

independent estimates were 1,500 and 1,750 wolves in at least 233 packs (Fuller *et al.* 1992).

During the winter of 1997–98, a Statewide wolf population and distribution survey was repeated by MN DNR, using methods similar to those of the two previous surveys. Field staff of Federal, State, tribal, and county land management agencies and wood products companies were queried to identify occupied wolf range in Minnesota. Data from five concurrent radio telemetry studies tracking 36 packs, representative of the entire Minnesota wolf range, were used to determine average pack size and territory area. Those figures were then used to calculate a Statewide estimate of pack numbers and the overall wolf population in the occupied range, with single (nonpack) wolves factored into the estimate (Berg and Benson 1999).

The 1997–98 survey concluded that approximately 2,445 wolves existed in about 385 packs in Minnesota during that winter period. This figure indicates the continued growth of the Minnesota wolf population at an average rate of about 3.7 percent annually. The Minnesota wolf population has shown approximately this average annual rate of increase since 1970 (Berg and Benson 1999, Fuller *et al.* 1992). No rigorous survey of the Minnesota wolf population has been conducted since the winter of 1997–98, but biologists generally accept that the population has increased, and will continue to increase, perhaps at a slower rate and with occasional fluctuations (Mech 1998, Paul 2001).

Simultaneous with the increase in wolf numbers in Minnesota there has been a parallel expansion of the area in which wolves are routinely found. During 1948–53 the major wolf range was estimated to be about 31,080 sq km (11,954 sq mi) (Stenlund 1955). A 1970 questionnaire survey resulted in an estimated wolf range of 38,400 sq km (14,769 sq mi) (calculated by Fuller *et al.* 1992 from Leirfallom 1970). Fuller *et al.* (1992), using data from Berg and Kuehn (1982), estimated that Minnesota primary wolf range included 36,500 sq km (14,038 sq mi) during winter 1978–79. By 1982–83, pairs or breeding packs of wolves were estimated to occupy an area of 57,050 sq km (22,000 sq mi) in northern Minnesota (Mech *et al.* 1988). That study also identified an additional 40,500 sq km (15,577 sq mi) of peripheral range, where habitat appeared suitable but no wolves or only lone wolves existed. The 1988–89 study produced an estimate of 60,200 sq km (23,165 sq mi) as the contiguous wolf range at that time in Minnesota (Fuller

*et al.* 1992), an increase of 65 percent over the primary range calculated for 1978–79. The 1997–98 study concluded that the contiguous wolf range had expanded to 88,325 sq km (33,971 sq mi), a 47 percent increase in 9 years (Berg and Benson 1999). The wolf population in Minnesota has recovered to the point that its contiguous range covered approximately 40 percent of the State during 1997–98.

#### Wisconsin

Wolves were considered to have been extirpated from Wisconsin by 1960. No formal attempts were made to monitor the State's wolf population from 1960 until 1979. From 1960 through 1975 individual wolves and an occasional wolf pair were reported. However, no evidence exists of any wolf reproduction occurring in Wisconsin, and the wolves that were reported may have been dispersing animals from Minnesota.

Wolf population monitoring by the WI DNR began in 1979 and estimated a Statewide population of 25 wolves at that time. This population remained relatively stable for several years, then declined slightly to approximately 15 to 19 wolves in the mid-1980s.

In the late 1980s, the Wisconsin wolf population began an increase that continues today. WI DNR intensively monitors its wolf population, using a combination of aerial, ground, and satellite radio telemetry, snow tracking, and wolf sign surveys (Wydeven *et al.* 1995, 2001a). The number of wolves in each pack is estimated based on the totality of ground and aerial observations made of the individual packs over the winter. During the winter of 2000–01, 30 of Wisconsin's 66 wolf packs (45 percent) had members carrying active radio transmitters much of the season. Twenty-seven of these monitored wolves were located 20 or more times during the mid-September to mid-April period. Five additional radio-tracked wolves were loners, and one was in an adjacent Minnesota pack. Minimum wolf population estimates (late-winter counts) for 1994 through 2001 are 57, 83, 99, 148, 178, 205, 248, and 257 animals, comprising 14, 18, 28, 35, 47, 57, 66, and 66 packs respectively (Wydeven *et al.* 2001a). WI DNR preliminarily estimated that about 320 wolves in 70 to 80 packs were in the State in late winter 2001–2002 (WI DNR 2002, Wydeven *et al.* 2002). Because the monitoring methods focus on wolf packs, it is believed that lone wolves are undercounted in Wisconsin, and that, as a result, these population estimates are probably slight underestimates of the actual wolf population within the State.

In 1995, wolves were first documented in Jackson County, Wisconsin, an area well to the south of the northern Wisconsin area occupied by other Wisconsin wolf packs. The number of wolves in this central Wisconsin area has dramatically expanded since that time. During the winter of 2000–2001, there were 34 wolves in 9 packs, plus 3 lone wolves, in and around Jackson County (Wydeven *et al.* 2001a).

During the winter of 2000–2001, 10 wolves occurred on Native American reservations in Wisconsin, and this increased to at least 13 wolves in the winter of 2001–2002 (WI DNR 2002, Wydeven pers. comm. 2002). These animals were on the Bad River (8) and Lac Courte Oreilles Reservations (5). There also is evidence of individual wolves on the Lac du Flambeau and Menominee Reservations, with a high likelihood of wolf packs developing on these reservation in the near future (Wydeven pers. comm. 2002).

Wolf numbers in Wisconsin alone greatly surpassed the second population goal of 200 animals identified in the Eastern Plan and exceeded its reclassification criterion several years ago. Although population growth nearly stalled between 1999–2000 and 2000–2001, a resumption of the steady upward trend was again quite apparent in the preliminary late-winter 2001–2002 estimate of 320. (Refer to the *Disease or predation* section below for additional discussion.)

#### Michigan

Michigan wolves were extirpated as a reproducing population long before they were listed as endangered in 1974. Prior to 1991, and excluding Isle Royale, the last known breeding population of wild Michigan wolves occurred in the mid-1950s. As wolves began to reoccupy northern Wisconsin, the Michigan Department of Natural Resources (MI DNR) began noting single wolves at various locations in the Upper Peninsula of Michigan. In the late 1980s, a wolf pair was verified in the central Upper Peninsula and produced pups in 1991. Since that time, wolf packs have spread throughout the Upper Peninsula, with immigration occurring from both Wisconsin on the west and Ontario on the east. They now are found in every county of the Upper Peninsula.

The MI DNR annually monitors the wolf population in the Upper Peninsula by intensive late winter tracking surveys that focus on each pack. Pack locations are derived from previous surveys, citizen reports, and ground tracking of radio-collared wolves. During the winter of 2000–2001 at least 50 wolf packs