Amended Environmental Assessment

Public Hunting

On

Moosehorn National Wildlife Refuge
Baring Plantation, Calais, Charlotte, Edmunds, Meddybemps and Pembroke

Washington County, Maine

April 2007

U.S. Department of the Interior
Fish and Wildlife Service
Moosehorn National Wildlife Refuge
103 Headquarters Road Suite 1
Baring, ME 04694

UNITED STATES FISH AND WILDLIFE SERVICE
ENVIRONMENTAL ACTION STATEMENT

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA), and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and have determined that the action of **Implementation of the Preferred Alternative for Moosehorn National Wildlife Refuge's Public Hunting Program, as described in the Finding of No Significant Impact:**

Check One:

	is a categorical exclusion as provided by 516 DM 2, Appendix 1. No further NEPA documentation will therefore be made.
X	is found not to have significant environmental effects as determined by the attached environmental assessment and finding of no significant impact.
	is found to have significant effects and, therefore, further consideration of this action will require a notice of intent to be published in the Federal Register announcing the decision to prepare an EIS.
	is not approved because of unacceptable environmental damage, or violation of Fish and Wildlife Service mandates, policy, regulations, or procedures.
	is an emergency action within the context of 40 CFR 1506.11. Only those actions necessary to control the immediate impacts of the emergency will be taken. Other related actions remain subject to NEPA review.

Other supporting documents (list):

Signature Approval:

1. 04/23/07
Originator — Date

2. 4/25/07
WO/RO Environmental Coordinator — Date

3. 4-27-07
Acting Regional Chief, National Wildlife Refuge System — Date

4. 4-27-07
Acting Regional Director — Date

Finding of No Significant Impact
Moosehorn National Wildlife Refuge
Hunt Plan

The Draft Hunt Management Plan and Environmental Assessment of February 2007 for Moosehorn National Wildlife Refuge (NWR) evaluated three management alternatives , carefully considering their impacts on the environment, and their potential contribution to the mission of the National Wildlife Refuge System, and the refuge's purposes and goals. A brief summary of the three alternatives follows.

Alternative A: Under this alternative the Refuge would be closed to all hunting. This alternative would displace the individuals who have historically hunted on Refuge lands. The Service does not anticipate any economic effects resulting from this alternative since displaced hunters would likely continue to hunt in the general area surrounding the Refuge, and continue to use traditional services (i.e. fuel and supplies). Likewise the Service does not anticipate significant effects to the resident wildlife populations as individuals are free to move on and off Refuge property.

While closing the Refuge to hunting may not have a significant effect on an individual's ability to hunt in this region, it may have a significant effect on community relations with the Service. Hunting is a very strong tradition in this part of the State, and a limited number of local residents have questioned the Refuge about allowing hunting on Refuge lands.

This alternative is not consistent with Service policy or the National Wildlife Refuge Improvement Act. It also diminishes the Refuge's ability to manage wildlife populations.

Alternative B: This alternative was the Service's Proposed Action in the Hunt Management Plan and Environmental Assessment. It expands the current hunting program by allowing the hunting of migratory birds, upland game, and black bear, bobcat, eastern coyote, moose and white-tailed deer on portions of both divisions of the Moosehorn NWR. Less than 40 percent of Refuge lands would be open to the hunting of migratory game birds.

The proposed hunting program is consistent with the purposes for which the Refuge was established; Service policy on hunting; the National Wildlife Refuge Improvement Act of 1997; and the broad management objectives of the National Wildlife Refuge System.

The Service does not anticipate any adverse effects to the endangered and threatened species that utilize the Refuge. Through a preventive law enforcement program, including a free permit system, hunters would be advised of the possible presence of endangered and threatened species. The majority of other species of management to the Refuge are not present during the hunting seasons. No hunting would be permitted after March 31.

Alternative C: This was the No Action Alternative in the Draft Environmental Assessment

required by the Council of Environmental Quality's regulations on implementing the National Environmental Policy Act. Under this alternative , there would be no change from our current hunting program. The existing hunting program for white-tailed deer would continue.

The Draft Hunt Management Plan and Draft Environmental Assessment was distributed for a 14 day comment period from March 15, 2007 to March 15, 2007. After consideration of all public comments, I determined that this Environmental Assessment was sufficient to support my findings.

After careful review of the proposed management actions, and based on the analysis provided in the EA and comments received during the review period, I have selected Alternative B (the Service's Proposed Action in the Draft EA) for implementation.

I have selected Alternative B because it helps fulfill the mission of the National Wildlife Refuge System; best achieves the refuge's purposes, visions and goals; and is consistent with principles of sound fish and wildlife management and the National Wildlife Improvement Act of 1997.

I find that the implementation of Alternative B will not have a significant impact on the quality of the human environment in accordance with Section 102(2) c of the National Environmental Policy Act. It adheres to all legal mandates and Service policies. As such, I have concluded than an Environmental Impact Statement is not required, and this Finding of No Significant Impact is appropriate and warranted.

4-27-07

Acting

Marvin Moriarty
Regional Director
U.S. Fish and Wildlife Service
Hadley, Massachusetts

Date

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people.

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

National Wildlife Refuge System Improvement Act of 1997

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ENVIRONMENTAL ASSESSMENT ON PUBLIC HUNTING

PROPOSED ON MOOSEHORN NATIONAL WILDLIFE REFUGE

As a result of a 2003 lawsuit filed by the Fund for Animals, the U.S. Fish and Wildlife Service (Service) is required to amend environmental assessments that describe hunting programs at sixteen national wildlife refuges located in the Northeast Region. The amended environmental assessments will address the cumulative impacts of hunting at all refuges which were named in the lawsuit. This document addresses the hunting programs at Moosehorn National Wildlife Refuge in Maine.

A expanded hunting program at Moosehorn National Wildlife Refuge was first proposed in the *Environmental Assessment Public Hunting On Moosehorn National Wildlife Refuge Washington County, Maine, January 2005* Following a public comment period, the expanded hunting program was initiated in Fall 2005.

The remainder of this document details the hunting program alternatives that were developed and finalized in the 2005 EA. Cumulative impacts of the current hunting programs at Moosehorn National Wildlife Refuge will be addressed following a description of the alternatives that were first proposed in 2005.

I. Purpose and Need for Action

The purpose of this assessment is to discuss the environmental effects of expanding an existing annual hunting program at Moosehorn National Wildlife Refuge (Refuge) in Baring Plantation, Calais, Charlotte, Edmunds Township, Meddybemps, and Pembroke in Washington County, Maine.

Moosehorn was officially established as a national wildlife refuge on July 1, 1937. The Refuge has continued to acquire lands from willing sellers, and now includes two mainland divisions and 5 islands. Public use on the land prior to acquisition by the Service has varied significantly among the parcels. The islands receive little if any public visitation, while the two mainland units have a long tradition of public access, including hunting. Prior to acquisition by the Service, access to much of the mainland property was regulated by State wildlife laws and regulations, and the personal wishes of the private owners. During recent acquisition meetings and landowner contacts many individuals have indicated they wanted the land to remain open to hunting, once it became part of the Refuge.

Continuation of traditional uses on lands incorporated into the Refuge is subject to a compatibility determination by the Refuge, to ensure that the use would not conflict with other Refuge objectives. This assurance adheres to the Service policy concerning hunting (Refuge Manual, Chapter 8, paragraph 5.3) which requires consideration of the following criteria and standards:

(1) Compatibility with the purposes for which the Refuge was established, the goals of

the Refuge, and the overall objectives of the National Wildlife Refuge System,

(2) Biological soundness,

(3) Economic feasibility, and

(4) Recreational opportunities, including a consideration of the effects of excessive demand on the quality of the hunting experience and public safety.

In addition, the National Wildlife Refuge System Improvement Act of 1997 states that the National Wildlife Refuge System was created to conserve fish, wildlife, and plants and their habitats "... providing Americans opportunities to participate in compatible wildlife-dependent recreation, including fishing and hunting, on Service lands and to better appreciate the value of, and need for, fish and wildlife conservation." The Act defines compatible wildlife-dependent recreation as a "legitimate and appropriate general public use of the System." It establishes hunting, fishing, wildlife observation and photography, and environmental education and interpretation as "priority public uses" where compatible with the mission and purpose of individual national wildlife refuges.

Through this environmental assessment, the Service intends to assess the environmental impact on increased hunting on the Refuge in order to provide a decision on expanding the existing hunting program prior to the fall 2005 hunting seasons. The Refuge is currently only open to the hunting of white-tailed deer during the State of Maine archery, firearms and muzzleloader seasons.

II. Proposal

The U.S. Fish and Wildlife Service (Service) proposes to expand a public hunting program at Moosehorn National Wildlife Refuge. The Service proposes to open portions of the Refuge to the hunting of migratory game birds and waterfowl, small and big game. The hunting program will be conducted in accordance with State and Federal regulations, National Wildlife System regulations contained in Title 50 of the Code of Federal Regulations (50 CFR), and refuge-specific hunting and public use regulations also contained in 50 CFR.

III. Location

Moosehorn NWR is in the eastern tip of Maine, in Washington County. The Refuge has two divisions, the 20,027-acre Baring Division about four miles southwest of Calais, Maine, and the 8,871-acre Edmunds Division about four miles south of Dennysville Maine, directly adjacent to Dennys and Cobscook Bays along U.S. Highway 1. Within the Refuge, 7,462 acres are designated as Wilderness Areas: 4,680 acres on the Baring Division and 2,782 on the Edmunds Division. The refuge is named for Moosehorn Stream, a waterway within its boundaries. Moosehorn's landscape is varied, with rolling hills, large ledge outcrops, fresh and saltwater marshes, blueberry barrens, streams, bogs, cedar swamps, old hayfields, and cobble beaches. A

mixed forest of aspen, maple, birch, spruce, and fir dominates the upland. Scattered stands of tall white pine are common. The Edmunds Division includes more than 18 miles of rocky shoreline along Dennys and Whiting Bays in Cobscook Bay with tidal fluctuations up to 24 feet twice a day.

Moosehorn contains 4,401 acres of wetlands ranging from open water lakes to emergent marshes. There are 54 managed impoundments or flowages on the refuge. Many of these were likely once beaver flowages or small streams. Numerous dikes and water control structures were built in the 1950s.

IV. Alternatives Including Proposed Action

During the planning process, three alternatives, including the proposed action and the no action alternatives, were developed. The alternatives are:

A. Alternative 1 – Refuge Closed to All Hunting
The Refuge closes to all hunting. Under this alternative the Refuge would discontinue the existing hunting program for white-tailed deer. The Refuge would be closed to all hunting.

B. Alternative 2 - Proposed Action
Under this alternative the Refuge would expand available hunting opportunities. Hunting of American woodcock, Wilson's snipe, ruffed grouse, waterfowl, snowshoe hare, red squirrel, gray squirrel, skunk, woodchuck, porcupine, raccoon, red fox, bobcat, eastern coyote, black bear, white-tailed deer (archery, firearms and muzzleloader), and moose would be permitted on designated parts of both divisions of the Refuge.

The lands within Moosehorn NWR can be classified into four different categories based on this proposal to modify the hunt program. Hunt Permits and maps of all areas open to hunting will be available at the Refuge office and designated locations. (See Figures 3 and 4). **Hunting will not be permitted April 1 through August 31.**

1. Closed to all hunting:

Cobscook Bay State Park on the Edmunds Division, and posted "No Hunting" and/or Safety Zones on the Baring Division. These areas are described in our Refuge Specific Regulations.

2.Open to hunting of American woodcock, Wilson's snipe, ruffed grouse, waterfowl, snowshoe hare, red squirrel, gray squirrel, skunk, woodchuck, porcupine, raccoon, red fox, bobcat, eastern coyote, black bear, white-tailed deer (archery, firearms and muzzleloader), and moose during seasons established annually by the State of Maine:

Edmunds Division and that part of the Baring Division lying west of State Route 191. Black Bear and Wilson's snipe may be hunted during state prescribed seasons from October 1 to the close of the State season. Eastern coyotes, red squirrel, woodchuck, and porcupine may be hunted from October 1 through March 31, annually.

3. Open to waterfowl hunting:

Edmunds Division:

That portion of the Edmunds Division that lies north of Hobart Stream and west of US Route 1; refuge lands that are east of US Route 1; and refuge lands that lie south of South Trail. Waterfowl hunting will **not be permitted** at the Nat Smith Marsh and Fields and Bill's Hill Fields and Ponds.

Baring Division:

That portion of the Baring Division lying west of State Route 191.

4. Open to white-tailed deer hunting:

That portion of Baring Division that lies east of Route 191during State of Maine Archery, Firearms and Muzzleloader Seasons.

Black bear and eastern coyote may also be hunted on this area during the deer seasons. During the archery deer season hunters may only use legal archery equipment.

All hunts will be conducted in accordance with State and Federal regulations, with the exception of the following "refuge specific" regulations:

1) "the unauthorized distribution of bait and the hunting over bait is prohibited on wildlife refuge areas" (50 CFR, 32.2(h)).

2) Dogs may be used to hunt any legal species, consistent with state regulations, except deer and moose. Dogs must be under control of the hunter at all times.

3) The Refuge prohibits the use of any permanent tree stands, including the insertion of metallic or ceramic objects in a tree for the purpose of erecting a ladder or tree stand (50 CFR 32.2(i)). Temporary tree stands are allowed, but must be clearly labeled with the names, addresses, phone numbers and hunting license numbers of individuals using them. All stands must be removed by the last day of the white-tailed deer hunting season.

4) Permanent waterfowl blinds may not be erected on the Refuge. All temporary blinds, concealment materials, boats, and decoys must be removed at the end of each day.

5) Cutting or destruction of Refuge vegetation is prohibited (50 CFR 27.51).
6) Falconry is not permitted on the Refuge.

7) During the hunting seasons, hunters are allowed to enter the Refuge 2 hours prior to legal shooting hours and remain on the Refuge 1 hour after legal shooting time, except for hunters pursuing eastern coyote or raccoon at night.

8) During the firearms big game seasons, hunters must wear in a conspicuous manner on head, chest and back a minimum of 400 square inches of solid-colored hunter orange clothing or material.

9) Hunters may possess only approved nontoxic shot while in the field (this requirement does not apply to single-projectile ammunition).

10) Any hunter who kills a bear, deer, or moose on Refuge lands must notify the Refuge Office in person, or by phone, and make the animal available for inspection by refuge personnel.

11) Hunting is not permitted in the following areas:

i. The South Magurrewock Area: The boundary of this area begins at the intersection of the Charlotte Road and U.S. Route 1; it follows the Charlotte Road in a southerly direction to a point just south of the fishing pier and observation blind, where it turns in an easterly direction, crossing the East Branch of the Magurrewock Stream, and proceeds in a northerly direction along the upland edge of the Upper and Middle Magurrewock Marshes to U. S. Route 1 where it follows Route 1 in a southerly direction to the point of origin.

ii. The North Magurrewock Area: The boundary of this area begins where the northern exterior boundary of the refuge and Route 1 intersect; it follows the boundary line in a westerly direction to the railroad grade where it follows the main railroad grade and refuge boundary in a southwest direction to the upland edge of the Lower Barn Meadow Marsh; it then follows the upland edge of the marsh in a southerly direction to U.S. Route 1, where it follows Route 1 to the point of origin.

iii. The posted safety zone around the Refuge Headquarters Complex: The boundary of this area starts where the southerly edge of the Horse Pasture Field intersects with the Charlotte Road. The boundary follows the southern edge of the Horse Pasture Field, across the abandoned Maine Central Railroad grade, where it intersects with the North Fireline Road. It follows the North Fireline Road to a point near the northwest corner of the Lane Construction Tract. The line then proceeds along a cleared and marked trail in a northwesterly direction to the Barn Meadow Road. It proceeds south along the Barn Meadow Road to the intersection with the South Fireline Road, where it follows the South Fire line Road across the Headquarters Road to the intersection with the Mile Bridge Road. It then follows the Mile Bridge Road in a southerly direction to the intersection with the Lunn Road, then along the Lunn Road leaving the road in an easterly direction at the site of the old crossing, across the abandoned Maine Central Railroad grade to the Charlotte Road (directly across from the Moosehorn Ridge Road gate). The line follows the Charlotte Road in a northerly direction to the point of origin.

iv. The Southern Gravel Pit: The boundary of this area starts at a point where Cranberry Brook crosses the Charlotte Road and proceeds south along the Charlotte Road to the Baring/Charlotte Town Line, east along the Town Line to a point where it intersects the railroad grade where it turns in a northerly direction, and follows the railroad grade to Cranberry Brook, following Cranberry Brook in a westerly direction to the point of origin.

5. <u>Additional Refuge Regulations:</u>

Vehicular Access

Traditionally, gates on both divisions of the Refuge have been opened during the firearms deer season to permit vehicular access to the area's interior. This practice will be continued in the immediate future and will be evaluated on an annual basis as part of the Annual Hunting Program Proposal.

Registration

We require every hunter to possess and carry a personally signed refuge hunting permit. Permits and regulations are available from the Refuge in person during normal business hours (8:00 a.m. -- 4:30 p.m. Monday – Friday; closed holidays), or by contacting the Project Leader by telephone (207-454-7161) or mail (Moosehorn National Wildlife Refuge,103 Headquarters Road, Baring, ME 04694).

Hunters must complete a Hunter Information Card and submit it by mail or in person at the Refuge Headquarters no later than two weeks after the close of the hunting season in March, annually; failure to comply with this requirement may result in suspension of future hunting privileges on Moosehorn National Wildlife Refuge.

Hunters who will use trailing dogs to pursue black bear, bobcat, eastern coyote, or raccoon must register with the Refuge Office prior to hunting on refuge lands. Hunters who wish to pursue eastern coyote or raccoon after day time hunting hours must obtain a special use permit from the Refuge Office.

Non-toxic Shot

Hunters may possess only approved non-toxic shot when hunting migratory game birds and when using a shotgun to hunt upland species; this regulation does not apply to single-projectile ammunition.

Documentation of Decisions

The process of determining which species of wildlife could be hunted in the various parts of the Refuge included collaboration with a number of individuals, including Fish and Wildlife Service, US Geological Survey, and Maine Department of Inland Fisheries and Wildlife staff biologists, and several interested parties including people who hunted some areas prior to their acquisition by the Refuge.

Core Research Area

That portion of the Baring Division that lies east of State Route 191 contains the core American woodcock research area. The Refuge's population of woodcock and the impact of various habitat management actions have been studied on this area for over 25 years. Expanding the hunting program, beyond that which is proposed, would jeopardize future research opportunities of a non-hunted population in this area. Additional disturbance during the months of September and October has the potential to alter the behavior of woodcock and other species of interest. Under the preferred alternative, the maximum of 40 percent of the Refuge's acreage would be open to the hunting of migratory game birds.

Cobscook Bay State Park

An 868-acre parcel in the southeast corner of the Edmunds Division has been managed under a Cooperative Management Agreement, by the Maine Department of Conservation since 1965 as Cobscook Bay State Park. Due to safety considerations and the relatively small size of the park, it is closed to hunting. Under the preferred alternative, it will remain closed until such time as the current agreement is terminated or modified.

Bear Hunting and Trapping

The trapping of bears is not addressed in this plan. It will be discussed when the existing Refuge Trapping Plan is revised.

The use of bait is prohibited on National Wildlife Refuges (50CFR 32.2(h)). Hunting bears with the use of bait cannot be permitted on Moosehorn National Wildlife Refuge.

Under the preferred alternative the hunting of bears with trailing dogs and by the stalking method will be permitted from October 1 to the close of the State season on that portion of the Baring Division west of State Route 191, and all of the Edmunds Division except Cobscook Bay State Park. Bears can also be hunted during the State Archery and Firearms Seasons on that part of the Baring Division that lies east of State Route 191.

Moose Hunting

Under the preferred alternative, moose hunting will be permitted on that portion of the Baring Division that lies west of State Route 191, and all of the Edmunds Division except

Cobscook Bay State Park. Under the preferred alternative, that portion of the Baring Division that lies east of State Route 191 would be closed to moose hunting. The moose hunting season for Wildlife Management Districts (WMD) 27 and 28, which includes both divisions of the Refuge, is usually the second week in October (Oct. 8-13, in 2007). As previously discussed in the above section, this is a time that is popular with Refuge visitors seeking wildlife and scenery to view.

Based on observations by the Refuge's biological staff, and conversations with the State's Regional Biologist, the size of the Refuge's moose population is believed to be small and can change over time as the animals can move on and off the refuge at will.

Although the moose population in this part of the State has not been surveyed, the success rate of hunters can be used as an index to the moose population in Wildlife Management District (WMD) 29, which used to include all Refuge lands. As an example, in 2003 there were 25 bull-only permits issued for WMD 29; only 8 hunters were successful, which translates to a success rate of 32%. The state-wide average success rate during 2003, for all seasons and permits was 80% (MDIFW 2004).

In 2005 MDIFW reduced the number of Wildlife Management Districts from 30 to 29. Prior to that time all of Moosehorn NWR was in WMD 29. With the new system, all of the Edmunds Division and that part of the Baring Division east of the abandoned railroad track are in WMD 27; the remainder of the Baring Division is within WMD 28.

Well over half of the people that visit the Moosehorn NWR inquire about where they can find a moose. From a public use standpoint, it is desirable to have an area on the Refuge where the moose are not hunted so that people would have a chance to view moose in the absence of hunting. Wildlife observation is also a priority public use, and this alternative provides opportunities for both those interested in hunting moose, and those who are interested in viewing and /or photographing the animal in its natural habitat.

It should also be noted that there are large tracts of land near the Refuge that are open to moose hunting and moose viewing that may provide better opportunities for hunting and viewing than refuge lands do. There are a relatively small number of moose hunting permits issued for WMD 27 and 28 (formerly WMD 29) each year (30 permits in 2004).

Deer Hunting

Under the preferred alternative, with the exception of safety zones, the Refuge will remain open to the hunting of white-tailed deer during the State of Maine archery, firearms, and muzzleloader seasons.

Eastern Coyote Hunting

Under Maine Law, there is no closed hunting season on eastern coyote during daylight hours. In the past hunters have expressed an interest in being able to legally shoot a coyote if they encountered one while deer hunting. Under the preferred proposal, we

would allow hunting of eastern coyotes during the archery, firearms, and muzzleloader deer seasons, during daylight hours on that portion of the Baring Division that lies east of Route 191. On the remainder of Refuge lands open to hunting, coyotes may be hunted from October 1 to March 31, annually.

Refuge research, monitoring and maintenance and public use activities begin to increase around April 1. Year round hunting was not proposed in order to minimize conflicts with other user groups and Refuge work.

Upland Game Birds: Ruffed Grouse

Under the preferred alternative ruffed grouse may be hunted on the entire Edmunds Division except Cobscook Bay State Park, and that part of the Baring Division that lies west of State Route 191. Grouse hunting was not proposed for that part of the Baring Division that lies east of State Route 191 for the reasons stated in the "Core Research Area" paragraph above.

Ruffed grouse populations respond well to the habitat management practices used to create early successional habitat for woodcock and other species. Both the Baring and Edmunds Grouse Hunting Areas should provide a quality experience for those who seek this species.

Hunters are required to use non-toxic shot while hunting this species.

Migratory Game Birds: American Woodcock and Wilson's Snipe

American woodcock and Wilson's snipe may be hunted on that part of the Baring Division that lies west of State Route 191 and all of the Edmunds Division except Cobscook Bay State Park. That part of the Baring Division that lies east of State Route 191 will be not be open for the hunting of snipe or woodcock because it contains the Core Research Area.

A maximum of 40 percent of the Refuge's total area may be open to the hunting of migratory birds. The open areas described above contain 40 percent of the Refuge's current acreage. The areas open to the hunting of these species contain some excellent woodcock habitat which has resulted from forest management for this species. Based on annual singing ground surveys, woodcock numbers near managed parts of the refuge are significantly higher than those on un-managed areas. Hunters should have good opportunity to encounter game.

Hunters will be required to use non-toxic shot while hunting these species.

Migratory Game Birds: Waterfowl – Ducks and Geese

Under the preferred alternative that portion of the Baring Division west of State Route 191 and portions of the Edmunds Division would be open to waterfowl hunting during the State of Maine seasons.

Parts of the Edmunds Division that will be open to waterfowl hunting are primarily recent acquisitions. During the development of the most recent Land Protection Plan, verbal commitments were made to maintain traditional uses of lands acquired for the refuge, to the extent possible. Most of the parcels that abut Dennys Bay and Hobart Stream were traditionally hunted prior to Refuge ownership.

All refuge lands east of U.S. Route 1, and those areas north of Hobart Stream and west of Route 1 would be open to waterfowl hunting. Refuge lands south of South Trail would also be open. Two areas, Nat Smith Marsh and Field, and Bill's Hill Fields and Ponds, will be closed to waterfowl hunting due to their proximity to private residences and county roads.

The Nat Smith Marsh will also serve as a sanctuary area for waterfowl that are hunted along the shore of Dennys Bay. It is a former tidal marsh and is utilized by a variety of shore and wading birds during fall migration. The Bill's Hill Fields and Ponds will also serve as a sanctuary area. Both ponds contain extensive stands of wild rice that can attract over 125 black and wood ducks during fall migration.

Waterfowl hunting was not proposed for the six impoundments that lie along the Weir Road and Crane Mill Road at Edmunds. These impoundments are small and do not hold large numbers of waterfowl during the fall, based on observations of refuge biological staff and volunteers. These impoundments are important for pre-hunting season banding of waterfowl, which is conducted in conjunction with bait in August and September. Trapping waterfowl in late September using bait would interfere with legal hunting of waterfowl, and conversely allowing waterfowl hunting on the site in early October would conflict with the refuge's banding program, as it is not legal to hunt waterfowl on a site until 10 days after the last bait has been removed.

Under the preferred alternative hunters will have the opportunity to pursue Canada geese during both the early (September) and regular goose seasons in the coastal areas, interior wetlands, and the upland fields near Hobart Stream. That portion of the Edmunds Division south of South Trail and the Baring Division west of State Route 191 contain several ponds and beaver flowages that attract wood ducks, teal and black ducks during the early part of the waterfowl season.

During the later part of the waterfowl season, hunters would continue their tradition of hunting black ducks, bufflehead, and other species along the shore of Dennys Bay. Those areas closed to waterfowl hunting would provide a "refuge" for waterfowl, as well as an opportunity for those visitors interested in wildlife observation and photography to view and photograph waterfowl in their natural habitats in the absence of hunting.

Other Species

Under Maine State Law there are several other species that occur on the Refuge that may be hunted. These include red squirrel, gray squirrel, snowshoe hare, bobcat, raccoon, red fox, skunk, and porcupine.
The Edmunds Division and that part of the Baring Division that lies west of Route 191 will be open to the hunting of these species, however hunting on Refuge lands will not be permitted after during April 1 through August 31, annually.

C. Alternative 3
Maintain existing program - the Refuge would remain open to the hunting of white-tailed deer during the State prescribed archery and firearms seasons.

V. Affected Environment

A. Brief History, Purpose, and Objectives of the Refuge

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. In accordance with this mission, the Service has identified broad objectives of the National Wildlife Refuge System under which Moosehorn NWR operates. These are:

1) To preserve, restore, and enhance in their natural ecosystems all species of animals and plants that are endangered or threatened on lands of the National Wildlife Refuge System.

2) To perpetuate the migratory bird resource for the benefit of the people.

3) To preserve the natural diversity and abundance of mammals and non-migratory birds on refuge lands.

4) To provide understanding and appreciation of fish and wildlife ecology and our role in the environment, and provide refuge recreational experiences oriented toward wildlife to the extent these activities are compatible with the purpose for which the refuge was established.

The National Wildlife Refuge System Improvement Act of 1997 established six priority public uses, where compatible, of Refuges. These include: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. The Service has gone on further to define specific objectives for Moosehorn NWR.

The refuge is guided by following objectives listed in a Master Plan released to the public in 1971:

To develop, test, and demonstrate woodcock management techniques and practices.

To produce as many ducks as practical by maintaining good quality waterfowl habitat.

To preserve and manipulate habitat to maintain optimum populations of all wildlife indigenous to the refuge.

To provide wildlife-oriented recreation and environmental education programs and facilities.

To preserve the scenic and natural features of the refuge that reflect the beauty and charm of the area.

To protect and manage wilderness in accordance with the Wilderness Act of 1964.

B. Environment and Land Use

The Refuge is an ecologically diverse complex, providing both food and shelter to a tremendous variety of resident and migratory species. Habitats found on the Refuge include: red and white spruce forests, balsam fir stands, mixed hardwoods, white and red pine stands, blueberry fields, old hayfields, cedar swamps, fresh and saltwater marshes, raspberry thickets, grass- and shrub-covered islands, granite- lined shores and cobble beaches. The intertidal areas adjacent to the Edmunds Division provide excellent foraging areas for both waterfowl and shorebirds. In recent years, Refuge efforts have focused on land acquisition, obtaining additional biological information on both mainland and island properties, and providing high quality wildlife habitat.

In the past, the primary consumptive uses of the Refuge lands prior to acquisition have included hunting, timber harvesting, and berry picking. The primary game species sought were white-tailed deer, ruffed grouse, woodcock, and a variety of waterfowl species. The blueberry fields on the Baring Division have long provided local residents a place to pick organically grown berries. Non-consumptive uses of the Refuge and areas surrounding the Refuge include hiking, bird watching, wildlife viewing, kayaking, and environmental education.

C. Physical Resources

1) Geology and Soils

Typical of this part of New England, the rolling Refuge terrain lies between sea level and 480 feet above mean sea level (msl). The relief of the Baring Division ranges from 80 to 480 feet above msl, while the Edmunds Division ranges from sea level to 200 feet above msl. The rolling hills, large rock outcrops, and stream valleys reflects the impacts of the late Pleistocene Wisconsin glaciation. Glacial deposits of till, outwash, and marine clay underlie the local soils. Bedrock is exposed in less than 2% of the area.

Soils vary from sandy loam to clay and peat (Table 1). The two major soil associations include Lyman-Scantic-Peru group and the Marlow-Peru-Lyman group. The deep, well-drained, stony Marlow soils and the shallow, well-drained Lyman soils occur on crests and upper slopes of ridges. Peru soils are deep, moderately well drained, and developed in very firm glacial till. The deep, poorly drained Scantic soils have a seasonal high water table and are considered wetland soils (USFWS 1990).

Information in Table 1 was obtained from a digital soils map of Washington County, Maine provided by the Natural Resource Conservation Service. The published soil survey is still being complied. Data for Moosehorn NWR were extracted using ESRI ArcMap Geographic Information System software. The fifteen most common soil types for each Division of the Refuge are listed below in order of their extent. A total of 54 soil types occur on the Baring Division and 44 have been identified at Edmunds.

2) Hydrology

Moosehorn NWR contains 4401acres of wetlands ranging from open water lakes to emergent marshes. The Refuge has 54 managed impoundments or flowages. Many of these were likely once beaver flowages or small streams. Numerous dikes and water control structures were built in the 1950s to benefit nesting and migrating waterfowl, particularly American black duck. The Refuge has 18 miles of rocky shoreline along Denny's and Whiting Bays and 7 miles of shoreline on Meddybemps Lake. Portions of both Divisions (Baring and Edmunds) are within the Denny's River Watershed; the Denny's is a high priority river for Atlantic salmon recovery. Moosehorn is a breeding and migratory resting stop for many waterfowl, wading birds, shorebirds, and songbirds. Bald eagle and osprey nest on the Refuge. Nearly one-third of the Refuge is designated as federal wilderness.

Rivers, Streams and Riparian Areas

Riparian areas are adjacent to water bodies and non-forested wetlands and are often areas with high species richness with dynamic and complex biophysical processes. Riparian areas along rivers provide important structural components including large nest and roost trees for eagles and osprey and cavity trees for wood ducks, hooded mergansers, and songbirds. Riparian areas often contain a mix of native shrubs including alder, elderberry, and viburnum that provide food and cover for nesting and migrating songbirds.

Moosehorn and Magurrewock Streams are the two largest stream drainages in the Baring Division. Hobart Stream is the primary drainage in the Edmunds Division. Moosehorn NWR has approximately 20 streams, 13 of which are large enough to support populations of native brook trout. Several important trout streams, including Cranberry Brook and Mahar Stream, depend on a continual outflow from Refuge impoundments. Fish are an important part of the Refuge's aquatic systems and provide a prey base for bald eagle, osprey, common loon, river otter, and other wildlife. Several impoundments have fishways including Middle Magurrewock, Upper Magurrewock, Tyler Flowage, and

Howard Mill. Anadromous fish, such as Atlantic salmon and alewives are able to make their way into the upper marshes. In the past, alewives from the Denny's River were released in several flowages that don't have fishways (USFWS 1986).

The seven miles of shoreline on Meddybemps Lake within the Refuge provides a critical upland buffer to the largest freshwater lake in the region.

The Refuge assumes complete water rights for all waters within its boundaries, except Vose Pond. Cranberry, Bearce, and Conic Lakes were deeded to the Service by the State of Maine. The Refuge obtained flowage easements from private landowners adjacent to Howard Mill Flowage at Baring, and Burnt Cove Brook and Hobart Lake at Edmunds. An agreement with Maine Central Railroad states that at Lower Barn Meadow the water level will be kept below the top of the existing concrete water control structure (USFWS 1986).

Water from the St. Croix River sometimes backs up into Magurrewock Marsh on the Refuge. It is not known if there have been any negative impacts on Refuge water quality (USFWS 1986).

3) Air Quality

Wildlife, vegetation, water, soil, and visibility are affected by air pollution. Some of these impacts can include ozone injury to vegetation, bioaccumulation of mercury in the food chain, acidification of water and soil, eutrophication of aquatic systems, and impaired visibility. The Clean Air Act requires the USFWS to protect and enhance air quality on Refuges. Wilderness Areas, including those at Moosehorn NWR, are designated Class I air quality areas and afforded the highest air quality protection. Moosehorn NWR maintains an air quality-visibility monitoring station (IMPROVE – Interagency Monitoring of Protected Visual Environments) and sends samples to Crocker Nuclear Laboratory at the University of California, Davis, for processing and analysis. One of the nearby potential sources of air pollution is the paper mill in Baileyville (Woodland), Maine.

The Refuge also maintains a high-resolution digital camera that takes an image every fifteen minutes, which may be viewed over the Internet (www.hazecam.net). This is part of the Hazecam Network that has been established to monitor haze and visibility throughout the northeast. The Refuge began monitoring visibility in 1984 with an 8mm still camera. In 1989, the U.S. EPA formally attributed visibility impairment to the Georgia Pacific paper mill in Baileyville. To establish that the plume from a nearby paper mill was periodically impairing the visibility over the Baring Wilderness Area a time-lapse video camera was installed in 1994. Although no enforcement action was taken, Georgia Pacific modified their process in an attempt to improve visibility (Maurry Mills, Wildlife Biologist, Moosehorn NWR). The time-lapse video camera was operational until 2004 when the Hazecam camera was installed.

There is also an air quality monitoring station at Acadia National Park that is used to document negative impacts to air quality from pollution sources such as power plants, industries, and automobiles. Ground level ozone, mercury bioaccumulation, and acid rain are affecting humans and natural systems in the region. High mercury levels in fish prompted the State of Maine to issue an advisory recommending that certain at-risk people not eat fish from Maine lakes and ponds. In 2001, Acadia National Park recorded 10 days when the air was unhealthy to breathe due to ground level ozone. Moosehorn and Acadia record ozone injury to plants such as black cherry and white pine (USFWS 2004).

There is growing consensus that global climate change is occurring as a result of emissions of carbon dioxide and other greenhouse gases from human activities that may lead to significant impacts across the U.S. including sea-level rise adding stress to coastal communities and ecosystems (Wigley 2004). The effect of climate change on wildlife and habitats is expected to be variable and species specific, with a predicted general trend of ranges shifting northward. Uncertainty about the future effects of climate change requires managers to use adaptive management to maintain healthy ecosystems in light of unpredictability (Inkley et al. 2004).

4) Water Quality

No known land uses upstream of the Refuge adversely impact water quality or quantity on Moosehorn NWR. Effluent from the paper mill in Woodland flows into the St. Croix River and there have been several spills in recent years. Georgia Pacific was fined for a series of spills that occurred between January 1995 and August 2000. Two of these spills were of Kemira UDA, a whitening agent used in the paper making process. On February 13, 2002 a spill of 100,000 gallons of black liquor resulted in the mortality of Atlantic salmon parr at the Milltown, New Brunswick fish hatchery. The most recent spill occurred on July 1, 2004 when 3.5 million gallons of untreated waste was released into the St. Croix River.

The Maine Department of Environmental Protection classifies the waters that flow through or occur on parts of Moosehorn NWR as follows (MEDEP website: www.maine.gov/dep/blwq/docmonitoring/classification/index.htm):

Cobscook Bay estuarine waters = Class SA (highest quality)
Hobart Stream = Class AA (highest quality)
Moosehorn Stream = Class B
St. Croix River = Class C (from Woodland Dam to Tidewater)
Other Tributaries= Class B

Mercury is a heavy metal that is found naturally in small amounts in oceans, rocks, and soil. Mercury is mined from the earth for use in generating electricity, manufacturing consumer products such as lamps, and in other industrial processes. Eventually mercury

is released into the water or air as a byproduct of combustion or through waste disposal (such as a garbage incinerator). Once emitted into the air, mercury can travel for days before deposition through dry particles and gases, rain, or snow. The impact of mercury on humans and the environment depends on whether it converts into the toxic form of methylmercury. This form of mercury, if consumed, bioaccumulates as it moves up the food chain causing various reproductive and neurological problems for fish and wildlife. Mercury does not break down in the environment and is therefore, considered a significant health threat to humans and wildlife (Evers 2005, MEDEP website: http://www.maine.gov/dep/mercury/).

Mercury levels in Maine fish, loons, and eagles are among the highest in North America, and high mercury levels are found in aquatic as well as terrestrial environments (Evers 2005). Since 1994, the Maine Bureau of Health has issued a statewide advisory recommending that pregnant women, women of childbearing age, and young children limit their fish consumption based on the type of fish they consume (MEDEP website: http://www.maine.gov/dep/mercury/). Evers (2005) reported a suite of "biological hotpots' where mercury concentrations are elevated in fish and wildlife that including one in Downeast Maine.

Mercury is high in parts of Downeast Maine for several likely reasons: the region is downwind of the major sources of atmospheric pollution; a history of point source pollution in the area (e.g., tanneries); and several site-specific factors that enhance methylmercury production including high acidity in waterbodies, abundant shoreline wetlands, and small lakes with large watersheds. In addition, fluctuating water levels are now well documented as creating more methylmercury in a wetland ecosystem than stable water levels (David Evers and Chris DeSorbo, Biodiversity Research Institute, personal communication).

Water quality studies in the early 1980s indicated that acid rain had little or no effect on Refuge waters thus far. It is unknown what, if any, mitigating effect the regular liming of dikes has on flowage water pH (USFWS 1986). Evers (2005) documented biological hotspots in aquatic systems in the northeast where mercury in biota exceed levels at which adverse impacts occur. One of the identified hot spots is in Downeast Maine. Elevated mercury levels are found in many animals including fish; aquatic birds forest songbirds, mink, and otter (Evers 2005).

D. Biological Resources

1) Vegetation

Moosehorn NWR and the surrounding region are generally characterized by rolling hills, large rock outcrops, scattered boulders, second-growth northern hardwood-conifer forest, pockets of pure spruce-fir, old hayfields, and cobble beaches. Scattered stands of tall white pine are common. Numerous streams, beaver flowages, bogs, cedar swamps, fresh and saltwater marshes, blueberry barrens, and scrub-shrub and forested wetlands are imbedded within the forested landscape. The Edmunds Division includes more than 18 miles of rocky shoreline along Dennys and Whiting Bays in Cobscook Bay with tidal fluctuations up to 24 feet twice a day.

In 2004, the USFWS contracted with the James W. Sewall Company to conduct aerial surveys and photo interpretation of the land cover types on Moosehorn and other New England NWRs. Table 2 is a compilation of the land cover types identified by Sewall.

Wetlands

The Refuge wetlands, totaling 4,401 acres or 18% of the Refuge, include 4 natural lakes, and dozens of impoundments, beaver ponds, marshes, streams, rivers, and peatlands. There are 54 managed impoundments on the Refuge—45 on the Baring Division and 9 on the Edmunds Division. There are 32 unmanaged natural marshes and bogs on the Refuge. The open-water lakes range in size from 20 to 295 acres.

The wetlands support a mix of open water and aquatic vegetation including sedges, pondweeds, and cattails. Impoundment management has focused entirely on waterfowl and waterbird production with upland management around wetlands aimed at woodcock and other migratory bird breeding habitat, waterfowl foraging habitat (e.g., mowing dikes for Canada goose), grassland bird breeding habitat, and bald eagle and osprey nesting structures. Natural waterfowl foods (e.g., seeds and tubers of wetland plants) were supplemented by seeding of millet and wild rice. Beavers hamper water management efforts in some impoundments by plugging the water control structures. However, beavers impound streams, creating waterfowl and marshbird habitat in some unmanaged areas on the Refuge (USFWS 1986).

Alder and willow species are common wetland shrubs and leatherleaf, sweet gale, and sphagnum moss are abundant bog plants. Forested wetlands are dominated by black spruce, northern white cedar, red maple, cinnamon fern, sphagnum, and some tamarack.

Forests

Mixed hardwood-conifer forests cover much of the Refuge. The deciduous component of the forest includes mixed stands of quaking and bigtooth aspen, paper and gray birch, red maple, American beech, and black cherry. Common understory species include winterberry, bracken fern, sedges, and bunchberry. The conifer component is dominated by mixed and pure stands of spruce and balsam fir. Old growth white pine are scattered throughout (USFWS 1990). Much of the balsam fir on the Refuge succumbed to spruce

budworm outbreak during the late 1970s. In 1985, a wildfire burned about 600 acres in the mid-southern portion of the Edmunds Division, mostly in the Wilderness Area.

In 1979, the Refuge initiated a long-term management plan (through 2020) to increase forest habitat diversity by altering age and species composition, with a primary focus of providing a shifting mosaic of young forest to benefit American woodcock. Timber harvesting and other forest management techniques are used on the Refuge to benefit wildlife and not necessarily to maximize timber yields (USFWS 1985a), and were chosen to demonstrate how small woodlot owners can manage forest wildlife habitat on their own woodlots through timber harvesting. The eight forest management units in the Baring Division total 6,645 acres of which a maximum of 5,159 acres will be harvested by the year 2020, or an average of 130 acres per year; approximately 10,000 acres of woodlands in the Baring Division will be allowed to continue reversion to the natural seral stage.

Five forest management units in the Edmunds Division comprise 3,175 acres. Within each zone merchantable timber stands are harvested on a 40-50-year rotation with 10-year cutting intervals using clearcut blocks of varying sizes. Den trees or other ecologically significant trees left uncut. Most blocks are approximately 5 acres with boundaries 330’ by 660’. Within each management unit, stands or blocks also were designated to be left unharvested. Alder and other non-commercial stands are cut in strips 66’ wide on a 20-year rotation with 5-year cutting intervals (USFWS 1993). Prescribed fire is used to control spruce budworm outbreaks by breaking up large stands of balsam fir and is also used to eliminate heavy slash loads (USFWS 1985a).

In general, the forest is managed to increase or maintain the aspen and alder components. Oak, an uncommon species on the Refuge, is favored through selective cutting. Apple trees are managed to promote fruit production. Active or potential den trees and other unique microhabitats are left uncut. Wilderness Areas, Research Natural Areas, and cedar swamps are not managed (USFWS 1985a).

Early Successional Habitat

The Refuge maintains several blueberry fields, meadows, and pastures as permanent forest openings. Much of the Refuge lands were stripped of all merchantable timber prior to government ownership. The location of the Refuge in the heart of woodcock breeding grounds and along the major migration route provided the impetus for increasing woodcock habitat through experimental habitat manipulation. In the early days of the Refuge, at least 100 clearings were made in strips and plots for singing and feeding grounds. About 10 miles of secondary access roads were created through potential habitat to provide additional feeding and singing grounds.

The forest management described above provides early successional habitat for woodcock and other species dependent on this habitat type, as well as habitat for species that require mid- and late-successional forests.

2) Wildlife

A. Federal Endangered and Threatened Species

The population of Atlantic salmon that inhabit the Dennys River was listed as an endangered species in December 2000. The Refuge does not own any land that abuts the Dennys River, however some holdings border on Dennys Bay. The Service does not anticipate any adverse effects to Atlantic salmon due to the activities of hunters.

Only one federal threatened species utilizes the Refuge during the nesting season and/or migration, bald eagle. Although bald eagles currently nest at several locations on both divisions of the Refuge, eagles do not typically initiate nesting activities until February. The Service does not anticipate any adverse effects to bald eagles due to the presence of hunters during the months of September through March.

The coastal areas that are proposed to be opened to waterfowl hunting are used year-round by bald eagles as foraging and roosting areas. These areas have been traditionally hunted in the past, and no negative effects to the local eagle population have occurred. The eagle population has, in fact, been increasing both in the local area and throughout the Northeast.

Peregrine falcons, a species recently removed from the Endangered Species list by the Service, are rare visitors to the Refuge during their migration. We do not anticipate that hunting will have any adverse effects on peregrines. The majority of hunting will occur after the falcons have passed through the area.

B. Maine Endangered and Threatened Species

The only species listed as endangered or threatened by the State of Maine that are known to occur or breed within Moosehorn NWR are the bald eagle and peregrine falcon. The bald eagle (threatened) is listed by both the State of Maine and the U.S. Fish and Wildlife Service. The Service does not anticipate any adverse effects to these species due to the expansion of the hunt program.

C. Waterfowl

Moosehorn NWR and the waters lying adjacent to the Refuge provide nesting, feeding, migrating, and/or wintering habitat for a wide variety of waterfowl species. The abundance and diversity vary significantly with the tide cycle and among the seasons. The species most frequently observed include:

American Black Duck	Canada Goose
Mallard	Bufflehead
Wood Duck	Blue-winged Teal
American Green-winged Teal	White-winged Scoter
Surf Scoter	Long-tailed Duck
Common Eider	Common Goldeneye
Red-breasted Merganser	Hooded Merganser
Common Merganser	Ring-necked Duck

The ability of the Refuge to support both the resident and migratory species is contingent on the existence of a healthy, functioning ecosystem. In particular, the diversity of migratory species that utilize the Refuge during the spring and fall migrations are dependent on the availability of food crops (e.g., wild rice, berries, and invertebrates) and a wide variety of freshwater and marine invertebrates.

D. Other Migratory Birds

A variety of raptors utilize Moosehorn N.W.R. for nesting and feeding habitat during the breeding season. The most common species observed include: bald eagle, northern harrier, sharp-shinned hawk, broad-winged hawk, red-shouldered hawk, American kestrel, merlin, and osprey. Several other species utilize the Refuge during their nesting and migration seasons.

Moosehorn NWR also provides important nesting and stop-over habitat for many resident and migratory landbirds, including American woodcock. The diversity of habitats provided by the Refuge (e.g. mature spruce / fir stands, open field and barrens, mixed hardwoods, islands, extensive intertidal areas and mudflats, and various wetland communities) enables the Refuge to support over 220 bird species.

E. Resident Wildlife

A wide variety of wildlife species reside on, or adjacent to, the various parcels of land managed by Moosehorn NWR. The majority of species and habitats of management concern to the Refuge have been mentioned in the previous sections. However, the following species of potential management concern are known to occur within the Refuge:

White-tailed Deer	River Otter	Harbor Seal
Mink	Red Fox	Muskrat
Eastern Coyote	Black Bear	Weasel
Beaver	Moose	Bobcat
Porcupine	Spruce Grouse	Fisher
Ruffed Grouse	Snowshoe Hare	

The Refuge and surrounding lands support the range of medium to large mammal species including white-tailed deer, moose, black bear, coyote, red fox, bobcat, river otter, fisher, mink, and snowshoe hare. No detailed surveys of small mammals and bats have been conducted on the Refuge. Harbor seals are common in the waters of Cobscook Bay.

Beaver occupy nearly every flowage in the Refuge and muskrat are common in the wetlands. Beaver, muskrat, and other fur-bearing animals were greatly reduced in number in the 1880s due to overexploitation and loss of forested habitat. Laws protecting these animals were passed in the early 1900s and by the time the Refuge was established in 1937 beaver were back. During the 1940s they occupied all the best flowage sites throughout the Refuge. As the beaver population continued to rebound their activities increasing caused flooding of roads and railroads, plugged culverts and spillways, and blocked trout streams. The Refuge instituted a beaver and muskrat trapping program in 1954 to remove nuisance beaver and to ease pressure on declining food supplies. Muskrat populations fluctuate more dramatically because of winterkill during severe winters when marshes freeze solid (USFWS 1985b).

Reptiles and Amphibians

Twenty-two species of reptiles and amphibians are known to occur on the Refuge. Painted and snapping turtles are common in most Refuge wetlands. Of the five species of snakes that occur at Moosehorn NWR, the most remarkable is the northern water snake, which resides primarily in the Magurrewock Stream watershed. This is apparently a somewhat isolated population. Five species of salamanders occur on the Refuge including the spotted and blue-spotted salamanders that breed in vernal pools. Nine species of frogs and toads are present including American toad, mink frog, and leopard frog.

Refuge staff have been monitoring frog and salamander populations by conducting call count surveys and monitoring vernal pools as part of a Regional effort coordinated by USGS personnel at the Patuxent Wildlife Research Center.

Fish

At least twenty-six species of freshwater fish have been identified in Refuge brooks, streams, and ponds. Self-sustaining populations of brook trout occur in several streams on both divisions of the Refuge. Smallmouth bass and chain pickerel are common in Refuge streams, lakes, and ponds. The Dennys and St. Croix Rivers have supported runs of Atlantic salmon, as well as shad, alewife, and American eel.

The waters of Cobscook Bay provide habitat for an additional twelve saltwater species of fish. Harvestable populations of soft-shelled clams, mussels, and periwinkles are found in the mudflats of the intertidal zone.

E. Cultural Resources

Moosehorn NWR lies within a potentially rich area of early human activity (McPheters et al. 2004) however; very little historical or cultural evidence has been unearthed within its 33,000-acre boundary. To date, two arrowheads are on file with the Maine State Museum and three historical cemeteries are located on the Edmunds Division. Two archeology surveys have been completed within the last three years. The first, (A Fire Line) showed no findings of historical or cultural significance. The other, a proposed Liquefied Natural Gas (LNG) pipeline, has not yet been concluded.

Adjacent areas of interest include the Lincoln House (1787) in Dennysville and closer to the Baring Division, along U.S. Route 1, St. Croix Island, site of the first French settlement in the New World. The nearest known archaeological site, known as N'tolonapemk, which means "Our Ancestor's Place" (Passamaquoddy), is located near the town of Meddybemps Lake approximately 10.5 miles from the Refuge's headquarters office. Archaeologists have known about the site since the 1960s. The site has produced artifacts that date back 8,000 years.

Additionally, Section 106 of the National Historic Preservation Act of 1966, as amended, requires the Service to evaluate the effects of any of its actions on cultural resources (historic, architectural and archeological properties) that are listed or eligible for listing in the National Register of Historic Places (NRHP). In accordance with the regulations under Section 106, the Service consulted with the State Historic Preservation Officer (SHPO) of Maine. The SHPO indicated that there are five recorded archaeological sites along the Cobscook Bay shoreline. All are prehistoric sites that have not yet been professionally investigated in detail, but are considered to have potential as significant sites worthy of listing in the National Register of Historic Places. There are no known archaeological sites within the Baring Division. The soils are mostly fine-grained glaciomarine and till derived soil, poorly drained, and not attractive for prehistoric settlement.

Archaeological remains in the form of prehistoric campsites or villages would most likely be located along coastline and streams where early inhabitants would have taken advantage of water supply and fishing and hunting opportunities. At the time of European contact, the Passamaquoddy tribe frequented the area around the Moosehorn NWR. Permanent European settlement of the area began in the mid-eighteenth century.

The proposed action would not likely affect any cultural resources found on Moosehorn NWR. We would hope that the environmental education, ethical behavior and FWS regulations would deter those individuals utilizing the Refuge during the hunting season to remove or disturb any cultural resources. All cultural resource discoveries will be report immediately to the SHPO.

Refuge closed to all Hunting Alternative

This alternative requires no development of new trails, roads, or other facilities, and therefore, will not have any effect on the refuge's cultural and historic resources.

Proposed Action Alternative
The Service's policy is to preserve all cultural, historic, and archaeological resources in the public trust, and avoid any adverse effects wherever possible. There are no anticipated direct or indirect cumulative impacts to refuge cultural and historical resources anticipated following the guidance of this proposed action.

No Action Alternative: Maintain Existing Program (Deer Hunting Only)
This alternative requires no development of new trails, roads, or other facilities, and therefore, will not have any anticipated effects on the refuge's cultural and historic resources.

Summary: Based on the information provided in this section and in consultation with John Wilson, USFWS Region 5 Archaeologist, the Service anticipates no negative effects of the proposed action alternative on the Refuge's cultural resources. There is no activity associated with the proposed action alternative that will disturb soil.

VII. Environmental Consequences and Cumulative Impacts Analysis

A. **Alternative 1 -** Refuge Closed to Hunting

Under this alternative the Refuge would be closed to all hunting. This alternative would displace the individuals who have historically hunted on Refuge lands.

Physical Impacts
Under the "No Hunting" alternative, negative impacts to soil and water resources could increase. With increasing numbers of geese, the potential to negatively affect water quality wetlands would increase because of the increasing amount of fecal droppings. Excessive grazing by Canada geese would likely increase erosion along shorelines of ponds and lakes thus negatively affect water quality, and cause increased erosion and sedimentation (USFWS 2002). Impacts on physical resources by not allowing any hunting on the refuge are expected if Canada goose populations continue to grow.

Biological Impacts
The Service does not anticipate significant direct immediate effects on resident and migratory wildlife populations of closing the refuge to hunting. However, we anticipate negative long term cumulative impacts to wildlife populations and habitats on the refuge under Alternative 1.

The USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat and threaten the well-being of habitats and other wildlife species, and in some instances, that of human health and

safety. A lack of hunting on the refuge diminishes the Refuge's ability to manage wildlife populations. Wildlife habitats susceptible to damage, such as native wetlands and marshes, would continue to be overgrazed by increasing numbers of resident Canada geese, resulting in increasingly degraded habitat for black ducks, green-winged teal, and other ducks, as well as sora, Virginia rail, and other waterbirds (Haramis and Kearns 2000). Likewise, an increased local deer population to a density of 15-20 deer per square mile would likely negatively affect forest regeneration, resulting in degradation of habitat for woodcock, chestnut-sided warbler, and other migratory birds that use regenerating forest; negative effects of deer browsing on forest regeneration have been demonstrated by numerous researchers (see review by Russell et al. 2001) when deer population densities have reached 15-20 deer per square mile.

Furthermore, the cumulative effect of closing refuges to hunting may result in decline in cultural and financial support for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation. The cumulative effect on closing refuges to hunting may be reduced conservation of wildlife habitats if the above revenues are not replaced by another source.

Socioeconomic Impacts

The Service does anticipate some negative economic effects on the local economy resulting from Alternative 1, particularly since hunters who would travel 30-50 or more miles specifically to hunt upland game on the refuge would be displaced and likely would not continue to hunt in the local area surrounding the Refuge, and would not continue to use traditional services (e.g. fuel, lodging, guiding, and supplies). The Service does not anticipate significant local economic effects from this alternative resulting from displaced big game hunters and waterfowl hunters, as they would likely continue to hunt in the general area surrounding the Refuge, and continue to use traditional services (e.g. fuel and supplies). While closing the Refuge to hunting may not have a significant effect on an individual's ability to hunt in this region, it may have a significant effect on community relations with the Service. Hunting is a very strong tradition in this region of Maine, and a limited number of local residents have questioned the Refuge about allowing hunting on Refuge lands.

Closing of the refuge to hunting under Alternative 1 may erode cultural and financial support for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit

migratory songbirds and other wildlife. The cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Closing the refuge to hunting will exclude a source of dependable access and opportunity for hunters to pursue this traditional wildlife-dependent activity, and will deny a source of access and opportunity for new participants to become initiated into hunting.

A lack of hunting on the refuge diminishes the Refuge's ability to manage wildlife populations; USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat, and in some instances, threaten the health and safety of humans. Hunting can maintain bear populations at levels that minimize conflicts between bears and people. No attacks of bears on humans on the refuge have been reported, however bears acted aggressively toward humans during 3 separate encounters in May and June 2006 in the South Trail area of the Refuge's Baring Division. Hunting also can be used to reduce wildlife populations to lower the risk of wildlife/motor vehicle collisions, such as with deer and moose. During 2006, several Canada geese, and at least one bear and one bobcat were killed as a result of collisions with motor vehicles along roads through Refuge.

This alternative is not consistent with Service policy and the National Wildlife Refuge Improvement Act.

Cultural and Historical Resource Impacts
There would be no negative impacts on cultural or historical resources under this no hunting alternative.

Summary of Alternative 1 – Refuge Closes to Hunting
This alternative was not proposed because, in the best professional judgment of the Refuge Manager, it would reduce the Refuge's ability to minimize adverse effects of over-abundant species on habitats, priority wildlife species, and human health and safety. Furthermore, this alternative is not in the best interests of the natural resources of the refuge, local community, the region, and the Atlantic Flyway, and it is not consistent with Service policy and the National Wildlife Refuge Improvement Act.

B. Alternative 2 - Proposed Action - under this alternative the Refuge would expand available hunting opportunities. Besides white-tailed deer, the hunting of waterfowl, American woodcock, Wilson's snipe, ruffed grouse, bobcat, raccoon, red fox, red squirrel, gray squirrel, porcupine, woodchuck, snowshoe hare, black bear, eastern coyote, and moose would be permitted on designated parts of both divisions of the Refuge.

Physical Impacts
Under the proposed alternative, negative impacts to soil and water resources (USFWS 2002) likely would decrease. This alternative would give the Refuge the ability to directly affect game species populations (e.g., Canada goose) through hunting and thereby mitigate effects of their activities on soil and water resources, such as increased erosion and sedimentation along shorelines of ponds and lakes resulting from excessive grazing by Canada geese (USFWS 2002).

Biological Impacts
The Service does not anticipate significant direct immediate effects on resident and migratory wildlife populations of opening the refuge to hunting. However, a hunting program on the refuge enhances the Refuge's ability to manage wildlife populations. Harvest objectives may be established to increase or reduce take of a particular species for the purpose of effecting or complementing habitat management or visitor service objectives.

As previously noted, many portions of the Refuge were open to hunting prior to acquisition by the Service. Hunting is consistent with the purposes for which the Refuge was established; the Service policy on hunting; the National Wildlife Refuge System Improvement Act of 1997; and the broad management objectives of the National Wildlife Refuge System. Hunters would be directed to the Moosehorn NWR Hunt Brochure for additional information, maps, and Refuge-specific regulations. The Service would encourage the use of dogs to facilitate locating and retrieving upland game and waterfowl that might otherwise be lost in dense vegetation.

Table 1 shows the state of residency of hunters for the last 2 years on MHNWR. For the 2006-07 season, only 88 hunters returned survey cards out of a total of the 312 permits that were issued so far (28% return rate). The majority of hunters using the refuge are from the State of Maine (see Table 3).

With the exception of migratory birds, MDIFW has the sole responsibility of establishing season length and harvest limits for the all the species we propose to open to hunting. They have evaluated population parameters and habitat conditions in making their determination regarding which species can be harvested and harvest limits. MDIFW routinely evaluates harvest levels and hunt effort, and a Refuge hunt conducted under state regulations should not create any unforeseen threats to these species.

Socioeconomic Impacts
The Service does not anticipate future economic effects resulting from the proposed

alternative substantially different than that which occurred during 2005-2006, when Alternative 2 was in place. There could be a slight increase in the use of traditional services (e.g. fuel, lodging, guiding, and supplies) if hunters were visiting the area just to hunt on the refuge. Also, allowing hunting on the refuge will have a positive effect on community relations with the Service. Hunting is a very strong tradition in this region of Maine, and a limited number of local residents have questioned the Refuge about allowing hunting on Refuge lands.

Opening of the refuge to hunting under Alternative 2 may contribute to further financial support for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Opening the refuge to hunting will provide dependable access and opportunity for hunters to pursue this traditional wildlife-dependent activity, and will provide access and opportunity for new participants to become initiated into hunting.

The USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat, and in some instances, threaten the health and safety of humans. Hunting can maintain bear populations at levels that minimize conflicts between bears and people. No attacks of bears on humans on the refuge have been reported, however bears acted aggressively toward humans during 3 separate encounters in May and June 2006 in the South Trail area of the Refuge's Baring Division. Hunting also can be used to reduce wildlife populations to lower the risk of wildlife/motor vehicle collisions, such as with deer and moose. During 2006, several Canada geese, and at least one bear and one bobcat were killed as a result of collisions with motor vehicles along roads through Refuge.

This alternative is consistent with Service policy and the National Wildlife Refuge Improvement Act.

Cultural and Historical Resource Impacts
There would be no impacts on cultural or historical resources predicted.

Summary of Alternative 2 – Proposed Action
This alternative was proposed because, in the best professional judgment of the Refuge Manager, it would enhance the Refuge's ability to minimize adverse effects of over-abundant species on habitats, priority wildlife species, and human health and safety. Furthermore, this alternative is in the best interests of the natural resources of the refuge, local community, the region, and the Atlantic Flyway, and it is consistent with Service policy and the National Wildlife Refuge Improvement Act.

C. Alternative 3 - Maintain Existing Program - the Refuge would remain open to the hunting of white-tailed deer during the State prescribed archery and firearms and muzzleloader seasons.

Under this alternative most Refuge lands would remain open to hunting of white-tailed deer during the State prescribed archery, regular firearms, and muzzle loader seasons. The hunt would continue to be conducted in accordance with State and Federal regulations.

Physical Impacts
Under this "No Change" alternative, negative impacts to soil and water resources could increase. With increasing numbers of geese, the potential to negatively affect water quality wetlands would increase because of the increasing amount of fecal droppings. Excessive grazing by Canada geese would likely increase erosion along shorelines of ponds and lakes thus negatively affect water quality, and cause increased erosion and sedimentation (USFWS 2002). Impacts on physical resources by not allowing any hunting on the refuge are expected if Canada goose populations continue to grow.

Biological Impacts
The Service does not anticipate significant direct immediate effects on resident and migratory wildlife populations under Alternative 3. However, we anticipate negative long term cumulative impacts to wildlife populations and habitats on the refuge under this alternative. The USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat and threaten the well-being of other wildlife species, and in some instances, that of human health and safety. A lack of hunting of a wide range of species on the refuge diminishes the Refuge's ability to manage wildlife populations. Wildlife habitats susceptible to damage, such as native wetlands and marshes, would continue to be overgrazed by increasing numbers of Canada geese, resulting in increasingly degraded habitat for black ducks, green-winged teal, and other ducks, as well as sora, Virginia rail, and other waterbirds (Haramis and Kearns 2000).

Furthermore, the cumulative effect of closing refuges to many forms of hunting may result in decline in cultural and financial support for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to many forms of hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation. The end result may be reduced conservation of wildlife habitats if the above revenues are not replaced by another source.

There are additional hunting opportunities that could be available on several significant recent acquisitions. Under this alternative, the visiting public would not be able to take advantage of these opportunities. This alternative is not consistent with the National Wildlife Refuge Improvement Act.

Socioeconomic Impacts

The Service does anticipate some negative economic effects on the local economy resulting from Alternative 3, particularly since hunters who would travel 30-50 or more miles specifically to hunt upland game on the refuge would be displaced and likely would not continue to hunt in the local area surrounding the Refuge, and would not continue to use traditional services (e.g. fuel, lodging, guiding, and supplies). The Service does not anticipate significant local economic effects from this alternative resulting from displaced big game hunters and waterfowl hunters, as local deer hunters would continue to hunt on the Refuge while other big game and waterfowl hunters would likely continue to hunt in the general area surrounding the Refuge, and continue to use traditional services (e.g. fuel and supplies). While closing the Refuge to most forms of hunting may not have a significant effect on an individual's ability to hunt in this region, it may have a significant effect on community relations with the Service. Hunting is a very strong tradition in this region of Maine, and a limited number of local residents have questioned the Refuge about allowing hunting on Refuge lands.

Closing of the refuge to all but deer hunting under Alternative 3 may erode cultural and financial support for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. The cumulative effect of closing refuges to most forms of hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having

enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Closing the refuge to many forms of hunting will exclude a source of dependable access and opportunity for hunters to pursue this traditional wildlife-dependent activity, and will deny a source of access and opportunity for new participants to become initiated into hunting.

A lack of hunting for many species on the refuge diminishes the Refuge's ability to manage wildlife populations. The USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat, and in some instances, threaten the health and safety of humans. Hunting can maintain bear populations at levels that minimize conflicts between bears and people. No attacks of bears on humans on the refuge have been reported, however bears acted aggressively toward humans during 3 separate encounters in May and June 2006 in the South Trail area of the Refuge's Baring Division. Hunting also can be used to reduce wildlife populations to lower the risk of wildlife/motor vehicle collisions, such as with deer and moose. During 2006, several Canada geese, and at least one bear and one bobcat were killed as a result of collisions with motor vehicles along roads through Refuge.

Cultural and Historical Resource Impacts
There would be no impacts on cultural or historical resources predicted.

Summary of Alternative 3 – Maintain Existing Program
This alternative was not proposed because, in the best professional judgment of the Refuge Manager, it would not enhance the Refuge's ability to minimize adverse effects of over-abundant species on habitats, priority wildlife species, and human health and safety. Furthermore, this alternative is not in the best interests of the natural resources of the refuge, local community, the region, and the Atlantic Flyway, and it is not consistent with Service policy and the National Wildlife Refuge Improvement Act.

D. Cumulative Impact Analysis for Each Alternative

Council on Environmental Quality regulations require Federal agencies to consider the direct, indirect, and cumulative impacts associated with implementing a proposed action such as the hunting program that was proposed for Moosehorn National Wildlife Refuge in 2005.

Court cases have identified five elements that constitute a meaningful cumulative impacts analysis and must be included in Environmental Assessments for each refuge hunting

program. These five elements are:

1. the area in which the effects of the proposed project will be felt;
2. the impacts that are expected in that area from the proposed project;
3. other actions – past, present, and proposed, and reasonably foreseeable – that have had or are expected to have impacts in the same area;
4. the impacts or expected impacts from these other actions; and
5. the overall impact that can be expected if the individual impacts are allowed to accumulate.

The following is a "Cumulative Impacts Analysis" for all three alternatives for hunting on Moosehorn NWR.

1. Anticipated Direct and Indirect Impacts of Proposed Hunt on Wildlife Species

A. Hunted Resident Wildlife:

Refuge closed to all Hunting Alternative
Under this alternative, the refuge would not open any hunting. Current hunter levels on the refuge would drop to zero and as a result, no hunting mortality of animals would occur under this alternative. However, the lack of hunting has the potential to increase predators to many species of resident. This is a potential impact that may or may not have significant outcomes on individual populations and without detailed population information or an investigation on these species the specific effects can not be determined. If the local deer population were increase to a density of 15-20 deer per square mile the effects of browsing by deer would likely negatively affect forest regeneration, resulting in degradation of habitat for wildlife such as American woodcock, ruffed grouse, and snowshoe hare, that use forest understory vegetation and regenerating forest; negative effects of deer browsing on forest regeneration and understory vegetation have been demonstrated by numerous researchers (see review by Russell et al. 2001) when deer population densities have reached 15-20 deer per square mile. Therefore the impacts to wildlife populations by not allowing any hunting on the refuge potentially are negative effects on populations as a result of degradation of their habitat. The cumulative effect of closing deer hunting over a broad region would likely be a negative effect on habitat for some species of resident birds and mammals.

Resident Canada geese have the potential to destroy desirable vegetation in managed impoundments and natural wetlands. Failure to permit hunting of this species may result in changes to the vegetative composition of Refuge wetlands. Wildlife habitats susceptible to damage, such as native wetlands and marshes, would continue to be overgrazed by increasing numbers of resident Canada geese, resulting in increasingly degraded habitat for black ducks, green-winged teal, and other ducks, as well as sora, Virginia rail, and other waterbirds.

Proposed Action Alternative

Ruffed Grouse

The ruffed grouse (*Bonasa umbellus*) is considered the most popular upland game bird among hunters in Maine. Grouse and/or woodcock were hunted by over half of all Maine license holders in the 1980s and it is estimated that 100,000 hunters harvested over 500,000 grouse annually. However, estimates of statewide grouse harvest since 1988 are not available (Teisl et al. 1992). Moose hunters have been reporting harvest numbers and bird hunters reported grouse in excellent (1995), fair (1996-97), and good (1998-2004) numbers in the recent past (MDIFW 2006).

In 2005, a low reproductive output and one of the poorest fall grouse hunting seasons was reported. This is likely due to record-breaking cold and wet weather in the spring of 2005 (MDIFW 2006). Even so, ruffed grouse numbers tend to fluctuate greatly. Although grouse population peaks and lows often occur on ten-year cycles in the Lake States and midwest Canadian provinces, this has not been observed in the East. .

Although ruffed grouse number can decline due to spring weather events, their biggest threat is loss of habitat or degradation. Maine's forest is constantly changing, which potentially may impact statewide grouse numbers. However changes in habitat are difficult to predict over the longterm (i.e. 60 years). In most forest settings, the maturation of some forest stands will cause a decline in the quality of grouse habitat. This habitat is constantly revitalized by timber harvesting especially clear cutting in small blocks and strips to create an uneven-aged forest composed of even-aged stands of aspen, birch, and mixed wood.

Maine moose hunters have been asked to report the number of grouse they and their party saw or harvested during the moose hunting season for that last decade (See Table 4). Approximately half of all moose permit holders say they hunted grouse during their moose hunt. Many subpermittee also hunted grouse during the moose hunt. Results show that slightly more than half of all grouse taken by moose hunting parties during the moose season are shot by moose hunt permittees and sub-permittees. The other half of all ruffed grouse harvested are taken by others in the moose hunting party.

To help determine annual trends in the ruffed grouse population across the moose hunting zone (which covers all but southern Maine), MDIFW began calculating the number of grouse seen per 100 hours of moose hunting effort. The first year

(1994), moose hunters saw an estimated 35 birds per 100 hours of moose hunting. In 1995, an exceptional grouse year, the average of 107 grouse seen per 100 hours of hunting was nearly three times that of the previous year. In 2005, moose hunters reported seeing only 13 grouse per 100 hours, which is substantially lower

than the previous year of 33. These changes could be due to the changes in the moose hunt area occurred that occurred in 1997, 2001, and again in 2002. These newly added areas have lower grouse densities than northern Maine which likely contributed to the lower number of grouse seen per 100 hours throughout the total moose hunt area.

The number of ruffed grouse harvested in the state of Maine during moose hunts is only a portion of the number harvested. It is hard to predict the number of grouse harvested without having yearly hunter harvest reports. Moosehorn NWR is trying to determine the number of each species that is taken from the refuge and has instituted a new reporting system. Table 5 is a summary of species hunted, seen and harvested on Moosehorn NWR during the 2005-06 and 2006-07 seasons. The number of grouse taken on the refuge during the first reporting season was 5, while the second season has 10 grouse reported. Although the harvest number is low, grouse are the second most hunted species on the refuge and are seen frequently by hunters.

In 2006 the refuge initiated monitoring of the breeding population of ruffed grouse in areas open and closed to grouse hunting. In two years of hunting on the refuge a total of 15 grouse was harvested, despite grouse being the second-most popular species in the hunt program. Because relatively few grouse are being harvested, no measurable direct impacts to the ruffed grouse population or other species are anticipated from hunting this species. Hunting of ruffed grouse as stated in the proposed action should have no adverse cumulative effects on their local, regional or global populations.
Opening of the refuge to ruffed grouse hunting may contribute to further financial support for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Opening the refuge to grouse hunting will provide dependable access and opportunity for hunters to pursue this traditional wildlife-

dependent activity, and will provide access and opportunity for new participants to become initiated into hunting.

American Woodcock

Restrictive hunting regulations for the American woodcock (*Scolopax minor*) were implemented in the east in 1985, and again in 1997, when woodcock numbers declined drastically since the late 1960s. In 1997, all states in the Eastern Management Region were required to shorten their woodcock hunting seasons to 30 days from 45 days and select opening dates no earlier than 6 October. Hunting seasons in the Eastern Region were able to open on October 1 again in 2002. However, the range wide woodcock population is still at a relatively low level compared to populations in the 1960s despite the effort to increase hunting restrictions (MDIFW 2006).

Because no method to identify and survey the activities of hunters who pursue woodcock existed, the USFWS and state wildlife agencies established the Migratory Bird Harvest Information Program (HIP). The data collected during the 2005 hunting season revealed that approximately 5,800 woodcock hunters bagged 9,100 woodcock in Maine last year (see Table 6). The previous years estimated harvest level of 15,600 woodcock by 4,300 hunters appears to be higher; however confidence intervals of the estimates for the two years overlap. A decrease in the woodcock harvest is most likely due fewer hunter visits, related to poor weather conditions for hunting that persisted through much of October.

Number of woodcock harvested per successful hunt (2.2 birds) in 2005 was similar to the estimate of 2.1 in 2004. Hunters harvested on average 11.0 woodcock for the 2005 season, up slightly from 10.3 woodcock for the 2004 season. The recruitment index (the ratio of juveniles per adult female woodcock) has stayed constant at 1.7 (1963-05) which indicates normal production in 2005 for woodcock breeding in Maine and eastern Canada. The numbers of displaying male woodcock in the Eastern Region in 2006 were unchanged from 2005 based on male Singing Ground Surveys (Kelley and Rau 2006).

The number of male woodcock on singing grounds in Maine in 2006 was higher than in 2005. However, no change in the male woodcock population index is seen based on the most recent ten-year trend (1996-2006). The woodcock population decline is widely accepted to be primarily due to habitat loss by development and forest maturation (MDIFW 2006).

The American woodcock is hunted on the Refuge, often in conjunction with ruffed grouse (see Table 5). During the last two years hunters have reported seeing many woodcock, but low numbers have been harvested, only 10 in the 2005-06 season and so far 19 in the 2006-07 season. These numbers are slightly higher than that number of ruffed grouse harvested even though the ruffed grouse hunting season is three times as long as that for hunting woodcock. With such

relatively few woodcock being currently harvested on the refuge, the opening of additional acreage to hunting as stated in the proposed action should have no adverse cumulative effects on their local, regional or flyway populations.

Although woodcock are showing declines in numbers on their breeding grounds, habitat loss is considered to be the culprit, not hunting. This hypothesis was corroborated by a study conducted by the U.S. Geological Survey's Biological Resources Division and others across 4 states during 1997-2000 (McAuley *et al.* 2005). Results showed no significant differences in woodcock survival between hunted and non-hunted areas. Predation was the largest cause of mortality on non-hunted sites. Furthermore, the authors concluded that hunting was not having a significant impact on woodcock numbers in the Northeast.

Refuge staff monitor the breeding population of woodcock in areas of the refuge open and closed to hunting, and annually band approximately 100-200 woodcock. In two years of hunting on the refuge a total of 29 woodcock was harvested, despite the refuge being a popular destination for upland bird hunters who often hunt this species in conjunction with grouse hunting. Because relatively few woodcock are being harvested, no measurable direct impacts to the woodcock population or other species are anticipated from hunting this species. Hunting of American woodcock as stated in the proposed action should have no adverse cumulative effects on their local, regional or flyway populations.

Moosehorn NWR is known for pioneering research and management techniques to benefit the American woodcock. It has been demonstrated that by implementing habitat management programs the local population of this species can be increased significantly. Individuals that hunt woodcock on the Refuge have the opportunity to see the results of on the ground habitat management and learn about the Refuge's programs. This will ultimately lead to increased support for Moosehorn NWR, and programs that lead to increased habitat management for the American woodcock and other early successional species.

Opening of the refuge to woodcock hunting may contribute to further financial support for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled

largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Opening the refuge to woodcock hunting will provide dependable access and opportunity for hunters to pursue this traditional wildlife-dependent activity, and will provide access and opportunity for new participants to become initiated into hunting.

Wilson's snipe

The Wilson's snipe (*Gallinago delicata*) is found in every county in Maine with the highest numbers in Washington, Penobscot, Kennebec, and Aroostook Counties (Adamus 1985). However, in the late 1930's, drought during the breeding season and extended cold periods on the winter range severely reduced the continental population (Fogarty et al. 1977). Concerned about the snipe population, the USFWS closed the hunting season on snipe from 1941 to 1953. Hunting resumed in 1954 as the population recovered. Even so snipe hunting has not become as popular as it once was (Tudor 2000). Maine's snipe population should remain stable in the near future unless there are droughts for several breeding seasons, or snipe hunting greatly increases (Tudor 2000).

Harvest statistics from HIP for snipe hunting in Maine (see Table 6) are imprecise due to small sample sizes of snipe hunters in the state; confidence intervals of the estimates of hunter numbers and harvests for the 2003 and 2004 hunting seasons include zero. No snipe were reported in the refuge's harvest report in 2005, and one snipe was killed by a legal hunter during the 2006 season. Displaying snipe are recorded during the refuge's annual woodcock singing male survey, providing an index to the breeding population.

The Wilson's snipe is hunted primarily in wetter habitats than that in which other upland game birds like ruffed grouse and American woodcock are found. While no hunters reported time spent hunting them on the Refuge during the 2005-06 season, there were 6 visits during the 2006-07 season. One snipe out of the four seen was harvested from the Refuge during this season (see Table 5). For this reason, no measurable changes due to hunting are anticipated in the snipe population on the Refuge in the near future.

The refuge monitors the breeding population of snipe in conjunction with annual woodcock breeding population surveys in areas open and closed to hunting. In two years of hunting on the refuge one snipe was harvested, and no hunters reported specifically hunting snipe. Because relatively few snipe are being harvested, no measurable direct impacts to the snipe population or other species are anticipated from hunting this species. Hunting of Wilson's snipe as stated in the proposed action should have no adverse cumulative effects on their local,

regional or flyway populations.

Opening of the refuge to snipe hunting may contribute to further financial support for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Opening the refuge to snipe hunting will provide dependable access and opportunity for hunters to pursue this traditional but little used wildlife-dependent activity, and will provide access and opportunity for new participants to become initiated into hunting.

Waterfowl – Ducks and Geese

In 1985, the state of Maine completed a waterfowl assessment and in turn the focus of waterfowl management changed from a harvest-oriented goal to a breeding population-oriented goal. Increasing certain breeding populations of waterfowl are the main management priorities. Low black duck populations caused major changes in hunting regulations since 1983, which was a major change for waterfowl hunters (MDIFW 2006).

The Mid-winter Waterfowl Survey is conducted at the same time every year in each state in the Atlantic Flyway, from Maine to Georgia. Any individual state's count should be viewed in the context of the total count for the Flyway, as waterfowl are migratory and annual differences in weather affect their distribution. In January of 2006, the coastal waters and estuaries of Maine from Kittery to Eastport were surveyed. During this survey a total of 82,365 birds were documented, which was a slight increase from the previous year's count of 73,503 (see Table 7). A record count of mallards (4,025) was the most notable survey information, up 1,827 from 2005 (2,198) and 801 greater than the last high count in 2002 (3,224). Black duck numbers remain below the 10-year average of 18,419, but were up (16,631) from the 2005 count (14,027). Only 73 scaup were observed this year, which indicates a continuous long-term decline. Common

eider numbers (34,041) were similar to last year and scoters (4,480) were well above the 10-year average of 2,905. Flocks of long-tailed ducks (formerly called oldsquaw) were observed as larger than normal. Canada geese numbers (3,338) was nearly identical to 2005 (3,489) (MDIFW 2006).

Hunters in Maine have harvested thousands of ducks over that last 40 years. The most frequently harvested dabblers are the wood duck, mallard, and black duck (see Table 8). Black duck harvests have ranged from 5,000 (mean for 1991-95) to 32,000 (mean for 1966-75). Of the sea ducks harvested in the state of Maine, the common eider is the most common species harvested (see Table 9).

Waterfowl hunting on Moosehorn NWR over that last 2 years has been the third most popular type of hunting, behind deer and upland game birds (see Table 5). In 2005, 20 hunters reported hunting ducks on the refuge, and 15 hunters hunted geese. While they saw < 500 ducks and 219 geese, they harvested a total of 15 ducks and 3 geese. Fifty visits for ducks by hunters in 2006 resulted in 2,169 ducks being seen, and 22 harvested; hunters reported seeing 283 geese on 36 trips, accounting for a total harvest of 6 geese.

A specific biological effect that the refuge would hope to achieve is the reduction of overgrazing of wetland vegetation of by the resident summer population of Canada geese, which currently numbers approximately 400. However, achieving this goal by a reduction in the resident goose population through hunter harvest is improbable due to the wetlands where geese would be most vulnerable to hunting are closed to hunting to minimize disturbance to black ducks (i.e., refuge wetlands).
The overall biological effects of opening several areas to hunting of waterfowl should be minimal. Less than 40 percent of Refuge lands would be open to the hunting of migratory birds. Waterfowl species utilizing the Refuge spend significant time foraging on the extensive intertidal areas surrounding the Refuge. As a result, the vulnerability of birds to hunting on Refuge lands will be determined by the tidal cycle and weather conditions during the hunt.

Waterfowl hunting has positive impacts on many different species of wildlife. In particular, sportsmen contribute heavily to migratory bird conservation. Hunters have provided a steady stream of revenue to build the National Wildlife Refuge System for the last 60 years. They have also helped to restore waterfowl habitat on millions of acres of public and private lands across the country. The benefit that these projects have is not just for waterfowl, but for migratory songbirds and other wildlife as well (USFWS 2000).

Two programs that changed the course of wildlife conservation began in the early 1930s. These two programs are the Duck Stamp Program described below and the Federal Aid in Wildlife Restoration Act, better known as the Pittman-Robertson Act. The Duck Stamp Act required all waterfowl hunters 16 years or older to buy

a Migratory Bird Hunting and Conservation Stamp. This Program has generated more that $671 million that has been used to preserve nearly five million acres of waterfowl habitat in the U.S. Many of the national wildlife refuges across the country have been paid for all or in part by Duck Stamp money. In Maine, an average of 11,175 duck stamps have been sold yearly since 1982 with an average of $136,334 in revenues (see Table 10) (MDIFW 2006).

These Federal Duck Stamp dollars benefit numerous other birds, wildlife, and plants have similarly prospered because of habitat protection. Many of the nation's Endangered and Threatened species find food or shelter in refuges preserved by these funds. For every dollar that is spent on Federal Duck Stamps, ninety-eight cents go directly to purchase vital habitat for protection in the National Wildlife Refuge System.

Red and Gray Squirrels

The Maine Comprehensive Wildlife Conservation Strategy reports that red squirrels (*Tamiasciurus hudsonicus*) are common throughout the entire state while grays (*Sciurus carolinensis*) are common only in southern Maine. More detailed population estimates are not available for either species in the state of Maine or on the refuge at this time. The gray squirrel population on the refuge is highly variable and is considered uncommon to common. The gray squirrel population on the refuge, as elsewhere in the species range, seems to fluctuate in relation to acorn crops (McShea 2000). Red squirrel populations fluctuate also, but in relation to cone crops (Kemp and Keith 1970). Populations of red squirrels on the refuge have not been surveyed, but are considered common to abundant.

No data for squirrel hunting in the state of Maine are currently available. However, there were no hunters or visits recorded for hunting squirrels during the last two years at the Refuge. No squirrels were harvested on the Refuge in the last 2 years but many hunters reported seeing red squirrels while pursuing other species during the 2006-07 season. For this reason, no measurable changes are anticipated in the red squirrel and gray squirrel populations on the Refuge in the near future due to hunting. Hunting of squirrels as stated in the proposed action should have no adverse cumulative effects on their local, regional or global populations.

A potential positive biological impact of harvesting squirrels would be the reduction of squirrel populations, which are nest predators of many migratory birds. The end result, if enough squirrels were harvested, may be improved nest success for migratory birds that breed at the refuge.

Opening of the refuge to squirrel hunting may contribute to further financial support for wildlife conservation, should squirrel hunting gain in popularity, as hunters have provided through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a

steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Opening the refuge to squirrel hunting will provide dependable access and opportunity for hunters to pursue this traditional wildlife-dependent activity, and will provide access and opportunity for new participants to become initiated into hunting. Squirrel hunting is particularly good for introducing new hunters to hunting, as squirrels are often abundant and easy to observe, and the potential for harvesting squirrels is high. Success in hunting is important in hunter recruitment and retention (Duda et al. 1998).

Snowshoe Hare

The snowshoe hare (*Lepus americanus*) is common throughout the state of Maine. While snowshoe hare populations are strongly cyclic in some areas of its range, this is not the case in the state of Maine. Phenomenal-like die-offs and particularly high or low population levels have been observed in Maine, but a definite cycle has not been documented. However, regional differences in abundance have been documented within the State and population fluctuations occur on a local, but not statewide, scale (Cross 1986).

Snowshoe hare are an important prey species for many animals including bobcat and Canada lynx (Boone and Krohn 1998). Early successional forests increased 39% in the 80s and 90s, which are favorable to snowshoe hares. Due to this, the carrying capacity for hares has increased. However, due to current forest practices the carrying capacity is expected to decrease in the future if action in the form of forest management is not taken (Jakubas and Cross 2002).

Early successional habitat is a major focus on Moosehorn NWR, which should be extremely beneficial to snowshoe hare populations on the refuge. Although surveys have not been conducted on this species, it is believed that the snowshoe hare population is in good condition on the Refuge. While quite a few hunters reported hunting snowshoe hares on the Refuge in the last two year, not many were seen (8 in 2005-06 season and 2 in 2006-07) or harvested (2 in 2005-06 and

0 in 2006-07) (see Table 5). For this reason, no measurable changes are anticipated in the snowshoe hare population on the Refuge in the near future due to hunting. Hunting of snowshoe hare as stated in the proposed action should have no adverse cumulative effects on their local, regional or global populations.

Opening of the refuge to snowshoe hare hunting may contribute to further financial support for wildlife conservation, as hunters have provided through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Opening the refuge to hare hunting will provide dependable access and opportunity for hunters to pursue this traditional wildlife-dependent activity, and will provide access and opportunity for new participants to become initiated into hunting. Hunting snowshoe hares with dogs is particularly good for introducing new hunters to hunting, as hares are often abundant and are easy to observe when hunting with skilled dogs, and the potential for harvesting hares is high. Seeing game and successfully harvesting game are important in hunter recruitment and retention (Duda et al. 1998).

Raccoons

The raccoon (*Procyon lotor*) is common statewide, but population size and trend are unknown (Connolly 1986, Boone and Krohn 1998). They are hunted and trapped in Maine, but harvested animals are not tagged, so harvest trends are not available. It is believed that raccoon populations are stable.

Raccoons are a very adaptable species despite the constant changes in their environment and habitat. The state of Maine doesn't have adequate measures of population densities, recruitment rates, mortality rates, or the sex and age composition of the raccoon population or harvest. Although there is a lack of knowledge within the state of Maine and the refuge on the status of raccoons, they

appear able to survive the changing conditions found in Maine and the Refuge today and the imminent future (Connolly 1985).

Raccoon hunting is allowed on the refuge, including at night with the use of trailing dogs. However, no raccoon hunting has occurred during 2005-2006 on the Refuge, and hence no raccoons have been taken on the Refuge by hunters. For this reason, no measurable changes are anticipated in the raccoon population on the Refuge in the near future due to hunting. Hunting of raccoons as stated in the proposed action should have no adverse cumulative effects on their local, regional or global populations.

Distemper and rabies are common diseases in raccoons. Controlling the raccoon population with hunting can aid in reducing the spread of distemper and rabies. Also, management of raccoons has been done in concern for fisher populations throughout the state (Connolly 1986). Reduced raccoon numbers may also alleviate the effects of nest predation by raccoons on resident and migratory birds.

Opening of the refuge to raccoon hunting may contribute to further financial support for wildlife conservation, as hunters have provided through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

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Skunks, Porcupines and Woodchucks

Population trends for the striped skunks (*Mephitis mephitis*), porcupines (*Erethizon dorsatum*) and woodchucks (*Marmota monax*) are unknown according to the state of Maine. This is also true for Refuge populations. Skunks, porcupines and woodchuck harvests are not recorded by the state of Maine.

Based on two years of refuge hunter surveys, skunks, porcupine and woodchuck were not hunted on the refuge and none have been harvested. For this reason, no measurable changes are anticipated in the skunk, porcupine, and woodchuck populations on the Refuge in the near future due to hunting. Hunting of these species as stated in the proposed action should have no adverse cumulative effects on their local, regional or global populations.

Distemper and rabies are common diseases in skunks. Controlling the skunk population with hunting can aid in stemming the spread of distemper and rabies. A potential positive impact of hunting would be a reduction in skunk numbers, which may also alleviate the effects of nest predation by skunks on resident and migratory birds.

Opening of the refuge to skunk, porcupine, and woodchuck hunting may contribute to further financial support for wildlife conservation, as hunters have provided through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

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Eastern Coyote

The Eastern coyote (*Canis latrans*) is distributed statewide and is considered abundant. However, this wasn't always the case. It is believed that coyotes came to Maine gradually from Minnesota over a number of years after the wolf was extirpated (Jakubus 1999). Even so, Maine's coyote are not genetically similar to western coyotes. There is genetic evidence that there is overlap with eastern Canadian wolves (*Canis lycaon*) (Wilson et al. 2004).

Currently the state's coyote population is between 10,000 to 12,000 in the winter and increases to 19,000 in the spring. This number decreases due to the low number of pups that survive after birth. The coyote population will likely remain relatively constant unless wolves reestablish themselves in the state and then it is believed the coyote population will drastically decline (Jakubas 1999).

The coyote population in Maine has been the center of controversy in recent years because of its potential role in affecting deer populations. There is a desire by some publics to control or eliminate coyote populations. However, hunting and trapping has little to no effect in determining statewide coyote population levels. There would need to be mortality rates greater than 70% for there to be a reduction in the population (Jakubas 1999). No current estimates of coyotes on the Refuge are available.

Over 2,000 coyote are harvested in the state of Maine every year by both hunting and trapping (see Table 11). However, this number is lower than the actual due to some nuisance removal not being recorded in pelt sales. This number has been on a steady increase for that last decade (MDIFW 2006). On the Refuge there were more coyote hunting visits in 2006-2007 than the previous year. Even so, no coyotes were harvested (see Table 5). For this reason, no measurable changes are anticipated in the coyote population on the Refuge in the near future due to hunting. Hunting of coyotes as stated in the proposed action should have no adverse cumulative effects on their local, regional or global populations.

Distemper, sarcoptic mange and rabies are common diseases sometimes found in coyotes. Controlling the coyote population with hunting can aid in stemming the spread of disease. Additional potential positive impacts of hunting coyotes would be a temporary reduction in coyote numbers, which may alleviate the effects of nest depredation by coyotes on resident and migratory birds, as well as predation on white-tailed deer and neighboring livestock.

The USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat and threaten the well-being of other wildlife species, and in some instances, that of human health and safety. Having the ability to control or reduce local populations reduces the risks of diseases spreading to other species.

Opening of the refuge to coyote hunting may contribute to further financial support for wildlife conservation, as hunters have provided through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the

cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Opening the refuge to coyote hunting will provide dependable access and opportunity for hunters to pursue this traditional wildlife-dependent activity, and will provide access and opportunity for new participants to become initiated into hunting.

Red Fox

The red fox (*Vulpes vulpes*) population is distributed statewide (Caron 1986) and currently considered to be abundant and stable (Jakubas 2004). Historical records indicate that their population has had continuous growth since the early 1800s as agriculture and logging began to create red fox habitat. The estimated red fox population in the state of Maine in 1985 was approximately 75,000 animals (Caron 1986). Population estimate for the refuge are not currently available, although fox tracks are commonly seen in the snow during winter.

Red fox are hunted, but most take of this species in Maine is from trapping. Harvests across the state of Maine have averaged around 1,500 each year for the last decade (see Table 11). This is considerably lower than historical reports that estimate greater than 4,000 red fox were harvested annually in Maine during the 1970s and 80s (Caron 1986). Within the last 2 years, there have been no reports of hunting or harvesting of red fox on the Refuge (see Table 5). For this reason, no measurable changes are anticipated in the red fox population on the Refuge in the near future due to hunting. Hunting of red fox as stated in the proposed action should have no adverse cumulative effects on their local, regional or global populations.

Distemper, sarcoptic mange and rabies are common diseases sometimes found in red fox. Hunting of red fox may aid in stemming the spread of disease. The ability to control and/or maintain their population through hunting can reduce the risk of diseases spreading to other species. Additional potential positive impacts of hunting red fox would be a temporary reduction in fox numbers, which may alleviate the effects of nest depredation by foxes on resident and migratory birds.

Opening of the refuge to fox hunting may contribute to further financial support for wildlife conservation, as hunters have provided through purchases of hunting

licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

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Bobcat

The bobcat (*Lynx rufus*) is a trapped and hunted species that is distributed over most of the state (Morris 1986). The *Bobcat Management System* is used to manage the bobcat population in the state of Maine (McLaughlin 1995). Recently high snowshoe hare densities have lead to an increasing bobcat population (Jakubas 2004).

The bobcat population in Maine is at the northern edge of their range and limited by severe winters. This has lead to a highly variable abundance and distribution of bobcat in Maine over the past 2 centuries. Climatic and habitat changes have lead to this population variation (Morris 1986). The refuge does not have a good estimate of the number of bobcats using the area. A 1985 estimate for the area was approximately 20 to 40 animals in the district (Morris 1986).

The number of bobcats harvested in Maine during the 2004-2005 trapping and hunting seasons (Table 9) was the second highest harvest ever and the highest harvest since the 1980-1981 season. Last year, the state of Maine lengthened the hunting season by 2 weeks, which likely contributed to the high harvest. The bobcat population has done very well in response to the increased population of snowshoe hares, and the state believes that recent high harvests are not detrimental to the bobcat population (MDIFW 2006).

The number of bobcat harvested in the state of Maine has tripled in the last nine years from 128 during the 1996-97 season to 376 during the 2004-05 season (see Table 9). Historically, the refuge has not been regularly hunted for bobcats. In

the last 2 years, there have only been 2 visits to the Refuge for bobcat hunting resulting with none being harvested (see Table 5). One bobcat was killed by a motor vehicle on the refuge along Route 1 in the Baring Division during the winter of 2006-2007. For this reason, no measurable changes are anticipated in the bobcat population on the Refuge in the near future due to hunting. Hunting of bobcats as stated in the proposed action should have no adverse cumulative effects on their local, regional or global populations.

Opening of the refuge to bobcat hunting may contribute to further financial support for wildlife conservation, as hunters have provided through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

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The USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat and threaten the well-being of other wildlife species, and in some instances, that of human health and safety. Having the ability to control or reduce local populations reduces the risks of diseases spreading to other species. An additional potential positive impact of hunting bobcats would be a temporary reduction in bobcat numbers, which may alleviate the effects of depredation by bobcat on white-tailed deer.

American Black Bear

The American black bear (*Ursus americanus*) is Maine's only bear species, and it is abundant and distributed over most of the state (McLaughlin 1999). Maine's black bear population has been carefully managed since 1981 by monitoring

radio-tagged bears in three areas of the state as well as hunting and trapping (McLaughlin 1988, McLaughlin 1999, Jakubas and Vashon 2004). Management goals and objectives influenced by the public guide Maine's management activities (McLaughlin 1999). Estimated populations of bears in Maine are found to be 23,000 animals (Jakubas and Vashon 2004).

The state of Maine reported in their Research and Management Report that Maine's spring 2006 bear population estimate remains near 23,000 bears. The report states that the harvest levels experienced since 1999 have stabilized the bear population with regard to their management goal (MDIFW 2005). No population estimates for the refuge are currently available.

The number of state issued bear permits have fluctuated over the last 15 years from the lowest at 9,991 permits to the highest 15,252 (See Table 12). However, the number of bear harvested has increased yearly from 2,088 in 1990 to 3,921 in 2004 across the entire state of Maine. There was a decrease in the number of bears harvested in the state in 2005 with only 2873 harvested (MDIFW 2005).

In the WMD 29, only approximately 40 to 60 bear are taken yearly (see Table 13). The number harvested has increased slowly in the past few years (MDIFW 2000-06). With regard to bear harvests on the Refuge, no bear have been hunted or killed in the last 2 years (see Table 5), although one bear was killed by a motor vehicle along the Charlotte Road in the Baring Division in 2006. For this reason, no measurable changes are anticipated in the black bear population on the Refuge in the near future due to hunting. Hunting of black bear as stated in the proposed action should have no adverse cumulative effects on their local, regional or global populations.

Black bear hunting on the refuge has many positive impacts. Hunting as a management strategy helps obtain a balance between the biological needs of the species and the needs of society. Hunting maintains bear populations at levels that minimize conflicts between bears and people. No attacks of bears on humans on the refuge have been reported, however bears acted aggressively toward humans during 3 separate encounters in May and June 2006 in the South Trail area of the Baring Division.

During waterfowl banding operations on the refuge in September the past few years, bears have damaged waterfowl traps as they tried to gain access to the ducks in the traps and the corn that is used as duck bait. The refuge programs also provide both hunting and viewing opportunities which are priority public uses on the Refuge. This in turn assures the future conservation and management of bears on the Refuge.

Opening of the refuge to bear hunting may contribute to further financial support for wildlife conservation, as hunters have provided through purchases of hunting

licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.
The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Opening the refuge to bear hunting will provide dependable access and opportunity for hunters to pursue this traditional wildlife-dependent activity, and will provide access and opportunity for new participants to become initiated into hunting.

The USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat and threaten the well-being of other wildlife species, and in some instances, that of human health and safety. Having the ability to control or reduce local populations reduces these risks. An additional potential positive impact of hunting bears would be a temporary reduction in bear numbers, which may alleviate the effects of depredation by bears on neonatal white-tailed deer.

Due to the minimal bear hunting activity and the current absence of black bear harvest on the refuge, we do not believe that non-hunted resident wildlife will be impacted. However, if more bear were harvested on the refuge, there may be a significant benefit to some species that black bear prey on, such as neonatal white-tailed deer.

White-tailed Deer
The white-tailed deer (*Odocoileus virginianus*) is a popular game species in Maine whose population has increased significantly since colonial times. During these early times Maine's winters were severe, and deer faced predation from man, wolves, bobcats, black bears, and mountain lions (Stanton 1963, Banasiak 1964, Lavigne 1999). Logging and clearing, moderation of winters, and the extirpation of the wolf and eastern cougar are believed to have been responsible for the increase in Maine's deer population during the 1800s.

The current population is managed to meet goals and objectives by region. Some of these call for an increase in deer populations in some areas of the state, and a decrease or maintenance of current population levels in other areas (Lavigne 1999, Lavigne 2004). Many variables are taken into consideration including the effects severe winters and management goals when the current deer management system determines the number of any-deer permits (Lavigne 2004). The current white-tailed deer population in the state of Maine is estimated to be 230,000 individual in the wintering herd as of 2003 (see Figure 5). There are not population estimates for deer on the Refuge.

In the last 7 years hunters have harvested an average of 127 adult bucks within the entire WMD 29. Adult doe harvests average 6 per year (see Table 14). In the last 2 years, white-tailed deer have been hunted by 108 hunters during the 2005-06 season and 206 during the 2006-07 season (calculation so far) (see Table 5). During these hunts 20 deer were seen during the 2005-06 season and 64 during the 2006-07 season (see Table 5). The effects on the local deer population of hunting under current state regulations are inconsequential due to the polygynous mating system of white-tailed deer, the restrictions on the harvest of antlerless deer, and the low number of deer that are taken on the refuge annually (0 in 2005, 4 in 2006). For this reason, no measurable changes are anticipated in the white-tailed deer population on the Refuge in the near future due to hunting. Hunting of white-tailed deer as stated in the proposed action should have no adverse cumulative effects on their local, regional or global populations.

Opening of the refuge to deer hunting may contribute to further financial support for wildlife conservation, as hunters have provided through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Opening the refuge to deer hunting will provide dependable access and opportunity for hunters to pursue this traditional wildlife-

dependent activity, and will provide access and opportunity for new participants to become initiated into hunting.

The USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat and threaten the well-being of other wildlife species, and in some instances, that of human health and safety. Having the ability to control or reduce local populations reduces these risks. An additional positive impact of hunting of white-tailed deer is to minimize negative effects of browsing on forest regeneration. A local deer population having a density of 15-20 deer per square mile would likely negatively affect forest regeneration, resulting in degradation of habitat for woodcock, chestnut-sided warbler, and other migratory birds that use regenerating forest; negative effects of deer browsing on forest regeneration have been demonstrated by numerous researchers (see review by Russell et al. 2001) when deer population densities have reached 15-20 deer per square mile.

Moose

Moose (*Alces alces*) is one of the most sought after game species in Maine. At one time in the early 1900s their population dwindled to an estimated 2,000 animals which was attributed to clearing forests for farmland, brainworm, and unrestricted hunting (Morris and Elowe 1993 and Banasiak et al. 1980). The population increased as the state worked to protect the moose from excessive hunting and habitat loss. Moose populations are now managed by the state of Maine through a yearly permit process. An increase during the1900s is attributed to protection from excessive hunting and improving habitat conditions and by 1985 the population was estimated to be 21,150 (Morris 1999).

The 1985 population was estimated to be 29,000 moose in winter based on censuses done in the mid 1980s and trend information from hunting and road kill statistics. However, this population estimate has wide confidence intervals (20-46%). Also, several of the zones have not been censused and the initial estimates were updated based on changes in the number of moose seen by hunters. However, state of Maine biologists believe this was not a gross overestimate of the moose population at the time and is more likely to be an underestimate (Morris 1999). The moose population on the refuge has not been surveyed at this time.

Moose hunting is usually open for one week in the middle of October in WMD 29 and has only been open since 2001 (MDIFW 2002). Only 30 permits (total for bull and cows) have been issued each year for WMD 29 since 2001 (MDIFW 2002-06). The success rate for this district has averaged 35% over the last five years with approximately 10 moose harvested each year (see Table 15). No moose were hunted and harvested in the last two years on the refuge (see Table 5). For this reason, no measurable changes are anticipated in the moose

population on the Refuge in the near future due to hunting. Hunting of moose as stated in the proposed action should have no adverse cumulative effects on their local, regional or global populations.

Opening of the refuge to moose hunting may contribute to further financial support for wildlife conservation, as hunters have provided through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Opening the refuge to moose hunting will provide dependable access and opportunity for hunters to pursue this traditional wildlife-dependent activity, and will provide access and opportunity for new participants to become initiated into hunting.

The USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat and threaten the well-being of other wildlife species, and in some instances, that of human health and safety. Having the ability to control or reduce local populations reduces the risks of moose-car collisions and the spread of communicable diseases. An additional positive impact of moose hunting is to minimize negative effects of browsing on forest regeneration.

No Action Alternative: Maintain Existing Program (Deer Hunting Only)

Under this alternative, the refuge would not open to migratory bird, upland game or additional big game hunting. Current public use levels on the refuge would remain the same as levels prior to 2005. As a result, additional mortality of individual hunted animals would not occur under this alternative. However, the lack of hunting has the potential to increase predators to many species of resident wildlife. This is a potential impact that may or may not have significant outcomes on individual populations and without detailed population information or an investigation on these species the specific

effects can not be determined. If the local deer population were increase to a density of 15-20 deer per square mile the effects of browsing by deer would likely negatively affect forest regeneration, resulting in degradation of habitat for wildlife such as American woodcock, ruffed grouse, and snowshoe hare, that use forest understory vegetation and regenerating forest; negative effects of deer browsing on forest regeneration and understory vegetation have been demonstrated by numerous researchers (see review by Russell et al. 2001) when deer population densities have reached 15-20 deer per square mile. Therefore the impacts to wildlife populations by not allowing any hunting on the refuge potentially are negative effects on populations as a result of degradation of their habitat. The cumulative effect of closing deer hunting over a broad region would likely be a negative effect on habitat for some species of resident birds and mammals.

Resident Canada geese have the potential to destroy desirable vegetation in managed impoundments and natural wetlands. Failure to permit hunting of this species may result in changes to the vegetative composition of Refuge wetlands. Wildlife habitats susceptible to damage, such as native wetlands and marshes, would continue to be overgrazed by increasing numbers of resident Canada geese, resulting in increasingly degraded habitat for black ducks, green-winged teal, and other ducks, as well as sora, Virginia rail, and other waterbirds.

There would be an increased potential for detrimental encounters between humans and moose and bears, such as collisions between vehicles and moose and bears on the public roads that go through the Refuge.

Summary – Anticipated Effects of Alternatives on Hunted Resident Wildlife
It is the best professional judgment of the Refuge Manager that the proposed action would have no measurable adverse cumulative effects on local, regional or flyway populations of hunted resident and migratory wildlife. The proposed action will enhance the Refuge's ability to minimize adverse effects of over-abundant species on habitats and priority wildlife species. Furthermore, this alternative is in the best interests of the natural resources of the refuge and vicinity, the region, and the Atlantic Flyway, and it is consistent with Service policy and the National Wildlife Refuge Improvement Act.

Refuge staff consulted with staff from USFWS Division of Migratory Bird Management, Canaan Valley NWR, Lake Umbagog NWR, and Maine Coastal Islands NWR regarding the cumulative effects on resident and migratory hunted wildlife of hunting on all refuges. Because of the regulatory process for harvest management of migratory birds in place within the Service, the setting of hunting seasons largely outside the breeding seasons of resident and migratory wildlife, the ability of individual refuge hunt programs to adapt refuge-specific hunting regulations to changing local conditions, and the wide geographic separation of individual refuges, we anticipate no direct or indirect cumulative effects on resident and migratory hunted wildlife of hunting on all refuges.

Alternatives 1 and 3 were not proposed because in the best professional judgment of the Refuge Manager Alternative 1 would reduce, and Alternative 3 would not enhance, the

Refuge's ability to minimize adverse effects of over-abundant species on habitats and, priority wildlife species, and neither alternative is in the best interests of the natural resources of the refuge, local community, the region, and the Atlantic Flyway. Furthermore, neither Alternative 1 nor 3 is consistent with Service policy and the National Wildlife Refuge Improvement Act.

B. Non-Hunted Resident Wildlife Impacts

Refuge closed to all Hunting Alternative

Under this alternative there would not be any incidental hunting mortality to non-hunted resident wildlife. However, the lack of hunting has the potential to increase predators to many species of non-hunted resident wildlife including small mammals, reptiles and amphibians. This is a potential impact that may or may not have significant outcomes on individual populations and without detailed population information or an investigation on these species the specific effects can not be determined. If the local deer population were increase to a density of 15-20 deer per square mile the effects of browsing by deer would likely negatively affect forest regeneration, resulting in degradation of habitat for resident wildlife that use forest understory vegetation and regenerating forest; negative effects of deer browsing on forest regeneration and understory vegetation have been demonstrated by numerous researchers (see review by Russell et al. 2001) when deer population densities have reached 15-20 deer per square mile. Therefore the impacts to non-hunted resident wildlife populations by not allowing any hunting on the refuge potentially are negative effects on populations as a result of degradation of their habitat. The cumulative effect of closing deer hunting over a broad region would likely be a negative effect on habitat for some species of resident birds, mammals, herpetiles, and insects.

Resident Canada geese have the potential to destroy desirable vegetation in managed impoundments and natural wetlands. Failure to permit hunting of this species may result in changes to the vegetative composition of Refuge wetlands.

Proposed Action Alternative

Non-hunted resident wildlife would include resident birds, small mammals such as voles, moles, mice, shrews, and bats; reptiles and amphibians such as snakes, turtles, salamanders, frogs and toads; and invertebrates such as butterflies, moths, insects and spiders. These species have very limited home ranges and hunting could not possibly affect their populations regionally; thus, only local effects will be discussed.

Disturbance by hunting to non-hunted wildlife would be the most likely concern. Displacement of resident birds is usually brief, infrequent, and short distance. Disturbance would be unlikely for many small mammals, such as bats, which are inactive during fall and winter when hunting season occurs, and/or are nocturnal. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity during the hunting season when temperatures low, making encounters with reptiles and amphibians infrequent and inconsequential to local populations. Invertebrates are also not active

during cold weather and will have few interactions with hunters during the hunting season. The Service anticipates no measurable negative cumulative impacts to resident non-hunted wildlife populations locally, regionally, or globally due to this alternative. Refuge staff consulted with staff from USFWS Division of Migratory Bird Management, Canaan Valley NWR, Lake Umbagog NWR, and Maine Coastal Islands NWR regarding the cumulative effects on non-hunted wildlife of hunting on all refuges. Because of the regulatory process for harvest management of migratory birds in place within the Service, the setting of hunting seasons largely outside the breeding seasons of resident and migratory wildlife, the ability of individual refuge hunt programs to adapt refuge-specific hunting regulations to changing local conditions, and the wide geographic separation of individual refuges, we anticipate no direct or indirect cumulative effects non-hunted wildlife of hunting on all refuges.

No Action Alternative: Maintain Existing Program (Deer Hunting Only)
Under this alternative the refuge would remain open to deer hunting during the archery, firearms and muzzleloader seasons. No additional hunting would be permitted. Non-hunted resident wildlife includes non-migratory birds; small mammals, such as voles, moles, mice moles, shrews, and bats; reptiles and amphibians; and a variety of invertebrates.

However, the lack of hunting has the potential to increase predators to many species of non-hunted resident wildlife including small mammals, reptiles and amphibians. This is a potential impact that may or may not have significant outcomes on individual populations and without detailed population information or an investigation on these species the specific effects can not be determined. Current public use levels would remain the same under this alternative, consequently there would be no additional cumulative direct impacts to this group of wildlife species.

Summary – Anticipated Effects of Alternatives on Non-Hunted Resident Wildlife
It is the best professional judgment of the Refuge Manager that the proposed action would have no measurable adverse cumulative effects on local, regional or flyway populations of non-hunted resident wildlife. The proposed action will enhance the Refuge's ability to minimize adverse effects of over-abundant species on habitats and priority wildlife species. Furthermore, this alternative is in the best interests of the natural resources of the refuge and vicinity, the region, and the Atlantic Flyway, and it is consistent with Service policy and the National Wildlife Refuge Improvement Act.

Alternatives 1 and 3 were not proposed because in the best professional judgment of the Refuge Manager Alternative 1 would reduce, and Alternative 3 would not enhance, the Refuge's ability to minimize adverse effects of over-abundant species on habitats and, priority wildlife species, and neither alternative is in the best interests of the natural resources of the refuge, local community, the region, and the Atlantic Flyway. Furthermore, neither Alternative 1 nor 3 is consistent with Service policy and the National Wildlife Refuge Improvement Act.

C. Migratory Species Impacts

Refuge closed to all Hunting Alternative

Migratory waterfowl hunting would not be permitted under this alternative and, therefore, mortality of waterfowl species due to hunting would not occur. Waterfowl, shorebirds, and marsh and water birds use areas, such as impoundment system, and adjacent fields, and marshes, would be closed to hunting, and would not be impacted. As a result, there would be no increase in disturbance to those species. Because the refuge would also not open to American woodcock hunting, migratory forest species would not be impacted by an increase in hunter disturbance. Since the Refuge would not be open to the hunting of Wilson's snipe wetlands where this species is found would not be impacted.

A lack of hunting on the refuge diminishes the Refuge's ability to manage wildlife populations. Wildlife habitats susceptible to damage, such as native wetlands and marshes, would continue to be overgrazed by increasing numbers of resident Canada geese, resulting in increasingly degraded habitat for black ducks, green-winged teal, and other ducks, as well as sora, Virginia rail, and other waterbirds (Haramis and Kearns 2000). Likewise, an increase in the local deer population to a density of 15-20 deer per square mile would likely negatively affect forest regeneration, resulting in degradation of habitat for woodcock, chestnut-sided warbler, and other migratory birds that use regenerating forest; negative effects of deer browsing on forest regeneration have been demonstrated by numerous researchers (see review by Russell et al. 2001) when deer population densities have reached 15-20 deer per square mile.

The impacts to migratory species populations by not allowing any hunting on the refuge potentially are negative effects on populations of wetland-dependant birds and forest understory-dependant birds as a result of degradation of their habitat. The cumulative effect of closing hunting over a broad region would likely be a negative effect on habitat for these groups of migratory birds.

Proposed Action Alternative

The U.S. Fish and Wildlife Service annually prescribe frameworks, or outer limits, for dates and times when hunting may occur and the number of birds that may be taken and possessed. These frameworks are necessary to allow State selections of season and limits for recreation and sustenance; aid Federal, State, and tribal governments in the management of migratory game birds; and permit harvests at levels compatible with population status and habitat conditions. Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the frameworks from which States may select season dates, bag limits, shooting hours, and other options for the each migratory bird hunting season. The frameworks are essentially permissive in that hunting of migratory birds would not be permitted without them. Thus, in effect, Federal annual regulations both allow and limit the hunting of migratory birds.

Non-hunted migratory birds would include songbirds, wading birds, raptors, and woodpeckers. Disturbance to these migratory birds could have regional, local, and flyway effects. Regional and flyway effects would not be applicable to species that do not migrate such as most woodpeckers, and some songbirds such as chickadees. Disturbance by hunting to non-hunted migratory birds should not have cumulative negative impacts for the following reasons. Hunting season does not coincide with the nesting season. Long-term future impacts that could occur if reproduction was reduced by hunting are not relevant for this reason. Disturbance to the daily wintering activities, such as feeding and resting, of birds may occur. Disturbance to birds by hunters is probably commensurate with that caused by non-consumptive users.

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C. 703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway. Moosehorn NWR is within the Atlantic Flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules, based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g. dove, woodcock, etc.); and special early waterfowl seasons, such as teal or resident Canada geese. Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those

involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties (USFWS 2006).

Because the Service is required to take abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate frameworks for each species, we consider factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows.

NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, ‘‘Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSES 88– 14),’’ filed with the Environmental Protection Agency on June 9, 1988. We published Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and our Record of Decision on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment, “Duck Hunting Regulations for 2006-07,” and an August 24, 2006, Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53376), the Service announced its intent to develop a new Supplemental Environmental Impact Statement for the migratory bird hunting program. Public scoping meetings were held in the spring of 2006, as announced in a March 9, 2006, Federal Register notice (71 FR 12216). More information may be obtained from: Chief, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, Department of the Interior, MS MBSP-4107-ARLSQ, 1849 C Street, NWR, Washington, DC 20240.

Refuge staff consulted with staff from USFWS Division of Migratory Bird Management, Canaan Valley NWR, Lake Umbagog NWR, and Maine Coastal Islands NWR regarding the cumulative effects on migratory birds of hunting on all refuges. Because of the regulatory process for harvest management of migratory birds in place within the Service, the setting of hunting seasons largely outside the breeding seasons of resident and migratory wildlife, the ability of individual refuge hunt programs to adapt refuge-specific hunting regulations to changing local conditions, and the wide geographic separation of

individual refuges, we anticipate no direct or indirect cumulative effects on migratory birds of hunting on all refuges.

No Action Alternative: Maintain Existing Program (Deer Hunting Only)
Migratory waterfowl hunting would not be permitted under this alternative and, therefore, additional mortality of waterfowl due to hunting would not occur. Waterfowl, shorebirds, and marsh and water birds use areas, such as impoundment system, and adjacent fields, and marshes, would be closed to hunting, and would not be impacted. As a result, there would be no increase in disturbance to those species. Because the refuge would also not be open to American woodcock hunting, migratory forest species would not be impacted by an increase in hunter disturbance. Since the Refuge would not be open to the hunting of Wilson's snipe wetlands where this species is found would not be impacted.

A lack of hunting on the refuge diminishes the Refuge's ability to manage wildlife populations. Wildlife habitats susceptible to damage, such as native wetlands and marshes, would continue to be overgrazed by increasing numbers of resident Canada geese, resulting in increasingly degraded habitat for black ducks, green-winged teal, and other ducks, as well as sora, Virginia rail, and other waterbirds (Haramis and Kearns 2000).

The impacts to migratory species populations by not allowing migratory bird hunting on the refuge potentially are negative effects on populations of wetland-dependant migratory birds as a result of degradation of their habitat. The cumulative effect of closing hunting over a broad region would likely be a negative effect on habitat for this group of migratory birds.

Summary – Anticipated Effects of Alternatives on Migratory Species
It is the best professional judgment of the Refuge Manager that the proposed action would have no measurable adverse cumulative effects on local, regional or flyway populations of migratory species. The proposed action will enhance the Refuge's ability to minimize adverse effects of over-abundant species on habitats and priority wildlife species. Furthermore, this alternative is in the best interests of the natural resources of the refuge and vicinity, the region, and the Atlantic Flyway, and it is consistent with Service policy and the National Wildlife Refuge Improvement Act.

Alternatives 1 and 3 were not proposed because in the best professional judgment of the Refuge Manager Alternative 1 would reduce, and Alternative 3 would not enhance, the Refuge's ability to minimize adverse effects of over-abundant species on habitats and, priority wildlife species, and neither alternative is in the best interests of the natural resources of the refuge, local community, the region, and the Atlantic Flyway. Furthermore, neither Alternative 1 nor 3 is consistent with Service policy and the National Wildlife Refuge Improvement Act.

D. Endangered Species Impacts

Refuge closed to all Hunting Alternative
No negative impacts to endangered or threatened species are anticipated by not allowing hunting on the refuge.

Proposed Action Alternative
The Service does not anticipate any adverse effects to the endangered and threatened species that utilize the Refuge. Through a preventive law enforcement program, hunters would be advised of the possible presence of endangered and threatened species, and informed of the high level of protection afforded to these species. The majority of the species of management concern to the Refuge are not present in this region during the hunting period, and therefore will not be affected by this hunt program. Management concerns regarding hunted species such as Black Duck are addressed through Federal and State regulations establishing hunting seasons and bag limits. Because current public use levels on the refuge would remain the same, there would be no increased chance of adversely affecting threatened and endangered species.

Maintain Existing Program (Deer Hunting Only) Alternative
Because current public use levels on the refuge would remain the same, there would be no increased chance of adversely affecting threatened and endangered species.

One bald eagle nest on the Baring Division is located within a “No Hunt” zone. However, eagles forage over the entire Refuge.

2. Anticipated Direct and Indirect Impacts on Proposed Action on Refuge Programs, Facilities, and Cultural Resources

A. Other Refuge Wildlife-Dependent Recreation

Refuge closed to all Hunting Alternative
The public would not have the opportunity to harvest a renewable resource, participate in wildlife-oriented recreation that is compatible with the purposes for which the refuge was established, have an increased awareness of Moosehorn NWR and the National Wildlife Refuge System; nor would the Service be meeting public use demand. Public relations would not be enhanced with the local community. There would be no conflict between hunters and non-consumptive wildlife-dependent recreational users.

The USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat, and in some instances, threaten the health and safety of humans. Hunting can maintain bear populations at levels that minimize conflicts between bears and people. No attacks of bears on humans on the refuge have been reported, however bears acted aggressively toward humans during 3

separate encounters in May and June 2006 in the South Trail area of the Refuge's Baring Division. Hunting also can be used to reduce wildlife populations to lower the risk of wildlife/motor vehicle collisions, such as with deer and moose. During 2006, several Canada geese, and at least one bear and one bobcat were killed as a result of collisions with motor vehicles along roads through Refuge. In increase in adverse encounters between humans and wildlife is anticipated locally, and there would likely be a cumulative increase if hunting were eliminated throughout the flyway.

Proposed Action Alternative

One of the intentions of the Refuge Improvement Act is to provide Refuge visitors with a quality, safe and enjoyable recreational experience oriented toward wildlife. These uses must be compatible with the purpose for which the Refuge was established. The Service recognizes that hunting and fishing are acceptable, traditional form of wildlife-dependent recreation as well as a management tool to effectively control certain wildlife population levels. However, Moosehorn NWR provides additional wildlife dependent opportunities throughout the year.

The Refuge Improvement Act clearly identifies the top six wildlife dependent activities such as Hunting, Fishing, Environmental Education, Environmental Interpretation, Wildlife Photography and Observation. Moosehorn NWR, in addition to hunting and fishing, provides visitors with a wide variety of the remaining opportunities. Historically hunting has had minimal impacts on those opportunities that occur during the hunting season. Preliminary numbers show that less than ten percent of the total visitation to the Refuge occurs during the peak of the hunting season (November). The Refuge does not anticipate any significant impacts to other forms of wildlife dependent activities on Moosehorn NWR.

The Refuge maintains and monitors a no-hunt zone that includes six miles of hiking trails (approximately one-half square mile area around the Headquarters Office). Parking, public restrooms and a welcome center are provided in close proximity of trailheads located within this zone. There are three additional no hunt zones located on the Baring Division of Moosehorn NWR. All these areas provide for additional wildlife observation and photography. During the months of September and October each year, an auto tour route is open to the public. To date, there is no information showing any type of negative impacts to any of the other wildlife dependent activities.

A lease established in 1966 on the Edmunds Division, allows the State of Maine to manage Cobscook Bay State Park. This area, closed to hunting, provides additional opportunities such as camping, hiking, fishing, wildlife observation and photography. Weather permitting, snowmobiling and cross-country skiing is also permitted. Additionally, that portion of the Edmunds Division that lies west of Route 1 is open to vehicular traffic throughout the hunting season. A 3.75-mile loop provides access for other wildlife dependent activities including remote access to wilderness trailheads.

No Action Alternative: Maintain Existing Program (Deer Hunting Only)
The public would not have the opportunity to harvest a renewable resource, participate in wildlife-oriented recreation that is compatible with the purposes for which the refuge was established, have an increased awareness of Moosehorn NWR and the National Wildlife Refuge System; nor would the Service be meeting public use demand. Public relations would not be enhanced with the local community. There would be no increase in conflict between hunters and non-consumptive wildlife-dependent recreational users.

The USFWS considers hunting to be an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat, and in some instances, threaten the health and safety of humans. Hunting can maintain bear populations at levels that minimize conflicts between bears and people. No attacks of bears on humans on the refuge have been reported, however bears acted aggressively toward humans during 3 separate encounters in May and June 2006 in the South Trail area of the Refuge's Baring Division. Hunting also can be used to reduce wildlife populations to lower the risk of wildlife/motor vehicle collisions, such as with deer and moose. During 2006, several Canada geese, and at least one bear and one bobcat were killed as a result of collisions with motor vehicles along roads through Refuge.

Summary – Anticipated Effects of Alternatives on Other Refuge Wildlife-Dependent Recreation
It is the best professional judgment of the Refuge Manager that the proposed action would have no measurable adverse cumulative effects on other Refuge wildlife-dependent recreation. The proposed action will enhance the Refuge's ability to minimize the risk of adverse effects of over-abundant species on habitats, priority wildlife species, and human health and safety. Furthermore, this alternative is in the best interests of the natural resources of the refuge and vicinity, the region, and the Atlantic Flyway, and it is consistent with Service policy and the National Wildlife Refuge Improvement Act.

Alternatives 1 and 3 were not proposed because in the best professional judgment of the Refuge Manager Alternative 1 would reduce, and Alternative 3 would not enhance, the Refuge's ability to minimize the risk of adverse effects of over-abundant species on habitats, priority wildlife species, and human health and safety, and neither alternative is in the best interests of the natural resources of the refuge, local community, the region, and the Atlantic Flyway. Furthermore, neither Alternative 1 nor 3 is consistent with Service policy and the National Wildlife Refuge Improvement Act.

B. Refuge Facilities

Refuge closed to all Hunting Alternative
Additional damage to roads and trails due to hunter use during wet weather periods would not occur with this alternative. However, other users would still be using roads, thereby necessitating periodic maintenance. Additionally, costs associated with an

expanded hunting program in the form of road maintenance, instructional sign needs, and law enforcement would not be applicable.

Proposed Action Alternative
Limited accessibility affects all public uses found on the Refuge. Much of the 28,898 acres of Moosehorn NWR are only accessible by foot. The majority of the roads that do intersect both the Baring and Edmunds Division are used primarily for management purposes. However, the Refuge maintains and manages approximately 18 miles of roads and multiple trails throughout the hunting season. Management of road and trail access includes road maintenance, production of maps and permits, opening and closing gates, and maintaining pullout areas for parking and information kiosks. Information kiosks provide a variety of information to all users such as trail & hunting maps and notices recommending the wearing blaze orange.

Facilities associated with wildlife dependent activities require low to minimal maintenance. Most facilities serve multiple use purposes throughout the year. These facilities pose little to no effect on wildlife due to there location adjacent major thoroughfares. There are no anticipated direct or indirect cumulative impacts to refuge facilities at this time.

No Action Alternative: Maintain Existing Program (Deer Hunting Only)
Additional damage to roads and trails due to hunter use during wet weather periods would not occur; however, other users would still be using roads, thereby necessitating periodic maintenance. Additionally, costs associated with an expanded hunting program in the form of road maintenance, instructional sign needs, and law enforcement would not be applicable.

Summary – Anticipated Effects of Alternatives on Refuge Facilities
It is the best professional judgment of the Refuge Manager that the proposed action would have no measurable adverse cumulative effects on Refuge facilities. The proposed action will enhance the Refuge's ability to minimize the risk of adverse effects of over-abundant species on habitats, priority wildlife species, and human health and safety. Furthermore, this alternative is in the best interests of the natural resources of the refuge and vicinity, the region, and the Atlantic Flyway, and it is consistent with Service policy and the National Wildlife Refuge Improvement Act.

Alternatives 1 and 3 were not proposed because in the best professional judgment of the Refuge Manager Alternative 1 would reduce, and Alternative 3 would not enhance, the Refuge's ability to minimize the risk of adverse effects of over-abundant species on habitats, priority wildlife species, and human health and safety, and neither alternative is in the best interests of the natural resources of the refuge, local community, the region, and the Atlantic Flyway. Furthermore, neither Alternative 1 nor 3 is consistent with Service policy and the National Wildlife Refuge Improvement Act.

C. Cultural Resources

Moosehorn NWR lies within a potentially rich area of early human activity (McPheters et al. 2004) however; very little historical or cultural evidence has been unearthed within its 33,000-acre boundary. To date, two arrowheads are on file with the Maine State Museum and three historical cemeteries are located on the Edmunds Division. Two archeological surveys have been completed within the last three years. The first, (A Fire Line) showed no findings of historical or cultural significance. The other, a proposed Liquefied Natural Gas (LNG) pipeline, has not yet been concluded.

Adjacent areas of interest include the Lincoln House (1787) in Dennysville and closer to the Baring Division, along U.S. Route 1, St. Croix Island, and site of the first French settlement in the New World. The nearest known archaeological site, known as N'tolonapemk, which means "Our Ancestor's Place" (Passamaquoddy), is located near the town of Meddybemps approximately 10.5 miles from the Refuge's headquarters office. Archaeologists have known about the site since the 1960s. The site has produced artifacts that date back 8,000 years.

Additionally, Section 106 of the National Historic Preservation Act of 1966, as amended, requires the Service to evaluate the effects of any of its actions on cultural resources (historic, architectural and archeological properties) that are listed or eligible for listing in the National Register of Historic Places (NRHP). In accordance with the regulations under Section 106, the Service consulted with the State Historic Preservation Officer (SHPO) of Maine. The SHPO indicated that there are five recorded archaeological sites along the Cobscook Bay shoreline. All are prehistoric sites that have not yet been professionally investigated in detail, but are considered to have potential as significant sites worthy of listing in the National Register of Historic Places. There are no known archaeological sites within the Baring Division. The soils are mostly fine-grained glaciomarine and till derived soil, poorly drained, and not attractive for prehistoric settlement.

Archaeological remains in the form of prehistoric campsites or villages would most likely be located along coastline and streams where early inhabitants would have taken advantage of water supply and fishing and hunting opportunities. At the time of European contact, the Passamaquoddy tribe frequented the area around the Moosehorn NWR. Permanent European settlement of the area began in the mid-eighteenth century.

The proposed action would not likely affect any cultural resources found on Moosehorn NWR. We would hope that the environmental education, ethical behavior and FWS regulations would deter those individuals utilizing the Refuge during the hunting season to remove or disturb any cultural resources. All cultural resource discoveries will be report immediately to the SHPO.

Refuge closed to all Hunting Alternative

This alternative requires no development of new trails, roads, or other facilities, and therefore, will not have any effect on the refuge's cultural and historic resources.

Proposed Action Alternative
The Service's policy is to preserve all cultural, historic, and archaeological resources in the public trust, and avoid any adverse effects wherever possible. There are no anticipated direct or indirect cumulative impacts to refuge cultural and historical resources anticipated following the guidance of this proposed action.

No Action Alternative: Maintain Existing Program (Deer Hunting Only)
This alternative requires no development of new trails, roads, or other facilities, and therefore, will not have any anticipated effects on the refuge's cultural and historic resources.

Summary – Anticipated Effects of Alternatives on Cultural Resources
It is the best professional judgment of the Refuge Manager that the proposed action would have no measurable adverse cumulative effects Refuge cultural resources. The proposed action will enhance the Refuge's ability to minimize the risk of adverse effects of over-abundant species on habitats, priority wildlife species, and human health and safety. Furthermore, this alternative is in the best interests of the natural resources of the refuge and vicinity, the region, and the Atlantic Flyway, and it is consistent with Service policy and the National Wildlife Refuge Improvement Act.

Alternatives 1 and 3 were not proposed because in the best professional judgment of the Refuge Manager Alternative 1 would reduce, and Alternative 3 would not enhance, the Refuge's ability to minimize the risk of adverse effects of over-abundant species on habitats, priority wildlife species, and human health and safety, and neither alternative is in the best interests of the natural resources of the refuge, local community, the region, and the Atlantic Flyway. Furthermore, neither Alternative 1 nor 3 is consistent with Service policy and the National Wildlife Refuge Improvement Act.

3. Anticipated Impacts of Proposed Hunt on Refuge Environment and Community

Refuge closed to all Hunting Alternative
The Service does anticipate some negative economic effects on the local economy resulting from Alternative 1, particularly since hunters who would travel 30-50 or more miles specifically to hunt upland game on the refuge would be displaced and likely would not continue to hunt in the local area surrounding the Refuge, and would not continue to use traditional services (e.g. fuel, lodging, guiding, and supplies). The Service does not anticipate significant local economic effects from this alternative resulting from displaced big game hunters and waterfowl hunters, as they would likely continue to hunt in the general area surrounding the Refuge, and continue to use traditional services (e.g. fuel and supplies). While closing the Refuge to hunting may not have a significant effect on an individual's ability to hunt in this region, it may have a significant effect on community relations with the Service. Hunting is a very strong tradition in this region of Maine, and a limited number of local residents have questioned the Refuge about

allowing hunting on Refuge lands.

Closing of the refuge to hunting under Alternative 1 may erode cultural and financial support for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. The cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Closing the refuge to hunting will exclude a source of dependable access and opportunity for hunters to pursue this traditional wildlife-dependent activity, and will deny a source of access and opportunity for new participants to become initiated into hunting.

Proposed Action Alternative

The refuge expects no significant, adverse impacts of the proposed alternative on the refuge environment which consists of soils, vegetation, air quality, water quality and solitude. Some disturbance to surface soils and vegetation would occur in areas selected for hunting; however minimal. Hunting would benefit vegetation as it is used to keep many resident wildlife populations in balance with the habitat's carrying capacity. The refuge would also control access to minimize habitat degradation.

The refuge expects impacts to air and water quality to be minimal and only due to refuge visitors' automobile and off-road vehicle emissions and run-off. The effect of these refuge-related activities, as well as other management activities, on overall air and water quality in the region are anticipated to be relatively insignificant, compared to the contributions of industrial centers, power plants, and non-refuge vehicle traffic. Existing State water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of the proposed action would not impact adjacent landowners or users beyond the constraints already implemented under existing State standards and laws.

Impacts associated with solitude are expected to be minimal given time and space zone management techniques, such as seasonal access and area closures, used to avoid conflicts among user groups. Therefore, no direct or indirect cumulative impacts to the

refuge environment will occur.

The Service does anticipate future positive economic effects in the community resulting from the proposed alternative, resulting from increased use of traditional services (e.g. fuel, lodging, guiding, and supplies) if hunters were visiting the area just to hunt on the refuge. Also, allowing hunting on the refuge will have a positive effect on community relations with the Service. Hunting is a very strong tradition in this region of Maine, and a limited number of local residents have questioned the Refuge about allowing hunting on Refuge lands.

Opening of the refuge to hunting under Alternative 2 may contribute to further financial support cumulatively among communities for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Opening the refuge to hunting will provide dependable access and opportunity for hunters from the local community and throughout the Atlantic Flyway to pursue this traditional wildlife-dependent activity, and will provide access and opportunity for new participants from the local community and throughout the Atlantic Flyway to become initiated into hunting.

No Action Alternative: Maintain Existing Program (Deer Hunting Only)
Under this alternative, there would be no additional effects of the refuge hunting program on the refuge environment and community. The Service does not anticipate significant local effects on the community from this alternative resulting from displaced big game hunters and waterfowl hunters, as local deer hunters would continue to hunt on the Refuge while other big game and waterfowl hunters would likely continue to hunt in the general area surrounding the Refuge, and continue to use traditional services (e.g. fuel and supplies). While keeping the refuge closed to most forms of hunting may not have a significant effect on an individual's ability to hunt in this region, it may have a significant effect on community relations with the Service. Hunting is a very strong tradition in this region of Maine, and a limited number of local residents have questioned the Refuge about allowing hunting on Refuge lands.

keeping the refuge closed to all but deer hunting under Alternative 3 may erode cultural and financial support for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. The cumulative effect of closing refuges to most forms of hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation.

The top two reasons given for hunter dissatisfaction and desertion in a national survey (Duda et al. 1995) were 1) not enough access to places to hunt (46%), and 2) not having enough places to hunt (44%). Access to land in Maine is controlled largely by private landowners. Less than 1% of land in Maine is owned by the federal government, and less than 5% is owned by the State (NRCM 2007). Among all states in the U.S., Maine ranks 29th in proportion of land area that is state-controlled and open to hunting (Duda et al. 2003). Maine ranks 37th among all states in the proportion of land area that is owned by state and federal governments (NRCM 2007). Closing the refuge to many forms of hunting will exclude a source of dependable access and opportunity for hunters to pursue this traditional wildlife-dependent activity, and will deny a source of access and opportunity for new participants to become initiated into hunting.

Summary – Anticipated Effects of Alternatives on Refuge Environment and Community
It is the best professional judgment of the Refuge Manager that the proposed action would have no measurable adverse cumulative effects Refuge environment, and will likely have positive local and cumulative effects on communities. The proposed action will enhance the Refuge's ability to garner support for conservation from communities, and to minimize the risk of adverse effects of over-abundant species on habitats, priority wildlife species, and human health and safety. Furthermore, this alternative is in the best interests of the natural resources of the refuge and vicinity, the region, and the Atlantic Flyway, and it is consistent with Service policy and the National Wildlife Refuge Improvement Act.

Alternatives 1 and 3 were not proposed because in the best professional judgment of the Refuge Manager Alternative 1 would reduce, and Alternative 3 would not enhance, the Refuge's ability to garner support for conservation from communities, as well as the Refuge's ability to minimize the risk of adverse effects of over-abundant species on habitats, priority wildlife species, and human health and safety. Neither alternative is in the best interests of the natural resources of the refuge, local community, the region, and the Atlantic Flyway. Furthermore, neither Alternative 1 nor 3 is consistent with Service policy and the National Wildlife Refuge Improvement Act.

4. Other Past, Present, Proposed, and Reasonably Foreseeable Hunts and Anticipated Impacts

Refuge closed to all Hunting Alternative
There would be no hunting allowed on the refuge and therefore, no cumulative effects on other past, present, proposed and reasonable foreseeable hunts are expected.

Proposed Action Alternative
Moosehorn NWR does not anticipate significant hunting harvest to occur immediately on Refuge lands as a result of opening these areas to hunting due to the availability of private land open to hunting outside the Refuge. Refuge-specific hunting regulations may be altered to achieve species-specific harvest objectives in the future. There are no other reasonably foreseeable hunts and anticipated impacts. Consequently, no direct or indirect unanticipated cumulative impacts will occur.

The refuge will work closely with State, Federal, and private partners to minimize unwanted impacts to adjacent lands and associated natural resources; however, no indirect or direct impacts are anticipated. The newly opened hunts would result in a net gain of public hunting opportunities positively affecting the general public, nearby residents, and refuge visitors. The refuge expects increased visitation and tourism to bring additional revenues to local communities but not a significant increase in overall revenue in any area.

The Service anticipates the economic effects of this alternative to be minor. As noted, the Service does not anticipate hunting pressure to originate outside the local community, other than for upland game bird hunting due to hunting, opportunities within this region of Maine. The quantities of fuel and supplies purchased by local hunters should not be affected by this alternative.

No Action Alternative: Maintain Existing Program (Deer Hunting Only)
There would be no additional hunts opening in the hunt program and therefore, the cumulative effect of this alternative is not expected to be significant.

5. Anticipated Impacts if Individual Hunts are Allowed to Accumulate

Refuge closed to all Hunting Alternative
Under this alternative there would not be any cumulative impacts of individual hunts because no hunting would be allowed on the refuge.

Proposed Action Alternative
Moosehorn NWR does not anticipate significant hunting harvest to occur immediately on Refuge lands as a result of opening these areas to hunting, and anticipates that hunting harvests will be sustainable. The Refuge will be adaptive in the harvest management under the hunt program. Refuge-specific hunting regulations may be altered to achieve species-specific harvest objectives in the future. Most game species populations are

monitored through field surveys or banding, and game harvests are monitored through a mandatory hunter survey, which will provide an additional means for monitoring populations. There are no other reasonably foreseeable hunts and anticipated impacts. Consequently, no direct or indirect unwanted cumulative impacts will occur.

Refuge staff consulted with staff from USFWS Division of Migratory Bird Management, Canaan Valley NWR, Lake Umbagog NWR, and Maine Coastal Islands NWR regarding the cumulative effects on resident wildlife, migratory birds, and non-hunted wildlife of hunting on all refuges. Because of the regulatory process for harvest management of migratory birds in place within the Service, the setting of hunting seasons largely outside the breeding seasons of resident and migratory wildlife, the ability of individual refuge hunt programs to adapt refuge-specific hunting regulations to changing local conditions, and the wide geographic separation of individual refuges, we anticipate no direct or indirect effects on resident wildlife, migratory birds, and non-hunted wildlife of hunting on all refuges.

No Action Alternative: Maintain Existing Program (Deer Hunting Only)
Moosehorn NWR opened the refuge deer hunt program in 1954 to control the population which was over browsing the Refuge and to provide a wildlife-dependent recreational use. Because this alternative does not allow for additional hunts, there is no anticipated impact of accumulated hunts.

VII. Consultation and Coordination with Others

During the preparation of this Environmental Assessment, Refuge staff consulted Service and MDIFW biologists with expertise and experience in the research and management of the wildlife species discussed in this document. Refuge staff consulted with staff from USFWS Division of Migratory Bird Management, Canaan Valley NWR, Lake Umbagog NWR, and Maine Coastal Islands NWR regarding the cumulative effects on resident wildlife, migratory birds, and non-hunted wildlife of hunting on all refuges. Because of the regulatory process for harvest management of migratory birds in place within the Service, the setting of hunting seasons largely outside the breeding seasons of resident and migratory wildlife, the ability of individual refuge hunt programs to adapt refuge-specific hunting regulations to changing local conditions, and the wide geographic separation of individual refuges, we anticipate no direct or indirect cumulative effects on resident wildlife, migratory birds, and non-hunted wildlife of hunting on all refuges. A Section 7 consultation has been conducted to ensure that expansion of the hunting program at Moosehorn NWR will not adversely affect any listed species.

The Hunt Plan, Compatibility Determination and this Environmental Assessment were made available for public review and comment. The local radio station broadcast the proposed changes and the opportunity for public input. News Releases were sent to local newspapers, and several articles resulted.

In addition copies of the documents were sent to two local hunting clubs, the Sportsman's Alliance of Maine, Maine Audubon, Quoddy Regional Land Trust, Maine Coast Heritage Trust,

Maine Chapter of the Nature Conservancy, Natural Resources Council of Maine, Passamaquoddy Tribal Offices at both Indian Township and Pleasant Point, Friend's of the Moosehorn, Maine Department of Inland Fisheries and Wildlife (both Regional and State Offices), Maine Warden Service Regional Headquarters, and several local waterfowl hunters. Written comments were received from Maine Department of Inland Fisheries and Wildlife, and three individuals. Most comments voiced strong support for the preferred alternative. Several changes were made to the draft documents as a result of the comments received.

VIII. Regulatory Compliance

The actions proposed in the preferred alternative will be carried out according to all applicable local, State, and Federal laws.

Following a period of public review, Moosehorn NWR's Hunt Plan Package was signed by the Refuge Manager and submitted to the Regional Office for review and approval on January 7, 2005. This package consisted of the Hunt Plan, an Environmental Assessment, FONSI form, Compatibility Determination, Public Outreach Plan, draft Refuge Specific Hunting Regulations, draft News Release and copies of letters of concurrence from the Maine Department of Inland Fisheries and Wildlife and Section 7 Evaluation.

The Hunt Management Plan was approved by the Refuge Supervisor on January 19, 2005. The Environmental Assessment, FONSI and Compatibility Determination were approved on January 20 and 21, 2005.

Refuge Specific Hunting Regulations were published in the Federal Register (Part32) on July 12, 2005, September 13, 2005, and July 24, 2006.

The Intra-Service Section 7 Biological Evaluation Form was completed by the USFWS Maine Field Office Endangered Species Biologist on December 5, 2004. The determination was that there would be no effect on Atlantic salmon; "is not likely to adversely affect the bald eagle".

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Appendix 1

Tables

Table 1. Most Common Soils Mapped on the Moosehorn NWR
(From Washington County Soil Survey (2004)

Soil Code	Soil Name	Origin	Drainage
Baring Division			
DWC	Dixfield-Turnbridge-Colonel Complex	Firm Glacial Till	Moderately Well Drained
LYC	Lyman-Turnbridge-Abram Complex	Glacial Till	Somewhat Excessively Drained
BRB	Brayton-Colonel Association	Firm Glacial Till	Somewhat Poorly Drained
DTC	Dixfield-Marlow-Turnbridge Complex	Glacial Till	Moderately Well Drained
DHB	Dixfield-Colonel Complex	Firm Glacial Till	Moderately Well Drained
WF	Wonsqueak Bucksport Soils	Highly Decomposed Organic Material	Very Poorly Drained
LUE	Lyman-Abram-Turnbridge Complex	Glacial Till	Somewhat Excessively Drained
HSC	Hermon-Monadnock-Skerry Complex	Glacial Till	Well Drained
STC	Skerry-Colonel-Turnbridge Complex	Loamy Glacial Till	Somewhat Poorly Drained
BW	Bucksport and Wonsqueak Soils	Highly Decomposed Organic Material	Very Poorly Drained
KW	Kinsman-Wonsqueak Association	Glaciofluvial Sands	Poorly Drained
Sa	Scantic Silt Loam	Glaciomarine Deposits	Poorly Drained
BTB	Brayton-Colonel Association	Firm Glacial Till	Poorly Drained
SOB	Skerry-Colonel Complex	Firm Glacial Till	Moderately Well Drained
LCB	Lamoine-Buxton-Scantic Complex	Glaciomarine Deposits	Somewhat Poorly Drained
Edmunds Division			
LCB	Lamoine-Buxton-Scantic Complex	Glaciomarine Deposits	Somewhat Poorly Drained
HXC	Hogback-Rawsonville-Abram Complex	Glacial Deposits	Well Drained
RNC	Rawsonville-Lamoine-Hogback Complex	Glacial Till	Well Drained
BRB	Brayton-Colonel Association	Firm Glacial Till	Somewhat Poorly Drained
LKB	Lamoine-Rawsonville-Scantic Complex	Glaciolacustrine and Glaciomarine Deposits	Somewhat Poorly Drained
NCB	Naskeag-Turnbridge-Abram Complex	Glacial Till	Poorly Drained
DWC	Dixfield-Turnbridge-Colonel Complex	Firm Glacial Till	Moderately Well Drained
LYC	Lyman-Turnbridge-Abram Complex	Glacial Till	Somewhat Excessively Drained
SF	Scantic-Biddeford Association	Glaciomarine Deposits	Poorly Drained
BW	Bucksport and Wonsqueak Soils	Highly Decomposed Organic Material	Very Poorly Drained
LTB	Lamoine-Turnbridge-Scantic Complex	Glaciomarine Deposits	Somewhat Poorly Drained
TLC	Turnbridge-Lamoine-Lyman Complex	Glacial Till	Well Drained
LSB	Lamoine-Scantic-Colonel Complex	Glaciomarine Deposits	Somewhat Poorly Drained
STC	Skerry-Colonel-Turnbridge Complex	Stony Glacial Till	Moderately Well Drained
CRC	Colton-Adams Complex	Glaciofluvial Sands and Gravels	Excessively Drained

Table 2. Land Cover Types on Moosehorn NWR			
Land Cover Type	**Total Acres (%)**	**Baring Division Acres (%)**	**Edmunds Division Acres (%)**
Wetlands			
Shrub Swamp	889 (3%)	706 (4%)	183 (2%)
Graminoid Marsh	831 (3%)	713 (4%)	118 (1%)
Open Water	822 (3%)	731 (4%)	91 (1%)
Beaver Marsh/Pond/Bog	451 (2%)	295 (1%)	156 (2%)
Red Maple Swamp	341 (1%)	236 (1%)	105 (1%)
Northern White Cedar Swamp	319 (1%)	186 (1%)	133 (2%)
Peat Bog	280 (1%)	152 (1%)	128 (1%)
Conifer Swamp	196 (1%)	93 (<1%)	103 (1%)
Ledge/Rocky Shoreline	104 (<1%)	0 (0%)	104 (1%)
Tidal Flat	60 (<1%)	0 (0%)	60 (1%)
Saltmarsh	55 (<1%)	0 (0%)	55 (1%)
Treed Peat Bog	53 (<1%)	52 (<1%)	1 (<1%)
Total Wetlands	**4,401 (15%)**	**3,164 (16%)**	**1,237 (14%)**
Uplands			
Aspen-Birch Woodland/Forest	10,332 (36%)	8,182 (41%)	2,150 (24%)
Spruce-Fir Upland Forest	9,147 (32%)	4,320 (22%)	4,827 (55%)
Red Maple-Pine Forest	1,967 (7%)	1,919 (10%)	48 (1%)
White Pine-Hemlock	1506 (5%)	1481 (7%)	25 (<1%)
Spruce-Fir Flats	498 (2%)	328 (2%)	170 (2%)
Abandoned Field	435 (2%)	262 (1%)	173 (2%)
Northern Hardwood Forest	174 (1%)	110 (1%)	64 (1%)
Utility/Transportation	135 (<1%)	115 (1%)	20 (<1%)
Log Yard	56 (<1%)	38 (<1%)	18 (<1%)
Administrative/Recreational	26 (<1%)	14 (<1%)	12 (<1%)
Upland Brush	23 (<1%)	5 (<1%)	18 (<1%)
Gravel Pit	17 (<1%)	14 (<1%)	3 (<1%)
Ledge	11 (<1%)	1 (<1%)	10 (<1%)
Red Pine Plantation	10 (<1%)	10 (<1%)	0 (0%)
Residential	10 (<1%)	1(<1%)	9 (<1%)
Total Uplands	**24,347 (85%)**	**16,800 (84%)**	**7,547 (86%)**
Refuge Total Acres	**28,748 (100%)**	**19,964 (69%)**	**8,784 (31%)**

Table 3. Resident state of hunters on MHNWR		
	2005-06	**2006-07**
Maine	133	74
Unknown	10	0
Pennsylvania	6	3
New York	3	6
New Jersey	2	2
New Hampshire	3	0
Connecticut	7	1
Massachusetts	0	1
North Carolina	0	1
Total	**164**	**88**

Table 4. Grouse harvests by moose hunters and others in their hunting party (MDIFW 2006).												
	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Permit holders reporting	1,069	1,252	1,321	1,323	1,739	2,542	1,887	2,673	2,251	1,428	2,512	2,379
Number of grouse seen	5,804	18,069	4,880	6,868	11,604	17,754	11,731	28,723	16,636	11,802	18,489	7,914
Grouse seen/100 hrs hunting	35	107	20	25	43	37	33	48	31	34	33	13
Grouse taken by permit holders	1,432	4,160	871	1,268	2,424	3,268	1,933	2,441	—	—	—	—
Grouse taken by others in party	1,146	3,779	836	1,024	2,182	2,990	2,081	2,703	—	—	—	—
Total grouse taken	**2,578**	**7,939**	**1,707**	**2,292**	**4,606**	**6,258**	**3,930**	**5,144**	**—**	**—**	**—**	**—**

Table 5. Species hunted, seen and harvested summary on MHNWR *

	# Hunters	# Visits	# Seen		# Taken	
Species	2005-06	2006-07	2005-06	2006-07	2005-06	2006-07
Deer	108	206	20	64	0	0**
Bear	0	0	0	0	0	0
Moose	1	9	3	1	0	0
Coyote	5	25	2	9	0	0
Woodcock	17	32	36	127	10	19
Snipe	0	6	0	4	0	1
Geese	15	36	219	283	3	6
Ducks	20	50	437	2,169	15	22
Hares	13	2	8	1	2	0
Grouse	40	125	49	122	5	10
Squirrel	0	0	1	0	0	0
Bobcat	0	2	0	1	0	0
Totals	**219**	**493**	**775**	**2781**	**35**	**58**

*Received returns from 88 hunters so far, a total of 312 permits were issued (28% return rate).

** There were at least four deer harvested from the Refuge during the 2006 seasons.

Table 6. Preliminary Migratory Bird HIP estimates of snipe and woodcock harvest & hunter activity in Maine during the 2003-2004 hunting seasons (Kelley and Rau 2006).

Year	**2003**	**2004**	**2005**
Woodcock Harvest	31,000 (±81%)	15,600 (±58%)	9,100 (±29%)
Active Woodcock Hunters	6,600 (±47%)	4,300 (±39%)	5,800 (±34%)
Woodcock Hunter Days Afield	21,400 (±41%)	27,000 (±62%)	25,200 (±39%)
Seasonal Woodcock Harvest Per Hunter	4.7 (±93%)	3.6 (±70%)	1.6 (±45%)
Snipe Harvest	9,300 (±196%)	100 (±191%)	N/A
Active Snipe Hunters	900 (±196%)	<50 (±191%)	N/A
Snipe Hunter Days Afield	3,700 (±196%)	100 (±191%)	N/A
Seasonal Snipe Harvest Per Hunter	10.0 (±277%)	6.0 (±270%)	N/A

Table 7. Mid-winter Waterfowl Survey data for Maine, January 1997-2006 (MDIFW 2006).

Species	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Mallard	556	995	1,849	892	1,162	3,224	2,857	2,055	2,198	4,025
Black Duck	14,597	24,027	32,600	20,666	12,971	21,368	17,283	10,799	14,027	16,631
Northern Pintail	0	0	0	0	0	0	0	10	0	0
Total Dabblers	**15,153**	**25,022**	**34,449**	**21,558**	**14,133**	**24,592**	**20,140**	**12,864**	**16,225**	**20,656**
Ruddy Ducks	0	0	0	0	0	508	60	0	0	0
Scaup	1,175	581	1,830	1,790	1,080	370	450	0	160	73
Common Goldeneye	5,429	4,543	7,416	3,392	2,510	5,577	3,912	6,783	7,374	5,982
Bufflehead	3,175	9,270	7,099	3,252	4,472	6,950	5,104	4,012	4,369	6,770
Common Merganser	1,662	4,028	5,451	4,948	5,550	7,802	3,600	1,944	2,298	4,114
Total Divers	**11,441**	**18,422**	**21,796**	**13,382**	**13,612**	**21,207**	**13,126**	**12,739**	**14,201**	**16,939**
Common Eider	39,001	31,809	38,735	38,351	28,664	46,036	26,347	17,240	34,794	34,041
Scoter	2,804	2,755	3,198	4,611	1,941	2,710	2,857	337	2,702	4,480
Long-tailed Duck	1,797	1,739	2,861	1,120	2,389	2,311	1,759	846	1,995	2,865
Harlequin	24	0	0	15	0	25	5	51	30	30
Total Sea Ducks	**43,626**	**36,303**	**44,794**	**44,097**	**32,994**	**51,082**	**30,968**	**18,474**	**39,521**	**41,416**
Unidentified Ducks	90	246	254	210	425	248	18	0	37	16
TOTAL DUCKS	**70,310**	**79,993**	**101,293**	**79,247**	**61,164**	**97,199**	**64,252**	**44,077**	**70,014**	**79,027**
Canada Goose	1,911	1,986	3,071	3,139	2,769	3,377	2,603	2,290	3,489	3,338
Brant	15	0	21	0	0	0	0	4	0	0
Total Geese	**1,926**	**1,986**	**3,092**	**3,139**	**2,769**	**3,377**	**2,603**	**2,294**	**3,489**	**3,338**
GRAND TOTAL	**72,236**	**81,979**	**104,385**	**82,386**	**63,933**	**100,506**	**66,855**	**46,371**	**73,503**	**82,365**

Table 8. Historic Maine dabbling and diving duck harvest statistics, 1961-2001 (MDIFW 2006)

	Mallard	Black Duck	Green-winged Teal	Blue-winged Teal	Wood Duck	Greater Scaup	Lesser Scaup	Ring-necked Duck	Buffle-head	Common Goldeneye
1961-65 (mean)	960	21,080	5,960	840	4,500	125	50	950	1,780	2,240
1966-70 (mean)	2,360	32,060	12,000	4,460	5,500	220	100	1,100	1,980	2,380
1971-75 (mean)	4,600	32,680	13,340	4,640	7,660	200	160	1,550	3,340	2,040
1976-80 (mean)	5,040	23,580	9,620	2,740	9,880	260	360	2,620	6,240	3,040
1981-85 (mean)	4,660	12,740	8,700	1,380	11,240	220	300	2,620	4,340	4,040
1986-90 (mean)	4,700	8,280	7,100	640	6,840	100	180	2,750	2,240	2,940
1991-95 (mean)	7,960	11,040	5,080	400	8,000	60	120	1,680	3,100	1,720
1996	7,100	7,800	6,200	1,600	10,300	0	100	2,100	3,500	2,000
1997	9,360	9,380	11,720	600	6,220	90	0	1,540	2,180	830
1998	10,761	9,481	13,330	549	9,732	205	124	2,175	1,227	775
1999	11,974	10,393	11,576	857	7,290	123	245	1,050	2,441	889
2000	8,438	6,843	8,391	198	9,676	50	130	809	2,164	655
2001	14,972	11,903	5,222	843	15,074	---	---	1,140	4,075	1,803

Table 9. Maine sea duck harvest statistics, 1961-2001 (MDIFW 2006)

	Common Eider	Long-tailed Duck*	White-winged Scoter	Surf Scoter	Black Scoter
1961-65 (mean)	1,360	280	1,660	1,060	560
1966-70 (mean)	2,800	1,520	3,120	4,000	1,580
1971-75 (mean)	8,820	1,080	4,160	4,440	1,460
1976-80 (mean)	7,580	1,300	2,020	2,980	1,680
1981-85 (mean)	11,980	1,520	2,340	1,880	740
1986-90 (mean)	13,680	2,360	1,500	1,980	400
1991-95 (mean)	14,840	2,420	1,460	1,412	372
1996	21,100	800	1,100	3,800	300
1997	19,340	530	1,450	3,040	520
1998	9,019	2,917	685	4,604	421
1999	16,007	1,094	741	2,938	1,331
2000	11,661	810	477	710	178
2001	14,117	1,691	1,880	1,891	1,905

* Formerly know as Oldsquaw

Table 10. Number of Duck Stamps Sold and Total Revenue by Year in Maine (USFWS).

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Sales	14,470	14,685	13,634	13,280	13,185	12,320	10,461	10,850	11,244	11,298	10,128	9,553
Revenue	$108,525	$110,138	$102,255	$99,600	$98,888	$123,200	$104,610	$135,625	$140,550	$169,470	$151,920	$143,295
	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**Average**	
Sales	9,855	8,784	9,251	9,568	10,341	10,733	10,810	11,041	10,331	10,037	11,175	
Revenue	$147,825	$131,750	$138,765	$143,520	$155,115	$160,995	$162,150	$165,615	$154,965	$150,555	$136,334	

Table 11. Harvest of furbearers from Maine's pelt-tagging records (MDIFW 2006).

Species	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
Beaver	16,640	10,547	10,482	9,850	9,803	11,757	7,709	8,222	10,436
Bobcat	128	205	150	194	308	269	331	273	376
Coyote	1,587	1,987	1,915	1,823	1,977	2,741	2,287	2,459	2,175
Fisher	1,886	2,827	1,807	2,578	2,028	3,117	2,630	2,526	2,174
Red Fox	1.599	1,894	1,539	1,248	1,272	2,056	1,469	1,535	1,413
Grey Fox	25	92	75	82	89	164	172	196	125
Marten	2,208	5,736	2,160	4,396	1,832	5,529	2,908	5,088	2,248
Mink	1,365	1,177	1,519	1,545	1,606	2,031	935	904	1,224
Otter	1,237	876	838	737	943	1,103	803	931	1,113

Pelts may not be tagged when nuisance animals (e.g., coyote and beaver) are lethally removed, thus pelt-tagging records may under-represent the harvest of some species.

Table 12. Maine bear hunter participation and harvest levels (MDIFW 2006).

Year	Number of Permits	Harvest
1990	11,803	2,088
1991	10,204	1,665
1992	10,133	2,042
1993	10,195	2,055
1994	9,991	2,243
1995	10,929	2,645
1996	10,928	2,246
1997	10,716	2,300
1998	10,871	2,618
1999	12,542	3,483
2000	12,811	3,951
2001	14,036	3,903
2002	15,252	3,512
2003	11,331	3,900
2004	11,740	3,921
2005	10,881*	2,873

* Preliminary estimate of permit sales

Table 13. Number of bears harvested in Maine in WMD 29 by year (MDIFW 2000-06).

Year	Method of Take				Total Harvest in District	Archery	Assisted by Guide	Residents	Non-residents
	Hunting with bait	Hunting with dogs	Trapping	Unknown					
1999	35	7	1	5	**48**	5	11	32	16
2000	25	8	0	6	**39**	6	16	20	19
2001	43	12	2	5	**63**	4	28	31	32
2002	24	1	7	7	**39**	3	18	23	16
2003	28	10	7	4	**49**	7	20	30	19
2004	33	7	8	2	**50**	6	21	28	22
2005	37	9	6	3	**58**	8	32	30	28
Total	**225**	**54**	**31**	**32**	**346**	**39**	**146**	**194**	**152**

Table 14. WMD 29 White-tailed deer harvest summary (MDIFW 2000-06).										
	Adult		Fawn		Total		Harvest Per 100 Adult Bucks		Harvest Per 100 Sq. Miles Habitat	
Year	Buck	Doe	Buck	Doe	Antlerless Deer	All Deer	Adult Does	Antlerless	Adult Bucks	All
1999	124	6	2	5	13	137	5	10	25	28
2000	139	4	6	3	13	152	3	9	29	31
2001	128	4	2	1	7	135	3	5	26	28
2002	154	12	3	2	17	171	8	11	32	35
2003	124	7	1	1	9	133	6	7	26	27
2004	122	7	1	1	9	131	6	7	25	27
2005	125	8	1	0	9	134	6	7	25	28
Total	**916**	**48**	**16**	**13**	**77**	**993**	**37**	**56**	**188**	**204**
Average	**183**	**10**	**3**	**3**	**15**	**199**	**7**	**11**	**38**	**41**

Table 15. Moose harvested in WMD 29 by year and permit type (MDIFW 2002-06).					
Year	Season	Permit Type	No. of Permits	No. of Moose Harvest	%Success
2001*	Oct.	AMP	**30**	**22**	**73**
2002	Oct.	AMP	**30**	**9**	**30**
2003	Oct.	BOP	25	8	32
	Oct.	AOP	5	1	20
2003 Subtotals			**30**	**9**	**30**
2004	Oct.	BOP	25	9	36
	Oct.	AOP	5	0	0
2004 Subtotals			**30**	**9**	**30**
2005	Oct.	BOP	25	11	44
	Oct.	AOP	5	1	20
2005 Subtotals			**30**	**12**	**40**
Averages			**30**	**12**	**41**

AMP = Any Moose Permit
BOP = Bull Only Permit – The holder may kill one male moose of any age.
AOP = Antlerless Only Permit – The holder may kill a cow, a calf, or a bull with antlers shorter than its ears.
*2001 was the first year that moose hunting was open in WMD 29.

Appendix 2

Figures

Figure 1: Baring Division Map

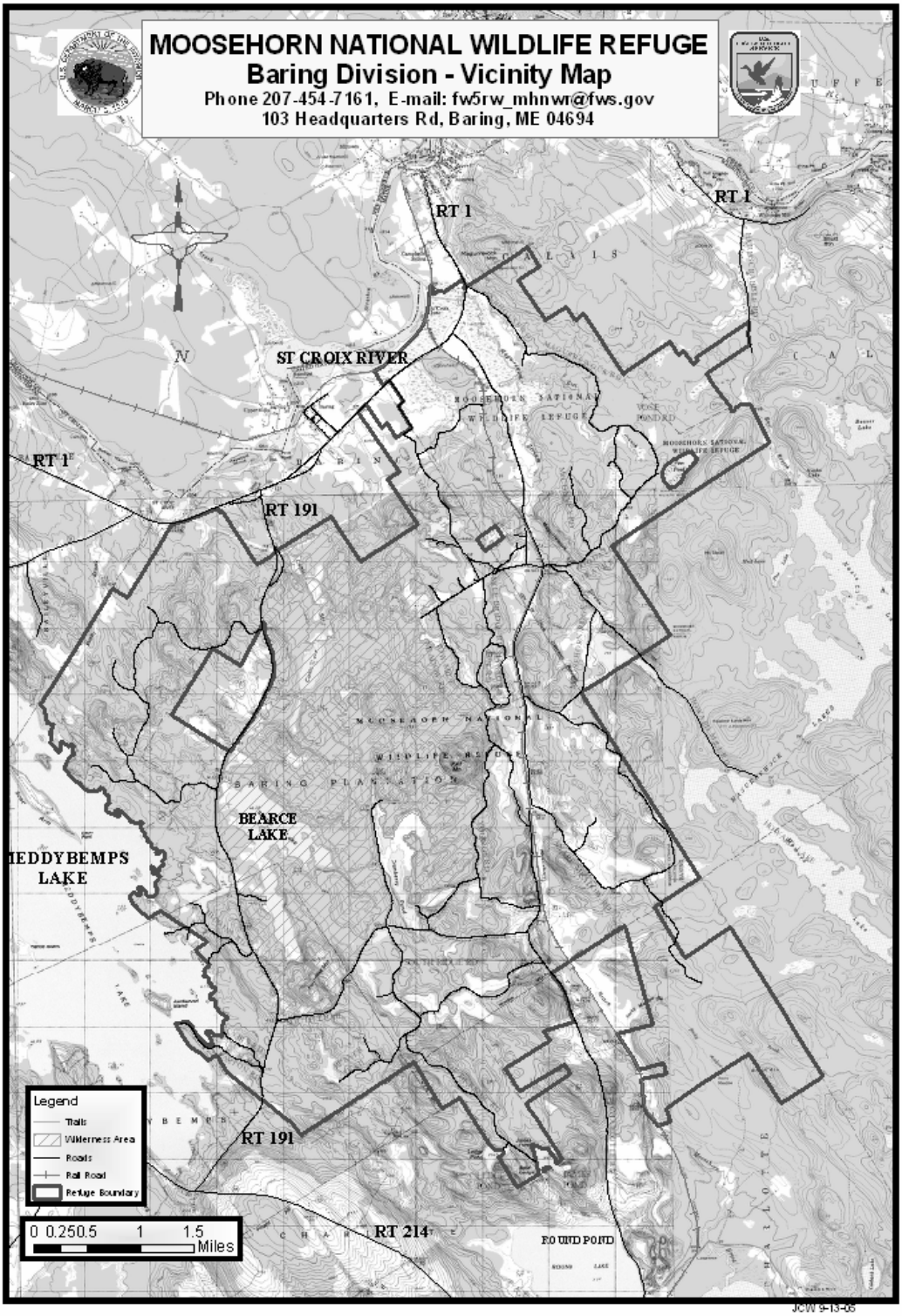

Figure 2: Edmunds Division Map

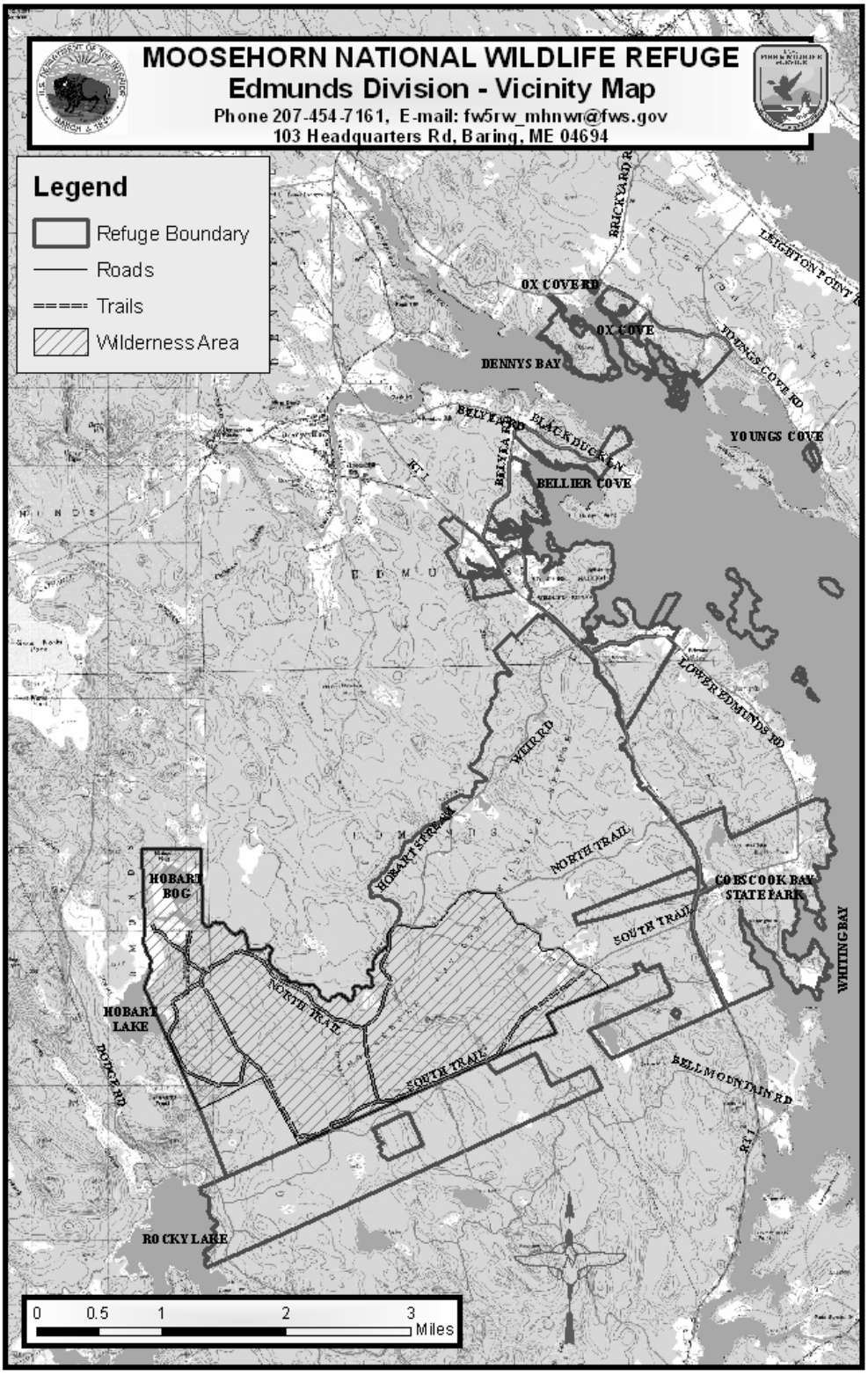

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Figure 3: Baring Division Hunt Map

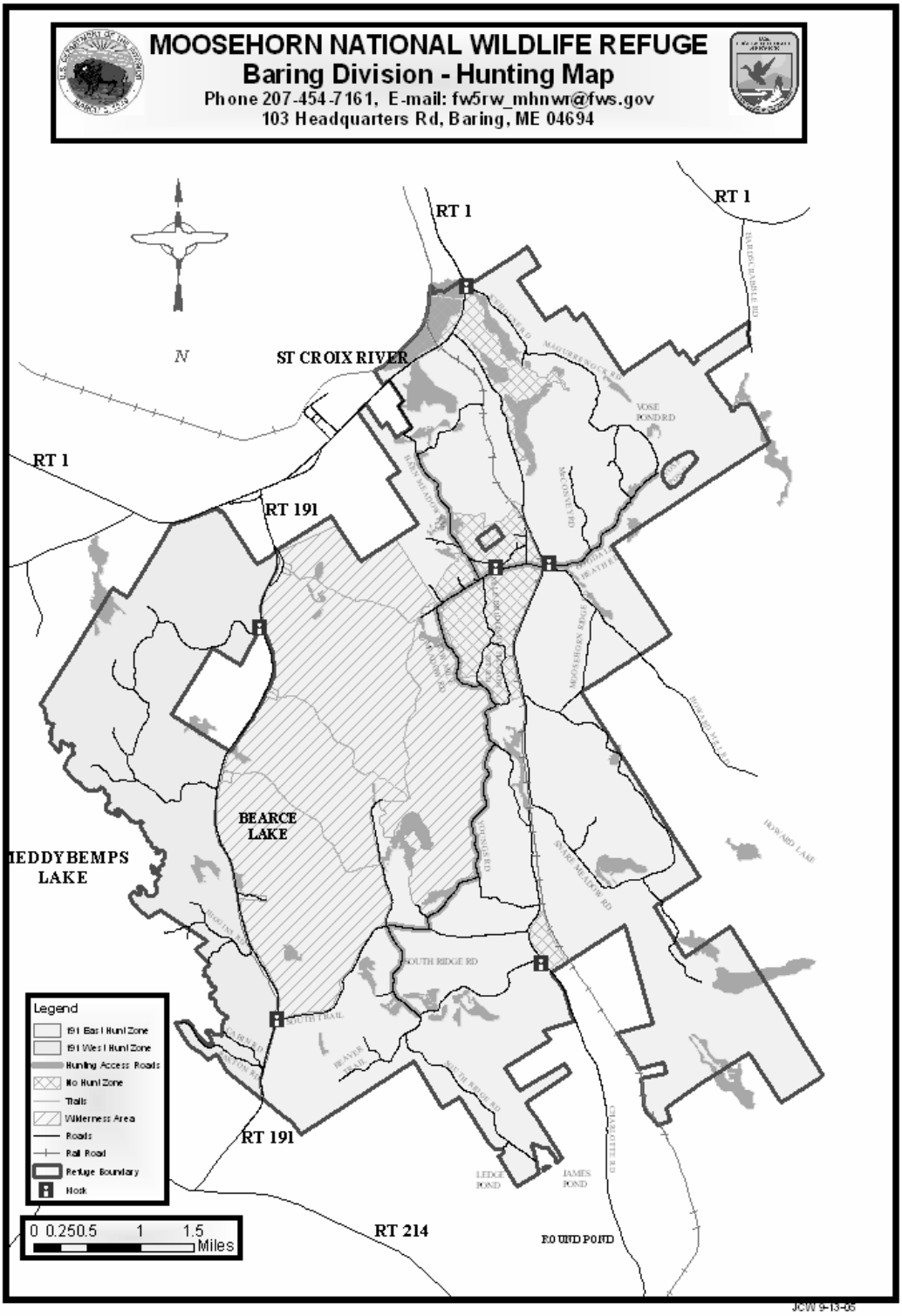


Figure 4: Edmunds Division Hunt Map

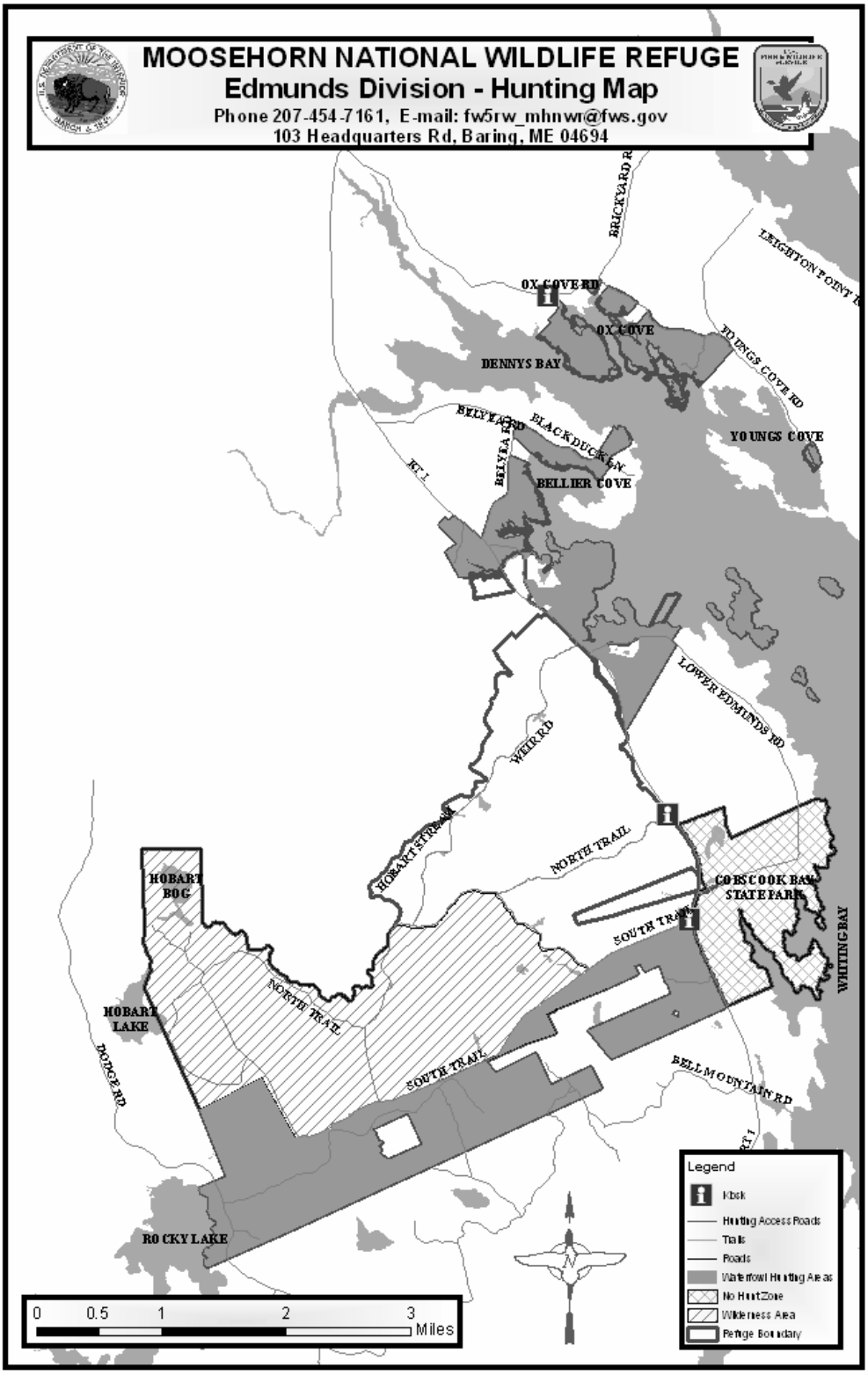
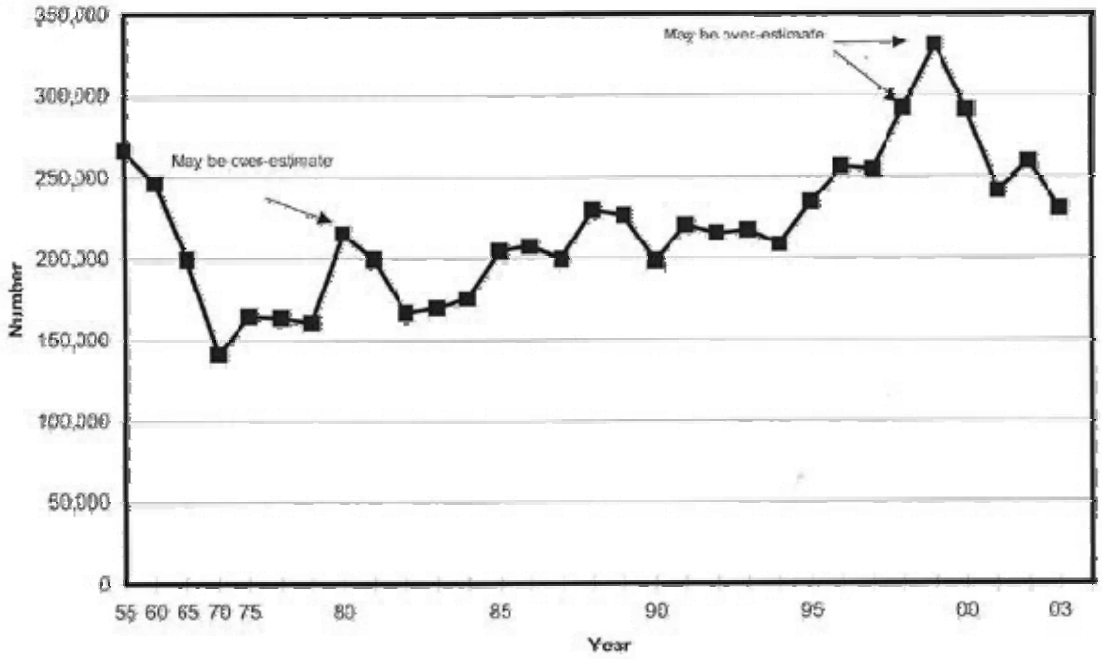


Figure 5.Maine's Statewide Wintering Deer Herd 1955-2003 (MDIFW 2005).



Appendix 3

Response to Public Comments

The Draft Hunt Plan and Environmental Assessment for Moosehorn National Wildlife Refuge (MHNWR) were available for public review and comment during December 2004. The draft EA included three alternatives for hunting. The proposed alternative in the draft EA for hunting was to expand hunting from the original deer only hunting. The availability of the draft EA was announced in the Federal Register, numerous local newspapers, and on the refuge's website. The document was available in the Calais Public Library, at the Moosehorn NWR Office/Visitor Center and 18 other locations. The Service received comments from the public and the responses to substantive comments were included in the EA.

Moosehorn NWR then completed a Revised Draft Hunt Plan and EA in January 2007. The availability of the Hunt Plan and EA was again announced in numerous local newspapers and on the refuge's website. The 30-day review period began on March 15, 2007 and ended on April 15, 2007. Copies of the documents were placed in the Calais Public Library, at the Moosehorn NWR Office/Visitor Center and seven other locations.

Three comments were received, two of which were in favor of the Proposed Action to implement the 2007 Hunt Plan which would allow portions of the Moosehorn NWR to be open to public hunting. One positive comment was from the Friends of Moosehorn NWR. The other favorable comment was received from the Safari Club International and Safari Club International Foundation (SCI and SCIF). However, they did have one concern which is presented and responded to below:

> SCI and SCIF are pleased that the authors of the planning documents make detailed reference to the extensive cumulative research and analysis that the FWS conducts on migratory bird hunting and its flyway-wide and national environmental effects both on species and habitat. We also compliment the authors for their consultation with other refuges from the region regarding the cumulative effects from hunting throughout the region. We suggest that the draft EA feature more prominently the refuge's consultation with Maine's state fish and game agency and we recommend that, in addition to noting the state's concurrences with the Hunt Plan, that the EA add more of the state agency's input about how hunting on the refuge assists with and/or is an element of the state's efforts to manage state wildlife populations. The fact that the refuge coordinates with and is a component of the state's wildlife management is an essential part of the cumulative impact of the refuge hunting program. **The Refuge has consulted with the State of Maine on many occasions. During the revision of the Hunt EA the State was extremely helpful in completion of the cumulative impact analysis. They provided the species specific harvest information used in the analysis.**

The third comment, by the Humane Society of the United States (HSUS), contained comments related to hunting on the National Wildlife Refuge System as a whole and containing elements

related to litigation filed in 2003 by the Fund for Animals against the U.S. Fish and Wildlife Service (Service). These comments were not specific to this revised draft EA and are noted but not responded to here. Comments by the HSUS directly related to the draft EA are summarized and responded to below.

The HSUS states that the "FWS is failing to provide adequate notice and the opportunity to comment" on the document. **The original EA was written in 2004 and a 30 day review and comment period was provided. Comments were received in favor and against opening the refuge to public hunting. The EA was revised in 2007 to address cumulative impacts in response to a 2003 lawsuit filed by the Fund for Animals. The revised hunt EA was available for a 30-day review and comment period from March 15, 2007 to April 15, 2007.**

The HSUS states that the Service has not provided adequate time to sufficiently analyze the ramifications of allowing hunting. **The Service notes the comment.**

The HSUS states the Service is not fulfilling the objective of managing federal lands primarily for the benefit of wildlife "in part because of the recreational hunting that the agency is allowing on Refuges." **The Service notes the comment.**

The HSUS states that the Refuge Improvement Act does not allow for sport hunting on Refuges unless it is "compatible with the purposes for which the Refuge and Refuge System were established." **The Service has followed its regulations for determining that hunting is compatible on Moosehorn NWR and a compatibility determination for hunting was signed by the U.S. Fish and Wildlife Service Region 5 Regional Chief of the National Wildlife Refuge System on January 20, 2005.**

The HSUS states that the Service must ensure the availability of sufficient funds before approving hunting on the refuge under the statutes of the Refuge Recreation Act. **Sufficient funds are available to implement the 2007 Hunt Plan for Moosehorn NWR as stated within the hunt plan on page 7.**

The HSUS states that the Service's objective of preparing refuge hunting packages by May 1, 2007 is "undertaking a haphazard, single-minded exercise so it can allow hunting on these Refuges." **The Service notes the comment.**

The HSUS states that the environmental assessment fails to take into account the "cumulative impacts on the Refuge System from the FWS's decision to expand hunting throughout the System." **The Service notes the comment.**

The HSUS states that the Service has not completed the Refuges 2003 Plan and Environmental Impact Statement (EIS). **The Service notes the comment.**

The HSUS feels that an EIS should be prepared. **The Service notes the comment.**

The HSUS states that the Service did not identify all relevant environmental concerns or take a "hard look" at the impacts on the Refuge System as a whole of expanding hunting on Refuges. **The Service notes the comment.**
The HSUS states that the Service must provide "some analysis of the cumulative impacts on the Refuge System from expanding or allowing hunting at all these Refuges." **The Service has provided such a cumulative impact analysis in this Revised EA.**

The HSUS states that the Service relies on the Migratory Bird Hunting Framework for the analysis of cumulative impacts to migratory birds and that the framework process "ignores the adverse and cumulative impacts to migratory birds from non-migratory bird hunting and ignores the impacts migratory bird habitat from hunters." **The Service notes the comment.**

The HSUS states that the Service does not adequately analyze the impacts of hunting to imperiled Refuge wildlife. **The Service notes the comment.**

The HSUS states that the Service may "not unduly narrow the purpose and need for hunting in the Refuge." **The Service notes the comment.**

The HSUS states that the Service has not adequately studied, developed and described alternative uses to the available Refuge resources. Moreover, the HSUS asks the Service to "consider and provide analysis of a 'Non-Consumptive Use' Alternative. **Alternative 1 in the MHNWR EA is a "no-action" alternative in which the Refuge is closed to all hunting. The MHNWR EA analyzes this alternative.**

The HSUS states that the Service fails to examine non-lethal management of wildlife and explain why non-lethal management practices are not included in the alternative being analyzed. **The Service notes the comment.**

The HSUS states that the Service has "failed to meaningfully involve the public in its NEPA review process for allowing hunting at the Refuges." **Both the original draft and revised EA and Hunt Plan were made available for public review for two 30 day periods. Extensive media coverage in local newspapers informed the public about the availability of these documents. There has been considerable media attention since the publication of the draft plan and many people have called or written to learn more about the hunting program.**

The HSUS states that the Service must complete a Section 7 evaluation. **Moosehorn NWR completed an Intra-Service Section 7 Biological Evaluation as part of the hunt plan and assessment.**

The HSUS states that the Service has compromised the biological integrity of refuges by allowing hunting and that the Service does not consider impacts of hunters on non-

consumptive users. The HSUS also claims that hunting and the number of hunters is decreasing and the Service has not capitalized on potential economic gain that would come from non-consumptive users. **The Service notes these comments.**

The HSUS states that the EA does not "elaborate as to the species of duck that may be harvested." **The MHNWR EA does state that hunters must comply with state regulations which dictate the number and species of ducks that may be harvested.**

The HSUS states that woodcock, American black ducks, pintail, greater and lesser scaup, and king rails should not be hunted because their populations are declining. **The Service relies on the Migratory Bird Sport Hunting Frameworks to set hunting regulations of migratory birds annually. The Frameworks are based on the best biological information available.**

The HSUS states that the ability of hunters to correctly identify most waterfowl species is "deplorable." **The Service notes the comment.**

The HSUS states that hunting has a "major, detrimental effect on wildlife viewing opportunities." **The Service notes the comment.**

The HSUS states that the environmental assessment does not consider temporal or monetary investments necessary to isolate consumptive and non-consumptive users on the Refuge. **The Service notes the comment.**

The HSUS states that in the cumulative impacts analysis, the environmental assessment states in the beginning that cumulative effects "may result from individually minor action, they may, viewed as a whole, become substantial over time," and then later, states "…the cumulative effects of these actions are not expected to be substantial." The HSUS feels these two statements are contradictory. **The Service disagrees. The first statement is the context for why a cumulative impact analysis is conducted and the second statement is the Service's conclusion after the analysis is completed.**

The HSUS states that the environmental assessment does not justify the cumulative impacts of hunting on targeted wildlife species. **The Service notes the comment.**