

Minnesota have expanded into the more agricultural portions of central and northwestern Minnesota, northern and central Wisconsin, and the entire Upper Peninsula of Michigan. Habitats currently being used by wolves span the broad range from the mixed hardwood-coniferous forest wilderness area of northern Minnesota; through sparsely settled, but similar habitats in Michigan's Upper Peninsula and northern Wisconsin; into more intensively cultivated and livestock-producing portions of central and northwestern Minnesota and central Wisconsin; and even approaching the fringes of the St. Paul, Minnesota, and Madison, Wisconsin, suburbs. Wolves are also dispersing from Minnesota into the agricultural landscape of North and South Dakota in increasing numbers (Licht and Fritts 1994, Straughan and Fain 2002). Similarly, a gray wolf that had been radio-collared in Michigan's Upper Peninsula was recently mistaken for a coyote and killed in north-central Missouri, presumably traveling through expanses of agricultural land along the way (Missouri Department of Conservation 2001).

Based upon computer modeling, Wisconsin and the Upper Peninsula of Michigan contain large tracts of wolf habitat, estimated at 15,052 sq km (5,812 sq mi) and 29,348 sq km (11,331 sq mi), respectively (Mladenoff *et al.* 1995; WI DNR 1999a). In Wisconsin, much of this suitable habitat is on public lands, with most of these public lands being National, State, and county forest lands.

Wisconsin DNR biologists conducted a population viability analysis (PVA) using the computer simulation model VORTEX. The purpose of a PVA is to estimate extinction probabilities by modeling long-term species' population changes that result from multiple interacting factors. The resulting extinction probabilities may be able to provide some limited insight into the effects that management alternatives, environmental fluctuation, and biological factors may have on rare species' populations over many years.

Under most of the scenarios that were modeled by WI DNR, the results of the PVA indicated that a wolf population of 300 to 500 animals would have a low probability of extinction over a 100-year timeframe. However, the modeling indicated that the population might decline to a level that might trigger relisting under State law (fewer than 80 wolves for 3 years). "[S]tate-relisting probabilities" ranged from 10 to 40 percent for those scenarios which looked at a combination of moderate environmental variability and a 5

percent probability of catastrophic events. Within-State extinction probabilities were only 1 percent for those same scenarios (WI DNR 1999a). However, at this stage of their development, PVA models must be used with great caution, and it would be unwise to base management decisions solely on their predictions. (Refer above to section Summary of Comments and Recommendations, section B, *Compliance with Laws, Regulations and Policies, Issue #11* for additional discussion on the problems of population viability analysis.)

The Wisconsin wolf population has increased at an average annual rate of 19 percent since 1985, and at 26 percent annually since 1993. Wisconsin had at least 320 wild gray wolves in early 2002 (WI DNR 2002, Wydeven *et al.* 2002). The Michigan wolf population (excluding Isle Royale) has increased at an average annual rate of about 24 percent in recent years and was at least 280 wolves in early 2002 (MI DNR 2002). Wolf survey methods in both States focus on wolf packs and may miss many lone individuals, thus underestimating the actual wolf populations. However, it is safe to say that the combined gray wolf population in the two States (excluding Isle Royale, MI) was at least 600 animals in late winter 2001–2002.

Final State wolf management plans for Michigan and Wisconsin, respectively, have identified habitat protection as one of their top priorities for maintaining a viable wolf population. Both State wolf management plans emphasize the need to manage human access to wolf areas by avoiding increasing road densities, protecting habitat corridors between larger tracts of wolf habitat, avoiding disturbance and habitat degradation in the immediate vicinity of den and rendezvous sites, and maintaining adequate prey species for wolves by suitable habitat and prey harvest regulations.

Both the Michigan Plan and the Wisconsin Plan establish wolf population goals that exceed the viable population threshold identified in the Federal recovery plan for isolated wolf populations, that is, a population of 200 or more wolves for 5 consecutive years (U.S. Fish and Wildlife Service 1992a). Each State adopted this "isolated population" approach to ensure the continued existence of a viable wolf population within its borders regardless of the condition or existence of wolf populations in adjacent States or Canada.

The Michigan Plan contains a long-term minimum goal of 200 wolves

(excluding Isle Royale wolves) and identifies 800 wolves as the estimated carrying capacity of suitable areas on the Upper Peninsula (MI DNR 1997). ("Carrying capacity" is the number of animals that an area is able to support over the long term; for wolves it is primarily based on the availability of prey animals and competition from other wolf packs.)

The Wisconsin Plan identifies a management goal of 350 wolves, well above the 200 wolves specified in the Federal recovery plan for a viable isolated wolf population. After the Wisconsin wolf population reaches 250 (excluding wolves on Native American reservations), the species will be removed from the State's threatened and endangered species list (WI DNR 1999a). Wisconsin DNR is likely to begin the State delisting process in late 2002.

Three comparable surveys of wolf numbers and range in Minnesota have been carried out in recent decades. The first survey estimated a State wolf population of 1,235 in 1979 (Berg and Kuehn 1982). In 1989, 1,500 to 1,750 wolves were estimated in the State (Fuller *et al.* 1992). This represents an average annual increase of about 3 percent. The 1998 survey (Berg and Benson 1999) estimated that the State's wolf population was 2,445 animals, indicating an average annual growth rate of 4 to 5 percent during the intervening 9 years. While estimates of the wolf population that are made at about 10-year intervals do not provide any insight into annual fluctuations in wolf numbers that might be due to winter conditions, prey availability and vulnerability, legal depredation control actions, and illegal killing, these 3 population estimates clearly indicate that the Minnesota wolf population has continued to increase. As of the 1998 survey, the State's wolf population was approximately twice the planning goal for Minnesota, as specified in the Eastern Plan. (Refer to the *Recovery Progress of the Eastern Gray Wolf* section above, for additional details on the increase in numbers and range of Minnesota wolves.)

The MN DNR prepared a Wolf Management Plan and an accompanying legislative bill in early 1999 and submitted them to the Minnesota Legislature. However, the Legislature failed to approve the MN Plan in the 1999 session. In early 2000, the MN DNR released a second bill that would result in somewhat different wolf management and protection than would the 1999 bill. The Minnesota Legislature did not pass the 2000 Minnesota wolf management bill, but instead passed separate legislation directing the DNR to