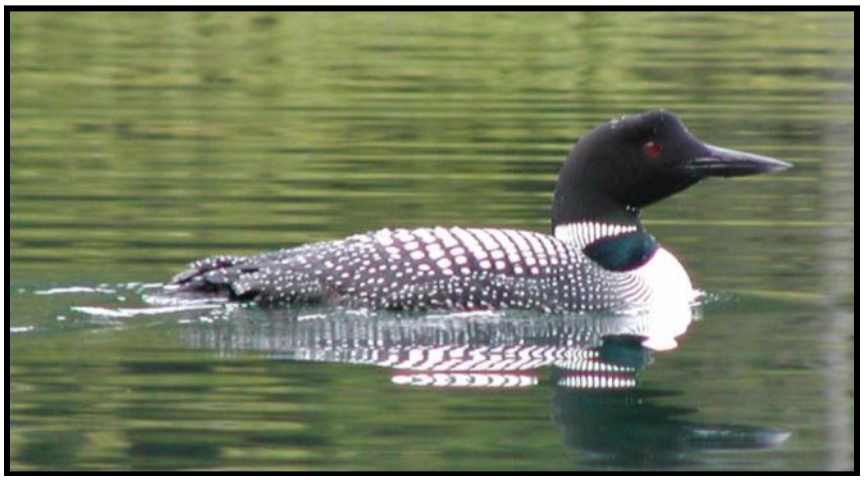
Conservation Plan for the Common Loon in Montana



MONTANA
Common Loon
Working Group

Prepared by Christopher A. M. Hammond

2009

To obtain copies of this Conservation Plan contact:

Chris Hammond
Montana Fish, Wildlife and Parks
490 North Meridian Road
Kalispell, MT 59901
406-751-4582

Or

Kristi Dubois
Montana Fish, Wildlife and Parks
3201 Spurgin Road
Missoula, MT 59804
406-542-5551

Cover Photo: Common Loon (*Gavia immer*) by Chris Hammond.

Please cite this document as: Hammond, C. A. H. 2009. Conservation Plan for the Common Loon in Montana. Montana Department of Fish, Wildlife and Parks, Kalispell, MT.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Common loons (*Gavia immer*) breed on lakes in the forested regions of Alaska, Canada, and the most northern portions of the continental United States. Breeding habitat once reached south to Utah and California (Evers 2007). Breeding populations in Oregon, Utah, and California were extirpated during the mid-1900s (Evers 2007). Today, Wyoming supports about 19 to 25 breeding pairs, mostly in the northwest corner of that state, while Washington has fewer than fifteen territorial pairs (personal communications Dan Poleschook, Jr. and Ginger Gumm). Taylor (2001) documented successful breeding on only two lakes in northern Idaho.

Montana now supports the largest breeding population of common loons in the western continental United States with a 10-year average summer count of 216 individuals. This population consists of an average of 62 territorial pairs, 52 non-breeding "single" adults, and 41 chicks. Since surveys began in the late 1980s, the population has remained remarkably stable. Fecundity in Montana appears to be above average in comparison to many other states ranging between 0.66 and 0.70 chicks fledged per territorial pair.

Globally, the population of common loons is considered "secure" (G5 Ranking). Montana's lists the common loon as a species of concern with a state ranking of S3B (NatureServe). Region 6 of the U.S. Fish and Wildlife Service lists common loons as a Species of Management Concern while the U.S. Forest Service in Region 1 lists it as a "sensitive species". The Montana Bird Conservation Plan, prepared by the Partners in Flight program, places the common loon as Level I, the highest level, on its Priority Bird Species List. The recently completed Montana Comprehensive Fish and Wildlife Conservation Strategy lists the common loon as a Tier I species (a species with the greatest conservation need).

Common loons are relatively long-lived birds with a relatively low reproductive rate. Data from other areas indicate that the average age of first-time breeders is about seven years old. Loons only lay only one to two eggs at a time. They will often renest if the first nest fails early in the season; the second nest rarely has more than one egg. They raise no more than one brood per year. It takes approximately 12 weeks for loon chicks to fledge from a lake. Both parents are needed to defend the territory and raise the young. In Montana, about 50% of loon nests fail each year due to natural causes (flooding, predation) and human factors (disturbance). Of the average 41 chicks that fledge from Montana's lakes each year, only about 20% (less than10) are expected to survive to adulthood and return to Montana area to breed. Juvenile loons take three years to mature. They typically spend their first three winters on or near the western coast before returning to their natal area.

Loons are extremely territorial and sensitive during the nesting season. Disturbance of loon nesting areas by humans can cause annual nest failures and consequently affect long-term occupancy of lakes and population viability. If nests sites are protected through efforts such as habitat conservation, floating signs, information and educational programs, volunteers, and use of nesting platforms, these nest sites can continue to be successful. Montana has an active loon conservation network led by a group of concerned representatives from agencies, tribes, nonprofit organizations, industry, and landowners known as the Common Loon Working Group.

The CLWG has used a number of these tools to protect nesting lakes that has help to maintain a stable viable breeding loon population in Montana.

Montana Fish, Wildlife & Parks recently pursued funding from the U. S. Fish and Wildlife Service's State Wildlife Grants Program to complete research essential to future management of common loons. This funding led to six years of research on Montana's common loon ecology and also color banding of over 160 adults and chicks. Part of this grant was also used to update Montana's management plan for common loons and has resulted in this new Conservation Plan

This **Conservation Plan for the Common Loon in Montana** includes chapters on population management, habitat management, disturbance, research, information and education, and coordination. Each chapter contains a specific goal along with objectives and strategies for achieving or maintaining the goal. The document also includes numerous appendices including a list of all Loon Lakes with various classification codes (Appendix A). Appendix B includes a set of Best Management Practices to protect loon nesting habitat while also allowing some degree of development and recreational use of these areas. Appendix C provides an example and instructions on how to write a Lake Site-Specific Management Plan. This plan for lakes is a tool to anticipate and/or resolve potential conflicts for a specific loon nesting lake.

This document strongly recommends that the CLWG and associated agencies and organizations and individuals continue to work together to continue to:

1. Annually monitor common loons in May and July;
2. Maintain the current effective outreach, educational, and management programs;
3. Maintain data from annual surveys and band observations; and
4. Review and analyze productivity data annually to monitor trend.

The Plan also recommends that the CLWG continuously evaluate objectives and strategies, particularly if the population growth rate declines to below 1.0 for five consecutive years.

INTRODUCTION

Common loons (*Gavia immer*) have long been a symbol of the remote northern lakes and wilderness. Because of their eerie calls, striking plumage, fierce territoriality, and a habitat selection that coincides with people, the common loon has garnered a significant amount of national attention. In the United States, public interest in common loon habitat and ecology increased dramatically during the latter part of the 20th century. A number of private organizations have developed strong interests in loon ecology and conservation and include Maine's Biodiversity Research Institute, North American Loon Fund (which spawned many state non-profit loon organizations), and many state loon societies. Similarly, state, federal, and Canadian wildlife resource agencies have increased their research and management efforts on common loons over the last 10 to 15 years, with gains in annual survey intensity, and knowledge of bio-accumulation of methyl mercury, migration, winter habitats, intra-specific strife, and general ecology. Today, these organizations cooperate with each other locally and nationwide to coordinate common loon inventories, research programs, and other management and educational activities that help maintain common loon habitat in much of its historic range. These organizations have recognized the overall concern about the effects that ever-increasing human development, recreational activities, and worldwide pollution may be having on common loon populations.

STATUS

The global population of common loons is considered "secure" (G5 Ranking) with a state ranking of S3B (NatureServe). Region 6 of the U.S. Fish and Wildlife Service lists it as a Species of Management Concern. The U.S. Forest Service in Region 1 lists the common loon as a "sensitive species". The Montana Bird Conservation Plan, prepared by the Partners in Flight program, lists the common loon as Level I, the highest level, on its Priority Bird Species List. The recently completed Montana Comprehensive Fish and Wildlife Conservation Strategy lists the common loon as a Tier I species (a species with the greatest conservation need).

DISTRIBUTION

General Distribution

Common loons breed on lakes in the forested regions of Alaska, Canada, and the most northern portions of the continental United States (Evers 2007). Historically, breeding populations of common loons existed across much of the northwestern United States including California, Idaho, Montana, Oregon, Washington, and Wyoming (Figure 1). Today, however, of the lower 48 states, Minnesota has the largest population of adult common loons with approximately 13,000, followed by Maine, Wisconsin, Michigan, and New York with approximately 4000, 3000, 2000, and 1000, respectively (Evers 2007). Wyoming supports about 19 to 25 breeding pairs, mostly in the northwest corner of that state, while Washington has fewer than five territorial pairs (Evers 2007). Breeding populations in Oregon and California were extirpated during the mid-1900s (Evers 2007). Taylor (2001) documented successful breeding on two lakes

in northern Idaho. Montana has the largest breeding population of common loons (*Gavia immer*) in the western continental United States supporting an average of 200 individuals (adults, juveniles, and chicks) each year. Montana's common loon population exists at the southern most extent of the current western North American range and therefore population levels may fluctuate more than within core areas because fragmentation and local extinctions can reach high levels near population edges (Mehlman 1997).

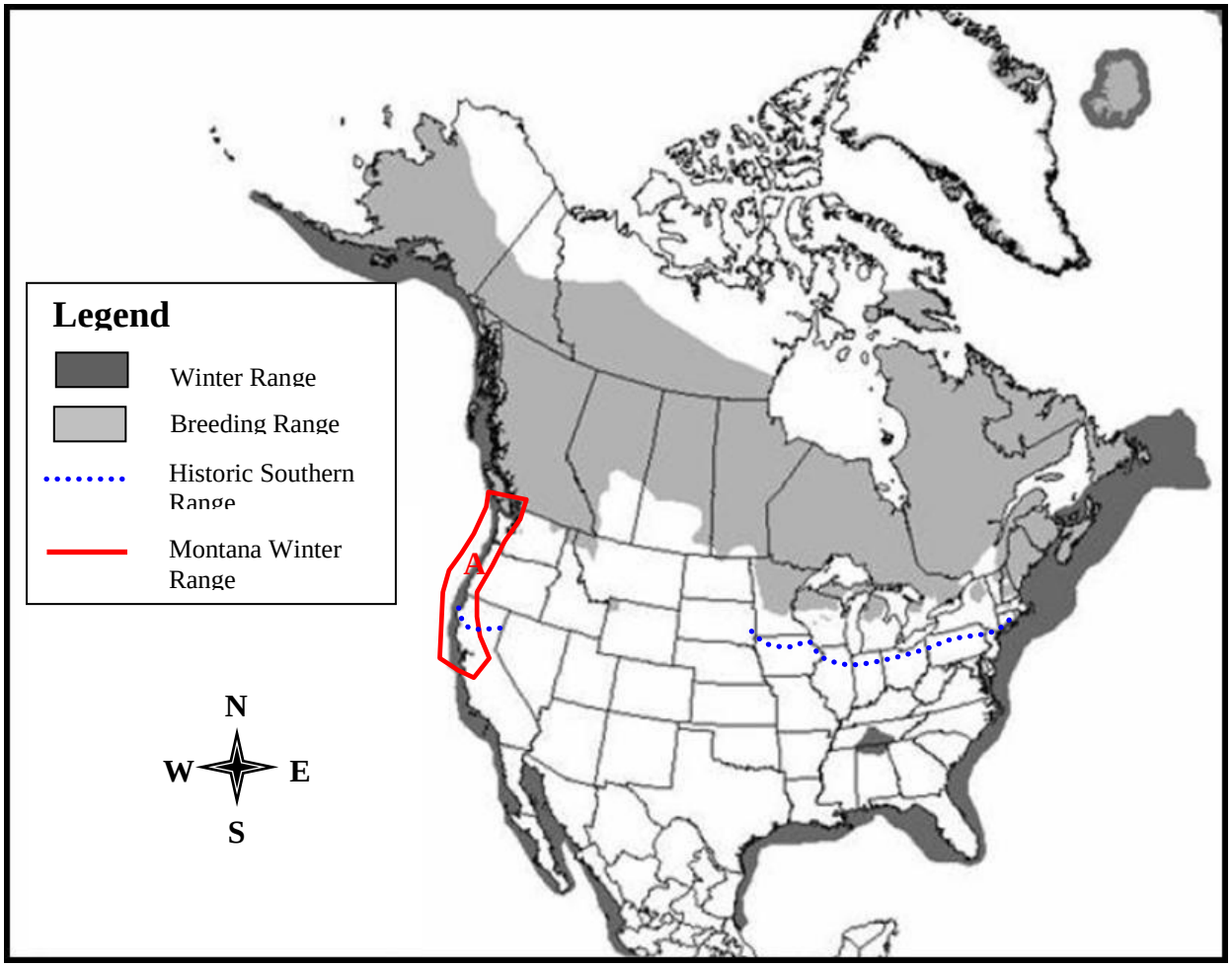


Figure 1. Distribution of the common loon in North America (modified from Evers 2007, McIntyre 1988). Polygon A depicts the winter range for Montana common loons based on band observations (Appendix D).

Montana Distribution

Most loon observations range from the Rocky Mountain Front west to the Idaho-Montana border with breeding limited to the northwest corner; however, breeding has occurred sporadically in other parts of the state (Skaar 1990) (Figure 2) and common loons are frequently observed on reservoirs and lakes throughout the state during migration.

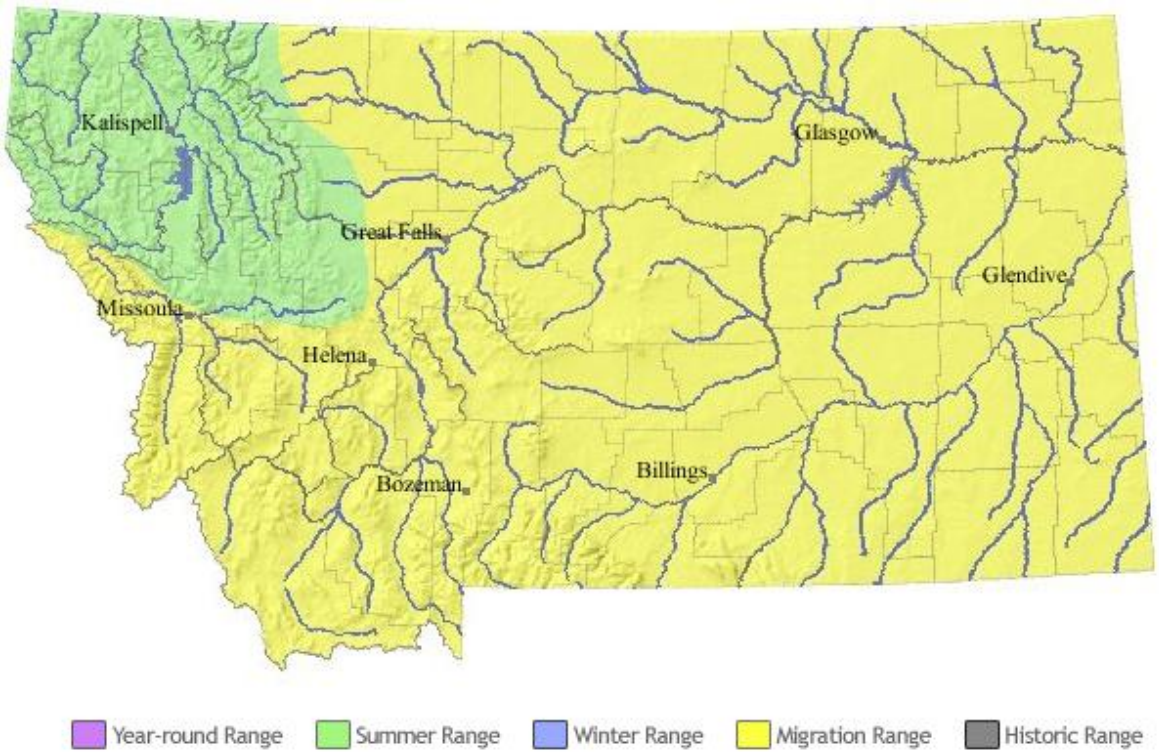


Figure 2. Range of common loons in Montana. Summer range is also core breeding range (Montana Natural Heritage Program).

Migration

The common loon population that breeds in Montana is thought to be relatively distinct from populations in central and possibly northwest Canada. Migratory loons captured in October 2006 on Flathead Lake and implanted with satellite transmitters moved to southwest inland lakes and the Gulf of California for the winter (Gullett 2008). A few of these loons then returned to central Alberta during the nesting season. In contrast, all the winter band re-observations or returns from Montana breeding loons have come from the west coast from Washington to mid-California (Figure 1, Appendix D). Several banded loons have been retrieved or observed during the spring or fall from lakes in Idaho, Washington, and Oregon. No data suggest at this point that Montana breeding birds spend any time in the southwest. Efforts are underway to begin banding birds and collecting data for the common loon population in British Columbia (personal communications Dan Poleschook, Jr. and Ginger Gumm).

BIOLOGY

General Ecology

Loons are piscivorous birds that evolved as diving specialists. The posterior position of the legs makes the loon an efficient swimmer, but severely limits its ability to walk on land. As a result, loons come ashore only to nest and breed, with nests typically located within three feet (1 m) of water (Vermeer 1973). They are a relatively long-lived species (25 to 30 yrs.) with delayed breeding maturity and relatively low fecundity (Evers 2002). Loons lay one or two eggs, rarely three, and if chicks can survive to fledging they have a considerably greater chance of survival (Croskery 1991). The average number of chicks fledged per territorial pair ranges from 0.29 to 0.96 for well-monitored populations (Table 1). Chicks surviving their first summer migrate and do not return for 2.5 years (McIntyre and Evers 2000). Most mortality for loons has been associated with the non-breeding season, during juvenile migration, or during the first 2.5 years when juveniles remain on the coast. The average age of first breeding was seven years, and adult (i.e., >3 yr. old) annual survival rates ranged from 0.91 to 0.97.

Subadult loons that survive to breed typically established territories within 10 miles (16 km) of their hatch site (Evers 2002). In Montana the distance for the only adult banded as a juvenile and then observed to establish a territory was over 19 miles (30 km) from Lake Rogers to Upper Thompson Lake's east lobe (Appendix D). Considering the poor pioneering capabilities of common loons, any sustained period of territory vacancy over even a small geographic area, associated with disturbance would negatively impact a population's ability to reoccupy those available territories. Abandoned territories or territories with no recruitment may remain vacant or become vacant because dispersal distance from nest site appears to be up to 40 miles (64 km), but usually around 8 miles (13 km) (McIntyre and Evers 2000).

Montana's loons breed on freshwater lakes arriving just as the winter ice melts off, usually in late March or early April. Skaar (1990) found that loons generally did not nest on lakes smaller than 13 acres in size and that when nesting on smaller lakes loons used surrounding lakes for foraging. His initial observations were later supported by the Montana Loon Ecology Project (Paugh 2006, Hammond 2008). Kelly (1992) reported from 1986 to 1990, over 50% of nests were in incubation by May 7 and 68% of the chick hatched between May 24 and June 7. Many territorial common loon pairs will renest in late May or early June if their nesting effort fails. Some hatches have occurred as late as the first week in July.

Reproduction and the recruitment rate of species with low reproductive potential is one of the important biological factors to monitor and consider in management. This is particularly true in common loons with the average age of first time breeders about seven years old. Based on research in many states, including Montana, the reproductive potential of loon depends on many factors. At the landscape scale, loons must be able to locate and select attractive territories. Research shows that important factors influencing this selection are the proximity to other territorial pairs and active feeding lakes (Hammond 2008) which in turn are most likely influenced by a loon's fidelity to its breeding and/or natal territory (Evers 2001). Although this appears to be counterintuitive, that a territorial species is highly attracted to already occupied

habitats for which they need to compete, it is beneficial to the species in the long term to take over an existing territory that already provides the necessary biological factors than to explore new unoccupied territories that may not provide those factors. In fact this habitat use pattern follows the ideal pre-emptive distribution model (Pulliam and Danielson 1991) where the best territories are occupied first and defended from competing loons.

Table 1. Fecundity (chicks fledged/territorial pair) estimates for North American common loon populations (Modified from Evers 2007). Fecundity value of 0.48 is equal to a population growth rate of 1.0.

Region	Fecundity Values
Maine (Rangeley Lakes)	0.29
Minnesota (Itasca State Park)	0.29
Ontario (Northwestern)	0.32
Minnesota (Boundary Waters Canoe Area)	0.37
Alaska (Kenai National Wildlife Refuge)	0.48
Michigan (east. Upper Peninsula)	0.51
New Hampshire (statewide)	0.52
Michigan (Seney National Wildlife Refuge)	0.59
Montana (statewide)	**(0.69)[a] 0.66[b] (0.7)[c]**
Vermont (statewide)	0.72
Michigan (Ottawa National Forest)	0.76
Michigan (Isle Royale National Park)	0.79
New York (Adirondacks)	0.96

[a] Estimate from 1986 to 1987 from the Montana Loon Study.
[b] Estimate from 1999 to 2003 from the Common Loon Annual Report.
[c] Estimate from 2006 to 2008 from the Montana Loon Ecology Project.

Another important biological factor is the availability of potential nest sites. In Montana loons generally select secure nest sites in sheltered bays and lee sides of islands and peninsulas with adequate substrate for nesting. Nests are usually located on the waters edge in areas with a water depth of one to three meters. Loons build up their nests with aquatic plant materials, but many nests are mostly matted down vegetation. However, loon nests have been observed on many different substrates such as logs, stumps, muskrat houses, gravel, and small sticks and pinecones (Montana Loon Ecology Project 2003-2008). Lakeshores that do not offer shelter from winds, waves, and large boat wakes are not suitable for loon nesting. Loons also generally select nesting locations that are secure from human development such as docks, boat ramps, lawns, etc. Second, there must be potential nest sites available. In Montana, loons have built nests on islands, shorelines, hummocks, and artificial platforms, constructing their nests of grasses/sedges, cattails, emergent vegetation, sticks and pine cones, and gravel (Montana Loon Ecology Project 2003 to 2008).

Overall reproductive success, or chicks that survive to fledge, depends on both the successful hatch of a loon nest and the survival of the hatched chick(s). The most influential factors on nest success in Montana were shoreline complexity, perimeter, and territory type (Paugh 2006). Shoreline complexity is a comparative figure relating the shoreline length to the circumference of a circle that has the same area as the lake. The smallest possible SDI value = 10 would be produced be a perfect circle, thus shoreline irregularities (e.g., coves, inlets) increase SDI. Territory types were classified as whole-lake territories where the loon pair defended an entire lake, partial-lake territories where multiple pairs defended territories on one lake, and multiple-lake territories where pairs defended and/or used multiple small lakes in a complex. Chick survival is estimated as a hatched chick that survives to fledge at 10 to 13 weeks of age, although, most research shows minimal mortality once chicks reach four to five weeks of age (Paugh 2006, Parker 1988). Kelly (1992) and Paugh (2006) documented relatively high chick survival for Montana, 0.91-0.93 and 0.77 respectively. Paugh (2006) found that a recreational user-hour measurement (Mean Angler Trips) negatively influenced chick survival, suggesting that boat use may have some impact on chick survival. The overall reproductive success of territories in Montana was most influenced by the complexity of the shoreline (positive influence, Figure 3) and the presence of islands (negative influence, Figure 4) (Hammond 2008).

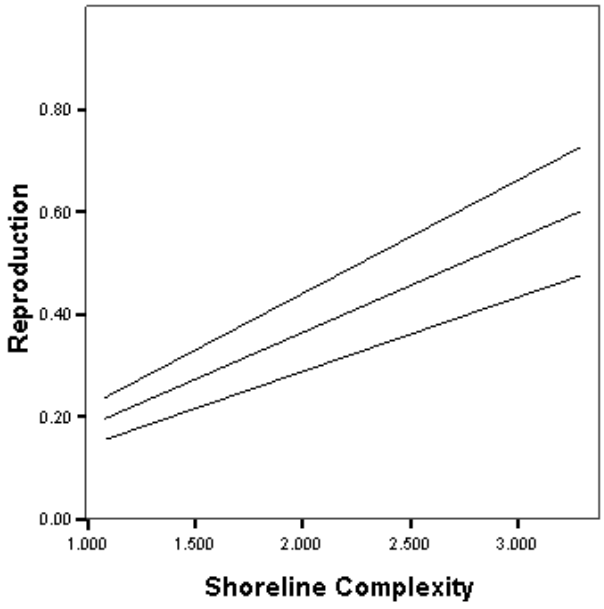


Figure 3. Relationship between shoreline complexity and common loon reproduction with 95% confidence, Montana, 2005-2007.

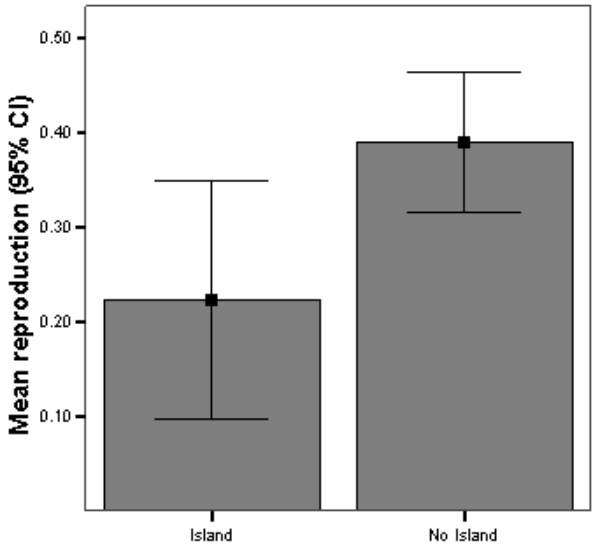


Figure 4. Common loon reproduction on lakes with and without islands for the common loon, Montana, 2005-2007.

Disturbance

Common loons are becoming increasingly affected by human disturbance with expanding access to remote lakes, inducing a decline in breeding populations in several areas (Caron and Robinson 1994, Clay and Clay 1997, Piper et al. 2002, Titus and VanDruff 1981, Vermeer 1973). Loons nest on popular fishing lakes throughout their breeding grounds (Vermeer 1973). These lakes also have the highest recreational use (Titus and VanDruff 1981, Vermeer 1973). Motor boats and canoes seem to be the main causes of nest flushing (Kelly 1992, Titus and VanDruff 1981, Vermeer 1973). When adults are flushed from the nest, eggs become vulnerable to predation by bald eagles, ravens, crows, etc. (Alvo 1981, Alvo and Blancher 2001, Croskery 1991, Titus and VanDruff 1981). In addition, eggs may be knocked off the nest or become overheated or chilled if adults are disturbed for extended periods (Croskery 1991). Fortunately, we have not observed a population decline in Montana (CLWG Annual Reports). This is most likely due to the comprehensive management and mitigation efforts enacted by the working group through outreach, education programs, and interns. Kelly (1992) demonstrated the negative effect of recreation on reproductive success could be effectively mitigated by placing floating signs around nest sites (Appendix F) and showed that the number of two-chick broods significantly increased in years where signs created voluntary closures.

Current Population

Based on the coordinated mid-July surveys initiated in mid-1980s, it appears Montana has maintained a fairly stable breeding population of common loons. From 1999 to 2008, the number of lakes surveyed ranged 141 to 205 with an average of 62±10 territorial pairs observed (Figure 5). Over this decade, the average annual production ranged from 35 to 52 with an average of 41

±14 (Figure 5). Unpaired or single bird counts have ranged from 30 to 77 (average53 ± 30) (Figure 5) and consistently comprised 17% to 35% of the total population (average of 24%) counted each year. In some years, many non-breeding loon lakes were not surveyed due to personnel needs for fire suppression, such as 2003.

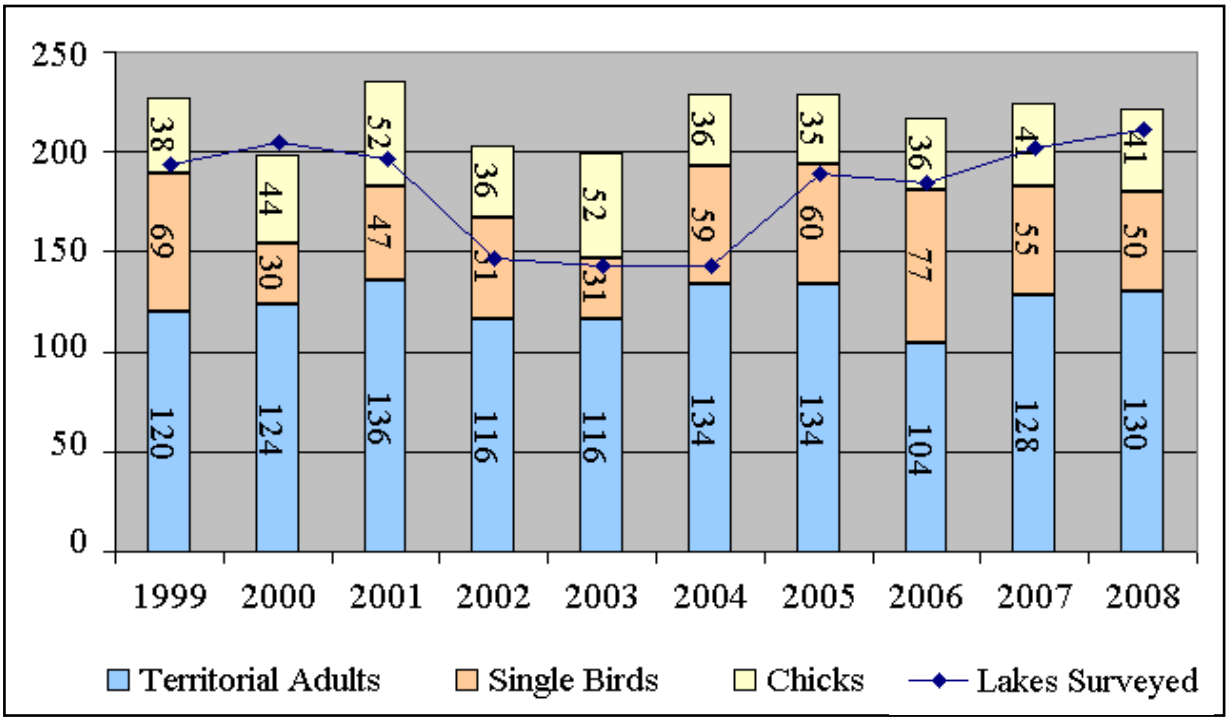


Figure 5. Numbers lakes surveyed and common loons observed on Loon Day, Montana, 1999-2008.

RESEARCH AND MANAGEMENT

History

In 1982, Don Skaar initiated the first comprehensive work on common loons in Montana. Through his extensive surveys across the breeding region, Skaar located 62 lakes with territorial pairs of loons. In 1990, Skaar completed the first management plan for common loons in Montana. This plan set in motion a number of subsequent research and management efforts aimed to maintain a strong and viable population of breeding common loons in Montana. He recommended future research focus on the effects of increasing recreational use and development on common loon nesting success and persistence in the region.

Shortly after the work of Skaar, the project then known as the Montana Loon Study began its transition into a non-profit organization, the Montana Loon Society. During the transition, Lynn Kelly finished her Master's research on the effects of human recreation on loon productivity. Her results (Kelly 1992) led to the implementation of the voluntary nesting area closure program using floating signs and public education. Skaar and the Montana Loon Society also initiated a

coordinated annual mid-July Loon Day survey on all possible loon nesting or occupied lakes using help of agency staff and numerous volunteers. In the mid 1990s, the Montana Natural Heritage Program developed a centralized database for all Loon Day observations. Through cooperation with Montana Fish, Wildlife, and Parks, the Heritage Program continues to store annual survey data. Pat Dolan with the Lolo National Forest completed The Common Loon (Gavia immer) in the Northern Region: Biology and Management Recommendations for loon lakes in USDA Forest Service Region 1.

Recognizing the need for collaboration in managing common loons in Montana, a team of biologists from both government and non-government agencies including Montana Department of Fish, Wildlife and Parks (FWP), Montana Department Of Natural Resources (DNRC), USDA Forest Service (USFS), Glacier National Park, Plum Creek Timber Company, Avista Corporation, Confederated Salish and Kootenai Tribes, the Montana Loon Society, and private citizens created the Common Loon Working Group (CLWG). The working group now also includes members U.S. Fish and Wildlife Service, University of Montana, The Center for Biological Diversity, lakeshore homeowner representatives, and other interested citizens and organizations. The CLWG usually meets twice a year and is open to anyone interested in common loon management and conservation. Today, this group helps coordinate annual common loon monitoring and management activities, secures funding for research and management programs such as the Loon Ranger program, and compiles annual reports and summaries. This group also worked with the lead author to complete this document, an updated Common Loon Conservation Plan for agencies to adopt for Montana.

Loon Ranger Program

In 2000, the CLWG implemented a Loon Ranger Program modeled after a Loon Ranger program was initiated in New Hampshire. Using FWP's student summer internship program, the CLWG typically selects two or three student interns to be "Loon Rangers" from early May through mid July (Appendix J). After training, these students work at public access sites and with homeowner's organizations, providing information to the recreating public about the effects of human activities on loon nesting, searching for banded loons and active nests, and placing floating signs around actives nest sites, where warranted (Appendix F). The Loon Ranger program has broadened to include several seasonal Forest Service wildlife technicians. All loon rangers provide public educational pamphlets; give campfire presentations, and presentations to homeowners' associations and other groups (Appendix H). The CLWG has documented that the Loon Ranger program has enhanced common loon nesting success and chick survival (Bissell 2002).

Recent Research

Since the early 2000s, the northwest Montana agencies and non-profit organizations have worked together to fund and complete several research projects on the nesting ecology of common loons. Montana Fish, Wildlife and Parks used funds from the State Wildlife Grants program (funded by the U.S. Fish and Wildlife Service for nongame species) and contracted with two universities to complete two master theses research projects on common loon nesting ecology and population dynamics. The Confederated Salish and Kootenai Tribes under the same

grant investigated migration routes and patterns of common loons staging on Flathead Lake. In addition, Montana Fish, Wildlife and Parks received results from our ongoing collaboration with a nationwide genetics project. The early results only indicate the sex of juveniles. Note that the only way to sex chicks is by DNA. Interestingly, the population has nearly a 1:1 ratio with 13 females and 15 males. The results of new research and the continued annual trend monitoring by the CLWG over the last decade has led to a need to update the original 1990 Conservation Plan.

MANAGEMENT AND CONSERVATION RECOMMENDATIONS

To reflect Montana's overall interest in maintaining and conserving common loons, the CLWG and FWP jointly pursued funding from the State Wildlife Grants Program to complete research essential to future management of common loons. Part of this grant is being used to revise and complete a new Common Loon Conservation Plan.

This Common Loon Conservation Plan includes sections on population management, habitat management, disturbance, research, information and education, and coordination. Each section contains a specific goal along with objectives and strategies for achieving or maintaining the goal. The document also includes numerous appendices including Best Management Practices for landowners near loon nesting lakes (Appendix B), example and how-to guide for Loon Lake Management Plans (Appendix C), and other summary biological data important to maintaining a viable population of breeding common loons in Montana.

This document asks that the CLWG continue annual monitoring, maintain the current outreach and educational programs, and review and analyze productivity data annually. The Plan also recommends that the working group continuously evaluate objectives and strategies, particularly if the population growth rate, λ, remains less than 1 for five consecutive years.

POPULATION MANAGEMENT

Population Management Goal:

Maintain a stable common loon population by monitoring important demographic parameters within known breeding areas of Montana. The Montana Common Loon Working Group will reevaluate this plan if a population decline is noticed over any five year period.

Conserving wildlife populations begins with a comprehensive understanding of the factors and dynamics responsible for population growth and stability. Information regarding important vital rates and how these vital rates influence the population growth rate (lambda or λ) provide managers with valuable insight for the best management strategies. Two particularly useful analyses for identifying key vital rates and risk are sensitivity analysis and population viability analysis.

In 2004, a sensitivity analysis and life-stage simulation analysis was conducted for Montana's common loons (Hammond unpublished) to determine which vital rate had the most influence on λ. That vital rate was fecundity, defined as the number of female chicks produced per breeding female. Current management strategies are designed with this in mind, and management actions implemented by multiple agencies and landowners specifically target maximizing chick production. Their combined efforts have the greatest influence on population growth and the long-term viability of Montana's common loon population.

Viability is defined as the likelihood of the persistence of a well-distributed population for a specified time, typically a century or longer (Morrison and Doak 2002). Two separate population viability analyses, count-based and demographic, were used to assess the viability of the loon population in Montana for 50 to 200 years into the future. The count-based model used existing count data from the 2005 Annual Loon Report by Gael Bissell MFWP. The demographic model used vital rates from existing literature to supplement the limited vital rates available for the Montana population. The deterministic lambda from the count-based model (λ = 1.044) was nearly equal to the demographic model (λ = 1.042). The count-based model generated extinction probabilities from 0.00008 at an initial population size (N_0) of 230 loons to 0.88 at an initial population size of 51. For the demographic model, extinction probabilities were 0 for all population sizes except for N_0 = 51. It has been shown that excessive variance can cause a population viability analysis to be overly pessimistic. The variance in the count-based model was over twice the variance of the demographic model, leading to much higher predictions for the risk of extinction. These measurements are best used as a relative measurement and not an absolute prediction of the extinction risk of loons in Montana. There is minimal to no extinction risk to the loon population in Montana if habitat and disturbance conditions as well as information and education efforts remain the same.

Objectives and Strategies

- Maintain an average annual population size of at least 62 territorial pairs with an average annual nest success rate of at least 50% when averaged over a five year period. If the averages fall below 56 pairs or 40% the Common Loon Working Group will meet to determine the cause(s) of the decline and develop management recommendations to return the number of territorial pairs or success rate to the acceptable level.
    - Estimate annual and average annual (over five years) population size, reproductive success, and recruitment.
    - Conduct coordinated and standardized survey to count territorial pairs, single birds, subadults, and chicks (young of the year) in order to estimate nest success and fledging success (Appendix A, Appendix E, Monitoring).
        - Determine band status of all breeding adults by coordinating band reobservation efforts to maximize the use of volunteers during the May surveys (Appendix D).
        - Maintain annual May (Saturday closest to the 15th) and July (3rd Saturday) surveys using the recommended survey frequency for each lake (Appendix A) and the standard survey protocol (Appendix E).
        - Where possible, survey other lakes that may have loon activity at least once every 3 to 5 years (Appendix A).
- Maintain an average annual fecundity rate of greater than or equal to 0.60 chicks fledged per territorial pair. If the averages fall below 0.48 the Common Loon Working Group will meet to determine the cause(s) of the decline and create management recommendations to return the ratio to the acceptable level.
    - Use July survey data to estimate fecundity (chicks fledged per territorial pair).
    - Compare fecundity estimates to population model included in USFWS Loon Conservation Plan to estimate λ (Fecundity when measured as chicks fledged per territorial pair should be at least 0.48 for $\lambda = 1$).
- Estimate additional important demographic rates.
    - Use band observation data to estimate adult minimum survival, territory fidelity, and juvenile recruitment.
    - Use marked birds to explore dispersal distance of displaced breeders and recruited juveniles.

- Use survey data to estimate annual territory success.
- Estimate long term lambda using total population estimates.
- Estimate lambda using the demographic model with multiple simulations. Regularly update the model based on band observation data.

HABITAT MANAGEMENT

Habitat Goal:

Maintain current number and spatial distribution of nesting territories as well as identify and protect quality potential territories that provide suitable nest and nursery sites.

The degree to which an individual animal can successfully interact with a landscape to meet its biological needs indicates the degree of habitat suitability associated with that landscape. Suitable habitat provides individuals with everything they need for survival and reproduction, such as adequate food, breeding sites, and security for successfully raising young. Connectivity between fragmented areas of suitable habitat via dispersal of juveniles increases the potential for gene flow among populations and is essential for the long-term stability of a population. To ensure long-term viability of a species, managers must take the necessary steps to establish and maintain adequate areas of suitable habitat as well as connectivity between populations.

Establishing patterns of habitat use by common loons is important for developing an appropriate management strategy. The configuration and quantity of common loon breeding territories likely depends on several factors; most importantly philopatry and dispersal (Evers 2001). Philopatry, measured as territorial fidelity from year to year, is high in loons, with a mean of 81% (McIntyre and Evers 2000). Limited data on territory fidelity for Montana also produced a mean of 81% (60% for males and 94% for females) (MFWP unpublished data). Hammond (2008) revealed that the most influential factors explaining territory occupancy in Montana were the number of territorial pairs and feeding lakes within 6 miles (10 km). Breeding adult dispersal distances are usually around 1.2 miles (2 km), while juvenile dispersal is around 11 miles (18 km) (Evers 2007). However, a breeding female in Montana dispersed over 19 miles (30 km) from Upsata Lake to Colburn Pond, well beyond distances cited in other research. The reoccupation of territories is therefore assumed to be the result of juveniles returning as adults. Thus, any sustained period of territory vacancy, over even small lake complexes, could negatively affect a population's ability to reoccupy those available territories.

Habitat characteristics of breeding territories for common loons are well documented (Evers 2007, Newbrey 2002, Paugh 2006, Titus and VanDruff 1981, Vermeer 1973). Specific to Montana, Paugh (2006) investigated nest scale and lake scale habitat characteristics in relation to nest success and chick survival and found that shoreline complexity, perimeter, and territory type had the greatest positive effect on nest success. Highest nest success was observed on lakes less than 60 acres (24 ha) in size and the lowest on large lakes with multiple loon pairs. Paugh (2006) observed that chick survival was best estimated by landscape scale habitat features, primarily the number of feeding lakes within 6 miles (10 km). His research should alert managers that not only are lake scale habitat factors important to loon management, but so are landscape scale factors, especially complexes of quality lakes.

Hammond (2008) continued and expanded on the research conducted by Paugh (2006) to explore demographic and landscape relationships. Model results from simulations provide managers with expected population responses prior to considering management actions. Additionally, probabilities of occupancy, along with rates of colonization and abandonment, will help to prioritize conservation efforts so managers can protect lakes that have the greatest chance of remaining occupied over time while continuing to produce offspring.

Most of Montana's common loon breeding is concentrated in the northwest part of the state north of Missoula and west of the continental divide. There are a few exceptions of nesting along the east front of Glacier National Park on the Blackfeet Indian Reservation and outside of Yellowstone National Park. The areas of highest breeding densities (Figure 2) are west of Kalispell along the Highway 2 to the Thompson Chain of Lakes, north of Whitefish along Highway 93 north to Eureka, and along Highways 83 and 200 including the Swan, Clearwater, and Blackfoot River valleys. Additional breeding takes place in or adjacent to Glacier National Park (Figure 2).

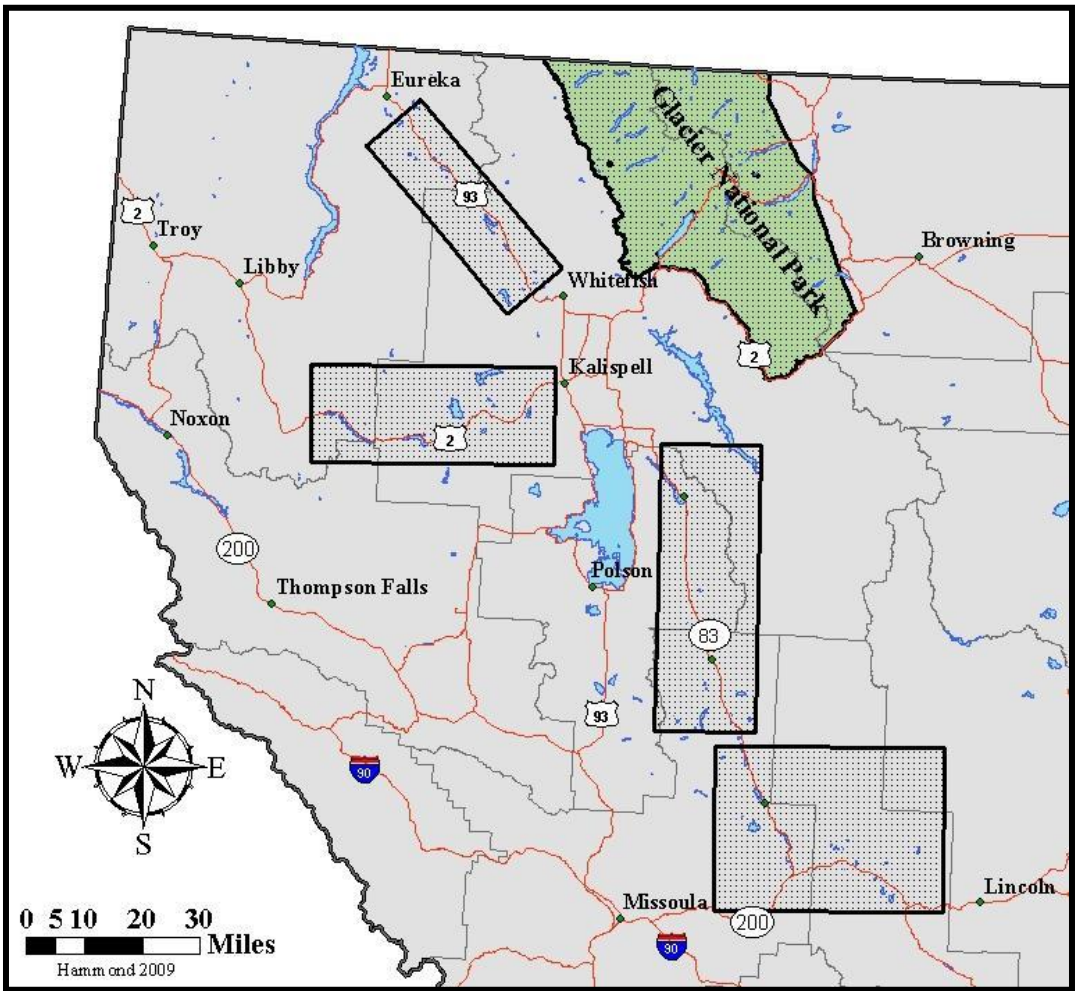


Figure 6. Concentrations of breeding common loons in Montana.

Objectives and Strategies

- Protect and conserve loon habitat.
    - Assess risk or identify existing areas of conservation concern at multiple scales (nest site, lake, and landscape).
    - Use territory history, occupancy probabilities, and reproduction to prioritize protection (Appendix A).
    - Identify opportunities to conserve important habitats including nesting and nursery habitat on lakes owned by landowners likely to sell, subdivide, or lease and specifically target education efforts (Appendix H) and the importance of relationship building with these landowners.
    - Inventory loon territories/lakes for other species (especially species of concern and threatened and endangered species) and sensitive habitat types (e.g. wetlands).
    - Use land conservation easements, land acquisitions, or other management plans where ever possible to protect nests/territories/lakes at risk of loss due to human impacts.
- Develop lake/site specific management plans that address local concerns or risk factors to ensure long term availability of each nesting territory (address development, no wake regulations, land ownership patterns, etc.) (Appendix C).
    - Local coordinators and/or biologists monitor proposed shoreline developments and no wake regulations of all breeding lakes and high potential lakes and actively participate in all levels of planning to provide comments to city and/or county planners and homeowners associations.
    - Identify lakes where water fluctuation is a primary cause of nest failure and coordinate with local water control agencies to mitigate water fluctuations where possible. Otherwise, consider the use of floating islands (Appendix G).
    - Record locations of all current, past, and suspected nesting and nursery sites.
    - Identify location, type, and impacts of current and probable future disturbance on nesting and nursery habitat.
    - Explain and diagram floating sign placement around known nest locations and the placement of onshore signs (Appendix F).

  - Describe historic and current public issues, concerns, and conflicts (e.g. lakeside trails, float plane use, fishing pressure).

  - Identify the amount of information and education effort needed (Appendix H).

- Reduce impacts of existing and future shoreline development on lakes that provide quality loon habitat.

  - Provide counties model regulations and Loon Friendly Best Management Practices to incorporate into regulations, neighborhood plans, and recommended standards and guidelines for developing on loon lakes (Appendix B).

  - Provide homeowners/landowners and agencies with lake management plans showing nest and nursery sites and make recommendations for setbacks, season closures, dock location, wake restrictions, etc (Appendix C).

  - Maintain and enhance mitigation efforts to minimize effects of shoreline disturbance on nesting loons.

  - Federal agencies, state agencies, and private landowners apply the Loon Conservation Plan and BMPs (Appendix B) before choosing sites for recreation facilities, homes, or other developments.

- Create contribution programs to collect donations for conservation efforts from homeowners associations, local conservation groups, and other entities.

- Implement generic recommendations and considerations for the use of artificial nesting platforms (Appendix G).

- Implement generic recommendations and considerations for the use of floating signs (Appendix F).

- Implement territory ranking system using probability and coordinator codes (Appendix A, Appendix C).

DISTURBANCE

Disturbance Goal:

Minimize breeding season (April 15 to July 15) disturbance throughout known common loon breeding areas of Montana.

Common loons are impacted by human disturbance to an increasing degree. Loons spending more time off the nest leave eggs vulnerable to predators and cooling (Christenson 1981). This has induced a decline in breeding populations in several areas (Caron & Robinson 1994, Clay & Clay 1997, Piper et al. 2002, Titus & VanDruff 1981, Vermeer 1973). This type of response is suspected in Montana, but quantifying it is complicated because of increases in observation and education protocols implemented 1989 (Bissell 2006).

Kelly (1992) showed that loons spend over twice the amount of time off the nest when the cause of nest flushing is human related (i.e. boats or people walking the shoreline). Her study also showed that flushing distances decreased by 50% from 460 ft (140 m) during the first week on the nest to only 230 ft (70 m) during the fourth week on the nest (Kelly 1992). In addition, high levels of boat-related disturbance can cause formerly occupied territories to be less attractive to potential new pairs. In some instances wakes from passing boats can erode nesting habitat and flood existing nests. There are also concerns about the impact of personal watercraft on loons. Although not thoroughly studied, the effects of personal watercraft on loon behavior in Montana are apparent. Loons with chicks stop feeding or loafing and assume an alert posture when they hear personal watercraft approaching, even though the vehicle is still at a great distance (estimated to be over 300 to 400 yards). Incubating loons also tended to lower their head, in the presence of personal watercraft at greater distances than fishing and other boats (Figure 7). This behavior was not observed when fishing or ski boats approached at the same distance and speed. Floating signs set at 100-150 yards tended to mitigate the effects of all motorized craft near loon nesting areas during the nesting season in the Clearwater drainage on their nests, with a lowered head, in the presence of personal watercraft. It was shown that the number of 2 chick broods increased significantly after the placement of floating signs and on shore signs when disturbance was a factor (Kelly 1992).

Figure 7. A nesting loon's response to disturbance.

Considering the poor pioneering capabilities of common loons, any sustained period of terri associated with disturbance would negatively impact a population's ability to reoccupy those available territories. Abandoned territories or territories with no recruitment may remain vacant

or become vacant because dispersal distance from nest site appears to be up to 40 miles (64 km), but usually around 8 miles (13 km) (McIntyre and Evers 2000).

Refer to Appendix B and Appendix C for more information and recommendations regarding mitigation measures for disturbance. Refer to Appendix E for photos of common loon responses to disturbance.

Objectives and Strategies

- Minimize recreation related impacts in nest and nursery areas (See Information and Education Chapter and Appendix H).
    - When necessary use floating signs and/or onshore signs to protect nesting loons and follow recommended protocol for sign use (Appendix C, Appendix F).
    - Partner with homeowners associations and outdoor programs to disseminate loon conservation material (See Information and Education Chapter and Appendix H).
    - Time near-shore disturbance (i.e. timber harvest, fuels reduction, boat launch repairs) within 150 yards (140 m) for dates outside of breeding season (August 1 to May 1) and coordinate with the area coordinator (Appendix A, Appendix B, Appendix C).
    - Assign a hazard rating to territories, nest sites, and nursery areas. See Appendix C for an example.
- Measure areas of increased disturbance and concentrated recreational use to update the conservation plan (Appendix B, Appendix C).
    - Collaborate with management agency personnel to obtain numbers and trends of campers/day use in core population areas.

COORDINATION

Coordination Goal:

Maintain and improve communication, coordination, and collaboration by all entities involved in conserving common loons in Montana.

Since its inception in 1998, the Montana Common Loon Working Group (CLWG) has established communication, collaboration, and cooperation among public agencies, private entities, non-profit organizations, universities, conservation organizations, homeowners associations, and individuals interested in the conservation of the common loon in Montana. Over the years partnerships were formed. Through its technical and research guidance, the CLWG established the Loon Ranger Program and assisted with the Montana Common Loon Ecology Project. The program has apparently mitigated, to some degree, the negative effects of shoreline development and disturbance observed in other areas of the United States while the Montana Common Loon Ecology Project provided explanations for previously unanswered questions. Through extensive coordination efforts the CLWG has ensured the persistence of the common loon population in Montana.

Objectives and Strategies

- Improve and maintain coordination between Montana Fish, Wildlife and Parks, Montana Department of Natural Resources, Montana Natural Heritage Program, U.S. Forest Service, Glacier National Park, Confederated Salish and Kootenai Tribes, Montana Loon Society, Plum Creek Timber Company, Avista, Blackfeet Nation, and other interested organizations.
    - Obtain new partners for the Montana Common Loon Working Group.
    - Obtain agency and partner cooperation regarding the objectives and strategies outlined in the Conservation Plan.
    - Ensure the CLWG continues to meet at least twice annually, generally in February and July.
    - Secure annual interagency funding agreements from all agency members of the working group to ensure that education and monitoring efforts continue.
    - Ensure the Montana Natural Heritage Program remains a primary source of common loon information for the public.

  - Ensure coordinators communicate with co-chairs throughout the breeding season and ensure intern supervisors coordinate with participating agencies on roles and responsibilities.

  - Recruit additional volunteers/citizen scientists and ensure they are trained and know appropriate contact and safety information (Appendix A, Appendix J).

  - Ensure coordinators follow protocol for the rescue of live common loons, the recovery of dead loons, and the collection of other biological samples (Appendix I).

  - Provide assistance for loon conservation or management activities to other working group members.

  - Encourage partnerships with other organizations (Ducks Unlimited, Trout Unlimited, Flathead Wildlife Inc., etc.).

  - Encourage coordination of all aquatic research projects on lakes with nesting loons.

- Establish annual Loon Ranger internship positions for the areas with the highest densities of loons (i.e. Kalispell West, Kalispell North, Clearwater/Blackfoot).

  - MFWP will continue to support two to three interns (not necessarily providing funding) through the state's internship program.

  - Internship supervisors and coordinators will be agreed upon at February CLWG meetings.

- Establish continuous and reliable funding and coordination for research and internship programs.

  - Develop an Adopt-A-Loon program through the Montana Fish, Wildlife and Parks Nongame Wildlife Checkoff.

  - Promote and advertise Montana Loon Society vehicle license plates.

  - Establish memorandums of understanding between Montana Fish, Wildlife and Parks, Montana Loon Society, U.S. Forest Service, and Montana Department of Natural Resources, as needed.

  - Establish annual Loon Ranger budget with Montana Loon Society, regarding funding for positions.

  - Fish, Wildlife and Parks pays for biological samples except when a carcass is used for study skin or taxidermy in which case the agency requesting the skin will pay.

- Encourage the continuation of the Citizen Science Loon Program in Glacier National Park.

- Establish communication with biologists in Canada and neighboring states to coordinate and share data for surveys conducted within approximately 20 miles (60) km of the border.

- Establish communications/partnerships with Audubon and other groups, along the coast and migratory lakes, and neighboring states to increase band observations.

- Encourage enforceable regulations that benefit common loons.

  - Cooperate with MFWP enforcement and other agencies to obtain enforceability of onshore signs and floating signs.

  - Cooperate with enforcement to establish thresholds for disturbing and harassing common loons through existing wildlife disturbance and harassment laws and ensure that interns and all field personnel are familiar with the procedures for reporting potential violations (Appendix J).

- Implement no-wake zone rules as part of lake management plans (Appendix C).

MONITORING

Monitoring Goal:

Implement effective monitoring programs and strategies for all concerns facing common loons through collaboration and coordination with all members of the Montana Common Loon Working Group.

Successful management of any wildlife population relies on extensive monitoring of several population parameters, as well as threats that may confront the population. Biologists, technicians, researchers, interns, and volunteers have diligently surveyed Montana's loon population for over 25 years collecting information pertinent to management of the population. Recent research has banded more than 50% of the breeding population and nearly 100 juveniles. In the past 5 years we have recovered or had birds observed all along the Pacific Coast from just north of Seattle, WA south to Santa Barbara, CA. Continued collection of this data would provide managers with a long-term regional specific survival, fidelity, wintering area, and dispersal data set. Band confirmations during the breeding season are best collected during May and June as some breeding pairs may nest, fail, re-nest, fail and not be on territory for July surveys. In addition, CLWG recognized the need to monitor risks to population and have established a working relationship with the Biodiversity Research Institute to analyze blood samples for methyl-mercury and other heavy metal contaminants (Figure 8). A well designed monitoring program will ensure that no data are lost and Montana will ultimately benefit in the information it will gain for years to come.

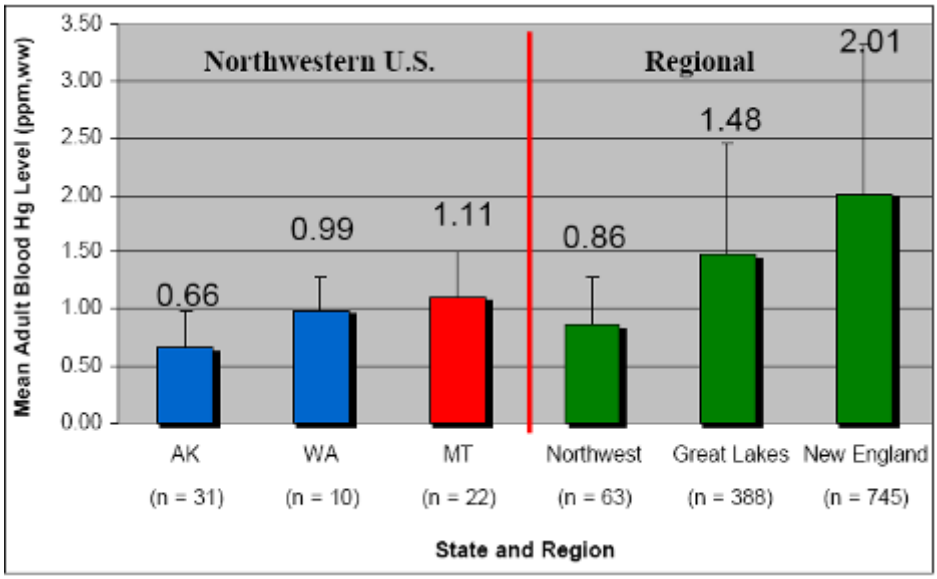


Figure 8. Mean adult common loon blood mercury (Hg) levels, 1992-2003 (from Savoy 2004).

Objectives and Strategies

- Monitor loons on breeding lakes during the May survey, and, if possible, make every attempt to identify birds observed on other lakes as marked or unmarked.
    - Secure high quality spotting scopes for personnel collecting field data.
    - Area coordinators (Appendix A) prioritize collection of observations of known banded breeding birds in respective areas.
    - Emphasize responsibilities of loon rangers to include band observation collection on lakes with loons banded as adults (Appendix D, Appendix J).
    - Coordinators obtain confirmation as soon as possible and provide updates to band observation data collector every two to three weeks during the breeding season.
    - Recruit wildlife biologists, technicians, and volunteers from local Audubon chapters, Montana Loon Society, etc. to assist with band observations.
    - Encourage the observation of single birds to identify juvenile recruitment or transient adults via bands (Appendix D).
    - Report all observations of adults banded as juveniles to co-chairs immediately as this is vital data for estimating recruitment of future breeders into the population.
    - Collect use related data at public access sites.
    - Collect observational data on type, location, and duration of watercraft use (canoe, float tube, personal watercraft, boat, etc.).
- Enhance the common loon database currently managed by MFWP (Montana Natural Heritage Program).
    - Create databases for the following: Mortality and Recovery Information, Recruited Birds from Marked Population, Marked Birds, Annual Band Observation, and Site Specific Management Plans.
    - Link all databases by a unique lake identifier (LLID).
    - Create centralized website/location (storehouse) for Montana loon research and other related documents (Theses, Management Plans, Annual Report, Biodiversity Research Institute Reports, Fish, Wildlife and Parks reports, etc).
    - Ensure that loon observation data are entered in timely manner (no later than September 15th).

- Maintain working relationship with the Biodiversity Research Institute (BRI) and other entities to monitor bioaccumulation of environmental contaminants and recoveries.
    - Assign individual to work with BRI to track banded bird recoveries.
    - Assign individual to collect and deliver samples (egg shells, whole eggs, recovered birds) to appropriate destination. Present results as they are collected at CLWG meeting (Appendix I).
- Contract to band more loons either annually or once every five to seven years to maintain marked population of at least 50% of the breeding adults on core lakes where in order to maintain the banding dataset into the future.

INFORMATION AND EDUCATION

Information and Education Goal:

Provide agencies and the public with the best available science and information related to factors affecting common loons, their management, and ongoing research.

Few bird species are more recognizable than the common loon. Whether it is the beautiful black and white plumage or the unmistakable vocalizations, the loon symbolizes wildness. As such the common loon garners nationwide attention made obvious by the number of organizations dedicated to its conservation. Successful conservation strategies require public awareness and involvement. Creating and distributing information for loon conservation will increase the public's understanding of current and future conflicts and illustrate the uniqueness of Montana's common loon population. In addition, education on how to avoid impacts, how to use BMPs, or how to use other tools helps decision-makers recognize the sensitivity and relative rarity of common loons.

The CLWG implemented the highly successful Loon Ranger Program in 2000 (Appendix J). Loon Rangers are often students, technicians, or volunteers coordinated by the CLWG using limited agency budgets and various grants and donations provide by organizations. A Loon Ranger's primary responsibility is providing education at boat launches on lakes with nesting loons. They are also responsible for locating nests, identifying problems, and collecting important territorial pair data and chick data. In addition, the rangers place protective floating signs around at risk nests (Appendix F) and floating platforms (Appendix G). The success of the floating sign program is tied to the information and education provided by Loon Rangers pertaining to the conservation and management of loons. The program remains a vital part of the conservation strategy of loons in Montana. Glacier National Park initiated a citizen science loon project in 2005 modified from the loon ranger program with a coordinator to train and direct volunteers to survey loon lakes and develop educational materials; funding for this project is uncertain beyond 2008.

Objectives and Strategies

- Provide consistent education and outreach programs to the public (Appendix H).
    - Provide information and education standards for common loon conservation.
    - Maintain and advertise the Loon Education Trunks at the Murphy Lake (Fortine) and Tally Lake Ranger (Kalispell) District Offices, the Montana Natural History Center (Missoula), and the Confederated Salish and Kootenai Tribes (Polson).
    - Distribute campfire talk outlines and materials.

  - Distribute Montana's Loons PowerPoint presentation.
  - Distribute lead-free fishing weight samples and lead pamphlets.
  - Distribute the Montana Loon Society pamphlet.
  - Distribute bookmarks with loon conservation message.
  - Develop a Living with Loons information pamphlet.

- Provide training to promote safety of Loon Rangers and all others in field and with the public.
- Ensure all new biologists, citizen scientist volunteers, interns, and bio-techs are trained each spring prior to field time.
  - CLWG sets training date(s), makes it a priority for new interns and technicians to attend, and designates first line supervisors for interns.
  - Create training manual that can also be used when individual are not able to attend training. Supervisor can use manual to ensure individual receives proper training and information prior to being sent out alone (Appendix J).
- Define roles of working group members in relation to information and education.
  - Interns will consistently visit public access sites and campgrounds to communicate with recreationists.
  - Coordinators, biologists, and interns will describe the situation for Montana's common loons and explain the purpose of floating buoys and conservation measures at various public speaking opportunities.
- Work with counties, planners, realtors, lakeshore homeowners associations, and others where there is common loon habitat to develop Site Specific Management Plans and loon-friendly BMPs.
  - Develop model regulations for areas with common loon habitat.
  - Develop standards and guidelines from existing county BMPs.
  - Provide educational workshops on common loons and other sensitive species for northwest Montana lakes.

RESEARCH

Research Goal:

Develop new research projects as needed and maintain current research projects to answer specific questions to guide common loon conservation and management.

Research of the loon population in Montana stemmed from the recommendations outlined in the first loon management plan finished by Don Skaar in 1990. A few years later, Dolan (1994) identified additional research needs and priorities. The research needs and recommendations, as well as how they were addressed, are summarized in Table 2. In 1992, Lynn Kelly completed research on the effects of human disturbance on loon productivity. Montana Fish, Wildlife and Parks (FWP) initiated the Common Loon Ecology Project in 2003 using a combination of State Wildlife Grant funds from the U.S. Fish and Wildlife Service along with private, tribal, and state assistance. Two Master's theses (Hammond 2008, Paugh 2006) were completed between 2003 and 2008. The Loon Ecology Project research focused on both habitat and population characteristics of Montana's breeding population and helped develop and confirm a number of population and habitat parameters for population models (See Population Management Chapter). Also, Montana Fish, Wildlife and Parks received results from our ongoing collaboration with a nationwide genetics project. The early results only indicate the sex of juveniles. Note that the only way to sex chicks is by DNA. Interestingly, the population has nearly a 1:1 ratio with 13 females and 15 males.

Objectives and Strategies

- Procure funding and continue data collection to estimate survival rates for adults and juveniles based on bands and complete ongoing research.

- Encourage the analysis of data collected on loon forms, etc., and determine whether the data are useful for management purposes.

- Use information collected on floating sign and onshore sign placement to evaluate the effectiveness in relation to the nest and nursery sites.

- Investigate relationships of how common loons may be affected by exotic species such as purple loosestrife, Eurasian water milfoil, zebra mussels, tiger muskie, northern pike, bullfrogs, and snapping turtles.

    - Identify species and locations where interactions with exotic species occur. Record observations in the comment section on the Loon Survey Form (Appendix E) and report this information to the area coordinator (Appendix A).

- Investigate risks to the population that occur both in and out of the state (oil spills, botulism, emaciation syndrome, mercury, lead, etc.).

Table 2. Past and proposed research topics relevant to common loons in Montana.

Research Topic	Investigator	Research Conducted
Effectiveness of different measures to protect loon nesting and rearing areas	Kelly (1992)	The Effects of Human Disturbance on Common Loon Productivity in Northwestern Montana
Conditions under which artificial nesting platforms can be used successfully for loons	Desorbo et al. (2007) & (2008), Piper et al. (2002)	Reproductive Advantages for Common Loons Using Rafts, Floating Platforms Increase Reproductive Success of Common Loons
Physical/biological characteristics of loon nesting lakes	Kelly (1992), Paugh (2006), Hammond (2008)	The Effects of Human Disturbance on Common Loon Productivity in Northwestern Montana, Common Loon Nesting Ecology in Northwest Montana, A Demographic and Landscape Analysis for Common Loons in Northwest Montana
Specific requirements for nesting loons	Kelly (1992), Paugh (2006)	The Effects of Human Disturbance on Common Loon Productivity in Northwestern Montana, Common Loon Nesting Ecology in Northwest Montana
Cause of loon nest failures and chick loss	Paugh (2006)	Common Loon Nesting Ecology in Northwest Montana
Lake/territory selection by first time breeding loons	Hammond (2008)	Montana Loon Ecology Project, A Demographic and Landscape Analysis for Common Loons in Northwest Montana
Turnover of breeding loons and pair bond duration	Hammond, Paugh (2003-8)	Montana Loon Ecology Project
Status of pollution of loon lakes by toxic chemicals	Savoy (2004)	Summary of Capture and Banding Efforts and Methylmercury Exposure to Montana's Breeding Common Loon Population, Montana Loon Ecology Project. Current contaminant research at the BioDiversity Research Institute.
Effectiveness of signs around loon nests and nursery areas	Kelly (1992)	The Effects of Human Disturbance on Common Loon Productivity in Northwestern Montana
Migration and wintering locations	Gullett, Hammond, Paugh (2003-8)	Montana Loon Ecology Project
Effects of disturbance on loon chicks	Kelly (1992), Paugh (2006), Hammond (2008)	The Effects of Human Disturbance on Common Loon Productivity in Northwestern Montana, Common Loon Nesting Ecology in Northwest Montana, A Demographic and Landscape Analysis for Common Loons in Northwest Montana
Effects of global warming on nesting		Not Yet Addressed
Effects of wake on nesting habitat		Not Yet Addressed
More effective and meaningful measures of disturbance impact on loon productivity		Not Yet Addressed
Status and effect of eutrification of loon lakes		Not Yet Addressed
Effects of exotic species on loon ecology		Not Yet Addressed

PREPARERS AND INDIVIDUALS WHO CONTRIBUTED

Jami Belt
Glacier National Park
P. O. Box 128
West Glacier, MT 59936

Gael Bissell
Montana Fish, Wildlife and Parks
490 North Meridian Road
Kalispell, MT 59901

Angela Daenzer
USFS Hungry Horse/Spotted Bear Districts
8975 Hwy 2 East
Hungry Horse, MT 59919

Kristi Dubois
Montana Fish, Wildlife and Parks
3201 Spurgin Road
Missoula, MT 59804

Christie Ferruzzi
USFS Murphy Lake Ranger District
P. O. Box 116
Fortine, MT

Steve Gniadek
Glacier National Park
P. O. Box 128
West Glacier, MT 59936

Brett Gullett
Idaho Department of Fish and Game
2679 Fairground Road Suite A
American Falls, ID 83211

Laura Holmquist
USFS Tally Lake Ranger District
650 Wolfpack Way
Kalispell, MT 59901

Jane Ingebretson
USFS Swan Lake Ranger District
200 Ranger Station Road
Big Fork, MT 59911

Amy Jacobs
USFS Tally Lake Ranger District
650 Wolfpack Way
Kalispell, MT 59901

Lynn Johnson
USFS Murphy Lake Ranger District
P. O. Box 116
Fortine, MT 59918

Lynn Kelly
Montana Loon Society
6525 Rocky Point Road
Polson, MT 59860

Bryce Maxell
Montana Natural Heritage Program
1515 East 6th Avenue
Helena, MT 59620

Justin Paugh
Montana Fish, Wildlife and Parks
P. O. Box 642
Big Timber, MT 59011

Garrett Schairer
Dpt. of Natural Resources and Conservation
2250 Hwy 93 N
Kalispell, MT 59901

Ron Steiner
Plum Creek Timber Company
P. O. Box 1990
Columbia Falls, MT 59912

Scott Story
Montana Fish, Wildlife and Parks
1420 East 6th Avenue
Helena, MT 59620

Carly Walker
Missoula County Rural Initiatives
317 Woody
Missoula, MT 59802

Additional personnel who reviewed the conservation plan, provided comments, or suggest changes include:

Steve Anderson

Dwight Bergeron

Al Bratkovich

Dan Carney

Elaine Caton

Glen Gill

Nate Hall

Lauri Hanauska-Brown

Janene Lichtenberg

Andrew Orahoske

Henning Stabins

Rick Stevens

Ellen Sullivan

Scott Tomson

Photos for Appendix E were generously provided by Dan Poleschook Jr. and Ginger Gumm.

LITERATURE CITED

Alvo, R. 1981. Marsh nesting of Common Loon (*Gavia immer*). Canadian Field-Naturalist 95:357.

Alvo, R. and P. J. Blancher. 2001. Common Raven, *Corvus corax*, observed taking an egg from a Common Loon, *Gavia immer* nest. Canadian Field-Naturalist 115:168-169.

Barr, J. F. 1986. Population dynamics of the Common Loon (*Gavia immer*) associated with mercury-contaminated waters in northwestern Ontario. Occasional Papers, Canadian Wildlife Service.

Burnham, K. P., and D. R. Anderson. 2002. Model selection and multimodel inference: a practical information-theoretic approach. Second edition. Springer-Verlag, New York, New York, USA.

Caron, J. A., and W. L. Robinson. 1994. Responses of breeding common loons to human activity in Upper Michigan. Hydrobiologia 279-280:431-438.

Christenson, B. L. 1981. Reproductive ecology of and response to disturbance by Common Loons in Maine. MS Thesis, University of Maine at Orono, USA.

Clay, D. and H. Clay. 1997. Reproductive success of the Common Loon, *Gavia immer*, on a small oligotrophic lake in eastern Canada. Canadian Field-Naturalist 111:586-590.

Cole, G. A. 1994. Textbook of limnology. Fourth Edition. Waveland Press, Inc. Prospect Heights, Ill. :134-135.

Croskery, P. R. 1991. Common Loon, *Gavia immer*, nesting success and young survival in northwestern Ontario. Canadian Field-Naturalist 105:45-48.

DeSorbo, C.R., Taylor, K.M., Kramar, D.E., Fair, J., Cooley Jr, J.H., Evers, D.C., Hanson, W., Vogel, H.S., Atwood, J.L. 2007. Reproductive advantages of common loons using rafts. Journal of Wildlife Management 71 (4):1206-1213.

DeSorbo, C. R., J. Fair, K. Taylor, W. Hanson, D. C. Evers, H. S. Vogel, and J. H. Cooley Jr. 2008. Guidelines for constructing and deploying common loon nesting rafts. Northeastern Naturalist. 15 (1): 85-86.

Dolan, P. M. 1994. The Common Loon (*Gavia immer*) in the northern region: biology and management recommendations. USDA Forest Service, Region 1, Missoula, MT.

Evers, D. C. 2007. Status assessment and conservation plan for the Common Loon (*Gavia immer*) in North America. BRI Report 2007-20. U.S. Fish and Wildlife Service, Hadley, MA.

Evers, D. C. 2002. Aspects of hydrological impacts on the common loon at Lake Umbagog, BRI report 2002-09, submitted to U.S. Fish and Wildlife Service 1976-99. Biodiversity Research Institute, Falmouth, Maine.

Evers, D. C. 2001. Common Loon population studies: Continental mercury patterns and breeding territory philopatry. PhD Dissertation, University of Minnesota, Minnesota.

Evers, D. C. 1992. A replicable capture method for adult and juvenile common loons on their nesting lakes. Pp. 214-220 NALF Proceedings. L. Morse, S. Stockwell, and M. Pokras (eds.) Proceedings 1992 Conference: Loon and its ecosystem.

Fair, J.S. 1979. Water-level fluctuations and common loon nest failure. S. A. Sutcliffe (Ed). Proceedings of the Second North American Conference on Common Loon Research and Management. National Audubon Society. Syracuse, NY. 57-63.

Franklin A. B., D. R. Anderson, R. J. Gutierrez, K. P Burnham. 2000. Climate, habitat quality, and fitness in northern spotted owl populations in northwestern California. Ecological Monographs 70:539-590.

Hammond, C. A. M. 2008. A demographic and landscape analysis for common loons in northwest Montana. MS Thesis, University of Montana, Missoula, Montana.

Heimberger, M., D. Euler, and J. Barr. 1983. The impact of cottage development on common loon reproductive success in Central Ontario. Wilson Bull., 95(3):431-439.

Kelly, L. 1992. The effects of human disturbance on Common Loon productivity in northwestern Montana. MS Thesis, Montana State University, Bozeman, Montana.

Mager III, J. N., Walcott, C, and Piper, W. H. 2008. Nest platforms increase aggressive behavior in common loons. Naturwissenschaften 95:141-147.

McIntyre, J.W. 1983. Nurseries: a consideration of habitat requirements during the early chick-rearing period in Common Loons. Journal of Field Ornithology 54:247-253.

McIntyre, J.W. 1988. The Common Loon: Spirit of Northern Lakes. University of Minnesota Press, Minneapolis. 228 pp.

McIntyre, J. W. and J. F. Barr. 1997. Common Loon (*Gavia immer*). In The Birds of North America, No. 313 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D. C.

McIntyre, J. W. and D.C. Evers (eds.). 2000. Loons: Old history and new findings. Proceedings of a Symposium from the 1997 meeting, American Ornithologists' Union. North American Loon Fund, Holderness, N.H.

McIntyre, J. W. and J. E. Mathisen. 1997. Artificial islands as nest sites for common loons. Journal of Wildlife Management 41(2):317-319.

Mehlman, D. W. 1997. Change in avian abundance across the geographic range in response to environmental change. Ecological Applications. 7(2):614-624.

Morris, W. F. and D. F. Doak. 2002. Quantitative conservation biology: theory and practice population viability analysis. Sinauer Associates, Sutherland, Massachusetts, USA. 480pp.

Nesser, J. A., G. L. Ford, C. L. Maynard, and D. S. Page-Dumroese. 1997. Ecological Unit Subsections. United States Forest Service Northern Region, Ogden, UT.

Newbrey, J. L. 2002. Effect of lake characteristics and human disturbance on lacustrine habitat selection by piscivorous birds in northern Wisconsin. MS Thesis, University of Wisconsin-Stevens Point, Stevens Point, Wisconsin.

Olson, S. T. and W. H. Marshall. 1952. The Common Loon in Minnesota. Minnesota Museum of Natural History. University of Minnesota. Occasional Papers: Number 5. 73 pp.

Parker, K. E. 1988. Common loon reproduction and chick feeding on acidified lakes in the Adirondack Park, New York. Canadian Journal of Zoology 66:804-810.

Paruk, J. D., D. McCormick, and D. Evers. 2000. Primer on Population Dynamics of Common Loons (Gavia immer) in the Upper Peninsula, Michigan. Report BRI 2000-04 submitted to The North American Loon Fund. BioDiversity Research Institute, Falmouth, Maine.

Paugh, J. I. 2006. Common Loon nesting ecology in northwest Montana. MS Thesis, Montana State University, Bozeman, MT.

Piper, W. H., M. W. Meyer, M. Klich, K. B. Tischler, and A. Dolsen. 2002. Floating platforms increase reproductive success of common loons. Biological Conservation 104:199-203.

Pulliam, H. R. and B. J. Danielson. 1991. Sources, sinks, and habitat selection: A landscape perspective on population dynamics. American Naturalist 137:S50-S66.

Reiser, M. H. 1988. Effects of regulated lake levels on the reproductive success, distribution, and abundance of the aquatic bird community in Voyageurs National Park, Minnesota. US Department of the Interior, National Park Service, Omaha, NB. Research/Resources Management Report MWR-13.

Sauer, J. R., J. E. Hines, G. Gough, I. Thomas, and B. G. Peterjohn. 1997. The North American Breeding Bird Survey results and analysis. Version 96.3. Patuxent Wildlife Research Center, Laurel, Maryland, USA.

Savoy, L. 2004. Summary of capture & banding efforts and methylmercury exposure to Montana's breeding Common Loon population. Report BRI 2004-08 BioDiversity Research Institute, Gorham, ME, USA.

Skaar, D. 1991. Monitoring and protection efforts for loons on four lakes on the Fortine Ranger District. North American Loon Fund, Kootenai National Forest, Montana Department of Fish, Wildlife and Parks. 35 pp.

Skaar, D. 1990. Montana Common Loon Management Plan. U. S. Forest Service, Flathead National Forest, Kalispell, MT, USA.

Strahler, A. N. 1981. Physical Geology. Harper & Row, New York. pp 468-473.

Strong, P. 1987. Reuse of nesting and nursery areas by Common Loons. Journal of Wildlife Management 51:123-127.

Strong, P. 1985. Habitat selection by Common Loons. PhD Dissertation, University of Maine, Maine.

Sutcliffe, S. A. 1980. Aspects of nesting ecology of Common Loons in New Hampshire. MS Thesis, University of New Hampshire, Durham, NH.

Taylor, J. 2001. 2001 Idaho panhandle loon survey. Unpubl. Report, Idaho Panhandle National Forests, Coeur d'Alene, Idaho.

Titus, J. R., and L. W. VanDruff. 1981. Response of the common loon to recreational pressure in the Boundary Waters Canoe Area, northeastern Minnesota. Wildlife Monographs 79:5-59.

Vermeer, K. 1973. Some aspects of the nesting requirements of common loons in Alberta. Wilson Bulletin 85:429-435.

Yonge, K.S. 1981. The breeding cycle and annual production of the common loon (*Gavia immer)* in the boreal forest region. M.S. Thesis. University of Manitoba, Winnipeg.

APPENDIX A:
Lake/Territory List with Classification and Area Coordinators

The Montana Common Loon Working Group (CLWG) divided range of Montana's loons into Coordinator Areas to facilitate efforts such as data collection, habitat management, and public education. These 16 areas (Figure A) have from four to 60 lakes. Some areas (such as Murphy Lake Ranger District and Tally-Stillwater) support numerous high-quality loon nesting lakes. Other areas (such as the Lower Clark Fork and the Blackfeet Indian Reservation) primarily provide staging lakes most important for loons migrating between their nesting lakes in Canada and wintering areas.

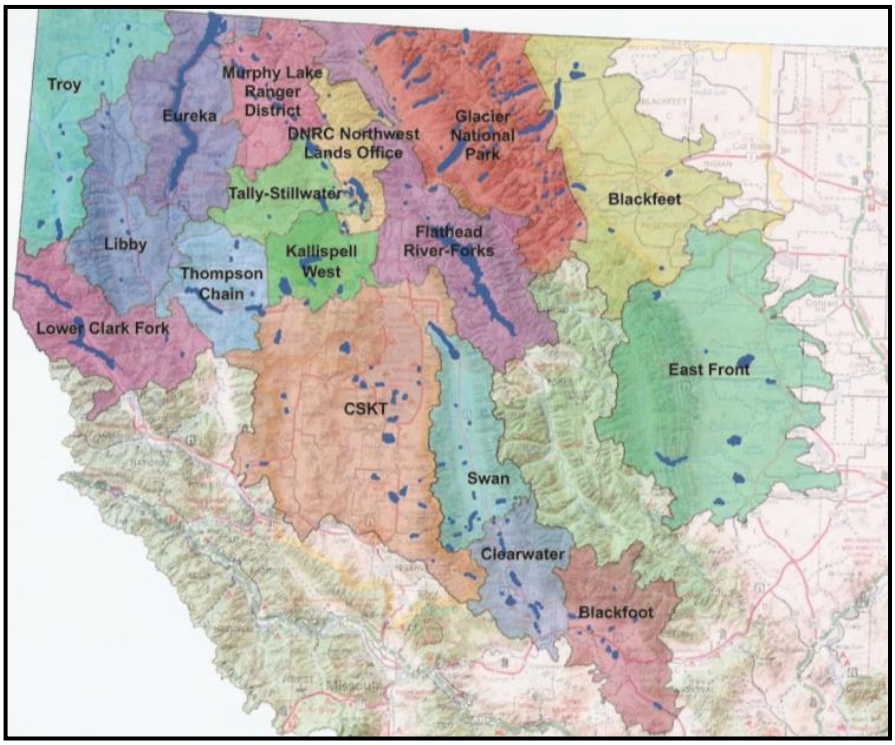


Figure A. Common Loon Monitoring Lakes and Coordinator Areas

To characterize lakes used or potentially used by common loons and to help prioritize management and conservation, the CLWG maintains a classification system for every lake for which loon data has been collected. Where more than one territory occupies a lake, each territory is classified separately. These codes, modified from Skaar (1990), are based primarily on how loons currently use a lake or have used that lake in the past 20 to 25 years. These codes are reviewed and modified every few years depending on changes in loon activities or habitat quality.

If a lake or territory has a site-specific management plan, its name will be an underlined hyperlink to that plan.

Surveys (See Appendix E)

None: No standardized survey is expected.

May/July: Survey is warranted in both May (nesting pairs) and July (nesting pairs and chicks) each year, although additional surveys may be done.

July Only: A survey is only expected in July (nesting pairs and chicks), although additional surveys may be done.

Nesting Code

A: Territorial Lake. Nesting has occurred or was attempted in the last five years.

B: Territorial Lake, but nesting has not been attempted in the last five years. Either old nesting records exist or a territorial pair has occupied the lake during the nesting season.

C: Not a territorial or nesting lake at this time and the lake meets criteria for nesting (under 5000 feet elevation, over 13 acres (5.4 hectares), and having shoreline habitat).

D: Not a territorial or potential breeding lake due to various considerations. These include high levels of human disturbance, lake size too small, lakes at elevations over 5000 feet (1525 m), etc.

E: Nesting status undetermined.

Nesting-season Foraging Code

F1: Critical nesting-season foraging habitat, whether or not used for nesting.

F2: Frequently used by loons for nesting-season foraging but apparently not critical foraging habitat. Observations of loons occur 50% or more of the years surveyed but are not likely a nearby nesting pair. May be a "singles" lake or a reservoir. Not used for nesting.

F3: Singles or pairs of common loons foraging less than 50% of the years where observations were made. Not used for nesting.

F4: Unknown foraging use. May or may not be a nesting lake.

Migratory Code

M1: Known migratory lake or reservoir where 10 or more loons observed in any one day in the migration season (generally from late March to April or during September or October).

M2: Known migratory lake or reservoir where singles or small groups of loons (usually fewer than 10) are observed during the migration season.

M3: Not known to be used as a migratory stop-over or staging area.

Probability of Occupancy (Hammond 2008)

Probabilities of occupancy are intended to help prioritize efforts to protect lakes. These numbers represent probabilities from 1 to 100%. Research indicated the most influential factors on territorial occupancy of common loons in Montana were the abundance of feeding lakes within 6 miles (10 km) and the number of territorial pairs within 6 miles (10 km). Occupied lakes with higher probabilities have the greatest chance of remaining occupied by loons and producing offspring and thus these lakes are a high conservation priority. An occupied lake with a low probability is also a high conservation priority because if the lake becomes unoccupied the chances of a territorial pair reoccupying that lake appear to be low. For example if a lake receives a nesting code of A, but only has a probability of 24% it means that maintaining nesting on that lake is vitally important because the density of loons in the area is not adequate to reoccupy the lake should it become unoccupied. Some lakes were given codes instead of numbers (**R** = Reservoir, **S** = Size too small, **E** = Elevation, **NA** = Not Analyzed).

Eureka Area: *Ellen Sullivan*

Eureka Ranger Station, Kootenai National Forest, PO Box 1712, Eureka, MT 59917, (406) 296-2536, easullivan @ fs.fed.us

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Carpenter (Tetrault)	May & July	B	F2	M3	50%
Costich	May & July	B	F2	M3	15%
Grob	May & July	E	F4	M3	6%
Koocanusa Reservoir (Big Creek to Ziegler)	May & July	E	F2	M1	R
Koocanusa Reservoir (Bridge North)	May & July	E	F2	M1	R
Koocanusa Reservoir (Bridge South)	May & July	E	F2	M1	R
Koocanusa Reservoir (South of Zeigler Mt)	May & July	E	F2	M1	R
Moran	May & July	B	F2	M3	18%
Sophie	May & July	B	F2	M3	26%
Swisher	None	D	F4	M3	S

Libby Area: *Jenny Holifield*

Libby Ranger Station, Kootenai National Forest, 31374 US Highway 2, Libby, MT 59923, (406) 293-6211, jholifield @ fs.fed.us

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Double N	May & July	A	F1	M3	54%
Howard	May & July	C	F3	M3	49%
Kessler	May & July	A	F1	M3	50%
Koocanusa Reservoir (Dam North to Ziegler Mtn)	July only	D	F2	M2	R
Loon (Pipe Creek)	May & July	C	F3	M3	46%
Lower Geiger	July only	D	F3	M3	E
Rainbow (Libby area)	May & July	C	F3	M3	46%

Troy: *Mandy Rockwell*

Three Rivers Ranger District, Kootenai National Forest, 1437 North Highway 2, Troy, MT, 59935, (406) 295-7463, mrockwell @ fs.fed.us

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Alvord	May & July	A	F1	M3	23%
Bull (Libby)	May & July	B	F3	M3	42%
Fish Lakes (by Vinal Cr.)	May & July	D	F2	M3	47%
Grouse	None	D	F4	M3	S
Hardy Ponds	May & July	B	F2	M3	S
Hoskins	May & July	A	F1	M3	50%
Kilbrennan	May & July	A	F1	M3	54%
Milnor	None	D	F4	M3	40%
Okaga	May & July	A	F1	M3	50%
Rene	May & July	A	F1	M3	50%
Savage	May & July	D	F3	M3	39%
Skinner	May & July	D	F3	M3	50%
Spar	None	D	F4	M3	49%
Vinal	May & July	D	F2	M3	62%

Murphy Lake Ranger District: *Christie Ferruzzi*

Murphy Lake Ranger Station, Kootenai National Forest, Box 116, Fortine, MT 59918, (406) 882-8327, cferruzzi @ fs.fed.us

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Big Therriault	July only	B	F1	M3	E
Black	May & July	B	F2	M3	13%
Blue (Stryker)	May & July	B	F2	M3	S
Bull (Stryker)	May & July	A	F1	M2	79%
Burnt	July only	D	F3	M3	S
Dickey	May & July	A	F1	M1	84%
Dudley Slough	July only	D	F3	M3	S
Fire	July only	D	F2	M3	S
Fish (by Bull/Stryker Lake)	May & July	B	F1	M3	76%
Frank	May & July	A	F1	M3	28%
Glen	May & July	B	F1	M3	28%
Lick	May & July	A	F1	M3	30%
Little Therriault	July only	D	F2	M3	E
Long	July only	D	F3	M3	42%
Loon (Trego)	May & July	A	F1	M3	73%
Loon's Echo (Gayle's) Pond	May & July	A	F1	M3	76%
Lost	May & July	C	F3	M3	45%
Lower Sunday	May & July	C	F2	M3	S
Marl	May & July	A	F1	M3	64%
Martin	May & July	A	F1	M3	84%
Murphy	May & July	A	F1	M3	84%
Rattlebone	July only	D	F3	M3	S
Rock	May & July	C	F3	M3	28%
Smokey	July only	D	F3	M3	S
Thirsty	July only	D	F3	M3	28%
Timber	May & July	B	F1	M3	28%
Upper Sunday	None	D	F3	M3	S
Weasel	July only	D	F2	M3	E

Kalispell West: *Gael Bissell*

Montana Fish, Wildlife and Parks, 490 N. Meridian Rd., Kalispell, MT 59901, (406) 751-4580, gbissell @ mt.gov

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Ashley/Causeway	May & July	A	F1	M2	79%
Ashley/East	May & July	A	F1	M2	79%
Ashley/South	May & July	A	F1	M2	79%
Ashley/Dam	May & July	A	F1	M2	79%
Dahl	May & July	C	F3	M3	50%
Foys	Often in April	D	F4	M1	39%
Lake Monroe	May & July	A	F1	M3	82%
Lake Rogers	May & July	A	F1	M2	51%
Little Bitterroot	May & July	B	F2	M2	82%
Lone	May & July	A	F1	M3	86%
Smith (Kila)	None	E	F4	M2	47%

Thompson Chain: *Gael Bissell*

Montana Fish, Wildlife and Parks, 490 N. Meridian Rd., Kalispell, MT 59901, (406) 751-4580, gbissell @ mt.gov

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Banana	None	D	F4	M3	S
Cad	None	C	F4	M3	S
Cibid	None	C	F4	M3	S
Crystal (TCL)	May & July	C	F3	M3	44%
Fishtrap	May & July	B	F3	M3	49%
Horseshoe (TCL)	May & July	B	F3	M3	36%
Island	May & July	A	F1	M2	46%
Lake Lavon	None	D	F4	M3	S
Leon	None	D	F4	M3	36%
Lillypad	None	D	F4	M3	S
Little McGregor	May & July	C	F2	M2	32%
Loon (Hwy. 2)	May & July	B	F2	M2	36%
Lost	None	C	F3	M3	36%
Lower Thompson	May & July	A	F1	M3	40%
Lynch	May & July	B	F1	M3	58%
McGregor	May & July	B	F2	M2	47%
Middle Thompson	May & July	C	F1	M2	44%
Pearson Reservoir	None	C	F4	M3	R
Topless	None	D	F4	M3	S
Upper Thompson/East Lobe	May & July	A	F1	M3	40%
Upper Thompson/Middle Lobe	May & July	A	F1	M3	40%
Upper Thompson/West Lobe	May & July	A	F1	M3	40%

DNRC NW Land Office: *Garrett Schairer*

Department of Natural Resources and Conservation, NW Land Office, Highway 93 N, Kalispell, MT 59901, (406) 751-2258, gschairer @mt.gov

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Baney	None	D	F3	M3	S
Beaver	May/July	A	F1	M3	64%
Bowser	None	D	F3	M3	S
Boyle	May/July	A	F1	M3	52%
Cliff	None	D	F3	M3	S
Cyclone	May/July	A	F1	M3	62%
Dollar	May/July	C	F4	M3	S
Little Beaver	May/July	B	F1	M3	56%
Lore	None	D	F3	M3	R
Meadow	May/July	A	F1	M3	S
Murray	May/July	C	F4	M3	64%
Northwestern	None	D	F3	M3	S
Rainbow Lake (Stillwater)	None	D	F4	M3	S
Smith (near Whitefish Lake)	None	E	F4	M3	57%
Upper Whitefish	May/July	A	F1	M3	46%
Whitefish	None	C	F3	M2	62%
Wood	None	D	F4	M3	S
Woods	May/July	C	F4	M3	56%

Tally-Stillwater: *Amy Jacobs*

Tally Lake Ranger District, Flathead National Forest, 650 Wolfpack Way, Kalispell, MT 59901, (406) 758-3544, ajacobs @ fs.fed.us

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Blanchard	May/July	A	F1	M3	40%
Bootjack	May/July	A	F1	M3	52%
Chinook	July Only	B	F3	M3	S
Dog	May/July	A	F1	M2	63%
Finger	May/July	A	F1	M3	63%
Fish (by Stillwater River)	None	D	F3	M3	S
Hole in the Wall	None	D	F3	M3	S
Lagoni	May/July	C	F2	M3	76%
Lost Coon	May/July	A	F1	M3	48%
Lower Stillwater	May/July	A	F1	M1	63%
Lupine	None	D	F3	M3	S
Middle Stillwater	May/July	A	F1	M3	73%
Skyles	May/July	C	F2	M3	56%
Spencer	May/July	C	F2	M3	67%
Sylvia	None	D	F3	M3	E
Tally/North	May/July	B	F1	M2	51%
Tally/South	May/July	A	F1	M2	51%
Upper Stillwater/Middle	May/July	A	F1	M1	74%
Upper Stillwater /North	May/July	A	F1	M1	74%
Upper Stillwater/South	May/July	A	F1	M1	74%

Flathead River-Forks: *Angela Daenzer*

Hungry Horse/Spotted Bear/Glacier View Ranger Districts, Flathead National Forest, 8975 Highway 2 E., Hungry Horse, MT, 59919, (406) 837-3804, adaenzer @ fs.fed.us

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Bailey	May/July	D	F1	M3	59%
Cedar Creek Reservoir	May/July	A	F1	M3	47%
Garnet (Mud)	May/July	A	F1	M3	54%
Half Moon	May/July	B	F1	M3	47%
Handkerchief	None	C	F4	M3	49%
Hungry Horse Reservoir	None	D	F3	M2	R
Lake Five	None	D	F3	M3	51%
Lion	May/July	D	F2	M3	54%
Red Meadow	None	D	F3	M3	E
Spoon	May/July	A	F1	M2	47%
Stanton	May/July	A	F1	M3	49%
Teepee	May/July	A	F1	M2	54%

Swan Valley: *Jane Ingebretson*

Swan Lake Ranger District, Flathead National Forest, 200 Ranger Station Rd, Bigfork, MT 59911, (406) 837-7539, jmingebretson @ fs.fed.us

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Bunyan	May/July	E	F2	M3	E
Crescent	July only	E	F4	M3	E
Crystal (Swan)	May/July	B	F2	M3	1%
Cygnet	May/July	B	F2	M3	44%
Glacier	May/July	B	F2	M3	E
Gray Wolf	July only	D	F4	M3	E
Holland	May/July	B	F2	M3	55%
Horseshoe Lake (Ferndale)	None	D	F3	M3	34%
Lindbergh	May/July	B	F1	M3	40%
Loon (Ferndale)	None	D	F3	M3	28%
Loon (Kraft Cr. Rd.)	May/July	A	F1	M3	11%
Lower Cold	July	D	F3	M3	E
Metcalf	July only	E	F4	M3	47%
Peck	May/July	B	F2	M3	20%
Pierce	May/July	A	F1	M3	63%
Shay	May/July	B	F2	M3	18%
Stoner	July only	D	F3	M3	50%
Swan (north)	May/July	A	F1	M3	32%
Swan (south)	May/July	A	F1	M3	32%
Tranquility	July only	E	F4	M3	S
Upper Cold	None	D	F2	M3	E
Upper Holland	July only	D	F2	M3	E
Van	May/July	A	F1	M3	29%

Clearwater River Drainage: *Scott Tomson*

Seeley Lake Ranger District, Lolo National Forest, Seeley Lake, MT 59868, (406) 677-3925, stomson @ fs.fed.us

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Big Sky (Fish)	May/July	B	F2	M3	47%
Clearwater	May/July	B	F2	M3	70%
Elbow	None	D	F3	M3	29%
Harpers	May/July	D	F2	M3	29%
Hidden (by Placid Creek)	None	D	F3	M3	66%
Lake Alva	May/July	A	F1	M3	70%
Lake Inez	May/July	B	F2	M3	47%
Marshall	May/July	D	F2	M3	45%
Placid	May/July	A	F1	M3	43%
Rainy	May/July	A	F1	M3	70%
Salmon	May/July	B	F2	M3	44%
Seeley/Middle	May/July	A	F1	M3	51%
Seeley/North	May/July	A	F1	M3	51%
Seeley/South	May/July	A	F1	M3	51%
Summit	May/July	A	F1	M3	60%
Tote Road	May/July	C	F3	M3	52%

Flathead Indian Reservation: *Janene Lichtenberg*

Confederated Salish and Kootenai Tribes, PO Box 278, Pablo, MT 59855, (406) 883-2888 ext. 7291 or (401) 270-3643, janenel @ cskt.org

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Crow Reservoir	May/July	D	F4	M3	R
Flathead Lake – Big Arm	May/July	C	F3	M2	R
Flathead Lake – Blue Bay	May/July	C	F2	M1	R
Flathead Lake – Cat's Bay	May/July	C	F3	M1	R
Flathead Lake – Dayton (Cromwell)	May/July	C	F3	M2	R
Flathead Lake – East Bay	May/July	C	F2	M1	R
Flathead Lake – Elmo	May/July	C	F3	M2	R
Flathead Lake – Melita Island	May/July	C	F3	M2	R
Flathead Lake – Polson Bay	May/July	C	F3	M1	R
Flathead Lake – Wildhorse Island	May/July	C	F3	M2	R
Flathead Lake – Yellow Bay	May/July	C	F3	M1	R
Hubbart Reservoir	None	C	F3	M3	R
Kicking Horse Reservoir	May/July	A	F1	M2	R
Lake Mary Ronan	None	C	F3	M3	49%
Lone Pine Reservoir	None	D	F3	M3	R
Lower Jocko	May/July	C	F3	M3	R
McDonald	May/July	C	F2	M2	R
Mission Reservoir	May/July	B	F3	M2	R
Ninepipe Reservoir	May/July	B	F1	M2	R
Pablo Reservoir	May/July	B	F1	M2	R
Rainbow (Dog)	None	D	F3	M3	48%
St. Mary (near Twin Lakes)	May/July	C	F3	M3	R
Swartz	May/July	D	F3	M3	54%
Twin Lakes	May/July	D	F3	M3	R
Upper Dry Fork Reservoir	None	C	F3	M3	R
Upper Jocko	May/July	C	F2	M3	R

Glacier National Park: *Lisa Bate*

Glacier National Park, PO Box 128, West Glacier, MT 59936, (406) 888-7833, lisa_bate @ nps.gov

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Akokala	July only	B	F1	M3	E
Arrow	July only	B	F2	M3	47%
Avalanche	May/July	C	F2	M3	50%
Bowman	July only	B	F2	M3	56%
Bullhead	May/July	D	F3	M3	E
Cosley	July only	B	F2	M3	25%
Cracker	July only	D	F4	M3	E
Dover Spike	May/July	A	F1	M3	54%
Elizabeth	July only	B	F2	M3	19%
Fish (by McDonald Lake)	May/July	D	F3	M3	S
Fishercap	May/July	C	F3	M3	32%
Glenns	July only	B	F2	M3	22%
Grace	July only	B	F2	M3	33%
Grinnell	May/July	D	F3	M3	49%
Gunsight	July only	D	F4	M3	E

(Glacier National Park, continued)

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Harrison	July only	B	F2	M3	38%
Helen	July only	D	F3	M3	E
Hidden (by Avalanche Lake)	July only	D	F3	M3	E
Hidden Meadow	May/July	A	F1	M3	86%
Howe	May/July	A	F1	M3	71%
Johns	May/July	D	F3	M3	S
Josephine	July only	C	F3	M3	15%
Kintla	July only	B	F2	M2	55%
Kootenai	July only	C	F3	M3	33%
Lake Ellen Wilson	July only	D	F3	M3	E
Lake Frances	July only	D	F3	M3	E
Lake Janet	July only	C	F3	M3	26%
Lake McDonald	May/July	C	F3	M2	50%
Lincoln	July only	D	F3	M3	49%
Logging	May/July	A	F1	M3	76%
Lonely	July only	D	F3	M3	E
Lower Quartz	July only	A	F1	M3	70%
Lower St. Mary	July only	B	F2	M3	43%
Lower Two Medicine	May/July	B	F2	M3	49%
Medicine Grizzly	July only	D	F4	M3	E
Middle Quartz	July only	A	F1	M3	63%
Mokowanis	July only	B	F2	M3	39%
Moskinonge (Waterton NP)	July only	A	F1	M3	N/A
No Name	July only	D	F4	M3	N/A
Old Man	July only	D	F4	M3	E
Poia	July only	D	F4	M3	E
Ptarmigan	July only	D	F4	M3	E
Quartz	July only	B	F2	M3	60%
Red Eagle	July only	B	F2	M3	46%
Redrock	July only	D	F3	M3	E
Rogers (GNP)	July only	B	F2	M3	59%
Running Crane	July only	D	F3	M3	E
Sherburne	May/July	B	F2	M3	29%
Slide	July only	D	F3	M3	E
St. Mary	May/July	C	F3	M2	42%
Stoney Indian	July only	D	F3	M3	E
Swiftcurrent	May/July	B	F2	M3	32%
Swiftcurrent Ridge	July only	D	F3	M3	E
Trout	May/July	A	F1	M3	43%
Two Medicine	May/July	C	F2	M3	49%
Upper Kintla	July only	B	F2	M3	42%
Upper Two Medicine	July only	D	F3	M3	49%
Waterton	July only	B	F2	M3	38%
Windmaker	July only	D	F3	M3	E
Winona (Mud)	May/July	A	F1	M3	73%

Blackfoot River Area Lakes: *Elaine Caton and Jay Kolbe*

Elaine Caton: P.O.B. 92, Ovando, MT 59854, (406) 793-5038, woodpecker @ blackfoot.net, and Jay Kolbe: P.O. Box 1288, Seeley Lake, MT, 59868, (406) 677-0162, jkolbe @ mt.gov

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Bandy Reservoir	May/July	C	F4	M3	R
Browns	May/July	B	F3	M2	36%
Colburn Pond (Hoyt Lake)	May/July	A	F1	M3	44%
Coopers	May/July	C	F2	M3	50%
Doney (Little)	May/July	A	F3	M3	16%
Doney Reservoir (Big)	May/July	A	F1	M3	24%
Evans	None	E	F4	M3	52%
Foote's West Marsh	May/July	E	F4	M3	S
James	May/July	C	F3	M3	48%
Jones	May/July	C	F3	M3	44%
Kleinschmidt	May/July	C	F3	M3	33%
Lahrity	None	D	F4	M3	R
Lake Otatsi	May/July	C	F4	M3	E
Mud	None	D	F4	M3	R
Nevada Creek Reservoir	None	D	F4	M1	R
Rice	May/July	C	F3	M3	S
Shoup	May/July	A	F1	M2	40%
Upsata	May/July	A	F1	M2	36%
Widgeon (Slough)	May/July	C	F4	M3	S

Lower Clark Fork: *Nate Hall*

Avista Corporation, P.O. Box 1469, Noxon, MT 59853, (406) 847-1281, Nate.hall @ avistacorp.com

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Cabinet Gorge	May/July	D	F4	**M1**	R
Miller Lake	May/July	C	F4	M3	S
Noxon Reservoir	May/July	D	F4	**M1**	R
Sylvan Lake	May/July	C	F4	M3	42%

East Front: *Wendy Clark Maples*

Choteau Ranger Station, Lewis and Clark National Forest, PO Box 340, Choteau, MT 59422, (406) 466-5341, wmaples @ fs.fed.us

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Bynum Reservoir	None	D	F4	M2	R
Diversion	None	D	F4	M2	R
Eureka Reservoir	None	D	F4	M2	R
Gibson Reservoir	None	D	F4	M2	R
Lake Frances (East Front)	None	D	F4	M2	?
Nilan Reservoir	None	D	F4	M2	R
Ostle Reservoir (Antelope Butte Lake)	None	D	F4	M2	R
Pishkun Reservoir	May/July	B	F2	M3	R
Willow Creek Reservoir	May/July	B	F2	M3	R

Blackfeet Indian Reservation: *Lou Bruno*

P.O. Box 25, East Glacier, MT 59434, (406) 226-9294, wilderlou @ 3riversdbs.net

Lake/Territory	Surveys?	Nesting	Foraging	Migration	Prob. of Occupancy
Cooper (Minnie White Horse)	July only	E	F4	M3	E
Dancing Winds Pond	July only	E	F4	M3	62%
Dog Gun	July only	E	F4	M2	E
Duck	July only	E	F4	M2	62%
Goose	May/July	B	F2	M2	43%
Green	None	D	F4	M1	14%
Horn	July only	E	F4	M3	N/A
Kipp	None	D	F4	M1	N/A
Lower St. Mary	May/July	B	F2	M2	43%
Lower Two Medicine *	May/July	B	F2	M2	49%
Mission	None	D	F4	M2	N/A
Mitten	None	D	F4	M1	48%
Pike	None	D	F4	M1	19%
Swift Reservoir	None	D	F4	M1	R

* Lower Two Medicine is also on Glacier National Park's coordinator list but it is not on their priority list for survey.

LOON SURVEY AREA COORDINATOR ROLES AND RESPONSIBILITIES

1. **Check Accuracy of Lake/Coordinator List** – Please check your contact information, list of lakes, lake type codes. Contact Amy Jacobs for any changes.

2. **Arrange for coverage of lakes and send out survey forms for May survey** – The first loon surveys of each year should be completed by mid-May (the Saturday closest to May 15th). Approximately 3-4 weeks prior to May 15th, line up people to survey lakes in your area. Each of the surveyors will need to receive a survey form prior to the May survey. The coordinators will need to add maps of the individual lakes to the back of the survey forms prior to mailing them out, or they can instruct the surveyors to draw the lake on the back of the form, including locations for loons, nests, boating activity, etc. Ask the surveyors to return their completed survey form within 1 week after the survey.

3. **Collect survey form for May survey** – You will probably need to follow up with phone calls, etc., to get the information back in a timely manner. This is especially true for the May survey. It is important to know which lakes have nesting pairs so you can start planning which lakes may need signs, public information, etc. On lakes where nesting pairs are indicated, it is a good idea to try to arrange for additional surveys between the mid-May survey and the Loon Day (July) survey to track nesting success and any possible disturbance.

4. **Monitor need for signs, public education, etc. –** The Area Coordinator will probably be the person who arranges for the placement of signs at boat docks, landings, campgrounds, etc., and who arranges for floating "buoy" signs to be

installed, if needed. Many of these decisions will be based on the information gathered from the May loon survey and from information from surveys in past years.

5. **Arrange observers for Loon Day (July) survey and send out survey forms** – The other "must do" survey for loons is Loon Day, usually the 3rd Saturday in July. Approximately 3-4 weeks before Loon Day, coordinate coverage of each of your lakes and send out survey forms to the surveyors. If you sent out enough forms in the spring to cover BOTH the spring and summer (July Loon Day) surveys, then a quick phone call in early July to confirm that the surveyors will be going to their lakes on Loon Day would be sufficient. Again, it is helpful to remind the surveyors to return their survey forms within one week of conducting the survey. They may also return any other information they have from additional loon surveys at this time.

6. **Gather loon survey information for the season** – Gather all the survey forms; this may require some follow up with phone calls, etc. to clarify the information on the survey forms and to get the forms back in a timely manner!

7. **Enter loon survey data** – Enter the May and July survey results into the Montana Natural Resource Information System database. Contact Amy Jacobs for the password. Click on the "Add or Edit" button, then choose your lake(or part of a lake) from the drop-down menu. To add new data, click the "Add New Survey" button. Try to keep the comments to a minimum.

8. **Mail all survey forms to**: Gael Bissell, 490 N. Meridian Rd., Kalispell, MT., 59901**.** Retain copies for yourself!

9. **Maintain a list of volunteers and other surveyors** you rely on for future use and information.

APPENDIX B:
Best Management Practices for Common Loon Habitat

INTRODUCTION

Public interest in common loon habitat and ecology has increased dramatically during the latter part of the 20th century. The persistence of common loons relies heavily on the public's continued interest as well as their active participation in conservation and management. Wildlife resource agencies and conservation groups have increased their research and management efforts on common loons over the last 20 years. Recognizing the need for collaboration in managing common loons in Montana, a team of biologists from both government and non-government agencies created the Common Loon Working Group (CLWG). They have cooperated with each other locally and nationwide to coordinate common loon inventories, research programs, and other management and educational activities that help maintain common loon habitat in much of its historic range.

The CLWG recognized the potential impacts of ever-increasing human development, recreational activities, and forest management activities may be having on common loon populations. In response to this concern the CLWG has developed a set of voluntary **Best Management Practices** (BMPs) to guide activities that could affect Montana's common loons or their habitat. The CLWG used information gathered from 20 years of loon monitoring throughout western Montana; the results and management implications from several Master's theses, research results on breeding common loons in Montana and other states from the 1980s through 2008, the recommendations and conclusions of the Conservation Plan for Common Loons in Montana, and 10 years of cooperative work together as diverse members of the CLWG.

Objectives of the BMPs are to 1) avoid disturbing loons during territory establishment, breeding, nesting, brood rearing, and at key foraging sites, and 2) avoid altering the habitat at or adjacent to known, suspected, and potential nest sites and important brood rearing sites.

These BMPs are general guidelines that will help a landowner or land manager evaluate both direct and cumulative effects of potential new activities on common loons and their habitat. Evaluating which guidelines provide the best conservation for a proposed activity are best reviewed during the planning process and incorporated as part of the final proposed action.

Why Do Common Loons Need Our Help?

As described in the Conservation Plan for Common Loons in Montana, human activities can cause short-term and long-term effects to individuals as well as the entire population. Many human activities can take place near or in common loon habitat that will not have any discernable impact on common loons or their habitat, depending on the activity, the timing of that activity, and how it might affect loon habitat. However, activities that generally occur close to common loon nesting, brood rearing, or key foraging sites can affect subsequent loon nesting success, not only for the current year, but possibly for many future years. Some of these activities include, but are not limited to water recreation, boats, canoes, and kayaks spending too

much time close to a nest, building and development in, on, or near nesting habitat, and the operation of loud equipment in close proximity to nesting loons. Any single activity or a combination of activities could have a significant or irreversible effect to common loon productivity and common loon habitats.

What Lakes Should Follow BMPs?

More than 300 Montana lakes with known or potential value for nesting, foraging, and migration were classified and coded by the CLWG (Appendix A). The following BMPs are organized in the context of these loon lake classifications or codes as described in Appendix A. The recommended BMPs depend on both the importance of that lake to loons and the nature, duration, and timing of that activity. If an activity is near a lake and not on this list, these common loon BMPs would probably not apply. However, if an activity is near a private or unnamed lake for which we have no data, we suggest you check with the local loon coordinator (Figure 1 and Appendix A) to be sure the lake is not an unsurveyed lake or pond. Many relatively small private ponds or lakes are not surveyed due to lack of access. Loon lakes are typically greater than 13 acres (5.4 hectares), but loons have nested on very small (<10 acres) potholes or wetlands in Montana in the past.

What Types of Activities Are Covered by BMPs?

We describe BMPs for forest management activities, subdivisions, construction, and the development of recreational sites or services. Forest management activities include, but are not limited to roads (construction, drainage, use, maintenance, etc.), timber harvest (erosion control, helicopter logging, and other alternate methods), trails, fire prevention and suppression (thinning, helicopter use, etc.), and future land use considerations. Other activities include, but are not limited to subdividing land, splitting existing lots, roads, docks (public and private), boat ramps, campsites, campgrounds, fishing access sites, and all the associated or subsequent activities related to or resulting from the above.

Is a Site Specific Management Plan Available or is More Information Needed?

If a proposed action is within ¼ mile of one of one of these classified loon lakes, particularly a nesting lakes coded "A" or "B", determine if a Specific Lake Management Plan already exists for that lake or territory (Appendix A). If one exists, that Plan should provide the best information about that lake or territory and provide the context and appropriate BMPs or management actions needed to protect common loon habitat. Work with the area coordinator (Figure 1 and Appendix A) and others to apply the BMPs in the plan to address the specific situation.

If a Site Specific Management Plan does ***not*** exist, we propose that the landowner, land manager, or community work together with the appropriate members of the CLWG to develop a detailed and effective Site Specific Management Plan using the history of loon activity on that lake, the nesting, brood-rearing, and foraging habits of the potentially affected loon pair(s), history of disturbance, these BMPs, and other information and tools relevant to maintaining habitat quality and reproductive success. This Site Specific Management Plan would be reviewed and approved

by the CLWG when completed. Instructions and examples for Site Specific Management Plans are provided in Appendix C. It might take members of the CLWG and others 60 days to develop a workable Site Specific Management Plan.

Obtain Relevant Site Specific Information MNHP/Coordinate with CLWG Coordinator

To obtain, or understand the specific nesting, foraging, or migration information for a specific site/lake/territory, you can do the following:

1. Obtain additional information on common loon nesting sites, historical use, brood-rearing, and production information for that lake or territory by first making a specific request to the Montana Natural Heritage Program or their Helena office at 406-444-5354. This request will need to be by lake name or territory name but must also include section, township, range, drainage, county, or other coordinate system.

2. Work with the local CLWG coordinator. The request for more detailed information through the Montana Natural Heritage Program will also be forwarded to the appropriate CLWG coordinator for that lake or territory. This individual will then help interpret the available historic and biological information, the application of the recommendations in the Lake Site Specific Management Plan (if one exists), the actual development of a Lake Site Specific Management Plan, and/or the application of the recommended BMPs.

RECOMMENDED BEST MANAGEMENT PRACTICES

These BMPs offer guidance to landowners, land managers, planners, or others who are considering activities listed in the introduction on or near an important loon lake or territory. In addition, these BMPs offer guidance to management agencies regulating and/or planning for these activities on loon lakes and to agencies or their entities planning or considering projects on public lakeshores and/or projects that would provide or change public access to loon lakes. These considerations apply to activities including but not limited to existing and planned features such as shoreline trails, campgrounds, picnic sites, boat ramps, fishing or boat docks, road access to recreational developments/features, and new or increased access to remote and/or previously inaccessible lakes.

If a land activity has already occurred within ¼ mile from one of these loon lakes, we recommend a review of any known past habitat or lakeshore changes to see if this activity has already had effects on that lake or territory habitat. This will help identify what actions, if any, to consider as part of the proposed project to avoid, reduce, or offset some of these already existing effects.

The following BMPs focus on minimizing changes to natural vegetation and shorelines that are part of important loon habitats and avoiding disturbances during the loon's critical or sensitive life stages (nesting and brood-rearing).

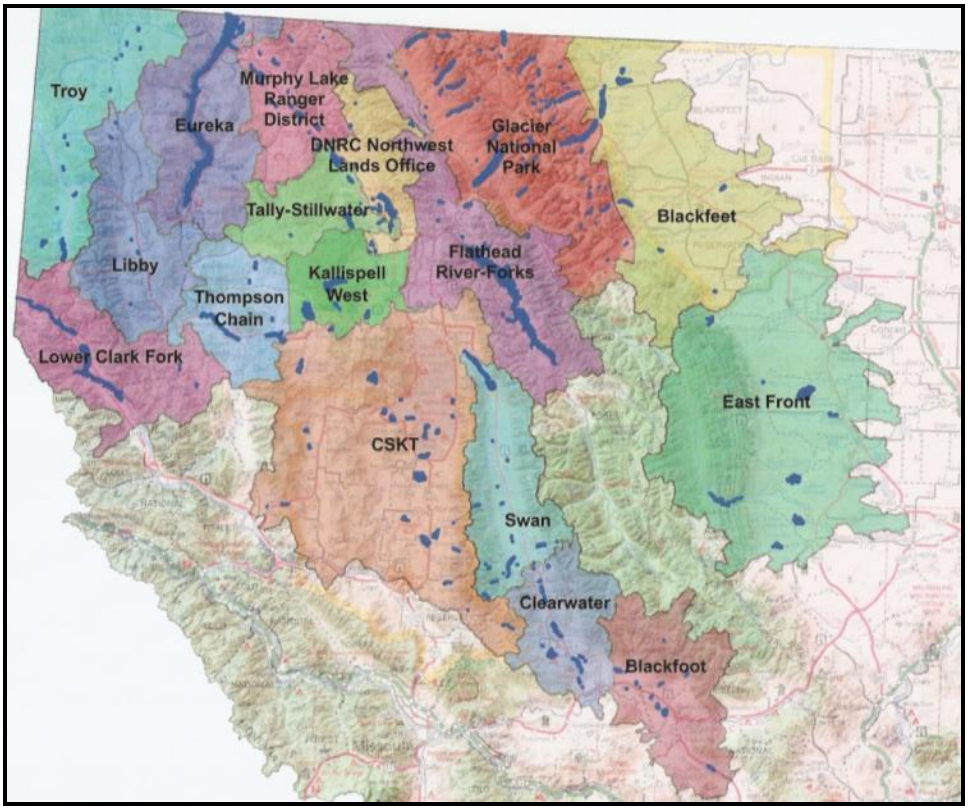


Figure 1. Common Loon Survey/Coordinator Areas (also see Appendix A).

Step 1: Evaluate proximity of proposed activities to important loon territories or lakes.

If proposed activity is within ¼ mile of a classified loon lake or territory listed in Appendix A or based on information from landowner, Montana Natural Heritage Program, or other source……. **Go to Step 2.**

If the action is proposed to occur on a lake in a remote area or on a lake not accessible by road, or outside of the generally surveyed area of northwest Montana (Figure 1), then obtain a site evaluation by a qualified biologist or by the appropriate member of the CLWG to determine if the lake may provide habitat for common loons.

If the action is proposed to occur on a lake with no road access, or outside of survey area in northwest Montana (Figure 1), then obtain a on site evaluation by a qualified ornithologist and /or the appropriate member of the CLWG to determine if the lake is being used or has the potential to be used by loons.

If the activity will not affect a loon lake……..**Go to Step 6.**

Step 2: Review Loon Lake Classification Codes (Appendix A) for those lakes/territories that fall within ¼ mile of proposed activity.

The CLWG members have classified approximately 150 lakes in northwest Montana according to their importantance for common loons. There are different classification codes for nesting, foraging, and migration; the various codes reflect the relative importance of that lake or territory to loons in Montana.

If the activity falls within ¼ mile of a lake coded A, B or F1, go to **Step 3.**

If the lake is not listed or associated with codes A, B or F1, go to **Step 5**.

Step 3: Proposed Activities on Lakes coded A, B, or F1.

Obtain additional information on loon use of lakes adjacent to the activity from an area coordinator (Appendix A) or the Montana Natural Heritage Program. The area coordinator can provide you with a copy of a Site Specific Management Plan, if one is available. Review the plan and relevant biological information with the appropriate CLWG coordinator or other CLWG members. The Site Specific Management Plan has already adapted the BMPs to the specific loon lake or territory based on local knowledge and breeding history and land uses. If a Site Specific Management Plan is not completed, consider supporting the development of one for that territory or lake. If a lake or territory Site Specific Management Plan is deemed unnecessary for the proposed activity, review and adapt/apply the following BMPs. This application of the BMPs would be termed a single forest activity implementation plan and it would be applied to that single activity.

a. Avoid activity within ¼ mile of A, B, and F1 lakes or territories during critical breeding season times Compare timing and distance of proposed activities to potential loon reproductive or foraging timeframes listed below and determine if the proposed forest management activity can be undertaken outside loon nesting, brood rearing, and foraging seasons.

- **Nest Sites Selection and Nesting:** Avoid activities from ice-out **~April 1 to June 15th:** Nesting sites are typically sheltered shorelines of islands, bays, peninsulas, and wetlands.

- **Brood-rearing areas:** Avoid activities near brood-rearing areas from **May 28-July 15th** unless reproduction has completely failed. If the nest has failed or chicks hatched and have been lost and the pair has not re-nested, the time restrictions would no longer apply for that season. Brood-rearing areas usually consist of shallow bays and shorelines commonly used by a loon family during the 4 weeks after chick hatch ~ these dates cover the time frames for first and second nesting attempts.

- **Key Foraging Sites:** Avoid activities near key adult foraging sites from **~May 1-July 15th** during nest site selection and nesting, and brood-rearing

seasons. Key foraging sites are defined as those portions of a territory or lake often used by nesting adults during incubation and young rearing. These sites may be on nearby lakes or in a different part of the lake/territory from brood rearing or nesting.

b. Avoid intense human activities within appropriate buffers from nest, brood-rearing or key foraging sites. If the activity must occur within ¼ mile of the A, B, or F1 lakes or territories during the nesting season, develop appropriate buffer areas around key loon sites using best available information. This would include information on: whether the activity is in the line of sight of the key area, the potential effects of other ongoing activities, the type of activity, the amount of time the proposed activity would take, anticipated noise levels, human presence on water or shoreline, etc. No activity should occur within these recommended buffers, unless there is mitigating information that allows you to reduce these distances.

- **Nest Sites:** Avoid direct human activity or presence on land or water within 500 ft of an active nest sites.
- **Brood rearing areas**: Avoid direct presence on land or water within 300 ft of brood rearing areas during the brood rearing season.
- **Key Foraging Sites:** Avoid direct presence on land or water within 100 ft from designated foraging sites on F1 lakes.

If proposed activity will ultimately affect current stand and riparian/wetland or shoreline vegetation within recommended buffers of key nest sites, brood rearing areas, and foraging sites on A, B, or F1 lakes……..……**Go to Step 4**

If proposed activity involves either private or public and includes, but is not limited to building a home, commercial enterprise, dock or road access, trail access, boat house on A, B, or F1 lakes……..…….....**Go to Step 5**

If the planning concludes and the CLWG coordinator's evaluation of the available loon information indicates that the proposed activity would affect the lakeshore of a C, D, or E lake or lake with F2 or F3 codes or any other lake including M1, M2, and M3..…….**Go to Step 6**

Step 4: Forest (Vegetative) Management near Lakes or Territories on A, B, or F1 Lakes (if not A, B or F1, go to Step 5)

These assume activity takes place outside nesting season window as listed above (ice out or ~April 1 to July 15th if nesting occurs and chicks hatch).

- Avoid riparian/wetland or upland vegetative disturbances within first 300 feet of nest sites, first 100 feet of brood rearing areas and 50 feet from foraging shorelines. Silvicultural prescriptions beyond these distances of the lakeshores need to consider visual screening and other factors listed below.

- Alternatively, undertake an on-site evaluation with knowledgeable member(s) of CLWG and create an appropriate buffer area with prescriptions around the nest sites, brood rearing areas or foraging sites based on site characteristics, visibility from shoreline or roads, security from predators or dogs, stand characteristics, roads, homes, docks, and other activities in area, etc.

- Consider the current stand condition and the harvest prescription and its potential effect on public access, visibility from roads or a public access site, visibility or vulnerability from proposed or existing developments, etc.

- Determine whether the harvest prescription will affect visual screening of the nest site from various points of view including water and shoreline or if it would provide new access of the site or lake since this could increase recreational use?). Some prescriptions at distances greater than 300 feet could have a disproportionate disturbing affect if the lake is small and isolated.

Step 5: Proposed activities affecting shorelines of lakes with Lake Codes A, B, and F1.

If construction is expected to occur in or near important common loon habitats, consider cluster development on other property rather than placing lots on or adjacent to nest sites, consider land donated (through an easement or other options) to a private conservation or public agency for permanent protection or designation of a permanent park or preserve for the sensitive area. In the case of a community park or preserve, develop a management plan with the appropriate public agency. The following guidelines will help ensure existing and alternative nest sites, brood rearing areas, and important foraging sites will not be abandoned.

- **Nest Sites**

    - Avoid construction of a building, road, trail, public access, dock or any development within 500-feet of existing, historic, and potential nest sites on lakes with a code of A or B.

    - Maintain vegetative integrity along shoreline within that 500 feet buffer by retaining at least 75% of natural vegetation or replanting about 75% of natural vegetation within the first 50 feet of the shoreline. The size of the required buffer may be modified depending on existing shoreline configuration, line of sight from proposed action, nest site cover, history of nest use, nearby land uses, availability of alternative nesting areas, future land uses, etc. The design of the buffer should be undertaken with assistance from the CLWG.

- Limit or minimize the use of private docks, homes, boathouses or construction sites that are in the direct line of sight and within 500 ft (160 m) of active loon nests. Dogs and other pets should not be allowed within 500 feet of nest site occupied by a pair of loons.

- Monitor effects of any human/pet use near or within this buffer area, using loon behavior as a guide to determining whether or not the buffer is adequate. If a human activity, such as walking near the shore or on a dock or docking a boat causes a loon to lower its head (Figure 2) or flush from a nest site, the buffer should be increased. Some degree of a nesting pair's tolerance to human activity may increase during the nesting season if the site becomes more hidden by vegetative growth and by lack of general disturbance within the buffer. If a human activity, such as walking near the shore or on a dock or docking a boat causes an incubating loon to lower its head or for the non-incubating adult to approach the disturbance or if an adult flushes from a nest site, the buffer area should be increased.

Figure 2. A nesting common loon's response to disturbance. Notice the egg in the water to the left of the loon. It is common for eggs to be knocked out of the nest when a disturbed loon is flushed from its nest. For additional photos of loons responses see Appendix E.

- **Brood rearing Habitat and Key Foraging Sites**

  - Avoid construction of a permanent building, road, trail, public access, dock or any development within 50-feet of shoreline that encompasses existing, historic, and potential key adult brood rearing or adult foraging sites on lakes with a code of A or B.

  - Maintain vegetative integrity along shoreline within that 50 feet shoreline buffer by retaining at least 75% of natural vegetation or replanting about 75% of natural vegetation within first 25 feet of the shoreline.

- Retain and protect marsh, emergent, and all wetland vegetation within known brood-rearing areas or along key foraging areas as this provides important buffer from upland activities, helps maintain high water quality, and provides fish and security for young birds and adults. The size of the required buffer may be modified depending on existing shoreline configuration, line of site from proposed action, size of foraging area, history of loon use, effects of nearby land uses, availability of alternative foraging areas, future land uses, etc. The design of the buffer should be undertaken with assistance from the appropriate CLWG members.

Step 6: Activities on all other Loon Lakes (C, D, E, F2-F3, and M1-M3).

The current state or federal forestry rules governing harvests next to water bodies should be adequate to protect water quality and potential future uses of that lake by common loons.

- **Apply Montana Stream Side Management Zone (SMZ) Act (MCA 77-5-301).** The SMZ regulations require a 50 to 100 ft partial harvest retention zone around all streams, lakes and other water bodies depending on slope. Trees retained must be representative of the species and size present in the pre-harvest stand. In practice less than 1/3 of the riparian volume can often be removed. Specific restrictions within SMZ deal with timber harvesting, broadcast burning, road construction, side casting of road materials, equipment operation, slash deposition, and the handling of hazardous and toxic waste.

- For more information please review Montana's Forest Practices.

BMA EVALUATION TOOLS AND CONSIDERATIONS

To evaluate loon sensitivity and/or effectiveness of applied buffers during loon breeding season, look for the following:

- **Active Nest Sites and Brood Rearing Areas**: Loon behavior can help determine if an activity such as a conducting a survey or a machine noise will cause a disturbance to loons during the breeding season that could impact nesting success. During incubation, observe the nesting adults during an everyday activity or during an approach by land or water near an active nest area. At the distance where that activity causes an adult loon to lower its head (Figure 2) is the recommended minimum buffer around that nesting area. The loon lowering its head in this manner is a clear indication that this activity or disturbance is beginning to stress the nesting loon. This behavior may also occur after the chicks hatch. Also, monitor the adult that is not on the nest. Usually the other adult, if on site, is nearby at a lookout area which could possibly be several hundred yards away. At this point the second adult is no longer fishing or resting, but focusing on either the nesting adult, the adult with chicks, humans, or the disturbance. The change in bird behavior at this

distance is also an indication of a buffer area around a nest site or brood rearing area. In both nesting situations and in situations where the chicks have already hatched adults may actually move closer to the boat or person. While approaching loons may show their white belly to display their presence, vocalize with a tremolo to announce they are disturbed or vocalize with a yodel to warn that you are in their territory. This behavior indicates that they want you to leave the area or to cease the activity. In extreme cases of disturbance common loons will surface rush towards the disturbance or rise completely out of the water and charge at the disturbance in what is known as a penguin dance. See Appendix E for photos of loon behaviors.

- **Other Human Activities on Lake:** On lakes that have shoreline development, public boat ramps, and other types of frequent human activity, forestry operations may be able proceed within the ¼ mile buffer especially if out of direct line of sight of nesting, brood rearing, or foraging shorelines. Conversely, on lakes with limited human activity, loons may be more sensitive to activities at greater distances because of a previous lack of human exposure. Monitor loon behavior when humans approach on land along shoreline or from behind the nest. If loons appear sensitive to human presence as stated above at distances greater than 500 ft, avoid any activity in that territory during the nesting or brood-rearing period.

APPENDIX C:
Lake/Site Specific Common Loon Management Plan

OUTLINE

1. Introduction

Site-specific lake management plans are under the umbrella of the *Conservation Plan for the Common Loon in Montana* prepared by Christopher Hammond and the Montana Common Loon Working Group (CLWG). Develop plans in conjunction with the appropriate representative(s) from the CLWG agencies and organizations involved in the Conservation Plan as well as landowners who have knowledge of historic and current concerns for a lake. These include, but are not limited to Montana Fish, Wildlife and Parks, Montana Loon Society, U.S. Forest Service, Plum Creek Timber Company, Montana Department of Natural Resources, U.S. Bureau of Indian Affairs, Montana Natural Heritage Program, and U.S. National Parks Service.

When preparing a plan, first incorporate the Conservation Plan and the Common Loon Working Group. Refer to Best Management Practices (BMPs) of the *Conservation Plan for the Common Loon in Montana*. Identify the reason for writing the site specific management plan. Apply the hazard and conflict ratings for nest areas, primary use areas, and staging areas (see box below). Include the sources of the information and the agencies and administrative units responsible for the plan's implementation. Provide the extent of site-specific information available for the common loon territory. Include an 8 ½ x 11" or larger map of the territory that illustrates observation points, land ownership, roads, public accesses/boat launches, territories and nest sites. Also show important feeding, courtship, and migration-staging areas for loons as well as bald eagle nests and perch trees. If possible use an aerial photo base for the map.

2. Lake History and Background

Provide background information and history. Include land and lakeshore ownership and use patterns. Specifically identify all land owners on the lakeshore that are adjacent to the nest site or that could have potential impact on nesting or chick rearing areas. Include a summary of habitat characteristics of the territory that might be important for common loon management.

3. History of Common Loon Use and Territory Description

Summarize what is known about common loon use on the lake. Include a subsection for each of the following (add additional subsections if relevant), referencing areas noted on the map:

a. Historical Use (including the source and storage location of observation forms and other historical documentation)
b. Habitat Conditions (island characteristics, water depth and quality, lakeshore vegetative cover, etc.)
c. Nest Chronology and Chick Productivity
d. Existing and Alternate Nest Site(s)
e. Pair Behavior – Courtship, Nesting, Chick-rearing, and Feeding
f. Prey (population trends and areas of concentrations of fish, leeches, crawdads, etc.)
g. Predators (bald eagle or raven nests or perches, pike or bass habitat, otters, snapping turtles, etc.)

h. Banding history

4. Potential Conflicts and Human Disturbance

Identify and discuss potential lake and land use conflicts and management problems in the territory. Where appropriate, include a subsection for each of the following (add additional subsections if relevant), referencing areas noted on the map:

a. Shoreline Habitat
b. Special Hazards or Contaminates
c. Fluctuating Water Levels
d. Fisheries Management (rotenone, stocking, spring run-off and water level control, gill netting, etc.)
e. Human Disturbance from Development (existing and potential subdivisions and development, water and sewage systems, campgrounds, boat launches, roads, etc.)
f. Human Recreational Disturbance (motorized watercraft areas and use patterns)
g. Potential Hazard/Conflict Ratings

Potential Hazard Rating (Nesting)

1. Unlikely that the nest will become lost or unsuitable and known alternate nest sites are available; chick-rearing areas have protection from motorized recreation.
2. Likely that the nest will become lost or unsuitable in the foreseeable future, but known alternate nest sites are available; or likely that chick-rearing areas will not have protection from motorized recreation.
3. Nest or nest site is in immediate danger of becoming lost or unsuitable and alternate nest sites are not available; chick-rearing areas do not have protection from motorized recreation.

Potential Conflict Rating (Territorial)

1. Activities that could impact the territory are not occurring now, nor are any planned.
2. Activities that could impact the territory are not occurring now, but are anticipated for the foreseeable future. Examples are new subdivisions, new recreation site, increased watercraft use, road construction or timber harvest.
3. Activities that would impact the territory are occurring or are planned for the immediate future. Examples are new subdivisions, new recreation site, increased watercraft use, road construction or timber harvest.

5. Management Recommendations

Identify specific management direction for the nest site, territory, and lake. Identify what is needed for present and future management, such as nest-site protection, habitat improvement projects, research, land-use coordination, land exchanges, easements, or land purchases (Appendix B). Where appropriate, include a sub-section for each of the following (add additional subsections if relevant):

a. Coordination with Landowners and Resource Managers
b. Nest Site and Nursery Area Protection (dates and location of buoy placement, dates and extents of temporary closures, etc.) (Appendix F)

c. Recommended Monitoring (time periods, loon band identification, spring and summer loon counts, observation forms, and loon database) (Appendix E)
d. Banding Needs (individuals banded)
e. Public Information (Appendix H)
f. Coordination with Fisheries management – netting, surveys, stocking schedules, prey habitat enhancement
g. Recommended Protection of Wildlife and Water Quality by Law Enforcement
h. Recommended Habitat Improvement Projects (nest platforms, dam reinforcement, etc.) (Appendix G)
i. Recommended Land Exchanges, Easements, or Purchases
j. Recommended Research

6. Summary

Provide any additional observations and remarks that may be important for the management or survey of the lake.

7. Author's Name and Date

Include the author's name and date. Also include the author's mailing address, email address, and agency or organization.

8. References Cited

In addition to published information, include file data, personal communications, and other sources of information.

The CLWG recognizes that every lake and territory provides a unique set of management and conservation situations. Site specific management plans are created by area coordinators (Appendix B) and used to address common threats (Appendix B) that face nesting common loons. A plan summarizes common loon use of the lake which allows managers to focus their attention on those circumstances most likely to negatively impact breeding common loons.

EXAMPLE

SITE SPECIFIC LAKE MANAGEMENT PLAN FOR THE COMMON LOON ON DICKEY LAKE, TREGO, MONTANA

1. Introduction

The agencies primarily responsible for implementing this Site Specific Management Plan for Dickey Lake are the USFS and MT FWP.

Dickey Lake has been selected for a site-specific lake management plan because it is an important migration and nesting lake for the common loon. See "Priority Selection for Lake Management Plan" toward the end of this document and reference Best Management Practices (BMP) of the *Conservation Plan for the Common Loon in Montana*.

Common loon studies in the area began in 1982 by Don Skaar and in 1984 by Lynn Kelly. Sources of on-site information are from (Skaar 1991) and (Kelly 1992). Information sources also include common loon management and monitoring by the FS and MLS that has occurred from 1990 to present (2008).

2. Lake History and Background

Dickey Lake is a glacial lake that formed in the Pleistocene Age after the last retreat of glacial ice from the Rocky Mountain Trench (Strahler 1981). It is an oligotrophic lake known for its clean, clear water and emerald blue color. The lake is surrounded by forest land and most of the lakeshore drops abruptly into the water

Dickey Lake is approximately 604 acres and 74 feet deep with a mean depth of 59 feet. It is spring fed, has the main Summit Creek inlet at the east end, several small streams entering along the north edge and the outlet from the southwest Bay of the lake. The outlet water flows into a small pond (Dickey Pond). The pond was previously an old mill pond in the late 1920's and early 1930's and it was formed by damming Dickey Creek.

Dickey Lake is primarily surrounded by FS land although the southwest corner is privately owned. The private land has approximately 20 residences, one bible camp and one family owned campground. There is a FS campground and boat launch at the northwest end and a FS Day Use area midway along the south shore. U.S. Highway 93 runs along the north side of the lake and the old highway road runs right next to the south shore. See map.

Settlement of the lake began in the late 1930's and increased to approximately 4-5 residences in the 1940's. The number of residences increased to approximately 12 in the 1970's and presently in 2008 there are approximately 20. In the 1950's, a road at the north edge of the private land and ran along the flat area of the west shoreline then over toward the outlet and the old Metzner house.

In the 1980's, XXXX XXXXXXX purchased the private land W of the Dickey Lake Bible Camp and surrounding Dickey Pond. Plans were drawn up for condos on this property and a marina at Dickey Pond. This did not happen and the land is now owned by XXXX XXXXXX and partners. No known plans for development exist at this time. In the mid-1990's, the old Metzner house on the north side of Dickey Pond burned down, leaving this area free of any houses.

3. History of Common Loon Use and Territory Description

a. Historical Use

Common loons have historically used this lake for feeding, spring/fall migration staging areas, courtship, nesting and chick-rearing. Loons generally arrive on the lake on the day of ice-out. From 1990-1999, the range of arrival time on the lake was from April 1-29. The average arrival date was April 12.

The common loon feeding area is mostly within 50-75 yards of the shoreline around the whole lake. Adult loons from adjacent lakes use the lake throughout the summer breeding season as well. In the absence of successful nesting on adjacent lakes or in the event of successful nesting when the chicks are large enough to dive on their own, the adult males will fly to adjacent lakes to feed. Single adult loons, and at times another pair, are often seen swimming and diving on Dickey Lake.

The spring/fall migration staging area is along an east/west line in the middle of the lake and parallel to the long north shoreline (more toward the west than east). See map. During this time, there is more feeding and diving in the staging area than at any other time of the season.

Historically, the common loon pair probably had courtship areas near potential nest sites. Common Loon pairs most likely nested where the shoreline was accessible. Flatter beach areas exist along the western shoreline, in the outlet (Bible Camp) bay and in a few places along the south shore. Most of these sites are now occupied by residences, the FS campground, the FS day-use area and the Bible Camp.

Today, the pair primarily uses the area at the east end of the lake as their courtship, nesting and chick-rearing areas. The chick-rearing area is the area behind the sign buoys and extends west along the north shore (outside the buoys). They have continued to use this courtship, nesting and chick rearing area from 1990 until the present.

In the spring of 2000, an adult loon was found dead near the FS overlook on the north shore. The FWP game warden (Jim Roberts) was called and it was determined that the loon had been shot by a 12 year old boy.

A 2nd loon pair nested late on Dickey Pond and successfully hatched chicks the 3rd week in June, 2007. The chick-rearing area was on the pond itself. In the spring of 2008, this pair attempted another nest midway along the N shore of the pond. The courtship and chick rearing areas for this pair are on the pond itself and also extend into the Bible Camp (outlet) bay of Dickey Lake.

Common loon studies in the area began in 1982 by Don Skaar and in 1984 by Lynn Kelly. The source of most of this historical documentation is from loon monitoring, observation forms and Spring and Summer Loon Counts from Christie Ferruzzi, Loon Rangers and Fortine Ranger District biologists from 1989 to the present. The hard-copy documentation resides at the Murphy Lake Ranger Station. Spring and Summer Loon Count Information is in the Montana NRIS Loon Database and hard copies also reside with Gael Bissell at the Kalispell FWP office.

b. Habitat Conditions

The main nesting and chick-rearing habitat for the primary pair is at the east end of Dickey Lake, where the water is crystal clear and about 4-14 feet deep. It is the quieter end of the lake away from the houses and the main watercraft recreation patterns (west 2/3 of the lake).

Forest Service designated old-growth forest occupies the east shore adjacent to the nesting area and tall shrubs overhang the shoreline. There are several tall trees that bald eagles and ravens use as perch trees. One is directly above the nesting platform. Highway 93 borders the nesting area to the north about 100 feet from the shoreline. The north shoreline has a steep bank sparsely covered with shrubs. The area above the shoreline is partially open along the highway right of way and partially forested as the highway moves farther from the lake. The "Old Highway" road runs along the south shore of the lake. The south shoreline has a low bank with high overhanging shrubs.

Loons use the whole lake for feeding, usually within about 50-75 yd. from the shoreline. The pairs concentrate much of their time and feeding activities in the nesting and nursery areas, but will use other parts of the lake as the chicks grow.

The main habitat for the second pair is Dickey Pond that is completely surrounded by private land. See map. The Pond has clear water and is about 5-12 feet deep. Much of the shoreline is grassy and somewhat marshy. The vegetation along the north shore of the pond is grassy with some low shrubs whereas the south shore has partial forest and high shrubs. The east end contains the inlet from Dickey into the Pond and the narrow west end has the outlet through the man-made dam into Dickey Creek. The north shore has an old foundation remaining from the Metzner house that burned down in the mid-1990s.

This pair's habitat includes the waters of the Bible Camp bay that is mostly surrounded by private land. Most of the shoreline has a low bank and the vegetation consists of high shrubs.

The Bible Camp is located on the east shore of the bay. The undeveloped west shoreline near the outlet has an accessible flat beach, but it progresses to the north into a high steep bank.

c. Nest Chronology and Chick Productivity

No successful chick production occurred from 1985-1989 as determined by loon monitoring by Kelly 1985-88 and Ferruzzi 1989. Due to the loss of historic nesting sites and no successful nesting from 1985-1989, it was suggested by Don Skaar (MLS) that a loon nesting platform be placed on the lake.

In 1990, three loon nesting platforms were built and placed by the FS on Dickey Lake – one at the E end and the other two at locations along the long N shore of the lake. Sign buoys were placed across the lake at the E end to protect that nest site. The loon pair nested on the platform at the E end the first year, but Highway 93 road construction had begun that year and traffic was rerouted along the S shore road. There was a lot of disturbance from the construction and traffic activity on both sides of the lake near the nest platform and the loon pair was not successful at hatching a chick. The pair nested again on the platform in 1991 and successfully hatched two chicks. Loons did not use the other two platforms that were on Dickey Lake and after three years, these were removed.

The primary loon pair has nested on the platform for the last 19 years (1990-2008) and mostly with successful chick production. The signed buoys have been placed across the east end of the lake every year as well. They have produced 1-2 chicks in 14 of the 19 seasons. This is a success rate of 74%. See 'Nest Chronology and Chick Productivity Table' below and detailed spreadsheet at XXXXXXX RD.

Loss of the 1990 nest was due to the Highway 93 road construction on the N side and heavy traffic on the S side of the nest platform. In 1995, one nest was lost due to a major storm. Heavy wave action and rocking forced the adult off the nest. In 1997, a water ski course was set up near the southeast end. The boat turning in front of the sign buoys caused high waves and rocking that caused the loon to leave the nest. Adjustments in anchoring and the addition of a splashboard helped mitigate the effects of wave action and the washing of sod and vegetation from the nest platform.

In 1996, an alternate nest site was chosen by the loons on a very small peninsula along the south shore but still within the nesting territory at the east end within the sign buoys. This nest was lost and a full egg was recovered that had possibly been kicked out of the nest. The pair attempted to re-nest on the nesting platform, but abandoned the nest.

Nest Chronology and Chick Productivity Table

Year	Nest on Platform	Alternate Nest	Hatch Date	# Chicks Hatched	# Chicks Survived	Comments
1989		Outlet bay		0	0	
1990	X			0	0	
1991	X		6/7	2	2	
1992	X, Renest		6/27	1	1	
1993	X, Renest		7/1	1	1	
1994	X		5/30	2	2	
1995	X, Renest			0	0	2 loon eggs retrieved from water.
1996	Renest	X		0	0	1st nest on sm. marsh on S shore at SE end- 1 egg found in water next to nest.
1997	X			0	0	
1998	X, Renest		7/1	1	1	
Year	**Nest on Platform**	**Alternate Nest**	**Hatch Date**	**# Chicks Hatched**	**# Chicks Survived**	**Comments**
1999	X		6/2	1	1	
2000	X		5/3	1	1	
2001	X		6/19	1	1	
2002	X			0	0	
2003	X			1	0	Lost chick when 2 weeks old.
2004	X			2	2	
2005	X			1	1	
2006	X			1	1	
2007	X			2	2	
2007		**Dickey Pond**	**7/3**	**2**	**2**	**2chicks hatched by a 2nd pair on Dickey Pond.**
2008	X			2	2	**2nd pair nested on Dickey Pond, but lost nest after 1 week.**
			Totals:	**21**	**20**	

Note: In 20 years, 21 chicks hatched and 20 chicks survived. Ave: 1 chick/year.

In 2003, one chick was hatched, but lost when it was about 2 weeks old, probably during a late night boating incident. It was reported by residents that there was a lot of tremeloeing and wailing at about 1:00 AM on this bright, full moon night.

Ravens and bald eagles regularly perch in trees along the east end and frequently visit the nesting area around the loon's hatch time.

In 2007, the second loon pair nested late on Dickey Pond and successfully hatched chicks the 3rd week in June, 2007. In the spring of 2008, this pair nested again, midway along the north shore. The nest was abandoned after one week and no egg fragments were recovered. This nest site provided easy access to shoreline predators and dogs.

d. Existing and Alternate Nest Site

The existing nest for the primary pair is on a 6 X 6 ft. platform made of cedar logs. Sod and riparian vegetation has been placed on the wire mesh top. Every year, Guenter Heinz, FS, replaced missing vegetation and placed a pile of straw on top. A ten-inch board was nailed to the west side (windward side) of the platform to minimize the effects of washing from wave action. The platform is pulled to shore and tied to a tree at the water's edge in winter and then put out every spring in early May. It is placed about 40 feet from the shore where the clear water is 4-6 feet deep. The platform is anchored by three double cinder blocks spread out to minimize rocking from wave action. This same platform has been in use for 19 years. The nesting territory extends ~250 yards from the east shoreline westward to the sign buoys and is ~400 yards between the north and south shorelines. See map.

In 1996 an alternate nest site was used on a marshy jut of shoreline on the south shore of the southeast end. This nest was lost and the egg was found out of the nest. (This is not a good nest site as it is small, easily flooded, very close to the road and accessible to on-shore predators.) The pair then re-nested on the platform, but was unsuccessful.

Other potential nest sites for nesting platforms may be at various indentations along the north shoreline. The best would be in one of two small bays along the north shoreline, but at the east end. The small bays closer to the west end often have rope swings nearby. The use of platforms is good on this lake as most if not all of the accessible shoreline has human use of some kind.

In the springs of 2007 and 2008, the second pair nested on Dickey Pond, midway along the N shore of the pond. This site is completely surrounded by private land. The Pond is about 5-14 feet deep and also has clear water. The nest is a natural nest on the grassy and somewhat marshy shoreline. There are no overhanging shrubs. The pair uses the whole pond as their nesting territory and chick-rearing area. It is approximately 150 yards long and 20-25 yards wide.

e. Pair Behavior – Courtship, Nesting, Chick-rearing and Feeding

The primary pair carries out courtship activities (simultaneous bill dipping and diving and hanging close to the shore) in the territory at the east end and uses the marshy jut of land along the south shoreline for onshore nest testing and copulation. They await the placement of the nesting platform every year and stay close while this is occurring. They are usually nesting on the platform within 1-7 days of placement. In the event they lose the first nest, the pair usually re-nests on the platform within one week.

The primary pair uses this same territory behind the buoys for chick-rearing, but also will extend outside the buoys along the north shore. They usually move west along the north shoreline when predators (bald eagles or ravens) are focusing-in on the nesting area and newly hatched/young chicks. As the chicks grow, the family feeds further along the north shoreline.

The second pair on Dickey Pond probably carries out courtship activities on the pond and accessible shorelines of the pond. They may also use the Bible Camp bay near the outlet to the pond.

In 2007, the second pair nested on Dickey Pond and successfully hatched 2 chicks. They used the pond as the chick rearing area. There was concern about the ability of the chicks to get out of the pond and into Dickey Lake for feeding and learning to fly due to a board being placed across the cement inlet to the pond. The board was removed and they did leave the pond. The pair nested again midway along the north shore of the pond in 2008, but lost the nest after about 2 weeks. They did not re-nest.

f. Prey

Fish, crayfish and leeches are important food sources for loons on Dickey Lake. The predominant native fish species are the red shiner, coarse scaled sucker, fine scaled sucker and pygmy whitefish. The nonnative species are the Kamloops, brook trout, Kokanee, northern pike and small-mouthed bass. Dickey Lake is periodically stocked with Kokanee and Kamloops. Small fish, crayfish and leeches are found in the shallow waters along accessible beaches and provide food for chicks. It is important to note prey species habitat requirements, food needs and interactions in order to maintain habitat for all species affected.

g. Predators

A bald eagle nest exists on Murphy Lake that is 1-2 miles from Dickey Lake. The eagles perch in tall trees at various points along the lake and there are a few perch trees in the nesting area at the east end, one directly behind the nest platform. Ravens may also have a nest near the east end and they also congregate near the nesting area. The Bass on Dickey Lake may not be large enough to prey on young chicks, but the pike are. Fishermen report that the pike population is low. The 2007 and 2008 nest site on Dickey Pond unfortunately provides good access to terrestrial predators (dogs, coyotes). It also does not have shrub cover for screening from avian predators.

h. Banding

On 7/12/2004, the first loon was banded on Dickey Lake. It was a juvenile, and one of two chicks of the year from the east end nest. On 6/24/2005, both adults of the east end pair were banded. Then on 7/27/2005, one juvenile was banded and this was the only chick hatched that year. See Common Loons on Dickey Lake Band Table below and Master Band List for descriptions for all area lakes.

Common Loons on Dickey Lake Band Table

Maturity/Sex	Year Banded	Left Leg	Right Leg	Comments
Juvenile	7/12/2004	Silver/Red Stripe	Red/Yellow	
Adult Female	6/24/2005	Green/Green	Orange Stripe/Silver	
Adult Male	6/24/2005	Yellow/Red	Silver/White Dot	
Juvenile	7/27/2005	Silver/White Dot	Green/Green Stripe	Recovered, rehabilitated & released near Santa Cruz, CA

4. Potential Impacts and Human Disturbance

a. Shoreline Habitat

The forested east shoreline habitat that is adjacent to the nesting area is FS old-growth forest. It is fairly secure from harvest/logging activities, however this designation may not continue. Fuel reduction activities may be considered as long as old-growth character is maintained. Any management activities should mitigate potential disturbance to the loon nesting area.

b. Special Hazards or Contaminants

The roads are possible future sources of highway salt and dust abatement chemical contamination to the lake and the nesting area. A blanket of dust from the road along the south shore extends over the lake during the dry summer. There is potential for spills of hazardous materials from trucks traveling on Highway 93.

Water and sewer for the housing sites and the Dickey Lake Bible Camp are a potential concern for water quality. Some of the early houses get their drinking water from the lake, but also have septic systems that drain into the lake.

Oil and gas from boat motors are water contaminants. Boats also have the potential to introduce noxious weeds such as milfoil.

c. Fluctuating Water Levels

Water levels can fluctuate naturally in the spring and early summer especially in a rainy year. Water levels have been artificially raised in the summer when the outlet is blocked by an 8-10 inch board (reportedly by homeowners for boating purposes). Use of the nesting platform effectively addresses fluctuating water levels for the east end nest, but blocking the outlet is a problem for the Dickey Pond pair when they have chicks. The pond is not long enough for flight take-off and the chicks must be able to access Dickey Lake to learn to fly and to reach a larger food source.

d. Fisheries Management

Gill netting, survey and stocking activities can negatively impact loons if they are conducted from early spring – mid-July in the courtship, nesting or chick-rearing areas. Any activities should be addressed in regard to timing and potential impacts. Rotenone is not likely to be used on Dickey Lake as the lake is a water source for some residents.

e. Human Disturbance from Development

Common Loon pairs most likely nested, historically in the flatter, accessible beach areas along the western shoreline. Most of the house sites in the private section at the west end are now occupied. There is open land between the homes and Dickey Pond. The private land around and adjacent to Dickey Pond is not developed at this time, but any future development would have a

great impact on the future of loon nesting success for this pond this nesting area. It would make it virtually impossible to nest on Dickey Pond.

The FS campground and day-use areas are recreational sites where any additional developments or improvements could have potential effects to the shoreline (sediment) and water or contaminant (fertilizer, oil and gas from boats) drainage into the lake.

In the 1990's, the FS was contacted about closing the road from the South Shore Day Use area west past the Osler campground, the Dickey Lake Bible Camp and out to the county road. The FS made an attempt through signing and policy to direct traffic to the Day Use area from the east end access off of Highway 93. This effectively increased the amount of traffic past the E end nesting area and increased the amount of dust. Most of the local Trego community still uses the west access that does not pass the nesting area. This continues to be an issue and there is FS consideration of closing the road from the Day Use area to the Osler Campground and turning it into a walking trail. This would effectively increase and likely double the amount of traffic passing the nesting area to reach the Day Use area.

The south shore road passes close to the primary nest at the east end and any road work during the spring may cause disturbance including potential abandonment of the nest. There is a road pullout on FS land that has been used as a dispersed camping site. This is the location of the known, but poor alternate nest site and the loon mating area. Human use of this area has a great potential for disrupting loon courtship, nesting and chick-rearing activities.

f. Human Recreational Disturbance

The motorized watercraft use is mainly in the NW 2/3 of the lake. In the 1990's, motorized watercraft use on Dickey Lake increased significantly from what it had been in the 1980's. This is attributed to the increased number of people moving into the area, the doubling in size of the north FS Campground (early 1990's) and the increased use of the lake by watercraft. Boats and jet skis venture into the east end, so having the sign buoys across the lake during nesting and the first two weeks of chick rearing is critical.

In the 2000's, motorized watercraft use continues to increase, but it is mainly concentrated during good weather days and is often free from watercraft during poor weather days (as it has been historically). The effects in regard to global warming are uncertain, but if it means an increase in clear, sunny days, it most likely means an increase in concentrations of motorized activities.

Water quality problems associated with motorized recreation are shoreline erosion from increased wave action and pollution from poor boat fuel handling. Other potential conflicts are from speedboat or ski boat wakes that wash sod and vegetation from the nesting platform or cause extreme rocking that result in the adult loon leaving the nest. All have been observed on Dickey Lake.

Non-motorized recreation, mostly canoeing and kayaking is focused mainly from the South Shore Day Use area toward the quieter east 1/3 of the lake and the loon nesting area. Some also occurs in the Bible Camp bay and along the north shoreline from the FS Campground.

"During the nesting phase, any boat that moves slowly, hugs the shore and is likely to stop is a threat, whether motorized or not (Dolan 1994). The adult loon is likely to leave the nest, exposing the eggs to cooling and predators. Adult loons are also known to accidentally kick the eggs out of the nest when startled and then the eggs are lost when they sink into the water.

"During the chick-rearing stage, while the loons stay close to the shore, any boat that uses that area will disrupt the family's behavior. However, once the loons start to use a larger area and move farther from shore, speedboats are more likely to separate families. Motorized boats and jet skis are involved in most accidental collisions and harassment" (Dolan 1994). "Young chicks are poor swimmers and divers and can easily be killed by a fast moving boat" (McIntyre 1988). Whenever a family group is separated, the chicks become more susceptible to predators.

g. Potential Hazard/Conflict Ratings

Using the criteria listed below, Dickey Lake has a **potential hazard rating of 1**. It is unlikely the nest or chick-rearing areas will become lost, but this hazard rating only applies as long as management continues to provide a nesting platform and sign buoys to protect the existing nesting and chick-rearing areas.

Potential Hazard Rating for Nests

1. Unlikely that the nest will become lost or unsuitable and known alternate nest sites are available; chick-rearing areas have protection from motorized recreation.
2. Likely that the nest will become lost or unsuitable in the foreseeable future, but known alternate nest sites are available; or likely that chick-rearing areas will not have protection from motorized recreation.
3. Nest or nest site is in immediate danger of becoming lost or unsuitable and alternate nest sites are not available; chick-rearing areas do not have protection from motorized recreation.

Dickey Lake has a potential conflict rating of 2-3. Ever-increasing recreational activities on the lake affect chick-rearing and feeding. The potential redirecting of all traffic from the east end to the FS Day Use area on the south shore will impact the east territory of the primary pair. Potential development of the private land around and adjacent to Dickey Pond would make that territory unusable for the Dickey Pond pair.

Potential Conflict Rating for Territory

1. Activities that could impact the territory are not occurring now, nor are any planned.
2. Activities that could impact the territory are not occurring now, but are anticipated for the foreseeable future. Examples are new subdivisions, new recreation site, increased watercraft use, road construction or timber harvest.
3. Activities that would impact the territory are occurring or are planned for the immediate future. Examples are new subdivisions, new recreation site, increased watercraft use, road construction or timber harvest.

5. Management Recommendations

a. Coordination with Landowners and Resource Managers

The Common Loon Working Group shall review the site-specific lake management plan for adequacy and interpretation of data and they will provide management recommendations. In all considerations such as housing, campground or recreation site development/improvements, land management activities or road construction/alteration, it is important to coordinate with and provide recommendations to landowners and resource managers.

Proper planning for water and sewage systems should address important water quality issues. Older water and sewage systems may need to change to higher standards. Coordination with state and county road crews and mitigation for any potential chemical contamination from roads is necessary for maintaining good water quality.

b. Nest Site and Nursery Area Protection

Due to the loss of historical nesting habitat, continued use of the nesting platform at the east end of Dickey Lake is highly recommended. The loon pair has used the platform for the last 19 years. The platform is moved out from the shoreline in early May. The sign buoys asking lake users to stay out of the nesting area are placed at the same time. The usual time the buoys are in place is about 6 weeks- 4 weeks during incubation and the first 2 weeks after the chicks hatch. This may be extended if the first nest is lost and a re-nest occurs. In the fall, the nesting platform is moved in to the shoreline to protect it from wind damage and later, possible vandalism by winter recreationists (building fires on or with it).

An increase in the amount of traffic passing the nesting area at the east end in order to access the South Shore Day Use area may cause nest disturbance and potential abandonment of the nest site. This should be an important factor in any FS decision made about access here and mitigation should be addressed.

The pullout along the south shore should not become known as a camping site as it directly impacts this loon territory for courtship, nesting and chick-rearing. It would be best to remove any pullouts from this area in order to keep traffic moving. Major highway or any road work during the spring should be noted as a concern for the nesting success of this loon pair.

To promote successful nesting on Dickey Pond, it is critical to work with the local landowner, XXXX XXXXXX, XXX and partners (XXXX XXXXXXXXX) and interested local homeowners, XXXX and XXXXX XXXXXXX. We should pursue the potential planting of a vegetation screen to protect the nest from avian and onshore predators. Lake owners involved with placing the board across the outlet (raising the water level of the lake) should be coordinated with and provided information about effects to nesting loons. Coordination with FWP about this issue is recommended.

c. Monitoring

Monitoring of Common Loon activities on the lake from ice-out (usually 1st-2nd week in April) until flight south (mid-September- late October) in the fall is important for successful management. Monitoring of nesting and chick-rearing activities, usually May - mid-July provides critical knowledge to the manager about all aspects of loon behaviors, human activities and loon/human interactions. It is also important in the identification of loon bands for verification of historical nesting by resident pairs, foraging on other lakes and dispersal of previous year's chicks that have returned as young adults.

Continuation of the Spring and Summer Loon counts is critical for tracking successful nesting and productivity. The CLWG has a good structure set up using Area Coordinators, loon rangers and volunteers to accomplish these goals. A standard loon observation form is used to monitor loon activities and the same form is used for the Spring and Summer Loon counts. See Appendix E of the Conservation Plan for the Common Loon in Montana. This information can then be recorded in the Montana NRIS Loon Database.

d. Banding

Continued participation in the loon banding effort is critical to tracking the loon population, consistency of a specific pair on a territory, forage use of nearby lakes and dispersal to other lakes. A high powered spotting scope, monitoring, documentation and reporting are important to successful tracking of loon bands.

e. Public Information

The FS places a notice in the local newspaper every spring to provide information to the public about nesting loons and sign buoys being temporarily placed for the voluntary closure on local lakes. Informational signs regarding loon nesting are placed at boat launches. A loon ranger monitors loon activities and visits the boat launches to provide information to lake users. This has all been successful on Dickey Lake, as people have gotten used to the yearly temporary closure.

f. Coordination with Fisheries Management

The FS shall contact FWP for fish gill netting, surveys or stocking schedules and locations. Any activities shall be addressed in regard to timing and potential impacts to nesting and chick-rearing. These shall be recorded as part of this plan.

g. Protection of Wildlife and Water Quality by Law Enforcement

The FWP game warden provides law enforcement for any fishing and boating regulations on the lake. For motorized recreation, the warden's enforcement of the 200-ft. no-wake limit and boat fuel handling is essential for the protection of water quality. Law enforcement of fishing and boating regulations is also important for the safety and protection of loons, fish and other wildlife.

6. Summary

Dickey Lake is important for common loon nesting and foraging and it is used as a loon migration staging area (stop-over). Dickey Lake has a potential hazard rating of 1 and a potential conflict rating of 2 to 3. It is unlikely the nest or chick-rearing areas will become lost, but this hazard rating only applies as long as management continues to provide a nesting platform and sign buoys to protect the existing nesting and chick-rearing areas. The conflict rating is higher due to ever-increasing recreational activities, likely redirection of traffic past the nesting/nursery area and potential private land development around and adjacent to Dickey Pond.

Our efforts to protect the nest sites and chick-rearing areas from disturbance, monitor loon activities and work with the public should continue. It is essential to actively coordinate with private landowners, agencies and other groups to protect important habitat and mitigate potential effects to water quality. Continued increase in development and recreational activities could affect the productivity of loons using Dickey Lake. The development of lake management plans that address watercraft and jet-ski activity levels on area lakes must be a priority for agencies that manage loons.

7. Author and Date

Written by Christie Ferruzzi on February 20, 2009
Email: xxxxx@xx.xxx.xx
XXXXXX Ranger District, XXXXXX National Forest
XXXXXX R.D., P.O. Box XXX, XXXXXXX MT XXXXX

8. References Cited

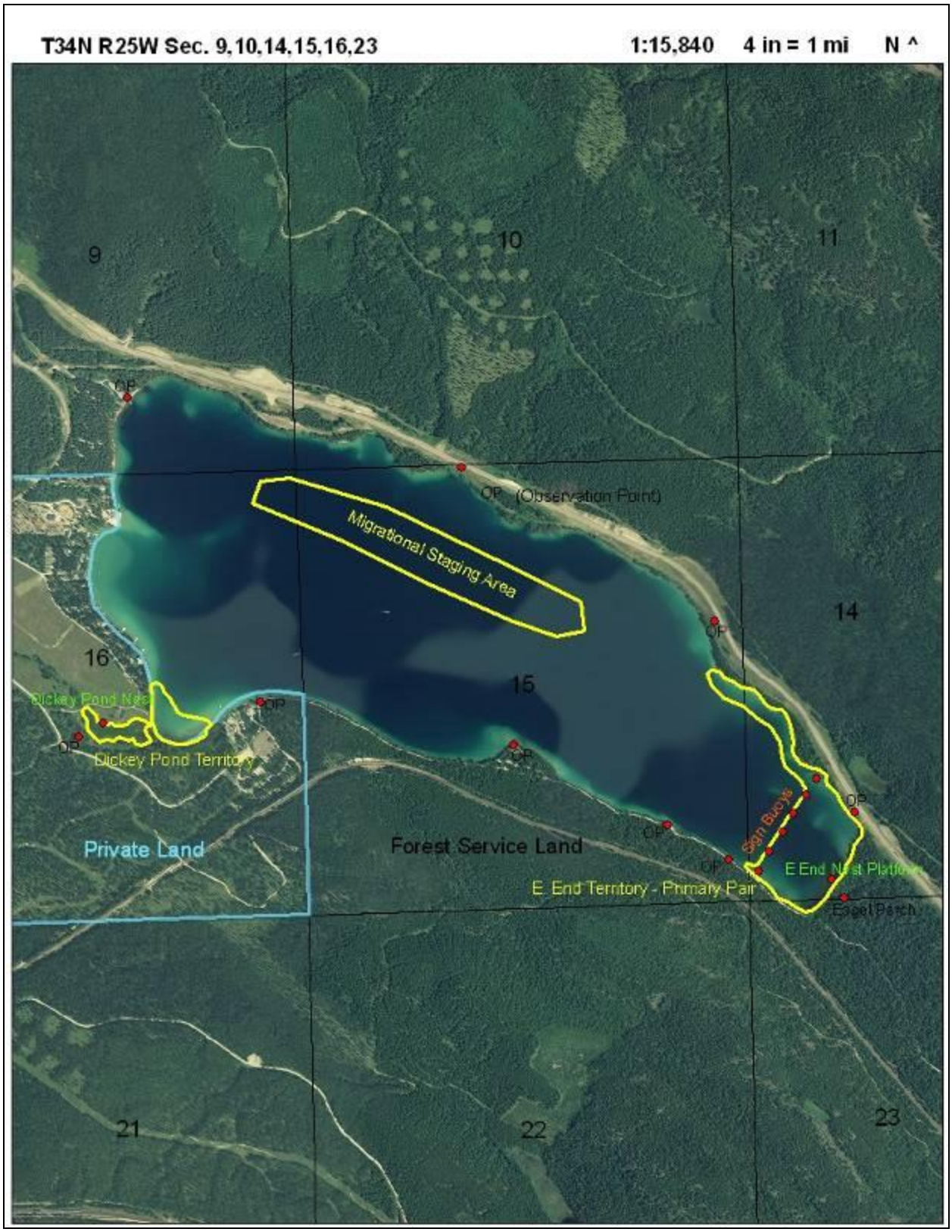
Dolan, P. M. 1994. The Common Loon (Gavia immer) in the Northern Region: Biology and Management Recommendations. USDA Forest Service, Region 1, Missoula, MT. 45 pp.

Kelly, L. M. 1992. The effects of human disturbance on Common Loon productivity in northwestern Montana. M. S. thesis, Montana State University, Bozeman, MT, 65 pp.

McIntyre, J. W. 1988. The Common Loon: Spirit of Northern Lakes. University of Minnesota Press, Minneapolis. 228 pp.

Skaar, D. 1991. Monitoring and protection efforts for loons on four lakes on the Fortine Ranger District. North American Loon Fund, Kootenai National Forest, Montana Department of Fish, Wildlife and Parks. 35 pp.

Strahler, A. N. 1981. Physical Geology. Harper & Row, Publishers, New York. pp 468-473.


T34N R25W Sec. 9,10,14,15,16,23
1:15,840 4 in = 1 mi
N ^
9
10
11
14
15
16
21
22
23
OP
OP (Observation Point)
Migrational Staging Area
Dickey Pond Nest
Dickey Pond Territory
Private Land
Forest Service Land
Sign Buoys
E End Nest Platform
E End Territory - Primary Pair
Excel Perch

APPENDIX D:
Band Recoveries and Observations

As part of the Loon Ecology Project (2003-present) and previous research (1996-1997), Montana Fish, Wildlife and Parks and several collaborators have banded approximately 160 common loons (adults, juveniles, and chicks) on lakes in Montana. This was conducted in an effort to gather the necessary population, habitat, and other data essential for completing the comprehensive management plan. Over the years we have recovered seven birds along the Pacific Coast and three birds inland, but outside of Montana. We have observed three banded birds alive on the coast as well. Our Lower Stillwater Lake female returns from her wintering area of Morro Bay, California every year. She has shown both winter site fidelity and breeding territory fidelity for 11 consecutive years. A Murphy Lake juvenile has called the same oceanic bay home since leaving Montana in 2006. Hopefully we will observe this bird back in Montana soon. A Dickey Lake juvenile was rehabilitated and released in Santa Cruz, California. In addition we have many local recoveries and observation of our banded birds that are too many to display or list. Two examples are given in the following page (Figure B and Figure C).

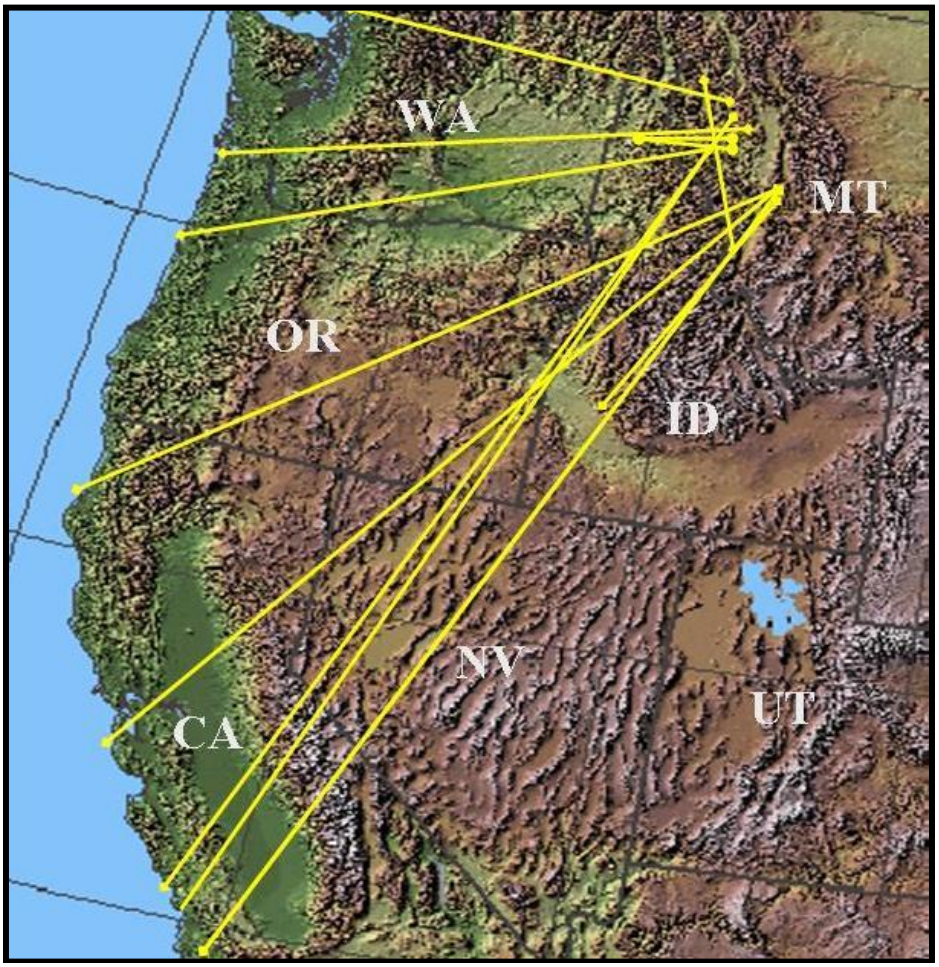


Figure A. Band recoveries and observations for common loons banded in Montana.

Our first documented adult banded as a chick that established a territory and successfully fledged young was a chick banded on Rogers Lake in 2003 west of Kalispell. This male bred with the banded territorial female on Upper Thompson Lake's east lobe in 2008. The banding observations were also used to estimate adult survival and territory fidelity. Adult male (90.1%) and adult female survival (89.9%) were essentially the same. However, territory fidelity was much higher in females than in males at 94% and 60%, respectively. Continued observations will allow biologists to estimate the recruitment of chicks into the breeding population.

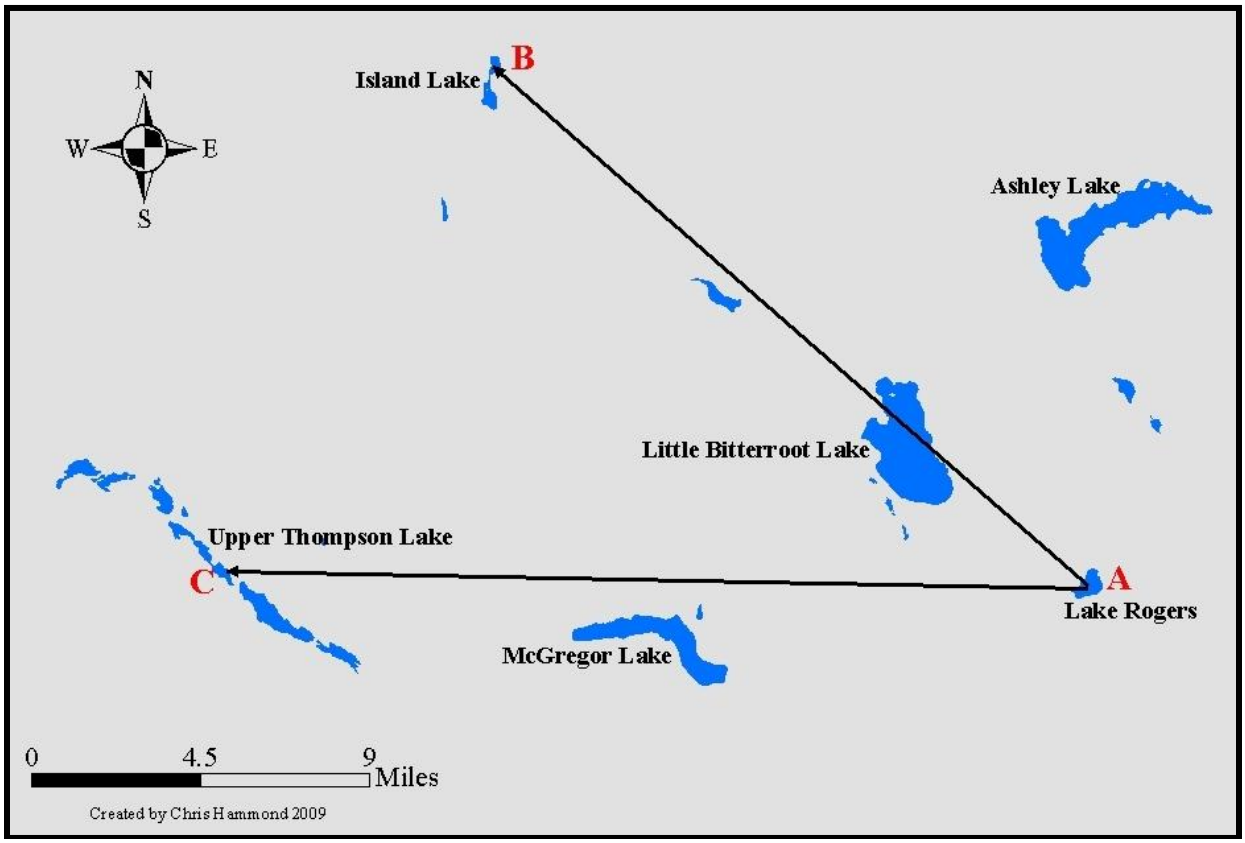


Figure B. Map of Lake Rogers male common loon movements. This bird was banded as chick on Lake Rogers (A) in 2003. In 2005, he was observed as an intruder on Island Lake (B). He was not observed in 2006 or 2007. Then in 2008 he paired with the banded territorial female on Upper Thompson Lake (C). The pair successfully fledged one chick. The Rogers Lake chick was the first banded chick recruited into the breeding population.

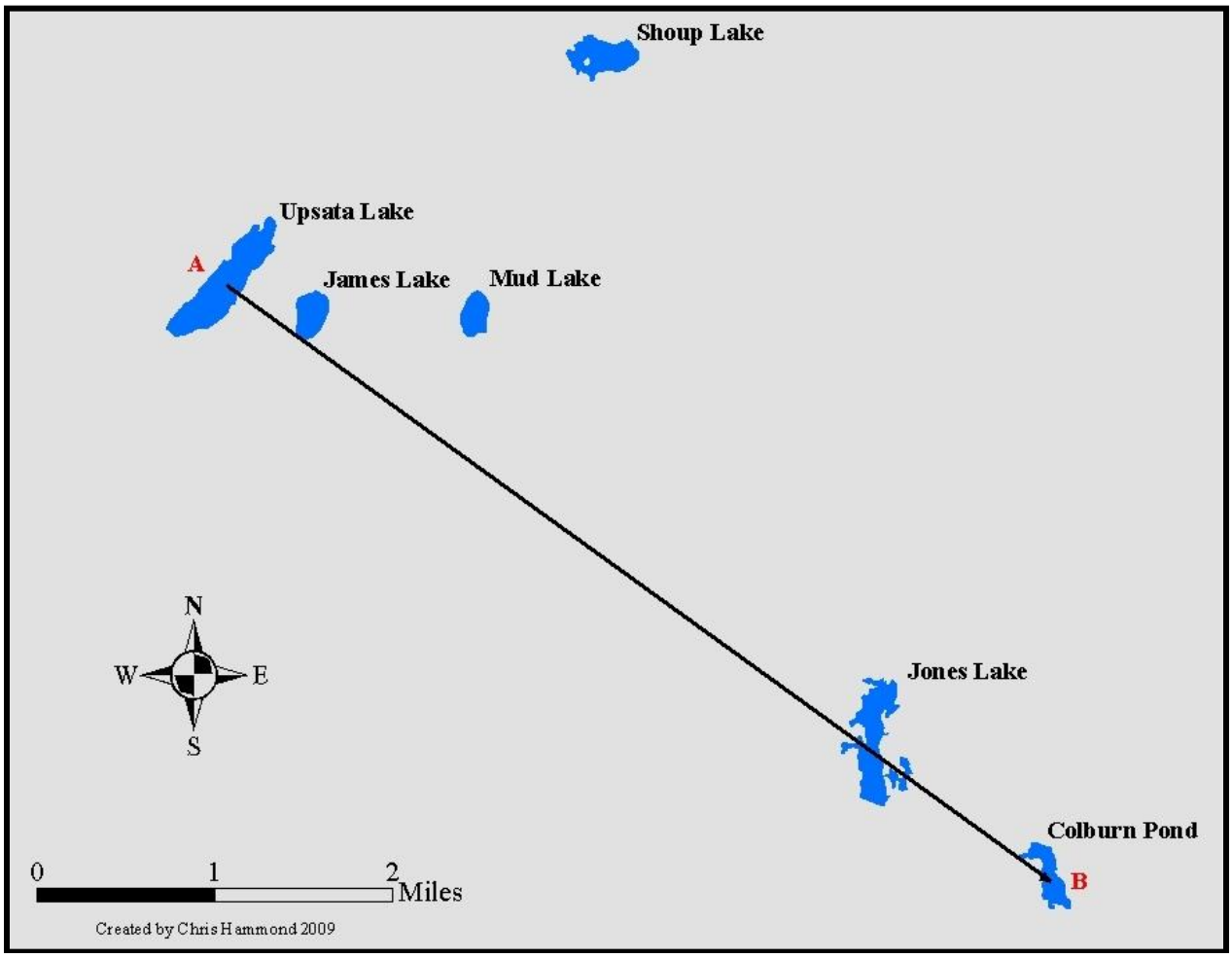


Figure C. Map of Upsata Lake breeding female common loon dispersal. This bird was originally banded in 1996 on Upsata Lake (A). She returned to her territory in 1997, but was not observed in 1998 or 1999. Then in 2000, she was observed with a new male on Colburn Pond (B) in 2000. No observations were reported since 2005 where she was last observed nesting on Colburn Pond.

APPENDIX E:
Common Loon Surveys

Montana Loon Survey Procedures

Scheduling your survey:

Work with your area coordinator (Appendix A), to find out which lakes to survey and when to survey them. Most loon lakes are to be surveyed once in May and once in July. The target date for the May survey is the Saturday closest to May 15. For the July survey, it is the third Saturday of the month. For example, for 2009, the survey dates are May 16 and July 18. If it is not possible to survey on a Saturday, it may be acceptable to survey any time from the Friday before to the following Monday.

Before you head out to a lake:

If the lake or its access is on private land, make sure to have permission to be there.
Familiarize yourself with regulations specific to the land management agency.
Notify a friend or relative of your itinerary and return time for safety purposes.
Find out what you can about access routes, observation points, and areas of the lake frequented by loons.

Bring with you:

- Loon Observation Form with lake map on reverse side (Get these from your Area Coordinator, Appendix A)
- Bug repellent and/or bear pepper spray (optional)
- Boat, paddles, and life jackets (although most lakes are surveyed from shore)
- Loon identification materials
- First-aid kit, knife, signaling device, matches
- Water and food
- Map and compass
- Binoculars
- Spotting scope, if possible
- Camera
- Water and food
- Rain gear and extra clothes

While at the lake:

If possible, monitor lakes **when winds are light**, typically early in the morning. Adult loons are extremely difficult to see in choppy water. If observation points are limited to one side of the lake, consider observing the lake when the sun will be at your back.

Approach the lake **slowly and quietly** so that you do not disturb loons, while being observant for other wildlife such as bears and moose.

Keep your distance, especially if you identify a nest site or chicks. This is important whether you are on shore or in a boat.

Plan to spend **an hour or more** at the lake. You may see loons right away, or it may take up to an hour to confirm presence or absence of loons. Take your time and be sure. Try to view the lake from several observation points to ensure you are not missing anything.

Follow instructions on the "**Loon Observation Form**." Complete one form for each lake and one form per visit, even if you do not see loons. Data collected when not seeing loons are just as valuable.

The **essential parts of the form** to fill out are the lake, observer, and date information at the top and everything in the "Summary" box.

On the **map** on the back of the form, indicate loon locations, nest site, floating buoys, boats/watercraft, eagles and other predators, and your observation points. If your form is lacking a printed map, sketch one as best you can by copying the lake shape and other important features from the map you used to navigate to your lake.

The **table at the bottom of the form** is designed for recording things like loon interactions, nesting, chick rearing, loon/human interactions, predators, and waterfowl at timed intervals. Use the codes provided just above the table for individual loons and their behaviors (see photos in this appendix). The last line of the table is already printed with an example.

If you see what looks like **bands on the legs** of a loon, do your best to identify the color and arrangement of bands. Also watch for stripes and dots. (See photos in this appendix for more information on observing and recording bands.) For each banded loon, record its code used for this observation form (i.e. loon A1 or C2), then the color of the band closest to the body on the left leg, the band closest to the left foot, the band closest to the body on the right leg, and then the band closest to the right foot. An example could be "Loon ***A3*** (LL) ***Orange Stripe*** / ***Silver*** (RL) ***White*** / ***Yellow***". Contact your area's coordinator as soon as you can. Someone with more experience identifying bands or with a high-power spotting scope may need to return to the lake soon. Also, the coordinator should be able to provide you information about the bird's age, where and when it was banded, and other places it has been observed.

Loon chicks typically hatch in Montana between late May and late June. Loon pairs that have re-nested due to a nest failure may hatch their chicks as late as mid-July.

- **Keep your distance to prevent disturbance when observing loons with chicks.**
- If you see chicks make sure to get an accurate count of the number. They can be difficult to detect especially when less than 6 weeks old or if away from adults. The raised tail of an adult loon (as seen during preening or distress) can be mistaken for a back-riding chick.
- Document nursery areas. Note and photograph the location of loon chicks on the lake.
- Photograph the chicks from a distance, even if they will be difficult to see in the photo, and do so through a spotting scope if possible.
- Help us determine hatch dates by classifying chicks into one of the categories below.

If you are not sure whether a bird is a loon, photograph it if possible. Also photograph nest and chick locations. Photograph from a distance so you do not disturb the loons.

After you complete your survey:

Turn in your Loon Observation Forms to your coordinator (Appendix A) as soon as possible.

Contact your coordinator as soon as possible if you are unable to get to lakes you have agreed to survey.

Classification of Loon Chicks by Stage

(Photos by Dan Poleschook, Jr. and Ginger Gumm)

STAGE 1 - The chicks are small and have black to brown downy feathers with a white belly. They keep these downy feathers only from hatch for approximately 7 to 10 days. Chicks in this stage are often observed on the backs of adults.

STAGE 2 - From 10 to 14 days old, the black downy feathers appear more brownish or reddish-gray. The chicks keep these feathers until they are approximately 4 weeks old when they may start to appear unkempt.

STAGE 3 - At about 4 weeks of age, the brownish (reddish) gray downy feathers start being replaced by smoother gray contour feathers. By the end of this stage, at about 9 weeks old, the chicks have completely replaced their down feathers with smooth gray contour feathers.

STAGE 4 - At 10 to 11 weeks, juvenile plumage is complete and flight feathers have erupted enough to allow flight practice. They can fly when they are 11 to 13 weeks old. At 14 weeks old most chicks are surviving on their own as their parents have already left the lake. The chicks will retain this last set of feathers until the next summer when they will experience their first complete molt.

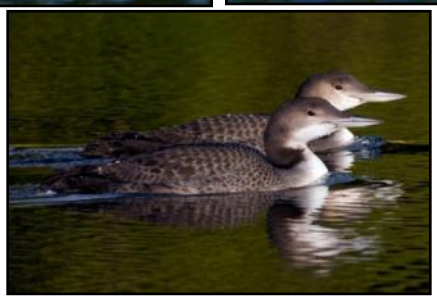


Photo Guide to Common Loons and Similar Species

(Photos by Dan Poleschook, Jr. and Ginger Gumm)

Common Loon on Nest (Summer Plumage)

Common Loon Nest with Two Eggs

Common Loon Family with Two Stage One Chicks

Common Loon in Winter Plumage

Upright Wing Flap (Territorial Behavior)

Penguin Dance (Territorial Behavior)

Surface Rush (Territorial Behavior)

Aggression towards Waterfowl

Common Merganser (male)

Common Merganser (female)

Similarity: all black head and overall coloration
Distinguishing: thin, bright orange bill

Barrow's Goldeneye (male)

Common Goldeneye (male)

Similarity: black head and overall coloration in males
Distinguishing: white patch on face, duck-like shape, short bill, small size

Double-crested Cormorant

Similarity: size¸ long bill, neck shape
Distinguishing: orange face and throat

Yellow-billed Loon (Basic Plumage)

Rarely observed in Montana
Distinguishing: heavy pale to yellow bill that angles up

Western Grebe

Similarity: general shape, red eye
Distinguishing: white neck/cheek

Red-necked Grebe

Similarity: tremolo, general shape, chicks ride on back
Distinguishing: red neck, white cheek, small size

Observing Banded Loons

When making band observations, always state which leg (i.e. LL or RL) the bands were on and the color combination on that leg as "some color" over (or /) "some color". This can be complicated because in many situations the leg is upside down. A very easy way to remember which color is reported first is to always record the combination as **the band closest to the body over the band closest to the foot**. (Note: some birds may have only one band per leg.) All loons will have a silver color USFWS band with a unique band number (number not visible). Color bands may have stripes, dots, or letters present. Report all bands to area coordinators.

Example 1: February 2006 images of the Upper Stillwater Lake female common loon at her usual winter home in Morro Bay, California. The bands for this bird are recorded as **LL Red/Blue, RL Not Observed**. The red band is listed first, as it is closest to the body. The right leg is not visible; therefore it is recorded as not observed. (Photo by Darwin Long)

The following banded common loon photos were taken in Washington and were provided by Daniel Poleschook, Jr. and Ginger Gumm.

Example 2: Very rarely will you have the opportunity to observe bands when a loon is taking off from a lake, although it is possible to observe bands while in flight. The band combination for this bird is **LL Orange/Green, RL Red/Silver.**

Example 3: Sometime observations can be made with legs still in the water. The band combination for this bird is **LL Red??/White or Silver, RL Fluorescent Pink/Fluorescent Green**. In this case it is difficult to make out the bands on the LL. Report only what you can positively identify or make a note of you uncertainty (i.e. "??", or possible colors).

Example 4: This is typical of the type of observation you will make. One leg will be raise into the air exposing the leg. This bird has only a single band on leg indicating it was either too small to receive two bands at initial capture or it lost a band. The band combination for this bird is **LL Not observed, RL Yellow/Nothing**. On your observation form clearly indicate that the leg had only a single band.

Example 5: Again, this is the typical observation. It would be easy to record this as LL Orange Stripe??/Unknown, RL White/Green, but that would be incorrect. **Remember always record the band closest to the body first.** The correct observation is **LL Orange Stripe??/Unknown, RL Green/White**. The band on the left leg is questionable so I made sure to note my uncertainty.

LOON OBSERVATION FORM (January 2009)

Lake/Territory Name _____ Observer _____

Date _____ Weather (temp., wind, precip.) _____ Address _____

Time Observed (Start/Stop) _____ Phone _____

Instructions: 1. Record significant observations of loon interactions, nesting, chick rearing, loon/human interactions, predators and waterfowl. Loon behaviors using timed intervals may be indicated in the lower table. 2. On the map on back, indicate loon locations, nest site, floating buoys, boats/watercraft, eagles and other predators, and observation points.

Summary:

 # Pairs ____ **# Singles** ____ **Total Adults** ____ **# Sub Adults** ____ **# Chicks/Juveniles** ____ **Chick Size (Stage or Age)** _____

(brown & white adult-sized bird) (young of the year)

 # banded adults ___ **# banded chicks** ___ **# People (on shore)** ___ **# & type of Boats** _____ **Loon signs on shore (location)** _____

Sign buoys at nest site ____ **Artificial nest platform present?** ____ **Nesting (Y/N)** **Nest Status: (Incubating)(Abandoned)(Hatched)**

 # Eagles ____ **Eagle Location and Activity** _____ **Ravens (# and Activity)** _____

Significant Observations _____

Color of Bands:

Indicate loon: Adult 1 (A1) of pair, Adult 2 (A2) of pair, Chick 1 (C1), Chick 2 (C2) and other adults (A3, A4…)

	Left Leg	(closest to body)	(closest to foot)	Right Leg	(closest to body)	(closest to foot)
Loon	(LL)		/	(RL)		/
Loon	(LL)		/	(RL)		/
Loon	(LL)		/	(RL)		/

Loon Behavior Key:

B1 Diving/feeding self	B8 Call – wail	T3 Territorial – approach	T9 Territorial – harassment diving
B2 Diving/feeding chick	B9 Call – hoot	T4 Territorial – raised neck	M1 Courtship – mutual bill dipping/diving
B3 Swimming	B10 Call – flight tremelo	T5 Territorial – upright wingflap	M2 Courtship – ashore nest testing
B4 Preening	B11 Chick riding on adult	T6 Territorial – circling, bill dipping, diving	M3 Courtship – copulation
B5 Sleeping/loafing	B12 Chick fed by adult	T7 Territorial – penguin dance	N1 Nesting – nest building
B6 Flying	T1 Territorial call – yodel	T8 Territorial – surface rush	N2 Nesting – incubation
B7 Call – tremelo	T2 Territorial – tremelo/yodel	T8 Territorial – chasing/attack	N3 Nesting – left nest

Loon Behavior Table: List the key codes with the corresponding loon using 5-15 minute time intervals. See example at bottom of table- Adult 1 is feeding self (B1) and yodeled – territorial call (T1). Adult 2 is nesting (N1). Do not record behaviors if loons are reacting to your presence.

Time Interval (Start) (Stop)	Adult 1 (A1) of pair	Adult 2 (A2) of pair	Other Adults (A3, A4…)	Chick 1 (C1)	Chick 2 (C2)	# People on Shore	# Boats in Water	Comments
10:15-10:25	B1, T1	N2				12	3	EXAMPLE: A1 yodeled when boat approached. A2 is nesting.

Please hand draw a map if none is provided and include a north arrow and a time interval. Label loons, nesting areas, nursery areas, observation points, and watercraft on map.

BEHAVIOR DEFINITION

T1) **Yodel** – Territorial call given by the male loon, usually given when another male flies over the territory or in a territorial encounter.

T3) **Approach** – A pair approaching an intruder loon, other waterfowl or boat

T4) **Raised Neck** – A heightened alertness and is an easy clue that something is disturbing the birds.

T5) **Upright Wing-flap** – The loons to rise up out of the water and flap their wings with white breasts towards the intruder. This is a long distance signal to an intruder (loon or boat) that the territory is occupied.

T6) **Circling** – The resident pair and the intruder loon move around each other in a circle.
Bill Dipping – A repeated sequence of raising the neck/head and a dipping of the face into the water. A nervous gesture, which occurs as the loons come within a close distance of the intruder.
Mutual Dive – Jerky head movements followed by shallow dives by 1 or more loons.

T7) **Penguin Dance** –The birds raise up vertically out of the water, treading water with their feet. Sometimes they slap the water with their wings. This is the most aggressive territorial behavior.

T8) **Surface Rush** – Usually follows Penguin Dance. The "dancing" bird falls forward into the water and continues the momentum as an underwater torpedo.

T9) **Chasing** – Occurs on the surface as the loon uses their wings in an "oaring" motion to chase off an intruder.
Attack – Loons will attack other birds, such as grebes.

T10) **Harassment Diving**– Loons will harass waterfowl by diving and resurfacing under the offending bird.

Sample Volunteer Letter

Area Coordinator
Mailing Address
Loonville, MT 59937

Date

Dear _____,

I have enclosed you Loon Observation Forms for _____(Lake). I have also included a copy of Appendix E (Common Loon Surveys) from the Conservation Plan for Common Loons in Montana. This packet provides considerable amounts of information that will assist you with you observations. Thank you so much for your willingness to help and for you enthusiasm!

In an attempt to get more information on the loon population and more information on nesting attempts, we will again be conducting surveys twice; once during the spring season and once during the summer season. The first survey should be conducted in mid-May, which this year falls on _____. The second survey date is the traditional Loon Day survey which is _____. As a minimum it is very important to get these surveys done. Of course you are always welcome to visit the lake(s) more often and take more observations.

Please use your Loon Observation Form for your surveys. Note the message near the top of the form under "Instructions". As a minimum, please fill out the top of the form and the information in the box. This observation form should be used for both the May and July surveys, and can also be used for any additional surveys you do. There is a spot on for a map on the back of the form. Please draw a map if loons are spotted, especially if they appear to be nesting. The map will be very helpful to us.

Please return your survey forms to me as soon as you complete them. As in the past, mail the form even if you didn't see any loons. There absence from a lake is important too. We have a database set up for storing all of the information we gather. This same effort is being coordinated in other parts of Montana, so we are optimistic that we will learn a lot about our population of loons and that as a result our loon management will improve so that we can enjoy these wonderful birds for many years to come. If you have any questions about these forms please call me.

Again, many thanks! I hope your lakeside visits are filled with pleasant surprises.

Sincerely,

Area Coordinator

APPENDIX F:
The Use of Signs: An Essential Common Loon Management Tool

This appendix includes information about the kinds of signs to use, how to obtain or construct the signs, how and when to place them, and when to remove them. All decisions about applying shore or floating signs must be made with the Area Coordinator for that lake (Appendix A).

WHY USE SIGNS

The rationale for the use of floating signs around loon nests comes from analysis of data collected in Montana between 1987 and 1991 (Kelly 1992). This revealed that 60% of departures from nests by loons were due to human disturbance and 51% of these departures were related to approaching boats. The loons were off the nest for an average of 24 minutes. Forty percent of nest departures were the result of various loon activities such as changing incubators, heat or insect stresses, building the nest platform, or territoriality. Loons were off the nest for an average of eight minutes for these reasons. In addition, it was found that loons left the nest in response to approaching boats at 140 yards (128 m), 130 yards (119 m), 100 yards (91 m), and 70 yards (64 m) during the first, second, third and fourth weeks of incubation, respectively (Kelly 1992). The heightened sensitivity of loons to approaching boats is a result of their physical adaptations for diving which dramatically limit their ability to move efficiently on land. While individual loons do habituate to boats and tolerate closer approaches, they will eventually leave the nest and will remain off the nest until the boat leaves the area. Eggs that are unprotected, especially during the last two weeks of incubation, are generally lost after one hour (Sutcliffe 1980) to chilling or to ravens. The purpose of the floating signs is to reduce the amount of human caused disturbance. With exponential increases in water-based human recreation, the use of floating signs to protect loon nesting areas will continue to be critical to successful loon reproduction and management.

The most effective protection for nesting loons is the combination of floating signs AND someone on the boat ramps explaining why the signs are there. There are few people willing to spend their time on boat ramps in the spring watching other people playing in the water and the few people who are out there cannot be in several locations at once. A small number of floating signs have been ignored, stolen, or vandalized. The likelihood of this happening increases dramatically in the absence of public education. This public education can take the form of a volunteer handing out brochures on the boat ramp, a "Loon Ranger" near the signed areas, a campground host making a point of stressing the closed area for loon nests, or a water safety officer working with the wardens.

SHORE SIGNS

At a minimum, post signs onshore explaining that loons are nesting and why recreationists should be concerned, especially on trails that follow the shoreline.

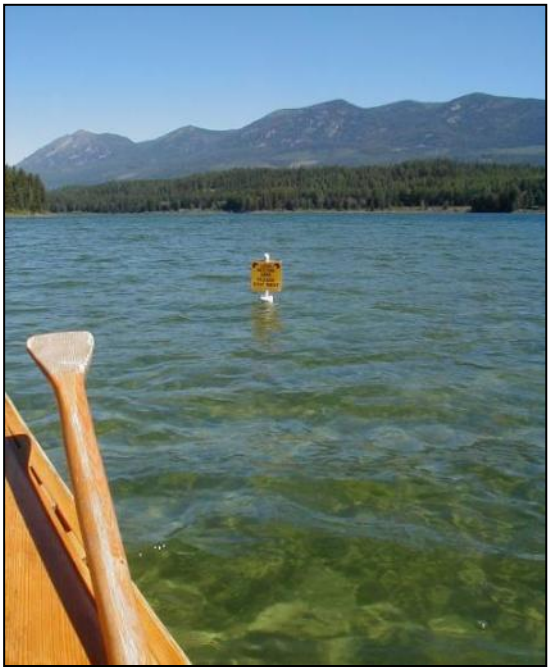
The shore signs shown below may be obtained from an Area Coordinator (Appendix A). The larger "No Laughing Matter" signs are typically left up year-round and replaced each spring. Post the temporary sign at the time floating buoys are placed on the lake. This provides the

estimated date that floating signs will be removed (generally 30 days from estimated nest-initiation date, unless the nesting area is also the nursery area).

Before laminating these signs, it is best to trim down the white edge so that there is a large enough plastic edge for stapling or nailing into. The signs last much longer if the plastic over the paper is not punctured.

FLOATING SIGNS

Floating signs are preferred over shoreline/boat ramp signs because people often fail to read posted information in their hurry to get into the water. However, do not use floating signs in an area where the public has never seen them without extensive education efforts. **NOTE:** These signed buoys should be used for loons only. Do not use loon signs to protect grebes and other waterfowl. Do not use ropes or tie jugs between the signs as this is unsightly, unnecessary, and expensive. It creates boating hazards and in the process you may keep the loon off the nest for extended periods of time. The only exception is that ropes and a single floating sign can be used to close a channel to a backwater nesting area such as the one present on Seeley Lake.



CORRECT PLACEMENT OF FLOATING SIGNS

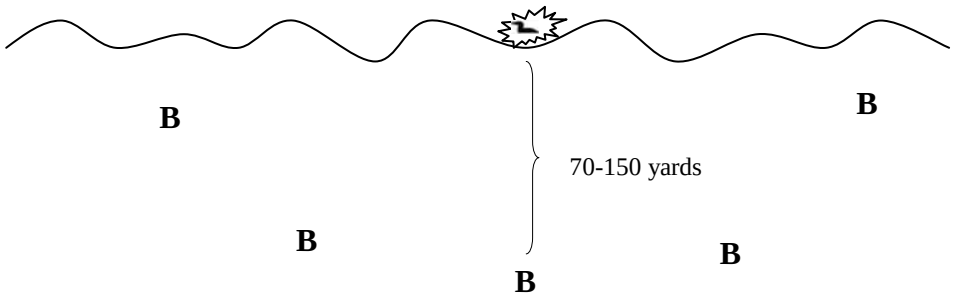
Correct placement of floating signs impacts the effectiveness of the signing program. Use GPS to record the exact location of nest sites and floating sign buoy each year, and use this information to evaluate the effectiveness of buoy placement in relation to the nest site.

Since loons are much more sensitive to any kind of boat presence during the first two weeks of incubation, the presence of your boat may get them off the nest while you are setting signs. This may not mean that the signs are too close. However, when the signs are set, leave the area quickly to help the loon return to the nest.

Once the loon returns to incubating, slowly approach the signs. **If the bird stays on the nest when your boat is right at the signs, then the signs are properly set.** This distance will typically be between 70 to150 yards (64 to 140 m) from the nest depending on the amount of tolerance exhibited by the birds for people and the configuration of the lake. Obviously, it is important to err on the side of more distance for the loon, although few birds actually need the maximum distance of 150 yards (140 m). **Do not place signs out more than 150 yards (140 m) because it will appear to close off too much of the lake.** This can result in vandalism or theft of signs or deliberate noncompliance. Accidental noncompliance occurs when the signs are too far apart so the semi-circle around the nest is not readily apparent. It is important to maintain flexibility in sign location in consideration of the recreating public. **Do not block traditional boating travel/navigation routes used by the public.**

Shoreline Nest Sites: Nests along the shoreline typically need five signs arranged in a semicircle 70-150 yd (64 to 140 m) from the nest site (Figure 1). In order to get the signs evenly spaced, you may want to put the "point" sign in first. This is the sign at the height of the semicircle, straight out from the nest. Then place the two signs nearest to shore. They should be 20 to 30 feet (6 to 10 m) from land so that canoes hugging the shoreline can see and heed the signs. Finally, place signs between the shoreline and point signs to fill in the semicircle. If the semicircle seems hard to follow, the signs may be too far from shore and spread out too far from each other. Try pulling them in closer to shore. If you feel the distance is right, but the signs still seem hard to follow, add an additional sign.

Figure 1. Placement of signs around a shoreline nest site (5 signs)



Island Nest Sites: Most island nests require at least six signs encircling the island (Figure 2). If the island is large enough, the signs on the side of the island opposite the nest can be much closer to the island than the signs on the side where the nest is. Some islands are large enough to sign in a manner similar to shoreline nests (Figure 3).

Figure 2. Placement of signs around a small island (6 signs)

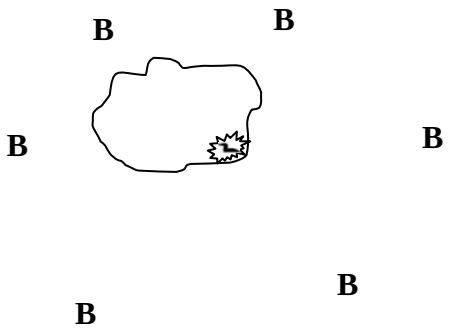
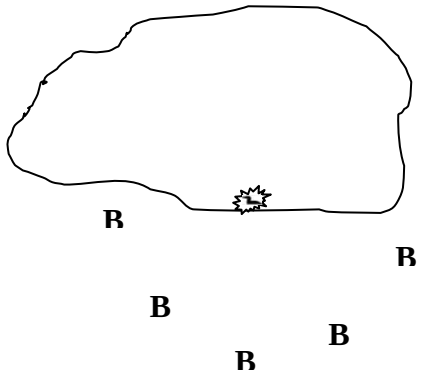


Figure 3. Placement of signs around a large island (5 signs)



WHEN TO PLACE AND REMOVE FLOATING SIGNS

Floating signs are typically placed as soon as possible after the birds are settled onto the nests. However, people are arriving to recreate on lakes earlier and earlier in the spring, in larger and larger numbers. Signs can be placed around apparent nesting areas before a nest site is known. This can quiet the area down so that the birds can proceed with courtship and nest selection, since human presence disrupts the courting and nest selection process as well as incubation. Yonge (1981) and Heimberger et al. (1983) found that early nesting efforts tend to be more successful. Kelly (1992) found that all nests initiated between April 26 and May 1 were successful, but fewer initiated between May 8 and May 26 were successful. Thus, delay of nesting caused by increased recreation early in May can predispose the nest to failure. Loons tend to reuse nesting sites, especially if they were previously successful (Strong 1987).

Shoreline development limits the numbers of nest sites which can be used by loons. As a result, it is often possible to ascertain the approximate location of the nest before the birds are settled.

The downside to early sign placement is that it may be necessary to move or adjust the signs in response to the actual location of the nest so that only the nesting area which needs protection is actually closed to human use. This extra effort is done in consideration of recreationists who may not comply with floating closures if they perceive that too much of the lake is "closed off" or that the loons are not in the area enclosed by the signs.

If a nest failure occurs, loons may renest. If they do, they often renest in a different spot, which will require that the signs be moved.

Loon signs can stay up as long as the family unit is using the enclosed area. Once they are consistently using other parts of the lake (or after the chick is two to three weeks old), the signs need to be promptly removed. As recreational pressures increase, it may be necessary to use signs to protect nursery areas temporarily so that family units with very young chicks have time to feed and rest. These essential activities are compromised when loon families are constantly moving to avoid watercraft. This is particularly true during the Fourth of July weekend.

CONSTRUCTION OF FLOATING SIGNS

Materials needed for one sign and approximate 2008 costs:

- **37 inch long piece of 4 inch schedule 40 PVC pipe**. Comes in 10' lengths, so three can be cut out of a 10-foot piece, at about $2.70 per foot.
- **Two high-pressure 4 inch PVC slip caps**, at about $8.60 each.
- **One 40 inch piece of ¾ inch EMT thin-wall conduit**. This comes in 10-foot lengths at $1.20 per foot.
- **PVC two-part glue system (primer and glue)**, costing about $10.00 for both cans, enough for 30 to 40 attachments.
- **PVC glue E6100** (about $10.00 per tube and tube will seal many eye hooks). This is best used between 70 and 85 degrees F.
- **Paint for covering PVC glue to make it UV resistant.**
- **Four self-tapping metal screws.**
- **Eye bolt (about 1 inch circumference and 4 long) with two washers and one nut**.
- **One ¼ inch bolt, approximately 3½ inches long, with two nuts**.
- **One small metal coffee can measure of dry pea-size gravel**.
- **Two metal "LOON NESTING AREA" signs**. Members of the Montana Common Loon Working Group make bulk purchases of the metal signs, often through Montana Fish, Wildlife, and Parks.

In 2008, we purchased enough materials for 40 floating signs. Excluding the cost of the metal signs, this was about $35 per sign. Buying in bulk probably reduced our cost by 20%.

Tools and Equipment needed

- Tape measure and pencil
- Power drill
- Drill bit for pre-drilling hole slightly smaller than self-tapping screws
- Drill bit for driving self-tapping screws
- Drill bit for 3/4“ hole through PVC cap
- Drill bit for eye bolt through PVC cap
- Drill bit for 1/4” hole through conduit
- Two crescent wrenches
- Hack saw for 3/4“ conduit pipe
- Hand saw for 4” PVC pipe
- Small metal coffee can
- Caulking gun
- Paint brush
- Water to test floatation, such as an extra large trash can or a 24” x 4-foot plastic culvert lined with a garbage bag.

Instructions

Step 1) After pre-drilling the holes, screw the two metal loon signs back-to-back on either side of the 40” conduit pipe. Make sure the top of the signs is flush with the top of the conduit pipe. Place glue on the screw before screwing into the conduit. Use two screws for each sign.

Step 2) Glue both the top and bottom of the conduit to seal out water, using silicone glue or possibly the E6100. ***This glue must cure 24 hours.***

Step 3) Center drill the 4” PVC top cap so you can slide a 3/4“ EMT thin wall conduit (40 inches long) through the cap. The conduit must fit tightly in the hole.

Step 4) From the bottom of the metal signs, measure down the conduit 4” and drill a 1/4” hole through the conduit. Push the conduit through the top cap with the loons signs above the top of the cap, then insert the 1/4” bolt, which will prevent the conduit from pulling out of the cap when the sign is pulled from water. The bolt will need two nuts to tighten it against the conduit with each end equal distance from the conduit. Pull up the conduit snug against the bottom of the top cap, then seal both the bottom and top of the cap around the conduit with PVC glue E6100.

Step 5) Cut the 4” PVC pipe down to 37 inches.

Step 6) Center drill the bottom cap so you can attach the eye bolt with two washers (one on each side of the cap) and a nut. Seal the eye bolt on the cap with PVC glue E6100.

Step 7) Glue on the bottom cap, pour in the gravel, slip on the top cap, and check how the loon sign floats in water. The sign should float with the water level at the bottom of the top cap. Add or remove small amounts of gravel as needed. When the correct amount of gravel is added, glue the top cap with the metal signs onto the main body.

Step 8) 24-hours after the PVC glue is dry, paint over it so that the sun can’t break it down.

APPENDIX G:
The Use of Artificial Nest Platforms

The Montana Common Loon Working Group has accumulated a considerable amount of experience using artificial nesting platforms for common loons. Our primary reasons for providing platforms have been: 1) fluctuating water levels flooding or stranding nests, 2) replacing habitat lost by past human development, and 3) lessening shoreline predation and disturbance. For more information on floating platforms as loon nesting structures and our experience on specific lakes, contact an Area Coordinator (Appendix A).

MANAGEMENT CONSIDERATIONS

The use of nesting platforms should not be considered as mitigation for planned destruction of habitat or loss of habitat suitability. Using platforms is labor intensive, can be costly, and has no guarantee of success.

The decision about whether to provide an artificial nest platform involves several factors. To avoid luring loons to nest in inappropriate areas, the area must provide everything needed for successful loon reproduction, such as adequate food, shallow chick-rearing areas, and relative safety from predation and human disturbance. The lake must have supported breeding loons in the past, or loons currently using the lake must either not be breeding, or they are nesting in poor locations (Dolan 1994).

It can be difficult to assess the success of an artificial island because loon nesting success depends on many variables and it may take some time for loons to decide to use a given platform. DeSorbo et al (2007) found that of the platforms used for nesting, only 51% were used the first year. Nesting platforms have also been shown to increase aggressive behavior and reduce territory productivity in common loons (Mager et al. 2008). We have learned by experience that adding a platform to a lake can throw loon society into turmoil, leading to zero production of chicks and adult loons killed by other loons.

CONSTRUCTION OF NESTING PLATFORMS

Key design considerations for loon nest platforms:

- ***Prevent trapping loon adults or chicks in mesh or crevices, but do provide traction.***
- ***Make sure both loon adults and chicks will be able to climb up onto platform.***
- ***Provide overhead cover (i.e. live or dead plants or mesh) to protect from predation.***
- ***Buffer anticipated wave action caused by wind or boats.***
- ***Accommodate water level fluctuations with an adequate anchoring system.***
- ***Anticipate maintenance needs, such as reattachment of mesh or other parts, removal from water for winter, removal of overhead cover for winter (if kept outside in snowy area), and replacement of vegetation on platforms left in place.***

We have used SIMPLE CEDAR LOG STRUCTURES (Figure 1) with success for nesting loons in Western Montana since at least the 1980s. They are relatively inexpensive to build, can be built to a variety of sizes, and it is easy to add wave buffers and avian predator covers (Figure 2).

However, cedar log nesting structures must be maintained to prevent them from trapping young loon chicks or even adults. They are heavy and difficult to handle, especially when water-logged. They fare best if removed every fall for storage or maintenance. Cedar logs left in place beyond the loon nesting season have been crushed on rocks by winds and ice, pulled behind powerboats for sport, and burned for warmth by ice fishermen. See DeSorbo et al. 2008 for materials, costs, and construction details.

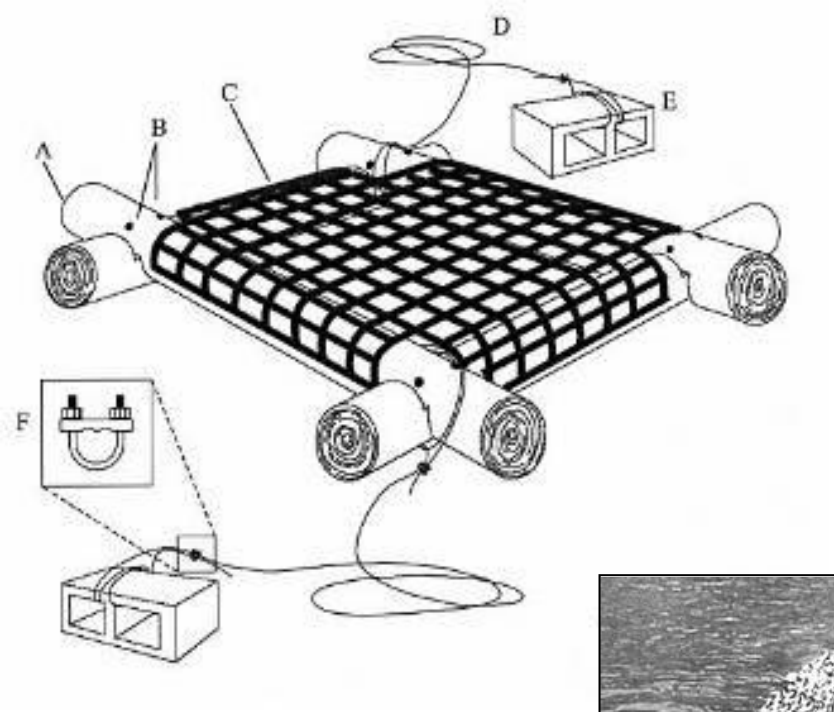


Figure 1. Diagram of a cedar log nesting platform for the common loon. Inset shows cable clamps used to attach cables to anchor blocks. Mesh size of plastic snow fence not to scale (DeSorbo et al. 2008).

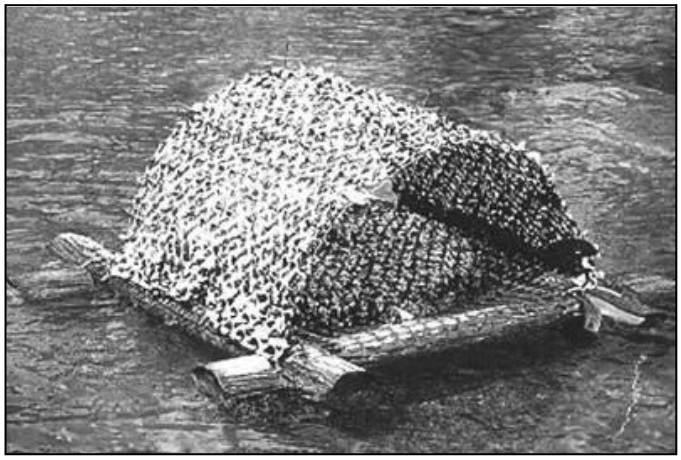
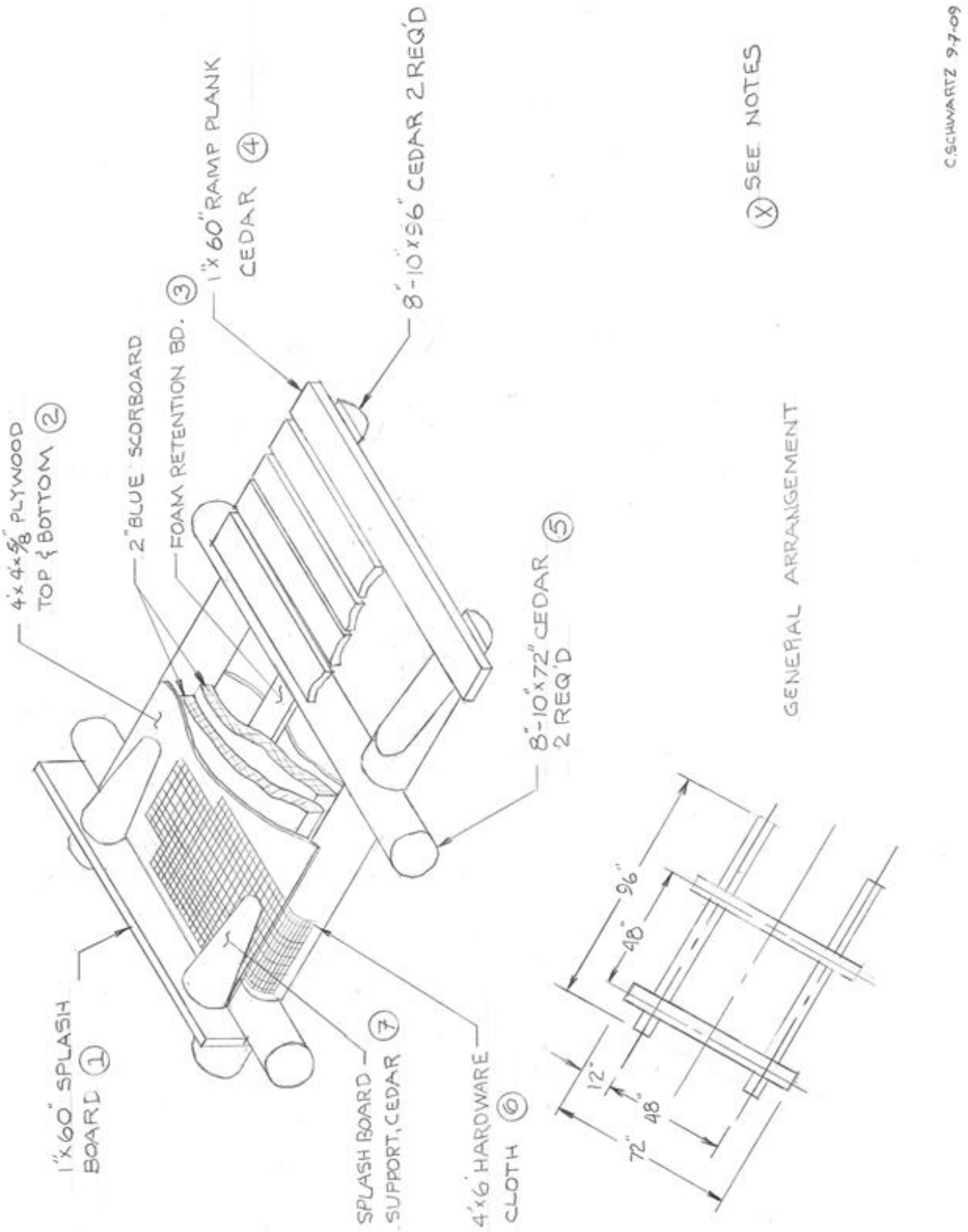


Figure 2. A Common Loon raft on Mooselookmeguntic Lake, Maine. Raft includes optional avian cover to obscure eggs and incubating loons from aerial predators and humans. Photo: Lucas Savoy.

Figure 3. Established overhead cover planted on 2003 Upper Stillwater lake loon nest platform

Dickey Lake area loon volunteer Chuck Schwartz recently designed an improved version of the cedar platform, which we call the SCHWARTZ CADILLAC CEDAR LOG LOON PLATFORM (Figures 4 and 5). This platform features built-in splashboard and access ramp, additional buoyancy and support, and safer mesh. The access ramp helps to provide maximum freeboard without hampering the ability of loons to access the platform. For aesthetic reasons and simplicity, overhead cover can be provided by "planting" willow directly on the platform. Alternatively, the butts of the brush can be inserted into holes drilled for that purpose in the main frame logs and secured with grabber screws.

Figure 4 Schwartz Cadillac Cedar Log Loon Platform with newly planted cover


4'x4'x5/8" PLYWOOD TOP & BOTTOM (2)
2" BLUE SCORBOARD
FOAM RETENTION BD.
1"x60" RAMP PLANK CEDAR (4)
8"-10"x96" CEDAR 2 REQ'D
(X) SEE NOTES
C.SCHWARTZ 9-7-09
8"-10"x72" CEDAR 2 REQ'D (5)
GENERAL ARRANGEMENT
1"x60" SPLASH BOARD (1)
SPLASH BOARD SUPPORT, CEDAR (7)
4'x6' HARDWARE CLOTH (6)
96"
48"
12"
48"
72"

Materials and 2009 Costs for One Schwartz Cadillac Cedar Log Loon Platform

Description	Quantity	Cost (ea.)	Cost (total)
RSS or hot-dipped galvanized lag screws, 3/8 x 10"	8	$3.25	$26.00
RSS or hot-dipped galvanized lag screws, 5/16 x 4"	20	$0.47	$ 9.40
Plywood, CDX, 5/8 x 4' x 8'	1	$18.00	$18.00
Hardware Cloth (1/2" x 1/2" mesh ONLY), 4' x 6'	1	$2.99/ft	$18.00
Blue Scoreboard polystyrene insulation (or other rigid closed-cell foam), 2" x 4' x 8'	1	$30.00	$30.00
Fencing staples, galvanized	as req'd	nominal	
Grabber drywall screws (or galvanized nails or decking screws), 2 1/2'	as req'd	nominal	
Cedar Logs, 8’ x 10” x 72”	4	provided	
Cedar Logs, 8’ x 10” x 96”	2	provided	
TOTAL COST (2009), excluding cedar logs			**$101.40**

Construction Notes for the Schwartz Cadillac Cedar Log Loon Platform (Numbers refer to circled labels on Figure 5):

1) Rip a 6’ cedar log into 1” boards for the splashboard, support board (#3), and ramp planks (#4). Use the widest board for the splashboard (at least 8” wide and 6’ long). Attach this to the supports with two 4" RSS screws on each end. See note #7.
2) Attach plywood sheets, top and bottom, to logs with 2 1/2" grabber screws, 6" o.c.
3) Provide a scrap cedar board to restrain foam board from movement. Usually this will be about 5’ long but its length will depend on the diameter of the cedar logs. Attach with 2 1/2 " grabber screws as required.
4) Rip a 6’ piece of cedar log into 1” x 60” cedar ramp planks. You will need enough planks to cover about 30” of ramp. Attach these to the log frame with two 4" RSS screws on each end. Leave no gaps wide enough for an adult loon or chick to get their feet stuck.
5) Notch cedar logs “Lincoln-log style” to provide a flat surface on topside for installation of plywood sheet. Secure logs with two 3/8" x 10’’ RSS screws at each joint.
6) Attach hardware cloth on top side of platform and wrap around sides. Attach as required with galvanized fencing staples. To prevent injury to birds, wire ends must be trimmed to the cross wires or the ends must be folded under mesh.
7) The angled splashboard support pieces are salvage from ramp formation. Attach supports over plywood sheet into log frame with two 4" RSS screws.

Deployment Notes for Schwartz Cadillac Cedar Log Loon Platform:

-- Provide three concrete blocks for anchors. Two blocks will anchor the end with the splash shield, one block for the ramp end. Attach blocks to platform with rope approximately 3 times as long as the depth of water at the nest site.

-- Position the platform with splashboard facing towards the windward side of lake.

-- For a uniform freeboard, the log mass should be balanced about the longitudinal centerline of the platform. This is affected by log diameters, dryness, and taper, and by placement of nesting materials.

We have also used BIOMIMICRY FLOATING ISLANDS from Floating Islands International (Figure 6 and 7) have also been used with success for nesting loons. These are considerably more expensive to purchase, but have several advantages. They are very lightweight, they look natural and inconspicuous, and they can support enough vegetation to hide a loon and its nest. They also apparently do not require removal and storage every winter.

Figure 6. Layout from above of a Biomimicry floating island (image from Floating Islands International).

Figure 7. 2008 Lower Stillwater Lake loon nest on Biomimicry floating island after hatch. Photo: Laura Holmquist.

In all but the most sheltered locations, the use of Biomimicry floating islands smaller than 36 square feet (3.3 square meters) is not recommended by the Montana CLWG. You can see in Figure 8 that the nesting loon is very exposed to wind and waves on such a small platform, although it did successfully hatch.

Figure 8. Lower Stillwater Lake loon on a 25 ft^2 Biomimicry floating island in the 2008 nesting season. Photo: Laura Holmquist.

PLACEMENT OF NESTING PLATFORMS

It is critical to locate artificial nesting structures properly to avoid further lowering loon nesting success. Placement must be out of prevailing winds and wave action (represented by arrows in lower drawing in Figure 9. Also consider human use patterns and locations of historical nest sites (DeSorbo et al. 2008), as well as the locations of nests and apparent territorial boundaries of other loons on the lake. The area must be at least three feet (1 m) deeper than any expected amount of water level decrease.

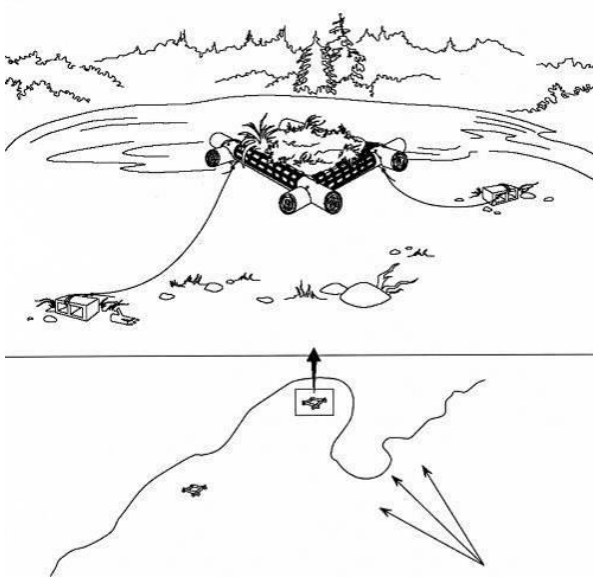


Figure 9. Upper pane represents a cove within a loon territory, displayed from an aerial perspective in lower pane. Lower raft in bottom pane represents a poor choice for placement due to exposure from prevailing winds (DeSorbo et al. 2008).

Carefully selected locations of artificial nest islands can also increase the effectiveness of floating nest area buoy signs (Appendix F), should you decide to use them. For example, a platform intended to create a nesting area in a small bay with a narrow inlet might need only two or three signs to be delineated on an obvious way. Alternatively, platforms can be placed in areas that receive so little human use that signing would not be necessary.

Anchors have been made of cinder blocks, railroad spike tie plates, and various other heavy, indestructible items. Generally, two anchors are used, in line with prevailing winds and waves. Leave enough slack in the line to accommodate water level changes and to allow the platform to adjust to changes in wind direction.

AVOIDING TRANSPORT OF AQUATIC NUISANCE SPECIES

Loon nest platforms and their anchoring materials can also provide habitat for or transport of aquatic nuisance species such as zebra mussels, Eurasian watermilfoil, and whirling disease. The easiest way to avoid further transport of these species is to only use new platforms, ropes, and anchors or ones that have only been used in that specific body of water. Anyone maintaining platforms should be able to identify aquatic nuisance species they may find attached so they can report them to the Montana Aquatic Nuisance Species Coordinator. See the Montana Fish, Wildlife and Parks "Aquatic Nuisance Species--Identification and Distribution" page http://fwp.mt.gov/cms/servlet/fishing/guide/ANS/default.html.

The Montana Common Loon Working Group strongly discourages the transport of a used nesting platform from one body of water to another. If moving a platform is absolutely necessary, it must be thoroughly washed several times to remove all sediment and vegetation, including small roots. High-pressure hot water is best. Let the platform bake in the sun and air out completely for at least a month. Do not reuse a platform taken from any body of water known to have aquatic nuisance species.

APPENDIX H:
Information and Education

Montana Loon Society's Educational Loon Trunks

The Montana Loon Society developed Educational Loon Trunks for loan in Western Montana, free of charge. Activities and materials are appropriate for students from pre-Kindergarten to High School.

TRUNKS ARE AVAILABLE AT THESE LOCATIONS:

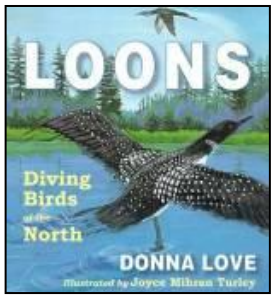
Montana Natural History Center
120 Hickory Street
Missoula, MT
Contact: Jazz Rowell
(406) 327-0405
Info @ TheNatureCenter.org

U.S. Forest Service
Tally Lake Ranger Station
650 Wolfpack Way, Kalispell, MT
Contact: Amy Jacobs
(406) 758-3544
ajacobs @ fs.fed.us

Confederated Salish & Kootenai Tribes
Natural Resources Department
301 Main Street, Polson, MT
Contact: Germaine White
(406) 883-2888 ext. 7299
germainew @ cskt.org

U.S. Forest Service
Murphy Lake Ranger Station
12797 U.S. Hwy 93 S., Fortine, MT
Contact: Lynn Johnson
(406) 882-8345
lmjohnson @ fs.fed.us

CONTENT HIGHLIGHTS:



"Loons on Our Lakes" Information & Activity Notebook

Loon study skin or taxidermy mounts (may require special arrangements)

Loon egg replica

Loon puppets - one adult & one chick

Children's Loon Costume with script

Laminated Posters

"Lottie the Loon," plush squeeze with realistic loon call

Loon Videos: "Great Montana Loon Rescue" & "On Golden Pond"

Loon Slide Show & Cassettes: "Hello, I Am a Loon" & "Voice of the Loons"

"The Life of a Loon in Pictures," with script

Loon Books:

How the Loon Lost Her Voice, by Anne Cameron
Loons, by Roy Dennis
Loons, Diving Birds of the North, by Donna Love
Loon Lake, by Jonathan London
Loon Lifestyle, Conversations with Claire De Loon, by Jane MacDonald
Love of Loons, by Kate Crowley and Mike Link
Top 40 Questions and Answers about Loons, by Jeff Fair

Plum Creek

Montana Loon Society's Educational Loon Trunk is brought to you in part by a grant from Plum Creek Timber Company and by contributions from the U.S. Forest Service

Ways Watercraft Affect Loons
Canoes slip quietly into nesting areas and can startle loons off nests. **Fishing Boats,** especially bass and pike anglers, spend lots of time in waters perfect for nest sites. **Speed Boats** send waves crashing into the shoreline. **Personal Watercraft** can speed in shallow water and may run over chicks.

PLEASE OBEY ALL LOON NESTING SANCTUARY SIGNS!

Most loon lakes are signed warning that a nest is near. Loons give a warning too. **Their distress call sounds like a laugh. Listen for and heed this call. It means: *"Please move away."***

If you see a loon 'dancing' by raising its chest straight up out of the water, and slapping the water with its wings, it is ***URGENT*** that you move away. ***You are in their territory.***

What Everyone Can Do:
Enjoy loons from a distance. Listen to their lovely, haunting calls. Enjoy the solitude of Montana. Loons need this solitude to breed and raise their young. If the loons are gone, your solitude might be slipping away too.

The Montana Loon Society
The Montana Loon Society is a non-profit organization concerned about the Common Loon in Montana. An increase of human recreational pressures on lakes, shoreline development and springtime angling in nesting areas has caused this concern.

The Montana Loon Society's Purpose Is To:

Monitor Common Loon populations in Montana.
Increase public knowledge and awareness about loons.
Protect and enhance critical loon habitat and welfare.
Identify management or research needs and obtain funds for same.
Facilitate cooperation between government agencies, lakeshore owners and the general public to accomplish these goals.

For more information contact us at:

P.O. Box 1131,
Seeley Lake, Montana 59868
www.montanaloons.org

RESPONSIBLE WATERCRAFT USE AND

Montana's Loons

Montana has many treasures, Including its beautiful mountain lakes.

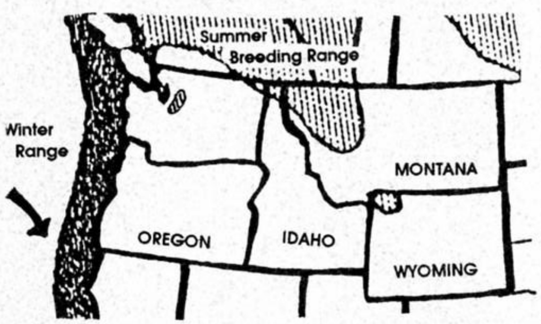
The Common Loon, known for its haunting calls and striking black and white breeding plumage, use a number of these lakes for their summer nesting grounds.

Watercraft operators are naturally drawn to these lakes and often come into close contact with loons. Responsible watercraft use will help ensure that both humans and loons continue to share Montana's lakes.

The Common Loon

Common Loons are large, goose-size, black and white diving birds that spend their summer on open fresh-water lakes and winter on the coast. They feed mostly on fish. They are 2-3 feet long, weigh 8-12 pounds and have a wingspan of 4 - 5 feet.

Approximate Range of the Common Loon in the Pacific Northwest



The Common Loon is not as common in the Western States as the name implies. Breeding pairs are found in only four states west of the Mississippi River. Montana has the largest population with approximately 200 birds. Most of these nest north of Missoula and west of the Continental Divide.

Montana's Nesting Loons

Of the 65 pairs which attempt to nest only 24-26 pairs successfully hatch and raise 1 - 2 chicks each year. Nests are usually on small islands in marshy areas such as bays, coves, inlets or backwaters.

The nesting season in May and June is the loon's most CRITICAL TIME and loons aren't like ducks and geese that have large broods. Loons *only* lay 2 eggs, which both parents take turns incubating for 28-29 days.

Boat Traffic Can Cause Loss Of Eggs.

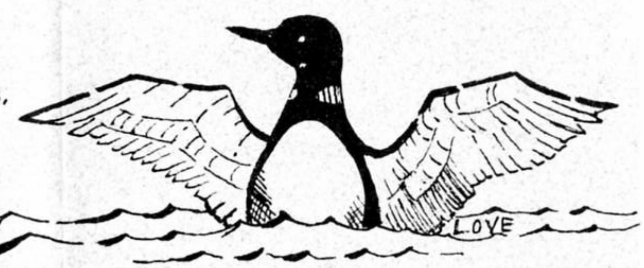
- ❖ **Loon parents leave if watercraft come within 150 yards of the nest** (the length of 1 1/2 football fields) leaving the eggs without warmth or protection.
- ❖ **If disturbed often, loons abandon the nest.** A pair *may* renest if it isn't too late in the season, but they only have two chances. If two loons are together near inlets, marshy shorelines, or backwaters in May or June a nest site may have been disturbed.

Nursery Room

Loon chicks rest, feed, and grow in and around their territory during the months of June, July and August. Look for them in backwaters and along the shoreline.

Boat Traffic Can Cause Loss of Chicks.

- ❖ **Young chicks are not waterproof.** They need to be able to climb up on their parent's backs to stay warm and dry. When watercraft come close parents leave their chicks to defend their territory.
- ❖ **Young chicks are very buoyant and** can't dive quickly to get out of the way. They can be run over.
- ❖ **Chicks tire easily.** The presence of watercraft causes them to keep swimming instead of feeding and resting. This can weaken them affecting their ability to survive.



Safeguard your health and wealth

The Ribbon of Life

The shoreline, where land, water, and air meet, is a vital link providing plants and wildlife the resources they need for life. We, too, rely on shorelines for sustenance. Communities have grown up along the water's edge and we continue to return to the shore to rest and restore our spirits.

Those of us who live by water experience its magic every day. Our health, our children's health, and the long term value of our waterfront property depend on how we care for the shore, the "ribbon of life."

Photo by: Lester Bigcrane, Wildland Rec., CS&KT

Twelve Simple Steps to Keep Your Paradise Intact

- Keep the lot well-treed, never clearcut.
- Protect shoreline vegetation; replant area lacking shrubs and trees with native species.
- Start a buffer strip by leaving some grass uncut near the water.
- Give clear instructions to your contractors and monitor their work.
- Avoid spilling fuels, antifreeze, paint thinner or other chemicals on land or water; clean up fast!
- Don't use fertilizers, pesticides, or herbicides near the water.
- Use only phosphate-free soaps, detergents and cleaners in your home.
- Pump out your septic tank regularly every two to three years if you have a field system.
- Extend the life of your septic system by avoiding tank additives and minimizing water consumption.
- Refuel your boat with care; don't spill a drop.
- Watch your boat's wake; it causes erosion and is a disturbance to birds nesting on the water's edge!

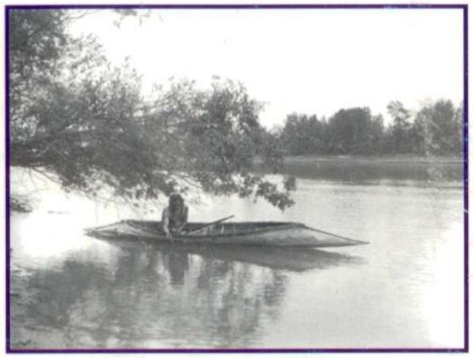


Photo by: U of M Library, Missoula, MT

Benefits of Shoreline Care

Caring for your shoreline means less work, not more! You will help preserve water quality and safeguard your family's health. You will also help protect the beauty of your paradise, maintaining its investment value. Extra benefits include more time to relax and enjoy!

Prepared by:

Lake County Conservation Dist.
45358 Hwy 93
Ronan, Montana 59864
(406) 676-2841

Flathead Lakers
P.O. Box 70
Polson, Montana 59860
(406) 883-1346

Lake County Planning Dept.
106 4th Ave. E.
Polson, Montana 59860
(406) 883-7235

Flathead Conservation Dist.
30 Lower Valley Rd.
Kalispell, MT 59901
(406) 752-4220

Confederated Salish and Kootenai Tribe
Natural Resource Dept.
Box 278
Pablo, Montana 59855
(406) 883-2888

Always check regulations before building or making changes to your shoreline.

Cover Photo by: Lester Bigcrane, Wildland Rec., CS&KT

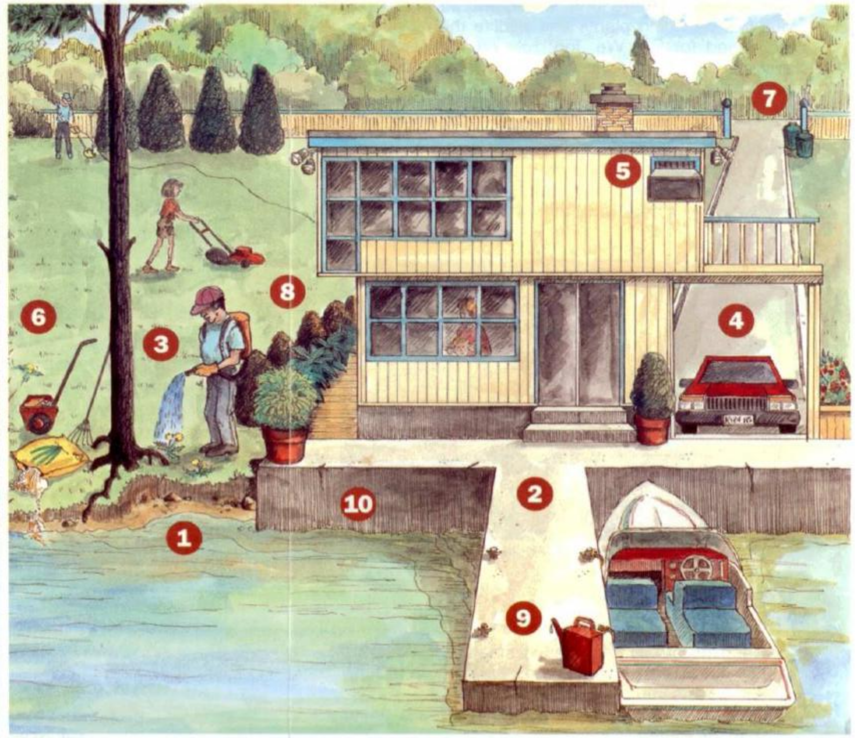
Special thanks to The Living By Water Project for their contribution to this brochure

Gull Printing, Inc.

Waterfront Living

simple tips, lasting benefits

Waterfront Living



Let's Enjoy

1. Natural shoreline — great wildlife habitat.
2. Small floating dock — low impact: hinged from a stationary platform or deck located above high water.
3. Septic system far from the shore — reduces water pollution.
4. Narrow, gravelled footpath — less chance of erosion.
5. Trimmed trees and adjustable awning — natural air conditioner with view maintained.
6. You work less — relax more!
7. Kitchen compost — improves your soil's quality.
8. Low-maintenance native plants — provide shoreline buffer.
9. Building — set back from shore and in character with setting.
10. Well-maintained motor — electric, or modern 2 stroke or 4 stroke outboard, operated at low wake speed near shore.

Let's Talk

1. Bare shoreline — subject to erosion which can degrade water quality and affect your property value.
2. Solid dock — destroys wildlife habitat, alters current, causes erosion elsewhere.
3. Fertilizer spills, chemical runoff and pet droppings — damage water quality.
4. Paved lane — pollution-laden runoff, including oil and antifreeze leaks from your car, flows to water.
5. No shade trees — overworked air conditioner adds to electric bill.
6. Removal of natural vegetation — more work for you and more runoff.
7. Collecting lawn clippings — deprives soil of nutrients; try mulching.
8. Ornamental shrubs — require chemicals and extra work.
9. Poor fuel management — gas and oil spills from cans, tanks and leaky boat motors are deadly to aquatic environments.
10. Hardened shoreline — eliminates "natural filter", degrades water quality and blocks wildlife access.

"Montana's Loons"

Presentation by Chris Hammond

Unless otherwise indicated, all images are of adult common loons in breeding-season plumage.

Slide	Image(s)	Notes
1	Common Loons on the water	**Common Loon** *Gavia immer*. Breeds across Alaska and Canada with small populations in the northeastern states. Montana has the largest population west of the Mississippi with 200 birds. The largest populations in the lower 48 are in Minnesota (state bird), Wisconsin, and Michigan. This in the only loon to breed in the lower 48. They winter along both coasts. Calls are particularly haunting. Goose-sized birds measuring 30-33 inches from the beak to tail, 8-12 pounds, 4 foot wing-span.
2	(Loon call text with embedded loon sounds)	**Loon Calls** • Wails: More ghostly, some say wolf-like; eerie; used to communicate with each other (pair), or with other loons; warning for bald eagles, "Whereeee areee youuu?'. • Tremolos or Laugh: Sound of disturbance; the higher the pitch the more disturbed. • Yodels: Male only; territorial and aggressive; # of repetitions is important (distinct to individuals). • Hoots: Family calls. • Combinations of Tremolos with wail or yodel: Tremolo always precedes: tremolo/wail = afraid, such as with human disturbance; tremolo/yodel = fight, but also flight, perhaps a male against a pair.
3	Arctic loon on nest	**Arctic Loon** *Gavia arctica arctica* (European Arctic Loon) Gavia arctica viridigularis (Siberian/Alaskan Species) Breeds in arctic and subarctic areas. Slightly smaller than the Common Loon. Larger and grayer than the Pacific Loon.
4	Pacific loon on nest	**Pacific Loon** *Gavia pacifica*. Breeds in Alaska/Northwest Territories and Siberia. Designated as a distinct species from the Arctic Loon on basis of geographical occurrences and differences in appearance. Silver gray head and smaller than the Arctic Loon.
5	Red-throated loon	**Red-throated Loon** *Gavia stellata.* Breeds along the Alaskan, Northwest Territories and Hudson Bay coastlines. These are considered to be the least specialized of the loons because their adaptations for diving are less well developed than for the other four species. RTLO are more grebe-like. Their plumage lacks the iridescent head feathers, stripes on the neck and back of head and large spots on the body feathers. They have the largest wing surface area relative to body size and can make the most efficient take off for flight. They have been observed taking off directly from land.
6	Yellow-billed loon	**Yellow-billed Loon** *Gavia adamsii*. Breeds in tundra and adjacent arctic coasts. Largest of the loon species. Calls are similar to common loons.

Slide	Image(s)	Notes
7	Common loon on water, wings extended	**Adaptations** The wing surface area is only half that of a goose of the same size. This reduction of wing area is necessary to reduce drag while the bird is diving.
8	Loon running on take-off	It also means that the birds must have a runway for take off. Sometimes that runway needs to ¼ mile long. They cannot take off from land. When landing in water, they set their wings and glide in, landing on their bellies.
9	Loon in flight	The loon is very distinctive in flight, with its long legs trailing out from the tail, humped back (like the Concord Jet) and rapid wing beat. After take off, they fly low at first and slowly start to gain elevation. They circle around the lake, often doing the flight tremolo and finally clear the trees. Once underway, their cruising speed is 75 MPH and if they are in a big hurry, they have been clocked at 100 MPH.
10	Close-up of loon, side image, with fish in bill	Adaptations seen here include: Black and white camouflage allowing the bird to virtually disappear in sparkling water. It also allows the bird to disappear when dive so prey can't see them. The red eye allows the bird to see better in low light hunting situations such as hunting under water. The "fish-spear" beak of course allows the loon to catch its fish prey. The fish are not speared, but are caught and swallowed head first. The edges of the bill are very sharp, but not serrated like a common merganser. Loons can adjust their position in a vertical column of water much like a submarine. They use their wings to press air out of their plumage and body cavity. This causes them to sink in place like a stone. When they loosen their wings, they rise vertically in place. Loons have bones that are more solid than most other birds. This allows them to dive to greater depths with little effort. Loons are "flying submarines." Their legs come out of their bodies at the tail and serve as the "motor" for the submarine. Most of the leg of the loon is encased in its body giving the bird a very strong swimming stroke, but seriously limiting its ability to walk on land. Loons out swim their fish prey as underwater they become torpedo-shaped. The smoothness of the head, body shape, laterally compressed legs all aid in reducing resistance of movement in water.
11	Pair on a misty lake	**Life History and Distribution** A pair of loons will return to the same lake for many years. They usually arrive in early to mid April.
12	Close-up of adult on nest	Courtship between loons is rather subdued since the partners probably know one another. They just quietly swim, dive, preen, and rest together. Then they examine the shorelines of islands or marshy sites looking for a suitable location for a nest.
13	On nest with reflection of loon in water	Loon nests are immediately adjacent to water in marshy backwaters or near inlets. They are large structures often up to 3 feet across and mostly composed of rootlets and mud from underwater.
14	Loon turning egg	Both sexes help incubate 2 eggs for about 26-28 days. The eggs are laid 1 day apart, so the first egg will hatch 12-24 hours before the second egg. Eggs are turned each time an adult returns to the nest.
15	Adult feeding chick	Newly hatched chicks are covered with black downy feathers that remain for about 7-10 days. They are replaced by brownish-gray down feathers between 10-14 days old.

Slide	Image(s)	Notes
16	Adult, two small chicks on board	Adults carry the chicks on their backs for the first few weeks after hatching. In this way, the chicks are protected from aquatic predators and can get warm and dry after being exposed to cold water.
17	Pair with two small chicks in water	A nursery area is a shallow backwater area where the loon family stays for the first four weeks after chicks are hatched. The site is protected from winds and wind-generated waves that can separate the chicks from their parents. It is also perfect for bass and pike habitat, so anglers need to be extra alert for loon families in these areas in June and July.
18	Chick next to adult	At about 4 weeks old, the brownish-gray downy feathers are replaced by smoother contour feathers of the same color.
19	Adult and older chick, side by side	By the time the young are 10-11 weeks old, their juvenile plumage is complete, and flight feathers have erupted enough to allow flight practice. They fly 11-13 weeks after their hatch date. This set of feathers will be retained by the juvenile until the next summer when it will experience its first complete molt. This molt replaces all the juvenile feathers with another set of "basic" plumage. The color? You guessed it…..gray!
20	Four adults close together, one stretching wings	Loon chicks start to fly when they are 11-13 weeks old which means they are flightless until at least middle August. By September, the adults are starting to gather on staging areas in preparation for the fall migration to the Pacific Coast. This year's chicks will stay on the coast for 3 years while the adults will return to their territories again next April.
21	"Penguin dance"	**Disturbance** Loons are extremely territorial towards other loons, water birds, and people on their lakes or near their nests. They communicate extreme stress, disturbance, and territoriality by doing the "Penguin Dance." If you see this behavior, leave the area immediately, since the message of this behavior is "you are too close."
22	Male yodeling	When the male yodels, he lowers his head across the water and usually faces whatever is causing the territorial problem.
23	Adult in upright wing-flap posture, small chick nearby	How do you know if you are disturbing a loon pair or family? A series of behaviors will help you determine this. If a nonresident loon or a boat enters the territory, the first response from the resident pair is to rise up out of the water, face the intruder, and flash the white chest and underwings. The message seems to be "this territory is taken. I really don't want to have to deal with you, but I will if you persist." Then the birds approach the intruder to communicate their territoriality more clearly. [People have said "the loons like me--they come right up to my boat." While loons are curious, their usual reason for approaching during the nesting and chick-rearing seasons is territorial defense].
24	Attentive pose	Then the bird(s) will nervously bob their heads. They look under the water for an intruding loon attacking from that angle, then raise their heads on an elongated neck and search for a loon popping out of the water. They communicate the same way when a boat has come too close. [Watch for a raised neck and listen for vocalizations. If any of these things occur, move away from the birds and give them a little more room. During the nesting season (May1-June 30) if you see one bird in the water, the other one is probably on a nest that could be nearby. If you see two birds in the water, you may have caused the nesting bird to leave the nest. Look around. Are you near a marshy shoreline or island or in a backwater? If so, move away from the shore line so the bird can return to the nest.]

Slide	Image(s)	Notes
25	Anglers in boat and loon family	Loons and people can coexist on the same lake as long as people give the birds extra space. Watch for floating signs that indicate closed areas around nest sites and try to stay at least 100 yards from a family group. If we do this, our children and grandchildren will have a chance of the haunting calls of loons on their favorite lake.

APPENDIX I:
Handling of Live Common Loons and Specimens

The Montana Common Loon Working Group represents professional wildlife biologists and others interested in Montana's loons. We are concerned with a) the welfare of individual loons, b) the persistence and strengthening of the state's breeding population of loons, and c) the health and diversity of Montana's aquatic ecosystems. As such, members are routinely tasked with rescuing injured loons, banding loons, recovering loon carcasses, as well as collecting various biological samples. This appendix is provided as a guideline those procedures.

CAPTURING AND HANDLING COMMON LOONS

The purpose of capturing common loons is to investigate various aspects of loon ecology including survival, behaviors, reproduction, response to bioaccumulants, and in some cases to rescue birds. Capture methods for breeding common loons and their chicks are explained in detail in Evers (1992). **Note: All attempts to capture and handle common loons, whether to rescue or to band, must be done with or by qualified state, federal, or tribal biologists or similarly qualified loon researchers. If none of these people are available to assist in the capture and handling operations, make direct contact with them, follow their advice and recommendations, and proceed in a safe manner.** Every loon that is handled, if healthy enough, should be banded so it can be monitored over time. It is very important to coordinate with Montana Fish, Wildlife and Parks on acceptable band combinations prior to placing bands on a bird to avoid duplication. Coordination is also necessary to ensure the bird receives an aluminum USFWS band and it is placed on the correct leg based on the age of the bird. Other samples including secondary feathers, tail feathers, and blood may be taken and submitted to the Biodiversity Research Institute. Properly trained Area Coordinators (Appendix A) will have more detailed protocol.

Rescuing trapped and injured common loons

The Montana Common Loon Working Group recommends that rescue of common loons should be attempted in some cases. Rescue may be appropriate when a loon is injured or when it is unable to escape from a situation such as a wet highway or a freezing water body. Rescues should not be limited to human-caused problems. However, we generally would not rescue a loon that was injured while another wild species attempted to prey on it or one that was injured in a dispute with another loon.

The safety of people attempting the rescue must be a paramount consideration. A loon in hand can cause serious injury, especially if its bill makes contact with your eye. Rescues on rough water or thin ice should not be attempted, nor those involving inclement weather or unsafe watercraft.

Veterinary assistance should be obtained any time the rescue would involve a) causing additional injury such as surgical removal of a fishing lure, or b) removal of the loon to a facility for rehabilitation.

A loon that requires handling or transport should be kept restrained with its eyes covered to prevent it from hurting itself or its rescuers. The loon should not be allowed to rest on its keel for long periods of time. Use a rolled towel or other pressure-relieving technique. Watch for signs of heat stress and, if needed, cool the loon by setting it on a bag of crushed or cubed ice that is covered with towel or fabric. If the air is very cold, keep the loon warm inside a heated vehicle or by body contact with someone holding the loon.

If rehabilitation is needed, place the loon in the care of a wildlife rescue facility recognized or registered by the government authority for wildlife care and rehabilitation. As soon as the loon recovers sufficiently, return it to the water body where it was found or to the closest appropriate location. During loon breeding season, do not release a loon into the territory of a territorial pair that could re-injure the loon. In fall or winter, do not place a loon that cannot fly in a lake that may freeze over.

Consider the loon's welfare and the potential for its successful and long-term rehabilitation. If the loon is suffering significant pain or distress that cannot be relieved, it should be humanely euthanized. Seek the opinion of a qualified veterinarian.

COLLECTION OF BIOLOGICAL SPECIMENS

Eggs and Egg Shells

Whole eggs are collected and analyzed for chick development and mercury analysis, while egg shell fragments are collected and stored for future analyses. Egg shells are collected only after the chicks hatch and the loon family has left the nest area. Collect as many shell fragments and as much membrane material as possible. Be sure to examine the area surrounding the nest bowl as loons will move fragments into the water. Place the sample into a clean ziploc bag. Label the bag (either with a card placed inside the bag or with a permanent marker) with the following information: species (i.e. COLO), contents (egg shells), lake/territory (include coordinates), state, date, collector’s name, and any additional important information.

Whole eggs are collected from a nest only if you are absolutely positive the breeding pair is no longer incubating. **Do not remove viable eggs from active nests (yes, it has happened).** The easiest way to avoid this is to have an accurate hatch date and monitor the nest regularly. If the eggs do not hatch on the estimated date, allow an addition three to five days and then reassess the situation. We have waited as long as 25 days past the estimated hatch date in some cases due to prolonged incubation. Other situations may warrant collection sooner, such as flooded nests and abandoned nests. In other situations, whole eggs are collected after a chick hatches and an egg remains on the nest. Always use discretion prior to removing eggs from a nest. Wrap eggs in padding (paper towels work well) and place in a clean ziploc bag. Label the bag with the same information listed above. Place the sample in a freezer as soon as possible. It will begin to smell very bad, if it does not already.

Transfer whole eggs and eggshells to the CLWG co-chairs at the July meeting. The co-chairs will submit the samples to the Biodiversity Research Institute (BRI) for analysis. The co-chairs are also responsible for following up with BRI to obtain results.

Carcass Collection

The Common Loon Working Group collects common loon carcasses for necropsies whenever possible. Necropsies provide valuable information on cause specific mortality. If possible take pictures of the bird before collection (see below). Prior to freezing (if possible) record the following information: date, species, age (adult, subadult, juvenile, or chick), contents (carcass), recovery location (include city/state or location/state), coordinates (UTM or Lat/Long with datum/WGS 84 is the default datum on most GPS units), collector's name, the band combination including the USFWS band number, if it was banded, suspected cause of death, and any additional important information. Place the form in a ziploc bag and place it with the carcass in a garbage bag. Then place that garbage bag into another garbage bag and seal it. Apply a collection tag or label to the bagged carcass. At this point you should freeze and preserve the specimen. Contact the nearest area coordinator (Appendix A) to arrange the delivery of the carcass. Area coordinators should contact a nongame biologist with Montana Fish, Wildlife and Parks and have the carcass shipped to the Fish, Wildlife and Parks Laboratory in Bozeman, Montana for the necropsy. In addition area coordinators (Appendix A) mail or email a copy of the collection form to the biologist in charge of the mortality data.

Example:

Date: 13 October 2004
Species: Common Loon
Age: Juvenile
Contents: Carcass
Recovery Location: Long Beach Peninsula, WA
Coordinates: 46.633, -124.05/Datum WGS 84
Collector: Jim Conner, PhD
Bands: LL White Dot/Silver, RL Blue/Yellow Dot, USFWS #938-446-76*
Cause of Death: Unknown**
Addition information: The bird was washed up on shore. It appeared very thin.

***** The silver band is missing in the photo.

****** A necropsy later revealed this bird may have died of Type C Botulism.

APPENDIX J:
Loon Ranger Training and Responsibilities

MONTANA LOON RANGERS INTERNET RESOURCES

Videos:

Loon capture and processing: http://www.vimeo.com/2945173
Installing a loon cam: http://www.vimeo.com/1121034
"Ranger minute," loon nesting, feeding chick: http://www.vimeo.com/2442391
Loon swimming and diving: http://www.vimeo.com/890664
Too close! (tremolo, oaring, penguin dance): http://www.vimeo.com/298327
Nesting, egg-laying on platform: http://www.kare11.com/video/player.aspx?aid=30875&bw

Loon Nest Cam:

Biodiversity Research Institute: http://www.briloon.org/watching-wildlife/loon-cam.php

Sounds:

Loon dictionary (Journey North): http://www.learner.org/jnorth/tm/loon/Dictionary.html
Looney Tunes (Journey North):
http://www.learner.org/jnorth/tm/loon/identification.html#Looney
Loon Yodel Studies (Journey North):
http://www.learner.org/jnorth/tm/loon/YodelStudies_JM.html
Loon Sounds [all loon species] (Jungle Walk): http://www.junglewalk.com/sound/Loon-sounds.htm

Other Resources:

Beached Bird Guide for Northern Lake Michigan:
http://www.gtbay.org/downloads/beachedbirdguide1_1.pdf
Montana Field Guide [all loon species] MT Fish, Wildlife & Parks:
http://fieldguide.mt.gov/displaySpecies.aspx?family=Gaviidae
Loon Q&A (Journey North): http://www.learner.org/jnorth/search/Loon.html
Satellite Tracking of Loons: http://www.seaturtle.org/tracking/index.shtml?project_id=95
Montana NRIS Loon Database: http://nris.state.mt.us/apps/loon/default.asp
Montana Loon Society: http://www.montanaloons.org/

TRAINING AGENDA

- Introductions
- Common Loon Ecology Presentation
  - PowerPoint for Indoor Talks
  - Loon Board for Outdoor Talks
  - Loon Costume Demonstration
  - Loon Behaviors
- Management Efforts
  - Floating Signs
    - Importance
    - Placement
    - Removal
  - Floating Platforms
    - Importance
    - Placement
    - Removal
- Public Education
  - Professional appearance and conduct (representing many agencies)
    - Eye contact
    - Introduce yourself (I'm____ with the ____)
    - Break the ice
      - "How is the fishing?"
      - "Great day to be on the lake."
      - "Gotta love the sunshine."
      - Do not try to talk to them while they are loading or unloading a boat unless you are offering to help
    - Quickly state your purpose and point out signs
    - Give out information and lead free sinkers
  - Especially critical on Memorial Day and 4th of July weekends
  - Mostly one on one at ramps/campgrounds
  - Occasional evening programs
  - Loon Tour of the Thompson Chain of Lakes, Seeley Lake Loon Festival, and others
  - Methods
    - Loon PowerPoint
    - Loon Board for Outdoor Talks
    - Loon Costume Demonstration
    - Loon Trunk for teachers and rangers
- Monitoring System
  - Data sheets and how to record data
  - Area Coordinators
  - Data Base
    - Results from previous years
    - Montana Natural Heritage Program
    - Survey forms must be returned promptly
  - May 16 - presence of territorial pairs and possible nesting

- July 18- Loon Day survey counting all adults and chicks on all loon lakes

- A Day in the life of a Loon Ranger
  - Check on the birds/nests/chicks and signs
  - Recording Bands (Time permitting)
  - Examples of Daily/Weekly Schedules
  - Important Dates
  - Independent Working schedule
  - Mileage and Hour forms
- Personal Safety
  - Your safety comes first
  - Boat Safety
  - Life vests
  - Driving skills
  - Things to watch for when dealing with the recreating public
  - Most people are great to talk to but…
  - Watch for bumper stickers, hats, etc that indicate a dislike of biologists, environmentalists, governmental regulations, hatred of other wildlife species (ie: wolves, grizzlies), any indication of listening to "hate radio".
  - If you feel uncomfortable - get out
- Area Contacts
  - Area Biologist/MLS contact person/Area Coordinator/Supervisor
  - Lynn Kelly - 883-5797
  - Game Wardens and Enforcement Officers
    - Call if you observe violations of closed area or no-wake regulations, harassment of the birds, unsafe boating behavior.
    - Get boat numbers if possible
    - Get behavior on video if possible
- Personnel paperwork
- Field Equipment
  - Spotting Scope
  - Binoculars
  - Ranger Notebook with data sheets
  - Cold/wet weather gear
  - Hip boots/waders
  - Work gloves
  - Pocket knife/Multi-tool
- Field Work Training
  - Observations of loon behaviors on a local lake
  - Observations of banded loons
  - Placing floating signs
  - Interact with the public