

Exploration of the Human Context for Loon Mortality in New England, 2000-2008

• Cartographer: Nicole Cardona • May 2009 • Introduction to GIS • Projection: NAD 1983 UTM Zone 19N

The Common Loon (*Gavia immer*) in New England



Common Loon, breeding adult

The common loon is a native waterfowl species which is currently endangered within its U.S. range. Loons are migrating birds, spending winter months on the coast and moving inland to lakes to breed in the early spring. New England is part of the southern range of the common loon. Although loons are found across New England, the breeding range extends only through Massachusetts.

Loon numbers and habitat have been declining over the last century due to environmental and anthropogenic factors (McIntyre and Barr, 1997). The species has been determined an environmental indicator species for lake habitat and therefore is of special interest to researchers (Scheuhammer et al., 1998).

One of the current problems facing loon populations is lead poisoning which is due to ingestion of fishing gear.

Loons take up these objects because they resemble rocks, which loons use to help with digestion. Also these objects may be in the fish they eat or directly consumed (i.e. fishing wire/hooks with bait) (Pokras et al., in press).

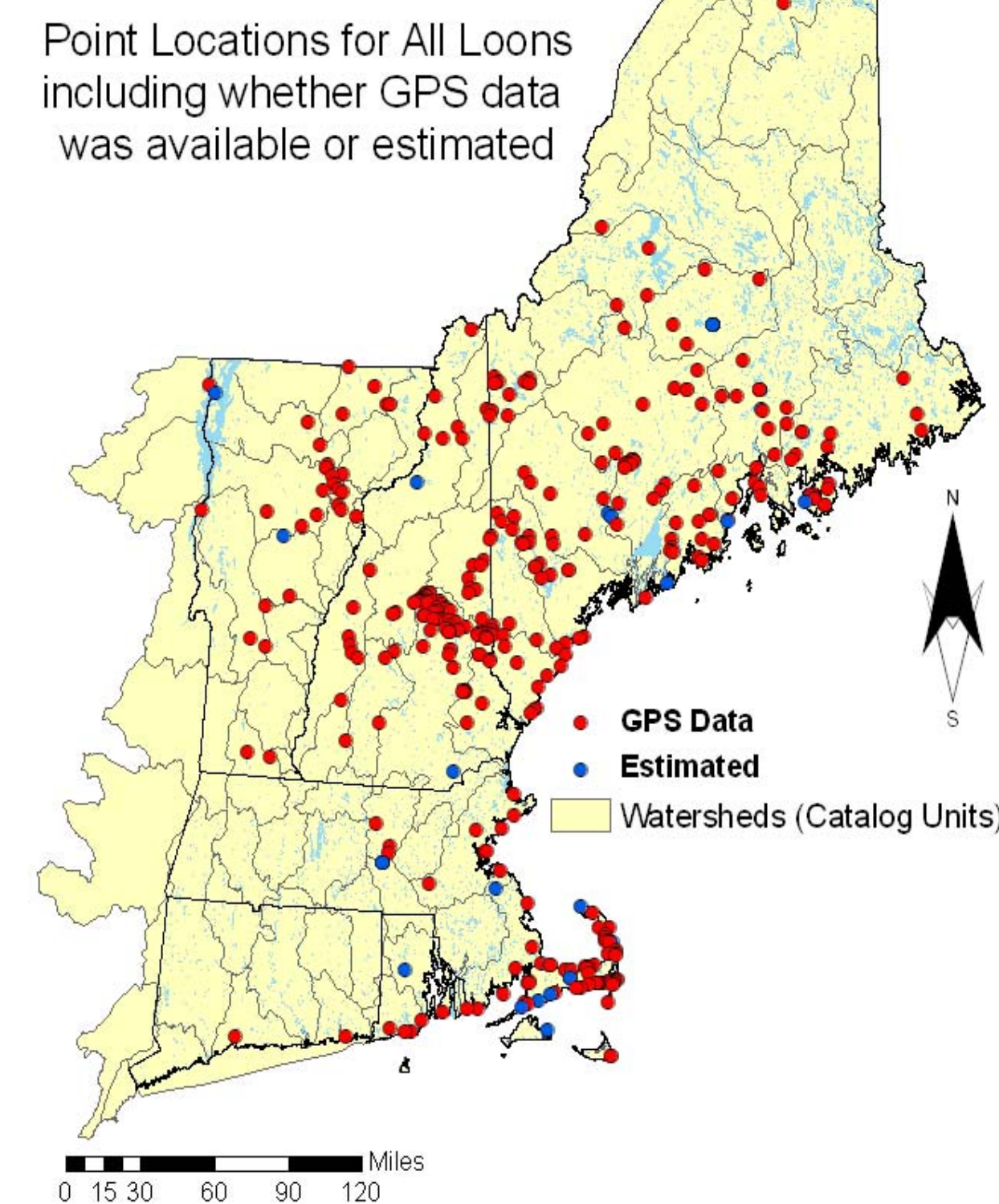
In a recent study, the cause of mortality of almost half of all breeding adult loons was lead toxicosis (Sidor et al., 2003).



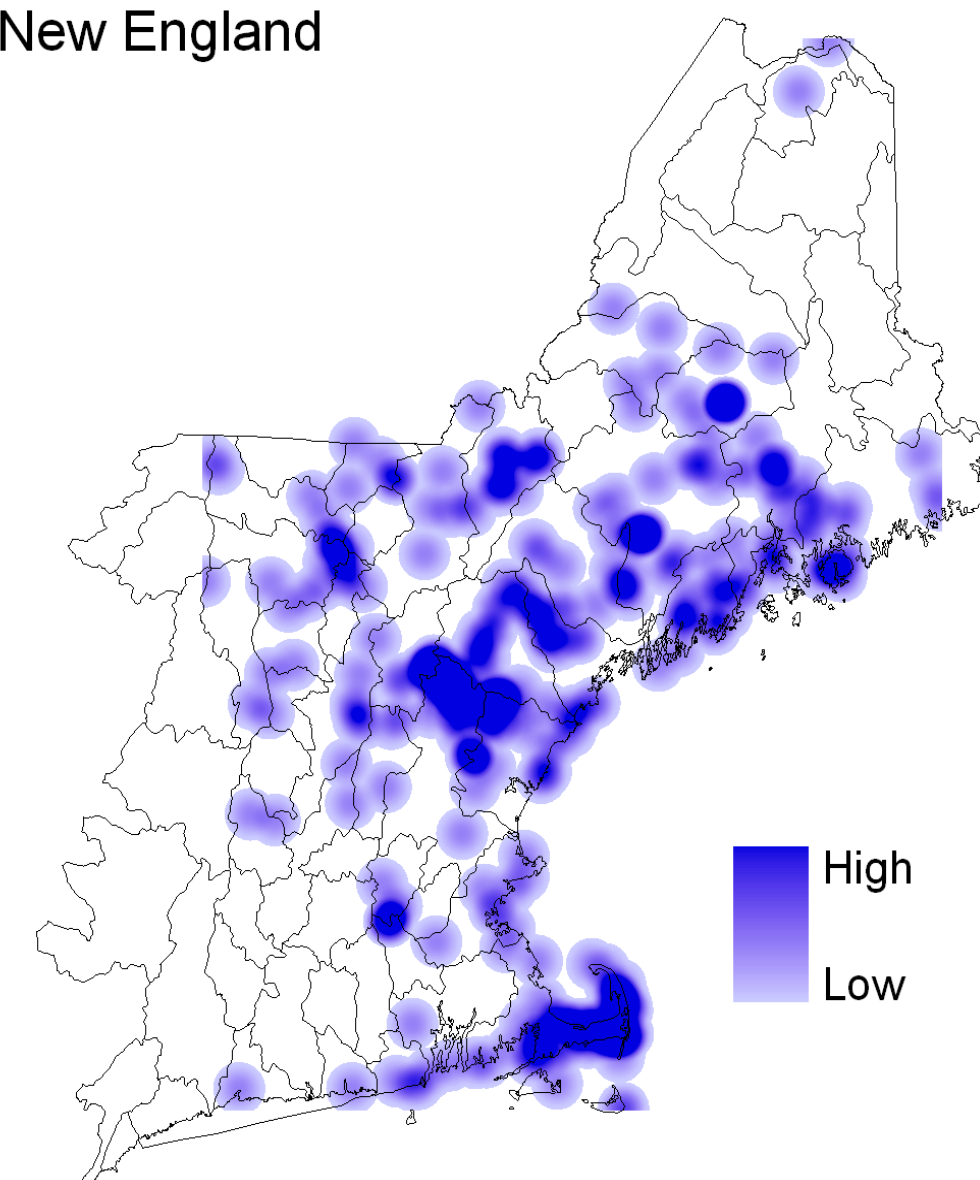
X-ray showing fishing gear in the digestive tract of a common loon



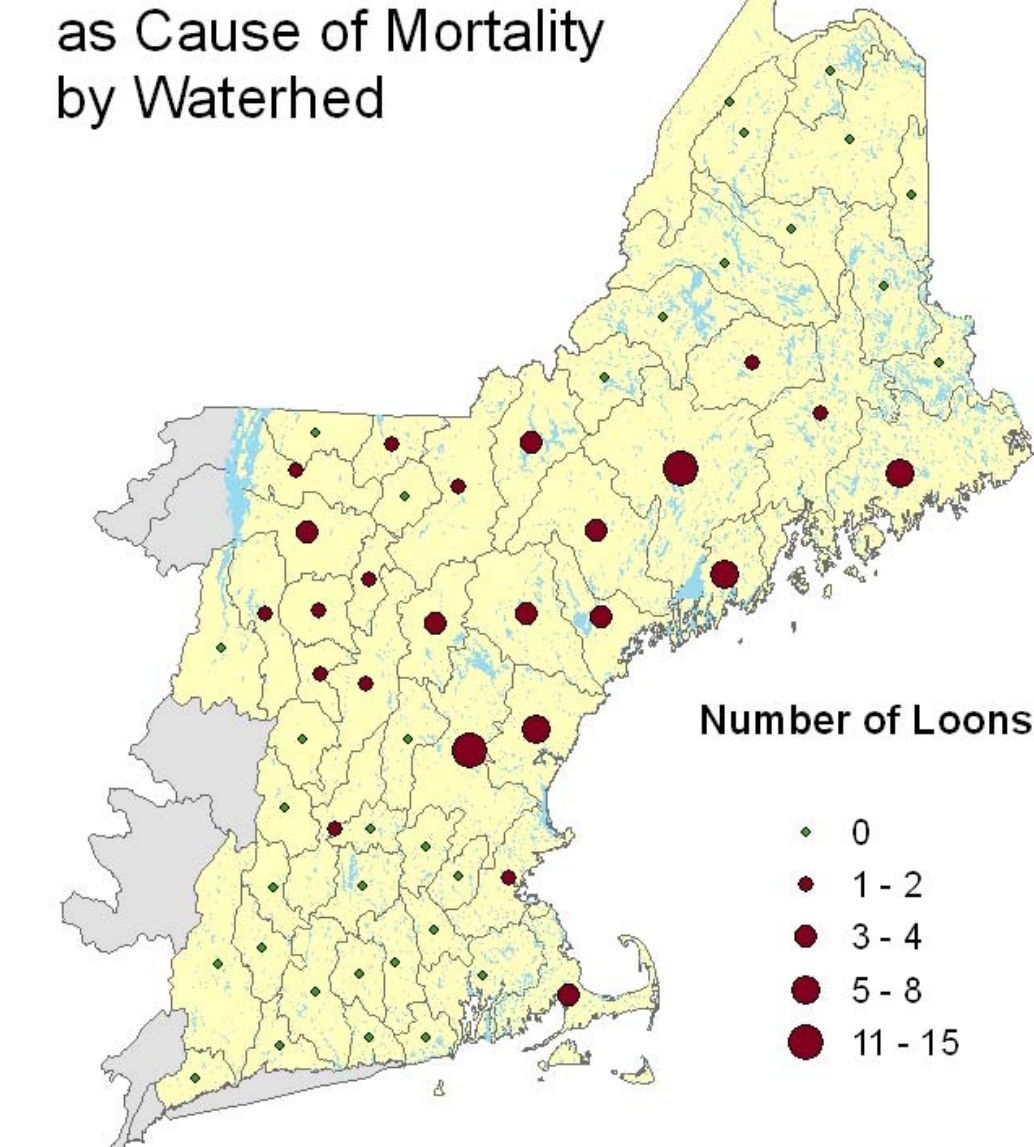
Common Loons found across New England from 2000-2008



Density of Common Loons found across New England



Number of Loons with Lead Toxicosis as Cause of Mortality by Watershed



Data Sources

MRLC National Land Cover Database: <http://www.mrlc.gov>
 USGS Hydrologic Units (Cataloging Units): <http://water.usgs.gov/GIS/huc.html>
 ESRI Census 2000 Data: http://arcdata.esri.com/data/tiger2000/tiger_download.cfm
 Cummings School of Veterinary Medicine at Tufts University, Wildlife Clinic, unpublished data

Overview

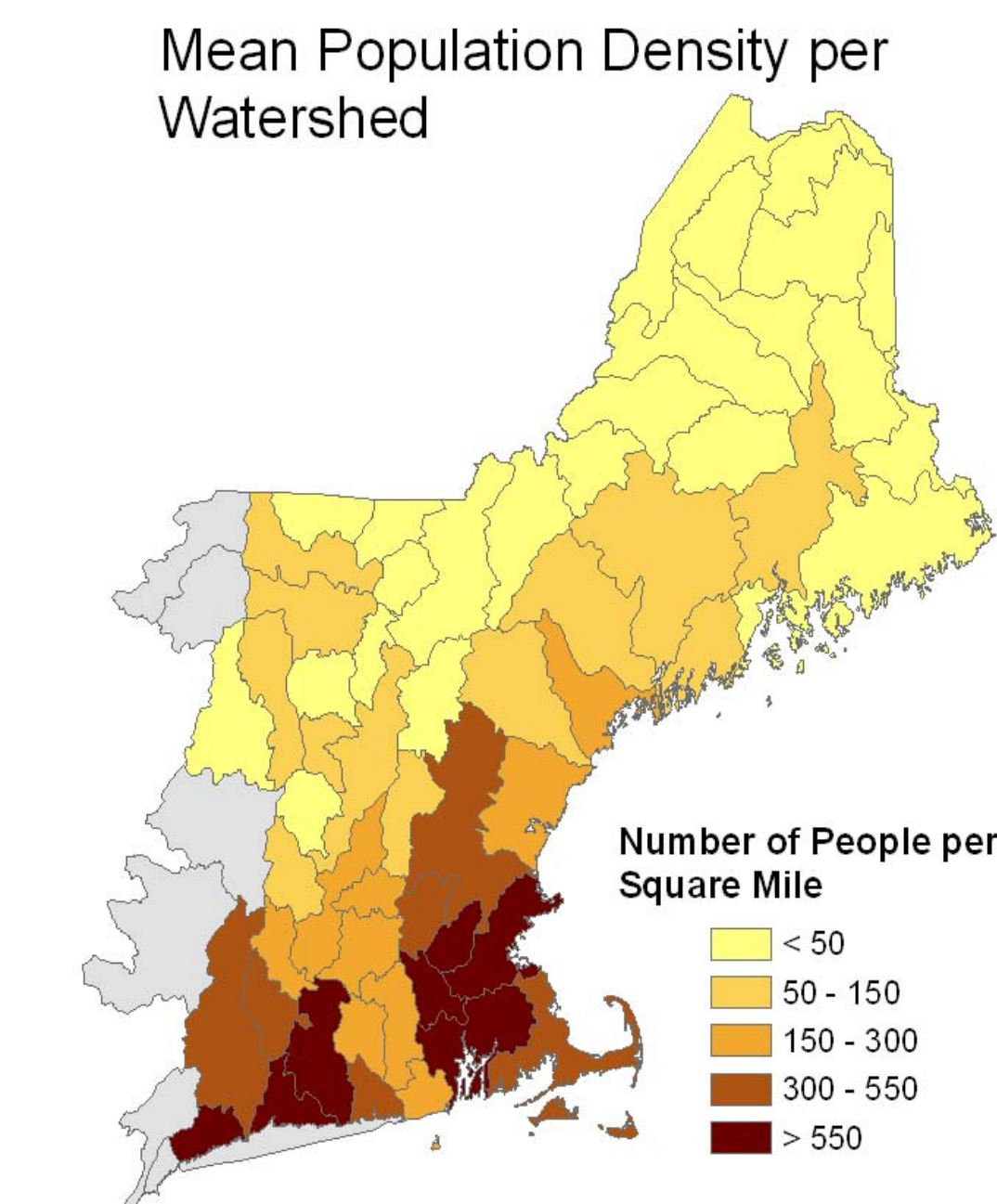
Data collected between the years 2000 and 2008 from 394 common loon necropsies was explored. This is the most recent subset of a database collected since 1987 and is unpublished. Loon mortality was explored by watershed as a preliminary visual investigation of the data in recent years, including the possible influence of anthropogenic factors.

Methodology

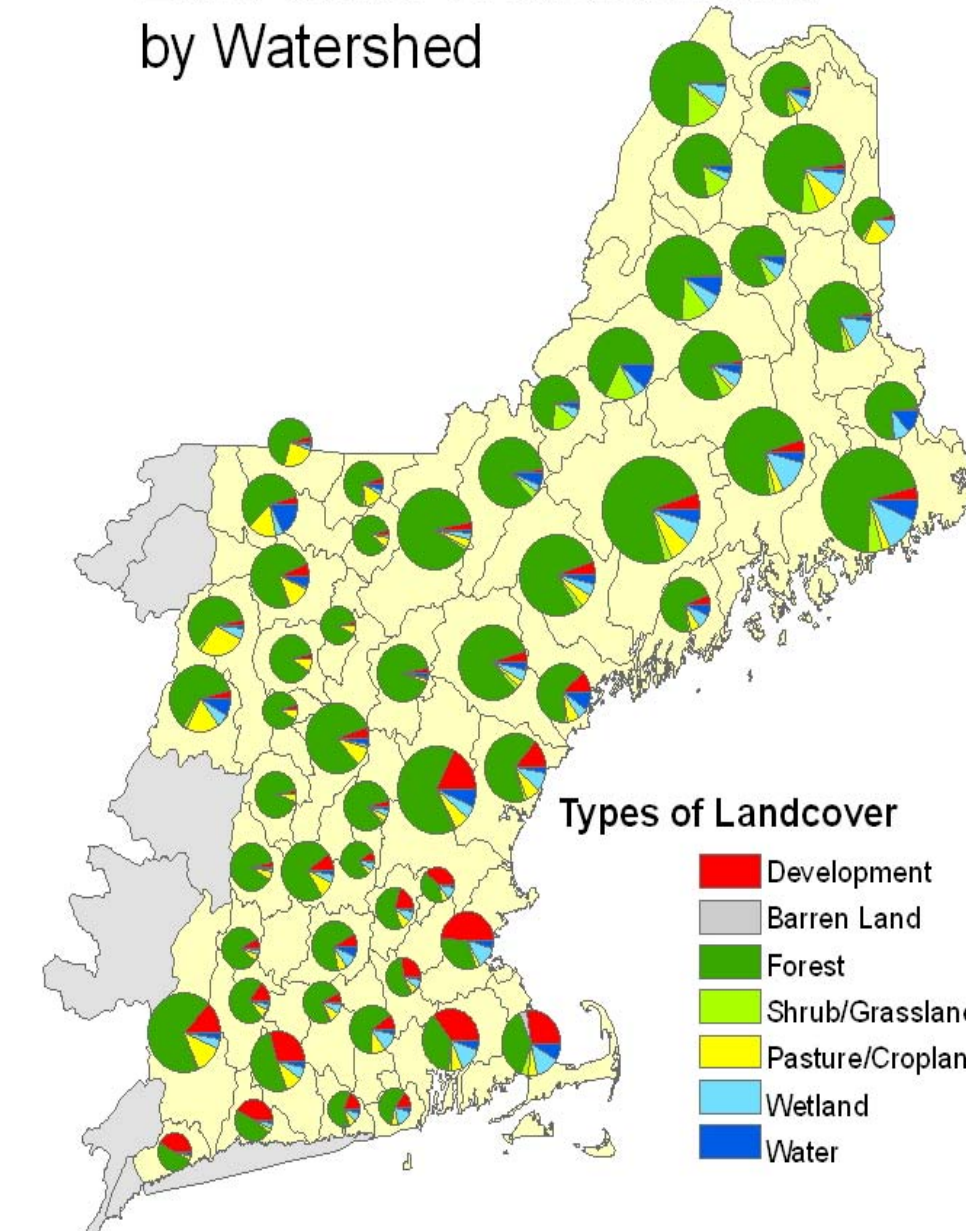
Watersheds within the New England states were chosen. An exploration of loon mortality was done by density mapping of all loons across New England and then specifically those affected by lead toxicosis by watershed. An exploration of anthropogenic influences was done by density mapping of population per watershed and types of land cover by watershed.

Anthropogenic Influences

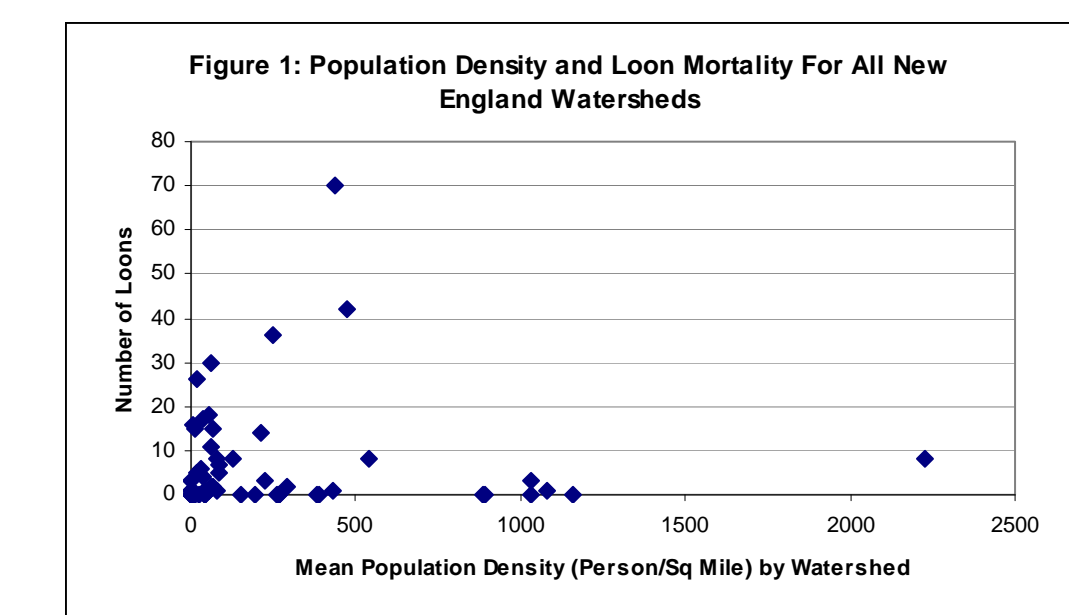
It is important to consider human factors when looking at loon conservation and management (Sidor et al., 2003). Previous studies have suggested that high population density and recreational uses of land are tied with loon mortality. Areas with higher population and human use may also result in higher numbers of carcasses recovered yet they can be thought of as priority areas for management. This is especially true for recreational areas where use of lead fishing gear can be monitored.



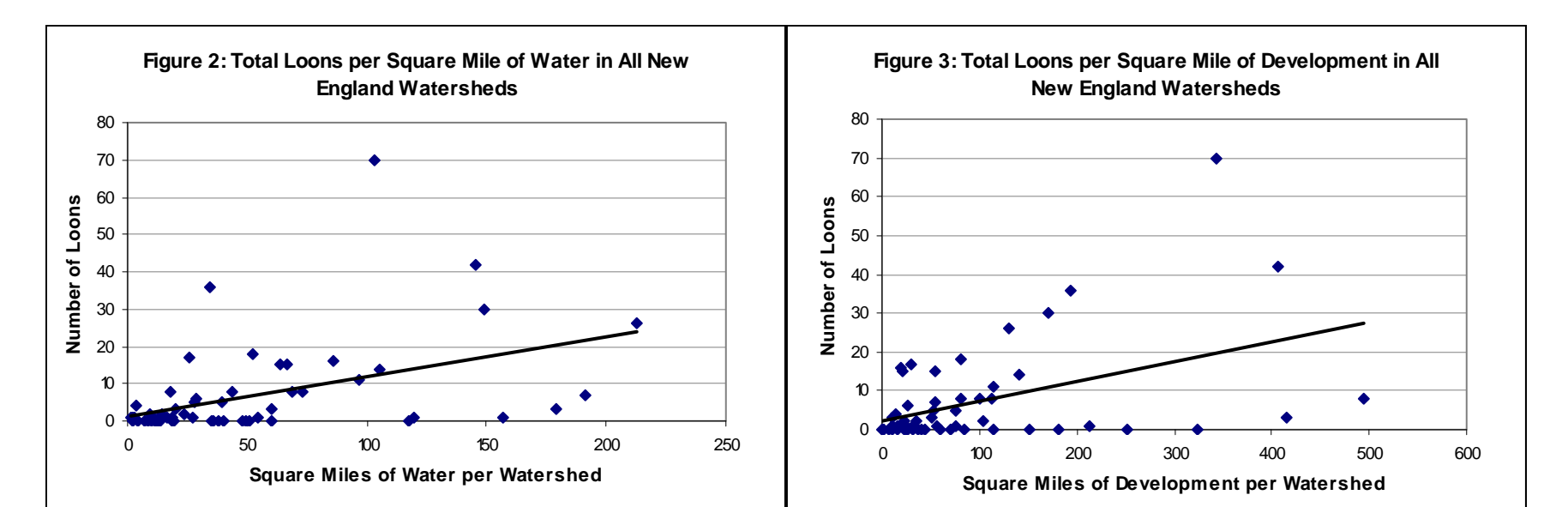
Land Cover Characteristics by Watershed



Population density varied greatly by watershed, with areas in southern CT, eastern MA and south-central NH showing the highest densities as expected. Higher loon mortality may be more linked to a middle population density as it does not seem to have a direct linear relationship (Figure 1).



Areas in south-central NH and eastern ME have the highest percent of water/wetlands, indicating they are areas with the most possible loon habitat. On the other hand, areas in the southern NE states have the highest percent of development, showing another aspect of human population and influence of the landscape. Both of these land type areas show a positive relationship with loon numbers, indicating they may be areas of interest. (Figures 2 & 3).



Uses

This exploration can be used to look at possibilities for future studies. One important aspect of mapping mortality may be to identify priority areas where there is more human-loon interaction due to high population, high loon population/mortality, more land use for recreation or a combination of those factors. More information on loon population distribution would be useful to complete this type of analysis.

References

Pokras et al. Lead objects ingested by Common Loons in new England. *Northeastern Naturalist* - in press.
 McIntyre, Judith W. and Jack F. Barr. 1997. Common loon (*Gavia immer*). *The Birds of North America* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from <http://bna.birds.cornell.edu/bna/species/313/articles/introduction>
 Scheuhammer, A.M., A.K. Wong and D. Boyd. Mercury and selenium accumulation in common loons (*Gavia immer*) and common mergansers (*Mergus merganser*) from eastern Canada. *Environmental Toxicology and Chemistry* 17: 197-201.
 Sidor et al. Mortality of common loons in New England, 1987-2000. *Journal of Wildlife Diseases* 39: 306-315.
 Wildlife Medicine Research at Tufts University - Loon Health and Mortality (<http://www.tufts.edu/vet/wildlife/research.html#loon>)