Enhancing citizen-based loon monitoring as a tool for lake management in Wisconsin

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Introduction

In 1978, the Sigurd Olson Environmental Institute (SOEI) initiated the LoonWatch program in response to concerns that the population of loons in Wisconsin was declining. As part of the program, LoonWatch began a citizen component to track loons called the Annual Lake Monitoring Program (ALMP). Volunteers known as Loon Rangers collect information on loon territorial occupancy, describe reproductive outcomes, and map nesting and nursery site locations. In 1978 about 25 volunteers participated. Today we receive over 300 monitoring forms annually. The goals of this monitoring project are:

•Collect long-term data on self-selected lakes in Wisconsin on the occupancy and reproduction of common loons.

•Identify critical habitat for loon nesting and chick rearing through identification of nest and nursery sites on a lake map.

•Educate Rangers about loon conservation and have them leverage this message into their communities

The lakes in this study are self selected, which does not allow for loon populations assessment. LoonWatch works with the Wisconsin Department of Natural Resources (WDNR) to conduct a loon population estimates every five years.

In 2007, the WDNR Northwoods Loon Protection Program (NLPP) was in need of long term monitoring for the Wisconsin Loon Population Model research. This model provides a matrix for making predictions about future loon populations based on multiple stressors that may impact breeding success and adult mortality. These stressors include mercury exposure, habitat alteration, and increased human disturbance

Without funding to hire WDNR staff to do the monitoring, they implemented the Wisconsin Loon Citizen Scientist network. Citizens collect the data necessary (annual growth rate, adult survival, fecundity, juvenile recruitment) to annually update the Wisconsin Loon Population Model. Lakes are selected at random to insure an unbiased sample.

Methods

The LoonWatch ALMP solicits volunteer reports of season-long loon activity on lakes where citizens live or visit frequently. In spring, volunteers have the option of attending a Loon Ranger educational workshop. Each volunteer receives a loon ranger packet which includes a lake monitoring form and instructions. After the loons leave in the fall, the data forms are returned and during November-February the previous summer's data is entered and analyzed. The number of times lakes are monitored throughout the loon breeding season varies for each volunteer.

In 2007 LoonWatch and the Northwoods Loon Protection Program were awarded a grant from the Wisconsin Citizen-based Monitoring Partnership Program. While the two programs are looking for different results from loon monitoring, they are collecting similar information. By taking a more integrated approach, these programs:

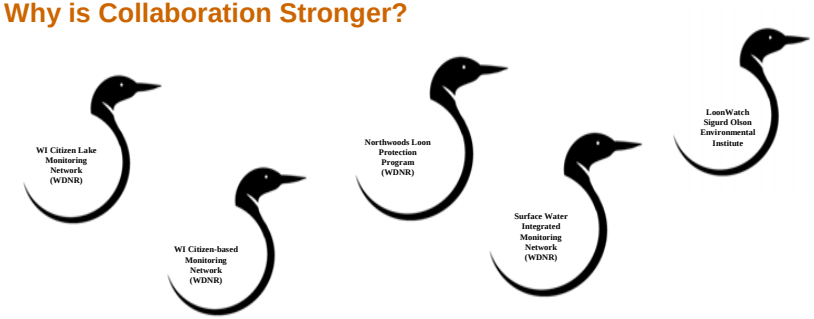
•Held two trainings at maximum capacity

•Created mandatory cross-over (all Loon Citizen Scientists are required to participate in Annual Lake Monitoring Program)

•Centralized all Wisconsin loon data on the Surface Water Integrated Monitoring System (SWIMS) database

•Increased volunteer enrollment in both programs

Why is Collaboration Stronger?



After chick rearing is complete and during migration, loons form groups known as rafts. Rafts of loons hunt more efficiency, have refuge from predators, and one can speculate that they enjoy the socialization.

As a result of the 2007 Wisconsin Citizen-based Monitoring Partnership Program, LoonWatch has joined a raft with other citizen-based monitoring projects, and has seen similar benefits such as access to larger pools of volunteers, safer data storage, and a stronger social network. While still awaiting data from the 2008 monitoring season, we anticipate better analysis and management opportunities for Wisconsin waters based on the efforts to raft up with other monitoring programs.

Results

Year	Lakes Monitored Loons	# of Adult	Adults per Lake	# of Loon Rangers	Territorial Pairs (TP)	TP (w/ HC)	TP (w/ FC)	Hatched Chicks (HC)	HC (w/ TP)	HC (w/ FC)	Fledged Chicks (FC)	8 Week FC	FC (w/ TP)	FC (w/ HC)	% Survival Rate	Hatched per Territorial Pair	Fledged Per Territorial Pair		Uncleaned Hatched/TP	Uncleaned Fledged/TP	Uncleaned 8 week Fledged
1978	156	200	1.282051282	25	68			72			64				88.888889	1.058823529	0.941176471				
1979	219	267	1.219178082	85	105			128			99				77.34375	1.219047619	0.942857143				
1980	505	615	1.217821782	180	223			331			310				93.655589	1.484304933	1.390134529				
1981	417	823	1.973621103	412	224			291			272				93.47079	1.299107143	1.214285714				
1982	494	1086	2.198380567	690	389						234						0.601542416				
1983	874	1513	1.731121281	746	626						493						0.787539936				
1984	664	1551	2.335843373	603	640						491						0.7671875				
1985	605	1413	2.33553719	406	538						415						0.771375465				
1986	389	789	2.028277635	231	264			286			188				65.277778	1.090909091	0.712121212		1.090909091	0.712121212	
1987	357	789	2.210084034	291	312			312			245				78.525641	1	0.78525641		1	0.78525641	
1988	444	780	1.756756757	200	320			321			243				75.700935	1.003125	0.759375		1.003125	0.759375	
1989	435	770	1.770114943	270	282			262			194				74.045802	0.929078014	0.687943262		0.929078014	0.687943262	
1990	433	1021	2.357967667	231	282			260			162				62.307692	0.921985816	0.574468085		0.921985816	0.574468085	
1991	349	695	1.991404011	332	289			246			154				62.601626	0.851211073	0.532871972		0.851211073	0.532871972	
1992	327	724	2.214067278	257	278			239			185				77.405858	0.859630824	0.663082437		0.859630824	0.663082437	
1993	276	663	2.402173913	208	272			244			181				74.180328	0.897058824	0.665441176		0.897058824	0.665441176	
1994	306	687	2.245098039	245	257			228			132				58.40708	0.875377432	0.513618677		0.875377432	0.513618677	
1995 * data was missing for 1995- needs to be found					146	114	90	113	110	101	85		83	85	84.158416	0.964912281	0.922222222		0.773972603	0.582191781	
1996	258	524	2.031007752	203	213	165	85	166	156	127	106		104	100	78.740157	0.945454545	1.223529412		0.770342723	0.488262911	
1997	213	455	2.136150235	208	220	181	127	222	193	174	154		154	146	83.908046	1.086298343	1.212598425		1.009090909	0.7	
1998	159			174	200	129	99	158	158	117	97		97	87	74.358974	1.224806202	0.97979798		0.79	0.485	
1999	205			**195**	241	144	119	157	151	138	123		119	115	83.333333	1.048611111	1		0.651452282	0.510373444	
2000	148			**145**	205	149	123	141	137	126	112		110	107	84.920635	0.919463087	0.894308943		0.687804878	0.546341463	
2001	150			136	184	133	114	150	150	127	126		123	111	87.401575	1.127819549	1.078947368		0.815217391	0.679347826	
2002	189			185	224	186	162	138	138	133	135	115	127	116	87.218045	0.741071429	0.628712871		0.616071429	0.513392857	0.513392857
2003	212			197	273	248	259	182	182	180	166	158	165	159	88.333333	0.733870968	0.637065637		0.666666667	0.608058608	0.578754579
2004	231			226	281	222	233	227	227	218	211	173	211	199	91.284404	1.022522523	0.905579399		0.807829181	0.75088968	0.615658363
2005	253			238	315	228	292	266	266	255	247	223	247	227	89.019608	1.166666667	0.845890411		0.844444444	0.784126984	0.707936508
2006	309			288	380.5	280	241	259	259	255	226	197	197	194	76.078431	0.925	0.817427386		0.680683311	0.593955322	0.517738693
2007	304			276	366	256	255	265	265	265	248	228	228	212	80	1.03515625	0.894117647		0.724043716	0.677595628	0.629508
mean	340.724				** orange and blue were calculated with different data, survey questions changed.											1.015120802	0.843322671				

Figure 1: Summary of Annual Lakes Monitoring Program Data 1978-2007

Monitoring forms have changed in past years to obtain more or different information: 1978-1985, 1986-1994, 1995-2005, and 2006-present.

While our numbers don't tell us a lot about loon population dynamics, they do show the long history of engagement with loon monitoring . Almost 40 Rangers have been with the program 15 years or more.

Conclusions

One of the major flaws of the Annual Lakes Monitoring Program was that data could only be accessed through LoonWatch . As of August first, 25 Loon Rangers (12%) were entering data into the SWIMS program. In the past, annual reports would be turned in once the loons left at the end of summer. Having live data throughout the summer can have many benefits, such as alerting scientists who are doing banding to when chicks are born. Further cross-over to other programs such as the WI Citizen Lake Monitoring Network will be more accessible to volunteers who report in SWIMS.

The trainings held jointly with the NNLP and LoonWatch engaged sixty-one participants. Participants were educated about the two loon monitoring programs in Wisconsin and were schooled in both program protocols. During a verbal feedback session, participants had very positive remarks and indicated that they would like to return to a session such as this in the future.

The Annual Lakes Monitoring Program is more appropriately titled a citizen-based monitoring program rather than a citizen science program. Education and environmental literacy of those involved is prioritized. With the help of a 2008 WI Citizen-based Monitoring grant, LoonWatch will work with a qualified biostatistician to determine ways of adding scientific rigor to the project to also make important contributions to the science of loon protection.

For further information

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