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RESEARCH

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STATUS OF MARTEN IN WISCONSIN, 1985

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ABSTRACT

The status of a reintroduced marten population in the Nicolet National Forest was studied through live-trapping, winter track counts, and records of direct observations. Marten were reproducing and the population was increasing on the area. However, 89% of the marten were still within a 12-mile radius of the release site. Additional stocking in the Nicolet National Forest does not appear necessary at present to maintain a viable population.

Management recommendations include: stocking at least 100 marten over a 3-year period within the Fisher Management Unit (FMU) of the Chequamegon National Forest to accelerate expansion of the occupied marten range, a public education program explaining the relocations, continued monitoring of future population trends and range expansion through winter track counts, and maintaining mature eastern hemlock and swamp conifer stands and large den trees in areas where marten are desired.

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INTRODUCTION

The marten (Martes americana) occurred in most forested areas of Wisconsin until the mid 1800s (Les 1979). Jackson (1961) felt that areas of dense conifer-hardwood forest in the northern portion of the state likely supported an average density of 1 marten/mile^2. But, unregulated trapping and habitat changes resulting from logging, wildfires, and agricultural expansion led to their extirpation during the 1920s.

Schorger (1942) felt that marten were originally much more numerous than fisher (Martes pennanti), based on trapper and fur trader reports from 1804-70. Those reports showed approximately 9 times as many marten being taken as fisher. Only 21 marten were harvested in 1919, none in 1920, and the season was closed in 1921. Marten were extirpated during the 1920s. The last verified report of a marten came from Douglas County in 1925 (Jackson 1961), and they are presently classified as an endangered species in Wisconsin.

Two re-introduction efforts have been undertaken. In 1953, 5 marten from Montana were released on Stockton Island (Ashland County). One marten was observed there in 1972, but only a few, if any, remain now. That reintroduction effort was considered a failure.

In a second effort, the U.S. Forest Service (USFS) and the Wisconsin Department of Natural Resources (DNR) released 172 marten from Ontario and Colorado in the Fisher Management Unit (FMU) of the Nicolet National Forest from 1975-83 (Table 1). Davis (1983) described these releases in detail. Unfortunately, only 27 of the 124 marten released the first winter were females, and some appeared to be in very poor condition.

Davis (1978) radio-tagged 21 of the 124 marten released in 1975-76 to evaluate the success or failure of the reintroduction program. Six of these moved off the FMU, 2 died of predation and 1 from injuries inflicted by the radio collar. None of the females showed evidence of reproduction. He concluded that the success of the reintroduction was uncertain at that time.

The objectives of this study were to evaluate the distribution and reproductive status of the marten population 2-3 years after their release into the FMU, and to determine if additional stocking was needed to establish a self-sustaining population. Data were also obtained on population trends of the reintroduced fisher population in the area.

TABLE 1. Marten reintroductions in the Nicolet National Forest Fisher Management Unit, 1975-83.

Date	Source	Numbers Released		
		Male	Female	Total
Oct 75-Apr 76	Ontario	97	27	124
Dec 80-Mar 81	Colorado	9	10	19
Mar 81	Ontario	9	9	18
Dec 81-Jan 82	Colorado	2	2	4
Aug 82-Mar 83	Colorado	3	3	7*
Total		120	51	172

* One additional marten was released, but its sex was not recorded.

DESCRIPTION OF STUDY AREA

Field work in this study was concentrated in and near the FMU in the Nicolet National Forest (Fig. 1). This 120,000-acre area established in 1956 to protect fisher, now protects both fisher and marten from dry land trapping.

Few permanent residents live within the FMU except in 2 small communities (Argonne and Hiles) along its southern border. The Headwaters Wilderness Area (22,374 acres) lies in the center of the FMU. Tourism and wood products provide the major sources of income in the area.

Mean monthly temperatures on the study area range from 14 F in January to 67 F in July. Precipitation averages 30 inches/year with an average annual snowfall of 60 inches (Wisconsin Statistical Reporting Service 1967).

Extensive timber cutting and fires occurred on the area between 1870 and 1940. Elliott (1977) provided a detailed description of the timber types and logging activities during that period. The resulting forest habitat is characterized by parallel northeast-southwest ridges of northern hardwoods (sugar maple, red maple, basswood, white ash, yellow birch, eastern hemlock), quaking and large-tooth aspen, and jack, red, and white pine. Tamarack, black spruce, northern white cedar, balsam fir, lowland brush, and muskeg occur in the intervening lowlands. Forest management practices proposed for the area are designed to promote the northern hardwood type.

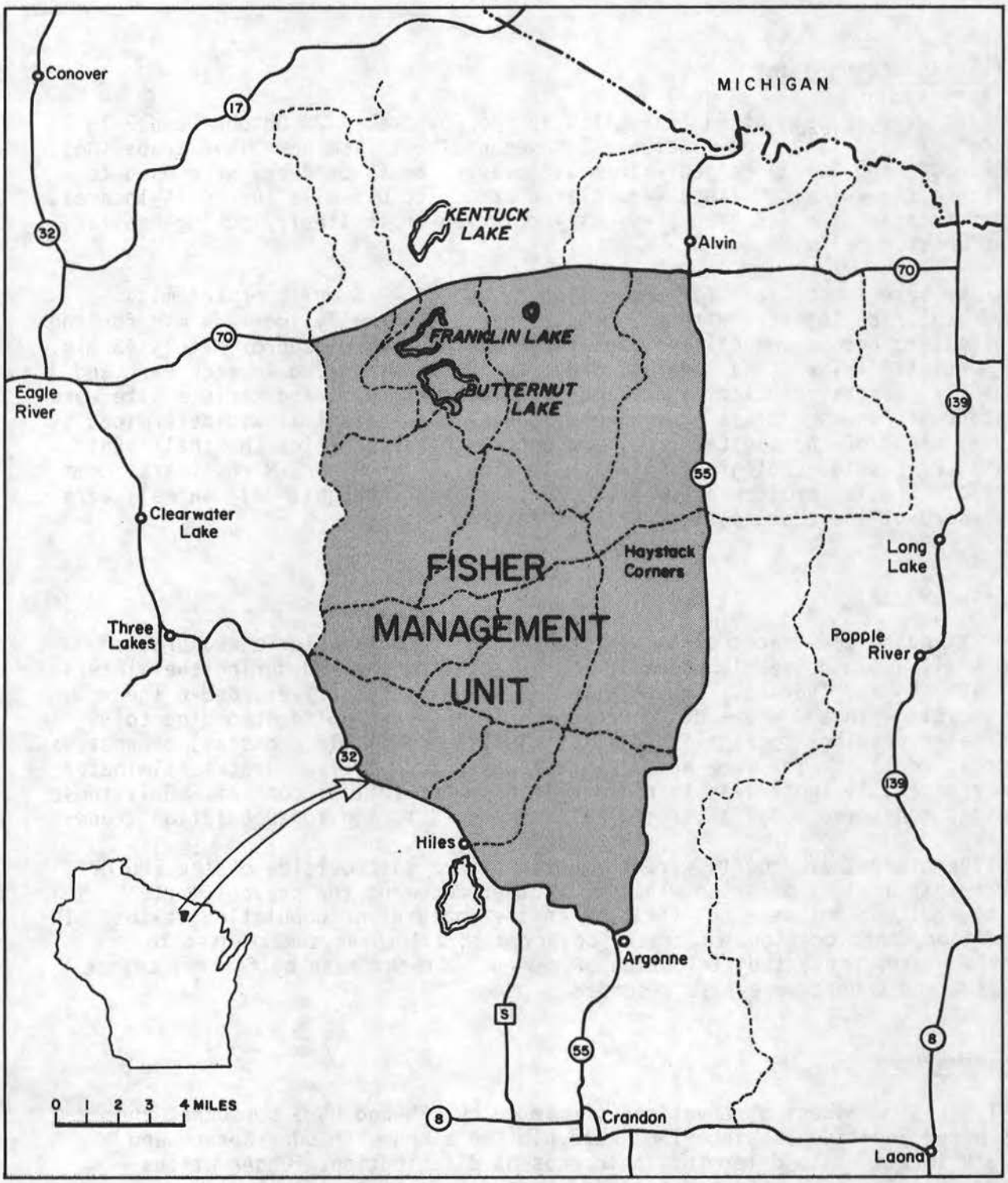

FIGURE 1. The Nicolet National Forest Fisher Management Unit.

METHODS

Trapping and Handling

Marten were trapped at 64 trap sites in the FMU from 4-27 October and 3-16 December 1983, and from 1 October-2 November 1984. Tomahawk live-traps (nos. 108, 204, and 207.5) baited with meat (beaver, beef, or deer) were used to capture the animals. Traps were placed at 0.1 to 0.5-mile intervals in areas where marten sign had been previously observed or in likely looking habitat, and checked daily.

Marten were immobilized for processing by using 5-7.5 mg/lb of ketamine hydrochloride injected with a 3 cc syringe. It normally took 2-4 min for the animals to become immobilized, and they remained so for approximately 45 min. A monel tag (Size 4, National Band and Tag Co.) was placed in each ear, and the sex, weight, physical condition, body measurements, and capture site were recorded. The age class (juvenile or adult) of each animal was determined by development of the sagital crest and dental characteristics (Marshall 1951; James P. Ludwig, Ecological Research Services, Iron River, Mich., pers. comm. 1983). Similar procedures were used on all fisher caught. All animals were released at the capture site after processing.

Track Counts

Ten standardized track counts were conducted 1-3 days after a measurable snowfall along driveable roads in and surrounding the FMU during the winters of 1983-84 and 1984-85. Two observers, including the driver, drove the transects with a 4-wheel-drive vehicle. Tracks were noted according to odometer readings to facilitate later plotting; multiple crossings of what was considered to be the same animal were reduced to 1 tally. Tracks eliminated were generally those less than 1/4 mile from the initial contact. Only those counts conducted 1 day after snowfall were used to monitor population trends.

Twelve other track counts were conducted either just outside of the FMU or more than 1 night after snowfall to further document the present marten distribution, but were not included in the analyses of population status. In addition, the locations of tracks observed on all surveys were used to document the present distribution of marten. Tracks made by fisher, coyote, otter, and bobcat were also recorded.

Observations

All verified direct observations of marten by DNR and USFS personnel and by other individuals since 1982 were plotted along with our capture and track locations to determine their present distribution. Observations made prior to 1982 were not included because, in several instances, marten were observed considerable distances from the release sites during the reintroduction period but apparently did not become established in these areas.

RESULTS AND DISCUSSION

Trapping Success

We captured 17 marten on the FMU 68 times in 1,808 trap-nights (Table 2). An additional marten was caught by a UW-Stevens Point student while sampling small mammal populations on the study area. Forty-seven fisher (19 males; 28 females) were also captured and marked during this study.

It is unlikely that either the sex or age ratios of the marten captured represented the true structure of the reintroduced population. Only 3 of the 18 marten captured were females, and the proportion of juveniles dropped from 80% in 1983 down to 17% in 1984. Strickland et al. (1982) reported that most trapping efforts produced disproportionate numbers of males and juveniles. They attributed this to the greater mobility and, perhaps, lesser wariness of these 2 classes.

Marten were caught at 18 (28%) of the trap sites and fisher at 29 (45%). The greatest number of individual marten captured at a single trap site in 1 year was 3, and the greatest number of fisher caught was 4. Ten trap sites produced both marten and fisher in the same year.

No serious problems were encountered in immobilizing the animals. The length of time from injection to immobilization averaged 3 min (ranged from 1-5 min), and all animals recovered. The only significant trap injuries observed were slight tooth damage to 1 marten and 1 fisher. Foot pad, lip, and nose abrasions were noted on 11 of the fisher captured.

Population Status

None of the marten captured had been initially reintroduced from Ontario or Colorado. Ten of those captured were juveniles born after the last animals were reintroduced. All of the reintroduced marten had been either ear-tagged or tattooed), and none of the adults we captured had marks or tags. These data provided the first documentation of marten reproduction on the FMU following the reintroduction.

Four of the 10 marten captured in 1983 were recaptured in 1984. But, sample sizes were too small to adequately determine an annual survival rate for marten on the FMU.

The average number of marten tracks observed/100 miles in the FMU increased from 15.8 during the winter of 1983-84 to 37.5 in 1984-85 (Table 3). The average number of fisher tracks observed also more than doubled during this period. Coyote tracks were observed at about the same rate as fishers, but otter and bobcat tracks occurred much less frequently.

Minimum daily temperatures appeared to account for much of the variation in individual track count results. The average number of marten tracks observed/100 miles was 6 times greater when minimum temperatures were above 0 F than when they were below 0 F, and the average number of fisher tracks was almost 3 times higher. Although Johnson (1984) found that snow depths affected track count results, our surveys were not affected because snow depths were fairly uniform (between 11 and 16 inches) during most of the track counts.

TABLE 2. Marten captured in the Fisher Management Unit, 1983-84.

Sex	Age Class	Date of First Capture	Weight When First Captured (lb)	No. of Times Captured
M	Juv	4 Oct 83*	1.9	19
M	Adult	15 Oct 83	2.5	6
M	Juv	16 Oct 83*	2.0	2
M	Juv	18 Oct 83	2.0	2
M	Juv	22 Oct 83	1.5	4
M	Juv	4 Dec 83*	2.2	6
M	Juv	4 Dec 83	1.7	2
M	Adult	5 Dec 83	2.0	1
F	Juv	14 Dec 83*	1.3	4
M	Juv	15 Dec 83	2.1	2
M	Juv	16 Jul 84**	1.7	1
F	Juv	2 Oct 84	1.4	1
F	Adult	4 Oct 84	1.5	1
M	Adult	12 Oct 84	2.5	4
M	Adult	16 Oct 84	2.0	10
M	Adult	19 Oct 84	2.2	1
M	Adult	25 Oct 84	2.0	2
M	Adult	31 Oct 84	3.0	1

* Recaptured in 1984.
** Caught by John D. Burk, student intern, UW-Stevens Point.

Numbers of marten tracks observed during this study were compared with those observed on track counts run by DNR Wildlife Management personnel in and near the FMU in 1982 and 1983 (Table 4). These showed a steady increase from 4.8 tracks/100 miles in 1982 to 23.7 in 1985. It is unlikely that the marten population increased five-fold as indicated by the track counts, but it undoubtedly has increased substantially within the FMU since 1982. Numbers of fisher tracks observed also increased substantially during this period.

Present Distribution

A total of 199 marten capture, track, and direct observation locations were obtained and plotted from 1982-85 (Fig. 2). These occurred in 61 sections within 21 townships, but 89% were within 12 miles of the release sites. Although the marten population is increasing, its present distribution is still very limited. Marten have been reintroduced into the Huron Mountains and the Ottawa National Forest in the Upper Peninsula of Michigan (Churchill et al. 1981). The release sites were only 35-80 miles from the FMU, so these animals could also contribute to the reestablishment and expansion of marten in Wisconsin.

TABLE 3. Tracks observed on track count surveys within the Fisher Management Unit, winters of 1983-84 and 1984-85.

Date	Minimum Temperature (F)	Snow Depth (inches)	Miles Run	Numbers of Tracks Observed				
				Marten	Fisher	Coyote	Bobcat	Otter
17 Jan 84	-27	16	18.9	1	5	5	0	0
17 Jan 84	-27	16	14.4	0	1	6	0	0
24 Jan 84	+10	15	24.5	3	11	10	0	0
14 Mar 84	+18	12	30.7	10	19	18	0	2
1983-84 Totals			88.5	14	36	39	0	2
Tracks/100 Miles				15.8	40.7	44.1	--	2.3
13 Dec 84	+3	6	28.9	22	30	23	3	0
13 Dec 84	+3	6	10.0	6	25	23	0	0
15 Dec 84	+13	8	9.7	1	3	8	0	1
23 Jan 85	+9	12	28.8	12	25	23	0	0
31 Jan 85	-28	11	30.5	4	15	16	2	0
8 Feb 85	-29	15	12.1	0	3	0	0	0
1984-85 Totals			120.0	45	101	93	5	1
Tracks/100 Miles				37.5	84.2	77.5	4.2	0.8

TABLE 4. Frequency of pine marten and fisher tracks observed on track count surveys in and near the Fisher Management Unit, 1982-85.

Winter	Miles Run	Pine Marten		Fisher	
		No. of Tracks	Tracks/ 100 Miles	No. of Tracks	Tracks/ 100 Miles
1981-82*	84.2	4	4.8	17	20.2
1982-83*	115.0	10	8.7	30	26.1
1983-84**	166.4	17	10.2	59	35.5
1984-85**	206.6	49	23.7	143	69.2

* Track counts run by Wildlife Management personnel.
** Standardized track counts run by Research personnel.

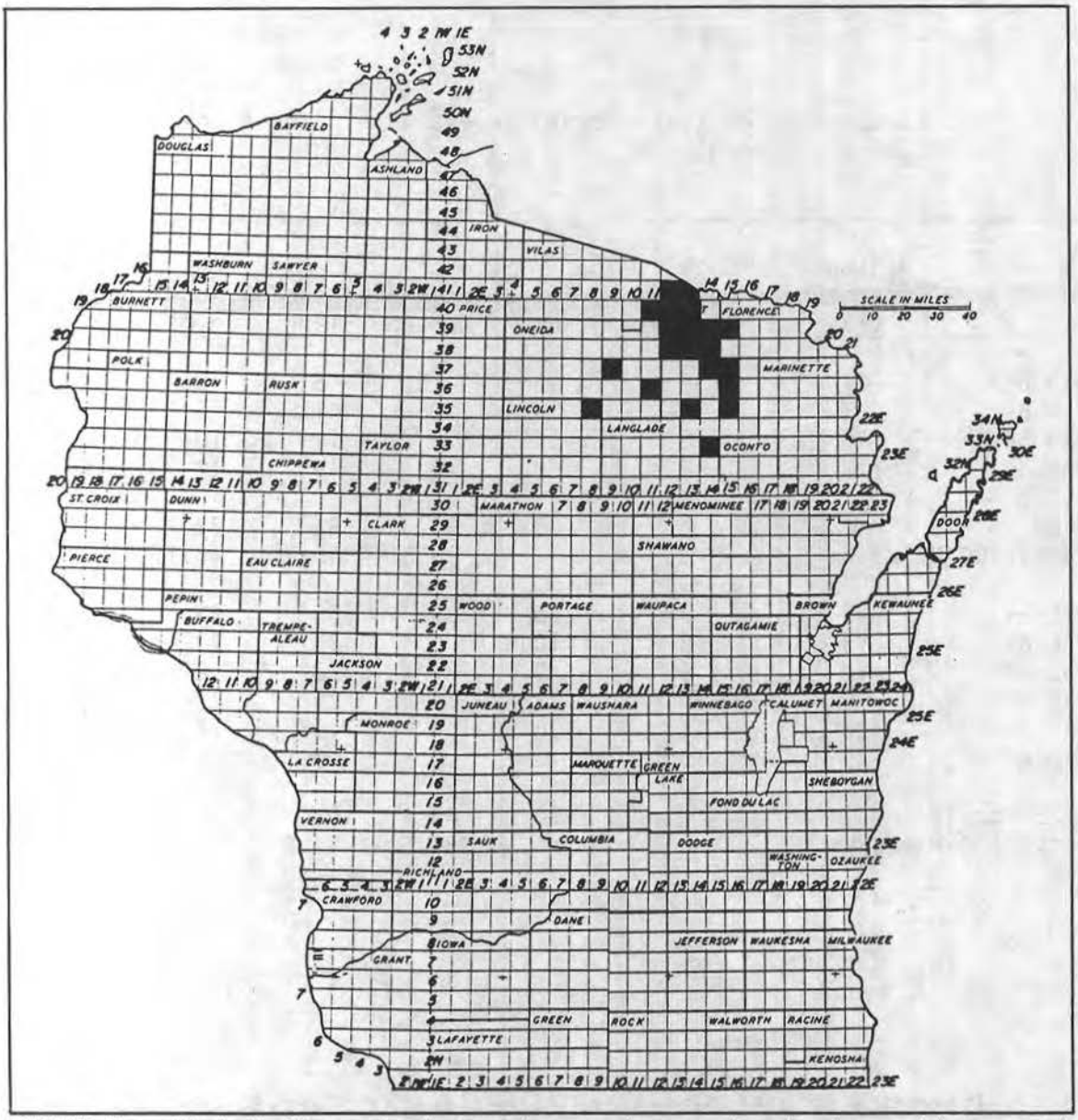

FIGURE 2. Distribution of pine marten captures, track observations, and sightings by township, 1982-85.

The highest concentrations of marten observations and our best trapping success occurred in the vicinities of Butternut and Franklin lakes, Haystack Corners, and in an area just north of Hiles (Fig. 3). Burk (1985) compared the forest composition, den site availability, and small mammal populations in these areas to those in areas with fewer marten. He concluded that marten appeared to be selecting larger coniferous stands (primarily hemlock-hardwood and swamp conifer), and that the availability of den sites was very important. Small mammal populations appeared to be readily available in all the areas he sampled.

This contrasted with Davis' (1978) findings immediately after the marten reintroduction into the FMU. He found that marten use of habitat types was proportional to their availability.

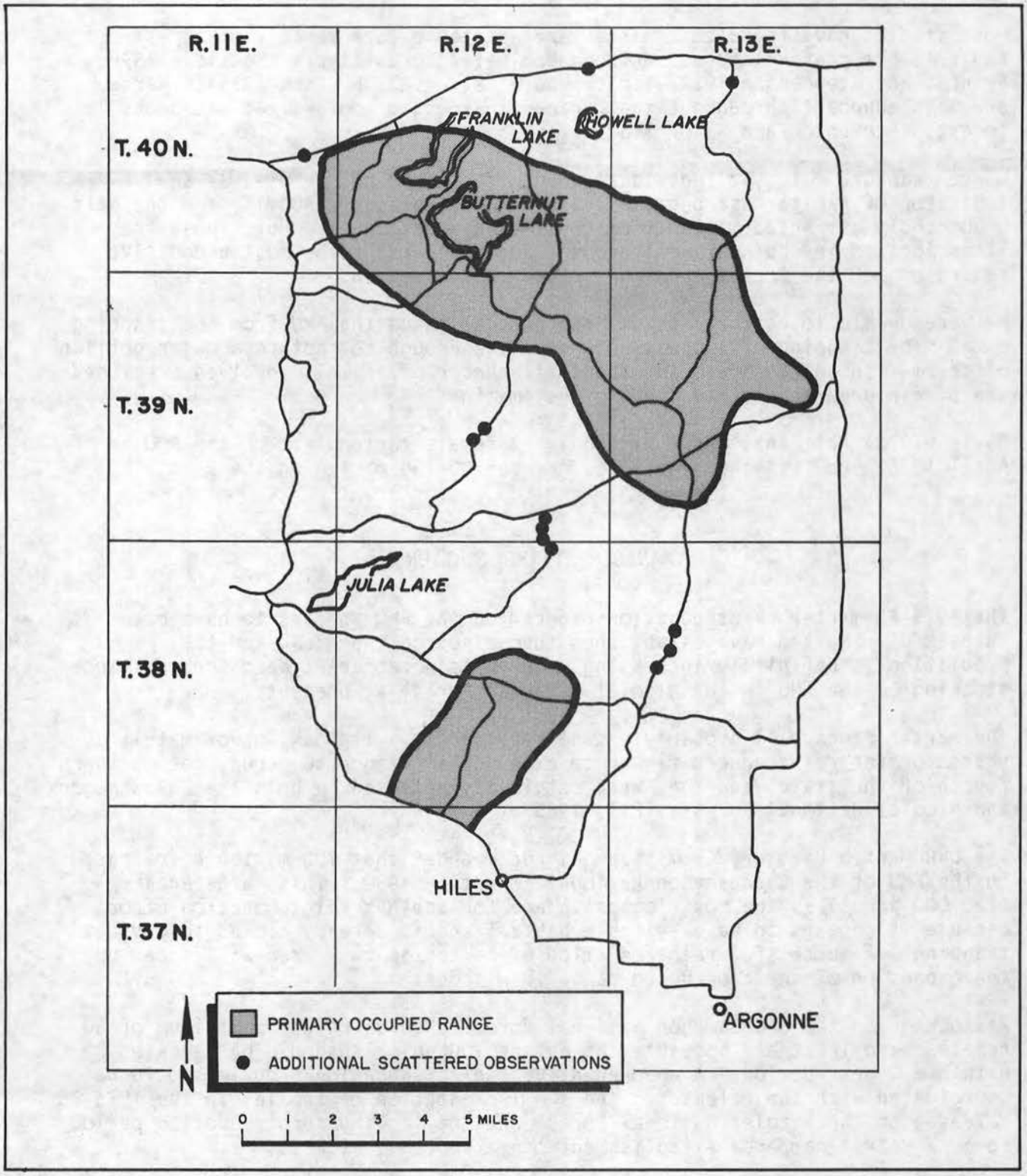

FIGURE 3. Primary occupied marten range within the Fisher Management Unit, 1985.

Most studies have found that marten are adaptable to a variety of forest habitats but prefer mature, softwood-dominated forest types (Soutiere 1978, Francis and Stephenson 1972, Strickland et al. 1982, Buskirk 1983). Marten are less abundant throughout their range in young or pole-sized deciduous forests (Steventon and Major 1982).

Marten capture rates at individual trap sites could not be used as an indicator of habitat use because traps were not placed randomly, and the bait undoubtedly attracted marten from considerable distances. But, those trap sites located in and near coniferous swamps appeared to be most productive, regardless of the forest type the traps were placed in.

We were unable to estimate the marten population on the FMU from the trapping data. The trapping effort was not intensive enough to capture a major portion of the marten on the area, and the small number of animals involved precluded use of capture/recapture methods of estimation.

Davis (1978) felt that there were only 12 female marten left on the FMU as of April 1976. We feel that there now may be 100-150 marten on the area.

MANAGEMENT IMPLICATIONS

The 1975-83 marten reintroduction program on the FMU appears to have been successful. Marten have established themselves on the area, and the population is definitely increasing. There is no apparent need for additional stocking on the FMU in the Nicolet National Forest at present.

The marten range will probably expand very slowly. It took approximately 20 years for the reintroduced fisher to expand their range to occupy the northern fourth of the state, and they were originally released in both the Chequamegon and Nicolet National Forests (Pils 1985).

The DNR Marten Recovery Committee has recommended that 100 marten be released in the FMU of the Chequamegon National Forest by 1990. This large area (220,000 acres) is the most logical place for another reintroduction effort because it appears to have suitable habitat and is already closed to dry-set trapping. A successful reintroduction of marten in this area will speed up the expansion of their occupied range in Wisconsin.

Restocking on the Chequamegon National Forest should include a minimum of 50 females, and if at all possible the entire 100 animals should be released within a 1-year period. A comprehensive public education program should be coordinated with the releases. The small proportion of females in the 1975-76 releases on the Nicolet National Forest and the lengthy reintroduction period (over 7 years) hampered establishment of marten on that area.

Many of the marten released from 1975-83 in the Nicolet National Forest were in very poor condition from being held in cold and wet conditions when trapped and transported. Their survival was further jeopardized by being released in a strange area with deep snow cover and extremely cold temperatures. Releases on the Chequamegon National Forest should occur during the fall when temperatures are moderate, travel is not restricted by snow, and prey are more available. This will also give the marten time to become acquainted with the area before enduring the rigors of winter. It will be most economical and

efficient to contract for the marten with a reliable, experienced supplier. All of the marten should be tattooed (inside the ear) and ear-tagged before release. Blood samples should be taken and tested for any disease indicators. In addition, blood samples and other tissue material should be archived for future genetic reference.

Previous studies have reported conflicting results regarding marten movements following quick releases (animals released immediately) and slow releases (animals confined in a holding cage on the area for several days before being released). Davis (1983) found that movement of slow-released marten were significantly less than those of animals that were quick-released. Conversely, Churchill et al. (1981) found that "quick-released marten established home ranges near their release sites much more often than slow-released individuals." The slow-release procedure requires considerable time and labor and, therefore, should not be considered absolutely necessary for another successful reintroduction effort.

Winter track counts should be continued to document future population trends and range expansion in the marten population. Marten populations fluctuate annually with prey populations (Strickland et al. 1982), but more intensive surveys may be necessary if it appears that there have been longer-term declines in the marten population or its range.

Although this study was not designed to develop habitat management guidelines, much information was obtained from the literature and our own field experience that can be used to maintain and enhance marten habitat in and around the FMU. Generally, forest management practices should promote an abundance of mature conifer stands and den sites distributed throughout a generally mature forest.

Soutiere (1979) concluded that marten occurred in managed forests in Maine and that the impact of timber harvesting depended on the severity of the cut. Areas of extensive forest managed by selective harvest with scattered, mature conifer stands supported good populations of marten.

Important conifer stands for marten in eastern North America include eastern hemlock (de Vos 1952, Churchill et al. 1981, Taylor and Abrey 1982), boreal spruce-fir (Mech and Rogers 1977, Soutiere 1979, Raine 1982, Steventon and Major 1982), and northern white cedar (de Vos 1952, Burk 1985). Den sites can be in large snags, hollow deciduous trees located in mature conifer stands (Churchill et al. 1981), and hollow northern white cedars (Burk 1985).

Marten habitat should be enhanced if the guidelines in Nicolet Supplement No. 15 (U.S. Forest Service 1981) on old growth and Nicolet Supplement No. 18 (U.S. Forest Service 1984) on reserve trees are followed during normal forest management activities. These guidelines state that up to 5% of each compartment should be kept in old growth and specify the number, species, and size of den trees to maintain for each 40 acres. The guidelines could be expanded to include a greater number of mature conifer stands and den sites in areas managed more intensively for marten.

SUMMARY

1. Seventeen marten were trapped 68 times on the FMU. A disproportionate number were males and juveniles.

2. None of the marten captured were animals from the initial re-introductions. Ten marten captured were juveniles born after the last animals were introduced.

3. Track counts observed/100 miles increased markedly from 15.8 in 1983-84 to 37.5 in 1984-85.

4. Marten are presently distributed in 61 sections in 21 townships, but most were within 12 miles of the release site. They appeared to be selecting for mature, softwood-dominated forest types with sufficient numbers of den sites.

5. No further marten should be stocked on the Nicolet National Forest, but 100 marten should be reintroduced into the FMU on the Chequamegon National Forest, accompanied by a public education program explaining the relocations.

6. Forty-seven fisher were also captured on the FMU. Fisher track counts more than doubled from 1983-84 to 1984-85.

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APPENDIX. Scientific names of plants and animals used in text.*

Animals	Plants
Beaver, *Castor canadensis*	Aspen,
	Large-tooth, *Populus grandidentata*
Bobcat, *Lynx rufus*	Quaking, *Populus tremuloides*
Coyote, *Canis latrans*	Balsam fir, *Abies balsamea*
Fisher, *Martens pennanti*	Basswood, *Tilia americana*
Marten, *Martens americana*	Black spruce, *Picea mariana*
Otter, *Lutra canadensis*	Eastern hemlock, *Tsuga canadensis*
	Northern white cedar, *Thuja occidentalis*
	Maple,
	Red, *Acer rubrum*
	Sugar, *Acer saccharum*
	Pine,
	Jack, *Pinus banksiana*
	Red, *Pinus resinosa*
	White, *Pinus strobus*
	Tamarack, *Larix laricina*
	White ash, *Fraxinus americana*
	Yellow birch, *Betula lutea*

* Scientific names of animals from Jackson (1961) and of plants from Gleason and Cronquist (1965).

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