124 | 4.0 |
| 3 | 89 | 132 | 2.4 | 1 | 119 | 28.0 |
| 3 | 89 | 132 | 3.4 | 1 | 138 | 20.0 |
| 3 | 89 | 135 | 2.4 | 3 | 140 | 7.6 |
| 3 | 89 | 135 | 2.5 | 1 | 141 | 23.0 |
| 3 | 89 | 135 | 2.9 | 1 | 133 | 17.0 |
| 3 | 89 | 135 | 1.9 | 1 | 143 | 25.0 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 3 | 89 | 140 | 2.8 | 1 | 122 | 4.0 |
| 3 | 89 | 140 | 2.0 | 1 | 127 | 8.0 |
| 3 | 89 | 140 | 88.8 | 1 | 124 | 24.0 |
| 3 | 89 | 142 | 1.9 | 1 | 120 | 28.0 |
| 3 | 89 | 142 | 1.6 | 3 | 124 | 4.0 |
| 4 | 89 | 135 | 3.4 | 3 | 140 | 11.0 |
| 4 | 89 | 135 | 6.1 | 3 | 146 | 14.5 |
| 4 | 89 | 137 | 3.4 | 1 | 155 | 25.0 |
| 4 | 89 | 140 | 2.2 | 1 | 152 | 20.0 |
| 4 | 89 | 140 | 2.6 | 1 | 140 | 10.0 |
| 4 | 89 | 140 | 0.7 | 1 | 117 | 25.0 |
| 4 | 89 | 140 | 2.5 | 3 | 142 | 4.5 |
| 4 | 89 | 140 | 2.9 | 3 | 157 | 7.0 |
| 4 | 89 | 140 | 2.1 | 1 | 131 | 4.0 |
| 4 | 89 | 142 | 1.1 | 3 | 121 | 4.0 |
| 4 | 89 | 142 | 0.8 | 1 | 115 | 23.0 |
| 4 | 89 | 142 | 1.1 | 1 | 138 | 4.0 |
| 4 | 89 | 142 | 88.8 | 1 | 123 | 23.0 |
| 15 | 89 | 132 | 2.5 | 1 | 124 | 28.0 |
| 15 | 89 | 132 | 2.1 | 1 | 112 | 18.0 |
| 15 | 89 | 135 | 2.4 | 3 | 158 | 13.5 |
| 15 | 89 | 140 | 2.1 | 1 | 128 | 31.0 |
| 15 | 89 | 140 | 1.4 | 3 | 128 | 16.5 |
| 15 | 89 | 140 | 1.8 | 3 | 129 | 5.0 |
| 16 | 89 | 140 | 2.0 | 2 | 148 | 21.0 |
| 16 | 89 | 140 | 1.6 | 3 | 129 | 14.5 |
| 16 | 89 | 140 | 1.5 | 3 | 123 | 4.5 |
| 16 | 89 | 140 | 1.1 | 3 | 122 | 14.5 |
| 16 | 89 | 140 | 1.5 | 3 | 141 | 19.5 |
| 16 | 89 | 140 | 1.0 | 1 | 138 | 20.0 |
| 16 | 89 | 140 | 1.9 | 1 | 149 | 31.0 |
| 16 | 89 | 140 | 2.1 | 1 | 148 | 30.0 |
| 16 | 89 | 142 | 1.6 | 3 | 126 | 14.5 |
| 27 | 89 | 132 | 1.8 | 1 | 106 | 10.0 |
| 27 | 89 | 132 | 2.6 | 1 | 112 | 14.0 |
| 27 | 89 | 132 | 2.6 | 3 | 117 | 6.0 |
| 27 | 89 | 132 | 1.4 | 3 | 120 | 16.0 |
| 27 | 89 | 132 | 1.1 | 3 | 129 | 27.0 |
| 27 | 89 | 132 | 1.9 | 3 | 125 | 6.5 |
| 27 | 89 | 132 | 2.1 | 3 | 126 | 18.0 |
| 27 | 89 | 132 | 2.1 | 1 | 110 | 12.0 |
| 27 | 89 | 132 | 2.5 | 1 | 107 | 10.0 |
| 27 | 89 | 132 | 2.1 | 1 | 105 | 6.0 |
| 27 | 89 | 132 | 3.2 | 3 | 125 | 19.0 |
| 27 | 89 | 135 | 2.0 | 1 | 146 | 10.0 |
| 27 | 89 | 135 | 2.3 | 3 | 165 | 17.5 |
| 27 | 89 | 135 | 88.8 | 1 | 135 | 27.0 |
| 27 | 89 | 135 | 3.0 | 3 | 152 | 6.0 |
| 27 | 89 | 137 | 5.0 | 3 | 151 | 14.0 |
| 27 | 89 | 137 | 2.8 | 1 | 139 | 6.0 |
| 27 | 89 | 139 | 1.4 | 1 | 125 | 24.0 |
| 27 | 89 | 140 | 1.0 | 1 | 126 | 27.0 |
| 27 | 89 | 140 | 2.0 | 1 | 128 | 29.0 |
| 27 | 89 | 140 | 2.5 | 1 | 151 | 16.0 |
| 27 | 89 | 140 | 1.9 | 1 | 159 | 25.0 |
| 27 | 89 | 140 | 1.9 | 3 | 126 | 6.5 |
| 27 | 89 | 140 | 2.2 | 1 | 141 | 4.0 |
| 27 | 89 | 140 | 1.2 | 1 | 128 | 29.0 |
| 27 | 89 | 140 | 2.5 | 1 | 140 | 4.0 |
| 27 | 89 | 142 | 1.2 | 1 | 129 | 29.0 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 27 | 89 | 142 | 2.4 | 3 | 115 | 6.5 |
| 27 | 89 | 142 | 1.2 | 3 | 119 | 15.0 |
| 27 | 89 | 143 | 2.8 | 3 | 144 | 5.0 |
| 27 | 89 | 146 | 1.9 | 3 | 130 | 6.5 |
| 27 | 89 | 149 | 5.8 | 3 | 153 | 6.5 |
| 27 | 89 | 149 | 3.4 | 1 | 153 | 18.0 |
| 28 | 89 | 132 | 2.0 | 1 | 122 | 24.0 |
| 28 | 89 | 132 | 2.5 | 1 | 137 | 32.0 |
| 28 | 89 | 132 | 3.0 | 3 | 117 | 9.5 |
| 28 | 89 | 132 | 88.8 | 3 | 123 | 5.0 |
| 28 | 89 | 132 | 5.0 | 1 | 144 | 7.0 |
| 28 | 89 | 135 | 2.5 | 1 | 165 | 27.0 |
| 28 | 89 | 135 | 3.9 | 3 | 155 | 14.0 |
| 28 | 89 | 135 | 5.5 | 3 | 167 | 17.0 |
| 28 | 89 | 135 | 0.7 | 3 | 129 | 11.2 |
| 28 | 89 | 139 | 3.2 | 1 | 160 | 18.0 |
| 28 | 89 | 139 | 88.8 | 1 | 124 | 16.0 |
| 28 | 89 | 140 | 1.2 | 3 | 166 | 18.0 |
| 28 | 89 | 140 | 1.0 | 1 | 136 | 30.0 |
| 28 | 89 | 140 | 1.2 | 3 | 125 | 19.0 |
| 28 | 89 | 140 | 1.2 | 1 | 134 | 33.0 |
| 28 | 89 | 142 | 1.5 | 3 | 128 | 17.5 |
| 28 | 89 | 142 | 1.8 | 1 | 152 | 10.0 |
| 1 | 90 | 132 | 2.9 | 1 | 141 | 10.0 |
| 1 | 90 | 132 | 1.9 | 1 | 150 | 20.0 |
| 1 | 90 | 132 | 1.0 | 3 | 120 | 17.2 |
| 1 | 90 | 132 | 1.5 | 3 | 123 | 18.8 |
| 1 | 90 | 132 | 1.4 | 1 | 109 | 20.0 |
| 1 | 90 | 132 | 1.8 | 1 | 113 | 20.0 |
| 1 | 90 | 132 | 1.8 | 1 | 113 | 22.0 |
| 1 | 90 | 135 | 2.1 | 1 | 154 | 24.0 |
| 1 | 90 | 135 | 1.8 | 1 | 158 | 28.0 |
| 1 | 90 | 135 | 2.3 | 1 | 154 | 21.0 |
| 1 | 90 | 140 | 1.9 | 1 | 142 | 9.0 |
| 1 | 90 | 140 | 1.6 | 2 | 113 | 15.0 |
| 1 | 90 | 140 | 3.3 | 1 | 157 | 25.0 |
| 1 | 90 | 140 | 2.3 | 1 | 119 | 27.0 |
| 1 | 90 | 140 | 2.3 | 1 | 156 | 27.0 |
| 1 | 90 | 140 | 1.4 | 1 | 157 | 28.0 |
| 1 | 90 | 140 | 2.3 | 3 | 117 | 5.5 |
| 1 | 90 | 140 | 1.1 | 1 | 115 | 20.0 |
| 1 | 90 | 140 | 1.4 | 1 | 160 | 29.0 |
| 1 | 90 | 140 | 1.3 | 3 | 121 | 18.6 |
| 1 | 90 | 142 | 1.1 | 3 | 122 | 19.0 |
| 1 | 90 | 142 | 1.3 | 1 | 120 | 28.0 |
| 1 | 90 | 142 | 1.5 | 1 | 108 | 16.0 |
| 1 | 90 | 142 | 2.5 | 1 | 140 | 12.0 |
| 1 | 90 | 143 | 2.8 | 1 | 160 | 25.0 |
| 1 | 90 | 143 | 1.1 | 1 | 97 | 5.0 |
| 2 | 90 | 132 | 1.1 | 3 | 106 | 4.5 |
| 2 | 90 | 132 | 2.1 | 1 | 160 | 24.0 |
| 2 | 90 | 132 | 1.4 | 1 | 118 | 22.0 |
| 2 | 90 | 132 | 0.9 | 1 | 116 | 16.0 |
| 2 | 90 | 132 | 1.0 | 1 | 118 | 18.0 |
| 2 | 90 | 132 | 1.6 | 1 | 142 | 5.0 |
| 2 | 90 | 132 | 88.8 | 1 | 119 | 16.0 |
| 2 | 90 | 132 | 0.9 | 3 | 122 | 5.5 |
| 2 | 90 | 132 | 1.1 | 3 | 124 | 17.8 |
| 2 | 90 | 132 | 2.6 | 1 | 141 | 6.0 |
| 2 | 90 | 132 | 0.6 | 1 | 101 | 3.0 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 2 | 90 | 132 | 1.5 | 1 | 115 | 18.0 |
| 2 | 90 | 132 | 0.8 | 1 | 114 | 18.0 |
| 2 | 90 | 132 | 0.8 | 1 | 116 | 18.0 |
| 2 | 90 | 132 | 0.9 | 1 | 110 | 13.0 |
| 2 | 90 | 132 | 1.0 | 1 | 98 | 4.0 |
| 2 | 90 | 132 | 1.6 | 1 | 142 | 5.0 |
| 2 | 90 | 132 | 0.9 | 3 | 103 | 2.5 |
| 2 | 90 | 132 | 88.8 | 1 | 110 | 6.0 |
| 2 | 90 | 132 | 1.3 | 1 | 102 | 5.0 |
| 2 | 90 | 132 | 88.8 | 1 | 105 | 5.0 |
| 2 | 90 | 135 | 3.9 | 1 | 158 | 21.0 |
| 2 | 90 | 135 | 3.5 | 2 | 152 | 6.5 |
| 2 | 90 | 135 | 0.9 | 1 | 139 | 3.0 |
| 2 | 90 | 135 | 5.4 | 1 | 151 | 13.0 |
| 2 | 90 | 135 | 2.5 | 1 | 154 | 17.0 |
| 2 | 90 | 135 | 3.1 | 1 | 146 | 11.0 |
| 2 | 90 | 135 | 1.1 | 1 | 163 | 23.0 |
| 2 | 90 | 135 | 3.3 | 1 | 150 | 13.0 |
| 2 | 90 | 135 | 2.9 | 1 | 145 | 9.0 |
| 2 | 90 | 137 | 2.5 | 1 | 160 | 21.0 |
| 2 | 90 | 137 | 88.8 | 1 | 118 | 17.0 |
| 2 | 90 | 137 | 88.8 | 3 | 129 | 14.0 |
| 2 | 90 | 137 | 1.3 | 3 | 119 | 15.0 |
| 2 | 90 | 139 | 1.0 | 3 | 121 | 5.5 |
| 2 | 90 | 139 | 2.0 | 1 | 123 | 25.0 |
| 2 | 90 | 139 | 3.1 | 1 | 145 | 5.0 |
| 2 | 90 | 139 | 88.8 | 1 | 112 | 20.0 |
| 2 | 90 | 139 | 1.4 | 1 | 123 | 23.0 |
| 2 | 90 | 139 | 2.6 | 1 | 151 | 14.0 |
| 2 | 90 | 139 | 88.8 | 1 | 118 | 16.0 |
| 2 | 90 | 140 | 1.3 | 1 | 120 | 20.0 |
| 2 | 90 | 140 | 88.8 | 1 | 115 | 22.0 |
| 2 | 90 | 140 | 88.8 | 1 | 129 | 27.0 |
| 2 | 90 | 140 | 88.8 | 3 | 129 | 7.0 |
| 2 | 90 | 140 | 1.3 | 1 | 118 | 20.0 |
| 2 | 90 | 140 | 1.8 | 1 | 123 | 26.0 |
| 2 | 90 | 140 | 88.8 | 1 | 126 | 24.0 |
| 2 | 90 | 140 | 0.7 | 1 | 149 | 11.0 |
| 2 | 90 | 140 | 1.5 | 1 | 141 | 4.0 |
| 2 | 90 | 140 | 2.6 | 1 | 138 | 1.0 |
| 2 | 90 | 140 | 88.8 | 1 | 116 | 14.0 |
| 2 | 90 | 140 | 0.6 | 1 | 112 | 16.0 |
| 2 | 90 | 140 | 88.8 | 1 | 122 | 18.0 |
| 2 | 90 | 142 | 88.8 | 1 | 118 | 16.0 |
| 2 | 90 | 142 | 88.8 | 1 | 119 | 18.0 |
| 2 | 90 | 142 | 1.0 | 1 | 111 | 13.0 |
| 2 | 90 | 142 | 0.9 | 1 | 113 | 16.0 |
| 2 | 90 | 142 | 2.5 | 1 | 144 | 5.0 |
| 2 | 90 | 142 | 1.1 | 1 | 112 | 14.0 |
| 2 | 90 | 142 | 0.9 | 1 | 104 | 7.0 |
| 2 | 90 | 142 | 1.4 | 1 | 113 | 16.0 |
| 2 | 90 | 142 | 88.8 | 1 | 119 | 18.0 |
| 2 | 90 | 142 | 1.3 | 1 | 112 | 16.0 |
| 2 | 90 | 142 | 88.8 | 1 | 118 | 18.0 |
| 2 | 90 | 142 | 88.8 | 1 | 113 | 10.0 |
| 2 | 90 | 143 | 0.8 | 1 | 99 | 1.0 |
| 2 | 90 | 143 | 1.5 | 1 | 100 | 1.0 |
| 2 | 90 | 143 | 0.9 | 1 | 104 | 1.0 |
| 2 | 90 | 143 | 88.8 | 1 | 133 | 29.0 |
| 2 | 90 | 146 | 1.3 | 1 | 161 | 23.0 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 3 | 90 | 132 | 1.8 | 1 | 117 | 25.0 |
| 3 | 90 | 132 | 1.6 | 1 | 122 | 30.0 |
| 3 | 90 | 132 | 1.3 | 1 | 106 | 14.0 |
| 3 | 90 | 132 | 0.5 | 3 | 99 | 0.0 |
| 3 | 90 | 132 | 1.7 | 1 | 107 | 14.0 |
| 3 | 90 | 132 | 1.3 | 1 | 119 | 27.0 |
| 3 | 90 | 132 | 2.1 | 1 | 110 | 18.0 |
| 3 | 90 | 132 | 1.0 | 1 | 110 | 14.0 |
| 3 | 90 | 132 | 1.4 | 1 | 110 | 16.0 |
| 3 | 90 | 132 | 2.4 | 3 | 122 | 18.4 |
| 3 | 90 | 132 | 3.1 | 3 | 118 | 5.0 |
| 3 | 90 | 132 | 1.3 | 1 | 117 | 18.0 |
| 3 | 90 | 132 | 1.5 | 1 | 99 | 2.0 |
| 3 | 90 | 132 | 0.9 | 1 | 118 | 26.0 |
| 3 | 90 | 132 | 1.2 | 1 | 112 | 18.0 |
| 3 | 90 | 132 | 1.4 | 2 | 119 | 16.8 |
| 3 | 90 | 132 | 1.0 | 1 | 113 | 18.0 |
| 3 | 90 | 132 | 1.0 | 1 | 100 | 5.0 |
| 3 | 90 | 132 | 1.1 | 1 | 125 | 30.0 |
| 3 | 90 | 135 | 2.5 | 1 | 145 | 13.0 |
| 3 | 90 | 135 | 2.1 | 1 | 117 | 25.0 |
| 3 | 90 | 135 | 3.4 | 1 | 158 | 27.0 |
| 3 | 90 | 135 | 2.9 | 1 | 152 | 21.0 |
| 3 | 90 | 137 | 1.8 | 1 | 116 | 22.0 |
| 3 | 90 | 137 | 2.5 | 1 | 153 | 17.0 |
| 3 | 90 | 137 | 1.4 | 3 | 149 | 6.0 |
| 3 | 90 | 140 | 1.3 | 1 | 113 | 20.0 |
| 3 | 90 | 140 | 1.6 | 1 | 137 | 3.0 |
| 3 | 90 | 140 | 1.6 | 3 | 115 | 16.0 |
| 3 | 90 | 140 | 2.5 | 1 | 158 | 20.0 |
| 3 | 90 | 140 | 1.3 | 2 | 125 | 18.8 |
| 3 | 90 | 140 | 2.6 | 1 | 151 | 20.0 |
| 3 | 90 | 140 | 1.5 | 1 | 110 | 18.0 |
| 3 | 90 | 142 | 1.6 | 1 | 108 | 16.0 |
| 3 | 90 | 142 | 1.8 | 1 | 104 | 14.0 |
| 3 | 90 | 142 | 1.5 | 1 | 120 | 25.0 |
| 3 | 90 | 142 | 1.0 | 1 | 119 | 24.0 |
| 3 | 90 | 142 | 1.3 | 1 | 116 | 23.0 |
| 3 | 90 | 142 | 1.3 | 1 | 111 | 16.0 |
| 3 | 90 | 146 | 1.5 | 1 | 115 | 21.0 |
| 3 | 90 | 146 | 2.4 | 3 | 120 | 19.0 |
| 4 | 90 | 132 | 2.4 | 1 | 99 | 5.0 |
| 4 | 90 | 132 | 2.0 | 1 | 154 | 20.0 |
| 4 | 90 | 132 | 2.3 | 1 | 99 | 5.0 |
| 4 | 90 | 132 | 1.0 | 1 | 99 | 5.0 |
| 4 | 90 | 132 | 2.0 | 1 | 101 | 5.0 |
| 4 | 90 | 132 | 2.5 | 3 | 126 | 5.5 |
| 4 | 90 | 135 | 4.1 | 1 | 142 | 9.0 |
| 4 | 90 | 137 | 88.8 | 1 | 138 | 5.0 |
| 4 | 90 | 139 | 3.1 | 1 | 145 | 12.0 |
| 4 | 90 | 140 | 1.0 | 1 | 138 | 5.0 |
| 4 | 90 | 140 | 1.8 | 1 | 117 | 20.0 |
| 4 | 90 | 140 | 3.3 | 1 | 138 | 5.0 |
| 4 | 90 | 140 | 2.0 | 1 | 157 | 24.0 |
| 4 | 90 | 140 | 1.8 | 1 | 142 | 9.0 |
| 4 | 90 | 142 | 1.3 | 1 | 114 | 18.0 |
| 4 | 90 | 142 | 1.6 | 1 | 107 | 12.0 |
| 4 | 90 | 142 | 1.5 | 1 | 116 | 20.0 |
| 4 | 90 | 142 | 1.9 | 1 | 113 | 18.0 |
| 4 | 90 | 142 | 1.9 | 1 | 142 | 5.0 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 4 | 90 | 142 | 1.1 | 1 | 110 | 14.0 |
| 4 | 90 | 146 | 3.0 | 1 | 150 | 15.0 |
| 4 | 90 | 146 | 1.5 | 1 | 121 | 26.0 |
| 4 | 90 | 146 | 2.0 | 1 | 110 | 15.0 |
| 4 | 90 | 146 | 1.1 | 1 | 113 | 17.0 |
| 15 | 90 | 132 | 2.3 | 1 | 124 | 8.0 |
| 15 | 90 | 132 | 3.0 | 1 | 127 | 13.0 |
| 15 | 90 | 132 | 2.5 | 1 | 139 | 27.0 |
| 15 | 90 | 135 | 2.0 | 1 | 129 | 18.0 |
| 15 | 90 | 135 | 2.5 | 3 | 134 | 15.0 |
| 15 | 90 | 139 | 2.9 | 1 | 123 | 10.0 |
| 15 | 90 | 139 | 2.0 | 1 | 141 | 27.0 |
| 15 | 90 | 140 | 2.3 | 3 | 137 | 5.5 |
| 15 | 90 | 140 | 2.8 | 1 | 122 | 10.0 |
| 15 | 90 | 140 | 2.9 | 1 | 140 | 27.0 |
| 15 | 90 | 140 | 3.0 | 1 | 113 | 1.0 |
| 15 | 90 | 140 | 2.4 | 3 | 131 | 5.5 |
| 15 | 90 | 140 | 3.2 | 1 | 128 | 15.0 |
| 15 | 90 | 142 | 2.0 | 1 | 125 | 12.0 |
| 15 | 90 | 142 | 2.1 | 1 | 123 | 8.0 |
| 15 | 90 | 142 | 2.0 | 3 | 122 | 5.0 |
| 15 | 90 | 142 | 3.3 | 1 | 123 | 8.0 |
| 15 | 90 | 142 | 1.6 | 1 | 134 | 19.0 |
| 15 | 90 | 142 | 3.1 | 1 | 119 | 7.0 |
| 16 | 90 | 135 | 3.1 | 1 | 165 | 26.0 |
| 16 | 90 | 135 | 2.9 | 1 | 145 | 7.0 |
| 16 | 90 | 137 | 1.3 | 3 | 127 | 6.5 |
| 16 | 90 | 140 | 0.8 | 1 | 127 | 24.0 |
| 16 | 90 | 140 | 1.4 | 5 | 127 | 0.0 |
| 16 | 90 | 140 | 1.4 | 1 | 112 | 9.0 |
| 16 | 90 | 140 | 1.6 | 1 | 119 | 14.0 |
| 16 | 90 | 140 | 1.5 | 1 | 128 | 25.0 |
| 27 | 90 | 132 | 2.0 | 1 | 118 | 8.0 |
| 27 | 90 | 132 | 0.8 | 3 | 131 | 6.0 |
| 27 | 90 | 132 | 1.1 | 1 | 114 | 5.0 |
| 27 | 90 | 132 | 1.4 | 1 | 126 | 19.0 |
| 27 | 90 | 132 | 0.5 | 3 | 130 | 6.0 |
| 27 | 90 | 132 | 2.0 | 1 | 130 | 20.0 |
| 27 | 90 | 132 | 2.6 | 1 | 147 | 1.0 |
| 27 | 90 | 132 | 3.5 | 1 | 163 | 18.0 |
| 27 | 90 | 132 | 2.0 | 3 | 148 | 2.5 |
| 27 | 90 | 132 | 1.0 | 3 | 159 | 7.0 |
| 27 | 90 | 135 | 1.9 | 1 | 149 | 5.0 |
| 27 | 90 | 135 | 2.7 | 1 | 147 | 5.0 |
| 27 | 90 | 135 | 2.7 | 1 | 169 | 27.0 |
| 27 | 90 | 137 | 1.1 | 3 | 137 | 6.0 |
| 27 | 90 | 137 | 1.3 | 1 | 109 | 5.0 |
| 27 | 90 | 139 | 2.5 | 1 | 126 | 18.0 |
| 27 | 90 | 139 | 1.0 | 1 | 125 | 18.0 |
| 27 | 90 | 139 | 0.9 | 1 | 127 | 20.0 |
| 27 | 90 | 139 | 1.1 | 1 | 140 | 32.0 |
| 27 | 90 | 139 | 1.6 | 1 | 131 | 24.0 |
| 27 | 90 | 140 | 1.5 | 1 | 145 | 5.0 |
| 27 | 90 | 140 | 1.5 | 1 | 161 | 18.0 |
| 27 | 90 | 140 | 1.3 | 1 | 133 | 25.0 |
| 27 | 90 | 140 | 1.6 | 3 | 169 | 6.4 |
| 27 | 90 | 140 | 1.8 | 1 | 165 | 20.0 |
| 27 | 90 | 140 | 88.8 | 3 | 144 | 0.5 |
| 27 | 90 | 140 | 1.3 | 3 | 157 | 7.0 |
| 27 | 90 | 140 | 0.9 | 2 | 140 | 7.0 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 27 | 90 | 140 | 1.1 | 1 | 129 | 20.0 |
| 27 | 90 | 140 | 1.7 | 3 | 158 | 7.0 |
| 27 | 90 | 140 | 1.1 | 3 | 132 | 6.0 |
| 27 | 90 | 140 | 1.1 | 3 | 171 | 6.4 |
| 27 | 90 | 140 | 0.8 | 3 | 129 | 0.5 |
| 27 | 90 | 140 | 1.3 | 2 | 140 | 7.0 |
| 27 | 90 | 140 | 1.1 | 1 | 162 | 20.0 |
| 27 | 90 | 140 | 1.5 | 3 | 161 | 6.0 |
| 27 | 90 | 140 | 0.8 | 1 | 123 | 18.0 |
| 27 | 90 | 142 | 0.6 | 1 | 109 | 4.0 |
| 27 | 90 | 142 | 1.0 | 1 | 123 | 9.0 |
| 27 | 90 | 142 | 0.8 | 1 | 125 | 18.0 |
| 27 | 90 | 146 | 1.4 | 3 | 115 | 6.5 |
| 27 | 90 | 146 | 88.8 | 3 | 140 | 6.0 |
| 28 | 90 | 132 | 3.9 | 1 | 133 | 9.0 |
| 28 | 90 | 135 | 1.6 | 3 | 171 | 8.0 |
| 28 | 90 | 135 | 3.1 | 3 | 140 | 6.8 |
| 28 | 90 | 135 | 2.4 | 1 | 144 | 25.0 |
| 28 | 90 | 135 | 2.6 | 3 | 177 | 25.0 |
| 28 | 90 | 135 | 4.3 | 1 | 153 | 5.0 |
| 28 | 90 | 135 | 1.3 | 3 | 153 | 3.5 |
| 28 | 90 | 135 | 2.4 | 1 | 154 | 1.0 |
| 28 | 90 | 137 | 1.1 | 3 | 142 | 8.0 |
| 28 | 90 | 137 | 88.8 | 1 | 167 | 20.0 |
| 28 | 90 | 139 | 0.3 | 3 | 156 | 2.5 |
| 28 | 90 | 140 | 1.4 | 3 | 145 | 6.8 |
| 28 | 90 | 140 | 0.8 | 1 | 142 | 29.0 |
| 28 | 90 | 140 | 0.6 | 1 | 122 | 9.0 |
| 28 | 90 | 140 | 2.4 | 1 | 139 | 18.0 |
| 28 | 90 | 140 | 2.0 | 1 | 162 | 16.0 |
| 28 | 90 | 140 | 1.7 | 1 | 165 | 16.0 |
| 28 | 90 | 140 | 0.9 | 3 | 175 | 7.2 |
| 28 | 90 | 142 | 1.5 | 3 | 137 | 8.0 |
| 28 | 90 | 142 | 0.8 | 1 | 126 | 14.0 |
| 28 | 90 | 142 | 1.9 | 1 | 138 | 18.0 |
| 28 | 90 | 142 | 1.3 | 3 | 133 | 19.5 |
| 28 | 90 | 143 | 3.0 | 1 | 172 | 22.0 |

**Pablo field numbers**

**1 -Lightly grazed pasture (searched 1986, 1988 - 1990)**

**2 & 3 - Alfalfa fields (searched 1988 - 1990)**

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 1 | 86 | 132 | 2.1 | 1 | 124 | 20.0 |
| 1 | 86 | 132 | 4.1 | 1 | 153 | 24.0 |
| 1 | 86 | 135 | 1.9 | 1 | 175 | 27.0 |
| 1 | 86 | 135 | 2.5 | 1 | 165 | 0.0 |
| 1 | 86 | 135 | 4.3 | 1 | 155 | 27.0 |
| 1 | 86 | 139 | 2.3 | 1 | 154 | 24.0 |
| 1 | 86 | 140 | 0.7 | 3 | 175 | 14.5 |
| 1 | 86 | 140 | 1.4 | 3 | 169 | 6.5 |
| 1 | 86 | 140 | 1.3 | 3 | 177 | 20.0 |
| 1 | 86 | 140 | 1.3 | 3 | 134 | 11.2 |
| 1 | 86 | 140 | 1.4 | 1 | 154 | 24.0 |
| 1 | 86 | 140 | 1.9 | 1 | 155 | 25.0 |
| 1 | 86 | 140 | 1.4 | 3 | 148 | 8.0 |
| 1 | 86 | 140 | 1.7 | 3 | 150 | 8.0 |
| 1 | 86 | 142 | 1.6 | 5 | 151 | 0.0 |
| 1 | 88 | 132 | 3.1 | 1 | 134 | 18.0 |
| 1 | 88 | 132 | 3.6 | 2 | 141 | 6.5 |
| 1 | 88 | 132 | 3.4 | 1 | 121 | 7.0 |
| 1 | 88 | 132 | 3.6 | 1 | 120 | 2.0 |
| 1 | 88 | 132 | 4.9 | 1 | 140 | 27.0 |
| 1 | 88 | 132 | 3.6 | 1 | 119 | 6.0 |
| 1 | 88 | 132 | 4.9 | 3 | 159 | 3.5 |
| 1 | 88 | 139 | 88.8 | 3 | 147 | 5.5 |
| 1 | 88 | 139 | 1.5 | 3 | 142 | 5.5 |
| 1 | 88 | 140 | 1.7 | 3 | 154 | 4.0 |
| 1 | 88 | 140 | 1.7 | 3 | 170 | 10.5 |
| 1 | 88 | 143 | 2.7 | 3 | 124 | 4.0 |
| 2 | 88 | 132 | 88.8 | 1 | 133 | 6.0 |
| 2 | 88 | 135 | 2.4 | 3 | 176 | 4.0 |
| 2 | 88 | 135 | 2.7 | 1 | 158 | 6.0 |
| 2 | 88 | 135 | 3.2 | 1 | 157 | 5.0 |
| 3 | 88 | 132 | 5.1 | 1 | 132 | 6.0 |
| 3 | 88 | 135 | 2.0 | 3 | 183 | 14.5 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 2 | 88 | 135 | 88.8 | 3 | 153 | 3.5 |
| 1 | 89 | 132 | 88.8 | 1 | 152 | 4.0 |
| 1 | 89 | 132 | 3.4 | 1 | 152 | 29.0 |
| 1 | 89 | 132 | 5.5 | 1 | 151 | 29.0 |
| 1 | 89 | 132 | 2.6 | 3 | 155 | 27.0 |
| 1 | 89 | 132 | 4.1 | 3 | 133 | 6.5 |
| 1 | 89 | 135 | 88.8 | 1 | 158 | 11.0 |
| 1 | 89 | 135 | 5.1 | 1 | 147 | 6.0 |
| 1 | 89 | 139 | 3.2 | 1 | 146 | 20.0 |
| 1 | 89 | 139 | 3.2 | 3 | 145 | 8.0 |
| 1 | 89 | 140 | 2.5 | 1 | 146 | 22.0 |
| 1 | 89 | 140 | 2.4 | 1 | 164 | 20.0 |
| 1 | 89 | 140 | 3.5 | 1 | 149 | 25.0 |
| 1 | 89 | 140 | 3.1 | 3 | 174 | 19.0 |
| 1 | 89 | 140 | 2.6 | 1 | 149 | 26.0 |
| 1 | 89 | 140 | 1.6 | 3 | 140 | 13.4 |
| 1 | 89 | 140 | 4.0 | 3 | 171 | 6.4 |
| 1 | 89 | 140 | 2.2 | 3 | 153 | 8.4 |
| 1 | 89 | 143 | 4.0 | 1 | 135 | 12.0 |
| 2 | 89 | 132 | 2.8 | 3 | 138 | 6.5 |
| 2 | 89 | 132 | 4.8 | 3 | 133 | 6.5 |
| 2 | 89 | 132 | 4.5 | 3 | 140 | 19.8 |
| 2 | 89 | 132 | 5.5 | 3 | 167 | 7.2 |
| 2 | 89 | 135 | 4.9 | 1 | 145 | 2.0 |
| 2 | 89 | 135 | 3.6 | 1 | 165 | 21.0 |
| 2 | 89 | 135 | 5.1 | 3 | 179 | 6.0 |
| 2 | 89 | 143 | 4.9 | 1 | 140 | 26.0 |
| 3 | 89 | 140 | 4.8 | 3 | 148 | 8.8 |
| 1 | 90 | 135 | 3.6 | 1 | 178 | 21.0 |
| 1 | 90 | 135 | 1.5 | 3 | 168 | 4.5 |
| 1 | 90 | 135 | 1.6 | 3 | 176 | 5.5 |
| 1 | 90 | 137 | 4.5 | 1 | 129 | 5.0 |
| 1 | 90 | 140 | 2.0 | 3 | 140 | 9.2 |
| 1 | 90 | 140 | 2.2 | 3 | 153 | 12.0 |
| 1 | 90 | 140 | 1.5 | 1 | 156 | 1.0 |
| 1 | 90 | 140 | 3.0 | 1 | 155 | 29.0 |
| 1 | 90 | 140 | 2.0 | 1 | 139 | 22.0 |
| 1 | 90 | 140 | 1.4 | 1 | 161 | 1.0 |
| 1 | 90 | 140 | 2.6 | 1 | 145 | 19.0 |
| 1 | 90 | 140 | 1.8 | 3 | 151 | 11.2 |
| 1 | 90 | 140 | 1.4 | 3 | 154 | 7.0 |
| 1 | 90 | 140 | 1.1 | 1 | 161 | 5.0 |
| 1 | 90 | 140 | 3.8 | 1 | 123 | 5.0 |
| 1 | 90 | 142 | 1.6 | 1 | 163 | 5.0 |
| 2 | 90 | 132 | 4.2 | 1 | 146 | 22.0 |
| 2 | 90 | 132 | 4.4 | 1 | 126 | 3.0 |
| 2 | 90 | 132 | 5.1 | 1 | 136 | 14.0 |
| 2 | 90 | 132 | 2.8 | 3 | 142 | 7.6 |
| 2 | 90 | 132 | 4.5 | 3 | 139 | 7.2 |
| 2 | 90 | 132 | 3.9 | 1 | 134 | 8.0 |
| 2 | 90 | 135 | 4.1 | 1 | 148 | 24.0 |
| 2 | 90 | 135 | 2.5 | 3 | 158 | 6.4 |
| 2 | 90 | 135 | 2.9 | 1 | 152 | 28.0 |
| 2 | 90 | 135 | 4.9 | 1 | 149 | 27.0 |
| 2 | 90 | 135 | 4.2 | 1 | 134 | 13.0 |
| 2 | 90 | 139 | 4.5 | 1 | 128 | 5.0 |
| 2 | 90 | 140 | 2.2 | 3 | 150 | 7.6 |
| 2 | 90 | 140 | 3.1 | 3 | 145 | 6.4 |

| FIELDNUMBR | YEAR | SPECIESAOU | ROBELAVERG | FATE | INITIATION | EXPOSURE |
|---|---|---|---|---|---|---|
| 2 | 90 | 140 | 3.4 | 3 | 145 | 18.0 |
| 2 | 90 | 140 | 88.8 | 3 | 159 | 6.8 |
| 2 | 90 | 140 | 3.5 | 2 | 147 | 6.0 |
| 2 | 90 | 140 | 2.8 | 3 | 141 | 6.4 |
| 2 | 90 | 140 | 2.1 | 3 | 147 | 21.0 |
| 2 | 90 | 142 | 5.0 | 3 | 132 | 4.5 |
| 2 | 90 | 142 | 1.9 | 3 | 139 | 7.0 |
| 2 | 90 | 143 | 3.9 | 1 | 132 | 4.0 |