

2015 Project Abstract

For the Period Ending June 30, 2017

PROJECT TITLE: Assessing Contaminants in Minnesota Loons and Pelicans – Phase III

PROJECT MANAGER: Carrol Henderson

AFFILIATION: Minnesota Department of Natural Resources

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FUNDING SOURCE: Environment and Natural Resources Trust Fund)

LEGAL CITATION: M.L. 2015, Chp. 76, Sec. 2, Subd. 03j

APPROPRIATION AMOUNT: \$141,000

AMOUNT SPENT: \$ 140,750

AMOUNT REMAINING: \$ 250

Overall Project Outcomes and Results

The Deepwater Horizon oil spill in the Gulf of Mexico in 2010 exposed Minnesota-origin loons and white pelicans to direct mortality and to cancer-causing pollutants called Polycyclic Aromatic Hydrocarbons (PAH) and Dioctyl Sodium Sulfosuccinate (DOSS). This study used radiotelemetry to study migration patterns of juvenile loons and to determine the extent of PAH and DOSS contaminants in live adult loons, loons found dead, and unhatched loon eggs.

Radiotelemetry efforts showed that juvenile loons migrate to the Gulf of Mexico in their first fall and then migrate to the northern Atlantic region offshore from Canada for their second summer and to the northeastern states and Ontario in their second year. They returned to the Gulf of Mexico each winter. Surviving birds wintered in the Gulf of Mexico where petroleum contaminants had settled offshore from Alabama and Florida. The subadult loons were expected to return to Minnesota for the first time in spring of 2017 but the last transmitter quit working in March of 2017.

A total of 17 of 22 juvenile loons marked with transmitters perished in their first two years and demonstrated that this species experiences high mortality in the first couple years of life.

Contaminant analyses revealed that 18 of 42 blood, feather, and fat samples from loons contained petroleum contaminants. Four of 29 unhatched loon eggs also contained PAH contaminants.

Project Results Use and Dissemination

The telemetry and contaminant data collected in this study have been incorporated with the results of previous research to validate and justify a claim to the US Fish and Wildlife Service for \$6 million in remediation funds from the BP settlement to carry out long term restoration efforts for loon and pelican conservation in Minnesota. This would be the first of up to five three-year claims for loon and pelican remediation funds for Minnesota.



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2015 Work Plan FINAL REPORT

August 16, 2017

Final Report

Date of Work Plan Approval: June 11, 2015

Project Completion Date: June 30, 2017

PROJECT TITLE: Assessing Contaminants in Minnesota Loons and Pelicans – Phase III

Project Manager: Carrol Henderson

Organization: Minnesota Department of Natural Resources

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Location: Statewide

Total ENRTF Project Budget:	EN RTF Appropriation:	\$141,000
	Amount Spent:	\$140,750
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Legal Citation: M.L. 2015, Chp. 76, Sec. 2, Subd. 03j

Appropriation Language:

\$141,000 the first year is from the trust fund to the commissioner of natural resources to continue to assess the potential impact of petroleum, dispersants, and heavy metal contaminants from the Deepwater Horizon oil spill in the Gulf of Mexico on the wintering habitat of Minnesota's common loons and white pelicans using radiotelemetry, geolocators, and contaminant analysis.

I. PROJECT TITLE: Assessing Contaminants in Minnesota Loons and Pelicans – Phase III

II. PROJECT STATEMENT: Since April 2010, the Deepwater Horizon oil spill has taken on significant dimensions because of direct mortality and possible long term impacts on Minnesota-origin Common loons and American white pelicans. Petroleum contaminants (PAH) and toxic dispersants (DOSS) released into the Gulf of Mexico cause continuing exposure to loons and pelicans that winter in the Gulf of Mexico. PAH stands for Polycyclic Aromatic Hydrocarbons. They are petroleum contaminants that are carcinogenic, mutagenic, and teratogenic. DOSS stands for Dioctyl Sodium Sulfosuccinate. Known commercially as "Corexit", from 800,000 to 1,000,000 gallons of Corexit were dispersed onto oil slicks in the Gulf. It did not break down the oil. It only made it sink. DOSS is reported by the Environmental Protection Agency to cause respiratory, nervous system, liver, kidney, and blood disorders. It is carcinogenic and causes hormone disruption.

Minnesota has the largest breeding population of both loons (12,000 adult loons in the state) and American white pelicans (22,000 breeding pairs) in the continental United States. This presents a national stewardship responsibility to look after the long term health of and survival of those populations.

Loons hatched in Minnesota in the summers of 2008 and 2009 were in the Gulf when the oil spill occurred, and young pelicans hatched in 2009 were also present in the Gulf when the oil spill occurred. Subadult loons do not return to Minnesota until the beginning of their third year, and they typically do not begin breeding until their fifth year. Young American white pelicans do not return to Minnesota until spring of their second year. The Deepwater Horizon oil spill caused the death of approximately 200 Common loons and continuing contamination may be affecting their long term survival and reproduction at sublethal levels. This study is directed at learning the extent of those long term damages.

ENRTF funding in 2011 provided three years of field studies in which telemetry showed that, in addition to the impacts on juvenile loons, adult loons from Minnesota subsequently migrated to winter in the area affected by the oil spill. Analyses of loon and pelican blood, tissue, egg, and bill knob samples revealed that a significant percentage of loons and pelicans from Minnesota had picked up both oil and dispersant contaminants in the Gulf. This may be causing long term sublethal impacts including reproductive failure, population declines, or reduced longevity in these long-lived species. Five activities are proposed over the next two years to continue assessing pollutant levels, migration patterns, and population trends for loons and, to a lesser extent, white pelicans.

The data collection on American white pelicans relating to PAH and DOSS contaminants in eggs and bill knobs and migration and wintering movements will be completed through the activities of Phases I and II of this project. No further research on white pelicans is proposed for Phase III at this time.

This information will be used by the US Fish and Wildlife Service in development of their federal court case based on the Natural Resources Damage and Restoration (NRDAR) process under the Oil Pollution Act to reimburse states for the loss of wildlife due to oil spills. This data and other information previously gathered in this ENRTF study will likely result in a significant settlement to the State of Minnesota for damages to loons and pelicans, with the proceeds to be used for future loon and waterbird restoration and management purposes over a 15-year period.

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of November 15, 2015: Progress on Phase 3 has been delayed by several months as the last parts of Phase 2 are being completed, so no money has been expended to date. The contract with the University of Connecticut has been delayed because of issues between the University of Connecticut and the Minnesota DNR regarding intellectual property rights questions. Those questions have now been resolved and the contract for PAH and DOSS analysis should be signed by December 1.

Project Status as of April 15, 2016: The last components and expenditures of Phase II are being completed in spring of 2016 and as those expenditures are completed, Phase III activities will commence.

Project Status as of September 15, 2016: the US Geological Survey crew has continued to recapture loons outfitted with geolocators in 2014 and 2015 to retrieve data on their movements and diving activity. A total of 41 loons were captured in 2015 including 31 adults and 10 juveniles. Twenty-seven adults and 9 juveniles were banded, and 7 juveniles were outfitted with geotags. There were 24 adults and six juveniles recaptured with geolocators so that their movement and diving data could be retrieved. That data is still being analyzed for additional recaptures made in the summer of 2016. The University of Connecticut is continuing to analyze the contaminant levels in loon blood, eggs, and feathers. The USGS has added another type of sampling this summer with their own funding to take water and fecal samples from captured loons. Those samples are being tested for DNA to determine the fish species present at the capture sites and the fish species being eaten by the loons. This data will be included with future reports.

Project Status as of April 15, 2017: A total of 96 adult loons have been geotagged in the course of this study (2010-2015) and 51 of those loons have been recaptured (a recapture rate of 53%). Out of those 51 recaptures, 37 geotags had recoverable data for analysis of migration and diving behavior. An additional 12 adults were captured in summer of 2016 and 11 were recaptured later in the summer of 2016 for recovery of diving and movement data on their summer breeding grounds.

Project Status as of August 15, 2017: Phase III of this project to assess the migration and diving behavior of both adult and juvenile loons has now been successfully completed. A final report from the USGS has been received summarizing the migration and wintering behavior of juvenile and subadult loons. This landmark study on loons has been instrumental in making a case with the US Fish and Wildlife Service for justifying the use of Natural Resource Damage and Remediation (NRDAR) funds from BP for restoration of loons in Minnesota. On May 15 the DNR submitted a plan to the USFWS for use of \$6 million for three years of loon conservation work which would likely begin late in 2018 or early in 2019-as soon as the funds are released from the federal government. That plan is included in this final report.

Overall Project Outcomes and Results: Phase III has been successfully completed on time and under budget. This study has been utilized in making a case for damage to Minnesota loon and pelican populations by the Deepwater Horizon oil spill and the US Fish and Wildlife Service is now undergoing a review of the proposed Minnesota loon and pelican restoration plan which requests \$6,200,000 for 2019 through 2021. All three phases of this LCCMR-funded study represents an investment of \$641,000 in Environment and Natural Resources Trust Fund dollars which are generating significant remediation funds to recover the losses of loons and pelicans that resulted from the Deepwater Horizon oil spill.

The Deepwater Horizon oil spill in the Gulf of Mexico in 2010 exposed Minnesota-origin loons and white pelicans to direct mortality and to cancer-causing pollutants called Polycyclic Aromatic Hydrocarbons (PAH) and Dioctyl Sodium Sulfosuccinate (DOSS). This study used radiotelemetry to study migration patterns of juvenile loons and to determine the extent of PAH and DOSS contaminants in live adult loons, loons found dead, and unhatched loon eggs.

Radiotelemetry efforts showed that juvenile loons migrate to the Gulf of Mexico in their first fall and then migrate to the northern Atlantic region offshore from Canada for their second summer and to the northeastern states and Ontario in their second year. They returned to the Gulf of Mexico each winter. Surviving birds wintered in the Gulf of Mexico where petroleum contaminants had settled offshore from Alabama and Florida. The subadult loons were expected to return to Minnesota for the first time in spring of 2017 but the last transmitter quit working in March of 2017.

A total of 17 of 22 juvenile loons marked with transmitters perished in their first two years and demonstrated that this species experiences high mortality in the first couple years of life. Contaminant analyses revealed that 18 of 42 blood, feather, and fat samples from loons contained petroleum contaminants. Four of 29 unhatched loon eggs also contained PAH contaminants.

The telemetry and contaminant data collected in this study have been incorporated with the results of previous research to validate and justify a claim to the US Fish and Wildlife Service for \$6 million in remediation funds from the BP settlement to carry out long term restoration efforts for loon and pelican conservation in Minnesota. This would be the first of up to five three-year claims for loon and pelican remediation funds for Minnesota.

IV. PROJECT ACTIVITIES AND OUTCOMES:

Activity 1: Migration patterns and wintering distribution of juvenile common loons. Budget: \$74,000

Description: The US Geological Survey was contracted in Phase 2 of this project for their biologists and a wildlife veterinarian to capture 15 juvenile loons by night-lighting in the summer of 2014. In August, 2014, 15 loons were captured and surgically outfitted with internal satellite transmitters and outfitted with geolocators on their leg bands to monitor their subsequent migration and movements. Little is known about how juvenile loons utilize the Gulf of Mexico in their first two years of life. This has become an extremely important part of this study because it documents the wintering sites in the Gulf of Mexico that have been most directly impacted by the Deepwater Horizon oil spill. Loons will subsequently tracked over the next two years and eventually recaptured to obtain data collected on the geolocators which includes the depths to which the loons dive while feeding. This activity will extend the tracking and monitoring efforts that are currently funded under Phase II of this project. It will also allow for retrieving any satellite transmitters on juvenile loons that die prematurely and allow them to be placed on additional loons to allow for a larger ultimate project sample size of satellite monitored loons.

Summary Budget Information for Activity 1:

Budget:	\$	74,000
Amount Spent:	\$	74,000

Balance: \$ 0

Activity Completion Date:

Outcome	Completion Date	Budget
1. Monitor satellite transmitter data for 15 juvenile loons for migration, wintering area identification, movements and survival through 2018.	April 15, 2017	\$ 55,000
2. Recover geolocator tags via carcass recovery or recapture in Minnesota to download data and produce final report.	April 15, 2017	\$ 19,000

Project Status as of November 15, 2015: The USGS is currently monitoring the juvenile loons that were outfitted with satellite transmitters in 2014 and 2015 and their status can be observed on the USGS website (Google: USGS, loon tracking). Efforts will also be made in the spring and summer of 2016 to recapture adult loons that were previously outfitted with geolocators so the data they have gathered can be downloaded and analyzed.

Project Status as of April 15, 2016: Phase III activities for loon research and tracking will commence on May of 2016 including recapture of loons to retrieve data from geolocators, collection of blood and feathers for continuing contaminant analysis, satellite monitoring of migration and movements of the subadult loons, and late summer capture of three juvenile loons to outfit them with satellite transmitters.

Status as of September 15, 2016: Satellite transmitters were implanted in 22 juvenile loons that were captured on project breeding lakes in Minnesota during August 2014 and August 2015. Transmitters on 17 of these birds provided adequate location data to document movement to wintering areas. Fifteen of the radiomarked loons died and transmitter signals were lost for three birds. Carcasses of eight loons were recovered and contributing causes of death determined in seven cases. Three of the juveniles that were radiomarked in 2014 were monitored through spring 2016. These three loons summered as yearlings near the Gulf of St. Lawrence or Nova Scotia and all returned to the Gulf of Mexico for their second winter.

Project Status as of April 15, 2017: The USGS is summarizing their activities and accomplishments for their final report which will be submitted by June 30, 2017. They will be going out for one more week of loon captures the week of June 19 to recapture loons equipped with geolocators to download the migration and diving data that has been collected since last year.

Project Status as of August 15, 2017: Phase III (Assessing Contaminants in Minnesota Loons and Pelicans) has been successfully completed on time and under budget. This study has been utilized in making a case for damage to Minnesota loon and pelican populations by the Deepwater Horizon oil spill and the US Fish and Wildlife Service is undergoing a review of the proposed Minnesota loon and pelican restoration plan which requests \$6,200,000 for 2019 through 2021. That plan is included in this report.

Final Report Summary:

Satellite telemetry was used to determine the migration patterns and wintering locations of juvenile common loons (*Gavia immer*) that were produced in Minnesota. Satellite transmitters were implanted in 22 juvenile loons that were captured on breeding lakes in Minnesota during August 2014 and August 2015. Transmitters on 17 of these birds provided adequate location data to document movement to wintering areas. Usually, the radiomarked juvenile loons departed natal lakes for neighboring or other nearby lakes before making longer movements towards their wintering areas in the Gulf of Mexico and Atlantic Ocean. During their first fall migration, the loons staged on a variety of lakes and reservoirs in several states (Iowa, Illinois, Indiana, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, Ohio, and Tennessee). Movement data from the radiomarked loons were served on a web site established to provide project information to partners and the public (www.umesc.usgs.gov/terrestrial/migratory_birds/loons/migrations.html).

Mortalities of 17 of the radiomarked loons were documented and transmitter signals were lost for five loons. Carcasses of ten loons were recovered and contributing causes of death determined in nine cases. Three of the juveniles that were radiomarked in 2014 were monitored through spring 2016. These three loons summered as yearlings near the Gulf of St. Lawrence or Nova Scotia and all returned to the Gulf of Mexico for their second winter. One loon was tracked through its third winter on the Gulf of Mexico until the battery was exhausted in March 2017. Using satellite telemetry and archival geolocator tag technologies, Kenow et al. (2014) documented migratory movements of 22 breeding adult loons from Minnesota. The radiomarked or geotagged adult birds traveled from breeding lakes, often via larger staging lakes within Minnesota, to the Great Lakes (primarily Lake Michigan), and then on to wintering areas in impoundments in the southern U.S (5%), the southern Atlantic Coast (9%), or the Gulf of Mexico (86%). The objective of this study was to describe the movements and wintering ground use of juvenile loons produced in Minnesota during their first two years of life, using satellite transmitter and geolocator tag technologies.

Field work conducted during summers 2014 and 2015 focused on deploying satellite transmitters and archival geolocator tags on a sample of juvenile loons. This information will be used to develop and implement regional common loon conservation strategies. In addition, blood samples were collected from juvenile loons, processed, and preserved for contaminant analyses by the University of Connecticut.

Transmitters were implanted in the abdominal cavity. Surgical techniques and the handling and care of loons were done under approval of the Animal Care and Use Committee of the Upper Midwest Environmental Sciences Center and complied with the Animal Welfare Act. The surgical procedures were conducted in a portable laboratory by Dr. Darryl Heard (College of Veterinary Medicine, University of Florida, Gainesville, FL) and Dr. Scott Ford (Avian Specialty Veterinary Services, Menomonee Falls, WI). Following surgery, loons were held until demonstrating control of head and neck and an ability to assume an alert posture. The satellite transmitters were programmed to transmit on a variable schedule based on the anticipated stage of migration during the loon's annual cycle - 8 hours on: 72 hours off during the breeding season, 8 hours on: 24 hours off during initial fall migration, and 8 hours on: 72 hours off for the remaining life of the transmitter. Transmitter data, received by equipment on polar-orbiting National Oceanic and Atmospheric Administration Tiros-N weather satellites, were transmitted to the Service Argos data processing center in Landover, Maryland, where loon locations were estimated from the Doppler shift in the transmitter's carrier frequency. Location estimates were acquired using Argos Standard Service Processing.

We captured and radiomarked 22 juvenile common loons in association with this project during summers 2014-2015. Twenty-one of the radiomarked loons were also equipped with an archival geolocator tag. A detailed summary of capture and banding records is provided in Table 1. Maps depicting the generalized movements are provided in Figures 2 through 4.

Of 17 apparent mortalities, carcasses of ten loons were recovered and PTTs and geolocator tags recovered from an additional three loons. Parasitic infection (in 6 cases), transmitter implant issues (2), potential red tide toxicity (2), gunshot (1), and predation (2) were among the contributing causes of death. Departure dates from natal lakes ranged from 07 September through 19 November. Several of the radiomarked juvenile loons departed natal lakes for neighboring or other nearby lakes before making longer movements towards their wintering areas in the Gulf of Mexico and Atlantic Ocean. During their first fall migration, the loons staged on a variety of lakes and reservoirs in several states (Iowa, Illinois, Indiana, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, Ohio, and Tennessee). Arrival dates on wintering grounds ranged from 31 October through 30 December. Of the 17 radiomarked juvenile loons that reached their wintering grounds during their first fall

migration, 16 (94%) occupied nearshore areas, lagoons, bays, and offshore areas of the Gulf of Mexico from northeast Mexico to the Florida Keys (Figure 5). One radiomarked loon (6%) wintered in Florida waters of the Atlantic Ocean.

Seven loons among those radiomarked in 2014 and 2015 provided movement data during their first spring migration. Six loons exhibited a northward movement along the Atlantic Coast (Loon IDs 1138-0635, 1138-06648, 1138-06654, 1138-06658, 1138-06687, 1138-06696) and one loon followed an interior route through the eastern Great Lakes (Loon ID 1138-06650). Three loons that survived through their second fall migration summered as yearlings in the Gulf of St. Lawrence (2) or in waters off Nova Scotia (1) and all returned to the Gulf of Mexico for their second winter.

During spring 2016, five radiomarked loons continued to provide location data. One loon (Loon ID 1138-06650) migrated north through Lake Ontario and Lake Superior to Big Trout Lake, Ontario (latest location as of 06 June 2016). The other four loons moved northward along the Atlantic Coast. Of these four loons, three died (1138-06635, 1138-06658, 1138-06696) and transmission signals were lost in one case (1138-06687).

Movements of radiomarked loons were depicted on the UMESC public website (http://www.umesc.usgs.gov/terrestrial/migratory_birds/loons/migrations.html). Efforts will be made to search natal and adjoining lakes for marked loons returning to Minnesota over the next several years. A final manuscript detailing the results of this study, along with interpretation, will be prepared and submitted for publication in a peer-reviewed journal.

Table 1.
Number of common loons captured, marked, & sampled in Minnesota 2010-2016.

Year	No. loons captured	No. loons newly banded	No. loons radiomarked	No. loons geotagged	Recaptures-recoveries of geolocator-tagged adults/geotags recovered
2010	4 (2 adults; 2 juveniles)	4 (2 adults; 2 juveniles)	2 adults	2 adults	1/1*a
2011	48 (30 adults; 18 juveniles)	39 (29 adults; 10 juveniles*b)	13 adults	27 adults (17 new plus 10 used tags)	2/2
2012	81 (56 adults; 25 juveniles)	72 (51 adults; 21 juveniles*c)	0	42 adults	9/8
2013	34 (22 adults; 12 juveniles)	16 (8 adults; 8 juveniles* d)	0	0	18/11*e
2014	41 (13 adults; 28 juveniles)	31 (3 adults; 28 juveniles)	15 juveniles	1 adult; 15 juveniles	13/10
2015	41 (31 adults; 10 juveniles)	36 (27 adults; 9 juvenile*f)	7 juveniles	24 adults; 6 juveniles	8/5
2016	48 (39 adults; 9 juveniles)	30 (26 adults; 4 juveniles*g)	0	2 adults	10/9
Total	297 (193 adults; 104 juveniles)	228 (146 adults; 82 juveniles)	15 adults; 22 juveniles	98 adults; 21 juveniles	61/46

*a Includes recovery of adult loon marked in 2010 Stumpf lake male recovered along shore of Green Bay) and geolocator tag.

*b Eight juveniles were too small to band in 2011.

*c Four juveniles were too small to band in 2012.

*d Four juveniles were too small to band in 2013.

*e Includes recoveries of three geolocator tags from adults recovered while wintering. Six geolocator tags fell off their leg bands.

*f One juvenile was too small to band in 2015.

*g Five juveniles were too small to band in 2016.



Figure 1. Distribution of Minnesota lakes where juvenile common loon were captured and marked with satellite transmitters and archival geolocator tags during 2014-2015.

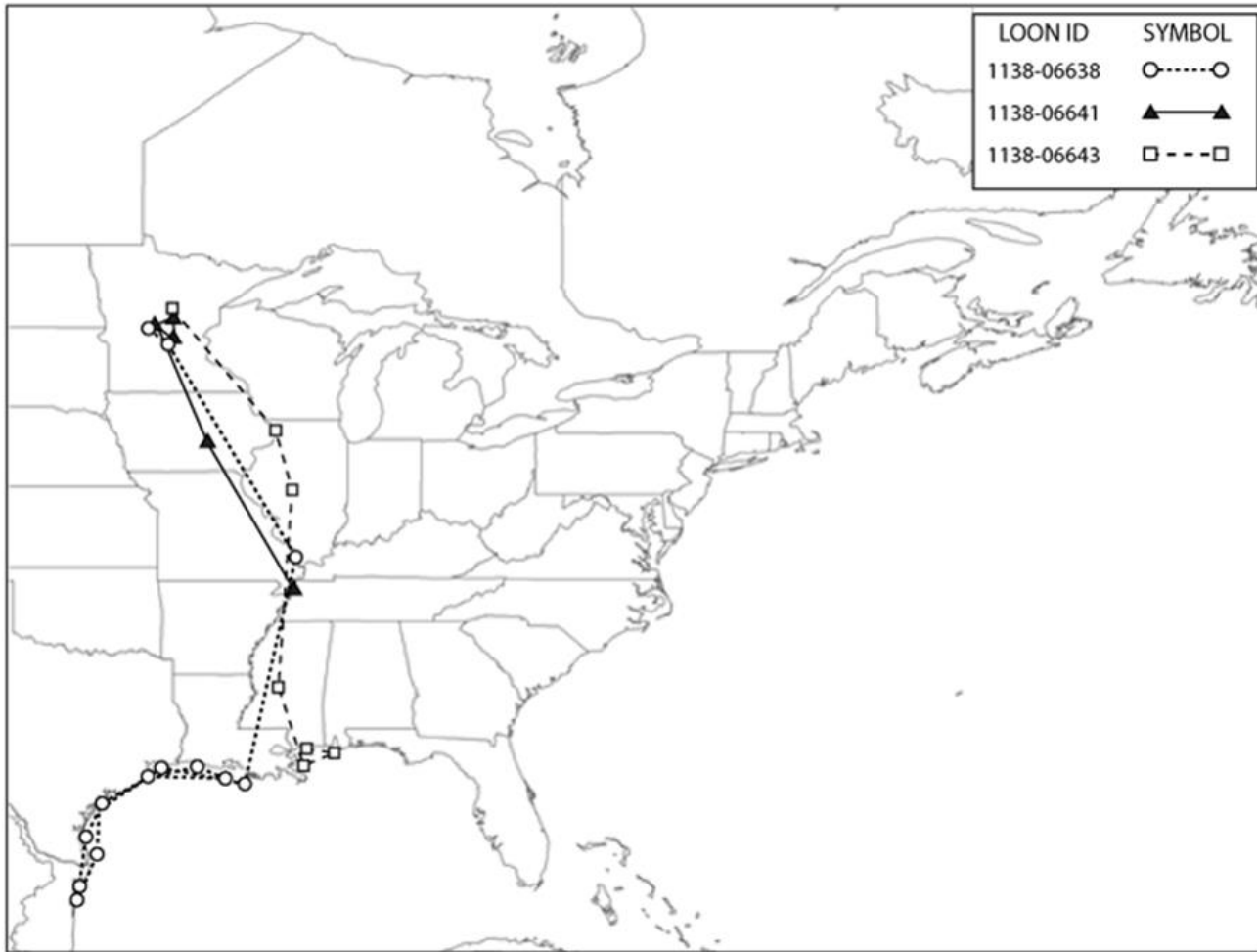
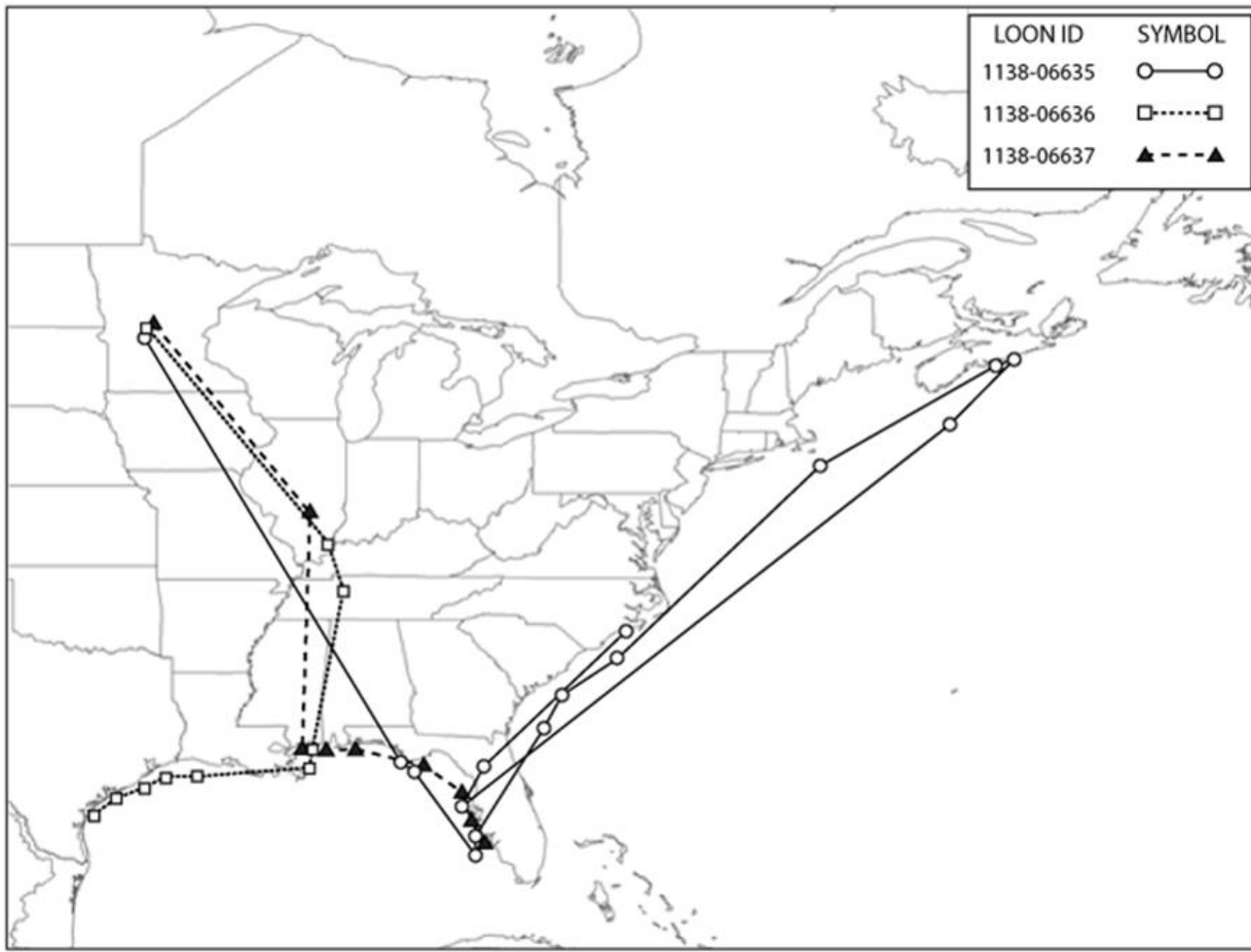


Figure 2. Wintering and first-year movements of of six juvenile/subadult loons

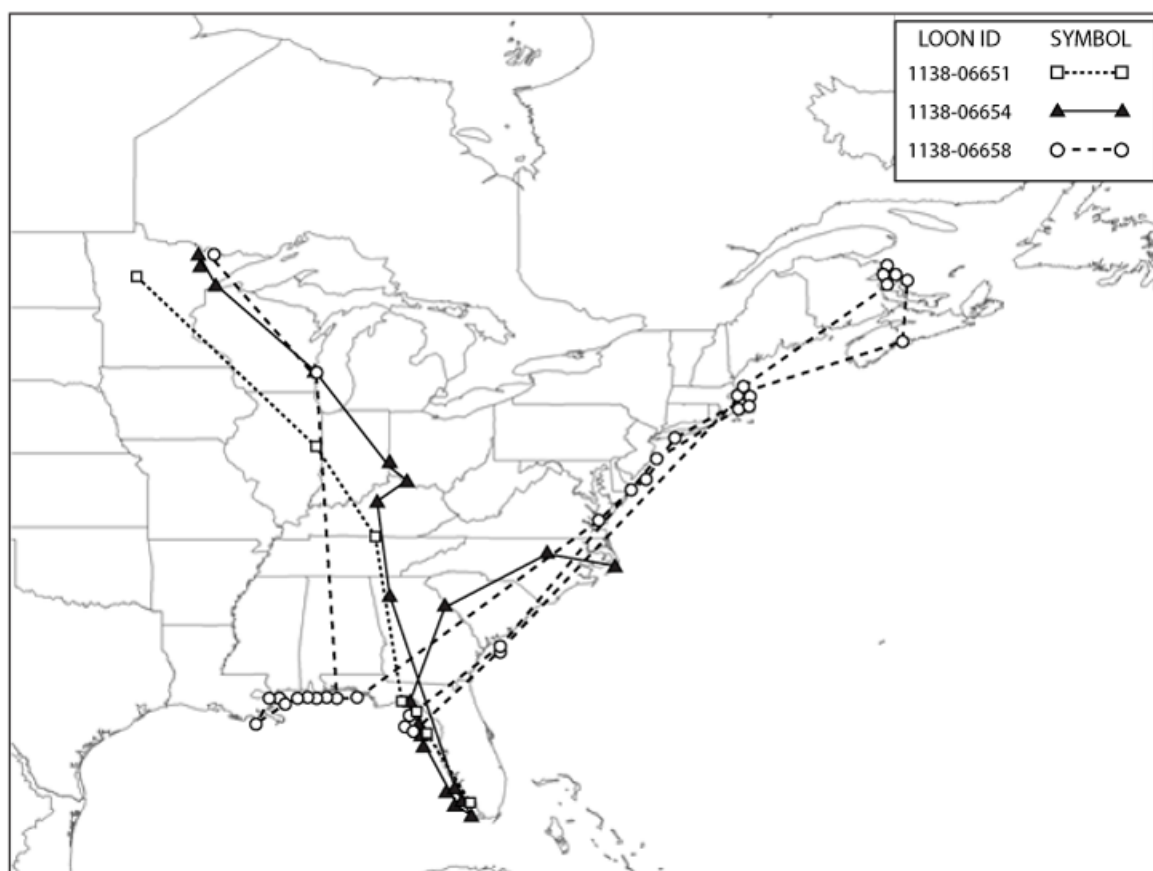
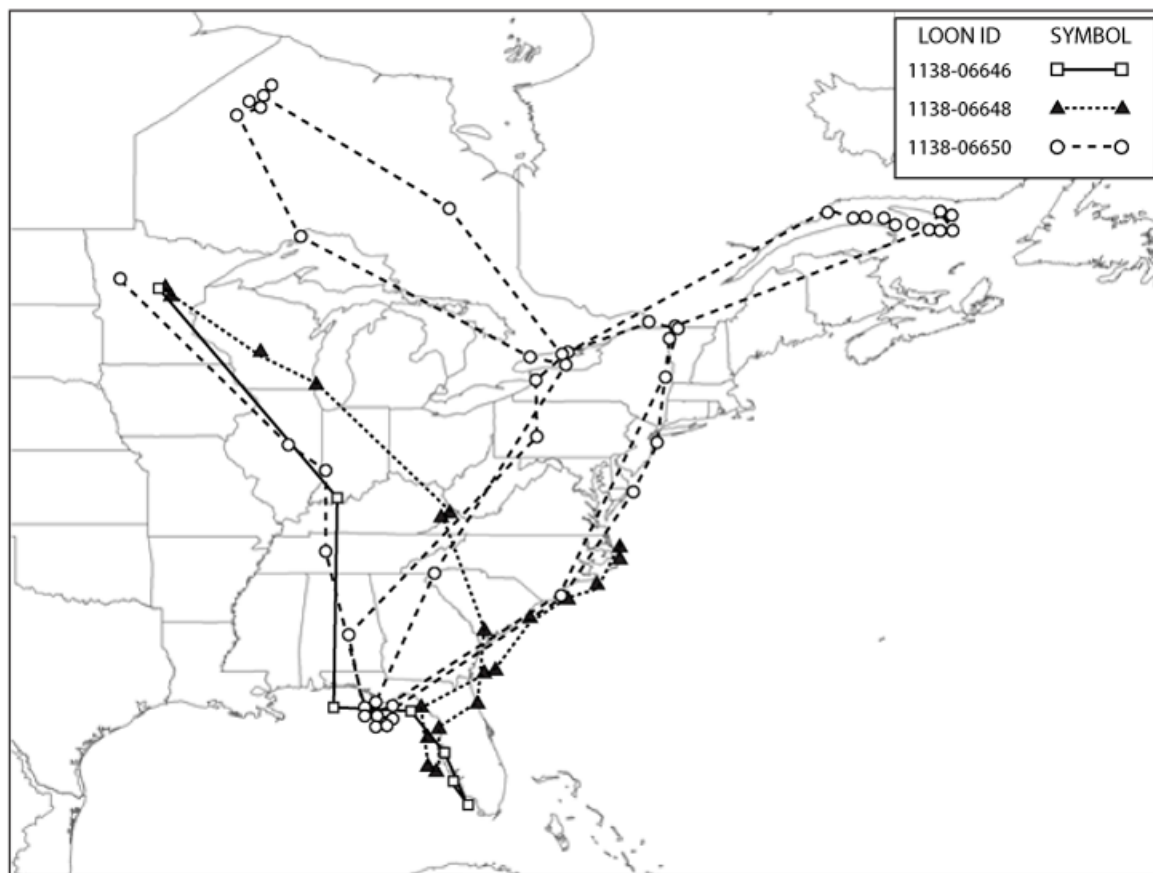


Figure 3. Wintering and first-year movements of six juvenile loons.

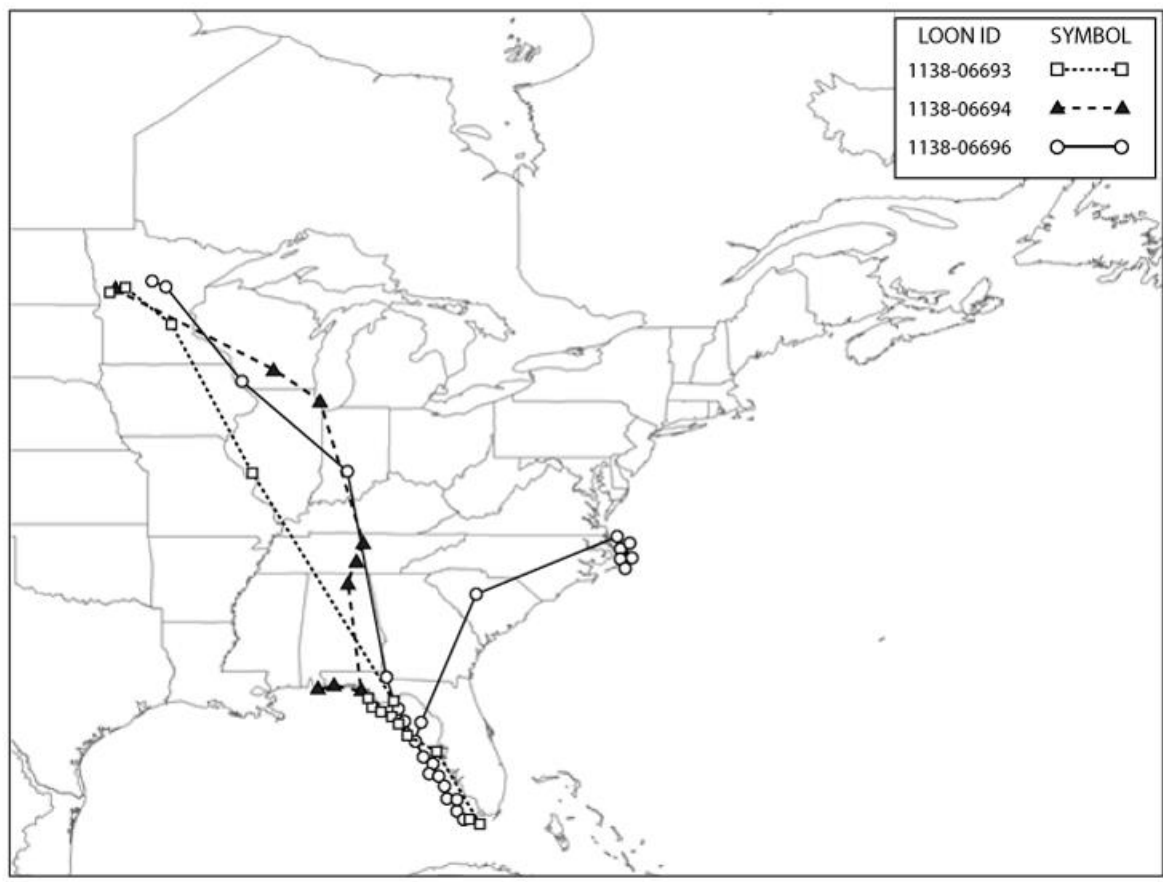
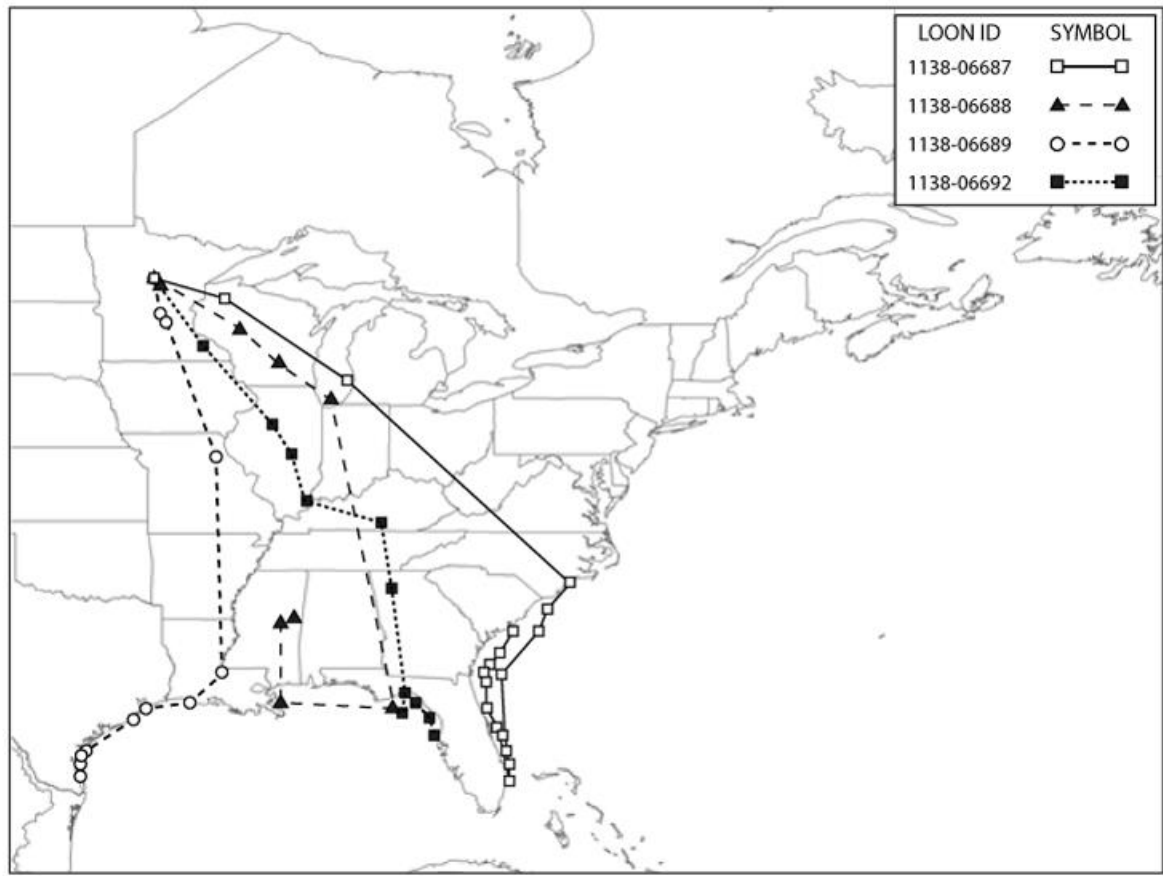


Figure 4. Wintering and first-year movements of seven juvenile loons.



Figure 5. Wintering locations of radiomarked juvenile common loons hatched in Minnesota, 2014-2015.

Activity 2: Loon tissue contaminant analysis.

Budget: \$ 67,000

Description: Contract with the University of Connecticut to analyze loon feather samples collected by US Geological Survey biologists for both PAH and DOSS contaminants to verify levels of PAH and DOSS detected in blood samples from the same loons. The U of Connecticut will also analyze blood samples taken from live loons captured by USGS staff in the course of placing or recovering geolocators and satellite transmitters. They will also analyze blood and fatty tissue samples of loons found dead in Minnesota for PAH and DOSS.

This analysis will be carried out by the Center for Environmental Sciences and Engineering at the University of Connecticut because that facility has been doing the analysis of PAH and DOSS samples in wildlife contaminated by the Deep Horizon oil spill for federal agencies and research institutions. It is important that the results obtained for Minnesota’s loons to be consistent with the results obtained with other samples from the oil spill to strengthen the evidence that will be necessary to present for federal litigation related to upcoming NRDAR proceedings. The U of Connecticut also has access to original samples of oil spilled during the Deep Horizon incident so that unique PAH and DOSS features found in MN can be matched to the “fingerprint” characteristics of the oil spill petroleum and dispersant. That is why a Minnesota-based firm was not identified to carry out this analysis.

Summary Budget Information for Activity 2:

Budget	\$	67,000
Amount Spent:	\$	66,750
Balance:	\$	250

Activity Completion Date:

Outcome	Completion Date	Budget
1. Analyze for PAH and DOSS in 215 samples of loon blood, feathers, eggs, and fatty tissues and provide results to the MN DNR and USGS.	June 30, 2017	\$ 67,000

Project Status as of November 15, 2015: Contract with UConn is currently being negotiated and should be finalized by December 1, 2015. Once completed, analysis of loon samples can proceed.

Project Status as of April 15, 2016: the contract with UConn has been completed and we will resume providing their lab with loon samples of blood, feathers, tissues, and unhatched eggs this spring.

Project Status as of September 15, 2016: We are awaiting the results for contaminant analyses done through June 30, 2016. Results will be included in the project status for April 15, 2017.

Project Status as of April 15, 2017: Summaries have been received for PAH, Alkyl PAH, and DOSS contaminants in loon blood and feathers tested through March 7, 2017.

Final Report Summary: Final reports have been received from UConn for PAH, Alkyl PAH and DOSS contaminants in 29 loon eggs collected in 1016 and for PAH contaminants in 13 samples of loon blood and fatty tissues salvaged from dead loons found in Minnesota in 2016. Following are cumulative results in Tables 2 through 5 for testing of loon blood, feathers, and fatty tissues for PAH and Alkyl PAH from both live loons captured and released and for dead loons from which blood and fatty tissues were collected for analysis. Table 6 summarizes PAH concentrations for 29 unhatched loon eggs collected in the summer of 2016. Tests for DOSS in these samples were negative.

TABLE 2. LOON BLOOD & FEATHER ANALYSES FROM LIVE LOONS FOR PAH CONTAMINATION.

Field ID	Collected	Total PAH		Naphthalene		Acenaphthalene		Fluorene		Acenaphthene		Phenanthrene		Anthracene		Fluoranthene	
		feathers	blood	feathers	blood	feathers	blood	feathers	blood	feathers	blood	feathers	blood	feathers	blood	feathers	blood
1038-94316	7/10/12		ND		ND		ND		ND		ND		ND		ND		ND
1038-94316	7/16/14	17..7	0.0	17.7	ND		ND		ND		ND		ND		ND		ND
1038-94319	7/11/12		0.0		ND		ND		ND		ND		ND		ND		ND
1038-94319	7/16/14		0.0		ND		ND		ND		ND		ND		ND		ND
1038-94323	7/11/12		0.0		ND		ND		ND		ND		ND		ND		ND
1038-94323	7/10/13		0.0		ND		ND		ND		ND		ND		ND		ND
1038-94326	7/11/12		ND		ND		ND		ND		ND		ND		ND		ND
1038-94326	7/7/15		ND		ND		ND		ND		ND		ND		ND		ND
1038-94333	7/12/12		ND		ND		ND		ND		ND		ND		ND		ND
1038-94333	7/14/14		29.2		ND		ND		ND		29.2		ND		ND		ND
1038-94339	7/16/12	30.1	ND		ND		ND		ND	30.1	ND		ND		ND		ND
1038-94339	7/16/13		ND		ND		ND		ND		ND		ND		ND		ND
1038-94340	7/16/12	17..1	ND	17.1	ND		ND		ND		ND		ND		ND		ND

1038-94340	7/16/13		17.7		ND	ND	ND	17.7	ND	ND	ND
1038-94343	7/17/12		ND		ND	ND	ND	ND	ND	ND	ND
1038-94343	7/17/14		56.3		20.1	ND	ND	36.2	ND	ND	ND
1038-94344	7/17/12		ND		ND	ND	ND	ND	ND	ND	ND
1038-94344	7/16/14		16.5		16.5	ND	ND	ND	ND	ND	ND
1038-94368	7/25/12		ND		ND	ND	ND	ND	ND	ND	ND
1038-94368	7/18/13		ND		ND	ND	ND	ND	ND	ND	ND
1138-06666	7/14/15	14..8	ND		ND	ND	ND	ND	ND	ND	14.8
1138-06666	6/21/16		ND		ND	ND	ND	ND	ND	ND	ND
1138-06669	7/14/15		0.0		ND	ND	ND	ND	ND	ND	ND
1138-06669	6/22/16		0.0		ND	ND	ND	ND	ND	ND	ND
1138-06670	7/14/15	16..4	ND		ND	ND	ND	ND	ND	ND	16.4
1138-06670	5/4/16	37..8	ND		ND	ND	ND	ND	ND	ND	37.8
1138-06673	7/15/15		0.0		ND	ND	ND	ND	ND	ND	ND
1138-06673	6/22/16		ND		ND	ND	ND	ND	ND	ND	ND
1138-06676	7/16/15		ND		ND	ND	ND	ND	ND	ND	ND
160421	n/a	12..8	n/a	12.8	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1138-06684	7/18/15	17..8	52.3		ND	ND	ND	34.5	ND	ND	17.8
1138-06684	5/5/16	31..1	ND	31.1	ND	ND	ND	ND	ND	ND	ND

Napthalene contaminants in feathers was a mean of 19.7 (4 of 32 samples) and for blood was a mean of 18.3 (2 of 32 samples) nannograms/gram. Acenaphthene contaminants in feathers was a mean of 30.1 (1 of 32 samples) and for blood was a mean of 29.4 (4 of 32 samples) nannograms/gram. Fluoranthene contaminants in feathers was a mean of 21.7 (4 of 32 samples) and not encountered in blood samples.

TABLE 3. ANALYSES OF LOON BLOOD & FEATHERS FROM LIVE LOONS FOR ALKYL PAH CONTAMINANTS (Alkyl PAH contaminants are an additional “family” of petroleum contaminants separate from PAH contaminants tested previously.

Field ID	Collected	2-methyl naphthalene	2-methyl naphthalene	2,6-dimethyl naphthalene	2,6-dimethyl naphthalene	1,3-dimethyl naphthalene	1,3-dimethyl naphthalene	1,5-dimethyl naphthalene	1,5-dimethyl naphthalene	2,3,5-trimethyl naphthalene	2,3,5-trimethyl naphthalene	1-methyl fluorene	1-methyl fluorene	3-methyl phenanthrene	3-methyl phenanthrene	9-methyl phenanthrene	9-methyl phenanthrene
		Blood	Feathers	Blood	Feathers	Blood	Feathers	Blood	Feathers	Blood	Feathers	Blood	Feathers	Blood	Feathers	Blood	Feathers
1038-94316	7/10/12	ND		ND		ND		ND		ND		ND		ND		ND	
1038-94316	7/16/14	ND		ND		ND		ND		ND		ND		ND		ND	
1038-94319	7/11/12	16.6		ND		ND		ND		ND		ND		ND		ND	
1038-94319	7/16/14	ND		ND		34.1		ND		ND		ND		ND		ND	
1038-94323	7/11/12	ND		ND		ND		ND		ND		ND		ND		ND	
1038-94323	7/10/13	ND		ND		ND		ND	18.7	ND		ND		ND		ND	
1038-94326	7/11/12	ND		ND		ND		ND		ND		ND		ND		ND	
1038-94326	7/7/15	17.6		ND		ND		ND		ND		ND		ND		19.2	
1038-94333	7/12/12	ND		ND		ND		ND		ND		ND		ND		ND	17.8
1038-94333	7/14/14	ND		ND		ND		ND		ND		ND		ND		ND	
1038-94339	7/16/12	ND	23.1	ND		ND		ND		ND		ND		ND		ND	
1038-94339	7/16/13	ND		ND	34.1	ND		ND		ND		ND		ND		ND	
1038-94340	7/16/12	ND		ND		ND		ND		ND		ND		ND		ND	
1038-94340	7/16/13	ND		ND		ND		ND		ND		ND		ND		ND	
1038-94343	7/17/12	ND		ND		ND		ND		ND		ND		ND		ND	
1038-94343	7/17/14	ND		ND		ND		29.5		ND		ND		ND		ND	
1038-94344	7/17/12	ND		ND		ND		ND		ND		ND		ND		ND	
1038-94344	7/16/14	ND		ND		ND		ND		ND		ND		ND		ND	
1038-94368	7/25/12	ND		ND		ND		ND		ND		ND		ND		ND	
1038-94368	7/18/13	16.9		ND		ND		ND		ND		ND		ND		ND	
1138-06666	7/14/15	ND	19.1	ND		ND		ND		ND		ND		ND		ND	20.7
1138-06666	6/21/16	ND		ND		ND		ND		ND		ND		ND		ND	
1138-06669	7/14/15	ND		ND		ND		ND		ND		ND		ND		ND	
1138-06669	6/22/16	ND		ND		ND		ND		ND		ND		16.7		ND	
1138-06670	7/14/15	ND		ND		ND		ND		ND		ND		ND		ND	
1138-06670	5/4/16	ND		ND		31.2		ND		ND		ND		ND		ND	
1138-06673	7/15/15	ND		ND		ND		ND		ND		ND		ND		ND	
1138-06673	6/22/16	ND		ND		ND	28.8	ND		ND		ND		ND		14.6	

1138-06676	7/16/15	ND	ND	ND	ND	ND	ND	ND	ND	24.2
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
1138-06684	07/18/15	ND	ND	ND	ND	ND	ND	ND	ND	
1138-06684	05/05/16	ND	ND	ND	ND	ND	ND	ND	ND	24.1

TABLE 4. Alkyl PAH

FEATHERS

BLOOD

Alkyl PAH for 32 samples of blood and feathers from live loons.

ALKYL-PAH	# samples	mean ng/g	# samples	mean(ng/g)
2-methyl-napthalene	2	21.1	3	17.7
2,6 dimethyl-napthalene	0	0	1	34.1
1,3 dimethyl-napthalene	1	28.8	2	32.6
1,5 dimethyl napthalene	0	0	1	29.5
2,3,5 trimethyl napthalene	1	18.7	0	0
3-methyl phenanthrene	1	16.7	0	0
9-methyl phenanthrene	4	21.7	3	19.3

The following information has been provided from UConn on the PAH contaminants found in the blood and fatty samples of dead loons encountered in Minnesota in the summer of 2016.

Table 5. PAH IN BLOOD AND FAT SAMPLES FROM DEAD LOONS

Sample #	Tissue	Total PAH	Acenap	Flour	Acen	Anthra	Benzo
Loons found dead in Minnesota in summer of 2016							
MN 16-03	BLOOD	102.7	53.7			49	
MN 16-03	FAT						
MN 16-06							
MN 16-06							
MN 16-07							
MN 16-09							
MN 16-10		23					23
MN 16-15		33.3		33.3			
MN 16-16	BLOOD						
MN 16-16	FAT	42.2		42.2			
MN 16-17							
MN 16-19	BLOOD						
MN 16-19	FAT						
MN16-20		36.7			36.6		
*Concentrations shown in ng/g (nannograms/gram)							
** Key to PAH contaminants							
Acenap:	Acenaphthalene						
Flour:	Flourene						
Acen:	Acenaphthene						
Anthra:	Anthracene						
Benzo:	Benzo(a)anthracene						

TABLE 6. PAH CONTAMINANTS IN MINNESOTA LOON EGGS, 2016.

4 of 29 EGGS HAD PAH CONTAMINANTS.

Sample #	Total PAH	Flourene	Anthracene
MN 20	22.8	0	22.8
MN 21	53.4	0	53.4
MN 27	88	0	88
MN 28	320.6	320.6	0

ng/g: parts per billion

Overall Project Outcomes and Results:

Following are the NRDAR remediation plans that were submitted to the USFWS on May 15, 2017 for conservation restoration actions for both common loons and American white pelicans:

RESTORATION PLAN FOR COMMON LOONS IN MINNESOTA

Richard Baker and Carrol Henderson, Minnesota Department of Natural Resources 5/12/2017

Range of breeding loons in Minnesota is shown in Figure 6.

Map derived from the Minnesota Breeding Bird Atlas

The Common Loon (*Gavia immer*, "loon") was injured as a result of the Deepwater Horizon oil spill. This proposal directly restores common loons by facilitating adult and chick survivorship and reproductive success at breeding locations in Minnesota, USA. This plan is scalable and as proposed, Phase 1 funds the first three years of an anticipated 15 year period. The objectives of this proposal are to reduce mortality and increase reproductive success of common loons breeding and nesting in MN. Our goal is to implement two key restoration activities to help restore loon resources.

Objective 1.0: Protection and Restoration of Critical Lakeshore Habitat

Lakeshore habitat throughout the range of the loon in Minnesota is under increasing pressure from development. Lakeshore development destroys loon nesting habitat and contributes to decreased water quality and clarity in loon nesting, foraging and migration staging lakes (Fig. 1). The single best strategy for restoring loons to the state is to protect loon nesting and foraging habitat through perpetual easements or fee title acquisitions. These protection efforts will preserve shoreline, allow for shoreline restoration when needed, preserve water quality, and protect both loon nesting and seasonal foraging areas. Following initial establishment and restoration, these protected habitats would require minimal maintenance over time.

The Minnesota DNR has been involved with loon surveys and conservation since the creation of the Nongame Wildlife Program in 1977. Our studies have determined that Minnesota has the highest population of common loons in the lower 48 states which is estimated at 12,000 loons. The next highest population of loons in the lower 48 states is Wisconsin which has a population estimated at 3,400 loons. The Minnesota DNR also has over 20 years of information on loon use of lakes obtained through two annual monitoring programs. Additionally, shorelines critical to maintaining quality lake habitat have been identified in several counties as deep-water cisco lakes with a history of late summer/early fall use by flocks of loons foraging prior to fall migration. This and other information will be used to target protection of lakes with a history of loon nesting or fall staging, high potential for loon nesting, and/or a high potential for loss of loon habitat to development in the absence of land protection.

In addition, the use of loon nesting platforms is a proven strategy used to enhance loon nesting, especially on lakes with inadequate undeveloped shoreline. Loon nest success is often higher if the nest is on a platform, rather than on a lake shoreline where the nest is accessible to predators like otters, fishers, or raccoons (Fig. 2). Platforms are not appropriate in every situation and use of platforms will be based on staff recommendations.

Task 1.1 Evaluation, Prioritization and Purchase of Loon Habitat.

Work toward the protection of loon habitat will include analysis of data to identify and prioritize loon habitat sites for purchase by perpetual easement or fee title. Additional costs associated with land acquisition include: appraisal, survey, title review and document recording. Estimated costs of Task 1.1:

Acquisition of up to nine sites via perpetual easements/fee title: \$4,118,000

Task 1.2 Lakeshore Management and Restoration

Protection of nesting and foraging habitat must be coupled with guidance and funding to support the restoration and maintenance of the sites. It is estimated that one-third of the sites acquired will require some degree of restoration. This task includes the development of management/restoration plans for each site, and the purchase of native plants, other materials and labor for sites requiring restoration and shoreline stabilization. Estimated cost of Task 1.2:

Restoration cost: \$100,000.

Task 1.3 Loon Nesting Platforms (See Figure 7 for example of a loon nesting platform).

Up to 20 loon nesting platforms will be placed along targeted lakeshores where the lake association has agreed to manage these platforms according to DNR guidelines and report on their nesting use, egg and chick production, chick survival, and mortality events. High quality nest platforms should function for 15 to 20 years.

This task includes soliciting lake association partners, acquisition of loon platforms, creating formal agreements, placement and on-going maintenance of platforms by lake association cooperators, training workshops for loon cooperators in the techniques of loon nesting platform placement and management. Estimated cost of Task 1.3:

Platform cost: \$1100/platform x 20 = \$22,000

OBJECTIVE 2.0: LOON-FRIENDLY EDUCATIONAL, LAND USE OPTIONS AND TECHNICAL GUIDANCE

Task 2.1 "Loon-Friendly Land Use Options and Technical Assistance"

Based on information gathered from the prioritization process in task 1.1, technical assistance for lake associations and local units of government focused on "Loon-Friendly Land Use Options" will be provided. This effort will provide information and professional assistance focused on the development of incentive programs to encourage loon friendly lake management and ordinances that help local units of government protect and maintain loon habitat and water quality. These activities may include the creation or modification of local ordinances including no-wake zones near loon nesting areas or lakeshore ordinances to help protect loon habitat.

To monitor the effectiveness of these efforts, Minnesota DNR will develop a web application (app) for use by lake association and other loon volunteers with data to be summarized annually. The volunteers will use the app to collect information on seasonal loon numbers, nesting activity, migration dates, and chick production. They can also report incidents of loon mortality and nest failures through the app. Estimated cost for Task 2.1:

Development of reporting application and production of associated educational materials: \$80,000

Task 2.2 Statewide Loon-Friendly Education Program

This task will focus on promoting information to the public and lake association members on tools and actions that can help protect and enhance the loon population. Concepts such as loon-friendly fishing tackle and boating safety “best management practices” will be provided. Educational efforts will, among other activities, promote fishing tackle exchanges at sporting goods stores, provide information to lake associations, incorporate loon-friendly boat operation into boat and water safety training, and provide displays for use at the State Fair, Governor’s fishing opener, sport shows, and other DNR educational events. This task also includes exploring partnerships with the private sector, fishing tackle retailers and manufacturers, and promoting loon-safe boating practices in collaboration with boat manufacturers and retailers, local governments, and lake associations. Estimated cost for Task 2.2:

Educational materials \$60,000

Objective 1-2: Staffing requirements. 8 (FTEs) A full complement of 8 staff will be needed by year three of this proposal. Initially a full-time project manager and a full-time education coordinator will be hired. Once the additional aspects of the proposal are ready for further implementation, the additional staff will be hired to carry out and complete the full complement of objectives. The budget for staff reflects this phased approach.

Full-time project manager – responsible for overall project including developing work plans, establishing priorities, managing budgets, monitoring implementation.

Two full-time staff – responsible for analysis of existing loon data, developing priorities for habitat protection and placement of platforms, assist with acquisition, and provide technical assistance to local units of government and lake associations.

One full-time education coordinator responsible for implementing education efforts.

Four staff working on protection, restoration and educational efforts with lake associations and shoreline owners throughout the range of the loon in Minnesota.

Estimate: \$200,000/year one, \$600,000/year two, and & \$700,000/year three = \$1,500,000 (includes salary, fringe, computer and office costs).

Total Budget: \$6,000,000

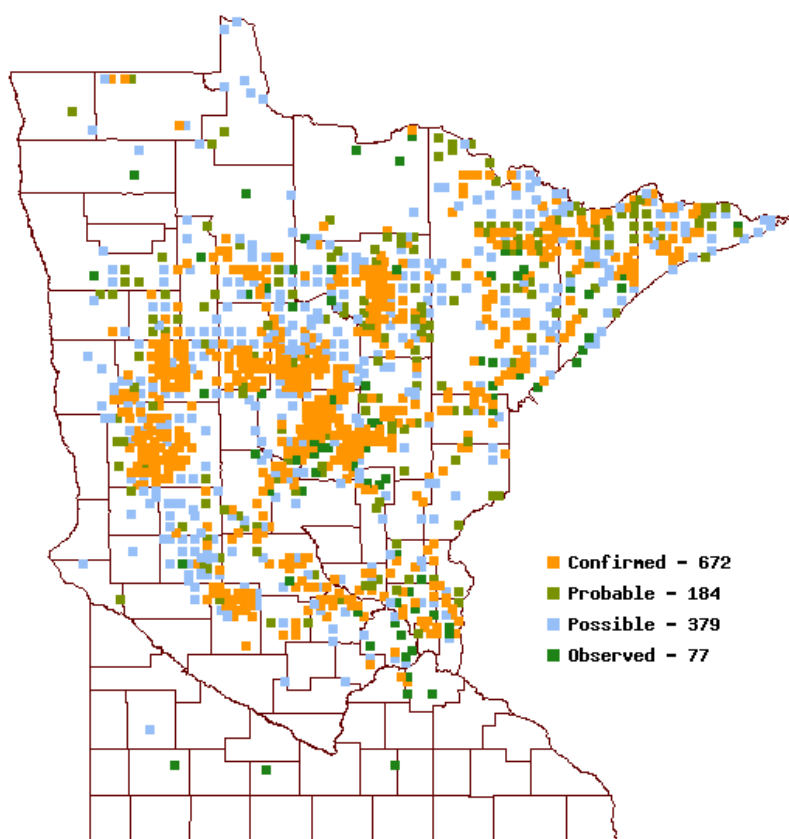


Figure 6. Common loon distribution in Minnesota, 2013. “Confirmed,” “Probable,” and “Possible” refers to the likelihood of nesting within the township. “Observed” refers to an observation of the species without nesting association. (Source: Audubon Minnesota-Minnesota Breeding Bird Atlas Project) Data collected from 2009-2013.



Fig. 7. Example of Occupied Loon Nesting Platform

RESTORATION PLAN FOR AMERICAN WHITE PELICANS IN MINNESOTA 5-14-2017

Carrol Henderson, Minnesota Department of Natural Resources 5/5/2017

The American White Pelican (*Pelecanus erythrorhynchos*) was injured as a result of the Deepwater Horizon oil spill. This proposal directly restores American White Pelicans (pelican) by facilitating reproductive success and survivorship through the restoration and conservation of nesting habitat at Minnesota Lake, Faribault Co. MN.

Pelicans were first reported nesting on Minnesota Lake in 1994. A state-wide survey of pelicans breeding in Minnesota (MN) was conducted in 2004 by the Minnesota Department of Natural Resources (MN DNR). Pelicans were found to be nesting at 16 sites throughout the state, with a state-wide estimate of 15,824 breeding pairs. At that time, MNDNR identified 974 nesting pairs (Table 1) of pelicans inhabiting a small island located in Minnesota Lake, Faribault Co. MN. The island is approximately 50 to 75 meters long, less than 10 meters wide, and roughly 2 meters above water level. Unfortunately, in 2010, high water levels on the lake began to flood out and erode the lower peripheral areas of the island, thus forcing the pelicans to nest on farm cropland on the shores of Minnesota Lake, just south of the existing colony. To date, flooding continues to impact the nesting colony. For example, survey data from 2010 show 622 pelican nests occurred on the island and 748 nests on cropland, and in 2011, only 429 nests occurred on the island, while 1,458 nests occurred on the cropland (Table 1).

Regrettably, on May 17, 2011, the farmer who was cash-renting the cropland stomped and clubbed the eggs and chicks in over 1000 of the nests in the cornfield. He was subsequently arrested and fined. Since that time however a variety of deterrent techniques, including exploders and hazing/harassment, permitted by USDA-APHIS and the MN DNR, have been used to force the pelicans from the cropland nesting site. These techniques have failed and pelicans are again nesting and roosting on the cropland in spring of 2017. Our concern is that pelicans nesting on the mainland are extremely vulnerable to predation by raccoons, opossums, foxes, and coyotes, and by human disturbance, leading to decreased productivity of the breeding colony.

Listed as a “species of special concern” in Minnesota, the pelican has highly specific habitat requirements and deserves careful monitoring of nesting sites for protection. Pelicans were originally extirpated from Minnesota in the 1880s because they were perceived to be major predators of sport fish. They did not begin nesting in the state again until about 1966. The first report of nesting attempts for Minnesota Lake was when three unsuccessful nests were observed in 1984. The statewide American white pelican population has increased since then and nest counts in 2012 and 2015 ranged between 16,406 and 22,023 nests on seven lakes. A summary of the nesting history of American white pelicans on Minnesota Lake is shown in Table 1.

There is a significant problem with attempting to provide a secure nesting habitat for Minnesota Lake’s pelicans in the Minnesota Lake vicinity and to create good relations with local farmers and residents who now perceive pelicans as a nuisance and a threat to their economic livelihood. Long-term conservation of pelicans likely will depend on effectively addressing this issue.

The objective of this proposal is to conduct an engineering and design feasibility study in order to facilitate long term reproductive success and survivability of American White Pelicans on Minnesota Lake. This would be accomplished by determining the feasibility of enhancing the historic pelican nesting island in Minnesota Lake and/ or creating an additional nesting island on the lake, and/or creating a potential nesting island on a restoration wetland in the immediate vicinity of Minnesota Lake. If the study shows this strategy to be a workable approach to creating/enhancing pelican nesting habitat, we would submit at a later date a follow-up proposal for creating and/or enhancing the historic nesting island with the Open Ocean funds from the Deepwater Horizon NRDAR.

- **Objective: Engineering and design feasibility study of a pelican nesting island in Minnesota Lake, Faribault County, Minnesota.**

The MN DNR will request a feasibility study for engineering and design for dredging or other techniques either to create a new pelican nesting island on Minnesota Lake, to build up the size and height of the existing pelican nesting island on Minnesota Lake, to consider a combination of both strategies or to investigate the feasibility of creating a potential nesting island on a restoration wetland in the immediate vicinity of Minnesota Lake. This could accommodate more pelicans and concurrently—and hopefully—eliminate conflicts with landowners on the lakeshore.

- Cost estimate for engineering and design feasibility study of nesting island or building up existing nesting island: \$200,000.

Table 1. Nesting history for American white pelican, Minnesota Lake, Faribault Co. MN.

Pelican Colony Minnesota Lake, MN	1 st report	Colony Nest Counts				
		1994	2004/2005	2010	2011	2012
Nesting Island	See below*	974	622	429	1868	979
Lakeshore cropland		0	748	1458	0	0
Total		974	1370	1887*	1868	979

- Seventy to eighty flightless young observed for the first time.

V. DISSEMINATION:

Description: Results of this project will continue to be shared with the LCCMR staff and members and with the public as information and results become available. Results will also be shared with the USFWS Restoration Program Manager, Deepwater Horizon NRDAR Field Office, Fairhope, Alabama, so that the results of this research can be incorporated into the federal court case that is being prepared by the USFWS against BP to reimburse the State of Minnesota for damages done to Minnesota’s common loon and white pelican populations by the Deepwater Horizon oil spill. Results and updates will also be shared with local, state, and national media as the opportunity presents itself.

Project Status as of November 15, 2015: This project was featured in the Outdoors Weekend section of the Star Tribune on October 30, 2015 and I also made two presentations about this project to approximately 80 people for the Aitkin Lakes and Rivers Festival at Aitkin on June 20, to the DNR Scientific and Natural Areas Citizen’s Advisory Committee on August 5, and on August 12 as part of the Chataqua Lecture Series audience of 105 persons at Crosslake.

Project Status as of April 15, 2016: Presentations about this LCCMR-funded loon project will be made on March 16 for the Department of Transportation engineers workshop, Minnetonka Bird Club on May 6, Cross Lake Chataqua program at Cross Lake on August 10, Cullen Lake Association meeting at Nisswa on August 13. Reporters are also interested in covering this project as more details become available in the spring regarding sites and dates.

Project Status as of September 15, 2016: The loon research project was featured on the front page of the Star Tribune on September 4, 2016, and KARE-11 TV will be featuring a story on this project on the weekend of September 17-18, 2016.

Project Status as of April 15, 2017: Two presentations about the loon research project were given were given to 45 middle school students for a Trout in the Classroom event in Inver Grove Heights on March 17 and a third presentation was given to the Hiawatha Valley Audubon Society meeting in Winona on April 5. About 70 people attended that presentation.

Project Status as of August 15, 2017: Additional presentations on this loon research project have been given in Winnipeg, Manitoba to their wildlife department officials on June 9, and a presentation to the Rivers and Lake Awards event in Brainerd on June 15. This presentation was recorded and posted on Minnesota Public Radio by reporter Kirsti Mahron on July 3 and can be viewed on their MPR podcast site. The title of the report is “*Minn. loons could get aid from BP oil spill cleanup funds.*”

Final Report Summary: This extensive project has accomplished its original goals which was to document the correlation between Minnesota loons (and pelicans) and the contamination and damages caused for these species by the Deepwater Horizon oil spill. The data gathered by the studies that have been funded by the Environment and Natural Resources Trust Fund have made it possible to present a legitimate case for remediation claims from the BP remediation account which has been deposited with the US Fish and Wildlife Service. It appears that the initial allocation of settlement funds (\$6,200,000) will occur by the beginning of 2019 and additional funds could be allocated every three years over a 15-year remediation period.

VI. PROJECT BUDGET SUMMARY:

A. ENRTF Budget Overview:

Budget Category	\$ Amount	Overview Explanation
Professional/Technical/Service Contracts:	\$	
USGS, Activity 1	\$ 74,000	Loon monitoring and telemetry
UConn, Activity 2	\$ 67,000	Analysis of loon tissues for contaminants
TOTAL ENRTF BUDGET:	\$ 141,000	

Explanation of Use of Classified Staff: N/A

Explanation of Capital Expenditures Greater Than \$5,000: N/A

Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation: N/A

Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: 1 (staff salary from USGS -No DNR staff)

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
USGS senior loon biologist salary match \$10,000	\$ 10,000	\$ 8,000	Project management, implementation and report preparation
State			

DNR Nongame Wildlife Program supervisor-15% time for two years.	\$ 15,000	\$ 12,000	Project management, supervision, planning, and report preparation
TOTAL OTHER FUNDS:	\$ 25,000	\$ 20,000	

VII. PROJECT STRATEGY:

A. Project Partners: US Geological Survey, University of Connecticut Center for Environmental Sciences, MN Pollution Control Agency, and DNR Nongame Wildlife Program

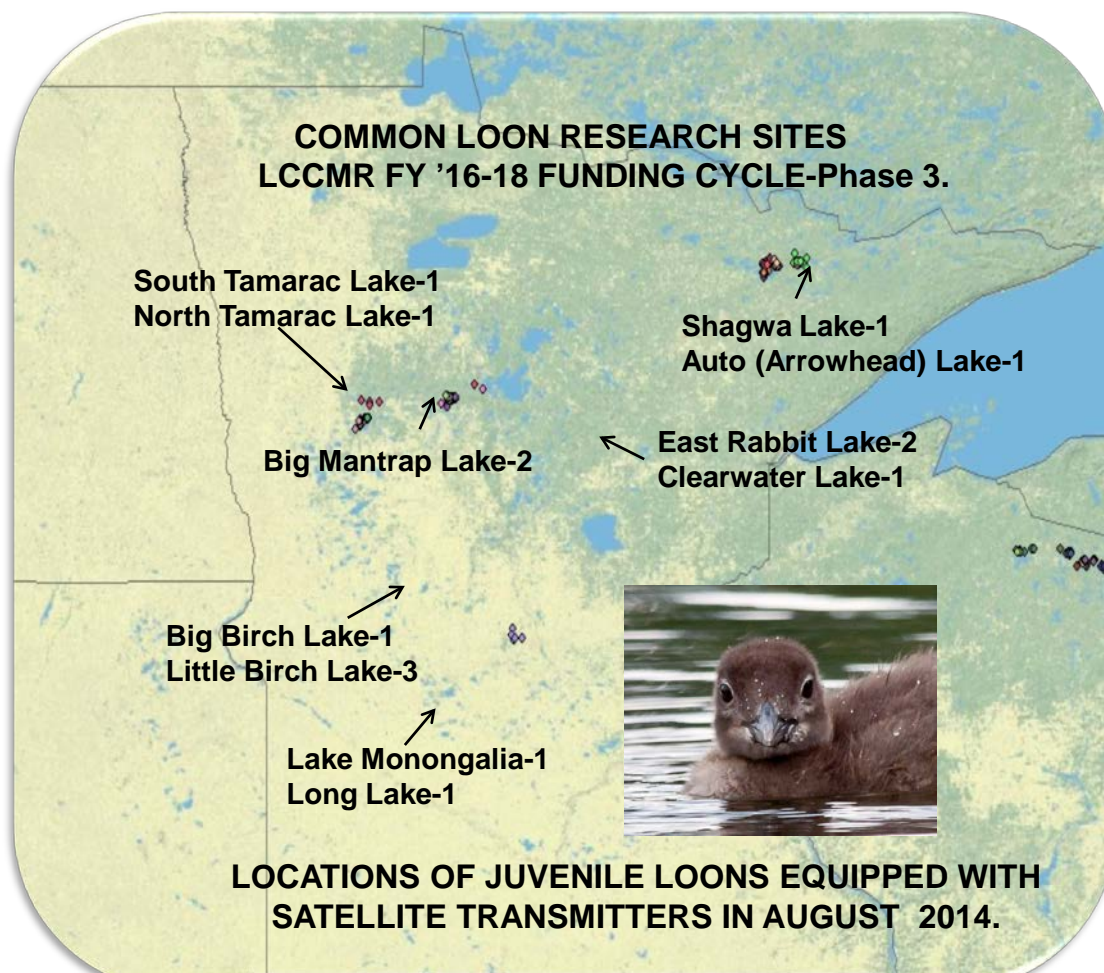
B. Project Impact and Long-term Strategy: The goal of this project is to assess the immediate and long term impacts that may affect Minnesota's population of loons and pelicans as a result of the DeepWater Horizon oil spill that occurred in 2010. The oil spill caused direct mortality to birdlife in the Gulf of Mexico including loons and pelicans. It may also have caused long term sublethal effects that could reduce reproductive potential or longevity for these long-lived birds. This project is part of a 10-year long term strategy to quantify negative long term impacts so that this information can be used by the US Fish and Wildlife Service in developing a federal court case that according to guidelines of the Natural Resources Damages and Restoration Act which will potentially result in award of damages from BP to the State of Minnesota over a 15 year period for restoration and management of loons and pelicans to the extent that they were affected by the oil spill.

C. Funding History:

Funding Source and Use of Funds	Funding Timeframe	M.L.2011 (fy 12-13)	M.L.2014	M.L.2015	\$ Amount
ENRTF Appropriation		\$ 250,000	\$ 260,000	\$ 141,000	\$ 651,000

VIII. FEE TITLE ACQUISITION/CONSERVATION EASEMENT/RESTORATION REQUIREMENTS: N/A

IX. VISUAL COMPONENT or MAP(S):



X. RESEARCH ADDENDUM: N/A

XI. REPORTING REQUIREMENTS: Final report has been completed and submitted.

Environment and Natural Resources Trust Fund

M.L. 2015 Project Budget



Project Title: Assessing Contaminants in Minnesota Loons and Pelicans – Phase III

Legal Citation: M.L. 2015, Chp. 76, Sec. 2, Subd. 03j

Project Manager: Carrol L. Henderson

Organization: Minnesota Department of Natural Resources

M.L. 2015 ENRTF Appropriation: \$ 141,000

Project Length and Completion Date: 2 Years, June 30, 2017 u

Date of Report: April 15, 2017

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	USGS loon satellite tracking and geolocator retrieval and reporting			UConn contaminant analysis & reporting of loon blood, feathers, eggs, & fat tissues				
Professional/Technical/Service Contracts								
US Geological Survey: Collaborative Agreement to monitor the location and status of loons equipped with satellite transmitters and recapture loons equipped with geolocators. Post satellite info on USGS website.	\$74,000	\$74,000	\$0	\$0	\$0	\$0	\$74,000	\$0
University of Connecticut: Contract for analysis 216 loon tissues (blood, eggs, feathers, and fat) for PAH and DOSS contaminants and provide reports to the MNDNR.				\$67,000	\$66,750	\$250	\$67,000	\$250
COLUMN TOTAL	\$74,000	\$74,000	\$0	\$67,000	\$66,750	\$250	\$141,000	\$250