

**2005 NORTHEAST LOON STUDY WORKGROUP**  
**Minutes - 16<sup>th</sup> Meeting - Tufts University Wildlife Clinic, Grafton, MA**  
**April 12-13, 2005**

**2004 POPULATION MONITORING AND MANAGEMENT COMPARISONS**

State comparisons, Harry Vogel, Loon Preservation Committee – See handout

**STATE PROJECTS IN PROGRESS AND FUTURE PLANS**

NY- Nina Schoch, Adirondack Cooperative Loon Program – See handout

VT - Harry Vogel for Eric Hanson, Vermont Institute of Natural Sciences - See handout

NH - Harry Vogel, Loon Preservation Committee - See handout

- Total # adults decreased for 4<sup>th</sup> year, chick survival unchanged.
- Rate of increase in TP has decreased in NH over time – # TP remaining steady, probably due to habitat availability – nesting success on rafts very good
- ~1/2 chicks hatched in NH related to direct management (raft placement, enforcement, etc)
- Legislation passed in NH to ban use & sale of lead sinkers (<=1 oz) & lead jigs (<1”) on all freshwater in NH beginning in 2007

ME - Lucas Savoy, BioDiversity Research Institute - See handout

- Reproductive monitoring for FPL on fluctuating reservoirs on ~70 rafts
- Surveyed lakes in Allegash, Rangeley Lakes, Moosehead
- Overall productivity very low = 0.22 chicks surviving
  - May be typical unmanaged survival?
  - Predation a big factor in chick survival
- Continued color-marking/Hg sampling loons in NE, as well as in AK, NE, MT....
- Satellite transmitters in 2 loons – will continue migration work in 2005
- Genetics – Amy McMillan, can now sex chicks & adults through DNA
  - Finding 1:1 sex ratio in chicks
- Report available on [www.briloon.org](http://www.briloon.org) summarizing Hg results

MA - Lucas Savoy, BioDiversity Research Institute, Rose Miconi, MA Aquatic Conservation Society, Dan Clark, MA State Department of Conservation and Recreation - See handout

- Single paired lakes, increasing and producing
  - 9 hatched, 7 survived
- 12 lakes besides Quabbin & Wachusetts that have pairs
- Set out 3 rafts – although loons ended up nesting naturally
- Use signs & ropes for high traffic lakes >> pair successful for last 2 years
- Adding 5 more potential lakes in 2005, with 40 more to look at in future, based on criteria developed by Brad Blodgett (often related to size and human activity).
- Had reliable reports of loons nesting in Manomet in 2004 – will be checking in 2005.
- Birds utilizing primarily reservoirs
- Smaller lakes = primarily private property, difficult to get access through lake associations
- Quabbin & Wachusett reservoirs – average year ~7 chicks/18 pairs.
  - Placed more rafts in 2004 b/c limiting factor on Quabbin = water level fluctuation

- Couple of adult mortalities from Wachusett – blunt trauma = F, nesting adult predated and eggs also taken
- 4 territorial pairs – 2 attempted nesting, and 2 had 2 chicks

### **DEAD THINGS AND THE THINGS THAT KILLED THEM**

#### Loon Mortality, Mark Pokras, Tufts

- Continuing loon necropsy study
- Seeing small sample of chicks (usually caught & eaten by predators, thus underestimated in sample)
- Lots of trauma by other loons – adults vs. adults, adults vs. chicks
  - Biased subset being necropsied (the losers)
  - Possible underlying cause >> loons fighting to death?
    - Loons killed by other loons have statistically higher Hg levels than loons not killed by other loons (may not be responding appropriately to aggressive encounter)
    - Extreme competition in animals that are territorial, long-lived, with limited resources (territory availability)?
      - See more territorial competition with higher density lakes
  - Older specimens from museums not seeing as many sternal puncture wounds, but small sample size
- Anthropogenic mortality – fishing line, gunshot, lead ingestion...
- Only identify specific cause of mortality for ~50% cadavers that come in
  - \$\$ = limiting factor
  - Freshness of specimens affects results
    - Unfrozen specimens would enable histopath analysis
  - Many years of archived tissues that could be analyzed with funding
    - Need to be consistent analyzing dead vs. live loons so can compare results
  - Tufts vet student (Erica Jarmen) will be doing fresh necropsies on site in ME & NH in summer, 2005
- Toxic level of Hg in liver ~10ppm >> see reproductive effects, not necessarily readily visible neurologic effects
- Seeing elevated lead levels in birds that also have elevated Hg levels
  - Are the high Hg loons behaving differently & eating more lead?
  - Are areas with high Hg also areas with high lead?
  - Are there other heavy metals in lead fishing tackle that would also affect birds?
- Standardizing collection effort/methods and necropsy techniques
  - Opportunistic collection vs. highly monitored lakes where would know if loon not on territory
- Estimating that collecting ~1/5 dead loons in NH

#### Seanet, Mark Pokras, Tufts:

- Coastal bird strandings along east coast (New England to Delaware Bay)
- >> patterns of mortality along coast – seasonality, species...
- Info for wind energy development – patterns of predevelopment mortality data
- Loon necropsy data incorporated into Seanet database
- Fisheries by-catch info also (pathology “controls”)
- Dead bird field guide will be published in 2005
- National Biological Health Center – web-based reporting system

#### Botulism, Genetics, Dave Adams, NY Dept of Environmental Conservation – See powerpoint

Loon Health Project, Nina Schoch, Adirondack Cooperative Loon Program and Dr. Stephanie James, Wildlife Conservation Society

- Developed health assessment protocol – *open for input from NELSWG to revise to workable field table & protocol*
- Would like to develop priorities for which tests to run based on last 2 year's of analysis
  - Seeing levels of organochlorines, DDE, nonachlors, PCB's
  - Infectious diseases – avian influenza (8/11 positives), paramyxo 1 (1), Chlamydia (1)
  - Non-serologic tests – PCR on swabs (transport from field needs to be done carefully)
  - Parasitology
    - Hemoparasites in different areas of NA – grad student at UVM
    - 12-15 breast feathers for parasites in gulls (consistency)
- Field collection protocols important to collect samples properly – vet student?
- Live loons – Tufts – relationship between total & methylHg levels in blood unclear?
  - All Hg in feathers = methyl

**OTHER RESEARCH UPDATES**

Satellite Telemetry, Lucas Savoy, BioDiversity Research Institute, Nina Schoch, Adirondack Cooperative Loon Program, Dave Adams, NY Dept of Environmental Conservation - See poster

Raft Paper, Chris DeSorbo, BioDiversity Research Institute

- Characterizing raft use/success on fluctuating water reservoirs vs stable levels
- Loons prefer island sites
- Majority of rafts used w/in 1<sup>st</sup> 3 years – if not used w/in 3 years, then ok to pull
- Only use 1 raft/territory, so don't end up splitting territory.
- Using rafts over time >> increased repro success (higher than natural nest sites)
- Can place rafts in locations where no natural island site, so get benefits of island site if not available
- >> Less predation, decreased impact of fluctuating water levels

Loon Species Profile, NH Loon Recovery Plan, Harry Vogel, Loon Preservation Committee

- Quantifying & standardizing impacts on wildlife
- Goal to develop comprehensive conservation plan for each species
- Threat identification, underlying causes
- Rank threats >> “threat rank” & characterization as critical, moderate, low
  - Scope
  - Severity
  - Timing (scale of impact – now, in long-term)
  - Likelihood
  - Information
- Used to develop/determine research needs if information not available to suitably rank threats
- Feasibility ranking of management efforts
  - Action, efficacy, resources, organization (ability to implement management), expertise, motivation, information >> feasibility rank of implementing management compared between species
- Developing loon species profile for federal funding will aid in developing NH's loon recovery plan
  - NH database good (~29 years data), mgmt has been effective in overcoming some of these threats, and tested mechanisms for implementing change in legislature
  - Could be used for assessing risk to loon population
  - Evaluating population trends/population viability

### Loon Population Modeling, Jason Gear, US Environmental Protection Agency

- EPA interested in effects of environmental stressors on wildlife
- ORD charged with assessing tools & techniques for assessing risk to wildlife
- Pop'n modeling step enables environmental effects on vital rates to be integrated at the pop'n level >> pop'n level assessment of risks
- Stressors may operate additively or synergistically
  - Spatial component – stressors may vary across a landscape
  - Age component
- Candidate models for loons
  - Total pop'n size – no age structure
  - Factors affecting model selection
  - Perturbation analysis
  - Stressors
  - Uncertainty
- Matrix model
  - Assumptions of model
    - Subadult survival
    - Longevity
  - Density dependence and stochastics (pop'n viability analysis)
  - Useful for loons because
    - Incorporates age structure of pop'n, not just total pop'n size, which can affect dynamics of pop'n
      - Young can be affected by different stressor than older animals
    - Eggs, hatchlings, fledglings – don't know survival for each of the first 3 age classes, only after ~3 years
  - Projection matrix model (density independent) >> fate of a given individual in each age class will survive to next age class in next year
    - Stable distribution >> ~72% of pop'n surviving
  - $\lambda$  = finite rate of pop'n growth = 1.0 if stable pop'n size, <1.0 = declining pop'n, >1 = increasing pop'n
  - If density dependence is a factor in pop'n (# territories available), then carrying capacity of habitat a factor in growth rate of pop'n
  - # females in a given summer – how many females will she contribute to pop'n one year later? Assume constant fecundity
  - Elasticity matrix – what parameters in model is pop'n most sensitive to?
    - If changed adult survival by 1%, affects pop'n b/c long-lived species
      - Impt for determining which age class to invest conservation efforts
  - Is there senescence in loons? Is survival & reproduction same or decreasing in loons as they get older?
    - Assume that constant adult survival (longevity =  $w$  ~28 years; adult survival of 0.92) & reproduction
    - Model relatively insensitive to fecundity, but is very sensitive to adult survival
  - Current models assume  $w=28$ , but if change  $w=15$  years, >> lower pop'n growth rate
    - Need to take care to incorporate info on longevity into interpretations
  - Predicting pop'n growth rates from longevity rates, not dependent on geographic boundaries, etc., does assume closed pop'n
  - Annual count data = alternative source of data to check models
  - Pop'ns reach ceiling in many cases where become saturated, & can't grow beyond that point
    - Loons = classic example of density dependence, space limited – only certain amount habitat available (can reach saturation) >> non-exponential growth rate – flattens out.

- Stochasticity in model b/c error dependent on tools to measure pop'n, uncertainty in pop'ns, and annual variation in weather, etc, affecting reproduction
- Ability of adult to obtain a territory affects carrying capacity
    - If leave everything else the same, ~75% of all adult females would need to obtain a territory to maintain carrying capacity of territory
  - Can lead to different carrying capacities depending on ability of birds to obtain territories, pair, hatching success, etc.
- Pop'n Viability Analysis - variation can depress pop'n growth rates
  - Next steps = spatial integration of demographic models
    - >> understanding of how contaminant like Hg affects pop'ns (through fecundity)
    - >> geographic differences
    - risk assessments at landscape levels
  - Can do trend analysis over time
    - If don't see trends, could estimate stable/single demographic rate over time
    - LPC's 30 year record would hopefully give sense of how effective model is at evaluating pop'n

Science on the Fly!, Nina Schoch, Adirondack Cooperative Loon Program - website, classroom activity, & video demo

Forestry vs. Loons in MA, Dan Clark, MA Dept. of Conservation and Recreation – See handout

- Conservation management practices for several species – clearly defined >> consistency
- Potential impact of forestry operations on loons, eagles...?
  - Noise, visual changes
  - Enhanced mercury release (e.g.: clearcut site) in proximity to water
  - Patch cuts, uneven mgmt – shoreline buffer?
    - Wetlands – only 50% basal area
  - Is there a scientific basis for regulating forestry practices as related to impacts on nesting loons?
- Could do study with credible observers collecting data on how loons respond to logging noise/disturbance...
- LPC recommends minimum of 500' distance to loon nesting site, and also conducting operations outside breeding season.

Development and Recreation vs. Loons, Carolyn Spilman, State University of New York

Research Questions:

1. Relationship between shoreline development & loon productivity?
2. Relationship between APA land classification & loon productivity?
3. How do field study results (ground analysis) compare with results based on APA land classification?

Objectives:

1. Quantify shoreline development units for a sample of 20 lakes
  - Shoreline development units:
    - House/cottage/cabin = 1
    - Dock = 1
    - Campground = 10
    - Marina = 5
    - Boat launch = 5
    - Beach/Park = 5
    - Other = 1

2. Compare shoreline development of study lakes with reproductive success of banded loons over a 5 year period (2000-2004)
  - Calculation of lake development ratio = total # development units/shoreline length
    - Lake size = up to 341 ha
    - Range of development units/lake =2-161
    - Shoreline development ratio = 0.67-26.83
  - Calculation of productivity (2000-2004)
    - Hatching success = # Hatch/#eggs
    - Fledging success = # Fledge/#eggs
    - # eggs =121
    - #hatch =70
    - # fledge =50
  - Results: hatching: adjusted  $R^2 = 0.0262$ ,  $p=0.235$ ; fledging: adjusted  $R^2 = -0.0257$ ,  $p=0.478$
3. Calculate percent of developed shoreline using APA land classification coverage - Relationship between APA land classification & loon productivity?
  - Weighted land use classes (hamlet, mod intensity, low intensity, rural, resource mgmt) to make development index
    - $DI = (Area_{(mod\ int)}/5.26) + (Area_{(Low\ int)}/12.95) + (Area_{(Rural)}/34.4) + (Area_{(Res\ Mgmt)}/172.8)$
    - Calculated w/in 250m lake buffer
    - Divided by total buffer area
  - Regression b/n development index vs. hatching success: Adj  $R^2 =0.092$ ,  $p=0.05$ ; vs. fledging success: Adj  $R^2 =0.028$ ,  $p=0.18$
  - How do field study results (ground analysis) compare with results based on APA land classification?
    - Development Index vs. Development Units: Adj  $R^2 =0.31$ ,  $p=0.009$
    - Development Index vs. Development Ratio: Adj  $R^2 =0.48$ ,  $p=0.0008$
  - Suggestions:
    - How to understand hamlet zoning & recreational use
    - Campsite can be seasonal and may not affect nest site selection
    - Redefine hatching & fledging success b/c bias in # eggs b/c not always observed directly. Nesting success defined as # chicks hatched/nesting pair, or chicks hatched/potential territory?
    - Habitat type? Shoreline coverage – microhabitat?

Umbagog Update and Future Plans, Dave Evers, BioDiversity Research Institute

- NH Audubon, LPC & BRI funded for 3 year study on Lake Umbagog ecosystem (Nat'l Wildlife Refuge)
- Funded b/c detecting pop'n declines in loons & osprey – lost ~40 adult loons in ~3 years
- Pop'n health in terms of individual health?
  - Tufts could provide vet student for collecting samples or new vet graduate stationed at site to assist with sampling all species
  - Coordinate with Elizabeth Walsh/avian contaminant in ME
  - BRI/LPC need to decide on time/schedule needed – mid-June to mid-August?
  - Nested hierarchy of tested to be done to evaluate health in birds
- Public use component (time/activity budgets) to evaluate human disturbance impacts on breeding loons
- Capture/color-marking loons

- Cyanobacteria toxin? Bass were introduced into lake >> possible trigger providing extra trophic level that letting fat soluble toxins biomagnify up to loons?
  - Jim Haney at UNH – microcystins
  - related to nutrients, NPK, temperature...
  - Not easily detectable in necropsy studies
- Assessing environmental contaminants, public use, ecosystem health to evaluate stressors on ecosystem

Territory Ranking Project, Kate Taylor, Loon Preservation Committee, Dave Evers, BioDiversity Research Institute

- Trying to predict reproductive success in loons using shoreline features
- North Cape Oil Spill was basis for effort to predict high habitat quality to purchase suitable habitat
- NH productivity data >> ~13 parameters to predict habitat >>~76% variability, then when add in mgmt & education >> ~96% variation
- Distance from already occupied lake important parameter to also include to strengthen predictive model
- Weighting parameters would be good to do & sensitivity analysis (PCA) to determine primary drivers in matrix to evaluate habitat potential

NA Status Assessment and Conservation Plan, Dave Evers, BioDiversity Research Institute

- Conservation Plan finished – funded through USFWS
- Will be available on website when finalized by USFWS
- Foundation interested in printing plan (~100 pages) into lay document similar to “Mercury Connections” - e.g.: “Loon Connections”

Mercury – Research and Legislation, Dave Evers, BioDiversity Research Institute, Harry Vogel, Loon Preservation Committee

- “Mercury Connections” = synthesis of Ecotoxicology journal issue (21 papers) on mercury research in NE
- NH Senate bill 128 = follow-on 4 pollutant bill requiring NH to come up with emissions control on Hg, to reduce Hg emissions by 50#/year, then to 24#/year in 2014; primarily from one coal-burning stack – PS&H
- High public interest in regulating Hg emissions & high profile, including republicans (Karl Johnson & Jeff Bradley involved in bills).
- BRI testifying in state & federal hearings to regulate Hg emissions
- ME has legislation that removes Hg emissions & NE putting together team approach to regulating Hg emissions, attorney generals collaborating on law suit against federal gov’t to regulate emissions more.
- Federal not implementing regulations to significantly decrease emissions – pollution trading not effective at decreasing problems associated with local hot-spots
- NE has significantly decreased point sources of Hg emissions. Primary sources now from coal-burning stacks in PA, OH, MD etc.
- Developed 9 biological hotspots in NE based on Hg data in NE
- Wintering loon blood Hg levels low (<1ppm)
- Senators Clinton & Snow sent letters to EPA saying didn’t include all science in Hg rule
- Environmental Science & Technology to develop national Hg monitoring plan
  - Air & watershed
  - Chemical characterization
  - Aquatic biota
  - Wildlife: insectivorous & piscivorous birds
  - 200 monitoring stations across country
    - 20 ecoregions – each with intensive site – atmospheric deposition
    - Cluster sampling sites = 190

- \$25 million to initiate and \$15 million thereafter
- Dave providing info to assist in writing of plan
- Possible regional aspect initiated in NE – funding would go to states for monitoring wildlife (important to standardize productivity between states)

Lead – Research and Legislation, Mark Pokras, Tufts, Harry Vogel, Loon Preservation Committee

- *See handout*
- Increasing legislation to regulate use of lead in different products
- Regarding fishing tackle, all state reg'ns are different (some ban use, some sale) and bans don't always go along with biology of what seeing, but political realities different
- Alternatives more readily available and competitive in cost, some things that are good for one use may not be good for another use (e.g.: tungsten)
- Balance of needing additional science with policy to regulate toxic substances
  - Disconnect in health & medical communities with animal toxicity/exposure to same problems
  - Important to make connections between impacts on multiple species, including humans, providing more weight to implement legislation banning toxic substances
  - Concern about animal rights implication to stop hunting & fishing as opposed to actual conservation of resources (consumption conservation – hunting & fishing)
  - Public health aspects related to problems associated in hunting & fishing – e.g.: encouraging increased women & children participation, potentially leading to increased exposure
  - Use animals as bellweathers of impacts on human health
  - Lead leaching into soil from firing ranges dependent upon soil characteristics, acidity, etc

Plans for 2005 – Sharing & Archiving Samples:

- How to accomplish goals & archive samples in best way possible, to maximize amount testing that can be done
- Archiving of samples:
  - Need to decide what to save & how to save it
  - WCS can store loon samples in ultra-cold freezer. Can temporarily be stored at Tufts
  - Storage in glass vs. plastic
- Need to decide what types of tests to be run on blood samples, and if should be done on an individual animal vs. pooled samples (to decrease costs)
  - Immune function testing – would be reflective of synergistic effects of contaminants
    - Difficult to store for extended transport – need to talk with Sylvane at Yukon?
    - Plasma electrophoresis? High resolution – variations in beta & gamma sites
  - Biomarkers? DNA fragmentation - to trigger running different tests
    - Fish & loons greatest fragmentation in Umbagog, but as go up watershed, DNA fragmentation declines. Multiple stressors in Umbagog possibly impacting DNA? (Opposite to Hg in watershed)
  - Infectious disease
  - Bacteriology
  - Serology – exposure vs. isolation (PCR)?
- Dosing of cells with specific levels of metals
- Staff – Tufts can provide vet student for processing samples in field
  - What do we want them to do? E.g.: cbc, some in-field bench top tests
- Increase consistency with protocols for collecting & analyzing samples, replicate samples to ensure quality control
- Pilot loon health study in NH/NY may be able to be expanded to NA loon study

Joint Funding for Projects:

- Tufts – necropsies covered, and can contribute to hematology
- WCS – can provide limited funding for loon health
- Funding from Umbagog project would pay for testing on those birds
- Could do a team approach to foundation for doing larger study?
  - Rachel – Jane’s Trust

NELSWG Coordinator Need, Role, Feasibility Discussion, Harry Vogel, Loon Preservation Committee

- Value of coordinator:
  - Scientific value & financial benefit (joint funding) to coordinating research & education efforts
  - Dedicated person for compilation & analysis of joint datasets – would need knowledge of databases & statistics
    - Compilation of regional annual census data, productivity data, coordinated education/outreach, and funding resources
  - LPC has biologist coming on that could possibly work part-time as a coordinator
- Possible sources of funding for long-term position (part-time?)
  - NH Charitable Foundation – focused on NH
  - Conservation biology graduate student – non-thesis option; e.g.: Steve Kaul through Plymouth State University, Antioch (Jon Atwood)
    - Product to show cohesiveness of group e.g.: website
  - Internship?

Next NELSWG Meeting:

- late Feb? 7-8, 14-15, 21-22, 28-Mar 1; Mid-Mar?
- Chumford, MA (EPA)

Wetlands International: Can be added to list or update list if needed