

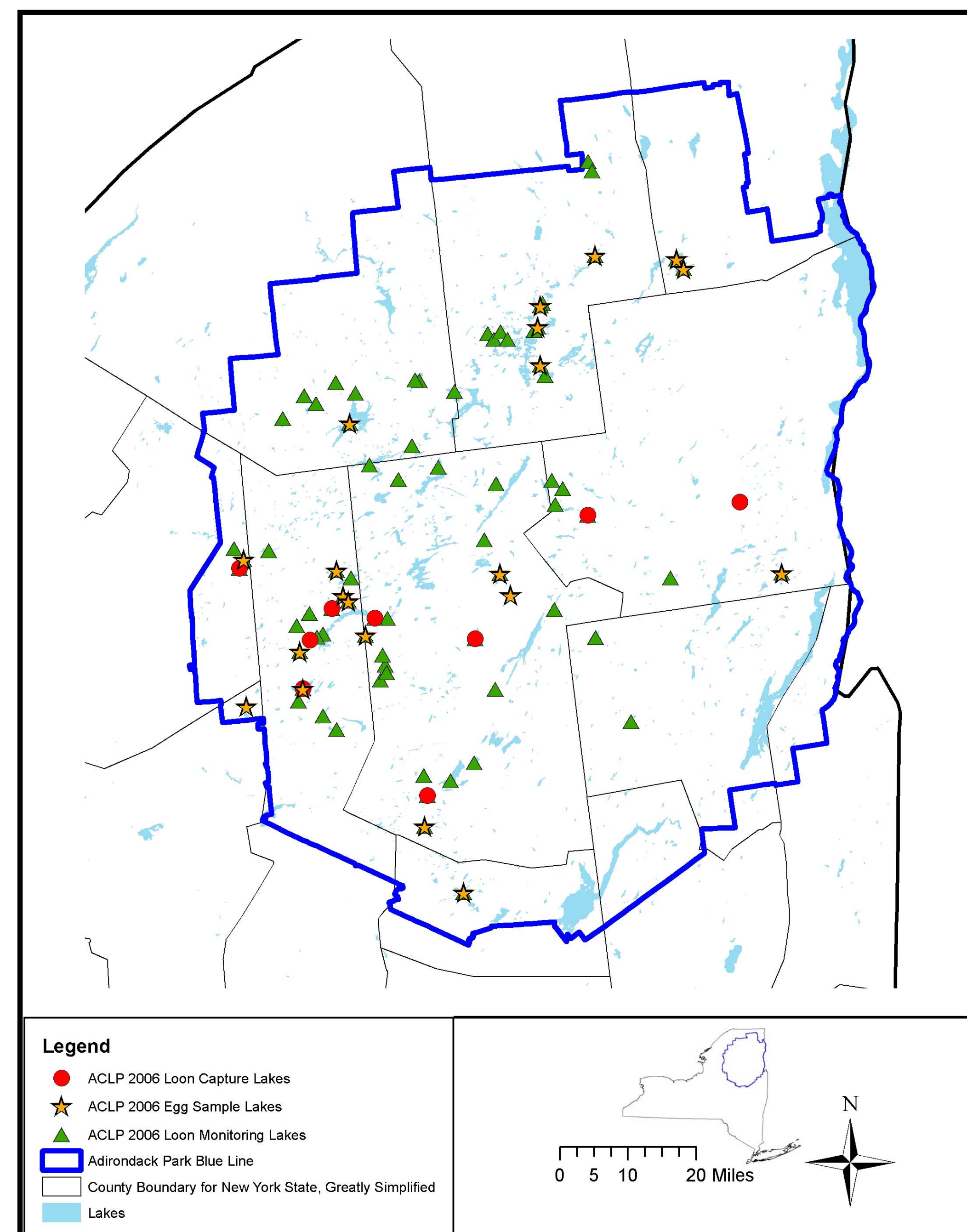
Dr. Nina Schoch – Wildlife Conservation Society’s Adirondack Program
 Dr. David Evers and Melissa Duron – BioDiversity Research Institute, Gorham, ME
 Dr. Michale Glennon – Wildlife Conservation Society’s Adirondack Program
 Howard Simonin – Bureau of Habitat, NYS Dept. of Environmental Conservation
 Dr. Charles Driscoll – Dept. of Civil and Environmental Engineering, Syracuse University
 John Ozard – Bureau of Wildlife, NYS Dept. of Environmental Conservation

ABSTRACT

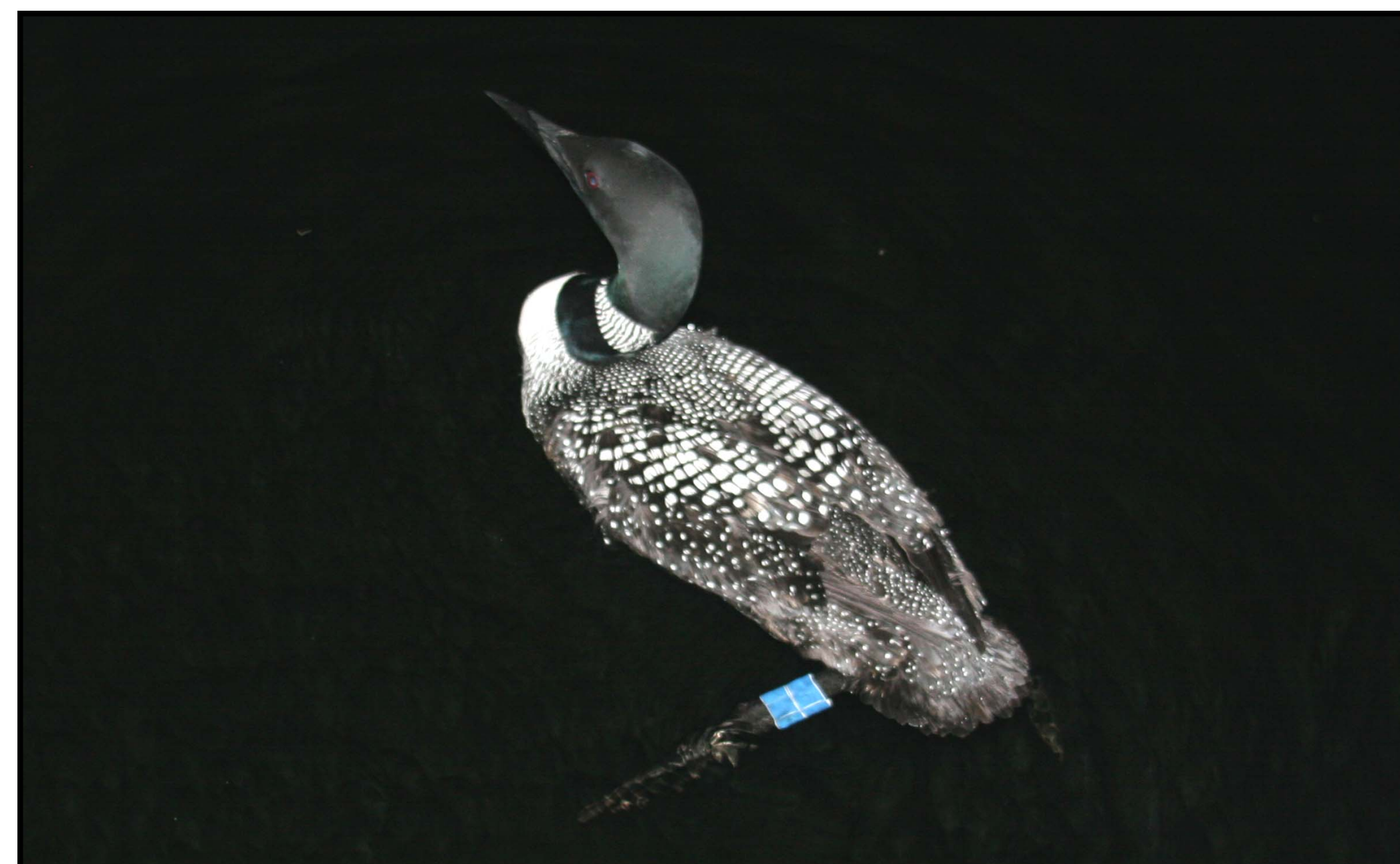
The Wildlife Conservation Society’s Adirondack Loon Conservation Program, in conjunction with BioDiversity Research Institute, NYS Department of Environmental Conservation, the Natural History Museum of the Adirondacks, and the Audubon Society of New York, used the Common Loon (*Gavia immer*) as an indicator species to assess the mercury exposure and risk in aquatic ecosystems in New York’s Adirondack Park. A mercury hazard profile was developed based on the blood mercury levels in 261 loons (151 adults, of which 77 were male and 74 were female, and 110 juveniles) sampled on 80 lakes from 1998-2006.

Adult and juvenile loons living on acidic lakes had significantly higher mercury levels than did loons on non-acidic lakes. Thirteen percent of the loons sampled had elevated mercury levels, and were at risk for behavioral changes, with potential impacts to their survival and reproductive success. Although there was a significant negative trend in reproductive success with male or female loon mercury levels, there was not a statistically significant difference in the average number of chicks fledged by high mercury loons vs. low mercury loons. However, loons living on acidic lakes fledged significantly fewer (42%) loon chicks than did loons on non-acidic lakes. Additional analyses in process include a mercury exposure profile, wildlife criterion value, and a population model for Adirondack loons. Results of this project will provide a scientific foundation for policy makers to make informed decisions regarding the regulation of airborne pollutants and the management of wildlife and freshwater ecosystems, based on reproductive impacts to a piscivorous predator at the top of the aquatic food web.

FIGURE #1: ADIRONDACK LOON STUDY LAKES, 2006



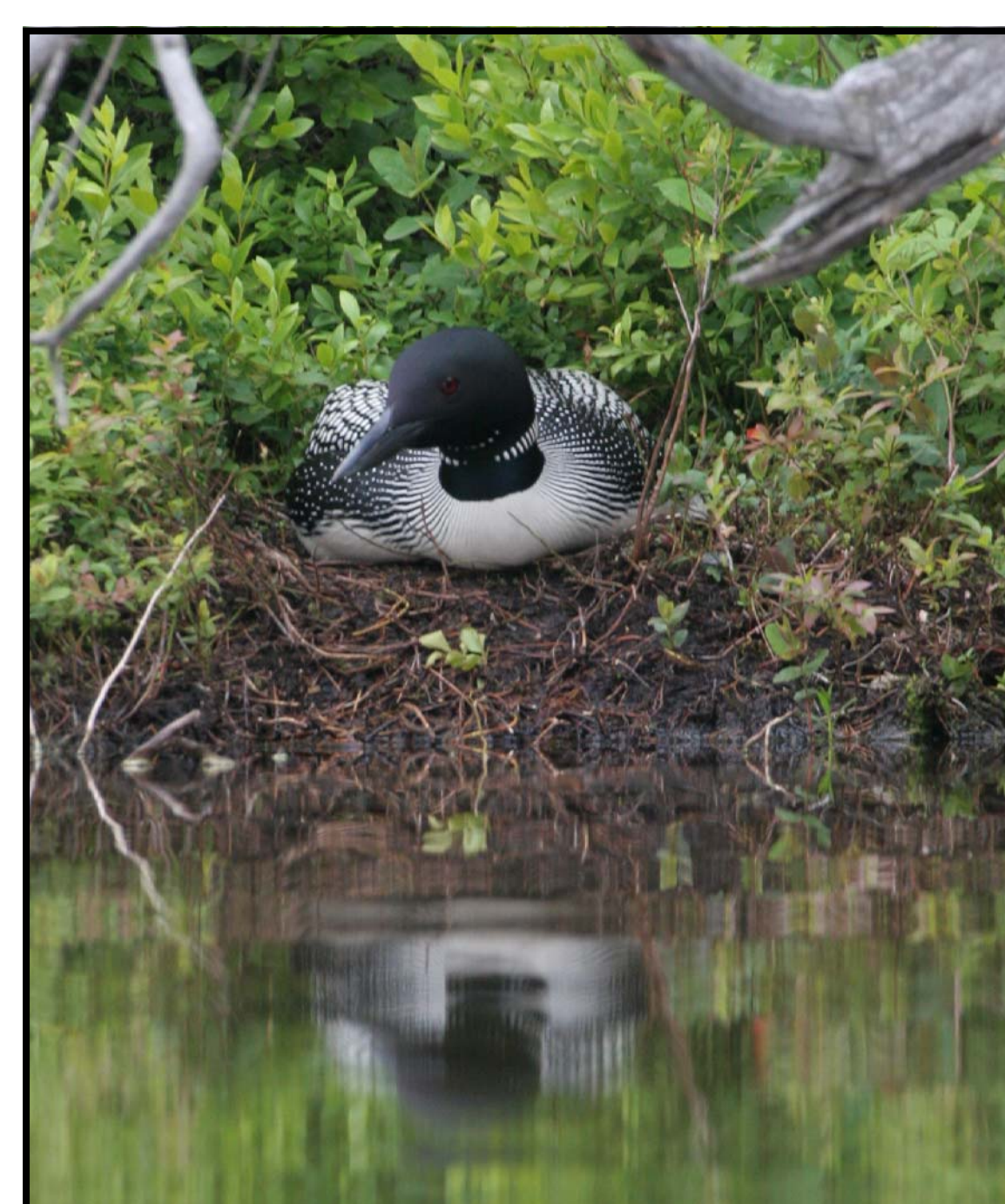
This project is supported through the Environmental Monitoring, Evaluation, and Protection Program of the New York State Energy Research and Development Authority.



INTRODUCTION

- ❖ Mercury is a neurotoxin that poses significant risks to both human and ecological health on regional, national, and global scales.
- ❖ New York’s six million acre Adirondack Park is one of nine biological “hotspots” in the Northeast (Evers et al., 2007a).
- ❖ In acidic environments, elemental mercury is converted at a higher rate to methyl-mercury, an extremely toxic form that magnifies up the food web.
- ❖ Common loons (*Gavia immer*), a Species of Special Concern in New York State, are a valuable biotic monitor of mercury in aquatic ecosystems (Evers et al., 2007b).
- ❖ We are investigating the effects of mercury pollution and acid deposition on the reproductive success and survival in the Adirondack loon population as part of NYSERDA’s EMEP Project #7608.

- ❖ This study will provide a valuable biotic component of the proposed Comprehensive National Mercury Monitoring Act (Mason et al., 2005) and New York mercury monitoring program.



- ❖ The results of our research provide a scientific foundation for monitoring and regulating emissions of air-borne pollutants based on the reproductive impacts to a piscivorous predator at the top of the aquatic food web.

METHODS

- ❖ Blood samples for mercury analysis were collected from 261 loons (151 adults, of which 77 were male and 74 were female, and 110 juveniles) on 80 lakes in the Adirondack Park from 1998-2006.
- ❖ Loons were captured using nightlighting and playback techniques. Adult loons and large juveniles were banded with US Fish and Wildlife Service aluminum bands and a unique color-combination of plastic bands.

METHODS (continued)

- ❖ Loon blood mercury levels were classified into mercury risk categories developed from the literature and *in situ* studies by BioDiversity Research Institute and their collaborators.
- ❖ The reproductive success and survival of uniquely identified loons was determined through regular observations of returning birds each breeding season.
- ❖ Mercury levels were determined in 68 non-viable loon eggs collected from 34 lakes.

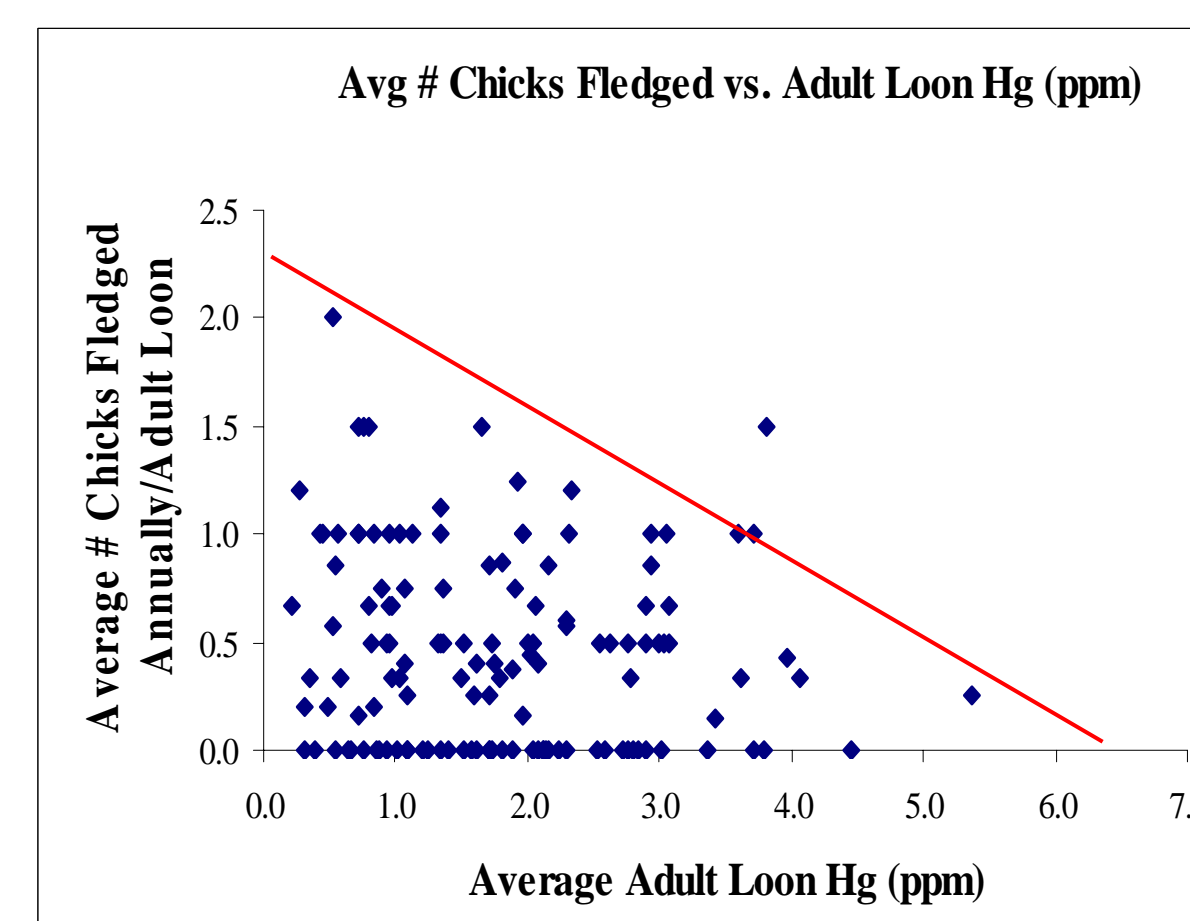


PRELIMINARY RESULTS

- ❖ Average male loon blood mercury levels were higher than that of female loons.
- ❖ Average adult loon blood mercury levels were higher than that of juvenile loons.
- ❖ 35 loons (13%) had blood mercury levels high enough to cause behavioral, physiological, and reproductive changes (Evers, et al., 2007b).

	#	%	Avg	Max	Min	Std
Adult	151	58%	1.78	5.87	0.22	1.07
Male	74	28%	2.15	5.36	0.58	1.03
Female	77	30%	1.43	5.87	0.22	0.98
Juvenile	110	42%	0.21	0.82	0.00	0.17

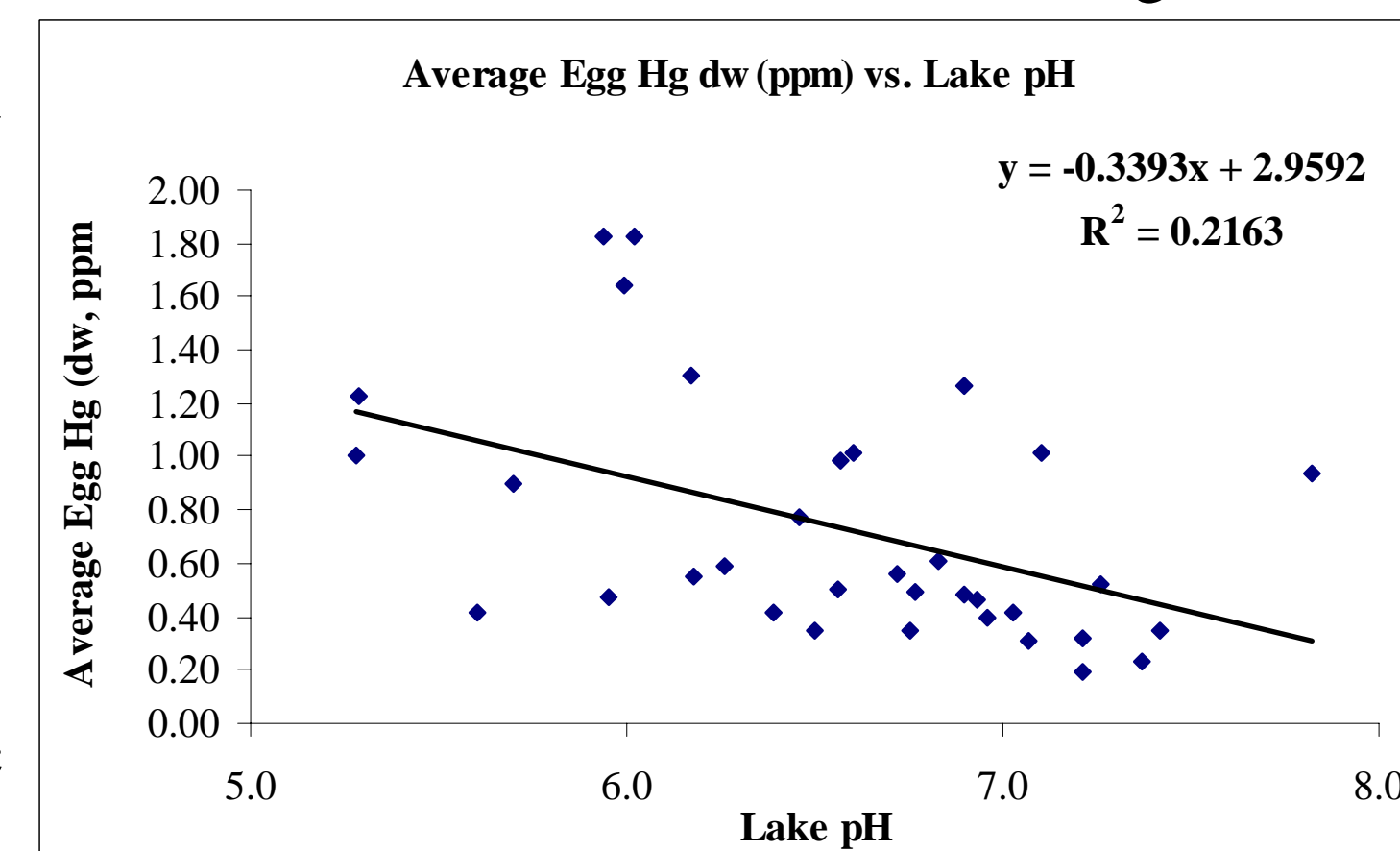
Blood Hg Risk Category	Low	Moderate	High	Extra-High	Total # Birds
Adult Total:	44	88	15	4	151
Female	32	40	4	1	77
Male	12	48	11	3	74
Juvenile	33	61	4	12	110
Total # Loons	77	149	19	16	261
% Loons in Risk Category	29.5%	57.1%	7.3%	6.1%	



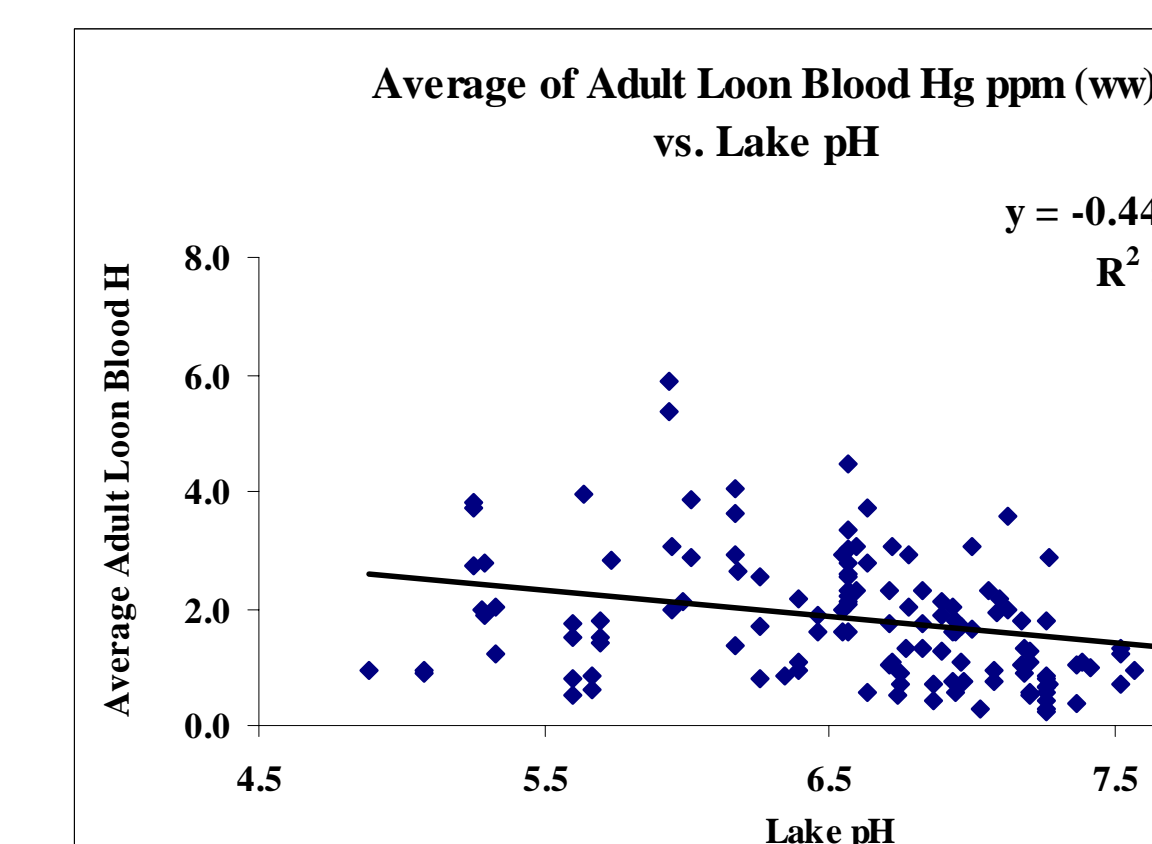
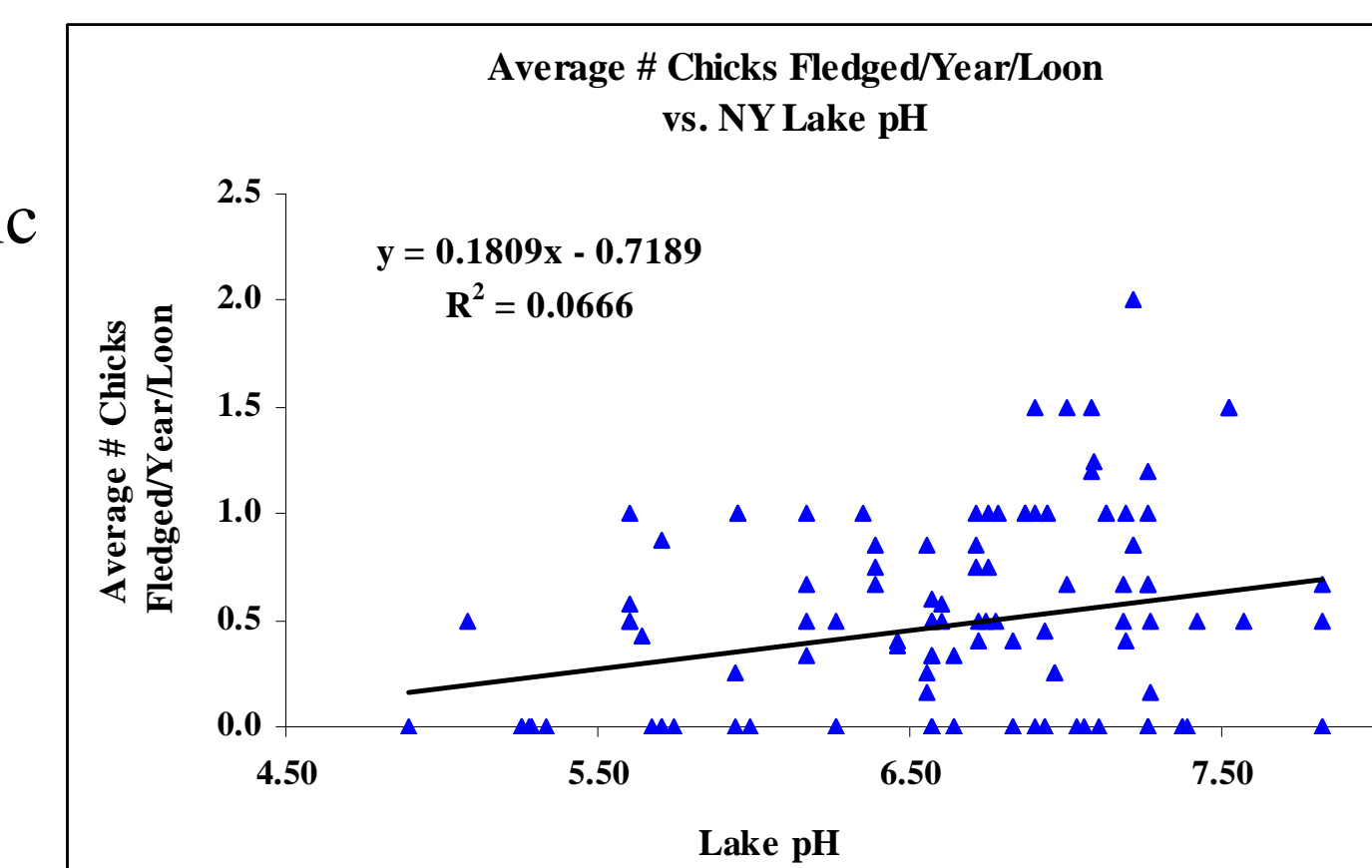
- ❖ The relationship pattern of loon productivity and adult mercury levels is similar to Burgess and Meyer (*In Press*). Based on their use of quartile regression analysis, loons with higher mercury body burdens produce fewer fledged young.

- ❖ Significant trends: as lake pH decreased, adult loon blood and egg mercury levels increased and fewer loon chicks were fledged.

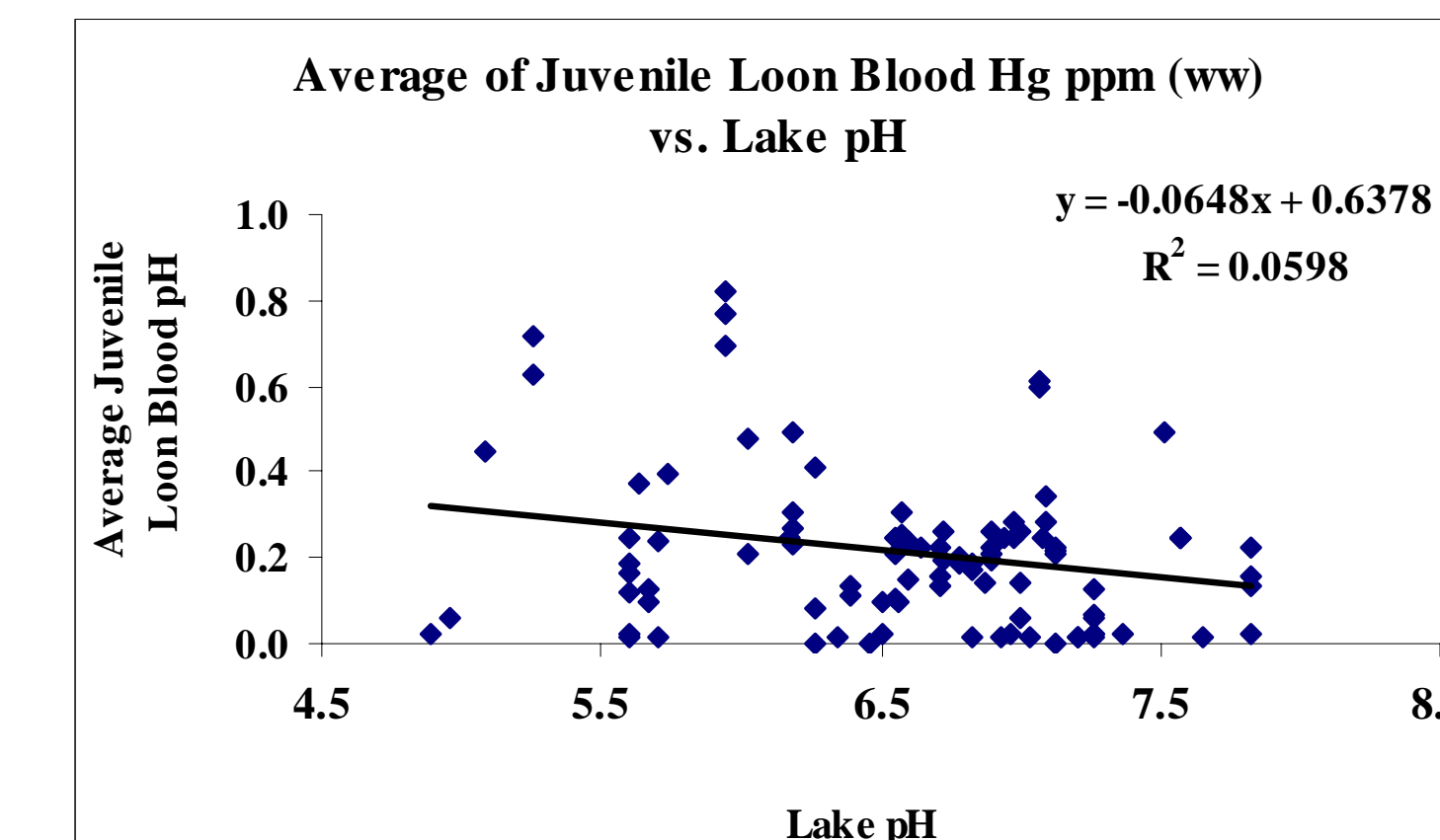
- ❖ Loon eggs laid on acidic lakes (pH<6.3, Meyer 1995 et al.) had significantly higher (89.9%) mercury levels than loon eggs laid on non-acidic (pH>6.3) lakes.



- ❖ Adult loons on acidic lakes produced 42% fewer young than loons on non-acidic lakes



- ❖ Adult loons and loon chicks living on acidic lakes had significantly (41% and 71% respectively) higher mercury levels than birds on non-acidic lakes.



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