

SURVIVAL RATES DURING NON-BREEDING PERIODS: The “ACHILLES’ HEEL” OF PIPING PLOVER RECOVERY EFFORTS. Scott Melvin¹, Anne Hecht², Diane L. Amirault³, and James P. Gibbs⁴. ¹Massachusetts Division of Fisheries and Wildlife, Route 135, Westborough, MA, 01581; scott.melvin@state.ma.us. ²U.S. Fish and Wildlife Service, Weir Hill Road, Sudbury, MA, 01776; anne_hecht@fws.gov. ³Canadian Wildlife Service, Atlantic Region, P.O. Box 6227, Sackville, New Brunswick, E4L 1G6, Canada. ⁴College of Environmental Science and Forestry, State University of New York, Syracuse, NY, 13210.

The Atlantic Coast population of Piping Plovers (*Charadrius melodus*) remains highly vulnerable to declines in survival rates during non-breeding periods. Population trends and persistence probabilities are more sensitive to changes in survival rates than to other demographic parameters, including the parameter typically targeted in conservation efforts: fecundity (chicks fledged per pair). Results from a viability analysis reported in the U.S. recovery plan for Atlantic Coast Piping Plovers demonstrate the high sensitivity of persistence probabilities to even small declines in adult and juvenile survival rates. For a hypothetical population of 1,500 pairs of Piping Plovers with mean annual fecundity of 1.5 chicks fledged per pair and mean annual survival rates for adults and fledglings of 0.74 and 0.48, respectively, the imposition of linear, 50-year declines in adult and fledgling survival rates of just 5% and 10%, respectively (to 0.70 and 0.44) increased the probability that the population would decline to ≤ 50 pairs over 100 years from 0.20 to 0.84. Factors affecting survival during migration and wintering are poorly understood, yet these non-breeding periods comprise two-thirds of the annual cycle. Progress toward recovery could be quickly slowed or reversed by even small sustained decreases in survival during non-breeding periods, and it would be difficult to increase current fecundity levels sufficiently to compensate for widespread long-term declines in survival. Because we are unable to monitor trends in survival rates of Piping Plovers as we do trends in abundance, distribution, and fecundity, the adverse demographic effects of reduced survival could manifest themselves with little, if any, warning. Recovery efforts should give increased attention to understanding and ameliorating factors that could reduce survival rates, especially during migration and wintering periods, while continuing management to maximize fecundity and survival rates on the breeding grounds. Localized studies may help to identify and understand agents and processes affecting survival during non-breeding periods. However, direct monitoring of long-term trends in survival over wide geographic areas through banding is unrealistic, and injuries associated with leg bands may themselves reduce survival rates. It may be necessary, instead, to indirectly track survival rates by examining discrepancies on the breeding grounds between fecundity estimates in one year and population trends the next.