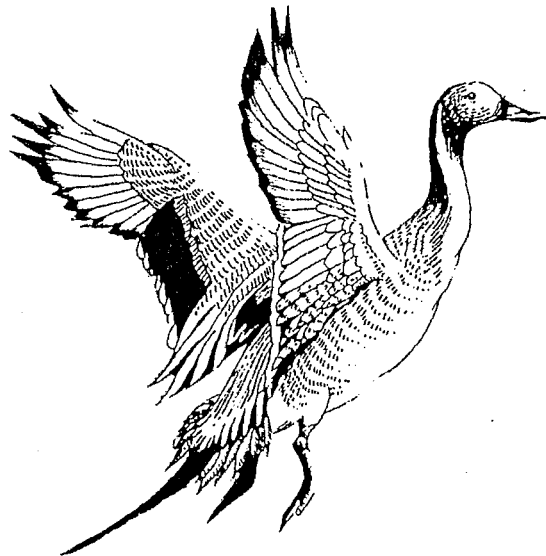


OPERATIONAL PLAN AND ENVIRONMENTAL
ASSESSMENT
FOR
STRIPED SKUNK AND RACCOON MANAGEMENT



BENTON LAKE NATIONAL WILDLIFE REFUGE
BLACK EAGLE, MT.
JANUARY 24, 1992

PREPARED BY: *Stephen J. Martin*
DATE: 1-27-92

REVIEWED BY: *James E. McCollum*
DATE: 1/27/92

PURPOSE AND NEED FOR ACTION

PURPOSE: The proposed action is to trap and remove striped skunk and raccoon at Benton Lake National Wildlife Refuge (BLNWR). The purpose of the action is to manage, not eradicate, skunk and raccoon populations to maximize waterfowl production by obtaining high nest success.

NEED: Waterfowl production is one of the primary goals of BLNWR. Refuge objectives for waterfowl production include maintaining optimum wetland and habitat conditions and a Mayfield Nest Success between 30-60%. A major threat in meeting these goals and objectives is the destruction of nests by two mammalian nest predators, the striped skunk and raccoon. The impact of skunks and raccoons on nesting waterfowl and the effectiveness of their removal in increasing duck nesting success was documented at BLNWR during an experimental control study conducted from 1986-89 (Martin 1990). (See Page 5 Biological Consequences)

Current skunk and raccoon populations at BLNWR are greater than during pre-settlement times. Skunks were considered common and raccoons rare on the refuge during the 1960's. Refuge Manager Eugene Stroops (1961-69) stated "skunks became more abundant on the refuge during the 1970's with the establishment of Waterbank tracts adjacent to the refuge. Raccoons were very, very rare while I was manager." Hoffman and Pattie (1968) stated "Striped skunks have adapted very well to human presence, and are also common to abundant in cultivated lands. In Montana, the species is common throughout the state. In Montana, 'coons' were originally rather scarce, and the only early records come from eastern Montana, in the valley of the Yellowstone River and its tributaries. However, in the past two decades the species has increased enormously, and is now to be found in nearly every county in Montana, wherever suitable river or stream-bottom habitat occurs."

The increase in abundance and distribution of skunks and raccoon in Montana is even more pronounced on BLNWR. The massive conversion of native prairie to agriculture on lands surrounding the refuge has resulted in the loss of wildlife habitat and habitat fragmentation. Consequently the refuge has become an island of wildlife habitat that harbors substantially greater populations of skunks and raccoons than the surrounding land.

These artificially high nest predator populations jeopardize the nesting success of numerous migratory bird species that breed on the refuge. Many of these species, especially waterfowl, are experiencing record low population levels throughout North America. During the 1980's these low populations prompted the U.S. Fish and Wildlife Service to designate National Species of Special Emphasis

(NSSE) and instructed the National Wildlife Refuge System to identify management activities to increase production of Northern pintail, mallard, redhead and canvasback. These species continue to decline today. All of these species nest at BLNWR and during "wet" springs the northern pintail is the most abundant nesting duck. 'Pintail nesting success on BLNWR has ranged from 28% during years of no skunk and raccoon removal to 45 to 86% with removal.

Continued declines in the continental waterfowl population spawned the creation of the North American Waterfowl Management Plan (NAWMP) in 1986. The plan makes specific recommendations regarding mallards and northern pintails. It states, "A variety of management techniques should be considered to reduce the effects of agricultural practices and predation on nesting ducks and their eggs."

The need for skunk and raccoon management is clear. In the absence of skunk and raccoon removal the refuge will return to pre-control nesting success of less than 20%, a level that barely sustains a breeding population. Birds such as the northern pintail and mallard will continue to be attracted to BLNWR because of available spring water and apparently good nesting cover only to be subjected to mammalian predation that provides only a 1 in 5 chance of hatching.

Unfortunately the refuge cannot support high skunk and raccoon population levels and at the same time do justice to NSSE, the NAWMP or fulfil the intent of the original Executive Order, signed by President Herbert Hoover, that set aside the land for "use as a refuge and breeding ground for birds." (Attachment 1).

THE PROPOSED ACTION AND THE ALTERNATIVES

A. No Action Alternative

Under this alternative, the proposed removal of skunks and raccoons on the refuge would not be conducted. Skunk and raccoon populations would increase to levels similar to those before 1986. Duck nesting success would be lowered and refuge waterfowl objectives would not be met.

B. Nesting Cover Improvement Alternative

This alternative calls for the conversion of 5800 acres of native prairie to Dense Nesting Cover (DNC).

DNC fields provide vegetative diversity and habitat that is more attractive to nesting ducks than native grasslands (NGL). Duck nest densities during 1984-90 averaged 2.2 (range 1-3.3) in DNC versus .33 nests/acre (range .05-.6) in NGL. DNC also provides habitat that is more secure from nest predators than

NGL. Mayfield nest successes for the same period were 76% in DNC and 57% in NGL.

This alternative is unacceptable since the conversion to DNC would result in the loss of biodiversity for the refuge. Numerous nongame wildlife species would be eliminated or reduced from the refuge and public opposition would be strong. The breaking of native prairie and conversion to DNC would also violate the USFWS Region 6 policy on sodbusting.

C. Sport Trapping Alternative

Public trapping of skunks and raccoons for their furs during the fall would be an alternative to spring trapping by refuge personnel. This alternative is unlikely to receive any public support since the demand for skunk and raccoon fur is nearly non-existent. The alternative is unacceptable because of the potential conflict with the refuge hunting program. Hunters and their dogs may encounter traps and hunters may vandalize traps.

D. Non-Lethal Control: Electric Fence Barrier

Under this alternative the entire refuge uplands considered attractive for nesting waterfowl would be fenced with a predator proof electric fence. Exclusion of skunks and raccoons would result in high nest success and production objectives would be obtained.

This alternative is unacceptable since the costs to construct and maintain the electric fences would be prohibitive. Costs to construct electric fences around seven DNC fields, 619 acres, would cost over \$300,000 (\$7-8/ft, personal communication Rick Warhurst, Ducks Unlimited). Costs to fence the smallest refuge DNC field, 40 acres, would total nearly \$35,000. Even with protection of 40-619 acres, birds nesting on the remaining 11,000 + acres would be subjected to high nest destruction by skunks and raccoons. The unsightliness of the fences would detract from the naturalness of the native prairies that characterize the refuge and local opposition would be expected. The fence would also create a barrier and obstruct the movements of pronghorn antelope, mule deer and white-tailed deer.

E. Non-Lethal Control: Taste Aversion Conditioning

Under this alternative chicken eggs would be injected with lithium chloride and placed in locations where they would be ingested by skunks and raccoons. Ingestion of lithium elicits severe sickness and vomiting in the target animals. Early researchers thought that the aversion would be directed toward eggs once an animal experienced illness after eating a

treated egg. Unfortunately recent studies with aversion conditioning in raccoons reveal that raccoons "learn" to recognize the presence of lithium in eggs and continue to eat eggs not treated with lithium. New aversive agents being tested include an estrogen based agent that is not easily detected by raccoons (Nicolaus et.al. 1990). Pen trails on red fox, opossum, raccoon and striped skunk indicated raccoons developed an apparent taste aversion to estrogen based agents although skunks did not (Nauman et. al. 1990).

This alternative is unacceptable since the use of aversive agents has not been thoroughly researched and evaluated.

F. Non-Lethal Control: Live trap and release

This alternative would include the live trapping and transportation of skunks and raccoon to locations off the refuge where they would be released alive. This removal action would receive criticism from the local community because of the fear of rabies in skunks and raccoons. It is unlikely that suitable locations could be found for release or that permission could be obtained for release from other federal or state land management agencies or private landowners. Contacts were made with refuge managers at Charles M. Russell, Lee Metcalf, Medicine Lake, National Bison Range and Red Rock Lakes but none of these stations were willing to accept skunks and raccoons trapped at Benton Lake. Contacts with the Montana Dept. of Fish, Wildlife and Parks were also unsuccessful in finding locations for releasing skunks and raccoons.

G. Proposed Action Alternative

The proposed action is to trap and remove the principal mammalian nest predators, striped skunk and raccoon, from Benton Lake NWR, to obtain a Mayfield nesting success of 60% for the four major upland habitat types. Upland habitats include 5973 acres of NGL(80%), 778 acres of shoreline(11%), 656 acres of DNC(9%) and 54 acres of dikes (<1%).

The State of Montana classifies the skunk as a "predatory animal" and the raccoon as "non-game wildlife." Under both classifications these animals are unregulated as to dates or methods of removal.

Refuge personnel will conduct the trapping that will normally commence on March 1 and be completed by July 15 annually. Removal methods will include kill trapping with 220 conibear traps in wooden cubby box sets and live trapping with cages. Live trapped animals will be destroyed by shooting or euthanized with drugs administered with a jab-pole/syringe.

Traps will be inspected daily and all non-target animals in live traps released. Detailed records of predator control operations will be maintained and annual reports prepared.

The effectiveness of removing skunks and raccoons will be determined by annual monitoring of Mayfield nest success in representative habitats. Predator control will be operational until nest success exceeds 60% Mayfield for all four individual habitat types. Specific emphasis will be placed on monitoring nest success in NGL since it comprises 80% of the upland nesting habitat. Once nesting success exceeds 60% control will be terminated until success drops below 60%.

AFFECTED ENVIRONMENT

The proposed predator management activities will take place on the 12,383 acre BLNWR located in north-central Montana. Benton Lake is located on the western edge of the Great Plains approximately 50 miles from the Rocky Mountains.

The refuge upland is primarily native grassland and classed as a shortgrass disclimax. Trees are few and generally located in shelterbelt plantings. Land use surrounding the refuge is mostly agricultural, primarily dry land cereal grain crops (90%), but a small amount (10%) is rangeland.

The refuge contains 5563 acres of open water and marsh, 5773 acres of native grassland, 656 acres of dense nesting cover (DNC), 150 acres of shelterbelts and 227 acres of buildings, roads and administrative areas.

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

A. Physical Considerations

Impacts to the physical environment will be minimal since no construction activities will occur.

B. Biological Considerations

The proposed action will not affect any endangered species including bald eagles and peregrine falcons that are present during spring migration. Exposed bait will not be used and all sets will be located to prevent accidental trapping of raptors.

There will be a reduction of target species (skunk and raccoon) on the refuge during the trapping year. Both species are common to the area but the reduction will have little effect on the local populations adjacent to the refuge. These populations will re-

invade the vacant predator habitat created by the removal program with most emigration occurring in late summer and fall as young of the year disperse.

There is expected to be some limited mortality to non-target species. Non-target species include badger, long-tailed weasel, mink, yellow-bellied marmot, Richardson ground squirrel, cottontail rabbit, white-tailed jackrabbit and domestic cats and dogs. If captured in live traps these species, with the exception of cats and dogs, will be released at the site of capture. Proper use, location and baiting by qualified personnel will minimize non-target captures. Captured cats and dogs will be taken to the Cascade Animal Shelter in Great Falls.

A reduction in skunk and raccoon populations will not compromise refuge biological diversity. Both species will continue to be a part of the refuge mammalian predatory community along with coyote, badger, mink, long-tailed and least weasel and an occasional red fox.

There is the potential to increase nesting success of 10 species of neo-tropical migrants including blue-winged and cinnamon teal, black-necked stilt, upland sandpiper, marbled godwit, Wilson's phalarope, Franklin's gull, common tern, black tern and common yellowthroat. Nesting success of marsh and waterbirds, songbirds and upland gamebirds should also increase.

BLNWR has been nominated for Regional designation in the Western Hemisphere Shorebird Reserve Network because of its importance as a breeding ground and migration stop for thousands of shorebirds. Species likely to benefit with increasing nest success include American avocet, willet, killdeer and three species of neo-tropical migrants.

The impact of skunk and raccoon removal on nesting ducks is expected to be similar to those documented during an experimental control study conducted from 1986-89. Skunks and raccoons were removed during this study with kill traps and live traps from early March until mid-July. A total of 118 skunks and 43 raccoon were removed (Attachment 2). The average number caught per year totaled 30 skunk and 11 raccoon.

Due to yearly variations in the number of traps and length of trapping period the number of skunk and raccoon caught were combined and trapping success determined by the number of animals caught per 100 trap-nights. These figures allowed for comparisons between years and served as an index to the relative abundance of skunk and raccoon population (Attachment 3)

A refuge study was conducted from 1985-91 to evaluate duck nesting response to skunk and raccoon removal. The study included one year (1985) of pre-removal, four years of removal (1986-89) and two

years of post-removal (1990-91).

Standardized methods were used to locate nests with hen nest success determined by the modified Mayfield method. The average duck nesting success for all habitats combined was only 19% in 1985 when no predator control was employed (Attachment 3). Following the spring removal of 62 skunk and 18 raccoon in 1986 nest success increased to 72%. Nesting success remained above 70% in 1987 and 1988 and dropped to 62% in 1989. When between year comparisons are made it is apparent that there is an inverse relationship between relative abundance of skunks and raccoons (ie, animals caught/100 trapnights) and nest success. When relative abundance of skunks and raccoons decrease nesting success increases (ie, 1986 to 1987) and when relative abundance increases nesting success decreases (ie, 1988 to 1989). Simply stated, when the refuge has high numbers of predators the upland nesting success is low. This fact has been further documented by the decline of nesting success during the two years since removal stopped. In 1990 nest success dropped slightly and in 1991 it fell to 38%. This downward trend is related to increased skunk and raccoon populations and is expected to continue without skunk and raccoon removal.

An important question that needs to be addressed when considering the management of skunk and raccoon populations to increase nesting success is at what level of nesting success is removal warranted and how long should it continue?

Management decisions should be based on sound biological data and careful analysis of the data. The BLNWR database includes records for 3314 duck nests studied from 1985-91. This database includes records for studies conducted by refuge personnel from 1985-88 and 1990-91 and studies by Patuxent Wildlife Research Center and the University of Montana in 1989. Refuge studies were replicated on the same fields. The two other studies were independent of refuge studies and are not as useful in making comparisons between years.

The refuge data as stated above show the relationship between duck nesting success and predator removal. During five of seven years the combined Mayfield nest success of the four major habitat types exceeded 60%. But a review of the data for each of the habitat types reveals a wide range of variance between years (Attachment 4). For example in 1985 before removal the nest success for NGL and DNC was near 10% while shorelines and dikes were near 40%.

Following spring removal in 1986, DNC, shoreline and dike success increased to approximately 80% but NGL was only 57%. In 1987 success was nearly identical to 1986 for all habitats. In 1988 there was an increase in skunk and raccoon relative abundance that was reflected in an increase in the animals caught/100 trapnights from .54 to .62. Associated with this increase was a slight reduction in nest success from 74 to 72% for all habitats combined. Habitats that experienced drops in success included NGL, DNC and

shorelines. During 1989 the relative abundance increased from .62 to .83 animals/100 trapnights and the success for all habitats dropped from 72 to 62%. DNC and NGL success increased and dike and shoreline habitats dropped. Some of this change is probably related to the different methods employed during nest searches.

The first nesting season after removal stopped, 1990, the overall Mayfield dropped although DNC and shorelines increased and NGL and dikes decreased. In 1991 success dropped in all habitats and all types combined.

A review of these data indicated the importance of examining the overall Mayfield nest success and individual habitat type success. Skunk and raccoon control is warranted and should be continued as long as Mayfield nest success is 60% or less in any of the four major upland nesting habitats. When success rises above 60% the removal of skunks and raccoons should be terminated until success falls below 60%.

Results of these studies clearly demonstrate that the removal of skunks and raccoons at BLNWR can dramatically increase duck nesting success. The high nesting success at BLNWR achieved with predator management is unique and has not been reported for any other waterfowl refuge in the country. The unique features believed responsible for this success are the physical characteristics of the refuge and the composition of the predator community. The small size and the series of dikes and roads that bisect the refuge allow for easy trap placement and provide good trap coverage of the refuge uplands. Equally, if not more, important is the composition of the predator community. Benton lake has only two major mammalian nest predators and both of these species are easily captured. Red foxes that annually take 900,000 nesting hens (Sargeant et. al. 1984) and destroy thousands of nests in the prairie pothole region are nearly absent from the refuge predator community. Coyotes are present but have little impact on nesting ducks and are believed responsible for excluding red fox (Martin 1990). Avian nest predation is limited with an occasional nest destroyed by a California or ring-billed gull. Two species that exert considerable predation pressure throughout their range, the American crow and Black-billed magpie, are rarely seen during the nesting season.

The trapping and removal of skunks and raccoons will increase the nesting success of all species of waterfowl but will especially benefit upland nesters including pintail, gadwall, mallard, blue/cinnamon teal, wigeon and lesser scaup.

C. Social Considerations

The proposed action is not expected to affect the public use opportunities available on the refuge. Live traps will be used in areas open to the public but placement will be made so that traps are not visible from the roads.

The economic loss resulting from the removal of skunks and raccoons is expected to be minimal. Recreational opportunities off refuge in terms of public hunting and trapping of these species will be slightly reduced.

Costs to administer the program including salaries, vehicles and supplies are expected to be \$1000-1200 annually.

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Warhurst, Rick. Personal communication. Ducks Unlimited, Inc. North American Habitat Office. Bismarck, North Dakota.

CONSULTATION & COORDINATION

The draft Operational Plan/Environmental Assessment was sent to the following individuals for comment and review.

Margaret Adams, President, Upper Missouri River Breaks Audubon Chapter, Great Falls, MT.

Mike Aderhold, Region 4 Supervisor, Montana Department of Fish, Wildlife and Parks, Great Falls, MT.

John Cornely, Region 6 Migratory Bird Coordinator, U.S. Fish & Wildlife Service, Denver, CO.

Janet Ellis, Program Director, Montana Audubon, Helena, MT.

Hank Fisher, Defenders Of Wildlife, Missoula, MT.

David Genter, Program Director, Montana Natural Heritage Program, Helena, MT.

Jeff Herbert, Waterfowl Coordinator, Montana Department of Fish, Wildlife and Parks, Helena, MT.

News Release. A news release was sent to the Great Falls Tribune on December 13, 1991. Public comments will be accepted through December 31, 1991.

Executive Order

BENTON LAKE BIRD REFUGE, MONTANA

It is hereby ordered that the unappropriated public lands hereinafter described in terms of the public-land surveys, and shown on the diagram hereto attached and made a part of this order, situated at Benton Lake in the State of Montana, in Ts. 22 and 23 N., R. 3 E., and in T. 22 N., R. 4 E., P. M., be and the same are hereby reserved and set apart for the use of the Department of Agriculture as a refuge and breeding ground for birds, subject to existing valid rights:

Principal Meridian

In T. 22 N., R. 3 E., W $\frac{1}{2}$ and S $\frac{1}{2}$ SE $\frac{1}{4}$ Sec. 2, all Secs. 3, 4 and 5, E $\frac{1}{2}$ E $\frac{1}{2}$, SW $\frac{1}{4}$ SE $\frac{1}{4}$, Lots 5, 6, and E $\frac{1}{2}$ SW $\frac{1}{4}$ Sec. 6, NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 7, N $\frac{1}{2}$ N $\frac{1}{2}$, SE $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ SW $\frac{1}{4}$ and SE $\frac{1}{4}$ Sec. 8, all Secs. 9, 10 and 11, NW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 12, NW $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ N $\frac{1}{2}$ and S $\frac{1}{2}$ Sec. 13, all Secs. 14 and 15, N $\frac{1}{2}$, E $\frac{1}{2}$ SW $\frac{1}{4}$ and SE $\frac{1}{4}$ Sec. 16, N $\frac{1}{2}$ Sec. 17, NE $\frac{1}{4}$, NE $\frac{1}{4}$ NW $\frac{1}{4}$ and S $\frac{1}{2}$ NW $\frac{1}{4}$ Sec. 18, NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 21, N $\frac{1}{2}$ N $\frac{1}{2}$ and SE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 22, all Secs. 23, 24 and 25, NE $\frac{1}{4}$, N $\frac{1}{2}$ NW $\frac{1}{4}$ and NE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 26;

In T. 23 N., R. 3 E., SE $\frac{1}{4}$ Sec. 34, NW $\frac{1}{4}$ SW $\frac{1}{4}$ and S $\frac{1}{2}$ SW $\frac{1}{4}$ Sec. 35;

In T. 22 N., R. 4 E., SW $\frac{1}{4}$ NW $\frac{1}{4}$, NW $\frac{1}{4}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ SW $\frac{1}{4}$ and SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 18, W $\frac{1}{2}$ E $\frac{1}{2}$ and W $\frac{1}{2}$ Sec. 19, W $\frac{1}{2}$ E $\frac{1}{2}$ and W $\frac{1}{2}$ Sec. 30, and N $\frac{1}{2}$ Sec. 31.

It is unlawful, within this reservation, (a) to hunt, trap, capture, wilfully disturb, or kill any wild animal or bird of any kind whatever, or take or destroy the eggs of any wild bird, to occupy or use any part of the reservation, or enter thereon for any purpose, except under such rules and regulations as may be prescribed by the Secretary of Agriculture; (b) to cut, burn or destroy any timber, underbrush, grass, or other natural growth; (c) wilfully to leave or suffer fire to burn unattended near any timber or other inflammable material; (d) after building a fire in or near any forest, timber, or other inflammable material, to leave it without totally extinguishing it; and (e) wilfully to injure, molest, or destroy any property of the United States.

Warning is expressly given to all persons not to commit any of the acts herein enumerated, under the penalties prescribed by Sections 106, 107 and 145 of Title 18, Chap. 4, United States Code, or by the act of February 18, 1929 (U. S. C. Supp. 3, Title 16, Chap. 7a, Sec. 715i).

This refuge shall be known as the Benton Lake Bird Refuge.

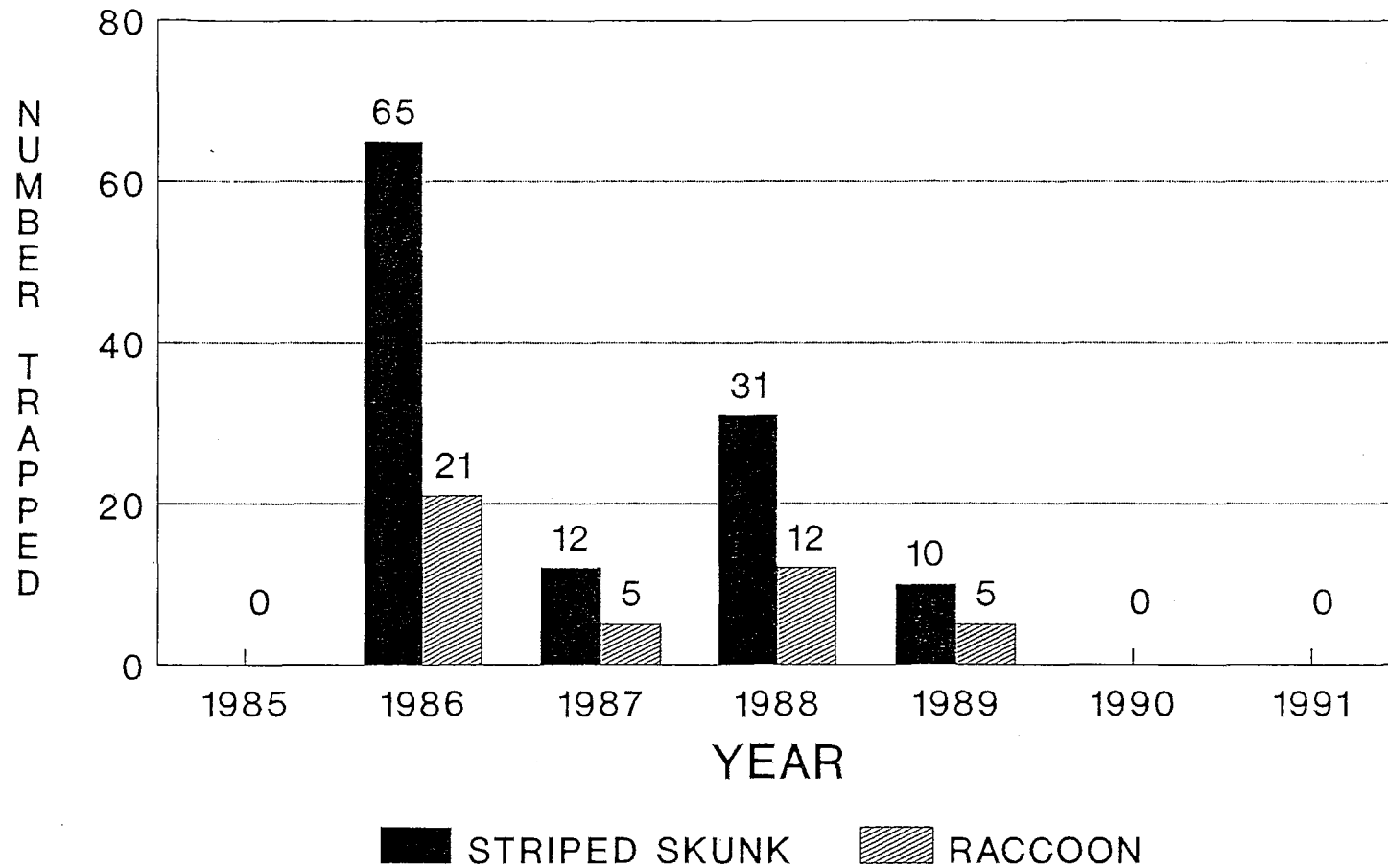
HERBERT HOOVER

THE WHITE HOUSE,

November 21, 1929.

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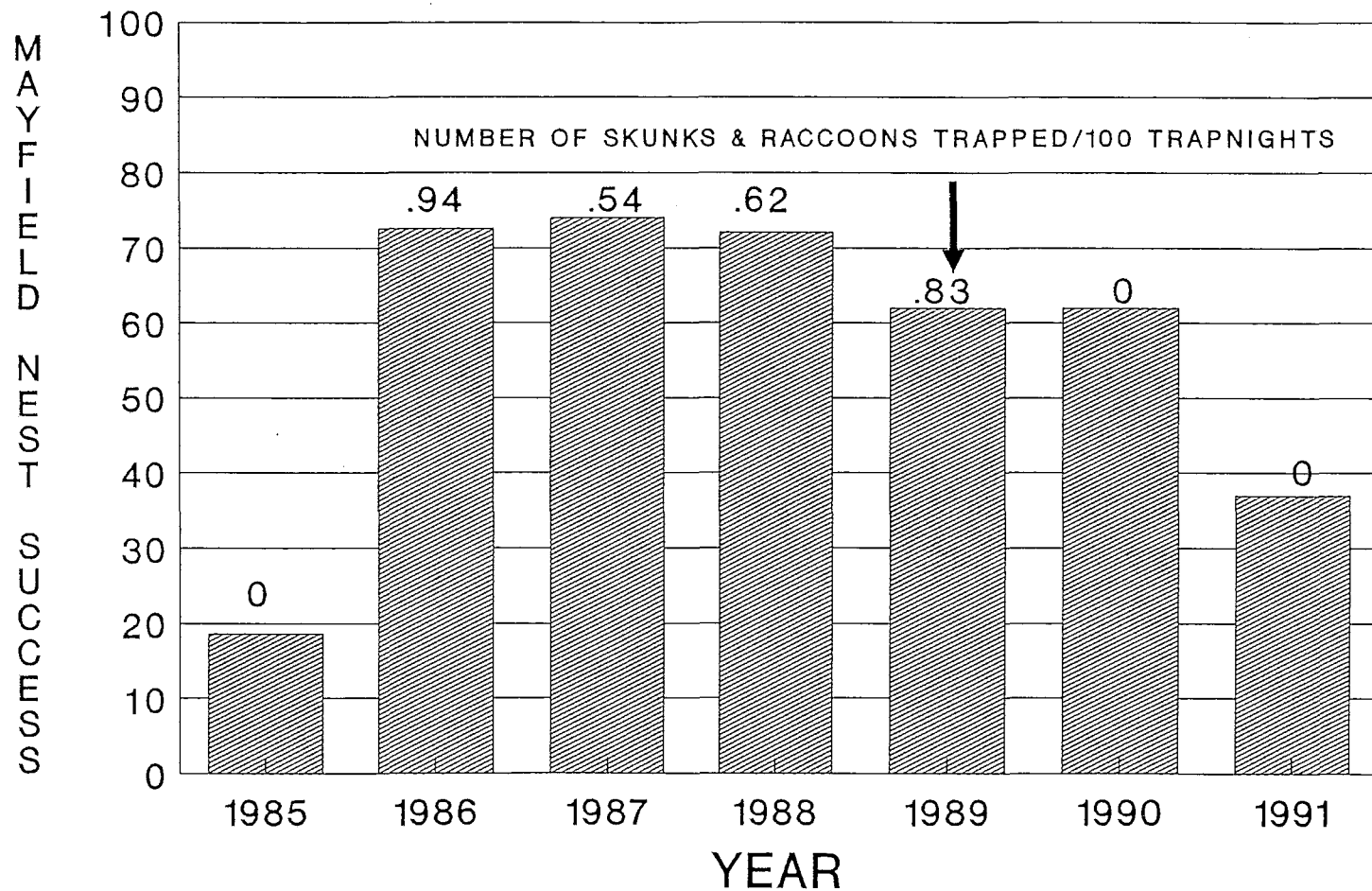
NUMBER OF SKUNKS AND RACCOONS TRAPPED 1985-91



BENTON LAKE

DUCK NEST SUCCESS

Benton Lake NWR 1985-91



DUCK NEST SUCCESS BY HABITAT

1985-1991

