Mud Lake
Wildlife Management Area

Management Plan
2014

Upper Snake Region

Mud Lake
Wildlife Management Area

2014 -2023 Management Plan
December 2014

Idaho Department of Fish and Game
Upper Snake Region
4279 Commerce Circle
Idaho Falls, Idaho 83401

Prepared By:
Curtis Hendricks
Habitat Biologist, Mud Lake District

Table of Contents

List of Tables

List of Figures

Executive Summary

Idaho Department of Fish and Game (Department) manages 32 Wildlife Management Areas (WMAs). Researchers from the University of Idaho and The Nature Conservancy evaluated the value of Idaho's WMAs to wildlife. They found the WMA network, created to support game species, "also conserves the full range of Idaho's wildlife and other ecological features" (Karl et al. 2005). Surveys and monitoring work conducted by Department biologists on Upper Snake Region WMAs confirm their value to big game, nongame, and many at-risk species identified in Idaho's State Wildlife Action Plan. In many cases, WMAs provide the principal habitat for at-risk species in the Upper Snake Region.

Wildlife Management Areas often abut other protected lands such as National Forests, Bureau of Land Management (BLM) lands, or private lands protected by conservation easement. Due to wildlife-focused management, WMAs often serve as highly productive core areas of the landscapes in which they exist. Management of these areas involves a combination of restoring and maintaining important natural habitats to contribute to landscape-level habitat function (e.g., sage-steppe, slough wetlands) and creating hyper-productive habitats (e.g., food plots, impounded wetlands) to enhance the carrying capacity for certain wildlife species.

Wildlife Management Area management plans strive to direct management that upholds these values. They may also be bounded or guided by legislative and/or funding mandates, Department species plans, the State Wildlife Action Plan, conservation partner objectives, national wildlife conservation strategies and plans (federal and non-government organizations), and especially the Department's own strategic plan, *The Compass*. Priorities, Management Directions, Performance Targets, and Strategies have been developed to be as consistent as possible with all of these documents and to capture the broader conservation values already provided by WMAs and ensure these values are protected and enhanced.

The Department's Upper Snake Region manages seven WMAs that collectively comprise about 85,000 acres of land. Management focus is to maintain highly functional wildlife habitat and provide wildlife-based recreation. These areas include:

- Tex Creek WMA in Bonneville County, a crucial wintering area for the region's deer and elk
- Market Lake and Mud Lake WMAs, two deep marsh units that are vital waterbird migratory stopover and production areas in Jefferson County
- Chilly Slough Wetland Conservation Area (WCA), a protected complex of wet meadow and wetland habitats in Custer County
- Cartier Slough WMA, a natural wetland associated with slough channels of the Henrys Fork River in Madison County
- Deer Parks Complex Wildlife Mitigation Units (WMU), managed cooperatively with the BLM and Shoshone-Bannock Tribes to restore and protect highly functional habitats along the Snake River in Jefferson and Madison counties

- Sand Creek WMA (including the Chester Segment), a mosaic of deep-water and shallow wetlands, wet meadow, marsh, and sagebrush-steppe habitats in Fremont County that provide winter refuge for mule deer, elk, and moose from surrounding high-elevation public lands including Yellowstone National Park

Examples of at-risk species partially dependent on Upper Snake Region WMAs include: Ute ladies' tresses orchid, St. Anthony sand dunes tiger beetle, northern leopard frog, greater sage-grouse, Columbian sharp-tailed grouse, sandhill crane, trumpeter swan, lesser scaup, northern pintail, white-faced ibis, long-billed curlew, and yellow-billed cuckoo.

All regional wildlife areas (WMAs, WMUs, and WCAs) are funded through a combination of hunting license dollars, appropriations from federal excise taxes derived from the sale of firearms and ammunition, and funding provided by the Bonneville Power Administration and Bureau of Reclamation to mitigate habitat loss from construction of various dams in the region. Hunters pay a large portion of the management tab and they are rewarded with habitat management areas that sustain many of the region's big game herds and provide consistent waterfowl and upland game bird production and hunting opportunities. Non-hunters, who value the varied benefits provided by the Upper Snake Region's WMAs, also benefit from the broad ranging conservation values associated with Department WMAs.

The Mud Lake Wildlife Management Area (MDWMA) was established primarily to preserve and improve breeding/nesting habitat for waterfowl. Land acquisition for MDWMA began in 1940; the latest acquisition was made in 2012. Mud Lake WMA was originally named North Lake WMA, because the original acquisition was the North Lake parcel. The name was changed to the MDWMA after the North Lake wetlands dried up. A total of 8,504 acres have been purchased; 5,889 acres (69%) with federal Pittman-Robertson (PR) funds and the other 2,615 acres with state license funds. There are also 2,705 acres of U.S. Government withdrawn land and 259 acres of land that are leased from the Idaho Department of Lands within project boundaries. Currently, a total of 11,468 acres are managed as MDWMA (Appendix IX). A 50/50 mix of PR and state license dollars has provided the majority of the funding used to develop and manage MDWMA. The Department is charged with the management responsibility of MDWMA.

This document provides direction in the form of defined WMA Priorities; Conservation Targets that represent WMA Priorities and allow for more-focused management; and Management Directions, Performance Targets, and Strategies to direct specific management actions to benefit the identified Conservation Targets. A draft version of this document was offered for public inspection and comment in February 2014.

Mud Lake WMA priorities were determined through a combination of public and staff input and Department statewide priorities identified in The Compass. The management priorities identified for MDWMA are Waterfowl Habitat, Special Status Species Habitat, Upland Game Bird Habitat, Big Game and Trophy Species Habitat, and Wildlife-based Recreation and Education. Conservation Targets—species or habitats that represent MDWMA priorities and provide management feedback—were selected to focus the Department's management efforts. The

selected Conservation Targets are northern pintail and ring-necked pheasant, greater sage-grouse, and white-faced ibis. A Management Program Table was developed to outline specific Management Directions, Performance Targets, and Strategies designed to benefit the selected Conservation Targets.

The Department recognizes that wildlife utilizing MDWMA also depend upon the surrounding private and public lands to meet their annual habitat needs; therefore, we also defined landscapes around MDWMA, for each Conservation Target, with associated landscape-level Management Directions, Performance Targets, and Strategies. The Department does not have management authority for non-WMA lands, therefore the majority of management actions at the landscape level involve interagency cooperation and working with private landowners to achieve management goals for Conservation Targets.

This plan will serve as a guide for current and future managers in planning where to direct efforts and resources for maximum wildlife benefit, public enjoyment, and efficient operation. As new information and technology becomes available, and as more property is acquired, Strategies may be modified to most effectively reach the Management Directions and Performance Targets in this plan. All Management Directions, Performance Targets, and Strategies are dependent on adequate funding, personnel, and public support.

Introduction

This management plan is designed to provide broad guidance for the long-term management of Mud Lake Wildlife Management Area (MDWMA). It replaces an earlier management plan written in 1999. This new plan was completed during 2012 and 2013 with extensive public input. This plan incorporates management goals and actions from other applicable wildlife management documents and policies. These plans or policies include Idaho Department of Fish and Game (Department) plans and policies, Federal agency plans or initiatives, and/or conservation partner documents that identify important wildlife management practices. These pertinent plans, policies, and documents include the following:

- State Wildlife Action Plan (2005)
- Statewide management plans for:
    - waterfowl (1991)
    - upland game (1991)
    - mule deer (2010)
    - white-tailed deer (2005)
    - elk (2014)
    - moose (1991)
    - furbearer (1991)
- Statewide big game depredation management plan (1988)
- Conservation Plan for the Greater Sage-grouse in Idaho (2006)
- Policy for Avian and Mammalian Predation Management (2000)

Other plans this document uses, is part of, or references include:

- North American Waterfowl Management Plan (2012)
- Intermountain West Waterbird Conservation Plan (2006)
- U.S. Shorebird Conservation Plan (2001)
- Intermountain West Regional Shorebird Plan (2000)
- Partners in Flight Tri-National Vision for Landbird Conservation (2010)
- Idaho Partners in Flight: Idaho Bird Conservation Plan (2000)
- Idaho's Invasive Species Plan (2012)

Department Mission

All wildlife, including all wild animals, wild birds, and fish, within the state of Idaho, is hereby declared to be the property of the state of Idaho. It shall be preserved, protected, perpetuated, and managed. It shall be only captured or taken at such times or places, under such conditions, or by such means, or in such manner, as will preserve, protect, and perpetuate such wildlife, and provide for the citizens of this state and, as by law permitted to others, continued supplies of such wildlife for hunting, fishing and trapping (Idaho Code Section 36-103).

Department Strategic Goals

The Department's 2005 Strategic Plan, *The Compass*, is the primary guiding document for all other Department plans and outlines four goals for the Department:

- Fish, Wildlife and Habitat: Sustain Idaho's fish and wildlife and the habitats upon which they depend.
- Fish and Wildlife Recreation: Meet the demand for fish and wildlife recreation.
- Working With Others: Improve public understanding of and involvement in fish and wildlife management.
- Management Support: Enhance the capacity of the Department to manage fish and wildlife and serve the public.

The 2014 Wildlife Management Area (WMA) plans describe the management direction for each of the 32 WMAs the Department manages to help accomplish these goals. The specific *Compass* objectives and strategies relevant to WMAs are included in Appendix I.

Statewide WMA Vision

Our WMAs are managed to provide and showcase important habitat for all wildlife and to offer high quality, wildlife-based public recreation.

Mud Lake WMA Mission

Protect and manage the wildlife resources of MDWMA, as mitigation for habitat losses elsewhere in the region, to ensure sufficient quantities of high quality and secure habitat for breeding and migrating waterfowl and for a wide variety of other game and nongame species. Provide high quality wildlife-based recreational opportunities and nature viewing compatible with this primary mission for the benefit of the public.

Modification of Plan

This plan provides broad, long-term management direction for MDWMA. It will be evaluated at least every five years to determine if adjustments are needed. The plan will be modified as needed to accommodate changing conditions and goals and to incorporate available advancements in management knowledge and techniques.

Other Considerations

All strategies proposed in this plan are bound by the contractual agreements between cooperating agencies, the mission of MDWMA, and all applicable Department species management plans and policies. Issues and strategies that are inconsistent with the mission were not considered. In addition, the implementation of all strategies will be subject to available funding, personnel, and safety considerations.

Area Description and Current Status

Mud Lake WMA in Jefferson County is three miles north of Terreton, Idaho, and 35 miles northwest of Idaho Falls (Figure 1). The MDWMA is adjacent to the 4,500+ acre Mud Lake and the 10,500 acre Camas National Wildlife Refuge. The entire MDWMA lies within big Game Management Unit (GMU) 63.

The elevation of the MDWMA is about 4,780 feet above sea level. Topography varies only 150 feet from the surface of Mud Lake to sandy and basaltic ridges. The volcanic cinder cone, Clay Butte, is the highest point on MDWMA, at about 300 feet above the lake level. The lake has no natural outlet. The land around Mud Lake is mostly lakebed sediments used for agricultural and alkaline-saline meadows. Some of the soil is sandy and underlain with basalt rock. There are some soils that are deep and medium textured, but still with rough, sandy inclusions.

The area has a typical eastern Idaho desert climate of cold winters with variable snowfall; cool, windy, dry springs; hot, dry summers; and warm falls. Temperatures range from a recorded low of -50° F to a high of 105° F. Snow depths vary from five inches to over 13 inches. The growing season ranges from 80 to 100 days. The area generally has 85 to 95 frost-free days/year. Killing frosts usually occur in September through late April. Soil frost depths average 28-36 inches. Freeze-up of the lake typically occurs by the middle of November, and ice-out occurs around late March or early April. Ice thickness averages 14-18 inches. The annual precipitation ranges from eight to 11 inches, but only a small part falls during the growing season. Annual evaporation is estimated at 30 to 40 inches, with 80% occurring between May and September.

Mud Lake WMA occurs around the 4,500+ acre Mud Lake. Mud Lake was once a seasonally flooded sink area where Camas Creek spread out and disappeared into the aquifer. These seasonally wet areas extended several miles farther southeast, south, and west from Mud Lake's present area. Over the years, dikes were built and the water was kept in a smaller, but deeper lake. Bordering farmlands have been established in areas that were historically covered by seasonal wetlands.

Mud Lake WMA consists of a shallow lake (average depth 5 feet) with extensive tall emergent marshes dominated by hardstem bulrush (*Schoenoplectus acutus*) and cattail (*Typha latifolia*) occupying shallower areas. Patches of short emergent marsh plants occupy fringes of the lake. Marshes are bordered by extensive mesic and alkaline meadows characterized by Baltic rush (*Juncus balticus*) and saltgrass (*Distichlis spicata*). Scrub-shrub wetlands dominated by willows, primarily coyote willow (*Salix exigua*), line canal banks and form patches on the edges of marshes. Upland habitat is mostly big sagebrush (*Artemisia tridentata*)-steppe.

The number of acres of agricultural land actively managed across MDWMA varies annually from 950-1,150 acres.

Mud Lake WMA was established primarily to preserve and improve breeding/nesting habitat for waterfowl. Mud Lake WMA provides over 27,000 user days, with waterfowl and pheasant

hunting providing approximately 14,110 user days. Sixty-three percent of the use on MDWMA is from traditional consumptive user groups (hunters, anglers, trappers). Mud Lake WMA also provides opportunity for wildlife viewing, picnicking, boating, fishing, big game hunting, upland bird hunting, horseback riding, and windsurfing. Thirty seven percent of the use on MDWMA is from non-consumptive users. Mud Lake WMA is a popular destination for recreationists and the amount of use almost quadrupled from 1999 to 2005 (Appendix IV).

Land acquisition for MDWMA began in 1940. The latest acquisition was made in 2012. A total of 8,504 acres (69%) of MDWMA have been purchased with federal Pittman-Robertson (PR) funds and the other 2,615 acres with state license dollars. There are also 2,705 acres of U.S. Government withdrawn land and 259 acres of land that are leased from the Idaho Department of Lands (IDL) within MDWMA boundary. Currently, a total of 11,468 acres are managed as MDWMA (Appendix IX). Over the last decade, management of MDWMA has been funded with state license dollars (50%) and PR funds (50%).

Mud Lake WMA is bordered by private farm lands on the east and south, and partially on the west. Sagebrush-steppe-dominated lands abut on the north side. Water to fill Mud Lake comes from Camas Creek, fed by seasonal snowmelt runoff, and ground water pumping by local irrigators. The Department has no control over the water and water levels in Mud Lake. North Lake is included in the project boundary, but is now dry in most years because of significantly altered ground water levels. Aquifer levels have declined primarily due to changes in flood irrigation and the pumping of ground water for irrigation in the Mud Lake basin (Spinazola 1993). The site was originally named North Lake WMA, but the name was changed after North Lake dried up.

In 2012, the Department acquired the 2,615-acre Marty Segment, which is the east portion of MDWMA. This addition joined MDWMA to Camas National Wildlife Refuge. Nine hundred and 50 acres of the Marty Segment are enrolled in the Natural Resources Conservation Service (NRCS) Wetland Reserve Program (WRP). These acres have special management criteria with the objective being to return the habitat to a functioning wetland ecosystem.

Infestations of the noxious weed Russian knapweed (*Acroptilon repens*) have historically been a serious management problem on MDWMA. Control of Russian knapweed is one of the primary reasons for sharecropping the agricultural fields. The Department has spent thousands of dollars and hundreds of hours trying to eradicate Russian knapweed. These efforts have been successful across most of MDWMA, but other invasive plant species have become problematic, including Canada thistle (*Cirsium arvense*), halogeton (*Halogeton glomeratus*), and kochia (*Bassia scoparia*) in mesic areas and former wetlands that have dried up (e.g., North Lake). Cheatgrass (*Bromus tectorum*) in particular has become more widespread in sagebrush-steppe uplands on MDWMA than it was traditionally. This trend is worrisome and needs to be monitored.

The reason that weeds have become so problematic on MDWMA is likely the result of many factors. MDWMA was grazed too intensively for many years. This grazing pressure led to the disappearance of native bunchgrasses and promoted the establishment of invasives (halogeton,

cheatgrass, thistles, etc.). The sites where livestock were provided salt and mineral blocks are particularly problematic with Halogeton infestations dominating these areas.

In some areas on MDWMA, fire has been used as a management tool to aid in the control of noxious weeds. The burning was effective in allowing the treatment and control of the specific weeds, but the rehabilitation efforts (drilling seed, hand planted plugs, and other efforts) failed to establish, and these disturbed sites allowed for the establishment of other problematic invasive species.

In some areas on MDWMA, the soil types make rehabilitation difficult. Some of the soils are prone to hard crusting and in other places the soils are quite sandy and tend to shift with the windy conditions that are common across the area. Any habitat treatments or disturbance projects implemented on non-irrigated land needs to be accompanied by a thorough rehabilitation plan or managers will simply promote the establishment of unwanted invasives.

There are 28 species of waterfowl and 49 species of water and shorebirds that use MDWMA with the most common being Canada geese, mallard, gadwall, American widgeon, northern pintail, green-winged teal, cinnamon teal, redhead, lesser scaup, sandhill crane, white-faced ibis, Franklin's gull, eared grebe, and double-crested cormorant (Appendix VII). Trumpeter swan, bald and golden eagle, and peregrine falcons are now common visitors to MDWMA. Peregrine falcons successfully fledged young from the MDWMA hack tower from 2002-2005. However, the hack tower has not had peregrine falcon nesting use since 2005. In 2009, bald eagles initiated a nest and have successfully fledged young on the WMA ever since. Ring-necked pheasant, gray partridge, sage-grouse, mule deer, moose, white-tailed deer, pronghorn antelope, jackrabbits, cotton-tailed rabbits, and an occasional elk reside on MDWMA year-round. A complete list of the wildlife that use MDWMA can be found in Appendix VII.

Mud Lake WMA is open for recreational uses year-round and is visited by thousands of people each year. Visitors come to enjoy the hunting, fishing, and other nature-based activities offered on the WMA (Appendix IV) and utilize the campgrounds, roads, and trails maintained by the Department.

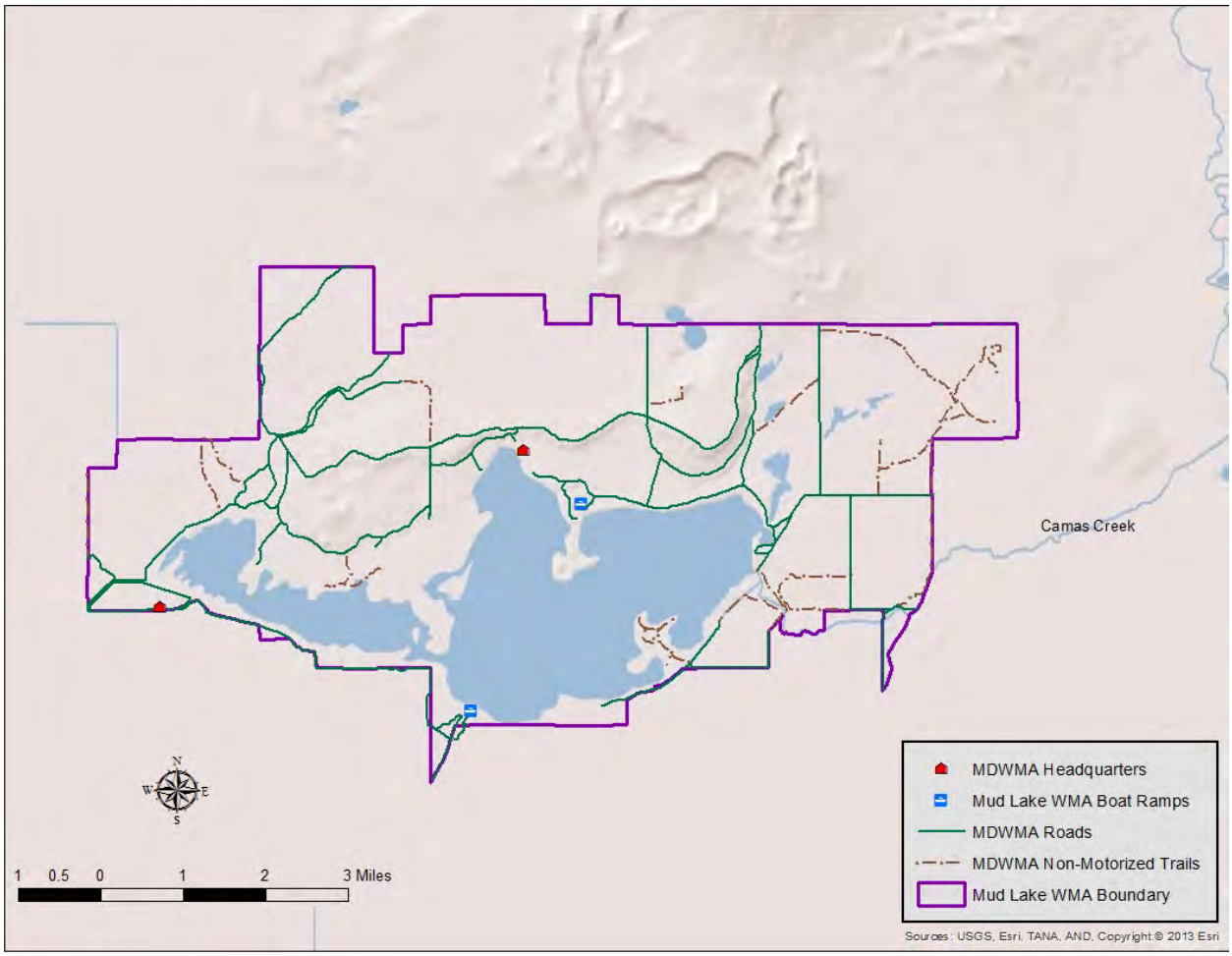


Figure 1. Map of Mud Lake Wildlife Management Area.

Management Issues

Upper Snake Region habitat staff presented information on the WMAs in the Upper Snake Region and the preparation of the 2014 WMA plans at two big game season setting public meetings in February and March of 2012. These meetings were held in Idaho Falls and Rexburg. We created displays highlighting the WMAs, the planning process, and management issues that we had identified prior to the meetings. We encouraged attendees to give us written comments regarding management of the WMAs and any issues they felt that we need to address in our future management. We directed attendees to the online survey available on the Department website (described below) and provided a form at the meetings for written comments.

Throughout 2012 (Feb-Dec), an online survey form was available on the Department website. The survey allowed participants to answer questions and provide feedback on WMA management statewide and the management of specific WMAs. Upper Snake Region habitat staff sent >600 emails to neighbors, cooperators, legislators, sportsmen's groups, land management agencies and concerned citizens inviting them to take the online survey. A news release was issued in the Idaho Falls Post Register inviting the public to take the online survey.

Additionally, MDWMA staff, with significant help from the Idaho Falls Idaho Master Naturalist Group, conducted on-site surveys from June-November of 2012. These paper surveys included similar questions to the online survey and provided an opportunity for users to suggest ways to improve management of the WMA. Random survey time periods, alternating between early and late in the day and between weekdays and weekends, were selected for each week. Surveys were delivered to users in person, left on the windshield of unattended vehicles (with a self-addressed stamped envelope for return), and were handed out opportunistically by MDWMA staff during non-designated survey times. A cover letter included with the survey described the survey's purpose.

We received 127 online surveys specific to MDWMA and 95 on-site paper surveys from MDWMA users during 2012. Of these completed surveys ($n = 222$), 143 (64%) included suggestions for improved management of MDWMA. Additional information gathered from these surveys on visitor use trends is available in Appendix IV.

The following is a list of all MDWMA management issues identified by members of the public or Department staff. The issues identified by the public were grouped, based on similarity, into three general categories: Habitat Management, Wildlife Management, and Public Use Management. Similar comments were then combined to form management issue statements under each category. Not all comments received are within the scope of these plans. For instance, WMAs have no influence on how wolves or other predators are managed. Those are decisions made by the Commission, Director, and Wildlife Populations staff. We also have little control over programs such as the pheasant release program. In instances where the comments are outside the jurisdiction of the plan, the comments have been forwarded to the appropriate entity for consideration. Our responses below are not intended as a rebuttal to the opinions expressed

by the public. Instead we have endeavored to be transparent and explain why we can or cannot act upon each idea.

Issues Identified by the Public

Habitat Management (36% of public comments)

1. **Improve or restore more habitat on MDWMA (23 comments).**

   Discussion: The majority of comments associated with this management issue described a need to improve habitat for specific species (i.e., big game, pheasant, waterfowl) or described methods that we should use to improve habitat (i.e., conversion of rhizomatous grass fields, development of more food plots, convert fields to native vegetation, more controlled burns, more shrub plantings, more annual forage crop plantings). Providing high quality wildlife habitat is the primary, overarching goal of MDWMA. The Management Program we have outlined in the following section is designed to achieve this goal for the species identified in these comments, and others, using many of the methodologies identified by the public.

2. **MDWMA needs to be expanded through land acquisitions (6 comments).**

   Discussion: The Department has an active land acquisition program for MDWMA. Since the original acquisition in 1940, 10,861acres have been added to the WMA with the latest 2,615 acquisition occurring in December of 2012. We will continue to seek opportunities to add to MDWMA as we recognize that as large as MDWMA currently is, it is still not large enough to provide secure habitat for all target wildlife during the varied seasonal extremes in eastern Idaho, particularly as other similar habitats become more marginalized across the region.

3. **Prevent livestock from accessing MDWMA (1 comment).**

   Discussion: No livestock grazing is currently permitted on MDWMA, although trespass cattle from neighboring private and Bureau of Land Management (BLM) lands often gain access. Each year we actively work to maintain fences between MDWMA and neighboring grazed areas, improve cattle guards when necessary, and work with neighboring landowners and the state brand inspector to get trespass cattle removed from the WMA as quickly as possible. Mud Lake WMA staff attempt to work amicably with our neighbors to get the offending cattle removed, but there are Idaho statues that allow us to take further action if necessary, including charging a fee for forage utilization.

4. **Water Level Management on MDWMA (12 comments).**

   Discussion: A significant number of comments recommended that the Department do things differently with water management on MDWMA (e.g., maintain more water in the lake, keep Camas Creek flowing, put water in the lake in the fall, etc.). These are all good recommendations that would improve wildlife and fish habitat. Unfortunately, the Department has no control on the water level and water management in Mud Lake and

Camas Creek. The water management in Mud Lake is directly controlled by irrigational interests and climatic conditions (winter snow pack, rainfall, etc.). The Department works with these irrigation companies to implement management activities that allow for water to be delivered where and when it needs to, while at the same time providing value to wildlife. The Department does control water levels on two wetland segments on the WMA (a portion of the West Sloughs and a portion of the Marty Tract, Appendix XII). These areas are managed to provide seasonal shallow wetland habitat for spring and fall migratory waterbirds. Over the years, the water table in the Mud Lake area has dropped dramatically and the functionality of many historic wetland areas has been negatively impacted. The Department is working with Camas National Wildlife Refuge, the NRCS, Intermountain Joint Venture, and private landowners to implement practices and water use programs that attempt to maintain or restore wetland function across the Mud Lake Basin.

5. **Improve noxious weed control on MDWMA (1 comment).**

   Discussion: Noxious weed management is a significant part of the overall habitat management of MDWMA. One permanent technician and one seasonal technician spend a large portion of their time actively treating noxious weeds with chemical, mechanical, and biological control methods. Mud Lake WMA staff are active participants in the Continental Divide Cooperative Weed Management Area, participate in weed control efforts on neighboring federal lands, and work with neighboring private landowners to prevent the spread of noxious weeds on to the WMA. We will continue, or increase, these noxious weed control efforts into the future as funding allows.

Wildlife Management (21% of public comments)

1. **Increase big game, moose, and upland game bird numbers (5 comments).**

   Discussion: There are multiple factors that affect population growth and decline in moose, big game, and upland bird populations, but the availability of year-round, high quality habitat is typically the most important. Providing high quality habitat for all of these species is a high priority for MDWMA staff. The majority of the moose, big game, and upland game birds on MDWMA spend a large portion of the year on or adjacent to MDWMA. This is very different from most of the big game and moose populations in the state that make fairly significant migrational movements from summer to winter range; the Mud Lake populations are area residents for the most part. The Department recognizes that maintaining quality year-round habitat on MDWMA and promoting habitat on adjacent properties in combination with evaluating harvest impacts is crucial to maintaining healthy populations of these species in the area.

2. **Gather more data and information about big game and moose populations in the area (2 comments).**

   Discussion: MDWMA is in GMU 63. The Department attempts to collect hunter harvest data for moose, big game, and upland game birds in the Mud Lake area and use this data in

conjunction with other information to grossly monitor game populations in the area. The Department does not conduct standardized population monitoring flights in this unit for big game. Mud Lake WMA staff try to complete a moose population survey every year to monitor moose populations. There is a need to conduct habitat use, seasonal movement, and exploitation data on the big game species in the Mud Lake area.

Surveys conducted in the area include: springtime pheasant crow counts, mourning dove coo surveys, sage-grouse lek counts, and autumn sandhill crane surveys. Department personnel monitor species to the best of their ability as time, personnel, and priorities allow. In addition, MDWMA personnel have participated in banding efforts for mourning dove and waterfowl for the last 10 years. These efforts have yielded general movement and production data for the doves and waterfowl that utilize MDWMA.

3. Improve fishing for game fish in MDWMA (4 comments).

Discussion: The fishery at Mud Lake is managed by the Fisheries Section in the Upper Snake Region. Historically, Mud Lake was a very productive and popular fishery for yellow perch and largemouth bass. Additionally, Lahontan cutthroat trout and tiger muskie have been stocked in Mud Lake. A serious challenge for fisheries management in Mud Lake is dealing with a significantly altered water table. Over the years, the water table in the area has dropped dramatically and the sustainability of Mud Lake for game fish has been significantly impacted.

In the past, springs and ground water flows enabled Mud Lake to sustain more water into winter; over the years, the water table in the area has dropped dramatically. To further compound the problem, after severe flooding in the area during the mid-1980s, the irrigation companies were mandated by an agreement with the Army Corp of Engineers to enter winter with no more than 2.5’ of water at the measuring gauge. As a result of reduced winter flows and water volume, dissolved oxygen often drops to intolerable levels. Large winter fish mortality events are common now and the sustainability of these areas for game fish has declined.

Since the Department has no control or input on water management in Mud Lake, it is difficult to manage for a stable fishery and for fish managers to justify investing significant resources toward fish management in the Mud Lake system. Every three years the fisheries section of the Upper Snake Region seeks public input pertaining to fishing regulations and seasons within the region. Every six years there is an evaluation of the statewide Fisheries Management Plan. The public is encouraged to be an active participant in both of these planning efforts. These efforts are designed to incorporate the desires and suggestions of the public into the future of fisheries management in the region and across the state.

4. **Explore the potential of establishing a wild turkey population on MDWMA (1 comment).**

   Discussion: The Upper Snake Region is considered marginal wild turkey habitat. Wild turkeys do, however, exist to the east of MDWMA in tributaries of the South and Henry's Forks of the Snake River. We examined MDWMA for quantity and quality of turkey habitat and found that MDWMA is marginal wild turkey habitat and will likely not be able to sustain a large population of wild turkeys. Food sources are very limited, particularly winter forage. Turkeys would be almost completely dependent on artificial food sources throughout the winter. Neighboring cattle feed operations would become winter habitat and the Department currently deals with the negative impacts associated with the congregation of wintering turkeys at livestock feed yards at a number of locations across the region. Prudent management dictates that turkey releases should only be implemented where there is ample quality year-round habitat. If there are positive changes to the habitat such that a sustainable population could be initiated, we will reconsider this possibility.

5. **Improve management of the ring-necked pheasant release program (18 comments).**

   Discussion: Mud Lake WMA is one of the WMAs across the state where the Department releases pen-reared rooster pheasants. Hunters who wish to pursue pheasants on WMAs that release birds must purchase a pheasant permit and then adhere to pheasant hunting regulations that are applicable to the associated WMAs. Mud Lake WMA staff or volunteers typically release rooster pheasants two days/week throughout the pheasant season for an approximate total of 900 annually. Release dates and times are not disclosed to the public.

   The comments concerning the pheasant release program ranged from: release more birds, release other species, try to develop a release protocol that helps hunters who are not at the WMA at the time of release to have a better chance of finding pheasants to harvest, get rid of the youth hunting area, release hen pheasants in addition to the roosters in hopes of increasing the local pheasant population, implement a pheasant release program in an area or in habitats where there are no wild pheasant populations or there is not a focus on trying to enhance the wild pheasant population (5 comments), and stop the pheasant release program all together.

   The pheasant release program is a very costly program and the revenue generated from the sale of WMA pheasant hunting permits does not cover the cost of the program. Economically, the Department would struggle to justify releasing more roosters than are currently being made available.

   Other species of birds (chukar partridge and Hungarian partridge) can be more difficult to raise in captivity and thus more costly to produce and harder to acquire. Chukar partridge might be a viable alternative and/or addition to release on WMAs. Department staff will evaluate the potential of releasing chukar partridge.

Department personnel have experimented with developing a release schedule that is inconsistent over the course of the season in order to provide more equitable opportunity for sportsmen. This strategy was highly effective during the 2013 season and will continue to be applied on MDWMA.

The Department tries to encourage youth involvement in the out of doors and the youth hunting areas are designed to try and facilitate this objective. The size of these areas is small in comparison to the available habitat across MDWMA. The value and use of the youth hunting areas will continue to be monitored, and if changes to the hunting areas are warranted, the Department will respond accordingly.

Literature has shown that approximately 98% of pen-reared pheasants are dead within two weeks of release into the wild. Releasing pen-reared hens would likely be ineffective in bolstering the wild pheasant population on MDWMA. In addition, it could be a costly effort that does not produce more wild birds.

Department staff are also concerned with the amount of concentrated hunting pressure put on wild birds on MDWMA as a result of the pheasant release program. This issue will be evaluated and if changes to the program are deemed appropriate, alternative options will be pursued.

Public Use Management (48% of public comments)

1. **Allow more/less motorized vehicle access on MDWMA (9 comments).**

   Discussion: Of these nine comments, three wanted more motorized access, three wanted less motorized access, and three felt that there was currently the correct balance of ATV access and restriction on MDWMA.

   These comments seem to indicate that the current level of motorized roads and trails on MDWMA is about right. We intend to maintain motorized access at current levels. We will continue to monitor use and needs and adapt management accordingly.

2. **Provide better maps, signage, and boundary marking at MDWMA (12 comments).**

   Discussion: Mud Lake WMA staff agree that improved maps, signage, and boundary marking would be beneficial to MDWMA users. The public should be aware, however, that vandalism and theft of signs routinely thwart this management objective and signs are costly to replace. We have included strategies in the Management Program Table of this plan to improve these information resources.

3. **Improve maintenance and condition of MDWMA roads (12 comments).**

   Discussion: The majority of comments were directed toward the rutted, slippery, rocky, and bumpy condition of the dirt roads during inclement weather. Comments suggested a need to

improve the road surface (e.g., gravel or pavement) or a need for more frequent road grading. There was a suggestion to pave the road to the South Boat Ramp.

There are approximately 41.19 miles of roads associated with MDWMA that are open to motorized travel at least part of the year (roads are closed due to wet, muddy conditions and drifting snow). The maintenance and control of these roads is as follows: 1) the Department maintains 28.51 miles of road,(2) Jefferson County 5.78 miles of road, 3) the Department and Mud Lake Water Users (MLWU) 1.57 miles of road, and 4) the Department, MLWU, and Jefferson County maintain the remaining 5.31 miles of road associated with MDWMA. The Department-controlled roads are kept in a useable, but low maintenance state (i.e., useable by four-wheel drive vehicles during most spring-fall weather conditions). Maintaining smooth dirt road conditions is a difficult and expensive endeavor and improving road surfaces (i.e., gravel or pavement) would be even more expensive. Funds spent on additional road maintenance and/or improvement would come from funds that would otherwise be spent on WMA priorities such as habitat improvements, facilities and equipment maintenance, and land acquisitions. At this time, MDWMA does not intend to divert significant funds away from the core WMA priorities to increase road maintenance, but will continue to maintain MDWMA-controlled roads in a useable, low maintenance state. Extremely problematic sections of roads will be improved as funding and priorities allow. If increased funding is available in the future, or if road maintenance becomes an increased priority, the Department will consider significant road improvements.

4. Improve trailer boat access ramps and provide or improve lake access points for watercraft access on MDWMA (13 comments).

Discussion: Seven of these comments specifically identified a need for improvements to or development of more watercraft type access points across the WMA. Four of the comments made recommendations about making improvement to the current boat ramps. These recommendations were: provide lighting at the boat ramps (1 comment), repair the ramps themselves (2 comments), and dredge out or deepen the channel from the North boat ramp to the lake (1 comment). One comment suggested that the Department provide a disabled access dock at the South boat ramp.

Public users are welcome to access the lake with watercraft anywhere they can as long as they follow the motorized access rules on the WMA. Trailering of watercraft into the lake is allowed at two locations, the North and South Boat ramps. There are 10 developed low-maintenance watercraft access points on the WMA. These low-maintenance access points are designed for canoe type watercraft where the watercraft is actually lifted and carried to the water, not trailered in to the lake. With a little effort, there are literally hundreds of locations where those who want to access the lake can launch small watercraft.

The Region's Access Section does a very good job of maintaining the boat ramps across the Upper Snake, but there are always repairs that are needed. One problem with the South boat ramp at Mud Lake is that boat operators "power load" their boats which causes the substrate to erode out from under the ramps themselves. This activity greatly damages the ramps.

Department staff tries to stay abreast of repair needs and get them fixed as quickly as time and resources allow. The Department will evaluate the process required to enhance the access channel from the North boat ramp to the main lake. Mud Lake WMA staff recognizes that the North boat ramp access becomes compromised as the lake level drops in the fall. There was one suggestion for providing a handicapped accessible dock at the South boat ramp. The Department tries to maintain handicapped accessible opportunities where possible and appropriate. The Department will explore the possibility and opportunity to provide a handicapped accessible dock at the South ramp.

It is important that all those who operate watercraft on MDWMA, both motorized and non-motorized, follow the waterfowl nesting closure for the western portion of the lake. This closure provides secure nesting habitat by restricting watercraft use to management only west of the McKenzie Point vegetation line from January 1 through July 15 of each year. This closure is marked on the MDWMA brochure.

5. MDWMA campsites and other user facilities (6 comments).

Discussion: Three comments recommended more campsites on MDWMA. Two comments suggested providing garbage cans and one comment identified a desire for shade pavilions with areas where young children can play.

There are currently two locations for overnight camping at MDWMA (the North and South boat ramps): these camping areas are large and rarely even come close to being full. There are a number of fire rings at each of the camping locations and both campsites have restroom facilities and a small shaded pavilion. We will continue to monitor campsite demand/use and evaluate the need for additional campsites. Similar to road maintenance, we anticipate maintaining campsites in a relatively unimproved, but safe and useable state. Adding visitor services is important, but with limited budgets we believe we should direct funds toward WMA priorities such as habitat improvements and land acquisitions. If future trends in campsite use suggest improvements (i.e., garbage cans or larger covered pavilions) are needed to meet use, we will re-evaluate the need for campsite improvements and seek additional funding.

6. Hunting restrictions and use restrictions on MDWMA (8 comments).

Discussion: These comments focused on current hunting, scouting, or boat use activities on MDWMA. Four comments recommended requiring non-toxic shot for all hunting and target shooting. Two people suggested that we not allow the use of trail/game cameras on MDWMA. One person suggested that duck hunting stop at 1:00 daily and another suggested restricting the use of large boat motors on Mud Lake.

The Department is aware of the potential impacts of lead shot on certain wildlife species and is evaluating the use of lead shot on WMAs across the state. We will continue to evaluate and monitor these impacts and make changes accordingly. The use of game cameras has become incredibly popular over the last number of years and has led to some conflict among users.

The Department will monitor the impacts of trail camera use and the conflicts associated with their use and make changes as necessary to address biological and social concerns. The minimization of disturbance to waterfowl and providing safety/refuge areas for waterfowl has proven to be beneficial to migrating birds (Evans and Day 2002, Korschgen and Dahlgren 1992, and Madsen 1995). The Department recognizes the need for waterfowl to have refuge areas. On Mud Lake, birds find refuge in the large expanses of open water that are away from vegetation and cover and in Camas National Wildlife Refuge. Many privately-owned wetlands provide undisturbed refuge areas. In the Management Program Table, we outline one area that will also be set aside as a wildlife security area on MDWMA. The Department will continue to monitor and evaluate the impacts of disturbance to migrating waterfowl, particularly as this relates to hunting activity and implement changes as deemed appropriate. The size of boat motors allowed on Mud Lake is somewhat regulated by water depth. Changing water depths on Mud Lake throughout the season offers differing access and access limitations to a wide variety of boaters. Those who want to escape the areas used by large boat motors can typically find shallow wetlands where these boats cannot operate. The popularity of "Mud Buddy" type motors and airboats could potentially make disturbance and quality of experience an issue at Mud Lake. The Department will continue monitoring these impacts and make changes as deemed appropriate.

7. **Provide more wildlife viewing access sites and photography blinds on MDWMA (2 comments).**

   Discussion: There was one comment that suggested providing more wildlife viewing access sites and one comment that recommended providing photography blinds on MDWMA. The road and trail systems, with the pull outs that are currently found on MDWMA, provide significant wildlife viewing opportunity. The Department will evaluate the value and applicability of providing some additional wildlife viewing sites on MDWMA that allow for more intimate experiences with wildlife. As a result of public interest, we have established a wildlife refuge area within MDWMA that includes walking trails and will be improved for wildlife viewing.

   The Department's strategic plan, *The Compass*, recognizes the value and desirability of non-consumptive wildlife recreation. At MDWMA, we look for ways to promote that value consistent with *The Compass* and improve the non-consumptive experience. We will evaluate the need and value of erecting permanent wildlife photography/viewing blinds located in wildlife security/viewing areas. Any blinds not erected and maintained by the Department for the public need to adhere to the rules developed by the Department for blinds on Department lands.

8. **Provide more educational displays and volunteer/work opportunities at MDWMA along with more public outreach that highlights the value of MDWMA (7 comments).**

   Discussion: There were three comments encouraging the development of more educational sites and trails on MDWMA. There was a single suggestion to provide more jobs and to do more to promote work service days on the MDWMA. There was one comment that identified

the need to do more outreach that identified the value of MDWMA, and there were two comments that recommended that the Department do not actively try and promote use of MDWMA to the public, because much of the value of the MDWMA experience is the lack of people and crowding.

The Department recognizes that solitude and lack of crowding is what many people want out of an outdoor experience, but there is a balance to informing the public of available outdoor recreation opportunities and maintaining quality outdoor experiences for sportsmen. The Department will continue to monitor overcrowding issues at MDMWA.

9. Provide some wildlife security areas on MDWMA (8 comments).

Discussion: Wildlife seek out refuge areas when disturbed. Data indicates that for many species (pheasant, white-tailed deer, and others), that if security areas are maintained that these species will shift into these refuge areas when pressured and not leave the vicinity. The non-motorized restrictions on Green Island and McKenzie point have offered some refuge habitat for wildlife on MDWMA, but hunters recommend not allowing hunting and keeping dogs leashed while visiting the security area. The Department will evaluate the value of wildlife security/viewing areas on MDWMA and have already incorporated these suggestions in one area.

Overall Management of Mud Lake WMA (.04 %)

1. Do Not change anything on MDWMA (5 comments).

Discussion: There were five comments that recommended that the Department do nothing different with the management of MDWMA. Mud Lake staff appreciates the support of those that feel like the WMA is meeting their expectations, but there are things that we can and should do to make MDWMA a better place for wildlife and for the public. Things such as habitat improvements, data collection, and infrastructure improvements (Appendix X) are all critical elements to ensuring that MDWMA is as productive as possible into the future.

Public Comments on Draft Plans

In April 2014, the draft WMA plans were made available to the public for comment. The comment period closed on June 10, 2014. Mud Lake WMA received input on the draft plan from a total of six individuals. Three strongly agreed with the way the plan was written, two agreed and one was neutral. None of the commenters had additional comments.

The Department received one comment from Idaho Conservation League. They were concerned with ensuring that each WMA plan considered the landscape in which it resides and non-consumptive wildlife uses. They had no comments specific to MDWMA. Significant portions of all WMA plans are dedicated to landscape scale planning. In fact, each focal species/habitat selected has an associated landscape. The MDWMA plan also incorporates wildlife viewing as a priority recreational pursuit. We believe that we have addressed these two issues very clearly.

Issues Identified by the Department

1. **One of the major threats to wildlife globally is the loss of wetland habitats. Idaho has lost a significant amount of its wetlands over time. In fact, it is estimated that Idaho has lost approximately 56% of its wetlands (Dahl 1990).**

   Discussion: In the Mud Lake area, shifts in farming practices, the loss of widespread flood irrigation, increased ground water pumping, climatic changes, and other factors across the Mud Lake basin have altered the distribution and abundance of water and wetland habitats across the landscape. Historically, artesian springs flowed and ground water could be found close to the surface near Mud Lake. The ground water table has dropped as much as 20 feet in the last 30 years in the Mud Lake area (well records across the Mud Lake area). These changes have dried once flooded areas and springs and significantly altered the availability of wetland habitats. The switch from flood irrigation to sprinkler and center pivots has had a tremendous impact on the water table and wetlands in the Mud Lake area. These changes have made wetland management and maintenance difficult and expensive. It is important to recognize that activities and water use in places miles away from Mud Lake have significant impacts to the water table and hydrological function of Mud Lake.

   The Camas Creek and Medicine Lodge watersheds feed the Mud Lake aquifer (Figure 2), lake, and wetlands. In years with high snow pack, Camas Creek will actually run and add water to Mud Lake, but in many years very little, if any, stream flow from Camas Creek will make it to Mud Lake. Camas National Wildlife Refuge has the most senior water right associated with Camas Creek and even they struggle to get their allotment of water in many years. Upstream uses and diversions impact the amount of water that makes it the bottom of the system.

   Research has shown that ground water from the Egin Bench area actually feeds the Mud Lake aquifer (Spinazola 1993). Historically, the Egin area had large amounts of flood irrigated agricultural fields. Over time, producers there began converting to more efficient sprinkler and pivot irrigation practices. This change has likely resulted in a significant decrease of water infiltrating into the aquifer, and thus, altering the amount and distribution of ground water in the Mud Lake area. Recently, there has been a large amount of discussion about ground water recharge. The Egin area has been an area that has received a lot of attention pertaining to the benefits of ground water recharge. The benefits of ground water recharge in the Egin area could have real beneficial impacts to the Mud Lake system. Retaining flood irrigation across the region should be a priority for managers, both from a habitat created and ground water maintenance perspective. This file contains a great collection of informative research as it relates to the Mud Lake area hydrology.

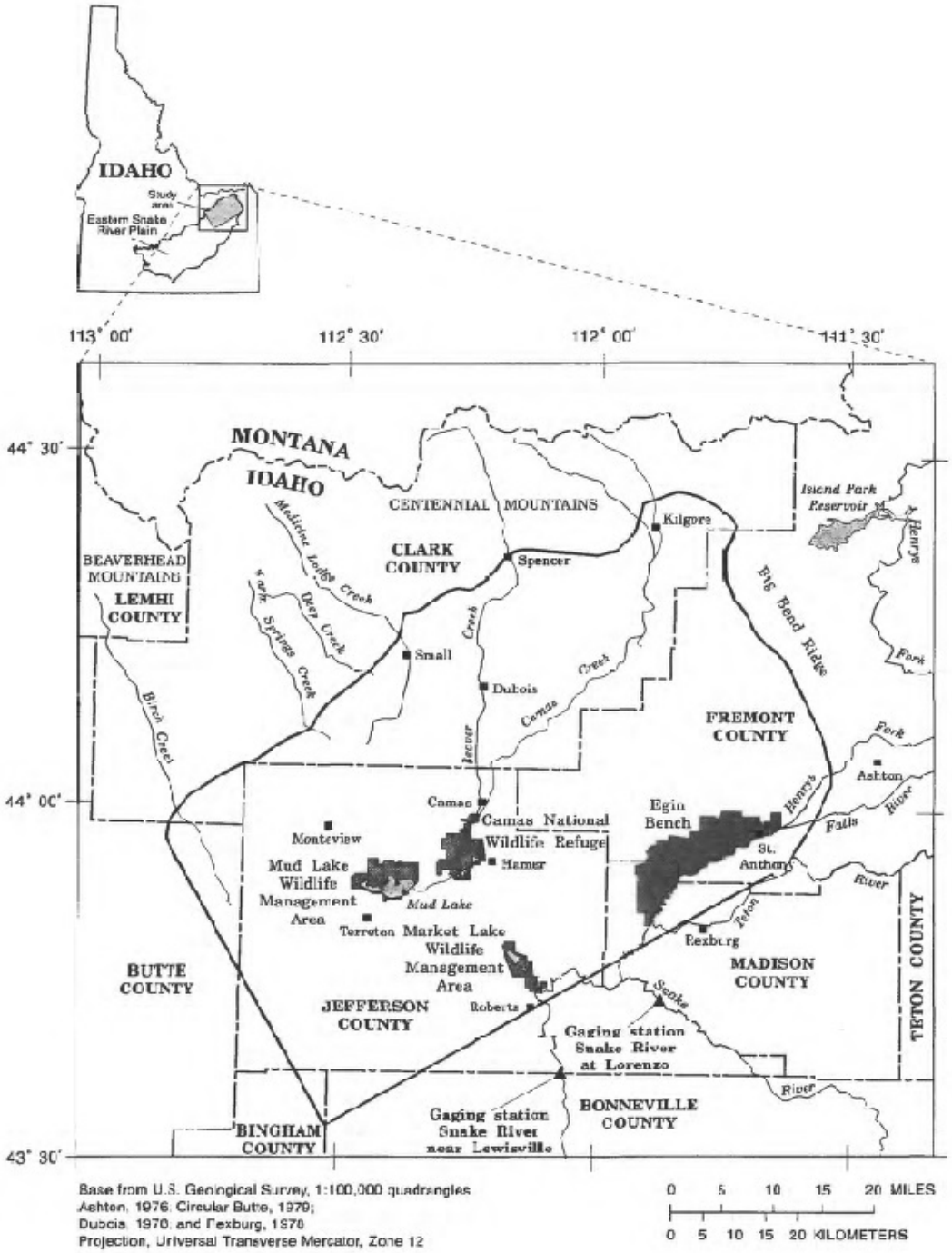


Figure 2. Mud Lake Aquifer system, Spinazola 1993.

2. Pursue methods to maintain and improve wildlife habitat on private and public lands in the Mud Lake area.

Discussion: Changes in land uses and farming techniques have led to dramatic alterations in the types and amount of wildlife habitat in the Mud Lake area. Many of these changes have decreased the habitat value to wildlife. The habitat types that have been changed are widely variable; the following is a list of habitat types that have been lost or altered in the Mud Lake area over time and the impacts to wildlife species.

- Flood Irrigated Agricultural Fields and Pasture Lands – Flood irrigation in the Mud Lake area traditionally provided high quality foraging resources for breeding and migratory bird species as well as local wildlife species. Over time, many agricultural producers have transitioned to sprinkler irrigation. This transition has led to a decrease in the productivity of many agricultural fields for wildlife.
- Sagebrush Steppe—The loss of functional sagebrush steppe habitat in the area has impacted numerous wildlife species. The Mud Lake area historically provided habitat to many sagebrush obligate species such as: greater sage-grouse, pronghorn, sage-sparrow, and other species. Over time, agricultural conversion, prescribed and wildfire, conversion to non-native grasses for forage, noxious weed invasion, and other activities have greatly reduced the amount and quality of sagebrush habitats in the Mud Lake area. Protection of the remaining sagebrush stands and enhancement of disturbed stands needs to be a priority for conservation partners in this area.
- Quality Perennial Grasslands and Upland Cover—The Mud Lake area at one time provided high quality upland game bird hunting opportunity, especially for ring-necked pheasant. This is no longer the case. The decline in wild pheasant populations can likely be attributed to a wide number of causes, but the loss of high quality nesting, winter food, and thermal cover habitats are likely factors. These same upland habitats are critical for waterfowl production on MDWMA and the surrounding area.
- Shelterbelts, Tree Rows, and Shrub Stands—The establishment of tree rows, shelterbelts, shrub plantings, and other such habitats has been incredibly valuable for numerous wildlife species, particularly breeding and migrating songbirds and raptors. Research done in the Mud Lake area (Carlisle et al. 2008) indicates that these habitats are vitally important for many migrating songbird species. Many of these plantings are becoming decadent and disappearing. There is a need to establish new plantings that will provide the habitat values of these older stands in the years to come, otherwise these habitats will fade out. It is important to understand that the habitat we improve, plant, or create now is what will be available and productive in the coming decades. It is important to recognize the benefit of shelterbelts and windrows while at the same time understanding that they can also provide nesting and perch habitat for avian nest predators (corvids). The risks and rewards of such habitats can be balanced with appropriate planning and placement.

3. **There is a need to better understand moose densities and movements on MDWMA and the surrounding area.**

   Discussion: Moose are a highly desirable wildlife species within the Upper Snake, both for hunting and viewing opportunities. Mud Lake has proven to be a productive area for moose. In 1999, GMU 63 was opened to moose hunting and combined with the GMU 63A hunt. In 2003, the GMU 63 hunt was split out into its own hunt. In 2009, all moose hunting was eliminated in GMU 63 due to decreased hunter success, declining antler widths, and declining moose populations. Moose populations were tracked via fixed wing aerial surveys. Moose populations responded to the harvest closure in the area and an antlered moose hunt (2 permits) was resumed in the 2013 fall hunting season. The response of this moose population to production and management efforts is poorly understood. It is assumed that this population is not driven by migration in and out of the area, but rather is a product of resident individuals. In order to properly manage this population, some basic movement and production data is needed.

4. **The pheasant release program may conflict with efforts to restore wild pheasant populations on MDWMA.**

   Discussion: Comments from the public about the Department's pen-reared pheasant release program were diverse, with many supporting the program with modifications and others calling for an end of the program all together. The topic of maintaining the program at all is not the focus of this concern, but rather this concern is based on potential impacts to wild pheasant populations on MDWMA with the pen-reared program being implemented on the same area.

   The pheasant release program concentrates large numbers of hunters onto a small landscape. This is the very same landscape where the Department and conservation partners are trying to enhance wild pheasant populations. The concentration of hunters makes it very difficult for even wild roosters to survive the hunting season in the area surrounding the release sites. Crow counts across MDWMA and adjacent properties, validates the concern of low rooster densities. Crow counts from the two routes in the Mud Lake area total 23.5 miles and resulted in a high count of 10 roosters; eight roosters on the MDWMA route and two on the Marty route. Research indicates that hen pheasant nesting is related to the density of crowing cocks in an area. With the hunting pressure associated with the pen-reared release program, there are very few male pheasants surviving the hunting season and this may impact reproduction by wild hens.

   Many Department staff and partners feel that the Department should examine release locations for the pen-reared program. Areas that have no wild pheasant populations, but offer some kind of cover for hunting may be more desirable than potentially productive wild pheasant habitats because that might allow the Department to positively influence wild populations.

The Department may need to evaluate its pen-reared pheasant release program as it relates to goals to improve wild pheasant populations. Wild pheasant populations are struggling in the Mud Lake area and the Department's pen-reared release program likely exacerbates these struggles. The pen-reared release program focuses a high volume of hunting pressure on the exact area where Department and pheasant conservation partners are trying to address wild pheasant population concerns. Research indicates that hen pheasants nest in areas related to crowing cocks. With the hunting pressure associated with the pen-reared release program, there are very few male pheasants, pen-reared or wild, surviving the hunting season in the release areas. This may significantly influence breeding seasons, effectively eliminating hundreds of acres from pheasant production.

Mud Lake WMA Management Program

The Department is responsible for the conservation, protection, perpetuation, and management of all wildlife, fish, and plants in Idaho. Wildlife Management Areas enable the Department to directly affect habitat to maximize suitability for species in key areas and are an integral component in the Department's approach to fulfill its mandate in Idaho Code. Management to restore and maintain important natural habitats and create hyper-productive habitats that enhance carrying capacity for selected wildlife species remain key strategies on MDWMA. However, the most pervasive threats to WMA ecological integrity, such as noxious weeds, rural residential/commercial development, increased water diversion, and conflicting land uses on public lands, typically come from outside a WMA's boundary. Therefore, WMA managers must recognize and create opportunities to collaborate with adjacent landowners, expanding our collective conservation efforts for WMA-dependent wildlife.

An effective way to enable a broader influence over the future of MDWMA is through the use of Conservation Targets to guide management. Conservation Targets could be either a focal species or a habitat-type that benefits numerous species. According to Noss et al. (1999), focal species are those used by resource managers to determine the appropriate size and configuration of conservation areas. Conservation of species within landscapes used for other enterprises such as forestry, recreation, agriculture, grazing, and commercial development requires managers to determine the composition, quantity, and configuration of landscape elements required to meet the needs of the species present (Lambeck 1997). Since it is impractical to identify key landscape elements for all species dependent on MDWMA, a carefully selected suite of Conservation Targets can help provide for the conservation needs of many species. Additionally, identifying landscape-scale Conservation Targets across ownership boundaries helps address wildlife-related issues on MDWMA and creates a platform for conservation partnerships on the surrounding landscape.

The following six-step process was used to create the MDWMA management program described in this plan. Each of these steps is described in detail on the ensuing pages.

1) Summary of Management Priorities
2) Focal Species Assessment
3) Selection of Conservation Targets
4) Coverage Assessment of Selected Conservation Targets
5) Spatial Delineation of Conservation Target Landscapes
6) Creation of Management Program Table

Summary of Management Priorities

Mud Lake WMA, like many other WMAs, was created for a specific purpose and therefore has inherent management priorities incorporated in the cooperating agency agreements and land ownerships that formed the WMA. Mud Lake WMA was originally acquired to provide breeding and migrational waterfowl habitat in the Upper Snake Region.

Legal mandates associated with the 2001 appropriation of federal funding for the State Wildlife Grants program also guide the Department's management priorities. The U.S. Congress appropriated federal funds through the State Wildlife Grants program to help meet the need for conservation of all fish and wildlife. Along with this new funding came the responsibility of each state to develop a State Wildlife Action Plan (SWAP). The Department coordinated this effort in compliance with its legal mandate to protect and manage all of the state's fish and wildlife resources (IDFG 2005). The SWAP does not distinguish between game and nongame species in its assessment of conservation need and is Idaho's seminal document identifying species at-risk. Therefore, at-risk species identified in the SWAP, both game and nongame, are a management priority for the Department.

In addition to the biological goals of preserving, protecting, and perpetuating all fish and wildlife in Idaho, the Department also has a statewide goal of protecting and improving wildlife-based recreation and education. The Department's strategic plan, *The Compass*, outlines multiple strategies designed to maintain or improve both consumptive (e.g., hunting, trapping, fishing) and non-consumptive (e.g., wildlife watching) wildlife-based recreation opportunities across the state.

Taking the biological and funding resources of MDWMA into consideration, in concert with these foundational priorities of MDWMA and statewide Department priorities, the Department developed the following list of broad-scale MDWMA Management Priorities.

Mud Lake WMA Management Priorities (listed in order of priority):

1. Waterfowl Habitat
2. Special Status Species Habitat
3. Upland Game Habitat
4. Big Game and Trophy Species Habitat
5. Wildlife-based Recreation and Education

Focal Species Assessment

This section of the MDWMA Plan is an assessment of various fish and wildlife species on MDWMA and the associated Mud Lake Basin watershed in order to identify Conservation Targets to guide management. Table 1 evaluates taxa that are either flagship species (Groves 2003) and/or special status species (i.e., at-risk) identified by the Department in the Idaho Comprehensive Wildlife Conservation Strategy (IDFG 2005) and key federal agencies. Only flagship and special status species that 1) have been documented utilizing MDWMA lands, or 2) are likely to occur on MDWMA because they are found in the Mud Lake Basin watershed and utilize habitats found on MDWMA during significant or critical parts of their life history were included in the focal species assessment.

Flagship species are popular, charismatic species that serve as symbols and catalysts to motivate conservation awareness, support, and action (Heywood 1995). Flagship species often represent a landscape or ecosystem (e.g., Mud Lake Basin watershed, wetlands, or the sage/steppe ecotone),

a threat (e.g., habitat loss or climate change), organization (e.g., state government or non-government organization) or geographic region (e.g., protected area, Department Region or state; Veríssimo et al. 2009). Waterfowl are an example of a group that fits the criteria as both focal and flagship species. In addition, they are a culturally and economically important species in Idaho and represent a founding priority for establishment of the MDWMA. Therefore, waterfowl is an important flagship species group considered in the MDWMA assessment.

A principal limitation of the flagship species concept is that by focusing limited management resources on culturally and economically important species, more vulnerable species may receive less or no attention (Simberloff 1998). To overcome this limitation, we are explicitly considering a wide variety of at-risk species (Groves 2003); yielding a more comprehensive assessment that includes culturally and economically important species (e.g., mallard and mule deer) along with formally designated conservation priorities (e.g., bald eagle and sage-grouse). Categories of at-risk vertebrate species considered in this assessment are: 1) species designated as endangered, threatened, proposed, or candidate for listing under the Endangered Species Act by the U.S. Fish and Wildlife Service (USFWS), 2) species designated as Idaho Species of Greatest Conservation Need (SGCN); 3) species designated as Sensitive by Region 4 (Intermountain Region) of the U.S. Forest Service (USFS); and 4) species designated as Sensitive by the Idaho State Office of BLM.

The Idaho SGCN list was developed as part of the Idaho Comprehensive Wildlife Conservation Strategy (IDFG 2005). The Comprehensive Wildlife Conservation Strategy document is now referred to as the SWAP. Idaho's plan serves to coordinate the efforts of all partners working toward conservation of wildlife and wildlife habitats across the state.

Although the Idaho SWAP SGCN includes most of the special status species identified by land management agencies in Idaho, some species not listed as SGCN are considered priorities by other agencies. The Mud Lake Basin watershed is a mosaic of land ownerships including private lands, lands managed by the IDL, USFS, USFWS, BLM, Department of Energy lands, and lands managed by the Department. The BLM and USFWS are key partners in this landscape as their management actions directly influence ecological function on MDWMA. To maximize coordination, communication, and partnership opportunity we include USFWS, USFS, and BLM Sensitive Species in our biodiversity assessment.

United States Forest Service Sensitive Species are animal species identified by the Intermountain Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. The Forest Service Manual (FSM 2670.22) directs the development of sensitive species lists. This designation applies only on USFS–administered lands.

Bureau of Land Management Sensitive Species are designated by State Directors in cooperation with the State fish and wildlife agency (BLM manual 6840). The Idaho State BLM Office updated these designations in 2003. The sensitive species designation is normally used for

species that occur on BLM public lands and for which BLM has the capability to significantly affect the conservation status of the species through management.

The Intermountain West Joint Venture (IWJV) also maintains a list of priority species. The IWJV has identified 40 priority species from which to base conservation planning. Although the IWJV priorities are not used as a rationale for inclusion in the table, the plan does acknowledge when a species selected by other criteria is also a priority for the IWJV.

Information on species status, occurrence, beneficial management/conservation actions and threats were derived through consultation with Department staff, occurrence records in the Department's Idaho Fish and Wildlife Information System database, consultation with various BLM and USFS species lists, and species summaries provided in the Idaho SWAP.

Suitability of assessed species as a focal species were estimated by Upper Snake Regional Habitat and Diversity staff based on descriptions in Groves (2003) and USFWS (2005). Potentially suitable focal species may include species with one or more of the following five characteristics*:*

- *Species with high conservation need*
- *Species or habitats that are representative of a broader group of species sharing the same or similar conservation needs*
- *Species with a high level of current program effort*
- *Species with potential to stimulate partnerships*
- *Species with a high likelihood that factors affecting status can realistically be addressed* (USFWS 2005)

Table 1. Status of flagship and special status species on Mud Lake WMA, including their potential suitability as a focal species for management.

Species	Status Designation(s)	Occurrence Context in Mud Lake WMA Landscape	Threats	Beneficial Management and Conservation Actions	Suitability as a Focal Species at Mud Lake WMA
Mammals					
Elk (*Cervus elaphus*)	Flagship	Elk occasionally visit MDWMA in large numbers and there is a small resident herd on the north shore. There are year-round populations on Camas NWR (50-200 animals) and on the nearby INL. The numbers of elk in GMU 63 can fluctuate greatly in response to habitat/climatic conditions and human pressures. Elk in this area readily move between the INL, Camas NWR, private agricultural fields, and the BLM lands. Over the years the number of elk using MDWMA has increased as motor vehicle restrictions have created more security cover.	The primary threats to elk on MDWMA would be overharvest and lack of quality security habitat. The elk in the Mud Lake area are very transient in nature, they are continually moving about the landscape as forage resources and human disturbances change.	Continue to provide security cover and forage resources for the elk in the area. This can help to decrease depredation issues on adjacent agricultural fields and offer hunter opportunity. Increased information on elk movements in the Mud Lake/Table Butte area would benefit managers as they struggle to alleviate depredations, offer hunter opportunity, and promote a healthy elk population.	***Potentially suitable as a focal species***. Elk are a relatively abundant animal on the Mud Lake landscape and are dependent on habitats that are representative of a broader group of species sharing the same or similar conservation needs.
Idaho Pocket Gopher (*Thomomys idahoensis*)	SGCN	Undocumented on MDWMA. Presence is possible based on available habitat.	Population distribution in Idaho is mostly undocumented. However, loss of shrub steppe and grassland habitats in the range of this species is likely a factor affecting conservation.	The primary action recommended actions in Idaho's SWAP are documenting population distribution and initiating efforts to better document habitat associations.	***Unsuitable as a focal species***. Limited information on distribution in the project area. Unknown distribution limits potential management feedback.
Moose (*Alces alces*)	Flagship	Moose are commonly found across MDWMA, but exact densities are unknown. The moose on MDWMA are not like the majority of moose populations within the Upper Snake Region. Although there are some emigration/migration impacts to this population, it is largely driven by local production and survival. Movements between Camas NWR and the private lands in the Mud Lake area are common. Moose depredation on haystacks and landscaping plants can be a problem in some winters. Mud Lake WMA management can help minimize these depredation concerns and issues.	Over harvest and the moving of depredating or problem moose have been factors in the productivity of this moose population in the past. Managers believe that illegal harvest of moose in this area is a problem and threat to this population.	More information is needed on moose numbers and movements on MDWMA and in the area. During the winter, moose depredations are a common occurrence near MDWMA. Most of the local residents are tolerant of these moose using haystacks, but the threat to human safety has led to removal of many moose from the area.	***Potentially suitable as a focal species***. Moose are a relatively abundant animal on MDWMA and are dependent on habitats that are representative of a broader group of species sharing the same or similar conservation needs.
Mule Deer (*Odocoileus hemionus*)	Flagship	Mule deer are a common species on MDWMA with a year-round population of approximately 50. During winter months this population may double as deer from the neighboring areas move on to MDWMA.	The primary threats to mule deer on MDWMA are: loss of security cover and over harvest. The change to short range weapons for deer will, improve survival and populations should benefit from this hunting restriction.	Mule deer readily utilize all habitats found on MDWMA. The most appropriate conservation and beneficial management practices for mule deer on MDWMA would be to monitor harvest and populations, continue to provide appropriate seasonal habitat needs, and to ensure that there adequate security habitat is available.	***Potentially suitable as a focal species***. Mule deer are a relatively abundant animal on MDWMA and are dependent on habitats that are representative of a broader group of species sharing the same or similar conservation needs.
Myotis Guild	SGCN; BLM Sensitive	California myotis, fringed myotis, western small-footed myotis, Yuma myotis. Mud Lake WMA provides valuable foraging habitat for a variety of bat species, although this is poorly documented.	Individuals are long-lived and exhibit low reproductive potential. Roost sites tend to be colonial, and may be limiting in some areas; aggregations are susceptible to disturbance and intentional persecution. High prey densities are often associated with wetlands	Minimize broad-spectrum insect control activities that reduce prey base. Where possible, document natural roosting habitat such as cliffs. Create day- and night-roosting habitat through installation of bat boxes. Deploy escapement devices on troughs and water tanks, and develop natural and artificial pooled water sources. Track with ongoing efforts of the East Idaho Bat Working Group to identify	***Unsuitable as a focal species.*** Unknown scope of occurrence and composition of guild on MDWMA. Primary use of Mud Lake is likely as foraging habitat. Most threats to the Myotis guild are associated with roosting habitat.

Species	Status Designation(s)	Occurrence Context in Mud Lake WMA Landscape	Threats	Beneficial Management and Conservation Actions	Suitability as a Focal Species at Mud Lake WMA
			and other highly productive habitat. Habitat use rates and, at the population level, survival and recruitment rates likely track aerial insect prey availability. Accessible surface water also likely affects local distribution and abundance	opportunities to mitigate bat mortalities from wind energy development.	
Pronghorn (*Antilocapra americana*)	Flagship	Mud Lake WMA is year-round habitat for a small population of local pronghorn, but during winters of high snow accumulations, the tall stands of sagebrush are critical wintering habitat for up to 200 pronghorn.	The primary threats to pronghorn in the Mud Lake area is the loss of quality sagebrush steppe habitat and movement barriers such as: fences and roads.	Conservation and enhancement of existing sagebrush habitats and creating movement corridors for pronghorn to continue seasonal movements would be the most valued conservations measures in the Mud Lake area.	***Unsuitable as a focal species***. Limited information on distribution, populations, and detailed seasonal habitat use patterns limits potential management feedback.
Pygmy Rabbit (*Brachylagus idahoensis*)	SGCN; BLM Sensitive	Nearest documented occurrence is approximately 5 miles southeast of MDWMA. However, potentially suitable habitat does exist on the WMA.	Loss, alteration, and fragmentation of sagebrush-steppe. Agents of habitat loss and degradation include agricultural conversion, urbanization (and related infrastructure networks), prescribed and wildland fire, invasive plants, conifer encroachment, vegetation treatments that remove sagebrush, and unsustainable livestock grazing. Habitat fragmentation has implications for pygmy rabbits due to limited dispersal capability.	Conduct a pygmy rabbit survey within suitable habitat on the Mud Lake WMA. Minimize disturbance to mature sagebrush should be considered. Several recent initiatives focusing on the conservation of greater sage-grouse (i.e., BLM National Sage-grouse Habitat Conservation Strategy, Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats, SageMap) also provide general guidance for conserving sagebrush habitats and associated species.	***Unsuitable as a focal species.*** Limited management information on occurrence and use on MDWMA.
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	SGCN; BLM Sensitive	Potential use of MDWMA by foraging Townsend's big-eared bat is possible but undocumented. Populations in Idaho occur predominately on the Snake River Plain, where distribution and abundance is correlated with cavity-forming rock formations. Numerous hibernacula in lava tube caves have been identified in south central and southeast Idaho (Genter 1986, Lewis 1994, Keller and Saathoff 1995).	The primary issue facing this species is disturbance and destruction of roost sites through mine closures, renewed mining, recreational caving, and other roost-disturbing activities. This species is sensitive to anthropogenic disturbances.	Document state population trends. Protect/restore year-round roosting options by working with land managers. These activities are currently being undertaken by the East Idaho Bat Monitoring Initiative of the Idaho Bat Working Group.	***Unsuitable as a focal species***. Limited information on distribution in the project area. Unknown distribution limits potential management feedback. Townsend's big-eared bat primary use of MDWMA is likely foraging over wetland areas, therefore, most prevalent threats are not likely to be addressed by WMA management.
White-tailed Deer (*Odocoileus virginianus*)	Flagship	White-tailed deer are common on MDWMA, but actual populations are unknown. White-tails use adjacent private lands and Camas National Wildlife Refuge to meet seasonal needs. Movement between Camas NWR and MDWMA is common for the white-tails in this area.	The primary threats to white-tailed deer on MDWMA are: loss of security cover and over harvest. The change to short range weapons for deer will, improve survival and populations should benefit from this hunting restriction.	White-tailed deer readily utilize all habitats found on MDWMA. The most appropriate conservation and beneficial management practices for white-tailed deer on MDWMA would be to monitor harvest and populations, continue to provide appropriate seasonal habitat needs, and to ensure that there adequate security habitat is available.	***Potentially suitable as a focal species***. White-tailed deer are a relatively abundant animal on MDWMA and are dependent on habitats that are representative of a broader group of species sharing the same or similar conservation needs.

Species	Status Designation(s)	Occurrence Context in Mud Lake WMA Landscape	Threats	Beneficial Management and Conservation Actions	Suitability as a Focal Species at Mud Lake WMA
Birds					
American Avocet (*Recurvirostra americana*)	SGCN, IWJV	Mud Lake WMA is utilized as migration stop-over habitat for American avocet. Some nesting may occur, but that is not documented.	Loss of mud flat and shallow wetlands during migration times.	Enhance and/or maintain the amount of shallow wetland and mud flat habitat in the area during migrational time periods.	***Unsuitable as a focal species***. Unsuitable as a focal species given ephemeral use of MDWMA .
American White Pelican (*Pelecanus erythrorhynchos*)	BLM Type 2, SGCN	Mud Lake WMA is an important foraging and roosting habitat for white pelicans, particularly early in the season.	The primary regional threat to pelicans is loss or disturbance at nesting colonies.	Maintain security of main marsh units during early spring through mid-summer to maintain pelican foraging and roosting habitat.	***Unsuitable as a focal species.*** Unsuitable as a focal species given ephemeral use of MDWMA .
Bald Eagle (*Haliaeetus leucocephalus*)	BLM Type 1, SGCN, USFS R4 Sensitive	There is a single pair of bald eagles that nest on MDWMA. These eagles took over and old great blue heron nest on Green Island.	Perhaps the greatest threat to bald eagles in Idaho is disturbance during the nesting period from activities such as forestry, human recreation, and construction projects. Shooting, poisoning, and electrocution are also significant threats in the Upper Snake Region, Idaho.	Population recovery goals have been met in the Upper Snake Region, Idaho. Nest monitoring should continue. Disturbance around nest sites should be minimized or avoided altogether, especially during late–winter/early–spring when eagles are initiating territory establishment and breeding activities. Continue building an eagle data base for MDWMA and the surrounding area.	***Potentially suitable as a focal species.*** Breeding bald eagles can be a valuable indicator of human disturbance, particularly from recreation and management activities.
Black Tern (*Chlidonias niger*)	BLM Type 3, SGCN,	Mud Lake supports breeding colonies of black terns, one of the few locations in Idaho that is known to do so. The nesting sites at Mud Lake are one of two nesting sites known in the region.	Greatest threat to black terns in Idaho is loss of marsh habitat and human disturbance (although black terns appear to be tolerant of nearby human activity as long as the colony is not entered).	Minimize disturbance during nesting season and monitor species productivity and use on MDWMA. Management that benefits other colony-nesters at Mud Lake will benefit black tern.	***Unsuitable as a focal species.*** Unsuitable as a focal species given lack of information related to use of MDWMA .
Black-crowned Night Heron (*Nycticorax nycticorax*)	SGCN	In the Great Basin, there are approximately 2800 breeding pairs (Ivey and Herziger 2005). Of these, approximately 800 pairs breed in Idaho at multiple locations in the southern half of the state.	Greatest threat to black-crowned night herons is loss of marsh habitat and human disturbance in colonies.	Maintaining quality wetland and riparian habitats, including maintaining suitable water levels will benefit this species. Consistent periodic monitoring may help alert managers to habitat or population problems.	***Potentially suitable as a focal species.*** Due to its dependence on secure marsh habitats for breeding. The presence of this species as breeders is both a good indicator of breeding habitats on MDWMA, and surrounding foraging habitats on the Snake River system.
Black-necked Stilt (*Himantopus mexicanus*)	SGCN, IWJV	MDWMA is utilized as migration stop-over habitat for black-necked stilts. Some nesting may occur, but that is not documented.	Loss of mud flat and shallow wetlands during migration times.	Enhance and/or maintain the amount of shallow wetland and mud flat habitat in the area during migrational time periods.	***Unsuitable as a focal species.*** Use of MDWMA is ephemeral.
Brewer's Sparrow (*Spizella breweri*)	BLM Type 3, SGCN, IWJV	Brewer's sparrow is a common breeder in sagebrush habitat within MDWMA and vicinity.	Shrub steppe obligate species, closely associated with big sagebrush. Habitat destruction and degradation in sage steppe are the primary threats to Brewer's sparrow populations.	Conservation actions should focus on preserving areas of intact, un-fragmented shrub steppe habitat.	***Potentially suitable as a focal species.*** Brewer's sparrow is a sagebrush obligate and representative of sagebrush-dependent species sharing similar conservation needs. Unqualified scope of occurrence on MDWMA would require preliminary work to determine the extent of breeding.
California Gull (*Larus californicus*)	SGCN	In the Great Basin and Northern Rocky Mountains there are approximately 71,936 breeding pairs. Just over half of these (36,320 pairs) bred in southern Idaho, as of 1993 (Trost and Gerstell 1994). Only known colony in the Upper Snake region is on Island Park Reservoir. Mud Lake and vicinity provide some level of foraging habitat for this species.	The main threat to this species in the Upper Snake Region is ongoing human disturbance at the nesting colony within Island Park Reservoir.	Prevent disturbance at breeding colonies.	***Unsuitable as a focal species***. Occurrence context on MDWMA does not reflect main threats to the population. Lack of knowledge limits potential management feedback.

Species	Status Designation(s)	Occurrence Context in Mud Lake WMA Landscape	Threats	Beneficial Management and Conservation Actions	Suitability as a Focal Species at Mud Lake WMA
Caspian Tern (*Sterna caspia*)	SGCN	Only known colony in the Upper Snake region is on Island Park Reservoir. In 2004 there were two active colonies in Idaho. Mud Lake and vicinity provide some level of foraging habitat for this species, although most foraging birds are observed further upstream in Fremont County.	The main threat to this species in the Upper Snake Region is ongoing human disturbance at the nesting colony within Island Park Reservoir.	Prevent disturbance at breeding colonies.	***Unsuitable as a focal species***. Occurrence context on MDWMA does not reflect main threats to the population. Lack of knowledge limits potential management feedback.
Cattle Egret (*Bubulcus ibis*)	SGCN	Cattle egrets are documented breeders on MDWMA and commonly use MDWMA during migration movements.	In Idaho, cattle egrets generally breed in mixed–species colonies in willows or tamarisks along water, on islands, or in bulrush/cattail marshes. Nests are generally located off the ground, although may be located near water level in bulrush marshes. Cattle egrets forage in open pastures, fields, and meadows, usually in association with cattle or other livestock, feeding primarily on insects.	Maintain breeding habitat in main marsh units of MDWMA and support strategies that maintain suitable foraging habitat in the WMA landscape such as conservation easement acquisitions. Also, activities that benefit foraging white-faced ibis on the landscape scale will benefit cattle egret conservation.	***Potentially suitable as a focal species*** due to its dependence on a combination of marsh breeding habitats and surrounding agricultural lands for foraging. However, limited breeding numbers limits potential management feedback. Best use of this species as a focal species may be within breeding or foraging guild.
Clark's Grebe (*Aechmophorus clarkii*)	SGCN	An estimated 400-500 Clark's grebes of these breed in Idaho, where breeding distribution is primarily associated with the extensive Snake River drainage in the southern and southeastern parts of the state. The only known colony in the Upper Snake region is on MDWMA. Mud Lake additionally provides transitional habitat for this species.	Two of the main issues for grebes nesting in Idaho are water quality and water level fluctuations. Nesting colonies also are sensitive to disturbance by humans approaching the colony on foot or by boat.	Prevent disturbance and maintain beneficial water levels at breeding colonies.	***Unsuitable as a focal species***. Occurrence context on MDWMA does not reflect main threats to the population. Lack of knowledge limits potential management feedback.
Western Grebe	SGCN	An estimated 4034 of these birds breed in Idaho, primarily along the Snake River drainage in the southern and southeastern parts of the state. There are five recently active colonies in the Upper Snake Region, including MDWMA, Market Lake WMA, Island Park Reservoir, Mesa Marsh, and Silver Lake in Harriman State Park.	Two of the main issues for grebes nesting in Idaho are water quality and water level fluctuations. Nesting colonies also are sensitive to disturbance by humans approaching the colony on foot or by boat.	Prevent disturbance and maintain beneficial water levels at breeding colonies.	***Potentially suitable as a focal species*** due to its dependence on a MDWMA for breeding and foraging. Best use of this species as a focal species may be within breeding or foraging guild.
Common Loon (*Gavia immer*)	SGCN, USFS R4 Sensitive,	Common loons are occasionally seen on MDWMA during spring and fall migration periods. Uncommon on MDWMA. The only documented breeding site in the Upper Snake Region is on Indian Lake in Fremont County.	Threats to most Idaho waterbirds are not related to the use of transitional habitat but are related to maintenance of nesting breeding habitat.	Degradation of habitat through shoreline nesting habitat due to human development and/or disturbance	***Unsuitable as a focal species***. Presence of common loon is limited to transitional use at MDWMA and Snake River Habitats.
Ferruginous Hawk (*Buteo regalis*)	BLM Type 3, SGCN, IWJV	The sage/steppe uplands on MDWMA and adjacent landscape are good quality nesting/foraging habitat for this hawk. Mud Lake WMA has supported a successful breeding pair of Ferruginous Hawks for years.	Ferruginous hawks nest close to the ground and are susceptible to human disturbance. Population declines have been attributed to the negative effects of cultivation, grazing, poisoning, and controlling small mammals, mining, and fire in nesting habitats. A more recent concern is the development of wind farms, where hawks can potentially collide with turbines during spring	Primary conservation actions include maintaining prey populations (ground squirrels, etc.), and mitigating development impacts from recreation, urbanization, infrastructure and wind energy development.	***Potentially suitable as a focal species***. However, limited and seasonal occurrence on MDWMA limits potential management feedback at the focal species scale.

Species	Status Designation(s)	Occurrence Context in Mud Lake WMA Landscape	Threats	Beneficial Management and Conservation Actions	Suitability as a Focal Species at Mud Lake WMA
			and fall migration.		
Forster's Tern (*Sterna forsteri*)	SGCN	Forster's terns are documented breeders at MDWMA. MDWMA is one of five documented breeding sites in the state, probably representing fewer than 100 breeding pairs.	Similar to other marsh-nesting colonial waterbirds, water level fluctuations and human disturbance can result in nest failure	Maintaining water levels and minimizing human disturbance during nesting should be a priority. Consistent monitoring of the breeding colonies should be implemented, , such that all colonies are surveyed every 3 years	***Potentially suitable as a focal species.*** Due to its dependence on a MDWMA for breeding and foraging. Due to low number of breeding individuals at MDWMA, best use of this species as a focal species may be within breeding or foraging guild.
Franklin's Gull (*Larus pipixcan*)	SGCN	In 2010, IDFG counted 13,074 Franklin's gull nests at MDWMA. In 2012 the number of nests counted declined to 5,530. Despite this decline, breeding colonies at Mud Lake and Market Lake WMAs currently comprise one of the largest Franklin's gull breeding concentrations throughout their range.	Franklin's gull colonies can be seriously affected by fluctuating water levels, potentially leading to complete abandonment. Exotic plant species and overgrowth of marsh plants can create habitat that is too dense for nesting. Franklin's gulls are particularly sensitive to human disturbance early in the breeding cycle and again during the chick phase, and will abandon with excessive human exposure.	Maintaining a suitable water level likely is the most important conservation action, followed by maintaining vegetation that is open enough for nest construction. Consistent monitoring of breeding colonies should be implemented, such that all colonies are surveyed every 3 years. Caution should be exercised when entering these colonies and all research activities should be planned carefully to avoid periods of peak sensitivity, and disturbance should be limited to as much as possible.	***Potentially suitable as a focal species.*** This species has a potential to provide valuable feedback to managers due to its breeding numbers on the WMA and its dependence on WMA wetlands for nesting and brood-rearing. Also, due to this species' dependence on foraging habitats on private lands adjacent to MDWMA, it could provide valuable input on species and waterbird conservation on a landscape level.
Great Egret (*Ardea alba*)	SGCN	Great egrets are documented breeders at MDWMA. In the Great Basin, there are approximately 1119 breeding pairs (Ivey and Herziger 2005). Of these, approximately 26 pairs breed in Idaho at 4–6 sites in the southern half of the state.	Similar to other marsh-nesting colonial waterbirds, water level fluctuations and human disturbance can result in nest failure	Maintaining water levels and minimizing human disturbance during nesting should be a priority. Consistent monitoring of the breeding colonies should be implemented, , such that all colonies are surveyed every 3 years	***Potentially suitable as a focal species.*** Due to its dependence on a MDWMA for breeding and foraging. Due to low number of breeding individuals at MDWMA, best use of this species as a focal species may be within breeding or foraging guild.
Greater Sage-grouse (*Centrocercus urophasianus*)	BLM Sensitive, SGCN, USFS Sensitive, ESA Candidate	Mud Lake WMA provides year-round habitat for sage-grouse, but it is critical winter habitat. In severe winters, where snow accumulations are substantial, hundreds of sage-grouse will move into the tall sagebrush pockets across MDWMA. There is one known active lek on the Marty Segment of MDWMA.	Loss, degradation, and fragmentation of sagebrush habitat are the major threats to the greater sage–grouse in Idaho. Habitat degradation factors include alteration of historical fire regimes, conversion of sagebrush habitat, water developments, use of herbicides and pesticides, invasive species, urbanization, energy development, mineral extraction, and recreation.	Identify, protect, and maintain existing sagebrush seasonal habitats particularly breeding and winter habitats. Identify new lek/breeding habitats in MDWMA vicinity. Where possible, restore damaged and lost sage-steppe habitat. Manage projects to significantly reduce fragmentation of existing sagebrush habitats and to reduce human disturbance. Continue to monitor the leks near MDWMA.	***Potentially suitable as a focal species.*** sage-grouse have a high conservation need and are representative of a group of species sharing similar conservation needs. They have a high level of current Department program effort and are a species with potential to stimulate partnerships. However, numbers around Mud Lake are suppressed and getting management feedback would be challenging
Hooded Merganser (*Lophodytes cucullatus*)	SGCN	Hooded mergansers are observed occasionally during migrational periods at MDWMA. Limited potential breeding habitat is present on Gem Lake WHA but nesting is not documented.	Hooded Merganser populations have suffered on both breeding and wintering grounds from habitat alteration, mostly associated with changing forestry practices and especially snag removal.	Maintain cottonwood overstory, particularly older age classes	***Unsuitable as a focal species***. Presence of Hooded merganser is likely limited to transitional use of MDWMA and Snake River Habitats.

Species	Status Designation(s)	Occurrence Context in Mud Lake WMA Landscape	Threats	Beneficial Management and Conservation Actions	Suitability as a Focal Species at Mud Lake WMA
Lesser Scaup (*Aythya affinis*)	SGCN, IWJV	Common nesting duck on MDWMA, which is likely one of the most important nesting areas for this species in the Upper Snake Region. Pairs and broods are associated with fresh seasonal and semi-permanent wetlands and lakes with emergent vegetation, such as bulrush and cattail. The lesser scaup prefers smaller bodies of water and nests on dry ground, usually close to water, such as in the wet–meadow zone of wetlands, but also in tracts of native prairie, hayfields, or even sparse shrub patches.	Many threats faced by the lesser scaup throughout its range do not apply in Idaho. In Idaho, degradation of habitat is a potential issue. Loss or degradation of wetlands due to drainage and conversion to agriculture, dredging and filling, modification of water levels, levee construction, changes in siltation, and introduction of exotic plants are all potential issues of concern that may impact both breeding and wintering habitats for this species.	Primary actions should focus on restoring wetlands and associated uplands through cooperative joint ventures of federal and state, resource agencies, private and public landowners.	***Potentially suitable as a focal species.*** This species has a potential to provide valuable feedback to managers due to its breeding numbers on the WMA and its dependence on WMA wetlands for nesting, brood-rearing and foraging.
Loggerhead Shrike (*Lanius ludovicianus*)	BLM	Loggerhead shrike nesting habitat exists on MDWMA within grassland and grassland shrub habitats. However, nesting and habitat use of the landscape are not well documented.	Loss of grassland habitat, degradation and loss of nesting trees/shrubs within grasslands, degradation of foraging habitat due to overgrazing, low reproductive success due to reductions in prey base (grasshoppers and beetles) due to pesticides.	Protect or restore grassland habitat with scattered trees or shrubs. Avoid overgrazing by livestock and minimize use of pesticides to control grasshoppers.	***Unsuitable as a focal species***. Limited information on distribution in the project area. Unknown distribution limits potential management feedback.
Long-billed Curlew (*Numenius americanus*)	SGCN, IWJV	Long-billed curlews are documented breeders on the shorter grass fields on MDWMA as well as adjacent to the WMA.	The greatest threat to long-billed curlew in Idaho is loss of habitat. Conversion of grasslands to croplands, residential development, and increasing recreational use has all resulted in losses of suitable habitat in Idaho. Carlisle (personal comm.) has also documented significant losses from recreational shooting.	Protect nesting areas from fragmentation and human disturbance from approximately mid-April to mid-June. Maintain agricultural lands and practices around breeding areas through conservation easement acquisitions and NRCS programs that support moderate grazing, flood irrigation and grass hay production.	***Potentially suitable as a focal species***. Long-billed curlews are very sensitive to habitat fragmentation and changes in land use on a landscape scale. However, most curlew nesting occurs off of the WMA. .
Mallard (*Anas platyrhynchos*)	Flagship, IWJV	Mallards are abundant on the Mud Lake landscape during both the breeding and migrational seasons. Mallards are the most highly sought after waterfowl species by hunters on MDWMA.	The species is threatened by wetland habitat degradation and loss from pollution and pesticide pollution, wetland drainage, peat-extraction, changing wetland management practices (e.g., decreased grazing and mowing in meadows leading to scrub over-growth). The species also suffers mortality as a result of lead shot ingestion. It is also susceptible to duck virus enteritis (DVE), avian influenza and avian botulism so may be threatened by future outbreaks of these diseases (although it may be able to withstand sporadic losses due to	Protect breeding and nesting areas and continue to provide critical migrational stop-over habitat. Monitor harvest, production, and disease outbreaks in the region. Mud Lake WMA has a significant banding program, where hundreds of mallards are banded each season. This effort yields valuable information as it relates to season movements and distribution of mallards from the Mud Lake area.	***Potentially suitable as a focal species***. Due to high management status, their dependence on MDWMA wetlands and associated uplands and partnership potential. . Also, due to this species' likely dependence on nesting habitats on adjacent private lands, it could provide valuable input on species and waterbird conservation on a landscape level.

Species	Status Designation(s)	Occurrence Context in Mud Lake WMA Landscape	Threats	Beneficial Management and Conservation Actions	Suitability as a Focal Species at Mud Lake WMA
			its high reproductive potential).		
Northern Pintail (*Anas acuta*)	SGCN, IWJV	Pintails are common on MDWMA. Mud Lake supports nesting pintail populations, but MDWMA provides critical stop-over habitat for thousands of migrating birds during the spring and fall months. More detailed information on nesting habitat and use of the WMA would be beneficial for management.	The species is threatened by wetland habitat loss on its breeding and wintering grounds. The species is also threatened by changing wetland management practices (decreased grazing and mowing in meadows leading to scrub over-growth). It also suffers poisoning from lead shot ingestion and is susceptible to avian botulism and avian influenza.	Protect breeding and nesting areas and continue to provide critical migrational stop-over habitat. Production is limited in the Mud Lake area, but MDWMA provides critical migrational stop-over habitat for northern pintails. Monitor harvest, production, and disease outbreaks in the region. Mud Lake WMA has a significant banding program, where some pintails are banded each season. It would be valuable for this banding effort to try and focus on northern Pintails for a few years in order to obtain valuable seasonal movement and distributional data for pintails that utilize the Mud Lake area.	***Potentially suitable as a focal species***. Due to high management status, their dependence on MDWMA wetlands and associated uplands and partnership potential. Also, due to this species' likely dependence on nesting habitats on adjacent private lands, it could provide valuable input on species and waterbird conservation on a landscape level.
Prairie Falcon (*Falco mexicanus*)	BLM Sensitive	There are no documented active prairie falcon nests on MDWMA, but prairie falcons are common visitors to MDWMA, where they likely utilize upland foraging habitats.	Habitat loss from rural-residential development and large-scale agricultural development adversely impacts prairie falcons particularly in areas where ground squirrels are important forage species. Human disturbance is a frequent cause of nest failure.	Enhancement/maintenance of steppe and grassland habitats (and activities that benefit ground squirrels, rodents and small upland birds) will benefit foraging prairie falcons.	***Unsuitable as a focal species***. Occurrence context on MDWMA does not reflect main threats to the population. Lack of knowledge limits potential management feedback.
Peregrine Falcon (*Falco peregrinus anatum*)	BLM Sensitive, SGCN, USFS Sensitive,	Peregrine falcons are common visitors to MDWMA. A peregrine hack tower t is maintained on MDWMA. This tower has successfully fledged young in the past, but the tower has not been used by nesting peregrines since 2005.	Loss of habitat, particularly at cliff nest sites or adjacent wetlands, is a key threat to peregrine falcons. Disturbance at nest sites during breeding is also a threat to this species.	Mud Lake WMA and the surrounding area has very limited natural nesting habitat for peregrines, but hack towers have proven to be suitable nesting habitat and peregrines have successfully fledged young from these towers (Camas NWR and MDWMA). Mud Lake WMA and surrounding habitats provides an abundant prey base for Peregrines. Management has focused on minimizing disturbance at nest sites and monitoring peregrine use of MDWMA, but area use by peregrines is poorly understood.	***Unsuitable as a focal species.*** The MDWMA tower has been inactive in recent years and peregrine use of the WMA has been largely transitional. Limited information on use of MDWMA by peregrines limits the potential value of management feedback.
Red-necked Grebe (*Podiceps grisegena*)		Red-necked grebes are observed occasionally during migrational periods at MDWMA.	Highly susceptible to pollutants but bioacccumulation appears to occur mostly on wintering grounds. Susceptible to disturbance by recreationists during nesting, both from exposure of nests when birds are flushed off nests and separation of young from adults when rapidly approached by boats. Because of their reliance on wetland habitat, draining of wetlands and/or drought are potentially serious issues for this species in Idaho.	Maintaining water levels and minimizing human disturbance during nesting should be a priority.	***Unsuitable as a focal species***. Presence of red-necked grebe is likely limited to transitional use of MDWMA and Snake River Habitats, limiting the potential for valuable feedback to WMA managers.

Species	Status Designation(s)	Occurrence Context in Mud Lake WMA Landscape	Threats	Beneficial Management and Conservation Actions	Suitability as a Focal Species at Mud Lake WMA
Ring-necked Pheasant (*Phasianus colchicus*)	Flagship	Wild ring-necked pheasants were once abundant in the Mud Lake area. pheasant populations around Mud Lake have dramatically declined over the years. No single factor has been clearly identified as the reason for these declines, but habitat loss and alteration, in combination with pesticide use, and alterations in farming methods have all likely contributed to these declines. Mud Lake was once a destination for pheasant hunters. Historic crow counts at Mud Lake were reported to be the highest in the state.	Habitat loss, changes in farming practices, use of pesticides, and altered predator densities all threaten ring-necked pheasant populations.	Improving nesting and brood-rearing habitat in the Mud Lake area in combination with providing seasonal food sources would promote more productive pheasant populations. Implementing high quality habitat improvement projects with local landowners, particularly programs that partner with other agency programs would greatly improve conditions for pheasants across this landscape.	**Potentially suitable as a focal species.** Important game animal and social acceptance. Partnership leverage as well as habitat availability and management capabilities make pheasant a potential focal species.
Sage Sparrow (*Artemisiospiza belli*)	BLM Sensitive, IWJV	MDWMA has suitable breeding habitat but their occurrence is poorly documented.	Degradation and fragmentation of sagebrush habitat are the major threats to the sage sparrow in Idaho. Habitat degradation factors include alteration of historical fire regimes, conversion of sagebrush habitat, water developments, use of herbicides and pesticides, invasive species, urbanization, energy development, mineral extraction, and recreation.	Identify, protect, and maintain existing in-tact sagebrush habitats. Where possible, restore damaged and lost sage-steppe habitat. Manage projects to significantly reduce fragmentation of existing sagebrush habitats and to reduce human disturbance.	**Unsuitable as a focal species.** Lack of documented use of MDWMA
Sandhill Crane (*Grus canadensis*)	SGCN, IWJV	Sandhill cranes on MDWMA and vicinity are part of the Rocky Mountain Population (RMP). Mud Lake WMA provides breeding and migrational stop over habitat for the sandhill cranes in the RMP.	Greatest threat to RMP cranes is loss of migration-staging habitat. However, loss and degradation of wetland/riparian breeding habitat is also an issue.	Protect and restore wetland/riparian habitat for breeding sandhill cranes and maintain agricultural production for foraging areas where appropriate on MDWMA. Document breeding locations on MDWMA, including nesting brooding locations.	***Potentially suitable as a focal species.*** This species has a potential to provide some valuable feedback to managers due to its breeding numbers on the WMA and its dependence on WMA habitats for nesting, brood-rearing and foraging. However, lack of current knowledge on the species' use of WMA habitats may limit potential management feedback.
Short-eared Owl (*Asio flammeus*)	Sensitive SGCN	Suitable breeding and foraging habitat is present on MDWMA and immediate vicinity. Short-eared Owls are common breeders in this landscape. Species is known to be nomadic; therefore additional suitable habitat may be unoccupied in some years.	As ground-nesters (often in loose colonies), the short-eared owl is particularly vulnerable to habitat loss and degradation, and human disturbance. Residential, commercial, transportation, utility, and agricultural development of suitable nesting habitats are key factors in local short-eared owl population declines. Timing of agricultural activities such as tilling, mowing, burning, etc. can adversely affect short-eared owls breeding in agricultural areas. Because of their low-flying hunting technique and colonial tendencies, populations of short-eared owls in proximity to roads are potentially subject to high mortality due to	This species benefits from any actions or projects that protect, enhance, or restore potentially suitable foraging and breeding habitats. Projects designed to benefit other grassland and shrub-steppe species (e.g., greater sage-grouse, sharp-tailed grouse, mule deer) also will benefit short-eared owls. Monitoring for use of agricultural lands prior to ground disturbing actions also would benefit the short-eared owl.	***Potentially suitable as a focal species.*** This species has a potential to provide some valuable feedback to managers due to its breeding numbers on the WMA and its dependence on WMA habitats for nesting, brood-rearing and foraging. However, Nomadic ecology may complicate population monitoring.

Species	Status Designation(s)	Occurrence Context in Mud Lake WMA Landscape	Threats	Beneficial Management and Conservation Actions	Suitability as a Focal Species at Mud Lake WMA
			vehicle collisions.		
Snowy Egret (*Egretta thula*)	SGCN	Snowy egrets are documented breeders at MDWMA. In the Great Basin, there are approximately 1661 breeding pairs (Ivey and Herziger 2005). Of these, approximately 326 pairs breed in Idaho at 4 sites in the southern half of the state.	Similar to other marsh-nesting colonial waterbirds, water level fluctuations and human disturbance can result in nest failure	Maintaining water levels and minimizing human disturbance during nesting should be a priority. Consistent monitoring of the breeding colonies should be implemented, , such that all colonies are surveyed every 3 years	***Potentially suitable as a focal species.*** Due to its dependence on a MDWMA for breeding and foraging. Due to low number of breeding individuals at MDWMA, best use of this species as a focal species may be within breeding or foraging guild.
Swainson's Hawk (*Buteo swainsoni*)	BLM Type 5, SGCN, IWJV	In general, Swainson's hawk utilization of MDWMA is poorly documented. However, they are a likely breeder and may also utilize MDWMA habitats during migration.	Main threat is vulnerability of this species as it congregates in large numbers during migration and on the wintering grounds (e.g., Argentina). On breeding grounds, conversion of native grasslands to crops can degrade or eliminate nesting habitat. Development of wind farms may cause direct mortality if migrating hawks collide with turbines during spring and fall migration.	Maintain and/or restore native grasslands in order to retain adequate foraging and nesting habitats. Identify nesting trees and avoid disturbance there during breeding. Migration corridors should be identified and important stopover habitat protected. Better data on mortality rates of migrating Swainson's hawks (and other raptors) as a result of wind farm development are needed.	***Unsuitable as a focal species***. Occurrence context on MDWMA does not reflect the main threats to Swainson's hawk (e.g., vulnerability on migration and wintering grounds). Limited and unquantified seasonal occurrence on MDWMA limits potential management feedback at the focal species scale.
Trumpeter Swan (*Cygnus buccinator*)	BLM Type 3, SGCN, USFS R4 Sensitive, USFWS State Imperiled Species Type 3, IWJV	Mud Lake WMA does provides high quality foraging habitat for trumpeter swans and trumpeters are often seen there during the breeding season, but for some reason MDWMA does not currently support breeding trumpeter swans at this time. There has been work done to evaluate habitat quality for trumpeters on MDWMA. Boat and access restrictions for breeding waterfowl provides for low disturbance nesting areas for swans and other waterfowl. Deflectors have been placed on majority of the power lines around MDWMA to minimize bird strikes. This should reduce power line collisions in the future.	Managing disturbance at nest sites or potential nest sites is likely an important factor to nest establishment and success. Most successful nest sites in Idaho occur on managed, protected wetlands. Loss and degradation of wetland and riparian habitat is also a prevalent threat to breeding swans. In winter, key mortality factors are power line strikes, starvation during cold weather, and illegal shooting.	Reduce human disturbance at known and potential nest sites. Protect and restore wetland/riparian habitat for breeding trumpeter swans. Document/monitor breeding locations & nest success on the WMA, including nesting brooding locations. Manage pond drawdowns to maximize macrophyte abundance. Mark power lines near rivers, known foraging areas and travel routes. Continue to document new winter field feeding areas. Some feel that the water level fluctuations at MDMWA during the breeding season may be one reason why trumpeters do not successfully nest at MDMWA. Partners are planning on providing a floating nest platform on MDMWA to address this concern.	***Potentially suitable as a focal species.*** The Upper Snake River and its tributaries are important winter habitat for migrating swans and important breeding/brooding habitat for local populations. The nearby Market Lake WMA is one of the few consistently successful nesting territories for trumpeter swans in Idaho. Also, trumpeter swans are dependent on habitats that are representative of a broader group of species sharing the same or similar conservation needs. They are designated a focal species for wetland conservation by the IWJV.
Western Burrowing Owl (*Athene cunicularia hypugaea*)	BLM Sensitive SGCN	Known to occur on MDWMA and the adjacent landscape during the breeding season.	Burrowing owls breed in open, well-drained grasslands, prairies, farmlands, steppes, and may have some association with irrigated agriculture. In Idaho, burrowing owls typically use burrows excavated by badgers. Loss of nesting habitat through urbanization and agricultural conversion is a serious threat throughout Idaho. Indiscriminate shooting of badgers may limit nest sites. Recent concern that illegal shooting of burrowing owls may be impacting populations (Carlisle personal comm.) Pesticides are a	Many of the recommended conservation actions In Idaho's SWAP relate to statewide population assessments or monitoring to better understand threats. However, management that identifies nesting areas, limits human disturbance in known nesting areas and reduces exposure to pesticides will benefit nesting burrowing owls on MDWMA.	***Unsuitable as a focal species***. Occurrence context on MDWMA does not reflect main threats to the population. Also, limited information on occurrence and us of MDWMA limits potential management feedback.

Species	Status Designation(s)	Occurrence Context in Mud Lake WMA Landscape	Threats	Beneficial Management and Conservation Actions	Suitability as a Focal Species at Mud Lake WMA
			potentially significant threat to this species as it often nests close to agricultural fields.		
White-faced Ibis(*Plegadis chihi*)	BLM Type 4, SGCN, IWJV	Mud Lake WMA combined with Market Lake WMA provides critical nesting and breeding habitat for 37% of white-faced ibis in the intermountain population. The flood irrigated portions of MDWMA and adjacent properties are crucial foraging areas supporting these ibis colonies in the Upper Snake region.	Threats to the white-faced ibis in the Mud Lake area are: water level fluctuations during the nesting period and the loss of foraging resources as the amount of flood irrigated lands and natural wetlands decreases in the region.	Maintain stable water levels and minimize human disturbance around active nesting colonies. Work collaboratively with the NRCS and private landowners within 12 km area around the WMA.	**Potentially suitable as a focal species.** This species has a potential to provide valuable feedback to managers due to its breeding numbers on the WMA and its dependence on WMA wetlands for nesting and brood-rearing. Also, due to this species' dependence on foraging habitats on private lands adjacent to MDWMA, it could provide valuable input on species and waterbird conservation on a landscape level.
Willow Flycatcher (*Empidonax traillii*)	BLM Type 3, IWJV	Documented occurrences during the breeding season in riparian habitats on MDWMA.	Loss, degradation, and fragmentation of lowland riparian habitat due to water diversions, impoundments, heavy livestock grazing etc. Increase in nest predator access due to meadow desiccation and conifer encroachment is also an issue (Great Basin Bird Observatory 2010).	Riparian and Springs habitat conservation strategies benefit this species. Maintain or restore shrub willow patches, preferably in multiple patches along a given riparian reach. Manage grazing such that it does not significantly fragment or reduce the density of willow patches. Maintain the presence of wet soils and nearby surface water. Reduce nest predator access by preventing conifer encroachment into riparian habitat. (Great Basin Bird Observatory 2010).	***Potentially suitable as a focal species.*** Willow flycatcher is a riparian obligate and representative of riparian-dependent species sharing similar conservation needs. Unqualified scope of occurrence on MDWMA would require preliminary work to determine the extent of breeding.
Wilson's Phalarope (*Phalaropus tricolor*)	BLM Sensitive, SGCN, IWJV	Breeds and utilizes MDWMA wetlands as transitional habitat. However, the level of breeding on the WMA is poorly documented	Loss of freshwater habitats. Human disturbance during the nesting and brood-rearing period is a concern.	Utilize seasonal closures to protect nesting waterfowl. Manage for hemi-marsh with diverse vegetation types. Maintain stable spring early summer water levels (in managed wetlands) to minimize nest loss and maintain stable brood-rearing habitat. Implement a disturbance regime to manage for a beneficial wetland plant mosaic that includes sedges, spikerushes and bulrush; and avoids development or perpetuation of cattail stands. Where possible, utilize late-season partial drawdowns to maximize macrophyte production. Also, given the arid landscape surrounding MDWMA wetland habitats, maintaining optimal brood-rearing habitat at Department-managed wetlands is crucial to maximizing benefits to phalaropes.	***Potentially Suitable as a Focal Species.*** Wilsons phalarope require well-managed uplands adjacent to wetland/marsh habitats to breed successfully. Their habitat needs represent many other species dependent on MDWMA wetlands. However, the extent of breeding on MDWMA is not well-documented and would require substantial initial effort to better understand their occurrence context on WMA lands.
Reptiles/Amphibians					
Common Garter Snake (*Thamnophis sirtalis*)	BLM Sensitive	Occurs on MDWMA but context of occurrence is poorly documented.	Threats to common garter snakes are most likely related to loss and degradation of riparian and wetland habitats and hibernacula.	Management that protects, restores or improves riparian and other wet habitats and enhances prey species availability (i.e., earthworms, insects, amphibians, and small mammals) will benefit common garter snake. Identifying and protecting hibernacula will also benefit common garter snake.	***Unsuitable as a focal species.*** Limited information on utilization of MDWMA habitats limits the potential value of management feedback.

Selection of Conservation Targets

We define an effective Conservation Target as one providing meaningful conservation benefits for multiple species that share similar habitat requirements or life history traits. They are useful for directing limited management resources and maximizing conservation effort. One measure of effectiveness is to assess the number of species that a Conservation Target benefits (or covers) within the management landscape.

Regional Habitat and Diversity staff worked together to complete the coverage assessment table (Table 2). We evaluated each of the Conservation Targets to determine which species from Table 1 would benefit from management activities focused on that target. Evaluations are based on knowledge of species habitat requirements, occurrence within the management landscape, and the scope of current and planned management actions. The assessment considered only those habitat features or needs relevant to the species as it occurs on the management landscape. For instance, we emphasized the importance of breeding and migrational habitat needs for northern pintail, knowing that most breeding and wintering activity for these species occurs elsewhere. Our results indicate that the selected Conservation Targets on MDWMA provide substantial but variable habitat benefits for an array of assessed species. We found that management efforts directed towards maintaining or enhancing wetland habitat will provide conservation benefits for 43 of the 52 assessed species.

We also evaluated which species or guilds would receive little or no tangible benefit from management actions for specific Conservation Targets; these are designated "conservation needs." We identified conservation needs for several species or guilds and determined that further data will be useful to inform the next WMA planning process. Recent studies suggest the conservation needs of some of these species (e.g., the Myotis guild) are increasing dramatically. A prudent management strategy is to consider a landscape where these species may be prioritized for management in the future. Broad strategies for addressing these management needs are identified in the following Management Program Table (pages 57-63), but typically include collection of additional baseline data.

The Conservation Targets selected to guide management on MDWMA (corresponding MDWMA Priority in parentheses) are:

1. Northern Pintail
2. Ring-necked Pheasant (Upland Game Bird Habitat)
3. Greater Sage-grouse (Special Status Species Habitat)
4. White-faced Ibis (Distance Foraging Species)

Northern Pintail

Wetland Habitat was selected as a Conservation Target on MDWMA because:

- Sixty-three percent of the species evaluated in Table 1 will benefit from efforts to meet the seasonal resource needs of northern pintails (see Table 1). Much of the focus for

pintail habitat will focus on wetland habitats, upland nesting habitat, and seasonal foraging opportunities.

- Northern pintail seasonal habitats are limited in the Mud Lake area; this fact makes areas like MDWMA and other wetlands incredibly valuable for wildlife. Wetlands make up a small percentage of available habitats, but yield the highest species richness and diversity.
- Wetland protection and restoration is the primary recommended beneficial management and conservation action for 47% of the species evaluated.
- Wetland habitat extent and function can be mapped and monitored on MDWMA and the adjacent landscape.
- Wetland habitat restoration and conservation can be spatially monitored by MDWMA staff.
- Given the high species value of wetland habitats—particularly of priority species such as northern pintail, white-faced ibis, mallard, sandhill crane, trumpeter swan, ring-necked pheasant, etc.—wetland restoration and conservation partnerships are very achievable.
- Waterfowl (mallard, northern pintail, and Canada geese) are flagship species and are the primary foundational priority for the creation of MDWMA.

Ring-necked Pheasant

Ring-necked pheasant was selected as a Conservation Target to represent Upland Game Bird Habitat on MDWMA because:

- Ring-necked pheasant were once the dominant upland game bird on MDWMA and are a highly valued game species.
- Ring-necked pheasant fulfill all criteria for suitability as a focal species.
- There is pheasant research currently being conducted and research has been done in the past on MDWMA that provides information specific to pheasant survival and habitat use in the Mud Lake area.
- The seasonal habitat requirements of ring-necked pheasant are particularly valuable as a surrogate for other flagship and special status species. In particular, the nesting habitat needs for pheasant is a very good surrogate for the nesting requirements of many of our waterfowl species that use MDWMA.

Greater Sage-grouse

Greater sage-grouse was selected as a Conservation Target to represent Special Status Species Habitat on MDWMA because:

- Greater sage-grouse fulfill all criteria for suitability as a focal species.
- Greater sage-grouse are designated as a Candidate species for listing under the Endangered Species Act, are a national conservation priority, and a key planning species for federal land managers that have significant land ownership in the MDWMA landscape and Habitat District.

- Greater sage-grouse depend on specific qualitative attributes of sage-steppe and wet meadow habitats that are not addressed simply by expanding the extent of these habitats on MDWMA. By identifying greater sage-grouse as a Conservation Target, we are seeking to maintain and restore highly functional sage-steppe and wet meadow habitat that will benefit many other species that rely on these same habitat types.

White-faced Ibis

White-faced ibis were selected as a Conservation Target to represent Special Status Species Habitat on MDWMA because:

- White-faced ibis fulfill all criteria for suitability as a focal species.
- The breeding and migrational habitat requirements of white-faced ibis are particularly valuable as a surrogate for other flagship and special status species.
- Research has recently been conducted on white-faced ibis that demonstrates the value of flood irrigation for ibis. The value of flood irrigation is shared by numerous game and other nongame species (mallard, northern pintail, curlew, Franklin's gull, dowitchers, yellowlegs, phalaropes, sandpipers, etc.).

Coverage Assessment of Selected Conservation Targets

We define an effective Conservation Target as one providing meaningful conservation benefits for multiple species that share similar habitat requirements or life history traits. They are useful for directing limited management resources and maximizing conservation effort. One measure of effectiveness is to assess the number of species that a Conservation Target benefits (or covers) within the management landscape.

Regional Habitat and Diversity staff worked together to complete the coverage assessment table (Table 2). We evaluated each of the Conservation Targets to determine which species from Table 1 would benefit from management activities focused on that target. Evaluations are based on knowledge of species habitat requirements, occurrence within the management landscape, and the scope of current and planned management actions. The assessment considered only those habitat features or needs relevant to the species as it occurs on the management landscape. Our results indicate that the selected Conservation Targets on MDWMA provide substantial, but variable habitat benefits for an array of assessed species. We found that management efforts directed towards maintaining or enhancing wetland habitat will provide conservation benefits for 44 of the 49 assessed species while those actions targeting white-faced ibis, although important, will benefit 37 species.

We also evaluated which species or guilds would receive little or no tangible benefit from management actions for specific Conservation Targets; these are designated "conservation needs." We identified conservation needs for several species or guilds and determined that further data will be useful to inform the next WMA planning process. Recent studies suggest the conservation needs of some of these species (e.g., the Myotis guild) are increasing dramatically. A prudent management strategy is to consider a landscape where these species may be prioritized

for management in the future. Broad strategies for addressing these management needs are identified in the following Management Program Table (pages 57-63), but typically include collection of additional baseline data.

Table 2. Analysis of Conservation Target coverage and identification of conservation needs.

	Conservation Targets[a]				
Species Assessed in Table 1	**Northern Pintail**	**Ring-necked Pheasant**	**Greater Sage-grouse**	**White-faced Ibis**	**Conservation Need**
American Avocet	P			P	
American White Pelican	P			P	X
Bald Eagle	P	P	P		X
Black Tern	P			P	
Black-crowned Night Heron	P	P		P	
Black-necked Stilt	P			P	
Brewer's Sparrow		P	X		
California Gull	P			P	X
Caspian Tern	P			P	
Cattle Egret	P	P		P	
Clark's Grebe	P	P		P	
Common Garter Snake	P	P	P	P	
Common Loon	P	P		P	
Elk	P	P	P		
Ferruginous Hawk			P		
Forster's Tern	P	P		P	
Franklin's Gull	P	P	P	P	
Golden Eagle		P	P		
Great Egret	P	P		P	
Greater Sage-grouse	P	P	X		
Grasshopper Sparrow	P	P	P		
Hooded Merganser	P			P	
Idaho Pocket Gopher	P	P	P	P	
Lesser Scaup	P	P		P	
Loggerhead Shrike		P	P	P	
Long-billed Curlew	P	P	P	P	
Mallard	P	P	P	P	
Moose	P	P	P	P	
Mule Deer	P	P	P	P	
Myotis Guild	P	P			X
Northern Pintail	P	P	P	P	

	Conservation Targets[a]				
Species Assessed in Table 1	**Northern Pintail**	**Ring-necked Pheasant**	**Greater Sage-grouse**	**White-faced Ibis**	**Conservation Need**
Prairie Falcon	P	P	P		
Peregrine Falcon	P	P	P		
Pronghorn			P		
Pygmy Rabbit			P		X
Red-necked Grebe	P	P		P	
Ring-necked Pheasant	P	X	P	P	
Sage Sparrow			X		
Sandhill Crane	P	P	P		
Short-Eared Owl	P	P	P	P	
Snowy Egret	P	P	P	P	
Spotted Sandpiper	P	P	P	P	
Swainson's Hawk	P	P	P	P	
Townsend's big-eared Bat					X
Trumpeter Swan	P	P		P	
Western Burrowing Owl		P	P		X
Western Grebe	P	P		P	
White-faced Ibis	P	P		X	
White-tailed Deer	P	P	P	P	
Willow Flycatcher	P	P		P	
Wilson's Phalarope	P	P		P	
Waterfowl Upland Nesting Cover		X	X		

[a] Entries marked with "X" indicate that the majority or all habitat needs for an assessed species within the management landscape are being met by management actions benefitting the Conservation Target. Entries marked with "P" indicate only a portion of the species habitat needs are being met by management actions for the Conservation Target. Conservation needs exist where target-specific management actions provide little or no tangible habitat benefit for an assessed species. Blank cells under conservation targets may indicate a conservation need or where dissimilar habitat needs preclude conservation benefits.

Spatial Delineation of Conservation Target Landscapes

Each of the focal species selected as Conservation Targets for MDWMA also utilize habitats off of MDWMA to meet their annual needs. In the case of the Wetland Habitat Conservation Target, the species that will benefit from improved wetland habitats also range off of MDWMA. Therefore, it is crucial that we actively participate in habitat conservation efforts within the landscape, beyond the borders of the WMA, if we are to maintain the integrity of the WMA itself. As a hypothetical example, if the forage resources in the Mud Lake area for the white-faced ibis that nest on MDWMA are negatively impacted by loss of flood irrigation or other

changes, there is little that we could do within the boundaries of MDWMA to sustain the local breeding ibis population in the long term.

This section describes the methods used to define spatial landscapes for each of the MDWMA Conservation Targets. We used the best data available (i.e., collar data from wildlife utilizing MDWMA, seasonal movement data from MDWMA and the scientific literature, species ecology data from the scientific literature, and local knowledge) to construct these Conservation Target-specific landscapes. These landscapes are then utilized in the Management Program Table to identify Conservation Target-specific Management Directions, Performance Targets, and Strategies for both MDWMA and the landscape.

Northern Pintail Landscape

Mud Lake WMA provides critical breeding and migrational habitat for northern pintails. Maintaining MDWMA and the surrounding area in productive pintail habitat is a high priority for the Department. Pintails use MDWMA and the surrounding area for breeding/nesting, migrational stop-over, molting, and seasonal foraging needs. The focus for delineating the MDWMA Northern Pintail Landscape was the breeding/nesting habitat requirements for pintails. The literature indicates that pintails tend to locate their nests farther from water than other ground nesting ducks; sometimes a mile or more, but most often within 100 yards (Bellrose 1980).

The value of migrational forage and loafing habitat is not ignored in the defined landscape. In fact, all of the migrational habitats on MDWMA are encompassed by the breeding/nesting one mile buffer. The Department recognizes that pintails will forage miles away from the wetland habitats associated with MDWMA. The focus of the pintail landscape identified in Figure 3 is specific to MDWMA wetland habitats. Appendix XI identifies the other important wetland habitats in the Mud Lake Area.

We used the following steps to estimate the MDWMA Northern Pintail Landscape (all GIS analyses performed with ArcGIS 10.1 [ESRI, Redlands, Calif.], unless otherwise noted):

- Utilized an ArcGIS shapefile of the water bodies and waterways associated with MDWMA that would provide brood-rearing and seasonal migration habitats (foraging, loafing, molting, etc.) for pintail. We then buffered the boundaries of these waterways by one mile to include the majority of nesting and breeding habitats used by pintails and other ducks on MDWMA (Bellrose 1980).

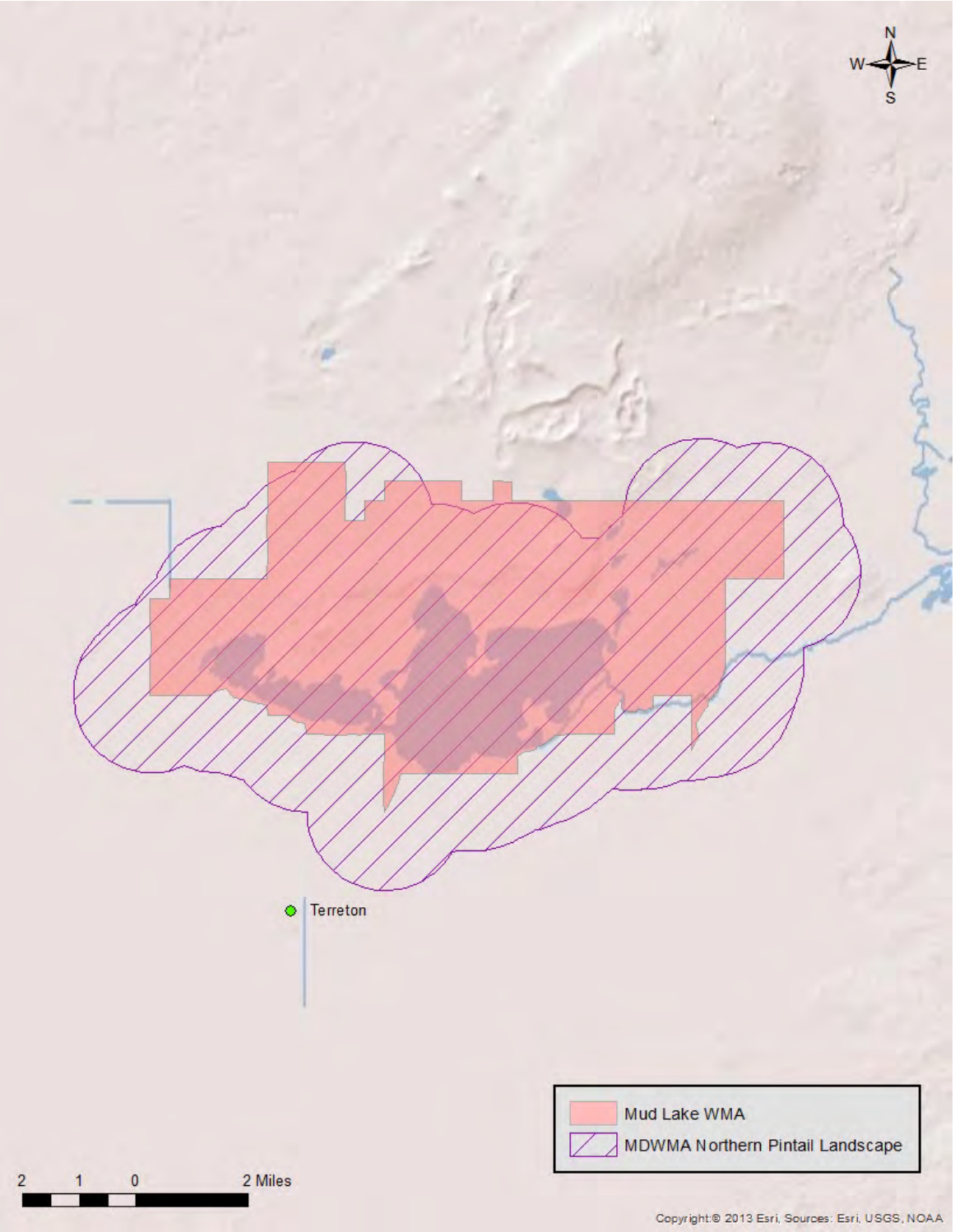


Figure 3. Northern Pintail Landscape depicting the potential habitat use area of pintails on Mud Lake WMA.

Ring-necked Pheasant Landscape

There has been a considerable amount of work done on ring-necked pheasant habitat use and home range size across the United States. The majority of this work has shown that the annual home range size of most pheasants is close to one square mile (Hanson and Progulske 1973, Whiteside and Guthery 1983, Perkins et. al 1997, Smith et. al 1999, and Flake et. al 2012). Upon review of the home range information, we decided that using a 1.5 mile value for potential pheasant habitat on MDWMA would encompass nearly all of the potential pheasant habitat that is directly associated with MDWMA. We took this 1.5 mile size and buffered the MDWMA boundary by this distance in order to include most seasonal movements by pheasants in the Mud Lake area.

We used the following steps to create the MDWMA Ring-necked Pheasant Landscape:

- ArcGIS shapefile of the MDWMA boundary and buffered it by a 1.5 mile radius
- The outer boundary of the resulting buffer defined the MDWMA Ring-necked Pheasant Landscape (Figure 4)

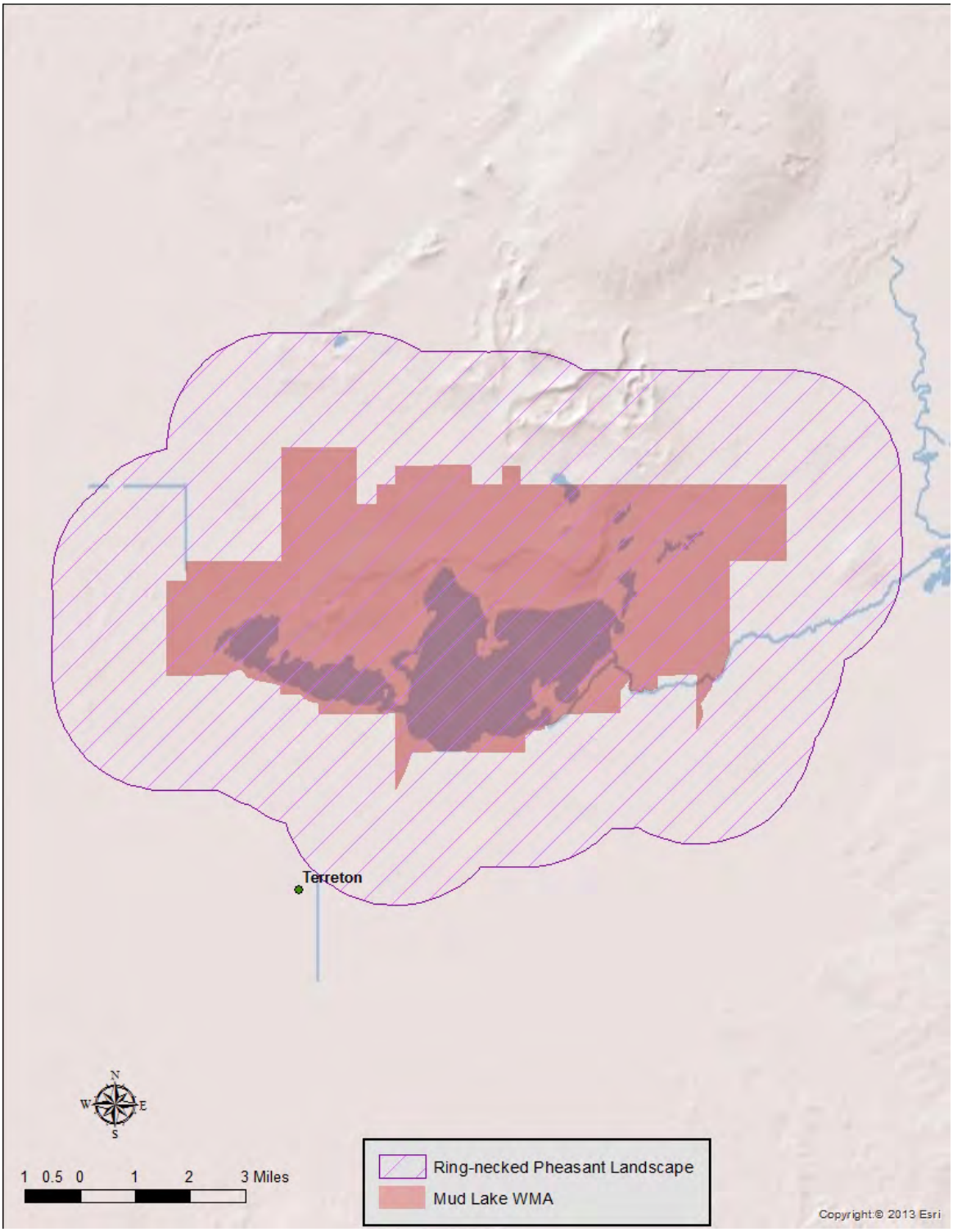


Figure 4. Ring-necked Pheasant Landscape depicting the likely year-round use area of pheasants that utilize Mud Lake WMA.

Greater Sage-grouse Landscape

The Department maintains a database of all known greater sage-grouse location points in Idaho. In particular, there has been research conducted specifically on the Table Butte sage-grouse population (Beck et al. 2006, Connelly et al. 1988). The Table Butte sage-grouse population is directly linked to MDWMA. The birds within the Table Butte population are the birds that most readily utilize MDWMA. The research conducted on this population provided very good estimates of seasonal use movements for these grouse. We utilized radio telemetry locations from approximately 200 collared sage-grouse captured within the Table Butte lek complex area. These animals were collared as part of research projects examining sage-grouse survival, habitat use, and season movements. Migratory grouse moved as far as 35 miles (straight-line distance) between winter and summer ranges. These locations were brought into Geospatial Modeling Environment (GME; www.spatialecology.com), and a minimum convex polygon (MCP) for annual movements was created for this sage-grouse population and then was buffered by 0.9 km. The 0.9 km buffer was the result of literature identifying this as the upper limit to daily sage-grouse movements (Knick and Connelly 2011). In 2010, the Department cooperated with the BLM to create a statewide map of greater sage-grouse habitat in Idaho (BLM 2010). Connelly et al. (2000) outlined the seasonal movements and habitat requirements of sage-grouse. We used the Department's telemetry location database, map of suitable sage-grouse habitat, and published information on sage-grouse seasonal movements to develop the MDWMA Greater Sage-grouse Landscape.

We used the following steps to estimate the MDWMA Sage-grouse Landscape from these collar data (all GIS analyses performed with ArcGIS 10.1 [ESRI, Redlands, Calif.], unless otherwise noted):

- Utilized Geospatial Modeling Environment (GME; www.spatialecology.com) and an ArcGIS shapefile of Table Butte sage-grouse collar locations to create a 100% MCP boundary around all collar locations
- Created a 0.9 km buffer around the MCP boundary to encompass all likely sage-grouse movements that occurred between locations (i.e., movements that occurred in the interval between recorded locations)
- Clipped the resulting boundary of sage-grouse movements from the statewide sage-grouse habitat layer
- Utilized the outer boundary of the resulting clipped sage-grouse habitat and use buffer to define the MDWMA Greater Sage-grouse Landscape (Figure 5)

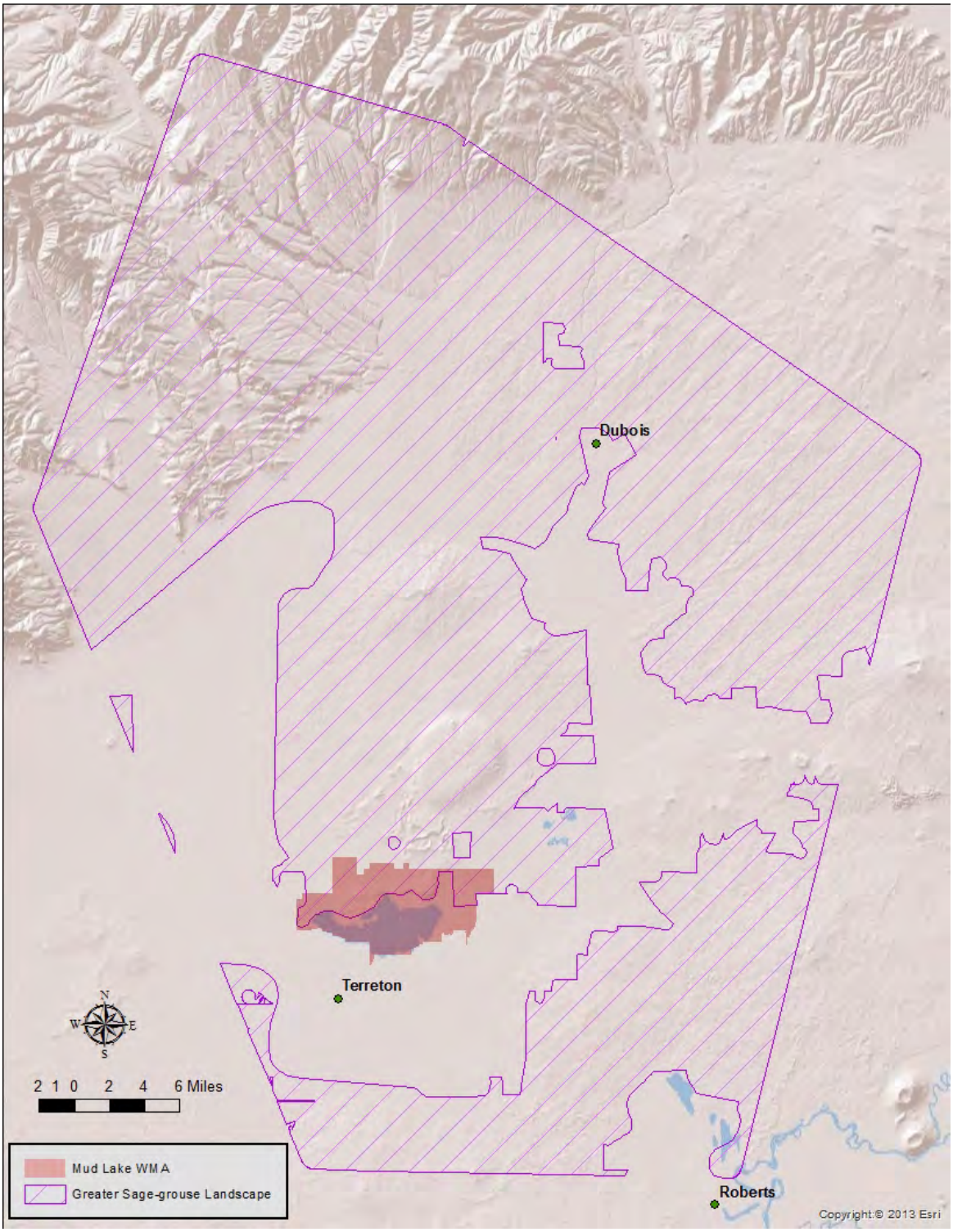


Figure 5. Greater Sage-grouse Landscape depicting suitable sage-grouse habitat that is likely used by sage-grouse that utilize Mud Lake WMA and the adjacent area.

White-faced Ibis Landscape

Mud Lake WMA provides globally critical breeding and foraging habitat for white-faced ibis. Maintaining MDWMA and the surrounding area in productive ibis habitat is a high priority for the Department.

We used the following steps to estimate the MDWMA white-faced ibis Landscape from these data:

- Reviewed the literature associated with white-faced ibis and the Mud Lake area. A recent publication indicated that irrigated agricultural lands within 12 kilometers of MDWMA were of critical importance to breeding white-faced ibis associated with MDWMA (Moulton et al. 2012). Using this information we proceeded to develop the White-faced Ibis Landscape.
- Acquired shapefiles of MDWMA boundary.
- Created a 12 km buffer around MDWMA property boundary.
- Utilized the outer boundary of the resulting buffer to define the MDWMA White-faced Ibis Landscape (Figure 6).

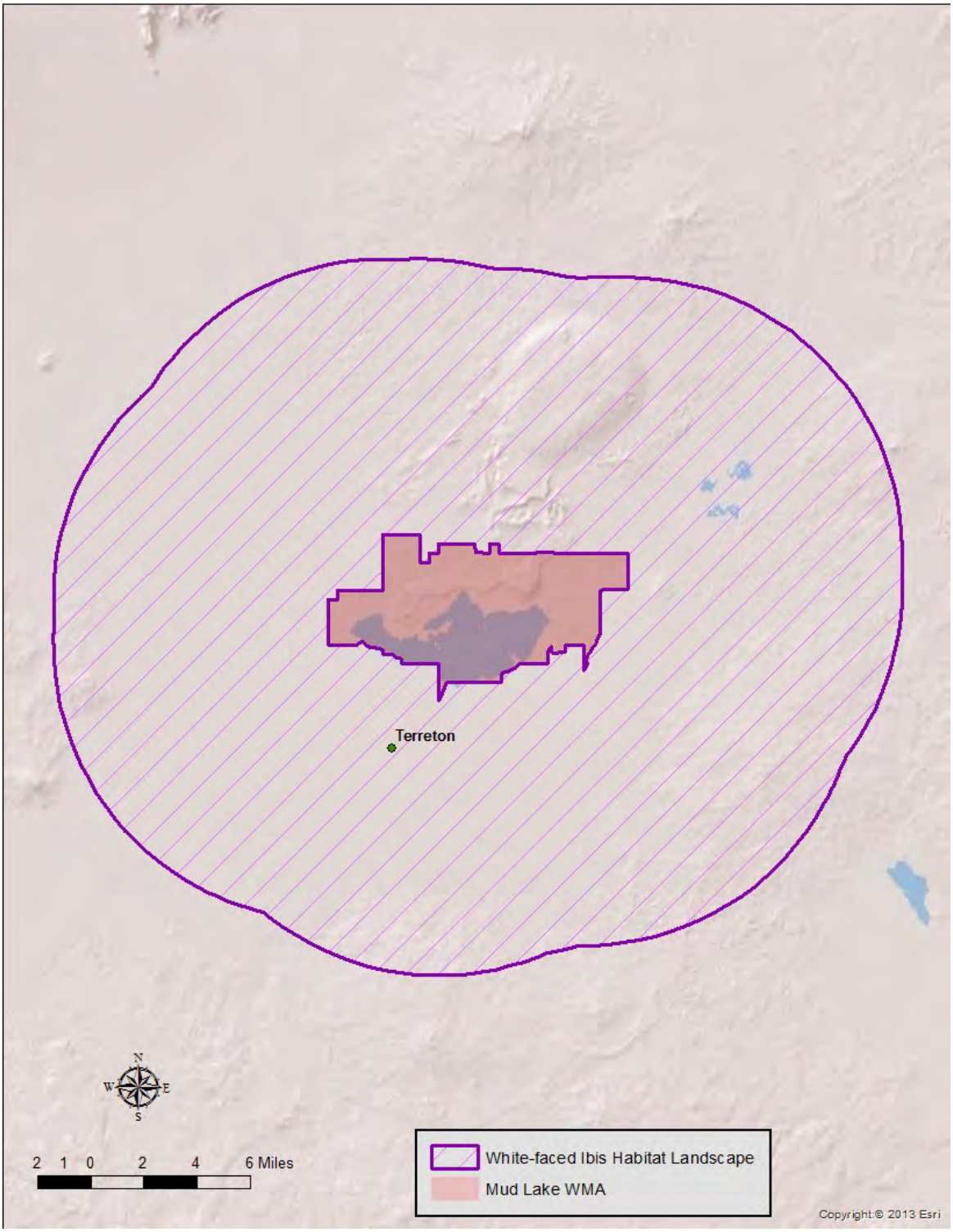


Figure 6. White-faced Ibis Habitat Landscape depicting the habitat area most likely used by white-faced ibis that are associated with Mud Lake WMA.

Mud Lake WMA Management Program Table

The following table outlines the Management Directions, Performance Targets, Strategies, and Outcome Metrics MDWMA staff will use to manage for the Conservation Targets selected (page 44) to represent each MDWMA Priority (page 31) at both the MDWMA and Conservation Target-specific landscape scale. The last section of the table outlines strategies that will be used to increase our knowledge of the voids identified in the Conservation Target coverage assessment (Table 2). The Compass Objective column links the Management Directions in this table to the objectives of the Department's strategic plan, *The Compass* (Appendix I).

WMA Priority: Waterfowl Habitat					
Conservation Target: Northern Pintail					
Scope	**Management Direction**	**Performance Target**	**Strategies**	**Metric**	**Compass Objective (Appendix I)**
MDWMA	Provide quality migrational, breeding/nesting, and brood-rearing habitat for northern pintails.	Annually, provide 100 acres of unharvested/standing agricultural crops for migrating waterfowl	Through farming efforts on MDWMA leave Department's share of crop standing in field or identify specific fields for crop production specifically for waterfowl and upland game birds	Acres Improved and/or Maintained	A, B, C, E, F, H
		Annually, enhance or maintain 70 acres of seasonal pintail habitat through moist soil and shallow water management	Where possible, seasonally flood moist soil management units to provide waterfowl resources		
			Seasonally flood the West Sloughs, Marty Wetlands, and other suitable locations so as to maximize invertebrate production for foraging waterfowl and waterbirds (increase duration of saturation and shallow flooding during spring and attempt to maintain groundwater closer to the surface for longer in early summer)		
			Implement a water management plan that utilizes water drawdowns, drying up of units, duration of impoundment, and other water management strategies to maintain highly productive waterfowl habitats		
			use mechanical disturbance (e.g., disking, mowing, harrowing, etc.), fire, seasonal flooding, and seeding where appropriate to increase diversity and productivity of wet meadow and shallow marsh vegetation		
		Annually, improve or actively manage 200 acres of waterfowl upland nesting habitat.	As productivity of perennial grass/forb upland nesting habitat deteriorates, re-seed with an appropriate grass species and legume mix in order to maintain quality upland nesting cover		
			Control or manage predator perching habitat		
			Use mechanical disturbance (e.g., disking, mowing, harrowing, etc.), fire, and seeding where appropriate to increase diversity and productivity of upland nesting habitat		
		Annually, improve or actively manage 200 acres of waterfowl breeding/nesting, brood-rearing, and migrational/molting in wetland habitats.	Use mechanical disturbance, fire, water level management, and herbicide applications to maintain the appropriate ratio of open water to vegetative cover in wetland habitats (maintenance of productive hemi-marsh habitat		
			Control or manage predator perching habitat		
			As productivity of palustrine scrub shrub (PSS) and palustrine emergent wetland (PEM) habitats deteriorate, use mechanical disturbance (disking, mowing, etc.), fire, water management, herbicide, and other appropriate methods to maintain quality waterfowl habitat.		
		Annually, flood irrigate 400 acres of agricultural cropland in a manner that is beneficial for breeding and migrating waterfowl.	Spatially and temporally manage agricultural production and wildlife farming activities to provide forage resources		

WMA Priority: Waterfowl Habitat					
Conservation Target: Northern Pintail					
Scope	**Management Direction**	**Performance Target**	**Strategies**	**Metric**	**Compass Objective (Appendix I)**
MDWMA	Provide quality migrational, breeding/nesting, and brood-rearing habitat for northern pintails.	Annually, monitor and manage waterfowl disease outbreaks on 5,000 acres on MDWMA	Implement a waterfowl disease monitoring and management protocol for MDWMA	Disease events detected	A, B, C, E, F, H
		Seek out ways to implement State, Federal, and non-government organization programs and grants to benefit northern pintail breeding/nesting habitats on MDWMA. Examples of this would be NAWCA Grants, HIP Projects, Candidate Species Grants, Idaho Fish and Wildlife Foundation Grants, etc.	Restore West Sloughs and Marty Tract Wetlands	Projects identified and or implemented and/or acres restored	
		Provide secure breeding and nesting habitats for waterbirds on MDWMA	Implement seasonal activity closures to minimize disturbance to breeding pintails where appropriate.	Acres Improved and/or Maintained	
		Annually maintain 15 miles of water delivery infrastructure and 100 acres of managed water impoundments to provide quality pintail habitat	Implement infrastructure and impoundment improvements as needed that will enhance/maintain wetland productivity for waterfowl		
	Increase our knowledge of northern pintail use and production on MDWMA.	Annually, conduct management-oriented monitoring for northern pintail and other waterfowl	Annually, gather waterfowl temporal and spatial trend data on MDWMA.	Brood counts, nesting success and migration monitoring conducted	A, B, C, E, F, G, H
			Periodically quantify waterfowl nest success on MDWMA and make management decisions as data dictates		
			Periodically conduct projects that examine nest success and production across MDWMA. Implement appropriate management activities identified in the state-wide waterfowl management plan.		
Northern Pintail Landscape (Figure 3)	Provide quality seasonal northern pintail habitat across the Mud Lake Area	Work with conservation partners, government agencies, and private landowners to improve at least 100 acres of seasonal habitats for northern pintail annually	Annually, work with landowners to convert at least 100 acres rhizomatous grass fields (e.g., expired CRP fields) or crested wheatgrass stands on private lands to more beneficial bunchgrass/forb mix stands for nesting waterfowl	Acres Improved	A, B, C, E, F, G, H, J, K
			Provide technical assistance to conservation partners on projects that will enhance or maintain northern pintail habitat		
			Develop cooperative upland, riparian, and wetland habitat improvement projects to plant vegetation, control noxious weeds, and exclude livestock from riparian habitats on public and private lands		
		Work with private landowners and land management agencies to incorporate seasonal northern pintail habitat needs into their land use planning	Work with private landowners and conservation partners, and government agencies to implement wet soil/shallow wetland management practices that are beneficial to pintails across the landscape (i.e., timely flooding of habitats)	Projects identified Incorporating habitat needs, landowners contacted, and projects implemented	
			Provide information to private landowners on the impacts of vegetation manipulation activities (i.e., mowing, burning, disking, herbicide application, etc.).		
			Work with IDFG Farm Bill Coordinator to prioritize, identify, and implement CRP-SAFE, WRP and other applicable projects within the landscape		
			Utilize data on northern pintail habitat needs to inform proposed public and State land projects		
			Prioritize HIP projects within the Mud Lake Habitat District on northern pintail habitat improvements in the landscape		
	Increase our knowledge of northern pintail seasonal habitat requirements, movements, population dynamics, and the potential effects of human activity	Conduct or support management-oriented monitoring projects for northern pintail	Conduct and/or support monitoring that documents movement, habitat use, and production on northern pintails	Monitoring Projects Completed	A, B, C, E, F, H, J, K

WMA Priority: Upland Game Bird Habitat					
Conservation Target: Ring-Necked Pheasant					
Scope	**Management Direction**	**Performance Target**	**Strategies**	**Metric**	**Compass Objective (Appendix I)**
MDWMA	Provide high quality, year-round habitat for Ring-Necked Pheasant	Annually, improve and/or actively manage 500 acres of pheasant breeding, nesting and brood-rearing habitat each year across MDWMA	Maintain vigor and diversity in perennial grass/forb fields with periodic disturbance (i.e., burn, graze, hay, interseeding, mechanical)	Acres Improved and/or Maintained	A, B, C, E, F, H
			Implement management actions in perennial stands (i.e., grass, grass/forb, alfalfa) on a rotational basis to maintain diversity, heterogeneity, and adequate grass height-density for nesting across the landscape		
			Identify areas and implement restoration activities in crested wheatgrass monocultures and other marginalized habitats.		
			Implement wet soil management practices that enhance brood-rearing habitats across MDWMA (i.e., brood strips, timely flooding of appropriate habitats, etc.)		
			Maintain food plots across MDWMA that provides forage and security habitat for pheasant during the breeding and brood-rearing time frames		
			Establish/Maintain crowing strips in appropriate habitats on MDWMA		
			Remove nesting and perch habitat for avian predators in pheasant nesting habitats		
			Improve riparian habitats with willow/shrub plantings and noxious weed control		
			Minimize human disturbance in pheasant nesting habitats. Adaptive access management strategies such as seasonal human entry closures, road closures, and other actions could be implemented in nesting habitats		
		Annually, improve and maintain 500 acres of pheasant fall/winter habitat on MDWMA	Improve or maintain quality of winter thermal and security cover such as: cattail, bulrush, willow, wind break, and shrub habitats, through mechanical treatment, controlled burning, water management, seedings, and other management efforts.	Acres Improved and/or Maintained	
			Maintain productive food plots that are strategically placed across MDWMA that will provide high quality fall/winter forage for Ring-Necked Pheasant		
			Incorporate mast producing shrubs into habitat plantings for winter cover and forage		
	Increase our knowledge of ring-necked pheasant seasonal habitat requirements, movements, population dynamics, and the potential effects of human activity	Conduct management-oriented research and monitoring projects for Ring-Necked Pheasant	Conduct annual spring crow counts, brood counts, or other appropriate population monitoring protocols to monitor pheasant trends over time	Completed pheasant transplant/habitat use Project by 2016. Management Improvements Identified	A, B, C, E, F, G, H
			Periodically quantify pheasant nest success on MDWMA and make management decisions as data dictates		
			Conduct a project that examines the impacts of the Department's pheasant stocking program on existing wild Pheasant populations and hunter crowding issues		
			Periodically conduct projects that examine nest success and production across MDWMA. Implement appropriate management activities identified in the state-wide upland game bird management plan		
			Complete a study to examine the seasonal movements, habitat use, production, and survival of wild transplanted ring-necked pheasant utilizing MDWMA		

WMA Priority: Upland Game Bird Habitat					
Conservation Target: Ring-Necked Pheasant					
Scope	**Management Direction**	**Performance Target**	**Strategies**	**Metric**	**Compass Objective (Appendix I)**
Ring-Necked Pheasant Landscape (Figure 4)	Provide high quality, year-round habitat for Ring-Necked Pheasant	Work with conservation partners, government agencies, and private landowners to improve seasonal habitats for Ring-Necked Pheasant. Improve a minimum of 100 acres annually	Convert rhizomatous grass fields (e.g., expired CRP fields) or crested wheatgrass stands on private lands to more beneficial bunchgrass/forb mix stands	Acres Improved	A, B, C, E, F, G, H, J, K
			Implement shrub planting projects on private and public lands to provide nesting, forage, security, and thermal habitat		
			Develop cooperative upland, riparian, and wetland habitat improvement projects to plant vegetation, control noxious weeds, and manage livestock in riparian habitats on public and private lands to benefit riparian habitat		
		Annually, work with private landowners and land management agencies to incorporate seasonal Ring-Necked Pheasant habitat needs into their land use planning	Work with private landowners and conservation partners, and government agencies to implement wet soil management practices that are beneficial to pheasants across the landscape (i.e., brood strips, timely flooding of habitats)	Projects identified Incorporating habitat needs, landowners contacted, and projects implemented	
			Provide information to private landowners on the impacts of vegetation manipulation activities (i.e., mowing, burning, disking, herbicide application)		
			Work with IDFG Farm Bill Coordinator to prioritize, identify, and implement CRP-SAFE, WRP and other applicable projects within the landscape		
			Utilize data on ring-necked pheasant habitat needs to inform proposed public and State land projects		
			Prioritize HIP projects within the Mud Lake Habitat District on ring-necked pheasant habitat improvements in the landscape		
	Increase our knowledge of ring-necked pheasant seasonal habitat requirements, movements, population dynamics, and the potential effects of human activity	Conduct or support management-oriented monitoring projects for Ring-Necked Pheasant	Expand pheasant population monitoring efforts across the Mud Lake area	Projects Completed	A, B, C, E, F, H, J, K
			Develop and implement a study to examine the success of transplanting local wild pheasants to quality habitats across the landscape		

WMA Priority: Special Status Species Habitat					
Conservation Target: Greater Sage-grouse					
Scope	**Management Direction**	**Performance Target**	**Strategies**	**Metric**	**Compass Objective (Appendix I)**
MDWMA	Provide high quality, year-round habitat for greater sage-grouse	Annually, improve or maintain 200 acres of sage-grouse nesting habitat	Follow the metrics outlined by Connelly et al. (2000), or more recent comparable guidelines, when planning the desired future condition of project sites	Acres Created or Improved	A, B, C, E, F, G, H
			Focus sage-grouse habitat improvements <3 miles from occupied leks		
			Convert rhizomatous grass fields (e.g., expired CRP fields, Crested wheatgrass seedings), including those with sparse sagebrush cover, to sagebrush/grass/forb mixes with adequate sagebrush cover		
			In expired CRP fields with acceptable understory quality and established sagebrush, improve by establishing forb strips to increase both forage quality and insect production		
			When appropriate implement sage-grouse nest predator removal on MDWMA		
			Improve sagebrush habitats on MDWMA through noxious weed control, seeding, conversion of crested wheat grass stands, and other applicable management methods		

WMA Priority: Special Status Species Habitat					
Conservation Target: Greater Sage-grouse					
Scope	**Management Direction**	**Performance Target**	**Strategies**	**Metric**	**Compass Objective (Appendix I)**
MDWMA	Provide high quality, year-round habitat for greater sage-grouse	Annually, improve or maintain 100 acres of brood-rearing habitat for sage-grouse	If feasible and necessary, utilize adaptive access management strategies (e.g., localized, temporary human entry closures or additional road closures) around leks	Acres Created or Improved	A, B, C, E, F, G, H
			Improve wet meadow and moist soil habitats on MDWMA	Acres Improved or Maintained	
			When possible, conduct vegetation disturbances outside of the primary nesting and early brood-rearing seasons (Apr to Aug)		
		Annually, improve or maintain 400 acres of sage-grouse wintering habitat	Improve and/or maintain the sagebrush habitats on MDWMA. The tall sagebrush stands on MDWMA are critical sage-grouse winter habitat on MDMWA in winters with significant snow accumulations		
			Minimize human disturbance if needed in wintering areas, with temporary closures		
		Annually, implement infrastructure improvements that will enhance/maintain sagebrush habitat productivity for sage-grouse	Remove unnecessary perch and nesting sites for Sage-grouse predators on MDWMA	Feet of Fence Marked or Removed	
			Mark wire fences near known lek sites or remove unneeded fencing altogether		
	Increase our knowledge of greater sage-grouse seasonal use of MDWMA and habitat selection on MDWMA	Conduct ≥1 monitoring and/or research project on greater sage-grouse	Develop a study to examine the seasonal movements, habitat use, production, and survival of greater sage-grouse utilizing MDWMA	Projects Completed	A, B, C, E, F, G, H, K, N
		Conduct spring lek searches at least every 3 years to document the status of known leks and document new leks	Conduct lek searches on the WMA to document existing and new leks		
Greater Sage-grouse Landscape (Figure 5)	Provide high quality, year-round habitat for greater sage-grouse	Annually, create or improve 100 acres of sagebrush and wet meadow habitat on public or private lands	Implement shrub planting projects on private and public lands to re-establish sagebrush in areas impacted by wildlife	Acres Created or Improved	A, B, C, E, F, G, H, J, K
			Cooperate with private landowners on CRP mid-management to plant forb strips in sagebrush stands with poor understory		
			Actively participate in cooperative efforts to control noxious weeds in sagebrush habitat		
			Develop cooperative riparian improvement projects to plant willows, control noxious weeds, and manage livestock in riparian habitats on public and private lands to benefit riparian habitat		
			Implement fence marking projects around known lek sites		
		Annually, work with private landowners and land management agencies to incorporate greater sage-grouse habitat needs into their land use planning	Provide technical assistance on 100% of public and state livestock grazing plans and shrub manipulation projects	Projects Incorporating Habitat Needs	A, B, C, D, E, F, G, H, J, K
			Utilize data on greater sage-grouse lek locations to inform proposed public and State land projects		
			Work with IDFG Farm Bill Coordinator and NRCS to prioritize, identify, and implement Sage-grouse Initiative projects within the landscape		
	Increase our knowledge of greater sage-grouse seasonal habitat use, movements, population dynamics, and the potential effects of human disturbance	Increase our knowledge of greater sage-grouse seasonal habitat use, movements, population dynamics, and the potential effects of human disturbance	Periodically (every 3-5 years or more frequent as funding allows) conduct lek searches to document the status of known leks and identify new leks	Projects Completed	A,B, C, E, F, G, H, K
			Conduct or partner on ≥1 monitoring and/or research project on greater sage-grouse		
			Develop a study to examine the seasonal movements, habitat selection, productivity, and survival of greater sage-grouse		
			Evaluate impacts of nest predators on Sage-grouse in the Mud Lake basin		

WMA Priority: Special Status Species Habitat					
Conservation Target: White-Faced Ibis					
Scope	**Management Direction**	**Performance Target**	**Strategies**	**Metric**	**Compass Objective (Appendix I)**
MDWMA	Provide high quality breeding and foraging habitat for white-faced ibis	Annually, improve or maintain 100 acres quality white-faced ibis nesting habitat.	Utilize mechanical, chemical, prescribed fire, and other vegetation management practices to enhance or maintain ibis nesting habitat.	Acres Improved	B, C, F, G, H
			Work with water users to try and eliminate dramatic fluctuations in water levels. These efforts would minimize flooding of ibis nests.		
			Implement seasonal activity closures to minimize disturbance to breeding Ibis		
		Annually, manage activity in areas where white-faced ibis nest to minimize disturbance.	Implement temporal area closures to minimize disturbance to nesting Ibis	Violations detected	B, C, F
		Annually, create, improve, or maintain 250 acres of quality foraging habitats for white-faced ibis	Maintain flood irrigation on agricultural fields across MDWMA	Acres maintained or improved	
			Implement water management strategies on MDWMA wetlands to provide forage resources for ibis		
			Work with conservation partners, diversity staff, and government agencies to develop programs that promote quality foraging habitats for ibis		
		Annually monitor seasonal habitats, movements and habitat use of white-faced ibis	Conduct and support monitoring that documents movement, habitat use, and production in white-faced ibis	N/A	B, C, F, G, H, K
White-faced Ibis Landscape (Figure 6)	Provide high quality breeding and foraging habitat for white-faced ibis	Work with other wetland managers to provide foraging and nesting habitat for white-faced ibis across the Region	Seek out ways to implement State, Federal, and non-government organization programs and grants to benefit ibis habitat. Examples of this would be NAWCA Grants, WRP, CRP, WIG Grants, Candidate Species Grants, Idaho Fish and Wildlife Foundation Grants, etc.	Acres maintained or improved	B, C, F, G, H, K, N
			Annually work with Mud Lake Water Users to manage spring water fluctuations in Mud Lake		
			Encourage seasonal activity closures to minimize disturbance to breeding ibis where appropriate		
		Maintain and expand flood irrigation on agricultural fields and pasture lands in the Mud Lake area.	Work with conservation partners, government agencies, politicians, and private landowners to identify programs or policies that expand or maintain flood irrigation practices across the landscape	Acres improved or maintained	B, C, F, G, H, K
		Increase our knowledge of seasonal habitat requirements, movements, population dynamics, and effects of land management practices on white-faced ibis	Monitor movement, habitat use, and production in white-faced ibis within the landscape	Projects developed or implemented, publications, reports, etc.	

WMA Priority: Wildlife-based Recreation and Education					
Scope	**Management Direction**	**Performance Target**	**Strategies**	**Metric**	**Compass Objective (Appendix I)**
MDWMA	Provide opportunity for consumptive and non-consumptive wildlife-based recreation and education	Annually provide 16,800 recreational hunting, trapping and fishing user-days consistent with the MDWMA mission	Unless future data indicates a needed change to meet the MDWMA mission, maintain the current level of motorized access (outside of the winter road closure) to provide opportunity for motorized use and opportunity for non-motorized use away from open roads	User Days	E, F, G, H, I, N
			Increase MDWMA staff and IDFG law enforcement presence to curtail illegal activities (e.g., illegal harvest, illegal motor vehicle use, littering) that diminish the recreation of law abiding users		
			Evaluate concerns and suggestions by pheasant hunters and Department staff to make the release pheasant program as efficient and productive as possible.		

WMA Priority: Wildlife-based Recreation and Education					
Scope	**Management Direction**	**Performance Target**	**Strategies**	**Metric**	**Compass Objective (Appendix I)**
MDWMA	Provide opportunity for consumptive and non-consumptive wildlife-based recreation and education	Annually provide 16,800 recreational hunting, trapping and fishing user-days consistent with the MDWMA mission	Provide adequate lake access sites for public recreation	User Days	E, F, G, H, I, N
			Maintain 70 acre wildlife security area on Camas Creek and provide additional wildlife security areas where appropriate on MDWMA		
		Annually provide 13,200 non-consumptive wildlife-based recreation and education user-days consistent with the MDWMA mission	Develop a new educational signage system along a MDWMA trail	User Days	F, G, H, J, K, N
			Update the MDWMA bird list		
			Evaluate the costs and benefits of a permanent photography blind, and if blind construction is deemed beneficial, evaluate if a reservation system or a "first come, first served" system will be used for access to the blind		
			Maintain 70 acre wildlife security area on Camas Creek and provide additional wildlife security areas where appropriate on MDWMA		
		Maintain facilities, signage, and MDWMA-managed roads/trails to facilitate recreation and education	Provide improved maps, informational signage, and boundary markers	Facilities, Signage, or Roads/Trails Maintained or Improved	G, H, K, M, N
			Maintain MDWMA-managed roads in a useable but low maintenance state		
			Improve signage on, and maintenance of, designated trails		
			Maintain campsites in a safe, useable, low maintenance state		
		During the next 10 years conduct 2 visitor use surveys to gather data and information to help guide MDWMA management	Every five years conduct a visitor use survey for MDWMA	Surveys conducted	

Conservation Needs Identified in Conservation Target Coverage Assessment (Table 2)					
Scope	**Management Direction**	**Performance Target**	**Strategies**	**Metric**	**Compass Objective (Appendix I)**
MDWMA	Develop strategies and/or action plan to address voids identified in the coverage assessment	Western Burrowing Owl	With Wildlife Diversity Program staff, develop a monitoring protocol to address burrowing owls on MDWMA	Monitoring completed	E, F, G, H, J, K, M
			Recruit volunteers to conduct monitoring of owl use according to protocols developed		
		Raptor guild	With Diversity staff lead, develop a raptor monitoring protocol and organize volunteers to conduct raptor monitoring		
		Bat guild	With Diversity staff lead, develop a plan to ensure that management considers bat habitat requirements	Plans completed	
			With Diversity staff lead, recruit volunteers to monitor bat populations and to develop a species list		
			With Diversity staff lead, identify areas of high concentrations of bats and identify habitat use		
		Pygmy Rabbit	With Diversity staff lead, identify potential Pygmy Rabbit habitat on MDWMA and if potential habitat is found on MDWMA implement searches to validate habitat model		
Federal lands within all landscapes	Develop strategies to address voids identified in the coverage assessment	All species	Work with Federal agencies to re-introduce vegetation manipulation projects (i.e. fire) into the landscape	Plan completed	E, F, G, H, J, K, M
			Work with Federal agencies to maintain a complex mosaic of vegetation succession in all areas	N/A	

Monitoring

Monitoring and reporting are critical for tracking accomplishment of performance targets identified in the MDWMA Management Program Table. Monitoring can be separated into three categories: compliance monitoring, biological monitoring, and public use monitoring.

Compliance Monitoring

Compliance monitoring documents the completion of regular management tasks that are essential to WMA operations. These include but are not limited to:

- Maintaining WMA facilities and access sites
- Maintaining infrastructure at ponds and wetlands
- Providing technical assistance to local agency staff and private landowners
- Maintaining public access sites

Compliance monitoring will be reported annually at work plan meetings between regional and headquarters staff.

Biological Monitoring

Wildlife Management Areas across the state have a range of established biological monitoring programs and needs. Additional monitoring needs may have been identified during development of the MDWMA Management Program Table. Biological monitoring includes wildlife, vegetation and habitat monitoring. It may also include assessing the effectiveness of management and restoration activities. Monitoring may occur at multiple spatial and temporal scales, depending on objectives.

Currently, MDWMA monitors habitat, habitat treatments, spatial and temporal use of the WMA by a variety of bird species, weed infestations, game bird habitat use, and pheasant production and harvest. In Table 3, future monitoring needs associated with performance targets and strategies identified in the MDWMA Management Program Table are summarized. The goal is to measure success or effectiveness of strategies that are implemented to reach performance targets. A detailed monitoring plan including specific techniques will be completed for MDWMA by December 31, 2014.

In 2010, the Department initiated a statewide, long-term habitat monitoring program for all WMAs. The goal of the program is to collect quantitative and comparable baseline data to monitor habitat change on all WMAs due to management actions or other causes. The baseline data collected will be specific to each WMA, based on the habitat types present and its unique management issues. Baseline data typically includes:

- Distribution and extent of cover types, including mapping of vegetation cover types
- Vegetation structure, composition, and condition

- Presence or abundance of noxious weeds and other invasive plants
- Riparian and wetland condition and function assessment
- Photo points

To date, this program has collected baseline data on five WMAs, with surveys of all 32 WMAs expected to be completed by 2019. This is a long-term program and will be repeated starting in 2020.

Table 3. Biological monitoring for Mud Lake WMA, 2014-2023.

Performance Target	Survey Type	Survey Frequency
Enhance or restore 100 acres of seasonal pintail habitat through moist soil and shallow water management by 2023	Vegetation transects as appropriate	Before project initiation and twice within 5 years after project
Create or enhance 200 acres of upland nesting habitat for waterfowl and pheasants	Vegetation transects as appropriate	Before project initiation and twice within 5 years after project
Create 75 acres of perennial grass/forb cover on the lands already prepared for this treatment by the winter of 2015	Vegetation transects as appropriate	Before project initiation and twice within 5 years after project
Create or improve at least 200 acres of sagebrush habitat, including at least 50 acres of sage-grouse brood-rearing habitat by 2023	Vegetation transects as appropriate	Before project initiation and twice within 5 years after project
Experiment with different methods of converting crested wheat grass or undesirable grasses to native or functional species. Implement treatments on 20 acres by 2019	Vegetation transects as appropriate	Before project initiation and twice within 5 years after project
Gather visitor use data and information to help guide MDWMA management	Visitor use surveys	Every 5 years

*Note - This monitoring table focuses on conversion, restoration, or enhancement projects, not standard annual MDWMA management practices

Public Use Monitoring

Wildlife Management Areas use public surveys and monitoring tools (e.g., traffic counters) to evaluate public satisfaction and use patterns as well as identify issues of concern. In some areas, hunter check stations monitor hunter success and satisfaction. These survey data help managers determine whether they are meeting the goals for MDWMA.

Reporting

Mud Lake WMA will produce a five-year report on implementation of this plan in 2019, including a summary of accomplishments and progress towards meeting performance targets.

During the five-year review, WMA staff will determine whether modifications to the plan are needed to meet performance targets, to accommodate changing conditions and priorities, or to incorporate advancements in management knowledge and techniques.

Current Monitoring Efforts

Weed Monitoring/Mapping

Areas on the WMA that have been priority weed treatment areas (i.e., like the Marty WRP section, Appendix XII) have been mapped. Mapping occurred prior to weed control efforts and then mapped again after control treatments. The weed mapping efforts document abundance, species, and percent cover of weed species. These mapping efforts are then compared to one another to detect change of weed species and abundance over time. These comparisons give managers an idea as to what treatments are working and what species of weeds are being best controlled.

Photo Plots

Seventeen photo plots are distributed across MDWMA. These plots are visited in May of each year and one photo is taken from each plot center towards the four cardinal directions. Thus, each photo plot has four annual photos associated with it. These photos are compared over time to provide managers a gross metric of habitat change.

Traffic Counters

Four traffic counters are located at different entry points on the area. Monthly readings are taken during and throughout the year to establish traffic use patterns and the data is used to determine the total number of visitors that use MDWMA annually.

User Surveys

User survey forms were developed to establish public use trends. Area personnel interview users as they are encountered. Rigorous visitor use surveys are conducted every 5-7 years on MDWMA. These user surveys inform managers as to what activities MDWMA is being used for by the public.

Wildlife Population Surveys

Surveys are conducted annually for eagles, moose, sandhill cranes, greater sage-grouse, ring-necked pheasant, trumpeter swans, and mourning doves on MDWMA and the surrounding area. These surveys are conducted by MDWMA staff and volunteers. In addition, surveys are conducted as resources and needs dictate for water and shorebirds, colony nesting waterbirds, and other nongame species.

Harvest Inventories

Hunter check stations are conducted annually to monitor hunter success and satisfaction. Wing barrels are used to establish grouse population composition and production trends. These activities are run by the Populations section of the Wildlife Bureau. In addition, MDWMA personnel and enforcement staff often conduct hunter check stations specifically targeting waterfowl hunters on MDWMA.

Recommended Future Monitoring Efforts Not Identified in Monitoring Table

Waterfowl Breeding and Production Survey

An in-depth and statistically valid breeding waterfowl survey would be very informative for management of MDWMA. This survey should be conducted every five to seven years in order to monitor waterfowl breeding trends on MDWMA.

Wetland Vegetation Monitoring

Periodically, a thorough monitoring effort should be implemented across the wetland habitats on MDWMA to evaluate changes and function of the wetland communities associated with the WMA. This effort would evaluate the wetland values that MDWMA provides to different wildlife species and evaluate the effectiveness of some of the management activities implemented on MDWMA.

References

Beck, J. L., K. P. Reese, J. W. Connelly, and M. B. Lucia. 2006. Movements and Survival of Juvenile Greater Sage-Grouse in Southeastern Idaho. Wildlife Society Bulletin, 34:1070–1078. doi: 10.2193/0091-7648(2006)34[1070:MASOJG]2.0.CO;2

Bellrose, F. C. 1980. Ducks, Geese, and Swans of North America. Harrisburg, Pennsylvania. Stackpole.

Carlisle, J., R. Larranaga, and G. Kaltenecker. 2008. Migration monitoring of songbirds at Camas National Wildlife Refuge, Market Lake Wildlife Management Area, and Mud Lake Wildlife Management Area in eastern Idaho. Unpublished report, Idaho Bird Observatory, Boise, Idaho.

Connelly, J. W., H. W. Browers, and R. J. Gates. 1988. Seasonal Movements of Sage Grouse in Southeastern Idaho. The Journal of Wildlife Management Vol. 52, No. 1 (Jan. 1988), pp. 116-122.

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin 28:967-985.

Dahl, T. E. 1990. Wetland losses in the United States 1780s to 1980s. U.S. Fish and Wildlife Service, Washington, D.C.

Evans, D. M., and K. R. Day. 2002. Hunting disturbance on a large shallow lake: the effectiveness of waterfowl refuges. Ibis, 144: 2–8. doi: 10.1046/j.0019-1019.2001.00001.x

Flake, L. D., A. E. Gabbert, T. R. Kirshenmann, A. P. Leif, and C. T. Switzer. 2012. Ring-Necked Pheasants: Thriving in South Dakota. South Dakota Department of Game, Fish and Parks, Pierre.

Genter, D. L. 1986. Wintering bats of the Upper Snake River Plain: occurrence in lava tube caves. Great Basin Naturalist 46:241-244.

Great Basin Bird Observatory. 2010. Nevada Comprehensive Bird Conservation Plan, ver. 1.0. Great Basin Bird Observatory, Reno, Nevada. Available: www.gbbo.org/bird_conservation_plan.html [Accessed January 15, 2014].

Groves, C. 2003. Drafting a Conservation Blueprint: A Practitioner's Guide to Planning for Biodiversity. Island Press, Washington, D.C.

Hanson, L. E., and D. R. Progulske. 1973. Movements and cover preferences of pheasants in South Dakota. Journal of Wildlife Management, Vol. 37, No.4, pp. 454-461.

Heywood, V. H. 1995. Global biodiversity assessment. Cambridge University Press, Cambridge.

Idaho Department of Fish and Game. 1999. Management Plan for Mud Lake Wildlife Management Area, 65 p. Idaho Department of Fish and Game, Boise.

Idaho Department of Fish and Game. 2005. Idaho Comprehensive Wildlife Conservation Strategy. Idaho Conservation Data Center, Idaho Department of Fish and Game, Boise, Idaho. https://fishandgame.idaho.gov/public/wildlife/cwcs/ [Accessed March 3, 2014].

Ivey, G. L., and C. P. Herziger, coordinators. 2005. Intermountain West Waterbird Conservation Plan—A plan associated with the Waterbird Conservation for the Americas initiative. Version 1.0. Published by U.S. Fish and Wildlife Service Pacific Region, Portland, Oregon.

Karl, J. W., J. M. Scott, and E. Strand. 2005. An assessment of Idaho's wildlife management areas for the protection of wildlife. Natural Areas Journal 25:36-45.

Keller, B. L., and R. T. Saathoff. 1995. A survey of day roosting by *Plecotus townsendii* in lava-tube caves at Craters of the Moon National Monument, Butte County, Idaho. Unpublished Report, National Park Service, Arco, Idaho, USA.

Knick, S. T., and J. W. Connelly. 2011. Greater Sage-grouse: Ecology and Conservation of a Landscape Species and Its Habitats. University of California Press, Berkeley and Los Angeles.

Korschgen, C. E., and R. B. Dahlgren. 1992. 13.2.15. Human Disturbances of Waterfowl: Causes, Effects, and Management. Waterfowl Management Handbook. Paper 12.

Lambeck, R. J. 1997. Focal species: A multi-species umbrella for nature conservation. Conservation Biology 11:849–856.

Lewis, S. E. 1994. Night Roosting Ecology of Pallid Bats (*Antrozous pallidus*) in Oregon. American Midland Naturalist Vol. 132, No. 2 (Oct., 1994), pp. 219-226.

Madsen, J. 1995. Impacts of disturbance on migratory waterfowl. Ibis, 137: S67–S74. doi: 10.1111/j.1474-919X.1995.tb08459.x

Moulton, C., J. Carlisle, and R. Cavallaro. 2012. Habitat use of Foraging White-faced Ibis in Eastern Idaho. 2013 Annual meeting, Idaho Chapter of The Wildlife Society, Coeur d'Alene, Idaho.

Noss, R. F., E. Dinerstein, B. Gilbert, M. Gilpin, B. J. Miller, J. Terborgh, and S. Trombulak. 1999. Core areas: where nature begins. *In* J. Terborgh and M. Soule, eds., Continental Conservation: Scientific Foundations of Regional Reserve Networks, pp. 92-128. Washington D.C.: Island Press.

Perkins, A. L., W. R. Clark, T. Z. Riley, and P. A. Vohs. 1997. Effects of Landscape and Weather on Winter Survival of Ring-Necked Pheasant Hens. Journal of Wildlife Management, Vol. 61, No. 3, p. 634-644.

Simberloff, D. 1998. Flagships, umbrellas, and keystones: Is single-species management passé in the landscape era? Biological Conservation 83:247-257.

Smith, S. A., N. J. Stewart, and J. E. Gates. 1999. Home Ranges, Habitat Selection and Mortality of Ring-necked Pheasants (Phasianus colchicus) in North-central Maryland. The American Midland Naturalist 141(1) :185-197.

Spinazola, J. M. 1993. Geohydrology and simulation of flow and water levels in the aquifer system in the Mud Lake area of the eastern Snake River plain, eastern Idaho. USGS Water-Resources Investigations Report: 93-4227.

Stearns, H. T., L. L. Bryan, and L. Crandall. 1939. Geology and water resources of the Mud Lake region, Idaho: U.S. Geological Survey Water-Supply Paper 818.

Trost, C. H., and A. Gerstell. 1994. Status and distribution of colonial nesting waterbirds in southern Idaho, 1993. Technical Bulletin No. 94–6, Idaho Bureau of Land Management, Boise.

U.S. Fish and Wildlife Service. 2005. The U.S. Fish and Wildlife Service's Focal Species Strategy for Migratory Birds Measuring success in bird conservation. http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/FocalSpecies/The%20Focal%20Species%20Fact%20Sheet%20and%20Table.pdf [Accessed December 6, 2012].

Veríssimo, D., I. Fraser, R. Bristol, J. Groombridge, and D. MacMillan. 2009. Birds as tourism flagship species: A case study on tropical islands. Animal Conservation 12:549-558.

Whiteside, R. W., and F. S. Guthery. 1983. Ring-Necked Pheasant Movements, Home Ranges, and Habitat Use In West Texas. Journal of Wildlife Management, Vol. 47, No. 4, pp. 1097-1104.

Appendices

I. THE COMPASS – THE DEPARTMENT'S STRATEGIC PLAN

In 2006, the Department completed a strategic plan—*The Compass*—based on public input and legislative mandates. It continues to guide the Department in 2014 and is the primary guiding document for all other Department plans developed since 2006. The following table presents the goals, objectives, and strategies from *The Compass* that are most relevant to WMA management. *Compass* objectives are lettered on the left side for reference in the Management Program Table.

The Compass
GOAL—Fish, Wildlife, and Habitat
A. Objective – Maintain or improve game populations to meet the demand for hunting, fishing, and trapping.
B. Objective – Ensure the long-term survival of native fish, wildlife, and plants.
C. Objective – Increase the capacity of habitat to support fish and wildlife.
D. Objective – Eliminate the impacts of fish and wildlife diseases on fish and wildlife populations, livestock, and humans.
GOAL—Fish and Wildlife Recreation
E. Objective – Maintain a diversity of fishing, hunting, and trapping opportunities.
F. Objective – Sustain fish and wildlife recreation on public lands.
G. Objective – Maintain broad public support for fish and wildlife recreation and management.
H. Objective – Increase opportunities for wildlife viewing and appreciation.
I. Objective – Increase the variety and distribution of access to private land for fish and wildlife recreation.
GOAL—Working With Others
J. Objective – Improve citizen involvement in the decision-making process.
K. Objective – Increase public knowledge and understanding of Idaho's fish and wildlife.
GOAL—Management Support
L. Objective – Attract and retain a diverse and professional workforce.
M. Objective – Provide equipment and facilities for excellent customer service and management effectiveness.
N. Objective – Improve funding to meet legal mandates and public expectations.

II. HISTORY

(The first portion of this History that is in quotes and is italicized, is taken directly from Stearns et. al. 1939)

"*Some of the early fur traders and explorers traversed the borders of this region. It is reported that the first American trading post on the Pacific slope was Fort Henry, erected in 1810 at Egin, by Andrew Henry, of the Missouri Fur Co. This post was soon abandoned. In 1870 a stage station on the route from Salt Lake City to Butte was established at Sand Hole Lake. About 10 years later settlement began with the establishment of a few cattle ranches along Camas, Beaver, and Medicine Lodge Creeks, on which considerable hay was raised. At that time, according to early inhabitants, Mud Lake was a more or less intermittent pond, never covering more than a few hundred acres, whereas Sand Hole Lake never went dry. About 1895 irrigation began on the terrace southwest of St. Anthony, known as the Egin Bench. About 1900, according to several witnesses, water was noticed standing in pools just east of the railroad about 1 mile north of the present site of Hamer.*

It appears from Russell's account, based on a visit to Mud Lake in 1900, that there were then numerous ephemeral lakes in the eastern part of Snake River Plain. Of these, Mud Lake was the only on that did not dry up every summer. He stated that Mud Lake fluctuated in area from month to month and at its maximum had an area of 40 to 50 square miles, and added that the lake was dry in the summer of 1891 and was lower in the summer of 1900 than it had been at any other time in the 9 years since 1891.Surveys made at intervals from this time on give more accurate data as to the fluctuations of the lake and indicate that the extremes have not been as great as those indicated by Russell. In May and June 1899 a meander survey of Mud Lake by the General Land Office showed a water surface of 2,460 acres and dry lake beds to the south and west of Mud Lake occupying about 3,000 acres. From 1899 to 1908 the lake rose very little, if at all. In 1908 a survey of the lake by O. E. Peterson showed practically the same area covered by water as was shown by the General Land Office survey hi 1899. Mr. Peterson found all except one of the original Land Office monuments around the lake. From 1908 to 1914 the lake rose about 5 feet, as indicated by a survey made by D. P. Olson in 1914, which showed a water surface of about 14,200 acres. This is the latest survey of any consequence until the present investigation was begun in 1921. Unfortunately, no gage readings to show the rise and fall of Mud Lake were made prior to 1921.

In 1908 the first water filing was made on Mud Lake for irrigation, and in 1921 more than 150,000 acres was included in several projects for which it was planned to obtain water from Mud Lake and nearby lakes and sloughs. This acreage was divided among two large Carey Act projects aggregating about 30,000 acres and numerous private irrigation enterprises. Dry farming has been attempted in several parts of the region and has been partly successful on the high slopes north of Dubois, between Medicine Lodge and Camas Creeks, and in the vicinity of the Juniper Buttes. Close to Mud Lake it has met with failure.

During recent years the cattle industry of the Mud Lake region has been largely replaced by the sheep industry, until now about a quarter of a million sheep are raised here annually. The

United States Government has established an experiment station at Dubois, where efforts are being made to breed sheep that will be good for both mutton and wool.

The Wood Live Stock Co., with headquarters at Spencer, and the Wool Growers Association, of Sugar City, controls most of the range. They usually feed the sheep in the winter at the irrigated tracts, such as Egin Bench, Roberts, or Mud Lake, and graze them in the spring on the lava plains at the foot of the Centennial Mountains. Later, as the grass dries and water becomes scarce, the sheep are driven into the mountains for the summer. In the fall they return over the same route, using the spring range on the way to the feeding ground. Several large branding and shearing corrals are located in the region. The principal towns within the region, with their population in 1930, are St. Anthony, 2,778; Ashton, 1,003; Dubois, 312; and Roberts, 297. Of these only Dubois lies within the drainage basin of Mud Lake. Other villages within the drainage basin are Camas, Hamer, Spencer, and Kilgore. The Lidy Hot Springs are also in this drainage basin.

The annual inflow into Mud Lake, which reached a peak of 83,000 acre-feet in 1923, gradually declined thereafter until 1929 and 1930, when it was only about 40,000 acre-feet. This decrease in water supply resulted in the abandonment of the lands holding the later water filings and a gradual decline in the population of the area in the vicinity of Mud Lake."

The above history covered up to about the mid-1930s in the Mud Lake area. Around 1940, dikes and levees were begun around Mud Lake in order to maintain a storage water basin for irrigation. Water delivery canals and infrastructure were built to deliver water to agricultural producers. As flood irrigation has given way to sprinkler irrigation, much of this infrastructure has been abandoned or filled in.

Sheep grazing has given way to more cattle operations, although there are still a number of operators that move and winter sheep bands throughout the Mud Lake area. The long history and high stocking rates of livestock grazing across the Mud Lake area has had long lasting and significant impacts to the habitat types and conditions that we see on the landscape today.

Mud Lake WMA itself, is made up largely of old homesteads and farms that the Department has purchased over time in hopes of preserving the wildlife values associated with Mud Lake. Many of the acres that were historic farm sites are still actively managed for agricultural production and wildlife food and cover resources. Mud Lake WMA has two sharecrop agreements (North and West Agricultural Fields) and one agricultural production lease (Marty Tract Lease) currently under contract. With the sharecrop agreements, the Department retains a share of all the crops produced. The Department can then leave its share of the crops standing for wildlife or trade them for goods and services from the sharecropper. Under the Marty Tract lease agreement, the lessee simply pays a flat per acre fee to lease the farming rights to the property. With both farming scenarios, there are signed contracts that explain the details of the agreement. The awarding of these contracts is the result of an open competitive bidding process. The agricultural production agreements have allowed the Department to provide higher quality habitat, control noxious weeds, maintain equipment, exercise water rights, increase game availability for the public, and sometimes generate revenue that is used to better manage wildlife in the area.

The restoration of many of the old farmed parcels has proven to be a difficult undertaking. Mud Lake WMA staff has attempted to seed perennial grass stands over much of MDWMA in order to provide nesting and security cover for birds and other wildlife. Noxious weed infestations and low precipitation makes establishment of these habitat plantings a frustrating endeavor.

The original land acquisition for MDWMA was the North Lake area. It was once a productive wetland, but is now dry. Fortunately, the Department followed up the North Lake purchase with others that essentially buffered Mud Lake itself. The value of the wetlands and the associated upland communities cannot be overstated. Mud Lake WMA provides migrational habitat to hundreds of thousands of waterfowl and shorebirds, breeding habitat to numerous wetland bird species, year-round habitat for moose, mule deer, white-tailed deer, pronghorn, ring-necked pheasant, greater sage-grouse, and a few elk.

Mud Lake WMA and other WMAs serve as the cornerstones for wildlife conservation across Idaho. Many conservation efforts are built around Department WMAs. It is very important that the Department and the public continue to recognize and protect the wildlife values that WMAs provide.

Background Information Pertaining to the Withdrawal Lands on MDWMA (Appendix IX)

The following information is taken directly out of the Camas National Wildlife Refuge draft Comprehensive Conservation Plan and Environmental Assessment (2014).

"Currently, a total of 11,468 acres are managed as Mud Lake WMA. This includes 259 acres of land that are leased from the IDL, and 2,705 acres of U.S. Government withdrawn land (the North Lake Wildlife Management Area) that is administered by the IDFG as part of the Mud Lake WMA (IDFG 1999).

The North Lake State Migratory Waterfowl Refuge (later known as the North Lake Wildlife Management Area) was created by Public Land Order 278 (10 FR 6313, May 21, 1945) which withdrew 313 acres of Federal lands. On October 1, 1954 an additional 2,392 acres were withdrawn under Public Land Order 1014 for a total of 2,705 acres. Both PLOs stated that:
Subject to valid existing rights, and to the provisions of existing withdrawals, the following—described public lands in Idaho are hereby withdrawn from all forms of appropriation under public-land laws, and reserved under the jurisdiction of the Department of the Interior for use of the Department of Fish and Game of the State of Idaho, in connection with the North Lake State Migratory Waterfowl Refuge, under such conditions as may be prescribed by the Secretary of the Interior.

Under the National Wildlife System Improvement Act, a Wildlife Coordination Area is defined as:
a wildlife management area that has been previously acquired by the Federal Government and subsequently made available to a State—
(A) by cooperative agreement between the United States Fish and Wildlife Service and the State; or
(B) is acquired by the Federal Government and subsequently made available to a State—
(i) by cooperative agreement between the United States Fish and Wildlife Service and the State fish and game agency pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661-666c); or

(ii) by long-term leases or agreements pursuant to the Bankhead-Jones Farm Tenant Act (50 Stat. 525; 7 U.S.C. 1010 et seq.).

The Act also notes that Coordination Areas are specifically excluded from the definition of the term "refuge." As such, they are exempt from the requirement to develop Comprehensive Conservation Plans and other requirements of the Improvement Act."

III. MANAGEMENT REQUIREMENTS AND AUTHORITIES

Federal funds, including those derived from the Land and Water Conservation Fund and USFWS Federal Aid Program, have been used in part to acquire and manage MDWMA lands. Certain activities are prohibited from funding with Federal Aid funds, and all provisions of Federal Aid funding are adhered to in the management of MDWMA.

Other federal and state laws also affect management of MDWMA. The Department has responsibility under provisions of the Endangered Species Act to ensure that management actions protect threatened and endangered species, and responsibility under the Clean Water Act to ensure that water quality standards and guidelines are in place on MDWMA lands and waters. Under the National Historic Preservation Act, the Department must ensure that historic properties are protected on MDWMA.

The Idaho Noxious Weed Law under Idaho Code 22-2405 requires all landowners to eradicate noxious weeds on their lands, except in special management zones. The counties are required to enforce the law and the State of Idaho is required to ensure the counties do so.

Consistent with Idaho Codes 38-101 and 38-111, and through a cooperative agreement with the Idaho Department of Lands, the Department is required to pay a fee for fire protection on all forest and some rangeland acreage it owns, and for residences in forest areas. Fees are submitted annually based on the number of qualified acres and residences owned by the Department.

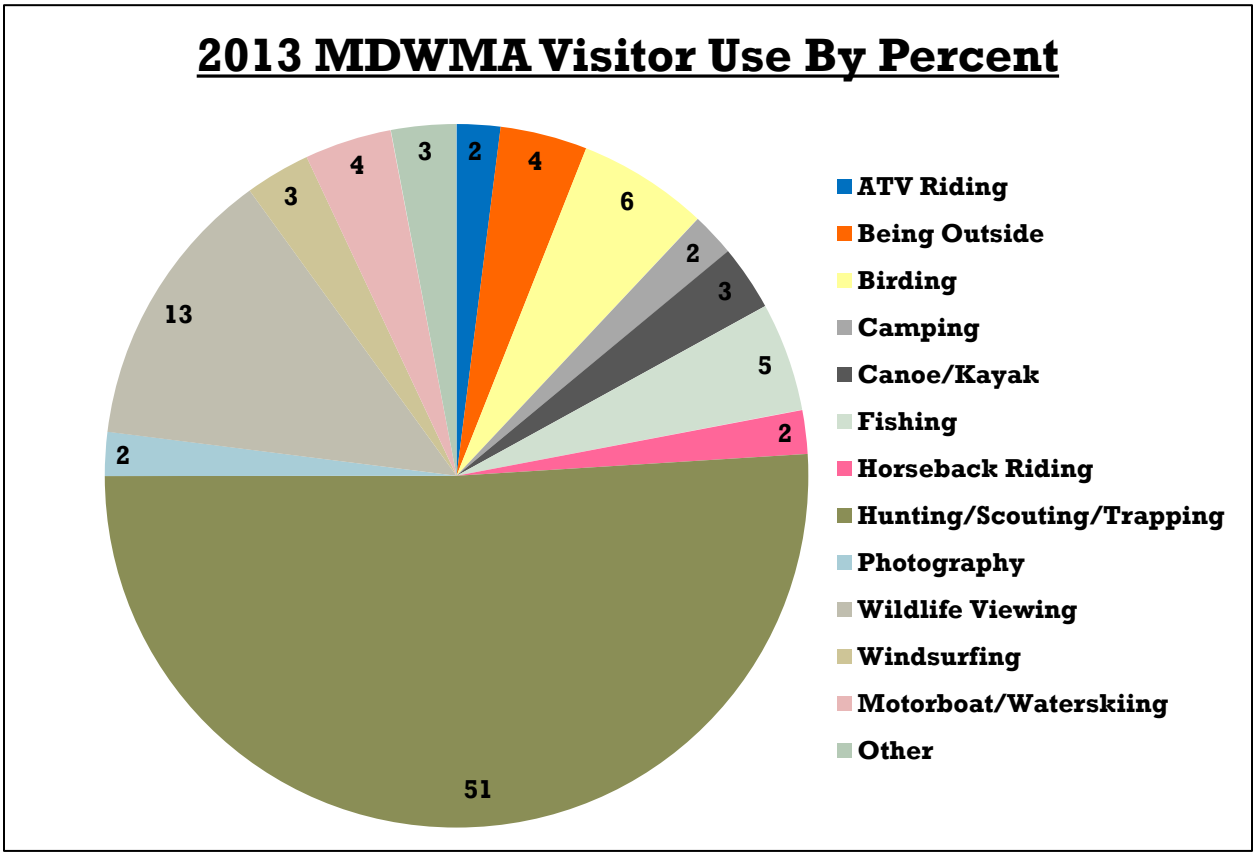
The Department is required by Idaho Code 63-602A to pay a fee-in-lieu of taxes (FILT) for lands that are owned by the Department and meet certain code requirements. These fees are submitted annually to affected counties based on the number of qualifying acres and agricultural tax rates.

IV. USER TRENDS FROM VISITOR USE SURVEYS

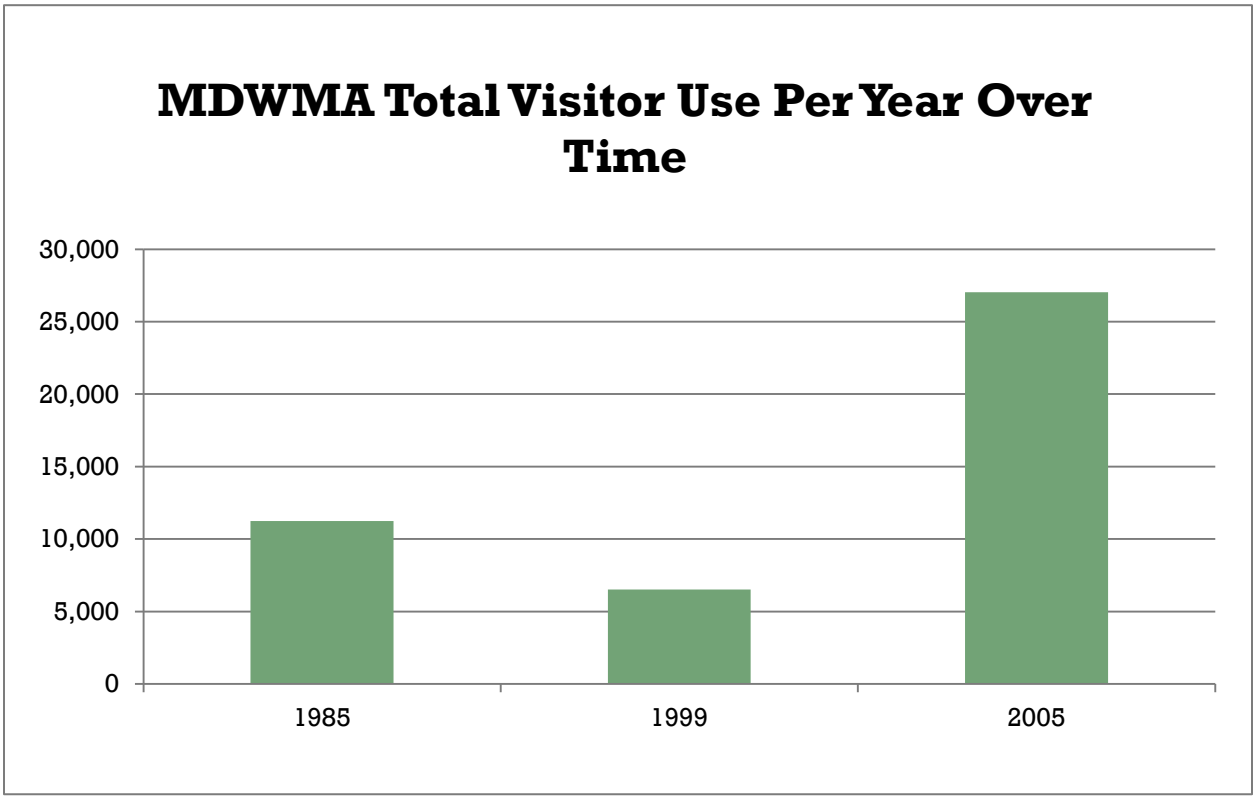
From July 1, 2012 - June 30, 2013, MDWMA staff and the Idaho Falls Chapter of the Idaho Master Naturalists conducted visitor use surveys at MDWMA. These surveys included a number of questions to assess user demographics, the purpose of the user's visit, their satisfaction with the visit, and provided an opportunity for users to suggest ways to improve management of MDWMA. Random survey time periods, alternating between early and late in the day and between weekdays and weekends, were selected for each week. Surveys were delivered to users in person, left on the windshield of unattended vehicles (with a self-addressed stamped envelope for return), and were handed out opportunistically by MDWMA staff during non-designated survey times. A cover letter included with the survey described the survey's purpose. We received 222 completed surveys from MDWMA users during the survey period. User traffic data is usually collected during the same time frame as the User Surveys are being conducted, but due to some equipment malfunctions, MDWMA staff was unable to collect traffic counter data during the 2012-2013 User Survey time period. Traffic counter information used in this plan is from the 2005 traffic counter survey. MDWMA staff will collect traffic counter information during the 2013-2014 season. The following graphs depict some of the information gathered during this survey effort and MDWMA visitor use over time.

Basic results from the 2012-2013 MDWMA Visitor Use Surveys and the 2005 Traffic Counter Data:

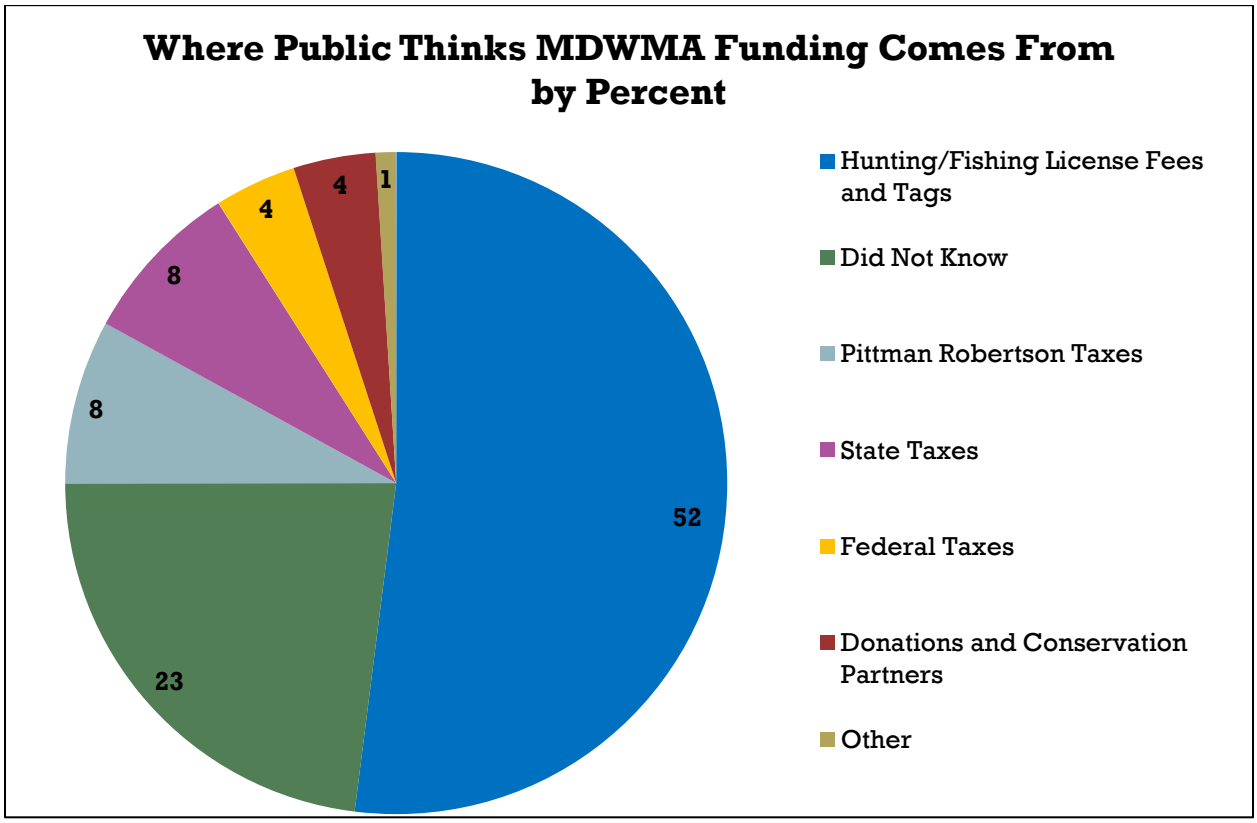
- 86% of MDWMA visitors are residents
- 51% of MDWMA visitors are hunting/trapping/scouting (consumptive users)
- Visitor use increased from 6,505 in 1999 users to 27,035 in 2005
- Non-Consumptive use now makes up 44% of MDWMA use, a 7% increase from 2005 to 2013
- 71% of MDWMA Users have a hunting and/or fishing license
- 96% of visitors to MDWMA are return users (have been to MDWMA prior)
- 71% of MDWMA visitors support conservation permits to use Department-managed WMAs
- 57% of MDWMA use occurs on weekends
- Visitors drive an average of 82 miles one way to visit MDWMA
- 98% of visitors knew that MDMWA was owned/managed by the Department
- 23% of the visitors did not know where the funding for MDWMA management came from (*See graph below for more information on public's ideas on MDWMA funding)
- Peak months of use on MDWMA are October, June, and July
- There are 2.43 people/vehicle that visit MDWMA



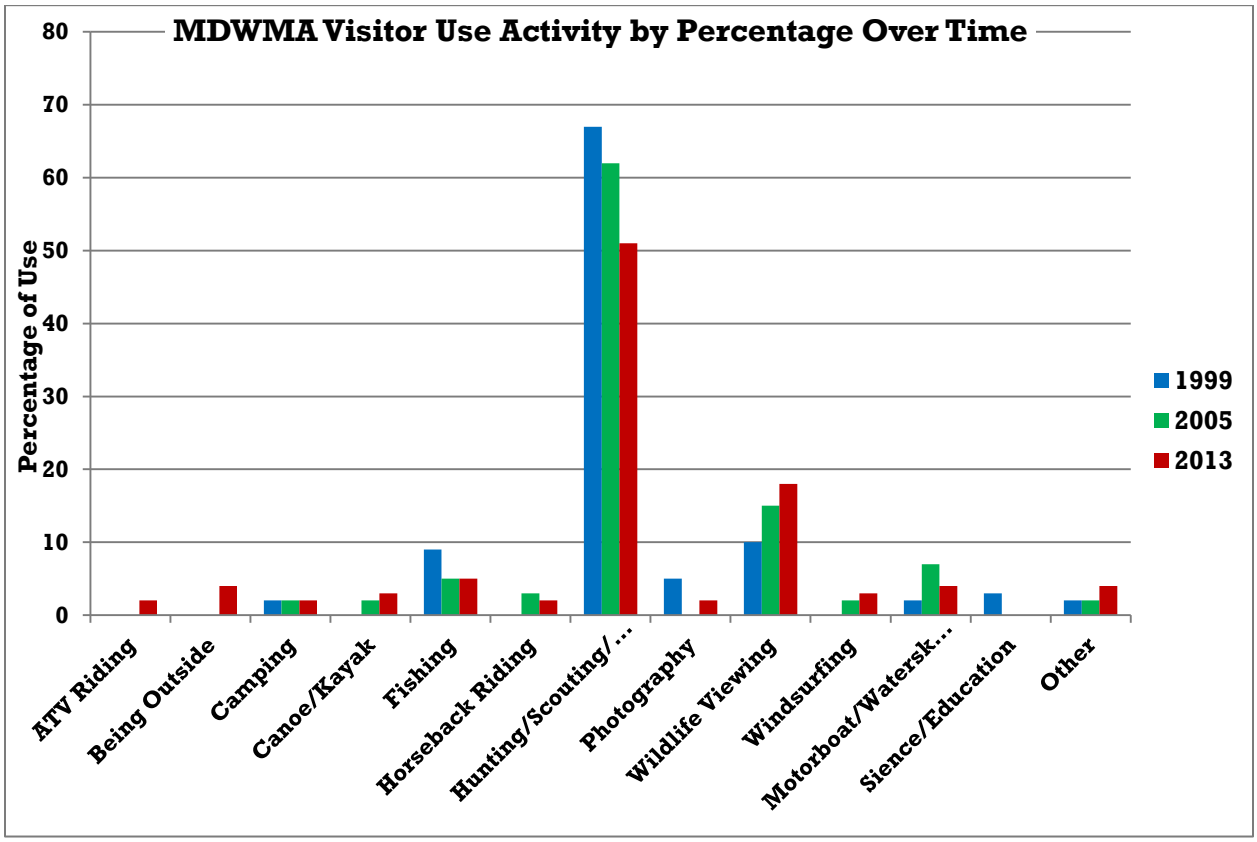
Mud Lake WMA 2013 Visitor Use by Activity



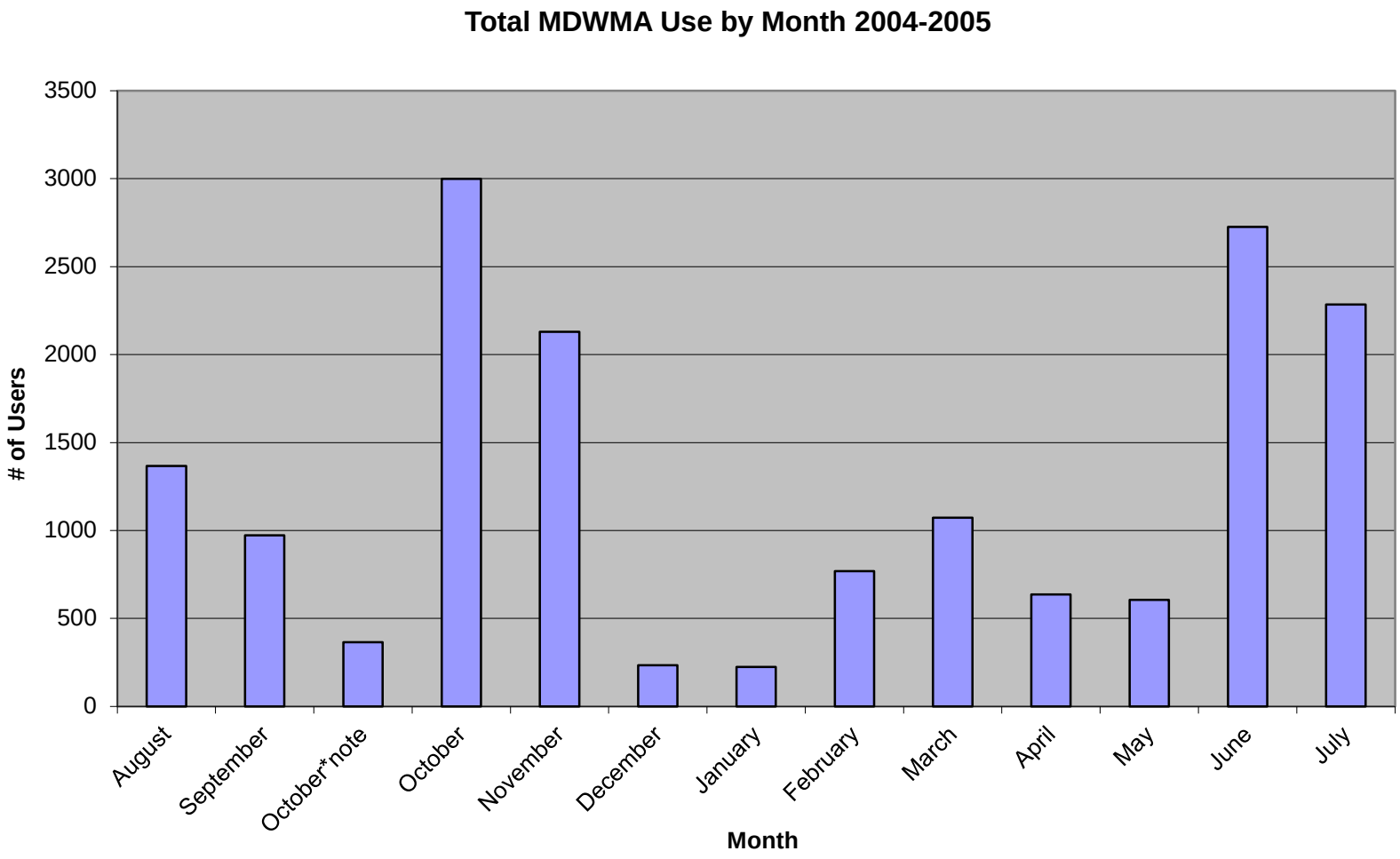
Mud Lake WMA Visitor Use Per Year



Public Understanding of Mud Lake WMA Funding



Percent Mud Lake WMA Visitor Use Activity over Time



Mud Lake WMA Use by Month

Seasonal Uses of Mud Lake WMA

Winter—Mud Lake WMA is becoming a year-round destination for recreationists, with December and January being exceptions. Most of the use of MDWMA over these winter months consists of coyote hunting and trapping.

Spring—Birdwatchers begin using MDWMA in late February and continue on through late fall. There is a boost in bird watching activity in late March as the big flights of snow geese arrive at MDWMA.

Summer—In June, recreationists start utilizing MDMWA; these users are water skiers, wind surfers, horseback riders, and wildlife viewers. These activities continue into late summer.

Late Summer and Fall—August brings the hunting public to MDWMA. There is an elk hunt that starts in GMU 63 on August 1; this hunt lasts until December 31 in an attempt to minimize depredations in the area (antlerless harvest in this elk hunt is only available from August 1 through August 31). The general deer archery season is split into two hunts, the first hunt begins on August 30 and ends September 30, and the second hunt opens on November 1 and ends December 19. There is a general any weapon deer season from October 10 through October 24. Duck hunting opens near the first weekend of October most years and continues until Mud Lake freezes over, which is typically the third week of November. In the MDWMA Use by Month graph above, the column titled, "*October* note*", is the visitor use on MDWMA for just the opening weekend of the waterfowl hunting season. The data demonstrates that this weekend draws a considerable amount of visitor use to MDWMA. The pheasant hunt begins on October 15 and lasts through November. The pen-reared pheasant release program is a popular activity for hunters on MDWMA, and the user survey demonstrates this. As the data suggests, MDWMA is a popular place in October and November for consumptive users. Safety concerns have become an issue with many hunters utilizing the same landscapes. Quality of experience for some has also been raised as an issue. For the time being, MDWMA is able to meet most visitor expectations, but use and conflicts need to be monitored over time.

As the information indicates, visitor use on MDWMA has dramatically increased over time. This increase has put additional pressure on the wildlife resources in the area. More non-consumptive users are discovering and using MDWMA. This diversity makes it more difficult for MDWMA managers to balance the demands of these user groups and maintain the wildlife objectives for MDWMA.

V. 1999-2013 ACCOMPLISHMENTS

Since the MDWMA plan was revised in 1999, these accomplishments have occurred relative to the Goals and Objectives of the 1999 plan.

Goal: Maintain or improve current waterfowl production and improve waterfowl nesting and migration habitat on MDWMA.

Objective: Maintain waterfowl nesting success at or above 30%.

Accomplishments:

- Watercraft closure has been maintained for most productive wetland areas on MDWMA.
- Approximately 150 acres of cattail and bulrush have been treated to maintain productive wetland mix of open water and vegetation.
- Nesting structure for avian nest predators is annually removed where appropriate across MDWMA.

Objective: Maintain and improve upland nesting cover on MDWMA.

Accomplishments:

- Approximately 100 acres of permanent grass cover has been planted with mixed success across MDWMA.

Objective: Provide mammalian predator-free nesting cover with an electric-fence exclosure in the East Sloughs segment of MDWMA.

Accomplishments:

- This exclosure is still maintained, but the value of this area on MDWMA for nesting waterfowl has been significantly reduced due to the changes in the local water table. There are no longer wetlands near the predator exclosure area.

Objective: Enhance overwater nesting cover for waterfowl. This objective also provides migration habitat for waterfowl.

Accomplishments:

- Approximately 150 acres of cattail and bulrush have been treated to maintain productive wetland mix of open water and vegetation.
- Wetland vegetation in some areas is burned to remove old decedent debris and increase vigor of vegetation.

Objective: Provide nesting structures for ducks and geese.

Accomplishments:

- 111 goose nesting platforms are maintained annually on MDWMA

Objective: Monitor for waterfowl diseases and attempt to control outbreaks when they occur.

Accomplishments:

- Mud Lake WMA staff monitors the area weekly for signs indicating disease or mortality factors for waterfowl. Carcasses that are recovered are sent into the Health Lab for testing.
- Mud Lake WMA staff has been intimately involved with testing for Avian Influenza.

Objective: Enhance and increase the quantity of goose pasture on MDWMA. This objective also provides migration habitat for waterfowl.

Accomplishments:

- Food plots, upland foraging, and loafing areas are maintained across MDWMA for goose habitat.

Objective: Maintain or improve waterfowl migration habitat.

Accomplishments:

- The WMA tries to create valuable migrational habitat through moist soil management (mechanically manipulating wetland areas) and seasonal flooding of wetlands .
- The WMA maintains flood irrigation across approximately 700 acres of agricultural ground where migrating waterfowl forage.
- The WMA leaves 100 - 150 acres of standing, unharvested agricultural crops as food plots for migrating waterfowl.
- The Department just purchased an additional 2,615 acres adjacent to historic MDWMA; much of this new acquisition provides a diversity of migrational habitat for waterfowl and connects MDWMA to Camas National Refuge, forming an area protected for wildlife and recreation exceeding 22,000 acres.

Goal: Control noxious weeds on MDWMA to enhance wildlife habitat.

Objective: Decrease and control the Russian knapweed infestations on MDWMA.

Accomplishments:

- Mud Lake WMA staff annually treats approximately 500-600 acres of noxious weeds across the WMA and adjacent property.
- Mud Lake WMA staff monitors the effectiveness of treatments via mapping, photo plots, and observational methods.

Goal: Improve upland game habitat on the MDWMA by providing better nesting cover, brood-rearing habitat, winter cover, and winter food resources.

Objective: Provide more high quality nesting cover for upland game.

Accomplishments:

- Mud Lake WMA staff has planted over 100 acres into permanent nesting cover across MDWMA.
- The Department has aggressively tried to control noxious weeds in upland nesting habitat.
- The Department just acquired an additional 2,615 acres adjacent to the old Mud Lake WMA. This new acquisition provides significant acres in upland nesting habitat and connects MDWMA to Camas National Refuge, forming an area protected for wildlife and recreation exceeding 22,000 acres.

Objective: Provide winter cover and food plots for upland game.

Accomplishments:

- WMA staff and sharecroppers leave 100-150 acres of standing food plots for wildlife across MDWMA.

Objective: Reduce predation on upland game.

Accomplishments:

- Avian predator nesting and perch habitat has been managed and removed where deemed appropriate in order to reduce the impacts of avian predators.
- Direct predator removal has been implemented on two occasions across the WMA. Mammalian and avian predators were targeted during these efforts.
- Mud Lake WMA staff has tried to improve quality nesting and security habitat across the area.
- Trapping by licensed trappers is encouraged across the WMA.

Objective: Provide nesting, brood-rearing, and winter habitat for sage-grouse.

Accomplishments:

- Mud Lake WMA staff control noxious weeds in sage-grouse habitats.
- Seasonal wet meadow habitat is maintained in appropriate areas across MDWMA to provide brood-rearing habitat for sage-grouse.
- Mud Lake WMA staff have seeded and planted sagebrush in areas across the WMA where sagebrush has been lost.

Goal: To provide access and opportunity for a variety of wildlife appreciation or outdoor recreational activities.

Objective: Provide high quality waterfowl hunting opportunities.

Accomplishments:

- Mud Lake WMA staff has no control over water levels in MDWMA, but access to available hunting habitat is maintained across MDWMA.
- Mud Lake WMA attempts to balance hunter desires, access, and security areas for migrating birds across the area.
- Mud Lake WMA staff and sharecroppers offer highly valuable foraging opportunities to waterfowl in the form of food plots and flooded fields; these activities offer hunting opportunities for the public.

Objective: Provide quality upland game hunting opportunities.

Accomplishments:

- Mud Lake WMA continues to try and improve habitat conditions for upland game, but it seems that upland game populations struggle to increase in this area.
- Mud Lake WMA staff currently implement the pheasant release program on MDWMA.
- Mud Lake WMA staff, in conjunction with local Pheasants Forever Chapter, is conducting a wild pheasant release project to evaluate pheasant habitat use, survival, and productivity across Mud Lake WMA and adjacent lands. This project will assist managers in pheasant habitat improvements and MDWMA management for pheasant in the future.

Objective: Provide quality big game hunting opportunities.

Accomplishments:

- Mud Lake WMA management has greatly enhanced the security habitat available for big game on the WMA (Green Island and McKenzie Point motorized closures). These changes have resulted in increasing MDWMA use by big game.

- Mud Lake WMA has restricted all big game hunting to short range weapons, which has led to an increase in use of MDWMA by big game.

Objective: Provide public furbearer trapping opportunity on MDWMA and work with canal companies to address damage to water delivery infrastructure caused by furbearers..

Accomplishments:

- Mud Lake WMA management provides for widespread trapping opportunities across the area.
- Mud Lake WMA staff tries to maintain diverse access across MDWMA to allow trappers access to trapping areas.

Objective: Provide access for public fishing.

Accomplishments:

- Mud Lake WMA staff, in cooperation with the Access and Fisheries Sections, tries to maintain a wide variety of fishing access opportunities for anglers on MDWMA.
- Two boat ramps for motorized watercraft are maintained on MDWMA.
- Two fishing docks and one fishing pier are maintained on MDWMA.
- Multiple launch sites for non-motorized watercraft are available for anglers on MDWMA.

Objective: Provide for a variety of non-consumptive outdoor recreational activities on MDWMA.

Accomplishments:

- Mud Lake WMA provides a great deal of non-consumptive activities for the public. In fact, in the 2005 user survey conducted on MDWMA, 37% of the use occurring on MDWMA was by non-consumptive users. Common non-consumptive uses on MDMWA are: 1) wildlife viewing, 2) boating, 3) horseback riding, 4) ATV riding, and 5) windsurfing.
- Mud Lake WMA staff provide multiple trails, watercraft launch sites, roads, and other resources for non-consumptive users on MDWMA.

Objective: Enhance available wildlife information to the public.

Accomplishments:

- There are now five informational kiosks across MDWMA. These kiosks provide detailed maps of the WMA, hunting and fishing regulations, wildlife and WMA informational guides, and other pertinent information related to MDWMA.

- Mud Lake WMA staff work with the regional Communications staff to provide information through media outlets (radio, newspaper, internet, etc.) to the public about issues and wildlife in the Mud Lake area.
- Mud Lake WMA staff work with conservation groups and public news outlets to inform the public about wildlife news and needs occurring in the Mud Lake area.

Goal: Minimize and control wildlife depredations on agricultural lands surrounding MDWMA.

Objective: Provide alfalfa and small grains on MDWMA for waterfowl use.

Accomplishments:

- Mud Lake WMA provides large amounts of forage for wildlife. Portions of grown crops are left standing for wildlife across MDWMA. Mud Lake WMA has an active food plot program that establishes forage resources for wildlife consumption. Alfalfa, grain, corn, sorghum, and sunflower are common crops left for wildlife.

Objective: Provide alfalfa and other forage on MDWMA for big game use.

Accomplishments:

- Mud Lake WMA provides large amounts of forage for wildlife. Portions of grown crops are left standing for wildlife across MDWMA. Mud Lake WMA has an active food plot program that establishes forage resources for wildlife consumption. Alfalfa, grain, corn, sorghum, and sunflower are common crops left for wildlife.

Objective: Provide assistance for depredation problems on private land.

Accomplishments:

- Mud Lake WMA staff work with landowners with depredation problems across the habitat district. Staff deliver propane cannons, develop hunts specifically designed to address depredation issues, work with volunteers to haze/disturb depredating species, develop lure crops and habitat improvements in the area that will decrease depredations, and other methods to help private landowners with depredation problems.

Objective: Maintain and improve working relationships with neighboring landowners.

Accomplishments:

- Mud Lake WMA staff spend a considerable amount of time interacting with neighbors on numerous issues or activities in the Mud Lake area. These interactions range from depredation concerns, management activities on MDWMA, species management in the area, access issues or improvements, public use concerns, and a variety of other topics.

Over time, the relationship between the Department and neighboring landowners and the general public has improved dramatically.

Goal: Maintain or improve nongame wildlife and plant populations and biodiversity on MDWMA.

Objective: Provide migratory, breeding and/or winter habitat for species with special designations, such as threatened and endangered species and species of special concern.

Accomplishments:

- Mud Lake WMA staff provide significant habitat and protection for nongame and special designation wildlife species in the form of: habitat improvement efforts (seedings, plantings, nesting structures, moist soil management, etc.), seasonal closures to limit disturbance, flood irrigation of forage resources, security area delineations, seasonal flooding, and a variety of other management practices.

Objective: Provide migratory and breeding habitat for shorebirds.

Accomplishments:

- Mud Lake WMA staff focus on providing migratory and breeding habitat for shorebirds in the form of: season flooding of shallow wetland habitats, moist soil management in appropriate areas, mechanical manipulation of habitats to provide exposed soils for foraging areas, flood irrigation of forage resources, seasonal closures in breeding habitats, security area delineations, and other management efforts.

Objective: Provide migratory, breeding and winter habitat for nongame species.

Accomplishments:

- Mud Lake WMA staff focus on providing migratory, breeding, and winter habitat for nongame species in the form of: season flooding of shallow wetland habitats, moist soil management in appropriate areas, mechanical manipulation of habitats to provide exposed soils for foraging areas, flood irrigation of forage resources, maintaining food plots that benefit nongame species, seasonal closures in breeding habitats, security area delineations, and other management efforts.

Goal: Provide habitat to maintain big game populations on MDWMA and reduce depredations on surrounding private lands.

Objective: Maintain current big game habitat on MDWMA.

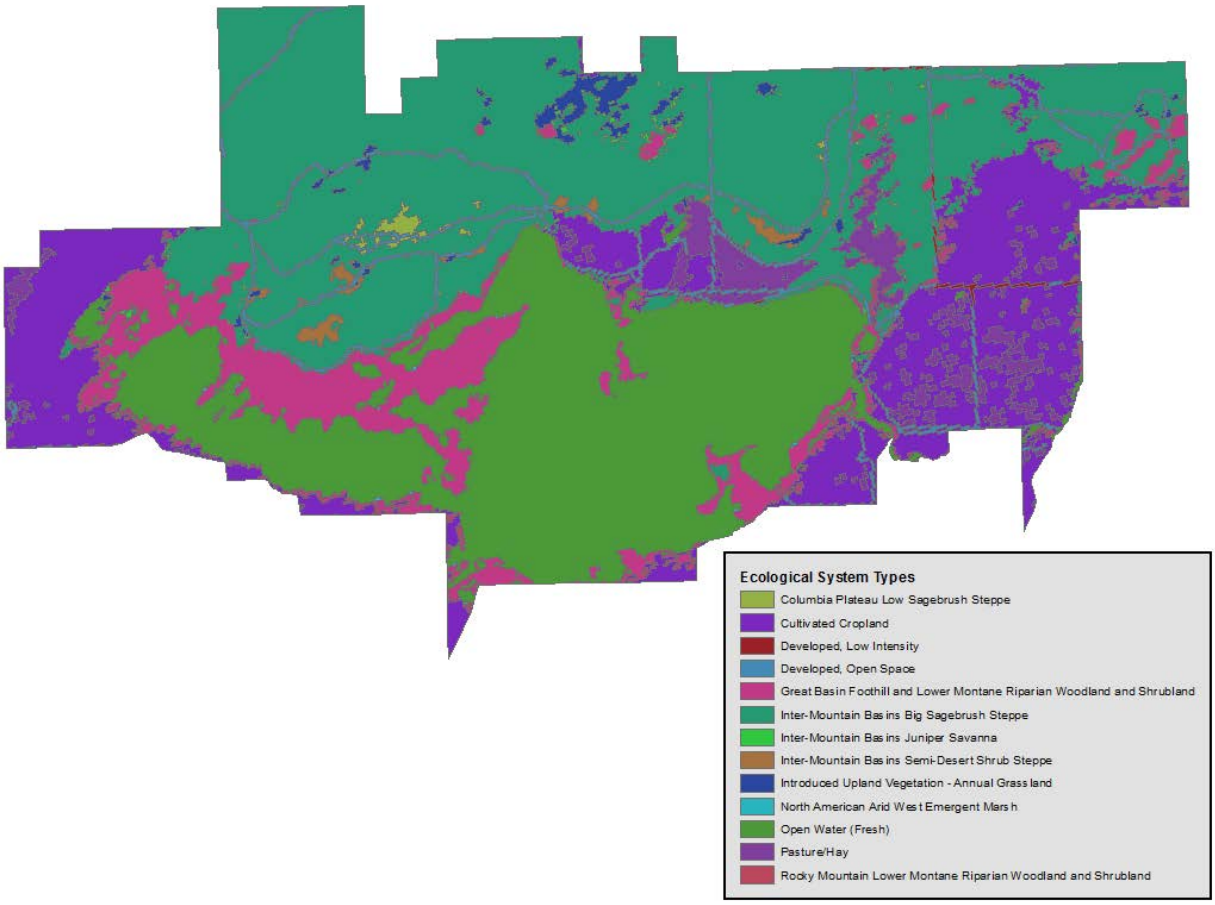
Accomplishments:

- Through sharecrop agreements and established food plots specifically for wildlife, MDWMA provides high quality forage resources for big game. Approximately 100-150 acres of forage is specifically left and maintained for wildlife use across MDWMA. These forage resources are heavily used by big game and serve to keep big game on MDWMA and reduce depredations on adjacent private lands.

VI. VEGETATION

Northwest GAP Analysis Project Land Cover, version 2.0 spatial data (U.S. Geological Survey, Gap Analysis Program, Moscow, Idaho; http://gapanalysis.usgs.gov) was used to estimate the ecological system type composition of MDWMA.

Ecological System	Acres	Percentage
Columbia Plateau low sagebrush steppe	37	0.27
Cultivated cropland	2,361	16.99
Developed, low intensity	23	0.17
Developed, open space	399	2.87
Great Basin foothill and lower montane riparian woodland and shrubland	1,263	9.09
Intermountain basins big sagebrush steppe	5,122	36.86
Intermountain basins juniper savanna	43	0.31
Intermountain basins semi-desert shrub steppe	77	0.56
Introduced upland vegetation - annual grassland	152	1.09
North American arid west emergent marsh	9	0.06
Open water (fresh)	3,705	26.66
Pasture/hay	545	3.92
Rocky Mountain lower montane riparian woodland and shrubland	160	1.15



Map of ecological system type composition of Mud Lake WMA

VII. WILDLIFE AND FISH SPECIES LIST

(*Common Species; additional information available at www.idfg.idaho.gov*)

Mammals	***Birds (cont.)***	***Birds (cont.)***
American badger	American robin	Common merganser
Bat species	American tree sparrow	Common nighthawk
Beaver	American white pelican	Common raven
Black-tailed jackrabbit	American widgeon	Common redpoll
Bobcat	Baird's sandpiper	Common snipe
Bushy-tailed wood rat	Bald eagle	Common tern
Cottontail rabbit	Bank swallow	Cooper's hawk
Coyote	Barn Swallow	Dark-eyed junco
Deer mouse	Barrow's goldeneye	Double-crested cormorant
Elk	Belted kingfisher	Downy woodpecker
Great basin pocket mouse	Black tern	Dusky flycatcher
Mink	Black-bellied plover	Eared grebe
Montane meadow mouse	Black-billed magpie	Eastern kingbird
Moose	Black-capped chickadee	Eurasian collared dove
Moose	Black-crowned night heron	European starling
Mule deer	Black-headed grosbeak	Evening grosbeak
Muskrat	Black-necked stilt	Ferruginous hawk
Northern pocket gopher	Black-throated gray warbler	Forster's tern
Porcupine	Blue-gray gnatcatcher	Franklin's gull
Pronghorn	Blue-winged teal	Gadwall
Raccoon	Bohemian waxwing	Golden eagle
Red fox	Brewer's blackbird	Goshawk
Richardson's ground squirrel	Brewer's sparrow	Gray partridge
Shrew (various species)	Brown-headed cowbird	Gray-crowned rosy finch
Striped skunk	Bufflehead	Great blue heron
Weasel	California gull	Great egret
Western jumping mouse	Calliope hummingbird	Great horned owl
White-tailed deer	Canada goose	Greater sage-grouse
White-tailed jackrabbit	Canvasback	Greater scaup
Yellow-bellied marmot	Cattle egret	Greater yellowlegs
Birds	Cedar waxwing	Green-winged teal
American avocet	Chipping sparrow	Hairy woodpecker
American bittern	Cinnamon teal	Hermit thrush
American coot	Clark's grebe	Herring gull
American crow	Clark's nutcracker	Hooded merganser
American goldfinch	Cliff swallow	Horned grebe
American kestrel	Common goldeneye	Horned lark
American redstart	Common loon	House sparrow

Birds (cont.)	***Birds (cont.)***	***Birds (cont.)***
House wren	Ring-necked pheasant	Western sandpiper
Killdeer	Rock dove	Western screech owl
Lapland longspur	Ross's goose	Western tanager
Lark sparrow	Rough-legged hawk	Western wood peewee
Lazuli bunting	Rough-winged swallow	Whimbrel
Least sandpiper	Ruby-crowned kinglet	White-crowned sparrow
Lesser scaup	Ruddy duck	White-faced ibis
Lesser yellowlegs	Rufous hummingbird	White-fronted goose
Lewis's woodpecker	Sage sparrow	White-throated sparrow
Loggerhead shrike	Sage thrasher	Willet
Long-billed curlew	Sandhill crane	Willow flycatcher
Long-billed marsh wren	Savannah sparrow	Wilson's phalarope
Long-eared owl	Saw-whet owl	Wilson's warbler
Mallard	Say's phoebe	Wood duck
Marbled godwit	Semipalmated sandpiper	Yellow warbler
Merlin	Sharp-shinned hawk	Yellow-breasted chat
Mockingbird	Short-eared owl	Yellow-headed blackbird
Mountain bluebird	Snow bunting	Yellow-rumped warbler
Mourning dove	Snow goose	Yellowthroat
Northern flicker	Snowy egret	***Amphibians & Reptiles***
Northern harrier	Solitary vireo	Common garter snake
Northern oriole	Song sparrow	Gopher snake
Northern pintail	Sora	Racer
Northern shoveler	Spotted sandpiper	Sagebrush lizard
Northern shrike	Swainson's hawk	Tiger salamander
Olive-sided flycatcher	Swainson's thrush	Western rattlesnake
Osprey	Townsend's solitaire	Western skink
Pectoral sandpiper	Townsend's warbler	Western terrestrial garter snake
Peregrine falcon	Tree swallow	***Fish***
Pied-billed grebe	Trumpeter swan	Bullhead catfish
Prairie falcon	Tundra swan	Channel catfish
Red-breasted merganser	Turkey vulture	Lahontan cutthroat trout
Redhead	Vesper sparrow	Largemouth bass
Red-naped sapsucker	Violet-green swallow	Tiger muskie
Red-necked phalarope	Virginia rail	Utah chub
Red-tailed hawk	Warbling vireo	Utah sucker
Red-winged blackbird	Western burrowing owl	Yellow perch
Ring-billed gull	Western kingbird	
Ring-necked duck	Western meadowlark	

VIII. IMPORTANT MDWMA MANAGEMENT ACTIVITIES

Upland Nesting Cover

Due to historic grazing use, agricultural pursuits, noxious weed control, crested wheat seedings, fire, changes in the local water table, and other habitat changes on the lands that make up MDWMA, the quality and availability of upland nesting cover needs to be improved. Quality nesting cover is likely one of the limiting factors for both waterfowl and upland game birds on MDWMA and in the Mud Lake landscape.

Restoring native upland communities on MDWMA and across the West has proven to be difficult and inconsistent at best. The specific obstacles to enhancing upland nesting cover on MDWMA are: low precipitation, soil types (some form crusts, some are sandy, etc.), competition from invasive species before desired seeding can establish, and wind erosion. It is important that managers develop a very thorough and thoughtful rehabilitation plan prior to any habitat enhancement project on MDWMA.

If managers will follow the strategies identified in the management table of this plan for the upland habitat requirements for ring-necked pheasant and sage-grouse, the needs of waterfowl upland nesting habitat will be addressed as well.

Water Level Management on MDWMA

The Department has limited opportunity to influence wetland function on MDWMA through water level management. The water levels and management associated with the main Mud Lake wetland complex are completely dictated by climatic conditions, ground water levels, and direct pumping by agricultural producers. Although MDWMA staff cannot control water levels, wetland function can be influenced through vegetation and soil management efforts. There are two exceptions to this where the Department has direct control over wetland water levels, and these are the Marty Tract wetlands and a portion of the West Sloughs wetlands.

The Marty Tract WRP wetlands (Appendix XII) are dependent almost completely on pumped water from the Sheep Shed and Camas East A and B pumps. Historically, many of these wetland basins were influenced by a very high water table. The WRP project on the Marty Tract is an attempt to try and restore some of the seasonal functionality of these wetlands. At the time that this management plan for MDWMA was being written, the WRP restoration plan and Marty Tract Wetland developments were still being designed and the final details will be added as soon as the final designs are completed.

The West Sloughs have segments that the Department can control (Appendix XII). These wetlands can be flooded by the Jernberg well. Mud Lake WMA staff initiated a ground water monitoring effort in the spring of 2013. The purpose of this effort was to track ground water levels over time and evaluate the cost effectiveness of flooding these wetland cells. A wide variety of wildlife utilize these wetlands when they are maintained. In fact, duck nesting

densities can be quite high in the sagebrush/grass habitats surrounding these wetlands. In total, there are approximately 200 acres associated with this wetland habitat management unit.

It is important to know a little history of the maintenance of Mud Lake dikes and levees. In the mid-1980s there was significant flooding in the Mud Lake area and of Mud Lake itself. Many of the dikes and levees associated with Mud Lake were compromised and washed out. In fact, the late Jim Moore (long time Utility Craftsman for the Department and Roberts, Idaho native) said that at the time of the flooding, "There was four feet of water in the North Agricultural Fields near the Farm Pond Pump". That is a lot of water on the landscape. In response to this flooding, the Army Corp of Engineers came in and rebuilt many of the dikes and water maintenance infrastructure associated with Mud Lake. The Army Corp developed an agreement with the Mud Lake Water Users which restricts how much water can be stored in Mud Lake going into winter. The agreement states that no more than 2.5 feet of water on the gauge can be stored in Mud Lake going into winter. This is a small amount of water as compared to the water levels during peak irrigation season (peak irrigation season water levels are about 7 feet). The fluctuating water levels are actually good for wildlife, particularly water and shore birds, but can be difficult for fish during winter and for nesting birds in the spring. The important point to be made is that the Mud Lake Water Users are restricted by this agreement as to over-winter water storage levels in Mud Lake.

Waterfowl and Dove Banding

Over the last decade, MDWMA has been one of the leaders across the state in the banding of waterfowl and mourning doves.

Mud Lake seems to be a concentration area for molting waterfowl. Beginning in late July, molting waterfowl begin to show up at MDWMA. Trapping efforts for waterfowl typically begin in mid-July (primarily geese at this time) and then continue until mid-September. Trapping methods for waterfowl are: baited walk in/swim in traps, day and night netting operations.

Mourning dove banding begins at MDWMA on July 1. Mud Lake WMA staff simply incorporate checking dove traps into their daily routines, and maintenance of the dove traps does not require much staff time. Five to six baited walk-in traps are maintained in total on MDWMA; generally four being located at the North HQ and two at the South HQ.

Noxious Weed Control

Noxious weeds have been under active control on MDWMA since its acquisition in 1940. Control measures include proper land use practices, mechanical control, chemical control, and biological control. The three main weed species being controlled are Russian knapweed (*Acroptilon repens*) Canada thistle (*Cirsium arvense*), and musk thistle (*Carduus nutans*). Leafy spurge (*Euphorbia esula*) has not been identified on the area, but can be found on adjacent lands. Cheat grass (*Bromus tectorum*) is not classified as a noxious weed, but is a real concern for MDWMA managers. Control of cheat grass has proven difficult, but still remains a priority for WMA personnel.

Biological control was initiated in the early 2000s with the release of the Canada thistle stem mining weevil in the West Sloughs area. Since this time, there have been additional Canada thistle bio-control releases in the form of seed head weevil and defoliating beetles. In addition, the Department has partnered in the testing of Russian knapweed bio-controls. These Russian knapweed bio-control test plots are on the Marty Tract of MDWMA.

Chemical control is primarily used on infestations found along roadways, heavily used areas, and large expansive infestations. Milestone® (Chlorsulfuron) is the most commonly used herbicide on MDWMA, although other chemicals (e.g., Weedmaster®, Roundup®, Starane®,) are also used for specific applications when corresponding land management agency regulations allow. Tordon® was commonly used in the past, but some areas are struggling to recover from these treatments and the use of this product has been discontinued. Herbicides are applied with a blue dye and delivered aerially or with a 200-gallon truck mounted sprayer, 25-gallon ATV sprayer, or backpack sprayer. The ability to apply Milestone aerially significantly improved control efforts of noxious weeds on MDWMA. Aerial application is far more cost effective and control success has risen dramatically. With aerial application, we are able to get herbicide into brush stands and if applied at the correct rates the impacts to sagebrush or other woody species is minimal. Aerial applications of Milestone have been typically done in September. Rapid re-vegetation of disturbed soil prior to noxious weed infestation is the preferred management option at MDWMA. Establishment of desirable plants minimizes weed control naturally, but restoration efforts often prove difficult and frustrating.

The most common methods of weed movement onto and within the property are vehicles, animal movements (e.g., wildlife and trespass cattle), and wind/water borne seed. Weed mapping and photo points are the most common methods of weed monitoring on MDWMA.

IX. LAND ACQUISITIONS AND AGREEMENTS

Land Acquisitions				
Year	**Funds Used**	**Acres**	**Acquired From**	**Ownership**
1940	PR	607.14	Leo S. Twitchell	IDFG
1941	PR	791.42	Manford D. Turman	IDFG
1942	PR	73.51	Michael Kreutzer	IDFG
1948	PR	320	Frank S. Jackett	IDFG
1948	PR	160	August Kreutzer	IDFG
1949	PR	640	W.E. Crouch	IDFG
1949	PR	640	David Jernberg	IDFG
1949	PR	55	M.M. Owsley	IDFG
1949	PR	640	W.E. Crouch	IDFG
1949	PR	80	August Kreutzer	IDFG
1950	PR	400	Frank S. Jackett	IDFG
1950	PR	80.77	Frank S. Jackett	IDFG
1950	PR	172	James O. Staley	IDFG
1950	PR	160	Michael Kreutzer	IDFG
1953	Gift	40	Owsley Canal Company	IDFG
1954	PR	250.11	Shuldberg and Gerard	IDFG
1954	PR	280	Shuldberg and Gerard	IDFG
1954	Gift	2	Shuldberg and Gerard	IDFG
1959	Gift	2	Frank S. Jackett	IDFG
1963	PR	13.64	M.M. Owsley	IDFG
1966	PR	80	Michael Kreutzer	IDFG
1966	PR	240	Violet Kreutzer	IDFG
1969	PR	16	Glen Sparks Estate	IDFG
1969	IDFG	1.125	Glen Sparks Estate	IDFG
2012	IDFG	2,615	Pheasants Forever	IDFG

Cooperative Land Agreements				
Year	**Funds Used**	**Acres**	**Acquired From**	**Ownership**
1945	U.S. Government Withdrawal	313	BLM	BLM
1954	U.S. Government Withdrawal	2,392.32	BLM	BLM
1959	Lease	259.3	State of Idaho, IDL	IDL
	Subtotal	2,964		
	WMA Total	**11,468**		

Easements and Right of Way Agreements (as of 2013)		
Agreement Type	**Cooperator**	**Description**
NRCS Wetland Restoration Program Easement	NRCS	This easement was a part of the Marty Ranch purchase and includes 958 acres of MDWMA (Appendix XII). All of these acres are associated with the old Marty Ranch property. It is important that MDWMA managers be aware of the covenants associated with this WRP easement. *For specific details of this easement refer to the electronic record of this file, it can be found in the Mud Lake folder in the WRP subfolder.
Land Management Easement	Mud Lake Water Users (MLWU)	There is a signed agreement between the Department and the Mud Lake Water Users (MLWU), where the MLWU has the right to do canal and water delivery maintenance on the canals that are located on MDWMA (Sparks Canal, Owsley Canal, Jacket Ditch, etc.). These agreements are written as such that the MLWU have the leeway to perform needed maintenance within a designated number of feet out from the center of the water delivery channel. This distance varies somewhat from canal to canal, but it is typically close to 45' on either side of the canal. There is not an official agreement adopted for the Marty Tract and the associated canals on this property. The Department should probably pursue the development of a legal documented easement for the Marty Tract and the associated MLWU water delivery systems. It is important to note that in the easements it discusses the need for MLWU to level excavated soil in order to maintain the ability to do maintenance and weed control on these areas. Weed control responsibilities should also fall upon MLWU for the areas where they have jurisdiction to do maintenance. The spoils from MLWU maintenance activities still cannot be put in places where the spoils will fill a wetland without the proper Army Corps of Engineers permitting.

WATER RIGHTS ASSOCIATED WITH MDWMA

Water Right #	Priority Date	Amount and Beneficial Use	Period of Use	Source	Name
31-024484	1/3/1949	4 CFS Wildlife	4/1 – 11/01	Ground Water	Jernberg Well
31-02316	2/18/1953	7.5 CFS or 1938 AFA	Irrigation 4/1 -11/01	Ground Water	B-Well
		Wildlife/Irrigation	Wildlife 1/1 – 12/31		
31-02448B	1/3/1949	6 CFS Wildlife	4/1 – 11/1	Ground Water	Mitigation Well
		.2 CFS Irrigation			
31-12287	2/6/1918	.31 CFS	4/1-10/31 Irrigation, 39.6 acre limit	Deadline Lake	Rarely has water
31-12288	2/6/1918	9.69 CFS or 3536 AFA	4/1-10/31 Irrigation, 1240 acre limit	Deadline Lake	Rarely has water
31-12289	3/3/1906	.47 CFS	4/1-10/31 Irrigation, 40 acre limit	Unnamed Stream	Rarely has water
31-12290	3/3/1906	14.73 CFS	4/1-10/31 Irrigation, 1240 acre limit	Unnamed Stream	Rarely has water
31-12291	3/27/1930	.31 CFS or 114 AFA	5/1-11/1 Irrigation, 37.5 acre limit	Ground Water	Marty East Well B
31-12292	3/27/1930	9.69 CFS or 3536 AFA	5/1 – 11/1 Irrigation, 1,162.3 acre limit	Ground Water	Marty East Well B
31-12293	3/27/1930	.31 CFS or 114 AFA	5/1-11/1	Ground Water	Sheep Shed Well
31-12294	3/27/1930	9.69 CFS or 3536 AFA	5/1 11/1 Irrigation	Ground Water	Sheep Shed Well
31-12295	7/31/1930	.23 CFS or 84.3 AFA	5/1-11/1 Irrigation,16.2 acre limit	Ground Water	Marty East Well B
31-12296	7/31/1930	7.17 CFS or 2615.7 AFA	5/1 – 11/1 Irrigation, 501.8 acre limit	Ground Water	Marty East Well B
31-12297	10/14/1940	.31 CFS or 114.6 AFA	5/1-11/1 Irrigation, 40 acre limit	Ground Water	Marty East Well A
31-12298	10/14/1940	9.69 CFS or 3554.9 AFA	5/1 – 11/1 Irrigation, 1240 acre limit	Ground Water	Marty East Well A
		80 Shares of Owsley Canal Company Water; 1 share = 2 acre feet of water		Mud Lake Water Users Canal System	West Ag. Fields Water
		240 Shares of Mud Lake Water Users Stock		Mud Lake Water Users Canal System (Camas Creek)	Green Island and South Pasture Water

X. INFRASTRUCTURE

Building/structures
1 residence on South side of WMA (WMA Headquarters)
1 garage associated with South side residence
1 residence on North side of WMA
1 garage associated with North side residence
24' x 36' steel storage building
1 concrete shop and storage shed
5 steel grain storage silos (2 on North WMA and 3 at Marty corrals)
1 wooden storage shed (North side compound)
1 open 50' by 20' concrete and metal storage shed (Marty corrals)
2 picnic pavilions (one each at North and South boat ramps)

Roads and trails
18 miles of road
4 miles of trails

Boat Ramps (maintained ramps for trailered watercraft)
2 boat ramps (North and South Boat Ramps – these are maintained primarily by the Access Program)

Fences
22.70 miles of fence

Information Kiosks
There are 5 primary informational kiosks across MDWMA (Southwest entrance, East Entrance, Marty, Green Island, and South Boat Ramp)

Campsites
2 approved and developed campsites - each has a vault toilet, shelter, and steel fire rings

Traffic Counters (3 counters)
Mud Lake WMA monitors visitor use traffic at 4 locations (Southwest entrance, East entrance, South Dike road, and South Boat Ramp – the Access Program monitors the South Boat Ramp)

Irrigation Pivots
2 center pivot irrigation lines

Irrigation Wheel Lines
8 shaft driven irrigation wheel lines

Hand Irrigation Line
175 pieces of 4" hand irrigation line

Water Control Structures
8 water control structures in the West Sloughs wetland complex
There are numerous water control structures associated with the Marty Tract, but there will be significantly more installed during the 2014 and 2015 Fiscal Years. **This section will be updated after these improvements are made.*

Water Delivery Ditch
14.78 miles of water delivery ditch (Green Island = 1.4, Camas East Segment = 3.07, Camas West Segment = 4.86, Marty Sheep Shed Main Ditch = 1.75, Marty Camas East A and B Main Ditch = 1.2, NAG Delivery Ditch = 1.1, Jernberg Delivery Ditch = 1.4) **These ditch totals are for the main delivery ditches only, there are substantially more arterial ditches across MDWMA, especially on the Marty North Uplands parcel. The WRP Project and RFP Project on the Marty Tract will likely modify many of the ditches on these acres.*

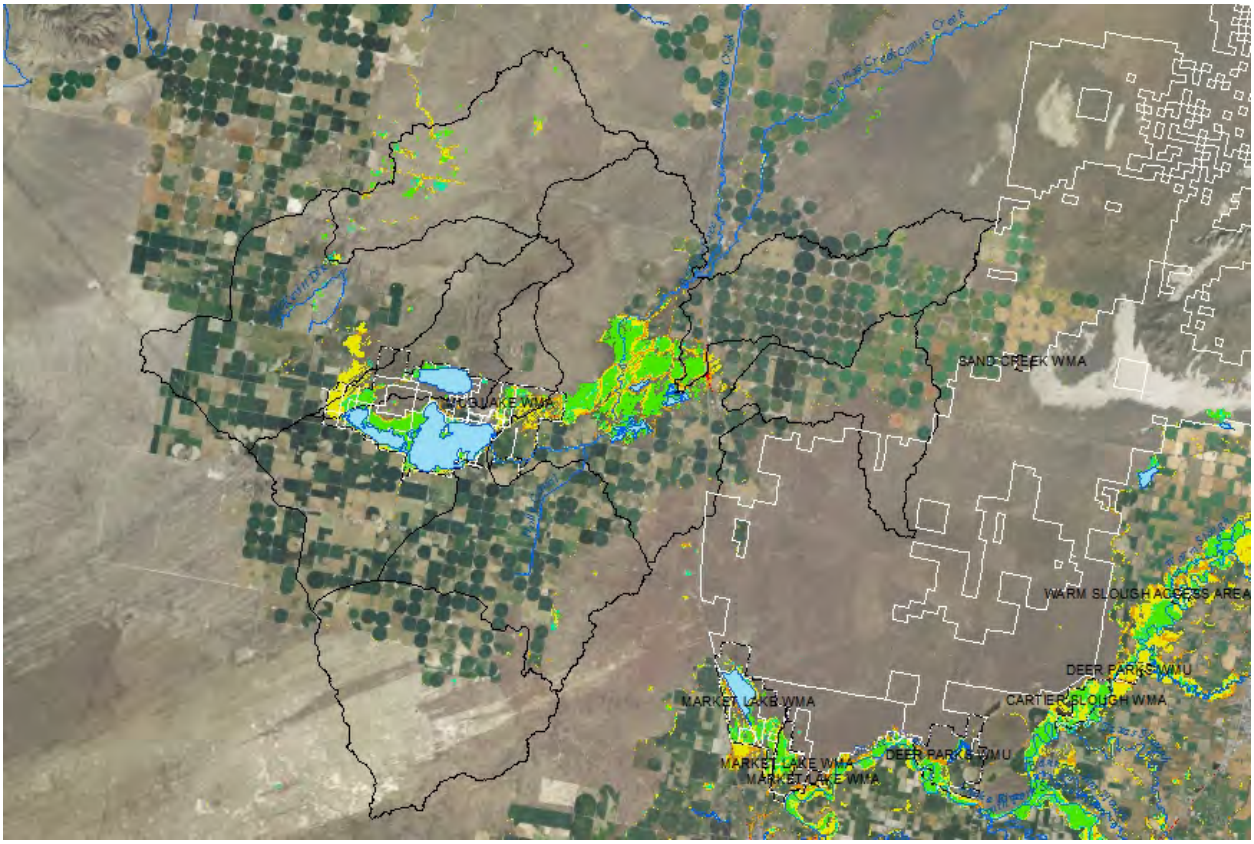
Buried Irrigation Delivery Pipe, including mainline from Farm Pond
1 mile of buried water delivery pipe

Irrigation Pumps
5 lift pumps (Jernberg, B-Well, Sheep Shed, East Camas A and B)
1 Irrigation Pump (Farm Pond)
2 drain pumps (West Ag. Fields and Green Island)
*****For detailed information on the pumps and wells on MDWMA consult the files that hold this information.

Piezometers (water level monitoring)
4 piezometers located in the West Sloughs

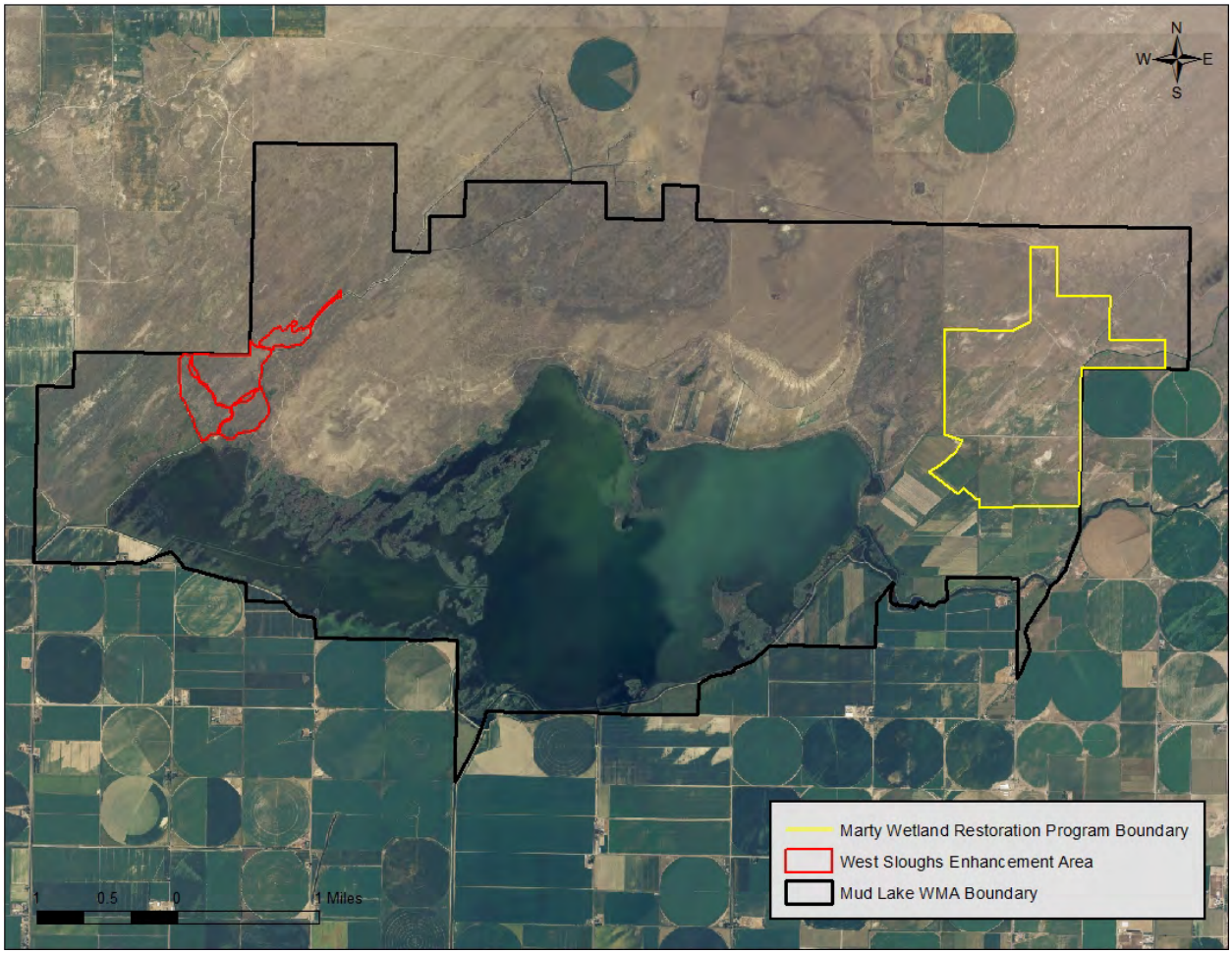
Peregrine Hack Tower
1 peregrine falcon hack tower in the Northwest corner of the MDWMA

XI. DETAILED WETLAND HABITAT ACROSS MUD LAKE AREA



Map of ecological system type composition of Mud Lake WMA

XII. WEST SLOUGHS AND MARTY WETLAND MANAGEMENT AREAS



MUD LAKE

WILDLIFE MANAGEMENT AREA PLAN

Approval

Submitted by:

Curtis Hendricks, Habitat Biologist

Reviewed by:

Terry Thomas, Regional Habitat Manager

Steve Schmidt, Regional Supervisor

Sal Palazzolo, Bureau of Wildlife

Tom Hemker, State Habitat Manager

Approved by:

Virgil Moore, Director