

THE 2017 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 97 nesting loon pairs and 118 territorial pairs statewide. Of the 97 pairs that attempted nesting, 74 successfully hatched 117 eggs, with 92 chicks surviving through August (chick survival rate 79%, 0.78 chicks surviving per territorial pair). Three new nesting pairs and 2 new potential territorial pair were identified. Sixteen pairs that have nested in recent years did not nest in 2017. Of 30 pairs whose first nest attempts failed, 8 re-nested, and 7 were successful. Known causes of nest failure included depredation (1 nest), flooding (10 nests), loon disturbance (1 nest), human disturbance (1 nest), and blackflies causing abandonment (1 nest). The remaining failed nests were abandoned for unknown reasons with predators and disruption from intruder loons being the most likely causes. The causes of mortality of most chicks were unknown. At least 1 chick disappeared after interactions with an intruder loon, 2 were depredated by Bald Eagles, and 1 died from sibling rivalry. During the summer months, 7 adult loon mortalities were documented, and two were unconfirmed. Two adults died after becoming entangled in or ingesting fishing gear, and 1 likely died after a territorial fight. Two loons were rescued after becoming entangled in fishing line (Fairfield) and snaring a hook (Eden). We monitored several other loons reported in distress or caught in fishing line. About 200 volunteers surveyed lakes throughout Vermont on 15 July as part of the LoonWatch program, an annual statewide loon count. Loons were observed on 111 of 161 surveyed lakes, where observers counted 308 adults, 85 chicks, and 0 subadult loons. The total number of adult loons was similar to 2013-16. To provide a historical perspective, volunteers counted 179 and 225 adult loons in 2003 and 2008, respectively. Thirty two of the 97 breeding pairs nested on nesting rafts, 29 on islands, 25 in marshes, and 11 on shorelines. Forty-one nesting rafts were placed on known or potential nesting waterbodies. Warning sign buoys were placed around 54 of the 97 nests. Volunteers provided technical assistance through the placement and maintenance of nest warning signs and/or nesting rafts on 50 lakes as part of the adopt-a-lake program. The VLCP was featured on Vermont Public Radio's Outdoor Radio program, a joint effort with VCE. Ten loon conservation programs were presented to over 330 people statewide. We continued to distribute 2 informational brochures on loon conservation and conservation of lakeshores. Loon conservation brochures were available in self-serve boxes at over 40 boat access areas.

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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 over the subsequent 22 years to 97 in 2017. 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. Forty years of Common Loon conservation and education 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 2013-2017 was 88 with 20 territorial pairs in the southern half of the state in 2017.

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, two VCE interns, 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 in April by VFWD staff. 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-one artificial nesting rafts were placed on 34 lakes. 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. This year, a new raft was placed on Lake Fairlee after the pair had a failed nest at the Thetford town beach and picnic area to reduce future conflict with lakeshore use. Adopt-a-lake volunteers maintained or helped with 21 rafts.

Warning sign buoys were placed around 54 of the 97 active nest sites to discourage human intrusion close to nests. These signs were also placed around 2 other nest sites where loons ultimately did not nest in 2017. Sign buoys were used in areas where repeated human disturbance was likely to occur.

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).

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. Ten slide lectures, discussions, and workshops on loon biology, conservation, and research were presented to audiences at lake associations, libraries, and other organizations (conservation groups, Road Scholar). Approximately 330 people attended these programs. 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. 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 at programs. "The Common Loon – a guide for boaters" containing information about loon conservation and natural history was available at over 40 boat access areas in self-serve boxes and at state parks with loon lakes. A second 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. The newsletter and brochures were distributed at all programs. The VLCP was featured on Vermont Public Radio's Outdoor Radio program, a joint effort with VCE.

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). Seven eggs were collected in 2017. Currently BRI is archiving egg samples until funding is allocated for more mercury analysis. 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 2017

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 118 known and potential territorial loon pairs, 97 of which were confirmed to nest on 84 lakes (Fig. 1, Table 1). Three new nesting pairs were identified, including Great Hosmer Pond – North (failed nest), Knapp Brook Pond (failed nest), and Norford Lake (1 chick). Two new potential loon pairs were identified on Halls Lake and Warden Pond. A failed nest was reported on Warden Pond, but we were unable to contact the person who reported this information. We

were no longer observing two loons together on the two new potential territorial pairs identified in 2016 on Gale Meadows Pond and Glen Lake.

Population levels and breeding success

The number of nesting pairs and territorial pairs increased from 2016. Of the 97 pairs that attempted nesting, 74 successfully hatched 117 eggs, with 92 chicks surviving through August (Fig. 2, Table 2). In press releases sent out in late August and early September, we reported 94 or 95 chicks surviving, but 3 late season chick losses were observed. There were 113 known territorial pairs on water bodies where nesting or nest building had occurred within the last 3 years, and 5 potential territorial pairs, each of which was observed consistently for 6 weeks or more. Sixteen pairs that have nested in recent years did not nest in 2017, thus 86 percent of the known territorial pairs nested. This represents a high rate of pairs nesting compared to recent years. Of 30 pairs whose first nest attempts failed, 8 re-nested, and 7 were successful. Known causes of nest failure included depredation (1 nest), flooding (10 nests), loon disturbance (1 nest), human disturbance (1 nest), and blackflies causing abandonment (1 nest). Rainfall amounts were above average in May and June. The remaining failed nests were abandoned for unknown reasons with predators and disruption from intruder loons being the most likely causes. Details are provided in Table 1.

The chick survival rate through August was 79% with 0.78 chicks surviving per territorial pair in 2017. Since 1979, the average chick survival rate is 82% with 0.70 chicks per territorial pair. The causes of mortality of most chicks were unknown. At least 1 chick disappeared after interactions with intruder loons (Maidstone SE), 2 were depredated by Bald Eagles (Sunset – Marlboro, Norton P. – Island), and 1 died from sibling rivalry (Thurman Dix Res.). Seven adult loon mortalities were documented, and two were unconfirmed. Two adults died after becoming entangled in or ingesting fishing gear (Woodbury L., South P. – Marlboro), and 1 likely died after a territorial fight (Spring L.). Four of the loons that died from unknown causes were sent to Tufts University for necropsies.

Management Results: artificial nesting rafts and nest warning sign buoys

Of the 97 known nests, 32 were on artificial nesting rafts (81% successful), 29 on islands (79% successful), 25 in marshes (72% successful), and 11 on shorelines (64% successful). Nests with warning sign buoys had an 80% success rate compared to 72% for nests without signs. Signs are used more frequently for raft and island sites, which are often more exposed to boaters. Shoreline nests are more likely to be depredated causing nest success rates to be low.

Vermont LoonWatch Day

Vermont LoonWatch day was conducted on 15 July when over 200 volunteers counted 308 adult loons, 85 chicks, and 0 subadults (Table 2, Fig. 3). Loons were observed on 111 of the 161 lakes surveyed. The total number of adult loons was similar to 2013-2016. Forty-seven of 308 adult loons counted were located in southern and central Vermont, an increase from 39 in both 2013 and 2014 and 46 in 2016, but lower than the 51 adults observed in 2015. Volunteers counted the most loons on Green River Res. and Norton Pond (12 adults), Caspian Lake (11 adults), and Seymour Lake (10 adults).

Loon Rescues

Two loons were rescued after becoming entangled in fishing line (Fairfield) and snaring a hook (Eden). Our first attempt at catching the loon on Lake Eden failed, but two days later the loon was caught by lake residents after it beached itself to avoid other loons. The VFWD game warden brought the loon to rehabber Craig Newman (Outreach for Earth Stewardship), who had veterinarian Craig Newman remove the hook. VLCP volunteer Dennis Hendy was able to capture and release an adult loon with fishing line around its legs on Fairfield Pond. On Woodbury Lake, we successfully captured another loon that had ingested some fishing line. Because it was very weak, we brought the loon to Avian Haven rehab center in Freedom, Maine where they treated the loon for almost two months before it began ailing and had to be euthanized. On South Pond (Marlboro), we failed to capture one of the breeding pair caught up in fishing line. Two weeks later it disappeared and likely did not survive.

On Bald Hill Pond, one of the breeding adults successfully pecked off fishing line over a week of monitoring. Two other loons were reported in fishing line on Jobs Pond and Somerset Reservoir. We only found healthy loons during follow-up surveys on these latter two water bodies.

The VLCP biologist spent over 40 hours in 2017 conducting capture attempts and coordinating monitoring efforts with volunteers and game wardens. The biologist has spent 40-85 hours annually dealing with loons in distress in recent years. Volunteers were instrumental in the monitoring and capture attempts of all these birds.

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 50 of the 69 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. Two natural sources of mortality include predation and intraspecific competition between breeding pairs and extraterritorial (rogue/intruder) loons. 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.

Table 1. Summary of Common Loon breeding activity in Vermont, 2017

Nesting pairs: 97 Known territorial pairs: 113 Potential territorial pairs: 5 Total territorial pairs: 118																
Chicks hatched out: 117 Chicks surviving through August: 92																
Lake list divided into sections: 1) nesting pairs, 2) known and potential territorial pairs, and 3) loon active lakes.																
Loonwatch Count 15 July 2017: Adult loons - 308 New nesting pairs: 3 New territorial pairs: 2																
Lake Name	Town	2017 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescues/ Mortality/ Monitor	Date	Age	Mortality and Rescue Cause	Comments	# years nested	# years nest success	total # surviving chicks
Baker P.	Barton	nesting	marsh	Successful		1 Ch	1 Ch							13	11	16
Bald Hill P.	Westmore	nesting	shoreline	Successful		2 Ch	2 Ch		Monitor	7/31/2017	adult	Fishing gear - monofilament	Yellow line wrapped around body. Picked it off over a week.	16	10	12
Beaver P.	Holland	nesting	island	Successful		1 Ch	1 Ch							35	30	36
Beecher P.	Brighton	nesting	marsh	Successful		1 Ch	1 Ch							4	3	3
Berlin P. - north	Berlin	nesting	marsh	Successful	signs	1 Ch	0 Ch	Unknown						14	13	15
Bourn P.	Sunderland	nesting	island	Successful		2 Ch	2 Ch							16	15	17
Bruce P. / Clark P.	Sheffield	nesting	marsh	Flooded										8	0	
Buck L.	Woodbury	nesting	marsh	Successful		1 Ch	1 Ch							10	6	6
Caspian L.	Greensboro	nesting	raft	Successful	signs	1 Ch	1 Ch							3	2	3
Chandler P.	Wheelock	nesting	raft	Successful: 2nd egg collected		1 Ch	1 Ch							10	7	7
Chittendon Res. - East	Chittenden	nesting	raft	Successful	signs	2 Ch	1 Ch	Unknown					Chance second chick still present but not observed during 3 surveys under wavy conditions	13	10	12
Chittendon Res. - NW	Chittenden	nesting	raft	Successful	signs	2 Ch	2 Ch							2	2	4
Coles P.	Walden	nesting	marsh	Successful	signs	1 Ch	1 Ch							18	15	22
Curtis P.	Calais	nesting	marsh	Abandoned - no eggs; re-nest successful	signs	1 Ch	1 Ch							2	1	1
Derby P.	Derby	nesting	marsh	Abandoned - no eggs	signs									9	5	5
Dog P.	Woodbury	nesting	marsh	Successful	signs	2 Ch	2 Ch							2	1	2
Dunmore L. / Mud P.	Leicester/ Salisbury	nesting	marsh	Flooded	signs				Mortality	8/5/2017	adult	Unknown	Observed swimming lethargically in water; found dead later in the day.	11	8	9
Echo L. (Charleston)	Charleston	nesting	raft	Successful	signs	2 Ch	2 Ch							7	3	4
Eden L.	Eden	nesting	raft	Successful	signs	2 Ch	1 Ch	Unknown	Rescue	7/17/2017	adult	Fishing gear - hook in bill	7/17 failed attempt, adult diving and strong; 7/19 beached, caught by residents, warden brought loon to Craig Newman. Likely part of pair. Chick possibly killed by boat hit (not confirmed)	14	12	16
Elligo L.	Greensboro	nesting	island	Successful	signs	2 Ch	2 Ch							16	13	16
Elmore L.	Elmore	nesting	marsh	Flooded	signs									6	1	1
Ewell P.	Peacham	nesting	marsh	Successful	signs	2 Ch	2 Ch							9	9	10
Fairfield	Fairfield	nesting	raft	Over-incubation	signs				Rescue	7/3/2017		Fishing gear - monofilament	Volunteer Dennis Hendy captured loon with monofilament around legs. Released.	4	0	
Fairlee L.	Fairlee	nesting	raft	Depredation-Mammalian; re-nest successful	signs	1 Ch	1 Ch							2	2	2
Flagg P.	Wheelock	nesting	island	Successful		1 Ch	1 Ch							5	4	6

Table 1 continued. Summary of Common Loon breeding activity in Vermont, 2017

Lake Name	Town	2017 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescues/ Mortality/ Monitor	Date	Age	Mortality and Rescue Cause	Comments	# years nested	# years nest success	total # surviving chicks
Forest L.	Averill	nesting	raft	Successful		2 Ch	1 Ch	Unknown - disappeared early						24	21	26
Fosters P.	Peacham	nesting	raft	Successful		2 Ch	2 Ch							15	15	23
Great Averill L. - North	Averill	nesting	raft	Abandoned - no eggs										23	12	13
Great Averill L. - South	Averill	nesting	raft	Abandoned - no eggs										8	6	6
Great Hosmer P. - North	Albany/ Craftsbury	nesting	shoreline	Over-incubation										1	0	
Great Hosmer P. - South	Albany/ Craftsbury	nesting	marsh	Successful; 2nd egg collected	signs	1 Ch	1 Ch							7	7	10
Green River Res. - Access Bay	Hyde Park	nesting	island	Successful	signs	2 Ch	2 Ch							10	9	11
Green River Res. - Merganser inlet	Hyde Park	nesting	island	Successful		1 Ch	1 Ch							3	1	1
Green River Res. - NW	Hyde Park	nesting	island	Successful	signs	2 Ch	2 Ch							39	30	42
Green River Res. - South	Hyde Park	nesting	shoreline	Flooded	signs									3	1	1
Greenwood L.	Woodbury	nesting	raft	Successful	signs	1 Ch	0 Ch	Unknown - disappeared early						7	6	5
Groton L. - North	Groton	nesting	raft	Successful	signs	2 Ch	2 Ch							8	5	7
Hardwick L.	Hardwick	nesting	raft	Successful; 2nd egg collected		1 Ch	1 Ch		Mortality	5/18/2017	adult	Unknown	Found dead along shore; 2 other adults acting pair like and nested two weeks later	14	13	19
Harveys L.	Barnet	nesting	marsh	Successful	signs	1 Ch	1 Ch							9	7	6
Holland P. - North	Holland	nesting	shoreline	Flooded										3	0	0
Iroquois L.	Hinesburg	nesting	island	Flooded										2	0	
Island P.	Brighton	nesting	island	Successful		2 Ch	1 Ch	Unknown						17	14	16
Jobs P.	Westmore	nesting	shoreline	Abandoned - no eggs					Monitor	7/7/2017	adult	Fishing gear - monofilament	Loon reported to have fishing line coming from mouth. Both adults clean on 7/15/17.	10	5	5
Joe's P. - inlet	Cabot/ Danville	nesting	raft	Successful	signs	1 Ch	1 Ch							18	18	24
Joe's P. - 1st Pond	Cabot/ Danville	nesting	shoreline	Successful		1 Ch	0 Ch	Unknown - disappeared early					2nd chick reported but not re-observed or confirmed	8	5	3
Keiser P.	Peacham	nesting	marsh	Successful		1 Ch	0 Ch	Unknown - disappeared early					Chick gone by 7/4	13	10	9
Kent P.	Killington	nesting	island	Successful	signs	1 Ch	1 Ch							8	6	8
Kettle P.	Groton/ Marshfield	nesting	raft	Successful	signs	2 Ch	2 Ch							27	17	23
Knapp Brook P.	Reading	nesting	island	Over-incubation										1	0	0
Little Hosmer P.	Craftsbury	nesting	island	Abandoned - no eggs; re-nest successful	signs	1 Ch	1 Ch							17	10	9
Long P. (Eden)	Eden	nesting	marsh	Successful		1 Ch	1 Ch							6	4	5
Long P. (Westmore)	Westmore	nesting	island	Abandoned - no eggs; re-nest successful	signs	2 Ch	2 Ch							19	15	20
Lower Symes P.	Ryeate	nesting	marsh	Successful		2 Ch	1 Ch	Unknown						14	13	19
Lyford P.	Walden	nesting	marsh	Successful		2 Ch	1 Ch	Unknown						8	6	6
Maidstone L. - SE	Maidstone	nesting	island	Human disturbance	signs									7	3	5

Table 1 continued. Summary of Common Loon breeding activity in Vermont, 2017

Lake Name	Town	2017 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescues/ Mortality/ Monitor	Date	Age	Mortality and Rescue Cause	Comments	# years nested	# years nest success	total # surviving chicks
Maidstone L. -SW	Maidstone	nesting	island	Other - blackflies; re-nest successful	signs	1 Ch	0 Ch	Trauma - intruder loon					Lakeshore owner observed intruder loon attacking and killing the chick	35	32	36
Martins P.	Peacham	nesting	raft	Successful	signs	2 Ch	2 Ch							21	21	31
May P.	Barton	nesting	marsh	Successful	signs	2 Ch	2 Ch							21	18	26
Metcalf P.	Fletcher	nesting	island	Over-incubation; over-incubation	signs									5	2	4
Miller P.	Stratford	nesting	marsh	Successful	signs	1 Ch	1 Ch							5	5	7
Molly's Falls Res. - Island	Cabot	nesting	raft	Successful		2 Ch	2 Ch	Unknown						5	4	7
Molly's Falls Res. - North	Cabot	nesting	raft	Abandoned - eggs	signs									23	21	29
Newark P.	Newark	nesting	island	Successful	signs	2 Ch	1 Ch	Unknown						28	21	29
Nichols P.	Woodbury	nesting	raft	Successful	signs	2 Ch	2 Ch							18	16	17
Ninevah L.	Mount Holly	nesting	island	Successful	signs	1 Ch	1 Ch							23	21	29
No. 10 P. (Mirror L.)	Calais	nesting	raft	Successful	signs	2 Ch	2 Ch							10	10	13
Norford		nesting	island	Successful		1 Ch	1 Ch						No access for anyone but club members. Will need to find contact for monitoring.	1	1	1
Norton P. - Island	Norton	nesting	raft	Successful	signs	2 Ch	1 Ch	Depredation - Avian					Lake resident witnessed eagle take one of the chicks late in season.	38	31	40
Norton P. - North	Norton	nesting	raft	Abandoned - no eggs	signs									9	3	6
Norton P. - South	Norton	nesting	raft	Successful		1 Ch	1 Ch							17	15	18
Osmore P.	Peacham	nesting	island	Abandoned - no eggs										9	5	5
Pensioner P.	Charleston	nesting	raft	Successful	signs	2 Ch	2 Ch							10	9	12
Pigeon P.	Groton	nesting	raft	Successful		2 Ch	2 Ch							3	1	2
Raponda L.	Wilkinson	nesting	marsh	Successful	signs	1 Ch	1 Ch							2	2	2
Ricker P.	Groton	nesting	raft	Successful	signs	2 Ch	0 Ch	Unknown	Mortality	9/23/2017	adult	Unknown	1 chick disappeared early - report of drowning in bladderwort and eagle taking 2nd one -not confirmed. Adult beached itself; weak. Released on L. Groton and later died. Decomposing so not sent to Tufts.	15	12	11
Seymour L. - Winape	Morgan	nesting	raft	Loon disturbance	signs									20	15	20
Shadow L. - (Concord)	Concord	nesting	marsh	Flooded										11	5	6
Silver L. (Leicester)	Leicester	nesting	shoreline	Successful		2 Ch	2 Ch							4	4	6
Somerset Res. - Dandeneau Cove	Somerset	nesting	island	Flooded; re-nest successful	signs	1 Ch	1 Ch							36	26	33
Somerset Res. - Narrows	Somerset	nesting	island	Flooded										5	1	1
Somerset Res. - North Islands	Somerset	nesting	island	Successful	signs	2 Ch	2 Ch							10	8	11
South P. (Eden)	Eden	nesting	island	Successful	signs	2 Ch	2 Ch							19	15	20

Table 1 continued. Summary of Common Loon breeding activity in Vermont, 2017

Lake Name	Town	2017 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescues/ Mortality/ Monitor	Date	Age	Mortality and Rescue Cause	Comments	# years nested	# years nest success	total # surviving chicks
South P. (Marlboro)	Marlboro	nesting	marsh	Successful	signs	2 Ch	2 Ch		Rescue	7/22/2017	adult	Fishing gear - monofilament	Likely died. Failed rescue attempt. Bird disappeared in next two weeks.	3	3	5
Spectacle P.	Brighton	nesting	raft	Successful	signs	2 Ch	0 Ch	Unknown - disappeared early						23	21	23
Spring L.	Shrewsbury	nesting	shoreline	Abandoned - no eggs	signs				Mortality	7/1/2017	adult	Intruder loon	Found highly decomposed. In late May, bird beached itself after territorial dispute. Weak but went back in water on its own; likely died shortly after. NOT sent to Tufts.	15	10	14
Stiles Res.	Waterford	nesting	marsh	Abandoned										14	9	13
Sugar Hill Res.		nesting	raft	Successful	signs	1 Ch	1 Ch							2	2	2
Sunset L. (Marlboro)	Marlboro	nesting	island	Successful	signs	2 Ch	0 Ch	Depredation - Avian	Mortality	7/15/2017	adult	Unknown	Adult found dead in water; part of breeding pair; 1st chick disappeared at same time bald eagle diving at family. 2nd chick disappeared after adult died.	9	7	6
Thurman Dix Res.	Orange	nesting	island	Successful		2 Ch	1 Ch	Sibling rivalry						37	30	35
Ticklenaked		nesting	marsh	Successful	signs	2 Ch	0 Ch	Unknown					Big snapping turtles known to be common in pond	3	2	1
Wallingford P.	Wallingford	nesting	marsh	Successful		2 Ch	2 Ch							18	13	21
Wantastiquet P.	Weston	nesting	island	Flooded; re-nest successful		2 Ch	2 Ch							9	8	12
West Mountain P.	Maidstone	nesting	shoreline	Successful		1 Ch	1 Ch							17	11	7
Wolcott P.	Wolcott	nesting	marsh	Successful	signs	2 Ch	0 Ch	Unknown; Unknown 2nd chick found in October						25	21	26
Woodbury L. (Sabin)	Woodbury	nesting	raft	Successful	signs	2 Ch	2 Ch		Mortality	6/1/2017	adult	Fishing gear - monofilament	Non-breeding adult captured with monofilament around the bill. Sent to Avian Haven. Did well for 6-7 weeks before ailing quickly. Damaged feather area not healing. Euthanized.	11	11	12
Woodward Res.	Plymouth	nesting	shoreline	Successful	signs	2 Ch	2 Ch							11	8	10
Zack Woods P.	Hyde Park	nesting	island	Successful	signs	2 Ch	1 Ch	Unknown					Intruder loon observed chasing second chick after the first chick disappeared within the previous two days.	21	19	30
Bean P.	Sutton	territory		last nested 2016										12	12	14
Brownington P.	Brownington	territory	marsh	last nested 2016										15	6	9
Center P.	Newark	territory		last nested 2015	signs									3	0	
Daniels /Daniels West P.	Glover	territory		last nested 2016										6	5	5
East Long P.	Woodbury	territory		last nested 2016										36	28	33
Groton L. - South	Groton	territory	marsh	last nested 2015										14	12	15
Holland P. - South	Holland	territory		last nested 2016	signs									20	13	16
Little Averill L. - North	Averill	territory		last nested 2015										6	4	1

Table 1 continued. Summary of Common Loon breeding activity in Vermont, 2017

Lake Name	Town	2017 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescues/ Mortality/ Monitor	Date	Age	Mortality and Rescue Cause	Comments	# years nested	# years nest success	total # surviving chicks
Little Averill L. - West	Averill	territory		last nested 2016	signs									29	17	24
Long P. (Greensboro)	Greensboro	territory		last nested 2015										1	0	
Maidstone L. - North	Maidstone	territory		last nested 2016										7	5	3
Miles P.	Concord	territory		last nested 2015										22	16	22
Neal P.	Lunenburg	territory		last nested 2015										2	0	
Parker L.	Glover	territory		nest building in 2016										0		
Peacham P. - North	Peacham	territory		last nested 2016	signs									39	32	37
Peacham P. - SW	Peacham	territory	marsh	last nested 2015										27	19	23
Coits P.	Cabot	potential territory		last nested 2016	signs								2 adults in May but then usually just one observed.	3	3	2
Halls L.	Newbury	potential territory												0		
Mollys P.	Cabot	potential territory														
Peacham P. - SE	Peacham	potential territory		last nested 2014										6	2	3
Warden P.	Barnet	potential territory											Nest reported but not found.			
Amherst L.	Plymouth	loon active														
Berlin P. -South	Berlin	loon active														
Branch P.	Sunderland	loon active												1	1	1
Carmi L.	Franklin	loon active														
Champlain L.	various	loon active							Mortality	6/15/2017	sub-adult	Unknown	Subadult observed swimming with head down; found dead short time later	2	0	0
Clyde R.	Newport	loon active														
Crystal L.	Barton	loon active														
Dunmore L.- North	Leicester/ Salisbury	loon active														
Gale Meadows Res.	Winhall	loon active												2	0	0
Glen P.	Castleton	loon active														
Hardwood P.	Elmore	loon active												10	9	11
Harriman Res.	Wilmington	loon active														
Hortonia L.	Hubbardton	loon active														
Lowell L.	Londonderry	loon active														
Marshfield P.	Marshfield	loon active												0		
McConnell P.	Brighton	loon active												15	11	15
Memphramagog L. - Holbrook Bay	Newport	loon active														
Memphremagog L. - John's River	Derby	loon active												4	2	1
Moore Res. - Roaring Brook	Concord	loon active												4	3	0
Morey L.	Fairlee	loon active												0		
Nelson P.	Woodbury	loon active												1	0	
Noyes P.	Groton	loon active												1	0	0
Nulhegan	Brighton	loon active														
Rescue L.	Ludlow	loon active														
Seymour L. - West	Morgan	loon active												1	1	2

Table 1 continued. Summary of Common Loon breeding activity in Vermont, 2017

Lake Name	Town	2017 status	Nest Type	Nest Outcome	Nest Warning Sign Buoys	Chicks hatched out	Chicks through August	Chick Mortality Cause	Rescues/ Mortality/ Monitor	Date	Age	Mortality and Rescue Cause	Comments	# years nested	# years nest success	total # surviving chicks
Shadow L. (Glover)	Glover	loon active														
South Bay	Newport	loon active														
Sunset L. (Benson)	Benson	loon active											Reports of 2 loons but not documented well.			
Wallace P.	Canaan	loon active												0		
Wapanacki P.	Wolcott	loon active														
Waterbury Res.	Waterbury	loon active											Increased loon activity this year	3	1	1
West Hill P.	Cebot	loon active											Two loons reported often; coming from Coits?			
Willoughby L.	Westmore	loon active														

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

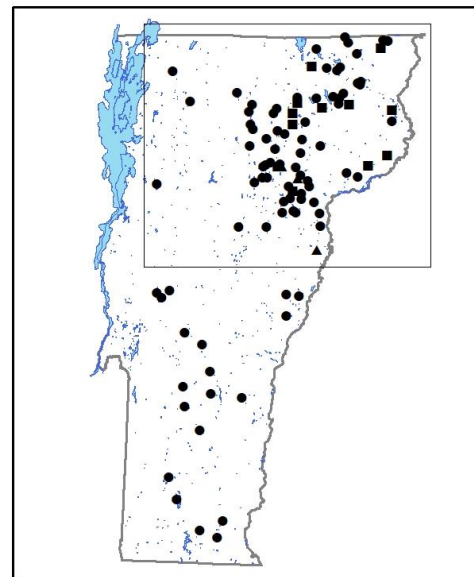
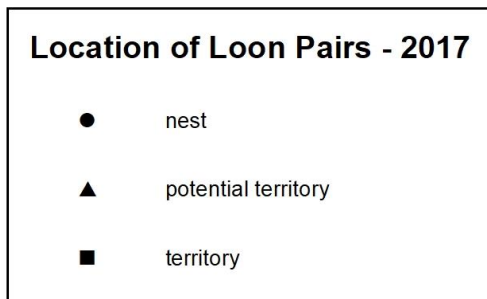
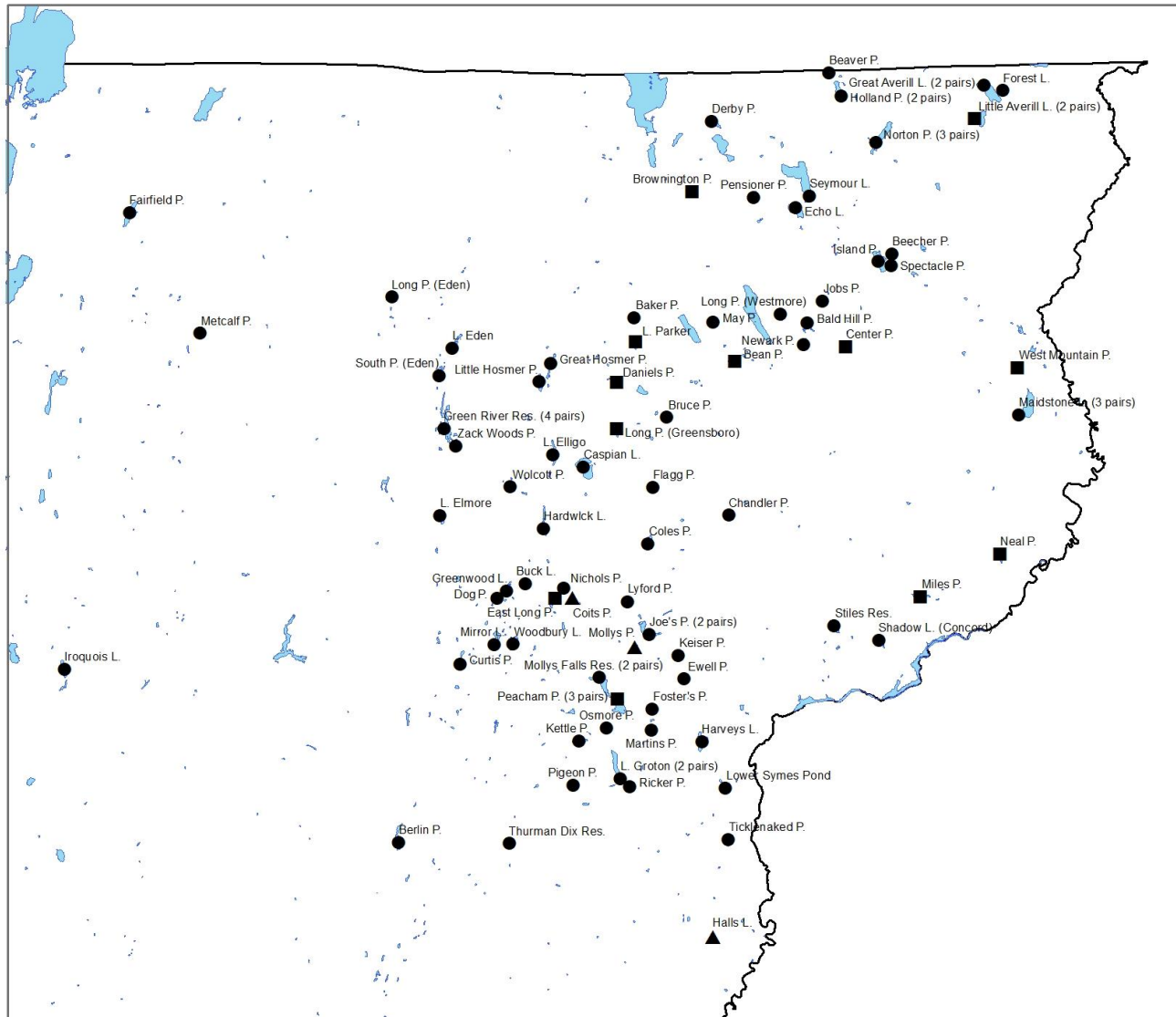


Figure 1b. Common Loon Nesting and Territorial Pairs in Vermont – Southern Area

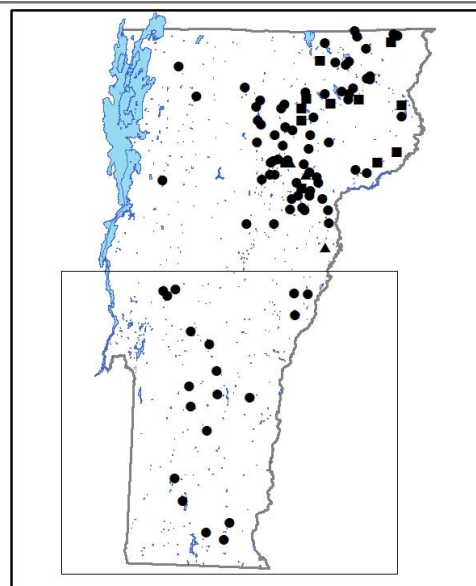
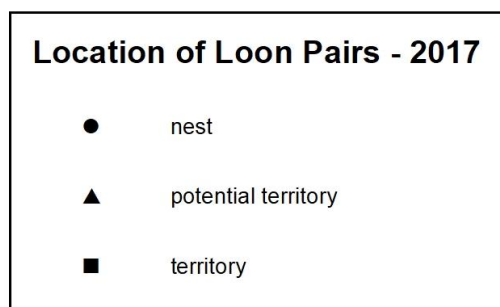
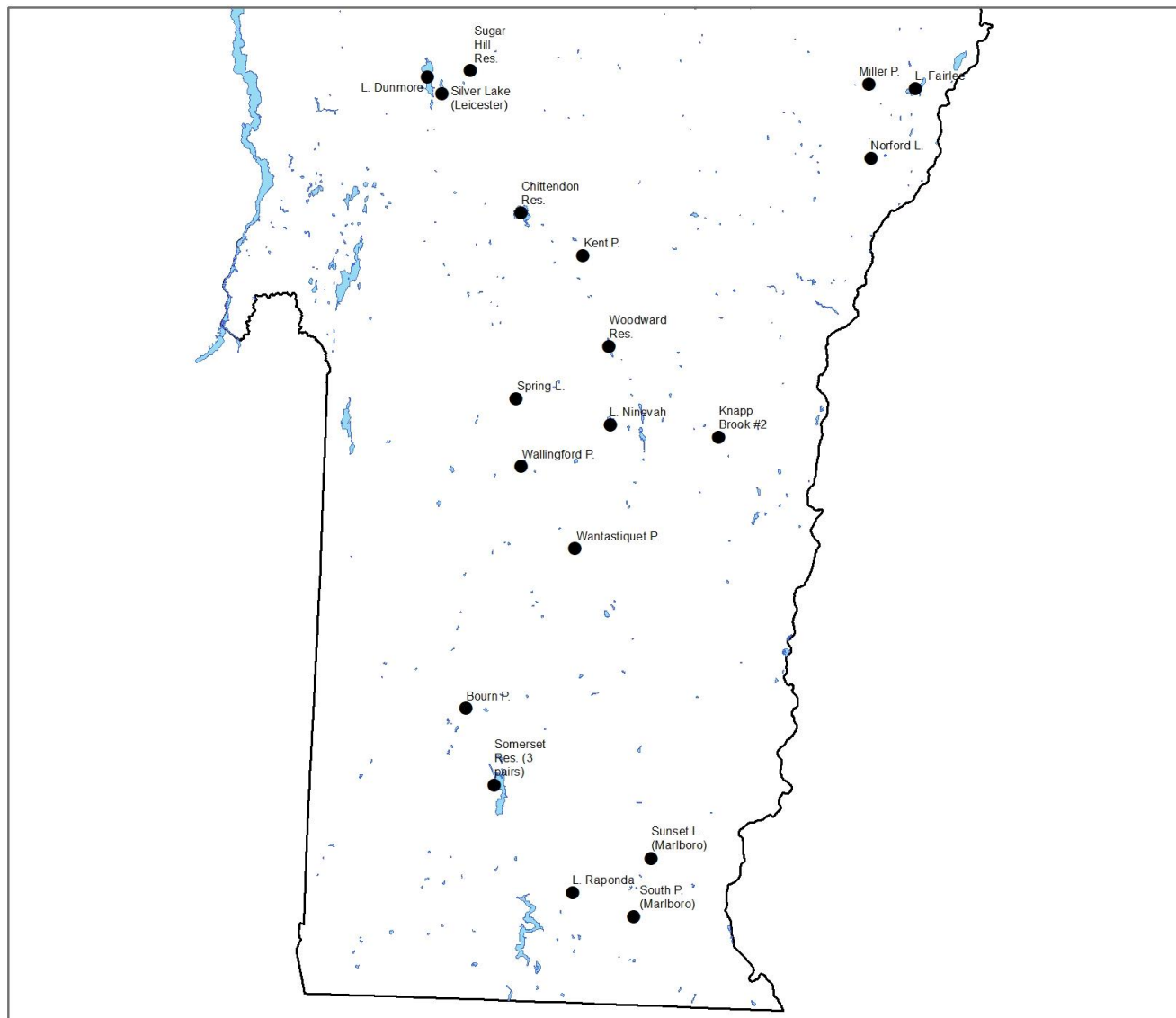


Figure 2. Summary of Common Loon breeding activity in Vermont, 1978-2017

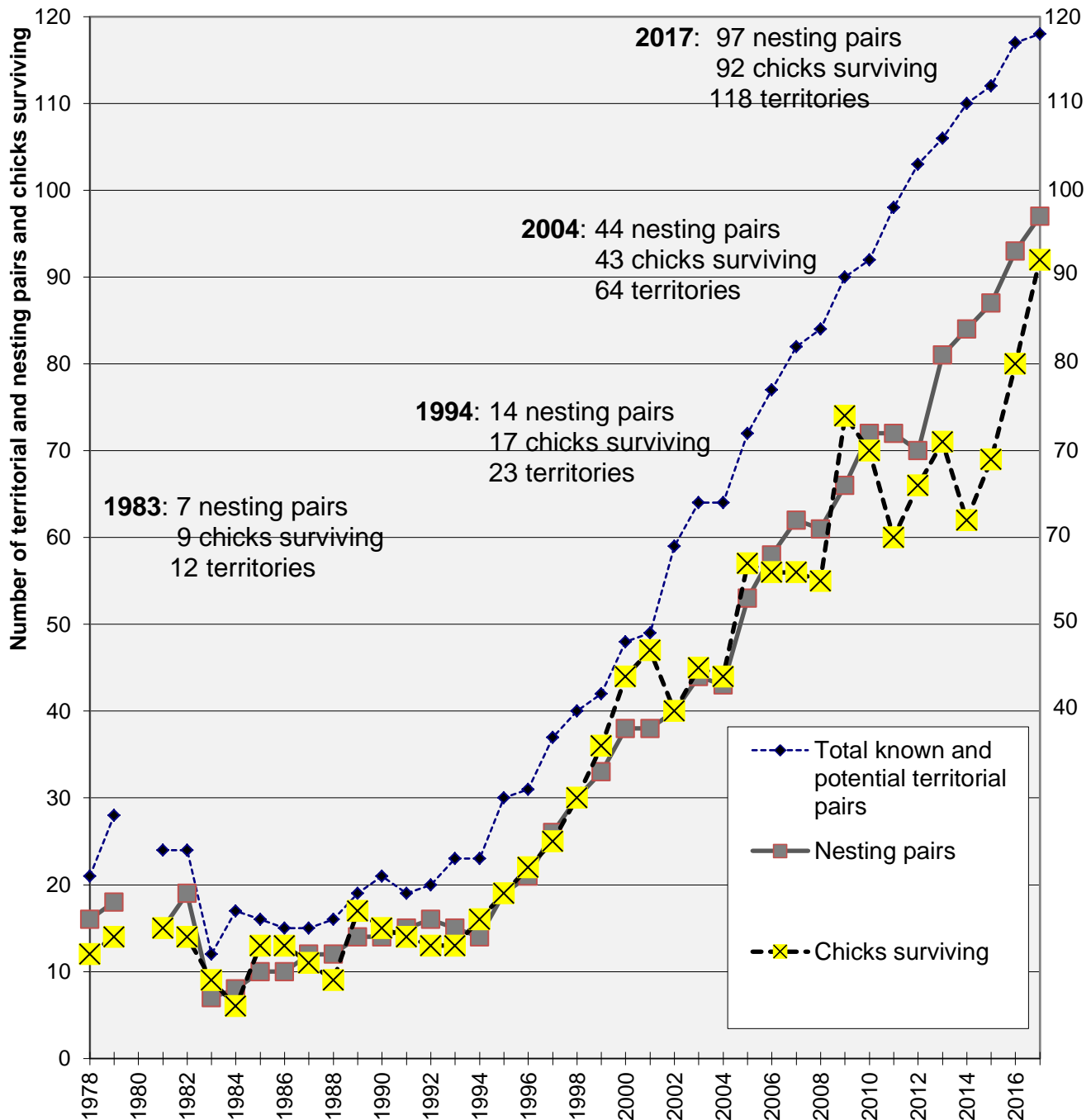


Table 2. Summary of population changes and reproductive success of Common Loons in Vermont, 1979-2017

Year	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17
TOTAL territorial pairs	28	0	24	24	12	17	16	15	15	16	19	21	19	20	23	23	30	31	37	40	42	48	49	59	64	64	72	77	82	86	90	92	98	103	106	110	112	117	118
Known terr. prs.	21	--	18	19	9	12	11	11	12	13	16	17	16	18	17	21	22	24	29	34	39	44	44	49	53	57	60	65	71	75	80	85	88	92	93	100	102	111	113
Potential terr. prs.	7	--	6	5	3	5	5	4	3	3	3	4	3	2	6	2	8	7	8	6	3	4	5	10	11	7	12	12	11	11	10	7	10	11	13	10	10	6	5
Nesting pairs	18	--	15	19	7	8	10	10	12	12	14	14	15	16	15	14	19	21	26	30	33	38	38	40	44	43	53	58	62	61	66	72	72	70	81	84	87	93	97
Successful pairs	12	--	11	12	5	6	8	9	9	7	10	9	10	10	11	13	15	14	21	23	25	36	34	34	38	34	47	44	47	49	53	57	52	50	62	57	65	65	74
Chicks hatched	--	--	--	--	10	7	--	16	12	11	19	18	16	15	18	20	21	25	32	37	41	56	56	52	62	54	68	66	71	75	83	85	76	87	97	93	103	102	117
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	47	40	45	44	57	56	56	55	74	70	60	66	71	62	69	80	92
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	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
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	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
% chick survival	--	--	--	--	90%	86%	--	81%	92%	82%	89%	83%	88%	87%	72%	85%	90%	88%	78%	81%	88%	79%	84%	77%	73%	81%	84%	85%	79%	73%	89%	82%	79%	76%	73%	67%	67%	78%	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	36	38	41	39	49	52	57	54	61	63	63	63	72	72	76	83	84

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	135	166	179	184	191	201	218	225	228	201 ^c	271	280	297	301	298	301	308
Number of chicks	--	--	--	--	9	16	13	17	9	9	16	15	15	15	14	11	17	21	21	26	36	45	45	39	44	40	45	53	54	42	65	53	52	63	69	66	63	74	85
Number of subadults	8	--	11	6	7	1	0	5	15	9	9	33	18	23	11	14	10	9	2	6	6	10	2	5	0	3	5	2	9	8	6	0	7	9	3	6	9	2	0
Number of lakes surveyed																				150	107	131	133	123		98	122	133	148	148	129	129	162	150	162	161	162	153	161
Number of lakes occupied																										68	69	84	86	84	89	76	102	98	106	103	116	112	111

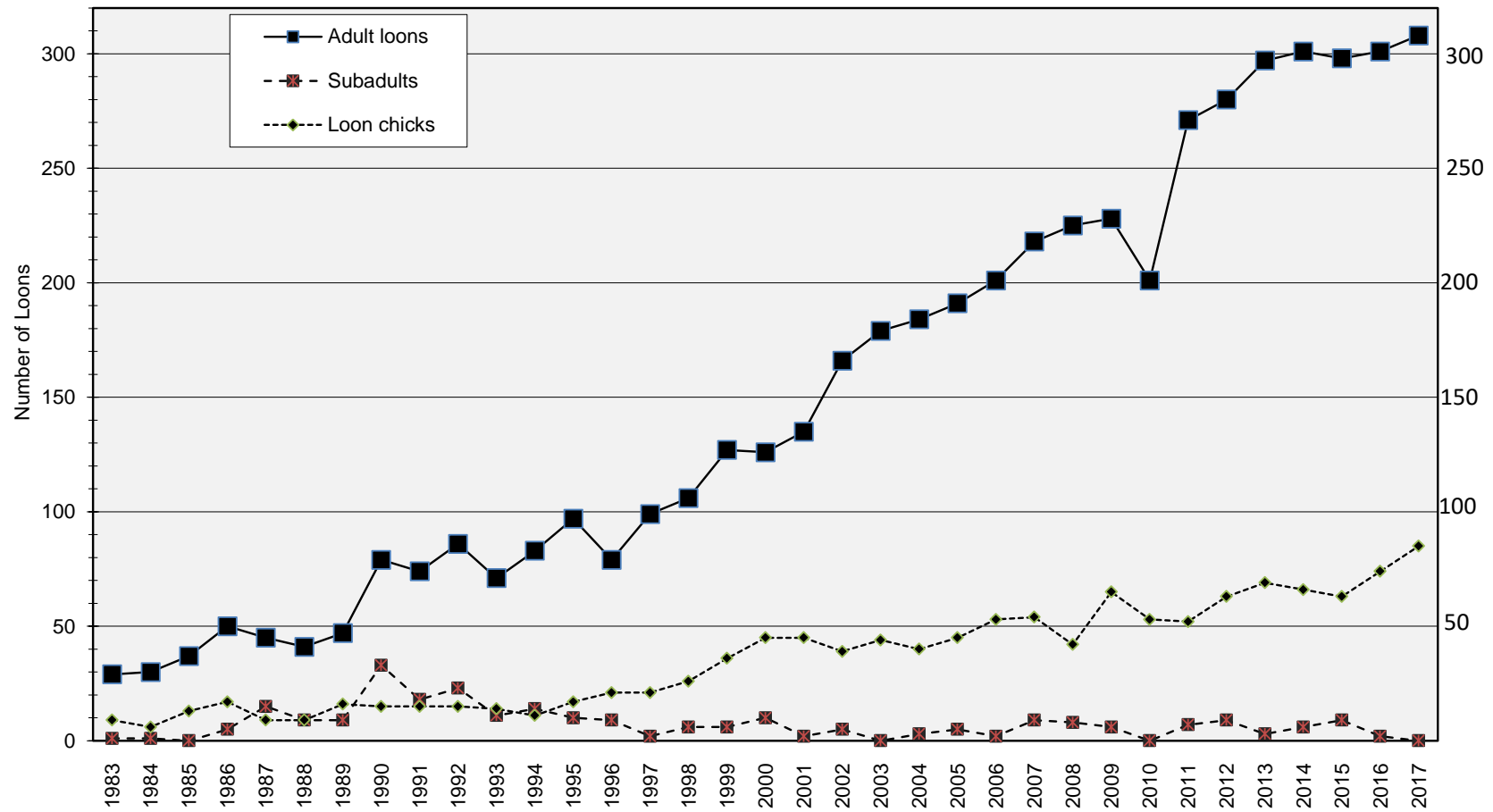
^a The number of lakes surveyed for Loonwatch increased in 1999. It is possible survey adult loon counts during the mid-1990s were slightly lower.

^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.

Figure 3. Vermont Loonwatch Results, 1983-2017
(an annual statewide loon census on the third Saturday of July)



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 likely fail 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, 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. 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 openings surrounded by ice continue occur, and the public expects rescues to occur. 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.
5. 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.
6. 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 sincerely thank the VFWD for ongoing, core financial support through the federal State Wildlife Grant program and the Nongame Wildlife Fund. We are also sincerely grateful for Great River Hydro's continued generous support of our efforts to monitor and manage nesting loons on Somerset Reservoir. Many individual donors have provided critical support to maintain VLCP programs. Without them, VCE's statewide loon conservation work would not be possible.

Professional assistance: Kirsti Carr and Nate Launer provided support as VCE interns. VFWD biologist John Buck 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, New Discovery, Ricker, and Stillwater state parks helped with outreach efforts. Craig Newman at Outreach for Earth Stewardship, veterinarian Dan Hament in Richmond, VT, 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 Alex Daulton of BRI. The Nature Conservancy's efforts to protect loon habitat continue to promote the success of this project, and we appreciate all the staff and members who contribute to those efforts. Chris Rimmer, Susan Hindinger, Steve Faccio, and Melissa MacKenzie 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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