NORTHWOODS LOON PROTECTION PROGRAM – WISCONSIN LOON CITIZEN SCIENCE PROJECT

Michael W. Meyer, Douglas Killian, Dennis Stockwell, Bureau of Science Services,
Wisconsin Department of Natural Resources, Rhinelander WI

What Does a Loon Citizen Scientist Do?

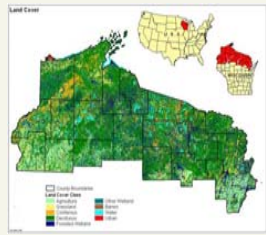
- Collect loon population data necessary to update the Wisconsin Loon Population Model
- Identify critical loon nesting habitat for conservation and management
- Assist with loon banding and lake water chemistry projects.

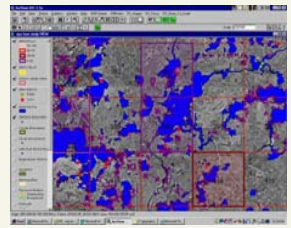
How is this accomplished?

- Loon Citizen Scientists will survey lake(s) from May – August, ideally once weekly
- During each survey, the number of adult loons present, the nesting status, and chick survival are recorded
- Once per year, identify returning adults by identifying color leg bands when present
- Assist project staff with night banding efforts in July and early August
- Fill in appropriate data sheets and return to Project Leaders at the end of the season

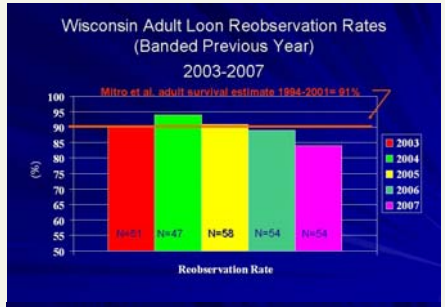
Study Area & Experimental Design

Field surveys were conducted during May 1 – August 30 to estimate the loon population density and population demographic parameters (adult survival, fecundity, and juvenile recruitment) within the area of risk. GIS tools were used to create a 8600 km^2 sample grid which was subdivided into 344 25-km^2 cells. Cells were stratified into 4 categories of loon nesting habitat quality based on surface water area. Cells were randomly selected (22 in 2002, 32 in 2003 & 2004) from each strata and all lakes >4 ha within or intersected by the cells were surveyed to count and map the number and location of loons present. There are a total of 1582 lakes >4ha within the study area.





Findings



COMMON LOON 2 STAGE DETERMINISTIC PROJECTION MATRIX MODEL

MATLAB version 7, The Mathworks, Natick, MA, USA

$$A(\lambda)=\begin{Bmatrix} P_1 & F_2 \\ G_1 & P_2 \end{Bmatrix}$$

A(λ)= Population Annual Growth Rate
P_1=juvenile survival
P_2=adult survival
F_2=adult fertility
G_1=transition to adulthood

Wisconsin Loon Population Annual Growth Rate 2002-2004

Assume Constant Adult (0.91) and Juvenile (0.53) Survival between years

2002 Annual Growth Rate = 1.0054
2002 fertility rates (bp=0.82, bs=0.42, cs=0.758)

2003 Annual Growth Rate = 1.0129
2003 fertility rates (bp=0.787, bs=0.417, cs=0.867)

2004 Annual Growth Rate = 1.0216
2004 fertility rates (bp=0.83, bs=0.452, cs=0.833)

Mean λ 2002-2004
1.013 ± 0.008 (SD)

Loon Citizen Scientist Accuracy 2008

- Band reobservations - <50%
- Territorial Pair presence/absence – 100%
- Proportion Nesting – 85%
- Nest outcome – 100%
- Chick hatching – 95%
- Chick survival – 100%
- Conclusion – Loon Citizen Scientists accurately identify territorial pair and nest outcome; trained staff required to quantify adult reobservation rates and rate of nesting

Acknowledgements Funding was provided by the Wisconsin Citizen Based Monitoring Network, USEPA STAR Grant Program, Electric Power Research Institute, Wisconsin Utilities Association, Wisconsin DNR, USGS/BRD UMESC, University of WI, Water Environmental Resource Foundation, WI DOA Focus on Energy Environmental Research Program. This work would not have been possible without the valuable assistance of many dedicated WDNR and USGS staff 2000-2006, and most importantly 85 Wisconsin Loon Citizen Scientists 2007-2008.