

THE 2020 BREEDING STATUS OF COMMON LOONS IN VERMONT

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ABSTRACT: The Vermont Loon Conservation Project, a program of the Vermont Center for Ecostudies and the Vermont Fish and Wildlife Department, documented 96 nesting loon pairs and 135 territorial pairs statewide. Of the 96 pairs that attempted nesting, 65 successfully hatched 102 eggs, with 75 chicks surviving through August (chick survival rate 74%, 0.56 chicks surviving per territorial pair). The slight drop in productivity in 2020 can be explained by a higher percent of territorial pairs not nesting and a lower nest success rate. Three new nesting pairs and 3 new potential territorial pair were identified. In addition, two new pairs started nest building but never laid eggs. Thirty-three pairs that have nested in recent years did not nest in 2020. Of 32 pairs whose first nest attempts failed, 4 re-nested, and 1 was successful. Known causes of nest failure included depredation (12 nests), human disturbance (1 nest), and loon disturbance (2 nests). After a record number of flooded nests in 2019 (13), no flooded nests were documented in 2020. The remaining failed nests were abandoned for unknown reasons, with depredation and disruption from intruder loons being the most likely causes. The causes of most chick mortality were unknown. At least 7 chicks disappeared after interactions with intruder loons and 1 was taken by a Bald Eagle (No. 10 P.). During the summer months, 7 adult loon mortalities were documented. Two additional mortalities occurred in late October and November on Lake Champlain. A few of the birds have been necropsied as of mid-September. Two likely died from a fungal respiratory disease. A rescue attempt was made on adult loon entangled in fishing line/gear on L. Rescue but the loon was healthy enough to avoid capture. This loon, as of late August, had a single strand of line at the bill, was behaving normally, and has been observed on nearby lakes. Three loons were reportedly entangled in fishing gear, but were not observed during follow-up surveys. One loon was observed on a small pond from which it could not fly, but the loon likely went overland to a nearby larger water body. Three chicks were retrieved for necropsies (Lowell L. - attack by another loon, Lowell L. - possible disease TBD, Wolcott P. - starvation). About 200 volunteers surveyed lakes throughout Vermont on 18 July as part of the Loonwatch program, an annual statewide loon count. Loons were observed on 125 of 171 surveyed lakes, where observers counted 358 adults, 66 chicks, and 1 subadult loon. The total number of adult loons has increased substantially comparing the 2018-2020 period to the 2013-17 when 297 to 308 loons were counted each year. To provide a historical perspective, volunteers counted 179 and 225 adult loons in 2003 and 2008, respectively. Thirty-four of the 96 breeding pairs nested on nesting rafts, 31 on islands, 24 in marshes, and 7 on shorelines. Forty-two nesting rafts were placed on known or potential nesting waterbodies. Warning sign buoys were placed around 50 of the 95 nests. Volunteers provided technical assistance through the placement and maintenance of nest warning signs and/or nesting rafts on 56 lakes as part of the adopt-a-lake program. Four loon conservation webinar programs were presented. No live programs were conducted due to the Covid-19 pandemic. We continued to distribute 2 informational brochures on loon conservation and conservation of lakeshores.

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INTRODUCTION

In 1977, the Vermont Loon Conservation Project (VLCP) was initiated to assess the status of Common Loons (*Gavia immer*) in Vermont and found that the breeding population had significantly declined (Laughlin 1977). As a result, the VLCP began a loon monitoring and management program in 1978. Numbers of breeding pairs peaked at 19 in 1982, and then dropped sharply to 7 pairs in 1983 for unknown reasons. From 1983 to 1989, Vermont's breeding loon population gradually increased at an average rate of 1 pair per year, stabilized between 1989 and 1994 at 14-16 breeding pairs, and then experienced a marked increase since the mid-1990s to 96 nest attempts in 2020. The VLCP is a program of the Vermont Center for Ecostudies (VCE) and the Vermont Fish and Wildlife Department (VFWD).

In 2005, the Common Loon was removed from the Vermont Endangered and Threatened Species list. Conservation and educational efforts by many groups and individuals enabled the achievement of this milestone. Through the guidance of VCE and VFWD, monitoring and management programs were implemented throughout the 1980s and 1990s. In 1998, the Vermont Loon Recovery Plan (Borden and Rimmer 1998) was recommended for approval by the Vermont Scientific Advisory Group (SAG) on Birds and the Vermont Endangered Species Committee (ESC), and approved by the Vermont Agency of Natural Resources (ANR). The recovery plan recommended actions on management, monitoring, research, and education programs to promote the recovery of the species. The Common Loon was designated a state endangered species in 1987 following documentation of its population decline in the early 1980's. The target level to de-list as written in the Vermont Loon Recovery Plan was "40 nesting pairs averaged over 5 consecutive years", with a minimum of 5 nesting pairs in "2 geographically discrete areas. From 2000-2004, the average number of nesting loon pairs was 41, and 6 pairs nested in the southern half of Vermont. Today, the average number of nesting pairs from 2016-2020 was 95 with 22 nesting pairs in the southern half of the state in 2020.

Since the mid-1980's, the VLCP has been a joint program between VCE and VFWD. The Nongame Wildlife Fund has been the primary funding source for the VLCP (35-40% of budget) for many years, and VFWD has provided technical, law enforcement, and logistical support. Starting in 2013, the VFWD began utilizing the federal Pittman-Robertson Fund for the VLCP. VCE annually hires the VLCP biologist, provides staff support, and raises the remaining VLCP budget through donations and grants.

METHODS

Monitoring of lakes with breeding and territorial loons

The VLCP biologist, a VCE intern, and volunteers surveyed approximately 135 lakes with known histories of loon nesting, occupancy by territorial pairs, or high levels of loon activity on a regular basis (weekly to monthly). Over 180 adopt-a-lake volunteers provided technical assistance in this intensive monitoring effort.

Vermont Loonwatch day was initiated in 1983 to provide a mid-summer estimate of the statewide loon population. On the third Saturday in July each year, volunteers survey assigned lakes, ponds, and reservoirs from 8:00 to 9:00 a.m., recording the number of adult loons, subadult loons (1-2 year olds), and loon chicks on the water body, as well as relevant human and wildlife activity. The information has provided an annual statewide population estimate, an estimate of the number of non-breeding loons, and a check on lakes with previously undetected breeding pairs.

Management

Loon management practices included: 1) stabilization of water levels during the nesting period through cooperation with hydroelectric companies and others who control water levels; 2) placement of artificial nesting rafts in appropriate sites; 3) placement of warning sign buoys to discourage human intrusion at nest sites; 4) responding to all reports of distressed or dead loons, and 5) providing technical assistance to regulatory agencies. Volunteers provided important technical support for the first 4 of these practices.

The 8 hydroelectric companies and 3 agencies that regulate water levels on lakes where loons have historically nested were contacted when loons began nesting. Each company was requested to stabilize water levels during the nesting period so that nests would not be flooded by rising water levels or left stranded by water drawdowns.

Forty-two artificial nesting rafts were placed statewide. These rafts provided an alternative nest site to natural sites where predation from terrestrial mammals and/or fluctuating water levels had caused nests to fail in previous years. Rafts were

placed on some lakes with presumed territorial loon pairs, but where natural habitat is lacking (e.g., no suitable islands and/or marshes, highly developed shorelines). In cases where a potential pair is present and natural nest sites exist, rafts will not be considered unless the pair fails to nest after 4 or 5 consecutive years of occupancy. Rafts are considered on lakes where natural nests have failed 3 consecutive times, and the VLCP deems that rafts might prove beneficial. We also consider using rafts when natural nests are located in very close proximity to active cottages and other human activities to reduce potential disturbance. Adopt-a-lake volunteers maintained or helped with 23 rafts. Two rafts were replaced on Mollys Falls Reservoir because of water drawdown for dam repairs; the old rafts were too heavy to move from the nearby mudflats. Both rafts were utilized. The raft on Sugar Hill Reservoir was not placed because of very low water levels for dam repairs. Only a single loon was reported on this reservoir during most surveys.

Warning sign buoys were placed around 50 of the 96 active nest sites to discourage human intrusion close to nests. These signs were also placed around 4 other nest sites where loons ultimately did not nest in 2020. Sign buoys were used in areas where repeated human disturbance was likely to occur. In most locations, people respect the presence of the signs.

The VLCP biologist coordinated responses to loons in distress with volunteers, VFWD game wardens, wildlife rehab personnel, and veterinarians (e.g., caught in monofilament, injured, road crashes, landed on ponds too small to fly from, iced-in, other). The VLCP biologist has also begun assisting with necropsies and will take on a larger role in this process in the future to be able to analyze fresh loons instead of frozen ones. Bren Lundborg from the Vermont Institute of Natural Science (VINS) has taken on a primary role in conducting necropsies of Vermont's loons. In addition, Tufts Wildlife Clinic was not conducting necropsies in 2020 because of the COVID-19 pandemic.

Education

Public education continued to be a vital part of loon management efforts. The VLCP biologist contacted landowners of new nesting sites as soon as nesting was suspected or observed. Four loon conservation webinar programs were presented. No live programs were conducted due to the Covid-19 pandemic. We continued to distribute 2 informational brochures on loon conservation and conservation of lakeshores. A sign informing boaters and anglers how to help nesting loons was placed at lake access areas. Another sign cautioning boaters to be alert for loon chicks and to watch loons from a distance was also placed at some access areas.

Communication with volunteers is a major component of the program. This informal education is on-going and creates highly knowledgeable people in and around the lakes and ponds in Vermont. The biologist answers all inquiries from the public. Biologists, staff educators, and the project's volunteer network regularly informed camp owners and other lake users about loon conservation measures.

Two brochures directed at 1) boaters and 2) lakeshore owners were distributed. A brochure "the Common Loon – a guide for lakeshore owners" contained information about the importance of riparian habitat for the health of a lake and was distributed to several lake associations. VCE mailed the *Loon Caller* newsletter to over 800 loon volunteers, donors, and other loon program contacts.

Contaminant sampling

Abandoned eggs were collected and delivered to Biodiversity Research Institute (276 Canco Rd., Portland, ME 04103) for methylmercury (MeHg) analysis (Evers et al. 1999). Twenty-two eggs were collected in 2020. Results from 2017 indicated that the eggs collected Curtis Pond and Chandler Pond had high mercury levels. Both are shallow ponds with extensive muddy bottoms which might promote the methylation of inorganic mercury. Loon pairs on both ponds have successfully fledged numerous chicks. BRI has archived egg samples from most of the previous 10 years. Cooperators on this research include the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, BRI, the Vermont Department of Environmental Conservation, and several other state agencies, private organizations, and universities.

RESULTS AND DISCUSSION

Description of loon activity on individual lakes in 2020

Lake and loon activity descriptions are provided for nesting pairs, known and potential territorial pairs, and lakes with high levels of loon activity in Table 1. Nesting pairs nested this year, territorial pairs have nested in recent years, and potential territorial pairs have no recent history of nesting but 2 adult loons were observed throughout much of the summer.

Distribution of territorial and nesting pairs

There were 135 known and potential territorial loon pairs, 96 of which were confirmed to nest on 82 lakes (Fig. 1, Table 1). Three new nesting pairs were identified, including Collins P. (over-incubation), Lewis P. (abandoned), and Somerset Res. NE (1 chick). Two additional new pairs started building nests but never laid eggs (Glen L., Halls L.). Three new potential territorial pairs were identified on Long P. (Sheffield), Noyes P., and Lake Rescue. Five pairs were downlisted to being potential territories or loon active as the pairs have not nested recently (Daniels P., Harvey's L.-South, Mitchell L., Norford L., and L. Parker).

Population levels and breeding success

The number of nesting pairs dropped slightly from 101 in 2019 to 96 in 2020. However, the number of territorial pairs increased to 135 from 129 in 2019. Of the 96 pairs that attempted nesting, 65 successfully hatched 102 eggs, with 75 chicks surviving through August (Fig. 2, Table 2). The slight drop in productivity in 2020 can be explained by a higher percent of territorial pairs not nesting and a lower nest success rate.

There were 123 known territorial pairs on water bodies where nesting or nest building had occurred within the last 3 years, and 12 potential territorial pairs, each of which was observed consistently for 6 weeks or more. Twenty-seven pairs that have nested in recent years did not nest in 2020, thus 78 percent of the known territorial pairs nested. The 5-year average nesting rate of known territorial pairs from 2015-19 was 83 percent. It should be noted that 5 pairs that have nested in the past several years were downlisted to "potential territory" status. Most of these pairs appeared to be less consistent this year, have only attempted to nest once or twice, and occupy marginal habitat.

The nest success rate was 68%, which is lower than the previous 5-year average 2015-19 of 74%. Of 32 pairs whose first nest attempts failed, 4 re-nested, and 1 was successful. Known causes of nest failure included depredation (12 nests), human disturbance (1 nest), and loon disturbance (2 nests). For depredation cases, eggshells were found outside the nest bowl. There is a chance some of these eggs were depredated after the nest was abandoned for other reasons. After a record number of flooded nests in 2019 (13), no known nests flooded in 2020. The remaining failed nests were abandoned for unknown reasons, with depredation and disruption from intruder loons being the most likely causes. Details are provided in Table 1.

The chick survival rate through August was 74% with 0.56 chicks surviving per territorial pair (ch/tp) in 2020. From 1979-2019, the average chick survival rate is 75% with 0.69 ch/tp. This was the lowest ch/tp rate observed in Vermont since 1984. The estimate for a stable and sustainable population is 0.48 ch/tp. The causes of most chick mortality were unknown. At least 7 chicks disappeared after interactions with intruder loons; 1 was taken by a Bald Eagle (No. 10 P.). An 8 week-old chick on Wolcott Pond was highly emaciated but the underlying cause of this starvation is unknown.

Seven adult mortalities were documented during the summer months. Two additional adult loons were found alive but later died during migration on Lake Champlain in late October and November. A few of them have been necropsied as of mid-September. Two likely died from a fungal respiratory disease (Long P. – Eden/Belvidere, May P.). One had puncture wounds in the sternum from an attack by another loon (Long P.-Westmore). However, there were no obvious signs that this caused the death of this adult, and the injury could have occurred months or years ago. The May Pond loon was brought to the VINS for treatment, and the Long (Westmore) loon was brought to a small pond for observation where it died later. Several loons were not retrieved because of decomposition (Echo L.-Charleston, L. Seymour), and another loon reportedly was found dead on Little Averill, but this case was not confirmed. Three chicks were retrieved for necropsies (Lowell L. – attack by another loon, Lowell L. – possible disease TBD, Wolcott P. – starvation).

Management Results: artificial nesting rafts and nest warning sign buoys

Of the 96 known nests, 34 were constructed on artificial nesting rafts (74% successful), 31 were on islands (74% successful), 24 were in marshes (67% successful), and 7 were on shorelines (14% successful). The raft success rate has typically been above 85 percent in recent years. Nests with warning sign buoys (n=50) had an 68% success rate compared to 67% for nests without signs (n=46). Signs are used more frequently for raft and island sites, which are often more exposed to boaters, but also tend to be more successful being away from shoreline predators. Shoreline nests are more likely to be depredated causing nest success rates to be low. We have begun placing "goose guards" on several artificial nesting rafts in April and early May to prevent Canada geese from nesting on the rafts. Geese used one raft on L. Fairlee

causing the loons to choose a shoreline nest which was depredated. Geese used the Little Averill – west raft as perch. This was discovered in mid-June and cleaned-up allowing the loons to successfully nest in late June.

Vermont Loonwatch Day

Vermont Loonwatch day was conducted on 18 July when over 200 volunteers counted 358 adult loons, 66 chicks, and 1 subadult (Table 2, Fig. 3). Loons were observed on 125 of the 171 lakes surveyed. The total number of adult loons has increased substantially over the 2018-2020 compared to the 2013-17 period when 297 to 308 loons were counted each year. To provide a historical perspective, volunteers counted 179 and 225 adult loons in 2003 and 2008, respectively. Reasons for the increase are numerous. Survey conditions were relatively calm in both 2018-2020. During the previous few years, counts may have been suppressed because of higher winds and rainy conditions. Over 10 additional lakes were surveyed in the past 3 years. And there were likely more loons.

Seventy-nine of 358 adult loons counted were located in southern and central Vermont, an increase from 46 to 68 loons counted annually between 2015 and 2019. West central Vermont has observed the largest percentage increase in loons during the past 5 years increasing from 25 adults in 2016 to 46 in 2020. North central Vermont has the largest concentrated population with about 150 adults over each of the past 3 years. Volunteers counted the most loons on Lake Seymour (18 adults) and Green River Res. (17 adults) followed by Somerset Res. (11 adults), and Norton Pond (10 adults).

Loon Rescues

A rescue attempt was made on adult loon entangled in fishing line/gear on L. Rescue but the loon was healthy enough to avoid capture. This loon as of late August had a single strand of line at the bill, was behaving normally, and has been observed on nearby lakes. One loon was observed on small pond near Thurman Dix Res. from which it could not fly, but the loon likely went overland to a nearby larger water body. We searched for several loons reportedly caught in fishing line on South P. (Marlboro) and L. Eden, but all loons found were healthy. Lake residents on Woodbury L. reported a possible boat hit of a chick after observing a boat driving through the location of the family. The chick was observed on shore for a short time before it returned to the water and appeared healthy. Two beached loons were retrieved on Lake Champlain during migration in Oct./Nov. in North Hero and South Burlington; both loons died within a day.

The VLCP biologist spent over 80 hours in 2020 conducting capture attempts, coordinating monitoring efforts with volunteers and game wardens, and processing loon mortalities. The biologist has spent 40-90 hours annually dealing with loons in distress in recent years. Volunteers were instrumental in the monitoring and capture attempts of all these birds with volunteer time exceeding 50-100 hours per year.

Volunteer Effort

Volunteers provided important technical assistance for loon conservation efforts in Vermont. The efforts of adopt-a-lake volunteers, who helped monitor over 70 lakes statewide, varied from a few surveys over the summer to daily observations. Volunteers assisted with either loon nest warning signs and/or nesting rafts on 56 of the 74 lakes where these management tools were used. Volunteers were critical in helping to inform the VLCP biologist about lakes and ponds with increased loon activity, potential territorial pair development, and loons in distress. Volunteers or other citizens aware of the loon program helped determine the status of most of the potential territorial pairs through repeated surveys.

Threats to Vermont's loons

Vermont's loons continue to face many short- and long-term threats to their viability, including: (1) water level fluctuations on lakes where water levels are regulated; (2) shoreline development and human disturbance; (3) mortality through lead poisoning, entanglement with monofilament fishing line, and fishing gear ingestion; (4) environmental background of bio-accumulating mercury and methyl-mercury, (5) oil spills in wintering coastal areas, and (6) disease such as aspergillosis and botulism. There have been recent region-wide population declines in Wisconsin and parts of Ontario. Although the specific reasons for the decline are not known, tens of thousands have died due to botulism poisoning on the Great Lakes for the past 20 years, and it is possible that the effects of these mortalities are only now being observed. Two natural sources of mortality include predation of eggs and chicks and intraspecific competition between breeding pairs and extraterritorial (rogue/intruder) loons. See the mortality assessment in the next section for details. Background and historic information on these threats are provided in the Vermont Common Loon Recovery Plan (Borden and Rimmer 1998, pp. 5-10) and the VLCP 2000 and 2009 annual reports.

Mortality Assessment 1989-2019

From 1989 to 2019, Tufts University Wildlife Veterinary Clinic, University of New Hampshire Pathology Lab, and several other veterinarians have analyzed 104 of the 124 dead loons to determine the cause of death of each bird. Twenty loons were not analyzed because they could not be retrieved, or were too decomposed for analysis. For 102 of the 104 loons analyzed, the cause of death or at least some contributing factors were identified (Fig. 4).

The Vermont legislature banned the sale and use of half-inch or less lead sinkers in 2006 and 2007, respectively. Since lead mortality has been a leading cause of loon mortality, we compared the 13 years before and after 2007 (Fig. 5). The number of loons killed by lead poisoning dropped by 47% (17 loons pre-2007, 9 loons 2007-present). The loon population has increased substantially between these two time periods, thus we compared the mortality rates in consideration of the overall adult loon population (Fig. 6). Lead mortality rates dropped 71%. Despite the significant decline, 6 loons were known to have died from lead fishing gear between 2014-19. The rates of ingestion and entanglement in monofilament fishing gear was more steady throughout the study period.

In assessing other human-caused direct mortality, chicks are more vulnerable to boat hits (8 documented mortalities) compared to adults (2 mortalities). The VLCP receives reports of numerous near collisions, and most chick mortality is not observed.

Thirteen loons have died from fungal respiratory disease—aspergillosis—and notably, 11 cases have occurred from 2007 to 2019 with only 2 cases prior to 2007 (Fig. 6). Two more cases were detected in 2020, but are not included in these summary figures. Fungal disease tends to affect weakened or immune-compromised birds. The substantial increase in fungal disease-related mortality is cause for concern and we are discussing what further studies could be conducted to elucidate what has changed. Is there a correlated stressor that has increased in the past decade, such as competition or climate change factors? In New Hampshire and Maine, several loons have recently died of malaria, which is potentially related to climate change.

Reports of loon territorial chases and fights has increased over the past decade, likely due to the increase in the adult loon population. Some territorial encounters can result in the death of one of the birds, especially with male fighting. However, the mortality rate from loon fights is about the same before and after 2007—despite a near-doubling of the adult loon population. Since intruding adult loons will kill chicks during territorial disputes, we would expect to observe a higher rate of chick loss caused by competition and attacks as the overall population increases. However, such events are rarely witnessed. In 2019, a record nine chicks were reported to have disappeared after territorial interactions (32% of total chicks lost), but the average rate from 2015-2019 (16% of lost chicks) is actually lower than from 2000-2004 (34%). In any given year, we don't know the causes of loss for 60-95% of loon chicks that disappear, but predation and territorial disputes are likely two major reasons.

Table 1. Summary of Common Loon breeding activity in Vermont, 2020

		Nesting pairs: 95 Known territorial pairs: 123 Potential territorial pairs: 12 Total territorial pairs: 134															
		Chicks hatched out: 102 Chicks surviving through August: 75															
		Lake list divided into sections: 1) nesting pairs and known and potential territorial pairs, and 2) loon active lakes.															
		Loonwatch Count on 18 July 2020: Adult loons - 358 New nesting pairs: 3 New territorial pairs: 3 Pairs no longer active: 2															

Table 1 continued									Rescues / Mortality / Monitor Situations							
Lake Name	Town	2020 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescue/ Mortality/ Monitor	Mortality and Rescue Cause	Date	Age	Comments	# years nested	# years nest success	total # surviving chicks
				Last nested in 2019										4	1	2
Dog P.	Woodbury	territory	shoreline													
Dunmore L. / Mud P.	Leicester/ Sa	nesting	island	Successful	signs	2 Ch	2 Ch							14	10	12
East Long P.	Woodbury	nesting	island	Successful		1 Ch	1 Ch						Chance that chick was missed during last survey	39	31	37
Echo L. (Charleston)	Charleston	nesting	raft	Successful; 2nd egg collected	signs	1 Ch	1 Ch		Mortality	Unknown - not analyzed	5/23/2020	AD	Highly decomposed dead loon found in late May; not analyzed.	10	5	5
Eden L.	Eden	nesting	raft	Abandoned - no egg(s)	signs				Monitor	Fishing gear - mo	7/27/2020	Ad	Report of loon with fishing line but all loons observed were healthy.	16	12	16
Elligo L.	Greensboro	nesting	island	Successful	signs	2 Ch	2 Ch							19	16	21
Elmore L.	Elmore	territory	marsh	Last nested in 2019	signs									8	3	3
Ewell P.	Peacham	nesting	marsh	Abandoned - no egg(s)										12	10	11
Fairfield P.	Fairfield	territory	raft	Last nested in 2018									In Aug., moved raft to SW cove where pair observed most often in 2020	5	0	0
Fairlee L.	Fairlee	nesting	shoreline	Dedpredation - mammalian	signs								Raft occupied by geese; loons nested east of inlet on shore.	5	4	5
Flagg P.	Wheelock	territory	island	Last nested in 2019										7	5	7
Forest L.	Averill	nesting	raft	Successful		2 Ch	1 Ch	Unknown						27	24	29
Fosters P.	Peacham	nesting	raft	Successful		2 Ch	2 Ch	Unknown						18	18	28
Glen P.	Castleton	territory											New territorial pair - nest building observed			
Great Averill L. - North	Averill	nesting	raft	Abandoned - no egg(s)										26	14	16
Great Averill L. - South	Averill	potential territory														
Great Averill L. - SW inlet	Averill	nesting	raft	Depredation - avian; 2nd egg collected; re-nest abandoned - no egg(s)									Likely bald eagle depredation of egg from 1st nest attempt with egg shell found 30 meters from nest across a channel.	10	6	6
Great Hosmer P. - North	Albany/ Craft	territory	marsh	Last nested in 2019										2	0	
Great Hosmer P. - South	Albany/ Craft	nesting	marsh	Successful		1 Ch	0 Ch	Trauma - attack by other loon						10	9	11
Green River Res. - Access Bay	Hyde Park	nesting	island	Successful	signs	1 Ch	1 Ch							13	11	14
Green River Res. - Merganser inlet	Hyde Park	territory	island	Last nested in 2019									Nest building observed	5	2	2
Green River Res. - NW	Hyde Park	nesting	island	Abandoned - no egg(s)	signs									42	31	44

Table 1 continued									Rescues / Mortality / Monitor Situations							
Lake Name	Town	2020 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescue/ Mortality/ Monitor	Mortality and Rescue Cause	Date	Age	Comments	# years nested	# years nest success	total # surviving chicks
Green River Res. - South	Hyde Park	territory	island	Last nested in 2019										5	3	3
Greenwood L.	Woodbury	nesting	raft	Loon disturbance	signs								2nd egg disappeared during incubation period.	10	7	5
Groton L. - North	Groton	nesting	raft	Successful	signs	1 Ch	1 Ch							10	7	9
Groton L. - South	Groton	nesting	shoreline	Depredation - mammalian	signs									17	13	16
Halls L.	Newbury	territory											New territorial pair - nest building observed			
Hardwick L.	Hardwick	nesting	raft	Successful; 2nd egg collected		1 Ch	1 Ch							17	15	20
Hardwood P.	Elmore	nesting	island	Successful		1 Ch	1 Ch							12	11	14
Harveys L. - North	Barnet	nesting	marsh	Abandoned - no egg(s)	signs									12	8	7
Harveys L. - South		potential territory	shoreline	Last nested in 2019									New pair in 2019 but not observed consistently in 2020	1	0	
Holland P. - North	Holland	nesting	raft	Successful		2 Ch	1 Ch	Unknown - disappeared early					2nd chick died on raft	6	2	2
Holland P. - South	Holland	nesting	island	Successful		1 Ch	1 Ch							23	16	19
Hortonia L.	Hubbardton	potential territory											new potential pair			
Iroquois L.	Hinesburg	nesting	raft	Successful	signs	2 Ch	2 Ch							5	2	4
Island P.	Brighton	nesting	island	Abandoned; re-nest abandoned - egg(s)									First nest possibly flooded by wakes as right at water line. Second nest had broken shell w/ material in it. 2nd egg left intact with scratches on it.	20	15	17
Jobs P.	Westmore	nesting	shoreline	Depredation - mammalian										12	6	7
Joe's P. - inlet	Cabot/ Danville	nesting	raft	Abandoned - no egg(s)	signs	1 Ch	1 Ch							21	21	26
Joe's P. - 1st Pond	Cabot/ Danville	nesting	shoreline	Abandoned										11	6	4
Keiser P.	Danville/ Peabody	nesting	marsh	Abandoned										16	11	10
Kent P.	Killington	nesting	island	Successful	signs	2 Ch	2 Ch							11	8	11
Kettle P.	Groton/ Marsh	nesting	raft	Abandoned - no egg(s)	signs									29	18	25
Knapp Brook P.	Reading	territory	island	Last nested in 2018										3	2	2
Lewis P.	Lewis	nesting	marsh	Abandoned - no egg(s)										1	0	0
Little Averill L. - North	Averill	nesting	raft	Successful		2 Ch	2 Ch		Mortality	Unknown - not analyzed	7/1/2020	AD	Highly decomposed loon but not collected. Territorial chases reported after the chicks hatched. 2nd egg left in nest and disappeared later.	8	6	5

Table 1 continued									Rescues / Mortality / Monitor Situations							
Lake Name	Town	2020 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescue/ Mortality/ Monitor	Mortality and Rescue Cause	Date	Age	Comments	# years nested	# years nest success	total # surviving chicks
Little Averill L. - West	Averill	nesting	raft	Successful		1 Ch	1 Ch							30	18	25
Little Hosmer P.	Craftsbury	territory	island	Last nested in 2019										19	11	9
Long P. (Eden)	Eden	nesting	marsh	Abandoned - egg(s)					Mortality		9/1/2020	AD		9	5	7
Long P. (Greensboro)	Greensboro	nesting	marsh	Successful		1 Ch	1 Ch							3	2	2
Long P. (Sheffield)	Sheffield	potential territory														
Long P. (Westmore)	Westmore	nesting	island	Successful	signs	2 Ch	2 Ch		Mortality		8/10/2020	AD		22	17	22
Lowell L.	Londonderry	nesting	island	Successful	signs	2 Ch	0 Ch	Trauma - attack by other loon; Unknown (late 12 weeks of age)	Mortality; Monitor; Rescue	Trauma - other loon; Fishing line - monofilament; Rescue - chick distressed - unknown	8/7/20; 6/21/2020	Chick; AD; Chick	Chick killed during territorial dispute. Fishing gear - unsure if there was actual line. Rescue: 2nd chick brought to VINS where it died.	2	2	0
Lower Symes P.	Ryegate	nesting	marsh	Successful		1 Ch	0 Ch	Unknown - disappeared early						17	15	20
Lyford P.	Walden	nesting	marsh	Successful		2 Ch	2 Ch							11	9	11
Maidstone L. - North	Maidstone	nesting	shoreline	Successful		2 Ch	0 Ch	Trauma - attack by other loon						10	8	5
Maidstone L. - SE	Maidstone	nesting	island	Human disturbance										10	5	7
Maidstone L. - SW	Maidstone	nesting	island	Successful	signs	2 Ch	0 Ch	Trauma - attack by other loon						38	35	40
Martins P.	Peacham	nesting	raft	Abandoned - no egg(s)	signs									24	23	34
May P.	Barton	territory	marsh	Last nested in 2019					Mortality	Aspergillosis	6/26/2020	AD		23	20	28
Metcalf P.	Fletcher	nesting	island	Depredation - mammalian	signs									8	3	5
Miles P.	Concord	nesting	island	Successful	signs	1 Ch	1 Ch							25	19	24
Mitchell L.	Sharon	potential territory	marsh	Last nested in 2019									downgrade to potential pair	3	0	0
Miller P.	Strafford	nesting	marsh	Abandoned - no egg(s)										6	5	7
Molly's Falls Res. - Island	Cabot	nesting	raft	Successful		2 Ch	2 Ch							7	6	11
Molly's Falls Res. - North	Cabot	nesting	raft	Successful; 2nd egg collected	signs	1 Ch	1 Ch							26	24	33

Table 1 continued									Rescues / Mortality / Monitor Situations							
Lake Name	Town	2020 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescue/ Mortality/ Monitor	Mortality and Rescue Cause	Date	Age	Comments	# years nested	# years nest success	total # surviving chicks
Mollys P.	Cabot	nesting	marsh	Successful		2 Ch	1 Ch	Unknown						2	2	2
Morey L.	Fairlee	potential territory														
Neal P.	Lunenburg	territory	marsh	Last nested in 2019										3	0	
Newark P.	Newark	nesting	island	Depredation - mammalian	signs				Mortality		7/1/2020	AD	6/29 loon observed going on and off shore. 7/1 found loon dead in water, emaciated.	30	22	31
Nichols P.	Woodbury	nesting	raft	Successful	signs	1 Ch	1 Ch							20	18	20
Ninevah L.	Mount Holly	nesting	island	Successful	signs	2 Ch	2 Ch							26	24	34
No. 10 P. (Mirror L.)	Calais	nesting	raft	Successful	signs	1 Ch	0 Ch	Predation: bald eagle					Eagle observed with chick on shoreline	13	12	15
Norford L.	Thetford	potential territory	island	Last nested in 2017									downgrade to potential pair	1	1	1
Norton P. - Island	Norton	territory	raft	Last nested in 2018	signs									39	32	41
Norton P. - North	Norton	nesting	raft	Abandoned - egg(s)	signs									12	5	9
Norton P. - South	Norton	nesting	raft	Successful; 2nd egg collected		1 Ch	1 Ch							20	18	21
Noyes P.	Groton	potential territory											new potential pair	1	0	0
Old Marsh P.	Fair Haven	nesting	island	Successful		2 Ch	1 Ch	Unknown - disappeared early						3	3	2
Osmore P.	Peacham	nesting	island	Successful		2 Ch	2 Ch							12	8	10
Parker L.	Glover	potential territory	marsh	Last nested in 2018									downgrade to potential pair	1	0	0
Peacham P. - North	Peacham	nesting	island	Abandoned - egg(s)	signs									42	34	38
Peacham P. - east	Peacham	territory	marsh	Last nested in 2019										7	2	3
Peacham P. - SW	Peacham	territory	marsh	Last nested in 2015										27	19	23
Pensioner P.	Charleston	nesting	raft	Successful	signs	2 Ch	1 Ch	Unknown						13	11	13
Pigeon P.	Groton	nesting	raft	Successful		1 Ch	1 Ch							6	4	6
Raponda L.	Wilmington	nesting	shoreline	Depredation - mammalian (both nest and re-nest)	signs								New nest site on island with house and bridge to it. Game camera videoed red fox depredating re-nest.	4	2	2

Table 1 continued									Rescues / Mortality / Monitor Situations							
Lake Name	Town	2020 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescue/ Mortality/ Monitor	Mortality and Rescue Cause	Date	Age	Comments	# years nested	# years nest success	total # surviving chicks
Rescue L.	Ludlow	potential territory							Rescue	Fishing gear - monofilament	6/22/2020	AD	Twosome observed several times. Rescue: Adult loon with fishing line first (several strands around head) observed on Colby P. 6/22. Bird flew to L. Rescue by 6/25 (diving, a bit lethargic, interacted with other loon). Observed on Amherst late June; back on Rescue mid to late July. Rescue attempt 7/24 failed; 4" strand out of mouth; loon behaving normal. 8/25 on Amherst.			
Ricker P.	Groton	nesting	raft	Successful	signs	2 Ch	1 Ch	Unknown - disappeared early						18	15	12
Seymour L. - Winape	Morgan	nesting	raft	Over-incubation	signs				Mortality	Unknown - not analyzed	8/1/2020	AD	The pair was off the nest frequently due to both other loons and potentially human disturbance. Mortality: decomposed adult found 8/1/2020 - not collected	21	15	20
Shadow L. - (Concord)	Concord	territory	marsh	Last nested in 2019										12	6	8
Shadow L. (Glover)	Glover	potential territory														
Silver L. (Leicester)	Leicester	nesting	raft	Successful		2 Ch	2 Ch							6	6	9
Somerset Res. - Dandeneau Cove	Somerset	nesting	island	Successful	signs	2 Ch	1 Ch	Unknown - disappeared early						38	27	34
Somerset Res. - Narrows	Somerset	nesting	island	Successful	signs	1 Ch	0 Ch	Unknown - disappeared early						8	4	3
Somerset Res. - NE	Somerset	nesting	island	Depredation - mammalian; re-nest successful	signs	2 Ch	1 Ch	Unknown - disappeared early						1	1	1
Somerset Res. - North Isl.	Somerset	nesting	island	Depredation - mammalian									Nest not found until after eggshells found in nest bowl. Chance of possible hatch and then chick disappeared shortly after.	13	9	12
South P. (Eden)	Eden	nesting	island	Successful	signs	2 Ch	2 Ch							22	17	24
South P. (Marlboro)	Marlboro	nesting	marsh	Successful	signs	2 Ch	2 Ch		Monitor	Fishing gear - monofilament	7/16/2020	AD	Unknown if loon actually caught up in fishing line - all loons healthy during follow-up surveys	6	6	10
Spectacle P.	Brighton	nesting	raft	Successful	signs	2 Ch	1 Ch	Unknown						26	24	27
Spring L.	Shrewsbury	nesting	raft	Successful	signs	1 Ch	1 Ch							18	13	18

Table 1 continued									Rescues / Mortality / Monitor Situations							
Lake Name	Town	2020 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescue/ Mortality/ Monitor	Mortality and Rescue Cause	Date	Age	Comments	# years nested	# years nest success	total # surviving chicks
Stiles Res.	Waterford	territory	marsh	Last nested in 2018										15	9	13
Sugar Hill Res.	Goshen	territory	raft	Last nested in 2019										4	4	5
Thurman Dix Res.	Orange	nesting	marsh	Successful		2 Ch	1 Ch	Unknown - disappeared early	Monitor	Small pond	7/18/2020	AD	Loon observed on very small reservoir that feeds Orange Res. and water treatment plant (near Thurman Dix). Bird gone the next day. Likely shuffled on land to Orange Res. and flew off.	40	33	38
Ticklenaked	Ryegate	nesting	marsh	Successful	signs	2 Ch	0 Ch	Unknown - disappeared early; Trauma-attack by other loon						6	4	2
Wallingford P.	Wallingford	nesting	marsh	Successful		2 Ch	2 Ch							20	15	25
Wantastiquet P.	Weston	nesting	island	Other										12	9	13
Warden P.	Barnet	territory	shoreline	Last nested in 2019										1	0	
Waterbury Res.	Waterbury	territory	island	Last nested in 2019					Mortality		6/24/2020	AD	Mortality: found floating in south end	4	1	1
West Mountain P.	Maidstone	territory	shoreline	last nested 2017										17	11	7
Wolcott P.	Wolcott	nesting	marsh	Successful		2 Ch	0 Ch	Unknown - disappeared early; starvation	Mortality		8/9/2020	Chick	Chick observed earlier in the day and appeared healthy.	28	24	25
Woodbury L. (Sabin)	Woodbury	nesting	raft	Successful	signs	2 Ch	2 Ch		Monitor	Boat hit	8/10/2020	Chick	Person observed motorboat go through family group and one chick went to shore afterward. Bird swam off and has been observed multiple times since.	14	14	17
Woodward Res.	Plymouth	nesting	island	Successful	signs	2 Ch	2 Ch							14	10	13
Zack Woods P.	Hyde Park	nesting	island	Successful	signs	2 Ch	2 Ch							24	22	35
Coits P.	Cabot	loon active	marsh	Last nested in 2016										3	3	2
Gale Meadows Res.	Winhall	loon active												2	0	0
Lakota L.	Barnard	loon active	marsh	Last nested in 2018										1	1	2
McConnell P.	Brighton	loon active	marsh	Last nested in 2007									Two loons on LW day.	15	11	15
Nulhegan	Brighton	loon active														
Rood P.	Williamstown	loon active											twosome observed several times			

Table 1 continued									Rescues / Mortality / Monitor Situations							
Lake Name	Town	2020 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescue/ Mortality/ Monitor	Mortality and Rescue Cause	Date	Age	Comments	# years nested	# years nest success	total # surviving chicks
Seymour L. - West	Morgan	loon active												1	1	2
Silver L. (Georgia)	Georgia	loon active														
Silver L. (Barnard)	Barnard	loon active											new potential pair			
Stratton P.	Stratton	loon active											twosome obsered several times			
Sunset L. (Benson)	Benson	loon active														
Sunset L. (Marlboro)	Marlboro	loon active	island	last nested 2017										9	7	6
Wallace P.	Canaan	loon active												0		
Willoughby L.	Westmore	loon active														

Figure 1a. Common Loon Nesting and Territorial Pairs in Vermont – Northern Area

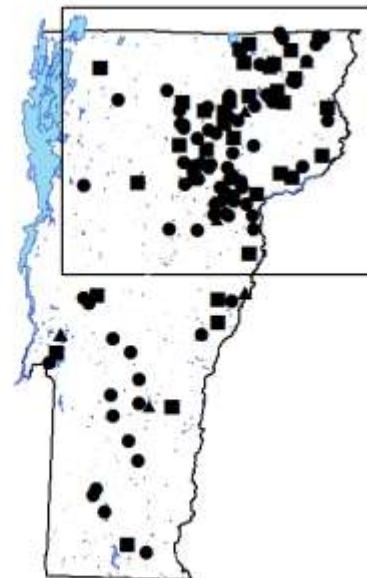
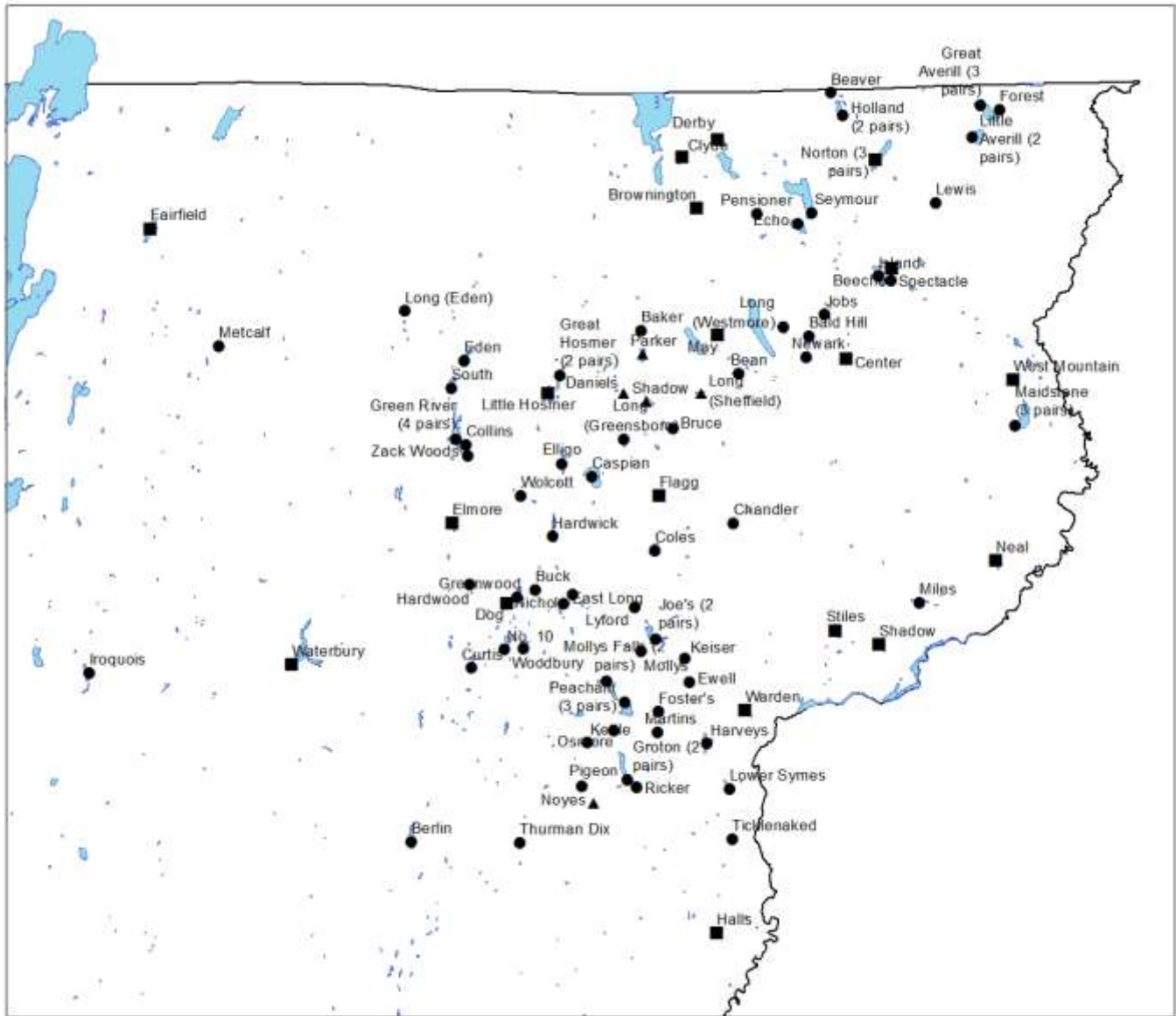


Figure 1b. Common Loon Nesting and Territorial Pairs in Vermont – Southern Area

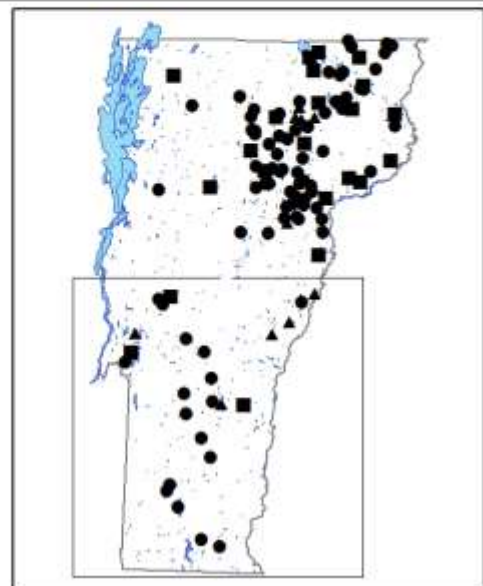
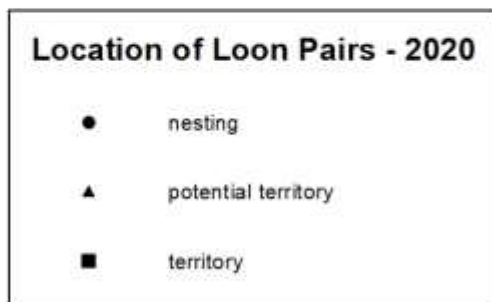
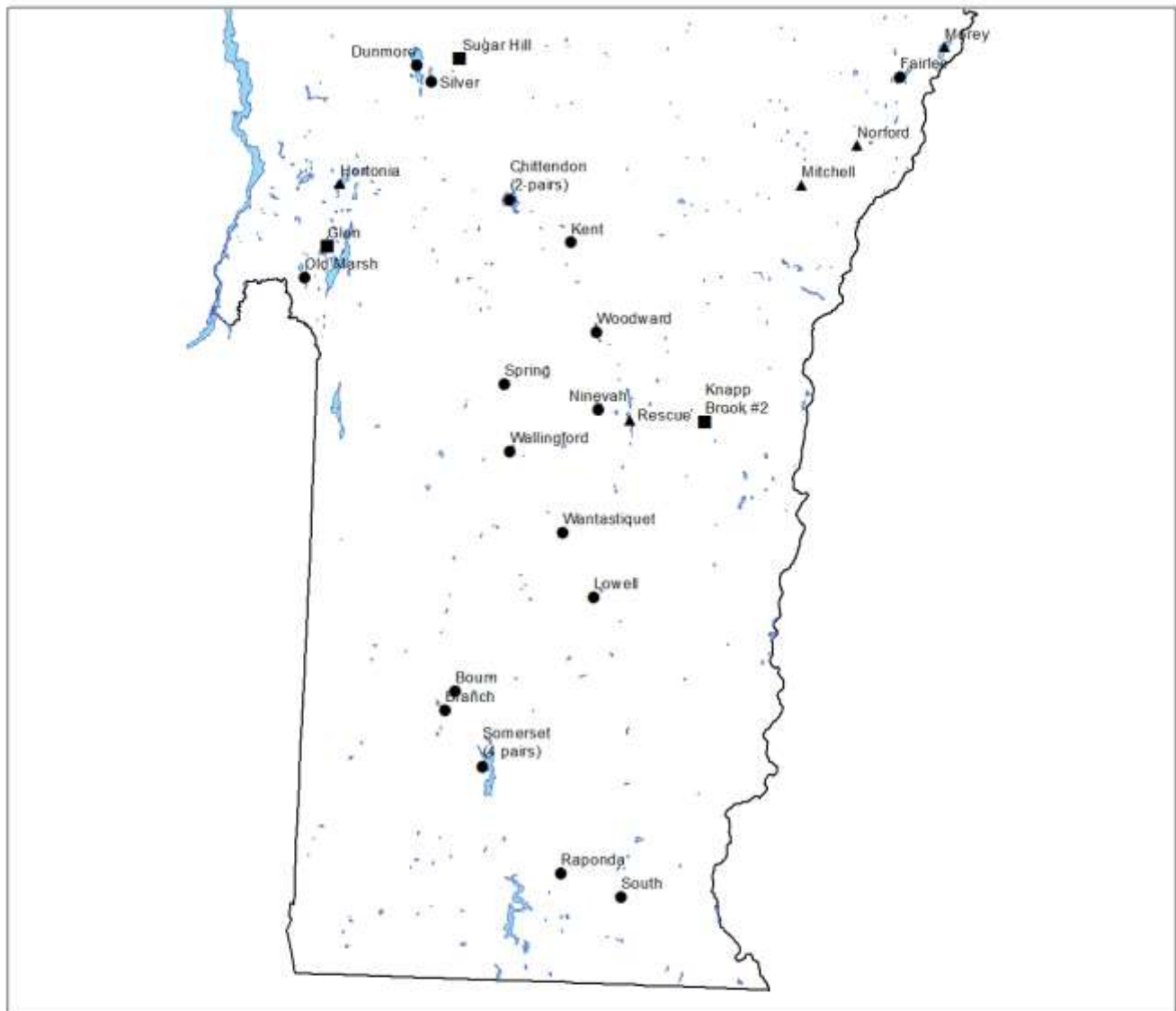


Figure 2. Summary of Common Loon breeding activity in Vermont, 1978-2020

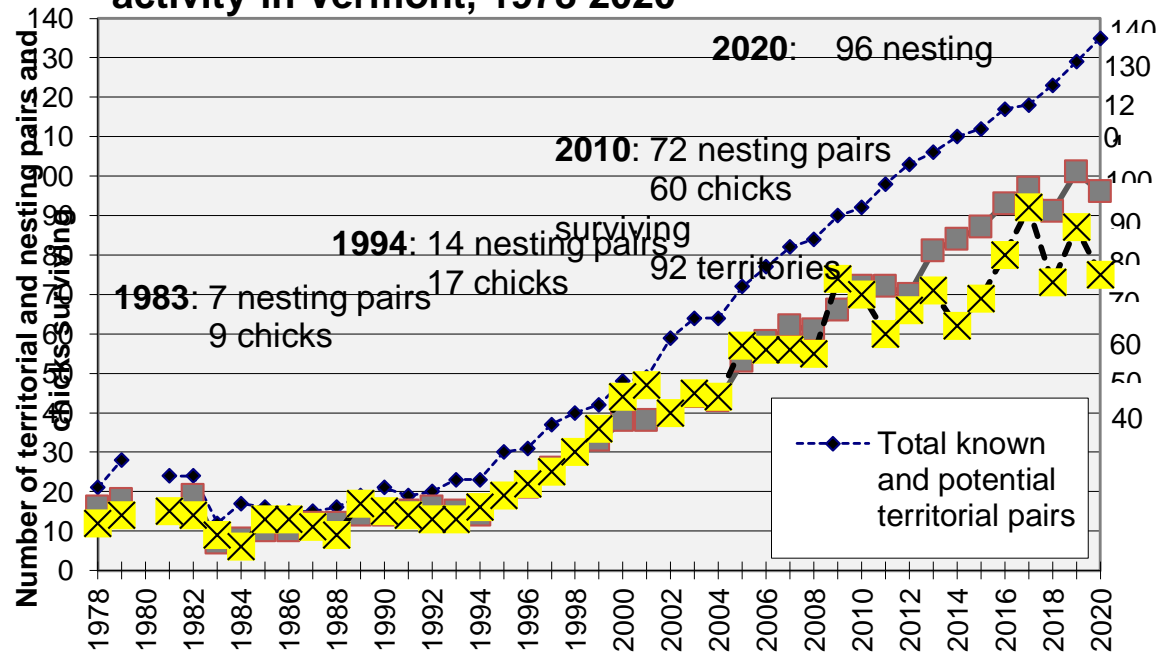


Table 2. Summary of population changes and reproductive success of Common Loons in Vermont, 1979-2020

Year	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00
TOTAL territorial pairs	<u>28</u>	<u>0</u>	<u>24</u>	<u>24</u>	<u>12</u>	<u>17</u>	<u>16</u>	<u>15</u>	<u>15</u>	<u>16</u>	<u>19</u>	<u>21</u>	<u>19</u>	<u>20</u>	<u>23</u>	<u>23</u>	<u>30</u>	<u>31</u>	<u>37</u>	<u>40</u>	<u>42</u>	<u>48</u>
Known terr. prs.	21	--	18	19	9	12	11	11	12	13	16	17	16	18	17	21	22	24	29	34	39	44
Potential terr. prs.	7	--	6	5	3	5	5	4	3	3	3	4	3	2	6	2	8	7	8	6	3	4
Nesting pairs	18	--	15	19	7	8	10	10	12	12	14	14	15	16	15	14	19	21	26	30	33	38
Successful pairs	12	--	11	12	5	6	8	9	9	7	10	9	10	10	11	13	15	14	21	23	25	36
Nest Success	67%		73%	63%	71%	75%	80%	90%	75%	58%	71%	64%	67%	63%	73%	93%	79%	67%	81%	77%	76%	95%
Chicks hatched	--	--	--	--	10	7	--	16	12	11	19	18	16	15	18	20	21	25	32	37	41	56
Chicks surviving through August	14	--	15	14	9	6	13	13	11	9	17	15	14	13	13	17	19	22	25	30	36	44
Chicks surviving per nesting pair	0.78	--	1.00	0.74	1.29	0.75	1.30	1.30	0.92	0.75	1.21	1.07	0.93	0.81	0.87	1.21	1.00	1.05	0.96	1.00	1.09	1.16
Chicks surviving per total territorial pair	0.50	--	0.63	0.58	0.75	0.35	0.81	0.87	0.73	0.56	0.89	0.71	0.74	0.65	0.57	0.74	0.63	0.71	0.68	0.75	0.86	0.92
% chick survival	--	--	--	--	90%	86%	--	81%	92%	82%	89%	83%	88%	87%	72%	85%	90%	88%	78%	81%	88%	79%
Lakes with nesting pairs	17	--	14	19	7	8	10	10	11	11	13	13	14	15	14	14	18	21	25	29	32	36

Loonwatch results^{a,b} (statewide annual survey)

Number of adults	--	--	--	--	29	30	37	50	45	41	47	79	74	86	71	83	97	79	99	106	127	126
Number of chicks	--	--	--	--	9	16	13	17	9	9	16	15	15	15	14	11	17	21	21	26	36	45
Number of subadults	8	--	11	6	7	1	0	5	15	9	9	33	18	23	11	14	10	9	2	6	6	10
Number of lakes surveyed																					150	107
Number of lakes occupied																						

^a The number of lakes surveyed for Loonwatch increased in 1999. It is possible survey adult loon counts during the mid-1990s were slightly lower.

^b Data since 2002 do not include Lake Champlain survey results, because of the large-scale survey effort conducted in that year.

On July 19 and 20 in 2002, 28 adult and 18 subadult loons were counted in non-overlap regions on Lake Champlain.

^c Over 10 known lakes with loon activity were missed in 2010.

(continued on next page)

Table 2 continued - Summary of population changes and reproductive success of Common Loons in Vermont

Year	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
TOTAL territorial pairs	49	59	64	64	72	77	82	86	90	92	98	103	106	110	112	117	118	123	129	135
Known terr. prs.	44	49	53	57	60	65	71	75	80	85	88	92	93	100	102	111	113	117	123	123
Potential terr. prs.	5	10	11	7	12	12	11	11	10	7	10	11	13	10	10	6	5	6	6	12
Nesting pairs	38	40	44	43	53	58	62	61	66	72	72	70	81	84	87	93	97	91	101	96
Successful pairs	34	34	38	34	47	44	47	49	53	57	52	50	62	57	65	65	74	66	75	65
Nest Success	89%	85%	86%	79%	89%	76%	76%	80%	80%	79%	72%	71%	77%	68%	75%	70%	76%	73%	74%	68%
Chicks hatched	56	52	62	54	68	66	71	75	83	85	76	87	97	93	103	102	117	97	115	102
Chicks surviving through August	47	40	45	44	57	56	56	55	74	70	60	66	71	62	69	80	92	73	87	75
Chicks surviving per nesting pair	1.24	1.00	1.02	1.02	1.08	0.97	0.90	0.90	1.12	0.97	0.83	0.94	0.88	0.74	0.79	0.86	0.95	0.80	0.86	0.78
Chicks surviving per total territorial pair	0.96	0.68	0.70	0.69	0.79	0.73	0.68	0.64	0.82	0.76	0.61	0.64	0.67	0.56	0.62	0.68	0.78	0.59	0.67	0.56
% chick survival	84%	77%	73%	81%	84%	85%	79%	73%	89%	82%	79%	76%	73%	67%	67%	78%	79%	75%	76%	74%
Lakes with nesting pairs	36	38	41	39	49	52	57	54	61	63	63	63	72	72	76	83	84	78	86	81

Loonwatch results^{a,b} (statewide annual survey)

Number of adults	135	166	179	184	191	201	218	223	228	201 ^c	271	280	297	301	298	301	308	356	339	358
Number of chicks	45	39	44	40	45	53	54	42	65	53	52	63	69	66	63	74	85	65	89	66
Number of subadults	2	5	0	3	5	2	9	8	6	0	7	9	3	6	9	2	0	3	4	1
Number of lakes surveyed	131	133	123	98	122	133	148	148	129	129	162	150	162	161	162	153	161	174	175	171
Number of lakes occupied				68	69	84	86	84	89	76	102	98	106	103	116	112	111	132	121	125

Figure 3. Vermont Loonwatch Results, 1983-2020
 (an annual statewide loon census on the third Saturday of July)

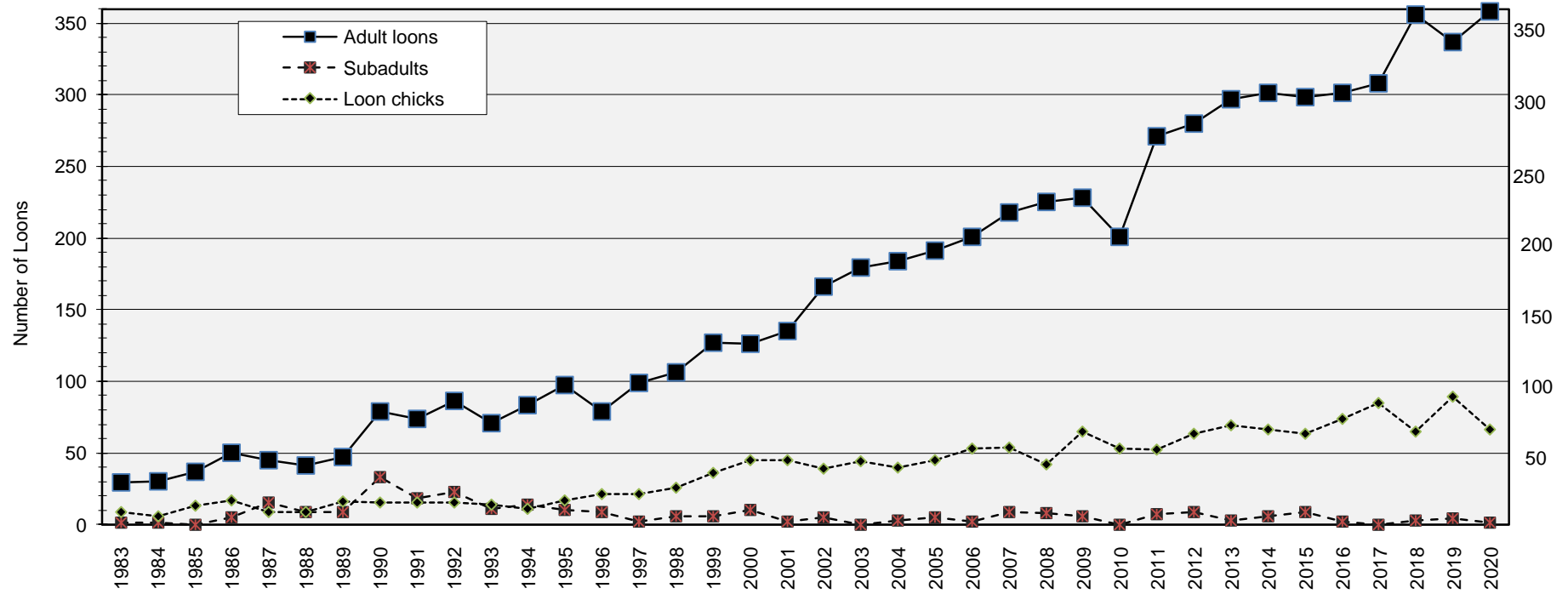


Figure 4. Vermont Adult Loon Mortality 1989-2019

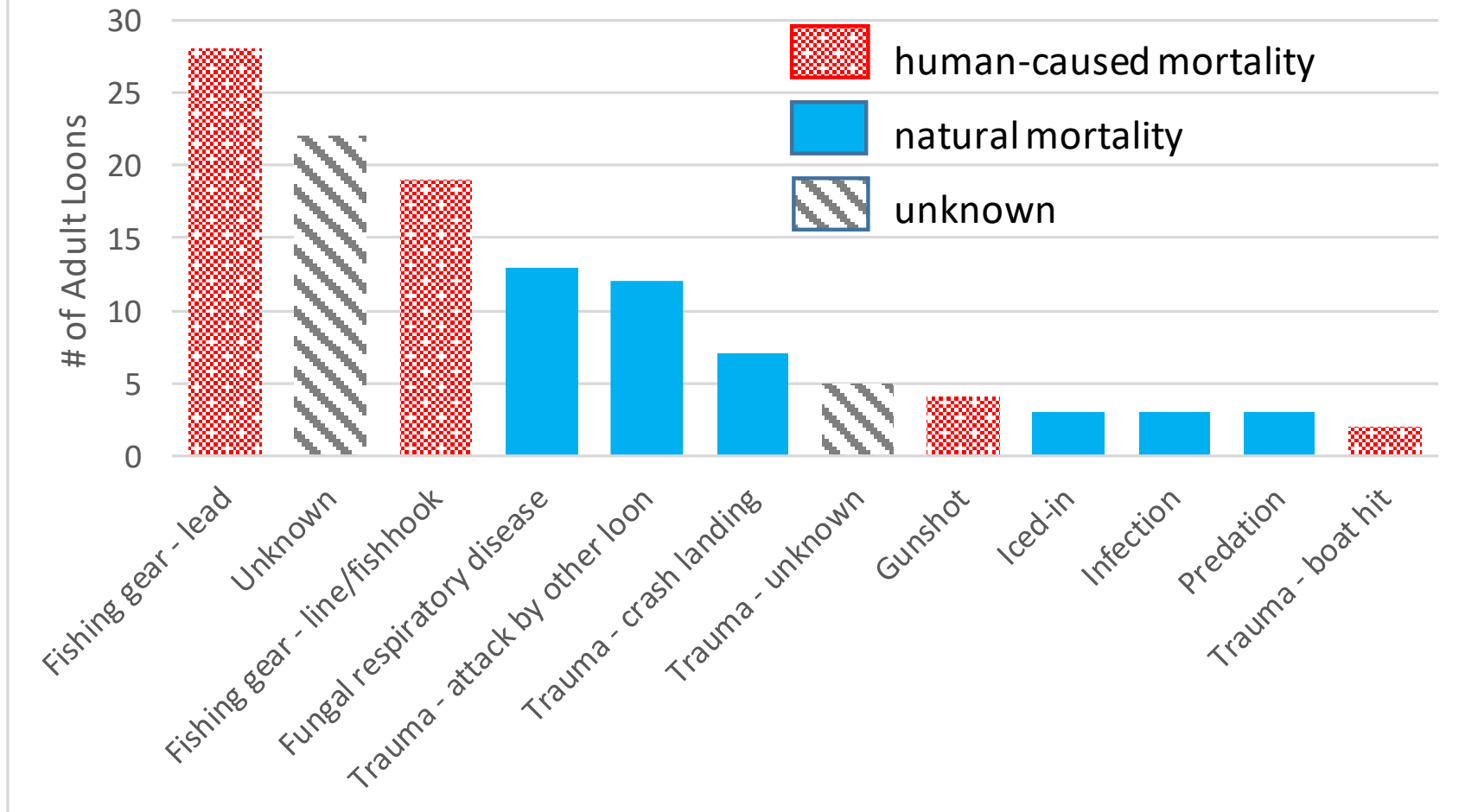


Figure 5. Mortality Before and After Lead Fishing Gear Ban in 2007
- total number of adult loons

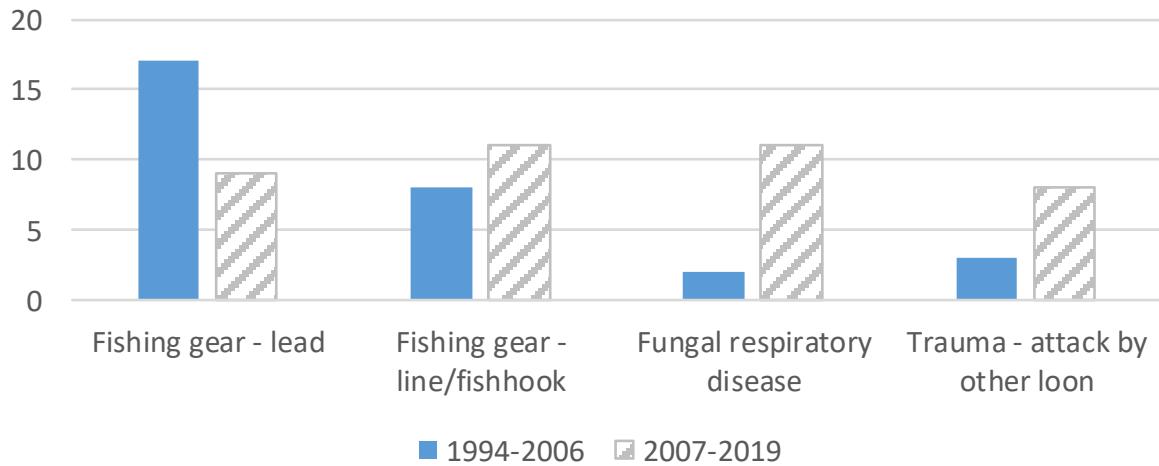
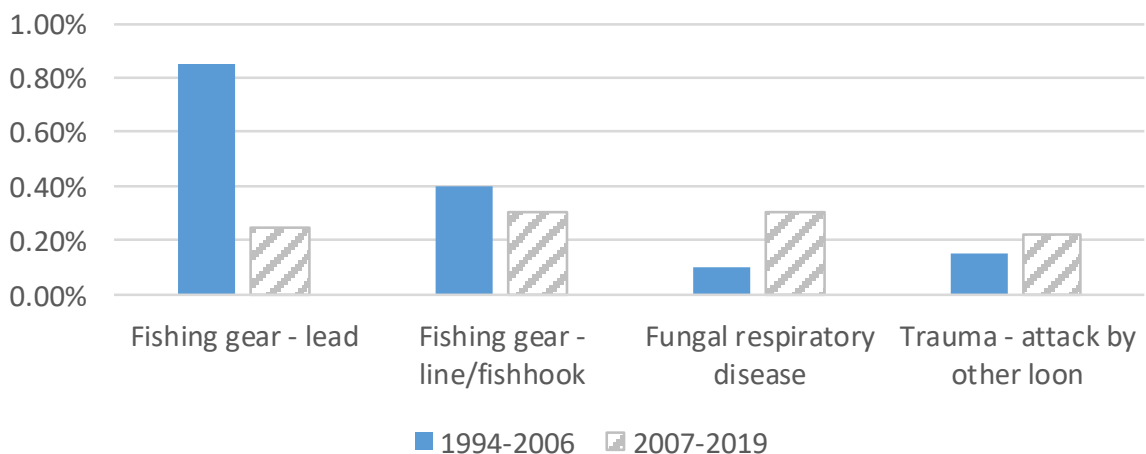


Figure 6. Average Annual Mortality Before and After Lead Fishing Gear Ban in 2007
- % of adult loon population



RECOMMENDATIONS

The total adult loon population and numbers of nesting pairs have steadily increased since the mid-1990s. These results suggest that conservation efforts have aided the loon recovery in Vermont, in spite of persistent threats identified above. Increasing numbers of territorial pairs and ponds with more consistent loon activity indicate a potential for further growth in the breeding population. The invaluable assistance of volunteer observers, cottage owners, VFWD biologists and game wardens, and Vermont State Park and Green Mountain National Forest staff have greatly enhanced the effectiveness of statewide loon conservation efforts. Monitoring and management efforts, participation of volunteers, education of lake-users, and water level management should continue to be the primary tools for ensuring success of Vermont's breeding loons.

Implementation of the comprehensive Vermont Loon Recovery Plan (Borden and Rimmer 1998) has been ongoing and has helped the VLCP realize its population recovery goals. The majority of the short-term, high priority goals have been implemented since the mid-1990s. The post-delisting monitoring and management plan addresses continued threats to loons in Vermont and the species' dependence on the VLCP's management and educational efforts. It should be emphasized that over 50% of the breeding loons in Vermont have directly benefited from VLCP management programs, and that many of these pairs would be less successful without such assistance. The Vermont Loon Recovery Plan will continue to guide loon conservation efforts in the future.

With most short-term goals of the Recovery Plan having been achieved, the VLCP must now address the Plan's long-term, medium priority actions while monitoring potential changes due to delisting and the lead sinker ban. Many of the actions and recommendations below have been in place for several years, but resources have limited their implementation. These include:

1. Development of a comprehensive database would allow us to better assess and summarize Vermont's loon population trends, share and compare data with New Hampshire, Maine, Massachusetts, and New York, develop a detailed population viability assessment for Vermont, and more efficiently coordinate volunteers.
2. We would like to provide more detailed training packets for adopt-a-lake volunteers.
3. Other future initiatives to consider should focus on improving the awareness of lake users on busy lakes. Actions could include (a) developing an information sheet and set of management protocols for loon breeding lakes, especially those requiring intensive management and education, and (b) developing permanent displays at State Parks and at kiosks on busy lakes.
4. Improve outreach about lake water quality and shoreline conservation practices using loons as a focus for action.
5. Capture methods have improved over the past decade. It would be helpful to upgrade equipment for both summer and winter rescues. Loons caught in open water surrounded by ice continue to occur, and the public expects to attempt rescues. If the situation is safe, we will potentially attempt to conduct ice rescues. We need to invest in ice-rescue equipment to make these situations even more safe.
6. Further work should assess other means to protect nesting sites, including conservation easements. The Trust for Public Land has indicated an interest in prioritizing critical shorelines for protecting nesting areas.
7. Future research needs should be assessed and prioritized including the effects of climate change.

The VLCP will continue its involvement with the Northeast Loon Study Working Group (NELSWG), a coalition of state and federal agency representatives, universities, non-profit organizations, and other interested parties addressing the conservation problems of loons in eastern North America. This is a valuable partnership and forum for information exchange.

Acknowledgments

Major contributors: We thank the VFWD and Great River Hydro (GRH) for ongoing, core financial support. VFWD provides funding through the federal State Wildlife Grant program and the Nongame Wildlife Fund. GRH's funding primarily supports monitoring and management at Somerset Reservoir. Individual donors provide critical support to maintain VLCP programs.

Professional assistance: Avery Ellis provided support as a VCE intern. VFWD biologist Doug Morin provided general support for the VLCP. We greatly appreciate ongoing support from VFWD game wardens who assisted with the project. We thank the hydroelectric companies and other groups that regulate water levels for their continuing stabilization efforts. We are especially grateful to Mathew Cole from Great River Hydro, Sylvain Breault from Coaticook River Water Power Company, John Sutter from Green Mountain Power, Hardwick Electric Department, Craig Myotte and John Pilton of Morrisville Water and Light, Bill Rogers from Great Bay Hydro, and Reg Abare from the Barre Public Works Department for their efforts to ensure stable water levels during the nesting season. Vermont Parks and Recreation staff at Brighton, Maidstone, Mollys Falls, New Discovery, Ricker, and Stillwater state parks helped with outreach efforts. Craig Newman at Outreach for Earth Stewardship, veterinarians Dan Hament in Richmond, VT and Andrea Gilbert and Denise O'Connor at the Hardwick Veterinary Clinic, and Bren Lundborg at the Vermont Institute of Natural Science (VINS). Kappy Sprenger, and Avian Haven have assisted loons in distress over the past several years. Thanks also go to Dr. Mark Pokras of Tufts University Wildlife Medicine Program, John Cooley and Harry Vogel of the LPC, and Lucas Savoy and Alex Daulton of BRI. Chris Rimmer, Susan Hindinger, and Steve Faccio. Mistie Boule, and Sarah Carline of VCE assisted in VLCP fundraising and administration.

Volunteer assistance: We extend special thanks to the more than 280 Loonwatch and adopt-a-lake volunteers who care so deeply about Vermont's loons. We received assistance from dozens of lakeshore owners in reporting loon sightings and allowing access to lakes. Numerous volunteers helped distribute loon conservation brochures and promote awareness about loon conservation. Volunteers and staff spent hundreds of hours monitoring and attempting to catch loons in distress over the past several years

Vermont Wildlife Action Plan: The efforts of VFWD staff and many contributing partners resulted in the formal acceptance of the congressionally mandated Vermont Wildlife Action Plan in November 2005. The plan draws attention to the 323 Species of Greatest Conservation Need in Vermont, including the Common Loon. Now that the Common Loon has been removed from the Vermont Endangered and Threatened Species list due to many years of dedicated monitoring and management of this species, the Vermont Wildlife Action Plan provides for continued attention to our natural heritage. For more information, visit http://www.vtfishandwildlife.com/SWG_home.cfm.

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