Monitoring Aquatic Wildlife Resources in the Northern Highlands

Can Citizen Scientists Assist?

by

Mike Meyer

Wisconsin Department of Natural Resources

Wisconsin Lakes

Citizen Lake Monitoring

Monitoring Results
Reports & Data

For Volunteers
Enter Data
How to Submit Data On the Web
Manual - Water Quality
Manual - Aquatic Invasives
Datasheets and Forms
Invasives Lists & Maps
Frequently Asked Questions

Special Projects
Remote Sensing
Secchi Dip-In

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Volunteer Opportunities (UWEX)
Training Sessions (UWEX)

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General Information

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History
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Citizen Lake Monitoring 2010: A Year in Review

During the 2010 monitoring season:

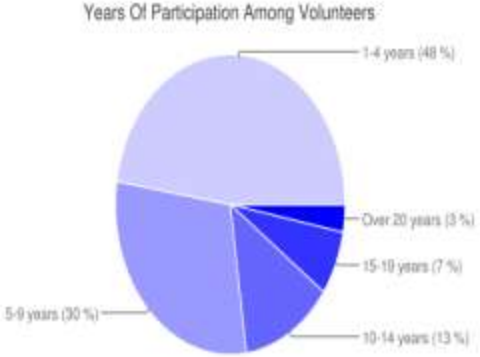
- **925 volunteers** monitored water quality at over **814 monitoring stations**
- **102 new Secchi volunteers and 77 new chemistry volunteers** participated.
- Data for **623 monitoring stations were entered online** (vs. 589 in 2009, vs. 572 in 2008, 530 in 2007 and 398 in 2006) into SWIMS by volunteers. The rest submitted data through our touchtone telephone line or on paper. The goal for the coming several years is to work towards 100% of data reported online (data from 63% of participating monitoring stations was entered online in 2007, 71% in 2008, 74% in 2009, 77% in 2010). This shift will decrease mailing costs and staff time, which will allow the Citizen Lake Monitoring network to grow.

We've all heard about it. We've all seen it on the news - State Government cutbacks and furloughs. But the more impressive news is that the volunteers in the Citizen Lake Monitoring Network have picked up the workload and our Network is expanding well beyond expectations. With agency staffing cutbacks, the data collected by the volunteers is even more (if possible) valuable than in the past. Volunteer clarity and chemistry data is used by loon research and climate change staff and USGS. Volunteer data is used to identify impaired waterbodies for the 303(d) list and for lake restoration projects. Data is used to make management decisions and by all levels of government to make water quality determinations.

Our Network's success is due to the volunteers. Volunteers are offering to take over duties that are normally considered agency duties such as equipment maintenance, data entry for volunteers without computer access, delivering supplies to other volunteers and reviewing manuals. Due to the volunteer participation, our equipment and lab funding has not been hit as hard as many other factions of the government. Those who govern see the value in supporting the Network and funding the Network so the volunteers can continue to collect high quality data on our lakes. This grass-root effort shows in the longevity of the Network and the number of volunteers that continue to monitor year after year after year.

Aquatic Invasive Species (AIS) are high on government's radar, and our volunteers continue to be the ones to detecting the new AIS when that enter our lakes. This has greatly improved our control and eradication success. Here's to the dedicated work of the volunteers. You have made 2010 another successful year.

Retention and the term length of volunteers are excellent. Twenty four volunteers are still actively participating after 20 years.



Years Of Participation Among Lakes

Mike Meyer, Doug Killian, Dennis Stockwell
WDNR Science Services
Rhinelander

WISCONSIN
DEPT. OF NATURAL RESOURCES

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.

Weekly lake surveys document presence of territorial adults and floaters, nest attempts, and chick survival

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

Adult Survival Rate – Re-observations of >1200 Wisconsin adult loons individually color-marked 1991 - 2008


08/06/2008






Nest Monitoring

Proportion nesting

Clutch size

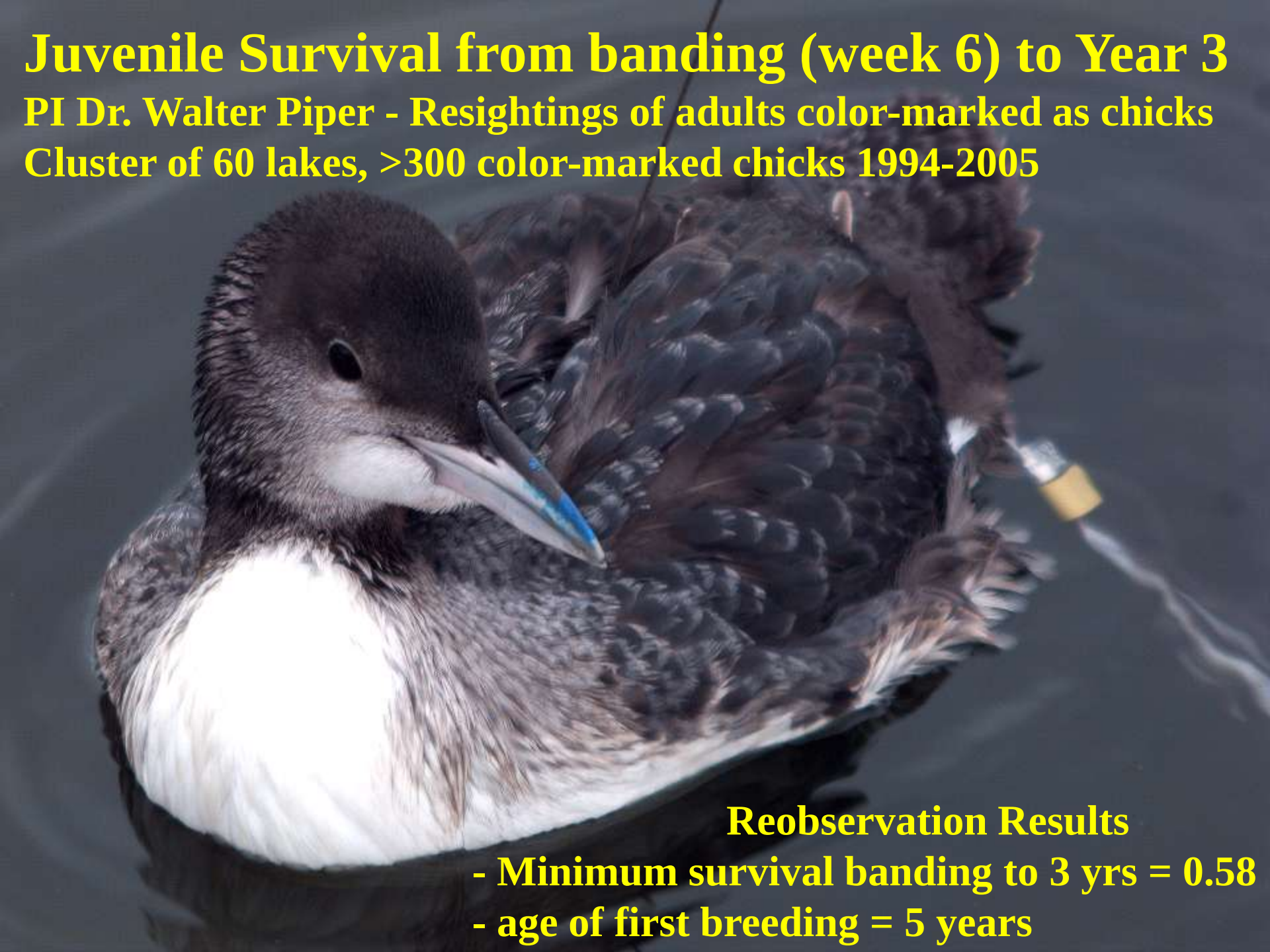
Nest Success

Chick Survival to Banding

Juvenile Survival from banding (week 6) to Year 3

PI Dr. Walter Piper - Resightings of adults color-marked as chicks

Cluster of 60 lakes, >300 color-marked chicks 1994-2005



Reobservation Results

- Minimum survival banding to 3 yrs = 0.58

- age of first breeding = 5 years

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

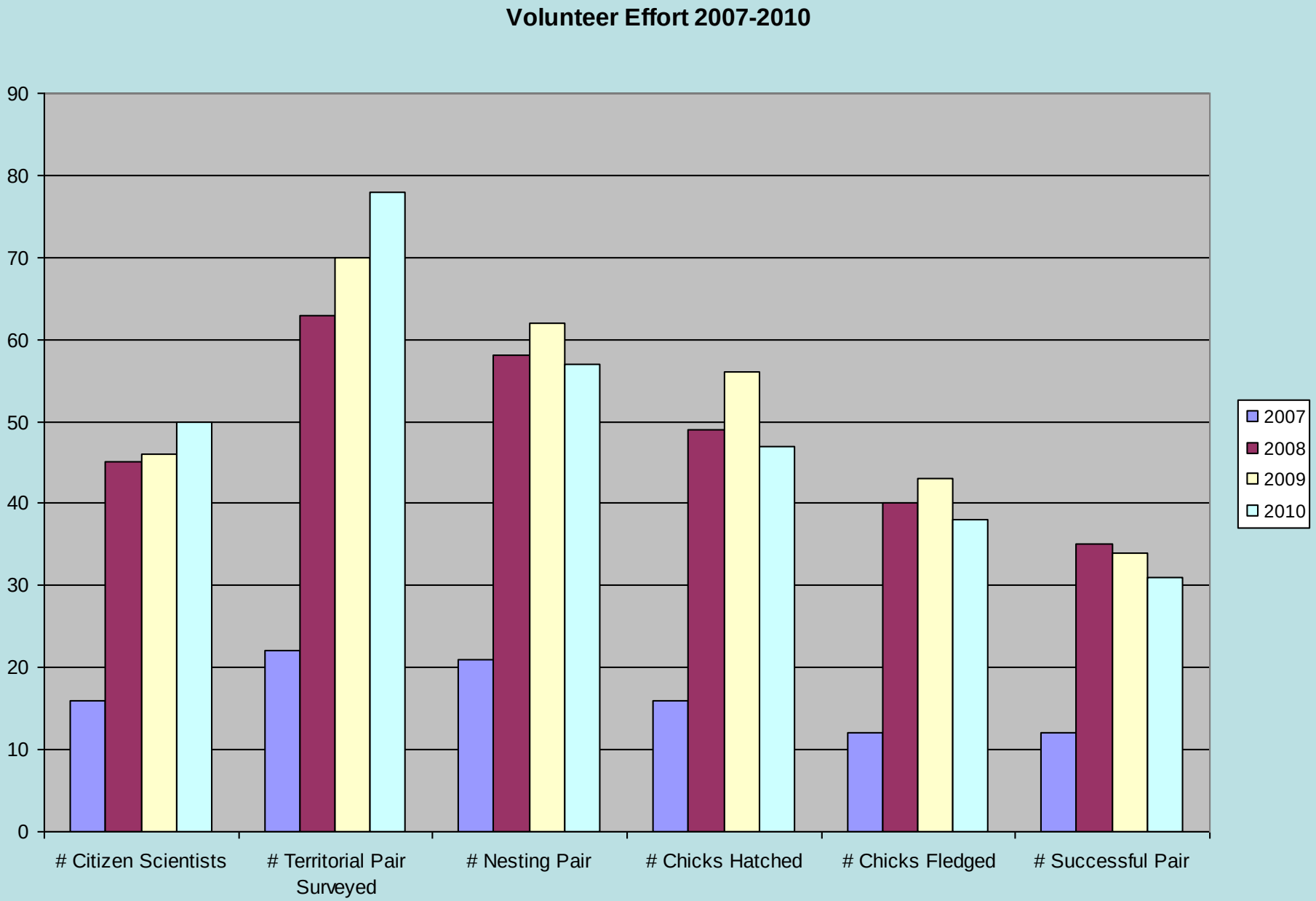
G_1=transition to adulthood

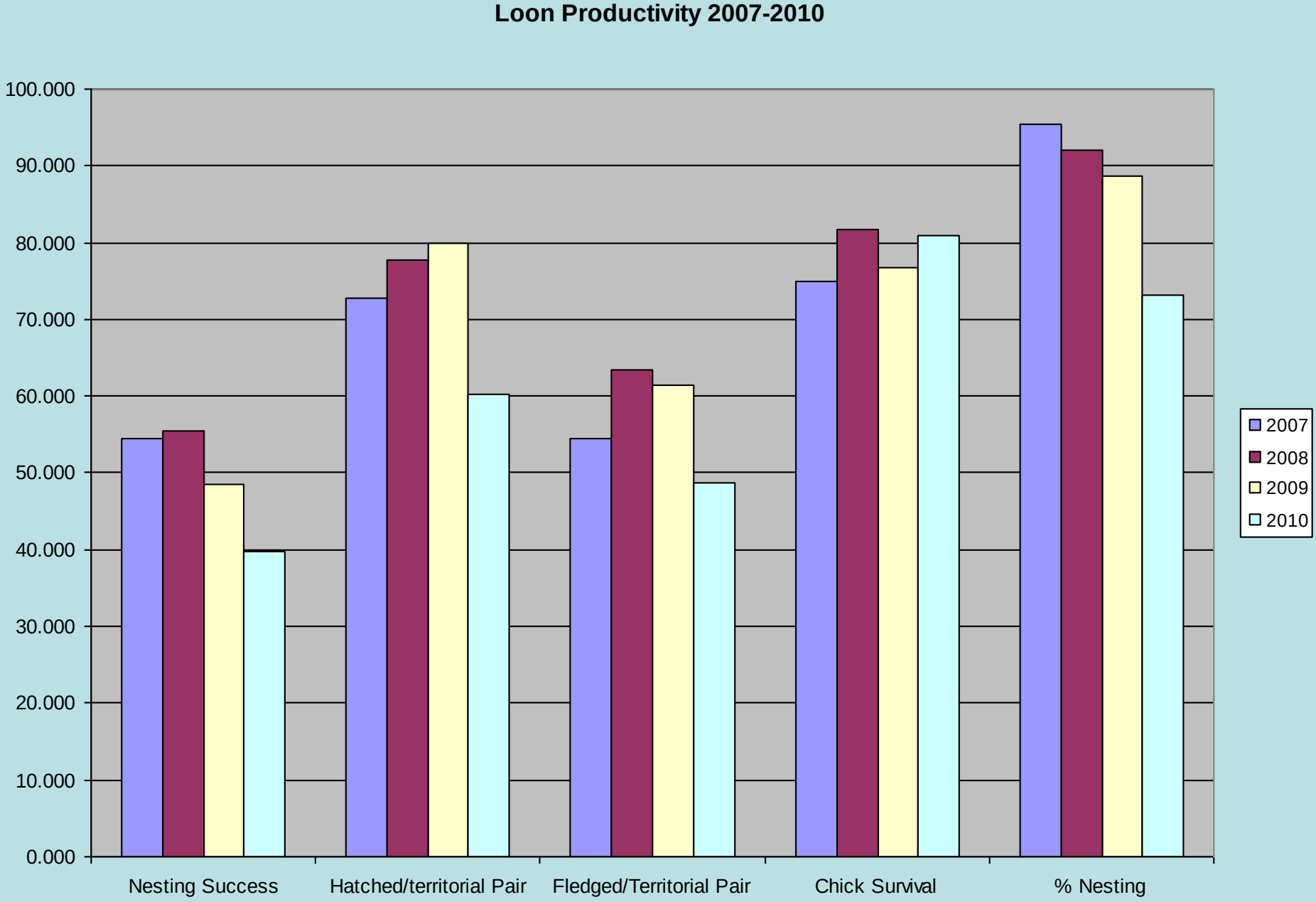
Loon Citizen Scientist Accuracy 2008

(n=35 lakes)

- Band reobservations - <35%
- 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 (fecundity); trained staff required to quantify adult re-observation rates (adult survival and juvenile recruitment)


Volunteer Effort 2007-2010
90
80
70
60
50
40
30
20
10
0
Citizen Scientists
Territorial Pair Surveyed
Nesting Pair
Chicks Hatched
Chicks Fledged
Successful Pair
2007
2008
2009
2010


Loon Productivity 2007-2010
100.000
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.000
Nesting Success
Hatched/territorial Pair
Fledged/Territorial Pair
Chick Survival
% Nesting
2007
2008
2009
2010

Cost/Benefit Analysis
WDNR LTE's

- Cost of monitoring fecundity weekly at 60 lakes using WDNR LTEs (USEPA study)
  - 1520 WDNR LTE hours (salary/FB = $22,800)
    - Weekly surveys, 30 lakes/LTE
    - May 1 – August 21 = 18 weeks
    - 80 hours = data entry
  - Travel
    - Vehicles (5000mi * 0.37mi) = $1,850
    - Boats/motor/trailers/canoes (gas & maintenance) - $1000
  - **Total = $25,650**

Cost/Benefit Analysis (cont.)

- Cost of monitoring fecundity weekly at 60 lakes using citizen scientists
  - 310 WDNR LTE hours (salary/FB = $4650)
    - 100 hours = 5 training workshops
    - 150 hours season prep – datasheet & newsletter mailings, maintenance of citizen science contact info/mailing list
    - 60 hours = data entry
  - Supplies, newsletter, mailings - $1500
  - Travel - $500
  - **Total - $6650**

  - **Net Savings $19,000**

Intangible Citizen Scientist Benefits

- Citizens participate in a State-of-the-Science Common Loon Conservation project
- Contribute data critical to natural resource policy making in northern Wisconsin
- Receive policy education via annual newsletters and spring training Workshops
- Become advocates for sound lake stewardship policies.

Volume 2, Issue 1
March 15, 2009

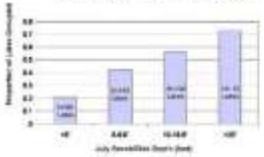
Red Eye News

New Research Grant Studies Climate Change Impact on Wisconsin Loons

NORTHWOODS LOON PROTECTION PROGRAM

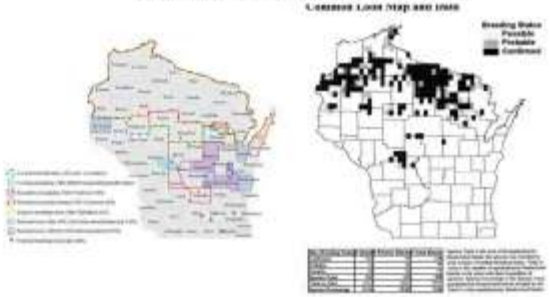
The Wisconsin Department of Natural Resources and partners at the US Geological Survey Water Center in Madison and the US Geological Survey Upper Midwest Environmental Science Center in La Crosse will begin a research study this summer to investigate whether predicted changes in Northern Wisconsin climate will result in reduced nest habitat quality of Common Loons. Loons typically select lakes for breeding that have good nesting habitat and relatively clear water. Previous work has shown that loons are less likely to be found on lakes as the secchi disk reading decline.

Proportion of Lakes with Territorial Loons Present by Water Clarity Category



USGS Hydrologists John Walker and Randy Hunt will model the potential impacts of future climate conditions on lakes within the Trout Lake watershed in Vilas County. They will investigate whether changes in temperature and precipitation could lead to changes in lake water quality in the region. WDNR Research Scientist Mike Meyer and USGS Research Scientist Kevin Kenow will be heading up crews that will be documenting loon use of lakes within the watershed and at the southern extent of their breeding range—southern and central Wisconsin. Specifically, the research crews will be identifying which lake factors (such as water clarity) nesting loons are looking for when setting up breeding territories. They will then assess whether lake models predict these factors could change under future climate conditions, potentially reducing the amount of lakes suitable for loons in Wisconsin.

Historical accounts and current WBBA Atlas show WI common loon breeding distribution has shifted north



The Wisconsin breeding loon population has shifted north over the past 100 years, it is possible that reduced lake water quality is responsible for this range reduction.. Investigators will examine whether the water quality of southern lakes abandoned by breeding loons is lower than northern lakes currently used by nesting loons. By examining the current quality of lakes once used by loons but are no longer, learning what lake factors loons are currently selecting, and modeling the future condition of lakes in northern Wisconsin under a warming climate, scientists will assess how loons may fare as lake conditions change across the region. Funding for this research project was received from the Wisconsin Focus on Energy Program.

For more information, contact Mike Meyer at WDNR Rhinelander,

Michael.Meyer@Wisconsin.gov

Join Us – It's Fun!!

Ginger Gumm / Daniel Poleschook

Wisconsin Initiative on Climate Change Impacts: Wildlife Working Group

Michael W. Meyer

Karl J. Martin

Co-Chairs

Citizen Science & Wisconsin's Wildlife Response to Climate Change

WISCONSIN INITIATIVE ON CLIMATE CHANGE IMPACTS

Droughts and increased evaporation leads to lower lake levels affecting:

- Recreation
- Property values
- Ecosystems

Especially in regions with increased groundwater pumping

Fallison Lake
Vilas County

Photo: Tim Asplund, WDNR

Lake Phenology - Biota

How you can help

- Document dates of ice off and ice over on your lake
- Document the arrival of the first common loon on territory
- Participate in the Northern Highland Frog and Toad Spring Phenology Survey

- We invite any volunteer who can do this conveniently to choose one or two wetlands associated with their lake to track frog and toad phenology throughout the spring and summer.

- Ideally, we would like surveys to be completed every other day throughout the breeding season, but once a week would suffice.

Frog and Toad Phenology Protocol

The protocol for conducting the survey is as follows.

1. Pick 1 or 2 spots to conduct your surveys. Choose significant wetlands on or near your lake. You may want to choose sites where you know frog calling typically occurs and sites that you can access conveniently. Use a lake map to identify the survey site and record information about the site on the data form.

2. Use one data form to record a call index value of frog species heard at each point that you monitor.

3. Listen anytime after sunset for 5 minutes.

4. Listen once to twice weekly from April 1 - June 15, and once weekly from June 16 - August 1.

5. The call index is a rough estimate of the numbers of calling males of a particular species, according to the following index values

    1.) Individuals can be counted, there is space between the calls.
    2.) Call of individuals can be distinguished, but there is some overlapping of calls (intermediate between 1 and 3)
    3.) Full Chorus. Calls are constant, continuous, and overlapping

6. Enter sky and wind conditions as described on the back of the datasheet.

Department of Natural Resources
Bureau of Endangered Resources
Box 7921
Madison, WI 53707

WISCONSIN FROG AND TOAD SURVEY -- SONG PHENOLOGY DATA SHEET

Form 3700-9 2-88

County ______________________

Phenology Site No. ______________

Year ______________________

Observer(s) name, address and telephone number:

INSTRUCTIONS: Use this form to record call index values of species heard at one particular site throughout the year. Listen any time after sunset for 5 min., at least twice weekly during the period 1 April - 15 June, and at least once weekly thereafter until 1 August. If time is Central Standard, denote with CST after time recorded. Return to the above address by 15 August.

Location= T ______ N R ______ Section ______ ______ 1/4

Description of Wetland: ______________________________

____

____

Listening Point: ______________________________

____

	Time		Temp. °F					CALL INDEX*											
Date	Begin	End	Air	Water	Sky**	Wind**	Dew?	Wood Frog	Chorus Frog	Spring Peeper	Leopard Frog	Pickerel Frog	Am. Toad	E. Gray Tree Frog	C. Gray Tree Frog	Cricket Frog	Mink Frog	Green Frog	Bullfrog

*The call index is a rough estimate of the numbers of calling males of a particular species, according to the following index values.

1. Individuals can be counted; there is space between calls.
2. Calls of individuals can be distinguished but there is some overlapping of calls (intermediate between "1 and 3").
3. Full chorus. Calls are constant, continuous and overlapping.

**See back of sheet for wind and sky codes.

Resources

- Natural History Information
  - http://inventory.wiatri.net/frogtoadsurvey/WIfrogs/

- Frog and Toad Calls
  - http://www.pwrc.usgs.gov/frogquiz/index.cfm?fuseaction=main.lookup
  - http://www.naturenorth.com/spring/sound/shfrsnd.html
  - CD's or cassette tape:

    Madison Audubon Society
    222 S. Hamilton Street, Suite #1
    Madison, WI 53703
    608-255-2473
    www.madisonaudubon.org/audubon/html/frogtape.htm

Wisconsin
Frog and Toad Survey


Gray Treefrogs © Mitch Bergeson

WFTS News

Survey Routes Available for 2011

Previous annual summaries available online

Website Sponsors

Citizen-Based Monitoring Network of Wisconsin

WI Frogs

Natural History
Learn about the habitat and life history of Wisconsin's frogs.

Species Accounts
Wisconsin is home to twelve frog species and one toad species. Click on a species name below for more information.

Toads
Eastern American Toad (*Bufo americanus*)

Treefrogs
Northern Cricket Frog (*Acris crepitans*)
Boreal Chorus Frog (*Pseudacris maculata*)
Spring Peeper (*Pseudacris crucifer*)
Cope's Gray Treefrog (*Hyla chrysoscelis*)
Eastern Gray Treefrog (*Hyla versicolor*)

True Frogs
American Bullfrog (*Lithobates catesbeianus*)
Green Frog (*Lithobates clamitans*)
Pickerel Frog (*Lithobates palustris*)
Northern Leopard Frog (*Lithobates pipiens*)
Mink Frog (*Lithobates septentrionalis*)
Wood Frog (*Lithobates sylvaticus*)

USGS Frog Calls and Quiz
Listen to the calls of each Wisconsin species and then test your skills on the quiz. (links to USGS site)

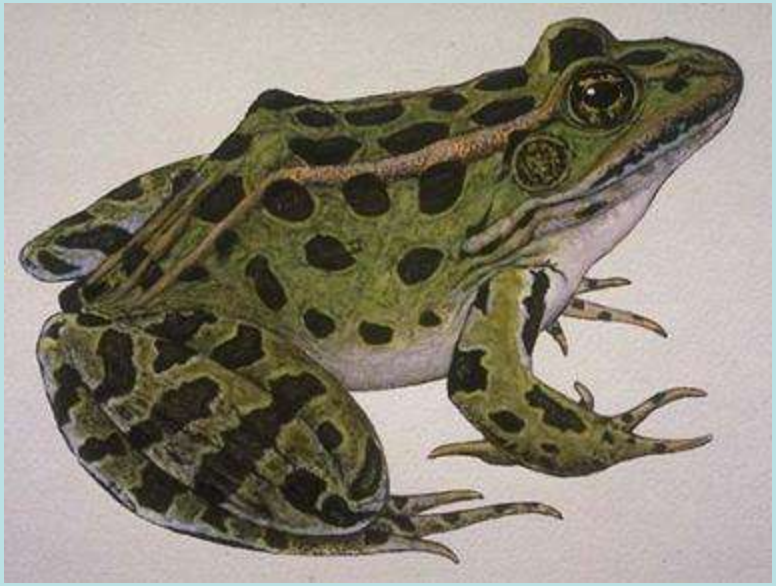
Wisconsin Wetlands
Links for more information about Wisconsin's wetlands.
Wisconsin Wetlands Association
Wisconsin Wetlands - WDNR

Early Spring Callers

Eric Cote

Suzanne L. & Joseph T. Collins

Northern Highland Lake Frogs



Tree Frogs and a Toad

The Common Loon as Botulism E Biosentinel

Michael W. Meyer PhD
WDNR Science Services – Rhinelander

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Michael.Meyer@Wisconsin.gov

Preliminary 2007 Great Lakes Carcass Count = 6982

Courtesy M. Jankowski USGS

Top 5 Species collected by Great Lake

Courtesy M. Jankowski USGS

Lake Michigan (3491)

- **Common loon (622)**
  - BOT E confirmed by NWHC
- Double-crested cormorant (581)
- Long-tailed duck (545)
- Ring-billed gull (448)
- Horned grebe (351)

Lake Huron (44)

- **Common loon (23)**
  - Bot E confirmed
- Red-necked grebe (5)
- Double crested cormorant (1)
- White-winged scoter (# not available)
- Long-tailed duck (# not available)

Lake Erie (1694)

- Ring-billed gull (972)
- **Common loon (685)**
  - BOT E confirmed by NWHC
- Herring gull (13)
- White-winged scoter (8)
- Great black-backed gull (5)

Lake Ontario (1753 so far)

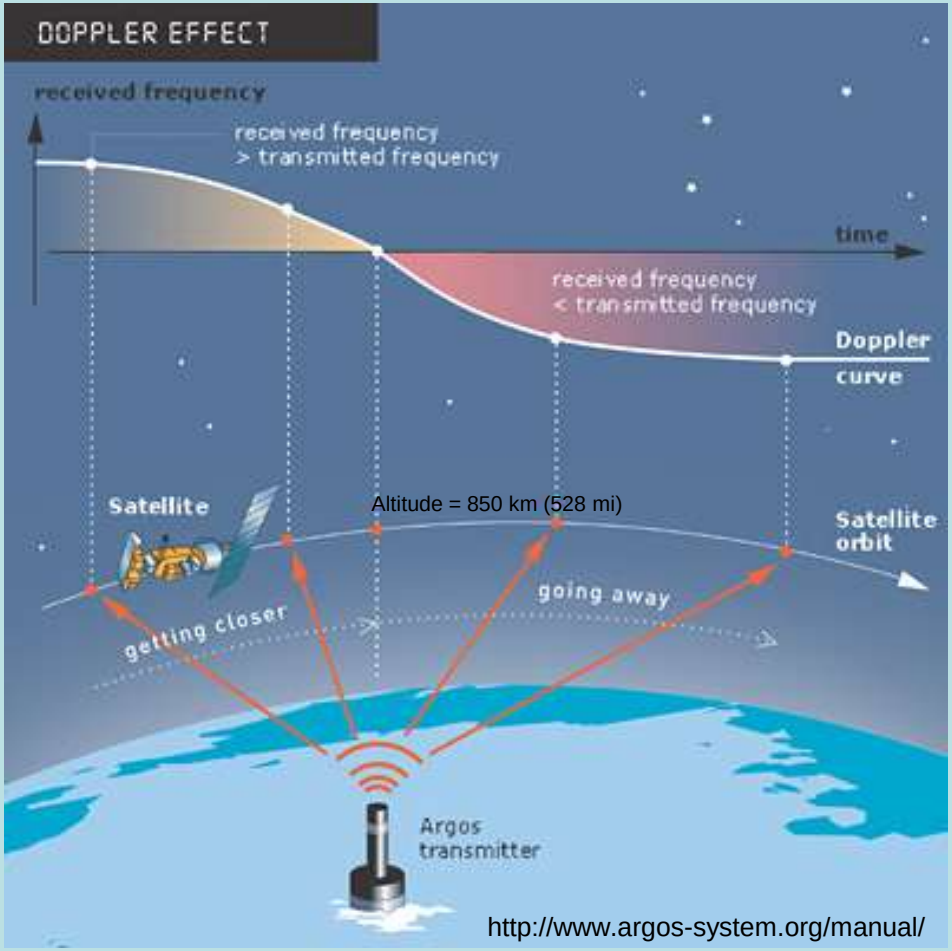
- Ring-billed gull (942)
  - BOT E confirmed by CCWHC
- Caspian tern (309)
- Double-crested cormorant (162)
- Long-tailed duck (128)
  - BOT E confirmed by CCWHC
- **Common loon (128)**

Fine-resolution location

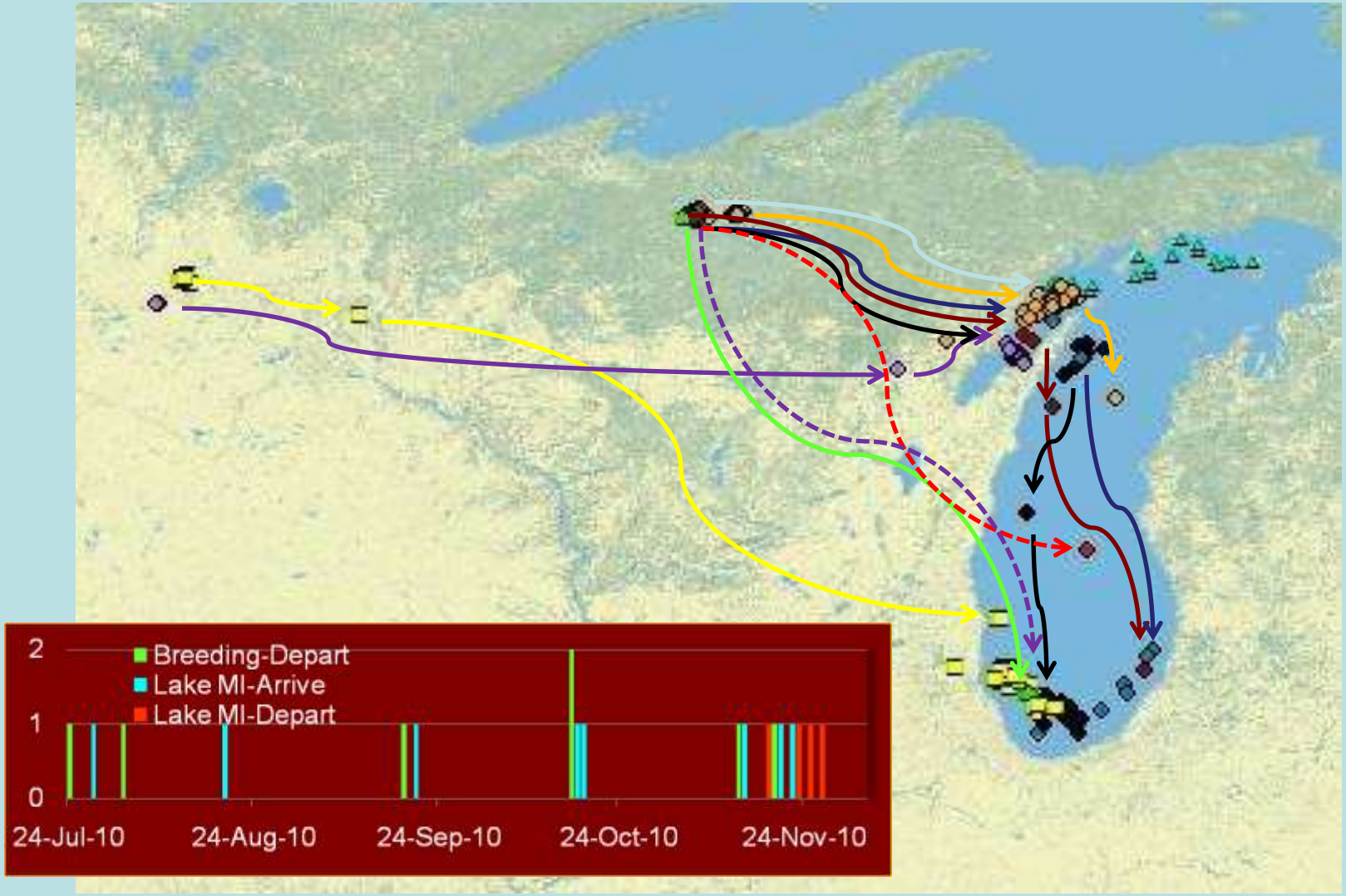
- Implantable satellite transmitters (Microwave Telemetry model PTT-100) in 10 adult male loons used to provide fine resolution (e.g., <250 m accuracy) location data
  - Abdominal implant with exteriorized antenna
  - 64 grams (~1.5% of BW) volume = 32 cc
- 1,500 hours, duty cycles:
  - Breeding- 8 hrs on:72 hrs off
  - Fall migration- 8on:24off
  - Wintering- 6on:96off
  - Spring migration- 8on:24off
  - 8on:96off thru Oct 2011

Tracking loons via satellite

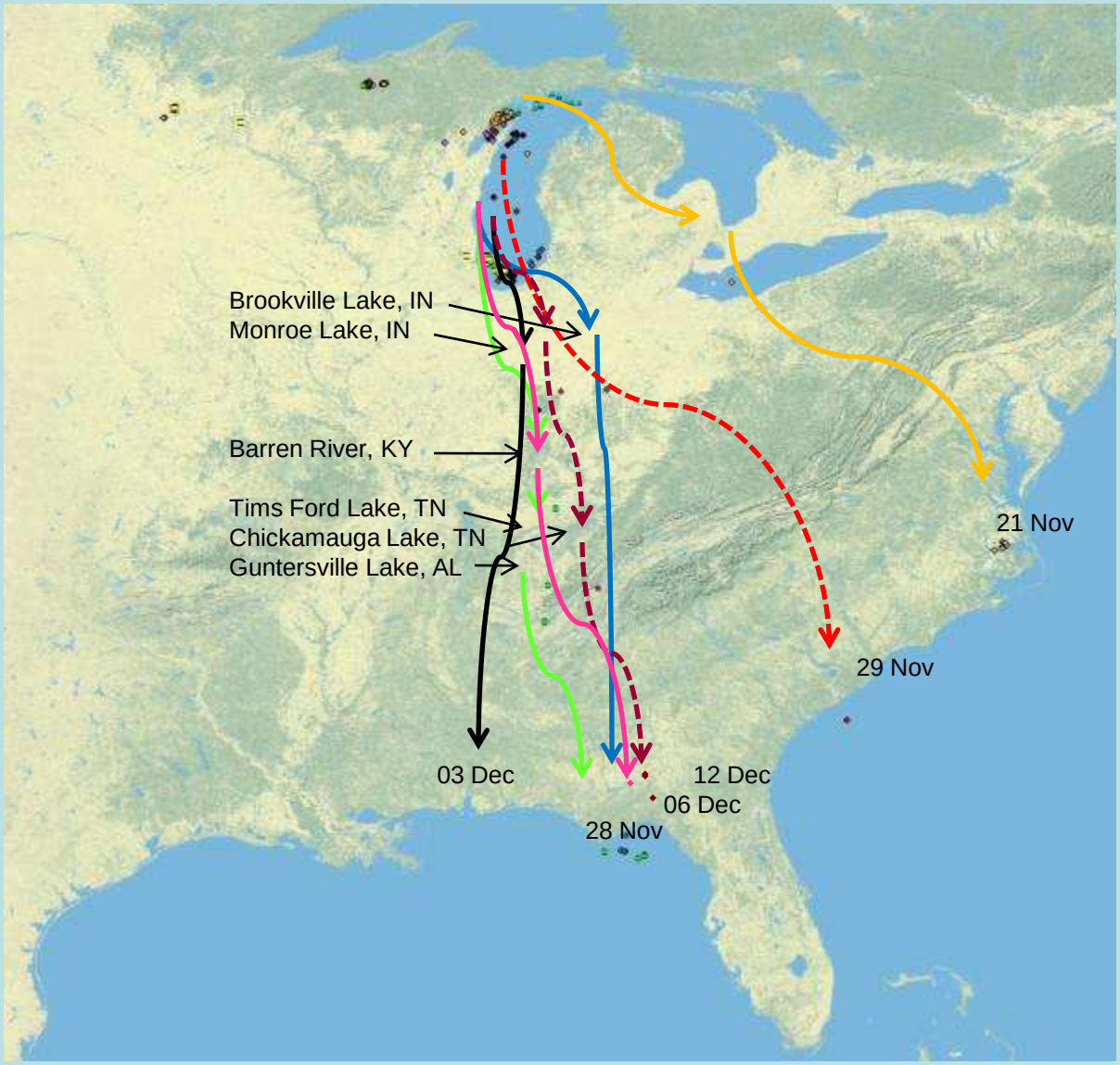
- Satellite transmitters available for birds in early 1980s - 170 g
- Argos receiver onboard NOAA polar-orbiting satellites
- Transmitter needs to emit a strong and stable signal as the location is computed on the basis of Doppler effect measurement
- Backpack harness and bib collar not acceptable to common loons



Migration of Radiomarked Common Loons in 2010



Migration of Radiomarked Common Loons in 2010



Common loon migration webpage:

http://www.umesc.usgs.gov/terrestrial/migratory_birds/loons/migrations.html