2019 Belgrade Lakes Common Loon Monitoring Summary Report



Castle Island Nest, 2019

SUBMITTED TO:

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SUBMITTED BY:

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Loon Conservation Associates is dedicated to the protection and welfare of loons through collaboration, education, and the implementation of successful conservation actions.

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1.0 EXECUTIVE SUMMARY

Supported by funds from the Belgrade Lakes Association (BLA), Loon Conservation Associates (LCA) spearheaded a collaborative study with the BLA, conducting comprehensive common loon (*Gavia immer*) monitoring surveys on Great Pond and Long Pond. Loons are a key indicator of aquatic integrity for lakes, and this initiative provides an opportunity to confirm the current population status, identify major threats, and create long-term, sustainable conservation solutions designed to aid the current population.

Engaging and educating local volunteers to conduct surveys with professional guidance was a key component of the project. Results published in this report are taken from data gathered by LCA and BLA members and volunteers.

In 2019, Great Pond and Long Pond were surveyed bi-weekly by LCA and alternatively by BLA volunteers. Based on well-defined criteria for an established loon territory, a total of 23 territorial pairs were documented and 14 of these pairs nested. From nine successful nests, 13 chicks hatched and eight survived to > six weeks of age – an age defined as fledging for modeling purposes. Overall productivity on Great Pond and Long Pond in 2019 was 0.35 fledged young per territorial pair.

Historically, nesting loons have benefited from the use of artificial nesting islands (rafts). Pairs nesting on rafts have had better success than pairs nesting naturally. In 2019, two rafts were deployed in occupied territories on Long Pond. Both rafts were used by nesting pairs, and both were successful (100%), each hatching two chicks. Comparatively, only seven of 13 natural nests (54%) were successful.

Significant findings included:

- Reobservation of the 1997 W Boat Ramp, Long Pond, banded female. She did not breed. She and an unbanded male did occupy and defend a territory in lower Long Pond. This was the only banded loon confirmed on either pond.
- There was a significant discrepancy in the productivity of the loons on Great Pond and Long Pond in 2019. Great Pond fledged two chicks, while Long Pond fledged six.
- One adult mortality occurred. The specimen was collected and given to the Maine Department of Inland Fisheries and Wildlife for future necropsy.

2.0 INTRODUCTION

Loons were first banded in the Belgrade Lakes in 1997. The effort was funded as part of a Maine Department of Environmental Protection, Regional Monitoring and Assessment Program (ReMAP). Ongoing monitoring and banding efforts were continued, sporadically, over the following decades, but were limited by a lack of funding.

Data gathered from the prior banding effort and occasional surveys provides some insight into the population status. Personal monitoring efforts conducted over the last two decades confirmed Long Pond has upwards of $10\pm$ territorial pairs of loons, with knowledge of at least six territories known on Great Pond. Casual evidence suggests the population is relatively stable, with annual fluctuations in productivity, typical of the species throughout their range. However, recent declines in chick numbers observed by local residents and seasonal camp owners has generated concern about the health of the population.

Great Pond and Long Pond are vulnerable to multiple anthropogenic stressors, coupled with the potential impacts of climate change. More information is needed on the individual performance (i.e., reproductive success) and specific movements of individuals to better understand the status of the population.

3.0 OBJECTIVES

Collaborate with BLA to:

- Conduct bi-weekly, comprehensive productivity surveys to identify territorial pairs, nesting pairs, nest success/failure, number of chicks hatched, and number of chicks fledged;
- Consult on deployment and placement of artificial nesting rafts, where appropriate, to increase nest success rates, and minimize nest loss due to flooding and predation, and
- 3. Engage and instruct citizen volunteers on the basics of conducting comprehensive loon breeding surveys.

4.0 STUDY AREA

This study is limited to the entirety of Great Pond and Long Pond, Kennebec County, Maine (Figure 1).

Figure 1. The Belgrade Lakes Study Area. Courtesy of Google Earth.



5.0 METHODS

5.1 GROUND SURVEYS

All known or potential loon territories and surrounding areas were surveyed by LCA and BLA volunteers using binoculars and/or a spotting scope, when needed. Surveys were conducted by boat, or alternatively from shore. Surveys began in May and concluded in August. Confirmed territories occupied by loon pairs were prioritized and surveyed biweekly at a minimum. To minimize impacts on the loons, surveys were conducted from the greatest distance possible. If nesting evidence was obscured by vegetation it necessitated searching for nest evidence by foot. All known nesting sites were checked regularly for nesting evidence.

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Loon territories were delineated according to observed territorial behavior by a loon pair such as close physical association, and defensive posturing and calling along borders. Territories are used by pairs for feeding, resting, breeding, nesting and chick rearing, and are protected against incursion by other loons (and sometimes waterfowl) for a minimum of four weeks. Territories are used as a unit of reference in describing loon breeding activity and are recognized as being either *established* or *transitional*. Established territories have consistent occupancy for at least three seasons; transitional territories exhibit inconsistent occupation.

Nesting pairs were defined as those laying at least one egg; a nesting attempt was evidenced by a constructed nest dish or scrape with at least one egg present or fresh eggshell fragments. Successful nesting pairs hatched at least one chick. Causes of nest failure were attributed according to evidence observed.

Chicks hatched were recorded as those that hatched completely out of their eggs, not necessarily departing from the nest. For this report, we define the terms *chick* and *fledgling* as follows: *chicks* refer to loon young \leq six weeks of age post-hatching and fledglings or "fledged young" refer to loon young > six weeks of age. Sub-adult loons in alternate plumage are recorded as immatures (ages 1-2). The number of loon chicks to survive past six weeks of age, were assumed to have fledged.

5.2 ARTIFICIAL NESTING ISLANDS

Rafts were floated in territories that met specific criteria for flotation; including knowledge of 1) wind and wave action patterns relative to each territory, 2) loon territorial boundaries and proximity to neighboring territories, 3) previous traditional and non-traditional nest site locations, 4) boat traffic patterns relative to the specific territory, and 5) shoreline activities.

5.3 DEFINING REPRODUCTIVE SUCCESS

Reproductive success was evaluated according to four parameters; 1) nesting frequency, 2) hatching success, 3) chick survivorship, and 4) overall productivity. Nesting frequency was defined as the number of nesting pairs per total territorial pairs. This measure indicates the percent of the total potential breeding population that attempts to reproduce each season. The rate of success by these pairs, or hatching success, was measured through the number

of chicks hatched by these pairs. Chick survivorship was defined as the number of chicks surviving divided by the number of chicks hatched. Overall productivity is a combination of the prior three parameters and measured through fledged young per territorial pair (CS/TP).

6.0 RESULTS

6.1 OVERALL STUDY AREA PRODUCTIVITY

During the 2019 field season, Great Pond and Long Pond were surveyed six times by LCA. Twenty-three territorial pairs were identified. Of the 23 pairs, 14 nested, and nine successful nests hatched 15 chicks; eight survived to fledge. This yielded a nesting frequency of 0.61, a hatching success of 1.07, and chick survival of 0.53. Overall productivity was 0.35 fledged young per territorial pair (Table 1).

Table 1. Common Loon Population and Productivity, Great Pond and Long Pond, 2019.

Population		Reproductive Success	
Territorial Pairs	23	Nesting Frequency	0.61
Nesting Pairs	14	Hatching Success	1.07
Chicks Hatched	15	Chick Survivorship	0.53
Chicks Surviving	8	Overall Productivity	0.35

6.1.1 GREAT POND PRODUCTIVITY

Twelve territorial pairs were identified on Great Pond. Of the 12 pairs, seven nested, and three successful nests hatched four chicks; two survived to fledge. This yielded a nesting frequency of 0.58, a hatching success of 0.57, and chick survival of 0.50. Overall productivity was 0.17 fledged young per territorial pair (Table 2).

Table 2. Common Loon Population and Productivity, Great Pond, 2019.

Population		Reproductive Success	
Territorial Pairs	12	Nesting Frequency	0.58
Nesting Pairs	8	Hatching Success	0.57
Chicks Hatched	4	Chick Survivorship	0.50
Chicks Surviving	2	Overall Productivity	0.17

6.1.2 LONG POND PRODUCTIVITY

Eleven territorial pairs were identified on Long Pond. Of the 11 pairs, seven nested, and six successful nests hatched 11 chicks; six survived to fledge. This yielded a nesting frequency of 0.64, a hatching success of 1.57, and chick survival of 0.55. Overall productivity was 0.55 fledged young per territorial pair (Table 3).

Table 3. Common Loon Population and Productivity, Long Pond, 2019.

Population		Reproductive Success	
Territorial Pairs	11	Nesting Frequency	0.64
Nesting Pairs	7	Hatching Success	1.57
Chicks Hatched	11	Chick Survivorship	0.55
Chicks Surviving	6	Overall Productivity	0.55

6.4 Productivity and Nest Failure by Lake/Territory, 2019.

Productivity results were analyzed and documented by lake/territory, including nest failures. A total of six nest failures were recorded. There were two cases of mammalian predation and four unknown causes of failure. The nesting pair at Lynch Cove, Long Pond, failed twice (Table 4, Figure 2).

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Table 4. Productivity and	Nest Failure Result	s ny Lake.	/ Lerritory, ZUT9.
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Territory	TP*	NP*	CH*	CS*	NF*	CAUSE OF NEST FAILURE	
GREAT POND:							
Marina	Y	Y	2	1	0		
Finger Reef	Y	Y	0	0	1	Unknown	
Blueberry Island	Y	Y	1	0	0		
Robbins Mill Stream	Y	Y	0	0	1	Unknown	
Crooked Island	Y	N	0	0	0		
Chutes island	Y	N	0	0	0		
Bear Springs	Y	N	0	0	0		
Snake Point Cove	Y	Y	1	1	0		
Horse Point	Y	N	0	0	0		
Pine Island	Y	Y	0	0	1	Unknown	
Austin Bog	Y	Y	0	0	1	Mammalian Predation	

Oak Island	Y	Ν	0	0	0	
LONG POND:						
Beaver Cove	Y	Y	2	2	0	
Tracy Cove	Y	Y	2	1	0	
Lynch Cove	Y	Y	0	0	2	Mammalian Predation
Blueberry Island	Y	Y	0	0	1	Unknown
Castle Island	Y	Y	2	2	0	
W Boat Ramp	Y	Ν	0	0	0	
Lost River	Y	Ν	0	0	0	
Graveyard	Y	Y	1	1	0	
SW Cove	Y	N	0	0	0	
Ingham Stream	Y	Y	2	0	0	
Ingham Pond	Y	Y	2	0	0	

*TP = territorial pair, NP = nesting pair, CH = chick(s) hatched, CS = chick(s) surviving NF = nest failure.

Figure 2. Mammalian Predation, Lynch Cove, Long Pond, 2019.



Population and productivity were mapped for each lake for location reference, confirmed occupation and reproductive success (Figure 3, 4).

Figure 3. Common Loon Population and Productivity, Great Pond, 2019. Courtesy of Google Earth.



Figure 4. Common Loon Population and Productivity, Long Pond, 2019. Courtesy of Google Earth.



6.2 USE OF ARTIFICIAL NESTING ISLANDS (RAFTS)

Artificial nests rafts were floated in two territories on Long Pond in 2019 (Tracy Cove and Beaver Cove). Breeding pairs used both rafts, and each pair successfully hatched two chicks (100%). There were seven natural nest attempts and four were successful (57%)(Figure 5). Figure 5. Loon Raft, Tracy Cove, Long Pond, 2019.



6.3 BANDED LOON REOBSERVATIONS AND RECOVERIES

Loons were first banded on Great Pond and Long Pond in 1997. Between 1997 and 2008, 17 loons were banded (13 adults and four juveniles). In 2019, one banded individual was confirmed on Long Pond (Table 5). All breeding loons were confirmed as either banded, with a positive confirmation or as unbanded (100% confirmation).

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Band #	Lake	Year	Sex	Age	Original Territory	2019 Territory	2019	Notes
0848-04699	Long Pond	1997	Μ	ATY	W Boat Ramp	NA	Ν	
0898-05397	Long Pond	1997	U	HY	W Boat Ramp	NA	Ν	
0898-05395	Long Pond	1997	F	ATY	Twin Islands	NA	Ν	
0559-61756	Great Pond	1997	М	ATY	Pine Island	NA	Ν	
0848-04785	Great Pond	1997	F	ATY	Pins Island	NA	Ν	
0559-61896	Long Pond	1999	F	ATY	Southwest	NA	Ν	
0559-61871	Long Pond	1999	Μ	ATY	Twin Islands	NA	Ν	
0938-03338	Long Pond	1999	U	HY	Twin Islands	NA	Ν	
0898-09873	Long Pond	2000	F	ATY	Beaver Cove	NA	Ν	
0938-30822	Long Pond	2003	М	ATY	Beaver Cove	NA	Ν	Deceased 2005
0938-30886	Long Pond	2003	Μ	ATY	Lynch Cove	NA	Ν	Deceased 2006 - BAEG
0938-03384	Long Pond	2003	F	ATY	Lynch Cove	NA	Ν	
0938-66608	Long Pond	2008	Μ	ATY	W Boat Ramp	NA	Ν	
0938-66613	Long Pond	2008	F	ATY	W Boat Ramp	W Boat Ramp	Y	W/ unbanded male
0938-66612	Long Pond	2008	U	HY	W Boat Ramp	NA	Ν	Deceased 2018
0938-66607	Long Pond	2008	М	ATY	Snake Point Cove	NA	N	
0938-66603	Long Pond	2008	U	HY	Snake Point Cove	NA	N	

Table 5. Banded Loon Reobservations and Recoveries, 2019.

6.4 MORTALITIES:

One adult loon was recovered from Great Pond on July 11, 2019. The specimen showed no obvious signs of injury. It was turned over to Maine Department of Inland Fisheries and Wildlife for future necropsy, with hopes of determining the cause of death.

7.0 DISCUSSION

In 2019, all known territories (100%) were occupied by loon pairs, with some additional, suitable habitat available for occupation by new pairs. This high occupancy rate demonstrates a strong breeding base in numbers, with potential to sustain a healthy breeding population.

Nesting conditions were ideal in 2019. Water levels during nesting remained fairly consistent. No nests were lost due to flooding, which is often a cause of loon nest failures. Fifteen of the 23 pairs on the two ponds nested (65%). Six of the 15 nesting pairs failed (40%). Determining the cause of nest failure is important when evaluating current productivity, and equally as important when considering future conservation measures to improve productivity.

The 2019 overall productivity of 0.35 CH/TP is well below the established sustainable population threshold of 0.48 CH/TP. However, loon productivity is subject to significant year-to-year fluctuations, and one year is not indicative of longer-term trends. Multi-year

studies, typically no less than five years in duration are required to adequately assess the population status.

Two nest rafts were introduced many years ago on Long Pond. Reproductive success from those territories has been monitored closely. It is likely the reproductive success exceeds the success rate of pairs nesting naturally on the ponds. Many current territories lack natural nesting islands, requiring loons to nest on the mainland and increasing the risk of failure from mammalian predators. There are suitable spots for placement of additional nest rafts in some territories, should circumstances warrant (successive years of natural nest failure). This conservation measure requires a serious commitment to construct, maintain, deploy, and remove rafts, annually, and in a timely manner.

Tracking the movements, territory and mate fidelity, and long-term survival of banded loons is key to understanding the dynamics of the local population. With only one banded loon observed and identified in 2019, new capture and banding efforts are required to color mark additional loons.

In its' first year, this project demonstrated the effectiveness of collaboration between trained professional researchers and volunteer citizen scientists. Although the volunteer effort was just beginning, new volunteers signed on throughout the season and there is great promise for future growth. Formal training and education modeled after successful programs in other regions will be an important next step. This unique partnership allows for the development of sustainable conservation efforts, which in turn provides valuable information to local communities and scientists concerned about the health of loon populations.

8.0 RECOMMENDATIONS

Common loons have responded well to dedicated human conservation measures designed to either stabilize a population or help a population rebound. However, these actions were implemented after years of research needed to accurately verify the status of the population, and identify past and present stressors, which may have led to population declines.

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LCA recommends the following actions for 2020:

- With professional guidance, continue to use standardized survey methods to collect data on the number of territorial pairs, nesting pairs, location of nests, chicks hatched, and those surviving >six weeks of age.
- Consider constructing and introducing nest rafts in the following territories; Lynch Cove, and W Boat Ramp, Long Pond and Austin Bog, Great Pond.
- Introduce the use of nest monitoring cameras (trail cameras), as circumstances allow to better understand the causes of nest disturbance and failure.
- Further develop the engagement and knowledge of citizen science volunteers by conducting formal classroom and field training, and seek to expand the volunteer base.
- Capture and band loons through traditional night capture of adults with chicks, allowing individual identification and tracking of movements and survival over time.
- Continue to engage and inform the local community about loons on Great Pond and Long Pond through all available media.

9.0 ACKNOWLEDGMENTS

LCA wishes to acknowledge the Belgrade Lakes Association and its' members, especially Dick Greenan, and all the volunteers who participated in field surveys.